Applied Foundation Testing

Alabama Certificate of Authorization CA3058-E

April 3, 2018

Report of High-Strain Dynamic Pile Testing and Axial Static Compressive Load Testing
TP-10B-1 & TP-10B-2
I-10 over Mobile River and Bayway
Load Test Program
Mobile Country, Alabama
AFT Project No.: 118008

Authored By:

Michael P. Worsham, P.E.
Senior Geotechnical Engineer

For: **Mr. Davis Daniel**
Jordan Pile Driving, Inc.
301 N. Water Street
Mobile, Alabama 36652

Joseph D. Bailey, P.E.
Senior Geotechnical Engineer
Alabama Registration No.: 33695-E

ALABAMA LICENSED No. 33695-E PROFESSIONAL ENGINEER JOSEPH D BAILEY

Digitally signed by Joseph D. Bailey
DN: cn=Joseph D. Bailey, o=Applied FOundation Testing, Inc., ou, email=jbailey@testpile.com, c=US
Date: 2018.04.03 15:23:23 -05'00'

INTRODUCTION

The proposed I-10 Mobile River Bridge and Bayway project includes the construction of a new six-lane bridge across the Mobile River and a new eight-lane Bayway. A load test program has been conducted in advance of the construction contract to optimize the foundation design. Foundation types included in the load test program include two HP14x89 steel H-piles, two 18-inch square prestressed concrete piles, one 30-inch square prestressed concrete pile, five 54-inch diameter spun-cast concrete cylinder piles, one 60-inch diameter steel pipe pile, and one 72-inch diameter drilled shaft.

This report summarizes the installation and testing of the 18-inch square prestressed concrete piles at locations TP-10B-1 and TP-10B-2. High-strain dynamic pile testing, also known as PDA, was performed during initial drives of the two piles, 1 day restrikes on both test piles, and a 7 day restrike on TP-10B-1. Axial compressive static load testing was performed approximately 10 days after the initial drive of TP-10B-2. A 13 day restrike was subsequently performed on TP-10B-2 three days after static load testing. A summary of the test dates is included in Table 1 below.

Table 1: Summary of Test Dates

Test Pile	Test Description	Test Date
TP-10B-1	Initial Drive	3/12/2018
	1 Day Restrike	3/13/2018
	7 Day Restrike	3/19/2018
TP-10B-2	Initial Drive	3/13/2018
	1 Day Restrike	3/14/2018
	Static Load Testing	3/23/2018
	13 Day Restrike	3/26/2018

The project plans indicate test piles TP-10B-1 and TP-10B-2 were located at station 469+60.00 near the Texas Street at I-10 intersection. Please refer to the project source documents for a site plan of the actual location of the test piles. The 18-inch square prestressed concrete piles were 77 feet in length.

Installation of the test piles was performed by Jordan Pile Driving, Inc. In addition, Jordan Pile Driving, Inc. provided the reaction system and necessary office and field support to carry out the load testing. Applied Foundation Testing (AFT) was the specialty engineering firm performing the dynamic pile testing and monitoring the axial compressive static load test. Dynamic pile testing was performed by Mr. Michael Worsham, P.E. Mr. Andrew Best and Mr. Michael Worsham, P.E. performed the axial compressive static load testing. Data analysis and reporting was performed by Mr. Michael Worsham, P.E. and Mr. Joe Bailey, P.E. Mr. Donald Robertson, P.E. provided quality assurance oversight for the data analysis and reporting.

This report contains a compilation of the results for the dynamic pile testing and axial compressive static load testing for TP-10B-1 and TP-10B-2. This report includes an overview of the testing program, graphical representations of the data, discussion of the results, and instrumentation calibrations.

GENERALIZED SOIL CONDITIONS

Thompson Engineering performed the subsurface exploration as part of this project. The subsurface exploration consisted of drilling a single Standard Penetration Test (SPT) boring near each of the proposed foundation load test locations identified for the project. The nearest soil boring to TP-10B-1 and TP-10B-2 is boring TH-10 located at station 470+55.32 offset right 106.31 feet.

A copy of soil boring TH-10 is included in Appendix E. Detailed descriptions of the subsurface conditions encountered are presented in this attached soil boring. A summary of the soil conditions given below represents a summary of conditions as indicated in the provided materials and is included only to assist in evaluation of the load test data. For further details regarding the soil conditions at the test site and elsewhere, the reader should reference the project source documents.

The water surface elevation measurements noted in boring log TH-10 at the time of drilling (ATD) was +11.1 feet, and the 24-hour delayed water surface was -7.1 feet with respect to NAVD (North American Vertical Datum of 1988). Table 2 below provides a summary of the subsurface conditions.

Table 2: Description of Subsurface Soil Conditions(1)

Average Elevation From- To(2)	Material Description	Typical N-Value Range
+12.9 to +1.2	Silty Sand; Sand with Silt (SM, SP-SM)	3 to 15
+1.2 to -8.8	Sandy Fat Clay; Lean Clay with Sand (CH, CL)	1
-8.8 to -88.8	Sand with Silt; Silt with Sand; Sand (SP-SM, SP)	11 to 46
-88.8 to -108.8	Fat Clay; Lean Clay with Sand (CH, CL)	7 to 13
-108.8 to -133.8	Sand; Silty Sand (SP, SM)	31 to 76
-133.8 to -153.8	Sandy Lean Clay; Fat Clay (CL, CH)	23 to 39
-153.8 to -167.1	Silty Sand; Sand with Silt (SM, SP-SM)	45 to 50/6”

Note 1: Table created from Thompson Engineering Test Boring Record TH-10 contained in the project plans.
Note 2: Elevations are referenced to North American Vertical Datum of 1988 (NAVD)

HIGH-STRAIN DYNAMIC PILE TESTING (PDA)

The test piles were installed by Jordan Pile Driving, Inc. Each test pile was prepared for high-strain dynamic testing by drilling holes and setting drop-in anchors for gage attachment approximately two pile diameters, or 36 inches, below the pile top.

The test piles were impact driven using an APE D30-32 open-ended diesel pile driving hammer. The APE D30-32 diesel hammer has a maximum rated energy of 74,419 foot-pounds (ram weight of 6,615 pounds at a stroke height of 11.25 feet). We understand the APE D30-32 hammer utilized a hammer cushion consisting of 6 inches of micarta and aluminum.

Applied Foundation Testing performed dynamic pile testing using a Pile Driving Analyzer Model PAX manufactured by Pile Dynamics, Inc. Dynamic testing was accomplished by externally attaching two piezo-resistive accelerometers and two strain transducers and taking measurements during the initial drive and subsequent restrikes. Calibration information for the sensors utilized is included in Appendix F. The dynamic pile testing was performed in general accordance with the project plans and special provisions and ASTM D4945 *"Standard Test Method for High-Strain Dynamic Testing of Deep Foundations"*. During the initial drive, TP-10B-1 and TP-10B-2 were driven approximately to the estimated tip elevation of -60 feet as shown in the project plans.

Plots and tabular summaries of the dynamic testing results are included in Appendix B. In general, these summaries include blows per foot (BLC), penetration depth below reference, maximum Case method resistance, auto capacity method resistance for friction piles (RA2), maximum compressive stress (CSX), compressive stress at the bottom of pile (CSB), maximum tensile stress (TSX), stroke (STK), maximum transfer energy (EMX), and beta pile integrity factor (BTA). A string line was used as a reference for measuring penetration depth during the initial drive and restrikes. A summary of the test pile installation is provided in Tables 3 and 4 below.

Table 3: Summary of Pile Driving Information

Test Pile	Hammer Model	Approximate Reference Elevation (feet)	Approximate Ground Elevation (feet)	Approximate Final Pile Top Elevation (feet)	Approximate Final Tip Elevation[(1)] (feet)
TP-10B-1	APE D30-32	+15.8	+13.1	+17.2	-59.8
TP-10B-2	APE D30-32	+15.3	+13.1	+16.1	-60.9

Note 1: Approximate reference elevation based on inspector's reported pile top survey measurement after initial drive. Approximate final pile tip elevation based inspector's reported pile top survey measurement after initial drive and pile movements during restrikes.

Table 4: Summary of Dynamic Pile Testing Results

Test Pile	EOD or BOR[1]	Blows per Foot at EOD or Blows per Inch for Restrike	Max. CSX Stress (ksi)	Avg. CSX Stress (ksi)	Max. TSX Stress (ksi)	Avg. TSX Stress (ksi)	Max. CSB Stress (ksi)	Avg. CSB Stress (ksi)	Avg. Transfer Energy (k-ft) / Approx. Stroke (ft.)
TP-10B-1	EOD	58BL/1’	3.59	2.64	1.50	0.65	1.98	1.61	19.8/7.74
	1 Day RS	6BL/1”, 5BL/1”, 4BL/1”, 2BL/0.33”	3.76	3.55	0.86	0.56	2.41	2.31	26.3/8.91
	7 Day RS	6BL/1”, 5BL/1”, 5BL/1”, 2BL/0.25”	4.32	3.92	0.99	0.64	2.69	2.40	26.6/8.33
TP-10B-2	EOD	25BL/0.5’	3.50	2.51	1.24	0.72	1.98	1.44	17.5/7.32
	1 Day RS	5BL/1”, 3BL/1”, 4BL/1”, 1BL/0.33”	4.84	4.23	1.75	1.18	2.72	2.46	28.7/8.58
	13 Day RS	4BL/1”, 3BL/1”, 3BL/1”, 4BL/1”, 4BL/1”, 1BL/0.25”[2]	4.01	3.74	1.29	1.07	2.34	2.17	24.9/8.23

Note 1: EOD – End of Initial Drive; RS – Restrike
Note 2: Due to spalling of concrete at pile top during first 3 inches of restrike, the pile was driven an additional 2 inches to ensure good quality data was captured.

Allowable maximum driving stresses for the square prestressed concrete piles are defined by the formulas located in the project special provisions. The maximum allowable compressive stress limit is defined as 4.1ksi – effective prestress. The maximum allowable tensile stress limit is defined as $3\sqrt{(f'_c)}$ + effective prestress.

In the above formula f’c is defined as the minimum concrete compressive strength for the piles, which is 5,000 psi per Plan Sheet 15. Per Plan Sheet 15, the initial prestress depending on the strand type ranges from 1,071 psi to 1,147 psi. The prestress strand type used for the test piles is not known by AFT. Assuming a loss of 20 percent from initial prestress provides effective prestress values of 857 psi (0.86 ksi) or 918 psi (0.92 ksi) depending on strand type used. Utilizing the worst case of these values, the maximum allowable compressive stress is calculated as 3.18 ksi, and the maximum allowable tensile stress is calculated as 1.07 ksi.

The dynamic pile testing measurements indicate the maximum compressive stress (CSX) and maximum tensile stress (TSX) exceeded allowable stress limits for portions of the initial drives and restrikes. During initial drives of the piles when measurements indicated driving stresses exceeding allowable stress limits, adjustments to the hammer fuel setting were immediately made until the driving stresses were lowered to acceptable values. During restrikes, maximum compressive stress (CSX) and maximum tensile stress (TSX) values exceeding the allowable stress limits were measured. These high stresses were due to the use of a previously used conditioned pile cushion and the hammer at the highest fuel setting of 4 in order to transfer maximum energies to the pile to attempt to fully mobilize resistance. Given the purposes of the load test program, it is important to attempt to fully mobilize resistance during testing. It is not recommend letting driving stresses to reach levels exceeding allowable stress limits during production pile driving and restrikes.

During the 13-day restrike of TP-10B-2, spalling of concrete near the pile top took place. For the first 3 inches of the restrike, one blow with lower quality data was recorded, which has been excluded from these results. After the first 3 inches of the restrike, the pile was driven an additional 2 inches to ensure good quality data was captured.

Other than the concrete spalling near the pile top during the 13-day restrike of TP-10B-2, neither pile tested showed signs of integrity problems.

SIGNAL MATCHING ANALYSIS

Signal matching analyses were performed using the computer program CAPWAP (version 2014) to further evaluate the field measurements. Summaries of these analyses are presented in Table 5 below. The complete analyses are included in Appendix C. Signal matching analysis is considered a standard procedure to estimate the total ultimate resistance as well as estimate the resistance distribution (shaft and toe) from the dynamic pile testing data. The signal matching approach is used to back calculate various soil parameters. The program uses the data measured during a single blow as a boundary condition and the user performs many iterations on soil parameters to make a calculated wave-up match the measured one.

Table 5: Signal Matching Results Summary

Test Pile	EOD or Restrike	Blow No.	R_{ult} (kips)	R_{shaft} (kips)	R_{end} (kips)	Max. Case Method JC Damping Factor	EMX (k-ft)/ Stroke (feet)	Qs (in)	Qt (in)	Ss (s/ft)	St (s/ft)	Match Quality
TP-10A-1	EOD	2594	355	150	205	0.57	23.4/8.75	0.07	0.34	0.20	0.25	2.34
	1 Day Restrike	2	500	283	217	0.52	29.0/9.62	0.04	0.26	0.22	0.27	1.73
	7 Day Restrike	3	510	288	222	0.53	29.3/8.66	0.04	0.29	0.22	0.18	1.58
TP-10A-2	EOD	2331	375	150	225	0.50	24.7/8.75	0.04	0.36	0.20	0.22	2.01
	1 Day Restrike	2	440	176	264	0.40	37.4/10.63	0.04	0.44	0.21	0.15	1.67
	13 Day Restrike	11	483	219	264	0.40	27.0/8.79	0.04	0.37	0.20	0.05	3.02

The results of the CAPWAP signal matching analyses generally have the most confidence in the total resistance value, and to a lesser extent the resistance distribution in side resistance along the length of the pile and end bearing resistance at the pile bottom. This is generally attributed to intricacies in separating side resistance and end bearing resistance from the total resistance using signal matching techniques.

The signal matching analysis for TP-10B-1 indicated a total ultimate resistance of 355 kips at EOD, 500 kips during the 1 day restrike; and 510 kips during the 7-day restrike. The signal matching analysis for TP-10B-2 indicated a total ultimate resistance of 375 kips at EOD, 440 kips during the 1 day restrike; and 483 kips during the 13-day restrike (1 day after static load testing). Based on the set measurements during EOD and restrikes for TP-10B-1 and TP-10B-2, the resistance values presented in this report are considered fully mobilized.

AXIAL COMPRESSIVE STATIC LOAD TESTING

The axial static compression load testing was performed on TP-10B-2 in general accordance with the project plans and special provisions and ASTM D1143, *"Standard Test Methods for Deep Foundations Under Static Axial Compressive Load"*. Loading was applied using a hydraulic jacking system acting against a weighted platform. Weather conditions were approximately 60° to 70° F and sunny with slight breezes. These weather conditions did not affect the testing.

The "Quick Test" loading sequence was followed as detailed in the project special provisions. The test pile was loaded in 10 increments with increases in load of approximately 65 kips per increment or 10% of the target nominal resistance load of 650 kips as shown in the plans. The maximum test load achieved was 674 kips. At the maximum test load, the continuous jacking was required to maintain load. During each load increment/decrement the load was maintained for approximately four minutes. After reaching and maintaining the maximum load for four minutes, the applied load was removed in four, approximately equal, decrements.

The load curve shown in Figure 1 of Appendix D is based on the continuous readings from the load cell and the average pile top displacement based on the electronic LVDT's. The Davisson Failure Criterion is also plotted in this figure. Parameters used in computing the theoretical elastic compression line included pile length, pile diameter/width, pile area, and pile material elastic modulus. The pile length, pile diameter/width, and pile area utilized were 77 feet (73.5 feet below grade and ~ 3.5 feet above grade), 18 inches, and 324 square inches, respectively. The pile material elastic modulus utilized was 6,437 kips per square inch based on the elastic modulus taken from the dynamic testing measurements. The Davisson Failure Criteria offset was calculated to be 0.30 inches.

A summary of the load versus displacement information for the test pile is presented in Table 6 below. The maximum applied load was 674 kips and the maximum displacement was 1.290 inches. The final permanent displacement (after unloading) was 0.836 inches.

As shown in Figure 1 of Appendix D, the pile top displaced below the Davisson Failure Criterion. The failure load based on the Davisson Failure Criterion was approximately 572 kips. The pile top displacement at the failure load was approximately 0.554 inches.

Table 6. Summary of Load Versus Displacement

Test Pile	Maximum Load (kips)	Maximum Pile Top Displacement (inches)	Permanent Pile Top Displacement (inches)
TP-10B-2	674	1.290	0.836

Additional comments on the test set up and measurements are discussed as follows:

The load based on the continuous readings from the load cell was used in the field and this report as the governing load measurement. Only minor variations between the loads provided by the calibrated load cell and the calibrated hydraulic jacking system existed. The two independent devices had excellent agreement throughout the load test. A variation between the load cell and calculated load from hydraulic jack pressure is not unusual during pile load testing and typically expected. This is due to some load eccentricity and/or friction between the bearing

plates and load cell. This variation between the loads provided by the load cell and the calibrated hydraulic jacking system is well within acceptable industry standard.

The top of pile movement was measured using two LVDT's at axisymmetric points (180-degree separation) placed approximately 1 foot below the top of the pile. LVDT 108207 was mounted on the north side of the pile and LVDT 108208 was mounted on the south side of the pile. A piece of smooth lubricated glass was placed beneath the LVDT's and affixed to the independent reference beam.

In addition to the two LVDT's, a digital survey with an invar rod affixed to the hydraulic jack was utilized as a back-up to continuously record pile top movement. The invar rod was placed on the east side of the pile mounted to the hydraulic jack. Back-up manual survey readings of the pile top movement were also taken by the inspector during the load test using an auto level and ruler affixed to the hydraulic jack. The three independent devices (LVDT's, manual survey, and digital survey) had excellent agreement throughout the load test. The digital survey measurement data was not included in average pile top displacement on the Figure 1 load curve, but is provided in Figure 3.

SUMMARY AND CONCLUSIONS

The load test program included the installation of two 18-inch square prestressed concrete piles at locations TP-10B-1 and TP-10B-2. These two test piles were subjected to dynamic pile testing during initial drive and restrikes. TP-10B-2 was also subjected to axial compressive static load testing. A summary of the load test results is provided below:

TP-10B-1 Load Testing Summary:

- The signal matching analysis of the dynamic testing data for TP-10B-1 indicated a total ultimate resistance of 355 kips at EOD, 500 kips for the 1 day restrike, and 510 kips for the 7 day restrike.
- This pile was not subjected to axial compressive static load testing.

TP-10B-2 Load Testing Summary:

- The signal matching analysis of the dynamic testing data for TP-10B-2 indicated a total ultimate resistance of 375 kips at EOD, 440 kips for the 1 day restrike, and 483 kips for the 13 day restrike (1 day after static load testing).
- TP-10B-1 was subjected to axial compressive static load testing with a maximum load of 674 kips with a maximum displacement of 1.290 inches and a permanent displacement of 0.836 inches.
- The failure load based on the Davisson Failure Criterion was approximately 572 kips. The pile top displacement at the failure load was approximately 0.554 inches.

The purpose of this test pile program is to determine the pile bearing resistances (ultimate, side resistance, and end bearing) achievable for the pile type, size, and lengths installed. In addition, the designers may choose to use the results to optimize their foundation design and/or to minimize the risk of constructability issues. However, the design team would also need to consider the scope of the test pile program, the methods used for pile installation, and potential variability of soils along the bridge length when using the information gathered.

Some points to consider from the test pile program for the 18-inch square prestressed concrete piles at locations TP-10B-1 and TP-10B-2 are as follows:

- The dynamic pile testing results indicated lower ultimate total resistances than measured during the axial compressive static load test at TP-10B-2. Additionally, attempting to utilize higher resistances similar to those measured during static load testing in the dynamic test data signal matching analysis yielded poor match qualities so this approach was not utilized. The dynamic testing analyses included in this report are based on typical methods which produce good match qualities, and do not represent an attempt to match the static load test results. During production phase dynamic pile testing it may not be possible to verify the higher resistances achieved in this static load test. Additionally, during production phase testing when keeping driving stress values below allowable limits during initial drives and restrikes is of the upmost importance, due to possibly lower transfer energies, less resistance may be mobilized than shown in this report.
- Dynamic pile testing on production piles is recommended to determine bearing resistances, measure pile driving stresses, and determine hammer driving system suitability. Driving criteria may be developed based on this testing with recommendations provided to control tensile and compressive stresses at or below allowable levels.
- Signal matching analyses of the production pile dynamic test data is recommended to confirm and/or to provide a better estimate of the ultimate pile bearing resistance.

Below is a summary of the Appendix contents:

- Appendix A – Inspector's Pile Driving Records
- Appendix B – Dynamic Pile Testing Data Summaries
- Appendix C – CAPWAP Signal Matching Analysis Output
- Appendix D – Axial Compressive Static Load Testing Graphical Results
    - Figure 1 – Average Pile Top Displacement versus Applied Load with Davisson Failure Criterion
    - Figure 2 – Comparison Plot of Applied Load (from load cell and load based on relating the hydraulic pressure to the jack calibration) versus Elapsed Time
    - Figure 3 – Comparison Plot of Pile Top Displacement (LVDT's and digital survey) versus Elapsed Time
- Appendix E – Relevant Project Documents
- Appendix F – Instrument Calibrations

CLOSURE

We want to thank you for the opportunity to be involved in this project. We also want to thank you for all your support in setting up the test. Please do not hesitate to call us if you have any questions regarding the information in this report.

LIMITATIONS

This report presents test measurements made by Applied Foundation Testing, Inc. Interpretations were made based upon the measurements made by AFT with the latest techniques available and currently accepted standards of care recognized by Geotechnical Engineering professionals. Applied Foundation Testing is an independent agency and is not the Geotechnical Engineer of Record. The Geotechnical Engineer of Record should ultimately make final recommendations for foundation design and construction.

Appendix A

Inspector's Pile Driving Records
TP-10B-1 and TP-10B-2

I-10 over Mobile River Bridge Load Test Program

ALDOT Project No.: IM-I010(341)
Mobile County, Alabama
AFT Project No.: 118008

FORM C-15A
REVISED 08-07-95

ALABAMA DEPARTMENT OF TRANSPORTATION
TEST PILE RECORD

Project Number	County	Division
IM-I010(341)	Mobile	Southwest Region

Bridge: Station	to Station	Bridge Identification Number
469+20	469+20	

Road Between	and	Lane (if applicable)
Texas St	I-10	EB

Contractor	Inspector
Jordan Pile Driving	Donald Hector

Date	Bent No.& Lane	Pile No.	Kind of Soil
3/12/2018	TEST PILE	TP-10B-1	Silty Sand

Kind of Pile	Size of Pile	Total Length (ft)
PPC	18" Square	77

Elev. Ground Line at Pile	Final Elev. At Top of Pile	Tip Elevation
13.1	17.8	-59.9

Hammer Make	Hammer Model	Hammer Kind
APE	D-30-32	Diesel

Hammer Type	Hammer Action	Rated Energy (ft.-lbs.)
Open	Single	74,419 @ 11.25 Stroke

Weight of Hammer (lbs.)	Design Load (from plans) (tons)
4,190	

Hammer Cushion: Material	Thickness (in.)	Area (sq. in.)
Foster Lon	3	272.25

Pile Cushion (Before Driving): Material	Thickness (in.)	Area (sq. in.)
Plywood	10.25	324

Pile Cushion (After Driving): Material	Thickness (in.)	Area (sq. in.)
Plywood	5	324

Pile Cap Weight (lbs.): 2,260

Height Of Fall (feet)	Energy Delivered To Pile (E) (ft.-lbs.)	Blows Per Foot Of Penetration (N)	Total Penetration (feet)	Bearing (Ru) (tons)
4.3	18,017	4	24	
4.31	18,059	8	25	
5.04	21,118	14	26	
5.39	22,584	30	27	

REMARKS

1. When using open type and gravity hammers, record weight of hammer and height of fall of hammer. Show rated energy when using closed type hammers.
2. Energy delivered to pile should be maintained practically constant once record keeping has begun unless specified otherwise by the Engineer.
3. Pile cushion is only required with concrete piling.
4. Pile cushion thickness after driving must be at least one-half the original thickness.
5. The bearing should be determined from the graph of Blows/Foot versus Bearing which is provided from the Wave Equation Analysis or Dynamic Formula of the driving system. If a graph is not provided, refer to Item 505.03(b)2 of the specifications to estimate the bearing capacity using the Dynamic Formula.
6. Driving should be continuous. Note any interruptions exceeding one hour.
7. Draw a sketch on back of this sheet showing location of test pile.
8. For continuation of test pile record, use Form C-15C-2.
9. Test pile (check one): Static Load Tested _____ Dynamic Load Test __x__ (If static load tested, load test report shall be attached to this report).

Correct _____
Project Manager

Approved _____
Division Construction Engineer

FORM C-15A-2
REVISED 08-07-95

ALABAMA DEPARTMENT OF TRANSPORTATION
CONTINUATION OF TEST PILE RECORD

Project Number	County	Division
IM-I010(341)	Mobile	Southwest Region

Bridge: Station	to Station	Bridge Identification Number
469+20	469+20	

Date	Bent No.& Lane	Pile No.	Kind of Soil
3/12/2018	TEST PILE	TP-10B-1	Silty Sand

Height Of Fall (feet)	Energy Delivered To Pile (E) (ft.-lbs.)	Blows Per Foot Of Penetration (N)	Total Penetration (feet)	Bearing (Ru) (tons)
5.33	22,333	46	28	
6.00	25,140	46	29	
6.00	25,140	54	30	
6.38	26,732	60	31	
6.43	26,942	49	32	
7.18	30,084	61	33	
7.65	32,054	75	34	
7.15	29,959	82	35	
5.55	23,255	82	36	
7.07	29,623	82	37	
6.23	26,104	74	38	
6.26	26,229	66	39	
7.89	33,059	50	40	
7.43	31,132	46	41	
7.51	31,467	47	42	
6.77	28,366	47	43	
6.27	26,271	47	44	
5.84	24,470	51	45	
5.67	23,757	49	46	
5.54	23,213	72	47	
6.01	25,182	69	48	
6.28	26,313	62	49	

FORM C-15A-2
REVISED 08-07-95

ALABAMA DEPARTMENT OF TRANSPORTATION
CONTINUATION OF TEST PILE RECORD

Project Number	County	Division
IM-I010(341)	Mobile	Southwest Region

Bridge: Station	to Station	Bridge Identification Number
469+20	469+20	

Date	Bent No.& Lane	Pile No.	Kind of Soil
3/12/2018	TEST PILE	TP-10B-1	Silty Sand

Height Of Fall (feet)	Energy Delivered To Pile (E) (ft.-lbs.)	Blows Per Foot Of Penetration (N)	Total Penetration (feet)	Bearing (Ru) (tons)
7.13	29,875	52	50	
6.33	26,523	46	51	
6.04	25,308	52	52	
5.62	23,548	48	53	
6.23	26,104	46	54	
5.53	23,171	50	55	
6.95	29,121	42	56	
5.40	22,626	48	57	
4.47	18,729	56	58	
6.51	27,277	48	59	
4.92	20,615	59	60	
6.49	27,193	48	61	
6.55	27,445	71	62	
7.32	30,671	55	63	
7.12	29,833	59	64	
7.42	31,090	57	65	
6.97	29,204	58	66	
7.38	30,922	56	67	
7.90	33,101	52	68	
7.66	32,095	49	69	
8.07	33,813	43	70	

FORM C-15A-2
REVISED 08-07-95

ALABAMA DEPARTMENT OF TRANSPORTATION
CONTINUATION OF TEST PILE RECORD

Project Number	County	Division
IM-I010(341)	Baldwin	Southwest Region

Bridge: Station	to Station	Bridge Identification Number
469+20	469+20	

Date	Bent No.& Lane	Pile No.	Kind of Soil
2/22/2018	TEST PILE	TP-10B-1	Silty Sand

Height Of Fall (feet)	Energy Delivered To Pile (E) (ft.-lbs.)	Blows Per Foot Of Penetration (N)	Total Penetration (feet)	Bearing (Ru) (tons)
7.45	31,216	40	71	
7.78	32,598	48	72	
7.40	31,006	59	73	
8.13	34,065	65	74	
8.33	34,903	54	75	
	0		76	
	0		77	
	0		78	
	0		79	
	0		80	
	0		81	
	0		82	
	0		83	
	0		84	
	0		85	
	0		86	
	0		87	
	0		88	
	0		89	
	0		90	
	0		91	

FORM C-15A
REVISED 08-07-95

ALABAMA DEPARTMENT OF TRANSPORTATION
TEST PILE RECORD

Project Number: IM-I010(341)	County: Mobile	Division: Southwest Region
Bridge: Station 469+20 to Station 469+20		Bridge Identification Number:
Road Between: Texas St and I-10		Lane (if applicable): EB
Contractor: Jordan Pile Driving	Inspector: Donald Hector	
Date: 3/13/2018	Bent No.& Lane: TEST PILE	Pile No.: TP-10B-2 / Kind of Soil: Silty Sand
Kind of Pile: PPC	Size of Pile: 18" Square	Total Length (ft): 77
Elev. Ground Line at Pile: 13.1	Final Elev. At Top of Pile: 16.9	Tip Elevation: -59.9
Hammer Make: APE	Hammer Model: D-30-32	Hammer Kind: Diesel
Hammer Type: Open	Hammer Action: Single	Rated Energy (ft.-lbs.): 74,419 @ 11.25 Stroke
Weight of Hammer (lbs.): 4,190	Design Load (from plans) (tons):	
Hammer Cushion: Material: Foster Lon	Thickness (in.): 3	Area (sq. in.): 272.25
Pile Cushion (Before Driving): Material: Plywood	Thickness (in.): 10.25	Area (sq. in.): 324
Pile Cushion (After Driving): Material: Plywood	Thickness (in.): 5	Area (sq. in.): 324
Pile Cap Weight (lbs.): 2,260		

Height Of Fall (feet)	Energy Delivered To Pile (E) (ft.-lbs.)	Blows Per Foot Of Penetration (N)	Total Penetration (feet)	Bearing (Ru) (tons)
4.53	18,981	5	24	
4.71	19,735	5	25	
5.17	21,662	11	26	
5.43	22,752	20	27	

REMARKS

1. When using open type and gravity hammers, record weight of hammer and height of fall of hammer. Show rated energy when using closed type hammers.
2. Energy delivered to pile should be maintained practically constant once record keeping has begun unless specified otherwise by the Engineer.
3. Pile cushion is only required with concrete piling.
4. Pile cushion thickness after driving must be at least one-half the original thickness.
5. The bearing should be determined from the graph of Blows/Foot versus Bearing which is provided from the Wave Equation Analysis or Dynamic Formula of the driving system. If a graph is not provided, refer to Item 505.03(b)2 of the specifications to estimate the bearing capacity using the Dynamic Formula.
6. Driving should be continuous. Note any interruptions exceeding one hour.
7. Draw a sketch on back of this sheet showing location of test pile.
8. For continuation of test pile record, use Form C-15C-2.
9. Test pile (check one): Static Load Tested ___x___ Dynamic Load Test ___x___ (If static load tested, load test report shall be attached to this report).

Correct _____ Project Manager

Approved _____ Division Construction Engineer

FORM C-15A-2
REVISED 08-07-95

ALABAMA DEPARTMENT OF TRANSPORTATION
CONTINUATION OF TEST PILE RECORD

Project Number	County	Division
IM-I010(341)	Mobile	Southwest Region

Bridge: Station	to Station	Bridge Identification Number
469+20	469+20	

Date	Bent No.& Lane	Pile No.	Kind of Soil
3/13/2018	TEST PILE	TP-10B-2	Silty Sand

Height Of Fall (feet)	Energy Delivered To Pile (E) (ft.-lbs.)	Blows Per Foot Of Penetration (N)	Total Penetration (feet)	Bearing (Ru) (tons)
5.11	21,411	34	28	
5.72	23,967	36	29	
6.16	25,810	37	30	
6.55	27,445	35	31	
6.21	26,020	41	32	
6.56	27,486	43	33	
5.92	24,805	55	34	
7.72	32,347	46	35	
6.60	27,654	45	36	
8.13	34,065	46	37	
8.15	34,149	41	38	
7.51	31,467	42	39	
8.22	34,442	38	40	
8.28	34,693	36	41	
8.21	34,400	36	42	
7.41	31,048	42	43	
7.44	31,174	42	44	
7.45	31,216	40	45	
6.94	29,079	38	46	
6.74	28,241	46	47	
6.57	27,528	48	48	
6.36	26,648	50	49	

FORM C-15A-2
REVISED 08-07-95

ALABAMA DEPARTMENT OF TRANSPORTATION
CONTINUATION OF TEST PILE RECORD

Project Number	County	Division
IM-I010(341)	Mobile	Southwest Region

Bridge: Station	to Station	Bridge Identification Number
469+20	469+20	

Date	Bent No.& Lane	Pile No.	Kind of Soil
3/13/2018	TEST PILE	TP-10B-2	Silty Sand

Height Of Fall (feet)	Energy Delivered To Pile (E) (ft.-lbs.)	Blows Per Foot Of Penetration (N)	Total Penetration (feet)	Bearing (Ru) (tons)
6.47	27,109	49	50	
6.40	26,816	48	51	
6.02	25,224	50	52	
6.20	25,978	48	53	
6.20	25,978	49	54	
6.28	26,313	48	55	
6.25	26,188	48	56	
6.23	26,104	48	57	
6.14	25,727	51	58	
5.99	25,098	55	59	
6.40	26,816	55	60	
6.31	26,439	55	61	
6.62	27,738	58	62	
6.13	25,685	71	63	
6.87	28,785	51	64	
7.66	32,095	48	65	
7.16	30,000	47	66	
7.68	32,179	50	67	
8.20	34,358	50	68	
7.84	32,850	48	69	
8.36	35,028	48	70	

FORM C-15A-2
REVISED 08-07-95

ALABAMA DEPARTMENT OF TRANSPORTATION
CONTINUATION OF TEST PILE RECORD

Project Number	County	Division
IM-I010(341)	Baldwin	Southwest Region

Bridge: Station	to Station	Bridge Identification Number
469+20	469+20	

Date	Bent No.& Lane	Pile No.	Kind of Soil
3/13/2018	TEST PILE	TP-10B-2	Silty Sand

Height Of Fall (feet)	Energy Delivered To Pile (E) (ft.-lbs.)	Blows Per Foot Of Penetration (N)	Total Penetration (feet)	Bearing (Ru) (tons)
8.46	35,447	49	71	
8.14	34,107	57	72	
8.08	33,855	52	73	
7.31	30,629	54	74	
8.91	37,333	45	75	
8.31	34,819	23	75.5	
	0		77	
	0		78	
	0		79	
	0		80	
	0		81	
	0		82	
	0		83	
	0		84	
	0		85	
	0		86	
	0		87	
	0		88	
	0		89	
	0		90	
	0		91	

Appendix B

Dynamic Pile Testing Data Summaries
TP-10B-1 and TP-10B-2

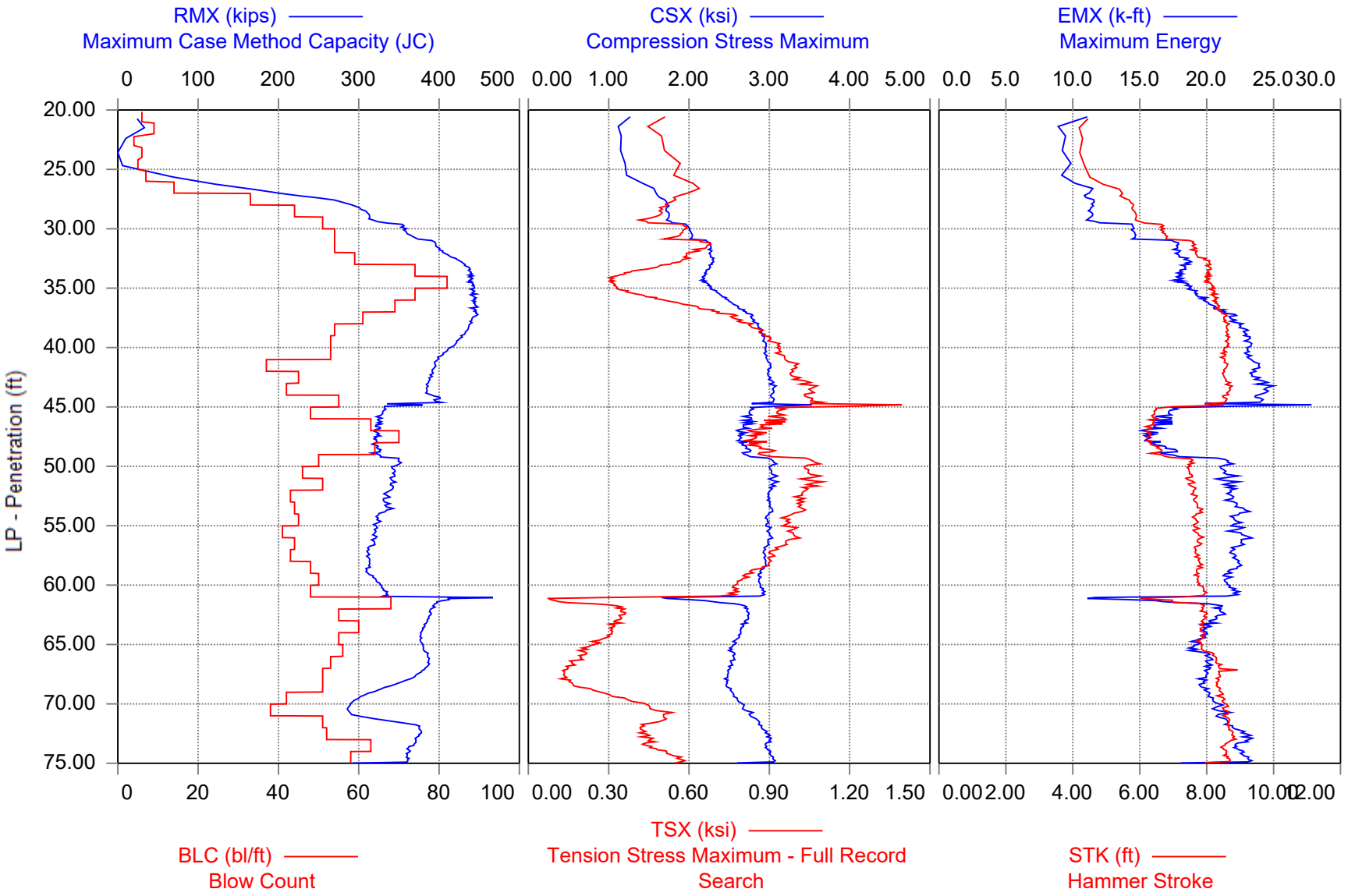
I-10 over Mobile River Bridge Load Test Program

ALDOT Project No.: IM-I010(341)
Mobile County, Alabama
AFT Project No.: 118008

Applied Foundation Testing, Inc. - PDIPLOT2 Ver 2017.2.58.3 - Case Method & iCAP® Results

Printed: 28-March-2018 Test started: 12-March-2018

I-10 OVER MOBILE RIVER - TP-10B-1



I-10 OVER MOBILE RIVER - TP-10B-1 18" PSC, 77' LONG
OP: AFT Date: 12-March-2018

AR: 324.00 in² SP: 0.150 k/ft³
LE: 74.00 ft EM: 5,970.66 ksi
WS: 13,580.0 f/s JC: 0.57

RMX: Maximum Case Method Capacity (JC)
RX6: Maximum Case Method Capacity (JC=0.6)
RA2: Auto Capacity Friction Piles
CSX: Compression Stress Maximum
CSB: Compression Stress at Bottom of Pile
TSX: Tension Stress Maximum - Full Record Search
EMX: Maximum Energy
STK: Hammer Stroke
BTA: Integrity Factor (1)

BL#	Depth ft	BLC bl/ft	TYPE	RMX kips	RX6 kips	RA2 kips	CSX ksi	CSB ksi	TSX ksi	EMX k-ft	STK ft	BTA (%)
6	21.00	6	AV6	17	16	43	1.27	0.25	0.51	11.1	4.49	100
			STD	8	7	12	0.21	0.02	0.13	3.0	0.40	0
			MAX	24	22	63	1.63	0.28	0.74	16.8	5.22	100
			MIN	0	0	26	1.05	0.23	0.36	8.4	4.06	100
15	22.00	9	AV9	33	32	56	1.13	0.24	0.46	9.0	4.23	100
			STD	5	6	2	0.06	0.00	0.05	0.4	0.09	0
			MAX	40	38	59	1.21	0.25	0.54	9.6	4.35	100
			MIN	21	19	53	1.03	0.23	0.37	8.4	4.05	100
19	23.00	4	AV4	0	0	0	1.16	0.21	0.51	9.6	4.26	100
			STD	0	0	0	0.05	0.01	0.05	0.3	0.08	0
			MAX	0	0	0	1.21	0.22	0.55	9.9	4.35	100
			MIN	0	0	0	1.07	0.20	0.43	9.2	4.16	100
25	24.00	6	AV6	0	0	30	1.13	0.20	0.50	9.1	4.21	100
			STD	0	0	3	0.09	0.02	0.07	0.8	0.18	0
			MAX	0	0	35	1.26	0.22	0.61	10.1	4.47	100
			MIN	0	0	25	1.01	0.18	0.40	7.9	3.96	100
30	25.00	5	AV5	0	0	28	1.23	0.20	0.59	10.1	4.36	100
			STD	0	0	3	0.06	0.01	0.05	0.6	0.12	0
			MAX	0	0	32	1.33	0.21	0.68	11.0	4.56	100
			MIN	0	0	25	1.18	0.18	0.55	9.5	4.25	100
37	26.00	7	AV7	64	64	63	1.26	0.30	0.57	9.4	4.48	100
			STD	17	17	11	0.15	0.05	0.10	1.3	0.35	0
			MAX	85	85	78	1.48	0.38	0.70	11.5	5.05	100
			MIN	36	34	49	1.10	0.24	0.44	7.8	4.14	100
51	27.00	14	AV14	151	151	140	1.51	0.55	0.61	10.8	5.16	100
			STD	29	29	21	0.08	0.09	0.04	0.9	0.26	0
			MAX	194	194	167	1.62	0.68	0.68	12.6	5.61	100
			MIN	103	103	94	1.34	0.39	0.56	9.4	4.68	100
84	28.00	33	AV33	256	256	235	1.67	0.88	0.55	11.3	5.62	100
			STD	27	27	28	0.06	0.08	0.04	0.6	0.17	0
			MAX	294	294	276	1.76	0.99	0.62	12.2	5.91	100
			MIN	205	205	179	1.56	0.71	0.47	10.2	5.29	100
128	29.00	44	AV44	306	306	281	1.73	1.04	0.49	11.4	5.83	100
			STD	7	7	6	0.03	0.03	0.03	0.4	0.10	0
			MAX	318	318	293	1.81	1.10	0.55	12.1	6.09	100
			MIN	292	292	267	1.66	0.99	0.41	10.6	5.61	100

I-10 OVER MOBILE RIVER - TP-10B-1 18" PSC, 77' LONG
OP: AFT Date: 12-March-2018

BL#	Depth ft	BLC bl/ft	TYPE	RMX kips	RX6 kips	RA2 kips	CSX ksi	CSB ksi	TSX ksi	EMX k-ft	STK ft	BTA (%)
179	30.00	51	AV51	336	336	305	1.86	1.17	0.51	12.8	6.28	100
			STD	19	19	17	0.12	0.06	0.08	1.6	0.40	0
			MAX	368	368	335	2.08	1.28	0.65	15.5	6.95	100
			MIN	310	310	280	1.65	1.07	0.34	10.4	5.71	100
233	31.00	54	AV54	366	365	328	2.04	1.30	0.57	14.8	6.80	100
			STD	10	10	9	0.06	0.04	0.04	0.9	0.24	0
			MAX	397	397	357	2.28	1.44	0.71	18.4	7.75	100
			MIN	350	350	315	1.96	1.24	0.47	13.7	6.51	100
287	32.00	54	AV54	398	398	357	2.26	1.44	0.65	17.8	7.61	100
			STD	5	5	4	0.03	0.02	0.03	0.4	0.12	0
			MAX	407	407	367	2.33	1.48	0.75	18.6	7.95	100
			MIN	387	387	343	2.18	1.40	0.58	16.9	7.35	100
346	33.00	59	AV59	420	418	359	2.28	1.51	0.58	18.3	7.89	100
			STD	9	9	5	0.04	0.03	0.03	0.6	0.22	0
			MAX	438	436	369	2.39	1.58	0.65	19.9	8.44	100
			MIN	403	402	343	2.20	1.45	0.51	17.0	7.49	100
420	34.00	74	AV74	438	437	367	2.23	1.58	0.41	18.2	8.06	100
			STD	4	4	10	0.04	0.03	0.06	0.4	0.14	0
			MAX	448	446	387	2.32	1.64	0.53	19.2	8.44	100
			MIN	427	426	351	2.13	1.52	0.30	17.0	7.72	100
502	35.00	82	AV82	441	439	384	2.21	1.66	0.32	18.3	8.08	100
			STD	5	5	12	0.05	0.02	0.02	0.6	0.17	0
			MAX	454	452	396	2.32	1.71	0.38	19.7	8.57	100
			MIN	428	426	348	2.10	1.60	0.29	17.0	7.72	100
576	36.00	74	AV74	443	440	389	2.38	1.72	0.41	19.3	8.22	100
			STD	5	5	2	0.07	0.01	0.06	0.6	0.16	0
			MAX	453	450	396	2.53	1.74	0.55	20.8	8.61	100
			MIN	432	429	381	2.22	1.68	0.32	18.0	7.95	100
645	37.00	69	AV69	444	443	380	2.59	1.73	0.61	20.5	8.33	100
			STD	5	5	6	0.08	0.01	0.07	0.7	0.15	0
			MAX	459	458	408	2.73	1.75	0.74	21.7	8.61	100
			MIN	434	432	364	2.42	1.70	0.45	18.9	7.99	100
706	38.00	61	AV61	443	441	366	2.78	1.71	0.77	21.9	8.54	100
			STD	4	4	5	0.05	0.01	0.04	0.5	0.13	0
			MAX	455	453	376	2.91	1.74	0.87	23.3	8.79	100
			MIN	435	433	355	2.64	1.70	0.65	20.3	8.15	100
760	39.00	54	AV54	435	433	354	2.89	1.72	0.86	22.7	8.61	100
			STD	4	4	4	0.04	0.01	0.03	0.4	0.09	0
			MAX	443	442	363	2.96	1.73	0.91	23.7	8.84	100
			MIN	425	424	344	2.80	1.70	0.78	21.6	8.40	100
813	40.00	53	AV53	422	421	340	2.94	1.72	0.92	23.2	8.63	100
			STD	5	5	5	0.03	0.01	0.03	0.4	0.11	0
			MAX	435	434	350	3.00	1.74	0.99	24.1	8.89	100

I-10 OVER MOBILE RIVER - TP-10B-1 18" PSC, 77' LONG
OP: AFT Date: 12-March-2018

BL#	Depth ft	BLC bl/ft	TYPE	RMX kips	RX6 kips	RA2 kips	CSX ksi	CSB ksi	TSX ksi	EMX k-ft	STK ft	BTA (%)
			MIN	411	410	329	2.88	1.70	0.85	22.3	8.36	100
866	41.00	53	AV53	405	404	327	2.96	1.70	0.94	23.1	8.52	100
			STD	5	5	6	0.04	0.01	0.03	0.5	0.11	0
			MAX	415	413	342	3.07	1.72	1.04	24.6	8.84	100
			MIN	395	393	314	2.88	1.67	0.87	22.1	8.27	100
903	42.00	37	AV37	394	393	316	3.00	1.69	0.99	23.7	8.56	100
			STD	3	3	3	0.04	0.01	0.04	0.5	0.13	0
			MAX	400	399	323	3.10	1.71	1.08	25.1	8.89	100
			MIN	389	388	310	2.90	1.68	0.90	22.4	8.31	100
948	43.00	45	AV45	389	388	312	3.01	1.69	1.00	23.8	8.55	100
			STD	4	4	8	0.05	0.01	0.04	0.7	0.15	0
			MAX	402	401	342	3.11	1.72	1.10	25.4	8.93	100
			MIN	381	380	301	2.92	1.66	0.93	22.1	8.27	100
990	44.00	42	AV42	385	384	305	3.05	1.70	1.05	24.4	8.66	100
			STD	3	3	3	0.04	0.01	0.04	0.6	0.13	0
			MAX	392	390	313	3.12	1.72	1.12	25.5	8.89	100
			MIN	380	379	300	2.97	1.68	0.98	23.0	8.40	100
1045	45.00	55	AV55	382	380	301	3.06	1.67	1.11	23.6	8.37	96
			STD	39	39	20	0.41	0.13	0.25	4.5	0.86	12
			MAX	416	413	364	3.59	1.77	1.50	28.7	8.89	100
			MIN	201	200	226	1.13	0.92	0.17	2.8	3.70	35
1093	46.00	48	AV48	329	329	294	2.76	1.63	0.94	17.2	6.46	100
			STD	5	6	6	0.06	0.01	0.04	0.7	0.13	0
			MAX	341	341	301	2.93	1.68	1.07	19.1	6.91	100
			MIN	309	308	260	2.59	1.59	0.82	15.4	6.09	100
1156	47.00	63	AV63	324	322	301	2.70	1.62	0.89	16.4	6.33	100
			STD	5	7	8	0.08	0.01	0.06	0.9	0.18	0
			MAX	335	335	325	2.82	1.64	1.00	17.8	6.60	100
			MIN	315	307	286	2.47	1.59	0.71	14.1	5.86	100
1226	48.00	70	AV70	322	317	304	2.65	1.61	0.85	15.7	6.27	100
			STD	5	7	10	0.08	0.01	0.06	0.8	0.17	0
			MAX	334	334	326	2.79	1.63	0.96	17.2	6.60	100
			MIN	313	305	286	2.48	1.59	0.71	14.0	5.91	100
1290	49.00	64	AV64	323	322	289	2.71	1.63	0.87	16.9	6.51	100
			STD	5	6	10	0.07	0.02	0.05	0.8	0.17	0
			MAX	332	332	314	2.83	1.67	0.95	18.4	6.85	100
			MIN	311	308	273	2.55	1.59	0.74	15.0	6.12	100
1340	50.00	50	AV50	344	343	288	2.97	1.66	1.02	20.6	7.31	100
			STD	11	11	11	0.14	0.03	0.09	1.7	0.39	0
			MAX	357	356	308	3.15	1.70	1.15	22.5	7.83	100
			MIN	323	322	267	2.69	1.60	0.84	17.0	6.54	100
1386	51.00	46	AV46	343	343	281	3.03	1.65	1.05	21.4	7.49	100

I-10 OVER MOBILE RIVER - TP-10B-1 18" PSC, 77' LONG
OP: AFT Date: 12-March-2018

BL#	Depth	BLC	TYPE	RMX	RX6	RA2	CSX	CSB	TSX	EMX	STK	BTA
	ft	bl/ft		kips	kips	kips	ksi	ksi	ksi	k-ft	ft	(%)
			STD	3	3	8	0.05	0.02	0.04	0.6	0.10	0
			MAX	350	350	295	3.15	1.69	1.15	22.9	7.79	100
			MIN	335	335	263	2.95	1.62	0.98	20.4	7.28	100
1437	52.00	51	AV51	342	341	275	3.04	1.62	1.05	21.6	7.55	100
			STD	4	4	9	0.05	0.02	0.04	0.7	0.15	0
			MAX	352	351	293	3.15	1.66	1.15	23.5	7.91	100
			MIN	333	332	244	2.93	1.59	0.93	19.9	7.21	100
1480	53.00	43	AV43	334	333	248	2.99	1.61	1.02	21.8	7.63	100
			STD	5	5	8	0.04	0.02	0.03	0.5	0.10	0
			MAX	346	345	264	3.07	1.64	1.09	23.0	7.91	100
			MIN	324	323	230	2.92	1.57	0.94	20.8	7.46	100
1524	54.00	44	AV44	334	333	242	3.02	1.57	1.02	22.5	7.76	100
			STD	6	7	8	0.05	0.02	0.04	0.8	0.14	0
			MAX	347	346	257	3.13	1.62	1.13	24.1	7.99	100
			MIN	322	320	228	2.92	1.53	0.94	21.1	7.46	100
1569	55.00	45	AV45	323	320	231	2.97	1.53	0.97	22.1	7.67	100
			STD	4	4	4	0.04	0.01	0.04	0.6	0.11	0
			MAX	333	329	244	3.08	1.56	1.07	23.7	7.99	100
			MIN	317	313	225	2.90	1.51	0.90	20.9	7.42	100
1610	56.00	41	AV41	321	317	231	3.01	1.50	0.99	22.5	7.72	100
			STD	3	3	4	0.05	0.01	0.05	0.9	0.15	0
			MAX	326	323	244	3.11	1.53	1.08	24.4	8.07	100
			MIN	314	311	222	2.90	1.48	0.89	21.0	7.49	100
1654	57.00	44	AV44	317	312	230	2.97	1.49	0.96	22.5	7.74	100
			STD	5	5	3	0.05	0.01	0.05	0.7	0.14	0
			MAX	326	321	239	3.09	1.52	1.05	24.1	8.07	100
			MIN	308	304	223	2.89	1.47	0.88	21.3	7.49	100
1697	58.00	43	AV43	312	308	235	2.94	1.51	0.91	22.1	7.72	100
			STD	3	4	3	0.04	0.01	0.04	0.6	0.13	0
			MAX	320	315	242	3.03	1.54	1.00	23.2	7.99	100
			MIN	307	298	228	2.86	1.48	0.83	21.0	7.46	100
1745	59.00	48	AV48	312	306	241	2.93	1.52	0.87	22.1	7.77	100
			STD	3	4	3	0.05	0.01	0.05	0.6	0.12	0
			MAX	320	315	248	3.06	1.54	1.00	23.7	8.07	100
			MIN	307	298	235	2.86	1.50	0.78	21.3	7.60	100
1795	60.00	50	AV50	320	310	248	2.88	1.52	0.80	21.5	7.73	100
			STD	6	6	5	0.03	0.01	0.04	0.5	0.09	0
			MAX	337	326	264	2.94	1.55	0.87	22.4	7.95	100
			MIN	309	298	238	2.80	1.49	0.72	20.2	7.49	100
1843	61.00	48	AV48	332	320	257	2.91	1.56	0.77	21.9	7.91	100
			STD	8	8	8	0.04	0.01	0.06	0.7	0.12	0
			MAX	344	333	269	3.00	1.59	1.04	23.1	8.11	100
			MIN	287	278	210	2.81	1.54	0.68	19.6	7.68	100

I-10 OVER MOBILE RIVER - TP-10B-1 18" PSC, 77' LONG
OP: AFT Date: 12-March-2018

BL#	Depth ft	BLC bl/ft	TYPE	RMX kips	RX6 kips	RA2 kips	CSX ksi	CSB ksi	TSX ksi	EMX k-ft	STK ft	BTA (%)
1911	62.00	68	AV68	405	394	321	2.33	1.89	0.21	17.5	7.27	100
			STD	22	22	7	0.41	0.09	0.11	3.9	0.70	0
			MAX	478	470	338	2.77	1.96	0.40	21.9	8.07	100
			MIN	387	375	306	1.16	1.50	0.07	8.5	5.91	100
1966	63.00	55	AV55	388	375	305	2.73	1.95	0.35	20.9	7.93	100
			STD	3	3	4	0.03	0.01	0.03	0.5	0.13	0
			MAX	394	382	315	2.83	1.98	0.42	22.0	8.27	100
			MIN	383	369	297	2.66	1.93	0.28	19.9	7.68	100
2026	64.00	60	AV60	381	368	301	2.67	1.91	0.32	20.0	7.86	100
			STD	3	3	5	0.05	0.02	0.04	0.6	0.14	0
			MAX	389	376	314	2.77	1.95	0.39	21.3	8.15	100
			MIN	375	362	291	2.58	1.88	0.22	19.0	7.53	100
2081	65.00	55	AV55	377	365	294	2.60	1.87	0.28	19.6	7.85	100
			STD	2	2	5	0.05	0.01	0.04	0.6	0.14	0
			MAX	383	371	307	2.69	1.89	0.36	20.7	8.19	100
			MIN	374	361	283	2.49	1.85	0.18	18.2	7.53	100
2137	66.00	56	AV56	382	370	295	2.54	1.86	0.21	19.4	7.99	100
			STD	3	4	6	0.04	0.01	0.03	0.7	0.20	0
			MAX	391	380	309	2.63	1.88	0.29	20.8	8.44	100
			MIN	377	364	285	2.43	1.83	0.14	17.8	7.60	100
2190	67.00	53	AV53	386	375	303	2.53	1.87	0.17	20.2	8.32	100
			STD	2	2	4	0.04	0.01	0.03	0.4	0.13	0
			MAX	392	381	313	2.61	1.89	0.24	21.0	8.61	100
			MIN	382	370	295	2.45	1.85	0.12	19.4	8.07	100
2241	68.00	51	AV51	373	361	295	2.48	1.82	0.14	19.9	8.43	100
			STD	6	6	5	0.04	0.03	0.03	0.5	0.46	0
			MAX	384	373	306	2.58	1.87	0.21	21.0	11.59	100
			MIN	358	347	286	2.40	1.76	0.09	18.7	8.11	100
2292	69.00	51	AV51	338	327	286	2.49	1.68	0.19	19.8	8.35	100
			STD	12	12	4	0.04	0.06	0.05	0.5	0.12	0
			MAX	359	347	295	2.57	1.77	0.29	20.7	8.57	100
			MIN	319	308	272	2.39	1.58	0.10	18.6	8.03	100
2334	70.00	42	AV42	300	290	289	2.59	1.45	0.35	20.4	8.47	100
			STD	8	8	4	0.05	0.07	0.05	0.4	0.12	0
			MAX	315	305	296	2.67	1.57	0.44	21.3	8.70	100
			MIN	288	277	278	2.50	1.32	0.25	19.5	8.23	100
2372	71.00	38	AV38	288	277	298	2.71	1.28	0.48	20.9	8.58	100
			STD	3	3	5	0.05	0.03	0.04	0.6	0.15	0
			MAX	295	284	307	2.81	1.34	0.55	21.9	8.89	100
			MIN	282	271	287	2.59	1.23	0.40	19.4	8.23	100
2423	72.00	51	AV51	344	334	325	2.86	1.44	0.47	21.5	8.65	100
			STD	26	25	8	0.05	0.15	0.05	0.6	0.12	0

I-10 OVER MOBILE RIVER - TP-10B-1 18" PSC, 77' LONG
OP: AFT Date: 12-March-2018

BL#	Depth ft	BLC bl/ft	TYPE	RMX kips	RX6 kips	RA2 kips	CSX ksi	CSB ksi	TSX ksi	EMX k-ft	STK ft	BTA (%)
			MAX	379	368	345	2.94	1.71	0.57	22.3	8.93	100
			MIN	300	289	310	2.75	1.24	0.35	20.2	8.40	100
2475	73.00	52	AV52	375	360	330	2.97	1.84	0.44	22.8	8.76	100
			STD	3	4	4	0.05	0.07	0.03	0.6	0.12	0
			MAX	381	366	338	3.06	1.93	0.49	24.0	9.03	100
			MIN	368	351	321	2.84	1.70	0.36	21.3	8.53	100
2538	74.00	63	AV63	366	351	341	2.98	1.93	0.46	22.4	8.57	100
			STD	5	5	5	0.04	0.01	0.04	0.6	0.14	0
			MAX	377	361	353	3.07	1.95	0.56	23.5	8.84	100
			MIN	357	341	330	2.89	1.92	0.37	21.6	8.31	100
2596	75.00	58	AV58	357	342	333	3.01	1.92	0.55	22.6	8.55	100
			STD	20	19	15	0.23	0.11	0.08	2.5	0.57	0
			MAX	365	350	343	3.13	1.95	0.89	24.2	8.89	100
			MIN	216	211	230	1.27	1.10	0.11	4.4	4.32	100
			Average	362	357	303	2.64	1.61	0.65	19.8	7.74	100
			Std. Dev.	64	64	55	0.41	0.28	0.30	3.5	0.93	2
			Maximum	478	470	408	3.59	1.98	1.50	28.7	11.59	100
			Minimum	0	0	0	1.01	0.18	0.07	2.8	3.70	35

Total number of blows analyzed: 2596

BL#	Sensors
1-94	F3: [P454] 145.3 (1.00); F4: [P455] 145.8 (1.00); A3: [K5647] 334.0 (1.00); A4: [K5362] 346.0 (1.00)
95-1044	F3: [P454] 145.3 (0.98); F4: [P455] 145.8 (0.98); A3: [K5647] 334.0 (1.02); A4: [K5362] 346.0 (1.02)
1045-2596	F3: [P454] 145.3 (0.97); F4: [P455] 145.8 (0.97); A3: [K5647] 334.0 (1.03); A4: [K5362] 346.0 (1.03)

BL#	Comments
1030	CHECK LOOSE V4
1842	CHANGE PILE CUSHION, MOVE TEMPLATE

Time Summary

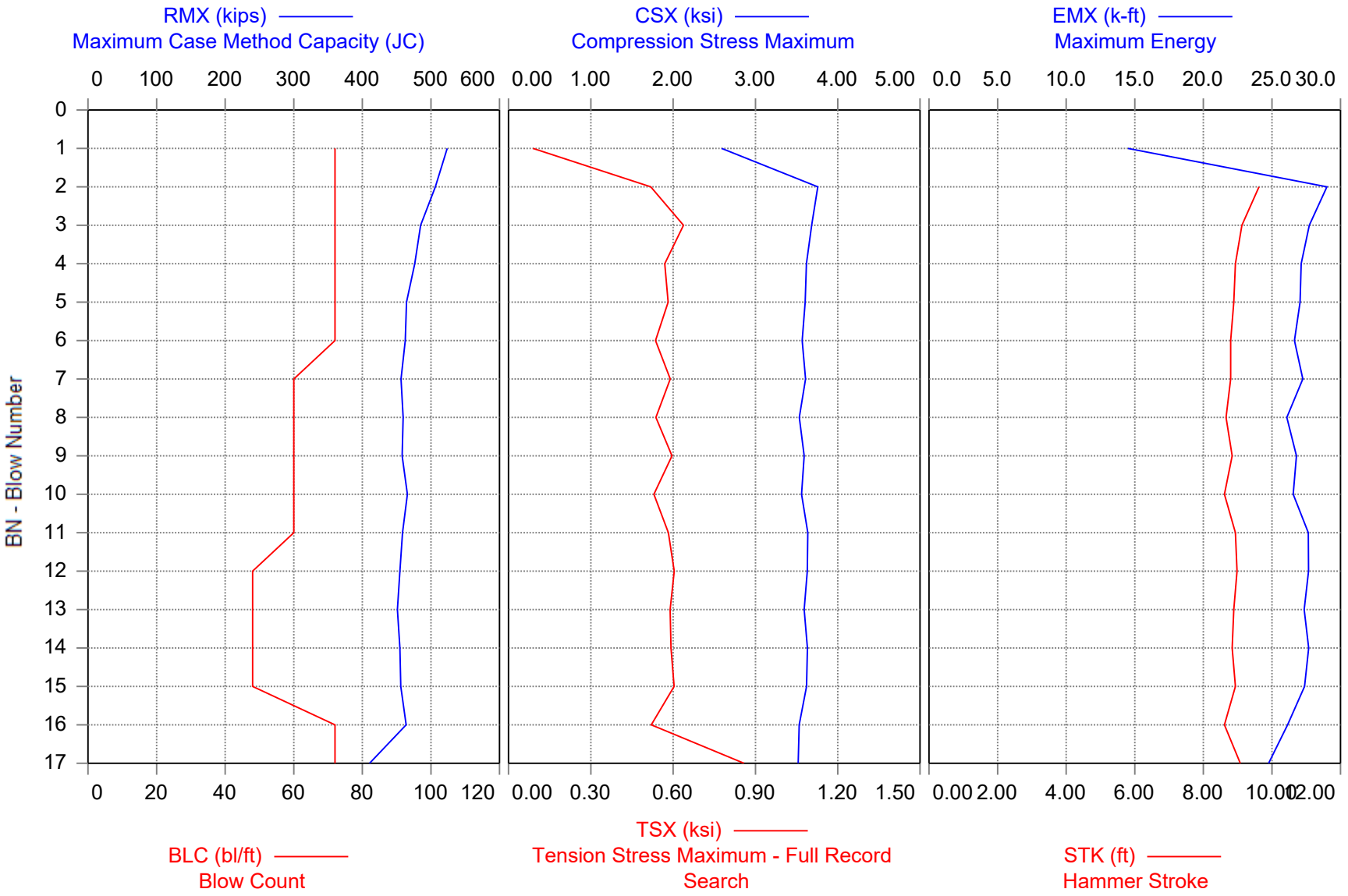
Drive	24 minutes 9 seconds	4:32 PM - 4:56 PM (3/12/2018) BN 1 - 1030
Stop	14 minutes 28 seconds	4:56 PM - 5:11 PM
Drive	19 minutes 27 seconds	5:11 PM - 5:30 PM BN 1031 - 1843
Stop	1 hours 19 minutes 33 seconds	5:30 PM - 6:50 PM
Drive	18 minutes 13 seconds	6:50 PM - 7:08 PM BN 1844 - 2596

Total time [02:35:51] = (Driving [01:01:50] + Stop [01:34:01])

Applied Foundation Testing, Inc. - PDIPLOT2 Ver 2017.2.58.3 - Case Method & iCAP® Results

Printed: 28-March-2018 Test started: 13-March-2018

I-10 OVER MOBILE RIVER - TP-10B-1 1 DAY RESTRIKE



I-10 OVER MOBILE RIVER - TP-10B-1 1 DAY RESTRIKE 18" PSC, 77' LONG
OP: AFT Date: 13-March-2018

AR: 324.00 in² SP: 0.150 k/ft³
LE: 74.00 ft EM: 5,970.66 ksi
WS: 13,580.0 f/s JC: 0.52

RMX: Maximum Case Method Capacity (JC)
RX6: Maximum Case Method Capacity (JC=0.6)
RA2: Auto Capacity Friction Piles
CSX: Compression Stress Maximum
CSB: Compression Stress at Bottom of Pile
TSX: Tension Stress Maximum - Full Record Search
EMX: Maximum Energy
STK: Hammer Stroke
BTA: Integrity Factor (1)

BL#	BLC	RMX	RX6	RA2	CSX	CSB	TSX	EMX	STK	BTA
	bl/ft	kips	kips	kips	ksi	ksi	ksi	k-ft	ft	(%)
1	72	524	467	378	2.59	2.12	0.09	14.5	0.00	100
2	72	506	446	437	3.76	2.17	0.52	29.0	9.62	100
3	72	485	429	433	3.68	2.19	0.64	27.7	9.12	100
4	72	476	420	453	3.62	2.31	0.57	27.1	8.93	100
5	72	464	408	433	3.60	2.34	0.58	27.1	8.89	100
6	72	463	406	428	3.57	2.37	0.54	26.6	8.79	100
7	60	456	400	431	3.61	2.36	0.59	27.2	8.79	100
8	60	459	404	431	3.53	2.33	0.54	26.1	8.66	100
9	60	458	402	440	3.59	2.37	0.60	26.8	8.84	100
10	60	466	410	438	3.56	2.32	0.53	26.5	8.61	100
11	60	459	402	420	3.64	2.35	0.58	27.7	8.93	100
12	48	455	399	420	3.63	2.34	0.60	27.7	8.98	100
13	48	451	395	421	3.59	2.41	0.59	27.4	8.89	100
14	48	455	399	423	3.63	2.33	0.59	27.7	8.84	100
15	48	456	400	432	3.62	2.36	0.60	27.4	8.93	100
16	72	464	408	442	3.53	2.37	0.52	26.1	8.61	100
17	72	410	362	400	3.52	2.26	0.86	24.8	9.07	100
Average		465	409	427	3.55	2.31	0.56	26.3	8.91	100
Std. Dev.		23	22	17	0.25	0.08	0.14	3.1	0.23	0
Maximum		524	467	453	3.76	2.41	0.86	29.0	9.62	100
Minimum		410	362	378	2.59	2.12	0.09	14.5	8.61	100

Total number of blows analyzed: 17

BL# Sensors

1-17 F3: [P454] 145.3 (0.97); F4: [P455] 145.8 (0.97); A3: [K5647] 334.0 (1.03); A4: [K5362] 346.0 (1.03)

BL# Comments

17 6BL/1", 5BL/1", 4BL/1", 2BL/0.33"

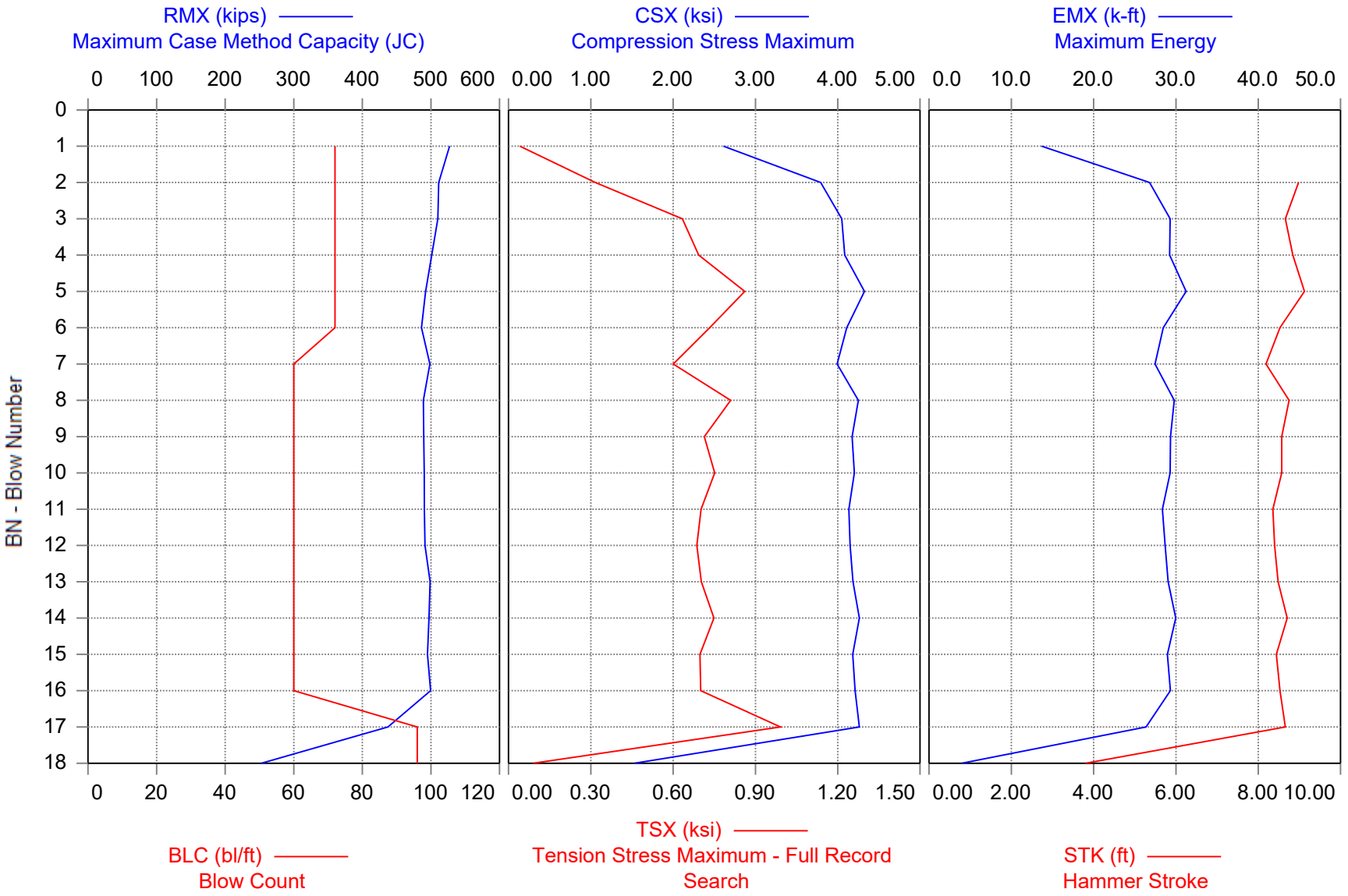
Time Summary

Drive 24 seconds 3:57 PM - 3:57 PM BN 1 - 17

Applied Foundation Testing, Inc. - PDIPLOT2 Ver 2017.2.58.3 - Case Method & iCAP® Results

Printed: 28-March-2018 Test started: 19-March-2018

I-10 OVER MOBILE RIVER - TP-10B-1 7 DAY RESTRIKE



I-10 OVER MOBILE RIVER - TP-10B-1 7 DAY RESTRIKE 18" PSC, 77' LONG
OP: AFT Date: 19-March-2018

AR: 324.00 in² SP: 0.150 k/ft³
LE: 74.00 ft EM: 5,970.66 ksi
WS: 13,580.0 f/s JC: 0.53

RMX: Maximum Case Method Capacity (JC)
RX6: Maximum Case Method Capacity (JC=0.6)
RA2: Auto Capacity Friction Piles
CSX: Compression Stress Maximum
CSB: Compression Stress at Bottom of Pile
TSX: Tension Stress Maximum - Full Record Search
EMX: Maximum Energy
STK: Hammer Stroke
BTA: Integrity Factor (1)

BL#	BLC	RMX	RX6	RA2	CSX	CSB	TSX	EMX	STK	BTA
	bl/ft	kips	kips	kips	ksi	ksi	ksi	k-ft	ft	(%)
1	72	527	479	403	2.61	2.08	0.04	13.7	0.00	100
2	72	511	452	429	3.79	2.21	0.32	26.8	8.98	100
3	72	510	454	454	4.05	2.25	0.63	29.3	8.66	100
4	72	501	445	463	4.09	2.42	0.69	29.2	8.84	100
5	72	492	435	452	4.32	2.54	0.86	31.2	9.12	100
6	72	486	428	442	4.11	2.51	0.73	28.5	8.53	100
7	60	498	440	432	3.99	2.45	0.60	27.5	8.19	100
8	60	489	431	450	4.25	2.51	0.81	29.8	8.75	100
9	60	489	432	442	4.17	2.47	0.71	29.3	8.57	100
10	60	490	432	442	4.20	2.56	0.75	29.3	8.57	100
11	60	490	430	433	4.13	2.57	0.70	28.4	8.36	100
12	60	491	433	424	4.15	2.55	0.69	28.7	8.40	100
13	60	499	439	440	4.18	2.58	0.70	29.0	8.48	100
14	60	497	437	438	4.26	2.52	0.75	30.0	8.70	100
15	60	495	436	427	4.18	2.56	0.70	29.0	8.44	100
16	60	499	439	434	4.21	2.52	0.70	29.3	8.53	100
17	96	437	379	424	4.26	2.69	0.99	26.4	8.66	100
18	96	253	223	252	1.53	1.23	0.09	4.0	3.80	100
Average		481	425	427	3.92	2.40	0.64	26.6	8.33	100
Std. Dev.		58	52	45	0.69	0.32	0.24	6.6	1.15	0
Maximum		527	479	463	4.32	2.69	0.99	31.2	9.12	100
Minimum		253	223	252	1.53	1.23	0.04	4.0	3.80	100

Total number of blows analyzed: 18

BL# Sensors

1-18 F3: [P454] 145.3 (0.97); F4: [P455] 145.8 (0.97); A3: [K5647] 334.0 (1.03); A4: [K5362] 346.0 (1.03)

BL# Comments

18 6BL/1", 5BL/1", 5BL/1", 2BL/0.25"

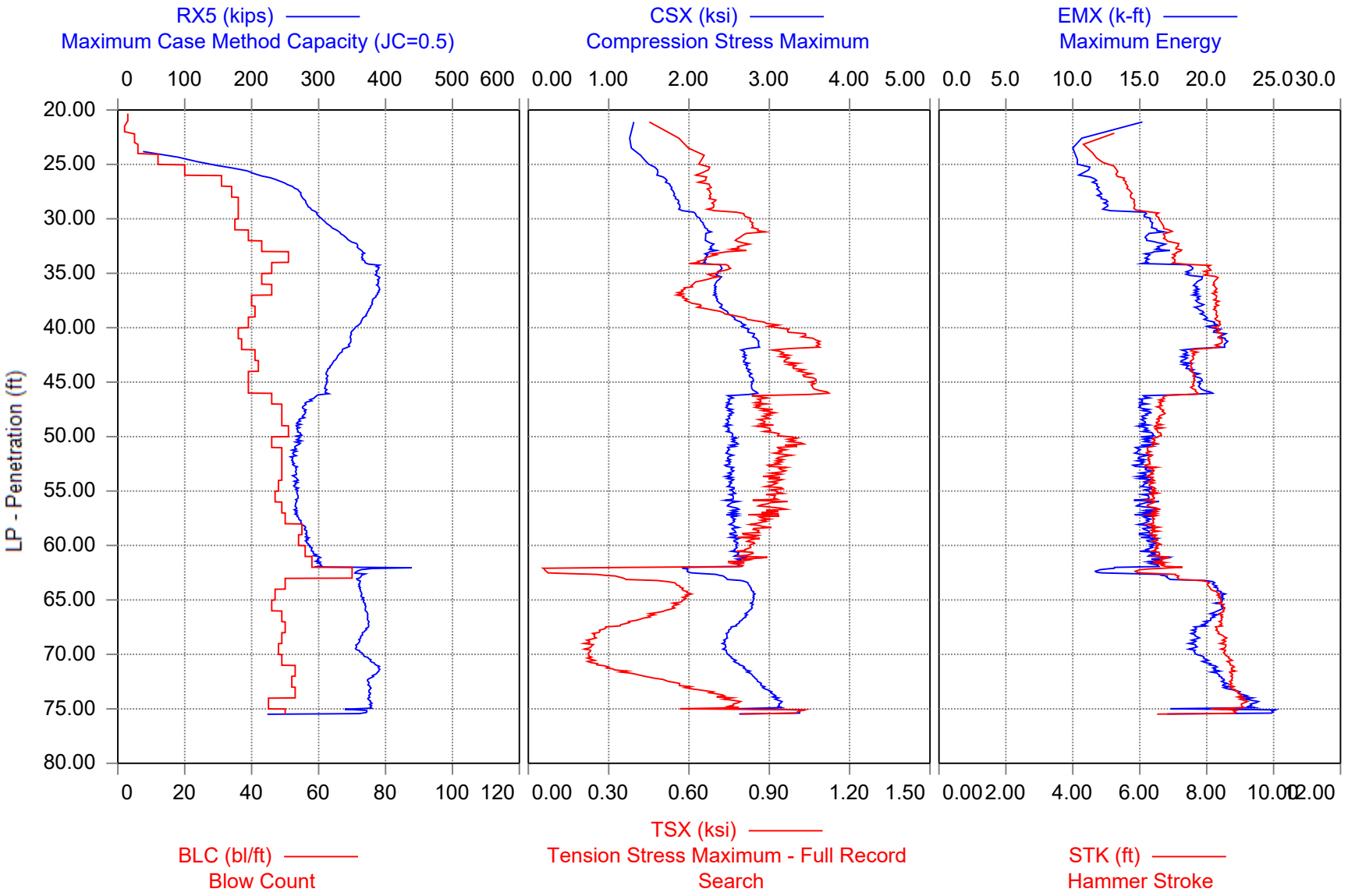
Time Summary

Drive 24 seconds 10:19 AM - 10:19 AM BN 1 - 18

Applied Foundation Testing, Inc. - PDIPLOT2 Ver 2017.2.58.3 - Case Method & iCAP® Results

Printed: 20-March-2018 Test started: 13-March-2018

I-10 OVER MOBILE RIVER - TP-10B-2



I-10 OVER MOBILE RIVER - TP-10B-2 18" PSC, 77' LONG
OP: AFT Date: 13-March-2018

AR: 324.00 in² SP: 0.150 k/ft³
LE: 74.00 ft EM: 6,436.67 ksi
WS: 14,100.0 f/s JC: 0.50

RX5: Maximum Case Method Capacity (JC=0.5)
RX6: Maximum Case Method Capacity (JC=0.6)
RA2: Auto Capacity Friction Piles
CSX: Compression Stress Maximum
CSB: Compression Stress at Bottom of Pile
TSX: Tension Stress Maximum - Full Record Search
EMX: Maximum Energy
STK: Hammer Stroke
BTA: Integrity Factor (1)

BL#	Depth ft	BLC bl/ft	TYPE	RX5 kips	RX6 kips	RA2 kips	CSX ksi	CSB ksi	TSX ksi	EMX k-ft	STK ft	BTA (%)
3	21.00	3	AV3	0	0	15	1.18	0.16	0.38	12.3	**	82
			STD	0	0	21	0.11	0.03	0.10	4.1	**	2
			MAX	0	0	45	1.31	0.19	0.52	18.1	**	84
			MIN	0	0	0	1.05	0.13	0.27	9.3	**	80
5	22.00	2	AV2	0	0	0	1.51	0.20	0.56	19.6	6.23	92
			STD	0	0	0	0.00	0.00	0.13	1.9	0.62	8
			MAX	0	0	0	1.51	0.20	0.69	21.4	6.85	100
			MIN	0	0	0	1.51	0.20	0.42	17.7	5.61	84
10	23.00	5	AV5	0	0	36	1.26	0.20	0.56	10.7	4.46	100
			STD	0	0	4	0.07	0.01	0.04	1.1	0.22	0
			MAX	0	0	40	1.39	0.23	0.63	12.5	4.87	100
			MIN	0	0	29	1.18	0.19	0.52	9.4	4.25	100
16	24.00	6	AV6	19	16	45	1.31	0.24	0.62	10.2	4.45	100
			STD	22	22	10	0.09	0.03	0.07	0.7	0.20	0
			MAX	58	57	60	1.46	0.29	0.73	11.2	4.83	100
			MIN	0	0	34	1.18	0.22	0.51	9.1	4.20	100
28	25.00	12	AV12	104	104	98	1.43	0.40	0.64	10.2	4.78	100
			STD	18	18	21	0.05	0.06	0.03	0.4	0.14	0
			MAX	131	131	134	1.53	0.49	0.71	11.0	5.10	100
			MIN	77	77	70	1.36	0.31	0.59	9.7	4.57	100
48	26.00	20	AV20	183	183	166	1.59	0.66	0.66	11.0	5.29	100
			STD	20	20	15	0.03	0.07	0.02	0.4	0.10	0
			MAX	209	208	188	1.64	0.75	0.69	11.8	5.45	100
			MIN	141	141	142	1.53	0.51	0.61	10.4	5.01	100
79	27.00	31	AV31	240	239	213	1.71	0.85	0.66	11.5	5.53	100
			STD	13	13	11	0.05	0.04	0.03	0.5	0.13	0
			MAX	261	261	231	1.81	0.91	0.72	12.3	5.75	100
			MIN	210	210	188	1.55	0.75	0.58	9.9	5.10	100
113	28.00	34	AV34	270	270	241	1.80	0.94	0.68	12.0	5.70	100
			STD	5	5	7	0.03	0.02	0.02	0.3	0.08	0
			MAX	277	276	252	1.86	0.97	0.71	12.6	5.86	100
			MIN	260	260	228	1.73	0.91	0.62	11.2	5.51	100
149	29.00	36	AV36	281	281	252	1.87	0.99	0.69	12.4	5.82	100
			STD	3	3	4	0.03	0.02	0.03	0.3	0.08	0
			MAX	288	288	262	1.92	1.02	0.75	13.1	5.98	100
			MIN	275	274	244	1.81	0.97	0.62	11.8	5.66	100

I-10 OVER MOBILE RIVER - TP-10B-2 18" PSC, 77' LONG
OP: AFT Date: 13-March-2018

BL#	Depth ft	BLC bl/ft	TYPE	RX5 kips	RX6 kips	RA2 kips	CSX ksi	CSB ksi	TSX ksi	EMX k-ft	STK ft	BTA (%)
185	30.00	36	AV36	297	296	261	2.03	1.07	0.77	14.6	6.32	100
			STD	5	5	4	0.10	0.03	0.07	1.4	0.32	0
			MAX	306	306	268	2.15	1.12	0.84	16.1	6.66	100
			MIN	287	286	255	1.85	1.01	0.64	12.0	5.73	100
220	31.00	35	AV35	314	314	278	2.18	1.14	0.84	15.9	6.68	100
			STD	6	6	7	0.04	0.02	0.02	0.3	0.09	0
			MAX	327	327	291	2.28	1.21	0.90	17.0	6.95	100
			MIN	303	303	264	2.11	1.10	0.80	15.3	6.54	100
259	32.00	39	AV39	336	336	300	2.22	1.22	0.81	15.8	6.79	100
			STD	6	6	7	0.03	0.02	0.04	0.5	0.11	0
			MAX	345	344	313	2.31	1.25	0.91	17.3	7.11	100
			MIN	325	324	287	2.17	1.19	0.74	15.0	6.66	100
302	33.00	43	AV43	358	357	318	2.28	1.30	0.79	16.5	7.11	100
			STD	6	6	7	0.05	0.03	0.04	0.6	0.19	0
			MAX	369	369	331	2.37	1.36	0.87	17.7	7.46	100
			MIN	345	344	301	2.17	1.25	0.70	15.4	6.63	100
353	34.00	51	AV51	367	365	312	2.22	1.32	0.68	15.6	7.05	100
			STD	4	4	8	0.03	0.02	0.04	0.4	0.09	0
			MAX	373	371	329	2.29	1.35	0.76	16.3	7.25	100
			MIN	357	355	293	2.14	1.27	0.60	14.6	6.82	100
399	35.00	46	AV46	385	382	336	2.35	1.41	0.72	18.2	7.86	100
			STD	8	8	11	0.09	0.04	0.06	1.4	0.42	0
			MAX	393	391	348	2.48	1.47	0.81	19.8	8.44	100
			MIN	366	360	300	2.12	1.31	0.57	14.8	6.85	100
442	36.00	43	AV43	389	382	336	2.36	1.46	0.66	19.2	8.20	100
			STD	3	3	4	0.04	0.02	0.04	0.6	0.19	0
			MAX	393	389	345	2.44	1.49	0.74	20.1	8.57	100
			MIN	384	377	328	2.26	1.41	0.54	18.1	7.75	100
488	37.00	46	AV46	389	382	335	2.32	1.47	0.58	19.2	8.25	100
			STD	2	3	4	0.03	0.01	0.04	0.4	0.13	0
			MAX	393	386	343	2.41	1.49	0.68	19.9	8.61	100
			MIN	383	374	326	2.24	1.44	0.50	18.2	7.99	100
528	38.00	40	AV40	382	374	330	2.36	1.46	0.60	19.4	8.29	100
			STD	3	3	5	0.04	0.01	0.04	0.4	0.13	0
			MAX	388	382	337	2.44	1.48	0.68	20.2	8.53	100
			MIN	377	369	319	2.29	1.44	0.52	18.8	8.07	100
569	39.00	41	AV41	374	366	323	2.46	1.46	0.71	19.6	8.27	100
			STD	3	3	5	0.06	0.01	0.06	0.4	0.12	0
			MAX	379	372	332	2.59	1.49	0.82	20.6	8.48	100
			MIN	366	358	314	2.34	1.45	0.59	18.6	8.03	100
608	40.00	39	AV39	362	355	313	2.63	1.48	0.87	20.3	8.33	100
			STD	4	4	5	0.07	0.01	0.06	0.6	0.17	0
			MAX	370	363	322	2.78	1.51	1.01	21.8	8.70	100

I-10 OVER MOBILE RIVER - TP-10B-2 18" PSC, 77' LONG
OP: AFT Date: 13-March-2018

BL#	Depth ft	BLC bl/ft	TYPE	RX5 kips	RX6 kips	RA2 kips	CSX ksi	CSB ksi	TSX ksi	EMX k-ft	STK ft	BTA (%)
			MIN	352	344	302	2.51	1.45	0.77	19.3	8.03	100
644	41.00	36	AV36	349	341	299	2.77	1.48	1.00	21.0	8.38	100
			STD	3	4	4	0.06	0.01	0.05	0.5	0.14	0
			MAX	357	351	309	2.88	1.50	1.10	21.9	8.66	100
			MIN	344	335	292	2.67	1.46	0.91	19.9	8.15	100
681	42.00	37	AV37	345	333	288	2.84	1.48	1.06	21.0	8.30	100
			STD	4	5	7	0.08	0.02	0.06	1.1	0.29	0
			MAX	351	343	301	2.95	1.52	1.16	22.5	8.75	100
			MIN	333	320	272	2.61	1.41	0.87	17.7	7.46	100
722	43.00	41	AV41	330	319	273	2.69	1.42	0.95	18.4	7.60	100
			STD	4	2	4	0.04	0.01	0.04	0.4	0.12	0
			MAX	337	324	282	2.78	1.45	1.03	19.3	7.87	100
			MIN	323	314	264	2.56	1.40	0.84	17.3	7.28	100
764	44.00	42	AV42	318	312	264	2.72	1.40	0.99	18.5	7.54	100
			STD	4	3	5	0.04	0.01	0.03	0.5	0.10	0
			MAX	326	318	276	2.78	1.43	1.05	19.3	7.75	100
			MIN	307	306	253	2.60	1.38	0.88	17.1	7.25	100
803	45.00	39	AV39	312	304	257	2.77	1.40	1.05	19.3	7.62	100
			STD	3	3	3	0.04	0.01	0.03	0.5	0.10	0
			MAX	318	310	267	2.85	1.43	1.11	20.3	7.83	100
			MIN	306	298	252	2.69	1.37	0.98	18.3	7.42	100
842	46.00	39	AV39	311	299	254	2.79	1.40	1.07	19.7	7.61	100
			STD	3	2	4	0.03	0.01	0.03	0.4	0.11	0
			MAX	315	303	263	2.86	1.41	1.15	20.7	7.87	100
			MIN	305	294	247	2.72	1.38	1.01	18.8	7.39	100
888	47.00	46	AV46	293	283	255	2.55	1.36	0.90	16.0	6.83	100
			STD	10	9	9	0.13	0.02	0.10	1.8	0.41	0
			MAX	318	307	269	2.91	1.41	1.17	21.0	7.95	100
			MIN	274	270	235	2.44	1.34	0.81	14.5	6.51	100
937	48.00	49	AV49	279	275	248	2.50	1.36	0.88	15.4	6.65	100
			STD	3	4	10	0.05	0.01	0.05	0.6	0.15	0
			MAX	287	284	272	2.62	1.38	0.98	16.5	6.95	100
			MIN	272	266	232	2.39	1.34	0.78	14.3	6.37	100
986	49.00	49	AV49	272	270	239	2.49	1.36	0.88	15.3	6.57	100
			STD	4	5	12	0.05	0.01	0.04	0.5	0.13	0
			MAX	282	282	265	2.62	1.37	1.01	16.7	6.91	100
			MIN	263	260	222	2.41	1.34	0.80	14.5	6.37	100
1037	50.00	51	AV51	270	267	230	2.50	1.36	0.91	15.5	6.56	100
			STD	6	6	8	0.06	0.01	0.06	0.7	0.14	0
			MAX	279	277	256	2.60	1.38	1.06	16.5	6.82	100
			MIN	237	237	211	2.38	1.33	0.79	13.2	6.28	100
1083	51.00	46	AV46	269	267	236	2.56	1.37	0.99	15.7	6.41	100

I-10 OVER MOBILE RIVER - TP-10B-2 18" PSC, 77' LONG
OP: AFT Date: 13-March-2018

BL#	Depth ft	BLC bl/ft	TYPE	RX5 kips	RX6 kips	RA2 kips	CSX ksi	CSB ksi	TSX ksi	EMX k-ft	STK ft	BTA (%)
			STD	5	5	8	0.07	0.01	0.06	0.8	0.18	0
			MAX	278	277	255	2.70	1.40	1.12	17.1	6.79	100
			MIN	260	259	224	2.40	1.34	0.83	13.9	6.01	100
1132	52.00	49	AV49	263	261	231	2.49	1.36	0.94	15.0	6.26	100
			STD	4	4	7	0.05	0.01	0.05	0.6	0.14	0
			MAX	271	270	251	2.60	1.38	1.04	16.2	6.54	100
			MIN	256	252	215	2.38	1.34	0.85	13.7	6.01	100
1181	53.00	49	AV49	263	257	229	2.50	1.38	0.93	15.1	6.30	100
			STD	4	5	7	0.06	0.01	0.05	0.6	0.15	0
			MAX	273	271	243	2.63	1.40	1.04	16.6	6.63	100
			MIN	256	250	214	2.41	1.36	0.84	14.1	6.04	100
1230	54.00	49	AV49	266	255	224	2.51	1.39	0.93	15.4	6.35	100
			STD	3	5	7	0.06	0.01	0.05	0.6	0.14	0
			MAX	272	265	237	2.62	1.41	1.03	16.6	6.60	100
			MIN	259	245	208	2.39	1.37	0.81	14.0	6.06	100
1278	55.00	48	AV48	266	252	219	2.52	1.38	0.92	15.5	6.37	100
			STD	3	5	6	0.06	0.01	0.06	0.7	0.15	0
			MAX	273	263	234	2.64	1.41	1.03	16.8	6.66	100
			MIN	258	241	206	2.42	1.36	0.81	14.5	6.12	100
1325	56.00	47	AV47	268	247	216	2.54	1.37	0.92	15.6	6.40	100
			STD	3	6	6	0.07	0.01	0.06	0.7	0.16	0
			MAX	275	258	230	2.68	1.40	1.05	17.0	6.72	100
			MIN	263	234	205	2.41	1.34	0.79	14.3	6.09	100
1374	57.00	49	AV49	266	241	215	2.54	1.33	0.90	15.5	6.39	100
			STD	2	5	5	0.07	0.01	0.06	0.7	0.16	0
			MAX	271	253	228	2.70	1.34	1.04	17.1	6.79	100
			MIN	261	231	205	2.45	1.30	0.82	14.5	6.17	100
1424	58.00	50	AV50	270	240	220	2.55	1.31	0.88	15.5	6.41	100
			STD	3	4	5	0.07	0.01	0.06	0.7	0.16	0
			MAX	278	251	231	2.68	1.33	1.01	16.9	6.72	100
			MIN	263	231	208	2.39	1.28	0.76	13.9	6.06	100
1479	59.00	55	AV55	280	247	230	2.55	1.32	0.85	15.4	6.39	100
			STD	3	3	6	0.07	0.01	0.07	0.7	0.17	0
			MAX	286	254	244	2.71	1.36	1.00	17.0	6.79	100
			MIN	274	241	215	2.41	1.29	0.71	14.0	6.06	100
1533	60.00	54	AV54	283	250	231	2.58	1.36	0.83	15.8	6.49	100
			STD	3	4	6	0.07	0.01	0.07	0.8	0.18	0
			MAX	290	261	244	2.71	1.38	0.96	17.3	6.82	100
			MIN	276	242	217	2.44	1.34	0.71	14.3	6.14	100
1589	61.00	56	AV56	291	257	242	2.58	1.37	0.82	15.8	6.51	100
			STD	4	4	5	0.07	0.01	0.07	0.7	0.18	0
			MAX	300	267	253	2.73	1.40	0.95	17.3	6.91	100
			MIN	283	250	230	2.47	1.35	0.70	14.5	6.20	100

I-10 OVER MOBILE RIVER - TP-10B-2 18" PSC, 77' LONG
OP: AFT Date: 13-March-2018

BL#	Depth ft	BLC bl/ft	TYPE	RX5 kips	RX6 kips	RA2 kips	CSX ksi	CSB ksi	TSX ksi	EMX k-ft	STK ft	BTA (%)
1647	62.00	58	AV58	300	265	246	2.62	1.41	0.81	16.3	6.66	100
			STD	7	7	8	0.08	0.01	0.07	0.9	0.19	0
			MAX	308	276	267	2.77	1.43	0.93	17.7	7.01	100
			MIN	256	226	206	2.45	1.36	0.64	13.4	6.25	100
1717	63.00	70	AV70	369	337	312	2.14	1.63	0.17	14.1	6.59	100
			STD	23	24	23	0.25	0.04	0.12	2.4	0.65	0
			MAX	510	482	383	2.48	1.71	0.37	17.5	8.93	100
			MIN	352	320	281	1.18	1.50	0.05	8.6	5.75	100
1767	64.00	50	AV50	361	325	319	2.69	1.72	0.52	20.0	7.90	100
			STD	3	3	7	0.10	0.01	0.08	1.3	0.34	0
			MAX	366	332	333	2.81	1.74	0.61	21.5	8.23	100
			MIN	355	319	299	2.44	1.68	0.34	16.9	7.04	100
1814	65.00	47	AV47	364	328	322	2.80	1.72	0.59	21.1	8.33	100
			STD	2	3	5	0.03	0.01	0.03	0.3	0.14	0
			MAX	369	333	333	2.86	1.73	0.65	21.8	8.57	100
			MIN	358	320	309	2.75	1.70	0.53	20.3	8.07	100
1860	66.00	46	AV46	369	332	319	2.78	1.70	0.55	21.1	8.47	100
			STD	2	2	6	0.03	0.01	0.03	0.4	0.11	0
			MAX	373	337	334	2.87	1.72	0.63	22.1	8.75	100
			MIN	365	327	308	2.73	1.69	0.49	20.4	8.27	100
1909	67.00	49	AV49	373	337	317	2.69	1.69	0.44	20.4	8.44	100
			STD	2	2	6	0.05	0.01	0.05	0.5	0.13	0
			MAX	378	342	330	2.78	1.70	0.54	21.2	8.70	100
			MIN	369	332	307	2.57	1.67	0.33	19.1	8.15	100
1959	68.00	50	AV50	372	337	319	2.55	1.66	0.31	19.5	8.36	100
			STD	3	3	6	0.06	0.01	0.05	0.6	0.16	0
			MAX	380	343	333	2.69	1.68	0.42	21.0	8.70	100
			MIN	365	329	303	2.42	1.62	0.20	18.2	8.03	100
2008	69.00	49	AV49	363	330	339	2.46	1.57	0.24	19.1	8.49	100
			STD	3	2	11	0.04	0.03	0.03	0.4	0.14	0
			MAX	370	335	362	2.52	1.63	0.29	20.0	8.75	100
			MIN	358	326	316	2.37	1.51	0.16	18.2	8.19	100
2056	70.00	48	AV48	359	328	360	2.46	1.53	0.23	19.1	8.53	100
			STD	4	4	10	0.04	0.02	0.03	0.5	0.13	0
			MAX	368	337	381	2.55	1.60	0.32	20.2	8.89	100
			MIN	353	320	341	2.39	1.51	0.17	18.3	8.27	100
2105	71.00	49	AV49	377	345	374	2.56	1.70	0.24	19.9	8.66	100
			STD	6	6	6	0.05	0.06	0.03	0.4	0.11	0
			MAX	388	357	392	2.67	1.79	0.29	20.8	8.93	100
			MIN	363	331	358	2.46	1.60	0.17	18.9	8.44	100
2158	72.00	53	AV53	388	353	382	2.73	1.84	0.35	20.7	8.76	100
			STD	4	6	6	0.05	0.02	0.05	0.4	0.11	0

I-10 OVER MOBILE RIVER - TP-10B-2 18" PSC, 77' LONG
OP: AFT Date: 13-March-2018

BL#	Depth ft	BLC bl/ft	TYPE	RX5 kips	RX6 kips	RA2 kips	CSX ksi	CSB ksi	TSX ksi	EMX k-ft	STK ft	BTA (%)
			MAX	394	362	394	2.86	1.86	0.48	22.0	9.07	100
			MIN	378	338	371	2.63	1.80	0.25	19.7	8.57	100
2210	73.00	52	AV52	376	332	371	2.87	1.86	0.53	21.3	8.74	100
			STD	3	4	6	0.05	0.01	0.06	0.5	0.12	0
			MAX	383	343	384	2.97	1.89	0.64	22.3	9.03	100
			MIN	371	327	357	2.74	1.83	0.39	20.3	8.44	100
2263	74.00	53	AV53	376	331	373	3.02	1.89	0.68	22.4	8.92	100
			STD	2	3	5	0.07	0.01	0.07	0.8	0.19	0
			MAX	382	337	386	3.20	1.92	0.83	24.3	9.37	100
			MIN	371	326	361	2.86	1.85	0.54	20.7	8.57	100
2308	75.00	45	AV45	376	333	376	3.12	1.92	0.77	23.3	9.08	100
			STD	8	5	7	0.05	0.01	0.04	0.7	0.13	0
			MAX	384	339	389	3.22	1.94	0.92	24.4	9.47	100
			MIN	324	305	347	2.99	1.88	0.68	20.3	8.84	100
2333	75.50	50	AV25	359	325	370	3.16	1.87	0.92	22.7	8.47	100
			STD	40	37	43	0.59	0.23	0.29	5.9	1.28	0
			MAX	390	354	405	3.50	1.98	1.24	26.7	9.37	100
			MIN	223	196	225	1.21	1.09	0.08	4.0	4.16	100
			Average	322	303	283	2.51	1.44	0.72	17.5	7.32	100
			Std. Dev.	57	54	60	0.32	0.26	0.25	3.1	1.06	1
			Maximum	510	482	405	3.50	1.98	1.24	26.7	9.47	100
			Minimum	0	0	0	1.05	0.13	0.05	4.0	4.16	80

Total number of blows analyzed: 2333

BL#	Sensors
1-30	F3: [P454] 145.3 (1.00); F4: [P455] 145.8 (1.00); A3: [K5647] 334.0 (1.00); A4: [K5362] 346.0 (1.00)
31-2333	F3: [P454] 145.3 (0.98); F4: [P455] 145.8 (0.98); A3: [K5647] 334.0 (1.02); A4: [K5362] 346.0 (1.02)

BL#	Comments
1647	CHANGE PILE CUSHION, MOVE TEMPLATE

Time Summary

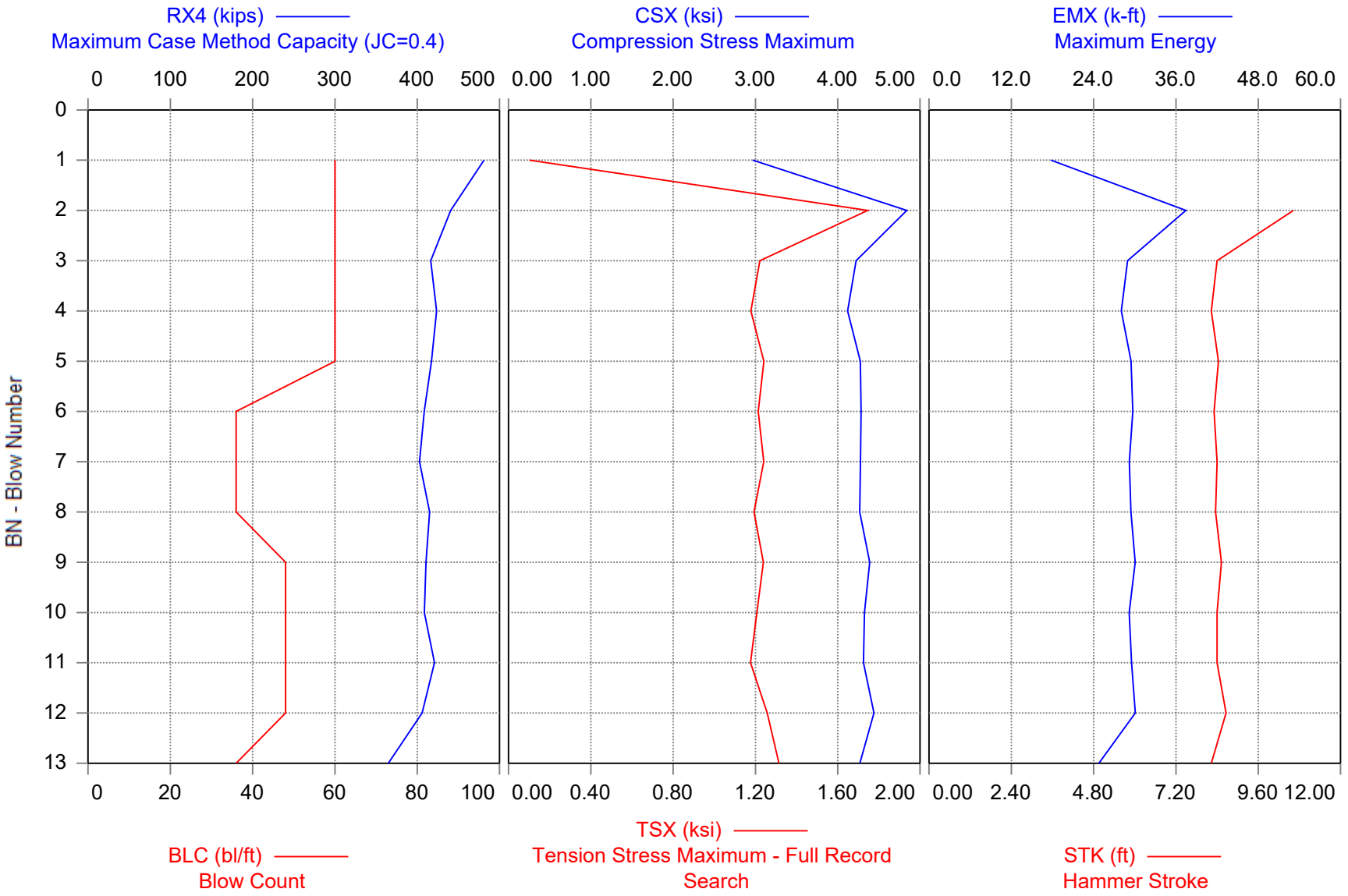
Drive	41 minutes 16 seconds	1:17 PM - 1:59 PM (3/13/2018) BN 1 - 1647
Stop	1 hours 12 minutes 52 seconds	1:59 PM - 3:11 PM
Drive	23 minutes 6 seconds	3:11 PM - 3:35 PM BN 1648 - 2333

Total time [02:17:16] = (Driving [01:04:23] + Stop [01:12:52])

Applied Foundation Testing, Inc. - PDIPLOT2 Ver 2017.2.58.3 - Case Method & iCAP® Results

Printed: 28-March-2018 Test started: 14-March-2018

I-10 OVER MOBILE RIVER - TP-10B-2 1 DAY RESTRIKE



I-10 OVER MOBILE RIVER - TP-10B-2 1 DAY RESTRIKE 18" PSC, 77' LONG
OP: AFT Date: 14-March-2018

AR: 324.00 in² SP: 0.150 k/ft³
LE: 74.00 ft EM: 6,436.67 ksi
WS: 14,100.0 f/s JC: 0.40

RX4: Maximum Case Method Capacity (JC=0.4) TSX: Tension Stress Maximum - Full Record Search
RX5: Maximum Case Method Capacity (JC=0.5) EMX: Maximum Energy
RA2: Auto Capacity Friction Piles STK: Hammer Stroke
CSX: Compression Stress Maximum BTA: Integrity Factor (1)
CSB: Compression Stress at Bottom of Pile

BL#	BLC	RX4	RX5	RA2	CSX	CSB	TSX	EMX	STK	BTA
	bl/ft	kips	kips	kips	ksi	ksi	ksi	k-ft	ft	(%)
1	60	481	428	405	2.97	2.30	0.10	17.8	0.00	100
2	60	441	404	440	4.84	2.44	1.75	37.4	10.63	100
3	60	416	376	394	4.22	2.44	1.22	28.9	8.40	100
4	60	424	383	383	4.12	2.39	1.18	28.0	8.23	100
5	60	417	376	388	4.27	2.45	1.24	29.5	8.44	100
6	36	408	366	380	4.28	2.42	1.21	29.7	8.31	100
7	36	403	361	373	4.28	2.52	1.24	29.2	8.40	100
8	36	415	373	378	4.27	2.40	1.19	29.4	8.36	100
9	48	411	371	392	4.39	2.49	1.24	30.0	8.53	100
10	48	409	369	391	4.33	2.46	1.21	29.2	8.40	100
11	48	421	381	387	4.31	2.46	1.18	29.5	8.40	100
12	48	406	370	384	4.44	2.54	1.26	30.1	8.66	100
13	36	365	312	339	4.27	2.72	1.31	24.8	8.23	100
Average		417	375	387	4.23	2.46	1.18	28.7	8.58	100
Std. Dev.		25	25	21	0.40	0.10	0.34	4.1	0.63	0
Maximum		481	428	440	4.84	2.72	1.75	37.4	10.63	100
Minimum		365	312	339	2.97	2.30	0.10	17.8	8.23	100

Total number of blows analyzed: 13

BL# Sensors

1-13 F3: [P454] 145.3 (1.00); F4: [P455] 145.8 (1.00); A3: [K5647] 334.0 (1.00); A4: [K5362] 346.0 (1.00)

BL# Comments

13 5BL/1", 3BL/1", 4BL/1", 1BL/.33"

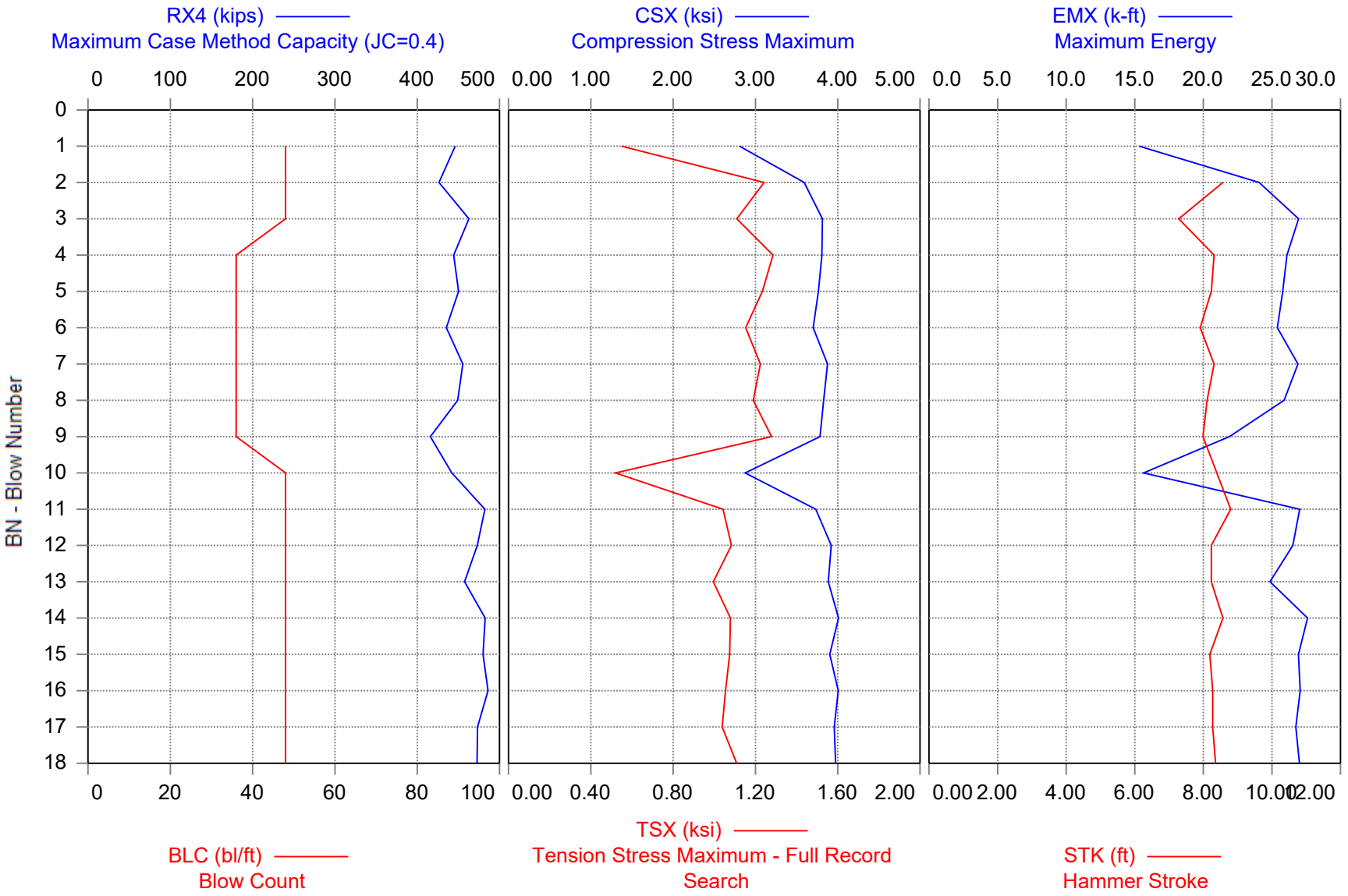
Time Summary

Drive 17 seconds 2:11 PM - 2:12 PM BN 1 - 13

Applied Foundation Testing, Inc. - PDIPLOT2 Ver 2017.2.58.3 - Case Method & iCAP® Results

Printed: 28-March-2018 Test started: 26-March-2018

I-10 OVER MOBILE RIVER - TP-10B-2 13 DAY RESTRIKE



I-10 OVER MOBILE RIVER - TP-10B-2 13 DAY RESTRIKE 18" PSC, 77' LONG
OP: AFT Date: 26-March-2018

AR: 324.00 in² SP: 0.150 k/ft³
LE: 74.00 ft EM: 6,436.67 ksi
WS: 14,100.0 f/s JC: 0.40

RX4: Maximum Case Method Capacity (JC=0.4)
RX5: Maximum Case Method Capacity (JC=0.5)
RA2: Auto Capacity Friction Piles
CSX: Compression Stress Maximum
CSB: Compression Stress at Bottom of Pile
TSX: Tension Stress Maximum - Full Record Search
EMX: Maximum Energy
STK: Hammer Stroke
BTA: Integrity Factor (1)

BL#	BLC	RX4	RX5	RA2	CSX	CSB	TSX	EMX	STK	BTA
	bl/ft	kips	kips	kips	ksi	ksi	ksi	k-ft	ft	(%)
1	48	446	401	432	2.81	1.98	0.55	15.3	0.00	100
2	48	426	395	417	3.59	1.90	1.24	24.1	8.57	100
3	48	463	444	465	3.81	2.08	1.11	26.9	7.28	100
4	36	444	413	397	3.81	2.15	1.29	26.1	8.31	100
5	36	450	415	409	3.76	2.13	1.23	25.8	8.23	100
6	36	435	399	421	3.70	2.03	1.15	25.4	7.91	100
7	36	455	422	401	3.87	2.24	1.22	26.9	8.31	100
8	36	449	415	402	3.83	2.16	1.19	25.9	8.11	100
9	36	416	396	384	3.78	2.29	1.28	21.9	7.99	100
10	48	442	397	404	2.87	1.91	0.52	15.6	0.00	100
11	48	482	433	495	3.73	2.09	1.04	27.0	8.79	100
12	48	473	429	449	3.92	2.29	1.08	26.5	8.23	100
13	48	458	407	454	3.88	2.24	1.00	24.9	8.23	100
14	48	482	441	478	4.01	2.34	1.08	27.6	8.57	100
15	48	480	431	466	3.90	2.22	1.07	26.9	8.19	100
16	48	486	443	467	4.01	2.33	1.05	27.1	8.27	100
17	48	473	426	460	3.96	2.29	1.04	26.7	8.27	100
18	48	473	427	458	3.97	2.31	1.11	27.0	8.36	100
Average		457	419	437	3.74	2.17	1.07	24.9	8.23	100
Std. Dev.		20	16	32	0.33	0.14	0.21	3.6	0.32	0
Maximum		486	444	495	4.01	2.34	1.29	27.6	8.79	100
Minimum		416	395	384	2.81	1.90	0.52	15.3	7.28	100

Total number of blows analyzed: 18

BL# Sensors

1-2 F3: [P454] 145.3 (1.00); F4: [P455] 145.8 (1.00); A3: [K5647] 334.0 (1.00); A4: [K5362] 346.0 (1.00)
3-10 F3: [P454] 145.3 (1.00); F4: [P455] 145.8 (1.00); A3: off; A4: [K5362] 346.0 (1.00)
11-18 F3: [P454] 145.3 (1.00); F4: [P455] 145.8 (1.00); A3: [K5647] 334.0 (1.00); A4: [K5362] 346.0 (1.00)

BL# Comments

9 4BL/1", 3BL/1", 3BL/1"
10 DUE TO SPALLING AT PILE TOP AN ADDITIONAL 2 INCHES OF DATA GATHERED
18 4BL/1", 4BL/1", 1BL/0.25"

Time Summary

Drive 9 minutes 5 seconds 3:15 PM - 3:24 PM BN 1 - 18

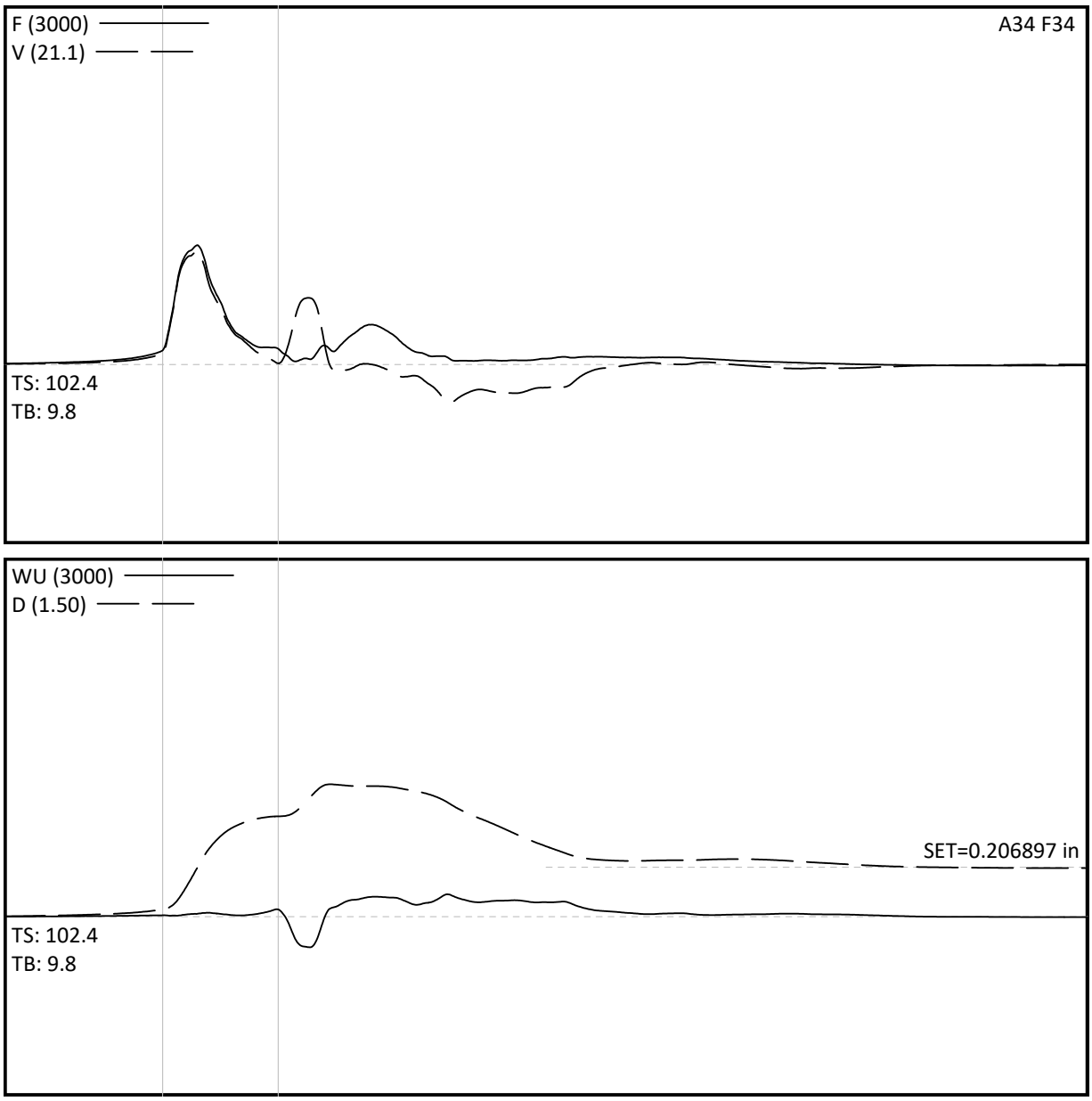
Appendix C

CAPWAP Signal Matching Analysis Output
TP-10B-1 and TP-10B-2

I-10 over Mobile River Bridge Load Test Program

ALDOT Project No.: IM-I010(341)
Mobile County, Alabama
AFT Project No.: 118008

I-10 OVER MOBILE RIVER TP-10B-1



Project Information

PROJECT: I-10 OVER MOBILE RIVER
PILE NAME: TP-10B-1
DESCR: 18'' PSC, 77' LONG
OPERATOR: AFT
FILE: TP-10B-1 ana
3/12/2018 7:08:31 PM
Blow Number 2594

Pile Properties

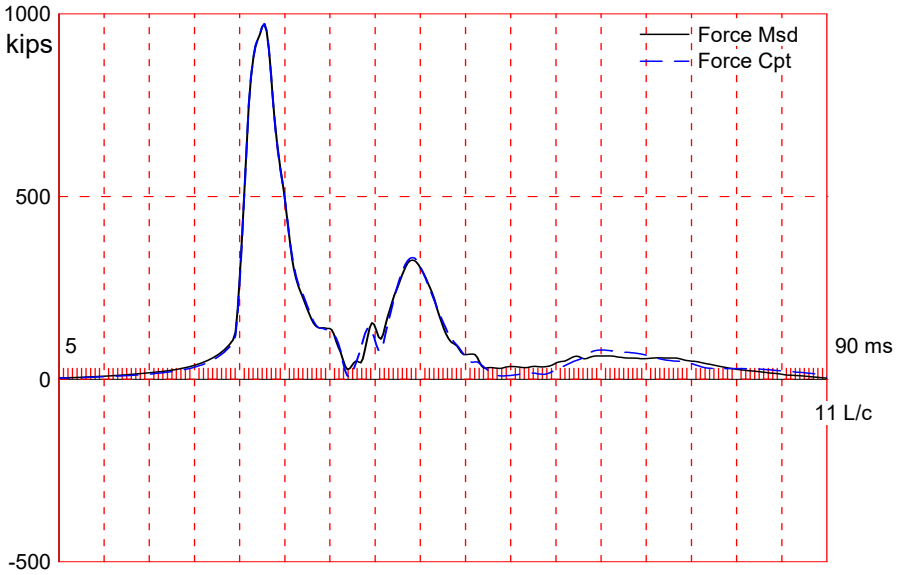
LE	74.00 ft
AR	324.00 in^2
EM	5970.66 ksi
SP	0.150 k/ft3
WS	13580.0 f/s
EA/C	142.5 ksec/ft
2L/C	10.90 ms
JC	0.57 []
LP	74.97 ft

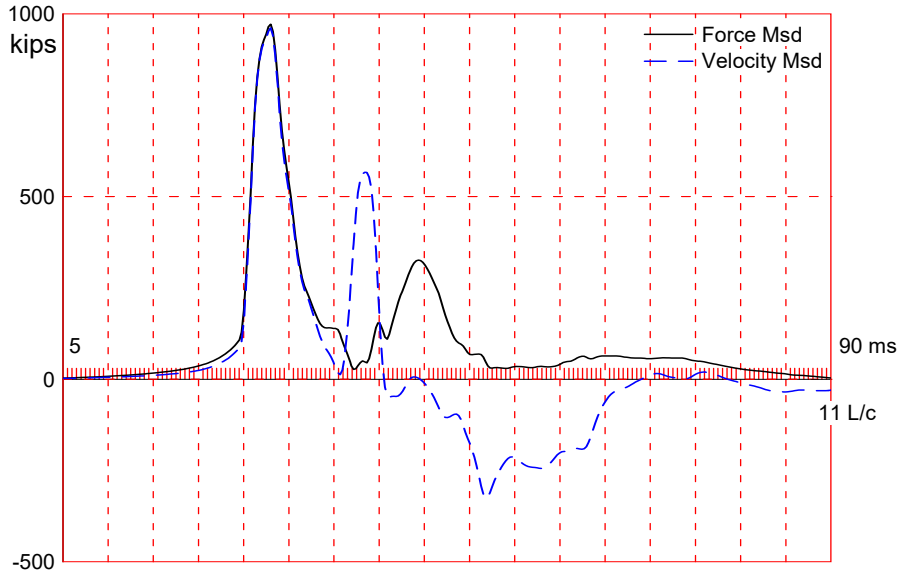
Quantity Results

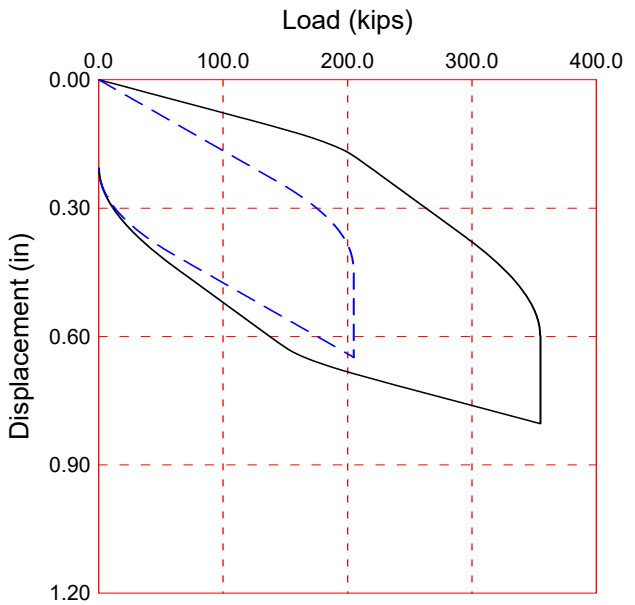
RMX	361 kips
RX6	345 kips
RA2	333 kips
CSX	3.08 ksi
CSB	1.94 ksi
TSX	0.59 ksi
EMX	23.4 k-ft
STK	8.75 ft
BTA	100 (%)

Sensors

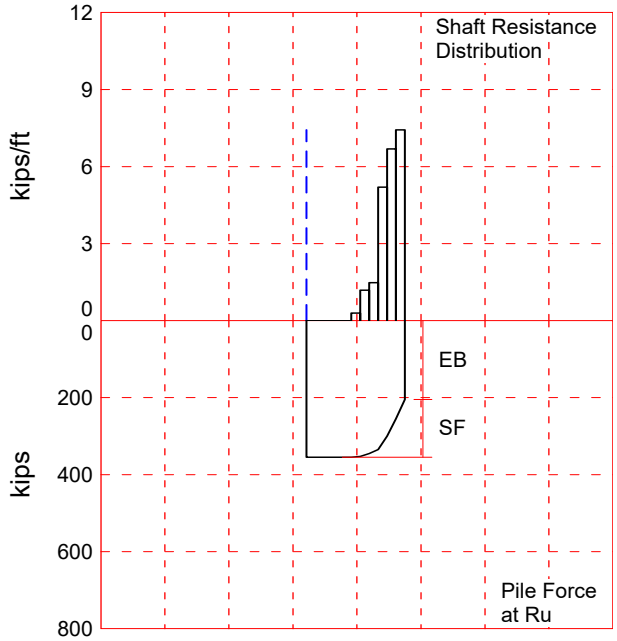
F3: [P454] 145.3 (0.97)
F4: [P455] 145.8 (0.97)
A3: [K5647] 334 mv/5000g's (1.03)
A4: [K5362] 346 mv/5000g's (1.03)
CLIP: OK







RU =	355.0 kips
SF =	150.0 kips
EB =	205.0 kips
Dy =	0.60 in
Dx =	0.80 in
SET/Bl =	0.21 in



Length b. Sensors	74.0 ft
Embedment	72.5 ft
Top Area	324.0 in^2
End Bearing Area	324.0 in^2
Top Perimeter	6.00 ft
Top E-Modulus	5971 ksi
Top Spec. Weight	150.0 lb/ft^3
Top Wave Spd.	13580 ft/s
Overall W.S.	13578 ft/s
Match Quality	2.34
Top Compr. Stress	3.0 ksi
Max Compr. Stress	3.1 ksi
Max Tension Stress	-0.62 ksi
Avg. Shaft Quake	0.07 in
Toe Quake	0.34 in
Avg. Shaft Smith Dpg.	0.20 s/ft
Toe Smith Damping	0.25 s/ft

About the CAPWAP Results

The CAPWAP program performs a signal matching or reverse analysis based on measurements taken on a deep foundation under an impact load. The program is based on a one-dimensional mathematical model. Under certain conditions, the model only crudely approximates the often complex dynamic situations.

The CAPWAP analysis relies on the input of accurately measured dynamic data plus additional parameters describing pile and soil behavior. If the field measurements of force and velocity are incorrect or were taken under inappropriate conditions (e.g., at an inappropriate time or with too much or too little energy) or if the input pile model is incorrect, then the solution cannot represent the actual soil behavior.

Generally the CAPWAP analysis is used to estimate the axial compressive pile capacity and the soil resistance distribution. The long-term capacity is best evaluated with restrike tests since they incorporate soil strength changes (set-up gains or relaxation losses) that occur after installation. The calculated load settlement graph does not consider creep or long term consolidation settlements. When uplift is a controlling factor in the design, use of the CAPWAP results to assess uplift capacity should be made only after very careful analysis of only good measurement quality, and further used only with longer pile lengths and with nominally higher safety factors.

CAPWAP is also used to evaluate driving stresses along the length of the pile. However, it should be understood that the analysis is one dimensional and does not take into account bending effects or local contact stresses at the pile toe.

Furthermore, if the user of this software was not able to produce a solution with satisfactory signal “match quality” (MQ), then the associated CAPWAP results may be unreliable. There is no absolute scale for solution acceptability but solutions with MQ above 5 are generally considered less reliable than those with lower MQ values and every effort should be made to improve the analysis, for example, by getting help from other independent experts.

Considering the CAPWAP model limitations, the nature of the input parameters, the complexity of the analysis procedure, and the need for a responsible application of the results to actual construction projects, it is recommended that at least one static load test be performed on sites where little experience exists with dynamic behavior of the soil resistance or when the experience of the analyzing engineer with both program use and result application is limited.

Finally, the CAPWAP capacities are ultimate values. They MUST be reduced by means of an appropriate factor of safety to yield a design or working load. The selection of a factor of safety should consider the quality of the construction control, the variability of the site conditions, uncertainties in the loads, the importance of structure and other factors. The CAPWAP results should be reviewed by the Engineer of Record with consideration of applicable geotechnical conditions including, but not limited to, group effects, potential settlement from underlying compressible layers, soil resistances provided from any layers unsuitable for long term support, as well as effective stress changes due to soil surcharges, excavation or change in water table elevation.

The CAPWAP analysis software is one of many means by which the capacity of a deep foundation can be assessed. The engineer performing the analysis is responsible for proper software application and the analysis results. Pile Dynamics accepts no liability whatsoever of any kind for the analysis solution and/or the application of the analysis result.

CAPWAP SUMMARY RESULTS

Total CAPWAP Capacity: 355.0; along Shaft 150.0; at Toe 205.0 kips

Soil Sgmnt No.	Dist. Below Gages ft	Depth Below Grade ft	Ru kips	Force in Pile kips	Sum of Ru kips	Unit Resist. (Depth) kips/ft	Unit Resist. (Area) ksf	Smith Damping Factor s/ft
				355.0				
1	6.7	5.2	0.0	355.0	0.0	0.00	0.00	0.00
2	13.5	12.0	0.0	355.0	0.0	0.00	0.00	0.00
3	20.2	18.7	0.0	355.0	0.0	0.00	0.00	0.00
4	26.9	25.4	0.0	355.0	0.0	0.00	0.00	0.00
5	33.6	32.1	0.0	355.0	0.0	0.00	0.00	0.00
6	40.4	38.9	2.0	353.0	2.0	0.30	0.05	0.20
7	47.1	45.6	8.0	345.0	10.0	1.19	0.20	0.20
8	53.8	52.3	10.0	335.0	20.0	1.49	0.25	0.20
9	60.5	59.0	35.0	300.0	55.0	5.20	0.87	0.20
10	67.3	65.8	45.0	255.0	100.0	6.69	1.11	0.20
11	74.0	72.5	50.0	205.0	150.0	7.43	1.24	0.20
Avg. Shaft			13.6			2.07	0.34	0.20
Toe			205.0				91.11	0.25

Soil Model Parameters/Extensions		Shaft	Toe
Quake	(in)	0.07	0.34
Case Damping Factor		0.21	0.36
Damping Type		Viscous	Sm+Visc
Unloading Quake	(% of loading quake)	30	54
Reloading Level	(% of Ru)	100	100
Unloading Level	(% of Ru)	0	
Soil Plug Weight	(kips)		0.278

CAPWAP match quality = 2.34 (Wave Up Match) ; RSA = 0
Observed: Final Set = 0.21 in; Blow Count = 58 b/ft
Computed: Final Set = 0.21 in; Blow Count = 58 b/ft

max. Top Comp. Stress = 3.0 ksi (T= 28.2 ms, max= 1.029 x Top)
max. Comp. Stress = 3.1 ksi (Z= 47.1 ft, T= 31.5 ms)
max. Tens. Stress = -0.62 ksi (Z= 13.5 ft, T= 36.9 ms)
max. Energy (EMX) = 23.4 kip-ft; max. Measured Top Displ. (DMX)= 0.56 in

EXTREMA TABLE

Pile Sgmnt No.	Dist. Below Gages ft	max. Force kips	min. Force kips	max. Comp. Stress ksi	max. Tens. Stress ksi	max. Trnsfd. Energy kip-ft	max. Veloc. ft/s	max. Displ. in
1	3.4	974.0	-75.5	3.0	-0.23	23.4	6.7	0.57
2	6.7	974.4	-138.6	3.0	-0.43	23.4	6.7	0.56
3	10.1	974.9	-186.1	3.0	-0.57	23.3	6.7	0.56
4	13.5	975.4	-201.9	3.0	-0.62	23.3	6.7	0.56
5	16.8	975.9	-189.6	3.0	-0.59	23.2	6.7	0.55
6	20.2	976.5	-173.1	3.0	-0.53	23.1	6.7	0.54
7	23.5	977.4	-160.4	3.0	-0.50	23.1	6.7	0.54
8	26.9	978.8	-150.2	3.0	-0.46	23.0	6.7	0.53
9	30.3	981.0	-131.9	3.0	-0.41	22.8	6.7	0.52
10	33.6	983.8	-103.8	3.0	-0.32	22.7	6.6	0.52
11	37.0	987.6	-68.3	3.0	-0.21	22.6	6.6	0.51
12	40.4	991.6	-32.6	3.1	-0.10	22.5	6.6	0.50
13	43.7	994.0	-26.5	3.1	-0.08	22.3	6.5	0.50
14	47.1	1002.5	-33.3	3.1	-0.10	22.2	6.5	0.49
15	50.5	996.7	-36.8	3.1	-0.11	21.6	6.4	0.48
16	53.8	988.4	-40.7	3.1	-0.13	21.5	6.6	0.48
17	57.2	936.4	-41.2	2.9	-0.13	20.7	7.5	0.47
18	60.5	897.8	-44.2	2.8	-0.14	20.7	8.1	0.47
19	63.9	750.1	-40.7	2.3	-0.13	18.0	8.5	0.47
20	67.3	639.5	-45.5	2.0	-0.14	18.0	8.6	0.46
21	70.6	502.6	-41.1	1.6	-0.13	14.5	8.4	0.46
22	74.0	565.1	-46.5	1.7	-0.14	11.0	8.2	0.45
Absolute	47.1			3.1			(T =	31.5 ms)
	13.5				-0.62		(T =	36.9 ms)

CASE METHOD

J =	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
RP	676.9	557.3	437.6	318.0	198.4	78.7	0.0	0.0	0.0	0.0
RX	729.8	623.9	555.1	499.2	443.6	390.6	339.1	322.0	320.8	319.6
RU	676.9	557.3	437.6	318.0	198.4	78.7	0.0	0.0	0.0	0.0

RAU = 315.6 (kips); RA2 = 326.7 (kips)

Current CAPWAP Ru = 355.0 (kips); Corresponding J(RP)= 0.27; J(RX) = 0.57

VMX	TVP	VT1*Z	FT1	FMX	DMX	DFN	SET	EMX	QUS	KEB
ft/s	ms	kips	kips	kips	in	in	in	kip-ft	kips	kips/in
6.8	27.99	930.6	942.6	977.0	0.56	0.21	0.21	23.4	728.5	603

PILE PROFILE AND PILE MODEL

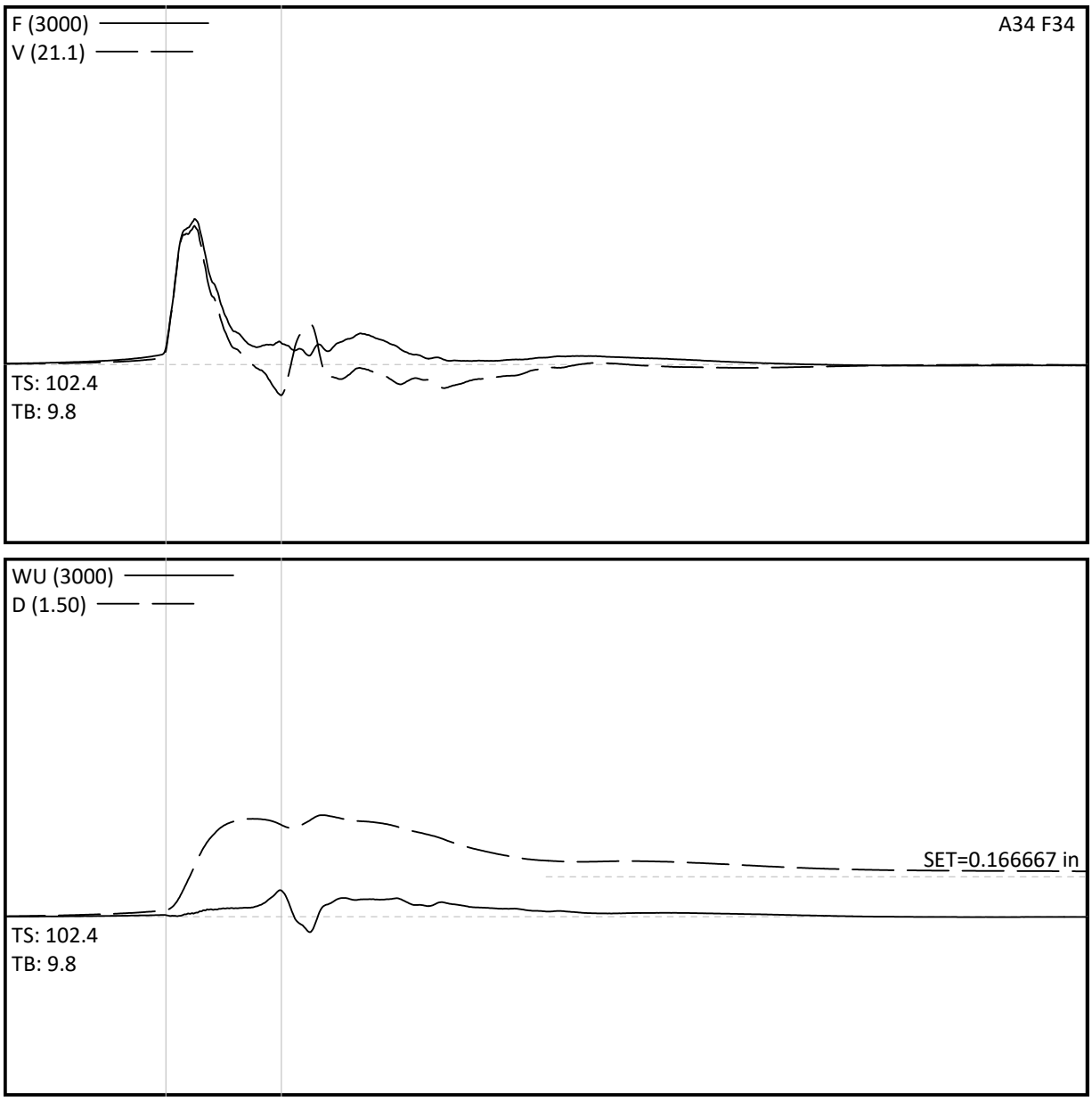
Depth ft	Area in^2	E-Modulus ksi	Spec. Weight lb/ft^3	Perim. ft
0.0	324.0	5970.7	150.000	6.00
74.0	324.0	5970.7	150.000	6.00

Toe Area 324.0 in^2

Top Segment Length 3.36 ft, Top Impedance 142 kips/ft/s

Wave Speed: Pile Top 13580.0, Elastic 13580.0, Overall 13578.0 ft/s
Pile Damping 2.00 %, Time Incr 0.248 ms, 2L/c 10.9 ms
Total volume: 166.500 ft^3; Volume ratio considering added impedance: 1.000

I-10 OVER MOBILE RIVER TP-10B-1 1 DAY RESTRIKE



Project Information

PROJECT: I-10 OVER MOBILE RIVER
PILE NAME: TP-10B-1 1 DAY RESTRIKE
DESCR: 18'' PSC, 77' LONG
OPERATOR: AFT
FILE: TP-10B-1 1 DAY RESTRIKE ana
3/13/2018 3:57:29 PM
Blow Number 2

Pile Properties

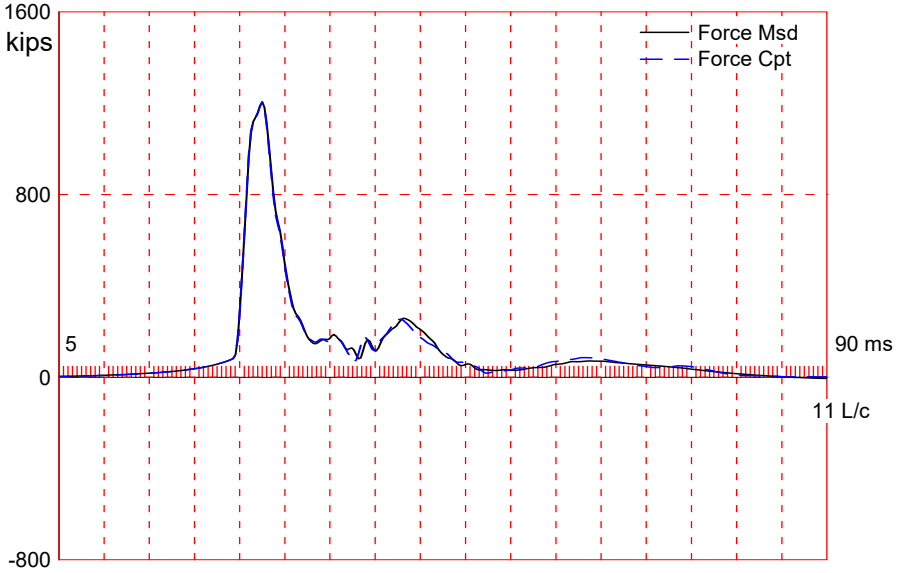
LE	74.00 ft
AR	324.00 in^2
EM	5970.66 ksi
SP	0.150 k/ft3
WS	13580.0 f/s
EA/C	142.5 ksec/ft
2L/C	10.90 ms
JC	0.52 []
LP	72.53 ft

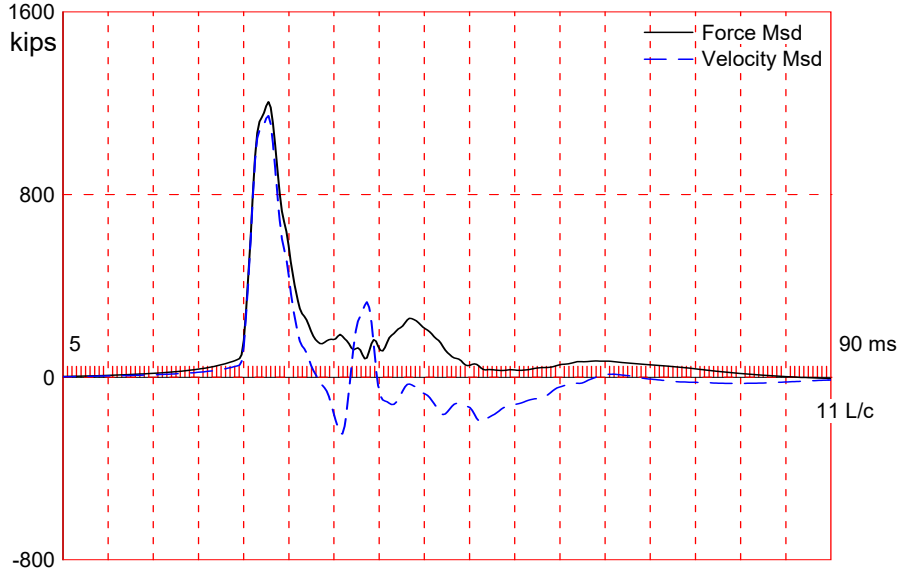
Quantity Results

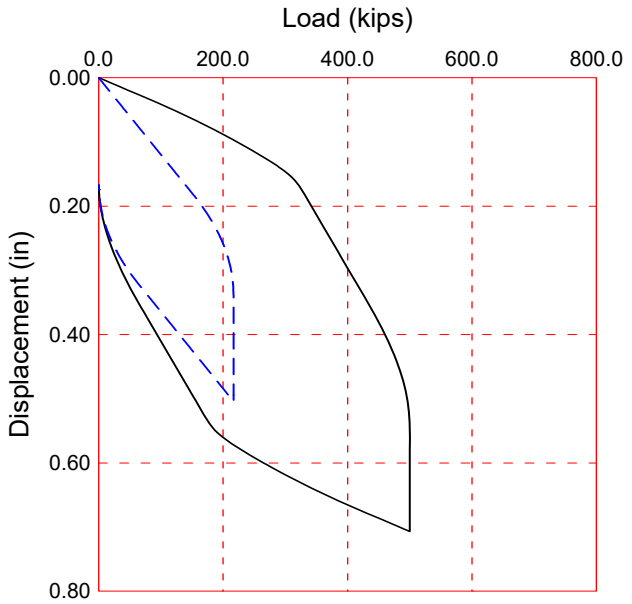
RMX	506 kips
RX6	446 kips
RA2	437 kips
CSX	3.76 ksi
CSB	2.17 ksi
TSX	0.52 ksi
EMX	29.0 k-ft
STK	9.62 ft
BTA	100 (%)

Sensors

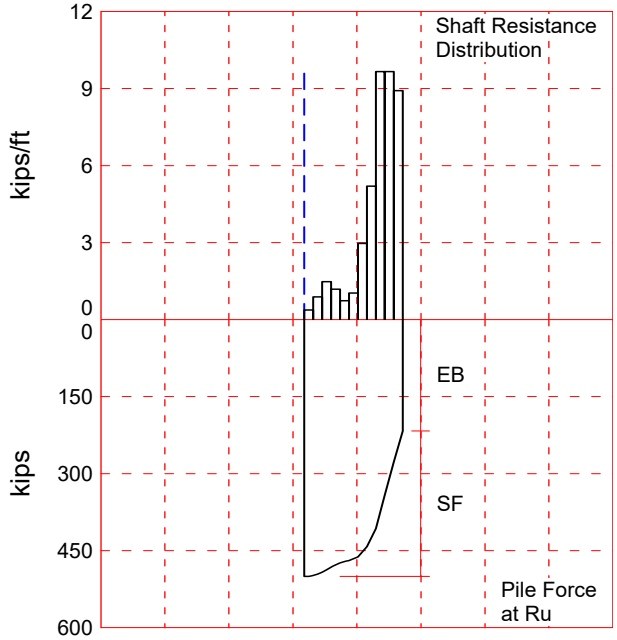
F3: [P454] 145.3 (0.97)
F4: [P455] 145.8 (0.97)
A3: [K5647] 334 mv/5000g's (1.03)
A4: [K5362] 346 mv/5000g's (1.03)
CLIP: OK







RU =	500.0 kips
SF =	283.0 kips
EB =	217.0 kips
Dy =	0.54 in
Dx =	0.71 in
SET/Bl =	0.17 in



Length b. Sensors	74.0 ft
Embedment	72.5 ft
Top Area	324.0 in^2
End Bearing Area	324.0 in^2
Top Perimeter	6.00 ft
Top E-Modulus	5971 ksi
Top Spec. Weight	150.0 lb/ft^3
Top Wave Spd.	13580 ft/s
Overall W.S.	13578 ft/s
Match Quality	1.73
Top Compr. Stress	3.7 ksi
Max Compr. Stress	3.8 ksi
Max Tension Stress	-0.49 ksi
Avg. Shaft Quake	0.04 in
Toe Quake	0.26 in
Avg. Shaft Smith Dpg.	0.22 s/ft
Toe Smith Damping	0.27 s/ft

About the CAPWAP Results

The CAPWAP program performs a signal matching or reverse analysis based on measurements taken on a deep foundation under an impact load. The program is based on a one-dimensional mathematical model. Under certain conditions, the model only crudely approximates the often complex dynamic situations.

The CAPWAP analysis relies on the input of accurately measured dynamic data plus additional parameters describing pile and soil behavior. If the field measurements of force and velocity are incorrect or were taken under inappropriate conditions (e.g., at an inappropriate time or with too much or too little energy) or if the input pile model is incorrect, then the solution cannot represent the actual soil behavior.

Generally the CAPWAP analysis is used to estimate the axial compressive pile capacity and the soil resistance distribution. The long-term capacity is best evaluated with restrike tests since they incorporate soil strength changes (set-up gains or relaxation losses) that occur after installation. The calculated load settlement graph does not consider creep or long term consolidation settlements. When uplift is a controlling factor in the design, use of the CAPWAP results to assess uplift capacity should be made only after very careful analysis of only good measurement quality, and further used only with longer pile lengths and with nominally higher safety factors.

CAPWAP is also used to evaluate driving stresses along the length of the pile. However, it should be understood that the analysis is one dimensional and does not take into account bending effects or local contact stresses at the pile toe.

Furthermore, if the user of this software was not able to produce a solution with satisfactory signal “match quality” (MQ), then the associated CAPWAP results may be unreliable. There is no absolute scale for solution acceptability but solutions with MQ above 5 are generally considered less reliable than those with lower MQ values and every effort should be made to improve the analysis, for example, by getting help from other independent experts.

Considering the CAPWAP model limitations, the nature of the input parameters, the complexity of the analysis procedure, and the need for a responsible application of the results to actual construction projects, it is recommended that at least one static load test be performed on sites where little experience exists with dynamic behavior of the soil resistance or when the experience of the analyzing engineer with both program use and result application is limited.

Finally, the CAPWAP capacities are ultimate values. They MUST be reduced by means of an appropriate factor of safety to yield a design or working load. The selection of a factor of safety should consider the quality of the construction control, the variability of the site conditions, uncertainties in the loads, the importance of structure and other factors. The CAPWAP results should be reviewed by the Engineer of Record with consideration of applicable geotechnical conditions including, but not limited to, group effects, potential settlement from underlying compressible layers, soil resistances provided from any layers unsuitable for long term support, as well as effective stress changes due to soil surcharges, excavation or change in water table elevation.

The CAPWAP analysis software is one of many means by which the capacity of a deep foundation can be assessed. The engineer performing the analysis is responsible for proper software application and the analysis results. Pile Dynamics accepts no liability whatsoever of any kind for the analysis solution and/or the application of the analysis result.

CAPWAP SUMMARY RESULTS

Total CAPWAP Capacity: 500.0; along Shaft 283.0; at Toe 217.0 kips

Soil Sgmnt No.	Dist. Below Gages ft	Depth Below Grade ft	Ru kips	Force in Pile kips	Sum of Ru kips	Unit Resist. (Depth) kips/ft	Unit Resist. (Area) ksf
				500.0			
1	6.7	5.3	2.0	498.0	2.0	0.38	0.06
2	13.5	12.0	6.0	492.0	8.0	0.89	0.15
3	20.2	18.7	10.0	482.0	18.0	1.49	0.25
4	26.9	25.4	8.0	474.0	26.0	1.19	0.20
5	33.6	32.2	5.0	469.0	31.0	0.74	0.12
6	40.4	38.9	7.0	462.0	38.0	1.04	0.17
7	47.1	45.6	20.0	442.0	58.0	2.97	0.50
8	53.8	52.3	35.0	407.0	93.0	5.20	0.87
9	60.5	59.1	65.0	342.0	158.0	9.66	1.61
10	67.3	65.8	65.0	277.0	223.0	9.66	1.61
11	74.0	72.5	60.0	217.0	283.0	8.92	1.49
Avg. Shaft			25.7			3.90	0.65
Toe			217.0				96.44

Soil Model Parameters/Extensions		Shaft	Toe
Smith Damping Factor		0.22	0.27
Quake	(in)	0.04	0.26
Case Damping Factor		0.44	0.41
Damping Type		Viscous	Sm+Visc
Unloading Quake	(% of loading quake)	30	62
Reloading Level	(% of Ru)	100	100
Unloading Level	(% of Ru)	0	
Soil Plug Weight	(kips)		0.750

CAPWAP match quality = 1.73 (Wave Up Match) ; RSA = 0
Observed: Final Set = 0.17 in; Blow Count = 72 b/ft
Computed: Final Set = 0.17 in; Blow Count = 72 b/ft

max. Top Comp. Stress = 3.7 ksi (T= 28.0 ms, max= 1.030 x Top)
max. Comp. Stress = 3.8 ksi (Z= 53.8 ft, T= 31.7 ms)
max. Tens. Stress = -0.49 ksi (Z= 13.5 ft, T= 36.9 ms)
max. Energy (EMX) = 28.9 kip-ft; max. Measured Top Displ. (DMX)= 0.42 in

EXTREMA TABLE

Pile Sgmnt No.	Dist. Below Gages ft	max. Force kips	min. Force kips	max. Comp. Stress ksi	max. Tens. Stress ksi	max. Trnsfd. Energy kip-ft	max. Veloc. ft/s	max. Displ. in
1	3.4	1208.6	-9.5	3.7	-0.03	28.9	8.0	0.43
2	6.7	1214.2	-64.6	3.7	-0.20	28.8	8.0	0.42
3	10.1	1214.5	-134.6	3.7	-0.42	28.6	7.9	0.42
4	13.5	1220.0	-159.9	3.8	-0.49	28.6	7.9	0.41
5	16.8	1208.7	-145.9	3.7	-0.45	28.1	7.9	0.40
6	20.2	1213.1	-125.8	3.7	-0.39	28.0	7.8	0.40
7	23.5	1190.5	-99.9	3.7	-0.31	27.2	7.8	0.39
8	26.9	1195.5	-81.1	3.7	-0.25	27.1	7.7	0.39
9	30.3	1181.0	-81.5	3.6	-0.25	26.5	7.7	0.39
10	33.6	1190.4	-59.3	3.7	-0.18	26.5	7.6	0.39
11	37.0	1191.3	-35.9	3.7	-0.11	26.1	7.5	0.39
12	40.4	1206.6	-8.7	3.7	-0.03	26.1	7.4	0.39
13	43.7	1211.9	-8.6	3.7	-0.03	25.6	7.2	0.39
14	47.1	1236.1	-8.6	3.8	-0.03	25.6	7.1	0.38
15	50.5	1220.3	-8.2	3.8	-0.03	24.3	6.8	0.38
16	53.8	1245.4	-8.2	3.8	-0.03	24.2	6.6	0.38
17	57.2	1160.9	-7.6	3.6	-0.02	22.0	6.7	0.37
18	60.5	1118.5	-7.5	3.5	-0.02	22.0	7.6	0.37
19	63.9	925.4	-6.4	2.9	-0.02	17.8	8.4	0.36
20	67.3	825.3	-6.4	2.5	-0.02	17.8	8.7	0.36
21	70.6	561.5	-5.3	1.7	-0.02	13.5	8.6	0.35
22	74.0	639.5	-5.2	2.0	-0.02	9.7	8.4	0.35
Absolute	53.8			3.8			(T =	31.7 ms)
	13.5				-0.49		(T =	36.9 ms)

CASE METHOD

J =	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
RP	1035.3	913.8	792.2	670.6	549.0	427.5	305.9	184.3	62.7	0.0
RX	1055.7	927.6	802.8	693.9	601.1	518.1	442.3	376.1	347.4	328.1
RU	1083.2	966.4	849.6	732.8	616.0	499.2	382.4	265.6	148.8	32.0

RAU = 276.1 (kips); RA2 = 438.7 (kips)

Current CAPWAP Ru = 500.0 (kips); Corresponding J(RP)= 0.44; J(RX) = 0.52

VMX	TVP	VT1*Z	FT1	FMX	DMX	DFN	SET	EMX	QUS	KEB
ft/s	ms	kips	kips	kips	in	in	in	kip-ft	kips	kips/in
8.1	27.75	1100.1	1151.0	1211.4	0.42	0.16	0.17	29.0	1176.1	835

PILE PROFILE AND PILE MODEL

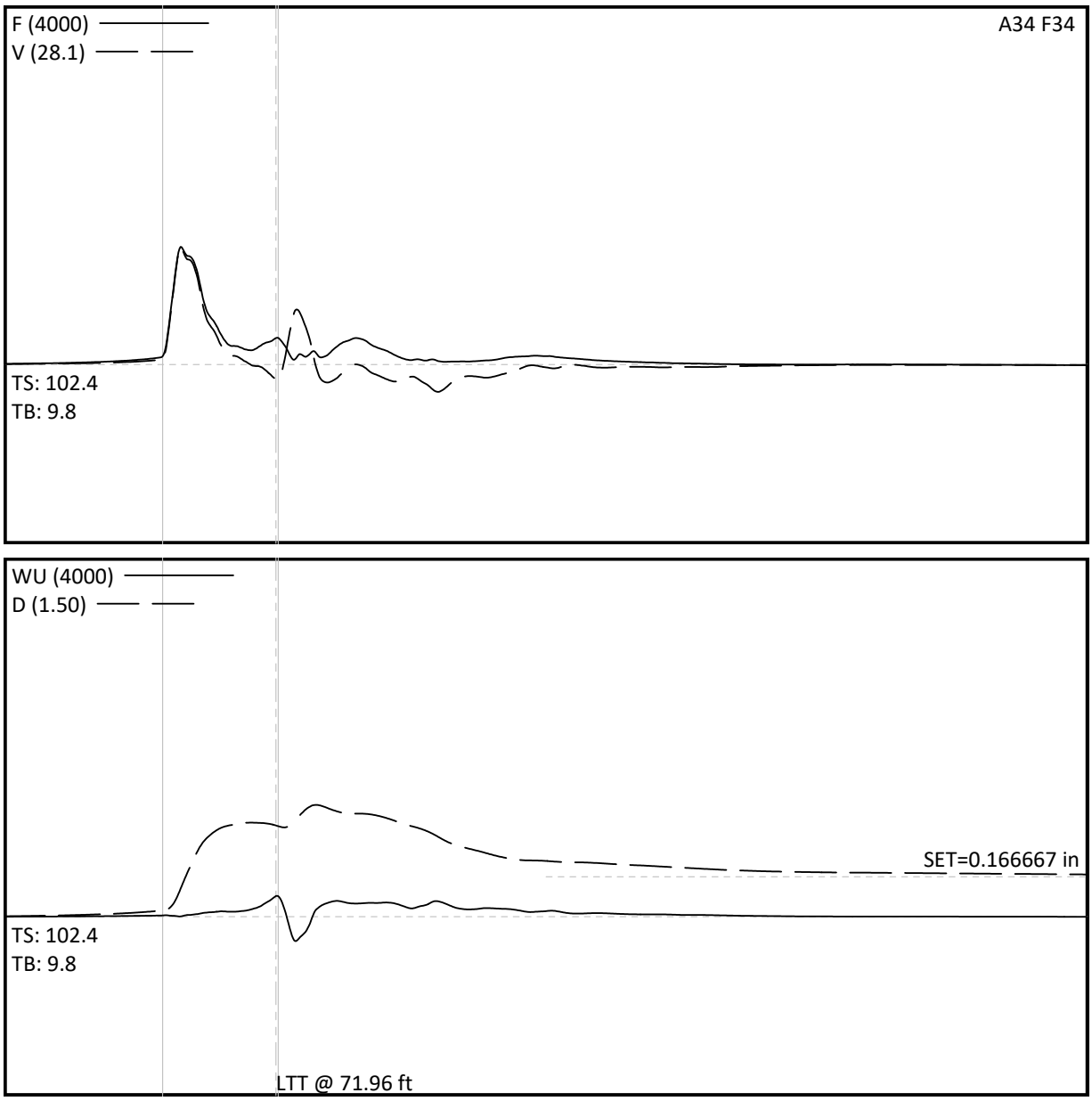
Depth ft	Area in^2	E-Modulus ksi	Spec. Weight lb/ft^3	Perim. ft
0.0	324.0	5970.7	150.000	6.00
74.0	324.0	5970.7	150.000	6.00

Toe Area 324.0 in^2

Top Segment Length 3.36 ft, Top Impedance 142 kips/ft/s

Wave Speed: Pile Top 13580.0, Elastic 13580.0, Overall 13578.0 ft/s
Pile Damping 2.00 %, Time Incr 0.248 ms, 2L/c 10.9 ms
Total volume: 166.500 ft^3; Volume ratio considering added impedance: 1.000

I-10 OVER MOBILE RIVER TP-10B-1 7 DAY RESTRIKE



Project Information

PROJECT: I-10 OVER MOBILE RIVER
PILE NAME: TP-10B-1 7 DAY RESTRIKE
DESCR: 18'' PSC, 77' LONG
OPERATOR: AFT
FILE: TP-10B-1 7 DAY RESTRIKE ana
3/19/2018 10:19:37 AM
Blow Number 3

Pile Properties

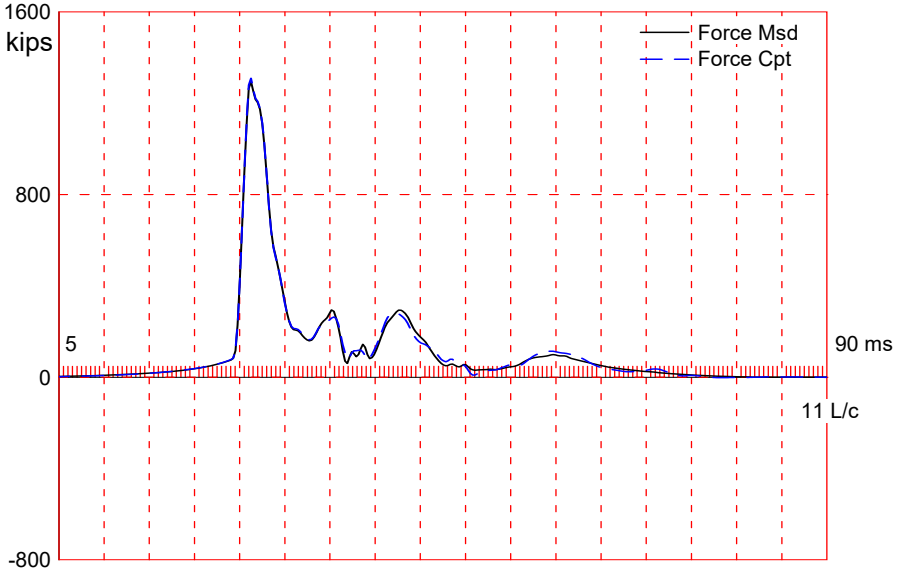
LE	74.00 ft
AR	324.00 in^2
EM	5970.66 ksi
SP	0.150 k/ft3
WS	13580.0 f/s
EA/C	142.5 ksec/ft
2L/C	10.90 ms
JC	0.53 []
LP	72.82 ft

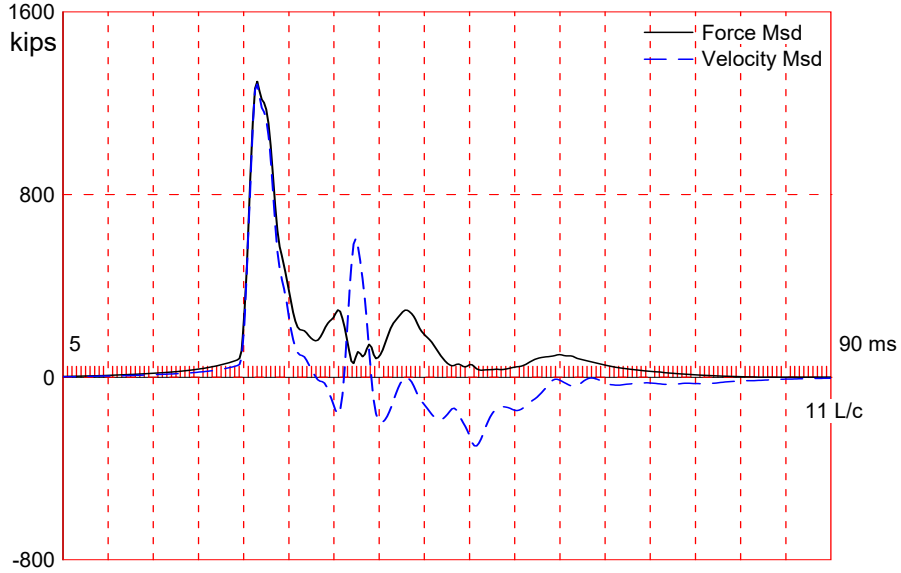
Quantity Results

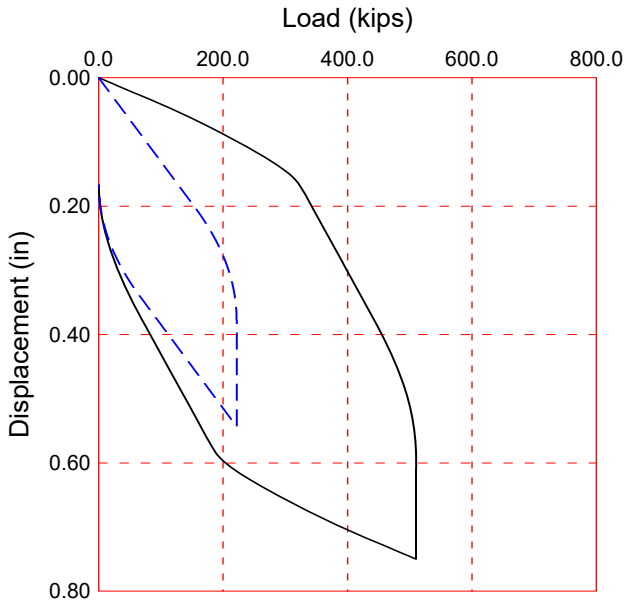
RMX	512 kips
RX6	456 kips
RA2	453 kips
CSX	4.05 ksi
CSB	2.26 ksi
TSX	0.64 ksi
EMX	29.3 k-ft
STK	8.66 ft
BTA	100 (%)

Sensors

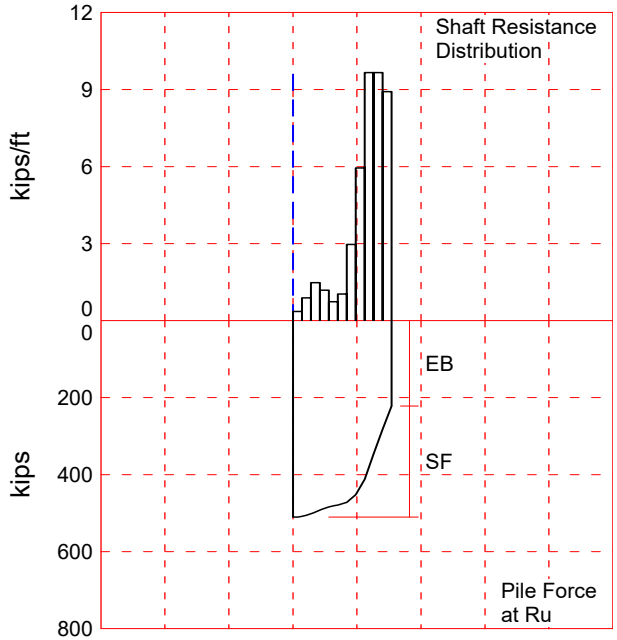
F3: [P454] 145.3 (0.97)
F4: [P455] 145.8 (0.97)
A3: [K5647] 334 mv/5000g's (1.03)
A4: [K5362] 346 mv/5000g's (1.03)
CLIP: OK







RU =	510.0 kips
SF =	288.0 kips
EB =	222.0 kips
Dy =	0.58 in
Dx =	0.75 in
SET/Bl =	0.17 in



Length b. Sensors	74.0 ft
Embedment	72.8 ft
Top Area	324.0 in^2
End Bearing Area	324.0 in^2
Top Perimeter	6.00 ft
Top E-Modulus	5971 ksi
Top Spec. Weight	150.0 lb/ft^3
Top Wave Spd.	13580 ft/s
Overall W.S.	13578 ft/s
Match Quality	1.58
Top Compr. Stress	4.1 ksi
Max Compr. Stress	4.1 ksi
Max Tension Stress	-0.65 ksi
Avg. Shaft Quake	0.04 in
Toe Quake	0.29 in
Avg. Shaft Smith Dpg.	0.22 s/ft
Toe Smith Damping	0.18 s/ft

About the CAPWAP Results

The CAPWAP program performs a signal matching or reverse analysis based on measurements taken on a deep foundation under an impact load. The program is based on a one-dimensional mathematical model. Under certain conditions, the model only crudely approximates the often complex dynamic situations.

The CAPWAP analysis relies on the input of accurately measured dynamic data plus additional parameters describing pile and soil behavior. If the field measurements of force and velocity are incorrect or were taken under inappropriate conditions (e.g., at an inappropriate time or with too much or too little energy) or if the input pile model is incorrect, then the solution cannot represent the actual soil behavior.

Generally the CAPWAP analysis is used to estimate the axial compressive pile capacity and the soil resistance distribution. The long-term capacity is best evaluated with restrike tests since they incorporate soil strength changes (set-up gains or relaxation losses) that occur after installation. The calculated load settlement graph does not consider creep or long term consolidation settlements. When uplift is a controlling factor in the design, use of the CAPWAP results to assess uplift capacity should be made only after very careful analysis of only good measurement quality, and further used only with longer pile lengths and with nominally higher safety factors.

CAPWAP is also used to evaluate driving stresses along the length of the pile. However, it should be understood that the analysis is one dimensional and does not take into account bending effects or local contact stresses at the pile toe.

Furthermore, if the user of this software was not able to produce a solution with satisfactory signal “match quality” (MQ), then the associated CAPWAP results may be unreliable. There is no absolute scale for solution acceptability but solutions with MQ above 5 are generally considered less reliable than those with lower MQ values and every effort should be made to improve the analysis, for example, by getting help from other independent experts.

Considering the CAPWAP model limitations, the nature of the input parameters, the complexity of the analysis procedure, and the need for a responsible application of the results to actual construction projects, it is recommended that at least one static load test be performed on sites where little experience exists with dynamic behavior of the soil resistance or when the experience of the analyzing engineer with both program use and result application is limited.

Finally, the CAPWAP capacities are ultimate values. They MUST be reduced by means of an appropriate factor of safety to yield a design or working load. The selection of a factor of safety should consider the quality of the construction control, the variability of the site conditions, uncertainties in the loads, the importance of structure and other factors. The CAPWAP results should be reviewed by the Engineer of Record with consideration of applicable geotechnical conditions including, but not limited to, group effects, potential settlement from underlying compressible layers, soil resistances provided from any layers unsuitable for long term support, as well as effective stress changes due to soil surcharges, excavation or change in water table elevation.

The CAPWAP analysis software is one of many means by which the capacity of a deep foundation can be assessed. The engineer performing the analysis is responsible for proper software application and the analysis results. Pile Dynamics accepts no liability whatsoever of any kind for the analysis solution and/or the application of the analysis result.

CAPWAP SUMMARY RESULTS

Total CAPWAP Capacity: 510.0; along Shaft 288.0; at Toe 222.0 kips

Soil Sgmnt No.	Dist. Below Gages ft	Depth Below Grade ft	Ru kips	Force in Pile kips	Sum of Ru kips	Unit Resist. (Depth) kips/ft	Unit Resist. (Area) ksf
				510.0			
1	6.7	5.5	2.0	508.0	2.0	0.36	0.06
2	13.5	12.3	6.0	502.0	8.0	0.89	0.15
3	20.2	19.0	10.0	492.0	18.0	1.49	0.25
4	26.9	25.7	8.0	484.0	26.0	1.19	0.20
5	33.6	32.5	5.0	479.0	31.0	0.74	0.12
6	40.4	39.2	7.0	472.0	38.0	1.04	0.17
7	47.1	45.9	20.0	452.0	58.0	2.97	0.50
8	53.8	52.6	40.0	412.0	98.0	5.95	0.99
9	60.5	59.4	65.0	347.0	163.0	9.66	1.61
10	67.3	66.1	65.0	282.0	228.0	9.66	1.61
11	74.0	72.8	60.0	222.0	288.0	8.92	1.49
Avg. Shaft			26.2			3.96	0.66
Toe			222.0				98.67

Soil Model Parameters/Extensions		Shaft	Toe
Smith Damping Factor		0.22	0.18
Quake	(in)	0.04	0.29
Case Damping Factor		0.44	0.28
Damping Type		Viscous	Sm+Visc
Unloading Quake	(% of loading quake)	30	56
Reloading Level	(% of Ru)	100	100
Unloading Level	(% of Ru)	0	

CAPWAP match quality = 1.58 (Wave Up Match) ; RSA = 0
Observed: Final Set = 0.17 in; Blow Count = 72 b/ft
Computed: Final Set = 0.17 in; Blow Count = 72 b/ft

max. Top Comp. Stress = 4.1 ksi (T= 26.8 ms, max= 1.006 x Top)
max. Comp. Stress = 4.1 ksi (Z= 13.5 ft, T= 27.5 ms)
max. Tens. Stress = -0.65 ksi (Z= 30.3 ft, T= 35.2 ms)
max. Energy (EMX) = 29.3 kip-ft; max. Measured Top Displ. (DMX)= 0.47 in

EXTREMA TABLE

Pile Sgmnt No.	Dist. Below Gages ft	max. Force kips	min. Force kips	max. Comp. Stress ksi	max. Tens. Stress ksi	max. Trnsfd. Energy kip-ft	max. Veloc. ft/s	max. Displ. in
1	3.4	1312.8	-8.2	4.1	-0.03	29.3	8.9	0.46
2	6.7	1316.4	-113.0	4.1	-0.35	29.2	8.9	0.46
3	10.1	1315.0	-175.0	4.1	-0.54	29.0	8.8	0.45
4	13.5	1320.6	-197.0	4.1	-0.61	28.8	8.8	0.44
5	16.8	1309.2	-197.9	4.0	-0.61	28.2	8.7	0.43
6	20.2	1314.6	-180.2	4.1	-0.56	28.1	8.7	0.43
7	23.5	1290.6	-190.6	4.0	-0.59	27.2	8.6	0.42
8	26.9	1294.6	-202.9	4.0	-0.63	27.1	8.6	0.41
9	30.3	1275.5	-211.5	3.9	-0.65	26.5	8.5	0.41
10	33.6	1279.8	-187.6	4.0	-0.58	26.4	8.5	0.40
11	37.0	1271.8	-166.9	3.9	-0.52	26.0	8.4	0.40
12	40.4	1281.0	-152.7	4.0	-0.47	25.9	8.3	0.39
13	43.7	1276.0	-145.9	3.9	-0.45	25.4	8.2	0.39
14	47.1	1293.5	-79.9	4.0	-0.25	25.3	8.1	0.38
15	50.5	1265.2	-30.1	3.9	-0.09	23.9	7.9	0.38
16	53.8	1291.9	-38.0	4.0	-0.12	23.8	7.7	0.37
17	57.2	1222.7	-33.3	3.8	-0.10	21.1	7.4	0.37
18	60.5	1251.8	-35.0	3.9	-0.11	21.0	8.3	0.36
19	63.9	1058.9	-13.0	3.3	-0.04	16.5	9.4	0.36
20	67.3	910.3	-12.1	2.8	-0.04	16.5	10.0	0.36
21	70.6	507.5	-2.8	1.6	-0.01	11.7	10.4	0.35
22	74.0	578.6	-2.8	1.8	-0.01	7.7	10.5	0.35
Absolute	13.5			4.1			(T =	27.5 ms)
	30.3				-0.65		(T =	35.2 ms)

CASE METHOD

J =	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
RP	1037.5	879.5	721.5	563.5	405.5	247.5	89.5	0.0	0.0	0.0
RX	1039.5	915.5	811.1	714.2	622.6	536.4	455.8	401.3	379.7	362.1
RU	1091.5	938.9	786.3	633.7	481.1	328.5	175.9	23.3	0.0	0.0

RAU = 312.8 (kips); RA2 = 452.9 (kips)

Current CAPWAP Ru = 510.0 (kips); Corresponding J(RP)= 0.33; J(RX) = 0.53

VMX	TVP	VT1*Z	FT1	FMX	DMX	DFN	SET	EMX	QUS	KEB
ft/s	ms	kips	kips	kips	in	in	in	kip-ft	kips	kips/in
9.2	26.51	1305.7	1311.9	1311.9	0.47	0.16	0.17	29.3	1109.2	766

PILE PROFILE AND PILE MODEL

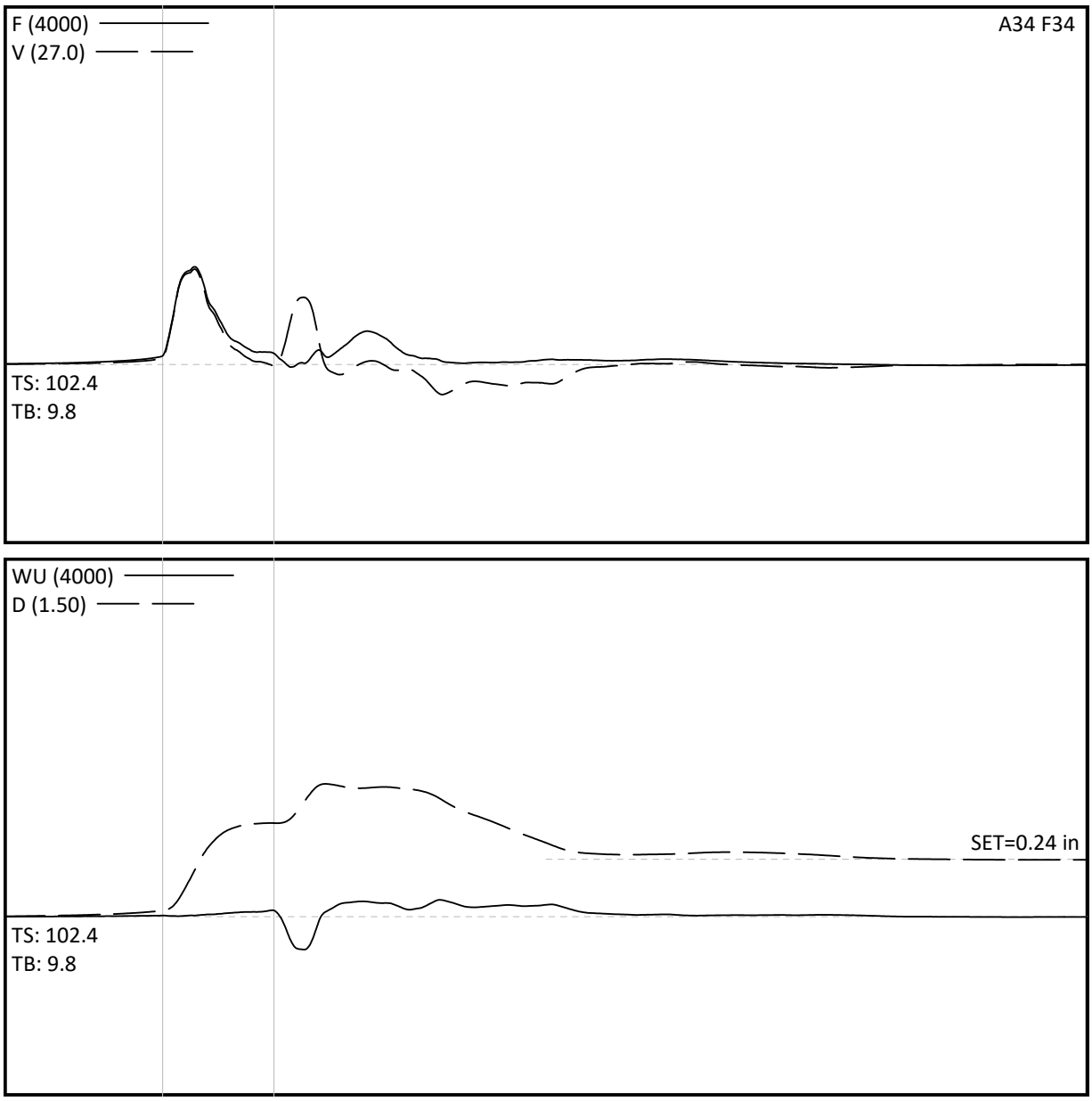
Depth ft	Area in^2	E-Modulus ksi	Spec. Weight lb/ft^3	Perim. ft
0.0	324.0	5970.7	150.000	6.00
74.0	324.0	5970.7	150.000	6.00

Toe Area 324.0 in^2

Top Segment Length 3.36 ft, Top Impedance 142 kips/ft/s

Wave Speed: Pile Top 13580.0, Elastic 13580.0, Overall 13578.0 ft/s
Pile Damping 2.00 %, Time Incr 0.248 ms, 2L/c 10.9 ms
Total volume: 166.500 ft^3; Volume ratio considering added impedance: 1.000

I-10 OVER MOBILE RIVER TP-10B-2



Project Information

PROJECT: I-10 OVER MOBILE RIVER
PILE NAME: TP-10B-2
DESCR: 18'' PSC, 77' LONG
OPERATOR: AFT
FILE: TP-10B-2 ana
3/13/2018 3:34:59 PM
Blow Number 2331

Pile Properties

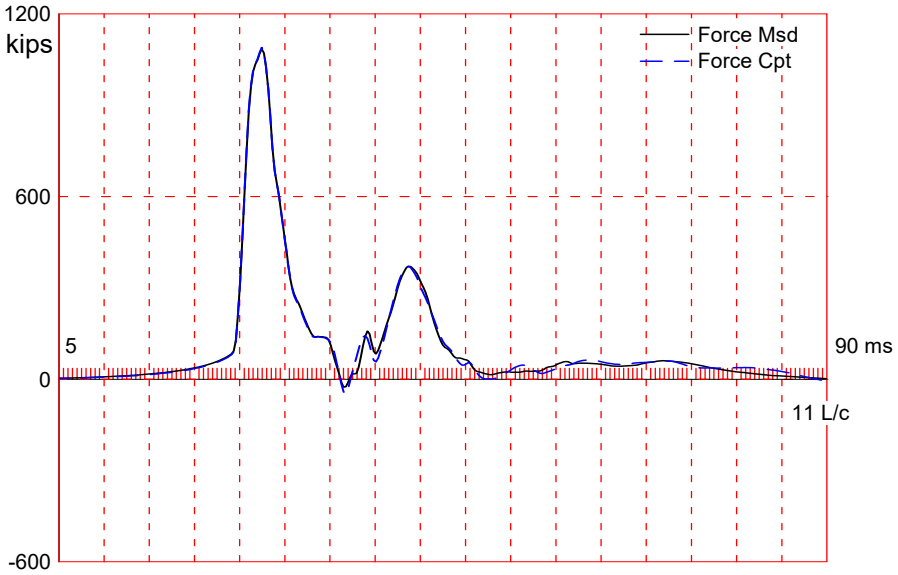
LE 74.00 ft
AR 324.00 in^2
EM 6436.67 ksi
SP 0.150 k/ft3
WS 14100.0 f/s
EA/C 147.9 ksec/ft
2L/C 10.50 ms
JC 0.50 []
LP 75.46 ft

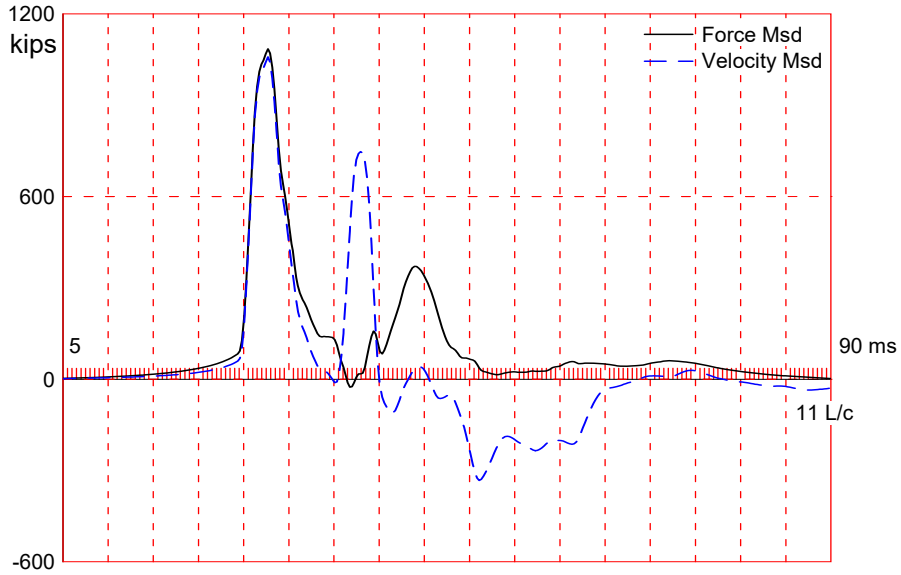
Quantity Results

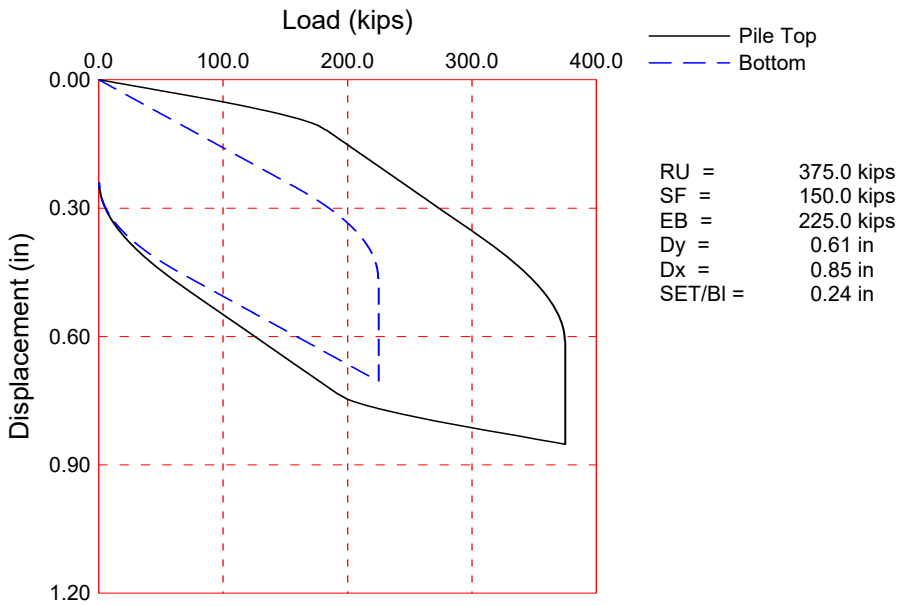
RX5 373 kips
RX6 338 kips
RA2 386 kips
CSX 3.36 ksi
CSB 1.95 ksi
TSX 0.98 ksi
EMX 24.7 k-ft
STK 8.75 ft
BTA 100 (%)

Sensors

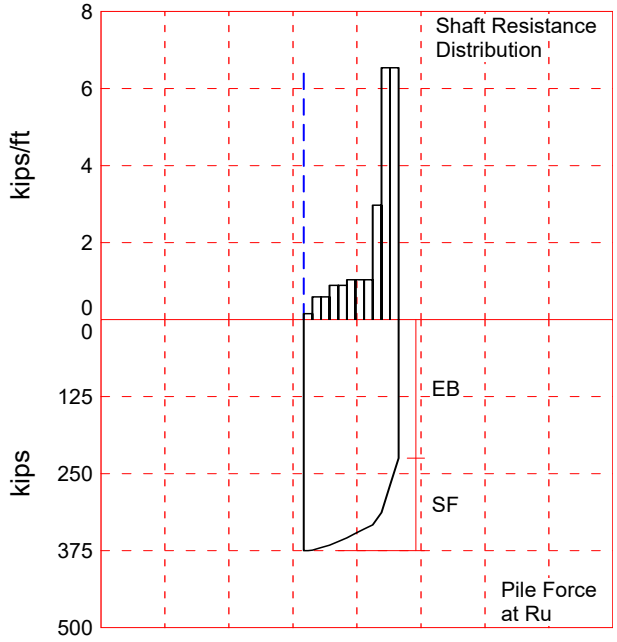
F3: [P454] 145.3 (0.98)
F4: [P455] 145.8 (0.98)
A3: [K5647] 334 mv/5000g's (1.02)
A4: [K5362] 346 mv/5000g's (1.02)
CLIP: OK







RU =	375.0 kips
SF =	150.0 kips
EB =	225.0 kips
Dy =	0.61 in
Dx =	0.85 in
SET/Bl =	0.24 in



Length b. Sensors	74.0 ft
Embedment	73.5 ft
Top Area	324.0 in^2
End Bearing Area	324.0 in^2
Top Perimeter	6.00 ft
Top E-Modulus	6437 ksi
Top Spec. Weight	150.0 lb/ft^3
Top Wave Spd.	14100 ft/s
Overall W.S.	14095 ft/s
Match Quality	2.01
Top Compr. Stress	3.4 ksi
Max Compr. Stress	3.4 ksi
Max Tension Stress	-0.99 ksi
Avg. Shaft Quake	0.04 in
Toe Quake	0.36 in
Avg. Shaft Smith Dpg.	0.20 s/ft
Toe Smith Damping	0.22 s/ft

About the CAPWAP Results

The CAPWAP program performs a signal matching or reverse analysis based on measurements taken on a deep foundation under an impact load. The program is based on a one-dimensional mathematical model. Under certain conditions, the model only crudely approximates the often complex dynamic situations.

The CAPWAP analysis relies on the input of accurately measured dynamic data plus additional parameters describing pile and soil behavior. If the field measurements of force and velocity are incorrect or were taken under inappropriate conditions (e.g., at an inappropriate time or with too much or too little energy) or if the input pile model is incorrect, then the solution cannot represent the actual soil behavior.

Generally the CAPWAP analysis is used to estimate the axial compressive pile capacity and the soil resistance distribution. The long-term capacity is best evaluated with restrike tests since they incorporate soil strength changes (set-up gains or relaxation losses) that occur after installation. The calculated load settlement graph does not consider creep or long term consolidation settlements. When uplift is a controlling factor in the design, use of the CAPWAP results to assess uplift capacity should be made only after very careful analysis of only good measurement quality, and further used only with longer pile lengths and with nominally higher safety factors.

CAPWAP is also used to evaluate driving stresses along the length of the pile. However, it should be understood that the analysis is one dimensional and does not take into account bending effects or local contact stresses at the pile toe.

Furthermore, if the user of this software was not able to produce a solution with satisfactory signal “match quality” (MQ), then the associated CAPWAP results may be unreliable. There is no absolute scale for solution acceptability but solutions with MQ above 5 are generally considered less reliable than those with lower MQ values and every effort should be made to improve the analysis, for example, by getting help from other independent experts.

Considering the CAPWAP model limitations, the nature of the input parameters, the complexity of the analysis procedure, and the need for a responsible application of the results to actual construction projects, it is recommended that at least one static load test be performed on sites where little experience exists with dynamic behavior of the soil resistance or when the experience of the analyzing engineer with both program use and result application is limited.

Finally, the CAPWAP capacities are ultimate values. They MUST be reduced by means of an appropriate factor of safety to yield a design or working load. The selection of a factor of safety should consider the quality of the construction control, the variability of the site conditions, uncertainties in the loads, the importance of structure and other factors. The CAPWAP results should be reviewed by the Engineer of Record with consideration of applicable geotechnical conditions including, but not limited to, group effects, potential settlement from underlying compressible layers, soil resistances provided from any layers unsuitable for long term support, as well as effective stress changes due to soil surcharges, excavation or change in water table elevation.

The CAPWAP analysis software is one of many means by which the capacity of a deep foundation can be assessed. The engineer performing the analysis is responsible for proper software application and the analysis results. Pile Dynamics accepts no liability whatsoever of any kind for the analysis solution and/or the application of the analysis result.

CAPWAP SUMMARY RESULTS

Total CAPWAP Capacity: 375.0; along Shaft 150.0; at Toe 225.0 kips

Soil Sgmnt No.	Dist. Below Gages ft	Depth Below Grade ft	Ru kips	Force in Pile kips	Sum of Ru kips	Unit Resist. (Depth) kips/ft	Unit Resist. (Area) ksf
				375.0			
1	6.7	6.2	1.0	374.0	1.0	0.16	0.03
2	13.5	13.0	4.0	370.0	5.0	0.59	0.10
3	20.2	19.7	4.0	366.0	9.0	0.59	0.10
4	26.9	26.4	6.0	360.0	15.0	0.89	0.15
5	33.6	33.1	6.0	354.0	21.0	0.89	0.15
6	40.4	39.9	7.0	347.0	28.0	1.04	0.17
7	47.1	46.6	7.0	340.0	35.0	1.04	0.17
8	53.8	53.3	7.0	333.0	42.0	1.04	0.17
9	60.5	60.0	20.0	313.0	62.0	2.97	0.50
10	67.3	66.8	44.0	269.0	106.0	6.54	1.09
11	74.0	73.5	44.0	225.0	150.0	6.54	1.09
Avg. Shaft			13.6			2.04	0.34
Toe			225.0				100.00

Soil Model Parameters/Extensions		Shaft	Toe
Smith Damping Factor		0.20	0.22
Quake	(in)	0.04	0.36
Case Damping Factor		0.20	0.33
Damping Type		Viscous	Sm+Visc
Unloading Quake	(% of loading quake)	40	42
Reloading Level	(% of Ru)	100	100
Unloading Level	(% of Ru)	3	
Soil Plug Weight	(kips)		0.316

CAPWAP match quality = 2.01 (Wave Up Match) ; RSA = 0
Observed: Final Set = 0.24 in; Blow Count = 50 b/ft
Computed: Final Set = 0.24 in; Blow Count = 50 b/ft

max. Top Comp. Stress = 3.4 ksi (T= 27.9 ms, max= 1.005 x Top)
max. Comp. Stress = 3.4 ksi (Z= 13.5 ft, T= 28.6 ms)
max. Tens. Stress = -0.99 ksi (Z= 13.5 ft, T= 36.5 ms)
max. Energy (EMX) = 24.8 kip-ft; max. Measured Top Displ. (DMX)= 0.55 in

EXTREMA TABLE

Pile Sgmnt No.	Dist. Below Gages ft	max. Force kips	min. Force kips	max. Comp. Stress ksi	max. Tens. Stress ksi	max. Trnsfd. Energy kip-ft	max. Veloc. ft/s	max. Displ. in
1	3.4	1092.6	-152.1	3.4	-0.47	24.8	7.1	0.55
2	6.7	1095.1	-237.9	3.4	-0.73	24.8	7.1	0.55
3	10.1	1095.1	-301.9	3.4	-0.93	24.6	7.1	0.55
4	13.5	1098.2	-320.3	3.4	-0.99	24.6	7.0	0.54
5	16.8	1091.4	-317.4	3.4	-0.98	24.2	7.0	0.54
6	20.2	1094.7	-302.5	3.4	-0.93	24.1	7.0	0.53
7	23.5	1088.2	-300.3	3.4	-0.93	23.7	7.0	0.52
8	26.9	1091.7	-296.8	3.4	-0.92	23.6	6.9	0.52
9	30.3	1080.7	-292.6	3.3	-0.90	23.1	6.9	0.51
10	33.6	1084.3	-260.6	3.3	-0.80	23.1	6.9	0.50
11	37.0	1073.5	-235.1	3.3	-0.73	22.5	6.9	0.50
12	40.4	1077.0	-194.3	3.3	-0.60	22.4	6.8	0.49
13	43.7	1065.2	-172.6	3.3	-0.53	21.8	6.8	0.49
14	47.1	1071.8	-124.8	3.3	-0.39	21.7	6.7	0.48
15	50.5	1065.0	-80.6	3.3	-0.25	21.1	6.7	0.48
16	53.8	1067.7	-47.8	3.3	-0.15	21.1	6.8	0.47
17	57.2	1015.9	-49.7	3.1	-0.15	20.5	7.9	0.47
18	60.5	979.2	-52.7	3.0	-0.16	20.5	8.9	0.47
19	63.9	851.0	-52.1	2.6	-0.16	18.8	9.5	0.46
20	67.3	720.1	-56.3	2.2	-0.17	18.7	9.7	0.46
21	70.6	481.0	-51.3	1.5	-0.16	15.0	9.5	0.46
22	74.0	557.7	-52.3	1.7	-0.16	11.5	9.3	0.45
Absolute	13.5			3.4			(T =	28.6 ms)
	13.5				-0.99		(T =	36.5 ms)

CASE METHOD

J =	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
RP	683.1	541.9	400.7	259.5	118.3	0.0	0.0	0.0	0.0	0.0
RX	720.7	595.2	537.9	480.9	426.1	373.0	338.3	330.2	328.1	327.8
RU	703.8	564.6	425.5	286.4	147.3	8.1	0.0	0.0	0.0	0.0

RAU = 322.7 (kips); RA2 = 385.9 (kips)

Current CAPWAP Ru = 375.0 (kips); Corresponding J(RP)= 0.22; J(RX) = 0.50

VMX	TVP	VT1*Z	FT1	FMX	DMX	DFN	SET	EMX	QUS	KEB
ft/s	ms	kips	kips	kips	in	in	in	kip-ft	kips	kips/in
7.2	27.68	1033.5	1061.5	1089.4	0.55	0.24	0.24	24.7	746.2	629

PILE PROFILE AND PILE MODEL

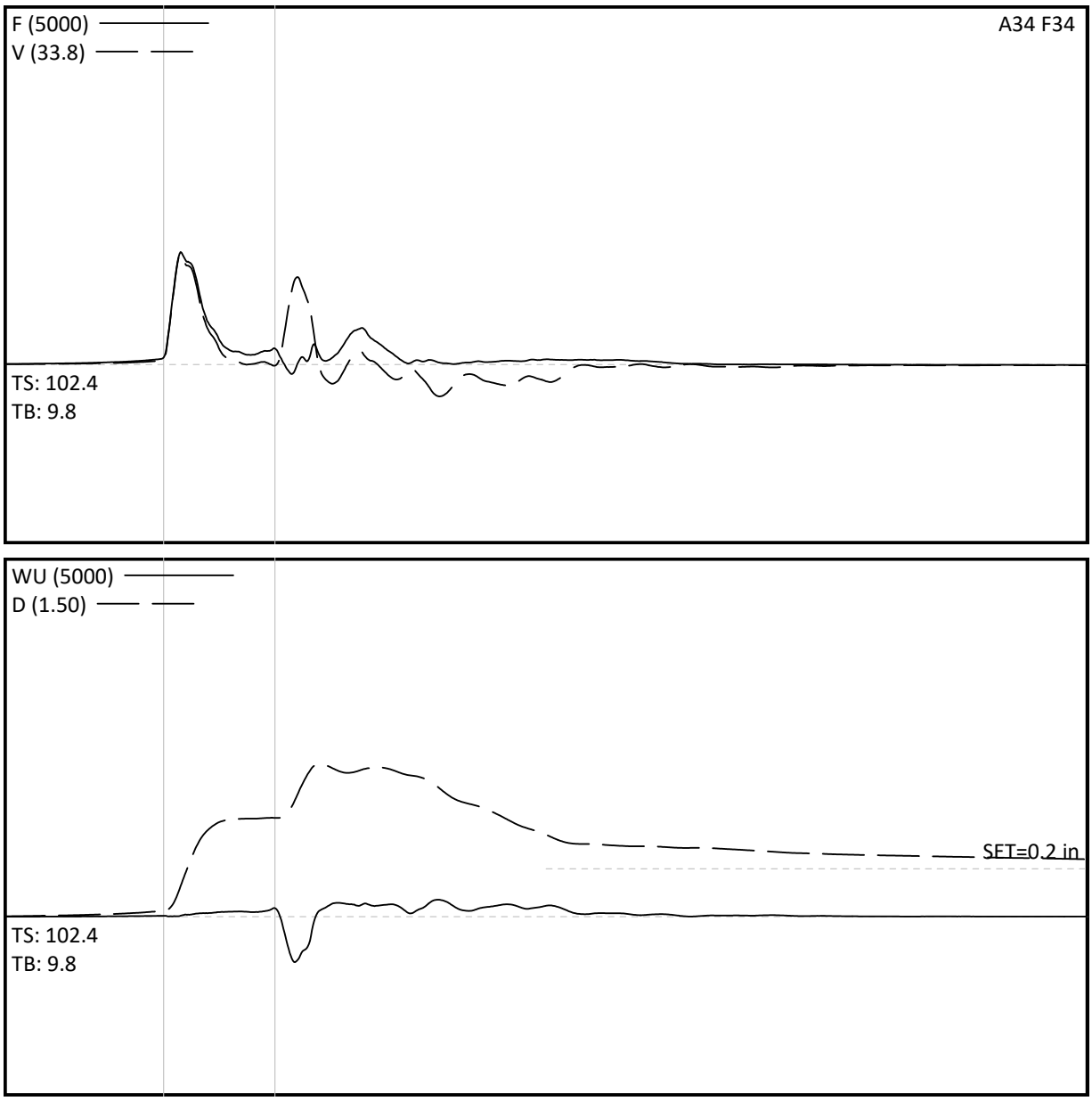
Depth ft	Area in^2	E-Modulus ksi	Spec. Weight lb/ft^3	Perim. ft
0.0	324.0	6436.7	150.000	6.00
74.0	324.0	6436.7	150.000	6.00

Toe Area 324.0 in^2

Top Segment Length 3.36 ft, Top Impedance 148 kips/ft/s

Wave Speed: Pile Top 14100.0, Elastic 14100.0, Overall 14095.2 ft/s
Pile Damping 2.00 %, Time Incr 0.239 ms, 2L/c 10.5 ms
Total volume: 166.500 ft^3; Volume ratio considering added impedance: 1.000

I-10 OVER MOBILE RIVER TP-10B-2 1 DAY RESTRIKE



Project Information

PROJECT: I-10 OVER MOBILE RIVER
PILE NAME: TP-10B-2 1 DAY RESTRIKE
DESCR: 18'' PSC, 77' LONG
OPERATOR: AFT
FILE: TP-10B-2 1 DAY RESTRIKE ana
3/14/2018 2:11:48 PM
Blow Number 2

Pile Properties

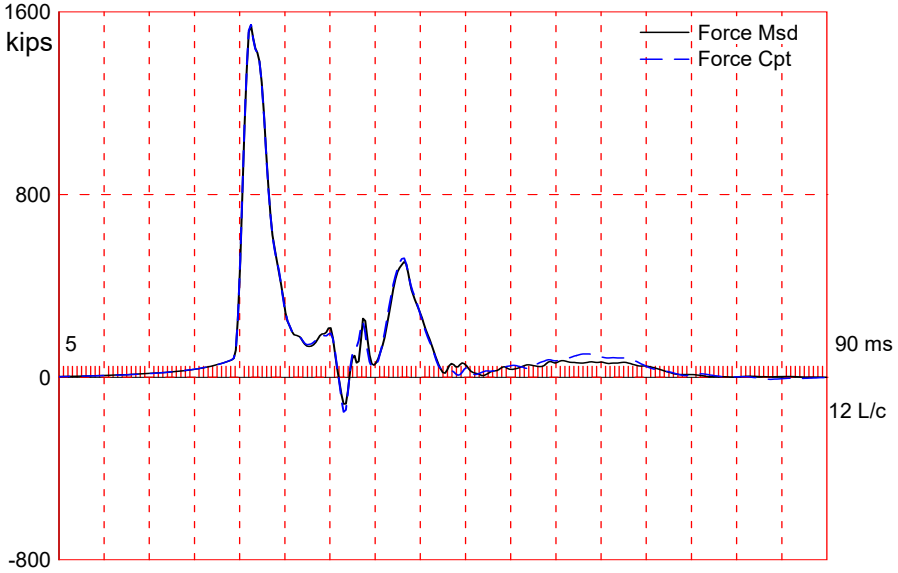
LE	74.00 ft
AR	324.00 in^2
EM	6436.67 ksi
SP	0.150 k/ft3
WS	14100.0 f/s
EA/C	147.9 ksec/ft
2L/C	10.50 ms
JC	0.40 []
LP	73.53 ft

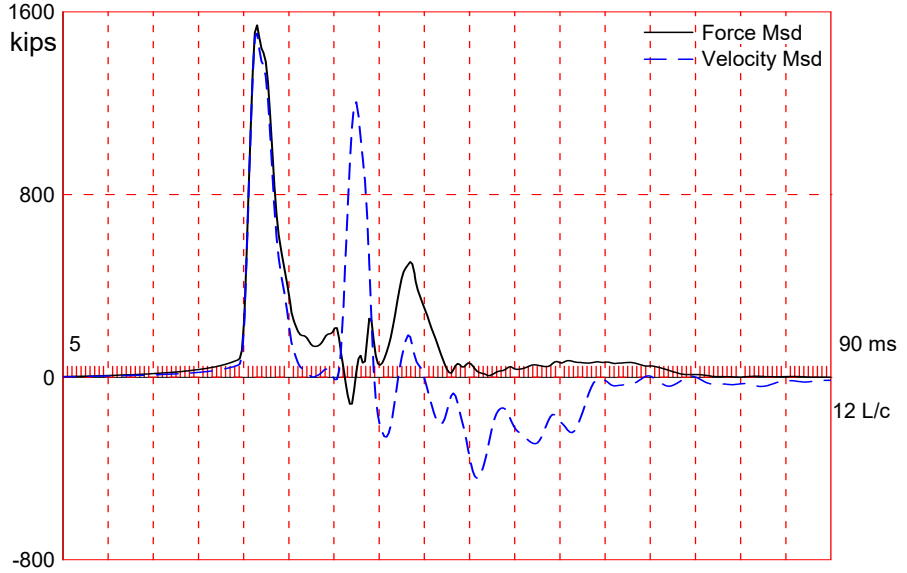
Quantity Results

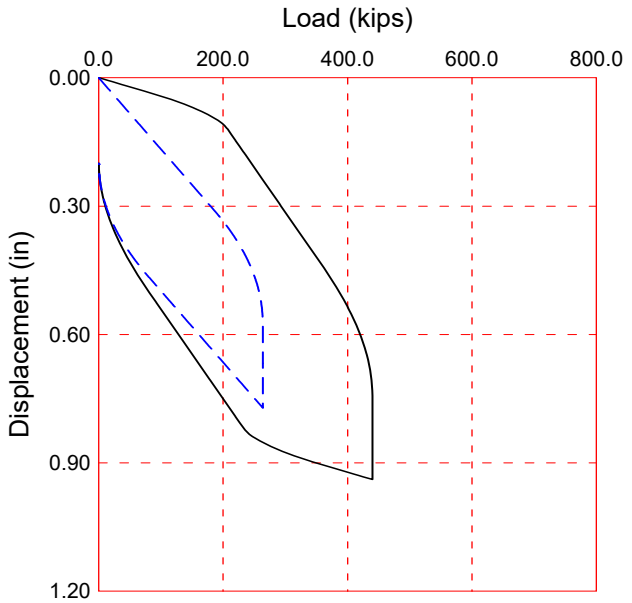
RX4	441 kips
RX5	404 kips
RA2	440 kips
CSX	4.84 ksi
CSB	2.44 ksi
TSX	1.75 ksi
EMX	37.4 k-ft
STK	10.63 ft
BTA	100 (%)

Sensors

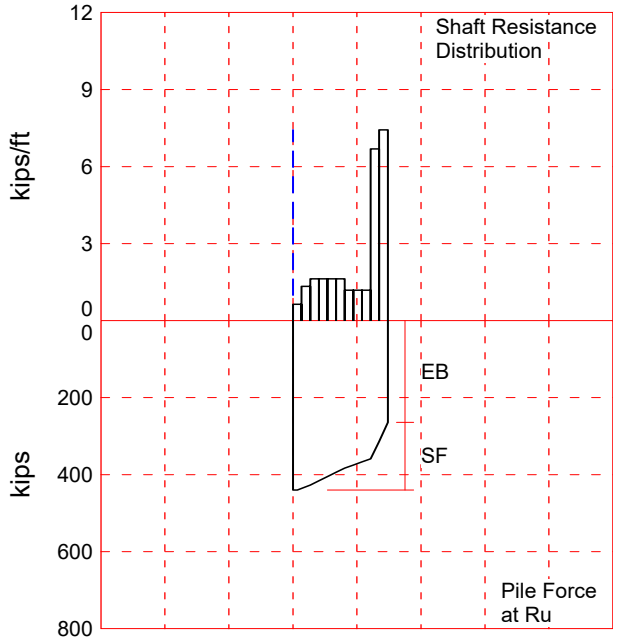
F3: [P454] 145.3 (1)
F4: [P455] 145.8 (1)
A3: [K5647] 334 mv/5000g's (1)
A4: [K5362] 346 mv/5000g's (1)
CLIP: OK







RU =	440.0 kips
SF =	176.0 kips
EB =	264.0 kips
Dy =	0.74 in
Dx =	0.94 in
SET/Bl =	0.20 in



Length b. Sensors	74.0 ft
Embedment	73.5 ft
Top Area	324.0 in^2
End Bearing Area	324.0 in^2
Top Perimeter	6.00 ft
Top E-Modulus	6437 ksi
Top Spec. Weight	150.0 lb/ft^3
Top Wave Spd.	14100 ft/s
Overall W.S.	14095 ft/s
Match Quality	1.67
Top Compr. Stress	4.8 ksi
Max Compr. Stress	4.8 ksi
Max Tension Stress	-1.95 ksi
Avg. Shaft Quake	0.04 in
Toe Quake	0.44 in
Avg. Shaft Smith Dpg.	0.21 s/ft
Toe Smith Damping	0.15 s/ft

About the CAPWAP Results

The CAPWAP program performs a signal matching or reverse analysis based on measurements taken on a deep foundation under an impact load. The program is based on a one-dimensional mathematical model. Under certain conditions, the model only crudely approximates the often complex dynamic situations.

The CAPWAP analysis relies on the input of accurately measured dynamic data plus additional parameters describing pile and soil behavior. If the field measurements of force and velocity are incorrect or were taken under inappropriate conditions (e.g., at an inappropriate time or with too much or too little energy) or if the input pile model is incorrect, then the solution cannot represent the actual soil behavior.

Generally the CAPWAP analysis is used to estimate the axial compressive pile capacity and the soil resistance distribution. The long-term capacity is best evaluated with restrike tests since they incorporate soil strength changes (set-up gains or relaxation losses) that occur after installation. The calculated load settlement graph does not consider creep or long term consolidation settlements. When uplift is a controlling factor in the design, use of the CAPWAP results to assess uplift capacity should be made only after very careful analysis of only good measurement quality, and further used only with longer pile lengths and with nominally higher safety factors.

CAPWAP is also used to evaluate driving stresses along the length of the pile. However, it should be understood that the analysis is one dimensional and does not take into account bending effects or local contact stresses at the pile toe.

Furthermore, if the user of this software was not able to produce a solution with satisfactory signal “match quality” (MQ), then the associated CAPWAP results may be unreliable. There is no absolute scale for solution acceptability but solutions with MQ above 5 are generally considered less reliable than those with lower MQ values and every effort should be made to improve the analysis, for example, by getting help from other independent experts.

Considering the CAPWAP model limitations, the nature of the input parameters, the complexity of the analysis procedure, and the need for a responsible application of the results to actual construction projects, it is recommended that at least one static load test be performed on sites where little experience exists with dynamic behavior of the soil resistance or when the experience of the analyzing engineer with both program use and result application is limited.

Finally, the CAPWAP capacities are ultimate values. They MUST be reduced by means of an appropriate factor of safety to yield a design or working load. The selection of a factor of safety should consider the quality of the construction control, the variability of the site conditions, uncertainties in the loads, the importance of structure and other factors. The CAPWAP results should be reviewed by the Engineer of Record with consideration of applicable geotechnical conditions including, but not limited to, group effects, potential settlement from underlying compressible layers, soil resistances provided from any layers unsuitable for long term support, as well as effective stress changes due to soil surcharges, excavation or change in water table elevation.

The CAPWAP analysis software is one of many means by which the capacity of a deep foundation can be assessed. The engineer performing the analysis is responsible for proper software application and the analysis results. Pile Dynamics accepts no liability whatsoever of any kind for the analysis solution and/or the application of the analysis result.

CAPWAP SUMMARY RESULTS

Total CAPWAP Capacity: 440.0; along Shaft 176.0; at Toe 264.0 kips

Soil Sgmnt No.	Dist. Below Gages ft	Depth Below Grade ft	Ru kips	Force in Pile kips	Sum of Ru kips	Unit Resist. (Depth) kips/ft	Unit Resist. (Area) ksf
				440.0			
1	6.7	6.3	4.0	436.0	4.0	0.64	0.11
2	13.5	13.0	9.0	427.0	13.0	1.34	0.22
3	20.2	19.7	11.0	416.0	24.0	1.64	0.27
4	26.9	26.4	11.0	405.0	35.0	1.64	0.27
5	33.6	33.2	11.0	394.0	46.0	1.64	0.27
6	40.4	39.9	11.0	383.0	57.0	1.64	0.27
7	47.1	46.6	8.0	375.0	65.0	1.19	0.20
8	53.8	53.4	8.0	367.0	73.0	1.19	0.20
9	60.5	60.1	8.0	359.0	81.0	1.19	0.20
10	67.3	66.8	45.0	314.0	126.0	6.69	1.11
11	74.0	73.5	50.0	264.0	176.0	7.43	1.24
Avg. Shaft			16.0			2.39	0.40
Toe			264.0				117.33

Soil Model Parameters/Extensions		Shaft	Toe
Smith Damping Factor		0.21	0.15
Quake	(in)	0.04	0.44
Case Damping Factor		0.25	0.27
Damping Type		Viscous	Sm+Visc
Unloading Quake	(% of loading quake)	30	56
Reloading Level	(% of Ru)	100	100
Unloading Level	(% of Ru)	0	
Soil Plug Weight	(kips)		0.316

CAPWAP match quality = 1.67 (Wave Up Match) ; RSA = 0
Observed: Final Set = 0.20 in; Blow Count = 60 b/ft
Computed: Final Set = 0.20 in; Blow Count = 60 b/ft

max. Top Comp. Stress = 4.8 ksi (T= 26.7 ms, max= 1.004 x Top)
max. Comp. Stress = 4.8 ksi (Z= 13.5 ft, T= 27.4 ms)
max. Tens. Stress = -1.95 ksi (Z= 30.3 ft, T= 34.8 ms)
max. Energy (EMX) = 37.3 kip-ft; max. Measured Top Displ. (DMX)= 0.64 in

EXTREMA TABLE

Pile Sgmnt No.	Dist. Below Gages ft	max. Force kips	min. Force kips	max. Comp. Stress ksi	max. Tens. Stress ksi	max. Trnsfd. Energy kip-ft	max. Veloc. ft/s	max. Displ. in
1	3.4	1548.2	-311.1	4.8	-0.96	37.3	10.1	0.63
2	6.7	1553.7	-462.0	4.8	-1.43	37.1	10.1	0.63
3	10.1	1547.3	-542.8	4.8	-1.68	36.6	10.0	0.62
4	13.5	1554.2	-540.4	4.8	-1.67	36.5	10.0	0.62
5	16.8	1533.3	-555.4	4.7	-1.71	35.4	9.9	0.61
6	20.2	1540.3	-552.2	4.8	-1.70	35.4	9.9	0.60
7	23.5	1513.3	-594.9	4.7	-1.84	34.2	9.8	0.59
8	26.9	1519.9	-607.9	4.7	-1.88	34.1	9.8	0.58
9	30.3	1493.1	-630.8	4.6	-1.95	33.3	9.7	0.58
10	33.6	1499.4	-611.1	4.6	-1.89	33.2	9.7	0.58
11	37.0	1472.3	-611.9	4.5	-1.89	32.4	9.6	0.57
12	40.4	1477.1	-600.8	4.6	-1.85	32.2	9.6	0.56
13	43.7	1448.6	-586.7	4.5	-1.81	31.3	9.5	0.55
14	47.1	1452.5	-531.8	4.5	-1.64	30.9	9.5	0.55
15	50.5	1432.9	-446.4	4.4	-1.38	29.8	9.4	0.54
16	53.8	1436.5	-321.8	4.4	-0.99	28.9	9.4	0.53
17	57.2	1419.5	-239.7	4.4	-0.74	27.9	9.3	0.53
18	60.5	1435.1	-90.2	4.4	-0.28	27.9	11.0	0.53
19	63.9	1382.6	-52.4	4.3	-0.16	26.9	12.7	0.53
20	67.3	1211.9	-48.7	3.7	-0.15	26.8	13.5	0.53
21	70.6	742.4	-40.7	2.3	-0.13	21.0	14.0	0.53
22	74.0	618.3	-38.2	1.9	-0.12	14.7	14.5	0.52
Absolute	13.5			4.8			(T =	27.4 ms)
	30.3				-1.95		(T =	34.8 ms)

CASE METHOD

J =	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
RP	967.3	753.4	539.5	325.6	111.7	0.0	0.0	0.0	0.0	0.0
RX	967.3	753.4	556.9	498.7	440.6	403.7	385.8	382.9	382.1	381.4
RU	1019.4	810.7	602.0	393.3	184.6	0.0	0.0	0.0	0.0	0.0

RAU = 378.1 (kips); RA2 = 440.2 (kips)

Current CAPWAP Ru = 440.0 (kips); Corresponding J(RP)= 0.25; J(RX) = 0.40

VMX	TVP	VT1*Z	FT1	FMX	DMX	DFN	SET	EMX	QUS	KEB
ft/s	ms	kips	kips	kips	in	in	in	kip-ft	kips	kips/in
10.4	26.49	1538.4	1567.8	1567.8	0.64	0.19	0.20	37.4	1071.0	599

PILE PROFILE AND PILE MODEL

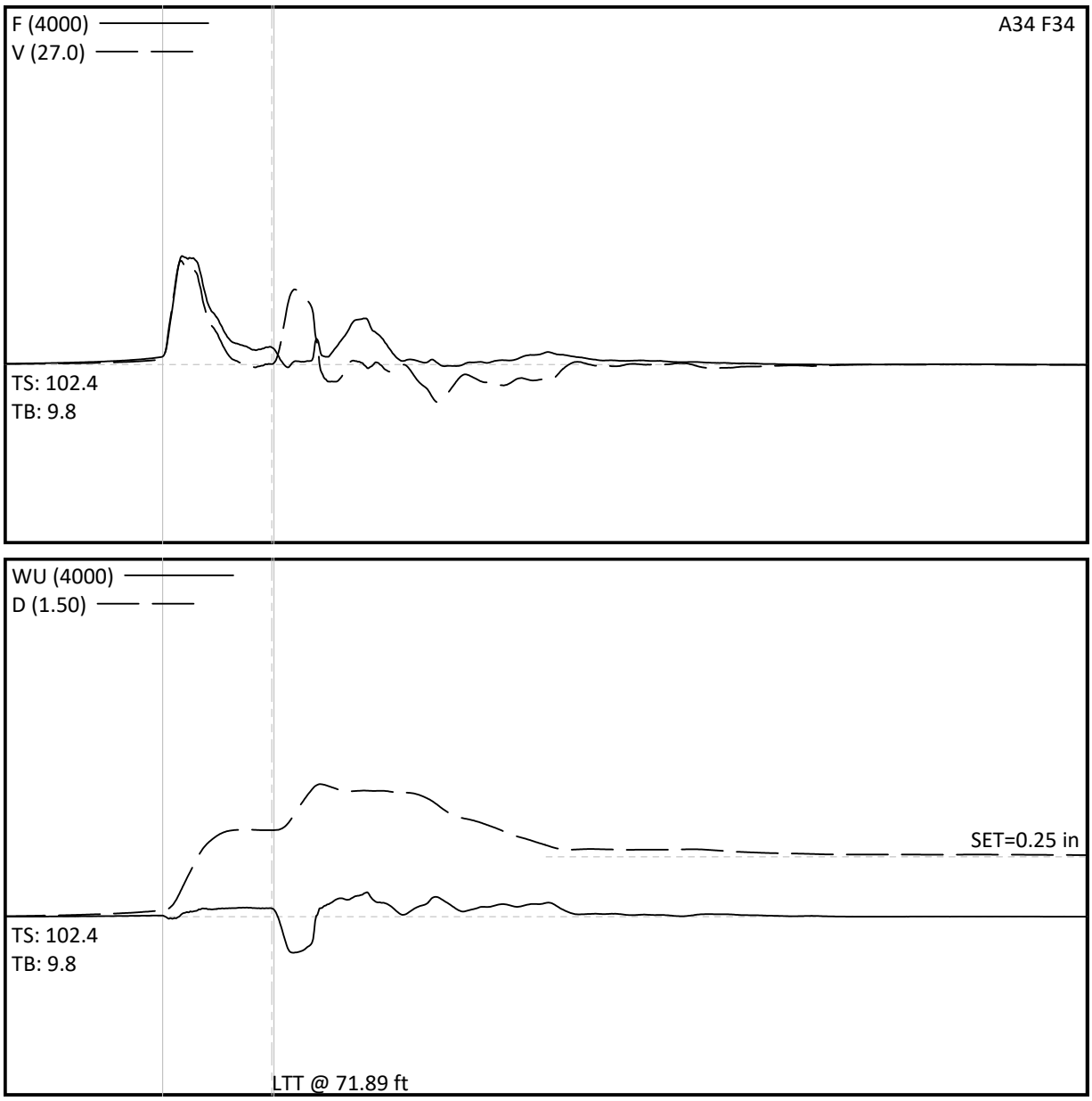
Depth ft	Area in^2	E-Modulus ksi	Spec. Weight lb/ft^3	Perim. ft
0.0	324.0	6436.7	150.000	6.00
74.0	324.0	6436.7	150.000	6.00

Toe Area 324.0 in^2

Top Segment Length 3.36 ft, Top Impedance 148 kips/ft/s

Wave Speed: Pile Top 14100.0, Elastic 14100.0, Overall 14095.2 ft/s
Pile Damping 2.00 %, Time Incr 0.239 ms, 2L/c 10.5 ms
Total volume: 166.500 ft^3; Volume ratio considering added impedance: 1.000

I-10 OVER MOBILE RIVER TP-10B-2 13 DAY RESTRIKE



Project Information

PROJECT: I-10 OVER MOBILE RIVER
PILE NAME: TP-10B-2 13 DAY RESTRIKE
DESCR: 18'' PSC, 77' LONG
OPERATOR: AFT
FILE: TP-10B-2 13 DAY RESTRIKE ana
3/26/2018 3:24:27 PM
Blow Number 11

Pile Properties

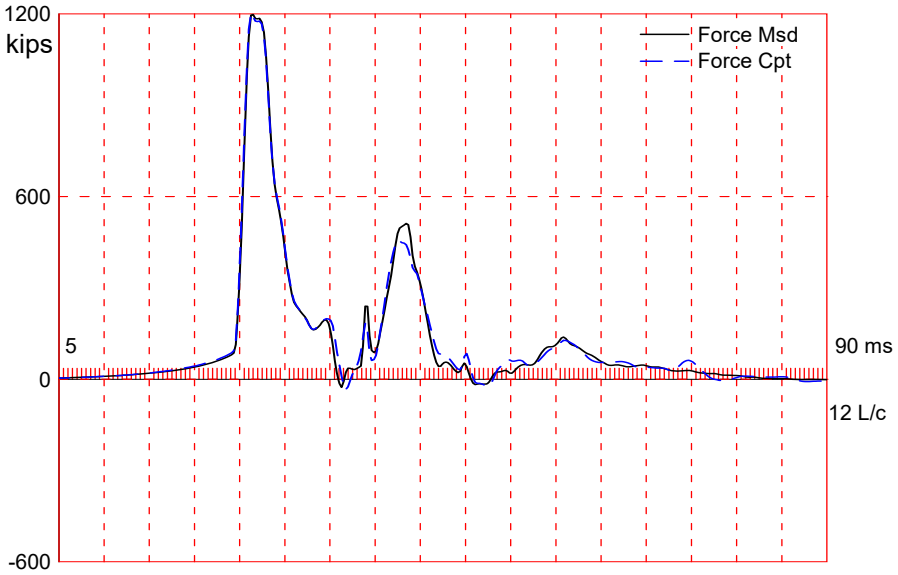
LE 74.00 ft
AR 324.00 in^2
EM 6436.67 ksi
SP 0.150 k/ft3
WS 14100.0 f/s
EA/C 147.9 ksec/ft
2L/C 10.50 ms
JC 0.40 []
LP 73.79 ft

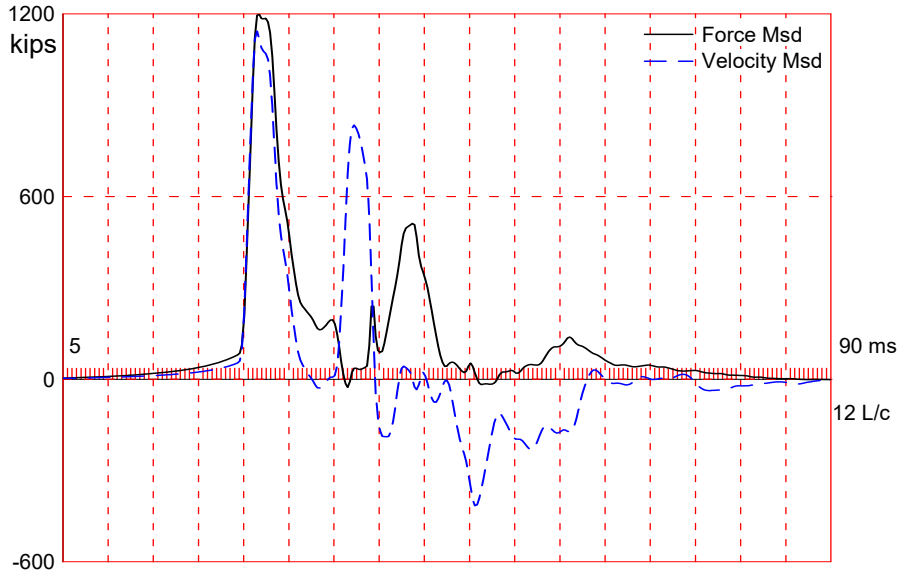
Quantity Results

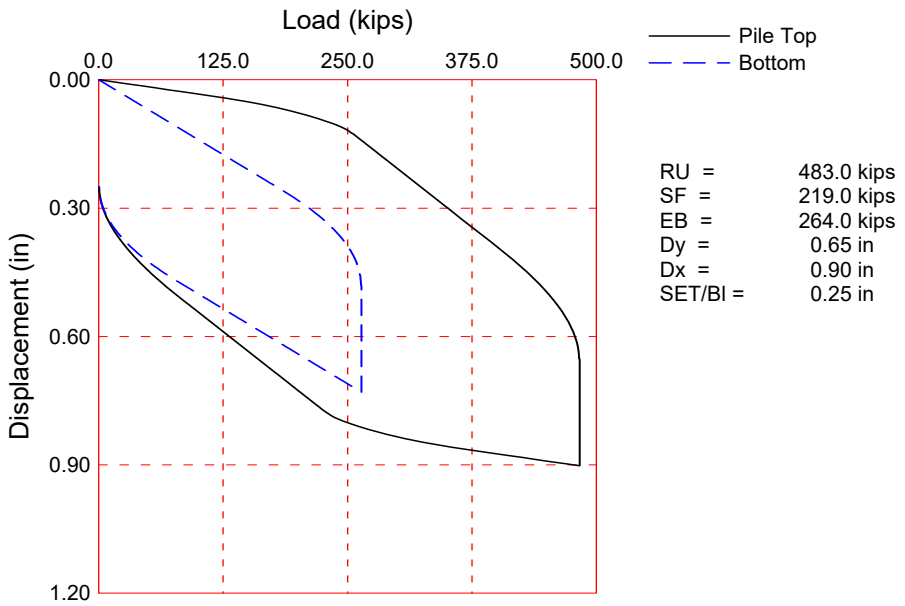
RX4 482 kips
RX5 433 kips
RA2 495 kips
CSX 3.73 ksi
CSB 2.09 ksi
TSX 1.04 ksi
EMX 27.0 k-ft
STK 8.79 ft
BTA 100 (%)

Sensors

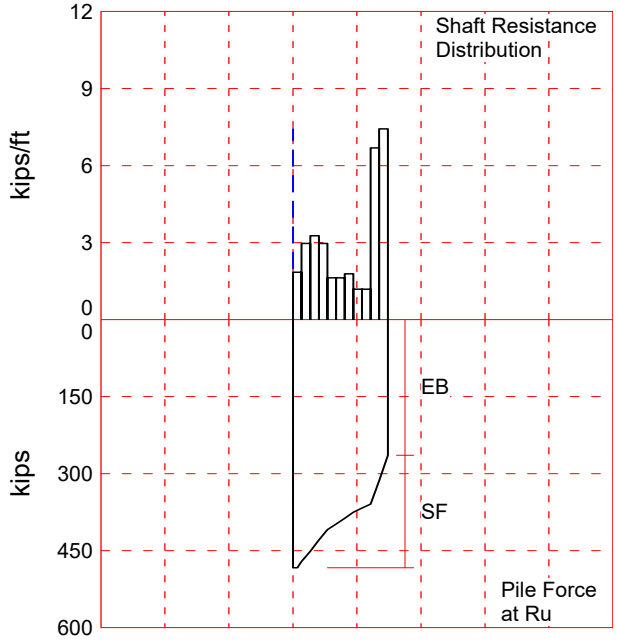
F3: [P454] 145.3 (1)
F4: [P455] 145.8 (1)
A3: [K5647] 334 mv/5000g's (1)
A4: [K5362] 346 mv/5000g's (1)
CLIP: OK







RU =	483.0 kips
SF =	219.0 kips
EB =	264.0 kips
Dy =	0.65 in
Dx =	0.90 in
SET/Bl =	0.25 in



Length b. Sensors	74.0 ft
Embedment	73.8 ft
Top Area	324.0 in^2
End Bearing Area	324.0 in^2
Top Perimeter	6.00 ft
Top E-Modulus	6437 ksi
Top Spec. Weight	150.0 lb/ft^3
Top Wave Spd.	14100 ft/s
Overall W.S.	14095 ft/s
Match Quality	3.02
Top Compr. Stress	3.7 ksi
Max Compr. Stress	3.8 ksi
Max Tension Stress	-1.51 ksi
Avg. Shaft Quake	0.04 in
Toe Quake	0.37 in
Avg. Shaft Smith Dpg.	0.20 s/ft
Toe Smith Damping	0.05 s/ft

About the CAPWAP Results

The CAPWAP program performs a signal matching or reverse analysis based on measurements taken on a deep foundation under an impact load. The program is based on a one-dimensional mathematical model. Under certain conditions, the model only crudely approximates the often complex dynamic situations.

The CAPWAP analysis relies on the input of accurately measured dynamic data plus additional parameters describing pile and soil behavior. If the field measurements of force and velocity are incorrect or were taken under inappropriate conditions (e.g., at an inappropriate time or with too much or too little energy) or if the input pile model is incorrect, then the solution cannot represent the actual soil behavior.

Generally the CAPWAP analysis is used to estimate the axial compressive pile capacity and the soil resistance distribution. The long-term capacity is best evaluated with restrike tests since they incorporate soil strength changes (set-up gains or relaxation losses) that occur after installation. The calculated load settlement graph does not consider creep or long term consolidation settlements. When uplift is a controlling factor in the design, use of the CAPWAP results to assess uplift capacity should be made only after very careful analysis of only good measurement quality, and further used only with longer pile lengths and with nominally higher safety factors.

CAPWAP is also used to evaluate driving stresses along the length of the pile. However, it should be understood that the analysis is one dimensional and does not take into account bending effects or local contact stresses at the pile toe.

Furthermore, if the user of this software was not able to produce a solution with satisfactory signal “match quality” (MQ), then the associated CAPWAP results may be unreliable. There is no absolute scale for solution acceptability but solutions with MQ above 5 are generally considered less reliable than those with lower MQ values and every effort should be made to improve the analysis, for example, by getting help from other independent experts.

Considering the CAPWAP model limitations, the nature of the input parameters, the complexity of the analysis procedure, and the need for a responsible application of the results to actual construction projects, it is recommended that at least one static load test be performed on sites where little experience exists with dynamic behavior of the soil resistance or when the experience of the analyzing engineer with both program use and result application is limited.

Finally, the CAPWAP capacities are ultimate values. They MUST be reduced by means of an appropriate factor of safety to yield a design or working load. The selection of a factor of safety should consider the quality of the construction control, the variability of the site conditions, uncertainties in the loads, the importance of structure and other factors. The CAPWAP results should be reviewed by the Engineer of Record with consideration of applicable geotechnical conditions including, but not limited to, group effects, potential settlement from underlying compressible layers, soil resistances provided from any layers unsuitable for long term support, as well as effective stress changes due to soil surcharges, excavation or change in water table elevation.

The CAPWAP analysis software is one of many means by which the capacity of a deep foundation can be assessed. The engineer performing the analysis is responsible for proper software application and the analysis results. Pile Dynamics accepts no liability whatsoever of any kind for the analysis solution and/or the application of the analysis result.

CAPWAP SUMMARY RESULTS

Total CAPWAP Capacity: 483.0; along Shaft 219.0; at Toe 264.0 kips

Soil Sgmnt No.	Dist. Below Gages ft	Depth Below Grade ft	Ru kips	Force in Pile kips	Sum of Ru kips	Unit Resist. (Depth) kips/ft	Unit Resist. (Area) ksf
				483.0			
1	6.7	6.5	12.0	471.0	12.0	1.85	0.31
2	13.5	13.2	20.0	451.0	32.0	2.97	0.50
3	20.2	20.0	22.0	429.0	54.0	3.27	0.55
4	26.9	26.7	20.0	409.0	74.0	2.97	0.50
5	33.6	33.4	11.0	398.0	85.0	1.64	0.27
6	40.4	40.1	11.0	387.0	96.0	1.64	0.27
7	47.1	46.9	12.0	375.0	108.0	1.78	0.30
8	53.8	53.6	8.0	367.0	116.0	1.19	0.20
9	60.5	60.3	8.0	359.0	124.0	1.19	0.20
10	67.3	67.0	45.0	314.0	169.0	6.69	1.11
11	74.0	73.8	50.0	264.0	219.0	7.43	1.24
Avg. Shaft			19.9			2.97	0.49
Toe			264.0				117.33

Soil Model Parameters/Extensions		Shaft	Toe
Smith Damping Factor		0.20	0.05
Quake	(in)	0.04	0.37
Case Damping Factor		0.30	0.09
Damping Type		Viscous	Sm+Visc
Unloading Quake	(% of loading quake)	30	34
Reloading Level	(% of Ru)	100	100
Unloading Level	(% of Ru)	5	

CAPWAP match quality = 3.02 (Wave Up Match) ; RSA = 0
Observed: Final Set = 0.25 in; Blow Count = 48 b/ft
Computed: Final Set = 0.25 in; Blow Count = 48 b/ft

max. Top Comp. Stress = 3.7 ksi (T= 26.7 ms, max= 1.007 x Top)
max. Comp. Stress = 3.8 ksi (Z= 6.7 ft, T= 27.0 ms)
max. Tens. Stress = -1.51 ksi (Z= 30.3 ft, T= 35.1 ms)
max. Energy (EMX) = 26.9 kip-ft; max. Measured Top Displ. (DMX)= 0.55 in

EXTREMA TABLE

Pile Sgmnt No.	Dist. Below Gages ft	max. Force kips	min. Force kips	max. Comp. Stress ksi	max. Tens. Stress ksi	max. Trnsfd. Energy kip-ft	max. Veloc. ft/s	max. Displ. in
1	3.4	1209.5	-146.9	3.7	-0.45	26.9	7.6	0.54
2	6.7	1218.0	-264.6	3.8	-0.82	26.8	7.6	0.54
3	10.1	1197.8	-368.9	3.7	-1.14	25.7	7.5	0.53
4	13.5	1207.4	-383.1	3.7	-1.18	25.5	7.4	0.52
5	16.8	1168.4	-411.5	3.6	-1.27	24.4	7.3	0.51
6	20.2	1177.3	-424.0	3.6	-1.31	24.3	7.2	0.51
7	23.5	1132.5	-471.4	3.5	-1.45	23.1	7.2	0.50
8	26.9	1138.2	-471.7	3.5	-1.46	23.1	7.1	0.49
9	30.3	1095.4	-488.8	3.4	-1.51	22.0	7.1	0.49
10	33.6	1101.0	-461.5	3.4	-1.42	21.9	7.0	0.48
11	37.0	1081.0	-459.8	3.3	-1.42	21.3	7.0	0.48
12	40.4	1086.6	-435.7	3.4	-1.34	21.1	6.9	0.47
13	43.7	1066.3	-411.6	3.3	-1.27	20.3	6.9	0.46
14	47.1	1070.3	-342.7	3.3	-1.06	19.9	6.8	0.45
15	50.5	1046.3	-305.3	3.2	-0.94	18.7	6.8	0.45
16	53.8	1050.2	-225.3	3.2	-0.70	18.0	6.9	0.45
17	57.2	1040.9	-141.7	3.2	-0.44	16.6	8.3	0.45
18	60.5	1040.3	-54.6	3.2	-0.17	16.4	9.6	0.45
19	63.9	966.6	-51.0	3.0	-0.16	15.7	10.4	0.44
20	67.3	792.7	-43.7	2.4	-0.13	15.7	10.6	0.44
21	70.6	444.5	-27.6	1.4	-0.09	11.5	10.8	0.44
22	74.0	431.2	-25.0	1.3	-0.08	7.3	10.8	0.43
Absolute	6.7			3.8			(T =	27.0 ms)
	30.3				-1.51		(T =	35.1 ms)

CASE METHOD

J =	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
RP	775.0	617.5	460.1	302.7	145.2	0.0	0.0	0.0	0.0	0.0
RX	779.1	645.7	580.8	531.3	481.8	432.4	412.2	408.1	406.1	406.1
RU	850.6	700.7	550.8	401.0	251.1	101.2	0.0	0.0	0.0	0.0

RAU = 406.1 (kips); RA2 = 495.3 (kips)

Current CAPWAP Ru = 483.0 (kips); Corresponding J(RP)= 0.19; J(RX) = 0.40

VMX	TVP	VT1*Z	FT1	FMX	DMX	DFN	SET	EMX	QUS	KEB
ft/s	ms	kips	kips	kips	in	in	in	kip-ft	kips	kips/in
7.8	26.49	1156.9	1192.4	1209.7	0.55	0.25	0.25	27.0	806.5	714

PILE PROFILE AND PILE MODEL

Depth ft	Area in^2	E-Modulus ksi	Spec. Weight lb/ft^3	Perim. ft
0.0	324.0	6436.7	150.000	6.00
74.0	324.0	6436.7	150.000	6.00

Toe Area 324.0 in^2

Top Segment Length 3.36 ft, Top Impedance 148 kips/ft/s

Wave Speed: Pile Top 14100.0, Elastic 14100.0, Overall 14095.2 ft/s
Pile Damping 2.00 %, Time Incr 0.239 ms, 2L/c 10.5 ms
Total volume: 166.500 ft^3; Volume ratio considering added impedance: 1.000

Appendix D

Axial Compressive Static Load Testing Graphical Results
TP-10B-1 and TP-10B-2

I-10 over Mobile River Bridge Load Test Program

ALDOT Project No.: IM-I010(341)
Mobile County, Alabama
AFT Project No.: 118008

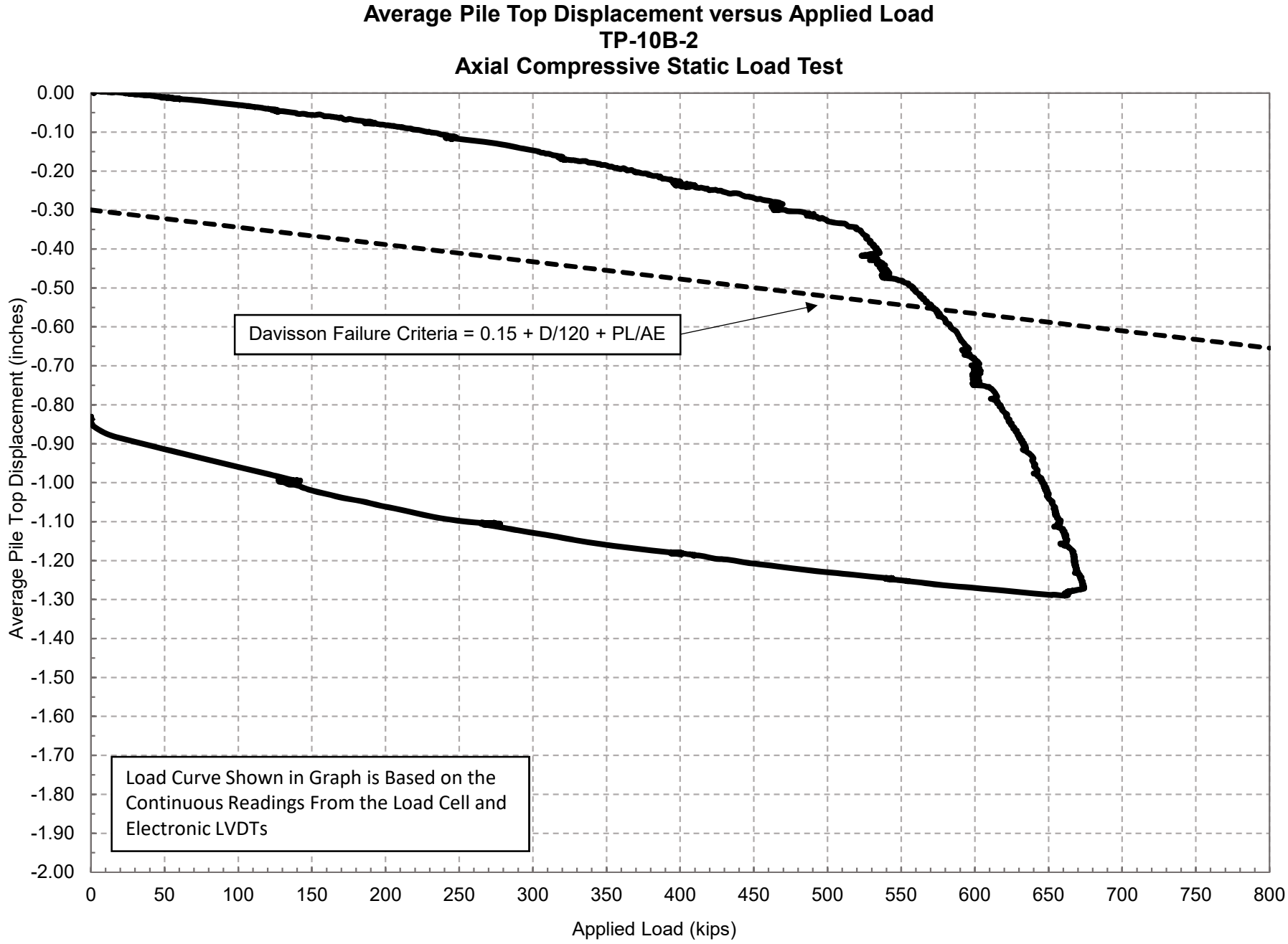


Figure 1

Applied Foundation Testing, Inc.

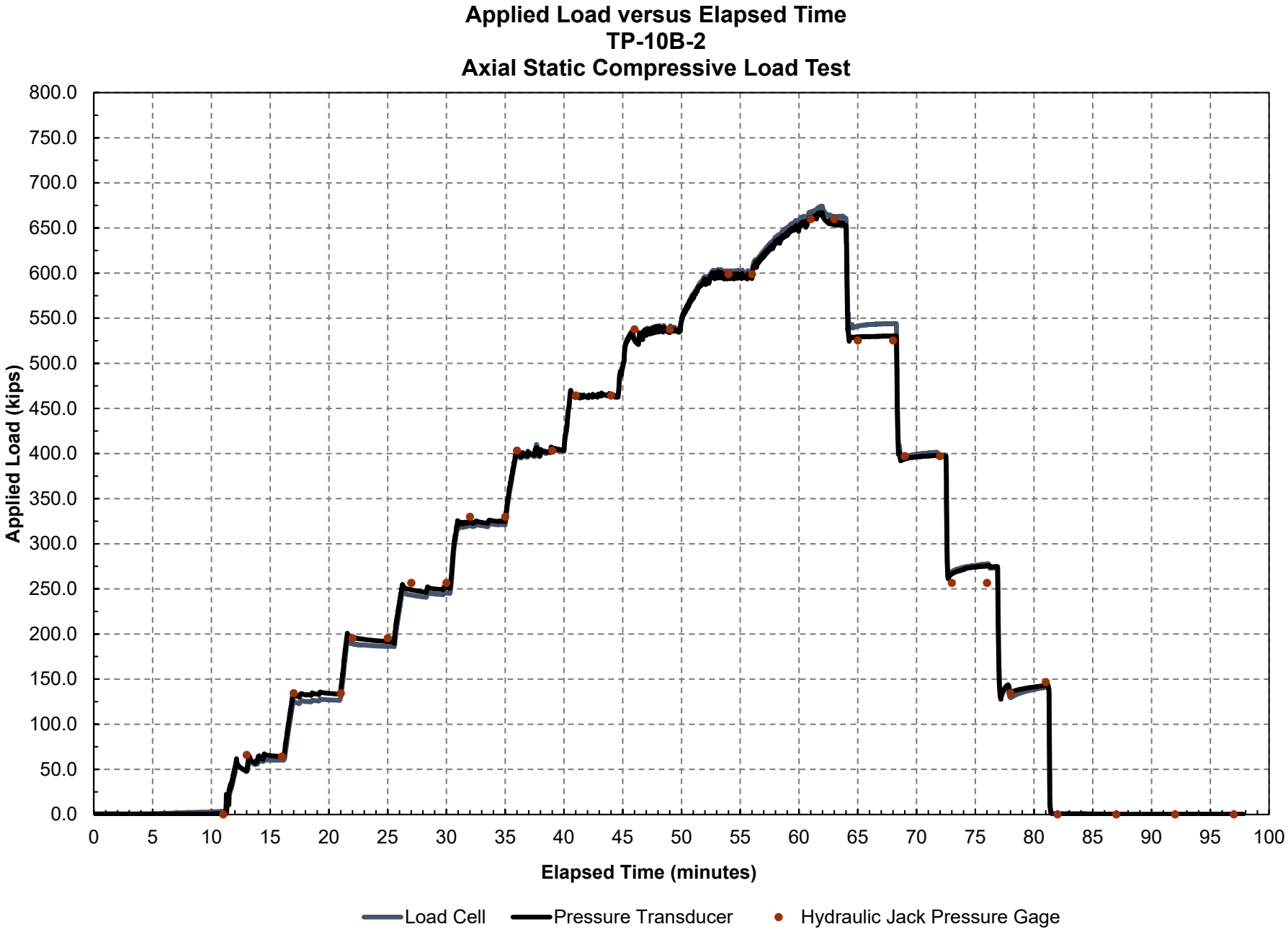


Figure 2

Appilied Foundation Testing, Inc.

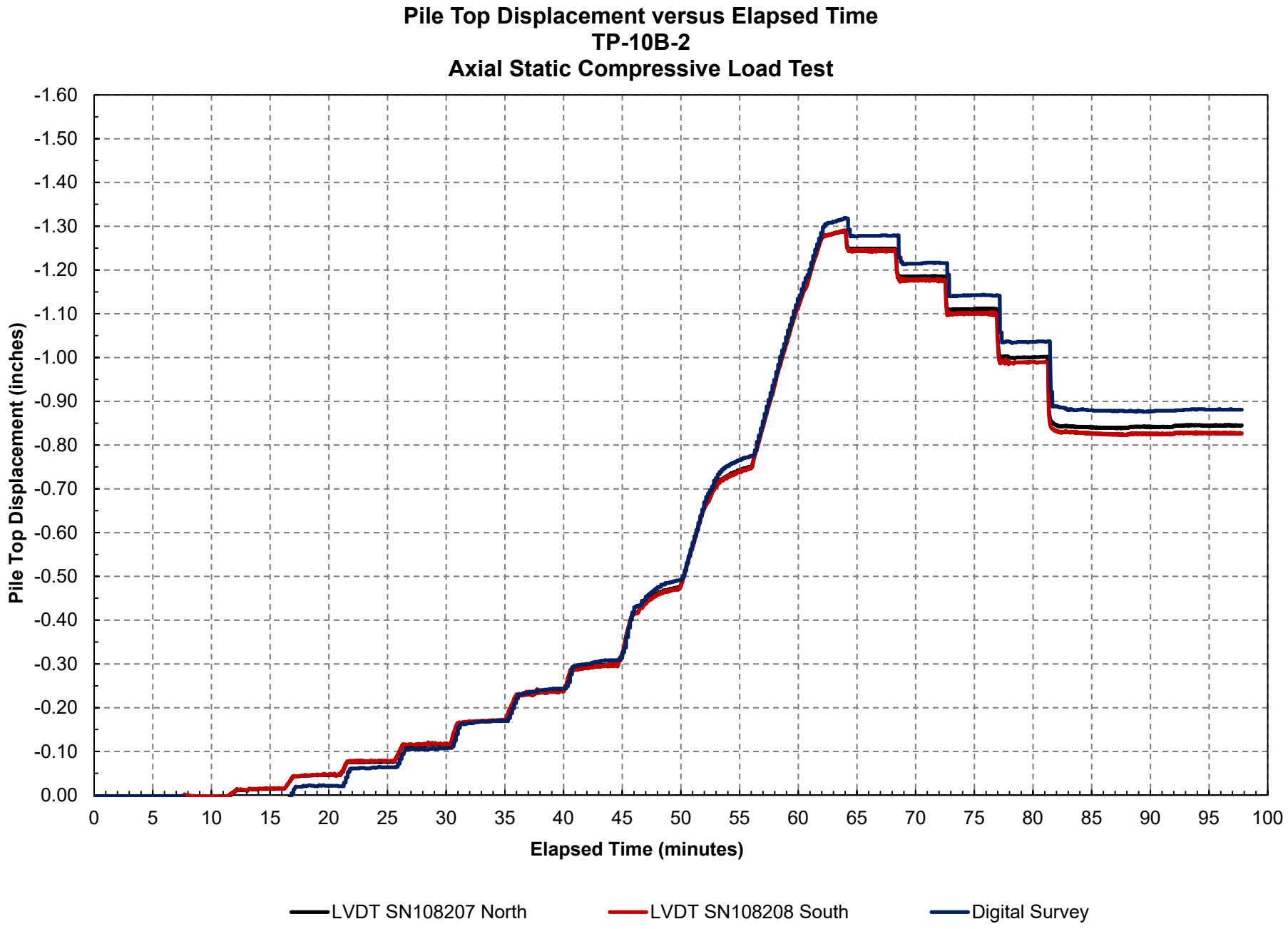


Figure 3

Applied Foundation Testing, Inc.

Appendix E

Relevant Project Documents
TP-10B-1 and TP-10B-2

I-10 over Mobile River Bridge Load Test Program

ALDOT Project No.: IM-I010(341)
Mobile County, Alabama
AFT Project No.: 118008

REFERENCE PROJECT NO.	FISCAL YEAR	SHEET NO.
IM-1010(341)	2018	2

GENERAL PROJECT NOTES

200 THE CONTRACTOR SHALL SUBMIT SHOP DRAWINGS DIRECTLY TO THE MATERIALS AND TESTS ENGINEER OF ALL RAPID LOAD TESTS, SHAFT LOAD TESTS AND STATIC LOAD TESTS FOR APPROVAL.

201 THE CONTRACTOR SHALL PROVIDE REPORTS TO THE MATERIALS AND TESTS ENGINEER OF ALL STATIC LOAD TESTS, RAPID LOAD TESTS AND DYNAMIC TESTS, PREPARED BY SPECIALTY ENGINEERING FIRMS.

202 THE CONTRACTOR SHALL SUBMIT AN INSTALLATION PLAN FOR REVIEW AND APPROVAL FOR ALL TEST PILES IN THIS PROJECT.

301 LOCATION TP-10:

ALL FOUR TEST PILES SHALL BE IMPACT DRIVEN WITH PDA MONITORING TO PLANNED TIP ELEVATION OR TO REFUSAL, WHICHEVER COMES FIRST (NO JETTING).
CONTRACTOR SHALL PLAN TO RESTRIKE MEASUREMENT ON EACH PILE FOR DYNAMIC LOAD TESTING AND SIGNAL MATCHING ANALYSIS AT APPROXIMATELY 1 DAY AFTER INITIAL DRIVE.
CONTRACTOR SHALL PLAN FOR RESTRIKE MEASUREMENT ON PILES TP-10A-1 AND TP-10B-1 FOR DYNAMIC LOAD TESTING AND SIGNAL MATCHING ANALYSIS AT APPROXIMATELY 7 DAYS AFTER INITIAL DRIVE.
CONTRACTOR SHALL PERFORM STATIC LOAD TEST ON PILES TP-10A-2 AND TP-10B-2 IN ACCORDANCE WITH APPLICABLE SPECIAL PROVISIONS
CONTRACTOR SHALL PLAN FOR RESTRIKE MEASUREMENT ON PILES TP-10A-2 AND TP-10B-2 FOR DYNAMIC LOAD TESTING AND SIGNAL MATCHING ANALYSIS WITHIN 7 DAYS AFTER STATIC LOAD TEST.

302 LOCATION TP-WPA STEEL PIPE PILE:

PILE MAY BE INSTALLED WITH ONE SPLICE, AND FINAL PIECE SHALL NOT BE LESS THAN 75 FT IN LENGTH.

VIBRATORY HAMMER MAY BE USED TO INSTALL FIRST PIECE, AFTER SPLICING THE PILE SHALL BE DRIVEN TO THE TARGET TIP ELEVATION USING IMPACT HAMMER.

CONTRACTOR TO PROVIDE HAMMER SUFFICIENT TO DRIVE PILE TO TIP WITH WAVE EQUATION ANALYSIS PER ALDOT SPECS, WITH TARGETED DRIVING RESISTANCE AT END OF INITIAL DRIVE NOT MORE THAN 10 BLOWS PER INCH.

DYNAMIC MONITORING OF PILE USING PDA DURING INSTALLATION AFTER SPLICE, WITH SIGNAL MATCHING ANALYSIS ON SELECTED BLOWS NEAR END OF INITIAL DRIVE.

RAPID LOAD TEST OF PILE USING 19MN RAPID LOAD TEST DEVICE BETWEEN 10 AND 21 DAYS AFTER INITIAL DRIVE.

RESTRIKE BLOWS FOR DYNAMIC LOAD TESTING AND SIGNAL MATCHING ANALYSIS WITHIN ONE WEEK AFTER COMPLETION OF RAPID LOAD TEST (RLT).

303 LOCATION TP-WPB DRILLED SHAFT:

CONTRACTOR TO PERFORM LATERAL RAPID LOAD TESTS USING RAPD LOAD TEST DEVICE AFTER COMPLETION OF AXIAL LOAD TEST(S); LATERAL RLT SHALL BE CAPABLE TO APPLY A LATERAL FORCE OF AT LEAST 1000 KIPS. LATERAL RLT SHALL BE PERFORMED IN FOUR PROGRESSIVELY LARGER INCREMENTS UP TO MAXIMUM FORCE.

LATERAL RLT SHALL INCLUDE MEASUREMENTS OF FORCE AND TOP OF SHAFT DISPLACEMENT AND OF DISPLACEMENT AT NOT LESS THAN 6 ELEVATIONS BELOW TOP OF SHAFT.

TEST SHAFT SHALL BE CONSTRUCTED USING POLYMER BASED DRILLING FLUIDS, WITH ON-SITE SUPPORT FROM FLUID SUPPLIER.

304 LOCATION TP-04:

JETTING OF TP-04 ALLOWED (BUT NOT REQUIRED) TO ELEVATION -70FT
PILE SHALL BE IMPACT DRIVEN WITH PDA MONITORING TO TIP ELEVATION -110FT OR TO REFUSAL, WHICHEVER COMES FIRST
CONTRACTOR SHALL PLAN FOR UP TO TWO RESTRIKE MEASUREMENTS ON THIS PILE AT APPROXIMATELY 1 DAY AND 14 DAYS AFTER INITIAL DRIVE FOR DYNAMIC LOAD TESTING AND SIGNAL MATCHING ANALYSIS.

305 LOCATION TP-23:

JETTING OF TP-23A SHOULD BE PERFORMED TO ELEVATION -100FT
JETTING OF TP-23B AND TP-23C ALLOWED (BUT NOT REQUIRED) TO ELEVATION -70FT
PILE SHALL BE IMPACT DRIVEN WITH PDA MONITORING TO PLANNED TIP ELEVATION OR TO REFUSAL, WHICHEVER COMES FIRST. PLANNED TIP ELEVATION:
TP-23A: -130
TP-23B: -100
TP-23C: -100
CONTRACTOR SHALL PLAN FOR RESTRIKE MEASUREMENT ON EACH PILE FOR DYNAMIC LOAD TESTING AND SIGNAL MATCHING ANALYSIS AT ONE DAY AFTER INITIAL DRIVE AND WITHIN ONE WEEK AFTER COMPLETION OF RAPID LOAD TEST (RLT).
RAPID LOAD TEST OF EACH PILE USING 19MN RAPID LOAD TEST DEVICE NOT SOONER THAN 2 WEEKS AFTER INITIAL DRIVE.

306 LOCATION TP-111:

FOR TP-111A, JETTING IS ALLOWED (BUT NOT REQUIRED) TO ELEVATION -60FT
FOR TP-111B, JETTING SHALL BE PERFORMED TO ELEVATION -90FT
BOTH PILES SHALL BE IMPACT DRIVEN WITH PDA MONITORING TO TIP ELEVATION -120FT OR TO REFUSAL, WHICHEVER COMES FIRST
CONTRACTOR SHALL PLAN FOR UP TO TWO RESTRIKE MEASUREMENTS ON THESE PILES AT APPROXIMATELY 1 DAY AND 14 DAYS AFTER INITIAL DRIVE FOR DYNAMIC LOAD TESTING AND SIGNAL MATCHING ANALYSIS.

307 TEST PILES TP-WPA AND TP-WPB SHALL BE PLACED WITHIN THE LIMITS AN EXPLORATION TRENCH. IF REQUIRED SPACING IS NOT ADEQUATE IN ONE TRENCH, ONE OF THE PILES MAY BE PLACED IN AN ADJACENT EXPLORATION TRENCH.

308 THE CONTRACTOR SHALL CONTACT BILL TURNER (334-242-6144) WITH THE ENVIRONMENTAL TECHNICAL SECTION OF THE ALABAMA DEPARTMENT OF TRANSPORTATION NO LATER THAN TWO (2) WEEKS PRIOR TO STARTING WORK IN ORDER TO MAKE SURE THE EXPLORATION TRENCHES ARE MARKED AND VISIBLE.

800 IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO CONTACT THE VARIOUS UTILITY OWNERS AND DETERMINE THE EXACT LOCATION OF ALL EXISTING UTILITIES ON THIS PROJECT WHETHER SHOWN ON THE PLANS OR NOT. THE LOCATION OF ANY REQUIRED GUARDRAIL, SIGNS, FOOTINGS OF ANY NATURE AND/OR ELECTRICAL/COMMUNICATIONS CONDUITS MAY BE ADJUSTED AS DIRECTED BY THE ENGINEER TO PREVENT ANY CONFLICTS WITH THESE UTILITIES. UTILITY LINE LOCATE REQUESTS WILL BE LIMITED TO INCREMENTS NOT TO EXCEED 2000 LINEAR FEET PER WORKING DAY OPERATIONS. MULTIPLE REQUESTS WILL BE REQUIRED FOR PROJECTS GREATER THAN 2000 LINEAR FEET IN LENGTH.

900 NPDES PERMIT COVERAGE NOT REQUIRED FOR THIS PROJECT.

901 THERE SHALL BE NO FUEL TANKS STORED ON THE RIGHT OF WAY. IN ADDITION, FUEL TRUCKS OR VEHICLES TRANSPORTING CHEMICALS, FERTILIZER, ETC., NOT SHALL BE LEFT UNATTENDED ON THE RIGHT OF WAY.

902 THE CONTRACTOR SHALL FOLLOW ALL REQUIREMENTS CONTAINED WITHIN THE ARMY CORPS OF ENGINEERS PERMIT AND ANY REQUIREMENTS FROM U.S. FISH AND WILDLIFE SERVICE.

903 THE CONTRACTOR SHALL FOLLOW THE ALDOT STANDARD MANTEE CONSTRUCTION CONDITIONS LISTED BELOW:

A. THE LEAD PROJECT PROPONENT/CONTRACTOR SHALL INSTRUCT ALL PERSONNEL ASSOCIATED WITH THE PROJECT OF THE POTENTIAL PRESENCE OF MANATEES AND THE NEED TO AVOID COLLISIONS WITH MANATEES. ALL CONSTRUCTION PERSONNEL ARE RESPONSIBLE FOR OBSERVING WATER-RELATED ACTIVITIES FOR THE PRESENCE OF MANATEES. THE U.S. FISH AND WILDLIFE SERVICE WOULD RECOMMEND HIRING AN INDIVIDUAL FAMILIAR WITH THIS SPECIES TO ACT AS A SPOTTER FOR MANATEES DURING IN-WATER ACTIVITIES.

B. THE LEAD PROJECT PROPONENT/CONTRACTOR SHALL ADVISE ALL CONSTRUCTION PERSONNEL THAT THERE ARE CIVIL AND CRIMINAL PENALTIES FOR HARMING, HARASSING, OR KILLING MANATEES WHICH ARE PROTECTED UNDER THE MARINE MAMMAL PROTECTION ACT OF 1972 AND THE ENDANGERED SPECIES ACT OF 1973.

C. SILTATION BARRIERS SHALL BE MADE OF MATERIAL IN WHICH MANATEES CANNOT BECOME ENTANGLED, ARE PROPERLY SECURED, AND ARE REGULARLY MONITORED TO AVOID MANATEE ENTRAPMENT. BARRIERS MUST NOT BLOCK MANATEE ENTRY TO, OR EXIT FROM, ESSENTIAL HABITAT.

D. ALL VESSELS ASSOCIATED WITH THE CONSTRUCTION PROJECT SHALL OPERATE AT "NO WAKE/IDLE" SPEEDS AT ALL TIMES WHILE IN THE CONSTRUCTION AREA AND WHILE IN WATER WHERE THE DRAFT OF THE VESSEL PROVIDES LESS THAN A FOUR-FOOT CLEARANCE FROM THE BOTTOM. ALL VESSELS WILL FOLLOW ROUTES OF DEEP WATER WHENEVER POSSIBLE.

E. IF MANATEES ARE SEEN WITHIN 100 YARDS OF THE ACTIVE DAILY CONSTRUCTION/DREDGING OPERATION OR VESSEL MOVEMENT, ALL APPROPRIATE PRECAUTIONS SHALL BE IMPLEMENTED TO ENSURE THEIR PROTECTION. THESE PRECAUTIONS SHALL INCLUDE THE OPERATION OF ALL MOVING EQUIPMENT NO CLOSER THAN 50 FEET OF A MANATEE. OPERATION OF ANY EQUIPMENT CLOSER THAN 50 FEET TO A MANATEE SHALL NECESSITATE IMMEDIATE SHUTDOWN OF THAT EQUIPMENT. ACTIVITIES WILL NOT RESUME UNTIL THE MANATEE(S) HAS DEPARTED THE PROJECT AREA OF ITS OWN VOLITION.

F. ANY COLLISION WITH AND/OR INJURY TO A MANATEE SHALL BE REPORTED IMMEDIATELY TO THE U.S. FISH AND WILDLIFE SERVICE IN DAPHNE (251-441-5181).

G. TEMPORARY SIGNS CONCERNING THE MANATEES SHALL BE POSTED PRIOR TO AND DURING ALL CONSTRUCTION/DREDGING ACTIVITIES. ALL SIGNS ARE TO BE REMOVED BY THE LEAD PROJECT PROPONENT/CONTRACTOR UPON COMPLETION OF THE PROJECT. A SIGN MEASURING AT LEAST 3 FT. BY 4 FT. WHICH READS CAUTION: MANATEE AREA WILL BE POSTED IN A LOCATION PROMINENTLY VISIBLE TO WATER RELATED CONSTRUCTION CREWS. A SECOND SIGN SHOULD BE POSTED IF VESSELS ARE ASSOCIATED WITH THE CONSTRUCTION, AND SHOULD BE PLACED VISIBLE TO THE VESSEL OPERATOR. THE SECOND SIGN SHOULD BE AT LEAST 8" BY 11" WHICH READS CAUTION: MANATEE HABITAT. IDLE SPEED IS REQUIRED IF OPERATING A VESSEL IN THE CONSTRUCTION AREA. ALL EQUIPMENT MUST BE SHUTDOWN IF A MANATEE COMES WITHIN 50 FEET OF OPERATION. ANY COLLISION WITH AND/OR INJURY TO A MANATEE SHALL BE REPORTED IMMEDIATELY TO THE U.S. FISH AND WILDLIFE SERVICE IN DAPHNE (251-441-5181).

904-914 OMIT

915 BASIN BOOM SHALL BE REUSED AS NECESSARY AT EACH LOCATION (WATER).

CURRENT ALABAMA DEPARTMENT OF TRANSPORTATION

REVISIONS

ALABAMA DEPARTMENT OF TRANSPORTATION
1409 COLISEUM BOULEVARD
MONTGOMERY, AL 36130-3050

GENERAL PROJECT NOTES

DRAWN BY: _____
DATE DRAWN: _____

SPECIAL DRAWING NO.

INDEX NO.

PILE TIP ELEVATIONS

REFERENCE PROJECT NO	FISCAL YEAR	SHEET NO
IM-I010(341)	2018	2A

PILE TIP ELEVATIONS AND TARGETED NOMINAL RESISTANCE

TEST PILE	PILE TYPE	STATION	SIDE	OFFSET	PILE LENGTH (FT)	TARGETED NOMINAL RESISTANCE (kips)	ESTIMATED TIP ELEVATION (FT)	MINIMUM TIP ELEVATION (FT)
TP-10A-1	HP 14X89	STATION 469+20.00	RT	110	82	300	-65	
TP-10A-2	HP 14X89	STATION 469+20.00	RT	111	82	300	-65	
TP-10B-1	18" PPC SQUARE	STATION 469+60.00	RT	110	77	650	-60	
TP-10B-2	18" PPC SQUARE	STATION 469+60.00	RT	110	77	650	-60	
TP-WPA	60" STEEL PIPE	STATION 513+33.00	LT	100	175	3100	-170	
TP-WPB	72" DRILLED SHAFT	STATION 513+53.00	LT	100	177	N/A	-170	
TP-04	54" PPC CYLINDRICAL	STATION 574+00.00	LT	150	120	3100	-110	-80
TP-23A	54" PPC CYLINDRICAL	STATION 629+57.00	LT	150	140	3100	-130	
TP-23B	54" PPC CYLINDRICAL	STATION 630+00.00	LT	150	110	3100	-100	
TP-23C	30" PPC SQUARE	STATION 630+43.00	LT	150	110	1500	-100	
TP-111A	54" PPC CYLINDRICAL	STATION 897+50.00	RT	150	130	3100	-120	
TP-111B	54" PPC CYLINDRICAL	STATION 898+00.00	RT	150	130	3100	-120	

RESPONSIBLE PE:	SUPERVISOR:	DESIGNER:	PLAN SUBMITTAL	ALABAMA DEPARTMENT OF TRANSPORTATION		SHEET TITLE	ROUTE
DATE:	DATE:	DATE:				PILE TIP ELEVATIONS	I-10

PLAN SHEET

REFERENCE PROJECT NO	FISCAL YEAR	SHEET NO
IM-I010(341)	2018	4

BEGIN PROJECT
℄ CONSTRUCTION (I-10)
STA 465+00.00

(2) TP-10A-1,
TP-10A-2
HP 14X89
LOAD TESTS

(2) TP-10B-1,
TP-10B-2
18" PPC SQUARE
PILE LOAD
TESTS

NOTE: SEE SHEET 2A FOR PILE TIP ELEVATIONS

RESPONSIBLE PE:	SUPERVISOR:	DESIGNER:	PLAN SUBMITTAL
DATE:	DATE:	DATE:	

ALABAMA DEPARTMENT OF TRANSPORTATION

HORIZ 50 0 50 SCALE (FEET)

SHEET TITLE	ROUTE
PLAN SHEET STA 461+00 TO STA 475+00	I-10

REFERENCE PROJECT NUMBER	FISCAL YEAR	SHEET NUMBER
IM-I010(341)	2018	16

thompson ENGINEERING

RECORD OF TEST BORING

Site Description:	I-10 Mobile River Bridge and Bayway					**County:**	Mobile
Boring No.:	TH-10	**Boring Location:**	470+55.32	**Offset:**	106.31' RT	**Alignment:**	I-10 Bayway
ALDOT PE No.:	DPI-0030(005)	**TE Project No.:**	15-1101-0228			**Eng./Geo.:**	C.Tisher
Elev.:	12.9 ft.	**Northing:**	245999.249	**Easting:**	1797615.33	**Date Started:**	9/7/2017
Total Depth:	180.0 ft.	**Soil Depth:**	180.0 ft.	**Core Depth:**	0.0 ft.	**Date Completed:**	9/8/2017
Bore Hole Diameter (in):	4-inch	**AASHTO / ASTM Sampling Methods:**	AASHTO T206 & T207				
Drill Machine:	CME 45C	**Drill Method:**	MR	**Hammer Type:**	Automatic	**Energy Ratio:**	86%
Core Size:	N/A	**Driller:**	Thompson Eng	**Groundwater:**	**TOB** 1.8 ft.	**24 HR**	20.0 ft.

Depth (ft)	Elevation (ft)	MATERIAL DESCRIPTION	Graphic Log	Sample Depth (ft.)	Sample No./Type	1st 6"	2nd 6"	3rd 6"	N Value	SPT N VALUE (blows/foot) PL MC LL; FINES CONTENT (%) 10 20 30 40 50 60 70 80 90
0.0		Loose, light blue and brown, fine grained, with trace gravel and wood, SILTY SAND (SM, A-2-4(0)), LL=NP PL=NP PI=NP NMC=17.8 %#200=18.3		0.0	SS-1	2	4	6	10	
	10.0	Medium dense, reddish brown, fine grained, POORLY GRADED SAND with SILT (SP-SM)		1.5	SS-2	4	8	7	15	
5.0		Medium dense, pale brown, fine grained, POORLY GRADED SAND with SILT (SP-SM, A-2-4(0)), LL=NP PL=NP PI=NP NMC=21.1 %#200=10.9		3.0	SS-3	5	8	6	14	
		Medium dense, moist, gray		4.5	SS-4	5	6	6	12	
		Loose		6.0	SS-5	3	4	3	7	
10.0	5.0	Very loose		8.5	SS-6	1	2	1	3	
	0.0	Very soft, moist, dark gray, with trace gravel, SANDY FAT CLAY (CH, A-7-6(14)), LL=55 PL=23 PI=31 NMC=51.7 %#200=54.0		13.5	SS-7	0	0	1	1	
15.0										
	-5.0	Undisturbed sample obtained from 18.0 to 20.0 feet. Approximately 24 inches of recovery. Moist, dark gray and reddish brown, LEAN CLAY with SAND (CL, A-6(15)), LL=39 PL=16 PI=22 NMC=48.7 %#200=73.8		18.0	ST-1					
20.0										
	-10.0	Medium dense, moist, white, fine to medium grained, POORLY GRADED SAND with SILT (SP-SM, A-3(0)), LL=NP PL=NP PI=NP NMC=26.4 %#200=5.6		23.5	SS-8	9	14	15	29	
25.0										
	-15.0	Medium dense, moist, white and pale brown, fine grained, POORLY GRADED SAND with SILT		28.5	SS-9	8	10	13	23	
30.0										

LEGEND

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	AC - Auger Cuttings	HSA - Hollow Stem Augers	MR - Mud Rotary Wash
ST - Shelby Tube	GB - Grab Bag	SSA - Solid Stem Augers	RC - Rock Coring
DCP - Dynamic Cone Penetrometer	NQ - Rock Core	HA - Hand Auger	

thompson ENGINEERING

RECORD OF TEST BORING

Site Description:	I-10 Mobile River Bridge and Bayway					**County:**	Mobile
Boring No.:	TH-10	**Boring Location:**	470+55.32	**Offset:**	106.31' RT	**Alignment:**	I-10 Bayway
ALDOT PE No.:	DPI-0030(005)	**TE Project No.:**	15-1101-0228			**Eng./Geo.:**	C.Tisher
Elev.:	12.9 ft.	**Northing:**	245999.249	**Easting:**	1797615.33	**Date Started:**	9/7/2017
Total Depth:	180.0 ft.	**Soil Depth:**	180.0 ft.	**Core Depth:**	0.0 ft.	**Date Completed:**	9/8/2017
Bore Hole Diameter (in):	4-inch	**AASHTO / ASTM Sampling Methods:**	AASHTO T206 & T207				
Drill Machine:	CME 45C	**Drill Method:**	MR	**Hammer Type:**	Automatic	**Energy Ratio:**	86%
Core Size:	N/A	**Driller:**	Thompson Eng	**Groundwater:**	**TOB** 1.8 ft.	**24 HR**	20.0 ft.

Depth (ft)	Elevation (ft)	MATERIAL DESCRIPTION	Graphic Log	Sample Depth (ft.)	Sample No./Type	1st 6"	2nd 6"	3rd 6"	N Value	SPT N VALUE (blows/foot) PL MC LL; FINES CONTENT (%) 10 20 30 40 50 60 70 80 90
30.0		(SP-SM, A-3(0)), LL=NP PL=NP PI=NP NMC=23.7 %#200=6.9								
	-20.0	Dense, moist, reddish brown, fine grained, POORLY GRADED SILT WITH SAND (SP-SM)		33.5	SS-10	8	17	18	35	
35.0										
	-25.0	Dense, reddish brown and pale brown		38.5	SS-11	9	15	18	33	
40.0										
	-30.0	Dense, moist, red and pale brown, fine to medium grained, POORLY GRADED SAND with SILT (SP-SM, A-3(0)), LL=NP PL=NP PI=NP NMC=22.4 %#200=5.6		43.5	SS-12	9	16	15	31	
45.0										
	-35.0	Medium dense		48.5	SS-13	7	13	16	29	
50.0										
	-40.0	Medium dense, fine grained		53.5	SS-14	12	12	15	27	
55.0										
	-45.0	Medium dense, moist, red and pale brown, fine to medium grained, POORLY GRADED SAND with SILT		58.5	SS-15	6	6	5	11	
60.0										

LEGEND

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	AC - Auger Cuttings	HSA - Hollow Stem Augers	MR - Mud Rotary Wash
ST - Shelby Tube	GB - Grab Bag	SSA - Solid Stem Augers	RC - Rock Coring
DCP - Dynamic Cone Penetrometer	NQ - Rock Core	HA - Hand Auger	

thompson ENGINEERING

RECORD OF TEST BORING

Site Description:	I-10 Mobile River Bridge and Bayway					**County:**	Mobile
Boring No.:	TH-10	**Boring Location:**	470+55.32	**Offset:**	106.31' RT	**Alignment:**	I-10 Bayway
ALDOT PE No.:	DPI-0030(005)	**TE Project No.:**	15-1101-0228			**Eng./Geo.:**	C.Tisher
Elev.:	12.9 ft.	**Northing:**	245999.249	**Easting:**	1797615.33	**Date Started:**	9/7/2017
Total Depth:	180.0 ft.	**Soil Depth:**	180.0 ft.	**Core Depth:**	0.0 ft.	**Date Completed:**	9/8/2017
Bore Hole Diameter (in):	4-inch	**AASHTO / ASTM Sampling Methods:**	AASHTO T206 & T207				
Drill Machine:	CME 45C	**Drill Method:**	MR	**Hammer Type:**	Automatic	**Energy Ratio:**	86%
Core Size:	N/A	**Driller:**	Thompson Eng	**Groundwater:**	**TOB** 1.8 ft.	**24 HR**	20.0 ft.

Depth (ft)	Elevation (ft)	MATERIAL DESCRIPTION	Graphic Log	Sample Depth (ft.)	Sample No./Type	1st 6"	2nd 6"	3rd 6"	N Value	SPT N VALUE (blows/foot) PL MC LL; FINES CONTENT (%) 10 20 30 40 50 60 70 80 90
60.0		(SP-SM, A-3(0)), LL=NP PL=NP PI=NP NMC=22.8 %#200=5.2								
	-50.0	Dense, fine grained		63.5	SS-16	7	15	19	34	
65.0										
	-55.0	Medium dense		68.5	SS-17	4	8	8	16	
70.0										
	-60.0	Medium dense, moist, red and pale brown, fine to medium grained, POORLY GRADED SAND (SP, A-3(0)), LL=NP PL=NP PI=NP NMC=19.9 %#200=3.7		73.5	SS-18	10	10	14	24	
75.0										
	-65.0	Dense		78.5	SS-19	12	14	17	31	
80.0										
	-70.0	Medium dense, pale brown and reddish brown, with trace gravel		83.5	SS-20	6	7	10	17	
85.0										
	-75.0	Medium dense, moist, pale brown and reddish brown, fine to medium grained, POORLY GRADED SAND		88.5	SS-21	6	6	7	13	
90.0										

LEGEND

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	AC - Auger Cuttings	HSA - Hollow Stem Augers	MR - Mud Rotary Wash
ST - Shelby Tube	GB - Grab Bag	SSA - Solid Stem Augers	RC - Rock Coring
DCP - Dynamic Cone Penetrometer	NQ - Rock Core	HA - Hand Auger	

STRATA SYMBOLS

- SAND (SP)
- SILT (MH)
- FAT CLAY (CH)
- SILTY SAND (SM)
- POORLY GRADED SAND with SILT (SP-SM)
- ORGANIC SOILS (OL)
- Paving
- GRAVEL (GP)
- SANDY SILT (ML)
- LEAN CLAY (CL)
- TOPSOIL
- CLAYEY SAND (SC)
- CLAYEY SILTY SAND (SC-SM)
- WELL GRADED SAND with SILT and GRAVEL (SW-SM)
- SANDSTONE
- DOLOMITE
- CLAYEY GRAVEL (GC)
- POORLY GRADED GRAVEL with SILT and SAND (GP-GM)
- SILTY CLAY (CL-ML)
- Ground Water, ATD
- 24 Hr./Delayed Ground Water
- HSA - Hollow Stem Auger
- SSA - Solid Stem Auger
- MR - Mud Rotary

NO - Not Obtained

NE - Not Encountered

REC Recovery

RQD Rock Quality Designation

pp - Pocket Penetrometer

SS - Split Spoon

ST - Shelby Tube

DCP - Dynamic Cone Penetrometer

AC - Auger Cuttings

GB - Grab Bag

NQ - Rock Core

Alabama Department of Transportation

Bridge Sheet of

thompson ENGINEERING
2970 COTTAGE HILL RD.
MOBILE, AL 36606

APPROVED : SAM STERNBERG III, P.E.

GEOTECHNICAL ENGINEER

DATE :

PROJECT NO. 17-1101-0145
I-10 MOBILE RIVER BRIDGE
LOAD TEST PROGRAM
MOBILE COUNTY, ALABAMA

Preliminary Project No:

TEST BORING RECORD
Sheet 1 of 12

REFERENCE PROJECT NUMBER	FISCAL YEAR	SHEET NUMBER
IM-I010(341)	2018	17

RECORD OF TEST BORING

thompson ENGINEERING

Site Description:	I-10 Mobile River Bridge and Bayway					**County:**	Mobile
Boring No.:	TH-10	**Boring Location:**	470+55.32	**Offset:**	106.31' RT	**Alignment:**	I-10 Bayway
ALDOT PE No.:	DPI-0030(005)	**TE Project No.:**	15-1101-0228			**Eng./Geo.:**	C.Tisher
Elev.:	12.9 ft.	**Northing:**	245999.249	**Easting:**	1797615.33	**Date Started:**	9/7/2017
Total Depth:	180.0 ft.	**Soil Depth:**	180.0 ft.	**Core Depth:**	0.0 ft.	**Date Completed:**	9/8/2017
Bore Hole Diameter (in):	4-inch	**AASHTO / ASTM Sampling Methods:**	AASHTO T206 & T207				
Drill Machine:	CME 45C	**Drill Method:**	MR	**Hammer Type:**	Automatic	**Energy Ratio:**	86%
Core Size:	N/A	**Driller:**	Thompson Eng	**Groundwater:**	**TOB** 1.8 ft.	**24 HR**	20.0 ft.

Depth (ft)	Elevation (ft)	MATERIAL DESCRIPTION	Graphic Log	Sample Depth (ft.)	Sample No./Type	1st 6"	2nd 6"	3rd 6"	N Value	SPT N VALUE (blows/foot) PL MC LL; FINES CONTENT (%) 10 20 30 40 50 60 70 80 90
90.0		(SP, A-3(0)), LL=NP PL=NP PI=NP NMC=24.0 %#200=4.7								
	-80.0	Dense		93.5	SS-22	8	16	21	37	
95.0										
	-85.0	Dense		98.5	SS-23	16	22	24	46	
100.0										
	-90.0	Firm, moist, dark gray, FAT CLAY (CH)		103.5	SS-24	2	3	4	7	
105.0										
	-95.0	Undisturbed sample obtained from 108.0 to 110.0 feet. Approximately 24 inches of recovery. Moist, greenish gray, with trace sand, FAT CLAY (CH, A-7-6(66)), LL=85 PL=23 PI=62 NMC=39.5 %#200=93.7		108.0	ST-2					
110.0										
	-100.0	Stiff, moist, greenish gray, LEAN CLAY with SAND (CL)		113.5	SS-25	2	5	8	13	
115.0										
	-105.0	Undisturbed sample obtained from 118.0 to 120.0 feet. Approximately 24 inches of recovery. Moist, greenish gray, LEAN CLAY with SAND (CL,		118.0	ST-3					
120.0										

LEGEND

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	AC - Auger Cuttings	HSA - Hollow Stem Augers	MR - Mud Rotary Wash
ST - Shelby Tube	GB - Grab Bag	SSA - Solid Stem Augers	RC - Rock Coring
DCP - Dynamic Cone Penetrometer	NQ - Rock Core	HA - Hand Auger	

RECORD OF TEST BORING

thompson ENGINEERING

Site Description:	I-10 Mobile River Bridge and Bayway					**County:**	Mobile
Boring No.:	TH-10	**Boring Location:**	470+55.32	**Offset:**	106.31' RT	**Alignment:**	I-10 Bayway
ALDOT PE No.:	DPI-0030(005)	**TE Project No.:**	15-1101-0228			**Eng./Geo.:**	C.Tisher
Elev.:	12.9 ft.	**Northing:**	245999.249	**Easting:**	1797615.33	**Date Started:**	9/7/2017
Total Depth:	180.0 ft.	**Soil Depth:**	180.0 ft.	**Core Depth:**	0.0 ft.	**Date Completed:**	9/8/2017
Bore Hole Diameter (in):	4-inch	**AASHTO / ASTM Sampling Methods:**	AASHTO T206 & T207				
Drill Machine:	CME 45C	**Drill Method:**	MR	**Hammer Type:**	Automatic	**Energy Ratio:**	86%
Core Size:	N/A	**Driller:**	Thompson Eng	**Groundwater:**	**TOB** 1.8 ft.	**24 HR**	20.0 ft.

Depth (ft)	Elevation (ft)	MATERIAL DESCRIPTION	Graphic Log	Sample Depth (ft.)	Sample No./Type	1st 6"	2nd 6"	3rd 6"	N Value	SPT N VALUE (blows/foot) PL MC LL; FINES CONTENT (%) 10 20 30 40 50 60 70 80 90
120.0		A-6(12)), LL=33 PL=17 PI=16 NMC=30.4 %#200=83.4								
	-110.0	Dense, moist, pale brown, fine to medium grained, SAND (SP), with gravel		123.5	SS-26	9	16	15	31	
125.0										
	-115.0	Dense, pale brown, medium to coarse grained		128.5	SS-27	9	19	18	37	
130.0										
	-120.0	Very dense, moist, pale brown, fine to medium grained, with trace gravel, SILTY SAND (SM, A-2-4(0)), LL=NP PL=NP PI=NP NMC=16.9 %#200=13.5		133.5	SS-28	16	37	39	76	
135.0										
	-125.0	Dense		138.5	SS-29	13	20	22	42	
140.0										
	-130.0	Very dense, with trace gravel		143.5	SS-30	16	28	31	59	
145.0										
	-135.0	Very stiff, moist, bluish gray, SANDY LEAN CLAY (CL, A-6(8)), LL=32 PL=14 PI=17 NMC=22.8		148.5	SS-31	8	11	12	23	
150.0										

LEGEND

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	AC - Auger Cuttings	HSA - Hollow Stem Augers	MR - Mud Rotary Wash
ST - Shelby Tube	GB - Grab Bag	SSA - Solid Stem Augers	RC - Rock Coring
DCP - Dynamic Cone Penetrometer	NQ - Rock Core	HA - Hand Auger	

RECORD OF TEST BORING

thompson ENGINEERING

Site Description:	I-10 Mobile River Bridge and Bayway					**County:**	Mobile
Boring No.:	TH-10	**Boring Location:**	470+55.32	**Offset:**	106.31' RT	**Alignment:**	I-10 Bayway
ALDOT PE No.:	DPI-0030(005)	**TE Project No.:**	15-1101-0228			**Eng./Geo.:**	C.Tisher
Elev.:	12.9 ft.	**Northing:**	245999.249	**Easting:**	1797615.33	**Date Started:**	9/7/2017
Total Depth:	180.0 ft.	**Soil Depth:**	180.0 ft.	**Core Depth:**	0.0 ft.	**Date Completed:**	9/8/2017
Bore Hole Diameter (in):	4-inch	**AASHTO / ASTM Sampling Methods:**	AASHTO T206 & T207				
Drill Machine:	CME 45C	**Drill Method:**	MR	**Hammer Type:**	Automatic	**Energy Ratio:**	86%
Core Size:	N/A	**Driller:**	Thompson Eng	**Groundwater:**	**TOB** 1.8 ft.	**24 HR**	20.0 ft.

Depth (ft)	Elevation (ft)	MATERIAL DESCRIPTION	Graphic Log	Sample Depth (ft.)	Sample No./Type	1st 6"	2nd 6"	3rd 6"	N Value	SPT N VALUE (blows/foot) PL MC LL; FINES CONTENT (%) 10 20 30 40 50 60 70 80 90
150.0		%#200=62.6								
	-140.0	Hard, moist, bluish gray, FAT CLAY (CH, A-7-6(42)), LL=57 PL=14 PI=43 NMC=18.1 %#200=92.3		158.5	SS-32	9	17	22	39	
155.0										
	-145.0									
160.0										
	-150.0									
165.0										
	-155.0	Dense, moist, grayish brown, fine to medium grained, with trace clay and trace gravel, SILTY SAND (SM, A-2-4(0)), LL=NP PL=NP PI=NP NMC=15.1 %#200=19.5		168.5	SS-33	6	18	27	45	
170.0										
	-160.0									
175.0										
	-165.0	Very dense, wet, brownish gray, fine grained, POORLY GRADED SAND with SILT (SP-SM)		178.5	SS-34	30	50/6	X	50/6	
180.0										

LEGEND

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	AC - Auger Cuttings	HSA - Hollow Stem Augers	MR - Mud Rotary Wash
ST - Shelby Tube	GB - Grab Bag	SSA - Solid Stem Augers	RC - Rock Coring
DCP - Dynamic Cone Penetrometer	NQ - Rock Core	HA - Hand Auger	

STRATA SYMBOLS

- SAND (SP)
- SILT (MH)
- FAT CLAY (CH)
- SILTY SAND (SM)
- POORLY GRADED SAND with SILT (SP-SM)
- ORGANIC SOILS (OL)
- Paving
- GRAVEL (GP)
- SANDY SILT (ML)
- LEAN CLAY (CL)
- TOPSOIL
- CLAYEY SAND (SC)
- CLAYEY SILTY SAND (SC-SM)
- WELL GRADED SAND with SILT and GRAVEL (SW-SM)
- SANDSTONE
- DOLOMITE
- CLAYEY GRAVEL (GC)
- POORLY GRADED GRAVEL with SILT and SAND (GP-GM)
- SILTY CLAY (CL-ML)
- Ground Water, ATD
- 24 Hr./Delayed Ground Water
- HSA - Hollow Stem Auger
- SSA - Solid Stem Auger
- MR - Mud Rotary

NO - Not Obtained

NE - Not Encountered

REC Recovery

RQD Rock Quality Designation

pp - Pocket Penetrometer

SS - Split Spoon

ST - Shelby Tube

DCP - Dynamic Cone Penetrometer

AC - Auger Cuttings

GB - Grab Bag

NQ - Rock Core

Alabama Department of Transportation

Bridge Sheet of

thompson ENGINEERING
2970 COTTAGE HILL RD.
MOBILE, AL 36606

APPROVED : SAM STERNBERG III, P.E.

GEOTECHNICAL ENGINEER

DATE :

PROJECT NO. 17-1101-0145
I-10 MOBILE RIVER BRIDGE
LOAD TEST PROGRAM
MOBILE COUNTY, ALABAMA

Preliminary Project No:

TEST BORING RECORD
Sheet 2 of 12

REFERENCE PROJECT NUMBER	FISCAL YEAR	SHEET NUMBER
IM-I010(341)	2018	18

thompson ENGINEERING

RECORD OF TEST BORING

Site Description:	I-10 Mobile River Bridge and Bayway					**County:**	Mobile
Boring No.:	TH-10	**Boring Location:**	470+55.32	**Offset:**	106.31' RT	**Alignment:**	I-10 Bayway
ALDOT PE No.:	DPI-0030(005)	**TE Project No.:**	15-1101-0228			**Eng./Geo.:**	C.Tisher
Elev.:	12.9 ft.	**Northing:**	245999.249	**Easting:**	1797615.33	**Date Started:**	9/7/2017
Total Depth:	180.0 ft.	**Soil Depth:**	180.0 ft.	**Core Depth:**	0.0 ft.	**Date Completed:**	9/8/2017
Bore Hole Diameter (in):	4-inch	**AASHTO / ASTM Sampling Methods:**	AASHTO T206 & T207				
Drill Machine:	CME 45C	**Drill Method:**	MR	**Hammer Type:**	Automatic	**Energy Ratio:**	86%
Core Size:	N/A	**Driller:**	Thompson Eng	**Groundwater:**	**TOB** 1.8 ft.	**24 HR**	20.0 ft.

Depth (ft)	Elevation (ft)	MATERIAL DESCRIPTION	Graphic Log	Sample Depth (ft.)	Sample No./Type	1st 6"	2nd 6"	3rd 6"	N Value	● SPT N VALUE (blows/foot) PL MC LL ▲ FINES CONTENT (%) ▲ 10 20 30 40 50 60 70 80 90
		Boring Terminated at 180.0 feet. *Groundwater depth TOB most likely influenced by drilling method.								

LEGEND

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	AC - Auger Cuttings	HSA - Hollow Stem Augers	MR - Mud Rotary Wash
ST - Shelby Tube	GB - Grab Bag	SSA - Solid Stem Augers	RC - Rock Coring
DCP - Dynamic Cone Penetrometer	NQ - Rock Core	HA - Hand Auger	

thompson ENGINEERING

RECORD OF TEST BORING

Site Description:	I-10 Mobile River Bridge and Bayway					**County:**	Mobile
Boring No.:	MB-1	**Boring Location:**	514+25.88	**Offset:**	18.84' LT	**Alignment:**	I-10 Main Span
ALDOT PE No.:	DPI-0030(005)	**TE Project No.:**	15-1101-0228			**Eng./Geo.:**	B.Ellis/C.Tisher
Elev.:	2.9 ft.	**Northing:**	249675.65	**Easting:**	1799417.497	**Date Started:**	4/20/2016
Total Depth:	300.0 ft.	**Soil Depth:**	300.0 ft.	**Core Depth:**	0.0 ft.	**Date Completed:**	4/27/2016
Bore Hole Diameter (in):	4-inch	**AASHTO / ASTM Sampling Methods:**	AASHTO T206 & T207				
Drill Machine:	CME 550X	**Drill Method:**	MR	**Hammer Type:**	Automatic	**Energy Ratio:**	88%
Core Size:	N/A	**Driller:**	Thompson Eng	**Groundwater:**	**TOB** 0.0 ft.	**24 HR**	0.0 ft.

Depth (ft)	Elevation (ft)	MATERIAL DESCRIPTION	Graphic Log	Sample Depth (ft.)	Sample No./Type	1st 6"	2nd 6"	3rd 6"	N Value	● SPT N VALUE (blows/foot) PL MC LL ▲ FINES CONTENT (%) ▲ 10 20 30 40 50 60 70 80 90
0.0	0.0	Loose, moist, dark brown, fine to coarse grained, SILTY SAND with GRAVEL (SM)		0.0	SS-1	4	4	4	8	
		Medium dense, wet, dark brown, fine to medium grained, with wood, SILTY SAND with GRAVEL (SM, A-2-4(0)), LL=NP PL=NP PI=NP NMC=57.0 %#200=17.6		1.5	SS-2	4	5	7	12	
				3.0	SS-3	4	2	2	4	
		Very loose, wet, dark brown, fine to coarse grained, POORLY GRADED GRAVEL with SILT and SAND (GP-GM)		4.5	SS-4	2	2	5	7	
5.0		Loose, most likely fall in		6.0	SS-5	3	3	3	6	
	-5.0	Loose, most likely fall in								
		Very loose, most likely fall in		8.5	SS-6	2	1	1	2	
10.0										
	-10.0	Very loose, wet, dark brown, fine to coarse grained, POORLY GRADED GRAVEL with SILT and SAND (GP-GM, A-1-a(0)), LL=NP PL=NP PI=NP NMC=18.9 %#200=10.9		13.5	SS-7	1	2	2	4	
15.0										
	-15.0	Loose, wet, gray and brown, fine grained, POORLY GRADED SAND with GRAVEL (SP, A-1-b(0)), LL=NP PL=NP PI=NP NMC=16.9 %#200=4.7		18.5	SS-8	5	5	4	9	
20.0										
	-20.0	Loose, dark brown and gray, fine to medium grained		23.5	SS-9	4	5	5	10	
25.0										
	-25.0	Medium dense, gray and light gray		28.5	SS-10	8	12	11	23	
30.0										

LEGEND

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	AC - Auger Cuttings	HSA - Hollow Stem Augers	MR - Mud Rotary Wash
ST - Shelby Tube	GB - Grab Bag	SSA - Solid Stem Augers	RC - Rock Coring
DCP - Dynamic Cone Penetrometer	NQ - Rock Core	HA - Hand Auger	

thompson ENGINEERING

RECORD OF TEST BORING

Site Description:	I-10 Mobile River Bridge and Bayway					**County:**	Mobile
Boring No.:	MB-1	**Boring Location:**	514+25.88	**Offset:**	18.84' LT	**Alignment:**	I-10 Main Span
ALDOT PE No.:	DPI-0030(005)	**TE Project No.:**	15-1101-0228			**Eng./Geo.:**	B.Ellis/C.Tisher
Elev.:	2.9 ft.	**Northing:**	249675.65	**Easting:**	1799417.497	**Date Started:**	4/20/2016
Total Depth:	300.0 ft.	**Soil Depth:**	300.0 ft.	**Core Depth:**	0.0 ft.	**Date Completed:**	4/27/2016
Bore Hole Diameter (in):	4-inch	**AASHTO / ASTM Sampling Methods:**	AASHTO T206 & T207				
Drill Machine:	CME 550X	**Drill Method:**	MR	**Hammer Type:**	Automatic	**Energy Ratio:**	88%
Core Size:	N/A	**Driller:**	Thompson Eng	**Groundwater:**	**TOB** 0.0 ft.	**24 HR**	0.0 ft.

Depth (ft)	Elevation (ft)	MATERIAL DESCRIPTION	Graphic Log	Sample Depth (ft.)	Sample No./Type	1st 6"	2nd 6"	3rd 6"	N Value	● SPT N VALUE (blows/foot) PL MC LL ▲ FINES CONTENT (%) ▲ 10 20 30 40 50 60 70 80 90
30.0										
	-30.0	Medium dense, wet, yellowish brown and brown, fine grained, POORLY GRADED SAND with GRAVEL (SP, A-3(0)), LL=NP PL=NP PI=NP NMC=28.7 %#200=3.4		33.5	SS-11	6	5	6	11	
35.0										
	-35.0	Loose, with trace shells		38.5	SS-12	5	4	5	9	
40.0										
	-40.0	Medium dense, wet, pale brown, fine to medium grained, with trace gravel, POORLY GRADED SAND (SP, A-1-b(0)), LL=NP PL=NP PI=NP NMC=22.2 %#200=2.1		43.5	SS-13	4	6	8	14	
45.0										
	-45.0	Loose, wet, pale brown, fine to medium grained, POORLY GRADED GRAVEL with SAND (GP, A-1-a(0)), LL=NP PL=NP PI=NP NMC=11.7 %#200=3.1		48.5	SS-14	6	5	4	9	
50.0										
	-50.0	Loose, light brown		53.5	SS-15	4	3	4	7	
55.0										
	-55.0	Medium dense, wet, pale brown, fine to medium grained, POORLY GRADED SAND with SILT		58.5	SS-16	8	10	6	16	
60.0										

LEGEND

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	AC - Auger Cuttings	HSA - Hollow Stem Augers	MR - Mud Rotary Wash
ST - Shelby Tube	GB - Grab Bag	SSA - Solid Stem Augers	RC - Rock Coring
DCP - Dynamic Cone Penetrometer	NQ - Rock Core	HA - Hand Auger	

STRATA SYMBOLS

- SAND (SP)
- SILT (MH)
- FAT CLAY (CH)
- SILTY SAND (SM)
- POORLY GRADED SAND with SILT (SP-SM)
- ORGANIC SOILS (OL)
- Paving
- GRAVEL (GP)
- SANDY SILT (ML)
- LEAN CLAY (CL)
- TOPSOIL
- CLAYEY SAND (SC)
- CLAYEY SILTY SAND (SC-SM)
- WELL GRADED SAND with SILT and GRAVEL (SW-SM)
- SANDSTONE
- DOLOMITE
- CLAYEY GRAVEL (GC)
- POORLY GRADED GRAVEL with SILT and SAND (GP-GM)
- SILTY CLAY (CL-ML)
- Ground Water, ATD
- 24 Hr./Delayed Ground Water
- HSA - Hollow Stem Auger
- SSA - Solid Stem Auger
- MR - Mud Rotary

NO - Not Obtained

NE - Not Encountered

REC Recovery

RQD Rock Quality Designation

pp - Pocket Penetrometer

SS - Split Spoon

ST - Shelby Tube

DCP - Dynamic Cone Penetrometer

AC - Auger Cuttings

GB - Grab Bag

NQ - Rock Core

Alabama Department of Transportation

Bridge Sheet of

thompson ENGINEERING
2970 COTTAGE HILL RD.
MOBILE, AL 36606

APPROVED : SAM STERNBERG III, P.E.

GEOTECHNICAL ENGINEER

DATE :

PROJECT NO. 17-1101-0145
I-10 MOBILE RIVER BRIDGE
LOAD TEST PROGRAM
MOBILE COUNTY, ALABAMA

Preliminary Project No:

TEST BORING RECORD

Sheet 3 of 12

Appendix F

Instrument Calibrations
TP-10B-1 and TP-10B-2

I-10 over Mobile River Bridge Load Test Program

ALDOT Project No.: IM-I010(341)
Mobile County, Alabama
AFT Project No.: 118008

Pile Dynamics, Inc.

Certificate of Calibration

Transducer Model: BDI ST350

Serial Number: P454

PDI Gage Factor: 145.3 με/V

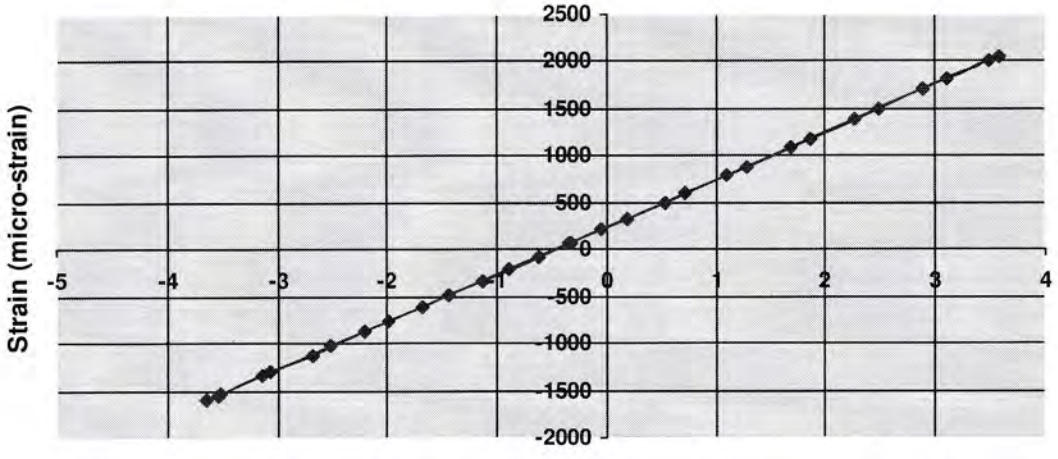
General Gage Factor: 504.7 $\mu\varepsilon/mV/V_{ext}$

Initial Offset Voltage: -0.113 mV/V_{ext}

Table 1 – Representative Calibration Data

Applied Strain (με)	Transducer Output (mV/V_{ext})	Applied Strain (με)	Transducer Output (mV/V_{ext})
65	-0.330	335	0.184
-83	-0.628	598	0.709
-331	-1.125	889	1.284
-607	-1.670	1188	1.872
-876	-2.202	1497	2.487
-1115	-2.687	1814	3.109
-1344	-3.136	2058	3.573
-1543	-3.541	2013	3.492
-1597	-3.646	1700	2.888
-1525	-3.515	1387	2.272
-1288	-3.058	1088	1.683
-1023	-2.521	794	1.100
-753	-1.982	502	0.529
-483	-1.439	210	-0.047
-210	-0.893	71	-0.319
70	-0.337	70	-0.321

Calibration Curve



Mean Linear Correlation Coefficient (LCC): 9.999805E-1

LCC Standard Deviation: 1.224288E-6

Calibrated By: Vanna Thach

Signature: Thach

Date/Time: 1/26/2018 8:12 AM

Temperature (°C): 24.3

Pile Dynamics, Inc.

Certificate of Calibration

Transducer Model: BDI ST350

Serial Number: P455

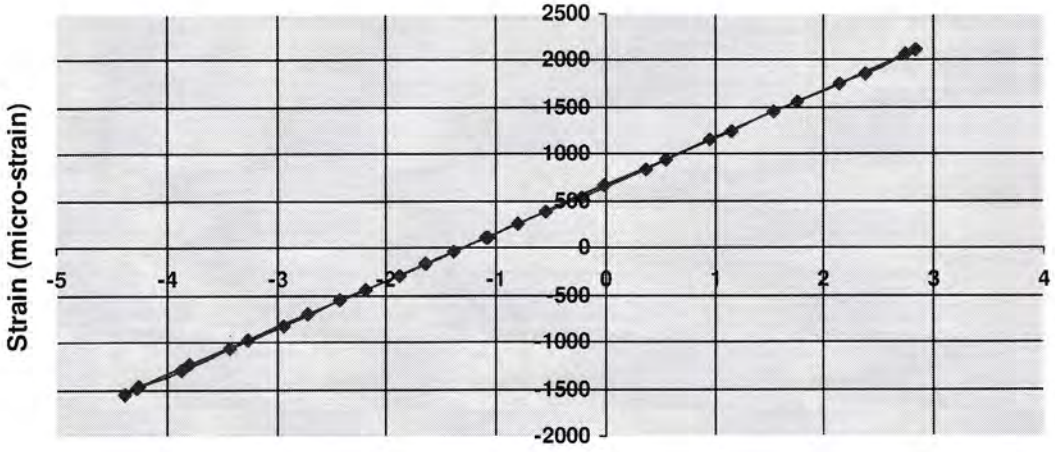
PDI Gage Factor: 145.8 με/V

General Gage Factor: 506.2 $\mu\varepsilon/mV/V_{ext}$
Initial Offset Voltage: -0.434 mV/V_{ext}

Table 1 – Representative Calibration Data

Applied Strain (με)	Transducer Output (mV/V_{ext})	Applied Strain (με)	Transducer Output (mV/V_{ext})
110	-1.082	389	-0.551
-42	-1.386	657	-0.021
-288	-1.881	947	0.552
-560	-2.418	1246	1.143
-828	-2.945	1556	1.751
-1070	-3.431	1869	2.371
-1290	-3.866	2115	2.834
-1489	-4.264	2069	2.749
-1547	-4.375	1752	2.143
-1473	-4.243	1446	1.542
-1238	-3.788	1147	0.958
-976	-3.260	845	0.360
-707	-2.726	548	-0.218
-440	-2.191	255	-0.796
-163	-1.641	114	-1.075
118	-1.086	114	-1.076

Calibration Curve



Mean Linear Correlation Coefficient (LCC): 9.999817E-1

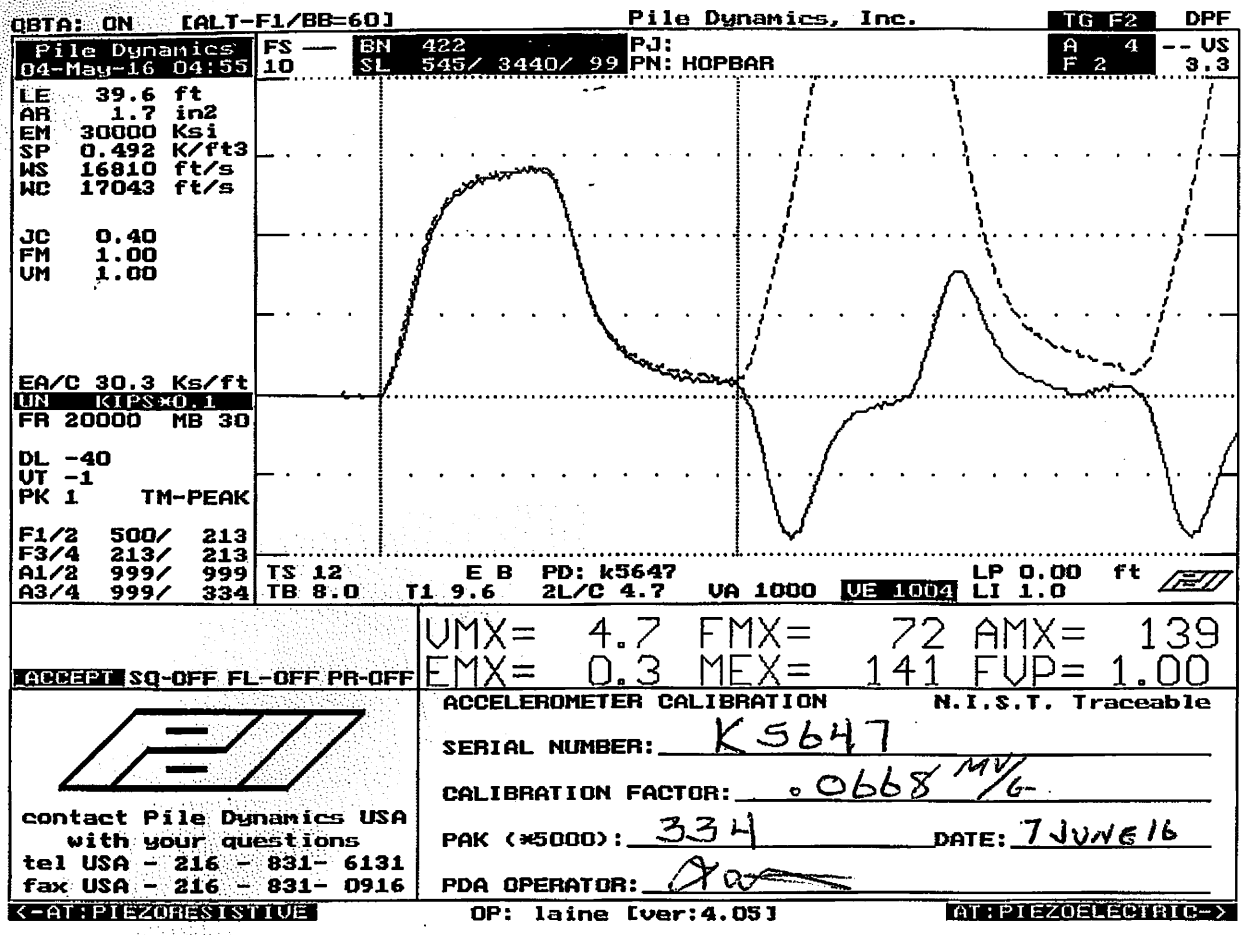
LCC Standard Deviation: 3.891526E-7

Calibrated By: Vanna Thach

Signature: Thach

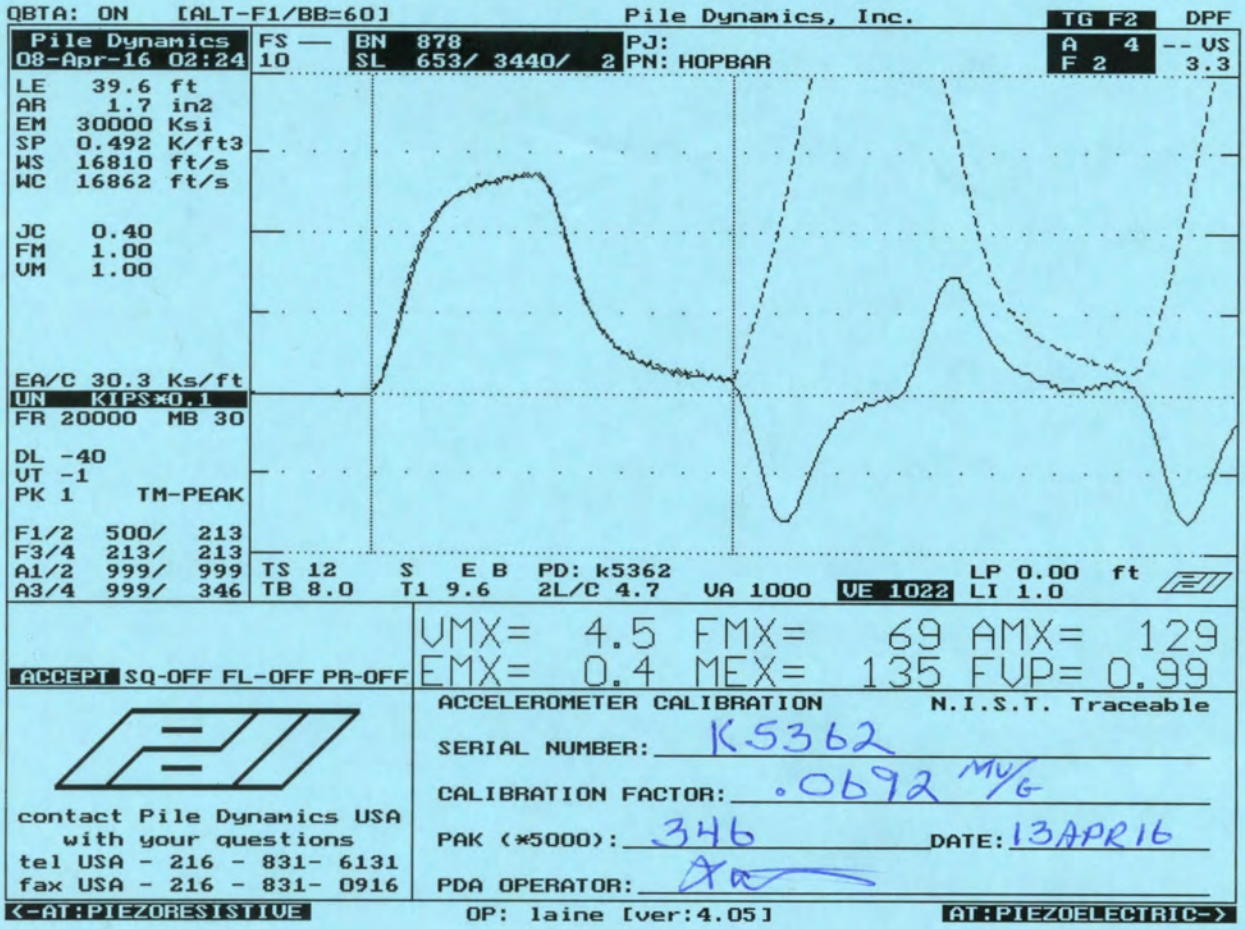
Date/Time: 1/26/2018 7:26 AM

Temperature (°C): 23.6



Smart Sensor

Smart Chip Programmed By M.W. **on** 7JUN16 **CRC Value** 34B5



Smart Sensor

Smart Chip Programmed By A.M.W. **on** 13APR16 **CRC Value** 1022

ALABAMA DEPARTMENT OF TRANSPORTATION
JACK CALIBRATION PROCEDURE
PILING JACK

LAB NO: FGR 113-18

PROJECT NO(S): IM-I010(341)

COPIES TO: File
Physical Laboratory
Division
Project Engineer
Contractor

COUNTY: Mobile

DIVISION: 9TH

DATE: February 23, 2018

BMT-16, Rev. 10/87

CONTRACTOR: Jordan Pile Driving
CONTRACTOR'S ADDRESS: 301 N. Water St., Mobile Al 36652
MAKE OF JACK: Dudgeon
SERIAL NUMBER: ALDOT-13469
SERIAL NO. OF PUMP: 85693P
ALDOT 13498
MAKE OF DIAL: WIKA 11058X0F
DIAL GRADUATION: 0 TO 10,000 PSI
SMALLEST INCREMENT OF DIAL: 50 PSI
MARKS ON DIAL: N/A
TRAVEL OF RAM: 15"
DIAMETER OF RAM: 12.5"
RAM EXTENDED: 3", 6" AND 9"
INCHES DURING CALIBRATION
CALIBRATED BY: WEISS AND MEADOWS
DATE: 02/23/2018

TEST RESULTS

	INCREMENT NO.	APPLIED LOAD LBS	JACK DIAL READING AVERAGE PSI
	1	75000	650
	2	150000	1250
	3	225000	1850
	4	300000	2500
	5	375000	3100
	6	450000	3700
	7	525000	4300
	8	600000	4900
	9	675000	5500
*	10	750000	6100

*3 X 375 TONS

This calibration expires 09/23/2018

jmm

Steve Ingram
Testing Engineer

GEOKON 48 Spencer St. Lebanon, NH 03766 USA

Load Cell Calibration Report

Model Number: 3000X-4448kN-4.5

Calibration Date: February 06, 2018

Serial Number: 2202

This calibration has been verified/validated as of 02/07/2018

Max. Range (kN): 4448

Calibration Instruction: CI-3000

Cable Length: N/A

Technician:

Initial Cycling Data

Load (kN):	0	0	6672	0
Reading:	0.4690	0.4675	2.2425	0.4675

Calibration

Applied Load in kN	Readings from GK-501 or GK-502 readout box / 4000				Linearity % Max Load	Polynomial Error (%FS)
	Cycle 1	Cycle 2	Average	Change		
0	0.4675	0.4690	0.4683		-0.09	-0.04
445	0.5868	0.5873	0.5870	0.1187	-0.05	-0.02
890	0.7058	0.7063	0.7060	0.1190	0.01	0.02
1334	0.8235	0.8260	0.8248	0.1188	0.05	0.05
1779	0.9418	0.9425	0.9421	0.1173	-0.03	-0.05
2224	1.0603	1.0615	1.0609	0.1188	0.01	-0.01
2669	1.1793	1.1805	1.1799	0.1190	0.07	0.05
3114	1.2968	1.2968	1.2968	0.1169	-0.05	-0.07
3558	1.4153	1.4165	1.4159	0.1191	0.02	0.01
4003	1.5335	1.5350	1.5343	0.1184	0.02	0.04
4448	1.6508	1.6528	1.6518	0.1175	-0.04	-0.02
0	0.4690	0.4683	0.4686			

GK-501 or GK-502 Readout / 4000

Linear Gage Factor (G): 0.0002660 mV/V/kN

Regression Zero (R_0):* 0.4693

Polynomial Gage Factors: A: 7.376 B: 3744 C: -1756

Polynomial, $L = AR_1^2 + BR_1 + C$

Full Scale mV/ V: 1.184 mV/ V

Calculate C by setting L=0 and R_1 = initial field zero reading in the polynomial equation

* Note: The above calibration uses a linear regression method. The Regression Zero Reading shown is ideal for straight line computation and does not usually agree with the actual no-load reading.

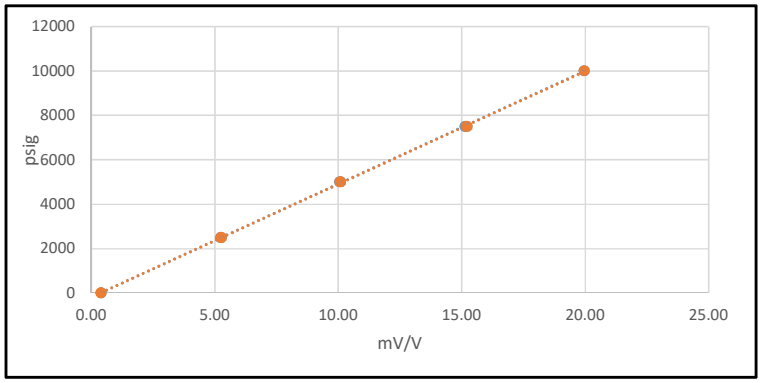
The above named instrument has been calibrated by comparison with standards traceable to the NIST, in compliance with ANSI Z540-1.

Applied Foundation Testing, Inc.
4035 J. Louis Street
Green Cove Springs, Fl 32043
P: (904) 284-1337
F: (904) 284-1339

Pressure Transducer Calibration Report

Calibration Date	9/25/2017
Calibration Due	9/25/2018
Technician	William H. Richardson
Ambient	26 C / 75% RH

Description	Omega 10kpsi	
Model	PX329-10KGV	
Serial Number	060807D176	
Range	10000	psig



Calibrating Equipment		
Item	**Description**	**Serial**
Pressure Reference	CEJN 30kpsi	CP285481
Data Acquisition	NI 9219	1A4225C
30kpsi Hand Pump	Enerpac HPN2000	N/A

Load Cycle 1			Load Cycle 2			Average
Reference (psig)	**Found As (mV/V)**	**Left As (mV/V)**	**Reference (psig)**	**Found As (mV/V)**	**Left As (mV/V)**	**Nonlinearity (%)**
0	0.40	0.40	0	0.40	0.40	0.19%
2500	5.24	5.24	2500	5.28	5.28	-0.06%
5000	10.05	10.05	5000	10.10	10.10	-0.54%
7500	15.16	15.16	7500	15.23	15.23	0.54%
10000	19.95	19.95	10000	19.98	19.98	-0.17%
7500	15.13	15.13	7500	15.20	15.20	0.38%
5000	10.10	10.10	5000	10.09	10.09	-0.43%
2500	5.24	5.24	2500	5.26	5.26	-0.11%
0	0.40	0.40	0	0.40	0.40	0.19%

Linear Gage Factor	**509.2362**	**psig/mV/V**
Regression Zero	**-184.2194**	**psig**
Maximum Nonlinearity	**-0.54%**	
Sensitivity	**20.3660**	**mV/V**

Applied Foundation Testing, Inc. hereby certifies that this instrument meets or exceeds all requirements for its intended use and the reported calibration factors are accurate to within the limits of the calibrating procedure. Reference standards and calibrations are traceable to the National Institute of Standards and Technology (NIST) where applicable.

Technician:

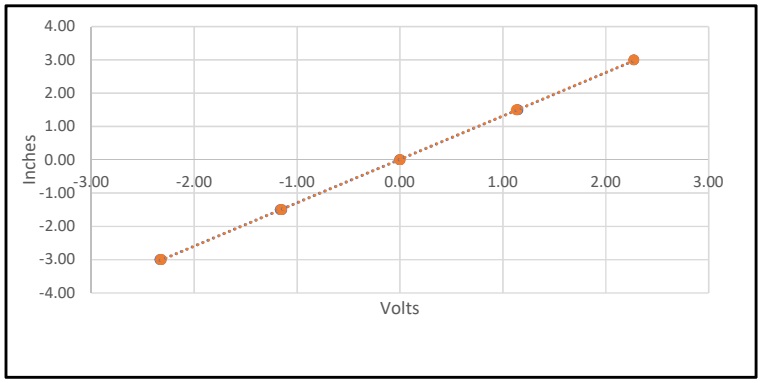
Approved:

Applied Foundation Testing, Inc.
2345 Success Drive
Odessa, Fl 33556
P: (727) 376-5040
F: (727) 376-5018

Displacement Transducer Calibration Report

Calibration Date	10/9/2017
Calibration Due	10/9/2018
Technician	A. Bates-Mendonca
Ambient	31°c / 55% RH

Description	RDP 6 inch LVDT	
Model	LDC3000C	
Serial Number	108207	
Range	6	in



Calibrating Equipment		
Item	**Description**	**Serial**
Digital Multimeter	Fluke 15B+	29022241WS14
Traceable Rule	Fowler 12 inch	251010207
Benchtop PS	LWPS305D	020253984

Displacement Cycle 1			Displacement Cycle 2			Average
Reference (in)	**Found As (VDC)**	**Left As (VDC)**	**Reference (in)**	**Found As (VDC)**	**Left As (VDC)**	**Nonlinearity (%)**
-3.00	-2.33	-2.33	-3.00	-2.32	-2.32	-0.29%
-1.50	-1.16	-1.16	-1.50	-1.16	-1.16	0.05%
0.00	0.00	0.00	0.00	0.00	0.00	0.23%
1.50	1.14	1.14	1.50	1.13	1.13	-0.09%
3.00	2.27	2.27	3.00	2.27	2.27	-0.35%
1.50	1.15	1.15	1.50	1.14	1.14	0.11%
0.00	0.00	0.00	0.00	0.00	0.00	0.27%
-1.50	-1.15	-1.15	-1.50	-1.15	-1.15	0.29%
-3.00	-2.32	-2.32	-3.00	-2.33	-2.33	-0.22%

Linear Gage Factor	**1.3037**	**in/V**
Regression Zero	**0.0156**	**in**
Maximum Nonlinearity	**-0.35%**	
Sensitivity	**4.5903**	**V**

Applied Foundation Testing, Inc. hereby certifies that this instrument meets or exceeds all requirements for its intended use and the reported calibration factors are accurate to within the limits of the calibrating procedure. Reference standards and calibrations are traceable to the National Institute of Standards and Technology (NIST) where applicable.

Technician:

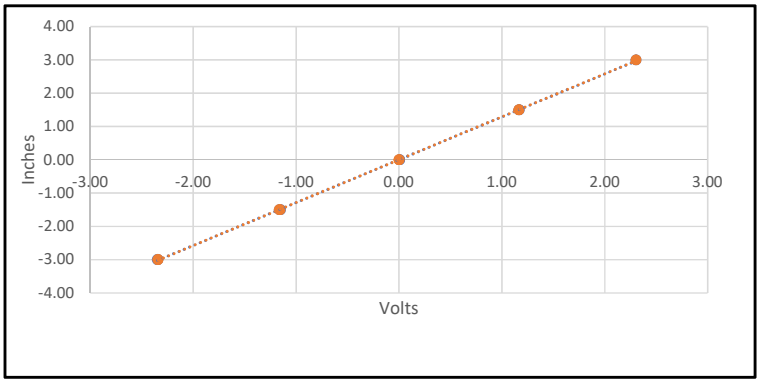
Approved:

Applied Foundation Testing, Inc.
2345 Success Drive
Odessa, Fl 33556
P: (727) 376-5040
F: (727) 376-5018

Displacement Transducer Calibration Report

Calibration Date	10/9/2017
Calibration Due	10/9/2018
Technician	W. Richardson
Ambient	31°c / 55% RH

Description	RDP 6 inch LVDT	
Model	LDC3000C	
Serial Number	108208	
Range	6	in



Calibrating Equipment		
Item	**Description**	**Serial**
Digital Multimeter	Fluke 15B+	29022241WS14
Traceable Rule	Fowler 12 inch	251010207
Benchtop PS	LWPS305D	020253984

Displacement Cycle 1			Displacement Cycle 2			Average
Reference (in)	**Found As (VDC)**	**Left As (VDC)**	**Reference (in)**	**Found As (VDC)**	**Left As (VDC)**	**Nonlinearity (%)**
-3.00	-2.35	-2.35	-3.00	-2.34	-2.34	-0.29%
-1.50	-1.16	-1.16	-1.50	-1.16	-1.16	0.21%
0.00	0.01	0.01	0.00	0.00	0.00	0.14%
1.50	1.17	1.17	1.50	1.17	1.17	0.13%
3.00	2.31	2.31	3.00	2.31	2.31	-0.42%
1.50	1.17	1.17	1.50	1.17	1.17	0.11%
0.00	0.01	0.01	0.00	0.00	0.00	0.13%
-1.50	-1.15	-1.15	-1.50	-1.16	-1.16	0.22%
-3.00	-2.34	-2.34	-3.00	-2.34	-2.34	-0.22%

Linear Gage Factor	**1.2886**	**in/V**
Regression Zero	**0.0039**	**in**
Maximum Nonlinearity	**-0.42%**	
Sensitivity	**4.6533**	**V**

Applied Foundation Testing, Inc. hereby certifies that this instrument meets or exceeds all requirements for its intended use and the reported calibration factors are accurate to within the limits of the calibrating procedure. Reference standards and calibrations are traceable to the National Institute of Standards and Technology (NIST) where applicable.

Technician:

Approved: