Proactive by Design

GEOTECHNICAL
ENVIRONMENTAL
ECOLOGICAL
WATER
CONSTRUCTION MANAGEMENT

249 Vanderbilt Avenue
Norwood, MA 02062
781-278-3800
www.gza.com

May 26, 2016
File No. 02.0172505.00-C, PC

Mr. Charlie Ezequelle
Renaugh Bros., Inc.
283 Fort Bridge Road #2
Vernon, Vermont 05354

Re: **Dynamic Pile Testing Results**
Wardsboro BRF 013-1(15)
Wardsboro, Vermont

Dear Mr. Ezequelle:

This report summarizes the results of dynamic pile testing performed by GZA at the above referenced site from May 4, 2016 through May 18, 2016. The dynamic pile testing was performed in general accordance with the project specifications and ASTM Method Designation D4945-12, "Standard Test Method for High-Strain Testing of Piles" to measure driving stresses in the test pile, evaluate hammer performance, and calculate the "Case Method" nominal resistance of the installed test piles.

TEST PILE

Testing was performed on two (2) HP12x74, Grade 50 steel H-piles. One test pile was located within the Abutment 2 substructure and the second test pile was located within the Abutment 1 substructure. Prior to testing, the Abutment 2 and Abutment 1 test piles were installed to a penetration of approximately 18.5 feet and 50 feet, respectively, with the APE D19-42 diesel impact hammer operating on its minimum fuel setting. The test piles were then dynamically monitored to their final set with the APE D19-42 diesel impact hammer operating on fuel setting 4. Details of the APE D19-42 diesel hammer are summarized below. The required nominal resistance of 346 kips is based upon dividing the maximum calculated factored pile load of 225 kips by the specified resistance factor of 0.65 per LRFD specification. The maximum allowable driving stress for Grade 50 steel is 45 ksi (i.e. $0.9f_y$).

HAMMER

The test piles were impacted with an APE D19-42 single acting diesel hammer with a ram weight of 4,189 lbs. and a maximum rated stroke of 11.25 feet, yielding a maximum rated energy of 47,126 foot-lbs. The APE D19-42 is equipped with a ratchet style fuel pump with four settings. The fuel pump settings are designed to limit the ram stroke to 5.6 feet, 7.4 feet, 9.3 feet, and 11.25 feet (open) yielding rated energies of 23,566 foot-lbs., 31,107 foot-lbs., 39,119 foot-lbs., and 47,126 foot-lbs., respectively. Based on the results of the dynamic pile test program, the APE D19-42 installed the test piles while operating on fuel setting 4.

The PDA was used to make dynamic force and acceleration measurements of the tested piles. These measurements were evaluated in the field to determine "Case Method" nominal resistance, pile stress and hammer performance. PDA summary sheets and plots of select averaged PDA parameters versus blow number are attached and summarized in Table 1.

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DYNAMIC PILE TEST RESULTS

ABUTMENT 2 PILE 2

Abutment 2 Pile 2 developed a "Case Method" nominal resistance of 380 kips at a pile penetration of 98.0 feet (tip elevation +1,310.0 feet) and a reported pile penetration resistance of 17-19-19-19-20-23 blows per inch for the final six inches of pile penetration with the APE D19-42 operating on fuel setting 4 and providing an 8.6-foot ram stroke. Subsequent CAPWAP analyses performed on the dynamic test data from the end of initial drive indicated a nominal resistance of 350 kips with 250 kips (71 percent) as skin friction and 100 kips (29 percent) as end bearing. The maximum average calculated compressive driving stress of 27.9 ksi is within the allowable limits for Grade 50 steel.

Abutment 2 Pile 2 was monitored during restrike after a setup period of approximately 48 hours. Early restrike test results indicated that Pile 2 develop a "Case Method" pile capacity of 420 kips at a reported penetration resistance of 21 blows per inch of pile penetration with the APE D19-42 operating on fuel setting 4 and providing an 8.2-foot ram stroke. Subsequent CAPWAP analyses performed on the dynamic test data from the beginning of restrike indicated a nominal resistance of 410 kips with 140 kips (34 percent) as skin friction and 270 kips (66 percent) as end bearing.

ABUTMENT 1 PILE 4

Abutment 1 Pile 4 developed a "Case Method" nominal resistance of 420 kips at a pile penetration of 69.2 feet (tip elevation +1,338.8 feet) and a reported pile penetration resistance of 17-16-16-20-20-16 blows per inch for the final six inches of pile penetration with the APE D19-42 operating on fuel setting 4 and providing an 8.7-foot ram stroke. Subsequent CAPWAP analyses performed on the dynamic test data from the end of initial drive indicated a nominal resistance of 430 kips with 250 kips (58 percent) as skin friction and 180 kips (42 percent) as end bearing. The maximum average calculated compressive driving stress of 28.2 ksi is within the allowable limits for Grade 50 steel.

Abutment 1 Pile 4 was monitored during restrike after a setup period of approximately 48 hours. Early restrike test results indicated that Pile 4 develop a "Case Method" pile capacity of 480 kips at a reported penetration resistance of 8 blows per inch of pile penetration with the APE D19-42 operating on fuel setting 4 and providing an 8.6-foot ram stroke. Subsequent CAPWAP analyses performed on the dynamic test data from the beginning of restrike indicated a nominal resistance of 480 kips with 160 kips (33 percent) as skin friction and 320 kips (67 percent) as end bearing.

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LIMITATIONS

This report has been prepared for specific application to the Wardsboro BRF 013-1(15) project located in Wardsboro, Vermont in accordance with generally accepted soil and foundation practice. The static resistance values computed with the "Case Method" and from CAPWAP analysis are estimates of the mobilized, axial compressive soil resistance at the time of testing. These soil resistance results are ultimate resistance values and they must be reduced by an appropriate factor of safety or factored compressive loading. Piles demonstrating driving characteristics different from the tested pile may require additional testing to confirm the developed nominal resistance. Services not provided on this project by GZA such as logging pile resistance (blow counts during driving) are reported herein only as it applies to the pile testing accomplished. No other warranty, expressed or implied, is made.

If you have any further questions, please contact either of the undersigned.

Very truly yours,
GZA GEOENVIRONMENTAL, INC.

Michael J. Deery
Project Engineer

Seth H. Hamblin
Consultant/Reviewer

Bradford W. Roberts
Senior Principal

Attachments: PDA Data Summary Table
PDA Field Data
CAPWAP Analysis
Pile Installation Log

TABLE 1

WARDSBORO BRF 013-1(15)
DYNAMIC PILE TESTING RESULTS
WARDSBORO, VERMONT

PILE STRUCTURE	PILE NUMBER	DATE TESTED	TEST TYPE [4]	BLOW COUNT [3] (bpi)	PILE LENGTH (ft)	PILE PENETRATION (ft)	TIP ELEVATION	APE D19-42 FUEL SETTING	RAM STROKE (ft)	TRANSFER ENERGY [5] (kip-ft)	PILE STRESS [6] At Butt (ksi)	PILE STRESS [6] At Tip (ksi)	PDA [7] TOTAL CAPACITY (kips)	CAPWAP [8] TOTAL CAPACITY (kips)	CAPWAP [8] SKIN FRICTION (kips)	CAPWAP [8] END BEARING (kips)
Abutment 2	2	5/4/16	EOD	6-6-6-6-5-6	40	37.5	+ 1,370.5	2	7.4	14.3	25.8	16.0	270	-----	-----	-----
		5/5/16	EOD(2)	11-12-13-13-13-13	80	78.0	+ 1,330.0	3	8.2	16.4	25.6	19.2	310	320	280	40
		5/16/16	EOD(3)	17-19-19-19-20-23	120	98.0	+ 1,310.0	4	8.6	20.5	27.9	26.8	380	350	250	100
		5/18/16	BOR	21 bpi					8.2	21.8	28.4	25.7	420	410	140	270
Abutment 1	4	5/16/16	EOD	17-16-16-20-20-16	80	69.2	+ 1,338.8	4	8.7	19.8	28.2	25.1	420	430	250	180
		5/18/16	BOR	8 bpi					8.6	24.0	30.5	17.4	480	480	160	320

Notes :

1. Test pile is HP12x74 Grade 50 pile driven with an APE D19-42 single acting diesel impact hammer.
2. The specified nominal resistance (ultimate pile capacity) is 346 kips based upon dividing the maximum factored load of 225 kips by a performance factor of 0.65.
3. Blow counts were reported by others.
4. Test type is defined as: EOD = end of drive, BOR = beginning of restrike.
5. Transferred Energy is the delivered hammer energy to the pile measured at the PDA sensors.
6. Pile Stress is the maximum force delivered to the pile divided by the pile area, measured at the sensor location.
7. PDA Total Capacity is the ultimate pile capacity predicted at the time of testing including skin and endbearing resistance.
8. CAPWAP Total Capacity, Skin Friction and End Bearing are derived from CAPWAP analysis and are reported as ultimate pile capacity.
9. Pile penetration is referenced to the top of the falsework template (reported elevation +1408.0 feet).

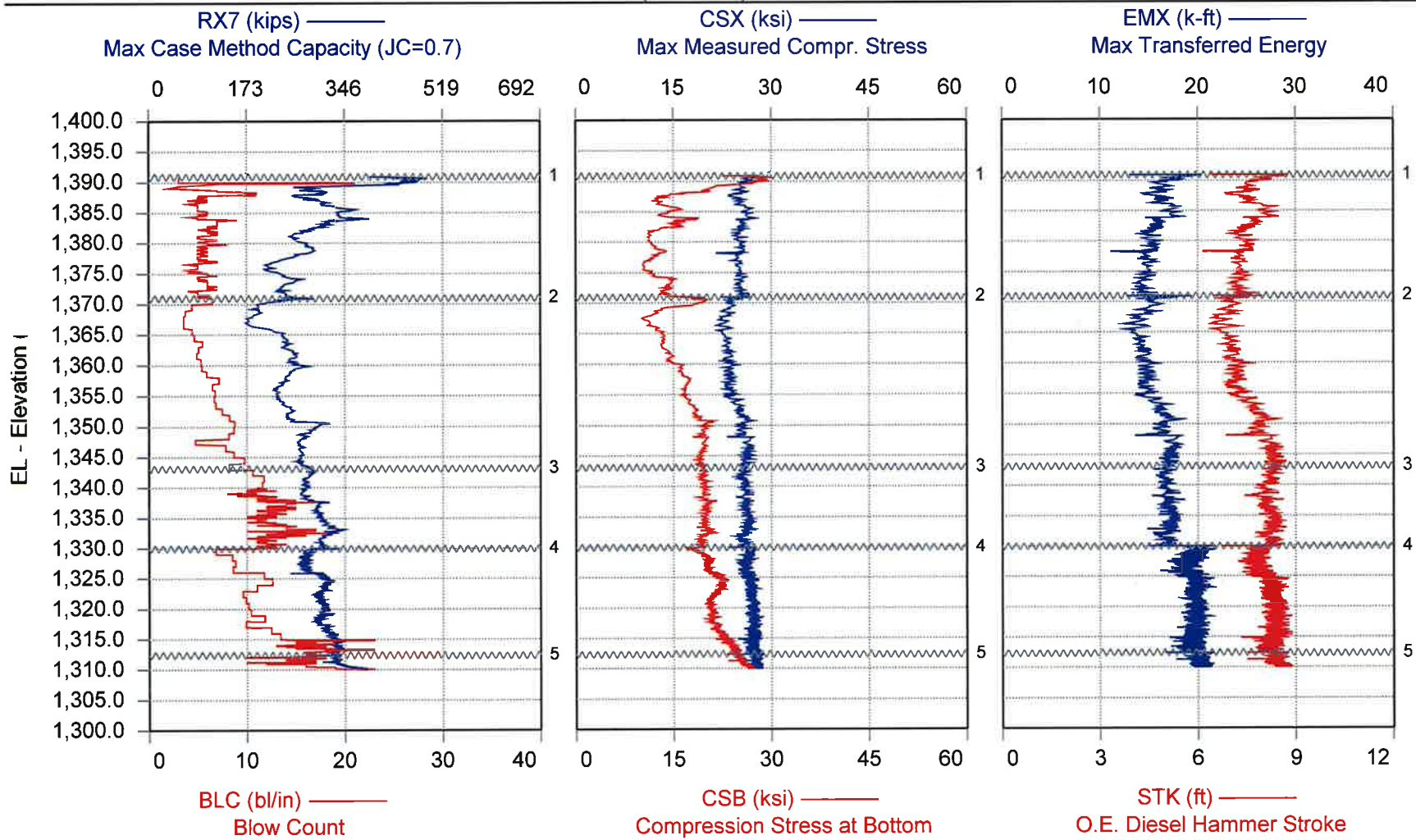
GZA GeoEnvironmental Inc. - PDIPLOT2 Ver 2016.1.56.2 - Case Method & iCAP® Results

Printed: 26-May-2016

Test started: 04-May-2016

WARDSBORO BRF 013-1(15) - ABUTMENT 2 PILE 2 (ID)

APE D19-42 (HP12X74)



1 - APE D19-42 operating on fuel setting 2

2 - Splice 40' HP12x74 onto installed pile - Total Length = 80 feet

3 - APE D19-42 operating on fuel setting 3

4 - Splice 40' HP12x74 onto installed pile - Total Length = 120 feet

5 - Ape D19-42 operating on fuel setting 4 (Open)

WARDSBORO BRF 013-1(15) - ABUTMENT 2 PILE 2 (ID)
OP: MICHAEL DEERY

APE D19-42 (HP12X74)
Date: 04-May-2016

AR: 21.80 in²
LE: 37.00 ft
WS: 16,810.0 f/s

SP: 0.492 k/ft³
EM: 30,008 ksi
JC: 0.70 []

RX7: Max Case Method Capacity (JC=0.7)
CSX: Max Measured Compr. Stress
CSB: Compression Stress at Bottom
EMX: Max Transferred Energy

STK: O.E. Diesel Hammer Stroke
FVP: Force/Velocity proportionality
BTA: BETA Integrity Factor

BL#	Elev. ft	BLC bl/in	TYPE	RX7 kips	CSX ksi	CSB ksi	EMX k-ft	STK ft	FVP []	BTA (%)
37	1,390.00	3	AV35	461	26.7	28.4	17.9	8.1	0.97	100.0
50	1,389.94	19	AV4	458	25.9	28.0	16.5	7.8	0.98	100.0
70	1,389.86	21	AV2	436	25.9	27.4	16.5	7.8	0.98	100.0
80	1,389.80	7	AV1	426	25.9	27.2	16.9	7.8	0.98	100.0
90	1,389.67	6	AV1	443	25.2	27.2	15.4	7.5	0.98	100.0
100	1,389.31	3	AV1	256	25.3	21.6	16.3	7.5	0.98	100.0
110	1,389.00	2	AV1	295	25.9	21.1	17.2	7.7	0.99	100.0
120	1,388.65	7	AV1	268	24.5	20.0	15.1	7.2	0.99	100.0
130	1,388.54	7	AV1	308	25.6	20.4	16.2	7.6	0.99	100.0
140	1,388.43	8	AV1	307	25.5	19.3	16.1	7.6	0.99	100.0
150	1,388.33	11	AV1	315	26.3	20.5	17.0	7.9	0.99	100.0
160	1,388.25	11	AV1	315	26.1	19.5	16.8	7.8	0.99	100.0
170	1,388.17	10	AV1	303	25.4	17.1	16.2	7.6	0.99	100.0
180	1,388.08	10	AV1	307	24.9	16.0	15.9	7.4	0.99	100.0
190	1,388.00	10	AV1	308	25.6	16.7	16.8	7.6	1.00	100.0
200	1,387.92	11	AV1	259	24.3	14.5	15.4	7.1	1.00	100.0
210	1,387.77	5	AV1	256	23.6	14.4	14.3	6.8	1.00	100.0
220	1,387.63	6	AV1	259	23.5	14.4	14.5	6.9	1.00	100.0
230	1,387.47	5	AV1	279	24.3	12.5	15.4	7.2	1.00	100.0
240	1,387.30	5	AV1	291	25.1	13.8	16.3	7.5	1.00	100.0
250	1,387.15	6	AV1	274	24.5	12.3	15.7	7.3	1.00	100.0
260	1,386.98	4	AV1	302	25.8	12.5	17.6	7.8	1.00	100.0
270	1,386.79	6	AV1	306	24.7	12.0	15.6	7.4	1.00	100.0
280	1,386.62	5	AV1	317	25.6	13.1	17.0	7.7	1.00	100.0
290	1,386.44	4	AV1	305	25.0	12.8	16.0	7.6	1.00	100.0
300	1,386.22	5	AV1	307	24.6	12.5	15.2	7.4	1.00	100.0
310	1,386.05	5	AV1	328	26.0	13.4	17.2	7.9	0.99	100.0
320	1,385.88	5	AV1	332	26.1	14.2	17.5	8.0	1.00	100.0
330	1,385.70	5	AV1	348	26.1	15.5	17.3	8.0	1.00	100.0
340	1,385.55	5	AV1	366	27.0	16.0	18.1	8.4	1.00	100.0
350	1,385.38	5	AV1	359	26.6	16.3	17.8	8.2	0.99	100.0
360	1,385.22	6	AV1	338	26.3	15.0	17.1	8.1	1.00	100.0
370	1,385.08	6	AV1	332	25.7	14.1	16.6	7.9	1.00	100.0
380	1,384.94	6	AV1	336	25.5	14.3	16.4	7.9	1.00	100.0

WARDSBORO BRF 013-1(15) - ABUTMENT 2 PILE 2 (ID)
OP: MICHAEL DEERY

APE D19-42 (HP12X74)
Date: 04-May-2016

BL#	Elev.	BLC	TYPE	RX7	CSX	CSB	EMX	STK	FVP	BTA
	ft	bl/in		kips	ksi	ksi	k-ft	ft	[]	(%)
390	1,384.78	5	AV1	336	26.8	14.1	17.9	8.3	1.00	100.0
400	1,384.64	6	AV1	333	26.2	13.0	17.5	8.1	1.00	100.0
410	1,384.48	5	AV1	338	26.1	12.7	17.2	8.0	1.00	100.0
420	1,384.31	4	AV1	337	26.2	13.1	17.2	8.1	1.00	100.0
430	1,384.13	5	AV1	352	26.5	14.0	17.3	8.2	1.00	100.0
440	1,383.97	5	AV1	390	27.5	18.9	18.2	8.5	1.00	100.0
450	1,383.84	8	AV1	365	26.5	17.5	17.3	8.1	1.00	100.0
460	1,383.75	9	AV1	326	24.6	18.6	14.6	7.4	1.00	100.0
470	1,383.64	7	AV1	330	25.9	15.3	16.2	7.9	1.00	100.0
480	1,383.52	7	AV1	313	25.2	15.2	15.4	7.6	1.00	100.0
490	1,383.39	7	AV1	319	25.3	16.8	15.5	7.7	1.00	100.0
500	1,383.27	7	AV1	320	25.8	15.3	16.2	7.8	1.00	100.0
510	1,383.13	7	AV1	307	25.5	14.6	15.8	7.7	1.00	100.0
520	1,383.01	7	AV1	319	26.0	15.8	16.4	7.9	1.00	100.0
530	1,382.89	7	AV1	306	25.7	15.1	16.1	7.8	1.00	100.0
540	1,382.76	6	AV1	303	25.3	16.1	15.6	7.7	1.00	100.0
550	1,382.63	6	AV1	311	25.9	16.4	16.3	7.8	1.00	100.0
560	1,382.49	7	AV1	291	24.9	15.3	15.2	7.4	0.99	100.0
570	1,382.36	6	AV1	286	25.0	13.5	15.3	7.4	1.00	100.0
580	1,382.22	5	AV1	290	26.0	13.0	16.5	7.8	1.00	100.0
590	1,382.06	6	AV1	274	24.7	12.9	14.9	7.2	1.00	100.0
600	1,381.93	7	AV1	282	25.5	12.5	15.8	7.5	1.00	100.0
610	1,381.79	7	AV1	271	25.1	11.4	15.3	7.4	1.00	100.0
620	1,381.65	6	AV1	273	25.2	11.7	15.4	7.4	1.00	100.0
630	1,381.52	7	AV1	258	24.3	11.2	14.2	7.1	1.00	100.0
640	1,381.38	7	AV1	256	25.1	11.1	15.2	7.4	1.00	100.0
650	1,381.25	6	AV1	255	24.7	11.3	14.8	7.2	1.00	100.0
660	1,381.08	5	AV1	250	24.2	11.5	14.2	7.0	1.00	100.0
670	1,380.93	5	AV1	255	24.8	11.3	14.9	7.2	1.00	100.0
680	1,380.78	5	AV1	263	25.8	11.1	16.3	7.7	1.01	100.0
690	1,380.64	6	AV1	258	24.8	11.3	15.0	7.3	1.00	100.0
700	1,380.51	7	AV1	260	24.5	11.2	14.4	7.2	1.00	100.0
710	1,380.36	6	AV1	263	24.8	11.3	14.7	7.3	1.00	100.0
720	1,380.22	5	AV1	266	24.9	11.2	14.8	7.3	1.00	100.0
730	1,380.06	6	AV1	281	26.0	11.4	16.1	7.8	1.00	100.0
740	1,379.92	6	AV1	280	25.8	11.5	15.8	7.6	1.00	100.0
750	1,379.80	8	AV1	277	25.2	11.7	15.1	7.5	1.00	100.0
760	1,379.68	6	AV1	281	25.4	11.6	15.5	7.5	1.00	100.0
770	1,379.52	5	AV1	278	25.3	11.8	15.2	7.5	1.00	100.0
780	1,379.37	5	AV1	288	25.9	12.0	16.0	7.7	1.00	100.0
790	1,379.24	6	AV1	291	25.9	12.3	15.8	7.7	1.00	100.0

WARDSBORO BRF 013-1(15) - ABUTMENT 2 PILE 2 (ID)
OP: MICHAEL DEERY

APE D19-42 (HP12X74)
Date: 04-May-2016

BL#	Elev.	BLC	TYPE	RX7	CSX	CSB	EMX	STK	FVP	BTA
	ft	bl/in		kips	ksi	ksi	k-ft	ft	[]	(%)
800	1,379.10	6	AV1	288	24.9	12.1	14.8	7.3	1.00	100.0
810	1,378.95	5	AV1	290	25.6	12.2	15.6	7.6	1.00	100.0
820	1,378.80	5	AV1	293	25.9	12.8	15.9	7.7	1.00	100.0
830	1,378.64	6	AV1	289	25.8	13.7	15.8	7.7	1.00	100.0
840	1,378.49	6	AV1	286	25.4	13.9	15.1	7.5	1.00	100.0
850	1,378.33	5	AV1	278	25.9	13.7	15.9	7.7	1.01	100.0
860	1,378.18	5	AV1	259	21.5	12.8	11.1	6.1	0.99	100.0
870	1,378.04	6	AV1	263	25.2	12.8	14.9	7.4	0.99	100.0
880	1,377.90	6	AV1	257	24.9	12.0	14.6	7.2	1.00	100.0
890	1,377.75	5	AV1	256	24.6	12.5	14.5	7.2	0.99	100.0
900	1,377.60	5	AV1	246	24.9	12.0	14.7	7.3	1.00	100.0
910	1,377.43	5	AV1	239	25.0	11.6	15.0	7.4	1.00	100.0
920	1,377.29	6	AV1	232	24.6	11.8	14.4	7.2	0.99	100.0
930	1,377.12	5	AV1	229	24.7	11.2	14.7	7.2	1.00	100.0
940	1,376.96	7	AV1	224	24.1	11.4	13.8	7.0	1.00	100.0
950	1,376.85	7	AV1	216	25.4	10.6	15.6	7.4	1.01	100.0
960	1,376.68	5	AV1	216	25.2	10.6	15.3	7.4	1.00	100.0
970	1,376.50	4	AV1	206	25.5	10.4	15.7	7.5	1.00	100.0
980	1,376.35	5	AV1	210	24.6	10.3	14.5	7.1	1.00	100.0
990	1,376.17	5	AV1	211	24.6	10.3	14.4	7.2	1.00	100.0
1000	1,376.00	5	AV1	219	25.0	10.5	14.6	7.3	1.01	100.0
1010	1,375.83	5	AV1	205	25.2	10.5	15.2	7.3	1.00	100.0
1020	1,375.63	4	AV1	208	25.2	10.4	14.8	7.3	1.01	100.0
1030	1,375.43	5	AV1	216	25.0	10.5	14.8	7.2	1.00	100.0
1040	1,375.25	4	AV1	229	25.4	11.7	15.1	7.4	1.01	100.0
1050	1,375.07	6	AV1	231	25.4	11.5	15.2	7.4	1.01	100.0
1060	1,374.93	6	AV1	234	24.9	11.2	14.4	7.2	1.01	100.0
1070	1,374.79	6	AV1	239	25.7	12.1	15.3	7.6	1.01	100.0
1080	1,374.67	7	AV1	237	24.8	12.1	14.4	7.2	1.01	100.0
1090	1,374.48	5	AV1	244	24.7	11.8	14.0	7.1	1.01	100.0
1100	1,374.32	5	AV1	252	26.1	12.4	15.7	7.6	1.01	100.0
1110	1,374.15	5	AV1	271	25.7	14.7	15.1	7.5	1.01	100.0
1120	1,374.00	6	AV1	263	25.6	15.2	14.7	7.5	1.00	100.0
1130	1,373.85	5	AV1	258	24.7	14.5	13.9	7.1	1.01	100.0
1140	1,373.69	6	AV1	257	25.4	14.9	14.6	7.4	1.01	100.0
1150	1,373.56	6	AV1	254	25.7	14.8	15.0	7.5	1.01	100.0
1160	1,373.42	6	AV1	246	25.2	14.6	14.3	7.2	1.01	100.0
1170	1,373.28	6	AV1	238	24.8	14.7	13.9	7.1	1.01	100.0
1180	1,373.14	6	AV1	238	25.1	14.4	14.1	7.2	1.02	100.0
1190	1,372.99	6	AV1	238	24.7	14.1	13.6	7.0	1.02	100.0
1200	1,372.86	7	AV1	233	25.1	14.3	14.1	7.2	1.01	100.0

WARDSBORO BRF 013-1(15) - ABUTMENT 2 PILE 2 (ID)
OP: MICHAEL DEERY

APE D19-42 (HP12X74)
Date: 04-May-2016

BL#	Elev.	BLC	TYPE	RX7	CSX	CSB	EMX	STK	FVP	BTA
	ft	bl/in		kips	ksi	ksi	k-ft	ft	[]	(%)
1210	1,372.72	6	AV1	234	25.1	13.9	14.3	7.2	1.02	100.0
1220	1,372.58	6	AV1	232	25.4	14.6	14.6	7.3	1.01	100.0
1230	1,372.44	7	AV1	228	24.7	13.5	13.6	7.0	1.02	100.0
1240	1,372.29	6	AV1	243	25.4	14.4	14.3	7.3	1.02	100.0
1250	1,372.13	4	AV1	229	25.9	13.9	15.0	7.5	1.02	100.0
1260	1,371.95	5	AV1	238	24.8	13.1	13.7	7.1	1.03	100.0
1270	1,371.78	5	AV1	242	25.5	13.2	14.3	7.3	1.02	100.0
1280	1,371.63	5	AV1	243	25.7	13.9	14.4	7.4	1.01	100.0
1283	1,371.58	5	AV1	244	25.8	13.6	14.7	7.4	1.02	100.0
1288	1,371.50	5	AV5	243	25.5	13.9	14.4	7.3	1.02	100.0
1294	1,371.42	6	AV6	243	25.4	13.7	14.2	7.3	1.02	100.0
1300	1,371.33	6	AV6	244	25.8	13.9	14.5	7.4	1.01	100.0
1306	1,371.25	6	AV6	243	25.9	13.9	14.6	7.4	1.01	100.0
1311	1,371.17	5	AV5	243	25.8	13.9	14.5	7.4	1.02	100.0
1317	1,371.08	6	AV6	247	26.0	14.3	14.6	7.5	1.02	100.0
1323	1,371.00	6	AV5	267	25.8	16.0	14.3	7.4	1.01	100.0
1392	1,370.12	7	AV41	241	24.4	19.0	16.3	7.2	0.99	100.0
1452	1,369.04	4	AV6	192	23.8	16.2	15.5	7.1	1.00	100.0
1492	1,368.16	4	AV4	193	23.1	12.5	14.8	6.9	1.00	100.0
1542	1,367.00	4	AV5	176	22.7	10.9	14.1	6.7	1.00	100.0
1582	1,366.07	4	AV4	186	22.5	11.5	13.7	6.7	1.00	100.0
1632	1,365.11	4	AV5	226	22.7	12.8	13.6	6.8	1.00	100.0
1692	1,364.04	5	AV6	241	23.0	13.5	13.9	6.9	1.00	100.0
1752	1,363.12	6	AV6	242	23.2	13.3	14.0	7.0	1.00	100.0
1812	1,362.15	5	AV6	248	23.2	13.6	14.2	7.0	1.00	100.0
1872	1,361.14	5	AV6	258	23.7	14.6	14.8	7.2	1.00	100.0
1942	1,360.03	5	AV7	255	23.3	14.6	14.4	7.1	1.00	100.0
2002	1,359.11	5	AV6	265	23.8	16.2	15.0	7.3	1.00	100.0
2072	1,358.11	6	AV7	248	23.4	16.2	14.7	7.1	1.00	100.0
2162	1,357.05	7	AV9	241	23.7	17.3	14.9	7.2	1.00	100.0
2242	1,356.03	7	AV8	229	23.4	16.9	14.5	7.0	1.00	100.0
2322	1,355.04	7	AV8	227	23.8	16.7	14.9	7.3	1.00	100.0
2402	1,354.04	7	AV8	231	23.9	17.0	14.8	7.3	1.00	100.0
2482	1,353.06	7	AV8	243	24.7	17.6	15.8	7.6	1.00	100.0
2572	1,352.06	8	AV9	251	25.1	18.3	16.1	7.7	1.00	100.0
2672	1,351.04	8	AV10	248	25.7	18.7	16.6	7.9	1.00	100.0
2772	1,350.09	9	AV10	293	26.0	20.0	17.0	8.0	1.00	100.0
2882	1,349.03	9	AV11	289	25.4	19.7	16.1	7.8	1.00	100.0
2982	1,348.01	8	AV10	274	25.4	19.3	16.1	7.7	1.01	100.0
3032	1,347.14	5	AV5	266	26.5	19.8	17.5	8.2	1.00	100.0
3132	1,346.02	8	AV10	269	26.6	19.7	17.7	8.3	1.01	100.0

WARDSBORO BRF 013-1(15) - ABUTMENT 2 PILE 2 (ID) APE D19-42 (HP12X74)
OP: MICHAEL DEERY Date: 04-May-2016

BL#	Elev.	BLC	TYPE	RX7	CSX	CSB	EMX	STK	FVP	BTA
	ft	bl/in		kips	ksi	ksi	k-ft	ft	[]	(%)
3232	1,345.06	9	AV10	270	26.3	19.2	17.2	8.3	1.01	100.0
3352	1,344.03	10	AV12	266	26.1	19.0	17.1	8.4	1.01	100.0
3452	1,343.02	8	AV10	279	26.1	19.3	17.2	8.4	1.01	100.0
3572	1,342.07	11	AV12	288	25.7	19.6	16.7	8.3	1.01	100.0
3722	1,341.00	12	AV15	278	25.5	19.4	16.5	8.2	1.02	100.0
3852	1,340.06	12	AV13	277	26.0	19.7	16.9	8.3	1.02	100.0
3872	1,339.92	11	AV2	276	25.7	19.9	16.5	7.9	1.01	100.0
3882	1,339.85	12	AV1	271	25.5	19.7	16.2	7.8	1.01	100.0
3892	1,339.77	11	AV1	274	26.0	20.1	16.8	8.0	1.02	100.0
3902	1,339.69	10	AV1	276	25.9	20.0	16.8	8.0	1.02	100.0
3912	1,339.61	10	AV1	272	25.6	19.7	16.3	7.9	1.02	100.0
3922	1,339.54	13	AV1	274	25.6	19.9	16.5	7.9	1.01	100.0
3932	1,339.47	10	AV1	273	26.2	20.2	17.0	8.1	1.01	100.0
3942	1,339.38	10	AV1	271	25.6	19.6	16.4	7.9	1.02	100.0
3952	1,339.30	10	AV1	272	25.9	19.6	16.8	8.0	1.02	100.0
3962	1,339.22	10	AV1	270	26.3	19.7	17.0	8.2	1.02	100.0
3972	1,339.14	11	AV1	268	26.2	19.6	17.0	8.1	1.01	100.0
3982	1,339.06	9	AV1	269	26.7	20.0	17.5	8.3	1.01	100.0
3992	1,338.96	8	AV1	270	26.0	19.5	17.1	8.1	1.01	100.0
4002	1,338.87	11	AV1	268	25.9	19.5	16.7	8.0	1.02	100.0
4012	1,338.80	11	AV1	271	25.9	19.4	16.7	8.0	1.01	100.0
4022	1,338.72	12	AV1	276	26.4	19.8	17.2	8.1	1.01	100.0
4032	1,338.65	9	AV1	283	27.2	20.6	18.2	8.5	1.01	100.0
4052	1,338.50	13	AV2	279	25.8	19.7	16.6	7.9	1.01	100.0
4062	1,338.43	12	AV1	278	25.6	19.6	16.5	7.8	1.00	100.0
4072	1,338.36	12	AV1	277	25.6	19.5	16.6	7.8	1.01	100.0
4082	1,338.29	11	AV1	278	25.5	19.3	16.5	7.8	1.01	100.0
4092	1,338.21	11	AV1	273	24.6	18.8	15.3	7.4	1.02	100.0
4102	1,338.14	12	AV1	278	25.4	19.3	16.3	7.8	1.01	100.0
4122	1,338.01	14	AV2	283	25.7	19.6	16.6	7.9	1.01	100.0
4132	1,337.96	15	AV1	287	26.3	20.0	17.2	8.1	1.00	100.0
4142	1,337.89	11	AV1	283	26.0	19.7	17.0	8.1	1.01	100.0
4162	1,337.75	12	AV2	285	26.0	19.7	16.9	8.0	1.01	100.0
4172	1,337.68	12	AV1	309	26.8	20.9	18.0	8.4	1.01	100.0
4182	1,337.63	17	AV1	314	26.3	20.7	17.3	8.2	1.01	100.0
4202	1,337.52	14	AV2	309	26.5	20.9	17.6	8.3	1.00	100.0
4212	1,337.46	15	AV1	302	25.9	20.4	17.1	8.1	1.01	100.0
4232	1,337.35	14	AV2	300	26.0	20.4	17.1	8.1	1.01	100.0
4242	1,337.29	14	AV1	299	25.7	20.1	16.5	7.9	1.01	100.0
4262	1,337.17	14	AV2	298	26.5	20.6	17.5	8.3	1.01	100.0
4272	1,337.11	14	AV1	298	26.0	20.2	16.9	8.0	1.01	100.0

WARDSBORO BRF 013-1(15) - ABUTMENT 2 PILE 2 (ID)
OP: MICHAEL DEERY

APE D19-42 (HP12X74)
Date: 04-May-2016

BL#	Elev.	BLC	TYPE	RX7	CSX	CSB	EMX	STK	FVP	BTA
	ft	bl/in		kips	ksi	ksi	k-ft	ft	[]	(%)
4282	1,337.04	12	AV1	298	25.8	20.1	16.8	8.0	1.01	100.0
4302	1,336.92	14	AV2	298	25.9	20.0	16.8	8.0	1.01	100.0
4312	1,336.86	15	AV1	296	25.4	19.6	16.3	7.9	1.02	100.0
4322	1,336.80	12	AV1	298	26.1	20.1	17.1	8.1	1.01	100.0
4332	1,336.73	12	AV1	296	25.6	19.8	16.5	7.9	1.02	100.0
4352	1,336.60	13	AV2	297	25.8	19.8	16.8	8.0	1.01	100.0
4362	1,336.54	15	AV1	296	26.4	20.2	17.5	8.2	1.01	100.0
4382	1,336.42	13	AV2	296	26.0	19.8	16.9	8.1	1.02	100.0
4392	1,336.34	11	AV1	292	25.6	19.5	16.5	8.0	1.01	100.0
4402	1,336.28	14	AV1	295	26.8	20.5	17.8	8.4	1.00	100.0
4412	1,336.21	11	AV1	293	25.7	19.6	16.6	8.0	1.01	100.0
4422	1,336.14	13	AV1	293	25.5	19.4	16.5	7.9	1.01	100.0
4442	1,336.01	13	AV2	300	26.4	20.1	17.6	8.3	1.01	100.0
4452	1,335.94	12	AV1	303	26.4	20.3	17.5	8.4	1.01	100.0
4462	1,335.88	13	AV1	298	26.1	20.0	16.9	8.0	1.00	100.0
4482	1,335.76	14	AV2	304	26.4	20.1	17.5	8.3	1.01	100.0
4492	1,335.69	12	AV1	300	26.2	19.9	17.0	8.1	1.01	100.0
4502	1,335.61	11	AV1	299	25.4	19.5	16.1	8.0	1.02	100.0
4512	1,335.54	11	AV1	303	26.5	20.1	17.6	8.4	1.02	100.0
4522	1,335.47	13	AV1	305	26.4	20.1	17.4	8.1	1.00	100.0
4532	1,335.40	11	AV1	302	26.6	20.1	17.5	8.3	1.01	100.0
4542	1,335.33	10	AV1	300	26.9	20.2	17.9	8.5	1.01	100.0
4562	1,335.18	13	AV2	299	26.2	19.6	17.0	8.1	1.01	100.0
4572	1,335.10	10	AV1	303	26.8	19.8	17.9	8.3	0.99	100.0
4582	1,335.02	11	AV1	303	26.9	19.9	17.7	8.4	1.00	100.0
4592	1,334.95	12	AV1	307	26.5	19.7	17.5	8.3	1.01	100.0
4602	1,334.88	12	AV1	308	26.6	19.9	17.6	8.3	1.00	100.0
4612	1,334.81	11	AV1	307	26.9	19.9	17.7	8.4	1.01	100.0
4622	1,334.73	11	AV1	310	27.1	20.1	18.2	8.6	1.01	100.0
4642	1,334.58	11	AV2	308	26.4	19.7	17.2	8.3	1.01	100.0
4652	1,334.51	12	AV1	310	26.7	19.9	17.7	8.4	1.00	100.0
4662	1,334.44	12	AV1	306	26.3	19.5	17.2	8.1	1.01	100.0
4672	1,334.37	10	AV1	310	26.9	19.7	17.9	8.5	1.01	100.0
4682	1,334.29	13	AV1	313	26.5	19.6	17.4	8.3	1.00	100.0
4692	1,334.23	12	AV1	316	26.8	19.9	17.7	8.5	1.01	100.0
4712	1,334.10	13	AV2	312	27.0	19.9	18.0	8.5	1.01	100.0
4722	1,334.04	14	AV1	310	26.3	19.4	17.0	8.2	1.01	100.0
4742	1,333.92	14	AV2	309	26.1	19.3	16.9	8.1	1.01	100.0
4752	1,333.84	11	AV1	315	26.8	19.8	17.8	8.4	1.01	100.0
4762	1,333.78	14	AV1	318	26.6	19.7	17.3	8.3	1.00	100.0
4782	1,333.67	15	AV2	324	26.3	19.7	17.1	8.3	1.01	100.0

WARDSBORO BRF 013-1(15) - ABUTMENT 2 PILE 2 (ID)
OP: MICHAEL DEERY

APE D19-42 (HP12X74)
Date: 04-May-2016

BL#	Elev.	BLC	TYPE	RX7	CSX	CSB	EMX	STK	FVP	BTA
	ft	bl/in		kips	ksi	ksi	k-ft	ft	[]	(%)
4792	1,333.61	14	AV1	326	26.3	19.7	17.3	8.4	1.02	100.0
4802	1,333.55	14	AV1	321	26.3	19.6	17.2	8.2	1.02	100.0
4822	1,333.43	14	AV2	320	26.2	19.5	16.8	8.2	1.01	100.0
4832	1,333.37	14	AV1	317	25.2	18.5	16.1	8.1	1.03	100.0
4852	1,333.25	14	AV2	332	26.5	20.1	17.3	8.3	1.00	100.0
4862	1,333.20	17	AV1	334	26.2	20.0	16.9	8.2	1.01	100.0
4882	1,333.10	17	AV2	339	26.7	20.6	17.6	8.5	1.01	100.0
4902	1,333.00	17	AV2	337	26.4	20.3	17.1	8.4	1.03	100.0
4912	1,332.96	17	AV1	337	26.6	20.8	17.4	8.3	1.01	100.0
4922	1,332.90	10	AV1	335	26.8	20.8	17.8	8.4	1.02	100.0
4942	1,332.76	13	AV2	315	25.5	19.7	15.6	8.0	1.01	100.0
4952	1,332.69	13	AV1	324	26.2	20.7	17.4	8.3	1.00	100.0
4972	1,332.58	16	AV2	323	26.0	20.4	17.2	8.4	1.00	100.0
4982	1,332.54	18	AV1	324	26.1	20.5	17.5	8.5	1.01	100.0
5002	1,332.42	12	AV2	314	26.5	20.8	17.7	8.4	0.99	100.0
5012	1,332.35	12	AV1	315	25.6	20.2	16.6	8.1	0.99	100.0
5022	1,332.28	13	AV1	323	25.9	20.4	17.3	8.4	1.01	100.0
5042	1,332.17	16	AV2	310	25.0	19.6	15.9	7.9	1.01	100.0
5052	1,332.12	15	AV1	309	25.2	19.6	16.0	8.0	0.99	100.0
5062	1,332.05	11	AV1	307	25.4	19.7	16.5	8.0	0.99	100.0
5082	1,331.92	13	AV2	308	25.9	19.9	17.0	8.3	0.99	100.0
5092	1,331.86	14	AV1	310	24.7	19.0	15.5	7.9	1.00	100.0
5102	1,331.79	11	AV1	308	25.1	19.2	16.0	8.0	1.00	100.0
5112	1,331.71	10	AV1	308	25.3	19.3	16.3	8.1	1.00	100.0
5122	1,331.63	11	AV1	301	25.4	19.3	16.3	8.0	0.99	100.0
5132	1,331.56	12	AV1	302	25.2	19.1	16.3	8.0	0.99	100.0
5142	1,331.48	11	AV1	302	25.0	18.8	15.9	7.9	0.99	100.0
5162	1,331.35	13	AV2	301	26.0	19.5	17.1	8.3	0.99	100.0
5172	1,331.27	11	AV1	303	25.7	19.3	16.8	8.4	0.99	100.0
5182	1,331.20	11	AV1	304	26.3	19.6	17.5	8.4	1.00	100.0
5192	1,331.13	12	AV1	305	25.4	19.1	16.4	8.1	0.99	100.0
5202	1,331.06	12	AV1	299	25.2	18.8	16.1	8.1	0.99	100.0
5212	1,330.98	11	AV1	304	25.3	19.0	16.5	8.1	0.99	100.0
5232	1,330.84	12	AV2	306	26.4	19.5	17.6	8.5	0.99	100.0
5242	1,330.78	13	AV1	305	26.0	19.3	17.1	8.2	0.99	100.0
5252	1,330.71	14	AV1	304	25.9	19.3	17.0	8.3	1.00	100.0
5272	1,330.58	12	AV2	306	26.0	19.3	17.1	8.4	0.99	100.0
5282	1,330.52	13	AV1	303	25.4	18.9	16.3	8.1	1.00	100.0
5292	1,330.45	11	AV1	306	26.5	19.6	17.8	8.4	0.99	100.0
5302	1,330.38	12	AV1	306	25.7	19.0	16.7	8.3	1.00	100.0
5321	1,330.25	13	AV5	309	25.9	19.2	17.0	8.4	0.99	100.0

WARDSBORO BRF 013-1(15) - ABUTMENT 2 PILE 2 (ID)
OP: MICHAEL DEERY

APE D19-42 (HP12X74)
Date: 04-May-2016

BL#	Elev.	BLC	TYPE	RX7	CSX	CSB	EMX	STK	FVP	BTA
	ft	bl/in		kips	ksi	ksi	k-ft	ft	[]	(%)
5334	1,330.17	13	AV13	309	25.7	19.1	16.7	8.3	0.99	100.0
5347	1,330.08	13	AV13	311	25.5	19.1	16.4	8.2	0.99	100.0
5358	1,330.00	11	AV10	310	25.6	19.2	16.4	8.2	0.99	100.0
5440	1,329.00	7	AV80	285	26.8	18.3	20.1	7.9	1.00	100.0
5542	1,328.00	9	AV102	277	26.5	20.0	19.6	7.8	1.00	100.0
5648	1,327.00	9	AV106	275	26.1	20.4	19.1	7.8	1.00	100.0
5751	1,326.00	9	AV103	279	25.9	20.2	18.7	7.8	1.00	100.0
5892	1,325.00	12	AV140	304	26.4	21.6	19.2	8.0	1.00	100.0
6043	1,324.00	13	AV151	316	26.8	22.5	19.8	8.2	1.00	100.0
6175	1,323.00	11	AV132	311	26.9	22.3	20.0	8.3	1.00	100.0
6290	1,322.00	10	AV115	301	26.9	21.4	19.8	8.3	1.00	100.0
6409	1,321.00	10	AV119	305	27.0	20.8	19.6	8.3	1.00	100.0
6531	1,320.00	10	AV122	311	27.3	20.6	20.0	8.4	1.00	100.0
6656	1,319.00	10	AV125	312	27.3	21.0	20.0	8.4	1.00	100.0
6798	1,318.00	12	AV142	302	27.3	20.8	19.8	8.4	1.01	100.0
6917	1,317.00	10	AV119	307	27.4	21.2	19.9	8.4	1.01	100.0
7067	1,316.00	13	AV150	316	27.1	21.7	19.6	8.4	1.01	100.0
7228	1,315.00	13	AV161	326	27.3	22.5	19.7	8.4	1.01	100.0
7242	1,314.92	14	AV14	335	27.4	23.0	19.7	8.4	1.01	100.0
7265	1,314.83	23	AV22	346	27.5	23.4	19.7	8.4	1.01	100.0
7284	1,314.75	19	AV19	342	27.1	23.3	19.3	8.1	1.01	100.0
7299	1,314.67	15	AV15	337	26.9	23.2	19.0	8.1	1.01	100.0
7314	1,314.58	15	AV15	335	27.1	23.3	19.3	8.2	1.01	100.0
7331	1,314.50	17	AV17	335	27.3	23.5	19.7	8.3	1.01	100.0
7346	1,314.42	15	AV15	332	27.2	23.5	19.5	8.3	1.01	100.0
7361	1,314.33	15	AV15	329	27.1	23.4	19.3	8.2	1.01	100.0
7378	1,314.25	17	AV17	328	27.1	23.4	19.3	8.2	1.01	100.0
7397	1,314.17	19	AV19	327	26.9	23.3	19.0	8.1	1.01	100.0
7415	1,314.08	18	AV18	328	27.1	23.5	19.4	8.2	1.01	100.0
7429	1,314.00	14	AV14	331	27.3	23.7	19.6	8.3	1.01	100.0
7442	1,313.92	13	AV13	333	27.2	23.8	19.5	8.2	1.01	100.0
7460	1,313.83	18	AV18	334	27.3	23.9	19.5	8.3	1.01	100.0
7474	1,313.75	14	AV14	335	27.1	23.9	19.4	8.2	1.01	100.0
7492	1,313.67	18	AV18	336	27.1	24.0	19.3	8.2	1.01	100.0
7510	1,313.58	18	AV18	336	27.1	24.1	19.3	8.2	1.01	100.0
7525	1,313.50	15	AV15	336	27.0	24.1	19.1	8.2	1.01	100.0
7544	1,313.42	19	AV19	338	27.0	24.2	19.2	8.2	1.01	100.0
7562	1,313.33	18	AV17	336	27.5	24.6	19.7	8.3	1.01	100.0
7581	1,313.25	19	AV19	335	27.2	24.4	19.4	8.2	1.01	100.0
7604	1,313.17	23	AV23	333	27.0	24.4	19.1	8.1	1.01	100.0
7622	1,313.08	18	AV18	331	27.0	24.3	19.0	8.1	1.01	100.0

WARDSBORO BRF 013-1(15) - ABUTMENT 2 PILE 2 (ID)
OP: MICHAEL DEERY

APE D19-42 (HP12X74)
Date: 04-May-2016

BL#	Elev.	BLC	TYPE	RX7	CSX	CSB	EMX	STK	FVP	BTA
	ft	bl/in		kips	ksi	ksi	k-ft	ft	[]	(%)
7641	1,313.00	19	AV19	331	27.1	24.5	19.2	8.1	1.01	100.0
7658	1,312.92	17	AV17	328	27.2	24.6	19.3	8.2	1.01	100.0
7674	1,312.83	16	AV16	329	27.4	24.7	19.6	8.3	1.01	100.0
7691	1,312.75	17	AV17	327	27.2	24.6	19.3	8.2	1.01	100.0
7707	1,312.67	16	AV16	326	27.0	24.4	19.0	8.1	1.01	100.0
7723	1,312.58	16	AV16	327	27.1	24.5	19.1	8.2	1.01	100.0
7740	1,312.50	17	AV17	326	27.1	24.5	19.0	8.2	1.01	100.0
7757	1,312.42	17	AV17	327	27.1	24.6	19.2	8.2	1.01	100.0
7773	1,312.33	16	AV15	329	27.4	24.7	19.6	8.3	1.01	100.0
7791	1,312.25	18	AV18	333	27.9	25.1	20.3	8.4	1.01	100.0
7808	1,312.17	17	AV17	331	27.8	25.0	20.1	8.4	1.01	100.0
7823	1,312.08	15	AV15	331	27.8	25.0	20.2	8.4	1.01	100.0
7833	1,312.00	10	AV10	330	27.6	25.0	20.0	8.4	1.01	100.0
7847	1,311.92	14	AV14	334	27.8	25.2	20.2	8.4	1.01	100.0
7865	1,311.83	18	AV18	333	27.6	25.1	19.9	8.4	1.01	100.0
7879	1,311.75	14	AV14	330	27.4	25.0	19.6	8.3	1.01	100.0
7896	1,311.67	17	AV17	333	27.7	25.2	20.1	8.4	1.01	100.0
7913	1,311.58	17	AV17	333	27.8	25.4	20.2	8.4	1.01	100.0
7927	1,311.50	14	AV14	333	27.8	25.5	20.3	8.5	1.01	100.0
7942	1,311.42	15	AV15	330	27.6	25.3	20.0	8.4	1.01	100.0
7959	1,311.33	17	AV17	332	27.7	25.5	20.1	8.4	1.01	100.0
7976	1,311.25	17	AV16	329	27.5	25.2	19.8	8.3	1.01	100.0
7986	1,311.17	10	AV10	329	27.5	25.3	19.9	8.2	1.01	100.0
8001	1,311.08	15	AV15	330	27.5	25.4	20.0	8.3	1.01	100.0
8018	1,311.00	17	AV17	335	27.8	25.7	20.3	8.4	1.01	100.0
8030	1,310.92	12	AV12	334	27.6	25.6	20.1	8.3	1.01	100.0
8046	1,310.83	16	AV16	337	27.7	25.7	20.2	8.4	1.01	100.0
8062	1,310.75	16	AV16	340	27.8	25.9	20.4	8.4	1.01	100.0
8078	1,310.67	16	AV16	343	27.7	26.0	20.3	8.4	1.01	100.0
8094	1,310.58	16	AV16	346	27.7	26.0	20.3	8.4	1.01	100.0
8110	1,310.50	16	AV16	351	27.9	26.3	20.5	8.5	1.01	100.0
8127	1,310.42	17	AV17	356	27.5	26.2	20.0	8.4	1.01	100.0
8146	1,310.33	19	AV19	363	27.8	26.5	20.4	8.5	1.01	100.0
8165	1,310.25	19	AV19	374	27.9	26.8	20.5	8.6	1.01	100.0
8184	1,310.17	19	AV19	377	28.0	27.0	20.7	8.6	1.01	100.0
8204	1,310.08	20	AV20	372	27.9	26.8	20.5	8.6	1.01	100.0
8226	1,310.00	23	AV22	375	27.9	26.8	20.5	8.6	1.01	100.0

WARDSBORO BRF 013-1(15) - ABUTMENT 2 PILE 2 (ID)
OP: MICHAEL DEERY

APE D19-42 (HP12X74)
Date: 04-May-2016

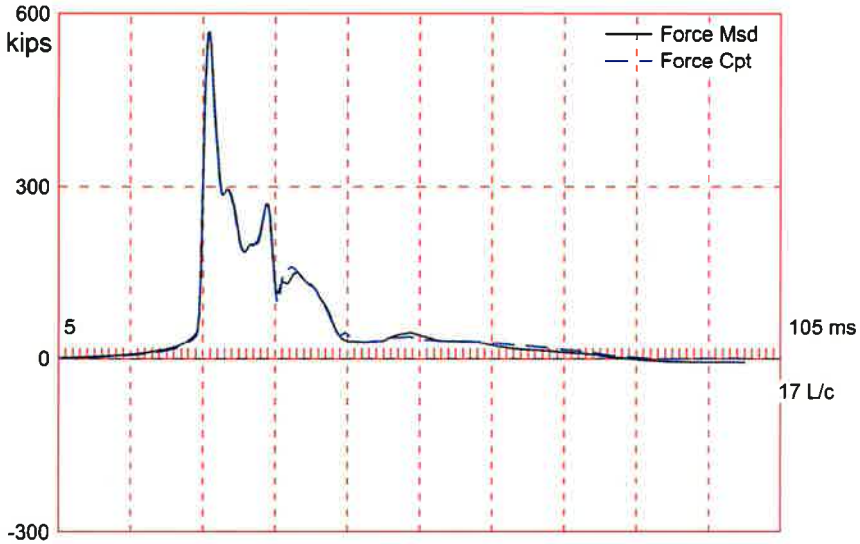
BL#	Sensors
3-5357	F3: [F740] 98.0 (0.97); F4: [I839] 93.9 (0.97); A3: [K3013] 343.0 (1.03); A4: [K2139] 318.0 (1.03)
5361-8226	F3: [F740] 98.0 (1.00); F4: [I839] 93.9 (1.00); A3: [K3013] 343.0 (1.00); A4: [K2139] 318.0 (1.00)

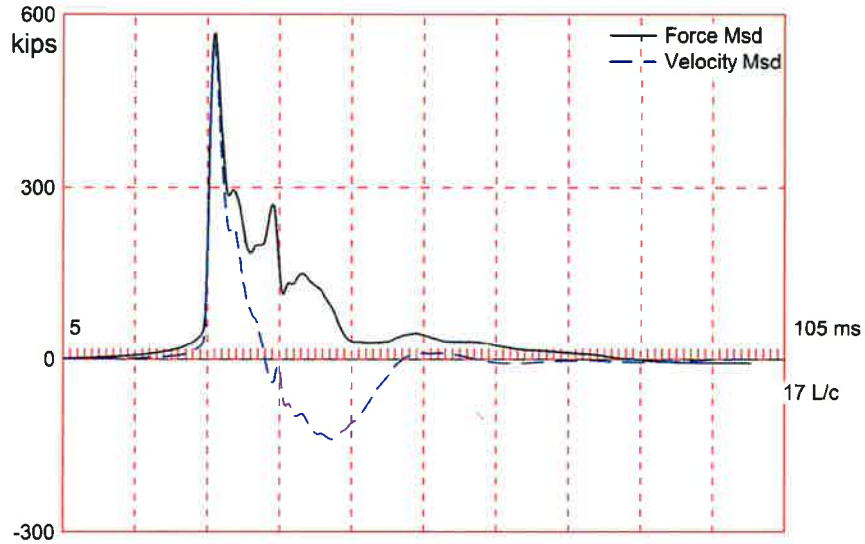
BL#	Comments
3	APE D19-42 operating on fuel setting 2
1325	Splice 40' HP12x74 onto installed pile - Total Length = 80 feet
3442	APE D19-42 operating on fuel setting 3
5361	Splice 40' HP12x74 onto installed pile - Total Length = 120 feet
7765	Ape D19-42 operating on fuel setting 4 (Open)

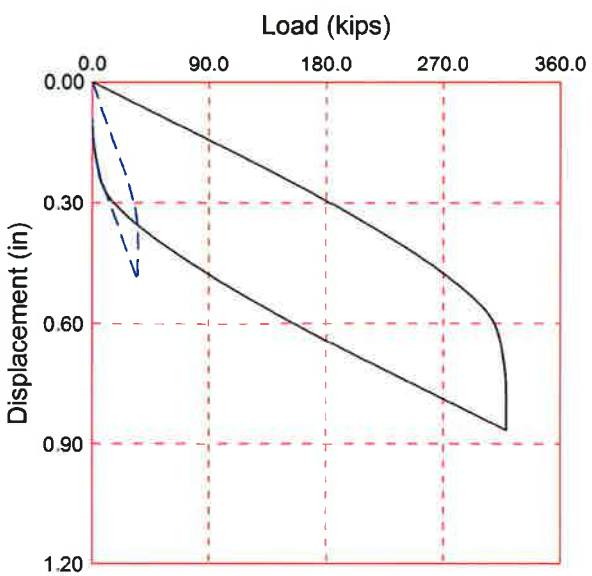
Time Summary

Drive	43 minutes 51 seconds	12:55 PM - 1:39 PM (5/4/2016) BN 1 - 1322
Stop	23 hours 40 minutes 41 seconds	1:39 PM - 1:19 PM
Drive	6 minutes 11 seconds	1:19 PM - 1:25 PM BN 1323 - 1472
Stop	11 minutes 57 seconds	1:25 PM - 1:37 PM
Drive	1 hours 2 minutes 38 seconds	1:37 PM - 2:40 PM BN 1482 - 3842
Stop	14 minutes 53 seconds	2:40 PM - 2:55 PM
Drive	48 minutes 28 seconds	2:55 PM - 3:43 PM BN 3852 - 5357
Stop	10 days 22 hours 13 minutes 53 seconds	3:43 PM - 1:57 PM
Drive	1 hours 30 minutes 3 seconds	1:57 PM - 3:27 PM BN 5358 - 8226

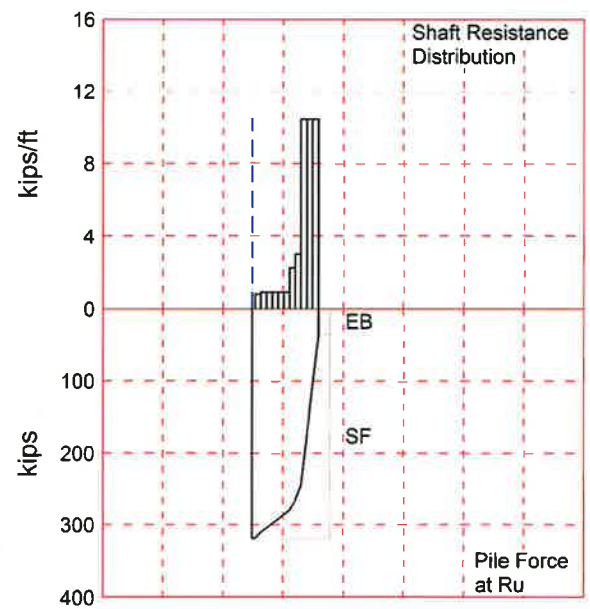
Total time [12: 02:32:38] = (Driving [04:11:12] + Stop [11: 22:21:26])







RU =	318.4 kips
SF =	283.0 kips
EB =	35.4 kips
Dy =	0.78 in
Dx =	0.87 in
SET/BI =	0.09 in



Length b. Sensors	77.0 ft
Embedment	77.0 ft
Top Area	21.8 in^2
End Bearing Area	148.2 in^2
Top Perimeter	4.06 ft
Top E-Modulus	30000 ksi
Top Spec. Weight	492.0 lb/ft^3
Top Wave Spd.	16810 ft/s
Overall W.S.	16810 ft/s
Match Quality	1.49
Top Compr. Stress	26.1 ksi
Max Compr. Stress	26.6 ksi
Max Tension Stress	-0.58 ksi
Avg. Shaft Quake	0.20 in
Toe Quake	0.31 in
Avg. Shaft Smith Dpg.	0.15 s/ft
Toe Smith Damping	0.20 s/ft

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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: 318.4; along Shaft 283.0; at Toe 35.4 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
				318.4			
1	10.0	10.0	8.0	310.4	8.0	0.80	0.20
2	16.7	16.7	6.0	304.4	14.0	0.90	0.22
3	23.4	23.4	6.0	298.4	20.0	0.90	0.22
4	30.1	30.1	6.0	292.4	26.0	0.90	0.22
5	36.8	36.8	6.0	286.4	32.0	0.90	0.22
6	43.5	43.5	6.0	280.4	38.0	0.90	0.22
7	50.2	50.2	15.0	265.4	53.0	2.24	0.55
8	56.9	56.9	20.0	245.4	73.0	2.99	0.74
9	63.6	63.6	70.0	175.4	143.0	10.45	2.58
10	70.3	70.3	70.0	105.4	213.0	10.45	2.58
11	77.0	77.0	70.0	35.4	283.0	10.45	2.58
Avg. Shaft			25.7			3.68	0.91
Toe			35.4				34.40

Soil Model Parameters/Extensions		Shaft	Toe
Smith Damping Factor		0.15	0.20
Quake	(in)	0.20	0.31
Case Damping Factor		1.07	0.18
Damping Type		Viscous	Viscous
Reloading Level	(% of Ru)	100	100
Unloading Level	(% of Ru)	0	
Soil Plug Weight	(kips)		0.131

CAPWAP match quality = 1.49 (Wave Up Match) ; RSA = 0
Observed: Final Set = 0.09 in; Blow Count = 132 b/ft
Computed: Final Set = 0.06 in; Blow Count = 206 b/ft
Transducer F3(F740) CAL: 98.0; RF: 0.97; F4(I839) CAL: 93.9; RF: 0.97
A3(K3013) CAL: 343; RF: 1.03; A4(K2139) CAL: 318; RF: 1.03

max. Top Comp. Stress = 26.1 ksi (T= 26.3 ms, max= 1.017 x Top)
max. Comp. Stress = 26.6 ksi (Z= 10.0 ft, T= 26.7 ms)
max. Tens. Stress = -0.58 ksi (Z= 56.9 ft, T= 49.2 ms)
max. Energy (EMX) = 17.3 kip-ft; max. Measured Top Displ. (DMX)= 0.58 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	3.3	569.6	-0.8	26.1	-0.04	17.3	14.0	0.58
2	6.7	574.4	-0.7	26.3	-0.03	17.2	13.9	0.57
4	13.4	560.9	-0.5	25.7	-0.02	16.1	13.7	0.54
5	16.7	565.3	-0.5	25.9	-0.02	15.9	13.6	0.52
6	20.1	552.8	-0.4	25.4	-0.02	15.3	13.5	0.51
7	23.4	557.3	-0.5	25.6	-0.02	15.2	13.3	0.50
8	26.8	545.1	-0.4	25.0	-0.02	14.6	13.2	0.49
9	30.1	549.6	-0.5	25.2	-0.02	14.5	13.1	0.47
10	33.5	537.8	-0.3	24.7	-0.01	13.9	13.0	0.46
11	36.8	542.5	-3.1	24.9	-0.14	13.8	12.9	0.45
12	40.2	532.4	-4.4	24.4	-0.20	13.3	12.8	0.43
13	43.5	540.6	-7.0	24.8	-0.32	13.1	12.6	0.42
14	46.9	534.8	-8.5	24.5	-0.39	12.6	12.4	0.41
15	50.2	546.3	-11.0	25.1	-0.50	12.5	12.1	0.39
16	53.6	526.4	-10.7	24.1	-0.49	11.5	11.8	0.38
17	56.9	552.7	-12.7	25.3	-0.58	11.4	11.2	0.36
18	60.3	536.5	-10.8	24.6	-0.49	10.3	10.5	0.35
19	63.6	563.9	-12.3	25.9	-0.57	10.2	9.8	0.34
20	67.0	450.6	-4.3	20.7	-0.20	7.3	9.2	0.33
21	70.3	446.7	-6.0	20.5	-0.27	7.3	9.6	0.32
22	73.7	287.8	0.0	13.2	0.00	4.6	10.8	0.32
23	77.0	245.9	-0.5	11.3	-0.02	1.7	11.3	0.31
Absolute	10.0			26.6			(T =	26.7 ms)
	56.9				-0.58		(T =	49.2 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	642.0	593.9	545.7	497.6	449.5	401.3	353.2	305.1	257.0	208.8
RX	644.0	595.8	547.6	499.3	451.3	404.7	360.3	317.0	276.0	257.6
RU	666.1	620.4	574.7	529.0	483.3	437.6	391.9	346.2	300.5	254.7

RAU = 233.7 (kips); RA2 = 339.3 (kips)

Current CAPWAP Ru = 318.4 (kips); Corresponding J(RP)= 0.67; J(RX) = 0.70

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
14.2	25.89	553.6	569.6	573.3	0.58	0.09	0.09	17.4	627.0	115

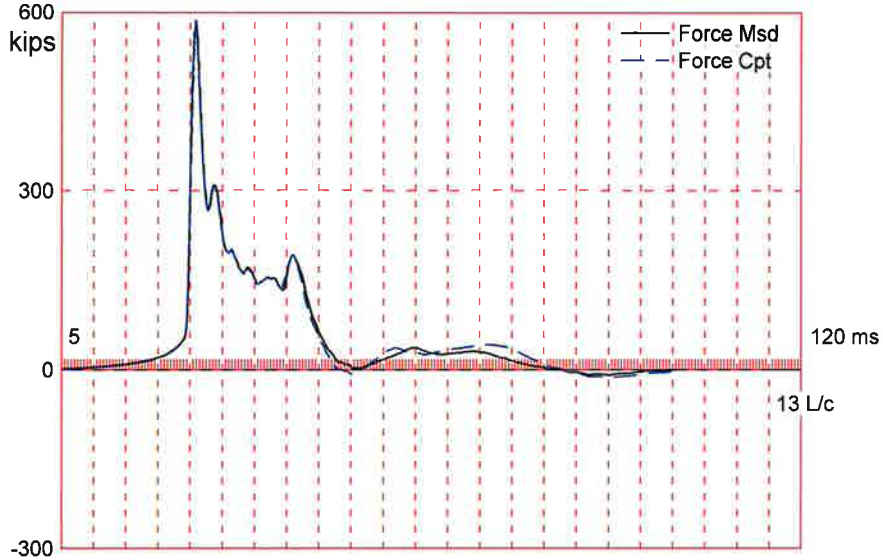
PILE PROFILE AND PILE MODEL

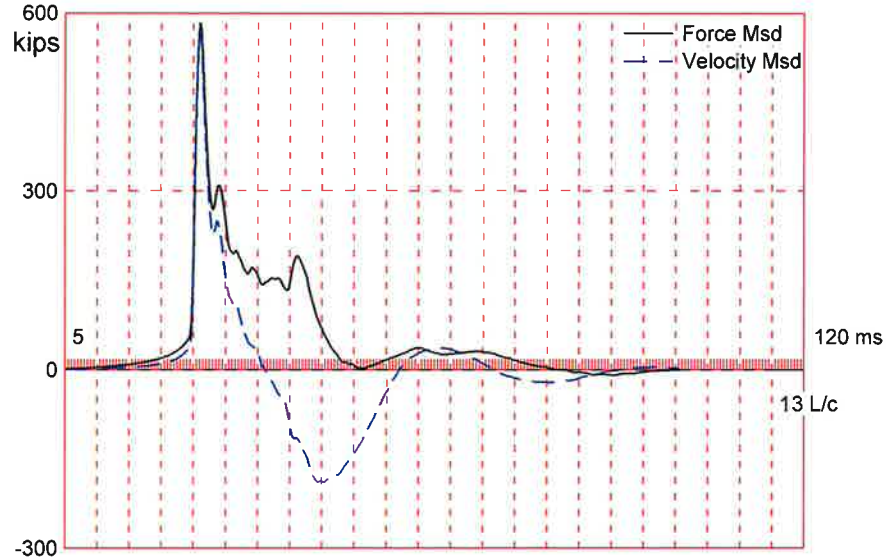
Depth ft	Area in^2	E-Modulus ksi	Spec. Weight lb/ft^3	Perim. ft
0.0	21.8	29999.9	492.000	4.06
77.0	21.8	29999.9	492.000	4.06

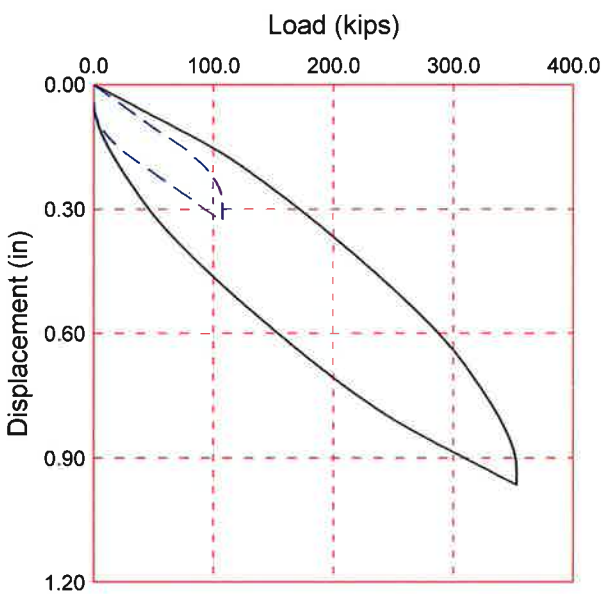
Toe Area 148.2 in^2

Top Segment Length 3.35 ft, Top Impedance 39 kips/ft/s

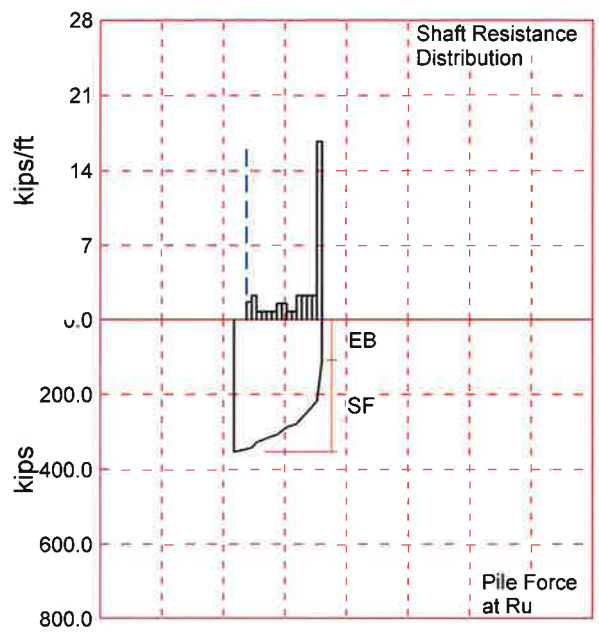
Wave Speed: Pile Top 16810.0, Elastic 16810.0, Overall 16810.0 ft/s
Pile Damping 1.00 %, Time Incr 0.199 ms, 2L/c 9.2 ms
Total volume: 11.657 ft^3; Volume ratio considering added impedance: 1.000







RU =	352.8 kips
SF =	245.0 kips
EB =	107.8 kips
Dy =	0.92 in
Dx =	0.97 in
SET/BI =	0.04 in



Length b. Sensors	115.0 ft
Embedment	98.0 ft
Top Area	21.8 in^2
End Bearing Area	148.2 in^2
Top Perimeter	4.06 ft
Top E-Modulus	29992 ksi
Top Spec. Weight	492.0 lb/ft^3
Top Wave Spd.	16808 ft/s
Overall W.S.	16808 ft/s
Match Quality	2.18
Top Compr. Stress	27.0 ksi
Max Compr. Stress	27.9 ksi
Max Tension Stress	-2.65 ksi
Avg. Shaft Quake	0.10 in
Toe Quake	0.22 in
Avg. Shaft Smith Dpg.	0.10 s/ft
Toe Smith Damping	0.20 s/ft

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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.

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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: 352.8; along Shaft 245.0; at Toe 107.8 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
				352.8			
1	23.0	6.0	10.0	342.8	10.0	1.67	0.41
2	29.6	12.6	15.0	327.8	25.0	2.28	0.56
3	36.1	19.1	5.0	322.8	30.0	0.76	0.19
4	42.7	25.7	5.0	317.8	35.0	0.76	0.19
5	49.3	32.3	5.0	312.8	40.0	0.76	0.19
6	55.9	38.8	5.0	307.8	45.0	0.76	0.19
7	62.4	45.4	10.0	297.8	55.0	1.52	0.38
8	69.0	52.0	10.0	287.8	65.0	1.52	0.38
9	75.6	58.6	5.0	282.8	70.0	0.76	0.19
10	82.1	65.1	5.0	277.8	75.0	0.76	0.19
11	88.7	71.7	15.0	262.8	90.0	2.28	0.56
12	95.3	78.3	15.0	247.8	105.0	2.28	0.56
13	101.9	84.8	15.0	232.8	120.0	2.28	0.56
14	108.4	91.4	15.0	217.8	135.0	2.28	0.56
15	115.0	98.0	110.0	107.8	245.0	16.74	4.13
Avg. Shaft			16.3			2.50	0.62
Toe			107.8				104.77

Soil Model Parameters/Extensions		Shaft	Toe
Smith Damping Factor		0.10	0.20
Quake	(in)	0.10	0.22
Case Damping Factor		0.64	0.55
Damping Type		Viscous	Viscous
Unloading Quake	(% of loading quake)	100	70
Reloading Level	(% of Ru)	100	100
Unloading Level	(% of Ru)	9	

CAPWAP match quality = 2.18 (Wave Up Match) ; RSA = 0
Observed: Final Set = 0.04 in; Blow Count = 276 b/ft
Computed: Final Set = 0.04 in; Blow Count = 277 b/ft
Transducer F3(F740) CAL: 98.0; RF: 0.99; F4(I839) CAL: 93.9; RF: 0.99
A3(K3013) CAL: 343; RF: 1.01; A4(K2139) CAL: 318; RF: 1.01

max. Top Comp. Stress = 27.0 ksi (T= 26.2 ms, max= 1.033 x Top)
max. Comp. Stress = 27.9 ksi (Z= 23.0 ft, T= 27.4 ms)
max. Tens. Stress = -2.65 ksi (Z= 95.3 ft, T= 55.9 ms)
max. Energy (EMX) = 19.4 kip-ft; max. Measured Top Displ. (DMX)= 0.69 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	3.3	587.9	-13.3	27.0	-0.61	19.4	14.6	0.69
2	6.6	588.5	-13.6	27.0	-0.62	19.4	14.5	0.68
4	13.1	591.0	-16.4	27.1	-0.75	19.2	14.5	0.66
6	19.7	601.1	-20.3	27.6	-0.93	19.1	14.2	0.64
8	26.3	590.2	-20.7	27.1	-0.95	18.1	13.8	0.62
10	32.9	561.3	-19.4	25.7	-0.89	16.7	13.6	0.60
12	39.4	555.0	-22.0	25.5	-1.01	16.1	13.5	0.58
14	46.0	548.9	-23.9	25.2	-1.10	15.6	13.3	0.56
16	52.6	543.4	-31.8	24.9	-1.46	15.1	13.1	0.54
18	59.1	541.3	-39.9	24.8	-1.83	14.5	12.9	0.51
20	65.7	528.3	-45.4	24.2	-2.08	13.6	12.6	0.49
22	72.3	512.6	-48.9	23.5	-2.24	12.7	12.4	0.46
24	78.9	508.2	-52.0	23.3	-2.38	12.2	12.2	0.43
26	85.4	509.8	-55.1	23.4	-2.53	11.6	11.9	0.40
28	92.0	492.4	-56.5	22.6	-2.59	10.6	11.5	0.37
29	95.3	500.9	-57.8	23.0	-2.65	10.4	11.2	0.36
30	98.6	475.7	-55.2	21.8	-2.53	9.6	11.1	0.34
31	101.9	484.2	-57.5	22.2	-2.64	9.4	10.8	0.33
32	105.1	455.5	-55.4	20.9	-2.54	8.7	10.8	0.32
33	108.4	453.9	-56.9	20.8	-2.61	8.6	10.8	0.30
34	111.7	443.9	-55.3	20.4	-2.54	7.9	10.5	0.29
35	115.0	471.8	-56.0	21.6	-2.57	4.5	9.7	0.28
Absolute	23.0			27.9			(T =	27.4 ms)
	95.3				-2.65		(T =	55.9 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	684.4	636.9	589.5	542.1	494.6	447.2	399.7	352.3	304.9	257.4
RX	686.9	640.1	593.3	546.5	500.2	455.1	411.0	375.0	345.4	322.1
RU	720.2	676.3	632.5	588.6	544.8	500.9	457.1	413.2	369.3	325.5

RAU = 164.3 (kips); RA2 = 372.1 (kips)

Current CAPWAP Ru = 352.8 (kips); Corresponding J(RP)= 0.70; J(RX) = 0.77

VMX ft/s	TVP ms	VT1*Z kips	FT1 kips	FMX kips	DMX in	DFN in	SET in	EMX kip-ft	QUS kips	KEB kips/in
14.7	26.00	572.6	586.2	586.2	0.69	0.04	0.04	19.5	636.5	490

PILE PROFILE AND PILE MODEL

Depth ft	Area in^2	E-Modulus ksi	Spec. Weight lb/ft^3	Perim. ft
0.0	21.8	29992.2	492.000	4.06
115.0	21.8	29992.2	492.000	4.06

Toe Area 148.2 in^2

Top Segment Length 3.29 ft, Top Impedance 39 kips/ft/s

Wave Speed: Pile Top 16807.9, Elastic 16807.9, Overall 16807.9 ft/s
Pile Damping 1.00 %, Time Incr 0.195 ms, 2L/c 13.7 ms
Total volume: 17.410 ft^3; Volume ratio considering added impedance: 1.000

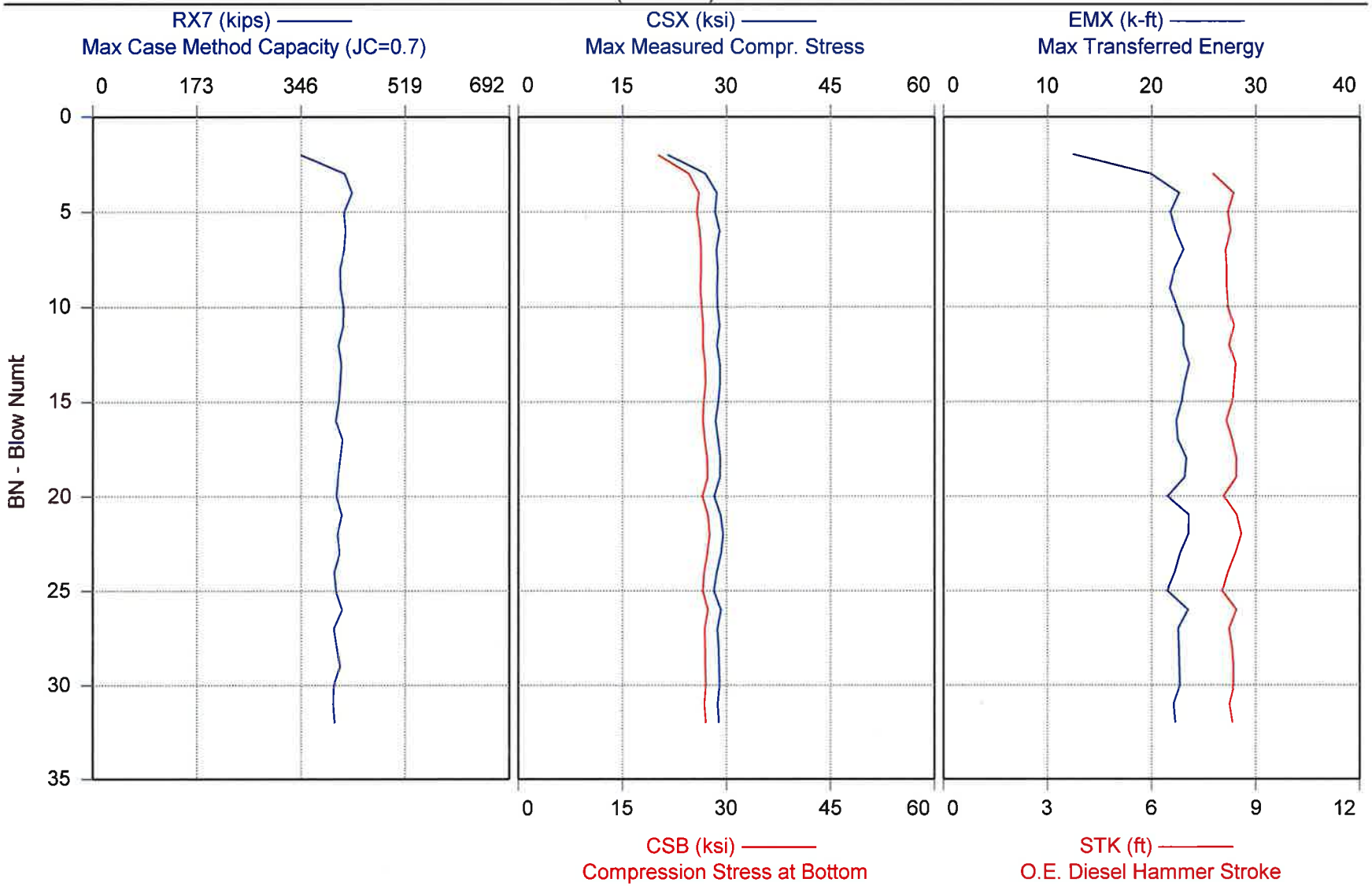
GZA GeoEnvironmental Inc. - PDIPLOT2 Ver 2016.1.56.2 - Case Method & iCAP® Results

Printed: 26-May-2016

Test started: 18-May-2016

WARDSBORO BRF 013-1(15) - ABUTMENT 2 PILE 2 (RS)

APE D19-42 (HP12x74)



WARDSBORO BRF 013-1(15) - ABUTMENT 2 PILE 2 (RS) APE D19-42 (HP12x74)
OP: MICHAEL DEERY Date: 18-May-2016

AR: 21.80 in² SP: 0.492 k/ft³
LE: 115.00 ft EM: 30,008 ksi
WS: 16,810.0 f/s JC: 0.70 []

RX7: Max Case Method Capacity (JC=0.7) STK: O.E. Diesel Hammer Stroke
CSX: Max Measured Compr. Stress FVP: Force/Velocity proportionality
CSB: Compression Stress at Bottom BTA: BETA Integrity Factor
EMX: Max Transferred Energy

BL#	RX7	CSX	CSB	EMX	STK	FVP	BTA
	kips	ksi	ksi	k-ft	ft	[]	(%)
2	345	21.5	20.1	12.4	0.0	1.01	100.0
3	418	26.9	24.6	19.9	7.8	1.00	100.0
4	430	28.6	26.0	22.6	8.4	1.00	100.0
5	417	28.4	25.7	21.8	8.2	1.00	100.0
6	420	29.0	26.1	22.2	8.3	1.00	100.0
7	418	28.5	26.3	23.0	8.1	1.00	100.0
8	410	28.7	26.3	22.2	8.1	1.00	100.0
9	411	28.6	26.2	21.8	8.1	1.00	100.0
10	416	28.7	26.4	22.4	8.2	1.00	100.0
11	416	29.0	26.6	23.1	8.4	0.99	100.0
12	408	28.6	26.6	23.0	8.2	1.00	100.0
13	412	29.0	26.9	23.6	8.4	0.99	100.0
14	411	29.0	27.0	23.2	8.4	0.99	100.0
15	408	28.8	26.7	22.9	8.3	0.99	100.0
16	403	28.4	26.6	22.3	8.1	1.00	100.0
17	415	28.8	26.8	22.5	8.3	0.99	100.0
18	411	29.1	27.2	23.3	8.4	1.00	100.0
19	407	29.0	27.3	23.1	8.4	0.99	100.0
20	405	28.2	26.5	21.5	8.1	1.00	100.0
21	414	29.1	27.3	23.6	8.4	0.99	100.0
22	406	29.5	27.6	23.5	8.6	0.99	100.0
23	410	29.2	27.2	22.8	8.4	0.99	100.0
24	401	28.6	26.8	22.3	8.2	1.00	100.0
25	404	28.2	26.6	21.5	8.0	1.00	100.0
26	414	29.2	27.3	23.5	8.4	1.00	100.0
27	400	28.6	26.9	22.5	8.2	1.00	100.0
28	406	28.9	26.9	22.6	8.3	1.00	100.0
29	410	28.9	26.9	22.6	8.4	1.00	100.0
30	400	29.0	27.0	22.7	8.4	1.00	100.0
31	400	28.7	26.8	22.1	8.2	1.00	100.0
32	402	28.9	27.0	22.3	8.3	1.00	100.0
Average	408	28.5	26.5	22.2	8.3	1.00	100.0

Total number of blows analyzed: 31

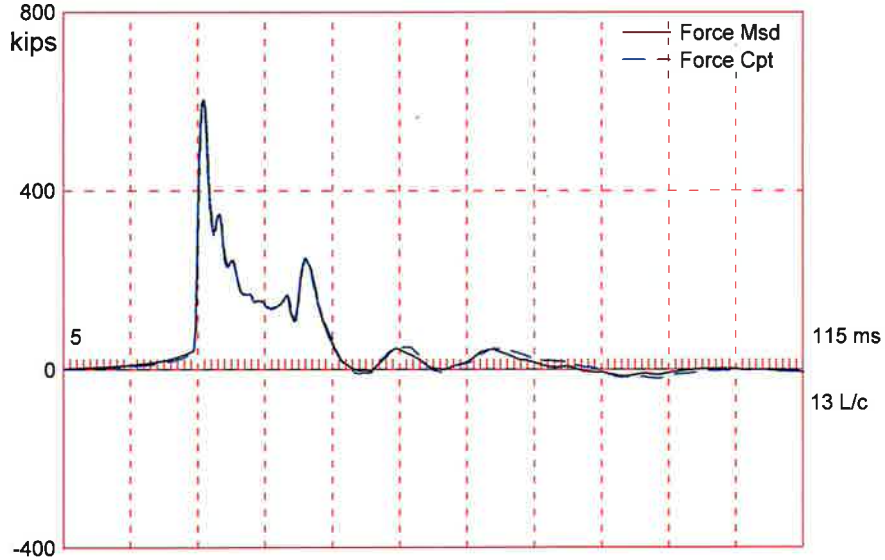
WARDSBORO BRF 013-1(15) - ABUTMENT 2 PILE 2 (RS) APE D19-42 (HP12x74)
OP: MICHAEL DEERY Date: 18-May-2016

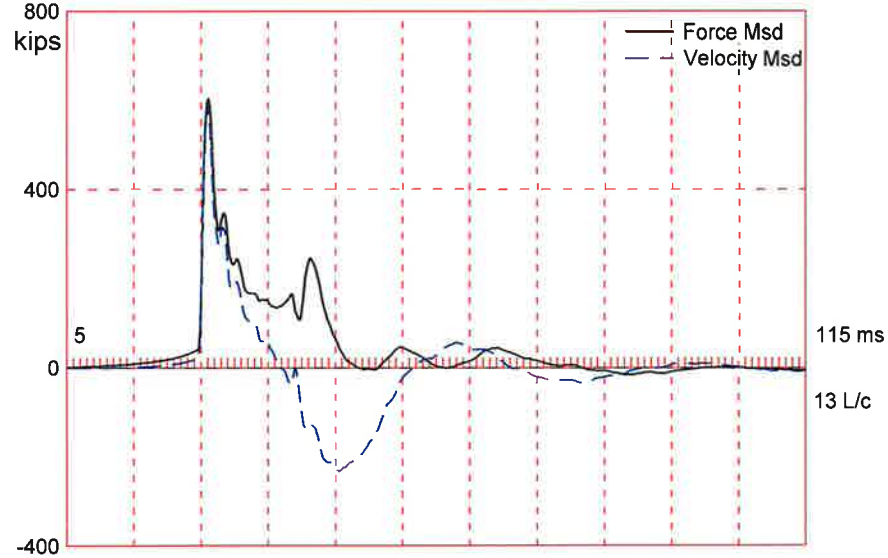
BL# Sensors

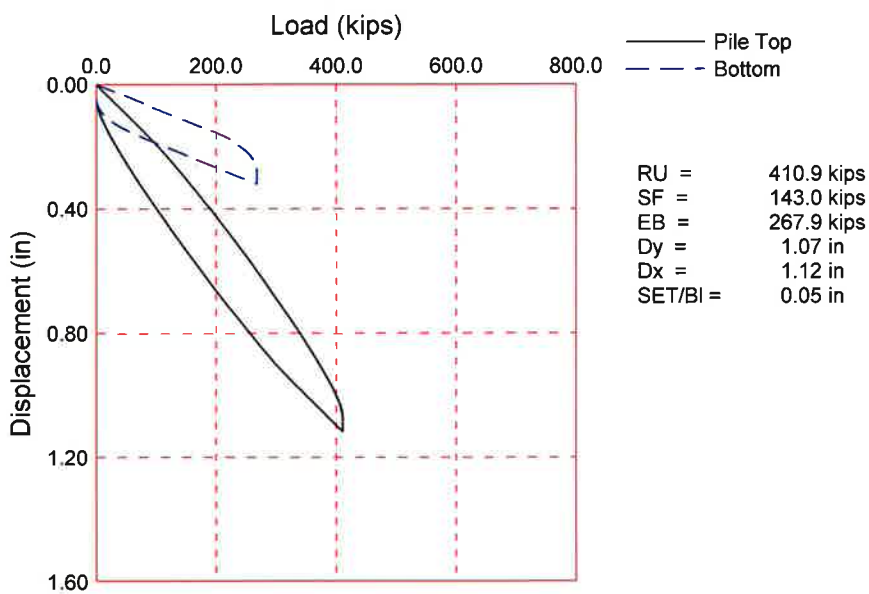
2-32 F3: [F740] 98.0 (1.00); F4: [I839] 93.9 (1.00); A3: [K3013] 343.0 (1.00); A4: [K2139] 318.0 (1.00)

Time Summary

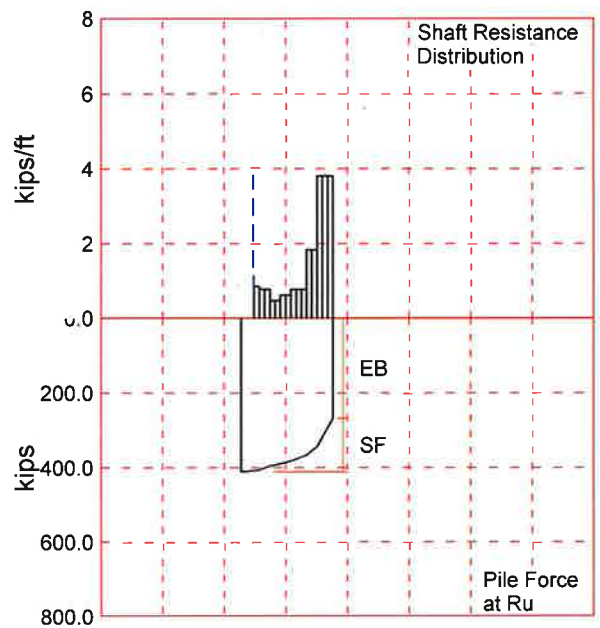
Drive 2 minutes 38 seconds 8:43 AM - 8:46 AM BN 1 - 34







RU =	410.9 kips
SF =	143.0 kips
EB =	267.9 kips
Dy =	1.07 in
Dx =	1.12 in
SET/Bl =	0.05 in



Length b. Sensors	115.0 ft
Embedment	98.0 ft
Top Area	21.8 in^2
End Bearing Area	148.2 in^2
Top Perimeter	4.06 ft
Top E-Modulus	30000 ksi
Top Spec. Weight	492.0 lb/ft^3
Top Wave Spd.	16810 ft/s
Overall W.S.	16810 ft/s
Match Quality	1.84
Top Compr. Stress	27.5 ksi
Max Compr. Stress	28.0 ksi
Max Tension Stress	-3.72 ksi
Avg. Shaft Quake	0.13 in
Toe Quake	0.21 in
Avg. Shaft Smith Dpg.	0.13 s/ft
Toe Smith Damping	0.09 s/ft

CAPWAP(R) 2014-1 Licensed to GZA GeoEnvironmental Inc.

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: 410.9; along Shaft 143.0; at Toe 267.9 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
				410.9			
1	23.0	6.0	5.0	405.9	5.0	0.83	0.21
2	29.6	12.6	5.0	400.9	10.0	0.76	0.19
3	36.1	19.1	5.0	395.9	15.0	0.76	0.19
4	42.7	25.7	3.0	392.9	18.0	0.46	0.11
5	49.3	32.3	3.0	389.9	21.0	0.46	0.11
6	55.9	38.9	4.0	385.9	25.0	0.61	0.15
7	62.4	45.4	4.0	381.9	29.0	0.61	0.15
8	69.0	52.0	5.0	376.9	34.0	0.76	0.19
9	75.6	58.6	5.0	371.9	39.0	0.76	0.19
10	82.1	65.1	5.0	366.9	44.0	0.76	0.19
11	88.7	71.7	12.0	354.9	56.0	1.83	0.45
12	95.3	78.3	12.0	342.9	68.0	1.83	0.45
13	101.9	84.9	25.0	317.9	93.0	3.80	0.94
14	108.4	91.4	25.0	292.9	118.0	3.80	0.94
15	115.0	98.0	25.0	267.9	143.0	3.80	0.94
Avg. Shaft			9.5			1.46	0.36
Toe			267.9				260.36

Soil Model Parameters/Extensions		Shaft	Toe
Smith Damping Factor		0.13	0.09
Quake	(in)	0.13	0.21
Case Damping Factor		0.48	0.62
Damping Type		Viscous	Viscous
Unloading Quake	(% of loading quake)	76	90
Reloading Level	(% of Ru)	100	100
Unloading Level	(% of Ru)	54	
Resistance Gap (included in Toe Quake)	(in)		0.00

CAPWAP match quality = 1.84 (Wave Up Match) ; RSA = 0
Observed: Final Set = 0.05 in; Blow Count = 252 b/ft
Computed: Final Set = 0.05 in; Blow Count = 258 b/ft
Transducer F3(F740) CAL: 98.0; RF: 0.99; F4(I839) CAL: 93.9; RF: 0.99
Not Active A3(K3013) CAL: 343; RF: 1.01; A4(K2139) CAL: 318; RF: 1.01

max. Top Comp. Stress = 27.5 ksi (T= 26.2 ms, max= 1.018 x Top)
max. Comp. Stress = 28.0 ksi (Z= 23.0 ft, T= 27.4 ms)
max. Tens. Stress = -3.72 ksi (Z= 88.7 ft, T= 55.9 ms)
max. Energy (EMX) = 21.4 kip-ft; max. Measured Top Displ. (DMX)= 0.75 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	3.3	599.9	-20.0	27.5	-0.92	21.4	15.1	0.77
2	6.6	600.3	-20.5	27.5	-0.94	21.3	15.1	0.76
4	13.1	601.3	-24.9	27.6	-1.14	21.2	15.0	0.74
6	19.7	607.1	-31.8	27.8	-1.46	21.0	14.9	0.72
8	26.3	599.3	-32.4	27.5	-1.49	20.3	14.7	0.70
10	32.9	591.4	-32.1	27.1	-1.47	19.6	14.5	0.68
12	39.4	581.9	-31.9	26.7	-1.46	18.9	14.4	0.66
14	46.0	577.7	-38.6	26.5	-1.77	18.4	14.2	0.63
16	52.6	574.6	-40.5	26.4	-1.86	17.9	14.1	0.61
18	59.1	569.1	-43.7	26.1	-2.00	17.3	13.9	0.58
20	65.7	564.6	-52.9	25.9	-2.43	16.6	13.7	0.55
22	72.3	557.8	-62.1	25.6	-2.85	15.9	13.5	0.52
24	78.9	551.8	-69.4	25.3	-3.18	15.1	13.3	0.49
26	85.4	551.6	-76.3	25.3	-3.50	14.2	13.0	0.45
28	92.0	536.4	-77.3	24.6	-3.55	12.8	12.6	0.41
29	95.3	548.9	-79.5	25.2	-3.64	12.5	12.2	0.39
30	98.6	531.3	-75.1	24.4	-3.44	11.6	11.9	0.37
31	101.9	546.2	-79.3	25.1	-3.64	11.3	11.5	0.35
32	105.1	495.2	-64.4	22.7	-2.95	9.8	11.4	0.33
33	108.4	477.3	-65.4	21.9	-3.00	9.6	11.9	0.31
34	111.7	415.7	-48.3	19.1	-2.22	8.3	12.0	0.29
35	115.0	462.3	-48.2	21.2	-2.21	7.6	11.4	0.27
Absolute	23.0			28.0			(T =	27.4 ms)
	88.7				-3.72		(T =	55.9 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	685.5	634.5	583.5	532.5	481.5	430.5	379.5	328.6	277.6	226.6
RX	686.6	637.5	590.3	549.5	508.7	471.4	437.2	413.8	395.7	382.8
RU	693.7	643.5	593.3	543.2	493.0	442.8	392.7	342.5	292.3	242.2

RAU = 219.0 (kips); RA2 = 394.6 (kips)

Current CAPWAP Ru = 410.9 (kips); Corresponding J(RP)= 0.54; J(RX) = 0.72

VMX ft/s	TVP ms	VT1*Z kips	FT1 kips	FMX kips	DMX in	DFN in	SET in	EMX kip-ft	QUS kips	KEB kips/in
15.1	26.00	588.6	606.7	607.1	0.75	0.05	0.05	21.5	647.4	1290

PILE PROFILE AND PILE MODEL

Depth ft	Area in^2	E-Modulus ksi	Spec. Weight lb/ft^3	Perim. ft
0.0	21.8	29999.9	492.000	4.06
115.0	21.8	29999.9	492.000	4.06

Toe Area 148.2 in^2

Top Segment Length 3.29 ft, Top Impedance 39 kips/ft/s

Wave Speed: Pile Top 16810.0, Elastic 16810.0, Overall 16810.0 ft/s
Pile Damping 1.00 %, Time Incr 0.195 ms, 2L/c 13.7 ms
Total volume: 17.410 ft^3; Volume ratio considering added impedance: 1.000

SAXIMETER BLOW COUNT/STROKE PILE DRIVING RECORD

Pile # 2 Time: Start/stop Date: 5/9/16
Project Wardsboro BRF 013-1(15) Location Abut #2
Pile Type/size Length (1) 40' Batter —
Elevation: Ground: 1407 Pile Tip Cutoff:
Hammer Type/Size APE Fuel Setting: 3
Cap/Helmet/Cushion
Contractor Renaud

Heat # -60113079

Depth ft	Blow/ft ft	H BPM	Depth ft	Blow/ft ft	H BPM	Depth ft	Blow/ft ft	H BPM	Depth ft	Blow/ft ft	H BPM
0-1			25-26	10	7.44	50-51	—		75-76	7	
1-2			26-27	10	7.11	51-52	—		76-77	6	
2-3			27-28	10	7.47	52-53	5		77-78	7	7.7
3-4			28-29	11	7.25	53-54	5		78-79	7	
4-5			29-30	5		54-55	5	7.93	79-80	5	
5-6	16	6.40	30-31	5		55-56	6		80-81	7	
6-7	18	6.93	31-32	6		56-57	6		81-82	7	
7-8	22	7.14	32-33	6		57-58	6		82-83	7	
8-9	26	7.23	33-34	4	7.17	58-59	6		83-84	—	
9-10	27	7.33	34-35	4		59-60	5		84-85	6	
10-11	33	7.68	35-36	4		60-61	5		85-86	6	
11-12	35	7.63	36-37	6		61-62	6		86-87	6	
12-13	26	7.38	37-38	4		62-63	6		87-88	6	
13-14	26	7.29	38-39	5		63-64	5		88-89	7	7.50
14-15	32	7.45	39-40	5		64-65	5	7.93	89-90	6	
15-16	37	7.71	40-41	4		65-66	8		90-91	6	
16-17	33	7.32	41-42	3		66-67	4		91-92	5	
17-18	38	7.68	42-43	4		67-68	5		92-93	5	
18-19	19	7.75	43-44	5	7.61	68-69	5		93-94	6	
19-20	21		44-45	5		69-70	5		94-95	7	
20-21	7	7.27	45-46	5		70-71	5		95-96	5	
21-22	7	7.43	46-47	5		71-72	8		96-97	7	
22-23	8	7.55	47-48	5		72-73	9		97-98	6	
23-24	8	7.60	48-49	4		73-74	8		98-99	5	
24-25	11	7.41	49-50	5		74-75	7		99-100	5	

6
5
6
5
12 (27') 7.1
7
5
6
6
5
5
6
6
7 28'
8
6
5
5
6
5
6
7
6
6
6 (29') 7.44

7.3

Remarks

Depth	Min	Interruption Reason

Blow/inch

4	5	6	7	6	6	6	6	7 (7.38)			

AXIMETER BLOW COUNT/STROKE PILE DRIVING RECORD

e #-- 2 Time: Start/stop _____ Date: _____

roject _____ Location _____

Pile Type/size _____ Length _____ Batter _____

Elevation: Ground: _____ Pile Tip _____ Cutoff:

Hammer Type/Size _____ Fuel Setting: _____

Cap/Helmet/Cushion

Contractor _____

Depth ft	Blow/ft ft	H BPM	Depth ft	Blow/ft ft	H BPM	Depth ft	Blow/ft ft	H BPM	Depth ft	Blow/ft ft	H BPM	
0-1	6		25-26	4		50-51	6		75-76	5		
1-2	5		26-27	4		51-52	6		76-77	6		
2-3	6		27-28	4		52-53	6		77-78	6		
3-4	5		28-29	5	7.17	53-54	6	7.20	78-79	6	7.14	
4-5	5		29-30	5		54-55	6		79-80	5		
5-6	5	7.22	30-31	4		55-56	6		80-81	6		
6-7	6		31-32	4		56-57	6		81-82	6		
7-8	6		32-33	5		57-58	5		82-83	5		
8-9	4		33-34	6		58-59	6		83-84	6		
9-10	5		34-35	6		59-60	7		84-85	6		
10-11	5		35-36	6		60-61	6		85-86	78	7.02	34-35
11-12	7		36-37	6		61-62	6		86-87	53	6.97	35-36
12-13	7		37-38	7		62-63	6		87-88	45	6.89	36-37
13-14	5		38-39	4		63-64	5	7.14	88-89	38	6.61	37-38
14-15	5		39-40	5		64-65	7		89-90	43	6.65	38-39
15-16	5		40-41	5	7.19	65-66	5		90-91	53	6.79	39-40
16-17	4	7.19	41-42	5		66-67	6		91-92	56	6.84	40-41
17-18	6		42-43	5		67-68	5		92-93	66	6.82	41-42
18-19	5		43-44	5		68-69	4		93-94	61	6.85	42-43
19-20	4		44-45	5		69-70	5		94-95	59	7.10	43-44
20-21	5		45-46	6		70-71	5		95-96	64	6.91	44-45
21-22	5		46-47	6		71-72	5		96-97	65	7.19	45-46
22-23	5		47-48	5		72-73	5		97-98	71	7.16	46-47
23-24	5		48-49	5		73-74	6		98-99	86	7.14	47-48
24-25	4		49-50	6		74-75	5		99-100	78	7.21	48-49

Remarks	Depth	Min	Interruption Reason

blow/inch

SAXIMETER BLOW COUNT/STROKE PILE DRIVING RECORD

Pile # _____ Time: Start/stop _____ Date: _____
Project _____ Location _____
Pile Type/size _____ Length _____ Batter _____
Elevation: Ground: _____ Pile Tip _____ Cutoff:
Hammer Type/Size _____ Fuel Setting: _____
Cap/Helmet/Cushion
Contractor _____

	Depth ft	Blow/ft ft	H BPM	Depth ft	Blow/ft ft	H BPM	Depth ft	Blow/ft ft	H BPM	Depth ft	Blow/ft ft	H BPM
52	0-1 53	81	7.13	25-26	10	7.95	50-51	11 14	7.99	75-76	10	8.13
53	1-2 54	80	7.21	26-27	10	7.99	51-52	14	8.01	76-77	11	8.05
54	2-3 55	82	7.48	27-28	9 11	7.98	52-53	12	7.84	77-78	12	8.36
55	3-4 56	75	7.64	28-29	9	7.96	53-54	14	7.88	78-79	12	8.16
56	4-5 57	81	7.72	29-30	8	7.98	54-55	15	7.93	79-80	11	8.08
57	5-58	85	7.87	30-31	11	7.92	55-56	12	7.94	80-81	11	7.89
58	6-7 59	104	7.88	31-32	11	7.69	56-57	12	7.99	81-82	11	8.09
	59	98	7.71	32-33	12	8.12	57-58	13	8.14	82-83	12	7.98
60	8-9 61	57	8.14	33-34	9	8.05	58-59	15	7.80	83-84	12	8.37
	9-10 62	94	8.15	34-35	13	7.81	59-60	13	7.97	84-85	10	8.37
	10-11 63	104	8.16	35-36	12	7.92	60-61	11	7.83	85-86	13	7.84
	11-12 64	117	8.26	36-37	12	7.57	61-62	14	8.0	86-87	12	8.43
	12-13 65	99	8.29	37-38	11	8.09	62-63	11	7.85	87-88	13	8.18
	13-14 66	127	8.20	38-39	11	7.76	63-64	13	7.65	88-89	14	7.97
	14-15 67	141	8.12	39-40	12	7.90	64-65	13	8.65	89-90	14	8.29
	15-16 68	137	8.14	40-41	14	7.88	65-66	12	8.16	90-91	11	8.19
68	16-17 69	11	7.84	41-42	15	7.89	66-67	13	8.11	91-92	14	8.46
	17-18 70	12	7.74	42-43	11	7.96	67-68	14	7.95	92-93	15	7.96
	18-19 71	11	7.85	43-44	12	8.01	68-69	12	8.16	93-94	14	8.48
	19-20 72	10	7.80	44-45	12	8.05	69-70	11	7.95	94-95	14	8.24
	20-21 73	10	7.97	45-46	17	8.01	70-71	11	8.16	95-96	14	7.90
	21-22 74	10	7.95	46-47	14	8.18	71-72	13	8.16	96-97	14	8.50
	22-23 75	13	7.89	47-48	15	8.04	72-73	11	7.83	97-98	14	8.33
	23-24 76	10	7.88	48-49	14	7.99	73-74	10	8.14	98-99	17	8.26
	24-25 77	10	7.96	49-50	14	7.80	74-75	13	8.18	99-100	17	8.37

Remarks	Depth	Min	Interruption Reason

Fuel setting 3 @60'

blow/inch

75 17/7.8
1 17/8.38
2 10/8.23
3 13/8.10
4 13/7.96
5 16/8.33
6 18/8.04
7 12/8.44
8 12/8.21
9 13/8.04
10 16/7.80
11 15/7.8
76 11/8.17
1 13/8.09
2 14/7.91
3 11/8.05
4 10/8.0
5 11/7.93
6 12/8.04
7 11/7.73
8 13/8.31
9 11/7.84
10 11/8.30
11 12/8.0
77 12/8.0

1 13/8.23
2 14/8.04
3 12/8.19
4 13/8.15
5 11/8.01
6 12/8.16
7 13/8.25
8 13/8.11
9 13/8.10
78 10 11/8.07

IMETER BLOW COUNT/STROKE PILE DRIVING RECORD

#2 Time: Start/stop _____ Date: 5/16/16

ct Wardsboro BRF 013-1(15) Location Abut #2

Type/size _____ Length _____ Batter _____

evation: Ground: _____ Pile Tip _____ Cutoff:

Hammer Type/Size _____ Fuel Setting: _____

Cap/Helmet/Cushion

Contractor _____

Test Piles

Depth ft	Blow/ft ft	H / BPM	Depth ft	Blow/ft ft	H BPM	Depth ft	Blow/ft ft	H BPM	Depth ft	Blow/ft ft	H BPM
0-1	78		25-26	14	7.87	50-51	15	6.34	75-76	28	8.40
1-2	36	7.80	26-27	13	7.98	51-52	13	6.50	76-77		
2-3	82	7.77	27-28	18	8.09	52-53	14	7.16	77-78		
3-4	107	7.70	28-29	14	8.33	53-54	18	6.83	78-79		
4-5	100	7.68	29-30	18	8.03	54-55	14	6.75	79-80		
5-6	93	7.73	30-31	18	8.17	55-56	17	7.44	80-81		
6-7	141	7.87	31-32	15	8.02	56-57	17	6.24	81-82		
83-84	151	8.13	32-33	19	7.80	57-58	14	6.64	82-83		
8-9	132	8.20	33-34	18	7.53	58-59	15	7.22	83-84		
9-10	115	8.10	34-35	—		59-60	17	7.38	84-85		
10-11	119	8.13	35-36	23	7.94	60-61	17	6.74	85-86		
11-12	122	8.23	36-37	18	8.12	61-62	10	7.99	86-87		
12-13	125	8.29	37-38	19	7.95	62-63	15	8.02	87-88		
13-14	142	8.48	38-39	17	7.92	63-64	17	8.09	88-89		
14-15	117	8.33	39-40	14	7.94	64-65	12	7.97	89-90		
15-16	150	8.23	40-41	17	7.74	65-66	16	8.23	90-91		
16-17	161	8.26	41-42	16	6.79	66-67	16	8.28	91-92		
17-18	14	7.66	42-43	16	8.0	67-68	16	8.11	92-93		
18-19	23	8.12	43-44	17	7.46	68-69	16	7.92	93-94		
19-20	19	7.98	44-45	17	6.91	69-70	16	8.07	94-95		
20-21	15	8.28	45-46	16	7.87	70-71	17	8.41	95-96		
21-22	15	7.99	46-47	18	7.55	71-72	19	8.09	96-97		
22-23	17	8.15	47-48	17	6.29	72-73	19	8.37	97-98		
23-24	19	7.96	48-49	15	7.10	73-74	19	8.41	98-99		
24-25	18	8.01	49-50	10	6.45	74-75	20	8.48	99-100		

fuel set #4

Remarks	Depth	Min	Interruption Reason
			Fuel setting 4
			19 blow/in @ 8.3 stroke
			for 6" consecutive

blow/inch

Refusal

30 blows / inch w/ ~10' stroke

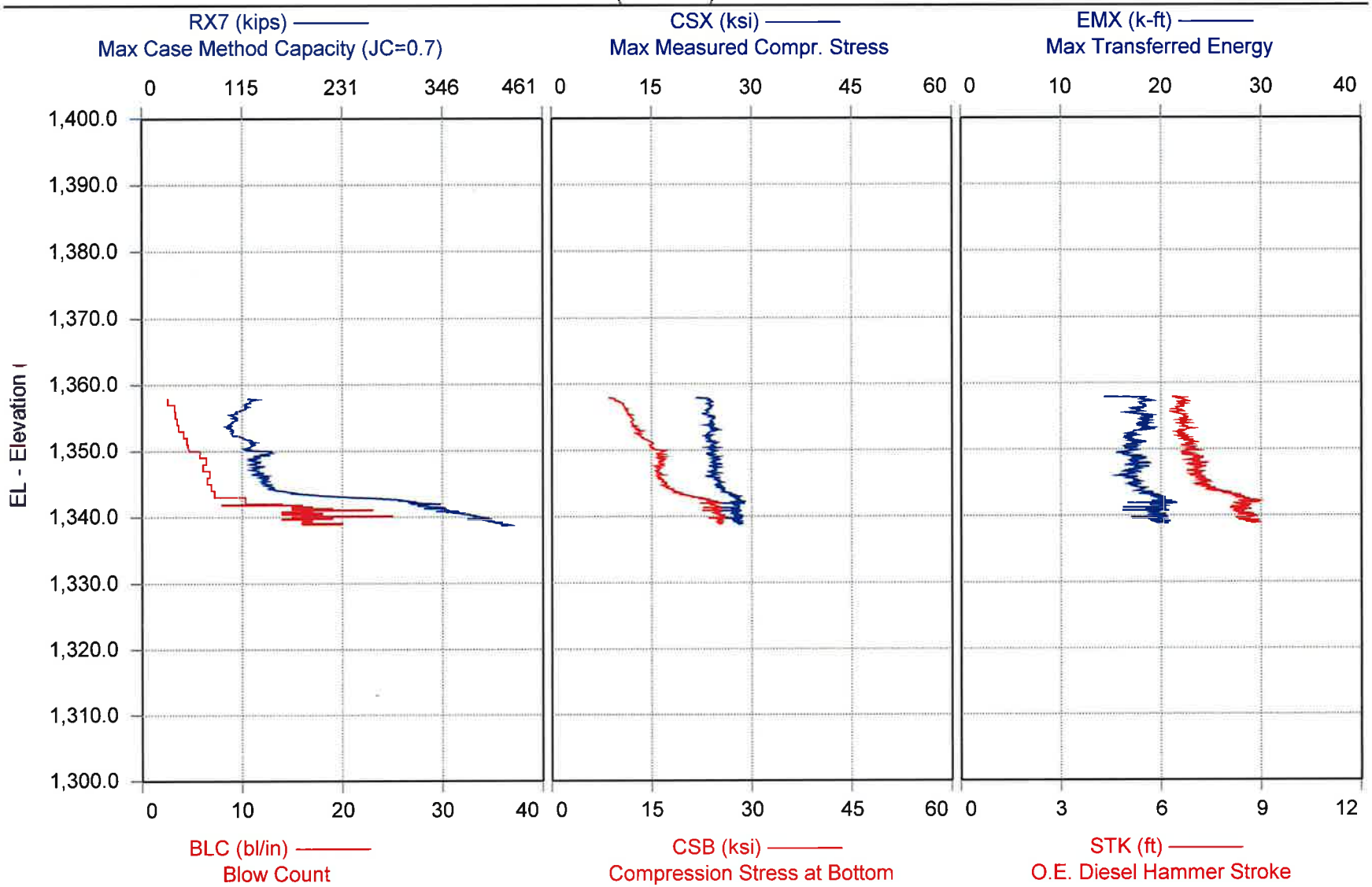
GZA GeoEnvironmental Inc. - PDIPLOT2 Ver 2016.1.56.2 - Case Method & iCAP® Results

Printed: 26-May-2016

Test started: 16-May-2016

WARDSBORO BRF 013-1(15) - ABUTMENT 1 PILE 4 (ID)

APE D19-42 (HP12x74)



WARDSBORO BRF 013-1(15) - ABUTMENT 1 PILE 4 (ID)
OP: MICHAEL DEERY

APE D19-42 (HP12x74)
Date: 16-May-2016

AR: 21.80 in²
LE: 77.00 ft
WS: 16,807.9 f/s

SP: 0.492 k/ft³
EM: 30,000 ksi
JC: 0.70 []

RX7: Max Case Method Capacity (JC=0.7)
CSX: Max Measured Compr. Stress
CSB: Compression Stress at Bottom
EMX: Max Transferred Energy

STK: O.E. Diesel Hammer Stroke
FVP: Force/Velocity proportionality
BTA: BETA Integrity Factor

BL#	Elev.	BLC	TYPE	RX7	CSX	CSB	EMX	STK	FVP	BTA
	ft	bl/in		kips	ksi	ksi	k-ft	ft	[]	(%)
32	1,357.00	3	AV32	124	23.4	9.8	17.8	6.6	1.04	97.1
72	1,356.00	3	AV40	118	23.7	11.0	17.9	6.6	0.99	100.0
113	1,355.00	3	AV41	107	23.4	11.6	17.7	6.5	0.99	100.0
156	1,354.00	4	AV43	105	24.0	12.1	18.4	6.7	0.99	100.0
201	1,353.00	4	AV45	103	24.1	12.6	18.5	6.7	0.99	100.0
252	1,352.00	4	AV51	108	23.7	13.2	17.3	6.6	0.99	100.0
307	1,351.00	5	AV55	126	23.8	14.4	17.1	6.7	1.00	100.0
363	1,350.00	5	AV56	126	24.1	15.1	17.0	6.8	1.00	100.0
433	1,349.00	6	AV70	140	24.1	16.4	16.7	6.8	1.00	100.0
511	1,348.00	7	AV78	130	24.5	16.4	17.5	7.0	0.99	100.0
585	1,347.00	6	AV74	131	24.6	16.2	17.7	7.1	1.00	100.0
667	1,346.00	7	AV82	136	24.2	16.0	16.8	7.0	1.00	100.0
746	1,345.00	7	AV79	141	24.9	16.6	17.3	7.2	0.99	100.0
830	1,344.00	7	AV84	149	25.2	17.3	17.6	7.3	0.98	100.0
918	1,343.00	7	AV88	192	26.6	19.3	18.5	7.9	0.98	100.0
1042	1,342.00	10	AV124	296	28.0	23.1	20.1	8.5	0.97	100.0
1056	1,341.92	14	AV14	328	27.4	23.8	19.4	8.6	0.98	100.0
1064	1,341.83	8	AV8	326	27.9	24.2	20.2	8.5	0.98	100.0
1080	1,341.75	16	AV16	324	27.6	24.1	19.5	8.3	0.98	100.0
1095	1,341.67	15	AV15	322	27.5	24.1	19.5	8.3	0.97	100.0
1110	1,341.58	15	AV15	329	28.0	24.5	20.1	8.5	0.97	100.0
1127	1,341.50	17	AV17	334	28.0	24.7	20.1	8.5	0.97	100.0
1142	1,341.42	15	AV15	344	28.0	24.9	20.1	8.5	0.97	100.0
1158	1,341.33	16	AV16	347	27.9	25.0	19.9	8.5	0.97	100.0
1177	1,341.25	19	AV19	341	27.0	24.1	18.6	8.3	0.98	100.0
1192	1,341.17	15	AV15	347	27.4	24.5	19.2	8.3	0.98	100.0
1207	1,341.08	15	AV15	350	27.2	24.4	19.0	8.2	0.98	100.0
1230	1,341.00	23	AV23	356	27.6	24.8	19.4	8.4	0.98	100.0
1247	1,340.92	17	AV17	361	27.9	25.1	19.9	8.5	0.97	100.0
1263	1,340.83	16	AV16	356	27.3	24.4	19.0	8.4	0.98	100.0
1277	1,340.75	14	AV14	362	27.9	25.1	19.8	8.4	0.98	100.0
1292	1,340.67	15	AV15	361	27.5	24.8	19.2	8.3	0.98	100.0
1310	1,340.58	18	AV18	366	27.7	25.0	19.5	8.4	0.98	100.0
1328	1,340.50	18	AV18	367	27.3	24.6	18.9	8.3	0.98	100.0

WARDSBORO BRF 013-1(15) - ABUTMENT 1 PILE 4 (ID) APE D19-42 (HP12x74)
OP: MICHAEL DEERY Date: 16-May-2016

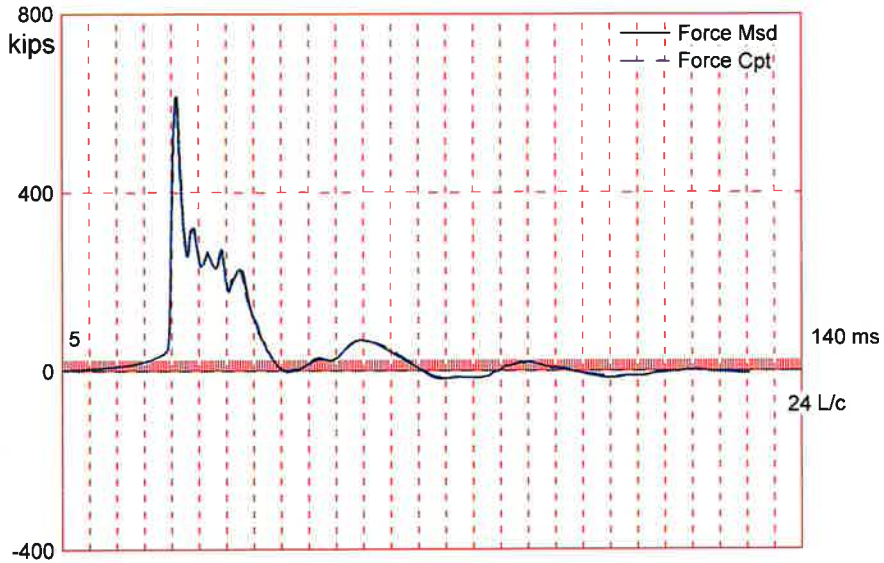
BL#	Elev.	BLC	TYPE	RX7	CSX	CSB	EMX	STK	FVP	BTA
	ft	bl/in		kips	ksi	ksi	k-ft	ft	[]	(%)
1342	1,340.42	14	AV14	370	27.4	24.8	19.0	8.3	0.98	100.0
1357	1,340.33	15	AV15	377	27.9	25.3	19.7	8.5	0.98	100.0
1375	1,340.25	18	AV18	377	27.7	25.2	19.3	8.4	0.98	100.0
1391	1,340.17	16	AV16	381	27.9	25.4	19.8	8.6	0.98	100.0
1416	1,340.08	25	AV25	382	27.8	25.4	19.5	8.5	0.98	100.0
1432	1,340.00	16	AV16	387	28.0	25.5	19.8	8.6	0.98	100.0
1447	1,339.92	15	AV15	392	28.3	25.7	20.3	8.7	0.98	100.0
1463	1,339.83	16	AV16	395	28.2	25.8	20.2	8.8	0.97	100.0
1482	1,339.75	19	AV19	391	27.5	25.2	19.2	8.7	0.98	100.0
1496	1,339.67	14	AV14	397	27.8	25.3	19.7	8.5	0.98	100.0
1513	1,339.58	17	AV17	398	27.7	25.3	19.4	8.5	0.98	100.0
1529	1,339.50	16	AV16	399	27.5	25.1	19.2	8.4	0.98	100.0
1545	1,339.42	16	AV16	403	27.6	25.2	19.5	8.5	0.98	100.0
1562	1,339.33	17	AV17	405	27.5	25.1	19.2	8.4	0.98	100.0
1578	1,339.25	16	AV16	410	28.0	25.4	20.0	8.7	0.98	100.0
1594	1,339.17	16	AV16	412	28.0	25.3	19.8	8.6	0.98	100.0
1610	1,339.08	16	AV16	413	27.9	25.2	19.6	8.6	0.98	100.0
1630	1,339.00	20	AV20	415	27.9	25.1	19.7	8.6	0.97	100.0
1650	1,338.92	20	AV20	422	28.4	25.4	20.2	8.8	0.98	100.0
1665	1,338.84	16	AV14	420	28.2	25.1	19.8	8.7	0.98	100.0

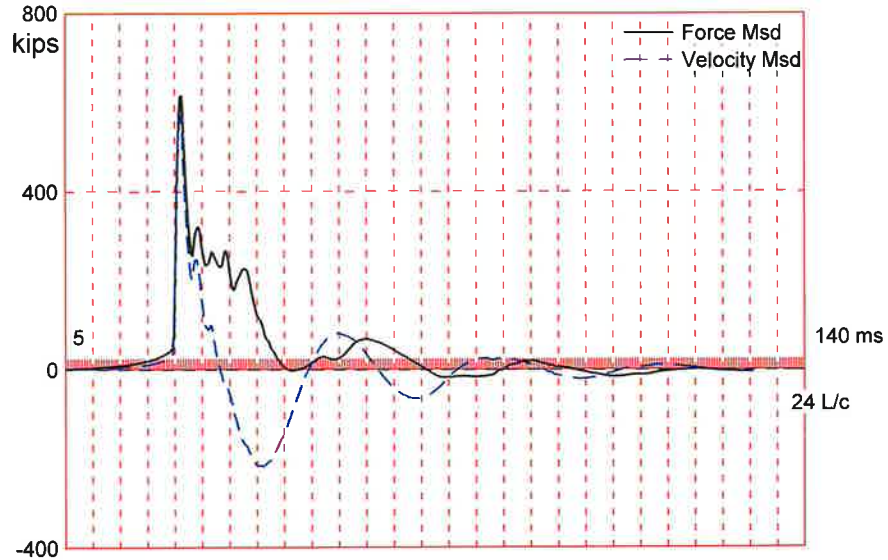
BL#	Sensors
1	F3: [ST CAL] 147.5 (0.98); F4: [ST CAL] 147.5 (0.98); A3: [PR CAL] 1000.0 (1.02); A4: [PR CAL] 1000.0 (1.02)
2-1664	F3: [F740] 98.0 (0.98); F4: [I839] 93.9 (0.98); A3: [K3013] 343.0 (1.02); A4: [K2139] 318.0 (1.02)

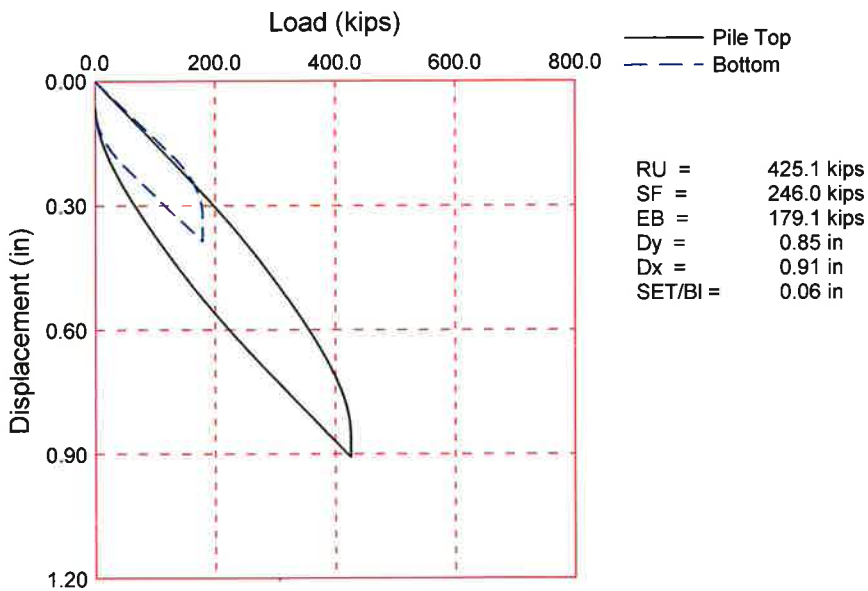
BL#	Comments
1	APE D19 42 FUEL 3

Time Summary

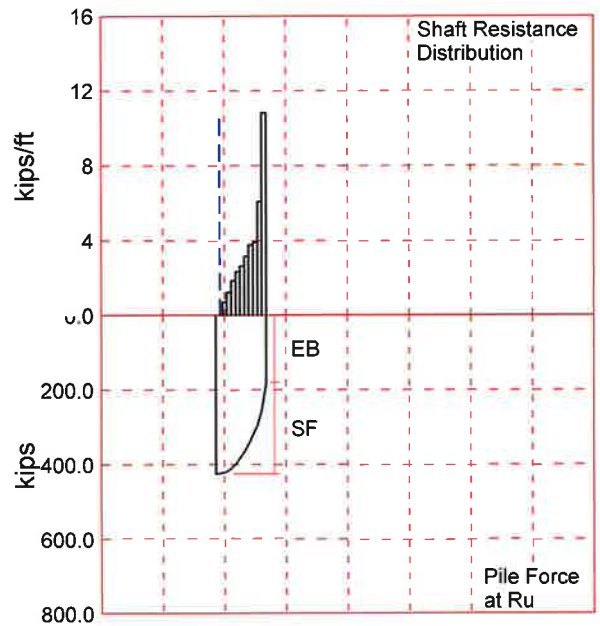
Drive 58 minutes 6 seconds 9:44 AM - 10:42 AM BN 1 - 1665







RU =	425.1 kips
SF =	246.0 kips
EB =	179.1 kips
Dy =	0.85 in
Dx =	0.91 in
SET/BI =	0.06 in



Length b. Sensors	77.0 ft
Embedment	69.1 ft
Top Area	21.8 in^2
End Bearing Area	148.2 in^2
Top Perimeter	4.06 ft
Top E-Modulus	29992 ksi
Top Spec. Weight	492.0 lb/ft^3
Top Wave Spd.	16808 ft/s
Overall W.S.	16808 ft/s
Match Quality	1.02
Top Compr. Stress	27.8 ksi
Max Compr. Stress	28.5 ksi
Max Tension Stress	-2.00 ksi
Avg. Shaft Quake	0.20 in
Toe Quake	0.25 in
Avg. Shaft Smith Dpg.	0.12 s/ft
Toe Smith Damping	0.13 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: 425.1; along Shaft 246.0; at Toe 179.1 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
				425.1			
1	16.7	8.9	6.4	418.7	6.4	0.72	0.18
2	23.4	15.6	8.2	410.5	14.6	1.22	0.30
3	30.1	22.3	12.4	398.1	27.0	1.85	0.46
4	36.8	29.0	15.6	382.5	42.6	2.33	0.57
5	43.5	35.7	17.7	364.8	60.3	2.64	0.65
6	50.2	42.4	21.1	343.7	81.4	3.15	0.78
7	56.9	49.1	25.2	318.5	106.6	3.76	0.93
8	63.6	55.8	26.2	292.3	132.8	3.91	0.96
9	70.3	62.5	40.7	251.6	173.5	6.08	1.50
10	77.0	69.1	72.5	179.1	246.0	10.83	2.67
Avg. Shaft			24.6			3.56	0.88
Toe			179.1				174.06

Soil Model Parameters/Extensions		Shaft	Toe
Smith Damping Factor		0.12	0.13
Quake	(in)	0.20	0.25
Case Damping Factor		0.77	0.62
Damping Type		Viscous	Viscous
Unloading Quake	(% of loading quake)	93	100
Reloading Level	(% of Ru)	100	100
Unloading Level	(% of Ru)	59	
Soil Plug Weight	(kips)		0.201

CAPWAP match quality = 1.02 (Wave Up Match) ; RSA = 0
Observed: Final Set = 0.06 in; Blow Count = 192 b/ft
Computed: Final Set = 0.07 in; Blow Count = 167 b/ft
Transducer F3(F740) CAL: 98.0; RF: 1.00; F4(I839) CAL: 93.9; RF: 1.00
A3(K3013) CAL: 343; RF: 1.00; A4(K2139) CAL: 318; RF: 1.00

max. Top Comp. Stress = 27.8 ksi (T= 26.3 ms, max= 1.025 x Top)
max. Comp. Stress = 28.5 ksi (Z= 16.7 ft, T= 27.1 ms)
max. Tens. Stress = -2.00 ksi (Z= 36.8 ft, T= 47.8 ms)
max. Energy (EMX) = 19.6 kip-ft; max. Measured Top Displ. (DMX)= 0.63 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	3.3	606.2	-16.8	27.8	-0.77	19.6	15.0	0.63
2	6.7	607.9	-19.5	27.9	-0.89	19.5	15.0	0.62
4	13.4	615.9	-27.7	28.2	-1.27	19.1	14.8	0.58
5	16.7	621.6	-34.6	28.5	-1.58	18.8	14.6	0.56
6	20.1	610.3	-35.0	28.0	-1.60	18.1	14.5	0.54
7	23.4	618.0	-40.0	28.3	-1.83	17.9	14.3	0.53
8	26.8	604.4	-37.4	27.7	-1.72	17.1	14.1	0.51
9	30.1	614.0	-42.7	28.2	-1.96	16.9	13.8	0.50
10	33.5	591.8	-37.7	27.1	-1.73	15.8	13.6	0.48
11	36.8	602.5	-43.6	27.6	-2.00	15.6	13.4	0.46
12	40.2	574.8	-37.5	26.4	-1.72	14.4	13.2	0.44
13	43.5	586.7	-42.4	26.9	-1.94	14.1	12.9	0.42
14	46.9	557.0	-33.4	25.5	-1.53	12.9	12.6	0.40
15	50.2	570.3	-38.7	26.2	-1.78	12.7	12.3	0.39
16	53.6	536.2	-28.4	24.6	-1.30	11.5	12.0	0.37
17	56.9	549.8	-31.7	25.2	-1.45	11.2	11.7	0.35
18	60.3	511.1	-18.3	23.4	-0.84	9.9	11.4	0.33
19	63.6	528.8	-21.8	24.2	-1.00	9.7	11.0	0.31
20	67.0	509.0	-11.0	23.3	-0.51	8.5	10.5	0.30
21	70.3	527.3	-13.9	24.2	-0.64	8.3	9.6	0.28
22	73.7	444.2	-3.2	20.4	-0.15	7.0	10.3	0.26
23	77.0	428.5	-5.3	19.7	-0.24	5.0	10.4	0.25
Absolute	16.7			28.5			(T =	27.1 ms)
	36.8				-2.00		(T =	47.8 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	730.2	683.0	635.8	588.6	541.4	494.2	447.0	399.8	352.6	305.4
RX	730.2	683.0	635.8	588.6	541.4	494.2	447.0	422.4	414.0	405.6
RU	735.9	689.3	642.6	596.0	549.4	502.8	456.1	409.5	362.9	316.2

RAU = 344.3 (kips); RA2 = 423.2 (kips)

Current CAPWAP Ru = 425.1 (kips); Corresponding J(RP)= 0.65; J(RX) = 0.69

VMX ft/s	TVP ms	VT1*Z kips	FT1 kips	FMX kips	DMX in	DFN in	SET in	EMX kip-ft	QUS kips	KEB kips/in
14.9	26.09	581.3	620.9	620.9	0.63	0.06	0.06	19.8	684.1	720

PILE PROFILE AND PILE MODEL

Depth ft	Area in^2	E-Modulus ksi	Spec. Weight lb/ft^3	Perim. ft
0.0	21.8	29992.2	492.000	4.06
77.0	21.8	29992.2	492.000	4.06

Toe Area 148.2 in^2

Top Segment Length 3.35 ft, Top Impedance 39 kips/ft/s

Wave Speed: Pile Top 16807.9, Elastic 16807.9, Overall 16807.9 ft/s
Pile Damping 1.00 %, Time Incr 0.199 ms, 2L/c 9.2 ms
Total volume: 11.657 ft^3; Volume ratio considering added impedance: 1.000

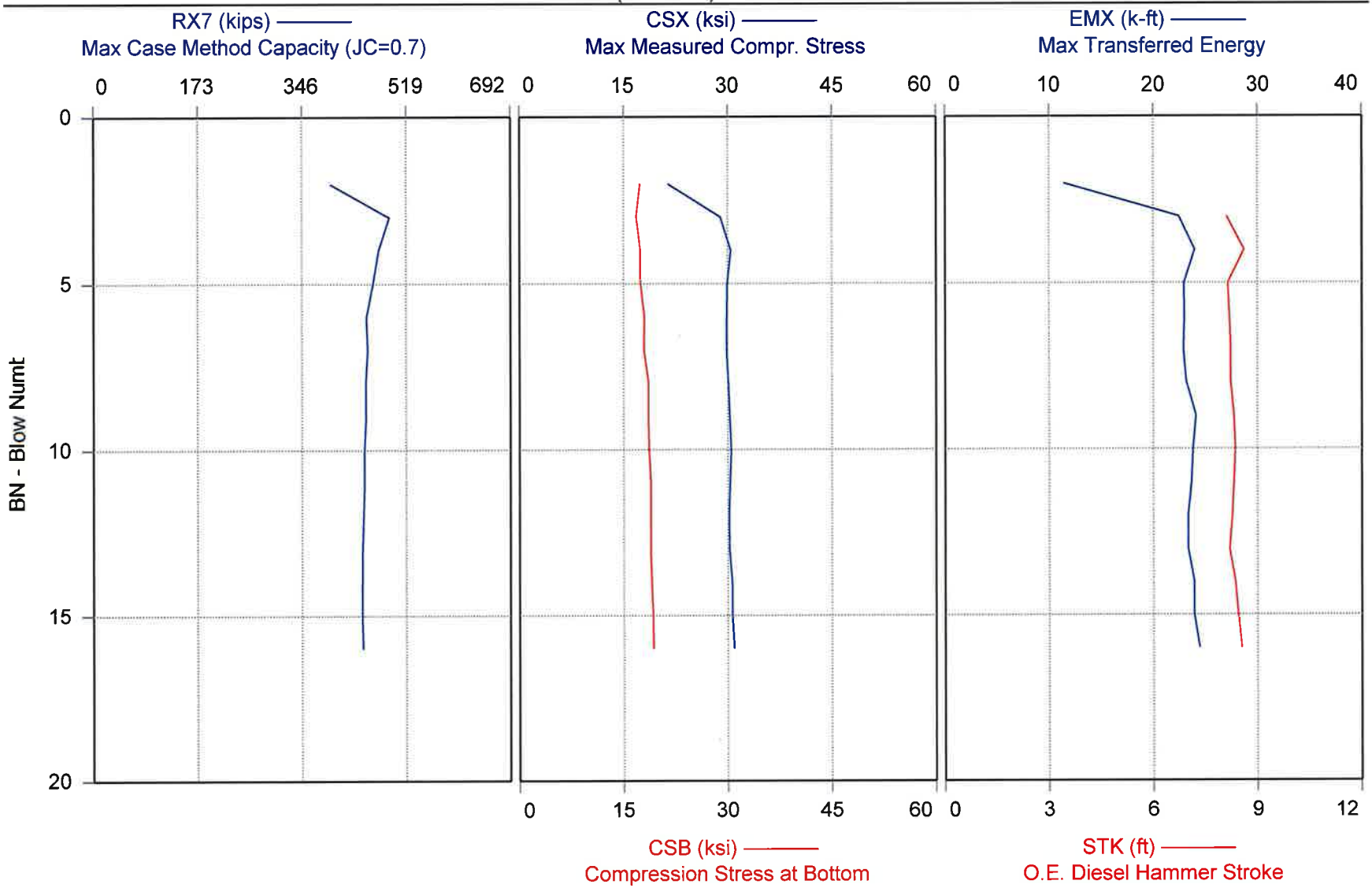
GZA GeoEnvironmental Inc. - PDIPLOT2 Ver 2016.1.56.2 - Case Method & iCAP® Results

Printed: 26-May-2016

Test started: 18-May-2016

WARDSBORO BRF 013-1(15) - ABUTMENT 1 PILE 4 (RS)

APE D19-42 (HP12x74)



WARDSBORO BRF 013-1(15) - ABUTMENT 1 PILE 4 (RS) APE D19-42 (HP12x74)
OP: MICHAEL DEERY Date: 18-May-2016

AR: 21.80 in² SP: 0.492 k/ft³
LE: 77.00 ft EM: 30,008 ksi
WS: 16,810.0 f/s JC: 0.70 []

RX7: Max Case Method Capacity (JC=0.7) STK: O.E. Diesel Hammer Stroke
CSX: Max Measured Compr. Stress FVP: Force/Velocity proportionality
CSB: Compression Stress at Bottom BTA: BETA Integrity Factor
EMX: Max Transferred Energy

BL#	RX7	CSX	CSB	EMX	STK	FVP	BTA
	kips	ksi	ksi	k-ft	ft	[]	(%)
2	393	21.4	17.4	11.4	0.0	0.99	100.0
3	491	29.0	16.9	22.4	8.1	1.00	100.0
4	473	30.5	17.4	24.0	8.6	0.99	100.0
5	464	29.9	17.5	22.9	8.1	1.01	100.0
6	453	29.9	18.0	23.0	8.2	1.00	100.0
7	455	29.8	17.9	22.9	8.2	1.00	100.0
8	452	30.1	18.6	23.1	8.2	0.99	100.0
9	452	30.3	18.5	24.1	8.3	1.00	100.0
10	449	30.5	18.6	23.8	8.4	1.00	100.0
11	450	30.3	18.9	23.6	8.3	1.00	100.0
12	448	30.2	18.9	23.3	8.3	1.00	100.0
13	446	30.2	18.9	23.3	8.2	0.99	100.0
14	446	30.6	19.0	23.9	8.4	0.99	100.0
15	446	30.6	19.2	23.9	8.4	1.01	100.0
16	447	30.9	19.3	24.4	8.5	1.00	100.0
Average	451	29.6	18.3	22.7	8.3	1.00	100.0

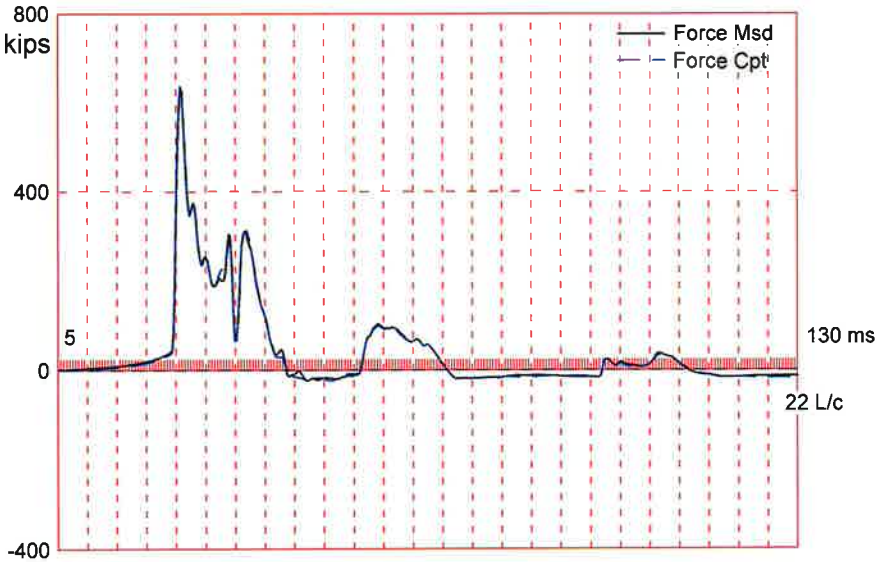
Total number of blows analyzed: 15

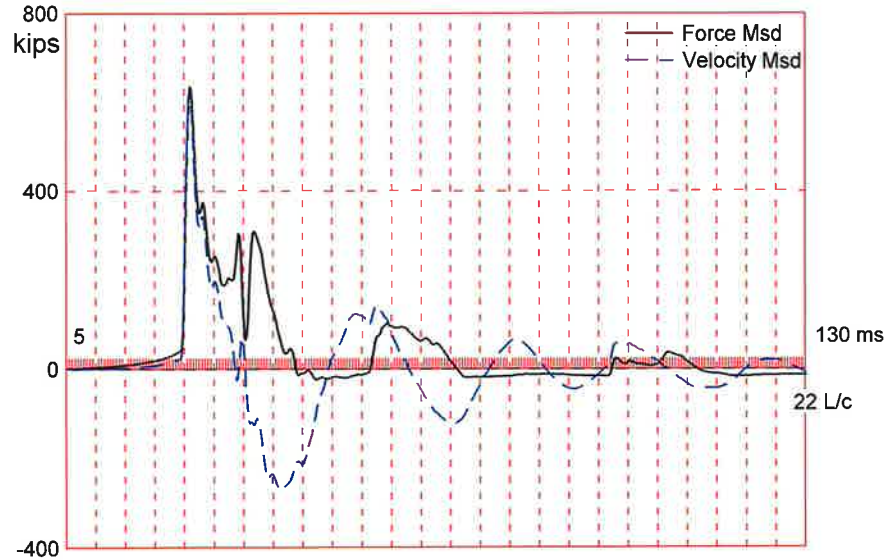
BL# Sensors

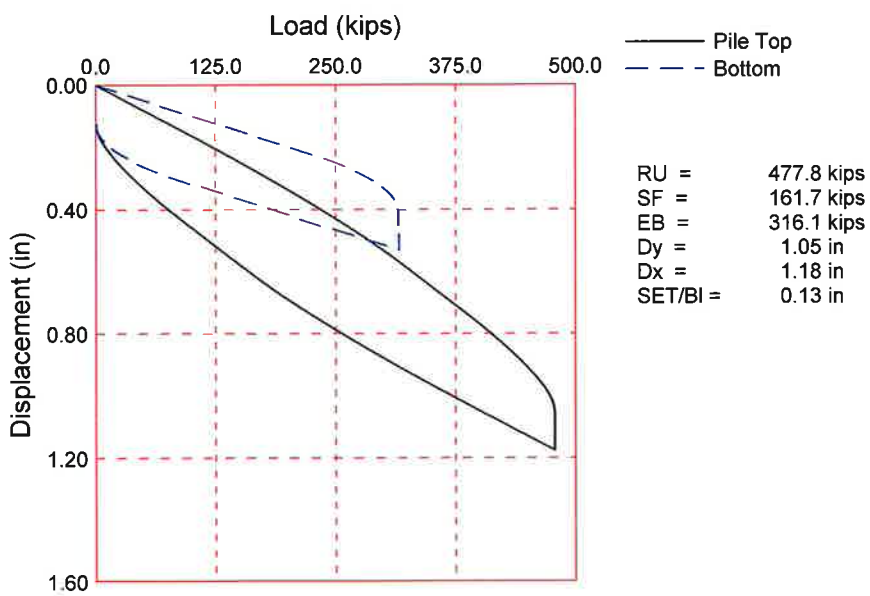
2-16 F3: [F740] 98.0 (1.00); F4: [I839] 93.9 (1.00); A3: [K2942] 355.0 (1.00); A4: [K2139] 318.0 (1.00)

Time Summary

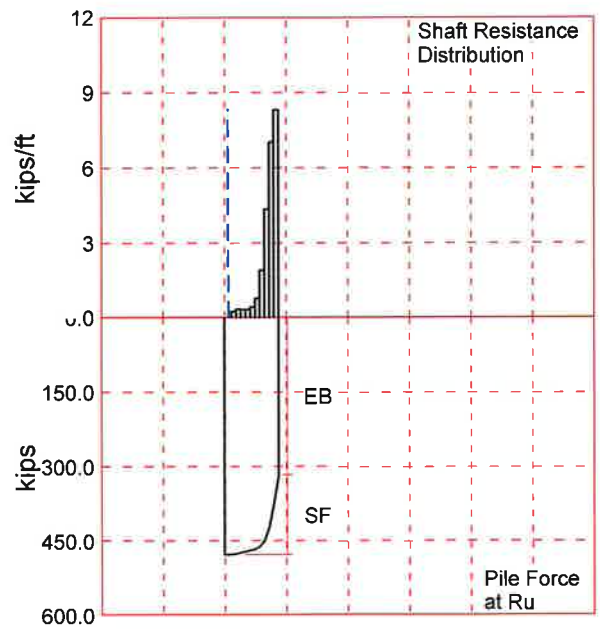
Drive 2 minutes 46 seconds 11:17 AM - 11:20 AM BN 1 - 18







RU =	477.8 kips
SF =	161.7 kips
EB =	316.1 kips
Dy =	1.05 in
Dx =	1.18 in
SET/BI =	0.13 in



Length b. Sensors	77.0 ft
Embedment	69.2 ft
Top Area	21.8 in^2
End Bearing Area	148.2 in^2
Top Perimeter	4.06 ft
Top E-Modulus	30000 ksi
Top Spec. Weight	492.0 lb/ft^3
Top Wave Spd.	16810 ft/s
Overall W.S.	16810 ft/s
Match Quality	1.09
Top Compr. Stress	29.2 ksi
Max Compr. Stress	30.2 ksi
Max Tension Stress	-6.45 ksi
Avg. Shaft Quake	0.13 in
Toe Quake	0.31 in
Avg. Shaft Smith Dpg.	0.23 s/ft
Toe Smith Damping	0.09 s/ft

CAPWAP(R) 2014-1 Licensed to GZA GeoEnvironmental Inc.

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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.

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CAPWAP SUMMARY RESULTS

Total CAPWAP Capacity: 477.8; along Shaft 161.7; at Toe 316.1 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
				477.8			
1	16.7	8.9	2.2	475.6	2.2	0.25	0.06
2	23.4	15.6	2.3	473.3	4.5	0.34	0.08
3	30.1	22.3	2.2	471.1	6.7	0.33	0.08
4	36.8	29.0	2.2	468.9	8.9	0.33	0.08
5	43.5	35.7	2.9	466.0	11.8	0.43	0.11
6	50.2	42.4	5.1	460.9	16.9	0.76	0.19
7	56.9	49.1	12.7	448.2	29.6	1.90	0.47
8	63.6	55.8	29.2	419.0	58.8	4.36	1.07
9	70.3	62.5	47.2	371.8	106.0	7.05	1.74
10	77.0	69.2	55.7	316.1	161.7	8.32	2.05
Avg. Shaft			16.2			2.34	0.58
Toe			316.1				307.21

Soil Model Parameters/Extensions		Shaft	Toe
Smith Damping Factor		0.23	0.09
Quake	(in)	0.13	0.31
Case Damping Factor		0.98	0.74
Damping Type		Viscous	Sm+Visc
Unloading Quake	(% of loading quake)	66	90
Reloading Level	(% of Ru)	100	100
Unloading Level	(% of Ru)	98	
Resistance Gap (included in Toe Quake)	(in)		0.12
Soil Plug Weight	(kips)		0.188

CAPWAP match quality = 1.09 (Wave Up Match) ; RSA = 0
Observed: Final Set = 0.13 in; Blow Count = 96 b/ft
Computed: Final Set = 0.16 in; Blow Count = 76 b/ft
Transducer F3(F740) CAL: 98.0; RF: 1.00; F4(I839) CAL: 93.9; RF: 1.00
A3(K2942) CAL: 355; RF: 1.00; A4(K2139) CAL: 318; RF: 1.00

max. Top Comp. Stress = 29.2 ksi (T= 26.1 ms, max= 1.034 x Top)
max. Comp. Stress = 30.2 ksi (Z= 63.6 ft, T= 29.9 ms)
max. Tens. Stress = -6.45 ksi (Z= 56.9 ft, T= 48.6 ms)
max. Energy (EMX) = 23.4 kip-ft; max. Measured Top Displ. (DMX)= 0.75 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	3.3	636.3	-29.5	29.2	-1.35	23.4	16.0	0.76
2	6.7	636.7	-40.6	29.2	-1.86	23.3	16.0	0.75
4	13.4	640.8	-55.6	29.4	-2.55	22.9	15.8	0.71
5	16.7	643.6	-65.1	29.5	-2.99	22.7	15.8	0.69
6	20.1	635.7	-73.3	29.2	-3.36	22.2	15.7	0.68
7	23.4	638.5	-83.5	29.3	-3.83	22.0	15.6	0.66
8	26.8	630.2	-89.1	28.9	-4.08	21.4	15.5	0.65
9	30.1	633.0	-96.9	29.0	-4.45	21.2	15.4	0.63
10	33.5	625.4	-102.3	28.7	-4.69	20.7	15.3	0.61
11	36.8	628.7	-112.8	28.8	-5.17	20.5	15.2	0.59
12	40.2	622.0	-118.2	28.5	-5.42	19.9	15.1	0.57
13	43.5	627.0	-126.2	28.8	-5.79	19.6	15.0	0.55
14	46.9	619.7	-129.0	28.4	-5.91	18.8	14.8	0.53
15	50.2	631.4	-135.2	29.0	-6.20	18.4	14.6	0.50
16	53.6	625.8	-134.7	28.7	-6.18	17.4	14.2	0.48
17	56.9	649.1	-140.7	29.8	-6.45	16.9	13.7	0.45
18	60.3	624.7	-130.8	28.6	-6.00	15.2	13.0	0.43
19	63.6	657.7	-135.8	30.2	-6.23	14.8	12.2	0.40
20	67.0	574.6	-106.5	26.3	-4.88	11.8	11.4	0.38
21	70.3	570.6	-109.2	26.2	-5.01	11.4	12.4	0.36
22	73.7	422.4	-65.0	19.4	-2.98	7.4	14.2	0.33
23	77.0	423.4	-68.4	19.4	-3.14	3.6	15.1	0.31
Absolute	63.6			30.2			(T =	29.9 ms)
	56.9				-6.45		(T =	48.6 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	649.2	587.8	526.3	464.8	403.4	341.9	280.4	219.0	157.5	96.0
RX	656.7	598.9	551.4	523.6	506.1	494.2	482.3	470.9	459.5	448.2
RU	657.0	596.3	535.6	474.9	414.3	353.6	292.9	232.2	171.5	110.8

RAU = 427.1 (kips); RA2 = 455.0 (kips)

Current CAPWAP Ru = 477.8 (kips); Corresponding J(RP)= 0.28; J(RX) = 0.64

VMX ft/s	TVP ms	VT1*Z kips	FT1 kips	FMX kips	DMX in	DFN in	SET in	EMX kip-ft	QUS kips	KEB kips/in
16.1	25.89	624.8	639.1	639.1	0.75	0.13	0.13	23.6	644.1	1607

PILE PROFILE AND PILE MODEL

Depth ft	Area in^2	E-Modulus ksi	Spec. Weight lb/ft^3	Perim. ft
0.0	21.8	29999.9	492.000	4.06
77.0	21.8	29999.9	492.000	4.06

Toe Area 148.2 in^2

Top Segment Length 3.35 ft, Top Impedance 39 kips/ft/s

Wave Speed: Pile Top 16810.0, Elastic 16810.0, Overall 16810.0 ft/s
Pile Damping 1.00 %, Time Incr 0.199 ms, 2L/c 9.2 ms
Total volume: 11.657 ft^3; Volume ratio considering added impedance: 1.000

SAXIMETER BLOW COUNT/STROKE PILE DRIVING RECORD

Pile # 4 Time: Start/stop _____ Date: 5/13/16

Project _____ Location Abut #1

Pile Type/size H 12x 74 Length 2@40' Batter N/A

Elevation: Ground: 1407 Pile Tip _____ Cutoff:

Hammer Type/Size APE Fuel Setting: 3

Cap/Helmet/Cushion

Contractor Renard

Heat # 60113079

start fuel #3

Depth ft	Blow/ft ft	H BPM	Depth ft	Blow/ft ft	H BPM	Depth ft	Blow/ft ft	H BPM	Depth ft	Blow/ft ft	H BPM
0-1			25-26	20	6.59	50-51	33	6.55	75-76 10	15	7.93
1-2			26-27	23	6.67	51-52	40	6.39	76-77 11	15	8.12
2-3			27-28	26	6.63	52-53	41	6.48	77-78 67'	23	8.22
3-4			28-29	25	6.81	53-54	43	6.57	78-79 1	17	8.25
4-5			29-30	27	6.72	54-55	45	6.68	79-80 2	16	8.01
5-6			30-31	34	6.70	55-56	51	6.52	80-81 3	14	8.32
6-7			31-32	37	6.48	56-57	55	6.69	81-82 4	15	7.84
7-8			32-33	37	6.66	57-58	56	6.67	82-83 5	18	7.79
8-9			33-34	39	6.64	58-59	70	6.75	83-84 6	18	8.24
9-10			34-35	43	6.63	59-60	78	6.91	84-85 7	14	8.43
10-11			35-36	43	6.52	60-61	74	7.05	85-86 8	15	8.28
11-12			36-37	43	6.73	61-62	82	6.97	86-87 9	18	8.24
12-13			37-38	10	5.87	62-63	79	7.18	87-88 10	16	8.17
13-14			38-39	18	6.40	63-64	84	7.25	88-89 11	25	8.28
14-15			39-40	27	5.50	64-65	88	7.83	89-90 68	16	8.21
15-16			40-41	20	6.48	65-66	124	8.28	90-91 1	15	8.90
16-17			41-42	22	6.45	66-67 1	14	8.25	91-92 2	16	8.48
17-18			42-43	24	6.69	67-68 2	8	8.37	92-93 3	19	7.60
18-19	VIBRO		43-44	30	6.72	68-69 3	16	8.21	93-94 4	14	8.03
19-20			44-45	33	6.86	69-70 4	15	8.33	94-95 5	17	8.22
20-21			45-46	34	6.82	70-71 5	15	8.38	95-96 6	16	8.27
21-22	14	6.34	46-47	37	6.76	71-72 6	17	8.37	96-97 7	16	8.27
22-23	18	6.38	47-48	43	6.42	72-73 7	15	8.39	97-98 8	17	8.52
23-24	20	6.52	48-49	53	6.10	73-74 8	16	8.05	98-99 9	16	8.25
24-25	20	6.42	49-50	54	6.10	74-75 9	19	8.41	99-100 10	16	8.55

69'
20 8.52
20 8.66
16 8.56

Remarks	Depth	Min	Interruption Reason

blow/inch

Test Pile 6" @ 16 w/ 8.3 stroke

or

3" @ 20 w/ 8.3 stroke