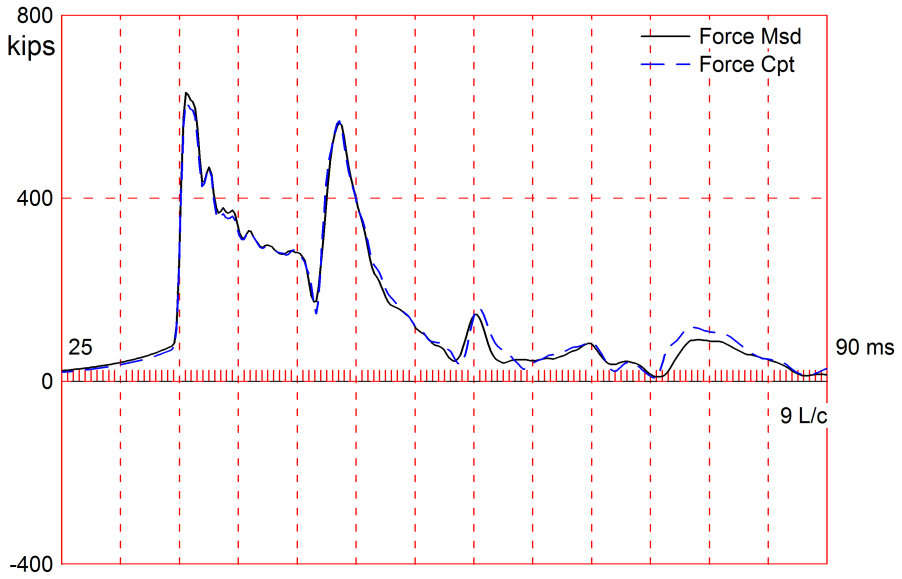
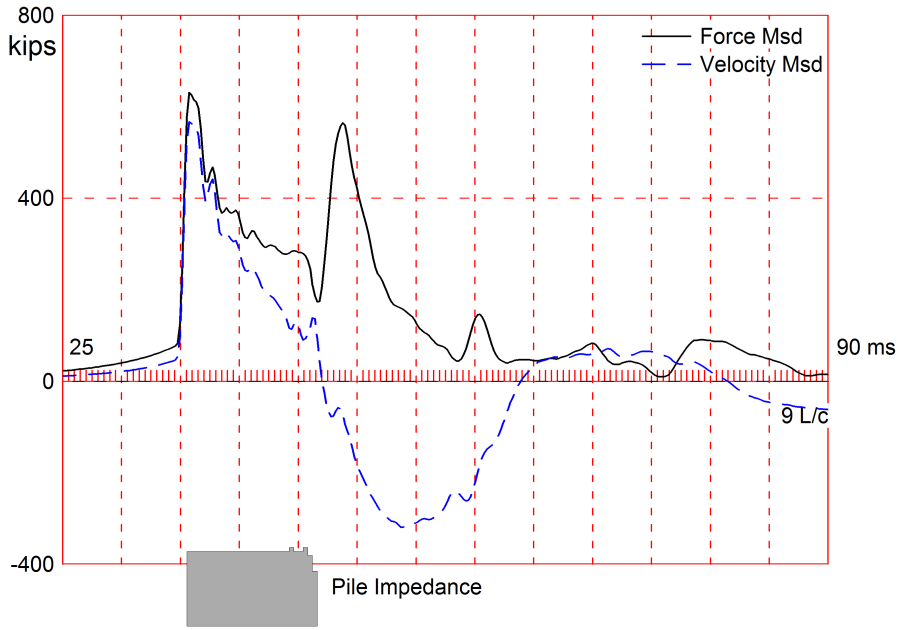
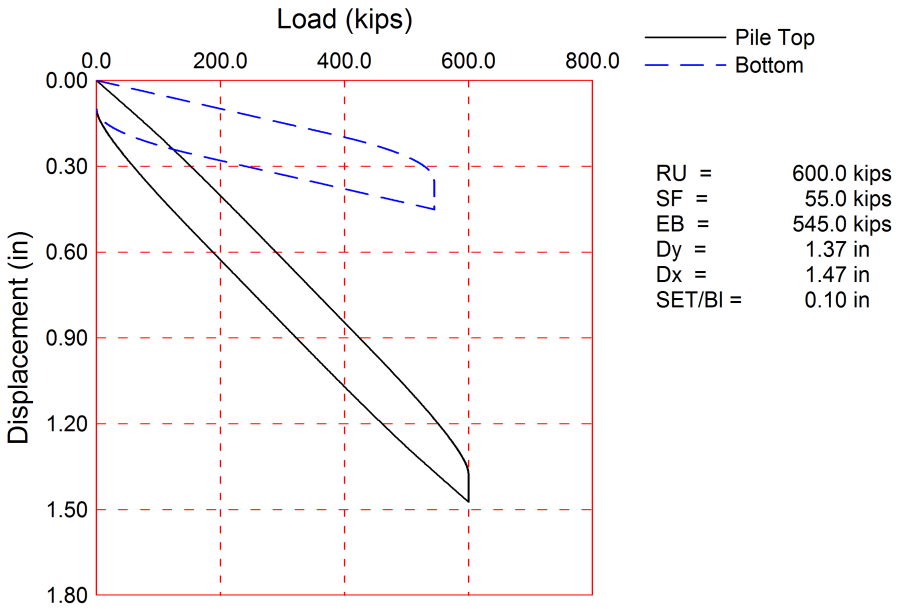
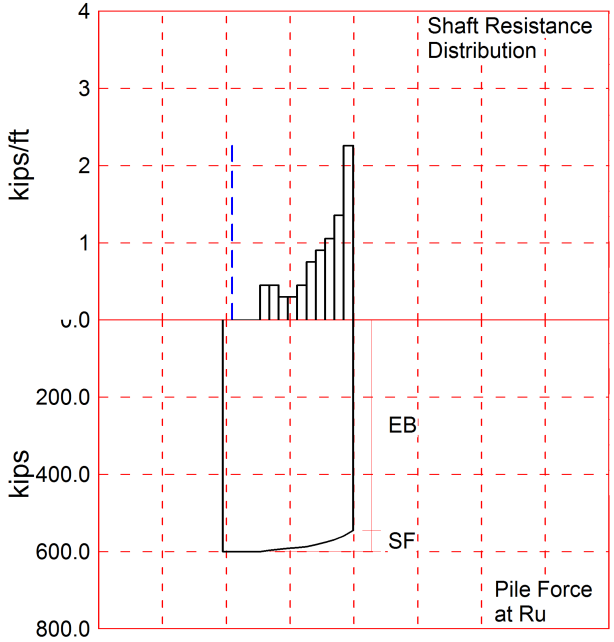






RU =	600.0 kips
SF =	55.0 kips
EB =	545.0 kips
Dy =	1.37 in
Dx =	1.47 in
SET/Bl =	0.10 in



Length b. Sensors	92.9 ft
Embedment	83.6 ft
Top Area	21.4 in^2
End Bearing Area	198.5 in^2
Top Perimeter	4.70 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	3.90
Top Compr. Stress	28.4 ksi
Max Compr. Stress	32.3 ksi
Max Tension Stress	-4.60 ksi
Avg. Shaft Quake	0.10 in
Toe Quake	0.27 in
Avg. Shaft Smith Dpg.	0.30 s/ft
Toe Smith Damping	0.10 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: 600.0; along Shaft 55.0; at Toe 545.0 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	Quake in
				600.0					
1	13.3	3.9	0.0	600.0	0.0	0.00	0.00	0.00	0.10
2	19.9	10.6	0.0	600.0	0.0	0.00	0.00	0.00	0.10
3	26.5	17.2	0.0	600.0	0.0	0.00	0.00	0.00	0.10
4	33.2	23.8	3.0	597.0	3.0	0.45	0.10	0.30	0.10
5	39.8	30.5	3.0	594.0	6.0	0.45	0.10	0.30	0.10
6	46.5	37.1	2.0	592.0	8.0	0.30	0.06	0.30	0.10
7	53.1	43.7	2.0	590.0	10.0	0.30	0.06	0.30	0.10
8	59.7	50.4	3.0	587.0	13.0	0.45	0.10	0.30	0.10
9	66.4	57.0	5.0	582.0	18.0	0.75	0.16	0.30	0.10
10	73.0	63.6	6.0	576.0	24.0	0.90	0.19	0.30	0.10
11	79.6	70.3	7.0	569.0	31.0	1.05	0.22	0.30	0.10
12	86.3	76.9	9.0	560.0	40.0	1.36	0.29	0.30	0.10
13	92.9	83.6	15.0	545.0	55.0	2.26	0.48	0.30	0.10
Avg. Shaft			4.2			0.66	0.14	0.30	0.10
Toe			545.0				395.36	0.10	0.27

Soil Model Parameters/Extensions		Shaft	Toe
Case Damping Factor		0.43	1.43
Damping Type		Viscous	Smith
Unloading Quake	(% of loading quake)	94	44
Reloading Level	(% of Ru)	100	100
Unloading Level	(% of Ru)	93	
Resistance Gap (included in Toe Quake)	(in)		0.05
Soil Plug Weight	(kips)		0.142

CAPWAP match quality = 3.90 (Wave Up Match) ; RSA = 0
Observed: Final Set = 0.10 in; Blow Count = 120 b/ft
Computed: Final Set = 0.05 in; Blow Count = 252 b/ft
Transducer F3(F607) CAL: 93.6; RF: 0.97; F4(D815) CAL: 93.0; RF: 0.97
A3(K2524) CAL: 360; RF: 1.13; A4(K3550) CAL: 360; RF: 1.10

max. Top Comp. Stress = 28.4 ksi (T= 35.9 ms, max= 1.137 x Top)
max. Comp. Stress = 32.3 ksi (Z= 92.9 ft, T= 42.1 ms)
max. Tens. Stress = -4.60 ksi (Z= 46.5 ft, T= 61.8 ms)
max. Energy (EMX) = 34.4 kip-ft; max. Measured Top Displ. (DMX)= 1.10 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	608.3	-27.1	28.4	-1.27	34.4	15.4	1.14
2	6.6	608.3	-29.0	28.4	-1.35	34.2	15.4	1.12
4	13.3	608.3	-32.7	28.4	-1.53	33.6	15.4	1.08
6	19.9	608.3	-39.2	28.4	-1.83	32.8	15.3	1.03
8	26.5	609.8	-40.6	28.5	-1.90	31.9	15.2	0.98
10	33.2	616.8	-44.5	28.8	-2.08	31.0	15.0	0.93
12	39.8	613.6	-80.5	28.7	-3.76	29.1	14.7	0.87
14	46.5	606.8	-98.5	28.3	-4.60	27.1	14.4	0.81
15	49.8	600.6	-95.3	28.1	-4.45	26.0	14.3	0.78
16	53.1	604.6	-92.0	28.2	-4.30	25.3	14.2	0.75
17	56.4	599.5	-86.1	28.0	-4.02	24.0	14.0	0.71
18	59.7	604.5	-89.7	28.2	-4.19	23.3	13.9	0.68
19	63.1	598.5	-88.3	28.0	-4.12	21.9	13.7	0.64
20	66.4	607.6	-87.8	28.4	-4.10	21.0	13.5	0.61
21	69.7	603.9	-77.5	28.2	-3.62	19.3	13.1	0.57
22	73.0	626.4	-73.1	29.3	-3.41	18.3	13.1	0.53
23	76.3	636.2	-61.7	29.7	-2.88	16.4	12.8	0.50
24	79.6	633.0	-59.9	29.6	-2.80	15.5	12.7	0.46
25	83.0	665.0	-45.0	31.1	-2.10	13.7	13.3	0.42
26	86.3	673.8	-45.4	31.5	-2.12	12.8	13.8	0.39
27	89.6	680.6	-30.3	31.8	-1.41	10.9	14.1	0.35
28	92.9	691.8	-28.4	32.3	-1.33	9.6	13.4	0.30
Absolute	92.9			32.3			(T =	42.1 ms)
	46.5				-4.60		(T =	61.8 ms)

CASE METHOD

J =	0.0	0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8
RP	673.2	565.3	457.4	349.5	241.6					
RX	800.7	756.1	730.9	705.7	680.5	655.4	635.4	617.5	599.6	587.3
RU	673.2	565.3	457.4	349.5	241.6					

RAU = 460.7 (kips); RA2 = 679.3 (kips)

Current CAPWAP Ru = 600.0 (kips); Corresponding J(RP)= 0.14; J(RX) = 1.60

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
15.0	35.74	571.2	641.5	641.5	1.10	0.10	0.10	34.5	688.9	2477

Possible Pile Damage at 0.9 L Below Gages?

PILE PROFILE AND PILE MODEL

Depth ft	Area in^2	E-Modulus ksi	Spec. Weight lb/ft^3	Perim. ft
0.0	21.4	29992.2	492.000	4.70
92.9	21.4	29992.2	492.000	4.70

Toe Area 198.5 in^2

Segmnt Number	Dist. B.G. ft	Impedance kips/ft/s	Imped. Change %	Tension Slack in	Tension Eff.	Compression Slack in	Compression Eff.	Perim. ft	Wave Speed ft/s
1	3.3	38.20	0.00	0.00	0.000	-0.00	0.000	4.70	16807.9
23	76.3	40.20	5.24	0.00	0.000	-0.00	0.000	4.70	16807.9
24	79.6	38.20	0.00	0.00	0.000	-0.00	0.000	4.70	16807.9
26	86.3	40.20	5.24	0.00	0.000	-0.00	0.000	4.70	16807.9
27	89.6	36.20	-5.24	0.00	0.000	-0.00	0.000	4.70	16807.9
28	92.9	28.20	-26.18	0.00	0.000	-0.00	0.000	4.70	16807.9

Wave Speed: Pile Top 16807.9, Elastic 16807.9, Overall 16807.9 ft/s
Pile Damping 1.00 %, Time Incr 0.197 ms, 2L/c 11.1 ms
Total volume: 13.705 ft^3; Volume ratio considering added impedance: 0.993