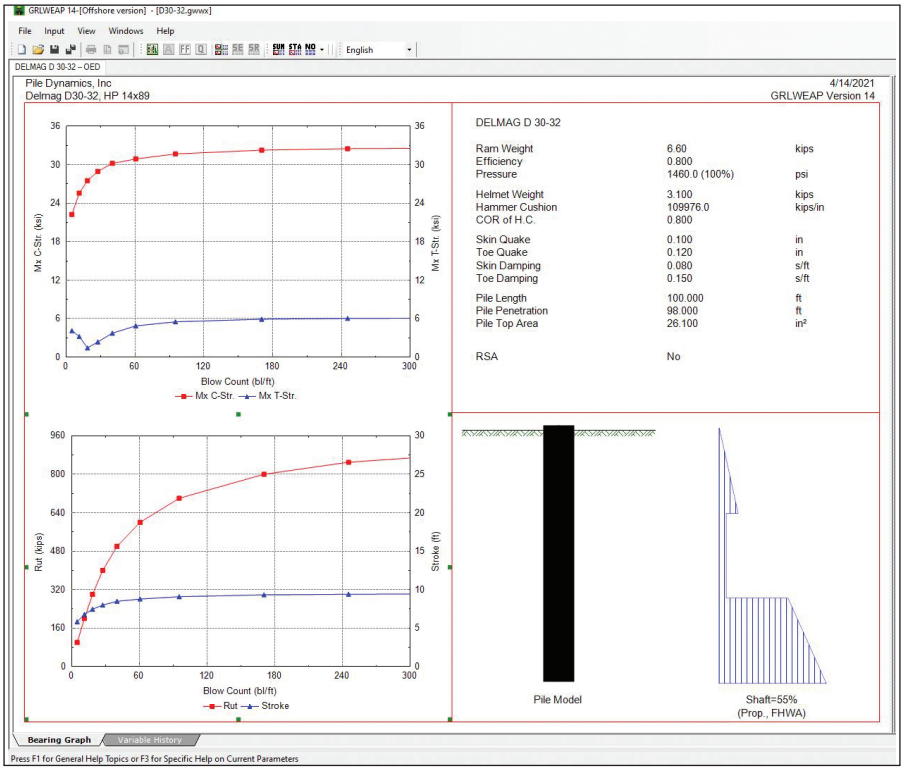
GRL Wave Equation Analysis (GRLWEAP14)

GRLWEAP14 Wave Equation Analysis is a one-dimensional software program that models the pile driving process. The program simulates the motions and forces in a pile foundation as it is installed with either an impact or vibratory hammer. It can be used to perform a bearing graph analysis (blow count and stresses versus capacity for multiple capacities), an inspector's chart analysis (blow count and stresses versus stroke for a single capacity), or a driveability analysis (blow count and stresses for a calculated capacity at a given penetration depth or multiple penetration depths).



GRLWEAP14 Bearing Graph Output

Benefits of Wave Equation Analysis

- Assists in selection of appropriate pile driving equipment and pile installation procedures
- Computes the blow count vs capacity and blow count vs driving stress relationships for a given hammer-pile-soil system
- Predicts driving stress levels which can be used to reduce the risk of pile damage
- Predicts hammer performance which can be used to optimize hammer selection and driving time
- Models both onshore and offshore pile installations

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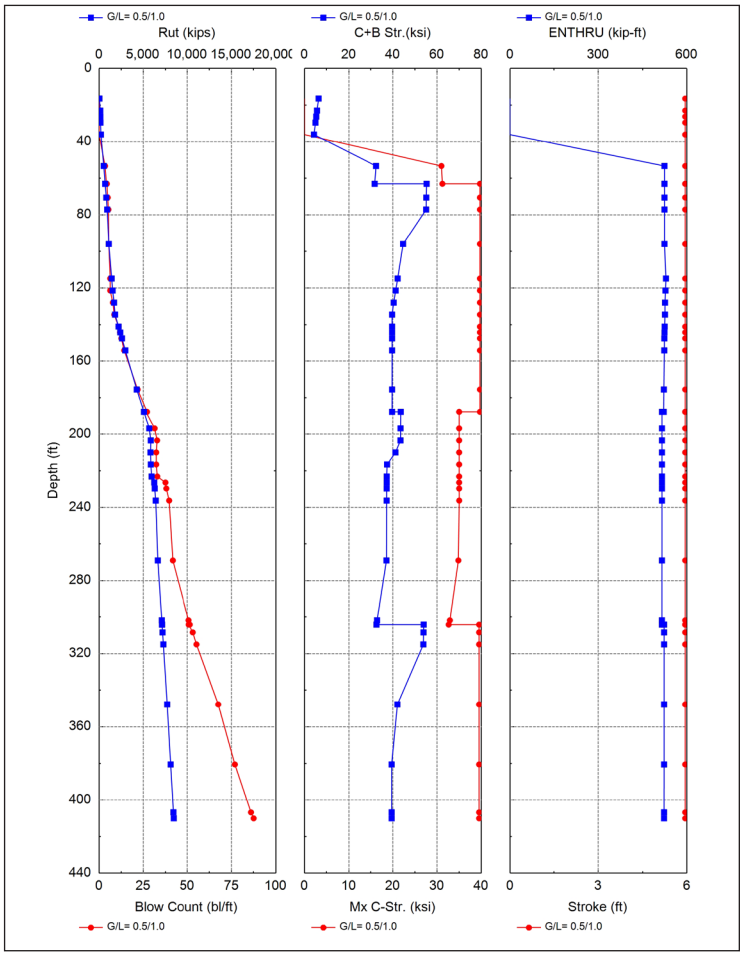
Analysis Procedure

The GRL engineer assembles the project information necessary to perform a wave equation analysis, including details on the proposed pile hammer as well as the hammer cushion, helmet, and for a concrete pile, the pile cushion. The engineer also obtains the pertinent project details including pile type, pile length, required ultimate capacity, specified driving stress limits, and geotechnical information. Details on any special pile installation procedures such as predrilling or jetting, if proposed, are also gathered, to determine their influence on the soil modeling. Appropriate wave equation input parameters for the hammer, pile, and soil models are then selected based on this information and input into the GRLWEAP14 program. Depending upon the project needs or requirements, a wave equation bearing graph, inspectors chart, or driveability analysis is performed. The GRL engineer prepares a final report summarizing the wave equation analyses performed, the analysis results, and applicable pile installation recommendations.

For additional information on Wave Equation Analysis or any other GRL Engineers service please contact info@GRLengineers.com or visit us at www.GRLengineers.com.



GRLWEAP14 Driveability Analysis Graphical Results

Driveability Analysis Summary

Gain/Loss Factor at Shaft/Toe = 0.500/1.000

Depth	Rut	Rshaft	Rtoe	Blow Ct	Mx C-Str.	C+B Str.	Stroke	ENTHRU	Hammer
ft	kips	kips	kips	bl/ft	ksi	ksi	ft	kip-ft	-
16.4	45.7	41.1	4.6	0.0	0.000	6.357	5.95	0.0	MHU 800S
23.0	136.7	55.8	80.9	0.0	0.000	5.630	5.95	0.0	MHU 800S
26.2	147.9	67.0	80.9	0.0	0.000	5.275	5.95	0.0	MHU 800S
29.5	161.9	81.0	80.9	0.0	0.000	4.926	5.95	0.0	MHU 800S
36.1	210.9	165.4	45.5	0.0	0.000	4.244	5.95	0.0	MHU 800S
53.3	532.5	487.0	45.5	3.4	30.988	32.433	5.95	524.3	MHU 800S
63.0	691.1	645.6	45.5	4.2	31.207	31.827	5.95	524.2	MHU 800S
63.0	691.1	645.6	45.5	4.4	39.691	55.298	5.95	524.3	MHU 800S
70.5	821.2	775.6	45.5	4.9	39.691	55.153	5.95	524.3	MHU 800S
77.1	922.6	841.7	80.9	5.3	39.691	55.083	5.95	524.3	MHU 800S
96.0	1101.6	1020.7	80.9	5.5	39.691	44.666	5.95	524.3	MHU 800S
114.8	1427.0	1346.1	80.9	6.3	39.691	42.213	5.95	529.3	MHU 800S
121.4	1533.7	1479.1	54.6	6.3	39.691	41.296	5.95	527.7	MHU 800S
128.0	1694.6	1640.0	54.6	7.8	39.691	40.409	5.95	526.2	MHU 800S
134.5	1810.1	1755.5	54.6	8.6	39.691	39.691	5.95	526.0	MHU 800S
141.1	2204.0	1900.6	303.4	11.0	39.691	39.691	5.95	524.9	MHU 800S
144.4	2398.2	2094.8	303.4	11.8	39.691	39.691	5.95	524.4	MHU 800S
147.6	2595.0	2291.6	303.4	12.6	39.691	39.691	5.95	523.8	MHU 800S
154.2	2968.8	2665.4	303.4	14.2	39.691	39.691	5.95	523.6	MHU 800S
175.5	4257.8	3954.4	303.4	21.8	39.691	39.691	5.95	522.3	MHU 800S
187.7	5071.7	4768.3	303.4	27.1	39.691	39.691	5.95	521.6	MHU 800S
187.7	5071.7	4768.3	303.4	26.5	34.998	43.600	5.95	515.9	MHU 800S
196.9	5674.4	5371.0	303.4	31.4	34.998	43.516	5.95	515.9	MHU 800S
203.4	5845.1	5788.2	56.9	32.8	34.998	43.475	5.95	515.9	MHU 800S
210.0	5814.4	5757.5	56.9	32.3	34.998	41.224	5.95	515.9	MHU 800S
216.5	5847.2	5790.3	56.9	32.3	34.998	37.437	5.95	515.9	MHU 800S
223.1	5939.2	5882.3	56.9	32.9	34.998	37.263	5.95	515.9	MHU 800S
226.4	6236.5	5933.1	303.4	37.5	34.998	37.253	5.95	515.9	MHU 800S
229.7	6287.4	5984.0	303.4	38.0	34.999	37.243	5.95	515.9	MHU 800S
236.2	6402.7	6099.3	303.4	39.6	35.010	37.224	5.95	515.9	MHU 800S
269.0	6642.0	6582.9	59.2	41.7	34.823	37.153	5.95	515.8	MHU 800S
301.8	7087.6	7028.4	59.2	50.7	32.899	32.899	5.95	515.7	MHU 800S
304.2	7116.6	7057.5	59.2	51.4	32.630	32.630	5.95	515.6	MHU 800S
304.2	7117.8	7058.6	59.2	50.8	39.499	53.975	5.95	522.9	MHU 800S

GRLWEAP14 Driveability Analysis Numerical Results

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