

Pile and Soil Model

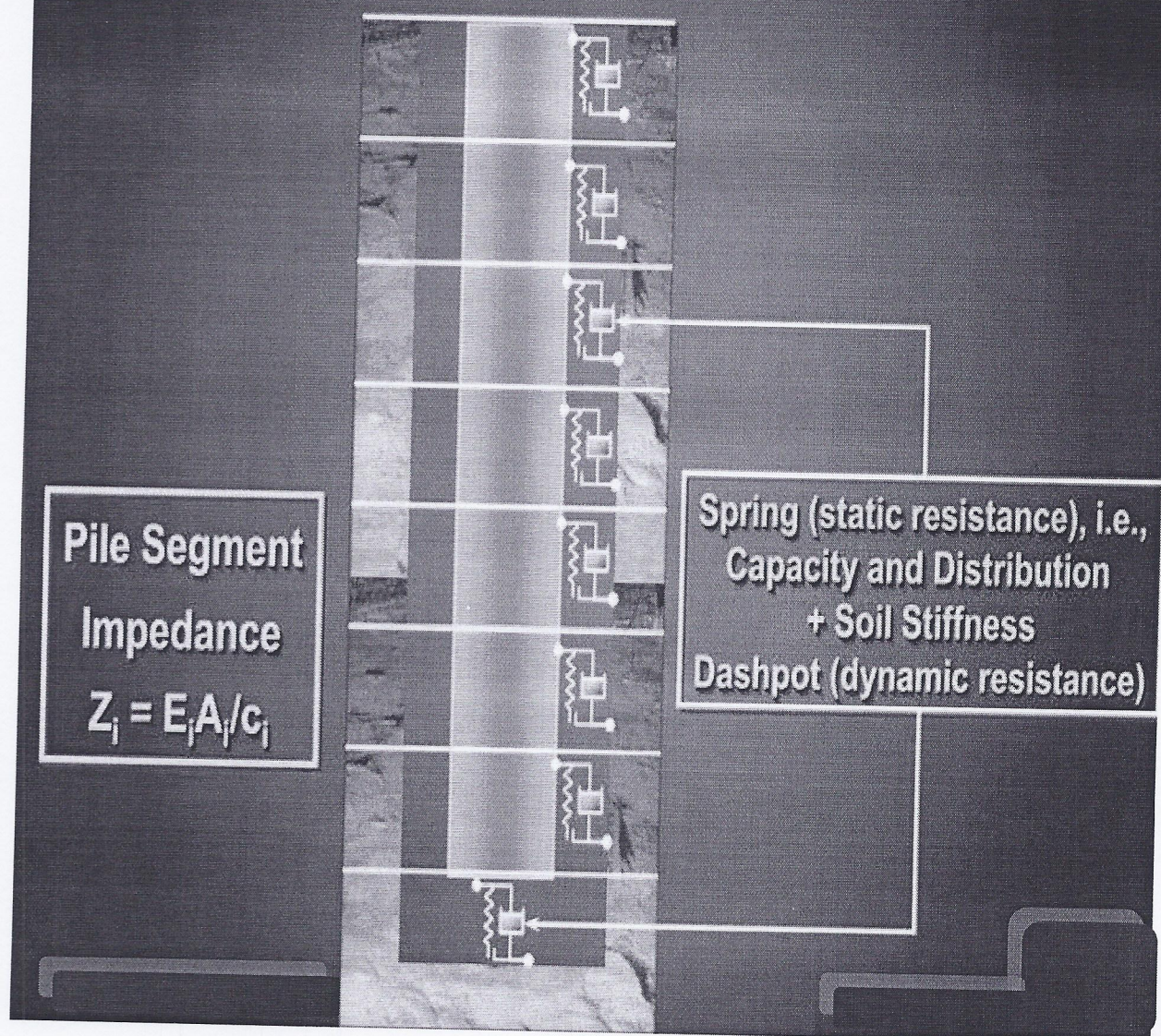


FIGURE -3 Pile and Soil Model

مكتب الابراج الاستشاري لفحص الركائز



PILE QUALITY ASSURANCE

JOB REF DLT-2014-KUH01	DATE November 30,2014
PROJECT NAME KURBALA UNIVERSITY HOSPITAL	
PROJECT LOCATION KARADAT Maryam, KARKH, BAGHDAD	
REPORT FOR DYNAMIC LOAD TEST	

APPENDIX - "B"

EQUIPMENT CERTIFICATE

Email: abraj.piletesting@gmail.com
Mobile: 07822277666

Certificate of Calibration

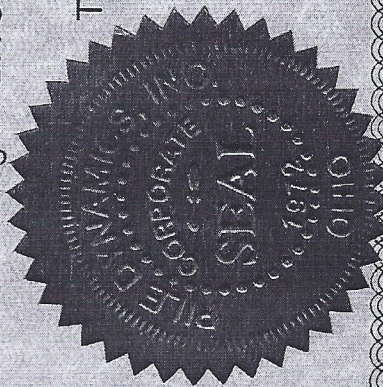
Pile Dynamics, Inc. certifies that the

Pile Driving Analyzer®, Model PAX

Serial Number: 4308 LA

was calibrated on 12 June 2013
using a PDA Calibration Box whose output was calibrated with test equipment
traceable to NIST.

This certificate is valid for 2 years from above date.



Tested by: *Robert J. ...*



Pile Dynamics, Inc.
30725 Aurora Road
Cleveland, Ohio 44139 USA



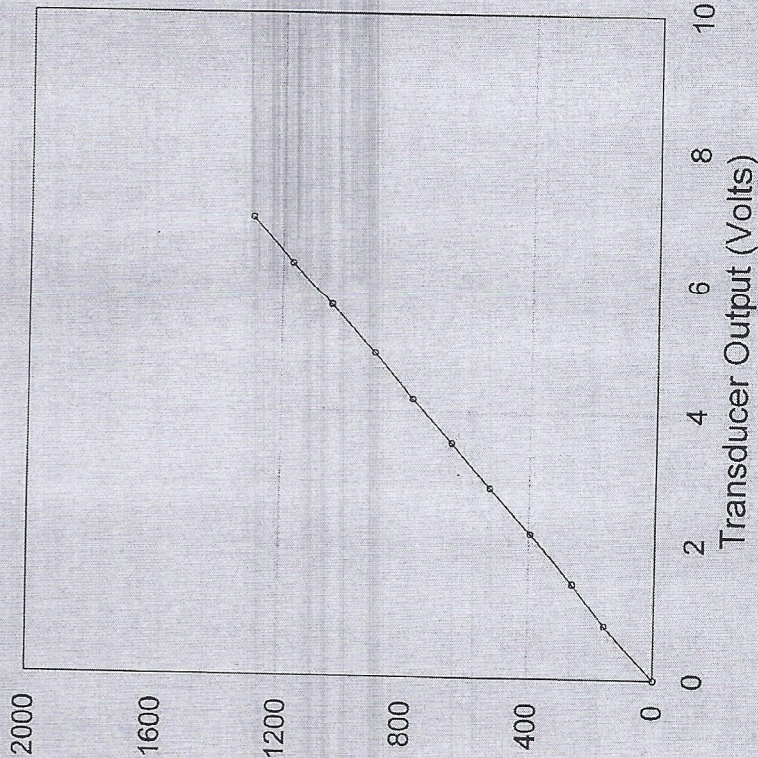
Pile Dynamics, Inc.

Pile Dynamics, Inc.

Transducer

J196

Strain ($\mu\epsilon$)



PDA Cal Factor (5.0 V) 92.5 $\mu\epsilon/V$

Applied Strain ($\mu\epsilon$)	Transducer Output (Volts)
0	0.00
158	0.79
261	1.40
396	2.14
524	2.83
650	3.52
776	4.20
899	4.88
1040	5.61
1167	6.28
1298	6.98

Shunt (60.4 K Ω) 2.5 V
General Factor 321.3 $\mu\epsilon/mV/V$

Traceable to N.I.S.T.

Strain Transducer Calibrator System 2011 Version 1.5

Calibrated by: Jenny Pucsek
Calibrated on: 04-Jun-2013

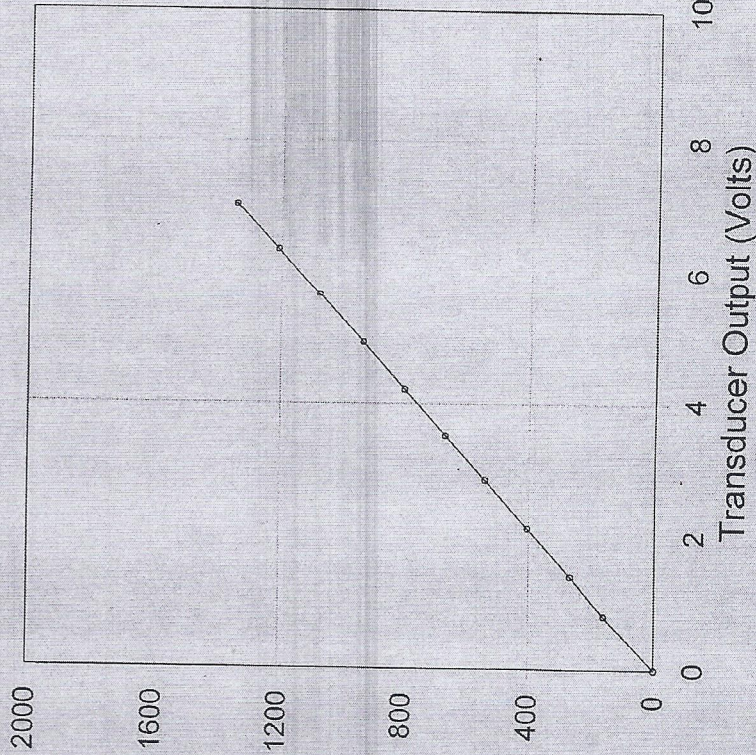
Smart Sensor? ☒ Yes ☐ No Smart Chip ☐ Programmed by: JP Date: 6-4-13 CRC value 302



Pile Dynamics, Inc.

Transducer J198

Strain ($\mu\epsilon$)



PDA Cal Factor (5.0 V) 95.4 $\mu\epsilon$ /V

Applied Strain ($\mu\epsilon$)	Transducer Output (Volts)
0	0.00
162	0.81
267	1.40
403	2.12
540	2.84
667	3.51
801	4.22
934	4.91
1076	5.64
1211	6.34
1348	7.03

Shunt (60.4 K Ω) 2.5 V
General Factor 331.2 $\mu\epsilon$ /mV/V

Traceable to N.I.S.T.

Strain Transducer Calibrator System 2011 Version 1.5

Calibrated by: Jenny Ryschke
Calibrated on: 04 Jun-2013

Smart Sensor? ☒ Yes ☐ No Smart Chip ☐ Programmed by: JP Date: 04-13 CRC value E352

QBTA: ON [ALT-F1/BB=60]

Pile Dynamics, Inc.

DPF

Pile Dynamics 20-May-13 14:41		FS —	BN 125	PJ: sn	TG F2 -- US
		10	SL 54/ 3440/ 99	PN: HOPBAR	A2 F2 3.3
LE 39.6 ft					
AR 1.7 in2					
EM 30000 Ksi					
SP 0.492 K/ft3					
WS 16810 ft/s					
WC 16862 ft/s					
JC 0.40					
FM 1.00					
UM 1.00					
EA/C 30.3 Ks/ft					
UN KIPS±0.1					
FR 20000 MB 30					
DL -28					
UT -1					
PK 1 TM-PEAK					
F1 500		TS 12	B	PD: 44022-075	LP 0.00 ft
F2 213		TB 8.0	T1 9.5	2L/C 4.7 UA 1000	UE 1022 LI 1.0
A1 999					
A2 1145					

ACCEPT SQ-OFF FL-OFF PR-OFF



contact Pile Dynamics USA
with your questions
tel USA - 216 - 831- 6131
fax USA - 216 - 831- 0916

VMX= 4.1 FMX= 64 AMX= 149
EMX= 0.3 MEX= 125 FVP= 1.00

ACCELEROMETER CALIBRATION

N.I.S.T. Traceable

SERIAL NUMBER: 44022

CALIBRATION FACTOR: 1145 G/v

PAK (*5000):

DATE: 20-MAY-13

PDA OPERATOR:

<-AT:PIEZORESISTIVE

OP: alex [ver:4.05]

AT:PIEZOELECTRIC->

QBTA: ON [ALT-F1/BB=60]

File Dynamics, Inc.

DPF

File Dynamics 21-May-13 07:12	FS — 10	BN 133 SL 58/ 3440/ 2	PJ: sn PN: HOPBAR	TG F2 -- US A2 F2 3.3
LE 39.6 ft AR 1.7 in2 EM 30000 Ksi SP 0.492 K/ft3 WS 16810 ft/s WC 16862 ft/s				
JC 0.40 FM 1.00 UM 1.00				
EA/C 30.3 Ks/ft UN KIPS*0.1 FR 20000 MB 30				
DL -33 UT -1 PK 1 TM-PEAK				
F1 500 F2 213 A1 999 A2 1145				
TS 12 TB 8.0	B PD: 44020-075 T1 9.4 2L/C 4.7	VA 1000	VE 1022	LP 0.00 ft LI 1.0

ACCEPT SQ-OFF FL-OFF PR-OFF

VMX= 3.9 FMX= 61 AMX= 139
EMX= 0.2 MEX= 119 FVP= 1.00



contact File Dynamics USA
with your questions
tel USA - 216 - 831- 6131
fax USA - 216 - 831- 0916

ACCELEROMETER CALIBRATION

N.I.S.T. Traceable

SERIAL NUMBER: 44020

CALIBRATION FACTOR: 1145 g/v

RAK (*5000): DATE: 21-MAY-13

PDA OPERATOR: *[Signature]*

<-AT:PIEZORESISTIVE

OP: alex [ver:4.05]

AT:PIEZOELECTRIC->

مكتب الابراج الاستشاري لفحص الركائز



PILE QUALITY ASSURANCE

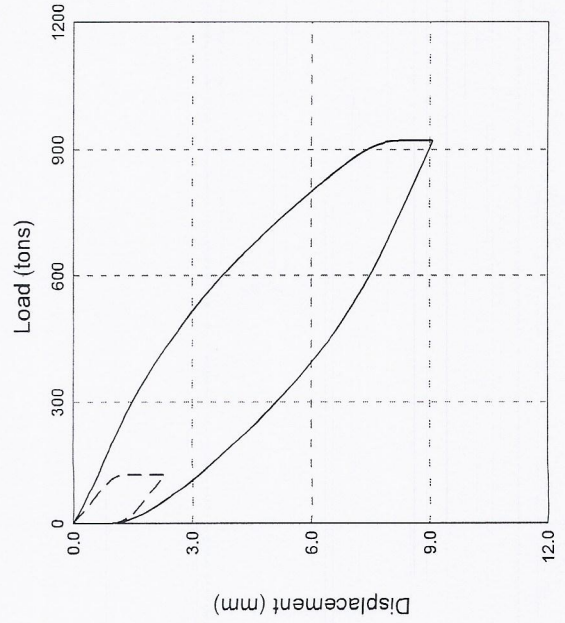
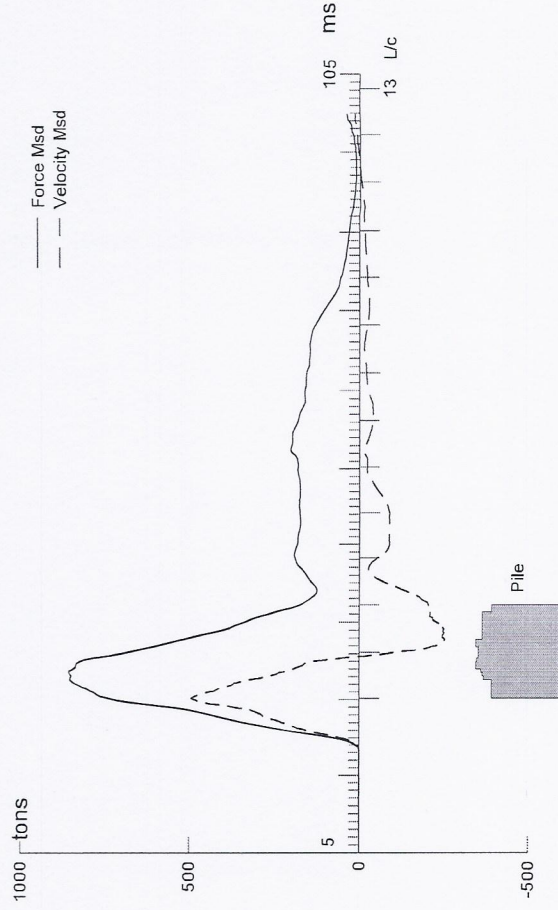
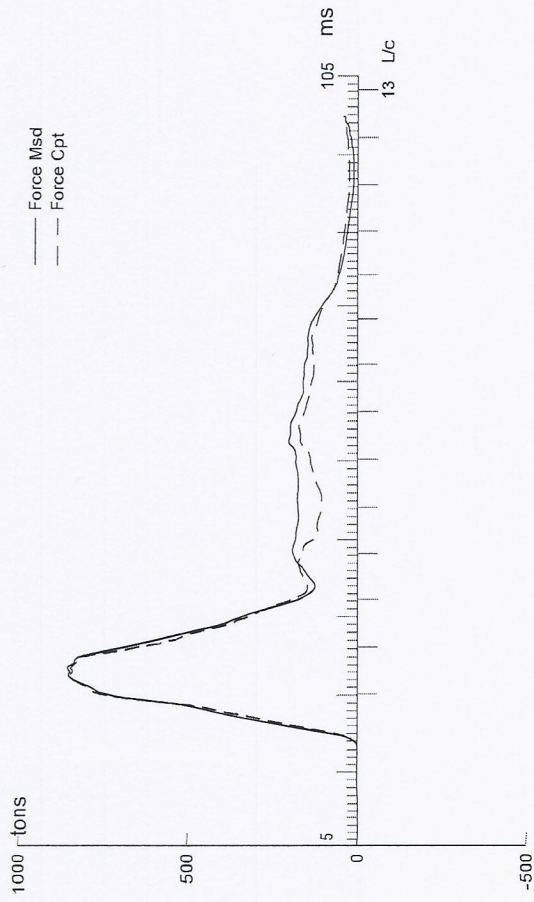
JOB REF DLT-2014-KUH01	DATE November 30,2014
PROJECT NAME KURBALA UNIVERSITY HOSPITAL	
PROJECT LOCATION KARADAT Maryam, KARKH, BAGHDAD	
REPORT FOR DYNAMIC LOAD TEST	

APPENDIX-"C"

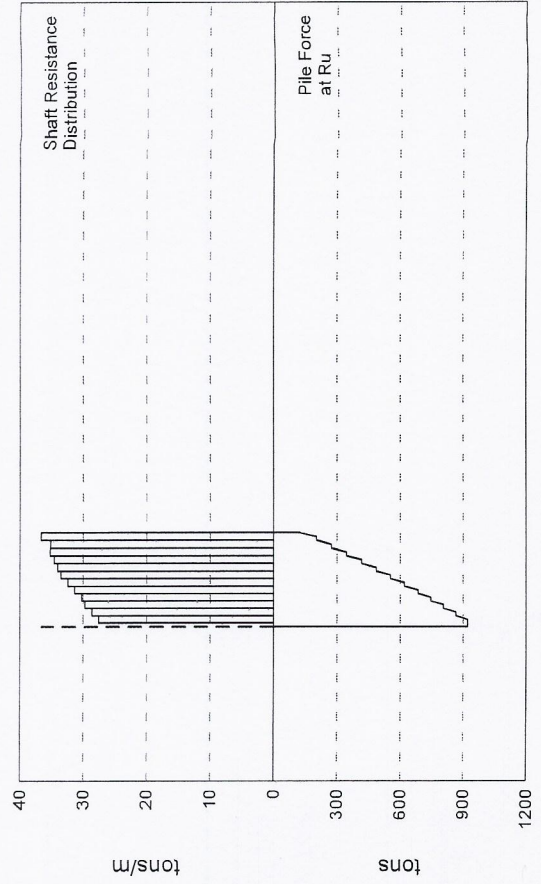
DYNAMIC LOAD TEST OUTPUT

Email: abraj.piletesting@gmail.com

Mobile: 07822277666



$R_u = 920.6$ tons
 $R_s = 794.2$ tons
 $R_b = 126.4$ tons
 $D_y = 8.1$ mm
 $D_x = 9.1$ mm



DLT-2014-KUH01; Pile: A40
BORED PILE; Blow: 4
Abraj Consultant for Pile Testing

Test: 23-Nov-2014 15:15:
CAPWAP (R) 2006-3
OP: ENG. ALI

CAPWAP SUMMARY RESULTS

Total CAPWAP Capacity:			920.6; along Shaft		794.2; at Toe		126.4 tons			
Soil Sgmnt No.	Dist. Below Gages	Depth Below Grade	Ru tons	Force in Pile tons	Sum of Ru tons	Unit Resist. (Depth) tons/m	Unit Resist. (Area) tons/m²	Smith Damping Factor s/m	Quake mm	
	m	m	tons	tons	tons	tons/m	tons/m²	s/m		
				920.6						
1	3.1	2.6	56.3	864.4	56.3	21.98	8.74	1.471	1.004	
2	5.1	4.6	58.4	805.9	114.7	28.65	11.40	1.471	1.003	
3	7.1	6.6	60.7	745.3	175.4	29.74	11.83	1.471	1.003	
4	9.2	8.7	61.8	683.5	237.1	30.27	12.05	1.471	1.003	
5	11.2	10.7	64.0	619.5	301.1	31.36	12.48	1.471	1.003	
6	13.3	12.8	66.2	553.3	367.3	32.44	12.91	1.471	1.003	
7	15.3	14.8	68.4	485.0	435.7	33.52	13.34	1.471	1.003	
8	17.3	16.8	69.5	415.5	505.1	34.06	13.55	1.471	1.003	
9	19.4	18.9	70.6	344.9	575.7	34.60	13.77	1.471	1.003	
10	21.4	20.9	71.9	273.0	647.6	35.26	14.03	1.471	1.003	
11	23.5	23.0	71.7	201.3	719.3	35.14	13.98	1.471	0.908	
12	25.5	25.0	74.8	126.4	794.2	36.69	14.60	1.471	0.656	
Avg. Shaft			66.2			31.77	12.64	1.471	0.962	
Toe			126.4				251.55	1.313	1.004	
Soil Model Parameters/Extensions						Shaft	Toe			
Case Damping Factor						2.235	0.318			
Unloading Quake (% of loading quake)						20	35			
Reloading Level (% of Ru)						100	100			
Unloading Level (% of Ru)						0				
Soil Plug Weight (tons)							6.84			
CAPWAP match quality = 5.78 (Wave Up Match) ; RSA = 0										
Observed: final set = 1.000 mm; blow count = 1000 b/m										
Computed: final set = 0.859 mm; blow count = 1164 b/m										
max. Top Comp. Stress = 0.173 tons/cm² (T= 28.1 ms, max= 1.039 x Top)										
max. Comp. Stress = 0.180 tons/cm² (Z= 3.1 m, T= 28.3 ms)										
max. Tens. Stress = -0.000 tons/cm² (Z= 3.1 m, T= 17.0 ms)										
max. Energy (EMX) = 3.64 tonne-m; max. Measured Top Displ. (DMX)= 5.70 mm										

DLT-2014-KUH01; File: A40
 BORED PILE; Blow: 4
 Abraj Consultant for Pile Testing

Test: 23-Nov-2014 15:15:
 CAPWAP (R) 2006-3
 OP: ENG. ALI

EXTREMA TABLE

Pile Sgmt No.	Dist. Below Gages m	max. Force tons	min. Force tons	max. Comp. Stress tons/cm ²	max. Tens. Stress tons/cm ²	max. Trnsfd. Energy tonne-m	max. Veloc. m/s	max. Displ. mm
1	1.0	871.3	-0.5	0.173	-0.000	3.64	0.9	5.599
2	2.0	889.6	-0.5	0.177	-0.000	3.52	0.8	5.259
4	4.1	824.6	-0.4	0.164	-0.000	2.85	0.7	4.596
6	6.1	759.0	-0.4	0.151	-0.000	2.29	0.6	4.012
8	8.2	698.9	-0.4	0.139	-0.000	1.83	0.5	3.525
9	9.2	713.9	-0.4	0.142	-0.000	1.77	0.5	3.308
10	10.2	640.3	-0.3	0.127	-0.000	1.45	0.5	3.111
11	11.2	653.5	-0.3	0.130	-0.000	1.40	0.5	2.906
12	12.2	573.9	-0.3	0.114	-0.000	1.13	0.4	2.711
13	13.3	581.9	-0.3	0.116	-0.000	1.08	0.4	2.511
14	14.3	507.9	-0.3	0.101	-0.000	0.85	0.4	2.329
15	15.3	517.6	-0.3	0.103	-0.000	0.81	0.3	2.153
16	16.3	453.8	-0.3	0.090	-0.000	0.63	0.3	2.005
17	17.3	464.1	-0.3	0.092	-0.000	0.60	0.3	1.844
18	18.4	394.2	-0.3	0.078	-0.000	0.45	0.3	1.707
19	19.4	402.2	-0.2	0.080	-0.000	0.43	0.3	1.568
20	20.4	330.0	-0.2	0.066	-0.000	0.32	0.2	1.455
21	21.4	330.7	-0.2	0.066	-0.000	0.30	0.2	1.340
22	22.4	249.5	-0.2	0.050	-0.000	0.22	0.2	1.250
23	23.5	254.5	-0.2	0.051	-0.000	0.21	0.2	1.158
24	24.5	206.4	-0.1	0.041	-0.000	0.15	0.1	1.079
25	25.5	199.3	-0.1	0.040	-0.000	0.08	0.2	1.003
Absolute	3.1			0.180			(T =	28.3 ms)
	3.1				-0.000		(T =	17.0 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	809.2	765.0	720.8	676.6	632.4	588.2	544.0	499.8	455.6	411.4
RX	809.2	765.0	720.8	676.6	632.4	588.2	544.0	499.8	455.6	411.4
RU	1096.2	1080.7	1065.2	1049.7	1034.2	1018.7	1003.2	987.7	972.2	956.7
RAU =	269.5 (tons);		RA2 =		714.8 (tons)					

Current CAPWAP Ru = 920.6 (tons); Corresponding J(RP) = 0.00; J(RX) = 0.00

VMX	TVP	VT1*Z	FT1	FMX	DMX	DFN	SET	EMX	QUS
m/s	ms	tons	tons	tons	mm	mm	mm	tonne-m	tons
0.97	25.44	506.1	745.0	866.6	5.697	0.852	1.000	3.7	1113.8

Possible Pile Damage at 0.95 L Below Gages?

PILE PROFILE AND PILE MODEL

Depth m	Area cm ²	E-Modulus tons/cm ²	Spec. Weight tons/m ³	Perim. m
0.00	5026.55	442.0	2.400	2.513
25.50	5026.55	442.0	2.400	2.513
Toe Area	0.503	m ²		

DLT-2014-KUH01; Pile: A40
 BORED PILE; Blow: 4
 Abraj Consultant for Pile Testing

Test: 23-Nov-2014 15:15:
 CAPWAP(R) 2006-3
 OP: ENG. ALI

Segmnt Number	Dist. B.G. m	Impedance tons/m/s	Imped. Change %	Slack mm	Tension Eff.	Compression Slack mm	Eff.	Perim. m
1	1.02	522.82	0.00	0.000	0.000	-0.000	0.000	2.513
6	6.12	582.82	11.48	0.000	0.000	-0.000	0.000	2.513
7	7.14	592.82	13.39	0.000	0.000	-0.000	0.000	2.513
8	8.16	602.82	15.30	0.000	0.000	-0.000	0.000	2.513
9	9.18	642.82	22.95	0.000	0.000	-0.000	0.000	2.513
11	11.22	632.82	21.04	0.000	0.000	-0.000	0.000	2.513
12	12.24	622.82	19.13	0.000	0.000	-0.000	0.000	2.513
15	15.30	642.82	22.95	0.000	0.000	-0.000	0.000	2.513
17	17.34	592.82	13.39	0.000	0.000	-0.000	0.000	2.513
24	24.48	522.82	0.00	0.000	0.000	-0.000	0.000	2.513
25	25.50	522.82	0.00	0.000	0.000	-0.000	0.000	2.513

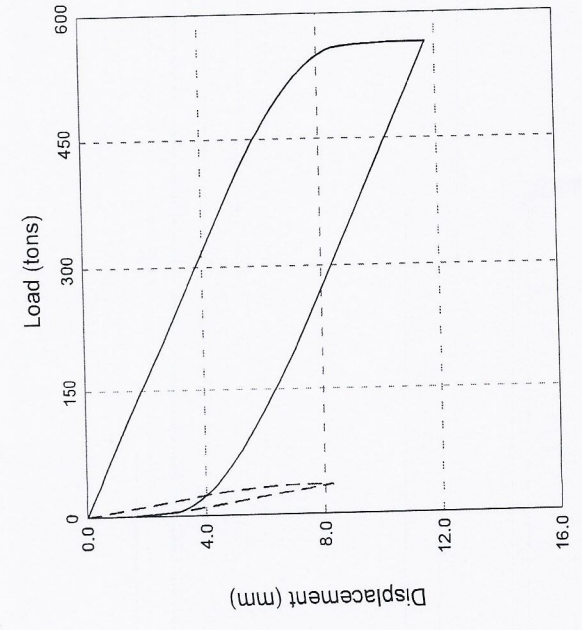
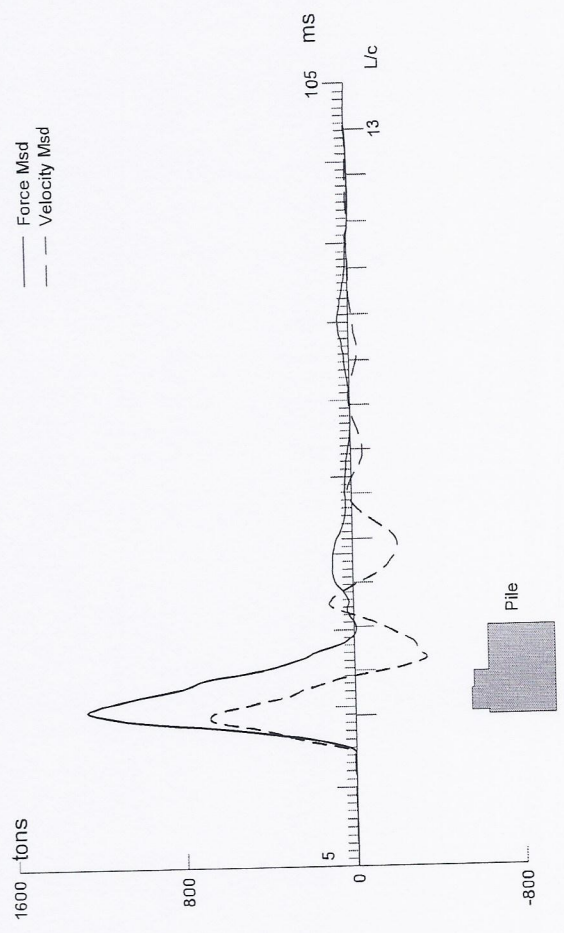
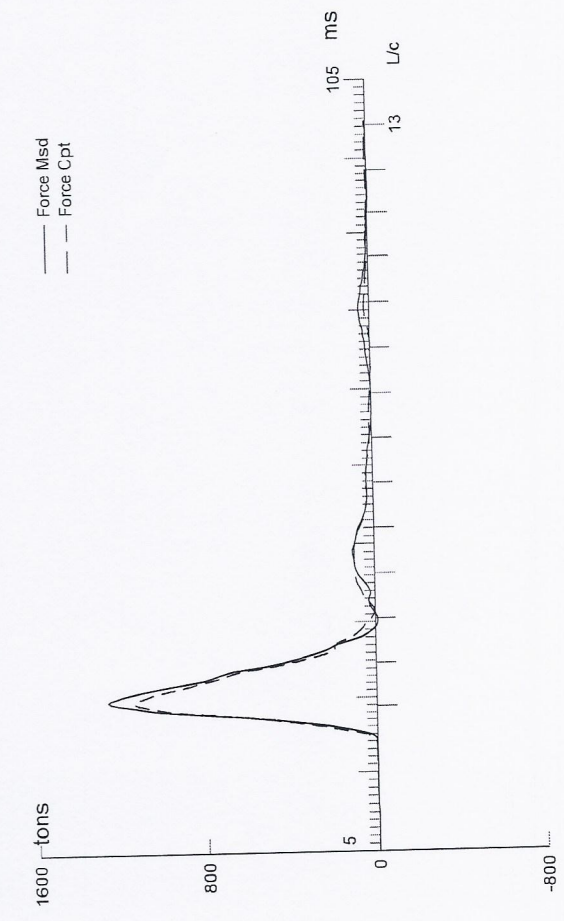
Pile Damping 2.0 %, Time Incr 0.240 ms, Wave Speed 4250.0 m/s, 2L/c 12.0 ms



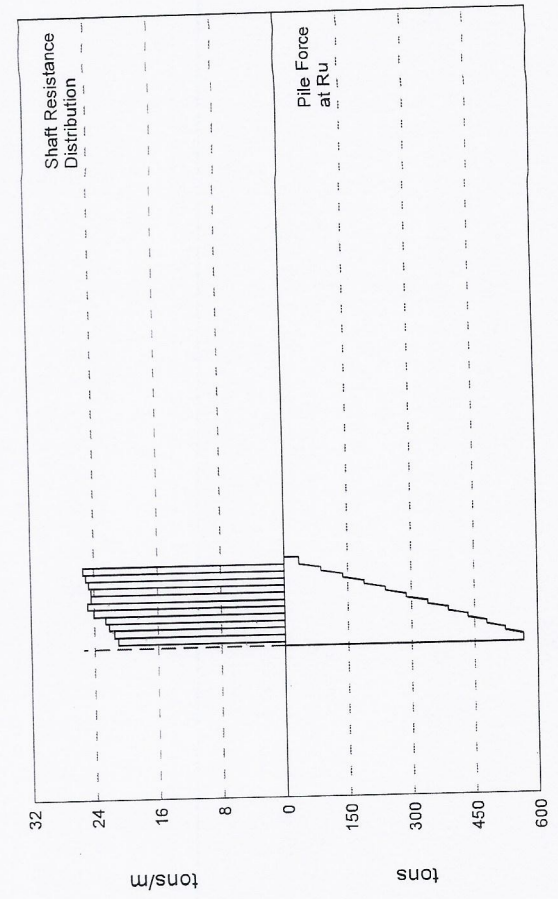
26-Nov-2014
CAPWAP(R) 2006-3

DLT-2014-KUH01; Pile: A18; BORED PILE; Blow: 10 (Test: 23-Nov-2014 12:45;)

Abraj Consultant for Pile Testing



$R_u = 565.3$ tons
 $R_s = 530.6$ tons
 $R_b = 34.7$ tons
 $D_y = 10.7$ mm
 $D_x = 11.7$ mm



DLT-2014-KUH01; Pile: A18
 BORED PILE; Blow: 10
 Abraj Consultant for Pile Testing

Test: 23-Nov-2014 12:45:
 CAPWAP (R) 2006-3
 OP: ENG. ALI

CAPWAP SUMMARY RESULTS

Total CAPWAP Capacity:			565.3; along Shaft		530.6; at Toe		34.7 tons			
Soil Sgmnt No.	Dist. Below Gages m	Depth Below Grade m	Ru tons	Force in Pile tons	Sum of Ru tons	Unit Resist. (Depth) tons/m	Unit Resist. (Area) tons/m²	Smith Damping Factor s/m	Quake mm	
				565.3						
1	3.1	2.6	42.9	522.5	42.9	16.74	6.66	1.812	4.947	
2	5.1	4.6	43.9	478.6	86.7	21.50	8.56	1.812	4.947	
3	7.1	6.6	45.1	433.5	131.9	22.13	8.81	1.812	4.947	
4	9.2	8.7	46.0	387.4	177.9	22.57	8.98	1.812	4.947	
5	11.2	10.7	49.1	338.3	227.0	24.07	9.58	1.812	4.867	
6	13.3	12.8	50.7	287.6	277.8	24.86	9.89	1.812	4.736	
7	15.3	14.8	49.8	237.8	327.6	24.42	9.72	1.812	4.550	
8	17.3	16.8	49.8	188.0	377.3	24.39	9.71	1.812	4.449	
9	19.4	18.9	50.4	137.6	427.7	24.71	9.83	1.812	4.413	
10	21.4	20.9	51.1	86.5	478.8	25.04	9.96	1.812	4.382	
11	23.5	23.0	51.8	34.7	530.6	25.39	10.10	1.812	4.351	
12	25.5	25.0	0.0	34.7	530.6	0.00	0.00	0.000	4.318	
Avg. Shaft			44.2			21.22	8.44	1.812	4.672	
Toe			34.7				69.09	0.081	5.983	
Soil Model Parameters/Extensions						Shaft	Toe			
Case Damping Factor						1.776	0.005			
Unloading Quake (% of loading quake)						96	74			
Reloading Level (% of Ru)						100	100			
Unloading Level (% of Ru)						83				
Resistance Gap (included in Toe Quake) (mm)							0.062			
Soil Plug Weight (tons)							5.38			
CAPWAP match quality = 3.51 (Wave Up Match) ; RSA = 0										
Observed: final set = 1.000 mm;					blow count	=	1000 b/m			
Computed: final set = 1.009 mm;					blow count	=	991 b/m			
Replay Factor: F2:1.000; V2:1.000;										
max. Top Comp. Stress = 0.232 tons/cm² (T=					25.0 ms, max=	1.042 x Top)				
max. Comp. Stress = 0.241 tons/cm² (Z=					3.1 m, T=	25.5 ms)				
max. Tens. Stress = -0.052 tons/cm² (Z=					16.3 m, T=	35.5 ms)				
max. Energy (EMX) = 6.05 tonne-m;					max. Measured Top Displ. (DMX)= 6.33 mm					

DLT-2014-KUH01; File: A18
 BORED PILE; Blow: 10
 Abraj Consultant for Pile Testing

Test: 23-Nov-2014 12:45:
 CAPWAP (R) 2006-3
 OP: ENG. ALI

EXTREMA TABLE

Pile Sgmnt No.	Dist. Below Gages m	max. Force tons	min. Force tons	max. Comp. Stress tons/cm ²	max. Tens. Stress tons/cm ²	max. Trnsfd. Energy tonne-m	max. Veloc. m/s	max. Displ. mm
1	1.0	1164.8	-24.9	0.232	-0.005	6.05	1.4	6.789
2	2.0	1190.8	-57.7	0.237	-0.011	6.00	1.3	6.601
4	4.1	1110.1	-121.9	0.221	-0.024	5.29	1.3	6.224
6	6.1	1031.2	-171.1	0.205	-0.034	4.64	1.2	5.848
8	8.2	951.7	-212.5	0.189	-0.042	4.02	1.1	5.471
9	9.2	968.5	-215.8	0.193	-0.043	3.99	1.1	5.285
10	10.2	873.3	-238.3	0.174	-0.047	3.55	1.1	5.123
11	11.2	896.5	-231.9	0.178	-0.046	3.55	1.0	4.976
12	12.2	807.4	-248.1	0.161	-0.049	3.14	1.0	4.865
13	13.3	828.8	-236.9	0.165	-0.047	3.14	1.0	4.804
14	14.3	741.6	-250.2	0.148	-0.050	2.76	0.9	4.878
15	15.3	764.9	-232.7	0.152	-0.046	2.75	0.9	4.974
16	16.3	687.3	-259.1	0.137	-0.052	2.38	0.8	5.086
17	17.3	700.8	-241.0	0.139	-0.048	2.37	0.8	5.191
18	18.4	614.3	-255.6	0.122	-0.051	1.97	0.8	5.305
19	19.4	613.5	-228.5	0.122	-0.045	1.95	0.8	5.405
20	20.4	516.7	-236.5	0.103	-0.047	1.49	0.8	5.511
21	21.4	503.1	-216.9	0.100	-0.043	1.47	0.8	5.604
22	22.4	396.4	-217.3	0.079	-0.043	0.99	0.9	5.699
23	23.5	375.6	-187.0	0.075	-0.037	0.93	1.0	5.780
24	24.5	259.6	-191.7	0.052	-0.038	0.54	1.1	5.866
25	25.5	217.9	-150.3	0.043	-0.030	0.12	1.2	5.934
Absolute	3.1			0.241			(T =	25.5 ms)
	16.3				-0.052		(T =	35.5 ms)

CASE METHOD

J =	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
RP	980.3	895.2	810.0	724.8	639.7	554.5	469.4	384.2	299.1	213.9
RX	999.8	909.9	821.0	732.1	643.2	554.5	469.4	384.2	299.1	213.9
RU	1056.1	978.6	901.0	823.4	745.8	668.3	590.7	513.1	435.6	358.0

RAU = 150.3 (tons); RA2 = 647.8 (tons)

Current CAPWAP Ru = 565.6 (tons); Corresponding J(RP) = 0.49; J(RX) = 0.49

VMX	TVP	VT1*Z	FT1	FMX	DMX	DFN	SET	EMX	QUS
m/s	ms	tons	tons	tons	mm	mm	mm	tonne-m	tons
1.27	24.11	687.4	1144.4	1268.8	6.331	0.951	1.000	5.7	1542.2

PILE PROFILE AND PILE MODEL

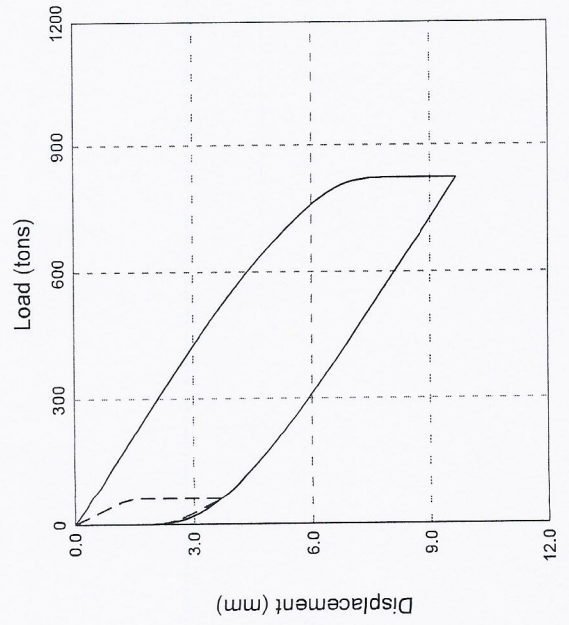
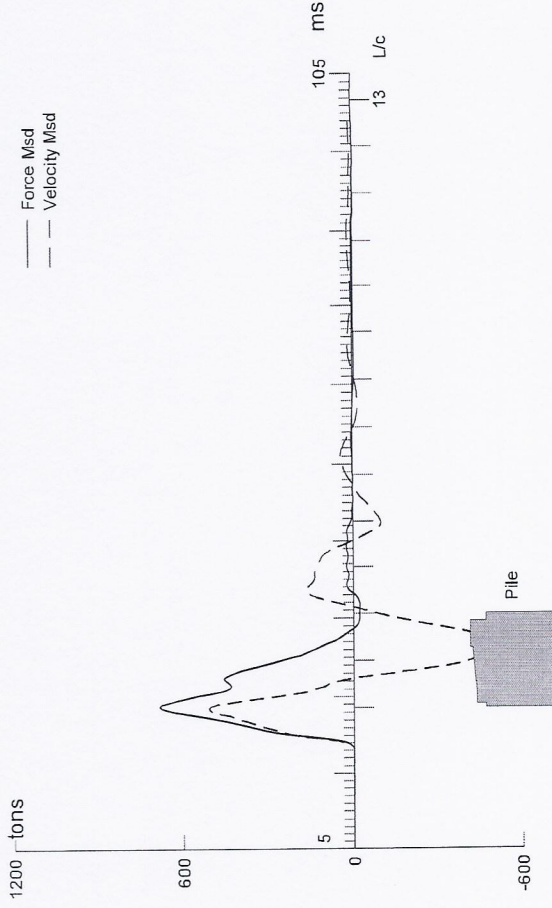
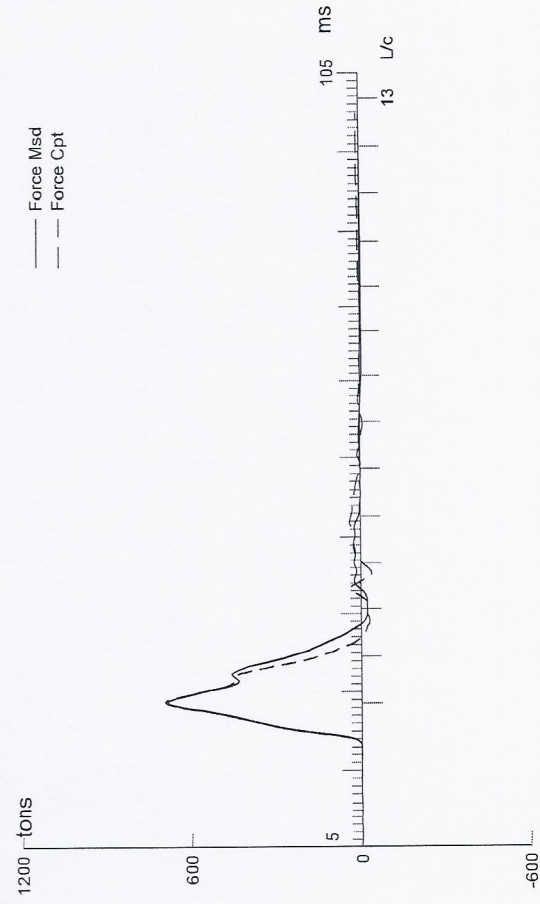
Depth		Area	E-Modulus	Spec. Weight	Perim.			
m		cm ²	tons/cm ²	tons/m ³	m			
0.00		5026.55	473.8	2.400	2.513			
25.50		5026.55	473.8	2.400	2.513			
Toe Area		0.503	m ²					
Segmnt Number	Dist. B.G. m	Impedance tons/m/s	Imped. Change %	Tension Slack mm	Eff.	Compression Slack mm	Eff.	Perim. m
1	1.02	541.27	0.00	0.000	0.000	-0.000	0.000	2.513

DLT-2014-KUH01; File: A18
 BORED PILE; Blow: 10
 Abraj Consultant for Pile Testing

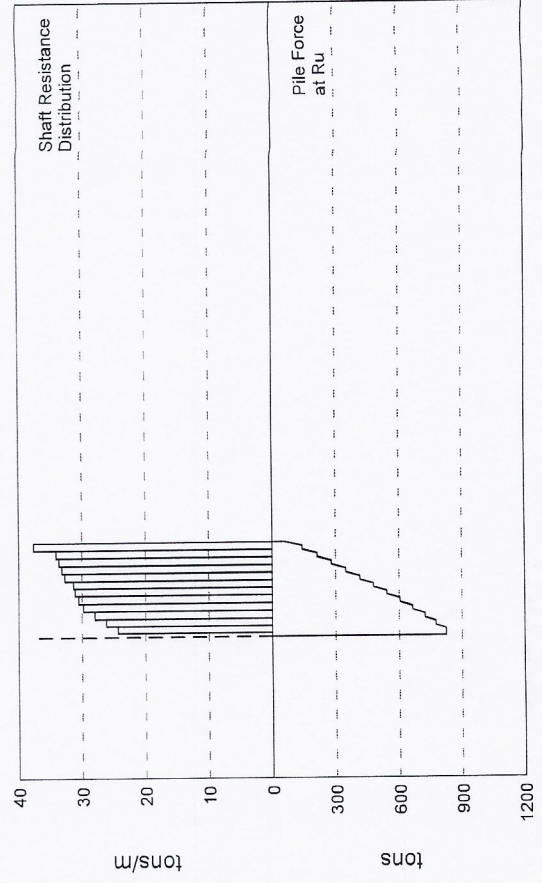
Test: 23-Nov-2014 12:45:
 CAPWAP (R) 2006-3
 OP: ENG. ALI

Segmnt Number	Dist. B.G. m	Impedance tons/m/s	Imped. Change %	Slack mm	Tension Eff.	Compression Slack mm	Eff.	Perim. m
2	2.04	681.27	25.87	0.000	0.000	-0.000	0.000	2.513
8	8.16	661.27	22.17	0.000	0.000	-0.000	0.000	2.513
13	13.26	541.27	0.00	0.000	0.000	-0.000	0.000	2.513
25	25.50	541.27	0.00	0.000	0.000	-0.000	0.000	2.513

Pile Damping 2.0 %, Time Incr 0.232 ms, Wave Speed 4400.0 m/s, 2L/c 11.6 ms



$R_u = 824.7$ tons
 $R_s = 760.1$ tons
 $R_b = 64.5$ tons
 $D_y = 7.7$ mm
 $D_x = 9.7$ mm



DLT-2014-KUH01; File: A11
BORED PILE; Blow: 3
Abraj Consultant for Pile Testing

Test: 23-Nov-2014 16:11:
CAPWAP(R) 2006-3
OP: ENG. ALI

CAPWAP SUMMARY RESULTS									
Total CAPWAP Capacity:			824.7; along Shaft		760.1; at Toe		64.5 tons		
Soil Sgmnt No.	Dist. Below Gages m	Depth Below Grade m	Ru tons	Force in Pile tons	Sum of Ru tons	Unit Resist. (Depth) tons/m	Unit Resist. (Area) tons/m²	Smith Damping Factor s/m	Quake mm
				824.7					
1	3.1	2.6	49.7	775.0	49.7	19.40	7.72	0.967	2.822
2	5.1	4.6	53.4	721.6	103.1	26.18	10.42	0.967	2.813
3	7.1	6.6	57.1	664.5	160.2	28.00	11.14	0.967	2.813
4	9.2	8.7	60.8	603.7	221.0	29.82	11.86	0.967	2.626
5	11.2	10.7	62.4	541.3	283.4	30.56	12.16	0.967	2.334
6	13.3	12.8	63.4	477.9	346.8	31.10	12.37	0.967	2.077
7	15.3	14.8	64.0	413.9	410.8	31.37	12.48	0.967	1.945
8	17.3	16.8	66.7	347.2	477.5	32.70	13.01	0.967	1.633
9	19.4	18.9	67.7	279.5	545.2	33.17	13.20	0.967	1.233
10	21.4	20.9	68.6	210.9	613.8	33.64	13.39	0.967	0.858
11	23.5	23.0	69.6	141.3	683.3	34.10	13.57	0.967	0.489
12	25.5	25.0	76.8	64.5	760.1	37.65	14.98	0.967	0.063
Avg. Shaft			63.3			30.41	12.10	0.967	1.714
Toe			64.5				128.36	2.325	1.351
Soil Model Parameters/Extensions						Shaft	Toe		
Case Damping Factor						1.409	0.288		
Unloading Quake (% of loading quake)						60	82		
Reloading Level (% of Ru)						100	100		
Unloading Level (% of Ru)						99			
Soil Plug Weight (tons)							3.69		
CAPWAP match quality = 5.36 (Wave Up Match) ; RSA = 0									
Observed: final set = 2.000 mm; blow count = 500 b/m									
Computed: final set = 0.995 mm; blow count = 1005 b/m									
max. Top Comp. Stress = 0.142 tons/cm² (T= 24.3 ms, max= 1.059 x Top)									
max. Comp. Stress = 0.150 tons/cm² (Z= 3.1 m, T= 24.8 ms)									
max. Tens. Stress = -0.032 tons/cm² (Z= 19.4 m, T= 36.6 ms)									
max. Energy (EMX) = 2.24 tonne-m; max. Measured Top Displ. (DMX)= 4.51 mm									

DLT-2014-KUH01; Pile: A11
 BORED PILE; Blow: 3
 Abraj Consultant for Pile Testing

Test: 23-Nov-2014 16:11:
 CAPWAP (R) 2006-3
 OP: ENG. ALI

EXTREMA TABLE

Pile Sgmnt No.	Dist. Below Gages m	max. Force tons	min. Force tons	max. Comp. Stress tons/cm ²	max. Tens. Stress tons/cm ²	max. Trnsfd. Energy tonne-m	max. Veloc. m/s	max. Displ. mm
1	1.0	711.6	-60.2	0.142	-0.012	2.24	0.9	4.246
2	2.0	732.1	-92.2	0.146	-0.018	2.20	0.9	4.062
4	4.1	692.4	-87.5	0.138	-0.017	1.89	0.8	3.691
6	6.1	652.5	-93.2	0.130	-0.019	1.61	0.8	3.333
8	8.2	614.3	-102.0	0.122	-0.020	1.36	0.7	3.001
9	9.2	635.0	-123.3	0.126	-0.025	1.33	0.7	2.838
10	10.2	574.3	-95.4	0.114	-0.019	1.14	0.6	2.691
11	11.2	594.3	-104.2	0.118	-0.021	1.11	0.6	2.539
12	12.2	533.7	-92.4	0.106	-0.018	0.94	0.6	2.400
13	13.3	553.4	-123.0	0.110	-0.024	0.91	0.5	2.248
14	14.3	493.3	-114.6	0.098	-0.023	0.76	0.5	2.110
15	15.3	513.7	-143.7	0.102	-0.029	0.73	0.5	1.961
16	16.3	466.6	-139.9	0.093	-0.028	0.62	0.5	1.832
17	17.3	499.1	-158.0	0.099	-0.031	0.61	0.4	1.710
18	18.4	444.2	-150.5	0.088	-0.030	0.53	0.4	1.619
19	19.4	454.6	-161.1	0.090	-0.032	0.53	0.3	1.532
20	20.4	380.6	-146.6	0.076	-0.029	0.45	0.3	1.469
21	21.4	379.7	-152.0	0.076	-0.030	0.45	0.3	1.408
22	22.4	286.5	-136.9	0.057	-0.027	0.37	0.3	1.383
23	23.5	288.6	-139.3	0.057	-0.028	0.37	0.3	1.363
24	24.5	208.9	-107.0	0.042	-0.021	0.27	0.3	1.363
25	25.5	205.9	-98.9	0.041	-0.020	0.09	0.3	1.351
Absolute	3.1			0.150			(T =	24.8 ms)
	19.4				-0.032		(T =	36.6 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	598.1	539.0	479.9	420.8	361.7	302.7	243.6	184.5	125.4	66.3
RX	598.1	539.0	479.9	420.8	361.7	302.7	243.6	184.5	125.4	66.3
RU	802.8	764.2	725.6	687.0	648.4	609.8	571.2	532.6	494.0	455.4

RAU = 0.0 (tons); RA2 = 192.0 (tons)

Current CAPWAP Ru = 824.7 (tons); Corresponding J(RP) = 0.00; J(RX) = 0.00

VMX	TVP	VT1*Z	FT1	FMX	DMX	DFN	SET	EMX	QUS
m/s	ms	tons	tons	tons	mm	mm	mm	tonne-m	tons
0.98	23.82	511.7	677.2	690.3	4.506	2.000	2.000	2.3	706.4

PILE PROFILE AND PILE MODEL

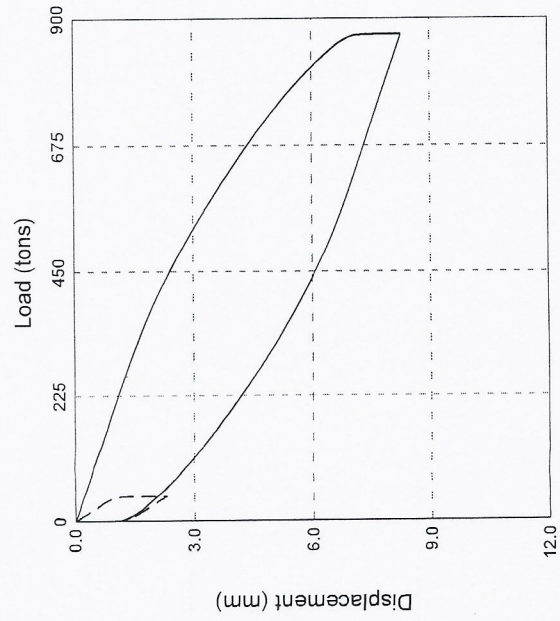
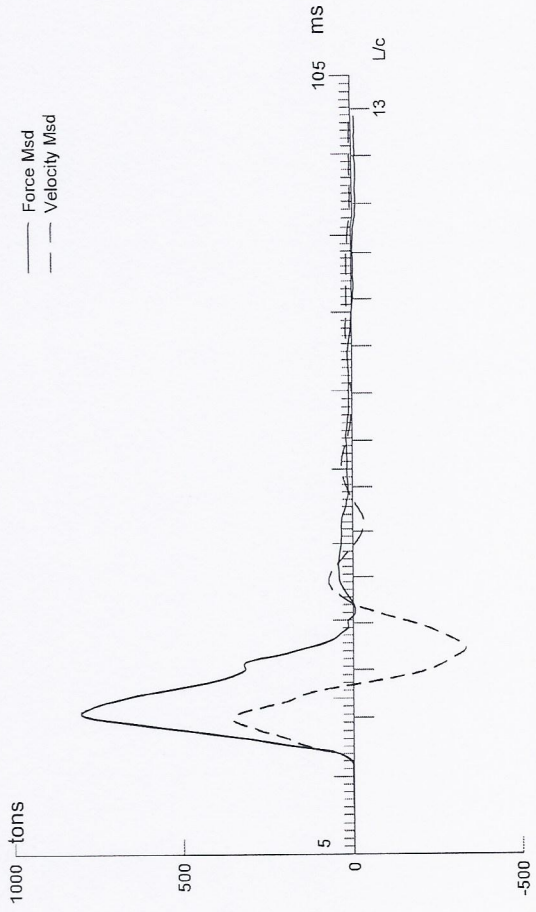
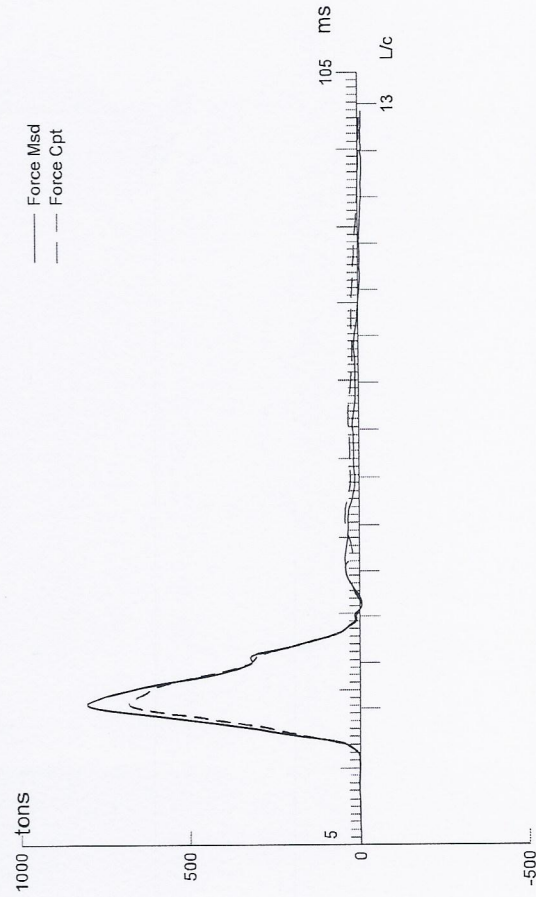
FILE PROFILE AND FILE MODEL								
Depth m			Area cm ²	E-Modulus tons/cm ²	Spec. Weight tons/m ³		Perim. m	
0.00			5026.55	440.0	2.400		2.513	
25.50			5026.55	440.0	2.400		2.513	
Toe Area			0.503	m ²				
Segmnt Number	Dist. B.G. m	Impedance tons/m/s	Imped. Change %	Slack mm	Tension Eff.	Compression Slack mm	Eff.	Perim. m
1	1.02	521.60	0.00	0.000	0.000	-0.000	0.000	2.513

DLT-2014-KUH01; Pile: A11
 BORED PILE; Blow: 3
 Abraj Consultant for Pile Testing

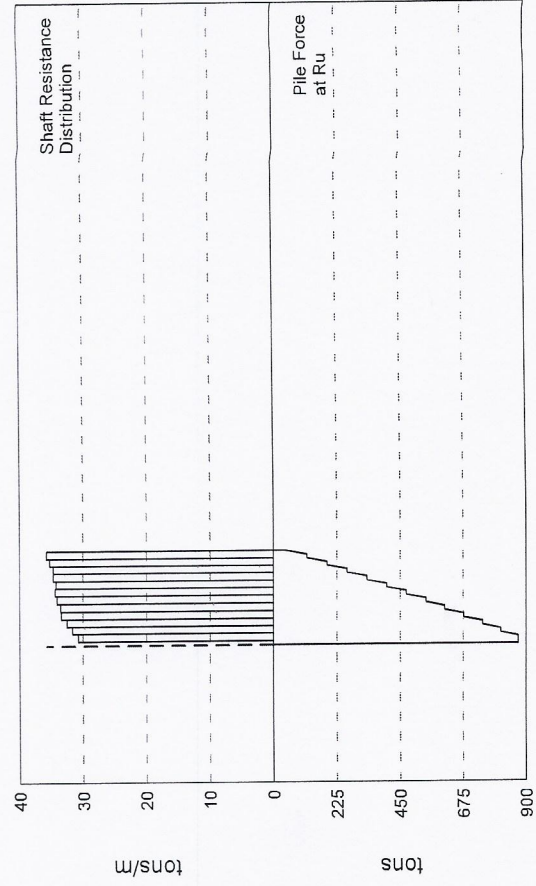
Test: 23-Nov-2014 16:11:
 CAPWAP(R) 2006-3
 OP: ENG. ALI

Segmnt Number	Dist. B.G. m	Impedance tons/m/s	Imped. Change %	Slack mm	Tension Eff.	Compression Slack mm	Eff.	Perim. m
2	2.04	591.60	13.42	0.000	0.000	-0.000	0.000	2.513
6	6.12	594.33	13.94	0.000	0.000	-0.000	0.000	2.513
7	7.14	597.05	14.46	0.000	0.000	-0.000	0.000	2.513
8	8.16	599.78	14.99	0.000	0.000	-0.000	0.000	2.513
9	9.18	602.51	15.51	0.000	0.000	-0.000	0.000	2.513
10	10.20	605.24	16.04	0.000	0.000	-0.000	0.000	2.513
11	11.22	607.96	16.56	0.000	0.000	-0.000	0.000	2.513
12	12.24	610.69	17.08	0.000	0.000	-0.000	0.000	2.513
13	13.26	613.42	17.60	0.000	0.000	-0.000	0.000	2.513
14	14.28	616.15	18.13	0.000	0.000	-0.000	0.000	2.513
15	15.30	618.87	18.65	0.000	0.000	-0.000	0.000	2.513
16	16.32	621.60	19.17	0.000	0.000	-0.000	0.000	2.513
17	17.34	641.60	23.01	0.000	0.000	-0.000	0.000	2.513
24	24.48	521.60	0.00	0.000	0.000	-0.000	0.000	2.513
25	25.50	521.60	0.00	0.000	0.000	-0.000	0.000	2.513

Pile Damping 2.0 %, Time Incr 0.241 ms, Wave Speed 4240.1 m/s, 2L/c 12.0 ms



Ru = 871.3 tons
 Rs = 826.1 tons
 Rb = 45.1 tons
 Dy = 7.3 mm
 Dx = 8.3 mm



DLT-2014-KUH01; File: A10
 BORED PILE; Blow: 2
 Abraj Consultant for Pile Testing

Test: 23-Nov-2014 16:35:
 CAPWAP (R) 2006-3
 OP: ENG. ALI

CAPWAP SUMMARY RESULTS

Total CAPWAP Capacity:			871.3; along Shaft		826.1; at Toe		45.1 tons		
Soil Sgmt No.	Dist. Below Gages	Depth Below Grade	Ru tons	Force in Pile tons	Sum of Ru tons	Unit Resist. (Depth) tons/m	Unit Resist. (Area) tons/m²	Smith Damping Factor s/m	Quake mm
	m	m	tons	tons	tons				
				871.3					
1	3.1	2.6	62.7	808.6	62.7	24.50	9.75	0.897	1.081
2	5.1	4.6	64.5	744.0	127.3	31.64	12.59	0.897	1.082
3	7.1	6.6	66.4	677.6	193.7	32.54	12.95	0.897	1.082
4	9.2	8.7	68.2	609.4	261.9	33.43	13.30	0.897	1.082
5	11.2	10.7	68.4	541.0	330.3	33.55	13.35	0.897	1.082
6	13.3	12.8	69.6	471.4	399.9	34.11	13.57	0.897	1.082
7	15.3	14.8	70.2	401.3	470.0	34.39	13.68	0.897	1.082
8	17.3	16.8	69.8	331.4	539.8	34.22	13.62	0.897	1.000
9	19.4	18.9	70.7	260.7	610.6	34.67	13.79	0.897	0.959
10	21.4	20.9	70.7	190.0	681.3	34.67	13.79	0.897	0.954
11	23.5	23.0	71.9	118.1	753.1	35.23	14.02	0.897	0.946
12	25.5	25.0	73.0	45.1	826.1	35.78	14.24	0.897	0.945
Avg. Shaft			68.8			33.05	13.15	0.897	1.030
Toe			45.1				89.80	2.251	1.004
Soil Model Parameters/Extensions						Shaft	Toe		
Case Damping Factor						1.421	0.195		
Unloading Quake (% of loading quake)						100	30		
Reloading Level (% of Ru)						100	100		
Unloading Level (% of Ru)						55			
Soil Plug Weight (tons)							6.84		
CAPWAP match quality = 4.27 (Wave Up Match) ; RSA = 0									
Observed: final set = 1.000 mm; blow count = 1000 b/m									
Computed: final set = 0.595 mm; blow count = 1681 b/m									
Replay Factor: F2:1.000; V1:1.000; V2:1.000;									
max. Top Comp. Stress = 0.140 tons/cm² (T= 23.8 ms, max= 1.060 x Top)									
max. Comp. Stress = 0.148 tons/cm² (Z= 3.1 m, T= 24.3 ms)									
max. Tens. Stress = -0.011 tons/cm² (Z= 3.1 m, T= 35.4 ms)									
max. Energy (EMX) = 2.30 tonne-m; max. Measured Top Displ. (DMX)= 3.58 mm									

DLT-2014-KUH01; File: A10
 BORED PILE; Blow: 2
 Abraj Consultant for Pile Testing

Test: 23-Nov-2014 16:35:
 CAPWAP (R) 2006-3
 OP: ENG. ALI

EXTREMA TABLE

File Sgmnt No.	Dist. Below Gages m	max. Force tons	min. Force tons	max. Comp. Stress tons/cm ²	max. Tens. Stress tons/cm ²	max. Trnsfd. Energy tonne-m	max. Veloc. m/s	max. Displ. mm
1	1.0	701.3	-22.6	0.140	-0.004	2.30	0.9	4.382
2	2.0	723.3	-35.8	0.144	-0.007	2.24	0.8	4.142
4	4.1	665.5	-24.8	0.132	-0.005	1.80	0.7	3.666
6	6.1	606.2	-4.0	0.121	-0.001	1.43	0.7	3.214
8	8.2	547.0	-0.0	0.109	-0.000	1.11	0.6	2.792
9	9.2	566.7	-0.0	0.113	-0.000	1.06	0.5	2.580
10	10.2	489.1	-0.0	0.097	-0.000	0.84	0.5	2.393
11	11.2	506.6	-0.0	0.101	-0.000	0.79	0.5	2.198
12	12.2	435.2	-0.0	0.087	-0.000	0.62	0.4	2.029
13	13.3	452.1	-0.0	0.090	-0.000	0.59	0.4	1.862
14	14.3	385.2	-0.0	0.077	-0.000	0.45	0.4	1.723
15	15.3	402.0	-0.0	0.080	-0.000	0.43	0.3	1.579
16	16.3	332.8	-0.0	0.066	-0.000	0.33	0.3	1.463
17	17.3	341.3	-0.0	0.068	-0.000	0.31	0.3	1.345
18	18.4	267.0	-0.0	0.053	-0.000	0.24	0.3	1.249
19	19.4	269.7	-0.0	0.054	-0.000	0.22	0.3	1.150
20	20.4	207.0	-0.0	0.041	-0.000	0.17	0.2	1.083
21	21.4	215.3	-0.0	0.043	-0.000	0.16	0.2	1.023
22	22.4	156.1	-6.0	0.031	-0.001	0.12	0.2	0.997
23	23.5	166.9	-4.0	0.033	-0.001	0.12	0.2	0.966
24	24.5	114.2	-38.1	0.023	-0.008	0.09	0.2	0.961
25	25.5	114.9	-27.2	0.023	-0.005	0.06	0.2	0.949
Absolute	3.1			0.148			(T =	24.3 ms)
	3.1				-0.011		(T =	35.4 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	605.6	554.6	503.5	452.5	401.4	350.4	299.3	248.3	197.2	146.2
RX	606.6	554.6	503.5	452.5	401.4	350.4	299.3	248.3	197.2	146.2
RU	640.7	593.2	545.7	498.1	450.6	403.0	355.5	308.0	260.4	212.9

RAU = 3.9 (tons); RA2 = 508.1 (tons)

Current CAPWAP Ru = 871.3 (tons); Corresponding J(RP) = 0.00; J(RX) = 0.00

VMX	TVP	VT1*Z	FT1	FMX	DMX	DFN	SET	EMX	QUS
m/s	ms	tons	tons	tons	mm	mm	mm	tonne-m	tons
0.69	22.85	357.9	758.2	804.3	3.579	1.021	1.000	2.1	903.9

PILE PROFILE AND PILE MODEL

Depth m	Area cm ²	E-Modulus tons/cm ²	Spec. Weight tons/m ³	Perim. m
0.00	5026.55	440.0	2.400	2.513
25.50	5026.55	440.0	2.400	2.513

Toe Area 0.503 m²

Top Segment Length 1.02 m, Top Impedance 521.60 tons/m/s

File Damping 2.0 %, Time Incr 0.241 ms, Wave Speed 4240.1 m/s, 2L/c 12.0 ms