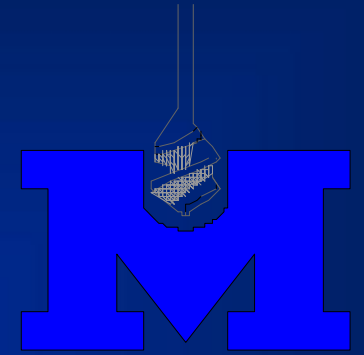


SUPERPILE 2009 - Burlingame, CA



Design and Construction of
Drilled Full Displacement Piles
using the Penetration
Resistance Method

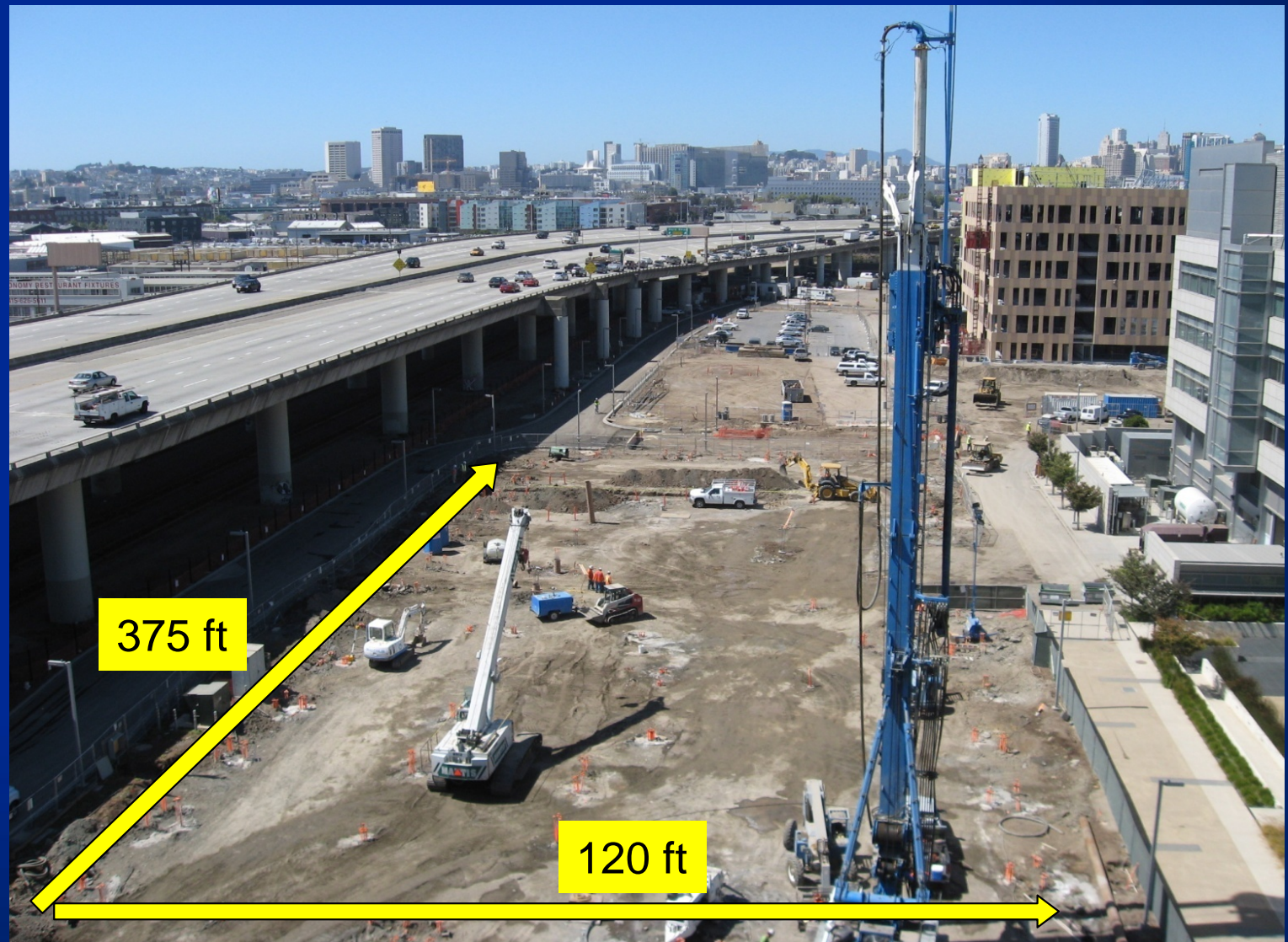
Peter Faust

Malcolm Drilling Company Inc.

Alexandria Parking Garage, San Francisco

Design - Build

- 321 Piles
- DIA = 18"
- 40 - 80 ft
- 620 kips C.
- 225 kips T.



Client

- Cost/Time Effective Foundation System
- Low Environmental Impact (Noise/Vibration)
- Reduce Spoils (Landfill with Contaminants)

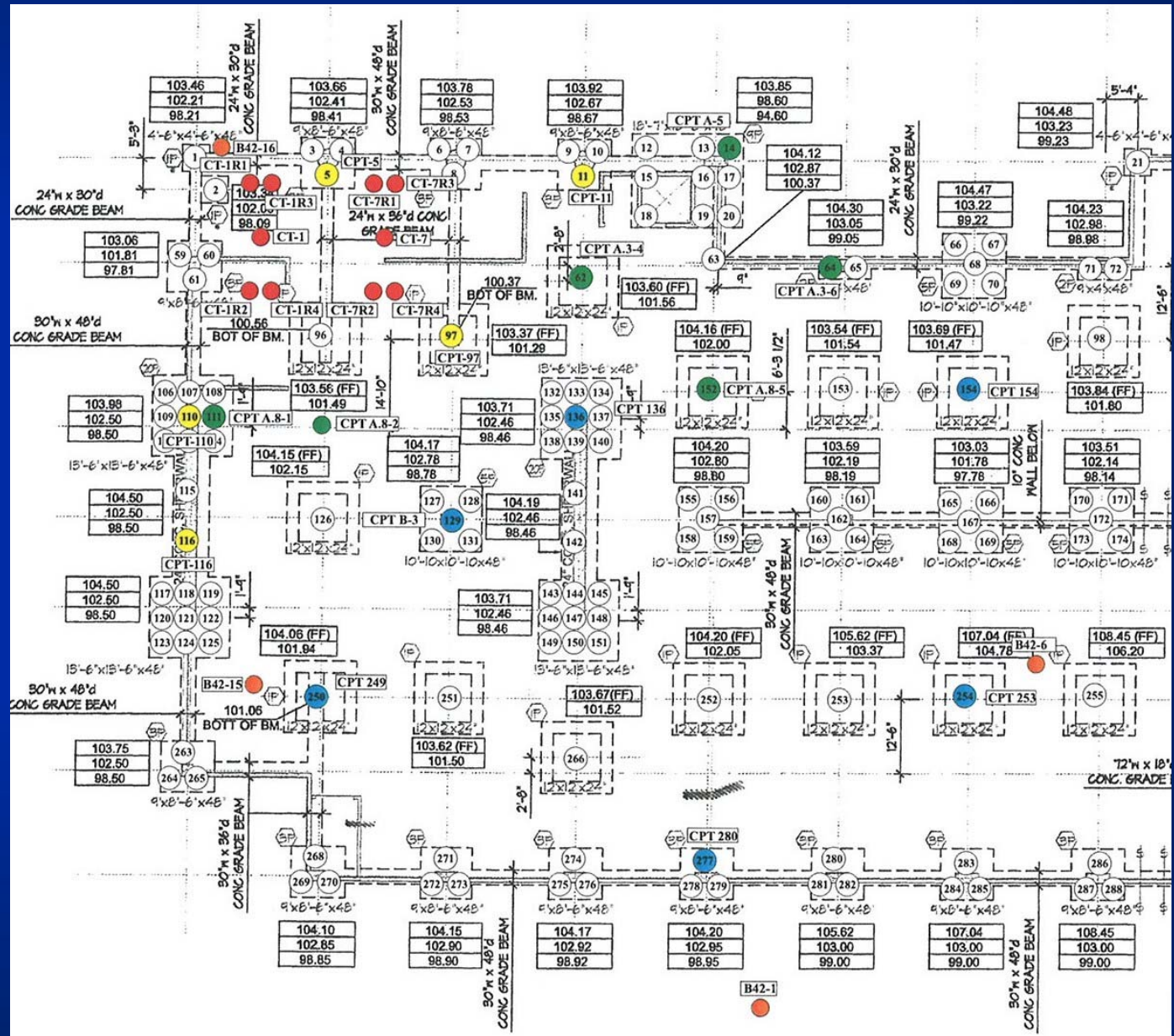
Geotech Consultant

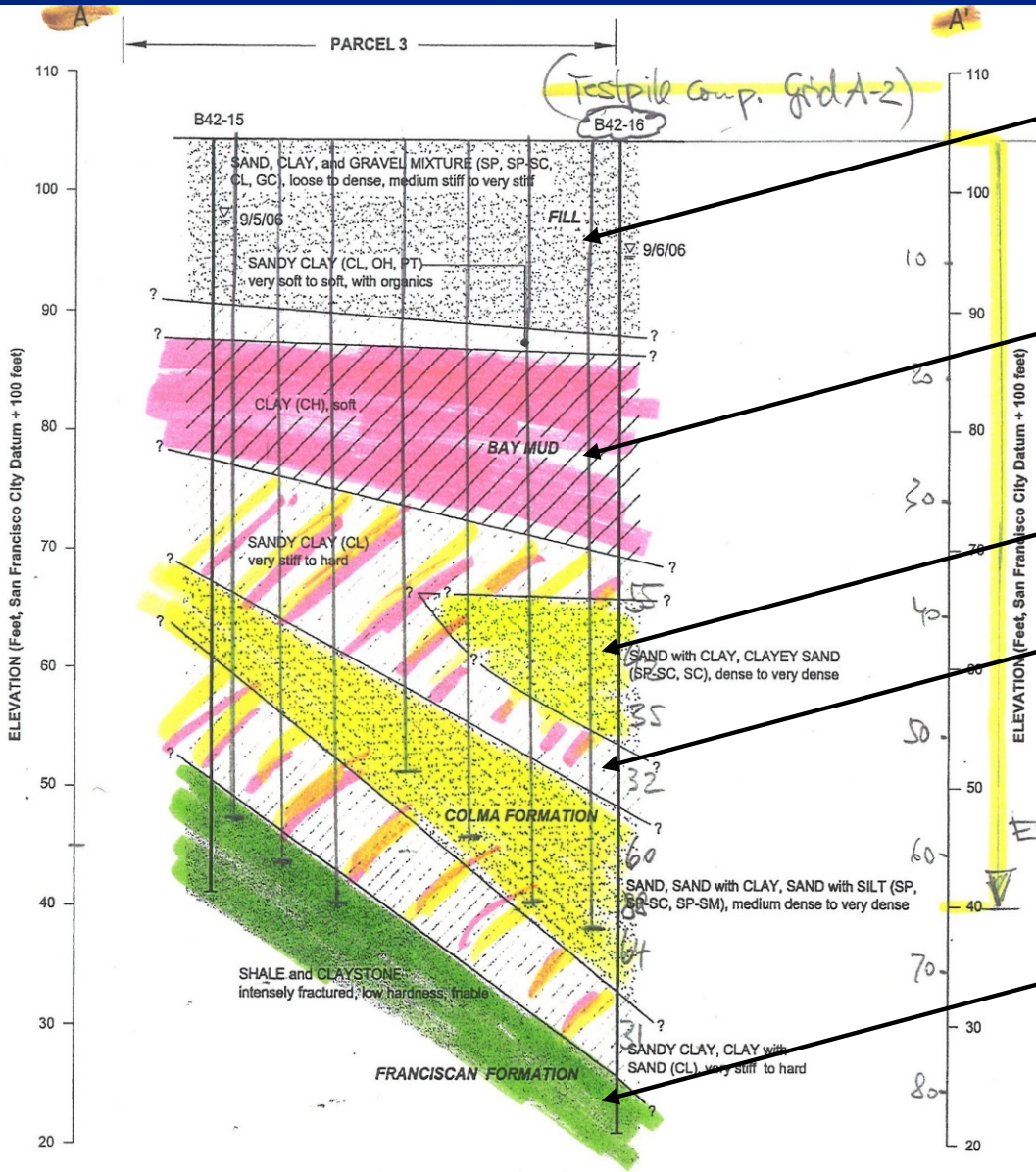
- 8 SPT Borings + 1 CPT Sounding
- Evaluation of Soil Bearing Capacity
- Test Program of various Foundation Systems
- Displacement Pile Recommendation

Design Build Contractor

- Additional CPT Soundings
- Test Pile Program
- Site Specific Pile Design
- Indicator Test Piles to confirm Assumptions
- Savings due to 'Pile-by-Pile Design'

- 8 SPT
- 25 CPT
- 5 Load Tests
- 20 Indicator Piles





Fill

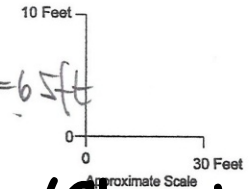
Soft Clay

Dense Sand

Sandy Clay

Shale/Claystone

Notes:
1. The above profile represents a generalized soil cross section interpreted from widely spaced borings. Soil deposits may vary in type, strength, and other important properties between points of exploration.



BLOCKS 41-43 PARCEL 3 MISSION BAY WEST San Francisco, California		
IDEALIZED SUBSURFACE PROFILE A-A'		
Date 03/01/07	Project No. 4086.13	Figure 3
Treadwell&Rollo		

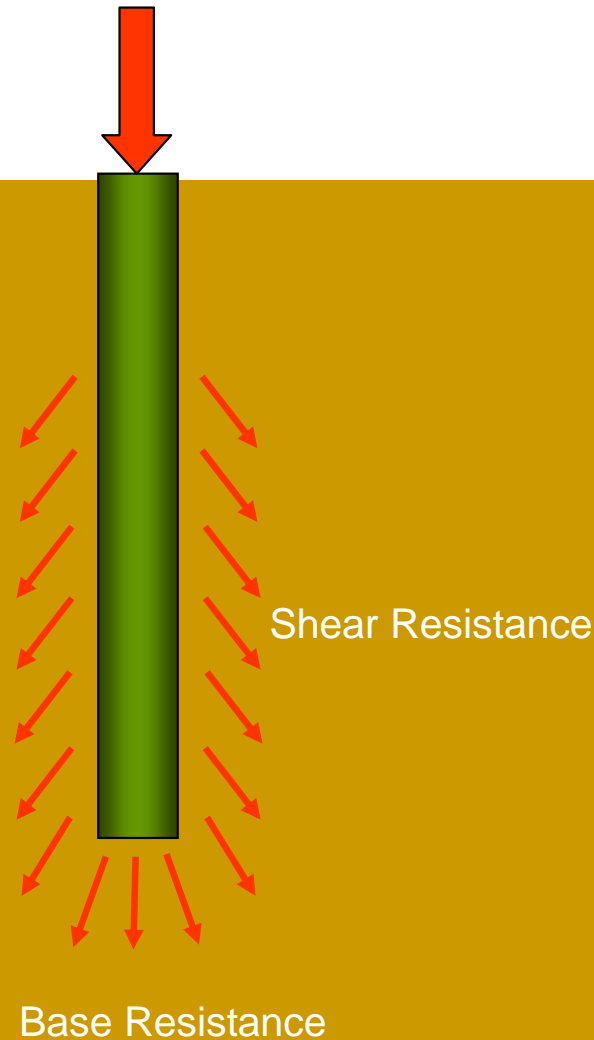
Displacement Piles

- Definition: *A small diameter (< 36") continuously drilled and grouted pile with or without steel reinforcement.*
- Axial Capacity: up to 2,000 kips Ultimate in Soil
- Friction: High Tension & Compression Capacity
- Slender: Medium Lateral Capacity
- Applications: Foundation, Ground Improvement to Reduce Liquefaction Risk

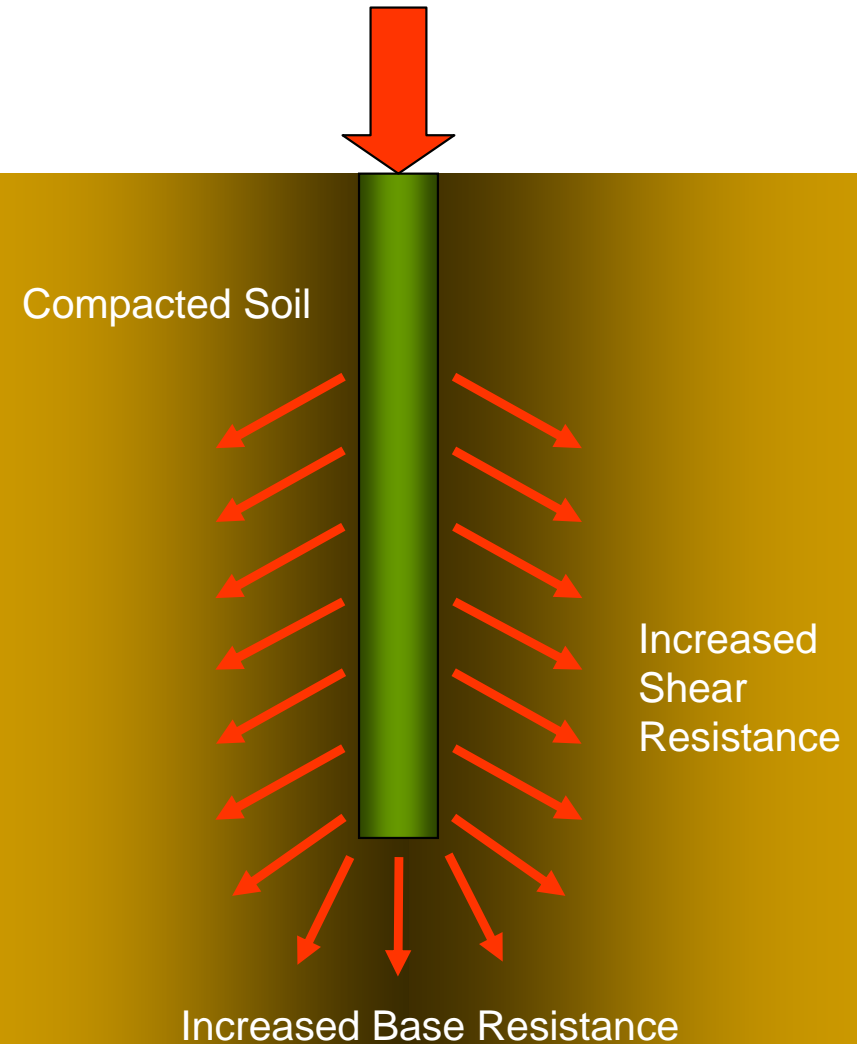
Advantages

- Lateral Soil Compaction
 - ➔ Low Settlements
 - ➔ Higher Soil Resistance
- 50-100% Higher Capacity Than Conventional Pile
- Very little Spoils (Ideal in Contaminated Soils)
- No Vibrations and little Noise during Installation
- Fast and Efficient Installation

Conventional Drilled Pile



Displacement Pile



Soil Compaction will increase Shear and Base Resistance

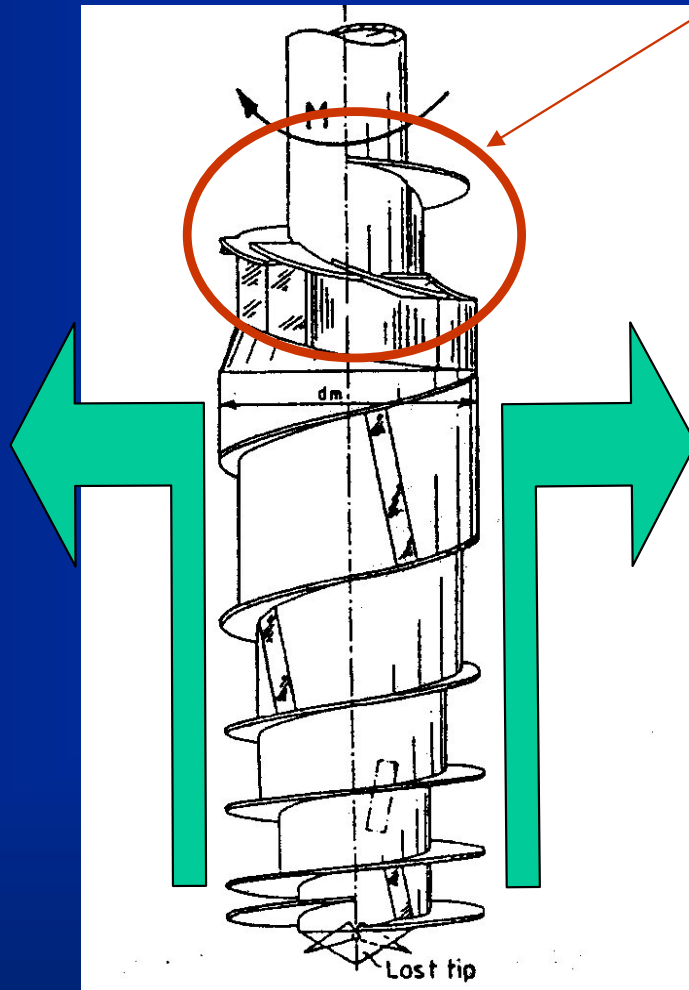


MDCI is License Holder in the Western US

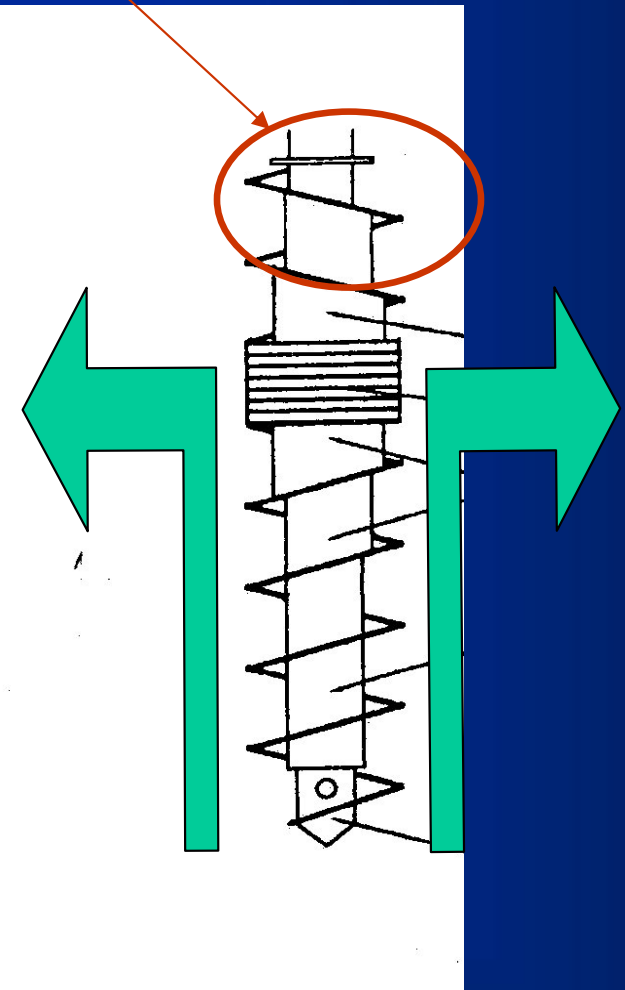
Full Displacement Pile (FDP)

Reverse Flighting

Soil
Transport



Omega Pile



Other FDP



Concrete Pressure Gage

On Board Software
[B-Tronic]

Flowmeter (Opt.)

Stroke Counter





Full Displacement Tool



15 Feet

Partial Displacement Tool



Drilling



Grouting



Cage Installation

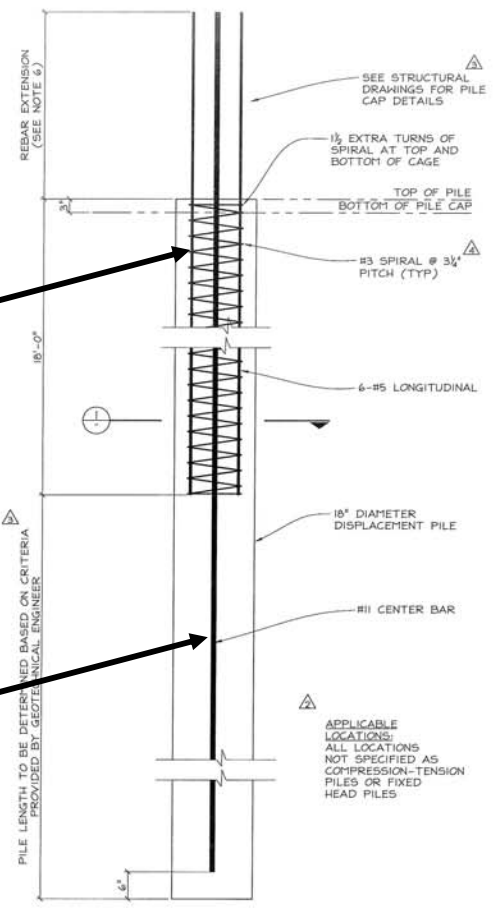


Pile Cap Work

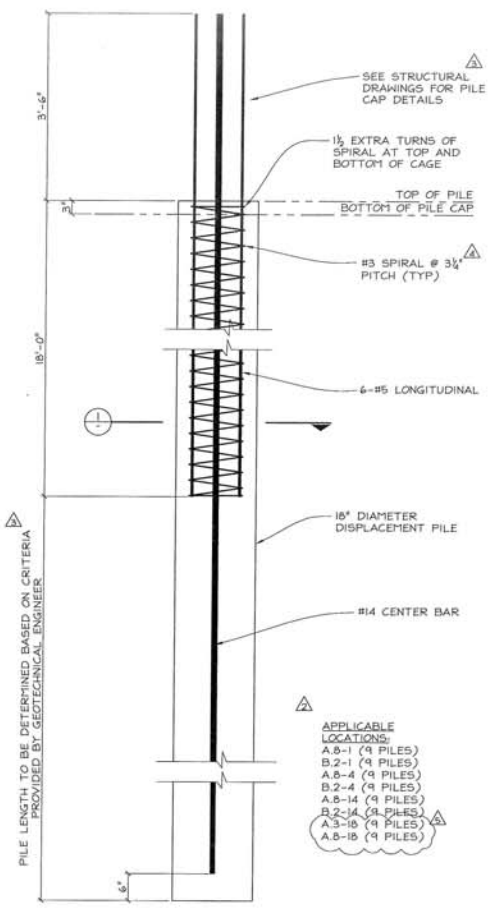
Site Soil OMEGA Pile Design Construction QA/QC

Top Cage

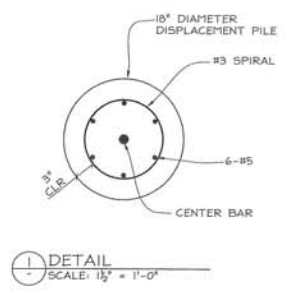
Center Bar



COMPRESSION-ONLY PILE
SCALE: 1" = 1'-0"



COMPRESSION-TENSION PILE
SCALE: 1" = 1'-0"



- NOTES:**
- PILE GROUT: $f'_c = 5000$ PSI.
 - REINFORCING STEEL: ASTM A615, GRADE 60.
 - COMPRESSION-ONLY PILE DESIGN LOADS:
 $P = 280$ KIPS (ASD)
 $P_u = 380$ KIPS (LRFD)
 $V_u = 14.7$ KIPS (LRFD)
 $M_u = 630$ KIP-IN (LRFD)
 - COMPRESSION-TENSION PILE DESIGN LOADS:
 $P_{max} = 280$ KIPS COMPRESSION (ASD)
 $P_{min} = -45$ KIPS TENSION (ASD)
 $P_{u,max} = 380$ KIPS COMPRESSION (LRFD)
 $P_{u,min} = -90$ KIPS TENSION (LRFD)
 $V_u = 14.7$ KIPS (LRFD)
 $M_u = 630$ KIP-IN (LRFD)
 - PILE LENGTH TO BE BASED ON INSTALLATION REQUIREMENTS PRESENTED IN THE PROJECT GEOTECHNICAL REPORT.
 - REBAR EXTENSION SHALL BE 3 INCHES LESS THAN DEPTH OF PILE CAP.

K:\BLCE\2008\8008-MALCOLM DRILLING\0808-APGD PILES.DWG, 7/10/2008 12:41:16 PM

<p>7-10-08 ADDED COMPRESSION-TENSION PILE LOCATIONS HC ESI</p> <p>4-23-08 REVISED PER STRUCTURAL ENGINEER COMMENT HC ESI</p> <p>4-9-08 REVISIONS PER SF BUILDING DEPARTMENT PLAN CHECK HC ESI</p> <p>3-17-08 ADD FIXED HEAD PILE TYPE HC ESI</p> <p>3-3-08 REVISED PER STRUCTURAL ENGINEER'S COMMENTS HC ESI</p>	<p>OWNER: ALEXANDRIA RE EQUITIES P.S.</p> <p>CLIENT: MALCOLM DRILLING Company, Inc. 3508 Breakwater Court, Hayward, CA 94545</p> <p>BLCE REGISTERED PROFESSIONAL ENGINEER NO. 056713 EXP. 6/30/09 STATE OF CALIFORNIA</p> <p>1670 OWENS STREET SAN FRANCISCO, CA AUGER PRESSURE GROUTED DISPLACEMENT (APGD) PILES DETAILS AND NOTES 1 OF 2</p>	<p>SHEET APGD-1 OF DRAWING NO. 1 OF 2</p> <p>REVISION: JUL 10, 2008</p> <p>SCALE: AS NOTED</p>
<p>NO. DATE REVISIONS BY CK</p> <p>CADD FILE NAME: _____</p> <p>PLOT DATE: _____</p> <p>APPROVES: _____ DATE: _____</p> <p>DESIGN: ESI, CHECKED: DJB, DRAWN: HJC</p> <p>CONTRACT: _____ DATE: FEB, 12, 2008 PER: 8008</p>		

- 750 kip Compression Tests
- 225 kip Tension Test

Loadcell

Spherical
Bearing

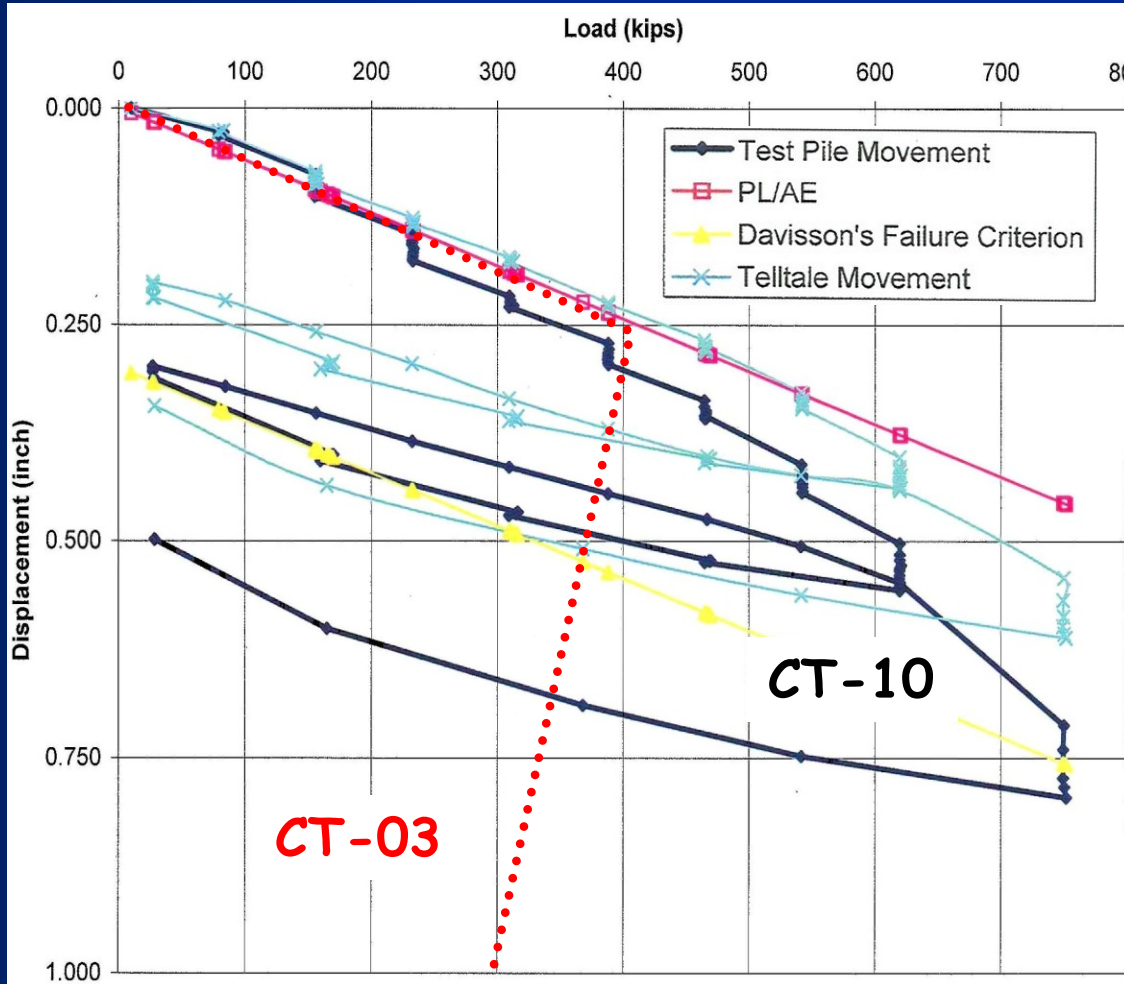
500T Jack



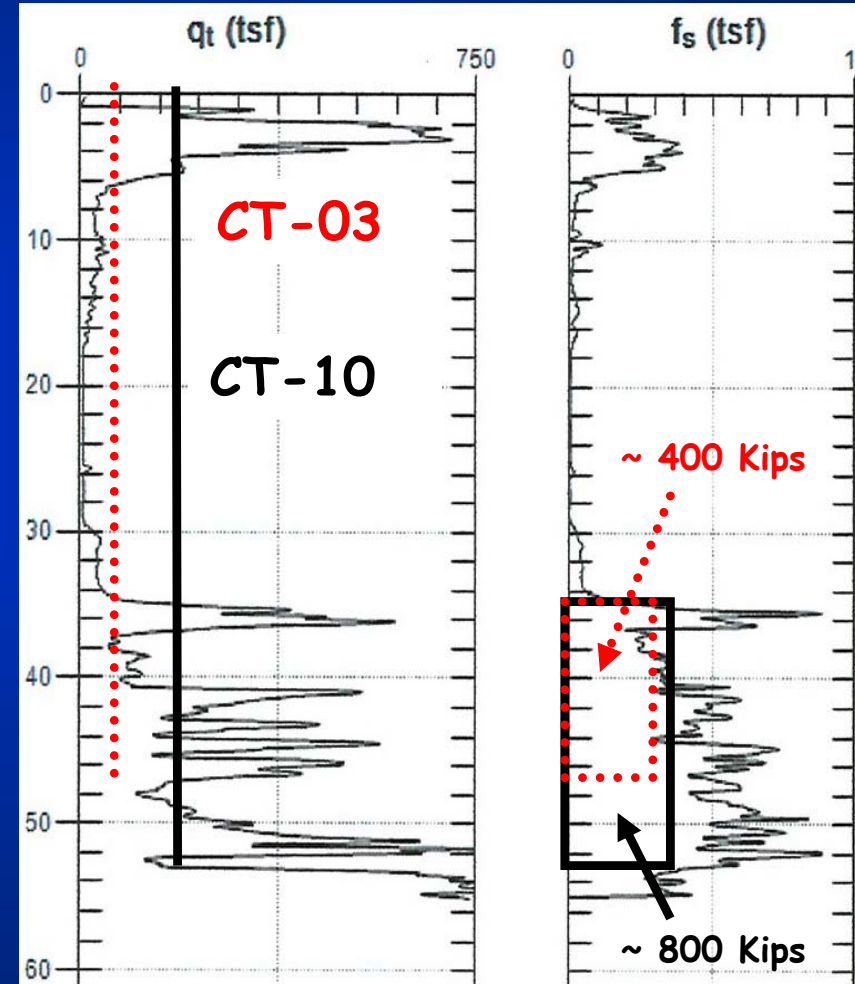
Telltail



Pile Length Adjustment



Load-Settlement Curve



CPT Sounding

Design Considerations

1. SPT and/or CPT Soil Investigation
2. Direct Assessment of Bearing Capacity
 - Van Impe, Bustamante, Ne Smith
3. Test Pile Installation with Electronic Monitoring of Installation Parameter (B-Tronic)
4. Static Load Test Program
5. Relate Test Results to **Penetration Resistance**



CPT Resistance

Geotechnical Site Report



Test Pile Installation and Recording of **Penetration Resistance** (ALPHA Value)



Pile Load Test (s)



Comparison of Test Load and ALPHA Value

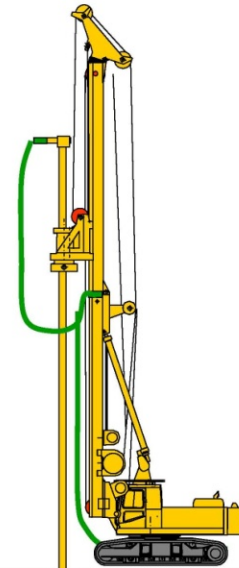


Set Target ALPHA Value in Drilling Software (B-Tronic)



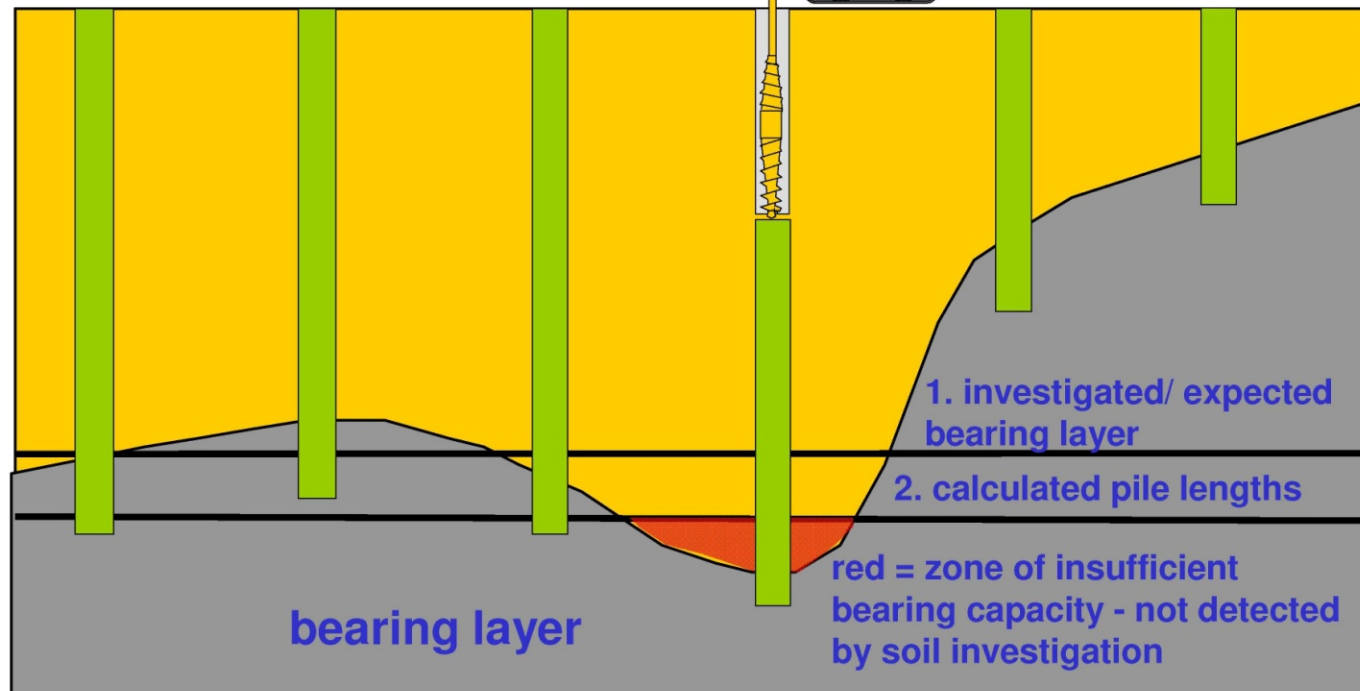
Adapted Pile Length (Pile-by-Pile Design) due to Self-Investigating Drilling System using the Target ALPHA Value

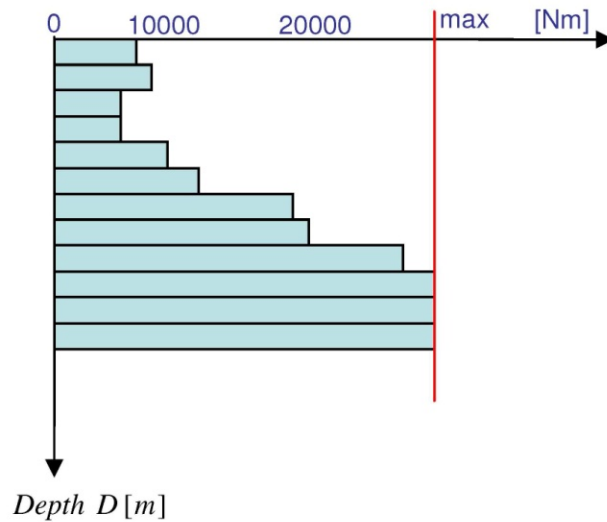
Adapted pile lengths due to self investigation system



Pile-by-Pile Design

Pile Depth Variation should be accepted as intrinsic component





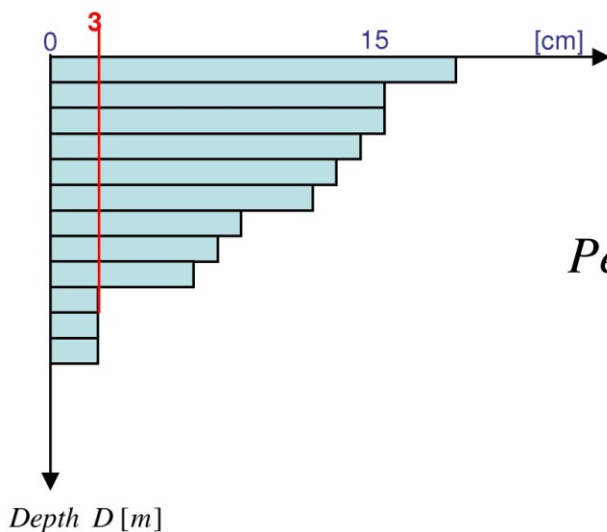
Torque [Nm]

$$\alpha = \frac{\text{torque}}{\text{penetration}}$$

ALPHA VALUE

[Penetration Resistance]

$$= \frac{240 \text{ kNm}}{0,03 \text{ m} / U} = 8000 [-]$$



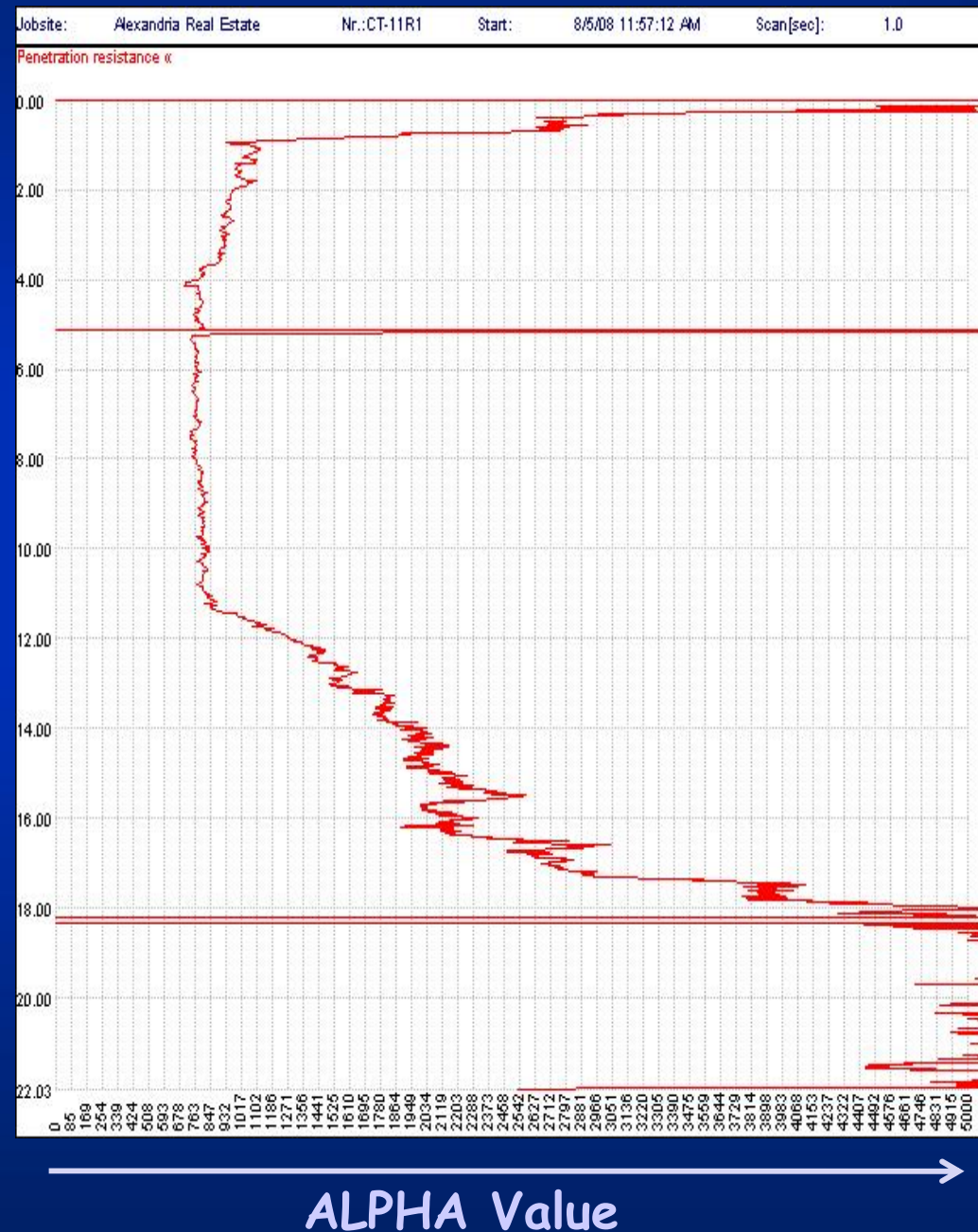
Penetration n $\left[\frac{m}{\text{rotation}} \right]$

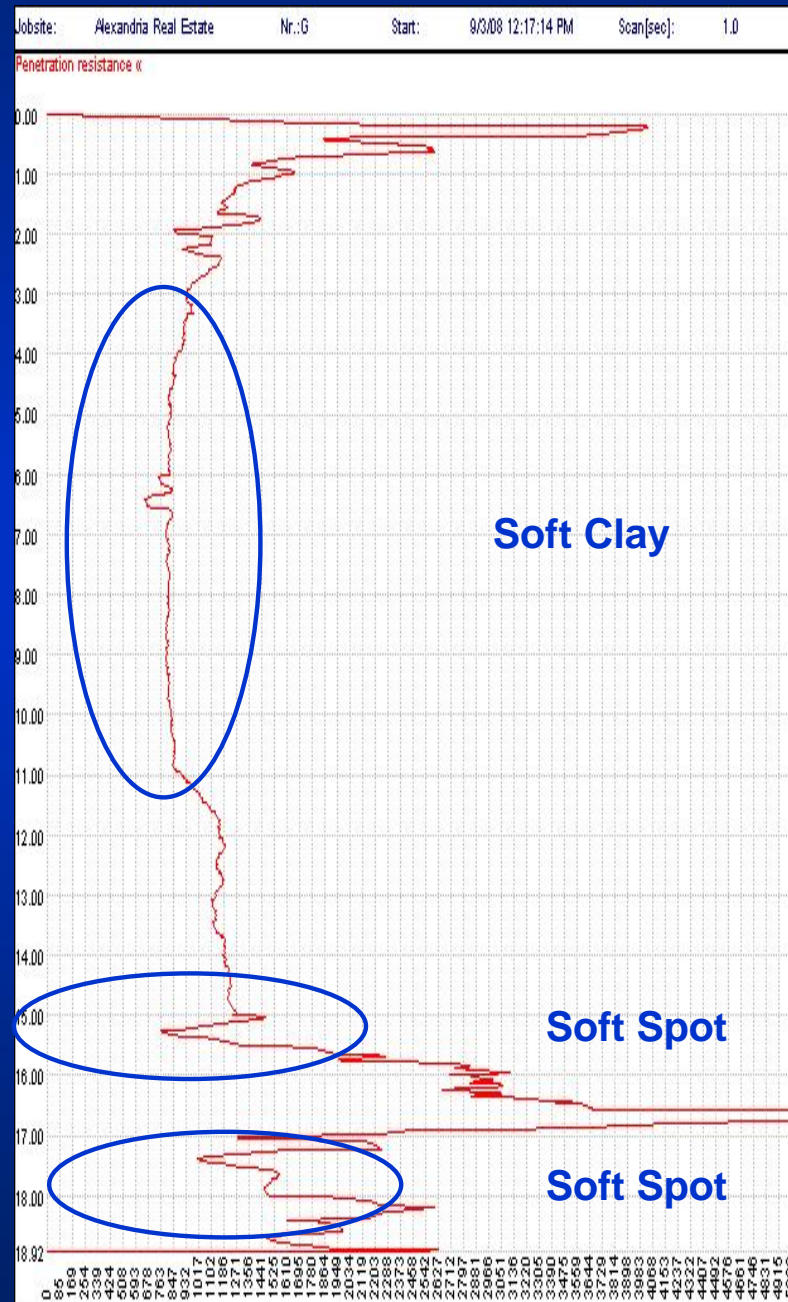
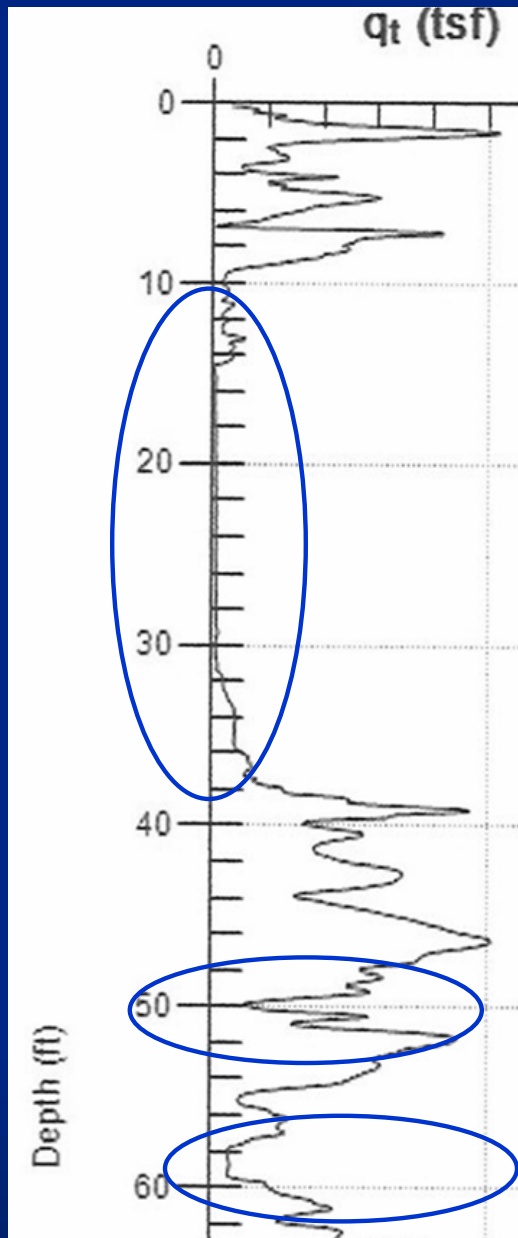
The Alpha value is an index for the penetration resistance and shows the bearing capacity of the soil.

ALPHA Value

[Penetration Resistance]

- Site Specific
- Tool Specific
- Drill Rig Specific
- Real Time Display
- 'Hole-by-Hole CPT'





- CPT Data
- Test Pile Data
- Indicator Piles



Installation
Criteria

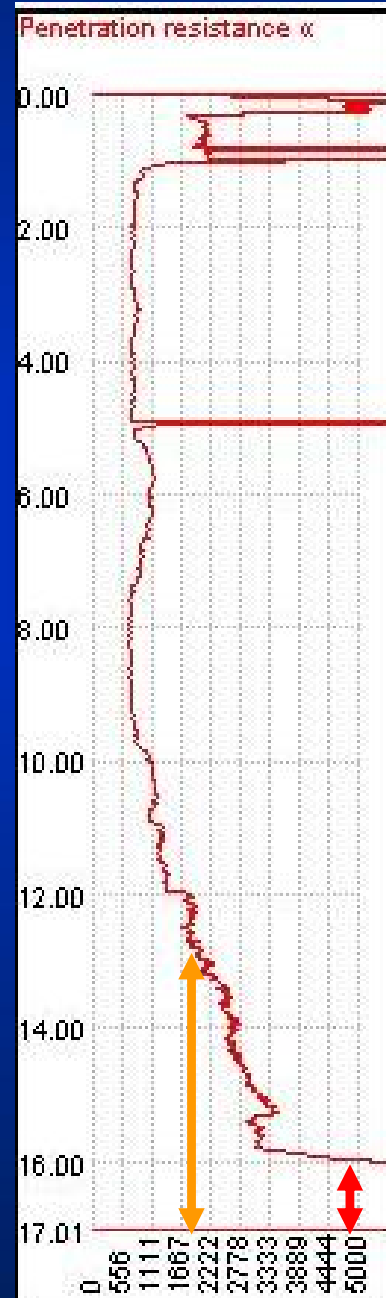


Alpha \geq 2,000 for 4 meter

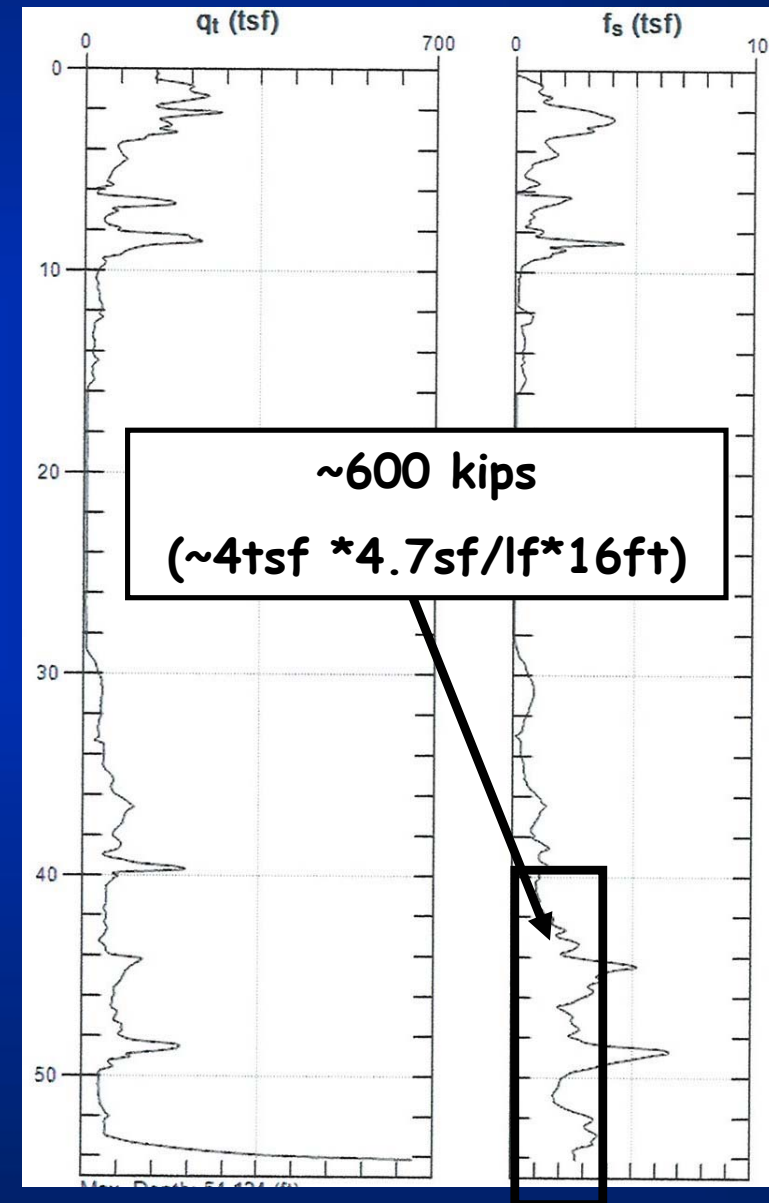
+

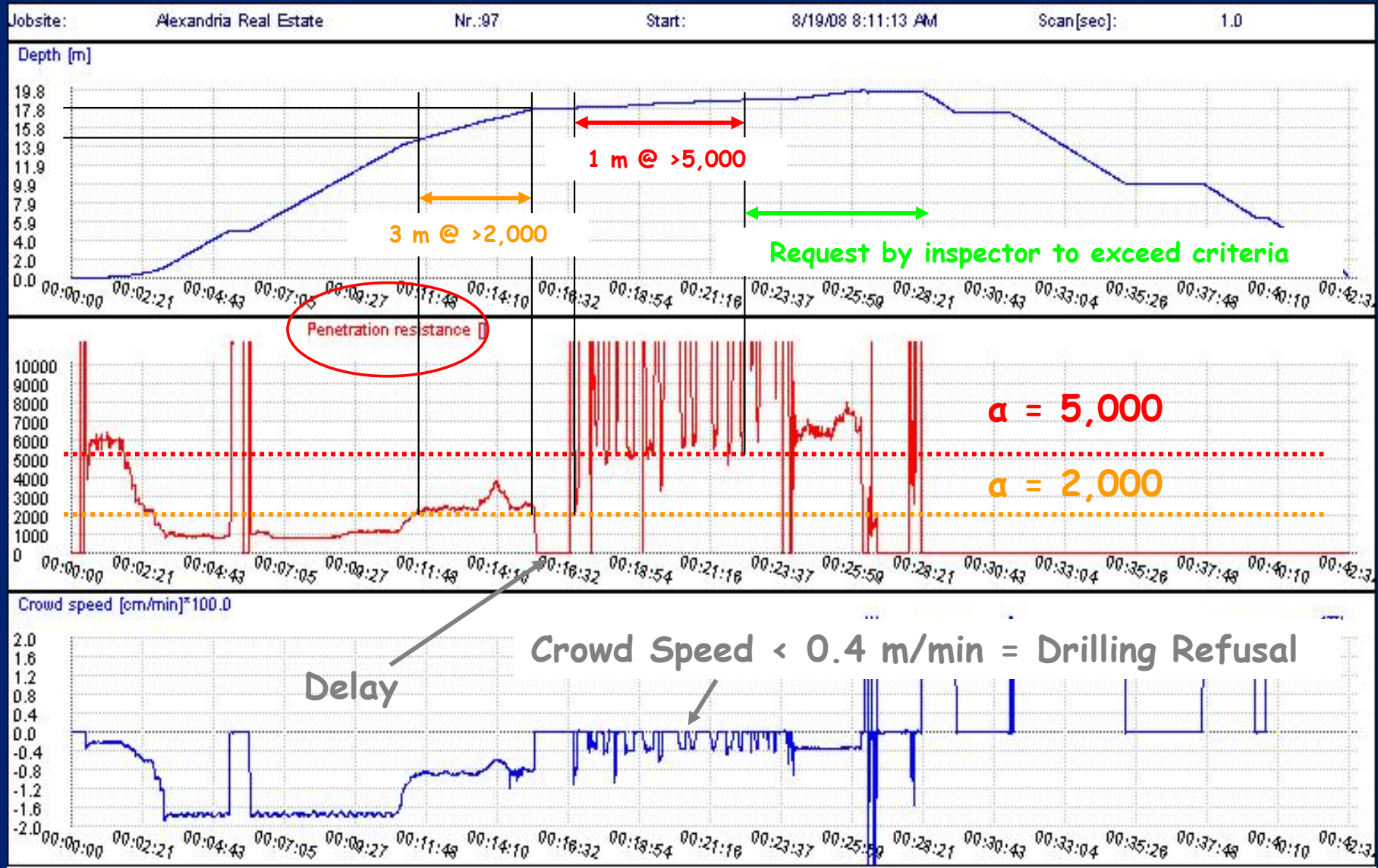
Alpha \geq 5,000 for 1 meter

Alpha Value



CPT Sounding





Time Related Penetration Resistance (ALPHA Value)




Operators View

--> -->		[Keyboard Icon]			
Depth		-1,50 m		Penetration resistance Penetration rate 	Jobsite data Work procedure Stop File administration Crowd assistant Interruption
Crowd speed		-4,17 m/min			
4,25					
Pressure		0,54 bar			
Concrete volume nominal (+ 20 %)		0,23 m³			
Concrete volume start (start: 0,2 bar)		0,00 m³			
		Strokes 0 Torque 18 % KDK 1 11 l/min			
Mast inclination -0,8 ° -0,5 °		drilling			
Menu		084 Check analog input All1 B1.10 101 Drilling mode reach			15 : 38

ALPHA Value - Why?

- Optimize Drilling Progress
- Less Wear and Tear on Tools and Machine
- Enables Pile-by-Pile Design
- Reproducible 'Test-Pile Conditions'
- Automatic QA/QC Protocols
- Pile Length Reduction

Drilling Log, FDP Piles



Malcolm Drilling

Jobsite: Alexandria Real Estate
Client: Malcolm Drilling Co. Project No.: 02-08-017

Drilling Rig: BG-40 Rotary Drive: Pile No.: CT-12R1
Operator: Danny Boswell Date: Aug 5, 2008
Diameter: 480 mm
Inclination: 0°

Concrete: Cement: kg/m³
Grain size: mm SFA: kg/m³
Consistency: WZ:

Nominal pile toe: 20.84 m
Actual pile toe: 20.84 m
Nominal pile length: 20.84 m
Actual pile length: 20.84 m
Empty bore length: 0 m
Act. concrete consumpt.: 3.612 m³
Nom. concrete consumpt.: 3.43 m³
Excess consumption: 0.182 m³

Drilling start: 1:23:06 PM Start of concreting: 1:44:58 PM
Drilling end: 1:44:57 PM End of concreting: 1:58:40 PM
Total time: 00:35:43 Pulling speed: 1.47 m/min

Concrete pressure [b...]	Penetration Rate [m/...]	Torque [%]	Concrete Amount. [V...]	Force(Push) [F]	Force(Pull) [F]	Penetration resistance...
0.00	0.00	0.00	0.00	0.00	0.00	0.00
2.00	2.00	2.00	2.00	2.00	2.00	2.00
4.00	4.00	4.00	4.00	4.00	4.00	4.00
6.00	6.00	6.00	6.00	6.00	6.00	6.00
8.00	8.00	8.00	8.00	8.00	8.00	8.00
10.00	10.00	10.00	10.00	10.00	10.00	10.00
12.00	12.00	12.00	12.00	12.00	12.00	12.00
14.00	14.00	14.00	14.00	14.00	14.00	14.00
16.00	16.00	16.00	16.00	16.00	16.00	16.00
18.00	18.00	18.00	18.00	18.00	18.00	18.00
20.00	20.00	20.00	20.00	20.00	20.00	20.00
20.84	20.84	20.84	20.84	20.84	20.84	20.84

Comments: Supervisor: Client:

Malcolm Drilling Company, Inc. - 3503 Breakwater Court, CA 94545 - PH (510)780-9181

FROM (TRH) JUL 01 2008 16:46/ST. 16:44/NO. 7527028108 P 0

Treadwell Rollo
D1 14th Street, 3rd Floor
Iland, California 94612
874-4500

OMEGA DRILLED DISPLACEMENT PILE LOG

Project: 1670 Owens Street, Mission Bay, San Francisco
Drilling Contractor: Malcolm Drilling Co.
Checked by: Date:

Malcolm Pile No: 285
TR Pile No: T-108
Zone: A or B
Pile Location: C-7

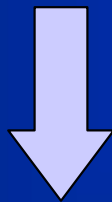
Project No: 4086.13
Date: 7-31-08
Field Engineer: KIS

Pile Diameter	480 mm	18 in.	Values from Computer Screen:
Ground Elevation	3' 10.3		Theoretical Volume (120%) 3.13 m ³
Pile Length	15.68 m	51.44 ft	Volume 1 (all strokes) 3.91 m ³
Tip Elevation	51.55		Volume 2 (after 0.3 bar) 3.19 m ³
Stroke Count	195	Calibration 0.021 /strk	Theoretical Volume (100%) 2.16 m ³ 9.198 ft ³
Volume per Stroke Count	4.10 m ³	144.11 ft ³	GROUT FACTOR 1.57
Flow Meter Volume % B.T.	4.42 m ³	153.10 ft ³	GROUT FACTOR 1.77
Drilling Start/Finish	0754 / 0807		Pumping Start/Finish 0810 / 0827

Depth(m)/Pene. Res. /Torque[%]/Crowd(m/min)	Depth(m)/Stroke Pressure(bar)/Crowd(m/min)
0 757/32/1.04 11320/1.04/0.32	0 410.0/2.20 (190) 510.0/1.33 (190) 51.5/1.91 (190)
0.410/29/1.20 11725/32/1.04 11320/1.04/0.32	0.410/29/1.20 11725/32/1.04 11320/1.04/0.32
0.820/30/1.10 11725/32/1.04 11320/1.04/0.32	0.820/30/1.10 11725/32/1.04 11320/1.04/0.32
1.230/32/1.04 11725/32/1.04 11320/1.04/0.32	1.230/32/1.04 11725/32/1.04 11320/1.04/0.32
1.640/32/1.04 11725/32/1.04 11320/1.04/0.32	1.640/32/1.04 11725/32/1.04 11320/1.04/0.32
2.050/32/1.04 11725/32/1.04 11320/1.04/0.32	2.050/32/1.04 11725/32/1.04 11320/1.04/0.32
2.460/32/1.04 11725/32/1.04 11320/1.04/0.32	2.460/32/1.04 11725/32/1.04 11320/1.04/0.32
2.870/32/1.04 11725/32/1.04 11320/1.04/0.32	2.870/32/1.04 11725/32/1.04 11320/1.04/0.32
3.280/32/1.04 11725/32/1.04 11320/1.04/0.32	3.280/32/1.04 11725/32/1.04 11320/1.04/0.32
3.690/32/1.04 11725/32/1.04 11320/1.04/0.32	3.690/32/1.04 11725/32/1.04 11320/1.04/0.32
4.100/32/1.04 11725/32/1.04 11320/1.04/0.32	4.100/32/1.04 11725/32/1.04 11320/1.04/0.32
4.510/32/1.04 11725/32/1.04 11320/1.04/0.32	4.510/32/1.04 11725/32/1.04 11320/1.04/0.32
4.920/32/1.04 11725/32/1.04 11320/1.04/0.32	4.920/32/1.04 11725/32/1.04 11320/1.04/0.32
5.330/32/1.04 11725/32/1.04 11320/1.04/0.32	5.330/32/1.04 11725/32/1.04 11320/1.04/0.32
5.740/32/1.04 11725/32/1.04 11320/1.04/0.32	5.740/32/1.04 11725/32/1.04 11320/1.04/0.32
6.150/32/1.04 11725/32/1.04 11320/1.04/0.32	6.150/32/1.04 11725/32/1.04 11320/1.04/0.32
6.560/32/1.04 11725/32/1.04 11320/1.04/0.32	6.560/32/1.04 11725/32/1.04 11320/1.04/0.32
6.970/32/1.04 11725/32/1.04 11320/1.04/0.32	6.970/32/1.04 11725/32/1.04 11320/1.04/0.32
7.380/32/1.04 11725/32/1.04 11320/1.04/0.32	7.380/32/1.04 11725/32/1.04 11320/1.04/0.32
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8.200/32/1.04 11725/32/1.04 11320/1.04/0.32	8.200/32/1.04 11725/32/1.04 11320/1.04/0.32
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9.020/32/1.04 11725/32/1.04 11320/1.04/0.32	9.020/32/1.04 11725/32/1.04 11320/1.04/0.32
9.430/32/1.04 11725/32/1.04 11320/1.04/0.32	9.430/32/1.04 11725/32/1.04 11320/1.04/0.32
9.840/32/1.04 11725/32/1.04 11320/1.04/0.32	9.840/32/1.04 11725/32/1.04 11320/1.04/0.32
10.250/32/1.04 11725/32/1.04 11320/1.04/0.32	10.250/32/1.04 11725/32/1.04 11320/1.04/0.32
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11.890/32/1.04 11725/32/1.04 11320/1.04/0.32	11.890/32/1.04 11725/32/1.04 11320/1.04/0.32
12.300/32/1.04 11725/32/1.04 11320/1.04/0.32	12.300/32/1.04 11725/32/1.04 11320/1.04/0.32
12.710/32/1.04 11725/32/1.04 11320/1.04/0.32	12.710/32/1.04 11725/32/1.04 11320/1.04/0.32
13.120/32/1.04 11725/32/1.04 11320/1.04/0.32	13.120/32/1.04 11725/32/1.04 11320/1.04/0.32
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13.940/32/1.04 11725/32/1.04 11320/1.04/0.32	13.940/32/1.04 11725/32/1.04 11320/1.04/0.32
14.350/32/1.04 11725/32/1.04 11320/1.04/0.32	14.350/32/1.04 11725/32/1.04 11320/1.04/0.32
14.760/32/1.04 11725/32/1.04 11320/1.04/0.32	14.760/32/1.04 11725/32/1.04 11320/1.04/0.32
15.170/32/1.04 11725/32/1.04 11320/1.04/0.32	15.170/32/1.04 11725/32/1.04 11320/1.04/0.32
15.580/32/1.04 11725/32/1.04 11320/1.04/0.32	15.580/32/1.04 11725/32/1.04 11320/1.04/0.32
15.990/32/1.04 11725/32/1.04 11320/1.04/0.32	15.990/32/1.04 11725/32/1.04 11320/1.04/0.32
16.400/32/1.04 11725/32/1.04 11320/1.04/0.32	16.400/32/1.04 11725/32/1.04 11320/1.04/0.32
16.810/32/1.04 11725/32/1.04 11320/1.04/0.32	16.810/32/1.04 11725/32/1.04 11320/1.04/0.32
17.220/32/1.04 11725/32/1.04 11320/1.04/0.32	17.220/32/1.04 11725/32/1.04 11320/1.04/0.32
17.630/32/1.04 11725/32/1.04 11320/1.04/0.32	17.630/32/1.04 11725/32/1.04 11320/1.04/0.32
18.040/32/1.04 11725/32/1.04 11320/1.04/0.32	18.040/32/1.04 11725/32/1.04 11320/1.04/0.32
18.450/32/1.04 11725/32/1.04 11320/1.04/0.32	18.450/32/1.04 11725/32/1.04 11320/1.04/0.32
18.860/32/1.04 11725/32/1.04 11320/1.04/0.32	18.860/32/1.04 11725/32/1.04 11320/1.04/0.32
19.270/32/1.04 11725/32/1.04 11320/1.04/0.32	19.270/32/1.04 11725/32/1.04 11320/1.04/0.32
19.680/32/1.04 11725/32/1.04 11320/1.04/0.32	19.680/32/1.04 11725/32/1.04 11320/1.04/0.32
20.090/32/1.04 11725/32/1.04 11320/1.04/0.32	20.090/32/1.04 11725/32/1.04 11320/1.04/0.32
20.500/32/1.04 11725/32/1.04 11320/1.04/0.32	20.500/32/1.04 11725/32/1.04 11320/1.04/0.32
20.910/32/1.04 11725/32/1.04 11320/1.04/0.32	20.910/32/1.04 11725/32/1.04 11320/1.04/0.32
21.320/32/1.04 11725/32/1.04 11320/1.04/0.32	21.320/32/1.04 11725/32/1.04 11320/1.04/0.32
21.730/32/1.04 11725/32/1.04 11320/1.04/0.32	21.730/32/1.04 11725/32/1.04 11320/1.04/0.32
22.140/32/1.04 11725/32/1.04 11320/1.04/0.32	22.140/32/1.04 11725/32/1.04 11320/1.04/0.32
22.550/32/1.04 11725/32/1.04 11320/1.04/0.32	22.550/32/1.04 11725/32/1.04 11320/1.04/0.32
22.960/32/1.04 11725/32/1.04 11320/1.04/0.32	22.960/32/1.04 11725/32/1.04 11320/1.04/0.32
23.370/32/1.04 11725/32/1.04 11320/1.04/0.32	23.370/32/1.04 11725/32/1.04 11320/1.04/0.32
23.780/32/1.04 11725/32/1.04 11320/1.04/0.32	23.780/32/1.04 11725/32/1.04 11320/1.04/0.32
24.190/32/1.04 11725/32/1.04 11320/1.04/0.32	24.190/32/1.04 11725/32/1.04 11320/1.04/0.32
24.600/32/1.04 11725/32/1.04 11320/1.04/0.32	24.600/32/1.04 11725/32/1.04 11320/1.04/0.32
25.010/32/1.04 11725/32/1.04 11320/1.04/0.32	25.010/32/1.04 11725/32/1.04 11320/1.04/0.32
25.420/32/1.04 11725/32/1.04 11320/1.04/0.32	25.420/32/1.04 11725/32/1.04 11320/1.04/0.32
25.830/32/1.04 11725/32/1.04 11320/1.04/0.32	25.830/32/1.04 11725/32/1.04 11320/1.04/0.32
26.240/32/1.04 11725/32/1.04 11320/1.04/0.32	26.240/32/1.04 11725/32/1.04 11320/1.04/0.32
26.650/32/1.04 11725/32/1.04 11320/1.04/0.32	26.650/32/1.04 11725/32/1.04 11320/1.04/0.32
27.060/32/1.04 11725/32/1.04 11320/1.04/0.32	27.060/32/1.04 11725/32/1.04 11320/1.04/0.32
27.470/32/1.04 11725/32/1.04 11320/1.04/0.32	27.470/32/1.04 11725/32/1.04 11320/1.04/0.32
27.880/32/1.04 11725/32/1.04 11320/1.04/0.32	27.880/32/1.04 11725/32/1.04 11320/1.04/0.32
28.290/32/1.04 11725/32/1.04 11320/1.04/0.32	28.290/32/1.04 11725/32/1.04 11320/1.04/0.32
28.700/32/1.04 11725/32/1.04 11320/1.04/0.32	28.700/32/1.04 11725/32/1.04 11320/1.04/0.32
29.110/32/1.04 11725/32/1.04 11320/1.04/0.32	29.110/32/1.04 11725/32/1.04 11320/1.04/0.32
29.520/32/1.04 11725/32/1.04 11320/1.04/0.32	29.520/32/1.04 11725/32/1.04 11320/1.04/0.32
29.930/32/1.04 11725/32/1.04 11320/1.04/0.32	29.930/32/1.04 11725/32/1.04 11320/1.04/0.32
30.340/32/1.04 11725/32/1.04 11320/1.04/0.32	30.340/32/1.04 11725/32/1.04 11320/1.04/0.32
30.750/32/1.04 11725/32/1.04 11320/1.04/0.32	30.750/32/1.04 11725/32/1.04 11320/1.04/0.32
31.160/32/1.04 11725/32/1.04 11320/1.04/0.32	31.160/32/1.04 11725/32/1.04 11320/1.04/0.32
31.570/32/1.04 11725/32/1.04 11320/1.04/0.32	31.570/32/1.04 11725/32/1.04 11320/1.04/0.32
31.980/32/1.04 11725/32/1.04 11320/1.04/0.32	31.980/32/1.04 11725/32/1.04 11320/1.04/0.32
32.390/32/1.04 11725/32/1.04 11320/1.04/0.32	32.390/32/1.04 11725/32/1.04 11320/1.04/0.32
32.800/32/1.04 11725/32/1.04 11320/1.04/0.32	32.800/32/1.04 11725/32/1.04 11320/1.04/0.32
33.210/32/1.04 11725/32/1.04 11320/1.04/0.32	33.210/32/1.04 11725/32/1.04 11320/1.04/0.32
33.620/32/1.04 11725/32/1.04 11320/1.04/0.32	33.620/32/1.04 11725/32/1.04 11320/1.04/0.32
34.030/32/1.04 11725/32/1.04 11320/1.04/0.32	34.030/32/1.04 11725/32/1.04 11320/1.04/0.32
34.440/32/1.04 11725/32/1.04 11320/1.04/0.32	34.440/32/1.04 11725/32/1.04 11320/1.04/0.32
34.850/32/1.04 11725/32/1.04 11320/1.04/0.32	34.850/32/1.04 11725/32/1.04 11320/1.04/0.32
35.260/32/1.04 11725/32/1.04 11320/1.04/0.32	35.260/32/1.04 11725/32/1.04 11320/1.04/0.32
35.670/32/1.04 11725/32/1.04 11320/1.04/0.32	35.670/32/1.04 11725/32/1.04 11320/1.04/0.32
36.080/32/1.04 11725/32/1.04 11320/1.04/0.32	36.080/32/1.04 11725/32/1.04 11320/1.04/0.32
36.490/32/1.04 11725/32/1.04 11320/1.04/0.32	36.490/32/1.04 11725/32/1.04 11320/1.04/0.32
36.900/32/1.04 11725/32/1.04 11320/1.04/0.32	36.900/32/1.04 11725/32/1.04 11320/1.04/0.32
37.310/32/1.04 11725/32/1.04 11320/1.04/0.32	37.310/32/1.04 11725/32/1.04 11320/1.04/0.32
37.720/32/1.04 11725/32/1.04 11320/1.04/0.32	37.720/32/1.04 11725/32/1.04 11320/1.04/0.32
38.	

OMEGA Piles by Malcolm Drilling

- Cost Efficient Pile System
- Environmental Friendly
- State of the Art QA/QC



Ideal for Design-Build



Thank You

