Final Report of Special Inspections

Project: *Widgery Wharf Building 1*

Location: *Union Wharf, Portland, ME*

Owner: *Proprietors of Union Wharf*

Owner's Address: *36 Union Wharf, Portland, ME*

Architect of Record: *Archetype, PA*

Structural Engineer of Record: *Structural Design Consulting, Inc.*
618 Scenic Road, Unit 2
Laconia, NH 03246

To the best of my information, knowledge and belief, the Special Inspections required for this project, and itemized in the *Statement of Special Inspections* submitted for permit, have been performed and all discovered discrepancies have been reported and resolved other than the following:

Comments: *No outstanding issue*

(Attach continuation sheets if required to complete the description of corrections.)

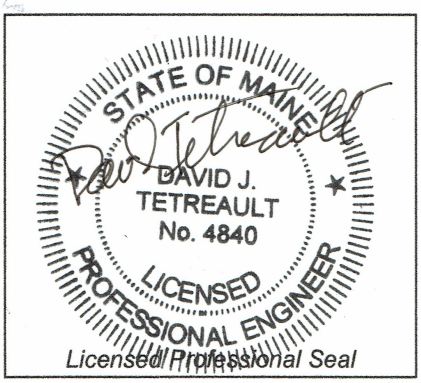
Interim reports submitted prior to this final report form a basis for and are to be considered an integral part of this final report.

Respectfully submitted,
Special Inspector

David J. Tetreault, P.E.
(Type or print name)

David Tetreault
Signature

06/20/18
Date



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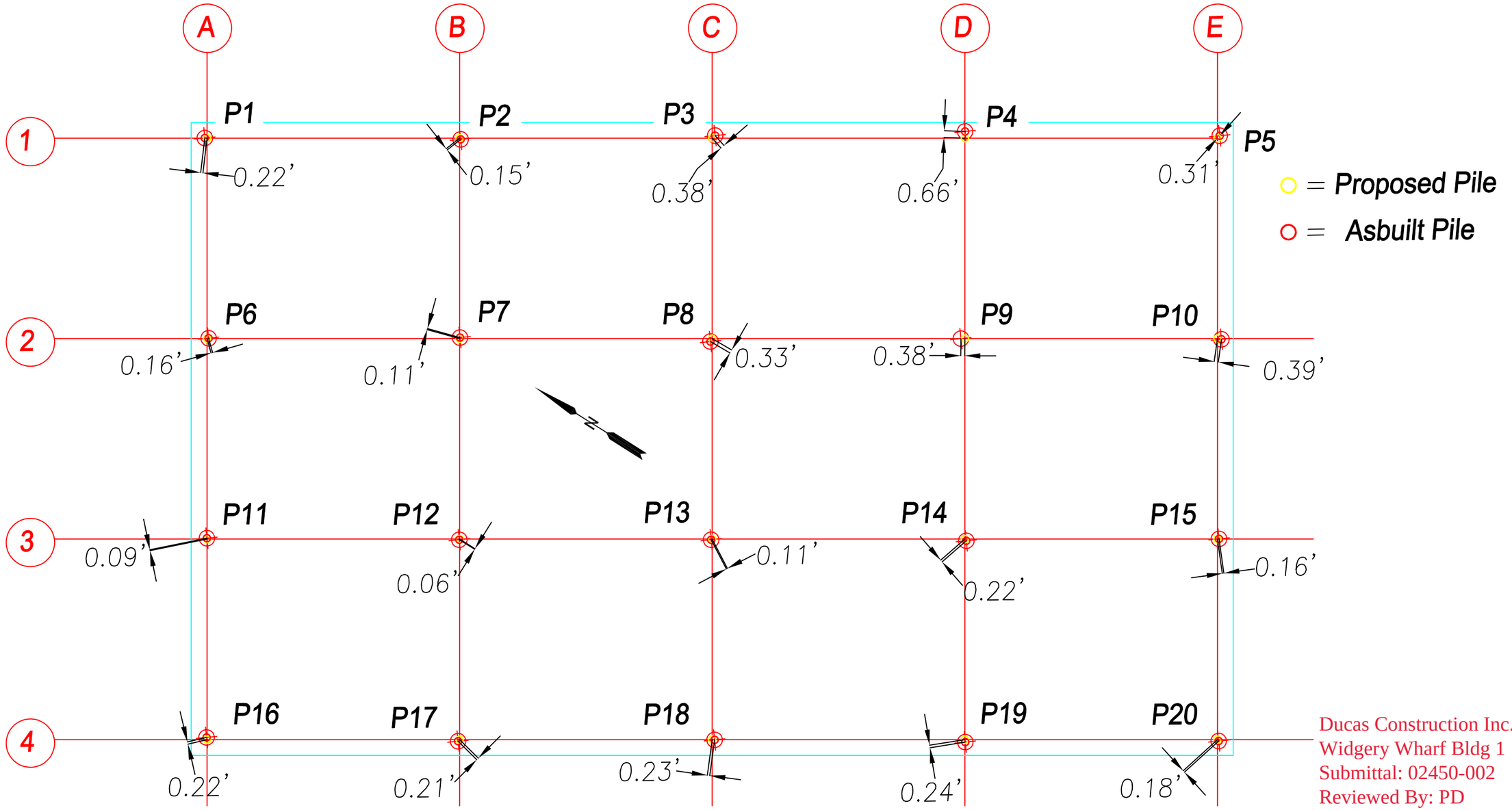


Ducas Construction Inc.
Widgery Wharf Bldg 1
Submittal: 02450-002
Reviewed By: PD
Date: 12/7/17

Widgery Wharf - Building 1
Pipe Pile Asbuilt Plan
1" = 10'

H.B. FLEMING
89 PLEASANT AVENUE
SO. PORTLAND, ME 04106
P: 207-799-8514 F: 207-799-8538
www.hbfleming.com

TITLE: Pipe Pile Asbuilt Plan
PROJECT: Widgery Wharf - Building 1
LOCATION: Portland, ME
DATE: 12/07/17
SCALE: As Noted

17-0670 M

December 11, 2017

CM Union LLC
Attn: Charlie Poole
36 Union Wharf
Portland, ME 04101

Ducas Construction Inc.
Widgery Wharf Building 1
Submittal: 02450-003
Reviewed By: PD
Date: 12/13/17
FOR RECORD

Subject: Pile Installation Summary
Office Building
Widgery Wharf
Portland, Maine

Dear Charlie:

In accordance with our Revised Proposal dated July 5, 2017, we have observed pile foundation installation for the subject project. H.B. Fleming, Inc. installed 20, 10.75-inch by 0.5-inch wall steel pipe piles (numbers 1 through 20) between November 22, and December 7, 2017. Our observations indicate a total of 1,987.9 linear feet of pile were installed. The piles were driven with an APE D19-42 Single Acting Diesel Hammer. Pile capacity and corresponding set criteria were evaluated by Geosciences Testing & Research, Inc., working under subcontract to H.B. Fleming, Inc. A pile installation summary table is appended. We look forward to being of continuing service to you. Please contact us with any questions.

Sincerely,

S.W.COLE ENGINEERING, INC.

Evan M. Walker, P.E.
Geotechnical Engineer

EMW:red
Encl.

S.W.COLE ENGINEERING, INC.

PILE DRIVING SUMMARY

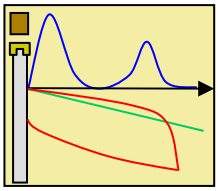
Client:	CM Union LLC	S.W.COLE Job #:	17-0670
General Contractor:	Ducas Construction, Inc.	Project:	Office Building
Pile Contractor:	H.B. Fleming, Inc.	Location:	Widgery Wharf, Portland, ME
Pile Hammer:	APE D19-42 Single Acting Diesel	Rated Energy (ft-lbs):	42,800
Pile Type:	10.75" O.D. x 0.5" Wall Seconday Pipe, 45 ksi Steel	Design Compressive Capacity:	85 Tons

Pile #	Driven Length (feet)	Trim for Splice (feet)	First Splice (feet)	Trim for Second Splice (feet)	Second Splice (feet)	Final Cut-off (feet)	In-place Length (feet)	Cut-off Elevation (feet)	Tip Elevation (feet)	Final Set (blows/inch) Last 3 inches			Date Final Set	Remarks
1	42.0	0.1	41.7	0.3	41.8	27.8	97.3	5.83	-91.5	8	9	11-0"	12/5/17	
2	41.3	0.1	42.0	0.3	42.0	26.8	98.1	5.83	-92.3	11-0"			12/5/17	
3	41.9	0.0	41.7	0.3	41.0	27.3	97.0	5.33	-91.7	2	2	11-0"	12/4/17	
4	41.3	0.1	40.3	0.6	40.1	19.0	102.0	5.33	-96.7	8	8	11-0"	12/5/17	
5	42.3	0.1	40.8	0.3	41.9	25.1	99.5	4.83	-94.7	8	8	11-0"	12/5/17	
6	41.9	0.1	40.6	0.4	41.3	22.9	100.4	5.83	-94.6	11	19	15	11/27/17	Test Pile with PDA
7	41.8	0.0	41.8	0.3	40.5	23.9	99.9	5.83	-94.1	5	5	11-0"	12/5/17	
8	44.5	0.1	41.9	0.3	24.0	10.4	99.6	5.33	-94.3	11-0"			12/6/17	Obstruction at 6 feet (elevation 2' ±)
9	41.5	0.1	40.4	0.3	24.6	3.4	102.7	5.33	-97.4	6	11-0"		12/6/17	
10	40.7	0.1	41.1	0.2	24.6	4.1	102.0	4.83	-97.2	6	6	11-0"	12/6/17	
11	41.0	0.1	40.9	0.3	41.8	21.4	101.9	5.83	-96.1	8	8	11-0"	12/5/17	
12	40.9	0.1	41.2	0.3	40.6	23.2	99.1	5.83	-93.3	11-0"			12/5/17	
13	42.0	0.1	41.7	0.3	21.9	7.5	97.7	5.83	-91.9	4	7	11-0"	12/6/17	
14	43.4	0.1	43.2	0.4	16.3	4.2	98.2	5.33	-92.9	9	11-0"		11/28/17	
15	42.2	0.1	41.8	0.1	19.2	1.2	101.8	4.83	-97.0	7	11	11-0"	11/28/17	
16	40.9	0.0	41.1	0.3	40.0	21.8	99.9	5.83	-94.1	4	7	11-0"	12/4/17	
17	42.0	0.0	41.6	0.3	40.5	27.0	96.8	5.83	-91.0	6	11-0"		12/5/17	
18	42.5	0.0	40.2	0.1	23.0	12.5	93.1	5.83	-87.3	11-0"			12/7/17	
19	41.9	0.1	40.9	0.5	25.7	8.9	99.0	5.33	-93.7	7	11	11	12/6/17	
20	40.3	0.0	40.9	0.5	40.2	19.0	101.9	4.83	-97.1	8	13	16	11/27/17	Test Pile with PDA
						Total =	1987.9	feet						

Prepared by: T. Demers
Reviewed by: E. Walker

GEOSCIENCES TESTING AND RESEARCH, INC.

55 Middlesex Street, Suite 225, N. Chelmsford, MA 01863
Ph: (978)251-9395, Fx: (978)251-9396



November 29, 2017 GTR Project # 17.316

Mr. John Linscott IV, P.E.
H.B. Fleming, Inc.
89 Pleasant Street
South Portland, ME 04106

RE: Dynamic Pile Testing Report
Widgery Wharf
Portland, Maine

Dear Scotty:

At your request, we have performed dynamic pile testing at the above-referenced site on November 28, 2017. The dynamic testing was requested in order to evaluate pile capacity, driving stresses, and hammer performance during test pile installation. Testing was conducted using the Pile Driving Analyzer™ (PDA), which records, digitizes, and processes the force and acceleration signals for use in the Case Method and CAPWAP analyses. The dynamic testing was carried out in general accordance with ASTM D4945, "Standard Test Method for High Strain Dynamic Testing of Piles".

Background and Site Description

Steel pipe piles (CEP 10.75" x 0.5" Wall) were driven for the support of the structure. Two (2) test piles, designated as Piles #6, and #20, were installed and tested during the end of driving (EOD) on November 28, 2017. Refer to Table 1 for details regarding the test piles.

Field Details

Subsurface Conditions

Refer to the geotechnical report and/or borings logs for further details on the subsurface conditions.

Pile Details

Steel CEP 10.75" x 0.5" wall piles 120 feet in length were driven for the support of the structure. We understand the ultimate capacity is 320 kips (160 tons). The pile area is 16.1 square inches. The allowable compressive and tensile driving stresses are 40.5 ksi (AASHTO guidelines of 90% of the 45 ksi yield strength). Piles were fitted with cast steel driving points.

Driving System

An APE D19-42 single acting diesel hammer was used to drive the piles. The maximum rated energy for the hammer is 47.1 kip-ft (based on a ram weight of 4.2 kips and a stroke 11.3 feet).

Instrumentation

The instrumentation consists of two strain gages and two accelerometer transducers attached below the top of the piles. One strain gage and one accelerometer were placed on opposite sides of the pile to minimize the effects of uneven impact and pile bending. This instrumentation provides information about driving stresses (compressive and tensile) and pile integrity, hammer performance (transferred energy), and pile bearing capacity.

The PDA is a computer fitted with a data acquisition and signal conditioning system. During driving, the strain and acceleration signals are recorded and processed for each hammer blow. The strain signal is converted to a force record and the acceleration signal is converted to a velocity record. The PDA saves selected hammer blows containing this information to disk and determines the compressive stresses, displacement, and energy at the point of measurement (pile top). In addition, the pile bearing capacity can be estimated in the field using the Case Method. This information can be viewed on the computer screen during driving. Selected blows can be further processed to predict the static pile capacity using the CAPWAP analysis. Refer to Appendix A for literature on the dynamic testing, the Case Method, and CAPWAP.

Results

General

The results of the dynamic testing program are summarized in Table 1, which includes the driven depth, blow count, stroke, maximum transferred energy, maximum pile top displacement, and maximum compressive stress at the gage location and pile tip. The blow count was recorded by others.

Also included in Table 1 is the pile bearing capacity as determined by the Case Method in the field and CAPWAP analysis in the office. Three separate PDA plots of various parameters (maximum transferred energy and stroke - left plot, RMX Case Method capacity with Jc=0.7 and Jc=0.9 - middle plot, and maximum measured compressive stress at the pile top and max estimated compressive stress at the pile tip - right plot) are presented for the test piles with Blow Number in Appendix B. Appendix B also contains the above data, and additional data, in tabular form.

In Table 1, the Case Method capacity represents an average over the blows indicated at end of driving (EOD). CAPWAP analyses were performed on selected blow from EOD data for each test pile. Appendix C contains the full results of the CAPWAP analyses and Table 2 summarizes the CAPWAP results.

Field Observations and Hammer Performance

Test Piles #6 and #20 were initially driven on November 27, 2017 to a depth of around 99 to 100 feet below grade. The dynamic gages were then attached and the piles were driven around 6 inches (bpi). The final blow count ranged between 8 and 16 blows per inch. The hammer was operated at the maximum fuel setting resulting in a 7 to 7.5 ft stroke (15 to 17 kip-ft transferred energy).

Pile Integrity and Stresses

The maximum compressive and tensile driving stresses were below the allowable limit (40.5 ksi) throughout testing. The pile cap should be positioned directly over the pile axial center of gravity to maintain good hammer alignment during driving. This minimizes bending stresses and keeps local stress concentrations to a minimum. There were no signs of damage or significant misalignment between the pile and hammer during testing.

Pile Bearing Capacity

The RX7 Case Method field capacity was around 385 kips at 8 blows per inch and 430 kips at 16 blows per inch, respectively. The EOD CAPWAP capacities were 365 and 390 kips for blow counts of 8 bpi and 16 bpi, respectively. Table 2 presents the results of the CAPWAP analyses in more detail. The total capacity, frictional capacity, end bearing capacity, and percentage of end bearing are included. The quake and damping soil parameters as determined from the CAPWAP analyses are also presented in Table 2.

Conclusions

The presented data from the dynamic measurements and their analyses leads to the following findings and conclusions.

1. The EOD CAPWAP capacities were 365 and 390 kips for blow counts of 8 bpi and 16 bpi, respectively. These capacities are based on the hammer operating at the maximum fuel setting resulting in a stroke of around 7 to 7.5 feet (corresponding to an averaged transferred energy of around 15 to 17 kip-ft).

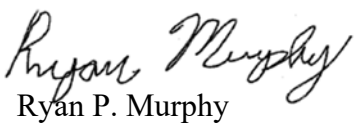
2. The maximum compressive and tensile driving stresses were below the allowable limit of 40.5 ksi during testing. The dynamic records did not indicate pile damage.

3. We recommend a driving criterion of 8 blows per inch for 3 consecutive inches or 11 blows for 1 inch. The hammer should be operated at the maximum fuel setting (stroke of around 7 to 7.5 feet and transferred energy of 15 to 17 kip-ft).

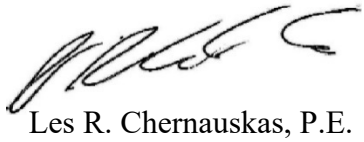
Static pile capacity evaluations determined from dynamic testing provide an estimate of the axial pile bearing capacity at the time of testing. At very high blow counts (low pile set), the Case Method and CAPWAP analyses tend to predict lower capacities, since not all of the soil resistance may be fully mobilized, particularly at the pile toe. Other factors not considered in this analysis are bending, downdrag, lateral and uplift requirements, cyclic loading, effective stress changes (e.g. due to changes in the water table, excavations, and/or fills), settlement, and pile group effects. The foundation designer should evaluate if any of these issues are applicable to the pile design.

This report has been prepared in accordance with generally accepted geotechnical engineering principles with specific application to this project. Our conclusions are based on applicable standards of practice, including any information reported to and/or prepared for us. No other warranty, expressed or implied, is made. If you have any questions regarding this report, please do not hesitate to contact us.

Sincerely,
Geosciences Testing and Research, Inc.



Ryan P. Murphy
Geotechnical Engineer

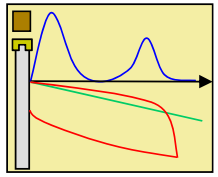


Les R. Chernauskas, P.E.
Principal

Attachments: Tables 1 and 2, Appendices A through C
17.316 Widgery Wharf - PDA Report

TABLES

TABLE 1
SUMMARY OF DYNAMIC TESTING
WIDGERY WHARF
PORTLAND, ME
APE D19-42 DIESEL HAMMER - CEP 10.75 x 0.5 Wall

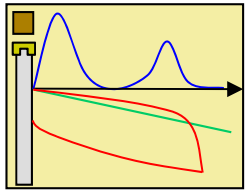


Test Pile	Date	Time of[1] Driving	Driven[2] Depth (feet)	Observed[3] Blow Count bpi	Blow Number(s)	Stroke[4]	Maximum[4] Transferred Energy (kip-ft)	Maximum[4] Displacement (inches)	Maximum[4] Comp. Stress Pile Top (ksi)	Maximum[5] Comp. Stress Pile Tip (ksi)	Case[6] Method Capacity (kips)	CAPWAP Capacity (kips)
6	11/28/2017	EOD	99	11	20 to 30	7.4	17.3	0.86	27.1	26.7	386	390
				19, 15	31 to 63	7.4	17.2	0.86	27.1	28.3	411	-
20	11/28/2017	EOD	100	8, 8	25 to 40	7.3	15.4	0.78	25.2	30.7	386	365
				13, 16	41 to 69	7.4	15.8	0.80	25.6	32.3	429	-

Notes:

1. Indicates that the data was obtained during the end of drive (EOD) .
2. Driven depth is referenced from grade next to pile.
3. The blow count was reported by others.
4. The maximum transferred energy, stroke, maximum pile top displacement, and maximum pile top compressive stress are determined by the PDA at the gage locations. These values represent an average over the blow(s) indicated.
5. The maximum compressive stress at the pile tip is estimated by the PDA. These values represent an average over the blow(s) indicated.
6. The Case Method capacity was determined using the RMX method and a JC value of 0.7. These values represent an average over the blow(s) indicated.

TABLE 2
SUMMARY OF CAPWAP RESULTS
WIDGERY WHARF
PORTLAND, ME
APE D19-42 DIESEL HAMMER - CEP 10.75 x 0.5 Wall



Test Pile	Time of Driving	Blow Number	Side	Tip	Total	Percent End Bearing	Quake		Damping	
							Side (inch)	Tip (inch)	Side (sec/ft)	Tip (sec/ft)
6	EOD	24	70	320	390	82%	0.28	0.27	0.22	0.05
20	EOD	40	165	200	365	55%	0.10	0.10	0.05	0.10

APPENDIX A
DYNAMIC ANALYSIS LITERATURE

HIGH STRAIN DYNAMIC PILE TESTING

Introduction

Dynamic pile testing (a.k.a. High Strain Dynamic Pile Testing - HSDPT) is commonly employed for evaluating the capacity of driven piles. It is also provides information about hammer performance and pile integrity/stresses. Dynamic testing is carried out in accordance with ASTM D4945, "Standard Test Method for High Strain Dynamic Testing of Piles". Dynamic pile testing involves using strain gages and accelerometers to record an impact wave and its reflections generated by a piling hammer. Both driven piles and drilled foundations can be tested (provided that an impact hammer is used to create the high strain wave for the drilled foundations).

Procedure

Dynamic pile testing was performed using a Pile Driving Analyzer (PDA®), such as the PAK®, PAL®, or PAX® systems, manufactured by Pile Dynamics, Inc. (PDI) of Cleveland, Ohio. These systems are computers fitted with data acquisition and signal conditioning components. The instrumentation consists of two strain gages and two accelerometer transducers attached a minimum of 1.5 pile diameters below the pile top. During impact, the strain and acceleration signals are recorded and processed for each hammer blow. The strain signal is converted to a force record and the acceleration signal is converted to a velocity record. The PDA® saves selected hammer blows containing this information to disk and determines the transferred energy, compressive/tensile stresses, displacement, pile integrity, and the estimated pile bearing capacity using the Case Method. This information can be viewed on the computer screen during driving. A screen shot of data collection in the PDA® Windows (PDA-W®) Program is provided in Figure 1. Selected blows can be further processed to predict the static pile capacity using signal matching programs.

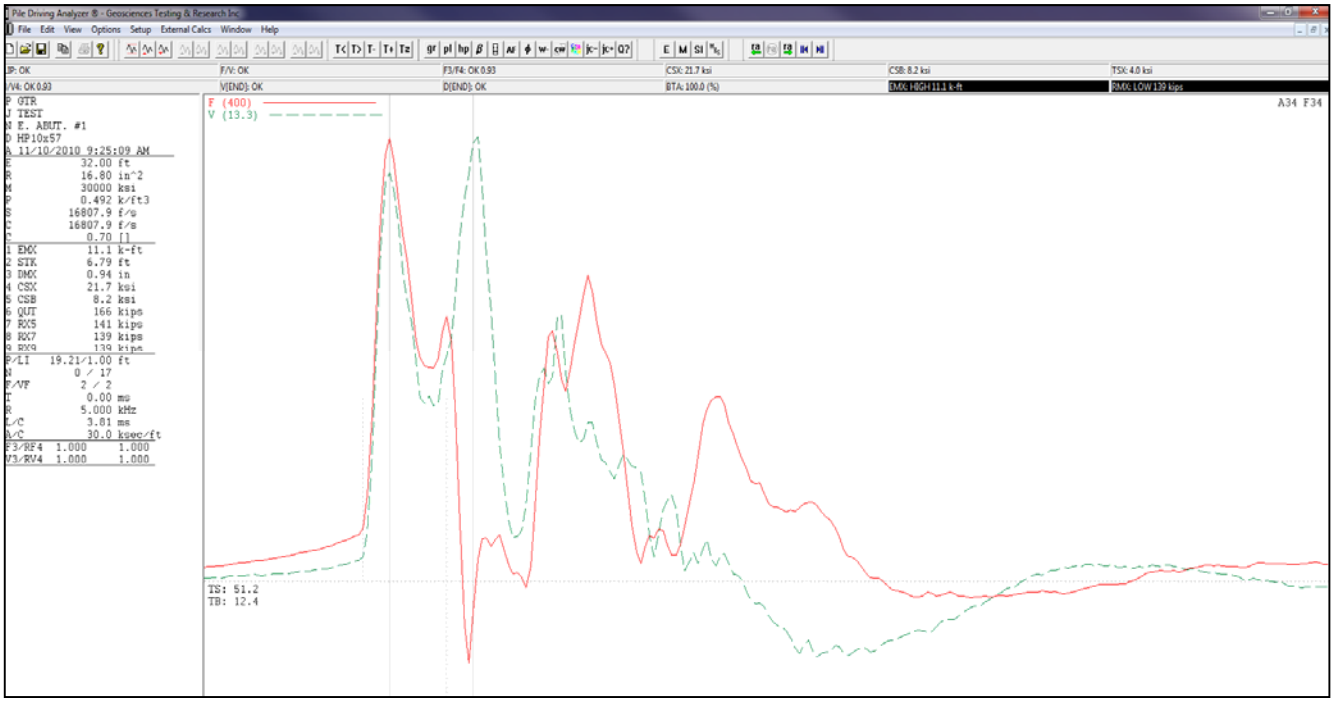


Figure 1. Data collection during pile driving in the (PDI - PDA®-Win Program).

Theory

When a ram strikes the pile head, it initiates a large strain wave that propagates down the pile as illustrated in Figure 2. External soil resistance or changes in the pile's impedance (due to variations in the pile's material or geometry) causes reflection waves that are recorded by the instrumentation. Knowing the material properties and pile geometry at the point of measurement, the strain can be converted to force, while the acceleration is integrated with time to produce velocity.

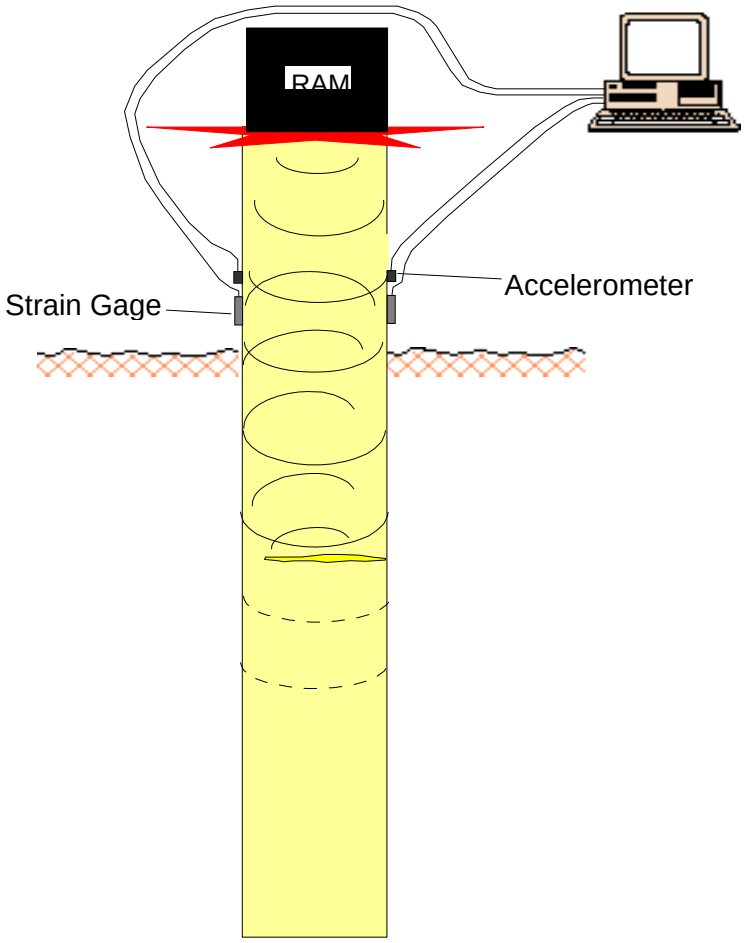


Figure 2. Pile instrumentation and hammer impact.

As long as there is no change in the pile impedance and there are no external forces (i.e. friction), the force and velocity are proportional (equal). Reflections at the tip can be explained by two classical boundary conditions. Free end conditions (analogous to easy driving through soft clay) require zero force and no velocity restrictions at the tip, resulting in a compression wave returning as a tension wave and an increase in velocity (theoretically doubling). Figure 3 graphically presents a typical reflection from a pipe pile during penetration into soft clay. Fixed end conditions (analogous to hard driving into bedrock) require zero velocity and no force restrictions at the tip, resulting in a compression wave being reflected with a greater magnitude than the incident wave (theoretically doubling) and the tip velocity at theoretically zero. Figure 4 graphically presents a typical reflection from an H-pile driven to bedrock. The time the wave takes to travel down to the tip and reflect back to the transducers is twice the pile length divided by the wave speed of the pile material (2L/C).

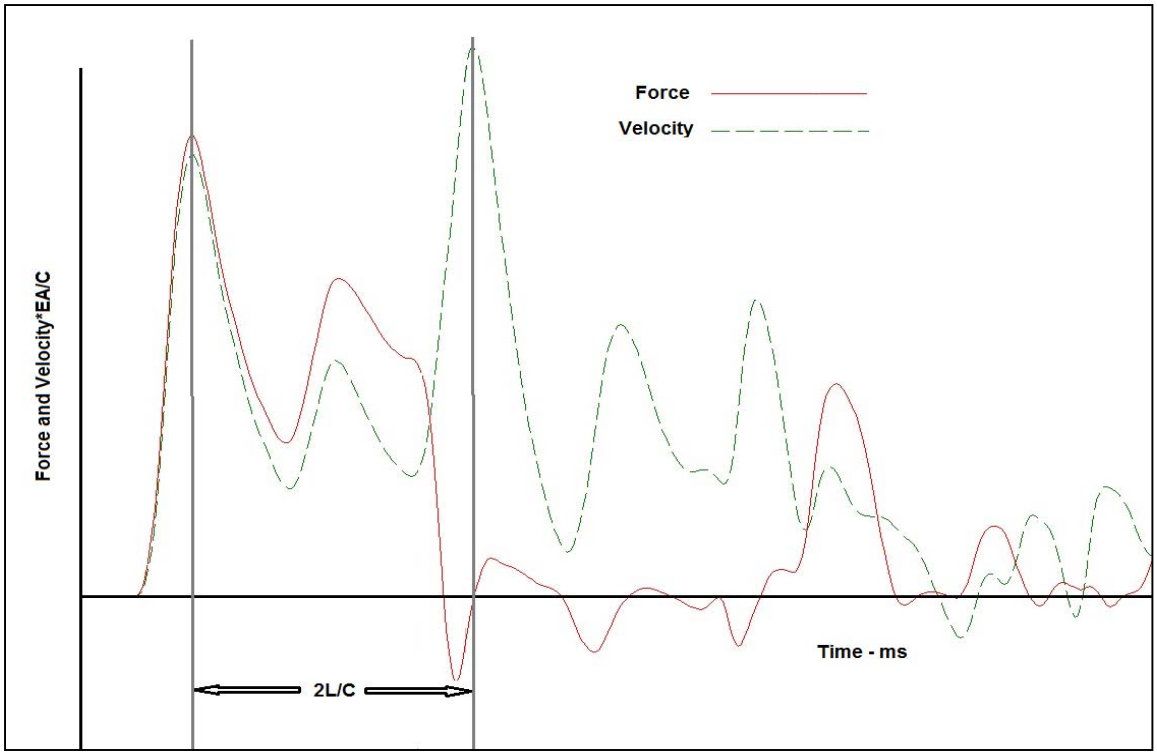


Figure 3. Typical Force and Velocity traces for a pipe pile driven into soft clay (high velocity and low force at tip - 2L/C).

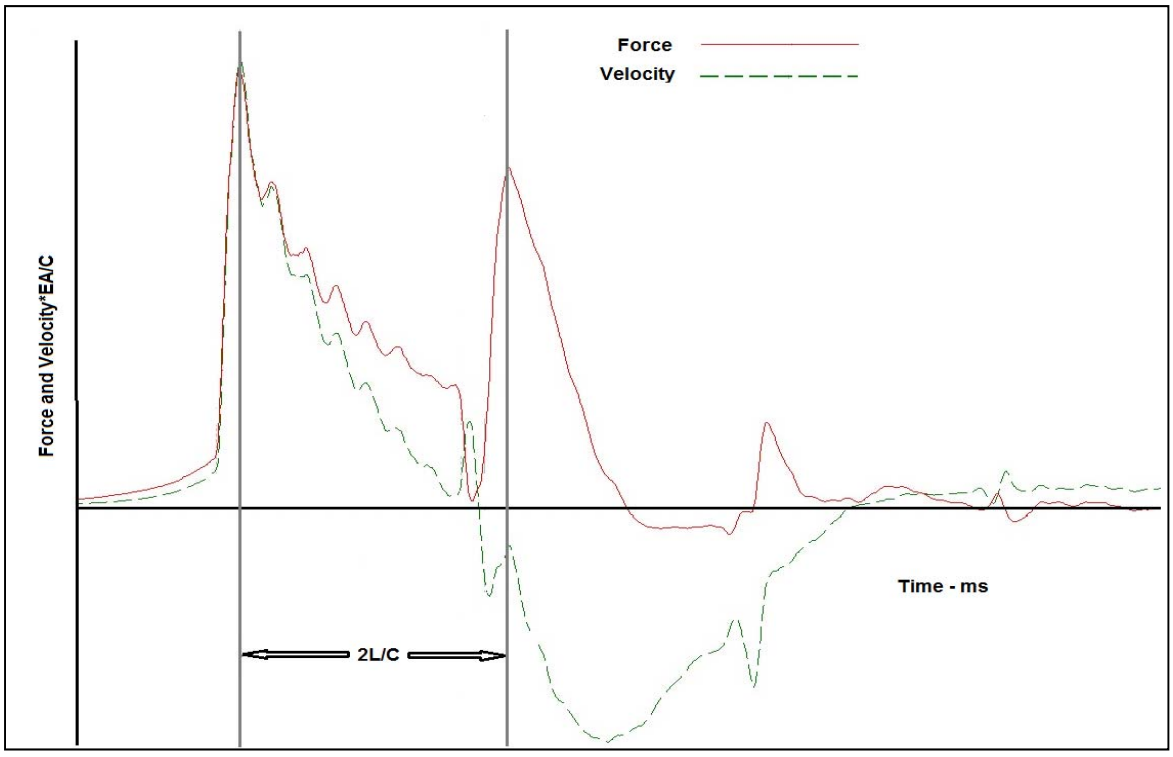


Figure 4. Typical Force and Velocity traces for an H-pile driven into bedrock (high force and low velocity at tip - 2L/C).

If a pile contains a defect or is damaged (e.g. reduction in impedance) during driving, the wave reflecting from the zone of decreased impedance will show a reduction in the force and increase in the velocity (somewhat comparable to "free end conditions"). These reflections would arrive to the measuring transducers before the expected reflections associated with the pile tip as the damaged zone is at a point along the pile between the transducer location and pile tip. The detection of damage during driving is usually easily identifiable and typically associated with cracking of concrete piles or splice breakage.

Dynamic Testing Summary Output

After data collection, the most pertinent output quantities from the dynamic pile testing can be summarized in a graphical manner. The data can be also presented in tabular format, averaging the results based on penetration depth or blow number as specified by the user. Figure 5 shows typical graphical output. Each of the three plots presents two quantities sharing the vertical (penetration) axis.

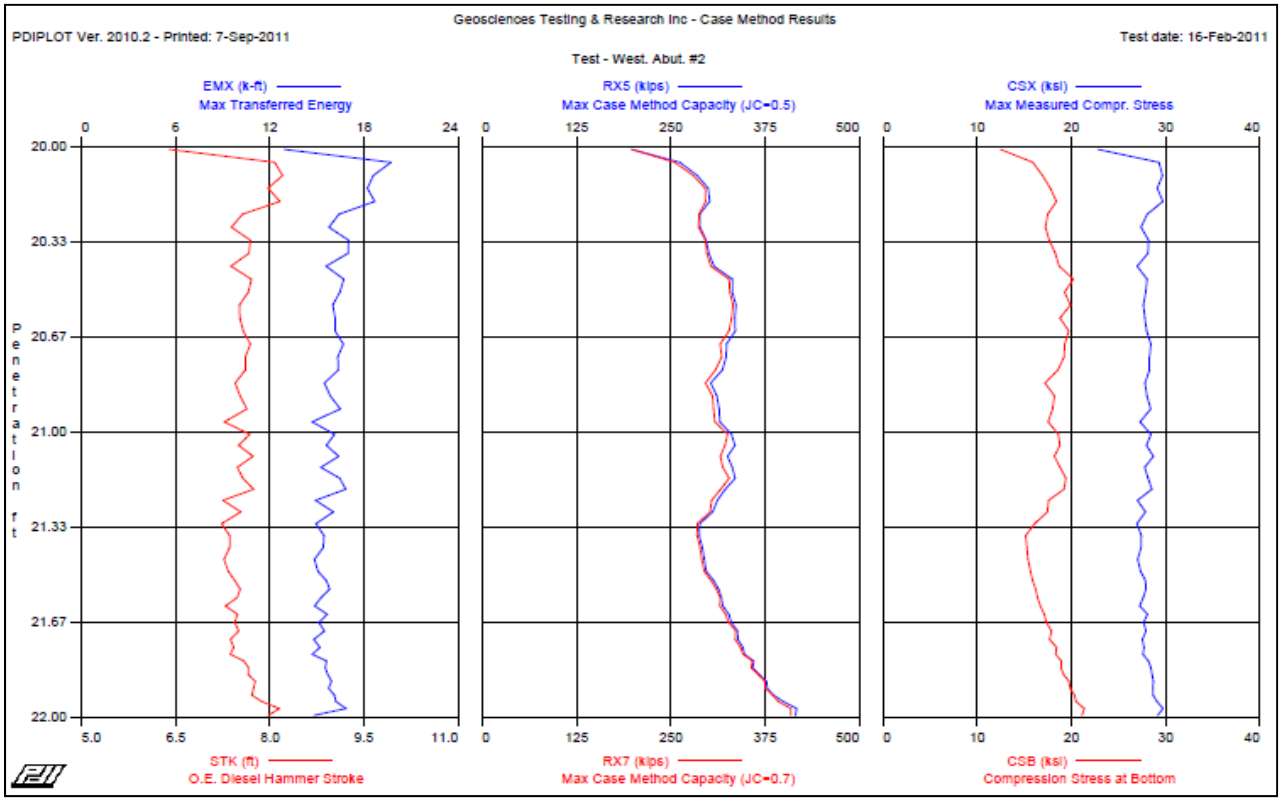


Figure 5. Typical Dynamic Testing summary Output (PDI Plot® Program)

Signal Matching Analyses

Signal matching using the dynamic testing data can be performed to predict the static pile capacity. Programs such as CAPWAP® (developed by Pile Dynamics, Inc.) or TEPWAP/PWAP (developed by GTR) are numerical analyses used to solve the one dimensional wave equation using the measured force and velocity. E.A Smith (1960) suggested modeling the hammer-pile-soil system for use in the wave equation by a series of masses, springs and dashpots as shown in Figure 6. The signal matching programs determine the best match between measured and calculated pile top forces and

replace the hammer input with the measured force and velocity. The pile is separated into many small segments, often 1 meter in length. The velocity record obtained from the dynamic pile testing transducers is used as input to the top pile segment. The resistance, damping, and quake are the primary soil parameters assigned by the user to each pile segment below grade. The signal matching programs will calculate the displacement, velocity, and stresses (forces) for each pile segment based on the input velocity record and the user assigned soil parameters. These parameters are adjusted and modified in an iterative fashion until the best match is obtained between the force calculated for the pile top segment and the force measured at the pile top during testing. The user assigned soil parameters based on the best match represent the "actual soil conditions", including the resistance (and therefore pile capacity). This capacity is based on the resistance at the time of the testing. Static load tests are typically conducted several days or weeks after driving. Therefore, restrike tests are recommended to be performed some time after driving to assess time dependent changes in pile capacity, such as setup or relaxation.

New PDA Appendix.docx

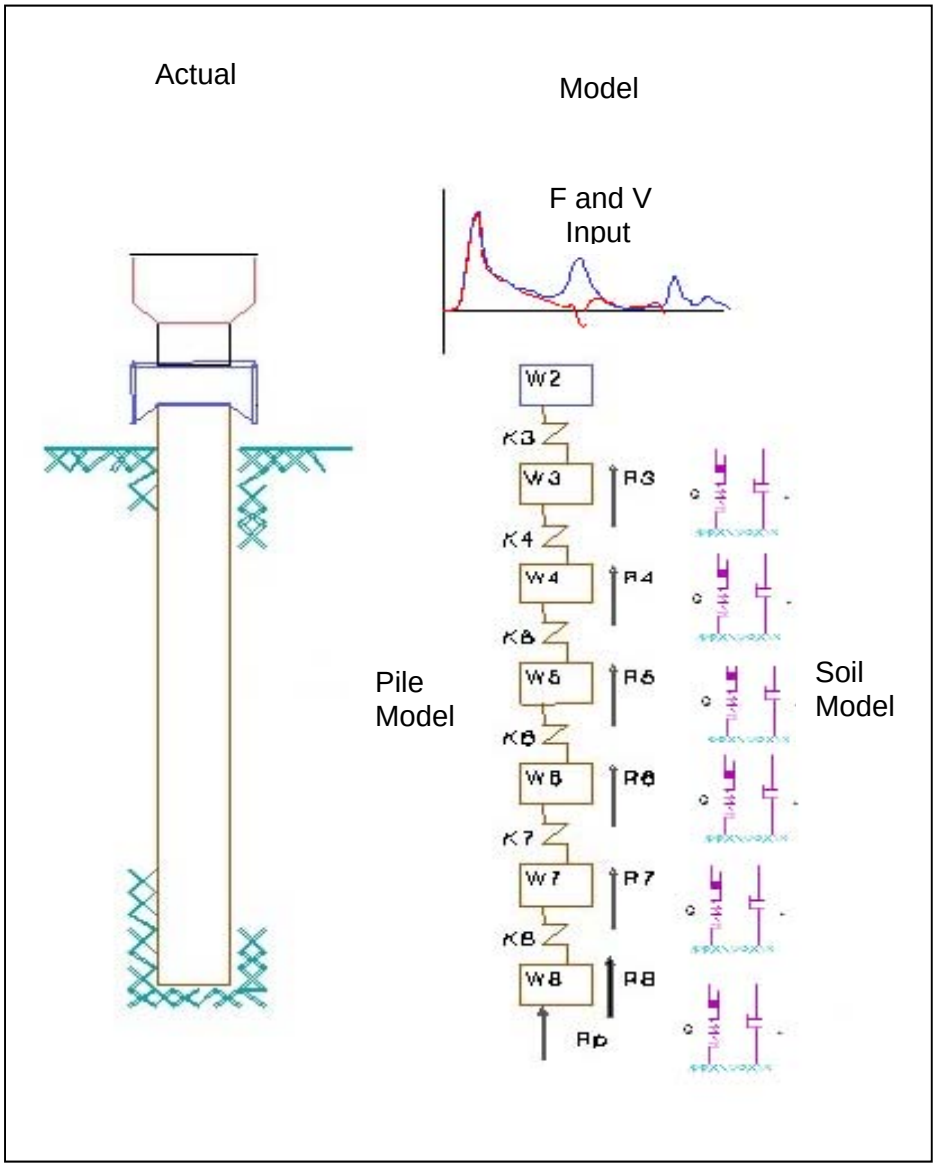


Figure 6. Signal Matching Model (i.e. CAPWAP® or TEPWAP/PWAP).

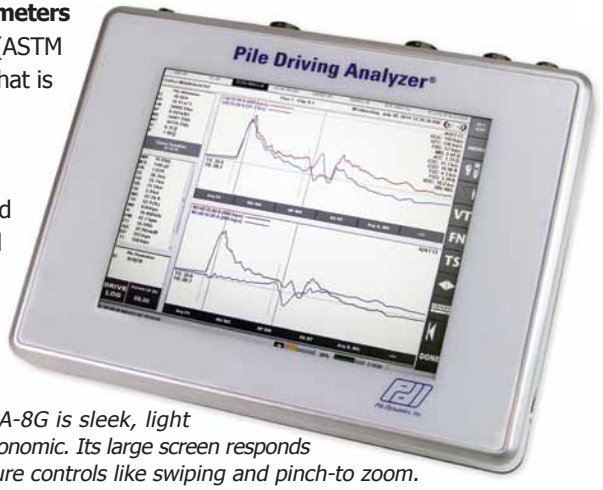
Pile Driving Analyzer® Model 8G

System for dynamic load testing and pile driving monitoring

Pile Dynamics, Inc.

Bearing capacity of all types of deep foundations

The **Pile Driving Analyzer** (PDA) eighth generation (8G) system acquires data from **accelerometers** and **strain transducers** attached to a pile or shaft so that High Strain Dynamic Tests (ASTM D4945) may be performed. The tests require the impact of a pile driving hammer or, if that is not available, of a suitable drop weight.



The PDA-8G is sleek, light and ergonomic. Its large screen responds to gesture controls like swiping and pinch-to zoom.

High Strain Dynamic Load Test with the PDA-8G

The PDA-8G assesses bearing capacity and structural integrity. Preliminary field results are further analyzed with the CAPWAP® software, for results that correlate very well with static load tests. High Strain Dynamic Load Tests may be performed on drilled shafts, continuous flight auger, cast-in-situ or driven piles. The PDA-8G has new features that make it easier to use for drilled shaft testing, such as the option of conducting the test with four or more wireless strain transducers. When a ram of sufficient mass is used, high strain dynamic load tests performed with the PDA may meet Rapid Load Test standards (ASTM D7383).

PDA-8G in the field

The Pile Driving Analyzer model 8G is designed with the field engineer in mind. Its screen, with a higher resolution LCD than previous generations of PDAs, displays measured signals and calculated results in real time, and allows more options to be viewed simultaneously.

SiteLink® (Remote Testing*)

- A cost and time efficient alternate to traditional on-site testing
- The engineer performs Pile Driving Monitoring or Dynamic Load Tests from any office
- Real time field to office data transmission via Internet
- Simple field setup

**U.S. Patent No. US 6,301,551 B1*

Pile Driving Monitoring with the PDA-8G

Pile Driving Monitoring helps establish the Driving Criterion and contributes to safe and economical production pile installation. **The PDA-8G calculates the capacity of driven piles at the time of testing (by Case Method and iCAP®), driving hammer performance, driving stresses, and indicators of pile integrity.** The enhanced data transmission of the PDA-8G allows testing during driving with fast hitting hammers having blow rates as high as 120 bpm, without loss of data.

Wireless Mode

- No cables from the accelerometers and strain transducers to the PDA.
- Fast signal transmission of up to 100 m (330 ft) through WiFi

The PDA-8G may also be used with cabled (traditional) accelerometers and strain transducers.

Receiving test data with SiteLink.

Quality Assurance for Deep Foundations

Four or Eight Universal Data Channels

Most High Strain Dynamic Tests require only 2 strain transducers and 2 accelerometers installed near the top of the foundation. These 2 pairs of sensors are sufficient to obtain the force and velocity records needed for the PDA calculations, thus making four channels of data acquisition adequate for most driven pile tests.

Eight channels of data acquisition - 4 strain transducers and 4 accelerometers - are recommended for dynamic tests of augered cast-in-place / continuous flight auger piles and drilled shafts, and might be helpful for spiral-welded pipes. Eight channels are also essential for dynamic measurements to be made simultaneously on follower and pile, and when a pair of accelerometers and strain transducers is installed at a second location along the length of the foundation (for example by embedding sensors near the toe of a concrete pile). **The 8 channels of data acquisition of the PDA model 8G are universal: any combination of accelerometers and strain transducers may be used.**

All PDA-8G channels, either in Wireless or Traditional modes, are compatible with Smart Sensors (no need to input sensor calibration into the PDA).

clockwise from top right: Wireless Transmitter, Accelerometer and Strain Transducer

Engineers around the world have been using the PDA for more than four decades. High Strain Dynamic Tests performed with the PILE DRIVING ANALYZER are standardized by ASTM 4945 and are recognized by, among others, National Codes of Australia, Brazil, Canada, China, Egypt, Qatar, United Kingdom and Eurocode 7; International Building Code (USA); American Association of State Highway Officials, US Federal Highway Administration and most US Departments of Transportation; regional, provincial or municipal governments in Argentina, Mexico and the Philippines; the American Society of Civil Engineers, Deep Foundations Institute and Pile Driving Contractors Association.

Please contact Pile Dynamics for information on compliance with standards from other countries.

Selected PDA-8G Features: 320 X 250 X 68 mm, 5 kg, replaceable battery, external 12V battery connection, battery indicator, Microsoft Windows® 7 Operating System, Ethernet port, 4 USB ports. For complete current specifications visit www.pile.com/specifications.

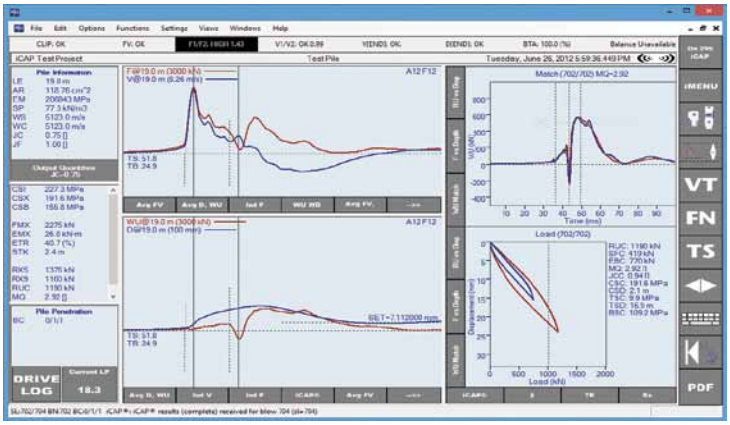
Software: PDA systems include licenses of CAPWAP®, GRLWEAP and of the PDA software suite. The PDA software suite includes PDA-S with iCAP®, PDIPLOT2 and PDI-Curves.

CAPWAP uses force and velocity records measured by the PDA sensors to, by signal matching, determine resistance distribution and dynamic soil response and simulate a static load test. Hundreds of comparisons demonstrate the very good correlation of CAPWAP analysis with static load testing results. CAPWAP analysis of PDA data is the standard of practice for Dynamic Load Testing.

GRLWEAP is a wave equation analysis program that simulates pile driving. It can be used to evaluate driving stresses and select a hammer for efficient installation or to evaluate the suitability of a drop weight system for the Dynamic Load Test of a drilled shaft.

PDA Software Suite

- **PDA-S** offers a more intuitive interface than former PDA programs, and runs both in the PDA-8G and in an office computer during post processing, offering touchscreen as well as desktop functionality and simplifying the software learning process. In addition to soil resistance at the time of the test, PDA-S outputs a vast array of other variables, customized by the user for each application. PDA-S also issues warnings and alerts during data input and acquisition. It outputs fully customized graphs, with up to three graphs appearing on the screen in real time.
- **iCAP** calculates capacity at the time of testing through a signal matching procedure performed during Pile Driving Monitoring. Because it is based on CAPWAP logic, it is a step beyond capacity determined by the Case Method. With no user interaction, iCAP extracts the soil behavior from dynamic measurements, computes capacity at the time of test, and produces a simulated static load test graph in real time. The PDA-8G offers one touch iCAP results in the field.
- **PDIPLOT2** generates tables and plots of any PDA quantity PDA versus blow number, length, elevation or any other quantity. It provides the statistical summary output required by ASTM D4945 and is fully customizable.
- **PDI-CURVES** combines plots of Force-Velocity versus time (required by ASTM D4945), and of other quantities from multiple PDA-S files in one single document.



PDA-S software

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CAPWAP® 2006

For reliable Dynamic Load Tests on any type of deep foundation

CAPWAP – **CA**se **P**ile **W**ave **A**nalysis **P**rogram – determines static soil resistance and simulates a static load test.

CAPWAP calculates:

- Static shaft resistance, magnitude and distribution
- Static end bearing
- Stresses at any point along the shaft
- Energy transferred from the ram to the foundation

from force and velocity data measured by the **Pile Driving Analyzer®** on a foundation impacted by a ram.

Based on these results, CAPWAP simulates a static load test and predicts the instantaneous load settlement behavior of the tested foundation.

CAPWAP 2006 has an improved mathematical model that enhances the analysis of drilled shafts and augered cast-in-place piles. Numerous automatic search and help functions make CAPWAP an efficient and reliable analysis tool.

TYPICAL CAPWAP ANALYSIS

Forces and velocities measured at the top of a foundation during ram impact are related (complementary) quantities; foundation characteristics and soil resistance parameters govern this relationship. The basic CAPWAP procedure uses this fact and consists of the following steps:

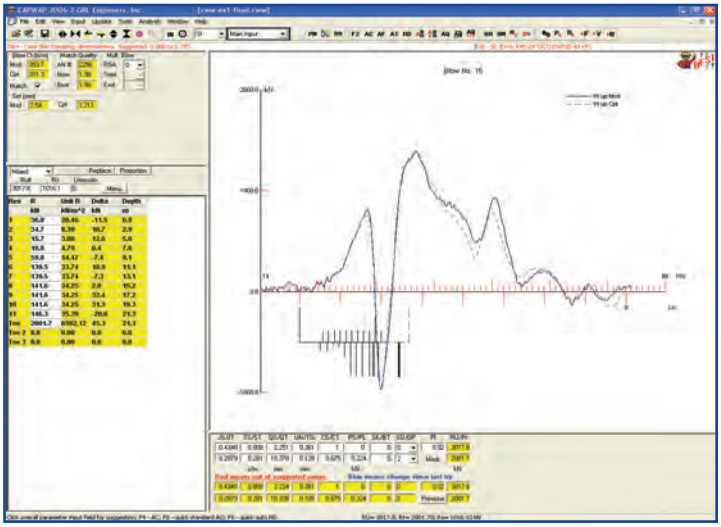
1. *Retrieve force and velocity data from the Pile Driving Analyzer.*
2. *Setup pile model.*
3. *Assume soil resistance parameters.*
4. *Perform analysis using one of the measured quantities as an input and calculate the complementary quantity.*
5. *Compare measured with computed quantity.*
6. *If match is not satisfactory, adjust soil parameters such as resistance, quake and damping and go to step 4.*
7. *Output soil model, satisfactory match and simulated static test.*

HELP FEATURES

CAPWAP guides the user to properly adjust the large number of variables that affect the signal matching process. Arriving at bearing capacity results is an efficient and rewarding process thanks to:

- Automated signal matching option (AC)
- Best match for individual or groups of variables (AQ)
- Automatic resistance distribution (AF)
- Automatic toe parameters check (AT)
- Static resistance – damping exchange (RD)
- Extensive expert help system
- Background manual

A training class prepares the software novice. Continuing technical support from Pile Dynamics is available to all registered users.



CAPWAP Analysis Screen

Pile Dynamics, Inc.

Quality Assurance for Deep Foundations

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CAPWAP® 2006

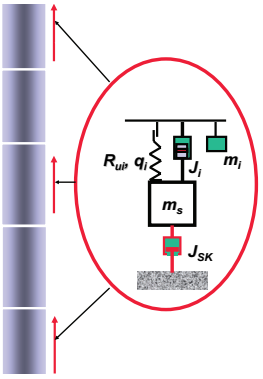
For reliable Dynamic Load Tests on any type of deep foundation

THE CAPWAP PILE AND SOIL MODEL

CAPWAP is a signal matching program with an extended, Smith-type soil and continuous pile model. CAPWAP calculations are based on one-dimensional wave propagation theory. Calculations can be performed in English, SI or Metric units.

In its default mode, CAPWAP models the deep foundation as a series of 1 m long uniform sections with multiple elastic properties. Pile damping, splices, non-uniformities and multiple pile or shaft materials may also be modeled.

The soil resistance is typically lumped into individual resistance forces at 2 m intervals with elasto-plastic static, linearly viscous and mass related dynamic properties. Radiation damping is represented by an additional mass and dashpot. The user has the option of using individual toe resistance parameters such as a plug mass, a resistance gap and a true Smith damping approach. CAPWAP options include Residual Stress Analysis (RSA) for end of drive situations and Multiple Blow Analysis (MBA) to analyze restrike tests.

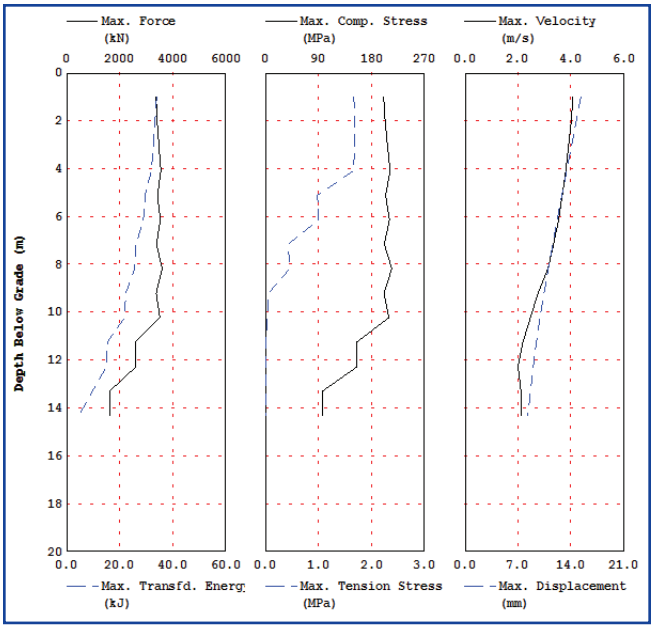


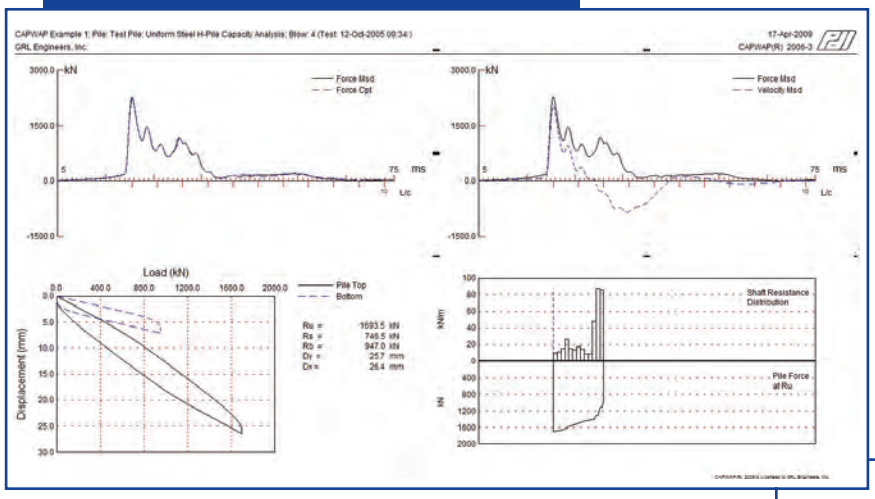
CAPWAP Soil Resistance and Pile Model

OUTPUT

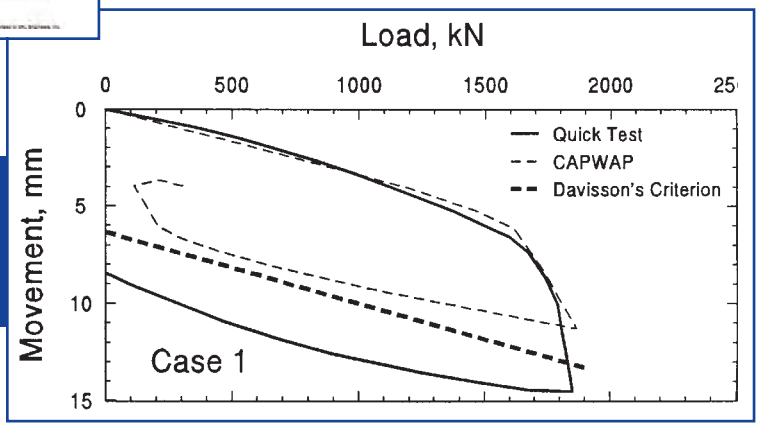
- Simulated static test
- Resistance distribution
- Forces and stresses along the shaft
- Shaft and toe damping and quake
- Measured and computed forces and velocities
- Maxima of displacement and velocity
- Transferred energy
- CASE Method results

CAPWAP-calculated variables as a function of depth below sensors (from left: force in pile; transferred energy; tensile and compressive stresses; maxima of displacement and velocity.)





CAPWAP output (counter clockwise from top right: measured signals; signal match; simulated static test; resistance distribution; pile model.)



Load-Set Curves (measured from static load test and simulated by CAPWAP) of a 12 inch prestressed concrete pile, driven into sandy, clayey silts. CAPWAP analysis performed on an end of drive record. Static test performed within two hours of pile driving.

CORRELATIONS

Correlations between Load-Set Curves from static load test and from CAPWAP simulated tests on a variety of soils and types of foundations have been extensively published and are available at www.pile.com/reference.

Minimum Requirements

- Windows 2000, XP, or later • 30 MB of hard disk space
- CD-ROM Drive • USB Port for hardware key license
- Program to be operated by a person with engineering education at a institution of higher learning with additional preparation by Pile Dynamics or its representatives.

Quality Assurance for Deep Foundations

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Pile Dynamics, Inc.

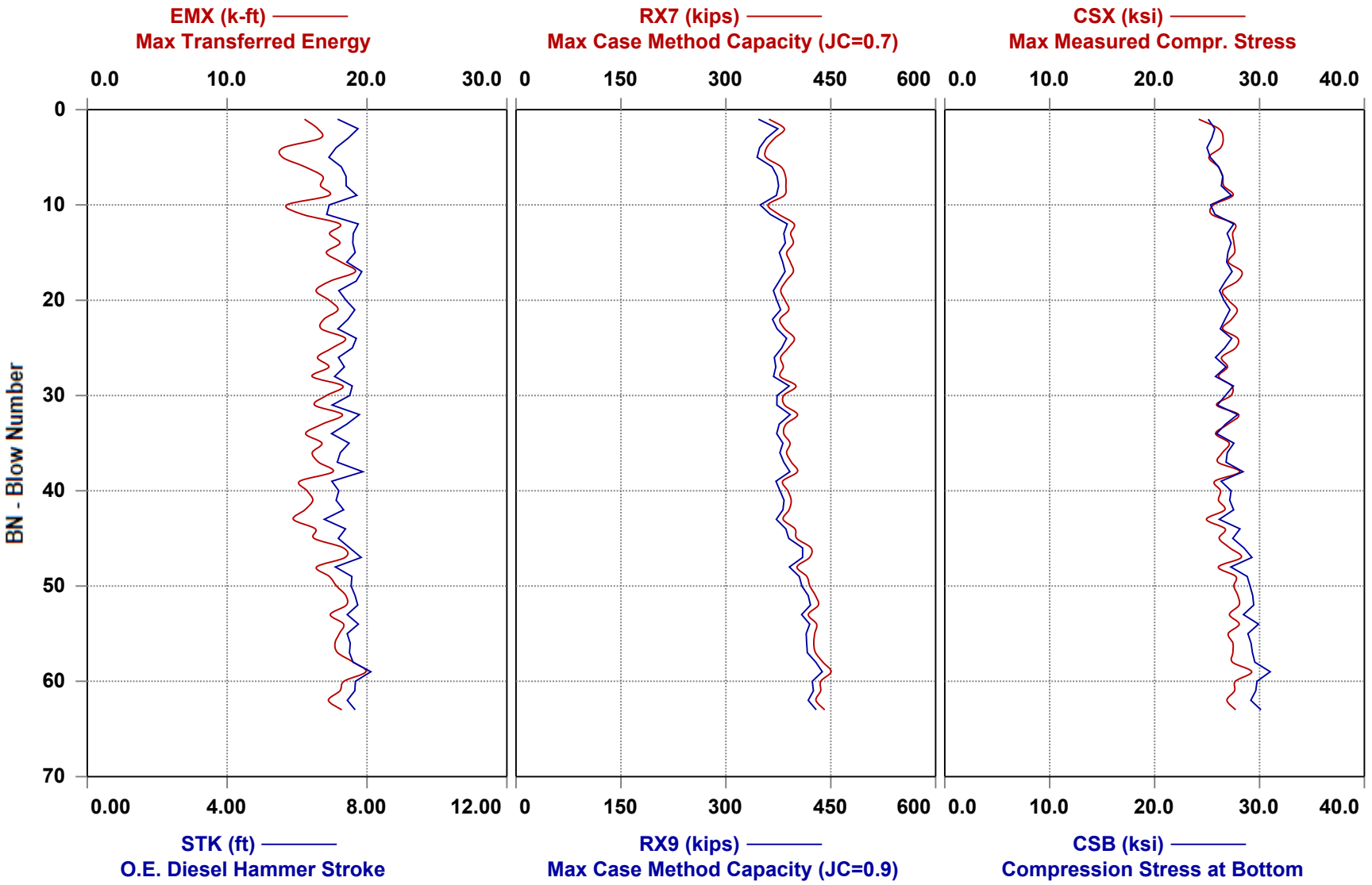
APPENDIX B
PDA VARIABLES

Geosciences Testing & Research Inc - PDIPLOT2 Ver 2016.1.56.3 - Case Method & iCAP® Results

Printed: 29-November-2017 Test started: 28-November-2017

17.316 WIDGERY WHARF 11-28-17 - PILE #6 EOD_1

CEP 10.75 X 0.5 WALL



17.316 WIDGERY WHARF 11-28-17 - PILE #6 EOD_1
CEP 10.75 X 0.5 WALL
OP: RPM
Date: 28-November-2017

AR: 16.10 in²
LE: 110.00 ft
WS: 16,807.9 f/s
SP: 0.492 k/ft³
EM: 30,000 ksi
JC: 0.90 []

EMX: Max Transferred Energy
STK: O.E. Diesel Hammer Stroke
RX7: Max Case Method Capacity (JC=0.7)
RX9: Max Case Method Capacity (JC=0.9)
CSX: Max Measured Compr. Stress
CSB: Compression Stress at Bottom
DMX: Maximum Displacement
BPM: Blows per Minute

BL#	Depth	BLC	TYPE	EMX	STK	RX7	RX9	CSX	CSB	DMX	BPM
	ft	bl/ft		k-ft	ft	kips	kips	ksi	ksi	in	bpm
9	99.08	108	AV9	15.9	7.35	374	362	26.1	25.9	0.81	43.5
			STD	1.2	0.26	11	12	0.9	0.7	0.05	0.7
			MAX	17.3	7.74	386	375	27.5	27.3	0.87	44.8
			MIN	14.0	6.91	357	345	24.2	25.0	0.73	42.4
19	99.17	120	AV10	17.1	7.45	386	376	27.1	26.7	0.86	43.2
			STD	1.4	0.33	11	11	0.9	0.7	0.04	1.0
			MAX	19.2	7.85	398	388	28.3	27.5	0.94	45.0
			MIN	14.3	6.85	360	349	25.4	25.3	0.77	42.1
30	99.25	132	AV11	17.3	7.42	386	376	27.1	26.7	0.86	43.3
			STD	0.7	0.20	7	7	0.6	0.5	0.02	0.6
			MAX	18.5	7.70	400	391	27.9	27.5	0.89	44.3
			MIN	16.1	7.07	377	367	26.1	25.8	0.82	42.6
49	99.33	228	AV19	16.5	7.31	396	385	26.6	27.4	0.84	43.6
			STD	1.0	0.30	12	12	0.9	0.9	0.03	0.9
			MAX	18.4	7.88	422	410	28.3	29.3	0.91	45.2
			MIN	14.7	6.78	381	372	24.9	25.9	0.78	42.1
63	99.41	180	AV14	18.2	7.62	431	420	27.7	29.5	0.88	42.8
			STD	0.7	0.17	8	8	0.6	0.6	0.02	0.5
			MAX	19.9	8.11	450	438	29.2	31.0	0.93	43.3
			MIN	17.2	7.43	418	408	26.9	28.5	0.85	41.5
			Average	17.0	7.43	397	387	27.0	27.4	0.85	43.3
			Std. Dev.	1.3	0.28	22	22	0.9	1.4	0.04	0.8
			Maximum	19.9	8.11	450	438	29.2	31.0	0.94	45.2
			Minimum	14.0	6.78	357	345	24.2	25.0	0.73	41.5

Total number of blows analyzed: 63

BL# Sensors

1-63 F3: [O988] 148.7 (1.00); F4: [O749] 147.8 (1.00); A3: [K0362] 325.0 (1.00); A4: [K6141] 352.0 (1.00)

Time Summary

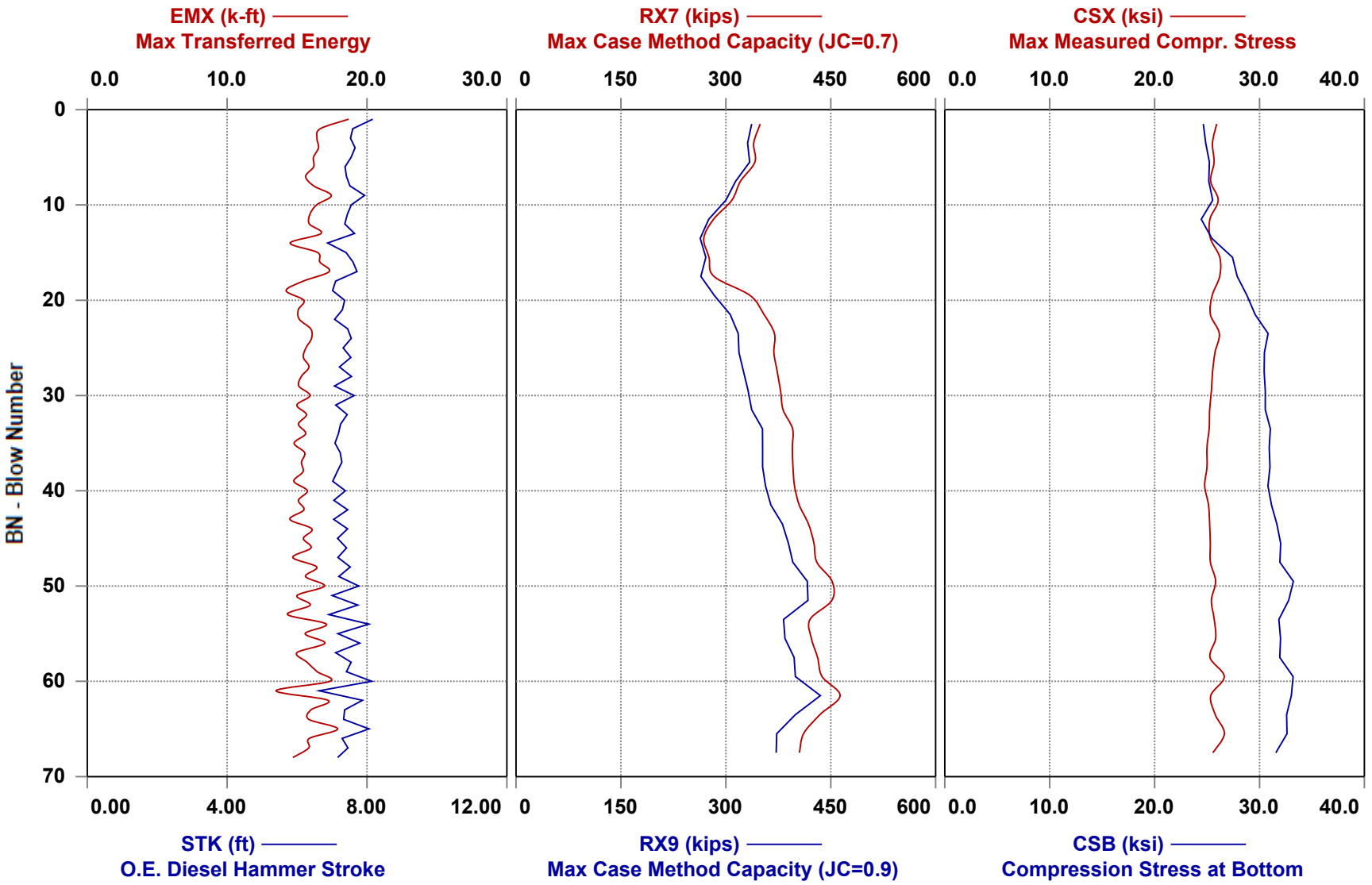
Drive 1 minute 25 seconds 11:14 AM - 11:16 AM BN 1 - 63

Geosciences Testing & Research Inc - PDIPLOT2 Ver 2016.1.56.3 - Case Method & iCAP® Results

Printed: 29-November-2017 Test started: 28-November-2017

17.316 WIDGERY WHARF 11-28-17 - PILE #20 EOD_1

CEP 10.75 X 0.5 WALL



17.316 WIDGERY WHARF 11-28-17 - PILE #20 EOD_1
CEP 10.75 X 0.5 WALL
OP: RPM
Date: 28-November-2017

AR: 16.10 in²
LE: 111.00 ft
WS: 16,807.9 f/s
SP: 0.492 k/ft³
EM: 30,000 ksi
JC: 0.90 []

EMX: Max Transferred Energy
STK: O.E. Diesel Hammer Stroke
RX7: Max Case Method Capacity (JC=0.7)
RX9: Max Case Method Capacity (JC=0.9)
CSX: Max Measured Compr. Stress
CSB: Compression Stress at Bottom
DMX: Maximum Displacement
BPM: Blows per Minute

BL#	Depth	BLC	TYPE	EMX	STK	RX7	RX9	CSX	CSB	DMX	BPM
	ft	bl/ft		k-ft	ft	kips	kips	ksi	ksi	in	bpm
24	100.17	144	AV24	16.1	7.46	319	300	25.7	26.7	0.80	43.2
			STD	0.9	0.27	34	28	0.5	2.1	0.03	0.8
			MAX	18.7	8.16	374	347	26.8	31.0	0.88	44.9
			MIN	14.2	6.87	263	254	24.6	24.1	0.73	41.4
32	100.25	96	AV8	15.5	7.36	376	328	25.5	30.5	0.78	43.5
			STD	0.3	0.20	7	8	0.6	0.5	0.02	0.6
			MAX	15.9	7.63	386	339	26.2	31.2	0.80	44.3
			MIN	15.0	7.07	365	318	24.6	29.9	0.76	42.7
40	100.33	96	AV8	15.3	7.20	396	354	25.0	30.9	0.79	44.0
			STD	0.3	0.11	9	10	0.3	0.4	0.01	0.3
			MAX	15.7	7.38	411	371	25.3	31.6	0.81	44.5
			MIN	14.8	7.02	385	343	24.3	30.0	0.76	43.4
53	100.42	156	AV13	15.5	7.30	434	399	25.3	32.1	0.79	43.7
			STD	0.7	0.27	25	31	0.7	0.9	0.01	0.8
			MAX	17.0	7.76	483	463	26.6	34.1	0.82	44.8
			MIN	14.3	6.91	404	362	24.1	30.6	0.77	42.4
68	100.49	192	AV15	16.1	7.49	425	388	26.0	32.3	0.81	43.2
			STD	1.1	0.41	52	63	1.0	1.3	0.03	1.1
			MAX	17.9	8.13	515	495	27.6	34.8	0.85	45.7
			MIN	13.5	6.63	358	302	23.9	30.4	0.75	41.4
			Average	15.8	7.39	380	348	25.6	29.9	0.79	43.4
			Std. Dev.	0.9	0.30	59	56	0.8	2.9	0.02	0.9
			Maximum	18.7	8.16	515	495	27.6	34.8	0.88	45.7
			Minimum	13.5	6.63	263	254	23.9	24.1	0.73	41.4

Total number of blows analyzed: 68

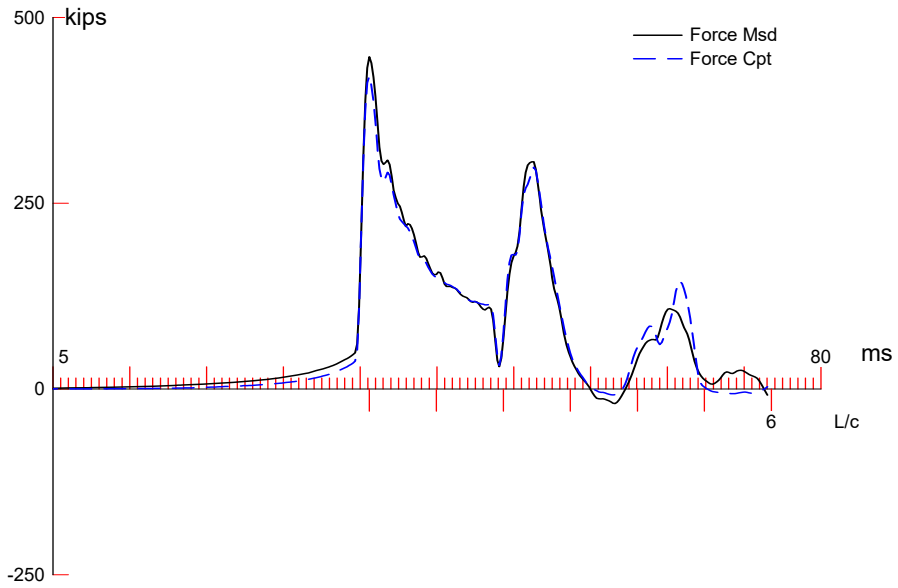
BL# Sensors

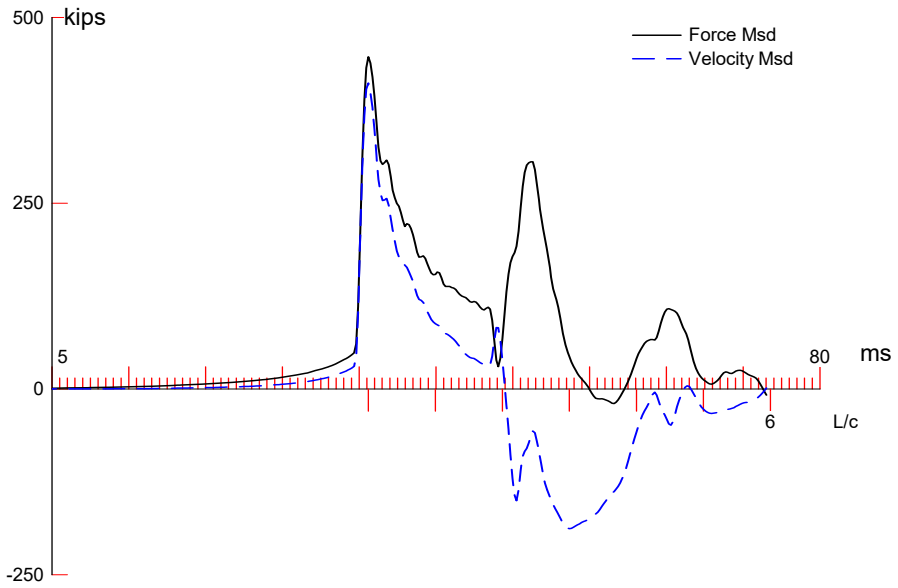
1-68 F3: [O988] 148.7 (1.00); F4: [O749] 147.8 (1.00); A3: [K0362] 325.0 (1.00); A4: [K6141] 352.0 (1.00)

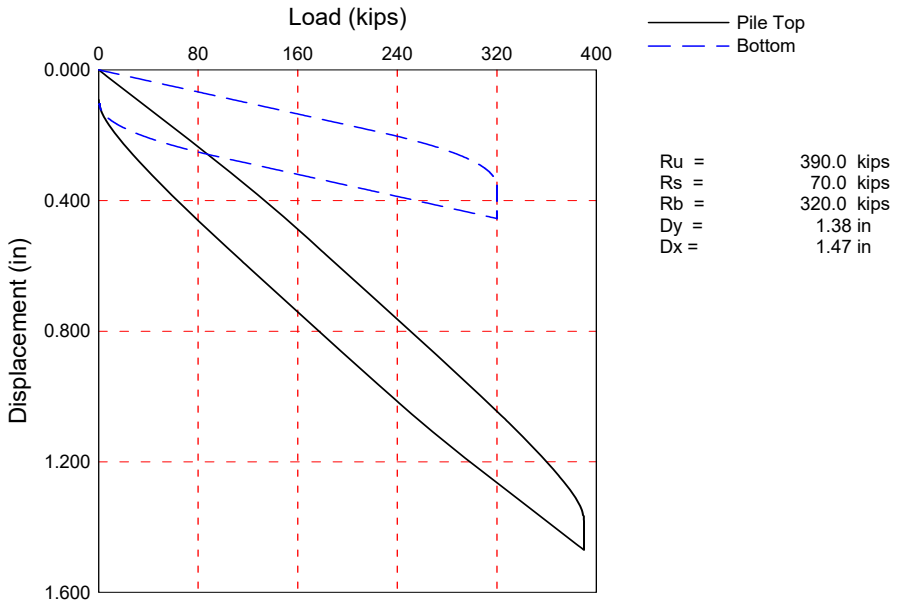
Time Summary

Drive 1 minute 32 seconds 10:31 AM - 10:33 AM BN 1 - 68

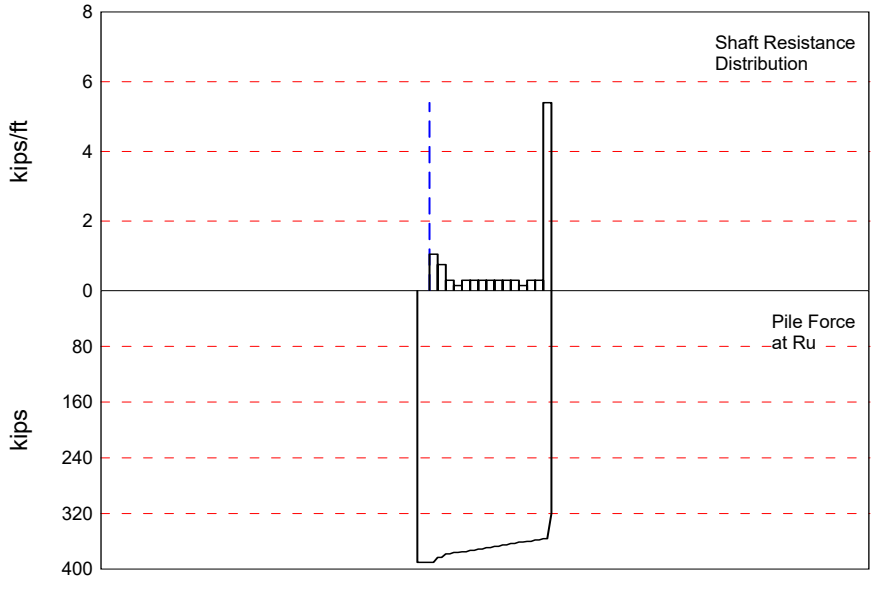
APPENDIX C
CAPWAP RESULTS







Ru = 390.0 kips
Rs = 70.0 kips
Rb = 320.0 kips
Dy = 1.38 in
Dx = 1.47 in



CAPWAP SUMMARY RESULTS

Total CAPWAP Capacity: 390.0; along Shaft 70.0; at Toe 320.0 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
				390.0				
1	16.7	5.9	7.0	383.0	7.0	1.19	0.42	0.220
2	23.3	12.5	5.0	378.0	12.0	0.75	0.27	0.220
3	30.0	19.2	2.0	376.0	14.0	0.30	0.11	0.220
4	36.7	25.9	1.0	375.0	15.0	0.15	0.05	0.220
5	43.3	32.5	2.0	373.0	17.0	0.30	0.11	0.220
6	50.0	39.2	2.0	371.0	19.0	0.30	0.11	0.220
7	56.7	45.9	2.0	369.0	21.0	0.30	0.11	0.220
8	63.3	52.5	2.0	367.0	23.0	0.30	0.11	0.220
9	70.0	59.2	2.0	365.0	25.0	0.30	0.11	0.220
10	76.7	65.9	2.0	363.0	27.0	0.30	0.11	0.220
11	83.3	72.5	2.0	361.0	29.0	0.30	0.11	0.220
12	90.0	79.2	1.0	360.0	30.0	0.15	0.05	0.220
13	96.7	85.9	2.0	358.0	32.0	0.30	0.11	0.220
14	103.3	92.5	2.0	356.0	34.0	0.30	0.11	0.220
15	110.0	99.2	36.0	320.0	70.0	5.40	1.92	0.220
Avg. Shaft			4.7			0.71	0.25	0.220
Toe			320.0				507.70	0.050

Soil Model Parameters/Extensions		Shaft	Toe
Quake	(in)	0.280	0.270
Case Damping Factor		0.536	0.557
Damping Type			Smith
Unloading Quake	(% of loading quake)	89	30
Reloading Level	(% of Ru)	100	100
Unloading Level	(% of Ru)	7	
Resistance Gap (included in Toe Quake)	(in)		0.000

CAPWAP match quality = 2.62 (Force Match) ; RSA = 0
Observed: final set = 0.091 in; blow count = 132 b/ft
Computed: final set = 0.055 in; blow count = 220 b/ft

max. Top Comp. Stress = 26.1 ksi (T= 36.1 ms, max= 1.037 x Top)
max. Comp. Stress = 27.1 ksi (Z= 16.7 ft, T= 37.1 ms)
max. Tens. Stress = -3.46 ksi (Z= 110.0 ft, T= 65.0 ms)
max. Energy (EMX) = 17.3 kip-ft; max. Measured Top Displ. (DMX)= 0.89 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	420.7	-7.9	26.1	-0.49	17.34	14.3	0.879
2	6.7	421.7	-13.4	26.2	-0.83	17.40	14.3	0.870
4	13.3	431.2	-19.7	26.8	-1.22	17.27	13.9	0.846
6	20.0	414.8	-15.7	25.8	-0.97	15.99	13.6	0.823
8	26.7	401.4	-13.2	24.9	-0.82	15.07	13.5	0.799
10	33.3	396.8	-24.5	24.6	-1.52	14.61	13.4	0.776
12	40.0	396.5	-29.0	24.6	-1.80	14.28	13.3	0.749
14	46.7	393.1	-32.9	24.4	-2.04	13.77	13.1	0.719
16	53.3	389.9	-33.3	24.2	-2.07	13.24	13.0	0.687
18	60.0	386.7	-30.6	24.0	-1.90	12.69	12.9	0.654
20	66.7	383.7	-44.2	23.8	-2.75	12.11	12.7	0.618
22	73.3	380.8	-48.7	23.6	-3.02	11.45	12.6	0.577
24	80.0	378.1	-51.9	23.5	-3.23	10.74	12.4	0.533
25	83.3	379.6	-54.5	23.6	-3.39	10.44	12.4	0.509
26	86.7	374.6	-53.7	23.3	-3.34	9.90	12.3	0.483
27	90.0	376.4	-53.7	23.4	-3.34	9.54	12.2	0.457
28	93.3	375.3	-53.5	23.3	-3.32	9.08	12.2	0.429
29	96.7	377.6	-54.3	23.4	-3.37	8.69	12.1	0.402
30	100.0	369.4	-53.7	22.9	-3.34	8.12	12.9	0.373
31	103.3	383.1	-54.7	23.8	-3.40	7.70	14.4	0.344
32	106.7	391.5	-54.6	24.3	-3.39	7.12	14.6	0.315
33	110.0	412.4	-55.7	25.6	-3.46	5.31	13.3	0.285
Absolute	16.7			27.1			(T =	37.1 ms)
	110.0				-3.46		(T =	65.0 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	447.9	406.3	364.7	323.2	281.6	240.0	198.4	156.9	115.3	73.7
RX	480.5	452.1	440.4	430.2	420.0	411.9	404.7	398.0	392.5	386.9
RU	447.9	406.3	364.7	323.2	281.6	240.0	198.4	156.9	115.3	73.7

RAU = 85.2 (kips); RA2 = 428.6 (kips)

Current CAPWAP Ru = 390.0 (kips); Corresponding J(RP)= 0.14; J(RX) = 0.84

VMX	TVP	VT1*Z	FT1	FMX	DMX	DFN	SET	EMX	QUS
ft/s	ms	kips	kips	kips	in	in	in	kip-ft	kips
14.41	36.09	414.1	449.5	449.5	0.889	0.093	0.091	18.5	451.8

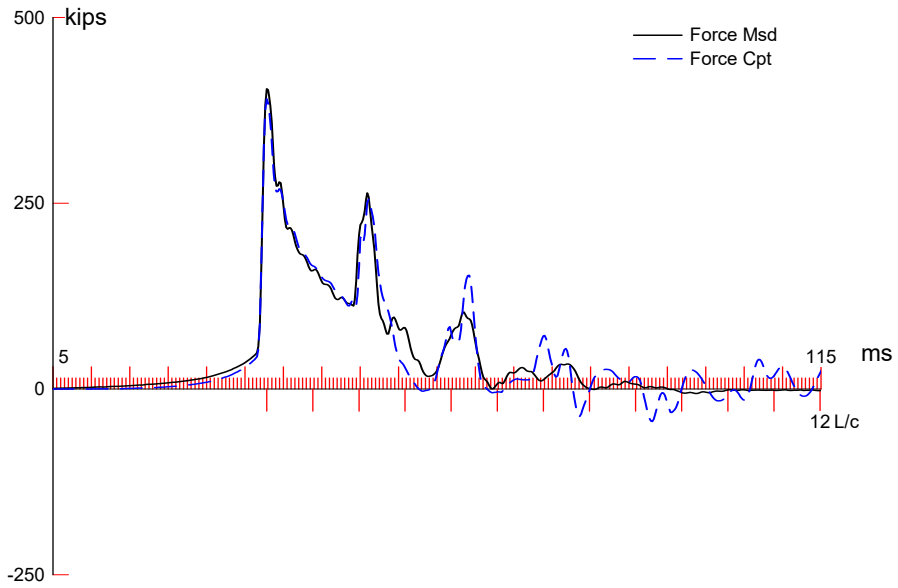
PILE PROFILE AND PILE MODEL

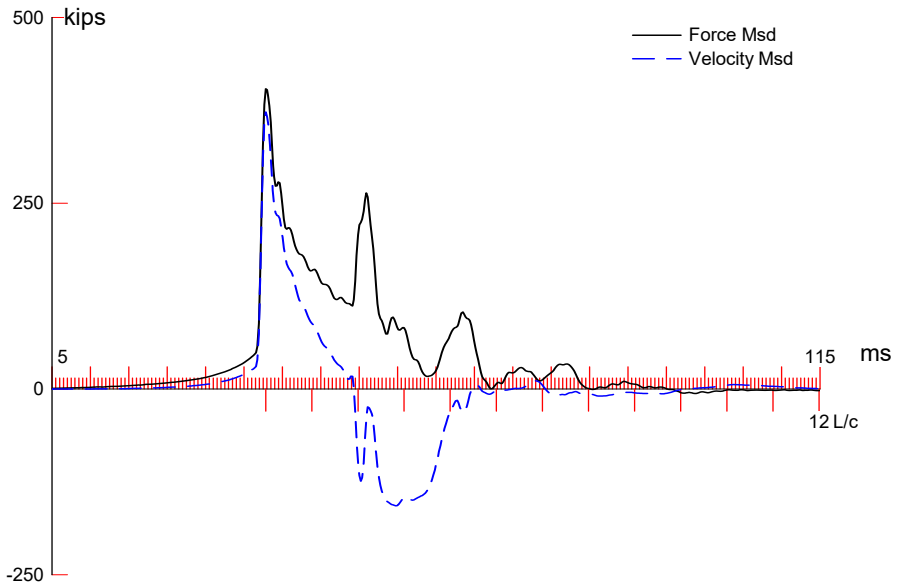
Depth ft	Area in^2	E-Modulus ksi	Spec. Weight lb/ft^3	Perim. ft
0.00	16.10	29992.2	492.000	2.814
110.00	16.10	29992.2	492.000	2.814

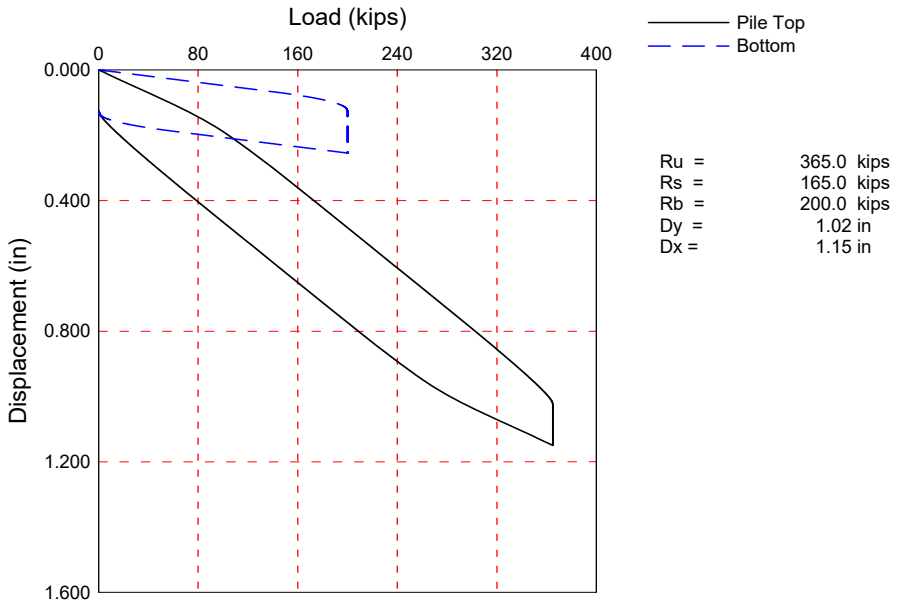
Toe Area 0.630 ft^2

Top Segment Length 3.33 ft, Top Impedance 28.74 kips/ft/s

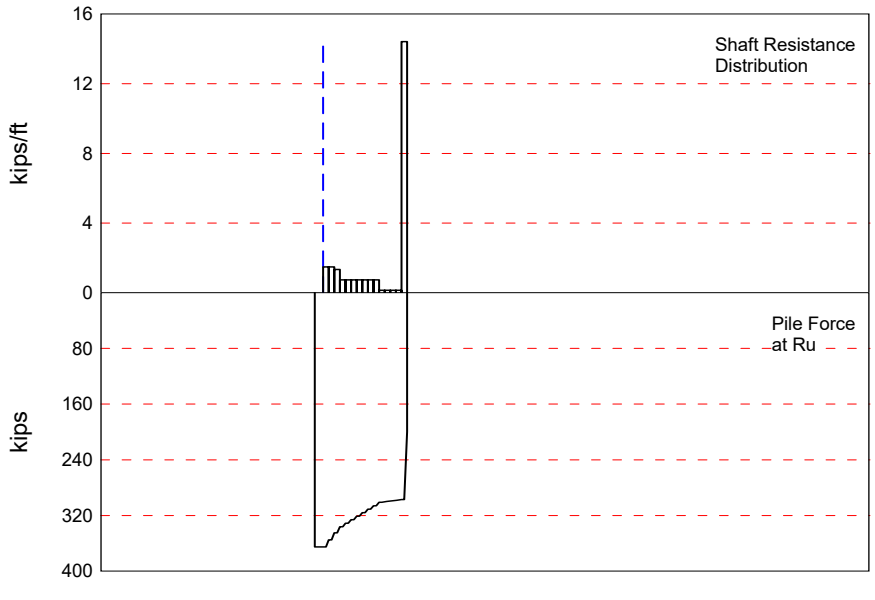
Pile Damping 1.0 %, Time Incr 0.198 ms, Wave Speed 16807.9 ft/s, 2L/c 13.1 ms







Ru =	365.0 kips
Rs =	165.0 kips
Rb =	200.0 kips
Dy =	1.02 in
Dx =	1.15 in



CAPWAP SUMMARY RESULTS

Total CAPWAP Capacity: 365.0; along Shaft 165.0; at Toe 200.0 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
				365.0				
1	16.8	6.2	10.0	355.0	10.0	1.63	0.58	0.054
2	23.5	12.9	10.0	345.0	20.0	1.49	0.53	0.054
3	30.3	19.6	9.0	336.0	29.0	1.34	0.48	0.054
4	37.0	26.3	5.0	331.0	34.0	0.74	0.26	0.054
5	43.7	33.1	5.0	326.0	39.0	0.74	0.26	0.054
6	50.5	39.8	5.0	321.0	44.0	0.74	0.26	0.054
7	57.2	46.5	5.0	316.0	49.0	0.74	0.26	0.054
8	63.9	53.2	5.0	311.0	54.0	0.74	0.26	0.054
9	70.6	60.0	5.0	306.0	59.0	0.74	0.26	0.054
10	77.4	66.7	5.0	301.0	64.0	0.74	0.26	0.054
11	84.1	73.4	1.0	300.0	65.0	0.15	0.05	0.054
12	90.8	80.2	1.0	299.0	66.0	0.15	0.05	0.054
13	97.5	86.9	1.0	298.0	67.0	0.15	0.05	0.054
14	104.3	93.6	1.0	297.0	68.0	0.15	0.05	0.054
15	111.0	100.3	97.0	200.0	165.0	14.42	5.12	0.054
Avg. Shaft			11.0			1.64	0.58	0.054
Toe			200.0				317.31	0.100

Soil Model Parameters/Extensions		Shaft	Toe
Quake	(in)	0.100	0.096
Case Damping Factor		0.310	0.696
Unloading Quake	(% of loading quake)	30	100
Reloading Level	(% of Ru)	100	100
Unloading Level	(% of Ru)	47	
Resistance Gap (included in Toe Quake)	(in)		0.020

CAPWAP match quality = 4.63 (Force Match) ; RSA = 0
Observed: final set = 0.125 in; blow count = 96 b/ft
Computed: final set = 0.103 in; blow count = 117 b/ft

max. Top Comp. Stress = 24.2 ksi (T= 35.8 ms, max= 1.173 x Top)
max. Comp. Stress = 28.4 ksi (Z= 111.0 ft, T= 42.6 ms)
max. Tens. Stress = -4.52 ksi (Z= 94.2 ft, T= 63.8 ms)
max. Energy (EMX) = 15.3 kip-ft; max. Measured Top Displ. (DMX)= 0.80 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	3.4	390.4	-43.5	24.2	-2.70	15.29	12.9	0.785
2	6.7	392.0	-36.9	24.3	-2.29	15.32	12.9	0.774
4	13.5	397.4	-24.6	24.7	-1.53	15.20	12.7	0.752
6	20.2	387.3	-35.0	24.0	-2.17	14.27	12.5	0.727
8	26.9	376.7	-36.1	23.4	-2.24	13.36	12.3	0.702
10	33.6	366.3	-31.6	22.7	-1.96	12.53	12.1	0.675
12	40.4	361.8	-27.3	22.5	-1.70	11.98	11.9	0.647
14	47.1	357.2	-32.7	22.2	-2.03	11.43	11.8	0.616
16	53.8	352.8	-35.1	21.9	-2.18	10.85	11.7	0.583
18	60.5	348.4	-34.0	21.6	-2.11	10.24	11.5	0.549
20	67.3	344.1	-41.3	21.4	-2.56	9.61	11.4	0.511
22	74.0	339.7	-52.9	21.1	-3.28	8.95	11.3	0.470
24	80.7	334.2	-61.8	20.8	-3.84	8.20	11.2	0.425
25	84.1	335.1	-66.1	20.8	-4.10	7.93	11.1	0.402
26	87.5	334.2	-69.1	20.8	-4.29	7.60	11.1	0.378
27	90.8	335.2	-71.7	20.8	-4.45	7.30	11.1	0.353
28	94.2	334.5	-72.8	20.8	-4.52	6.96	11.0	0.329
29	97.5	342.7	-72.7	21.3	-4.52	6.67	11.0	0.304
30	100.9	344.6	-72.0	21.4	-4.47	6.34	10.9	0.280
31	104.3	372.0	-71.8	23.1	-4.46	6.03	10.8	0.255
32	107.6	426.0	-71.2	26.5	-4.42	5.70	10.1	0.230
33	111.0	458.0	-71.2	28.4	-4.42	4.09	8.4	0.205
Absolute	111.0			28.4			(T =	42.6 ms)
	94.2				-4.52		(T =	63.8 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	549.0	525.8	502.6	479.4	456.2	433.1	409.9	386.7	363.5	340.3
RX	559.7	537.9	516.2	495.1	474.1	453.0	432.0	411.5	391.1	370.7
RU	553.7	531.0	508.3	485.6	462.9	440.1	417.4	394.7	372.0	349.3

RAU = 102.1 (kips); RA2 = 279.6 (kips)

Current CAPWAP Ru = 365.0 (kips); Corresponding J(RP)= 0.79; matches RX9 within 5%

VMX	TVP	VT1*Z	FT1	FMX	DMX	DFN	SET	EMX	QUS
ft/s	ms	kips	kips	kips	in	in	in	kip-ft	kips
13.07	35.82	375.5	405.3	406.3	0.796	0.125	0.125	15.7	409.8

PILE PROFILE AND PILE MODEL

Depth ft	Area in^2	E-Modulus ksi	Spec. Weight lb/ft^3	Perim. ft
0.00	16.10	29992.2	492.000	2.814
111.00	16.10	29992.2	492.000	2.814

Toe Area 0.630 ft^2

Top Segment Length 3.36 ft, Top Impedance 28.74 kips/ft/s

Pile Damping 0.5 %, Time Incr 0.200 ms, Wave Speed 16807.9 ft/s, 2L/c 13.2 ms

S.W.COLE ENGINEERING, INC.

Construction Observation Report

Project Name:	Widgery Wharf	**Project No. :**	17-0670
Location:	Portland, Maine	**Date:**	11-10-17
Client:	CM Union LLC	**S.W.COLE Rep. :**	K. Gimpel
Client's Rep.:	Charlie Poole	**Arrived on Site:**	9:00a
Contractor:	Ducas Construction	**Left Site:**	9:30a

General Observations and Discussions:

As requested by Ducas Construction, we made a site visit to observe exposed subgrade soils and to sample fill material for analytical testing. On site, we met with Patrick and Jodie (Ducas Construction) and Justin (Chase Excavating). Prior to our visit, about half of the site had been excavated down to approximate bottom of pile cap elevation. We understand Chase is over-excavating approximately 3 inches to allow for a working mat of ¾" crushed stone overlying the geotextile fabric and the excavation is being extended laterally a minimum of 3 feet as specified in the project documents.

Subgrade materials exposed at bottom of pile cap generally consisted of dark brown to black uncontrolled fills containing varying amounts of sand, silt, clay and gravel with brick, wood and ash. Subgrade appeared saturated and loose, but relatively firm under foot. We understand from conversations on site that subgrade elevation is below normal high tide elevation. Conditions and materials observed at subgrade generally appear to be consistent with findings contained in Summit Geoengineering Services project geotechnical report dated October 14, 2015. Following excavation, Summit's report recommends proof-rolling using a 10-ton machine without vibration after which any soft or unsuitable soils encountered should be removed and replaced with ¾" crushed stone. We discussed the planned proof-rolling with Patrick and Justin and it was agreed that given the saturated conditions and loose material, there is a strong potential for portions of the subgrade to rut or yield. We recommended the geotechnical engineer of record be contacted to allow for field recommendations to be made as necessary in the event proof-rolling compromises subgrade.

Visually, some of the darker fill material in the encountered near subgrade in the southeastern portion of the excavation appeared to contain some level of contaminates thought to be petroleum. Material was sampled and a separate report with findings and handling guidelines will be provided after test results have been finalized.

Attachments: Photo

Reviewed by: Roger E Domey

The S.W.COLE field representative is on-site at the request of our client to provide construction materials testing and to observe and document construction activities. The contractor has sole responsibility for schedule, site safety, methods, completeness and quality control.


ZAXIS
250 LC

S.W.COLE ENGINEERING, INC.

Report of Concrete Compressive Strength

ASTM C-31 & C-39

Project Name: Portland ME - Widgery Wharf - Construction Materials Testing Services

Project Number: 17-0670

Client: CM Union LLC

Client Contract Number:

General Contractor:

Concrete Supplier: AUBURN CONCRETE

PLACEMENT INFORMATION

Date Cast: 1/11/2018 **Time Cast:** 12:00 **Date Received:** 1/12/2018

Placement Location: TIE BEAMS: E LINE FROM 1 LINE TO 4 LINE AND BETWEEN D LINE AND E LINE ON LINES 1 THROUGH 4

Placement Method: PUMP

Placement Vol. (yd³): 34

Cylinders Made By: CHARLES CROMWELL

Aggregate Size (in): 3/4

INITIAL CURING CONDITIONS

Temperatures

Minimum (ºF) 53 **Maximum (ºF)** 84

DELIVERY INFORMATION

Admixtures: MASTER AIR AE200 / MASTER GLENIUM / MASTER LIFE CI 30 / MASTER SET R100

TEST RESULTS

Slump (in) (C-143): 6 1/2

Air Content (%) (C-231) 7

Air Temp (ºF): 42

Conc. Temp (ºF) (C-1064): 61

Load Number: 1

Mixer Number 155

Ticket Number 304895

Cubic Yards: 8

Design (psi): **4000**

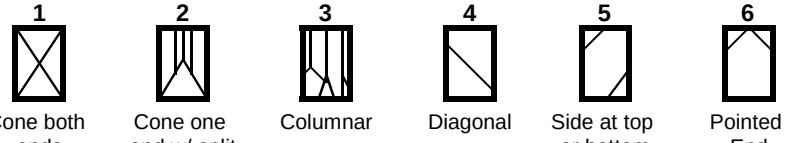
Batch 11:11

Arrive 11:40

Depart 12:00

Cylinder Designation	Cylinder Weight (lbs)	Cylinder Diameter (in)	Cross Sectional Area(In)²	Date Of Test	Cure Type	**Age (days)**	Fracture Type	Load (kips)	**Strength (psi)**
996-1A	8.25	4.01	12.60	1/18/2018	Lab	**7**	5	60.2	**4780**
996-1B	8.25	4.00	12.57	2/8/2018	Lab	**28**	4	89.6	**7130**
996-1C	8.25	4.01	12.65	2/8/2018	Lab	**28**	4	88.6	**7000**
996-1D	8.25			Hold	Lab				

Fracture Types



1 Cone both ends; 2 Cone one end w/ split; 3 Columnar; 4 Diagonal; 5 Side at top or bottom; 6 Pointed End

Remarks:

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S.W.COLE ENGINEERING, INC.

Report of Concrete Compressive Strength

ASTM C-31 & C-39

Project Name: Portland ME - Widgery Wharf - Construction Materials Testing Services

Project Number: 17-0670

Client: CM Union LLC

Client Contract Number:

General Contractor:

Concrete Supplier: AUBURN CONCRETE

PLACEMENT INFORMATION

Date Cast: 1/19/2018 **Time Cast:** 10:50 **Date Received:** 1/22/2018

Placement Location: GB & TB: D-LINE FROM 1-LINE TO 4-LINE AND BETWEEN C-LINE AND D-LINE ON 1, 2 , 3, AND 4 LINES

Placement Method: PUMP

Placement Vol. (yd³): 40

Cylinders Made By: AIDAN BOYCE

Aggregate Size (in): 3/4

INITIAL CURING CONDITIONS

Temperatures

Minimum (ºF) 51 **Maximum (ºF)** 81

DELIVERY INFORMATION

Admixtures: MASTER AIR AE200 / MASTER GLENIUM / MASTER LIFE CI 30 / MASTER SET R100

TEST RESULTS

Slump (in) (C-143): 8 3/4

Air Content (%) (C-231) 5.5

Air Temp (ºF): 28

Conc. Temp (ºF) (C-1064): 57

Load Number: 2

Mixer Number 150

Ticket Number 220815

Cubic Yards: 10

Design (psi): **5000**

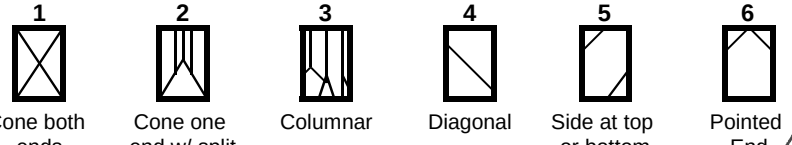
Batch 9:45

Arrive 10:30

Depart 10:45

Cylinder Designation	Cylinder Weight (lbs)	Cylinder Diameter (in)	Cross Sectional Area(In)²	Date Of Test	Cure Type	**Age (days)**	Fracture Type	Load (kips)	**Strength (psi)**
996-2A	8.30	3.99	12.49	1/22/2018	Lab	**3**	4	33.6	**2690**
996-2B	8.30	4.00	12.58	1/26/2018	Lab	**7**	5	54.8	**4360**
996-2C	8.30	3.99	12.52	2/16/2018	Lab	**28**	4	96.2	**7690**
996-2D	8.30	4.00	12.54	2/16/2018	Lab	**28**	3	88.8	**7080**
996-2E	8.30			Hold	Lab				

Fracture Types



Remarks: PROJECT SPECS REQUIRE 4000 psi DESIGN STRENGTH.

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Report of Concrete Compressive Strength

ASTM C-31 & C-39

Project Name: Portland ME - Widgery Wharf - Construction Materials Testing Services

Project Number: 17-0670

Client: CM Union LLC

Client Contract Number:

General Contractor:

Concrete Supplier: AUBURN CONCRETE

PLACEMENT INFORMATION

Date Cast: 1/26/2018 **Time Cast:** 1:42 **Date Received:** 1/29/2018

Placement Location: FOUNDATION WALLS: C-LINE FROM 2-LINE TO 4-LINE AND BETWEEN B-LINE AND C-LINE ON 1,2,3 AND 4-LINES

Placement Method: PUMP

Placement Vol. (yd³): 38

Cylinders Made By: AIDAN BOYCE

Aggregate Size (in): 3/4

INITIAL CURING CONDITIONS

Temperatures

Minimum (ºF) 50 **Maximum (ºF)** 61

DELIVERY INFORMATION

Admixtures: MASTER AIR AE200 / MASTER GLENIUM / MASTER LIFE CI 30 / MASTER SET R100

TEST RESULTS

Slump (in) (C-143): 8 1/4

Air Content (%) (C-231) 5.8

Air Temp (ºF): 19

Conc. Temp (ºF) (C-1064): 63

Load Number: 2

Mixer Number 144

Ticket Number 220894

Cubic Yards: 9.5

Design (psi): **5000**

Batch 12:12

Arrive 12:50

Depart 1:44

Cylinder Designation	Cylinder Weight (lbs)	Cylinder Diameter (in)	Cross Sectional Area(In)²	Date Of Test	Cure Type	**Age (days)**	Fracture Type	Load (kips)	**Strength (psi)**
996-3A	8.35	3.99	12.53	2/2/2018	Lab	**7**	4	58.6	**4680**
996-3B	8.35	3.99	12.52	2/23/2018	Lab	**28**	4	90.4	**7220**
996-3C	8.35	4.01	12.60	2/23/2018	Lab	**28**	4	93.8	**7450**
996-3D	8.35			Hold	Lab				

Fracture Types

1 Cone both ends; 2 Cone one end w/ split; 3 Columnar; 4 Diagonal; 5 Side at top or bottom; 6 Pointed End

Remarks: PROJECT SPECS REQUIRE 4000 psi STRENGTH.

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S.W.COLE ENGINEERING, INC.

Report of Concrete Compressive Strength

ASTM C-31 & C-39

Project Name: Portland ME - Widgery Wharf - Construction Materials Testing Services

Project Number: 17-0670

Client: CM Union LLC

Client Contract Number:

General Contractor:

Concrete Supplier: AUBURN CONCRETE

PLACEMENT INFORMATION

Date Cast: 2/2/2018 **Time Cast:** 9:28 **Date Received:** 2/5/2018

Placement Location: TIE BEAMS: BETWEEN A&B-LINES AND 1&3-LINES

Placement Method: PUMP

Cylinders Made By: AIDAN BOYCE

Placement Vol. (yd³): 29

Aggregate Size (in): 3/4

INITIAL CURING CONDITIONS

Temperatures

Minimum (ºF) 49 **Maximum (ºF)** 59

DELIVERY INFORMATION

Admixtures: MASTER AIR AE200 / MASTER GLENIUM / MASTER LIFE CI 30 / MASTER SET R100

TEST RESULTS

Slump (in) (C-143): 6 3/4

Air Content (%) (C-231) 5.8

Air Temp (ºF): 28

Conc. Temp (ºF) (C-1064): 57

Load Number: 1

Mixer Number 163

Ticket Number 221032

Cubic Yards: 10

Design (psi): **5000**

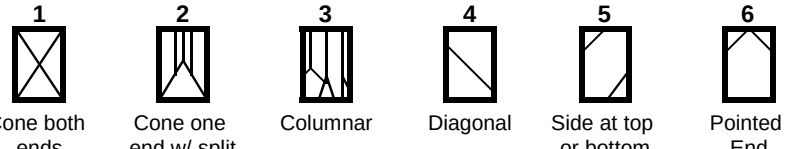
Batch 8:16

Arrive 8:50

Depart 9:25

Cylinder Designation	Cylinder Weight (lbs)	Cylinder Diameter (in)	Cross Sectional Area(In)²	Date Of Test	Cure Type	**Age (days)**	Fracture Type	Load (kips)	**Strength (psi)**
996-4A	8.35	4.01	12.60	2/9/2018	Lab	**7**	4	53.6	**4250**
996-4B	8.35	4.01	12.63	3/2/2018	Lab	**28**	4	94.0	**7440**
996-4C	8.35	4.02	12.66	3/2/2018	Lab	**28**	4	94.8	**7490**
996-4D	8.35			Hold	Lab				

Fracture Types



Remarks: PROJECT SPECS REQUIRE 4000 psi STRENGTH.

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Report of Concrete Compressive Strength

ASTM C-31 & C-39

Project Name: Portland ME - Widgery Wharf - Construction Materials Testing Services

Project Number: 17-0670

Client: CM Union LLC

Client Contract Number:

General Contractor:

Concrete Supplier: AUBURN CONCRETE

PLACEMENT INFORMATION

Date Cast: 2/9/2018 **Time Cast:** 8:25

Date Received: 2/12/2018

Placement Location: ELEVATOR PIT SLAB

Placement Method: PUMP

Cylinders Made By: AIDAN BOYCE

Placement Vol. (yd³): 13

Aggregate Size (in): 3/4

INITIAL CURING CONDITIONS

Temperatures

Minimum (ºF) 56 **Maximum (ºF)** 77

DELIVERY INFORMATION

Admixtures: MASTER AIR AE200 / MASTER GLENIUM / MASTER LIFE CI 30 / MASTER SET R100

TEST RESULTS

Slump (in) (C-143): 5 3/4

Air Content (%) (C-231) 6.8

Air Temp (ºF): 18

Conc. Temp (ºF) (C-1064): 57

Load Number: 1

Mixer Number 156

Ticket Number 22144

Cubic Yards: 6.5

Design (psi): **5000**

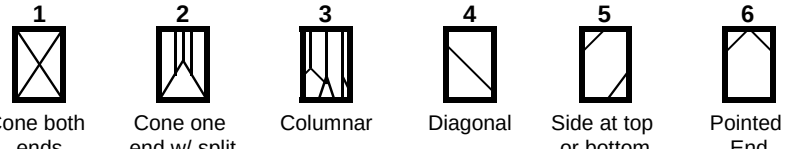
Batch 7:20

Arrive 8:00

Depart 8:25

Cylinder Designation	Cylinder Weight (lbs)	Cylinder Diameter (in)	Cross Sectional Area(In)²	Date Of Test	Cure Type	**Age (days)**	Fracture Type	Load (kips)	**Strength (psi)**
996-5A	8.40	4.01	12.60	2/16/2018	Lab	**7**	3	60.8	**4820**
996-5B	8.40	4.01	12.64	3/9/2018	Lab	**28**	4	90.0	**7120**
996-5C	8.40	4.01	12.64	3/9/2018	Lab	**28**	4	91.2	**7220**
996-5D	8.40			Hold	Lab				

Fracture Types



Remarks: PROJECT SPECS REQUIRE 4000 psi STRENGTH.

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S.W.COLE ENGINEERING, INC.

Report of Concrete Compressive Strength

ASTM C-31 & C-39

Project Name: Portland ME - Widgery Wharf - Construction Materials Testing Services

Project Number: 17-0670

Client: CM Union LLC

Client Contract Number:

General Contractor:

Concrete Supplier: AUBURN CONCRETE

PLACEMENT INFORMATION

Date Cast: 2/13/2018 **Time Cast:** 11:40

Date Received: 2/14/2018

Placement Location: ELEVATOR GRADE BEAMS

Placement Method: PUMP

Placement Vol. (yd³): 30

Cylinders Made By: PETER PHELAN

Aggregate Size (in): 3/4

INITIAL CURING CONDITIONS

Temperatures

Minimum (ºF) NT **Maximum (ºF)** NT

DELIVERY INFORMATION

Admixtures: AIR / GLENIUM / RETARDER / CORROSION INHIBITOR

TEST RESULTS

Slump (in) (C-143): 8

Air Content (%) (C-231) 5.6

Air Temp (ºF):

Conc. Temp (ºF) (C-1064): 55

Load Number: 1

Mixer Number 148

Ticket Number 221203

Cubic Yards: 10

Design (psi): **5000**

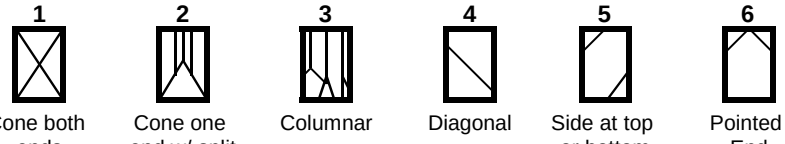
Batch 10:46

Arrive

Depart

Cylinder Designation	Cylinder Weight (lbs)	Cylinder Diameter (in)	Cross Sectional Area(In)²	Date Of Test	Cure Type	**Age (days)**	Fracture Type	Load (kips)	**Strength (psi)**
996-6A	8.50	4.01	12.62	2/20/2018	Lab	**7**	4	67.2	**5330**
996-6B	8.50	4.00	12.59	3/13/2018	Lab	**28**	4	100.2	**7960**
996-6C	8.50	4.01	12.62	3/13/2018	Lab	**28**	4	101.8	**8070**
996-6D	8.50			Hold	Lab				

Fracture Types



1 Cone both ends; 2 Cone one end w/ split; 3 Columnar; 4 Diagonal; 5 Side at top or bottom; 6 Pointed End

Remarks: PROJECT SPECS REQUIRE 4000 psi STRENGTH.

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S.W.COLE ENGINEERING, INC.

Report of Concrete Compressive Strength

ASTM C-31 & C-39

Project Name: Portland ME - Widgery Wharf - Construction Materials Testing Services

Project Number: 17-0670

Client: CM Union LLC

Client Contract Number:

General Contractor:

Concrete Supplier: AUBURN CONCRETE

PLACEMENT INFORMATION

Date Cast: 2/15/2018 **Time Cast:** 9:45

Date Received: 2/16/2018

Placement Location: STEM WALL: A(+10')/3 (-5')

Placement Method: PUMP

Placement Vol. (yd³): 13

Cylinders Made By: NATHANIEL MCARTHUR

Aggregate Size (in): 3/4

INITIAL CURING CONDITIONS

Temperatures

Minimum (ºF) 48 **Maximum (ºF)** 76

DELIVERY INFORMATION

Admixtures: AIR / MRWR / CNI

TEST RESULTS

Slump (in) (C-143): 9

Air Content (%) (C-231) 7.4

Air Temp (ºF): 35

Conc. Temp (ºF) (C-1064): 61

Load Number: 2

Mixer Number 164

Ticket Number 221300

Cubic Yards: 6.5

Design (psi): **4000**

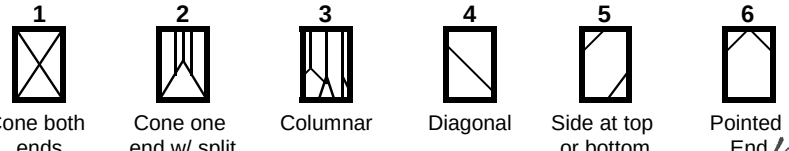
Batch 8:29

Arrive 9:15

Depart

Cylinder Designation	Cylinder Weight (lbs)	Cylinder Diameter (in)	Cross Sectional Area(In)²	Date Of Test	Cure Type	**Age (days)**	Fracture Type	Load (kips)	**Strength (psi)**
996-7A	8.20	4.00	12.54	2/22/2018	Lab	**7**	4	64.2	**5120**
996-7B	8.20	4.00	12.58	3/15/2018	Lab	**28**	5	95.6	**7600**
996-7C	8.20	4.00	12.58	3/15/2018	Lab	**28**	5	86.6	**6890**
996-7D	8.20			Hold	Lab				

Fracture Types



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Report of Concrete Compressive Strength

ASTM C-31 & C-39

Project Name: Portland ME - Widgery Wharf - Construction Materials Testing Services

Project Number: 17-0670

Client: CM Union LLC

Client Contract Number:

General Contractor:

Concrete Supplier: AUBURN CONCRETE

PLACEMENT INFORMATION

Date Cast: 3/7/2018 **Time Cast:** 9:50 **Date Received:** 3/8/2018

Placement Location: STAIRWELL STEM WALL: D/1 TO D/2 TO C/2 TO C/1

Placement Method: PUMP

Cylinders Made By: PETER PHELAN

Placement Vol. (yd³): 8

Aggregate Size (in): 3/4

INITIAL CURING CONDITIONS

Temperatures

Minimum (ºF) NT **Maximum (ºF)** NT

DELIVERY INFORMATION

Admixtures: AIR / RETARDER / HRWR / CI

TEST RESULTS

Slump (in) (C-143): 6 1/2

Air Content (%) (C-231) 7.5

Air Temp (ºF): 37

Conc. Temp (ºF) (C-1064): 58

Load Number: 1

Mixer Number 96

Ticket Number 221629

Cubic Yards: 8

Design (psi): **4000**

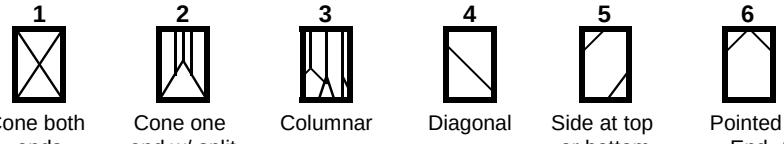
Batch 8:17

Arrive

Depart

Cylinder Designation	Cylinder Weight (lbs)	Cylinder Diameter (in)	Cross Sectional Area(In)²	Date Of Test	Cure Type	**Age (days)**	Fracture Type	Load (kips)	**Strength (psi)**
996-8A	8.15	4.00	12.55	3/14/2018	Lab	**7**	5	32.8	**2620**
996-8B	8.15	4.00	12.59	4/4/2018	Lab	**28**	4	48.2	**3830**
996-8C	8.15	4.02	12.69	4/4/2018	Lab	**28**	4	49.4	**3890**
996-8D	8.15	4.01	12.61	5/2/2018	Lab	**56**	4	58.4	**4630**

Fracture Types



1 Cone both ends; 2 Cone one end w/ split; 3 Columnar; 4 Diagonal; 5 Side at top or bottom; 6 Pointed End

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Report of Concrete Compressive Strength

ASTM C-31 & C-39

Project Name: Portland ME - Widgery Wharf - Construction Materials Testing Services

Project Number: 17-0670

Client: CM Union LLC

Client Contract Number:

General Contractor:

Concrete Supplier: AUBURN CONCRETE

PLACEMENT INFORMATION

Date Cast: 3/15/2018 **Time Cast:** 9:15

Date Received: 3/16/2018

Placement Location: STAIRWAY B SLAB

Placement Method: TRUCK CHUTE

Cylinders Made By: CHARLES CROMWELL

Placement Vol. (yd³): 5

Aggregate Size (in): 3/4

INITIAL CURING CONDITIONS

Temperatures

Minimum (ºF) 44 **Maximum (ºF)** 69

DELIVERY INFORMATION

Admixtures: MASTER AIR / MASTER SET / MASTER GLENIUM / MASTER LIFE CI 3 / POLYMESH

TEST RESULTS

Slump (in) (C-143): 5

Air Content (%) (C-231) 6.5

Air Temp (ºF): 36

Conc. Temp (ºF) (C-1064): 71

Load Number: 1

Mixer Number 83

Ticket Number 221677

Cubic Yards: 5

Design (psi): **5000**

Batch 8:17

Arrive 8:50

Depart 9:45

Cylinder Designation	Cylinder Weight (lbs)	Cylinder Diameter (in)	Cross Sectional Area(In)²	Date Of Test	Cure Type	**Age (days)**	Fracture Type	Load (kips)	**Strength (psi)**
996-9A	8.15	4.01	12.66	3/22/2018	Lab	**7**	5	40.6	**3210**
996-9B	8.15	4.01	12.62	4/12/2018	Lab	**28**	4	63.8	**5060**
996-9C	8.15	4.01	12.63	4/12/2018	Lab	**28**	5	64.6	**5120**
996-9D	8.15			Hold	Lab				

Fracture Types

1 Cone both ends; 2 Cone one end w/ split; 3 Columnar; 4 Diagonal; 5 Side at top or bottom; 6 Pointed End

Remarks:

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Report of Concrete Compressive Strength

ASTM C-31 & C-39

Project Name: Portland ME - Widgery Wharf - Construction Materials Testing Services

Project Number: 17-0670

Client: CM Union LLC

Client Contract Number:

General Contractor:

Concrete Supplier: AUBURN CONCRETE

PLACEMENT INFORMATION

Date Cast: 3/21/2018 **Time Cast:** 8:40 **Date Received:** 3/22/2018

Placement Location: ELEVATOR SLAB AND STEM WALL ON SOUTH SIDE OF BUILDING

Placement Method: PUMP

Cylinders Made By: PETER PHELAN

Placement Vol. (yd³): 20

Aggregate Size (in): 3/8

INITIAL CURING CONDITIONS

Temperatures

Minimum (ºF) NT **Maximum (ºF)** NT

DELIVERY INFORMATION

Admixtures: AIR / MRWR/ CI / RETARDER / POLY MESH / SLAG

TEST RESULTS

Slump (in) (C-143): 4 1/2

Air Content (%) (C-231) 5.2

Air Temp (ºF): 24

Conc. Temp (ºF) (C-1064): 76

Load Number: 1

Mixer Number 158

Ticket Number 221763

Cubic Yards: 10

Design (psi): **5000**

Batch 7:04

Arrive 7:58

Depart 8:45

Cylinder Designation	Cylinder Weight (lbs)	Cylinder Diameter (in)	Cross Sectional Area(In)²	Date Of Test	Cure Type	**Age (days)**	Fracture Type	Load (kips)	**Strength (psi)**
996-10A	8.00	4.02	12.69	3/28/2018	Lab	**7**	4	38.6	**3040**
996-10B	8.00	4.01	12.64	4/18/2018	Lab	**28**	4	65.2	**5160**
996-10C	8.05	4.01	12.60	4/18/2018	Lab	**28**	4	64.2	**5090**
996-10D	8.05			Hold	Lab				

Fracture Types

1 Cone both ends; 2 Cone one end w/ split; 3 Columnar; 4 Diagonal; 5 Side at top or bottom; 6 Pointed End

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Report of Concrete Compressive Strength

ASTM C-31 & C-39

Project Name: Portland ME - Widgery Wharf - Construction Materials Testing Services

Project Number: 17-0670

Client: CM Union LLC

Client Contract Number:

General Contractor:

Concrete Supplier: AUBURN CONCRETE

PLACEMENT INFORMATION

Date Cast: 3/21/2018 **Time Cast:** 11:20 **Date Received:** 3/22/2018

Placement Location: ELEVATOR SLAB AND STEM WALL ON SOUTH SIDE OF BUILDING

Placement Method: PUMP

Cylinders Made By: PETER PHELAN

Placement Vol. (yd³): 20

Aggregate Size (in): 3/4

INITIAL CURING CONDITIONS

Temperatures

Minimum (ºF) NT **Maximum (ºF)** NT

DELIVERY INFORMATION

Admixtures: AIR / MRWR/ CI / RETARDER / SLAG

TEST RESULTS

Slump (in) (C-143): 8

Air Content (%) (C-231) 7.5

Air Temp (ºF): 28

Conc. Temp (ºF) (C-1064): 60

Load Number: 3

Mixer Number 156

Ticket Number 221777

Cubic Yards: 9

Design (psi): **4000**

Batch 9:51

Arrive 11:00

Depart 11:35

Cylinder Designation	Cylinder Weight (lbs)	Cylinder Diameter (in)	Cross Sectional Area(In)²	Date Of Test	Cure Type	**Age (days)**	Fracture Type	Load (kips)	**Strength (psi)**
996-11A	7.95	4.02	12.67	3/28/2018	Lab	**7**	4	42.4	**3350**
996-11B	8.00	4.00	12.55	4/18/2018	Lab	**28**	4	66.6	**5310**
996-11C	8.05	4.01	12.61	4/18/2018	Lab	**28**	4	68.6	**5440**
996-11D	8.00			Hold	Lab				

Fracture Types

1 Cone both ends; 2 Cone one end w/ split; 3 Columnar; 4 Diagonal; 5 Side at top or bottom; 6 Pointed End

Remarks:

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Report of Concrete Compressive Strength

ASTM C-31 & C-39

Project Name: Portland ME - Widgery Wharf - Construction Materials Testing Services

Project Number: 17-0670

Client: CM Union LLC

Client Contract Number:

General Contractor:

Concrete Supplier: AUBURN CONCRETE

PLACEMENT INFORMATION

Date Cast: 3/28/2018 **Time Cast:** 12:20

Date Received: 3/29/2018

Placement Location: LOBBY AREA STEM WALLS

Placement Method: PUMP

Cylinders Made By: AIDAN BOYCE

Placement Vol. (yd³): 10

Aggregate Size (in): 3/4

INITIAL CURING CONDITIONS

Temperatures

Minimum (ºF) 57 **Maximum (ºF)** 62

DELIVERY INFORMATION

Admixtures: MASTER AIR AE200 / MASTER SET R100 / MASTER GLENIUM / MASTER LIF CI30

TEST RESULTS

Slump (in) (C-143): 6

Air Content (%) (C-231) 6.5

Air Temp (ºF): 42

Conc. Temp (ºF) (C-1064): 68

Load Number: 1

Mixer Number 138

Ticket Number 221940

Cubic Yards: 10

Design (psi): **5000**

Batch 11:01

Arrive 11:30

Depart

Cylinder Designation	Cylinder Weight (lbs)	Cylinder Diameter (in)	Cross Sectional Area(In)²	Date Of Test	Cure Type	**Age (days)**	Fracture Type	Load (kips)	**Strength (psi)**
996-12A	8.10	3.99	12.49	4/4/2018	Lab	**7**	4	41.8	**3350**
996-12B	8.15	4.01	12.64	4/25/2018	Lab	**28**	4	68.2	**5400**
996-12C	8.15	4.01	12.64	4/25/2018	Lab	**28**	4	65.4	**5180**
996-12D	8.20			Hold	Lab				

Fracture Types

1 Cone both ends; 2 Cone one end w/ split; 3 Columnar; 4 Diagonal; 5 Side at top or bottom; 6 Pointed End

Remarks:

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S.W.COLE ENGINEERING, INC.

Report of Concrete Compressive Strength

ASTM C-31 & C-39

Project Name: Portland ME - Widgery Wharf - Construction Materials Testing Services

Project Number: 17-0670

Client: CM Union LLC

Client Contract Number:

General Contractor:

Concrete Supplier: AUBURN CONCRETE

PLACEMENT INFORMATION

Date Cast: 4/6/2018 **Time Cast:** 8:30

Date Received: 4/10/2018

Placement Location: 3RD FLOOR SLAB ON DECK

Placement Method: PUMP

Placement Vol. (yd³): 50

Cylinders Made By: AIDAN BOYCE

Aggregate Size (in): 3/4

INITIAL CURING CONDITIONS

Temperatures

Minimum (ºF) NT **Maximum (ºF)** NT

DELIVERY INFORMATION

Admixtures: MASTER GLENIUM (HRWR) / MASTERSET FP20 @ 2% NON-CHLR

TEST RESULTS

Slump (in) (C-143): 8

Air Content (%) (C-231) 1.4

Air Temp (ºF): 28

Conc. Temp (ºF) (C-1064): 58

Load Number: 3

Mixer Number 159

Ticket Number 222181

Cubic Yards: 10

Design (psi): **4000**

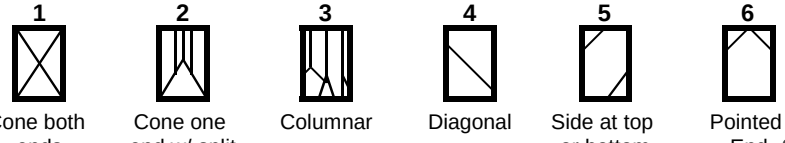
Batch 7:33

Arrive 8:10

Depart 8:30

Cylinder Designation	Cylinder Weight (lbs)	Cylinder Diameter (in)	Cross Sectional Area(In)²	Date Of Test	Cure Type	**Age (days)**	Fracture Type	Load (kips)	**Strength (psi)**
996-13A	8.60	4.01	12.65	4/13/2018	Lab	**7**	5	41.8	**3300**
996-13B	8.60	4.02	12.66	5/4/2018	Lab	**28**	4	57.4	**4530**
996-13C	8.55	4.02	12.67	5/4/2018	Lab	**28**	4	58.6	**4630**
996-13D	8.60			Hold	Lab				

Fracture Types



1 Cone both ends; 2 Cone one end w/ split; 3 Columnar; 4 Diagonal; 5 Side at top or bottom; 6 Pointed End

Remarks:

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S.W.COLE ENGINEERING, INC.

Report of Concrete Compressive Strength

ASTM C-31 & C-39

Project Name: Portland ME - Widgery Wharf - Construction Materials Testing Services

Project Number: 17-0670

Client: CM Union LLC

Client Contract Number:

General Contractor:

Concrete Supplier: AUBURN CONCRETE

PLACEMENT INFORMATION

Date Cast: 4/10/2018 **Time Cast:** 9:50

Date Received: 4/11/2018

Placement Location: 2ND FLOOR SLAB ON DECK

Placement Method: PUMP

Placement Vol. (yd³): 70

Cylinders Made By: PETER PHELAN

Aggregate Size (in): 3/4

INITIAL CURING CONDITIONS

Temperatures

Minimum (ºF) 54 **Maximum (ºF)** 65

DELIVERY INFORMATION

Admixtures: HRWR / 3% NCA

TEST RESULTS

Slump (in) (C-143): 7

Air Content (%) (C-231) 1.9

Air Temp (ºF): 34

Conc. Temp (ºF) (C-1064): 61

Load Number: 7

Mixer Number: 148

Ticket Number 222268

Cubic Yards: 10

Design (psi): **4000**

Batch 8:40

Arrive 9:10

Depart

Cylinder Designation	Cylinder Weight (lbs)	Cylinder Diameter (in)	Cross Sectional Area(In)²	Date Of Test	Cure Type	**Age (days)**	Fracture Type	Load (kips)	**Strength (psi)**
996-14A	8.65	4.00	12.57	4/17/2018	Lab	**7**	4	54.8	**4360**
996-14B	8.65	4.00	12.53	5/8/2018	Lab	**28**	4	75.2	**6000**
996-14C	8.65	3.99	12.50	5/8/2018	Lab	**28**	4	68.2	**5460**
996-14D	8.65			Hold	Lab				

Fracture Types

1 Cone both ends; 2 Cone one end w/ split; 3 Columnar; 4 Diagonal; 5 Side at top or bottom; 6 Pointed End

Remarks:

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S.W.COLE ENGINEERING, INC.

Report of Concrete Compressive Strength

ASTM C-31 & C-39

Project Name: Portland ME - Widgery Wharf - Construction Materials Testing Services

Project Number: 17-0670

Client: CM Union LLC

Client Contract Number:

General Contractor:

Concrete Supplier: AUBURN CONCRETE

PLACEMENT INFORMATION

Date Cast: 4/11/2018 **Time Cast:** 8:15

Date Received: 4/12/2018

Placement Location: 4TH FLOOR SLAB ON DECK

Placement Method: PUMP

Placement Vol. (yd³): 64

Cylinders Made By: PETER PHELAN

Aggregate Size (in): 3/4

INITIAL CURING CONDITIONS

Temperatures

Minimum (ºF) 52 **Maximum (ºF)** 68

DELIVERY INFORMATION

Admixtures: HRWR / 2% NCA

TEST RESULTS

Slump (in) (C-143): 7 1/4

Air Content (%) (C-231) 1.9

Air Temp (ºF): 34

Conc. Temp (ºF) (C-1064): 62

Load Number: 3

Mixer Number 95

Ticket Number 222302

Cubic Yards: 10

Design (psi): **4000**

Batch 6:49

Arrive 7:20

Depart

Cylinder Designation	Cylinder Weight (lbs)	Cylinder Diameter (in)	Cross Sectional Area(In)²	Date Of Test	Cure Type	**Age (days)**	Fracture Type	Load (kips)	**Strength (psi)**
996-15A	8.60	4.01	12.62	4/18/2018	Lab	**7**	4	52.1	**4130**
996-15B	8.65	4.00	12.59	5/9/2018	Lab	**28**	5	64.8	**5150**
996-15C	8.60	4.01	12.62	5/9/2018	Lab	**28**	4	69.0	**5470**
996-15D	8.60			Hold	Lab				

Fracture Types

1 Cone both ends; 2 Cone one end w/ split; 3 Columnar; 4 Diagonal; 5 Side at top or bottom; 6 Pointed End

Remarks:

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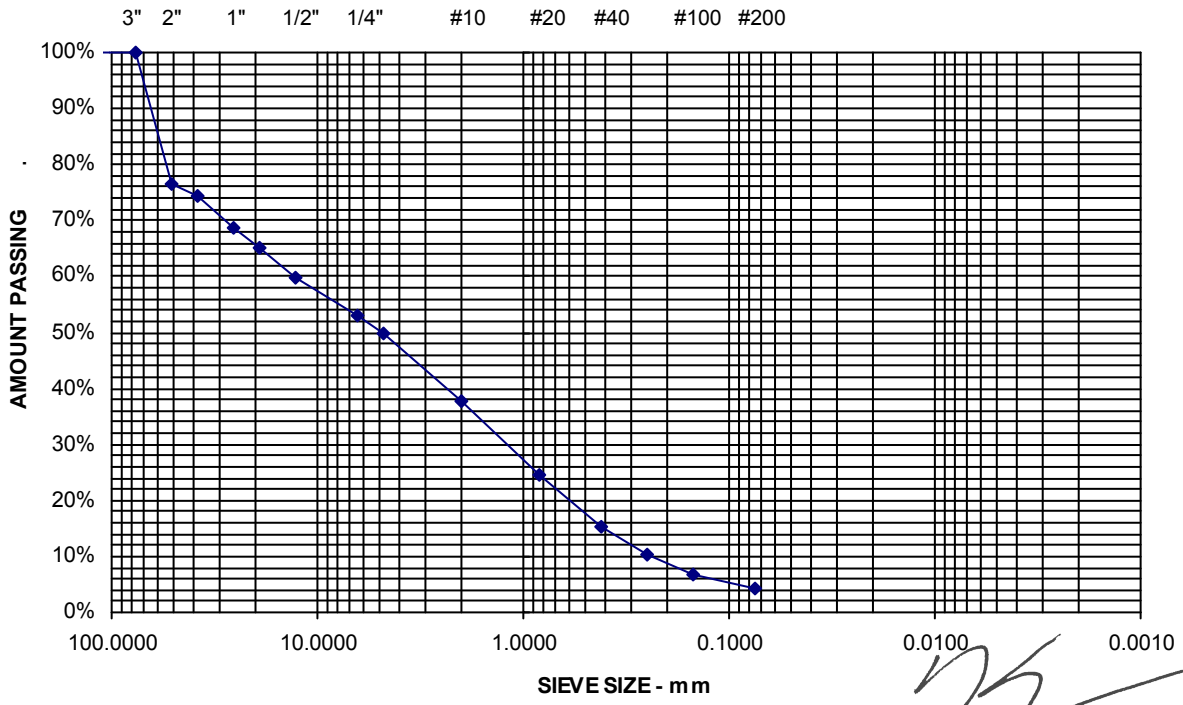
Report of Gradation

ASTM C-117 & C-136

Project Name	PORTLAND ME - WIDGERY WHARF - CONSTRUCTION MATERIALS TESTING SERVICES	Project Number	17-0670
Client	CM UNION LLC	Lab ID	23222G
Material Type	AGGREGATE SUBBASE	Date Received	12/7/2017
Material Source	SHOP	Date Completed	12/8/2017
		Tested By	PAUL SHAFFER

STANDARD DESIGNATION (mm/µm)	SIEVE SIZE	AMOUNT PASSING (%)	2015 MDOT 703.06 TYPE D SPECIFICATIONS (%)
150 mm	**6"**	**100**	**100**
125 mm	**5"**	**100**	
100 mm	**4"**	**100**	
75 mm	**3"**	**100**	
50 mm	**2"**	**76**	
38.1 mm	**1-1/2"**	**74**	
25.0 mm	**1"**	**69**	
19.0 mm	**3/4"**	**65**	
12.5 mm	**1/2"**	**60**	**35 - 80**
6.3 mm	**1/4"**	**53**	**25 - 65**
4.75 mm	**No. 4**	**50**	
2.00 mm	**No. 10**	**38**	
850 um	**No. 20**	**25**	
425 um	**No. 40**	**15**	**0 - 30**
250 um	**No. 60**	**10**	
150 um	**No. 100**	**7**	
75 um	**No. 200**	**4.2**	**0.0 - 7.0**

SAMPLE MEETS SPECIFICATION



Comments 2.7% retained on the 3" sieve not factored into gradation

Roger E. Domingo

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S.W.COLE ENGINEERING, INC.

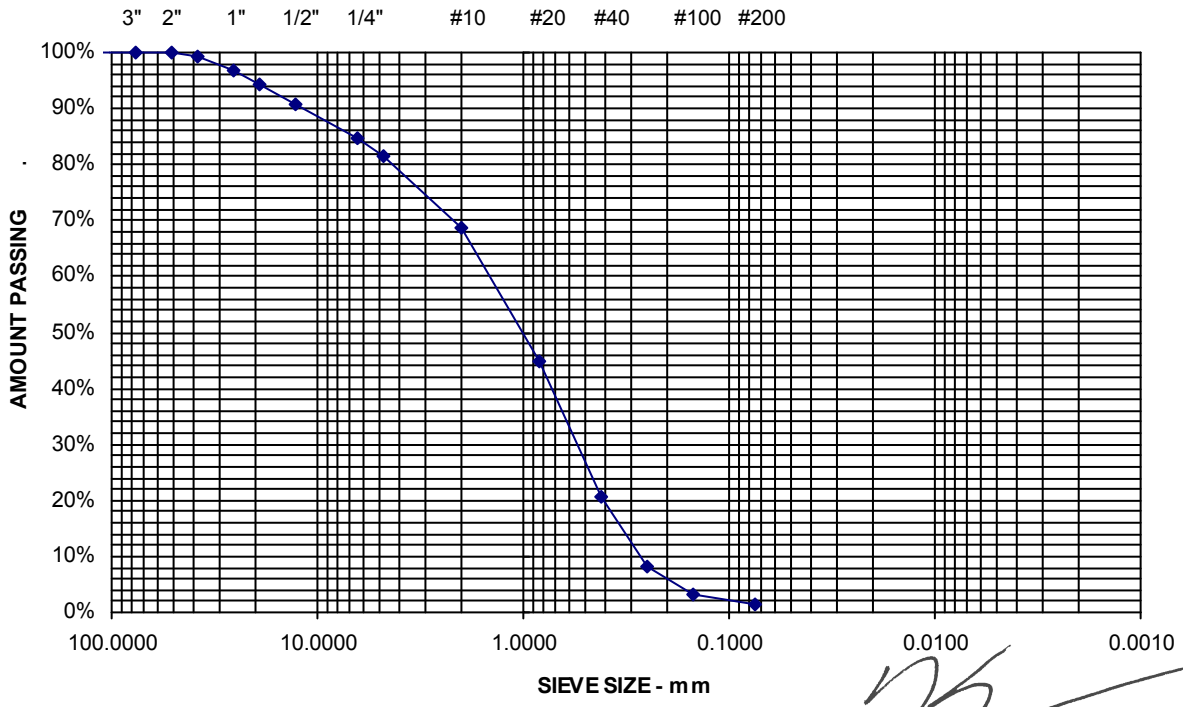
Report of Gradation

ASTM C-117 & C-136

Project Name	PORTLAND ME - WIDGERY WHARF - CONSTRUCTION MATERIALS TESTING SERVICES	Project Number	17-0670
Client	CM UNION LLC	Lab ID	23224G
Material Type	SAND	Date Received	12/7/2017
Material Source	CUMBERLAND PIT	Date Completed	12/8/2017
		Tested By	PAUL SHAFFER

STANDARD DESIGNATION (mm/µm)	SIEVE SIZE	AMOUNT PASSING (%)	2015 MDOT 703.06 TYPE E SPECIFICATIONS (%)
150 mm	**6"**	**100**	
125 mm	**5"**	**100**	
100 mm	**4"**	**100**	
75 mm	**3"**	**100**	
50 mm	**2"**	**100**	
38.1 mm	**1-1/2"**	**99**	
25.0 mm	**1"**	**97**	
19.0 mm	**3/4"**	**94**	
12.5 mm	**1/2"**	**91**	
6.3 mm	**1/4"**	**85**	**25 - 100**
4.75 mm	**No. 4**	**82**	
2.00 mm	**No. 10**	**69**	
850 um	**No. 20**	**45**	
425 um	**No. 40**	**21**	**0 - 50**
250 um	**No. 60**	**8**	
150 um	**No. 100**	**3**	
75 um	**No. 200**	**1.4**	**0.0 - 7.0**

SAMPLE MEETS SPECIFICATION



Comments

Roger E. Domingo

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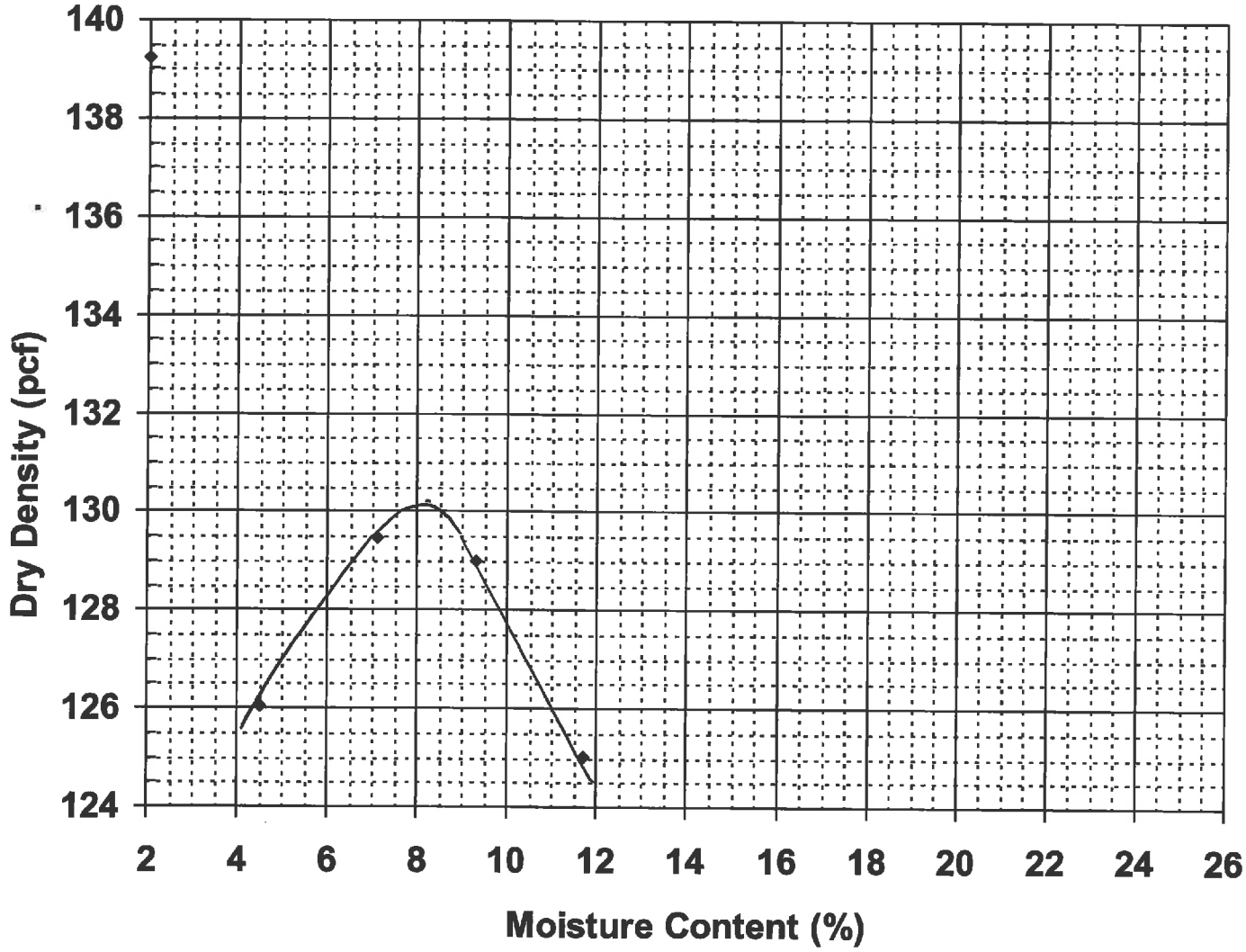
S.W.COLE ENGINEERING, INC.

Report of Moisture-Density

Method ASTM D-1557 MODIFIED Procedure C

Project Name	PORTLAND ME - WIDGERY WHARF - CONSTRUCTION MATERIALS TESTING SERVICES	Project Number	17-0670
Client	CM UNION LLC	Lab ID	23222G
Material Type	AGGREGATE SUBBASE	Date Received	12/7/2017
Material Source	SHOP	Date Completed	12/12/2017
		Tested By	TIMOTHY STOREY

Moisture-Density Relationship Curve



Maximum Dry Density (pcf)	130.1
Optimum Moisture Content (%)	8.2
Percent Oversized	30.0%

Corrected Dry Density (pcf)	**137.2**
Corrected Moisture Content (%)	**6.3**

Comments

Roger E. Domingo

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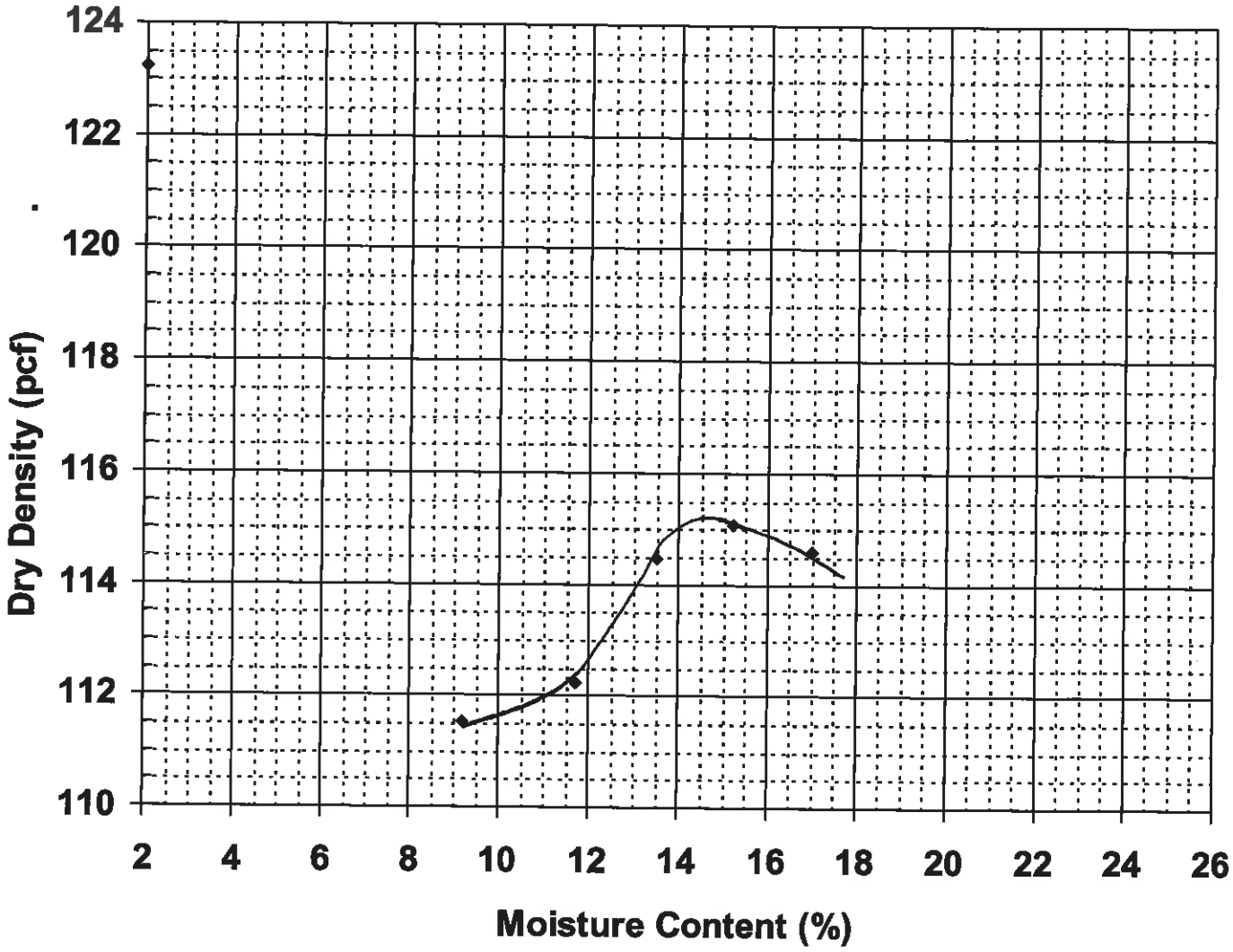
S.W.COLE ENGINEERING, INC.

Report of Moisture-Density

Method ASTM D-1557 MODIFIED **Procedure A**

Project Name	PORTLAND ME - WIDGERY WHARF - CONSTRUCTION MATERIALS TESTING SERVICES	Project Number	17-0670
Client	CM UNION LLC	Lab ID	23224G
Material Type	SAND	Date Received	12/7/2017
Material Source	CUMBERLAND PIT	Date Completed	12/12/2017
		Tested By	AIDAN BOYCE

Moisture-Density Relationship Curve



Maximum Dry Density (pcf)	115.3
Optimum Moisture Content (%)	14.5
Percent Oversized	18.4%

Corrected Dry Density (pcf)	**121.3**
Corrected Moisture Content (%)	**12.2**

Comments

Roger E. Domingo

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S.W.COLE ENGINEERING, INC.

Report of Field Density

ASTM D6938

Project: **PORTLAND ME - WIDGERY WHARF - CONSTRUCTION MATERIALS TESTING SERVICES** Project Number: **17-0670**

Client: **CM UNION LLC**

Field Density Test Results

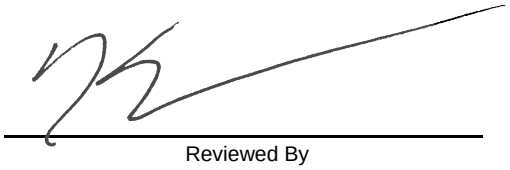
Test #	Test Date	Tech	Test Location	Elev Feet	Test Depth	Lab ID	Dry Density	Moisture Content Percent	Compaction Percent	Required Compaction
1	1/17/2018	AAB	E/3.5 EXTERIOR BACKFILL	6.1	8	23224G	116.7	2.6	96.2	95
2	1/17/2018	AAB	D.5/4 EXTERIOR BACKFILL	5.1	8	23224G	119.3	2.9	98.4	95

Laboratory Compaction Test Reference

Lab ID	Date Received	Material Source	Material Type	Method	Max Dry Density	Optimum Moisture Content (%)	Comments
23224G	12/7/2017	Cumberland Pit	Sand	ASTM D-1557 Modified A	121.3	12.2	

Elevation Notes:

Comments:



Reviewed By

S.W.COLE ENGINEERING, INC.

Report of Field Density

ASTM D6938

Project: **PORTLAND ME - WIDGERY WHARF - CONSTRUCTION MATERIALS TESTING SERVICES** Project Number: **17-0670**

Client: **CM UNION LLC**

Field Density Test Results

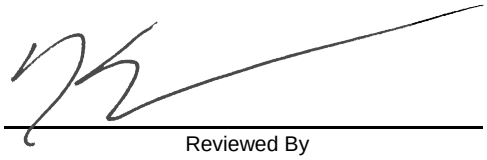
Test #	Test Date	Tech	Test Location	Elev Feet	Test Depth	Lab ID	Dry Density	Moisture Content Percent	Compaction Percent	Required Compaction
5	2/5/2018	ALC	D TO E BY 1 TO 2	8'	6	23222G	130.3	5.1	95.0	95
6	2/5/2018	ALC	C TO D BY 1 TO 2	6'	8	23224G	115.7	5.0	95.4	95
7	2/5/2018	ALC	C TO D BY 2 TO 3	6'	8	23224G	117.4	5.0	96.8	95
8	2/5/2018	ALC	C TO D BY 3 TO 4	5'	8	23224G	118.7	5.6	97.9	95

Laboratory Compaction Test Reference

Lab ID	Date Received	Material Source	Material Type	Method	Max Dry Density	Optimum Moisture Content (%)	Comments
23222G	12/7/2017	Shop	Aggregate Subbase	ASTM D-1557 Modified C	137.2	6.3	
23224G	12/7/2017	Cumberland Pit	Sand	ASTM D-1557 Modified A	121.3	12.2	

Elevation Notes:

Comments:



Reviewed By

S.W.COLE ENGINEERING, INC.

Soil Observation Report

Project Name:	Widgery Wharf	**Project No. :**	17-0670
Location:	36 Union Wharf Portland, ME	**Date:**	1-22-18
Client / Client's Rep:	CM Union LLC/Charlie Poole	**S.W.COLE Rep. :**	A. Boyce
Earthwork Contractor:	Chase Excavating	**Arrived on Site:**	10:00a
Work Area:	E/3.5 and D.5/4 Foundation backfill	**Left Site:**	10:30a

Soil Observations	**Observed**		**Comments**
Subgrade Preparation	Yes ☐	No ☒	Was Placed Before Arrival
Fill Placement (method and uniformity)	Yes ☐	No ☒	Was Placed Before Arrival
Material (proper type, sample #)	Yes ☒	No ☐	#23224G, 121.3 @ 12.2%
Lift Thickness	Yes ☐	No ☒	
Compaction (equipment, passes)	Yes ☒	No ☐	4 Passes with Wacker Nelson BPU 4045 (710lbs)
In-place Densities (frequency)*	Yes ☒	No ☐	(2) as requested

Non-Conformance Items

Person Notified: _____ Yes ☐ No ☒ _____

***refer to associated report for in-situ density results**

Observations / Discussions:

S.W. Cole was onsite as requested by Ducas Construction. The fill had already been placed upon arrival but we were able to observe the compaction process. In-situ density tests performed indicated material was compacted to a minimum of 95 percent of the above referenced proctor value. All results were verbally reported to Ducas Construction prior to leaving the site.

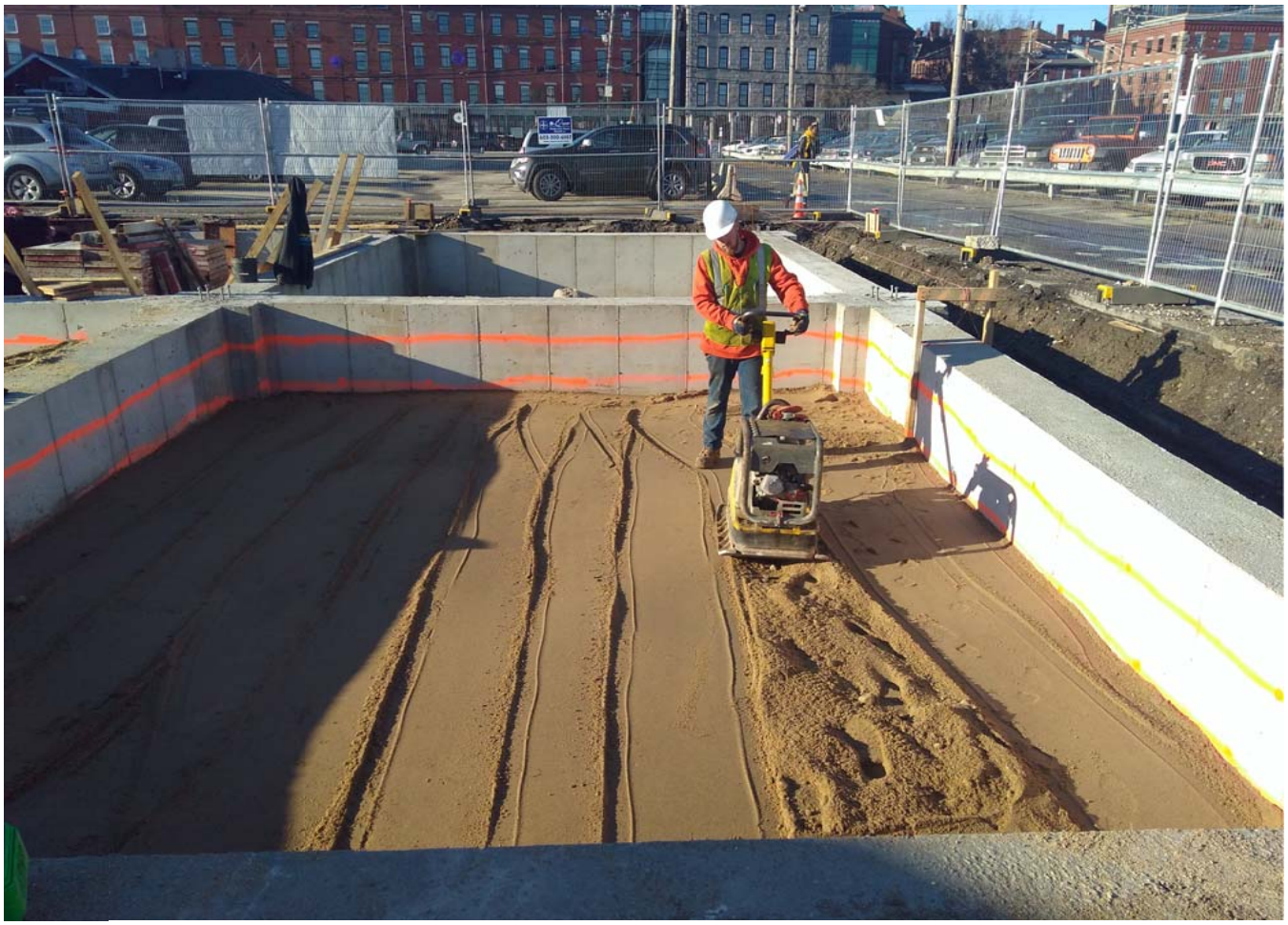
Attachments: None

Reviewed by: _____

The S.W.COLE field representative is on-site at the request of our client to provide construction materials testing and to observe and document construction activities. The contractor has sole responsibility for schedule, site safety, methods, completeness and quality control.


MSRC
ZAXIS
160LC


1949



S.W.COLE ENGINEERING, INC.

Concrete Construction Observation Report

Project Name:	Widgery Wharf	**Project No. :**	17-0670
Location:	Portland, Maine	**Date:**	12-22-17
Client / Client's Rep:	CM Union LLC	**S.W.COLE Rep. :**	C. Cromwell
Placement Location:	Tie Beams: E-line from 1-line to 4-line and between D-line and E-line on 1-line, 2-line, 3-line, and 4-line.	**Arrived on Site:**	7:30
Placement Type:	Pre-placement reinforcing only	**Left Site:**	8:30

Pre-Placement Observations	**In Compliance**		
Bar size and location (diameter, length, bend and coverage)	Yes ☒	No ☐	Per Plan
Splicing (type, overlap)	Yes ☒	No ☐	Per Plan
Stability (wiring, chairs, spacers)	Yes ☒	No ☐	Bricks, Positioners
Reinforcement conditions (cleanliness, temperature, etc.)	Yes ☒	No ☐	Clean/ Ambient
Embedments and anchor bolts installed	Yes ☐	No ☐	N/A
Soil subgrade prepared in accordance with project specifications	Yes ☐	No ☐	N/A

Referenced Drawings	**Date**	**Page(s)**	**Rev.**	**Bar Reinforcing Grade & Type**
Archetype Architects –General Notes	02/13/17	S0.01		ASTM: A 615
Archetype Architects- Pile Cap and Tie Beam	02/13/17	S1.02		
Archetype Architects-Foundation Sections	02/13/17	S2.02		GRADE:60

Concrete Placement Observations	**In Compliance**		**Comments**
Required mix used	Yes ☐	No ☐	Reinforcing only
Concrete properly conveyed to all areas of placement	Yes ☐	No ☐	
Internal vibration / consolidation of concrete	Yes ☐	No ☐	
Even layering around openings and embedments	Yes ☐	No ☐	
Post placement observations (finishing, curing, etc.)	Yes ☐	No ☐	

Field Testing of Concrete Performed Yes ☐ No ☒

***CYLINDER SET NO:** ←**refer to associated concrete test report*

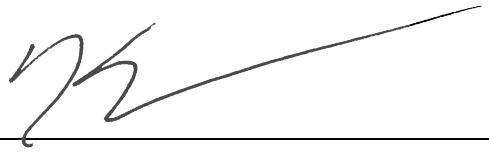
Non-Conformance Items

Person Notified: See notes Yes ☐ No ☐

Notes:

SW Cole arrived onsite as scheduled by Ducas Construction for pre-placement observations of the reinforcing steel installation in the above referenced work area. Reinforcing size and spacing observed appeared consistent with above referenced documents, however, type consisted of standard ASTM A615 rather than epoxy-coated per ASTM A775 as specified in the Issued For Construction project specifications in division 03300, section 2.02, item 1. This perceived discrepancy was brought to the attention of Ducas Construction (Patrick) and we understand their understanding is that epoxy reinforcing is not required, but will confirm with the structural engineer of record.

Attachments: Photos

Reviewed by: 

S.W.COLE ENGINEERING, INC.

Concrete Construction Observation Report

Project Name:	Widgery Wharf	**Project No. :**	17-0670
Location:	Portland, Maine	**Date:**	1-10 &1-11-18
Client / Client's Rep:	CM Union LLC	**S.W.COLE Rep. :**	C. Cromwell
Placement Location:	Tie Beams: E-line from 1-line to 4-line and between D-line and E-line on 1-line, 2-line, 3-line, and 4-line.	**Arrived on Site:**	7:30/9:00
Placement Type:	Tie Beams	**Left Site:**	8:30/2:15

Pre-Placement Observations	**In Compliance**		
Bar size and location (diameter, length, bend and coverage)	Yes ☒	No ☐	Per Plan
Splicing (type, overlap)	Yes ☒	No ☐	Per Plan
Stability (wiring, chairs, spacers)	Yes ☒	No ☐	Bricks, Positioners
Reinforcement conditions (cleanliness, temperature, etc.)	Yes ☒	No ☐	Clean/ Ambient
Embedments and anchor bolts installed	Yes ☒	No ☐	Galvanized
Soil subgrade prepared in accordance with project specifications	Yes ☐	No ☐	By others

Referenced Drawings	**Date**	**Page(s)**	**Rev.**	**Bar Reinforcing Grade & Type**
Archetype Architects –General Notes	02/13/17	S0.01		ASTM: A 775
Archetype Architects- Pile Cap and Tie Beam	02/13/17	S1.02		
Archetype Architects-Foundation Sections	02/13/17	S2.02		GRADE:60

Concrete Placement Observations	**In Compliance**		**Comments**
Required mix used	Yes ☒	No ☐	See notes
Concrete properly conveyed to all areas of placement	Yes ☒	No ☐	Pumped
Internal vibration / consolidation of concrete	Yes ☒	No ☐	Mechanically Consolidated
Even layering around openings and embedments	Yes ☒	No ☐	
Post placement observations (finishing, curing, etc.)	Yes ☐	No ☐	N/A

Field Testing of Concrete Performed Yes ☒ No ☐

***CYLINDER SET NO:** 996-1 ←**refer to associated concrete test report*

Non-Conformance Items

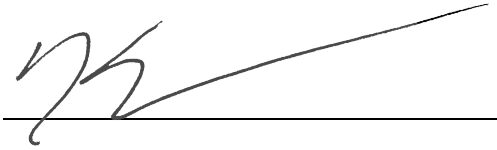
Person Notified: _____ Yes ☐ No ☒ _____

Notes:

SW Cole arrived onsite as scheduled by Ducas Construction for pre-placement observations of the reinforcing steel installation in the above referenced work area on 1/10/18. Reinforcing observed appeared consistent with above referenced documents. Reinforcing was epoxy coated and consisted of (4) #6 bars with 180° hooks both ways for the pile caps and for tie beams 1 row of (3) #6 bars on top and bottom of beam with #3 stirrups at 12" O.C. Anchor rods were galvanized and in place before placement.

Concrete placed on 1/11/18 was a 4000psi mix with Master Air AE200 and Master Glenium 7500, Masterlife CI 30 (corrosion inhibitor), and Masterset R100 (retarder). Concrete field testing indicated mix placed was within project specification and one set of four cylinders were made onsite.

Attachments: Photos

Reviewed by: 

S.W. COLE ENGINEERING, INC. CCOR 1-10 TO 1-11-18

S.W.COLE ENGINEERING, INC.

Concrete Construction Observation Report

Project Name:	Widgery Wharf	**Project No. :**	17-0670
Location:	Portland, Maine	**Date:**	1-18-18 / 1-19-18
Client / Client's Rep:	CM Union LLC	**S.W.COLE Rep. :**	C. Cromwell/ A. Boyce
Placement Location:	GB & TB: D-line from 1-line to 4-line and between C-line and D-line on 1, 2, 3, and 4-lines	**Arrived on Site:**	9:30a
Placement Type:	Concrete	**Left Site:**	12:00p

Pre-Placement Observations	**In Compliance**		
Bar size and location (diameter, length, bend and coverage)	Yes ☒	No ☐	Per Plan
Splicing (type, overlap)	Yes ☒	No ☐	Per Plan
Stability (wiring, chairs, spacers)	Yes ☒	No ☐	Bricks, Positioners
Reinforcement conditions (cleanliness, temperature, etc.)	Yes ☒	No ☐	Clean/ Ambient
Embedments and anchor bolts installed	Yes ☒	No ☐	
Soil subgrade prepared in accordance with project specifications	Yes ☐	No ☐	By Others

Referenced Drawings	**Date**	**Page(s)**	**Rev.**	**Bar Reinforcing Grade & Type**
Archetype Architects –General Notes	02/13/17	S0.01		ASTM: A 775
Archetype Architects- Pile Cap and Tie Beam	02/13/17	S1.02		
Archetype Architects-Foundation Sections	02/13/17	S2.02		GRADE:60

Concrete Placement Observations	**In Compliance**		**Comments**
Required mix used	Yes ☒	No ☐	5000PSI ¾" W/Air
Concrete properly conveyed to all areas of placement	Yes ☒	No ☐	Pump
Internal vibration / consolidation of concrete	Yes ☒	No ☐	Mechanical
Even layering around openings and embedments	Yes ☒	No ☐	
Post placement observations (finishing, curing, etc.)	Yes ☐	No ☐	Not observed

Field Testing of Concrete Performed Yes ☒ No ☐

***CYLINDER SET NO:** 996 - 2 ←**refer to associated concrete test report*

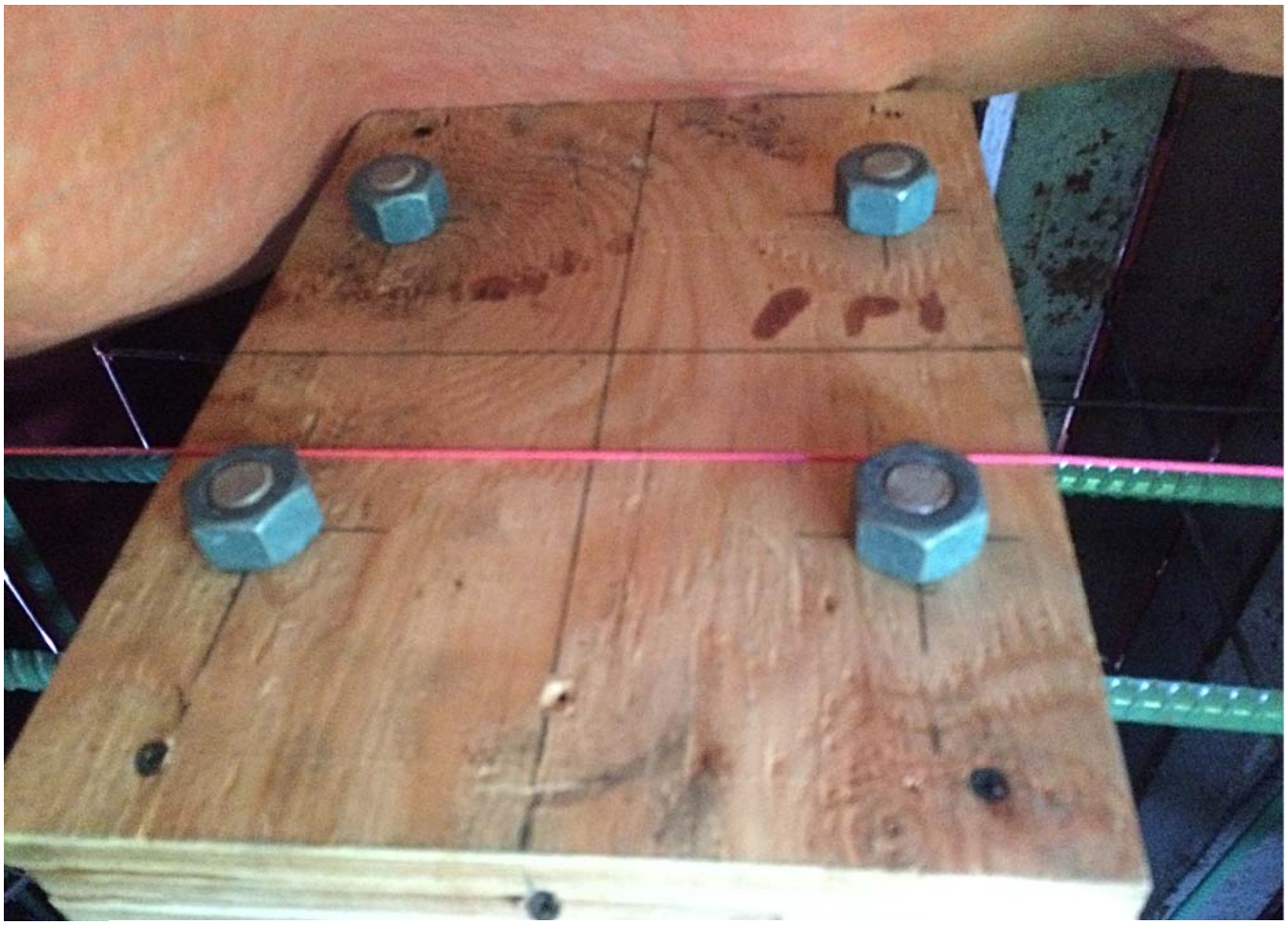
Non-Conformance Items

Person Notified: _____ Yes ☐ No ☒ _____

1-18-18 / Reinforcing: SW Cole arrived onsite as scheduled by Ducas Construction for pre-placement observations of the reinforcing steel installation in the above referenced work area. Reinforcing observed appeared consistent with above referenced documents. Reinforcing was epoxy coated and consisted of (4) #6 bars with 180° hooks both ways for the pile caps and for tie beams one row of (3) #6 bars on top and bottom of beam with #3 stirrups at 12" O.C. There was two types of Grade beams; GB1 consisted of two rows of (3) #8 bars that extend 24" into pile cap with 90° hook on top and 2 rows of (3) #7 bars that extend 24" into pile on bottom and #3 stirrups at 9" O.C. GB2 had two rows of (3) #6 bars that extend 15" into GB1 with 90° hook top and bottom with #3 stirrups at 9" O.C. Anchor bolt was still in progress at the time of our visit. Frost blankets and ground heater lines were being used for winter protection.

1-19-18 / Concrete: SW Cole was onsite to perform concrete field testing. The mix supplied by auburn concrete was a 5000PSI with: Air entrainment, MasterSet R 100, High Range water reducer and MasterLife CI 30. Initial testing and mid-load testing was performed with all the results being verbally reported to Auburn Q.C. (Waring Cutler) who was onsite to adjust loads accordingly. One set of five test specimens were cast for laboratory compressive testing at a later date before SW Cole's departure.

Attachments: Photos Reviewed by: _____



S.W.COLE ENGINEERING, INC.

Concrete Construction Observation Report

Project Name:	Widgery Wharf	**Project No. :**	17-0670
Location:	Portland, Maine	**Date:**	1-25-18 / 1-26-18
Client / Client's Rep:	CM Union LLC	**S.W.COLE Rep. :**	C. Cromwell/ A. Boyce
Placement Location:	GB & TB: C-line from 1-line to 4-line and between B-line and C-line on 1, 2, 3, and 4-lines	**Arrived on Site:**	9:00a/12:00a
Placement Type:	Grade Beams & Tie Beams	**Left Site:**	10:00a/3:00p

Pre-Placement Observations	**In Compliance**		
Bar size and location (diameter, length, bend and coverage)	Yes ☒	No ☐	Per Plan
Splicing (type, overlap)	Yes ☒	No ☐	Per Plan
Stability (wiring, chairs, spacers)	Yes ☒	No ☐	Bricks, Positioners
Reinforcement conditions (cleanliness, temperature, etc.)	Yes ☒	No ☐	Clean/ Ambient
Embedments and anchor bolts installed	Yes ☒	No ☐	
Soil subgrade prepared in accordance with project specifications	Yes ☐	No ☐	By Others

Referenced Drawings	**Date**	**Page(s)**	**Rev.**	**Bar Reinforcing Grade & Type**
Archetype Architects –General Notes	02/13/17	S0.01		ASTM: A 775
Archetype Architects- Pile Cap and Tie Beam	02/13/17	S1.02		
Archetype Architects-Foundation Sections	02/13/17	S2.01		GRADE:60
Archetype Architects-Foundation Sections	02/13/17	S2.02		

Concrete Placement Observations	**In Compliance**		**Comments**
Required mix used	Yes ☒	No ☐	5000 PSI W/Air (see notes)
Concrete properly conveyed to all areas of placement	Yes ☒	No ☐	Pumped
Internal vibration / consolidation of concrete	Yes ☒	No ☐	Mechanical
Even layering around openings and embedments	Yes ☒	No ☐	
Post placement observations (finishing, curing, etc.)	Yes ☐	No ☐	N/O

Field Testing of Concrete Performed Yes ☒ No ☐

***CYLINDER SET NO:** 996 - 3 ←**refer to associated concrete test report*

Non-Conformance Items

Person Notified: _____ Yes ☐ No ☒ _____

1-25-18 / Reinforcing: SW Cole arrived onsite as scheduled by Ducas Construction for pre-placement observations of the reinforcing steel installation in the above referenced work area. Reinforcing observed appeared consistent with above referenced documents. Anchor bolt installation was still in progress at the time of our visit. Frost blankets and ground heater lines were being used for winter protection.

1-26-18 / Concrete:
The Concrete supplied by Auburn concrete was a 5000psi mix containing: Masterlife CI 30, air entrainment, MasterSet R100 and MasterGlenium. We understand the project specifications require a minimum design strength of 4000psi. Initial and mid load testing was performed with all the results being verbally reported to Auburn Q.C. (Warring Cutler) who was onsite to adjust loads accordingly. One set of four test specimens were cast before S.W. Cole's departure.

Attachments: Photos

Reviewed by: 


SureBuilt
SureBuilt

S.W.COLE ENGINEERING, INC.

Concrete Construction Observation Report

Project Name:	Widgery Wharf	**Project No. :**	17-0670
Location:	Portland, Maine	**Date:**	2/1/18 & 2/2/18
Client / Client's Rep:	CM Union LLC	**S.W.COLE Rep. :**	C. Cromwell / A. Boyce
Placement Location:	Tie Beams: Between A & B-lines and 1 & 3-lines	**Arrived on Site:**	9:00a / 7:45a
Placement Type:	Grade Beams & Tie Beams	**Left Site:**	10:00a / 10:30a

Pre-Placement Observations	**In Compliance**		
Bar size and location (diameter, length, bend and coverage)	Yes ☒	No ☐	Per Plan
Splicing (type, overlap)	Yes ☒	No ☐	Per Plan
Stability (wiring, chairs, spacers)	Yes ☒	No ☐	Bricks, Positioners
Reinforcement conditions (cleanliness, temperature, etc.)	Yes ☒	No ☐	Clean/ Ambient
Embedments and anchor bolts installed	Yes ☒	No ☐	
Soil subgrade prepared in accordance with project specifications	Yes ☐	No ☐	By Others

Referenced Drawings	**Date**	**Page(s)**	**Rev.**	**Bar Reinforcing Grade & Type**
Archetype Architects –General Notes	02/13/17	S0.01		ASTM: A 775
Archetype Architects- Pile Cap and Tie Beam	02/13/17	S1.02		
Archetype Architects-Foundation Sections	02/13/17	S2.01		GRADE:60
Archetype Architects-Foundation Sections	02/13/17	S2.02		

Concrete Placement Observations	**In Compliance**		**Comments**
Required mix used	Yes ☒	No ☐	5000Psi ¾" W/Air Class A MDOT (See Notes)
Concrete properly conveyed to all areas of placement	Yes ☒	No ☐	Pump
Internal vibration / consolidation of concrete	Yes ☒	No ☐	Mechanical
Even layering around openings and embedments	Yes ☒	No ☐	
Post placement observations (finishing, curing, etc.)	Yes ☐	No ☐	N/O

Field Testing of Concrete Performed Yes ☒ No ☐

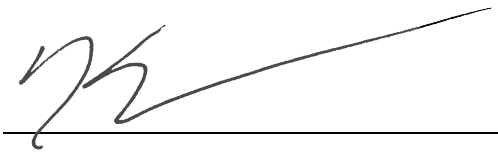
***CYLINDER SET NO:** 996 - 4 ←**refer to associated concrete test report*

Non-Conformance Items

Person Notified: _____ Yes ☐ No ☒ _____

2-1-18 / Reinforcing: SW Cole arrived onsite as scheduled by Ducas Construction for pre-placement observations of the reinforcing steel installation in the above referenced work area. Reinforcing observed appeared consistent with above referenced documents. Reinforcing was epoxy coated and consisted of (4) #6 bars with 180° hooks both ways for the pile caps and for tie beams 1 row of (3) #6 bars on top and bottom of beam extending 24" into pile cap with #3 stirrups at 12" O.C. Frost blankets and ground heater lines were being used for winter protection.

2-2-18 / Concrete:
S.W. Cole arrived onsite as scheduled by Ducas Construction for concrete field testing. The mixed supplied by Auburn Concrete was a 5000Psi Class A MDOT containing: MasterLife CI 30, MasterAir AE200, MasterGlenium, and Masterset R100. Initial and mid load testing was performed with results being verbally reported to Auburn Q.C. (Justin Rolliard) who was onsite to adjust loads accordingly. One set of four test specimens were cast for compression strength laboratory testing at a later date before S.W. Cole's departure.

Attachments: Photos Reviewed by: 


B-QUIP
603-300-6147

S.W.COLE ENGINEERING, INC.

Concrete Construction Observation Report

Project Name:	Widgery Wharf	**Project No. :**	17-0670
Location:	Portland, Maine	**Date:**	2/7/18 & 2/9/18
Client / Client's Rep:	CM Union LLC	**S.W.COLE Rep. :**	C. Cromwell / A. Boyce
Placement Location:	Grade Beams & Elevator base slab Between A & B-lines and 3 & 4-lines	**Arrived on Site:**	9:00a / 7:45a
Placement Type:	Grade Beams & Elevator Base Slab	**Left Site:**	10:00a / 9:15a

Pre-Placement Observations	**In Compliance**		
Bar size and location (diameter, length, bend and coverage)	Yes ☒	No ☐	Per Plan
Splicing (type, overlap)	Yes ☒	No ☐	Per Plan
Stability (wiring, chairs, spacers)	Yes ☒	No ☐	Bricks, Positioners
Reinforcement conditions (cleanliness, temperature, etc.)	Yes ☒	No ☐	Clean/ Ambient
Embedments and anchor bolts installed	Yes ☒	No ☐	
Soil subgrade prepared in accordance with project specifications	Yes ☐	No ☐	By Others

Referenced Drawings	**Date**	**Page(s)**	**Rev.**	**Bar Reinforcing Grade & Type**
Archetype Architects –General Notes	02/13/17	S0.01		ASTM: A 775
Archetype Architects- Pile Cap and Tie Beam	02/13/17	S1.02		
Archetype Architects-Foundation Sections	02/13/17	S2.01		GRADE:60
Archetype Architects-Foundation Sections	02/13/17	S2.02		

Concrete Placement Observations	**In Compliance**		**Comments**
Required mix used	Yes ☒	No ☐	5000psi ¾" W/Air
Concrete properly conveyed to all areas of placement	Yes ☒	No ☐	Pump
Internal vibration / consolidation of concrete	Yes ☒	No ☐	Mechanical
Even layering around openings and embedments	Yes ☒	No ☐	
Post placement observations (finishing, curing, etc.)	Yes ☐	No ☐	N/O

Field Testing of Concrete Performed Yes ☒ No ☐

***CYLINDER SET NO:** 996 - 5 ←**refer to associated concrete test report*

Non-Conformance Items

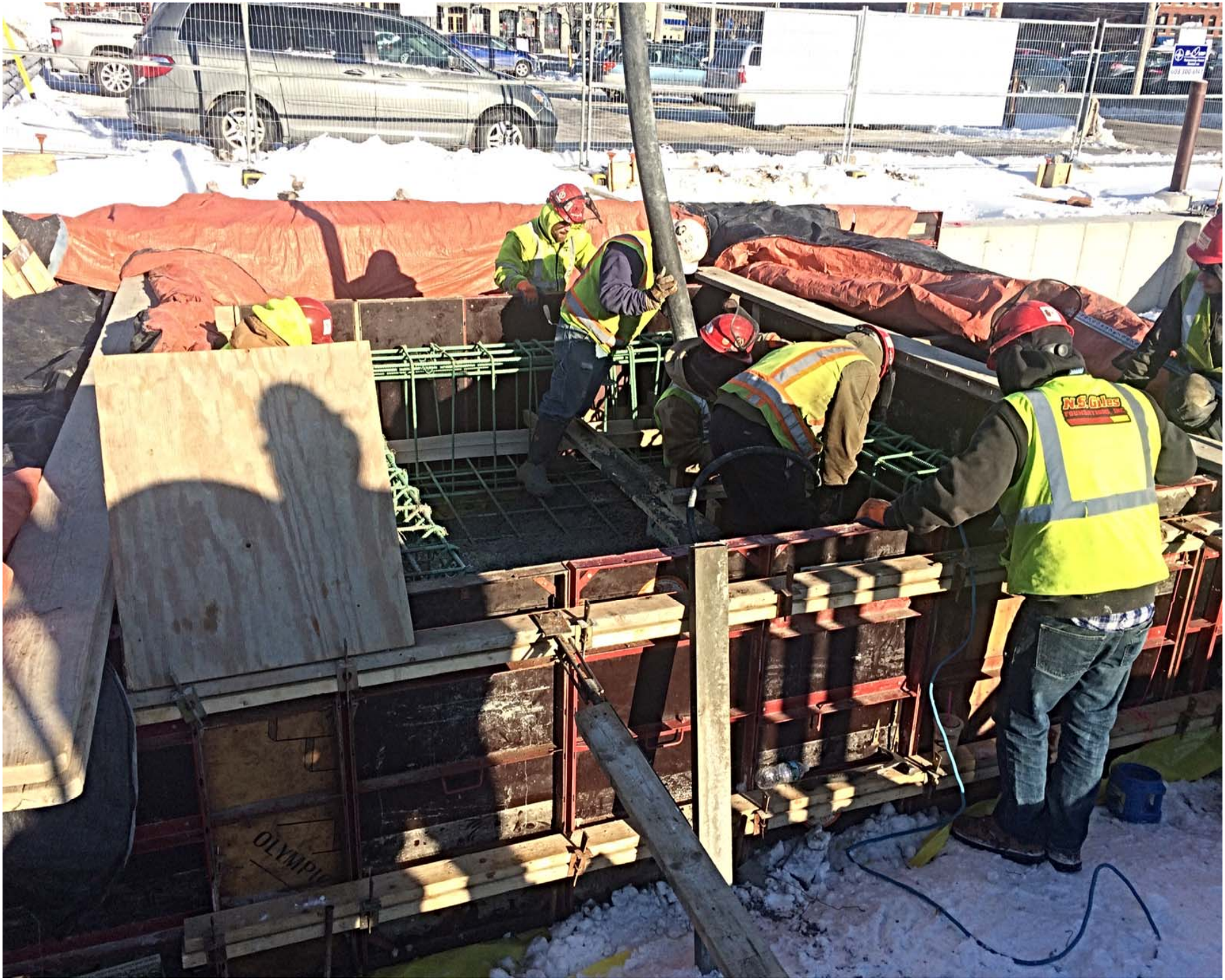
Person Notified: _____ Yes ☐ No ☒ _____

2-7-18 / Reinforcing: SW Cole arrived onsite as scheduled by Ducas Construction for pre-placement observations of the reinforcing steel installation in the above referenced work area. Reinforcing observed appeared consistent with above referenced project documents. Elevator base slab reinforcing consisted of #5 bars at 12" O.C. both ways. We understand N.S. Giles plans to place the elevator base slab along with a portion (1'-4") of the surrounding grade beams rather than monolithically with the entire grade beam as shown on S2.01, but that approval was received for the deviation. Frost blankets and ground heater lines were being used for winter protection.

2-9-18 / Concrete:
SW Cole arrived onsite as scheduled by Ducas Construction for concrete field testing. The mixed supplied by Auburn Concrete was a 5000Psi Class A MDOT mix containing: MasterLife CI 30, MasterGlenium, MasterSet R100, MasterAir AE200. 4000Psi mix is required by the specifications, however 5000Psi placed. Initial and mid-load testing was performed with test results being verbally reported to Auburn Q.C. (Justin Rolliard) and Ducas Construction. One set of four tests specimens were cast for laboratory compression strength testing at a later date before SW Cole's departure.

Attachments: Photos

Reviewed by: _____


N.S. Giles

S.W.COLE ENGINEERING, INC.

Concrete Construction Observation Report

Project Name:	Widgery Wharf	**Project No. :**	17-0670
Location:	Portland, Maine	**Date:**	2-13-18
Client / Client's Rep:	CM Union LLC	**S.W.COLE Rep. :**	P. Phelan
Placement Location:	Grade Beams A/3 to B(+8')/3 to B(+8')/4 to A/4 to A/3 and all elevator pit grade beams in that area	**Arrived on Site:**	11:00a
Placement Type:	Grade Beams	**Left Site:**	12:45p

Pre-Placement Observations	**In Compliance**		
Bar size and location (diameter, length, bend and coverage)	Yes ☒	No ☐	Per Details/Schedule
Splicing (type, overlap)	Yes ☒	No ☐	Per Plan
Stability (wiring, chairs, spacers)	Yes ☒	No ☐	Bricks and chairs
Reinforcement conditions (cleanliness, temperature, etc.)	Yes ☒	No ☐	Clean/ Ambient
Embedments and anchor bolts installed	Yes ☒	No ☐	Per plan
Soil subgrade prepared in accordance with project specifications	Yes ☐	No ☐	By Others

Referenced Drawings	**Date**	**Page(s)**	**Rev.**	**Bar Reinforcing Grade & Type**
Archetype Architects –General Notes	02/13/17	S0.01		ASTM: A 775
Archetype Architects- Pile Cap and Tie Beam	02/13/17	S1.02		
Archetype Architects-Foundation Sections	02/13/17	S2.01		GRADE:60

Concrete Placement Observations	**In Compliance**		**Comments**
Required mix used	Yes ☒	No ☐	4,000 psi with air and corrosion inhibitor required per plan, 5000 psi was used
Concrete properly conveyed to all areas of placement	Yes ☒	No ☐	Pump
Internal vibration / consolidation of concrete	Yes ☒	No ☐	Mechanical
Even layering around openings and embedments	Yes ☒	No ☐	Yes
Post placement observations (finishing, curing, etc.)	Yes ☐	No ☐	Not Onsite

Field Testing of Concrete Performed Yes ☒ No ☐

***CYLINDER SET NO:** 996 - 6 ←**refer to associated concrete test report*

Non-Conformance Items

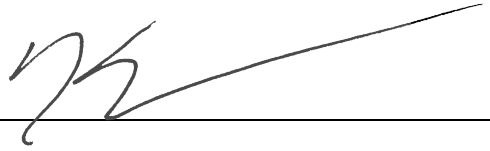
Person Notified: _____ Yes ☐ No ☒ _____

Notes:

S.W. Cole was onsite as requested for reinforcement observations and concrete field testing. Reinforcement observed appeared generally consistent with the above referenced documents with the exception of some bars not meeting the required concrete cover. These bars were corrected at time of placement using a grizzly bar to create the required space from bar to form.

Concrete was a 5,000psi mix containing air entrainment, high-range water reducer, retarder and corrosion inhibitor. The required strength for the placement is 4000psi per project documents and it was brought to the attention of the SW Cole representative that the Auburn Concrete 5000psi mix design was the excepted mix design. Concrete field test results appeared to be consistent with the above mentioned design. The project manager for Ducas construction and Auburn Concrete QC were notified of field test results and a set of four cylinders were cast for laboratory compressive strength testing.

Attachments: Photos

Reviewed by: 

S.W.COLE ENGINEERING, INC.

Concrete Construction Observation Report

Project Name:	Widgery Wharf	**Project No. :**	17-0670
Location:	Portland, Maine	**Date:**	2-15-18
Client / Client's Rep:	CM Union LLC	**S.W.COLE Rep. :**	N. McArthur
Placement Location:	8" stem wall near D(-10')/1(+10') & Stairwell Base Slab near B(-12')/3(+10')	**Arrived on Site:**	8:30a
Placement Type:	Stem Wall & Stairwell Base Slab	**Left Site:**	10:00a

Pre-Placement Observations	**In Compliance**		
Bar size and location (diameter, length, bend and coverage)	Yes ☒	No ☐	See Notes
Splicing (type, overlap)	Yes ☒	No ☐	Per Plan
Stability (wiring, chairs, spacers)	Yes ☒	No ☐	Bricks, Positioners
Reinforcement conditions (cleanliness, temperature, etc.)	Yes ☒	No ☐	Clean/ Ambient
Embedments and anchor bolts installed	Yes ☒	No ☐	
Soil subgrade prepared in accordance with project specifications	Yes ☐	No ☐	By Others

Referenced Drawings	**Date**	**Page(s)**	**Rev.**	**Bar Reinforcing Grade & Type**
Archetype Architects –General Notes	02/13/17	S0.01		ASTM: A 775
Archetype Architects- Pile Cap and Tie Beam	02/13/17	S1.02		
Archetype Architects-Foundation Sections	02/13/17	S2.01		GRADE:60
Archetype Architects-Foundation Sections	02/13/17	S2.02		

Concrete Placement Observations	**In Compliance**		**Comments**
Required mix used	Yes ☒	No ☐	4,000 psi w/ air
Concrete properly conveyed to all areas of placement	Yes ☒	No ☐	Pump
Internal vibration / consolidation of concrete	Yes ☒	No ☐	Mechanical
Even layering around openings and embedments	Yes ☒	No ☐	Yes
Post placement observations (finishing, curing, etc.)	Yes ☐	No ☐	Not Onsite

Field Testing of Concrete Performed Yes ☒ No ☐

***CYLINDER SET NO:** 996 - 7 ←**refer to associated concrete test report*

Non-Conformance Items

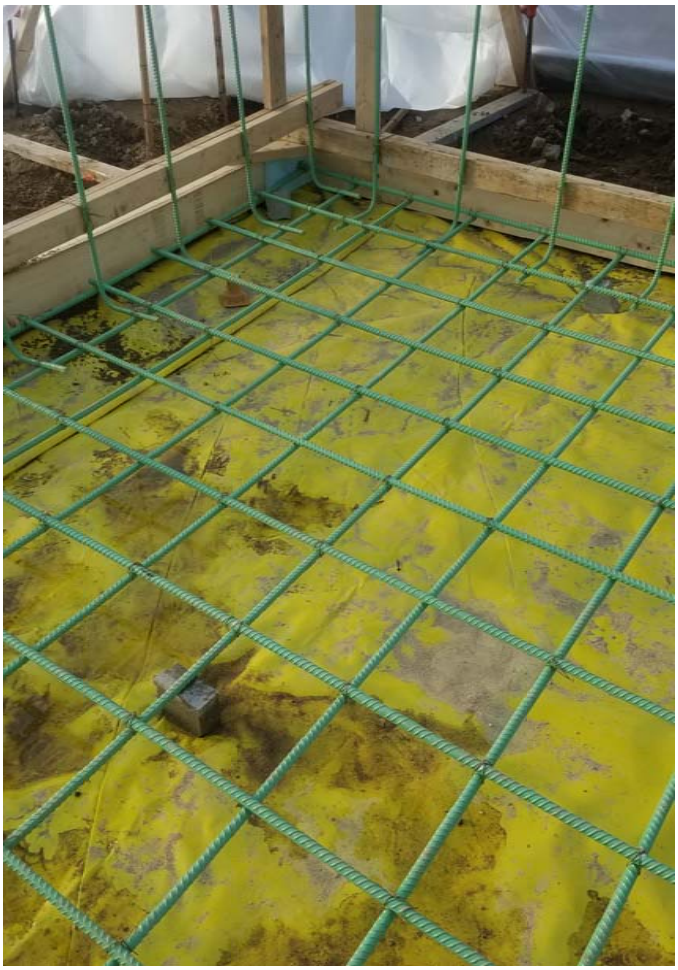
Person Notified: _____ Yes ☐ No ☒ _____

Notes:

S.W. Cole was onsite as requested for reinforcement observations and concrete field testing. Reinforcement observed appeared generally consistent with the above referenced documents. Reinforcement within the 8" stem wall consisted of #5 bar @ 15" O.C. vertically, and #5 bar @ 12" O.C. horizontally. Upon initial observation, the top #5 horizontal within the stem wall had not been installed. Before the placement of concrete, the missing #5 horizontal bar was installed as indicated in the provided project plans. Concrete was a 4,000psi mix containing air entrainment, high-range water reducer, and 3-1/2 gallons of corrosion inhibitor per cubic yard of concrete. Concrete field test results appeared to be mostly consistent with project specification with exception of concrete slump. Concrete slump test results ranged from 9" to 9-1/2" slump. The project manager of Ducas construction was notified immediately. One set of four cylinders were cast for laboratory compressive strength testing and placed into controlled storage.

Attachments: Photos

Reviewed by: 



S.W.COLE ENGINEERING, INC.

Concrete Construction Observation Report

Project Name:	Widgery Wharf	**Project No. :**	17-0670
Location:	Portland, Maine	**Date:**	3-7-18
Client / Client's Rep:	CM Union LLC	**S.W.COLE Rep. :**	P. Phelan
Placement Location:	Stairwell stem wall in area D/1 to D/2 to C/2 to C/1	**Arrived on Site:**	8:45a
Placement Type:	Stem Wall	**Left Site:**	10:30a

Pre-Placement Observations	**In Compliance**		
Bar size and location (diameter, length, bend and coverage)	Yes ☒	No ☐	Per Details on S2.02
Splicing (type, overlap)	Yes ☒	No ☐	Contact Splice per schedule
Stability (wiring, chairs, spacers)	Yes ☒	No ☐	Chairs as required
Reinforcement conditions (cleanliness, temperature, etc.)	Yes ☒	No ☐	Clean/ Ambient
Embedments and anchor bolts installed	Yes ☐	No ☐	None for placement
Soil subgrade prepared in accordance with project specifications	Yes ☐	No ☐	

Referenced Drawings	**Date**	**Page(s)**	**Rev.**	**Bar Reinforcing Grade & Type**
Archetype Architects –General Notes	02/13/17	S0.01		ASTM: A 775 and A 615
Archetype Architects- Pile Cap and Tie Beam	02/13/17	S1.02		
Archetype Architects-Foundation Sections	02/13/17	S2.01		GRADE:60
Archetype Architects-Foundation Sections	02/13/17	S2.02		

Concrete Placement Observations	**In Compliance**		**Comments**
Required mix used	Yes ☒	No ☐	4,000 psi w/ air
Concrete properly conveyed to all areas of placement	Yes ☒	No ☐	Pump
Internal vibration / consolidation of concrete	Yes ☒	No ☐	Mechanical
Even layering around openings and embedments	Yes ☐	No ☐	N/A
Post placement observations (finishing, curing, etc.)	Yes ☐	No ☐	Not Onsite

Field Testing of Concrete Performed Yes ☒ No ☐

***CYLINDER SET NO:** 996 - 8 ←**refer to associated concrete test report*

Non-Conformance Items

Person Notified: _____ Yes ☐ No ☒ _____

Notes:

S.W. Cole was onsite as requested by Ducas Construction for reinforcement observations and concrete field testing. Reinforcement observed appeared consistent with the above referenced documents. Concrete field test results were within the tolerance as compared to the parameters listed in Auburn Concretes mix design. Observations and test results were verbally relayed to the general contractor while on site.

Attachments: Photos

Reviewed by: Roger E Domey

S.W.COLE ENGINEERING, INC.

Concrete Construction Observation Report

Project Name:	Widgery Wharf	**Project No. :**	17-0670
Location:	Portland, Maine	**Date:**	3-15-18
Client / Client's Rep:	CM Union LLC	**S.W.COLE Rep. :**	C. Cromwell
Placement Location:	Stairway B Slab	**Arrived on Site:**	7:35a
Placement Type:	Slab	**Left Site:**	10:00a

Pre-Placement Observations	**In Compliance**		
Bar size and location (diameter, length, bend and coverage)	Yes ☒	No ☐	Per Details on S2.02
Splicing (type, overlap)	Yes ☐	No ☐	N/A
Stability (wiring, chairs, spacers)	Yes ☐	No ☐	N/A
Reinforcement conditions (cleanliness, temperature, etc.)	Yes ☒	No ☐	Clean/ Ambient tented
Embedments and anchor bolts installed	Yes ☐	No ☐	None for placement
Soil subgrade prepared in accordance with project specifications	Yes ☐	No ☐	

Referenced Drawings	**Date**	**Page(s)**	**Rev.**	**Bar Reinforcing Grade & Type**
Archetype Architects –General Notes	02/13/17	S0.01		ASTM: A 775 and A 615
Archetype Architects- Pile Cap and Tie Beam	02/13/17	S1.02		
Archetype Architects-Foundation Sections	02/13/17	S2.02		

Concrete Placement Observations	**In Compliance**		**Comments**
Required mix used	Yes ☒	No ☐	5,000 psi w/ air
Concrete properly conveyed to all areas of placement	Yes ☒	No ☐	Tailgated
Internal vibration / consolidation of concrete	Yes ☒	No ☐	Mechanical
Even layering around openings and embedments	Yes ☐	No ☐	N/A
Post placement observations (finishing, curing, etc.)	Yes ☐	No ☐	Not Onsite

Field Testing of Concrete Performed Yes ☒ No ☐

***CYLINDER SET NO:** 996 - 9 ←**refer to associated concrete test report*

Non-Conformance Items

Person Notified: _____ Yes ☐ No ☒ _____

Notes:

S.W. Cole was onsite as requested by Ducas Construction for reinforcement observations and concrete field testing. Reinforcement observed appeared consistent with the above referenced documents. Slab was a 4" fiber reinforced slab on 14" of rigid insulation with epoxy coated slab dowels at 12" O.C at top of stem wall at D(-9') between 1 & 2-lines as shown in details on S2.02. Concrete field test results were within the tolerance as compared to the parameters listed in Auburn Concretes mix design. Observations and test results were verbally relayed to the general contractor while on site.

Attachments: Photos Reviewed by: Roger E Dominy


R-10
FOAMULAR 250


FOAMULAR 250
R-10


FOAMULAR 250
R-10

Concrete Construction Observation Report

Project Name:	Widgery Wharf	**Project No. :**	17-0670
Location:	Portland, ME	**Dates:**	3-20, 3-21-18
Client / Client's Rep:	CM Union LLC/ Charlie Poole	**S.W.COLE Rep. :**	J. Moore / P. Phelan
Placement Location:	E line, A line to B line (3+8'5", 4+8'5")	**On-Site (3/20/18):**	2:00– 3:00pm
Placement Type:	Foundation wall and slab	**On-Site (3/21/18):**	8:00 -11:30am

Pre-Placement Observations	**In Compliance**		
Bar size and location (diameter, length, bend and coverage)	Yes ☒	No ☐	#5@12" horz./ #5@15" vert.
Splicing (type, overlap)	Yes ☒	No ☐	Per plan
Stability (wiring, chairs, spacers)	Yes ☒	No ☐	Plastic spacers, brick
Reinforcement conditions (cleanliness, temperature, etc.)	Yes ☒	No ☐	Clean, clear
Embedments and anchor bolts installed	Yes ☒	No ☐	at beams
Soil subgrade prepared in accordance with project specifications	Yes ☐	No ☐	N/A

Referenced Drawings	**Date**	**Page(s)**	**Rev.**	**Bar Reinforcing Grade & Type**
Archetype Architects- General Notes	2-13-18	S0.01	1	ASTM: A615, A775
Archetype Architects- Pile cap & tie beam plan	2-13-18	S1.02		
Archetype Architects- Foundation sections	2-13-18	S2.01		GRADE: 60
Archetype Architects- Foundation Sections	2-13-18	S2.02		

Concrete Placement Observations	**In Compliance**		**Comments**
Required mix used	Yes ☒	No ☐	See notes section
Concrete properly conveyed to all areas of placement	Yes ☒	No ☐	pump
Internal vibration / consolidation of concrete	Yes ☒	No ☐	Mechanical vibration
Even layering around openings and embedments	Yes ☒	No ☐	Troweled
Post placement observations (finishing, curing, etc.)	Yes ☐	No ☐	Not on-site

Field Testing of Concrete Performed Yes ☒ No ☐

***CYLINDER SET NO:** 996-10,11 ←**refer to associated concrete test report*

Non-Conformance Items *(person notified)* Yes ☐ No ☐

Notes: 3-20-18: SW Cole was onsite to preform reinforcing observations and field testing of concrete for air slump and temperature. Reinforcement appeared consistent with details contained in the project documents referenced above except 4 dowels for the stem walls had not been installed on the southern end of the slab area. We discussed this observation with N.S. Giles and it is our understand dowels were left out to provide worker access to all areas of the slab and will be put in at a later date when concrete is placed. We understand N.S. Giles used epoxy paint to cover reinforcing installed due to changes in the elevator location resulting in reinforcing insufficiencies. In the wall, the top row of horizontals was also not epoxy coated.

3-21-18: The placement started with 20 yds of 5000 psi 3/8" concrete with polymesh fiber, an air entrainment agent, mid-range water reducer, corrosion inhibitor, retarder and slag for the ground level elevator lobby slab. The first load was sampled mid discharge with test results within mix design tolerances. The second placement of the site visit included 9 yds of 4000 psi ¾" mix with air entrainment, high-range water reducer, corrosion inhibitor, retarder and slag used for wall and column wraps at south side of building. Mid-load testing results yielded results within the tolerances of the approved mix design with all test results reported to the general contractor and Auburn QC.

Attachments: Photos Reviewed by: _____

WHITE ENGINEERING, LLC P.O. Box 878 Glen, N.H. 03838
nealjwhite@gmail.com Tel. 603-383-9347 Fax. 603-383-8262

Client: S.W. Cole Engineering, Inc. **Report:** 001
Project: Widgery Wharf
Date: March 27, 2018
Project #: 17-0670
Subject: Site Inspection of Structural Steel

We visited the site on this date as requested to perform structural steel inspection. Upon arrival we met with the project superintendent and were advised that all structural framing was completed.

Inspection was performed using Novel Iron Works erection drawings, Canam joist and deck drawings and structural drawings as reference. Our actions and observations were as follows:

- Welder certifications were previously provided for personnel who worked on this project.
- Base plates were inspected for grouting, full bearing and tightened anchor rod nuts.
- A325 TC bolts were used and inspected per RCSC specifications. Where splines could not be removed due to limited access the bolts were hand tightened. These were inspected accordingly.
- Welding of HSS braces was visually inspected.
- Floor deck and roof deck installation, attachment and side lap fastening were inspected.
- Shear studs were visually inspected, counted and "ring tested".
- End connections on beam adjacent to elevator CMU wall and in stair opening were welded in lieu of bolts due to a field change. Welds were visually inspected.
- Joist installation and bearing at roof were inspected. Welds were randomly accessed and visually inspected. Bridging installation was inspected.
- Framing was inspected for overall conformance to drawings.

All work inspected appeared complete and acceptable with the following exceptions:

1. Approximately 250 shear studs were unacceptable or missing. Locations were marked with orange paint. Corrective work began during our visit and was proceeding in an acceptable manner.
2. Loose bolts were observed at third floor B/1.5 and B/1. Fourth floor at A/3.
3. Several deck screws are missing at fourth floor near B.5/3.
4. Joist bridging is not attached near C/1.
5. Deck must be welded at fourth floor on line E.

All items noted were reviewed with the superintendent and erector. Discrepancies will be corrected and re-inspected.

Inspector; Neal J White
CWI #86070201
ICC #8014170-S1

WHITE ENGINEERING, LLC P.O. Box 878 Glen, N.H. 03838
nealjwhite@gmail.com Tel. 603-383-9347 Fax. 603-383-8262

Client: S.W. Cole Engineering, Inc. **Report:** 002
Project: Widgery Wharf
Date: March 30, 2018
Project #: 17-0670
Subject: Site Inspection of Structural Steel

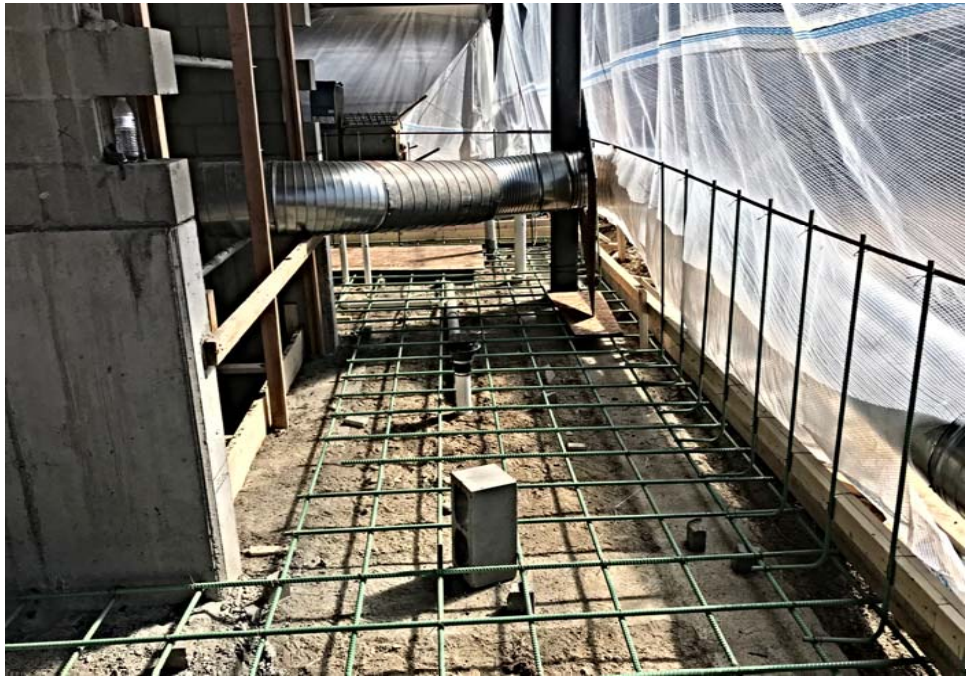
We visited the site on this date as requested to perform a re-inspection of corrected shear stud discrepancies noted in our previous report.

Shear studs had been manually welded per AWS D1.1 Clause 7. Welds were visually inspected and random studs were bend tested. Welder certifications were provided.

Shear stud discrepancies have been corrected and all studs are now acceptable.

The superintendent was advised of our observations.

Inspector; Neal J White
CWI #86070201
ICC #8014170-S1



S.W.COLE ENGINEERING, INC.

Concrete Construction Observation Report

Project Name:	Widgery Wharf	**Project No. :**	17-0670
Location:	Portland, Maine	**Date:**	3-27-18 / 3-28-18
Client / Client's Rep:	CM Union LLC	**S.W.COLE Rep. :**	P. Phelan / A. Boyce
Placement Location:	Stem wall A(-1)/3 to B(+8)/3 to B(+8)/4(+1) to A(-1)/4(+1)	**Arrived on Site:**	10:30a / 9:30a
Placement Type:	First floor elevator landing stem wall	**Left Site:**	10:45a /12:30p

Pre-Placement Observations	**In Compliance**		
Bar size and location (diameter, length, bend and coverage)	Yes ☒	No ☐	Per Details on S2.01
Splicing (type, overlap)	Yes ☒	No ☐	Contact Splice per schedule
Stability (wiring, chairs, spacers)	Yes ☒	No ☐	Chairs as required
Reinforcement conditions (cleanliness, temperature, etc.)	Yes ☒	No ☐	Clean/ Heated within tent
Embedments and anchor bolts installed	Yes ☐	No ☐	None for placement
Soil subgrade prepared in accordance with project specifications	Yes ☐	No ☐	

Referenced Drawings	**Date**	**Page(s)**	**Rev.**	**Bar Reinforcing Grade & Type**
Archetype Architects –General Notes	02/13/17	S0.01		ASTM: A 775 and A 615
Archetype Architects- Pile Cap and Tie Beam	02/13/17	S1.02		
Archetype Architects-Foundation Sections	02/13/17	S2.01		GRADE:60
Archetype Architects-Foundation Sections	02/13/17	S2.02		

Concrete Placement Observations	**In Compliance**		**Comments**
Required mix used	Yes ☒	No ☐	5000 Psi ¾" Air
Concrete properly conveyed to all areas of placement	Yes ☒	No ☐	Pump
Internal vibration / consolidation of concrete	Yes ☒	No ☐	Mechanical
Even layering around openings and embedments	Yes ☐	No ☐	
Post placement observations (finishing, curing, etc.)	Yes ☐	No ☐	N/A

Field Testing of Concrete Performed Yes ☒ No ☐

***CYLINDER SET NO:** 996 – 12 ←**refer to associated concrete test report*

Non-Conformance Items

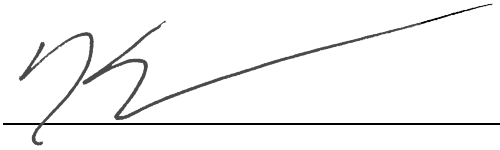
Person Notified: _____ Yes ☐ No ☒ _____

Notes:

Site Visit 3/27/18:
S.W. Cole was onsite as requested by Ducas Construction for reinforcement observations of concrete stem wall. Reinforcement observed appeared consistent with the above referenced documents featuring #5 epoxy coated vertical dowels embedded in slab at 15" o.c. spacing and horizontal #5 bars adhering to ASTM A615 grade 60 at 12" o.c. spacing.

Site Visit 3/28/18:
S.W. Cole was onsite as requested by Ducas Construction to perform concrete field testing. An initial and mid-load sample were taken with results being verbally reported to Auburn Q.C. (Justin Rolliard). One set of test specimens were cast for laboratory compression testing at a later date before S.W. Cole's departure.

Attachments: Photos

Reviewed by: 

The S.W.COLE field representative is on-site at the request of our client to provide construction materials testing and to observe and document construction activities. The contractor has sole responsibility for schedule, site safety, methods, completeness and quality control.


Hammond

S.W.COLE ENGINEERING, INC.

Concrete Construction Observation Report

Project Name:	Widgery Wharf	**Project No. :**	17-0670
Location:	Portland, Maine	**Date:**	4-6-18 / 4-11-18
Client / Client's Rep:	CM Union LLC	**S.W.COLE Rep. :**	P. Phelan
Placement Location:	4th Floor Slab on Deck	**Arrived on Site:**	12:00p / 7:30a
Placement Type:	Slab on Deck	**Left Site:**	12:30p / 9:15a

Pre-Placement Observations	**In Compliance**		
Bar size and location (diameter, length, bend and coverage)	Yes ☒	No ☐	Per Details on S3.01(W.W.F. 6x6)
Splicing (type, overlap)	Yes ☒	No ☐	Contact Splice (minimum 1 square)
Stability (wiring, chairs, spacers)	Yes ☒	No ☐	1" Chairs at 4'o.c
Reinforcement conditions (cleanliness, temperature, etc.)	Yes ☒	No ☐	Clean/ Heated within tent
Embedments and anchor bolts installed	Yes ☐	No ☐	None for placement
Soil subgrade prepared in accordance with project specifications	Yes ☐	No ☐	

Referenced Drawings	**Date**	**Page(s)**	**Rev.**	**Bar Reinforcing Grade & Type**
Archetype Architects –General Notes	02/13/17	S0.01		ASTM: A 185
Archetype Architects- 3rd & 4th Floor Framing	02/13/17	S1.04		
Archetype Architects-Foundation Sections	02/13/17	S3.01		

Concrete Placement Observations	**In Compliance**		**Comments**
Required mix used	Yes ☒	No ☐	4000 psi ¾"
Concrete properly conveyed to all areas of placement	Yes ☒	No ☐	Pump
Internal vibration / consolidation of concrete	Yes ☒	No ☐	Vibra-screed
Even layering around openings and embedments	Yes ☒	No ☐	Troweled around columns
Post placement observations (finishing, curing, etc.)	Yes ☐	No ☐	Not-onsite

Field Testing of Concrete Performed Yes ☒ No ☐

***CYLINDER SET NO:** 996-15 ←**refer to associated concrete test report*

Non-Conformance Items

Person Notified: _____ Yes ☐ No ☒ _____

Notes:

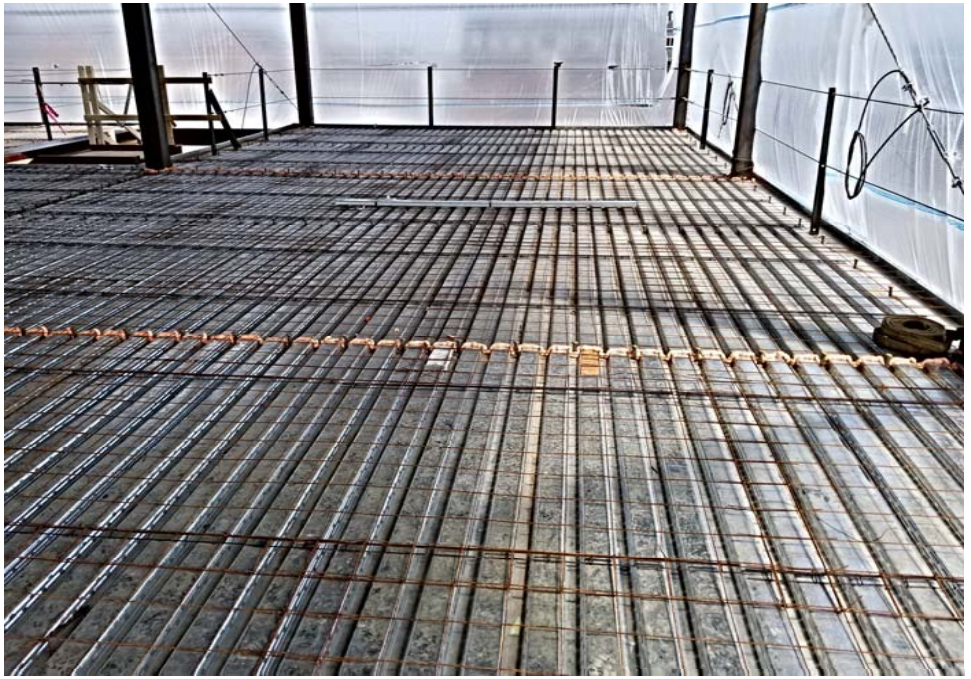
Site Visit 4-6-18

S.W. Cole was onsite as requested by Ducas Construction for reinforcement observations of 4th floor slab on deck. Reinforcement observed appeared consistent with the above referenced documents featuring 6x6 W.W.F. W1.4xW1.4 with 1" chairs at 4' o.c.

Site Visit 4-11-18

S.W. Cole was onsite as requested by Ducas Construction for concrete field testing of 4th floor slab on deck. The concrete placed was a 4000psi ¾" high range water reducer with 2% non-chloride accelerator for the first 4 loads and 3% on the last 24 yds. Mid load field tests yielded results within the requirements of the approved mix design. All results were verbally relayed to onsite representatives from Ducas Construction and Auburn Concrete.

Attachments: Photos Reviewed by: Roger E Domey



S.W.COLE ENGINEERING, INC.

Concrete Construction Observation Report

Project Name:	Widgery Wharf	**Project No. :**	17-0670
Location:	Portland, ME	**Date:**	4-6-18
Client / Client's Rep:	CM Union LLC	**S.W.COLE Rep. :**	A. Boyce
Placement Location:	Slab On Deck: 3rd floor	**Arrived on Site:**	8:00a
Placement Type:	Concrete Slab On Deck	**Left Site:**	9:30a

Pre-Placement Observations	**In Compliance**		
Bar size and location (diameter, length, bend and coverage)	Yes ☒	No ☐	6x6-W1.4xW1.4 WWF
Splicing (type, overlap)	Yes ☒	No ☐	One Square overlap
Stability (wiring, chairs, spacers)	Yes ☒	No ☐	Steel Chairs
Reinforcement conditions (cleanliness, temperature, etc.)	Yes ☒	No ☐	Clean
Embedments and anchor bolts installed	Yes ☒	No ☐	
Soil subgrade prepared in accordance with project specifications	Yes ☐	No ☐	N/A

Referenced Drawings	**Date**	**Page(s)**	**Rev.**	**Bar Reinforcing Grade & Type**
Archetype Architects –General Notes	2/13/17	S0.01		ASTM: A185
Archetype Architects –3rd & 4th Floor Framing Plan	2/13/17	S1.04		
Archetype Architects – Framing Sections	2/13/17	S3.01		GRADE:

Concrete Placement Observations	**In Compliance**		**Comments**
Required mix used	Yes ☒	No ☐	4000Psi ¾" non-air
Concrete properly conveyed to all areas of placement	Yes ☒	No ☐	Pump
Internal vibration / consolidation of concrete	Yes ☒	No ☐	Mechanical Screed
Even layering around openings and embedments	Yes ☒	No ☐	
Post placement observations (finishing, curing, etc.)	Yes ☐	No ☐	Not-onsite

Field Testing of Concrete Performed Yes ☒ No ☐

***CYLINDER SET NO:** 996 - 13 ←**refer to associated concrete test report*

Non-Conformance Items

Person Notified: _____ Yes ☐ No ☒ _____

Notes:

S.W. Cole was onsite to perform reinforcement observations and concrete field testing as requested by Ducas Construction. S.W. Cole was contacted last minute about concrete pour and two trucks had been placed before S.W. Cole's arrival. The reinforcement that was still visible appeared to be consistent with referenced documents above. The mix supplied by Auburn concrete was a 4000psi ¾" mix containing: high-range water reducer and MasterSet FP 20 @ 2% non-chlr. A mid-load sample was taken and test results were verbally reported to Auburn Q.C (Waring Cutler) who was onsite to adjust loads accordingly.

Attachments: None

Reviewed by: 

S.W.COLE ENGINEERING, INC.

Concrete Construction Observation Report

Project Name:	Widgery Wharf	**Project No. :**	17-0670
Location:	Portland, ME	**Date:**	4-3-18, 4-10-18
Client / Client's Rep:	CM Union LLC	**S.W.COLE Rep. :**	J. Moore/P. Phelan
Placement Location:	2nd floor slab on deck	**Arrived on Site:**	11am/8:45a
Placement Type:	Concrete Slab On Deck	**Left Site:**	12pm/10:15a

Pre-Placement Observations	**In Compliance**		
Bar size and location (diameter, length, bend and coverage)	Yes ☒	No ☐	6x6 W1.4xW1.4 WWF, 2 #3 Con.
Splicing (type, overlap)	Yes ☒	No ☐	1 square
Stability (wiring, chairs, spacers)	Yes ☒	No ☐	1" steel chairs
Reinforcement conditions (cleanliness, temperature, etc.)	Yes ☒	No ☐	Clean, Clear
Embedments and anchor bolts installed	Yes ☒	No ☐	Per plan
Soil subgrade prepared in accordance with project specifications	Yes ☒	No ☐	18 gauge steel deck

Referenced Drawings	**Date**	**Page(s)**	**Rev.**	**Bar Reinforcing Grade & Type**
Archetype Architects –General Notes	2/13/17	S0.01		ASTM: A185, A615
Archetype Architects – 2nd floor framing	2/13/17	S1.03		
Archetype Architects –3rd floor framing	2/13/17	S1.04		GRADE:60
Archetype Architects – framing sections	2/13/17	S3.01		

Concrete Placement Observations	**In Compliance**		**Comments**
Required mix used	Yes ☒	No ☐	4000Psi ¾" non-air
Concrete properly conveyed to all areas of placement	Yes ☒	No ☐	Pump
Internal vibration / consolidation of concrete	Yes ☒	No ☐	Mechanical Screed
Even layering around openings and embedments	Yes ☒	No ☐	
Post placement observations (finishing, curing, etc.)	Yes ☐	No ☐	Not-onsite

Field Testing of Concrete Performed Yes ☒ No ☐

***CYLINDER SET NO:** 996 - 14 ←**refer to associated concrete test report*

Non-Conformance Items

Person Notified: _____ Yes ☐ No ☒ _____

Notes:

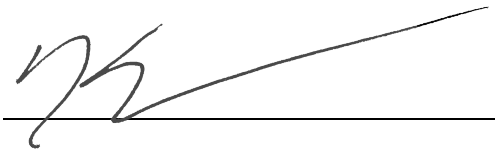
4-3-18 Reinforcing observations of 2nd and 3rd floor slabs on deck:

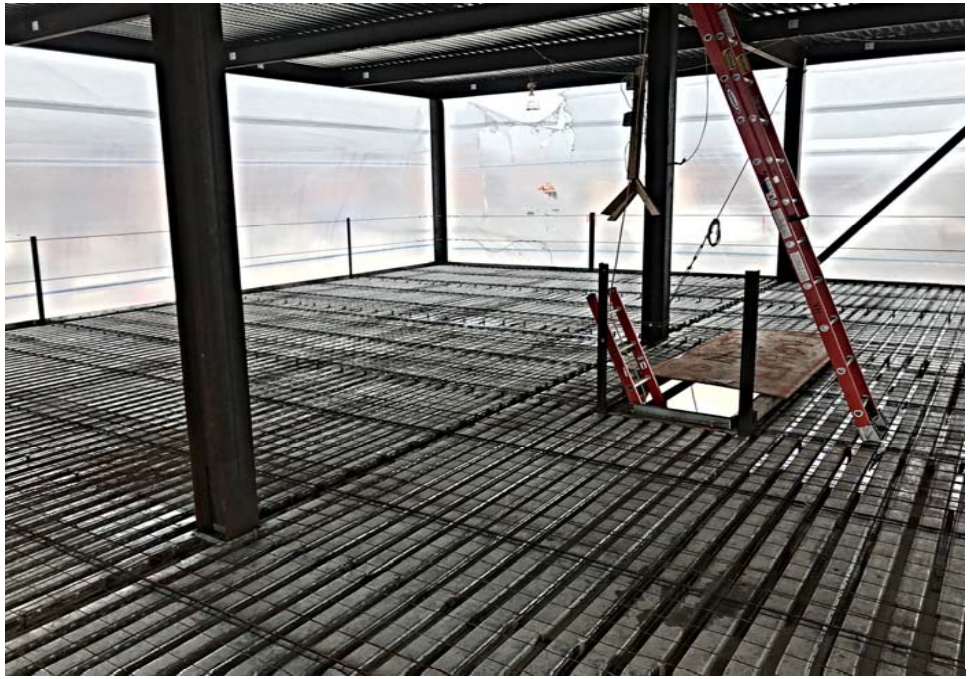
S.W. Cole was onsite as requested by Ducas Construction for reinforcement observations of the 2nd and 3rd floor slabs on deck. Reinforcement installation appeared consistent with details contained in the above referenced project documents. Overlap of WWF generally consisted of 1 square.

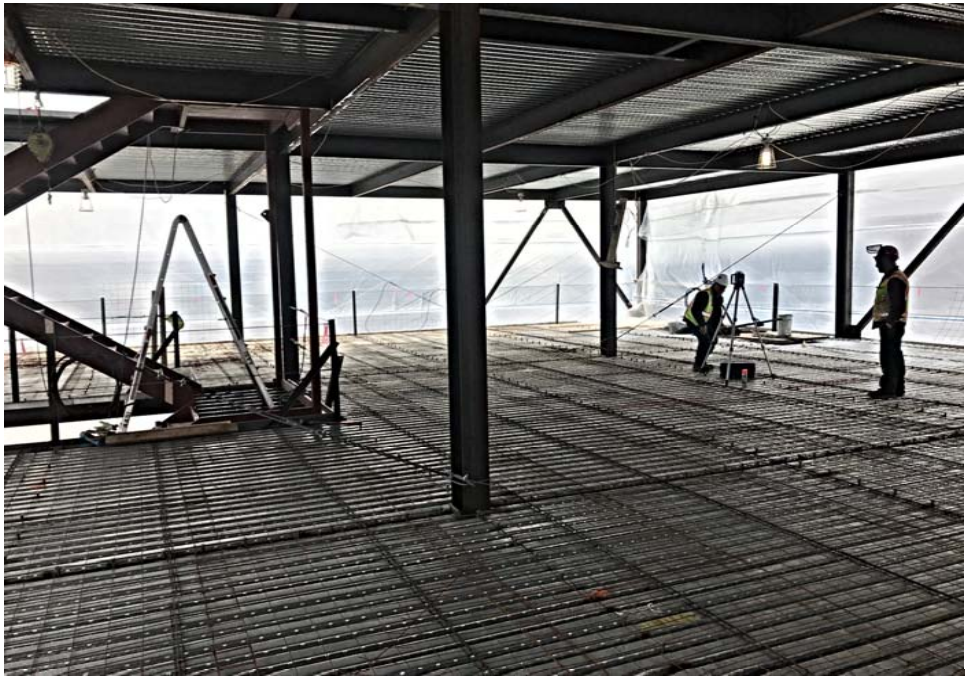
4-10-18 2nd floor slab on deck concrete placement:

S.W. Cole was onsite per same day scheduling for concrete field testing as requested by Ducas Construction. Due to the lateness of scheduling only one mid load sample was able to be obtained from the last load placed. The mix supplied by Auburn concrete was a 4000psi ¾" mix containing: high-range water reducer and a non-chloride accelerator @ 3%. The results of mid-load samples were verbally reported to Auburn Q.C (Waring Cutler) and Ducus Construction's onsite representative.

Attachments: Photos

Reviewed by: 





STRUCTURAL DESIGN CONSULTING INC.

618 Scenic Road, Unit 2
Laconia, NH 03246
Phone: (207) 232-2964

JOB NAME:	**Widgery Wharf Building 1**
JOB NO.:	**16018**
DATE OF VISIT:	**May 2, 2018**
TIME:	**11:15 A.M. – 12:15 P.M.**
WEATHER:	**80°, clear**
CLIENT:	**Archetype Architects**
OBSERVER:	**David Tetreault, SDC**

Erection of the primary framing system has been substantially completed. All elevated floor slabs have been placed, the CMU elevator core has been completed, stair framing has been erected, and spray fire-proofing of steel members has begun. The canopy at the northwest corner has not yet been installed.

No deviation from the Contract Documents was noted except as follows:

> The tension control bolts at the majority of 4th floor brace connections have not been tightened sufficiently. All of these bolts must be retightened and inspected.

Concern about steel deck deflection during concrete placement has been expressed. I reviewed the structural design, and the steel deck submittal and I observed the deflected shape (no measurements were taken to confirm the actual magnitude of deflection). I have found that the gauge and type of deck meets the Steel Deck Institute standards and recommendations as well as the deck manufacturer's load tables and the observed deflections appear to be as anticipated

SIGNATURE: David Tetreault