IAS ACCREDITED DIAMOND PIER
COMPRESSION FIELD LOAD TEST REPORT

Prepared for

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EEI REPORT NO. 07-020-10

OCTOBER 5, 2016

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October 5, 2016

Pin Foundations, Inc.
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Attention: Rick Gagliano

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Subject: IAS Accredited Diamond Pier Compression Field Load Test Report
EEI Report No. 07-020-10

Dear Mr. Gagliano:

Earth Engineers, Inc. (EEI) is pleased to transmit our test report for Diamond Piers, which have been developed, patented, and marketed by Pin Foundations, Inc. (PFI). Our services were completed in accordance with EEI Proposal No. 15-P093 dated April 2, 2015, which you authorized by signing on April 6, 2015.

PROJECT BACKGROUND

In 2006, PFI obtained ESR-1895 from International Code Council - Evaluation Service Inc. (ICC-ES) for the Diamond Pier DP-50 with 36-inch long bearing pins (reference PSI Report No. 704-25035-1 dated November 28, 2006). PFI is currently in the process of updating ESR-1895 for the Diamond Pier DP-50 and DP-75 models with 50-inch long bearing pins. As such, EEI has been retained to perform the compressive load testing and this report, which we understand you will be submitting to ICC-ES.

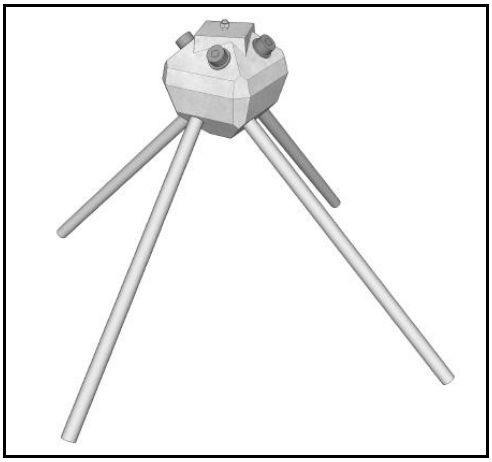


FIGURE 1: Typical schematic drawing for Diamond Pier DP-50 and DP-75.

SCOPE OF SERVICES

EEI's scope of services included a number of tasks related to assisting PFI with evaluating the compressive load carrying capacity of DP-50 and DP-75 Diamond Piers with 50-inch long bearing pins installed at sites with 1,500 and 2,000 pounds per square foot (psf) presumptive allowable soil bearing capacities per Table R401.4.1 of the International Residential Code (IRC)[1]. These tasks were completed under the direction of EEI Principal Geotechnical Engineer Troy Hull, P.E. The scope of services included the following:

1. Qualify two load test sites (Site #1 and Site #2). Site qualification included performing 6 soil test borings (B-1 through B-6), laboratory testing, and geotechnical engineering analyses to confirm that the 2 sites met the requirements of Section 4.3.1 of AC336.
2. Select load test samples of the DP-50 and DP-75 Diamond Piers at PFI's facility.
3. Perform 12 axial compressive pile load tests in general accordance with ASTM D1143/D1143M and AC336.
4. Perform two of the 12 axial compressive pile load tests in accordance with ASTM D1143 to address group effect.
5. Provide a final typed report summarizing the site qualification and load test results. Our report format addresses the applicable sections of AC336 in the order they appear in the acceptance criteria.

EEI is approved by IAS to conduct the requested load testing services in accordance with ASTM D1143/D1143M. See the accreditation certificate attached in Appendix M.

AC336 SECTION 2.1.1 – PRODUCT DESCRIPTION

Both the DP-50 and DP-75 Diamond Pier models consist of a pre-cast concrete pier with a single embedded galvanized anchor bolt, 4 steel bearing pins, and 4 bearing pin end caps. The anchor bolt diameters for the DP-50 and DP-75 are 1/2 and 5/8 inch, respectively.

The pre-cast concrete piers are manufactured by the outside vendors qualified by PFI under their Quality Control Manual. The steel bearing pins are purchased by PFI from commodity pipe suppliers which in turn purchase this commodity produced under ASTM guidelines by steel mills worldwide. The embedded, galvanized anchor bolts are also a standard commodity manufactured worldwide under ASTM guidelines, and purchased by PFI or the qualified outside vendors manufacturing the piers. The bearing pin end caps are manufactured by Tool Gauge, Inc. of Tacoma, Washington, using dies designed and approved by PFI. See Appendix B for the dimensioned drawings and concrete mix design for the Diamond Pier DP-50 and DP-75.

[1] AC336 Section 4.3.1 allows for 10 percent variation in the presumptive load-bearing value (i.e. 1,500 psf +/- 10% and 2,000 psf +/- 10%). All future reference in this report to the presumptive load-bearing value includes the 10 percent +/- tolerance.

AC336 SECTION 2.1.2 – INSTALLATION INSTRUCTIONS

The Diamond Pier DP-50 and DP-75 models are installed by placing the standard pre-cast concrete pier on the ground at the support location, and driving 4 steel bearing pins at approximately a 40 degree angle from the vertical through the assembly into the underlying ground. Detailed instructions for the installation of the Pier Foundation Assembly are presented in Appendix N attached to this report.

AC336 SECTION 2.1.3 – PACKAGING AND IDENTIFICATION

As stated in PFI's Quality Control Manual available in Appendix P, each lot of product manufactured on a specific date will be marked with a pallet label showing the patent numbers, piece count per pallet, the ICC-ES evaluation report number, the date manufactured and product name which can be referenced on an order and shipping manifest, and the phrase "For use with One and Two Family Dwelling Construction Only."

AC336 SECTION 2.2 – TESTING LABORATORIES

As required, EEI complies with Section 2.0 of the ICC-ES Acceptance Criteria for Test Reports (AC85) and Section 4.2 of the ICC-ES Rules of Procedure for Evaluation Reports.

AC336 SECTION 2.3 – TEST REPORTS

To the best of our knowledge, the test reports from PSI (concrete compression tests) and Carlson Testing (hydraulic ram calibrations) incorporated into this report as Appendices comply with the AC85.

AC336 SECTION 2.4 – PRODUCT SAMPLING

EEI's sampling of the Diamond Pier DP-50 and DP-75 for tests conducted in accordance with AC336 complied with Section 3.1 of AC85. EEI Principal Geotechnical Engineer Troy Hull, P.E. traveled to PFI's Gig Harbor, Washington facility on April 1, 2016 and randomly sampled the precast concrete piers to be used for compressive load testing.

AC336 SECTION 3.1.1 – CONCRETE COMPRESSIVE STRENGTH

This section applies to the precast concrete piers that were used for load testing in accordance with AC 336. Refer to Section 4.3.1 of this report. Note that the concrete compressive strength of the precast concrete piers load tested per ASTM D1143/D1143M cannot exceed 5,500 psi as that is the minimum concrete strength specified in PFI's Quality Control Manual for production piers.

AC336 SECTION 3.1.2 – CONCRETE AIR ENTRAINMENT

The concrete used to fabricate the load test assemblies was tested in accordance with Section 4.2 (i.e. volumetric test in accordance with ASTM C231) to verify the total air content (percent by volume of concrete) was not less than 5 percent nor more than 7 percent.

AC336 SECTION 3.2 – FIBERS

Not applicable.

AC336 SECTION 3.3.1 – STEEL BEARING PINS, GENERAL

The steel bearing pins for the DP-50 were 1-inch nominal diameter, schedule 40, galvanized steel pipe (1.315-inch actual outside diameter). The pipe wall thickness was 0.133 inches with a tolerance of +/- 1 percent. Each pin had a length of 50 inches +/- ½ inch. The pin corrosion resistance coating consisted of hot dip galvanizing in accordance with ASTM A53-02.

The steel bearing pins for the DP-75 were 1 ¼-inch nominal diameter, schedule 40, galvanized steel pipe (1.660-inch actual outside diameter). The pipe wall thickness was 0.140 inches with a tolerance of +/- 1 percent. Each pin had a length of 50 inches +/- 1/2 inch. The pin corrosion resistance coating consisted of hot dip galvanizing in accordance with ASTM A53-02.

AC336 SECTION 3.3.2 – STEEL BEARING PINS, PROPERTIES

The steel bearing pins consisted of Type E, Grade A (electric-resistance-welded), galvanized steel pipe complying with ASTM A53-02. See the mill test report attached in Appendix Q.

AC336 SECTION 3.4.1 – PRECAST ANCHOR BOLT, GENERAL

The galvanized steel anchor bolts precast in the top of each concrete pier were 1/2 inch in diameter by 5 inches long for the Diamond Pier DP-50 and 5/8 inch diameter by 5 1/2 inches long for the DP-75.

AC336 SECTION 3.4.2 – PRECAST ANCHOR BOLT, PROPERTIES

See certification report attached as Appendices P and Q.

AC336 SECTION 3.5 – BEARING PIN PIER

Refer to AC336 Section 4.3.1 and 4.3.2 below for load test procedure and detailed presentation of results. As required, the test results did demonstrate that vertical settlement of Diamond Pier DP-50 and DP-75 with 50-inch long steel bearing pins installed in both 1,500 and 2,000 psf soil (in accordance with IRC Table R401.4.1) was less than 0.5 inches.

The average settlement at the anticipated design loads are summarized in Section 4.3.2 below.

AC336 SECTION 4.1 – CONCRETE COMPRESSIVE STRENGTH

Concrete test cylinders specific to the Diamond Pier load testing program were molded by Stoneworks of Elk River, Minnesota at the time the precast concrete piers were poured. The cylinders and piers were then shipped to PFI and cured in accordance with Section 9.2 of ASTM C31, except that per AC336 they were cured in the same temperature and moisture environment as the precast concrete piers to be vertical load tested (reference Section 4.3.1 below). The concrete cylinders were tested by PSI in accordance with ASTM C39. Test results are found in the Compressive Strength Test Reports attached in Appendix J.

AC336 SECTION 4.2 – AIR ENTRAINMENT

For the concrete batches tested by Stoneworks, the total air content (percent by volume of concrete) is determined in accordance with ASTM C231.

AC336 SECTION 4.3.1 – VERTICAL LOAD BEARING TEST, GENERAL

CONCRETE COMPRESSIVE STRENGTH TESTING

As required, at least 3 concrete compression tests were conducted by PSI on 4 inch by 8 inch cylinder samples cast in accordance with ASTM C39 from the same batch (Batch C) as the Diamond Piers to be load tested.

Three concrete test cylinders were tested in accordance with ASTM C39 within a 72-hour period immediately following the last bearing pier tested from Batch C. The average of the three tests established the concrete compressive strength. See Appendix J for the test results. Note that the average of the 3 concrete compressive strength tests was less than 5,500 psi, which is a requirement for this project because the minimum compressive strength requirement in PFI's Quality Control Manual for production piers is 5,500 psi

LOAD TEST SITE QUALIFICATION

EEI conducted a geotechnical subsurface investigation on a select part of the Port of Camas-Washougal's 125-acre Steigerwald Commerce Center property at the east terminus of Grant Street, in Washougal, Clark County, Washington. The purpose of the subsurface investigation was to qualify two areas on the site that met the soil classification criteria outlined in 2015 IRC Table R401.4.1 for load-bearing pressures of 2,000 +/- 10 percent and 1,500 psf +/- 10 percent (see Table 1 below).

TABLE 1: IRC Table R401.4.1, Presumptive Load-Bearing Values of Foundation Materials[a]

CLASS OF MATERIAL	LOAD-BEARING PRESSURE (pounds per square foot)
Crystalline bedrock	12,000
Sedimentary and foliated rock	4,000
Sandy gravel and/or gravel (GW and GP)	3,000
Sand, silty sand, clayey sand, silty gravel and clayey gravel (SW, SP, SM, SC, GM AND GC)	2,000
Clay, sandy clay, silty clay, clayey silt, silt sandy silt, and sandy clay (CL, ML, MH AND CH)	1,500[b]

a. When soil tests are required by Section 401.4, the allowable bearing capacities of the soil shall be part of the recommendations.
b. When the building official determines that in-place soils with an allowable bearing capacity of less than 1,500 psf are likely to be present at the site, the allowable bearing capacity shall be determined by a soils investigation.

EEI selected two areas of the property to specifically investigate for PFI's load testing program. Site #1 (silt/clay soil with a load-bearing bearing capacity of 1,500 psf +/-10 percent) was located in the northwest corner of large undeveloped field contained within the Port of Camas/Washougal property (see Site Location Plan in Appendix C attached). Site #2 (sand and silty sand soil with a load-bearing capacity of 2,000 psf +/- 10 percent) was located in the southwest corner of the property.

Prior to the subsurface investigation, EEI reviewed available geologic references for the area. According to the "Geologic Map of the Vancouver Quadrangle, Washington and Oregon" (1987), the general area of the site consists of Holocene (the last 11,000 years) to upper Pleistocene (1.8 mya to 10,000 years) aged alluvium (Qal). These alluvial soils typically consist of sand, silt and clay on the floodplains of the Columbia River that are locally up to about 50 meters thick. This is generally consistent with the soil conditions encountered in our subsurface investigation.

On August 13, 2015, six Standard Penetration Test (SPT) soil borings (B-1 through B-6) were performed by PLi Systems of Hillsboro, Oregon using a Beretta T46 track rig outfitted with solid

stem auger and a calibrated automatic SPT hammer. Five of the borings (B-1 through B-5) were completed at Site #1 (silt site) and one boring (B-6) was completed at Site #2 (sand site).

The SPT was performed by driving a 2-inch, O.D., split-spoon sampler into the undisturbed soil formation located at the bottom of the advanced auger with repeated blows of a 140-pound, pin-guided, automatic mechanical hammer falling a vertical distance of 30 inches. The number of blows required to drive the sampler one foot is a measure of the *consistency* for cohesive soils and *density* for granular soils.

SPT samples were obtained at 2 ½ foot intervals and all soil samples were identified in the field, placed in sealed containers, and transported to the laboratory for further classification, testing and storage. In addition to SPT sampling, relatively undisturbed Shelby tube samples were obtained at depths selected by EEI Principal Geotechnical Engineer Troy Hull, P.E.

Samples of the subsurface soils encountered in our borings were returned to our laboratory for further evaluation to aid in classification of the materials. The laboratory evaluation consisted of visual and textural examinations (ASTM D2487-00), moisture content tests (ASTM D2216-98), particle size analyses (ASTM D1140), and Atterberg limits tests (ASTM D4318-10). Results of the tests are shown on the attached boring logs.

The following is a summary of soil and groundwater conditions encountered in the 6 borings. All of the borings encountered approximately 12 inches of topsoil. Beneath the topsoil in B-1 through B-5 was sandy silt/clay and silty/clay with sand, which classifies as ML/CL in accordance with the Unified Soil Classification System (USCS). The stratum extended to the maximum depths of the borings (10 ½ feet). The one exception was a thin (approximately 6 inches) seam of silty sand in B-3 from a depth of 3 to 3 ½ feet below grade. Moisture contents of the ML/CL material tested ranged from 6 to 41 percent. In general, the moisture content increased with depth. The fines content (i.e. material passing a #200 sieve) ranged from 52 to 99 percent. Based on the soil conditions encountered in Borings B-1 through B-5, we consider these soils to be characterized as silt/clay soils typically associated with 1,500 psf bearing material.

Beneath the topsoil in B-6, we encountered sand from 1 to 8 feet below existing grade. The moisture content of the samples tested ranged from 5 to 10 percent. The fines content ranged from 8 to 15 percent. A lense of silt with sand was encountered from 8 to 10 feet and then silty sand was encountered to the bottom of our boring (11 ½ feet). Based on the soil conditions in Borings B-6, we consider these soils to be characterized as sand and silty sand soils typically associated with 2,000 psf bearing material.

Groundwater was not encountered in any of the borings at the time of the subsurface investigation. Based on our past experience working at the Steigerwald Commerce Center property, groundwater is typically greater than about 15 feet below the ground surface. It is possible that groundwater levels will vary by season, year, and location across the site.

EEI performed geotechnical engineering analyses based on soil strength characterization using the data from our subsurface investigation and laboratory test data. Our bearing capacity calculations were performed using the General Bearing Capacity Equation, originally developed

by Karl Terzaghi and since modified by several researchers and practitioners (McCarthy, 1998). This method considers soil cohesion and internal friction, foundation size, total soil weight, and surcharge effects to determine bearing capacity. Soil cohesion and internal friction values were determined from Direct Shear lab testing. Table 2 is a brief summary of the calculation results.

TABLE 2: SUMMARY OF SITE BEARING CAPACITY CALCULATIONS

	REQUIRED BEARING CAPACITY PER 2015 IRC TABLE R401.4.1 (psf)	**GENERAL BEARING CAPACITY EQUATION NET ALLOWABLE BEARING RESULTS (psf)**
Site #1 (Silt/Clay)	1,500 +/- 150	1,610
Site #2 (Sand and Silty Sand)	2,000 +/- 200	1,870

In our professional opinion, the engineering analyses confirm that the soil within the zone of influence for Site #1 (i.e. in the area of borings B-1 through B-5) meets the requirement for soil with a load-bearing value within 10 percent of 1,500 psf as outlined in IRC Table R401.4.1. Additionally, Site #2 (i.e. in the area of B-6) is consistent with soil having a load-bearing value within 10 percent of 2,000 psf per IRC Table R401.4.1.

LOAD TEST PROCEDURE

Once the two test sites at the Port of Camas-Washougal were qualified, each testing area was completely cordoned off with safety tape (see Photo 4). This was done to prevent vehicles or equipment from driving over the site and compacting (improving) the near-surface soils. The approximate size of the 2 cordoned off sites was 75 feet (north-south direction) by 350 feet (east-west direction) for Site #1, and 75 feet (north-south direction) by 150 feet (east-west direction) for Site #2.

PHOTO 1: Site #2 (sand) cordoned off with caution tape to prevent vehicle traffic from accessing the Diamond Pier test area.

On April 4 and 5, 2016, PFI staff installed DP-50 and DP-75 Diamond Piers at Site #1 (silt/clay soil with a presumptive bearing capacity of 1,500 psf +/- 10 percent) and Site #2 (sand and silty sand with a presumptive bearing capacity of 2,000 psf +/- 10 percent). The installation was witnessed by EEI Principal Geotechnical Engineer Troy Hull, P.E. At that time it was visually confirmed that the ground surface had not been disturbed by any heavy equipment since the August 2015 subsurface investigation was completed. Additionally, all of the steel bearing pins were inspected by Mr. Hull for straightness and the concrete piers were inspected for any cracking. No discontinuities were observed in any of the pins or piers used for load testing.

As required by Section 4.3.1 of the AC, the Pier Foundation Assemblies were installed in a manner as recommended by the manufacturer for construction. A small amount of grass sod was removed with a shovel to seat the concrete pier (see Photo 2 below).

PHOTO 2: Sod removed in conical shape of concrete pier.

PHOTO 3: Typical concrete pier seated and ready for bearing pin installation.

Once the concrete pier was seated, a small bubble level was used to level the top of the concrete pier. The 4 steel bearing pins were placed through precast holes in the concrete pier.

Each steel bearing pin was driven a few inches with a 3-pound sledge. The steel bearing pins were then installed the rest of the way using a Bosch GSH 16 jackhammer with a pipe driving bit (see Photo 4 below). The levelness of the top of the concrete pier was continuously checked when driving the steel bearing pins into the ground. This same procedure was repeated for the other 11 Diamond Pier installations.

PHOTO 4: Typical driving of the steel bearing pins.

PHOTO 5: Typical Diamond Pier after the bearing pins were driven.

One to 2 inches of soil was removed from around the base and sides of the precast concrete pier to ensure that the entire test load was carried by the steel bearing pins and not the precast concrete pier. Additionally, the soil removal allowed EEI to inspect the base of the concrete pier where the steel bearing pins exit the pier after load testing both before and after load testing was completed.

PHOTO 6: Typical Diamond Pier after 1 to 2 inches of soil were removed from around the bottom and sides.

Load testing was conducted on all 12 Diamond Piers in general accordance with ASTM D1143/D1143M-07 (reapproved 2013), "Standard Test Methods for Deep Foundations Under Static Axial Compressive Load" between April 16 and May 3, 2016, and as detailed in AC336. All Diamond Piers were conducted as individual load tests, except Diamond Pier #CL-C-DP50-4 and CL-C-DP75-4 at Site #1, where group tests were performed to determine the potential effect of closely spaced Diamond Piers (i.e. as close as 3 feet on center).

The load test reaction frame consisted of two W12x40 by 25 foot long (minimum) wide flange steel beams supported on either end by a single 2.5 by 2.5 by 5 foot, solid concrete block manufactured by Ultrablock Inc. of Vancouver, Washington. Each concrete block weight was about 4,320 pounds. Additional 2.5 by 2.5 by 5 foot solid concrete blocks weighing 4,320 pounds were placed on top of the 2 steel beams as dead weight. The total dead weight exceeded the maximum test load by at least 10 percent as required by Section 3.4.3 of the ASTM standard. The steel beams and concrete block reaction frame was assembled using an all-terrain forklift working from outside the taped off restricted area to prevent the equipment from compacting the ground in the area of the tests.

PHOTO 7: Typical compression load test reaction frame setup.

Prior to the start of testing, the reaction frame and measuring systems were covered with a plastic tarp to protect from adverse temperature variations (i.e. direct sunlight and rain) as required by Section 4.1.3 of the ASTM standard.

PHOTO 8: Typical compression load test reaction frame setup after covering with tarp.

See Appendix F for a sketch of the reaction frame setup.

AC336 SECTION 4.3.2 – VERTICAL LOAD BEARING TEST LOAD APPLICATION

SINGLE PIER LOAD TEST

For each individual Diamond Pier load test, vertical load was applied to the top of the concrete pier using a single Enerpac 12-ton hydraulic hollow core ram. The hydraulic rams used throughout this load testing program were calibrated by Carlson Testing of Tigard, Oregon prior to load testing (see Appendix I attached). To prevent an eccentric load on the Diamond Piers as required by Section 7.1.3 of the ASTM standard, two plates with a matching ball and cup were placed between the top of the Diamond Pier and the hydraulic ram.

PHOTO 9: Loading plates with ball and matching cup.

In accordance with Section 8.1.3 of ASTM D1143/D1143M (Procedure B), each Diamond Pier was loaded to at least 200 percent of the anticipated design load in intervals that equaled 25 percent of the anticipated design load. Note that for some tests, additional load increments were included to obtain the maximum load carrying capacity of the Diamond Piers. In accordance with AC336 Section 4.3.2 and Section 8.1.13.1 of ASTM D1143/D1143M, each load increment was held for at least 15 minutes and until the axial movement did not exceed a rate of 0.01 inches per hour (0.0025 inches per minutes). The maximum load was held for at least 12 hours and until the axial movement measured over a period of 1 hour did not exceed 0.01 inches. Once the maximum test load interval was completed, the Diamond Pier was unloaded in 4 approximately equal intervals, with one hour between decrements.

For all incremental loads, settlement readings were taken at 1 minute intervals for the first five minutes and then 5 minute intervals to 15 minutes. Additional readings after 15 minutes were taken at 5 minute intervals.

For the maximum test load, readings were taken in accordance with the preceding paragraph. Additionally, readings were taken at 30 minutes, 1 hour, and then 1 hour intervals until the load

had been held for 12 hours. Because the axial movement measured over the 12th hour did not exceed 0.01 inches, additional 1 hour readings were not necessary between 12 and 24 hours.

For the unloading phase of each test, settlement readings were generally taken at 0, 55 and 60 minutes. A 55-minute reading was taken to demonstrate that axial movement had stopped between 55 and 60 minutes.

Section 7.1.1 of ASTM D1143/D1143M (2013 edition) recommends that the reference beams used in the compression load tests be supported on the ground at a minimum clear distance of 5 pile diameters, and not less than 8 feet, from the test pier. The previous compressive load testing performed to obtain ESR-1895 in 2006 was performed under an older ASTM test procedure (1994) that only required the reference beam supports be at least 8 feet from the test pile. The "diameter" of a Diamond Pier is somewhat arbitrary because it is a cluster of bearing pins. We generally consider the effective diameter of a Diamond Pier with 50-inch long bearing pins to be 3 feet. A 3-foot diameter Diamond Pier would require 33-foot long minimum reference beams to allow for 15 feet of clear distance on either side of the Diamond Pier. It is not practical to use 33-foot long reference beams made of standard wood lumber as they are not rigid enough. As such, steel beams need to be used. However, based on our past experience, steel beams experience noticeable expansion and contraction due to temperature changes so our preference would be to use wood material when possible. In discussions with ICC-ES staff, it was agreed that if it could be demonstrated that shorter reference beams complying with the old ASTM requirement would not affect the findings of the load testing, then shorter reference beams with at least 8 feet of clearance between the beam supports and the Diamond Pier could be used.

In order to demonstrate that the 8 foot minimum clearance would not impact the test results, a load test was performed where one reference beam had ground supports 8 feet from the edge o the test pier (in compliance with the 1994 ASTM edition). The second reference beam had ground supports 15 feet from the edge of the test pier (in compliance with the 2013 ASTM edition). The Diamond Pier tested was #CL-C-ST75-1 and was separate from the 12 tests performed to update ESR-1895 for DP-50 and DP-75 Diamond Piers with 50-inch bearing pins. The test data attached in Appendix K demonstrates that the variation in in deflection readings between the longer and shorter reference beams was negligible (reference the test data for Dial Gauge #5 and #6. The variation was less than 0.01 inches, which is the minimum accuracy of the test as defined in Section 7.1.3 of ASTM D1143/D1143M. In our professional opinion, it is acceptable to use shorter beams that comply with the older requirement of at least 8 feet of clear spacing between the test pier and reference beam support. As such, all 12 compression load tests submitted for approval in this report were performed using the shorter wood reference beams supported at least 8 feet laterally from the Diamond Piers.

GROUP LOAD TEST

The group test was performed on DP-50 and DP-75 Diamond Piers at Site #1, which has the weaker soil conditions between the 2 soil sites and, in our professional opinion, would be more likely to be influenced by group effect.

Three DP-50 Diamond Piers were installed in a linear arrangement with a center to center spacing of 3 feet. The purpose of this Diamond Pier configuration was to demonstrate whether a group of closely spaced Diamond Piers perform differently than an individual Diamond Pier.

The group test was performed by loading the center Diamond Pier in a similar manner as the other single Diamond Pier load tests, except that at approximately 1/2 inch of vertical deflection, the 2 outside Diamond Piers were immediately loaded to the same load and then additional settlement readings were taken on the central Diamond Pier for an additional hour. The 2 outside Diamond Piers were then immediately unloaded and the load test on the central Diamond Pier continued in its normal manner.

PHOTO 10: Diamond Pier DP-50 group load test alignment.

LOAD TEST RESULTS, CONCLUSIONS, AND RECOMMENDATIONS

Detailed load and deflection readings are tabulated and plotted in Appendix K attached. The following is a summary of the maximum average test load 1/2 inch deflection for all 12 individual Diamond Pier load tests, as well as the 2 group load tests at Site #1.

Each Diamond Pier was visually observed after completion of the load testing program. The steel bearing pins and precast concrete piers were completely removed from the ground and examined. The steel pins showed no inelastic bending and we observed no cracking or other failure in any of the pins or piers.

TABLE 3: SINGLE PIER LOAD TEST RESULTS FOR DP-50 DIAMOND PIERS WITH 50-INCH LONG BEARING PINS INSTALLED IN 1,500 PSF BEARING SOIL

Site #	Diamond Pier #	Test Soil Load Bearing Value (psf)[1]	Design Load (pounds)[2]	Maximum Test Load at 1/2 Inch Deflection (pounds)
1	CL-C-DP50-1	1,500	3,600	6,200
1	CL-C-DP50-2	1,500	3,600	6,400
1	CL-C-DP50-4	1,500	3,600	4,800
Average Maximum Test Load at ½ Inch Deflection (pounds):				5,800

1. The test soil load bearing value is obtained from IRC Table R401.4.1.
2. The design load is determined by multiplying the test soil load bearing value from IRC Table R401.4.1 times the equivalent bearing area. The equivalent bearing area for the DP-50 with 50-inch pins is 2.4 square feet.

For the DP-50 with 50-inch long steel bearing pins installed at Site #1, the average of the 3 test results at 1/2 inch of deflection was 5,800 pounds—and the upper and lower bounds for 15 percent deviation are 4,930 and 6,670 pounds. A review of the load test results from Table 3 above indicates that one of the test results was not within 15 percent of the average of the 3 tests. **As such, the load test result at 1/2-inch deflection for the Diamond Pier DP-50 with 50-inch long steel bearing pins installed in a soil with a load-bearing pressure of 1,500 psf in accordance with IRC Table R401.4.1 is 4,800 pounds. Given that the 4,800 pound test result is greater than the design load of 3,600 pounds, the test result meets the AC336 load testing requirement.**

TABLE 4: SINGLE PIER LOAD TEST RESULTS FOR DP-50 DIAMOND PIERS WITH 50-INCH LONG BEARING PINS INSTALLED IN 2,000 PSF BEARING SOIL

Site #	Diamond Pier #	Test Soil Load Bearing Value (psf)[1]	Design Load (pounds)[2]	Maximum Test Load at 0.5 Inch Deflection (pounds)
2	SA-C-DP50-1	2,000	4,400	5,400
2	SA-C-DP50-2	2,000	4,400	6,100
2	SA-C-DP50-3	2,000	4,400	4,600
Average Maximum Test Load at ½ Inch Deflection (pounds):				5,367

1. The test soil load bearing value is obtained from IRC Table R401.4.1.
2. The design load is determined by multiplying the test soil load bearing value from IRC Table R401.4.1 times the equivalent bearing area. The equivalent bearing area for the DP-50 with 50-inch pins is 2.2 square feet.

For the DP-50 with 50-inch long steel bearing pins installed at Site #2, the average of the 3 test results at 1/2 inch of deflection was 5,367 pounds—and the upper and lower bounds for 15 percent deviation were 4,562 and 6,172 pounds. A review of the load test results from Table 4 above indicates that all 3 test results were within 15 percent of the average of the 3 tests. **As such, the load test result at 1/2-inch deflection for the Diamond Pier DP-50 with 50-inch long steel bearing pins installed in a soil with a load-bearing pressure of 2,000 psf in accordance with IRC Table R401.4.1 is 5,367 pounds. Given that the 5,367 pound test**

result is greater than the design load of 4,800 pounds, the test result meets the AC336 load testing requirement.

TABLE 5: SINGLE PIER LOAD TEST RESULTS FOR DP-75 DIAMOND PIERS WITH 50-INCH LONG BEARING PINS INSTALLED IN 1,500 PSF BEARING SOIL

Site #	Diamond Pier #	Test Soil Load Bearing Value (psf)[1]	Design Load (pounds)[2]	Maximum Test Load at 0.5 Inch Deflection (pounds)
1	CL-C-DP75-1	1,500	4,200	6,200
1	CL-C-DP75-2	1,500	4,200	5,200
1	CL-C-DP75-3	1,500	4,200	5,000
Average Maximum Test Load at ½ Inch Deflection (pounds):				5,467

1. The test soil load bearing value is obtained from IRC Table R401.4.1.
2. The design load is determined by multiplying the test soil load bearing value from IRC Table R401.4.1 times the equivalent bearing area. The equivalent bearing area for the DP-75 with 50-inch pins is 2.8 square feet.

For the DP-75 with 50-inch long steel bearing pins installed at Site #1, the average of the 3 test results at 1/2 inch of deflection was 5,467 pounds—and the upper and lower bounds for 15 percent deviation were 4,647 and 6,287 pounds. A review of the load test results from Table 5 above indicates that all 3 test results were within 15 percent of the average of the 3 tests. **As such, the load test result at 1/2-inch deflection for the Diamond Pier DP-75 with 50-inch long steel bearing pins installed in a soil with a load-bearing pressure of 1,500 psf in accordance with IRC Table R401.4.1 is 5,467 pounds. Given that the 5,467 pound test result is greater than the design load of 4,800 pounds, the test result meets the AC336 load testing requirement.**

TABLE 6: SINGLE PIER LOAD TEST RESULTS FOR DP-75 DIAMOND PIERS WITH 50-INCH LONG BEARING PINS INSTALLED IN 2,000 PSF BEARING SOIL

Site #	Diamond Pier #	Test Soil Load Bearing Value (psf)[1]	Design Load (pounds)[2]	Maximum Test Load at 0.5 Inch Deflection (pounds)
2	SA-C-DP75-1	2,000	6,400	9,000
2	SA-C-DP75-2	2,000	6,400	9,300
2	SA-C-DP75-3	2,000	6,400	9,000
Average Maximum Test Load at ½ Inch Deflection (pounds):				9,100

1. The test soil load bearing value is obtained from IRC Table R401.4.1.
2. The design load is determined by multiplying the test soil load bearing value from IRC Table R401.4.1 times the equivalent bearing area. The equivalent bearing area for the DP-75 with 50-inch pins is 3.2 square feet.

For the DP-75 with 50-inch long steel bearing pins installed at Site #2, the average of the 3 test results at 1/2 inch of deflection was 9,100 pounds—and the upper and lower bounds for 15 percent deviation were 7,735 and 10,465 pounds. A review of the load test results from Table 6 above indicates that all 3 test results were within 15 percent of the average of the 3 tests. **As**

such, the load test result at 1/2-inch deflection for the Diamond Pier DP-75 with 50-inch long steel bearing pins installed in a soil with a load-bearing pressure of 2,000 psf in accordance with IRC Table R401.4.1 is 9,100 pounds. Given that the 9,100 pound test result is greater than the design load of 6,400 pounds, the test result meets the AC336 load testing requirement.

TABLE 7: GROUP LOAD TEST RESULTS FOR DP-50 AND DP-75 DIAMOND PIERS WITH 50-INCH LONG BEARING PINS INSTALLED IN 1,500 PSF BEARING SOIL

Site #	Diamond Pier #	Test Soil Load Bearing Value (psf)[1]	Design Load (pounds)[2]	Pile Group Test Load (pounds)[3]	Settlement, Before Pile Group Load Added (inches)	Settlement, After Pile Group Load Added (inches)
1	CL-C-DP50-4	1,500	3,600	5500	0.552	0.622
1	CL-C-DP75-4	1,500	4,200	5600	0.649	0.716

1. The test soil load bearing value is obtained from IRC Table R401.4.1.

The 2 group load tests demonstrated that the influence of fully loaded Diamond Piers located as close as 3 feet measured center to center was negligible. The Diamond Pier DP-50 installed in 1,500 psf bearing soil had a total settlement of 0.552 when loaded to approximately 150 percent of the design load. The settlement increased to 0.622 inches when Diamond Piers CL-C-DP50-3 and CL-C-DP50-5—located 3 feet laterally on opposing sides of Diamond Pier #CL-C-DP50-4—were loaded simultaneously to the same test load.

The Diamond Pier DP-75 installed in 1,500 psf bearing soil had a total settlement of 0.649 when loaded to approximately 115 percent of the design load. The settlement increased to 0.716 inches when Diamond Piers CL-C-DP50-3 and CL-C-DP50-5—located 3 feet laterally on opposing sides of Diamond Pier #CL-C-DP50-4—were loaded simultaneously to the same test load.

In our professional opinion, for the design loads established in this report, the DP-50 and DP-75 Diamond Piers with 50-inch long steel bearing pins should have a minimum separation of 3 feet on center based on the load test results.

AC336 SECTION 5.1 – QUALITY DOCUMENTATION

Pin Foundations' Quality Control Manual complying with ICC-ES Acceptance Criteria for Quality Documentation (AC10) is attached in Appendix O.

AC336 SECTION 5.2 – INSPECTIONS

As stated in AC336, third-party follow-up inspections are not required, but the manufacturing facilities may be subject to annual inspections in accordance with Section 9.0 of the ICC-ES Rules of Procedure for Evaluation Reports.

LIMITATIONS

The geotechnical recommendations presented in this report are based on the available project information, and the subsurface materials described in this report. If any of the noted information is incorrect, please inform EEI in writing so that we may amend the recommendations presented in this report if appropriate and if desired by the client. EEI will not be responsible for the implementation of its recommendations when it is not notified of any applicable changes.

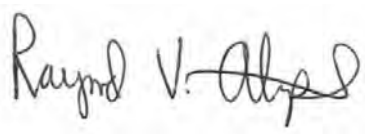
The Geotechnical Engineer warrants that the findings, recommendations, specifications, or professional advice contained herein have been made in accordance with generally accepted professional geotechnical engineering practices in the local area. No other warranties are implied or expressed.

This report has been prepared for the exclusive use of Pin Foundations, Inc. for the specific application to the Diamond Pier load testing conducted in 2016 at the Port of Camas-Washougal's Steigerwald Commerce Center property in Washougal, Washington. If you have any questions pertaining to this report, or if we may be of further service, please contact Troy Hull at 541-393-6340 (office) or 360-903-2784 (cell).

Sincerely,
Earth Engineers, Inc.

Troy Hull, P.E.
Principal Geotechnical Engineer

Reviewed by:



Ray Aliperti
Technical Director

Attachments:

Appendix A:	AC336 (revised June 2016)
Appendix B:	Diamond Pier Dimensioned Drawing and Concrete Mix Design
Appendix C:	Site Location Plan
Appendix D:	Topographic Site Location Plan
Appendix E:	Site Location Aerial Photo
Appendix F:	Load Test Setup Schematics
Appendix G:	Boring Logs and Laboratory Test Results
Appendix H:	Site Qualification Engineering Calculations
Appendix I:	Load Test Equipment List and Hydraulic Ram Calibration Reports
Appendix J:	Concrete Compressive Strength Test Report
Appendix K:	Load Test Data
Appendix L:	ASTM D1143
Appendix M:	Earth Engineers Inc.'s IAS Certificate of Accreditation
Appendix N:	Manufacturer's Diamond Pier Installation Instructions
Appendix O:	Pin Foundations, Inc. Quality Control Manual
Appendix P:	Material Certification Report for 1/2-inch Diameter Galvanized Anchor Bolt from Stoneworks Architectural
Appendix Q:	Material Certification Report for 5/8-inch Diameter Galvanized Anchor Bolt from Stoneworks Architectural
Appendix R:	Mill Test Report for 1-inch Diameter Nominal Steel Bearing Pin Pipe from Saha Thai Steel Pipe (Public) Company LTD
Appendix S:	Mill Test Certificate for 1 1/4-inch Diameter Nominal Steel Bearing Pin Pipe from Al Jazeera Steel Products Company SAOG
Appendix T:	Bibliography

APPENDIX A: AC336 (REVISED JUNE 2016)

ICC EVALUATION SERVICE
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ACCEPTANCE CRITERIA FOR BEARING PIN PIERS

AC336

Approved June 2016

Compliance date January 15, 2017

Previously approved August 2013, February 2010, October 2005

(Previously editorially revised September 2015 and March 2014)

PREFACE

Evaluation reports issued by ICC Evaluation Service, LLC (ICC-ES), are based upon performance features of the International family of codes. (Some reports may also reference older code families such as the BOCA National Codes, the Standard Codes, and the Uniform Codes.) Section 104.11 of the *International Building Code®* reads as follows:

> The provisions of this code are not intended to prevent the installation of any materials or to prohibit any design or method of construction not specifically prescribed by this code, provided that any such alternative has been approved. An alternative material, design or method of construction shall be approved where the building official finds that the proposed design is satisfactory and complies with the intent of the provisions of this code, and that the material, method or work offered is, for the purpose intended, at least the equivalent of that prescribed in this code in quality, strength, effectiveness, fire resistance, durability and safety.

This acceptance criteria has been issued to provide interested parties with guidelines for demonstrating compliance with performance features of the codes referenced in the criteria. The criteria was developed through a transparent process involving public hearings of the ICC-ES Evaluation Committee, and/or on-line postings where public comment was solicited.

New acceptance criteria will only have an "approved" date, which is the date the document was approved by the Evaluation Committee. When existing acceptance criteria are revised, the Evaluation Committee will decide whether the revised document should carry only an "approved" date, or an "approved" date combined with a "compliance" date. The compliance date is the date by which relevant evaluation reports must comply with the requirements of the criteria. See the ICC-ES web site for more information on compliance dates.

If this criteria is a revised edition, a solid vertical line (|) in the margin within the criteria indicates a change from the previous edition. A deletion indicator (→) is provided in the margin where any significant wording has been deleted.

ICC-ES may consider alternate criteria for report approval, provided the report applicant submits data demonstrating that the alternate criteria are at least equivalent to the criteria set forth in this document, and otherwise demonstrate compliance with the performance features of the codes. ICC-ES retains the right to refuse to issue or renew any evaluation report, if the applicable product, material, or method of construction is such that either unusual care with its installation or use must be exercised for satisfactory performance, or if malfunctioning is apt to cause injury or unreasonable damage.

Acceptance criteria are developed for use solely by ICC-ES for purposes of issuing ICC-ES evaluation reports.

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ACCEPTANCE CRITERIA FOR BEARING PIN PIERS (AC336)

1.0 INTRODUCTION

1.1 Purpose: The purpose of this acceptance criteria is to establish requirements for bearing pin piers to be recognized in an ICC Evaluation Service LLC (ICC-ES), evaluation report under the 2015, 2012, 2009 and 2006 *International Residential Code*® (IRC). The basis of recognition is IRC Section R104.11.

1.2 Scope: This acceptance criteria applies to bearing pin piers for use as the foundation of exterior porch deck, elevated walkway and stairway construction, and accessory structures as defined in the IRC. The bearing pin piers consist of precast, normal-weight concrete heads and steel bearing pins that are driven through precast holes in the head and into the underlying soil. An anchor bolt is precast into the top of the head for attachment of deck support posts or beams. Evaluation under this acceptance criteria pertains to establishing a minimum, 1-square-foot (0.093 m^2) equivalent bearing pressure area of the pier foundation assemblies, for the support of gravity loads when installed in soils with a minimum presumptive load-bearing value of 1,500 psf (71.9 kN/m^2), as defined in IRC Table R401.4.1. The bearing pin piers are intended for use in up to "severe" climate areas, as defined in IRC Figure R301.2(3).

1.3 Codes and Referenced Standards:

1.3.1 2015, 2012, 2009 and 2006 *International Residential Code*® (2009 IRC), International Code Council.

1.3.2 ASTM A53 (-12 for the 2015 IRC, -07 for the 2012 IRC, -06a for the 2009 IRC, -02 for the 2006 IRC), Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless, ASTM International.

1.3.3 ASTM A307 (-12 for the 2015 IRC, -07b for the 2012 IRC, -04e01 for the 2009 and 2006 IRC), Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength, ASTM International.

1.3.4 ASTM C31- 98, Standard Practice for Making and Curing Concrete Test Specimens in the Field, ASTM International.

1.3.5 ASTM C39-99, Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens, ASTM International.

1.3.6 ASTM C231-04, Air Content of Freshly Mixed Concrete by the Pressure Method, ASTM International.

1.3.7 ASTM D1143/D1143M-07 (reapproved 2013), Standard Test Method for Deep Foundations Under Static Axial Compressive Load, ASTM International.

2.0 BASIC INFORMATION

2.1 General: The following information shall be submitted:

2.1.1 Product Description: A detailed description of the bearing pin piers, including dimensioned drawings of the precast concrete head; description of the concrete mix design, including fibers (if applicable), air-entraining admixtures and curing conditions; description of the pin (steel specification, nominal size or outside diameter, nominal wall thickness, length, and corrosion-resistant coating); description of the pin caps (material specifications and size); description of the recommended sealant material for sealing the pin caps; and description of the precast, steel anchor bolt (steel and coating specifications, size and length).

2.1.2 Installation Instructions: Manufacturer's published installation instructions shall be submitted.

2.1.3 Packaging and Identification: A description of the method of packaging and field identification of the bearing pin pier. Identification provisions shall include the evaluation report number, and the words, "For Use with One- and Two-Family Dwelling Construction Only."

2.2 Testing Laboratories: Testing laboratories shall comply with Section 2.0 of the ICC-ES Acceptance Criteria for Test Reports (AC85) and Section 4.2 of the ICC-ES Rules of Procedure for Evaluation Reports.

2.3 Test Reports: Test reports shall comply with AC85.

2.4 Product Sampling: Sampling of the bearing pin piers for tests under this criteria shall comply with Section 3.1 of AC85.

3.0 TEST AND PERFORMANCE REQUIREMENTS

3.1 Concrete:

3.1.1 Compressive Strength: The concrete used to manufacture the precast concrete heads shall be tested for compressive strength in accordance with Section 4.1 and the tested compressive strength shall be specified in the evaluation report.

3.1.2 Air Entrainment: The concrete used to fabricate the precast concrete heads used in the tests required in Section 3.5, shall be air-entrained, and shall be tested in accordance with Section 4.2. The total air content (percent by volume of concrete) shall not be less than 5 percent nor more than 7 percent.

3.2 Fibers (if applicable): Synthetic fibers (if applicable) shall comply with the ICC-ES Acceptance Criteria for Concrete with Synthetic Fibers (AC32), or be recognized as complying with AC32 in a current ICC-ES evaluation report. The concrete used in AC32 testing shall be shown to be representative of the concrete used to manufacture the precast concrete heads for which recognition is sought.

3.3 Steel Bearing Pins:

3.3.1 General: Reports of physical properties testing shall be submitted for the steel bearing pin material of the assemblies used in the testing required in Section 3.5. Test reports shall be generated by a mill or testing laboratory.

3.3.2 Properties: The steel bearing pins shall consist of Type E, Grade A (electric-resistance-welded), or Type S, Grade A (seamless), galvanized steel pipe complying with ASTM A53.

3.4 Precast Anchor Bolt:

3.4.1 General: The steel anchor bolt shall be a minimum of $^1/_2$ inch (12.7 mm) in diameter.

3.4.2 Properties: The galvanized anchor bolt shall consist of steel complying with ASTM A307, as Grade A. and galvanized coating complying with ASTM A153/ASTM F2329 Class C. Test reports shall be generated by a mill or testing laboratory.

3.5 Bearing Pin Pier: Vertical load bearing testing shall be performed in accordance with Section 4.3. The settlement at the anticipated design load, as defined in Section 4.3.2, shall be no greater than 0.5 inch (12.7 mm).

4.0 TEST METHODS

4.1 Concrete Compressive Strength: Concrete test cylinders shall be molded and cured in the same temperature and moisture environment as used in the production of the precast heads in accordance with Section 9.2 of ASTM C31, and tested in accordance with ASTM C39.

4.2 Air Entrainment: The total air content (percent by volume of concrete) shall be determined in accordance with ASTM C231.

4.3 Vertical Load Bearing Test:

4.3.1 General: The compressive strength of the concrete used to fabricate the concrete piers used in testing shall be determined as follows: concrete test cylinders shall be molded from the same batch of concrete as the precast concrete head test specimens, and cured in accordance with Section 9.3 of ASTM C31, in the same temperature and moisture environment as the precast concrete head component of the bearing pin piers to be tested. Three cylinders shall be prepared and tested in accordance with ASTM C39 during a 72-hour period immediately following the last bearing pin pier tested, and the average compressive strength shall be reported along with the bearing pin pier test results.

A soils investigation shall be prepared by a registered geotechnical engineer to establish that the soils used in testing, within the zone of influence, yield a value within 10 percent of the presumptive soil load-bearing value for which recognition is sought. The pier foundation assembly to be tested shall be installed plumb and level in the soil in a manner consistent with the intended installation, and in accordance with the manufacturer's published installation instructions. Three tests are required in each condition for which recognition is sought, with none of the results varying by more than 15 percent from the average of the three, unless the lowest test value is used. The average result based on a minimum of five tests at each condition may be used regardless of the variations. The load and deflection measuring apparatus, equipment and configuration shall be as outlined in Sections 6 and 7 of ASTM D1143/D1143M. The soils investigation shall include determination of the minimum clear distance from the bearing pin pier where the anchoring or cribbing device(s) shall be installed that is/are used to provide reactive capacity for the applied loads.

4.3.2 Load Application: The bearing pin pier shall be loaded to 200 percent of the anticipated design load, in increments of approximately 25 percent of the anticipated design load of the installed bearing pin pier. The anticipated design load shall be defined as the test soil load-bearing value, determined in Section 4.3.1 of this criteria, multiplied by a minimum 1-square-foot (0.093 m^2) bearing area. Each load increment shall be maintained in accordance with Section 8.1.3.1 of ASTM D1143.

5.0 QUALITY CONTROL

5.1 Quality documentation complying with the ICC-ES Acceptance Criteria for Quality Documentation (AC10) shall be submitted.

5.2 Regular, ongoing inspections are not required under this criteria, but the manufacturing facilities may be subject to annual inspections in accordance with Section 9.0 of the ICC-ES Rules of Procedure for Evaluation Reports.

6.0 EVALUATION REPORT RECOGNITION

6.1 The evaluation report shall include the following statements:

6.1.1 The bearing capacity of the site soil shall be determined in accordance with IRC Sections R401.4 and R401.4.1, and provided to the code official upon request.

6.1.2 Use of the bearing pin piers where soil constituents, changing water levels or other factors indicate possible deleterious effects on the pier foundation assembly, is beyond the scope of this report.

6.1.3 In areas requiring frost protection, exterior decks on bearing pin piers may be supported by a dwelling when approved by the code official. See IRC Section R403.1.4.1, Exception 3, as applicable.

6.1.4 Frost protection for accessory structures are beyond the scope of this report, except for freestanding accessory structures constructed in accordance with IRC Section R403.1.4.1, Exceptions 1 or 2 where frost protection is not required.

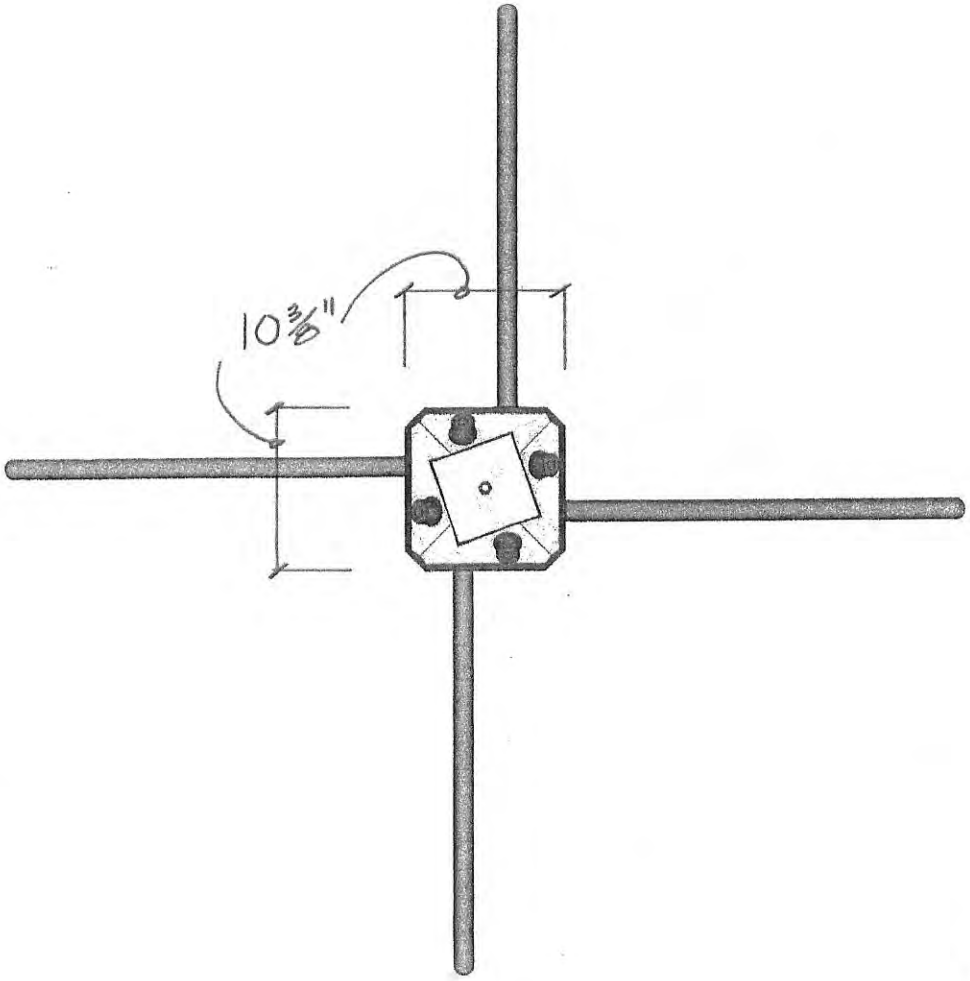
6.1.5 Use of the bearing pin piers to resist lateral and uplift loads was not evaluated.

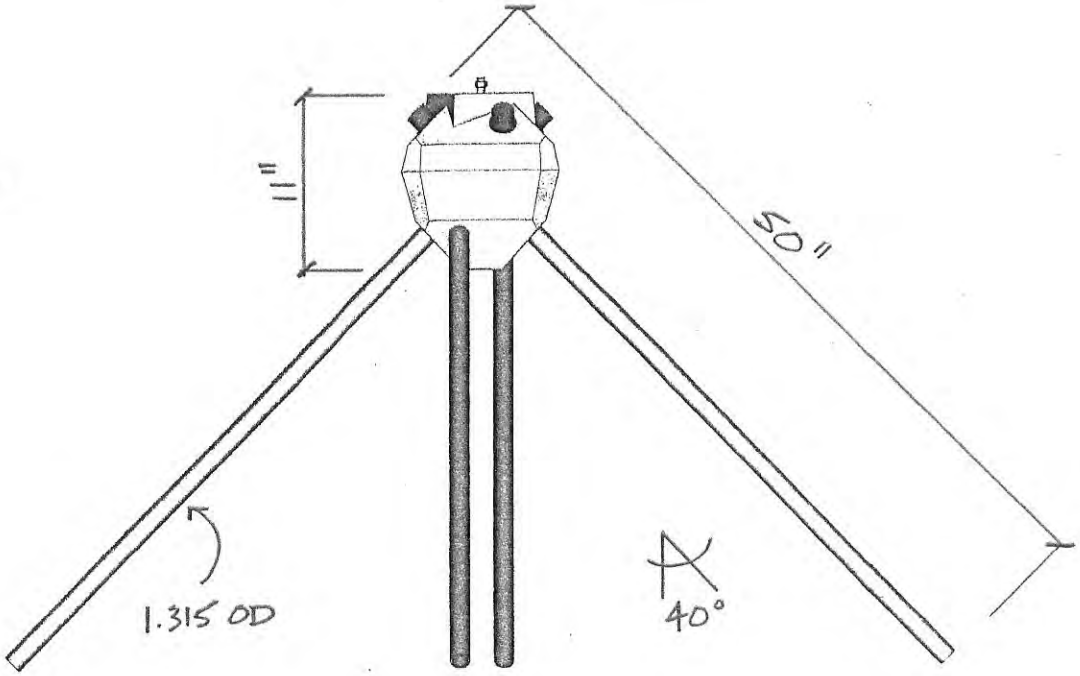
6.1.6 Wood in contact with the precast concrete head and precast galvanized anchor bolt shall be pressure-preservative-treated in accordance with 2015, 2012 and 2009 IRC Sections R317 and R318; and 2006 IRC Sections R319 and R320, as applicable. Compatibility of the precast concrete head and precast galvanized anchor bolt with wood treatments not described in 2015, 2012 and 2009 IRC Sections R317 and R318; and 2006 IRC Sections R319 and R320, as applicable, shall be established based on a current ICC-ES evaluation report on the wood treatment.

6.2 The evaluation report shall include the minimum spacing of the bearing pin piers, based on conditions of testing, as determined in Section 4.3 of this criteria. ■

APPENDIX B: DIAMOND PIER DIMENSIONED DRAWING AND CONCRETE MIX DESIGN

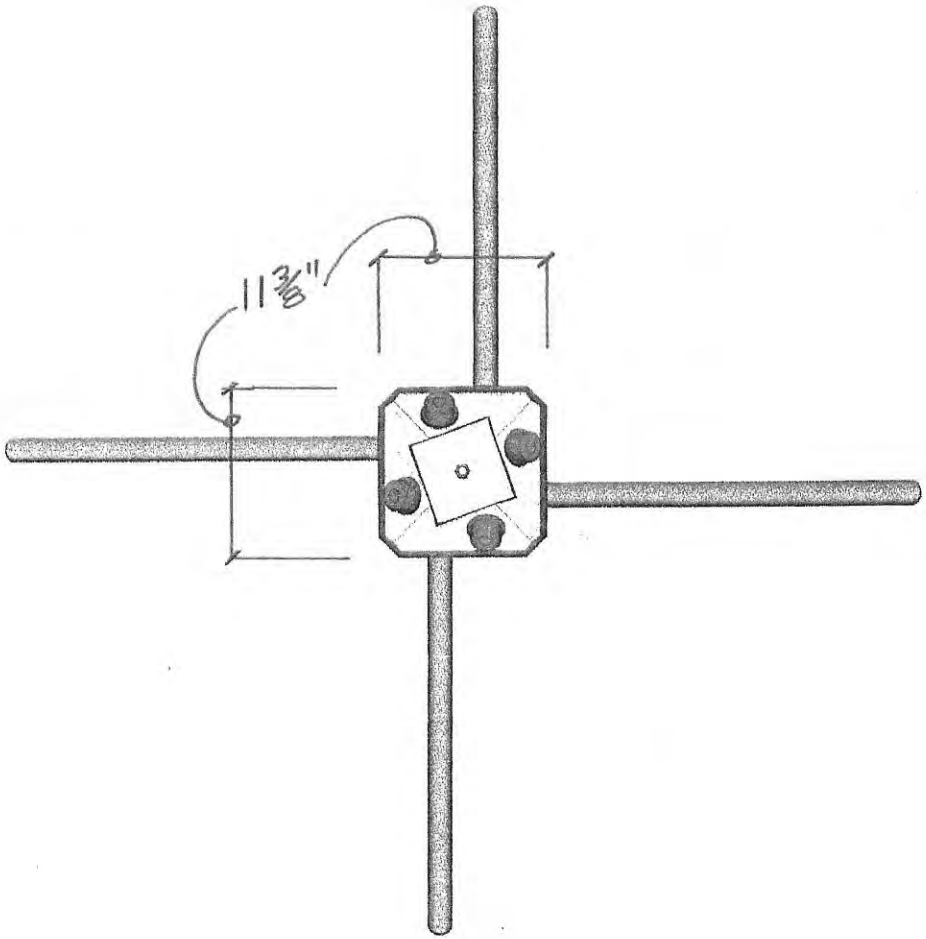
DP-50 Diamond Pier with 50" Pins

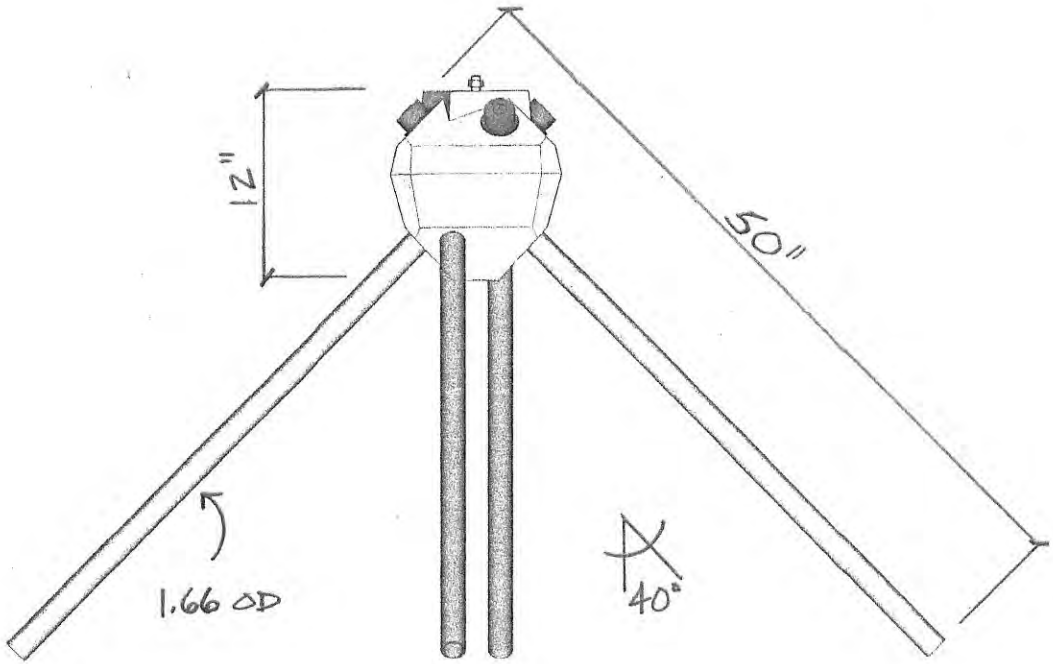




REFER TO DIMENSIONS ONLY
DO NOT SCALE DWGS

DP-75 Diamond Pier with 50” Pins





REFER TO DIMENSIONS ONLY
DO NOT SCALE DWGS

Stoneworks
ARCHITECTURAL PRECAST, INC.

CONCRETE MIX DESIGN

NO STEEL FIBER

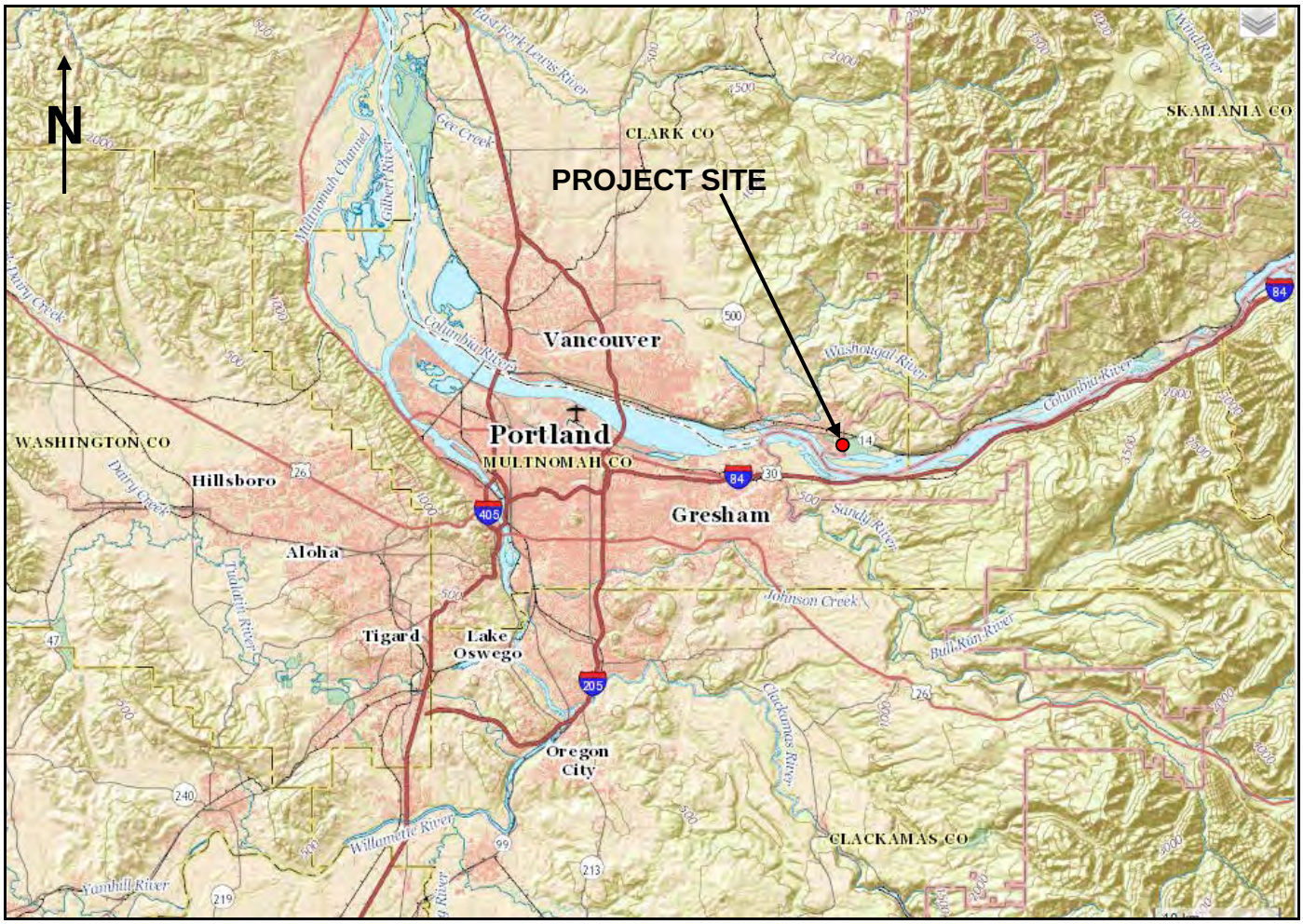
5500 psi @ 28 Days with Air Entrainment - DP-50, No steel Fiber

MATERIAL	POUNDS - SSD	ABSOLUTE VOLUME
Cement (minumum)	836	4.253
Sand	1640	9.843
1/2"/#8	1170	6.868
Water	253	4.054
% Air	6% (+/-1%)	1.620
TOTALS	3899 pounds	26.64 cu ft

Air Entrainment BASF MB-AE -90	Meets ASTM C260	2.25 oz/yd
Water Reducer (Plasticizer) BASF Glenium -7700	Meets ASTM C494, Type F	33.45 oz/yd

Water/Cement Ratio	0.303
Air	5%-7%
Slump	N/A

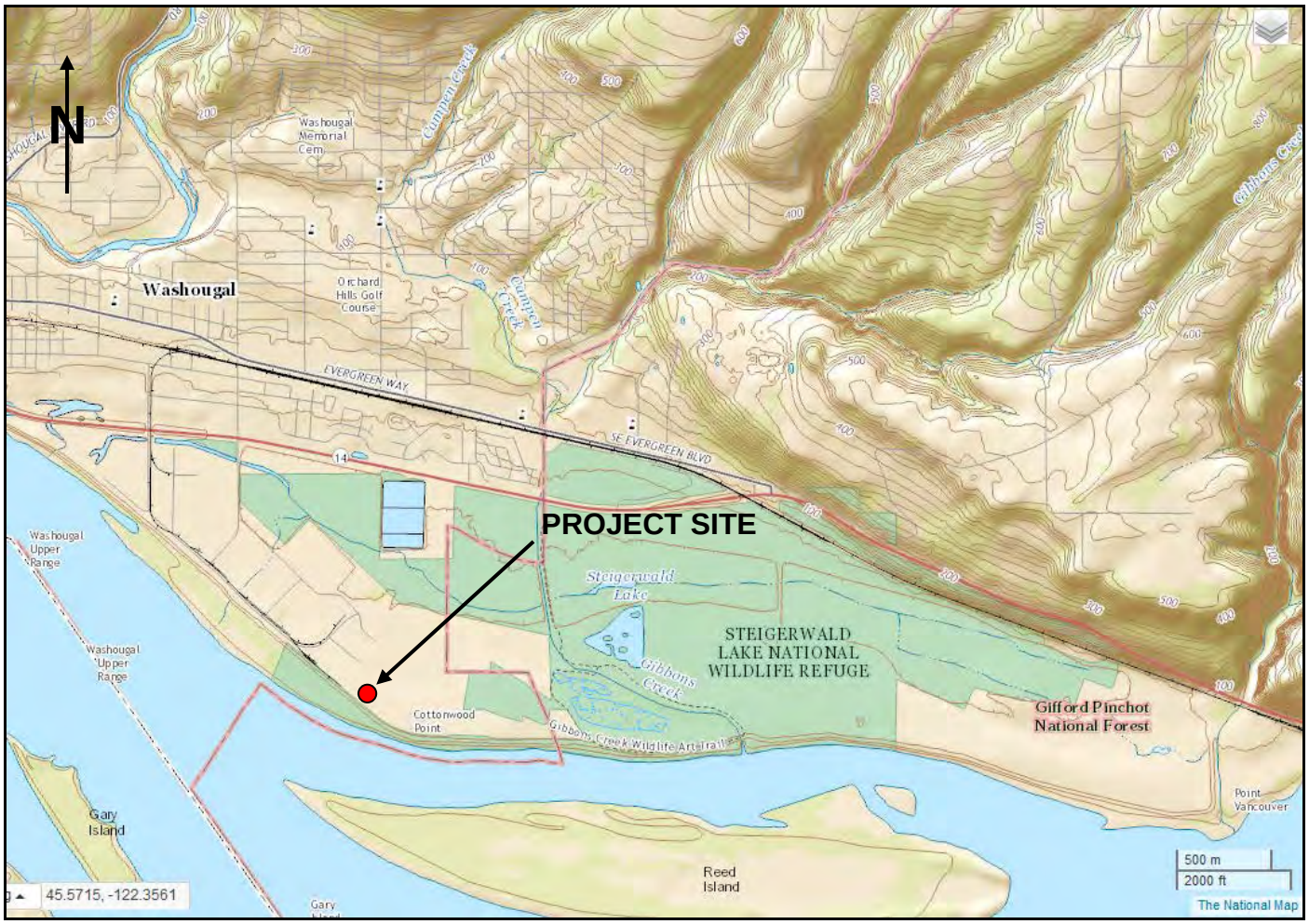
APPENDIX C: SITE LOCATION PLAN



Source: www.nationalmap.gov.

Earth Engineers, Inc.	**DIAMOND PIER LOAD TESTING PORT OF CAMAS-WASHOUGAL WASHOUGAL, WASHINGTON**	**EEI Report No. 07-020-10**
		October 5, 2016

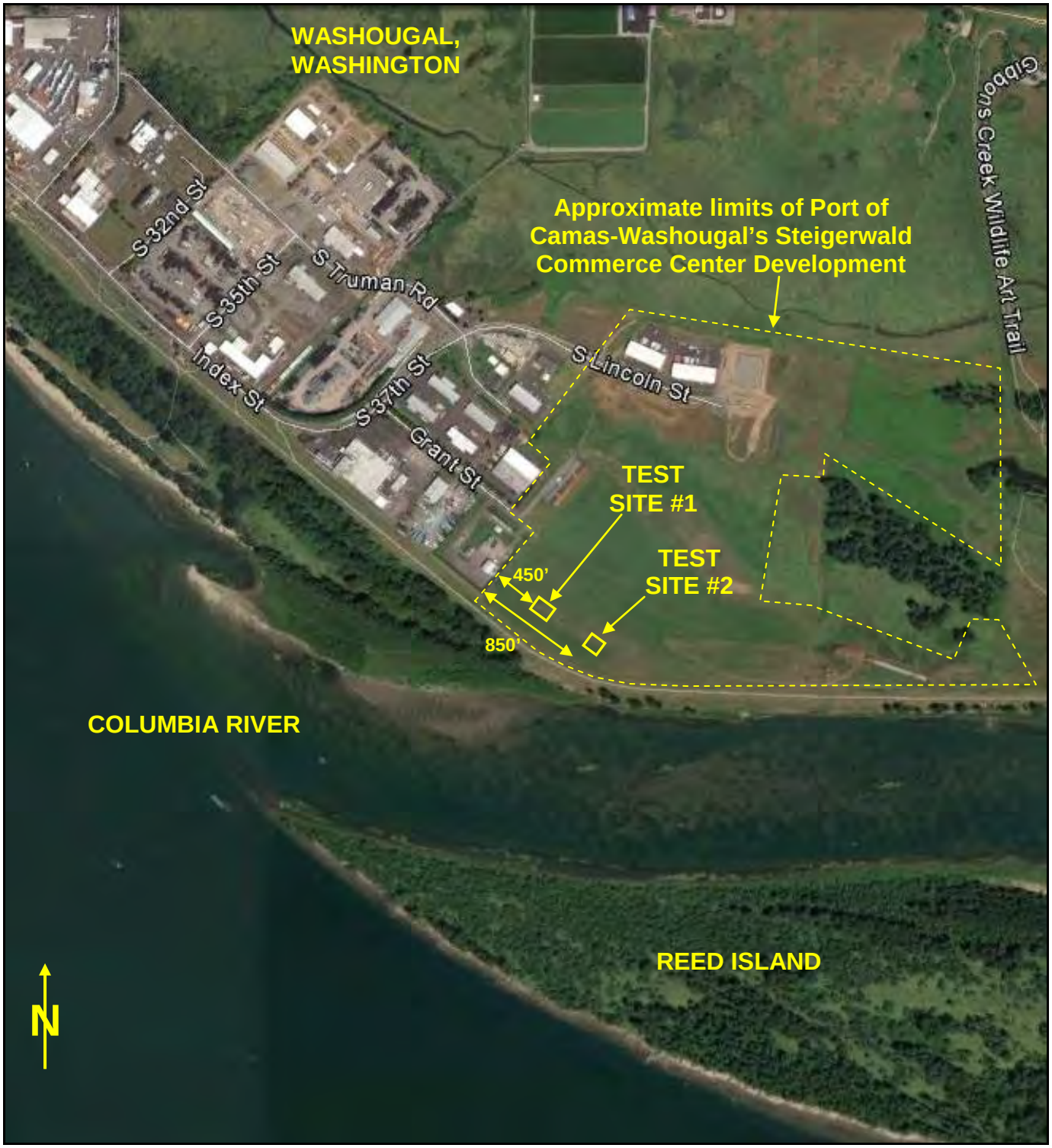
APPENDIX D: TOPOGRAPHIC SITE LOCATION PLAN



Source: www.nationalmap.gov.

Earth Engineers, Inc.	**DIAMOND PIER LOAD TESTING PORT OF CAMAS-WASHOUGAL WASHOUGAL, WASHINGTON**	**EEI Report No. 07-020-10**
		October 5, 2016

APPENDIX E: SITE LOCATION AERIAL PHOTO



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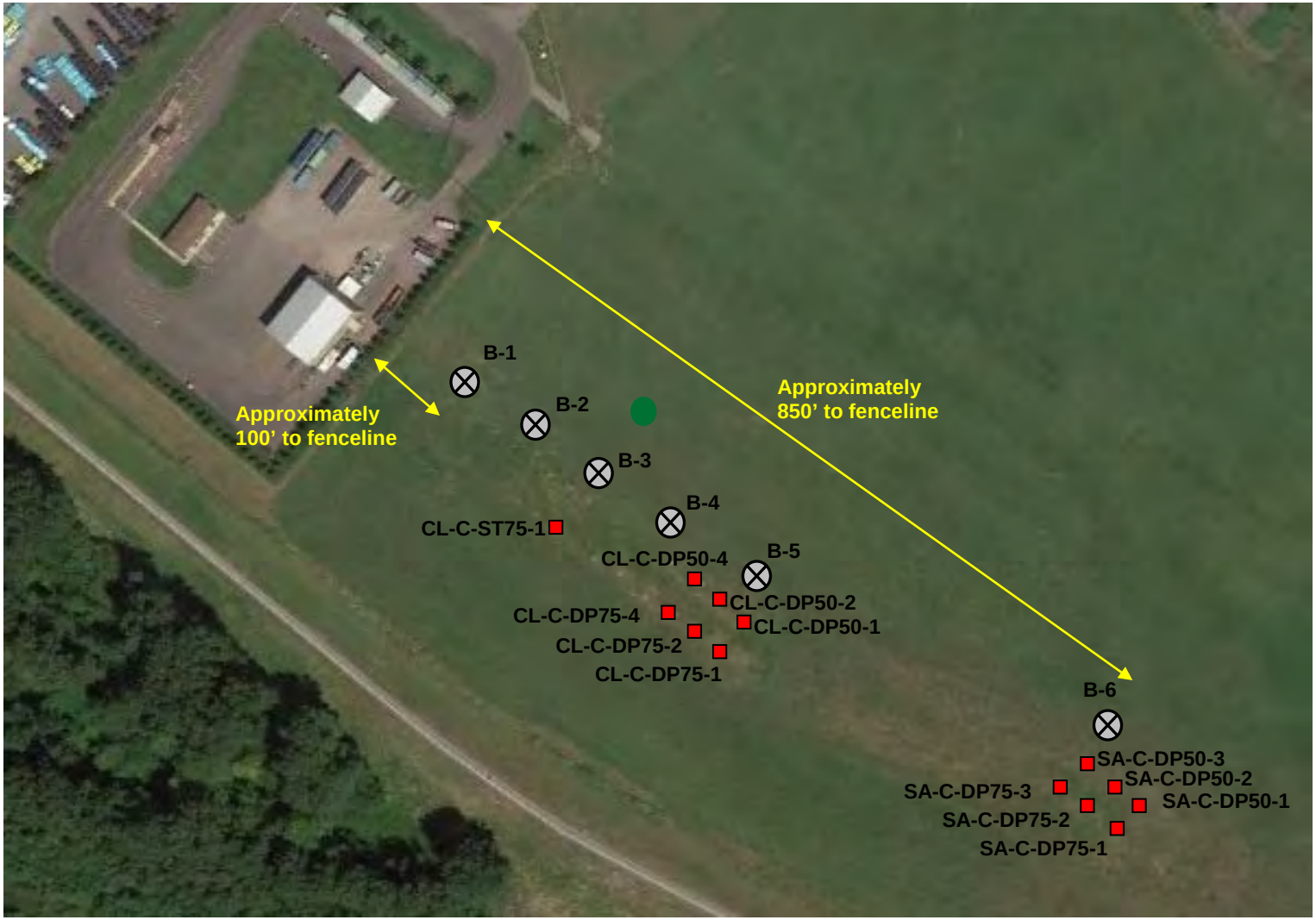
		October 5, 2016

APPENDIX F: LOAD TEST SETUP SCHEMATICS

APPENDIX F: DIAMOND PIER AND GEOTECHNICAL BORING LOCATION PLAN

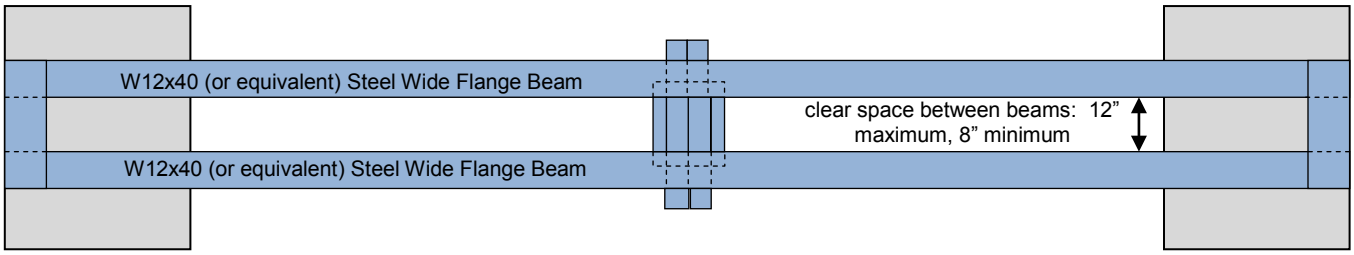


Base Aerial Photo Source: Google Earth.

Earth Engineers, Inc.	**DIAMOND PIER LOAD TESTING PORT OF CAMAS-WASHOUGAL WASHOUGAL, WASHINGTON**	**EEI Report No. 07-020-10**
		October 5, 2016

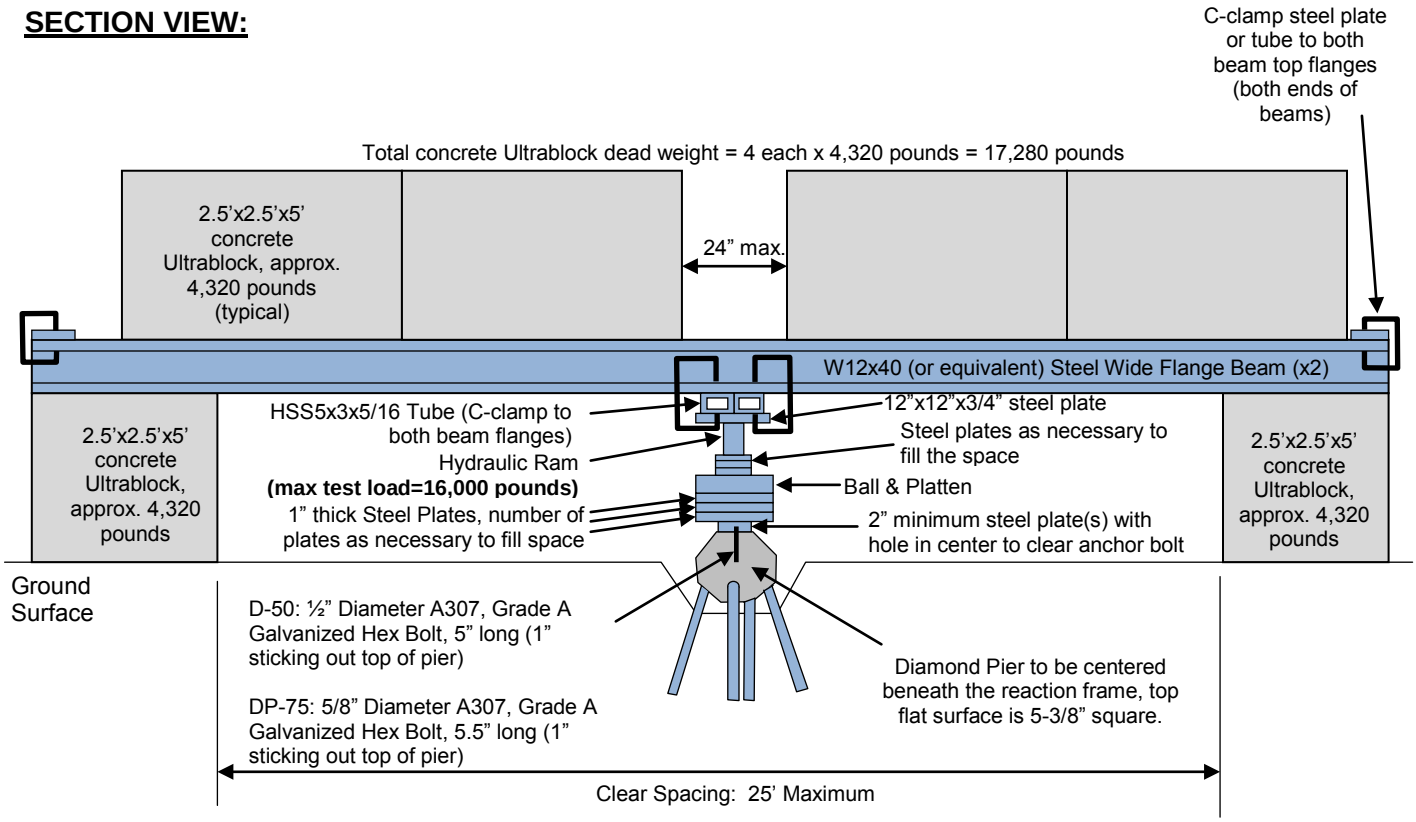
APPENDIX F: COMPRESSION LOAD TEST REACTION FRAME SETUP

PLAN VIEW:



NOTE: The 4 concrete Ultrablocks on top of the 2 steel beams not shown.

SECTION VIEW:



Not to scale.

NOTE: Movement measurement devices (i.e. reference beams, dial gauges, surveying level, steel rule) are not shown on drawing but are to be included in test configuration in accordance with ASTM D1143.

Earth Engineers, Inc.	**DIAMOND PIER LOAD TESTING PORT OF CAMAS-WASHOUGAL WASHOUGAL, WASHINGTON**	**EEI Report No. 07-020-10**
		October 5, 2016

APPENDIX G: BORING LOGS, SOIL CLASSIFICATION LEGEND, AND LABORATORY TEST RESULTS

APPENDIX G: BORING B-1

CLIENT: Pin Foundations, Inc.	EARTH ENGINEERS, INC. REPORT NO.: 07-020-10
PROJECT: Diamond Pier Compression Field Load Testing	EQUIPMENT: Beretta T46 with Auto SPT Hammer
LOCATION: Approximately 100' & 140' from W and S fence lines	APPROXIMATE ELEVATION: 32 feet (Google Earth)
DATE DRILLED: August 13, 2015	LOGGED BY: Cody Sorrelle and Troy Hull, P.E.

DEPTH (ft)	SAMPLE NO.	SAMPLE	SOIL DESCRIPTION	BLOWS PER 6 INCHES	N_{60} VALUE	% PASSING #200 SIEVE	LIQUID LIMIT	PLASTIC LIMIT	MOISTURE CONTENT (%)	POCKET PEN. (t.s.f.)	REMARKS
	SPT-1	■	**TOPSOIL** - sandy silt/clay, brown with orange mottling, moist, with grass rootlets	4 5	17					1.75	
			SANDY SILT/CLAY (ML/CL) - brown, moist, medium stiff to stiff	8		96					
	SPT-2	■		3 4 3	9	91				1.00	
5											
	SPT-3	■		0 2 2	5	97					
	SPT-4	■		0 2 2	5	99					
10											
	SPT-5	■		2 3 3	8	99				0.50	
			Boring terminated 11-1/2 feet below ground surface. Groundwater not encountered during drilling. Boring backfilled with bentonite chips.								
15			SPT values corrected for hammer energy correction ratio of 1.28 (reference May 28, 2015 calibration report from GeoDesign, Inc.)								
20											
25											

EARTH ENGINEERS, Inc.

APPENDIX G: BORING B-2

CLIENT: Pin Foundations, Inc.	EARTH ENGINEERS, INC. REPORT NO.: 07-020-10
PROJECT: Diamond Pier Compression Field Load Testing	EQUIPMENT: Beretta T46 with Auto SPT Hammer
LOCATION: Approximately 200' & 140' from W and S fence lines	APPROXIMATE ELEVATION: 32 feet (Google Earth)
DATE DRILLED: August 13, 2015	LOGGED BY: Cody Sorrelle and Troy Hull, P.E.

DEPTH (ft)	SAMPLE NO.	SAMPLE	SOIL DESCRIPTION	BLOWS PER 6 INCHES	N_{60} VALUE	% PASSING #200 SIEVE	LIQUID LIMIT	PLASTIC LIMIT	MOISTURE CONTENT (%)	POCKET PEN. (t.s.f.)	REMARKS
	SPT-1	■	**TOPSOIL** - sandy silt/clay, brown with orange mottling, moist, with grass rootlets	4 6	15						
		■	**SANDY SILT/CLAY (ML/CL)** - brown, moist, medium stiff to stiff	6		63			10		
	SPT-2	■		3 2 3	6	63			16		
5											
	SPT-3	■	**SILT/CLAY WITH SAND (ML/CL)** - brown, wet, medium stiff	2 2 2	5	77			33		Shelby Tube (5-7') Qp = 0.75tsf Torvane = 0.45 tsf Wet Unit Wt. = 112.1 pcf Moisture = 38.1% % Fines = 81.7%
	SPT-4	■		0 2 4	8	74			34	0.50	
10											
	SPT-5	■		1 2 2	5	74			36	0.50	
			Boring terminated 11-1/2 feet below ground surface. Groundwater not encountered during drilling. Boring backfilled with bentonite chips. SPT values corrected for hammer energy correction ratio of 1.28 (reference May 28, 2015 calibration report from GeoDesign, Inc.) Shelby tube was performed in a separate located 4' south of B-2 and drilled directly to 5'								
15											
20											
25											

EARTH ENGINEERS, Inc.

APPENDIX G: BORING B-3

CLIENT: Pin Foundations, Inc.

EARTH ENGINEERS, INC. REPORT NO.: 07-020-10

PROJECT: Diamond Pier Compression Field Load Testing

EQUIPMENT: Beretta T46 with Auto SPT Hammer

LOCATION: Approximately 300' & 140' from W and S fence lines

APPROXIMATE ELEVATION: 32 feet (Google Earth)

DATE DRILLED: August 13, 2015

LOGGED BY: Cody Sorrelle and Troy Hull, P.E.

DEPTH (ft)	SAMPLE NO.	SAMPLE	SOIL DESCRIPTION	BLOWS PER 6 INCHES	N_{60} VALUE	% PASSING #200 SIEVE	LIQUID LIMIT	PLASTIC LIMIT	MOISTURE CONTENT (%)	POCKET PEN. (t.s.f.)	REMARKS
	SPT-1	■	**TOPSOIL** - sandy silt/clay, brown with orange mottling, moist, with grass rootlets	4 7	17						
		■	**SANDY SILT/CLAY (ML/CL)** - brown, moist, medium stiff to stiff	6		66			8		
	SPT-2	■		4							
		■	**SILTY SAND (SM)** - brown, moist, very loose	1	4	47			4		Approximately 6" thick lense.
		■	**SANDY SILT/CLAY (ML/CL)** - brown, wet, medium stiff	2							
5											
	SPT-3	■		1 1 3	5	69			31		
	SPT-4	■	**SILT/CLAY WITH SAND (ML/CL)** - brown, wet, medium stiff to stiff	1 3 2	6	81	42	28	35	0.50	Shelby Tube (7.5-10')
10											
	SPT-5	■		1 1 3	5	80			34	1.00	
			Boring terminated 11-1/2 feet below ground surface. Groundwater not encountered during drilling. Boring backfilled with bentonite chips.								
15			SPT values corrected for hammer energy correction ratio of 1.28 (reference May 28, 2015 calibration report from GeoDesign, Inc.)								
			Shelby tube was performed in a separate located 4' south of B-3 and drilled directly to 7.5'								
20											
25											

EARTH ENGINEERS, Inc.

APPENDIX G: BORING B-4

CLIENT: Pin Foundations, Inc.	EARTH ENGINEERS, INC. REPORT NO.: 07-020-10
PROJECT: Diamond Pier Compression Field Load Testing	EQUIPMENT: Beretta T46 with Auto SPT Hammer
LOCATION: Approximately 400' & 140' from W and S fence lines	APPROXIMATE ELEVATION: 32 feet (Google Earth)
DATE DRILLED: August 13, 2015	LOGGED BY: Cody Sorrelle and Troy Hull, P.E.

DEPTH (ft)	SAMPLE NO.	SAMPLE	SOIL DESCRIPTION	BLOWS PER 6 INCHES	N_{60} VALUE	% PASSING #200 SIEVE	LIQUID LIMIT	PLASTIC LIMIT	MOISTURE CONTENT (%)	POCKET PEN. (t.s.f.)	REMARKS
	SPT-1	■	**TOPSOIL** - sandy silt/clay, brown with orange mottling, moist, with grass rootlets	3 6	14						
		■	**SANDY SILT/CLAY (ML/CL)** - brown, moist, medium stiff to stiff	5		52			6		
	SPT-2	■	**SILT/CLAY WITH SAND (ML/CL) -** brown, wet, soft to medium stiff	3 3 2	6	74			28		Shelby Tube (3-5') % Fines = 91.8%
5											
	SPT-3	■		1 2 2	5	96			31		
	SPT-4	■		1 2 3	6	83			36	0.50	
10											
	SPT-5	■		1 1 2	4	87			35		
			Boring terminated 11-1/2 feet below ground surface. Groundwater not encountered during drilling. Boring backfilled with bentonite chips.								
15			SPT values corrected for hammer energy correction ratio of 1.28 (reference May 28, 2015 calibration report from GeoDesign, Inc.)								
			Shelby tube was performed in a separate located 4' south of B-4 and drilled directly to 3'								
20											
25											

EARTH ENGINEERS, Inc.

APPENDIX G: BORING B-5

CLIENT: Pin Foundations, Inc.	EARTH ENGINEERS, INC. REPORT NO.: 07-020-10
PROJECT: Diamond Pier Compression Field Load Testing	EQUIPMENT: Beretta T46 with Auto SPT Hammer
LOCATION: Approximately 500' & 140' from W and S fence lines	APPROXIMATE ELEVATION: 33 feet (Google Earth)
DATE DRILLED: August 13, 2015	LOGGED BY: Cody Sorrelle and Troy Hull, P.E.

DEPTH (ft)	SAMPLE NO.	SAMPLE	SOIL DESCRIPTION	BLOWS PER 6 INCHES	N_{60} VALUE	% PASSING #200 SIEVE	LIQUID LIMIT	PLASTIC LIMIT	MOISTURE CONTENT (%)	POCKET PEN. (t.s.f.)	REMARKS
	SPT-1	■	**TOPSOIL** - sandy silt/clay, brown with orange mottling, moist, with grass rootlets	5 10	23						
		■	**SANDY SILT/CLAY (ML/CL)** - brown, moist, medium stiff	8		71			7		
	SPT-2	■		1 2 2	5	54			19		
5											
	SPT-3	■	**SILT/CLAY WITH SAND (ML/CL)** - brown, wet, soft to stiff	1 3 2	6	84			30	1.50	
	SPT-4	■		0 1 1	3	87			41		Shelby Tube (7.5-9.5') Qp = 0.50 to 0.75 tsf Torvane=0.2 tsf Wet Unit Wt. = 114.0 pcf Moisture = 36.9%
10											
	SPT-5	■		0 3 2	6	82			33	1.50	
			Boring terminated 11-1/2 feet below ground surface. Groundwater not encountered during drilling. Boring backfilled with bentonite chips. SPT values corrected for hammer energy correction ratio of 1.28 (reference May 28, 2015 calibration report from GeoDesign, Inc.) Shelby tube was performed in a separate located 4' south of B-5 and drilled directly to 6.5'								
15											
20											
25											

EARTH ENGINEERS, Inc.

APPENDIX G: BORING B-6

CLIENT: Pin Foundations, Inc.	EARTH ENGINEERS, INC. REPORT NO.: 07-020-10
PROJECT: Diamond Pier Compression Field Load Testing	EQUIPMENT: Beretta T46 with Auto SPT Hammer
LOCATION: Approximately 850' & 250' from W and S fence lines	APPROXIMATE ELEVATION: 34 feet (Google Earth)
DATE DRILLED: August 13, 2015	LOGGED BY: Cody Sorrelle and Troy Hull, P.E.

DEPTH (ft)	SAMPLE NO.	SAMPLE	SOIL DESCRIPTION	BLOWS PER 6 INCHES	N_{60} VALUE	% PASSING #200 SIEVE	LIQUID LIMIT	PLASTIC LIMIT	MOISTURE CONTENT (%)	POCKET PEN. (t.s.f.)	REMARKS
	SPT-1	■	**TOPSOIL** - sandy silt/clay, brown with orange mottling, moist, with grass rootlets	7 15	40						
		■	**SAND** - brown, moist, loose	16					5		
		□									
	SPT-2	■		9 3 3	8	8			5		
5		□									
	SPT-3	■		5 3 3	8	15			10		
		□									
	SPT-4	■		1							
		■	**SILT WITH SAND (ML)** - brown, wet, low plasticity, loose	3 2	6	63			33		
10		□									
	SPT-5	■	**SILTY SAND (SM)** - brown, wet, loose	1 3 2	6	31			30		
			Boring terminated 11-1/2 feet below ground surface. Groundwater not encountered during drilling. Boring backfilled with bentonite chips.								
15			SPT values corrected for hammer energy correction ratio of 1.28 (reference May 28, 2015 calibration report from GeoDesign, Inc.)								
20											
25											

EARTH ENGINEERS, Inc.

Earth Engineers, Inc.

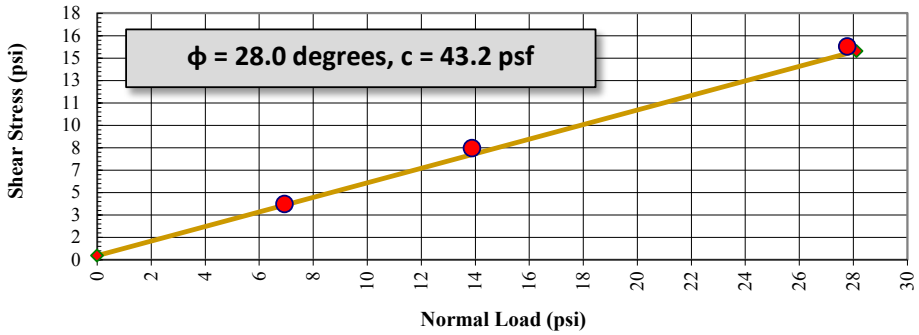
Direct Shear Test (ASTM D3080)

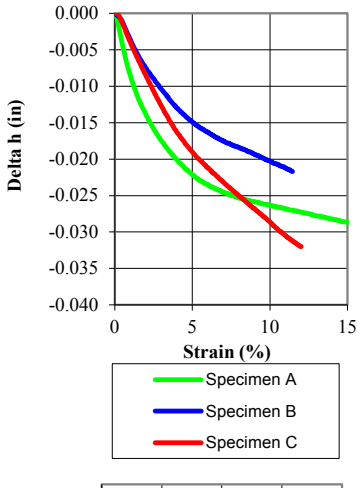
Date:

Checked By: T. Hull

Date: 6/2016

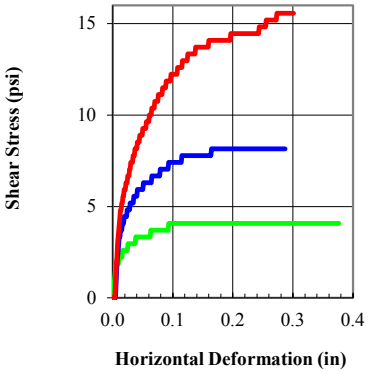
Tested By: J. Fissel





Initial	Specimen A	Specimen B	Specimen C
Moisture (%)	22.27	34.64	34.21
Dry Density (pcf)	91.90	80.32	80.49
Void Ratio	0.800	1.060	1.055
Saturation (%)	73.76	86.65	85.90
Diameter (in)	2.506	2.506	2.506
Height (in)	0.995	0.995	0.995

Final	A	B	C
Moisture (%)	36.27	36.60	40.44
Density (pcf)	86.62	80.80	79.35
Void Ratio	0.910	1.047	1.085
Saturation (%)	100.00	100.00	100.00
Diameter (in)	2.506	2.506	2.506
Height (in)	0.957	0.934	0.946
Normal Stress (psi)	6.9	13.9	27.8
Peak Stress (psi)	4.1	8.2	15.6
Strain (%)	15.0	11.5	12.0
Rate (in/min)	0.0005	0.0005	0.0005



Project:	Pin Foundations
Location:	Port of Camas/Washougal, Washington
Project Number:	07-020
Boring Number:	B4
Depth:	3-5 feet, upper 10 inches of sample
Other Test Results:	ASTM D1140: Specimen A - 91.8% fines
Sample Type:	Undisturbed
Description:	brown silty sand sandy silt
Test Type:	Direct Shear
Remarks:	

Earth Engineers, Inc.

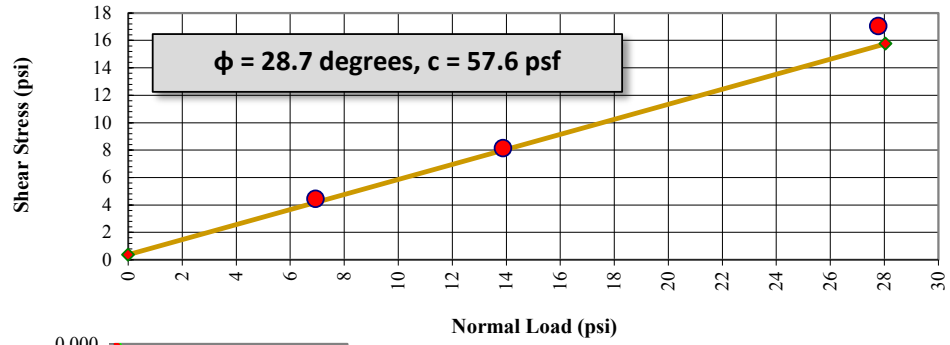
Direct Shear Test (ASTM D3080)

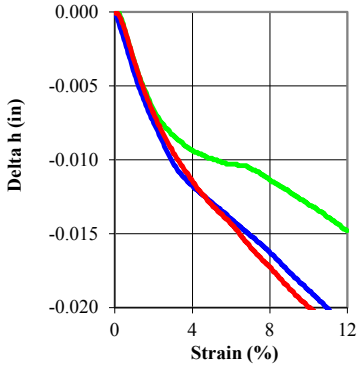
Date: 9/3/2016

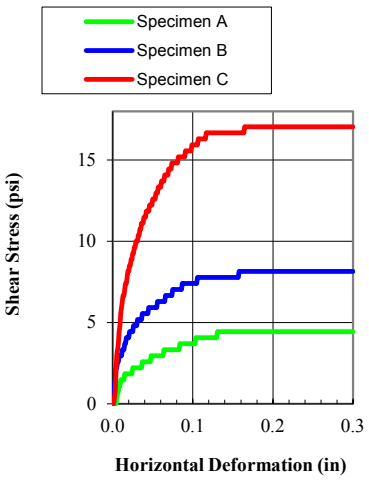
Checked By: T. Hull

Date: 7/2016

Tested By: J Fissel







Initial	Specimen A	B	C
Moisture (%)	34.11	33.62	34.73
Dry Density (pcf)	82.59	82.76	80.76
Void Ratio	1.003	0.999	1.048
Saturation (%)	90.12	89.19	87.79
Diameter (in)	2.506	2.506	2.506
Height (in)	0.995	0.995	0.995

Final	A	B	C
Moisture (%)	37.09	36.77	39.28
Density (pcf)	81.66	82.04	80.26
Void Ratio	1.026	1.016	1.061
Saturation (%)	100.00	100.00	100.00
Diameter (in)	2.506	2.506	2.506
Height (in)	0.957	0.948	0.907
Normal Stress (psi)	6.9	13.9	27.8
Peak Stress (psi)	4.4	8.2	17.0
Strain (%)	12.0	12.0	12.0
Rate (in/min)	0.0005	0.0005	0.0005

Project:	Pin Foundations
Location:	Port of Camas/Washougal, Washington
Project Number:	07-020
Boring Number	B2
Depth:	5-7 feet, bottom portion of sample
Other Test Results:	ASTM D1140: Specimen B -81.7%, Specimen C - 93.5% fines
Sample Type:	Undisturbed
Description:	Brown Lean Clay with Fine Sand
Test Type:	Direct Shear
Remarks:	Atterberg Test Results (ASTM D4318: LL= 43. PL=22, PI=21 (CL)

Earth Engineers, Inc.

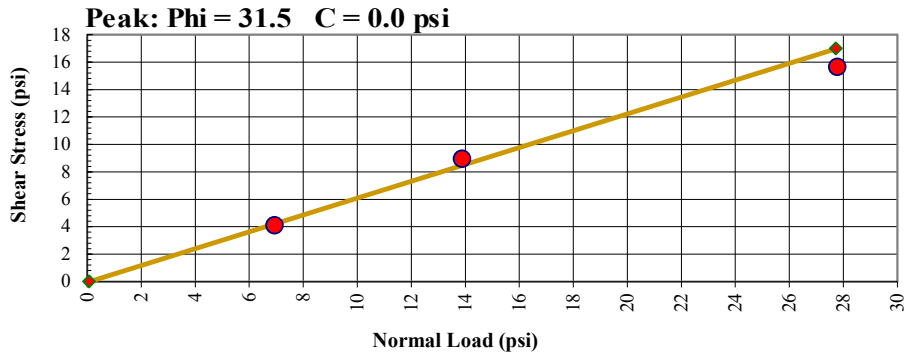
Direct Shear Test (ASTM D3080)

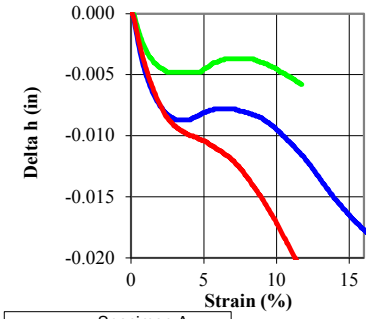
Date: 9/2016

Checked By: T. Hull

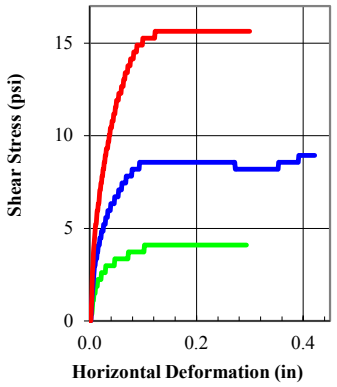
Date: 8/2016

Tested By: J Fissel





Initial	Specimen A	B	C
Moisture (%)	26.45	28.29	28.59
Density (pcf)	80.38	79.90	83.44
Void Ratio	1.058	1.071	0.983
Saturation (%)	66.25	70.03	77.11
Diameter (in)	2.500	2.500	2.500
Height (in)	0.995	0.995	0.995



Final	A	B	C
Moisture (%)	37.89	36.24	33.88
Density (pcf)	78.97	79.05	82.61
Void Ratio	1.095	1.093	1.002
Saturation (%)	95.86	97.16	99.48
Diameter (in)	2.500	2.500	2.500
Height (in)	0.973	0.945	0.945
Normal Stress (psi)	6.9	13.9	27.8
Peak Stress (psi)	4.1	8.9	15.6
Strain (%)	11.740	16.852	11.980
Rate (in/min)	0.0005	0.0005	0.0005

Project:	Pin Foundations
Location:	compiled: HA-4 and HA-5, 2.5-3 ft
Project Number:	07-020
Boring Number	composiste sample: 50% HA-4 at 2.5-3 ft and 50% HA-5 at 2.5-3 ft
Depth:	2.5-3 ft
Other Test Results:	NA
Sample Type:	Remolded
Description:	brown silty, fine sand
Test Type:	Direct Shear
Remarks:	ASTM D1140 fines content: 38.6%

APPENDIX H: SITE QUALIFICATION ENGINEERING CALCULATIONS

FOOTING BEARING CAPACITY PROGRAM

(Utilizing Friction & Cohesion: or Standard Penetration Test)

(Program - Bearing Capacity.xls)

CLIENT: Pin Fondations, Inc.

PROJECT: Bearing Pin Pier Load Testing - Silt Site (1,500 psf +/- 10%)

JOB NO: 07-020

INPUT:		***OUTPUT:***		
Width, B:	3 ft	Ultimate bearing capacity, q-ult:	4,870	psf
Length, L:	3 ft	Net bearing capacity, q-net:	4,816	psf
Embedment, D:	0.5 ft	Factor of Safety, FS:	3.0	
Depth to GWT:	12 ft	**Allowable Bearing, qa:**	**1,620**	**psf (ult)**
Slope of Ground:	10000 (H):1(V)		1,610	**psf (net)**
Total Density, y:	109.0 pcf			
Friction angle, Phi:	28.35 degrees	Cohesion component:	2,229	psf
Cohesion, c:	50.0 psf	Embedment component:	1,347	psf
Use Hansen Sy & Dc (1):	1	Friction component:	1,294	psf
Failure-Local (0)/General (1):	1	Ground Slope Inclination,i:	0.0	degrees
		Phi, radians:	0.49	rad
		Effective density:	109.0	pcf
		Surcharge density:	109	pcf

	Bearing Capacity Factors	Shape Factors	Depth Factors	Inclination Factors
	N	S	D	I
Cohesion, c:	26.50	1.58	1.07	1.00
Surcharge, q:	15.30	1.54	1.05	1.00
Friction, y:	13.19	0.60	1.00	1.00

General Bearing Capacity Equation:

q-ult = c*Nc*Sc*Dc*Ic + y*D*Nq*Sq*Dq*Iq + 0.5*y*B*Ny*Sy*Dy*Iy

q-net = q-ult - y*D

Nc = (Nq-1)*cot(phi)

Nq = exp[pi*tan(phi)]*[tan(pi/4+phi/2)]^2

Ny = K*(Nq+1)*tan(phi) K=1.5 (Hansen), 2 (Terzaghi & Peck-1967)

Sc = 1+(B/L)*(Nq/Nc)

Sq = 1+(B/L)*tan(phi)

Sy = 1-0.4*(B/L) (Hansen) 1-0.2*(B/L) (Terzaghi & Peck-1967)

Dc = 1+0.4*(D/B) (Hansen) 1+0.2*(D/B) (Terzaghi & Peck-1967) <= 1.46 maximum

Dq = 1+2*tan(phi)*[1-sin(phi)]^2*D/B

Dy = 1.00

Ic = 1 - [2*i/(pi+2)]

Iq = [1- tan(i)]^2

Iy = [1- tan(i)]^2

FOOTING BEARING CAPACITY PROGRAM

(Utilizing Friction & Cohesion: or Standard Penetration Test)

(Program - Bearing Capacity.xls)

CLIENT: Pin Fondations, Inc.

PROJECT: Bearing Pin Pier Load Testing - Sand Site (2,000 psf +/- 10%)

JOB NO: 07-020

INPUT:		***OUTPUT:***		
Width, B:	3 ft	Ultimate bearing capacity, q-ult:	5,676	psf
Length, L:	3 ft	Net bearing capacity, q-net:	5,621	psf
Embedment, D:	0.5 ft	Factor of Safety, FS:	3.0	
Depth to GWT:	12 ft	**Allowable Bearing, qa:**	**1,890**	**psf (ult)**
Slope of Ground:	100000 (H):1(V)		1,870	**psf (net)**
Total Density, y:	109.0 pcf			
Friction angle, Phi:	31.5 degrees	Cohesion component:	0	psf
Cohesion, c:	0.0 psf	Embedment component:	2,011	psf
Use Hansen Sy & Dc (1):	0	Friction component:	3,665	psf
Failure-Local (0)/General (1):	1	Ground Slope Inclination,i:	0.0	degrees
		Phi, radians:	0.55	rad
		Effective density:	109.0	pcf
		Surcharge density:	109	pcf

	Bearing Capacity Factors	Shape Factors	Depth Factors	Inclination Factors
	N	S	D	I
Cohesion, c:	34.04	1.64	1.03	1.00
Surcharge, q:	21.86	1.61	1.05	1.00
Friction, y:	28.02	0.80	1.00	1.00

General Bearing Capacity Equation:

q-ult = c*Nc*Sc*Dc*Ic + y*D*Nq*Sq*Dq*Iq + 0.5*y*B*Ny*Sy*Dy*Iy

q-net = q-ult - y*D

Nc = (Nq-1)*cot(phi)

Nq = exp[pi*tan(phi)]*[tan(pi/4+phi/2)]^2

Ny = K*(Nq+1)*tan(phi) K=1.5 (Hansen), 2 (Terzaghi & Peck-1967)

Sc = 1+(B/L)*(Nq/Nc)

Sq = 1+(B/L)*tan(phi)

Sy = 1-0.4*(B/L) (Hansen) 1-0.2*(B/L) (Terzaghi & Peck-1967)

Dc = 1+0.4*(D/B) (Hansen) 1+0.2*(D/B) (Terzaghi & Peck-1967) <= 1.46 maximum

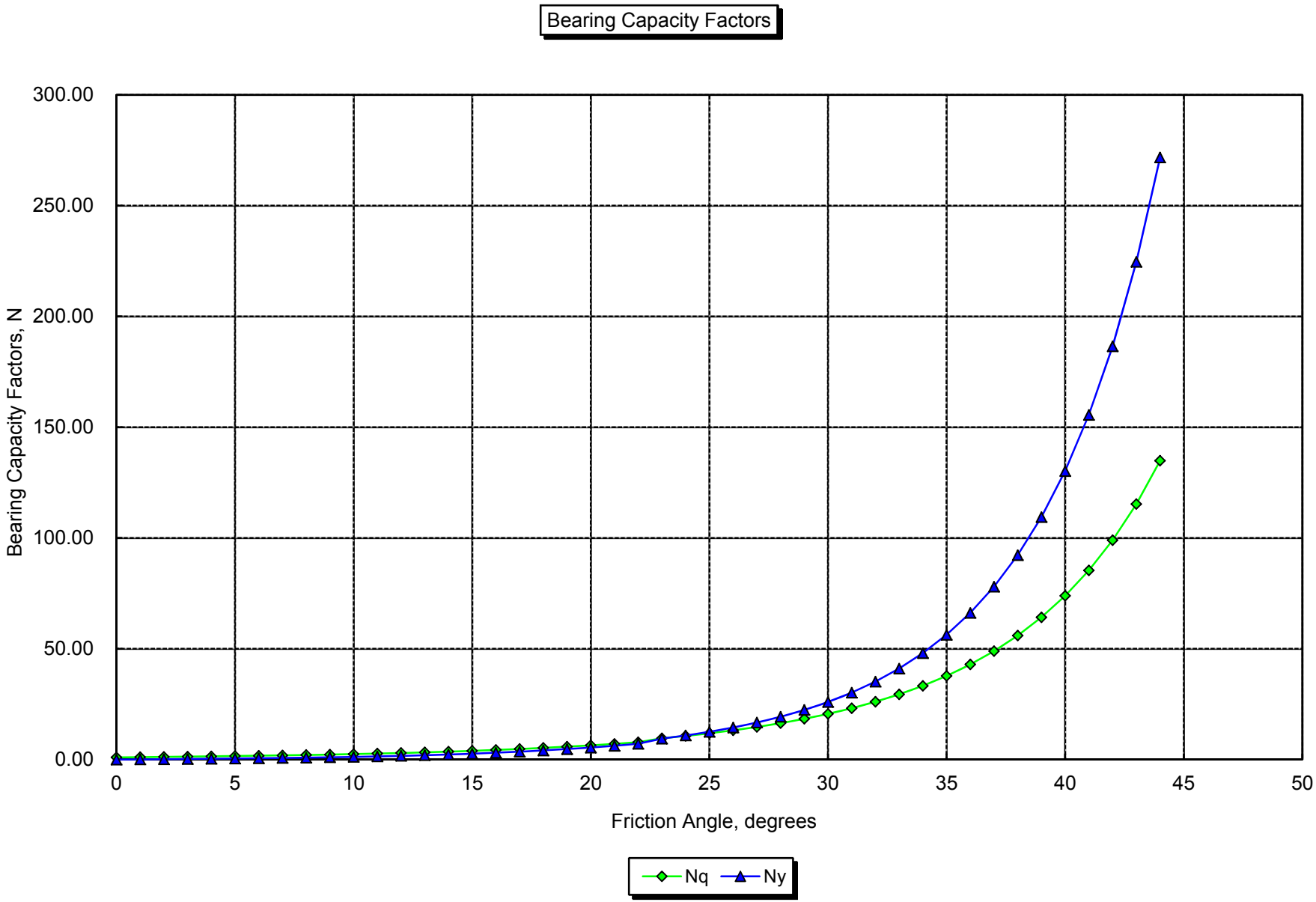
Dq = 1+2*tan(phi)*[1-sin(phi)]^2*D/B

Dy = 1.00

Ic = 1 - [2*i/(pi+2)]

Iq = [1- tan(i)]^2

Iy = [1- tan(i)]^2


Bearing Capacity Factors
300.00
250.00
200.00
150.00
100.00
50.00
0.00
Bearing Capacity Factors, N
0
5
10
15
20
25
30
35
40
45
50
Friction Angle, degrees
Nq
Ny

APPENDIX I: LOAD TEST EQUIPMENT LIST AND HYDRAULIC RAM CALIBRATION REPORTS

EQUIPMENT LIST

ID No.	Description (Manufacturer, Model No., Serial No., etc.):	Maintenance Frequency	Maintenance By	In-Service Checks	Date Last Checked	Date Calibrated	Calibrated By	Date Next Calibration Due	Calibration Procedure	Equipment Marked for Out of Service (2)
EEI 021	Enerpac 12-ton Hollow Core Hydraulic ram (also referenced as Cylinder #T04-019)	Once/year	R. Aliperti	Once/year		Prior to use		Prior to use	ASTM E74	
EEI 023	Enerpac 12-ton Hollow Core Hydraulic ram (also referenced as Cylinder #T04-021)	Once/year	R. Aliperti	Once/year		Prior to use		Prior to use	ASTM E74	
EEI 024	Enerpac Electric Hydraulic Pump	Once/year	R. Aliperti	Once/year		n/a			n/a	
EEI 025	WiKa 5000-psi Hydraulic pressure gage	Once/year	R. Aliperti	Once/year		Prior to use		Prior to use	ASTM E74	
EEI 026	WiKa 5000-psi Hydraulic pressure gage	Once/year	R. Aliperti	Once/year		Prior to use		Prior to use	ASTM E74	
EEI 027	WiKa 5000-psi Hydraulic pressure gage	Once/year	R. Aliperti	Once/year		Prior to use		Prior to use	ASTM E74	
EEI 33	Digital Dial Indicator Cen-Tech model #93295 SN #1	Once/year	R. Aliperti	Once/year		Once/year		Prior to use	ASME B89.1.10.M	
EEI 34	Digital Dial Indicator Cen-Tech model #93295 SN #2	Once/year	R. Aliperti	Once/year		Once/year		Prior to use	ASME B89.1.10.M	
EEI 35	Digital Dial Indicator Cen-Tech model #93295 SN #3	Once/year	R. Aliperti	Once/year		Once/year		Prior to use	ASME B89.1.10.M	
EEI 36	Digital Dial Indicator Cen-Tech model #93295 SN #4	Once/year	R. Aliperti	Once/year		Once/year		Prior to use	ASME B89.1.10.M	
EEI 37	Digital Dial Indicator Cen-Tech model #93295 SN #5	Once/year	R. Aliperti	Once/year		Once/year		Prior to use	ASME B89.1.10.M	
EEI 38	Digital Dial Indicator Cen-Tech model #93295 SN #6	Once/year	R. Aliperti	Once/year		Once/year		Prior to use	ASME B89.1.10.M	
EEI 39	Digital Dial Indicator Cen-Tech model #93295 SN #7	Once/year	R. Aliperti	Once/year		Once/year		Prior to use	ASME B89.1.10.M	
EEI 40	Digital Dial Indicator Cen-Tech model #93295 SN #8	Once/year	R. Aliperti	Once/year		Once/year		Prior to use	ASME B89.1.10.M	

EEI 41	Enerpac 10-ton Hollow Core Hydraulic Ram (temporary rental for Pin Foundations project)	Once/year	R. Aliperti	Once/year		Prior to use		Prior to use	ASTM E74	

(1) In-Service checks that are performed prior to each use are marked on the Compressive Strength Reports for which those items were used.
(2) Equipment marked for Out of Service performed by Technical Manager only. After equipment is marked for out of service the equipment shall either be properly discarded or placed in the storage room locker labeled “Out of Service Equipment”.

Carlson Testing, Inc.

Bend Office (541) 330-9155
Geotechnical Office (503) 601-8250
Eugene Office (541) 345-0289
Salem Office (503) 589-1252
Tigard Office (503) 684-3460

April 7, 2016
T1606196.CTI

Precision Measurements Inc.
18740 E. Aschoff Road
Rhododendron, Oregon 97049

Gentlemen:
The following is the test data obtained from (1) one load cell and readout submitted to our lab, our metal lab log # M5949A.

12 ton Hydraulic cylinder, T04-019, with 10,000 psi. ENFM gauge. Extended 1"

Gauge reading (psi.)	Actual load (lb.) 1st run	Actual load (lb.) 2nd run	Actual load (lb.) 3rd run	Actual load (lb.) Average
300	657	611	629	**632**
600	1450	1412	1439	**1433**
900	2240	2224	2267	**2243**
1200	3083	3029	3084	**3065**
1500	3860	3827	3804	**3830**
1800	4655	4630	4661	**4648**
2100	5491	5470	5458	**5473**
2400	6390	6371	6284	**6348**
2700	7236	7168	7099	**7167**
3000	8050	8043	7938	**8010**

Tests performed on our Tinius Olsen Universal testing machine, SN105750.

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If there are any further questions regarding this matter, please do not hesitate to contact this office.
Respectfully submitted,

CARLSON TESTING, INC.

Jay Hathaway
Project Manager

MC/jah

Carlson Testing, Inc.

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Tigard Office (503) 684-3460

April 7, 2016
T1606196.CTI

Precision Measurements Inc.
18740 E. Aschoff Road
Rhododendron, Oregon 97049

Gentlemen:
The following is the test data obtained from (1) one load cell and readout submitted to our lab, our metal lab log # M5949B.

12 ton Hydraulic cylinder, T04-019, with 10,000 psi. ENFM gauge. Extended 1"

Gauge reading (psi.)	Actual load (lb.) 1st run	Actual load (lb.) 2nd run	Actual load (lb.) 3rd run	Actual load (lb.) Average
500	1158	1194	1179	**1177**
1000	2510	2517	2499	**2508**
1500	3850	3839	3836	**3841**
2000	5158	5188	5189	**5178**
2500	6565	6575	6552	**6564**
3000	7946	7955	7914	**7938**
3500	9311	9336	9359	**9335**
4000	10760	10684	10716	**10720**
4500	12303	12334	12291	**12309**
5000	13522	13588	13516	**13542**
5500	14883	14949	14896	**14909**
6000	16382	16425	16419	**16408**

Tests performed on our Tinius Olsen Universal testing machine, SN105750.

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Respectfully submitted,

CARLSON TESTING, INC.

Jay Hathaway
Project Manager

MC/jah

Carlson Testing, Inc.

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April 7, 2016
T1606196.CTI

Precision Measurements Inc.
18740 E. Aschoff Road
Rhododendron, Oregon 97049

Gentlemen:
The following is the test data obtained from (1) one load cell and readout submitted to our lab, our metal lab log # M5949C.

12 ton Hydraulic cylinder, T04-019, with 10,000 psi. ENFM gauge. Extended 2"

Gauge reading (psi.)	Actual load (lb.) 1st run	Actual load (lb.) 2nd run	Actual load (lb.) 3rd run	Actual load (lb.) Average
300	594	594	610	**599**
600	1400	1374	1399	**1391**
900	2226	2201	2216	**2214**
1200	3054	2997	3009	**3020**
1500	3861	3790	3803	**3818**
1800	4660	4620	4603	**4627**
2100	5477	5401	5413	**5430**
2400	6320	6261	6234	**6271**
2700	7107	7109	7035	**7083**
3000	7919	7936	7899	**7918**

Tests performed on our Tinius Olsen Universal testing machine, SN10S750.

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If there are any further questions regarding this matter, please do not hesitate to contact this office.
Respectfully submitted,

CARLSON TESTING, INC.

Jay Hathaway
Project Manager

MC/jah

Carlson Testing, Inc.

Bend Office	(541) 330-9155
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Eugene Office	(541) 345-0289
Salem Office	(503) 589-1252
Tigard Office	(503) 684-3460

April 7, 2016
T1606196.CTI

Precision Measurements Inc.
18740 E. Aschoff Road
Rhododendron, Oregon 97049

Gentlemen:
The following is the test data obtained from (1) one load cell and readout submitted to our lab, our metal lab log # M5949D.

12 ton Hydraulic cylinder, T04-019, with 10,000 psi. ENFM gauge. Extended 2"

Gauge reading (psi.)	Actual load (lb.) 1st run	Actual load (lb.) 2nd run	Actual load (lb.) 3rd run	Actual load (lb.) Average
500	1138	1121	1136	**1131**
1000	2485	2474	2493	**2484**
1500	3792	3787	3803	**3794**
2000	5133	5141	5212	**5162**
2500	6481	6512	6543	**6512**
3000	7858	7874	7900	**7877**
3500	9286	9213	9313	**9270**
4000	10711	10644	10706	**10687**
4500	12202	12146	11943	**12097**
5000	13498	13366	13476	**13446**
5500	14858	14828	14794	**14826**
6000	16322	16265	16270	**16285**

Tests performed on our Tinius Olsen Universal testing machine, SN105750.

Our reports pertain to the material tested/inspected only. Information contained herein is not to be reproduced, except in full, without prior authorization from this office. Under all circumstances, the information contained in this report is provided subject to all terms and conditions of CTI'S General Conditions in effect at the time this report is prepared. No party other than those to whom CTI has distributed this report shall be entitled to use or rely upon the information contained in this document.

If there are any further questions regarding this matter, please do not hesitate to contact this office.
Respectfully submitted,

CARLSON TESTING, INC.

Jay Hathaway
Project Manager

MC/jah

Carlson Testing, Inc.

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April 7, 2016
T1606196.CTI

Precision Measurements Inc.
18740 E. Aschoff Road
Rhododendron, Oregon 97049

Gentlemen:
The following is the test data obtained from (1) one load cell and readout submitted to our lab, our metal lab log # M5949E.

12 ton Hydraulic cylinder, T04-020, with 10,000 psi. Enerpac gauge. Extended 1"

Gauge reading (psi.)	Actual load (lb.) 1st run	Actual load (lb.) 2nd run	Actual load (lb.) 3rd run	Actual load (lb.) Average
300	755	790	848	**797**
600	1611	1698	1760	**1689**
900	2305	2492	2508	**2435**
1200	3265	3304	3333	**3300**
1500	4154	4190	4241	**4195**
1800	4960	5020	5074	**5018**
2100	5701	5790	5842	**5777**
2400	6500	6620	6665	**6595**
2700	7435	7532	7581	**7516**
3000	8128	8382	8322	**8277**

Tests performed on our Tinius Olsen Universal testing machine, SN105750.

Our reports pertain to the material tested/inspected only. Information contained herein is not to be reproduced, except in full, without prior authorization from this office. Under all circumstances, the information contained in this report is provided subject to all terms and conditions of CTI'S General Conditions in effect at the time this report is prepared. No party other than those to whom CTI has distributed this report shall be entitled to use or rely upon the information contained in this document.

If there are any further questions regarding this matter, please do not hesitate to contact this office.
Respectfully submitted,

CARLSON TESTING, INC.

Jay Hathaway
Project Manager

MC/jah

Carlson Testing, Inc.

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Eugene Office (541) 345-0289
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Tigard Office (503) 684-3460

April 7, 2016
T1606196.CTI.

Precision Measurements Inc.
18740 E. Aschoff Road
Rhododendron, Oregon 97049

Gentlemen:
The following is the test data obtained from (1) one load cell and readout submitted to our lab, our metal lab log # M5949F.

12 ton Hydraulic cylinder, T04-020, with 10,000 psi. Enerpac gauge. Extended 1"

Gauge reading (psi.)	Actual load (lb.) 1st run	Actual load (lb.) 2nd run	Actual load (lb.) 3rd run	Actual load (lb.) Average
500	1476	1473	1482	**1477**
1000	2772	2801	2784	**2785**
1500	4261	4255	4243	**4253**
2000	5553	5587	5582	**5574**
2500	6913	6921	6905	**6913**
3000	8342	8406	8363	**8370**
3500	9679	9668	9658	**9668**
4000	11145	11098	11093	**11112**
4500	12489	12441	12443	**12457**
5000	13898	13858	13876	**13877**
5500	15184	15176	15183	**15181**
6000	16651	16584	16591	**16608**

Tests performed on our Tinius Olsen Universal testing machine, SN10S7S0.

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Respectfully submitted,

CARLSON TESTING, INC.

Jay Hathaway
Project Manager

MC/jah

Carlson Testing, Inc.

Bend Office (541) 330-9155
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April 7, 2016
T1606196.CTI

Precision Measurements Inc.
18740 E. Aschoff Road
Rhododendron, Oregon 97049

Gentlemen:
The following is the test data obtained from (1) one load cell and readout submitted to our lab, our metal lab log # M5949G.

12 ton Hydraulic cylinder, T04-020, with 10,000 psi. Enerpac gauge. Extended 2"

Gauge reading (psi.)	Actual load (lb.) 1st run	Actual load (lb.) 2nd run	Actual load (lb.) 3rd run	Actual load (lb.) Average
300	825	842	828	**831**
600	1746	1741	1739	**1742**
900	2522	2521	2508	**2517**
1200	3311	3329	3303	**3314**
1500	4226	4262	4204	**4230**
1800	5049	5073	5060	**5060**
2100	5792	5811	5802	**5801**
2400	6642	6660	6648	**6650**
2700	7550	7584	7541	**7558**
3000	8315	8327	8308	**8316**

Tests performed on our Tinius Olsen Universal testing machine, SN10S750.

Our reports pertain to the material tested/inspected only. Information contained herein is not to be reproduced, except in full, without prior authorization from this office. Under all circumstances, the information contained in this report is provided subject to all terms and conditions of CTI'S General Conditions in effect at the time this report is prepared. No party other than those to whom CTI has distributed this report shall be entitled to use or rely upon the information contained in this document.

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Respectfully submitted,

CARLSON TESTING, INC.

Jay Hathaway
Project Manager

MC/jah

Carlson Testing, Inc.

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Tigard Office (503) 684-3460

April 7, 2016
T1606196.CTI

Precision Measurements Inc.
18740 E. Aschoff Road
Rhododendron, Oregon 97049

Gentlemen:
The following is the test data obtained from (1) one load cell and readout submitted to our lab, our metal lab log # M5949H.

12 ton Hydraulic cylinder, T04-020, with 10,000 psi. Enerpac gauge. Extended 2"

Gauge reading (psi.)	Actual load (lb.) 1st run	Actual load (lb.) 2nd run	Actual load (lb.) 3rd run	Actual load (lb.) Average
500	1454	1454	1439	**1449**
1000	2763	2729	2790	**2760**
1500	4259	4231	4254	**4248**
2000	5571	5553	5598	**5574**
2500	6925	6916	6940	**6927**
3000	8340	8330	8339	**8336**
3500	9663	9683	9674	**9673**
4000	11148	11104	11090	**11114**
4500	12481	12431	12445	**12452**
5000	13899	13894	13874	**13889**
5500	15172	15166	15146	**15161**
6000	16638	16578	16654	**16623**

Tests performed on our Tinius Olsen Universal testing machine, 5N105750.

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Respectfully submitted,

CARLSON TESTING, INC.

Jay Hathaway
Project Manager

MC/jah

Carlson Testing, Inc.

Bend Office (541) 330-9155
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Eugene Office (541) 345-0289
Salem Office (503) 589-1252
Tigard Office (503) 684-3460

April 18, 2016
T1606196.CTI

Precision Measurements Inc.
18740 E. Aschoff Road
Rhododendron, Oregon 97049

Gentlemen:
The following is the test data obtained from (1) one load cell and readout submitted to our lab, our metal lab log # M5949A.

10 ton Hydraulic cylinder, 420995, with 10,000 psi. gauge 12816B. Extended 1"

Gauge reading (psi.)	Actual load (lb.) 1st run	Actual load (lb.) 2nd run	Actual load (lb.) 3rd run	Actual load (lb.) Average
500	1028	1036	1050	**1038**
1000	2079	2062	2079	**2073**
1500	3182	3145	3189	**3172**
2000	4218	4191	4217	**4208**
2500	5316	5303	5325	**5314**
3000	6376	6369	6387	**6377**
3500	7485	7495	7491	**7490**
4000	8542	8563	8576	**8560**
4500	9705	9686	9677	**9689**
5000	10745	10739	10748	**10744**
5500	11880	11837	11884	**11867**
6000	13046	13055	13086	**13062**

Tests performed on our Tinius Olsen Universal testing machine, SN105750.

Our reports pertain to the material tested/inspected only. Information contained herein is not to be reproduced, except in full, without prior authorization from this office. Under all circumstances, the information contained in this report is provided subject to all terms and conditions of CTI'S General Conditions in effect at the time this report is prepared. No party other than those to whom CTI has distributed this report shall be entitled to use or rely upon the information contained in this document.

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Respectfully submitted,

CARLSON TESTING, INC.

Jay Hathaway
Project Manager

MC/jah

Carlson Testing, Inc.

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Tigard Office	(503) 684-3460

April 18, 2016
T1606196.CTI

Precision Measurements Inc.
18740 E. Aschoff Road
Rhododendron, Oregon 97049

Gentlemen:
The following is the test data obtained from (1) one load cell and readout submitted to our lab, our metal lab log # M5949A.

10 ton Hydraulic cylinder, 420995, with 10,000 psi. gauge 12816B. Extended 2"

Gauge reading (psi.)	Actual load (lb.) 1st run	Actual load (lb.) 2nd run	Actual load (lb.) 3rd run	Actual load (lb.) Average
500	1028	1029	1035	**1030**
1000	2068	2070	2076	**2071**
1500	3180	3191	3186	**3185**
2000	4215	4246	4255	**4238**
2500	5325	5332	5369	**5342**
3000	6381	6388	6456	**6408**
3500	7526	7540	7557	**7541**
4000	8578	8650	8669	**8623**
4500	9726	9778	9827	**9777**
5000	10789	10854	10908	**10850**
5500	11940	11965	12011	**11972**
6000	13099	13179	13167	**13148**

Tests performed on our Tinius Olsen Universal testing machine, SN105750.

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Respectfully submitted,

CARLSON TESTING, INC.

Jay Hathaway
Project Manager

MC/jah

APPENDIX J: CONCRETE COMPRESSIVE STRENGTH TEST REPORT

Professional Service Industries, Inc.
3011 South Huson Street, Suite B
Tacoma, WA 98421

Phone: (253) 589-1804
Fax: (253) 589-2136

Concrete Test Report

Report No: CTR:0742100-99-C1
Issue No: 1

Client: PIN FOUNDATIONS INC
4810 PT. FOSDICK DR. NW, PMB 60
GIG HARBOR, WA 98335

CC: RICHARD GAGLIANO

Project: PIN FOUNDATIONS
WASHOUGAL, WA

These test results apply only to the specific locations and materials noted and may not represent any other locations or elevations. This report may not be reproduced, except in full, without written permission by Professional Service Industries, Inc. If a non-compliance appears on this report, to the extent that the reported non-compliance impacts the project, the resolution is outside the PSI scope of engagement.

Approved Signatory: Mike Kath (Branch Manager)
Date of Issue: 5/16/2016

Mix Data

Supplier:
Plant:
Mix Identification:
Specified Design Strength (psi):

Sample Details

Date Sampled: 03/08/16
Sample Location: Field Test Batch C
Curing Method:
Field Sample No.:
Contractor:
Ticket no.:
Sampled By: Client
Submitted By:
Weather:
Est. Wind (mph):

Date Received:
Field Cure Temp (°F) High:
Low:
Truck No.:
Est. Rh (%):

Specification:

		Measured	Specified
Slump (in):	ASTM C 143	N/A	
Slump w/ plasticizer (in):		N/A	
Air Temp (°F):		N/A	
Concrete Temp (°F):	ASTM C 1064	N/A	
Air Content (%)	ASTM C 231	N/A	
Unit Weight (pcf):	ASTM C 138	N/A	
Volume of Density Measure (ft³):		N/A	

Batch Size (yd³): **Time Batched:**
Yd³ Placed: **Time Sampled:**
Water Added (gal) Before: **Time Placed:**
After: **Time in Truck (mins):**

Compressive Strength of Concrete Cylinders — ASTM C 39

Specimen ID	Date Tested	Age (Days)	Diameter (in)	Length (in)	Area (in²)	Type of Cap	Ultimate Load (lbf)	Fracture Type / Remarks	Compressive Strength (psi)
0742100-99-C1\	05/03/16	56	4.01	8.00	12.63	U	64210	4	5080
0742100-99-C1\	05/03/16	56	4.00	8.05	12.57	U	68630	4	5460
0742100-99-C1\	05/03/16	56	3.99	8.00	12.50	U	68150	4	5450

Average Compressive Strength (psi)
Required Strength (psi)

Notes

1. Sampling to ASTM C 172
2. Specimen(s) prepared to ASTM C 31
3. Capping B=Bonded ASTM C 617, U=Unbonded ASTM C 1231, C = Combined, G = Ground

Remarks

Fracture Type: 4 = C39: Diagonal fracture; C1314: Tension Break
Test Time 1500 hrs

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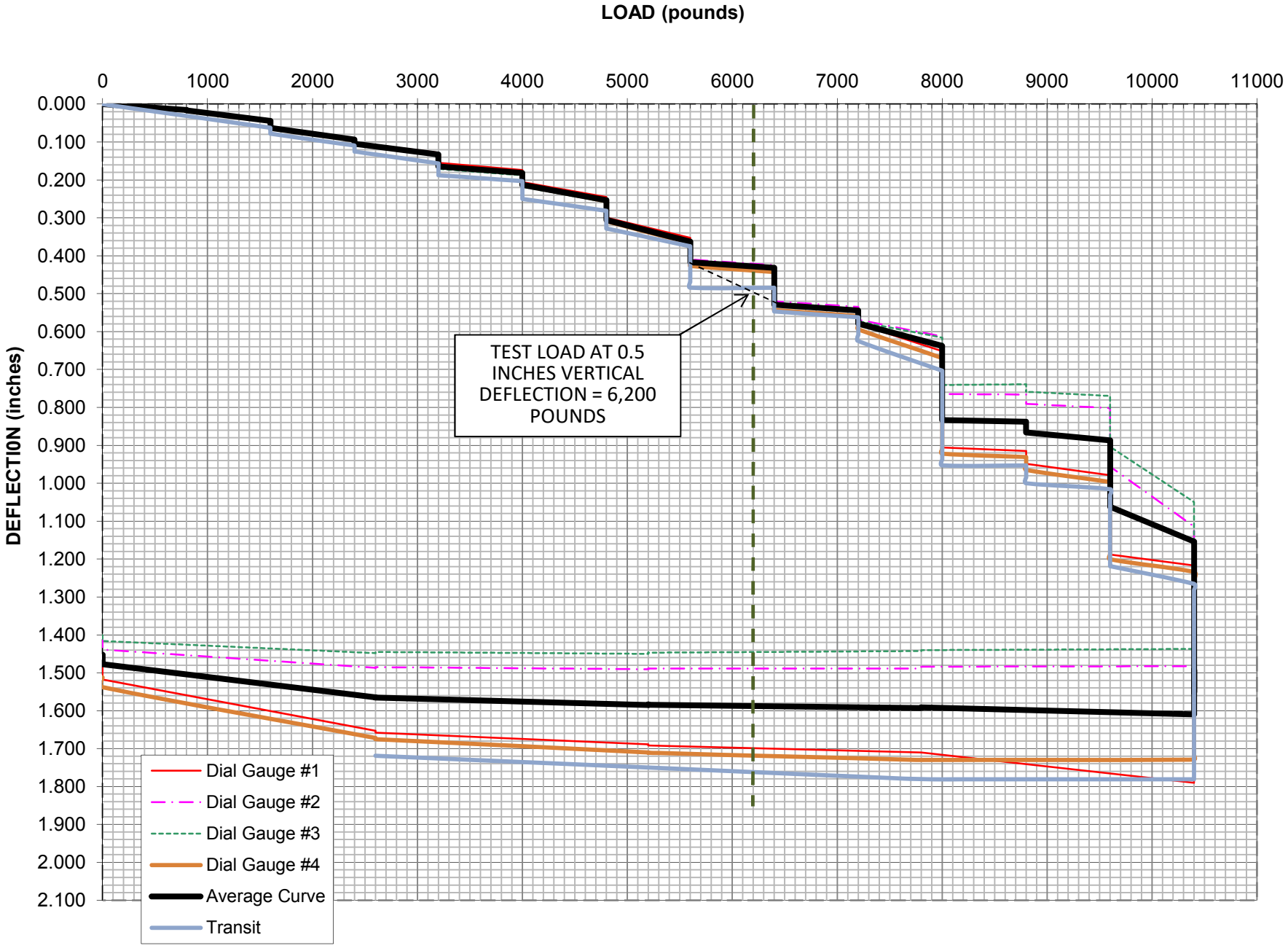
APPENDIX K: LOAD TEST DATA

AXIAL COMPRESSION LOAD TEST - SITE #1 (SILT/CLAY, 1,500 PSF BEARING)
DIAMOND PIER #CL-C-DP50-1, 1" NOMINAL DIAMETER x 50" LONG PINS
INSTALLED 4/4/16, TESTED 4/11/16-4/12/16



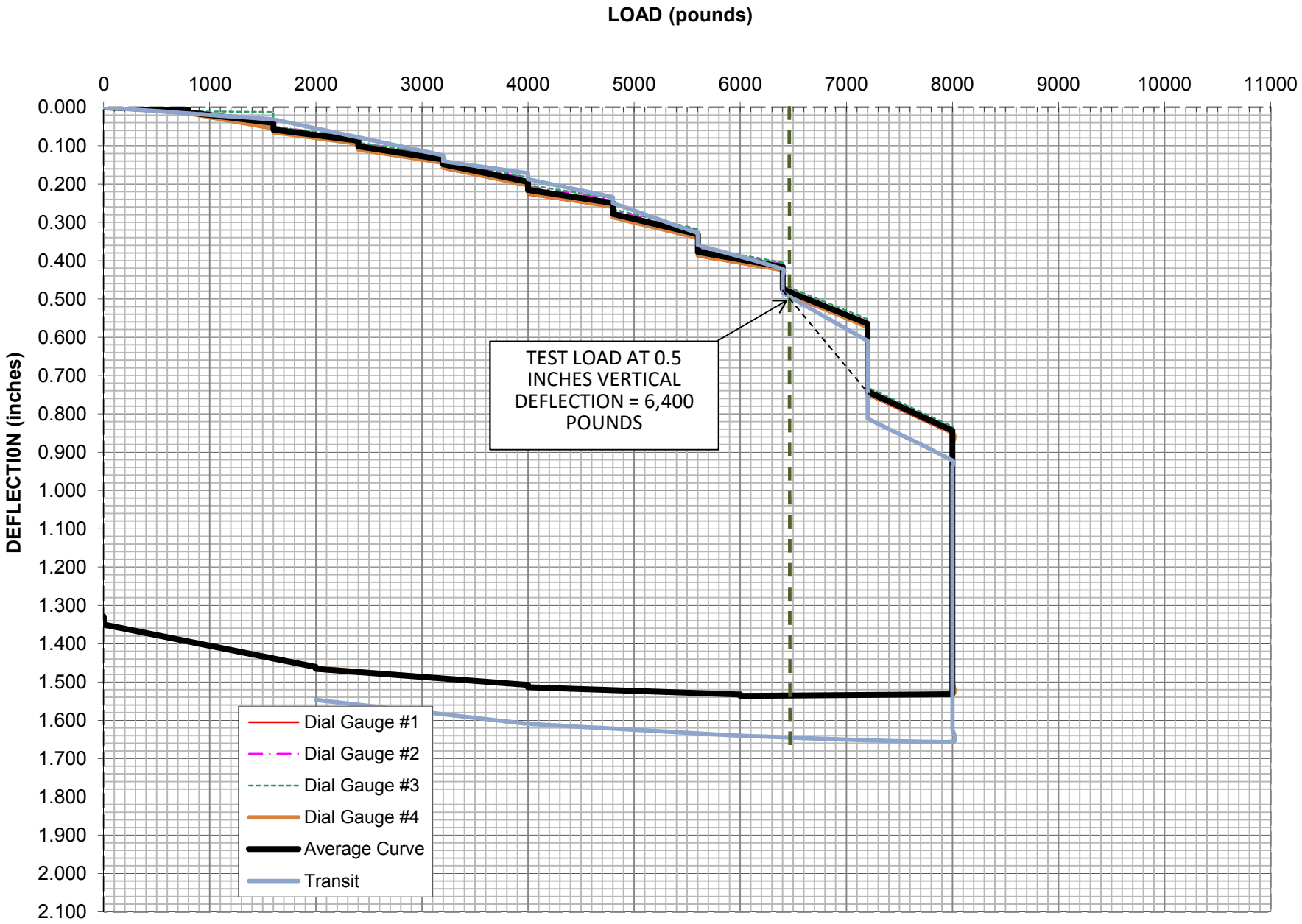
Project Name:	Diamond Pier Compression Field Load Testing
EEI Project No.:	07-020
Site:	Site #1 - Silt/Clay with presumptive bearing capacity of 1,500 psf
Test Method:	Compression
Diamond Pier Tested:	#CL-C-DP50-1
Date Installed:	4/4/2016
Date Test Started:	4/11/2016
Date Test Completed:	4/12/2016
Staff:	Ken Andrieu, Pete Furlong
Hydraulic Ram:	EEI Equipment #EEI 021
Ram Equation of the Line:	Load = (Gauge Pressure - 88) / 0.365
Dial Gauge #1:	EEI Equipment #EEI 33
Dial Gauge #2:	EEI Equipment #EEI 34
Dial Gauge #3:	EEI Equipment #EEI 35
Dial Gauge #4:	EEI Equipment #EEI 36

Load (pounds)	Gauge Pressure (psi)	Clock	Minutes	Dial Gauge #1 (in.)	Dial Gauge #2 (in.)	Dial Gauge #3 (in.)	Dial Gauge #4 (in.)	Dial Gauge Average (in.)	Transit (in.)	Test Remarks
0	0	14:25	0	0.000	0.000	0.000	0.000	0.000	1	
800	380	14:26	0	0.016	0.017	0.013	0.015	0.015	1 1/32	
800	380	14:27	1	0.017	0.019	0.014	0.015	0.016	1 1/32	
800	380	14:28	2	0.017	0.019	0.014	0.016	0.017	1 1/32	
800	380	14:29	3	0.017	0.019	0.014	0.016	0.017	1 1/32	
800	380	14:30	4	0.017	0.019	0.014	0.016	0.017	1 1/32	
800	380	14:31	5	0.017	0.019	0.014	0.016	0.017	1 1/32	
800	380	14:36	10	0.017	0.019	0.014	0.016	0.017	1 1/32	
800	380	14:41	15	0.018	0.018	0.013	0.017	0.017	1 1/32	
1600	672	14:51	0	0.044	0.046	0.043	0.045	0.045	1 1/16	
1600	672	14:52	1	0.046	0.048	0.045	0.046	0.046	1 1/16	
1600	672	14:53	2	0.049	0.051	0.048	0.050	0.050	1 1/16	
1600	672	14:54	3	0.051	0.053	0.050	0.052	0.052	1 1/16	
1600	672	14:55	4	0.052	0.053	0.051	0.053	0.052	1 1/16	
1600	672	14:56	5	0.054	0.055	0.052	0.055	0.054	1 1/16	
1600	672	15:01	10	0.055	0.058	0.054	0.056	0.056	1 1/16	
1600	672	15:06	15	0.057	0.062	0.059	0.058	0.059	1 1/16	
1600	672	15:21	30	0.060	0.064	0.062	0.061	0.062	1 5/64	
1600	672	15:36	45	0.061	0.065	0.062	0.062	0.063	1 5/64	
2400	964	15:42	0	0.091	0.095	0.094	0.093	0.093	1 7/64	
2400	964	15:43	1	0.094	0.098	0.098	0.098	0.097	1 7/64	
2400	964	15:44	2	0.095	0.099	0.100	0.098	0.098	1 7/64	
2400	964	15:45	3	0.095	0.100	0.100	0.098	0.098	1 7/64	
2400	964	15:46	4	0.095	0.100	0.100	0.098	0.098	1 7/64	
2400	964	15:47	5	0.096	0.102	0.102	0.099	0.100	1 7/64	
2400	964	15:52	10	0.099	0.104	0.104	0.102	0.102	1 1/8	
2400	964	15:57	15	0.101	0.105	0.106	0.104	0.104	1 1/8	
2400	964	16:12	30	0.101	0.106	0.107	0.105	0.105	1 1/8	
3200	1256	16:19	0	0.128	0.134	0.136	0.134	0.133	1 5/32	
3200	1256	16:20	1	0.134	0.140	0.142	0.140	0.139	1 5/32	
3200	1256	16:21	2	0.138	0.143	0.146	0.144	0.143	1 5/32	
3200	1256	16:22	3	0.141	0.147	0.149	0.147	0.146	1 5/32	
3200	1256	16:23	4	0.142	0.148	0.151	0.149	0.148	1 5/32	
3200	1256	16:24	5	0.143	0.152	0.154	0.150	0.150	1 5/32	
3200	1256	16:29	10	0.148	0.155	0.158	0.155	0.154	1 11/64	
3200	1256	16:34	15	0.151	0.158	0.162	0.157	0.157	1 3/16	
3200	1256	16:49	30	0.154	0.166	0.169	0.161	0.163	1 3/16	
3200	1256	17:04	45	0.155	0.167	0.171	0.163	0.164	1 3/16	
4000	1548	17:08	0	0.174	0.184	0.188	0.181	0.182	1 13/64	
4000	1548	17:09	1	0.176	0.187	0.190	0.184	0.184	1 13/64	
4000	1548	17:10	2	0.179	0.188	0.192	0.186	0.186	1 13/64	
4000	1548	17:11	3	0.181	0.190	0.193	0.188	0.188	1 13/64	
4000	1548	17:12	4	0.183	0.192	0.196	0.190	0.190	1 13/64	
4000	1548	17:13	5	0.185	0.193	0.197	0.192	0.192	1 7/32	
4000	1548	17:18	10	0.191	0.200	0.205	0.200	0.199	1 7/32	
4000	1548	17:23	15	0.197	0.207	0.211	0.206	0.205	1 15/64	
4000	1548	17:38	30	0.203	0.212	0.216	0.211	0.211	1 1/4	
4000	1548	17:53	45	0.206	0.214	0.218	0.214	0.213	1 1/4	
4800	1840	18:10	0	0.245	0.255	0.259	0.256	0.254	1 9/32	
4800	1840	18:11	1	0.250	0.260	0.265	0.261	0.259	1 9/32	
4800	1840	18:12	2	0.255	0.265	0.270	0.266	0.264	1 9/32	

4800	1840	18:13	3	0.259	0.269	0.273	0.270	0.268	1 9/32	
4800	1840	18:14	4	0.263	0.272	0.277	0.273	0.271	1 9/32	
4800	1840	18:15	5	0.265	0.275	0.280	0.276	0.274	1 19/64	
4800	1840	18:20	10	0.274	0.283	0.288	0.285	0.283	1 5/16	
4800	1840	18:25	15	0.279	0.288	0.293	0.290	0.288	1 5/16	
4800	1840	18:40	30	0.285	0.294	0.298	0.295	0.293	1 5/16	
4800	1840	18:55	45	0.289	0.299	0.304	0.300	0.298	1 21/64	
4800	1840	19:10	60	0.295	0.304	0.309	0.306	0.304	1 21/64	
4800	1840	19:25	75	0.299	0.305	0.310	0.309	0.306	1 21/64	
5600	2132	19:45	0	0.353	0.364	0.369	0.367	0.363	1 3/8	
5600	2132	19:46	1	0.355	0.366	0.371	0.369	0.365	1 3/8	
5600	2132	19:47	2	0.357	0.366	0.372	0.370	0.366	1 3/8	
5600	2132	19:48	3	0.358	0.367	0.373	0.371	0.367	1 3/8	
5600	2132	19:49	4	0.360	0.368	0.374	0.372	0.369	1 3/8	
5600	2132	19:50	5	0.361	0.371	0.377	0.373	0.371	1 3/8	
5600	2132	19:55	10	0.367	0.375	0.380	0.379	0.375	1 13/32	
5600	2132	20:00	15	0.371	0.378	0.384	0.384	0.379	1 13/32	
5600	2132	20:15	30	0.380	0.385	0.391	0.393	0.387	1 27/64	
5600	2132	20:30	45	0.384	0.387	0.393	0.397	0.390	1 27/64	
5600	2132	20:45	60	0.392	0.396	0.402	0.405	0.399	1 7/16	
5600	2132	21:00	75	0.399	0.401	0.407	0.412	0.405	1 7/16	
5600	2132	21:15	90	0.404	0.406	0.412	0.417	0.410	1 15/32	
5600	2132	21:30	105	0.408	0.407	0.413	0.421	0.412	1 15/32	
5600	2132	21:40	120	0.415	0.410	0.417	0.427	0.417	1 31/64	
6400	2424	21:45	0	0.429	0.425	0.431	0.443	0.432	1 31/64	
6400	2424	21:46	1	0.432	0.427	0.433	0.445	0.434	1 31/64	
6400	2424	21:47	2	0.437	0.428	0.434	0.446	0.436	1 31/64	
6400	2424	21:48	3	0.435	0.431	0.437	0.447	0.438	1 31/64	
6400	2424	21:49	4	0.440	0.437	0.444	0.454	0.444	1 31/64	
6400	2424	21:50	5	0.443	0.441	0.447	0.457	0.447	1 31/64	
6400	2424	21:55	10	0.456	0.452	0.451	0.469	0.457	1 1/2	
6400	2424	22:00	15	0.467	0.463	0.468	0.481	0.470	1 1/2	
6400	2424	22:15	30	0.488	0.483	0.488	0.501	0.490	1 33/64	
6400	2424	22:30	45	0.499	0.495	0.500	0.513	0.502	1 17/32	
6400	2424	22:45	60	0.508	0.501	0.507	0.521	0.509	1 17/32	
6400	2424	23:00	75	0.515	0.507	0.512	0.529	0.516	1 35/64	
6400	2424	23:15	90	0.520	0.512	0.517	0.533	0.521	1 35/64	
6400	2424	23:30	105	0.525	0.516	0.521	0.538	0.525	1 35/64	
6400	2424	23:45	120	0.529	0.520	0.525	0.543	0.529	1 35/64	
7200	2716	23:54	0	0.544	0.535	0.540	0.559	0.545	1 9/16	
7200	2716	23:55	1	0.547	0.537	0.543	0.562	0.547	1 9/16	
7200	2716	23:56	2	0.551	0.541	0.546	0.565	0.551	1 9/16	
7200	2716	23:57	3	0.552	0.542	0.547	0.567	0.552	1 9/16	
7200	2716	23:58	4	0.554	0.544	0.549	0.568	0.554	1 9/16	
7200	2716	23:59	5	0.555	0.544	0.550	0.569	0.555	1 19/32	
7200	2716	0:04	10	0.569	0.559	0.564	0.584	0.569	1 39/64	
7200	2716	0:09	15	0.580	0.569	0.573	0.594	0.579	1 5/8	
8000	3008	0:12	0	0.652	0.613	0.616	0.670	0.638	1 45/64	
8000	3008	0:13	1	0.660	0.617	0.620	0.676	0.643	1 45/64	
8000	3008	0:14	2	0.662	0.618	0.621	0.678	0.645	1 23/32	
8000	3008	0:15	3	0.685	0.635	0.637	0.702	0.665	1 23/32	
8000	3008	0:16	4	0.691	0.637	0.638	0.707	0.668	1 23/32	
8000	3008	0:17	5	0.715	0.646	0.646	0.734	0.685	1 3/4	
8000	3008	0:22	10	0.751	0.669	0.666	0.767	0.713	1 51/64	
8000	3008	0:27	15	0.772	0.677	0.672	0.788	0.727	1 13/16	
8000	3008	0:42	30	0.815	0.707	0.639	0.834	0.749	1 55/64	
8000	3008	0:57	45	0.842	0.726	0.709	0.858	0.784	1 7/8	
8000	3008	1:12	60	0.861	0.730	0.713	0.877	0.795	1 57/64	
8000	3008	1:27	75	0.875	0.737	0.718	0.890	0.805	1 29/32	
8000	3008	1:42	90	0.883	0.740	0.721	0.898	0.811	1 59/64	
8000	3008	1:57	105	0.893	0.763	0.740	0.909	0.826	1 15/16	
8000	3008	2:12	120	0.906	0.765	0.741	0.922	0.834	1 61/64	
8800	3300	2:16	0	0.915	0.766	0.739	0.931	0.838	1 61/64	
8800	3300	2:17	1	0.917	0.788	0.759	0.932	0.849	1 61/64	
8800	3300	2:18	2	0.918	0.789	0.759	0.933	0.850	1 31/32	
8800	3300	2:19	3	0.930	0.789	0.755	0.948	0.856	1 31/32	
8800	3300	2:20	4	0.935	0.789	0.756	0.951	0.858	1 31/32	
8800	3300	2:21	5	0.936	0.790	0.756	0.951	0.858	1 63/64	
8800	3300	2:26	10	0.949	0.791	0.759	0.965	0.866	2	
9600	3592	2:31	0	0.979	0.802	0.770	0.997	0.887	2 1/64	
9600	3592	2:32	1	0.986	0.811	0.778	1.003	0.895	2 1/32	
9600	3592	2:33	2	0.989	0.812	0.779	1.004	0.896	2 1/32	
9600	3592	2:34	3	0.990	0.812	0.779	1.005	0.897	2 1/32	

9600	3592	2:35	4	0.990	0.813	0.779	1.006	0.897	2 1/32	
9600	3592	2:36	5	0.991	0.813	0.779	1.006	0.897	2 3/64	
9600	3592	2:41	10	1.042	0.854	0.814	1.060	0.943	2 7/64	
9600	3592	8:31	15	1.103	0.880	0.838	1.119	0.985	2 9/64	Test was paused about 6 hours during staffing changeover
9600	3592	8:46	30	1.135	0.901	0.857	1.150	1.011	2 3/16	
9600	3592	9:01	45	1.172	0.952	0.901	1.187	1.053	2 7/32	
9600	3592	9:16	60	1.188	0.956	0.904	1.201	1.062	2 7/32	
10400	3884	9:23	0	1.217	1.114	1.050	1.234	1.154	2 17/64	
10400	3884	9:24	1	1.237	1.119	1.055	1.254	1.166	2 9/32	
10400	3884	9:25	2	1.251	1.129	1.065	1.267	1.178	2 9/32	
10400	3884	9:26	3	1.264	1.163	1.097	1.279	1.201	2 19/64	
10400	3884	9:27	4	1.274	1.164	1.099	1.288	1.206	2 5/16	
10400	3884	9:28	5	1.286	1.170	1.105	1.300	1.215	2 21/64	
10400	3884	9:33	10	1.315	1.201	1.136	1.329	1.245	2 23/64	
10400	3884	9:38	15	1.339	1.209	1.143	1.352	1.261	2 25/64	
10400	3884	9:53	30	1.405	1.238	1.172	1.418	1.308	2 29/64	
10400	3884	10:08	45	1.431	1.250	1.184	1.442	1.327	2 15/32	
10400	3884	10:23	60	1.462	1.260	1.195	1.473	1.348	2 31/64	
10400	3884	10:38	75	1.480	1.278	1.215	1.492	1.366	2 17/32	
10400	3884	10:53	90	1.499	1.287	1.224	1.510	1.380	2 35/64	
10400	3884	11:08	105	1.519	1.297	1.234	1.530	1.395	2 9/16	
10400	3884	11:23	120	1.542	1.318	1.257	1.553	1.418	2 19/32	
10400	3884	12:33	180	1.568	1.329	1.268	1.580	1.436	2 5/8	
10400	3884	13:23	240	1.596	1.337	1.276	1.608	1.454	2 21/32	
10400	3884	14:23	300	1.628	1.650	1.289	1.641	1.552	2 11/16	
10400	3884	15:23	360	1.650	1.360	1.300	1.662	1.493	2 45/64	
10400	3884	16:23	420	1.669	1.423	1.369	1.681	1.536	2 47/64	
10400	3884	17:23	480	1.679	1.470	1.420	1.691	1.565	2 3/4	
10400	3884	18:23	540	1.684	1.472	1.423	1.706	1.571	2 3/4	
10400	3884	19:23	600	1.685	1.475	1.427	1.705	1.573	2 49/64	
10400	3884	20:23	660	1.698	1.479	1.432	1.718	1.582	2 25/32	
10400	3884	21:23	720	1.790	1.483	1.437	1.729	1.610	2 25/32	
7800	2935	21:31	0	1.710	1.484	1.440	1.730	1.591	2 25/32	
7800	2935	22:26	55	1.710	1.486	1.441	1.730	1.592	2 25/32	
7800	2935	22:31	60	1.710	1.489	1.443	1.730	1.593	2 25/32	
5200	1986	22:36	0	1.692	1.489	1.447	1.711	1.585	2 3/4	
5200	1986	23:31	55	1.689	1.488	1.446	1.710	1.583	2 3/4	
5200	1986	23:36	60	1.689	1.491	1.450	1.710	1.585	2 3/4	
2600	1037	23:38	0	1.658	1.485	1.445	1.675	1.566	2 23/32	
2600	1037	0:36	55	1.654	1.488	1.448	1.673	1.566	2 23/32	
2600	1037	0:41	60	1.653	1.487	1.448	1.672	1.565	2 23/32	
0	0	8:30	0	1.518	1.439	1.416	1.538	1.478	--	No transit reading
0	0	9:25	55	1.487	1.414	1.396	1.513	1.453	--	No transit reading
0	0	9:30	60	1.487	1.414	1.396	1.512	1.452	--	No transit reading

AXIAL COMPRESSION LOAD TEST - SITE #1 (SILT/CLAY, 1,500 PSF BEARING)
DIAMOND PIER #CL-C-DP50-2, 1" NOMINAL DIAMETER x 50" LONG PINS
INSTALLED 4/4/16, TESTED 4/13/16-4/14/16

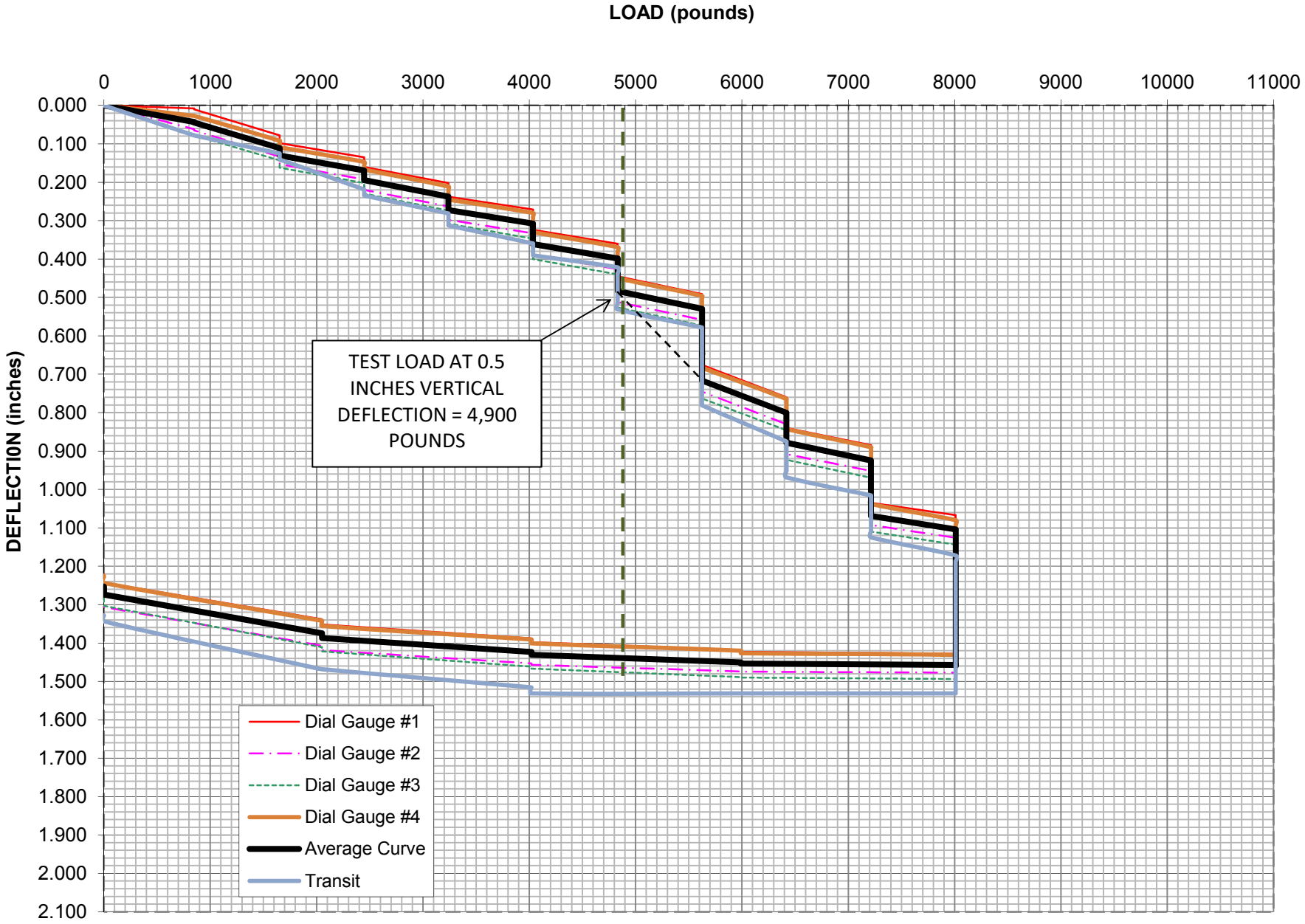


Project Name: Diamond Pier Compression Field Load Testing
EEI Project No.: 07-020
Site: Site #1 - Silt/Clay with presumptive bearing capacity of 1,500 psi
Test Method: Compression
Diamond Pier Tested: #CL-C-DP50-2
Date Installed: 4/4/2016
Date Test Started: 4/13/2016
Date Test Completed: 4/14/2016
Staff: Ken Andrieu, Pete Furlong
Hydraulic Ram: EEI Equipment #EEI 022
Equation of the Line: Load = (Gauge Pressure - 2) / 0.361
Dial Gauge #1: EEI Equipment #EEI 33
Dial Gauge #2: EEI Equipment #EEI 34
Dial Gauge #3: EEI Equipment #EEI 35
Dial Gauge #4: EEI Equipment #EEI 36

Load (pounds)	Gauge Pressure (psi)	Clock	Minutes	Dial Gauge #1 (in.)	Dial Gauge #2 (in.)	Dial Gauge #3 (in.)	Dial Gauge #4 (in.)	Dial Gauge Average (in.)	Transit (in.)	Test Remarks
0	0		0	0.000	0.000	0.000	0.000	0.000	1 1/32	
800	291	16:58	0	0.005	0.004	0.005	0.014	0.007	1 3/64	
800	291	16:59	1	0.007	0.005	0.006	0.018	0.009	1 3/64	
800	291	17:00	2	0.010	0.005	0.007	0.018	0.010	1 3/64	
800	291	17:01	3	0.010	0.006	0.008	0.018	0.011	1 3/64	
800	291	17:02	4	0.017	0.008	0.008	0.016	0.012	1 3/64	
800	291	17:03	5	0.017	0.008	0.009	0.016	0.013	1 3/64	
800	291	17:08	10	0.017	0.009	0.010	0.016	0.013	1 3/64	
800	291	17:13	15	0.017	0.009	0.011	0.016	0.013	1 3/64	
800	291	17:28	30	0.017	0.008	0.010	0.016	0.013	1 3/64	
1600	580	17:35	0	0.055	0.041	0.012	0.055	0.041	1 1/16	
1600	580	17:36	1	0.057	0.043	0.043	0.057	0.050	1 1/16	
1600	580	17:37	2	0.060	0.045	0.046	0.060	0.053	1 1/16	
1600	580	17:38	3	0.061	0.047	0.047	0.061	0.054	1 1/16	
1600	580	17:39	4	0.062	0.048	0.048	0.061	0.055	1 1/16	
1600	580	17:40	5	0.065	0.048	0.048	0.064	0.056	1 1/16	
1600	580	17:45	10	0.065	0.049	0.049	0.064	0.057	1 1/16	
1600	580	17:55	15	0.065	0.050	0.050	0.064	0.057	1 1/16	
1600	580	18:10	30	0.067	0.050	0.050	0.065	0.058	1 1/16	
2400	868	18:11	0	0.094	0.078	0.080	0.095	0.087	1 7/64	
2400	868	18:12	1	0.080	0.081	0.080	0.098	0.085	1 7/64	
2400	868	18:13	2	0.099	0.082	0.081	0.099	0.090	1 7/64	
2400	868	18:14	3	0.100	0.083	0.081	0.100	0.091	1 7/64	
2400	868	18:15	4	0.100	0.083	0.082	0.100	0.091	1 7/64	
2400	868	18:16	5	0.101	0.083	0.082	0.100	0.092	1 7/64	
2400	868	18:21	10	0.112	0.092	0.091	0.110	0.101	1 7/64	
2400	868	18:26	15	0.112	0.093	0.091	0.110	0.102	1 7/64	
2400	868	18:41	30	0.112	0.093	0.092	0.110	0.102	1 7/64	
3200	1157	18:42	0	0.146	0.127	0.126	0.145	0.136	1 5/32	
3200	1157	18:43	1	0.150	0.131	0.129	0.149	0.140	1 5/32	
3200	1157	18:44	2	0.152	0.132	0.130	0.150	0.141	1 5/32	
3200	1157	18:45	3	0.153	0.133	0.131	0.151	0.142	1 5/32	
3200	1157	18:46	4	0.153	0.134	0.132	0.152	0.143	1 5/32	
3200	1157	18:47	5	0.154	0.134	0.132	0.152	0.143	1 11/64	
3200	1157	18:52	10	0.156	0.136	0.134	0.154	0.145	1 11/64	
3200	1157	18:57	15	0.158	0.137	0.135	0.154	0.146	1 11/64	
3200	1157	19:12	30	0.160	0.139	0.137	0.157	0.148	1 11/64	
4000	1446	19:17	0	0.205	0.186	0.183	0.204	0.195	1 13/64	
4000	1446	19:18	1	0.210	0.191	0.187	0.209	0.199	1 13/64	
4000	1446	19:19	2	0.215	0.194	0.190	0.212	0.203	1 13/64	
4000	1446	19:20	3	0.217	0.196	0.192	0.214	0.205	1 13/64	
4000	1446	19:21	4	0.218	0.197	0.193	0.215	0.206	1 13/64	
4000	1446	19:22	5	0.218	0.197	0.194	0.215	0.206	1 13/64	
4000	1446	19:27	10	0.225	0.204	0.201	0.221	0.213	1 7/32	
4000	1446	19:32	15	0.227	0.206	0.202	0.223	0.215	1 7/32	
4000	1446	19:47	30	0.228	0.207	0.203	0.224	0.216	1 7/32	
4800	1735	19:50	0	0.261	0.241	0.237	0.260	0.250	1 17/64	
4800	1735	19:51	1	0.269	0.248	0.244	0.266	0.257	1 17/64	
4800	1735	19:52	2	0.274	0.253	0.249	0.271	0.262	1 17/64	
4800	1735	19:53	3	0.278	0.257	0.253	0.275	0.266	1 17/64	
4800	1735	19:54	4	0.280	0.260	0.256	0.277	0.268	1 17/64	
4800	1735	19:55	5	0.282	0.262	0.257	0.279	0.270	1 9/32	
4800	1735	20:00	10	0.286	0.266	0.262	0.283	0.274	1 9/32	
4800	1735	20:05	15	0.288	0.268	0.263	0.285	0.276	1 9/32	
4800	1735	20:20	30	0.289	0.270	0.266	0.287	0.278	1 9/32	
5600	2024	20:22	0	0.342	0.322	0.318	0.341	0.331	1 23/64	
5600	2024	20:23	1	0.349	0.328	0.324	0.346	0.337	1 23/64	
5600	2024	20:24	2	0.351	0.330	0.326	0.348	0.339	1 23/64	
5600	2024	20:25	3	0.354	0.333	0.328	0.351	0.342	1 23/64	

5600	2024	20:26	4	0.355	0.335	0.330	0.352	0.343	1 23/64	
5600	2024	20:27	5	0.357	0.336	0.331	0.353	0.344	1 23/64	
5600	2024	20:32	10	0.360	0.339	0.335	0.357	0.348	1 23/64	
5600	2024	20:37	15	0.362	0.341	0.337	0.359	0.350	1 3/8	
5600	2024	20:52	30	0.381	0.361	0.357	0.378	0.369	1 25/64	
5600	2024	21:07	45	0.386	0.367	0.362	0.384	0.375	1 25/64	
5600	2024	21:22	60	0.389	0.369	0.365	0.386	0.377	1 25/64	
6400	2312	21:32	0	0.427	0.409	0.405	0.425	0.417	1 29/64	
6400	2312	21:33	1	0.436	0.418	0.414	0.434	0.426	1 15/32	
6400	2312	21:34	2	0.443	0.424	0.419	0.440	0.432	1 15/32	
6400	2312	21:35	3	0.453	0.435	0.430	0.451	0.442	1 31/64	
6400	2312	21:36	4	0.459	0.440	0.435	0.456	0.448	1 31/64	
6400	2312	21:37	5	0.461	0.443	0.438	0.458	0.450	1 31/64	
6400	2312	21:42	10	0.470	0.452	0.447	0.467	0.459	1 1/2	
6400	2312	21:47	15	0.474	0.456	0.451	0.471	0.463	1 1/2	
6400	2312	22:02	30	0.480	0.463	0.458	0.477	0.470	1 1/2	
6400	2312	22:17	45	0.484	0.466	0.461	0.480	0.473	1 33/64	
6400	2312	22:32	60	0.485	0.468	0.463	0.481	0.474	1 33/64	
7200	2601	22:35	0	0.574	0.559	0.553	0.574	0.565	1 41/64	
7200	2601	22:36	1	0.584	0.568	0.562	0.581	0.574	1 41/64	
7200	2601	22:37	2	0.599	0.583	0.578	0.598	0.590	1 21/32	
7200	2601	22:38	3	0.617	0.601	0.596	0.615	0.607	1 43/64	
7200	2601	22:39	4	0.630	0.613	0.607	0.627	0.619	1 11/16	
7200	2601	22:40	5	0.638	0.623	0.617	0.637	0.629	1 45/64	
7200	2601	22:45	10	0.676	0.658	0.652	0.672	0.665	1 3/4	
7200	2601	22:50	15	0.700	0.683	0.677	0.696	0.689	1 51/64	
7200	2601	23:05	30	0.729	0.712	0.707	0.726	0.719	1 53/64	
7200	2601	23:20	45	0.744	0.729	0.724	0.741	0.735	1 27/32	
7200	2601	23:35	60	0.749	0.735	0.729	0.745	0.740	1 27/32	
7200	2601	23:50	75	0.751	0.738	0.732	0.747	0.742	1 27/32	
8000	2890	23:57	0	0.852	0.840	0.833	0.850	0.844	1 61/64	
8000	2890	23:58	1	0.875	0.865	0.860	0.878	0.870	1 31/32	
8000	2890	23:59	2	0.906	0.894	0.889	0.908	0.899	1 63/64	
8000	2890	0:00	3	0.921	0.908	0.901	0.919	0.912	1 63/64	
8000	2890	0:01	4	0.929	0.915	0.908	0.925	0.919	2	
8000	2890	0:02	5	0.935	0.920	0.913	0.931	0.925	2 1/16	
8000	2890	0:07	10	1.009	0.989	0.983	1.007	0.997	2 9/64	
8000	2890	0:12	15	1.048	1.036	1.030	1.047	1.040	2 11/64	
8000	2890	0:27	30	1.136	1.123	1.116	1.132	1.127	2 17/64	
8000	2890	0:42	45	1.191	1.180	1.172	1.188	1.183	2 5/16	
8000	2890	0:57	60	1.239	1.228	1.220	1.235	1.231	2 3/8	
8000	2890	1:12	75	1.248	1.251	1.256	1.246	1.250	2 3/8	
8000	2890	1:27	90	1.253	1.265	1.269	1.260	1.262	2 25/64	
8000	2890	1:42	105	1.264	1.273	1.278	1.272	1.272	2 25/64	
8000	2890	1:57	120	1.265	1.275	1.280	1.274	1.274	2 13/32	
8000	2890	2:57	180	1.282	1.291	1.296	1.290	1.290	2 13/32	
8000	2890	3:57	240	1.287	1.294	1.299	1.294	1.294	2 27/64	
8000	2890	4:57	300	1.347	1.353	1.358	1.354	1.353	2 1/2	
8000	2890	5:57	360	1.356	1.360	1.365	1.363	1.361	2 1/2	
8000	2890	6:57	420	1.362	1.365	1.370	1.369	1.367	2 1/2	
8000	2890	7:57	480	1.409	1.412	1.416	1.418	1.414	2 35/64	
8000	2890	8:57	540	1.452	1.454	1.449	1.450	1.451	2 19/32	
8000	2890	9:57	600	1.494	1.496	1.490	1.490	1.493	2 41/64	
8000	2890	10:57	660	1.506	1.506	1.502	1.503	1.504	2 21/32	
8000	2890	12:19	770	1.533	1.535	1.530	1.530	1.532	2 11/16	
6000	2168	12:28	0	1.536	1.541	1.536	1.534	1.537	2 43/64	
6000	2168	13:23	55	1.537	1.531	1.531	1.533	1.533	2 43/64	
6000	2168	13:28	60	1.537	1.531	1.531	1.533	1.533	2 43/64	
4000	1446	13:30	0	1.516	1.513	1.512	1.513	1.514	2 41/64	
4000	1446	14:25	55	1.513	1.505	1.500	1.510	1.507	2 41/64	
4000	1446	14:30	60	1.511	1.505	1.506	1.508	1.508	2 41/64	
2000	724	14:36	0	1.470	1.466	1.465	1.463	1.466	2 37/64	
2000	724	15:31	55	1.465	1.460	1.461	1.460	1.462	2 37/64	
2000	724	15:36	60	1.464	1.460	1.460	1.460	1.461	2 37/64	
0	0	15:42	0	1.352	1.347	1.353	1.349	1.350	--	Transit reading not taken
0	0	16:37	55	1.332	1.325	1.331	1.329	1.329	--	Transit reading not taken
0	0	16:42	60	1.331	1.325	1.332	1.329	1.329	--	Transit reading not taken

AXIAL COMPRESSION LOAD TEST - SITE #1 (SILT/CLAY, 1,500 PSF BERING)
DIAMOND PIER #CL-C-DP50-4, 1" NOMINAL DIAMETER x 50" LONG PINS
INSTALLED 4/4/16, TESTED 4/21/16-4/22/16

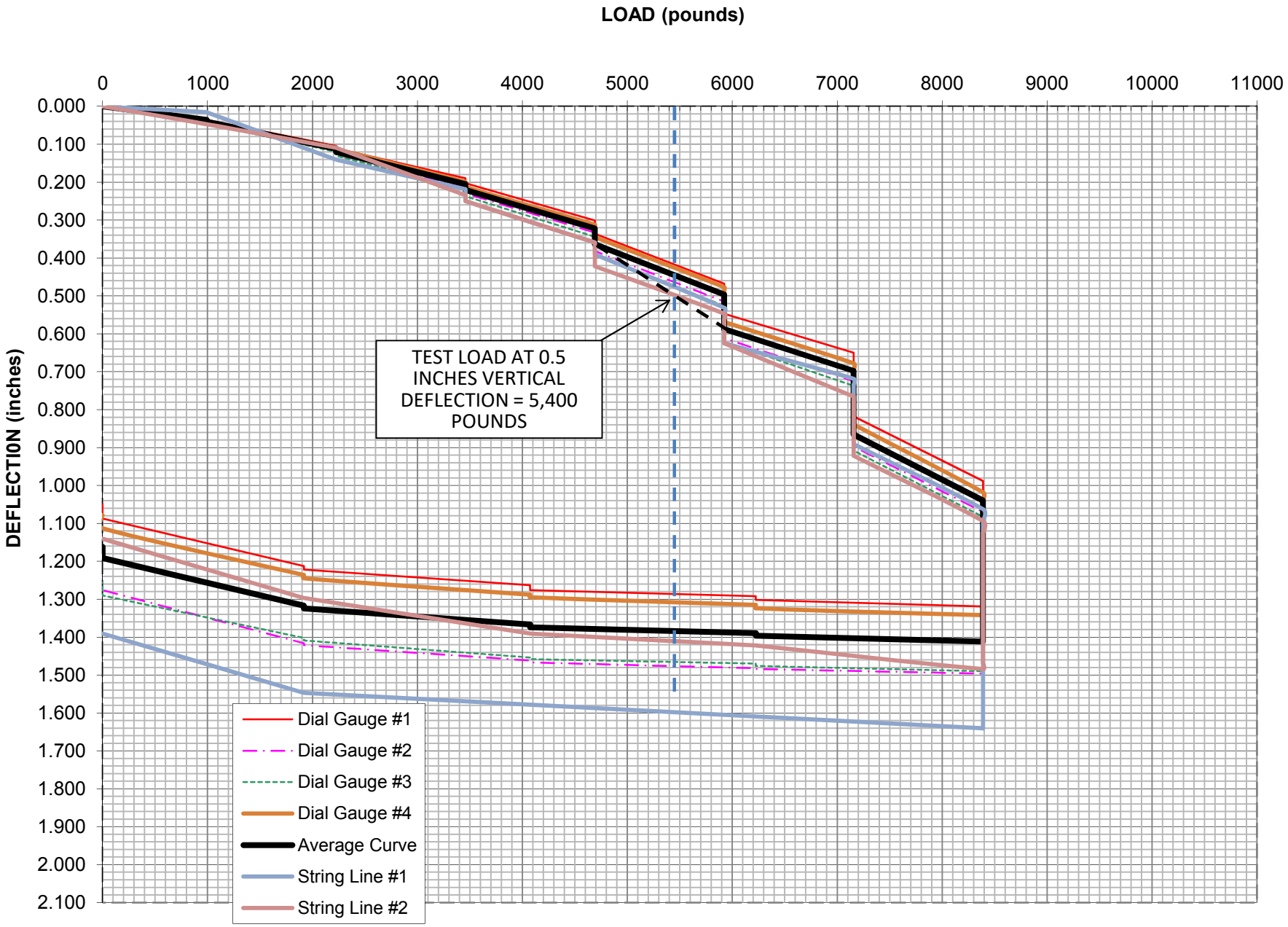


Project Name: Diamond Pier Compression Field Load Testing
EEI Project No.: 07-020
Site: Site #1 - Silt/Clay with presumptive bearing capacity of 1,500 psf
Test Method: Compression
Diamond Pier Tested: #CL-C-DP50-4
Date Installed: 4/4/2016
Date Test Started: 4/21/2016
Date Test Completed: 4/22/2016
Staff: Ken Andrieu, Bruce Lane
Hydraulic Ram: EEI Equipment #EEI 41 (Rented ram was used on the center pier)
Equation of the Line: Load = (Gauge Pressure - 39.6) / 0.46
Dial Gauge #1: EEI Equipment #EEI 33
Dial Gauge #2: EEI Equipment #EEI 34
Dial Gauge #3: EEI Equipment #EEI 35
Dial Gauge #4: EEI Equipment #EEI 36

Load (pounds)	Gauge Pressure (psi)	Clock	Minutes	Dial Gauge #1 (in.)	Dial Gauge #2 (in.)	Dial Gauge #3 (in.)	Dial Gauge #4 (in.)	Dial Gauge Average (in.)	Transit (in.)	Test Remarks
0	0	16:45	0	0.000	0.000	0.000	0.000	0.000	1 1/64	
849	430	16:47	0	0.008	0.062	0.076	0.027	0.043	1 3/32	
849	430	16:48	1	0.009	0.062	0.076	0.027	0.044	1 3/32	
849	430	16:49	2	0.009	0.062	0.076	0.027	0.044	1 3/32	
849	430	16:50	3	0.009	0.062	0.076	0.027	0.044	1 3/32	
849	430	16:51	4	0.009	0.062	0.076	0.027	0.044	1 3/32	
849	430	16:52	5	0.009	0.062	0.076	0.027	0.044	1 3/32	
849	430	16:57	10	0.009	0.062	0.076	0.027	0.044	1 3/32	
849	430	17:02	15	0.010	0.065	0.078	0.027	0.045	1 3/32	
1653	800	17:03	0	0.078	0.133	0.143	0.092	0.112	1 9/64	
1653	800	17:04	1	0.086	0.138	0.148	0.097	0.117	1 9/64	
1653	800	17:05	2	0.091	0.143	0.154	0.103	0.123	1 9/64	
1653	800	17:06	3	0.094	0.146	0.156	0.105	0.125	1 9/64	
1653	800	17:07	4	0.094	0.147	0.157	0.105	0.126	1 9/64	
1653	800	17:08	5	0.095	0.147	0.157	0.105	0.126	1 5/32	
1653	800	17:13	10	0.097	0.150	0.159	0.108	0.129	1 5/32	
1653	800	17:18	15	0.098	0.151	0.160	0.109	0.130	1 5/32	
1653	800	17:33	30	0.098	0.153	0.162	0.109	0.131	1 5/32	
2447	1165	17:34	0	0.135	0.193	0.202	0.147	0.169	1 15/64	
2447	1165	17:35	1	0.146	0.202	0.211	0.156	0.179	1 15/64	
2447	1165	17:36	2	0.150	0.205	0.214	0.159	0.182	1 15/64	
2447	1165	17:37	3	0.151	0.207	0.216	0.160	0.184	1 15/64	
2447	1165	17:38	4	0.154	0.210	0.219	0.162	0.186	1 15/64	
2447	1165	17:39	5	0.154	0.210	0.219	0.163	0.187	1 15/64	
2447	1165	17:44	10	0.158	0.214	0.223	0.166	0.190	1 1/4	
2447	1165	17:49	15	0.159	0.217	0.226	0.167	0.192	1 1/4	
2447	1165	18:04	30	0.160	0.220	0.230	0.167	0.194	1 1/4	
3240	1530	18:05	0	0.202	0.263	0.274	0.211	0.238	1 19/64	
3240	1530	18:06	1	0.210	0.271	0.282	0.219	0.246	1 19/64	
3240	1530	18:07	2	0.217	0.277	0.288	0.225	0.252	1 19/64	
3240	1530	18:08	3	0.220	0.279	0.290	0.227	0.254	1 19/64	
3240	1530	18:09	4	0.224	0.283	0.293	0.231	0.258	1 5/16	
3240	1530	18:10	5	0.226	0.287	0.297	0.233	0.261	1 5/16	
3240	1530	18:15	10	0.232	0.292	0.302	0.238	0.266	1 5/16	
3240	1530	18:20	15	0.235	0.295	0.305	0.241	0.269	1 5/16	
3240	1530	18:35	30	0.238	0.298	0.308	0.244	0.272	1 21/64	
3240	1530	18:50	45	0.238	0.298	0.308	0.245	0.272	1 21/64	
4036	1896	18:51	0	0.271	0.333	0.347	0.280	0.308	1 3/8	
4036	1896	18:52	1	0.280	0.342	0.355	0.289	0.317	1 3/8	
4036	1896	18:53	2	0.291	0.353	0.365	0.299	0.327	1 3/8	
4036	1896	18:54	3	0.295	0.356	0.368	0.302	0.330	1 3/8	
4036	1896	18:55	4	0.299	0.361	0.374	0.306	0.335	1 3/8	
4036	1896	18:56	5	0.302	0.364	0.376	0.309	0.338	1 25/64	
4036	1896	19:01	10	0.308	0.371	0.383	0.315	0.344	1 25/64	
4036	1896	19:06	15	0.313	0.375	0.387	0.319	0.349	1 25/64	
4036	1896	19:21	30	0.319	0.383	0.395	0.325	0.356	1 25/64	
4036	1896	19:36	45	0.323	0.387	0.398	0.329	0.359	1 13/32	
4036	1896	19:51	60	0.324	0.390	0.400	0.330	0.361	1 13/32	
4831	2262	19:52	0	0.360	0.426	0.440	0.369	0.399	1 7/16	
4831	2262	19:53	1	0.371	0.436	0.450	0.380	0.409	1 29/64	
4831	2262	19:54	2	0.381	0.446	0.459	0.389	0.419	1 15/32	
4831	2262	19:55	3	0.385	0.450	0.463	0.391	0.422	1 31/64	
4831	2262	19:56	4	0.386	0.451	0.465	0.393	0.424	1 31/64	
4831	2262	19:57	5	0.392	0.457	0.470	0.399	0.430	1 31/64	
4831	2262	20:02	10	0.401	0.466	0.480	0.408	0.439	1 31/64	
4831	2262	20:07	15	0.407	0.473	0.486	0.414	0.445	1 1/2	
4831	2262	20:22	30	0.415	0.481	0.495	0.421	0.453	1 1/2	
4831	2262	20:37	45	0.421	0.488	0.502	0.427	0.460	1 33/64	
4831	2262	20:52	60	0.426	0.493	0.507	0.432	0.465	1 33/64	
4831	2262	21:07	75	0.431	0.499	0.512	0.436	0.470	1 17/32	
4831	2262	21:22	90	0.438	0.504	0.518	0.443	0.476	1 17/32	
4831	2262	21:37	105	0.442	0.509	0.522	0.447	0.480	1 17/32	
4831	2262	21:52	120	0.445	0.512	0.526	0.450	0.483	1 35/64	
5625	2627	21:56	0	0.491	0.558	0.573	0.496	0.530	1 19/32	
5625	2627	21:57	1	0.496	0.564	0.578	0.501	0.535	1 19/32	
5625	2627	21:58	2	0.506	0.574	0.588	0.511	0.545	1 5/8	
5625	2627	21:59	3	0.515	0.582	0.597	0.520	0.554	1 5/8	
5625	2627	22:00	4	0.520	0.588	0.602	0.525	0.559	1 5/8	
5625	2627	22:01	5	0.528	0.595	0.609	0.533	0.566	1 5/8	
5625	2627	22:06	10	0.546	0.613	0.627	0.550	0.584	1 21/32	
5625	2627	22:11	15	0.557	0.623	0.637	0.561	0.595	1 21/32	
5625	2627	22:26	30	0.573	0.640	0.653	0.577	0.611	1 43/64	

5625	2627	22:41	45	0.582	0.650	0.663	0.586	0.620	1 11/16	
5625	2627	22:56	60	0.588	0.657	0.670	0.593	0.627	1 45/64	
5625	2627	23:11	75	0.597	0.665	0.679	0.601	0.636	1 47/64	
5625	2627	23:26	90	0.601	0.670	0.684	0.605	0.640	1 47/64	
5625	2627	23:41	105	0.606	0.675	0.689	0.610	0.645	1 47/64	
5625	2627	23:56	120	0.610	0.679	0.693	0.614	0.649	1 47/64	After this load increment, the 2 outer piers were loaded
5625	2627	23:59	1	0.608	0.679	0.694	0.615	0.649	1 47/64	Applied 1,400 lb. load to outside piers
5625	2627	0:01	1	0.603	0.673	0.688	0.614	0.645	1 47/64	Applied 2,800 lb. load to outside piers
5625	2627	0:03	1	0.624	0.692	0.713	0.635	0.666	1 3/4	Applied 4,20o lb. load to outside piers
5625	2627	0:05	0	0.641	0.708	0.726	0.649	0.681	1 49/64	Applied 5,625 lb. load to outside piers
5625	2627	0:06	1	0.646	0.713	0.731	0.654	0.686	1 49/64	
5625	2627	0:07	2	0.649	0.716	0.734	0.657	0.689	1 49/64	
5625	2627	0:08	3	0.651	0.718	0.736	0.658	0.691	1 49/64	
5625	2627	0:09	4	0.653	0.720	0.738	0.660	0.693	1 49/64	
5625	2627	0:10	5	0.654	0.721	0.739	0.661	0.694	1 25/32	
5625	2627	0:15	10	0.660	0.728	0.745	0.668	0.700	1 25/32	
5625	2627	0:20	15	0.664	0.732	0.750	0.671	0.704	1 25/32	
5625	2627	0:35	30	0.667	0.736	0.754	0.675	0.708	1 25/32	
5625	2627	0:50	45	0.672	0.741	0.758	0.679	0.713	1 51/64	
5625	2627	1:05	60	0.676	0.745	0.763	0.683	0.717	1 51/64	Removed the load entirely on the outer 2 piers after this reading was taken
6418	2992	1:09	0	0.760	0.830	0.846	0.764	0.800	1 57/64	
6418	2992	1:10	1	0.763	0.833	0.849	0.767	0.803	1 57/64	
6418	2992	1:11	2	0.765	0.835	0.850	0.768	0.805	1 57/64	
6418	2992	1:12	3	0.766	0.836	0.852	0.770	0.806	1 57/64	
6418	2992	1:13	4	0.774	0.843	0.860	0.778	0.814	1 57/64	
6418	2992	1:14	5	0.778	0.847	0.863	0.781	0.817	1 29/32	
6418	2992	1:19	10	0.790	0.859	0.875	0.793	0.829	1 29/32	
6418	2992	1:24	15	0.796	0.865	0.881	0.800	0.836	1 15/16	
6418	2992	1:39	30	0.807	0.877	0.892	0.810	0.847	1 15/16	
6418	2992	1:54	45	0.811	0.880	0.895	0.814	0.850	1 15/16	
6418	2992	2:09	60	0.813	0.882	0.897	0.816	0.852	1 15/16	
6418	2992	2:24	75	0.815	0.883	0.898	0.818	0.854	1 31/32	
6418	2992	2:39	90	0.828	0.895	0.911	0.831	0.866	1 31/32	
6418	2992	2:54	105	0.836	0.904	0.919	0.840	0.875	1 31/32	
6418	2992	3:09	120	0.840	0.908	0.923	0.843	0.879	1 63/64	
7214	3358	3:10	0	0.885	0.952	0.970	0.890	0.924	2 1/32	
7214	3358	3:11	1	0.888	0.955	0.972	0.893	0.927	2 1/32	
7214	3358	3:12	2	0.898	0.965	0.982	0.904	0.937	2 1/32	
7214	3358	3:13	3	0.911	0.978	0.995	0.916	0.950	2 3/64	
7214	3358	3:14	4	0.919	0.985	1.003	0.924	0.958	2 3/64	
7214	3358	3:15	5	0.924	0.991	1.007	0.929	0.963	2 3/64	
7214	3358	3:16	10	0.939	1.004	1.021	0.942	0.977	2 3/64	
7214	3358	3:17	15	0.942	1.007	1.024	0.945	0.980	2 3/64	
7214	3358	3:18	30	0.958	1.023	1.042	0.964	0.997	2 1/16	
7214	3358	3:19	45	0.975	1.040	1.057	0.979	1.013	2 5/64	
7214	3358	4:10	60	0.987	1.057	1.068	0.991	1.026	2 3/32	
7214	3358	4:25	75	1.001	1.063	1.079	1.025	1.042	2 7/64	
7214	3358	4:40	90	1.014	1.074	1.091	1.017	1.049	2 7/64	
7214	3358	4:55	105	1.022	1.081	1.098	1.025	1.057	2 1/8	
7214	3358	5:10	120	1.035	1.093	1.110	1.038	1.069	2 9/64	
8010	3724	5:12	0	1.067	1.126	1.144	1.080	1.104	2 3/16	
8010	3724	5:13	1	1.091	1.148	1.165	1.093	1.124	2 13/64	
8010	3724	5:14	2	1.093	1.151	1.168	1.096	1.127	2 13/64	
8010	3724	5:15	3	1.095	1.152	1.169	1.098	1.129	2 13/64	
8010	3724	5:16	4	1.107	1.165	1.182	1.111	1.141	2 7/32	
8010	3724	5:17	5	1.115	1.172	1.190	1.120	1.149	2 7/32	
8010	3724	5:22	10	1.136	1.193	1.210	1.140	1.170	2 1/4	
8010	3724	5:27	15	1.168	1.224	1.241	1.170	1.201	2 19/64	
8010	3724	5:42	30	1.211	1.266	1.282	1.213	1.243	2 11/32	
8010	3724	5:57	45	1.236	1.290	1.300	1.238	1.266	2 23/64	
8010	3724	6:12	60	1.246	1.299	1.314	1.247	1.277	2 23/64	
8010	3724	6:27	75	1.255	1.306	1.323	1.257	1.285	2 3/8	
8010	3724	6:42	90	1.271	1.321	1.337	1.272	1.300	2 25/64	
8010	3724	6:57	105	1.280	1.330	1.345	1.281	1.309	2 25/64	
8010	3724	7:12	120	1.285	1.334	1.349	1.286	1.314	2 13/32	
8010	3724	8:12	180	1.300	1.340	1.360	1.300	1.325	2 27/64	
8010	3724	9:12	240	1.326	1.371	1.387	1.329	1.353	2 7/16	
8010	3724	10:12	300	1.356	1.395	1.412	1.359	1.381	2 29/64	
8010	3724	11:12	360	1.383	1.414	1.430	1.387	1.404	2 31/64	
8010	3724	12:12	420	1.419	1.441	1.457	1.422	1.435	2 33/64	
8010	3724	13:12	480	1.420	1.447	1.464	1.427	1.440	2 17/32	
8010	3724	14:12	540	1.424	1.456	1.474	1.427	1.445	2 17/32	
8010	3724	15:12	600	1.435	1.471	1.488	1.440	1.459	2 35/64	
8010	3724	16:12	660	1.435	1.475	1.492	1.439	1.460	2 35/64	
8010	3724	17:12	720	1.428	1.477	1.494	1.431	1.458	2 35/64	
5990	2795	17:13	0	1.423	1.475	1.490	1.427	1.454	2 35/64	
5990	2795	17:33	20	1.423	1.474	1.490	1.427	1.454	2 35/64	
5990	2795	17:53	40	1.422	1.474	1.490	1.426	1.453	2 35/64	
5990	2795	18:13	60	1.418	1.474	1.489	1.420	1.450	2 35/64	
4020	1889	18:13	0	1.398	1.457	1.467	1.401	1.431	2 35/64	
4020	1889	18:33	20	1.393	1.454	1.463	1.397	1.427	2 17/32	
4020	1889	18:53	40	1.391	1.453	1.463	1.394	1.425	2 17/32	
4020	1889	19:13	60	1.388	1.453	1.462	1.391	1.424	2 17/32	
2051	983	19:13	0	1.352	1.419	1.422	1.356	1.387	2 31/64	
2051	983	19:33	20	1.343	1.411	1.414	1.348	1.379	2 31/64	
2051	983	19:53	40	1.340	1.408	1.412	1.344	1.376	2 31/64	
2051	983	20:13	60	1.338	1.407	1.411	1.342	1.375	2 31/64	
0	0	20:13	0	1.243	1.306	1.303	1.244	1.274	2 23/64	
0	0	20:33	20	1.225	1.289	1.286	1.228	1.257	2 11/32	
0	0	20:53	40	1.223	1.287	1.283	1.226	1.255	2 11/32	
0	0	21:13	60	1.221	1.285	1.282	1.225	1.253	2 11/32	

AXIAL COMPRESSION LOAD TEST - SITE #2 (SAND, 2,000 PSF BEARING)
DIAMOND PIER #SA-C-DP50-1, 1" NOMINAL DIAMETER x 50" LONG PINS
INSTALLED 4/4/16, TESTED 4/6/16-4/7/16

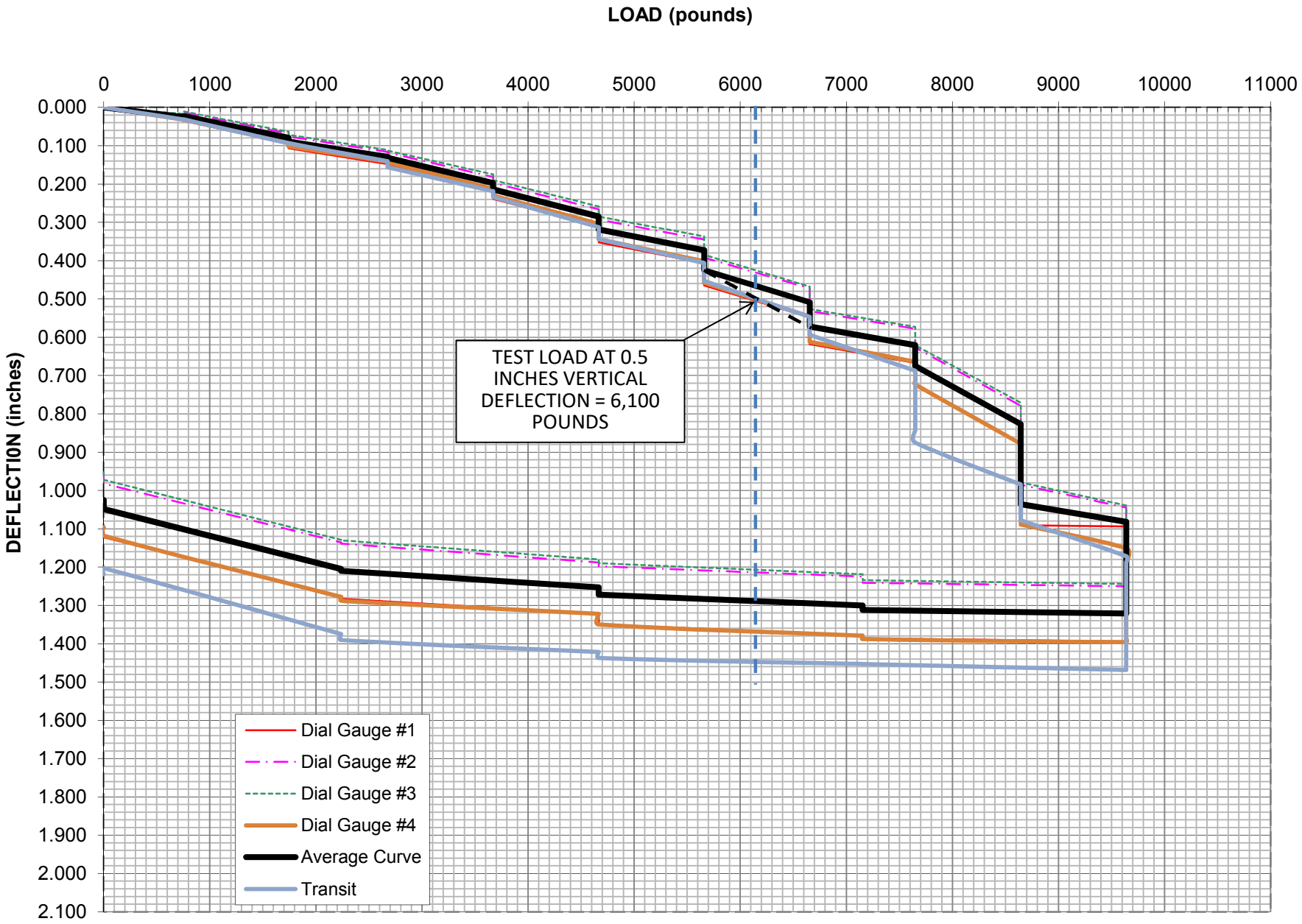


Project Name:	Diamond Pier Compression Field Load Testing
EEI Project No.:	07-020
Site:	Site #2 - Sand with presumptive bearing capacity of 2,000 psf
Test Method:	Compression
Diamond Pier Tested:	#SA-C-DP50-1
Date Installed:	4/4/2016
Date Test Started:	4/6/2016
Date Test Completed:	4/7/2016
Staff:	Troy Hull, Ken Andrieu & Bruce Lane
Hydraulic Ram:	EEI Equipment #EEI 021
Equation of the Line:	Load = (Gauge Pressure - 88) / 0.365
Dial Gauge #1:	EEI Equipment #EEI 33
Dial Gauge #2:	EEI Equipment #EEI 34
Dial Gauge #3:	EEI Equipment #EEI 35
Dial Gauge #4:	EEI Equipment #EEI 36

Load (pounds)	Gauge Pressure (psi)	Clock	Minutes	Dial Gauge #1 (in.)	Dial Gauge #2 (in.)	Dial Gauge #3 (in.)	Dial Gauge #4 (in.)	Dial Gauge Average (in.)	String Line #1	String Line #2	Test Remarks
0	0	15:09	0	0.000	0.000	0.000	0.000	0.000	23/32	1 37/64	
992	450	15:10	0	0.032	0.036	0.037	0.037	0.036	47/64	1 5/8	
992	450	15:11	1	0.033	0.036	0.037	0.037	0.036	47/64	1 5/8	
992	450	15:12	2	0.034	0.037	0.038	0.039	0.037	47/64	1 5/8	
992	450	15:13	3	0.035	0.039	0.039	0.039	0.038	47/64	1 5/8	
992	450	15:14	4	0.035	0.039	0.039	0.040	0.038	47/64	1 5/8	
992	450	15:15	5	0.035	0.039	0.040	0.040	0.039	47/64	1 5/8	
992	450	15:20	10	0.036	0.040	0.040	0.040	0.039	47/64	1 5/8	
992	450	15:25	15	0.036	0.041	0.041	0.040	0.040	47/64	1 5/8	
992	450	15:40	30	0.036	0.043	0.043	0.040	0.041	47/64	1 5/8	
2225	900	15:42	0	0.104	0.116	0.120	0.109	0.112	55/64	1 11/16	
2225	900	15:43	1	0.106	0.118	0.122	0.111	0.114	55/64	1 11/16	
2225	900	15:44	2	0.108	0.121	0.125	0.113	0.117	55/64	1 11/16	
2225	900	15:45	3	0.108	0.121	0.125	0.113	0.117	55/64	1 11/16	
2225	900	15:46	4	0.109	0.122	0.126	0.114	0.118	55/64	1 11/16	
2225	900	15:47	5	0.109	0.122	0.126	0.114	0.118	55/64	1 11/16	
2225	900	15:52	10	0.111	0.124	0.127	0.114	0.119	55/64	1 11/16	
2225	900	15:57	15	0.111	0.125	0.128	0.114	0.120	55/64	1 11/16	
2225	900	16:12	30	0.111	0.126	0.130	0.113	0.120	55/64	1 11/16	
3458	1350	16:15	0	0.190	0.213	0.220	0.199	0.206	15/16	1 13/16	
3458	1350	16:16	1	0.194	0.214	0.222	0.201	0.208	15/16	1 13/16	
3458	1350	16:17	2	0.195	0.215	0.223	0.203	0.209	15/16	1 13/16	
3458	1350	16:18	3	0.196	0.217	0.225	0.204	0.211	61/64	1 13/16	
3458	1350	16:19	4	0.196	0.217	0.225	0.205	0.211	61/64	1 13/16	
3458	1350	16:20	5	0.196	0.218	0.225	0.205	0.211	61/64	1 13/16	
3458	1350	16:25	10	0.200	0.223	0.230	0.208	0.215	61/64	1 13/16	
3458	1350	16:30	15	0.202	0.227	0.234	0.211	0.219	31/32	1 53/64	
3458	1350	16:45	30	0.203	0.230	0.237	0.213	0.221	31/32	1 53/64	
4690	1,800	16:48	0	0.301	0.333	0.344	0.312	0.323	1 5/64	1 15/16	
4690	1,800	16:49	1	0.307	0.336	0.348	0.315	0.327	1 5/64	1 15/16	
4690	1,800	16:50	2	0.314	0.346	0.357	0.323	0.335	1 5/64	1 15/16	
4690	1,800	16:51	3	0.315	0.347	0.358	0.324	0.336	1 5/64	1 15/16	
4690	1,800	16:52	4	0.318	0.350	0.360	0.326	0.339	1 3/32	1 61/64	
4690	1,800	16:53	5	0.319	0.352	0.362	0.328	0.340	1 3/32	1 61/64	
4690	1,800	16:58	10	0.325	0.358	0.369	0.333	0.346	1 3/32	1 61/64	
4690	1,800	17:03	15	0.327	0.362	0.372	0.336	0.349	1 3/32	1 31/32	
4690	1,800	17:18	30	0.332	0.370	0.381	0.340	0.356	1 7/64	1 63/64	
4690	1,800	17:33	45	0.336	0.379	0.389	0.345	0.362	1 7/64	2	
4690	1,800	17:48	60	0.336	0.382	0.392	0.345	0.364	1 7/64	2	
5923	2,250	17:50	0	0.468	0.515	0.526	0.477	0.497	1 1/4	2 1/8	
5923	2,250	17:51	1	0.475	0.522	0.532	0.484	0.503	1 17/64	2 9/64	
5923	2,250	17:52	2	0.483	0.529	0.541	0.498	0.513	1 17/64	2 9/64	
5923	2,250	17:53	3	0.485	0.533	0.544	0.508	0.518	1 17/64	2 9/64	
5923	2,250	17:54	4	0.488	0.537	0.547	0.511	0.521	1 17/64	2 9/64	
5923	2,250	17:55	5	0.491	0.540	0.550	0.514	0.524	1 9/32	2 5/32	
5923	2,250	18:00	10	0.504	0.555	0.566	0.528	0.538	1 19/64	2 11/64	
5923	2,250	18:05	15	0.511	0.563	0.573	0.534	0.545	1 5/16	2 3/16	
5923	2,250	18:20	30	0.520	0.572	0.584	0.543	0.555	1 5/16	2 3/16	
5923	2,250	18:35	45	0.530	0.587	0.596	0.553	0.567	1 21/64	2 3/16	
5923	2,250	18:50	60	0.538	0.597	0.606	0.560	0.575	1 21/64	2 3/16	
5923	2,250	19:05	75	0.544	0.604	0.612	0.566	0.582	1 11/32	2 13/64	
5923	2,250	19:20	90	0.546	0.608	0.618	0.568	0.585	1 11/32	2 13/64	
5923	2,250	19:35	105	0.547	0.612	0.621	0.569	0.587	1 11/32	2 13/64	
7156	2,700	19:40	0	0.650	0.725	0.737	0.678	0.698	1 7/16	2 11/32	
7156	2,700	19:41	1	0.670	0.741	0.753	0.694	0.715	1 29/64	2 11/32	

7156	2,700	19:42	2	0.674	0.748	0.758	0.698	0.720	1 29/64	2 23/64	
7156	2,700	19:43	3	0.686	0.759	0.770	0.710	0.731	1 15/32	2 23/64	
7156	2,700	19:44	4	0.690	0.769	0.780	0.720	0.740	1 15/32	2 3/8	
7156	2,700	19:45	5	0.711	0.785	0.797	0.736	0.757	1 1/2	2 3/8	
7156	2,700	19:50	10	0.726	0.800	0.812	0.750	0.772	1 17/32	2 25/64	
7156	2,700	19:55	15	0.744	0.820	0.830	0.768	0.791	1 9/16	2 7/16	
7156	2,700	20:10	30	0.764	0.843	0.852	0.789	0.812	1 9/16	2 15/32	
7156	2,700	20:25	45	0.778	0.855	0.865	0.802	0.825	1 9/16	2 15/32	
7156	2,700	20:40	60	0.790	0.868	0.880	0.813	0.838	1 19/32	2 31/64	
7156	2,700	20:55	75	0.798	0.877	0.886	0.820	0.845	1 19/32	2 31/64	
7156	2,700	21:10	90	0.806	0.885	0.895	0.829	0.854	1 39/64	2 1/2	
7156	2,700	21:25	105	0.812	0.892	0.902	0.834	0.860	1 39/64	2 1/2	
7156	2,700	21:40	120	0.818	0.897	0.908	0.839	0.866	1 39/64	2 1/2	
8389	3,150	21:49	0	0.988	1.070	1.083	1.018	1.040	1 25/32	2 43/64	
8389	3,150	21:50	1	1.011	1.092	1.106	1.039	1.062	1 13/16	2 45/64	
8389	3,150	21:51	2	1.022	1.104	1.117	1.048	1.073	1 27/32	2 23/32	
8389	3,150	21:52	3	1.034	1.115	1.128	1.058	1.084	1 55/64	2 23/32	
8389	3,150	21:53	4	1.041	1.122	1.136	1.066	1.091	1 55/64	2 47/64	
8389	3,150	21:54	5	1.048	1.129	1.142	1.072	1.098	1 7/8	2 47/64	
8389	3,150	21:59	10	1.079	1.158	1.174	1.102	1.128	1 29/32	2 3/4	
8389	3,150	22:04	15	1.107	1.190	1.200	1.131	1.157	1 15/16	2 51/64	
8389	3,150	22:19	30	1.146	1.222	1.233	1.169	1.193	1 31/32	2 53/64	
8389	3,150	22:34	45	1.178	1.252	1.264	1.203	1.224	2 7/64	2 55/64	
8389	3,150	22:49	60	1.194	1.270	1.283	1.223	1.243	2 1/8	2 57/64	
8389	3,150	23:04	75	1.220	1.295	1.290	1.241	1.262	2 9/64	2 29/32	
8389	3,150	23:19	90	1.225	1.309	1.306	1.250	1.273	2 5/32	2 59/64	
8389	3,150	23:34	105	1.225	1.316	1.313	1.249	1.276	2 5/32	2 59/64	
8389	3,150	23:49	120	1.225	1.323	1.320	1.247	1.279	2 5/32	2 59/64	
8389	3,150	0:49	180	1.230	1.342	1.338	1.253	1.291	2 7/32	2 59/64	
8389	3,150	1:49	240	1.239	1.362	1.362	1.262	1.306	2 1/4	2 61/64	
8389	3,150	2:49	300	1.252	1.382	1.381	1.276	1.323	2 9/32	2 63/64	
8389	3,150	3:49	360	1.255	1.401	1.391	1.279	1.332	2 19/64	3	
8389	3,150	4:49	420	1.263	1.414	1.411	1.288	1.344	2 19/64	3	
8389	3,150	5:49	480	1.272	1.431	1.426	1.298	1.357	2 5/16	3 1/64	
8389	3,150	6:49	540	1.285	1.454	1.446	1.310	1.374	2 21/64	3 1/64	
8389	3,150	7:49	600	1.312	1.476	1.472	1.334	1.399	2 23/64	3 3/64	
8389	3,150	8:49	660	1.316	1.490	1.486	1.338	1.408	2 23/64	3 3/64	
8389	3,150	9:49	720	1.319	1.496	1.490	1.342	1.412	2 23/64	3 1/16	
6225	2360	10:00	0	1.302	1.484	1.476	1.324	1.397	2 21/64	3	
6225	2360	10:55	55	1.292	1.482	1.470	1.315	1.390	2 21/64	3	
6225	2360	11:00	60	1.292	1.482	1.470	1.315	1.390	2 21/64	3	
4074	1575	11:00	0	1.276	1.467	1.458	1.295	1.374	2 19/64	2 31/32	
4074	1575	11:55	55	1.263	1.462	1.454	1.288	1.367	2 19/64	2 31/32	
4074	1575	12:00	60	1.263	1.462	1.454	1.288	1.367	2 19/64	2 31/32	
1918	788	12:00	0	1.222	1.421	1.409	1.245	1.324	2 17/64	2 7/8	
1918	788	12:55	55	1.213	1.416	1.402	1.236	1.317	2 17/64	2 7/8	
1918	788	13:00	60	1.213	1.416	1.402	1.236	1.317	2 17/64	2 7/8	
0	0	13:05	0	1.087	1.276	1.290	1.113	1.192	2 7/64	2 23/32	
0	0	14:00	55	1.049	1.266	1.255	1.078	1.162	2 7/64	2 23/32	
0	0	14:05	60	1.049	1.266	1.255	1.078	1.162	2 7/64	2 23/32	

AXIAL COMPRESSION LOAD TEST - SITE #2 (SAND, 2,000 PSF BEARING)
DIAMOND PIER #SA-C-DP50-2, 1" NOMINAL x 50" LONG PINS
INSTALLED 4/4/16, TESTED 4/26/16-4/27/16

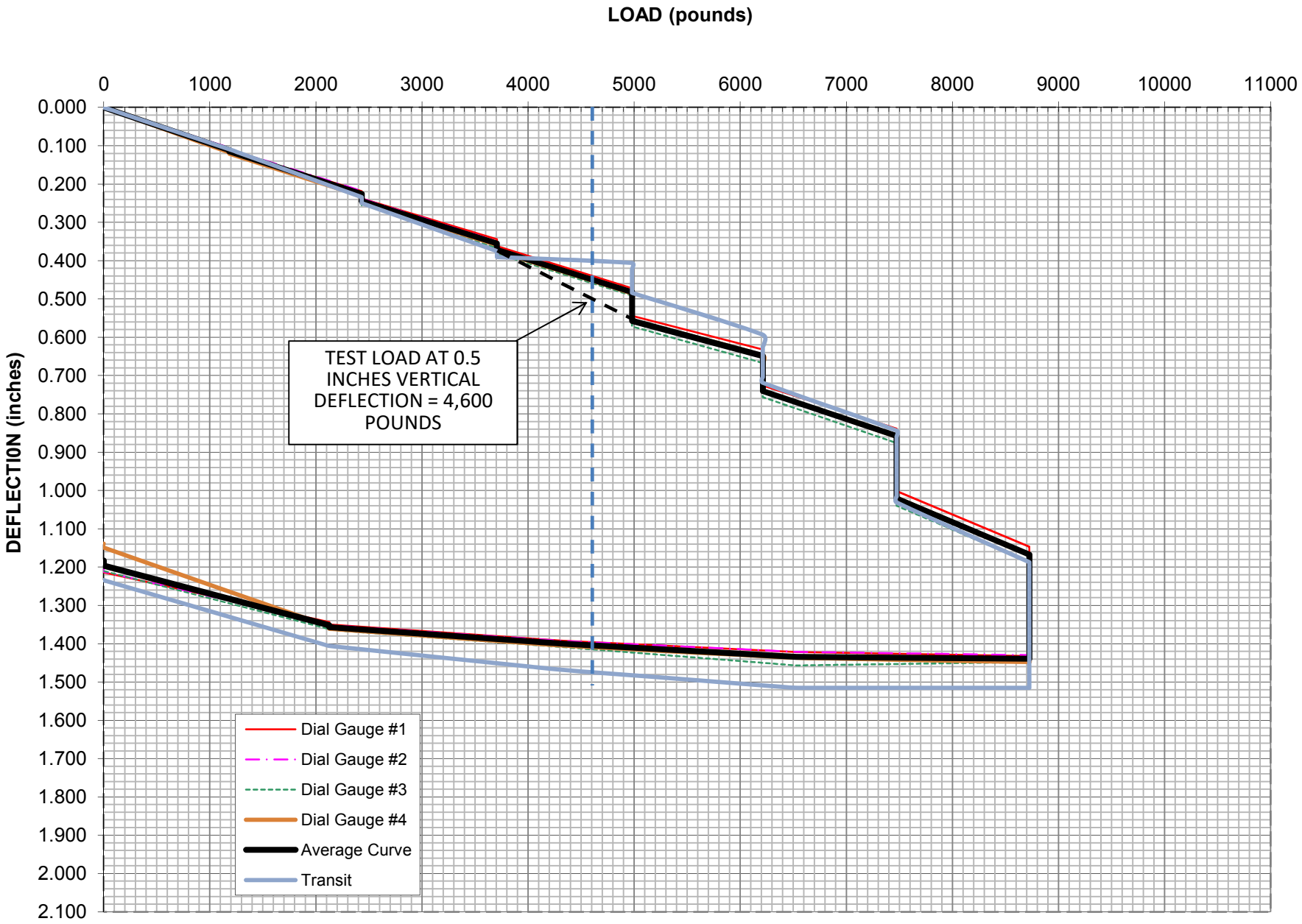


Project Name: Diamond Pier Compression Field Load Testing
EEI Project No.: 07-020
Site: Site #2 - Sand with presumptive bearing capacity of 2,000 psf
Test Method: Compression
Diamond Pier Tested: #SA-C-DP50-2
Date Installed: 4/4/2016
Date Test Started: 4/26/2016
Date Test Completed: 4/27/2016
Staff: Ken Andrieu, Bruce Lane
Hydraulic Ram: EEI Equipment #EEI 021
Equation of the Line: Load = (Gauge Pressure - 88) / 0.365
Dial Gauge #1: EEI Equipment #EEI 35
Dial Gauge #2: EEI Equipment #EEI 38
Dial Gauge #3: EEI Equipment #EEI 40
Dial Gauge #4: EEI Equipment #EEI 39

Load (pounds)	Gauge Pressure (psi)	Clock	Minutes	Dial Gauge #1 (in.)	Dial Gauge #2 (in.)	Dial Gauge #3 (in.)	Dial Gauge #4 (in.)	Dial Gauge Average (in.)	Transit (in.)	Test Remarks
0	0	16:20	0	0.000	0.000	0.000	0.000	0.000	1	
753	363	16:23	0	0.034	0.019	0.017	0.032	0.026	1 1/32	
753	363	16:24	1	0.035	0.020	0.017	0.032	0.026	1 1/32	
753	363	16:25	2	0.035	0.020	0.017	0.033	0.026	1 1/32	
753	363	16:26	3	0.035	0.020	0.017	0.033	0.026	1 1/32	
753	363	16:27	4	0.035	0.020	0.017	0.033	0.026	1 1/32	
753	363	16:28	5	0.035	0.020	0.017	0.033	0.026	1 1/32	
753	363	16:33	10	0.036	0.018	0.016	0.033	0.026	1 1/32	
753	363	16:38	15	0.036	0.016	0.013	0.033	0.025	1 1/32	
753	363	16:53	30	0.035	0.013	0.011	0.032	0.023	1 1/32	
1742	724	16:55	0	0.095	0.068	0.064	0.091	0.080	1 3/32	
1742	724	16:56	1	0.100	0.072	0.068	0.096	0.084	1 3/32	
1742	724	16:57	2	0.102	0.074	0.070	0.098	0.086	1 3/32	
1742	724	16:58	3	0.104	0.075	0.071	0.099	0.087	1 3/32	
1742	724	16:59	4	0.105	0.076	0.071	0.100	0.088	1 3/32	
1742	724	17:00	5	0.105	0.076	0.071	0.100	0.088	1 3/32	
1742	724	17:05	10	0.107	0.076	0.071	0.102	0.089	1 3/32	
1742	724	17:10	15	0.107	0.076	0.072	0.102	0.089	1 3/32	
2677	1065	17:14	0	0.148	0.116	0.111	0.142	0.129	1 9/64	
2677	1065	17:15	1	0.150	0.118	0.113	0.144	0.131	1 9/64	
2677	1065	17:16	2	0.151	0.118	0.113	0.144	0.132	1 9/64	
2677	1065	17:17	3	0.151	0.118	0.113	0.144	0.132	1 9/64	
2677	1065	17:18	4	0.151	0.118	0.113	0.144	0.132	1 9/64	
2677	1065	17:19	5	0.151	0.118	0.113	0.144	0.132	1 5/32	
2677	1065	17:24	10	0.151	0.118	0.113	0.144	0.132	1 5/32	
2677	1065	17:29	15	0.151	0.118	0.113	0.144	0.132	1 5/32	
3671	1428	17:30	0	0.220	0.182	0.175	0.213	0.198	1 7/32	
3671	1428	17:31	1	0.224	0.185	0.178	0.216	0.201	1 7/32	
3671	1428	17:32	2	0.226	0.186	0.179	0.217	0.202	1 7/32	
3671	1428	17:33	3	0.227	0.187	0.179	0.218	0.203	1 7/32	
3671	1428	17:34	4	0.234	0.194	0.186	0.226	0.210	1 7/32	
3671	1428	17:35	5	0.236	0.195	0.188	0.228	0.212	1 15/64	
3671	1428	17:40	10	0.239	0.197	0.190	0.230	0.214	1 15/64	
3671	1428	17:45	15	0.239	0.197	0.190	0.230	0.214	1 15/64	
4666	1791	17:47	0	0.311	0.266	0.259	0.304	0.285	1 5/16	
4666	1791	17:48	1	0.316	0.271	0.263	0.308	0.290	1 5/16	
4666	1791	17:49	2	0.323	0.277	0.270	0.315	0.296	1 5/16	
4666	1791	17:50	3	0.326	0.280	0.272	0.318	0.299	1 5/16	
4666	1791	17:51	4	0.328	0.282	0.274	0.320	0.301	1 5/16	
4666	1791	17:52	5	0.329	0.283	0.274	0.321	0.302	1 21/64	
4666	1791	17:57	10	0.338	0.289	0.281	0.330	0.310	1 11/32	
4666	1791	18:02	15	0.340	0.290	0.282	0.332	0.311	1 11/32	
4666	1791	18:17	30	0.345	0.291	0.283	0.337	0.314	1 11/32	
4666	1791	18:32	45	0.350	0.293	0.285	0.342	0.318	1 11/32	
4666	1791	18:47	60	0.352	0.293	0.285	0.344	0.319	1 11/32	
5660	2154	18:49	0	0.407	0.345	0.337	0.402	0.373	1 13/32	
5660	2154	18:50	1	0.412	0.350	0.342	0.405	0.377	1 13/32	
5660	2154	18:51	2	0.414	0.351	0.343	0.407	0.379	1 13/32	
5660	2154	18:52	3	0.429	0.366	0.358	0.422	0.394	1 13/32	
5660	2154	18:53	4	0.431	0.367	0.359	0.423	0.395	1 13/32	
5660	2154	18:54	5	0.432	0.369	0.361	0.425	0.397	1 27/64	
5660	2154	18:59	10	0.441	0.376	0.368	0.434	0.405	1 7/16	
5660	2154	19:04	15	0.448	0.382	0.374	0.441	0.411	1 7/16	
5660	2154	19:19	30	0.453	0.384	0.376	0.445	0.415	1 7/16	
5660	2154	19:34	45	0.465	0.392	0.385	0.457	0.425	1 29/64	
5660	2154	19:49	60	0.465	0.392	0.385	0.458	0.425	1 29/64	
6655	2517	19:53	0	0.548	0.472	0.468	0.546	0.509	1 35/64	
6655	2517	19:54	1	0.556	0.480	0.473	0.551	0.515	1 35/64	
6655	2517	19:55	2	0.571	0.494	0.489	0.568	0.531	1 9/16	

6655	2517	19:56	3	0.579	0.501	0.495	0.574	0.537	1 9/16	
6655	2517	19:57	4	0.581	0.503	0.497	0.576	0.539	1 9/16	
6655	2517	19:58	5	0.585	0.507	0.501	0.580	0.543	1 37/64	
6655	2517	20:03	10	0.592	0.513	0.506	0.586	0.549	1 37/64	
6655	2517	20:08	15	0.594	0.514	0.508	0.588	0.551	1 37/64	
6655	2517	20:23	30	0.595	0.516	0.510	0.590	0.553	1 37/64	
6655	2517	20:38	45	0.596	0.516	0.510	0.590	0.553	1 37/64	
6655	2517	20:53	60	0.614	0.531	0.525	0.608	0.570	1 19/32	
6655	2517	21:08	75	0.617	0.532	0.526	0.611	0.572	1 19/32	
6655	2517	21:23	90	0.617	0.532	0.526	0.612	0.572	1 19/32	
6655	2517	21:38	105	0.618	0.532	0.526	0.612	0.572	1 19/32	
6655	2517	21:53	120	0.618	0.532	0.526	0.612	0.572	1 19/32	
7649	2880	21:58	0	0.667	0.578	0.573	0.664	0.621	1 11/16	
7649	2880	21:59	1	0.669	0.582	0.577	0.669	0.624	1 11/16	
7649	2880	22:00	2	0.675	0.586	0.581	0.671	0.628	1 11/16	
7649	2880	22:01	3	0.678	0.589	0.583	0.674	0.631	1 45/64	
7649	2880	22:02	4	0.681	0.592	0.586	0.676	0.634	1 45/64	
7649	2880	22:03	5	0.682	0.591	0.587	0.677	0.634	1 45/64	
7649	2880	22:08	10	0.687	0.598	0.592	0.683	0.640	1 3/4	
7649	2880	22:13	15	0.691	0.600	0.595	0.686	0.643	1 3/4	
7649	2880	22:28	30	0.698	0.605	0.600	0.694	0.649	1 3/4	
7649	2880	22:43	45	0.700	0.608	0.603	0.696	0.652	1 25/32	
7649	2880	22:58	60	0.709	0.613	0.607	0.698	0.657	1 25/32	
7649	2880	23:13	75	0.710	0.614	0.608	0.705	0.659	1 25/32	
7649	2880	23:28	90	0.714	0.616	0.611	0.710	0.663	1 27/32	
7649	2880	23:43	105	0.719	0.621	0.616	0.715	0.668	1 27/32	
7649	2880	23:58	120	0.727	0.627	0.621	0.723	0.675	1 7/8	
8644	3243	0:00	0	0.879	0.779	0.771	0.878	0.827	1 63/64	
8644	3243	0:01	1	0.882	0.781	0.777	0.880	0.830	1 63/64	
8644	3243	0:02	2	0.910	0.810	0.812	0.911	0.861	2 1/32	
8644	3243	0:03	3	0.954	0.853	0.847	0.951	0.901	2 1/16	
8644	3243	0:04	4	0.965	0.863	0.857	0.961	0.912	2 1/16	
8644	3243	0:05	5	0.975	0.874	0.870	0.975	0.924	2 1/16	
8644	3243	0:10	10	1.005	0.900	0.894	1.005	0.951	2 3/64	
8644	3243	0:15	15	1.039	0.935	0.928	1.036	0.985	2 3/64	
8644	3243	0:30	30	1.067	0.965	0.956	1.064	1.013	2 3/64	
8644	3243	0:45	45	1.080	0.976	0.969	1.077	1.026	2 1/16	
8644	3243	1:00	60	1.086	0.982	0.975	1.083	1.032	2 1/16	
8644	3243	1:15	75	1.089	0.985	0.978	1.086	1.035	2 1/16	
8644	3243	1:30	90	1.090	0.985	0.979	1.087	1.035	2 1/16	
8644	3243	1:45	105	1.091	0.985	0.979	1.089	1.036	2 5/64	
8644	3243	2:00	120	1.091	0.985	0.979	1.089	1.036	2 5/64	
9638	3606	2:01	0	1.094	1.045	1.039	1.151	1.082	2 11/64	
9638	3606	2:02	1	1.094	1.084	1.071	1.189	1.110	2 3/16	
9638	3606	2:03	2	1.094	1.113	1.107	1.216	1.133	2 13/64	
9638	3606	2:04	3	1.094	1.113	1.130	1.242	1.145	2 13/64	
9638	3606	2:05	4	1.094	1.140	1.132	1.243	1.152	2 7/32	
9638	3606	2:06	5	1.094	1.144	1.136	1.247	1.155	2 15/64	
9638	3606	2:11	10	1.094	1.147	1.139	1.251	1.158	2 15/64	
9638	3606	2:16	15	1.094	1.148	1.140	1.251	1.158	2 17/64	
9638	3606	2:31	30	1.094	1.154	1.146	1.260	1.164	2 9/32	
9638	3606	2:46	45	1.094	1.156	1.149	1.263	1.166	2 19/64	
9638	3606	3:01	60	1.094	1.159	1.151	1.267	1.168	2 5/16	
9638	3606	3:16	75	1.094	1.163	1.155	1.272	1.171	2 21/64	
9638	3606	3:31	90	1.094	1.189	1.180	1.298	1.190	2 11/32	
9638	3606	3:46	105	1.311	1.200	1.192	1.313	1.254	2 11/32	
9638	3606	4:01	120	1.324	1.210	1.202	1.326	1.266	2 11/32	
9638	3606	5:01	180	1.329	1.213	1.204	1.331	1.269	2 23/64	
9638	3606	6:01	240	1.330	1.213	1.204	1.332	1.270	2 23/64	
9638	3606	7:01	300	1.330	1.216	1.216	1.346	1.277	2 23/64	
9638	3606	8:01	360	1.366	1.242	1.234	1.368	1.303	2 13/32	
9638	3606	9:01	420	1.373	1.248	1.240	1.375	1.309	2 13/32	
9638	3606	10:01	480	1.376	1.249	1.241	1.378	1.311	2 27/64	
9638	3606	11:01	540	1.377	1.247	1.240	1.378	1.311	2 7/16	
9638	3606	12:01	600	1.383	1.251	1.244	1.384	1.316	2 29/64	
9638	3606	13:01	660	1.385	1.245	1.248	1.387	1.316	2 15/32	
9638	3606	14:01	720	1.394	1.250	1.244	1.396	1.321	2 15/32	
7153	2699	14:01	0	1.386	1.241	1.234	1.388	1.312	2 29/64	
7153	2699	14:56	55	1.378	1.226	1.220	1.379	1.301	2 29/64	
7153	2699	15:01	60	1.378	1.225	1.219	1.379	1.300	2 29/64	
4666	1791	15:03	0	1.350	1.198	1.190	1.350	1.272	2 7/16	
4666	1791	15:58	55	1.322	1.188	1.181	1.323	1.254	2 27/64	
4666	1791	16:03	60	1.322	1.188	1.180	1.322	1.253	2 27/64	
2238	905	16:04	0	1.283	1.139	1.130	1.288	1.210	2 25/64	
2238	905	16:59	55	1.279	1.136	1.131	1.279	1.206	2 3/8	
2238	905	17:04	60	1.277	1.136	1.129	1.278	1.205	2 3/8	
0	0	17:08	0	1.122	0.982	0.972	1.118	1.049	2 13/64	
0	0	18:03	55	1.100	0.956	0.948	1.096	1.025	2 7/32	
0	0	18:08	60	1.101	0.954	0.946	1.097	1.025	2 7/32	

AXIAL COMPRESSION LOAD TEST - SITE #1 (SAND, 2,000 PSF BEARING)
DIAMOND PIER #SA-C-DP50-3, 1" NOMINAL x 50" LONG PINS
INSTALLED 4/4/16, TESTED 4/29/16-4/30/16

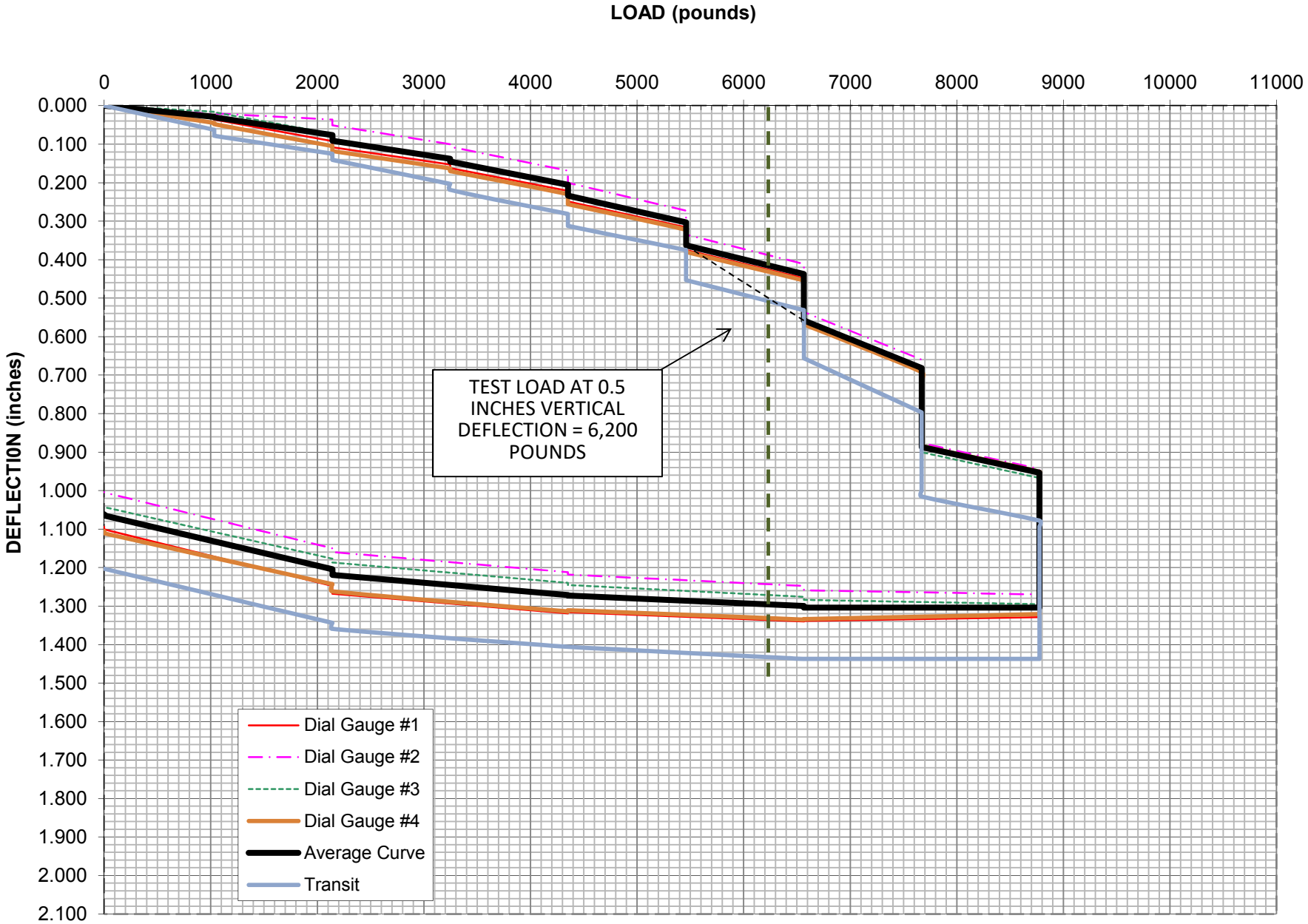


Project Name: Diamond Pier Compression Field Load Testing
EEI Project No.: 07-020
Site: Site #2 - Sand with presumptive bearing capacity of 2,000 psf
Test Method: Compression
Diamond Pier Tested: #SA-C-DP50-3
Date Installed: 4/4/2016
Date Test Started: 4/29/2016
Date Test Completed: 4/30/2016
Staff: Ken Andrieu, Bruce Lane
Hydraulic Ram: EEI Equipment #EEI 022
Equation of the Line: Load = (Gauge Pressure - 2) / 0.361
Dial Gauge #1: EEI Equipment #EEI 37
Dial Gauge #2: EEI Equipment #EEI 40
Dial Gauge #3: EEI Equipment #EEI 38
Dial Gauge #4: EEI Equipment #EEI 39

Load (pounds)	Gauge Pressure (psi)	Clock	Minutes	Dial Gauge #1 (in.)	Dial Gauge #2 (in.)	Dial Gauge #3 (in.)	Dial Gauge #4 (in.)	Dial Gauge Average (in.)	Transit (in.)	Test Remarks
0	0	10:10	0	0.000	0.000	0.000	0.000	0.000	1 1/64	
1186	430	10:11	0	0.108	0.105	0.114	0.118	0.111	1 1/8	
1186	430	10:12	1	0.110	0.107	0.115	0.119	0.113	1 1/8	
1186	430	10:13	2	0.111	0.107	0.115	0.119	0.113	1 1/8	
1186	430	10:14	3	0.111	0.107	0.116	0.120	0.114	1 1/8	
1186	430	10:15	4	0.111	0.107	0.116	0.120	0.114	1 1/8	
1186	430	10:16	5	0.112	0.107	0.116	0.120	0.114	1 1/8	
1186	430	10:21	10	0.113	0.108	0.116	0.121	0.115	1 1/8	
1186	430	10:26	15	0.113	0.108	0.116	0.121	0.115	1 1/8	
1186	430	10:31	20	0.113	0.109	0.118	0.121	0.115	1 1/8	
2432	880	10:31	0	0.219	0.218	0.233	0.232	0.226	1 1/4	
2432	880	10:32	1	0.224	0.222	0.235	0.235	0.229	1 1/4	
2432	880	10:33	2	0.232	0.231	0.245	0.244	0.238	1 1/4	
2432	880	10:34	3	0.234	0.233	0.246	0.245	0.240	1 1/4	
2432	880	10:35	4	0.235	0.233	0.247	0.246	0.240	1 1/4	
2432	880	10:36	5	0.235	0.234	0.248	0.247	0.241	1 1/4	
2432	880	10:41	10	0.237	0.236	0.259	0.248	0.245	1 1/4	
2432	880	10:46	15	0.238	0.236	0.250	0.249	0.243	1 17/64	
2432	880	10:51	20	0.238	0.237	0.250	0.249	0.244	1 17/64	
2432	880	11:01	30	0.238	0.238	0.251	0.249	0.244	1 17/64	
3706	1340	11:02	0	0.344	0.350	0.367	0.359	0.355	1 25/64	
3706	1340	11:03	1	0.350	0.356	0.371	0.363	0.360	1 25/64	
3706	1340	11:04	2	0.352	0.358	0.373	0.365	0.362	1 25/64	
3706	1340	11:05	3	0.354	0.359	0.375	0.367	0.364	1 25/64	
3706	1340	11:06	4	0.356	0.362	0.377	0.369	0.366	1 25/64	
3706	1340	11:07	5	0.357	0.362	0.377	0.370	0.367	1 25/64	
3706	1340	11:12	10	0.360	0.365	0.380	0.372	0.369	1 13/32	
3706	1340	11:17	15	0.361	0.366	0.381	0.373	0.370	1 13/32	
3706	1340	11:32	30	0.362	0.368	0.382	0.375	0.372	1 13/32	
4981	1800	11:34	0	0.472	0.481	0.491	0.486	0.483	1 27/64	
4981	1800	11:35	1	0.484	0.495	0.513	0.500	0.498	1 7/16	
4981	1800	11:36	2	0.496	0.506	0.521	0.509	0.508	1 29/64	
4981	1800	11:37	3	0.503	0.513	0.528	0.516	0.515	1 29/64	
4981	1800	11:38	4	0.511	0.521	0.536	0.523	0.523	1 15/32	
4981	1800	11:39	5	0.515	0.525	0.539	0.528	0.527	1 15/32	
4981	1800	11:44	10	0.522	0.532	0.546	0.534	0.534	1 31/64	
4981	1800	11:49	15	0.528	0.538	0.553	0.540	0.540	1 31/64	
4981	1800	12:04	30	0.535	0.545	0.559	0.546	0.546	1 1/2	
4981	1800	12:09	35	0.540	0.554	0.568	0.552	0.554	1 1/2	
4981	1800	12:19	45	0.542	0.557	0.571	0.554	0.556	1 1/2	
4981	1800	12:34	60	0.544	0.558	0.572	0.556	0.558	1 1/2	
6213	2245	12:36	0	0.632	0.650	0.667	0.648	0.649	1 39/64	
6213	2245	12:37	1	0.650	0.669	0.689	0.668	0.669	1 41/64	
6213	2245	12:38	2	0.661	0.678	0.694	0.676	0.677	1 41/64	
6213	2245	12:39	3	0.664	0.681	0.697	0.679	0.680	1 21/32	
6213	2245	12:40	4	0.666	0.683	0.699	0.681	0.682	1 21/32	
6213	2245	12:41	5	0.668	0.685	0.701	0.683	0.684	1 21/32	
6213	2245	12:46	10	0.679	0.698	0.716	0.696	0.697	1 43/64	
6213	2245	12:51	15	0.691	0.708	0.724	0.706	0.707	1 11/16	
6213	2245	13:06	30	0.701	0.718	0.734	0.717	0.718	1 45/64	
6213	2245	13:25	45	0.715	0.728	0.743	0.729	0.729	1 45/64	
6213	2245	13:36	60	0.718	0.731	0.747	0.732	0.732	1 23/32	
6213	2245	13:51	75	0.722	0.735	0.751	0.737	0.736	1 23/32	
6213	2245	14:06	90	0.725	0.738	0.753	0.739	0.739	1 23/32	
6213	2245	14:21	105	0.726	0.741	0.756	0.740	0.741	1 47/64	
7474	2700	14:27	0	0.839	0.854	0.876	0.860	0.857	1 55/64	
7474	2700	14:28	1	0.848	0.862	0.882	0.865	0.864	1 7/8	
7474	2700	14:29	2	0.886	0.902	0.920	0.905	0.903	1 59/64	
7474	2700	14:30	3	0.894	0.908	0.925	0.910	0.909	1 59/64	

7474	2700	14:31	4	0.896	0.911	0.927	0.913	0.912	1 59/64	
7474	2700	14:32	5	0.898	0.913	0.929	0.915	0.914	1 15/16	
7474	2700	14:37	10	0.907	0.922	0.937	0.923	0.922	1 15/16	
7474	2700	14:42	15	0.932	0.949	0.964	0.948	0.948	1 31/32	
7474	2700	14:57	30	0.960	0.977	0.994	0.977	0.977	2	
7474	2700	15:12	45	0.975	0.997	1.012	0.992	0.994	2 1/64	
7474	2700	15:27	60	0.988	1.011	1.027	1.005	1.008	2 1/64	
7474	2700	15:42	75	0.996	1.017	1.033	1.013	1.015	2 1/32	
7474	2700	15:57	90	0.999	1.022	1.038	1.016	1.019	2 1/32	
7474	2700	16:12	105	1.002	1.023	1.040	1.019	1.021	2 3/64	
8726	3152	16:19	0	1.147	1.168	1.188	1.168	1.168	2 13/64	
8726	3152	16:20	1	1.157	1.178	1.198	1.178	1.178	2 13/64	
8726	3152	16:21	2	1.168	1.188	1.208	1.188	1.188	2 7/32	
8726	3152	16:22	3	1.179	1.199	1.217	1.198	1.198	2 7/32	
8726	3152	16:23	4	1.184	1.204	1.221	1.203	1.203	2 15/64	
8726	3152	16:24	5	1.186	1.205	1.222	1.204	1.204	2 15/64	
8726	3152	16:29	10	1.219	1.239	1.256	1.238	1.238	2 17/64	
8726	3152	16:34	15	1.233	1.252	1.269	1.252	1.252	2 9/32	
8726	3152	16:49	30	1.254	1.271	1.288	1.272	1.271	2 19/64	
8726	3152	17:04	45	1.270	1.286	1.305	1.288	1.287	2 5/16	
8726	3152	17:19	60	1.284	1.301	1.318	1.303	1.302	2 21/64	
8726	3152	17:34	75	1.298	1.308	1.327	1.319	1.313	2 11/32	
8726	3152	17:49	90	1.313	1.320	1.339	1.332	1.326	2 23/64	
8726	3152	18:04	105	1.318	1.325	1.343	1.337	1.331	2 23/64	
8726	3152	18:19	120	1.326	1.331	1.349	1.344	1.338	2 3/8	
8726	3152	19:19	180	1.355	1.344	1.363	1.369	1.358	2 25/64	
8726	3152	20:19	240	1.361	1.348	1.366	1.375	1.363	2 13/32	
8726	3152	21:19	300	1.371	1.363	1.381	1.388	1.376	2 27/64	
8726	3152	22:19	360	1.375	1.371	1.388	1.392	1.382	2 29/64	
8726	3152	23:19	420	1.377	1.375	1.391	1.395	1.385	2 29/64	
8726	3152	0:19	480	1.383	1.383	1.400	1.405	1.393	2 15/32	
8726	3152	1:19	540	1.403	1.402	1.418	1.419	1.411	2 1/2	
8726	3152	2:19	600	1.408	1.405	1.422	1.423	1.415	2 17/32	
8726	3152	3:19	660	1.428	1.425	1.442	1.444	1.435	2 17/32	
8726	3152	4:19	720	1.432	1.430	1.448	1.448	1.440	2 17/32	
6526	2358	4:20	0	1.422	1.421	1.457	1.437	1.434	2 17/32	
6526	2358	5:15	55	1.422	1.421	1.457	1.437	1.434	2 17/32	
6526	2358	5:20	60	1.422	1.421	1.457	1.437	1.434	2 17/32	
4327	1564	5:20	0	1.392	1.393	1.409	1.405	1.400	2 31/64	
4327	1564	6:15	55	1.392	1.393	1.409	1.405	1.400	2 31/64	
4327	1564	6:20	60	1.392	1.393	1.409	1.405	1.400	2 31/64	
2127	770	6:20	0	1.350	1.352	1.364	1.361	1.357	2 27/64	
2127	770	7:15	55	1.347	1.348	1.362	1.358	1.354	2 27/64	
2127	770	7:20	60	1.344	1.348	1.362	1.355	1.352	2 27/64	
0	0	7:20	0	1.214	1.212	1.210	1.149	1.196	2 1/4	
0	0	8:15	55	1.206	1.190	1.197	1.139	1.183	2 1/4	
0	0	8:20	60	1.206	1.198	1.197	1.139	1.185	2 1/4	

AXIAL COMPRESSION LOAD TEST - SITE #1 (SILT/CLAY, 1,500 PSF BEARING)
DIAMOND PIER #CL-C-DP75-1, 1.25" NOMINAL DIAMETER x 50" LONG PINS
INSTALLED 4/4/16, TESTED 4/12/16-4/13/16

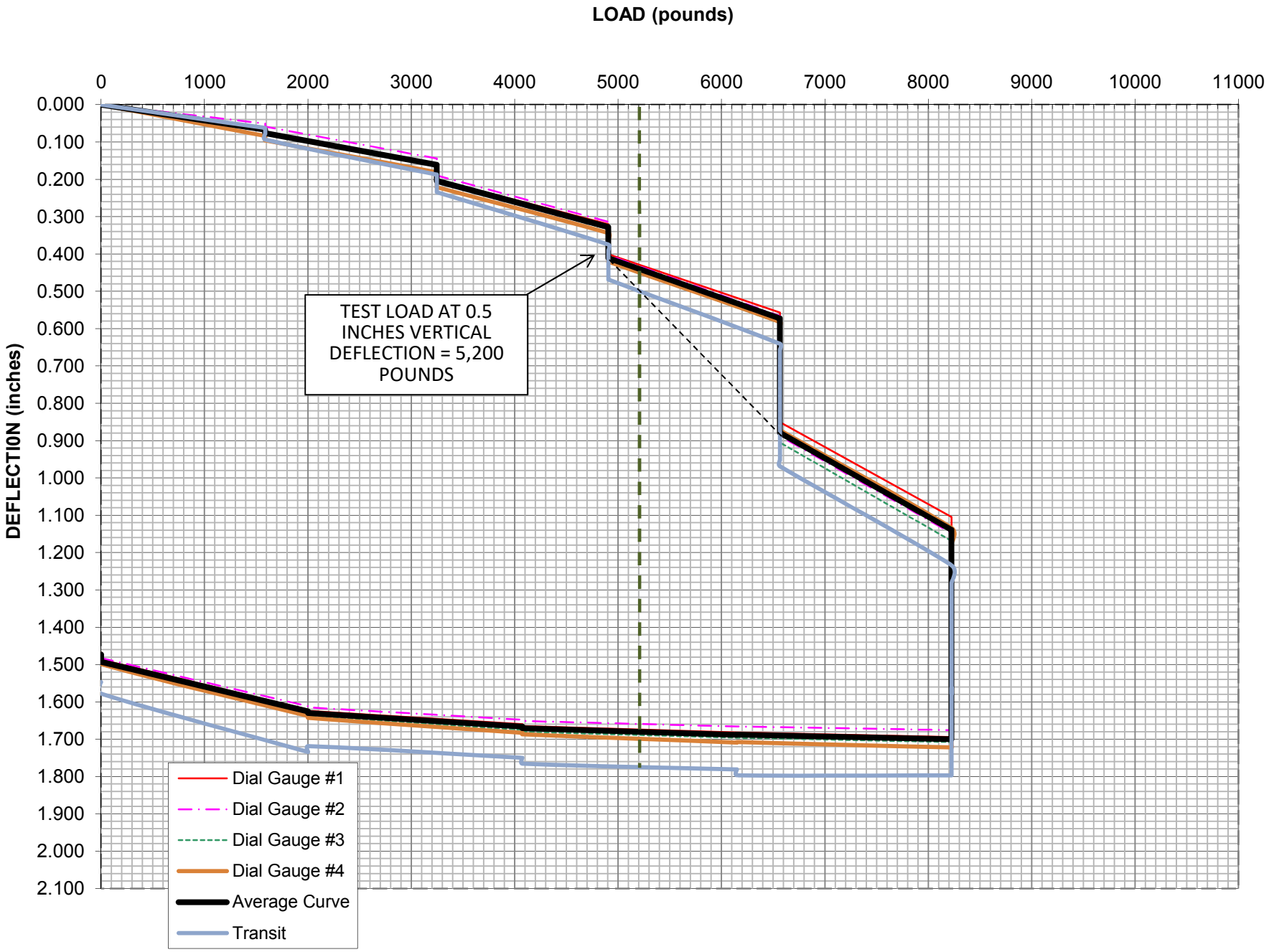


Project Name: Diamond Pier Compression Field Load Testing
EEI Project No.: 07-020
Site: Site #1 - Silt/Clay with presumptive bearing capacity of 1,500 psf
Test Method: Compression
Cross Pin Group Tested: #CL-C-DP75-1
Date Installed: 4/4/2016
Date Test Started: 4/12/2016
Date Test Completed: 4/13/2016
Staff: Ken Andrieu, Pete Furlong
Hydraulic Ram: EEI Equipment #EEI 022
Equation of the Line: Load = (Gauge Pressure - 2) / 0.361
Dial Gauge #1: EEI Equipment #EEI 33
Dial Gauge #2: EEI Equipment #EEI 34
Dial Gauge #3: EEI Equipment #EEI 35
Dial Gauge #4: EEI Equipment #EEI 36

Load (pounds)	Gauge Pressure (psi)	Clock	Minutes	Dial Gauge #1 (in.)	Dial Gauge #2 (in.)	Dial Gauge #3 (in.)	Dial Gauge #4 (in.)	Dial Gauge Average (in.)	Transit (in.)	Test Remarks
0	0	0	0	0.000	0.000	0.000	0.000	0.000	1	
1033	375	11:52	0	0.033	0.022	0.016	0.045	0.029	1 1/16	
1033	375	11:53	1	0.034	0.022	0.016	0.045	0.029	1 1/16	
1033	375	11:54	2	0.035	0.021	0.016	0.046	0.030	1 1/16	
1033	375	11:55	3	0.035	0.021	0.017	0.046	0.030	1 1/16	
1033	375	11:56	4	0.035	0.021	0.017	0.046	0.030	1 1/16	
1033	375	11:57	5	0.035	0.021	0.017	0.046	0.030	1 1/16	
1033	375	12:02	10	0.036	0.020	0.017	0.048	0.030	1 5/64	
1033	375	12:07	15	0.036	0.020	0.017	0.048	0.030	1 5/64	
2141	775	12:13	0	0.092	0.036	0.073	0.105	0.077	1 1/8	
2141	775	12:14	1	0.095	0.039	0.075	0.106	0.079	1 1/8	
2141	775	12:15	2	0.097	0.040	0.076	0.108	0.080	1 1/8	
2141	775	12:16	3	0.099	0.042	0.078	0.110	0.082	1 1/8	
2141	775	12:17	4	0.101	0.044	0.080	0.111	0.084	1 1/8	
2141	775	12:18	5	0.102	0.044	0.080	0.112	0.085	1 1/8	
2141	775	12:23	10	0.105	0.048	0.084	0.115	0.088	1 1/8	
2141	775	12:28	15	0.108	0.051	0.088	0.118	0.091	1 9/64	
2141	775	12:43	30	0.108	0.051	0.088	0.118	0.091	1 9/64	
3247	1174	12:45	0	0.153	0.100	0.135	0.163	0.138	1 13/64	
3247	1174	12:46	1	0.156	0.102	0.137	0.165	0.140	1 13/64	
3247	1174	12:47	2	0.159	0.103	0.138	0.167	0.142	1 13/64	
3247	1174	12:48	3	0.159	0.103	0.138	0.167	0.142	1 13/64	
3247	1174	12:49	4	0.159	0.104	0.140	0.167	0.143	1 13/64	
3247	1174	12:50	5	0.159	0.105	0.141	0.167	0.143	1 13/64	
3247	1174	12:55	10	0.159	0.105	0.141	0.167	0.143	1 13/64	
3247	1174	13:00	15	0.159	0.106	0.141	0.168	0.144	1 13/64	
3247	1174	13:15	30	0.162	0.107	0.143	0.170	0.146	1 7/32	
4352	1573	13:18	0	0.221	0.169	0.202	0.230	0.206	1 9/32	
4352	1573	13:19	1	0.231	0.179	0.212	0.240	0.216	1 9/32	
4352	1573	13:20	2	0.236	0.184	0.216	0.245	0.220	1 9/32	
4352	1573	13:21	3	0.238	0.185	0.218	0.246	0.222	1 9/32	
4352	1573	13:22	4	0.239	0.187	0.219	0.247	0.223	1 9/32	
4352	1573	13:23	5	0.240	0.188	0.220	0.248	0.224	1 19/64	
4352	1573	13:28	10	0.243	0.193	0.225	0.251	0.228	1 19/64	
4352	1573	13:33	15	0.247	0.198	0.229	0.255	0.232	1 5/16	
4352	1573	13:48	30	0.249	0.200	0.231	0.256	0.234	1 5/16	
5460	1973	13:54	0	0.316	0.273	0.302	0.322	0.303	1 3/8	
5460	1973	13:55	1	0.326	0.282	0.312	0.331	0.313	1 3/8	
5460	1973	13:56	2	0.329	0.286	0.315	0.334	0.316	1 3/8	
5460	1973	13:57	3	0.333	0.292	0.321	0.339	0.321	1 25/64	
5460	1973	13:58	4	0.338	0.297	0.325	0.342	0.326	1 25/64	
5460	1973	13:59	5	0.339	0.298	0.327	0.344	0.327	1 13/32	
5460	1973	14:04	10	0.349	0.298	0.336	0.352	0.334	1 7/16	
5460	1973	14:09	15	0.358	0.318	0.344	0.360	0.345	1 29/64	
5460	1973	14:24	30	0.366	0.325	0.352	0.369	0.353	1 29/64	
5460	1973	14:39	45	0.374	0.332	0.359	0.378	0.361	1 29/64	
5460	1973	14:54	60	0.375	0.335	0.362	0.380	0.363	1 29/64	
6565	2372	14:56	0	0.448	0.411	0.437	0.454	0.438	1 17/32	
6565	2372	14:57	1	0.457	0.418	0.444	0.460	0.445	1 17/32	
6565	2372	14:58	2	0.480	0.443	0.469	0.484	0.469	1 9/16	
6565	2372	14:59	3	0.484	0.447	0.473	0.487	0.473	1 9/16	
6565	2372	15:00	4	0.487	0.450	0.476	0.490	0.476	1 9/16	
6565	2372	15:01	5	0.489	0.452	0.478	0.492	0.478	1 37/64	
6565	2372	15:06	10	0.499	0.464	0.490	0.502	0.489	1 19/32	
6565	2372	15:11	15	0.509	0.476	0.502	0.512	0.500	1 39/64	
6565	2372	15:26	30	0.544	0.511	0.536	0.546	0.534	1 41/64	
6565	2372	15:41	45	0.563	0.529	0.555	0.564	0.553	1 21/32	
6565	2372	15:56	60	0.566	0.534	0.560	0.568	0.557	1 21/32	
6565	2372	16:11	75	0.566	0.536	0.561	0.568	0.558	1 21/32	

7670	2771	16:18	0	0.689	0.660	0.685	0.692	0.682	1 51/64	
7670	2771	16:19	1	0.711	0.682	0.706	0.713	0.703	1 51/64	
7670	2771	16:20	2	0.720	0.691	0.715	0.721	0.712	1 13/16	
7670	2771	16:21	3	0.726	0.696	0.720	0.726	0.717	1 13/16	
7670	2771	16:22	4	0.745	0.715	0.739	0.745	0.736	1 53/64	
7670	2771	16:23	5	0.751	0.721	0.745	0.751	0.742	1 27/32	
7670	2771	16:28	10	0.775	0.745	0.769	0.775	0.766	1 7/8	
7670	2771	16:33	15	0.795	0.765	0.788	0.793	0.785	1 29/32	
7670	2771	16:48	30	0.821	0.795	0.818	0.821	0.814	1 59/64	
7670	2771	17:03	45	0.840	0.817	0.840	0.841	0.835	1 61/64	
7670	2771	17:18	60	0.854	0.831	0.855	0.852	0.848	1 31/32	
7670	2771	17:33	75	0.872	0.853	0.875	0.870	0.868	1 63/64	
7670	2771	17:48	90	0.875	0.857	0.882	0.874	0.872	1 63/64	
7670	2771	18:03	105	0.880	0.865	0.887	0.877	0.877	2	
7670	2771	18:18	120	0.887	0.877	0.900	0.884	0.887	2 1/64	
8776	3170	18:19	0	0.951	0.944	0.967	0.951	0.953	2 5/64	
8776	3170	18:20	1	0.963	0.953	0.975	0.959	0.963	2 3/32	
8776	3170	18:21	2	0.989	0.980	1.003	0.987	0.990	2 1/8	
8776	3170	18:22	3	1.003	0.994	1.017	1.001	1.004	2 1/8	
8776	3170	18:23	4	1.021	1.012	1.034	1.018	1.021	2 9/64	
8776	3170	18:24	5	1.029	1.020	1.042	1.025	1.029	2 5/32	
8776	3170	18:29	10	1.051	1.044	1.070	1.051	1.054	2 3/16	
8776	3170	18:34	15	1.073	1.066	1.087	1.069	1.074	2 13/64	
8776	3170	18:49	30	1.112	1.100	1.121	1.106	1.110	2 1/4	
8776	3170	19:04	45	1.146	1.135	1.155	1.140	1.144	2 17/64	
8776	3170	19:19	60	1.161	1.151	1.171	1.157	1.160	2 9/32	
8776	3170	19:34	75	1.183	1.173	1.192	1.178	1.182	2 5/16	
8776	3170	19:49	90	1.212	1.199	1.219	1.205	1.209	2 21/64	
8776	3170	20:04	105	1.224	1.210	1.230	1.217	1.220	2 11/32	
8776	3170	20:19	120	1.232	1.216	1.236	1.225	1.227	2 3/8	
8776	3170	21:19	180	1.276	1.253	1.278	1.269	1.269	2 25/64	
8776	3170	22:19	240	1.295	1.268	1.292	1.288	1.286	2 25/64	
8776	3170	23:19	300	1.302	1.272	1.294	1.296	1.291	2 27/64	
8776	3170	0:19	360	1.307	1.272	1.295	1.300	1.294	2 7/16	
8776	3170	1:19	420	1.312	1.272	1.295	1.304	1.296	2 7/16	
8776	3170	2:19	480	1.317	1.272	1.295	1.309	1.298	2 7/16	
8776	3170	3:19	540	1.324	1.272	1.295	1.314	1.301	2 7/16	
8776	3170	4:19	600	1.326	1.270	1.295	1.316	1.302	2 7/16	
8776	3170	5:19	660	1.326	1.270	1.295	1.317	1.302	2 7/16	
8776	3170	6:19	720	1.329	1.270	1.295	1.321	1.304	2 7/16	
6565	2372	8:30	0	1.339	1.259	1.284	1.334	1.304	2 7/16	
6565	2372	9:25	55	1.340	1.249	1.276	1.335	1.300	2 7/16	
6565	2372	9:30	60	1.340	1.248	1.276	1.335	1.300	2 7/16	
4352	1573	9:31	0	1.316	1.218	1.245	1.311	1.273	2 13/32	
4352	1573	11:00	55	1.319	1.213	1.242	1.314	1.272	2 13/32	
4352	1573	11:05	60	1.319	1.212	1.240	1.314	1.271	2 13/32	
2141	775	11:10	0	1.268	1.160	1.187	1.262	1.219	2 23/64	
2141	775	12:05	55	1.249	1.150	1.178	1.244	1.205	2 11/32	
2141	775	12:10	60	1.248	1.150	1.177	1.243	1.205	2 11/32	
0	0	12:20	0	1.101	1.005	1.043	1.111	1.065	2 13/64	
0	0	13:15	55	1.097	1.004	1.043	1.108	1.063	2 13/64	
0	0	13:20	60	1.094	1.004	1.043	1.105	1.062	2 13/64	

AXIAL COMPRESSION LOAD TEST - SITE #1 (SILT/CLAY, 1,500 PSF BEARING)
DIAMOND PIER #CL-C-DP75-2, 1.25" NOMINAL x 50" LONG PINS
INSTALLED 4/4/16, TESTED 4/20/16-4/21/16

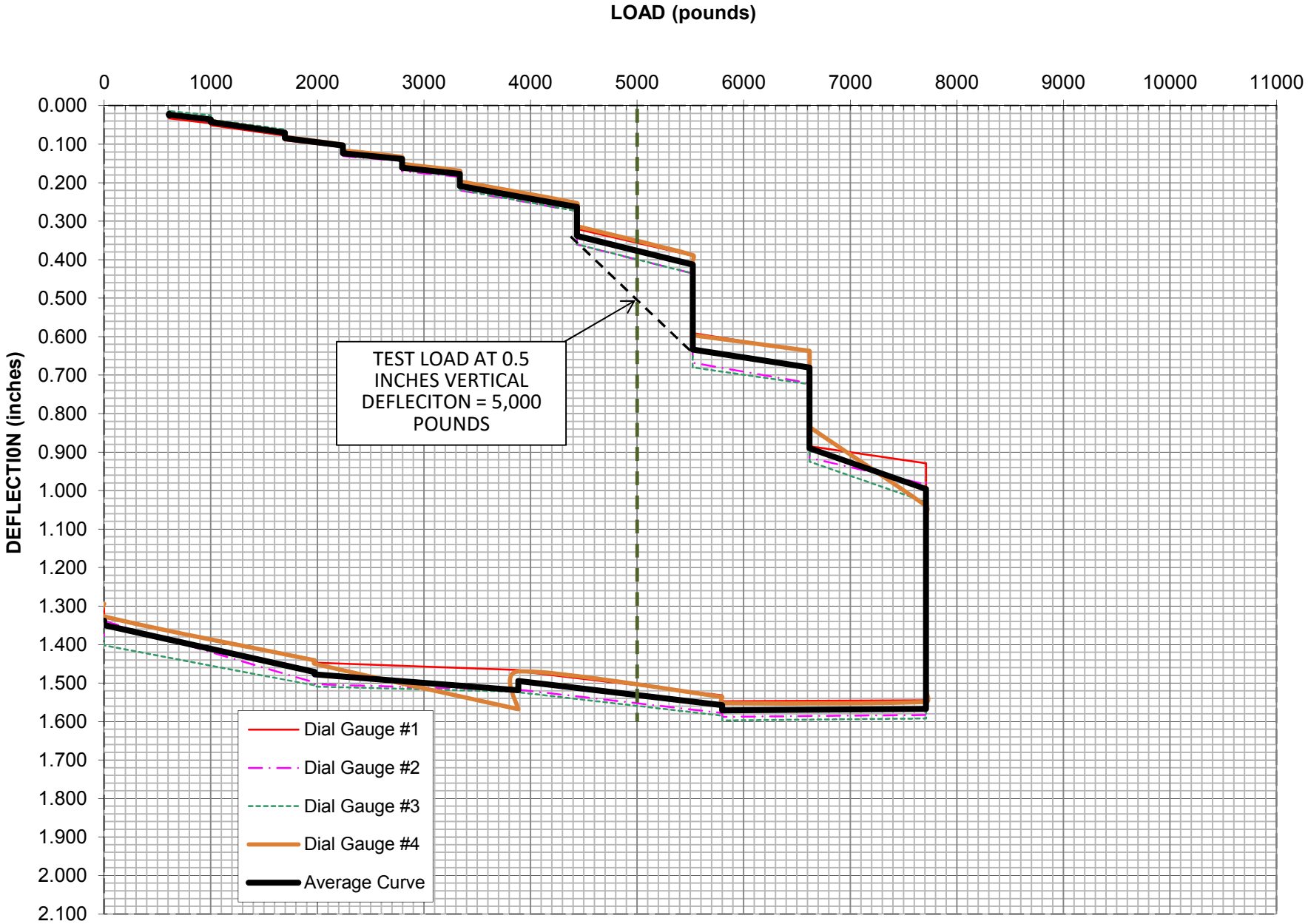


Project Name: Diamond Pier Compression Field Load Testing
EEI Project No.: 07-020
Site: Site #1 - Silt/Clay with presumptive bearing capacity of 1,500 psf
Test Method: Compression
Diamond Pier Tested: #CL-C-DP75-2
Date Installed: 4/4/2016
Date Test Started: 4/20/2016
Date Test Completed: 4/21/2016
Staff: Ken Andrieu, Bruce Lane
Hydraulic Ram: EEI Equipment #EEI 022
Equation of the Line: Load = (Gauge Pressure - 2) / 0.361
Dial Gauge #1: EEI Equipment #EEI 33
Dial Gauge #2: EEI Equipment #EEI 34
Dial Gauge #3: EEI Equipment #EEI 35
Dial Gauge #4: EEI Equipment #EEI 36

Load (pounds)	Gauge Pressure (psi)	Clock	Minutes	Dial Gauge #1 (in.)	Dial Gauge #2 (in.)	Dial Gauge #3 (in.)	Dial Gauge #4 (in.)	Dial Gauge Average (in.)	Transit (in.)	Test Remarks
0	0	11:41	0	0.000	0.000	0.000	0.000	0.000	1	
1587	575	11:43	0	0.067	0.051	0.067	0.084	0.067	1 1/16	
1587	575	11:44	1	0.068	0.052	0.069	0.086	0.069	1 1/16	
1587	575	11:45	2	0.068	0.052	0.069	0.086	0.069	1 1/16	
1587	575	11:46	3	0.069	0.052	0.069	0.086	0.069	1 1/16	
1587	575	11:47	4	0.070	0.052	0.069	0.087	0.070	1 1/16	
1587	575	11:48	5	0.070	0.052	0.070	0.088	0.070	1 5/64	
1587	575	11:53	10	0.072	0.054	0.070	0.090	0.072	1 5/64	
1587	575	11:58	15	0.076	0.058	0.073	0.093	0.075	1 5/64	
1587	575	12:13	30	0.077	0.059	0.074	0.096	0.077	1 3/32	
3247	1174	12:14	0	0.160	0.144	0.160	0.181	0.161	1 3/16	
3247	1174	12:15	1	0.164	0.148	0.164	0.184	0.165	1 3/16	
3247	1174	12:16	2	0.166	0.150	0.165	0.185	0.167	1 3/16	
3247	1174	12:17	3	0.172	0.156	0.171	0.191	0.173	1 3/16	
3247	1174	12:18	4	0.176	0.160	0.176	0.196	0.177	1 3/16	
3247	1174	12:19	5	0.179	0.163	0.179	0.199	0.180	1 13/64	
3247	1174	12:24	10	0.185	0.169	0.185	0.205	0.186	1 7/32	
3247	1174	12:29	15	0.187	0.172	0.187	0.207	0.188	1 7/32	
3247	1174	12:44	30	0.196	0.183	0.198	0.215	0.198	1 15/64	
3247	1174	12:59	45	0.200	0.188	0.204	0.220	0.203	1 15/64	
3247	1174	13:14	60	0.201	0.190	0.205	0.221	0.204	1 15/64	
4906	1773	13:16	0	0.320	0.314	0.334	0.344	0.328	1 3/8	
4906	1773	13:17	1	0.331	0.332	0.351	0.361	0.344	1 25/64	
4906	1773	13:18	2	0.346	0.341	0.359	0.368	0.354	1 13/32	
4906	1773	13:19	3	0.359	0.354	0.372	0.380	0.366	1 13/32	
4906	1773	13:20	4	0.362	0.357	0.375	0.383	0.369	1 13/32	
4906	1773	13:21	5	0.365	0.360	0.378	0.386	0.372	1 27/64	
4906	1773	13:26	10	0.377	0.373	0.391	0.398	0.385	1 27/64	
4906	1773	13:31	15	0.387	0.385	0.402	0.408	0.396	1 7/16	
4906	1773	13:46	30	0.400	0.400	0.417	0.420	0.409	1 15/32	
4906	1773	14:01	45	0.401	0.403	0.419	0.421	0.411	1 15/32	
6565	2372	14:05	0	0.557	0.566	0.585	0.582	0.573	1 41/64	
6565	2372	14:06	1	0.571	0.578	0.596	0.593	0.585	1 21/32	
6565	2372	14:07	2	0.623	0.631	0.649	0.646	0.637	1 11/16	
6565	2372	14:08	3	0.633	0.641	0.659	0.656	0.647	1 11/16	
6565	2372	14:09	4	0.669	0.677	0.695	0.692	0.683	1 47/64	
6565	2372	14:10	5	0.679	0.689	0.707	0.703	0.695	1 49/64	
6565	2372	14:15	10	0.714	0.724	0.743	0.737	0.730	1 51/64	
6565	2372	14:20	15	0.737	0.747	0.764	0.757	0.751	1 13/16	
6565	2372	14:35	30	0.766	0.784	0.801	0.789	0.785	1 27/32	
6565	2372	14:50	45	0.789	0.808	0.826	0.810	0.808	1 7/8	
6565	2372	15:05	60	0.809	0.832	0.849	0.830	0.830	1 29/32	
6565	2372	15:20	75	0.835	0.861	0.878	0.855	0.857	1 15/16	
6565	2372	15:35	90	0.845	0.875	0.892	0.865	0.869	1 61/64	
6565	2372	15:50	105	0.849	0.881	0.897	0.868	0.874	1 61/64	
6565	2372	16:05	120	0.851	0.888	0.905	0.872	0.879	1 31/32	
8224	2971	16:07	0	1.105	1.148	1.169	1.134	1.139	2 15/64	
8224	2971	16:08	1	1.146	1.189	1.212	1.177	1.181	2 9/32	
8224	2971	16:09	2	1.211	1.253	1.275	1.240	1.245	2 21/64	
8224	2971	16:10	3	1.248	1.290	1.312	1.276	1.282	2 3/8	
8224	2971	16:11	4	1.263	1.303	1.322	1.287	1.294	2 25/64	
8224	2971	16:12	5	1.286	1.326	1.346	1.309	1.317	2 13/32	
8224	2971	16:17	10	1.345	1.386	1.405	1.367	1.376	2 15/32	
8224	2971	16:22	15	1.393	1.437	1.455	1.416	1.425	2 17/32	
8224	2971	16:37	30	1.425	1.473	1.492	1.448	1.460	2 37/64	
8224	2971	16:52	45	1.433	1.483	1.501	1.454	1.468	2 9/16	
8224	2971	17:07	60	1.441	1.492	1.509	1.460	1.476	2 19/32	
8224	2971	17:22	75	1.458	1.511	1.527	1.477	1.493	2 39/64	
8224	2971	17:37	90	1.475	1.530	1.545	1.494	1.511	2 5/8	

8224	2971	17:52	105	1.500	1.558	1.573	1.516	1.537	2 21/32	
8224	2971	18:07	120	1.520	1.581	1.595	1.536	1.558	2 43/64	
8224	2971	19:07	180	1.563	1.624	1.637	1.580	1.601	2 23/32	
8224	2971	20:07	240	1.592	1.576	1.636	1.649	1.613	2 47/64	
8224	2971	21:07	300	1.597	1.581	1.636	1.650	1.616	2 47/64	
8224	2971	22:07	360	1.600	1.584	1.636	1.650	1.617	2 47/64	
8224	2971	23:07	420	1.621	1.604	1.654	1.666	1.636	2 3/4	
8224	2971	0:07	480	1.638	1.621	1.664	1.678	1.650	2 49/64	
8224	2971	1:07	540	1.659	1.641	1.682	1.697	1.670	2 25/32	
8224	2971	2:07	600	1.673	1.654	1.693	1.708	1.682	2 51/64	
8224	2971	3:07	660	1.684	1.665	1.701	1.716	1.692	2 51/64	
8224	2971	4:07	720	1.694	1.676	1.708	1.722	1.700	2 51/64	
6150	2222	4:10	0	1.682	1.666	1.696	1.708	1.688	2 51/64	
6150	2222	5:05	55	1.682	1.666	1.696	1.709	1.688	2 25/32	
6150	2222	5:10	60	1.682	1.666	1.696	1.709	1.688	2 25/32	
4075	1473	5:11	0	1.665	1.651	1.680	1.687	1.671	2 49/64	
4075	1473	6:06	55	1.660	1.648	1.675	1.683	1.667	2 3/4	
4075	1473	6:11	60	1.660	1.648	1.675	1.683	1.667	2 3/4	
2003	725	6:12	0	1.624	1.615	1.638	1.643	1.630	2 23/32	
2003	725	7:07	55	1.621	1.612	1.632	1.638	1.626	2 47/64	
2003	725	7:12	60	1.621	1.612	1.632	1.638	1.626	2 47/64	
0	0	7:14	0	1.487	1.483	1.502	1.499	1.493	2 37/64	
0	0	8:09	55	1.475	1.472	1.475	1.471	1.473	2 35/64	
0	0	8:14	60	1.475	1.472	1.474	1.471	1.473	2 35/64	

AXIAL COMPRESSION LOAD TEST - SITE #1 (SILT/CLAY, 1,500 PSF BEARING)
DIAMOND PIER #CL-C-DP75-4, 1.25" NOMINAL DIAMETER x 50" LONG PINS
INSTALLED 4/4/16, TESTED 4/25/16-4/26/16

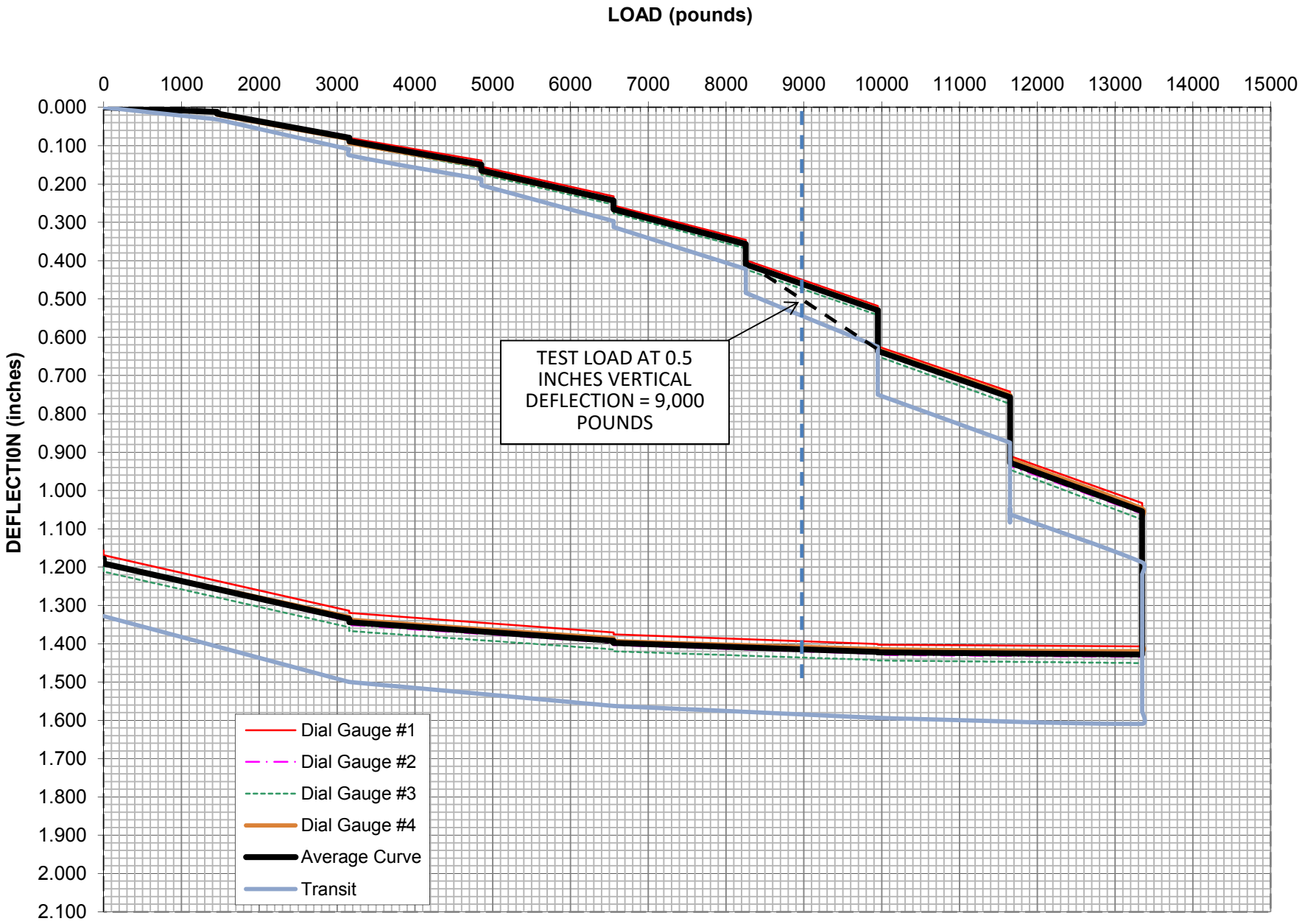


Project Name: Diamond Pier Compression Field Load Testing
EEI Project No.: 07-020
Site: Site #2 - Sand with presumptive bearing capacity of 2,000 psf
Test Method: Compression
Diamond Pier Tested: #CL-C-DP75-4
Date Installed: 4/4/2016
Date Test Started: 4/25/2016
Date Test Completed: 4/26/2016
Staff: Ken Andrieu, Bruce Lane
Hydraulic Ram: EEI Equipment #EEI 41 (Rented ram was used on the center pier)
Equation of the Line: Load = (Gauge Pressure - 39.6) / 0.46
Dial Gauge #1: EEI Equipment #EEI 33
Dial Gauge #2: EEI Equipment #EEI 34
Dial Gauge #3: EEI Equipment #EEI 35
Dial Gauge #4: EEI Equipment #EEI 36

Load (pounds)	Gauge Pressure (psi)	Clock	Minutes	Dial Gauge #1 (in.)	Dial Gauge #2 (in.)	Dial Gauge #3 (in.)	Dial Gauge #4 (in.)	Dial Gauge Average (in.)	Transit	Test Remarks
0	0	11:40	0	0.000	0.000	0.000	0.000	0.000	1 3/64	
610	320	11:45	0	0.025	0.020	0.017	0.021	0.021	1 1/16	
610	320	11:46	1	0.026	0.022	0.018	0.021	0.022	1 1/16	
610	320	11:47	2	0.027	0.022	0.018	0.023	0.023	1 1/16	
610	320	11:48	3	0.027	0.022	0.018	0.023	0.023	1 1/16	
610	320	11:49	4	0.027	0.023	0.019	0.023	0.023	1 1/16	
610	320	11:51	5	0.027	0.023	0.019	0.024	0.023	1 1/16	
610	320	11:56	10	0.029	0.023	0.020	0.024	0.024	1 1/16	
610	320	12:01	15	0.030	0.024	0.020	0.026	0.025	1 1/16	
610	320	12:06	20	0.033	0.019	0.011	0.025	0.022	1 1/16	
610	320	12:16	30	0.033	0.022	0.014	0.024	0.023	1 1/16	
1001	500	12:17	0	0.046	0.034	0.025	0.037	0.036	1 5/64	
1001	500	12:18	1	0.049	0.038	0.029	0.039	0.039	1 5/64	
1001	500	12:19	2	0.050	0.038	0.030	0.040	0.040	1 5/64	
1001	500	12:20	3	0.050	0.039	0.031	0.041	0.040	1 5/64	
1001	500	12:21	4	0.050	0.039	0.031	0.041	0.040	1 5/64	
1001	500	12:22	5	0.050	0.041	0.033	0.041	0.041	1 5/64	
1001	500	12:27	10	0.050	0.042	0.034	0.041	0.042	1 5/64	
1001	500	12:32	15	0.049	0.042	0.034	0.040	0.041	1 5/64	
1001	500	12:47	30	0.051	0.044	0.036	0.040	0.043	1 5/64	
1697	820	12:48	0	0.078	0.071	0.062	0.070	0.070	1 7/64	
1697	820	12:49	1	0.085	0.077	0.068	0.076	0.077	1 7/64	
1697	820	12:50	2	0.087	0.079	0.071	0.078	0.079	1 7/64	
1697	820	12:51	3	0.088	0.081	0.073	0.079	0.080	1 7/64	
1697	820	12:52	4	0.089	0.081	0.073	0.080	0.081	1 7/64	
1697	820	12:53	5	0.090	0.082	0.075	0.081	0.082	1 7/64	
1697	820	12:58	10	0.090	0.084	0.076	0.081	0.083	1 1/8	
1697	820	13:03	15	0.090	0.084	0.077	0.081	0.083	1 1/8	
1697	820	13:18	30	0.090	0.087	0.079	0.081	0.084	1 1/8	
2240	1,070	13:19	0	0.108	0.106	0.099	0.101	0.104	1 11/64	
2240	1,070	13:20	1	0.113	0.109	0.102	0.104	0.107	1 11/64	
2240	1,070	13:21	2	0.116	0.117	0.110	0.107	0.113	1 11/64	
2240	1,070	13:22	3	0.117	0.118	0.112	0.109	0.114	1 11/64	
2240	1,070	13:23	4	0.120	0.122	0.114	0.111	0.117	1 11/64	
2240	1,070	13:24	5	0.120	0.122	0.115	0.112	0.117	1 11/64	
2240	1,070	13:29	10	0.122	0.125	0.117	0.113	0.119	1 11/64	
2240	1,070	13:34	15	0.124	0.128	0.121	0.115	0.122	1 3/16	
2240	1,070	13:49	30	0.125	0.131	0.123	0.116	0.124	1 3/16	
2794	1,325	13:50	0	0.137	0.144	0.139	0.133	0.138	1 3/16	
2794	1,325	13:51	1	0.145	0.145	0.148	0.139	0.144	1 3/16	
2794	1,325	13:52	2	0.148	0.155	0.150	0.141	0.149	1 13/64	
2794	1,325	13:53	3	0.152	0.159	0.154	0.145	0.153	1 13/64	
2794	1,325	13:54	4	0.152	0.159	0.154	0.145	0.153	1 13/64	
2794	1,325	13:55	5	0.154	0.161	0.156	0.147	0.155	1 13/64	
2794	1,325	14:00	10	0.157	0.166	0.161	0.151	0.159	1 13/64	
2794	1,325	14:20	30	0.158	0.170	0.165	0.151	0.161	1 13/64	
3338	1,575	14:21	0	0.173	0.185	0.182	0.169	0.177	1 7/32	
3338	1,575	14:23	2	0.178	0.191	0.188	0.175	0.183	1 7/32	
3338	1,575	14:24	3	0.182	0.195	0.192	0.178	0.187	1 7/32	
3338	1,575	14:25	4	0.185	0.198	0.196	0.182	0.190	1 15/64	
3338	1,575	14:26	5	0.187	0.201	0.199	0.184	0.193	1 15/64	
3338	1,575	14:31	10	0.191	0.206	0.205	0.188	0.198	1 1/4	
3338	1,575	14:36	15	0.196	0.210	0.208	0.193	0.202	1 1/4	
3338	1,575	14:51	30	0.199	0.217	0.215	0.196	0.207	1 1/4	
3338	1,575	15:06	45	0.200	0.220	0.218	0.197	0.209	1 1/4	
4436	2,080	15:07	0	0.252	0.274	0.274	0.253	0.263	1 21/64	
4436	2,080	15:08	1	0.263	0.283	0.284	0.263	0.273	1 21/64	
4436	2,080	15:09	2	0.270	0.290	0.290	0.269	0.280	1 11/32	
4436	2,080	15:10	3	0.276	0.297	0.297	0.275	0.286	1 11/32	
4436	2,080	15:11	4	0.281	0.304	0.303	0.280	0.292	1 23/64	
4436	2,080	15:12	5	0.284	0.307	0.306	0.283	0.295	1 23/64	
4436	2,080	15:17	10	0.291	0.314	0.316	0.290	0.303	1 3/8	
4436	2,080	15:22	15	0.294	0.320	0.320	0.292	0.307	1 3/8	
4436	2,080	15:37	30	0.304	0.332	0.333	0.301	0.318	1 25/64	
4436	2,080	15:52	45	0.312	0.342	0.342	0.308	0.326	1 25/64	
4436	2,080	16:07	60	0.316	0.348	0.348	0.313	0.331	1 13/32	
4436	2,080	16:22	75	0.320	0.354	0.353	0.314	0.335	1 13/32	
4436	2,080	16:37	90	0.321	0.358	0.358	0.315	0.338	1 13/32	
4436	2,080	16:52	105	0.320	0.361	0.360	0.313	0.339	1 13/32	

5523	2,580	16:53	0	0.390	0.436	0.436	0.388	0.413	1 27/64	
5523	2,580	16:54	1	0.405	0.450	0.450	0.401	0.427	1 7/16	
5523	2,580	16:55	2	0.416	0.461	0.462	0.413	0.438	1 7/16	
5523	2,580	16:56	3	0.426	0.472	0.472	0.423	0.448	1 29/64	
5523	2,580	16:57	4	0.432	0.476	0.477	0.428	0.453	1 29/64	
5523	2,580	16:58	5	0.439	0.484	0.485	0.436	0.461	1 31/64	
5523	2,580	17:03	10	0.452	0.498	0.499	0.448	0.474	1 1/2	
5523	2,580	17:08	15	0.464	0.511	0.512	0.460	0.487	1 33/64	
5523	2,580	17:23	30	0.477	0.527	0.528	0.473	0.501	1 19/32	
5523	2,580	17:38	45	0.488	0.540	0.542	0.485	0.514	1 19/32	
5523	2,580	17:53	60	0.494	0.551	0.553	0.492	0.523	1 5/8	
5523	2,580	18:08	75	0.502	0.561	0.563	0.499	0.531	1 5/8	
5523	2,580	18:31	90	0.510	0.572	0.573	0.507	0.541	1 41/64	
5523	2,580	18:38	105	0.513	0.577	0.578	0.511	0.545	1 41/64	
5523	2,580	18:53	120	0.519	0.585	0.586	0.516	0.552	1 21/32	After this reading, added load to the 2 outside piers
5523	2,580	18:59	5	0.524	0.592	0.594	0.520	0.558	1 21/32	Applied 687 lb. load to outside piers
5523	2,580	19:05	5	0.533	0.602	0.605	0.531	0.568	1 43/64	Applied 1,375 lb. load to outside piers
5523	2,580	19:11	5	0.538	0.608	0.612	0.537	0.574	1 43/64	Applied 2,060 lb. load to outside piers
5523	2,580	19:17	5	0.542	0.613	0.618	0.543	0.579	1 11/16	Applied 2,750 lb. load to outside piers
5523	2,580	19:23	5	0.549	0.620	0.626	0.550	0.586	1 11/16	Applied 3,438 lb. load to outside piers
5523	2,580	19:29	5	0.558	0.629	0.637	0.560	0.596	1 45/64	Applied 4,125 lb. load to outside piers
5523	2,580	19:35	5	0.565	0.637	0.647	0.569	0.605	1 23/32	Applied 4,812 lb. load to outside piers
5523	2580	19:41	5	0.576	0.648	0.659	0.580	0.616	1 23/32	Applied 5,523 lb. load to outside piers
5523	2580	19:46	10	0.578	0.651	0.662	0.583	0.619	1 47/64	
5523	2580	19:51	15	0.580	0.654	0.666	0.586	0.622	1 47/64	
5523	2580	20:06	30	0.585	0.660	0.671	0.590	0.627	1 3/4	
5523	2580	20:21	45	0.588	0.665	0.676	0.593	0.631	1 3/4	
5523	2580	20:36	60	0.591	0.668	0.680	0.596	0.634	1 49/64	
6618	3084	20:43	0	0.639	0.721	0.724	0.637	0.680	1 13/16	
6618	3084	20:44	1	0.641	0.722	0.725	0.637	0.681	1 13/16	
6618	3084	20:45	2	0.665	0.749	0.754	0.668	0.709	1 55/64	
6618	3084	20:46	3	0.671	0.760	0.766	0.679	0.719	1 57/64	
6618	3084	20:47	4	0.692	0.775	0.782	0.695	0.736	1 59/64	
6618	3084	20:48	5	0.705	0.787	0.792	0.705	0.747	1 15/16	
6618	3084	20:53	10	0.719	0.802	0.807	0.720	0.762	1 31/32	
6618	3084	20:58	15	0.781	0.834	0.839	0.751	0.801	2 3/64	
6618	3084	21:13	30	0.781	0.863	0.868	0.779	0.823	2 5/64	
6618	3084	21:28	45	0.798	0.880	0.885	0.796	0.840	2 7/64	
6618	3084	21:43	60	0.812	0.895	0.900	0.810	0.854	2 1/8	
6618	3084	21:58	75	0.824	0.907	0.912	0.822	0.866	2 9/64	
6618	3084	22:13	90	0.828	0.912	0.917	0.826	0.871	2 9/64	
6618	3084	22:28	105	0.840	0.914	0.919	0.829	0.876	2 5/32	
6618	3084	22:43	120	0.885	0.915	0.925	0.835	0.890	2 5/32	
7712	3587	22:45	0	0.929	0.984	1.030	1.040	0.996	2 11/64	
7712	3587	22:46	1	0.971	0.977	1.050	1.060	1.015	2 3/16	
7712	3587	22:47	2	0.998	0.999	1.080	1.090	1.042	2 7/32	
7712	3587	22:48	3	1.000	1.000	1.090	1.090	1.045	2 7/32	
7712	3587	22:49	4	1.010	1.010	1.090	1.100	1.053	2 15/64	
7712	3587	22:50	5	1.020	1.020	1.107	1.110	1.064	2 1/4	
7712	3587	22:55	10	1.067	1.060	1.150	1.150	1.107	2 9/32	
7712	3587	13:00	15	1.090	1.170	1.180	1.090	1.133	2 5/16	
7712	3587	13:15	30	1.170	1.250	1.260	1.170	1.213	2 11/32	
7712	3587	13:30	45	1.204	1.280	1.290	1.205	1.245	2 3/8	
7712	3587	13:45	60	1.220	1.310	1.320	1.230	1.270	2 13/32	
7712	3587	0:00	75	1.252	1.330	1.340	1.250	1.293	2 27/64	
7712	3587	0:15	90	1.256	1.330	1.340	1.256	1.296	2 7/16	
7712	3587	0:30	105	1.280	1.360	1.370	1.280	1.323	2 7/16	
7712	3587	0:45	120	1.300	1.380	1.390	1.300	1.343	2 29/64	
7712	3587	1:45	180	1.330	1.410	1.420	1.330	1.373	2 15/32	
7712	3587	2:45	240	1.360	1.440	1.450	1.360	1.403	2 17/32	
7712	3587	3:45	300	1.380	1.450	1.470	1.380	1.420	2 35/64	
7712	3587	4:45	360	1.390	1.460	1.470	1.390	1.428	2 35/64	
7712	3587	5:45	420	1.390	1.480	1.490	1.410	1.443	2 9/16	
7712	3587	6:45	480	1.440	1.510	1.520	1.440	1.478	2 9/16	
7712	3587	7:45	540	1.470	1.520	1.530	1.470	1.498	2 37/64	
7712	3587	8:45	600	1.506	1.548	1.557	1.509	1.530	2 5/8	
7712	3587	9:45	660	1.520	1.560	1.569	1.523	1.543	2 41/64	
7712	3587	10:45	720	1.545	1.583	1.592	1.549	1.567	2 21/32	
5799	2707	10:53	0	1.547	1.588	1.597	1.552	1.571	2 21/32	
5799	2707	11:48	55	1.532	1.578	1.585	1.537	1.558	2 41/64	
5799	2707	11:53	60	1.532	1.578	1.585	1.536	1.558	2 41/64	
3886	1827	11:55	0	1.469	1.517	1.524	1.470	1.495	2 37/64	
3886	1827	12:50	55	1.466	1.516	1.523	1.568	1.518	2 37/64	
3886	1827	12:55	60	1.466	1.519	1.523	1.568	1.519	2 37/64	
1975	948	12:56	0	1.447	1.503	1.509	1.450	1.477	2 9/16	
1975	948	13:51	55	1.439	1.499	1.506	1.441	1.471	2 9/16	
1975	948	13:56	60	1.439	1.499	1.506	1.441	1.471	2 9/16	
0	0	14:01	0	1.330	1.339	1.402	1.327	1.350	2 29/64	
0	0	14:56	55	1.297	1.378	1.382	1.294	1.338	2 31/64	
0	0	15:01	60	1.297	1.378	1.382	1.294	1.338	2 31/64	

AXIAL COMPRESSION LOAD TEST - SITE #2 (SAND, 2,000 PSF BEARING)
DIAMOND PIER #SA-C-DP75-1, 1.25" NOMINAL x 50" LONG PINS
INSTALLED 4/4/16, TESTED 4/8/16-4/9/16

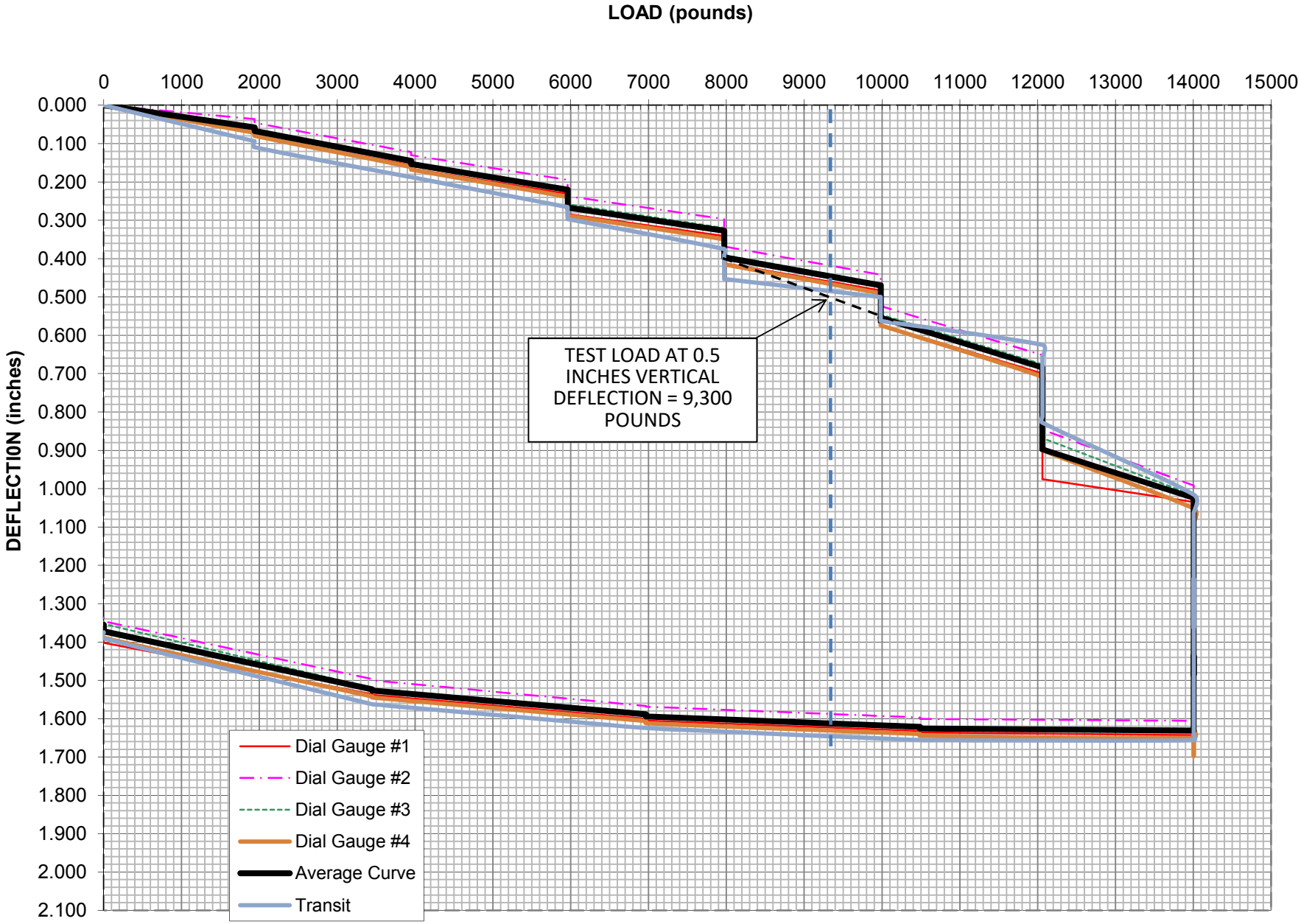


Project Name: Diamond Pier Compression Field Load Testing
EEI Project No.: 07-020
Site: Site #2 - Sand with presumptive bearing capacity of 2,000 psf
Test Method: Compression
Diamond Pier Tested: #SA-C-DP75-1
Date Installed: 4/4/2016
Date Test Started: 4/8/2016
Date Test Completed: 4/9/2016
Staff: Troy Hull, Ken Andrieu & Bruce Lane
Hydraulic Ram: EEI Equipment #EEI 021
Equation of the Line: Load = (Gauge Pressure - 88) / 0.365
Dial Gauge #1: EEI Equipment #EEI 33
Dial Gauge #2: EEI Equipment #EEI 34
Dial Gauge #3: EEI Equipment #EEI 35
Dial Gauge #4: EEI Equipment #EEI 36

Load (pounds)	Gauge Pressure (psi)	Clock	Minutes	Dial Gauge #1 (in.)	Dial Gauge #2 (in.)	Dial Gauge #3 (in.)	Dial Gauge #4 (in.)	Dial Gauge Average (in.)	Transit (in.)	Test Remarks
0	0	12:40	0	0.000	0.000	0.000	0.000	0.000	1	
1458	620	12:42	0	0.012	0.008	0.013	0.013	0.012	1 1/32	
1458	620	12:43	1	0.013	0.009	0.014	0.014	0.013	1 1/32	
1458	620	12:44	2	0.013	0.009	0.014	0.014	0.013	1 1/32	
1458	620	12:45	3	0.014	0.009	0.014	0.014	0.013	1 1/32	
1458	620	12:46	4	0.014	0.010	0.015	0.015	0.014	1 1/32	
1458	620	12:47	5	0.014	0.010	0.015	0.015	0.014	1 1/32	
1458	620	12:52	10	0.014	0.012	0.016	0.017	0.015	1 1/32	
1458	620	12:57	15	0.015	0.012	0.017	0.019	0.016	1 1/32	
1458	620	13:12	30	0.016	0.012	0.017	0.019	0.016	1 1/32	
3156	1240	13:21	0	0.075	0.075	0.084	0.083	0.079	1 7/64	
3156	1240	13:22	1	0.074	0.078	0.087	0.087	0.082	1 7/64	
3156	1240	13:23	2	0.074	0.079	0.088	0.087	0.082	1 7/64	
3156	1240	13:24	3	0.074	0.079	0.089	0.087	0.082	1 7/64	
3156	1240	13:25	4	0.075	0.080	0.090	0.088	0.083	1 7/64	
3156	1240	13:26	5	0.076	0.080	0.090	0.088	0.084	1 7/64	
3156	1240	13:31	10	0.077	0.082	0.092	0.090	0.085	1 7/64	
3156	1240	13:36	15	0.077	0.083	0.093	0.091	0.086	1 7/64	
3156	1240	13:51	30	0.080	0.084	0.095	0.093	0.088	1 1/8	
4855	1860	13:54	0	0.139	0.146	0.159	0.153	0.149	1 3/16	
4855	1860	13:55	1	0.142	0.148	0.161	0.155	0.152	1 3/16	
4855	1860	13:56	2	0.145	0.151	0.165	0.158	0.155	1 3/16	
4855	1860	13:57	3	0.147	0.153	0.166	0.160	0.157	1 3/16	
4855	1860	13:58	4	0.148	0.154	0.167	0.160	0.157	1 3/16	
4855	1860	13:59	5	0.149	0.156	0.169	0.161	0.159	1 3/16	
4855	1860	14:04	10	0.152	0.157	0.171	0.166	0.162	1 13/64	
4855	1860	14:09	15	0.152	0.159	0.173	0.166	0.163	1 13/64	
4855	1860	14:24	30	0.155	0.161	0.175	0.168	0.165	1 13/64	
6553	2480	14:28	0	0.232	0.240	0.254	0.245	0.243	1 19/64	
6553	2480	14:29	1	0.236	0.243	0.256	0.247	0.246	1 19/64	
6553	2480	14:30	2	0.240	0.247	0.260	0.250	0.249	1 19/64	
6553	2480	14:31	3	0.241	0.249	0.262	0.252	0.251	1 19/64	
6553	2480	14:32	4	0.244	0.251	0.265	0.255	0.254	1 19/64	
6553	2480	14:33	5	0.246	0.253	0.266	0.256	0.255	1 19/64	
6553	2480	14:38	10	0.248	0.256	0.269	0.260	0.258	1 19/64	
6553	2480	14:43	15	0.250	0.259	0.272	0.264	0.261	1 5/16	
6553	2480	14:58	30	0.255	0.262	0.276	0.268	0.265	1 5/16	
6553	2480	15:13	45	0.256	0.263	0.276	0.268	0.266	1 5/16	
8252	3100	15:20	0	0.346	0.355	0.368	0.357	0.357	1 27/64	
8252	3100	15:21	1	0.353	0.362	0.375	0.363	0.363	1 27/64	
8252	3100	15:22	2	0.359	0.368	0.380	0.369	0.369	1 27/64	
8252	3100	15:23	3	0.366	0.374	0.387	0.375	0.376	1 27/64	
8252	3100	15:24	4	0.368	0.377	0.390	0.378	0.378	1 7/16	
8252	3100	15:25	5	0.372	0.381	0.394	0.381	0.382	1 7/16	
8252	3100	15:30	10	0.379	0.388	0.401	0.388	0.389	1 29/64	
8252	3100	15:35	15	0.386	0.393	0.406	0.395	0.395	1 15/32	
8252	3100	15:50	30	0.393	0.402	0.415	0.403	0.403	1 15/32	
8252	3100	16:05	45	0.397	0.407	0.420	0.406	0.408	1 31/64	
8252	3100	16:20	60	0.399	0.410	0.423	0.408	0.410	1 31/64	
9951	3720	16:34	0	0.518	0.531	0.542	0.527	0.530	1 5/8	
9951	3720	16:35	1	0.529	0.543	0.554	0.537	0.541	1 5/8	
9951	3720	16:36	2	0.538	0.552	0.563	0.547	0.550	1 41/64	
9951	3720	16:37	3	0.546	0.560	0.571	0.554	0.558	1 41/64	
9951	3720	16:38	4	0.548	0.562	0.574	0.556	0.560	1 21/32	
9951	3720	16:39	5	0.556	0.570	0.582	0.564	0.568	1 21/32	
9951	3720	16:44	10	0.576	0.590	0.601	0.584	0.588	1 43/64	
9951	3720	16:49	15	0.584	0.599	0.610	0.593	0.597	1 45/64	
9951	3720	17:04	30	0.599	0.612	0.623	0.607	0.610	1 23/32	
9951	3720	17:19	45	0.608	0.623	0.633	0.615	0.620	1 23/32	

9951	3720	17:34	60	0.616	0.630	0.641	0.624	0.628	1 47/64	
9951	3720	17:49	75	0.622	0.637	0.647	0.630	0.634	1 3/4	
9951	3720	18:04	90	0.624	0.639	0.650	0.632	0.636	1 3/4	
11649	4340	18:23	0	0.742	0.760	0.774	0.751	0.757	1 7/8	
11649	4340	18:24	1	0.751	0.767	0.779	0.758	0.764	1 7/8	
11649	4340	18:25	2	0.758	0.775	0.788	0.767	0.772	1 57/64	
11649	4340	18:26	3	0.770	0.787	0.800	0.778	0.784	1 29/32	
11649	4340	18:27	4	0.780	0.797	0.810	0.789	0.794	1 29/32	
11649	4340	18:28	5	0.790	0.807	0.819	0.798	0.804	1 59/64	
11649	4340	18:33	10	0.814	0.832	0.844	0.821	0.828	1 61/64	
11649	4340	18:38	15	0.819	0.836	0.848	0.826	0.832	1 61/64	
11649	4340	18:53	30	0.830	0.847	0.861	0.838	0.844	1 31/32	
11649	4340	19:08	45	0.847	0.865	0.878	0.855	0.861	2	
11649	4340	19:23	60	0.861	0.882	0.895	0.872	0.878	2 1/64	
11649	4340	19:38	75	0.876	0.897	0.910	0.885	0.892	2 1/12	
11649	4340	19:53	90	0.888	0.912	0.925	0.899	0.906	2 3/64	
11649	4340	20:08	105	0.900	0.925	0.937	0.909	0.918	2 1/16	
11649	4340	20:23	120	0.910	0.936	0.946	0.918	0.928	2 1/16	
13348	4960	20:25	0	1.033	1.061	1.076	1.047	1.054	2 3/16	
13348	4960	20:26	1	1.056	1.084	1.100	1.071	1.078	2 7/32	
13348	4960	20:27	2	1.077	1.104	1.121	1.092	1.099	2 1/4	
13348	4960	20:28	3	1.083	1.110	1.125	1.095	1.103	2 1/4	
13348	4960	20:29	4	1.094	1.122	1.139	1.108	1.116	2 17/64	
13348	4960	20:30	5	1.103	1.129	1.144	1.116	1.123	2 17/64	
13348	4960	20:35	10	1.116	1.143	1.159	1.132	1.138	2 9/32	
13348	4960	20:40	15	1.136	1.163	1.179	1.150	1.157	2 19/64	
13348	4960	20:55	30	1.161	1.188	1.205	1.176	1.183	2 21/64	
13348	4960	21:10	45	1.183	1.210	1.228	1.197	1.205	2 11/32	
13348	4960	21:25	60	1.201	1.228	1.245	1.215	1.222	2 3/8	
13348	4960	21:40	75	1.215	1.242	1.259	1.229	1.236	2 25/64	
13348	4960	21:55	90	1.228	1.256	1.274	1.243	1.250	2 13/32	
13348	4960	22:10	105	1.241	1.268	1.285	1.255	1.262	2 13/32	
13348	4960	22:25	120	1.250	1.276	1.294	1.263	1.271	2 27/64	
13348	4960	23:25	180	1.264	1.293	1.310	1.279	1.287	2 29/64	
13348	4960	0:25	240	1.285	1.314	1.331	1.299	1.307	2 31/64	
13348	4960	1:25	300	1.300	1.329	1.345	1.313	1.322	2 1/2	
13348	4960	2:25	360	1.315	1.343	1.360	1.328	1.337	2 33/64	
13348	4960	3:25	420	1.330	1.360	1.377	1.344	1.353	2 17/32	
13348	4960	4:25	480	1.334	1.371	1.387	1.356	1.362	2 9/16	
13348	4960	5:25	540	1.354	1.380	1.396	1.365	1.374	2 9/16	
13348	4960	6:25	600	1.365	1.391	1.408	1.377	1.385	2 9/16	
13348	4960	7:25	660	1.388	1.415	1.432	1.400	1.409	2 37/64	
13348	4960	8:25	720	1.407	1.435	1.451	1.419	1.428	2 39/64	
9951	3720	8:25	0	1.403	1.429	1.444	1.415	1.423	2 19/32	
9951	3720	9:20	55	1.401	1.427	1.443	1.414	1.421	2 19/32	
9951	3720	9:25	60	1.401	1.427	1.443	1.414	1.421	2 19/32	
6553	2480	9:25	0	1.376	1.404	1.420	1.393	1.398	2 9/16	
6553	2480	10:20	55	1.371	1.398	1.415	1.386	1.393	2 9/16	
6553	2480	10:25	60	1.371	1.398	1.415	1.386	1.393	2 9/16	
3156	1240	10:25	0	1.320	1.351	1.367	1.337	1.344	2 1/2	
3156	1240	11:20	55	1.314	1.341	1.357	1.330	1.336	2 1/2	
3156	1240	11:25	60	1.314	1.341	1.357	1.330	1.336	2 1/2	
0	0	11:25	0	1.169	1.193	1.212	1.190	1.191	2 21/64	
0	0	12:20	55	1.157	1.178	1.198	1.180	1.178	2 21/64	
0	0	12:25	60	1.157	1.178	1.198	1.180	1.178	2 21/64	

AXIAL COMPRESSION LOAD TEST - SITE #2 (SAND, 2,000 PSF BEARING)
DIAMOND PIER #SA-C-DP75-2, 1.25" NOMINAL x 50" LONG PINS
INSTALLED 4/4/16, TESTED 4/27/16-4/28/16

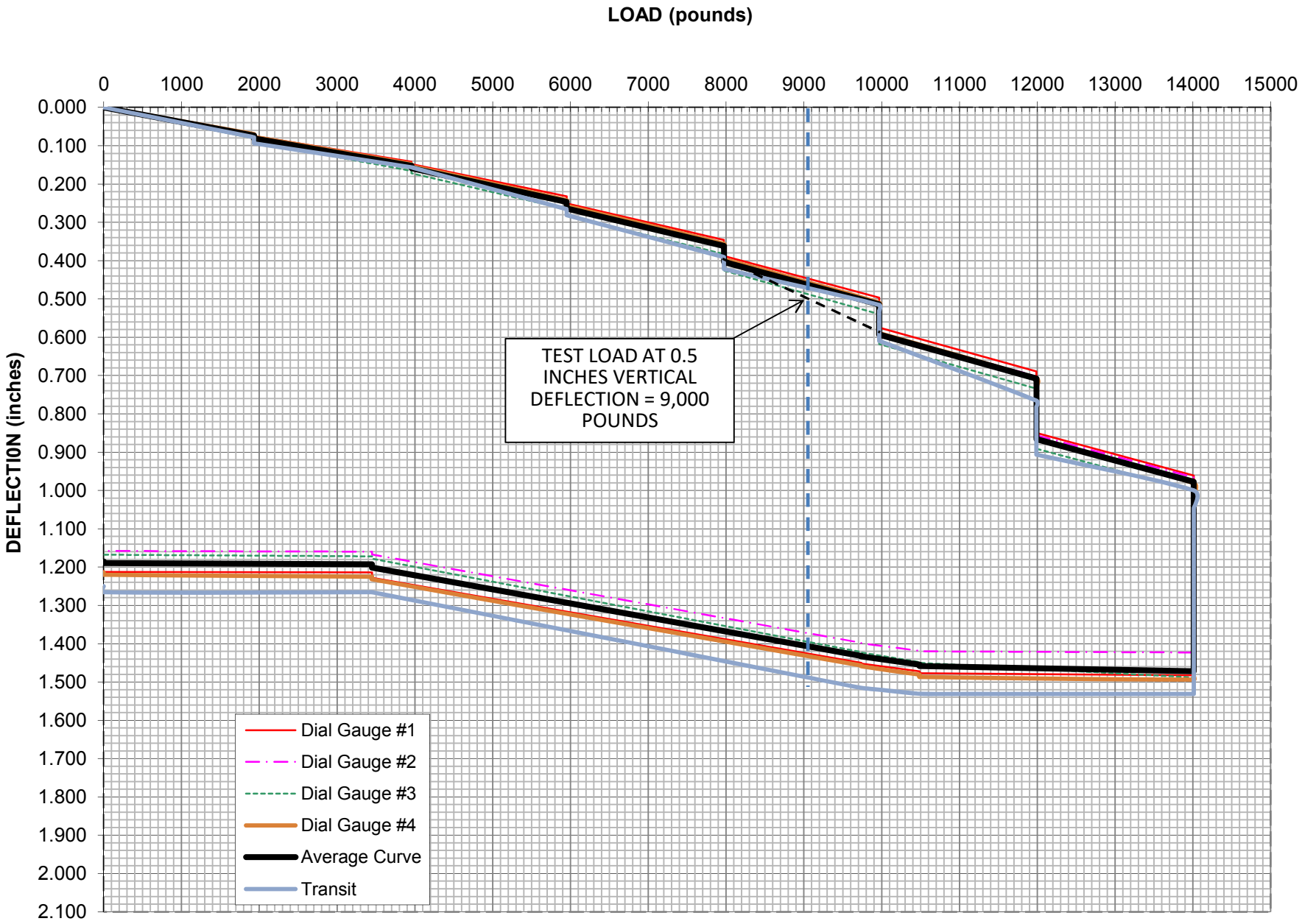


Project Name: Diamond Pier Compression Field Load Testing
EEI Project No.: 07-020
Site: Site #2 - Sand with presumptive bearing capacity of 2,000 psf
Test Method: Compression
Diamond Pier Tested: #SA-C-DP75-2
Date Installed: 4/4/2016
Date Test Started: 4/27/2016
Date Test Completed: 4/28/2016
Staff: Troy Hull, Ken Andrieu & Bruce Lane
Hydraulic Ram: EEI Equipment #EEI 022
Equation of the Line: Load = (Gauge Pressure - 2) / 0.361
Dial Gauge #1: EEI Equipment #EEI 40
Dial Gauge #2: EEI Equipment #EEI 35
Dial Gauge #3: EEI Equipment #EEI 37
Dial Gauge #4: EEI Equipment #EEI 38

Load (pounds)	Gauge Pressure (psi)	Clock	Minutes	Dial Gauge #1 (in.)	Dial Gauge #2 (in.)	Dial Gauge #3 (in.)	Dial Gauge #4 (in.)	Dial Gauge Average (in.)	Transit (in.)	Test Remarks
0	0	19:05	0	0.000	0.000	0.000	0.000	0.000	1	
1939	702	19:08	0	0.071	0.036	0.053	0.072	0.058	1 3/32	
1939	702	19:09	1	0.072	0.038	0.055	0.074	0.060	1 3/32	
1939	702	19:10	2	0.072	0.039	0.057	0.075	0.061	1 3/32	
1939	702	19:11	3	0.076	0.041	0.058	0.077	0.063	1 3/32	
1939	702	19:12	4	0.077	0.041	0.059	0.077	0.064	1 3/32	
1939	702	19:13	5	0.077	0.041	0.059	0.078	0.064	1 3/32	
1939	702	19:18	10	0.077	0.042	0.060	0.078	0.064	1 3/32	
1939	702	19:23	15	0.078	0.043	0.060	0.079	0.065	1 3/32	
1939	702	19:38	30	0.079	0.046	0.063	0.080	0.067	1 7/64	
3950	1428	19:39	0	0.156	0.122	0.142	0.161	0.145	1 3/16	
3950	1428	19:40	1	0.159	0.124	0.144	0.163	0.148	1 3/16	
3950	1428	19:41	2	0.159	0.126	0.145	0.164	0.149	1 3/16	
3950	1428	19:42	3	0.161	0.126	0.146	0.165	0.150	1 3/16	
3950	1428	19:43	4	0.161	0.127	0.146	0.166	0.150	1 3/16	
3950	1428	19:44	5	0.161	0.127	0.147	0.166	0.150	1 3/16	
3950	1428	19:49	10	0.163	0.128	0.147	0.167	0.151	1 3/16	
3950	1428	19:54	15	0.164	0.130	0.149	0.168	0.153	1 3/16	
3950	1428	20:09	30	0.165	0.130	0.149	0.168	0.153	1 3/16	
5961	2154	20:11	0	0.231	0.195	0.216	0.239	0.220	1 17/64	
5961	2154	20:12	1	0.235	0.200	0.221	0.244	0.225	1 17/64	
5961	2154	20:13	2	0.239	0.204	0.225	0.248	0.229	1 17/64	
5961	2154	20:14	3	0.243	0.207	0.228	0.251	0.232	1 17/64	
5961	2154	20:15	4	0.248	0.211	0.231	0.254	0.236	1 9/32	
5961	2154	20:16	5	0.253	0.216	0.236	0.260	0.241	1 9/32	
5961	2154	20:21	10	0.259	0.221	0.241	0.265	0.247	1 9/32	
5961	2154	20:26	15	0.261	0.222	0.243	0.266	0.248	1 9/32	
5961	2154	20:41	30	0.268	0.225	0.248	0.273	0.254	1 19/64	
5961	2154	20:56	45	0.276	0.232	0.253	0.281	0.261	1 19/64	
5961	2154	21:11	60	0.280	0.233	0.255	0.284	0.263	1 19/64	
5961	2154	21:26	75	0.282	0.235	0.257	0.286	0.265	1 19/64	
5961	2154	21:41	90	0.284	0.237	0.258	0.288	0.267	1 19/64	
7972	2880	21:45	0	0.341	0.297	0.320	0.350	0.327	1 3/8	
7972	2880	21:46	1	0.355	0.310	0.332	0.362	0.340	1 25/64	
7972	2880	21:47	2	0.368	0.322	0.343	0.374	0.352	1 13/32	
7972	2880	21:48	3	0.376	0.329	0.350	0.381	0.359	1 13/32	
7972	2880	21:49	4	0.380	0.333	0.354	0.385	0.363	1 13/32	
7972	2880	21:50	5	0.383	0.336	0.357	0.387	0.366	1 27/64	
7972	2880	21:55	10	0.387	0.341	0.362	0.393	0.371	1 27/64	
7972	2880	22:00	15	0.389	0.344	0.366	0.395	0.374	1 27/64	
7972	2880	22:15	30	0.394	0.349	0.371	0.400	0.379	1 7/16	
7972	2880	22:30	45	0.406	0.361	0.382	0.409	0.390	1 29/64	
7972	2880	22:45	60	0.408	0.364	0.385	0.412	0.392	1 29/64	
7972	2880	23:00	75	0.410	0.368	0.389	0.414	0.395	1 29/64	
7972	2880	23:15	90	0.412	0.368	0.391	0.415	0.397	1 29/64	
9983	3606	23:20	0	0.483	0.442	0.465	0.491	0.470	1 1/2	
9983	3606	23:21	1	0.493	0.450	0.472	0.498	0.478	1 1/2	
9983	3606	23:22	2	0.513	0.472	0.494	0.518	0.499	1 33/64	
9983	3606	23:23	3	0.518	0.476	0.498	0.523	0.504	1 17/32	
9983	3606	23:24	4	0.523	0.480	0.502	0.527	0.508	1 17/32	
9983	3606	23:25	5	0.528	0.485	0.507	0.532	0.513	1 35/64	
9983	3606	23:30	10	0.544	0.501	0.523	0.548	0.529	1 35/64	
9983	3606	23:35	15	0.559	0.575	0.536	0.562	0.558	1 9/16	
9983	3606	23:50	30	0.571	0.523	0.545	0.572	0.553	1 9/16	
9983	3606	0:05	45	0.573	0.524	0.546	0.574	0.554	1 9/16	
12061	4356	0:10	0	0.700	0.652	0.676	0.708	0.684	1 5/8	
12061	4356	0:11	1	0.717	0.670	0.694	0.727	0.702	1 21/32	
12061	4356	0:12	2	0.745	0.699	0.722	0.755	0.730	1 11/16	
12061	4356	0:13	3	0.757	0.708	0.730	0.762	0.739	1 45/64	

12061	4356	0:14	4	0.762	0.712	0.735	0.767	0.744	1 23/32	
12061	4356	0:15	5	0.772	0.721	0.744	0.777	0.754	1 23/32	
12061	4356	0:20	10	0.796	0.745	0.768	0.801	0.778	1 47/64	
12061	4356	0:25	15	0.809	0.757	0.780	0.813	0.790	1 3/4	
12061	4356	0:40	30	0.836	0.783	0.806	0.840	0.816	1 25/32	
12061	4356	0:55	45	0.842	0.789	0.811	0.845	0.822	1 25/32	
12061	4356	1:10	60	0.855	0.805	0.829	0.861	0.838	1 25/32	
12061	4356	1:25	75	0.868	0.813	0.837	0.870	0.847	1 25/32	
12061	4356	1:40	90	0.879	0.825	0.848	0.882	0.859	1 51/64	
12061	4356	1:55	105	0.884	0.833	0.855	0.887	0.865	1 13/16	
12061	4356	2:10	120	0.975	0.846	0.868	0.900	0.897	1 53/64	
14006	5058	2:15	0	1.035	0.992	1.018	1.052	1.024	2 1/64	
14006	5058	2:16	1	1.077	1.027	1.053	1.088	1.061	2 1/16	
14006	5058	2:17	2	1.117	1.066	1.090	1.125	1.099	2 7/64	
14006	5058	2:18	3	1.147	1.095	1.119	1.154	1.129	2 5/32	
14006	5058	2:19	4	1.165	1.115	1.141	1.174	1.149	2 7/32	
14006	5058	2:20	5	1.187	1.136	1.160	1.195	1.170	2 17/64	
14006	5058	2:25	10	1.230	1.177	1.201	1.235	1.211	2 21/64	
14006	5058	2:30	15	1.250	1.198	1.225	1.259	1.233	2 23/64	
14006	5058	2:45	30	1.302	1.250	1.274	1.306	1.283	2 15/64	
14006	5058	3:00	45	1.311	1.260	1.285	1.316	1.293	2 15/64	
14006	5058	3:15	60	1.352	1.301	1.325	1.357	1.334	2 9/32	
14006	5058	3:30	75	1.354	1.304	1.328	1.360	1.337	2 9/32	
14006	5058	3:45	90	1.359	1.308	1.333	1.364	1.341	2 19/64	
14006	5058	4:00	105	1.399	1.348	1.372	1.404	1.381	2 11/32	
14006	5058	4:15	120	1.406	1.355	1.380	1.410	1.388	2 11/32	
14006	5058	5:15	180	1.418	1.372	1.396	1.432	1.405	2 27/64	
14006	5058	6:15	240	1.426	1.386	1.410	1.474	1.424	2 27/64	
14006	5058	7:15	300	1.433	1.396	1.419	1.698	1.487	2 7/16	
14006	5058	8:15	360	1.442	1.416	1.438	1.450	1.437	2 7/16	
14006	5058	9:15	420	1.465	1.437	1.459	1.470	1.458	2 15/32	
14006	5058	10:15	480	1.535	1.513	1.533	1.541	1.531	2 17/32	
14006	5058	11:15	540	1.572	1.555	1.575	1.577	1.570	2 37/64	
14006	5058	12:15	600	1.597	1.580	1.601	1.603	1.595	2 39/64	
14006	5058	13:15	660	1.620	1.595	1.616	1.625	1.614	2 41/64	
14006	5058	14:15	720	1.643	1.606	1.626	1.650	1.631	2 21/32	
10488	3788	14:24	0	1.636	1.601	1.622	1.645	1.626	2 21/32	
10488	3788	15:19	55	1.632	1.597	1.619	1.640	1.622	2 21/32	
10488	3788	15:24	60	1.632	1.597	1.617	1.640	1.622	2 21/32	
6967	2517	15:25	0	1.605	1.569	1.592	1.612	1.595	2 5/8	
6967	2517	16:20	55	1.600	1.567	1.583	1.606	1.589	2 5/8	
6967	2517	16:25	60	1.600	1.567	1.583	1.606	1.589	2 5/8	
3449	1247	16:26	0	1.538	1.500	1.523	1.545	1.527	2 9/16	
3449	1247	17:21	55	1.536	1.497	1.520	1.542	1.524	2 9/16	
3449	1247	17:26	60	1.536	1.497	1.520	1.542	1.524	2 9/16	
0	0	17:27	0	1.402	1.346	1.353	1.389	1.373	2 25/64	
0	0	18:22	55	1.382	1.326	1.337	1.375	1.355	2 3/8	
0	0	18:27	60	1.382	1.326	1.337	1.375	1.355	2 3/8	

AXIAL COMPRESSION LOAD TEST - SITE #2 (SAND, 2,000 PSF BEARING)
DIAMOND PIER #SA-C-DP75-3, 1.25" NOMINAL x 50" LONG PINS
INSTALLED 4/4/16, TESTED 5/2/16-5/3/16



Project Name: Diamond Pier Compression Field Load Testing
EEI Project No.: 07-020
Site: Site #2 - Sand with presumptive bearing capacity of 2,000 psf
Test Method: Compression
Diamond Pier Tested: #SA-C-DP75-3
Date Installed: 4/4/2016
Date Test Started: 5/2/2016
Date Test Completed: 5/3/2016
Staff: Ken Andrieu, Bruce Lane
Hydraulic Ram: EEI Equipment #EEI 022
Equation of the Line: Load = (Gauge Pressure - 2) / 0.361
Dial Gauge #1: EEI Equipment #EEI 33
Dial Gauge #2: EEI Equipment #EEI 34
Dial Gauge #3: EEI Equipment #EEI 35
Dial Gauge #4: EEI Equipment #EEI 36

Load (pounds)	Gauge Pressure (psi)	Clock	Minutes	Dial Gauge #1 (in.)	Dial Gauge #2 (in.)	Dial Gauge #3 (in.)	Dial Gauge #4 (in.)	Dial Gauge Average (in.)	Transit (in.)	Test Remarks
0	0	10:35	0	0.000	0.000	0.000	0.000	0.000	1	
1934	700	10:37	0	0.069	0.076	0.081	0.070	0.074	1 5/64	
1934	700	10:38	1	0.072	0.079	0.084	0.073	0.077	1 5/64	
1934	700	10:39	2	0.074	0.082	0.087	0.075	0.080	1 5/64	
1934	700	10:40	3	0.075	0.083	0.087	0.076	0.080	1 5/64	
1934	700	10:41	4	0.075	0.083	0.088	0.076	0.081	1 5/64	
1934	700	10:42	5	0.075	0.083	0.088	0.077	0.081	1 3/32	
1934	700	10:47	10	0.075	0.083	0.088	0.077	0.081	1 3/32	
1934	700	10:52	15	0.075	0.083	0.089	0.077	0.081	1 3/32	
1934	700	10:57	20	0.075	0.084	0.089	0.077	0.081	1 3/32	
3956	1430	10:57	0	0.142	0.155	0.166	0.148	0.153	1 5/32	
3956	1430	10:58	1	0.145	0.158	0.168	0.150	0.155	1 5/32	
3956	1430	10:59	2	0.146	0.159	0.169	0.151	0.156	1 5/32	
3956	1430	11:00	3	0.146	0.159	0.169	0.151	0.156	1 5/32	
3956	1430	11:01	4	0.147	0.160	0.170	0.152	0.157	1 5/32	
3956	1430	11:02	5	0.147	0.160	0.170	0.152	0.157	1 5/32	
3956	1430	11:07	10	0.148	0.160	0.171	0.153	0.158	1 5/32	
3956	1430	11:12	15	0.148	0.161	0.172	0.153	0.159	1 5/32	
3956	1430	11:17	20	0.148	0.161	0.172	0.153	0.159	1 5/32	
5950	2150	11:18	0	0.232	0.248	0.266	0.242	0.247	1 17/64	
5950	2150	11:19	1	0.241	0.257	0.274	0.250	0.256	1 17/64	
5950	2150	11:20	2	0.246	0.261	0.277	0.254	0.260	1 17/64	
5950	2150	11:21	3	0.248	0.262	0.279	0.254	0.261	1 17/64	
5950	2150	11:22	4	0.248	0.262	0.279	0.255	0.261	1 17/64	
5950	2150	11:23	5	0.249	0.263	0.279	0.255	0.262	1 9/32	
5950	2150	11:28	10	0.250	0.264	0.281	0.257	0.263	1 9/32	
5950	2150	11:33	15	0.251	0.265	0.282	0.257	0.264	1 9/32	
5950	2150	11:38	20	0.251	0.265	0.282	0.257	0.264	1 9/32	
7972	2880	11:39	0	0.346	0.361	0.383	0.356	0.362	1 25/64	
7972	2880	11:40	1	0.355	0.370	0.392	0.366	0.371	1 25/64	
7972	2880	11:41	2	0.364	0.379	0.402	0.374	0.380	1 13/32	
7972	2880	11:42	3	0.369	0.383	0.405	0.377	0.384	1 13/32	
7972	2880	11:43	4	0.372	0.386	0.408	0.380	0.387	1 13/32	
7972	2880	11:44	5	0.375	0.389	0.412	0.383	0.390	1 13/32	
7972	2880	11:49	10	0.381	0.395	0.418	0.389	0.396	1 27/64	
7972	2880	11:54	15	0.384	0.398	0.421	0.392	0.399	1 27/64	
7972	2880	11:59	20	0.387	0.401	0.424	0.394	0.402	1 27/64	
7972	2880	12:09	30	0.388	0.403	0.425	0.395	0.403	1 27/64	
7972	2880	12:24	45	0.388	0.404	0.426	0.396	0.404	1 27/64	
9967	3600	12:25	0	0.497	0.510	0.540	0.510	0.514	1 33/64	
9967	3600	12:26	1	0.513	0.527	0.556	0.527	0.531	1 17/32	
9967	3600	12:27	2	0.520	0.535	0.563	0.534	0.538	1 17/32	
9967	3600	12:28	3	0.531	0.543	0.573	0.543	0.548	1 35/64	
9967	3600	12:29	4	0.536	0.550	0.578	0.548	0.553	1 35/64	
9967	3600	12:30	5	0.540	0.555	0.583	0.554	0.558	1 9/16	
9967	3600	12:35	10	0.550	0.564	0.591	0.561	0.567	1 37/64	
9967	3600	12:40	15	0.552	0.567	0.595	0.564	0.570	1 37/64	
9967	3600	12:45	20	0.557	0.572	0.601	0.570	0.575	1 37/64	
9967	3600	12:55	30	0.565	0.579	0.607	0.576	0.582	1 19/32	
9967	3600	13:10	45	0.570	0.584	0.612	0.582	0.587	1 19/32	
9967	3600	13:25	60	0.575	0.589	0.617	0.587	0.592	1 39/64	
9967	3600	13:40	75	0.575	0.589	0.618	0.589	0.593	1 39/64	
11989	4330	13:41	0	0.689	0.702	0.734	0.708	0.708	1 49/64	
11989	4330	13:42	1	0.711	0.724	0.756	0.730	0.730	1 25/32	
11989	4330	13:43	2	0.731	0.743	0.776	0.750	0.750	1 51/64	
11989	4330	13:44	3	0.740	0.751	0.783	0.757	0.758	1 51/64	
11989	4330	13:45	4	0.745	0.756	0.789	0.762	0.763	1 13/16	
11989	4330	13:46	5	0.752	0.763	0.796	0.769	0.770	1 13/16	
11989	4330	13:51	10	0.770	0.782	0.814	0.788	0.789	1 53/64	

11989	4330	13:56	15	0.785	0.795	0.827	0.800	0.802	1 27/32	
11989	4330	14:01	20	0.794	0.806	0.839	0.812	0.813	1 55/64	
11989	4330	14:11	30	0.807	0.818	0.850	0.824	0.825	1 7/8	
11989	4330	14:26	45	0.818	0.829	0.863	0.835	0.836	1 57/64	
11989	4330	14:41	60	0.830	0.839	0.873	0.845	0.847	1 57/64	
11989	4330	14:56	75	0.840	0.849	0.883	0.856	0.857	1 29/32	
11989	4330	15:11	90	0.848	0.856	0.890	0.864	0.865	1 29/32	
11989	4330	15:26	105	0.850	0.856	0.891	0.867	0.866	1 29/32	
14011	5060	15:29	0	0.961	0.966	1.002	0.981	0.978	2	
14011	5060	15:30	1	0.992	0.997	1.033	1.012	1.009	2 3/64	
14011	5060	15:31	2	1.015	1.020	1.056	1.035	1.032	2 5/64	
14011	5060	15:32	3	1.038	1.041	1.077	1.057	1.053	2 3/32	
14011	5060	15:33	4	1.051	1.054	1.089	1.070	1.066	2 3/32	
14011	5060	15:34	5	1.069	1.072	1.107	1.087	1.084	2 7/64	
14011	5060	15:39	10	1.098	1.100	1.136	1.116	1.113	2 1/8	
14011	5060	15:44	15	1.122	1.123	1.158	1.138	1.135	2 9/64	
14011	5060	15:49	20	1.145	1.144	1.178	1.162	1.157	2 11/64	
14011	5060	15:59	30	1.171	1.167	1.201	1.186	1.181	2 13/64	
14011	5060	16:14	45	1.198	1.188	1.223	1.213	1.206	2 1/4	
14011	5060	16:29	60	1.241	1.224	1.255	1.254	1.244	2 9/32	
14011	5060	16:44	75	1.261	1.242	1.277	1.274	1.264	2 5/16	
14011	5060	16:59	90	1.270	1.253	1.288	1.287	1.275	2 21/64	
14011	5060	17:14	105	1.294	1.269	1.303	1.306	1.293	2 23/64	
14011	5060	17:29	120	1.308	1.282	1.316	1.321	1.307	2 3/8	
14011	5060	18:29	180	1.355	1.318	1.354	1.369	1.349	2 7/16	
14011	5060	19:29	240	1.390	1.343	1.378	1.403	1.379	2 29/64	
14011	5060	20:29	300	1.414	1.356	1.391	1.427	1.397	2 15/32	
14011	5060	21:29	360	1.421	1.360	1.396	1.435	1.403	2 15/32	
14011	5060	22:29	420	1.426	1.374	1.410	1.450	1.415	2 31/64	
14011	5060	23:29	480	1.440	1.376	1.411	1.451	1.420	2 1/2	
14011	5060	0:29	540	1.441	1.376	1.411	1.452	1.420	2 1/2	
14011	5060	1:29	600	1.460	1.399	1.434	1.474	1.442	2 17/32	
14011	5060	2:29	660	1.472	1.411	1.445	1.484	1.453	2 17/32	
14011	5060	3:29	720	1.483	1.423	1.488	1.494	1.472	2 17/32	
10488	3788	3:30	0	1.477	1.420	1.450	1.487	1.459	2 17/32	
10488	3788	4:25	55	1.472	1.419	1.448	1.481	1.455	2 17/32	
10488	3788	4:30	60	1.472	1.419	1.448	1.481	1.455	2 17/32	
9737	3517	4:31	0	1.452	1.399	1.423	1.459	1.433	2 33/64	
9737	3517	5:26	55	1.450	1.398	1.422	1.457	1.432	2 33/64	
9737	3517	5:31	60	1.450	1.398	1.422	1.457	1.432	2 33/64	
3449	1247	5:32	0	1.228	1.167	1.178	1.232	1.201	2 17/64	
3449	1247	6:27	55	1.214	1.160	1.172	1.225	1.193	2 17/64	
3449	1247	6:32	60	1.214	1.160	1.172	1.225	1.193	2 17/64	
0	0	6:33	0	1.213	1.158	1.168	1.220	1.190	2 17/64	
0	0	7:28	55	1.210	1.155	1.162	1.214	1.185	2 1/4	
0	0	7:33	60	1.210	1.155	1.162	1.214	1.185	2 1/4	

Project Name: Diamond Pier Compression Field Load Testing
EEI Project No.: 07-020
Site: Site #1 - Silt/Clay with presumptive bearing capacity of 1,500 psf
Test Method: Compression
Diamond Pier Tested: #CL-C-ST75-1 (sacrificial test to compare reference beams)
Date Installed: 4/5/2016
Date Test Started: 5/23/2016
Date Test Completed: 5/24/2016
Staff: Ken Andrieu and Justin Munoz
Hydraulic Ram: EEI Equipment #EEI 022
Equation of Line: Load = (Gauge Pressure - 2) / 0.361
Dial Gauge #1: EEI Equipment #EEI 33
Dial Gauge #2: EEI Equipment #EEI 34
Dial Gauge #3: EEI Equipment #EEI 35
Dial Gauge #4: EEI Equipment #EEI 36
Dial Gauge #5: EEI Equipment #EEI 37
Dial Gauge #6: EEI Equipment #EEI 38

Load (pounds)	Gauge Pressure (psi)	Clock	Minutes	Dial Gauge #1 (in.)	Dial Gauge #2 (in.)	Dial Gauge #3 (in.)	Dial Gauge #4 (in.)	Dial Gauge Average (in.)	String Line #1	Dial Gauge #5 (in.)	Dial Gauge #6 (in)	Test Remarks
0	0			0.000	0.000	0.000	0.000	0.000	1	0.0000	0.0000	
1249	453	16:59	0	0.016	0.021	0.018	0.018	0.018	1 1/32	0.0000	0.0000	
1249	453	17:00	1	0.018	0.022	0.020	0.019	0.020	1 1/32	0.0000	0.0000	
1249	453	17:01	2	0.018	0.023	0.020	0.019	0.020	1 1/32	0.0000	0.0000	
1249	453	17:02	3	0.018	0.023	0.020	0.020	0.020	1 1/32	0.0000	0.0000	
1249	453	17:03	4	0.019	0.023	0.021	0.021	0.021	1 1/32	0.0000	0.0000	
1249	453	17:04	5	0.020	0.025	0.023	0.022	0.023	1 1/32	0.0000	0.0001	
1249	453	17:09	10	0.022	0.027	0.025	0.024	0.025	1 1/32	0.0001	0.0002	
1249	453	17:14	15	0.027	0.032	0.029	0.029	0.029	1 3/64	0.0003	0.0006	
1249	453	17:29	30	0.020	0.026	0.023	0.022	0.023	1 3/64	0.0005	0.0002	
2501	905	17:36	0	0.065	0.074	0.072	0.068	0.070	1 3/32	0.0001	0.0007	
2501	905	17:37	1	0.070	0.078	0.077	0.073	0.075	1 3/32	0.0000	0.0007	
2501	905	17:38	2	0.071	0.078	0.077	0.073	0.075	1 3/32	0.0000	0.0007	
2501	905	17:39	3	0.072	0.080	0.079	0.075	0.077	1 3/32	0.0000	0.0008	
2501	905	17:40	4	0.073	0.080	0.079	0.075	0.077	1 3/32	0.0000	0.0008	
2501	905	17:41	5	0.073	0.080	0.079	0.075	0.077	1 3/32	0.0000	0.0008	
2501	905	17:46	10	0.075	0.082	0.080	0.077	0.079	1 3/32	0.0001	0.0010	
2501	905	17:51	15	0.075	0.082	0.080	0.077	0.079	1 3/32	0.0001	0.0010	
3698	1337	17:53	0	0.149	0.159	0.159	0.154	0.155	1 3/16	0.0001	0.0010	
3698	1337	17:54	1	0.154	0.163	0.163	0.158	0.160	1 3/16	0.0001	0.0010	
3698	1337	17:55	2	0.162	0.170	0.170	0.166	0.167	1 3/16	0.0001	0.0010	
3698	1337	17:56	3	0.166	0.174	0.174	0.170	0.171	1 3/16	0.0001	0.0010	
3698	1337	17:57	4	0.167	0.176	0.176	0.171	0.173	1 3/16	0.0001	0.0010	
3698	1337	17:58	5	0.168	0.177	0.177	0.172	0.174	1 13/64	0.0001	0.0010	
3698	1337	18:03	10	0.170	0.179	0.180	0.173	0.176	1 13/64	0.0000	0.0011	
3698	1337	18:08	15	0.161	0.171	0.172	0.164	0.167	1 13/64	-0.0009	0.0005	
3698	1337	18:23	30	0.155	0.163	0.164	0.157	0.160	1 13/64	-0.0018	-0.0003	
4956	1791	18:25	0	0.270	0.279	0.282	0.276	0.277	1 21/64	-0.0018	-0.0002	
4956	1791	18:26	1	0.277	0.285	0.287	0.282	0.283	1 21/64	-0.0018	-0.0002	
4956	1791	18:27	2	0.278	0.287	0.289	0.283	0.284	1 21/64	-0.0018	-0.0002	
4956	1791	18:28	3	0.280	0.289	0.291	0.284	0.286	1 21/64	-0.0018	-0.0002	
4956	1791	18:29	4	0.293	0.301	0.304	0.298	0.299	1 21/64	-0.0018	-0.0002	
4956	1791	18:30	5	0.295	0.304	0.306	0.300	0.301	1 11/32	-0.0018	-0.0002	
4956	1791	18:35	10	0.311	0.319	0.322	0.316	0.317	1 23/64	-0.0018	-0.0003	
4956	1,791	18:40	15	0.320	0.327	0.330	0.324	0.325	1 23/64	-0.0012	0.0003	
4956	1,791	18:55	30	0.320	0.328	0.331	0.326	0.326	1 3/8	-0.0012	0.0004	
6213	2,245	18:59	0	0.454	0.462	0.466	0.461	0.461	1 1/2	-0.0014	0.0004	
6213	2,245	19:00	1	0.459	0.467	0.471	0.466	0.466	1 1/2	-0.0015	0.0004	
6213	2,245	19:01	2	0.481	0.489	0.494	0.488	0.488	1 1/2	-0.0017	0.0003	
6213	2,245	19:02	3	0.484	0.492	0.497	0.491	0.491	1 1/2	-0.0018	0.0002	
6213	2,245	19:03	4	0.486	0.494	0.499	0.492	0.493	1 1/2	-0.0018	0.0002	
6213	2,245	19:04	5	0.496	0.505	0.510	0.504	0.504	1 1/2	-0.0018	0.0002	
6213	2,245	19:09	10	0.505	0.514	0.519	0.512	0.513	1 37/64	-0.0021	0.0000	
6213	2,245	19:14	15	0.507	0.514	0.520	0.513	0.514	1 37/64	-0.0024	-0.0002	
6213	2,245	19:29	30	0.524	0.530	0.535	0.529	0.530	1 37/64	-0.0026	-0.0003	
6213	2,245	19:44	45	0.533	0.542	0.570	0.541	0.547	1 37/64	-0.0032	-0.0008	
6213	2,245	19:59	60	0.538	0.547	0.552	0.545	0.546	1 37/64	-0.0036	-0.0009	
6213	2,245	20:14	75	0.538	0.548	0.553	0.545	0.546	1 37/64	-0.0037	-0.0009	
7471	2,699	20:16	0	0.666	0.676	0.683	0.676	0.675	1 3/4	-0.0038	-0.0009	
7471	2,699	20:17	1	0.691	0.704	0.713	0.706	0.704	--	-0.0038	-0.0009	No transit reading
7471	2,699	20:18	2	0.701	0.711	0.719	0.712	0.711	--	-0.0038	-0.0009	No transit reading
7471	2,699	20:19	3	0.721	0.730	0.739	0.731	0.730	--	-0.0038	-0.0009	No transit reading
7471	2,699	20:20	4	0.737	0.748	0.758	0.749	0.748	--	-0.0038	-0.0009	No transit reading
7471	2,699	20:21	5	0.746	0.755	0.765	0.756	0.756	1 53/64	-0.0038	-0.0009	
7471	2,699	20:26	10	0.758	0.766	0.776	0.767	0.767	1 51/64	-0.0039	-0.0009	
7471	2,699	20:31	15	0.782	0.791	0.802	0.791	0.792	1 7/8	-0.0039	-0.0009	

7471	2,699	20:46	30	0.801	0.809	0.819	0.809	0.809	--	-0.0039	-0.0009	No transit reading
7471	2,699	21:01	45	0.819	0.829	0.840	0.828	0.829	--	-0.0039	-0.0009	No transit reading
7471	2,699	21:16	60	0.826	0.838	0.850	0.839	0.838	--	-0.0039	-0.0009	No transit reading
7471	2,699	21:31	75	0.844	0.853	0.864	0.853	0.854	--	-0.0039	-0.0009	No transit reading
7471	2,699	21:46	90	0.851	0.861	0.873	0.862	0.862	--	-0.0039	-0.0009	No transit reading
7471	2,699	22:01	105	0.871	0.880	0.891	0.880	0.881	--	-0.0039	-0.0009	No transit reading
7471	2,699	22:16	120	0.872	0.881	0.893	0.882	0.882	--	-0.0040	-0.0010	No transit reading
8726	3,152	22:20	0	0.951	0.963	0.976	0.966	0.964	--	-0.0040	-0.0010	No transit reading
8726	3,152	22:21	1	0.981	0.994	1.007	1.000	0.996	--	-0.0040	-0.0010	No transit reading
8726	3,152	22:22	2	1.005	1.017	1.028	1.020	1.018	--	-0.0040	-0.0010	No transit reading
8726	3,152	22:23	3	1.018	1.028	1.038	1.029	1.028	--	-0.0040	-0.0010	No transit reading
8726	3,152	22:24	4	1.036	1.047	1.058	1.050	1.048	--	-0.0041	-0.0010	No transit reading
8726	3,152	22:25	5	1.066	1.075	1.085	1.077	1.076	--	-0.0041	-0.0010	No transit reading
8726	3,152	22:30	10	1.110	1.118	1.128	1.121	1.119	--	-0.0041	-0.0010	No transit reading
8726	3,152	22:35	15	1.150	1.156	1.167	1.159	1.158	--	-0.0041	-0.0010	No transit reading
8726	3,152	22:40	20	1.177	1.183	1.193	1.186	1.185	--	-0.0042	-0.0010	No transit reading
8726	3,152	22:50	30	1.183	1.189	1.199	1.195	1.192	--	-0.0043	-0.0011	No transit reading
8726	3,152	23:05	45	1.192	1.199	1.209	1.200	1.200	--	-0.0043	-0.0011	No transit reading
8726	3,152	23:20	60	1.200	1.210	1.212	1.220	1.211	--	-0.0043	-0.0011	No transit reading
8726	3,152	23:35	75	1.210	1.218	1.229	1.221	1.220	--	-0.0046	-0.0012	No transit reading
8726	3,152	23:50	90	1.235	1.243	1.254	1.244	1.244	--	-0.0046	-0.0012	No transit reading
8726	3,152	0:05	105	1.250	1.257	1.267	1.258	1.258	--	-0.0046	-0.0012	No transit reading
8726	3,152	0:20	120	1.270	1.279	1.289	1.280	1.280	--	-0.0046	-0.0012	No transit reading
8726	3,152	1:20	180	1.285	1.293	1.303	1.294	1.294	2 25/64	-0.0047	-0.0012	
8726	3,152	2:20	240	1.302	1.309	1.321	1.312	1.311	2 25/64	-0.0045	-0.0014	
8726	3,152	3:20	300	1.330	1.337	1.347	1.339	1.338	2 13/32	-0.0042	-0.0018	
8726	3,152	4:20	360	1.341	1.343	1.353	1.348	1.346	2 13/32	-0.0040	-0.0022	
8726	3,152	5:20	420	1.343	1.348	1.358	1.353	1.351	2 27/64	-0.0040	-0.0023	
8726	3,152	6:20	480	1.350	1.355	1.365	1.359	1.357	2 27/64	-0.0039	-0.0025	
8726	3,152	7:20	540	1.355	1.359	1.369	1.364	1.362	2 27/64	-0.0035	-0.0025	
8726	3,152	8:20	600	1.387	1.391	1.401	1.396	1.394	2 7/16	-0.0030	-0.0021	
8726	3,152	9:20	660	1.393	1.397	1.408	1.403	1.400	2 7/16	-0.0028	-0.0019	
8726	3,152	10:20	720	1.422	1.425	1.436	1.43	1.428	2 29/64	-0.0007	-0.0004	
6543	2,364	10:25	0	1.412	1.415	1.425	1.420	1.418	2 29/64	-0.0007	-0.0004	
6543	2,364	11:20	55	1.451	1.457	1.468	1.459	1.459	2 29/64	0.0030	0.0052	
6543	2,364	11:25	60	1.443	1.448	1.459	1.451	1.450	2 29/64	0.0027	0.0049	
4327	1,564	11:28	0	1.425	1.431	1.44	1.436	1.433	2 29/64	0.0027	0.0049	
4327	1564	12:23	55	1.415	1.418	1.428	1.422	1.421	2 7/16	0.0025	0.0057	
4327	1564	12:28	60	1.416	1.419	1.429	1.423	1.422	2 7/16	0.0028	0.0058	
2127	770	12:30	0	1.378	1.379	1.388	1.386	1.383	2 13/32	0.0026	0.0057	
2127	770	13:25	55	0.621	1.396	1.407	1.403	1.207	2 13/32	0.0051	0.0092	
2127	770	13:30	60	0.62	1.397	1.407	1.403	1.207	2 13/32	0.0054	0.0093	
0	0	13:32	0	0.688	1.325	1.331	1.335	1.170	2 21/64	0.0054	0.0094	
0	0	14:27	55	0.731	1.277	1.284	1.293	1.146	2 19/64	0.0053	0.0093	
0	0	14:32	60	0.731	1.276	1.282	1.293	1.146	2 19/64	0.0054	0.0096	

APPENDIX L: ASTM D1143/D1143M

Designation: D1143/D1143M – 07 (Reapproved 2013)

Standard Test Methods for Deep Foundations Under Static Axial Compressive Load[1]

This standard is issued under the fixed designation D1143/D1143M; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

This standard has been approved for use by agencies of the U.S. Department of Defense.

1. Scope

1.1 The test methods described in this standard measure the axial deflection of a vertical or inclined deep foundation when loaded in static axial compression. These methods apply to all deep foundations, referred to herein as *piles*, that function in a manner similar to driven piles or cast-in-place piles, regardless of their method of installation, and may be used for testing single piles or pile groups. The test results may not represent the long-term performance of a deep foundation.

1.2 This standard provides minimum requirements for testing deep foundations under static axial compressive load. Plans, specifications, and/or provisions prepared by a qualified engineer may provide additional requirements and procedures as needed to satisfy the objectives of a particular test program. The engineer in responsible charge of the foundation design, referred to herein as the Engineer, shall approve any deviations, deletions, or additions to the requirements of this standard.

1.3 This standard allows the following test procedures:

Procedure A	Quick Test	8.1.2
Procedure B	Maintained Test (Optional)	8.1.3
Procedure C	Loading in Excess of Maintained Test (Optional)	8.1.4
Procedure D	Constant Time Interval Test (Optional)	8.1.5
Procedure E	Constant Rate of Penetration Test (Optional)	8.1.6
Procedure F	Constant Movement Increment Test (Optional)	8.1.7
Procedure G	Cyclic Loading Test (Optional)	8.1.8

1.4 Apparatus and procedures herein designated “optional” may produce different test results and may be used only when approved by the Engineer. The word “shall” indicates a mandatory provision, and the word “should” indicates a recommended or advisory provision. Imperative sentences indicate mandatory provisions.

1.5 A qualified geotechnical engineer should interpret the test results obtained from the procedures of this standard so as to predict the actual performance and adequacy of piles used in the constructed foundation. See Appendix X1 for comments regarding some of the factors influencing the interpretation of test results.

1.6 A qualified engineer shall design and approve all loading apparatus, loaded members, support frames, and test procedures. The text of this standard references notes and footnotes which provide explanatory material. These notes and footnotes (excluding those in tables and figures) shall not be considered as requirements of the standard. This standard also includes illustrations and appendices intended only for explanatory or advisory use.

1.7 The values stated in either SI units or inch-pound units are to be regarded separately as standard. The values stated in each system may not be exact equivalents; therefore, each system shall be used independently of the other. Combining values from the two systems may result in non-conformance with the standard.

1.8 The gravitational system of inch-pound units is used when dealing with inch-pound units. In this system, the pound [lbf] represents a unit of force [weight], while the unit for mass is slugs. The rationalized slug unit is not given, unless dynamic [F=ma] calculations are involved.

1.9 All observed and calculated values shall conform to the guidelines for significant digits and rounding established in Practice D6026.

1.10 The method used to specify how data are collected, calculated, or recorded in this standard is not directly related to the accuracy to which the data can be applied in design or other uses, or both. How one applies the results obtained using this standard is beyond its scope.

1.11 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 *ASTM Standards:*[2]

D653 Terminology Relating to Soil, Rock, and Contained Fluids

[1] This test method is under the jurisdiction of ASTM Committee D18 on Soil and Rock and is the direct responsibility of Subcommittee D18.11 on Deep Foundations.

Current edition approved June 15, 2013. Published July 2013. Originally approved in 1950. Last previous edition approved in 2007 as D1143 – 07$^{\varepsilon 1}$. DOI: 10.1520/D1143_D1143M-07R13.

[2] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard’s Document Summary page on the ASTM website.

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D3740 Practice for Minimum Requirements for Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction
D5882 Test Method for Low Strain Impact Integrity Testing of Deep Foundations
D6026 Practice for Using Significant Digits in Geotechnical Data
D6760 Test Method for Integrity Testing of Concrete Deep Foundations by Ultrasonic Crosshole Testing

2.2 *American National Standards:*[3]

ASME B30.1 Jacks
ASME B40.100 Pressure Gages and Gauge Attachments
ASME B89.1.10.M Dial Indicators (For Linear Measurements)

3. Terminology

3.1 *Definitions*—For common definitions of terms used in this standard, see Terminology D653.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *cast in-place pile, n*—a deep foundation unit made of cement grout or concrete and constructed in its final location, for example, drilled shafts, bored piles, caissons, auger cast piles, pressure-injected footings, etc

3.2.2 *deep foundation, n*— a relatively slender structural element that transmits some or all of the load it supports to soil or rock well below the ground surface, such as a steel pipe pile or concrete drilled shaft

3.2.3 *driven pile, n*—a deep foundation unit made of preformed material with a predetermined shape and size and typically installed by impact hammering, vibrating, or pushing.

3.2.4 *failure load, n*—for the purpose of terminating an axial compressive load test, the test load at which rapid continuing, progressive movement occurs, or at which the total axial movement exceeds 15 % of the pile diameter or width, or as specified by the engineer.

3.2.5 *telltale rod, n*—an unstrained metal rod extended through the test pile from a specific point to be used as a reference from which to measure the change in the length of the loaded pile.

3.2.6 *wireline, n*—a steel wire mounted with a constant tension force between two supports and used as a reference line to read a scale indicating movement of the test pile.

4. Significance and Use

4.1 Field tests provide the most reliable relationship between the axial load applied to a deep foundation and the resulting axial movement. Test results may also provide information used to assess the distribution of side shear resistance along the pile shaft, the amount of end bearing developed at the pile toe, and the long-term load-deflection behavior. A foundation designer may evaluate the test results to determine if, after applying an appropriate factor of safety, the pile or pile group has an ultimate static capacity and a deflection at service load satisfactory to support a specific foundation. When performed as part of a multiple-pile test program, the designer may also use the results to assess the viability of different piling types and the variability of the test site.

4.2 If feasible, without exceeding the safe structural load on the pile(s) or pile cap, the maximum load applied should reach a failure load from which the Engineer may determine the ultimate axial static compressive load capacity of the pile(s). Tests that achieve a failure load may help the designer improve the efficiency of the foundation by reducing the piling length, quantity, or size.

4.3 If deemed impractical to apply axial test loads to an inclined pile, the Engineer may elect to use axial test results from a nearby vertical pile to evaluate the axial capacity of the inclined pile.

NOTE 1—The quality of the result produced by this test method is dependent on the competence of the personnel performing it, and the suitability of the equipment and facilities used. Agencies that meet the criteria of Practice D3740 are generally considered capable of competent and objective testing/sampling/ inspection/etc. Users of this test method are cautioned that compliance with Practice D3740 does not in itself assure reliable results. Reliable results depend on many factors; Practice D3740 provides a means of evaluating some of those factors.

5. Test Foundation Preparation

5.1 Excavate or add fill to the ground surface around the test pile or pile group to the final design elevation unless otherwise approved by the Engineer.

5.2 Cut off or build up the test pile as necessary to permit construction of the load-application apparatus, placement of the necessary testing and instrumentation equipment, and observation of the instrumentation. Remove any damaged or unsound material from the pile top and prepare the surface so that it is perpendicular to the pile axis with minimal irregularity to provide a good bearing surface for a test plate.

5.3 For tests of single piles, install a solid steel test plate at least 25 mm [1 in.] thick perpendicular to the long axis of the test pile that covers the complete pile top area. The test plate shall span across and between any unbraced flanges on the test pile.

5.4 For tests on pile groups, cap the pile group with steel-reinforced concrete or a steel load frame designed for the anticipated loads. Provide a clear space beneath the pile cap as specified by the Engineer to eliminate any bearing on the underlying ground surface. For each loading point on the pile cap, provide a solid steel test plate oriented perpendicular to the axis of the pile group with a minimum thickness of 25 mm [1 in.], as needed to safely apply load to the pile cap. Center a single bearing plate on the centroid of the pile group. Locate multiple bearing plates symmetrically about the centroid of the pile group. Boxes and beams may bear directly on the pile cap when designed to bear uniformly along their contact surface with the cap.

5.5 To minimize stress concentrations due to minor irregularities of the pile top surface, set test plates bearing on the top of precast or cast-in-place concrete piles in a thin layer of

[3] Available from American Society of Mechanical Engineers (ASME), ASME International Headquarters, Three Park Ave., New York, NY 10016-5990, http://www.asme.org.

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quick-setting, non-shrink grout, less than 6 mm [0.25 in.] thick and having a compressive strength greater than the test pile at the time of the test. Set test plates, boxes, and beams designed to bear on a concrete pile cap in a thin layer of quick-setting, non-shrink grout, less than 6 mm [0.25 in.] thick and having a compressive strength greater than the pile cap at the time of the test. For tests on steel piles, or a steel load frame, weld the test plate to the pile or load frame. For tests on individual timber piles, set the test plate directly on the cleanly cut top of the pile, or in grout as described for concrete piles.

NOTE 2—Deep foundations sometimes include hidden defects that may go unnoticed prior to the static testing. Low strain integrity tests as described in D5882 and ultrasonic crosshole integrity tests as described in D6760 may provide a useful pre-test evaluation of the test foundation.

6. Apparatus for Applying and Measuring Loads

6.1 *General:*

6.1.1 The apparatus for applying compressive loads to a test pile or pile group shall conform to one of the methods described in 6.3–6.6 Unless otherwise specified by the Engineer, the apparatus for applying and measuring loads described in this section shall be capable of safely applying at least 120 % of the maximum anticipated test load. Use the method described in 6.3 to apply axial loads to either vertical or inclined piles or pile groups. Use the methods described in 6.4-6.6 to apply only vertical loads.

6.1.2 Align the test load apparatus with the longitudinal axis of the pile or pile group to minimize eccentric loading. When necessary to prevent lateral deflection and buckling along the unsupported pile length, provide lateral braces that do not influence the axial movement of the pile, or pile cap.

6.1.3 Each jack shall include a hemispherical bearing or similar device to minimize lateral loading of the pile or group. The hemispherical bearing should include a locking mechanism for safe handling and setup. Center bearing plates, hydraulic jack(s), load cell(s), and hemispherical bearings on the test beam(s), test pile, or test pile cap.

6.1.4 Provide bearing stiffeners as needed between the flanges of test and reaction beams. Provide steel bearing plates as needed to spread the load from the outer perimeter of the jack(s), or the bearing surface of beams or boxes, to bear on the surface of the test pile or pile cap. Also provide steel bearing plates to spread the load between the jack(s), load cells, and hemispherical bearings, and to spread the load to the test beam(s), test pile, or pile cap. Bearing plates shall extend the full flange width of steel beams and the complete top area of piles, or as specified by the Engineer, so as to provide full bearing and distribution of the load.

6.1.5 Unless otherwise specified, provide steel bearing plates that have a total thickness adequate to spread the bearing load between the outer perimeters of loaded surfaces at a maximum angle of 45 ° to the loaded axis. For center hole jacks and center hole load cells, also provide steel plates adequate to spread the load from their inner diameter to the their central axis at a maximum angle of 45 °, or per manufacturer recommendations. Bearing plates shall extend the full width of the test beam(s) or any steel reaction members so as to provide full bearing and distribution of the load.

6.1.6 A qualified engineer shall design and approve all loading apparatus, loaded members, support frames, and loading procedures. The test beam(s), load platforms, and support structures shall have sufficient size, strength, and stiffness to prevent excessive deflection and instability up to the maximum anticipated test load.

NOTE 3—Rotations and lateral displacements of the test pile or pile cap may occur during loading, especially for piles extending above the soil surface or through weak soils. Design and construct the support reactions to resist any undesirable rotations or lateral displacements

6.2 *Hydraulic Jacks, Gages, Transducers, and Load Cells:*

6.2.1 The hydraulic jack(s) and their operation shall conform to ASME B30.1 Jacks and shall have a nominal load capacity exceeding the maximum anticipated jack load by at least 20 %. The jack, pump, and any hoses, pipes, fittings, gages, or transducers used to pressurize it shall be rated to a safe pressure corresponding to the nominal jack capacity.

6.2.2 The hydraulic jack ram(s) shall have a travel greater than the sum of the anticipated maximum axial movement of the pile plus the deflection of the test beam and the elongation and movement of any anchoring system, but not less than 15 % of the average pile diameter or width. Use a single high-capacity jack when possible. When using a multiple jack system, provide jacks of the same make, model, and capacity, and supply the jack pressure through a common manifold. Fit the manifold and each jack with a pressure gage to detect malfunctions and imbalances.

6.2.3 Unless otherwise specified, the hydraulic jack(s), pressure gage(s), and pressure transducer(s) shall have a calibration to at least the maximum anticipated jack load performed within the six months prior to each test or series of tests. Furnish the calibration report(s) prior to performing a test, which shall include the ambient temperature and calibrations performed for multiple ram strokes up to the maximum stroke of the jack.

6.2.4 Each complete jacking and pressure measurement system, including the hydraulic pump, should be calibrated as a unit when practicable. The hydraulic jack(s) shall be calibrated over the complete range of ram travel for increasing and decreasing applied loads. If two or more jacks are to be used to apply the test load, they shall be of the same make, model, and size, connected to a common manifold and pressure gage, and operated by a single hydraulic pump. The calibrated jacking system(s) shall have accuracy within 5 % of the maximum applied load. When not feasible to calibrate a jacking system as a unit, calibrate the jack, pressure gages, and pressure transducers separately, and each of these components shall have accuracy within 2 % of the applied load.

6.2.5 Pressure gages shall have minimum graduations less than or equal to 1 % of the maximum applied load and shall conform to ASME B40.100 Pressure Gages and Gauge Attachments with an accuracy grade 1A having a permissible error ±1 % of the span. Pressure transducers shall have a minimum resolution less than or equal to 1 % of the maximum applied load and shall conform to ASME B40.100 with an accuracy grade 1A having a permissible error ±1 % of the span. When used for control of the test, pressure transducers shall include a real-time display.

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6.2.6 If the maximum test load will exceed 900 kN [100 tons], place a properly constructed load cell or equivalent device in series with each hydraulic jack. Unless otherwise specified the load cell(s) shall have a calibration to at least the maximum anticipated jack load performed within the six months prior to each test or series of tests. The calibrated load cell(s) or equivalent device(s) shall have accuracy within 1 % of the applied load, including an eccentric loading of up to 1 % applied at an eccentric distance of 25 mm [1 in.]. After calibration, load cells shall not be subjected to impact loads. A load cell is recommended, but not required, for lesser load. If not practicable to use a load cell, include embedded strain gages located in close proximity to the jack to confirm the applied load.

6.2.7 Do not leave the hydraulic jack pump unattended at any time during the test. Automated jacking systems shall include a clearly marked mechanical override to safely reduce hydraulic pressure in an emergency.

6.3 *Load Applied by Hydraulic Jack(s) Acting Against Anchored Reaction Frame (See Fig. 1 and Fig. 2):*

6.3.1 Apply the test load to the pile or pile group with the hydraulic jack(s) reacting against the test beam(s) centered over the test pile, or pile group. Install a sufficient number of anchor piles or suitable anchoring device(s) to provide adequate reactive capacity for the test beam(s). Provide a clear distance from the test pile or pile group of at least five times the maximum diameter of the largest anchor or test pile(s), but not less than 2.5 m [8 ft]. The Engineer may increase or decrease this minimum clear distance based on factors such as the type and depth of reaction, soil conditions, and magnitude of loads so that reaction forces do not significantly effect the test results.

NOTE 4—Excessive vibrations during anchor pile installation in non-cohesive soils may affect test results. Anchor piles that penetrate deeper than the test pile may affect test results. Install the anchor piles nearest the test pile first to help reduce installation effects.

6.3.2 Provide sufficient clearance between the bottom flange(s) of the test beam(s) and the top of the test pile or pile group to place the necessary bearing plates, hydraulic jack(s), hemispherical bearing, and load cell(s). For test loads of high magnitude requiring several anchors, a steel framework may be required to transfer the applied loads from the test beam(s) to the anchors.

6.3.3 When testing individual inclined piles, align the jack(s), test beam(s), and anchor piles with the inclined longitudinal axis of the test pile.

6.3.4 Attach the test beam(s) (or reaction framework if used) to the anchoring devices with connections designed to adequately transfer the applied loads to the anchors so as to prevent slippage, rupture or excessive elongation of the connections under maximum required test load.

6.4 *Load Applied by Hydraulic Jack(s) Acting Against a Weighted Box or Platform (Fig. 3):*

6.4.1 Apply the test load to the pile or pile group with the hydraulic jack(s) reacting against the test beam(s) centered over the test pile, or pile group. Center a box or platform on the test beam(s) with the edges of the box or platform parallel to the test beam(s) supported by cribbing or piles placed as far from the test pile or pile group as practicable, but in no case less than a clear distance of 1.5 m [5 ft]. If cribbing is used, the bearing area of the cribbing at ground surface shall be sufficient to prevent adverse settlement of the weighted box or platform.

6.4.2 The test beam(s) shall have sufficient size and strength to prevent excessive deflection under the maximum load, and sufficient clearance between the bottom flange(s) of the test

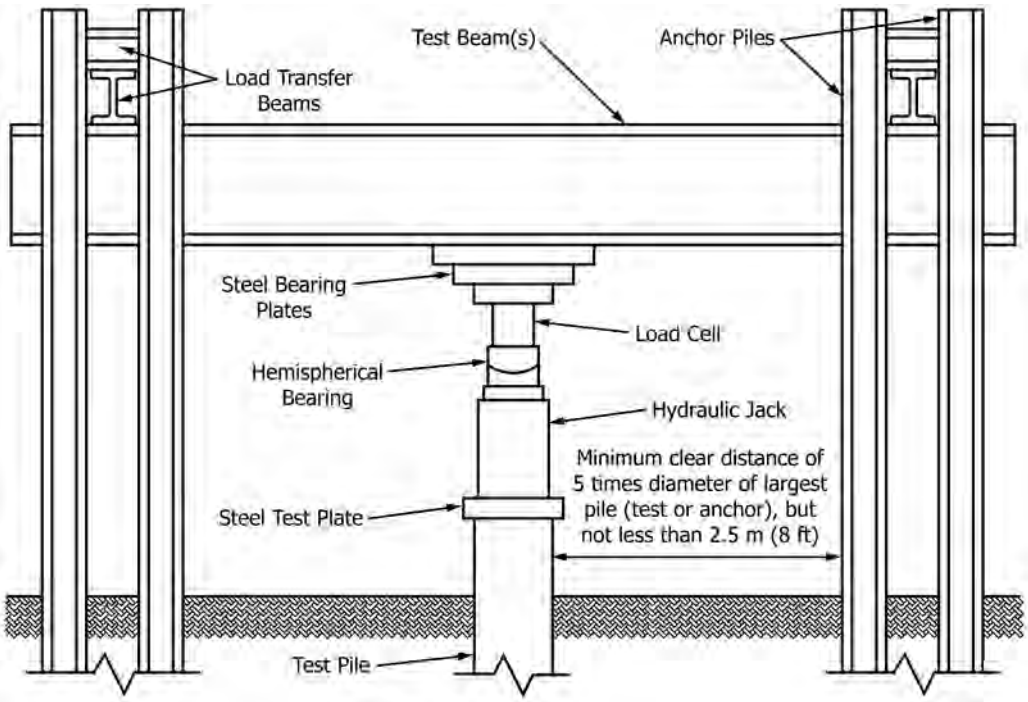

FIG. 1 Schematic of Hydraulic Jack Acting Against Anchored Reaction Frame

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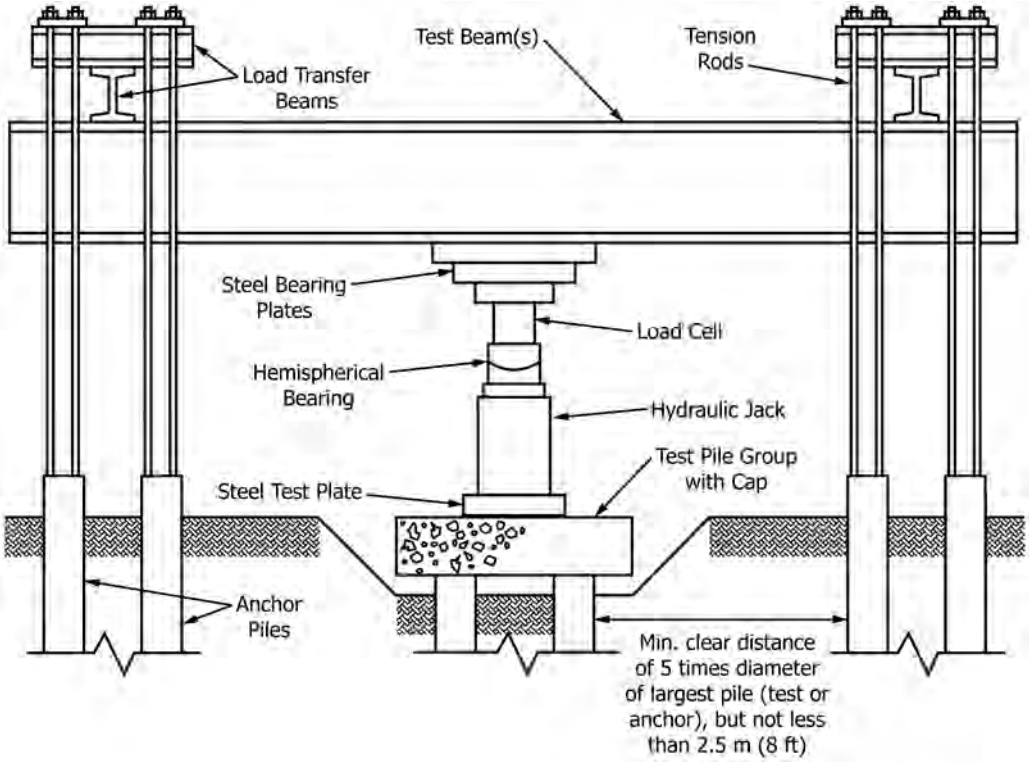

FIG. 2 Schematic of Hydraulic Jack on a Pipe Group Acting Against Anchored Reaction Frame

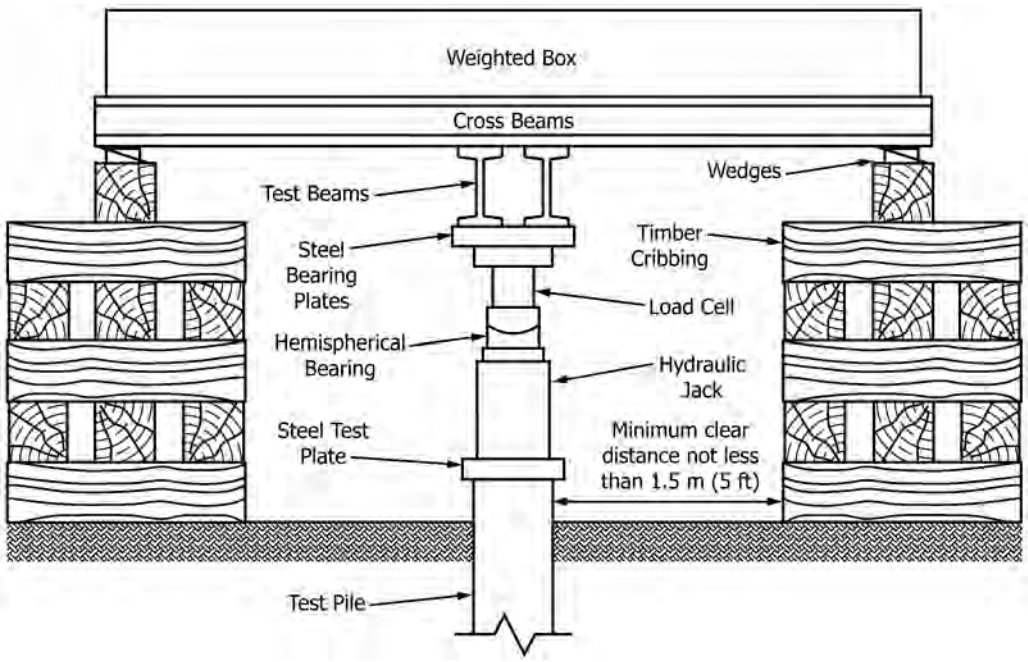

FIG. 3 Schematic Hydraulic Jack Acting Against Weighted Box or Platform

beam(s) and the top of the test pile or pile group to place the necessary bearing plates, hydraulic jack(s), hemispherical bearing, and load cell(s). Support the ends of the test beam(s) on temporary cribbing or other devices.

6.4.3 Load the box or platform with any suitable material such as soil, rock, concrete, steel, or water-filled tanks with a total weight (including that of the test beam(s) and the box or platform) at least 10 % greater than the maximum anticipated test load.

6.5 *Load Applied Directly Using Known Weights (See* Fig. 4, Fig. 5, *and* Fig. 6*):*

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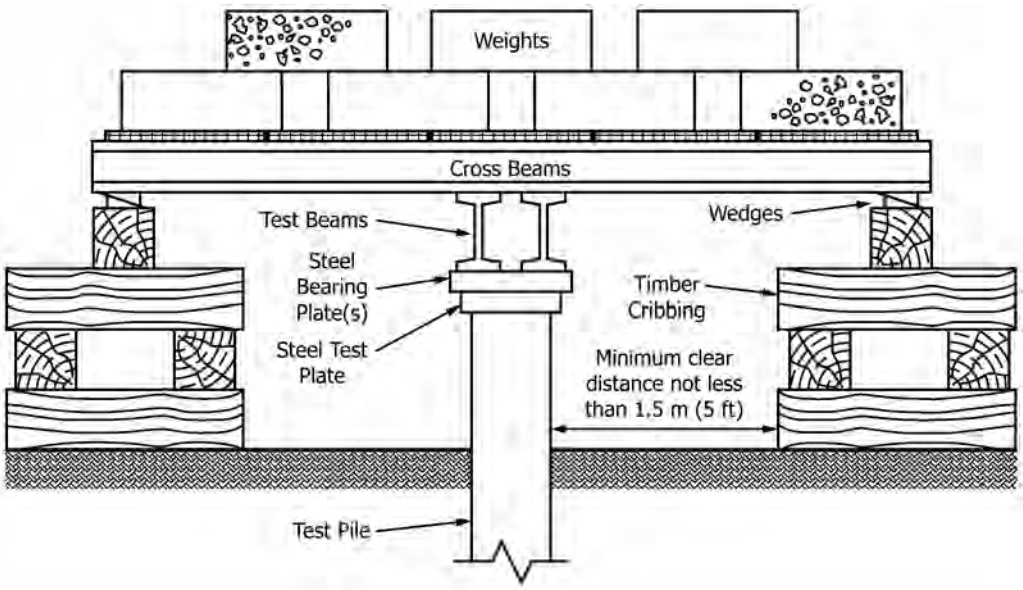

FIG. 4 Schematic of Direct Loading on a Single Pile Using Weighted Platform

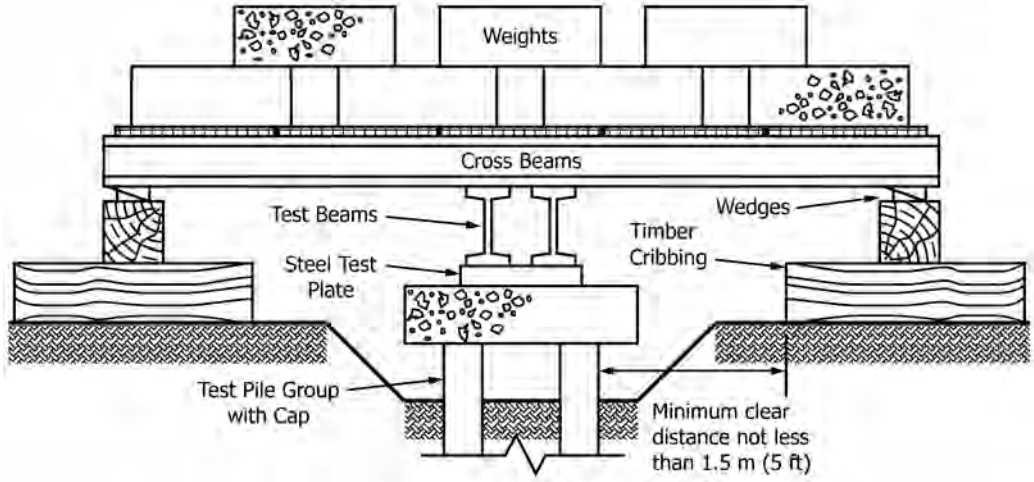

FIG. 5 Schematic of Direct loading on a Pile Group Using a Weighted Platform

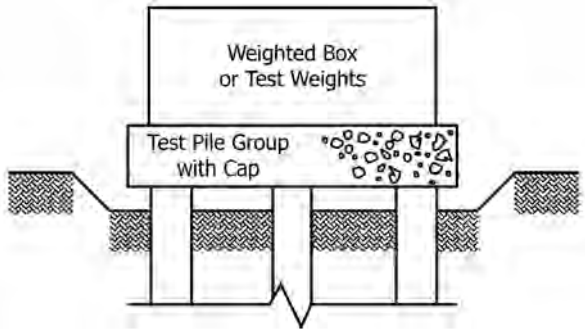

FIG. 6 Schematic of Direct Loading on a Pile Group

6.5.1 Center on the test pile or pile cap a test beam(s) of known weight and of sufficient size and strength to avoid excessive deflection under load with the ends supported on temporary cribbing if necessary to stabilize the beam(s). Alternatively, the known test weights or loading material may be applied directly on the pile or pile cap.

6.5.2 Center and balance a platform of known weight on the test beam(s) or directly on the pile cap with overhanging edges

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of the platform parallel to the test beam(s) supported by cribbing or by piles capped with timber beams, so that a clear distance of not less than 1.5 m [5 ft] is maintained between the supports and the test pile or pile group.

6.5.3 Place sufficient pairs of timber wedges between the top of the cribbing or timber cap beams and the bottom edges of the platform so that the platform can be stabilized during loading or unloading.

6.5.4 Apply the test loads to the pile or pile group using known weights. When loading the platform, remove any temporary supports at the ends of the test beam(s) and tighten the wedges along the bottom edges of the platform so that the platform is stable. Use loading materials such as steel or concrete so that the weight of incremental loads can be determined with accuracy of 5 %.

NOTE 5— Depending on the magnitude of the applied load and axial movement, platform stability may be difficult to control at or near a failure load when applying the load directly. The user should consider using a different load method when anticipating a failure load.

NOTE 6—The loading apparatus described in 6.5 may allow target rod level readings directly on the center of the pile top or pile cap to measure the pile top movement described in 7.2.4. To accommodate the target rod, use a double test beam with sufficient space between the beams, leave a hole through the platform, and leave a line of sight between the test weights for survey level readings.

6.6 *Other Types of Loading Apparatus (Optional)*—The Engineer may specify another type of loading apparatus satisfying the basic requirements of 6.3 or 6.4.

7. Apparatus for Measuring Movement

7.1 *General:*

7.1.1 Reference beams and wirelines shall be supported independent of the loading system, with supports firmly embedded in the ground at a clear distance from the test pile of at least five times the diameter of the test pile(s) but not less than 2.5 m [8 ft], and at a clear distance from any anchor piles of at least five times the diameter of the anchor pile(s) but not less than 2.5 m [8 ft]. Reference supports shall also be located as far as practicable from any cribbing supports but not less than a clear distance of 2.5 m [8 ft].

7.1.2 Reference beams shall have adequate strength, stiffness, and cross bracing to support the test instrumentation and minimize vibrations that may degrade measurement of the pile movement. One end of each beam shall be free to move laterally as the beam length changes with temperature variations. Supports for reference beams and wirelines shall be isolated from moving water and wave action. Provide a tarp or shelter to prevent direct sunlight and precipitation from affecting the measuring and reference systems.

7.1.3 Dial and electronic displacement indicators shall conform to ASME B89.1.10.M and should generally have a travel of 100 mm [4 in.], but shall have a minimum travel of at least 50 mm [2 in.]. Provide greater travel, longer stems, or sufficient calibrated blocks to allow for greater travel if anticipated. Electronic indicators shall have a real-time display of the movement available during the test. Provide a smooth bearing surface for the indicator stem perpendicular to the direction of stem travel, such as a small, lubricated, glass plate glued in place. Except as required in 7.4, indicators shall have minimum graduations of 0.25 mm [0.01 in.] or less, with similar accuracy. Scales used to measure pile movements shall have a length no less than 150 mm [6 in.], minimum graduations of 0.5 mm [0.02 in.] or less, with similar accuracy, and shall be read to the nearest 0.1 mm [0.005 in.]. Survey rods shall have minimum graduations of 1 mm [0.01 ft] or less, with similar accuracy, and shall be read to the nearest 0.1 mm [0.001 ft].

7.1.4 Dial indicators and electronic displacement indicators shall be in good working condition and shall have a full range calibration within three years prior to each test or series of tests. Furnish calibration reports prior to performing a test, including the ambient air temperature during calibration

7.1.5 Clearly identify each displacement indicator, scale, and reference point used during the test with a reference number or letter.

7.1.6 Indicators, scales, or reference points attached to the test pile, pile cap, reference beam, or other references shall be firmly affixed to prevent movement relative to the test pile or pile cap during the test. Unless otherwise approved by the Engineer, verify that reference beam and wireline supports do not move during the test by using a surveyor's level to take readings on a survey rod or a scale with reference to a permanent bench mark located outside of the immediate test area.

7.2 *Pile Top Axial Movements (See Fig. 7):*

7.2.1 Unless otherwise specified, all axial compressive load tests shall include apparatus for measuring the axial movement of the test pile top, or piles within a group, or the pile group cap. This apparatus shall include a primary measurement system and at least one redundant, secondary system, using at least two of the systems described herein.

NOTE 7—When possible use displacement indicators as the primary system to obtain the most precise measurements. Use the redundant system(s) to check top movement data and provide continuity when the measuring system is disturbed or reset for additional movement.

NOTE 8—Pile top movements measured directly on the test pile have superior accuracy to measurements on the test plate, but with negligible difference when using a thin layer of grout on a sound pile, or with a test plate welded to the pile. However, users may wish to verify that the test plate and pile top do not move relative to each other using additional indicators (Fig. 7).

7.2.2 *Displacement Indicators*—Mount a minimum of two displacement indicators on the reference beams to bear on the pile top at axisymmetric points equidistant from the center of the test pile, or pile cap, with stems parallel to the longitudinal axis of the pile, inclined pile, or pile group. Orient two parallel reference beams, one on each side of the test pile or pile cap, in a direction that permits placing their supports as far as feasible from anchor piles or cribbing. Alternatively, mount the two indicators on axisymmetric points equidistant from the center of the test pile, or pile cap, with the stems parallel to the longitudinal axis of the pile or pile group to bear on the reference beams.

NOTE 9—For piles having a width or diameter greater than 0.75 m [2.5 ft], and for piles without good lateral support near the top, use four displacement indicators to compensate for lateral movement or rotation of the pile top.

NOTE 10—For tests on inclined piles, monitor lateral pile movements as

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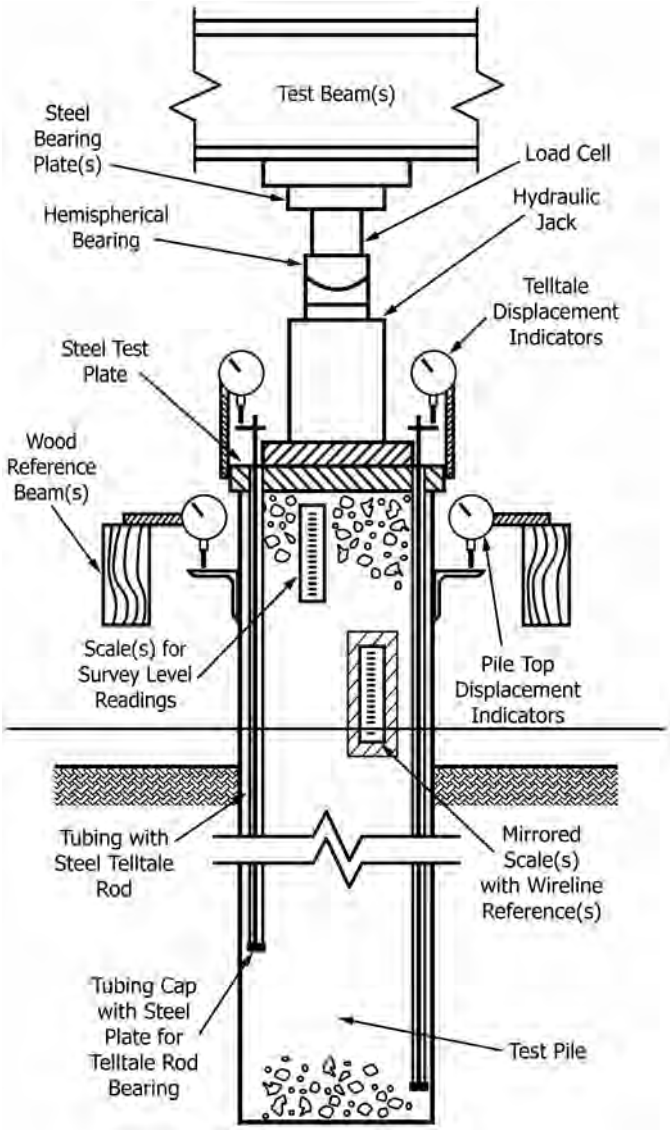

FIG. 7 Schematic of Instrumentation of Measuring Axial Pile Movements

described in 7.3 to detect instability that may result from gravitational forces during the test.

7.2.3 *Wireline, Mirror, and Scale*—Orient two wirelines parallel to each other and perpendicular to and located on opposite sides equidistant from the axis of the test pile, or pile group, in a direction that permits placing the wireline supports as far as practicable from anchor piles or cribbing. The wirelines shall include a weight or spring to maintain a constant tension force in the wire, so that, when plucked or tapped, the wireline will return to its original position. Use clean, uncoated steel wire with a diameter of 0.25 mm [0.01 in.] or less for the wirelines. Each wireline shall pass across, and remain clear of, a scale mounted on the test pile or pile cap parallel to the axis of the pile or pile group. Mount the scale on a mirror affixed to the test pile or pile cap and use the wireline as a reference line to read the scale. Use the mirror to eliminate parallax error in the scale reading by lining up the wire and its image in the mirror. Align the wire not more than 13 mm [0.5 in.] from the face of the scale.

7.2.4 *Surveyor's Level or Laser Beam*—Movement readings obtained using a surveyor's level or laser beam shall be taken on a survey rod or a scale and shall be referenced to a permanent bench mark located outside of the immediate test area or, alternatively, the surveyor's level shall be mounted on an object of fixed elevation (for example a driven pile) outside of the immediate test area. Reference points or scales used in taking displacement readings shall be mounted on the sides of the test pile or pile cap and located on opposite sides except that reference points may be located on top of the pile cap or readings may be taken on a single fixed point in the center of the test pile top, test plate or pile cap (see Fig. 6).

7.2.5 *Other Types of Measurement Systems (Optional)*—The Engineer may specify another type of measurement system satisfying the basic requirements of 7.2.

7.3 *Lateral Movements (Optional)*—Measure the lateral movements of the top of the test pile or pile group to within an accuracy of 2.5 mm [0.1 in.] using either of the following

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methods: *(a)* two displacement indicators oriented in orthogonal directions, mounted with their stems perpendicular to the longitudinal axis of the test pile(s) and bearing against lubricated glass plates affixed to the sides of the test pile or pile cap, or *(b)* a surveyor's transit reading from scales mounted laterally on two perpendicular sides of the test pile or pile cap with readings referenced to fixed foresights or backsights. For tests on inclined piles, orient the indicators or scales parallel and perpendicular to the vertical plane of the incline and perpendicular to the longitudinal axis of the test pile(s).

7.4 *Pile Compression and Strain Measurements (Optional):*

7.4.1 Measure the compression or strain of the test pile during loading at locations specified by the Engineer to help evaluate the distribution of load transfer from the pile to the surrounding soil.

7.4.2 Determine pile compression using displacement indicators to measure the relative movement between the pile top and an unstrained telltale rod (Figs. 7-10) bearing at a point within the pile. Unless located on the pile axis, install paired telltales in the pile with the rods in each pair oriented symmetrically opposite each other and equidistant from and parallel to the pile axis. Terminate telltale pairs near the pile bottom and at other points along the pile as required. Measure and record the distance from the pile top to the telltale termination point(s) to the nearest 10 mm [0.5 in.]. Install the telltales in a sheath or casing to insure free rod movement during the test. The rods shall have a rounded tip that bears on a clean steel plate affixed to the pile or shall be threaded into a nut affixed to the pile. Clean the telltale rods prior to installation, oil them during or after installation, and provide centralizers to restrain lateral movement but not axial movement at the pile top. The displacement indicators shall have a travel of at least a 5 mm [0.2 in.] and minimum graduations of 0.01 mm [0.0001 in.] or less, with similar accuracy. Mount a smooth bearing surface for the indicator stem on the telltale rod perpendicular to the direction of stem travel, such as a small, lubricated, glass plate clamped or glued in place.

7.4.3 *Other types of telltale (Optional)*—The Engineer may specify another type of telltale for the measurement of pile compression that satisfies the basic requirements of 7.4.2.

7.4.4 Measure pile strain directly using strain gages installed along the length of the pile axis. Install single gages along the pile axis, or gage pairs with the gages in each pair oriented symmetrically opposite each other and equidistant from and parallel to the pile axis. Measure and record the distance from the pile top to the gages to the nearest 10 mm [0.5 in.]. The gage type and installation shall be as specified by the Engineer and shall include temperature compensation as recommended by the gage manufacturer. Where feasible, measurement programs involving strain gages should include calibration of the fully instrumented pile and a complete history of gage readings starting before their installation in the pile.

NOTE 11—To interpret strain measurements and estimate pile stresses, the Engineer will require a depth profile describing the variation of pile constituents and their strength, cross sectional area, and stiffness. Stiffness properties may vary with the applied stress, especially for grout or concrete. Obtain this information from installation records and separate material property tests as needed.

8. Procedure

8.1 *Loading:*

8.1.1 *General:*

8.1.1.1 Apply test loads following one of the procedures described below for each test method, or as modified by the Engineer. If feasible, the maximum applied load should reach a failure that reflects the ultimate axial static compressive load capacity of the pile(s). Do not exceed the safe structural capacity of the pile or pile group, or the loading apparatus. Do not leave a loaded pile unattended.

8.1.1.2 To avoid excessive creep and possible structural failure of cast-in-place concrete piles, delay load testing after concrete placement to permit the fresh concrete to gain adequate strength and stiffness. Use test cylinders or cores of the pile concrete to determine the appropriate wait time, recognizing that the test cylinders will generally cure more quickly than concrete in the pile.

8.1.1.3 The static axial capacity of piles typically changes as time elapses after pile installation, possibly increasing (setup) or decreasing (relaxation), depending on the soil or rock properties and the pore water pressure and soil structure disturbance induced by installation. This behavior may affect both driven piles and cast-in-place piles. The Engineer may specify a waiting period between pile installation and static testing to investigate time effects. The waiting period may range from 3 to 30 days, or longer, based on testing (for example, redriving piles) or prior experience.

8.1.1.4 When temporarily dewatering a test site with piles installed in granular soils, maintain the groundwater level as near to the nominal elevation as possible and record the elevation of the groundwater surface during the test. Use the groundwater surface elevation measured during the test to correct the axial pile capacity when the groundwater level during the test deviates more than 1.5 m [5 ft] from the service groundwater elevation.

8.1.2 *Procedure A: Quick Test*—Apply the test load in increments of 5 % of the anticipated failure load. Add each load increment in a continuous fashion and immediately following the completion of movement readings for the previous load interval. Add load increments until reaching a failure load but do not exceed the safe structural capacity of the pile, pile group, or loading apparatus. During each load interval, keep the load constant for a time interval of not less than 4 min and not more than 15 min, using the same time interval for all loading increments throughout the test. Remove the load in five to ten approximately equal decrements, keeping the load constant for a time interval of not less than 4 min and not more than 15 min, using the same time interval for all unloading decrements Consider longer time intervals for the failure load to assess creep behavior and for the final zero load to assess rebound behavior.

8.1.3 *Procedure B: Maintained Test (Optional):*

8.1.3.1 Unless failure occurs first, load the pile to a maximum maintained load of 200 % of the anticipated design load for tests on individual piles, or 150 % of the pile group design load, applying the load in increments of 25 % of the design load. Maintain each load increment until the rate of axial

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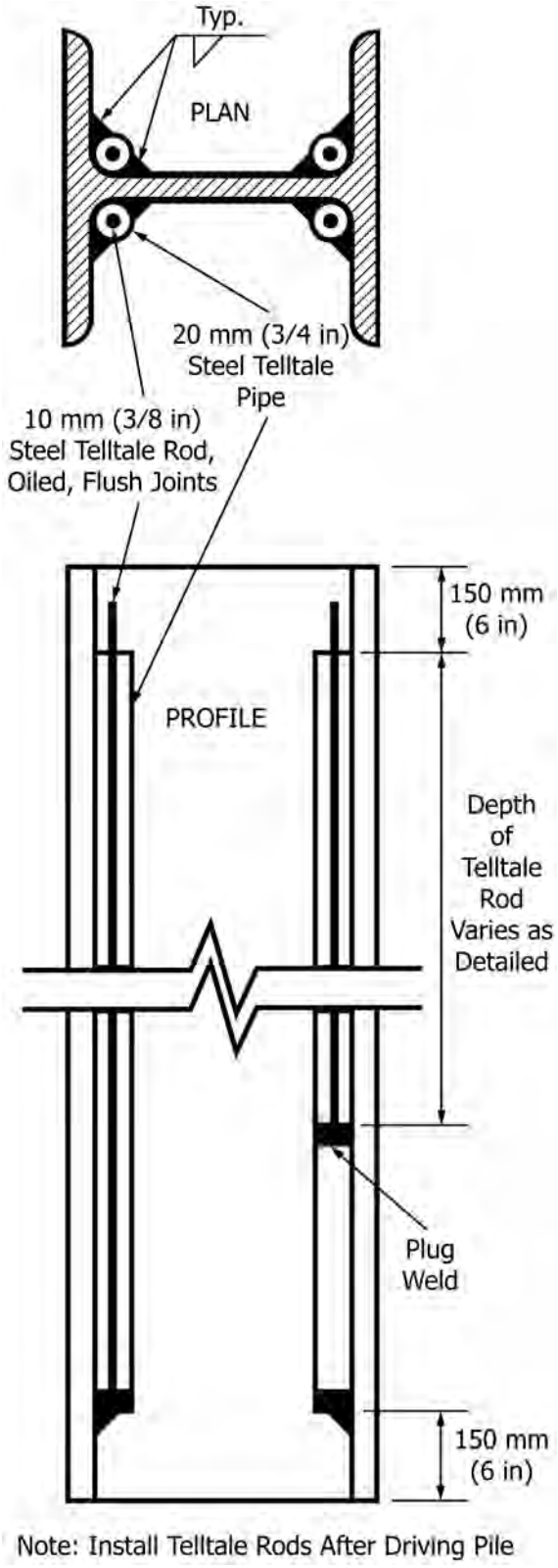

FIG. 8 Possible Installation of Telltales for Steel H-Piles

movement does not exceed 0.25 mm [0.01 in.] per hour, with a minimum time adequate to verify this movement rate based on the accuracy of the movement indicator readings, and with a maximum of 2 hr. After applying the maximum load and reaching an overall test duration of at least 12 hr, begin unloading when the axial movement measured over a period of 1 hr does not exceed 0.25 mm [0.01 in.]; otherwise allow the maximum load to remain on the pile or pile group for 24 hr. If

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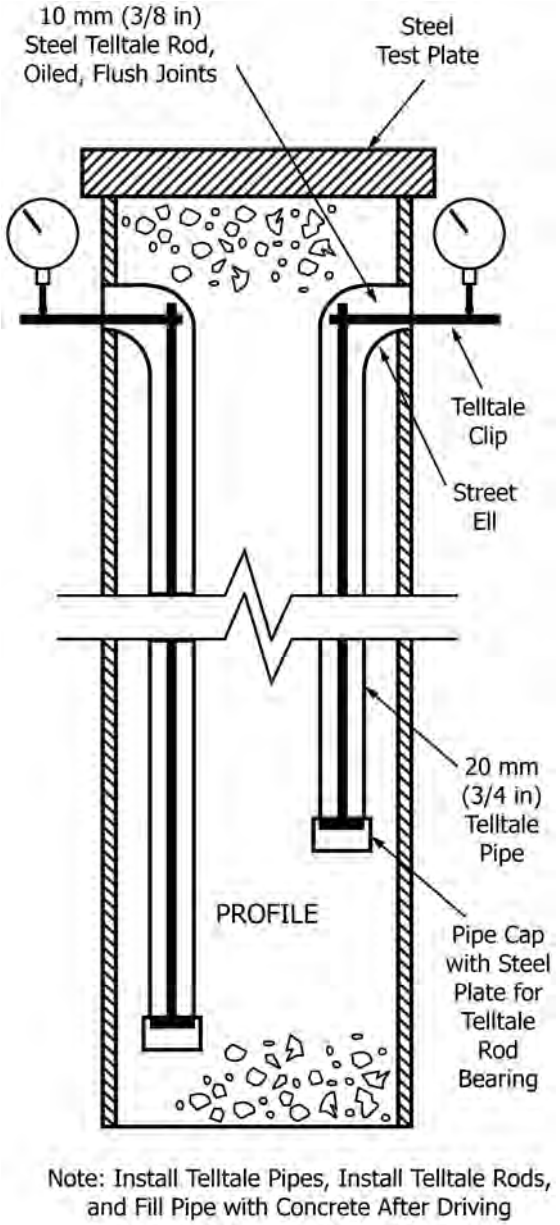

FIG. 9 Possible Installation of Telltales for Pipe Piles

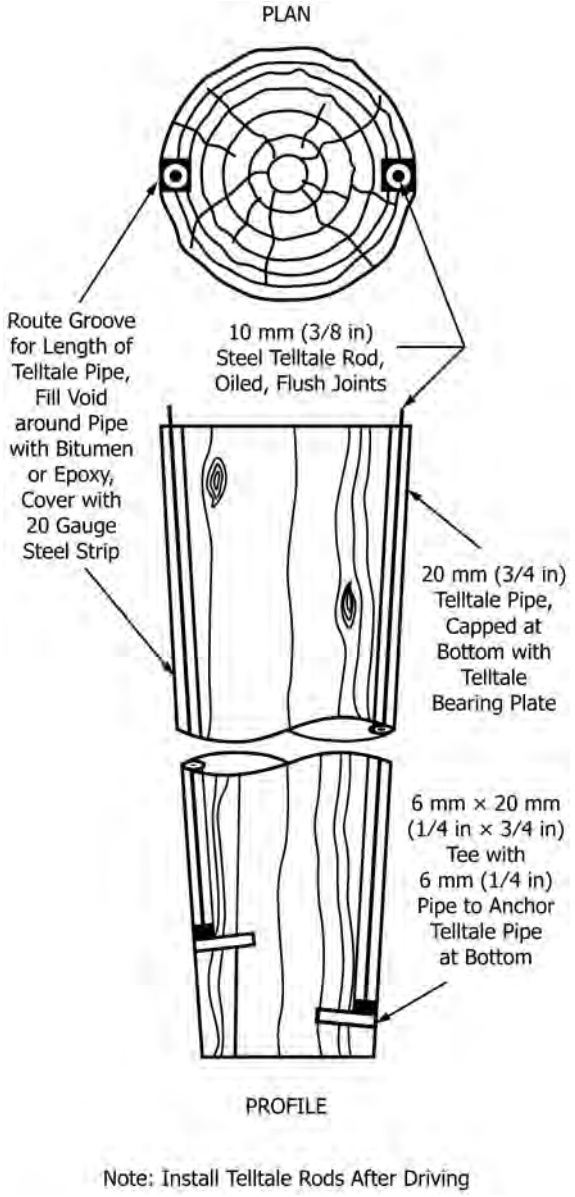

FIG. 10 Possible Installation of Telltales for Timber Piles

failure occurs during loading, maintain the failure load, or the maximum load possible, until the total axial movement equals 15 % the pile diameter or width. After completing the final load increment, remove the load in decrements of 25 % of the maximum test load with 1 hr between decrements.

8.1.3.2 If using the direct loading method described in 6.5, include in the first load increment the weight of the test beam(s) and the platform that bear directly on the pile. Before adding or removing load increments, tighten the wedges along the platform edges to stabilize the platform. Place or remove load increments in a manner which avoids impact and maintains the load balanced at all times. After each load increment has been added, loosen (but do not remove) the wedges and keep them loose to permit the full load to act on the pile as it moves.

NOTE 12— If negligible permanent axial movement occurs after unloading the pile, consider reloading the test pile(s) to a greater load or use the procedure in Section 8.1.4. If the test pile(s) approach failure during the maintained loading procedure, consider decreasing the final load increments to obtain a more accurate failure load.

8.1.4 *Procedure C: Loading in Excess of Maintained Test (Optional)*—After the load has been applied and removed in accordance with 8.1.3, reload the test pile or pile group to the maximum maintained load in increments of 50 % of the pile or pile group design load, allowing 20 min between load increments. Then apply additional load in increments of 10 % of the design load for the pile or pile group until reaching the maximum required load or failure, allowing 20 min between load increments. If failure occurs continue jacking the pile until the settlement equals 15 % of the pile diameter or width. If failure does not occur, hold the full load for 2 hr and then remove the load in four equal decrements, allowing 20 min between decrements.

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8.1.5 *Procedure D: Constant Time Interval Loading Test*—Follow the procedures of 8.1.3, but apply the load in increments of 20 % of the pile or group design load with 1 hr between load increments. Then unload the piles with 1 hr between load decrements.

8.1.6 *Procedure E: Constant Rate of Penetration Test (Optional):*

8.1.6.1 The apparatus for applying loads shall have a capacity as specified and shall be in accordance with section 6.3 or 6.4. Use a mechanical hydraulic jacking system equipped with a bleed valve, variable speed device, or other means for providing a smooth variable pressure delivery.

8.1.6.2 Vary the applied load as necessary to maintain a pile penetration rate of 0.25 to 1.25 mm [0.01 to 0.05 in.] per minute for cohesive soil or 0.75 to 2.5 mm [0.03 to 0.10 in.] per minute for granular soils, or as specified by the Engineer. Continue loading the pile until achieving continuous penetration at the specified rate. Hold the maximum applied load until obtaining a total pile penetration of at least 15 % of the average pile diameter or width, or until the pile stops penetrating. Gradually release the final load to protect the load and measurement systems

8.1.6.3 Control the rate of penetration by checking the time taken for successive small equal increments of penetration and then adjusting the jacking accordingly. Alternatively, use a mechanical or electrical device to monitor and control the penetration rate so that it remains constant

8.1.6.4 See 7.2.5 for measurement procedures. When using a video recording system, locate all gages for easy reading within the camera's field of view, as well as a digital clock displaying time to the nearest second.

8.1.7 *Procedure F: Constant Movement Increment Test (Optional):*

8.1.7.1 Apply test loads in increments required to produce pile top movement increments equal to approximately 1 % of the average pile diameter or width. Vary the applied load as necessary to maintain each movement increment, and do not apply additional load until the rate of load variation to hold that movement increment constant is less than 1 % of the total applied load per hour. Continue loading the pile in such increments until the total movement equals 15 % of the average pile diameter or width.

8.1.7.2 Remove the final test load in four equal decrements after maintaining the final movement increment until the rate of load variation is less than 1 % of the total applied load per hour. After removing the first load decrement, do not remove additional decrements until the rate of pile rebound for the preceding load decrement is less than 0.3 % of the average pile diameter or diagonal dimension per hour.

8.1.8 *Procedure G: Cyclic Loading Test (Optional)*—For the first application of test load increments, apply such increments in accordance with 8.1.3. After the application of loads equal to 50, 100 and 150 % of the pile design load for tests of individual piles or 50 and 100 % of the group design load for tests on pile groups, maintain the total test load in each case for 1 hr and remove the load in decrements equal to the loading increments, allowing 20 min between decrements. After removing each maximum applied load, reapply the load to each preceding load level in increments equal to 50 % of the design load, allowing 20 min between increments. Apply additional loads in accordance with 8.1.3. After the maximum required test load has been applied, hold and remove the test load in accordance with 8.1.3.

8.2 *Recording Test Readings:*

8.2.1 *General:*

8.2.1.1 For the required time intervals described below for each test method, record the time, applied load, and movement readings (displacement, and strain if measured) for each properly identified gage, scale, or reference point taken as nearly simultaneously as practicable. The Engineer may specify different reading intervals from those given below as needed to satisfy the objectives of a particular test pile program. Obtain additional test readings as specified by the Engineer, or as convenient for testing purposes, i.e. when using a datalogger to record readings at a constant time interval. When using the loading procedure described in 6.5, take the zero-load reading before placing the test beam(s) and platform on the pile(s). Clearly record and explain any field adjustments made to instrumentation or recorded data.

8.2.1.2 Verify the stability of the reference beams and load reaction system (including reaction piles) using a surveyor's level or transit and target rod or scales to determine movement. Record readings taken before applying any test load, at the proposed design load, at the maximum test load, and after the removal of all load. Intermediate readings for each load increment are recommended to provide additional quality assurance and detect potential failure of the load reaction system.

8.2.1.3 When using embedded strain gages to obtain incremental strain measurements as in 7.4 record strain readings just before starting the test and, as a minimum, during the test whenever recording readings of time, load, and movement. The Engineer may also require gage readings taken before and after the pile installation to obtain a complete strain history and investigate residual stress behavior.

8.2.2 *Procedure A: Quick Test*—Record test readings taken at 0.5, 1, 2 and 4 min after completing the application of each load increment, and at 8 and 15 min when permitted by longer load intervals. Record test readings taken at 1 and 4 min after completing each load decrement, and at 8 and 15 min when permitted by a longer unload intervals. Record readings taken at 1, 4, 8 and 15 min after all load has been removed.

NOTE 13—The movement measured between readings for a given load increment provides an indication of creep behavior.

8.2.3 *Procedure B: Maintained Test (also Procedures C, D, and G) (Optional)*—Record test readings taken before and after the application of each load increment or decrement. During each load interval, provided that the test pile or pile group has not failed, record additional readings taken at 5, 10, and 20 min following application of the load increment, and every 20 min thereafter as needed. After applying the total load, provided that the test pile or pile group has not failed, record additional readings taken at 5, 10, and 20 min, then every 20 min up to 2 hrs, then every hour from 2 to 12 hrs, and then every 2 hrs from 12 to 24 hrs as needed. If pile failure occurs, also record

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readings taken immediately before removing the first load decrement. During unloading, record readings taken at time intervals of 20 min. Record final readings 12 hr after removing all load.

8.2.4 *Procedure E: Constant Rate of Penetration (Optional)*—Record test readings taken at least every 30 s or at sufficient intervals to determine the actual rate of penetration. Operate any automatic monitoring and recording devices continuously during each test. When the test pile has achieved its specified rate of penetration, continue to take and record readings for the duration of the loading, and determine the maximum load applied. Take and record readings immediately after unloading and again 1 h after removing all load.

8.2.5 *Procedure F: Constant Movement Increment (Optional)*—Record test readings taken immediately before and after each movement increment with sufficient intermediate readings so as to determine the rate of load variation and the actual load required to maintain each settlement increment. During unloading, record readings taken immediately before and after the removal of each load decrement with sufficient intermediate readings so as to determine the rate of pile rebound. Record final readings taken 12 h after removing all load.

9. Safety Requirements

9.1 All operations in connection with pile load testing shall be carried out in such a manner so as to minimize, avoid, or eliminate the exposure of people to hazard. The following safety rules are in addition to general safety requirements applicable to construction operations:

9.1.1 Keep all test and adjacent work areas, walkways, platforms, etc. clear of scrap, debris, small tools, and accumulations of snow, ice, mud, grease, oil, or other slippery substances.

9.1.2 Provide timbers, blocking and cribbing materials made of quality material and in good serviceable condition with flat surfaces and without rounded edges.

9.1.3 Hydraulic jacks shall be equipped with spherical bearing plates or shall be in complete and firm contact with the bearing surfaces and shall be aligned so as to avoid eccentric loading.

9.1.4 Loads shall not be hoisted, swung, or suspended over anyone and shall be controlled by tag lines.

9.1.5 The test beam(s), reaction frame, anchor piles and other anchoring devices, test boxes, and their connections and supports shall be designed and approved by a qualified engineer and installed to transmit the required loads with an adequate factor of safety.

9.1.6 For tests on inclined piles, all inclined jacks, bearing plates, test beam(s), or frame members shall be firmly fixed into place or adequately blocked to prevent slippage upon release of load.

9.1.7 All reaction loads shall be stable and balanced. When using loading method in 6.5, safety wedges shall be in place at all times to prevent the platform from tipping. During testing, movements of the reaction load or system should be monitored to detect impending unstable conditions.

9.1.8 All test beams, reaction frames, platforms, and boxes shall be adequately supported at all times.

9.1.9 Only authorized personnel shall be permitted within the immediate test area, and only as necessary to monitor test equipment. As best as possible, locate pumps, load cell readouts, dataloggers, and test monitoring equipment at a safe distance away from jacks, loaded beams, weighted boxes, dead weights, and their supports and connections.

10. Report

10.1 The report of the load test shall include the following information as required by the Engineer and as appropriate to the pile type, test apparatus, and test method:

10.1.1 *General:*

10.1.1.1 Project identification and location,

10.1.1.2 Test site location,

10.1.1.3 Owner, structural engineer, geotechnical engineer, pile contractor, boring contractor,

10.1.1.4 Nearest test boring(s) or sounding(s), and their location with reference to test location,

10.1.1.5 Insitu and laboratory soil test results, and

10.1.1.6 Horizontal and vertical control datum.

10.1.2 *Pile Installation Equipment:*

10.1.2.1 Make, model, type and size of hammer,

10.1.2.2 Weight of hammer and ram,

10.1.2.3 Stroke or ram,

10.1.2.4 Rated energy of hammer,

10.1.2.5 Rated capacity of boiler or compressor,

10.1.2.6 Type and dimensions of capblock and pile cushion,

10.1.2.7 Weight and dimensions of drive cap and follower,

10.1.2.8 Size of predrilling or jetting equipment,

10.1.2.9 Weight of clamp, follower, adaptor, and oscillator for vibratory driver.

10.1.2.10 Type, size, length, and weight of mandrel,

10.1.2.11 Type, size, and length of auger,

10.1.2.12 Type and size of grout pump, and

10.1.2.13 Type, size, wall thickness, and length of drive casing.

10.1.2.14 Detailed description of drilling equipment and techniques,

10.1.2.15 Size, type, length, and installation or extraction method of casings or a combination thereof.

10.1.3 *Test and Anchor Pile Details:*

10.1.3.1 Identification and location of test and anchor piles,

10.1.3.2 Design load of test pile or pile group,

10.1.3.3 Type and dimensions of test and anchor piles

10.1.3.4 Test pile material including basic specifications,

10.1.3.5 Pile quality including knots, splits, checks and shakes, and straightness of piles, preservative treatment and conditioning process used for timber test piles including inspection certificates,

10.1.3.6 Wall thickness of pipe test pile,

10.1.3.7 Weight per foot of H test pile,

10.1.3.8 Description of test pile tip reinforcement or protection,

10.1.3.9 Description of banding–timber piles,

10.1.3.10 Description of special coatings used,

10.1.3.11 Test pile (mandrel) weight as driven,

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10.1.3.12 Date precast test piles made,
10.1.3.13 Details of concrete and/or grout mix design,
10.1.3.14 Concrete and/or grout placement techniques and records ,
10.1.3.15 Concrete and/or grout sample strengths and date of strength test,
10.1.3.16 Description of internal reinforcement used in test pile (size, length, number longitudinal bars, arrangement, spiral, or tie steel),
10.1.3.17 Condition of precast piles including spalled areas, cracks, top surface, and straightness of piles.
10.1.3.18 Effective prestress,
10.1.3.19 Degree of inclination for each pile,
10.1.3.20 Length of test pile during driving,
10.1.3.21 Final pile top and bottom elevations, and ground elevation referenced to a datum,
10.1.3.22 Embedded length–test and anchor piles,
10.1.3.23 Tested length of test pile, and
10.1.3.24 Final elevation of test pile butt(s) referenced to fixed datum.
10.1.4 *Test and Anchor Pile Installation:*
10.1.4.1 Date installed,
10.1.4.2 Volume of concrete or grout placed in pile,
10.1.4.3 Grout pressure used,
10.1.4.4 Description of pre-excavation or jetting (depth, size, pressure, duration),
10.1.4.5 Operating pressure for double-acting and differential type hammers,
10.1.4.6 Throttle setting–diesel hammer (at final driving),
10.1.4.7 Fuel type–diesel hammer,
10.1.4.8 Horsepower delivered and frequency of vibratory driver during final 3 m [10 ft] of pile penetration,
10.1.4.9 Description of special installation procedures used such as piles cased off,
10.1.4.10 Type and location of pile splices,
10.1.4.11 Driving or drilling records,
10.1.4.12 Final penetration resistance (blows per centimetre [blows per inch]),
10.1.4.13 Rate of pile penetration for last 3 m [10 ft] s/ft, vibratory driving,
10.1.4.14 When capblock replaced (indicate on log),
10.1.4.15 When pile cushion replaced (indicate on log),
10.1.4.16 Cause and duration of interruptions in pile installation, and
10.1.4.17 Notation of any unusual occurrences during installation.
10.1.5 *Pile Testing:*
10.1.5.1 Date and type of test,
10.1.5.2 Temperature and weather conditions during tests,
10.1.5.3 Number of piles in group test,
10.1.5.4 Brief description of load application apparatus, including jack capacity,
10.1.5.5 Description of instrumentation used to measure pile movement including location of indicators, scales, and other reference points with respect to pile top,
10.1.5.6 Description of special instrumentation such as strain rods or strain gages including location of such with reference to pile top,
10.1.5.7 Special testing procedures used,
10.1.5.8 Tabulation of all time, load, and movement readings,
10.1.5.9 Identification and location sketch of all gages, scales, and reference points,
10.1.5.10 Description and explanation of adjustments made to instrumentation or field data, or both,
10.1.5.11 Notation of any unusual occurrences during testing,
10.1.5.12 Test jack and other required calibration reports,
10.1.5.13 Groundwater level, and
10.1.5.14 Suitable photographs showing the test instrumentation and set-up.

11. Precision and Bias

11.1 *Precision*—Test data on precision is not presented due to the nature of this test method. It is either not feasible or too costly at this time to have ten or more agencies participate in an in situ testing program at a given site
11.1.1 Subcommittee D18.11 is seeking any data from the users of this test method that might be used to make a limited statement on precision.

11.2 *Bias*—There is no accepted reference value for this test method, therefore, bias cannot be determined.

12. Keywords

12.1 axial static pile capacity; field testing; jack; load cell; loading procedure; reference beam

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APPENDIX

(Nonmandatory Information)

X1. SOME FACTORS INFLUENCING INTERPRETATION OF TEST RESULTS

X1.1 Potential residual loads in the pile which could influence the interpreted distribution of load at the pile tip and along the pile shaft.

X1.2 Possible interaction of friction loads from test pile with upward friction transferred to the soil from anchor piles obtaining part or all of their support in soil at levels above the tip level of the test pile.

X1.3 Changes in pore water pressure in the soil caused by pile driving, construction fill, and other construction operations which may influence the test results for frictional support in relatively impervious soils such as clay and silt.

X1.4 Differences between conditions at time of testing and after final construction such as changes in grade or groundwater level.

X1.5 Potential loss of soil supporting test pile from such things as excavation and scour.

X1.6 Possible differences in the performance of a pile in a group or of a pile group from that of a single isolated pile.

X1.7 Affect on long-term pile performance of factors such as creep, environmental effects on pile material, negative friction loads not previously accounted for, and strength losses.

X1.8 Type of structure to be supported, including sensitivity of structure to settlements and relation between live and dead loads.

X1.9 Special testing procedures which may be required for the application of certain acceptance criteria or methods of interpretation.

X1.10 Requirement that non tested pile(s) have essentially identical conditions to those for tested pile(s) including, but not limited to, subsurface conditions, pile type, length, size and stiffness, and pile installation methods and equipment so that application or extrapolation of the test results to such other piles is valid.

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This standard is subject to revision at any time by the responsible technical committee and must be reviewed every five years and if not revised, either reapproved or withdrawn. Your comments are invited either for revision of this standard or for additional standards and should be addressed to ASTM International Headquarters. Your comments will receive careful consideration at a meeting of the responsible technical committee, which you may attend. If you feel that your comments have not received a fair hearing you should make your views known to the ASTM Committee on Standards, at the address shown below.

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APPENDIX M: EARTH ENGINEERS INC.'S IAS CERTIFICATE OF ACCREDITATION

INTERNATIONAL ACCREDITATION SERVICE®

CERTIFICATE OF ACCREDITATION

This is to attest that

EARTH ENGINEERS, INC.

4660 MAIN STREET, SUITE 100-1A
SPRINGFIELD, OREGON 97478

Testing Laboratory TL-694

has met the requirements of the IAS Accreditation Criteria for Testing Laboratories (AC89), has demonstrated compliance with ISO/IEC Standard 17025:2005, *General requirements for the competence of testing and calibration laboratories*, and has been accredited, commencing May 31, 2016, for the test methods listed in the approved scope of accreditation.

(See laboratory's scope of accreditation for fields of testing and accredited test methods.)

This accreditation certificate supersedes any IAS accreditation bearing an earlier effective date. The certificate becomes invalid upon suspension, cancellation or revocation of accreditation.
See http://iasonline.org/More/search.html for current accreditation information, or contact IAS at 562-364-8201.

INTERNATIONAL ACCREDITATION SERVICE®

ilac-MRA

C.P. Ramani

C.P. Ramani, P.E., C.B.O
President

15-12065

INTERNATIONAL ACCREDITATION SERVICE®

SCOPE OF ACCREDITATION

IAS Accreditation Number	TL-694
Accredited Entity	Earth Engineers, Inc.
Address	4660 Main Street, Suite 100-1a Springfield, OR 97478
Contact Name	Ray Aliperti, Branch Manager
Telephone	+1 (541) 393-6340
Effective Date of Scope	May 31, 2016
Accreditation Standard	ISO/IEC 17025:2005

ACCREDITED TEST METHODS	METHOD REFERENCE
ASTM D1143	Standard Test Methods for Deep Foundations Under Static Axial Compressive Load
ASTM D3689	Standard Test Methods for Deep Foundations Under Static Axial Tensile Load
ASTM D3966	Standard Test Methods for Deep Foundations Under Lateral Load

APPENDIX N: MANUFACTURER'S DIAMOND PIER INSTALLATION INSTRUCTIONS

DiamondPier® Quick Installation Sheet

253-858-8809 / 866-255-9478 Toll Free

Please Read the Current Full Diamond Pier Installation Manual and View the Installation Video, Both Available at: www.diamondpiers.com

Know Your Soils: Any Diamond Pier product sold through retail outlets may only be used in normal sound soils. See the full Diamond Pier Installation Manual. Soils that do not meet the prescriptive bearing strength in the local code are not sufficient and will not provide expected foundation capacity. The two common prescriptive bearing soil types in the IRC are 2000 psf sands/gravels and 1500 psf silts /clays. Confirm project soil strength at your site with your local code official. (Additional soils information may also be available at the U.S. Geological Soil Survey Site managed by the USDA; please visit http://websoilsurvey.sc.egov.usda.gov/.) Do not install Diamond Pier foundations in soils that have less than 1500 psf bearing strength; or in peats, unconsolidated or uncompacted fills, contaminated soils, soils with improper drainage or standing water; or in soils where traditional concrete piers, accepted by local codes, have failed to provide adequate bearing to support the loads of the structure, or to protect the structure from the negative effects of frost heave. If any of the normal soil conditions do not exist as defined, contact Pin Foundations, Inc. (PFI) for proper procedures to follow.

Know Your Site: Diamond Pier foundations should NOT be installed on slopes steeper than 2:1 (27 degrees) or on shifting or sliding soils. Check your site for proper drainage. Where there is standing water, drainage discharge, or the potential for water to pond, pool, or saturate the soil, the soil can be weakened and can affect foundation performance, potentially reducing uplift resistance and/or bearing capacity. Always direct any downspout or discharged water away from the project area.

Check Your Layout: *Confirm that there are no buried utilities or privately run underground lines within the project layout area (see* Pin Driving *section below)*. All loads from the supported structure must be properly calculated, and the piers spaced accordingly, so that each pier is supporting only up to its designated allowable load. See Table 1, "Residential Diamond Pier Load Chart" in the Diamond Pier Installation Manual. The pier bearing capacity is based on a minimum pier spacing of 3 feet, from center of bolt to center of bolt. If the project requires that the piers are spaced closer, the Load Chart bearing capacity must be reduced by 13% for each closer spaced pier. The piers must also be set back from existing foundations or landscape retaining walls and similar types of buried obstacles. See Table 2, "Horizontal Pin Distance for All Diamond Pier Models," in the Installation Manual for appropriate setback distances. The piers should not be installed in unconsolidated or uncompacted backfill, often found around the excavated perimeter of basement or daylight basement foundations. Diamond Pier foundations are only intended for use on simple structures supported by columns, posts, and beams. No asymmetric, rotational, overturning, or dynamic loads should be supported.

Tools and Supplies: Verify that you have the correct number of piers with the corresponding number of pins, pin caps, and inspection plugs; that the anchor nuts thread properly on the pier anchor bolt; and that there are no structural cracks in the pier. You will need all proper safety equipment and protective clothing, a square edge shovel, an automatic driving hammer with driving bit, a sledge hammer, a short level, a pipe wrench, and a tape measure. We recommend a minimum two-person crew for installation. Do not use the pin driving bit as a hammering tool or hammer against it with the sledge. It is only to be used, properly inserted, in the automatic hammer.

Setting the Concrete Head: Dig a conical hole that is approximately the shape of the bottom half of the concrete pier and slightly deeper than the pier itself, leaving loose soils directly below the pier. Following safe lifting procedures, carefully lift the concrete head, and position it in the hole to its midpoint, level and centered on your alignment (for deeper burial see Installation Manual at *www.diamondpiers.com* and click on "Backyards"). Replace some of the removed soils back around the sides of the pier at grade, packing it enough to maintain level and alignment during pin driving. See notes under Pin Driving below.

Pin Driving: WARNING: *Do not install Diamond Pier Foundations before all underground utilities have been located, marked and de-energized. Ensure that the horizontal pin distance of the foundations will be well outside all safety clearances required by your local utility. If underground lines are in the area, they must be de-energized and you must fully insulate yourself from any bodily contact with the driving tool.*

Remove any dirt and debris from the pins and check that they will fit easily in the driving holes of the concrete heads. (If a cut or burr is restricting the fit, try the other end of the pin.) Set the inspection plugs into the ends of the pins that will go first into the pier. Slide opposing pins through the driving holes in the concrete head and, making sure to support them in the center or top of the driving holes, set the pins a foot or so into the soil with the small sledge hammer. Then drive each pin alternately in increments with the automatic hammer, periodically checking for level and alignment, and keeping the weight of the auto-hammer from forcing the pin against the lower edges of the driving holes and potentially flaking the concrete. Finish driving the pins with the automatic hammer, being careful not to damage the precast pier or the upper ends of the pin, and leaving 3/4 inch of the pin protruding from the top of the concrete.

Note 1: Do not attempt to drive the pins all the way down with just a sledge hammer as this may damage the ends of the pins or crack the pier.
Note 2: Do not drive a pin all the way down at once if this causes the pier to be pulled to one side. Continue to rotate around the pier, driving the pins in increments, until the growing strength in the pile group is sufficient to allow final driving.
Note 3: Do not continue to hammer away at a pin that is bouncing or rattling against an impassable object, especially if it causes the pier to ride up the pin, pushes the pier to one side, or risks eccentrically stressing the pier. This may cause the pier to crack, and a cracked pier must be removed and replaced. Ensure that the pier will remain in place if encountering difficulties in the soil, and when following the steps in Note 4.
Note 4: If a pin meets resistance in the soil while being driven, and the obstruction is close enough to the surface, it can be dug up and removed. Then re-compact the soils with the sledge, reset the pier, and re-drive the pin or pins. The pier may also be turned, or relocated, within the parameters of your structure's design, to avoid underground objects. To relocate a pier, remove the pins by turning them with a pipe wrench, and corkscrewing or jacking them upward. See "Pin Removal" video on the website and the "Removing Pins" section in the Diamond Pier Installation Manual.

Capping the Pins: Set caps loosely on pin ends so they can be removed for the pin length inspection. Set brackets, columns, posts, and beams, and then frame and complete the supported structure. Once the framing material loads have been applied, pull the caps and re-verify the length of the protruding pins, adjusting as necessary by tapping with the sledge hammer. Set the caps over the ends of the pins, tapping them down tight with the hammer to seal them against the concrete. Now that the installation is complete, make sure to register the project for Warranty (go to *www.diamondpiers.com* and click on "Backyards").

These Quick Installation Instructions Are for Residential Retail Applications in Normal Sound Soils Only.

Form# DP In Sh – 1/1/2016
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APPENDIX O: PIN FOUNDATIONS, INC. QUALITY CONTROL MANUAL

QC Diamond Piers®
2010

Stoneworks Architectural Precast, Inc.
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Elk River, MN 55330
763 633-2200 ph 763 633-2201 fx
Kirt O'Konek - President
kokonek@stoneworksap.com

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QUALITY SYSTEM DOCUMENTATION CROSS-REFERENCE MATRIX

The matrix below identifies where, in the quality system documentation, the information required in Section 2.0 of the ICC-ES Acceptance Criteria for Quality Documentation (AC10) can be found. If an item does not apply (for example, the item relates to third-party inspections, which do not apply to this product, it is indicated with "N/A" (not applicable).

Date of Documentation: _____/ Evaluation Report or File No. __ESR-1895_____

PIN FOUNDATIONS, INC.

AC10 Section	**Document Identification and Date of Document**	**COMMENTS (IF NEEDED)**
2.1.1 (Signature)	Page 3 & 4	
2.1.2 (Manufacturing Location & Contact)	Page 4	
2.1.3 (Manual Revisions)	Page 9	
2.1.4 (Product ID)	Page 5	
2.1.5 (Traceability)	Page 5	
2.1.6 (Work Flow)	Page 13-17	
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2.7.2 (Document Approval)	Pages 23, 7.3.2.3	
2.7.3 (Records Retention)	Page 6, item 6. Page 23, 7.3.2.2	
Signature:		**Name of Signer:** **Date:**

NOTES:

GENERAL INFORMATION

Name Of Firm : **STONEWORKS, Architectural Precast, Inc.**

Address & Telephone/Fax :

Mailing Address: PO Box 738 Elk River, MN 55330

Shipping and Manufacturing Address: 11555 205th Ave NW, Elk River, MN 55330

Contact person : Kirt O'Konek, President PH: 763 633-2200 FX: 763 633-2201

Product: Diamond Piers®, Model DP-50

VERIFICATION OF LEGITIMACY

The information contained in this Quality Systems Document is true and correct to the best of my knowledge.

DATED THIS, THE_____DAY OF _____, 2010_____

MANUFACTURER: Stoneworks, Architectural Precast, Inc.

REPRESENTATIVE: _____

Kirt O'Konek, President, SAP

PRODUCT DESCRIPTION

The DP-50 Diamond Pier Foundation Assembly is comprised of a pre-cast concrete pier with steel bearing Pins, Pin end caps and embedded anchor bolt. The pier assembly was developed and tested by Pin Foundations, Inc. of Gig Harbor, Washington. The pre-cast concrete pier covered by this manual is manufactured by Stoneworks Architectural Precast, Inc. (SAP) The steel bearing Pins, are purchased by SAP, or individual end users, from commodity pipe suppliers which in turn purchase this commodity produced under ASTM guidelines by steel mills worldwide. The embedded anchor bolts are also a standard commodity manufactured worldwide under ASTM guidelines, and purchased by SAP. The Pin end caps are manufactured by Tool Gauge and Machine Works Inc., Plastic Molded Products of Tacoma, Washington, using dies designed and approved by Pin Foundations, Inc., and supplied to SAP.

Pin Foundations, Inc is the ICC-ES Report holder for this product.

PRODUCT IDENTIFICATION, LABELING AND TRACEABILITY

Each Lot of product manufactured on a specific date will be marked with a pallet label showing the patent numbers, the ICC-ES evaluation report number, the production lot number, and product name which can be referenced on an order and shipping manifest, and the phrase " For use with One and Two Family Dwelling Construction Only." These markings will be printed on the label attached to each pallet of product.

All materials test reports, production inspection documents and production test records shall be traceable to the production date and product type or name.

Manufactured concrete products shall be wrapped on pallets, which are identified as above for shipment.

ACCEPTANCE STATEMENTS / AFFIDAVIT

By signing this statement, the manufacturer, Stoneworks Architectural Precast, Inc. (hereinafter referred to as "SAP"), agrees to the following, and attest to the Affidavit statement below:

1. Pin Foundations, Inc and ICC-ES will be notified in writing if there is a significant change in the product, manufacturing procedures or quality system documentation from what was originally recognized upon issuance of the evaluation report. A significant change is one that may reduce the performance of the product as it pertains to applicable test standards or acceptance criteria.
2. SAP agrees to permit ICC-ES representatives to examine, at distribution points and the manufacturing plant, any product labeled as being in conformance with the evaluation report.
3. SAP shall promptly investigate and notify Pin Foundations Inc., and respond when it receives field complaints regarding the product; ICC-ES shall be notified of all such complaints.
4. The activities within SAP will be directed to insure the quality system criteria and requirements described in the Quality Control manual are followed.
5. The ICC-ES name, mark or report number will only be used on products that are in compliance with the evaluation report and the quality system documentation.
6. SAP agrees to retain all applicable completed forms, checklists, and reports specific to the Quality System Documentation for a minimum period of 2 years.

AFFIDAVIT: SAP hereby attests that the product specifications defined in this Quality System Documentation are consistent with the products tested to qualify for an ICC-ES Evaluation report, and submitted to ICC-ES as report number 704-25035-1, by Professional Service Industries, dated 11/28/06, along with report number 07-020-4 by Earth Engineers Inc, dated 7/2/08, and report number 07-020-7 by Earth Engineers Inc, dated 6/3/10.

See also ICC-ES Appendix C – Agreement between Report Holders and Manufacturers – attached.

DATED THIS, THE_____DAY OF _____, 2010_____

MANUFACTURER: Stoneworks Architectural Precast, Inc.

REPRESENTATIVE: _____

Kirt O'Konek, President, SAP

:

(Third Party inspections are not required under the Acceptance Criteria, AC336, section 5.2)

SCOPE

Because SAP. is committed to ensuring that all the products it manufactures are of the highest quality, all management and supervisory personnel are expected to enforce complete adherence to the principles and processes described herein.

Quality Assurance

SAP ensures consistent quality in its products by regularly verifying that its established manufacturing process is rigorously followed. All personnel are instructed to refer to the procedures, and specifications, herein. All supervisors or quality department auditors are to be allowed full access to observe the manufacturing process and to verify technician performance.

Quality Control

As per the procedures outlined in this manual, SAP performs inspections of the manufacturing process to ensure that the product meets specifications at each step. This begins with receipt inspection of all raw materials and subcomponents and continues until the final product is inspected for shipping to the customer.

The Quality Plan addresses the following aspects of the work performed by SAP.

- Procuring raw materials and services;
- Controlling the manufacturing process, including maintenance and calibration of equipment, to ensure that the finished products are of consistent quality.
  Periodic tests include the following:
  Preparation of compressive strength cylinders to be tested by a third party or authorized testing personnel.
  Periodic determination of concrete air content.
  Determination of moisture content of fine aggregates.
- Addressing and correcting non-compliances, and coordinating with Pin Foundations in this when applicable, and preventing future occurrences;
- Ensuring that all personnel are thoroughly trained in SAP's Quality requirements, as well as maintaining the production process in compliance with recognized standards at all times.

GLOSSARY OF TERMS

Authorized Inspection Agency: An agency accredited by International Accreditation Service (IAS).

Authorized Inspector: An employee or agent of the Authorized Inspection Agency who performs inspection when required by the Code or relevant Acceptance Criteria. (AC 336)

Code: The International Residential Code

Code Inspection: Inspection, by an Authorized Inspector, of activities performed under the Code or AC 336.

Labeled Product: An item manufactured by SAP and approved by Pin Foundations, Inc. and ICC ES as meeting the requirements of AC 336.

Material Supplier: An organization, which supplies raw materials or subcomponents that comply with the specifications and requirements of SAP and AC 336.

Non-Conformance: A deficiency in the characteristic, or manufacturing process of an item which renders its quality unacceptable or indeterminate.

Quality Control (QC) Those actions, which provide means to measure and control the characteristics of an item, process, or facility against established requirements.

QC Examiner: An employee of SAP who has been authorized by the Pin Foundations Inc. to perform quality examinations and inspections as required by this quality program.

Supplier: A vendor furnishing materials, items, or services to SAP

ABBREVIATIONS

AC	Acceptance Criteria
AIA	Authorized Inspection Agency
ASTM	American Society of Testing Materials
COC	Certificate of Compliance
CMTR	Certified Material Test Report
ICC-ES	International Code Council-Evaluation Services
NCR	Non-Conformance Report

1 QUALITY CONTROL PROGRAM

1.1 Policy

The president shall establish and ensure the execution of a QC system that is consistent with the requirements set forth in this manual.

1.1.1 *Quality Control* is the process which provides the means to control and measure the characteristics of an item or procedure to meet established requirements.

1.2 Scope and Authority

1.2.1 This manual establishes a system to ensure that all products are manufactured in accordance with applicable specifications, and that those materials and services procured externally conform to established standards.

1.2.2 The Operations Manager directs and implements the quality program and is also responsible for review, maintenance, and controlled distribution of the quality manual.

1.2.3 All SAP personnel who perform operations affecting quality shall be trained to suitable proficiency.

1.2.4 Quality inspections shall be made and documented at each phase of manufacturing.

1.3

1.3.1 The Operations Manager is to identify any changes that may be needed to establish quality procedures and shall **review the quality manual annually**. No changes shall be made to the manual without approval from the Operations Manager.

1.4 Employee and Customer Feedback

1.4.1 All employees are responsible for identifying quality problems and, if possible, recommending improvements. The Operations Manager, and Plant Foreman shall ensure that a mechanism exists whereby employees can express their concerns or suggestions without fear of reprisal.

1.4.2 Customers shall be informed that any negative feedback can be directed to the Operations Manager.

1.4.2.1 The Operations Manager shall review each such customer concern individually and provide a response to the customer within 3 working days. The response shall address the apparent cause of the problem and what initial corrective measures have been taken.

1.4.2.2 The Operations Manager shall investigate the concern and contact the customer again within 30 days, this time addressing the root cause of the problem and what steps have been taken to prevent recurrence.

1.4.3 The Operations Manager is responsible for tracking all quality suggestions and concerns and ensuring that appropriate corrective actions are taken.

1.5 Complaint Resolution.

This policy describes the procedure used by SAP to insure that complaints related to product quality and installation are resolved in a satisfactory manner, and that the information gained through the process is utilized to target continuous quality improvement efforts.

1.5.1 Responsibility -The Operations Manager shall be responsible for the following:
Assures the implementation of this procedure
Assigns a responsible party(s) to investigate and resolve the complaint.
Reviews and approves the corrective action to be taken to resolve the complaint.
Verifies the corrective action has resolved the complaint.
Conducts an annual review of complaints to facilitate quality improvement efforts.

1.5.2 Complaint Resolution Procedure.
1) Investigate root cause.
2) Implement corrective action.
3) Evaluate effect of corrective action.
4) Develop measures to prevent reoccurrence of similar complaints

2 ORGANIZATION

2.1 Functional Interactions

2.1.1 The overall organization of SAP is shown in Figure 2-1, the company organization chart. This chart shows the interrelation of the different technical and administrative groups.

2.2 Quality Responsibilities

2.2.1 The Operations Manager oversees implementation of the quality program described in this manual. Specific tasks include, but are not limited to, the following:

- 2.2.1.1 Ensuring that the manual stays current to changing product lines or production processes, and that quality is fully considered when SAP is developing a new procedure or production process;
- 2.2.1.2 Supervision of all inspectors, including their training and performance;
- 2.2.1.3 Ensuring that corrections recommended by inspectors, and production line personnel are fully considered and implemented as appropriate; and
- 2.2.1.4 Reviewing the quality manual annually, making recommendations for improvements and tracking implementation of revisions or corrections.

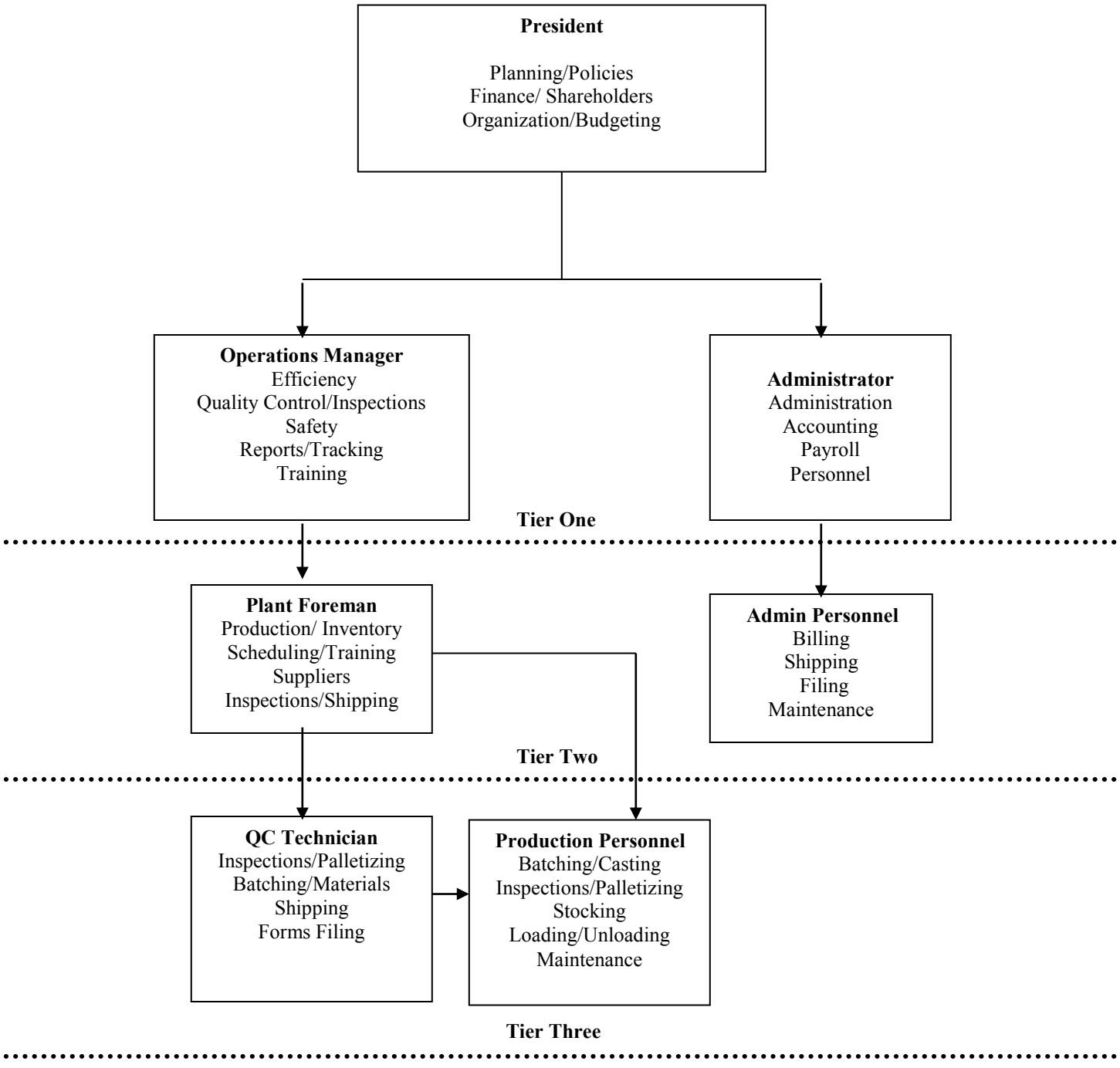
2.2.2 The Plant Foreman is responsible for ensuring that all personnel under their supervision adhere to all requirements of the quality program. Specific duties include, but are not limited to the following:

- 2.2.2.1 Ensuring that all incoming materials are properly inspected, and that such inspection is documented;
- 2.2.2.2 Review and approval of external sources of materials, parts, or services.

2.2.3 Production personnel are responsible for compliance with all requirements of the quality program at all times.

- 2.2.3.1 All staff members shall ensure that they understand the tasks to be performed and the related quality requirements before work begins.
- 2.2.3.2 Work schedules shall be reviewed to ensure that sufficient time has been allotted for inspections and required hold points.

FIGURE 2-1: ORGANIZATION CHART
SAP



3 MANUFACTURING

3.1 Preparation and Forming

3.1.1 Form Preparation – The forms consist of an upper and lower section of the proper size and proportions to form a DP-50 model pier as shown in Appendix B of the PSI Report No.704-25035-1, and fully dimensioned on page 0 of this manual. The forms must be clean and free of loose debris from previous pours before proceeding. Arrange as many base forms as will be poured for a given batch of concrete. Spray the inside of both forms with form release oil, lightly coating all interior surfaces.

3.1.2 Bolts – Verify that all anchor bolts are uniformly hot dipped galvanized, that they are of the proper diameter – (1/2"), and length (4"), and that they are selected from a group of bolts with certified lot number that has been verified to conform with ASTM A307, grade A. Roll approximately ½" of the threaded end of the bolt in a common automotive grease, lightly covering the threads, and insert this end in the center of the base form in a hole cut through the form and into its supporting base, no more than ¾" deep. Make sure that the bolt is plumb before proceeding.

3.1.3 Dowels – Align matching registration marks, and place the top form over the lower form, and seat it in its locking curb. Clamp the forms. Check each dowel for straightness by sighting along its length, and then slide dowels coated with form release into the upper form holes and through the clamped form set into and out the lower form holes on the opposite side. Seat the dowel snugly. (If one or more of the dowels does not fit properly in either or both of its forms holes, either the dowel or form has been improperly cut and should be discarded if uncorrectable and replaced.) Check by looking through the pouring opening at the top of the combined form to be sure that the bolt has not been knocked out of plumb during insertion of the dowels, and that all four dowels are properly in place.

3.1.4 Pre-pour Forms Placement. The forms with plumb bolts, properly seated dowels and tight clamps are now ready for pouring and should be placed near the concrete hopper.

3.2 POURING

3.2.1 Environment – Verify that the temperature where concrete mixing is to occur is at or above 50 degrees F and at or below 85 degrees F, before proceeding with concrete mixing. If either of these temperature ranges are exceeded, see "Mixing and Storing Concrete in Cold or Hot Conditions".

3.2.2 Materials Verification – Begin by verifying that the materials to be mixed have been checked and cleared for use under the requirements of the Quality System Manual. Enter verifications in Production Log for date of casting.

3.2.3 Pre-Pour, Weights and Measure Spray mixing drum with water and set to drain. Pre-measure cement, taking it from sealed bags of known weight or from buckets pre-filled with cement and sealed with air tight lids. Verify saturated surface dry ratio of fine aggregate using calibrated hydro-probe, and make the necessary corrections for proper added water quantity. Fill proper aggregate containers with specific weights of coarse and fine aggregates. Weigh out proper amount of plasticizer and air entrainment. Verify temperature of all mix components within range. (SEE Mix Design in the Appendix) Enter all Measurements, Temperatures and product count on Mix Ticket for date, and time corresponding to the Production Log.

3.3 CONCRETE MIXING

3.3.1 Mixing Pour 70% of water into drum. Load fine and coarse aggregate. Add cement, and begin mixer rotation, adding remaining water. Mix for 3 to 5 minutes. Let stand for 1 to 2 minutes, then add air entrainment and plasticizer directly to the mix, and mix again for 2 to 3 minutes. During the final 2 to 3 minutes, verify the consistency of the mix by inspecting the leading edge of the slurry as it rotates through the drum. The slurry should flow easily through the drum and across the mixing blades, be consistent, with no clumping or segregation of its constituents, and have a continuously rounding shape at its leading edge.

If the mix is too dry or two wet -minimal corrective action may be taken without having to sacrifice the batch. See "Corrective Batching".

Check temperature of mixed concrete and enter on Mix Ticket along with total mixing duration.

3.3.2 Dispensing At the end of the mixing cycle, deposit all the mixed concrete into the concrete hopper. Check the drum for stuck clumps of cement or aggregate or both. If the mix comes out clean, proceed to pouring the forms. If an inconsistent mix was created without all the components fully entrained, the batch may have to be abandoned. (See "Abandoned Batch".)

Enter in Production Log if batch must be abandoned.

3.3.3 Air Entrainment Once in the hopper, the air entrainment of the mix may have to be checked by the pressure method. This check is required once a month or for every new pallet of cement bags for the mix design (whichever is more frequent). (See "Air Procedure") This check may require that a batch be abandoned. (See "Abandoned Batch".)

3.3.4 Test Cylinders The batch may also require that a minimum of 4 sample test cylinders are taken and prepared for delivery to an approved testing lab. This check is required once a month or every 25 pours for the mix design, but will not result in an abandoned batch. Test results will be available 7 and 28 days from the date of batching, and, if results are unacceptable, may require that cast piers be abandoned prior to shipping. (See "Abandoned Piers".) Cylinders are to be numbered, and dated. The cylinders shall be filled with concrete from the "middle 1/3rd" of the hopper, approximately half way through the process of placing the concrete.

3.4 PLACING/CURING CONCRETE

3.4.1 Filling Forms Concrete from the hopper is to be scooped out and poured into the top of the Pier form. Fill halfway, hand shake for approx 5 seconds or lightly vibrate for 1-2 seconds, and then continue filling the form until the concrete reaches the top. Shake again or lightly vibrate for 1 second or less, making sure the coarse aggregate will not drop to the bottom half of the form.

3.4.2 Curing Once the forms are filled, move them to a curing station to be grouped as closely together as possible with similar filled forms. Ensure that all clamps are still solidly in place and insert wedge shaped blocks in the top of the form opening, down into the fresh concrete. This will "seal" the top and create the designed base cavity in the Pier. If the curing temperature is below 50 degrees F or above 85 degrees F, see "Mixing and Storing Concrete in Cold or Hot Conditions".

3.4.3 Forms Removal At the appropriate time in the curing process, the dowels should be removed. Strike the base of one of the tapered dowels with a 2-3 lb sledge to remove it, and wipe it clean as necessary. Rotate the form 90 degrees, and strike and remove the next dowel. (If the dowels do not remove easily, the filled forms made need longer curing.) The upper and lower forms may now be removed from the newly cast pier at this time. Start by scraping away any dried concrete residue on the outside of the forms. Then remove the wedge block by tapping it on the side with a hammer to loosen it, and pulling it up and out. Drive a small steel or hard plastic wedge in between the form lips where the forms meet. Work around the lips on form sides with the wedge until the top form "pops" away from the freshly cured concrete. Next lay the pier on its side and spin it until the newly exposed concrete is facing you. Tap around the remaining perimeter form lip to loosen it from the concrete until this side of the form "pops" away, or the partially encased pier can be placed in a "gravity release" box. This box holds the form lips, with the base of the pier just an inch above the bottom of the box, allowing the concrete pier to drop out of the form under its own weight. (The bottom of the box should be made of a padded surface capable of sufficiently cushioning the drop, without causing any damage to the pier.) Once both forms have been removed, set them aside, stacking as you go. These forms will be returned to the forms assembly area for any necessary cleaning. Proceed to the remaining piers, removing forms as described, and checking for inspection items as you proceed. (See Section 3.5)

Enter in the In-Production Inspection Log the date of forms removal, and product count.

3.5 INSPECTION

3.5.1 Inspection Items:

The production personnel shall inspect all DP-50 piers once they are removed from their forms, prior to stacking and palletizing. They should confirm that:

The cast pier has come away from the form "whole", where no corners, angles or portions of the pier shape were knocked off during from removal or subsequent handling.

The cast pier has a smooth uniform finish, especially on the top (weather exposed) portion of the pier, and that there are no exposed pockets of aggregate, multiple bubble holes or cavities, or areas of discoloration that would indicate a contaminant in the mix.

The cast pier anchor bolt protrudes plumb from the top of the pier, and extends ¾", with an 1/8" tolerance.

That the driving holes are clear and of the proper diameter, by easily inserting and removing into the driving holes, without bind, a 10" long section of 1" nominal sched 40 pipe. The cast driving holes in the pier shall be checked at the minimum random rate of 1 pier (all four holes) for every 16.

When the cast piers have passed inspection, note in the log, and release for palletizing.

3.6 PALLETIZING

3.6.1 Stacking Each pier that meets inspection should be immediately moved to a pallet. First check that the pallet is intact and of the proper style to ensure support of the concrete. They should be arranged and laid on their sides with bolts inward away from the pallet sides, forming a neat layer of piers. If the pallet will not be completed during this stacking session, cover this layer with a sheet of 4 mil clear plastic. A precut stiff cardboard, plastic or plywood separator board, minimum ¼" thick, should be placed over the arranged layer, and more piers added to form a second layer. Repeat again creating a full pallet, 3 layers high. Cover the pallet with 4 mil plastic , and "pre-wrap" the pallet sufficient to stabilize the piers when being moved into place for curing, making sure the date and product are marked on the warap. When processing for shipping, wrap the pallet tightly in 120 gauge (HD) clear plastic wrap, starting at the base and encircling each flat with at least two layers of wrap, and pulling diagonal stretches from low corner to high and back down again, so that all four top corners of the top flat are engaged, and trapped by the pallet wrap. Once it has gone through final inspection, the pallet is to be labeled with the Pier label.

Note: Pin bundles may be palletized separately provided they are affixed with their respective labels, and the Piers are fully wrapped in plastic as above.

3.6.2 Labeling The PIER label is to contain at a minimum the following information: The ICC-ES evaluation report number, the pallet#, which can be referenced to a shipping manifest and corresponding batch dates, the product model, company name and address, inspection date and inspector initials, the phrase *" **For use with One and Two Family Dwelling Construction Only**"* and the phrase *"Use only with Approved Galvanized Pins."* The inspector is to sign, date and number the pallet, and enter this information in the Final Inspection Log. (See example label in the Appendix) The PIN label is to contain at a minimum the following information: The ICC-ES evaluation report number, the Lot date, which can be referenced to a shipping manifest, company name and address, inspection date and inspector initials, the phrase *" **For use with One and Two Family Dwelling Construction Only**"* and the phrase *" Approved for Use only with Diamond Pier model DP-50."* (See example label in the Appendix)

3.6.3 Pre-Ship Cure Pre-wrapping the piers (see 3.6.1 above) will prevent the escape of most moisture due to evaporation. The freshly cast piers will continue to cure in this "pre-shipping" micro-environment. Wrapped and marked pallets should be stored (in order of their casting dates) under a roof or shade enclosure. They may not be stacked while pre-ship curing, and if the temperature (night or day) is below 45 degrees F, they must be stored indoors where the temperature is at or above 50 degrees F.

Pre-ship curing must take place for a minimum of 7 days from time of placing concrete in the forms, based on periodic 7 day cylinder breaks, indicating that concrete strength is typically at or above the minimum concrete strength within this time frame (see section 3.8.1). After 7 days, the pallets may be released for shipment or for outdoor storage. If a periodic 7 day cylinder break indicates that strengths may be below the specified strength, the pallets of piers cast between that 7 day cylinder break and the next 7 day cylinder break should be clearly marked with a HOLD sticker until the results of the 28 day breaks of the cylinders from that same batch are checked. If these 28 day cylinder breaks meet the specified strength, these pallets of piers may then be released for shipment or storage. If these 28 day cylinder breaks are below the specified strength, these pallets of piers shall be abandoned. (See Abandoned Piers.)

3.6.4 Storage Piers released for shipment or storage may remain at the casting facility in indoor, or outdoor storage, provided they remain within their full shipping wrap. They may at this time however be stacked – no more than two pallets high. These double stack pallets may also be placed on steel racks allowing higher storage areas to

be used. Where possible, pallets should be stored to allow their subsequent shipping to take place in reverse order – the oldest pallets leaving the facility first.

The Operations Manager shall perform a **final inspection** of all stored pallets to be shipped, to ensure that the piers have cured for the proper duration, that the piers are stacked straight and true, that the wrap is tight and intact, that they are properly labeled, and that the label is signed and dated.

Enter in Final Inspection Log this information specific to each numbered pallet.

3.7 CLEAN –UP

3.7.1 Forms Maintenance Forms and dowels will develop concrete residue overtime that must be removed from the forms to ensure a uniform concrete finish. On the inside of the forms, and the outside of the dowels, scraping should be avoided where it will mar the concrete contact surface. Lightly chip any raised concrete residue with a putty knife, and clean any remaining residue with the form release agent, using a coarse rag. Forms should be cleaned after every pour or once a week at a minimum during continuous production.

3.7.2 Form Repair Forms which have suffered from repeated castings, may develop cracks and should be removed from production and segregated for proper recycling. The bolt receiving holes in the top forms may also deteriorate such that the bolt does not remain firmly fixed during the pour. Forms with this deficiency should be removed from production, and remounted on new casting bases with new plumb tight bolt receiving holes before being returned to the production line.

3.8 PROCEDURES/ SPECIFICATIONS

3.8.1 Concrete Strength Design strength at 28 days for the Mix Design must be a minimum 5500 psi. See ASTM C31/C 31M-03, Standard Practice for Making and Curing Concrete Test Specimens in the Field, and ASTM C 39-99, Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.

3.8.2 Air Procedure – The target concrete air content for this product is 6%. The tolerance is plus or minus 1%, allowing for air entrainment as low as but no lower than 5%, and as high as but no higher than 7%.

Air Entrainment Test Procedure – see ASTM C-231, the Pressure Method. NOTE: The testing apparatus shall be calibrated and certified by an approved testing agency on an annual basis.

3.8.3 Corrective Batching - A batch may only be corrected for improper stiffness or spread (see section 3.3.1) within the first 10 minutes of the initial mixing, and for any batch which has been corrected, an air test must be performed. If these requirements cannot be met, the batch must be abandoned. (See section 3.8.4) If the batch is too stiff, NO WATER should be added. Only plasticizer may be added to the mix in minimal increments until the desired consistency and flow is reached. If the batch is too runny or its constituents are segregating, additional cement may be added in 1 pound increments until the desired consistency and flow is reached. A corrected batch may only be corrected in one direction- do not go back and forth between plasticizer and cement additions. Once batch has achieved desired consistency, AND meets the air entrainment requirements, it may be used for pier forming. If the air entrainment level is not within the specification, the batch must be abandoned.

3.8.4 Abandoned Batch – Concrete which has been mixed, but determined to have an air entrainment level below 5% or above 7%, may NOT be used for the Pre-cast Concrete Pier product specific to AC 336. Such concrete, or concrete which may have the proper air entrainment, but may be in some other way contaminated or improperly mixed, should be diverted from the production of Pre-cast Concrete Piers specific to AC 336. It may however be used for secondary, non-structural items not covered by this quality manual such as decorative garden or paving stones and the like.

3.8.5 Abandoned Piers – Piers which, after inspection or after the results of the 28 day break are deemed to have not met the requirements and/or specifications of this Quality Control manual, shall be diverted from labeling and customer delivery. They shall be individually marked with a strike of red spray paint, segregated, palletized, with the pallet marked "Not Accepted", and sent to a concrete recycling facility to be crushed.

3.8.6 Mixing and Storing Concrete in Cold or Hot Conditions – Temperature extremes are not conducive to concrete mixing and properly initiating the chemical reactions which take place in freshly mixed concrete, or concrete curing. See ACI 305 for mixing of concrete in hot weather conditions, ACI 306 for mixing of concrete in cold weather conditions. All production employees shall be required to read chapter 11 and 12 – "Hot

Weather Concreting" and "Cold Weather Concreting" respectively - of the Portland Cement Association handbook Design and Control of Concrete Mixtures – Thirteenth Edition. (See chapters in Appendix.)

Any corrected water temperature is to be based on Fig 11-4 in Chapter 11 of the PCA handbook Titled: Temperature of Freshly Mixed Concrete as Affected by the Temperature of its Ingredients, and is relative also to the temperature of the aggregates.

For extreme hot weather conditions, piers still in their forms must be covered under a moisture proof cover with NO heat added. Once removed from their forms (and inspected) they must be stacked under cover (shade) and pre-wrapped and pre-ship cured under cover. At the end of 7 days, ALL piers cast in extreme hot weather conditions shall be un-stacked and inspected for cracks. If such cracks exist, the cracked piers must be abandoned. (See section 3.8.5) Piers passing inspection shall be re-palletized, and stored in the normal way as per Section 3.6.4.

3.8.7 Incoming Material Specifications –

Cement – Holcim or supplier of equivalent material, Type I&II, 92.6 pound sacks or blown in.

Incoming cement bags from should be verified for cement type, and moisture damage. Moisture damage may have occurred if the processing date on the bags is more than 6 months old, or the bags have been stored outside without being covered and were exposed to moisture before being shipped, or they have torn open during handling and/or shipping. Torn bags will not be accepted and must be returned to the supplier. All cement bags are to be stored immediately under a roofed enclosure on a dry floor surface, and further covered with 4 mil plastic. If bags shipped intact are damaged or ripped open during unloading, all cement left IN such bags shall immediately be transferred to dry, 5 gallon containers and air tight lids immediately placed tight on such containers. Such containers shall be stored as above. Any cement that has fallen to the ground, shall be scooped up and discarded.

When cement is delivered by truck to be blown into a cement silo, the receiving agent is to review paper work from the driver confirming the cement Type and age, before authorizing any cement dispensing. Prior to placement in the silo, the receiving agent is to verify that the silo is dry and contains no contaminants.

Note in the Incoming Inventory log, the date, and amount of delivery, and initial the acceptance of the material. All certification and/or delivery paperwork is to be properly maintained and filed.

Fine Aggregate – Coarse Sand – Passing #4 screen and retained on #50 screen, Saturated Surface Dry Specific Gravity 2.668 - Elk River or supplier of equivalent material.

When sand is delivered by truck to be dumped in the aggregate storage area, the receiving agent is to review paper work from the driver confirming the sand type, particle size and specific gravity, before authorizing and dispensing. Prior to placement in the aggregate storage area, the receiving agent is to verify that area contains no contaminants, and as the sand is dispensed, that no foreign matter – other aggregates, soils etc. are in the sand.

Once dispensed, the sand should be covered with a waterproof tarp.

Note in the Incoming Inventory Log, the date, and amount of delivery, and initial the acceptance of the material. All certification and/or delivery paperwork is to be properly maintained and filed.

Coarse Aggregate – ½" minus, washed, crushed gravel - Passing 1/2" screen and retained on the #8 screen, Saturated Surface Dry Specific Gravity 2.726 – Larson #67, or supplier of equivalent material.

When gravel is delivered by truck to be dumped in the aggregate storage area, the receiving agent is to review paper work from the driver confirming the aggregate type, particle size and specific gravity, before authorizing and dispensing. Prior to placement in the aggregate storage area, the receiving agent is to verify that the area contains no contaminants, and as the gravel is dispensed, that no foreign matter – other aggregates, soils, etc. are in the aggregate.

Once dispensed, the gravel should be covered with a waterproof tarp.

Note in the Incoming Inventory Log, the date, and amount of delivery, and initial the acceptance of the material. All certification and/or delivery paperwork is to be properly maintained and filed.

Plasticizer: BASF Glenium® 7700 or equal -ASTM C494, Type F.

Plasticizer is shipped in tightly sealed, unopened containers labeled by the manufacturer. Verify that the specification for the chemical name, code number and complying ASTM is correct. Any damaged or opened containers are to be refused and immediately returned to the supplier. Store plasticizer immediately indoors on a dry floor surface or shelf specifically indicated for such storage.

Note in the Incoming Inventory log, the date, and amount of delivery, and initial the acceptance of the material. All certification and/or delivery paperwork is to be properly maintained and filed.

Air Entraining Admixture; BASF MB-AE 90, or equal – ASTM C260.
Air Entraining Chemical is shipped in tightly sealed, unopened containers labeled by the manufacturer. Verify that the specification for the chemical name, code number and complying ASTM is correct. Any damaged or opened containers are to be refused and immediately returned to the supplier. Store air entraining chemical immediately indoors on a dry floor surface or shelf specifically indicated for such storage.

Note in the Incoming Inventory log, the date, and amount of delivery, and initial the acceptance of the material. All certification and/or delivery paperwork is to be properly maintained and filed.

Pins – 1" nominal, schedule 40 galvanized steel Pipe (1.315" actual OD) – ASTM A 53-02
Wall thickness - .133", Tolerance - +/- 1%, 36" length, Tolerance - +/- ½"
Pin Corrosion Resistant Coating – Hot Dip galvanizing – ASTM A53-02

Pins are delivered bundled on pallets from a pipe supplier. This is a commodity material manufactured by a number of steel mills worldwide, and shall be stamped by the manufacturer with ASTM number. Verify with the driver, the Pin length corresponding to specific purchase orders, as well as visually inspecting the mill stamp, diameter and schedule of pipe. The receiving agent shall sign delivery tickets once the mill stamp, pipe diameter, schedule, length, and number of pieces has been verified.

Once unloaded, immediately cover the Pins with a waterproof tarp, or store indoors. The Pins on pallets may be stacked.

Note in the Incoming Inventory log, the date, and amount of delivery, and initial the acceptance of the material. All certification and/or delivery paperwork is to be properly maintained and filed.

Where individual end users procure their own Pins from commodity vendors, they shall verify that the pipe bears the proper ASTM stamp, and is of the proper schedule, diameter and length, and provide this information to SAP.

Caps – Flexible PVC (polyvinylchloride)– non-toxic resin, Slate Grey – ASTM

Caps are manufactured by Tool Gauge and Machine Works, Inc. Plastic Molded Products of 4336 South Adams Street, Tacoma, WA 98409. Receiving Agent shall verify the cap model number – DP-50C, as labeled on the cap product boxes, the piece count per box, corresponding to the required number of caps per pallet, and the total count of caps corresponding to specific purchase orders. At least one box in any shipment shall be opened and the contents inspected for cap size (for 1 nominal Pipe), color (slate grey), and clarity of patent number, and product name makings on the head of the caps. Once accepted, caps shall be stored indoors in the location specifically indicated for such storage.

Note in the Incoming Inventory log, the date, and amount of delivery, and initial the acceptance of the material. All certification and/or delivery paperwork is to be properly maintained and filed.

Sealant for Caps – Sealant shall be procured by the end user of the piers. A 50 year durability adhesive caulk (of any color) is recommended. This shall be a caulk appropriate for Non-porous material (cap) adhesion to porous material (concrete). The reference standard for such a caulk is ASTM C920, Type S, Grade NS, Class 25. This is a single component caulk made by manufacturers such as Dap, Dow, Tremco, GE, and others.

Bolts – ½" x 4, # 13 ASTM A 307-00 Grade A – Hot-dipped Galvanized Hex Head, Partial or Full Thread. Durability as per Factory Mutual Research Standard 4470, as dependent on DIN 50018

Incoming bolts and nuts must be checked for lot number and vendor to match approved suppliers. The production manager shall establish a list of approved suppliers based on verifications of bolt durability, mechanical strength and chemical properties. The receiving agent shall note the manufacturer's lot number and vendor number labeled on each box of delivered bolts and/or nuts, and the date of receipt in the Incoming Inventory Log. Bolts not delivered from an approved vendor shall be returned. Bolts from suppliers matching the approved vendors list shall be moved to the proper storage area, which shall be marked "Certified for Use in Production".

Note in the Incoming Inventory log, the date, and amount of delivery, and initial the acceptance of the material. All certification and/or delivery paperwork is to be properly maintained and filed.

NOTE: Stainless steel bolts and nuts may be substituted for Hot-dipped Galvanized components provided their mechanical properties are verified to be equivalent to or greater than the specified Hot-dipped Galvanized bolts.

(See appendix for sample Incoming Inventory Logs.)

3.9 SIGNIFICANT PRODUCT CHANGE

3.9.1 Definition

Significant Product Change is that which may improve the product or allow alternate materials without reducing the performance of the product as it pertains to applicable test standards or acceptance criteria. Changes may include alternate incoming materials, manufacturing processes, or design changes to the finished product configuration, dimension or geometry.

3.9.2 Responsibility / Notification

3.9.2.1 Only the ES Report Holder, Pin Foundations, Inc of Gig Harbor, Washington can authorize significant product changes, after a full engineering study has been implemented and the change or changes have been fully reviewed for compliance with applicable test standards and acceptance criteria. Refer to the Pin Foundations Quality System Manual, section 3.9.

4 CONTROL OF PROCURED MATERIAL, EQUIPMENT AND SERVICES

4.1 Policy

4.1.1 Only approved vendors shall supply materials, equipment, or services to SAP

4.1.1.1 A list of approved vendors shall be maintained. All approved vendors will be reviewed at least once in a 24-month period to ensure continuing adherence to their respective quality requirements.

4.2 Responsibility

4.2.1 The Operations Manager shall approve all external sources of materials, components, and services.

4.2.2 The Plant Foreman shall maintain a list of approved suppliers. Approval may be conditional upon completion of corrective actions.

4.3 Material Receipt, Handling and Storage

4.3.1 Before material is officially received, the Plant Foreman or receiving agent shall review the purchase order against the shipping document to ensure that the correct amount of the correct materials were included in the shipment. Inclusion of appropriate material test reports, and certificates of compliance shall also be verified. (See also section 3.8.6)

4.3.2 Receipt Inspection Procedure shall include:

4.3.2.1 Verification of correct lot number, and document review to material composition and certification.

4.3.2.2 Non-conforming or unacceptable materials shall be rejected and returned to supplier.

4.3.3 Handling and Storage Procedure

4.3.2.3 Items with limited shelf life shall be stored in such a way that the oldest material is used first.

4.3.2.4 All materials shall be stored in accordance with the supplier's recommendations to maintain clear identification, quality, functionality, and safety.

5 NON-CONFORMANCES

5.1.1 Definition

5.1.1.1 *Non-Conformance* is a deficiency in the characteristic, documentation, or operation of an item or process, which renders its quality unacceptable or indeterminate.

5.1.2 Responsibility

5.1.2.1 The Plant Foreman shall ensure the segregation and appropriate disposal of defective materials and components.

5.1.2.2 The Plant Foreman shall track all non-conformances and recommend corrective action.

5.1.2.3 Any SAP employees may prepare an internal Non-Conformance Report (NCR) for any project on which he or she is working if non-conformances are observed or suspected. This report shall be given to the Operations Manager or Administrator, and shall be reviewed and considered as any other employee concern.

5.2 Disposition of Non-Conforming Materials and products.

5.2.1 Products which are discovered to be in non conformance during production or final inspection are to be removed immediately from the curing stream, segregated and marked for proper disposal or delivery to an appropriate recycling facility. (see Abandoned Piers – section 3.1)

NON-CONFORMANCE REPORT

Date:	NCR Number:	Project or PO Number	Page of
Location or Area:		Sketch Attached?	
Drawing, Standard, Specification, or Inspection Criteria:			
DESCRIPTION OF NON-CONFORMANCE:			
NCR Prepared By:		NCR Reviewed By:	
FIELD DISPOSITION:			
Field Disposition By:		Approved By:	
FINAL INSPECTION	ACCEPT	REJECT	
Explanation if REJECT:			
INSPECTOR'S SIGNATURE: Date:			

FIGURE 5-1: NON-CONFORMANCE REPORT (NCR)

6 EQUIPMENT CALIBRATION

6.1 Responsibility

6.1.1 The Plant Foreman shall ensure that all instruments employed in production and inspection is calibrated to maintain accuracy of measurement within prescribed tolerances, according to the frequency recommended by the equipment manufacturer.

6.2 Procedure

6.2.1 The Plant Foreman shall maintain a database of all instruments, listing the responsible department; type and description of equipment; make' model and serial number or other identifying mark, including the testing agency's identification number; calibration frequency, date of last calibration, and date next calibration is due; and the calibration method.

6.2.2 To facilitate access and review by individuals using the equipment, the Plant Foreman shall keep files with technical data about the individual pieces of equipment, including standards, specifications and instructions for calibration and current calibration certificates.

6.2.3 Measuring and test equipment shall be clearly marked, using a sticker or other obvious method to indicate the date of the last calibration and the date the next calibration is due.

6.2.4 When not in use, all instruments and tools shall be stored with adequate protection to prevent misuse, damage and deterioration.

6.3 Out-of-Calibration Corrective Action

6.3.1 If equipment is found to be out of calibration prior to the commencement of work, work shall not begin until the equipment has been properly calibrated.

6.3.2 If equipment is found to be out of calibration while work is in progress or following the completion of work and shipment of the product to the customer, the Operations Manager shall review the report to determine what, if any, corrective action is required.

6.4 List of equipment requiring third party calibration;

Air Entrainment Air Meter,
Weigh Scales,
Material Thermometers

7 MANUFACTURING INSPECTION AND CONTROL

7.1 Scope

7.1.1 Inspections of the manufacturing process by the Operations Manager and Plant Foreman shall be periodically conducted to ensure continued consistency and quality; samples of manufactured items shall also be thoroughly examined. (See section 3.6.4)

7.2 Responsibility

7.2.1 All inspectors and personnel performing tests shall be fully trained and qualified; when inspectors and test personnel are drawn from the production staff and also hold manufacturing duties, they shall not conduct internal audits of an area where they normally work.

7.2.2 All equipment used for testing and inspection is properly maintained and calibrated.

7.3 Procedure

7.3.1 All procedures shall describe the required inspection and testing in full detail and shall reference applicable procedures, specifications, and standards.

7.3.2 Test procedures shall be reviewed and approved by the Operations Manager.

7.3.2.1 During sample preparation and testing, material identification shall be maintained according to batch and date or other applicable data so as to maintain each samples unique identity. Additional identification beyond that provided by the customer may be necessary.

7.3.2.2 All documents related to production quality such as incoming inspection, production inspection and tests and final inspection shall be retained for a period of at least two years.

7.3.2.3 All QC documents will be reviewed, approved and signed by the Plant Foreman who will also conduct a final inspection prior to shipment.

8 INTERNAL AUDITS AND INSPECTIONS

8.1 Policy

8.1.1 An annual internal audit of quality control procedures shall be made by the Operations Manager, or a designated qualified representative. Such representative shall have sufficient training or experience to conduct an audit, and shall not have direct production responsibility for the area being audited.

8.2 Procedure

8.2.1 The audit shall be prepared and signed by the Operations Manager, or prepared by the designated representative and signed by the Operations Manager. The report shall document the following:

8.2.1.1 All areas and procedures examined,

8.2.1.2 Any areas of extraordinary effort or innovation,

8.2.1.3 Any deficiencies noted, and

8.2.1.4 Suggested corrective actions and timetable for implementation.

8.2.2 The Operations Manager will track implementation of the corrective actions. When all corrections are completed, the auditor shall re-evaluate only those areas. A final report documenting the corrections shall be issued.

9 PERSONNEL TRAINING

9.1 Quality Control Training

9.1.1 To ensure that required proficiency is achieved and maintained, the Operations Manager and Plant Foreman shall implement, maintain and document a training program for all personnel performing activities that affect the quality of SAP products.

9.1.2 The training shall cover the following topics:

- 9.1.2.1 Why quality assurance and quality control are important to SAP and its customers;
- 9.1.2.2 The basic principles of quality assurance and quality control;
- 9.1.2.3 How these basic principles are implemented at SAP
- 9.1.2.4 How each employee is expected to uphold the quality principles, and
- 9.1.2.5 Penalties for violation of the quality requirements.

APPENDICIES

a) **Complaint Record**
b) **Manufacturing Flow Chart**
c) **Pier Dimensioned Drawing**
d) **Example Pallet Label**
e) **Mix Ticket**
f) **Production Inspection Form**
g) **Incoming Inventory Form**
h) **Outgoing Packing Slips**
i) **Mix Design**
j) **Cold Weather Concreting – Overview**
k) **Hot Weather Concreting – Overview**
l) **ASTM C321, Standard Method for Air Content of Freshly Mixed Concrete by the Pressure Method**
m) **ASTM C31M, Standard Practice for Making and Curing Concrete Test Specimens**
n) **Manual Revisions Master Sheet**

COMPLAINT RECORD

Project Number:	**Description of Complaint:**
Date of Complaint:	
Complaint Received From:	
Complaint Recorded By:	
Complaint Investigation Assigned To:	
Root Cause Investigation	
Possible Root Causes: *(Potential sources of error leading to the complaint)*	
Most Likely Root Cause:	
Proposed Corrective Action (CA) Plan	
Possible Solutions: *(Potential actions that will resolve complaint and prevent recurrence)*	
Specific Corrective Action(s) to be Taken: *(Include description of action, responsible party and target date for implementation)*	
Corrective Action Follow-Up: CA Implemented? ☐ Yes ☐ No CA Effective? ☐ Yes ☐ No Client Contacted? ☐ Yes ☐ No	**Comments:**
Date Complaint Closed:	**CA Approved/Verified By:**

APPENDIX P: MATERIAL CERTIFICATION REPORT FOR 1/2-INCH DIAMETER GALVANIZED ANCHOR BOLTS FROM STONEWORKS ARCHITECTURAL

Stoneworks Architectural
Sales Order 253763

Unlimited Supplies Inc

2/29/2016

Material Certification

Qty - 851 **1/2-13 x 5 HHCS A307 Galvanized** **Lot#** **95638CHI**

G50C500HH2 Headed bolts, threaded rods and bent bolts intended for general applications.

A307 Mechanical Properties

Grade	Tensile, ksi	Yield, min, ksi	Elong %, min
A	60 min	--	18
B	60 - 100	--	18
C*	58 - 80	36	23

A307 Chemical Properties

Element	Grade A	Grade B
Carbon, max	0.29%	0.29%
Manganese, max	1.20%	1.20%
Phosphorus, max	0.04%	0.04%
Sulfur, max	0.15%	0.05%

ASTM-A153 ASTM-F2329

Scope

Meets Specifications as listed

The ASTM-A153 Specification Covers zinc coating (hot dip) on iron and steel hardware. See the below chart for the different classes covered under A153. A newer and more fastener-appropriate specification, designed to replace A153 Class C, approved in 2005 and covering the requirement for hot-dip galvanizing bolts, screws, nuts, washers and other threaded fasteners is ASTM-F2329. It is slowly becoming more widely used and referenced, but many publications and technical manuals are not revised on a regular basis, so it may be a while before ASTM-F2329 is widely adopted. ASTM-A123 is a related hot-dip galvanizing specification covering iron and steel products made from rolled and pressed shapes, castings, plates, bars, and strips. The equilavent AASHTO specification to ASTM-A153 is AASHTO-M232.

Stoneworks Architectural
Sales Order 253763

Unlimited Supplies Inc

2/29/2016

Material Certification

Class	Description	Min Avg Coating Thickness, mils	Min Coating Thickness, Any Individual Specimen, mils
Class A	Castings, Malleable Iron Steel	3.4	3.1
Class B	Rolled, pressed, forged articles except those covered by Class C & D	See below B-1 through B-3	See below B-1 through B-3
Class B-1	3/16" and over in thickness and over 15" in length	3.4	3.1
Class B-2	Under 3/16" in thickness and over 15" in length	2.6	2.1
Class B-3	Any thickness and under 15" in length	2.2	1.9
Class C	Fasteners over 3/8" in diameter and similar articles, washers 3/16" to 1/4" thick	2.1	1.7
Class D	Fasteners 3/8" and under in diameter , rivets, nails and similar articles, washers under 3/16" thick	1.7	1.4

Authenticated by:

Jim Hegedus

APPENDIX Q: MATERIAL CERTIFICATION REPORT FOR 5/8-INCH DIAMETER GALVANIZED ANCHOR BOLT FROM STONEWORKS ARCHITECTURAL

Stoneworks Architectural
Sales Order 252787

Unlimited Supplies Inc

2/12/2016

Material Certification

Qty - 600 **5/8-11 x 5-1/2 HHCS A307 Galvanized** **Lot#** **93719CHI**

G62C550HH2 Headed bolts, threaded rods and bent bolts intended for general applications.

A307 Mechanical Properties

Grade	Tensile, ksi	Yield, min, ksi	Elong %, min
A	60 min	--	18
B	60 - 100	--	18
C*	58 - 80	36	23

A307 Chemical Properties

Element	Grade A	Grade B
Carbon, max	0.29%	0.29%
Manganese, max	1.20%	1.20%
Phosphorus, max	0.04%	0.04%
Sulfur, max	0.15%	0.05%

ASTM-A153 ASTM-F2329

Scope

Meets Specifications as listed

The ASTM-A153 Specification Covers zinc coating (hot dip) on iron and steel hardware. See the below chart for the different classes covered under A153. A newer and more fastener-appropriate specification, designed to replace A153 Class C, approved in 2005 and covering the requirement for hot-dip galvanizing bolts, screws, nuts, washers and other threaded fasteners is ASTM-F2329. It is slowly becoming more widely used and referenced, but many publications and technical manuals are not revised on a regular basis, so it may be a while before ASTM-F2329 is widely adopted. ASTM-A123 is a related hot-dip galvanizing specification covering iron and steel products made from rolled and pressed shapes, castings, plates, bars, and strips. The equilavent AASHTO specification to ASTM-A153 is AASHTO-M232.

Stoneworks Architectural
Sales Order 252787

Unlimited Supplies Inc

2/12/2016

Material Certification

Class	Description	Min Avg Coating Thickness, mils	Min Coating Thickness, Any Individual Specimen, mils
Class A	Castings, Malleable Iron Steel	3.4	3.1
Class B	Rolled, pressed, forged articles except those covered by Class C & D	See below B-1 through B-3	See below B-1 through B-3
Class B-1	3/16" and over in thickness and over 15" in length	3.4	3.1
Class B-2	Under 3/16" in thickness and over 15" in length	2.6	2.1
Class B-3	Any thickness and under 15" in length	2.2	1.9
Class C	Fasteners over 3/8" in diameter and similar articles, washers 3/16" to 1/4" thick	2.1	1.7
Class D	Fasteners 3/8" and under in diameter , rivets, nails and similar articles, washers under 3/16" thick	1.7	1.4

Authenticated by:

Jim Hegedus

APPENDIX R: MILL TEST REPORT FOR 1-INCH DIAMETER NOMINAL STEEL BEARING PIN PIPE FROM SAHA THAI STEEL PIPE (PUBLIC) COMPANY LTD

SAHA THAI STEEL PIPE (PUBLIC) COMPANY LTD

79 MOO 5 POOCHAOSAMINGPRAI ROAD, BANGYAPRAEK, PHRAPRADAENGK, SAMUTPRAKARN, 10130
THAILAND TEL/FAX: (662) 3459033-5 (5 LINES), 7544130 - 42, FAX : (662) 3859283, 7544100

MILL TEST REPORT

PAGE 2
NO. STS/127/14

PO NO. 7275

SIZE	THICK. (INCHES)	LGTH/FT.	BUNDLES	PIECES	NET WT. (MT.)	NO. OF PCS/BDLE	CHEMICAL COMPOSITION %											TENSILE TEST			ED %	AVERAGE ZINC COATING TEST(G/M²)	HYDRO TEST PRESSURE PSI.	BATCH NO.
							C	SI	Mn	P	S	Cu	V	Ni	Cr	Mo	Al	T.S. MPa	Y.P. MPa	EL %				
GALVANIZED STEEL PIPES, GPE, ASTM A 53 GR.A, SCH. 40																								
1"	0.133	21	11	660	10.560	60	0.045	0.009	0.224	0.007	0.007	0.003	0.003	0.008	0.014	0.001	0.030	332.60	309.16	51.94	0.013	598.78	3300	14216
1-1/4"	0.140	21	55	2,310	49.942	42	0.045	0.016	0.207	0.009	0.007	0.001	0.003	0.008	0.026	0.004	0.034	341.64	318.91	37.56	0.012	611.35	1200	14217
2"	0.154	21	33	858	29.910	26	0.056	0.036	0.159	0.009	0.003	0.008	0.005	0.015	0.315	0.001	0.030	367.39	342.70	33.74	0.012	691.81	2300	14219
2"	0.154	24	77	2,002	78.788	26	0.046	0.026	0.143	0.010	0.004	0.008	0.010	0.015	0.305	0.001	0.028	430.21	408.15	33.76	0.011	586.59	2300	14219
3-1/2"	0.226	21	12	144	12.509	12	0.063	0.006	0.292	0.006	0.014	0.025	0.003	0.023	0.023	0.001	0.04	389.88	370.28	27.70	0.011	574.40	2030	14222
3-1/2"	0.226	21	1	7	0.608	7	0.063	0.006	0.292	0.006	0.014	0.025	0.003	0.023	0.023	0.001	0.04	389.88	370.28	27.70	0.011	574.40	2030	14222
4"	0.237	21	59	590	60.693	10	0.045	0.007	0.225	0.007	0.007	0.001	0.000	0.009	0.026	0.001	0.024	357.90	260.64	45.24	0.011	586.50	1900	14223
6"	0.280	21	55	385	69.643	7	0.053	0.029	0.124	0.010	0.003	0.011	0.011	0.016	0.308	0.001	0.025	386.48	372.13	40.40	0.011	579.82	1520	14223
6"	0.280	24	14	98	20.260	7	0.053	0.029	0.124	0.010	0.003	0.011	0.011	0.016	0.308	0.001	0.025	386.48	372.13	40.40	0.011	579.82	1520	14223
6"	0.280	24	1	4	0.827	4	0.053	0.029	0.124	0.010	0.003	0.011	0.011	0.016	0.308	0.001	0.025	386.48	372.13	40.40	0.011	579.82	1520	14223
8"	0.322	21	15	75	20.418	5	0.152	0.007	0.441	0.004	0.004	0.002	0.015	0.01	0.011	0.008	0.054	457.36	392.56	34.82	0.012	574.77	1340	14227
SUB TOTAL			333	7,133	358.130																			
GALVANIZED STEEL PIPES, GPE, ASTM A 53 GR.A, SCH. 80																								
2"	0.218	21	40	1,040	49.826	26	0.045	0.016	0.177	0.011	0.006	0.001	0.002	0.007	0.021	0.000	0.033	397.49	378.13	32.40	0.011	567.04	2500	14219
SUB TOTAL			40	1,040	49.826																			
GALVANIZED STEEL PIPES, GPE, ASTM A 53 GR.A, SCH. 10																								
1-1/2"	0.109	21	9	549	10.933	61	0.079	0.027	0.259	0.008	0.014	0.054	0.014	0.028	0.031	0.006	0.037	363.22	302.54	38.11	0.011	58329	1000	14218
1-1/2"	0.109	21	1	39	0.776	39	0.079	0.027	0.259	0.008	0.014	0.054	0.014	0.028	0.031	0.006	0.037	363.22	302.54	38.11	0.011	58329	1000	14218
2"	0.109	21	53	1,221	30.708	37	0.044	0.014	0.189	0.007	0.008	0.000	0.000	0.011	0.025	0.001	0.022	347.64	307.96	37.70	0.012	574.82	1000	14219
3"	0.120	21	26	494	20.378	19	0.065	0.013	0.329	0.006	0.008	0.135	0.007	0.062	0.057	0.007	0.013	428.92	381.01	35.62	0.012	580.17	1000	14222
4"	0.120	21	16	304	16.273	19	0.068	0.012	0.340	0.008	0.008	0.072	0.013	0.052	0.039	0.015	0.023	416.04	366.60	36.92	0.011	568.99	960	14223
6"	0.134	21	17	119	10.542	7	0.057	0.007	0.382	0.006	0.006	0.035	0.007	0.023	0.021	0.001	0.052	427.21	357.81	36.28	0.015	581.04	730	14225
SUB TOTAL			102	2,724	89.608																			

INSPECTOR : .....

APPROVED BY : .....

(CONTINUED PAGE 3...)

From: Northwest Steel & Pipe, Inc. Date: 3/15/2016 To: NW STEEL SO#: 181099 PO#: TEST Heat#: 14216

APPENDIX S: MILL TEST CERTIFICATE FOR 1 ¼-INCH DIAMETER NOMINAL STEEL BEARING PIN PIPE FROM AL JAZEERA STEEL PRODUCTS COMPANY SAOG

AL JAZEERA STEEL PRODUCTS COMPANY SAOG

PO BOX 40, PC 327, Sohar Industrial Estate
SULTANATE OF OMAN
Phone : 968 26751763/4/5 Fax 968 26751766

MILL TEST CERTIFICATE

MTC NO. :544/10/2014 DATED 23/10/2014 P.O. NO. : 40356
INVOICE NO. :AJSPC/EXP/217 DATED 23/10/2014
CUSTOMER'S NAME :AMERICAN INTERNATIONAL FOREST PRODUCTS LLC
ADDRESS PO BOX 4166/PORTLAND,OR 97208 5560 SW 107TH AVE
BEAVERTON,OR 97005
PHONE: (503)520-5455. FAX: (503)469-7555

SR NO.	NPS (Inch)	OD (Inch)	WT (Inch)	LENGTH (Feet)	TYPE	Lb / Ft	HEAT NO.	BUNDLES	PCS	TOTAL (FEET)	NET WT. (MT)	MECHANICAL TESTING: UTS (psi)	YS (psi)	% EL. IN GL 2"	FLATTENING / BEND TEST	HYADRAULIC TEST (psi)	CHEMICAL ANALYSIS (%)					Zinc Coating (Oz/Ft²)
																	C / Cu	Mn / Ni	P / Cr	S / Mo	Si / V	
ERW STEEL PIPE CONFORMING TO THE SPECIFICATION ASTM A 53 - 07 SCH 40 GRA BARE & GPE/ ASTM A 53 - 07 SCH 40 GRB GPE																						
1	3/4" (UL)	1.050	0.113	21.0	BARE	1.13	A1406214	15	1260	26460	13.562	61904/62780	45990/46720	35/37	OK	700	0.133 0.011	0.400 0.018	0.007 0.009	0.019 0.006	0.007 0.007	--
2	1" (UL+FM)	1.315	0.133	21.0	BARE	1.68	A1408218	9	540	11340	8.642	63072/63948	45406/46136	40/42	OK	700	0.134 0.022	0.401 0.064	0.007 0.009	0.016 0.007	0.007 0.004	--
3	1.1/4" (UL+FM)	1.660	0.140	21.0	BARE	2.27	A1409219	50	2100	44100	45.408	61320/62196	46428/47304	40/42	OK	1200	0.102 0.017	0.420 0.009	0.018 0.009	0.010 0.006	0.010 0.005	--
4	1.1/2" (UL+FM)	1.900	0.145	21.0	BARE	2.72	A1409131	50	1800	37800	46.637	61758/62488	41902/42632	36/38	OK	1200	0.146 0.007	0.342 0.007	0.023 0.009	0.009 0.005	0.007 0.005	--
5	1.1/4" (UL+FM)	1.660	0.140	21.0	GPE	2.27	A1409219	5	210	4410	4.541	61320/62196	46428/47304	40/42	OK	1200	0.102 0.017	0.420 0.009	0.018 0.009	0.010 0.006	0.010 0.005	1.88/1.90
6	2" (UL+FM)	2.375	0.154	21.0	GPE	3.65	A1408128	2	52	1092	1.808	62634/63510	45990/46720	35/37	OK	2300	0.128 0.020	0.608 0.021	0.025 0.017	0.010 0.005	0.007 0.005	1.86/1.88
7	**2"** (GRB-ASME-UL+FM)	**2.375**	**0.154**	**21.0**	**GPE**	**3.65**	**B1405119**	**2**	**52**	**1092**	**1.808**	**63510/64240**	**45260/46136**	**35/37**	**OK**	**2500**	**0.199** **0.009**	**0.728** **0.096**	**0.011** **0.009**	**0.009** **0.007**	**0.016** **0.004**	**1.86/1.88**
8	2.1/2" (UL+FM)	2.875	0.203	21.0	GPE	5.79	A1409130	3	54	1134	2.978	62634/63510	46574/47304	34/36	OK	2500	0.138 0.028	0.623 0.030	0.026 0.032	0.010 0.007	0.019 0.004	1.87/1.89
9	3.1/2" (UL+FM)	4.000	0.226	21.0	GPE	9.11	A1409129	2	24	504	2.083	58400/59130	40150/42194	37/39	OK	2030	0.137 0.050	0.404 0.035	0.023 0.042	0.018 0.004	0.007 0.004	1.86/1.88
10	4" (UL+FM)	4.500	0.237	21.0	GPE	10.79	A1408429	10	100	2100	10.278	63072/63656	46720/47596	35/37	OK	1900	0.128 0.014	0.611 0.034	0.026 0.021	0.011 0.006	0.007 0.004	1.87/1.89
11	6" (UL+FM)	6.625	0.280	21.0	GPE	18.97	A1409431	10	70	1470	12.649	59130/59860	40150/41026	34/36	OK	1520	0.117 0.007	0.375 0.010	0.017 0.009	0.009 0.006	0.007 0.005	1.87/1.89
							GRAND TOTAL	**158**	**6262**	**131502**	**150.394**											

THIS IS TO CERTIFY THAT THE MATERIAL CONFORMS TO THE SPECIFICATION **ASTM A 53 GRADE-A & B**
ALL THE PIPES ARE TESTED NON DESTRUCTIVELY BY EDDY CURRENT METHOD AND HYDROSTATICALLY TESTED AT THE PRESSURE MENTIONED ABOVE

For Al Jazeera Steel Products Company SAOG

Authorized Signatory
Quality Control

From: Northwest Steel & Pipe, Inc. Date: 3/15/2016 To: NW STEEL SO#: 181099 PO#: TEST Heat#: A1409219

APPENDIX T: BIBLIOGRAPHY

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2012 International Residential Code (IRC) For One and Two-Family Dwellings, International Code Council Inc.