

Preliminary Report of Geotechnical Exploration - Structures

TOWN OF BAY HARBOR ISLANDS

BROAD CAUSEWAY BRIDGE REPLACEMENT

PROJECT DEVELOPMENT & ENVIRONMENT STUDY



Prepared for:

Town of Bay
Harbor Islands, Florida

February 23, 2024





Financial Project Identification	
Number:	452428-1-21-01
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Town of Bay Harbor Islands Project	
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February 23, 2024

The environmental review, consultation, and other actions required by applicable Federal environmental laws for this project are being or have been carried out by Florida Department of Transportation (FDOT) pursuant to 23 U.S.C. §327 and a Memorandum of Understanding dated May 26, 2022, and executed by Federal Highway Administration (FHWA) and FDOT.



Prepared for:
Town of Bay Harbor Islands

Prepared by:
AREHNA Engineering, Inc



February 23, 2024

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Subject: **Preliminary Report of Geotechnical Exploration - Structures**
Broad Causeway Bridge Replacement
Town of Bay Harbor Islands, FL
TBHI Project No. BC-160
AREHNA Project B-22-074

AREHNA Engineering, Inc. (AREHNA) is pleased to submit this report of our geotechnical exploration for the proposed project. Services were conducted in general accordance with the Agreement between Consultant and Subconsultant for Professional Services issued on October 1, 2022.

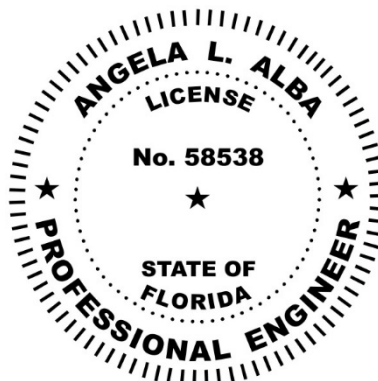
This report presents our preliminary analyses for the Project Development and Environment (PD&E) Study for the Broad Causeway Bridge Replacement and laboratory data obtained as well as our preliminary recommendations for site preparation, design, and construction. The Preliminary Geotechnical Report for the roadway and drainage improvements will be under a separate cover.

AREHNA appreciates the opportunity to have assisted you on this project. Should you have any questions with regards to this report, or if we can be of any further assistance, please contact this office.

Best Regards,

AREHNA ENGINEERING, INC.
FLORIDA BOARD OF PROFESSIONAL ENGINEERS CERTIFICATE OF AUTHORIZATION NO. 28410

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1.0 PROJECT INFORMATION AND SCOPE OF WORK

1.1 Project Description

The project involves the potential replacement of the Broad Causeway Bridge connecting the Town of Bay Harbor Islands (Town) with the City of North Miami, within Miami-Dade County. The bridge is part of the Broad Causeway, a roadway classified as “Urban Minor Arterial”. This arterial also begins in Bal Harbour/Surfside and connects those commuters to the mainland. The specific limits of the project extend from the Broad Causeway Island (25°53'19.41"N, 80° 8'54.52"W) on the west side and (25°53'11.30"N, 80° 8'18.93"W) to east of West Broadview Drive. The improvements include the approach spans and Broad Causeway Island. The Florida Department of Transportation (FDOT) Bridge Identification (ID) Number (No.) is 875101. A graphic depicting the location of the bridge is provided as **Figure 1 1**. The project is approximately 0.77 mile in length.

The existing bridge consists of four lanes, undivided (two in each direction), the four travel lanes are 10 ft. wide, without a raised median. The outside travel lanes also include shared-use markings to accommodate bicycles. In addition, pedestrians use a raised maintenance area on each side of the bridge, with a width that varies from 22 to 36 inches. There are no guardrails separating the sidewalk from the travel lane. Crossing over the Intracoastal Waterway (ICWW), the bridge has a horizontal clearance of 79.7 ft., a maximum vertical clearance of 18.0 ft. at Mean Low Water (MLW) and a minimum vertical clearance of 15.7 ft. at Mean High Water (MHW) at the Bascule crossing. The ICWW at the bridge crossings is deemed a navigable waterway by the United States Coast Guard (USCG). The bridge bascule is required by the USCG to open twice per hour on the quarter and three-quarter hour but only opens if vessels are waiting.

The existing bridge, constructed in 1951, has been determined to be functionally obsolete with fracture critical components based on a Bridge Inspection Report prepared in January 2023 and determined to be structurally deficient based on a Bridge Inspection Report prepared in January 2024 by FDOT. In 2017, major structural repairs were performed to the bridge at a construction cost of approximately \$17 million. As a result of a 2020 inspection carried out by FDOT, a design to address additional repairs has been completed and it has been determined that the cost to perform these repairs will amount to \$3.0 million. As a result of the 2024 inspection, temporary emergency repairs will be completed. One lane of the bridge is closed until repairs are complete. It is expected that major costly repairs will be needed more frequently as the bridge ages to prevent closure or severe damages. Because of the structure type, the number of structural deficiencies, and high maintenance costs, the Town is considering replacement of the bridge.

This Project Development and Environment (PD&E) Study has been conducted to address the structural and functional deficiencies of the existing Broad Causeway Bridge and to evaluate and compare the feasibility of continued rehabilitation and repair versus replacement of the bridge.

Figure 1-1 Project Location Map



Bridge concepts will include provisions for new pedestrian and bicycle accommodations to comply with Americans with Disabilities Act (ADA) requirements and guardrails for the safety of pedestrians.

Existing right-of way (ROW), owned by the Town, is anticipated to accommodate the replacement bridge and approaches. Included in the Town Charter by the 1953 Senate Bill No. 865, the State of Florida surrendered and granted to the Town any claim or control over all tidewaters and other lands, and all bayous and bay bottoms, beaches, waters, waterways and water bottoms, and all riparian rights within and adjacent to the Town limits for municipal purposes only, a strip of 300 ft. wide from Kane Concourse, westwardly across Biscayne Bay to approximately 123rd Street in the City of North Miami. This 300-ft. wide strip is shown in **Figure 1-2** as a bright yellow highlight. Therefore, the replacement bridge will be built within the 300 ft. strip over Biscayne Bay under claim or control by the Town.

Figure 1-2 *Depiction of 300-ft. wide strip from Kane Concourse to North Miami*



This report presents our preliminary geotechnical analyses and recommendations for the PD&E Study; including our understanding of the project, a review of existing subsurface information, an outline of our exploratory procedures, summary of field and laboratory data obtained as well as our preliminary recommendations for site preparation, foundation design and construction of the proposed bridge replacement and retaining walls.

1.2 Scope of Work

The purpose of our limited geotechnical exploration was to obtain preliminary information on the general subsurface conditions at the project site for the planned bridge and embankment retaining walls. The subsurface materials encountered were evaluated with respect to the available project characteristics. In this regard, engineering assessments for the following items were formulated:

- General location and description of potentially deleterious materials encountered in the borings which may have an impact on the proposed project.
- Identification of the existing ground water levels.
- Preliminary geotechnical recommendations for foundation design and construction.



The following services were performed to achieve the above-outlined objectives:

- Requested utility location services from Sunshine 811.
- Performed five Standard Penetration Test (SPT) borings on land extending to depths ranging from approximately 100 to 125 feet below existing grades for the proposed bridge. Samples were collected and Standard Penetration Test resistances measured in the SPT borings at approximate intervals of two feet for the top 16 feet and at approximate intervals of 2½ feet thereafter.
- Performed seven Standard Penetration Test (SPT) borings on a barge over the intracoastal waterway extending to depths of approximately 125 feet below existing mudline for the proposed bridge. Samples were collected and Standard Penetration Test resistances measured in the SPT borings at approximate intervals of two feet for the top 16 feet and at approximate intervals of 2½ feet thereafter.
- Performed three 4-inch diameter rock cores extending to depths of approximately 100 feet below existing grades nearby SPT Borings BB-03, BB-04 and BB-12 from depths below mudline ranging from approximately 43 feet to 100 feet.
- Performed four Standard Penetration Test (SPT) borings extending to depths ranging from approximately 40 to 50 feet below existing grade for the proposed walls. Samples were collected and Standard Penetration Test resistances measured in the SPT borings at approximate intervals of two feet for the top 10 feet and at approximate intervals of 5 feet thereafter.
- Visually classified and stratified soil samples in the laboratory using the Unified Soil Classification System.
- Performed a laboratory testing program consisting of natural moisture content tests, full grain-size analyses, Atterberg limits, and organics contents test to supplement the engineer's visual classifications.
- Reported the results of the field exploration and engineering analysis in a written preliminary report, signed and sealed by a professional engineer specializing in geotechnical engineering.



2.0 FIELD EXPLORATION & LABORATORY TESTING

2.1 Field Exploration

We performed a total of nine land SPT borings to explore subsurface conditions encountered at for the proposed bridge and walls during the period of March to May 2023. After obtaining the necessary permits, seven water SPT borings were performed in December 2023. The borings for the bridge extended to depths of approximately 100 to 125 feet and for the walls to depths of approximately 40 to 50 feet below existing ground surface. The locations and elevations of the borings shown in the Report of Core Boring sheets in **Appendix A** were surveyed by FR Aleman and provided to AREHNA on September 26, 2023 for the borings performed on land. It should be noted that the elevations of the mudline for the water borings (i.e., BB-5 through BB-11) were estimated using the low member elevation obtained from the existing bridge plans, daily gauge reading from the channel. At the time of report preparation, FR Aleman had not provided the surveyed elevation of the lowest member of the bridge.

The SPT borings were performed with the use of a CME 45 (land borings) and CME 55 (water borings) Drill Rig equipped with an automatic hammer using Bentonite “Mud” drilling procedures and 3-inch ID casing. Samples for the bridge borings were collected and Standard Penetration Test resistances were measured at approximate intervals of two feet for the top 16 feet and at approximate intervals of 2½ feet, thereafter. The soil sampling was performed in general accordance with ASTM Test Designation D-1586, entitled “Penetration Test and Split-Barrel Sampling of Soils.” Representative samples from the borings were sealed in glass jars, labeled and transferred for appropriate classification by a geotechnical engineer.

AREHNA performed 4-inch diameter rock cores within the limestone and cemented sand layers in the zones that encountered high blow counts. The samples of the limestone/sandstone formation were obtained by using a diamond-studded fastened to the end of wire-line double tube core barrel. The coring procedure was performed in general accordance with ASTM Test Designation ASTM D2113.

The core samples were placed in a wooden box then returned to our laboratory where the material was examined and the percent core recovery and rock quality designation determined by an engineer. The rock quality designation (RQD) was determined by dividing the combined length of the pieces of rock recovered which are equal or larger than 4 inches in length by the run length, expressed as a percentage. The core recovery is the ratio of the sample length obtained to the run length, expressed as a percentage. The coring performed utilized a 4-inch diameter core barrel to obtain approximately 4-inch diameter rock cores. The rock coring information is presented in **Appendix A and E**.



2.2 Laboratory Testing - Soil

Our laboratory testing program on soil samples included natural moisture content tests (AASHTO T-265/ASTM D-2216), full sieve gradation (AASHTO T-088/ASTM D-422), Atterberg limits (AASHTO T-89 and T-90/ASTM D4318), and organic content tests (AASHTO T-267/ASTM D-2974). The results of these tests are summarized on Table 2 in **Appendix B**.

2.3 Laboratory Testing – Rock

Our laboratory testing program on rock samples included splitting tensile tests in accordance with ASTM D3967 and FDOT S&FH (i.e. minimum length-to-diameter ratio was 1.0 when testing), and unconfined compression tests in accordance with ASTM D7012 with the height about twice the sample diameter when this length was available. For samples heights less than twice the diameter (if needed), the test results were corrected using established correction factors from ASTM C-42. The results of these tests are summarized in **Appendix B**.



3.0 SUBSURFACE CONDITIONS

3.1 USGS Topographic Data

The topographic survey map published by the United States Geological Survey (USGS) was reviewed for ground surface features at the project location (**Appendix A**). Based on this review, the pre-development ground surface elevation at the project site is approximately +0 to +5 National Geodetic Vertical Datum of 1929 (NGVD).

3.2 USDA Natural Resources Conservation Service Data

The United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) soil survey for the area is attached in **Appendix A**. This survey indicates that the soils along the project alignment consist of Udorthents-Water-Urban land complex, 0 to 60 percent slopes (9), Urban land, 0 to 2 percent slopes (15), and Water (99). A summary of the USDA soil type is provided on **Table 1** in **Appendix B**.

3.3 Regional Geology

The proposed project is located on the southern flank of the Florida Plateau, a stable, carbonate platform on which deposits of Jurassic, Cretaceous, tertiary limestone, dolomites, and evaporative have accumulated. In the study area, the upper 200 feet of this platform is composed predominantly of limestone and quartz sand. These sediments were deposited during several glacial and interglacial stages during the Pleistocene Epoch (10,000 to 2,000,000 years ago). Two geological formations were encountered within the explored depths of the subsurface investigation. These formations are, in descending order: the Miami Limestone Formation and the Fort Thompson Formation.

3.3.1 Miami Limestone

The Miami Limestone was encountered below the fill materials. This formation is a soft or weakly cemented porous limestone. The Miami Limestone is a soft to medium, light tan to tan, porous sometimes sandy, fossiliferous, oolitic limestone. It obtains a maximum thickness of about 45 feet along the Atlantic Coastal Ridge and thins abruptly near the Atlantic coastline. West of the ridge it is about 10 to 15 feet in thickness.

The Miami Limestone was deposited in a shallow near shore marine carbonate bank environment. Spheroidal carbonate sand grains called oolites formed and were deposited in this environment. Near shore process transported quartz sand into the area and reworked some of the carbonate material. Encrusting organisms called bryozoans were locally abundant and formed patches on the substrate. After sea level receded, the carbonate deposits were exposed to fresh water and the cementation process was initiated.

The degree of cementation, and therefore the competency of the rock, was influenced by both the abundance and the type of calcareous material in the original deposit. Humic and carbonic acids percolating downward through the material etched slots up to 4 feet deep in the surface of the stratum. Past surface solutioning of the limestone has resulted in a formation called "pinnacle rock". In some cases, old nearly vertical cylindrical-shaped solution cavities are filled with surficial fine quartz sands extending



below the groundwater level.

3.3.2 Fort Thompson Formation

Underlying the Miami Limestone, the Fort Thompson Formation includes sand, sandstone, and limestone unit. In the Miami area, the Fort Thompson Formation has a thickness of approximately 60 feet. The lithology of the Fort Thompson Formation is highly variable. Lithologies include fine quartz sand, molluscan quartz sandstone, fossiliferous quartz sandy limestone, fine grain freshwater limestone, and coralline limestone. These lithologies alternate abruptly in thickness and lateral extent.

Upper Sand: The upper Fort Thompson sand layer averages about 15 feet in thickness across the subject area. The uppermost 5 to 25 feet of this formation generally consists of loose to medium dense, tan-gray quartz fine sand with limestone fragments.

Limestone: The Fort Thompson limestone can be described as a soft to medium, porous to very porous, fossiliferous, quartz, sandy limestone. Abundant fossil coral molds in this limestone are evidence that portions of the unit were deposited in a shallow patch reef marine environment. The coral skeletal remains were dissolved when the deposit became exposed to slightly acidic freshwater. The dissolution of branching corals produced networks of channel pore spaces. The present irregular, pinnacled surface of this limestone unit is a result of deep etching of the rock by the process of weathering.

Lower Sand and Sandstone: The Fort Thompson limestone grades downward into a gray quartz and calcareous fine to medium sand. This sand has been cemented to varying degrees by carbonate material leached out of the overlying limestone. The cementation commonly takes the form of hard spheroidal sandstone nodules 1 to 2 inches in diameter occurring in a sand matrix. Sandstone lenses within the sand layer are a result of more complete cementation.

3.4 Subsurface Conditions

Pictorial representations of the subsurface conditions encountered in the borings are shown on the Report of Core Boring Sheets in **Appendix A**. These profiles and the following soil conditions highlight the general subsurface stratification.

The Soil Test Borings in **Appendix A** should be consulted for a detailed description of the subsurface conditions encountered at each boring location. When reviewing the boring records and the subsurface profiles, it should be understood that soil conditions may vary between and away from boring locations. In general, the following subsurface conditions were encountered:



In general, our borings performed on land encountered select fill soils that extend from the existing ground surface down to approximately 2 to 4 feet below ground surface (bgs) (approximately +1 to -1.5 feet, NAVD). A layer of sandy silt and silty shelly sand was encountered down to the existing natural limestone layer, approximately 10 to 22 feet bgs (approximately -6 to -17 feet, NAVD). This layer is not uniform through the site and it's occasionally organic and clayey. The causeway island was probably backfilled with dredge material from the bay; therefore, the high variability of the layer. In addition, the drillers reported hydrocarbon odors during the performance of Boring BB-03 while drilling through this upper layer. The odor was stronger from a depth of 6 to 10 feet and was faintly detected from 10 to 12 feet. Boring BB-03 is located near the existing gas station.

Underlying this material is the natural limestone (Miami Limestone formation) followed by the Fort Thompson Formation which consists of upper sand layer, limestone/sandstone occasionally with some sand. It is important to note that on the east side of the bridge (Boring BB-12) encountered a much thicker sand layer and the deeper rock obtained lower N-values. This was confirmed with the rock coring that obtained relatively low recoveries and RQDs in Boring BB-12.

During our water borings, we identified sediment layers at three specific locations, namely Borings BB-06, BB-07, and BB-11. These sediments primarily comprised fine sand with silt/limestone fragments (SP-SM/SP), limestone with shells, and trace of muck. The thickness of this sediment layer ranged from 0.3 to 2.0 feet. Underlying this material, we encountered the natural limestone (Miami Limestone formation) followed by the Fort Thompson Formation which consists of upper sand layer, and limestone/sandstone occasionally with some sand. This layering mirrors the composition encountered by the land borings.

In general, our findings are consistent with the borehole information outlined in the available existing plans from the 1950s.



Bridge Borings performed on land

Table 3.4a *Summary of Subsurface Conditions Encountered by Bridge Borings*

Elevation (feet, NAVD)		Material Description
From	To	
2.7 to 4.9	-0.2 to 2.6	Medium dense SAND with few shell/limerock fragments (SP), Silty SAND (SM)
-0.2 to 2.6	-9.1 to -14.3	Very loose/very soft to firm sandy silt with trace of shell (MH), silty sand with trace of shells (SM), <u>occasionally organic or with organics</u>
-9.1 to -14.3	-27.9 to -37.3	Sandy limestone (LS)
-27.9 to -37.3	-45.1 to -62.8	Loose to very dense SAND (SP) and cemented sand with sandstone/limestone fragments (SP-SM)
-45.1 to -62.8	Up to -122.3	Sandstone with cemented sand, Sandy Limestone. Core recovery typically ranged from 20% to 90%, with an average of 59%. RQD values generally ranged from 0% to 77%, with an average value of 26%.

Bridge Borings performed on water

Table 3.4b *Summary of Subsurface Conditions Encountered by Bridge Borings*

Elevation (feet, NAVD)		Material Description
From	To	
-5.3 to -10.3	-29 to -39	Sandy Limestone, occasionally sediments were encountered at the top of the limestone layer
-29 to -39	-31 to -74	Very loose to very dense SAND (SP) and cemented sand with sandstone/limestone fragments (SP-SM/GP)
-31 to -74	-117 to -135	Sandstone with cemented sand and Sandy Limestone. Occasionally with layers of fine sand with limestone/sandstone fragments (SP)



Wall Borings

Table 3.4c Summary of Subsurface Conditions Encountered by Wall Borings

Elevation (feet, NAVD)		Material Description
From	To	
3.3 to 5.2	1.2 to -1.7	Medium dense SAND with few shell/limerock fragments (SP), Silty SAND (SM)
1.2 to -1.7	-9.2 to -16.8	Very loose/very soft to firm sandy silt with trace of shell (MH), silty sand with trace of shells (SM), sandy clay (CL), <u>occasionally organic or with organics</u>
-9.2 to -16.8	-35.7 to -41.0	Sandy limestone (LS)
-35.7 to -41.0	Up to -45.7	Loose to very dense SAND (SP) and cemented sand with sandstone/limestone fragments (SP-SM)

3.5 Groundwater Conditions

The groundwater level was encountered at approximate depths ranging from approximately 3.6 to 5.4 feet below existing grades (i.e., elevation ranging from approximately +0.2 to -1.3 ft, NAVD) [by the land borings](#). Fluctuation in ground water levels should be expected due to seasonal climatic changes, construction activity, rainfall variations, surface water runoff, tidal activity, and other site-specific factors such as storm surge. Since ground water level variations are anticipated, design drawings and specifications should accommodate such possibilities and construction planning should be based on the assumption that variations will occur.

3.6 Estimated Seasonal High Water Level

The Seasonal High-Water Table (SHWT) is the highest average depth of soil saturation during the wet season in a normal year. A review of the Miami-Dade County NRCS Soil Survey indicated that the project is located within an area classified as Udorthents-Water-Urban land complex, 0 to 60 percent slopes (9), Urban land, 0 to 2 percent slopes (15), and Water (99). The depth of the water table is noted as 5 to 6.7 feet below the ground surface for these soil types. Groundwater measurements at the location of the bridge and wall borings align with the NRCS soil survey values.



Since the groundwater measurements at the test boring locations may not necessarily reflect the SHWT, a review of historical groundwater data was conducted.

Table 3.6 USGS Well Data Summary

Source	Location	Distance from Site	Ground Surface Elevation (feet, NGVD)	Groundwater Level	
				Elevation (feet, NAVD)	Duration
USGS Well No. G-894/ USGS ID 255350080105801	25°53'51.7", 80°10'57.2"	Approx. 2 miles NW	8.7	1.2 (Average)	Wet Season (2022)
				-1.0 (Lowest)	2001
				4.4 (Highest)	2020
USGS Well No. F-279/ USGS ID 255315080111501	25°53'17.79", 80°11'14.66"	Approx. 2 miles W	7.5	0.2 (Average)	Wet Season (2022)
				-0.5 (Lowest)	1998
				2.4 (Highest)	2020

Based on the groundwater table encountered within the borings, the Miami-Dade County NRCS Soil Survey and USGS well information, the preliminary SHWT is estimated to be at approximately 3 to 4 feet below the existing ground surface and/or approximately elevation +1 foot, NAVD and will be heavily tidally influenced.

3.7 Scour

From the available existing plans (1950s), it seems that the bay bottom ranges typically from approximately elevation -5.0 to -9.0 feet (assumed NGVD) or approximately -6.5 to -10.5 feet, NAVD. Soil samples within these depth ranges were collected from the borings conducted on land, and laboratory analyses were performed to determine the D₅₀ grain size [to be used as preliminary information and were provided to assist in the scour evaluation to be performed by others. The results are summarized in Table 3.7.1a.](#) The bridge [land](#) borings performed for this study closest to the intracoastal (i.e., BB-4 to the west and BB-12 to the east) encountered a layer of sandy silt (MH) and silty sand (SM) at the anticipated bay bottom elevation. Underlying the bay bottom sediments, an upper limestone layer was encountered typically 2 to 3 feet below the mudline (i.e., approximately elevation -9.0 feet, NAVD and -15 feet, NAVD at the west end and east end of the bridge, respectively). The bridge borings performed for this study closest to the intracoastal encountered the upper limestone at approximately elevation -10 feet and -14 feet, NAVD at the west and east end of the intracoastal, respectively, which is consistent with the as-built.



During our water borings, the mudline was estimated to range from elevation -5.3 to -10.3 feet, NAVD. We identified sediment layers at three specific locations, namely Borings BB-06, BB-07, and BB-11. These sediments primarily comprised fine sand with silt/limestone fragments (SP-SM/SP), limestone with shells, and trace of muck with a thickness ranging from 0.3 to 2 feet. Underlying the bay bottom sediments, an upper limestone layer was encountered. At the other four locations, the natural limestone layer was immediately encountered. The summary of the grain size results is shown in Table 3.7.1b below. The laboratory test results are presented in **Appendix B** of the report.

Table 3.7.1a Summary of Grain Size Analyses, D_{50} and D_{95} – Land Borings

Sample ID	USCS Classification	Sample Depth (ft)	Approx. Elevation (ft, NAVD)	D_{50} (mm)	D_{95} (mm)
BB-01	MH	10 – 12	-5.1 to -7.1	0.07 +/-	2.0
BB-02	SM	12 – 14	-8.2 to -10.2	0.18	0.7
BB-12	SM	14 – 16	-11.3 to -13.3	0.08	4.8
WB-01	SM	13.5 – 15	-9.5 to -11.0	4.68	22.0
WB-03	SM	18.5 – 20	-13.3 to -14.8	0.31	12.0

Note:

Borings performed on the causeway island.

Table 3.7.1b Summary of Grain Size Analyses, D_{50} and D_{95} – Water Borings

Sample ID	USCS Classification	Sample Depth (ft)	Approx. Elevation (ft, NAVD)	D_{50} (mm)	D_{95} (mm)
BB-07	SP-SM	0 – 2	-8.8 to -10.8	0.60	11.7
BB-08	SM	2 – 4	-10.6 to -12.6	0.22	1.1
BB-10	SM	4 – 6	-11.1 to -13.1	0.26	1.3



4.0 PRELIMINARY FOUNDATION EVALUATION - BRIDGE

4.1 General Information

Our preliminary geotechnical evaluation for feasibility of typical foundation alternatives for the proposed bridge improvements is presented in this section. Our preliminary analysis is based upon the previously presented project information, as well as the field and laboratory test data obtained during this geotechnical exploration. In our preliminary evaluation for the subject project, we have addressed the following geotechnical design and construction considerations:

- Support of the bridge replacement using various foundation alternatives such as shallow foundations, and deep foundations, including square driven precast prestressed concrete piles (PCP) and drilled shafts.
- Soil and water corrosion potential and the environmental classification of the substructure and superstructure.

4.2 Existing Bridge Structures

The original bridge is a movable-bascule bridge and was originally constructed in 1951 and is considered functionally obsolete. We understand that the bridge rating shows that the bridge substructure is in good condition. The existing bridge consists of 30-spans with a total length of 1,630 feet. The bridge is supported on 18-inch prestressed concrete driven piles. There are partial available plans for the original existing bridge, Sheet BX61, shows a note that all concrete piles shall be driven to 45 ton loading. No information on the driving logs providing the pile tip elevations of the existing piles is provided. As an attempt to estimate the approximate pile tip elevations, AREHNA conducted an analysis using FB-Deep (v3.1) and the available 2 borings performed near the waterway (BB-04 and BB-12) which are located about 80 feet from the existing bridge. The allowable pile capacity will be used to compare to the loading shown on the existing plans since it is most likely that Allowable Stress Design (ASD) method was used for the design of the existing bridge in the 1950s.

From the available existing plans (1950s), it seems that the bay bottom ranges from approximately elevation -5 to -9 feet (assumed NGVD29) or approximately -6.5 to -10.5 feet, NAVD. Underlying the bay bottom sediments, an upper limestone layer was encountered typically approximately 2 ft to 3 ft below mudline (i.e., approx. elevation -9 ft NAVD and -15 ft, NAVD at the west end and east end of the bridge, respectively). The bridge borings performed for this study closest to the intracoastal encountered the upper limestone at approximately elevation -10 ft and -14 ft, NAVD at the west and east end of the intracoastal, respectively, which is consistent with the as-builts. Conservatively, mudline elevation of -15.5 feet, NAVD and 5 feet of predrilling below the mudline were assumed in the FB-Deep calculations. The FB Deep results including the allowable pile capacity curves are included in **Appendix C**. The following tables present the summary of the pile embedment analyses:



Table 4.2 Summary of Analysis on Existing 18-in PCP

Pile Type Size	Design Pile Load (tons)	Approximate Mudline Elevation (feet, NAVD)	Estimated Pile Tip Elevation (feet, NAVD)		Estimated Minimum Pile Embedment (feet)	
			BB-04	BB-12	BB-04	BB-12
18-in PCP	45	-15.5	-52.5	-47.5	37	32

In general, the penetration for any pile shall be not less than 10 feet in hard material and not less than 1/3 the length of the pile nor less than 20 feet in soft material as documented on the AASHTO Standard Specification for Highway Bridges 1973, previous versions were not available. Based on the FB-Deep results, the penetration obtained fulfills this requirement. Our estimation suggests that the piles are currently penetrating between -47 to -53 feet, NAVD. However, it's advisable to conduct further testing (i.e. parallel seismic testing) to verify these assumptions.

Based on the borings, refusal conditions were encountered between -28 to -67 feet, NAVD. This indicates a potential pile refusal within the range where the existing pile tips were estimated to be.

4.3 Shallow Foundations

The use of shallow foundations is often the most cost effective foundation system. Spread footings can be supported on MSE Walls or Geosynthetic Reinforced Abutments. This type of foundation is dependent on the nominal bearing resistance of the soils and total and differential settlements. Spread footings may be acceptable in some cases for single span bridges; however, differential settlements typically exceed acceptable limits in the case of a multi-span bridge. In addition, the bottom of the footing needs to be located below the design scour elevation for bridges over water. Challenges will include differential settlement with adjacent pile supported foundations, potential conflict with wet utilities, deeper excavation to bear the footing on the natural rock and dewatering to cast the spread footing in the dry, which may affect feasibility. Therefore, shallow foundations are not considered further in this report.

4.4 Steel H-Piles or Pipe Piles

The steel H-Piles or pipe piles are a widely used foundation type for bridges within Florida and provide relatively low vibration during driving when compared to concrete driven piles. However, the disadvantage in this project is that these piles provide relatively lower axial capacities when compared to concrete driven piles and the need of larger sacrificial thickness due to corrosion. It also has a higher



difficulty to estimate the length of the piles due to the uncertainty of determining the pile tip elevation during pile installation and the high potential of pile splicing. These types of piles are typically less cost efficient than concrete driven piles from a cost per capacity standpoint. It is important to note that due to the high chloride content on the site (larger than 2,000 ppm), H-Piles could not be used per FDOT SDG. In addition, even if steel pipe piles are completely buried, internal redundancy would be required (i.e. steel pipe piles filled with concrete) which reduces pile capacity even further. Therefore, steel H-Piles or pipe piles foundations are not considered further in this report.

4.5 Augered Cast-In-Place Piles

The advantage of this type of piles is the relatively low to no vibration during construction and relatively low noise during construction. In addition, high pile capacities can be achieved when embedded in competent rock with no issues regarding pile installation refusal. The variability of the subsurface soil/rock conditions encountered is easier to control by selecting the proper pile tip elevation. The construction process is typically faster when compared to drilled shaft foundations and some driven piles.

However, this type of foundation presents several disadvantages for the project. These adverse conditions include constructability issues. Augered cast-in-place piles (ACIP) are only feasible for the end bents and piers to be constructed on land, requiring another type of deep foundation system for the piers over the water. In addition, augercast piles require to be installed on ground where the water level remains a minimum of one to two pile diameters below ground to help build a grout head. This foundation system may require a minimum of 4 feet of groundwater clearance. This additional clearance may be provided by constructing a soil platform.

The pile installation requires a collection system of the cuttings, slurry and extra pumped grout to avoid contamination of the bay. This can be a significant issue for contaminated soils. Boring BB-12, conducted on the empty lot on the east side of the project, revealed challenging conditions for ACIP such as low rock recoveries and a thicker sandy soil layer. In this specific area, the piles should extend to socked in the lower limestone layer (approximately elevation -82 feet, NAVD).

However, this foundation type is not suitable for very loose sands under groundwater due to non-uniform penetration rate during drilling and grouting. The bridge borings performed near the bridge approaches show a very loose to very soft sandy silt to silty sand layer from approximately elevation 0 to -14 feet, NAVD. Therefore, ACIP foundations will not be considered further in this report.



4.6 Drilled Shafts

Drilled concrete shafts are a feasible foundation type for this project. They have an advantage to develop high axial and lateral capacities in a single unit and typically generate lower construction induced vibrations than driven piles, when employing non-vibratory methods, such as rotary or oscillatory casing during installation. To ensure structural reliability, it is recommended to provide shaft redundancy.

A disadvantage is the dependency on construction procedures and quality control to ensure required capacities are reached. Drilled shafts are often used at sites where there is competent limestone or very dense strata at relatively shallow depths. For this project, it is recommended that the shafts socket into the lower limestone/sandstone layer starting approximately at elevations of -56 to -82 feet, NAVD. Challenges may arise during construction due to sandy materials, potentially causing soil cave-ins. Therefore, the use of temporary casings at the end bents and piers on land, and a combination of temporary casings with permanent casings at the piers over water, is likely necessary.

For this project, specialized equipment may be required to reduce vibrations during placement of the steel casing using non-vibratory methods. Additionally, the project **could** require at least two static load tests, one on the causeway island and another on the vacant lot east of the project, to confirm the design side shear value. Furthermore, the integrity of the drilled shafts must be verified through testing, employing tests such as Cross Sonic Logging (CSL) and/or Thermal Integrity Profiling (TIP).

4.6.1 Axial Capacity of Drilled Shafts

We have evaluated 48-inch and 60-inch diameter drilled shafts for support of the proposed bridge foundation system. In order to evaluate the axial capacities, *FB-Deep (v.3.1)* was used, along with correlations of soil and rock strength parameters to SPT N-values, within the sands and limestone encountered. Capacities curves provided are based on the calculated ultimate (nominal) skin friction (i.e., resistance factor side friction = 1.0) neglecting end bearing capacity.

The sand and soft limestone ($N < 25$ bpf) layers were modeled as sand in the axial capacity analyses. The side friction resistance in the competent rock layer ($N \geq 25$ bpf) was estimated as follows:

- $f_s = 0.1 N$ (tsf) (FDOT Soils and Foundation Handbook)

where, f_s = ultimate unit side friction resistance. Based on the handbook, the maximum value of f_s is 5 tsf when using this correlation.

Due to the sandy soil conditions and relatively low recoveries within the Miami Limestone formation, the drilled shafts are recommended to socket into the deeper limestone/sandstone of the Fort Thompson formation. Conservatively, the material was neglected within the Miami Limestone and sandy layer of the



Fort Thompson formation. For our analysis, the capacity started at the elevations shown in the table below.

Table 4.6.1a Approximate Top of Rock Socket Elevation Encountered by Bridge Borings

Location	Boring	Ground Surface/Mudline Elevation (feet, NAVD)	Top of Rock Socket Elevation (feet, NAVD)
ON LAND	BB-01	4.9	-60
	BB-02	3.8	-62
	BB-03	4.6	-56
	BB-04	2.7	-60
	BB-12	2.7	-82
ON WATER	BB-05	-5.3	-58
	BB-06	-6.3	-66
	BB-07	-8.8	-74
	BB-08	-8.6	-74
	BB-09	-6.6	-72
	BB-10	-7.1	-77
	BB-11	-10.3	-83

The use of temporary or permanent casing was not evaluated at this time. If drilled shafts are selected as the chosen foundation alternative, additional analyses will be performed to evaluate the potential of either temporary or permanent casing.

When using the Load Resistance Factor Design method (LRFD), a resistance factor, ϕ is applied to the ultimate mobilized shaft capacity to yield the factored shaft resistance capacity. Due to limited amount of rock core testing for the project and relatively high variability between borings, we recommend that a lower resistance factor be used than specified in the FDOT Structure Design Guidelines for axial compression with bi-directional load testing. At this preliminary phase the following resistance factors on compression and uplift capacities are recommended:

- Drilled Shaft Compression:
 - For rock socket, when using the Construction QC Method: 0.5 for non-redundant drilled shafts and 0.6 for redundant drilled shafts.
 - For rock socket, when using bi-directional load testing: 0.6 for non-redundant drilled shafts and 0.7 for redundant drilled shafts.
- Drilled Shaft Uplift:
 - For rock socket, when using the Construction QC Method: 0.4 for non-redundant drilled shafts and 0.5 for redundant drilled shafts.
 - For rock socket, when using bi-directional load testing: 0.5 for non-redundant drilled shafts and 0.6 for redundant drilled shafts.



As the design progresses, the axial compression resistance factor may be adjusted to match those in the FDOT SDG.

As mentioned previously in the report, rock coring was conducted at three specific locations on land, in proximity to Borings BB-02, BB-04, and BB-12. The water borings indicate that the rock within the lower Fort Thompson layer exhibited relatively weaker characteristics with more sandy material interbedded in rock layer for the borings conducted on the center of the channel. Given the comparatively low recoveries achieved on land, it is our opinion that conducting additional rock coring and laboratory testing is necessary to conduct a more comprehensive assessment of the feasibility of the drilled shafts.

The tables below provide the Nominal Bearing Resistance (R_n) and the corresponding estimate tip elevation for 48-inch and 60-inch diameter drilled shaft based on a rock socket length of four times the proposed diameter (4D).

**Table 4.6.1b Summary of Preliminary Estimated Pile Tip Elevations – Maximum R_n per Boring
For 48-inch Diameter Drilled Shaft**

Location	Boring No.	Ground Surface/ Mudline Elevation (feet, NAVD)	Top of Rock Socket Elevation (feet, NAVD)	Tip Elevation for a Rock Socket of 4D (feet, NAVD)	Approx. Shaft Length (feet)	Ultimate (Nominal) Capacity for 48-in DIA. (tons)	Recommended NBR (tons)
ON LAND	BB-01	4.9	-60	-76	81	974	974
	BB-02	3.8	-62	-78	82	715	715
	BB-03	4.6	-56	-72	77	1030	1030
	BB-04	2.7	-60	-76	79	870	870
	BB-12	2.7	-82	-98	101*	601	600
ON WATER**	BB-04	-5.3***	-60	-76	81	870	870
	BB-05	-5.3	-58	-74	79	850	850
	BB-06	-6.3	-66	-82	87	638	630
	BB-07	-8.8	-74	-90	95*	790	790
	BB-08	-8.6	-74	-90	95*	685	685
	BB-09	-6.6	-72	-88	93*	855	850
	BB-10	-7.1	-77	-93	98*	990	990
	BB-11	-10.3	-83	-99	104*	880	880
	BB-12	-10.3***	-82	-98	103*	601	600

Notes: *Shafts longer than 90 feet, could have constructability issues.

**Top of drilled shaft elevation assumed at elevation +5 feet, NAVD.

***Using nearby boring mudline elevation.

Assumes rock socket length of 4 diameters (4D).



**Table 4.6.1c Summary of Preliminary Estimated Pile Tip Elevations – Maximum Rn per Boring
For 60-inch Diameter Drilled Shaft**

Location	Boring No.	Ground Surface/ Mudline Elevation (feet, NAVD)	Top of Rock Socket Elevation (feet, NAVD)	Tip Elevation for a Rock Socket of 4D (feet, NAVD)	Approx. Shaft Length (feet)	(Nominal) Ultimate Capacity for 60-in DIA. (tons)	Recommended NBR (tons)
ON LAND	BB-01	4.9	-60	-80	85	1530	1530
	BB-02	3.8	-62	-82	86	1195	1195
	BB-03	4.6	-56	-76	81	1600	1600
	BB-04	2.7	-60	-80	83	1400	1400
	BB-12	2.7	-82	-102	105*	1065	1060
ON WATER**	BB-04	-5.3***	-60	-80	85	1400	1400
	BB-05	-5.3	-58	-78	83	1340	1340
	BB-06	-6.3	-66	-86	91*	808	805
	BB-07	-8.8	-74	-94	99*	997	995
	BB-08	-8.6	-74	-94	99*	1055	1050
	BB-09	-6.6	-72	-92	97*	1380	1375
	BB-10	-7.1	-77	-97	102*	1550	1500
	BB-11	-10.3	-83	-103	108*	1377	1370
	BB-12	-10.3***	-82	-102	107*	1065	1060

Notes: *Shafts longer than 90 feet, could have constructability issues.

**Top of drilled shaft elevation assumed at elevation +5 feet, NAVD.

***Using nearby boring mudline elevation.

Assumes rock socket length of 4 diameters (4D).

The graphical and tabular outputs from our *FB-Deep* analyses are presented in **Appendix C** and **Appendix D**, respectively.

4.6.2 Lateral Stability of Drilled Shafts

This report provides geotechnical parameters for use by AtkinsRéalis in performing lateral load analyses for the drilled shafts. The Recommended Soil Parameters for FB-MultiPier Analysis are presented in **Appendix C**. Soil resistance through scourable soils should be neglected.

4.7 Prestressed Concrete Driven Piles

Prestressed concrete (PSC) driven piles are another feasible foundation alternative for this project and are a widely used foundation type for bridges within Florida. However, this alternative present greater vibration and noise issues when compared with the previous mentioned alternative.



This foundation system may be able to provide the required axial and lateral capacities for the project and will be less impacted by the site environment, including corrosion, highwater elevation and proximity of the new bents to the bay. This type of foundation will not require a column extensions at the end bents and the pile capacity can be easily checked using driving criteria and/or dynamic testing.

To address potential high vibration levels during pile installation, it's recommended to extend preforming to greater depths and depending on the distance of the new piles to the existing piles, use of permanent casing may be required for preforming for some of the new piles. This step aims to minimize adverse impacts on nearby residences and the existing bridge. All adjacent residences will need to be monitored for settlement and vibration during pile installation. The existing bridge substructure will need to be monitored for settlement during pile and casing installation. Another disadvantage of driven piles will be that due to the soil/rock variability shown by the borings, the selection of the pile production length could be more challenging, and the need of longer pile production lengths may be need in order to avoid pile splicing. Finally, pile installation refusal could occur before reaching the minimum tip and deeper preforming might be needed.

4.7.1 Axial Capacity of PSCP

We have evaluated 24 and 30-inch square PSC piles for support of the proposed bridge foundation system. In order to evaluate the pile compression capacities, a static analysis using the design methodology presented in Research Bulletin 121 (RB-121) developed by Professor J.H. Schmertmann, was performed. A computerized version of this method, entitled *FB-Deep (v.3.1)*, was used. This method generates pile capacities through the use of empirical correlations between Standard Penetration Test (SPT) N-values and unit end bearing and side friction values for four general material types.

Typically, the Estimated Davisson Capacity (defined failure load) from *FB-Deep* is taken as the unfactored pile resistance and is calculated as the sum of the Ultimate Side Friction plus the Mobilized End Bearing (one-third of the ultimate end bearing). For SPT N-values of less than 3 or greater than 60 blows per foot, the methodology truncates the values to 0 and 60, respectively, for sands, and 0 and 100 for rock.

For our *FB-Deep* analysis, we assumed predrilled pile holes will be constructed in order to assist in the initiation of the pile driving operations; therefore, we did not include the upper soils down to the natural limestone (upper 12 to 16 feet). To account for preforming in our *FB-Deep* analyses, we reduced the SPT N-values by 50 percent within the preformed zone or in the limestone layer using a maximum value of SPT of 20 blows per foot to model the addition of the backfill sand material within the annular space. Preforming was assumed to extend to the bottom of the upper limestone formation (i.e., elevations ranging from approximately -28 to -35 feet for the bents and land piers and from elevation -29 to -38 feet for the intracoastal piers. For the intracoastal piers, the bottom of the bay was conservatively assumed at elevation -15.5 feet, NAVD. While AREHNA conducted the water borings, measurements were taken to estimate the mudline elevation. The estimated elevations ranged from -5.3 to -10.3 feet, NAVD.



The Nominal Bearing Resistance (NBR) to be achieved in the field during pile installation is calculated from the following equation:

$$\text{Nominal Bearing Resistance} = \frac{\text{Factored Design Load} + \text{Net Scour Resistance} + \text{Downdrag Load}}{\phi}$$

Where ϕ (resistance factor) is 0.65 or 0.75, depending on whether 5% or 100% dynamic testing of the piles is performed.

The *FB-Deep* analyses indicate that the maximum pile driving resistances for 24 and 30-inch PSC piles per the Structure Design Guidelines of 450 and 600 tons, respectively, may be achieved within the depths explored. Based on the SPT N-values, refusal conditions may be anticipated at elevations ranging from approximately -28 to -132 feet, NAVD.

The tables below provide the Nominal Bearing Resistance (R_n) and the corresponding estimate tip elevation for 24-inch and 30-inch PSCP to 80% the maximum pile driving resistance specified in the SDG in order to reduce potential for pile splices.

Table 4.7.1a Summary of Preliminary Estimated Pile Tip Elevations – Maximum R_n per Boring For 24-inch PCP

Location	Boring No.	Approx. Potential Refusal Elevation (feet, NAVD88)	Nominal Bearing Resistance, R_n (tons)	Approx. Estimated Pile Tip Elevation (feet, NAVD88)
ON LAND	BB-01	-28	360	-54
	BB-02	-49	360	-66
	BB-03	-55	360	-54
	BB-04	-60	360	-68
	BB-12	-67	360	-78
ON WATER	BB-04	-60	360	-69
	BB-05	-60	360	-56
	BB-06	-66	360	-80
	BB-07	-66	360	-90
	BB-08	-76	360	-79
	BB-09	-74	360	-69
	BB-10	-57	360	-71
	BB-11	-58	360	-55
	BB-12	-67	360	-92



Table 4.7.1b Summary of Preliminary Estimated Pile Tip Elevations – Maximum Rn per Boring For 30-inch PCP

Location	Boring No.	Approx. Potential Refusal Elevation (feet, NAVD88)	Nominal Bearing Resistance, Rn (tons)	Approx. Estimated Pile Tip Elevation (feet, NAVD88)
ON LAND	BB-01	-28	480	-52
	BB-02	-49	480	-66
	BB-03	-55	480	-54
	BB-04	-60	480	-52
	BB-12	-67	480	-78
ON WATER	BB-04	-60	480	-66
	BB-05	-60	480	-56
	BB-06	-66	480	-79
	BB-07	-66	480	-87
	BB-08	-76	480	-74
	BB-09	-74	480	-66
	BB-10	-57	480	-58
	BB-11	-58	480	-54
	BB-12	-67	480	-79

The graphical and tabular outputs from our *FB-Deep* analyses are presented in **Appendix C** and **Appendix D**, respectively. The test pile program will ultimately determine where the pile tips will bear. The lateral analysis will determine the minimum elevation for stability; however, preforming to deeper depths might be needed to reach this minimum elevation.

4.7.2 Lateral Stability of PSCP

This report provides geotechnical parameters for use by AtkinsRéalis in performing lateral load analyses for the driven piles. The Recommended Soil Parameters for FB-MultiPier Analysis are presented **Appendix C** for 24 and 30-inch square piles. These parameters are based on correlations with SPT N-values. To account for preforming in our analyses, we reduced the SPT N-values by 50 percent within the preformed zone or in the limestone layer using a maximum value of SPT of 20 blows per foot to model the addition of the backfill sand material within the annular space. Soil resistance through scourable soils should be neglected.



4.8 Downdrag

A layer of sandy silt and silty shelly sand was encountered down to the existing natural limestone layer, approximately 10 to 22 feet bgs. This layer is not uniform through the site and it's occasionally organic and clayey. Since this material will likely remain in place due to the depth it was encountered, high downdrag loads are anticipated at the bridge approaches. Additional evaluations will be considered in order to reduce the downdrag loads such as temporary surcharging prior to foundation installation or ground improvement (i.e., Mass Soil Mixing, or rigid inclusions with load transfer platform) which will be included in the next submittal. The downdrag analysis will be performed in general accordance with FHWA HI 97-013 (1998) as explained in the FDOT Soils Foundation Handbook.



5.0 PRELIMINARY FOUNDATION EVALUATION - WALLS

5.1 General Information

Our preliminary geotechnical evaluation for feasibility of typical foundation alternatives for the proposed retaining walls is presented in this section. Our preliminary analysis is based upon the previously presented project information, as well as the field and laboratory test data obtained during this geotechnical exploration. This report will provide a preliminary evaluation for the walls.

5.2 Existing Soil Conditions

As explained in Section 3.4, our borings encountered select fill soils that extend from the existing ground surface down to approximately 2 to 4 feet below ground surface (bgs) (approximately +1 to -1.5 feet, NAVD). A layer of SANDY SILT and SILTY SHELLY SAND was encountered down to the existing natural limestone layer, approximately 10 to 22 feet bgs (approximately -6 to -17 feet, NAVD). This layer is not uniform through the site and is occasionally organic and clayey. The causeway island was probably backfilled with dredge material from the bay; therefore, the high variability of the layer. In addition, the borings performed for the roadway and drainage improvements also encountered this layer. The organic content varies from 0.4 to 15.6 percent, the fines from 51 to 84 percent and liquid limit from NP to 97. In addition, the drillers reported hydrocarbon odors during the performance of Boring BB-03 while drilling through this upper layer.

Given the depth and variable nature of these unsuitable materials encountered, removal and replacement might prove unfeasible. The option of leaving this material in place would require ground improvement measures and additional borings and testing along the proposed walls. A working platform may be needed for the installation of ground improvement techniques and for the installation of driven piles. The need for a working platform in addition to the design and recommendations should be provided by a Specialty Engineer.

5.3 Potential Alternatives for MSE Walls

The presence of unsuitable plastic and organic materials would require ground improvement, the following are some alternatives.

5.3.1 Demucking/Complete Removal

The preferred option is to demuck or completely remove this layer. Select free drainage material could be used to replace this unsuitable material. However, the depth at which this material was encountered



poses feasibility challenges due to the substantial quantity of material requiring removal and replacement. This is compounded by the necessity for excavation protection, dewatering and compaction issues and potential construction schedule constraints. Potential contamination is another challenge with this option.

5.3.2 Surcharging or Preloading

Preloading involves placing a load equivalent to the final design loading conditions and providing sufficient time for the ground to settle and consolidate. Surcharging consists of applying a load greater than the final design loading conditions to accelerate consolidation. Both methods require sufficient time to reach the acceptable long term primary and secondary consolidation settlements. Settlement plates will be needed along the walls to measure the rate of settlement.

Due to the relatively high embankments this project is proposing, the temporary surcharge/preloading embankment should be constructed observing a 1(V): 2(H) slopes where there is enough space to construct the toe slopes and using a temporary MSE wall in areas with restricted space.

This method could potentially have logistical and schedule related issues.

5.3.3 Deep Mixing Method (DMM)

The deep mixing method is an in-situ soil treatment in which the native soils or fills are blended with cementitious and/or other materials, typically referred to as binders. Compared to native soils or fills, the soil-binder composite material that is created has enhanced engineering properties that are used in controlling and reducing settlements, increasing bearing capacity, and ensuring stability.

Based on the design manual publication no. FHWA-HRT-13-046 the minimum number of investigation points for the deep mixing supported embankments is every 50 to 100 ft along the wall alignment. The investigation depth below the bottom of the wall should be, at a minimum equal to 3 times the wall height unless a hard stratum is encountered above this depth. Therefore, supplemental geotechnical investigations should be planned if this alternative is selected.

However, this method could be more costly than the other alternatives and high-quality assurance during construction is required. A high-quality contractor experienced with soil mixing should be selected.

5.3.4 Rigid Inclusions with a Load Transfer Platform

Rigid inclusions are a high modulus/controlled stiffness grout, columns typically installed through weak, high compressible soils in order to improve the ground performance globally (i.e. reduce settlement, increase the bearing capacity and improve ground stability) with minimal spoil during construction. A load transfer platform constructed of granular soil is typically installed on top of the rigid inclusions and below



the proposed embankment to transfer the loads through the soft soils to the suitable strata. The grout columns are typically unreinforced and 12-inch to 18-inch in diameter. The load transfer platform consists of granular, structural fill soils and may be reinforced with one or more layers of biaxial geogrid and/or geotextile.

This alternative is typically faster and less costly and could provide less logistical challenges than the other methods. A high-quality contractor experienced in the construction of rigid inclusions should be selected. In addition, more closely spaced borings may be required for this alternative.

5.4 Existing and Proposed Seawalls

We understand that new seawalls are being considered on the north and south side of the causeway. Water borings to be performed on the intracoastal for the design of new seawalls are recommended. The existing and proposed seawalls should be designed to safely support the proposed retaining walls and [proposed nearby bridge foundations and](#) ensure that the wall deflections are within the permissible limits as shown on the Structure Design Guidelines.

It is important to note that an anchor system (i.e., deadman, tiebacks, soil nails) may be necessary for both existing and proposed seawalls. A comprehensive analysis of the existing seawall should be conducted to assess the need for replacement or improvement.



6.0 ENVIRONMENTAL CLASSIFICATION

Corrosion parameter tests were performed by AREHNA on a select water and soil sample obtained for the project site. The water sample was collected from waterway. The results are provided on the Report of Core Boring sheet in **Appendix A** and **Table 3 in Appendix B**. According to the soil test results, the environmental classification is moderately and extremely aggressive for substructure concrete and steel, respectively. Based on the water test results, the environmental classification is extremely aggressive for substructure concrete and steel (resistivity = 26 ohm-cm, chlorides = 49,950 ppm). Since the project is located within 2,500 feet of a major water body with chlorides content more than 12,000 ppm, the superstructure and substructure are classified as extremely aggressive.



7.0 PRELIMINARY CONSTRUCTION CONSIDERATIONS

The proposed roadway improvements and structures should be installed in accordance with the current FDOT Standard Specifications for Road and Bridge Construction (SSRBC).

7.1 Protection of Existing Structures and Vibration Monitoring

After the final design option is selected, recommendations for protection of the existing structures and vibrations monitoring program should be provided. During construction near the existing bridge, and/or existing buildings, precautions need to be taken in order to protect the existing structures. In order to avoid impacting and damaging the existing structures with vibrations, we recommend the following:

1. Protection of the existing structures in accordance with Section 108 of the specifications, [including survey and monitoring for settlement](#).
2. Vibrations monitoring in accordance with FDM Chapter 117 and Section 108 of the specifications.

We recommend the contractor inspect and survey the condition of the existing structures, pre and post construction, in accordance with Section 108 of the Specifications for excavation and construction of the foundations for the planned bridge replacement.

In an effort to estimate approximate vibrations induced by piling operations at a specific distance from the source, AREHNA conducted a preliminary estimation using a Peak Particle Velocity (PPV) approach. This was based on the type and amount of energy imposed by typical hammers used for efficiently driving 24-inch and 30-inch piles in the encountered soil conditions. The selected hammers for this preliminary analysis are:

- For 24-in PSCP: DELMAG D46-32 with a rated energy of 122.2 kip-ft.
- For 30-in PSCP: APE D70-52 with a rated energy of 173.6 kip-ft.

Following FDOT Standard Specifications, vibration levels should not exceed 0.5 in/s. Published recognized data from vibration induced construction works, such as Amick and Gendreau (2000), Wiss (1981), Heung (2007) and Turkel et al. (2023) proposed attenuation relationships with scaled distance and PPV. Based upon the latest works by Turkel et al. (2003) sponsored by FDOT research project BD24 TWO 977-33, at a scaled distance of 5.0 ft / $\sqrt{\text{kip-ft}}$, the PPV limit of 0.5 in/s is not exceeded for soils typical of Florida. The distances corresponding to the hammer sizes selected for this study predict a source distance of approximately 55 and 65 ft would not exceed the vibration trigger levels defined by the FDOT for a 24-in and 30-in PSCP, respectively. It should be noted that the estimate shown above is based on empirical correlations, which may not accurately predict the anticipated vibration levels since many factors are involved, such as actual hammer energy of hammer that will be used in construction, subsurface



conditions (i.e., rock vs. soil), type of hammer being used (i.e., variable moment hammer), frequency during driving, etc. .

Since some of the existing structures are located within these distances, once the final design option is chosen, the design team should provide recommendations for safeguarding the existing structures and provide recommendations for a vibration monitoring program. To prevent adverse effects on the existing structures from vibrations, the design team may consider evaluating the following potential recommendations:

- Performing pile holes to pile minimum tip elevation and conducting 100% dynamic testing. This may include the installation of casing to pile minimum tip elevation and cleaning the hole down to casing tip elevation.
- Commencing pile driving with the pile nearest to the existing structure and progressing away from it.
- Lowering the threshold from the FDOT Specifications for vibrations levels (<0.5 in/s) so that the Contractor means and methods will achieve the lower threshold.
- Locate the proposed bridge bents and piers as far as possible from the existing bents and piers.

It is important to note that the final recommendation should be tailored to the selected foundation system and its location relative to the proposed structures.

7.2 Site Preparation

7.2.1 Clearing and Grubbing

The initial step in new pavement, embankment and/or subgrade preparation within the subject construction area should generally consist of the removal of existing asphalt. The asphalt should be removed from the construction areas in accordance with Section 110 of the FDOT Standard Specifications for Road and Bridge Construction.

The stripping operations should be observed and documented by qualified personnel (defined as a geotechnical engineer or engineering technician working under the direction of a geotechnical engineer or CEI/FDOT construction personnel) in order to confirm that conditions are as anticipated and to evaluate the acceptability of the exposed materials as well as the unacceptability of the removed material.

7.2.2 Surface Water and Shallow Groundwater Control

Dewatering may be required depending on groundwater levels at the time of construction to achieve compaction requirements or trench excavations for utilities or drainage structures, if needed. It should be performed in accordance with Section 455-28 of the Standard Specifications.



Excavations should be made in accordance with Section 125 and 455-29 of the Standard Specifications. If compaction cannot be achieved due to pumping soils, these soils may be removed to depths of 1 to 2 feet below design grades and backfilled with structural fill as long as FDOT Standard Plans Indices 120-001 and 120-002 are followed.

7.2.3 Exposed Soil Treatment

Following stripping operations and documentation of the acceptability of the exposed surface by qualified personnel, the exposed sandy soils should be compacted in accordance with Section 120-9 of the Standard Specifications.

Structural Fill Placement and Compaction – Structural fill or backfill, as required in accordance with Index 120-001, should be placed and compacted in accordance with Sections 120-7, 120-8 and 120-9 of the Standard Specifications. Certain types of A-2-4 materials may be more difficult to compact than the cleaner sands due to their fines content and associated moisture sensitivity.

7.2.4 Erosion Control

Erosion control should be established in accordance with Section 104 of the Standard Specifications.

7.2.5 Temporary Excavation Stability

Excavations shall be performed in accordance with Section 104 of the FDOT Standard Specifications.



8.0 RECOMMENDATIONS FOR ADDITIONAL GEOTECHNICAL EXPLORATION

This preliminary geotechnical exploration was based on limited soil borings for a PD&E Study at this site. We recommend performing a detailed geotechnical exploration in accordance with FDOT Soil and Foundation Handbook and Structures Design Guidelines once a final design option is selected. We also recommend that an environmental study be performed to evaluate the extent of any petroleum product on the site that may be present as indicated by the petroleum odor in some of the borings.



9.0 FHWA CHECKLIST

We have completed the FHWA Checklist for this exploration in accordance with the Structure Design Guidelines. We have included Section A, Site Investigation Information and Section G, Structure Foundations – Driven Piles and Drilled Shafts and Retaining Walls in **Appendix F**.



10.0 BASIS FOR RECOMMENDATIONS

The analysis and recommendations submitted in this report are based upon the data obtained from the soil borings performed at the locations indicated. Regardless of the thoroughness of a geotechnical exploration, there is always a possibility that conditions may be different from those at specific boring locations and that conditions will not be as anticipated by the designers or contractors. In addition, the construction process itself may alter soil conditions. AREHNA is not responsible for the conclusions, opinions or recommendations made by others based on the data presented in this report.

The assessment of site environmental conditions or the presence of contaminants in the soil, rock, surface water or groundwater of the site was beyond the scope of this exploration. Any statements in this report regarding odors, staining of soils, or other unusual conditions observed are strictly for the information of AtkinsRéalis and Town of Bay Harbor Islands.

This report was prepared exclusively for AtkinsRéalis and Town of Bay Harbor Islands by AREHNA. The quality of information, conclusions and estimates contained herein is consistent with the level of effort involved in AREHNA's services and based on: i) information available at the time of preparation, ii) data supplied by outside sources and iii) the assumptions, conditions and qualifications set forth in this report. This report is intended to be used by AtkinsRéalis and Town of Bay Harbor Islands only, subject to the terms and conditions of its contract with AtkinsRéalis. Any other use of, or reliance on, this report by any third party is at that party's sole risk.



11.0 APPENDICES

APPENDIX A	USGS Topographic Survey & USDA Soil Survey Map	A-1
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	Summary of Corrosion Test Results – Table 3	B-3
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APPENDIX F	FHWA Checklist	F-1 thru F-23

APPENDIX A

USGS Topographic Survey & USDA Soil Survey Map

Boring Location Plan

Report of Core Borings – Bridge

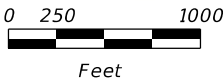
Report of Core Borings – Walls

USDA SOIL SURVEY MAP

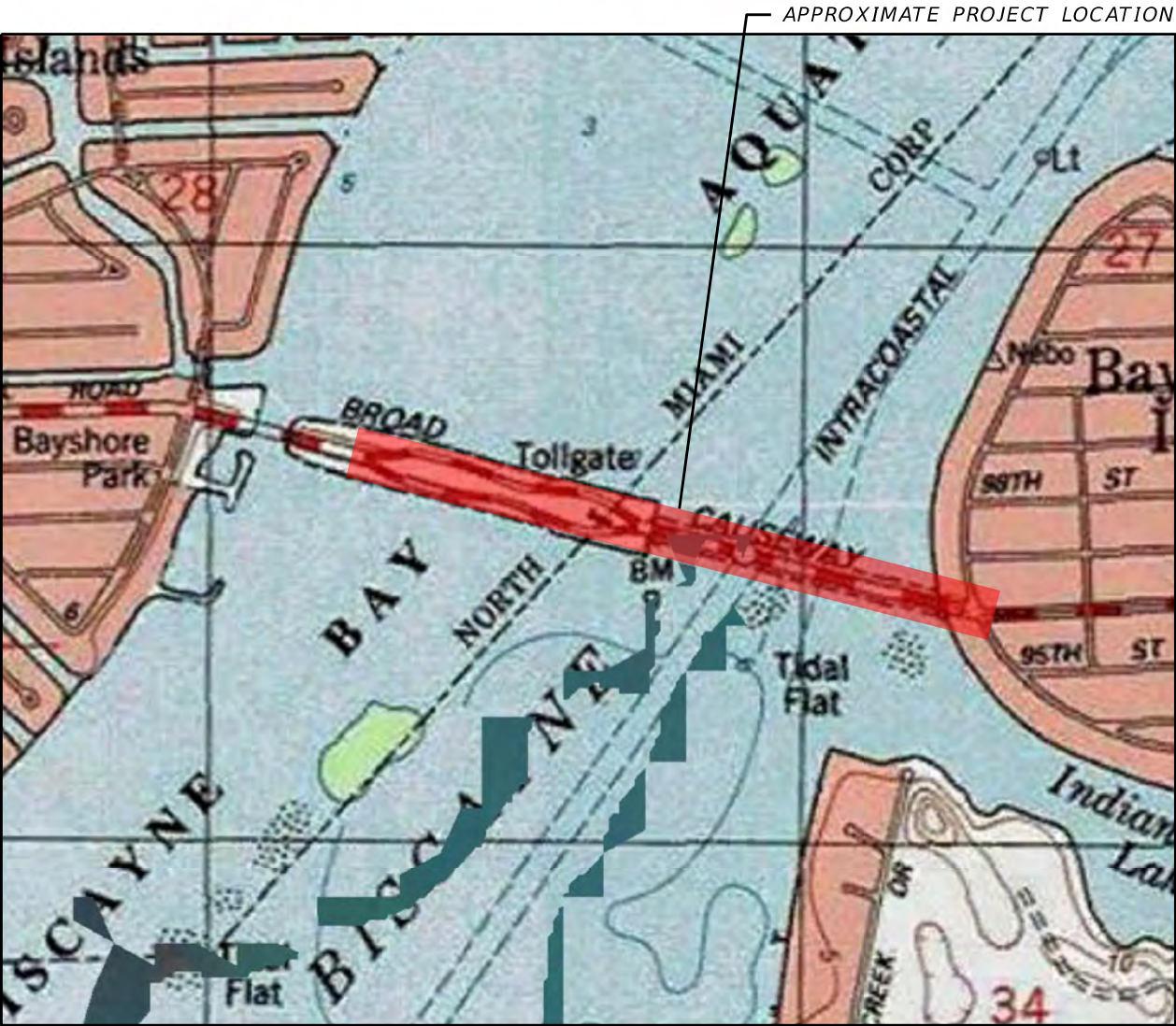


REFERENCE: USDA SOIL SURVEY OF MIAMI-DADE COUNTY, FLORIDA

TOWNSHIP: 42 S
RANGE: 43 E
SECTION: 4, 9

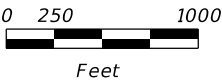


USGS TOPOGRAPHIC MAP



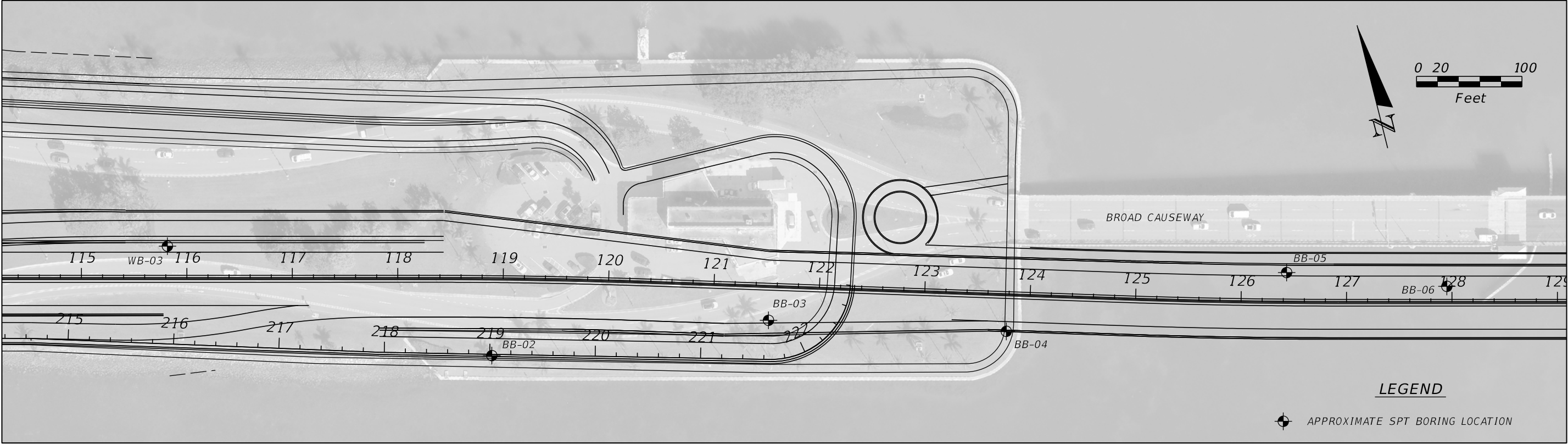
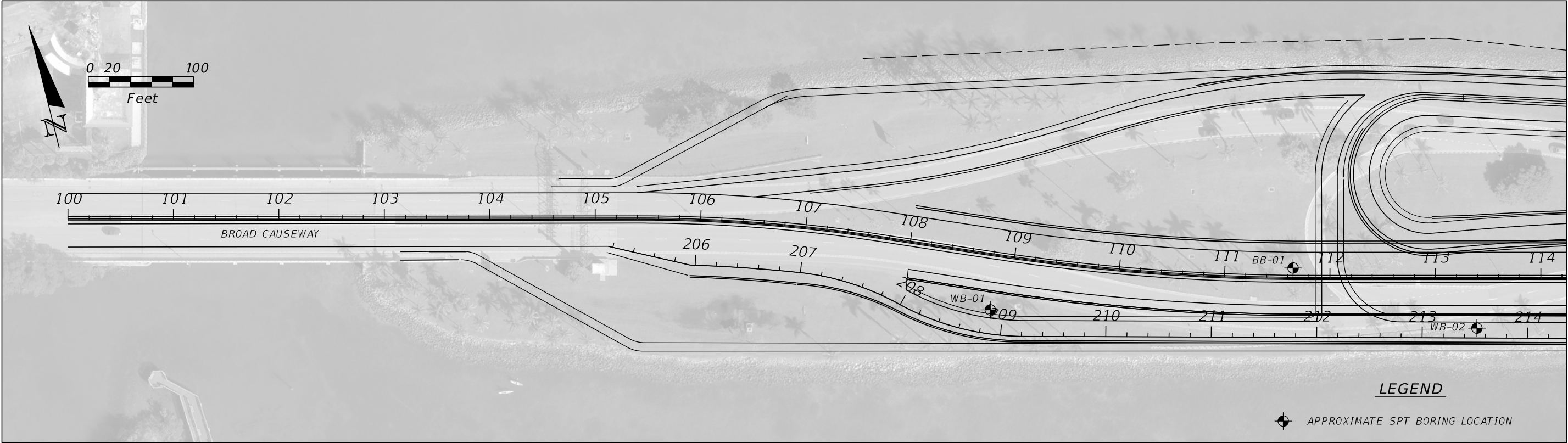
REFERENCE: "NORTH MIAMI, FLORIDA" USGS QUADRANGLE MAP

TOWNSHIP: 52 S
RANGE: 42 E
SECTION: 27, 28



REVISIONS				ANGELA L. ALBA, P.E. P.E. LICENSE NUMBER 58538 AREHNA ENGINEERING, INC. 12296 WILES ROAD CORAL SPRINGS, FLORIDA 33076	TOWN OF BAY HARBOR ISLANDS			USDA & USGS VICINITY MAPS	SHEET NO. A-1
DATE	DESCRIPTION	DATE	DESCRIPTION		ROAD NO.	COUNTY	PROJECT ID		
					922	MIAMI-DADE	BC-160		

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REVISIONS				ENGINEER OF RECORD	TOWN OF BAY HARBOR ISLANDS			SHEET NO.
DATE	DESCRIPTION	DATE	DESCRIPTION		ROAD NO.	COUNTY	PROJECT ID	
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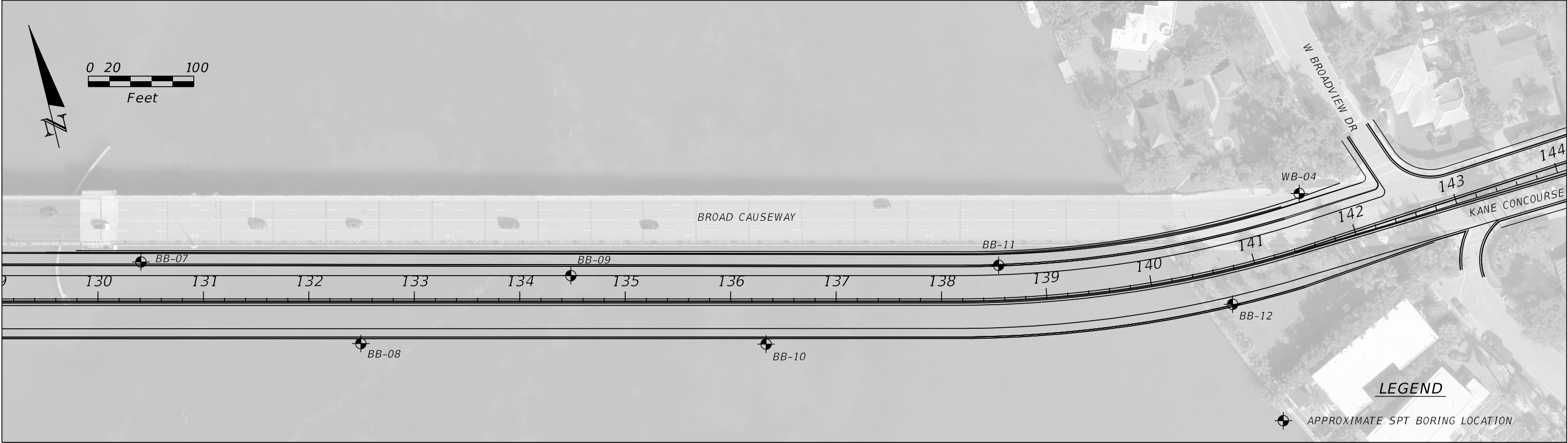
ANGELA L. ALBA, P.E.
LICENSE NUMBER: 58538
AREHNA ENGINEERING, INC.
12296 WILES ROAD
CORAL SPRINGS, FL 33076

BORING LOCATION PLAN

A-2

THE OFFICIAL RECORD OF THIS SHEET IS THE ELECTRONIC FILE DIGITALLY SIGNED AND SEALED UNDER RULE 61G15-23.004, F.A.C.

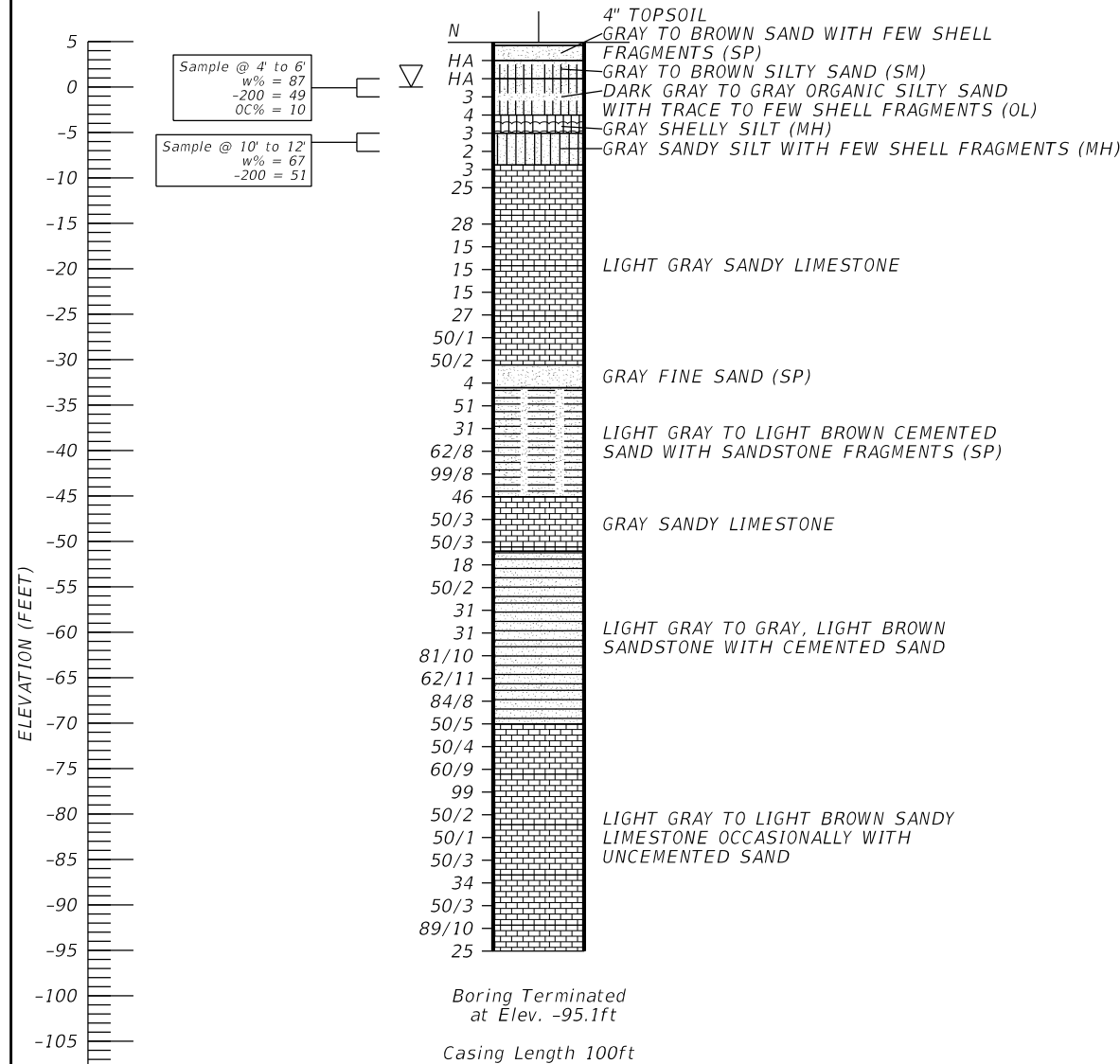
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REVISIONS				ENGINEER OF RECORD	TOWN OF BAY HARBOR ISLANDS			BORING LOCATION PLAN	SHEET NO.
DATE	DESCRIPTION	DATE	DESCRIPTION		ROAD NO.	COUNTY	PROJECT ID		
					922	MIAMI-DADE	BC-160		A-3

THE OFFICIAL RECORD OF THIS SHEET IS THE ELECTRONIC FILE DIGITALLY SIGNED AND SEALED UNDER RULE 61G15-23.004, F.A.C.

Bore #	BB-01
Reference	CL3
Station	111+65
Offset	10 LT
Latitude	25.8883939
Longitude	-80.1476146
Elevation	4.9'
Vertical Datum	NAVD88
Date	3/22/2023
Driller	W. CADONO
Hammer	Auto
Rig	CME-45



- NOTES:
1. SUBSURFACE CONDITIONS SHOWN ON THE BORINGS REPRESENT THE CONDITION AT THE BORING LOCATIONS. SUBSURFACE VARIATIONS BETWEEN BORINGS SHOULD BE ANTICIPATED. UNIFIED SOIL CLASSIFICATION SHOWN ON THE BORINGS IS BASED ON VISUAL CLASSIFICATION AND LABORATORY TESTS.
 2. THE LIMESTONE STRATA AND/OR ROCK-LIKE MATERIAL ENCOUNTERED WITHIN THE PROJECT SITE CORRESPONDS TO A HIGHLY VARIABLE ROCK FORMATION THAT TYPICALLY OFFERS HIGH RESISTANCE TO EXCAVATION, UNDERGROUND INSTALLATIONS, AND/OR SHEET PILE INSTALLATION/EXTRACTION. SPECIAL EQUIPMENT AND BREAKING TOOLS MAY BE REQUIRED TO EXCAVATE THIS MATERIAL. THIS MATERIAL IS ALSO DIFFICULT TO DEWATER DUE TO ITS HIGH POROSITY AND PERMEABILITY. FOR SHEET PILE, DRIVEN PILE/PANEL, AND OTHER RETAINING WALL/BULKHEAD SYSTEM RELATED WORK, THESE LIMESTONE LAYERS, AND/OR ROCK-LIKE MATERIAL MAY REQUIRE PREDRILLING TO PREVENT REFUSAL CONDITIONS, STRUCTURAL DAMAGE, AND TO MINIMIZE VIBRATION INDUCED SETTLEMENTS TO NEARBY STRUCTURES.

REVISIONS				ENGINEER OF RECORD	TOWN OF BAY HARBOR ISLANDS			REPORT OF CORE BORINGS	SHEET NO.
DATE	DESCRIPTION		DATE	DESCRIPTION	ROAD NO.	COUNTY	PROJECT ID		A-4
				ANGELA L. ALBA, P.E. LICENSE NUMBER: 58538 AREHNA ENGINEERING, INC. 12296 WILES ROAD CORAL SPRINGS, FL 33076	922	MIAMI-DADE	BC-160		



LEGEND

SP UNIFIED SOIL CLASSIFICATION SYSTEM (ASTM D 2488) GROUP SYMBOL AS DETERMINED BY VISUAL REVIEW

▽ GROUNDWATER TABLE

N NUMBERS TO THE LEFT OF BORINGS INDICATE SPT VALUE FOR 12 INCHES OF PENETRATION (UNLESS OTHERWISE NOTED).

HA HAND AUGER

WH FELL UNDER WEIGHT OF ROD AND HAMMER

WR FELL UNDER WEIGHT OF ROD

50/4 NUMBER OF BLOWS FOR 4 INCHES OF PENETRATION

← LOSS OF CIRCULATION OF DRILLING FLUID (%)

| CASING

w% NATURAL MOISTURE CONTENT (%)

-200 FINES PASSING THE #200 STANDARD SIEVE (%)

OC ORGANIC CONTENT (%)

PI PLASTICITY INDEX (%)

LL LIQUID LIMIT (%)

NP NON PLASTIC

***** THIS RUN IS LESS THAN 5 FEET LONG. RECOVERY AND RQD OBTAINED IN RELATIONSHIP TO THE LENGTH CORED.

REC CORE RECOVERY (%)

RQD ROCK QUALITY DESIGNATION (%)

Qu UNCONFINED COMPRESSIVE STRENGTH (KSF)

Qt SPLITTING TENSILE STRENGTH (KSF)

⊕ APPROXIMATE SPT BORING LOCATION

AREHNA PROJECT NO. B-22-074

ELEVATION (FEET)

ASPHALT

GRAVEL

SAND

SILTY SAND

SHELLY SAND

GRAVELLY SAND

CEMENTED SAND

ORGANIC SAND

SANDY CLAY

SILT

SANDY SILT

SHELLY SILT

SANDSTONE

LIMESTONE

AUTOMATIC HAMMER	
GRANULAR MATERIALS- RELATIVE DENSITY	SPT N-VALUE (BLOWS/FT.)
VERY LOOSE LOOSE MEDIUM DENSE DENSE VERY DENSE	LESS THAN 3 3 to 8 8 to 24 24 to 40 GREATER THAN 40
SILTS AND CLAYS CONSISTENCY	SPT N-VALUE (BLOWS/FT.)
VERY SOFT SOFT FIRM STIFF VERY STIFF HARD	LESS THAN 1 1 to 3 3 to 6 6 to 12 12 to 24 GREATER THAN 24

ENVIRONMENTAL CLASSIFICATION:

SUBSTRUCTURE CONCRETE: EXTREMELY AGGRESSIVE
(RESISTIVITY = 26 OHM-CM, CHLORIDES = 49,950 PPM)

SUBSTRUCTURE STEEL: EXTREMELY AGGRESSIVE
(RESISTIVITY = 26 OHM-CM, CHLORIDES = 49,950 PPM)

SUPERSTRUCTURE EXTREMELY AGGRESSIVE

TEST RESULTS:

RESISTIVITY SOIL AND WATER
26 TO 690 OHM-CM

CHLORIDES 15 TO 49,950 PPM

SULFATES 300 TO 330 PPM

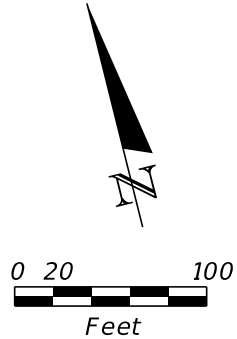
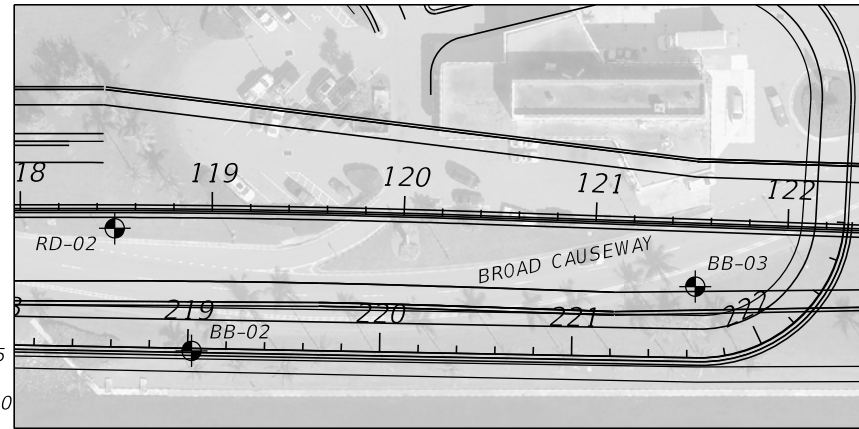
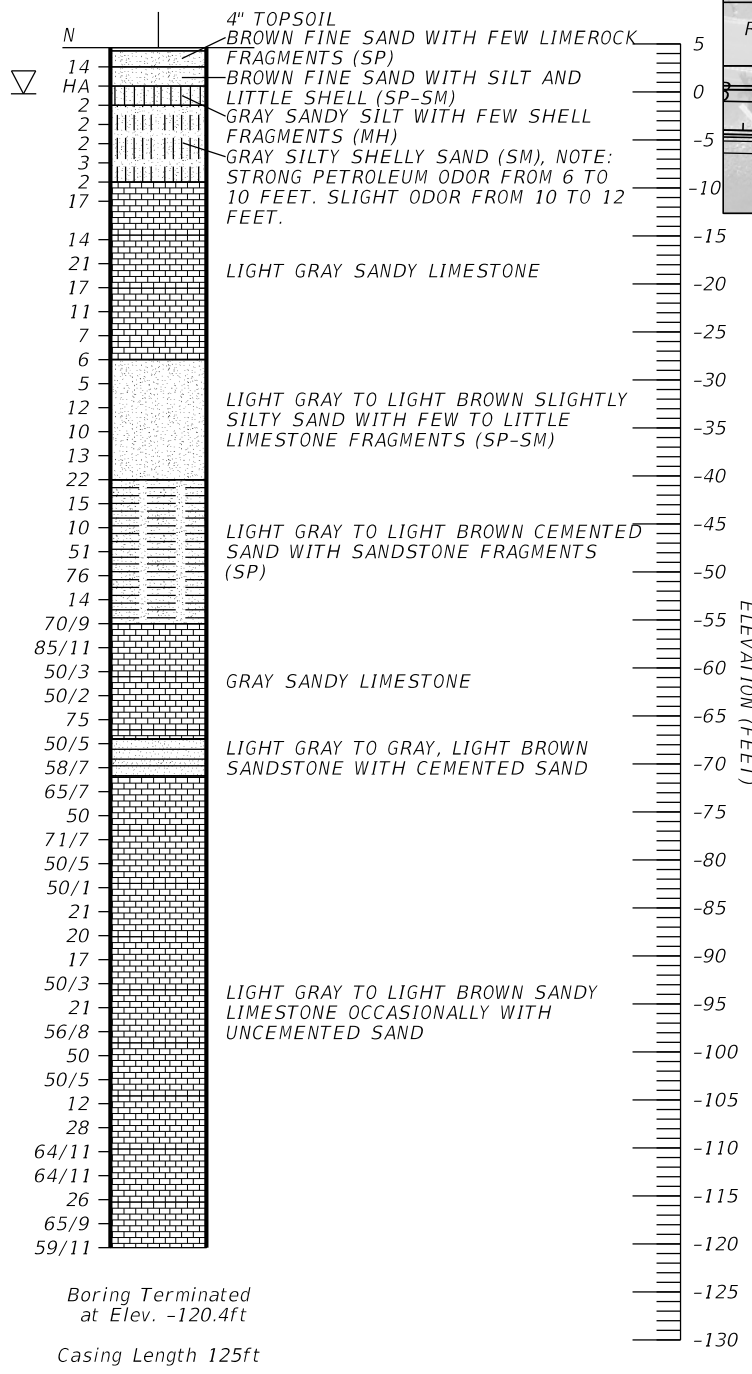
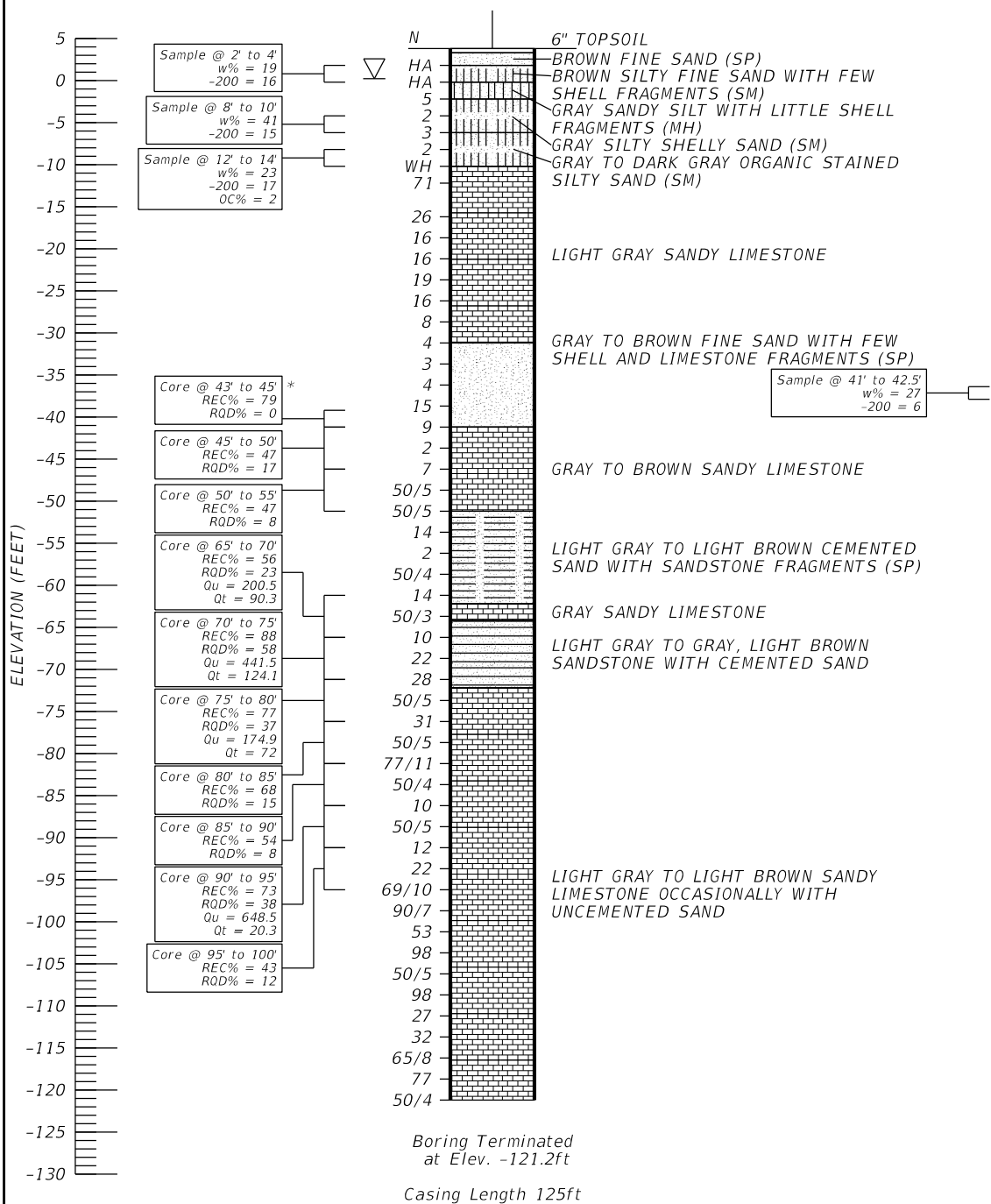
pH 7.1 TO 7.9

TYPICALLY TOOLS MAY BE DRIVEN TO

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Elevation 3.8'
Vertical Datum NAVD88
Date 3/21/2023
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Hammer Auto
Rig CME-45

Bore # BB-03
Reference CL3
Station 121+53
Offset 32 RT
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Longitude -80.1447453
Elevation 4.6'
Vertical Datum NAVD88
Date 3/24/2023
Driller W. CADONO
Hammer Auto
Rig CME-45



LEGEND

ASPHALT	ORGANIC SAND
GRAVEL	SANDY CLAY
SAND	SILT
SILTY SAND	SANDY SILT
SHELLY SAND	SHELLY SILT
GRAVELLY SAND	SANDSTONE
CEMENTED SAND	LIMESTONE

SP UNIFIED SOIL CLASSIFICATION SYSTEM (ASTM D 2488) GROUP SYMBOL AS DETERMINED BY VISUAL REVIEW

▽ GROUNDWATER TABLE

N NUMBERS TO THE LEFT OF BORINGS INDICATE SPT VALUE FOR 12 INCHES OF PENETRATION (UNLESS OTHERWISE NOTED).

HA HAND AUGER

WH FELL UNDER WEIGHT OF ROD AND HAMMER

WR FELL UNDER WEIGHT OF ROD

50/4 NUMBER OF BLOWS FOR 4 INCHES OF PENETRATION

← LOSS OF CIRCULATION OF DRILLING FLUID (%)

|| CASING

w% NATURAL MOISTURE CONTENT (%)

-200 FINES PASSING THE #200 STANDARD SIEVE (%)

OC ORGANIC CONTENT (%)

PI PLASTICITY INDEX (%)

LL LIQUID LIMIT (%)

NP NON PLASTIC

* THIS RUN IS LESS THAN 5 FEET LONG. RECOVERY AND RQD OBTAINED IN RELATIONSHIP TO THE LENGTH CORED.

REC CORE RECOVERY (%)

RQD ROCK QUALITY DESIGNATION (%)

Qu UNCONFINED COMPRESSIVE STRENGTH (KSF)

Qt SPLITTING TENSILE STRENGTH (KSF)

⊕ APPROXIMATE SPT BORING LOCATION

AREHNA PROJECT NO. B-22-074

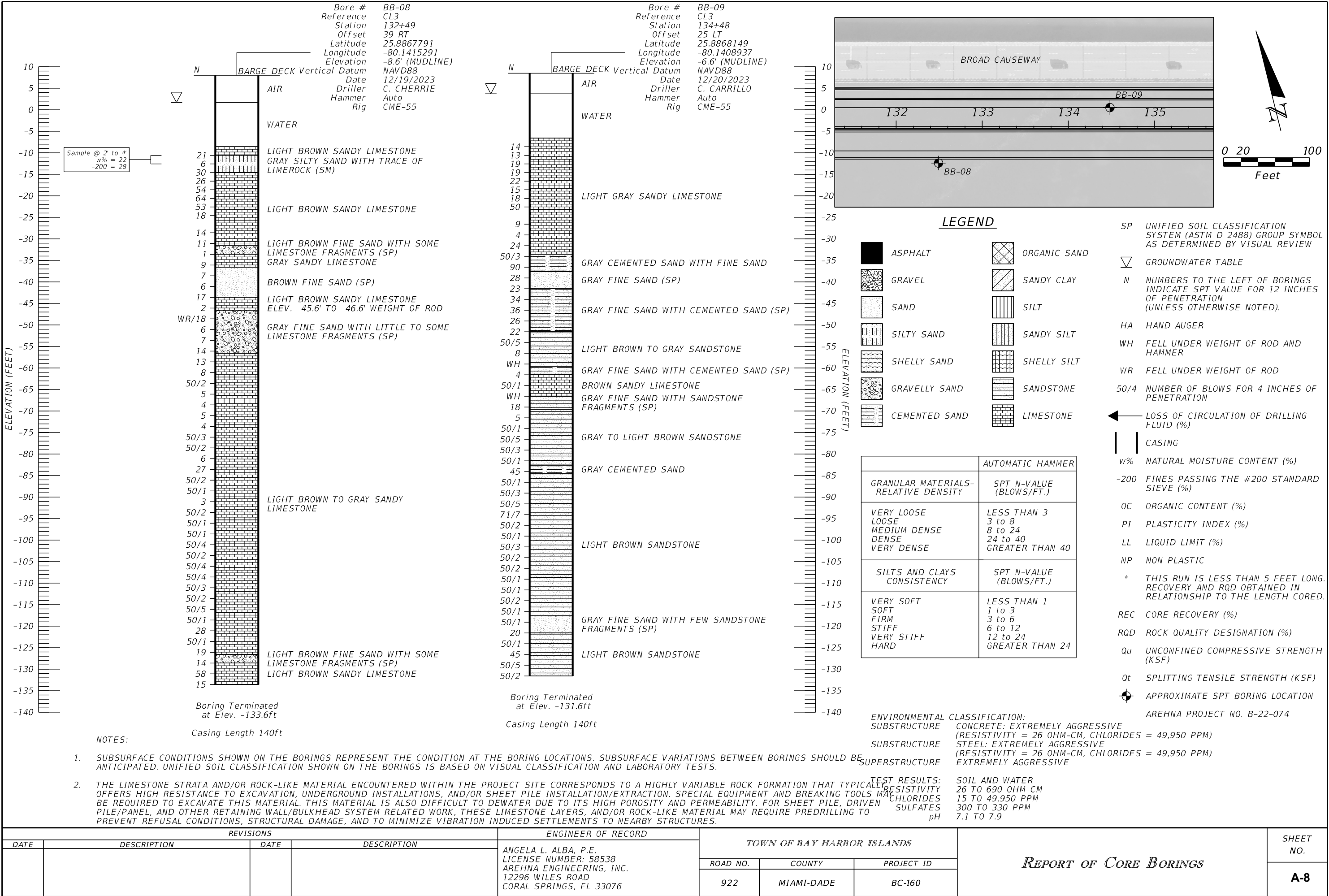
ENVIRONMENTAL CLASSIFICATION:
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SUBSTRUCTURE STEEL: EXTREMELY AGGRESSIVE (RESISTIVITY = 26 OHM-CM, CHLORIDES = 49,950 PPM)
SUPERSTRUCTURE EXTREMELY AGGRESSIVE

TEST RESULTS: SOIL AND WATER
RESISTIVITY 26 TO 690 OHM-CM
CHLORIDES 15 TO 49,950 PPM
SULFATES 300 TO 330 PPM
pH 7.1 TO 7.9

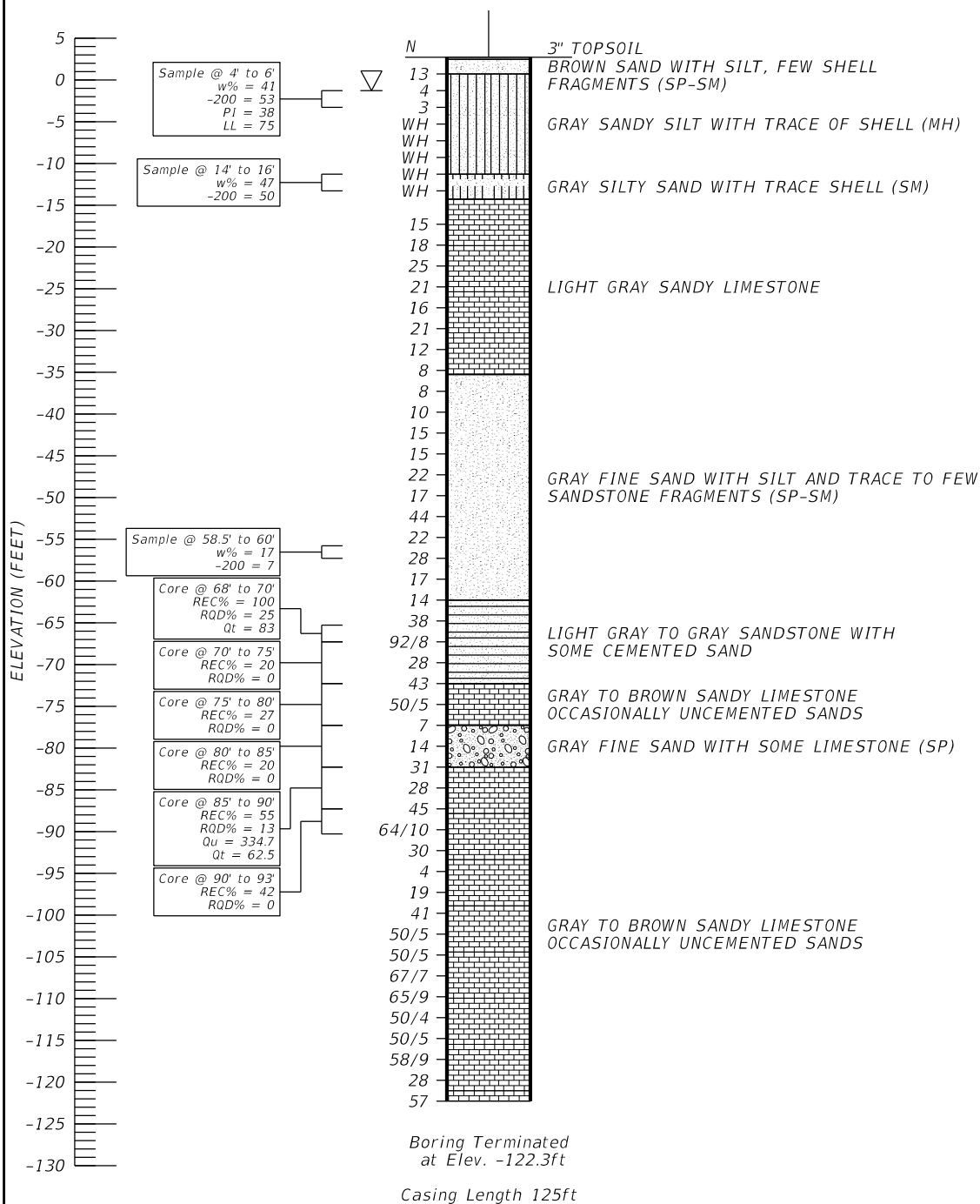
NOTES:

- SUBSURFACE CONDITIONS SHOWN ON THE BORINGS REPRESENT THE CONDITION AT THE BORING LOCATIONS. SUBSURFACE VARIATIONS BETWEEN BORINGS SHOULD BE ANTICIPATED. UNIFIED SOIL CLASSIFICATION SHOWN ON THE BORINGS IS BASED ON VISUAL CLASSIFICATION AND LABORATORY TESTS.
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REVISIONS				ENGINEER OF RECORD	TOWN OF BAY HARBOR ISLANDS			SHEET NO.
DATE	DESCRIPTION	DATE	DESCRIPTION	ANGELA L. ALBA, P.E. LICENSE NUMBER: 58538 AREHNA ENGINEERING, INC. 12296 WILES ROAD CORAL SPRINGS, FL 33076				
					ROAD NO.	COUNTY	PROJECT ID	
					922	MIAMI-DADE	BC-160	A-5
REPORT OF CORE BORINGS								



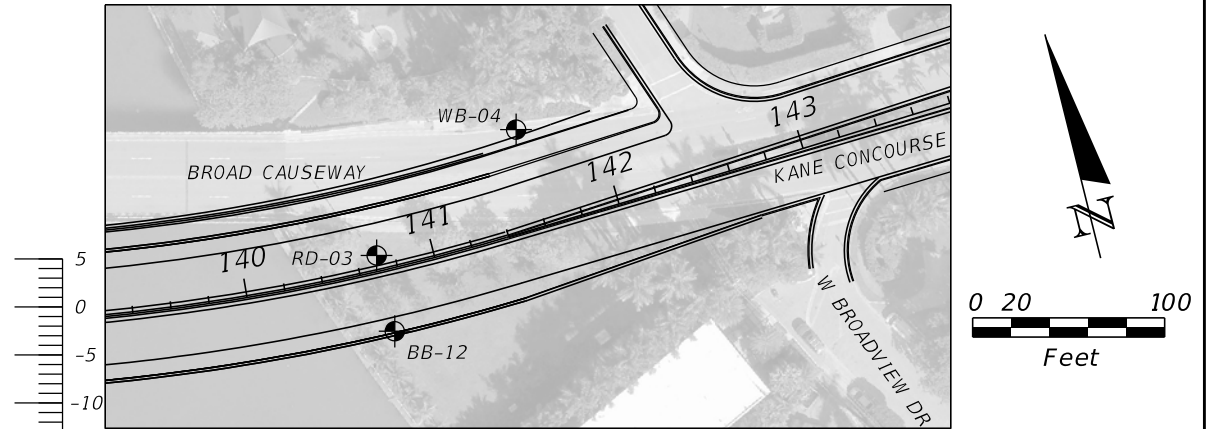
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Elevation 2.7'
Vertical Datum NAVD88
Date 3/29/2023
Driller A. MILAN
Hammer Auto
Rig CME-45



NOTES:

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REVISIONS				ENGINEER OF RECORD			TOWN OF BAY HARBOR ISLANDS			REPORT OF CORE BORINGS	SHEET NO.
DATE	DESCRIPTION	DATE	DESCRIPTION	ANGELA L. ALBA, P.E. LICENSE NUMBER: 58538 AREHNA ENGINEERING, INC. 12296 WILES ROAD CORAL SPRINGS, FL 33076			ROAD NO.	COUNTY	PROJECT ID		
							922	MIAMI-DADE	BC-160		
											A-10



LEGEND

ASPHALT	ORGANIC SAND
GRAVEL	SANDY CLAY
SAND	SILT
SILTY SAND	SANDY SILT
SHELLY SAND	SHELLY SILT
GRAVELLY SAND	SANDSTONE
CEMENTED SAND	LIMESTONE

	AUTOMATIC HAMMER
GRANULAR MATERIALS- RELATIVE DENSITY	SPT N-VALUE (BLOWS/FT.)
VERY LOOSE LOOSE MEDIUM DENSE DENSE VERY DENSE	LESS THAN 3 3 to 8 8 to 24 24 to 40 GREATER THAN 40
SILTS AND CLAYS CONSISTENCY	SPT N-VALUE (BLOWS/FT.)
VERY SOFT SOFT FIRM STIFF VERY STIFF HARD	LESS THAN 1 1 to 3 3 to 6 6 to 12 12 to 24 GREATER THAN 24

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STEEL: EXTREMELY AGGRESSIVE
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SUPERSTRUCTURE EXTREMELY AGGRESSIVE

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CHLORIDES 15 TO 49,950 PPM
SULFATES 300 TO 330 PPM
pH 7.1 TO 7.9

SP UNIFIED SOIL CLASSIFICATION
SYSTEM (ASTM D 2488) GROUP SYMBOL
AS DETERMINED BY VISUAL REVIEW

▽ GROUNDWATER TABLE

N NUMBERS TO THE LEFT OF BORINGS
INDICATE SPT VALUE FOR 12 INCHES
OF PENETRATION
(UNLESS OTHERWISE NOTED).

HA HAND AUGER

WH FELL UNDER WEIGHT OF ROD AND
HAMMER

WR FELL UNDER WEIGHT OF ROD

50/4 NUMBER OF BLOWS FOR 4 INCHES OF
PENETRATION

← LOSS OF CIRCULATION OF DRILLING
FLUID (%)

| CASING

w% NATURAL MOISTURE CONTENT (%)

-200 FINES PASSING THE #200 STANDARD
SIEVE (%)

OC ORGANIC CONTENT (%)

PI PLASTICITY INDEX (%)

LL LIQUID LIMIT (%)

NP NON PLASTIC

* THIS RUN IS LESS THAN 5 FEET LONG.
RECOVERY AND RQD OBTAINED IN
RELATIONSHIP TO THE LENGTH CORED.

REC CORE RECOVERY (%)

RQD ROCK QUALITY DESIGNATION (%)

Qu UNCONFINED COMPRESSIVE STRENGTH
(KSF)

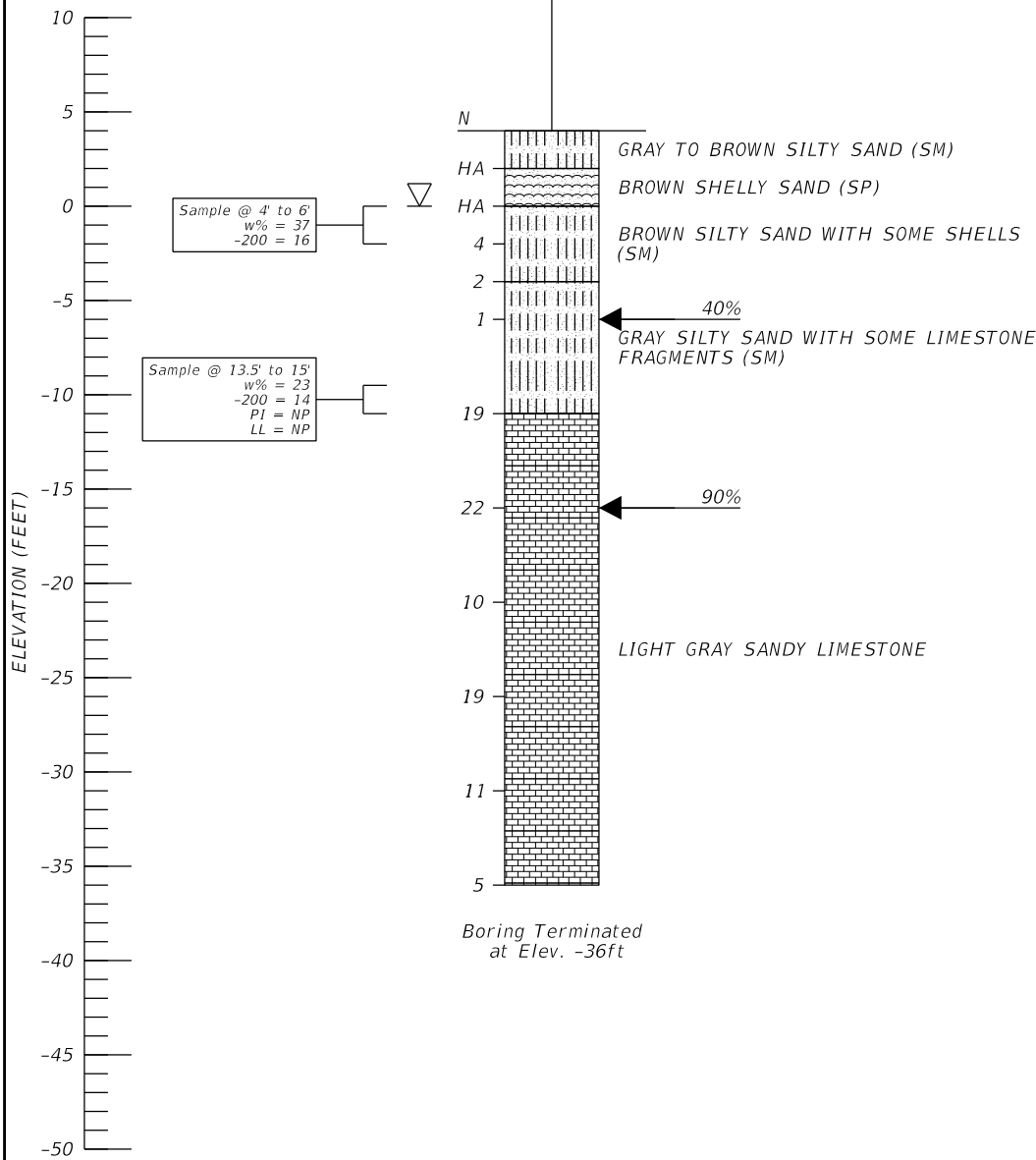
Qt SPLITTING TENSILE STRENGTH (KSF)

⊕ APPROXIMATE SPT BORING LOCATION

AREHNA PROJECT NO. B-22-074

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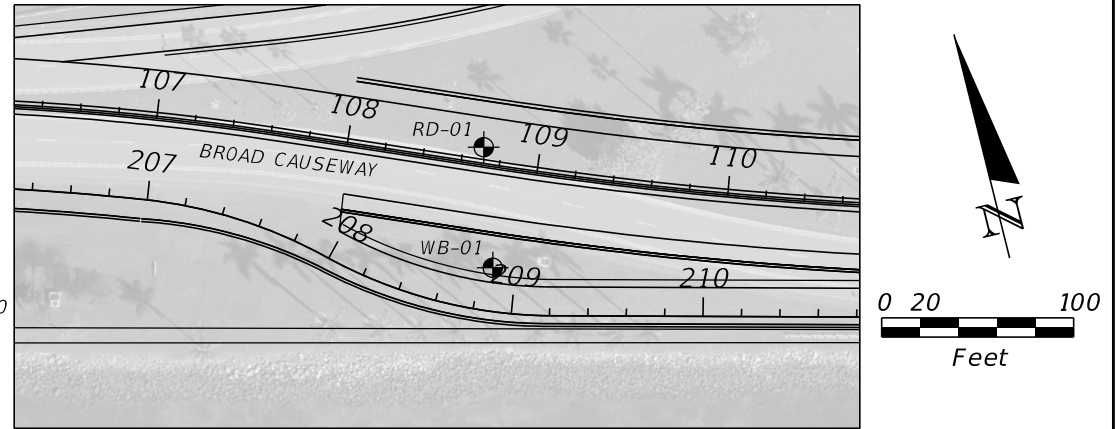
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Station 108+84
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Latitude 25.8884841
Longitude -80.1484906
Elevation 4'
Vertical Datum NAVD88
Date 3/20/2023
Driller M. SEIBERT
Hammer Auto
Rig CME-45



NOTES:

- SUBSURFACE CONDITIONS SHOWN ON THE BORINGS REPRESENT THE CONDITION AT THE BORING LOCATIONS. SUBSURFACE VARIATIONS BETWEEN BORINGS SHOULD BE ANTICIPATED. UNIFIED SOIL CLASSIFICATION SHOWN ON THE BORINGS IS BASED ON VISUAL CLASSIFICATION AND LABORATORY TESTS.
- THE LIMESTONE STRATA AND/OR ROCK-LIKE MATERIAL ENCOUNTERED WITHIN THE PROJECT SITE CORRESPONDS TO A HIGHLY VARIABLE ROCK FORMATION THAT TYPICALLY OFFERS HIGH RESISTANCE TO EXCAVATION, UNDERGROUND INSTALLATIONS, AND/OR SHEET PILE INSTALLATION/EXTRACTION. SPECIAL EQUIPMENT AND BREAKING TOOLS MAY BE REQUIRED TO EXCAVATE THIS MATERIAL. THIS MATERIAL IS ALSO DIFFICULT TO DEWATER DUE TO ITS HIGH POROSITY AND PERMEABILITY. FOR SHEET PILE, DRIVEN PILE/PANEL, AND OTHER RETAINING WALL/BULKHEAD SYSTEM RELATED WORK, THESE LIMESTONE LAYERS, AND/OR ROCK-LIKE MATERIAL MAY REQUIRE PREDRILLING TO PREVENT REFUSAL CONDITIONS, STRUCTURAL DAMAGE, AND TO MINIMIZE VIBRATION INDUCED SETTLEMENTS TO NEARBY STRUCTURES.

REVISIONS				ENGINEER OF RECORD		TOWN OF BAY HARBOR ISLANDS			REPORT OF CORE BORINGS	SHEET NO. A-11
DATE	DESCRIPTION	DATE	DESCRIPTION	ANGELA L. ALBA, P.E. LICENSE NUMBER: 58538 AREHNA ENGINEERING, INC. 12296 WILES ROAD CORAL SPRINGS, FL 33076		ROAD NO.	COUNTY	PROJECT ID		
						922	MIAMI-DADE	BC-160		



LEGEND

ASPHALT	ORGANIC SAND
GRAVEL	SANDY CLAY
SAND	SILT
SILTY SAND	SANDY SILT
SHELLY SAND	SHELLY SILT
GRAVELLY SAND	SANDSTONE
CEMENTED SAND	LIMESTONE

	AUTOMATIC HAMMER
GRANULAR MATERIALS- RELATIVE DENSITY	SPT N-VALUE (BLOWS/FT.)
VERY LOOSE LOOSE MEDIUM DENSE DENSE VERY DENSE	LESS THAN 3 3 to 8 8 to 24 24 to 40 GREATER THAN 40
SILTS AND CLAYS CONSISTENCY	SPT N-VALUE (BLOWS/FT.)
VERY SOFT SOFT FIRM STIFF VERY STIFF HARD	LESS THAN 1 1 to 3 3 to 6 6 to 12 12 to 24 GREATER THAN 24

ENVIRONMENTAL CLASSIFICATION:
SUBSTRUCTURE CONCRETE: EXTREMELY AGGRESSIVE
(RESISTIVITY = 26 OHM-CM, CHLORIDES = 49,950 PPM)
STEEL: EXTREMELY AGGRESSIVE
(RESISTIVITY = 26 OHM-CM, CHLORIDES = 49,950 PPM)
SUPERSTRUCTURE EXTREMELY AGGRESSIVE

TEST RESULTS: SOIL AND WATER
RESISTIVITY 26 TO 690 OHM-CM
CHLORIDES 15 TO 49,950 PPM
SULFATES 300 TO 330 PPM
pH 7.1 TO 7.9

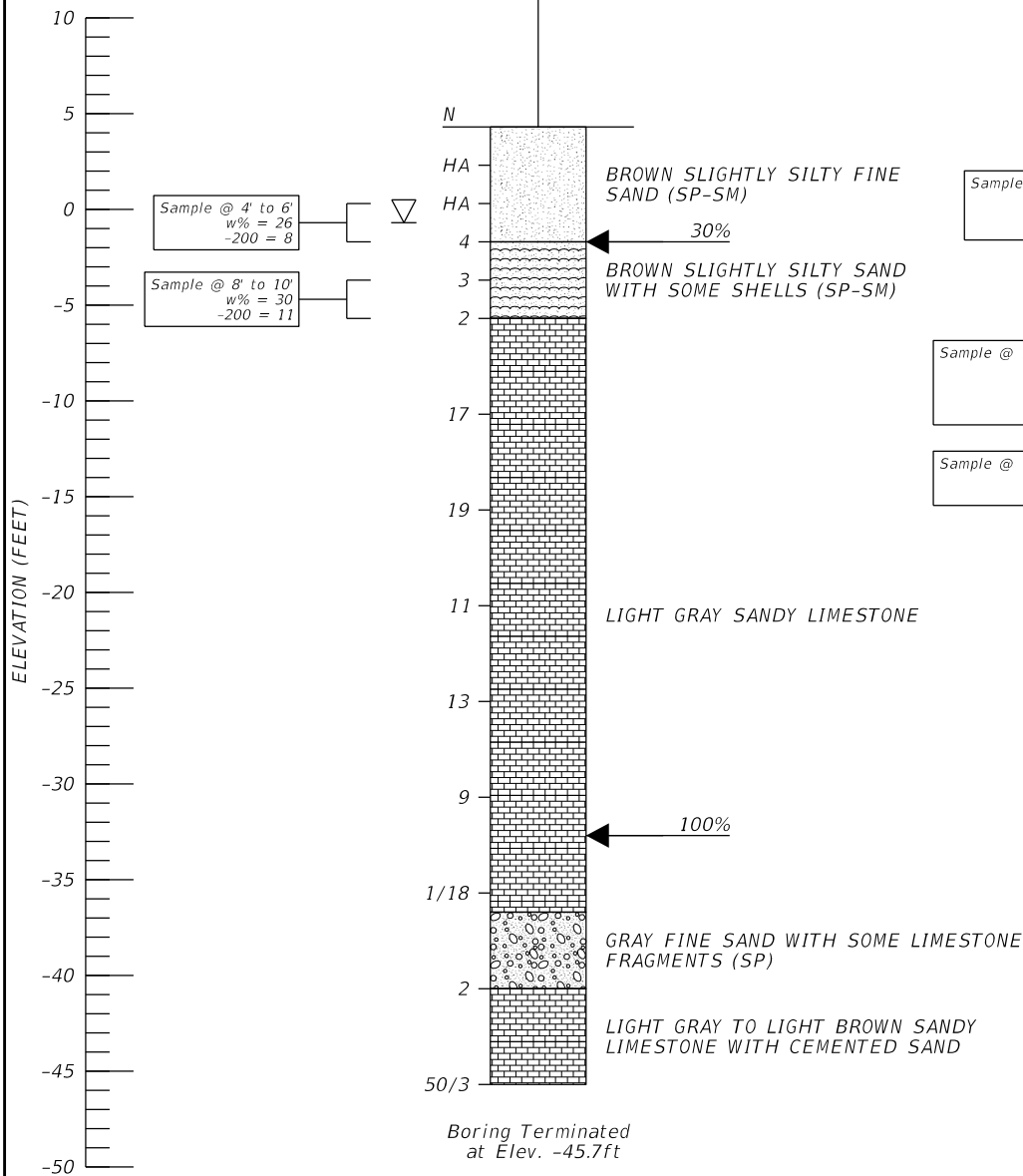
SP UNIFIED SOIL CLASSIFICATION SYSTEM (ASTM D 2488) GROUP SYMBOL AS DETERMINED BY VISUAL REVIEW
▽ GROUNDWATER TABLE
N NUMBERS TO THE LEFT OF BORINGS INDICATE SPT VALUE FOR 12 INCHES OF PENETRATION (UNLESS OTHERWISE NOTED).
HA HAND AUGER
WH FELL UNDER WEIGHT OF ROD AND HAMMER
WR FELL UNDER WEIGHT OF ROD
50/4 NUMBER OF BLOWS FOR 4 INCHES OF PENETRATION
← LOSS OF CIRCULATION OF DRILLING FLUID (%)
| CASING
w% NATURAL MOISTURE CONTENT (%)
-200 FINES PASSING THE #200 STANDARD SIEVE (%)
OC ORGANIC CONTENT (%)
PI PLASTICITY INDEX (%)
LL LIQUID LIMIT (%)
NP NON PLASTIC
* THIS RUN IS LESS THAN 5 FEET LONG. RECOVERY AND RQD OBTAINED IN RELATIONSHIP TO THE LENGTH CORED.
REC CORE RECOVERY (%)
RQD ROCK QUALITY DESIGNATION (%)
Qu UNCONFINED COMPRESSIVE STRENGTH (KSF)
Qt SPLITTING TENSILE STRENGTH (KSF)
⊕ APPROXIMATE SPT BORING LOCATION
AREHNA PROJECT NO. B-22-074

THE OFFICIAL RECORD OF THIS SHEET IS THE ELECTRONIC FILE DIGITALLY SIGNED AND SEALED UNDER RULE 61G15-23.004, F.A.C.

2/23/2024 2:24:47 PM 613767
D:\J-Arelna\Projects\2022-B-22-074 - Broad Causeway Bridge\BIBoring01.dgn

Bore # WB-02
Reference CL3
Station 113+39
Offset 47 RT
Latitude 25.8881229
Longitude -80.147144
Elevation 4.3'
Vertical Datum NAVD88
Date 3/21/2023
Driller M. SEIBERT
Hammer Auto
Rig CME-45

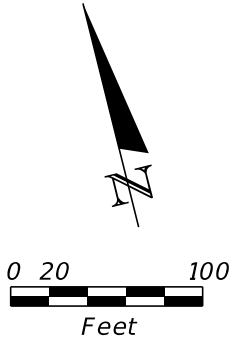
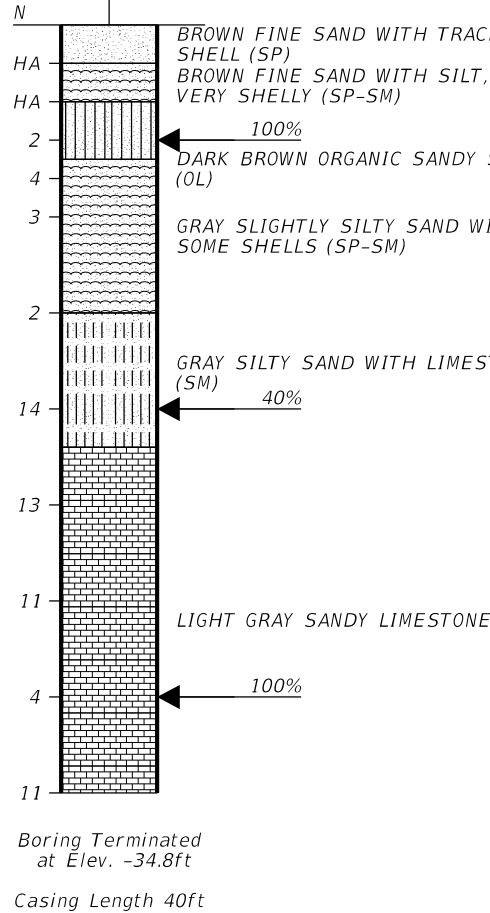
Bore # WB-03
Reference CL3
Station 115+82
Offset 31 LT
Latitude 25.8881649
Longitude -80.1463717
Elevation 5.2'
Vertical Datum NAVD88
Date 3/21/2023
Driller M. SEIBERT
Hammer Auto
Rig CME-45



Sample @ 4' to 6'
w% = 100
-200 = 58
OC% = 11

Sample @ 13.5' to 15'
w% = 29
-200 = 8
PI = NP
LL = NP

Sample @ 18.5' to 20'
w% = 28
-200 = 17



LEGEND

	ASPHALT		ORGANIC SAND
	GRAVEL		SANDY CLAY
	SAND		SILT
	SILTY SAND		SANDY SILT
	SHELLY SAND		SHELLY SILT
	GRAVELLY SAND		SANDSTONE
	CEMENTED SAND		LIMESTONE

	AUTOMATIC HAMMER
GRANULAR MATERIALS-RELATIVE DENSITY	SPT N-VALUE (BLOWS/FT.)
VERY LOOSE	LESS THAN 3
LOOSE	3 to 8
MEDIUM DENSE	8 to 24
DENSE	24 to 40
VERY DENSE	GREATER THAN 40
SILTS AND CLAYS CONSISTENCY	SPT N-VALUE (BLOWS/FT.)
VERY SOFT	LESS THAN 1
SOFT	1 to 3
FIRM	3 to 6
STIFF	6 to 12
VERY STIFF	12 to 24
HARD	GREATER THAN 24

SP	UNIFIED SOIL CLASSIFICATION SYSTEM (ASTM D 2488) GROUP SYMBOL AS DETERMINED BY VISUAL REVIEW
	GROUNDWATER TABLE
N	NUMBERS TO THE LEFT OF BORINGS INDICATE SPT VALUE FOR 12 INCHES OF PENETRATION (UNLESS OTHERWISE NOTED).
HA	HAND AUGER
WH	FELL UNDER WEIGHT OF ROD AND HAMMER
WR	FELL UNDER WEIGHT OF ROD
50/4	NUMBER OF BLOWS FOR 4 INCHES OF PENETRATION
	LOSS OF CIRCULATION OF DRILLING FLUID (%)
	CASING
w%	NATURAL MOISTURE CONTENT (%)
-200	FINES PASSING THE #200 STANDARD SIEVE (%)
OC	ORGANIC CONTENT (%)
PI	PLASTICITY INDEX (%)
LL	LIQUID LIMIT (%)
NP	NON PLASTIC
*	THIS RUN IS LESS THAN 5 FEET LONG. RECOVERY AND RQD OBTAINED IN RELATIONSHIP TO THE LENGTH CORED.
REC	CORE RECOVERY (%)
RQD	ROCK QUALITY DESIGNATION (%)
Qu	UNCONFINED COMPRESSIVE STRENGTH (KSF)
Qt	SPLITTING TENSILE STRENGTH (KSF)
	APPROXIMATE SPT BORING LOCATION

AREHNA PROJECT NO. B-22-074

ENVIRONMENTAL CLASSIFICATION:
SUBSTRUCTURE CONCRETE: EXTREMELY AGGRESSIVE (RESISTIVITY = 26 OHM-CM, CHLORIDES = 49,950 PPM)
SUBSTRUCTURE STEEL: EXTREMELY AGGRESSIVE (RESISTIVITY = 26 OHM-CM, CHLORIDES = 49,950 PPM)
SUPERSTRUCTURE EXTREMELY AGGRESSIVE

TEST RESULTS: SOIL AND WATER
RESISTIVITY 26 TO 690 OHM-CM
CHLORIDES 15 TO 49,950 PPM
SULFATES 300 TO 330 PPM
pH 7.1 TO 7.9

NOTES:

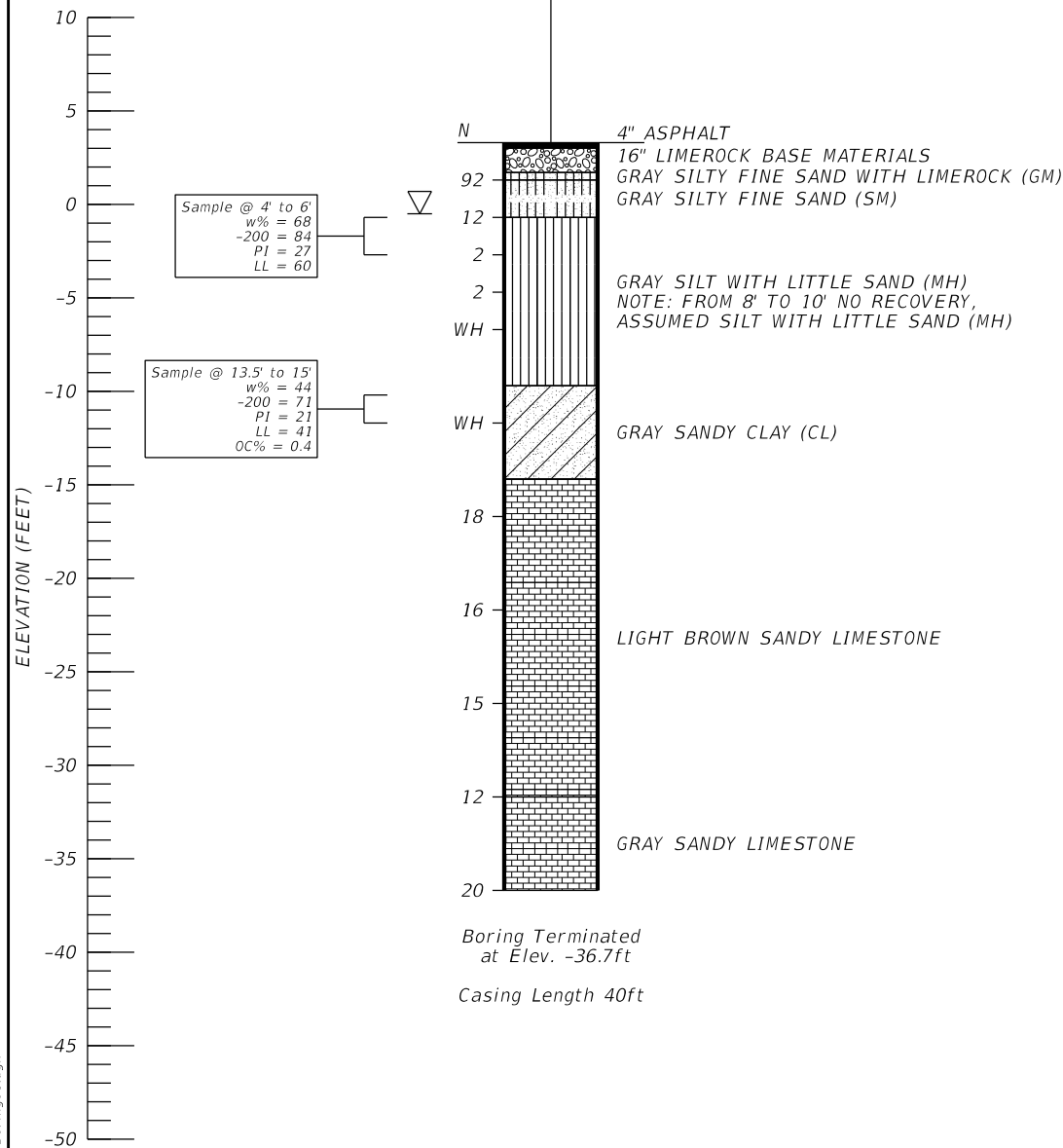
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REVISIONS				ENGINEER OF RECORD			TOWN OF BAY HARBOR ISLANDS			REPORT OF CORE BORINGS	SHEET NO.
DATE	DESCRIPTION	DATE	DESCRIPTION	ANGELA L. ALBA, P.E. LICENSE NUMBER: 58538 AREHNA ENGINEERING, INC. 12296 WILES ROAD CORAL SPRINGS, FL 33076			ROAD NO.	COUNTY	PROJECT ID		
							922	MIAMI-DADE	BC-160		

A-12

THE OFFICIAL RECORD OF THIS SHEET IS THE ELECTRONIC FILE DIGITALLY SIGNED AND SEALED UNDER RULE 61G15-23.004, F.A.C.

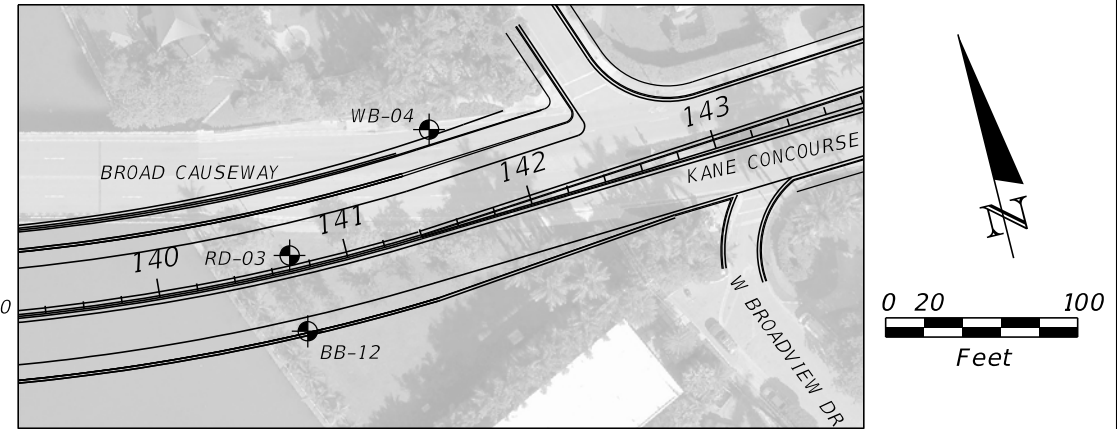
Bore # WB-04
Reference CL3
Station 141+60
Offset 52 LT
Latitude 25.8865506
Longitude -80.1387998
Elevation 3.3'
Vertical Datum NAVD88
Date 5/1/2023
Driller C. CHARRI
Hammer Auto
Rig CME-45



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							922	MIAMI-DADE	BC-160		
											A-13



LEGEND

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GRAVEL	SANDY CLAY
SAND	SILT
SILTY SAND	SANDY SILT
SHELLY SAND	SHELLY SILT
GRAVELLY SAND	SANDSTONE
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- w% NATURAL MOISTURE CONTENT (%)
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- AREHNA PROJECT NO. B-22-074

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TEST RESULTS: SOIL AND WATER
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SULFATES 300 TO 330 PPM
pH 7.1 TO 7.9

Summary of Laboratory Test Results – Table 2

Summary of Corrosion Test Results – Table 3

Summary of Seasonal High Water Table Estimate – Table 4

Laboratory Test Results $\pi \{2\}$

$$[\text{I} \cdot \bar{\text{O}} \text{Z} \text{N} | \cdot \bar{\text{U}} \text{Z} \text{N} \bar{\text{e}} \text{ } \phi \hat{\text{S}} \hat{\text{a}} \hat{\text{u}} \text{ } \text{w} \hat{\text{S}} \hat{\text{a}} \text{dzf} \hat{\text{u}} \hat{\text{a}} \text{ } \pi \text{ } \text{w} \text{Z} \bar{\text{O}}]$$

TABLE 1
SUMMARY OF USDA SOIL SURVEY
BROAD CAUSEWAY DRAWBRIDGE PD&E STUDY
TOWN OF BAY HARBOR ISLANDS, FLORIDA
AREHNA Project Number: B-22-074

Soil Unit Number	USDA Soil Type	Depth (inches)	USDA Soil Description	AASHTO	USCS	Permeability (in/hr)	Seasonal High Groundwater			Risk of Corrosion	
							Depth (feet)	Duration (months)	Kind	Steel	Concrete
9	Udorthents-Water-Urban land complex, 0 to 60 percent slopes	0 - 10	Very gravelly loam	GC, GM	A-1-b, A-2-6, A-6	6 to 10	5.0 - 6.0	May - Dec	Apparent	Moderate	Low
		10 - 80	Extremely gravelly loam	GC-GM, GC, GW	A-1-a, A-2-4, A-6						
15	Urban land, 0 to 2 percent slopes	-	-	-	-	-	-	-	-	-	-
99	Urban land, 0 to 2 percent slopes	-	-	-	-	-	-	-	-	-	-

NOTE: Urban land is altered land, which typically contains fill soils. The depth of the water table is dependent on the thickness of fill material at each site.

TABLE 2
SUMMARY OF LABORATORY TEST RESULTS
BROAD CAUSEWAY DRAWBRIDGE PD&E STUDY
TOWN OF BAY HARBOR ISLANDS, FLORIDA
AREHNA Project Number: B-22-074

Boring No.	Sample Depth (feet)	USCS Classification	Sieve Analysis (% Passing)						Atterberg Limits			Organic Content (%)	Natural Moisture Content (%)
			#4	#10	#40	#60	#100	#200	LL	PL	PI		
BB-01	4 - 6	OL	100	97.5	85.4	78	64.6	49	-	-	-	10.0	87
BB-01	10 - 12	MH	98	94	81	74	66	51	-	-	-	-	67
BB-02	2 - 4	SM	84	74	49	38	24	16	-	-	-	-	19
BB-02	8 - 10	SM	88	77	44	34	25	15	-	-	-	-	41
BB-02	12 - 14	SM	100	100	90	72	41	17	-	-	-	2.3	23
BB-03	41 - 42.5	SP-SM	100	100	99	98	79	6	-	-	-	-	27
BB-04	4 - 6	SM	90	82	61	50	39	28	-	-	-	-	45
BB-04	6 - 8	SM	95	88	74	62	45	31	-	-	-	2.3	43
BB-04	43.5 - 45	SP-SM	99	96	86	70	36	6	-	-	-	-	23
BB-07	0 - 2	SP-SM	83	70	44	32	20	12	-	-	-	-	34
BB-08	2 - 4	SM	100	100	83	57	37	28	-	-	-	-	22
BB-10	4 - 6	SM	100	99	81	48	26	17	-	-	-	-	19
BB-12	4 - 6	MH	98	92	75	70	64	53	75	37	38	-	41
BB-12	14 - 16	SM	95	88	73	68	62	50	-	-	-	-	47
BB-12	58.5 - 60	SP-SM	80	73	64	49	16	7	-	-	-	-	17
WB-01	4 - 6	SM	84	72	39	30	23	16	-	-	-	-	37
WB-01	13.5 - 15	SM	51	42	33	28	21	14	NP	NP	NP	-	23
WB-02	4 - 6	SP-SM	86	76	45	28	14	8	-	-	-	-	26
WB-02	8 - 10	SP-SM	73	60	32	23	16	11	-	-	-	-	30
WB-03	4 - 6	OL	100	99	93	87	75	58	-	-	-	11.2	100
WB-03	13.5 - 15	SP-SM	100	99	88	68	35	8	NP	NP	NP	-	29
WB-03	18.5 - 20	SM	76	69	57	46	30	17	NP	NP	NP	-	28
WB-04	4 - 6	MH	100	99	95	94	91	84	60	33	27	-	68
WB-04	13.5 - 15	CL	99	96	87	84	80	71	41	20	21	0.4	44

TABLE 3
SUMMARY OF CORROSION TEST RESULTS
BROAD CAUSEWAY DRAWBRIDGE PD&E STUDY
TOWN OF BAY HARBOR ISLANDS, FLORIDA
AREHNA Project Number: B-22-074

Boring No.	Sample Type	Sample Depth (feet)	USCS Symbol	pH	Resistivity (ohm-cm)	Chlorides (ppm)	Sulfates (ppm)	FDOT Substructure Environmental Classification - Steel	FDOT Substructure Environmental Classification - Concrete
RB-05	Soil	4.0 - 6.0	MH	7.1	690	15	300	Extremely	Moderately
CS - 1	Water	-	-	7.9	26	49950	330	Extremely	Extremely

Structures Design Guidelines
1 - General Requirements

Topic No. 625-020-018
January 2023

Table 1.3.2-1 Criteria for Substructure Environmental Classifications

Classification	Environmental Condition	Units	Steel		Concrete	
			Water	Soil	Water	Soil
Extremely Aggressive (If any of these conditions exist)	pH		< 6.0		< 5.0	
	Cl	ppm	> 2,000		> 2,000	
	SO ₄	ppm	N.A.		> 1,500	> 2,000
	Resistivity	Ohm-cm	< 1,000		< 500	
Slightly Aggressive (If all of these conditions exist)	pH		> 7.0		> 6.0	
	Cl	ppm	< 500		< 500	
	SO ₄	ppm	N.A.		< 150	< 1,000
	Resistivity	Ohm-cm	> 5,000		> 3,000	
Moderately Aggressive	This classification must be used at all sites not meeting requirements for either slightly aggressive or extremely aggressive environments.					
pH = acidity (-log ₁₀ H ⁺ ; potential of Hydrogen), Cl = chloride content, SO ₄ = Sulfate content.						

2. Superstructure: Any superstructure located within 2,500-feet of any coal burning industrial facility, pulpwood plant, fertilizer plant, or any other similar industry classify as Moderately Aggressive. All others classify as Slightly Aggressive.

TABLE 4
SUMMARY OF SEASONAL HIGH WATER TABLE ESTIMATE
BROAD CAUSEWAY DRAWBRIDGE PD&E STUDY
TOWN OF BAY HARBOR ISLANDS, FLORIDA
AREHNA Project Number: B-22-074

Boring Name	State Plane Coordinates Florida East NAD 83 ⁽¹⁾		Ground Elevation ⁽²⁾ (feet)	Boring Depth (Feet)	Measured Groundwater Table			USDA Soil Survey		Estimated Seasonal High Water Table
	Easting	Northing			Date Recorded	Depth ⁽³⁾⁽⁵⁾ (feet)	Approximate Groundwater Elevation (feet)	Map Symbol	Estimated SHGWT ⁽⁴⁾ Depth (feet)	Elevation (feet, NAVD 88)
BB-01	936403.3	566037.2	4.9	100	3/22/2023	4.9	0.0	9	5.0	1.0
BB-02	937085.9	565781.5	3.8	125	3/21/2023	3.6	0.2	9	5.0	1.2
BB-03	937348.6	565750.5	4.6	125	3/24/2023	4.8	-0.2	9	5.0	0.8
BB-04	937564.8	565685.8	2.7	125	3/28/2023	4.0	-1.3	9	5.0	-0.3
RB-01	935914.5	566149.3	2.6	20	3/20/2023	3.3	-0.7	9	5.0	0.3
RB-02	935999.9	566256.9	2.5	20	5/2/2023	3.8	-1.3	9	5.0	-0.3
RB-03	936037.7	566185.6	5.5	6	3/22/2023	GNA	N/A	9	5.0	0.5
RB-04	936213.1	566230.8	4.9	20	5/2/2023	5.0	-0.1	9	5.0	0.9
RB-05	936235.2	566078.3	4.9	6	3/22/2023	GNA	N/A	9	5.0	0.0
RB-06	936303.7	565998.7	4.9	6	3/20/2023	5.0	-0.1	9	5.0	0.9
RB-07	936425.4	566201.5	4.9	20	5/2/2023	4.0	0.9	9	5.0	0.9
RB-08	936620.0	566151.8	4.2	20	5/2/2023	5.5	-1.3	9	5.0	-0.3
RB-09	936834.6	566087.6	0.9	6	5/2/2023	1.8	-0.9	9	5.0	0.1
RB-10	937027.4	566040.8	2.8	20	5/2/2023	5.2	-2.4	9	5.0	-1.4
RB-11	937492.5	565905.9	1.9	25	5/2/2023	4.1	-2.2	9	5.0	-1.2
RD-01	936125.6	566130.2	5.6	20	3/22/2023	4.5	1.1	9	5.0	1.1
RD-02	937062.5	565853.1	4.7	20	3/20/2023	5.0	-0.3	9	5.0	0.7
RD-03	939219.5	565340.1	4.6	20	5/2/2023	4.0	0.6	9	5.0	0.6
WB-01	936115.1	566068.1	4.0	40	3/20/2023	4.0	0.0	9	5.0	1.0
WB-02	936558.7	565939.7	4.3	50	3/21/2023	5.0	-0.7	9	5.0	0.3
WB-03	936812.5	565956.6	5.2	40	3/21/2023	5.4	-0.2	9	5.0	0.8
WB-04	939305.8	565386.1	3.3	40	5/1/2023	3.8	-0.5	9	5.0	0.5

(1) Coordinates of the boring locations are based on survey data provided by FR-Aleman on 9/26/23.
(2) Approximate ground elevations provided provided by FR-Aleman on 9/26/23.
(3) Depth below existing grade at time of field work.
(4) Seasonal high water table depth per Miami-Dade County, Florida USDA Soil Survey information.
(5) GNA: Groundwater table not encountered within the first 10 feet of the boring.

TABLE 5
SUMMARY OF ROCK CORING TESTING RESULTS
TOWN OF BAY HARBOUR ISLANDS, FLORIDA
TBHI PROJECT NO. BC-160

GENERAL INFORMATION

Project Name: Broad Causeway
Project Number: B-22-074

Prepared by/ Date: PV/12-05-2023
Checked by/Date: TC/02-22-2024

Rock Coring No.	Ground Elevation	Run No.	Depth		Elevation		REC	RQD	Corrected Unconfined Compressive Strength, q _u	Splitting Tensile Strength, q _t
	From		To	From	To					
	(ft)		(ft)		(%)	(%)				
BB-02	3.8	1*	43	45	-39.2	-41.2	79	0	--	--
BB-02	3.8	2	45	50	-41.2	-46.2	47	17	--	--
BB-02	3.8	3	50	55	-46.2	-51.2	47	8	--	--
BB-02	3.8	4	65	70	-61.2	-66.2	56	23	201	90
BB-02	3.8	5	70	75	-66.2	-71.2	88	58	442	124
BB-02	3.8	6	75	80	-71.2	-76.2	77	37	175	72
BB-02	3.8	7	80	85	-76.2	-81.2	68	15	--	--
BB-02	3.8	8	85	90	-81.2	-86.2	54	8	--	--
BB-02	3.8	9	90	95	-86.2	-91.2	73	38	649	20
BB-02	3.8	10	95	100	-91.2	-96.2	43	12	--	--
BB-04	2.7	1*	56.5	60	-53.8	-57.3	69	0	--	--
BB-04	2.7	2	60	65	-57.3	-62.3	63	42	--	--
BB-04	2.7	3	65	70	-62.3	-67.3	62	43	28	38
BB-04	2.7	4	70	75	-67.3	-72.3	85	20	98	76
BB-04	2.7	5	75	80	-72.3	-77.3	90	77	401	103
BB-04	2.7	6	80	85	-77.3	-82.3	90	57	554	122
BB-04	2.7	7	85	90	-82.3	-87.3	62	22	--	--
BB-04	2.7	8	90	95	-87.3	-92.3	45	23	--	--
BB-04	2.7	9	95	100	-92.3	-97.3	67	23	90	25
BB-12	2.7	1*	68	70	-65.3	-67.3	100	25	--	83
BB-12	2.7	2	70	75	-67.3	-72.3	20	0	--	--
BB-12	2.7	3	75	80	-72.3	-77.3	27	0	--	--
BB-12	2.7	4	80	85	-77.3	-82.3	20	0	--	--
BB-12	2.7	5	85	90	-82.3	-87.3	55	13	335	63
BB-12	2.7	6*	90	93	-87.3	-90.3	42	0	--	--
MEAN							61	22	297	74
STANDARD DEVIATION									211	36
UPPER BOUND									509	110
LOWER BOUND									86	38

Note:

* REC and RQD based on modified core length.

TABLE 6
SUMMARY OF ROCK CORING TESTING RESULTS - ROCK SOCKET
TOWN OF BAY HARBOUR ISLANDS, FLORIDA
TBHI PROJECT NO. BC-160

GENERAL INFORMATION

Project Name: Broad Causeway
Project Number: B-22-074

Prepared by/ Date: PV/12-05-2023
Checked by/Date: TC/02-22-2024

Rock Coring No.	Ground Elevation	Run No.	Depth		Elevation		REC	RQD	Corrected Unconfined Compressive Strength, q _u	Splitting Tensile Strength, q _t
			From	To	From	To				
	(ft, NAVD88)		(ft)		(ft)					
BB-02	3.8	4	65	70	-61.2	-66.2	56	23	201	90
BB-02	3.8	5	70	75	-66.2	-71.2	88	58	442	124
BB-02	3.8	6	75	80	-71.2	-76.2	77	37	175	72
BB-02	3.8	7	80	85	-76.2	-81.2	68	15	--	--
BB-02	3.8	8	85	90	-81.2	-86.2	54	8	--	--
BB-02	3.8	9	90	95	-86.2	-91.2	73	38	649	20
BB-02	3.8	10	95	100	-91.2	-96.2	43	12	--	--
BB-04	2.7	3	65	70	-62.3	-67.3	62	43	28	38
BB-04	2.7	4	70	75	-67.3	-72.3	85	20	98	76
BB-04	2.7	5	75	80	-72.3	-77.3	90	77	401	103
BB-04	2.7	6	80	85	-77.3	-82.3	90	57	554	122
BB-04	2.7	7	85	90	-82.3	-87.3	62	22	--	--
BB-04	2.7	8	90	95	-87.3	-92.3	45	23	--	--
BB-04	2.7	9	95	100	-92.3	-97.3	67	23	90	25
BB-12	2.7	5	85	90	-82.3	-87.3	55	13	335	63
BB-12	2.7	6*	90	93	-87.3	-90.3	42	0	--	--
MEAN							66	29	297	73
STANDARD DEVIATION									211	38
UPPER BOUND									509	111
LOWER BOUND									86	36

Note:

* REC and RQD based on modified core length.

Project Name: Broad Causeway
 Project Number: B-22-074
 Boring Number: RB-05 (4'-6')
 Reviewed by: PV

Corrosion Classification

Steel	Extremely
Concrete	Moderately

Sample Type

Soil or Water	Soil

pH (FM 5-550)

pH Reading	7.10

Chlorides

(FM 5-552)

	Drops Required	Multiplier	No. Dilutions	Reading
0-100 ppm	2	5	3	15
100-400 ppm		20	3	
500-10,000 ppm		500	3	
5,000-100,000ppm		5000	30	
Final Reading				15

Sulfates (FM 5-553)

	Meter Reading	No. Dilutions	Reading
Low Range (2 to 70 ppm)		3	
High Range (70+ ppm)	10	30	300
Final Reading			300

Resistivity (FM 5-551)

	Ohms
	83000
	16000
	4100
	1300
	960
	890
	850
	840
	730
	690
Final Reading	690

Project Name: Broad Causeway
 Project Number: B-22-074
 Boring Number: Water Sample
 Reviewed by: PV

Corrosion Classification

Steel	Extremely
Concrete	Extremely

Sample Type

Soil or Water	Water

pH (FM 5-550)

pH Reading	7.85

Chlorides

(FM 5-552)

	Drops Required	Multiplier	No. Dilutions	Reading
0-100 ppm		5	1	
100-400 ppm		20	1	
500-10,000 ppm		500	1	
5,000-100,000ppm	1	5000	10	49950
Final Reading				49950

Sulfates (FM 5-553)

	Meter Reading	No. Dilutions	Reading
Low Range (2 to 70 ppm)		1	
High Range (70+ ppm)	33	10	330
Final Reading			330

Resistivity (FM 5-551)

	Ohms
	26
Final Reading	26

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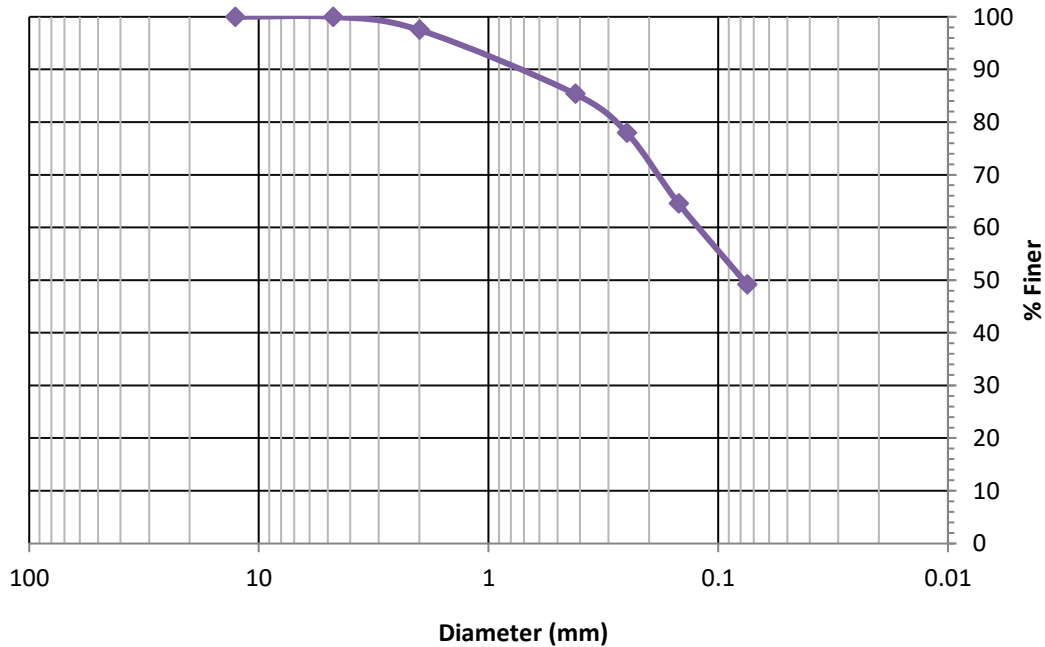
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Laboratory Test Report

Project Name: Broad Causeway
Client: Atkins
AREHNA Project No.: B-22-074

Report Date: 4/11/2023
Reviewed By: PV

Particle-Size Analysis of Soils (ASTM D6913)



Sieve Analysis

Sieve	Dia.	% Finer
1/2"	12.7	100.0
#4	4.76	100.0
#10	2.0	97.5
#40	0.42	85.4
#60	0.25	78.0
#100	0.149	64.6
#200	0.075	49.2

Material Information

Soil Classification:
AASHTO: A-8
Unified: OL
Natural Moisture: 86.8

D50: 0.079 mm

Avg. Organic Content: 10%

Boring No.: BB-01
Sample No.:
Depth: 4.0 - 6.0
Soil Description: Dark Brown Organic Silty Sand

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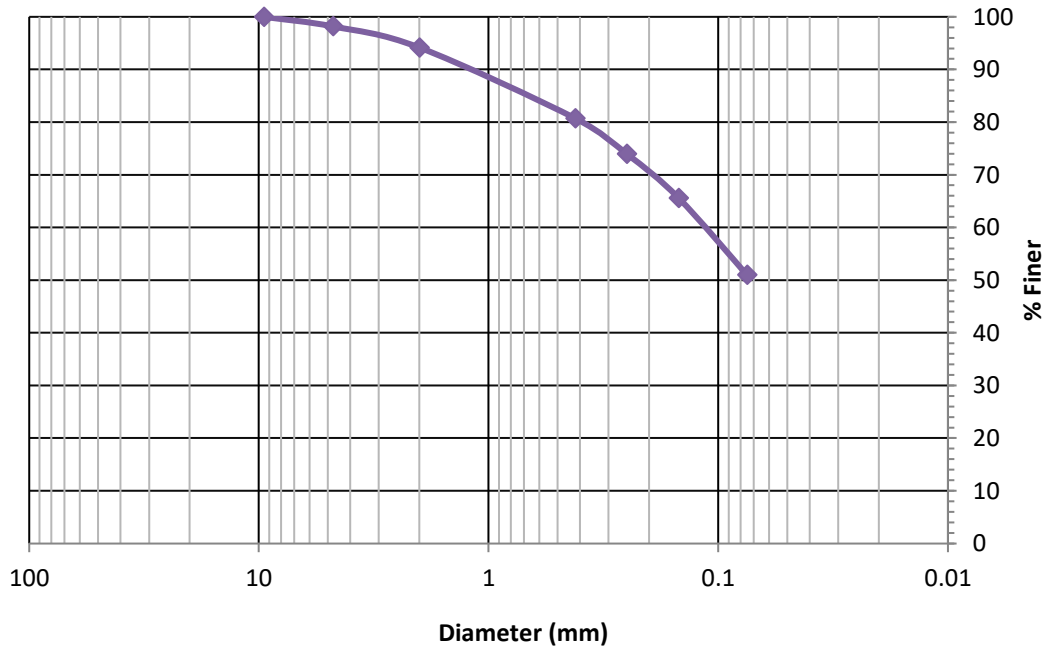
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Laboratory Test Report

Project Name: Broad Causeway
Client: Atkins
AREHNA Project No.: B-22-074

Report Date: 4/11/2023
Reviewed By: PV

Particle-Size Analysis of Soils (ASTM D6913)



Sieve Analysis		
Sieve	Dia.	% Finer
3/8"	9.51	100.0
#4	4.76	98.2
#10	2.0	94.2
#40	0.42	80.7
#60	0.25	74.0
#100	0.149	65.6
#200	0.075	51.0

Material Information

Soil Classification:
AASHTO: A-4
Unified: MH
Natural Moisture: 66.7

Boring No.: BB-01
Sample No.:
Depth: 10 - 12
Soil Description: Gray shelly silt

AREHNA Engineering, Inc.

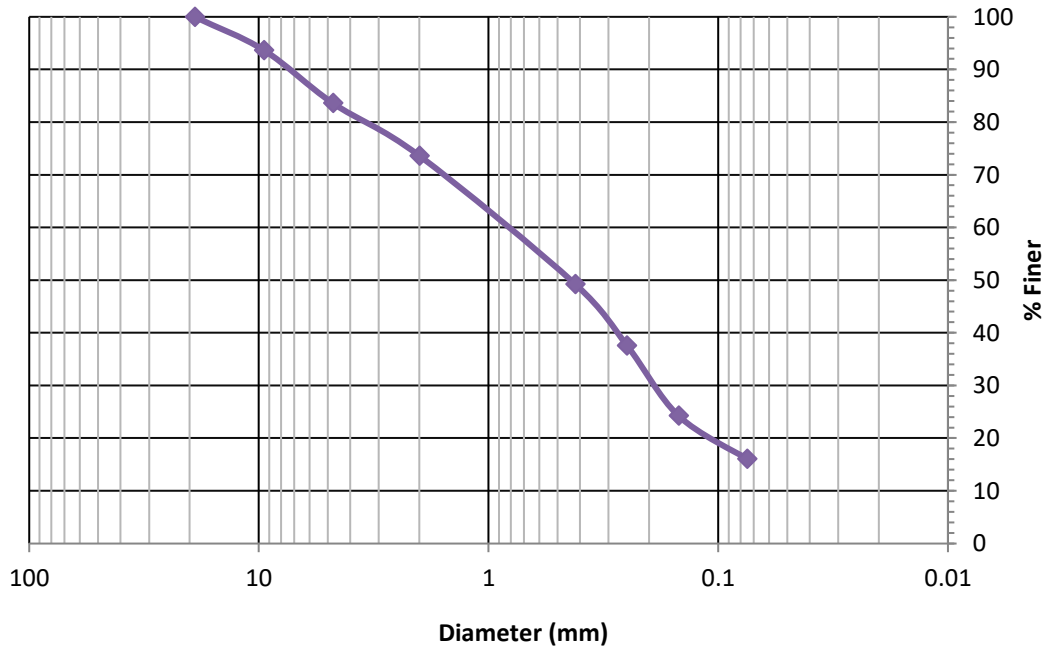
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Laboratory Test Report

Project Name: Broad Causeway
Client: Atkins
AREHNA Project No.: B-22-074

Report Date: 4/11/2023
Reviewed By: PV

Particle-Size Analysis of Soils (ASTM D6913)



Sieve Analysis

Sieve	Dia.	% Finer
3/4"	19.0	100.0
3/8"	9.51	93.7
#4	4.76	83.6
#10	2.0	73.6
#40	0.42	49.3
#60	0.25	37.6
#100	0.149	24.3
#200	0.075	16.1

Material Information

Soil Classification: D50: 0.467 mm
AASHTO: A-1-b
Unified: SM
Natural Moisture: 19.3

Boring No.: BB-02
Sample No.:
Depth: 2.0 - 4.0
Soil Description: Light Brown Silty Sand With few shells

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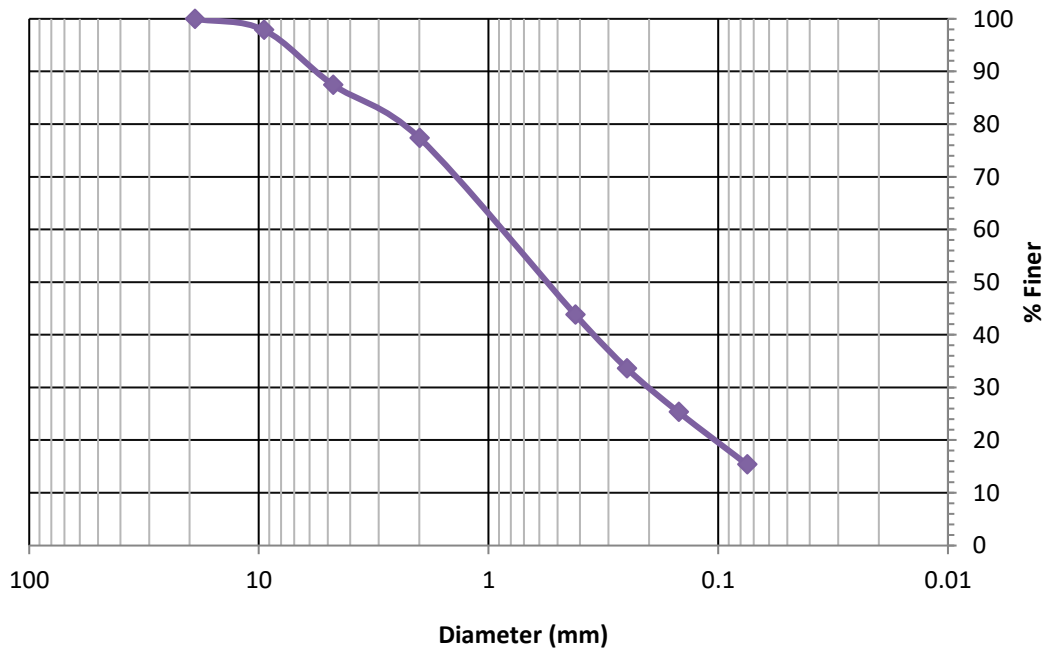
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Laboratory Test Report

Project Name: Broad Causeway
Client: Atkins
AREHNA Project No.: B-22-074

Report Date: 4/11/2023
Reviewed By: PV

Particle-Size Analysis of Soils (ASTM D6913)



Sieve Analysis

Sieve	Dia.	% Finer
3/4"	19.0	100.0
3/8"	9.51	97.9
#4	4.76	87.5
#10	2.0	77.4
#40	0.42	43.9
#60	0.25	33.6
#100	0.149	25.4
#200	0.075	15.4

Material Information

Soil Classification: D50: 0.709 mm
AASHTO: A-1-b
Unified: SM
Natural Moisture: 41.2

Boring No.: BB-02
Sample No.:
Depth: 8.0 - 10
Soil Description: Gray Silty shelly Sand

AREHNA Engineering, Inc.

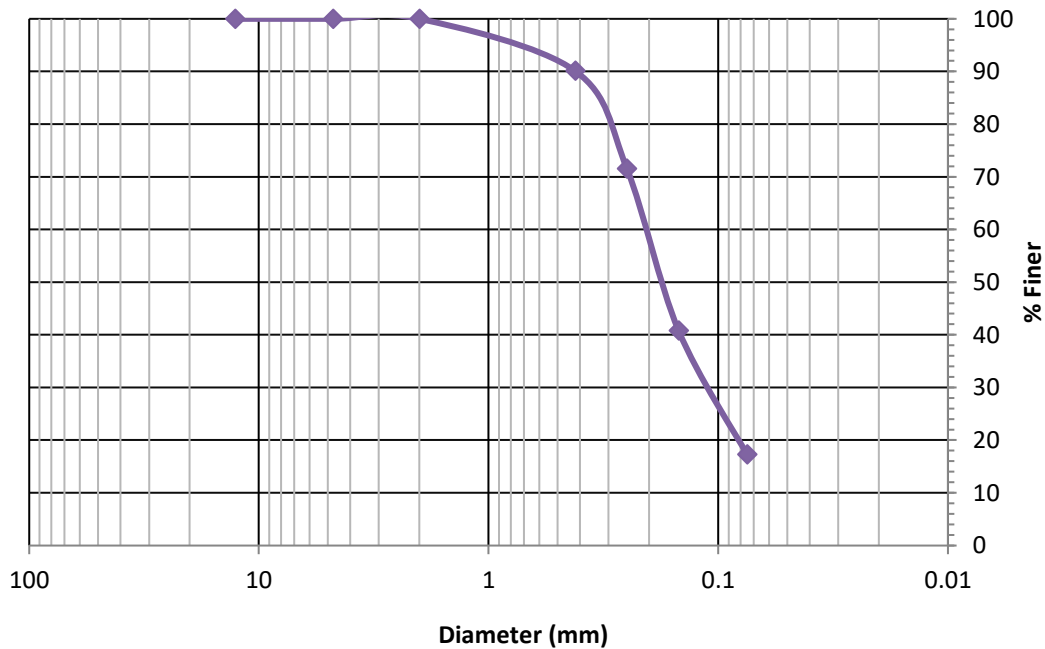
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Laboratory Test Report

Project Name: Broad Causeway
Client: Atkins
AREHNA Project No.: B-22-074

Report Date: 4/11/2023
Reviewed By: PV

Particle-Size Analysis of Soils (ASTM D6913)



Sieve Analysis		
Sieve	Dia.	% Finer
1/2"	12.7	100.0
#4	4.76	100.0
#10	2.0	100.0
#40	0.42	90.1
#60	0.25	71.5
#100	0.149	40.8
#200	0.075	17.3

Material Information

Soil Classification:
AASHTO: A-2-4
Unified: SM
Natural Moisture: 23.4

D50: 0.179 mm

Avg. Organic Content: 2.3%

Boring No.: BB-02
Sample No.:
Depth: 12.0 - 14.0
Soil Description: Dark gray organic stained silty sand

AREHNA Engineering, Inc.

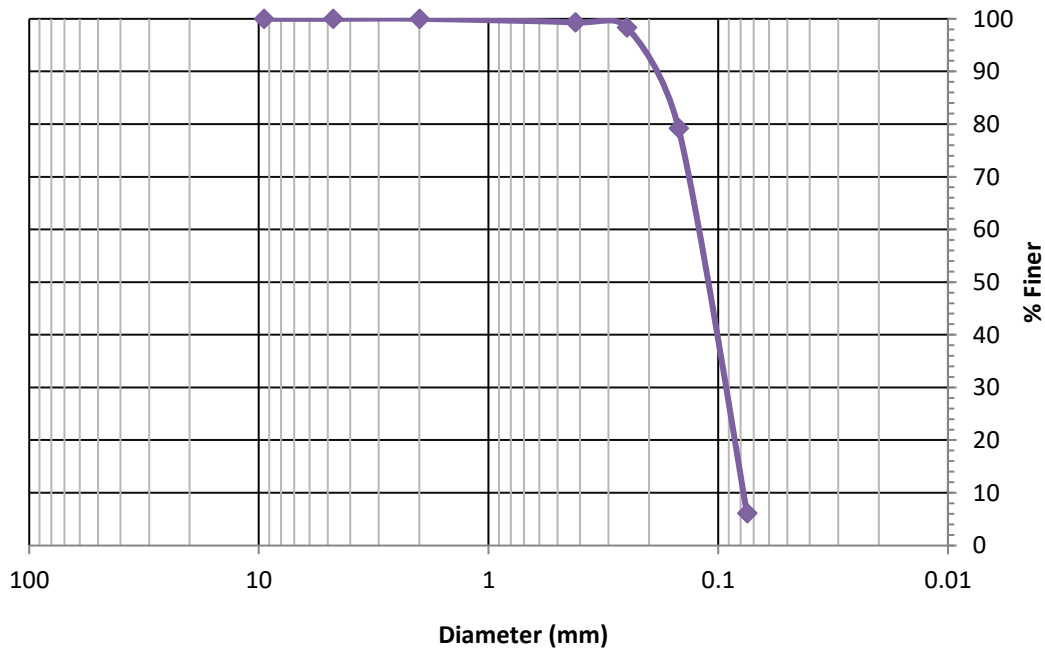
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Laboratory Test Report

Project Name: Broad Causeway
Client: Atkins
AREHNA Project No.: B-22-074

Report Date: 4/11/2023
Reviewed By: PV

Particle-Size Analysis of Soils (ASTM D6913)



Sieve Analysis

Sieve	Dia.	% Finer
3/8"	9.51	100.0
#4	4.76	100.0
#10	2.0	100.0
#40	0.42	99.3
#60	0.25	98.3
#100	0.149	79.2
#200	0.075	6.1

Material Information

Soil Classification: D50: 0.119 mm
AASHTO: A-3 Cc: 0.962 mm
Unified: SP-SM Cu: 1.641 mm
Natural Moisture: 26.6

Boring No.: BB-03
Sample No.:
Depth: 41 - 42.5
Soil Description: Light Gray Slightly Silty Sand

AREHNA Engineering, Inc.

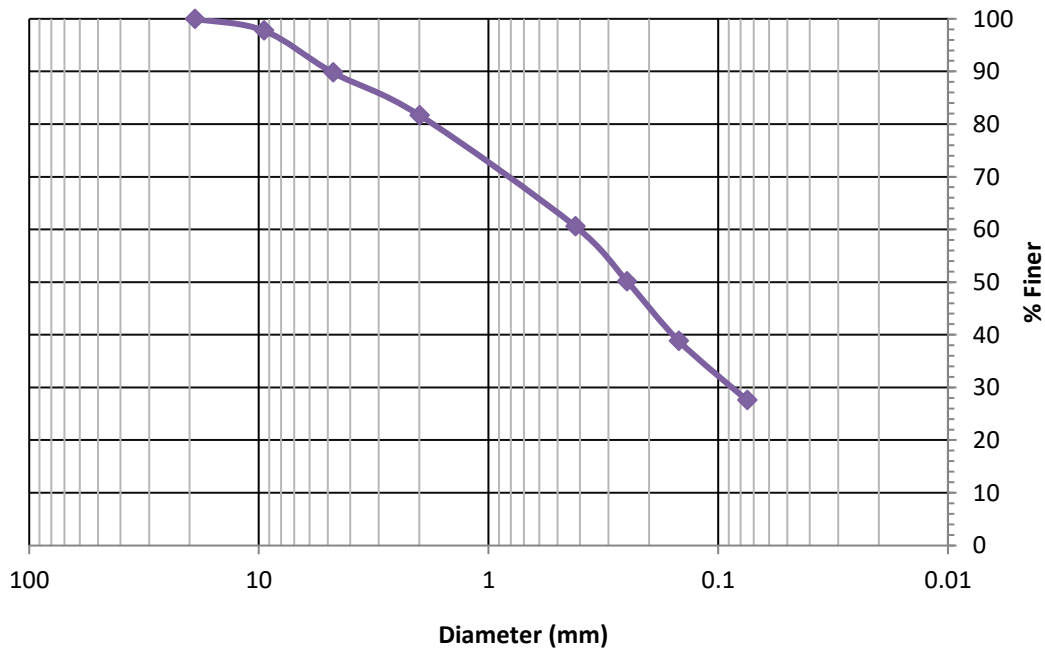
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Laboratory Test Report

Project Name: Broad Causeway
Client: Atkins
AREHNA Project No.: B-22-074

Report Date: 4/11/2023
Reviewed By: PV

Particle-Size Analysis of Soils (ASTM D6913)



Sieve Analysis

Sieve	Dia.	% Finer
3/4"	19.0	100.0
3/8"	9.51	97.8
#4	4.76	89.8
#10	2.0	81.7
#40	0.42	60.6
#60	0.25	50.2
#100	0.149	38.9
#200	0.075	27.6

Material Information

Soil Classification: D50: 0.249 mm
AASHTO: A-2-4
Unified: SM
Natural Moisture: 44.7

Boring No.: BB-04
Sample No.:
Depth: 4.0 - 6.0
Soil Description: Brown Silty Sand With Some Shells

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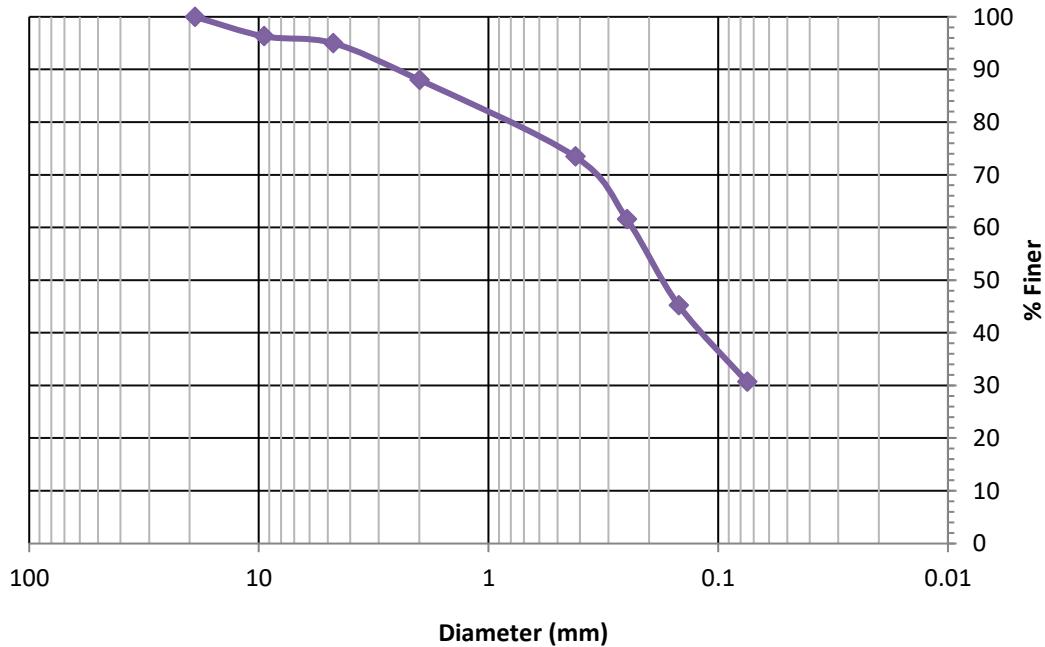
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Laboratory Test Report

Project Name: Broad Causeway
Client: Atkins
AREHNA Project No.: B-22-074

Report Date: 4/11/2023
Reviewed By: PV

Particle-Size Analysis of Soils (ASTM D6913)



Sieve Analysis

Sieve	Dia.	% Finer
3/4"	19.0	100.0
3/8"	9.51	96.3
#4	4.76	95.0
#10	2.0	88.0
#40	0.42	73.5
#60	0.25	61.6
#100	0.149	45.3
#200	0.075	30.7

Material Information

Soil Classification:
AASHTO: A-2-4
Unified: SM
Natural Moisture: 42.6

D50: 0.178 mm

Avg. Organic Content: 2.3%

Boring No.: BB-04
Sample No.:
Depth: 6.0 - 8.0
Soil Description: Gray Organic Stained Silty Sand

AREHNA Engineering, Inc.

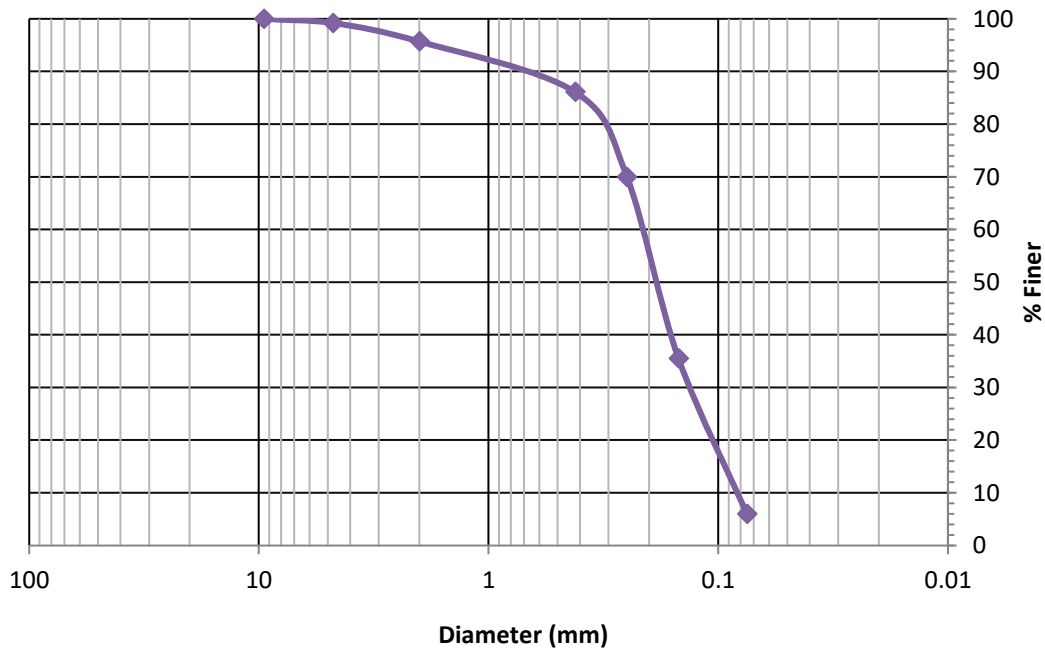
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Laboratory Test Report

Project Name: Broad Causeway
Client: Atkins
AREHNA Project No.: B-22-074

Report Date: 4/11/2023
Reviewed By: PV

Particle-Size Analysis of Soils (ASTM D6913)



Sieve Analysis

Sieve	Dia.	% Finer
3/8"	9.51	100.0
#4	4.76	99.2
#10	2.0	95.7
#40	0.42	86.1
#60	0.25	70.0
#100	0.149	35.5
#200	0.075	6.0

Material Information

Soil Classification: D50: 0.191 mm
AASHTO: A-3 Cc: 0.973 mm
Unified: SP-SM Cu: 2.596 mm
Natural Moisture: 22.9

Boring No.: BB-04
Sample No.:
Depth: 43.5 - 45
Soil Description: Light Brown Slightly Silty Fine Sand

AREHNA Engineering, Inc.

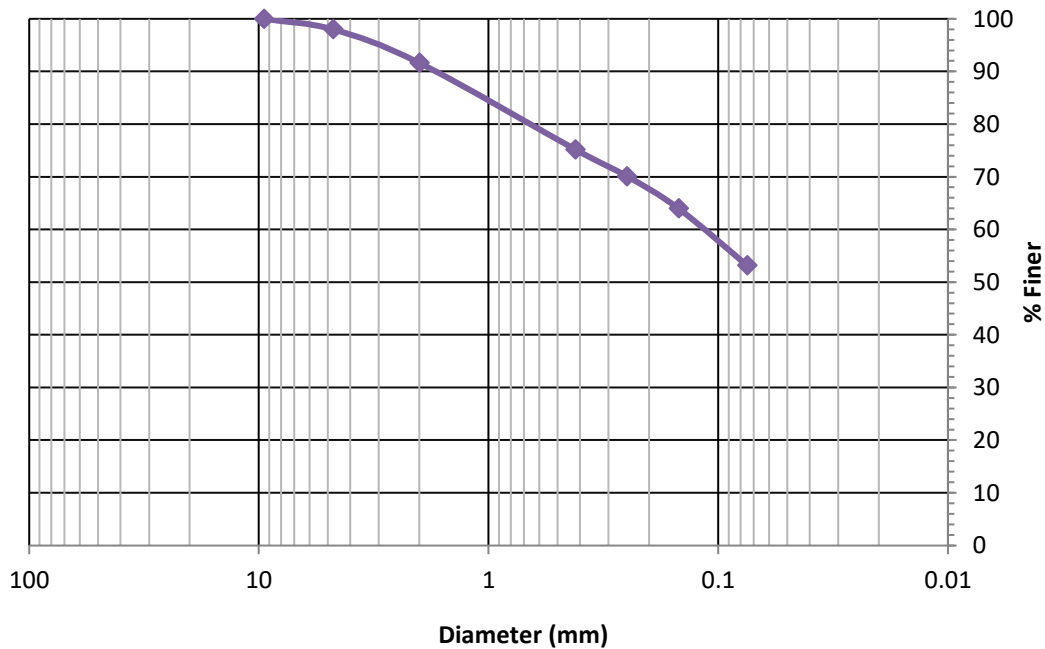
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Laboratory Test Report

Project Name: Broad Causeway
Client: Atkins
AREHNA Project No.: B-22-074

Report Date: 4/11/2023
Reviewed By: PV

Particle-Size Analysis of Soils (ASTM D6913)



Sieve Analysis

Sieve	Dia.	% Finer
3/8"	9.51	100.0
#4	4.76	98.0
#10	2.0	91.7
#40	0.42	75.2
#60	0.25	70.1
#100	0.149	64.0
#200	0.075	53.2

Material Information

Soil Classification:
AASHTO: A-7-5
Unified: MH
Natural Moisture: 41

Liquid Limit: 75
Plastic Limit: 37
Plasticity Index: 38

Boring No.: BB-12
Sample No.:
Depth: 4.0 - 6.0
Soil Description: Dark Gray sandy silt with trace of shells

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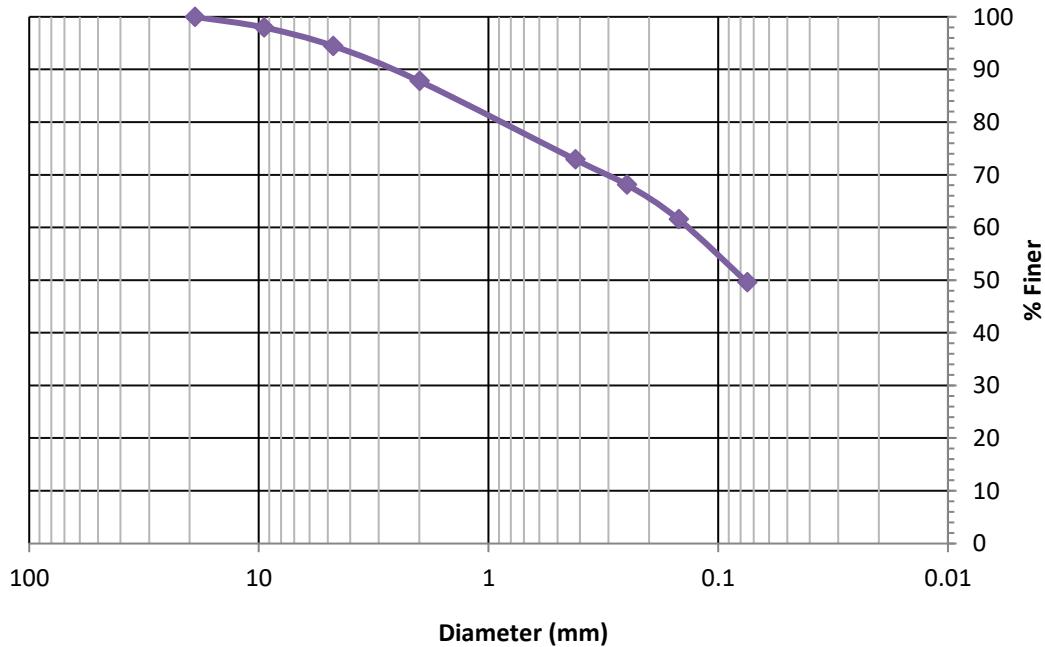
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Laboratory Test Report

Project Name: Broad Causeway
Client: Atkins
AREHNA Project No.: B-22-074

Report Date: 4/11/2023
Reviewed By: PV

Particle-Size Analysis of Soils (ASTM D6913)



Sieve Analysis

Sieve	Dia.	% Finer
3/4"	19.0	100.0
3/8"	9.51	98.0
#4	4.76	94.5
#10	2.0	87.8
#40	0.42	72.9
#60	0.25	68.1
#100	0.149	61.6
#200	0.075	49.6

Material Information

Soil Classification: D50: 0.077 mm
AASHTO: A-4
Unified: SM
Natural Moisture: 47.4

Boring No.: BB-12
Sample No.:
Depth: 14 - 16
Soil Description: Gray Silty Sand With trace of Shells

AREHNA Engineering, Inc.

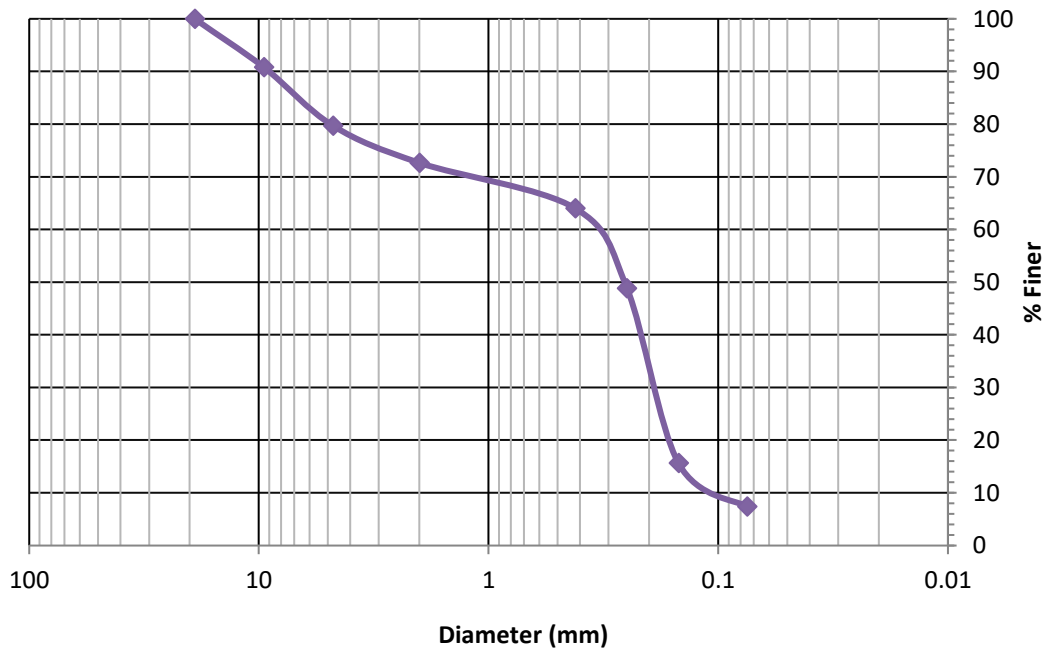
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Laboratory Test Report

Project Name: Broad Causeway
Client: Atkins
AREHNA Project No.: B-22-074

Report Date: 4/11/2023
Reviewed By: PV

Particle-Size Analysis of Soils (ASTM D6913)



Sieve Analysis

Sieve	Dia.	% Finer
3/4"	19.0	100.0
3/8"	9.51	90.8
#4	4.76	79.7
#10	2.0	72.7
#40	0.42	64.0
#60	0.25	48.8
#100	0.149	15.6
#200	0.075	7.4

Material Information

Soil Classification: D50: 0.263 mm
AASHTO: A-3 Cc: 1.007 mm
Unified: SP-SM Cu: 3.811 mm
Natural Moisture: 16.6

Boring No.: BB-12
Sample No.:
Depth: 58.5 - 60
Soil Description: Gray Slightly Silty Sand With Few Sandstone Fragments

AREHNA Engineering, Inc.

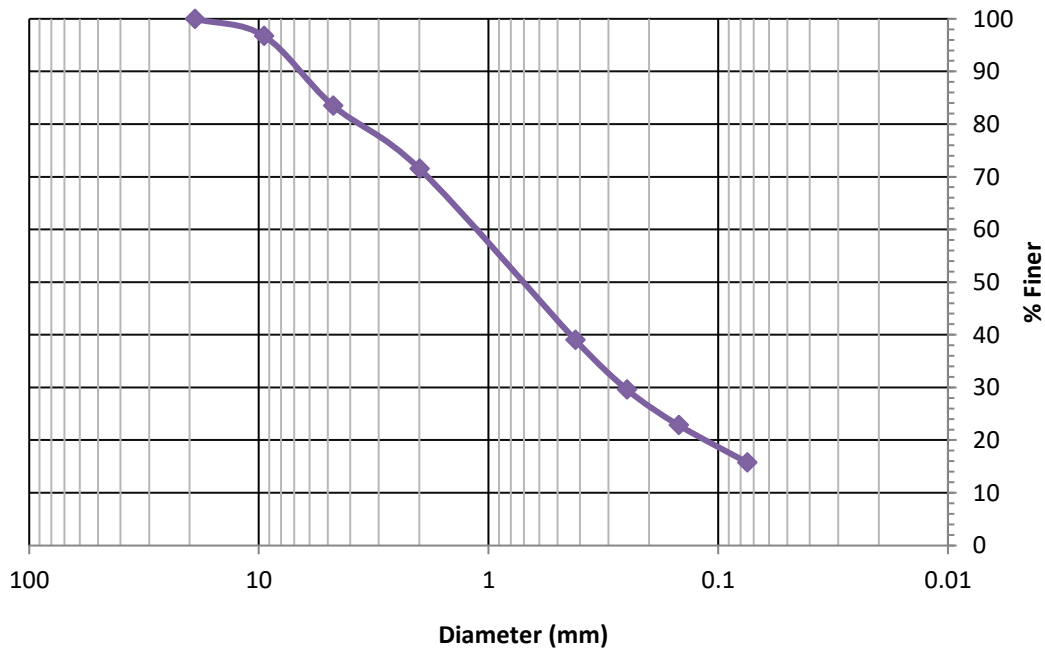
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Laboratory Test Report

Project Name: Broad Causeway
Client: Atkins
AREHNA Project No.: B-22-074

Report Date: 4/11/2023
Reviewed By: PV

Particle-Size Analysis of Soils (ASTM D6913)



Sieve Analysis

Sieve	Dia.	% Finer
3/4"	19.0	100.0
3/8"	9.51	96.8
#4	4.76	83.5
#10	2.0	71.6
#40	0.42	39.1
#60	0.25	29.6
#100	0.149	22.9
#200	0.075	15.8

Material Information

Soil Classification: D50: 0.952 mm
AASHTO: A-1-b
Unified: SM
Natural Moisture: 37.4

Boring No.: WB-01
Sample No.:
Depth: 4.0 - 6.0
Soil Description: Brown Silty Sand Some Shells

AREHNA Engineering, Inc.

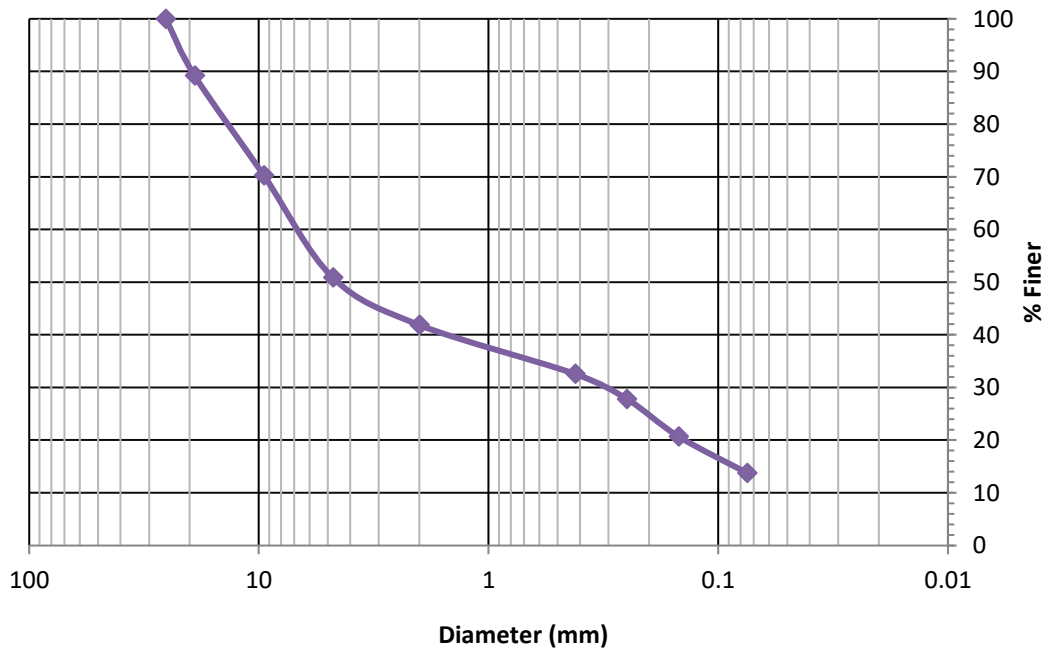
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Laboratory Test Report

Project Name: Broad Causeway
Client: Atkins
AREHNA Project No.: B-22-074

Report Date: 4/11/2023
Reviewed By: PV

Particle-Size Analysis of Soils (ASTM D6913)



Sieve Analysis		
Sieve	Dia.	% Finer
1"	25.4	100.0
3/4"	19.0	89.2
3/8"	9.51	70.3
#4	4.76	50.9
#10	2.0	41.9
#40	0.42	32.6
#60	0.25	27.8
#100	0.149	20.7
#200	0.075	13.8

Material Information

Soil Classification:
AASHTO: A-1-b
Unified: SM
Natural Moisture: 22.8

D50: 4.678 mm

Liquid Limit: NP
Plastic Limit: NP
Plasticity Index: NP

Boring No.: WB-01
Sample No.:
Depth: 13.5 - 15
Soil Description: Brown Silty Sand With Few Limestone Fragments

AREHNA Engineering, Inc.

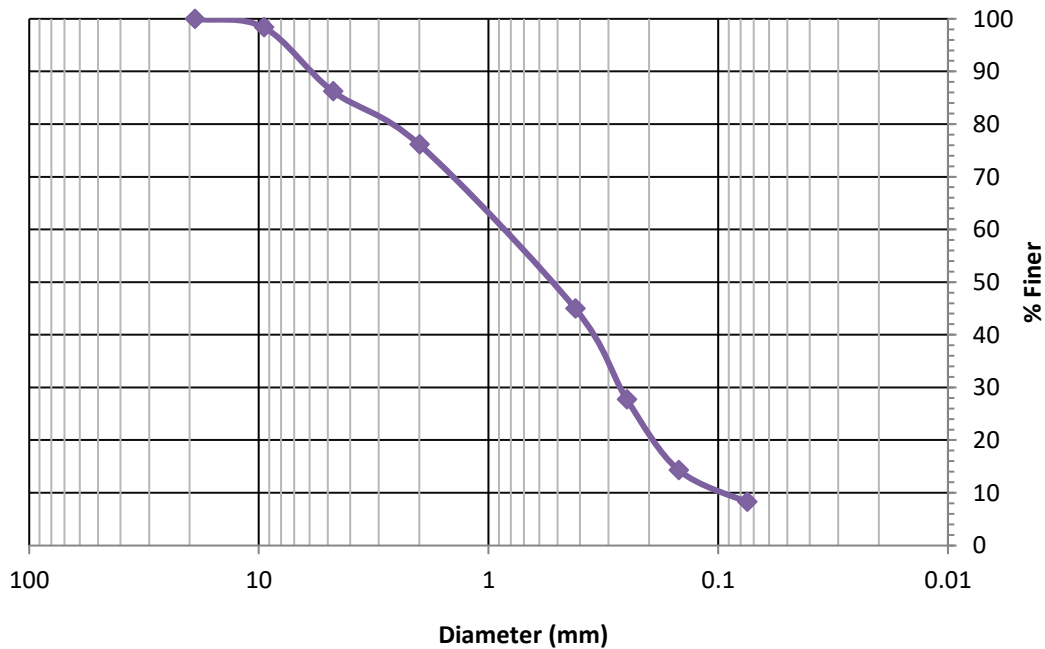
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Laboratory Test Report

Project Name: Broad Causeway
Client: Atkins
AREHNA Project No.: B-22-074

Report Date: 4/11/2023
Reviewed By: PV

Particle-Size Analysis of Soils (ASTM D6913)



Sieve Analysis

Sieve	Dia.	% Finer
3/4"	19.0	100.0
3/8"	9.51	98.4
#4	4.76	86.2
#10	2.0	76.1
#40	0.42	45.0
#60	0.25	27.7
#100	0.149	14.3
#200	0.075	8.3

Material Information

Soil Classification: D50: 0.674 mm
AASHTO: A-1-b Cc: 0.656 mm
Unified: SP-SM Cu: 12.324 mm
Natural Moisture: 25.7

Boring No.: WB-02
Sample No.:
Depth: 4.0 - 6.0
Soil Description: Brown Slightly Silty Fine Sand

AREHNA Engineering, Inc.

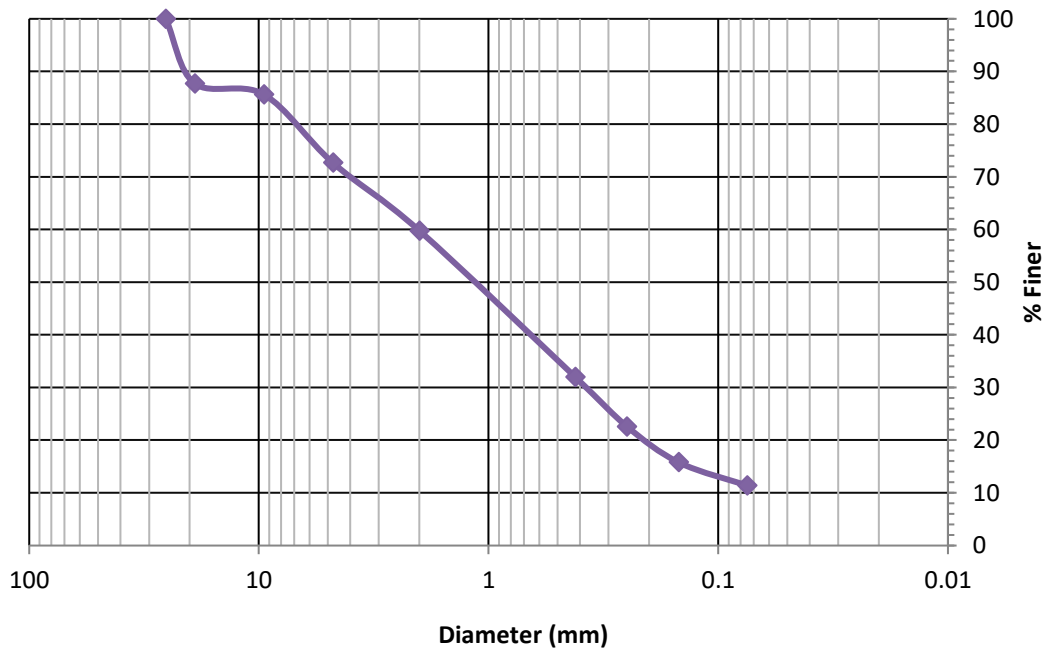
5012 W Lemon Street, Tampa, FL 33609 | 12296 Wiles Road, Coral Springs, FL 33076

Laboratory Test Report

Project Name: Broad Causeway
Client: Atkins
AREHNA Project No.: B-22-074

Report Date: 4/11/2023
Reviewed By: PV

Particle-Size Analysis of Soils (ASTM D6913)



Sieve Analysis		
Sieve	Dia.	% Finer
1"	25.4	100.0
3/4"	19.0	87.7
3/8"	9.51	85.7
#4	4.76	72.7
#10	2.0	59.8
#40	0.42	32.0
#60	0.25	22.6
#100	0.149	15.8
#200	0.075	11.4

Material Information

Soil Classification: D50: 1.443 mm
AASHTO: A-1-b
Unified: SP-SM
Natural Moisture: 30

Boring No.: WB-02
Sample No.:
Depth: 8.0 - 10
Soil Description: Brown Slightly Silty Sand With Some Shells

AREHNA Engineering, Inc.

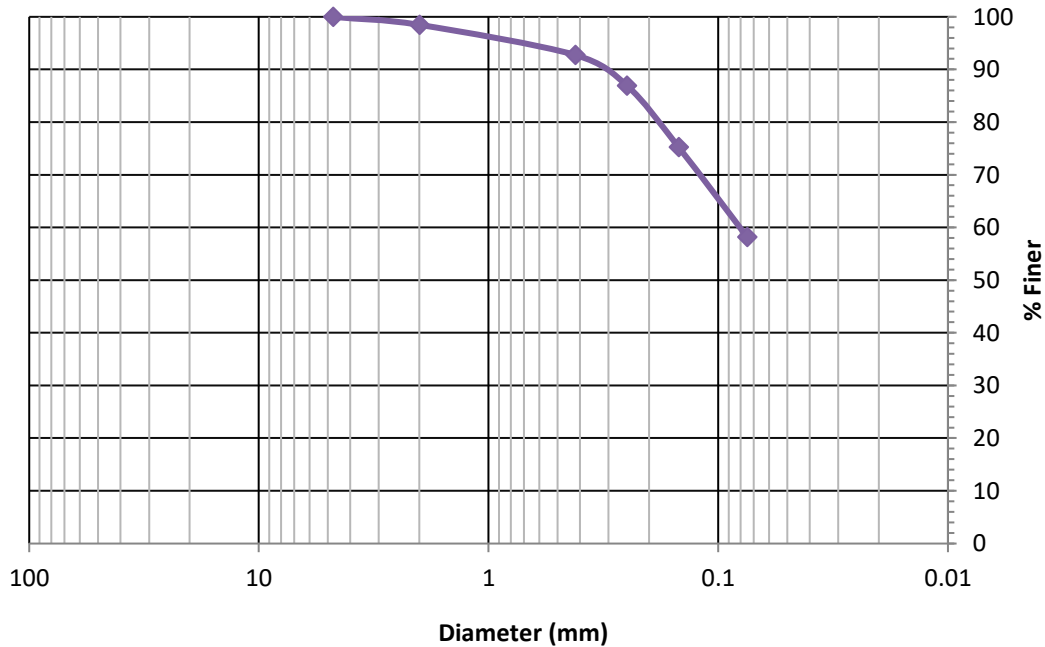
5012 W Lemon Street, Tampa, FL 33609 | 12296 Wiles Road, Coral Springs, FL 33076

Laboratory Test Report

Project Name: Broad Causeway
Client: Atkins
AREHNA Project No.: B-22-074

Report Date: 4/11/2023
Reviewed By: PV

Particle-Size Analysis of Soils (ASTM D6913)



Sieve Analysis		
Sieve	Dia.	% Finer
#4	4.76	100.0
#10	2.0	98.5
#40	0.42	92.8
#60	0.25	86.9
#100	0.149	75.3
#200	0.075	58.2

Material Information

Soil Classification:
AASHTO: A-8
Unified: OL
Natural Moisture: 100.3

Avg. Organic Content: 11.2%

Boring No.: WB-03
Sample No.:
Depth: 4.0 - 6.0
Soil Description: Dark Brown Organic Silt (OL)

AREHNA Engineering, Inc.

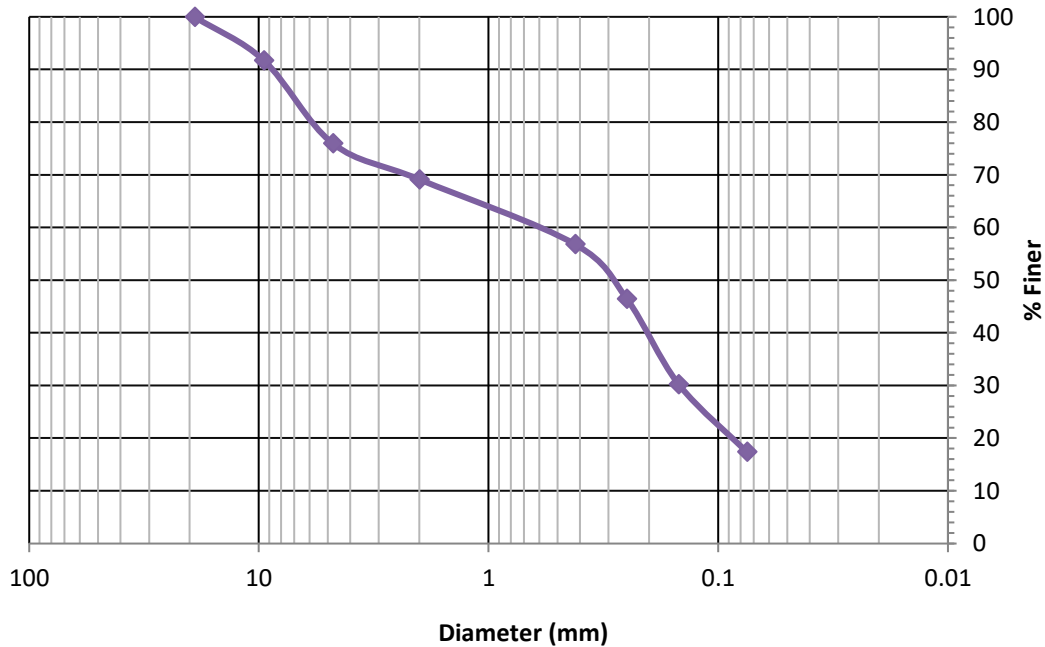
5012 W Lemon Street, Tampa, FL 33609 | 12296 Wiles Road, Coral Springs, FL 33076

Laboratory Test Report

Project Name: Broad Causeway
Client: Atkins
AREHNA Project No.: B-22-074

Report Date: 4/11/2023
Reviewed By: PV

Particle-Size Analysis of Soils (ASTM D6913)



Sieve Analysis

Sieve	Dia.	% Finer
3/4"	19.0	100.0
3/8"	9.51	91.7
#4	4.76	76.0
#10	2.0	69.1
#40	0.42	56.8
#60	0.25	46.4
#100	0.149	30.3
#200	0.075	17.4

Material Information

Soil Classification:
AASHTO: A-2-4
Unified: SM
Natural Moisture: 27.9

D50: 0.308 mm

Liquid Limit: NP
Plastic Limit: NP
Plasticity Index: NP

Boring No.: WB-03
Sample No.:
Depth: 18.5 - 20
Soil Description: Gray silty sand with limestone

AREHNA Engineering, Inc.

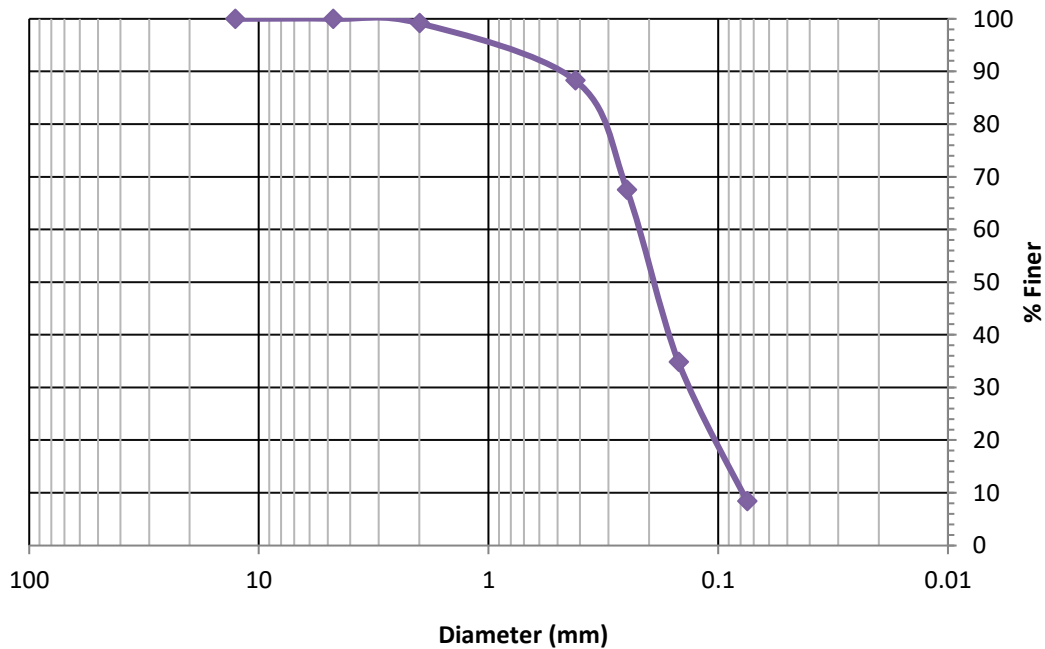
5012 W Lemon Street, Tampa, FL 33609 | 12296 Wiles Road, Coral Springs, FL 33076

Laboratory Test Report

Project Name: Broad Causeway
Client: Atkins
AREHNA Project No.: B-22-074

Report Date: 5/17/2023
Reviewed By: PV

Particle-Size Analysis of Soils (ASTM D6913)



Sieve Analysis

Sieve	Dia.	% Finer
1/2"	12.7	100.0
#4	4.76	100.0
#10	2.0	99.2
#40	0.42	88.3
#60	0.25	67.5
#100	0.149	34.8
#200	0.075	8.4

Material Information

Soil Classification:
AASHTO: A-3
Unified: SP-SM
Natural Moisture: 28.8

D50: 0.196 mm
Cc: 1.018 mm
Cu: 2.853 mm

Liquid Limit: NP
Plastic Limit: NP
Plasticity Index: NP

Boring No.: WB-03
Sample No.:
Depth: 13.5 - 15
Soil Description: Gray Slightly Silty Sand

AREHNA Engineering, Inc.

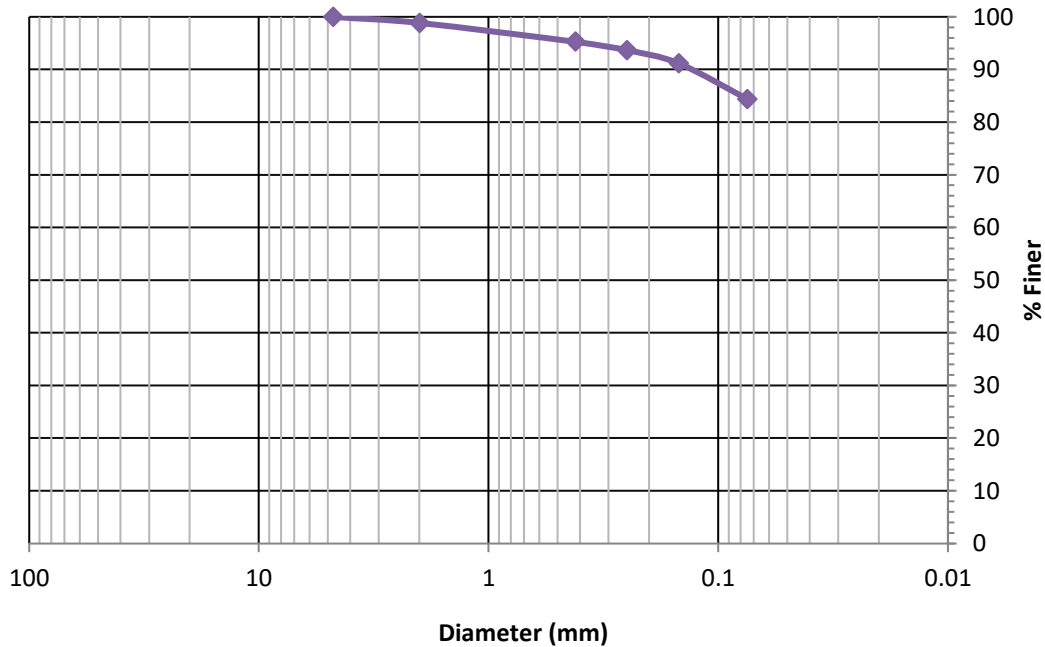
5012 W Lemon Street, Tampa, FL 33609 | 12296 Wiles Road, Coral Springs, FL 33076

Laboratory Test Report

Project Name: Broad Causeway
Client: Atkins
AREHNA Project No.: B-22-074

Report Date: 5/17/2023
Reviewed By: PV

Particle-Size Analysis of Soils (ASTM D6913)



Sieve Analysis		
Sieve	Dia.	% Finer
#4	4.76	100.0
#10	2.0	98.9
#40	0.42	95.3
#60	0.25	93.7
#100	0.149	91.2
#200	0.075	84.4

Material Information

Soil Classification:
AASHTO: A-7-5
Unified: MH
Natural Moisture: 68

Liquid Limit: 60
Plastic Limit: 33
Plasticity Index: 27

Boring No.: WB-04
Sample No.:
Depth: 4.0 - 6.0
Soil Description: Gray sandy silt

AREHNA Engineering, Inc.

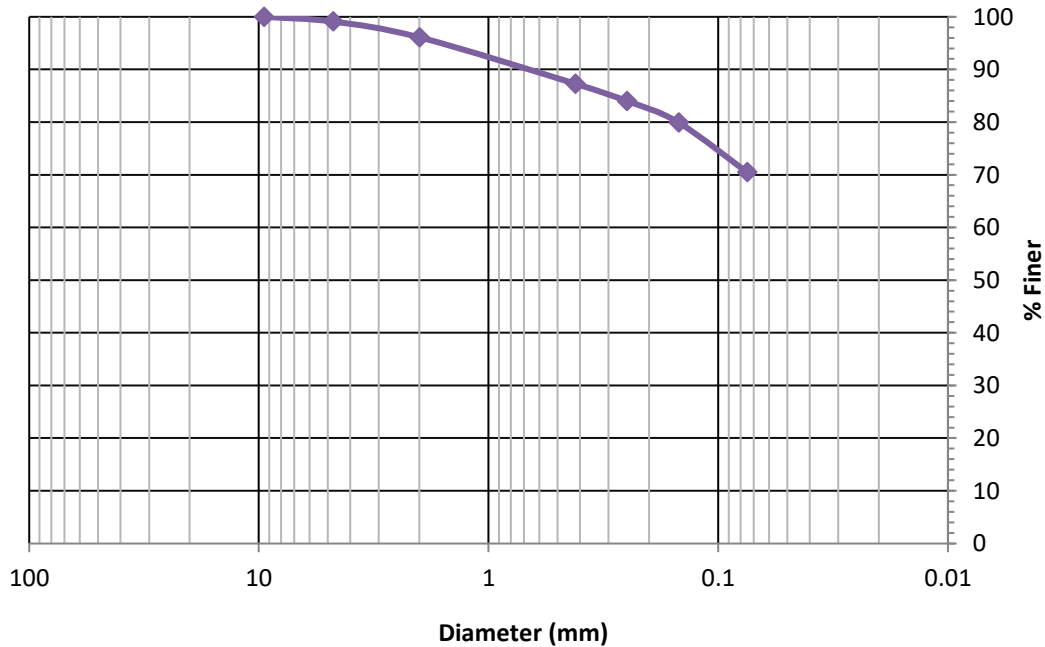
5012 W Lemon Street, Tampa, FL 33609 | 12296 Wiles Road, Coral Springs, FL 33076

Laboratory Test Report

Project Name: Broad Causeway
Client: Atkins
AREHNA Project No.: B-22-074

Report Date: 5/17/2023
Reviewed By: PV

Particle-Size Analysis of Soils (ASTM D6913)



Sieve Analysis		
Sieve	Dia.	% Finer
3/8"	9.51	100.0
#4	4.76	99.1
#10	2.0	96.1
#40	0.42	87.3
#60	0.25	84.0
#100	0.149	79.9
#200	0.075	70.5

Material Information

Soil Classification:
AASHTO: A-7-6
Unified: CL
Natural Moisture: 43.7

Avg. Organic Content: 0.4%
Liquid Limit: 41
Plastic Limit: 20
Plasticity Index: 21

Boring No.: WB-04
Sample No.:
Depth: 13.5 - 15
Soil Description: Gray sandy clay

AREHNA Engineering, Inc.

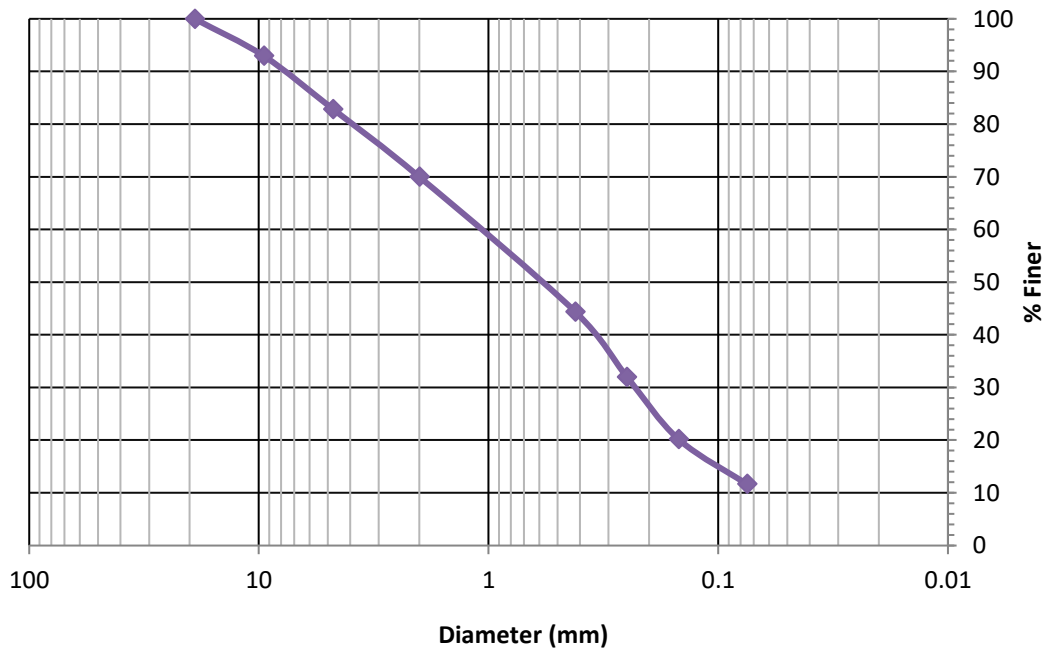
5012 W Lemon Street, Tampa, FL 33609 | 12296 Wiles Road, Coral Springs, FL 33076

Laboratory Test Report

Project Name: Broad Causeway
Client: Atkins
AREHNA Project No.: B-22-074

Report Date: 12/13/2023
Reviewed By: PV

Particle-Size Analysis of Soils (ASTM D6913)



Sieve Analysis

Sieve	Dia.	% Finer
3/4"	19.0	100.0
3/8"	9.51	93.0
#4	4.76	82.9
#10	2.0	70.0
#40	0.42	44.4
#60	0.25	32.0
#100	0.149	20.2
#200	0.075	11.7

Material Information

Soil Classification: D50: 0.598 mm
Unified: SP-SM
Natural Moisture: 34.3

Boring No.: BB-07
Sample No.: #1
Depth: 0.0 - 2.0
Soil Description: Dark Gray Slightly Silty Sand With Shellrock

AREHNA Engineering, Inc.

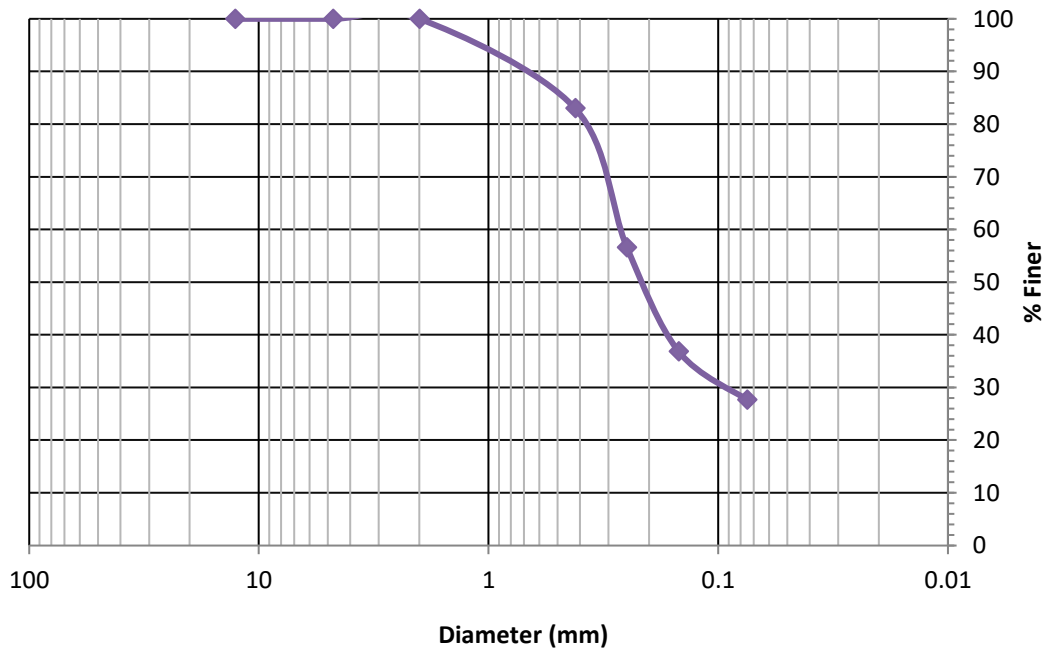
5012 W Lemon Street, Tampa, FL 33609 | 12296 Wiles Road, Coral Springs, FL 33076

Laboratory Test Report

Project Name: Broad Causeway Bridge
Client: Atkins
AREHNA Project No.: B-22-074

Report Date: 1/23/2024
Reviewed By: PV

Particle-Size Analysis of Soils (ASTM D6913)



Sieve Analysis		
Sieve	Dia.	% Finer
1/2"	12.7	100.0
#4	4.76	100.0
#10	2.0	100.0
#40	0.42	83.0
#60	0.25	56.6
#100	0.149	36.9
#200	0.075	27.7

Material Information

Soil Classification: D50: 0.216 mm
AASHTO: A-2-4
Unified: SM
Natural Moisture: 22.4

Boring No.: BB-08
Sample No.:
Depth: 2.0 - 4.0
Soil Description: Gray Silty Sand with trace of limerock

AREHNA Engineering, Inc.

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Laboratory Test Report

Project Name: Broad Causeway Bridge

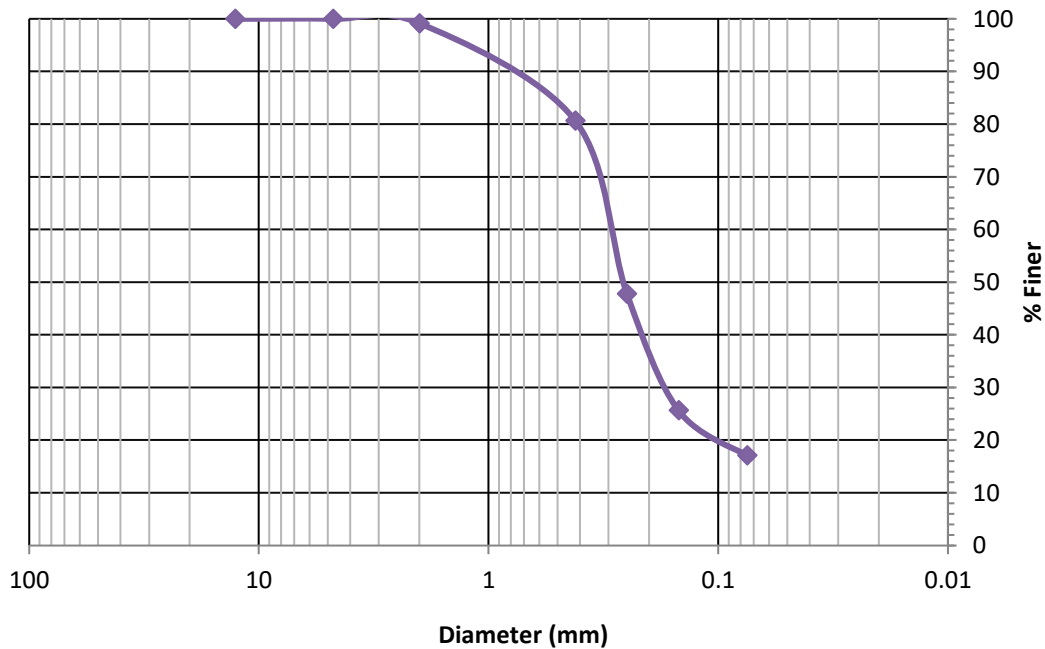
Client: Atkins

AREHNA Project No.: B-22-074

Report Date: 1/23/2024

Reviewed By: PV

Particle-Size Analysis of Soils (ASTM D6913)



Sieve Analysis

Sieve	Dia.	% Finer
1/2"	12.7	100.0
#4	4.76	100.0
#10	2.0	99.2
#40	0.42	80.7
#60	0.25	47.8
#100	0.149	25.7
#200	0.075	17.1

Material Information

Soil Classification:

D50: 0.262 mm

AASHTO: A-2-4

Unified: SM

Natural Moisture: 18.7

Boring No.: BB-10

Sample No.:

Depth: 4.0 - 6.0

Soil Description: Dark gray silty sand

**Standard Test Methods for Compressive Strength and Elastic Moduli of Intact Rock Core Specimens
(ASTM D7012)**
AREHNA Engineering, Inc.

GENERAL INFORMATION

Project Name:	Broad Causeway	Tested By:	RR/WO
Project Number:	B-22-074	Date:	11/22/2023
Rock Core No.:	BB-02	Run No.:	4
		Elevation (ft):	-61.2 to -66.2

SAMPLE INFORMATION

Diameter, D (in):	3.97	Sample Weight (lbf):	6.70	REC (%):	56
Length, L (in):	5.44	Sample Density (pcf):	172.4	RQD (%):	23
Sample Area, A (ft ²):	0.086	Length/Diameter:	1.372	Correction Factor:	0.944

LAB DATA

Change in Measured Axial Gauge, ΔL	Load, P	Axial Strain, $\epsilon = \Delta L/L$	Corrected Cross-Sectional Area, A_{cor}	Unconfined Compressive Strength, σ_u	Corrected Unconfined Compressive Strength, $\sigma_{u,cor}$
(in)	(lbf)	(-)	(ft ²)	(ksf)	(ksf)
0.0000	0	0.00000	0.08575	0.0	0.0
0.0006	500	0.00011	0.08576	5.8	5.5
0.0010	1000	0.0002	0.08576	11.7	11.0
0.0014	1500	0.0003	0.08577	17.5	16.5
0.0019	2000	0.0003	0.08578	23.3	22.0
0.0022	2500	0.0004	0.08578	29.1	27.5
0.0027	3000	0.0005	0.08579	35.0	33.0
0.0030	3500	0.0006	0.08579	40.8	38.5
0.0033	4000	0.0006	0.08580	46.6	44.0
0.0037	4500	0.0007	0.08580	52.4	49.5
0.0040	5000	0.0007	0.08581	58.3	55.0
0.0043	5500	0.0008	0.08581	64.1	60.5
0.0046	6000	0.0008	0.08582	69.9	66.0
0.0048	6500	0.0009	0.08582	75.7	71.5
0.0051	7000	0.0009	0.08583	81.6	77.0
0.0053	7500	0.0010	0.08583	87.4	82.5
0.0056	8000	0.0010	0.08583	93.2	88.0
0.0058	8500	0.0011	0.08584	99.0	93.5
0.0061	9000	0.0011	0.08584	104.8	99.0
0.0065	10000	0.0012	0.08585	116.5	110.0
0.0069	11000	0.0013	0.08585	128.1	121.0
0.0074	12000	0.0014	0.08586	139.8	132.0
0.0078	13000	0.0014	0.08587	151.4	143.0
0.0082	14000	0.0015	0.08588	163.0	154.0
0.0087	15000	0.0016	0.08588	174.7	164.9
0.0092	16000	0.0017	0.08589	186.3	175.9
0.0098	17000	0.0018	0.08590	197.9	186.9
0.0107	18000	0.0020	0.08591	209.5	197.9
0.0112	18250	0.0021	0.08592	212.4	200.6

NOTES:

1. The uniaxial compressive strength is calculated as follows: $\sigma_u = P/A$

**Standard Test Methods for Compressive Strength and Elastic Moduli of Intact Rock Core Specimens
(ASTM D7012)**
AREHNA Engineering, Inc.

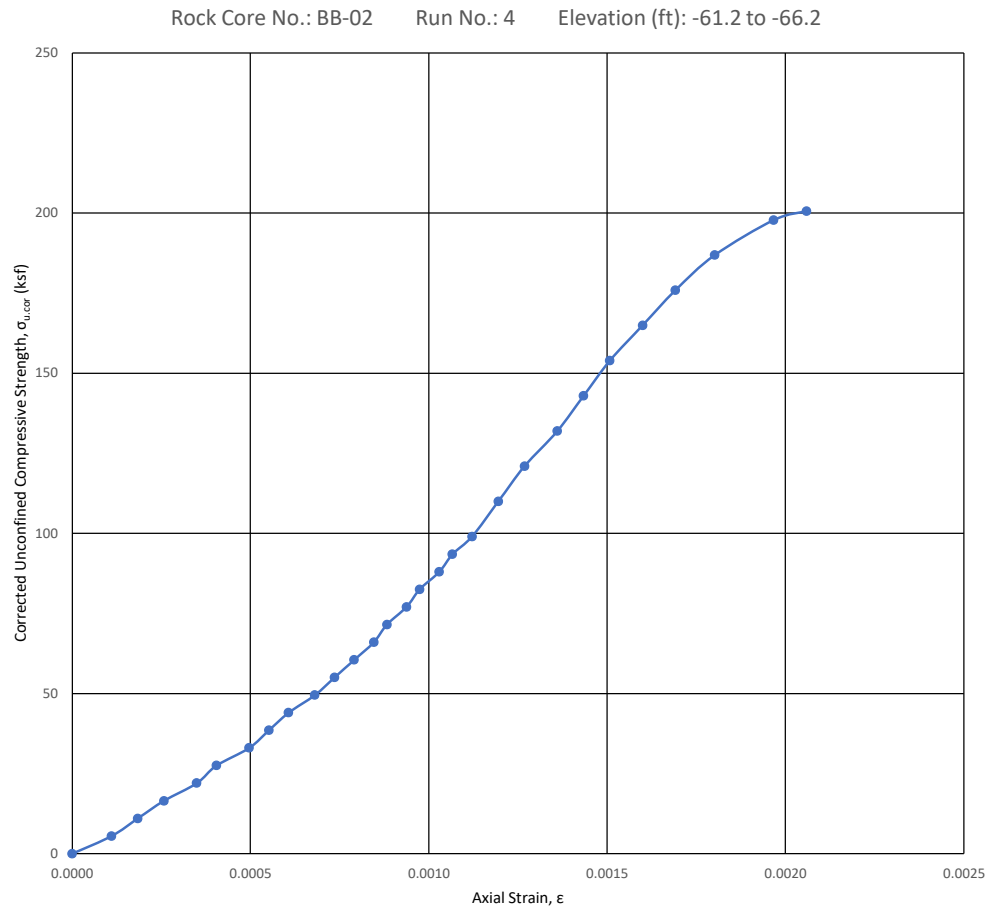
GENERAL INFORMATION

Project Name:	Broad Causeway	Tested By:	RR/WO
Project Number:	B-22-074	Date:	11/22/2023
Rock Core No.:	BB-02	Run No.:	4
		Elevation (ft):	-61.2 to -66.2

SAMPLE INFORMATION

Diameter, D (in):	3.97	Sample Weight (lbf):	6.70	REC (%):	56
Length, L (in):	5.44	Sample Density (pcf):	172.4	RQD (%):	23
Sample Area, A (ft ²):	0.086	Length/Diameter:	1.372	Correction Factor:	0.944

LAB DATA



Uniaxial Compressive Strength (ksf):	200.6
Tangent Elastic Modulus, E (ksf):	112,167

Standard Test Methods for Compressive Strength and Elastic Moduli of Intact Rock Core Specimens
(ASTM D7012)
AREHNA Engineering, Inc.

GENERAL INFORMATION

Project Name: Broad Causeway
Project Number: B-22-074
Rock Core No.: BB-02
Run No.: 4

Tested By: RR/WO
Date: 11/22/2023
Elevation (ft): -61.2 to -66.2

SAMPLE INFORMATION

Diameter, D (in): 3.97
Length, L (in): 5.44
Sample Area, A (ft²): 0.086

Sample Weight (lbf): 6.70
Sample Density (pcf): 172.4
Length/Diameter: 1.372

REC (%): 56
RQD (%): 23
Correction Factor: 0.944

PHOTOS



**Standard Test Methods for Compressive Strength and Elastic Moduli of Intact Rock Core Specimens
(ASTM D7012)**
AREHNA Engineering, Inc.

GENERAL INFORMATION

Project Name:	Broad Causeway	Tested By:	TC/RR
Project Number:	B-22-074	Date:	10/26/2023
Rock Core No.:	BB-02	Run No.:	5
		Elevation (ft):	-66.2 to -71.2

SAMPLE INFORMATION

Diameter, D (in):	4.074	Sample Weight (lbf):	8.05	REC (%):	88
Length, L (in):	6.247	Sample Density (pcf):	170.8	RQD (%):	58
Sample Area, A (ft ²):	0.091	Length/Diameter:	1.533	Correction Factor:	0.962

LAB DATA

Change in Measured Axial Gauge, ΔL	Load, P	Axial Strain, $\epsilon = \Delta L/L$	Corrected Cross-Sectional Area, A_{cor}	Unconfined Compressive Strength, σ_u	Corrected Unconfined Compressive Strength, $\sigma_{u,cor}$
(in)	(lbf)	(-)	(ft ²)	(ksf)	(ksf)
0.0000	0	0.00000	0.09053	0.0	0.0
0.0030	500	0.00048	0.09057	5.5	5.3
0.0040	1000	0.0006	0.09058	11.0	10.6
0.0045	1500	0.0007	0.09059	16.6	15.9
0.0050	2000	0.0008	0.09060	22.1	21.2
0.0053	2500	0.0008	0.09060	27.6	26.6
0.0060	3000	0.0010	0.09061	33.1	31.9
0.0060	3500	0.0010	0.09061	38.6	37.2
0.0063	4000	0.0010	0.09062	44.1	42.5
0.0070	4500	0.0011	0.09063	49.7	47.8
0.0070	5000	0.0011	0.09063	55.2	53.1
0.0073	5500	0.0012	0.09063	60.7	58.4
0.0078	6000	0.0012	0.09064	66.2	63.7
0.0080	6500	0.0013	0.09064	71.7	69.0
0.0081	7000	0.0013	0.09064	77.2	74.3
0.0083	7500	0.0013	0.09064	82.7	79.6
0.0088	8000	0.0014	0.09065	88.2	84.9
0.0090	8500	0.0014	0.09066	93.8	90.2
0.0091	9000	0.0015	0.09066	99.3	95.5
0.0100	10000	0.0016	0.09067	110.3	106.1
0.0100	11000	0.0016	0.09067	121.3	116.8
0.0110	12000	0.0018	0.09068	132.3	127.4
0.0110	13000	0.0018	0.09068	143.4	138.0
0.0115	14000	0.0018	0.09069	154.4	148.6
0.0120	15000	0.0019	0.09070	165.4	159.2
0.0123	16000	0.0020	0.09070	176.4	169.8
0.0125	17000	0.0020	0.09071	187.4	180.4
0.0130	18000	0.0021	0.09071	198.4	191.0
0.0140	19000	0.0022	0.09073	209.4	201.5
0.0143	20000	0.0023	0.09073	220.4	212.1
0.0148	21000	0.0024	0.09074	231.4	222.7
0.0151	22000	0.0024	0.09074	242.4	233.3
0.0153	23000	0.0024	0.09075	253.5	243.9
0.0155	24000	0.0025	0.09075	264.5	254.5
0.0161	25000	0.0026	0.09076	275.5	265.1
0.0168	26000	0.0027	0.09077	286.4	275.7
0.0170	27000	0.0027	0.09077	297.4	286.3
0.0175	28000	0.0028	0.09078	308.4	296.8
0.0180	29000	0.0029	0.09079	319.4	307.4
0.0183	30000	0.0029	0.09079	330.4	318.0
0.0188	31000	0.0030	0.09080	341.4	328.6
0.0190	32000	0.0030	0.09080	352.4	339.2
0.0193	33000	0.0031	0.09081	363.4	349.8
0.0200	34000	0.0032	0.09082	374.4	360.3
0.0205	35000	0.0033	0.09082	385.4	370.9
0.0215	36000	0.0034	0.09084	396.3	381.4
0.0215	37000	0.0034	0.09084	407.3	392.0
0.0220	39000	0.0035	0.09085	429.3	413.2
0.0228	40000	0.0036	0.09086	440.3	423.7
0.0235	41000	0.0038	0.09087	451.2	434.2
0.0245	41710	0.0039	0.09088	458.9	441.7

NOTES:

1. The uniaxial compressive strength is calculated as follows: $\sigma_u = P/A$

Standard Test Methods for Compressive Strength and Elastic Moduli of Intact Rock Core Specimens
(ASTM D7012)
AREHNA Engineering, Inc.

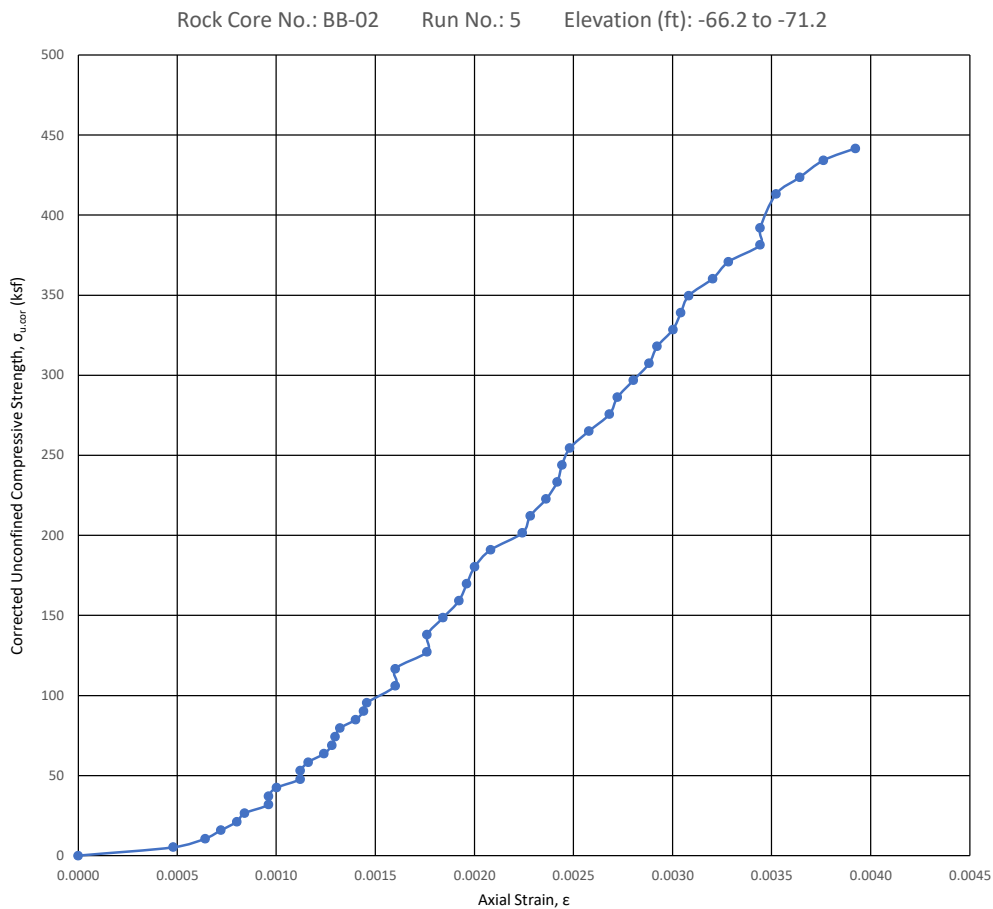
GENERAL INFORMATION

Project Name:	Broad Causeway	Tested By:	TC/RR
Project Number:	B-22-074	Date:	10/26/2023
Rock Core No.:	BB-02	Run No.:	5
		Elevation (ft):	-66.2 to -71.2

SAMPLE INFORMATION

Diameter, D (in):	4.074	Sample Weight (lbf):	8.05	REC (%):	88
Length, L (in):	6.247	Sample Density (pcf):	170.8	RQD (%):	58
Sample Area, A (ft ²):	0.091	Length/Diameter:	1.533	Correction Factor:	0.962

LAB DATA



Uniaxial Compressive Strength (ksf):	441.7
Tangent Elastic Modulus, E (ksf):	149,513

Standard Test Methods for Compressive Strength and Elastic Moduli of Intact Rock Core Specimens
(ASTM D7012)
AREHNA Engineering, Inc.

GENERAL INFORMATION

Project Name: Broad Causeway
Project Number: B-22-074
Rock Core No.: BB-02
Run No.: 5

Tested By: TC/RR
Date: 10/26/2023
Elevation (ft): -66.2 to -71.2

SAMPLE INFORMATION

Diameter, D (in): 4.074
Length, L (in): 6.247
Sample Area, A (ft²): 0.091

Sample Weight (lbf): 8.05
Sample Density (pcf): 170.8
Length/Diameter: 1.533

REC (%): 88
RQD (%): 58
Correction Factor: 0.962

PHOTOS



Standard Test Methods for Compressive Strength and Elastic Moduli of Intact Rock Core Specimens (ASTM D7012)

AREHNA Engineering, Inc.

GENERAL INFORMATION

Project Name:	Broad Causeway		
Project Number:	B-22-074		
Rock Core No.:	BB-02	Run No.:	6

Tested By:	RR/WO
Date:	11/21/2023
Elevation (ft):	-71.2 to -76.2

SAMPLE INFORMATION

Diameter, D (in):	3.97
Length, L (in):	6.70
Sample Area, A (ft ²):	0.086

Sample Weight (lbf):	6.91
Sample Density (pcf):	144.2
Length/Diameter:	1.689

REC (%)	77
RQD (%)	37
Correction Factor:	0.974

LAB DATA

[illegible]

NOTES:

1. The uniaxial compressive strength is calculated as follows: $\sigma_u = P/A$

**Standard Test Methods for Compressive Strength and Elastic Moduli of Intact Rock Core Specimens
(ASTM D7012)**
AREHNA Engineering, Inc.

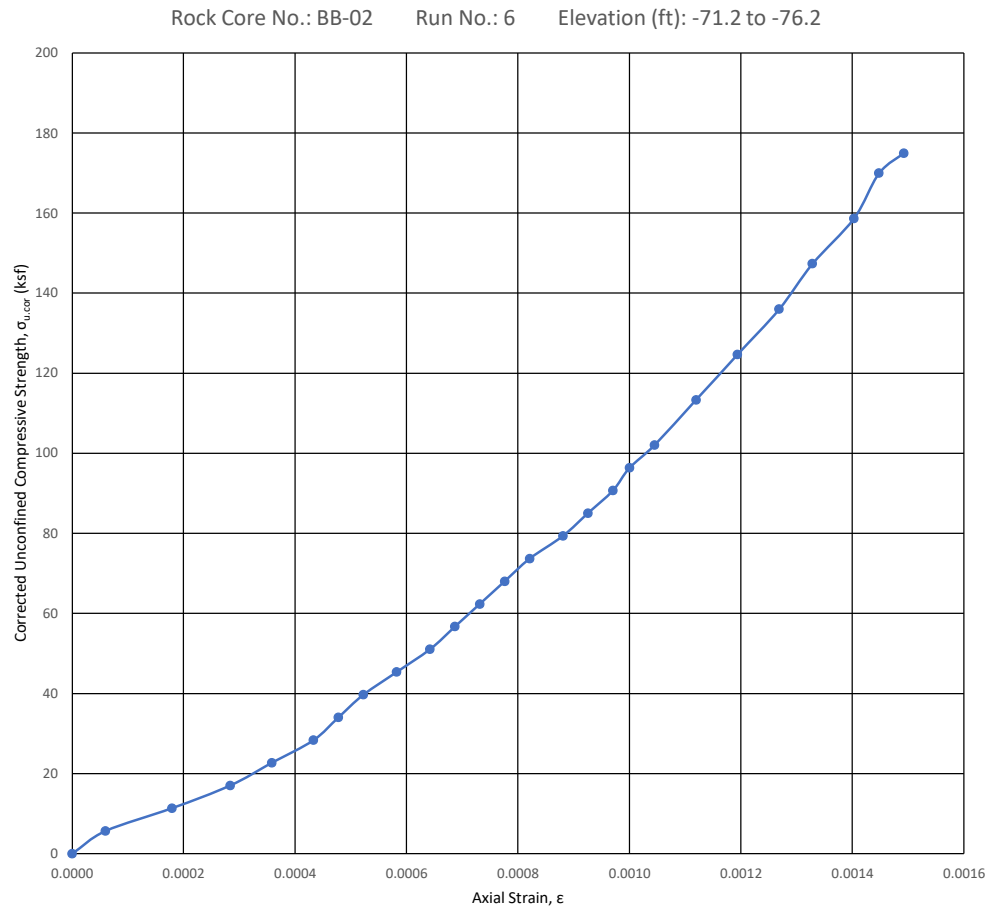
GENERAL INFORMATION

Project Name:	Broad Causeway	Tested By:	RR/WO
Project Number:	B-22-074	Date:	11/21/2023
Rock Core No.:	BB-02	Run No.:	6
		Elevation (ft):	-71.2 to -76.2

SAMPLE INFORMATION

Diameter, D (in):	3.97	Sample Weight (lbf):	6.91	REC (%):	77
Length, L (in):	6.70	Sample Density (pcf):	144.2	RQD (%):	37
Sample Area, A (ft ²):	0.086	Length/Diameter:	1.689	Correction Factor:	0.974

LAB DATA



Uniaxial Compressive Strength (ksf):	175.0
Tangent Elastic Modulus, E (ksf):	116,828

Standard Test Methods for Compressive Strength and Elastic Moduli of Intact Rock Core Specimens
(ASTM D7012)
AREHNA Engineering, Inc.

GENERAL INFORMATION

Project Name: Broad Causeway
Project Number: B-22-074
Rock Core No.: BB-02
Run No.: 6

Tested By: RR/WO
Date: 11/21/2023
Elevation (ft): -71.2 to -76.2

SAMPLE INFORMATION

Diameter, D (in): 3.97
Length, L (in): 6.70
Sample Area, A (ft²): 0.086

Sample Weight (lbf): 6.91
Sample Density (pcf): 144.2
Length/Diameter: 1.689

REC (%): 77
RQD (%): 37
Correction Factor: 0.974

PHOTOS



**Standard Test Methods for Compressive Strength and Elastic Moduli of Intact Rock Core Specimens
(ASTM D7012)**
AREHNA Engineering, Inc.

GENERAL INFORMATION

Project Name:	Broad Causeway	Tested By:	TC/RR
Project Number:	B-22-074	Date:	11/21/2023
Rock Core No.:	BB-02	Run No.:	9
		Elevation (ft):	-86.2 to -91.2

SAMPLE INFORMATION

Diameter, D (in):	3.98	Sample Weight (lbf):	7.81	REC (%):	73
Length, L (in):	7.13	Sample Density (pcf):	152.1	RQD (%):	38
Sample Area, A (ft ²):	0.086	Length/Diameter:	1.791	Correction Factor:	1.000

LAB DATA

Change in Measured Axial Gauge, ΔL	Load, P	Axial Strain, $\epsilon = \Delta L/L$	Corrected Cross-Sectional Area, A_{cor}	Unconfined Compressive Strength, σ_u	Corrected Unconfined Compressive Strength, $\sigma_{u,cor}$
(in)	(lbf)	(-)	(ft ²)	(ksf)	(ksf)
0.0000	0	0.00000	0.08640	0.0	0.0
0.0014	500	0.00020	0.08641	5.8	5.8
0.0022	1000	0.0003	0.08642	11.6	11.6
0.0028	1500	0.0004	0.08643	17.4	17.4
0.0033	2000	0.0005	0.08644	23.1	23.1
0.0037	2500	0.0005	0.08644	28.9	28.9
0.0042	3000	0.0006	0.08645	34.7	34.7
0.0050	3500	0.0007	0.08646	40.5	40.5
0.0055	4000	0.0008	0.08646	46.3	46.3
0.0062	4500	0.0009	0.08647	52.0	52.0
0.0068	5000	0.0010	0.08648	57.8	57.8
0.0074	5500	0.0010	0.08649	63.6	63.6
0.0079	6000	0.0011	0.08649	69.4	69.4
0.0086	6500	0.0012	0.08650	75.1	75.1
0.0090	7000	0.0013	0.08651	80.9	80.9
0.0093	7500	0.0013	0.08651	86.7	86.7
0.0098	8000	0.0014	0.08651	92.5	92.5
0.0100	8500	0.0014	0.08652	98.2	98.2
0.0105	9000	0.0015	0.08652	104.0	104.0
0.0112	10000	0.0016	0.08653	115.6	115.6
0.0118	11000	0.0017	0.08654	127.1	127.1
0.0129	12000	0.0018	0.08655	138.6	138.6
0.0140	15000	0.0020	0.08657	173.3	173.3
0.0146	16000	0.0020	0.08657	184.8	184.8
0.0150	17000	0.0021	0.08658	196.4	196.4
0.0155	18000	0.0022	0.08658	207.9	207.9
0.0159	19000	0.0022	0.08659	219.4	219.4
0.0164	20000	0.0023	0.08660	231.0	231.0
0.0168	21000	0.0024	0.08660	242.5	242.5
0.0172	22000	0.0024	0.08660	254.0	254.0
0.0176	23000	0.0025	0.08661	265.6	265.6
0.0180	24000	0.0025	0.08661	277.1	277.1
0.0185	25000	0.0026	0.08662	288.6	288.6
0.0187	26000	0.0026	0.08662	300.2	300.2
0.0190	27000	0.0027	0.08663	311.7	311.7
0.0193	28000	0.0027	0.08663	323.2	323.2
0.0196	29000	0.0027	0.08663	334.7	334.7
0.0199	30000	0.0028	0.08664	346.3	346.3
0.0205	32000	0.0029	0.08665	369.3	369.3
0.0210	34000	0.0029	0.08665	392.4	392.4
0.0216	36000	0.0030	0.08666	415.4	415.4
0.0221	38000	0.0031	0.08666	438.5	438.5
0.0226	40000	0.0032	0.08667	461.5	461.5
0.0232	42000	0.0033	0.08668	484.6	484.6
0.0236	44000	0.0033	0.08668	507.6	507.6
0.0241	46000	0.0034	0.08669	530.6	530.6
0.0246	48000	0.0035	0.08670	553.7	553.7
0.0251	50000	0.0035	0.08670	576.7	576.7
0.0257	52000	0.0036	0.08671	599.7	599.7
0.0262	54000	0.0037	0.08671	622.7	622.7
0.0268	56000	0.0038	0.08672	645.7	645.7
0.0272	56240	0.0038	0.08673	648.5	648.5

NOTES:

1. The uniaxial compressive strength is calculated as follows: $\sigma_u = P/A$

Standard Test Methods for Compressive Strength and Elastic Moduli of Intact Rock Core Specimens
(ASTM D7012)
AREHNA Engineering, Inc.

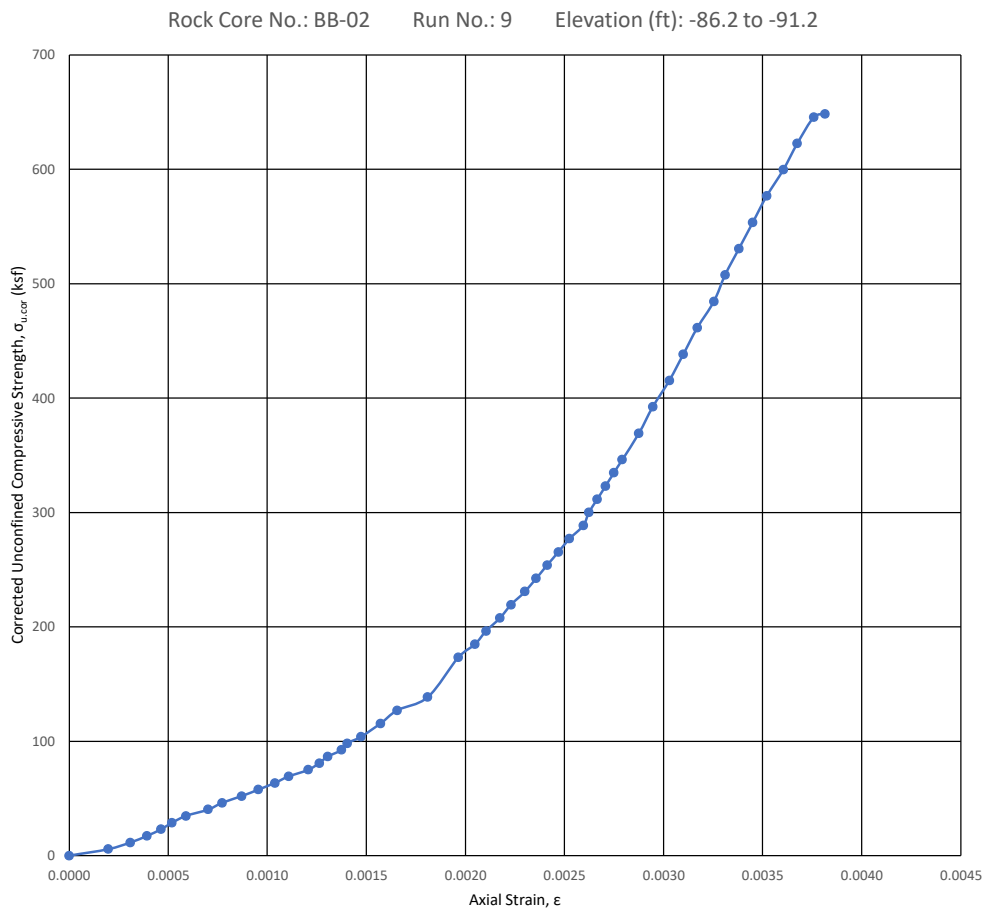
GENERAL INFORMATION

Project Name:	Broad Causeway	Tested By:	TC/RR
Project Number:	B-22-074	Date:	11/21/2023
Rock Core No.:	BB-02	Run No.:	9
		Elevation (ft):	-86.2 to -91.2

SAMPLE INFORMATION

Diameter, D (in):	3.98	Sample Weight (lbf):	7.81	REC (%):	73
Length, L (in):	7.13	Sample Density (pcf):	152.1	RQD (%):	38
Sample Area, A (ft ²):	0.086	Length/Diameter:	1.791	Correction Factor:	1.000

LAB DATA



Uniaxial Compressive Strength (ksf):	648.5
Tangent Elastic Modulus, E (ksf):	192,468

Standard Test Methods for Compressive Strength and Elastic Moduli of Intact Rock Core Specimens
(ASTM D7012)
AREHNA Engineering, Inc.

GENERAL INFORMATION

Project Name: Broad Causeway
Project Number: B-22-074
Rock Core No.: BB-02
Run No.: 9

Tested By: TC/RR
Date: 11/21/2023
Elevation (ft): -86.2 to -91.2

SAMPLE INFORMATION

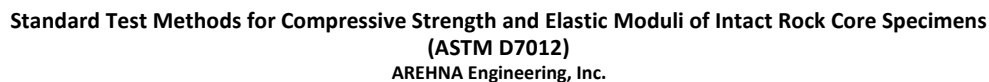
Diameter, D (in): 3.98
Length, L (in): 7.13
Sample Area, A (ft²): 0.086

Sample Weight (lbf): 7.81
Sample Density (pcf): 152.1
Length/Diameter: 1.791

REC (%): 73
RQD (%): 38
Correction Factor: 1.000

PHOTOS





Project Name:	Broad Causeway		
Project Number:	B-22-074		
Rock Core No.:	BB-04	Run No.:	3

Tested By:	AT/RR
Date:	11/21/2023
Elevation (ft):	-62.3 to -67.3

Diameter, D (in):	3.93
Length, L (in):	8.19
Sample Area, A (ft ²):	0.084

Sample Weight (lbf):	5.87
Sample Density (pcf):	102.3
Length/Diameter:	2.084

REC (%):	62
RQD (%):	43
Correction Factor:	1.000

[illegible]

1. The uniaxial compressive strength is calculated as follows: $\sigma_u = P/A$

Standard Test Methods for Compressive Strength and Elastic Moduli of Intact Rock Core Specimens
(ASTM D7012)
AREHNA Engineering, Inc.

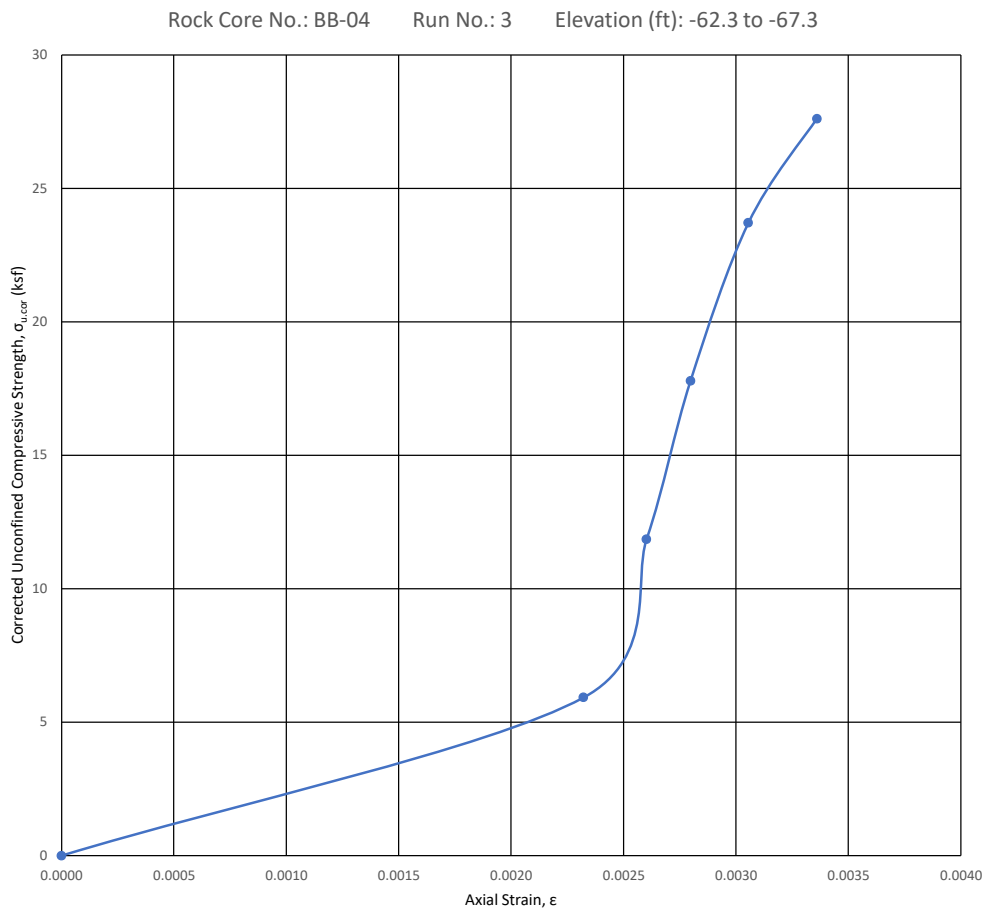
GENERAL INFORMATION

Project Name:	Broad Causeway	Tested By:	AT/RR
Project Number:	B-22-074	Date:	11/21/2023
Rock Core No.:	BB-04	Run No.:	3
		Elevation (ft):	-62.3 to -67.3

SAMPLE INFORMATION

Diameter, D (in):	3.93	Sample Weight (lbf):	5.87	REC (%):	62
Length, L (in):	8.19	Sample Density (pcf):	102.3	RQD (%):	43
Sample Area, A (ft ²):	0.084	Length/Diameter:	2.084	Correction Factor:	1.000

LAB DATA



Uniaxial Compressive Strength (ksf):	27.6
Tangent Elastic Modulus, E (ksf):	24,251

Standard Test Methods for Compressive Strength and Elastic Moduli of Intact Rock Core Specimens
(ASTM D7012)
AREHNA Engineering, Inc.

GENERAL INFORMATION

Project Name: Broad Causeway
Project Number: B-22-074
Rock Core No.: BB-04
Run No.: 3

Tested By: AT/RR
Date: 11/21/2023
Elevation (ft): -62.3 to -67.3

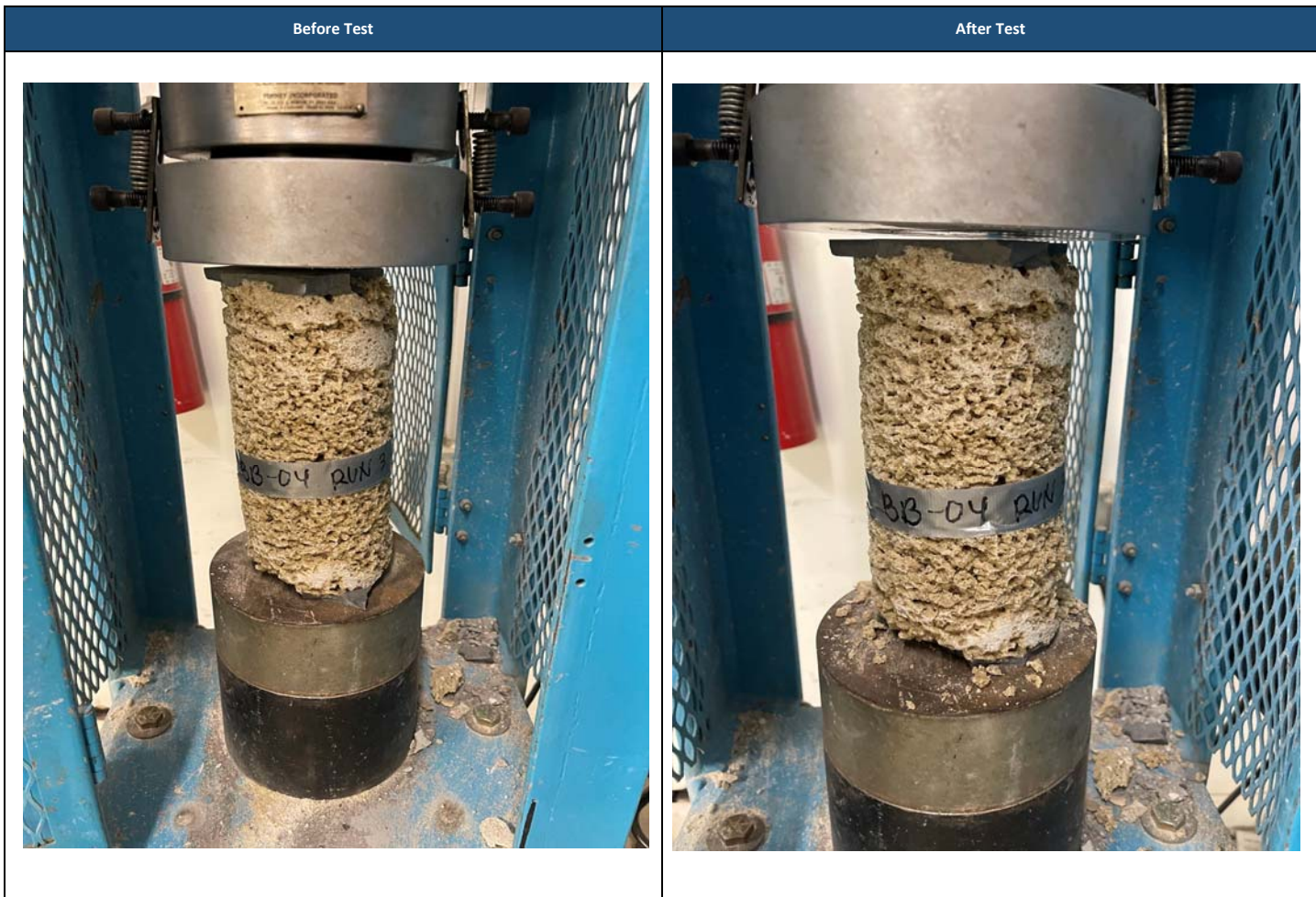
SAMPLE INFORMATION

Diameter, D (in): 3.93
Length, L (in): 8.19
Sample Area, A (ft²): 0.084

Sample Weight (lbf): 5.87
Sample Density (pcf): 102.3
Length/Diameter: 2.084

REC (%): 62
RQD (%): 43
Correction Factor: 1.000

PHOTOS



**Standard Test Methods for Compressive Strength and Elastic Moduli of Intact Rock Core Specimens
(ASTM D7012)**
AREHNA Engineering, Inc.

GENERAL INFORMATION

Project Name:	Broad Causeway	Tested By:	RR/WO
Project Number:	B-22-074	Date:	11/21/2023
Rock Core No.:	BB-04	Run No.:	4
		Elevation (ft):	-67.3 to -72.3

SAMPLE INFORMATION

Diameter, D (in):	3.98	Sample Weight (lbf):	8.94	REC (%):	85
Length, L (in):	7.71	Sample Density (pcf):	161.1	RQD (%):	20
Sample Area, A (ft ²):	0.086	Length/Diameter:	1.937	Correction Factor:	1.000

LAB DATA

Change in Measured Axial Gauge, ΔL	Load, P	Axial Strain, $\epsilon = \Delta L/L$	Corrected Cross-Sectional Area, A_{cor}	Unconfined Compressive Strength, σ_u	Corrected Unconfined Compressive Strength, $\sigma_{u,cor}$
(in)	(lbf)	(-)	(ft ²)	(ksf)	(ksf)
0.0000	0	0.00000	0.08640	0.0	0.0
0.0020	500	0.00026	0.08642	5.8	5.8
0.0031	1000	0.0004	0.08643	11.6	11.6
0.0038	1500	0.0005	0.08644	17.4	17.4
0.0042	2000	0.0005	0.08644	23.1	23.1
0.0047	2500	0.0006	0.08645	28.9	28.9
0.0049	3000	0.0006	0.08645	34.7	34.7
0.0053	3500	0.0007	0.08646	40.5	40.5
0.0056	4000	0.0007	0.08646	46.3	46.3
0.0058	4500	0.0008	0.08646	52.0	52.0
0.0060	5000	0.0008	0.08646	57.8	57.8
0.0062	5500	0.0008	0.08647	63.6	63.6
0.0064	6000	0.0008	0.08647	69.4	69.4
0.0065	6500	0.0008	0.08647	75.2	75.2
0.0067	7000	0.0009	0.08647	81.0	81.0
0.0068	7500	0.0009	0.08647	86.7	86.7
0.0069	8000	0.0009	0.08647	92.5	92.5
0.0070	8500	0.0009	0.08647	98.3	98.3

NOTES:

- The uniaxial compressive strength is calculated as follows: $\sigma_u = P/A$

Standard Test Methods for Compressive Strength and Elastic Moduli of Intact Rock Core Specimens
(ASTM D7012)
AREHNA Engineering, Inc.

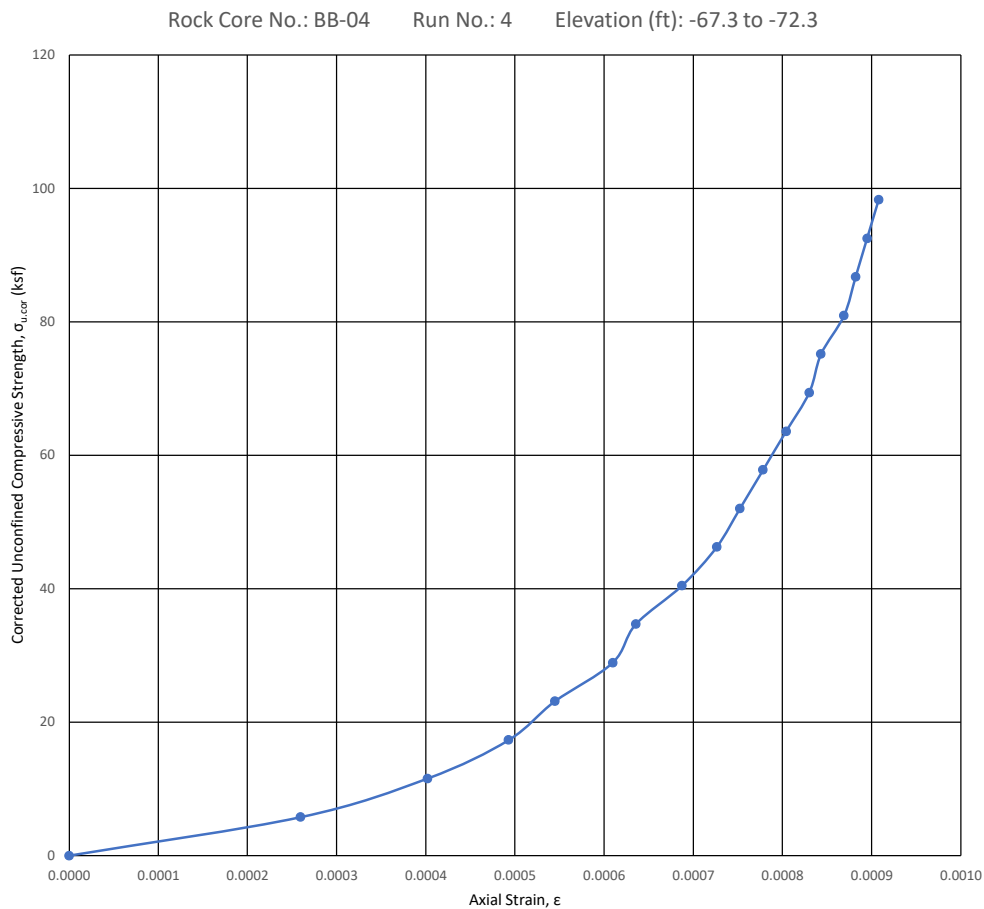
GENERAL INFORMATION

Project Name:	Broad Causeway	Tested By:	RR/WO
Project Number:	B-22-074	Date:	11/21/2023
Rock Core No.:	BB-04	Run No.:	4
		Elevation (ft):	-67.3 to -72.3

SAMPLE INFORMATION

Diameter, D (in):	3.98	Sample Weight (lbf):	8.94	REC (%):	85
Length, L (in):	7.71	Sample Density (pcf):	161.1	RQD (%):	20
Sample Area, A (ft ²):	0.086	Length/Diameter:	1.937	Correction Factor:	1.000

LAB DATA



Uniaxial Compressive Strength (ksf):	98.3
Tangent Elastic Modulus, E (ksf):	202,610

Standard Test Methods for Compressive Strength and Elastic Moduli of Intact Rock Core Specimens
(ASTM D7012)
AREHNA Engineering, Inc.

GENERAL INFORMATION

Project Name: Broad Causeway
Project Number: B-22-074
Rock Core No.: BB-04
Run No.: 4

Tested By: RR/WO
Date: 11/21/2023
Elevation (ft): -67.3 to -72.3

SAMPLE INFORMATION

Diameter, D (in): 3.98
Length, L (in): 7.71
Sample Area, A (ft²): 0.086

Sample Weight (lbf): 8.94
Sample Density (pcf): 161.1
Length/Diameter: 1.937

REC (%): 85
RQD (%): 20
Correction Factor: 1.000

PHOTOS



**Standard Test Methods for Compressive Strength and Elastic Moduli of Intact Rock Core Specimens
(ASTM D7012)**
AREHNA Engineering, Inc.

GENERAL INFORMATION

Project Name:	Broad Causeway	Tested By:	TC/RR
Project Number:	B-22-074	Date:	10/26/2023
Rock Core No.:	BB-04	Run No.:	5
		Elevation (ft):	-72.3 to -77.3

SAMPLE INFORMATION

Diameter, D (in):	3.995	Sample Weight (lbf):	8.96	REC (%):	90
Length, L (in):	8.256	Sample Density (pcf):	149.6	RQD (%):	77
Sample Area, A (ft ²):	0.087	Length/Diameter:	2.067	Correction Factor:	1.000

LAB DATA

Change in Measured Axial Gauge, ΔL	Load, P	Axial Strain, $\epsilon = \Delta L/L$	Corrected Cross-Sectional Area, A_{cor}	Unconfined Compressive Strength, σ_u	Corrected Unconfined Compressive Strength, $\sigma_{u,cor}$
(in)	(lbf)	(-)	(ft ²)	(ksf)	(ksf)
0.0000	0	0.00000	0.08705	0.0	0.0
0.0010	500	0.00012	0.08706	5.7	5.7
0.0030	1000	0.0004	0.08708	11.5	11.5
0.0035	1500	0.0004	0.08709	17.2	17.2
0.0040	2000	0.0005	0.08709	23.0	23.0
0.0048	2500	0.0006	0.08710	28.7	28.7
0.0053	3000	0.0006	0.08710	34.4	34.4
0.0058	3500	0.0007	0.08711	40.2	40.2
0.0060	4000	0.0007	0.08711	45.9	45.9
0.0065	4500	0.0008	0.08712	51.7	51.7
0.0068	5000	0.0008	0.08712	57.4	57.4
0.0070	5500	0.0008	0.08712	63.1	63.1
0.0073	6000	0.0009	0.08712	68.9	68.9
0.0075	6500	0.0009	0.08713	74.6	74.6
0.0078	7000	0.0009	0.08713	80.3	80.3
0.0080	7500	0.0010	0.08713	86.1	86.1
0.0080	8000	0.0010	0.08713	91.8	91.8
0.0081	8500	0.0010	0.08713	97.6	97.6
0.0085	9000	0.0010	0.08714	103.3	103.3
0.0088	10000	0.0011	0.08714	114.8	114.8
0.0090	11000	0.0011	0.08714	126.2	126.2
0.0093	12000	0.0011	0.08715	137.7	137.7
0.0095	13000	0.0012	0.08715	149.2	149.2
0.0100	14000	0.0012	0.08715	160.6	160.6
0.0102	15000	0.0012	0.08716	172.1	172.1
0.0102	16000	0.0012	0.08716	183.6	183.6
0.0105	17000	0.0013	0.08716	195.0	195.0
0.0110	18000	0.0013	0.08716	206.5	206.5
0.0110	19000	0.0013	0.08716	218.0	218.0
0.0112	20000	0.0014	0.08717	229.4	229.4
0.0115	21000	0.0014	0.08717	240.9	240.9
0.0118	22000	0.0014	0.08717	252.4	252.4
0.0120	23000	0.0015	0.08718	263.8	263.8
0.0120	24000	0.0015	0.08718	275.3	275.3
0.0123	25000	0.0015	0.08718	286.8	286.8
0.0125	26000	0.0015	0.08718	298.2	298.2
0.0128	27000	0.0015	0.08718	309.7	309.7
0.0133	29000	0.0016	0.08719	332.6	332.6
0.0135	30000	0.0016	0.08719	344.1	344.1
0.0135	31000	0.0016	0.08719	355.5	355.5
0.0140	32000	0.0017	0.08720	367.0	367.0
0.0141	33000	0.0017	0.08720	378.5	378.5
0.0141	34000	0.0017	0.08720	389.9	389.9
0.0145	35000	0.0018	0.08720	401.4	401.4
0.0220	35340				

NOTES:

1. The uniaxial compressive strength is calculated as follows: $\sigma_u = P/A$

Standard Test Methods for Compressive Strength and Elastic Moduli of Intact Rock Core Specimens
(ASTM D7012)
AREHNA Engineering, Inc.

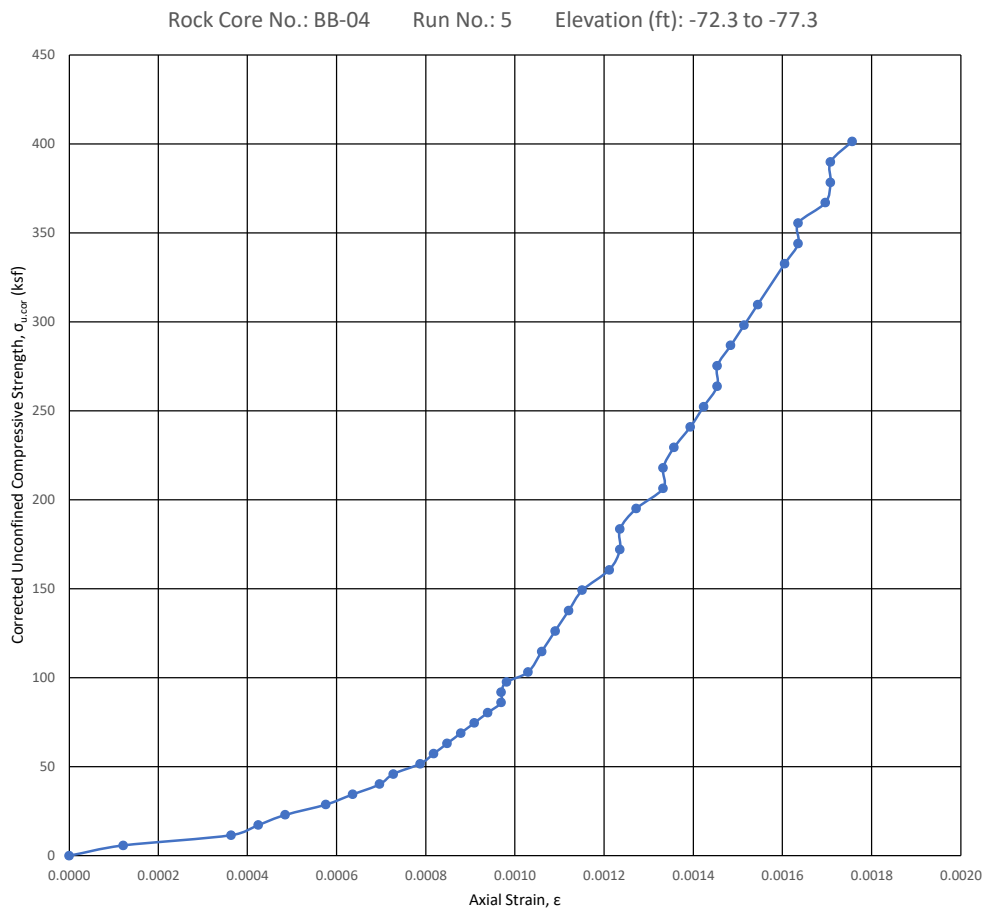
GENERAL INFORMATION

Project Name:	Broad Causeway	Tested By:	TC/RR
Project Number:	B-22-074	Date:	10/26/2023
Rock Core No.:	BB-04	Run No.:	5
		Elevation (ft):	-72.3 to -77.3

SAMPLE INFORMATION

Diameter, D (in):	3.995	Sample Weight (lbf):	8.96	REC (%):	90
Length, L (in):	8.256	Sample Density (pcf):	149.6	RQD (%):	77
Sample Area, A (ft ²):	0.087	Length/Diameter:	2.067	Correction Factor:	1.000

LAB DATA



Uniaxial Compressive Strength (ksf):	401.4
Tangent Elastic Modulus, E (ksf):	397,589

Standard Test Methods for Compressive Strength and Elastic Moduli of Intact Rock Core Specimens
(ASTM D7012)
AREHNA Engineering, Inc.

GENERAL INFORMATION

Project Name: Broad Causeway
Project Number: B-22-074
Rock Core No.: BB-04
Run No.: 5

Tested By: TC/RR
Date: 10/26/2023
Elevation (ft): -72.3 to -77.3

SAMPLE INFORMATION

Diameter, D (in): 3.995
Length, L (in): 8.256
Sample Area, A (ft²): 0.087

Sample Weight (lbf): 8.96
Sample Density (pcf): 149.6
Length/Diameter: 2.067

REC (%): 90
RQD (%): 77
Correction Factor: 1.000

PHOTOS



**Standard Test Methods for Compressive Strength and Elastic Moduli of Intact Rock Core Specimens
(ASTM D7012)**
AREHNA Engineering, Inc.

GENERAL INFORMATION

Project Name:	Broad Causeway	Tested By:	TC/RJ
Project Number:	B-22-074	Date:	10/31/2023
Rock Core No.:	BB-04	Run No.:	6
		Elevation (ft):	-77.3 to -82.3

SAMPLE INFORMATION

Diameter, D (in):	3.993	Sample Weight (lbf):	9.05	REC (%):	90
Length, L (in):	8.169	Sample Density (pcf):	152.9	RQD (%):	57
Sample Area, A (ft ²):	0.087	Length/Diameter:	2.046	Correction Factor:	1.000

LAB DATA

Change in Measured Axial Gauge, ΔL	Load, P	Axial Strain, $\epsilon = \Delta L/L$	Corrected Cross-Sectional Area, A_{cor}	Unconfined Compressive Strength, σ_u	Corrected Unconfined Compressive Strength, $\sigma_{u,cor}$
(in)	(lbf)	(-)	(ft ²)	(ksf)	(ksf)
0.0000	0	0.00000	0.08696	0.0	0.0
0.0010	500	0.00012	0.08697	5.7	5.7
0.0018	1000	0.0002	0.08698	11.5	11.5
0.0020	1500	0.0002	0.08698	17.2	17.2
0.0023	2000	0.0003	0.08699	23.0	23.0
0.0025	2500	0.0003	0.08699	28.7	28.7
0.0030	3000	0.0004	0.08699	34.5	34.5
0.0030	3500	0.0004	0.08699	40.2	40.2
0.0033	4000	0.0004	0.08700	46.0	46.0
0.0035	4500	0.0004	0.08700	51.7	51.7
0.0038	5000	0.0005	0.08700	57.5	57.5
0.0040	5500	0.0005	0.08700	63.2	63.2
0.0040	6000	0.0005	0.08700	69.0	69.0
0.0043	6500	0.0005	0.08701	74.7	74.7
0.0043	7000	0.0005	0.08701	80.5	80.5
0.0045	7500	0.0006	0.08701	86.2	86.2
0.0048	8000	0.0006	0.08701	91.9	91.9
0.0050	8500	0.0006	0.08701	97.7	97.7
0.0050	9000	0.0006	0.08701	103.4	103.4
0.0053	10000	0.0006	0.08702	114.9	114.9
0.0055	11000	0.0007	0.08702	126.4	126.4
0.0060	12000	0.0007	0.08703	137.9	137.9
0.0063	13000	0.0008	0.08703	149.4	149.4
0.0068	14000	0.0008	0.08703	160.9	160.9
0.0070	15000	0.0009	0.08704	172.3	172.3
0.0070	16000	0.0009	0.08704	183.8	183.8
0.0073	17000	0.0009	0.08704	195.3	195.3
0.0078	18000	0.0009	0.08704	206.8	206.8
0.0080	19000	0.0010	0.08705	218.3	218.3
0.0083	20000	0.0010	0.08705	229.8	229.8
0.0088	21000	0.0011	0.08705	241.2	241.2
0.0090	22000	0.0011	0.08706	252.7	252.7
0.0090	23000	0.0011	0.08706	264.2	264.2
0.0093	24000	0.0011	0.08706	275.7	275.7
0.0098	25000	0.0012	0.08707	287.1	287.1
0.0100	26000	0.0012	0.08707	298.6	298.6
0.0100	27000	0.0012	0.08707	310.1	310.1
0.0103	28000	0.0013	0.08707	321.6	321.6
0.0105	29000	0.0013	0.08707	333.1	333.1
0.0108	30000	0.0013	0.08708	344.5	344.5
0.0110	32000	0.0013	0.08708	367.5	367.5
0.0120	34000	0.0015	0.08709	390.4	390.4
0.0123	36000	0.0015	0.08709	413.4	413.4
0.0130	38000	0.0016	0.08710	436.3	436.3
0.0138	40000	0.0017	0.08711	459.2	459.2
0.0140	42000	0.0017	0.08711	482.1	482.1
0.0148	44000	0.0018	0.08712	505.1	505.1
0.0153	46000	0.0019	0.08712	528.0	528.0
0.0165	48000	0.0020	0.08714	550.9	550.9
0.017	48280	0.0021	0.08714	554.0	554.0

NOTES:

1. The uniaxial compressive strength is calculated as follows: $\sigma_u = P/A$

Standard Test Methods for Compressive Strength and Elastic Moduli of Intact Rock Core Specimens (ASTM D7012)

AREHNA Engineering, Inc.

GENERAL INFORMATION

Project Name: **Broad Causeway**
 Project Number: **B-22-074**
 Rock Core No.: **BB-04** Run No.: **6**

Tested By: **TC/RJ**
 Date: **10/31/2023**
 Elevation (ft): **-77.3 to -82.3**

SAMPLE INFORMATION

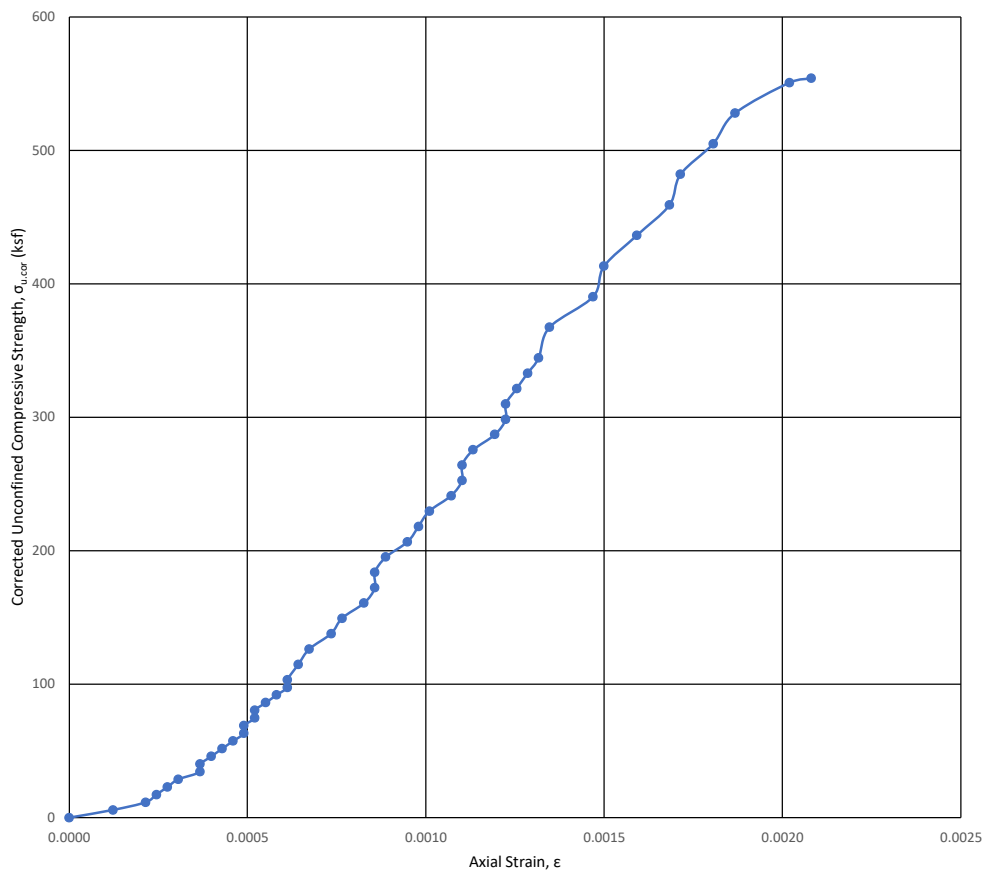
Diameter, D (in): **3.993**
 Length, L (in): **8.169**
 Sample Area, A (ft²): **0.087**

Sample Weight (lbf): **9.05**
 Sample Density (pcf): **152.9**
 Length/Diameter: **2.046**

REC (%): **90**
 RQD (%): **57**
 Correction Factor: **1.000**

LAB DATA

Rock Core No.: BB-04 Run No.: 6 Elevation (ft): -77.3 to -82.3



Uniaxial Compressive Strength (ksf): **554.0**
 Tangent Elastic Modulus, E (ksf): **334,898**

Standard Test Methods for Compressive Strength and Elastic Moduli of Intact Rock Core Specimens
(ASTM D7012)
AREHNA Engineering, Inc.

GENERAL INFORMATION

Project Name: Broad Causeway
Project Number: B-22-074
Rock Core No.: BB-04
Run No.: 6

Tested By: TC/RJ
Date: 10/31/2023
Elevation (ft): -77.3 to -82.3

SAMPLE INFORMATION

Diameter, D (in): 3.993
Length, L (in): 8.169
Sample Area, A (ft²): 0.087

Sample Weight (lbf): 9.05
Sample Density (pcf): 152.9
Length/Diameter: 2.046

REC (%): 90
RQD (%): 57
Correction Factor: 1.000

PHOTOS



Standard Test Methods for Compressive Strength and Elastic Moduli of Intact Rock Core Specimens (ASTM D7012)

AREHNA Engineering, Inc.

GENERAL INFORMATION

Project Name:	Broad Causeway		
Project Number:	B-22-074		
Rock Core No.:	BB-04	Run No.:	9

Tested By:	RR/WO
Date:	11/22/2023
Elevation (ft):	-92.3 to -97.3

SAMPLE INFORMATION

Diameter, D (in):	3.99
Length, L (in):	4.82
Sample Area, A (ft ²):	0.087

Sample Weight (lbf):	6.76
Sample Density (pcf):	194.1
Length/Diameter:	1.209

REC (%)	67
RQD (%)	23
Correction Factor:	0.918

LAB DATA

[illegible]

NOTES:

1. The uniaxial compressive strength is calculated as follows: $\sigma_{11} = P/A$

Standard Test Methods for Compressive Strength and Elastic Moduli of Intact Rock Core Specimens (ASTM D7012) AREHNA Engineering, Inc.

GENERAL INFORMATION

Project Name: **Broad Causeway**
 Project Number: **B-22-074**
 Rock Core No.: **BB-04** Run No.: **9**

Tested By: **RR/WO**
 Date: **11/22/2023**
 Elevation (ft): **-92.3 to -97.3**

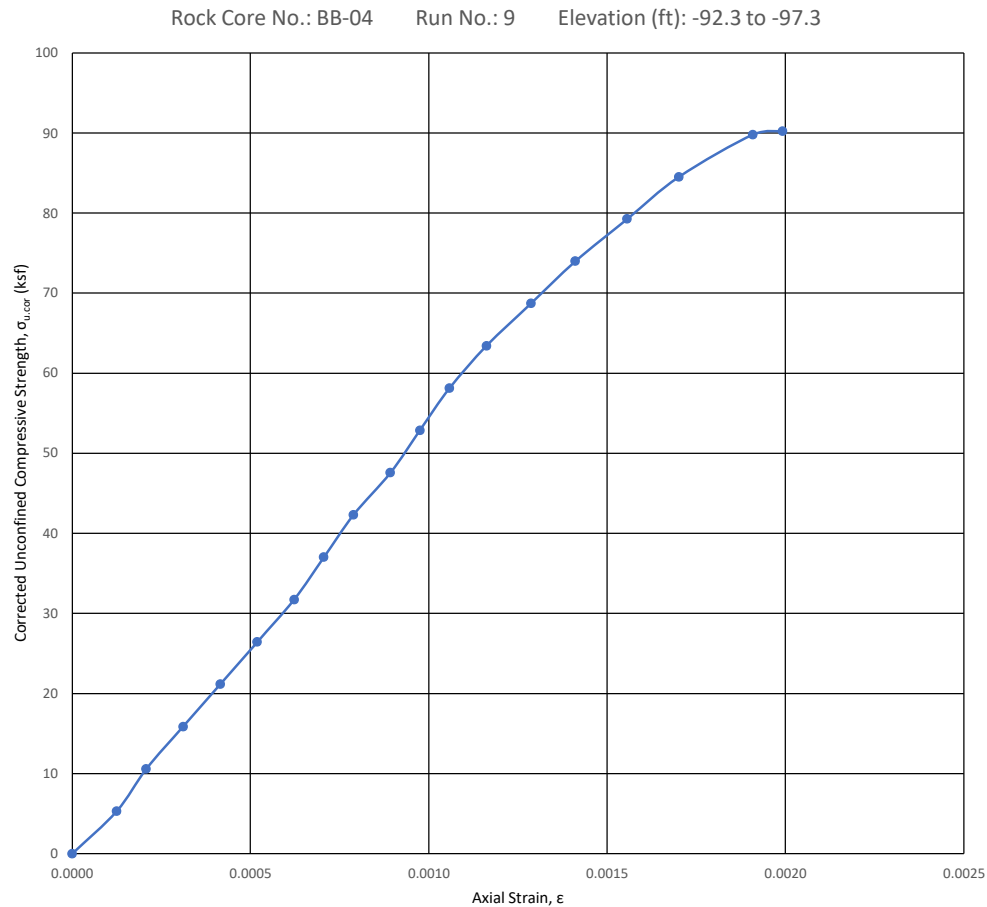
SAMPLE INFORMATION

Diameter, D (in): **3.99**
 Length, L (in): **4.82**
 Sample Area, A (ft²): **0.087**

Sample Weight (lbf): **6.76**
 Sample Density (pcf): **194.1**
 Length/Diameter: **1.209**

REC (%): **67**
 RQD (%): **23**
 Correction Factor: **0.918**

LAB DATA



Uniaxial Compressive Strength (ksf): **90.2**
 Tangent Elastic Modulus, E (ksf): **55,919**

Standard Test Methods for Compressive Strength and Elastic Moduli of Intact Rock Core Specimens
(ASTM D7012)
AREHNA Engineering, Inc.

GENERAL INFORMATION

Project Name:	Broad Causeway	Tested By:	RR/WO
Project Number:	B-22-074	Date:	11/22/2023
Rock Core No.:	BB-04	Run No.:	9
		Elevation (ft):	-92.3 to -97.3

SAMPLE INFORMATION

Diameter, D (in):	3.99	Sample Weight (lbf):	6.76	REC (%):	67
Length, L (in):	4.82	Sample Density (pcf):	194.1	RQD (%):	23
Sample Area, A (ft ²):	0.087	Length/Diameter:	1.209	Correction Factor:	0.918

PHOTOS



**Standard Test Methods for Compressive Strength and Elastic Moduli of Intact Rock Core Specimens
(ASTM D7012)**
AREHNA Engineering, Inc.

GENERAL INFORMATION

Project Name:	Broad Causeway	Tested By:	RR/WO
Project Number:	B-22-074	Date:	11/21/2023
Rock Core No.:	BB-12	Run No.:	5
		Elevation (ft):	-82.3 to -87.3

SAMPLE INFORMATION

Diameter, D (in):	3.99	Sample Weight (lbf):	8.57	REC (%):	55
Length, L (in):	7.35	Sample Density (pcf):	161.3	RQD (%):	13
Sample Area, A (ft ²):	0.087	Length/Diameter:	1.843	Correction Factor:	1.000

LAB DATA

Change in Measured Axial Gauge, ΔL	Load, P	Axial Strain, $\epsilon = \Delta L/L$	Corrected Cross-Sectional Area, A_{cor}	Unconfined Compressive Strength, σ_u	Corrected Unconfined Compressive Strength, $\sigma_{u,cor}$
(in)	(lbf)	(-)	(ft ²)	(ksf)	(ksf)
0.0000	0	0.00000	0.08672	0.0	0.0
0.0006	500	0.00008	0.08673	5.8	5.8
0.0011	1000	0.0001	0.08673	11.5	11.5
0.0013	1500	0.0002	0.08674	17.3	17.3
0.0016	2000	0.0002	0.08674	23.1	23.1
0.0021	2500	0.0003	0.08675	28.8	28.8
0.0026	3000	0.0004	0.08675	34.6	34.6
0.0028	3500	0.0004	0.08675	40.3	40.3
0.0033	4000	0.0004	0.08676	46.1	46.1
0.0036	4500	0.0005	0.08676	51.9	51.9
0.0039	5000	0.0005	0.08677	57.6	57.6
0.0042	5500	0.0006	0.08677	63.4	63.4
0.0044	6000	0.0006	0.08677	69.1	69.1
0.0047	6500	0.0006	0.08678	74.9	74.9
0.0049	7000	0.0007	0.08678	80.7	80.7
0.0051	7500	0.0007	0.08678	86.4	86.4
0.0053	8000	0.0007	0.08678	92.2	92.2
0.0054	8500	0.0007	0.08679	97.9	97.9
0.0056	9000	0.0008	0.08679	103.7	103.7
0.006	10000	0.0008	0.08679	115.2	115.2
0.0063	11000	0.0009	0.08680	126.7	126.7
0.0067	12000	0.0009	0.08680	138.2	138.2
0.007	13000	0.0010	0.08680	149.8	149.8
0.0073	14000	0.0010	0.08681	161.3	161.3
0.0076	15000	0.0010	0.08681	172.8	172.8
0.0079	16000	0.0011	0.08682	184.3	184.3
0.0082	17000	0.0011	0.08682	195.8	195.8
0.0085	18000	0.0012	0.08682	207.3	207.3
0.0088	19000	0.0012	0.08683	218.8	218.8
0.0091	20000	0.0012	0.08683	230.3	230.3
0.0094	21000	0.0013	0.08683	241.8	241.8
0.0096	22000	0.0013	0.08684	253.4	253.4
0.0099	23000	0.0013	0.08684	264.9	264.9
0.0101	24000	0.0014	0.08684	276.4	276.4
0.0103	25000	0.0014	0.08684	287.9	287.9
0.0106	26000	0.0014	0.08685	299.4	299.4
0.0107	27000	0.0015	0.08685	310.9	310.9
0.0108	28000	0.0015	0.08685	322.4	322.4
0.0110	29000	0.0015	0.08685	333.9	333.9
0.0112	29070	0.0015	0.08685	334.7	334.7

NOTES:

1. The uniaxial compressive strength is calculated as follows: $\sigma_u = P/A$

Standard Test Methods for Compressive Strength and Elastic Moduli of Intact Rock Core Specimens (ASTM D7012) AREHNA Engineering, Inc.

GENERAL INFORMATION

Project Name: **Broad Causeway**
 Project Number: **B-22-074**
 Rock Core No.: **BB-12** Run No.: **5**

Tested By: **RR/WO**
 Date: **11/21/2023**
 Elevation (ft): **-82.3 to -87.3**

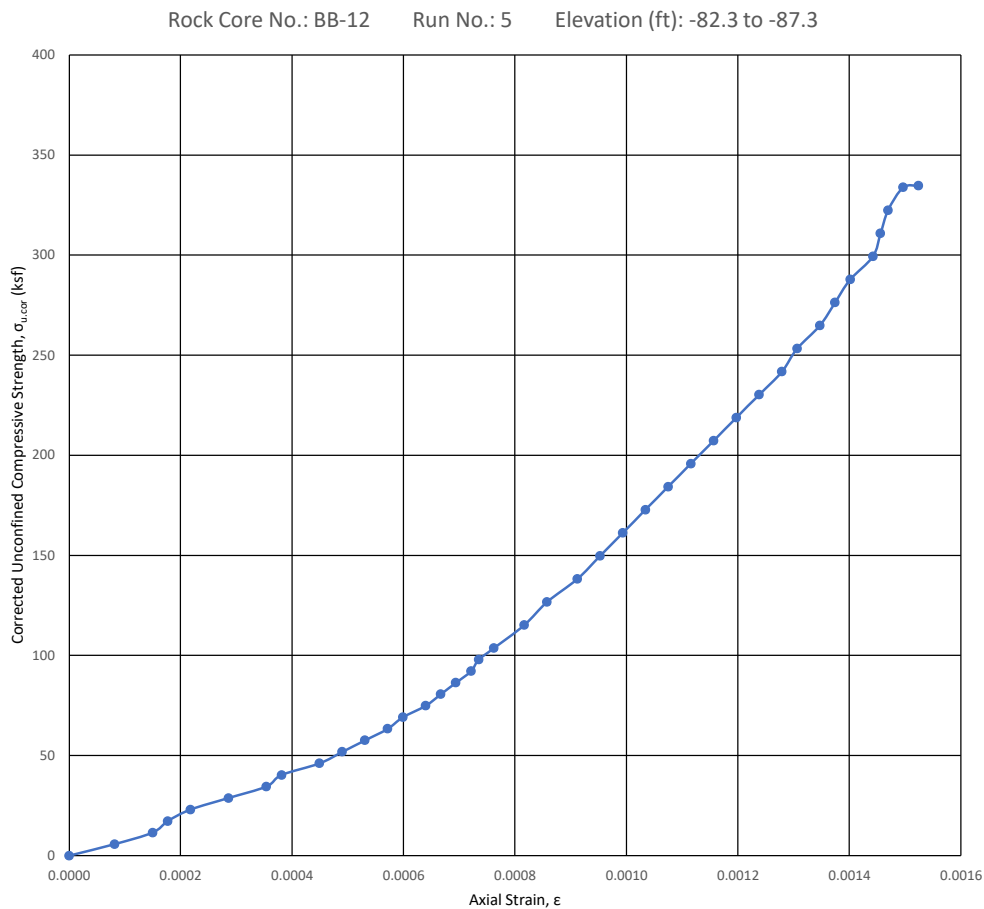
SAMPLE INFORMATION

Diameter, D (in): **3.99**
 Length, L (in): **7.35**
 Sample Area, A (ft²): **0.087**

Sample Weight (lbf): **8.57**
 Sample Density (pcf): **161.3**
 Length/Diameter: **1.843**

REC (%): **55**
 RQD (%): **13**
 Correction Factor: **1.000**

LAB DATA



Uniaxial Compressive Strength (ksf): **334.7**
 Tangent Elastic Modulus, E (ksf): **261,065**

Standard Test Methods for Compressive Strength and Elastic Moduli of Intact Rock Core Specimens
(ASTM D7012)
AREHNA Engineering, Inc.

GENERAL INFORMATION

Project Name: Broad Causeway
Project Number: B-22-074
Rock Core No.: BB-12
Run No.: 5

Tested By: RR/WO
Date: 11/21/2023
Elevation (ft): -82.3 to -87.3

SAMPLE INFORMATION

Diameter, D (in): 3.99
Length, L (in): 7.35
Sample Area, A (ft²): 0.087

Sample Weight (lbf): 8.57
Sample Density (pcf): 161.3
Length/Diameter: 1.843

REC (%): 55
RQD (%): 13
Correction Factor: 1.000

PHOTOS



**Standard Test Method for Splitting Tensile Strength of Intact Rock Core Specimens
(ASTM D3967)**

AREHNA Engineering, Inc.

GENERAL INFORMATION

Project Name:	Broad Causeway			Tested By:	WO
Project Number:	B-22-074			Date:	11/7/2023
Rock Core No.:	BB-02	Rock Core GSE:	3.8	ft, NAVD88	

LAB DATA

Run No.	Depth		Elevation		REC	RQD	Length, L	Diameter, D	Length/Diameter Ratio	Weight	Unit Weight	Maximum Applied Load, P	Splitting Tensile Strength, σ_t
	From	To	From	To									
	(ft)		(ft)										
4	65	70	-61.2	-66.2	56	23	3.97	3.99	1.0	4.35	151.3	15610	90.3
5	70	75	-66.2	-71.2	88	58	4.14	3.86	1.1	4.30	153.9	21590	124.1
6	75	80	-71.2	-76.2	77	37	4.04	3.97	1.0	3.98	138.0	12580	72.0
9	90	95	-86.2	-91.2	73	38	4.31	3.98	1.1	3.64	117.6	3800	20.3

NOTES:

- The splitting tensile strength of the specimen is calculated as follows: $q = 2P/\pi LD$

**Standard Test Method for Splitting Tensile Strength of Intact Rock Core Specimens
(ASTM D3967)
AREHNA Engineering, Inc.**

GENERAL INFORMATION

Project Name:	Broad Causeway	Tested By:	WO
Project Number:	B-22-074	Date:	11/7/2023
Rock Core No.:	BB-04	Rock Core GSE:	2.7 ft, NAVD88

LAB DATA

Run No.	Depth		Elevation		REC	RQD	Length, L	Diameter, D	Length/Diameter Ratio	Weight	Unit Weight	Maximum Applied Load, P	Splitting Tensile Strength, σ_t
	From	To	From	To									
	(ft)		(ft)		(%)	(%)	(in)	(in)	(-)	(lbf)	(pcf)	(lbf)	(ksf)
3	65	70	-62.3	-67.3	62	43	4.64	3.98	1.2	3.54	106.2	7670	38.1
4	70	75	-67.3	-72.3	85	20	4.23	3.95	1.1	3.78	125.9	13830	75.9
5	75	80	-72.3	-77.3	90	77	4.13	4.00	1.0	4.39	146.7	18560	103.2
6	80	85	-77.3	-82.3	90	57	4.32	3.99	1.1	4.65	149.1	22900	122.0
9	95	100	-92.3	-97.3	67	23	4.15	3.96	1.0	3.94	133.0	4460	24.8

NOTES:

1. The splitting tensile strength of the specimen is calculated as follows: $\sigma_t = 2P/\pi LD$

**Standard Test Method for Splitting Tensile Strength of Intact Rock Core Specimens
(ASTM D3967)**

AREHNA Engineering, Inc.

GENERAL INFORMATION

Project Name:	Broad Causeway			Tested By:	WO
Project Number:	B-22-074			Date:	11/7/2023
Rock Core No.:	8B-04	Rock Core GSE:	2.7	ft, NAVD88	

LAB DATA

Run No.	Depth		Elevation		REC	RQD	Length, L	Diameter, D	Length/Diameter Ratio	Weight	Unit Weight	Maximum Applied Load, P	Splitting Tensile Strength, σ_t
	From	To	From	To									
	(ft)		(ft)										
1	68	70	-65.3	-67.3	100	25	4.18	3.96	1.1	4.35	145.7	15010	83.0
5	85	90	-82.3	-87.3	55	13	3.80	3.98	1.0	3.47	127.2	10290	62.5

NOTES:

- The splitting tensile strength of the specimen is calculated as follows: $\sigma_t = 2P/\pi LD$

APPENDIX C

Driven Pile Capacity Curves

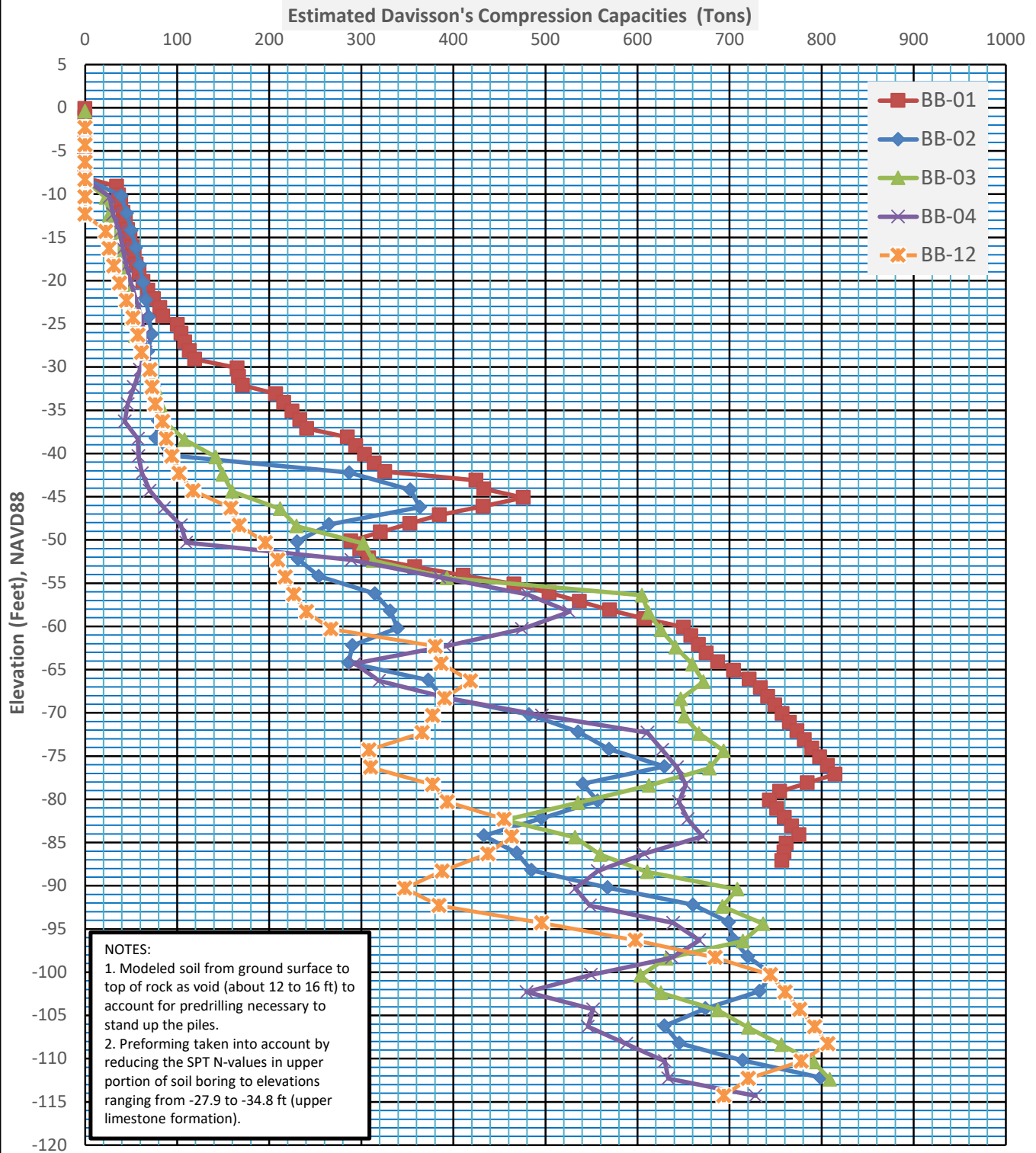
Drilled Shaft Capacity Curves

FB-MultiPier Soil Parameters

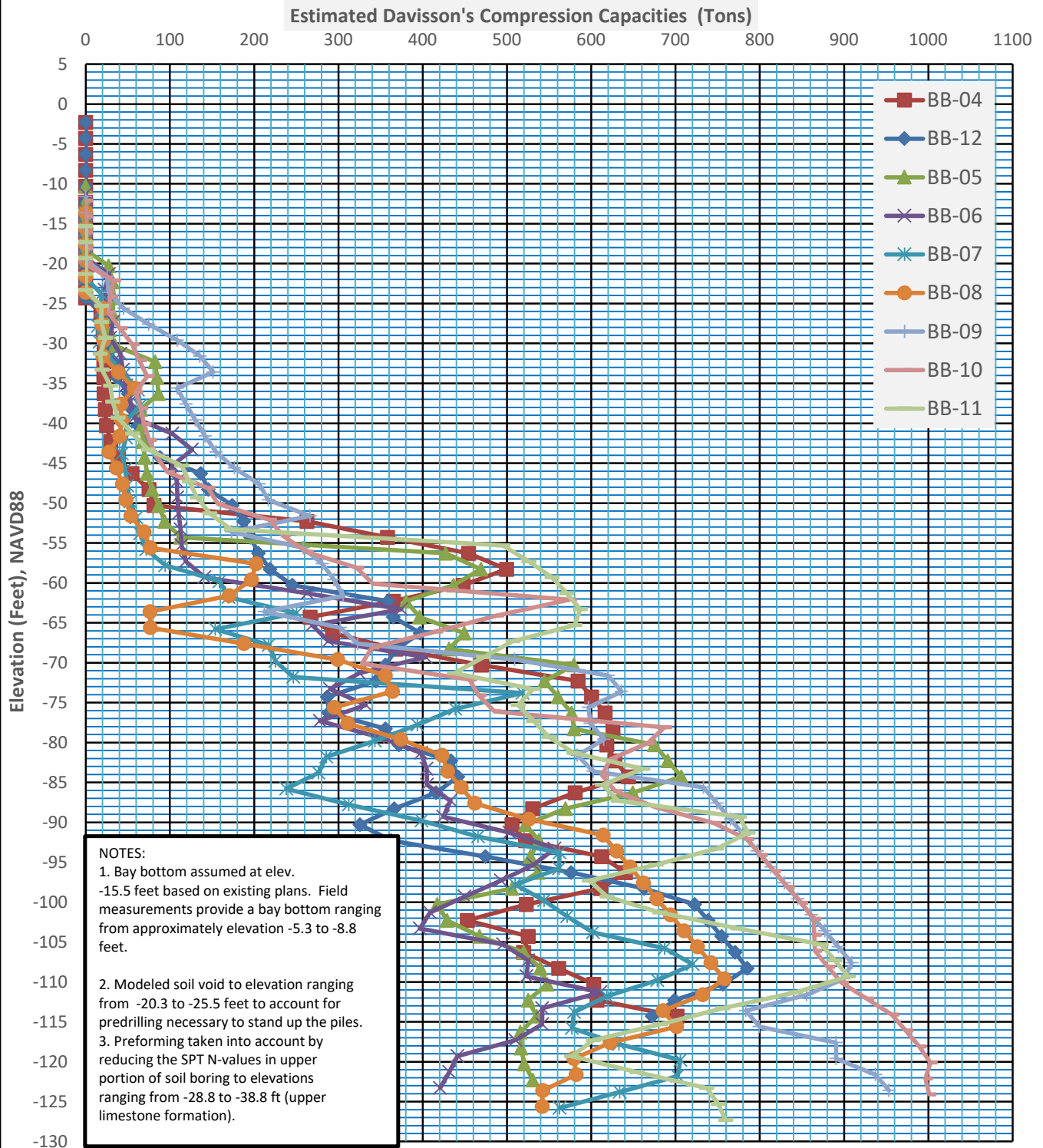
Analysis of Existing 18-inch PSCP

Driven Pile Capacity Curves
24-in PCP

BROAD CAUSEWAY BRIDGE
End Bents and Piers on Causeway Island
- 24-inch Prestressed Square Concrete Driven Pile -
Town of Bay Harbor Islands, Florida
AREHNA Project No. B-22-074

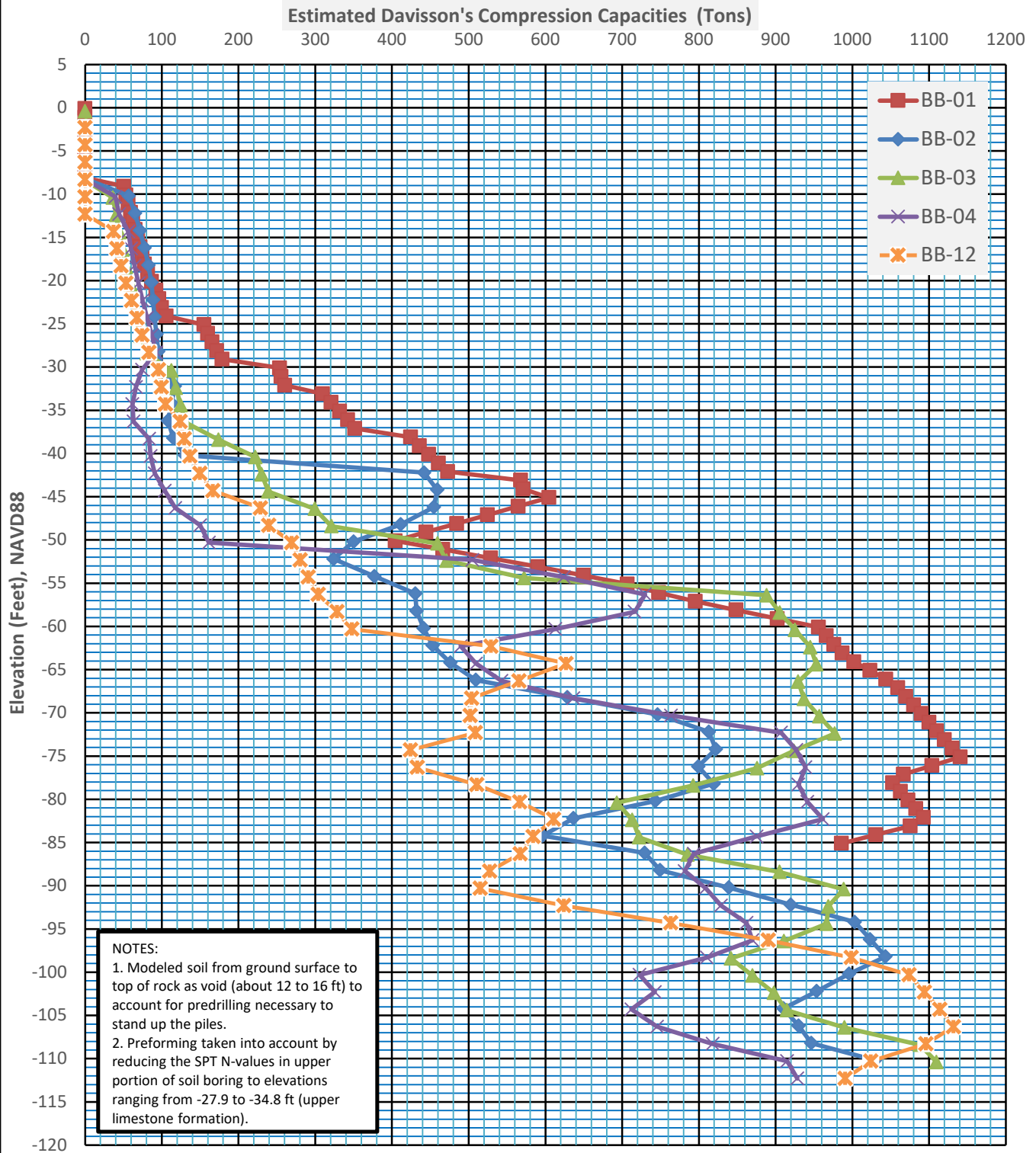


BROAD CAUSEWAY BRIDGE
Piers on Intracoastal Waterway
- 24-inch Prestressed Square Concrete Driven Pile -
Town of Bay Harbor Islands, Florida
AREHNA Project No. B-22-074

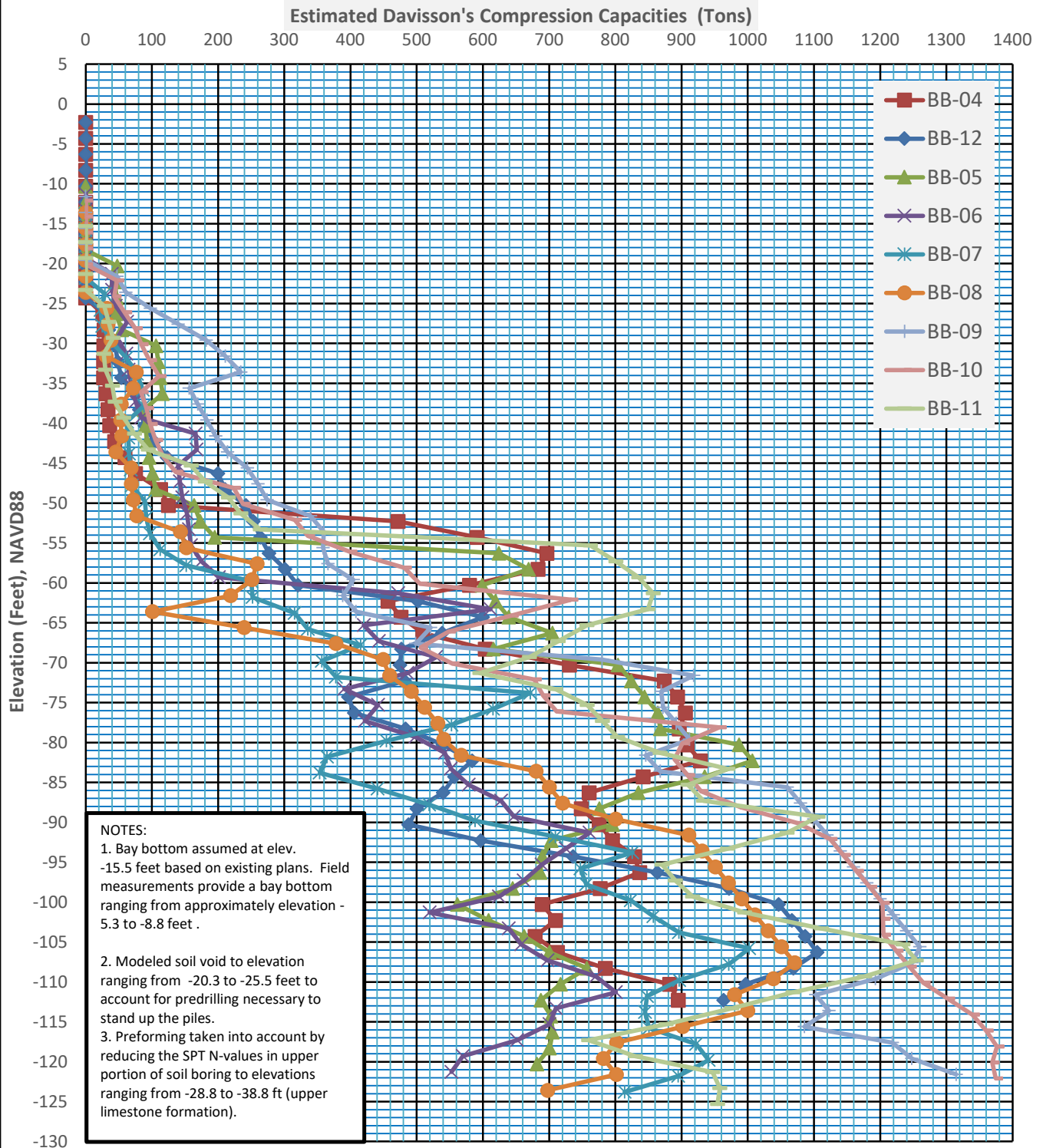


Driven Pile Capacity Curves
30-in PCP

BROAD CAUSEWAY BRIDGE
End Bents and Piers on land
- 30-inch Prestressed Square Concrete Driven Pile -
Town of Bay Harbor Islands, Florida
AREHNA Project No. B-22-074

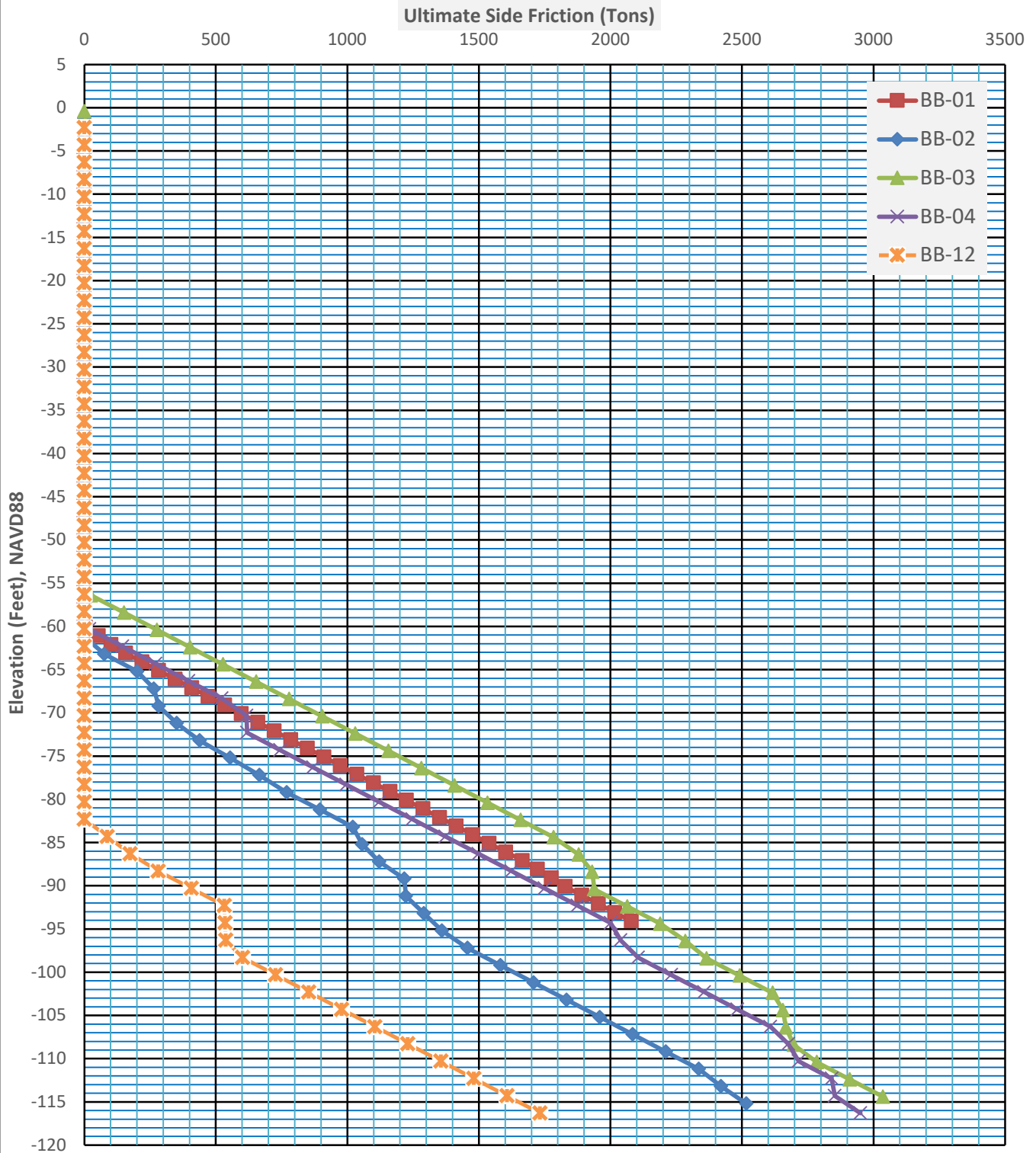


BROAD CAUSEWAY BRIDGE
Piers on Intracoastal Waterway
- 30-inch Prestressed Square Concrete Driven Pile -
Town of Bay Harbor Islands, Florida
AREHNA Project No. B-22-074

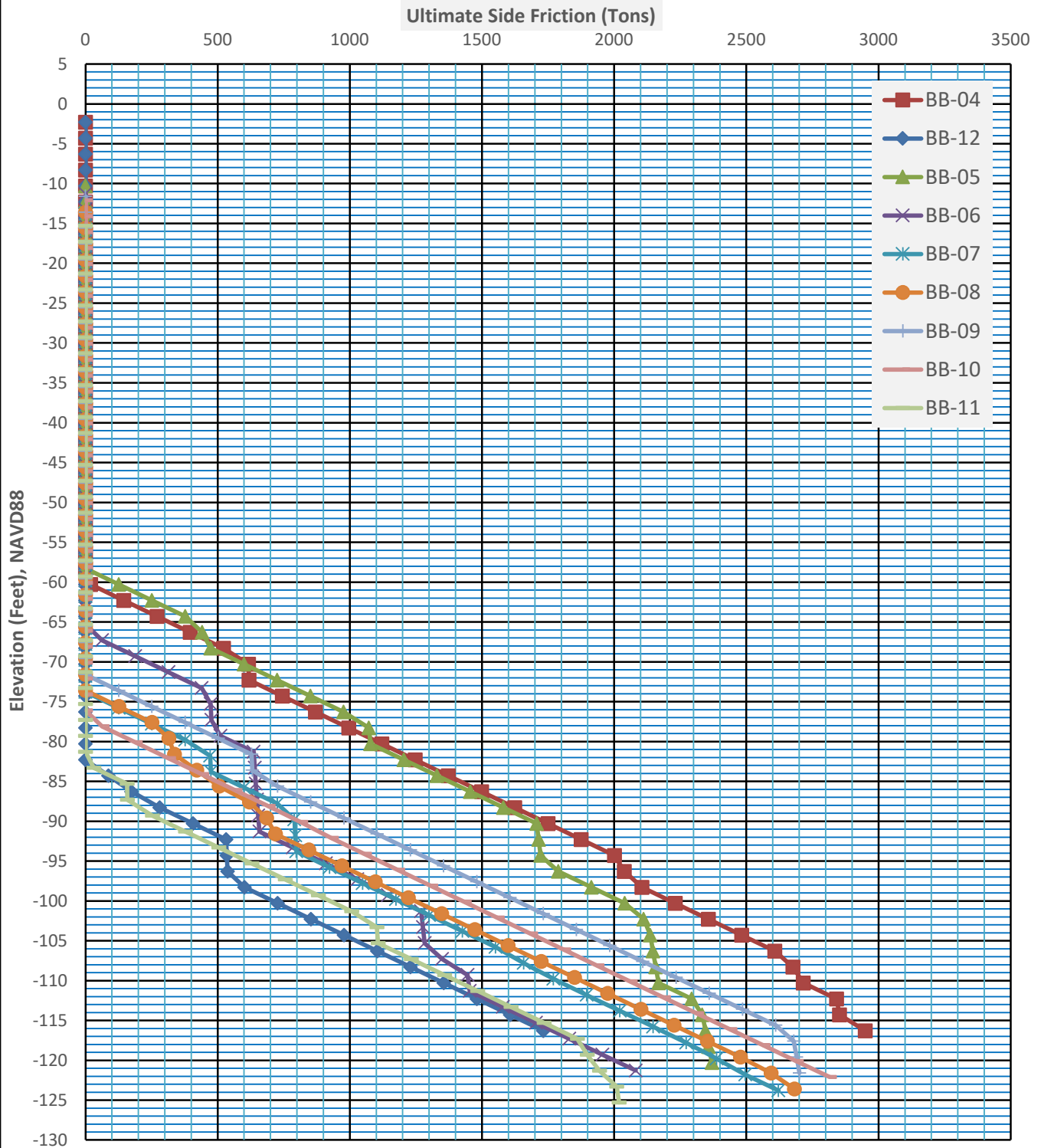


Drilled Shaft Capacity Curves
48-in diameter

BROAD CAUSEWAY BRIDGE
End Bents and Piers on Causeway Island
- 48-inch Diameter Drilled Shaft -
Town of Bay Harbor Islands, Florida
AREHNA Project No. B-22-074

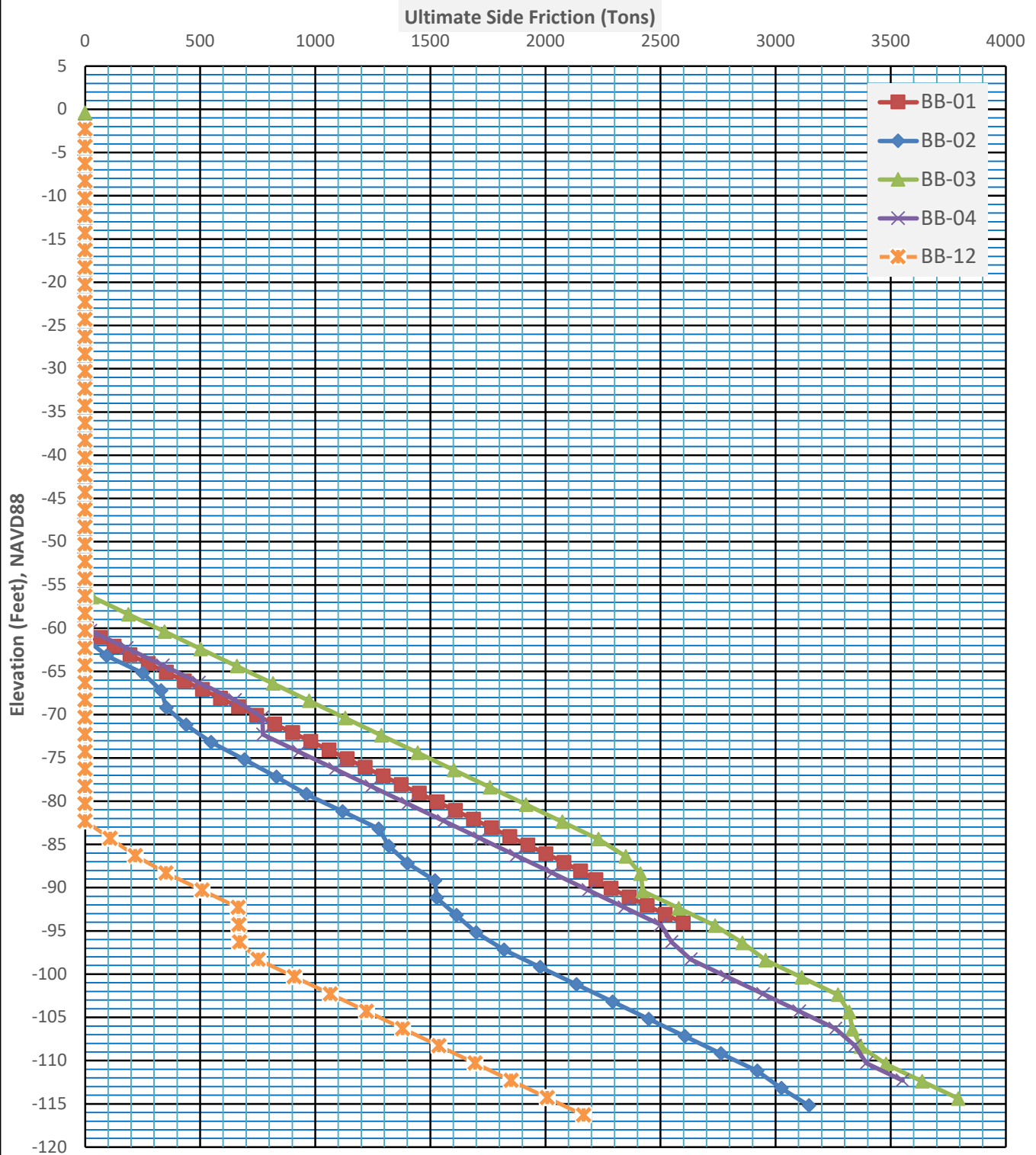


BROAD CAUSEWAY BRIDGE
Piers on Intracoastal Waterway
- 48-inch Diameter Drilled Shaft -
Town of Bay Harbor Islands, Florida
AREHNA Project No. B-22-074

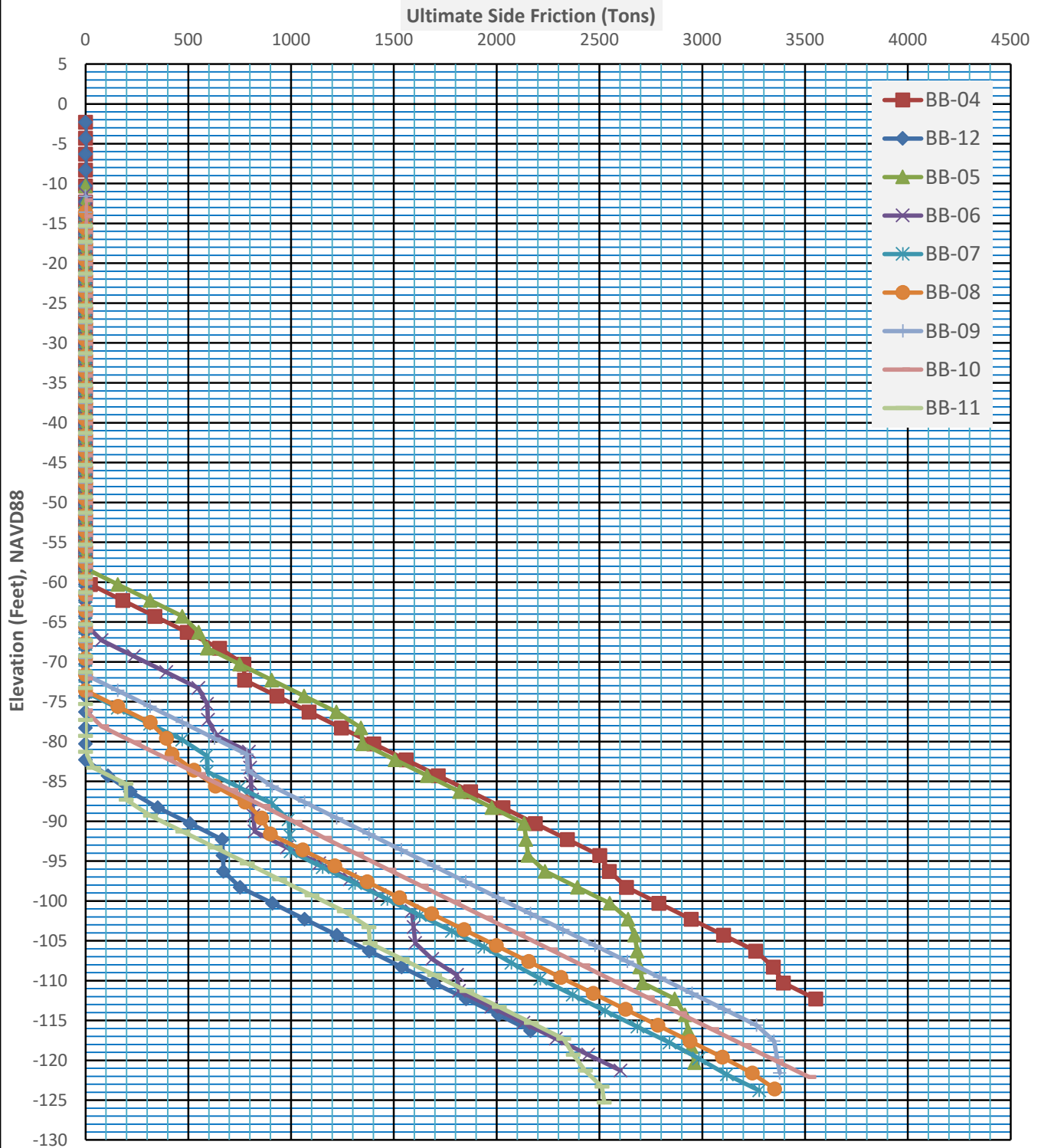


Drilled Shaft Capacity Curves
60-in diameter

BROAD CAUSEWAY BRIDGE
End Bents and Piers on Causeway Island
- 60-inch Diameter Drilled Shaft -
Town of Bay Harbor Islands, Florida
AREHNA Project No. B-22-074



BROAD CAUSEWAY BRIDGE
Piers on Intracoastal Waterway
- 60-inch Diameter Drilled Shaft -
Town of Bay Harbor Islands, Florida
AREHNA Project No. B-22-074



FB-MultiPier Soil Parameters
24-in Driven PCP

Project Name: Broad Causeway Bridge
Project Number: B-22-074
Prepared by/ Date: PV/11-09-23
Checked by/ Date: RR/11-10-23

Boring Number: BB-01
Boring GSE (ft, NAVD): 4.9
Bridge End/ Pier No.:
Station and Offset (Baseline): 111+65, 10 L
Preforming Elevation (ft): -30.1
Pile Size (in): 24
Pile Tip (CLOSED or OPEN or N/A): N/A
Pile Thickness (in): N/A
Pile Tip Area (in²): 576

Summary of Recommended Soil Parameters for FB-Pier Analysis PRECAST CONCRETE PILES (PCP)

ELEVATIONS AND SOIL TYPE:	Layer 1	Layer 2	Layer 3	Layer 4	Layer 5	Layer 6	Layer 7
Depth at top of layer (ft)	0	13.5	35	38	50	56	65
Depth at bottom of layer (ft)	13.5	35	38	50	56	65	100
Depth at design water table (ft)	0	0	0	0	0	0	0
Elevation at top of layer (ft, NAVD)	4.9	-8.6	-30.1	-33.1	-45.1	-51.1	-60.1
Elevation at bottom of layer (ft, NAVD)	-8.6	-30.1	-33.1	-45.1	-51.1	-60.1	-95.1
Water Table Elevation (ft, NAVD)	4.9	4.9	4.9	4.9	4.9	4.9	4.9
Soil Layer Type (0-Cohesionless, 1 -Cohesive, 2 -Rock)	1 -Cohesive	0-Cohesionless	0-Cohesionless	0-Cohesionless	2 -Rock	0-Cohesionless	2 -Rock
USCS Soil Layer Type (GW, GP, SP, SP-SM, SM, SC, ML, CL, CH, N/A for Rock)	ML	SP	SP	GW	N/A	GW	N/A
Average SPT N value (automatic), Blows/ ft	1	12	4	49	60	35	60
SOIL PROPERTIES FOR LATERAL SOIL MODEL:							
Lateral Soil Model	4(Matlock)	1 (O'Neill)	1 (O'Neill)	1 (O'Neill)	8 (McVay)	1 (O'Neill)	8 (McVay)
Internal Friction Angle, ϕ (degrees)	-----	32	29	40	-----	40	-----
Subgrade Soil Modulus, RK (pci)	-----	42	10	185	-----	133	-----
Undrained Strength, C (psf)	93	-----	-----	-----	16667	-----	16667
Strain @ 50% Failure, ϵ 50 (in/in)	0.027	-----	-----	-----	-----	-----	-----
Strain @ 100% Failure, ϵ 100 (in/in)	0.082	-----	-----	-----	-----	-----	-----
Total Unit Weight, γ_t (pcf)	101	112	102	130	-----	125	-----
Effective Unit Weight, γ_{eff} (pci) ¹	0.0226	0.0287	0.0229	0.0391	-----	0.0362	-----
Unconfined Compressive Strength, Limestone (psf)	186	-----	-----	-----	33333	-----	33333
SOIL PROPERTIES FOR THE AXIAL MODEL:							
Axial Soil Model	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al
Shear Modulus, G (ksi)	1989	1989	1989	1989	1989	1989	1989
Poisson's Ratio, ν	0.1	1.3	0.4	4.3	11.1	3.3	11.1
Vertical Failure Shear Stress (psf)	0.4	0.2	0.2	0.4	0.2	0.4	0.2
Internal Friction Angle, ϕ (degrees)	118	565	188	2280	1488	1649	1488
Total Unit Weight, γ_t (pcf)	-----	32	29	40	40	40	40
	101	112	102	130	120	125	120
SOIL PROPERTIES FOR THE TORSIONAL MODEL:							
Torsional Soil Model	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic
Shear Modulus, G (ksi)	0.1	1.3	0.4	4.3	11.1	3.3	11.1
Torsional Shear Stress (psf)	82	396	132	1596	700	1154	700
SOIL PROPERTIES FOR THE TIP MODEL:							
Tip Soil Model	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al
Shear Modulus, G (ksi)	1989	1989	1989	1989	1989	1989	1989
Poisson's Ratio, ν	0.1	1.3	0.4	4.3	11.1	3.3	11.1
Axial Bearing Failure Load, Qult (kip)	0.4	0.2	0.2	0.4	0.2	0.4	0.2
	16	381	127	1536	1850	1111	1850

Notes:

- Effective unit weight assumes ground water table at ground surface.
- The uncorrected SPT N value (Tip Model) corresponds to the safety hammer (Safety = automatic X 1.24).
- Rock with N (manual) less or equal to 10 shall be modeled as cohesionless (SP).
- Rock with N (manual) between 11 to 25 shall be modeled as cohesionless (GW).
- As indicated in Section 3.3.8.B of the SDG, a high end bearing resistance needs to be established such that the pile tip will not settle due to axial forces. Therefore, the soil parameters for LAYER 5 or similar can be used in order to avoid pile tip settlement per SDG.

Project Name: Broad Causeway Bridge
Project Number: B-22-074
Prepared by/ Date: PV/11-09-23
Checked by/ Date: RR/11-10-23

Boring Number: BB-02
Boring GSE (ft, NAVD): 3.8
Bridge End/ Pier No.:
Station and Offset (Baseline): 118+90, 73 R
Preforming Elevation (ft): -31.2
Pile Size (in): 24
Pile Tip (CLOSED or OPEN or N/A): N/A
Pile Thickness (in): N/A
Pile Tip Area (in²): 576

Summary of Recommended Soil Parameters for FB-Pier Analysis PRECAST CONCRETE PILES (PCP)

ELEVATIONS AND SOIL TYPE:	Layer 1	Layer 2	Layer 3	Layer 4	Layer 5	Layer 6	Layer 7
Depth at top of layer (ft)	0	14	35	50	75	87.5	97.5
Depth at bottom of layer (ft)	14	35	50	75	87.5	97.5	125
Depth at design water table (ft)	0	0	0	0	0	0	0
Elevation at top of layer (ft, NAVD)	3.8	-10.2	-31.2	-46.2	-71.2	-83.7	-93.7
Elevation at bottom of layer (ft, NAVD)	-10.2	-31.2	-46.2	-71.2	-83.7	-93.7	-121.2
Water Table Elevation (ft, NAVD)	3.8	3.8	3.8	3.8	3.8	3.8	3.8
Soil Layer Type (0-Cohesionless, 1 -Cohesive, 2 -Rock)	1 -Cohesive	0-Cohesionless	0-Cohesionless	0-Cohesionless	2 -Rock	2 -Rock	2 -Rock
USCS Soil Layer Type (GW, GP, SP, SP-SM, SM, SC, ML, CL, CH, N/A for Rock)	ML	SP	SP	SP	N/A	N/A	N/A
Average SPT N value (automatic), Blows/ ft	1	9	6	33	54	25	53
SOIL PROPERTIES FOR LATERAL SOIL MODEL:							
Lateral Soil Model	4(Matlock)	1 (O'Neill)	1 (O'Neill)	1 (O'Neill)	8 (McVay)	8 (McVay)	8 (McVay)
Internal Friction Angle, ϕ (degrees)	-----	31	30	38	-----	-----	-----
Subgrade Soil Modulus, RK (pci)	-----	30	18	125	-----	-----	-----
Undrained Strength, C (psf)	93	-----	-----	-----	16667	10333	16667
Strain @ 50% Failure, ϵ 50 (in/in)	0.027	-----	-----	-----	-----	-----	-----
Strain @ 100% Failure, ϵ 100 (in/in)	0.082	-----	-----	-----	-----	-----	-----
Total Unit Weight, γ_t (pcf)	101	112	105	125	-----	-----	-----
Effective Unit Weight, γ_{eff} (pci) ¹	0.0226	0.0287	0.0247	0.0362	-----	-----	-----
Unconfined Compressive Strength, Limestone (psf)	186	-----	-----	-----	33333	20667	33333
SOIL PROPERTIES FOR THE AXIAL MODEL:							
Axial Soil Model	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al
	1989	1989	1989	1989	1989	1989	1989
Shear Modulus, G (ksi)	0.1	1.0	0.6	3.2	11.1	6.9	11.1
Poisson's Ratio, ν	0.4	0.2	0.2	0.4	0.2	0.2	0.2
Vertical Failure Shear Stress (psf)	118	424	283	1555	1339	620	1314
Internal Friction Angle, ϕ (degrees)	-----	31	30	38	40	40	40
Total Unit Weight, γ_t (pcf)	101	112	105	125	120	120	120
SOIL PROPERTIES FOR THE TORSIONAL MODEL:							
Torsional Soil Model	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic
Shear Modulus, G (ksi)	0.1	1.0	0.6	3.2	11.1	6.9	11.1
Torsional Shear Stress (psf)	82	297	198	1088	700	434	700
SOIL PROPERTIES FOR THE TIP MODEL:							
Tip Soil Model	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al
	1989	1989	1989	1989	1989	1989	1989
Shear Modulus, G (ksi)	0.1	1.0	0.6	3.2	11.1	6.9	11.1
Poisson's Ratio, ν	0.4	0.2	0.2	0.4	0.2	0.2	0.2
Axial Bearing Failure Load, Qult (kip)	16	286	190	1048	1617	653	1579

Notes:

- Effective unit weight assumes ground water table at ground surface.
- The uncorrected SPT N value (Tip Model) corresponds to the safety hammer (Safety = automatic X 1.24).
- Rock with N (manual) less or equal to 10 shall be modeled as cohesionless (SP).
- Rock with N (manual) between 11 to 25 shall be modeled as cohesionless (GW).
- As indicated in Section 3.3.8.B of the SDG, a high end bearing resistance needs to be established such that the pile tip will not settle due to axial forces. Therefore, the soil parameters for LAYER 5 or similar can be used in order to avoid pile tip settlement per SDG.

Project Name: Broad Causeway Bridge
Project Number: B-22-074
Prepared by/ Date: PV/11-09-23
Checked by/ Date: RR/11-10-23

Boring Number: BB-03
Boring GSE (ft, NAVD): 4.6
Bridge End/ Pier No.:
Station and Offset (Baseline): 121+53, 32 R
Preforming Elevation (ft): -27.9
Pile Size (in): 24
Pile Tip (CLOSED or OPEN or N/A): N/A
Pile Thickness (in): N/A
Pile Tip Area (in²): 576

Summary of Recommended Soil Parameters for FB-Pier Analysis PRECAST CONCRETE PILES (PCP)

ELEVATIONS AND SOIL TYPE:	Layer 1	Layer 2	Layer 3	Layer 4	Layer 5	Layer 6	Layer 7
Depth at top of layer (ft)	0	14	32.5	50	60	87.5	100
Depth at bottom of layer (ft)	14	32.5	50	60	87.5	100	125
Depth at design water table (ft)	0	0	0	0	0	0	0
Elevation at top of layer (ft, NAVD)	4.6	-9.4	-27.9	-45.4	-55.4	-82.9	-95.4
Elevation at bottom of layer (ft, NAVD)	-9.4	-27.9	-45.4	-55.4	-82.9	-95.4	-120.4
Water Table Elevation (ft, NAVD)	4.6	4.6	4.6	4.6	4.6	4.6	4.6
Soil Layer Type (0-Cohesionless, 1 -Cohesive, 2 -Rock)	1 -Cohesive	0-Cohesionless	0-Cohesionless	0-Cohesionless	2 -Rock	2 -Rock	2 -Rock
USCS Soil Layer Type (GW, GP, SP, SP-SM, SM, SC, ML, CL, CH, N/A for Rock)	ML	SP	SP	GW	N/A	N/A	N/A
Average SPT N value (automatic), Blows/ ft	1	6	12	45	60	25	45
SOIL PROPERTIES FOR LATERAL SOIL MODEL:							
Lateral Soil Model	4(Matlock)	1 (O'Neill)	1 (O'Neill)	1 (O'Neill)	8 (McVay)	8 (McVay)	8 (McVay)
Internal Friction Angle, ϕ (degrees)	-----	30	32	40	-----	-----	-----
Subgrade Soil Modulus, RK (pci)	-----	18	42	172	-----	-----	-----
Undrained Strength, C (psf)	93	-----	-----	-----	16667	10333	16667
Strain @ 50% Failure, ϵ 50 (in/in)	0.027	-----	-----	-----	-----	-----	-----
Strain @ 100% Failure, ϵ 100 (in/in)	0.082	-----	-----	-----	-----	-----	-----
Total Unit Weight, γ_t (pcf)	101	105	112	130	-----	-----	-----
Effective Unit Weight, γ_{eff} (pci) ¹	0.0226	0.0247	0.0287	0.0391	-----	-----	-----
Unconfined Compressive Strength, Limestone (psf)	186	-----	-----	-----	33333	20667	33333
SOIL PROPERTIES FOR THE AXIAL MODEL:							
Axial Soil Model	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al
	1989	1989	1989	1989	1989	1989	1989
Shear Modulus, G (ksi)	0.1	0.6	1.3	4.1	11.1	6.9	11.1
Poisson's Ratio, ν	0.4	0.2	0.2	0.4	0.2	0.2	0.2
Vertical Failure Shear Stress (psf)	118	283	565	2120	1488	620	1116
Internal Friction Angle, ϕ (degrees)	-----	30	32	40	40	40	40
Total Unit Weight, γ_t (pcf)	101	105	112	130	120	120	120
SOIL PROPERTIES FOR THE TORSIONAL MODEL:							
Torsional Soil Model	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic
Shear Modulus, G (ksi)	0.1	0.6	1.3	4.1	11.1	6.9	11.1
Torsional Shear Stress (psf)	82	198	396	1484	700	434	700
SOIL PROPERTIES FOR THE TIP MODEL:							
Tip Soil Model	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al
	1989	1989	1989	1989	1989	1989	1989
Shear Modulus, G (ksi)	0.1	0.6	1.3	4.1	11.1	6.9	11.1
Poisson's Ratio, ν	0.4	0.2	0.2	0.4	0.2	0.2	0.2
Axial Bearing Failure Load, Qult (kip)	16	190	381	1428	1850	653	1290

Notes:

- Effective unit weight assumes ground water table at ground surface.
- The uncorrected SPT N value (Tip Model) corresponds to the safety hammer (Safety = automatic X 1.24).
- Rock with N (manual) less or equal to 10 shall be modeled as cohesionless (SP).
- Rock with N (manual) between 11 to 25 shall be modeled as cohesionless (GW).
- As indicated in Section 3.3.8.B of the SDG, a high end bearing resistance needs to be established such that the pile tip will not settle due to axial forces. Therefore, the soil parameters for LAYER 5 or similar can be used in order to avoid pile tip settlement per SDG.

Project Name: Broad Causeway Bridge
Project Number: B-22-074
Prepared by/ Date: PV/04-14-2023
Checked by/ Date: RR/11-10-23

Boring Number: BB-04
Boring GSE (ft, NAVD): 2.7
Bridge End/ Pier No.:
Station and Offset (Baseline): 123+79, 35 RT
Preforming Elevation (ft): -29.8
Pile Size (in): 24
Pile Tip (CLOSED or OPEN or N/A): N/A
Pile Thickness (in): N/A
Pile Tip Area (in²): 576

Summary of Recommended Soil Parameters for FB-Pier Analysis PRECAST CONCRETE PILES (PCP)

ELEVATIONS AND SOIL TYPE:								
	Layer 1	Layer 2	Layer 3	Layer 4	Layer 5	Layer 6	Layer 7	Layer 8
Depth at top of layer (ft)	0	12	32.5	50	60	70	75	95
Depth at bottom of layer (ft)	12	32.5	50	60	70	75	95	125
Depth at design water table (ft)	0	0	0	0	0	0	0	0
Elevation at top of layer (ft, NAVD)	2.7	-9.3	-29.8	-47.3	-57.3	-67.3	-72.3	-92.3
Elevation at bottom of layer (ft, NAVD)	-9.3	-29.8	-47.3	-57.3	-67.3	-72.3	-92.3	-122.3
Water Table Elevation (ft, NAVD)	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7
Soil Layer Type (0-Cohesionless, 1 -Cohesive, 2 -Rock)	1 -Cohesive	0-Cohesionless	0-Cohesionless	0-Cohesionless	2 -Rock	0-Cohesionless	2 -Rock	2 -Rock
USCS Soil Layer Type (GW,GP,SP,SP-SM,SM,SC,ML,CL,CH,N/A for Rock)	ML	SP	SP	SP	N/A	SP	N/A	N/A
Average SPT N value (automatic), Blows/ ft	1	8	5	22	57	10	60	39
SOIL PROPERTIES FOR LATERAL SOIL MODEL:								
Lateral Soil Model	4(Matlock)	1 (O'Neill)	1 (O'Neill)	1 (O'Neill)	8 (McVay)	1 (O'Neill)	8 (McVay)	8 (McVay)
Internal Friction Angle, ϕ (degrees)	-----	30	30	35	-----	31	-----	-----
Subgrade Soil Modulus, RK (pci)	-----	26	14	81	-----	34	-----	-----
Undrained Strength, C (psf)	93	-----	-----	-----	16667	-----	16667	16120
Strain @ 50% Failure, ϵ 50 (in/in)	0.027	-----	-----	-----	-----	-----	-----	-----
Strain @ 100% Failure, ϵ 100 (in/in)	0.082	-----	-----	-----	-----	-----	-----	-----
Total Unit Weight, γ_t (pcf)	101	112	105	115	-----	112	-----	-----
Effective Unit Weight, γ_{eff} (pcf) ¹	0.0226	0.0287	0.0247	0.0304	-----	0.0287	-----	-----
Unconfined Compressive Strength, Limestone (psf)	186	-----	-----	-----	33333	-----	33333	32240
SOIL PROPERTIES FOR THE AXIAL MODEL:								
Axial Soil Model	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al
Shear Modulus, G (ksi)	1989	1989	1989	1989	1989	1989	1989	1989
Poisson's Ratio, ν	0.1	0.9	0.5	2.2	11.1	1.1	11.1	10.7
Vertical Failure Shear Stress (psf)	0.4	0.2	0.2	0.3	0.2	0.2	0.2	0.2
Internal Friction Angle, ϕ (degrees)	118	377	236	1037	1414	471	1488	967
Total Unit Weight, γ_t (pcf)	-----	30	30	35	40	31	40	40
	101	112	105	115	120	112	120	120
SOIL PROPERTIES FOR THE TORSIONAL MODEL:								
Torsional Soil Model	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic
Shear Modulus, G (ksi)	0.1	0.9	0.5	2.2	11.1	1.1	11.1	10.7
Torsional Shear Stress (psf)	82	264	165	726	700	330	700	677
SOIL PROPERTIES FOR THE TIP MODEL:								
Tip Soil Model	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al
Shear Modulus, G (ksi)	1989	1989	1989	1989	1989	1989	1989	1989
Poisson's Ratio, ν	0.1	0.9	0.5	2.2	11.1	1.1	11.1	10.7
Axial Bearing Failure Load, Q _{ult} (kip)	0.4	0.2	0.2	0.3	0.2	0.2	0.2	0.2
	16	254	159	698	1732	317	1850	1087

Notes:

- Effective unit weight assumes ground water table at ground surface.
- The uncorrected SPT N value (Tip Model) corresponds to the safety hammer (Safety = automatic X 1.24).
- Rock with N (manual) less or equal to 10 shall be modeled as cohesionless (SP).
- Rock with N (manual) between 11 to 25 shall be modeled as cohesionless (GW).
- As indicated in Section 3.3.8.B of the SDG, a high end bearing resistance needs to be established such that the pile tip will not settle due to axial forces. Therefore, the soil parameters for LAYER 5 or similar can be used in order to avoid pile tip settlement per SDG.

AREHNA Engineering, Inc.12296 Wiles Rd
Coral Springs, Florida 33076

Project Name: Broad Causeway Bridge
 Project Number: B-22-074
 Prepared by/ Date: AT 1/5/24
 Checked by/ Date: PV 01/26/24

Boring Number: BB-05
 Boring GSE (ft, NAVD): -5.3
 Bridge End/ Pier No.:
 Station and Offset (Baseline): 126+43, 28 L
 Preforming Elevation (ft): -37.8
 Pile Size (in): 24
 Pile Tip (CLOSED or OPEN or N/A): N/A
 Pile Thickness (in): N/A
 Pile Tip Area (in²): 576

Summary of Recommended Soil Parameters for FB-Pier Analysis PRECAST CONCRETE PILES (PCP)

ELEVATIONS AND SOIL TYPE:						
	Layer 1	Layer 2	Layer 3	Layer 4	Layer 5	Layer 6
Depth at top of layer (ft)	0	10	32.5	52.5	87.5	100
Depth at bottom of layer (ft)	10	32.5	52.5	87.5	100	125
Depth at design water table (ft)	-7	-7	-7	-7	-7	-7
Elevation at top of layer (ft, NAVD)	-5.3	-15.3	-37.8	-57.8	-92.8	-105.3
Elevation at bottom of layer (ft, NAVD)	-15.3	-37.8	-57.8	-92.8	-105.3	-130.3
Water Table Elevation (ft, NAVD)	1.7	1.7	1.7	1.7	1.7	1.7
Soil Layer Type (0-Cohesionless, 1 -Cohesive, 2 -Rock)	0-Cohesionless	0-Cohesionless	0-Cohesionless	2 -Rock	0-Cohesionless	0-Cohesionless
USCS Soil Layer Type (GW,GP, SP, SP-SM, SM, SC, ML, CL, CH, N/A for Rock)	GW	SP	SP	N/A	GW	SP
Average SPT N value (automatic), Blows/ ft	19	8	7	60	22	18
SOIL PROPERTIES FOR LATERAL SOIL MODEL:						
Lateral Soil Model	1 (O'Neill)	1 (O'Neill)	1 (O'Neill)	8 (McVay)	1 (O'Neill)	1 (O'Neill)
Internal Friction Angle, ϕ (degrees)	39	30	30	-----	40	34
Subgrade Soil Modulus, RK (pci)	68	24	23	-----	81	66
Undrained Strength, C (psf)	-----	-----	-----	16667	-----	-----
Strain @ 50% Failure, ϵ 50 (in/in)	-----	-----	-----	-----	-----	-----
Strain @ 100% Failure, ϵ 100 (in/in)	-----	-----	-----	-----	-----	-----
Total Unit Weight, γ_t (pcf)	115	112	112	-----	115	115
Effective Unit Weight, γ_{eff} (pcf) ¹	0.0304	0.0287	0.0287	-----	0.0304	0.0304
Unconfined Compressive Strength, Limestone (psf)	-----	-----	-----	33333	-----	-----
SOIL PROPERTIES FOR THE AXIAL MODEL:						
Axial Soil Model	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al
	1989	1989	1989	1989	1989	1989
Shear Modulus, G (ksi)	1.9	0.8	0.8	11.1	2.2	1.8
Poisson's Ratio, ν	0.3	0.2	0.2	0.2	0.3	0.3
Vertical Failure Shear Stress (psf)	872	356	336	1488	1037	848
Internal Friction Angle, ϕ (degrees)	39	30	30	40	40	34
Total Unit Weight, γ_t (pcf)	115	112	112	120	115	115
SOIL PROPERTIES FOR THE TORSIONAL MODEL:						
Torsional Soil Model	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic
Shear Modulus, G (ksi)	1.9	0.8	0.8	11.1	2.2	1.8
Torsional Shear Stress (psf)	610	249	235	700	726	594
SOIL PROPERTIES FOR THE TIP MODEL:						
Tip Soil Model	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al
	1989	1989	1989	1989	1989	1989
Shear Modulus, G (ksi)	1.9	0.8	0.8	11.1	2.2	1.8
Poisson's Ratio, ν	0.3	0.2	0.2	0.2	0.3	0.3
Axial Bearing Failure Load, Qult (kip)	587	240	226	1850	698	571

Notes:

- Effective unit weight assumes ground water table at ground surface.
- The uncorrected SPT N value (Tip Model) corresponds to the safety hammer (Safety = automatic X 1.24).
- Rock with N (manual) less or equal to 10 shall be modeled as cohesionless (SP).
- Rock with N (manual) between 11 to 25 shall be modeled as cohesionless (GW).
- As indicated in Section 3.3.8.B of the SDG, a high end bearing resistance needs to be established such that the pile tip will not settle due to axial forces. Therefore, the soil parameters for LAYER 4 or similar can be used in order to avoid pile tip settlement per SDG.
- Neglect soil resistance above the scour elevation.

Project Name: **Broad Causeway Bridge**
Project Number: **B-22-074**
Prepared by/ Date: **AT 1/5/24**
Checked by/ Date: **PV 01/26/24**

Boring Number: **BB-06**
Boring GSE (ft, NAVD): **-6.3**
Bridge End/ Pier No.:
Station and Offset (Baseline): **127+95, 15 LT**
Preforming Elevation (ft): **-28.8**
Pile Size (in): **24**
Pile Tip (CLOSED or OPEN or N/A): **N/A**
Pile Thickness (in): **N/A**
Pile Tip Area (in²): **576**

Summary of Recommended Soil Parameters for FB-Pier Analysis PRECAST CONCRETE PILES (PCP)

ELEVATIONS AND SOIL TYPE:								
	Layer 1	Layer 2	Layer 3	Layer 4	Layer 5	Layer 6	Layer 7	Layer 8
Depth at top of layer (ft)	0	16	22.5	40	57.5	67.5	80	112.5
Depth at bottom of layer (ft)	16	22.5	40	57.5	67.5	80	112.5	125
Depth at design water table (ft)	-8	-8	-8	-8	-8	-8	-8	-8
Elevation at top of layer (ft, NAVD)	-6.3	-22.3	-28.8	-46.3	-63.8	-73.8	-86.3	-118.8
Elevation at bottom of layer (ft, NAVD)	-22.3	-28.8	-46.3	-63.8	-73.8	-86.3	-118.8	-131.3
Water Table Elevation (ft, NAVD)	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Soil Layer Type (0-Cohesionless, 1 -Cohesive, 2 -Rock)	0-Cohesionless	0-Cohesionless	0-Cohesionless	0-Cohesionless	2 -Rock	0-Cohesionless	2 -Rock	0-Cohesionless
USCS Soil Layer Type (GW, GP, SP, SP-SM, SM, SC, ML, CL, CH, N/A for Rock)	GW	SP	SP	SP	N/A	SP	N/A	GW
Average SPT N value (automatic), Blows/ ft	12	5	8	11	60	9	41	16
SOIL PROPERTIES FOR LATERAL SOIL MODEL:								
Lateral Soil Model	1 (O'Neill)	1 (O'Neill)	1 (O'Neill)	1 (O'Neill)	8 (McVay)	1 (O'Neill)	8 (McVay)	1 (O'Neill)
Internal Friction Angle, ϕ (degrees)	37	29	30	31	-----	31	-----	38
Subgrade Soil Modulus, RK (pci)	40	12	26	38	-----	30	-----	58
Undrained Strength, C (psf)	-----	-----	-----	-----	16667	-----	16667	-----
Strain @ 50% Failure, ϵ 50 (in/in)	-----	-----	-----	-----	-----	-----	-----	-----
Strain @ 100% Failure, ϵ 100 (in/in)	-----	-----	-----	-----	-----	-----	-----	-----
Total Unit Weight, γ_t (pcf)	112	105	112	112	-----	112	-----	115
Effective Unit Weight, γ_{eff} (pcf) ¹	0.0287	0.0247	0.0287	0.0287	-----	0.0287	-----	0.0304
Unconfined Compressive Strength, Limestone (psf)	-----	-----	-----	-----	33333	-----	33333	-----
SOIL PROPERTIES FOR THE AXIAL MODEL:								
Axial Soil Model	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al
Shear Modulus, G (ksi)	1989	1989	1989	1989	1989	1989	1989	1989
Poisson's Ratio, ν	1.2	0.5	0.9	1.2	11.1	1.0	11.1	1.6
Vertical Failure Shear Stress (psf)	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3
Internal Friction Angle, ϕ (degrees)	542	212	377	518	1488	424	1017	754
Total Unit Weight, γ_t (pcf)	37	29	30	31	40	31	40	38
	112	105	112	112	120	112	120	115
SOIL PROPERTIES FOR THE TORSIONAL MODEL:								
Torsional Soil Model	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic
Shear Modulus, G (ksi)	1.2	0.5	0.9	1.2	11.1	1.0	11.1	1.6
Torsional Shear Stress (psf)	379	148	264	363	700	297	700	528
SOIL PROPERTIES FOR THE TIP MODEL:								
Tip Soil Model	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al
Shear Modulus, G (ksi)	1989	1989	1989	1989	1989	1989	1989	1989
Poisson's Ratio, ν	1.2	0.5	0.9	1.2	11.1	1.0	11.1	1.6
Axial Bearing Failure Load, Q _{ult} (kip)	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3
	365	143	254	349	1850	286	1153	508

Notes:

- Effective unit weight assumes ground water table at ground surface.
- The uncorrected SPT N value (Tip Model) corresponds to the safety hammer (Safety = automatic X 1.24).
- Rock with N (manual) less or equal to 10 shall be modeled as cohesionless (SP).
- Rock with N (manual) between 11 to 25 shall be modeled as cohesionless (GW).
- As indicated in Section 3.3.8.B of the SDG, a high end bearing resistance needs to be established such that the pile tip will not settle due to axial forces. Therefore, the soil parameters for LAYER 5 or similar can be used in order to avoid pile tip settlement per SDG.
- Neglect soil resistance above the scour elevation.

Project Name: Broad Causeway Bridge
Project Number: B-22-074
Prepared by/ Date: AT 1/5/24
Checked by/ Date: PV 01/26/24

Boring Number: BB-07
Boring GSE (ft, NAVD): -8.8
Bridge End/ Pier No.:
Station and Offset (Baseline): 130+41, 38 ft
Preforming Elevation (ft): -38.8
Pile Size (in): 24
Pile Tip (CLOSED or OPEN or N/A): N/A
Pile Thickness (in): N/A
Pile Tip Area (in²): 576

Summary of Recommended Soil Parameters for FB-Pier Analysis PRECAST CONCRETE PILES (PCP)

ELEVATIONS AND SOIL TYPE:	Layer 1	Layer 2	Layer 3	Layer 4	Layer 5	Layer 6	Layer 7
Depth at top of layer (ft)	0	18	30	35	55	72.5	85
Depth at bottom of layer (ft)	18	30	35	55	72.5	85	125
Depth at design water table (ft)	-11.5	-11.5	-11.5	-11.5	-11.5	-11.5	-11.5
Elevation at top of layer (ft, NAVD)	-8.8	-26.8	-38.8	-43.8	-63.8	-81.3	-93.8
Elevation at bottom of layer (ft, NAVD)	-26.8	-38.8	-43.8	-63.8	-81.3	-93.8	-133.8
Water Table Elevation (ft, NAVD)	2.7	2.7	2.7	2.7	2.7	2.7	2.7
Soil Layer Type (0-Cohesionless, 1 -Cohesive, 2 -Rock)	0-Cohesionless	0-Cohesionless	0-Cohesionless	0-Cohesionless	2 -Rock	0-Cohesionless	2 -Rock
USCS Soil Layer Type (GW, GP, SP, SP-SM, SM, SC, ML, CL, CH, N/A for Rock)	GW	SP	SP	SP	N/A	GW	N/A
Average SPT N value (automatic), Blows/ ft	13	5	13	9	40	20	49
SOIL PROPERTIES FOR LATERAL SOIL MODEL:							
Lateral Soil Model	1 (O'Neill)	1 (O'Neill)	1 (O'Neill)	1 (O'Neill)	8 (McVay)	1 (O'Neill)	8 (McVay)
Internal Friction Angle, ϕ (degrees)	37	29	32	31	-----	39	-----
Subgrade Soil Modulus, RK (pci)	44	12	46	30	-----	73	-----
Undrained Strength, C (psf)	-----	-----	-----	-----	16533	-----	16667
Strain @ 50% Failure, ϵ 50 (in/in)	-----	-----	-----	-----	-----	-----	-----
Strain @ 100% Failure, ϵ 100 (in/in)	-----	-----	-----	-----	-----	-----	-----
Total Unit Weight, γ_t (pcf)	112	105	112	112	-----	115	-----
Effective Unit Weight, γ_{eff} (pci) ¹	0.0287	0.0247	0.0287	0.0287	-----	0.0304	-----
Unconfined Compressive Strength, Limestone (psf)	-----	-----	-----	-----	33067	-----	33333
SOIL PROPERTIES FOR THE AXIAL MODEL:							
Axial Soil Model	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al
Shear Modulus, G (ksi)	1989	1989	1989	1989	1989	1989	1989
Poisson's Ratio, ν	1.3	0.5	1.4	1.0	11.0	2.0	11.1
Vertical Failure Shear Stress (psf)	0.2	0.2	0.2	0.2	0.2	0.3	0.2
Internal Friction Angle, ϕ (degrees)	589	212	613	424	992	942	1215
Total Unit Weight, γ_t (pcf)	37	29	32	31	40	39	40
	112	105	112	112	120	115	120
SOIL PROPERTIES FOR THE TORSIONAL MODEL:							
Torsional Soil Model	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic
Shear Modulus, G (ksi)	1.3	0.5	1.4	1.0	11.0	2.0	11.1
Torsional Shear Stress (psf)	412	148	429	297	694	660	700
SOIL PROPERTIES FOR THE TIP MODEL:							
Tip Soil Model	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al
Shear Modulus, G (ksi)	1989	1989	1989	1989	1989	1989	1989
Poisson's Ratio, ν	1.3	0.5	1.4	1.0	11.0	2.0	11.1
Axial Bearing Failure Load, Qult (kip)	0.2	0.2	0.2	0.2	0.2	0.3	0.2
	397	143	413	286	1120	635	1432

Notes:

- Effective unit weight assumes ground water table at ground surface.
- The uncorrected SPT N value (Tip Model) corresponds to the safety hammer (Safety = automatic X 1.24).
- Rock with N (manual) less or equal to 10 shall be modeled as cohesionless (SP).
- Rock with N (manual) between 11 to 25 shall be modeled as cohesionless (GW).
- As indicated in Section 3.3.8.B of the SDG, a high end bearing resistance needs to be established such that the pile tip will not settle due to axial forces. Therefore, the soil parameters for LAYER 5 or similar can be used in order to avoid pile tip settlement per SDG.
- Neglect soil resistance above the scour elevation.

AREHNA Engineering, Inc.12296 Wiles Rd
Coral Springs, Florida 33076Project Name: Broad Causeway Bridge
Project Number: B-22-074
Prepared by/ Date: AT 1/5/24
Checked by/ Date: PV 01/26/24Boring Number: BB-08
Boring GSE (ft, NAVD): -8.6
Bridge End/ Pier No.:
Station and Offset (Baseline): 132+19, 39 RT
Preforming Elevation (ft): -36.1
Pile Size (in): 24
Pile Tip (CLOSED or OPEN or N/A): N/A
Pile Thickness (in): N/A
Pile Tip Area (in²): 576**Summary of Recommended Soil Parameters for FB-Pier Analysis PRECAST CONCRETE PILES (PCP)**

ELEVATIONS AND SOIL TYPE:						
	Layer 1	Layer 2	Layer 3	Layer 4	Layer 5	Layer 6
Depth at top of layer (ft)	0	14	27.5	45	75	110
Depth at bottom of layer (ft)	14	27.5	45	75	110	125
Depth at design water table (ft)	-10.3	-10.3	-10.3	-10.3	-10.3	-10.3
Elevation at top of layer (ft, NAVD)	-8.6	-22.6	-36.1	-53.6	-83.6	-118.6
Elevation at bottom of layer (ft, NAVD)	-22.6	-36.1	-53.6	-83.6	-118.6	-133.6
Water Table Elevation (ft, NAVD)	1.7	1.7	1.7	1.7	1.7	1.7
Soil Layer Type (0-Cohesionless, 1 -Cohesive, 2 -Rock)	0-Cohesionless	0-Cohesionless	0-Cohesionless	0-Cohesionless	2 -Rock	0-Cohesionless
USCS Soil Layer Type (GW,GP, SP, SP-SM, SM, SC, ML, CL, CH, N/A for Rock)	GW	SP	SP	SP	N/A	GW
Average SPT N value (automatic), Blows/ ft	15	5	6	9	55	32
SOIL PROPERTIES FOR LATERAL SOIL MODEL:						
Lateral Soil Model	1 (O'Neill)	1 (O'Neill)	1 (O'Neill)	1 (O'Neill)	8 (McVay)	1 (O'Neill)
Internal Friction Angle, ϕ (degrees)	37	30	30	31	-----	40
Subgrade Soil Modulus, RK (pci)	52	14	18	30	-----	121
Undrained Strength, C (psf)	-----	-----	-----	-----	16667	-----
Strain @ 50% Failure, ϵ 50 (in/in)	-----	-----	-----	-----	-----	-----
Strain @ 100% Failure, ϵ 100 (in/in)	-----	-----	-----	-----	-----	-----
Total Unit Weight, γ_t (pcf)	112	105	105	112	-----	125
Effective Unit Weight, γ_{eff} (pcf) ¹	0.0287	0.0247	0.0247	0.0287	-----	0.0362
Unconfined Compressive Strength, Limestone (psf)	-----	-----	-----	-----	33333	-----
SOIL PROPERTIES FOR THE AXIAL MODEL:						
Axial Soil Model	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al
	1989	1989	1989	1989	1989	1989
Shear Modulus, G (ksi)	1.5	0.5	0.6	1.0	11.1	3.1
Poisson's Ratio, ν	0.2	0.2	0.2	0.2	0.2	0.3
Vertical Failure Shear Stress (psf)	683	236	283	424	1364	1508
Internal Friction Angle, ϕ (degrees)	37	30	30	31	40	40
Total Unit Weight, γ_t (pcf)	112	105	105	112	120	125
SOIL PROPERTIES FOR THE TORSIONAL MODEL:						
Torsional Soil Model	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic
Shear Modulus, G (ksi)	1.5	0.5	0.6	1.0	11.1	3.1
Torsional Shear Stress (psf)	478	165	198	297	700	1055
SOIL PROPERTIES FOR THE TIP MODEL:						
Tip Soil Model	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al
	1989	1989	1989	1989	1989	1989
Shear Modulus, G (ksi)	1.5	0.5	0.6	1.0	11.1	3.1
Poisson's Ratio, ν	0.2	0.2	0.2	0.2	0.2	0.3
Axial Bearing Failure Load, Qult (kip)	460	159	190	286	1655	1016

Notes:

- Effective unit weight assumes ground water table at ground surface.
- The uncorrected SPT N value (Tip Model) corresponds to the safety hammer (Safety = automatic X 1.24).
- Rock with N (manual) less or equal to 10 shall be modeled as cohesionless (SP).
- Rock with N (manual) between 11 to 25 shall be modeled as cohesionless (GW).
- As indicated in Section 3.3.8.B of the SDG, a high end bearing resistance needs to be established such that the pile tip will not settle due to axial forces. Therefore, the soil parameters for LAYER 5 or similar can be used in order to avoid pile tip settlement per SDG.
- Neglect soil resistance above the scour elevation.

AREHNA Engineering, Inc.12296 Wiles Rd
Coral Springs, Florida 33076

Project Name: **Broad Causeway Bridge**
 Project Number: **B-22-074**
 Prepared by/ Date: **AT 1/5/24**
 Checked by/ Date: **PV 01/26/24**

Boring Number: **BB-09**
Boring GSE (ft, NAVD): **-6.6**
Bridge End/ Pier No.:
Station and Offset (Baseline): **134+48, 25 LT**
Preforming Elevation (ft): **-36.6**
Pile Size (in): **24**
Pile Tip (CLOSED or OPEN or N/A): **N/A**
Pile Thickness (in): **N/A**
Pile Tip Area (in²): **576**

Summary of Recommended Soil Parameters for FB-Pier Analysis PRECAST CONCRETE PILES (PCP)

ELEVATIONS AND SOIL TYPE:					
	Layer 1	Layer 2	Layer 3	Layer 4	Layer 5
Depth at top of layer (ft)	0	25	30	47.5	65
Depth at bottom of layer (ft)	25	30	47.5	65	125
Depth at design water table (ft)	-10.3	-10.3	-10.3	-10.3	-10.3
Elevation at top of layer (ft, NAVD)	-6.6	-31.6	-36.6	-54.1	-71.6
Elevation at bottom of layer (ft, NAVD)	-31.6	-36.6	-54.1	-71.6	-131.6
Water Table Elevation (ft, NAVD)	3.7	3.7	3.7	3.7	3.7
Soil Layer Type (0-Cohesionless, 1 -Cohesive, 2 -Rock)	0-Cohesionless	0-Cohesionless	0-Cohesionless	0-Cohesionless	2 -Rock
USCS Soil Layer Type (GW,GP, SP, SP-SM, SM, SC, ML, CL, CH, N/A for Rock)	SP	GW	SP	SP	N/A
Average SPT N value (automatic), Blows/ ft	9	20	32	5	57
SOIL PROPERTIES FOR LATERAL SOIL MODEL:					
Lateral Soil Model	1 (O'Neill)	1 (O'Neill)	1 (O'Neill)	1 (O'Neill)	8 (McVay)
Internal Friction Angle, ϕ (degrees)	31	39	38	30	-----
Subgrade Soil Modulus, RK (pci)	28	73	121	14	-----
Undrained Strength, C (psf)	-----	-----	-----	-----	16667
Strain @ 50% Failure, ϵ 50 (in/in)	-----	-----	-----	-----	-----
Strain @ 100% Failure, ϵ 100 (in/in)	-----	-----	-----	-----	-----
Total Unit Weight, γ_t (pcf)	112	115	125	105	-----
Effective Unit Weight, γ_{eff} (pcf) ¹	0.0287	0.0304	0.0362	0.0247	-----
Unconfined Compressive Strength, Limestone (psf)	-----	-----	-----	-----	33333
SOIL PROPERTIES FOR THE AXIAL MODEL:					
Axial Soil Model	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al
	1989	1989	1989	1989	1989
Shear Modulus, G (ksi)	0.9	2.0	3.1	0.5	11.1
Poisson's Ratio, ν	0.2	0.3	0.3	0.2	0.2
Vertical Failure Shear Stress (psf)	401	942	1508	236	1414
Internal Friction Angle, ϕ (degrees)	31	39	38	30	40
Total Unit Weight, γ_t (pcf)	112	115	125	105	120
SOIL PROPERTIES FOR THE TORSIONAL MODEL:					
Torsional Soil Model	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic
Shear Modulus, G (ksi)	0.9	2.0	3.1	0.5	11.1
Torsional Shear Stress (psf)	280	660	1055	165	700
SOIL PROPERTIES FOR THE TIP MODEL:					
Tip Soil Model	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al
	1989	1989	1989	1989	1989
Shear Modulus, G (ksi)	0.9	2.0	3.1	0.5	11.1
Poisson's Ratio, ν	0.2	0.3	0.3	0.2	0.2
Axial Bearing Failure Load, Q _{ult} (kip)	270	635	1016	159	1732

Notes:

- Effective unit weight assumes ground water table at ground surface.
- The uncorrected SPT N value (Tip Model) corresponds to the safety hammer (Safety = automatic X 1.24).
- Rock with N (manual) less or equal to 10 shall be modeled as cohesionless (SP).
- Rock with N (manual) between 11 to 25 shall be modeled as cohesionless (GW).
- As indicated in Section 3.3.8.B of the SDG, a high end bearing resistance needs to be established such that the pile tip will not settle due to axial forces. Therefore, the soil parameters for LAYER 5 or similar can be used in order to avoid pile tip settlement per SDG.
- Neglect soil resistance above the scour elevation.

AREHNA Engineering, Inc.12296 Wiles Rd
Coral Springs, Florida 33076Project Name: Broad Causeway Bridge
Project Number: B-22-074
Prepared by/ Date: AT 1/5/24
Checked by/ Date: PV 01/26/24Boring Number: BB-10
Boring GSE (ft, NAVD): -7.1
Bridge End/ Pier No.:
Station and Offset (Baseline): 136+34, 40 RT
Preforming Elevation (ft): -37.1
Pile Size (in): 24
Pile Tip (CLOSED or OPEN or N/A): N/A
Pile Thickness (in): N/A
Pile Tip Area (in²): 576**Summary of Recommended Soil Parameters for FB-Pier Analysis PRECAST CONCRETE PILES (PCP)**

ELEVATIONS AND SOIL TYPE:					
	Layer 1	Layer 2	Layer 3	Layer 4	Layer 5
Depth at top of layer (ft)	0	30	45	62.5	70
Depth at bottom of layer (ft)	30	45	62.5	70	125
Depth at design water table (ft)	-9.8	-9.8	-9.8	-9.8	-9.8
Elevation at top of layer (ft, NAVD)	-7.1	-37.1	-52.1	-69.6	-77.1
Elevation at bottom of layer (ft, NAVD)	-37.1	-52.1	-69.6	-77.1	-132.1
Water Table Elevation (ft, NAVD)	2.7	2.7	2.7	2.7	2.7
Soil Layer Type (0-Cohesionless, 1 -Cohesive, 2 -Rock)	0-Cohesionless	0-Cohesionless	2 -Rock	0-Cohesionless	2 -Rock
USCS Soil Layer Type (GW,GP, SP, SP-SM, SM, SC, ML, CL, CH, N/A for Rock)	SP	SP	N/A	GW	N/A
Average SPT N value (automatic), Blows/ ft	8	14	58	13	58
SOIL PROPERTIES FOR LATERAL SOIL MODEL:					
Lateral Soil Model	1 (O'Neill)	1 (O'Neill)	8 (McVay)	1 (O'Neill)	8 (McVay)
Internal Friction Angle, ϕ (degrees)	30	32	-----	37	-----
Subgrade Soil Modulus, RK (pci)	24	50	-----	46	-----
Undrained Strength, C (psf)	-----	-----	16667	-----	16667
Strain @ 50% Failure, ϵ 50 (in/in)	-----	-----	-----	-----	-----
Strain @ 100% Failure, ϵ 100 (in/in)	-----	-----	-----	-----	-----
Total Unit Weight, γ_t (pcf)	112	112	-----	112	-----
Effective Unit Weight, γ_{eff} (pci) ¹	0.0287	0.0287	-----	0.0287	-----
Unconfined Compressive Strength, Limestone (psf)	-----	-----	33333	-----	33333
SOIL PROPERTIES FOR THE AXIAL MODEL:					
Axial Soil Model	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al
Shear Modulus, G (ksi)	1989	1989	1989	1989	1989
Poisson's Ratio, ν	0.8	1.5	11.1	1.4	11.1
Vertical Failure Shear Stress (psf)	0.2	0.2	0.2	0.2	0.2
Internal Friction Angle, ϕ (degrees)	353	660	1438	613	1438
Total Unit Weight, γ_t (pcf)	30	32	40	37	40
	112	112	120	112	120
SOIL PROPERTIES FOR THE TORSIONAL MODEL:					
Torsional Soil Model	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic
Shear Modulus, G (ksi)	0.8	1.5	11.1	1.4	11.1
Torsional Shear Stress (psf)	247	462	700	429	700
SOIL PROPERTIES FOR THE TIP MODEL:					
Tip Soil Model	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al
Shear Modulus, G (ksi)	1989	1989	1989	1989	1989
Poisson's Ratio, ν	0.8	1.5	11.1	1.4	11.1
Axial Bearing Failure Load, Q _{ult} (kip)	0.2	0.2	0.2	0.2	0.2
	238	444	1771	413	1771

Notes:

- Effective unit weight assumes ground water table at ground surface.
- The uncorrected SPT N value (Tip Model) corresponds to the safety hammer (Safety = automatic X 1.24).
- Rock with N (manual) less or equal to 10 shall be modeled as cohesionless (SP).
- Rock with N (manual) between 11 to 25 shall be modeled as cohesionless (GW).
- As indicated in Section 3.3.8.B of the SDG, a high end bearing resistance needs to be established such that the pile tip will not settle due to axial forces. Therefore, the soil parameters for LAYER 5 or similar can be used in order to avoid pile tip settlement per SDG.
- Neglect soil resistance above the scour elevation.

AREHNA Engineering, Inc.12296 Wiles Rd
Coral Springs, Florida 33076Project Name: Broad Causeway Bridge
Project Number: B-22-074
Prepared by/ Date: AT 1/5/24
Checked by/ Date: PV 01/26/24Boring Number: BB-11
Boring GSE (ft, NAVD): -10.3
Bridge End/ Pier No.:
Station and Offset (Baseline): 138+55, 34 LT
Preforming Elevation (ft): -35.3
Pile Size (in): 24
Pile Tip (CLOSED or OPEN or N/A): N/A
Pile Thickness (in): N/A
Pile Tip Area (in²): 576**Summary of Recommended Soil Parameters for FB-Pier Analysis PRECAST CONCRETE PILES (PCP)**

ELEVATIONS AND SOIL TYPE:						
	Layer 1	Layer 2	Layer 3	Layer 4	Layer 5	Layer 6
Depth at top of layer (ft)	0	25	35	45	62.5	107.5
Depth at bottom of layer (ft)	25	35	45	62.5	107.5	125
Depth at design water table (ft)	-14	-14	-14	-14	-14	-14
Elevation at top of layer (ft, NAVD)	-10.3	-35.3	-45.3	-55.3	-72.8	-117.8
Elevation at bottom of layer (ft, NAVD)	-35.3	-45.3	-55.3	-72.8	-117.8	-135.3
Water Table Elevation (ft, NAVD)	3.7	3.7	3.7	3.7	3.7	3.7
Soil Layer Type (0-Cohesionless, 1 -Cohesive, 2 -Rock)	0-Cohesionless	0-Cohesionless	0-Cohesionless	2 -Rock	2 -Rock	0-Cohesionless
USCS Soil Layer Type (GW,GP, SP, SP-SM, SM, SC, ML, CL, CH, N/A for Rock)	SP	SP	SP	N/A	N/A	GW
Average SPT N value (automatic), Blows/ ft	7	5	25	60	50	13
SOIL PROPERTIES FOR LATERAL SOIL MODEL:						
Lateral Soil Model	1 (O'Neill)	1 (O'Neill)	1 (O'Neill)	8 (McVay)	8 (McVay)	1 (O'Neill)
Internal Friction Angle, ϕ (degrees)	30	30	36	-----	-----	37
Subgrade Soil Modulus, RK (pci)	20	14	93	-----	-----	46
Undrained Strength, C (psf)	-----	-----	-----	16667	16667	-----
Strain @ 50% Failure, ϵ 50 (in/in)	-----	-----	-----	-----	-----	-----
Strain @ 100% Failure, ϵ 100 (in/in)	-----	-----	-----	-----	-----	-----
Total Unit Weight, γ_t (pcf)	112	105	120	-----	-----	112
Effective Unit Weight, γ_{eff} (pcf) ¹	0.0287	0.0247	0.0333	-----	-----	0.0287
Unconfined Compressive Strength, Limestone (psf)	-----	-----	-----	33333	33333	-----
SOIL PROPERTIES FOR THE AXIAL MODEL:						
Axial Soil Model	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al
Shear Modulus, G (ksi)	1989	1989	1989	1989	1989	1989
Poisson's Ratio, ν	0.7	0.5	2.5	11.1	11.1	1.4
Vertical Failure Shear Stress (psf)	0.2	0.2	0.3	0.2	0.2	0.2
Internal Friction Angle, ϕ (degrees)	306	236	1178	1488	1240	613
Total Unit Weight, γ_t (pcf)	30	30	36	40	40	37
	112	105	120	120	120	112
SOIL PROPERTIES FOR THE TORSIONAL MODEL:						
Torsional Soil Model	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic
Shear Modulus, G (ksi)	0.7	0.5	2.5	11.1	11.1	1.4
Torsional Shear Stress (psf)	214	165	825	700	700	429
SOIL PROPERTIES FOR THE TIP MODEL:						
Tip Soil Model	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al
Shear Modulus, G (ksi)	1989	1989	1989	1989	1989	1989
Poisson's Ratio, ν	0.7	0.5	2.5	11.1	11.1	1.4
Axial Bearing Failure Load, Qult (kip)	0.2	0.2	0.3	0.2	0.2	0.2
	206	159	794	1850	1469	413

Notes:

- Effective unit weight assumes ground water table at ground surface.
- The uncorrected SPT N value (Tip Model) corresponds to the safety hammer (Safety = automatic X 1.24).
- Rock with N (manual) less or equal to 10 shall be modeled as cohesionless (SP).
- Rock with N (manual) between 11 to 25 shall be modeled as cohesionless (GW).
- As indicated in Section 3.3.8.B of the SDG, a high end bearing resistance needs to be established such that the pile tip will not settle due to axial forces. Therefore, the soil parameters for LAYER 5 or similar can be used in order to avoid pile tip settlement per SDG.
- Neglect soil resistance above the scour elevation.

Project Name: Broad Causeway Bridge
Project Number: B-22-074
Prepared by/ Date: PV/04-14-2023
Checked by/ Date: RR/11-10-23

Boring Number: BB-12
Boring GSE (ft, NAVD): 2.7
Bridge End/ Pier No.:
Station and Offset (Baseline): 140+71, 32 RT
Preforming Elevation (ft): -34.8
Pile Size (in): 24
Pile Tip (CLOSED or OPEN or N/A): N/A
Pile Thickness (in): N/A
Pile Tip Area (in²): 576

Summary of Recommended Soil Parameters for FB-Pier Analysis PRECAST CONCRETE PILES (PCP)

ELEVATIONS AND SOIL TYPE:								
	Layer 1	Layer 2	Layer 3	Layer 4	Layer 5	Layer 6	Layer 7	Layer 8
Depth at top of layer (ft)	0	16	37.5	65	77.5	85	95	100
Depth at bottom of layer (ft)	16	37.5	65	77.5	85	95	100	125
Depth at design water table (ft)	0	0	0	0	0	0	0	0
Elevation at top of layer (ft, NAVD)	2.7	-13.3	-34.8	-62.3	-74.8	-82.3	-92.3	-97.3
Elevation at bottom of layer (ft, NAVD)	-13.3	-34.8	-62.3	-74.8	-82.3	-92.3	-97.3	-122.3
Water Table Elevation (ft, NAVD)	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7
Soil Layer Type (0-Cohesionless, 1 -Cohesive, 2 -Rock)	1 -Cohesive	0-Cohesionless	0-Cohesionless	2 -Rock	0-Cohesionless	2 -Rock	0-Cohesionless	2 -Rock
USCS Soil Layer Type (GW,GP,SP,SP-SM,SM,SC,ML,CL,CH,N/A for Rock)	ML	SP	SP	N/A	SP	N/A	SP	N/A
Average SPT N value (automatic), Blows/ ft	1	8	19	45	17	40	11	54
SOIL PROPERTIES FOR LATERAL SOIL MODEL:								
Lateral Soil Model	4(Matlock)	1 (O'Neill)	1 (O'Neill)	8 (McVay)	1 (O'Neill)	8 (McVay)	1 (O'Neill)	8 (McVay)
Internal Friction Angle, ϕ (degrees)	-----	30	34	-----	33	-----	31	-----
Subgrade Soil Modulus, RK (pci)	-----	26	69	-----	62	-----	38	-----
Undrained Strength, C (psf)	93	-----	-----	16667	-----	16533	-----	16667
Strain @ 50% Failure, ϵ 50 (in/in)	0.027	-----	-----	-----	-----	-----	-----	-----
Strain @ 100% Failure, ϵ 100 (in/in)	0.082	-----	-----	-----	-----	-----	-----	-----
Total Unit Weight, γ_t (pcf)	101	112	115	-----	115	-----	112	-----
Effective Unit Weight, γ_{eff} (pcf) ¹	0.0226	0.0287	0.0304	-----	0.0304	-----	0.0287	-----
Unconfined Compressive Strength, Limestone (psf)	186	-----	-----	33333	-----	33067	-----	33333
SOIL PROPERTIES FOR THE AXIAL MODEL:								
Axial Soil Model	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al
Shear Modulus, G (ksi)	1989	1989	1989	1989	1989	1989	1989	1989
Poisson's Ratio, ν	0.1	0.9	1.9	11.1	1.7	11.0	1.2	11.1
Vertical Failure Shear Stress (psf)	0.4	0.2	0.3	0.2	0.3	0.2	0.2	0.2
Internal Friction Angle, ϕ (degrees)	118	377	895	1116	801	992	518	1339
Total Unit Weight, γ_t (pcf)	-----	30	34	40	33	40	31	40
	101	112	115	120	115	120	112	120
SOIL PROPERTIES FOR THE TORSIONAL MODEL:								
Torsional Soil Model	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic
Shear Modulus, G (ksi)	0.1	0.9	1.9	11.1	1.7	11.0	1.2	11.1
Torsional Shear Stress (psf)	82	264	627	700	561	694	363	700
SOIL PROPERTIES FOR THE TIP MODEL:								
Tip Soil Model	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al
Shear Modulus, G (ksi)	1989	1989	1989	1989	1989	1989	1989	1989
Poisson's Ratio, ν	0.1	0.9	1.9	11.1	1.7	11.0	1.2	11.1
Axial Bearing Failure Load, Q _{ult} (kip)	0.4	0.2	0.3	0.2	0.3	0.2	0.2	0.2
	16	254	603	1290	540	1120	349	1617

Notes:

1. Effective unit weight assumes ground water table at ground surface.
2. The uncorrected SPT N value (Tip Model) corresponds to the safety hammer (Safety = automatic X 1.24).
3. Rock with N (manual) less or equal to 10 shall be modeled as cohesionless (SP).
4. Rock with N (manual) between 11 to 25 shall be modeled as cohesionless (GW).
5. As indicated in Section 3.3.8.B of the SDG, a high end bearing resistance needs to be established such that the pile tip will not settle due to axial forces. Therefore, the soil parameters for LAYER 8 or similar can be used in order to avoid pile tip settlement per SDG.

FB-MultiPier Soil Parameters
30-in Driven PCP

Project Name: Broad Causeway Bridge
Project Number: B-22-074
Prepared by/ Date: PV/11-09-23
Checked by/ Date: RR/11-10-23

Boring Number: BB-01
Boring GSE (ft, NAVD): 4.9
Bridge End/ Pier No.:
Station and Offset (Baseline): 111+65, 10 L
Preforming Elevation (ft): -30.1
Pile Size (in): 30
Pile Tip (CLOSED or OPEN or N/A): N/A
Pile Thickness (in): N/A
Pile Tip Area (in²): 900

Summary of Recommended Soil Parameters for FB-Pier Analysis PRECAST CONCRETE PILES (PCP)

ELEVATIONS AND SOIL TYPE:	Layer 1	Layer 2	Layer 3	Layer 4	Layer 5	Layer 6	Layer 7
Depth at top of layer (ft)	0	13.5	35	38	50	56	65
Depth at bottom of layer (ft)	13.5	35	38	50	56	65	100
Depth at design water table (ft)	0	0	0	0	0	0	0
Elevation at top of layer (ft, NAVD)	4.9	-8.6	-30.1	-33.1	-45.1	-51.1	-60.1
Elevation at bottom of layer (ft, NAVD)	-8.6	-30.1	-33.1	-45.1	-51.1	-60.1	-95.1
Water Table Elevation (ft, NAVD)	4.9	4.9	4.9	4.9	4.9	4.9	4.9
Soil Layer Type (0-Cohesionless, 1 -Cohesive, 2 -Rock)	1 -Cohesive	0-Cohesionless	0-Cohesionless	0-Cohesionless	2 -Rock	0-Cohesionless	2 -Rock
USCS Soil Layer Type (GW, GP, SP, SP-SM, SM, SC, ML, CL, CH, N/A for Rock)	ML	SP	SP	GW	N/A	GW	N/A
Average SPT N value (automatic), Blows/ ft	1	12	4	49	60	35	60
SOIL PROPERTIES FOR LATERAL SOIL MODEL:							
Lateral Soil Model	4(Matlock)	1 (O'Neill)	1 (O'Neill)	1 (O'Neill)	8 (McVay)	1 (O'Neill)	8 (McVay)
Internal Friction Angle, ϕ (degrees)	-----	32	29	40	-----	40	-----
Subgrade Soil Modulus, RK (pci)	-----	42	10	185	-----	133	-----
Undrained Strength, C (psf)	93	-----	-----	-----	16667	-----	16667
Strain @ 50% Failure, ϵ 50 (in/in)	0.027	-----	-----	-----	-----	-----	-----
Strain @ 100% Failure, ϵ 100 (in/in)	0.082	-----	-----	-----	-----	-----	-----
Total Unit Weight, γ_t (pcf)	101	112	102	130	-----	125	-----
Effective Unit Weight, γ_{eff} (pci) ¹	0.0226	0.0287	0.0229	0.0391	-----	0.0362	-----
Unconfined Compressive Strength, Limestone (psf)	186	-----	-----	-----	33333	-----	33333
SOIL PROPERTIES FOR THE AXIAL MODEL:							
Axial Soil Model	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al
Shear Modulus, G (ksi)	1989	1989	1989	1989	1989	1989	1989
Poisson's Ratio, ν	0.1	1.3	0.4	4.3	11.1	3.3	11.1
Vertical Failure Shear Stress (psf)	0.4	0.2	0.2	0.4	0.2	0.4	0.2
Internal Friction Angle, ϕ (degrees)	118	565	188	2280	1488	1649	1488
Total Unit Weight, γ_t (pcf)	-----	32	29	40	40	40	40
	101	112	102	130	120	125	120
SOIL PROPERTIES FOR THE TORSIONAL MODEL:							
Torsional Soil Model	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic
Shear Modulus, G (ksi)	0.1	1.3	0.4	4.3	11.1	3.3	11.1
Torsional Shear Stress (psf)	82	396	132	1596	700	1154	700
SOIL PROPERTIES FOR THE TIP MODEL:							
Tip Soil Model	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al
Shear Modulus, G (ksi)	1989	1989	1989	1989	1989	1989	1989
Poisson's Ratio, ν	0.1	1.3	0.4	4.3	11.1	3.3	11.1
Axial Bearing Failure Load, Qult (kip)	0.4	0.2	0.2	0.4	0.2	0.4	0.2
	25	595	198	2400	2891	1736	2891

Notes:

- Effective unit weight assumes ground water table at ground surface.
- The uncorrected SPT N value (Tip Model) corresponds to the safety hammer (Safety = automatic X 1.24).
- Rock with N (manual) less or equal to 10 shall be modeled as cohesionless (SP).
- Rock with N (manual) between 11 to 25 shall be modeled as cohesionless (GW).
- As indicated in Section 3.3.8.B of the SDG, a high end bearing resistance needs to be established such that the pile tip will not settle due to axial forces. Therefore, the soil parameters for LAYER 5 or similar can be used in order to avoid pile tip settlement per SDG.

Project Name: Broad Causeway Bridge
Project Number: B-22-074
Prepared by/ Date: PV/11-09-23
Checked by/ Date: RR/11-10-23

Boring Number: BB-02
Boring GSE (ft, NAVD): 3.8
Bridge End/ Pier No.:
Station and Offset (Baseline): 118+90, 73 R
Preforming Elevation (ft): -31.2
Pile Size (in): 30
Pile Tip (CLOSED or OPEN or N/A): N/A
Pile Thickness (in): N/A
Pile Tip Area (in²): 900

Summary of Recommended Soil Parameters for FB-Pier Analysis PRECAST CONCRETE PILES (PCP)

ELEVATIONS AND SOIL TYPE:	Layer 1	Layer 2	Layer 3	Layer 4	Layer 5	Layer 6	Layer 7
Depth at top of layer (ft)	0	14	35	50	75	87.5	97.5
Depth at bottom of layer (ft)	14	35	50	75	87.5	97.5	125
Depth at design water table (ft)	0	0	0	0	0	0	0
Elevation at top of layer (ft, NAVD)	3.8	-10.2	-31.2	-46.2	-71.2	-83.7	-93.7
Elevation at bottom of layer (ft, NAVD)	-10.2	-31.2	-46.2	-71.2	-83.7	-93.7	-121.2
Water Table Elevation (ft, NAVD)	3.8	3.8	3.8	3.8	3.8	3.8	3.8
Soil Layer Type (0-Cohesionless, 1 -Cohesive, 2 -Rock)	1 -Cohesive	0-Cohesionless	0-Cohesionless	0-Cohesionless	2 -Rock	2 -Rock	2 -Rock
USCS Soil Layer Type (GW, GP, SP, SP-SM, SM, SC, ML, CL, CH, N/A for Rock)	ML	SP	SP	SP	N/A	N/A	N/A
Average SPT N value (automatic), Blows/ ft	1	9	6	33	54	25	53
SOIL PROPERTIES FOR LATERAL SOIL MODEL:							
Lateral Soil Model	4(Matlock)	1 (O'Neill)	1 (O'Neill)	1 (O'Neill)	8 (McVay)	8 (McVay)	8 (McVay)
Internal Friction Angle, ϕ (degrees)	-----	31	30	38	-----	-----	-----
Subgrade Soil Modulus, RK (pci)	-----	30	18	125	-----	-----	-----
Undrained Strength, C (psf)	93	-----	-----	-----	16667	10333	16667
Strain @ 50% Failure, ϵ 50 (in/in)	0.027	-----	-----	-----	-----	-----	-----
Strain @ 100% Failure, ϵ 100 (in/in)	0.082	-----	-----	-----	-----	-----	-----
Total Unit Weight, γ_t (pcf)	101	112	105	125	-----	-----	-----
Effective Unit Weight, γ_{eff} (pci) ¹	0.0226	0.0287	0.0247	0.0362	-----	-----	-----
Unconfined Compressive Strength, Limestone (psf)	186	-----	-----	-----	33333	20667	33333
SOIL PROPERTIES FOR THE AXIAL MODEL:							
Axial Soil Model	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al
	1989	1989	1989	1989	1989	1989	1989
Shear Modulus, G (ksi)	0.1	1.0	0.6	3.2	11.1	6.9	11.1
Poisson's Ratio, ν	0.4	0.2	0.2	0.4	0.2	0.2	0.2
Vertical Failure Shear Stress (psf)	118	424	283	1555	1339	620	1314
Internal Friction Angle, ϕ (degrees)	-----	31	30	38	40	40	40
Total Unit Weight, γ_t (pcf)	101	112	105	125	120	120	120
SOIL PROPERTIES FOR THE TORSIONAL MODEL:							
Torsional Soil Model	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic
Shear Modulus, G (ksi)	0.1	1.0	0.6	3.2	11.1	6.9	11.1
Torsional Shear Stress (psf)	82	297	198	1088	700	434	700
SOIL PROPERTIES FOR THE TIP MODEL:							
Tip Soil Model	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al
	1989	1989	1989	1989	1989	1989	1989
Shear Modulus, G (ksi)	0.1	1.0	0.6	3.2	11.1	6.9	11.1
Poisson's Ratio, ν	0.4	0.2	0.2	0.4	0.2	0.2	0.2
Axial Bearing Failure Load, Qult (kip)	25	446	298	1637	2527	1020	2468

Notes:

- Effective unit weight assumes ground water table at ground surface.
- The uncorrected SPT N value (Tip Model) corresponds to the safety hammer (Safety = automatic X 1.24).
- Rock with N (manual) less or equal to 10 shall be modeled as cohesionless (SP).
- Rock with N (manual) between 11 to 25 shall be modeled as cohesionless (GW).
- As indicated in Section 3.3.8.B of the SDG, a high end bearing resistance needs to be established such that the pile tip will not settle due to axial forces. Therefore, the soil parameters for LAYER 5 or similar can be used in order to avoid pile tip settlement per SDG.

Project Name: Broad Causeway Bridge
Project Number: B-22-074
Prepared by/ Date: PV/11-09-23
Checked by/ Date: RR/11-10-23

Boring Number: BB-03
Boring GSE (ft, NAVD): 4.6
Bridge End/ Pier No.:
Station and Offset (Baseline): 121+53, 32 R
Preforming Elevation (ft): -27.9
Pile Size (in): 30
Pile Tip (CLOSED or OPEN or N/A): N/A
Pile Thickness (in): N/A
Pile Tip Area (in²): 900

Summary of Recommended Soil Parameters for FB-Pier Analysis PRECAST CONCRETE PILES (PCP)

ELEVATIONS AND SOIL TYPE:	Layer 1	Layer 2	Layer 3	Layer 4	Layer 5	Layer 6	Layer 7
Depth at top of layer (ft)	0	14	32.5	50	60	87.5	100
Depth at bottom of layer (ft)	14	32.5	50	60	87.5	100	125
Depth at design water table (ft)	0	0	0	0	0	0	0
Elevation at top of layer (ft, NAVD)	4.6	-9.4	-27.9	-45.4	-55.4	-82.9	-95.4
Elevation at bottom of layer (ft, NAVD)	-9.4	-27.9	-45.4	-55.4	-82.9	-95.4	-120.4
Water Table Elevation (ft, NAVD)	4.6	4.6	4.6	4.6	4.6	4.6	4.6
Soil Layer Type (0-Cohesionless, 1 -Cohesive, 2 -Rock)	1 -Cohesive	0-Cohesionless	0-Cohesionless	0-Cohesionless	2 -Rock	2 -Rock	2 -Rock
USCS Soil Layer Type (GW, GP, SP, SP-SM, SM, SC, ML, CL, CH, N/A for Rock)	ML	SP	SP	GW	N/A	N/A	N/A
Average SPT N value (automatic), Blows/ ft	1	6	12	45	60	25	45
SOIL PROPERTIES FOR LATERAL SOIL MODEL:							
Lateral Soil Model	4(Matlock)	1 (O'Neill)	1 (O'Neill)	1 (O'Neill)	8 (McVay)	8 (McVay)	8 (McVay)
Internal Friction Angle, ϕ (degrees)	-----	30	32	40	-----	-----	-----
Subgrade Soil Modulus, RK (pci)	-----	18	42	172	-----	-----	-----
Undrained Strength, C (psf)	93	-----	-----	-----	16667	10333	16667
Strain @ 50% Failure, ϵ 50 (in/in)	0.027	-----	-----	-----	-----	-----	-----
Strain @ 100% Failure, ϵ 100 (in/in)	0.082	-----	-----	-----	-----	-----	-----
Total Unit Weight, γ_t (pcf)	101	105	112	130	-----	-----	-----
Effective Unit Weight, γ_{eff} (pci) ¹	0.0226	0.0247	0.0287	0.0391	-----	-----	-----
Unconfined Compressive Strength, Limestone (psf)	186	-----	-----	-----	33333	20667	33333
SOIL PROPERTIES FOR THE AXIAL MODEL:							
Axial Soil Model	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al
Shear Modulus, G (ksi)	1989	1989	1989	1989	1989	1989	1989
Poisson's Ratio, ν	0.1	0.6	1.3	4.1	11.1	6.9	11.1
Vertical Failure Shear Stress (psf)	0.4	0.2	0.2	0.4	0.2	0.2	0.2
Internal Friction Angle, ϕ (degrees)	118	283	565	2120	1488	620	1116
Total Unit Weight, γ_t (pcf)	-----	30	32	40	40	40	40
	101	105	112	130	120	120	120
SOIL PROPERTIES FOR THE TORSIONAL MODEL:							
Torsional Soil Model	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic
Shear Modulus, G (ksi)	0.1	0.6	1.3	4.1	11.1	6.9	11.1
Torsional Shear Stress (psf)	82	198	396	1484	700	434	700
SOIL PROPERTIES FOR THE TIP MODEL:							
Tip Soil Model	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al
Shear Modulus, G (ksi)	1989	1989	1989	1989	1989	1989	1989
Poisson's Ratio, ν	0.1	0.6	1.3	4.1	11.1	6.9	11.1
Axial Bearing Failure Load, Qult (kip)	0.4	0.2	0.2	0.4	0.2	0.2	0.2
	25	298	595	2232	2891	1020	2016

Notes:

- Effective unit weight assumes ground water table at ground surface.
- The uncorrected SPT N value (Tip Model) corresponds to the safety hammer (Safety = automatic X 1.24).
- Rock with N (manual) less or equal to 10 shall be modeled as cohesionless (SP).
- Rock with N (manual) between 11 to 25 shall be modeled as cohesionless (GW).
- As indicated in Section 3.3.8.B of the SDG, a high end bearing resistance needs to be established such that the pile tip will not settle due to axial forces. Therefore, the soil parameters for LAYER 5 or similar can be used in order to avoid pile tip settlement per SDG.

Project Name: Broad Causeway Bridge
Project Number: B-22-074
Prepared by/ Date: PV/04-14-2023
Checked by/ Date: RR/11-10-23

Boring Number: BB-04
Boring GSE (ft, NAVD): 2.7
Bridge End/ Pier No.:
Station and Offset (Baseline): 123+79, 35 RT
Preforming Elevation (ft): -29.8
Pile Size (in): 30
Pile Tip (CLOSED or OPEN or N/A): N/A
Pile Thickness (in): N/A
Pile Tip Area (in²): 900

Summary of Recommended Soil Parameters for FB-Pier Analysis PRECAST CONCRETE PILES (PCP)

ELEVATIONS AND SOIL TYPE:								
	Layer 1	Layer 2	Layer 3	Layer 4	Layer 5	Layer 6	Layer 7	Layer 8
Depth at top of layer (ft)	0	12	32.5	50	60	70	75	95
Depth at bottom of layer (ft)	12	32.5	50	60	70	75	95	125
Depth at design water table (ft)	0	0	0	0	0	0	0	0
Elevation at top of layer (ft, NAVD)	2.7	-9.3	-29.8	-47.3	-57.3	-67.3	-72.3	-92.3
Elevation at bottom of layer (ft, NAVD)	-9.3	-29.8	-47.3	-57.3	-67.3	-72.3	-92.3	-122.3
Water Table Elevation (ft, NAVD)	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7
Soil Layer Type (0-Cohesionless, 1 -Cohesive, 2 -Rock)	1 -Cohesive	0-Cohesionless	0-Cohesionless	0-Cohesionless	2 -Rock	0-Cohesionless	2 -Rock	2 -Rock
USCS Soil Layer Type (GW,GP,SP,SP-SM,SM,SC,ML,CL,CH,N/A for Rock)	ML	SP	SP	SP	N/A	SP	N/A	N/A
Average SPT N value (automatic), Blows/ ft	1	8	5	22	57	10	60	39
SOIL PROPERTIES FOR LATERAL SOIL MODEL:								
Lateral Soil Model	4(Matlock)	1 (O'Neill)	1 (O'Neill)	1 (O'Neill)	8 (McVay)	1 (O'Neill)	8 (McVay)	8 (McVay)
Internal Friction Angle, ϕ (degrees)	-----	30	30	35	-----	31	-----	-----
Subgrade Soil Modulus, RK (pci)	-----	26	14	81	-----	34	-----	-----
Undrained Strength, C (psf)	93	-----	-----	-----	16667	-----	16667	16120
Strain @ 50% Failure, ϵ 50 (in/in)	0.027	-----	-----	-----	-----	-----	-----	-----
Strain @ 100% Failure, ϵ 100 (in/in)	0.082	-----	-----	-----	-----	-----	-----	-----
Total Unit Weight, γ_t (pcf)	101	112	105	115	-----	112	-----	-----
Effective Unit Weight, γ_{eff} (pcf) ¹	0.0226	0.0287	0.0247	0.0304	-----	0.0287	-----	-----
Unconfined Compressive Strength, Limestone (psf)	186	-----	-----	-----	33333	-----	33333	32240
SOIL PROPERTIES FOR THE AXIAL MODEL:								
Axial Soil Model	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al
Shear Modulus, G (ksi)	1989	1989	1989	1989	1989	1989	1989	1989
Poisson's Ratio, ν	0.1	0.9	0.5	2.2	11.1	1.1	11.1	10.7
Vertical Failure Shear Stress (psf)	0.4	0.2	0.2	0.3	0.2	0.2	0.2	0.2
Internal Friction Angle, ϕ (degrees)	118	377	236	1037	1414	471	1488	967
Total Unit Weight, γ_t (pcf)	-----	30	30	35	40	31	40	40
	101	112	105	115	120	112	120	120
SOIL PROPERTIES FOR THE TORSIONAL MODEL:								
Torsional Soil Model	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic
Shear Modulus, G (ksi)	0.1	0.9	0.5	2.2	11.1	1.1	11.1	10.7
Torsional Shear Stress (psf)	82	264	165	726	700	330	700	677
SOIL PROPERTIES FOR THE TIP MODEL:								
Tip Soil Model	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al
Shear Modulus, G (ksi)	1989	1989	1989	1989	1989	1989	1989	1989
Poisson's Ratio, ν	0.1	0.9	0.5	2.2	11.1	1.1	11.1	10.7
Axial Bearing Failure Load, Q _{ult} (kip)	0.4	0.2	0.2	0.3	0.2	0.2	0.2	0.2
	25	397	248	1091	2706	496	2891	1698

Notes:

1. Effective unit weight assumes ground water table at ground surface.
2. The uncorrected SPT N value (Tip Model) corresponds to the safety hammer (Safety = automatic X 1.24).
3. Rock with N (manual) less or equal to 10 shall be modeled as cohesionless (SP).
4. Rock with N (manual) between 11 to 25 shall be modeled as cohesionless (GW).
5. As indicated in Section 3.3.8.B of the SDG, a high end bearing resistance needs to be established such that the pile tip will not settle due to axial forces. Therefore, the soil parameters for LAYER 5 or similar can be used in order to avoid pile tip settlement per SDG.

AREHNA Engineering, Inc.12296 Wiles Rd
Coral Springs, Florida 33076

Project Name: Broad Causeway Bridge
 Project Number: B-22-074
 Prepared by/ Date: AT 1/5/24
 Checked by/ Date: PV 01/26/24

Boring Number: BB-05
 Boring GSE (ft, NAVD): -5.3
 Bridge End/ Pier No.:
 Station and Offset (Baseline): 126+43, 28 L
 Preforming Elevation (ft): -37.8
 Pile Size (in): 30
 Pile Tip (CLOSED or OPEN or N/A): N/A
 Pile Thickness (in): N/A
 Pile Tip Area (in²): 900

Summary of Recommended Soil Parameters for FB-Pier Analysis PRECAST CONCRETE PILES (PCP)

ELEVATIONS AND SOIL TYPE:						
	Layer 1	Layer 2	Layer 3	Layer 4	Layer 5	Layer 6
Depth at top of layer (ft)	0	10	32.5	52.5	87.5	100
Depth at bottom of layer (ft)	10	32.5	52.5	87.5	100	125
Depth at design water table (ft)	-7	-7	-7	-7	-7	-7
Elevation at top of layer (ft, NAVD)	-5.3	-15.3	-37.8	-57.8	-92.8	-105.3
Elevation at bottom of layer (ft, NAVD)	-15.3	-37.8	-57.8	-92.8	-105.3	-130.3
Water Table Elevation (ft, NAVD)	1.7	1.7	1.7	1.7	1.7	1.7
Soil Layer Type (0-Cohesionless, 1 -Cohesive, 2 -Rock)	0-Cohesionless	0-Cohesionless	0-Cohesionless	2 -Rock	0-Cohesionless	0-Cohesionless
USCS Soil Layer Type (GW,GP, SP, SP-SM, SM, SC, ML, CL, CH, N/A for Rock)	GW	SP	SP	N/A	GW	SP
Average SPT N value (automatic), Blows/ ft	19	8	7	60	22	18
SOIL PROPERTIES FOR LATERAL SOIL MODEL:						
Lateral Soil Model	1 (O'Neill)	1 (O'Neill)	1 (O'Neill)	8 (McVay)	1 (O'Neill)	1 (O'Neill)
Internal Friction Angle, ϕ (degrees)	39	30	30	-----	40	34
Subgrade Soil Modulus, RK (pci)	68	24	23	-----	81	66
Undrained Strength, C (psf)	-----	-----	-----	16667	-----	-----
Strain @ 50% Failure, ϵ 50 (in/in)	-----	-----	-----	-----	-----	-----
Strain @ 100% Failure, ϵ 100 (in/in)	-----	-----	-----	-----	-----	-----
Total Unit Weight, γ_t (pcf)	115	112	112	-----	115	115
Effective Unit Weight, γ_{eff} (pcf) ¹	0.0304	0.0287	0.0287	-----	0.0304	0.0304
Unconfined Compressive Strength, Limestone (psf)	-----	-----	-----	33333	-----	-----
SOIL PROPERTIES FOR THE AXIAL MODEL:						
Axial Soil Model	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al
	1989	1989	1989	1989	1989	1989
Shear Modulus, G (ksi)	1.9	0.8	0.8	11.1	2.2	1.8
Poisson's Ratio, ν	0.3	0.2	0.2	0.2	0.3	0.3
Vertical Failure Shear Stress (psf)	872	356	336	1488	1037	848
Internal Friction Angle, ϕ (degrees)	39	30	30	40	40	34
Total Unit Weight, γ_t (pcf)	115	112	112	120	115	115
SOIL PROPERTIES FOR THE TORSIONAL MODEL:						
Torsional Soil Model	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic
Shear Modulus, G (ksi)	1.9	0.8	0.8	11.1	2.2	1.8
Torsional Shear Stress (psf)	610	249	235	700	726	594
SOIL PROPERTIES FOR THE TIP MODEL:						
Tip Soil Model	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al
	1989	1989	1989	1989	1989	1989
Shear Modulus, G (ksi)	1.9	0.8	0.8	11.1	2.2	1.8
Poisson's Ratio, ν	0.3	0.2	0.2	0.2	0.3	0.3
Axial Bearing Failure Load, Qult (kip)	918	375	353	2891	1091	893

Notes:

- Effective unit weight assumes ground water table at ground surface.
- The uncorrected SPT N value (Tip Model) corresponds to the safety hammer (Safety = automatic X 1.24).
- Rock with N (manual) less or equal to 10 shall be modeled as cohesionless (SP).
- Rock with N (manual) between 11 to 25 shall be modeled as cohesionless (GW).
- As indicated in Section 3.3.8.B of the SDG, a high end bearing resistance needs to be established such that the pile tip will not settle due to axial forces. Therefore, the soil parameters for LAYER 4 or similar can be used in order to avoid pile tip settlement per SDG.
- Neglect soil resistance above the scour elevation.

Project Name: **Broad Causeway Bridge**
Project Number: **B-22-074**
Prepared by/ Date: **AT 1/5/24**
Checked by/ Date: **PV 01/26/24**

Boring Number: **BB-06**
Boring GSE (ft, NAVD): **-6.3**
Bridge End/ Pier No.:
Station and Offset (Baseline): **127+95, 15 LT**
Preforming Elevation (ft): **-28.8**
Pile Size (in): **30**
Pile Tip (CLOSED or OPEN or N/A): **N/A**
Pile Thickness (in): **N/A**
Pile Tip Area (in²): **900**

Summary of Recommended Soil Parameters for FB-Pier Analysis PRECAST CONCRETE PILES (PCP)

ELEVATIONS AND SOIL TYPE:								
	Layer 1	Layer 2	Layer 3	Layer 4	Layer 5	Layer 6	Layer 7	Layer 8
Depth at top of layer (ft)	0	16	22.5	40	57.5	67.5	80	112.5
Depth at bottom of layer (ft)	16	22.5	40	57.5	67.5	80	112.5	125
Depth at design water table (ft)	-8	-8	-8	-8	-8	-8	-8	-8
Elevation at top of layer (ft, NAVD)	-6.3	-22.3	-28.8	-46.3	-63.8	-73.8	-86.3	-118.8
Elevation at bottom of layer (ft, NAVD)	-22.3	-28.8	-46.3	-63.8	-73.8	-86.3	-118.8	-131.3
Water Table Elevation (ft, NAVD)	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Soil Layer Type (0-Cohesionless, 1 -Cohesive, 2 -Rock)	0-Cohesionless	0-Cohesionless	0-Cohesionless	0-Cohesionless	2 -Rock	0-Cohesionless	2 -Rock	0-Cohesionless
USCS Soil Layer Type (GW, GP, SP, SP-SM, SM, SC, ML, CL, CH, N/A for Rock)	GW	SP	SP	SP	N/A	SP	N/A	GW
Average SPT N value (automatic), Blows/ ft	12	5	8	11	60	9	41	16
SOIL PROPERTIES FOR LATERAL SOIL MODEL:								
Lateral Soil Model	1 (O'Neill)	1 (O'Neill)	1 (O'Neill)	1 (O'Neill)	8 (McVay)	1 (O'Neill)	8 (McVay)	1 (O'Neill)
Internal Friction Angle, ϕ (degrees)	37	29	30	31	-----	31	-----	38
Subgrade Soil Modulus, RK (pci)	40	12	26	38	-----	30	-----	58
Undrained Strength, C (psf)	-----	-----	-----	-----	16667	-----	16667	-----
Strain @ 50% Failure, ϵ 50 (in/in)	-----	-----	-----	-----	-----	-----	-----	-----
Strain @ 100% Failure, ϵ 100 (in/in)	-----	-----	-----	-----	-----	-----	-----	-----
Total Unit Weight, γ_t (pcf)	112	105	112	112	-----	112	-----	115
Effective Unit Weight, γ_{eff} (pcf) ¹	0.0287	0.0247	0.0287	0.0287	-----	0.0287	-----	0.0304
Unconfined Compressive Strength, Limestone (psf)	-----	-----	-----	-----	33333	-----	33333	-----
SOIL PROPERTIES FOR THE AXIAL MODEL:								
Axial Soil Model	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al
Shear Modulus, G (ksi)	1989	1989	1989	1989	1989	1989	1989	1989
Poisson's Ratio, ν	1.2	0.5	0.9	1.2	11.1	1.0	11.1	1.6
Vertical Failure Shear Stress (psf)	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3
Internal Friction Angle, ϕ (degrees)	542	212	377	518	1488	424	1017	754
Total Unit Weight, γ_t (pcf)	37	29	30	31	40	31	40	38
	112	105	112	112	120	112	120	115
SOIL PROPERTIES FOR THE TORSIONAL MODEL:								
Torsional Soil Model	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic
Shear Modulus, G (ksi)	1.2	0.5	0.9	1.2	11.1	1.0	11.1	1.6
Torsional Shear Stress (psf)	379	148	264	363	700	297	700	528
SOIL PROPERTIES FOR THE TIP MODEL:								
Tip Soil Model	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al
Shear Modulus, G (ksi)	1989	1989	1989	1989	1989	1989	1989	1989
Poisson's Ratio, ν	1.2	0.5	0.9	1.2	11.1	1.0	11.1	1.6
Axial Bearing Failure Load, Qult (kip)	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3
	570	223	397	546	2891	446	1802	794

Notes:

- Effective unit weight assumes ground water table at ground surface.
- The uncorrected SPT N value (Tip Model) corresponds to the safety hammer (Safety = automatic X 1.24).
- Rock with N (manual) less or equal to 10 shall be modeled as cohesionless (SP).
- Rock with N (manual) between 11 to 25 shall be modeled as cohesionless (GW).
- As indicated in Section 3.3.8.B of the SDG, a high end bearing resistance needs to be established such that the pile tip will not settle due to axial forces. Therefore, the soil parameters for LAYER 5 or similar can be used in order to avoid pile tip settlement per SDG.
- Neglect soil resistance above the scour elevation.

AREHNA Engineering, Inc.12296 Wiles Rd
Coral Springs, Florida 33076Project Name: Broad Causeway Bridge
Project Number: B-22-074
Prepared by/ Date: AT 1/5/24
Checked by/ Date: PV 01/26/24Boring Number: BB-07
Boring GSE (ft, NAVD): -8.8
Bridge End/ Pier No.:
Station and Offset (Baseline): 130+41, 38 ft
Preforming Elevation (ft): -38.8
Pile Size (in): 30
Pile Tip (CLOSED or OPEN or N/A): N/A
Pile Thickness (in): N/A
Pile Tip Area (in²): 900**Summary of Recommended Soil Parameters for FB-Pier Analysis PRECAST CONCRETE PILES (PCP)**

ELEVATIONS AND SOIL TYPE:	Layer 1	Layer 2	Layer 3	Layer 4	Layer 5	Layer 6	Layer 7
Depth at top of layer (ft)	0	18	30	35	55	72.5	85
Depth at bottom of layer (ft)	18	30	35	55	72.5	85	125
Depth at design water table (ft)	-11.5	-11.5	-11.5	-11.5	-11.5	-11.5	-11.5
Elevation at top of layer (ft, NAVD)	-8.8	-26.8	-38.8	-43.8	-63.8	-81.3	-93.8
Elevation at bottom of layer (ft, NAVD)	-26.8	-38.8	-43.8	-63.8	-81.3	-93.8	-133.8
Water Table Elevation (ft, NAVD)	2.7	2.7	2.7	2.7	2.7	2.7	2.7
Soil Layer Type (0-Cohesionless, 1 -Cohesive, 2 -Rock)	0-Cohesionless	0-Cohesionless	0-Cohesionless	0-Cohesionless	2 -Rock	0-Cohesionless	2 -Rock
USCS Soil Layer Type (GW, GP, SP, SP-SM, SM, SC, ML, CL, CH, N/A for Rock)	GW	SP	SP	SP	N/A	GW	N/A
Average SPT N value (automatic), Blows/ ft	13	5	13	9	40	20	49
SOIL PROPERTIES FOR LATERAL SOIL MODEL:							
Lateral Soil Model	1 (O'Neill)	1 (O'Neill)	1 (O'Neill)	1 (O'Neill)	8 (McVay)	1 (O'Neill)	8 (McVay)
Internal Friction Angle, ϕ (degrees)	37	29	32	31	-----	39	-----
Subgrade Soil Modulus, RK (pci)	44	12	46	30	-----	73	-----
Undrained Strength, C (psf)	-----	-----	-----	-----	16533	-----	16667
Strain @ 50% Failure, ϵ 50 (in/in)	-----	-----	-----	-----	-----	-----	-----
Strain @ 100% Failure, ϵ 100 (in/in)	-----	-----	-----	-----	-----	-----	-----
Total Unit Weight, γ_t (pcf)	112	105	112	112	-----	115	-----
Effective Unit Weight, γ_{eff} (pci) ¹	0.0287	0.0247	0.0287	0.0287	-----	0.0304	-----
Unconfined Compressive Strength, Limestone (psf)	-----	-----	-----	-----	33067	-----	33333
SOIL PROPERTIES FOR THE AXIAL MODEL:							
Axial Soil Model	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al
Shear Modulus, G (ksi)	1989	1989	1989	1989	1989	1989	1989
Poisson's Ratio, ν	1.3	0.5	1.4	1.0	11.0	2.0	11.1
Vertical Failure Shear Stress (psf)	0.2	0.2	0.2	0.2	0.2	0.3	0.2
Internal Friction Angle, ϕ (degrees)	589	212	613	424	992	942	1215
Total Unit Weight, γ_t (pcf)	37	29	32	31	40	39	40
	112	105	112	112	120	115	120
SOIL PROPERTIES FOR THE TORSIONAL MODEL:							
Torsional Soil Model	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic
Shear Modulus, G (ksi)	1.3	0.5	1.4	1.0	11.0	2.0	11.1
Torsional Shear Stress (psf)	412	148	429	297	694	660	700
SOIL PROPERTIES FOR THE TIP MODEL:							
Tip Soil Model	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al
Shear Modulus, G (ksi)	1989	1989	1989	1989	1989	1989	1989
Poisson's Ratio, ν	1.3	0.5	1.4	1.0	11.0	2.0	11.1
Axial Bearing Failure Load, Qult (kip)	0.2	0.2	0.2	0.2	0.2	0.3	0.2
	620	223	645	446	1750	992	2238

Notes:

- Effective unit weight assumes ground water table at ground surface.
- The uncorrected SPT N value (Tip Model) corresponds to the safety hammer (Safety = automatic X 1.24).
- Rock with N (manual) less or equal to 10 shall be modeled as cohesionless (SP).
- Rock with N (manual) between 11 to 25 shall be modeled as cohesionless (GW).
- As indicated in Section 3.3.8.B of the SDG, a high end bearing resistance needs to be established such that the pile tip will not settle due to axial forces. Therefore, the soil parameters for LAYER 5 or similar can be used in order to avoid pile tip settlement per SDG.
- Neglect soil resistance above the scour elevation.

AREHNA Engineering, Inc.12296 Wiles Rd
Coral Springs, Florida 33076Project Name: Broad Causeway Bridge
Project Number: B-22-074
Prepared by/ Date: AT 1/5/24
Checked by/ Date: PV 01/26/24Boring Number: BB-08
Boring GSE (ft, NAVD): -8.6
Bridge End/ Pier No.:
Station and Offset (Baseline): 132+19, 39 RT
Preforming Elevation (ft): -36.1
Pile Size (in): 30
Pile Tip (CLOSED or OPEN or N/A): N/A
Pile Thickness (in): N/A
Pile Tip Area (in²): 900**Summary of Recommended Soil Parameters for FB-Pier Analysis PRECAST CONCRETE PILES (PCP)**

ELEVATIONS AND SOIL TYPE:						
	Layer 1	Layer 2	Layer 3	Layer 4	Layer 5	Layer 6
Depth at top of layer (ft)	0	14	27.5	45	75	110
Depth at bottom of layer (ft)	14	27.5	45	75	110	125
Depth at design water table (ft)	-10.3	-10.3	-10.3	-10.3	-10.3	-10.3
Elevation at top of layer (ft, NAVD)	-8.6	-22.6	-36.1	-53.6	-83.6	-118.6
Elevation at bottom of layer (ft, NAVD)	-22.6	-36.1	-53.6	-83.6	-118.6	-133.6
Water Table Elevation (ft, NAVD)	1.7	1.7	1.7	1.7	1.7	1.7
Soil Layer Type (0-Cohesionless, 1 -Cohesive, 2 -Rock)	0-Cohesionless	0-Cohesionless	0-Cohesionless	0-Cohesionless	2 -Rock	0-Cohesionless
USCS Soil Layer Type (GW,GP, SP, SP-SM, SM, SC, ML, CL, CH, N/A for Rock)	GW	SP	SP	SP	N/A	GW
Average SPT N value (automatic), Blows/ ft	15	5	6	9	55	32
SOIL PROPERTIES FOR LATERAL SOIL MODEL:						
Lateral Soil Model	1 (O'Neill)	1 (O'Neill)	1 (O'Neill)	1 (O'Neill)	8 (McVay)	1 (O'Neill)
Internal Friction Angle, ϕ (degrees)	37	30	30	31	-----	40
Subgrade Soil Modulus, RK (pci)	52	14	18	30	-----	121
Undrained Strength, C (psf)	-----	-----	-----	-----	16667	-----
Strain @ 50% Failure, ϵ 50 (in/in)	-----	-----	-----	-----	-----	-----
Strain @ 100% Failure, ϵ 100 (in/in)	-----	-----	-----	-----	-----	-----
Total Unit Weight, γ_t (pcf)	112	105	105	112	-----	125
Effective Unit Weight, γ_{eff} (pcf) ¹	0.0287	0.0247	0.0247	0.0287	-----	0.0362
Unconfined Compressive Strength, Limestone (psf)	-----	-----	-----	-----	33333	-----
SOIL PROPERTIES FOR THE AXIAL MODEL:						
Axial Soil Model	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al
	1989	1989	1989	1989	1989	1989
Shear Modulus, G (ksi)	1.5	0.5	0.6	1.0	11.1	3.1
Poisson's Ratio, ν	0.2	0.2	0.2	0.2	0.2	0.3
Vertical Failure Shear Stress (psf)	683	236	283	424	1364	1508
Internal Friction Angle, ϕ (degrees)	37	30	30	31	40	40
Total Unit Weight, γ_t (pcf)	112	105	105	112	120	125
SOIL PROPERTIES FOR THE TORSIONAL MODEL:						
Torsional Soil Model	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic
Shear Modulus, G (ksi)	1.5	0.5	0.6	1.0	11.1	3.1
Torsional Shear Stress (psf)	478	165	198	297	700	1055
SOIL PROPERTIES FOR THE TIP MODEL:						
Tip Soil Model	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al
	1989	1989	1989	1989	1989	1989
Shear Modulus, G (ksi)	1.5	0.5	0.6	1.0	11.1	3.1
Poisson's Ratio, ν	0.2	0.2	0.2	0.2	0.2	0.3
Axial Bearing Failure Load, Qult (kip)	719	248	298	446	2586	1587

Notes:

- Effective unit weight assumes ground water table at ground surface.
- The uncorrected SPT N value (Tip Model) corresponds to the safety hammer (Safety = automatic X 1.24).
- Rock with N (manual) less or equal to 10 shall be modeled as cohesionless (SP).
- Rock with N (manual) between 11 to 25 shall be modeled as cohesionless (GW).
- As indicated in Section 3.3.8.B of the SDG, a high end bearing resistance needs to be established such that the pile tip will not settle due to axial forces. Therefore, the soil parameters for LAYER 5 or similar can be used in order to avoid pile tip settlement per SDG.
- Neglect soil resistance above the scour elevation.

AREHNA Engineering, Inc.12296 Wiles Rd
Coral Springs, Florida 33076

Project Name: **Broad Causeway Bridge**
 Project Number: **B-22-074**
 Prepared by/ Date: **AT 1/5/24**
 Checked by/ Date: **PV 01/26/24**

Boring Number: **BB-09**
Boring GSE (ft, NAVD): **-6.6**
Bridge End/ Pier No.:
Station and Offset (Baseline): **134+48, 25 LT**
Preforming Elevation (ft): **-36.6**
Pile Size (in): **30**
Pile Tip (CLOSED or OPEN or N/A): **N/A**
Pile Thickness (in): **N/A**
Pile Tip Area (in²): **900**

Summary of Recommended Soil Parameters for FB-Pier Analysis PRECAST CONCRETE PILES (PCP)

ELEVATIONS AND SOIL TYPE:					
	Layer 1	Layer 2	Layer 3	Layer 4	Layer 5
Depth at top of layer (ft)	0	25	30	47.5	65
Depth at bottom of layer (ft)	25	30	47.5	65	125
Depth at design water table (ft)	-10.3	-10.3	-10.3	-10.3	-10.3
Elevation at top of layer (ft, NAVD)	-6.6	-31.6	-36.6	-54.1	-71.6
Elevation at bottom of layer (ft, NAVD)	-31.6	-36.6	-54.1	-71.6	-131.6
Water Table Elevation (ft, NAVD)	3.7	3.7	3.7	3.7	3.7
Soil Layer Type (0-Cohesionless, 1 -Cohesive, 2 -Rock)	0-Cohesionless	0-Cohesionless	0-Cohesionless	0-Cohesionless	2 -Rock
USCS Soil Layer Type (GW,GP, SP, SP-SM, SM, SC, ML, CL, CH, N/A for Rock)	SP	GW	SP	SP	N/A
Average SPT N value (automatic), Blows/ ft	9	20	32	5	57
SOIL PROPERTIES FOR LATERAL SOIL MODEL:					
Lateral Soil Model	1 (O'Neill)	1 (O'Neill)	1 (O'Neill)	1 (O'Neill)	8 (McVay)
Internal Friction Angle, ϕ (degrees)	31	39	38	30	-----
Subgrade Soil Modulus, RK (pci)	28	73	121	14	-----
Undrained Strength, C (psf)	-----	-----	-----	-----	16667
Strain @ 50% Failure, ϵ 50 (in/in)	-----	-----	-----	-----	-----
Strain @ 100% Failure, ϵ 100 (in/in)	-----	-----	-----	-----	-----
Total Unit Weight, γ_t (pcf)	112	115	125	105	-----
Effective Unit Weight, γ_{eff} (pcf) ¹	0.0287	0.0304	0.0362	0.0247	-----
Unconfined Compressive Strength, Limestone (psf)	-----	-----	-----	-----	33333
SOIL PROPERTIES FOR THE AXIAL MODEL:					
Axial Soil Model	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al
	1989	1989	1989	1989	1989
Shear Modulus, G (ksi)	0.9	2.0	3.1	0.5	11.1
Poisson's Ratio, ν	0.2	0.3	0.3	0.2	0.2
Vertical Failure Shear Stress (psf)	401	942	1508	236	1414
Internal Friction Angle, ϕ (degrees)	31	39	38	30	40
Total Unit Weight, γ_t (pcf)	112	115	125	105	120
SOIL PROPERTIES FOR THE TORSIONAL MODEL:					
Torsional Soil Model	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic
Shear Modulus, G (ksi)	0.9	2.0	3.1	0.5	11.1
Torsional Shear Stress (psf)	280	660	1055	165	700
SOIL PROPERTIES FOR THE TIP MODEL:					
Tip Soil Model	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al
	1989	1989	1989	1989	1989
Shear Modulus, G (ksi)	0.9	2.0	3.1	0.5	11.1
Poisson's Ratio, ν	0.2	0.3	0.3	0.2	0.2
Axial Bearing Failure Load, Q _{ult} (kip)	422	992	1587	248	2706

Notes:

- Effective unit weight assumes ground water table at ground surface.
- The uncorrected SPT N value (Tip Model) corresponds to the safety hammer (Safety = automatic X 1.24).
- Rock with N (manual) less or equal to 10 shall be modeled as cohesionless (SP).
- Rock with N (manual) between 11 to 25 shall be modeled as cohesionless (GW).
- As indicated in Section 3.3.8.B of the SDG, a high end bearing resistance needs to be established such that the pile tip will not settle due to axial forces. Therefore, the soil parameters for LAYER 5 or similar can be used in order to avoid pile tip settlement per SDG.
- Neglect soil resistance above the scour elevation.

AREHNA Engineering, Inc.12296 Wiles Rd
Coral Springs, Florida 33076Project Name: Broad Causeway Bridge
Project Number: B-22-074
Prepared by/ Date: AT 1/5/24
Checked by/ Date: PV 01/26/24Boring Number: BB-10
Boring GSE (ft, NAVD): -7.1
Bridge End/ Pier No.:
Station and Offset (Baseline): 136+34, 40 RT
Preforming Elevation (ft): -37.1
Pile Size (in): 30
Pile Tip (CLOSED or OPEN or N/A): N/A
Pile Thickness (in): N/A
Pile Tip Area (in²): 900**Summary of Recommended Soil Parameters for FB-Pier Analysis PRECAST CONCRETE PILES (PCP)**

ELEVATIONS AND SOIL TYPE:					
	Layer 1	Layer 2	Layer 3	Layer 4	Layer 5
Depth at top of layer (ft)	0	30	45	62.5	70
Depth at bottom of layer (ft)	30	45	62.5	70	125
Depth at design water table (ft)	-9.8	-9.8	-9.8	-9.8	-9.8
Elevation at top of layer (ft, NAVD)	-7.1	-37.1	-52.1	-69.6	-77.1
Elevation at bottom of layer (ft, NAVD)	-37.1	-52.1	-69.6	-77.1	-132.1
Water Table Elevation (ft, NAVD)	2.7	2.7	2.7	2.7	2.7
Soil Layer Type (0-Cohesionless, 1 -Cohesive, 2 -Rock)	0-Cohesionless	0-Cohesionless	2 -Rock	0-Cohesionless	2 -Rock
USCS Soil Layer Type (GW,GP, SP, SP-SM, SM, SC, ML, CL, CH, N/A for Rock)	SP	SP	N/A	GW	N/A
Average SPT N value (automatic), Blows/ ft	8	14	58	13	58
SOIL PROPERTIES FOR LATERAL SOIL MODEL:					
Lateral Soil Model	1 (O'Neill)	1 (O'Neill)	8 (McVay)	1 (O'Neill)	8 (McVay)
Internal Friction Angle, ϕ (degrees)	30	32	-----	37	-----
Subgrade Soil Modulus, RK (pci)	24	50	-----	46	-----
Undrained Strength, C (psf)	-----	-----	16667	-----	16667
Strain @ 50% Failure, ϵ 50 (in/in)	-----	-----	-----	-----	-----
Strain @ 100% Failure, ϵ 100 (in/in)	-----	-----	-----	-----	-----
Total Unit Weight, γ_t (pcf)	112	112	-----	112	-----
Effective Unit Weight, γ_{eff} (pci) ¹	0.0287	0.0287	-----	0.0287	-----
Unconfined Compressive Strength, Limestone (psf)	-----	-----	33333	-----	33333
SOIL PROPERTIES FOR THE AXIAL MODEL:					
Axial Soil Model	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al
Shear Modulus, G (ksi)	1989	1989	1989	1989	1989
Poisson's Ratio, ν	0.8	1.5	11.1	1.4	11.1
Vertical Failure Shear Stress (psf)	0.2	0.2	0.2	0.2	0.2
Internal Friction Angle, ϕ (degrees)	353	660	1438	613	1438
Total Unit Weight, γ_t (pcf)	30	32	40	37	40
	112	112	120	112	120
SOIL PROPERTIES FOR THE TORSIONAL MODEL:					
Torsional Soil Model	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic
Shear Modulus, G (ksi)	0.8	1.5	11.1	1.4	11.1
Torsional Shear Stress (psf)	247	462	700	429	700
SOIL PROPERTIES FOR THE TIP MODEL:					
Tip Soil Model	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al
Shear Modulus, G (ksi)	1989	1989	1989	1989	1989
Poisson's Ratio, ν	0.8	1.5	11.1	1.4	11.1
Axial Bearing Failure Load, Qult (kip)	0.2	0.2	0.2	0.2	0.2
	372	694	2767	645	2767

Notes:

- Effective unit weight assumes ground water table at ground surface.
- The uncorrected SPT N value (Tip Model) corresponds to the safety hammer (Safety = automatic X 1.24).
- Rock with N (manual) less or equal to 10 shall be modeled as cohesionless (SP).
- Rock with N (manual) between 11 to 25 shall be modeled as cohesionless (GW).
- As indicated in Section 3.3.8.B of the SDG, a high end bearing resistance needs to be established such that the pile tip will not settle due to axial forces. Therefore, the soil parameters for LAYER 5 or similar can be used in order to avoid pile tip settlement per SDG.
- Neglect soil resistance above the scour elevation.

AREHNA Engineering, Inc.12296 Wiles Rd
Coral Springs, Florida 33076

Project Name: Broad Causeway Bridge
 Project Number: B-22-074
 Prepared by/ Date: AT 1/5/24
 Checked by/ Date: PV 01/26/24

Boring Number: BB-11
 Boring GSE (ft, NAVD): -10.3
 Bridge End/ Pier No.:
 Station and Offset (Baseline): 138+55, 34 LT
 Preforming Elevation (ft): -35.3
 Pile Size (in): 30
 Pile Tip (CLOSED or OPEN or N/A): N/A
 Pile Thickness (in): N/A
 Pile Tip Area (in²): 900

Summary of Recommended Soil Parameters for FB-Pier Analysis PRECAST CONCRETE PILES (PCP)

ELEVATIONS AND SOIL TYPE:						
	Layer 1	Layer 2	Layer 3	Layer 4	Layer 5	Layer 6
Depth at top of layer (ft)	0	25	35	45	62.5	107.5
Depth at bottom of layer (ft)	25	35	45	62.5	107.5	125
Depth at design water table (ft)	-14	-14	-14	-14	-14	-14
Elevation at top of layer (ft, NAVD)	-10.3	-35.3	-45.3	-55.3	-72.8	-117.8
Elevation at bottom of layer (ft, NAVD)	-35.3	-45.3	-55.3	-72.8	-117.8	-135.3
Water Table Elevation (ft, NAVD)	3.7	3.7	3.7	3.7	3.7	3.7
Soil Layer Type (0-Cohesionless, 1 -Cohesive, 2 -Rock)	0-Cohesionless	0-Cohesionless	0-Cohesionless	2 -Rock	2 -Rock	0-Cohesionless
USCS Soil Layer Type (GW,GP, SP, SP-SM, SM, SC, ML, CL, CH, N/A for Rock)	SP	SP	SP	N/A	N/A	GW
Average SPT N value (automatic), Blows/ ft	7	5	25	60	50	13
SOIL PROPERTIES FOR LATERAL SOIL MODEL:						
Lateral Soil Model	1 (O'Neill)	1 (O'Neill)	1 (O'Neill)	8 (McVay)	8 (McVay)	1 (O'Neill)
Internal Friction Angle, ϕ (degrees)	30	30	36	-----	-----	37
Subgrade Soil Modulus, RK (pci)	20	14	93	-----	-----	46
Undrained Strength, C (psf)	-----	-----	-----	16667	16667	-----
Strain @ 50% Failure, ϵ 50 (in/in)	-----	-----	-----	-----	-----	-----
Strain @ 100% Failure, ϵ 100 (in/in)	-----	-----	-----	-----	-----	-----
Total Unit Weight, γ_t (pcf)	112	105	120	-----	-----	112
Effective Unit Weight, γ_{eff} (pcf) ¹	0.0287	0.0247	0.0333	-----	-----	0.0287
Unconfined Compressive Strength, Limestone (psf)	-----	-----	-----	33333	33333	-----
SOIL PROPERTIES FOR THE AXIAL MODEL:						
Axial Soil Model	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al
Shear Modulus, G (ksi)	1989	1989	1989	1989	1989	1989
Poisson's Ratio, ν	0.7	0.5	2.5	11.1	11.1	1.4
Vertical Failure Shear Stress (psf)	0.2	0.2	0.3	0.2	0.2	0.2
Internal Friction Angle, ϕ (degrees)	306	236	1178	1488	1240	613
Total Unit Weight, γ_t (pcf)	30	30	36	40	40	37
	112	105	120	120	120	112
SOIL PROPERTIES FOR THE TORSIONAL MODEL:						
Torsional Soil Model	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic
Shear Modulus, G (ksi)	0.7	0.5	2.5	11.1	11.1	1.4
Torsional Shear Stress (psf)	214	165	825	700	700	429
SOIL PROPERTIES FOR THE TIP MODEL:						
Tip Soil Model	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al
Shear Modulus, G (ksi)	1989	1989	1989	1989	1989	1989
Poisson's Ratio, ν	0.7	0.5	2.5	11.1	11.1	1.4
Axial Bearing Failure Load, Qult (kip)	0.2	0.2	0.3	0.2	0.2	0.2
	322	248	1240	2891	2295	645

Notes:

- Effective unit weight assumes ground water table at ground surface.
- The uncorrected SPT N value (Tip Model) corresponds to the safety hammer (Safety = automatic X 1.24).
- Rock with N (manual) less or equal to 10 shall be modeled as cohesionless (SP).
- Rock with N (manual) between 11 to 25 shall be modeled as cohesionless (GW).
- As indicated in Section 3.3.8.B of the SDG, a high end bearing resistance needs to be established such that the pile tip will not settle due to axial forces. Therefore, the soil parameters for LAYER 5 or similar can be used in order to avoid pile tip settlement per SDG.
- Neglect soil resistance above the scour elevation.

Project Name: Broad Causeway Bridge
Project Number: B-22-074
Prepared by/ Date: PV/04-14-2023
Checked by/ Date: RR/11-10-23

Boring Number: BB-12
Boring GSE (ft, NAVD): 2.7
Bridge End/ Pier No.:
Station and Offset (Baseline): 140+71, 32 RT
Preforming Elevation (ft): -34.8
Pile Size (in): 30
Pile Tip (CLOSED or OPEN or N/A): N/A
Pile Thickness (in): N/A
Pile Tip Area (in²): 900

Summary of Recommended Soil Parameters for FB-Pier Analysis PRECAST CONCRETE PILES (PCP)

ELEVATIONS AND SOIL TYPE:								
	Layer 1	Layer 2	Layer 3	Layer 4	Layer 5	Layer 6	Layer 7	Layer 8
Depth at top of layer (ft)	0	16	37.5	65	77.5	85	95	100
Depth at bottom of layer (ft)	16	37.5	65	77.5	85	95	100	125
Depth at design water table (ft)	0	0	0	0	0	0	0	0
Elevation at top of layer (ft, NAVD)	2.7	-13.3	-34.8	-62.3	-74.8	-82.3	-92.3	-97.3
Elevation at bottom of layer (ft, NAVD)	-13.3	-34.8	-62.3	-74.8	-82.3	-92.3	-97.3	-122.3
Water Table Elevation (ft, NAVD)	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7
Soil Layer Type (0-Cohesionless, 1 -Cohesive, 2 -Rock)	1 -Cohesive	0-Cohesionless	0-Cohesionless	2 -Rock	0-Cohesionless	2 -Rock	0-Cohesionless	2 -Rock
USCS Soil Layer Type (GW,GP,SP,SP-SM,SM,SC,ML,CL,CH,N/A for Rock)	ML	SP	SP	N/A	SP	N/A	SP	N/A
Average SPT N value (automatic), Blows/ ft	1	8	19	45	17	40	11	54
SOIL PROPERTIES FOR LATERAL SOIL MODEL:								
Lateral Soil Model	4(Matlock)	1 (O'Neill)	1 (O'Neill)	8 (McVay)	1 (O'Neill)	8 (McVay)	1 (O'Neill)	8 (McVay)
Internal Friction Angle, ϕ (degrees)	-----	30	34	-----	33	-----	31	-----
Subgrade Soil Modulus, RK (pci)	-----	26	69	-----	62	-----	38	-----
Undrained Strength, C (psf)	93	-----	-----	16667	-----	16533	-----	16667
Strain @ 50% Failure, ϵ 50 (in/in)	0.027	-----	-----	-----	-----	-----	-----	-----
Strain @ 100% Failure, ϵ 100 (in/in)	0.082	-----	-----	-----	-----	-----	-----	-----
Total Unit Weight, γ_t (pcf)	101	112	115	-----	115	-----	112	-----
Effective Unit Weight, γ_{eff} (pcf) ¹	0.0226	0.0287	0.0304	-----	0.0304	-----	0.0287	-----
Unconfined Compressive Strength, Limestone (psf)	186	-----	-----	33333	-----	33067	-----	33333
SOIL PROPERTIES FOR THE AXIAL MODEL:								
Axial Soil Model	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al
Shear Modulus, G (ksi)	1989	1989	1989	1989	1989	1989	1989	1989
Poisson's Ratio, ν	0.1	0.9	1.9	11.1	1.7	11.0	1.2	11.1
Vertical Failure Shear Stress (psf)	0.4	0.2	0.3	0.2	0.3	0.2	0.2	0.2
Internal Friction Angle, ϕ (degrees)	118	377	895	1116	801	992	518	1339
Total Unit Weight, γ_t (pcf)	-----	30	34	40	33	40	31	40
	101	112	115	120	115	120	112	120
SOIL PROPERTIES FOR THE TORSIONAL MODEL:								
Torsional Soil Model	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic
Shear Modulus, G (ksi)	0.1	0.9	1.9	11.1	1.7	11.0	1.2	11.1
Torsional Shear Stress (psf)	82	264	627	700	561	694	363	700
SOIL PROPERTIES FOR THE TIP MODEL:								
Tip Soil Model	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al	1-McVay et al
Shear Modulus, G (ksi)	1989	1989	1989	1989	1989	1989	1989	1989
Poisson's Ratio, ν	0.1	0.9	1.9	11.1	1.7	11.0	1.2	11.1
Axial Bearing Failure Load, Q _{ult} (kip)	0.4	0.2	0.3	0.2	0.3	0.2	0.2	0.2
	25	397	942	2016	843	1750	546	2527

Notes:

1. Effective unit weight assumes ground water table at ground surface.
2. The uncorrected SPT N value (Tip Model) corresponds to the safety hammer (Safety = automatic X 1.24).
3. Rock with N (manual) less or equal to 10 shall be modeled as cohesionless (SP).
4. Rock with N (manual) between 11 to 25 shall be modeled as cohesionless (GW).
5. As indicated in Section 3.3.8.B of the SDG, a high end bearing resistance needs to be established such that the pile tip will not settle due to axial forces. Therefore, the soil parameters for LAYER 8 or similar can be used in order to avoid pile tip settlement per SDG.

FB-MultiPier Soil Parameters
48 and 60-inch Diameter Drilled Shafts

Project Name: Broad Causeway Bridge
Project Number: B-22-074
Prepared by/ Date: PV/11-09-2023
Checked by/ Date: RR/11-10-23

Boring Number: BB-01
Boring GSE (ft, NAVD): 4.9
Bridge No:
End Bent/Pier No.:
Station and Offset (Baseline): 111+65, 10 L

Summary of Recommended Soil Parameters for FB-Pier Analysis- DRILLED SHAFTS

Version 1.10 (Created By/ Date: ALA/09-18-15 & Checked By/Date: CJR/09-22-15)

ELEVATIONS AND SOIL TYPE:							
	Layer 1	Layer 2	Layer 3	Layer 4	Layer 5	Layer 6	Layer 7
Depth at top of layer (ft)	0	13.5	35	38	50	56	65
Depth at bottom of layer (ft)	13.5	35	38	50	56	65	100
Depth at design water table (ft)	0	0	0	0	0	0	0
Elevation at top of layer (ft, NAVD)	4.9	-8.6	-30.1	-33.1	-45.1	-51.1	-60.1
Elevation at bottom of layer (ft, NAVD)	-8.6	-30.1	-33.1	-45.1	-51.1	-60.1	-95.1
Design Water Table Elevation (ft, NAVD)	4.9	4.9	4.9	4.9	4.9	4.9	4.9
Soil Layer Type (Cohesionless, Cohesive, Rock)	Cohesive	Cohesionless	Cohesionless	Cohesionless	Rock	Cohesionless	Rock
USCS Soil Layer Type (GW, SP, SP-SM, SM, SC, ML, CL, CH, NA)	ML	SP	SP	GW	N/A	GW	N/A
Average SPT N value (automatic), Blows/ ft	1	12	4	49	60	35	60
SOIL PROPERTIES FOR LATERAL SOIL MODEL:							
Lateral Soil Model	4(Matlock)	1 (O'Neill)	1 (O'Neill)	1 (O'Neill)	Limestone (McVay)	1 (O'Neill)	Limestone (McVay)
Internal Friction Angle, ϕ (degrees)	-----	32	29	40	-----	40	-----
Subgrade Soil Modulus, RK (pci)	-----	42	10	185	-----	133	-----
Unconfined Compressive Strength, q_u (psf)	186	-----	-----	-----	33333	-----	33333
Undrained Strength, C (psf)	93	-----	-----	-----	16667	-----	16667
Strain @ 50% Failure, ϵ 50 (in/in)	0.027	-----	-----	-----	-----	-----	-----
Strain @ 100% Failure, ϵ 100 (in/in)	0.082	-----	-----	-----	-----	-----	-----
Total Unit Weight, γ_t (pcf)	101	112	102	130	125	125	125
Effective Unit Weight, γ_{eff} (pcf) ¹	0.0226	0.0287	0.0229	0.0391	0.0362	0.0362	0.0362
SOIL PROPERTIES FOR THE AXIAL MODEL:							
Axial Soil Model	Drilled Shaft Clay	Drilled Shaft Sand	Drilled Shaft Sand	Drilled Shaft Sand	Drilled Shaft Limestone	Drilled Shaft Sand	Drilled Shaft Limestone
Ultimate Unit Skin Friction, f_{smax} (psf)	51	997	327	1798	10000	1704	10000
Undrained Strength, C (psf)	93	-----	-----	-----	16667	-----	16667
Internal Friction Angle, ϕ (degrees)	-----	32	29	40	-----	40	-----
Total Unit Weight, γ_t (pcf)	101	112	102	130	125	125	125
SOIL PROPERTIES FOR THE TORSIONAL MODEL:							
Torsional Soil Model	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic
Shear Modulus, G (ksi)	0.1	1.3	0.4	4.3	11.1	3.3	11.1
Torsional Shear Stress (psf)	36	698	229	1259	700	1193	700
SOIL PROPERTIES FOR THE TIP MODEL:							
Tip Soil Model	Drilled Shaft Clay	Drilled Shaft Sand	Drilled Shaft Sand	Drilled Shaft Sand	Drilled Shaft Limestone	Drilled Shaft Sand	Drilled Shaft Limestone
Uncorrected SPT N value (blows/ft) ²	-----	15	5	60	-----	43	-----
Undrained Shear Strength at the tip elevation (psf)	93	-----	-----	-----	16667	-----	16667

Notes:

- Effective unit weight assumes ground water table at ground surface.
- The uncorrected SPT N value (Tip Model) corresponds to the safety hammer (Safety = automatic X 1.24).
- Effective unit weight assumes ground water table at ground surface.
- As indicated in Section 3.3.8.B of the SDG, a high end bearing resistance needs to be established such that the shaft tip will not settle due to axial forces. Therefore, if needed, the soil parameters for Layer 4 or similar can be used in order to avoid shaft tip settlement per SDG.
- The lateral stability analysis will be performed by the Structural Engineer using FB-Multiplier, which takes into account group effects. FB-Multiplier uses the approach recommended by Brown and Reese (1988) and the P-Y multipliers used are consistent with AASHTO Table 10.7.2.4-1.
- This table does not account for scour.

Project Name: Broad Causeway Bridge
Project Number: B-22-074
Prepared by/ Date: PV/11-09-23
Checked by/ Date: RR/11-10-23

Boring Number: BB-02
Boring GSE (ft, NAVD): 3.8
Bridge No:
End Bent/Pier No.:
Station and Offset (Baseline): 118+90, 73 R

Summary of Recommended Soil Parameters for FB-Pier Analysis- DRILLED SHAFTS

Version 1.10 (Created By/ Date: ALA/09-18-15 & Checked By/Date: CJR/09-22-15)

ELEVATIONS AND SOIL TYPE:							
	Layer 1	Layer 2	Layer 3	Layer 4	Layer 5	Layer 6	Layer 7
Depth at top of layer (ft)	0	14	35	50	75	87.5	97.5
Depth at bottom of layer (ft)	14	35	50	75	87.5	97.5	125
Depth at design water table (ft)	0	0	0	0	0	0	0
Elevation at top of layer (ft, NAVD)	3.8	-10.2	-31.2	-46.2	-71.2	-83.7	-93.7
Elevation at bottom of layer (ft, NAVD)	-10.2	-31.2	-46.2	-71.2	-83.7	-93.7	-121.2
Design Water Table Elevation (ft, NAVD)	3.8	3.8	3.8	3.8	3.8	3.8	3.8
Soil Layer Type (Cohesionless, Cohesive, Rock)	Cohesive	Cohesionless	Cohesionless	Cohesionless	Rock	Rock	Rock
USCS Soil Layer Type (GW, SP, SP-SM, SM, SC, ML, CL, CH, NA)	ML	SP	SP	SP	N/A	N/A	N/A
Average SPT N value (automatic), Blows/ ft	1	9	6	33	54	25	53
SOIL PROPERTIES FOR LATERAL SOIL MODEL:							
Lateral Soil Model	4(Matlock)	1 (O'Neill)	1 (O'Neill)	1 (O'Neill)	Limestone (McVay)	Limestone (McVay)	Limestone (McVay)
Internal Friction Angle, ϕ (degrees)	-----	31	30	38	-----	-----	-----
Subgrade Soil Modulus, RK (pci)	-----	30	18	125	-----	-----	-----
Unconfined Compressive Strength, q_u (psf)	186	-----	-----	-----	33333	20667	33333
Undrained Strength, C (psf)	93	-----	-----	-----	16667	10333	16667
Strain @ 50% Failure, ϵ 50 (in/in)	0.027	-----	-----	-----	-----	-----	-----
Strain @ 100% Failure, ϵ 100 (in/in)	0.082	-----	-----	-----	-----	-----	-----
Total Unit Weight, γ_t (pcf)	101	112	105	125	125	125	125
Effective Unit Weight, γ_{eff} (pcf) ¹	0.0226	0.0287	0.0247	0.0362	0.0362	0.0362	0.0362
SOIL PROPERTIES FOR THE AXIAL MODEL:							
Axial Soil Model	Drilled Shaft Clay	Drilled Shaft Sand	Drilled Shaft Sand	Drilled Shaft Sand	Drilled Shaft Limestone	Drilled Shaft Limestone	Drilled Shaft Limestone
Ultimate Unit Skin Friction, f_{smax} (psf)	51	752	557	1693	10000	6200	10000
Undrained Strength, C (psf)	93	-----	-----	-----	16667	10333	16667
Internal Friction Angle, ϕ (degrees)	-----	31	30	38	-----	-----	-----
Total Unit Weight, γ_t (pcf)	101	112	105	125	125	125	125
SOIL PROPERTIES FOR THE TORSIONAL MODEL:							
Torsional Soil Model	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic
Shear Modulus, G (ksi)	0.1	1.0	0.6	3.2	11.1	6.9	11.1
Torsional Shear Stress (psf)	36	526	390	1185	700	434	700
SOIL PROPERTIES FOR THE TIP MODEL:							
Tip Soil Model	Drilled Shaft Clay	Drilled Shaft Sand	Drilled Shaft Sand	Drilled Shaft Sand	Drilled Shaft Limestone	Drilled Shaft Limestone	Drilled Shaft Limestone
Uncorrected SPT N value (blows/ft) ²	-----	11	7	41	-----	-----	-----
Undrained Shear Strength at the tip elevation (psf)	93	-----	-----	-----	16667	10333	16667

Notes:

1. Effective unit weight assumes ground water table at ground surface.
2. The uncorrected SPT N value (Tip Model) corresponds to the safety hammer (Safety = automatic X 1.24).
3. Effective unit weight assumes ground water table at ground surface.
4. As indicated in Section 3.3.8.B of the SDG, a high end bearing resistance needs to be established such that the shaft tip will not settle due to axial forces. Therefore, if needed, the soil parameters for Layer 4 or similar can be used in order to avoid shaft tip settlement per SDG.
5. The lateral stability analysis will be performed by the Structural Engineer using FB-Multiplier, which takes into account group effects. FB-Multiplier uses the approach recommended by Brown and Reese (1988) and the P-Y multipliers used are consistent with AASHTO Table 10.7.2.4-1.
6. This table does not account for scour.

Project Name: Broad Causeway Bridge
Project Number: B-22-074
Prepared by/ Date: PV/11-09-23
Checked by/ Date: RR/11-10-23

Boring Number: BB-03
Boring GSE (ft, NAVD): 4.6
Bridge No:
End Bent/Pier No.:
Station and Offset (Baseline): 121+53, 32 R

Summary of Recommended Soil Parameters for FB-Pier Analysis- DRILLED SHAFTS

Version 1.10 (Created By/ Date: ALA/09-18-15 & Checked By/Date: CJR/09-22-15)

ELEVATIONS AND SOIL TYPE:							
	Layer 1	Layer 2	Layer 3	Layer 4	Layer 5	Layer 6	Layer 7
Depth at top of layer (ft)	0	14	32.5	50	60	87.5	100
Depth at bottom of layer (ft)	14	32.5	50	60	87.5	100	125
Depth at design water table (ft)	0	0	0	0	0	0	0
Elevation at top of layer (ft, NAVD)	4.6	-9.4	-27.9	-45.4	-55.4	-82.9	-95.4
Elevation at bottom of layer (ft, NAVD)	-9.4	-27.9	-45.4	-55.4	-82.9	-95.4	-120.4
Design Water Table Elevation (ft, NAVD)	4.6	4.6	4.6	4.6	4.6	4.6	4.6
Soil Layer Type (Cohesionless, Cohesive, Rock)	Cohesive	Cohesionless	Cohesionless	Cohesionless	Rock	Rock	Rock
USCS Soil Layer Type (GW, SP, SP-SM, SM, SC, ML, CL, CH, NA)	ML	SP	SP	GW	N/A	N/A	N/A
Average SPT N value (automatic), Blows/ ft	1	6	12	45	60	25	45
SOIL PROPERTIES FOR LATERAL SOIL MODEL:							
Lateral Soil Model	4(Matlock)	1 (O'Neill)	1 (O'Neill)	1 (O'Neill)	Limestone (McVay)	Limestone (McVay)	Limestone (McVay)
Internal Friction Angle, ϕ (degrees)	-----	30	32	40	-----	-----	-----
Subgrade Soil Modulus, RK (pci)	-----	18	42	172	-----	-----	-----
Unconfined Compressive Strength, q_u (psf)	186	-----	-----	-----	33333	20667	33333
Undrained Strength, C (psf)	93	-----	-----	-----	16667	10333	16667
Strain @ 50% Failure, ϵ 50 (in/in)	0.027	-----	-----	-----	-----	-----	-----
Strain @ 100% Failure, ϵ 100 (in/in)	0.082	-----	-----	-----	-----	-----	-----
Total Unit Weight, γ_t (pcf)	101	105	112	130	125	125	125
Effective Unit Weight, γ_{eff} (pcf) ¹	0.0226	0.0247	0.0287	0.0391	0.0362	0.0362	0.0362
SOIL PROPERTIES FOR THE AXIAL MODEL:							
Axial Soil Model	Drilled Shaft Clay	Drilled Shaft Sand	Drilled Shaft Sand	Drilled Shaft Sand	Drilled Shaft Limestone	Drilled Shaft Limestone	Drilled Shaft Limestone
Ultimate Unit Skin Friction, f_{smax} (psf)	51	417	1285	1855	10000	6200	10000
Undrained Strength, C (psf)	93	-----	-----	-----	16667	10333	16667
Internal Friction Angle, ϕ (degrees)	-----	30	32	40	-----	-----	-----
Total Unit Weight, γ_t (pcf)	101	105	112	130	125	125	125
SOIL PROPERTIES FOR THE TORSIONAL MODEL:							
Torsional Soil Model	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic
Shear Modulus, G (ksi)	0.1	0.6	1.3	4.1	11.1	6.9	11.1
Torsional Shear Stress (psf)	36	292	899	1298	700	434	700
SOIL PROPERTIES FOR THE TIP MODEL:							
Tip Soil Model	Drilled Shaft Clay	Drilled Shaft Sand	Drilled Shaft Sand	Drilled Shaft Sand	Drilled Shaft Limestone	Drilled Shaft Limestone	Drilled Shaft Limestone
Uncorrected SPT N value (blows/ft) ²	-----	7	15	56	-----	-----	-----
Undrained Shear Strength at the tip elevation (psf)	93	-----	-----	-----	16667	10333	16667

Notes:

1. Effective unit weight assumes ground water table at ground surface.
2. The uncorrected SPT N value (Tip Model) corresponds to the safety hammer (Safety = automatic X 1.24).
3. Effective unit weight assumes ground water table at ground surface.
4. As indicated in Section 3.3.8.B of the SDG, a high end bearing resistance needs to be established such that the shaft tip will not settle due to axial forces. Therefore, if needed, the soil parameters for Layer 5 or similar can be used in order to avoid shaft tip settlement per SDG.
5. The lateral stability analysis will be performed by the Structural Engineer using FB-Multiplier, which takes into account group effects. FB-Multiplier uses the approach recommended by Brown and Reese (1988) and the P-Y multipliers used are consistent with AASHTO Table 10.7.2.4-1.
6. This table does not account for scour.

Project Name: Broad Causeway Bridge
Project Number: B-22-074
Prepared by/ Date: PV/11-09-23
Checked by/ Date: RR/11-10-23
Boring Number: BB-04
Boring GSE (ft, NAVD): 2.7
Bridge No:
End Bent/Pier No.:
Station and Offset (Baseline): 123+79, 35 RT

Summary of Recommended Soil Parameters for FB-Pier Analysis- DRILLED SHAFTS

Version 1.10 (Created By/ Date: ALA/09-18-15 & Checked By/Date: CJR/09-22-15)

ELEVATIONS AND SOIL TYPE:								
	Layer 1	Layer 2	Layer 3	Layer 4	Layer 5	Layer 6	Layer 7	Layer 8
Depth at top of layer (ft)	0	12	32.5	50	60	70	75	95
Depth at bottom of layer (ft)	12	32.5	50	60	70	75	95	125
Depth at design water table (ft)	0	0	0	0	0	0	0	0
Elevation at top of layer (ft, NAVD)	2.7	-9.3	-29.8	-47.3	-57.3	-67.3	-72.3	-92.3
Elevation at bottom of layer (ft, NAVD)	-9.3	-29.8	-47.3	-57.3	-67.3	-72.3	-92.3	-122.3
Design Water Table Elevation (ft, NAVD)	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7
Soil Layer Type (Cohesionless, Cohesive, Rock)	Cohesive	Cohesionless	Cohesionless	Cohesionless	Rock	Cohesionless	Rock	Rock
USCS Soil Layer Type (GW, SP, SP-SM, SM, SC, ML, CL, CH, NA)	ML	SP	SP	SP	N/A	SP	N/A	N/A
Average SPT N value (automatic), Blows/ ft	1	8	5	22	57	10	60	39
SOIL PROPERTIES FOR LATERAL SOIL MODEL:								
Lateral Soil Model	4(Matlock)	1 (O'Neill)	1 (O'Neill)	1 (O'Neill)	Limestone (McVay)	1 (O'Neill)	Limestone (McVay)	Limestone (McVay)
Internal Friction Angle, ϕ (degrees)	-----	30	30	35	-----	31	-----	-----
Subgrade Soil Modulus, RK (pci)	-----	26	14	81	-----	34	-----	-----
Unconfined Compressive Strength, qu (psf)	186	-----	-----	-----	33333	-----	33333	32240
Undrained Strength, C (psf)	93	-----	-----	-----	16667	-----	16667	16120
Strain @ 50% Failure, ϵ 50 (in/in)	0.027	-----	-----	-----	-----	-----	-----	-----
Strain @ 100% Failure, ϵ 100 (in/in)	0.082	-----	-----	-----	-----	-----	-----	-----
Total Unit Weight, γ_t (pcf)	101	112	105	115	125	112	125	125
Effective Unit Weight, γ_{eff} (pcf) ¹	0.0226	0.0287	0.0247	0.0304	0.0362	0.0287	0.0362	0.0362
SOIL PROPERTIES FOR THE AXIAL MODEL:								
Axial Soil Model	Drilled Shaft Clay	Drilled Shaft Sand	Drilled Shaft Sand	Drilled Shaft Sand	Drilled Shaft Limestone	Drilled Shaft Sand	Drilled Shaft Limestone	Drilled Shaft Limestone
Ultimate Unit Skin Friction, f _{smax} (psf)	51	630	460	1443	10000	1042	10000	9672
Undrained Strength, C (psf)	93	-----	-----	-----	16667	-----	16667	16120
Internal Friction Angle, ϕ (degrees)	-----	30	30	35	-----	31	-----	-----
Total Unit Weight, γ_t (pcf)	101	112	105	115	125	112	125	125
SOIL PROPERTIES FOR THE TORSIONAL MODEL:								
Torsional Soil Model	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic
Shear Modulus, G (ksi)	0.1	0.9	0.5	2.2	11.1	1.1	11.1	10.7
Torsional Shear Stress (psf)	36	441	322	1010	700	729	700	677
SOIL PROPERTIES FOR THE TIP MODEL:								
Tip Soil Model	Drilled Shaft Clay	Drilled Shaft Sand	Drilled Shaft Sand	Drilled Shaft Sand	Drilled Shaft Limestone	Drilled Shaft Sand	Drilled Shaft Limestone	Drilled Shaft Limestone
Uncorrected SPT N value (blows/ft) ²	-----	10	6	27	-----	12	-----	-----
Undrained Shear Strength at the tip elevation (psf)	93	-----	-----	-----	16667	-----	16667	16120

Notes:

- Effective unit weight assumes ground water table at ground surface.
- The uncorrected SPT N value (Tip Model) corresponds to the safety hammer (Safety = automatic X 1.24).
- Effective unit weight assumes ground water table at ground surface.
- As indicated in Section 3.3.8.B of the SDG, a high end bearing resistance needs to be established such that the shaft tip will not settle due to axial forces. Therefore, if needed, the soil parameters for Layer 5 or similar can be used in order to avoid shaft tip settlement per SDG.
- The lateral stability analysis will be performed by the Structural Engineer using FB-Multiplier, which takes into account group effects. FB-Multiplier uses the approach recommended by Brown and Reese (1988) and the P-Y multipliers used are consistent with AASHTO Table 10.7.2.4-1.
- This table does not account for scour.

Project Name: Broad Causeway Bridge
Project Number: B-22-074
Prepared by/ Date: AT/1/5/24
Checked by/ Date: PV 01/26/24

Boring Number: BB-05
Boring GSE (ft, NAVD): -5.3
Bridge No:
End Bent/Pier No.:
Station and Offset (Baseline): 126+43, 28 L

Summary of Recommended Soil Parameters for FB-Pier Analysis- DRILLED SHAFTS

Version 1.10 (Created By/ Date: ALA/09-18-15 & Checked By/Date: CJR/09-22-15)

ELEVATIONS AND SOIL TYPE:						
	Layer 1 0	Layer 2 10	Layer 3 32.5	Layer 4 52.5	Layer 5 87.5	Layer 6 100
Depth at top of layer (ft)	0	10	32.5	52.5	87.5	100
Depth at bottom of layer (ft)	10	32.5	52.5	87.5	100	125
Depth at design water table (ft)	-7	-7	-7	-7	-7	-7
Elevation at top of layer (ft, NAVD)	-5.3	-15.3	-37.8	-57.8	-92.8	-105.3
Elevation at bottom of layer (ft, NAVD)	-15.3	-37.8	-57.8	-92.8	-105.3	-130.3
Design Water Table Elevation (ft, NAVD)	1.7	1.7	1.7	1.7	1.7	1.7
Soil Layer Type (Cohesionless, Cohesive, Rock)	Cohesionless	Cohesionless	Cohesionless	Rock	Cohesionless	Cohesionless
USCS Soil Layer Type (GW, SP, SP-SM, SM, SC, ML, CL, CH, NA)	GW	GW	SP	N/A	GW	SP
Average SPT N value (automatic), Blows/ ft	37	15	7	60	22	18
SOIL PROPERTIES FOR LATERAL SOIL MODEL:						
Lateral Soil Model	1 (O'Neill)	1 (O'Neill)	1 (O'Neill)	Limestone (McVay)	1 (O'Neill)	1 (O'Neill)
Internal Friction Angle, ϕ (degrees)	40	38	30	-----	40	34
Subgrade Soil Modulus, RK (pci)	140	54	23	-----	81	66
Unconfined Compressive Strength, q_u (psf)	-----	-----	-----	33333	-----	-----
Undrained Strength, C (psf)	-----	-----	-----	16667	-----	-----
Strain @ 50% Failure, ϵ 50 (in/in)	-----	-----	-----	-----	-----	-----
Strain @ 100% Failure, ϵ 100 (in/in)	-----	-----	-----	-----	-----	-----
Total Unit Weight, γ_t (pcf)	125	115	112	125	115	115
Effective Unit Weight, γ_{eff} (pci) ¹	0.0362	0.0304	0.0287	0.0362	0.0304	0.0304
SOIL PROPERTIES FOR THE AXIAL MODEL:						
Axial Soil Model	Drilled Shaft Sand	Drilled Shaft Sand	Drilled Shaft Sand	Drilled Shaft Limestone	Drilled Shaft Sand	Drilled Shaft Sand
Ultimate Unit Skin Friction, f_{smax} (psf)	375	981	770	10000	1233	1479
Undrained Strength, C (psf)	-----	-----	-----	16667	-----	-----
Internal Friction Angle, ϕ (degrees)	40	38	30	-----	40	34
Total Unit Weight, γ_t (pcf)	125	115	112	125	115	115
SOIL PROPERTIES FOR THE TORSIONAL MODEL:						
Torsional Soil Model	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic
Shear Modulus, G (ksi)	3.5	1.6	0.8	11.1	2.2	1.8
Torsional Shear Stress (psf)	263	687	539	700	863	1036
SOIL PROPERTIES FOR THE TIP MODEL:						
Tip Soil Model	Drilled Shaft Sand	Drilled Shaft Sand	Drilled Shaft Sand	Drilled Shaft Limestone	Drilled Shaft Sand	Drilled Shaft Sand
Uncorrected SPT N value (blows/ft) ²	46	19	9	-----	27	22
Undrained Shear Strength at the tip elevation (psf)	-----	-----	-----	16667	-----	-----

Notes:

- Effective unit weight assumes ground water table at ground surface.
- The uncorrected SPT N value (Tip Model) corresponds to the safety hammer (Safety = automatic X 1.24).
- Effective unit weight assumes ground water table at ground surface.
- As indicated in Section 3.3.8.B of the SDG, a high end bearing resistance needs to be established such that the shaft tip will not settle due to axial forces. Therefore, if needed, the soil parameters for Layer 4 or similar can be used in order to avoid shaft tip settlement per SDG.
- The lateral stability analysis will be performed by the Structural Engineer using FB-Multiplier, which takes into account group effects. FB-Multiplier uses the approach recommended by Brown and Reese (1988) and the P-Y multipliers used are consistent with AASHTO Table 10.7.2.4-1.
- This table does not account for scour.

AREHNA Engineering, Inc.12296 Wiles Rd
Coral Springs, Florida 33076Project Name: **Broad Causeway Bridge**
Project Number: **B-22-074**
Prepared by/ Date: **AT/1/5/24**
Checked by/ Date: **PV 01/26/24**Boring Number: **BB-06**
Boring GSE (ft, NAVD): **-6.3**
Bridge No.:
End Bent/Pier No.:
Station and Offset (Baseline): **127+95, 15 LT****Summary of Recommended Soil Parameters for FB-Pier Analysis- DRILLED SHAFTS**

Version 1.10 (Created By/ Date: ALA/09-18-15 & Checked By/Date: CJR/09-22-15)

ELEVATIONS AND SOIL TYPE:								
	Layer 1	Layer 2	Layer 3	Layer 4	Layer 5	Layer 6	Layer 7	Layer 8
Depth at top of layer (ft)	0	16	22.5	40	57.5	67.5	80	112.5
Depth at bottom of layer (ft)	16	22.5	40	57.5	67.5	80	112.5	125
Depth at design water table (ft)	-8	-8	-8	-8	-8	-8	-8	-8
Elevation at top of layer (ft, NAVD)	-6.3	-22.3	-28.8	-46.3	-63.8	-73.8	-86.3	-118.8
Elevation at bottom of layer (ft, NAVD)	-22.3	-28.8	-46.3	-63.8	-73.8	-86.3	-118.8	-131.3
Design Water Table Elevation (ft, NAVD)	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Soil Layer Type (Cohesionless, Cohesive, Rock)	Cohesionless	Cohesionless	Cohesionless	Cohesionless	Rock	Cohesionless	Rock	Cohesionless
USCS Soil Layer Type (GW, SP, SP-SM, SM, SC, ML, CL, CH, NA)	GW	SP	SP	SP	N/A	SP	N/A	GW
Average SPT N value (automatic), Blows/ ft	23	9	8	11	60	9	41	16
SOIL PROPERTIES FOR LATERAL SOIL MODEL:								
Lateral Soil Model	1 (O'Neill)	1 (O'Neill)	1 (O'Neill)	1 (O'Neill)	Limestone (McVay)	1 (O'Neill)	Limestone (McVay)	1 (O'Neill)
Internal Friction Angle, ϕ (degrees)	40	31	30	31	-----	31	-----	38
Subgrade Soil Modulus, RK (pci)	85	30	26	38	-----	30	-----	58
Unconfined Compressive Strength, q_u (psf)	-----	-----	-----	-----	33333	-----	33333	-----
Undrained Strength, C (psf)	-----	-----	-----	-----	16667	-----	16667	-----
Strain @ 50% Failure, ϵ 50 (in/in)	-----	-----	-----	-----	-----	-----	-----	-----
Strain @ 100% Failure, ϵ 100 (in/in)	-----	-----	-----	-----	-----	-----	-----	-----
Total Unit Weight, γ_t (pcf)	120	112	112	112	125	112	125	115
Effective Unit Weight, γ_{eff} (pcf) ¹	0.0333	0.0287	0.0287	0.0287	0.0362	0.0287	0.0362	0.0304
SOIL PROPERTIES FOR THE AXIAL MODEL:								
Axial Soil Model	Drilled Shaft Sand	Drilled Shaft Sand	Drilled Shaft Sand	Drilled Shaft Sand	Drilled Shaft Limestone	Drilled Shaft Sand	Drilled Shaft Limestone	Drilled Shaft Sand
Ultimate Unit Skin Friction, f_{smax} (psf)	515	645	764	1226	10000	927	10000	1562
Undrained Strength, C (psf)	-----	-----	-----	-----	16667	-----	16667	-----
Internal Friction Angle, ϕ (degrees)	40	31	30	31	-----	31	-----	38
Total Unit Weight, γ_t (pcf)	120	112	112	112	125	112	125	115
SOIL PROPERTIES FOR THE TORSIONAL MODEL:								
Torsional Soil Model	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic
Shear Modulus, G (ksi)	2.3	1.0	0.9	1.2	11.1	1.0	11.1	1.6
Torsional Shear Stress (psf)	361	451	535	858	700	649	700	1093
SOIL PROPERTIES FOR THE TIP MODEL:								
Tip Soil Model	Drilled Shaft Sand	Drilled Shaft Sand	Drilled Shaft Sand	Drilled Shaft Sand	Drilled Shaft Limestone	Drilled Shaft Sand	Drilled Shaft Limestone	Drilled Shaft Sand
Uncorrected SPT N value (blows/ft) ²	29	11	10	14	-----	11	-----	20
Undrained Shear Strength at the tip elevation (psf)	-----	-----	-----	-----	16667	-----	16667	-----

Notes:

1. Effective unit weight assumes ground water table at ground surface.
2. The uncorrected SPT N value (Tip Model) corresponds to the safety hammer (Safety = automatic X 1.24).
3. Effective unit weight assumes ground water table at ground surface.
4. As indicated in Section 3.3.8.B of the SDG, a high end bearing resistance needs to be established such that the shaft tip will not settle due to axial forces. Therefore, if needed, the soil parameters for Layer 5 or similar can be used in order to avoid shaft tip settlement per SDG.
5. The lateral stability analysis will be performed by the Structural Engineer using FB-Multiplier, which takes into account group effects. FB-Multiplier uses the approach recommended by Brown and Reese (1988) and the P-Y multipliers used are consistent with AASHTO Table 10.7.2.4-1.
6. This table does not account for scour.

Project Name: Broad Causeway Bridge
Project Number: B-22-074
Prepared by/ Date: AT/1/5/24
Checked by/ Date: PV 01/26/24

Boring Number: BB-07
Boring GSE (ft, NAVD): -8.8
Bridge No:
End Bent/Pier No.:
Station and Offset (Baseline): 130+41, 38 ft

Summary of Recommended Soil Parameters for FB-Pier Analysis- DRILLED SHAFTS

Version 1.10 (Created By/ Date: ALA/09-18-15 & Checked By/Date: CJR/09-22-15)

ELEVATIONS AND SOIL TYPE:							
	Layer 1	Layer 2	Layer 3	Layer 4	Layer 5	Layer 6	Layer 7
Depth at top of layer (ft)	0	18	30	35	55	72.5	85
Depth at bottom of layer (ft)	18	30	35	55	72.5	85	125
Depth at design water table (ft)	-11.5	-11.5	-11.5	-11.5	-11.5	-11.5	-11.5
Elevation at top of layer (ft, NAVD)	-8.8	-26.8	-38.8	-43.8	-63.8	-81.3	-93.8
Elevation at bottom of layer (ft, NAVD)	-26.8	-38.8	-43.8	-63.8	-81.3	-93.8	-133.8
Design Water Table Elevation (ft, NAVD)	2.7	2.7	2.7	2.7	2.7	2.7	2.7
Soil Layer Type (Cohesionless, Cohesive, Rock)	Cohesionless	Cohesionless	Cohesionless	Cohesionless	Rock	Cohesionless	Rock
USCS Soil Layer Type (GW, SP, SP-SM, SM, SC, ML, CL, CH, NA)	GW	SP	SP	SP	N/A	GW	N/A
Average SPT N value (automatic), Blows/ ft	25	7	13	9	40	20	49
SOIL PROPERTIES FOR LATERAL SOIL MODEL:							
Lateral Soil Model	1 (O'Neill)	1 (O'Neill)	1 (O'Neill)	1 (O'Neill)	Limestone (McVay)	1 (O'Neill)	Limestone (McVay)
Internal Friction Angle, ϕ (degrees)	40	30	32	31	-----	39	-----
Subgrade Soil Modulus, RK (pci)	93	22	46	30	-----	73	-----
Unconfined Compressive Strength, q_u (psf)	-----	-----	-----	-----	33067	-----	33333
Undrained Strength, C (psf)	-----	-----	-----	-----	16533	-----	16667
Strain @ 50% Failure, ϵ 50 (in/in)	-----	-----	-----	-----	-----	-----	-----
Strain @ 100% Failure, ϵ 100 (in/in)	-----	-----	-----	-----	-----	-----	-----
Total Unit Weight, γ_t (pcf)	120	112	112	112	125	115	125
Effective Unit Weight, γ_{eff} (pcf) ¹	0.0333	0.0287	0.0287	0.0287	0.0362	0.0304	0.0362
SOIL PROPERTIES FOR THE AXIAL MODEL:							
Axial Soil Model	Drilled Shaft Sand	Drilled Shaft Sand	Drilled Shaft Sand	Drilled Shaft Sand	Drilled Shaft Limestone	Drilled Shaft Sand	Drilled Shaft Limestone
Ultimate Unit Skin Friction, f_{smax} (psf)	568	578	1177	987	9920	1251	10000
Undrained Strength, C (psf)	-----	-----	-----	-----	16533	-----	16667
Internal Friction Angle, ϕ (degrees)	40	30	32	31	-----	39	-----
Total Unit Weight, γ_t (pcf)	120	112	112	112	125	115	125
SOIL PROPERTIES FOR THE TORSIONAL MODEL:							
Torsional Soil Model	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic
Shear Modulus, G (ksi)	2.5	0.8	1.4	1.0	11.0	2.0	11.1
Torsional Shear Stress (psf)	397	404	824	691	694	876	700
SOIL PROPERTIES FOR THE TIP MODEL:							
Tip Soil Model	Drilled Shaft Sand	Drilled Shaft Sand	Drilled Shaft Sand	Drilled Shaft Sand	Drilled Shaft Limestone	Drilled Shaft Sand	Drilled Shaft Limestone
Uncorrected SPT N value (blows/ft) ²	31	9	16	11	-----	25	-----
Undrained Shear Strength at the tip elevation (psf)	-----	-----	-----	-----	16533	-----	16667

Notes:

1. Effective unit weight assumes ground water table at ground surface.
2. The uncorrected SPT N value (Tip Model) corresponds to the safety hammer (Safety = automatic X 1.24).
3. Effective unit weight assumes ground water table at ground surface.
4. As indicated in Section 3.3.8.B of the SDG, a high end bearing resistance needs to be established such that the shaft tip will not settle due to axial forces. Therefore, if needed, the soil parameters for Layer 5 or similar can be used in order to avoid shaft tip settlement per SDG.
5. The lateral stability analysis will be performed by the Structural Engineer using FB-Multiplier, which takes into account group effects. FB-Multiplier uses the approach recommended by Brown and Reese (1988) and the P-Y multipliers used are consistent with AASHTO Table 10.7.2.4-1.
6. This table does not account for scour.

AREHNA Engineering, Inc.12296 Wiles Rd
Coral Springs, Florida 33076Project Name: **Broad Causeway Bridge**Project Number: **B-22-074**Prepared by/ Date: **AT/1/5/24**Checked by/ Date: **PV 01/26/24**Boring Number: **BB-08**Boring GSE (ft, NAVD): **-8.6**Bridge No: End Bent/Pier No.: Station and Offset (Baseline): **132+19, 39 RT****Summary of Recommended Soil Parameters for FB-Pier Analysis- DRILLED SHAFTS**

Version 1.10 (Created By/ Date: ALA/09-18-15 & Checked By/Date: CJR/09-22-15)

ELEVATIONS AND SOIL TYPE:						
	Layer 1	Layer 2	Layer 3	Layer 4	Layer 5	Layer 6
Depth at top of layer (ft)	0	14	27.5	45	75	110
Depth at bottom of layer (ft)	14	27.5	45	75	110	125
Depth at design water table (ft)	-10.3	-10.3	-10.3	-10.3	-10.3	-10.3
Elevation at top of layer (ft, NAVD)	-8.6	-22.6	-36.1	-53.6	-83.6	-118.6
Elevation at bottom of layer (ft, NAVD)	-22.6	-36.1	-53.6	-83.6	-118.6	-133.6
Design Water Table Elevation (ft, NAVD)	1.7	1.7	1.7	1.7	1.7	1.7
Soil Layer Type (Cohesionless, Cohesive, Rock)	Cohesionless	Cohesionless	Cohesionless	Cohesionless	Rock	Cohesionless
USCS Soil Layer Type (GW, SP, SP-SM, SM, SC, ML, CL, CH, NA)	GW	SP	SP	SP	N/A	GW
Average SPT N value (automatic), Blows/ ft	36	10	6	9	55	32
SOIL PROPERTIES FOR LATERAL SOIL MODEL:						
Lateral Soil Model	1 (O'Neill)	1 (O'Neill)	1 (O'Neill)	1 (O'Neill)	Limestone (McVay)	1 (O'Neill)
Internal Friction Angle, ϕ (degrees)	40	31	30	31	-----	40
Subgrade Soil Modulus, RK (pci)	137	34	18	30	-----	121
Unconfined Compressive Strength, q_u (psf)	-----	-----	-----	-----	33333	-----
Undrained Strength, C (psf)	-----	-----	-----	-----	16667	-----
Strain @ 50% Failure, ϵ 50 (in/in)	-----	-----	-----	-----	-----	-----
Strain @ 100% Failure, ϵ 100 (in/in)	-----	-----	-----	-----	-----	-----
Total Unit Weight, γ_t (pcf)	125	112	105	112	125	125
Effective Unit Weight, γ_{eff} (pcf) ¹	0.0362	0.0287	0.0247	0.0287	0.0362	0.0362
SOIL PROPERTIES FOR THE AXIAL MODEL:						
Axial Soil Model	Drilled Shaft Sand	Drilled Shaft Sand	Drilled Shaft Sand	Drilled Shaft Sand	Drilled Shaft Limestone	Drilled Shaft Sand
Ultimate Unit Skin Friction, f_{smax} (psf)	501	753	526	1006	10000	1839
Undrained Strength, C (psf)	-----	-----	-----	-----	16667	-----
Internal Friction Angle, ϕ (degrees)	40	31	30	31	-----	40
Total Unit Weight, γ_t (pcf)	125	112	105	112	125	125
SOIL PROPERTIES FOR THE TORSIONAL MODEL:						
Torsional Soil Model	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic
Shear Modulus, G (ksi)	3.4	1.1	0.6	1.0	11.1	3.1
Torsional Shear Stress (psf)	351	527	368	704	700	1287
SOIL PROPERTIES FOR THE TIP MODEL:						
Tip Soil Model	Drilled Shaft Sand	Drilled Shaft Sand	Drilled Shaft Sand	Drilled Shaft Sand	Drilled Shaft Limestone	Drilled Shaft Sand
Uncorrected SPT N value (blows/ft) ²	45	12	7	11	-----	40
Undrained Shear Strength at the tip elevation (psf)	-----	-----	-----	-----	16667	-----

Notes:

- Effective unit weight assumes ground water table at ground surface.
- The uncorrected SPT N value (Tip Model) corresponds to the safety hammer (Safety = automatic X 1.24).
- Effective unit weight assumes ground water table at ground surface.
- As indicated in Section 3.3.8.B of the SDG, a high end bearing resistance needs to be established such that the shaft tip will not settle due to axial forces. Therefore, if needed, the soil parameters for Layer 5 or similar can be used in order to avoid shaft tip settlement per SDG.
- The lateral stability analysis will be performed by the Structural Engineer using FB-Multiplier, which takes into account group effects. FB-Multiplier uses the approach recommended by Brown and Reese (1988) and the P-Y multipliers used are consistent with AASHTO Table 10.7.2.4-1.
- This table does not account for scour.

AREHNA Engineering, Inc.

12296 Wiles Rd
Coral Springs, Florida 33076

Project Name: Broad Causeway Bridge
 Project Number: B-22-074
 Prepared by/ Date: AT/1/5/24
 Checked by/ Date: PV 01/26/24
 Boring Number: BB-09
 Boring GSE (ft, NAVD): -6.6
 Bridge No.:
 End Bent/Pier No.:
 Station and Offset (Baseline): 134+48, 25 LT

Summary of Recommended Soil Parameters for FB-Pier Analysis- DRILLED SHAFTS

Version 1.10 (Created By/ Date: ALA/09-18-15 & Checked By/Date: CJR/09-22-15)

ELEVATIONS AND SOIL TYPE:					
	Layer 1	Layer 2	Layer 3	Layer 4	Layer 5
Depth at top of layer (ft)	0	25	30	47.5	65
Depth at bottom of layer (ft)	25	30	47.5	65	125
Depth at design water table (ft)	-10.3	-10.3	-10.3	-10.3	-10.3
Elevation at top of layer (ft, NAVD)	-6.6	-31.6	-36.6	-54.1	-71.6
Elevation at bottom of layer (ft, NAVD)	-31.6	-36.6	-54.1	-71.6	-131.6
Design Water Table Elevation (ft, NAVD)	3.7	3.7	3.7	3.7	3.7
Soil Layer Type (Cohesionless, Cohesive, Rock)	Cohesionless	Cohesionless	Cohesionless	Cohesionless	Rock
USCS Soil Layer Type (GW, SP, SP-SM, SM, SC, ML, CL, CH, NA)	GW	GW	SP	SP	N/A
Average SPT N value (automatic), Blows/ ft	18	60	32	5	57
SOIL PROPERTIES FOR LATERAL SOIL MODEL:					
Lateral Soil Model	1 (O'Neill)	1 (O'Neill)	1 (O'Neill)	1 (O'Neill)	Limestone (McVay)
Internal Friction Angle, ϕ (degrees)	39	40	38	30	-----
Subgrade Soil Modulus, RK (pci)	66	185	121	14	-----
Unconfined Compressive Strength, q_u (psf)	-----	-----	-----	-----	33333
Undrained Strength, C (psf)	-----	-----	-----	-----	16667
Strain @ 50% Failure, ϵ 50 (in/in)	-----	-----	-----	-----	-----
Strain @ 100% Failure, ϵ 100 (in/in)	-----	-----	-----	-----	-----
Total Unit Weight, γ_t (pcf)	115	130	125	105	125
Effective Unit Weight, γ_{eff} (pcf) ¹	0.0304	0.0391	0.0362	0.0247	0.0362
SOIL PROPERTIES FOR THE AXIAL MODEL:					
Axial Soil Model	Drilled Shaft Sand	Drilled Shaft Sand	Drilled Shaft Sand	Drilled Shaft Sand	Drilled Shaft Limestone
Ultimate Unit Skin Friction, f_{smax} (psf)	672	1472	1600	483	10000
Undrained Strength, C (psf)	-----	-----	-----	-----	16667
Internal Friction Angle, ϕ (degrees)	39	40	38	30	-----
Total Unit Weight, γ_t (pcf)	115	130	125	105	125
SOIL PROPERTIES FOR THE TORSIONAL MODEL:					
Torsional Soil Model	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic
Shear Modulus, G (ksi)	1.8	4.3	3.1	0.5	11.1
Torsional Shear Stress (psf)	471	1031	1120	338	700
SOIL PROPERTIES FOR THE TIP MODEL:					
Tip Soil Model	Drilled Shaft Sand	Drilled Shaft Sand	Drilled Shaft Sand	Drilled Shaft Sand	Drilled Shaft Limestone
Uncorrected SPT N value (blows/ft) ²	22	60	40	6	-----
Undrained Shear Strength at the tip elevation (psf)	-----	-----	-----	-----	16667

Notes:

- Effective unit weight assumes ground water table at ground surface.
- The uncorrected SPT N value (Tip Model) corresponds to the safety hammer (Safety = automatic X 1.24).
- Effective unit weight assumes ground water table at ground surface.
- As indicated in Section 3.3.8.B of the SDG, a high end bearing resistance needs to be established such that the shaft tip will not settle due to axial forces. Therefore the soil parameters for Layer 5 or similar can be used in order to avoid shaft tip settlement per SDG.
- The lateral stability analysis will be performed by the Structural Engineer using FB-Multiplier, which takes into account group effects. FB-Multiplier uses the approach recommended by Brown and Reese (1988) and the P-Y multipliers used are consistent with AASHTO Table 10.7.2.4-1.
- This table does not account for scour.

AREHNA Engineering, Inc.12296 Wiles Rd
Coral Springs, Florida 33076Project Name: **Broad Causeway Bridge**Project Number: **B-22-074**Prepared by/ Date: **AT/1/5/24**Checked by/ Date: **PV 01/26/24**Boring Number: **BB-10**Boring GSE (ft, NAVD): **-7.1**Bridge No: End Bent/Pier No.: Station and Offset (Baseline): **136+34, 40 RT****Summary of Recommended Soil Parameters for FB-Pier Analysis- DRILLED SHAFTS**

Version 1.10 (Created By/ Date: ALA/09-18-15 & Checked By/Date: CJR/09-22-15)

ELEVATIONS AND SOIL TYPE:					
	Layer 1	Layer 2	Layer 3	Layer 4	Layer 5
Depth at top of layer (ft)	0	30	45	62.5	70
Depth at bottom of layer (ft)	30	45	62.5	70	125
Depth at design water table (ft)	-9.8	-9.8	-9.8	-9.8	-9.8
Elevation at top of layer (ft, NAVD)	-7.1	-37.1	-52.1	-69.6	-77.1
Elevation at bottom of layer (ft, NAVD)	-37.1	-52.1	-69.6	-77.1	-132.1
Design Water Table Elevation (ft, NAVD)	2.7	2.7	2.7	2.7	2.7
Soil Layer Type (Cohesionless, Cohesive, Rock)	Cohesionless	Cohesionless	Rock	Cohesionless	Rock
USCS Soil Layer Type (GW, SP, SP-SM, SM, SC, ML, CL, CH, NA)	GW	SP	N/A	GW	N/A
Average SPT N value (automatic), Blows/ ft	17	14	58	13	58
SOIL PROPERTIES FOR LATERAL SOIL MODEL:					
Lateral Soil Model	1 (O'Neill)	1 (O'Neill)	Limestone (McVay)	1 (O'Neill)	Limestone (McVay)
Internal Friction Angle, ϕ (degrees)	38	32	-----	37	-----
Subgrade Soil Modulus, RK (pci)	62	50	-----	46	-----
Unconfined Compressive Strength, q_u (psf)	-----	-----	33333	-----	33333
Undrained Strength, C (psf)	-----	-----	16667	-----	16667
Strain @ 50% Failure, ϵ 50 (in/in)	-----	-----	-----	-----	-----
Strain @ 100% Failure, ϵ 100 (in/in)	-----	-----	-----	-----	-----
Total Unit Weight, γ_t (pcf)	115	112	125	112	125
Effective Unit Weight, γ_{eff} (pcf) ¹	0.0304	0.0287	0.0362	0.0287	0.0362
SOIL PROPERTIES FOR THE AXIAL MODEL:					
Axial Soil Model	Drilled Shaft Sand	Drilled Shaft Sand	Drilled Shaft Limestone	Drilled Shaft Sand	Drilled Shaft Limestone
Ultimate Unit Skin Friction, f_{smax} (psf)	771	1252	10000	1318	10000
Undrained Strength, C (psf)	-----	-----	16667	-----	16667
Internal Friction Angle, ϕ (degrees)	38	32	-----	37	-----
Total Unit Weight, γ_t (pcf)	115	112	125	112	125
SOIL PROPERTIES FOR THE TORSIONAL MODEL:					
Torsional Soil Model	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic
Shear Modulus, G (ksi)	1.7	1.5	11.1	1.4	11.1
Torsional Shear Stress (psf)	540	877	700	923	700
SOIL PROPERTIES FOR THE TIP MODEL:					
Tip Soil Model	Drilled Shaft Sand	Drilled Shaft Sand	Drilled Shaft Limestone	Drilled Shaft Sand	Drilled Shaft Limestone
Uncorrected SPT N value (blows/ft) ²	21	17	-----	16	-----
Undrained Shear Strength at the tip elevation (psf)	-----	-----	16667	-----	16667

Notes:

1. Effective unit weight assumes ground water table at ground surface.
2. The uncorrected SPT N value (Tip Model) corresponds to the safety hammer (Safety = automatic X 1.24).
3. Effective unit weight assumes ground water table at ground surface.
4. As indicated in Section 3.3.8.B of the SDG, a high end bearing resistance needs to be established such that the shaft tip will not settle due to axial forces. There the soil parameters for Layer 5 or similar can be used in order to avoid shaft tip settlement per SDG.
5. The lateral stability analysis will be performed by the Structural Engineer using FB-Multiplier, which takes into account group effects. FB-Multiplier uses the approach recommended by Brown and Reese (1988) and the P-Y multipliers used are consistent with AASHTO Table 10.7.2.4-1.
6. This table does not account for scour.

AREHNA Engineering, Inc.12296 Wiles Rd
Coral Springs, Florida 33076

Project Name: Broad Causeway Bridge
 Project Number: B-22-074
 Prepared by/ Date: AT/1/5/24
 Checked by/ Date: PV 01/26/24

Boring Number: BB-11
 Boring GSE (ft, NAVD): -10.3
 Bridge No.:
 End Bent/Pier No.:
 Station and Offset (Baseline): 138+55, 34 LTY

Summary of Recommended Soil Parameters for FB-Pier Analysis- DRILLED SHAFTS

Version 1.10 (Created By/ Date: ALA/09-18-15 & Checked By/Date: CJR/09-22-15)

ELEVATIONS AND SOIL TYPE:						
	Layer 1	Layer 2	Layer 3	Layer 4	Layer 5	Layer 6
Depth at top of layer (ft)	0	25	35	45	62.5	107.5
Depth at bottom of layer (ft)	25	35	45	62.5	107.5	125
Depth at design water table (ft)	-14	-14	-14	-14	-14	-14
Elevation at top of layer (ft, NAVD)	-10.3	-35.3	-45.3	-55.3	-72.8	-117.8
Elevation at bottom of layer (ft, NAVD)	-35.3	-45.3	-55.3	-72.8	-117.8	-135.3
Design Water Table Elevation (ft, NAVD)	3.7	3.7	3.7	3.7	3.7	3.7
Soil Layer Type (Cohesionless, Cohesive, Rock)	Cohesionless	Cohesionless	Cohesionless	Rock	Rock	Cohesionless
USCS Soil Layer Type (GW, SP, SP-SM, SM, SC, ML, CL, CH, NA)	GW	SP	SP	N/A	N/A	GW
Average SPT N value (automatic), Blows/ ft	13	5	25	60	50	13
SOIL PROPERTIES FOR LATERAL SOIL MODEL:						
Lateral Soil Model	1 (O'Neill)	1 (O'Neill)	1 (O'Neill)	Limestone (McVay)	Limestone (McVay)	1 (O'Neill)
Internal Friction Angle, ϕ (degrees)	37	30	36	-----	-----	37
Subgrade Soil Modulus, RK (pci)	46	14	93	-----	-----	46
Unconfined Compressive Strength, q_u (psf)	-----	-----	-----	33333	33333	-----
Undrained Strength, C (psf)	-----	-----	-----	16667	16667	-----
Strain @ 50% Failure, ϵ 50 (in/in)	-----	-----	-----	-----	-----	-----
Strain @ 100% Failure, ϵ 100 (in/in)	-----	-----	-----	-----	-----	-----
Total Unit Weight, γ_t (pcf)	112	105	120	125	125	112
Effective Unit Weight, γ_{eff} (pcf) ¹	0.0287	0.0247	0.0333	0.0362	0.0362	0.0287
SOIL PROPERTIES FOR THE AXIAL MODEL:						
Axial Soil Model	Drilled Shaft Sand	Drilled Shaft Sand	Drilled Shaft Sand	Drilled Shaft Limestone	Drilled Shaft Limestone	Drilled Shaft Sand
Ultimate Unit Skin Friction, f_{smax} (psf)	634	402	1489	10000	10000	1442
Undrained Strength, C (psf)	-----	-----	-----	16667	16667	-----
Internal Friction Angle, ϕ (degrees)	37	30	36	-----	-----	37
Total Unit Weight, γ_t (pcf)	112	105	120	125	125	112
SOIL PROPERTIES FOR THE TORSIONAL MODEL:						
Torsional Soil Model	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic
Shear Modulus, G (ksi)	1.4	0.5	2.5	11.1	11.1	1.4
Torsional Shear Stress (psf)	444	281	1042	700	700	1009
SOIL PROPERTIES FOR THE TIP MODEL:						
Tip Soil Model	Drilled Shaft Sand	Drilled Shaft Sand	Drilled Shaft Sand	Drilled Shaft Limestone	Drilled Shaft Limestone	Drilled Shaft Sand
Uncorrected SPT N value (blows/ft) ²	16	6	31	-----	-----	16
Undrained Shear Strength at the tip elevation (psf)	-----	-----	-----	16667	16667	-----

Notes:

1. Effective unit weight assumes ground water table at ground surface.
2. The uncorrected SPT N value (Tip Model) corresponds to the safety hammer (Safety = automatic X 1.24).
3. Effective unit weight assumes ground water table at ground surface.
4. As indicated in Section 3.3.8.B of the SDG, a high end bearing resistance needs to be established such that the shaft tip will not settle due to axial forces. Therefore, if needed, the soil parameters for Layer 5 or similar can be used in order to avoid shaft tip settlement per SDG.
5. The lateral stability analysis will be performed by the Structural Engineer using FB-Multiplier, which takes into account group effects. FB-Multiplier uses the approach recommended by Brown and Reese (1988) and the P-Y multipliers used are consistent with AASHTO Table 10.7.2.4-1.
6. This table does not account for scour.

AREHNA Engineering, Inc.12296 Wiles Rd
Coral Springs, Florida 33076

Project Name:	Broad Causeway Bridge
Project Number:	B-22-074
Prepared by/ Date:	PV/11-09-23
Checked by/ Date:	RR/11-10-23
Boring Number:	BB-12
Boring GSE (ft, NAVD):	2.7
Bridge No:	
End Bent/Pier No.:	
Station and Offset (Baseline):	140+71, 32 RT

Summary of Recommended Soil Parameters for FB-Pier Analysis- DRILLED SHAFTS

Version 1.10 (Created By/ Date: ALA/09-18-15 & Checked By/Date: CJR/09-22-15)

ELEVATIONS AND SOIL TYPE:								
	Layer 1	Layer 2	Layer 3	Layer 4	Layer 5	Layer 6	Layer 7	Layer 8
Depth at top of layer (ft)	0	16	37.5	65	77.5	85	95	100
Depth at bottom of layer (ft)	16	37.5	65	77.5	85	95	100	125
Depth at design water table (ft)	0	0	0	0	0	0	0	0
Elevation at top of layer (ft, NAVD)	2.7	-13.3	-34.8	-62.3	-74.8	-82.3	-92.3	-97.3
Elevation at bottom of layer (ft, NAVD)	-13.3	-34.8	-62.3	-74.8	-82.3	-92.3	-97.3	-122.3
Design Water Table Elevation (ft, NAVD)	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7
Soil Layer Type (Cohesionless, Cohesive, Rock)	Cohesive	Cohesionless	Cohesionless	Rock	Cohesionless	Rock	Cohesionless	Rock
USCS Soil Layer Type (GW, SP, SP-SM, SM, SC, ML, CL, CH, NA)	ML	SP	SP	N/A	SP	N/A	SP	N/A
Average SPT N value (automatic), Blows/ ft	1	8	19	45	17	40	11	54
SOIL PROPERTIES FOR LATERAL SOIL MODEL:								
Lateral Soil Model	4(Matlock)	1 (O'Neill)	1 (O'Neill)	Limestone (McVay)	1 (O'Neill)	Limestone (McVay)	1 (O'Neill)	Limestone (McVay)
Internal Friction Angle, ϕ (degrees)	-----	30	34	-----	33	-----	31	-----
Subgrade Soil Modulus, RK (pci)	-----	26	69	-----	62	-----	38	-----
Unconfined Compressive Strength, q_u (psf)	186	-----	-----	33333	-----	33067	-----	33333
Undrained Strength, C (psf)	93	-----	-----	16667	-----	16533	-----	16667
Strain @ 50% Failure, ϵ 50 (in/in)	0.027	-----	-----	-----	-----	-----	-----	-----
Strain @ 100% Failure, ϵ 100 (in/in)	0.082	-----	-----	-----	-----	-----	-----	-----
Total Unit Weight, γ_t (pcf)	101	112	115	125	115	125	112	125
Effective Unit Weight, γ_{eff} (pcf) ¹	0.0226	0.0287	0.0304	0.0362	0.0304	0.0362	0.0287	0.0362
SOIL PROPERTIES FOR THE AXIAL MODEL:								
Axial Soil Model	Drilled Shaft Clay	Drilled Shaft Sand	Drilled Shaft Sand	Drilled Shaft Limestone	Drilled Shaft Sand	Drilled Shaft Limestone	Drilled Shaft Sand	Drilled Shaft Limestone
Ultimate Unit Skin Friction, f_{smax} (psf)	51	704	1438	10000	1210	9920	1099	10000
Undrained Strength, C (psf)	93	-----	-----	16667	-----	16533	-----	16667
Internal Friction Angle, ϕ (degrees)	-----	30	34	-----	33	-----	31	-----
Total Unit Weight, γ_t (pcf)	101	112	115	125	115	125	112	125
SOIL PROPERTIES FOR THE TORSIONAL MODEL:								
Torsional Soil Model	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic
Shear Modulus, G (ksi)	0.1	0.9	1.9	11.1	1.7	11.0	1.2	11.1
Torsional Shear Stress (psf)	36	492	1007	700	847	694	770	700
SOIL PROPERTIES FOR THE TIP MODEL:								
Tip Soil Model	Drilled Shaft Clay	Drilled Shaft Sand	Drilled Shaft Sand	Drilled Shaft Limestone	Drilled Shaft Sand	Drilled Shaft Limestone	Drilled Shaft Sand	Drilled Shaft Limestone
Uncorrected SPT N value (blows/ft) ²	-----	10	24	-----	21	-----	14	-----
Undrained Shear Strength at the tip elevation (psf)	93	-----	-----	16667	-----	16533	-----	16667

Notes:

1. Effective unit weight assumes ground water table at ground surface.
2. The uncorrected SPT N value (Tip Model) corresponds to the safety hammer (Safety = automatic X 1.24).
3. Effective unit weight assumes ground water table at ground surface.
4. As indicated in Section 3.3.8.B of the SDG, a high end bearing resistance needs to be established such that the shaft tip will not settle due to axial forces. Therefore, if needed, the soil parameters for Layer 6 or similar can be used in order to avoid shaft tip settlement per SDG.
5. The lateral stability analysis will be performed by the Structural Engineer using FB-Multiplier, which takes into account group effects. FB-Multiplier uses the approach recommended by Brown and Reese (1988) and the P-Y multipliers used are consistent with AASHTO Table 10.7.2.4-1.
6. This table does not account for scour.

Analysis of Existing 18-inch PSCP

General Information:

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Input file: Existing Piles\BB-04_Driven_Void=-20.5ft_Existing 18in pile.in
Project number: B-22-074
Job name: Broad Causeway Bridge
Engineer: PV/TC
Units: English

Analysis Information:

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Analysis Type: SPT

Soil Information:

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Boring date: 3/28/2023, Boring Number: BB-04
Station number: 123+79 Offset: +35

Ground Elevation: 2.700(ft)

Hammer type: Automatic Hammer, Correction factor = 1.24

ID	Depth (ft)	No. of Blows (Blows/ft)	Soil Type

1	0.00	9.00	5- Cavity layer
2	2.00	9.00	5- Cavity layer
3	4.00	4.00	5- Cavity layer
4	6.00	2.00	5- Cavity layer
5	8.00	3.00	5- Cavity layer
6	10.00	1.00	5- Cavity layer
7	12.00	2.00	5- Cavity layer
8	12.00	20.00	5- Cavity layer
9	14.00	20.00	5- Cavity layer
10	16.00	26.00	5- Cavity layer
11	18.20	15.00	5- Cavity layer
12	18.20	15.00	5- Cavity layer
13	20.00	15.00	5- Cavity layer
14	22.50	18.00	5- Cavity layer
15	23.20	0.00	5- Cavity layer
16	23.20	17.00	4- Lime Stone/Very shelly sand
17	25.00	17.00	4- Lime Stone/Very shelly sand
18	27.50	13.00	4- Lime Stone/Very shelly sand
19	30.00	18.00	4- Lime Stone/Very shelly sand
20	32.50	9.00	4- Lime Stone/Very shelly sand
21	32.50	0.00	1- Plastic Clay

"BB-04_Driven_Void=-20.5ft_Existing 18in pile.out"

Bottom of Canal Elev = -15.5'

Assumed 5' of preforming to
elev= -20.5'

No pile driving
records of existing
piles. Plans do not
show recommended
preforming
elevations. Assumed
no preforming for this
analysis.

22	32.50	8.00	4- Lime Stone/Very shelly sand
23	35.00	8.00	4- Lime Stone/Very shelly sand
24	37.50	9.00	4- Lime Stone/Very shelly sand
25	40.00	4.00	4- Lime Stone/Very shelly sand
26	40.00	0.00	1- Plastic Clay
27	40.00	2.00	3- Clean sand
28	42.50	2.00	3- Clean sand
29	45.00	1.00	3- Clean sand
30	47.50	6.00	3- Clean sand
31	50.00	5.00	3- Clean sand
32	50.00	0.00	1- Plastic Clay
33	50.00	14.00	3- Clean sand
34	52.50	14.00	3- Clean sand
35	55.00	36.00	3- Clean sand
36	55.00	0.00	1- Plastic Clay
37	55.00	22.00	4- Lime Stone/Very shelly sand
38	57.50	22.00	4- Lime Stone/Very shelly sand
39	60.00	19.00	4- Lime Stone/Very shelly sand
40	60.00	0.00	1- Plastic Clay
41	60.00	100.00	4- Lime Stone/Very shelly sand
42	62.50	100.00	4- Lime Stone/Very shelly sand
43	65.00	100.00	4- Lime Stone/Very shelly sand
44	67.50	100.00	4- Lime Stone/Very shelly sand
45	70.00	51.00	4- Lime Stone/Very shelly sand
46	70.00	0.00	1- Plastic Clay
47	70.00	20.00	4- Lime Stone/Very shelly sand
48	72.50	20.00	4- Lime Stone/Very shelly sand
49	72.50	0.00	1- Plastic Clay
50	72.50	1.00	4- Lime Stone/Very shelly sand
51	75.00	1.00	4- Lime Stone/Very shelly sand
52	75.00	0.00	1- Plastic Clay
53	75.00	87.00	4- Lime Stone/Very shelly sand
54	77.50	87.00	4- Lime Stone/Very shelly sand
55	80.00	84.00	4- Lime Stone/Very shelly sand
56	82.50	85.00	4- Lime Stone/Very shelly sand
57	85.00	85.00	4- Lime Stone/Very shelly sand
58	87.50	100.00	4- Lime Stone/Very shelly sand
59	90.00	65.00	4- Lime Stone/Very shelly sand
60	92.50	99.00	4- Lime Stone/Very shelly sand
61	95.00	99.00	4- Lime Stone/Very shelly sand
62	95.00	0.00	1- Plastic Clay
63	95.00	27.00	4- Lime Stone/Very shelly sand
64	97.50	27.00	4- Lime Stone/Very shelly sand
65	100.00	19.00	4- Lime Stone/Very shelly sand
66	100.00	0.00	1- Plastic Clay
67	100.00	100.00	4- Lime Stone/Very shelly sand
68	102.50	100.00	4- Lime Stone/Very shelly sand
69	105.00	100.00	4- Lime Stone/Very shelly sand
70	105.00	0.00	1- Plastic Clay
71	105.00	43.00	4- Lime Stone/Very shelly sand
72	107.50	43.00	4- Lime Stone/Very shelly sand
73	107.50	0.00	1- Plastic Clay

"BB-04_Driven_Void=-20.5ft_Existing 18in pile.out"

74	107.50	20.00	4- Lime Stone/Very shelly sand
75	110.00	20.00	4- Lime Stone/Very shelly sand
76	110.00	0.00	1- Plastic Clay
77	110.00	2.00	4- Lime Stone/Very shelly sand
78	112.50	2.00	4- Lime Stone/Very shelly sand
79	112.50	0.00	1- Plastic Clay
80	112.50	100.00	4- Lime Stone/Very shelly sand
81	115.00	100.00	4- Lime Stone/Very shelly sand
82	115.00	0.00	1- Plastic Clay
83	115.00	17.00	4- Lime Stone/Very shelly sand
84	117.50	17.00	4- Lime Stone/Very shelly sand
85	117.50	0.00	1- Plastic Clay
86	117.50	50.00	4- Lime Stone/Very shelly sand
87	120.00	50.00	4- Lime Stone/Very shelly sand
88	122.50	99.00	4- Lime Stone/Very shelly sand
89	125.00	76.00	4- Lime Stone/Very shelly sand

Blowcount Average Per Soil Layer

Layer Num.	Starting Elevation (ft)	Bottom Elevation (ft)	Thickness (ft)	Average Blowcount (Blows/ft)	Soil Type

1	2.70	-20.50	23.20	11.65	5-Void
2	-20.50	-29.80	9.30	16.19	4-Limestone, Very
Shelly Sand					
3	-29.80	-29.80	0.00	8.00	1-Plastic Clay
4	-29.80	-37.30	7.50	8.33	4-Limestone, Very
Shelly Sand					
5	-37.30	-37.30	0.00	2.00	1-Plastic Clay
6	-37.30	-47.30	10.00	2.75	3-Clean Sand
7	-47.30	-47.30	0.00	14.00	1-Plastic Clay
8	-47.30	-52.30	5.00	14.00	3-Clean Sand
9	-52.30	-52.30	0.00	22.00	1-Plastic Clay
10	-52.30	-57.30	5.00	22.00	4-Limestone, Very
Shelly Sand					
11	-57.30	-57.30	0.00	100.00	1-Plastic Clay
12	-57.30	-67.30	10.00	100.00	4-Limestone, Very
Shelly Sand					
13	-67.30	-67.30	0.00	20.00	1-Plastic Clay
14	-67.30	-69.80	2.50	20.00	4-Limestone, Very
Shelly Sand					
15	-69.80	-69.80	0.00	1.00	1-Plastic Clay
16	-69.80	-72.30	2.50	1.00	4-Limestone, Very
Shelly Sand					
17	-72.30	-72.30	0.00	87.00	1-Plastic Clay
18	-72.30	-92.30	20.00	86.50	4-Limestone, Very
Shelly Sand					

"BB-04_Driven_Void=-20.5ft_Existing 18in pile.out"

19	-92.30	-92.30	0.00	27.00	1-Plastic Clay
20	-92.30	-97.30	5.00	27.00	4-Limestone, Very
Shelly Sand					
21	-97.30	-97.30	0.00	100.00	1-Plastic Clay
22	-97.30	-102.30	5.00	100.00	4-Limestone, Very
Shelly Sand					
23	-102.30	-102.30	0.00	43.00	1-Plastic Clay
24	-102.30	-104.80	2.50	43.00	4-Limestone, Very
Shelly Sand					
25	-104.80	-104.80	0.00	20.00	1-Plastic Clay
26	-104.80	-107.30	2.50	20.00	4-Limestone, Very
Shelly Sand					
27	-107.30	-107.30	0.00	2.00	1-Plastic Clay
28	-107.30	-109.80	2.50	2.00	4-Limestone, Very
Shelly Sand					
29	-109.80	-109.80	0.00	100.00	1-Plastic Clay
30	-109.80	-112.30	2.50	100.00	4-Limestone, Very
Shelly Sand					
31	-112.30	-112.30	0.00	17.00	1-Plastic Clay
32	-112.30	-114.80	2.50	17.00	4-Limestone, Very
Shelly Sand					
33	-114.80	-114.80	0.00	50.00	1-Plastic Clay
34	-114.80	-122.30	7.50	66.33	4-Limestone, Very
Shelly Sand					

Driven Pile Data:

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Pile unit weight = 150.00(pcf), Section Type: Square

Pile Geometry:

Width (in)	Length (ft)	Tip Elev. (ft)

18.00	5.00	-2.30
18.00	6.00	-3.30
18.00	7.00	-4.30
18.00	8.00	-5.30
18.00	9.00	-6.30
18.00	10.00	-7.30
18.00	11.00	-8.30
18.00	12.00	-9.30
18.00	13.00	-10.30
18.00	14.00	-11.30
18.00	15.00	-12.30
18.00	16.00	-13.30
18.00	17.00	-14.30
18.00	18.00	-15.30
18.00	19.00	-16.30
18.00	20.00	-17.30
18.00	21.00	-18.30

"BB-04_Driven_Void=-20.5ft_Existing 18in pile.out"

18.00	22.00	-19.30
18.00	23.00	-20.30
18.00	24.00	-21.30
18.00	25.00	-22.30
18.00	26.00	-23.30
18.00	27.00	-24.30
18.00	28.00	-25.30
18.00	29.00	-26.30
18.00	30.00	-27.30
18.00	31.00	-28.30
18.00	32.00	-29.30
18.00	33.00	-30.30
18.00	34.00	-31.30
18.00	35.00	-32.30
18.00	36.00	-33.30
18.00	37.00	-34.30
18.00	38.00	-35.30
18.00	39.00	-36.30
18.00	40.00	-37.30
18.00	41.00	-38.30
18.00	42.00	-39.30
18.00	43.00	-40.30
18.00	44.00	-41.30
18.00	45.00	-42.30
18.00	46.00	-43.30
18.00	47.00	-44.30
18.00	48.00	-45.30
18.00	49.00	-46.30
18.00	50.00	-47.30
18.00	51.00	-48.30
18.00	52.00	-49.30
18.00	53.00	-50.30
18.00	54.00	-51.30
18.00	55.00	-52.30
18.00	56.00	-53.30
18.00	57.00	-54.30
18.00	58.00	-55.30
18.00	59.00	-56.30
18.00	60.00	-57.30
18.00	61.00	-58.30
18.00	62.00	-59.30
18.00	63.00	-60.30
18.00	64.00	-61.30
18.00	65.00	-62.30

Driven Pile Capacity:
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"BB-04_Driven_Void=-20.5ft_Existing 18in pile.out"

Section Type: Square
Pile Width: 18.00 (in)

Test Pile Length (ft)	Pile Width (in)	Ultimate Side Friction (tons)	Mobilized End Bearing (tons)	Estimated Davisson Capacity (tons)	Allowable Pile Capacity (tons)	Ultimate Pile Capacity (tons)
5.00	18.0	0.00	0.00	0.00	0.00	0.00
6.00	18.0	0.00	0.00	0.00	0.00	0.00
7.00	18.0	0.00	0.00	0.00	0.00	0.00
8.00	18.0	0.00	0.00	0.00	0.00	0.00
9.00	18.0	0.00	0.00	0.00	0.00	0.00
10.00	18.0	0.00	0.00	0.00	0.00	0.00
11.00	18.0	0.00	0.00	0.00	0.00	0.00
12.00	18.0	0.00	0.00	0.00	0.00	0.00
13.00	18.0	0.00	0.00	0.00	0.00	0.00
14.00	18.0	0.00	0.00	0.00	0.00	0.00
15.00	18.0	0.00	0.00	0.00	0.00	0.00
16.00	18.0	0.00	0.00	0.00	0.00	0.00
17.00	18.0	0.00	0.00	0.00	0.00	0.00
18.00	18.0	0.00	0.00	0.00	0.00	0.00
19.00	18.0	0.00	0.00	0.00	0.00	0.00
20.00	18.0	0.00	0.00	0.00	0.00	0.00
21.00	18.0	0.00	0.00	0.00	0.00	0.00
22.00	18.0	0.00	0.00	0.00	0.00	0.00
23.00	18.0	0.00	0.00	0.00	0.00	0.00
24.00	18.0	1.01	36.52	37.54	18.77	110.58
25.00	18.0	2.28	36.21	38.49	19.24	110.91
26.00	18.0	3.48	34.75	38.23	19.12	107.73
27.00	18.0	4.57	32.47	37.03	18.52	101.97
28.00	18.0	5.57	30.28	35.85	17.92	96.41
29.00	18.0	6.68	27.44	34.13	17.06	89.02
30.00	18.0	7.95	23.85	31.80	15.90	79.50
31.00	18.0	9.15	20.74	29.89	14.95	71.37
32.00	18.0	10.09	19.14	29.24	14.62	67.52
33.00	18.0	10.76	18.38	29.14	14.57	65.90
34.00	18.0	11.35	17.23	28.58	14.29	63.04
35.00	18.0	11.95	14.20	26.15	13.07	54.55
36.00	18.0	12.56	11.09	23.65	11.83	45.84
37.00	18.0	13.20	7.83	21.03	10.51	36.69
38.00	18.0	13.85	4.52	18.37	9.18	27.42
39.00	18.0	14.37	1.88	16.24	8.12	19.99
40.00	18.0	14.74	11.90	26.64	13.32	50.43
41.00	18.0	14.74	10.94	25.68	12.84	47.57
42.00	18.0	14.74	10.46	25.20	12.60	46.11
43.00	18.0	14.74	10.51	25.25	12.62	46.27
44.00	18.0	14.74	10.84	25.58	12.79	47.27
45.00	18.0	14.74	12.00	26.74	13.37	50.73
46.00	18.0	14.88	14.03	28.92	14.46	56.98

"BB-04_Driven_Void=-20.5ft_Existing 18in pile.out"

47.00	18.0	15.28	16.44	31.72	15.86	64.60
48.00	18.0	15.87	19.75	35.61	17.81	75.11
49.00	18.0	16.39	26.10	42.49	21.25	94.70
50.00	18.0	17.74	32.67	50.41	25.20	115.74
51.00	18.0	19.60	32.83	52.43	26.21	118.08
52.00	18.0	21.25	33.34	54.59	27.30	121.26
53.00	18.0	22.87	34.24	57.11	28.56	125.59
54.00	18.0	25.47	35.08	60.55	30.28	130.71
55.00	18.0	31.53	85.67	117.19	58.60	288.52
56.00	18.0	33.16	119.83	153.00	76.50	392.66
57.00	18.0	34.80	154.00	188.80	94.40	496.80
58.00	18.0	36.42	188.23	224.66	112.33	601.13
59.00	18.0	37.97	222.93	260.90	130.45	706.75
60.00	18.0	39.43	258.14	297.57	148.79	813.86
61.00	18.0	45.43	258.14	303.57	151.79	819.86
62.00	18.0	51.43	257.17	308.60	154.30	822.93
63.00	18.0	57.43	249.37	306.80	153.40	805.53
64.00	18.0	63.43	233.76	297.19	148.60	764.71
65.00	18.0	69.43	198.72	268.15	134.07	665.58

↓ @-52.3', 45 tons available
(allowable capacity)

NOTES

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1. MOBILIZED END BEARING IS 1/3 OF THE ORIGINAL RB-121 VALUES.
 2. DAVISSON PILE CAPACITY IS AN ESTIMATE BASED ON FAILURE CRITERIA, AND EQUALS ULTIMATE SIDE FRICTION PLUS MOBILIZED END BEARING.
 3. ALLOWABLE PILE CAPACITY IS 1/2 THE DAVISSON PILE CAPACITY.
 4. ULTIMATE PILE CAPACITY IS ULTIMATE SIDE FRICTION PLUS 3 x THE MOBILIZED END BEARING.
EXCEPTION: FOR H-PILES TIPPED IN SAND OR LIMESTONE, THE ULTIMATE PILE CAPACITY IS ULTIMATE SIDE FRICTION PLUS 2 x THE MOBILIZED END BEARING.

"BB-04_Driven_Void=-20.5ft_Existing 18in pile.out"

General Information:

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Input file: Existing Piles\BB-12_Driven_Void=-20.5ft_Existing 18in Pile.in
Project number: B-22-074
Job name: Broad Causeway Bridge
Engineer: PV/TC
Units: English

Analysis Information:

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Analysis Type: SPT

Soil Information:

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Boring date: 3/29/2023, Boring Number: BB-12
Station number: 140+71 Offset: +32

Ground Elevation: 2.700(ft)

Hammer type: Automatic Hammer, Correction factor = 1.24

ID	Depth (ft)	No. of Blows (Blows/ft)	Soil Type
1	0.00	13.00	5- Cavity layer
2	2.00	13.00	5- Cavity layer
3	4.00	4.00	5- Cavity layer
4	6.00	3.00	5- Cavity layer
5	8.00	1.00	5- Cavity layer
6	10.00	1.00	5- Cavity layer
7	12.00	1.00	5- Cavity layer
8	14.00	1.00	5- Cavity layer
9	16.00	1.00	5- Cavity layer
10	18.20	15.00	5- Cavity layer
11	18.20	15.00	5- Cavity layer
12	20.00	15.00	5- Cavity layer
13	22.50	18.00	5- Cavity layer
14	23.20	25.00	5- Cavity layer
15	23.20	25.00	4- Lime Stone/Very shelly sand
16	25.00	25.00	4- Lime Stone/Very shelly sand
17	27.50	21.00	4- Lime Stone/Very shelly sand
18	30.00	16.00	4- Lime Stone/Very shelly sand
19	32.50	21.00	4- Lime Stone/Very shelly sand
20	32.50	0.00	1- Plastic Clay
21	32.50	12.00	4- Lime Stone/Very shelly sand

"BB-12_Driven_Void=-20.5ft_Existing 18in Pile.out"

Bottom of Canal Elev = -15.5'

Assumed 5' of preforming to
elev= -20.5'

No pile driving
records of existing
piles. Plans do not
show recommended
preforming
elevations. Assumed
no preforming for this
analysis.

22	35.00	12.00	4- Lime Stone/Very shelly sand
23	37.50	8.00	4- Lime Stone/Very shelly sand
24	37.50	0.00	1- Plastic Clay
25	37.50	8.00	3- Clean sand
26	40.00	8.00	3- Clean sand
27	42.50	10.00	3- Clean sand
28	45.00	15.00	3- Clean sand
29	47.50	15.00	3- Clean sand
30	47.50	0.00	1- Plastic Clay
31	47.50	22.00	3- Clean sand
32	50.00	22.00	3- Clean sand
33	52.50	17.00	3- Clean sand
34	52.50	0.00	1- Plastic Clay
35	52.50	44.00	3- Clean sand
36	55.00	44.00	3- Clean sand
37	55.00	0.00	1- Plastic Clay
38	55.00	22.00	3- Clean sand
39	57.50	22.00	3- Clean sand
40	60.00	28.00	3- Clean sand
41	62.50	17.00	3- Clean sand
42	65.00	14.00	3- Clean sand
43	65.00	0.00	1- Plastic Clay
44	65.00	38.00	4- Lime Stone/Very shelly sand
45	67.50	38.00	4- Lime Stone/Very shelly sand
46	67.50	0.00	1- Plastic Clay
47	67.50	100.00	4- Lime Stone/Very shelly sand
48	70.00	100.00	4- Lime Stone/Very shelly sand
49	70.00	0.00	1- Plastic Clay
50	70.00	28.00	4- Lime Stone/Very shelly sand
51	72.50	28.00	4- Lime Stone/Very shelly sand
52	75.00	43.00	4- Lime Stone/Very shelly sand
53	75.00	0.00	1- Plastic Clay
54	75.00	100.00	4- Lime Stone/Very shelly sand
55	77.50	100.00	4- Lime Stone/Very shelly sand
56	77.50	0.00	1- Plastic Clay
57	77.50	7.00	4- Lime Stone/Very shelly sand
58	80.00	7.00	4- Lime Stone/Very shelly sand
59	80.00	0.00	1- Plastic Clay
60	80.00	14.00	3- Clean sand
61	82.50	14.00	3- Clean sand
62	82.50	0.00	1- Plastic Clay
63	82.50	31.00	3- Clean sand
64	85.00	31.00	3- Clean sand
65	85.00	0.00	1- Plastic Clay
66	85.00	28.00	4- Lime Stone/Very shelly sand
67	87.50	28.00	4- Lime Stone/Very shelly sand
68	90.00	45.00	4- Lime Stone/Very shelly sand
69	90.00	0.00	1- Plastic Clay
70	90.00	76.00	4- Lime Stone/Very shelly sand
71	92.50	76.00	4- Lime Stone/Very shelly sand
72	92.50	0.00	1- Plastic Clay
73	92.50	30.00	4- Lime Stone/Very shelly sand

"BB-12_Driven_Void=-20.5ft_Existing 18in Pile.out"

74	95.00	30.00	4- Lime Stone/Very shelly sand
75	95.00	0.00	1- Plastic Clay
76	95.00	4.00	4- Lime Stone/Very shelly sand
77	97.50	4.00	4- Lime Stone/Very shelly sand
78	97.50	0.00	1- Plastic Clay
79	97.50	19.00	4- Lime Stone/Very shelly sand
80	100.00	19.00	4- Lime Stone/Very shelly sand
81	100.00	0.00	1- Plastic Clay
82	100.00	41.00	4- Lime Stone/Very shelly sand
83	102.50	41.00	4- Lime Stone/Very shelly sand
84	102.50	0.00	1- Plastic Clay
85	102.50	100.00	4- Lime Stone/Very shelly sand
86	105.00	100.00	4- Lime Stone/Very shelly sand
87	107.50	100.00	4- Lime Stone/Very shelly sand
88	110.00	100.00	4- Lime Stone/Very shelly sand
89	112.50	86.00	4- Lime Stone/Very shelly sand
90	115.00	100.00	4- Lime Stone/Very shelly sand
91	117.50	100.00	4- Lime Stone/Very shelly sand
92	120.00	77.00	4- Lime Stone/Very shelly sand
93	120.00	0.00	1- Plastic Clay
94	120.00	28.00	4- Lime Stone/Very shelly sand
95	122.50	28.00	4- Lime Stone/Very shelly sand
96	122.50	0.00	1- Plastic Clay
97	122.50	57.00	4- Lime Stone/Very shelly sand
98	125.00	57.00	4- Lime Stone/Very shelly sand

Blowcount Average Per Soil Layer

Layer Num.	Starting Elevation (ft)	Bottom Elevation (ft)	Thickness (ft)	Average Blowcount (Blows/ft)	Soil Type

1	2.70	-20.50	23.20	6.61	5-Void
2	-20.50	-29.80	9.30	21.51	4-Limestone, Very
Shelly Sand					
3	-29.80	-29.80	0.00	12.00	1-Plastic Clay
4	-29.80	-34.80	5.00	12.00	4-Limestone, Very
Shelly Sand					
5	-34.80	-34.80	0.00	8.00	1-Plastic Clay
6	-34.80	-44.80	10.00	10.25	3-Clean Sand
7	-44.80	-44.80	0.00	22.00	1-Plastic Clay
8	-44.80	-49.80	5.00	22.00	3-Clean Sand
9	-49.80	-49.80	0.00	44.00	1-Plastic Clay
10	-49.80	-52.30	2.50	44.00	3-Clean Sand
11	-52.30	-52.30	0.00	22.00	1-Plastic Clay
12	-52.30	-62.30	10.00	22.25	3-Clean Sand
13	-62.30	-62.30	0.00	38.00	1-Plastic Clay
14	-62.30	-64.80	2.50	38.00	4-Limestone, Very

"BB-12_Driven_Void=-20.5ft_Existing 18in Pile.out"

Shelly Sand	15	-64.80	-64.80	0.00	100.00	1-Plastic Clay
	16	-64.80	-67.30	2.50	100.00	4-Limestone, Very
Shelly Sand	17	-67.30	-67.30	0.00	28.00	1-Plastic Clay
	18	-67.30	-72.30	5.00	28.00	4-Limestone, Very
Shelly Sand	19	-72.30	-72.30	0.00	100.00	1-Plastic Clay
	20	-72.30	-74.80	2.50	100.00	4-Limestone, Very
Shelly Sand	21	-74.80	-74.80	0.00	7.00	1-Plastic Clay
	22	-74.80	-77.30	2.50	7.00	4-Limestone, Very
Shelly Sand	23	-77.30	-77.30	0.00	14.00	1-Plastic Clay
	24	-77.30	-79.80	2.50	14.00	3-Clean Sand
	25	-79.80	-79.80	0.00	31.00	1-Plastic Clay
	26	-79.80	-82.30	2.50	31.00	3-Clean Sand
	27	-82.30	-82.30	0.00	28.00	1-Plastic Clay
	28	-82.30	-87.30	5.00	28.00	4-Limestone, Very
Shelly Sand	29	-87.30	-87.30	0.00	76.00	1-Plastic Clay
	30	-87.30	-89.80	2.50	76.00	4-Limestone, Very
Shelly Sand	31	-89.80	-89.80	0.00	30.00	1-Plastic Clay
	32	-89.80	-92.30	2.50	30.00	4-Limestone, Very
Shelly Sand	33	-92.30	-92.30	0.00	4.00	1-Plastic Clay
	34	-92.30	-94.80	2.50	4.00	4-Limestone, Very
Shelly Sand	35	-94.80	-94.80	0.00	19.00	1-Plastic Clay
	36	-94.80	-97.30	2.50	19.00	4-Limestone, Very
Shelly Sand	37	-97.30	-97.30	0.00	41.00	1-Plastic Clay
	38	-97.30	-99.80	2.50	41.00	4-Limestone, Very
Shelly Sand	39	-99.80	-99.80	0.00	100.00	1-Plastic Clay
	40	-99.80	-117.30	17.50	98.00	4-Limestone, Very
Shelly Sand	41	-117.30	-117.30	0.00	28.00	1-Plastic Clay
	42	-117.30	-119.80	2.50	28.00	4-Limestone, Very
Shelly Sand	43	-119.80	-119.80	0.00	57.00	1-Plastic Clay
	44	-119.80	-122.30	2.50	57.00	4-Limestone, Very
Shelly Sand						

Driven Pile Data:

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Pile unit weight = 150.00(pcf), Section Type: Square

Pile Geometry:

"BB-12_Driven_Void=-20.5ft_Existing 18in Pile.out"

Width (in)	Length (ft)	Tip Elev. (ft)
18.00	5.00	-2.30
18.00	6.00	-3.30
18.00	7.00	-4.30
18.00	8.00	-5.30
18.00	9.00	-6.30
18.00	10.00	-7.30
18.00	11.00	-8.30
18.00	12.00	-9.30
18.00	13.00	-10.30
18.00	14.00	-11.30
18.00	15.00	-12.30
18.00	16.00	-13.30
18.00	17.00	-14.30
18.00	18.00	-15.30
18.00	19.00	-16.30
18.00	20.00	-17.30
18.00	21.00	-18.30
18.00	22.00	-19.30
18.00	23.00	-20.30
18.00	24.00	-21.30
18.00	25.00	-22.30
18.00	26.00	-23.30
18.00	27.00	-24.30
18.00	28.00	-25.30
18.00	29.00	-26.30
18.00	30.00	-27.30
18.00	31.00	-28.30
18.00	32.00	-29.30
18.00	33.00	-30.30
18.00	34.00	-31.30
18.00	35.00	-32.30
18.00	36.00	-33.30
18.00	37.00	-34.30
18.00	38.00	-35.30
18.00	39.00	-36.30
18.00	40.00	-37.30
18.00	41.00	-38.30
18.00	42.00	-39.30
18.00	43.00	-40.30
18.00	44.00	-41.30
18.00	45.00	-42.30
18.00	46.00	-43.30
18.00	47.00	-44.30
18.00	48.00	-45.30
18.00	49.00	-46.30
18.00	50.00	-47.30
18.00	51.00	-48.30
18.00	52.00	-49.30
18.00	53.00	-50.30

"BB-12_Driven_Void=-20.5ft_Existing 18in Pile.out"

18.00	54.00	-51.30
18.00	55.00	-52.30
18.00	56.00	-53.30
18.00	57.00	-54.30
18.00	58.00	-55.30
18.00	59.00	-56.30
18.00	60.00	-57.30
18.00	61.00	-58.30
18.00	62.00	-59.30
18.00	63.00	-60.30
18.00	64.00	-61.30
18.00	65.00	-62.30
18.00	66.00	-63.30
18.00	67.00	-64.30
18.00	68.00	-65.30
18.00	69.00	-66.30
18.00	70.00	-67.30

Driven Pile Capacity:
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Section Type: Square
Pile Width: 18.00 (in)

Test Pile Length (ft)	Pile Width (in)	Ultimate Side Friction (tons)	Mobilized End Bearing (tons)	Estimated Davisson Capacity (tons)	Allowable Pile Capacity (tons)	Ultimate Pile Capacity (tons)
5.00	18.0	0.00	0.00	0.00	0.00	0.00
6.00	18.0	0.00	0.00	0.00	0.00	0.00
7.00	18.0	0.00	0.00	0.00	0.00	0.00
8.00	18.0	0.00	0.00	0.00	0.00	0.00
9.00	18.0	0.00	0.00	0.00	0.00	0.00
10.00	18.0	0.00	0.00	0.00	0.00	0.00
11.00	18.0	0.00	0.00	0.00	0.00	0.00
12.00	18.0	0.00	0.00	0.00	0.00	0.00
13.00	18.0	0.00	0.00	0.00	0.00	0.00
14.00	18.0	0.00	0.00	0.00	0.00	0.00
15.00	18.0	0.00	0.00	0.00	0.00	0.00
16.00	18.0	0.00	0.00	0.00	0.00	0.00
17.00	18.0	0.00	0.00	0.00	0.00	0.00
18.00	18.0	0.00	0.00	0.00	0.00	0.00
19.00	18.0	0.00	0.00	0.00	0.00	0.00
20.00	18.0	0.00	0.00	0.00	0.00	0.00
21.00	18.0	0.00	0.00	0.00	0.00	0.00

"BB-12_Driven_Void=-20.5ft_Existing 18in Pile.out"

22.00	18.0	0.00	0.00	0.00	0.00	0.00
23.00	18.0	0.00	0.00	0.00	0.00	0.00
24.00	18.0	1.49	51.83	53.32	26.66	156.97
25.00	18.0	3.35	48.33	51.68	25.84	148.33
26.00	18.0	5.15	46.04	51.19	25.59	143.27
27.00	18.0	6.83	43.32	50.15	25.08	136.80
28.00	18.0	8.39	39.55	47.94	23.97	127.03
29.00	18.0	9.80	36.61	46.41	23.21	119.63
30.00	18.0	11.07	34.21	45.28	22.64	113.71
31.00	18.0	12.33	31.18	43.51	21.76	105.87
32.00	18.0	13.75	27.20	40.95	20.47	95.35
33.00	18.0	14.95	24.76	39.71	19.86	89.23
34.00	18.0	15.85	24.10	39.95	19.98	88.16
35.00	18.0	16.74	23.65	40.39	20.19	87.69
36.00	18.0	17.57	23.91	41.48	20.74	89.30
37.00	18.0	18.29	25.28	43.57	21.78	94.12
38.00	18.0	19.17	31.51	50.67	25.34	113.69
39.00	18.0	20.30	31.49	51.79	25.89	114.77
40.00	18.0	21.39	31.87	53.27	26.63	117.01
41.00	18.0	22.46	32.17	54.63	27.32	118.97
42.00	18.0	23.59	32.64	56.23	28.12	121.52
43.00	18.0	24.62	33.83	58.45	29.22	126.11
44.00	18.0	25.83	35.37	61.20	30.60	131.94
45.00	18.0	27.25	37.24	64.49	32.25	138.98
46.00	18.0	28.78	39.40	68.18	34.09	146.97
47.00	18.0	30.39	41.48	71.88	35.94	154.85
48.00	18.0	35.77	48.30	84.06	42.03	180.66
49.00	18.0	38.11	49.49	87.60	43.80	186.57
50.00	18.0	40.14	51.58	91.72	45.86	194.88
51.00	18.0	42.29	53.44	95.73	47.86	202.62
52.00	18.0	44.18	55.69	99.87	49.94	211.26
53.00	18.0	52.10	71.26	123.37	61.68	265.90
54.00	18.0	58.32	70.19	128.52	64.26	268.91
55.00	18.0	64.54	69.63	134.17	67.08	273.42
56.00	18.0	67.57	69.78	137.34	68.67	276.89
57.00	18.0	70.56	70.00	140.56	70.28	280.56
58.00	18.0	73.70	70.04	143.74	71.87	283.82
59.00	18.0	77.28	69.78	147.06	73.53	286.61
60.00	18.0	81.15	68.99	150.14	75.07	288.12
61.00	18.0	84.37	70.49	154.86	77.43	295.83
62.00	18.0	86.62	72.32	158.95	79.47	303.60
63.00	18.0	86.15	81.84	167.99	83.99	331.68
64.00	18.0	85.68	96.51	182.19	91.09	375.21
65.00	18.0	94.58	160.31	254.90	127.45	575.52
66.00	18.0	97.41	155.43	252.84	126.42	563.69
67.00	18.0	100.24	150.92	251.15	125.58	552.99
68.00	18.0	104.65	135.75	240.40	120.20	511.91
69.00	18.0	110.65	110.31	220.96	110.48	441.59
70.00	18.0	116.65	110.31	226.96	113.48	447.59

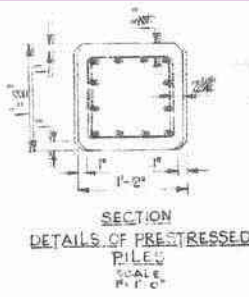
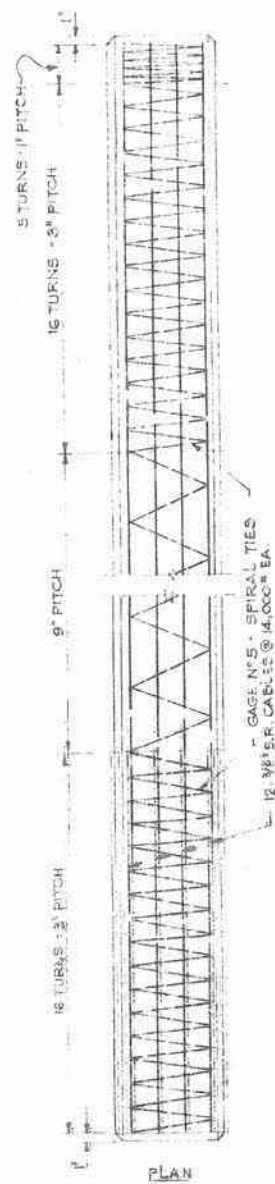
@-47.3', 45 tons available
(allowable capacity)

1. MOBILIZED END BEARING IS 1/3 OF THE ORIGINAL RB-121 VALUES.
2. DAVISSON PILE CAPACITY IS AN ESTIMATE BASED ON FAILURE CRITERIA, AND EQUALS ULTIMATE SIDE FRICTION PLUS MOBILIZED END BEARING.
3. ALLOWABLE PILE CAPACITY IS 1/2 THE DAVISSON PILE CAPACITY.
4. ULTIMATE PILE CAPACITY IS ULTIMATE SIDE FRICTION PLUS 3 x THE MOBILIZED END BEARING.
EXCEPTION: FOR H-PILES TIPPED IN SAND OR LIMESTONE, THE ULTIMATE PILE CAPACITY IS ULTIMATE SIDE FRICTION PLUS 2 x THE MOBILIZED END BEARING.

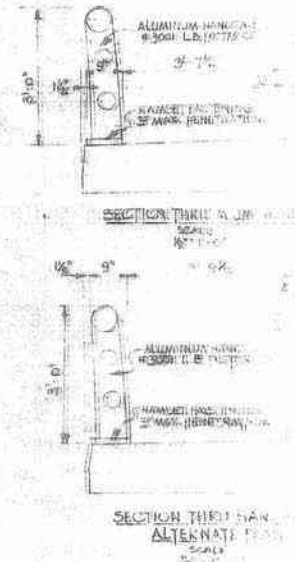
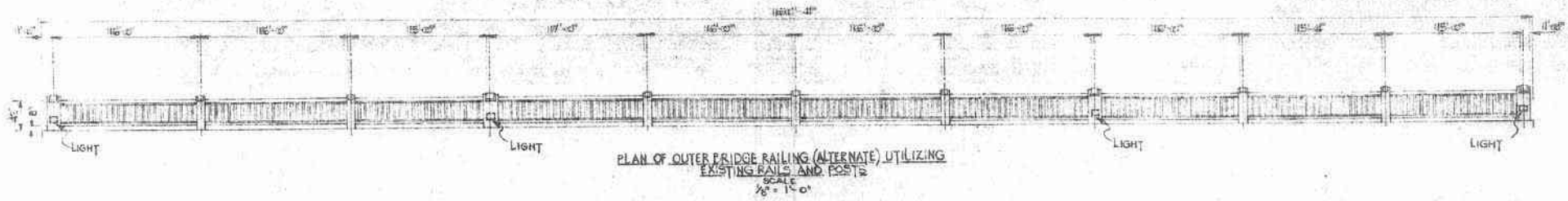
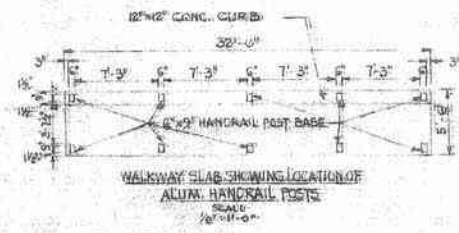
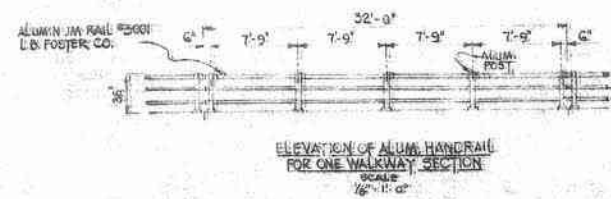
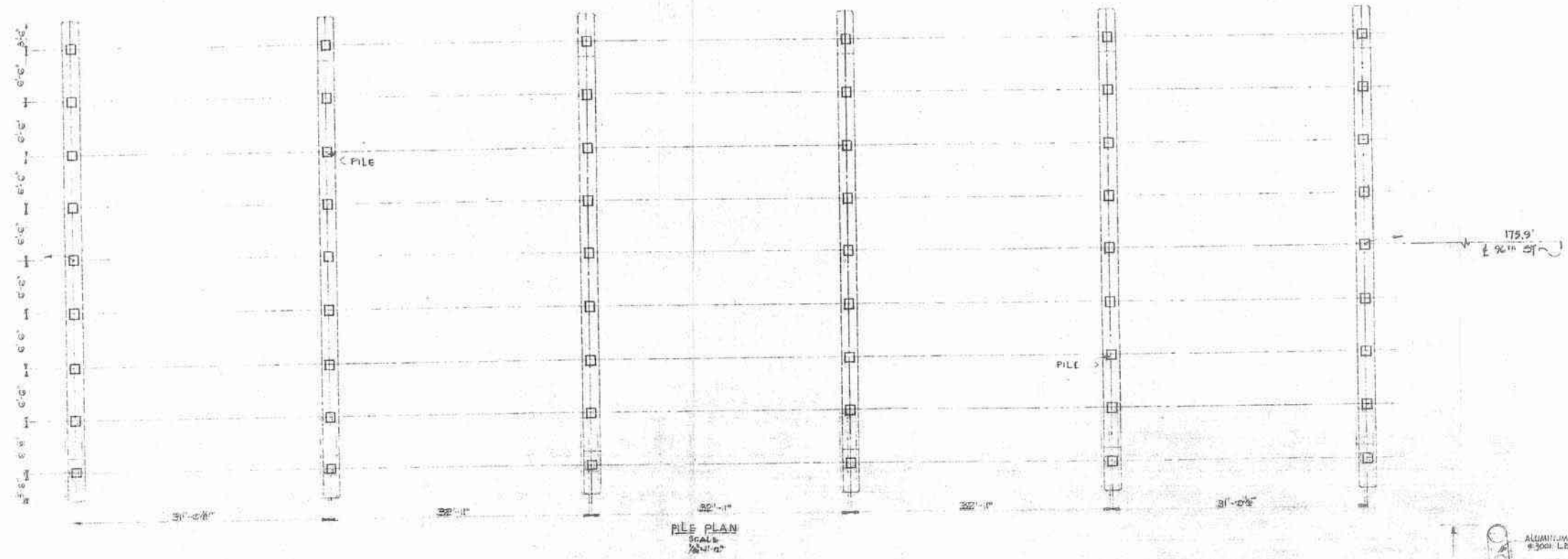
NOTES

"BB-12_Driven_Void=-20.5ft_Existing 18in Pile.out"

"BB-12_Driven_Void=-20.5ft_Existing 18in Pile.out"

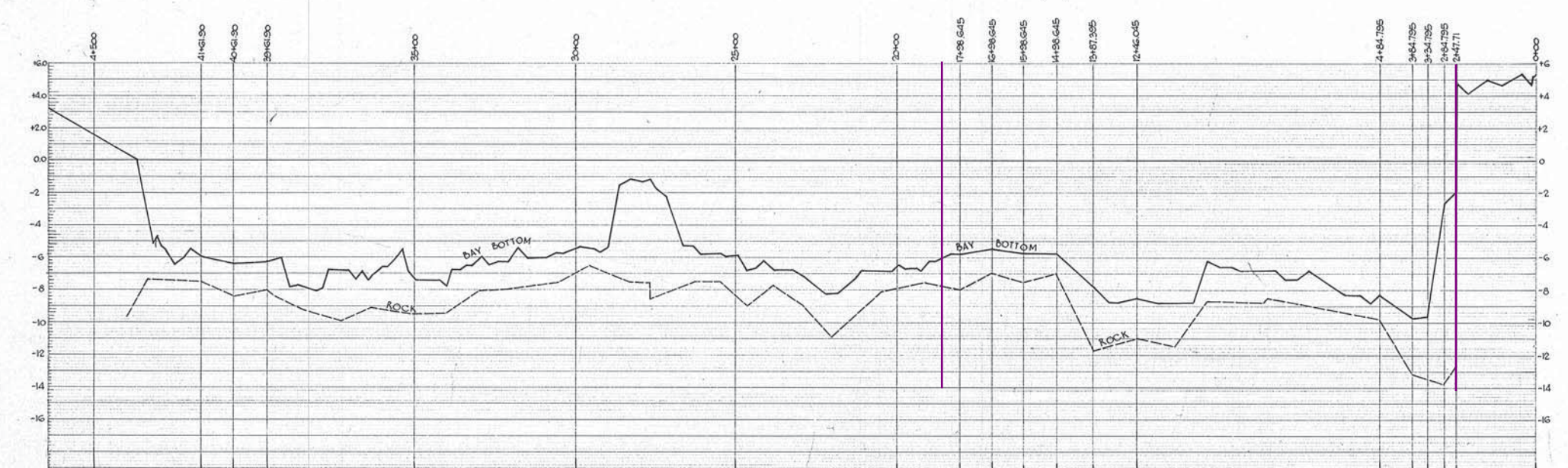
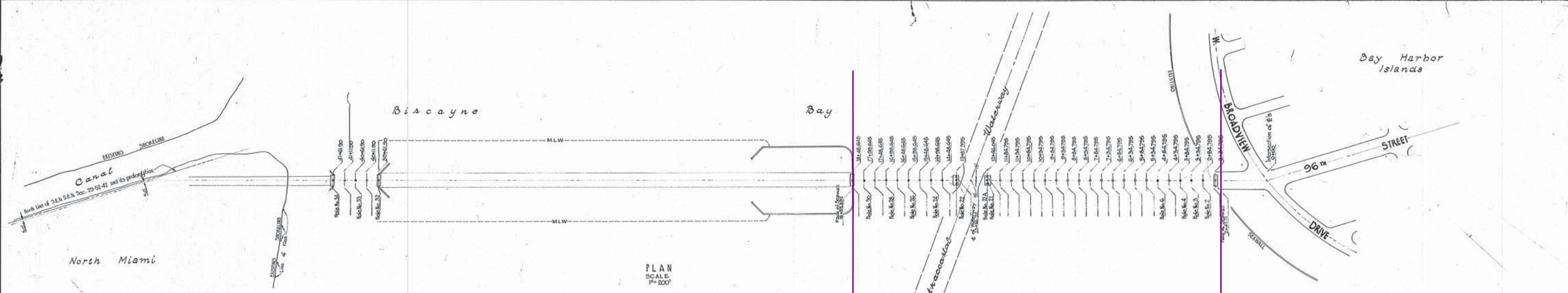


Note
ALL CONCRETE PILES
SHALL BE DRIVEN TO
A 45 TON LOADING.
54 REQ'D.



PRECAST PILE
BAY HARBOR
TOWN OF BAY HARBOR
M. B. GARRIS
SCALE
DRAWN BY

875102



NO. 34	NO. 33	NO. 32	NO. 30	MEAN	NO. 28	NO. 26	NO. 24	NO. 22	NO. 21A	NO. 21	NO. 19	NO. 17	NO. 15	NO. 13	NO. 11	NO. 9	NO. 7	NO. 5	NO. 3	NO. 2
-600 15' 50" Gray sand shell mud. Jr. Sample No. 1 750 24' 0" Brown white sandy limestone 4200 f.b.	-641 20' 50" Gray sand shell mud. Jr. Sample No. 1 841 22' 0" Brown white sandy limestone 4200 f.b.	-625 20' 50" Gray sand shell mud. Jr. Sample No. 1 841 22' 0" Brown white sandy limestone 4200 f.b.	-575 22' 50" Gray sand shell mud. Jr. Sample No. 1 800 25' 0" Brown white sandy limestone 4200 f.b.	-550 15' 50" Gray sand shell mud. Jr. Sample No. 1 700 22' 0" Brown white sandy limestone 4200 f.b.	-515 15' 50" Gray sand shell mud. Jr. Sample No. 1 750 22' 0" Brown white sandy limestone 4200 f.b.	-505 15' 50" Gray sand shell mud. Jr. Sample No. 1 750 22' 0" Brown white sandy limestone 4200 f.b.	-475 15' 50" Gray sand shell mud. Jr. Sample No. 1 750 22' 0" Brown white sandy limestone 4200 f.b.	-425 15' 50" Gray sand shell mud. Jr. Sample No. 1 750 22' 0" Brown white sandy limestone 4200 f.b.	-335 22' 50" Gray sand shell mud. Jr. Sample No. 1 800 25' 0" Brown white sandy limestone 4200 f.b.	-325 22' 50" Gray sand shell mud. Jr. Sample No. 1 800 25' 0" Brown white sandy limestone 4200 f.b.	-315 22' 50" Gray sand shell mud. Jr. Sample No. 1 800 25' 0" Brown white sandy limestone 4200 f.b.	-305 22' 50" Gray sand shell mud. Jr. Sample No. 1 800 25' 0" Brown white sandy limestone 4200 f.b.	-295 22' 50" Gray sand shell mud. Jr. Sample No. 1 800 25' 0" Brown white sandy limestone 4200 f.b.	-285 22' 50" Gray sand shell mud. Jr. Sample No. 1 800 25' 0" Brown white sandy limestone 4200 f.b.	-275 22' 50" Gray sand shell mud. Jr. Sample No. 1 800 25' 0" Brown white sandy limestone 4200 f.b.	-265 22' 50" Gray sand shell mud. Jr. Sample No. 1 800 25' 0" Brown white sandy limestone 4200 f.b.	-255 22' 50" Gray sand shell mud. Jr. Sample No. 1 800 25' 0" Brown white sandy limestone 4200 f.b.	-245 22' 50" Gray sand shell mud. Jr. Sample No. 1 800 25' 0" Brown white sandy limestone 4200 f.b.	-235 22' 50" Gray sand shell mud. Jr. Sample No. 1 800 25' 0" Brown white sandy limestone 4200 f.b.	-225 22' 50" Gray sand shell mud. Jr. Sample No. 1 800 25' 0" Brown white sandy limestone 4200 f.b.
-600 15' 50" Gray sand shell mud. Jr. Sample No. 1 750 24' 0" Brown white sandy limestone 4200 f.b.	-641 20' 50" Gray sand shell mud. Jr. Sample No. 1 841 22' 0" Brown white sandy limestone 4200 f.b.	-625 20' 50" Gray sand shell mud. Jr. Sample No. 1 841 22' 0" Brown white sandy limestone 4200 f.b.	-575 22' 50" Gray sand shell mud. Jr. Sample No. 1 800 25' 0" Brown white sandy limestone 4200 f.b.	-550 15' 50" Gray sand shell mud. Jr. Sample No. 1 700 22' 0" Brown white sandy limestone 4200 f.b.	-515 15' 50" Gray sand shell mud. Jr. Sample No. 1 750 22' 0" Brown white sandy limestone 4200 f.b.	-505 15' 50" Gray sand shell mud. Jr. Sample No. 1 750 22' 0" Brown white sandy limestone 4200 f.b.	-475 15' 50" Gray sand shell mud. Jr. Sample No. 1 750 22' 0" Brown white sandy limestone 4200 f.b.	-425 15' 50" Gray sand shell mud. Jr. Sample No. 1 750 22' 0" Brown white sandy limestone 4200 f.b.	-335 22' 50" Gray sand shell mud. Jr. Sample No. 1 800 25' 0" Brown white sandy limestone 4200 f.b.	-325 22' 50" Gray sand shell mud. Jr. Sample No. 1 800 25' 0" Brown white sandy limestone 4200 f.b.	-315 22' 50" Gray sand shell mud. Jr. Sample No. 1 800 25' 0" Brown white sandy limestone 4200 f.b.	-305 22' 50" Gray sand shell mud. Jr. Sample No. 1 800 25' 0" Brown white sandy limestone 4200 f.b.	-295 22' 50" Gray sand shell mud. Jr. Sample No. 1 800 25' 0" Brown white sandy limestone 4200 f.b.	-285 22' 50" Gray sand shell mud. Jr. Sample No. 1 800 25' 0" Brown white sandy limestone 4200 f.b.	-275 22' 50" Gray sand shell mud. Jr. Sample No. 1 800 25' 0" Brown white sandy limestone 4200 f.b.	-265 22' 50" Gray sand shell mud. Jr. Sample No. 1 800 25' 0" Brown white sandy limestone 4200 f.b.	-255 22' 50" Gray sand shell mud. Jr. Sample No. 1 800 25' 0" Brown white sandy limestone 4200 f.b.	-245 22' 50" Gray sand shell mud. Jr. Sample No. 1 800 25' 0" Brown white sandy limestone 4200 f.b.	-235 22' 50" Gray sand shell mud. Jr. Sample No. 1 800 25' 0" Brown white sandy limestone 4200 f.b.	-225 22' 50" Gray sand shell mud. Jr. Sample No. 1 800 25' 0" Brown white sandy limestone 4200 f.b.
-600 15' 50" Gray sand shell mud. Jr. Sample No. 1 750 24' 0" Brown white sandy limestone 4200 f.b.	-641 20' 50" Gray sand shell mud. Jr. Sample No. 1 841 22' 0" Brown white sandy limestone 4200 f.b.	-625 20' 50" Gray sand shell mud. Jr. Sample No. 1 841 22' 0" Brown white sandy limestone 4200 f.b.	-575 22' 50" Gray sand shell mud. Jr. Sample No. 1 800 25' 0" Brown white sandy limestone 4200 f.b.	-550 15' 50" Gray sand shell mud. Jr. Sample No. 1 700 22' 0" Brown white sandy limestone 4200 f.b.	-515 15' 50" Gray sand shell mud. Jr. Sample No. 1 750 22' 0" Brown white sandy limestone 4200 f.b.	-505 15' 50" Gray sand shell mud. Jr. Sample No. 1 750 22' 0" Brown white sandy limestone 4200 f.b.	-475 15' 50" Gray sand shell mud. Jr. Sample No. 1 750 22' 0" Brown white sandy limestone 4200 f.b.	-425 15' 50" Gray sand shell mud. Jr. Sample No. 1 750 22' 0" Brown white sandy limestone 4200 f.b.	-335 22' 50" Gray sand shell mud. Jr. Sample No. 1 800 25' 0" Brown white sandy limestone 4200 f.b.	-325 22' 50" Gray sand shell mud. Jr. Sample No. 1 800 25' 0" Brown white sandy limestone 4200 f.b.	-315 22' 50" Gray sand shell mud. Jr. Sample No. 1 800 25' 0" Brown white sandy limestone 4200 f.b.	-305 22' 50" Gray sand shell mud. Jr. Sample No. 1 800 25' 0" Brown white sandy limestone 4200 f.b.	-295 22' 50" Gray sand shell mud. Jr. Sample No. 1 800 25' 0" Brown white sandy limestone 4200 f.b.	-285 22' 50" Gray sand shell mud. Jr. Sample No. 1 800 25' 0" Brown white sandy limestone 4200 f.b.	-275 22' 50" Gray sand shell mud. Jr. Sample No. 1 800 25' 0" Brown white sandy limestone 4200 f.b.	-265 22' 50" Gray sand shell mud. Jr. Sample No. 1 800 25' 0" Brown white sandy limestone 4200 f.b.	-255 22' 50" Gray sand shell mud. Jr. Sample No. 1 800 25' 0" Brown white sandy limestone 4200 f.b.	-245 22' 50" Gray sand shell mud. Jr. Sample No. 1 800 25' 0" Brown white sandy limestone 4200 f.b.	-235 22' 50" Gray sand shell mud. Jr. Sample No. 1 800 25' 0" Brown white sandy limestone 4200 f.b.	-225 22' 50" Gray sand shell mud. Jr. Sample No. 1 800 25' 0" Brown white sandy limestone 4200 f.b.
-600 15' 50" Gray sand shell mud. Jr. Sample No. 1 750 24' 0" Brown white sandy limestone 4200 f.b.	-641 20' 50" Gray sand shell mud. Jr. Sample No. 1 841 22' 0" Brown white sandy limestone 4200 f.b.	-625 20' 50" Gray sand shell mud. Jr. Sample No. 1 841 22' 0" Brown white sandy limestone 4200 f.b.	-575 22' 50" Gray sand shell mud. Jr. Sample No. 1 800 25' 0" Brown white sandy limestone 4200 f.b.	-550 15' 50" Gray sand shell mud. Jr. Sample No. 1 700 22' 0" Brown white sandy limestone 4200 f.b.	-515 15' 50" Gray sand shell mud. Jr. Sample No. 1 750 22' 0" Brown white sandy limestone 4200 f.b.	-505 15' 50" Gray sand shell mud. Jr. Sample No. 1 750 22' 0" Brown white sandy limestone 4200 f.b.	-475 15' 50" Gray sand shell mud. Jr. Sample No. 1 750 22' 0" Brown white sandy limestone 4200 f.b.	-425 15' 50" Gray sand shell mud. Jr. Sample No. 1 750 22' 0" Brown white sandy limestone 4200 f.b.	-335 22' 50" Gray sand shell mud. Jr. Sample No. 1 800 25' 0" Brown white sandy limestone 4200 f.b.	-325 22' 50" Gray sand shell mud. Jr. Sample No. 1 800 25' 0" Brown white sandy limestone 4200 f.b.	-315 22' 50" Gray sand shell mud. Jr. Sample No. 1 800 25' 0" Brown white sandy limestone 4200 f.b.	-305 22' 50" Gray sand shell mud. Jr. Sample No. 1 800 25' 0" Brown white sandy limestone 4200 f.b.	-295 22' 50" Gray sand shell mud. Jr. Sample No. 1 800 25' 0" Brown white sandy limestone 4200 f.b.	-285 22' 50" Gray sand shell mud. Jr. Sample No. 1 800 25' 0" Brown white sandy limestone 4200 f.b.	-275 22' 50" Gray sand shell mud. Jr. Sample No. 1 800 25' 0" Brown white sandy limestone 4200 f.b.	-265 22' 50" Gray sand shell mud. Jr. Sample No. 1 800 25' 0" Brown white sandy limestone 4200 f.b.	-255 22' 50" Gray sand shell mud. Jr. Sample No. 1 800 25' 0" Brown white sandy limestone 4200 f.b.	-245 22' 50" Gray sand shell mud. Jr. Sample No. 1 800 25' 0" Brown white sandy limestone 4200 f.b.	-235 22' 50" Gray sand shell mud. Jr. Sample No. 1 800 25' 0" Brown white sandy limestone 4200 f.b.	-225 22' 50" Gray sand shell mud. Jr. Sample No. 1 800 25' 0" Brown white sandy limestone 4200 f.b.
-600 15' 50" Gray sand shell mud. Jr. Sample No. 1 750 24' 0" Brown white sandy limestone 4200 f.b.	-641 20' 50" Gray sand shell mud. Jr. Sample No. 1 841 22' 0" Brown white sandy limestone 4200 f.b.	-625 20' 50" Gray sand shell mud. Jr. Sample No. 1 841 22' 0" Brown white sandy limestone 4200 f.b.	-575 22' 50" Gray sand shell mud. Jr. Sample No. 1 800 25' 0" Brown white sandy limestone 4200 f.b.	-550 15' 50" Gray sand shell mud. Jr. Sample No. 1 700 22' 0" Brown white sandy limestone 4200 f.b.	-515 15' 50" Gray sand shell mud. Jr. Sample No. 1 750 22' 0" Brown white sandy limestone 4200 f.b.	-505 15' 50" Gray sand shell mud. Jr. Sample No. 1 750 22' 0" Brown white sandy limestone 4200 f.b.	-475 15' 50" Gray sand shell mud. Jr. Sample No. 1 750 22' 0" Brown white sandy limestone 4200 f.b.	-425 15' 50" Gray sand shell mud. Jr. Sample No. 1 750 22' 0" Brown white sandy limestone 4200 f.b.	-335 22' 50" Gray sand shell mud. Jr. Sample No. 1 800 25' 0" Brown white sandy limestone 4200 f.b.	-325 22' 50" Gray sand shell mud. Jr. Sample No. 1 800 25' 0" Brown white sandy limestone 4200 f.b.	-315 22' 50" Gray sand shell mud. Jr. Sample No. 1 800 25' 0" Brown white sandy limestone 4200 f.b.	-305 22' 50" Gray sand shell mud. Jr. Sample No. 1 800 25' 0" Brown white sandy limestone 4200 f.b.	-295 22' 50" Gray sand shell mud. Jr. Sample No. 1 800 25' 0" Brown white sandy limestone 4200 f.b.	-285 22' 50" Gray sand shell mud. Jr. Sample No. 1 800 25' 0" Brown white sandy limestone 4200 f.b.	-275 22' 50" Gray sand shell mud. Jr. Sample No. 1 800 25' 0" Brown white sandy limestone 4200 f.b.	-265 22' 50" Gray sand shell mud. Jr. Sample No. 1 800 25' 0" Brown white sandy limestone 4200 f.b.	-255 22' 50" Gray sand shell mud. Jr. Sample No. 1 800 25' 0" Brown white sandy limestone 4200 f.b.	-245 22' 50" Gray sand shell mud. Jr. Sample No. 1 800 25' 0" Brown white sandy limestone 4200 f.b.	-235 22' 50" Gray sand shell mud. Jr. Sample No. 1 800 25' 0" Brown white sandy limestone 4200 f.b.	-225 22' 50" Gray sand shell mud. Jr. Sample No. 1 800 25' 0" Brown white sandy limestone 4200 f.b.
-600 15' 50" Gray sand shell mud. Jr. Sample No. 1 750 24' 0" Brown white sandy limestone 4200 f.b.	-641 20' 50" Gray sand shell mud. Jr. Sample No. 1 841 22' 0" Brown white sandy limestone 4200 f.b.	-625 20' 50" Gray sand shell mud. Jr. Sample No. 1 841 22' 0" Brown white sandy limestone 4200 f.b.	-575 22' 50" Gray sand shell mud. Jr. Sample No. 1 800 25' 0" Brown white sandy limestone 4200 f.b.	-550 15' 50" Gray sand shell mud. Jr. Sample No. 1 700 22' 0" Brown white sandy limestone 4200 f.b.	-515 15' 50" Gray sand shell mud. Jr. Sample No. 1 750 22' 0" Brown white sandy limestone 4200 f.b.	-505 15' 50" Gray sand shell mud. Jr. Sample No. 1 750 22' 0" Brown white sandy limestone 4200 f.b.	-475 15' 50" Gray sand shell mud. Jr. Sample No. 1 750 22' 0" Brown white sandy limestone 4200 f.b.	-425 15' 50" Gray sand shell mud. Jr. Sample No. 1 750 22' 0" Brown white sandy limestone 4200 f.b.	-335 22' 50" Gray sand shell mud. Jr. Sample No. 1 800 25' 0" Brown white sandy limestone 4200 f.b.	-325 22' 50" Gray sand shell mud. Jr. Sample No. 1 800 25' 0" Brown white sandy limestone 4200 f.b.	-315 22' 50" Gray sand shell mud. Jr. Sample No. 1 800 25' 0" Brown white sandy limestone 4200 f.b.	-305 22' 50" Gray sand shell mud. Jr. Sample No. 1 800 25' 0" Brown white sandy limestone 4200 f.b.	-295 22' 50" Gray sand shell mud. Jr. Sample No. 1 800 25' 0" Brown white sandy limestone 4200 f.b.	-285 22' 50" Gray sand shell mud. Jr. Sample No. 1 800 25' 0" Brown white sandy limestone 4200 f.b.	-275 22' 50" Gray sand shell mud. Jr. Sample No. 1 800 25' 0" Brown white sandy limestone 4200 f.b.	-265 22' 50" Gray sand shell mud. Jr. Sample No. 1 800 25' 0" Brown white sandy limestone 4200 f.b.	-255 22' 50" Gray sand shell mud. Jr. Sample No. 1 800 25' 0" Brown white sandy limestone 4200 f.b.	-245 22' 50" Gray sand shell mud. Jr. Sample No. 1 800 25' 0" Brown white sandy limestone 4200 f.b.	-235 22' 50" Gray sand shell mud. Jr. Sample No. 1 800 25' 0" Brown white sandy limestone 4200 f.b.	-225 22' 50" Gray sand shell mud. Jr. Sample No. 1 800 25' 0" Brown white sandy limestone 4200 f.b.
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-600 15' 50" Gray sand shell mud. Jr. Sample No. 1 750 24' 0" Brown white sandy limestone 4200 f.b.	-641 20' 50" Gray sand shell mud. Jr. Sample No. 1 841 22' 0" Brown white sandy limestone 4200 f.b.	-625 20' 50" Gray sand shell mud. Jr. Sample No. 1 841 22' 0" Brown white sandy limestone 4200 f.b.	-575 22' 50" Gray sand shell mud. Jr. Sample No. 1 800 25' 0" Brown white sandy limestone 4200 f.b.	-550 15' 50" Gray sand shell mud. Jr. Sample No. 1 700 22' 0" Brown white sandy limestone 4200 f.b.	-515 15' 50" Gray sand shell mud. Jr. Sample No. 1 750 22' 0" Brown white sandy limestone 4200 f.b.	-505 15' 50" Gray sand shell mud. Jr. Sample No. 1 750 22' 0" Brown white sandy limestone 4200 f.b.	-475 15' 50" Gray sand shell mud. Jr. Sample No. 1 750 22' 0" Brown white sandy limestone 4200 f.b.	-425 15' 50" Gray sand shell mud. Jr. Sample No. 1 750 22' 0" Brown white sandy limestone 4200 f.b.	-335 22' 50" Gray sand shell mud. Jr. Sample No. 1 800 25' 0" Brown white sandy limestone 4200 f.b.	-325 22' 50" Gray sand shell mud. Jr. Sample No. 1 800 25' 0" Brown white sandy limestone 4200 f.b.	-315 22' 50" Gray sand shell mud. Jr. Sample No. 1 800 25' 0" Brown white sandy limestone 4200 f.b.	-305 22' 50" Gray sand shell mud. Jr. Sample No. 1 800 25' 0" Brown white sandy limestone 4200 f.b.	-295 22' 50" Gray sand shell mud. Jr. Sample No. 1 800 25' 0" Brown white sandy limestone 4200 f.b.	-285 22' 50" Gray sand shell mud. Jr. Sample No. 1 800 25' 0" Brown white sandy limestone 4200 f.b.	-275 22' 50" Gray sand shell mud. Jr. Sample No. 1 800 25' 0" Brown white sandy limestone 4200 f.b.	-265 22' 50" Gray sand shell mud. Jr. Sample No. 1 800 25' 0" Brown white sandy limestone 4200 f.b.	-255 22' 50" Gray sand shell mud. Jr. Sample No. 1 800 25' 0" Brown white sandy limestone 4200 f.b.	-245 22' 50" Gray sand shell mud. Jr. Sample No. 1 800 25' 0" Brown white sandy limestone 4200 f.b.	-235 22' 50" Gray sand shell mud. Jr. Sample No. 1 800 25' 0" Brown white sandy limestone 4200 f.b.	-225 22' 50" Gray sand shell mud. Jr. Sample No. 1 800 25' 0" Brown white sandy limestone 4200 f.b.
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DIAGRAM OF CORE BORINGS
VERT. SCALE 1"=10'

PLAN - PROFILE
DIAGRAM OF CORE BORINGS

BROAD CAUSEWAY VIADUCT

M.B. GARRIS CIVIL & CONSULTING ENGINEER
MIAMI - FLORIDA
JUNE 1950

SCALE: AS SHOWN

APPENDIX D

FB-Deep Analysis and Output – Driven Piles

FB-Deep Analysis and Output – Drilled Shafts

FB-Deep Analysis and Output –Driven Piles

General Information:

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Input file: ons\FB-Deep\Driven\BB-01_Driven_Void=-9.1ft_Preform=-30.1ft.in
Project number: B-22-074
Job name: Broad Causeway Bridge
Engineer: PV/TC
Units: English

Analysis Information:

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Analysis Type: SPT

Soil Information:

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Boring date: 3/22/2023, Boring Number: BB-01
Station number: 111+65 Offset: -10

Ground Elevation: 4.900(ft)

Hammer type: Automatic Hammer, Correction factor = 1.24

ID	Depth (ft)	No. of Blows (Blows/ft)	Soil Type
1	0.00	6.45	5- Cavity layer
2	2.00	6.45	5- Cavity layer
3	4.00	6.45	5- Cavity layer
4	6.00	3.00	5- Cavity layer
5	8.00	4.00	5- Cavity layer
6	10.00	3.00	5- Cavity layer
7	12.00	2.00	5- Cavity layer
8	14.00	3.00	5- Cavity layer
9	14.00	12.50	3- Clean sand
10	16.00	12.50	3- Clean sand
11	20.00	14.00	3- Clean sand
12	22.50	7.50	3- Clean sand
13	25.00	7.50	3- Clean sand
14	27.50	7.50	3- Clean sand
15	30.00	13.50	3- Clean sand
16	30.00	0.00	1- Plastic Clay
17	30.00	20.00	3- Clean sand
18	32.50	20.00	3- Clean sand
19	35.00	20.00	3- Clean sand
20	35.00	0.00	1- Plastic Clay
21	35.00	4.00	3- Clean sand

"BB-01_Driven_Void=-9.1ft_Preform=-30.1ft.out"

Predrilling to top of
natural limestone,
elevation -9.1' or a depth
of 14'

Preforming to elevation
-30.1' or a depth of 35'

22	37.50	4.00	3- Clean sand
23	37.50	0.00	1- Plastic Clay
24	37.50	51.00	3- Clean sand
25	40.00	51.00	3- Clean sand
26	42.50	31.00	3- Clean sand
27	42.50	0.00	1- Plastic Clay
28	42.50	93.00	3- Clean sand
29	45.00	93.00	3- Clean sand
30	47.50	100.00	3- Clean sand
31	47.50	0.00	1- Plastic Clay
32	47.50	46.00	3- Clean sand
33	50.00	46.00	3- Clean sand
34	50.00	0.00	1- Plastic Clay
35	50.00	100.00	4- Lime Stone/Very shelly sand
36	52.50	100.00	4- Lime Stone/Very shelly sand
37	55.00	100.00	4- Lime Stone/Very shelly sand
38	55.00	0.00	1- Plastic Clay
39	55.00	18.00	4- Lime Stone/Very shelly sand
40	57.50	18.00	4- Lime Stone/Very shelly sand
41	60.00	0.00	1- Plastic Clay
42	60.00	100.00	4- Lime Stone/Very shelly sand
43	60.00	100.00	4- Lime Stone/Very shelly sand
44	60.00	0.00	1- Plastic Clay
45	60.00	31.00	4- Lime Stone/Very shelly sand
46	62.50	31.00	4- Lime Stone/Very shelly sand
47	65.00	31.00	4- Lime Stone/Very shelly sand
48	65.00	0.00	1- Plastic Clay
49	65.00	97.00	4- Lime Stone/Very shelly sand
50	67.50	97.00	4- Lime Stone/Very shelly sand
51	70.00	67.00	4- Lime Stone/Very shelly sand
52	72.50	100.00	4- Lime Stone/Very shelly sand
53	75.00	100.00	4- Lime Stone/Very shelly sand
54	77.50	100.00	4- Lime Stone/Very shelly sand
55	80.00	80.00	4- Lime Stone/Very shelly sand
56	82.50	99.00	4- Lime Stone/Very shelly sand
57	85.00	100.00	4- Lime Stone/Very shelly sand
58	87.50	100.00	4- Lime Stone/Very shelly sand
59	90.00	100.00	4- Lime Stone/Very shelly sand
60	90.00	0.00	1- Plastic Clay
61	90.00	34.00	4- Lime Stone/Very shelly sand
62	92.50	34.00	4- Lime Stone/Very shelly sand
63	92.50	0.00	1- Plastic Clay
64	92.50	100.00	4- Lime Stone/Very shelly sand
65	95.00	100.00	4- Lime Stone/Very shelly sand
66	97.50	100.00	4- Lime Stone/Very shelly sand
67	97.50	0.00	1- Plastic Clay
68	97.50	25.00	4- Lime Stone/Very shelly sand
69	100.00	25.00	4- Lime Stone/Very shelly sand

Blowcount Average Per Soil Layer

"BB-01_Driven_Void=-9.1ft_Preform=-30.1ft.out"

Layer Num.	Starting Elevation (ft)	Bottom Elevation (ft)	Thickness (ft)	Average Blowcount (Blows/ft)	Soil Type
1	4.90	-9.10	14.00	4.48	5-Void
2	-9.10	-25.10	16.00	10.39	3-Clean Sand
3	-25.10	-25.10	0.00	20.00	1-Plastic Clay
4	-25.10	-30.10	5.00	20.00	3-Clean Sand
5	-30.10	-30.10	0.00	4.00	1-Plastic Clay
6	-30.10	-32.60	2.50	4.00	3-Clean Sand
7	-32.60	-32.60	0.00	51.00	1-Plastic Clay
8	-32.60	-37.60	5.00	51.00	3-Clean Sand
9	-37.60	-37.60	0.00	93.00	1-Plastic Clay
10	-37.60	-42.60	5.00	93.00	3-Clean Sand
11	-42.60	-42.60	0.00	46.00	1-Plastic Clay
12	-42.60	-45.10	2.50	46.00	3-Clean Sand
13	-45.10	-45.10	0.00	100.00	1-Plastic Clay
14	-45.10	-50.10	5.00	100.00	4-Limestone, Very
Shelly Sand					
15	-50.10	-50.10	0.00	18.00	1-Plastic Clay
16	-50.10	-55.10	5.00	18.00	4-Limestone, Very
Shelly Sand					
17	-55.10	-55.10	0.00	100.00	1-Plastic Clay
18	-55.10	-55.10	0.00	0.00	4-Limestone, Very
Shelly Sand					
19	-55.10	-55.10	0.00	31.00	1-Plastic Clay
20	-55.10	-60.10	5.00	31.00	4-Limestone, Very
Shelly Sand					
21	-60.10	-60.10	0.00	97.00	1-Plastic Clay
22	-60.10	-85.10	25.00	94.00	4-Limestone, Very
Shelly Sand					
23	-85.10	-85.10	0.00	34.00	1-Plastic Clay
24	-85.10	-87.60	2.50	34.00	4-Limestone, Very
Shelly Sand					
25	-87.60	-87.60	0.00	100.00	1-Plastic Clay
26	-87.60	-92.60	5.00	100.00	4-Limestone, Very
Shelly Sand					
27	-92.60	-92.60	0.00	25.00	1-Plastic Clay
28	-92.60	-95.10	2.50	25.00	4-Limestone, Very
Shelly Sand					

Driven Pile Data:

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Pile unit weight = 150.00(pcf), Section Type: Square

Pile Geometry:

Width Length Tip Elev.

"BB-01_Driven_Void=-9.1ft_Preform=-30.1ft.out"

(in)	(ft)	(ft)
24.00	5.00	-0.10
24.00	6.00	-1.10
24.00	7.00	-2.10
24.00	8.00	-3.10
24.00	9.00	-4.10
24.00	10.00	-5.10
24.00	11.00	-6.10
24.00	12.00	-7.10
24.00	13.00	-8.10
24.00	14.00	-9.10
24.00	15.00	-10.10
24.00	16.00	-11.10
24.00	17.00	-12.10
24.00	18.00	-13.10
24.00	19.00	-14.10
24.00	20.00	-15.10
24.00	21.00	-16.10
24.00	22.00	-17.10
24.00	23.00	-18.10
24.00	24.00	-19.10
24.00	25.00	-20.10
24.00	26.00	-21.10
24.00	27.00	-22.10
24.00	28.00	-23.10
24.00	29.00	-24.10
24.00	30.00	-25.10
24.00	31.00	-26.10
24.00	32.00	-27.10
24.00	33.00	-28.10
24.00	34.00	-29.10
24.00	35.00	-30.10
24.00	36.00	-31.10
24.00	37.00	-32.10
24.00	38.00	-33.10
24.00	39.00	-34.10
24.00	40.00	-35.10
24.00	41.00	-36.10
24.00	42.00	-37.10
24.00	43.00	-38.10
24.00	44.00	-39.10
24.00	45.00	-40.10
24.00	46.00	-41.10
24.00	47.00	-42.10
24.00	48.00	-43.10
24.00	49.00	-44.10
24.00	50.00	-45.10
24.00	51.00	-46.10
24.00	52.00	-47.10
24.00	53.00	-48.10
24.00	54.00	-49.10
"BB-01_Driven_Void=-9.1ft_Preform=-30.1ft.out"		

24.00	55.00	-50.10
24.00	56.00	-51.10
24.00	57.00	-52.10
24.00	58.00	-53.10
24.00	59.00	-54.10
24.00	60.00	-55.10
24.00	61.00	-56.10
24.00	62.00	-57.10
24.00	63.00	-58.10
24.00	64.00	-59.10
24.00	65.00	-60.10
24.00	66.00	-61.10
24.00	67.00	-62.10
24.00	68.00	-63.10
24.00	69.00	-64.10
24.00	70.00	-65.10
24.00	71.00	-66.10
24.00	72.00	-67.10
24.00	73.00	-68.10
24.00	74.00	-69.10
24.00	75.00	-70.10
24.00	76.00	-71.10
24.00	77.00	-72.10
24.00	78.00	-73.10
24.00	79.00	-74.10
24.00	80.00	-75.10
24.00	81.00	-76.10
24.00	82.00	-77.10
24.00	83.00	-78.10
24.00	84.00	-79.10
24.00	85.00	-80.10
24.00	86.00	-81.10
24.00	87.00	-82.10
24.00	88.00	-83.10
24.00	89.00	-84.10
24.00	90.00	-85.10
24.00	91.00	-86.10
24.00	92.00	-87.10
30.00	5.00	-0.10
30.00	6.00	-1.10
30.00	7.00	-2.10
30.00	8.00	-3.10
30.00	9.00	-4.10
30.00	10.00	-5.10
30.00	11.00	-6.10
30.00	12.00	-7.10
30.00	13.00	-8.10
30.00	14.00	-9.10
30.00	15.00	-10.10
30.00	16.00	-11.10
30.00	17.00	-12.10
30.00	18.00	-13.10

"BB-01_Driven_Void=-9.1ft_Preform=-30.1ft.out"

30.00	19.00	-14.10
30.00	20.00	-15.10
30.00	21.00	-16.10
30.00	22.00	-17.10
30.00	23.00	-18.10
30.00	24.00	-19.10
30.00	25.00	-20.10
30.00	26.00	-21.10
30.00	27.00	-22.10
30.00	28.00	-23.10
30.00	29.00	-24.10
30.00	30.00	-25.10
30.00	31.00	-26.10
30.00	32.00	-27.10
30.00	33.00	-28.10
30.00	34.00	-29.10
30.00	35.00	-30.10
30.00	36.00	-31.10
30.00	37.00	-32.10
30.00	38.00	-33.10
30.00	39.00	-34.10
30.00	40.00	-35.10
30.00	41.00	-36.10
30.00	42.00	-37.10
30.00	43.00	-38.10
30.00	44.00	-39.10
30.00	45.00	-40.10
30.00	46.00	-41.10
30.00	47.00	-42.10
30.00	48.00	-43.10
30.00	49.00	-44.10
30.00	50.00	-45.10
30.00	51.00	-46.10
30.00	52.00	-47.10
30.00	53.00	-48.10
30.00	54.00	-49.10
30.00	55.00	-50.10
30.00	56.00	-51.10
30.00	57.00	-52.10
30.00	58.00	-53.10
30.00	59.00	-54.10
30.00	60.00	-55.10
30.00	61.00	-56.10
30.00	62.00	-57.10
30.00	63.00	-58.10
30.00	64.00	-59.10
30.00	65.00	-60.10
30.00	66.00	-61.10
30.00	67.00	-62.10
30.00	68.00	-63.10
30.00	69.00	-64.10
30.00	70.00	-65.10

"BB-01_Driven_Void=-9.1ft_Preform=-30.1ft.out"

30.00	71.00	-66.10
30.00	72.00	-67.10
30.00	73.00	-68.10
30.00	74.00	-69.10
30.00	75.00	-70.10
30.00	76.00	-71.10
30.00	77.00	-72.10
30.00	78.00	-73.10
30.00	79.00	-74.10
30.00	80.00	-75.10
30.00	81.00	-76.10
30.00	82.00	-77.10
30.00	83.00	-78.10
30.00	84.00	-79.10
30.00	85.00	-80.10
30.00	86.00	-81.10
30.00	87.00	-82.10
30.00	88.00	-83.10
30.00	89.00	-84.10
30.00	90.00	-85.10

Driven Pile Capacity:
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Section Type: Square
Pile Width: 24.00 (in)

Test Pile Length (ft)	Pile Width (in)	Ultimate Side Friction (tons)	Mobilized End Bearing (tons)	Estimated Davisson Capacity (tons)	Allowable Pile Capacity (tons)	Ultimate Pile Capacity (tons)
5.00	24.0	0.00	0.00	0.00	0.00	0.00
6.00	24.0	0.00	0.00	0.00	0.00	0.00
7.00	24.0	0.00	0.00	0.00	0.00	0.00
8.00	24.0	0.00	0.00	0.00	0.00	0.00
9.00	24.0	0.00	0.00	0.00	0.00	0.00
10.00	24.0	0.00	0.00	0.00	0.00	0.00
11.00	24.0	0.00	0.00	0.00	0.00	0.00
12.00	24.0	0.00	0.00	0.00	0.00	0.00
13.00	24.0	0.00	0.00	0.00	0.00	0.00
14.00	24.0	0.00	34.28	34.28	17.14	102.83
15.00	24.0	2.27	34.35	36.62	18.31	105.32
16.00	24.0	4.53	34.44	38.97	19.48	107.84
17.00	24.0	6.81	34.54	41.36	20.68	110.44
18.00	24.0	9.17	34.64	43.82	21.91	113.10

"BB-01_Driven_Void=-9.1ft_Preform=-30.1ft.out"

19.00	24.0	11.62	34.73	46.35	23.18	115.81
20.00	24.0	14.18	34.79	48.96	24.48	118.54
21.00	24.0	16.42	34.97	51.38	25.69	121.32
22.00	24.0	17.67	35.77	53.45	26.72	125.00
23.00	24.0	18.07	37.45	55.53	27.76	130.44
24.00	24.0	17.71	41.12	58.83	29.41	141.07
25.00	24.0	17.67	45.45	63.12	31.56	154.02
26.00	24.0	17.89	50.44	68.33	34.16	169.21
27.00	24.0	18.31	56.10	74.40	37.20	186.60
28.00	24.0	18.95	62.36	81.31	40.65	206.04
29.00	24.0	20.72	63.88	84.59	42.30	212.35
30.00	24.0	31.78	68.69	100.48	50.24	237.86
31.00	24.0	35.37	68.89	104.26	52.13	242.05
32.00	24.0	38.01	70.42	108.43	54.21	249.27
33.00	24.0	40.13	73.27	113.40	56.70	259.95
34.00	24.0	42.08	77.15	119.23	59.62	273.53
35.00	24.0	50.63	114.61	165.24	82.62	394.46
36.00	24.0	51.31	115.62	166.94	83.47	398.19
37.00	24.0	51.87	119.20	171.07	85.53	409.46
38.00	24.0	56.98	150.04	207.02	103.51	507.09
39.00	24.0	65.37	150.59	215.96	107.98	517.14
40.00	24.0	73.15	151.71	224.86	112.43	528.27
41.00	24.0	79.82	153.43	233.25	116.62	540.11
42.00	24.0	84.84	155.93	240.77	120.39	552.64
43.00	24.0	98.51	186.43	284.94	142.47	657.80
44.00	24.0	106.18	187.88	294.06	147.03	669.81
45.00	24.0	112.62	191.06	303.67	151.84	685.78
46.00	24.0	118.25	195.91	314.16	157.08	705.99
47.00	24.0	123.44	202.24	325.68	162.84	730.16
48.00	24.0	143.81	280.81	424.62	212.31	986.23
49.00	24.0	152.53	280.74	433.27	216.63	994.74
50.00	24.0	161.29	314.82	476.11	238.06	1105.75
51.00	24.0	169.29	263.15	432.44	216.22	958.74
52.00	24.0	177.29	207.68	384.97	192.49	800.34
53.00	24.0	185.29	167.65	352.95	176.47	688.25
54.00	24.0	193.29	127.62	320.92	160.46	576.17
55.00	24.0	201.29	87.60	288.89	144.45	464.08
56.00	24.0	203.08	95.44	298.52	149.26	489.41
57.00	24.0	204.87	103.29	308.16	154.08	514.74
58.00	24.0	206.56	151.64	358.20	179.10	661.48
59.00	24.0	207.63	203.31	410.94	205.47	817.57
60.00	24.0	207.99	258.14	466.13	233.06	982.40
61.00	24.0	211.07	293.04	504.10	252.05	1090.18
62.00	24.0	214.14	322.81	536.95	268.48	1182.57
63.00	24.0	217.22	352.58	569.80	284.90	1274.96
64.00	24.0	220.29	387.48	607.77	303.89	1382.74
65.00	24.0	223.37	426.87	650.24	325.12	1503.97
66.00	24.0	231.37	426.87	658.24	329.12	1511.97
67.00	24.0	239.37	426.87	666.24	333.12	1519.97
68.00	24.0	247.30	427.51	674.81	337.40	1529.83
69.00	24.0	254.76	432.64	687.40	343.70	1552.67
70.00	24.0	261.67	442.86	704.54	352.27	1590.26

"BB-01_Driven_Void=-9.1ft_Preform=-30.1ft.out"

NBR of 360 tons at
elevation -54.1'



71.00	24.0	268.59	452.86	721.45	360.73	1627.18
72.00	24.0	276.05	457.48	733.53	366.76	1648.48
73.00	24.0	283.98	457.61	741.59	370.79	1656.80
74.00	24.0	291.98	457.35	749.33	374.67	1664.03
75.00	24.0	299.98	457.32	757.30	378.65	1671.93
76.00	24.0	307.98	457.32	765.30	382.65	1679.93
77.00	24.0	315.98	457.32	773.30	386.65	1687.93
78.00	24.0	323.98	457.35	781.33	390.66	1696.03
79.00	24.0	331.95	457.61	789.56	394.78	1704.77
80.00	24.0	339.90	458.12	798.02	399.01	1714.26
81.00	24.0	347.85	458.63	806.48	403.24	1723.75
82.00	24.0	355.83	458.89	814.71	407.36	1732.49
83.00	24.0	363.82	420.84	784.66	392.33	1626.33
84.00	24.0	371.82	382.75	754.58	377.29	1520.08
85.00	24.0	379.82	363.71	743.53	371.77	1470.96
86.00	24.0	387.82	363.71	751.53	375.77	1478.96
87.00	24.0	395.82	363.71	759.53	379.77	1486.96
88.00	24.0	403.82	363.71	767.53	383.77	1494.96
89.00	24.0	411.82	363.71	775.53	387.77	1502.96
90.00	24.0	419.82	341.83	761.65	380.83	1445.31
91.00	24.0	423.19	336.15	759.34	379.67	1431.64
92.00	24.0	426.57	330.47	757.04	378.52	1417.98

Section Type: Square
Pile Width: 30.00 (in)

Test Pile Length (ft)	Pile Width (in)	Ultimate Side Friction (tons)	Mobilized End Bearing (tons)	Estimated Davisson Capacity (tons)	Allowable Pile Capacity (tons)	Ultimate Pile Capacity (tons)
5.00	30.0	0.00	0.00	0.00	0.00	0.00
6.00	30.0	0.00	0.00	0.00	0.00	0.00
7.00	30.0	0.00	0.00	0.00	0.00	0.00
8.00	30.0	0.00	0.00	0.00	0.00	0.00
9.00	30.0	0.00	0.00	0.00	0.00	0.00
10.00	30.0	0.00	0.00	0.00	0.00	0.00
11.00	30.0	0.00	0.00	0.00	0.00	0.00
12.00	30.0	0.00	0.00	0.00	0.00	0.00
13.00	30.0	0.00	0.00	0.00	0.00	0.00
14.00	30.0	0.00	50.43	50.43	25.21	151.28
15.00	30.0	2.88	50.47	53.36	26.68	154.31
16.00	30.0	5.70	50.58	56.28	28.14	157.45
17.00	30.0	8.56	50.69	59.26	29.63	160.64
18.00	30.0	11.57	50.76	62.33	31.16	163.84
19.00	30.0	14.76	50.74	65.50	32.75	166.97
20.00	30.0	17.94	50.80	68.75	34.37	170.36
21.00	30.0	20.18	51.54	71.71	35.86	174.79
22.00	30.0	20.64	53.82	74.46	37.23	182.09

"BB-01_Driven_Void=-9.1ft_Preform=-30.1ft.out"

23.00	30.0	20.45	57.19	77.64	38.82	192.01
24.00	30.0	20.43	61.25	81.68	40.84	204.18
25.00	30.0	20.61	65.98	86.59	43.30	218.55
26.00	30.0	20.98	71.37	92.34	46.17	235.08
27.00	30.0	22.24	74.14	96.38	48.19	244.67
28.00	30.0	23.86	75.85	99.71	49.86	251.42
29.00	30.0	25.20	80.67	105.87	52.94	267.22
30.00	30.0	39.73	115.38	155.11	77.56	385.88
31.00	30.0	43.83	116.16	159.99	80.00	392.32
32.00	30.0	47.09	118.42	165.51	82.76	402.35
33.00	30.0	50.01	121.73	171.74	85.87	415.20
34.00	30.0	52.71	126.03	178.74	89.37	430.80
35.00	30.0	63.29	190.25	253.53	126.77	634.03
36.00	30.0	64.15	191.53	255.67	127.84	638.73
37.00	30.0	64.88	195.36	260.24	130.12	650.97
38.00	30.0	71.26	238.25	309.51	154.75	786.00
39.00	30.0	82.03	238.72	320.75	160.38	798.18
40.00	30.0	92.36	239.57	331.93	165.97	811.08
41.00	30.0	101.39	240.96	342.35	171.17	824.27
42.00	30.0	106.25	245.35	351.60	175.80	842.30
43.00	30.0	122.98	301.47	424.45	212.23	1027.38
44.00	30.0	132.68	303.24	435.91	217.96	1042.39
45.00	30.0	141.09	306.78	447.87	223.93	1061.43
46.00	30.0	148.56	312.09	460.65	230.33	1084.84
47.00	30.0	157.55	315.33	472.88	236.44	1103.54
48.00	30.0	179.94	387.78	567.72	283.86	1343.28
49.00	30.0	190.78	380.20	570.98	285.49	1331.39
50.00	30.0	201.62	403.01	604.63	302.32	1410.66
51.00	30.0	211.62	352.98	564.60	282.30	1270.55
52.00	30.0	221.62	302.94	524.56	262.28	1130.45
53.00	30.0	231.62	252.91	484.53	242.26	990.34
54.00	30.0	241.62	202.87	444.49	222.24	850.23
55.00	30.0	251.62	152.84	404.45	202.23	710.13
56.00	30.0	253.85	212.68	466.53	233.27	891.89
57.00	30.0	256.08	272.53	528.61	264.30	1073.66
58.00	30.0	258.20	332.16	590.36	295.18	1254.69
59.00	30.0	259.54	390.34	649.88	324.94	1430.56
60.00	30.0	259.99	446.85	706.84	353.42	1600.55
61.00	30.0	263.83	484.07	747.90	373.95	1716.04
62.00	30.0	267.68	527.69	795.37	397.69	1850.76
63.00	30.0	271.52	576.93	848.45	424.22	2002.30
64.00	30.0	275.36	626.96	902.33	451.16	2156.25
65.00	30.0	279.21	677.00	956.21	478.10	2310.20
66.00	30.0	289.21	677.00	966.21	483.10	2320.20
67.00	30.0	299.21	677.00	976.21	488.10	2330.20
68.00	30.0	309.12	677.76	986.88	493.44	2342.40
69.00	30.0	318.45	683.85	1002.30	501.15	2370.00
70.00	30.0	327.09	696.03	1023.12	511.56	2415.18
71.00	30.0	335.74	708.21	1043.95	521.97	2460.36
72.00	30.0	345.06	714.30	1059.36	529.68	2487.96
73.00	30.0	354.98	715.06	1070.04	535.02	2500.15
74.00	30.0	364.98	715.06	1080.04	540.02	2510.15

"BB-01_Driven_Void=-9.1ft_Preform=-30.1ft.out"

NBR of 480 tons at
elevation -52.1'



75.00	30.0	374.98	715.06	1090.04	545.02	2520.15
76.00	30.0	384.98	715.06	1100.04	550.02	2530.15
77.00	30.0	394.98	715.06	1110.04	555.02	2540.15
78.00	30.0	404.97	715.10	1120.07	560.04	2550.27
79.00	30.0	414.94	715.42	1130.36	565.18	2561.20
80.00	30.0	424.88	716.06	1140.94	570.47	2573.06
81.00	30.0	434.81	669.10	1103.91	551.96	2442.11
82.00	30.0	444.78	621.81	1066.60	533.30	2310.22
83.00	30.0	454.78	598.05	1052.83	526.41	2248.93
84.00	30.0	464.78	598.05	1062.83	531.41	2258.93
85.00	30.0	474.78	598.05	1072.83	536.41	2268.93
86.00	30.0	484.78	598.05	1082.83	541.41	2278.93
87.00	30.0	494.78	598.05	1092.83	546.41	2288.93
88.00	30.0	504.78	570.70	1075.48	537.74	2216.88
89.00	30.0	514.78	516.00	1030.77	515.39	2062.76
90.00	30.0	524.78	461.29	986.07	493.03	1908.65

NOTES

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1. MOBILIZED END BEARING IS 1/3 OF THE ORIGINAL RB-121 VALUES.
 2. DAVISSON PILE CAPACITY IS AN ESTIMATE BASED ON FAILURE CRITERIA, AND EQUALS ULTIMATE SIDE FRICTION PLUS MOBILIZED END BEARING.
 3. ALLOWABLE PILE CAPACITY IS 1/2 THE DAVISSON PILE CAPACITY.
 4. ULTIMATE PILE CAPACITY IS ULTIMATE SIDE FRICTION PLUS 3 x THE MOBILIZED END BEARING.
EXCEPTION: FOR H-PILES TIPPED IN SAND OR LIMESTONE, THE ULTIMATE PILE CAPACITY IS ULTIMATE SIDE FRICTION PLUS 2 x THE MOBILIZED END BEARING.

"BB-01_Driven_Void=-9.1ft_Preform=-30.1ft.out"

General Information:

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Input file: ns\FB-Deep\Driven\BB-02_Driven_Void=-10.2ft_Preform=-31.2ft.in
Project number: B-22-074
Job name: Broad Causeway Bridge
Engineer: PV/TC
Units: English

Analysis Information:

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Analysis Type: SPT

Soil Information:

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Boring date: 3/21/2023, Boring Number: BB-02
Station number: 118+90 Offset: +73

Ground Elevation: 3.800(ft)

Hammer type: Automatic Hammer, Correction factor = 1.24

ID	Depth (ft)	No. of Blows (Blows/ft)	Soil Type

1	0.00	6.45	5- Cavity layer
2	2.00	6.45	5- Cavity layer
3	4.00	6.45	5- Cavity layer
4	6.00	5.00	5- Cavity layer
5	8.00	2.00	5- Cavity layer
6	10.00	3.00	5- Cavity layer
7	12.00	2.00	5- Cavity layer
8	14.00	1.00	5- Cavity layer
9	14.00	20.00	3- Clean sand
10	16.00	20.00	3- Clean sand
11	16.00	0.00	1- Plastic Clay
12	16.00	13.00	3- Clean sand
13	20.00	13.00	3- Clean sand
14	22.50	8.00	3- Clean sand
15	25.00	8.00	3- Clean sand
16	27.50	9.50	3- Clean sand
17	30.00	8.00	3- Clean sand
18	30.00	0.00	1- Plastic Clay
19	30.00	4.00	3- Clean sand
20	32.50	4.00	3- Clean sand
21	35.00	2.00	3- Clean sand

Predrilling to top of
natural limestone,
elevation -10.2' or a
depth of 14'

Preforming to elevation
-31.2' or a depth of 35'

"BB-02_Driven_Void=-10.2ft_Preform=-31.2ft.out"

22	35.00	0.00	1- Plastic Clay
23	35.00	3.00	3- Clean sand
24	37.50	3.00	3- Clean sand
25	40.00	4.00	3- Clean sand
26	40.00	0.00	1- Plastic Clay
27	40.00	15.00	3- Clean sand
28	42.50	15.00	3- Clean sand
29	45.00	9.00	3- Clean sand
30	45.00	0.00	1- Plastic Clay
31	45.00	2.00	4- Lime Stone/Very shelly sand
32	47.50	2.00	4- Lime Stone/Very shelly sand
33	50.00	7.00	4- Lime Stone/Very shelly sand
34	50.00	0.00	1- Plastic Clay
35	50.00	100.00	4- Lime Stone/Very shelly sand
36	52.50	100.00	4- Lime Stone/Very shelly sand
37	55.00	100.00	4- Lime Stone/Very shelly sand
38	55.00	0.00	1- Plastic Clay
39	55.00	14.00	3- Clean sand
40	57.50	14.00	3- Clean sand
41	57.50	0.00	1- Plastic Clay
42	57.50	2.00	3- Clean sand
43	60.00	2.00	3- Clean sand
44	60.00	0.00	1- Plastic Clay
45	60.00	100.00	3- Clean sand
46	62.50	100.00	3- Clean sand
47	65.00	0.00	1- Plastic Clay
48	65.00	14.00	3- Clean sand
49	65.00	14.00	3- Clean sand
50	65.00	0.00	1- Plastic Clay
51	65.00	100.00	4- Lime Stone/Very shelly sand
52	67.50	100.00	4- Lime Stone/Very shelly sand
53	67.50	0.00	1- Plastic Clay
54	67.50	10.00	4- Lime Stone/Very shelly sand
55	70.00	10.00	4- Lime Stone/Very shelly sand
56	70.00	0.00	1- Plastic Clay
57	70.00	22.00	4- Lime Stone/Very shelly sand
58	72.50	22.00	4- Lime Stone/Very shelly sand
59	75.00	28.00	4- Lime Stone/Very shelly sand
60	75.00	0.00	1- Plastic Clay
61	75.00	100.00	4- Lime Stone/Very shelly sand
62	77.50	100.00	4- Lime Stone/Very shelly sand
63	77.50	0.00	1- Plastic Clay
64	77.50	31.00	4- Lime Stone/Very shelly sand
65	80.00	31.00	4- Lime Stone/Very shelly sand
66	80.00	0.00	1- Plastic Clay
67	80.00	100.00	4- Lime Stone/Very shelly sand
68	82.50	100.00	4- Lime Stone/Very shelly sand
69	85.00	84.00	4- Lime Stone/Very shelly sand
70	87.50	100.00	4- Lime Stone/Very shelly sand
71	87.50	0.00	1- Plastic Clay
72	87.50	10.00	4- Lime Stone/Very shelly sand
73	90.00	10.00	4- Lime Stone/Very shelly sand

"BB-02_Driven_Void=-10.2ft_Preform=-31.2ft.out"

74	90.00	0.00	1- Plastic Clay
75	90.00	100.00	4- Lime Stone/Very shelly sand
76	92.50	100.00	4- Lime Stone/Very shelly sand
77	92.50	0.00	1- Plastic Clay
78	92.50	12.00	4- Lime Stone/Very shelly sand
79	95.00	12.00	4- Lime Stone/Very shelly sand
80	97.50	22.00	4- Lime Stone/Very shelly sand
81	97.50	0.00	1- Plastic Clay
82	97.50	82.00	4- Lime Stone/Very shelly sand
83	100.00	82.00	4- Lime Stone/Very shelly sand
84	102.50	100.00	4- Lime Stone/Very shelly sand
85	105.00	53.00	4- Lime Stone/Very shelly sand
86	107.50	98.00	4- Lime Stone/Very shelly sand
87	110.00	100.00	4- Lime Stone/Very shelly sand
88	112.50	98.00	4- Lime Stone/Very shelly sand
89	112.50	0.00	1- Plastic Clay
90	112.50	27.00	4- Lime Stone/Very shelly sand
91	115.00	27.00	4- Lime Stone/Very shelly sand
92	117.50	32.00	4- Lime Stone/Very shelly sand
93	117.50	0.00	1- Plastic Clay
94	117.50	97.00	4- Lime Stone/Very shelly sand
95	120.00	97.00	4- Lime Stone/Very shelly sand
96	122.50	77.00	4- Lime Stone/Very shelly sand
97	125.00	100.00	4- Lime Stone/Very shelly sand

Blowcount Average Per Soil Layer

Layer Num.	Starting Elevation (ft)	Bottom Elevation (ft)	Thickness (ft)	Average Blowcount (Blows/ft)	Soil Type
1	3.80	-10.20	14.00	4.48	5-Void
2	-10.20	-12.20	2.00	20.00	3-Clean Sand
3	-12.20	-12.20	0.00	13.00	1-Plastic Clay
4	-12.20	-26.20	14.00	10.59	3-Clean Sand
5	-26.20	-26.20	0.00	4.00	1-Plastic Clay
6	-26.20	-31.20	5.00	4.00	3-Clean Sand
7	-31.20	-31.20	0.00	3.00	1-Plastic Clay
8	-31.20	-36.20	5.00	3.00	3-Clean Sand
9	-36.20	-36.20	0.00	15.00	1-Plastic Clay
10	-36.20	-41.20	5.00	15.00	3-Clean Sand
11	-41.20	-41.20	0.00	2.00	1-Plastic Clay
12	-41.20	-46.20	5.00	2.00	4-Limestone, Very
Shelly Sand					
13	-46.20	-46.20	0.00	100.00	1-Plastic Clay
14	-46.20	-51.20	5.00	100.00	4-Limestone, Very
Shelly Sand					
15	-51.20	-51.20	0.00	14.00	1-Plastic Clay

"BB-02_Driven_Void=-10.2ft_Preform=-31.2ft.out"

16	-51.20	-53.70	2.50	14.00	3-Clean Sand
17	-53.70	-53.70	0.00	2.00	1-Plastic Clay
18	-53.70	-56.20	2.50	2.00	3-Clean Sand
19	-56.20	-56.20	0.00	100.00	1-Plastic Clay
20	-56.20	-61.20	5.00	100.00	3-Clean Sand
21	-61.20	-61.20	0.00	14.00	1-Plastic Clay
22	-61.20	-61.20	0.00	0.00	3-Clean Sand
23	-61.20	-61.20	0.00	100.00	1-Plastic Clay
24	-61.20	-63.70	2.50	100.00	4-Limestone, Very
Shelly Sand					
25	-63.70	-63.70	0.00	10.00	1-Plastic Clay
26	-63.70	-66.20	2.50	10.00	4-Limestone, Very
Shelly Sand					
27	-66.20	-66.20	0.00	22.00	1-Plastic Clay
28	-66.20	-71.20	5.00	22.00	4-Limestone, Very
Shelly Sand					
29	-71.20	-71.20	0.00	100.00	1-Plastic Clay
30	-71.20	-73.70	2.50	100.00	4-Limestone, Very
Shelly Sand					
31	-73.70	-73.70	0.00	31.00	1-Plastic Clay
32	-73.70	-76.20	2.50	31.00	4-Limestone, Very
Shelly Sand					
33	-76.20	-76.20	0.00	100.00	1-Plastic Clay
34	-76.20	-83.70	7.50	94.67	4-Limestone, Very
Shelly Sand					
35	-83.70	-83.70	0.00	10.00	1-Plastic Clay
36	-83.70	-86.20	2.50	10.00	4-Limestone, Very
Shelly Sand					
37	-86.20	-86.20	0.00	100.00	1-Plastic Clay
38	-86.20	-88.70	2.50	100.00	4-Limestone, Very
Shelly Sand					
39	-88.70	-88.70	0.00	12.00	1-Plastic Clay
40	-88.70	-93.70	5.00	12.00	4-Limestone, Very
Shelly Sand					
41	-93.70	-93.70	0.00	82.00	1-Plastic Clay
42	-93.70	-108.70	15.00	85.83	4-Limestone, Very
Shelly Sand					
43	-108.70	-108.70	0.00	27.00	1-Plastic Clay
44	-108.70	-113.70	5.00	27.00	4-Limestone, Very
Shelly Sand					
45	-113.70	-113.70	0.00	97.00	1-Plastic Clay
46	-113.70	-121.20	7.50	90.33	4-Limestone, Very
Shelly Sand					

Driven Pile Data:

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Pile unit weight = 150.00(pcf), Section Type: Square

Pile Geometry:

Width Length Tip Elev.

"BB-02_Driven_Void=-10.2ft_Preform=-31.2ft.out"

(in)	(ft)	(ft)
24.00	10.00	-6.20
24.00	12.00	-8.20
24.00	14.00	-10.20
24.00	16.00	-12.20
24.00	18.00	-14.20
24.00	20.00	-16.20
24.00	22.00	-18.20
24.00	24.00	-20.20
24.00	26.00	-22.20
24.00	28.00	-24.20
24.00	30.00	-26.20
24.00	32.00	-28.20
24.00	34.00	-30.20
24.00	36.00	-32.20
24.00	38.00	-34.20
24.00	40.00	-36.20
24.00	42.00	-38.20
24.00	44.00	-40.20
24.00	46.00	-42.20
24.00	48.00	-44.20
24.00	50.00	-46.20
24.00	52.00	-48.20
24.00	54.00	-50.20
24.00	56.00	-52.20
24.00	58.00	-54.20
24.00	60.00	-56.20
24.00	62.00	-58.20
24.00	64.00	-60.20
24.00	66.00	-62.20
24.00	68.00	-64.20
24.00	70.00	-66.20
24.00	72.00	-68.20
24.00	74.00	-70.20
24.00	76.00	-72.20
24.00	78.00	-74.20
24.00	80.00	-76.20
24.00	82.00	-78.20
24.00	84.00	-80.20
24.00	86.00	-82.20
24.00	88.00	-84.20
24.00	90.00	-86.20
24.00	92.00	-88.20
24.00	94.00	-90.20
24.00	96.00	-92.20
24.00	98.00	-94.20
24.00	100.00	-96.20
24.00	102.00	-98.20
24.00	104.00	-100.20
24.00	106.00	-102.20
24.00	108.00	-104.20

"BB-02_Driven_Void=-10.2ft_Preform=-31.2ft.out"

24.00	110.00	-106.20
24.00	112.00	-108.20
24.00	114.00	-110.20
24.00	116.00	-112.20
30.00	10.00	-6.20
30.00	12.00	-8.20
30.00	14.00	-10.20
30.00	16.00	-12.20
30.00	18.00	-14.20
30.00	20.00	-16.20
30.00	22.00	-18.20
30.00	24.00	-20.20
30.00	26.00	-22.20
30.00	28.00	-24.20
30.00	30.00	-26.20
30.00	32.00	-28.20
30.00	34.00	-30.20
30.00	36.00	-32.20
30.00	38.00	-34.20
30.00	40.00	-36.20
30.00	42.00	-38.20
30.00	44.00	-40.20
30.00	46.00	-42.20
30.00	48.00	-44.20
30.00	50.00	-46.20
30.00	52.00	-48.20
30.00	54.00	-50.20
30.00	56.00	-52.20
30.00	58.00	-54.20
30.00	60.00	-56.20
30.00	62.00	-58.20
30.00	64.00	-60.20
30.00	66.00	-62.20
30.00	68.00	-64.20
30.00	70.00	-66.20
30.00	72.00	-68.20
30.00	74.00	-70.20
30.00	76.00	-72.20
30.00	78.00	-74.20
30.00	80.00	-76.20
30.00	82.00	-78.20
30.00	84.00	-80.20
30.00	86.00	-82.20
30.00	88.00	-84.20
30.00	90.00	-86.20
30.00	92.00	-88.20
30.00	94.00	-90.20
30.00	96.00	-92.20
30.00	98.00	-94.20
30.00	100.00	-96.20
30.00	102.00	-98.20
30.00	104.00	-100.20

"BB-02_Driven_Void=-10.2ft_Preform=-31.2ft.out"

30.00	106.00	-102.20
30.00	108.00	-104.20
30.00	110.00	-106.20
30.00	112.00	-108.20
30.00	114.00	-110.20

Driven Pile Capacity:
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Section Type: Square
Pile Width: 24.00 (in)

Test Pile Length (ft)	Pile Width (in)	Ultimate Side Friction (tons)	Mobilized End Bearing (tons)	Estimated Davisson Capacity (tons)	Allowable Pile Capacity (tons)	Ultimate Pile Capacity (tons)
10.00	24.0	0.00	0.00	0.00	0.00	0.00
12.00	24.0	0.00	0.00	0.00	0.00	0.00
14.00	24.0	0.00	39.30	39.30	19.65	117.91
16.00	24.0	7.54	37.70	45.24	22.62	120.63
18.00	24.0	12.38	37.75	50.13	25.07	125.64
20.00	24.0	17.01	38.03	55.04	27.52	131.09
22.00	24.0	20.44	38.93	59.38	29.69	137.25
24.00	24.0	23.03	39.88	62.90	31.45	142.66
26.00	24.0	26.11	40.13	66.24	33.12	146.51
28.00	24.0	30.38	38.84	69.22	34.61	146.90
30.00	24.0	34.30	38.03	72.33	36.17	148.38
32.00	24.0	35.81	32.15	67.96	33.98	132.26
34.00	24.0	36.98	33.64	70.62	35.31	137.89
36.00	24.0	37.66	37.22	74.88	37.44	149.31
38.00	24.0	38.61	38.60	77.22	38.61	154.42
40.00	24.0	40.19	39.23	79.42	39.71	157.89
42.00	24.0	45.85	31.06	76.91	38.46	139.04
44.00	24.0	48.04	43.10	91.14	45.57	177.34
46.00	24.0	52.92	233.86	286.77	143.39	754.49
48.00	24.0	52.95	300.31	353.26	176.63	953.87
50.00	24.0	53.78	309.97	363.76	181.88	983.70
52.00	24.0	69.78	195.24	265.03	132.51	655.51
54.00	24.0	85.78	144.51	230.30	115.15	519.32
56.00	24.0	96.18	135.16	231.34	115.67	501.65
58.00	24.0	100.38	153.36	253.74	126.87	560.47
60.00	24.0	100.38	214.41	314.79	157.40	743.61
62.00	24.0	118.62	212.91	331.53	165.76	757.34
64.00	24.0	132.76	206.58	339.33	169.67	752.48
66.00	24.0	142.58	147.64	290.22	145.11	585.50

"BB-02_Driven_Void=-10.2ft_Preform=-31.2ft.out"

68.00	24.0	155.08	131.13	286.21	143.10	548.47
70.00	24.0	157.06	215.66	372.73	186.36	804.06
72.00	24.0	161.43	226.72	388.15	194.07	841.59
74.00	24.0	166.06	316.20	482.26	241.13	1114.66
76.00	24.0	176.72	358.85	535.57	267.78	1253.27
78.00	24.0	190.25	378.86	569.12	284.56	1326.85
80.00	24.0	196.40	432.78	629.19	314.59	1494.75
82.00	24.0	212.40	328.23	540.64	270.32	1197.11
84.00	24.0	228.40	328.23	556.64	278.32	1213.11
86.00	24.0	244.40	251.43	495.83	247.92	998.69
88.00	24.0	256.90	176.29	433.19	216.59	785.77
90.00	24.0	258.88	209.96	468.85	234.42	888.77
92.00	24.0	274.88	209.96	484.85	242.42	904.77
94.00	24.0	280.67	286.77	567.44	283.72	1140.97
96.00	24.0	283.25	377.04	660.29	330.14	1414.36
98.00	24.0	290.08	408.78	698.85	349.43	1516.41
100.00	24.0	306.08	397.77	703.85	351.92	1499.39
102.00	24.0	322.08	397.77	719.85	359.92	1515.39
104.00	24.0	336.84	408.78	745.62	372.81	1563.17
106.00	24.0	348.45	384.10	732.56	366.28	1500.76
108.00	24.0	363.22	310.66	673.88	336.94	1295.20
110.00	24.0	379.22	250.16	629.38	314.69	1129.70
112.00	24.0	395.22	250.16	645.38	322.69	1145.70
114.00	24.0	403.24	311.11	714.35	357.17	1336.57
116.00	24.0	408.69	390.20	798.89	399.45	1579.29

Section Type: Square
Pile Width: 30.00 (in)

Test Pile Length (ft)	Pile Width (in)	Ultimate Side Friction (tons)	Mobilized End Bearing (tons)	Estimated Davisson Capacity (tons)	Allowable Pile Capacity (tons)	Ultimate Pile Capacity (tons)
10.00	30.0	0.00	0.00	0.00	0.00	0.00
12.00	30.0	0.00	0.00	0.00	0.00	0.00
14.00	30.0	0.00	56.80	56.80	28.40	170.41
16.00	30.0	9.42	55.80	65.22	32.61	176.82
18.00	30.0	15.49	55.85	71.34	35.67	183.04
20.00	30.0	21.52	55.94	77.46	38.73	189.34
22.00	30.0	26.51	56.15	82.66	41.33	194.95
24.00	30.0	30.46	56.06	86.52	43.26	198.64
26.00	30.0	34.53	54.10	88.62	44.31	196.81
28.00	30.0	38.83	51.75	90.58	45.29	194.07
30.00	30.0	42.88	50.16	93.04	46.52	193.36
32.00	30.0	44.59	50.88	95.47	47.74	197.24
34.00	30.0	45.46	54.93	100.39	50.20	210.26
36.00	30.0	47.12	69.95	117.07	58.54	256.98
38.00	30.0	48.55	64.23	112.78	56.39	241.24

"BB-02_Driven_Void=-10.2ft_Preform=-31.2ft.out"

40.00	30.0	50.24	57.73	107.97	53.99	223.43
42.00	30.0	55.54	59.56	115.09	57.55	234.21
44.00	30.0	56.19	74.07	130.26	65.13	278.39
46.00	30.0	66.14	375.60	441.75	220.87	1192.95
48.00	30.0	66.19	392.74	458.93	229.46	1244.41
50.00	30.0	67.23	387.46	454.69	227.35	1229.62
52.00	30.0	87.23	324.05	411.28	205.64	1059.39
54.00	30.0	107.23	242.64	349.87	174.93	835.15
56.00	30.0	120.49	203.53	324.02	162.01	731.08
58.00	30.0	125.48	251.60	377.08	188.54	880.29
60.00	30.0	125.48	304.89	430.36	215.18	1040.14
62.00	30.0	148.28	283.84	432.12	216.06	999.81
64.00	30.0	165.95	275.17	441.12	220.56	991.47
66.00	30.0	178.23	274.65	452.88	226.44	1002.19
68.00	30.0	193.85	282.31	476.15	238.08	1040.77
70.00	30.0	196.33	312.92	509.25	254.62	1135.10
72.00	30.0	201.78	426.82	628.60	314.30	1482.23
74.00	30.0	207.57	538.66	746.24	373.12	1823.56
76.00	30.0	220.90	591.97	812.87	406.44	1996.82
78.00	30.0	237.82	584.32	822.14	411.07	1990.78
80.00	30.0	245.51	553.71	799.21	399.61	1906.62
82.00	30.0	265.51	553.71	819.21	409.61	1926.62
84.00	30.0	285.51	457.70	743.20	371.60	1658.60
86.00	30.0	305.51	331.10	636.61	318.30	1298.81
88.00	30.0	321.13	275.18	596.30	298.15	1146.66
90.00	30.0	323.61	405.86	729.47	364.74	1541.20
92.00	30.0	343.61	405.86	749.47	374.74	1561.20
94.00	30.0	350.84	488.11	838.95	419.47	1815.17
96.00	30.0	354.06	565.79	919.85	459.92	2051.42
98.00	30.0	362.60	640.62	1003.22	501.61	2284.47
100.00	30.0	382.60	640.62	1023.22	511.61	2304.47
102.00	30.0	402.60	640.62	1043.22	521.61	2324.47
104.00	30.0	421.05	574.62	995.67	497.84	2144.91
106.00	30.0	435.57	517.98	953.54	476.77	1989.50
108.00	30.0	454.03	456.11	910.14	455.07	1822.36
110.00	30.0	474.03	456.11	930.14	465.07	1842.36
112.00	30.0	494.03	452.54	946.56	473.28	1851.64
114.00	30.0	504.05	525.60	1029.64	514.82	2080.84

NBR of 480 tons at
elevation -66.2'



2 x THE MOBILIZED END BEARING.

NOTES

1. MOBILIZED END BEARING IS 1/3 OF THE ORIGINAL RB-121 VALUES.
2. DAVISSON PILE CAPACITY IS AN ESTIMATE BASED ON FAILURE CRITERIA, AND EQUALS ULTIMATE SIDE FRICTION PLUS MOBILIZED END BEARING.
3. ALLOWABLE PILE CAPACITY IS 1/2 THE DAVISSON PILE CAPACITY.
4. ULTIMATE PILE CAPACITY IS ULTIMATE SIDE FRICTION PLUS 3 x THE MOBILIZED END BEARING.
EXCEPTION: FOR H-PILES TIPPED IN SAND OR LIMESTONE, THE ULTIMATE PILE CAPACITY IS ULTIMATE SIDE FRICTION PLUS

"BB-02_Driven_Void=-10.2ft_Preform=-31.2ft.out"

"BB-02_Driven_Void=-10.2ft_Preform=-31.2ft.out"

General Information:

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Input file: ons\FB-Deep\Driven\BB-03_Driven_Void=-9.4ft_Preform=-27.9ft.in
Project number: B-22-074
Job name: Broad Causeway Bridge
Engineer: PV/TC
Units: English

Analysis Information:

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Analysis Type: SPT

Soil Information:

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Boring date: 3/24/2023, Boring Number: BB-03
Station number: 121+53 Offset: +32

Ground Elevation: 4.600(ft)

Hammer type: Automatic Hammer, Correction factor = 1.24

ID	Depth (ft)	No. of Blows (Blows/ft)	Soil Type
1	0.00	6.45	5- Cavity layer
2	2.00	6.45	5- Cavity layer
3	4.00	6.45	5- Cavity layer
4	6.00	2.00	5- Cavity layer
5	8.00	2.00	5- Cavity layer
6	10.00	2.00	5- Cavity layer
7	12.00	3.00	5- Cavity layer
8	14.00	2.00	5- Cavity layer
9	14.00	8.50	3- Clean sand
10	16.00	8.50	3- Clean sand
11	20.00	7.00	3- Clean sand
12	22.50	10.50	3- Clean sand
13	25.00	8.50	3- Clean sand
14	25.00	0.00	1- Plastic Clay
15	25.00	5.50	3- Clean sand
16	27.50	5.50	3- Clean sand
17	30.00	3.50	3- Clean sand
18	32.50	3.00	3- Clean sand
19	35.00	5.00	3- Clean sand
20	35.00	0.00	1- Plastic Clay
21	35.00	12.00	3- Clean sand

"BB-03_Driven_Void=-9.4ft_Preform=-27.9ft.out"

Predrilling to top of
natural limestone,
elevation -9.4' or a
depth of 14'

Preforming to elevation
-27.9' or a depth of 32.5'

22	37.50	12.00	3- Clean sand
23	40.00	10.00	3- Clean sand
24	42.50	13.00	3- Clean sand
25	42.50	0.00	1- Plastic Clay
26	42.50	22.00	3- Clean sand
27	45.00	22.00	3- Clean sand
28	45.00	0.00	1- Plastic Clay
29	45.00	15.00	3- Clean sand
30	47.50	15.00	3- Clean sand
31	50.00	10.00	3- Clean sand
32	50.00	0.00	1- Plastic Clay
33	50.00	51.00	3- Clean sand
34	52.50	51.00	3- Clean sand
35	55.00	76.00	3- Clean sand
36	55.00	0.00	1- Plastic Clay
37	55.00	14.00	3- Clean sand
38	57.50	14.00	3- Clean sand
39	57.50	0.00	1- Plastic Clay
40	57.50	100.00	3- Clean sand
41	60.00	100.00	3- Clean sand
42	60.00	0.00	1- Plastic Clay
43	60.00	92.00	4- Lime Stone/Very shelly sand
44	62.50	92.00	4- Lime Stone/Very shelly sand
45	65.00	100.00	4- Lime Stone/Very shelly sand
46	67.50	100.00	4- Lime Stone/Very shelly sand
47	70.00	75.00	4- Lime Stone/Very shelly sand
48	72.50	100.00	4- Lime Stone/Very shelly sand
49	75.00	99.00	4- Lime Stone/Very shelly sand
50	77.50	100.00	4- Lime Stone/Very shelly sand
51	80.00	50.00	4- Lime Stone/Very shelly sand
52	82.50	100.00	4- Lime Stone/Very shelly sand
53	85.00	100.00	4- Lime Stone/Very shelly sand
54	87.50	100.00	4- Lime Stone/Very shelly sand
55	87.50	0.00	1- Plastic Clay
56	87.50	21.00	4- Lime Stone/Very shelly sand
57	90.00	21.00	4- Lime Stone/Very shelly sand
58	92.50	20.00	4- Lime Stone/Very shelly sand
59	95.00	17.00	4- Lime Stone/Very shelly sand
60	95.00	0.00	1- Plastic Clay
61	95.00	100.00	4- Lime Stone/Very shelly sand
62	97.50	100.00	4- Lime Stone/Very shelly sand
63	97.50	0.00	1- Plastic Clay
64	97.50	21.00	4- Lime Stone/Very shelly sand
65	100.00	21.00	4- Lime Stone/Very shelly sand
66	100.00	0.00	1- Plastic Clay
67	100.00	84.00	4- Lime Stone/Very shelly sand
68	102.50	84.00	4- Lime Stone/Very shelly sand
69	105.00	50.00	4- Lime Stone/Very shelly sand
70	107.50	100.00	4- Lime Stone/Very shelly sand
71	107.50	0.00	1- Plastic Clay
72	107.50	12.00	4- Lime Stone/Very shelly sand
73	110.00	12.00	4- Lime Stone/Very shelly sand

"BB-03_Driven_Void=-9.4ft_Preform=-27.9ft.out"

74	112.50	28.00	4- Lime Stone/Very shelly sand
75	112.50	0.00	1- Plastic Clay
76	112.50	69.00	4- Lime Stone/Very shelly sand
77	115.00	69.00	4- Lime Stone/Very shelly sand
78	117.50	69.00	4- Lime Stone/Very shelly sand
79	117.50	0.00	1- Plastic Clay
80	117.50	26.00	4- Lime Stone/Very shelly sand
81	120.00	26.00	4- Lime Stone/Very shelly sand
82	120.00	0.00	1- Plastic Clay
83	120.00	86.00	4- Lime Stone/Very shelly sand
84	122.50	86.00	4- Lime Stone/Very shelly sand
85	125.00	64.00	4- Lime Stone/Very shelly sand

Blowcount Average Per Soil Layer

Layer Num.	Starting Elevation (ft)	Bottom Elevation (ft)	Thickness (ft)	Average Blowcount (Blows/ft)	Soil Type
1	4.60	-9.40	14.00	4.05	5-Void
2	-9.40	-20.40	11.00	8.61	3-Clean Sand
3	-20.40	-20.40	0.00	5.50	1-Plastic Clay
4	-20.40	-30.40	10.00	4.38	3-Clean Sand
5	-30.40	-30.40	0.00	12.00	1-Plastic Clay
6	-30.40	-37.90	7.50	11.33	3-Clean Sand
7	-37.90	-37.90	0.00	22.00	1-Plastic Clay
8	-37.90	-40.40	2.50	22.00	3-Clean Sand
9	-40.40	-40.40	0.00	15.00	1-Plastic Clay
10	-40.40	-45.40	5.00	15.00	3-Clean Sand
11	-45.40	-45.40	0.00	51.00	1-Plastic Clay
12	-45.40	-50.40	5.00	51.00	3-Clean Sand
13	-50.40	-50.40	0.00	14.00	1-Plastic Clay
14	-50.40	-52.90	2.50	14.00	3-Clean Sand
15	-52.90	-52.90	0.00	100.00	1-Plastic Clay
16	-52.90	-55.40	2.50	100.00	3-Clean Sand
17	-55.40	-55.40	0.00	92.00	1-Plastic Clay
18	-55.40	-82.90	27.50	91.64	4-Limestone, Very
Shelly Sand					
19	-82.90	-82.90	0.00	21.00	1-Plastic Clay
20	-82.90	-90.40	7.50	20.67	4-Limestone, Very
Shelly Sand					
21	-90.40	-90.40	0.00	100.00	1-Plastic Clay
22	-90.40	-92.90	2.50	100.00	4-Limestone, Very
Shelly Sand					
23	-92.90	-92.90	0.00	21.00	1-Plastic Clay
24	-92.90	-95.40	2.50	21.00	4-Limestone, Very
Shelly Sand					
25	-95.40	-95.40	0.00	84.00	1-Plastic Clay

"BB-03_Driven_Void=-9.4ft_Preform=-27.9ft.out"

26	-95.40	-102.90	7.50	72.67	4-Limestone, Very
Shelly Sand					
27	-102.90	-102.90	0.00	12.00	1-Plastic Clay
28	-102.90	-107.90	5.00	12.00	4-Limestone, Very
Shelly Sand					
29	-107.90	-107.90	0.00	69.00	1-Plastic Clay
30	-107.90	-112.90	5.00	69.00	4-Limestone, Very
Shelly Sand					
31	-112.90	-112.90	0.00	26.00	1-Plastic Clay
32	-112.90	-115.40	2.50	26.00	4-Limestone, Very
Shelly Sand					
33	-115.40	-115.40	0.00	86.00	1-Plastic Clay
34	-115.40	-120.40	5.00	86.00	4-Limestone, Very
Shelly Sand					

Driven Pile Data:

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Pile unit weight = 150.00(pcf), Section Type: Square

Pile Geometry:

Width (in)	Length (ft)	Tip Elev. (ft)
24.00	5.00	-0.40
24.00	7.00	-2.40
24.00	9.00	-4.40
24.00	11.00	-6.40
24.00	13.00	-8.40
24.00	15.00	-10.40
24.00	17.00	-12.40
24.00	19.00	-14.40
24.00	21.00	-16.40
24.00	23.00	-18.40
24.00	25.00	-20.40
24.00	27.00	-22.40
24.00	29.00	-24.40
24.00	31.00	-26.40
24.00	33.00	-28.40
24.00	35.00	-30.40
24.00	37.00	-32.40
24.00	39.00	-34.40
24.00	41.00	-36.40
24.00	43.00	-38.40
24.00	45.00	-40.40
24.00	47.00	-42.40
24.00	49.00	-44.40
24.00	51.00	-46.40
24.00	53.00	-48.40
24.00	55.00	-50.40
24.00	57.00	-52.40

"BB-03_Driven_Void=-9.4ft_Preform=-27.9ft.out"

24.00	59.00	-54.40
24.00	61.00	-56.40
24.00	63.00	-58.40
24.00	65.00	-60.40
24.00	67.00	-62.40
24.00	69.00	-64.40
24.00	71.00	-66.40
24.00	73.00	-68.40
24.00	75.00	-70.40
24.00	77.00	-72.40
24.00	79.00	-74.40
24.00	81.00	-76.40
24.00	83.00	-78.40
24.00	85.00	-80.40
24.00	87.00	-82.40
24.00	89.00	-84.40
24.00	91.00	-86.40
24.00	93.00	-88.40
24.00	95.00	-90.40
24.00	97.00	-92.40
24.00	99.00	-94.40
24.00	101.00	-96.40
24.00	103.00	-98.40
24.00	105.00	-100.40
24.00	107.00	-102.40
24.00	109.00	-104.40
24.00	111.00	-106.40
24.00	113.00	-108.40
24.00	115.00	-110.40
24.00	117.00	-112.40
30.00	5.00	-0.40
30.00	7.00	-2.40
30.00	9.00	-4.40
30.00	11.00	-6.40
30.00	13.00	-8.40
30.00	15.00	-10.40
30.00	17.00	-12.40
30.00	19.00	-14.40
30.00	21.00	-16.40
30.00	23.00	-18.40
30.00	25.00	-20.40
30.00	27.00	-22.40
30.00	29.00	-24.40
30.00	31.00	-26.40
30.00	33.00	-28.40
30.00	35.00	-30.40
30.00	37.00	-32.40
30.00	39.00	-34.40
30.00	41.00	-36.40
30.00	43.00	-38.40
30.00	45.00	-40.40
30.00	47.00	-42.40

"BB-03_Driven_Void=-9.4ft_Preform=-27.9ft.out"

30.00	49.00	-44.40
30.00	51.00	-46.40
30.00	53.00	-48.40
30.00	55.00	-50.40
30.00	57.00	-52.40
30.00	59.00	-54.40
30.00	61.00	-56.40
30.00	63.00	-58.40
30.00	65.00	-60.40
30.00	67.00	-62.40
30.00	69.00	-64.40
30.00	71.00	-66.40
30.00	73.00	-68.40
30.00	75.00	-70.40
30.00	77.00	-72.40
30.00	79.00	-74.40
30.00	81.00	-76.40
30.00	83.00	-78.40
30.00	85.00	-80.40
30.00	87.00	-82.40
30.00	89.00	-84.40
30.00	91.00	-86.40
30.00	93.00	-88.40
30.00	95.00	-90.40
30.00	97.00	-92.40
30.00	99.00	-94.40
30.00	101.00	-96.40
30.00	103.00	-98.40
30.00	105.00	-100.40
30.00	107.00	-102.40
30.00	109.00	-104.40
30.00	111.00	-106.40
30.00	113.00	-108.40
30.00	115.00	-110.40

Driven Pile Capacity:

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Section Type: Square
Pile Width: 24.00 (in)

Test Pile Length (ft)	Pile Width (in)	Ultimate Side Friction (tons)	Mobilized End Bearing (tons)	Estimated Davisson Capacity (tons)	Allowable Pile Capacity (tons)	Ultimate Pile Capacity (tons)

"BB-03_Driven_Void=-9.4ft_Preform=-27.9ft.out"

5.00	24.0	0.00	0.00	0.00	0.00	0.00
7.00	24.0	0.00	0.00	0.00	0.00	0.00
9.00	24.0	0.00	0.00	0.00	0.00	0.00
11.00	24.0	0.00	0.00	0.00	0.00	0.00
13.00	24.0	0.00	0.00	0.00	0.00	0.00
15.00	24.0	1.49	21.19	22.68	11.34	65.07
17.00	24.0	3.90	22.45	26.34	13.17	71.23
19.00	24.0	6.06	24.27	30.33	15.16	78.87
21.00	24.0	8.33	26.12	34.44	17.22	86.68
23.00	24.0	11.74	26.92	38.67	19.33	92.51
25.00	24.0	17.65	27.42	45.07	22.53	99.91
27.00	24.0	19.70	27.47	47.17	23.58	102.10
29.00	24.0	21.16	28.89	50.05	25.03	107.83
31.00	24.0	21.89	32.66	54.55	27.28	119.87
33.00	24.0	22.68	37.10	59.78	29.89	133.98
35.00	24.0	25.77	46.06	71.83	35.92	163.94
37.00	24.0	29.71	46.87	76.58	38.29	170.32
39.00	24.0	32.90	48.99	81.88	40.94	179.85
41.00	24.0	35.74	51.69	87.43	43.71	190.80
43.00	24.0	44.10	64.00	108.10	54.05	236.10
45.00	24.0	52.40	89.55	141.94	70.97	321.04
47.00	24.0	56.75	92.77	149.51	74.76	335.05
49.00	24.0	60.02	99.68	159.70	79.85	359.07
51.00	24.0	74.43	137.52	211.95	105.97	486.99
53.00	24.0	90.53	139.09	229.62	114.81	507.80
55.00	24.0	110.96	191.43	302.39	151.19	685.26
57.00	24.0	115.10	197.67	312.77	156.39	708.12
59.00	24.0	129.87	263.39	393.26	196.63	920.04
61.00	24.0	148.35	456.45	604.80	302.40	1517.70
63.00	24.0	164.35	447.67	612.02	306.01	1507.35
65.00	24.0	180.35	445.19	625.55	312.77	1515.94
67.00	24.0	196.35	445.19	641.55	320.77	1531.94
69.00	24.0	212.10	447.67	659.77	329.88	1555.10
71.00	24.0	227.20	444.40	671.61	335.80	1560.41
73.00	24.0	242.95	404.04	646.99	323.50	1455.08
75.00	24.0	258.95	392.00	650.95	325.47	1434.94
77.00	24.0	274.95	392.00	666.95	333.47	1450.94
79.00	24.0	289.58	404.04	693.63	346.81	1501.71
81.00	24.0	300.72	377.66	678.38	339.19	1433.69
83.00	24.0	315.35	297.30	612.65	306.32	1207.25
85.00	24.0	331.35	204.02	535.37	267.69	943.41
87.00	24.0	347.35	108.51	455.86	227.93	672.88
89.00	24.0	354.48	177.73	532.20	266.10	887.65
91.00	24.0	358.62	200.91	559.54	279.77	961.37
93.00	24.0	362.62	248.05	610.67	305.33	1106.76
95.00	24.0	366.23	342.22	708.45	354.23	1392.89
97.00	24.0	382.23	310.10	692.33	346.16	1312.52
99.00	24.0	389.36	347.19	736.55	368.27	1430.92
101.00	24.0	399.44	315.19	714.63	357.32	1345.01
103.00	24.0	415.29	215.98	631.27	315.63	1063.23
105.00	24.0	427.64	175.53	603.17	301.58	954.22
107.00	24.0	439.99	185.58	625.57	312.79	996.73

"BB-03_Driven_Void=-9.4ft_Preform=-27.9ft.out"

NBR of 360 tons at elevation -54.4'



109.00	24.0	445.63	241.65	687.28	343.64	1170.58
111.00	24.0	448.32	271.95	720.27	360.14	1264.17
113.00	24.0	455.20	301.37	756.57	378.28	1359.31
115.00	24.0	468.89	322.67	791.56	395.78	1436.90
117.00	24.0	482.58	326.22	808.79	404.40	1461.23

Section Type: Square
Pile Width: 30.00 (in)

Test Pile Length (ft)	Pile Width (in)	Ultimate Side Friction (tons)	Mobilized End Bearing (tons)	Estimated Davisson Capacity (tons)	Allowable Pile Capacity (tons)	Ultimate Pile Capacity (tons)
5.00	30.0	0.00	0.00	0.00	0.00	0.00
7.00	30.0	0.00	0.00	0.00	0.00	0.00
9.00	30.0	0.00	0.00	0.00	0.00	0.00
11.00	30.0	0.00	0.00	0.00	0.00	0.00
13.00	30.0	0.00	0.00	0.00	0.00	0.00
15.00	30.0	1.85	34.44	36.28	18.14	105.15
17.00	30.0	5.15	35.46	40.61	20.31	111.54
19.00	30.0	8.30	36.48	44.78	22.39	117.73
21.00	30.0	11.50	37.30	48.81	24.40	123.41
23.00	30.0	16.21	37.00	53.21	26.61	127.22
25.00	30.0	22.06	37.06	59.12	29.56	133.25
27.00	30.0	24.41	37.59	62.01	31.00	137.20
29.00	30.0	25.93	40.43	66.37	33.18	147.23
31.00	30.0	26.81	45.50	72.30	36.15	163.29
33.00	30.0	27.57	52.92	80.49	40.24	186.32
35.00	30.0	32.22	80.24	112.46	56.23	272.93
37.00	30.0	37.36	80.99	118.35	59.17	280.33
39.00	30.0	41.88	82.59	124.48	62.24	289.67
41.00	30.0	45.90	84.61	130.52	65.26	299.74
43.00	30.0	54.98	118.84	173.82	86.91	411.50
45.00	30.0	65.50	156.29	221.79	110.90	534.38
47.00	30.0	71.69	158.36	230.05	115.03	546.78
49.00	30.0	77.04	161.83	238.87	119.44	562.52
51.00	30.0	92.61	206.85	299.46	149.73	713.15
53.00	30.0	108.61	212.51	321.12	160.56	746.13
55.00	30.0	138.69	320.73	459.43	229.71	1100.89
57.00	30.0	144.17	326.91	471.08	235.54	1124.91
59.00	30.0	162.60	409.60	572.20	286.10	1391.40
61.00	30.0	185.44	702.99	888.43	444.22	2294.42
63.00	30.0	205.44	699.91	905.35	452.67	2305.16
65.00	30.0	225.44	699.91	925.35	462.67	2325.16
67.00	30.0	245.44	699.91	945.35	472.67	2345.16
69.00	30.0	265.13	687.94	953.06	476.53	2328.93
71.00	30.0	284.01	645.38	929.38	464.69	2220.14
73.00	30.0	303.69	633.41	937.10	468.55	2203.91

"BB-03_Driven_Void=-9.4ft_Preform=-27.9ft.out"

NBR of 480 tons at elevation -53.4'



75.00	30.0	323.69	633.41	957.10	478.55	2223.91
77.00	30.0	343.69	633.41	977.10	488.55	2243.91
79.00	30.0	361.98	561.94	923.92	461.96	2047.81
81.00	30.0	375.90	499.98	875.88	437.94	1875.83
83.00	30.0	394.19	398.44	792.63	396.31	1589.50
85.00	30.0	414.19	279.05	693.24	346.62	1251.33
87.00	30.0	434.19	279.05	713.24	356.62	1271.33
89.00	30.0	443.10	279.05	722.14	361.07	1280.24
91.00	30.0	448.28	336.87	785.15	392.58	1458.90
93.00	30.0	453.28	451.80	905.07	452.54	1808.67
95.00	30.0	457.79	531.03	988.82	494.41	2050.89
97.00	30.0	477.79	490.88	968.67	484.33	1950.42
99.00	30.0	486.70	479.72	966.42	483.21	1925.86
101.00	30.0	499.30	411.71	911.01	455.51	1734.44
103.00	30.0	519.11	322.67	841.78	420.89	1487.11
105.00	30.0	534.55	335.23	869.78	434.89	1540.24
107.00	30.0	549.99	347.80	897.79	448.89	1593.38
109.00	30.0	557.03	357.66	914.69	457.35	1630.02
111.00	30.0	560.41	429.41	989.81	494.91	1848.62
113.00	30.0	569.00	519.16	1088.16	544.08	2126.48
115.00	30.0	586.11	523.59	1109.70	554.85	2156.89

NOTES

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1. MOBILIZED END BEARING IS 1/3 OF THE ORIGINAL RB-121 VALUES.
 2. DAVISSON PILE CAPACITY IS AN ESTIMATE BASED ON FAILURE CRITERIA, AND EQUALS ULTIMATE SIDE FRICTION PLUS MOBILIZED END BEARING.
 3. ALLOWABLE PILE CAPACITY IS 1/2 THE DAVISSON PILE CAPACITY.
 4. ULTIMATE PILE CAPACITY IS ULTIMATE SIDE FRICTION PLUS
3 x THE MOBILIZED END BEARING.
EXCEPTION: FOR H-PILES TIPPED IN SAND OR LIMESTONE, THE
ULTIMATE PILE CAPACITY IS ULTIMATE SIDE FRICTION PLUS
2 x THE MOBILIZED END BEARING.

"BB-03_Driven_Void=-9.4ft_Preform=-27.9ft.out"

General Information:

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Input file: ons\FB-Deep\Driven\BB-04_Driven_Void=-9.3ft_Preform=-29.8ft.in
Project number: B-22-074
Job name: Broad Causeway Bridge
Engineer: PV/TC
Units: English

Analysis Information:

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Analysis Type: SPT

Soil Information:

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Boring date: 3/28/2023, Boring Number: BB-04
Station number: 123+79 Offset: +35

Ground Elevation: 2.700(ft)

Hammer type: Automatic Hammer, Correction factor = 1.24

ID	Depth (ft)	No. of Blows (Blows/ft)	Soil Type

1	0.00	9.00	5- Cavity layer
2	2.00	9.00	5- Cavity layer
3	4.00	4.00	5- Cavity layer
4	6.00	2.00	5- Cavity layer
5	8.00	3.00	5- Cavity layer
6	10.00	1.00	5- Cavity layer
7	12.00	2.00	5- Cavity layer
8	12.00	10.00	3- Clean sand
9	14.00	10.00	3- Clean sand
10	16.00	13.00	3- Clean sand
11	16.00	0.00	1- Plastic Clay
12	16.00	7.50	3- Clean sand
13	20.00	7.50	3- Clean sand
14	22.50	9.00	3- Clean sand
15	25.00	8.50	3- Clean sand
16	27.50	6.50	3- Clean sand
17	30.00	9.00	3- Clean sand
18	32.50	4.50	3- Clean sand
19	32.50	0.00	1- Plastic Clay
20	32.50	8.00	4- Lime Stone/Very shelly sand
21	35.00	8.00	4- Lime Stone/Very shelly sand

"BB-04_Driven_Void=-9.3ft_Preform=-29.8ft.out"

Predrilling to top of
natural limestone,
elevation -9.3' or a
depth of 12'

Preforming to elevation
-29.8' or a depth of 32.5'

22	37.50	9.00	4- Lime Stone/Very shelly sand
23	40.00	4.00	4- Lime Stone/Very shelly sand
24	40.00	0.00	1- Plastic Clay
25	40.00	2.00	3- Clean sand
26	42.50	2.00	3- Clean sand
27	45.00	1.00	3- Clean sand
28	47.50	6.00	3- Clean sand
29	50.00	5.00	3- Clean sand
30	50.00	0.00	1- Plastic Clay
31	50.00	14.00	3- Clean sand
32	52.50	14.00	3- Clean sand
33	55.00	36.00	3- Clean sand
34	55.00	0.00	1- Plastic Clay
35	55.00	22.00	4- Lime Stone/Very shelly sand
36	57.50	22.00	4- Lime Stone/Very shelly sand
37	60.00	19.00	4- Lime Stone/Very shelly sand
38	60.00	0.00	1- Plastic Clay
39	60.00	100.00	4- Lime Stone/Very shelly sand
40	62.50	100.00	4- Lime Stone/Very shelly sand
41	65.00	100.00	4- Lime Stone/Very shelly sand
42	67.50	100.00	4- Lime Stone/Very shelly sand
43	70.00	51.00	4- Lime Stone/Very shelly sand
44	70.00	0.00	1- Plastic Clay
45	70.00	20.00	4- Lime Stone/Very shelly sand
46	72.50	20.00	4- Lime Stone/Very shelly sand
47	72.50	0.00	1- Plastic Clay
48	72.50	1.00	4- Lime Stone/Very shelly sand
49	75.00	1.00	4- Lime Stone/Very shelly sand
50	75.00	0.00	1- Plastic Clay
51	75.00	87.00	4- Lime Stone/Very shelly sand
52	77.50	87.00	4- Lime Stone/Very shelly sand
53	80.00	84.00	4- Lime Stone/Very shelly sand
54	82.50	85.00	4- Lime Stone/Very shelly sand
55	85.00	85.00	4- Lime Stone/Very shelly sand
56	87.50	100.00	4- Lime Stone/Very shelly sand
57	90.00	65.00	4- Lime Stone/Very shelly sand
58	92.50	99.00	4- Lime Stone/Very shelly sand
59	95.00	99.00	4- Lime Stone/Very shelly sand
60	95.00	0.00	1- Plastic Clay
61	95.00	27.00	4- Lime Stone/Very shelly sand
62	97.50	27.00	4- Lime Stone/Very shelly sand
63	100.00	19.00	4- Lime Stone/Very shelly sand
64	100.00	0.00	1- Plastic Clay
65	100.00	100.00	4- Lime Stone/Very shelly sand
66	102.50	100.00	4- Lime Stone/Very shelly sand
67	105.00	100.00	4- Lime Stone/Very shelly sand
68	105.00	0.00	1- Plastic Clay
69	105.00	43.00	4- Lime Stone/Very shelly sand
70	107.50	43.00	4- Lime Stone/Very shelly sand
71	107.50	0.00	1- Plastic Clay
72	107.50	20.00	4- Lime Stone/Very shelly sand
73	110.00	20.00	4- Lime Stone/Very shelly sand

"BB-04_Driven_Void=-9.3ft_Preform=-29.8ft.out"

74	110.00	0.00	1- Plastic Clay
75	110.00	2.00	4- Lime Stone/Very shelly sand
76	112.50	2.00	4- Lime Stone/Very shelly sand
77	112.50	0.00	1- Plastic Clay
78	112.50	100.00	4- Lime Stone/Very shelly sand
79	115.00	100.00	4- Lime Stone/Very shelly sand
80	115.00	0.00	1- Plastic Clay
81	115.00	17.00	4- Lime Stone/Very shelly sand
82	117.50	17.00	4- Lime Stone/Very shelly sand
83	117.50	0.00	1- Plastic Clay
84	117.50	50.00	4- Lime Stone/Very shelly sand
85	120.00	50.00	4- Lime Stone/Very shelly sand
86	122.50	99.00	4- Lime Stone/Very shelly sand
87	125.00	76.00	4- Lime Stone/Very shelly sand

Blowcount Average Per Soil Layer

Layer Num.	Starting Elevation (ft)	Bottom Elevation (ft)	Thickness (ft)	Average Blowcount (Blows/ft)	Soil Type
1	2.70	-9.30	12.00	4.67	5-Void
2	-9.30	-13.30	4.00	10.00	3-Clean Sand
3	-13.30	-13.30	0.00	7.50	1-Plastic Clay
4	-13.30	-29.80	16.50	7.95	3-Clean Sand
5	-29.80	-29.80	0.00	8.00	1-Plastic Clay
6	-29.80	-37.30	7.50	8.33	4-Limestone, Very
Shelly Sand					
7	-37.30	-37.30	0.00	2.00	1-Plastic Clay
8	-37.30	-47.30	10.00	2.75	3-Clean Sand
9	-47.30	-47.30	0.00	14.00	1-Plastic Clay
10	-47.30	-52.30	5.00	14.00	3-Clean Sand
11	-52.30	-52.30	0.00	22.00	1-Plastic Clay
12	-52.30	-57.30	5.00	22.00	4-Limestone, Very
Shelly Sand					
13	-57.30	-57.30	0.00	100.00	1-Plastic Clay
14	-57.30	-67.30	10.00	100.00	4-Limestone, Very
Shelly Sand					
15	-67.30	-67.30	0.00	20.00	1-Plastic Clay
16	-67.30	-69.80	2.50	20.00	4-Limestone, Very
Shelly Sand					
17	-69.80	-69.80	0.00	1.00	1-Plastic Clay
18	-69.80	-72.30	2.50	1.00	4-Limestone, Very
Shelly Sand					
19	-72.30	-72.30	0.00	87.00	1-Plastic Clay
20	-72.30	-92.30	20.00	86.50	4-Limestone, Very
Shelly Sand					
21	-92.30	-92.30	0.00	27.00	1-Plastic Clay

"BB-04_Driven_Void=-9.3ft_Preform=-29.8ft.out"

22	-92.30	-97.30	5.00	27.00	4-Limestone, Very
Shelly Sand					
23	-97.30	-97.30	0.00	100.00	1-Plastic Clay
24	-97.30	-102.30	5.00	100.00	4-Limestone, Very
Shelly Sand					
25	-102.30	-102.30	0.00	43.00	1-Plastic Clay
26	-102.30	-104.80	2.50	43.00	4-Limestone, Very
Shelly Sand					
27	-104.80	-104.80	0.00	20.00	1-Plastic Clay
28	-104.80	-107.30	2.50	20.00	4-Limestone, Very
Shelly Sand					
29	-107.30	-107.30	0.00	2.00	1-Plastic Clay
30	-107.30	-109.80	2.50	2.00	4-Limestone, Very
Shelly Sand					
31	-109.80	-109.80	0.00	100.00	1-Plastic Clay
32	-109.80	-112.30	2.50	100.00	4-Limestone, Very
Shelly Sand					
33	-112.30	-112.30	0.00	17.00	1-Plastic Clay
34	-112.30	-114.80	2.50	17.00	4-Limestone, Very
Shelly Sand					
35	-114.80	-114.80	0.00	50.00	1-Plastic Clay
36	-114.80	-122.30	7.50	66.33	4-Limestone, Very
Shelly Sand					

Driven Pile Data:

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Pile unit weight = 150.00(pcf), Section Type: Square

Pile Geometry:

Width (in)	Length (ft)	Tip Elev. (ft)
24.00	5.00	-2.30
24.00	7.00	-4.30
24.00	9.00	-6.30
24.00	11.00	-8.30
24.00	13.00	-10.30
24.00	15.00	-12.30
24.00	17.00	-14.30
24.00	19.00	-16.30
24.00	21.00	-18.30
24.00	23.00	-20.30
24.00	25.00	-22.30
24.00	27.00	-24.30
24.00	29.00	-26.30
24.00	31.00	-28.30
24.00	33.00	-30.30
24.00	35.00	-32.30
24.00	37.00	-34.30
24.00	39.00	-36.30

"BB-04_Driven_Void=-9.3ft_Preform=-29.8ft.out"

24.00	41.00	-38.30
24.00	43.00	-40.30
24.00	45.00	-42.30
24.00	47.00	-44.30
24.00	49.00	-46.30
24.00	51.00	-48.30
24.00	53.00	-50.30
24.00	55.00	-52.30
24.00	57.00	-54.30
24.00	59.00	-56.30
24.00	61.00	-58.30
24.00	63.00	-60.30
24.00	65.00	-62.30
24.00	67.00	-64.30
24.00	69.00	-66.30
24.00	71.00	-68.30
24.00	73.00	-70.30
24.00	75.00	-72.30
24.00	77.00	-74.30
24.00	79.00	-76.30
24.00	81.00	-78.30
24.00	83.00	-80.30
24.00	85.00	-82.30
24.00	87.00	-84.30
24.00	89.00	-86.30
24.00	91.00	-88.30
24.00	93.00	-90.30
24.00	95.00	-92.30
24.00	97.00	-94.30
24.00	99.00	-96.30
24.00	101.00	-98.30
24.00	103.00	-100.30
24.00	105.00	-102.30
24.00	107.00	-104.30
24.00	109.00	-106.30
24.00	111.00	-108.30
24.00	113.00	-110.30
24.00	115.00	-112.30
24.00	117.00	-114.30
30.00	5.00	-2.30
30.00	7.00	-4.30
30.00	9.00	-6.30
30.00	11.00	-8.30
30.00	13.00	-10.30
30.00	15.00	-12.30
30.00	17.00	-14.30
30.00	19.00	-16.30
30.00	21.00	-18.30
30.00	23.00	-20.30
30.00	25.00	-22.30
30.00	27.00	-24.30
30.00	29.00	-26.30

"BB-04_Driven_Void=-9.3ft_Preform=-29.8ft.out"

30.00	31.00	-28.30
30.00	33.00	-30.30
30.00	35.00	-32.30
30.00	37.00	-34.30
30.00	39.00	-36.30
30.00	41.00	-38.30
30.00	43.00	-40.30
30.00	45.00	-42.30
30.00	47.00	-44.30
30.00	49.00	-46.30
30.00	51.00	-48.30
30.00	53.00	-50.30
30.00	55.00	-52.30
30.00	57.00	-54.30
30.00	59.00	-56.30
30.00	61.00	-58.30
30.00	63.00	-60.30
30.00	65.00	-62.30
30.00	67.00	-64.30
30.00	69.00	-66.30
30.00	71.00	-68.30
30.00	73.00	-70.30
30.00	75.00	-72.30
30.00	77.00	-74.30
30.00	79.00	-76.30
30.00	81.00	-78.30
30.00	83.00	-80.30
30.00	85.00	-82.30
30.00	87.00	-84.30
30.00	89.00	-86.30
30.00	91.00	-88.30
30.00	93.00	-90.30
30.00	95.00	-92.30
30.00	97.00	-94.30
30.00	99.00	-96.30
30.00	101.00	-98.30
30.00	103.00	-100.30
30.00	105.00	-102.30
30.00	107.00	-104.30
30.00	109.00	-106.30
30.00	111.00	-108.30
30.00	113.00	-110.30
30.00	115.00	-112.30

Driven Pile Capacity:
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Section Type: Square
"BB-04_Driven_Void=-9.3ft_Preform=-29.8ft.out"

Pile Width: 24.00 (in)

Test Pile Length (ft)	Pile Width (in)	Ultimate Side Friction (tons)	Mobilized End Bearing (tons)	Estimated Davisson Capacity (tons)	Allowable Pile Capacity (tons)	Ultimate Pile Capacity (tons)
5.00	24.0	0.00	0.00	0.00	0.00	0.00
7.00	24.0	0.00	0.00	0.00	0.00	0.00
9.00	24.0	0.00	0.00	0.00	0.00	0.00
11.00	24.0	0.00	0.00	0.00	0.00	0.00
13.00	24.0	1.81	24.81	26.62	13.31	76.25
15.00	24.0	5.26	25.21	30.48	15.24	80.90
17.00	24.0	9.44	28.08	37.52	18.76	93.67
19.00	24.0	11.80	29.15	40.94	20.47	99.23
21.00	24.0	14.11	30.81	44.92	22.46	106.53
23.00	24.0	16.66	33.34	50.00	25.00	116.68
25.00	24.0	19.35	36.19	55.55	27.77	127.93
27.00	24.0	21.95	39.06	61.01	30.51	139.12
29.00	24.0	24.53	40.07	64.60	32.30	144.73
31.00	24.0	27.64	38.11	65.75	32.87	141.97
33.00	24.0	32.53	27.01	59.54	29.77	113.56
35.00	24.0	34.12	18.93	53.05	26.53	90.92
37.00	24.0	35.79	10.44	46.23	23.11	67.10
39.00	24.0	37.34	5.67	43.02	21.51	54.37
41.00	24.0	37.84	19.65	57.49	28.74	96.78
43.00	24.0	37.84	20.15	57.99	28.99	98.28
45.00	24.0	37.84	23.95	61.79	30.90	109.70
47.00	24.0	38.41	31.86	70.27	35.13	133.98
49.00	24.0	39.65	46.12	85.77	42.88	178.01
51.00	24.0	44.37	59.75	104.12	52.06	223.61
53.00	24.0	49.22	60.71	109.93	54.96	231.36
55.00	24.0	60.22	228.95	289.17	144.59	747.07
57.00	24.0	64.59	320.07	384.65	192.33	1024.78
59.00	24.0	68.82	411.97	480.78	240.39	1304.71
61.00	24.0	78.76	447.22	525.98	262.99	1420.41
63.00	24.0	94.76	379.68	474.45	237.22	1233.82
65.00	24.0	110.76	280.91	391.67	195.84	953.50
67.00	24.0	126.76	166.18	292.94	146.47	625.31
69.00	24.0	141.44	177.89	319.32	159.66	675.09
71.00	24.0	149.07	245.42	394.49	197.24	885.32
73.00	24.0	152.05	344.19	496.24	248.12	1184.62
75.00	24.0	152.05	458.92	610.97	305.48	1528.81
77.00	24.0	168.05	458.92	626.97	313.48	1544.81
79.00	24.0	184.05	458.92	642.97	321.48	1560.81
81.00	24.0	200.05	452.36	652.41	326.20	1557.13
83.00	24.0	216.05	429.04	645.09	322.55	1503.18
85.00	24.0	232.05	422.49	654.53	327.27	1499.50
87.00	24.0	248.05	422.49	670.53	335.27	1515.50
89.00	24.0	263.35	343.96	607.31	303.66	1295.24

"BB-04_Driven_Void=-9.3ft_Preform=-29.8ft.out"

NBR of 360 tons at
elevation -68.3'



Section Type: Square
Pile Width: 30.00 (in)

91.00	24.0	276.86	280.06	556.92	278.46	1117.03
93.00	24.0	292.17	240.26	532.43	266.21	1012.95
95.00	24.0	308.17	240.26	548.43	274.21	1028.95
97.00	24.0	313.52	325.34	638.87	319.43	1289.55
99.00	24.0	318.52	348.73	667.25	333.62	1364.70
101.00	24.0	328.57	309.03	637.59	318.80	1255.64
103.00	24.0	344.57	204.93	549.50	274.75	959.37
105.00	24.0	360.57	118.89	479.45	239.73	717.23
107.00	24.0	369.10	182.73	551.83	275.91	917.29
109.00	24.0	374.21	171.90	546.10	273.05	889.89
111.00	24.0	376.19	211.61	587.80	293.90	1011.03
113.00	24.0	380.19	249.47	629.66	314.83	1128.61
115.00	24.0	396.19	237.20	633.39	316.70	1107.79
117.00	24.0	399.56	328.64	728.20	364.10	1385.48

Test Pile Length (ft)	Pile Width (in)	Ultimate Side Friction (tons)	Mobilized End Bearing (tons)	Estimated Davisson Capacity (tons)	Allowable Pile Capacity (tons)	Ultimate Pile Capacity (tons)
5.00	30.0	0.00	0.00	0.00	0.00	0.00
7.00	30.0	0.00	0.00	0.00	0.00	0.00
9.00	30.0	0.00	0.00	0.00	0.00	0.00
11.00	30.0	0.00	0.00	0.00	0.00	0.00
13.00	30.0	2.22	37.33	39.54	19.77	114.19
15.00	30.0	6.28	38.05	44.33	22.16	120.42
17.00	30.0	11.84	44.45	56.29	28.15	145.20
19.00	30.0	15.11	44.98	60.10	30.05	150.06
21.00	30.0	18.19	46.25	64.44	32.22	156.94
23.00	30.0	21.54	48.22	69.76	34.88	166.20
25.00	30.0	25.17	49.81	74.99	37.49	174.61
27.00	30.0	28.27	52.29	80.55	40.28	185.13
29.00	30.0	31.04	55.88	86.93	43.46	198.70
31.00	30.0	34.82	57.93	92.75	46.37	208.60
33.00	30.0	40.67	33.76	74.43	37.21	141.95
35.00	30.0	42.65	23.67	66.32	33.16	113.65
37.00	30.0	44.73	17.02	61.75	30.87	95.78
39.00	30.0	46.68	16.39	63.07	31.54	95.86
41.00	30.0	47.30	36.22	83.52	41.76	155.96
43.00	30.0	47.30	38.06	85.36	42.68	161.47
45.00	30.0	47.30	43.61	90.91	45.46	178.14
47.00	30.0	47.96	55.87	103.84	51.92	215.58
49.00	30.0	49.51	68.06	117.56	58.78	253.68
51.00	30.0	55.53	94.34	149.87	74.94	338.56
53.00	30.0	58.57	102.98	161.55	80.78	367.51
55.00	30.0	75.28	429.60	504.88	252.44	1364.08

"BB-04_Driven_Void=-9.3ft_Preform=-29.8ft.out"

NBR of 480 tons at
elevation -52.3'



57.00	30.0	80.73	543.49	624.23	312.11	1711.22
59.00	30.0	86.02	643.74	729.76	364.88	2017.24
61.00	30.0	98.45	618.02	716.47	358.24	1952.51
63.00	30.0	118.45	494.55	613.01	306.50	1602.11
65.00	30.0	138.45	351.14	489.59	244.80	1191.87
67.00	30.0	158.45	351.14	509.59	254.80	1211.87
69.00	30.0	176.80	365.77	542.57	271.28	1274.11
71.00	30.0	186.34	450.18	636.52	318.26	1536.89
73.00	30.0	190.06	573.65	763.71	381.85	1911.01
75.00	30.0	190.06	717.06	907.12	453.56	2341.24
77.00	30.0	210.06	717.06	927.12	463.56	2361.24
79.00	30.0	230.06	708.86	938.92	469.46	2356.65
81.00	30.0	250.06	679.72	929.78	464.89	2289.21
83.00	30.0	270.06	671.52	941.58	470.79	2284.62
85.00	30.0	290.06	671.52	961.58	480.79	2304.62
87.00	30.0	310.06	565.17	875.23	437.61	2005.56
89.00	30.0	329.18	464.33	793.52	396.76	1722.19
91.00	30.0	346.08	435.54	781.62	390.81	1652.71
93.00	30.0	365.21	443.74	808.95	404.47	1696.43
95.00	30.0	385.21	443.74	828.95	414.47	1716.43
97.00	30.0	391.90	470.29	862.19	431.10	1802.77
99.00	30.0	398.15	471.76	869.91	434.95	1813.42
101.00	30.0	410.71	399.58	810.29	405.14	1609.45
103.00	30.0	430.71	292.02	722.73	361.36	1306.77
105.00	30.0	450.71	292.02	742.73	371.36	1326.77
107.00	30.0	461.37	250.72	712.09	356.05	1213.53
109.00	30.0	467.76	277.81	745.57	372.79	1301.20
111.00	30.0	470.24	347.70	817.93	408.97	1513.32
113.00	30.0	475.24	439.91	915.15	457.58	1794.98
115.00	30.0	495.24	433.11	928.34	464.17	1794.56

NOTES

1. MOBILIZED END BEARING IS 1/3 OF THE ORIGINAL RB-121 VALUES.
2. DAVISSON PILE CAPACITY IS AN ESTIMATE BASED ON FAILURE CRITERIA, AND EQUALS ULTIMATE SIDE FRICTION PLUS MOBILIZED END BEARING.
3. ALLOWABLE PILE CAPACITY IS 1/2 THE DAVISSON PILE CAPACITY.
4. ULTIMATE PILE CAPACITY IS ULTIMATE SIDE FRICTION PLUS
3 x THE MOBILIZED END BEARING.
EXCEPTION: FOR H-PILES TIPPED IN SAND OR LIMESTONE, THE
ULTIMATE PILE CAPACITY IS ULTIMATE SIDE FRICTION PLUS
2 x THE MOBILIZED END BEARING.

"BB-04_Driven_Void=-9.3ft_Preform=-29.8ft.out"

General Information:

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Input file: ns\FB-Deep\Driven\BB-12_Driven_Void=-13.3ft_Preform=-34.8ft.in
Project number: B-22-074
Job name: Broad Causeway Bridge
Engineer: PV/TC
Units: English

Analysis Information:

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Analysis Type: SPT

Soil Information:

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Boring date: 3/29/2023, Boring Number: BB-12
Station number: 140+71 Offset: +32

Ground Elevation: 2.700(ft)

Hammer type: Automatic Hammer, Correction factor = 1.24

ID	Depth (ft)	No. of Blows (Blows/ft)	Soil Type

1	0.00	13.00	5- Cavity layer
2	2.00	13.00	5- Cavity layer
3	4.00	4.00	5- Cavity layer
4	6.00	3.00	5- Cavity layer
5	8.00	1.00	5- Cavity layer
6	10.00	1.00	5- Cavity layer
7	12.00	1.00	5- Cavity layer
8	14.00	1.00	5- Cavity layer
9	16.00	1.00	5- Cavity layer
10	16.00	7.50	3- Clean sand
11	20.00	7.50	3- Clean sand
12	22.50	9.00	3- Clean sand
13	25.00	12.50	3- Clean sand
14	27.50	10.50	3- Clean sand
15	30.00	8.00	3- Clean sand
16	32.50	10.50	3- Clean sand
17	32.50	0.00	1- Plastic Clay
18	32.50	6.00	3- Clean sand
19	35.00	6.00	3- Clean sand
20	37.50	4.00	3- Clean sand
21	37.50	0.00	1- Plastic Clay

"BB-12_Driven_Void=-13.3ft_Preform=-34.8ft.out"

Predrilling to top of
natural limestone,
elevation -13.3' or a
depth of 16'

Preforming to elevation
-34.8' or a depth of 37.5'

22	37.50	8.00	3- Clean sand
23	40.00	8.00	3- Clean sand
24	42.50	10.00	3- Clean sand
25	45.00	15.00	3- Clean sand
26	47.50	15.00	3- Clean sand
27	47.50	0.00	1- Plastic Clay
28	47.50	22.00	3- Clean sand
29	50.00	22.00	3- Clean sand
30	52.50	17.00	3- Clean sand
31	52.50	0.00	1- Plastic Clay
32	52.50	44.00	3- Clean sand
33	55.00	44.00	3- Clean sand
34	55.00	0.00	1- Plastic Clay
35	55.00	22.00	3- Clean sand
36	57.50	22.00	3- Clean sand
37	60.00	28.00	3- Clean sand
38	62.50	17.00	3- Clean sand
39	65.00	14.00	3- Clean sand
40	65.00	0.00	1- Plastic Clay
41	65.00	38.00	4- Lime Stone/Very shelly sand
42	67.50	38.00	4- Lime Stone/Very shelly sand
43	67.50	0.00	1- Plastic Clay
44	67.50	100.00	4- Lime Stone/Very shelly sand
45	70.00	100.00	4- Lime Stone/Very shelly sand
46	70.00	0.00	1- Plastic Clay
47	70.00	28.00	4- Lime Stone/Very shelly sand
48	72.50	28.00	4- Lime Stone/Very shelly sand
49	75.00	43.00	4- Lime Stone/Very shelly sand
50	75.00	0.00	1- Plastic Clay
51	75.00	100.00	4- Lime Stone/Very shelly sand
52	77.50	100.00	4- Lime Stone/Very shelly sand
53	77.50	0.00	1- Plastic Clay
54	77.50	7.00	4- Lime Stone/Very shelly sand
55	80.00	7.00	4- Lime Stone/Very shelly sand
56	80.00	0.00	1- Plastic Clay
57	80.00	14.00	3- Clean sand
58	82.50	14.00	3- Clean sand
59	82.50	0.00	1- Plastic Clay
60	82.50	31.00	3- Clean sand
61	85.00	31.00	3- Clean sand
62	85.00	0.00	1- Plastic Clay
63	85.00	28.00	4- Lime Stone/Very shelly sand
64	87.50	28.00	4- Lime Stone/Very shelly sand
65	90.00	45.00	4- Lime Stone/Very shelly sand
66	90.00	0.00	1- Plastic Clay
67	90.00	76.00	4- Lime Stone/Very shelly sand
68	92.50	76.00	4- Lime Stone/Very shelly sand
69	92.50	0.00	1- Plastic Clay
70	92.50	30.00	4- Lime Stone/Very shelly sand
71	95.00	30.00	4- Lime Stone/Very shelly sand
72	95.00	0.00	1- Plastic Clay
73	95.00	4.00	4- Lime Stone/Very shelly sand

"BB-12_Driven_Void=-13.3ft_Preform=-34.8ft.out"

74	97.50	4.00	4- Lime Stone/Very shelly sand
75	97.50	0.00	1- Plastic Clay
76	97.50	19.00	4- Lime Stone/Very shelly sand
77	100.00	19.00	4- Lime Stone/Very shelly sand
78	100.00	0.00	1- Plastic Clay
79	100.00	41.00	4- Lime Stone/Very shelly sand
80	102.50	41.00	4- Lime Stone/Very shelly sand
81	102.50	0.00	1- Plastic Clay
82	102.50	100.00	4- Lime Stone/Very shelly sand
83	105.00	100.00	4- Lime Stone/Very shelly sand
84	107.50	100.00	4- Lime Stone/Very shelly sand
85	110.00	100.00	4- Lime Stone/Very shelly sand
86	112.50	86.00	4- Lime Stone/Very shelly sand
87	115.00	100.00	4- Lime Stone/Very shelly sand
88	117.50	100.00	4- Lime Stone/Very shelly sand
89	120.00	77.00	4- Lime Stone/Very shelly sand
90	120.00	0.00	1- Plastic Clay
91	120.00	28.00	4- Lime Stone/Very shelly sand
92	122.50	28.00	4- Lime Stone/Very shelly sand
93	122.50	0.00	1- Plastic Clay
94	122.50	57.00	4- Lime Stone/Very shelly sand
95	125.00	57.00	4- Lime Stone/Very shelly sand

Blowcount Average Per Soil Layer

Layer Num.	Starting Elevation (ft)	Bottom Elevation (ft)	Thickness (ft)	Average Blowcount (Blows/ft)	Soil Type
1	2.70	-13.30	16.00	4.62	5-Void
2	-13.30	-29.80	16.50	9.02	3-Clean Sand
3	-29.80	-29.80	0.00	6.00	1-Plastic Clay
4	-29.80	-34.80	5.00	6.00	3-Clean Sand
5	-34.80	-34.80	0.00	8.00	1-Plastic Clay
6	-34.80	-44.80	10.00	10.25	3-Clean Sand
7	-44.80	-44.80	0.00	22.00	1-Plastic Clay
8	-44.80	-49.80	5.00	22.00	3-Clean Sand
9	-49.80	-49.80	0.00	44.00	1-Plastic Clay
10	-49.80	-52.30	2.50	44.00	3-Clean Sand
11	-52.30	-52.30	0.00	22.00	1-Plastic Clay
12	-52.30	-62.30	10.00	22.25	3-Clean Sand
13	-62.30	-62.30	0.00	38.00	1-Plastic Clay
14	-62.30	-64.80	2.50	38.00	4-Limestone, Very
Shelly Sand					
15	-64.80	-64.80	0.00	100.00	1-Plastic Clay
16	-64.80	-67.30	2.50	100.00	4-Limestone, Very
Shelly Sand					
17	-67.30	-67.30	0.00	28.00	1-Plastic Clay

"BB-12_Driven_Void=-13.3ft_Preform=-34.8ft.out"

18	-67.30	-72.30	5.00	28.00	4-Limestone, Very
Shelly Sand					
19	-72.30	-72.30	0.00	100.00	1-Plastic Clay
20	-72.30	-74.80	2.50	100.00	4-Limestone, Very
Shelly Sand					
21	-74.80	-74.80	0.00	7.00	1-Plastic Clay
22	-74.80	-77.30	2.50	7.00	4-Limestone, Very
Shelly Sand					
23	-77.30	-77.30	0.00	14.00	1-Plastic Clay
24	-77.30	-79.80	2.50	14.00	3-Clean Sand
25	-79.80	-79.80	0.00	31.00	1-Plastic Clay
26	-79.80	-82.30	2.50	31.00	3-Clean Sand
27	-82.30	-82.30	0.00	28.00	1-Plastic Clay
28	-82.30	-87.30	5.00	28.00	4-Limestone, Very
Shelly Sand					
29	-87.30	-87.30	0.00	76.00	1-Plastic Clay
30	-87.30	-89.80	2.50	76.00	4-Limestone, Very
Shelly Sand					
31	-89.80	-89.80	0.00	30.00	1-Plastic Clay
32	-89.80	-92.30	2.50	30.00	4-Limestone, Very
Shelly Sand					
33	-92.30	-92.30	0.00	4.00	1-Plastic Clay
34	-92.30	-94.80	2.50	4.00	4-Limestone, Very
Shelly Sand					
35	-94.80	-94.80	0.00	19.00	1-Plastic Clay
36	-94.80	-97.30	2.50	19.00	4-Limestone, Very
Shelly Sand					
37	-97.30	-97.30	0.00	41.00	1-Plastic Clay
38	-97.30	-99.80	2.50	41.00	4-Limestone, Very
Shelly Sand					
39	-99.80	-99.80	0.00	100.00	1-Plastic Clay
40	-99.80	-117.30	17.50	98.00	4-Limestone, Very
Shelly Sand					
41	-117.30	-117.30	0.00	28.00	1-Plastic Clay
42	-117.30	-119.80	2.50	28.00	4-Limestone, Very
Shelly Sand					
43	-119.80	-119.80	0.00	57.00	1-Plastic Clay
44	-119.80	-122.30	2.50	57.00	4-Limestone, Very
Shelly Sand					

Driven Pile Data:

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Pile unit weight = 150.00(pcf), Section Type: Square

Pile Geometry:

Width (in)	Length (ft)	Tip Elev. (ft)
24.00	5.00	-2.30
24.00	7.00	-4.30

"BB-12_Driven_Void=-13.3ft_Preform=-34.8ft.out"

24.00	9.00	-6.30
24.00	11.00	-8.30
24.00	13.00	-10.30
24.00	15.00	-12.30
24.00	17.00	-14.30
24.00	19.00	-16.30
24.00	21.00	-18.30
24.00	23.00	-20.30
24.00	25.00	-22.30
24.00	27.00	-24.30
24.00	29.00	-26.30
24.00	31.00	-28.30
24.00	33.00	-30.30
24.00	35.00	-32.30
24.00	37.00	-34.30
24.00	39.00	-36.30
24.00	41.00	-38.30
24.00	43.00	-40.30
24.00	45.00	-42.30
24.00	47.00	-44.30
24.00	49.00	-46.30
24.00	51.00	-48.30
24.00	53.00	-50.30
24.00	55.00	-52.30
24.00	57.00	-54.30
24.00	59.00	-56.30
24.00	61.00	-58.30
24.00	63.00	-60.30
24.00	65.00	-62.30
24.00	67.00	-64.30
24.00	69.00	-66.30
24.00	71.00	-68.30
24.00	73.00	-70.30
24.00	75.00	-72.30
24.00	77.00	-74.30
24.00	79.00	-76.30
24.00	81.00	-78.30
24.00	83.00	-80.30
24.00	85.00	-82.30
24.00	87.00	-84.30
24.00	89.00	-86.30
24.00	91.00	-88.30
24.00	93.00	-90.30
24.00	95.00	-92.30
24.00	97.00	-94.30
24.00	99.00	-96.30
24.00	101.00	-98.30
24.00	103.00	-100.30
24.00	105.00	-102.30
24.00	107.00	-104.30
24.00	109.00	-106.30
24.00	111.00	-108.30

"BB-12_Driven_Void=-13.3ft_Preform=-34.8ft.out"

24.00	113.00	-110.30
24.00	115.00	-112.30
24.00	117.00	-114.30
30.00	5.00	-2.30
30.00	7.00	-4.30
30.00	9.00	-6.30
30.00	11.00	-8.30
30.00	13.00	-10.30
30.00	15.00	-12.30
30.00	17.00	-14.30
30.00	19.00	-16.30
30.00	21.00	-18.30
30.00	23.00	-20.30
30.00	25.00	-22.30
30.00	27.00	-24.30
30.00	29.00	-26.30
30.00	31.00	-28.30
30.00	33.00	-30.30
30.00	35.00	-32.30
30.00	37.00	-34.30
30.00	39.00	-36.30
30.00	41.00	-38.30
30.00	43.00	-40.30
30.00	45.00	-42.30
30.00	47.00	-44.30
30.00	49.00	-46.30
30.00	51.00	-48.30
30.00	53.00	-50.30
30.00	55.00	-52.30
30.00	57.00	-54.30
30.00	59.00	-56.30
30.00	61.00	-58.30
30.00	63.00	-60.30
30.00	65.00	-62.30
30.00	67.00	-64.30
30.00	69.00	-66.30
30.00	71.00	-68.30
30.00	73.00	-70.30
30.00	75.00	-72.30
30.00	77.00	-74.30
30.00	79.00	-76.30
30.00	81.00	-78.30
30.00	83.00	-80.30
30.00	85.00	-82.30
30.00	87.00	-84.30
30.00	89.00	-86.30
30.00	91.00	-88.30
30.00	93.00	-90.30
30.00	95.00	-92.30
30.00	97.00	-94.30
30.00	99.00	-96.30
30.00	101.00	-98.30

"BB-12_Driven_Void=-13.3ft_Preform=-34.8ft.out"

30.00	103.00	-100.30
30.00	105.00	-102.30
30.00	107.00	-104.30
30.00	109.00	-106.30
30.00	111.00	-108.30
30.00	113.00	-110.30
30.00	115.00	-112.30

Driven Pile Capacity:
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Section Type: Square
Pile Width: 24.00 (in)

Test Pile Length (ft)	Pile Width (in)	Ultimate Side Friction (tons)	Mobilized End Bearing (tons)	Estimated Davisson Capacity (tons)	Allowable Pile Capacity (tons)	Ultimate Pile Capacity (tons)
5.00	24.0	0.00	0.00	0.00	0.00	0.00
7.00	24.0	0.00	0.00	0.00	0.00	0.00
9.00	24.0	0.00	0.00	0.00	0.00	0.00
11.00	24.0	0.00	0.00	0.00	0.00	0.00
13.00	24.0	0.00	0.00	0.00	0.00	0.00
15.00	24.0	0.00	0.00	0.00	0.00	0.00
17.00	24.0	1.28	21.09	22.37	11.19	64.56
19.00	24.0	3.20	22.94	26.14	13.07	72.03
21.00	24.0	4.95	26.38	31.33	15.66	84.08
23.00	24.0	7.19	30.37	37.57	18.78	98.31
25.00	24.0	10.34	34.64	44.98	22.49	114.26
27.00	24.0	14.15	38.03	52.18	26.09	128.23
29.00	24.0	17.81	39.72	57.53	28.77	136.98
31.00	24.0	21.07	40.23	61.30	30.65	141.75
33.00	24.0	29.31	41.04	70.35	35.17	152.43
35.00	24.0	31.46	41.42	72.88	36.44	155.73
37.00	24.0	33.07	43.10	76.17	38.08	162.36
39.00	24.0	36.04	48.26	84.30	42.15	180.82
41.00	24.0	38.51	49.74	88.24	44.12	187.72
43.00	24.0	40.86	53.40	94.26	47.13	201.05
45.00	24.0	44.15	57.99	102.14	51.07	218.13
47.00	24.0	46.66	70.73	117.39	58.70	258.85
49.00	24.0	60.69	97.68	158.37	79.18	353.72
51.00	24.0	67.68	99.60	167.28	83.64	366.48
53.00	24.0	78.59	117.07	195.66	97.83	429.81
55.00	24.0	95.18	113.99	209.17	104.59	437.15
57.00	24.0	103.44	114.04	217.49	108.74	445.57

"BB-12_Driven_Void=-13.3ft_Preform=-34.8ft.out"

59.00	24.0	111.59	115.19	226.78	113.39	457.17
61.00	24.0	118.12	122.37	240.50	120.25	485.25
63.00	24.0	118.70	148.44	267.14	133.57	564.01
65.00	24.0	135.23	245.14	380.37	190.19	870.65
67.00	24.0	142.77	244.11	386.88	193.44	875.10
69.00	24.0	156.66	261.81	418.47	209.24	942.10
71.00	24.0	167.44	222.96	390.40	195.20	836.33
73.00	24.0	173.07	204.35	377.42	188.71	786.13
75.00	24.0	180.41	185.61	366.01	183.01	737.22
77.00	24.0	196.41	111.88	308.28	154.14	532.04
79.00	24.0	201.45	108.81	310.25	155.13	527.87
81.00	24.0	204.73	172.85	377.57	188.79	723.26
83.00	24.0	211.64	181.87	393.51	196.75	757.24
85.00	24.0	223.35	231.94	455.28	227.64	919.16
87.00	24.0	228.90	234.45	463.35	231.68	932.25
89.00	24.0	235.22	202.38	437.60	218.80	842.37
91.00	24.0	246.88	141.05	387.93	193.96	670.02
93.00	24.0	259.68	87.55	347.23	173.61	522.32
95.00	24.0	265.63	118.87	384.50	192.25	622.25
97.00	24.0	266.42	229.63	496.06	248.03	955.33
99.00	24.0	269.45	328.28	597.73	298.86	1254.29
101.00	24.0	275.40	408.92	684.32	342.16	1502.16
103.00	24.0	285.50	458.92	744.42	372.21	1662.26
105.00	24.0	301.50	458.92	760.42	380.21	1678.26
107.00	24.0	317.50	458.92	776.42	388.21	1694.26
109.00	24.0	333.50	458.92	792.42	396.21	1710.26
111.00	24.0	349.50	457.31	806.81	403.41	1721.44
113.00	24.0	365.50	412.53	778.03	389.02	1603.09
115.00	24.0	381.50	339.01	720.51	360.25	1398.52
117.00	24.0	397.50	296.44	693.95	346.97	1286.83

NBR of 360 tons at elevation -78.3'



Section Type: Square
Pile Width: 30.00 (in)

Test Pile Length (ft)	Pile Width (in)	Ultimate Side Friction (tons)	Mobilized End Bearing (tons)	Estimated Davisson Capacity (tons)	Allowable Pile Capacity (tons)	Ultimate Pile Capacity (tons)
5.00	30.0	0.00	0.00	0.00	0.00	0.00
7.00	30.0	0.00	0.00	0.00	0.00	0.00
9.00	30.0	0.00	0.00	0.00	0.00	0.00
11.00	30.0	0.00	0.00	0.00	0.00	0.00
13.00	30.0	0.00	0.00	0.00	0.00	0.00
15.00	30.0	0.00	0.00	0.00	0.00	0.00
17.00	30.0	1.59	35.42	37.01	18.51	107.86
19.00	30.0	4.20	37.26	41.46	20.73	115.98
21.00	30.0	6.69	40.14	46.83	23.42	127.11
23.00	30.0	9.57	43.84	53.41	26.70	141.08

"BB-12_Driven_Void=-13.3ft_Preform=-34.8ft.out"

25.00	30.0	13.65	47.05	60.70	30.35	154.81
27.00	30.0	18.46	49.22	67.68	33.84	166.11
29.00	30.0	22.87	51.36	74.24	37.12	176.96
31.00	30.0	26.28	56.90	83.17	41.59	196.97
33.00	30.0	36.62	59.02	95.64	47.82	213.68
35.00	30.0	39.06	60.35	99.42	49.71	220.12
37.00	30.0	40.76	64.19	104.94	52.47	233.32
39.00	30.0	45.04	78.97	124.01	62.00	281.94
41.00	30.0	47.89	81.56	129.44	64.72	292.56
43.00	30.0	50.94	85.85	136.79	68.40	308.50
45.00	30.0	54.11	95.42	149.54	74.77	340.38
47.00	30.0	57.66	108.77	166.43	83.22	383.97
49.00	30.0	76.21	152.45	228.66	114.33	533.56
51.00	30.0	85.27	154.14	239.41	119.71	547.69
53.00	30.0	98.25	171.08	269.33	134.66	611.49
55.00	30.0	118.98	161.42	280.40	140.20	603.24
57.00	30.0	128.95	162.01	290.96	145.48	614.99
59.00	30.0	137.38	166.58	303.96	151.98	637.11
61.00	30.0	142.00	186.38	328.38	164.19	701.13
63.00	30.0	147.68	200.11	347.79	173.90	748.02
65.00	30.0	169.04	360.03	529.08	264.54	1249.14
67.00	30.0	178.47	448.55	627.02	313.51	1524.12
69.00	30.0	195.82	369.72	565.54	282.77	1304.97
71.00	30.0	209.30	294.68	503.97	251.99	1093.32
73.00	30.0	216.33	285.62	501.95	250.97	1073.18
75.00	30.0	225.51	283.26	508.77	254.38	1075.29
77.00	30.0	245.51	178.46	423.96	211.98	780.88
79.00	30.0	251.81	181.05	432.86	216.43	794.96
81.00	30.0	255.88	254.61	510.49	255.25	1019.72
83.00	30.0	264.43	302.18	566.60	283.30	1170.96
85.00	30.0	279.18	331.67	610.85	305.43	1274.20
87.00	30.0	286.13	298.02	584.15	292.08	1180.20
89.00	30.0	294.02	273.09	567.11	283.55	1113.28
91.00	30.0	308.60	218.92	527.53	263.76	965.37
93.00	30.0	324.60	190.34	514.94	257.47	895.63
95.00	30.0	332.04	292.01	624.04	312.02	1208.05
97.00	30.0	333.03	430.46	763.49	381.74	1624.40
99.00	30.0	336.81	553.76	890.57	445.29	1998.10
101.00	30.0	344.25	654.56	998.81	499.41	2307.93
103.00	30.0	356.88	717.06	1073.94	536.97	2508.07
105.00	30.0	376.88	717.06	1093.94	546.97	2528.07
107.00	30.0	396.88	717.06	1113.94	556.97	2548.07
109.00	30.0	416.88	715.05	1131.93	565.96	2562.03
111.00	30.0	436.88	659.07	1095.95	547.98	2414.10
113.00	30.0	456.88	567.17	1024.05	512.02	2158.39
115.00	30.0	476.88	513.97	990.84	495.42	2018.78

NBR of 480 tons at
elevation -78.3'



AND EQUALS ULTIMATE SIDE FRICTION PLUS MOBILIZED END BEARING.

3. ALLOWABLE PILE CAPACITY IS 1/2 THE DAVISSON PILE CAPACITY.

4. ULTIMATE PILE CAPACITY IS ULTIMATE SIDE FRICTION PLUS
3 x THE MOBILIZED END BEARING.
EXCEPTION: FOR H-PILES TIPPED IN SAND OR LIMESTONE, THE
ULTIMATE PILE CAPACITY IS ULTIMATE SIDE FRICTION PLUS
2 x THE MOBILIZED END BEARING.

NOTES

1. MOBILIZED END BEARING IS 1/3 OF THE ORIGINAL RB-121 VALUES.

2. DAVISSON PILE CAPACITY IS AN ESTIMATE BASED ON FAILURE CRITERIA,
"BB-12_Driven_Void=-13.3ft_Preform=-34.8ft.out"

"BB-12_Driven_Void=-13.3ft_Preform=-34.8ft.out"

General Information:

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Input file: piers\BB-04_Driven_BOC=-15.5ft_Void=-25.5ft_Preform=-37.3ft.in
Project number: B-22-074
Job name: Broad Causeway Bridge
Engineer: PV/TC
Units: English

Analysis Information:

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Analysis Type: SPT

Soil Information:

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Boring date: 3/28/2023, Boring Number: BB-04
Station number: 123+79 Offset: +35

Ground Elevation: 2.700(ft)

Hammer type: Automatic Hammer, Correction factor = 1.24

ID	Depth (ft)	No. of Blows (Blows/ft)	Soil Type
1	0.00	9.00	5- Cavity layer
2	2.00	9.00	5- Cavity layer
3	4.00	4.00	5- Cavity layer
4	6.00	2.00	5- Cavity layer
5	8.00	3.00	5- Cavity layer
6	10.00	1.00	5- Cavity layer
7	12.00	2.00	5- Cavity layer
8	12.00	10.00	5- Cavity layer
9	14.00	10.00	5- Cavity layer
10	16.00	13.00	5- Cavity layer
11	18.20	7.50	5- Cavity layer
12	18.20	0.00	5- Cavity layer
13	20.00	7.50	5- Cavity layer
14	22.50	9.00	5- Cavity layer
15	25.00	8.50	5- Cavity layer
16	27.50	9.00	5- Cavity layer
17	28.20	0.00	5- Cavity layer
18	28.20	9.00	3- Clean sand
19	30.00	9.00	3- Clean sand
20	32.50	4.50	3- Clean sand
21	35.00	4.00	3- Clean sand

"BB-04_Driven_BOC=-15.5ft_Void=-25.5ft_Preform=-37.3ft.out"

Bottom of canal at -15.5' or a
depth of 18.2'

Predrilling 10' below bottom of
canal, to elevation -25.5' or a
depth of 28.2'

22	37.50	4.50	3- Clean sand
23	40.00	2.00	3- Clean sand
24	40.00	0.00	1- Plastic Clay
25	40.00	2.00	3- Clean sand
26	42.50	2.00	3- Clean sand
27	45.00	1.00	3- Clean sand
28	47.50	6.00	3- Clean sand
29	50.00	5.00	3- Clean sand
30	50.00	0.00	1- Plastic Clay
31	50.00	14.00	3- Clean sand
32	52.50	14.00	3- Clean sand
33	55.00	36.00	3- Clean sand
34	55.00	0.00	1- Plastic Clay
35	55.00	22.00	4- Lime Stone/Very shelly sand
36	57.50	22.00	4- Lime Stone/Very shelly sand
37	60.00	19.00	4- Lime Stone/Very shelly sand
38	60.00	0.00	1- Plastic Clay
39	60.00	100.00	4- Lime Stone/Very shelly sand
40	62.50	100.00	4- Lime Stone/Very shelly sand
41	65.00	100.00	4- Lime Stone/Very shelly sand
42	67.50	100.00	4- Lime Stone/Very shelly sand
43	70.00	51.00	4- Lime Stone/Very shelly sand
44	70.00	0.00	1- Plastic Clay
45	70.00	20.00	4- Lime Stone/Very shelly sand
46	72.50	20.00	4- Lime Stone/Very shelly sand
47	72.50	0.00	1- Plastic Clay
48	72.50	1.00	4- Lime Stone/Very shelly sand
49	75.00	1.00	4- Lime Stone/Very shelly sand
50	75.00	0.00	1- Plastic Clay
51	75.00	87.00	4- Lime Stone/Very shelly sand
52	77.50	87.00	4- Lime Stone/Very shelly sand
53	80.00	84.00	4- Lime Stone/Very shelly sand
54	82.50	85.00	4- Lime Stone/Very shelly sand
55	85.00	85.00	4- Lime Stone/Very shelly sand
56	87.50	100.00	4- Lime Stone/Very shelly sand
57	90.00	65.00	4- Lime Stone/Very shelly sand
58	92.50	99.00	4- Lime Stone/Very shelly sand
59	95.00	99.00	4- Lime Stone/Very shelly sand
60	95.00	0.00	1- Plastic Clay
61	95.00	27.00	4- Lime Stone/Very shelly sand
62	97.50	27.00	4- Lime Stone/Very shelly sand
63	100.00	19.00	4- Lime Stone/Very shelly sand
64	100.00	0.00	1- Plastic Clay
65	100.00	100.00	4- Lime Stone/Very shelly sand
66	102.50	100.00	4- Lime Stone/Very shelly sand
67	105.00	100.00	4- Lime Stone/Very shelly sand
68	105.00	0.00	1- Plastic Clay
69	105.00	43.00	4- Lime Stone/Very shelly sand
70	107.50	43.00	4- Lime Stone/Very shelly sand
71	107.50	0.00	1- Plastic Clay
72	107.50	20.00	4- Lime Stone/Very shelly sand
73	110.00	20.00	4- Lime Stone/Very shelly sand

Preforming to elevation
-37.3' or a depth of 40'

"BB-04_Driven_BOC=-15.5ft_Void=-25.5ft_Preform=-37.3ft.out"

74	110.00	0.00	1- Plastic Clay
75	110.00	2.00	4- Lime Stone/Very shelly sand
76	112.50	2.00	4- Lime Stone/Very shelly sand
77	112.50	0.00	1- Plastic Clay
78	112.50	100.00	4- Lime Stone/Very shelly sand
79	115.00	100.00	4- Lime Stone/Very shelly sand
80	115.00	0.00	1- Plastic Clay
81	115.00	17.00	4- Lime Stone/Very shelly sand
82	117.50	17.00	4- Lime Stone/Very shelly sand
83	117.50	0.00	1- Plastic Clay
84	117.50	50.00	4- Lime Stone/Very shelly sand
85	120.00	50.00	4- Lime Stone/Very shelly sand
86	122.50	99.00	4- Lime Stone/Very shelly sand
87	125.00	76.00	4- Lime Stone/Very shelly sand

Blowcount Average Per Soil Layer

Layer Num.	Starting Elevation (ft)	Bottom Elevation (ft)	Thickness (ft)	Average Blowcount (Blows/ft)	Soil Type
1	2.70	-25.50	28.20	6.86	5-Void
2	-25.50	-37.30	11.80	6.03	3-Clean Sand
3	-37.30	-37.30	0.00	2.00	1-Plastic Clay
4	-37.30	-47.30	10.00	2.75	3-Clean Sand
5	-47.30	-47.30	0.00	14.00	1-Plastic Clay
6	-47.30	-52.30	5.00	14.00	3-Clean Sand
7	-52.30	-52.30	0.00	22.00	1-Plastic Clay
8	-52.30	-57.30	5.00	22.00	4-Limestone, Very
Shelly Sand					
9	-57.30	-57.30	0.00	100.00	1-Plastic Clay
10	-57.30	-67.30	10.00	100.00	4-Limestone, Very
Shelly Sand					
11	-67.30	-67.30	0.00	20.00	1-Plastic Clay
12	-67.30	-69.80	2.50	20.00	4-Limestone, Very
Shelly Sand					
13	-69.80	-69.80	0.00	1.00	1-Plastic Clay
14	-69.80	-72.30	2.50	1.00	4-Limestone, Very
Shelly Sand					
15	-72.30	-72.30	0.00	87.00	1-Plastic Clay
16	-72.30	-92.30	20.00	86.50	4-Limestone, Very
Shelly Sand					
17	-92.30	-92.30	0.00	27.00	1-Plastic Clay
18	-92.30	-97.30	5.00	27.00	4-Limestone, Very
Shelly Sand					
19	-97.30	-97.30	0.00	100.00	1-Plastic Clay
20	-97.30	-102.30	5.00	100.00	4-Limestone, Very
Shelly Sand					

"BB-04_Driven_BOC=-15.5ft_Void=-25.5ft_Preform=-37.3ft.out"

21	-102.30	-102.30	0.00	43.00	1-Plastic Clay
22	-102.30	-104.80	2.50	43.00	4-Limestone, Very
Shelly Sand					
23	-104.80	-104.80	0.00	20.00	1-Plastic Clay
24	-104.80	-107.30	2.50	20.00	4-Limestone, Very
Shelly Sand					
25	-107.30	-107.30	0.00	2.00	1-Plastic Clay
26	-107.30	-109.80	2.50	2.00	4-Limestone, Very
Shelly Sand					
27	-109.80	-109.80	0.00	100.00	1-Plastic Clay
28	-109.80	-112.30	2.50	100.00	4-Limestone, Very
Shelly Sand					
29	-112.30	-112.30	0.00	17.00	1-Plastic Clay
30	-112.30	-114.80	2.50	17.00	4-Limestone, Very
Shelly Sand					
31	-114.80	-114.80	0.00	50.00	1-Plastic Clay
32	-114.80	-122.30	7.50	66.33	4-Limestone, Very
Shelly Sand					

Driven Pile Data:

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Pile unit weight = 150.00(pcf), Section Type: Square

Pile Geometry:

Width (in)	Length (ft)	Tip Elev. (ft)
24.00	5.00	-2.30
24.00	7.00	-4.30
24.00	9.00	-6.30
24.00	11.00	-8.30
24.00	13.00	-10.30
24.00	15.00	-12.30
24.00	17.00	-14.30
24.00	19.00	-16.30
24.00	21.00	-18.30
24.00	23.00	-20.30
24.00	25.00	-22.30
24.00	27.00	-24.30
24.00	29.00	-26.30
24.00	31.00	-28.30
24.00	33.00	-30.30
24.00	35.00	-32.30
24.00	37.00	-34.30
24.00	39.00	-36.30
24.00	41.00	-38.30
24.00	43.00	-40.30
24.00	45.00	-42.30
24.00	47.00	-44.30
24.00	49.00	-46.30

"BB-04_Driven_BOC=-15.5ft_Void=-25.5ft_Preform=-37.3ft.out"

24.00	51.00	-48.30
24.00	53.00	-50.30
24.00	55.00	-52.30
24.00	57.00	-54.30
24.00	59.00	-56.30
24.00	61.00	-58.30
24.00	63.00	-60.30
24.00	65.00	-62.30
24.00	67.00	-64.30
24.00	69.00	-66.30
24.00	71.00	-68.30
24.00	73.00	-70.30
24.00	75.00	-72.30
24.00	77.00	-74.30
24.00	79.00	-76.30
24.00	81.00	-78.30
24.00	83.00	-80.30
24.00	85.00	-82.30
24.00	87.00	-84.30
24.00	89.00	-86.30
24.00	91.00	-88.30
24.00	93.00	-90.30
24.00	95.00	-92.30
24.00	97.00	-94.30
24.00	99.00	-96.30
24.00	101.00	-98.30
24.00	103.00	-100.30
24.00	105.00	-102.30
24.00	107.00	-104.30
24.00	109.00	-106.30
24.00	111.00	-108.30
24.00	113.00	-110.30
24.00	115.00	-112.30
24.00	117.00	-114.30
30.00	5.00	-2.30
30.00	7.00	-4.30
30.00	9.00	-6.30
30.00	11.00	-8.30
30.00	13.00	-10.30
30.00	15.00	-12.30
30.00	17.00	-14.30
30.00	19.00	-16.30
30.00	21.00	-18.30
30.00	23.00	-20.30
30.00	25.00	-22.30
30.00	27.00	-24.30
30.00	29.00	-26.30
30.00	31.00	-28.30
30.00	33.00	-30.30
30.00	35.00	-32.30
30.00	37.00	-34.30
30.00	39.00	-36.30

"BB-04_Driven_BOC=-15.5ft_Void=-25.5ft_Preform=-37.3ft.out"

30.00	41.00	-38.30
30.00	43.00	-40.30
30.00	45.00	-42.30
30.00	47.00	-44.30
30.00	49.00	-46.30
30.00	51.00	-48.30
30.00	53.00	-50.30
30.00	55.00	-52.30
30.00	57.00	-54.30
30.00	59.00	-56.30
30.00	61.00	-58.30
30.00	63.00	-60.30
30.00	65.00	-62.30
30.00	67.00	-64.30
30.00	69.00	-66.30
30.00	71.00	-68.30
30.00	73.00	-70.30
30.00	75.00	-72.30
30.00	77.00	-74.30
30.00	79.00	-76.30
30.00	81.00	-78.30
30.00	83.00	-80.30
30.00	85.00	-82.30
30.00	87.00	-84.30
30.00	89.00	-86.30
30.00	91.00	-88.30
30.00	93.00	-90.30
30.00	95.00	-92.30
30.00	97.00	-94.30
30.00	99.00	-96.30
30.00	101.00	-98.30
30.00	103.00	-100.30
30.00	105.00	-102.30
30.00	107.00	-104.30
30.00	109.00	-106.30
30.00	111.00	-108.30
30.00	113.00	-110.30
30.00	115.00	-112.30

Driven Pile Capacity:
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Section Type: Square
Pile Width: 24.00 (in)

Test	Pile	Ultimate	Mobilized	Estimated	Allowable	Ultimate
"BB-04_Driven_BOC=-15.5ft_Void=-25.5ft_Preform=-37.3ft.out"						

Pile Length (ft)	Width (in)	Side Friction (tons)	End Bearing (tons)	Davisson Capacity (tons)	Pile Capacity (tons)	Pile Capacity (tons)
5.00	24.0	0.00	0.00	0.00	0.00	0.00
7.00	24.0	0.00	0.00	0.00	0.00	0.00
9.00	24.0	0.00	0.00	0.00	0.00	0.00
11.00	24.0	0.00	0.00	0.00	0.00	0.00
13.00	24.0	0.00	0.00	0.00	0.00	0.00
15.00	24.0	0.00	0.00	0.00	0.00	0.00
17.00	24.0	0.00	0.00	0.00	0.00	0.00
19.00	24.0	0.00	0.00	0.00	0.00	0.00
21.00	24.0	0.00	0.00	0.00	0.00	0.00
23.00	24.0	0.00	0.00	0.00	0.00	0.00
25.00	24.0	0.00	0.00	0.00	0.00	0.00
27.00	24.0	0.00	0.00	0.00	0.00	0.00
29.00	24.0	1.36	16.53	17.89	8.95	50.96
31.00	24.0	4.58	16.13	20.71	10.35	52.97
33.00	24.0	6.65	15.15	21.80	10.90	52.11
35.00	24.0	8.24	13.37	21.60	10.80	48.33
37.00	24.0	9.82	11.58	21.40	10.70	44.56
39.00	24.0	11.13	10.56	21.69	10.84	42.80
41.00	24.0	11.30	11.90	23.20	11.60	47.01
43.00	24.0	11.30	13.28	24.58	12.29	51.14
45.00	24.0	11.30	18.23	29.53	14.76	65.99
47.00	24.0	11.76	26.94	38.70	19.35	92.58
49.00	24.0	12.86	42.15	55.00	27.50	139.30
51.00	24.0	17.81	57.39	75.20	37.60	189.98
53.00	24.0	22.54	58.51	81.05	40.53	198.08
55.00	24.0	33.68	228.95	262.63	131.32	720.53
57.00	24.0	38.05	320.07	358.11	179.06	998.24
59.00	24.0	42.28	411.97	454.24	227.12	1278.17
61.00	24.0	52.22	447.22	499.44	249.72	1393.87
63.00	24.0	68.22	379.68	447.91	223.95	1207.28
65.00	24.0	84.22	280.91	365.13	182.57	926.96
67.00	24.0	100.22	166.18	266.40	133.20	598.77
69.00	24.0	114.90	177.89	292.78	146.39	648.55
71.00	24.0	122.53	245.42	367.95	183.97	858.78
73.00	24.0	125.51	344.19	469.70	234.85	1158.08
75.00	24.0	125.51	458.92	584.43	292.21	1502.27
77.00	24.0	141.51	458.92	600.43	300.21	1518.27
79.00	24.0	157.51	458.92	616.43	308.21	1534.27
81.00	24.0	173.51	452.36	625.87	312.93	1530.59
83.00	24.0	189.51	429.04	618.55	309.27	1476.64
85.00	24.0	205.51	422.49	627.99	314.00	1472.96
87.00	24.0	221.51	422.49	643.99	322.00	1488.96
89.00	24.0	236.81	343.96	580.77	290.38	1268.70
91.00	24.0	250.32	280.06	530.38	265.19	1090.49
93.00	24.0	265.63	240.26	505.89	252.94	986.41
95.00	24.0	281.63	240.26	521.89	260.94	1002.41
97.00	24.0	286.98	325.34	612.33	306.16	1263.01
99.00	24.0	291.98	348.73	640.71	320.35	1338.16

"BB-04_Driven_BOC=-15.5ft_Void=-25.5ft_Preform=-37.3ft.out"

101.00	24.0	302.03	309.03	611.05	305.53	1229.10
103.00	24.0	318.03	204.93	522.96	261.48	932.83
105.00	24.0	334.03	118.89	452.91	226.46	690.69
107.00	24.0	342.56	182.73	525.29	262.64	890.75
109.00	24.0	347.67	171.90	519.56	259.78	863.35
111.00	24.0	349.65	211.61	561.26	280.63	984.48
113.00	24.0	353.65	249.47	603.12	301.56	1102.07
115.00	24.0	369.65	237.20	606.85	303.42	1081.25
117.00	24.0	373.02	328.64	701.66	350.83	1358.94

Section Type: Square
Pile Width: 30.00 (in)

Test Pile Length (ft)	Pile Width (in)	Ultimate Side Friction (tons)	Mobilized End Bearing (tons)	Estimated Davisson Capacity (tons)	Allowable Pile Capacity (tons)	Ultimate Pile Capacity (tons)
5.00	30.0	0.00	0.00	0.00	0.00	0.00
7.00	30.0	0.00	0.00	0.00	0.00	0.00
9.00	30.0	0.00	0.00	0.00	0.00	0.00
11.00	30.0	0.00	0.00	0.00	0.00	0.00
13.00	30.0	0.00	0.00	0.00	0.00	0.00
15.00	30.0	0.00	0.00	0.00	0.00	0.00
17.00	30.0	0.00	0.00	0.00	0.00	0.00
19.00	30.0	0.00	0.00	0.00	0.00	0.00
21.00	30.0	0.00	0.00	0.00	0.00	0.00
23.00	30.0	0.00	0.00	0.00	0.00	0.00
25.00	30.0	0.00	0.00	0.00	0.00	0.00
27.00	30.0	0.00	0.00	0.00	0.00	0.00
29.00	30.0	1.70	24.25	25.95	12.98	74.46
31.00	30.0	5.73	21.84	27.56	13.78	71.23
33.00	30.0	8.32	18.94	27.26	13.63	65.14
35.00	30.0	10.30	16.71	27.00	13.50	60.42
37.00	30.0	12.27	14.79	27.07	13.53	56.66
39.00	30.0	13.91	16.87	30.79	15.39	64.54
41.00	30.0	14.12	19.49	33.62	16.81	72.61
43.00	30.0	14.12	22.26	36.39	18.19	80.91
45.00	30.0	14.12	29.71	43.83	21.92	103.26
47.00	30.0	14.62	44.62	59.24	29.62	148.49
49.00	30.0	15.85	59.28	75.13	37.57	193.69
51.00	30.0	22.35	90.82	113.18	56.59	294.83
53.00	30.0	25.31	99.49	124.79	62.40	323.76
55.00	30.0	42.10	429.60	471.70	235.85	1330.90
57.00	30.0	47.56	543.49	591.05	295.53	1678.04
59.00	30.0	52.85	643.74	696.59	348.29	1984.07
61.00	30.0	65.28	618.02	683.30	341.65	1919.33
63.00	30.0	85.28	494.55	579.83	289.91	1568.93
65.00	30.0	105.28	351.14	456.42	228.21	1158.70

"BB-04_Driven_BOC=-15.5ft_Void=-25.5ft_Preform=-37.3ft.out"

NBR of 480 tons at
elevation -66.3'



67.00	30.0	125.28	351.14	476.42	238.21	1178.70
69.00	30.0	143.62	365.77	509.39	254.70	1240.93
71.00	30.0	153.16	450.18	603.35	301.67	1503.71
73.00	30.0	156.88	573.65	730.53	365.27	1877.83
75.00	30.0	156.88	717.06	873.94	436.97	2308.07
77.00	30.0	176.88	717.06	893.94	446.97	2328.07
79.00	30.0	196.88	708.86	905.75	452.87	2323.48
81.00	30.0	216.88	679.72	896.60	448.30	2256.04
83.00	30.0	236.88	671.52	908.40	454.20	2251.44
85.00	30.0	256.88	671.52	928.40	464.20	2271.44
87.00	30.0	276.88	565.17	842.05	421.03	1972.39
89.00	30.0	296.01	464.33	760.34	380.17	1689.01
91.00	30.0	312.90	435.54	748.45	374.22	1619.53
93.00	30.0	332.03	443.74	775.77	387.89	1663.25
95.00	30.0	352.03	443.74	795.77	397.89	1683.25
97.00	30.0	358.73	470.29	829.02	414.51	1769.59
99.00	30.0	364.98	471.76	836.73	418.37	1780.24
101.00	30.0	377.53	399.58	777.11	388.56	1576.27
103.00	30.0	397.53	292.02	689.55	344.78	1273.59
105.00	30.0	417.53	292.02	709.55	354.78	1293.59
107.00	30.0	428.20	250.72	678.91	339.46	1180.35
109.00	30.0	434.58	277.81	712.39	356.20	1268.02
111.00	30.0	437.06	347.70	784.76	392.38	1480.15
113.00	30.0	442.06	439.91	881.97	440.99	1761.80
115.00	30.0	462.06	433.11	895.17	447.58	1761.38

NOTES

1. MOBILIZED END BEARING IS 1/3 OF THE ORIGINAL RB-121 VALUES.
2. DAVISSON PILE CAPACITY IS AN ESTIMATE BASED ON FAILURE CRITERIA, AND EQUALS ULTIMATE SIDE FRICTION PLUS MOBILIZED END BEARING.
3. ALLOWABLE PILE CAPACITY IS 1/2 THE DAVISSON PILE CAPACITY.
4. ULTIMATE PILE CAPACITY IS ULTIMATE SIDE FRICTION PLUS 3 x THE MOBILIZED END BEARING.
EXCEPTION: FOR H-PILES TIPPED IN SAND OR LIMESTONE, THE ULTIMATE PILE CAPACITY IS ULTIMATE SIDE FRICTION PLUS 2 x THE MOBILIZED END BEARING.

"BB-04_Driven_BOC=-15.5ft_Void=-25.5ft_Preform=-37.3ft.out"

Florida Bridge Software Institute
Shaft and Pile Analysis (FB-Deep v.3.1.0)

Date: January 19, 2024
Time: 13:11:28

General Information:

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Input file: piers\BB-05_Driven_BOC=-5.3ft_Void=-20.3ft_Preform=-37.8ft.in
Project number: B-22-074
Job name: Broad Causeway Bridge
Engineer: PV/TC
Units: English

Analysis Information:

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Analysis Type: SPT

Soil Information:

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Boring date: 12/6/23, Boring Number: BB-05
Station number: 126+43 Offset: 28 LT

Ground Elevation: -5.300(ft)

Hammer type: Automatic Hammer, Correction factor = 1.24

ID	Depth (ft)	No. of Blows (Blows/ft)	Soil Type

1	0.00	18.50	5- Cavity layer
2	2.00	18.50	5- Cavity layer
3	4.00	20.00	5- Cavity layer
4	6.00	20.00	5- Cavity layer
5	8.00	17.50	5- Cavity layer
6	10.00	16.50	5- Cavity layer
7	12.00	7.50	5- Cavity layer
8	14.00	12.50	5- Cavity layer
9	15.00	12.50	5- Cavity layer
10	15.00	12.50	4- Lime Stone/Very shelly sand
11	16.00	12.50	4- Lime Stone/Very shelly sand
12	16.00	0.00	1- Plastic Clay
13	16.00	2.50	4- Lime Stone/Very shelly sand
14	20.00	2.50	4- Lime Stone/Very shelly sand
15	20.00	0.00	1- Plastic Clay
16	20.00	10.50	4- Lime Stone/Very shelly sand
17	25.00	10.50	4- Lime Stone/Very shelly sand
18	25.00	0.00	1- Plastic Clay

BB-05_Driven_BOC=-5.3ft_Void=-20.3ft_Preform=-37.8ft.out

Predrilling 15' below bottom of
canal, to elevation -20.3'

Preforming to elevation
-37.8' or a depth of 32.5'
below mudline

19	25.00	3.50	4- Lime Stone/Very shelly sand
20	27.50	3.50	4- Lime Stone/Very shelly sand
21	30.00	5.00	4- Lime Stone/Very shelly sand
22	32.50	3.50	4- Lime Stone/Very shelly sand
23	32.50	0.00	1- Plastic Clay
24	32.50	38.00	3- Clean sand
25	35.00	38.00	3- Clean sand
26	35.00	0.00	1- Plastic Clay
27	35.00	4.00	3- Clean sand
28	37.50	4.00	3- Clean sand
29	40.00	5.00	3- Clean sand
30	42.50	5.00	3- Clean sand
31	45.00	5.00	3- Clean sand
32	45.00	0.00	1- Plastic Clay
33	45.00	9.00	3- Clean sand
34	47.50	9.00	3- Clean sand
35	50.00	14.00	3- Clean sand
36	50.00	0.00	1- Plastic Clay
37	50.00	9.00	4- Lime Stone/Very shelly sand
38	52.50	9.00	4- Lime Stone/Very shelly sand
39	52.50	0.00	1- Plastic Clay
40	52.50	100.00	4- Lime Stone/Very shelly sand
41	55.00	100.00	4- Lime Stone/Very shelly sand
42	57.50	100.00	4- Lime Stone/Very shelly sand
43	60.00	100.00	4- Lime Stone/Very shelly sand
44	60.00	0.00	1- Plastic Clay
45	60.00	8.00	4- Lime Stone/Very shelly sand
46	62.50	100.00	4- Lime Stone/Very shelly sand
47	62.50	0.00	1- Plastic Clay
48	62.50	8.00	3- Clean sand
49	65.00	100.00	3- Clean sand
50	65.00	0.00	1- Plastic Clay
51	65.00	100.00	4- Lime Stone/Very shelly sand
52	67.50	100.00	4- Lime Stone/Very shelly sand
53	70.00	100.00	4- Lime Stone/Very shelly sand
54	72.50	100.00	4- Lime Stone/Very shelly sand
55	72.50	0.00	1- Plastic Clay
56	72.50	91.00	3- Clean sand
57	75.00	91.00	3- Clean sand
58	75.00	0.00	1- Plastic Clay
59	75.00	100.00	4- Lime Stone/Very shelly sand
60	77.50	100.00	4- Lime Stone/Very shelly sand
61	80.00	100.00	4- Lime Stone/Very shelly sand
62	82.50	100.00	4- Lime Stone/Very shelly sand
63	85.00	100.00	4- Lime Stone/Very shelly sand
64	87.50	100.00	4- Lime Stone/Very shelly sand
65	87.50	0.00	1- Plastic Clay
66	87.50	16.00	4- Lime Stone/Very shelly sand
67	90.00	16.00	4- Lime Stone/Very shelly sand

BB-05_Driven_BOC=-5.3ft_Void=-20.3ft_Preform=-37.8ft.out

68	92.50	32.00	4- Lime Stone/Very shelly sand
69	92.50	0.00	1- Plastic Clay
70	92.50	82.00	4- Lime Stone/Very shelly sand
71	95.00	82.00	4- Lime Stone/Very shelly sand
72	95.00	0.00	1- Plastic Clay
73	95.00	23.00	4- Lime Stone/Very shelly sand
74	97.50	23.00	4- Lime Stone/Very shelly sand
75	100.00	20.00	4- Lime Stone/Very shelly sand
76	100.00	0.00	1- Plastic Clay
77	100.00	3.00	4- Lime Stone/Very shelly sand
78	102.50	3.00	4- Lime Stone/Very shelly sand
79	102.50	0.00	1- Plastic Clay
80	102.50	24.00	3- Clean sand
81	105.00	24.00	3- Clean sand
82	105.00	0.00	1- Plastic Clay
83	105.00	48.00	4- Lime Stone/Very shelly sand
84	107.50	48.00	4- Lime Stone/Very shelly sand
85	107.50	0.00	1- Plastic Clay
86	107.50	74.00	3- Clean sand
87	110.00	74.00	3- Clean sand
88	110.00	0.00	1- Plastic Clay
89	110.00	13.00	3- Clean sand
90	112.50	13.00	3- Clean sand
91	115.00	24.00	3- Clean sand
92	117.50	11.00	3- Clean sand
93	120.00	10.00	3- Clean sand
94	122.50	20.00	3- Clean sand
95	125.00	17.00	3- Clean sand

Blowcount Average Per Soil Layer

Layer Num.	Starting Elevation (ft)	Bottom Elevation (ft)	Thickness (ft)	Average Blowcount (Blows/ft)	Soil Type

1	-5.30	-20.30	15.00	16.63	5-Void
2	-20.30	-21.30	1.00	12.50	4-Limestone, Very
Shelly Sand					
3	-21.30	-21.30	0.00	2.50	1-Plastic Clay
4	-21.30	-25.30	4.00	2.50	4-Limestone, Very
Shelly Sand					
5	-25.30	-25.30	0.00	10.50	1-Plastic Clay
6	-25.30	-30.30	5.00	10.50	4-Limestone, Very
Shelly Sand					
7	-30.30	-30.30	0.00	3.50	1-Plastic Clay

BB-05_Driven_BOC=-5.3ft_Void=-20.3ft_Preform=-37.8ft.out

8	-30.30	-37.80	7.50	4.00	4-Limestone, Very
Shelly Sand					
9	-37.80	-37.80	0.00	38.00	1-Plastic Clay
10	-37.80	-40.30	2.50	38.00	3-Clean Sand
11	-40.30	-40.30	0.00	4.00	1-Plastic Clay
12	-40.30	-50.30	10.00	4.50	3-Clean Sand
13	-50.30	-50.30	0.00	9.00	1-Plastic Clay
14	-50.30	-55.30	5.00	9.00	3-Clean Sand
15	-55.30	-55.30	0.00	9.00	1-Plastic Clay
16	-55.30	-57.80	2.50	9.00	4-Limestone, Very
Shelly Sand					
17	-57.80	-57.80	0.00	100.00	1-Plastic Clay
18	-57.80	-65.30	7.50	100.00	4-Limestone, Very
Shelly Sand					
19	-65.30	-65.30	0.00	8.00	1-Plastic Clay
20	-65.30	-67.80	2.50	8.00	4-Limestone, Very
Shelly Sand					
21	-67.80	-67.80	0.00	8.00	1-Plastic Clay
22	-67.80	-70.30	2.50	8.00	3-Clean Sand
23	-70.30	-70.30	0.00	100.00	1-Plastic Clay
24	-70.30	-77.80	7.50	100.00	4-Limestone, Very
Shelly Sand					
25	-77.80	-77.80	0.00	91.00	1-Plastic Clay
26	-77.80	-80.30	2.50	91.00	3-Clean Sand
27	-80.30	-80.30	0.00	100.00	1-Plastic Clay
28	-80.30	-92.80	12.50	100.00	4-Limestone, Very
Shelly Sand					
29	-92.80	-92.80	0.00	16.00	1-Plastic Clay
30	-92.80	-97.80	5.00	16.00	4-Limestone, Very
Shelly Sand					
31	-97.80	-97.80	0.00	82.00	1-Plastic Clay
32	-97.80	-100.30	2.50	82.00	4-Limestone, Very
Shelly Sand					
33	-100.30	-100.30	0.00	23.00	1-Plastic Clay
34	-100.30	-105.30	5.00	23.00	4-Limestone, Very
Shelly Sand					
35	-105.30	-105.30	0.00	3.00	1-Plastic Clay
36	-105.30	-107.80	2.50	3.00	4-Limestone, Very
Shelly Sand					
37	-107.80	-107.80	0.00	24.00	1-Plastic Clay
38	-107.80	-110.30	2.50	24.00	3-Clean Sand
39	-110.30	-110.30	0.00	48.00	1-Plastic Clay
40	-110.30	-112.80	2.50	48.00	4-Limestone, Very
Shelly Sand					
41	-112.80	-112.80	0.00	74.00	1-Plastic Clay
42	-112.80	-115.30	2.50	74.00	3-Clean Sand
43	-115.30	-115.30	0.00	13.00	1-Plastic Clay
44	-115.30	-130.30	15.00	15.17	3-Clean Sand

BB-05_Driven_BOC=-5.3ft_Void=-20.3ft_Preform=-37.8ft.out

Driven Pile Data:

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Pile unit weight = 150.00(pcf), Section Type: Square

Pile Geometry:

Width (in)	Length (ft)	Tip Elev. (ft)
24.00	5.00	-10.30
24.00	7.00	-12.30
24.00	9.00	-14.30
24.00	11.00	-16.30
24.00	13.00	-18.30
24.00	15.00	-20.30
24.00	17.00	-22.30
24.00	19.00	-24.30
24.00	21.00	-26.30
24.00	23.00	-28.30
24.00	25.00	-30.30
24.00	27.00	-32.30
24.00	29.00	-34.30
24.00	31.00	-36.30
24.00	33.00	-38.30
24.00	35.00	-40.30
24.00	37.00	-42.30
24.00	39.00	-44.30
24.00	41.00	-46.30
24.00	43.00	-48.30
24.00	45.00	-50.30
24.00	47.00	-52.30
24.00	49.00	-54.30
24.00	51.00	-56.30
24.00	53.00	-58.30
24.00	55.00	-60.30
24.00	57.00	-62.30
24.00	59.00	-64.30
24.00	61.00	-66.30
24.00	63.00	-68.30
24.00	65.00	-70.30
24.00	67.00	-72.30
24.00	69.00	-74.30
24.00	71.00	-76.30
24.00	73.00	-78.30
24.00	75.00	-80.30
24.00	77.00	-82.30
24.00	79.00	-84.30
24.00	81.00	-86.30

BB-05_Driven_BOC=-5.3ft_Void=-20.3ft_Preform=-37.8ft.out

24.00	83.00	-88.30
24.00	85.00	-90.30
24.00	87.00	-92.30
24.00	89.00	-94.30
24.00	91.00	-96.30
24.00	93.00	-98.30
24.00	95.00	-100.30
24.00	97.00	-102.30
24.00	99.00	-104.30
24.00	101.00	-106.30
24.00	103.00	-108.30
24.00	105.00	-110.30
24.00	107.00	-112.30
24.00	109.00	-114.30
24.00	111.00	-116.30
24.00	113.00	-118.30
24.00	115.00	-120.30
24.00	117.00	-122.30
30.00	5.00	-10.30
30.00	7.00	-12.30
30.00	9.00	-14.30
30.00	11.00	-16.30
30.00	13.00	-18.30
30.00	15.00	-20.30
30.00	17.00	-22.30
30.00	19.00	-24.30
30.00	21.00	-26.30
30.00	23.00	-28.30
30.00	25.00	-30.30
30.00	27.00	-32.30
30.00	29.00	-34.30
30.00	31.00	-36.30
30.00	33.00	-38.30
30.00	35.00	-40.30
30.00	37.00	-42.30
30.00	39.00	-44.30
30.00	41.00	-46.30
30.00	43.00	-48.30
30.00	45.00	-50.30
30.00	47.00	-52.30
30.00	49.00	-54.30
30.00	51.00	-56.30
30.00	53.00	-58.30
30.00	55.00	-60.30
30.00	57.00	-62.30
30.00	59.00	-64.30
30.00	61.00	-66.30
30.00	63.00	-68.30
30.00	65.00	-70.30

BB-05_Driven_BOC=-5.3ft_Void=-20.3ft_Preform=-37.8ft.out

30.00	67.00	-72.30
30.00	69.00	-74.30
30.00	71.00	-76.30
30.00	73.00	-78.30
30.00	75.00	-80.30
30.00	77.00	-82.30
30.00	79.00	-84.30
30.00	81.00	-86.30
30.00	83.00	-88.30
30.00	85.00	-90.30
30.00	87.00	-92.30
30.00	89.00	-94.30
30.00	91.00	-96.30
30.00	93.00	-98.30
30.00	95.00	-100.30
30.00	97.00	-102.30
30.00	99.00	-104.30
30.00	101.00	-106.30
30.00	103.00	-108.30
30.00	105.00	-110.30
30.00	107.00	-112.30
30.00	109.00	-114.30
30.00	111.00	-116.30
30.00	113.00	-118.30
30.00	115.00	-120.30

Driven Pile Capacity:
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Section Type: Square
Pile Width: 24.00 (in)

Test Pile Length (ft)	Pile Width (in)	Ultimate Side Friction (tons)	Mobilized End Bearing (tons)	Estimated Davisson Capacity (tons)	Allowable Pile Capacity (tons)	Ultimate Pile Capacity (tons)
5.00	24.0	0.00	0.00	0.00	0.00	0.00
7.00	24.0	0.00	0.00	0.00	0.00	0.00
9.00	24.0	0.00	0.00	0.00	0.00	0.00
11.00	24.0	0.00	0.00	0.00	0.00	0.00
13.00	24.0	0.00	0.00	0.00	0.00	0.00
15.00	24.0	0.00	27.43	27.43	13.72	82.30

BB-05_Driven_BOC=-5.3ft_Void=-20.3ft_Preform=-37.8ft.out

17.00	24.0	1.49	30.48	31.97	15.99	92.94
19.00	24.0	1.98	31.48	33.47	16.73	96.43
21.00	24.0	3.27	28.70	31.98	15.99	89.38
23.00	24.0	5.36	22.67	28.03	14.01	73.36
25.00	24.0	7.44	27.46	34.90	17.45	89.82
27.00	24.0	8.13	74.26	82.39	41.20	230.90
29.00	24.0	8.90	75.74	84.63	42.32	236.11
31.00	24.0	9.83	76.65	86.48	43.24	239.77
33.00	24.0	14.00	51.24	65.23	32.62	167.71
35.00	24.0	28.32	38.24	66.57	33.28	143.05
37.00	24.0	29.81	38.32	68.13	34.07	144.76
39.00	24.0	31.34	38.66	70.00	35.00	147.32
41.00	24.0	32.97	39.94	72.90	36.45	152.77
43.00	24.0	34.25	44.55	78.80	39.40	167.90
45.00	24.0	37.04	49.84	86.88	43.44	186.56
47.00	24.0	38.90	54.89	93.80	46.90	203.58
49.00	24.0	39.93	72.70	112.63	56.31	258.02
51.00	24.0	47.59	379.72	427.31	213.65	1186.74
53.00	24.0	52.93	416.26	469.19	234.59	1301.71
55.00	24.0	68.93	367.56	436.49	218.24	1171.61
57.00	24.0	84.93	295.46	380.39	190.20	971.32
59.00	24.0	100.93	295.46	396.39	198.20	987.32
61.00	24.0	111.17	338.12	449.29	224.64	1125.54
63.00	24.0	121.01	310.29	431.29	215.65	1051.86
65.00	24.0	133.21	446.24	579.44	289.72	1471.92
67.00	24.0	149.21	395.51	544.71	272.36	1335.73
69.00	24.0	165.21	395.51	560.71	280.36	1351.73
71.00	24.0	181.21	395.51	576.71	288.36	1367.73
73.00	24.0	197.72	381.90	579.62	289.81	1343.43
75.00	24.0	216.01	458.92	674.93	337.46	1592.77
77.00	24.0	232.01	458.92	690.93	345.46	1608.77
79.00	24.0	248.01	458.92	706.93	353.46	1624.77
81.00	24.0	264.01	385.41	649.42	324.71	1420.25
83.00	24.0	280.01	289.33	569.34	284.67	1147.99
85.00	24.0	296.01	225.92	521.93	260.96	973.77
87.00	24.0	312.01	225.92	537.93	268.96	989.77
89.00	24.0	318.39	209.50	527.89	263.94	946.88
91.00	24.0	321.88	214.86	536.74	268.37	966.46
93.00	24.0	329.93	176.01	505.94	252.97	857.96
95.00	24.0	345.93	71.44	417.37	208.68	560.25
97.00	24.0	350.49	78.39	428.88	214.44	585.65
99.00	24.0	354.92	112.56	467.48	233.74	692.59
101.00	24.0	357.26	162.63	519.89	259.94	845.15
103.00	24.0	359.97	179.75	539.72	269.86	899.22
105.00	24.0	369.02	178.88	547.90	273.95	905.66
107.00	24.0	378.54	146.62	525.16	262.58	818.41
109.00	24.0	394.60	140.79	535.39	267.70	816.98
111.00	24.0	406.17	109.57	515.74	257.87	734.87
113.00	24.0	411.17	105.58	516.76	258.38	727.92

NBR of 360 tons at
approx. elevation -56'



BB-05_Driven_BOC=-5.3ft_Void=-20.3ft_Preform=-37.8ft.out

115.00	24.0	418.56	101.83	520.39	260.20	724.05
117.00	24.0	425.65	105.14	530.79	265.39	741.06

Section Type: Square
Pile Width: 30.00 (in)

Test Pile Length (ft)	Pile Width (in)	Ultimate Side Friction (tons)	Mobilized End Bearing (tons)	Estimated Davisson Capacity (tons)	Allowable Pile Capacity (tons)	Ultimate Pile Capacity (tons)
5.00	30.0	0.00	0.00	0.00	0.00	0.00
7.00	30.0	0.00	0.00	0.00	0.00	0.00
9.00	30.0	0.00	0.00	0.00	0.00	0.00
11.00	30.0	0.00	0.00	0.00	0.00	0.00
13.00	30.0	0.00	0.00	0.00	0.00	0.00
15.00	30.0	0.00	47.69	47.69	23.84	143.06
17.00	30.0	1.86	42.44	44.30	22.15	129.17
19.00	30.0	2.48	44.11	46.59	23.30	134.82
21.00	30.0	4.09	41.73	45.82	22.91	129.27
23.00	30.0	6.70	47.72	54.41	27.21	149.85
25.00	30.0	9.30	97.15	106.45	53.23	300.76
27.00	30.0	10.17	99.43	109.60	54.80	308.47
29.00	30.0	11.12	101.66	112.78	56.39	316.10
31.00	30.0	12.29	103.91	116.20	58.10	324.02
33.00	30.0	17.50	70.58	88.07	44.04	229.22
35.00	30.0	35.40	55.10	90.51	45.25	200.72
37.00	30.0	37.24	55.32	92.56	46.28	203.20
39.00	30.0	38.89	57.01	95.90	47.95	209.92
41.00	30.0	40.62	60.44	101.06	50.53	221.94
43.00	30.0	42.63	62.92	105.55	52.77	231.40
45.00	30.0	46.30	117.42	163.72	81.86	398.56
47.00	30.0	48.95	124.18	173.13	86.57	421.50
49.00	30.0	50.69	144.35	195.03	97.52	483.73
51.00	30.0	59.49	564.73	624.22	312.11	1753.68
53.00	30.0	66.16	602.86	669.02	334.51	1874.75
55.00	30.0	86.16	512.74	598.90	299.45	1624.38
57.00	30.0	106.16	512.74	618.90	309.45	1644.38
59.00	30.0	126.16	512.74	638.90	319.45	1664.38
61.00	30.0	138.96	566.07	705.02	352.51	1837.16
63.00	30.0	151.27	464.87	616.14	308.07	1545.87
65.00	30.0	166.51	637.80	804.31	402.15	2079.90
67.00	30.0	186.51	637.80	824.31	412.15	2099.90
69.00	30.0	206.51	637.80	844.31	422.15	2119.90
71.00	30.0	226.51	637.80	864.31	432.15	2139.90
73.00	30.0	247.16	620.77	867.94	433.97	2109.48

BB-05_Driven_BOC=-5.3ft_Void=-20.3ft_Preform=-37.8ft.out

NBR of 480 tons at
approx. elevation -56'



75.00	30.0	270.01	717.06	987.07	493.54	2421.20
77.00	30.0	290.01	717.06	1007.07	503.54	2441.20
79.00	30.0	310.01	625.18	935.19	467.59	2185.55
81.00	30.0	330.01	505.07	835.08	417.54	1845.23
83.00	30.0	350.01	425.81	775.82	387.91	1627.45
85.00	30.0	370.01	425.81	795.82	397.91	1647.45
87.00	30.0	390.01	313.40	703.41	351.71	1330.22
89.00	30.0	397.99	291.88	689.87	344.93	1273.63
91.00	30.0	402.35	284.17	686.52	343.26	1254.86
93.00	30.0	412.41	232.71	645.12	322.56	1110.55
95.00	30.0	432.41	128.98	561.39	280.70	819.35
97.00	30.0	438.11	170.71	608.82	304.41	950.23
99.00	30.0	443.65	218.88	662.53	331.26	1100.28
101.00	30.0	446.58	254.03	700.61	350.30	1208.67
103.00	30.0	449.96	307.14	757.10	378.55	1371.39
105.00	30.0	461.27	256.01	717.28	358.64	1229.29
107.00	30.0	473.17	214.36	687.54	343.77	1116.27
109.00	30.0	493.25	209.71	702.96	351.48	1122.37
111.00	30.0	507.71	197.49	705.20	352.60	1100.18
113.00	30.0	513.97	186.74	700.71	350.36	1074.20
115.00	30.0	523.20	158.39	681.60	340.80	998.39

NOTES

1. MOBILIZED END BEARING IS 1/3 OF THE ORIGINAL RB-121 VALUES.
2. DAVISSON PILE CAPACITY IS AN ESTIMATE BASED ON FAILURE CRITERIA, AND EQUALS ULTIMATE SIDE FRICTION PLUS MOBILIZED END BEARING.
3. ALLOWABLE PILE CAPACITY IS 1/2 THE DAVISSON PILE CAPACITY.
4. ULTIMATE PILE CAPACITY IS ULTIMATE SIDE FRICTION PLUS 3 x THE MOBILIZED END BEARING.
EXCEPTION: FOR H-PILES TIPPED IN SAND OR LIMESTONE, THE ULTIMATE PILE CAPACITY IS ULTIMATE SIDE FRICTION PLUS 2 x THE MOBILIZED END BEARING.

BB-05_Driven_BOC=-5.3ft_Void=-20.3ft_Preform=-37.8ft.out

General Information:

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Input file: piers\BB-06_Driven_BOC=-6.3ft_Void=-21.3ft_Preform=-28.8ft.in
Project number: B-22-074
Job name: Broad Causeway Bridge
Engineer: PV/TC
Units: English

Analysis Information:

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Analysis Type: SPT

Soil Information:

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Boring date: 12/8/23, Boring Number: BB-06
Station number: 127+95 Offset: 15 LT

Ground Elevation: -6.300(ft)

Hammer type: Automatic Hammer, Correction factor = 1.24

ID	Depth (ft)	No. of Blows (Blows/ft)	Soil Type

1	0.00	6.50	5- Cavity layer
2	2.00	6.50	5- Cavity layer
3	4.00	13.00	5- Cavity layer
4	6.00	13.50	5- Cavity layer
5	8.00	11.00	5- Cavity layer
6	10.00	12.50	5- Cavity layer
7	12.00	14.00	5- Cavity layer
8	14.00	10.50	5- Cavity layer
9	15.00	11.00	5- Cavity layer
10	15.00	11.00	4- Lime Stone/Very shelly sand
11	16.00	11.00	4- Lime Stone/Very shelly sand
12	20.00	6.00	4- Lime Stone/Very shelly sand
13	20.00	0.00	1- Plastic Clay
14	20.00	3.00	4- Lime Stone/Very shelly sand
15	22.50	3.00	4- Lime Stone/Very shelly sand
16	22.50	0.00	1- Plastic Clay
17	22.50	3.00	3- Clean sand
18	25.00	3.00	3- Clean sand

BB-06_Driven_BOC=-6.3ft_Void=-21.3ft_Preform=-28.8ft.out

Predrilling 15' below bottom of
canal, to elevation -21.3'

Preforming to elevation
-28.8' or a depth of 22.5'
below mudline

19	25.00	0.00	1- Plastic Clay
20	25.00	7.00	3- Clean sand
21	27.50	7.00	3- Clean sand
22	30.00	14.00	3- Clean sand
23	32.50	13.00	3- Clean sand
24	35.00	7.00	3- Clean sand
25	35.00	0.00	1- Plastic Clay
26	35.00	8.00	4- Lime Stone/Very shelly sand
27	37.50	8.00	4- Lime Stone/Very shelly sand
28	37.50	0.00	1- Plastic Clay
29	37.50	7.00	3- Clean sand
30	40.00	7.00	3- Clean sand
31	40.00	0.00	1- Plastic Clay
32	40.00	28.00	3- Clean sand
33	42.50	28.00	3- Clean sand
34	45.00	19.00	3- Clean sand
35	45.00	0.00	1- Plastic Clay
36	45.00	6.00	3- Clean sand
37	47.50	6.00	3- Clean sand
38	50.00	5.00	3- Clean sand
39	52.50	11.00	3- Clean sand
40	55.00	9.00	3- Clean sand
41	55.00	0.00	1- Plastic Clay
42	55.00	4.00	4- Lime Stone/Very shelly sand
43	57.50	4.00	4- Lime Stone/Very shelly sand
44	57.50	0.00	1- Plastic Clay
45	57.50	58.00	3- Clean sand
46	60.00	100.00	3- Clean sand
47	62.50	100.00	3- Clean sand
48	62.50	0.00	1- Plastic Clay
49	62.50	100.00	4- Lime Stone/Very shelly sand
50	65.00	100.00	4- Lime Stone/Very shelly sand
51	67.50	100.00	4- Lime Stone/Very shelly sand
52	67.50	0.00	1- Plastic Clay
53	67.50	14.00	3- Clean sand
54	70.00	14.00	3- Clean sand
55	70.00	0.00	1- Plastic Clay
56	70.00	5.00	4- Lime Stone/Very shelly sand
57	72.50	5.00	4- Lime Stone/Very shelly sand
58	72.50	0.00	1- Plastic Clay
59	72.50	100.00	3- Clean sand
60	75.00	100.00	3- Clean sand
61	75.00	0.00	1- Plastic Clay
62	75.00	17.00	3- Clean sand
63	77.50	17.00	3- Clean sand
64	77.50	0.00	1- Plastic Clay
65	77.50	3.00	3- Clean sand
66	80.00	3.00	3- Clean sand
67	80.00	0.00	1- Plastic Clay

BB-06_Driven_BOC=-6.3ft_Void=-21.3ft_Preform=-28.8ft.out

68	80.00	100.00	4- Lime Stone/Very shelly sand
69	82.50	100.00	4- Lime Stone/Very shelly sand
70	82.50	0.00	1- Plastic Clay
71	82.50	17.00	4- Lime Stone/Very shelly sand
72	85.00	17.00	4- Lime Stone/Very shelly sand
73	85.00	0.00	1- Plastic Clay
74	85.00	51.00	4- Lime Stone/Very shelly sand
75	87.50	51.00	4- Lime Stone/Very shelly sand
76	90.00	36.00	4- Lime Stone/Very shelly sand
77	90.00	0.00	1- Plastic Clay
78	90.00	69.00	4- Lime Stone/Very shelly sand
79	92.50	69.00	4- Lime Stone/Very shelly sand
80	95.00	100.00	4- Lime Stone/Very shelly sand
81	95.00	0.00	1- Plastic Clay
82	95.00	22.00	4- Lime Stone/Very shelly sand
83	97.50	22.00	4- Lime Stone/Very shelly sand
84	100.00	4.00	3- Clean sand
85	100.00	0.00	1- Plastic Clay
86	100.00	100.00	3- Clean sand
87	102.50	100.00	3- Clean sand
88	102.50	0.00	1- Plastic Clay
89	102.50	7.00	4- Lime Stone/Very shelly sand
90	105.00	7.00	4- Lime Stone/Very shelly sand
91	105.00	0.00	1- Plastic Clay
92	105.00	100.00	4- Lime Stone/Very shelly sand
93	107.50	100.00	4- Lime Stone/Very shelly sand
94	107.50	0.00	1- Plastic Clay
95	107.50	3.00	4- Lime Stone/Very shelly sand
96	110.00	3.00	4- Lime Stone/Very shelly sand
97	110.00	0.00	1- Plastic Clay
98	110.00	100.00	4- Lime Stone/Very shelly sand
99	112.50	100.00	4- Lime Stone/Very shelly sand
100	112.50	0.00	1- Plastic Clay
101	112.50	27.00	4- Lime Stone/Very shelly sand
102	115.00	27.00	4- Lime Stone/Very shelly sand
103	117.50	20.00	4- Lime Stone/Very shelly sand
104	120.00	9.00	4- Lime Stone/Very shelly sand
105	122.50	18.00	4- Lime Stone/Very shelly sand
106	122.50	0.00	1- Plastic Clay
107	122.50	8.00	3- Clean sand
108	125.00	8.00	3- Clean sand

Blowcount Average Per Soil Layer

Layer Num.	Starting Elevation	Bottom Elevation	Thickness	Average Blowcount	Soil Type

BB-06_Driven_BOC=-6.3ft_Void=-21.3ft_Preform=-28.8ft.out

	(ft)	(ft)	(ft)	(Blows/ft)	

1	-6.30	-21.30	15.00	10.97	5-Void
2	-21.30	-26.30	5.00	11.00	4-Limestone, Very
Shelly Sand					
3	-26.30	-26.30	0.00	3.00	1-Plastic Clay
4	-26.30	-28.80	2.50	3.00	4-Limestone, Very
Shelly Sand					
5	-28.80	-28.80	0.00	3.00	1-Plastic Clay
6	-28.80	-31.30	2.50	3.00	3-Clean Sand
7	-31.30	-31.30	0.00	7.00	1-Plastic Clay
8	-31.30	-41.30	10.00	10.25	3-Clean Sand
9	-41.30	-41.30	0.00	8.00	1-Plastic Clay
10	-41.30	-43.80	2.50	8.00	4-Limestone, Very
Shelly Sand					
11	-43.80	-43.80	0.00	7.00	1-Plastic Clay
12	-43.80	-46.30	2.50	7.00	3-Clean Sand
13	-46.30	-46.30	0.00	28.00	1-Plastic Clay
14	-46.30	-51.30	5.00	28.00	3-Clean Sand
15	-51.30	-51.30	0.00	6.00	1-Plastic Clay
16	-51.30	-61.30	10.00	7.00	3-Clean Sand
17	-61.30	-61.30	0.00	4.00	1-Plastic Clay
18	-61.30	-63.80	2.50	4.00	4-Limestone, Very
Shelly Sand					
19	-63.80	-63.80	0.00	58.00	1-Plastic Clay
20	-63.80	-68.80	5.00	79.00	3-Clean Sand
21	-68.80	-68.80	0.00	100.00	1-Plastic Clay
22	-68.80	-73.80	5.00	100.00	4-Limestone, Very
Shelly Sand					
23	-73.80	-73.80	0.00	14.00	1-Plastic Clay
24	-73.80	-76.30	2.50	14.00	3-Clean Sand
25	-76.30	-76.30	0.00	5.00	1-Plastic Clay
26	-76.30	-78.80	2.50	5.00	4-Limestone, Very
Shelly Sand					
27	-78.80	-78.80	0.00	100.00	1-Plastic Clay
28	-78.80	-81.30	2.50	100.00	3-Clean Sand
29	-81.30	-81.30	0.00	17.00	1-Plastic Clay
30	-81.30	-83.80	2.50	17.00	3-Clean Sand
31	-83.80	-83.80	0.00	3.00	1-Plastic Clay
32	-83.80	-86.30	2.50	3.00	3-Clean Sand
33	-86.30	-86.30	0.00	100.00	1-Plastic Clay
34	-86.30	-88.80	2.50	100.00	4-Limestone, Very
Shelly Sand					
35	-88.80	-88.80	0.00	17.00	1-Plastic Clay
36	-88.80	-91.30	2.50	17.00	4-Limestone, Very
Shelly Sand					
37	-91.30	-91.30	0.00	51.00	1-Plastic Clay
38	-91.30	-96.30	5.00	51.00	4-Limestone, Very

BB-06_Driven_BOC=-6.3ft_Void=-21.3ft_Preform=-28.8ft.out

Shelly Sand					
39	-96.30	-96.30	0.00	69.00	1-Plastic Clay
40	-96.30	-101.30	5.00	69.00	4-Limestone, Very
Shelly Sand					
41	-101.30	-101.30	0.00	22.00	1-Plastic Clay
42	-101.30	-106.30	5.00	22.00	4-Limestone, Very
Shelly Sand					
43	-106.30	-106.30	0.00	0.00	3-Clean Sand
44	-106.30	-106.30	0.00	100.00	1-Plastic Clay
45	-106.30	-108.80	2.50	100.00	3-Clean Sand
46	-108.80	-108.80	0.00	7.00	1-Plastic Clay
47	-108.80	-111.30	2.50	7.00	4-Limestone, Very
Shelly Sand					
48	-111.30	-111.30	0.00	100.00	1-Plastic Clay
49	-111.30	-113.80	2.50	100.00	4-Limestone, Very
Shelly Sand					
50	-113.80	-113.80	0.00	3.00	1-Plastic Clay
51	-113.80	-116.30	2.50	3.00	4-Limestone, Very
Shelly Sand					
52	-116.30	-116.30	0.00	100.00	1-Plastic Clay
53	-116.30	-118.80	2.50	100.00	4-Limestone, Very
Shelly Sand					
54	-118.80	-118.80	0.00	27.00	1-Plastic Clay
55	-118.80	-128.80	10.00	20.75	4-Limestone, Very
Shelly Sand					
56	-128.80	-128.80	0.00	8.00	1-Plastic Clay
57	-128.80	-131.30	2.50	8.00	3-Clean Sand

Driven Pile Data:

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Pile unit weight = 150.00(pcf), Section Type: Square

Pile Geometry:

Width (in)	Length (ft)	Tip Elev. (ft)

24.00	5.00	-11.30
24.00	7.00	-13.30
24.00	9.00	-15.30
24.00	11.00	-17.30
24.00	13.00	-19.30
24.00	15.00	-21.30
24.00	17.00	-23.30
24.00	19.00	-25.30
24.00	21.00	-27.30
24.00	23.00	-29.30
24.00	25.00	-31.30

BB-06_Driven_BOC=-6.3ft_Void=-21.3ft_Preform=-28.8ft.out

24.00	27.00	-33.30
24.00	29.00	-35.30
24.00	31.00	-37.30
24.00	33.00	-39.30
24.00	35.00	-41.30
24.00	37.00	-43.30
24.00	39.00	-45.30
24.00	41.00	-47.30
24.00	43.00	-49.30
24.00	45.00	-51.30
24.00	47.00	-53.30
24.00	49.00	-55.30
24.00	51.00	-57.30
24.00	53.00	-59.30
24.00	55.00	-61.30
24.00	57.00	-63.30
24.00	59.00	-65.30
24.00	61.00	-67.30
24.00	63.00	-69.30
24.00	65.00	-71.30
24.00	67.00	-73.30
24.00	69.00	-75.30
24.00	71.00	-77.30
24.00	73.00	-79.30
24.00	75.00	-81.30
24.00	77.00	-83.30
24.00	79.00	-85.30
24.00	81.00	-87.30
24.00	83.00	-89.30
24.00	85.00	-91.30
24.00	87.00	-93.30
24.00	89.00	-95.30
24.00	91.00	-97.30
24.00	93.00	-99.30
24.00	95.00	-101.30
24.00	97.00	-103.30
24.00	99.00	-105.30
24.00	101.00	-107.30
24.00	103.00	-109.30
24.00	105.00	-111.30
24.00	107.00	-113.30
24.00	109.00	-115.30
24.00	111.00	-117.30
24.00	113.00	-119.30
24.00	115.00	-121.30
24.00	117.00	-123.30
30.00	5.00	-11.30
30.00	7.00	-13.30
30.00	9.00	-15.30

BB-06_Driven_BOC=-6.3ft_Void=-21.3ft_Preform=-28.8ft.out

30.00	11.00	-17.30
30.00	13.00	-19.30
30.00	15.00	-21.30
30.00	17.00	-23.30
30.00	19.00	-25.30
30.00	21.00	-27.30
30.00	23.00	-29.30
30.00	25.00	-31.30
30.00	27.00	-33.30
30.00	29.00	-35.30
30.00	31.00	-37.30
30.00	33.00	-39.30
30.00	35.00	-41.30
30.00	37.00	-43.30
30.00	39.00	-45.30
30.00	41.00	-47.30
30.00	43.00	-49.30
30.00	45.00	-51.30
30.00	47.00	-53.30
30.00	49.00	-55.30
30.00	51.00	-57.30
30.00	53.00	-59.30
30.00	55.00	-61.30
30.00	57.00	-63.30
30.00	59.00	-65.30
30.00	61.00	-67.30
30.00	63.00	-69.30
30.00	65.00	-71.30
30.00	67.00	-73.30
30.00	69.00	-75.30
30.00	71.00	-77.30
30.00	73.00	-79.30
30.00	75.00	-81.30
30.00	77.00	-83.30
30.00	79.00	-85.30
30.00	81.00	-87.30
30.00	83.00	-89.30
30.00	85.00	-91.30
30.00	87.00	-93.30
30.00	89.00	-95.30
30.00	91.00	-97.30
30.00	93.00	-99.30
30.00	95.00	-101.30
30.00	97.00	-103.30
30.00	99.00	-105.30
30.00	101.00	-107.30
30.00	103.00	-109.30
30.00	105.00	-111.30
30.00	107.00	-113.30

BB-06_Driven_BOC=-6.3ft_Void=-21.3ft_Preform=-28.8ft.out

30.00	109.00	-115.30
30.00	111.00	-117.30
30.00	113.00	-119.30
30.00	115.00	-121.30

Driven Pile Capacity:

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Section Type: Square
Pile Width: 24.00 (in)

Test Pile Length (ft)	Pile Width (in)	Ultimate Side Friction (tons)	Mobilized End Bearing (tons)	Estimated Davisson Capacity (tons)	Allowable Pile Capacity (tons)	Ultimate Pile Capacity (tons)
5.00	24.0	0.00	0.00	0.00	0.00	0.00
7.00	24.0	0.00	0.00	0.00	0.00	0.00
9.00	24.0	0.00	0.00	0.00	0.00	0.00
11.00	24.0	0.00	0.00	0.00	0.00	0.00
13.00	24.0	0.00	0.00	0.00	0.00	0.00
15.00	24.0	0.00	27.58	27.58	13.79	82.73
17.00	24.0	2.12	20.62	22.74	11.37	63.99
19.00	24.0	3.81	21.26	25.06	12.53	67.57
21.00	24.0	4.76	27.78	32.55	16.27	88.12
23.00	24.0	5.47	23.59	29.06	14.53	76.24
25.00	24.0	6.62	34.70	41.32	20.66	110.72
27.00	24.0	8.90	35.35	44.25	22.12	114.95
29.00	24.0	11.55	36.39	47.94	23.97	120.72
31.00	24.0	15.99	36.96	52.95	26.47	126.87
33.00	24.0	21.19	36.38	57.57	28.79	130.33
35.00	24.0	25.94	76.92	102.86	51.43	256.71
37.00	24.0	27.53	98.74	126.27	63.13	323.74
39.00	24.0	29.83	72.99	102.81	51.41	248.79
41.00	24.0	36.50	71.85	108.35	54.18	252.05
43.00	24.0	46.97	61.81	108.78	54.39	232.40
45.00	24.0	55.49	54.96	110.45	55.22	220.36
47.00	24.0	57.72	55.12	112.83	56.42	223.06
49.00	24.0	59.93	53.81	113.74	56.87	221.36
51.00	24.0	61.73	57.04	118.77	59.38	232.85
53.00	24.0	63.07	78.05	141.11	70.56	297.21
55.00	24.0	69.39	193.65	263.04	131.52	650.33
57.00	24.0	70.18	304.41	374.59	187.29	983.40

BB-06_Driven_BOC=-6.3ft_Void=-21.3ft_Preform=-28.8ft.out

59.00	24.0	82.38	186.44	268.82	134.41	641.71
61.00	24.0	95.94	192.15	288.09	144.04	672.39
63.00	24.0	119.98	283.78	403.76	201.88	971.33
65.00	24.0	135.98	188.79	324.77	162.39	702.35
67.00	24.0	151.98	138.06	290.04	145.02	566.16
69.00	24.0	159.76	172.77	332.53	166.27	678.08
71.00	24.0	163.08	114.82	277.90	138.95	507.54
73.00	24.0	168.38	178.77	347.14	173.57	704.67
75.00	24.0	186.62	211.51	398.12	199.06	821.14
77.00	24.0	193.00	211.60	404.60	202.30	827.79
79.00	24.0	195.46	209.60	405.06	202.53	824.27
81.00	24.0	204.04	228.95	432.99	216.50	890.89
83.00	24.0	216.89	207.53	424.41	212.21	839.47
85.00	24.0	220.26	282.89	503.15	251.58	1068.93
87.00	24.0	230.38	326.08	556.45	278.23	1208.61
89.00	24.0	239.83	291.81	531.64	265.82	1115.27
91.00	24.0	250.54	242.22	492.76	246.38	977.20
93.00	24.0	264.29	185.49	449.77	224.89	820.75
95.00	24.0	279.36	129.34	408.71	204.35	667.40
97.00	24.0	283.73	112.77	396.49	198.25	622.02
99.00	24.0	287.45	208.00	495.45	247.73	911.46
101.00	24.0	297.44	227.80	525.25	262.62	980.86
103.00	24.0	311.64	211.52	523.16	261.58	946.20
105.00	24.0	313.03	297.94	610.97	305.48	1206.86
107.00	24.0	329.03	212.86	541.89	270.94	967.61
109.00	24.0	333.47	208.26	541.73	270.86	958.24
111.00	24.0	341.77	168.16	509.93	254.96	846.25
113.00	24.0	355.11	86.02	441.13	220.57	613.18
115.00	24.0	360.47	71.04	431.50	215.75	573.58
117.00	24.0	365.27	55.32	420.59	210.29	531.23

NBR of 360 tons at
approx. elevation -80'

Section Type: Square
Pile Width: 30.00 (in)

Test Pile Length (ft)	Pile Width (in)	Ultimate Side Friction (tons)	Mobilized End Bearing (tons)	Estimated Davisson Capacity (tons)	Allowable Pile Capacity (tons)	Ultimate Pile Capacity (tons)
5.00	30.0	0.00	0.00	0.00	0.00	0.00
7.00	30.0	0.00	0.00	0.00	0.00	0.00
9.00	30.0	0.00	0.00	0.00	0.00	0.00
11.00	30.0	0.00	0.00	0.00	0.00	0.00
13.00	30.0	0.00	0.00	0.00	0.00	0.00
15.00	30.0	0.00	39.43	39.43	19.71	118.29
17.00	30.0	2.65	37.35	40.00	20.00	114.71

BB-06_Driven_BOC=-6.3ft_Void=-21.3ft_Preform=-28.8ft.out

19.00	30.0	4.76	40.75	45.51	22.75	127.00
21.00	30.0	5.95	56.55	62.51	31.25	175.62
23.00	30.0	6.84	40.73	47.57	23.78	129.03
25.00	30.0	8.28	53.26	61.53	30.77	168.05
27.00	30.0	11.38	53.57	64.95	32.47	172.08
29.00	30.0	15.07	54.11	69.17	34.59	177.39
31.00	30.0	20.94	54.42	75.37	37.68	184.22
33.00	30.0	23.35	60.87	84.22	42.11	205.95
35.00	30.0	32.43	133.52	165.94	82.97	432.98
37.00	30.0	34.41	133.34	167.75	83.88	434.44
39.00	30.0	37.38	102.17	139.55	69.78	343.89
41.00	30.0	45.63	96.56	142.19	71.09	335.32
43.00	30.0	58.71	87.26	145.98	72.99	320.50
45.00	30.0	69.36	83.79	153.15	76.58	320.74
47.00	30.0	72.17	83.87	156.04	78.02	323.78
49.00	30.0	74.79	84.37	159.16	79.58	327.90
51.00	30.0	75.49	99.55	175.04	87.52	374.15
53.00	30.0	77.71	123.58	201.30	100.65	448.47
55.00	30.0	86.74	385.47	472.21	236.10	1243.15
57.00	30.0	87.73	523.92	611.65	305.82	1659.49
59.00	30.0	103.57	316.53	420.10	210.05	1053.16
61.00	30.0	126.53	316.32	442.86	221.43	1075.50
63.00	30.0	149.98	379.40	529.38	264.69	1288.17
65.00	30.0	169.98	315.99	485.96	242.98	1117.94
67.00	30.0	189.98	200.68	390.66	195.33	792.02
69.00	30.0	199.87	241.69	441.56	220.78	924.94
71.00	30.0	203.84	217.71	421.56	210.78	856.98
73.00	30.0	210.23	287.73	497.96	248.98	1073.41
75.00	30.0	233.27	309.39	542.66	271.33	1161.43
77.00	30.0	240.94	310.67	551.62	275.81	1172.97
79.00	30.0	244.30	334.24	578.54	289.27	1247.01
81.00	30.0	255.05	372.54	627.60	313.80	1372.69
83.00	30.0	271.11	375.92	647.03	323.51	1398.87
85.00	30.0	275.32	485.99	761.32	380.66	1733.30
87.00	30.0	287.97	437.12	725.09	362.54	1599.32
89.00	30.0	299.78	389.13	688.92	344.46	1467.18
91.00	30.0	313.18	348.37	661.55	330.77	1358.29
93.00	30.0	330.36	294.06	624.42	312.21	1212.53
95.00	30.0	349.20	170.48	519.68	259.84	860.63
97.00	30.0	354.66	284.37	639.03	319.51	1207.77
99.00	30.0	359.31	298.64	657.95	328.97	1255.22
101.00	30.0	372.01	325.62	697.63	348.81	1348.86
103.00	30.0	389.55	381.22	770.77	385.39	1533.22
105.00	30.0	391.28	409.49	800.77	400.39	1619.75
107.00	30.0	411.28	298.95	710.23	355.12	1308.14
109.00	30.0	416.84	283.76	700.60	350.30	1268.12
111.00	30.0	427.21	224.36	651.57	325.78	1100.28
113.00	30.0	443.89	125.86	569.74	284.87	821.46
115.00	30.0	450.58	102.02	552.61	276.30	756.66

NBR of 480 tons at
approx. elevation -79'

BB-06_Driven_BOC=-6.3ft_Void=-21.3ft_Preform=-28.8ft.out

NOTES

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1. MOBILIZED END BEARING IS 1/3 OF THE ORIGINAL RB-121 VALUES.
 2. DAVISSON PILE CAPACITY IS AN ESTIMATE BASED ON FAILURE CRITERIA,
AND EQUALS ULTIMATE SIDE FRICTION PLUS MOBILIZED END BEARING.
 3. ALLOWABLE PILE CAPACITY IS 1/2 THE DAVISSON PILE CAPACITY.
 4. ULTIMATE PILE CAPACITY IS ULTIMATE SIDE FRICTION PLUS
3 x THE MOBILIZED END BEARING.
EXCEPTION: FOR H-PILES TIPPED IN SAND OR LIMESTONE, THE
ULTIMATE PILE CAPACITY IS ULTIMATE SIDE FRICTION PLUS
2 x THE MOBILIZED END BEARING.

BB-06_Driven_BOC=-6.3ft_Void=-21.3ft_Preform=-28.8ft.out

Florida Bridge Software Institute
Shaft and Pile Analysis (FB-Deep v.3.1.0)

Date: January 16, 2024
Time: 09:37:45

General Information:

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Input file: piers\BB-07_Driven_BOC=-8.8ft_Void=-23.8ft_Preform=-38.8ft.in
Project number: B-22-074
Job name: Broad Causeway Bridge
Engineer: PV/TC
Units: English

Analysis Information:

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Analysis Type: SPT

Soil Information:

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Boring date: 12/12/23, Boring Number: BB-07
Station number: 130+41 Offset: 38 LT

Ground Elevation: -8.800(ft)

Hammer type: Automatic Hammer, Correction factor = 1.24

ID	Depth (ft)	No. of Blows (Blows/ft)	Soil Type

1	0.00	0.00	5- Cavity layer
2	2.00	0.00	5- Cavity layer
3	4.00	15.00	5- Cavity layer
4	6.00	13.00	5- Cavity layer
5	8.00	16.00	5- Cavity layer
6	10.00	11.00	5- Cavity layer
7	12.00	14.00	5- Cavity layer
8	14.00	8.50	5- Cavity layer
9	15.00	9.00	5- Cavity layer
10	15.00	9.00	4- Lime Stone/Very shelly sand
11	16.00	9.00	4- Lime Stone/Very shelly sand
12	16.00	0.00	1- Plastic Clay
13	16.00	4.50	4- Lime Stone/Very shelly sand
14	20.00	4.50	4- Lime Stone/Very shelly sand
15	22.50	3.00	4- Lime Stone/Very shelly sand
16	25.00	5.50	4- Lime Stone/Very shelly sand
17	25.00	0.00	1- Plastic Clay
18	25.00	2.00	4- Lime Stone/Very shelly sand

BB-07_Driven_BOC=-8.8ft_Void=-23.8ft_Preform=-38.8ft.out

Predrilling 15' below bottom of
canal, to elevation -23.8'

Preforming to elevation
-38.8' or a depth of 30'
below mudline

19	27.50	2.00	4- Lime Stone/Very shelly sand
20	27.50	0.00	1- Plastic Clay
21	27.50	7.50	4- Lime Stone/Very shelly sand
22	30.00	7.50	4- Lime Stone/Very shelly sand
23	30.00	0.00	1- Plastic Clay
24	30.00	16.00	3- Clean sand
25	32.50	16.00	3- Clean sand
26	35.00	10.00	3- Clean sand
27	35.00	0.00	1- Plastic Clay
28	35.00	7.00	4- Lime Stone/Very shelly sand
29	37.50	7.00	4- Lime Stone/Very shelly sand
30	40.00	3.00	4- Lime Stone/Very shelly sand
31	42.50	6.00	4- Lime Stone/Very shelly sand
32	42.50	0.00	1- Plastic Clay
33	42.50	7.00	3- Clean sand
34	45.00	7.00	3- Clean sand
35	47.50	4.00	3- Clean sand
36	50.00	7.00	3- Clean sand
37	50.00	0.00	1- Plastic Clay
38	50.00	22.00	3- Clean sand
39	52.50	22.00	3- Clean sand
40	55.00	22.00	3- Clean sand
41	55.00	0.00	1- Plastic Clay
42	55.00	100.00	4- Lime Stone/Very shelly sand
43	57.50	100.00	4- Lime Stone/Very shelly sand
44	57.50	0.00	1- Plastic Clay
45	57.50	37.00	4- Lime Stone/Very shelly sand
46	60.00	37.00	4- Lime Stone/Very shelly sand
47	60.00	0.00	1- Plastic Clay
48	60.00	2.00	3- Clean sand
49	62.50	2.00	3- Clean sand
50	65.00	3.00	3- Clean sand
51	65.00	0.00	1- Plastic Clay
52	65.00	100.00	4- Lime Stone/Very shelly sand
53	67.50	100.00	4- Lime Stone/Very shelly sand
54	70.00	100.00	4- Lime Stone/Very shelly sand
55	72.50	100.00	4- Lime Stone/Very shelly sand
56	72.50	0.00	1- Plastic Clay
57	72.50	18.00	4- Lime Stone/Very shelly sand
58	75.00	18.00	4- Lime Stone/Very shelly sand
59	75.00	0.00	1- Plastic Clay
60	75.00	45.00	4- Lime Stone/Very shelly sand
61	77.50	45.00	4- Lime Stone/Very shelly sand
62	80.00	27.00	4- Lime Stone/Very shelly sand
63	80.00	0.00	1- Plastic Clay
64	80.00	6.00	4- Lime Stone/Very shelly sand
65	82.50	6.00	4- Lime Stone/Very shelly sand
66	85.00	7.00	4- Lime Stone/Very shelly sand
67	85.00	0.00	1- Plastic Clay

BB-07_Driven_BOC=-8.8ft_Void=-23.8ft_Preform=-38.8ft.out

68	85.00	100.00	4- Lime Stone/Very shelly sand
69	87.50	100.00	4- Lime Stone/Very shelly sand
70	90.00	50.00	4- Lime Stone/Very shelly sand
71	92.50	100.00	4- Lime Stone/Very shelly sand
72	95.00	66.00	4- Lime Stone/Very shelly sand
73	95.00	0.00	1- Plastic Clay
74	95.00	32.00	4- Lime Stone/Very shelly sand
75	97.50	32.00	4- Lime Stone/Very shelly sand
76	97.50	0.00	1- Plastic Clay
77	97.50	100.00	4- Lime Stone/Very shelly sand
78	100.00	100.00	4- Lime Stone/Very shelly sand
79	102.50	84.00	4- Lime Stone/Very shelly sand
80	105.00	100.00	4- Lime Stone/Very shelly sand
81	107.50	100.00	4- Lime Stone/Very shelly sand
82	107.50	0.00	1- Plastic Clay
83	107.50	33.00	4- Lime Stone/Very shelly sand
84	110.00	33.00	4- Lime Stone/Very shelly sand
85	112.50	44.00	4- Lime Stone/Very shelly sand
86	112.50	0.00	1- Plastic Clay
87	112.50	71.00	4- Lime Stone/Very shelly sand
88	115.00	71.00	4- Lime Stone/Very shelly sand
89	117.50	100.00	4- Lime Stone/Very shelly sand
90	120.00	57.00	4- Lime Stone/Very shelly sand
91	120.00	0.00	1- Plastic Clay
92	120.00	13.00	4- Lime Stone/Very shelly sand
93	122.50	13.00	4- Lime Stone/Very shelly sand
94	125.00	19.00	4- Lime Stone/Very shelly sand

Blowcount Average Per Soil Layer

Layer Num.	Starting Elevation (ft)	Bottom Elevation (ft)	Thickness (ft)	Average Blowcount (Blows/ft)	Soil Type

1	-8.80	-23.80	15.00	9.77	5-Void
2	-23.80	-24.80	1.00	9.00	4-Limestone, Very
Shelly Sand					
3	-24.80	-24.80	0.00	4.50	1-Plastic Clay
4	-24.80	-33.80	9.00	4.08	4-Limestone, Very
Shelly Sand					
5	-33.80	-33.80	0.00	2.00	1-Plastic Clay
6	-33.80	-36.30	2.50	2.00	4-Limestone, Very
Shelly Sand					
7	-36.30	-36.30	0.00	7.50	1-Plastic Clay
8	-36.30	-38.80	2.50	7.50	4-Limestone, Very

BB-07_Driven_BOC=-8.8ft_Void=-23.8ft_Preform=-38.8ft.out

Shelly Sand					
9	-38.80	-38.80	0.00	16.00	1-Plastic Clay
10	-38.80	-43.80	5.00	16.00	3-Clean Sand
11	-43.80	-43.80	0.00	7.00	1-Plastic Clay
12	-43.80	-51.30	7.50	5.67	4-Limestone, Very
Shelly Sand					
13	-51.30	-51.30	0.00	7.00	1-Plastic Clay
14	-51.30	-58.80	7.50	6.00	3-Clean Sand
15	-58.80	-58.80	0.00	22.00	1-Plastic Clay
16	-58.80	-63.80	5.00	22.00	3-Clean Sand
17	-63.80	-63.80	0.00	100.00	1-Plastic Clay
18	-63.80	-66.30	2.50	100.00	4-Limestone, Very
Shelly Sand					
19	-66.30	-66.30	0.00	37.00	1-Plastic Clay
20	-66.30	-68.80	2.50	37.00	4-Limestone, Very
Shelly Sand					
21	-68.80	-68.80	0.00	2.00	1-Plastic Clay
22	-68.80	-73.80	5.00	2.00	3-Clean Sand
23	-73.80	-73.80	0.00	100.00	1-Plastic Clay
24	-73.80	-81.30	7.50	100.00	4-Limestone, Very
Shelly Sand					
25	-81.30	-81.30	0.00	18.00	1-Plastic Clay
26	-81.30	-83.80	2.50	18.00	4-Limestone, Very
Shelly Sand					
27	-83.80	-83.80	0.00	45.00	1-Plastic Clay
28	-83.80	-88.80	5.00	45.00	4-Limestone, Very
Shelly Sand					
29	-88.80	-88.80	0.00	6.00	1-Plastic Clay
30	-88.80	-93.80	5.00	6.00	4-Limestone, Very
Shelly Sand					
31	-93.80	-93.80	0.00	100.00	1-Plastic Clay
32	-93.80	-103.80	10.00	87.50	4-Limestone, Very
Shelly Sand					
33	-103.80	-103.80	0.00	32.00	1-Plastic Clay
34	-103.80	-106.30	2.50	32.00	4-Limestone, Very
Shelly Sand					
35	-106.30	-106.30	0.00	100.00	1-Plastic Clay
36	-106.30	-116.30	10.00	96.00	4-Limestone, Very
Shelly Sand					
37	-116.30	-116.30	0.00	33.00	1-Plastic Clay
38	-116.30	-121.30	5.00	33.00	4-Limestone, Very
Shelly Sand					
39	-121.30	-121.30	0.00	71.00	1-Plastic Clay
40	-121.30	-128.80	7.50	80.67	4-Limestone, Very
Shelly Sand					
41	-128.80	-128.80	0.00	13.00	1-Plastic Clay
42	-128.80	-133.80	5.00	13.00	4-Limestone, Very
Shelly Sand					

BB-07_Driven_BOC=-8.8ft_Void=-23.8ft_Preform=-38.8ft.out

Driven Pile Data:

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Pile unit weight = 150.00(pcf), Section Type: Square

Pile Geometry:

Width (in)	Length (ft)	Tip Elev. (ft)
24.00	5.00	-13.80
24.00	7.00	-15.80
24.00	9.00	-17.80
24.00	11.00	-19.80
24.00	13.00	-21.80
24.00	15.00	-23.80
24.00	17.00	-25.80
24.00	19.00	-27.80
24.00	21.00	-29.80
24.00	23.00	-31.80
24.00	25.00	-33.80
24.00	27.00	-35.80
24.00	29.00	-37.80
24.00	31.00	-39.80
24.00	33.00	-41.80
24.00	35.00	-43.80
24.00	37.00	-45.80
24.00	39.00	-47.80
24.00	41.00	-49.80
24.00	43.00	-51.80
24.00	45.00	-53.80
24.00	47.00	-55.80
24.00	49.00	-57.80
24.00	51.00	-59.80
24.00	53.00	-61.80
24.00	55.00	-63.80
24.00	57.00	-65.80
24.00	59.00	-67.80
24.00	61.00	-69.80
24.00	63.00	-71.80
24.00	65.00	-73.80
24.00	67.00	-75.80
24.00	69.00	-77.80
24.00	71.00	-79.80
24.00	73.00	-81.80
24.00	75.00	-83.80
24.00	77.00	-85.80
24.00	79.00	-87.80
24.00	81.00	-89.80

BB-07_Driven_BOC=-8.8ft_Void=-23.8ft_Preform=-38.8ft.out

24.00	83.00	-91.80
24.00	85.00	-93.80
24.00	87.00	-95.80
24.00	89.00	-97.80
24.00	91.00	-99.80
24.00	93.00	-101.80
24.00	95.00	-103.80
24.00	97.00	-105.80
24.00	99.00	-107.80
24.00	101.00	-109.80
24.00	103.00	-111.80
24.00	105.00	-113.80
24.00	107.00	-115.80
24.00	109.00	-117.80
24.00	111.00	-119.80
24.00	113.00	-121.80
24.00	115.00	-123.80
24.00	117.00	-125.80
30.00	5.00	-13.80
30.00	7.00	-15.80
30.00	9.00	-17.80
30.00	11.00	-19.80
30.00	13.00	-21.80
30.00	15.00	-23.80
30.00	17.00	-25.80
30.00	19.00	-27.80
30.00	21.00	-29.80
30.00	23.00	-31.80
30.00	25.00	-33.80
30.00	27.00	-35.80
30.00	29.00	-37.80
30.00	31.00	-39.80
30.00	33.00	-41.80
30.00	35.00	-43.80
30.00	37.00	-45.80
30.00	39.00	-47.80
30.00	41.00	-49.80
30.00	43.00	-51.80
30.00	45.00	-53.80
30.00	47.00	-55.80
30.00	49.00	-57.80
30.00	51.00	-59.80
30.00	53.00	-61.80
30.00	55.00	-63.80
30.00	57.00	-65.80
30.00	59.00	-67.80
30.00	61.00	-69.80
30.00	63.00	-71.80
30.00	65.00	-73.80

BB-07_Driven_BOC=-8.8ft_Void=-23.8ft_Preform=-38.8ft.out

30.00	67.00	-75.80
30.00	69.00	-77.80
30.00	71.00	-79.80
30.00	73.00	-81.80
30.00	75.00	-83.80
30.00	77.00	-85.80
30.00	79.00	-87.80
30.00	81.00	-89.80
30.00	83.00	-91.80
30.00	85.00	-93.80
30.00	87.00	-95.80
30.00	89.00	-97.80
30.00	91.00	-99.80
30.00	93.00	-101.80
30.00	95.00	-103.80
30.00	97.00	-105.80
30.00	99.00	-107.80
30.00	101.00	-109.80
30.00	103.00	-111.80
30.00	105.00	-113.80
30.00	107.00	-115.80
30.00	109.00	-117.80
30.00	111.00	-119.80
30.00	113.00	-121.80
30.00	115.00	-123.80

Driven Pile Capacity:
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Section Type: Square
Pile Width: 24.00 (in)

Test Pile Length (ft)	Pile Width (in)	Ultimate Side Friction (tons)	Mobilized End Bearing (tons)	Estimated Davisson Capacity (tons)	Allowable Pile Capacity (tons)	Ultimate Pile Capacity (tons)
5.00	24.0	0.00	0.00	0.00	0.00	0.00
7.00	24.0	0.00	0.00	0.00	0.00	0.00
9.00	24.0	0.00	0.00	0.00	0.00	0.00
11.00	24.0	0.00	0.00	0.00	0.00	0.00
13.00	24.0	0.00	0.00	0.00	0.00	0.00
15.00	24.0	0.00	18.97	18.97	9.48	56.91

BB-07_Driven_BOC=-8.8ft_Void=-23.8ft_Preform=-38.8ft.out

17.00	24.0	1.34	16.65	17.99	9.00	51.29
19.00	24.0	2.23	12.18	14.41	7.20	38.76
21.00	24.0	3.10	13.52	16.61	8.31	43.64
23.00	24.0	3.77	24.51	28.28	14.14	77.29
25.00	24.0	4.66	40.99	45.65	22.83	127.63
27.00	24.0	4.66	57.39	62.05	31.03	176.83
29.00	24.0	5.78	58.76	64.54	32.27	182.06
31.00	24.0	9.54	38.19	47.73	23.87	124.12
33.00	24.0	15.51	32.38	47.89	23.95	112.65
35.00	24.0	20.19	22.97	43.15	21.58	89.09
37.00	24.0	21.58	25.19	46.77	23.38	97.15
39.00	24.0	22.79	26.74	49.53	24.76	103.01
41.00	24.0	23.52	29.35	52.87	26.43	111.56
43.00	24.0	24.93	35.27	60.20	30.10	130.75
45.00	24.0	26.79	37.91	64.70	32.35	140.52
47.00	24.0	27.99	44.00	71.99	35.99	159.99
49.00	24.0	28.27	66.21	94.49	47.24	226.91
51.00	24.0	36.44	122.47	158.91	79.46	403.85
53.00	24.0	43.00	126.44	169.44	84.72	422.32
55.00	24.0	53.49	196.71	250.21	125.10	643.63
57.00	24.0	69.49	84.36	153.86	76.93	322.58
59.00	24.0	79.00	138.49	217.49	108.74	494.47
61.00	24.0	82.67	142.66	225.33	112.66	510.64
63.00	24.0	82.69	163.83	246.52	123.26	574.18
65.00	24.0	83.38	434.98	518.36	259.18	1388.32
67.00	24.0	99.38	339.23	438.61	219.30	1117.07
69.00	24.0	115.38	278.27	393.64	196.82	950.17
71.00	24.0	131.38	211.87	343.25	171.63	767.00
73.00	24.0	144.27	141.32	285.59	142.79	568.20
75.00	24.0	147.84	128.37	276.21	138.11	532.90
77.00	24.0	156.77	81.23	238.00	119.00	400.46
79.00	24.0	164.89	147.62	312.52	156.26	607.76
81.00	24.0	168.52	230.07	398.59	199.30	858.73
83.00	24.0	169.72	295.94	465.65	232.83	1057.53
85.00	24.0	171.03	391.31	562.34	281.17	1344.96
87.00	24.0	187.03	374.87	561.90	280.95	1311.64
89.00	24.0	201.66	308.14	509.80	254.90	1126.09
91.00	24.0	212.80	331.28	544.08	272.04	1206.65
93.00	24.0	227.36	344.01	571.37	285.69	1259.40
95.00	24.0	241.61	360.46	602.07	301.03	1322.98
97.00	24.0	247.96	439.23	687.19	343.59	1565.64
99.00	24.0	261.55	458.92	720.47	360.23	1638.31
101.00	24.0	277.55	400.81	678.36	339.18	1479.99
103.00	24.0	293.55	324.85	618.39	309.20	1268.08
105.00	24.0	309.55	270.04	579.59	289.79	1119.66
107.00	24.0	325.55	251.60	577.15	288.57	1080.34
109.00	24.0	334.46	298.64	633.10	316.55	1230.38
111.00	24.0	341.22	364.57	705.80	352.90	1434.94
113.00	24.0	350.80	351.69	702.49	351.25	1405.88

NBR of 360 tons at
approx. elevation -90'



BB-07_Driven_BOC=-8.8ft_Void=-23.8ft_Preform=-38.8ft.out

115.00	24.0	364.89	268.98	633.87	316.93	1171.83
117.00	24.0	379.74	182.75	562.49	281.24	927.99

Section Type: Square
Pile Width: 30.00 (in)

Test Pile Length (ft)	Pile Width (in)	Ultimate Side Friction (tons)	Mobilized End Bearing (tons)	Estimated Davisson Capacity (tons)	Allowable Pile Capacity (tons)	Ultimate Pile Capacity (tons)
5.00	30.0	0.00	0.00	0.00	0.00	0.00
7.00	30.0	0.00	0.00	0.00	0.00	0.00
9.00	30.0	0.00	0.00	0.00	0.00	0.00
11.00	30.0	0.00	0.00	0.00	0.00	0.00
13.00	30.0	0.00	0.00	0.00	0.00	0.00
15.00	30.0	0.00	29.31	29.31	14.66	87.94
17.00	30.0	1.67	20.81	22.49	11.24	64.12
19.00	30.0	2.79	22.30	25.09	12.55	69.70
21.00	30.0	3.87	34.84	38.71	19.36	108.40
23.00	30.0	4.71	56.84	61.55	30.78	175.23
25.00	30.0	5.83	71.74	77.57	38.78	221.04
27.00	30.0	5.83	80.53	86.36	43.18	247.43
29.00	30.0	7.22	81.10	88.32	44.16	250.52
31.00	30.0	11.92	50.74	62.66	31.33	164.14
33.00	30.0	19.39	45.12	64.51	32.25	154.75
35.00	30.0	25.23	40.28	65.52	32.76	146.08
37.00	30.0	26.97	41.08	68.05	34.02	150.20
39.00	30.0	28.48	41.28	69.76	34.88	152.32
41.00	30.0	29.40	60.16	89.56	44.78	209.89
43.00	30.0	31.12	60.42	91.54	45.77	212.39
45.00	30.0	33.54	63.57	97.11	48.55	224.25
47.00	30.0	34.29	78.38	112.67	56.34	269.44
49.00	30.0	34.56	117.28	151.84	75.92	386.41
51.00	30.0	45.99	204.41	250.39	125.20	659.21
53.00	30.0	56.50	195.74	252.24	126.12	643.73
55.00	30.0	66.87	248.87	315.73	157.87	813.46
57.00	30.0	86.87	248.87	335.73	167.87	833.46
59.00	30.0	98.75	316.53	415.27	207.64	1048.32
61.00	30.0	103.34	253.35	356.69	178.34	863.38
63.00	30.0	103.36	274.74	378.10	189.05	927.57
65.00	30.0	104.22	567.45	671.67	335.84	1806.58
67.00	30.0	124.22	491.24	615.46	307.73	1597.95
69.00	30.0	144.22	408.25	552.48	276.24	1368.98
71.00	30.0	164.22	290.14	454.36	227.18	1034.64
73.00	30.0	180.34	184.19	364.53	182.26	732.90

BB-07_Driven_BOC=-8.8ft_Void=-23.8ft_Preform=-38.8ft.out

75.00	30.0	184.80	168.75	353.55	176.77	691.04
77.00	30.0	195.96	244.95	440.91	220.46	930.82
79.00	30.0	206.12	312.88	519.00	259.50	1144.77
81.00	30.0	210.65	377.46	588.11	294.06	1343.03
83.00	30.0	212.15	497.42	709.57	354.78	1704.40
85.00	30.0	213.79	612.00	825.78	412.89	2049.78
87.00	30.0	233.79	513.53	747.32	373.66	1774.39
89.00	30.0	252.08	503.98	756.05	378.03	1764.01
91.00	30.0	266.00	557.52	823.51	411.76	1938.54
93.00	30.0	284.19	573.43	857.63	428.81	2004.49
95.00	30.0	302.02	593.98	896.00	448.00	2083.96
97.00	30.0	309.95	692.45	1002.40	501.20	2387.29
99.00	30.0	326.94	644.43	971.37	485.68	2260.22
101.00	30.0	346.94	549.47	896.40	448.20	1995.34
103.00	30.0	366.94	480.96	847.90	423.95	1809.81
105.00	30.0	386.94	457.91	844.85	422.42	1760.67
107.00	30.0	406.94	444.08	851.02	425.51	1739.18
109.00	30.0	418.07	504.17	922.24	461.12	1930.57
111.00	30.0	426.53	514.52	941.05	470.52	1970.09
113.00	30.0	438.50	456.59	895.09	447.54	1808.26
115.00	30.0	456.11	358.02	814.13	407.07	1530.17

NBR of 480 tons at
approx. elevation -87'

NOTES

1. MOBILIZED END BEARING IS 1/3 OF THE ORIGINAL RB-121 VALUES.
2. DAVISSON PILE CAPACITY IS AN ESTIMATE BASED ON FAILURE CRITERIA, AND EQUALS ULTIMATE SIDE FRICTION PLUS MOBILIZED END BEARING.
3. ALLOWABLE PILE CAPACITY IS 1/2 THE DAVISSON PILE CAPACITY.
4. ULTIMATE PILE CAPACITY IS ULTIMATE SIDE FRICTION PLUS 3 x THE MOBILIZED END BEARING.
EXCEPTION: FOR H-PILES TIPPED IN SAND OR LIMESTONE, THE ULTIMATE PILE CAPACITY IS ULTIMATE SIDE FRICTION PLUS 2 x THE MOBILIZED END BEARING.

BB-07_Driven_BOC=-8.8ft_Void=-23.8ft_Preform=-38.8ft.out

Florida Bridge Software Institute
Shaft and Pile Analysis (FB-Deep v.3.1.0)

Date: January 19, 2024
Time: 13:18:24

General Information:

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Input file: piers\BB-08_Driven_BOC=-8.6ft_Void=-23.6ft_Preform=-36.1ft.in
Project number: B-22-074
Job name: Broad Causeway Bridge
Engineer: PV/TC
Units: English

Analysis Information:

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Analysis Type: SPT

Soil Information:

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Boring date: 12/19/23, Boring Number: BB-08
Station number: 132+49 Offset: 39 RT

Ground Elevation: -8.600(ft)

Hammer type: Automatic Hammer, Correction factor = 1.24

ID	Depth (ft)	No. of Blows (Blows/ft)	Soil Type

1	0.00	10.50	5- Cavity layer
2	2.00	10.50	5- Cavity layer
3	4.00	3.00	5- Cavity layer
4	4.00	0.00	5- Cavity layer
5	4.00	15.00	5- Cavity layer
6	6.00	15.00	5- Cavity layer
7	8.00	13.00	5- Cavity layer
8	8.00	0.00	5- Cavity layer
9	8.00	20.00	5- Cavity layer
10	10.00	20.00	5- Cavity layer
11	12.00	20.00	5- Cavity layer
12	14.00	20.00	5- Cavity layer
13	15.00	0.00	5- Cavity layer
14	15.00	9.00	5- Cavity layer
15	16.00	9.00	4- Lime Stone/Very shelly sand
16	20.00	7.00	4- Lime Stone/Very shelly sand
17	22.50	5.50	4- Lime Stone/Very shelly sand
18	22.50	0.00	1- Plastic Clay

BB-08_Driven_BOC=-8.6ft_Void=-23.6ft_Preform=-36.1ft.out

Predrilling 15' below bottom of
canal, to elevation -23.6'

Preforming to elevation
-36.1' or a depth of 27.5'
below mudline

19	22.50	0.50	3- Clean sand
20	25.00	0.50	3- Clean sand
21	25.00	0.00	1- Plastic Clay
22	25.00	4.50	4- Lime Stone/Very shelly sand
23	27.50	4.50	4- Lime Stone/Very shelly sand
24	27.50	0.00	1- Plastic Clay
25	27.50	7.00	3- Clean sand
26	30.00	7.00	3- Clean sand
27	32.50	6.00	3- Clean sand
28	32.50	0.00	1- Plastic Clay
29	32.50	17.00	3- Clean sand
30	35.00	17.00	3- Clean sand
31	35.00	0.00	1- Plastic Clay
32	35.00	2.00	4- Lime Stone/Very shelly sand
33	37.50	2.00	4- Lime Stone/Very shelly sand
34	37.50	0.00	1- Plastic Clay
35	37.50	0.00	3- Clean sand
36	40.00	0.00	3- Clean sand
37	42.50	6.00	3- Clean sand
38	45.00	7.00	3- Clean sand
39	45.00	0.00	1- Plastic Clay
40	45.00	14.00	3- Clean sand
41	47.50	14.00	3- Clean sand
42	47.50	0.00	1- Plastic Clay
43	47.50	13.00	4- Lime Stone/Very shelly sand
44	50.00	13.00	4- Lime Stone/Very shelly sand
45	52.50	8.00	4- Lime Stone/Very shelly sand
46	52.50	0.00	1- Plastic Clay
47	52.50	100.00	4- Lime Stone/Very shelly sand
48	55.00	100.00	4- Lime Stone/Very shelly sand
49	55.00	0.00	1- Plastic Clay
50	55.00	5.00	4- Lime Stone/Very shelly sand
51	57.50	5.00	4- Lime Stone/Very shelly sand
52	60.00	4.00	4- Lime Stone/Very shelly sand
53	62.50	5.00	4- Lime Stone/Very shelly sand
54	65.00	4.00	4- Lime Stone/Very shelly sand
55	65.00	0.00	1- Plastic Clay
56	65.00	100.00	4- Lime Stone/Very shelly sand
57	67.50	100.00	4- Lime Stone/Very shelly sand
58	70.00	100.00	4- Lime Stone/Very shelly sand
59	70.00	0.00	1- Plastic Clay
60	70.00	6.00	4- Lime Stone/Very shelly sand
61	72.50	6.00	4- Lime Stone/Very shelly sand
62	72.50	0.00	1- Plastic Clay
63	72.50	27.00	4- Lime Stone/Very shelly sand
64	75.00	27.00	4- Lime Stone/Very shelly sand
65	75.00	0.00	1- Plastic Clay
66	75.00	100.00	4- Lime Stone/Very shelly sand
67	77.50	100.00	4- Lime Stone/Very shelly sand

BB-08_Driven_BOC=-8.6ft_Void=-23.6ft_Preform=-36.1ft.out

68	80.00	100.00	4- Lime Stone/Very shelly sand
69	80.00	0.00	1- Plastic Clay
70	80.00	3.00	4- Lime Stone/Very shelly sand
71	82.50	3.00	4- Lime Stone/Very shelly sand
72	82.50	0.00	1- Plastic Clay
73	82.50	100.00	4- Lime Stone/Very shelly sand
74	85.00	100.00	4- Lime Stone/Very shelly sand
75	87.50	100.00	4- Lime Stone/Very shelly sand
76	90.00	100.00	4- Lime Stone/Very shelly sand
77	92.50	100.00	4- Lime Stone/Very shelly sand
78	95.00	100.00	4- Lime Stone/Very shelly sand
79	97.50	100.00	4- Lime Stone/Very shelly sand
80	100.00	100.00	4- Lime Stone/Very shelly sand
81	102.50	100.00	4- Lime Stone/Very shelly sand
82	105.00	100.00	4- Lime Stone/Very shelly sand
83	107.50	100.00	4- Lime Stone/Very shelly sand
84	110.00	100.00	4- Lime Stone/Very shelly sand
85	110.00	0.00	1- Plastic Clay
86	110.00	28.00	4- Lime Stone/Very shelly sand
87	112.50	28.00	4- Lime Stone/Very shelly sand
88	112.50	0.00	1- Plastic Clay
89	112.50	100.00	4- Lime Stone/Very shelly sand
90	115.00	100.00	4- Lime Stone/Very shelly sand
91	115.00	0.00	1- Plastic Clay
92	115.00	19.00	4- Lime Stone/Very shelly sand
93	117.50	19.00	4- Lime Stone/Very shelly sand
94	117.50	0.00	1- Plastic Clay
95	117.50	14.00	3- Clean sand
96	120.00	14.00	3- Clean sand
97	120.00	0.00	1- Plastic Clay
98	120.00	58.00	4- Lime Stone/Very shelly sand
99	122.50	58.00	4- Lime Stone/Very shelly sand
100	122.50	0.00	1- Plastic Clay
101	122.50	15.00	4- Lime Stone/Very shelly sand
102	125.00	15.00	4- Lime Stone/Very shelly sand

Blowcount Average Per Soil Layer

Layer Num.	Starting Elevation (ft)	Bottom Elevation (ft)	Thickness (ft)	Average Blowcount (Blows/ft)	Soil Type

1	-8.60	-24.60	16.00	15.69	5-Void
2	-24.60	-31.10	6.50	8.23	4-Limestone, Very Shelly Sand

BB-08_Driven_BOC=-8.6ft_Void=-23.6ft_Preform=-36.1ft.out

3	-31.10	-31.10	0.00	0.50	1-Plastic Clay
4	-31.10	-33.60	2.50	0.50	3-Clean Sand
5	-33.60	-33.60	0.00	4.50	1-Plastic Clay
6	-33.60	-36.10	2.50	4.50	4-Limestone, Very Shelly Sand
7	-36.10	-36.10	0.00	7.00	1-Plastic Clay
8	-36.10	-41.10	5.00	7.00	3-Clean Sand
9	-41.10	-41.10	0.00	17.00	1-Plastic Clay
10	-41.10	-43.60	2.50	17.00	3-Clean Sand
11	-43.60	-43.60	0.00	2.00	1-Plastic Clay
12	-43.60	-46.10	2.50	2.00	4-Limestone, Very Shelly Sand
13	-46.10	-46.10	0.00	0.00	1-Plastic Clay
14	-46.10	-53.60	7.50	2.00	3-Clean Sand
15	-53.60	-53.60	0.00	14.00	1-Plastic Clay
16	-53.60	-56.10	2.50	14.00	3-Clean Sand
17	-56.10	-56.10	0.00	13.00	1-Plastic Clay
18	-56.10	-61.10	5.00	13.00	4-Limestone, Very Shelly Sand
19	-61.10	-61.10	0.00	100.00	1-Plastic Clay
20	-61.10	-63.60	2.50	100.00	4-Limestone, Very Shelly Sand
21	-63.60	-63.60	0.00	5.00	1-Plastic Clay
22	-63.60	-73.60	10.00	4.75	4-Limestone, Very Shelly Sand
23	-73.60	-73.60	0.00	100.00	1-Plastic Clay
24	-73.60	-78.60	5.00	100.00	4-Limestone, Very Shelly Sand
25	-78.60	-78.60	0.00	6.00	1-Plastic Clay
26	-78.60	-81.10	2.50	6.00	4-Limestone, Very Shelly Sand
27	-81.10	-81.10	0.00	27.00	1-Plastic Clay
28	-81.10	-83.60	2.50	27.00	4-Limestone, Very Shelly Sand
29	-83.60	-83.60	0.00	100.00	1-Plastic Clay
30	-83.60	-88.60	5.00	100.00	4-Limestone, Very Shelly Sand
31	-88.60	-88.60	0.00	3.00	1-Plastic Clay
32	-88.60	-91.10	2.50	3.00	4-Limestone, Very Shelly Sand
33	-91.10	-91.10	0.00	100.00	1-Plastic Clay
34	-91.10	-118.60	27.50	100.00	4-Limestone, Very Shelly Sand
35	-118.60	-118.60	0.00	28.00	1-Plastic Clay
36	-118.60	-121.10	2.50	28.00	4-Limestone, Very Shelly Sand
37	-121.10	-121.10	0.00	100.00	1-Plastic Clay
38	-121.10	-123.60	2.50	100.00	4-Limestone, Very Shelly Sand

BB-08_Driven_BOC=-8.6ft_Void=-23.6ft_Preform=-36.1ft.out

39	-123.60	-123.60	0.00	19.00	1-Plastic Clay
40	-123.60	-126.10	2.50	19.00	4-Limestone, Very
Shelly Sand					
41	-126.10	-126.10	0.00	14.00	1-Plastic Clay
42	-126.10	-128.60	2.50	14.00	3-Clean Sand
43	-128.60	-128.60	0.00	58.00	1-Plastic Clay
44	-128.60	-131.10	2.50	58.00	4-Limestone, Very
Shelly Sand					
45	-131.10	-131.10	0.00	15.00	1-Plastic Clay
46	-131.10	-133.60	2.50	15.00	4-Limestone, Very
Shelly Sand					

Driven Pile Data:

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Pile unit weight = 150.00(pcf), Section Type: Square

Pile Geometry:

Width (in)	Length (ft)	Tip Elev. (ft)
24.00	5.00	-13.60
24.00	7.00	-15.60
24.00	9.00	-17.60
24.00	11.00	-19.60
24.00	13.00	-21.60
24.00	15.00	-23.60
24.00	17.00	-25.60
24.00	19.00	-27.60
24.00	21.00	-29.60
24.00	23.00	-31.60
24.00	25.00	-33.60
24.00	27.00	-35.60
24.00	29.00	-37.60
24.00	31.00	-39.60
24.00	33.00	-41.60
24.00	35.00	-43.60
24.00	37.00	-45.60
24.00	39.00	-47.60
24.00	41.00	-49.60
24.00	43.00	-51.60
24.00	45.00	-53.60
24.00	47.00	-55.60
24.00	49.00	-57.60
24.00	51.00	-59.60
24.00	53.00	-61.60
24.00	55.00	-63.60
24.00	57.00	-65.60

BB-08_Driven_BOC=-8.6ft_Void=-23.6ft_Preform=-36.1ft.out

24.00	59.00	-67.60
24.00	61.00	-69.60
24.00	63.00	-71.60
24.00	65.00	-73.60
24.00	67.00	-75.60
24.00	69.00	-77.60
24.00	71.00	-79.60
24.00	73.00	-81.60
24.00	75.00	-83.60
24.00	77.00	-85.60
24.00	79.00	-87.60
24.00	81.00	-89.60
24.00	83.00	-91.60
24.00	85.00	-93.60
24.00	87.00	-95.60
24.00	89.00	-97.60
24.00	91.00	-99.60
24.00	93.00	-101.60
24.00	95.00	-103.60
24.00	97.00	-105.60
24.00	99.00	-107.60
24.00	101.00	-109.60
24.00	103.00	-111.60
24.00	105.00	-113.60
24.00	107.00	-115.60
24.00	109.00	-117.60
24.00	111.00	-119.60
24.00	113.00	-121.60
24.00	115.00	-123.60
24.00	117.00	-125.60
30.00	5.00	-13.60
30.00	7.00	-15.60
30.00	9.00	-17.60
30.00	11.00	-19.60
30.00	13.00	-21.60
30.00	15.00	-23.60
30.00	17.00	-25.60
30.00	19.00	-27.60
30.00	21.00	-29.60
30.00	23.00	-31.60
30.00	25.00	-33.60
30.00	27.00	-35.60
30.00	29.00	-37.60
30.00	31.00	-39.60
30.00	33.00	-41.60
30.00	35.00	-43.60
30.00	37.00	-45.60
30.00	39.00	-47.60
30.00	41.00	-49.60

BB-08_Driven_BOC=-8.6ft_Void=-23.6ft_Preform=-36.1ft.out

30.00	43.00	-51.60
30.00	45.00	-53.60
30.00	47.00	-55.60
30.00	49.00	-57.60
30.00	51.00	-59.60
30.00	53.00	-61.60
30.00	55.00	-63.60
30.00	57.00	-65.60
30.00	59.00	-67.60
30.00	61.00	-69.60
30.00	63.00	-71.60
30.00	65.00	-73.60
30.00	67.00	-75.60
30.00	69.00	-77.60
30.00	71.00	-79.60
30.00	73.00	-81.60
30.00	75.00	-83.60
30.00	77.00	-85.60
30.00	79.00	-87.60
30.00	81.00	-89.60
30.00	83.00	-91.60
30.00	85.00	-93.60
30.00	87.00	-95.60
30.00	89.00	-97.60
30.00	91.00	-99.60
30.00	93.00	-101.60
30.00	95.00	-103.60
30.00	97.00	-105.60
30.00	99.00	-107.60
30.00	101.00	-109.60
30.00	103.00	-111.60
30.00	105.00	-113.60
30.00	107.00	-115.60
30.00	109.00	-117.60
30.00	111.00	-119.60
30.00	113.00	-121.60
30.00	115.00	-123.60

Driven Pile Capacity:
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Section Type: Square
Pile Width: 24.00 (in)

BB-08_Driven_BOC=-8.6ft_Void=-23.6ft_Preform=-36.1ft.out

Test Pile Length (ft)	Pile Width (in)	Ultimate Side Friction (tons)	Mobilized End Bearing (tons)	Estimated Davisson Capacity (tons)	Allowable Pile Capacity (tons)	Ultimate Pile Capacity (tons)
5.00	24.0	0.00	0.00	0.00	0.00	0.00
7.00	24.0	0.00	0.00	0.00	0.00	0.00
9.00	24.0	0.00	0.00	0.00	0.00	0.00
11.00	24.0	0.00	0.00	0.00	0.00	0.00
13.00	24.0	0.00	0.00	0.00	0.00	0.00
15.00	24.0	0.00	0.00	0.00	0.00	0.00
17.00	24.0	1.31	19.56	20.87	10.44	59.99
19.00	24.0	2.90	15.96	18.86	9.43	50.77
21.00	24.0	4.29	17.01	21.29	10.65	55.30
23.00	24.0	5.17	15.11	20.28	10.14	50.50
25.00	24.0	5.17	33.54	38.71	19.35	105.78
27.00	24.0	6.06	51.55	57.61	28.80	160.70
29.00	24.0	8.21	33.69	41.91	20.95	109.29
31.00	24.0	10.87	31.62	42.48	21.24	105.72
33.00	24.0	14.25	26.12	40.37	20.19	92.62
35.00	24.0	20.66	6.98	27.64	13.82	41.59
37.00	24.0	20.66	15.71	36.37	18.18	67.78
39.00	24.0	20.66	23.14	43.79	21.90	90.07
41.00	24.0	20.81	26.91	47.72	23.86	101.54
43.00	24.0	21.92	31.58	53.50	26.75	116.66
45.00	24.0	25.13	44.04	69.18	34.59	157.27
47.00	24.0	27.97	48.73	76.70	38.35	174.16
49.00	24.0	33.67	168.53	202.19	101.10	539.25
51.00	24.0	36.15	160.41	196.55	98.28	517.37
53.00	24.0	41.56	128.64	170.20	85.10	427.49
55.00	24.0	57.56	18.64	76.20	38.10	113.49
57.00	24.0	58.55	18.03	76.59	38.29	112.65
59.00	24.0	59.50	128.01	187.51	93.75	443.52
61.00	24.0	60.33	238.57	298.90	149.45	776.03
63.00	24.0	61.27	294.20	355.48	177.74	943.88
65.00	24.0	62.15	301.74	363.89	181.95	967.38
67.00	24.0	78.15	216.66	294.81	147.41	728.14
69.00	24.0	94.15	216.66	310.81	155.41	744.14
71.00	24.0	102.74	271.02	373.77	186.88	915.82
73.00	24.0	104.97	317.96	422.93	211.47	1058.84
75.00	24.0	110.33	319.21	429.55	214.77	1067.97
77.00	24.0	126.33	319.21	445.55	222.77	1083.97
79.00	24.0	142.33	319.21	461.55	230.77	1099.97
81.00	24.0	150.63	375.10	525.73	262.86	1275.92
83.00	24.0	155.08	458.92	614.00	307.00	1531.84
85.00	24.0	171.08	458.92	630.00	315.00	1547.84
87.00	24.0	187.08	458.92	646.00	323.00	1563.84
89.00	24.0	203.08	458.92	662.00	331.00	1579.84

NBR of 360 tons at
approx. elevation -79'



BB-08_Driven_BOC=-8.6ft_Void=-23.6ft_Preform=-36.1ft.out

91.00	24.0	219.08	458.92	678.00	339.00	1595.84
93.00	24.0	235.08	458.92	694.00	347.00	1611.84
95.00	24.0	251.08	458.92	710.00	355.00	1627.84
97.00	24.0	267.08	458.92	726.00	363.00	1643.84
99.00	24.0	283.08	458.92	742.00	371.00	1659.84
101.00	24.0	299.08	458.92	758.00	379.00	1675.84
103.00	24.0	315.08	417.00	732.07	366.04	1566.07
105.00	24.0	331.08	354.12	685.19	342.60	1393.43
107.00	24.0	347.08	354.12	701.19	350.60	1409.43
109.00	24.0	363.08	259.51	622.59	311.29	1141.61
111.00	24.0	373.85	205.62	579.47	289.74	990.71
113.00	24.0	382.02	199.93	581.95	290.97	981.80
115.00	24.0	398.02	144.44	542.46	271.23	831.34
117.00	24.0	401.79	139.93	541.72	270.86	821.57

Section Type: Square
Pile Width: 30.00 (in)

Test Pile Length (ft)	Pile Width (in)	Ultimate Side Friction (tons)	Mobilized End Bearing (tons)	Estimated Davisson Capacity (tons)	Allowable Pile Capacity (tons)	Ultimate Pile Capacity (tons)
5.00	30.0	0.00	0.00	0.00	0.00	0.00
7.00	30.0	0.00	0.00	0.00	0.00	0.00
9.00	30.0	0.00	0.00	0.00	0.00	0.00
11.00	30.0	0.00	0.00	0.00	0.00	0.00
13.00	30.0	0.00	0.00	0.00	0.00	0.00
15.00	30.0	0.00	0.00	0.00	0.00	0.00
17.00	30.0	1.64	30.04	31.69	15.84	91.78
19.00	30.0	3.63	30.02	33.65	16.83	93.70
21.00	30.0	5.36	32.67	38.02	19.01	103.35
23.00	30.0	6.46	24.51	30.97	15.49	79.99
25.00	30.0	6.46	70.03	76.49	38.25	216.54
27.00	30.0	7.58	64.43	72.01	36.01	200.88
29.00	30.0	10.33	43.19	53.52	26.76	139.89
31.00	30.0	13.58	39.52	53.10	26.55	132.15
33.00	30.0	17.81	36.49	54.30	27.15	127.27
35.00	30.0	25.82	19.63	45.46	22.73	84.72
37.00	30.0	25.82	42.78	68.60	34.30	154.16
39.00	30.0	25.82	43.20	69.03	34.51	155.43
41.00	30.0	26.04	45.87	71.91	35.95	163.64
43.00	30.0	27.68	49.48	77.16	38.58	176.12
45.00	30.0	31.42	111.73	143.15	71.57	366.61
47.00	30.0	36.24	115.62	151.86	75.93	383.09
49.00	30.0	42.08	216.60	258.69	129.34	691.90

BB-08_Driven_BOC=-8.6ft_Void=-23.6ft_Preform=-36.1ft.out

51.00	30.0	45.18	205.73	250.91	125.45	662.36
53.00	30.0	51.95	166.72	218.66	109.33	552.10
55.00	30.0	71.95	28.77	100.72	50.36	158.77
57.00	30.0	73.19	165.96	239.14	119.57	571.11
59.00	30.0	74.37	303.42	377.80	188.90	984.11
61.00	30.0	75.42	373.67	449.08	224.54	1196.42
63.00	30.0	76.59	382.65	459.24	229.62	1224.54
65.00	30.0	77.68	414.24	491.93	245.96	1320.41
67.00	30.0	97.68	414.24	511.93	255.96	1340.41
69.00	30.0	117.68	414.24	531.93	265.96	1360.41
71.00	30.0	128.43	412.34	540.77	270.38	1365.45
73.00	30.0	131.22	436.08	567.30	283.65	1439.45
75.00	30.0	137.91	542.43	680.34	340.17	1765.20
77.00	30.0	157.91	542.43	700.34	350.17	1785.20
79.00	30.0	177.91	542.43	720.34	360.17	1805.20
81.00	30.0	188.29	612.28	800.57	400.28	2025.14
83.00	30.0	193.84	717.06	910.91	455.45	2345.03
85.00	30.0	213.84	717.06	930.91	465.45	2365.03
87.00	30.0	233.84	717.06	950.91	475.45	2385.03
89.00	30.0	253.84	717.06	970.91	485.45	2405.03
91.00	30.0	273.84	717.06	990.91	495.45	2425.03
93.00	30.0	293.84	717.06	1010.91	505.45	2445.03
95.00	30.0	313.84	717.06	1030.91	515.45	2465.03
97.00	30.0	333.84	717.06	1050.91	525.45	2485.03
99.00	30.0	353.84	717.06	1070.91	535.45	2505.03
101.00	30.0	373.84	664.66	1038.51	519.25	2367.83
103.00	30.0	393.84	586.06	979.90	489.95	2152.02
105.00	30.0	413.84	586.06	999.90	499.95	2172.02
107.00	30.0	433.84	467.80	901.64	450.82	1837.24
109.00	30.0	453.84	348.04	801.88	400.94	1497.95
111.00	30.0	467.32	314.72	782.03	391.02	1411.47
113.00	30.0	477.52	323.96	801.49	400.74	1449.42
115.00	30.0	497.52	200.06	697.59	348.79	1097.71

NBR of 480 tons at
approx. elevation -74'



NOTES

1. MOBILIZED END BEARING IS 1/3 OF THE ORIGINAL RB-121 VALUES.
2. DAVISSON PILE CAPACITY IS AN ESTIMATE BASED ON FAILURE CRITERIA, AND EQUALS ULTIMATE SIDE FRICTION PLUS MOBILIZED END BEARING.
3. ALLOWABLE PILE CAPACITY IS 1/2 THE DAVISSON PILE CAPACITY.
4. ULTIMATE PILE CAPACITY IS ULTIMATE SIDE FRICTION PLUS 3 x THE MOBILIZED END BEARING.
EXCEPTION: FOR H-PILES TIPPED IN SAND OR LIMESTONE, THE ULTIMATE PILE CAPACITY IS ULTIMATE SIDE FRICTION PLUS 2 x THE MOBILIZED END BEARING.

BB-08_Driven_BOC=-8.6ft_Void=-23.6ft_Preform=-36.1ft.out

General Information:

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Input file: piers\BB-09_Driven_BOC=-6.6ft_Void=-21.6ft_Preform=-36.6ft.in
Project number: B-22-074
Job name: Broad Causeway Bridge
Engineer: PV/TC
Units: English

Analysis Information:

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Analysis Type: SPT

Soil Information:

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Boring date: 12/20/23, Boring Number: BB-09
Station number: 134+48 Offset: 25 LT

Ground Elevation: -6.600(ft)

Hammer type: Automatic Hammer, Correction factor = 1.24

ID	Depth (ft)	No. of Blows (Blows/ft)	Soil Type

1	0.00	7.00	5- Cavity layer
2	2.00	7.00	5- Cavity layer
3	4.00	6.50	5- Cavity layer
4	6.00	9.50	5- Cavity layer
5	8.00	9.50	5- Cavity layer
6	10.00	11.00	5- Cavity layer
7	12.00	7.50	5- Cavity layer
8	14.00	9.00	5- Cavity layer
9	14.00	20.00	5- Cavity layer
10	15.00	20.00	5- Cavity layer
11	15.00	20.00	4- Lime Stone/Very shelly sand
12	16.00	20.00	4- Lime Stone/Very shelly sand
13	16.00	0.00	1- Plastic Clay
14	16.00	4.50	4- Lime Stone/Very shelly sand
15	20.00	4.50	4- Lime Stone/Very shelly sand
16	22.50	2.00	4- Lime Stone/Very shelly sand
17	22.50	0.00	1- Plastic Clay
18	22.50	12.00	4- Lime Stone/Very shelly sand

BB-09_Driven_BOC=-6.6ft_Void=-21.6ft_Preform=-36.6ft.out

19	25.00	12.00	4- Lime Stone/Very shelly sand
20	25.00	0.00	1- Plastic Clay
21	25.00	20.00	3- Clean sand
22	25.00	0.00	1- Plastic Clay
23	25.00	20.00	4- Lime Stone/Very shelly sand
24	27.50	20.00	4- Lime Stone/Very shelly sand
25	27.50	0.00	1- Plastic Clay
26	27.50	28.00	3- Clean sand
27	30.00	28.00	3- Clean sand
28	32.50	28.00	3- Clean sand
29	35.00	23.00	3- Clean sand
30	37.50	34.00	3- Clean sand
31	40.00	36.00	3- Clean sand
32	42.50	26.00	3- Clean sand
33	45.00	22.00	3- Clean sand
34	45.00	0.00	1- Plastic Clay
35	45.00	100.00	4- Lime Stone/Very shelly sand
36	47.50	100.00	4- Lime Stone/Very shelly sand
37	47.50	0.00	1- Plastic Clay
38	47.50	8.00	4- Lime Stone/Very shelly sand
39	50.00	8.00	4- Lime Stone/Very shelly sand
40	52.50	0.00	4- Lime Stone/Very shelly sand
41	52.50	0.00	1- Plastic Clay
42	52.50	4.00	3- Clean sand
43	55.00	4.00	3- Clean sand
44	55.00	0.00	1- Plastic Clay
45	55.00	100.00	4- Lime Stone/Very shelly sand
46	57.50	100.00	4- Lime Stone/Very shelly sand
47	57.50	0.00	1- Plastic Clay
48	57.50	0.00	4- Lime Stone/Very shelly sand
49	60.00	0.00	4- Lime Stone/Very shelly sand
50	60.00	0.00	1- Plastic Clay
51	60.00	18.00	3- Clean sand
52	62.50	18.00	3- Clean sand
53	62.50	0.00	1- Plastic Clay
54	62.50	5.00	4- Lime Stone/Very shelly sand
55	65.00	5.00	4- Lime Stone/Very shelly sand
56	65.00	0.00	1- Plastic Clay
57	65.00	100.00	4- Lime Stone/Very shelly sand
58	67.50	100.00	4- Lime Stone/Very shelly sand
59	70.00	100.00	4- Lime Stone/Very shelly sand
60	72.50	100.00	4- Lime Stone/Very shelly sand
61	75.00	100.00	4- Lime Stone/Very shelly sand
62	75.00	0.00	1- Plastic Clay
63	75.00	45.00	3- Clean sand
64	77.50	45.00	3- Clean sand
65	77.50	0.00	1- Plastic Clay
66	77.50	100.00	4- Lime Stone/Very shelly sand
67	80.00	100.00	4- Lime Stone/Very shelly sand

BB-09_Driven_BOC=-6.6ft_Void=-21.6ft_Preform=-36.6ft.out

Preforming to elevation
-36.6' or a depth of 30'
below mudline

Predrilling 15' below bottom of
canal, to elevation -21.6'

68	82.50	100.00	4- Lime Stone/Very shelly sand
69	85.00	100.00	4- Lime Stone/Very shelly sand
70	87.50	100.00	4- Lime Stone/Very shelly sand
71	90.00	100.00	4- Lime Stone/Very shelly sand
72	92.50	100.00	4- Lime Stone/Very shelly sand
73	95.00	100.00	4- Lime Stone/Very shelly sand
74	97.50	100.00	4- Lime Stone/Very shelly sand
75	100.00	100.00	4- Lime Stone/Very shelly sand
76	102.50	100.00	4- Lime Stone/Very shelly sand
77	105.00	100.00	4- Lime Stone/Very shelly sand
78	107.50	100.00	4- Lime Stone/Very shelly sand
79	110.00	100.00	4- Lime Stone/Very shelly sand
80	110.00	0.00	1- Plastic Clay
81	110.00	100.00	3- Clean sand
82	112.50	100.00	3- Clean sand
83	112.50	0.00	1- Plastic Clay
84	112.50	20.00	3- Clean sand
85	115.00	20.00	3- Clean sand
86	115.00	0.00	1- Plastic Clay
87	115.00	100.00	4- Lime Stone/Very shelly sand
88	117.50	100.00	4- Lime Stone/Very shelly sand
89	117.50	0.00	1- Plastic Clay
90	117.50	45.00	4- Lime Stone/Very shelly sand
91	120.00	45.00	4- Lime Stone/Very shelly sand
92	120.00	0.00	1- Plastic Clay
93	120.00	100.00	4- Lime Stone/Very shelly sand
94	122.50	100.00	4- Lime Stone/Very shelly sand
95	125.00	100.00	4- Lime Stone/Very shelly sand

Blowcount Average Per Soil Layer

Layer Num.	Starting Elevation (ft)	Bottom Elevation (ft)	Thickness (ft)	Average Blowcount (Blows/ft)	Soil Type

1	-6.60	-21.60	15.00	9.07	5-Void
2	-21.60	-22.60	1.00	20.00	4-Limestone, Very
Shelly Sand					
3	-22.60	-22.60	0.00	4.50	1-Plastic Clay
4	-22.60	-29.10	6.50	4.50	4-Limestone, Very
Shelly Sand					
5	-29.10	-29.10	0.00	12.00	1-Plastic Clay
6	-29.10	-31.60	2.50	12.00	4-Limestone, Very
Shelly Sand					
7	-31.60	-31.60	0.00	20.00	1-Plastic Clay

BB-09_Driven_BOC=-6.6ft_Void=-21.6ft_Preform=-36.6ft.out

8	-31.60	-31.60	0.00	0.00	3-Clean Sand
9	-31.60	-31.60	0.00	20.00	1-Plastic Clay
10	-31.60	-34.10	2.50	20.00	4-Limestone, Very
Shelly Sand					
11	-34.10	-34.10	0.00	28.00	1-Plastic Clay
12	-34.10	-51.60	17.50	29.00	3-Clean Sand
13	-51.60	-51.60	0.00	100.00	1-Plastic Clay
14	-51.60	-54.10	2.50	100.00	4-Limestone, Very
Shelly Sand					
15	-54.10	-54.10	0.00	8.00	1-Plastic Clay
16	-54.10	-59.10	5.00	8.00	4-Limestone, Very
Shelly Sand					
17	-59.10	-59.10	0.00	4.00	1-Plastic Clay
18	-59.10	-61.60	2.50	4.00	3-Clean Sand
19	-61.60	-61.60	0.00	100.00	1-Plastic Clay
20	-61.60	-64.10	2.50	100.00	4-Limestone, Very
Shelly Sand					
21	-64.10	-64.10	0.00	0.00	1-Plastic Clay
22	-64.10	-66.60	2.50	0.00	4-Limestone, Very
Shelly Sand					
23	-66.60	-66.60	0.00	18.00	1-Plastic Clay
24	-66.60	-69.10	2.50	18.00	3-Clean Sand
25	-69.10	-69.10	0.00	5.00	1-Plastic Clay
26	-69.10	-71.60	2.50	5.00	4-Limestone, Very
Shelly Sand					
27	-71.60	-71.60	0.00	100.00	1-Plastic Clay
28	-71.60	-81.60	10.00	100.00	4-Limestone, Very
Shelly Sand					
29	-81.60	-81.60	0.00	45.00	1-Plastic Clay
30	-81.60	-84.10	2.50	45.00	3-Clean Sand
31	-84.10	-84.10	0.00	100.00	1-Plastic Clay
32	-84.10	-116.60	32.50	100.00	4-Limestone, Very
Shelly Sand					
33	-116.60	-116.60	0.00	100.00	1-Plastic Clay
34	-116.60	-119.10	2.50	100.00	3-Clean Sand
35	-119.10	-119.10	0.00	20.00	1-Plastic Clay
36	-119.10	-121.60	2.50	20.00	3-Clean Sand
37	-121.60	-121.60	0.00	100.00	1-Plastic Clay
38	-121.60	-124.10	2.50	100.00	4-Limestone, Very
Shelly Sand					
39	-124.10	-124.10	0.00	45.00	1-Plastic Clay
40	-124.10	-126.60	2.50	45.00	4-Limestone, Very
Shelly Sand					
41	-126.60	-126.60	0.00	100.00	1-Plastic Clay
42	-126.60	-131.60	5.00	100.00	4-Limestone, Very
Shelly Sand					

Driven Pile Data:

BB-09_Driven_BOC=-6.6ft_Void=-21.6ft_Preform=-36.6ft.out

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Pile unit weight = 150.00(pcf), Section Type: Square

Pile Geometry:

Width (in)	Length (ft)	Tip Elev. (ft)
24.00	5.00	-11.60
24.00	7.00	-13.60
24.00	9.00	-15.60
24.00	11.00	-17.60
24.00	13.00	-19.60
24.00	15.00	-21.60
24.00	17.00	-23.60
24.00	19.00	-25.60
24.00	21.00	-27.60
24.00	23.00	-29.60
24.00	25.00	-31.60
24.00	27.00	-33.60
24.00	29.00	-35.60
24.00	31.00	-37.60
24.00	33.00	-39.60
24.00	35.00	-41.60
24.00	37.00	-43.60
24.00	39.00	-45.60
24.00	41.00	-47.60
24.00	43.00	-49.60
24.00	45.00	-51.60
24.00	47.00	-53.60
24.00	49.00	-55.60
24.00	51.00	-57.60
24.00	53.00	-59.60
24.00	55.00	-61.60
24.00	57.00	-63.60
24.00	59.00	-65.60
24.00	61.00	-67.60
24.00	63.00	-69.60
24.00	65.00	-71.60
24.00	67.00	-73.60
24.00	69.00	-75.60
24.00	71.00	-77.60
24.00	73.00	-79.60
24.00	75.00	-81.60
24.00	77.00	-83.60
24.00	79.00	-85.60
24.00	81.00	-87.60
24.00	83.00	-89.60
24.00	85.00	-91.60

BB-09_Driven_BOC=-6.6ft_Void=-21.6ft_Preform=-36.6ft.out

24.00	87.00	-93.60
24.00	89.00	-95.60
24.00	91.00	-97.60
24.00	93.00	-99.60
24.00	95.00	-101.60
24.00	97.00	-103.60
24.00	99.00	-105.60
24.00	101.00	-107.60
24.00	103.00	-109.60
24.00	105.00	-111.60
24.00	107.00	-113.60
24.00	109.00	-115.60
24.00	111.00	-117.60
24.00	113.00	-119.60
24.00	115.00	-121.60
24.00	117.00	-123.60
30.00	5.00	-11.60
30.00	7.00	-13.60
30.00	9.00	-15.60
30.00	11.00	-17.60
30.00	13.00	-19.60
30.00	15.00	-21.60
30.00	17.00	-23.60
30.00	19.00	-25.60
30.00	21.00	-27.60
30.00	23.00	-29.60
30.00	25.00	-31.60
30.00	27.00	-33.60
30.00	29.00	-35.60
30.00	31.00	-37.60
30.00	33.00	-39.60
30.00	35.00	-41.60
30.00	37.00	-43.60
30.00	39.00	-45.60
30.00	41.00	-47.60
30.00	43.00	-49.60
30.00	45.00	-51.60
30.00	47.00	-53.60
30.00	49.00	-55.60
30.00	51.00	-57.60
30.00	53.00	-59.60
30.00	55.00	-61.60
30.00	57.00	-63.60
30.00	59.00	-65.60
30.00	61.00	-67.60
30.00	63.00	-69.60
30.00	65.00	-71.60
30.00	67.00	-73.60
30.00	69.00	-75.60

BB-09_Driven_BOC=-6.6ft_Void=-21.6ft_Preform=-36.6ft.out

30.00	71.00	-77.60
30.00	73.00	-79.60
30.00	75.00	-81.60
30.00	77.00	-83.60
30.00	79.00	-85.60
30.00	81.00	-87.60
30.00	83.00	-89.60
30.00	85.00	-91.60
30.00	87.00	-93.60
30.00	89.00	-95.60
30.00	91.00	-97.60
30.00	93.00	-99.60
30.00	95.00	-101.60
30.00	97.00	-103.60
30.00	99.00	-105.60
30.00	101.00	-107.60
30.00	103.00	-109.60
30.00	105.00	-111.60
30.00	107.00	-113.60
30.00	109.00	-115.60
30.00	111.00	-117.60
30.00	113.00	-119.60
30.00	115.00	-121.60

Driven Pile Capacity:
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Section Type: Square
Pile Width: 24.00 (in)

Test Pile Length (ft)	Pile Width (in)	Ultimate Side Friction (tons)	Mobilized End Bearing (tons)	Estimated Davisson Capacity (tons)	Allowable Pile Capacity (tons)	Ultimate Pile Capacity (tons)
5.00	24.0	0.00	0.00	0.00	0.00	0.00
7.00	24.0	0.00	0.00	0.00	0.00	0.00
9.00	24.0	0.00	0.00	0.00	0.00	0.00
11.00	24.0	0.00	0.00	0.00	0.00	0.00
13.00	24.0	0.00	0.00	0.00	0.00	0.00
15.00	24.0	0.00	25.47	25.47	12.73	76.40
17.00	24.0	2.43	24.92	27.35	13.67	77.18
19.00	24.0	3.32	41.72	45.04	22.52	128.47

BB-09_Driven_BOC=-6.6ft_Void=-21.6ft_Preform=-36.6ft.out

21.00	24.0	4.13	70.78	74.91	37.46	216.48
23.00	24.0	4.92	103.73	108.65	54.33	316.11
25.00	24.0	7.30	128.28	135.58	67.79	392.13
27.00	24.0	11.27	140.07	151.34	75.67	431.47
29.00	24.0	19.77	88.97	108.74	54.37	286.68
31.00	24.0	27.98	91.13	119.11	59.56	301.38
33.00	24.0	35.00	95.19	130.19	65.09	320.57
35.00	24.0	40.43	101.46	141.88	70.94	344.80
37.00	24.0	47.36	107.45	154.81	77.41	369.70
39.00	24.0	52.67	123.79	176.46	88.23	424.03
41.00	24.0	57.78	148.15	205.92	102.96	502.22
43.00	24.0	68.01	148.78	216.79	108.39	514.34
45.00	24.0	106.50	159.88	266.38	133.19	586.13
47.00	24.0	122.50	50.44	172.94	86.47	273.82
49.00	24.0	127.69	130.43	258.12	129.06	518.98
51.00	24.0	129.12	151.84	280.97	140.48	584.65
53.00	24.0	129.86	164.86	294.72	147.36	624.44
55.00	24.0	131.36	174.42	305.78	152.89	654.61
57.00	24.0	147.36	64.67	212.04	106.02	341.33
59.00	24.0	151.36	150.72	302.08	151.04	603.52
61.00	24.0	154.32	168.44	322.76	161.38	659.64
63.00	24.0	160.09	349.17	509.27	254.63	1207.61
65.00	24.0	161.09	458.92	620.01	310.00	1537.85
67.00	24.0	177.09	458.92	636.01	318.00	1553.85
69.00	24.0	193.09	403.71	596.80	298.40	1404.22
71.00	24.0	209.09	389.91	598.99	299.50	1378.81
73.00	24.0	225.09	389.91	614.99	307.50	1394.81
75.00	24.0	241.09	342.43	583.52	291.76	1268.39
77.00	24.0	256.22	346.06	602.27	301.14	1294.38
79.00	24.0	274.29	458.92	733.21	366.61	1651.05
81.00	24.0	290.29	458.92	749.21	374.61	1667.05
83.00	24.0	306.29	458.92	765.21	382.61	1683.05
85.00	24.0	322.29	458.92	781.21	390.61	1699.05
87.00	24.0	338.29	458.92	797.21	398.61	1715.05
89.00	24.0	354.29	458.92	813.21	406.61	1731.05
91.00	24.0	370.29	458.92	829.21	414.61	1747.05
93.00	24.0	386.29	458.92	845.21	422.61	1763.05
95.00	24.0	402.29	458.92	861.21	430.61	1779.05
97.00	24.0	418.29	458.92	877.21	438.61	1795.05
99.00	24.0	434.29	458.92	893.21	446.61	1811.05
101.00	24.0	450.29	458.92	909.21	454.61	1827.05
103.00	24.0	466.29	433.55	899.85	449.92	1766.96
105.00	24.0	482.29	373.44	855.73	427.86	1602.61
107.00	24.0	498.29	285.16	783.45	391.73	1353.78
109.00	24.0	514.29	285.16	799.45	399.73	1369.78
111.00	24.0	531.41	359.07	890.48	445.24	1608.63
113.00	24.0	546.97	343.56	890.53	445.27	1577.65
115.00	24.0	554.51	382.71	937.23	468.61	1702.65
117.00	24.0	570.51	382.71	953.23	476.61	1718.65

NBR of 360 tons at
approx. elevation -69'

BB-09_Driven_BOC=-6.6ft_Void=-21.6ft_Preform=-36.6ft.out

Section Type: Square
Pile Width: 30.00 (in)

Test Pile Length (ft)	Pile Width (in)	Ultimate Side Friction (tons)	Mobilized End Bearing (tons)	Estimated Davisson Capacity (tons)	Allowable Pile Capacity (tons)	Ultimate Pile Capacity (tons)
5.00	30.0	0.00	0.00	0.00	0.00	0.00
7.00	30.0	0.00	0.00	0.00	0.00	0.00
9.00	30.0	0.00	0.00	0.00	0.00	0.00
11.00	30.0	0.00	0.00	0.00	0.00	0.00
13.00	30.0	0.00	0.00	0.00	0.00	0.00
15.00	30.0	0.00	47.24	47.24	23.62	141.72
17.00	30.0	3.04	57.74	60.78	30.39	176.26
19.00	30.0	4.15	93.51	97.67	48.83	284.70
21.00	30.0	5.16	134.77	139.93	69.97	409.48
23.00	30.0	6.15	175.75	181.90	90.95	533.40
25.00	30.0	9.13	201.68	210.81	105.40	614.16
27.00	30.0	14.09	220.38	234.47	117.24	675.24
29.00	30.0	24.46	132.14	156.60	78.30	420.88
31.00	30.0	34.44	135.02	169.45	84.73	439.48
33.00	30.0	43.06	139.97	183.03	91.51	462.97
35.00	30.0	50.63	145.83	196.46	98.23	488.12
37.00	30.0	56.45	157.78	214.23	107.11	529.78
39.00	30.0	60.75	183.56	244.31	122.15	611.42
41.00	30.0	73.97	186.31	260.27	130.14	632.89
43.00	30.0	86.09	188.09	274.18	137.09	650.37
45.00	30.0	133.13	206.46	339.59	169.79	752.51
47.00	30.0	153.13	206.46	359.59	179.79	772.51
49.00	30.0	159.62	198.89	358.51	179.25	756.28
51.00	30.0	161.40	204.68	366.09	183.04	775.45
53.00	30.0	162.32	241.77	404.09	202.04	887.62
55.00	30.0	164.21	224.25	388.46	194.23	836.96
57.00	30.0	184.21	224.25	408.46	204.23	856.96
59.00	30.0	189.21	331.81	521.02	260.51	1184.64
61.00	30.0	193.08	305.51	498.59	249.30	1109.61
63.00	30.0	200.12	579.88	780.00	390.00	1939.76
65.00	30.0	201.36	717.06	918.42	459.21	2352.55
67.00	30.0	221.36	648.05	869.41	434.70	2165.51
69.00	30.0	241.36	630.80	872.15	436.08	2133.75
71.00	30.0	261.36	630.80	892.15	446.08	2153.75
73.00	30.0	281.36	630.80	912.15	456.08	2173.75
75.00	30.0	301.36	544.57	845.92	422.96	1935.05
77.00	30.0	321.76	546.04	867.80	433.90	1959.89

BB-09_Driven_BOC=-6.6ft_Void=-21.6ft_Preform=-36.6ft.out

NBR of 480 tons at
approx. elevation -66'



79.00	30.0	342.86	717.06	1059.93	529.96	2494.05
81.00	30.0	362.86	717.06	1079.93	539.96	2514.05
83.00	30.0	382.86	717.06	1099.93	549.96	2534.05
85.00	30.0	402.86	717.06	1119.93	559.96	2554.05
87.00	30.0	422.86	717.06	1139.93	569.96	2574.05
89.00	30.0	442.86	717.06	1159.93	579.96	2594.05
91.00	30.0	462.86	717.06	1179.93	589.96	2614.05
93.00	30.0	482.86	717.06	1199.93	599.96	2634.05
95.00	30.0	502.86	717.06	1219.93	609.96	2654.05
97.00	30.0	522.86	717.06	1239.93	619.96	2674.05
99.00	30.0	542.86	717.06	1259.93	629.96	2694.05
101.00	30.0	562.86	685.36	1248.22	624.11	2618.93
103.00	30.0	582.86	610.21	1193.07	596.54	2413.49
105.00	30.0	602.86	499.86	1102.73	551.36	2102.46
107.00	30.0	622.86	499.86	1122.73	561.36	2122.46
109.00	30.0	642.86	442.71	1085.57	542.79	1970.99
111.00	30.0	664.26	554.15	1218.41	609.21	2326.71
113.00	30.0	683.68	564.19	1247.87	623.94	2376.26
115.00	30.0	693.14	621.80	1314.95	657.47	2558.55

NOTES

1. MOBILIZED END BEARING IS 1/3 OF THE ORIGINAL RB-121 VALUES.
2. DAVISSON PILE CAPACITY IS AN ESTIMATE BASED ON FAILURE CRITERIA, AND EQUALS ULTIMATE SIDE FRICTION PLUS MOBILIZED END BEARING.
3. ALLOWABLE PILE CAPACITY IS 1/2 THE DAVISSON PILE CAPACITY.
4. ULTIMATE PILE CAPACITY IS ULTIMATE SIDE FRICTION PLUS 3 x THE MOBILIZED END BEARING.
EXCEPTION: FOR H-PILES TIPPED IN SAND OR LIMESTONE, THE ULTIMATE PILE CAPACITY IS ULTIMATE SIDE FRICTION PLUS 2 x THE MOBILIZED END BEARING.

BB-09_Driven_BOC=-6.6ft_Void=-21.6ft_Preform=-36.6ft.out

Florida Bridge Software Institute
Shaft and Pile Analysis (FB-Deep v.3.1.0)

Date: January 17, 2024
Time: 08:51:30

General Information:

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Input file: piers\BB-10_Driven_BOC=-7.1ft_Void=-22.1ft_Preform=-37.1ft.in
Project number: B-22-074
Job name: Broad Causeway Bridge
Engineer: PV/TC
Units: English

Analysis Information:

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Analysis Type: SPT

Soil Information:

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Boring date: 12/21/23, Boring Number: BB-10
Station number: 136+34 Offset: 40 RT

Ground Elevation: -7.100(ft)

Hammer type: Automatic Hammer, Correction factor = 1.24

ID	Depth (ft)	No. of Blows (Blows/ft)	Soil Type

1	0.00	7.00	5- Cavity layer
2	2.00	7.00	5- Cavity layer
3	4.00	13.50	5- Cavity layer
4	6.00	2.50	5- Cavity layer
5	8.00	7.50	5- Cavity layer
6	10.00	8.50	5- Cavity layer
7	12.00	7.00	5- Cavity layer
8	14.00	10.00	5- Cavity layer
9	15.00	10.00	5- Cavity layer
10	15.00	10.00	4- Lime Stone/Very shelly sand
11	16.00	10.00	4- Lime Stone/Very shelly sand
12	20.00	8.00	4- Lime Stone/Very shelly sand
13	22.50	5.50	4- Lime Stone/Very shelly sand
14	25.00	4.00	4- Lime Stone/Very shelly sand
15	25.00	0.00	1- Plastic Clay
16	25.00	8.00	4- Lime Stone/Very shelly sand
17	27.50	0.00	4- Lime Stone/Very shelly sand
18	27.50	0.00	1- Plastic Clay

BB-10_Driven_BOC=-7.1ft_Void=-22.1ft_Preform=-37.1ft.out

Preforming to elevation
-37.1' or a depth of 30'
below mudline

19	27.50	20.00	3- Clean sand
20	30.00	20.00	3- Clean sand
21	30.00	0.00	1- Plastic Clay
22	30.00	9.00	3- Clean sand
23	32.50	9.00	3- Clean sand
24	35.00	11.00	3- Clean sand
25	37.50	13.00	3- Clean sand
26	40.00	10.00	3- Clean sand
27	40.00	0.00	1- Plastic Clay
28	40.00	25.00	3- Clean sand
29	42.50	25.00	3- Clean sand
30	45.00	16.00	3- Clean sand
31	45.00	0.00	1- Plastic Clay
32	45.00	42.00	3- Clean sand
33	47.50	42.00	3- Clean sand
34	47.50	0.00	1- Plastic Clay
35	47.50	100.00	3- Clean sand
36	50.00	100.00	3- Clean sand
37	50.00	0.00	1- Plastic Clay
38	50.00	45.00	3- Clean sand
39	52.50	45.00	3- Clean sand
40	55.00	30.00	3- Clean sand
41	55.00	0.00	1- Plastic Clay
42	55.00	100.00	4- Lime Stone/Very shelly sand
43	57.50	100.00	4- Lime Stone/Very shelly sand
44	60.00	100.00	4- Lime Stone/Very shelly sand
45	62.50	100.00	4- Lime Stone/Very shelly sand
46	62.50	0.00	1- Plastic Clay
47	62.50	12.00	4- Lime Stone/Very shelly sand
48	65.00	12.00	4- Lime Stone/Very shelly sand
49	65.00	0.00	1- Plastic Clay
50	65.00	20.00	3- Clean sand
51	67.50	20.00	3- Clean sand
52	70.00	9.00	3- Clean sand
53	70.00	0.00	1- Plastic Clay
54	70.00	100.00	4- Lime Stone/Very shelly sand
55	72.50	100.00	4- Lime Stone/Very shelly sand
56	75.00	100.00	4- Lime Stone/Very shelly sand
57	77.50	100.00	4- Lime Stone/Very shelly sand
58	80.00	100.00	4- Lime Stone/Very shelly sand
59	80.00	0.00	1- Plastic Clay
60	80.00	37.00	4- Lime Stone/Very shelly sand
61	82.50	37.00	4- Lime Stone/Very shelly sand
62	82.50	0.00	1- Plastic Clay
63	82.50	67.00	4- Lime Stone/Very shelly sand
64	85.00	67.00	4- Lime Stone/Very shelly sand
65	85.00	0.00	1- Plastic Clay
66	85.00	100.00	4- Lime Stone/Very shelly sand
67	87.50	100.00	4- Lime Stone/Very shelly sand

BB-10_Driven_BOC=-7.1ft_Void=-22.1ft_Preform=-37.1ft.out

68	90.00	100.00	4- Lime Stone/Very shelly sand
69	92.50	100.00	4- Lime Stone/Very shelly sand
70	95.00	100.00	4- Lime Stone/Very shelly sand
71	97.50	100.00	4- Lime Stone/Very shelly sand
72	100.00	100.00	4- Lime Stone/Very shelly sand
73	102.50	100.00	4- Lime Stone/Very shelly sand
74	105.00	67.00	4- Lime Stone/Very shelly sand
75	107.50	100.00	4- Lime Stone/Very shelly sand
76	110.00	100.00	4- Lime Stone/Very shelly sand
77	112.50	100.00	4- Lime Stone/Very shelly sand
78	115.00	100.00	4- Lime Stone/Very shelly sand
79	117.50	100.00	4- Lime Stone/Very shelly sand
80	120.00	100.00	4- Lime Stone/Very shelly sand
81	122.50	65.00	4- Lime Stone/Very shelly sand
82	125.00	100.00	4- Lime Stone/Very shelly sand

Blowcount Average Per Soil Layer

Layer Num.	Starting Elevation (ft)	Bottom Elevation (ft)	Thickness (ft)	Average Blowcount (Blows/ft)	Soil Type
1	-7.10	-22.10	15.00	7.73	5-Void
2	-22.10	-32.10	10.00	8.38	4-Limestone, Very
Shelly Sand					
3	-32.10	-32.10	0.00	8.00	1-Plastic Clay
4	-32.10	-34.60	2.50	8.00	4-Limestone, Very
Shelly Sand					
5	-34.60	-34.60	0.00	20.00	1-Plastic Clay
6	-34.60	-37.10	2.50	20.00	3-Clean Sand
7	-37.10	-37.10	0.00	9.00	1-Plastic Clay
8	-37.10	-47.10	10.00	10.50	3-Clean Sand
9	-47.10	-47.10	0.00	25.00	1-Plastic Clay
10	-47.10	-52.10	5.00	25.00	3-Clean Sand
11	-52.10	-52.10	0.00	42.00	1-Plastic Clay
12	-52.10	-54.60	2.50	42.00	3-Clean Sand
13	-54.60	-54.60	0.00	100.00	1-Plastic Clay
14	-54.60	-57.10	2.50	100.00	3-Clean Sand
15	-57.10	-57.10	0.00	45.00	1-Plastic Clay
16	-57.10	-62.10	5.00	45.00	3-Clean Sand
17	-62.10	-62.10	0.00	100.00	1-Plastic Clay
18	-62.10	-69.60	7.50	100.00	4-Limestone, Very
Shelly Sand					
19	-69.60	-69.60	0.00	12.00	1-Plastic Clay
20	-69.60	-72.10	2.50	12.00	4-Limestone, Very

BB-10_Driven_BOC=-7.1ft_Void=-22.1ft_Preform=-37.1ft.out

Shelly Sand					
21	-72.10	-72.10	0.00	20.00	1-Plastic Clay
22	-72.10	-77.10	5.00	20.00	3-Clean Sand
23	-77.10	-77.10	0.00	100.00	1-Plastic Clay
24	-77.10	-87.10	10.00	100.00	4-Limestone, Very
Shelly Sand					
25	-87.10	-87.10	0.00	37.00	1-Plastic Clay
26	-87.10	-89.60	2.50	37.00	4-Limestone, Very
Shelly Sand					
27	-89.60	-89.60	0.00	67.00	1-Plastic Clay
28	-89.60	-92.10	2.50	67.00	4-Limestone, Very
Shelly Sand					
29	-92.10	-92.10	0.00	100.00	1-Plastic Clay
30	-92.10	-132.10	40.00	95.75	4-Limestone, Very
Shelly Sand					

Driven Pile Data:

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Pile unit weight = 150.00(pcf), Section Type: Square

Pile Geometry:

Width (in)	Length (ft)	Tip Elev. (ft)
24.00	5.00	-12.10
24.00	7.00	-14.10
24.00	9.00	-16.10
24.00	11.00	-18.10
24.00	13.00	-20.10
24.00	15.00	-22.10
24.00	17.00	-24.10
24.00	19.00	-26.10
24.00	21.00	-28.10
24.00	23.00	-30.10
24.00	25.00	-32.10
24.00	27.00	-34.10
24.00	29.00	-36.10
24.00	31.00	-38.10
24.00	33.00	-40.10
24.00	35.00	-42.10
24.00	37.00	-44.10
24.00	39.00	-46.10
24.00	41.00	-48.10
24.00	43.00	-50.10
24.00	45.00	-52.10
24.00	47.00	-54.10
24.00	49.00	-56.10

BB-10_Driven_BOC=-7.1ft_Void=-22.1ft_Preform=-37.1ft.out

24.00	51.00	-58.10
24.00	53.00	-60.10
24.00	55.00	-62.10
24.00	57.00	-64.10
24.00	59.00	-66.10
24.00	61.00	-68.10
24.00	63.00	-70.10
24.00	65.00	-72.10
24.00	67.00	-74.10
24.00	69.00	-76.10
24.00	71.00	-78.10
24.00	73.00	-80.10
24.00	75.00	-82.10
24.00	77.00	-84.10
24.00	79.00	-86.10
24.00	81.00	-88.10
24.00	83.00	-90.10
24.00	85.00	-92.10
24.00	87.00	-94.10
24.00	89.00	-96.10
24.00	91.00	-98.10
24.00	93.00	-100.10
24.00	95.00	-102.10
24.00	97.00	-104.10
24.00	99.00	-106.10
24.00	101.00	-108.10
24.00	103.00	-110.10
24.00	105.00	-112.10
24.00	107.00	-114.10
24.00	109.00	-116.10
24.00	111.00	-118.10
24.00	113.00	-120.10
24.00	115.00	-122.10
24.00	117.00	-124.10
30.00	5.00	-12.10
30.00	7.00	-14.10
30.00	9.00	-16.10
30.00	11.00	-18.10
30.00	13.00	-20.10
30.00	15.00	-22.10
30.00	17.00	-24.10
30.00	19.00	-26.10
30.00	21.00	-28.10
30.00	23.00	-30.10
30.00	25.00	-32.10
30.00	27.00	-34.10
30.00	29.00	-36.10
30.00	31.00	-38.10
30.00	33.00	-40.10

BB-10_Driven_BOC=-7.1ft_Void=-22.1ft_Preform=-37.1ft.out

30.00	35.00	-42.10
30.00	37.00	-44.10
30.00	39.00	-46.10
30.00	41.00	-48.10
30.00	43.00	-50.10
30.00	45.00	-52.10
30.00	47.00	-54.10
30.00	49.00	-56.10
30.00	51.00	-58.10
30.00	53.00	-60.10
30.00	55.00	-62.10
30.00	57.00	-64.10
30.00	59.00	-66.10
30.00	61.00	-68.10
30.00	63.00	-70.10
30.00	65.00	-72.10
30.00	67.00	-74.10
30.00	69.00	-76.10
30.00	71.00	-78.10
30.00	73.00	-80.10
30.00	75.00	-82.10
30.00	77.00	-84.10
30.00	79.00	-86.10
30.00	81.00	-88.10
30.00	83.00	-90.10
30.00	85.00	-92.10
30.00	87.00	-94.10
30.00	89.00	-96.10
30.00	91.00	-98.10
30.00	93.00	-100.10
30.00	95.00	-102.10
30.00	97.00	-104.10
30.00	99.00	-106.10
30.00	101.00	-108.10
30.00	103.00	-110.10
30.00	105.00	-112.10
30.00	107.00	-114.10
30.00	109.00	-116.10
30.00	111.00	-118.10
30.00	113.00	-120.10
30.00	115.00	-122.10

Driven Pile Capacity:

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BB-10_Driven_BOC=-7.1ft_Void=-22.1ft_Preform=-37.1ft.out

Section Type: Square
Pile Width: 24.00 (in)

Test Pile Length (ft)	Pile Width (in)	Ultimate Side Friction (tons)	Mobilized End Bearing (tons)	Estimated Davisson Capacity (tons)	Allowable Pile Capacity (tons)	Ultimate Pile Capacity (tons)
5.00	24.0	0.00	0.00	0.00	0.00	0.00
7.00	24.0	0.00	0.00	0.00	0.00	0.00
9.00	24.0	0.00	0.00	0.00	0.00	0.00
11.00	24.0	0.00	0.00	0.00	0.00	0.00
13.00	24.0	0.00	0.00	0.00	0.00	0.00
15.00	24.0	0.00	33.16	33.16	16.58	99.49
17.00	24.0	1.96	27.69	29.65	14.83	85.04
19.00	24.0	3.74	23.41	27.16	13.58	73.98
21.00	24.0	5.31	35.50	40.81	20.41	111.82
23.00	24.0	6.50	48.65	55.15	27.57	152.44
25.00	24.0	7.42	56.04	63.45	31.73	175.52
27.00	24.0	8.37	64.68	73.05	36.52	202.41
29.00	24.0	14.06	45.47	59.54	29.77	150.48
31.00	24.0	19.43	45.99	65.42	32.71	157.41
33.00	24.0	22.48	46.67	69.15	34.57	162.48
35.00	24.0	24.67	50.64	75.31	37.65	176.58
37.00	24.0	27.17	56.59	83.76	41.88	196.93
39.00	24.0	29.27	67.59	96.87	48.43	232.05
41.00	24.0	42.12	102.98	145.10	72.55	351.07
43.00	24.0	48.55	108.37	156.92	78.46	373.66
45.00	24.0	59.30	159.09	218.38	109.19	536.55
47.00	24.0	74.33	159.82	234.15	117.08	553.79
49.00	24.0	91.30	170.52	261.82	130.91	602.87
51.00	24.0	109.60	212.03	321.63	160.82	745.69
53.00	24.0	121.66	219.15	340.82	170.41	779.12
55.00	24.0	140.76	433.32	574.08	287.04	1440.72
57.00	24.0	156.76	330.91	487.67	243.84	1149.50
59.00	24.0	172.76	242.64	415.40	207.70	900.67
61.00	24.0	188.76	151.09	339.85	169.92	642.02
63.00	24.0	201.36	126.73	328.09	164.04	581.54
65.00	24.0	203.74	251.66	455.40	227.70	958.73
67.00	24.0	210.27	256.29	466.55	233.28	979.13
69.00	24.0	214.71	270.55	485.26	242.63	1026.35
71.00	24.0	227.99	458.92	686.91	343.46	1604.75
73.00	24.0	243.99	422.84	666.83	333.41	1512.50
75.00	24.0	259.99	362.30	622.29	311.15	1346.89
77.00	24.0	275.99	336.66	612.65	306.33	1285.96
79.00	24.0	291.99	336.66	628.65	314.33	1301.96
81.00	24.0	303.66	372.74	676.41	338.20	1421.89

BB-10_Driven_BOC=-7.1ft_Void=-22.1ft_Preform=-37.1ft.out

83.00	24.0	312.49	433.28	745.77	372.89	1612.33
85.00	24.0	325.79	458.92	784.71	392.35	1702.55
87.00	24.0	341.79	458.92	800.71	400.35	1718.55
89.00	24.0	357.79	458.92	816.71	408.35	1734.55
91.00	24.0	373.79	458.92	832.71	416.35	1750.55
93.00	24.0	389.79	458.92	848.71	424.35	1766.55
95.00	24.0	405.79	458.28	864.06	432.03	1780.62
97.00	24.0	421.79	442.89	864.68	432.34	1750.47
99.00	24.0	437.79	427.51	865.30	432.65	1720.32
101.00	24.0	453.79	426.87	880.65	440.33	1734.39
103.00	24.0	469.72	427.51	897.23	448.61	1752.25
105.00	24.0	484.09	442.89	926.99	463.49	1812.78
107.00	24.0	498.47	458.28	956.75	478.37	1873.31
109.00	24.0	514.40	458.92	973.32	486.66	1891.16
111.00	24.0	530.40	458.92	989.32	494.66	1907.16
113.00	24.0	546.40	456.01	1002.41	501.20	1914.42
115.00	24.0	562.40	434.15	996.55	498.27	1864.84
117.00	24.0	578.40	422.49	1000.89	500.44	1845.86

Section Type: Square
Pile Width: 30.00 (in)

Test Pile Length (ft)	Pile Width (in)	Ultimate Side Friction (tons)	Mobilized End Bearing (tons)	Estimated Davisson Capacity (tons)	Allowable Pile Capacity (tons)	Ultimate Pile Capacity (tons)
5.00	30.0	0.00	0.00	0.00	0.00	0.00
7.00	30.0	0.00	0.00	0.00	0.00	0.00
9.00	30.0	0.00	0.00	0.00	0.00	0.00
11.00	30.0	0.00	0.00	0.00	0.00	0.00
13.00	30.0	0.00	0.00	0.00	0.00	0.00
15.00	30.0	0.00	47.18	47.18	23.59	141.54
17.00	30.0	2.45	40.67	43.12	21.56	124.47
19.00	30.0	4.68	54.32	59.00	29.50	167.63
21.00	30.0	6.63	68.35	74.99	37.49	211.69
23.00	30.0	8.13	75.77	83.90	41.95	235.44
25.00	30.0	9.27	86.91	96.18	48.09	270.00
27.00	30.0	10.46	100.36	110.82	55.41	311.54
29.00	30.0	17.48	66.28	83.76	41.88	216.33
31.00	30.0	24.33	67.67	92.00	46.00	227.34
33.00	30.0	27.32	70.19	97.51	48.76	237.89
35.00	30.0	29.98	75.70	105.68	52.84	257.08
37.00	30.0	32.83	84.01	116.84	58.42	284.87
39.00	30.0	34.83	101.14	135.98	67.99	338.26
41.00	30.0	52.74	170.94	223.68	111.84	565.57

BB-10_Driven_BOC=-7.1ft_Void=-22.1ft_Preform=-37.1ft.out

NBR of 360 tons at
approx. elevation -71'



43.00	30.0	61.59	175.99	237.58	118.79	589.56
45.00	30.0	74.12	241.62	315.74	157.87	798.98
47.00	30.0	92.00	243.41	335.41	167.70	822.23
49.00	30.0	114.08	285.09	399.17	199.58	969.35
51.00	30.0	137.20	344.16	481.35	240.68	1169.67
53.00	30.0	153.21	351.42	504.63	252.32	1207.46
55.00	30.0	175.95	557.05	733.00	366.50	1847.11
57.00	30.0	195.95	446.71	642.66	321.33	1536.07
59.00	30.0	215.95	332.27	548.22	274.11	1212.76
61.00	30.0	235.95	269.82	505.77	252.89	1045.42
63.00	30.0	251.70	301.82	553.52	276.76	1157.17
65.00	30.0	254.67	422.99	677.66	338.83	1523.63
67.00	30.0	263.08	427.78	690.86	345.43	1546.43
69.00	30.0	269.09	442.06	711.15	355.57	1595.26
71.00	30.0	284.99	671.96	956.95	478.47	2300.86
73.00	30.0	304.99	596.28	901.28	450.64	2093.84
75.00	30.0	324.99	564.23	889.23	444.61	2017.69
77.00	30.0	344.99	564.23	909.23	454.61	2037.69
79.00	30.0	364.99	564.23	929.23	464.61	2057.69
81.00	30.0	379.58	609.34	988.92	494.46	2207.60
83.00	30.0	390.62	685.01	1075.63	537.81	2445.65
85.00	30.0	407.23	717.06	1124.29	562.15	2558.42
87.00	30.0	427.23	717.06	1144.29	572.15	2578.42
89.00	30.0	447.23	717.06	1164.29	582.15	2598.42
91.00	30.0	467.23	717.06	1184.29	592.15	2618.42
93.00	30.0	487.23	716.26	1203.49	601.75	2636.02
95.00	30.0	507.23	697.03	1204.26	602.13	2598.32
97.00	30.0	527.23	677.80	1205.03	602.52	2560.63
99.00	30.0	547.23	677.00	1224.23	612.12	2578.23
101.00	30.0	567.23	677.00	1244.23	622.12	2598.23
103.00	30.0	587.15	677.80	1264.95	632.47	2620.55
105.00	30.0	605.12	697.03	1302.15	651.07	2696.21
107.00	30.0	623.09	716.26	1339.35	669.67	2771.87
109.00	30.0	643.00	717.06	1360.06	680.03	2794.19
111.00	30.0	663.00	713.42	1376.42	688.21	2803.26
113.00	30.0	683.00	686.09	1369.10	684.55	2741.28
115.00	30.0	703.00	671.52	1374.52	687.26	2717.56

NBR of 480 tons at
approx. elevation -58'



EXCEPTION: FOR H-PILES TIPPED IN SAND OR LIMESTONE, THE
ULTIMATE PILE CAPACITY IS ULTIMATE SIDE FRICTION PLUS
2 x THE MOBILIZED END BEARING.

NOTES

1. MOBILIZED END BEARING IS 1/3 OF THE ORIGINAL RB-121 VALUES.
2. DAVISSON PILE CAPACITY IS AN ESTIMATE BASED ON FAILURE CRITERIA,
AND EQUALS ULTIMATE SIDE FRICTION PLUS MOBILIZED END BEARING.
3. ALLOWABLE PILE CAPACITY IS 1/2 THE DAVISSON PILE CAPACITY.
4. ULTIMATE PILE CAPACITY IS ULTIMATE SIDE FRICTION PLUS
3 x THE MOBILIZED END BEARING.

BB-10_Driven_BOC=-7.1ft_Void=-22.1ft_Preform=-37.1ft.out

BB-10_Driven_BOC=-7.1ft_Void=-22.1ft_Preform=-37.1ft.out

Florida Bridge Software Institute
Shaft and Pile Analysis (FB-Deep v.3.1.0)

Date: January 19, 2024
Time: 13:51:57

General Information:

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Input file: piers\BB-11_Driven_BOC=-10.3ft_Void=-25.3ft_Preform=-35.3ft.in
Project number: B-22-074
Job name: Broad Causeway Bridge
Engineer: PV/TC
Units: English

Analysis Information:

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Analysis Type: SPT

Soil Information:

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Boring date: 12/26/23, Boring Number: BB-11
Station number: 138+55 Offset: 34 LT

Ground Elevation: -10.300(ft)

Hammer type: Automatic Hammer, Correction factor = 1.24

ID	Depth (ft)	No. of Blows (Blows/ft)	Soil Type

1	0.00	6.50	5- Cavity layer
2	2.00	6.50	5- Cavity layer
3	2.00	0.00	5- Cavity layer
4	2.00	14.00	5- Cavity layer
5	4.00	14.00	5- Cavity layer
6	6.00	11.00	5- Cavity layer
7	8.00	9.00	5- Cavity layer
8	8.00	0.00	5- Cavity layer
9	8.00	5.00	5- Cavity layer
10	10.00	5.00	5- Cavity layer
11	12.00	7.50	5- Cavity layer
12	14.00	7.00	5- Cavity layer
13	15.00	5.00	5- Cavity layer
14	15.00	5.00	4- Lime Stone/Very shelly sand
15	16.00	5.00	4- Lime Stone/Very shelly sand
16	20.00	5.50	4- Lime Stone/Very shelly sand
17	20.00	0.00	1- Plastic Clay
18	20.00	3.00	3- Clean sand

BB-11_Driven_BOC=-10.3ft_Void=-25.3ft_Preform=-35.3ft.out

Preforming to elevation
-35.3' or a depth of 25'
below mudline

19	22.50	3.00	3- Clean sand
20	25.00	2.50	3- Clean sand
21	25.00	0.00	1- Plastic Clay
22	25.00	7.00	3- Clean sand
23	27.50	7.00	3- Clean sand
24	30.00	8.00	3- Clean sand
25	32.50	4.00	3- Clean sand
26	35.00	4.00	3- Clean sand
27	35.00	0.00	1- Plastic Clay
28	35.00	46.00	3- Clean sand
29	37.50	46.00	3- Clean sand
30	37.50	0.00	1- Plastic Clay
31	37.50	25.00	3- Clean sand
32	40.00	25.00	3- Clean sand
33	42.50	18.00	3- Clean sand
34	45.00	11.00	3- Clean sand
35	45.00	0.00	1- Plastic Clay
36	45.00	72.00	4- Lime Stone/Very shelly sand
37	47.50	72.00	4- Lime Stone/Very shelly sand
38	50.00	100.00	4- Lime Stone/Very shelly sand
39	52.50	100.00	4- Lime Stone/Very shelly sand
40	55.00	100.00	4- Lime Stone/Very shelly sand
41	57.50	100.00	4- Lime Stone/Very shelly sand
42	60.00	100.00	4- Lime Stone/Very shelly sand
43	62.50	100.00	4- Lime Stone/Very shelly sand
44	62.50	0.00	1- Plastic Clay
45	62.50	19.00	3- Clean sand
46	65.00	19.00	3- Clean sand
47	65.00	0.00	1- Plastic Clay
48	65.00	60.00	3- Clean sand
49	67.50	60.00	3- Clean sand
50	70.00	51.00	3- Clean sand
51	70.00	0.00	1- Plastic Clay
52	70.00	13.00	4- Lime Stone/Very shelly sand
53	72.50	13.00	4- Lime Stone/Very shelly sand
54	72.50	0.00	1- Plastic Clay
55	72.50	100.00	4- Lime Stone/Very shelly sand
56	75.00	100.00	4- Lime Stone/Very shelly sand
57	75.00	0.00	1- Plastic Clay
58	75.00	86.00	3- Clean sand
59	77.50	86.00	3- Clean sand
60	77.50	0.00	1- Plastic Clay
61	77.50	100.00	4- Lime Stone/Very shelly sand
62	80.00	100.00	4- Lime Stone/Very shelly sand
63	82.50	100.00	4- Lime Stone/Very shelly sand
64	85.00	100.00	4- Lime Stone/Very shelly sand
65	87.50	100.00	4- Lime Stone/Very shelly sand
66	90.00	68.00	4- Lime Stone/Very shelly sand
67	90.00	0.00	1- Plastic Clay

BB-11_Driven_BOC=-10.3ft_Void=-25.3ft_Preform=-35.3ft.out

68	90.00	25.00	4- Lime Stone/Very shelly sand
69	92.50	25.00	4- Lime Stone/Very shelly sand
70	95.00	14.00	4- Lime Stone/Very shelly sand
71	95.00	0.00	1- Plastic Clay
72	95.00	100.00	4- Lime Stone/Very shelly sand
73	97.50	100.00	4- Lime Stone/Very shelly sand
74	100.00	100.00	4- Lime Stone/Very shelly sand
75	102.50	100.00	4- Lime Stone/Very shelly sand
76	105.00	100.00	4- Lime Stone/Very shelly sand
77	107.50	100.00	4- Lime Stone/Very shelly sand
78	107.50	0.00	1- Plastic Clay
79	107.50	10.00	4- Lime Stone/Very shelly sand
80	110.00	10.00	4- Lime Stone/Very shelly sand
81	112.50	27.00	4- Lime Stone/Very shelly sand
82	115.00	12.00	4- Lime Stone/Very shelly sand
83	115.00	0.00	1- Plastic Clay
84	115.00	5.00	4- Lime Stone/Very shelly sand
85	117.50	5.00	4- Lime Stone/Very shelly sand
86	117.50	0.00	1- Plastic Clay
87	117.50	100.00	4- Lime Stone/Very shelly sand
88	120.00	100.00	4- Lime Stone/Very shelly sand
89	122.50	0.00	1- Plastic Clay
90	122.50	13.00	4- Lime Stone/Very shelly sand
91	122.50	13.00	4- Lime Stone/Very shelly sand
92	125.00	12.00	4- Lime Stone/Very shelly sand

Blowcount Average Per Soil Layer

Layer Num.	Starting Elevation (ft)	Bottom Elevation (ft)	Thickness (ft)	Average Blowcount (Blows/ft)	Soil Type
1	-10.30	-25.30	15.00	8.87	5-Void
2	-25.30	-30.30	5.00	5.00	4-Limestone, Very
Shelly Sand					
3	-30.30	-30.30	0.00	3.00	1-Plastic Clay
4	-30.30	-35.30	5.00	3.00	3-Clean Sand
5	-35.30	-35.30	0.00	7.00	1-Plastic Clay
6	-35.30	-45.30	10.00	6.50	3-Clean Sand
7	-45.30	-45.30	0.00	46.00	1-Plastic Clay
8	-45.30	-47.80	2.50	46.00	3-Clean Sand
9	-47.80	-47.80	0.00	25.00	1-Plastic Clay
10	-47.80	-55.30	7.50	22.67	3-Clean Sand
11	-55.30	-55.30	0.00	72.00	1-Plastic Clay
12	-55.30	-72.80	17.50	92.00	4-Limestone, Very

BB-11_Driven_BOC=-10.3ft_Void=-25.3ft_Preform=-35.3ft.out

Shelly Sand					
13	-72.80	-72.80	0.00	19.00	1-Plastic Clay
14	-72.80	-75.30	2.50	19.00	3-Clean Sand
15	-75.30	-75.30	0.00	60.00	1-Plastic Clay
16	-75.30	-80.30	5.00	60.00	3-Clean Sand
17	-80.30	-80.30	0.00	13.00	1-Plastic Clay
18	-80.30	-82.80	2.50	13.00	4-Limestone, Very
Shelly Sand					
19	-82.80	-82.80	0.00	100.00	1-Plastic Clay
20	-82.80	-85.30	2.50	100.00	4-Limestone, Very
Shelly Sand					
21	-85.30	-85.30	0.00	86.00	1-Plastic Clay
22	-85.30	-87.80	2.50	86.00	3-Clean Sand
23	-87.80	-87.80	0.00	100.00	1-Plastic Clay
24	-87.80	-100.30	12.50	100.00	4-Limestone, Very
Shelly Sand					
25	-100.30	-100.30	0.00	25.00	1-Plastic Clay
26	-100.30	-105.30	5.00	25.00	4-Limestone, Very
Shelly Sand					
27	-105.30	-105.30	0.00	100.00	1-Plastic Clay
28	-105.30	-117.80	12.50	100.00	4-Limestone, Very
Shelly Sand					
29	-117.80	-117.80	0.00	10.00	1-Plastic Clay
30	-117.80	-125.30	7.50	15.67	4-Limestone, Very
Shelly Sand					
31	-125.30	-125.30	0.00	5.00	1-Plastic Clay
32	-125.30	-127.80	2.50	5.00	4-Limestone, Very
Shelly Sand					
33	-127.80	-127.80	0.00	100.00	1-Plastic Clay
34	-127.80	-132.80	5.00	100.00	4-Limestone, Very
Shelly Sand					
35	-132.80	-132.80	0.00	13.00	1-Plastic Clay
36	-132.80	-135.30	2.50	13.00	4-Limestone, Very
Shelly Sand					

Driven Pile Data:

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Pile unit weight = 150.00(pcf), Section Type: Square

Pile Geometry:

Width (in)	Length (ft)	Tip Elev. (ft)
24.00	5.00	-15.30
24.00	7.00	-17.30
24.00	9.00	-19.30
24.00	11.00	-21.30

BB-11_Driven_BOC=-10.3ft_Void=-25.3ft_Preform=-35.3ft.out

24.00	13.00	-23.30
24.00	15.00	-25.30
24.00	17.00	-27.30
24.00	19.00	-29.30
24.00	21.00	-31.30
24.00	23.00	-33.30
24.00	25.00	-35.30
24.00	27.00	-37.30
24.00	29.00	-39.30
24.00	31.00	-41.30
24.00	33.00	-43.30
24.00	35.00	-45.30
24.00	37.00	-47.30
24.00	39.00	-49.30
24.00	41.00	-51.30
24.00	43.00	-53.30
24.00	45.00	-55.30
24.00	47.00	-57.30
24.00	49.00	-59.30
24.00	51.00	-61.30
24.00	53.00	-63.30
24.00	55.00	-65.30
24.00	57.00	-67.30
24.00	59.00	-69.30
24.00	61.00	-71.30
24.00	63.00	-73.30
24.00	65.00	-75.30
24.00	67.00	-77.30
24.00	69.00	-79.30
24.00	71.00	-81.30
24.00	73.00	-83.30
24.00	75.00	-85.30
24.00	77.00	-87.30
24.00	79.00	-89.30
24.00	81.00	-91.30
24.00	83.00	-93.30
24.00	85.00	-95.30
24.00	87.00	-97.30
24.00	89.00	-99.30
24.00	91.00	-101.30
24.00	93.00	-103.30
24.00	95.00	-105.30
24.00	97.00	-107.30
24.00	99.00	-109.30
24.00	101.00	-111.30
24.00	103.00	-113.30
24.00	105.00	-115.30
24.00	107.00	-117.30
24.00	109.00	-119.30

BB-11_Driven_BOC=-10.3ft_Void=-25.3ft_Preform=-35.3ft.out

24.00	111.00	-121.30
24.00	113.00	-123.30
24.00	115.00	-125.30
24.00	117.00	-127.30
30.00	5.00	-15.30
30.00	7.00	-17.30
30.00	9.00	-19.30
30.00	11.00	-21.30
30.00	13.00	-23.30
30.00	15.00	-25.30
30.00	17.00	-27.30
30.00	19.00	-29.30
30.00	21.00	-31.30
30.00	23.00	-33.30
30.00	25.00	-35.30
30.00	27.00	-37.30
30.00	29.00	-39.30
30.00	31.00	-41.30
30.00	33.00	-43.30
30.00	35.00	-45.30
30.00	37.00	-47.30
30.00	39.00	-49.30
30.00	41.00	-51.30
30.00	43.00	-53.30
30.00	45.00	-55.30
30.00	47.00	-57.30
30.00	49.00	-59.30
30.00	51.00	-61.30
30.00	53.00	-63.30
30.00	55.00	-65.30
30.00	57.00	-67.30
30.00	59.00	-69.30
30.00	61.00	-71.30
30.00	63.00	-73.30
30.00	65.00	-75.30
30.00	67.00	-77.30
30.00	69.00	-79.30
30.00	71.00	-81.30
30.00	73.00	-83.30
30.00	75.00	-85.30
30.00	77.00	-87.30
30.00	79.00	-89.30
30.00	81.00	-91.30
30.00	83.00	-93.30
30.00	85.00	-95.30
30.00	87.00	-97.30
30.00	89.00	-99.30
30.00	91.00	-101.30
30.00	93.00	-103.30

BB-11_Driven_BOC=-10.3ft_Void=-25.3ft_Preform=-35.3ft.out

30.00	95.00	-105.30
30.00	97.00	-107.30
30.00	99.00	-109.30
30.00	101.00	-111.30
30.00	103.00	-113.30
30.00	105.00	-115.30
30.00	107.00	-117.30
30.00	109.00	-119.30
30.00	111.00	-121.30
30.00	113.00	-123.30
30.00	115.00	-125.30

Driven Pile Capacity:
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Section Type: Square
Pile Width: 24.00 (in)

Test Pile Length (ft)	Pile Width (in)	Ultimate Side Friction (tons)	Mobilized End Bearing (tons)	Estimated Davisson Capacity (tons)	Allowable Pile Capacity (tons)	Ultimate Pile Capacity (tons)
5.00	24.0	0.00	0.00	0.00	0.00	0.00
7.00	24.0	0.00	0.00	0.00	0.00	0.00
9.00	24.0	0.00	0.00	0.00	0.00	0.00
11.00	24.0	0.00	0.00	0.00	0.00	0.00
13.00	24.0	0.00	0.00	0.00	0.00	0.00
15.00	24.0	0.00	18.90	18.90	9.45	56.71
17.00	24.0	1.00	17.46	18.46	9.23	53.38
19.00	24.0	2.04	21.48	23.52	11.76	66.48
21.00	24.0	3.08	14.13	17.21	8.61	45.48
23.00	24.0	3.80	15.59	19.39	9.70	50.57
25.00	24.0	5.29	24.16	29.44	14.72	77.75
27.00	24.0	7.92	24.18	32.09	16.05	80.44
29.00	24.0	8.87	29.47	38.34	19.17	97.29
31.00	24.0	9.53	45.93	55.46	27.73	147.33
33.00	24.0	10.58	63.57	74.14	37.07	201.27
35.00	24.0	16.83	97.04	113.87	56.94	307.95
37.00	24.0	34.17	88.85	123.03	61.51	300.74
39.00	24.0	44.22	87.99	132.21	66.10	308.18
41.00	24.0	48.35	99.15	147.50	73.75	345.79
43.00	24.0	50.53	122.20	172.73	86.36	417.12

BB-11_Driven_BOC=-10.3ft_Void=-25.3ft_Preform=-35.3ft.out

NBR of 360 tons at
approx. elevation -55'



45.00	24.0	67.25	427.80	495.05	247.52	1350.64
47.00	24.0	81.54	444.40	525.93	262.97	1414.72
49.00	24.0	96.21	457.26	553.47	276.73	1467.99
51.00	24.0	112.04	458.92	570.96	285.48	1488.80
53.00	24.0	128.04	458.92	586.96	293.48	1504.80
55.00	24.0	144.04	436.52	580.56	290.28	1453.60
57.00	24.0	160.04	346.92	506.96	253.48	1200.80
59.00	24.0	176.04	296.19	472.23	236.11	1064.61
61.00	24.0	192.04	245.46	437.50	218.75	928.42
63.00	24.0	205.82	325.06	530.88	265.44	1180.99
65.00	24.0	212.99	300.14	513.12	256.56	1113.40
67.00	24.0	231.10	300.32	531.42	265.71	1132.07
69.00	24.0	249.02	300.81	549.83	274.92	1151.46
71.00	24.0	259.88	319.52	579.39	289.70	1218.43
73.00	24.0	265.81	395.51	661.32	330.66	1452.33
75.00	24.0	281.81	331.32	613.13	306.56	1275.76
77.00	24.0	299.23	332.67	631.91	315.95	1297.25
79.00	24.0	316.61	458.92	775.53	387.77	1693.37
81.00	24.0	332.61	453.55	786.16	393.08	1693.26
83.00	24.0	348.61	400.24	748.85	374.43	1549.34
85.00	24.0	364.61	312.40	677.01	338.50	1301.80
87.00	24.0	380.61	217.25	597.86	298.93	1032.36
89.00	24.0	396.05	222.62	618.67	309.33	1063.91
91.00	24.0	405.52	275.93	681.45	340.73	1233.31
93.00	24.0	410.43	363.77	774.20	387.10	1501.75
95.00	24.0	414.08	458.92	873.00	436.50	1790.84
97.00	24.0	430.08	458.92	889.00	444.50	1806.84
99.00	24.0	446.08	458.92	905.00	452.50	1822.84
101.00	24.0	462.08	380.51	842.59	421.29	1603.61
103.00	24.0	478.08	277.91	755.99	377.99	1311.80
105.00	24.0	494.08	188.01	682.09	341.05	1058.12
107.00	24.0	510.08	92.54	602.62	301.31	787.69
109.00	24.0	515.57	61.20	576.77	288.38	699.17
111.00	24.0	517.89	136.37	654.26	327.13	926.99
113.00	24.0	522.41	214.79	737.20	368.60	1166.78
115.00	24.0	525.98	224.67	750.66	375.33	1200.00
117.00	24.0	526.98	232.45	759.42	379.71	1224.32

Section Type: Square
Pile Width: 30.00 (in)

Test Pile Length (ft)	Pile Width (in)	Ultimate Side Friction (tons)	Mobilized End Bearing (tons)	Estimated Davisson Capacity (tons)	Allowable Pile Capacity (tons)	Ultimate Pile Capacity (tons)

BB-11_Driven_BOC=-10.3ft_Void=-25.3ft_Preform=-35.3ft.out

5.00	30.0	0.00	0.00	0.00	0.00	0.00
7.00	30.0	0.00	0.00	0.00	0.00	0.00
9.00	30.0	0.00	0.00	0.00	0.00	0.00
11.00	30.0	0.00	0.00	0.00	0.00	0.00
13.00	30.0	0.00	0.00	0.00	0.00	0.00
15.00	30.0	0.00	28.09	28.09	14.05	84.28
17.00	30.0	1.25	33.40	34.65	17.32	101.44
19.00	30.0	2.55	38.80	41.35	20.67	118.94
21.00	30.0	3.86	23.58	27.44	13.72	74.60
23.00	30.0	4.87	24.92	29.79	14.89	79.63
25.00	30.0	6.61	33.60	40.21	20.10	107.40
27.00	30.0	8.96	35.59	44.55	22.27	115.72
29.00	30.0	9.78	47.48	57.27	28.63	152.23
31.00	30.0	11.27	62.28	73.55	36.78	198.11
33.00	30.0	12.44	81.97	94.41	47.21	258.35
35.00	30.0	21.04	138.52	159.56	79.78	436.59
37.00	30.0	41.60	139.04	180.63	90.32	458.71
39.00	30.0	55.19	160.09	215.28	107.64	535.46
41.00	30.0	61.02	173.36	234.38	117.19	581.10
43.00	30.0	64.02	199.72	263.74	131.87	663.17
45.00	30.0	84.06	678.16	762.22	381.11	2118.54
47.00	30.0	101.92	698.91	800.83	400.41	2198.64
49.00	30.0	120.26	714.99	835.25	417.62	2265.22
51.00	30.0	140.04	717.06	857.11	428.55	2291.23
53.00	30.0	160.04	689.06	849.11	424.55	2227.23
55.00	30.0	180.04	577.06	757.11	378.55	1911.23
57.00	30.0	200.04	513.65	713.70	356.85	1741.00
59.00	30.0	220.04	450.24	670.28	335.14	1570.76
61.00	30.0	240.04	355.21	595.25	297.63	1305.66
63.00	30.0	257.28	452.27	709.56	354.78	1614.10
65.00	30.0	266.24	491.28	757.52	378.76	1740.08
67.00	30.0	288.51	492.08	780.59	390.30	1764.75
69.00	30.0	311.43	491.91	803.34	401.67	1787.15
71.00	30.0	324.85	542.81	867.66	433.83	1953.27
73.00	30.0	332.27	637.80	970.06	485.03	2245.66
75.00	30.0	352.27	557.56	909.82	454.91	2024.94
77.00	30.0	374.29	558.92	933.20	466.60	2051.03
79.00	30.0	395.77	710.35	1106.12	553.06	2526.82
81.00	30.0	415.77	643.71	1059.48	529.74	2346.91
83.00	30.0	435.77	533.91	969.67	484.84	2037.49
85.00	30.0	455.77	414.97	870.74	435.37	1700.69
87.00	30.0	475.77	414.97	890.74	445.37	1720.69
89.00	30.0	495.06	421.69	916.75	458.37	1760.12
91.00	30.0	506.91	488.32	995.23	497.61	1971.87
93.00	30.0	513.04	598.13	1111.17	555.58	2307.42
95.00	30.0	517.60	717.06	1234.66	617.33	2668.79
97.00	30.0	537.60	717.06	1254.66	627.33	2688.79
99.00	30.0	557.60	619.05	1176.65	588.32	2414.74
101.00	30.0	577.60	490.80	1068.40	534.20	2049.99

BB-11_Driven_BOC=-10.3ft_Void=-25.3ft_Preform=-35.3ft.out

103.00	30.0	597.60	378.43	976.03	488.01	1732.88
105.00	30.0	617.60	259.08	876.68	438.34	1394.85
107.00	30.0	637.60	121.90	759.50	379.75	1003.30
109.00	30.0	644.46	185.62	830.08	415.04	1201.31
111.00	30.0	647.36	299.53	946.89	473.45	1545.95
113.00	30.0	653.02	304.91	957.92	478.96	1567.74
115.00	30.0	657.48	296.79	954.27	477.13	1547.85

NOTES

1. MOBILIZED END BEARING IS 1/3 OF THE ORIGINAL RB-121 VALUES.
2. DAVISSON PILE CAPACITY IS AN ESTIMATE BASED ON FAILURE CRITERIA, AND EQUALS ULTIMATE SIDE FRICTION PLUS MOBILIZED END BEARING.
3. ALLOWABLE PILE CAPACITY IS 1/2 THE DAVISSON PILE CAPACITY.
4. ULTIMATE PILE CAPACITY IS ULTIMATE SIDE FRICTION PLUS 3 x THE MOBILIZED END BEARING.
EXCEPTION: FOR H-PILES TIPPED IN SAND OR LIMESTONE, THE ULTIMATE PILE CAPACITY IS ULTIMATE SIDE FRICTION PLUS 2 x THE MOBILIZED END BEARING.

NBR of 480 tons at
approx. elevation -54'



BB-11_Driven_BOC=-10.3ft_Void=-25.3ft_Preform=-35.3ft.out

General Information:

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Input file: piers\BB-12_Driven_BOC=-15.5ft_Void=-25.5ft_Preform=-34.8ft.in
Project number: B-22-074
Job name: Broad Causeway Bridge
Engineer: PV/TC
Units: English

Analysis Information:

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Analysis Type: SPT

Soil Information:

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Boring date: 3/29/2023, Boring Number: BB-12
Station number: 140+71 Offset: +32

Ground Elevation: 2.700(ft)

Hammer type: Automatic Hammer, Correction factor = 1.24

ID	Depth (ft)	No. of Blows (Blows/ft)	Soil Type
1	0.00	13.00	5- Cavity layer
2	2.00	13.00	5- Cavity layer
3	4.00	4.00	5- Cavity layer
4	6.00	3.00	5- Cavity layer
5	8.00	1.00	5- Cavity layer
6	10.00	1.00	5- Cavity layer
7	12.00	1.00	5- Cavity layer
8	14.00	1.00	5- Cavity layer
9	16.00	1.00	5- Cavity layer
10	18.20	15.00	5- Cavity layer
11	18.20	7.50	5- Cavity layer
12	20.00	7.50	5- Cavity layer
13	22.50	9.00	5- Cavity layer
14	25.00	12.50	5- Cavity layer
15	27.50	10.50	5- Cavity layer
16	28.20	8.00	5- Cavity layer
17	28.20	8.00	3- Clean sand
18	30.00	8.00	3- Clean sand
19	32.50	10.50	3- Clean sand
20	32.50	0.00	1- Plastic Clay
21	32.50	6.00	3- Clean sand

"BB-12_Driven_BOC=-15.5ft_Void=-25.5ft_Preform=-34.8ft.out"

Bottom of canal at -15.5' or a
depth of 18.2'

Predrilling 10' below bottom of
canal, to elevation -25.5' or a
depth of 28.2'

22	35.00	6.00	3- Clean sand
23	37.50	4.00	3- Clean sand
24	37.50	0.00	1- Plastic Clay
25	37.50	8.00	3- Clean sand
26	40.00	8.00	3- Clean sand
27	42.50	10.00	3- Clean sand
28	45.00	15.00	3- Clean sand
29	47.50	15.00	3- Clean sand
30	47.50	0.00	1- Plastic Clay
31	47.50	22.00	3- Clean sand
32	50.00	22.00	3- Clean sand
33	52.50	17.00	3- Clean sand
34	52.50	0.00	1- Plastic Clay
35	52.50	44.00	3- Clean sand
36	55.00	44.00	3- Clean sand
37	55.00	0.00	1- Plastic Clay
38	55.00	22.00	3- Clean sand
39	57.50	22.00	3- Clean sand
40	60.00	28.00	3- Clean sand
41	62.50	17.00	3- Clean sand
42	65.00	14.00	3- Clean sand
43	65.00	0.00	1- Plastic Clay
44	65.00	38.00	4- Lime Stone/Very shelly sand
45	67.50	38.00	4- Lime Stone/Very shelly sand
46	67.50	0.00	1- Plastic Clay
47	67.50	100.00	4- Lime Stone/Very shelly sand
48	70.00	100.00	4- Lime Stone/Very shelly sand
49	70.00	0.00	1- Plastic Clay
50	70.00	28.00	4- Lime Stone/Very shelly sand
51	72.50	28.00	4- Lime Stone/Very shelly sand
52	75.00	43.00	4- Lime Stone/Very shelly sand
53	75.00	0.00	1- Plastic Clay
54	75.00	100.00	4- Lime Stone/Very shelly sand
55	77.50	100.00	4- Lime Stone/Very shelly sand
56	77.50	0.00	1- Plastic Clay
57	77.50	7.00	4- Lime Stone/Very shelly sand
58	80.00	7.00	4- Lime Stone/Very shelly sand
59	80.00	0.00	1- Plastic Clay
60	80.00	14.00	3- Clean sand
61	82.50	14.00	3- Clean sand
62	82.50	0.00	1- Plastic Clay
63	82.50	31.00	3- Clean sand
64	85.00	31.00	3- Clean sand
65	85.00	0.00	1- Plastic Clay
66	85.00	28.00	4- Lime Stone/Very shelly sand
67	87.50	28.00	4- Lime Stone/Very shelly sand
68	90.00	45.00	4- Lime Stone/Very shelly sand
69	90.00	0.00	1- Plastic Clay
70	90.00	76.00	4- Lime Stone/Very shelly sand
71	92.50	76.00	4- Lime Stone/Very shelly sand
72	92.50	0.00	1- Plastic Clay
73	92.50	30.00	4- Lime Stone/Very shelly sand

"BB-12_Driven_BOC=-15.5ft_Void=-25.5ft_Preform=-34.8ft.out"

Preforming to elevation
-34.8' or a depth of 37.5'

74	95.00	30.00	4- Lime Stone/Very shelly sand
75	95.00	0.00	1- Plastic Clay
76	95.00	4.00	4- Lime Stone/Very shelly sand
77	97.50	4.00	4- Lime Stone/Very shelly sand
78	97.50	0.00	1- Plastic Clay
79	97.50	19.00	4- Lime Stone/Very shelly sand
80	100.00	19.00	4- Lime Stone/Very shelly sand
81	100.00	0.00	1- Plastic Clay
82	100.00	41.00	4- Lime Stone/Very shelly sand
83	102.50	41.00	4- Lime Stone/Very shelly sand
84	102.50	0.00	1- Plastic Clay
85	102.50	100.00	4- Lime Stone/Very shelly sand
86	105.00	100.00	4- Lime Stone/Very shelly sand
87	107.50	100.00	4- Lime Stone/Very shelly sand
88	110.00	100.00	4- Lime Stone/Very shelly sand
89	112.50	86.00	4- Lime Stone/Very shelly sand
90	115.00	100.00	4- Lime Stone/Very shelly sand
91	117.50	100.00	4- Lime Stone/Very shelly sand
92	120.00	77.00	4- Lime Stone/Very shelly sand
93	120.00	0.00	1- Plastic Clay
94	120.00	28.00	4- Lime Stone/Very shelly sand
95	122.50	28.00	4- Lime Stone/Very shelly sand
96	122.50	0.00	1- Plastic Clay
97	122.50	57.00	4- Lime Stone/Very shelly sand
98	125.00	57.00	4- Lime Stone/Very shelly sand

Blowcount Average Per Soil Layer

Layer Num.	Starting Elevation (ft)	Bottom Elevation (ft)	Thickness (ft)	Average Blowcount (Blows/ft)	Soil Type
1	2.70	-25.50	28.20	6.01	5-Void
2	-25.50	-29.80	4.30	8.00	3-Clean Sand
3	-29.80	-29.80	0.00	6.00	1-Plastic Clay
4	-29.80	-34.80	5.00	6.00	3-Clean Sand
5	-34.80	-34.80	0.00	8.00	1-Plastic Clay
6	-34.80	-44.80	10.00	10.25	3-Clean Sand
7	-44.80	-44.80	0.00	22.00	1-Plastic Clay
8	-44.80	-49.80	5.00	22.00	3-Clean Sand
9	-49.80	-49.80	0.00	44.00	1-Plastic Clay
10	-49.80	-52.30	2.50	44.00	3-Clean Sand
11	-52.30	-52.30	0.00	22.00	1-Plastic Clay
12	-52.30	-62.30	10.00	22.25	3-Clean Sand
13	-62.30	-62.30	0.00	38.00	1-Plastic Clay
14	-62.30	-64.80	2.50	38.00	4-Limestone, Very
Shelly Sand					
15	-64.80	-64.80	0.00	100.00	1-Plastic Clay

"BB-12_Driven_BOC=-15.5ft_Void=-25.5ft_Preform=-34.8ft.out"

16	-64.80	-67.30	2.50	100.00	4-Limestone, Very
Shelly Sand					
17	-67.30	-67.30	0.00	28.00	1-Plastic Clay
18	-67.30	-72.30	5.00	28.00	4-Limestone, Very
Shelly Sand					
19	-72.30	-72.30	0.00	100.00	1-Plastic Clay
20	-72.30	-74.80	2.50	100.00	4-Limestone, Very
Shelly Sand					
21	-74.80	-74.80	0.00	7.00	1-Plastic Clay
22	-74.80	-77.30	2.50	7.00	4-Limestone, Very
Shelly Sand					
23	-77.30	-77.30	0.00	14.00	1-Plastic Clay
24	-77.30	-79.80	2.50	14.00	3-Clean Sand
25	-79.80	-79.80	0.00	31.00	1-Plastic Clay
26	-79.80	-82.30	2.50	31.00	3-Clean Sand
27	-82.30	-82.30	0.00	28.00	1-Plastic Clay
28	-82.30	-87.30	5.00	28.00	4-Limestone, Very
Shelly Sand					
29	-87.30	-87.30	0.00	76.00	1-Plastic Clay
30	-87.30	-89.80	2.50	76.00	4-Limestone, Very
Shelly Sand					
31	-89.80	-89.80	0.00	30.00	1-Plastic Clay
32	-89.80	-92.30	2.50	30.00	4-Limestone, Very
Shelly Sand					
33	-92.30	-92.30	0.00	4.00	1-Plastic Clay
34	-92.30	-94.80	2.50	4.00	4-Limestone, Very
Shelly Sand					
35	-94.80	-94.80	0.00	19.00	1-Plastic Clay
36	-94.80	-97.30	2.50	19.00	4-Limestone, Very
Shelly Sand					
37	-97.30	-97.30	0.00	41.00	1-Plastic Clay
38	-97.30	-99.80	2.50	41.00	4-Limestone, Very
Shelly Sand					
39	-99.80	-99.80	0.00	100.00	1-Plastic Clay
40	-99.80	-117.30	17.50	98.00	4-Limestone, Very
Shelly Sand					
41	-117.30	-117.30	0.00	28.00	1-Plastic Clay
42	-117.30	-119.80	2.50	28.00	4-Limestone, Very
Shelly Sand					
43	-119.80	-119.80	0.00	57.00	1-Plastic Clay
44	-119.80	-122.30	2.50	57.00	4-Limestone, Very
Shelly Sand					

Driven Pile Data:

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Pile unit weight = 150.00(pcf), Section Type: Square

Pile Geometry:

Width (in)	Length (ft)	Tip Elev. (ft)

"BB-12_Driven_BOC=-15.5ft_Void=-25.5ft_Preform=-34.8ft.out"

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-----
24.00      5.00      -2.30
24.00      7.00      -4.30
24.00      9.00      -6.30
24.00     11.00      -8.30
24.00     13.00     -10.30
24.00     15.00     -12.30
24.00     17.00     -14.30
24.00     19.00     -16.30
24.00     21.00     -18.30
24.00     23.00     -20.30
24.00     25.00     -22.30
24.00     27.00     -24.30
24.00     29.00     -26.30
24.00     31.00     -28.30
24.00     33.00     -30.30
24.00     35.00     -32.30
24.00     37.00     -34.30
24.00     39.00     -36.30
24.00     41.00     -38.30
24.00     43.00     -40.30
24.00     45.00     -42.30
24.00     47.00     -44.30
24.00     49.00     -46.30
24.00     51.00     -48.30
24.00     53.00     -50.30
24.00     55.00     -52.30
24.00     57.00     -54.30
24.00     59.00     -56.30
24.00     61.00     -58.30
24.00     63.00     -60.30
24.00     65.00     -62.30
24.00     67.00     -64.30
24.00     69.00     -66.30
24.00     71.00     -68.30
24.00     73.00     -70.30
24.00     75.00     -72.30
24.00     77.00     -74.30
24.00     79.00     -76.30
24.00     81.00     -78.30
24.00     83.00     -80.30
24.00     85.00     -82.30
24.00     87.00     -84.30
24.00     89.00     -86.30
24.00     91.00     -88.30
24.00     93.00     -90.30
24.00     95.00     -92.30
24.00     97.00     -94.30
24.00     99.00     -96.30
24.00    101.00     -98.30
24.00    103.00    -100.30
24.00    105.00    -102.30

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"BB-12_Driven_BOC=-15.5ft_Void=-25.5ft_Preform=-34.8ft.out"

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24.00    107.00    -104.30
24.00    109.00    -106.30
24.00    111.00    -108.30
24.00    113.00    -110.30
24.00    115.00    -112.30
24.00    117.00    -114.30
30.00      5.00      -2.30
30.00      7.00      -4.30
30.00      9.00      -6.30
30.00     11.00      -8.30
30.00     13.00     -10.30
30.00     15.00     -12.30
30.00     17.00     -14.30
30.00     19.00     -16.30
30.00     21.00     -18.30
30.00     23.00     -20.30
30.00     25.00     -22.30
30.00     27.00     -24.30
30.00     29.00     -26.30
30.00     31.00     -28.30
30.00     33.00     -30.30
30.00     35.00     -32.30
30.00     37.00     -34.30
30.00     39.00     -36.30
30.00     41.00     -38.30
30.00     43.00     -40.30
30.00     45.00     -42.30
30.00     47.00     -44.30
30.00     49.00     -46.30
30.00     51.00     -48.30
30.00     53.00     -50.30
30.00     55.00     -52.30
30.00     57.00     -54.30
30.00     59.00     -56.30
30.00     61.00     -58.30
30.00     63.00     -60.30
30.00     65.00     -62.30
30.00     67.00     -64.30
30.00     69.00     -66.30
30.00     71.00     -68.30
30.00     73.00     -70.30
30.00     75.00     -72.30
30.00     77.00     -74.30
30.00     79.00     -76.30
30.00     81.00     -78.30
30.00     83.00     -80.30
30.00     85.00     -82.30
30.00     87.00     -84.30
30.00     89.00     -86.30
30.00     91.00     -88.30
30.00     93.00     -90.30
30.00     95.00     -92.30

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"BB-12_Driven_BOC=-15.5ft_Void=-25.5ft_Preform=-34.8ft.out"

30.00	97.00	-94.30
30.00	99.00	-96.30
30.00	101.00	-98.30
30.00	103.00	-100.30
30.00	105.00	-102.30
30.00	107.00	-104.30
30.00	109.00	-106.30
30.00	111.00	-108.30
30.00	113.00	-110.30
30.00	115.00	-112.30

Driven Pile Capacity:
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Section Type: Square
Pile Width: 24.00 (in)

Test Pile Length (ft)	Pile Width (in)	Ultimate Side Friction (tons)	Mobilized End Bearing (tons)	Estimated Davisson Capacity (tons)	Allowable Pile Capacity (tons)	Ultimate Pile Capacity (tons)
5.00	24.0	0.00	0.00	0.00	0.00	0.00
7.00	24.0	0.00	0.00	0.00	0.00	0.00
9.00	24.0	0.00	0.00	0.00	0.00	0.00
11.00	24.0	0.00	0.00	0.00	0.00	0.00
13.00	24.0	0.00	0.00	0.00	0.00	0.00
15.00	24.0	0.00	0.00	0.00	0.00	0.00
17.00	24.0	0.00	0.00	0.00	0.00	0.00
19.00	24.0	0.00	0.00	0.00	0.00	0.00
21.00	24.0	0.00	0.00	0.00	0.00	0.00
23.00	24.0	0.00	0.00	0.00	0.00	0.00
25.00	24.0	0.00	0.00	0.00	0.00	0.00
27.00	24.0	0.00	0.00	0.00	0.00	0.00
29.00	24.0	1.19	20.32	21.51	10.75	62.14
31.00	24.0	4.15	20.51	24.66	12.33	65.69
33.00	24.0	7.62	22.68	30.30	15.15	75.66
35.00	24.0	9.44	23.68	33.12	16.56	80.48
37.00	24.0	10.58	26.82	37.40	18.70	91.03
39.00	24.0	14.21	36.37	50.58	25.29	123.32
41.00	24.0	16.18	38.80	54.99	27.49	132.59
43.00	24.0	17.94	44.30	62.24	31.12	150.84
45.00	24.0	20.64	50.91	71.55	35.78	173.38
47.00	24.0	23.09	65.03	88.11	44.06	218.16
49.00	24.0	39.02	97.68	136.70	68.35	332.05
51.00	24.0	46.01	99.60	145.61	72.81	344.81

"BB-12_Driven_BOC=-15.5ft_Void=-25.5ft_Preform=-34.8ft.out"

53.00	24.0	56.92	117.07	173.99	87.00	408.14
55.00	24.0	73.51	113.99	187.50	93.75	415.48
57.00	24.0	81.77	114.04	195.82	97.91	423.90
59.00	24.0	89.92	115.19	205.11	102.56	435.50
61.00	24.0	96.45	122.37	218.83	109.41	463.58
63.00	24.0	97.03	148.44	245.47	122.73	542.34
65.00	24.0	113.56	245.14	358.70	179.35	848.98
67.00	24.0	121.10	244.11	365.21	182.61	853.43
69.00	24.0	134.99	261.81	396.80	198.40	920.43
71.00	24.0	145.77	222.96	368.73	184.37	814.66
73.00	24.0	151.40	204.35	355.75	177.87	764.46
75.00	24.0	158.74	185.61	344.34	172.17	715.55
77.00	24.0	174.74	111.88	286.61	143.31	510.37
79.00	24.0	179.78	108.81	288.58	144.29	506.20
81.00	24.0	183.06	172.85	355.90	177.95	701.59
83.00	24.0	189.97	181.87	371.84	185.92	735.57
85.00	24.0	201.68	231.94	433.61	216.81	897.49
87.00	24.0	207.23	234.45	441.68	220.84	910.58
89.00	24.0	213.55	202.38	415.93	207.97	820.70
91.00	24.0	225.21	141.05	366.26	183.13	648.35
93.00	24.0	238.01	87.55	325.55	162.78	500.65
95.00	24.0	243.96	118.87	362.83	181.42	600.58
97.00	24.0	244.75	229.63	474.39	237.19	933.66
99.00	24.0	247.78	328.28	576.06	288.03	1232.62
101.00	24.0	253.73	408.92	662.65	331.32	1480.49
103.00	24.0	263.83	458.92	722.75	361.38	1640.59
105.00	24.0	279.83	458.92	738.75	369.38	1656.59
107.00	24.0	295.83	458.92	754.75	377.38	1672.59
109.00	24.0	311.83	458.92	770.75	385.38	1688.59
111.00	24.0	327.83	457.31	785.14	392.57	1699.76
113.00	24.0	343.83	412.53	756.36	378.18	1581.42
115.00	24.0	359.83	339.01	698.84	349.42	1376.85
117.00	24.0	375.83	296.44	672.27	336.14	1265.16

NBR of 360 tons at elevation -92.3'



Section Type: Square
Pile Width: 30.00 (in)

Test Pile Length (ft)	Pile Width (in)	Ultimate Side Friction (tons)	Mobilized End Bearing (tons)	Estimated Davisson Capacity (tons)	Allowable Pile Capacity (tons)	Ultimate Pile Capacity (tons)
5.00	30.0	0.00	0.00	0.00	0.00	0.00
7.00	30.0	0.00	0.00	0.00	0.00	0.00
9.00	30.0	0.00	0.00	0.00	0.00	0.00
11.00	30.0	0.00	0.00	0.00	0.00	0.00
13.00	30.0	0.00	0.00	0.00	0.00	0.00
15.00	30.0	0.00	0.00	0.00	0.00	0.00
17.00	30.0	0.00	0.00	0.00	0.00	0.00

"BB-12_Driven_BOC=-15.5ft_Void=-25.5ft_Preform=-34.8ft.out"

19.00	30.0	0.00	0.00	0.00	0.00	0.00
21.00	30.0	0.00	0.00	0.00	0.00	0.00
23.00	30.0	0.00	0.00	0.00	0.00	0.00
25.00	30.0	0.00	0.00	0.00	0.00	0.00
27.00	30.0	0.00	0.00	0.00	0.00	0.00
29.00	30.0	1.49	29.64	31.13	15.56	90.41
31.00	30.0	4.88	30.28	35.15	17.58	95.70
33.00	30.0	9.52	35.26	44.78	22.39	115.30
35.00	30.0	11.76	36.59	48.35	24.17	121.53
37.00	30.0	13.05	40.89	53.94	26.97	135.73
39.00	30.0	17.80	57.68	75.49	37.74	190.86
41.00	30.0	20.15	60.97	81.12	40.56	203.07
43.00	30.0	22.57	66.64	89.21	44.61	222.49
45.00	30.0	25.03	78.55	103.58	51.79	260.68
47.00	30.0	27.97	95.16	123.12	61.56	313.44
49.00	30.0	49.04	150.76	199.80	99.90	501.32
51.00	30.0	58.00	152.62	210.62	105.31	515.86
53.00	30.0	71.16	171.08	242.24	121.12	584.40
55.00	30.0	91.89	161.42	253.31	126.66	576.15
57.00	30.0	101.87	162.01	263.88	131.94	587.90
59.00	30.0	110.29	166.58	276.87	138.44	610.03
61.00	30.0	114.91	186.38	301.29	150.65	674.05
63.00	30.0	120.59	200.11	320.70	160.35	720.93
65.00	30.0	141.95	360.03	501.99	250.99	1222.06
67.00	30.0	151.38	448.55	599.93	299.96	1497.03
69.00	30.0	168.73	369.72	538.45	269.23	1277.89
71.00	30.0	182.21	294.68	476.88	238.44	1066.24
73.00	30.0	189.24	285.62	474.86	237.43	1046.09
75.00	30.0	198.42	283.26	481.68	240.84	1048.20
77.00	30.0	218.42	178.46	396.88	198.44	753.79
79.00	30.0	224.72	181.05	405.77	202.89	767.88
81.00	30.0	228.79	254.61	483.41	241.70	992.63
83.00	30.0	237.34	302.18	539.52	269.76	1143.87
85.00	30.0	252.09	331.67	583.77	291.88	1247.11
87.00	30.0	259.04	298.02	557.06	278.53	1153.11
89.00	30.0	266.93	273.09	540.02	270.01	1086.19
91.00	30.0	281.51	218.92	500.44	250.22	938.28
93.00	30.0	297.51	190.34	487.85	243.93	868.54
95.00	30.0	304.95	292.01	596.96	298.48	1180.97
97.00	30.0	305.94	430.46	736.40	368.20	1597.31
99.00	30.0	309.72	553.76	863.49	431.74	1971.01
101.00	30.0	317.16	654.56	971.72	485.86	2280.84
103.00	30.0	329.79	717.06	1046.85	523.43	2480.98
105.00	30.0	349.79	717.06	1066.85	533.43	2500.98
107.00	30.0	369.79	717.06	1086.85	543.43	2520.98
109.00	30.0	389.79	715.05	1104.84	552.42	2534.94
111.00	30.0	409.79	659.07	1068.86	534.43	2387.01
113.00	30.0	429.79	567.17	996.96	498.48	2131.30
115.00	30.0	449.79	513.97	963.76	481.88	1991.69

NBR of 480 tons at
elevation -78.3'



1. MOBILIZED END BEARING IS 1/3 OF THE ORIGINAL RB-121 VALUES.
2. DAVISSON PILE CAPACITY IS AN ESTIMATE BASED ON FAILURE CRITERIA, AND EQUALS ULTIMATE SIDE FRICTION PLUS MOBILIZED END BEARING.
3. ALLOWABLE PILE CAPACITY IS 1/2 THE DAVISSON PILE CAPACITY.
4. ULTIMATE PILE CAPACITY IS ULTIMATE SIDE FRICTION PLUS 3 x THE MOBILIZED END BEARING.
EXCEPTION: FOR H-PILES TIPPED IN SAND OR LIMESTONE, THE ULTIMATE PILE CAPACITY IS ULTIMATE SIDE FRICTION PLUS 2 x THE MOBILIZED END BEARING.

NOTES

"BB-12_Driven_BOC=-15.5ft_Void=-25.5ft_Preform=-34.8ft.out"

"BB-12_Driven_BOC=-15.5ft_Void=-25.5ft_Preform=-34.8ft.out"

FB-Deep Analysis and Output –Drilled Shafts

General Information:

Input file: lations\FB-Deep\Drilled Shaft\BB-01_Drilled_48in_Void=-60ft.in
Project number: B-22-074
Job name: Broad Causeway Bridge
Engineer: PV/TC
Units: English

Analysis Information:

Analysis Type: Drilled Shaft Analysis

Soil Information:

Boring date: 3/22/2023
Boring number: BB-01
Station number: 111+65 Offset: -10

Ground Elevation: 4.90(ft)
Water table Elevation = 4.90(ft)

Rock side-friction is calculated using: McVay's method

ID	Depth (ft)	Elevation (ft)	SPT Blows (Blows/ft)	Unit Weight (pcf)	Soil Type
1	0.00	4.90	N/A	115.00	5- Cavity layer
2	2.00	2.90	N/A	115.00	5- Cavity layer
3	4.00	0.90	N/A	115.00	5- Cavity layer
4	6.00	-1.10	N/A	115.00	5- Cavity layer
5	8.00	-3.10	N/A	115.00	5- Cavity layer
6	10.00	-5.10	N/A	115.00	5- Cavity layer
7	12.00	-7.10	N/A	115.00	5- Cavity layer
8	14.00	-9.10	N/A	115.00	5- Cavity layer
9	16.00	-11.10	N/A	125.00	5- Cavity layer
10	20.00	-15.10	N/A	125.00	5- Cavity layer
11	22.50	-17.60	N/A	115.00	5- Cavity layer
12	25.00	-20.10	N/A	115.00	5- Cavity layer
13	27.50	-22.60	N/A	115.00	5- Cavity layer
14	30.00	-25.10	N/A	125.00	5- Cavity layer
15	32.50	-27.60	N/A	135.00	5- Cavity layer
16	35.00	-30.10	N/A	135.00	5- Cavity layer
17	37.50	-32.60	N/A	102.00	5- Cavity layer
18	40.00	-35.10	N/A	133.00	5- Cavity layer

"BB-01_Drilled_48in_Void=-60ft.out"

19	42.50	-37.60	N/A	127.00	5- Cavity layer
20	45.00	-40.10	N/A	133.00	5- Cavity layer
21	47.50	-42.60	N/A	133.00	5- Cavity layer
22	50.00	-45.10	N/A	132.00	5- Cavity layer
23	52.50	-47.60	N/A	135.00	5- Cavity layer
24	55.00	-50.10	N/A	135.00	5- Cavity layer
25	57.50	-52.60	N/A	120.00	5- Cavity layer
26	60.00	-55.10	N/A	135.00	5- Cavity layer
27	62.50	-57.60	N/A	125.00	5- Cavity layer
28	64.90	-60.00	N/A	125.00	5- Cavity layer
29	64.90	-60.00	N/A	125.00	4- Lime Stone/Very shelly sand
30	65.00	-60.10	N/A	125.00	4- Lime Stone/Very shelly sand
31	67.50	-62.60	N/A	135.00	4- Lime Stone/Very shelly sand
32	70.00	-65.10	N/A	135.00	4- Lime Stone/Very shelly sand
33	72.50	-67.60	N/A	135.00	4- Lime Stone/Very shelly sand
34	75.00	-70.10	N/A	135.00	4- Lime Stone/Very shelly sand
35	77.50	-72.60	N/A	135.00	4- Lime Stone/Very shelly sand
36	80.00	-75.10	N/A	135.00	4- Lime Stone/Very shelly sand
37	82.50	-77.60	N/A	135.00	4- Lime Stone/Very shelly sand
38	85.00	-80.10	N/A	135.00	4- Lime Stone/Very shelly sand
39	87.50	-82.60	N/A	135.00	4- Lime Stone/Very shelly sand
40	90.00	-85.10	N/A	135.00	4- Lime Stone/Very shelly sand
41	92.50	-87.60	N/A	125.00	4- Lime Stone/Very shelly sand
42	95.00	-90.10	N/A	135.00	4- Lime Stone/Very shelly sand
43	97.50	-92.60	N/A	135.00	4- Lime Stone/Very shelly sand
44	100.00	-95.10	N/A	125.00	4- Lime Stone/Very shelly sand

Top of Rock Socket
elev = -60'

ID	Cu-DIR (tsf)	qu (tsf)	qt (tsf)	Em (ksi)	qb (tsf)
1	N/A	N/A	N/A	N/A	N/A
2	N/A	N/A	N/A	N/A	N/A
3	N/A	N/A	N/A	N/A	N/A
4	N/A	N/A	N/A	N/A	N/A
5	N/A	N/A	N/A	N/A	N/A
6	N/A	N/A	N/A	N/A	N/A
7	N/A	N/A	N/A	N/A	N/A
8	N/A	N/A	N/A	N/A	N/A
9	N/A	N/A	N/A	N/A	N/A
10	N/A	N/A	N/A	N/A	N/A
11	N/A	N/A	N/A	N/A	N/A
12	N/A	N/A	N/A	N/A	N/A
13	N/A	N/A	N/A	N/A	N/A
14	N/A	N/A	N/A	N/A	N/A
15	N/A	N/A	N/A	N/A	N/A
16	N/A	N/A	N/A	N/A	N/A
17	N/A	N/A	N/A	N/A	N/A
18	N/A	N/A	N/A	N/A	N/A
19	N/A	N/A	N/A	N/A	N/A
20	N/A	N/A	N/A	N/A	N/A
21	N/A	N/A	N/A	N/A	N/A
22	N/A	N/A	N/A	N/A	N/A

"BB-01_Drilled_48in_Void=-60ft.out"

23	N/A	N/A	N/A	N/A	N/A
24	N/A	N/A	N/A	N/A	N/A
25	N/A	N/A	N/A	N/A	N/A
26	N/A	N/A	N/A	N/A	N/A
27	N/A	N/A	N/A	N/A	N/A
28	N/A	N/A	N/A	N/A	N/A
29	N/A	19.22	3.08	30.70	9.61
30	N/A	19.22	3.08	30.70	9.61
31	N/A	25.00	4.00	39.93	12.50
32	N/A	25.00	4.00	39.93	12.50
33	N/A	25.00	4.00	39.93	12.50
34	N/A	25.00	4.00	39.93	12.50
35	N/A	25.00	4.00	39.93	12.50
36	N/A	25.00	4.00	39.93	12.50
37	N/A	25.00	4.00	39.93	12.50
38	N/A	25.00	4.00	39.93	12.50
39	N/A	25.00	4.00	39.93	12.50
40	N/A	25.00	4.00	39.93	12.50
41	N/A	21.08	3.37	33.67	10.54
42	N/A	25.00	4.00	39.93	12.50
43	N/A	25.00	4.00	39.93	12.50
44	N/A	15.50	2.48	24.76	7.75

Top of Rock Socket
elev = -60'

ID	RQD F.M.	S.R.I.	Rock Recovery

1	N/A	N/A	N/A
2	N/A	N/A	N/A
3	N/A	N/A	N/A
4	N/A	N/A	N/A
5	N/A	N/A	N/A
6	N/A	N/A	N/A
7	N/A	N/A	N/A
8	N/A	N/A	N/A
9	N/A	N/A	N/A
10	N/A	N/A	N/A
11	N/A	N/A	N/A
12	N/A	N/A	N/A
13	N/A	N/A	N/A
14	N/A	N/A	N/A
15	N/A	N/A	N/A
16	N/A	N/A	N/A
17	N/A	N/A	N/A
18	N/A	N/A	N/A
19	N/A	N/A	N/A
20	N/A	N/A	N/A
21	N/A	N/A	N/A
22	N/A	N/A	N/A
23	N/A	N/A	N/A
24	N/A	N/A	N/A
25	N/A	N/A	N/A
26	N/A	N/A	N/A

"BB-01_Drilled_48in_Void=-60ft.out"

27	N/A	N/A	N/A
28	N/A	N/A	N/A
29	0.50	ROUGH	1.000
30	0.50	ROUGH	1.000
31	0.50	ROUGH	1.000
32	0.50	ROUGH	1.000
33	0.50	ROUGH	1.000
34	0.50	ROUGH	1.000
35	0.50	ROUGH	1.000
36	0.50	ROUGH	1.000
37	0.50	ROUGH	1.000
38	0.50	ROUGH	1.000
39	0.50	ROUGH	1.000
40	0.50	ROUGH	1.000
41	0.50	ROUGH	1.000
42	0.50	ROUGH	1.000
43	0.50	ROUGH	1.000
44	0.50	ROUGH	1.000

Drilled Shaft Data:

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Unit weight of concrete = 145.00(pcf), Concrete Slump = 6.00(in)
Modulus of Elasticity of concrete = 3987.00(ksi)

Shaft Geometry:

ID	Length (ft)	Tip Elev. (ft)	Case Len. (ft)	Diameter (in)	Base Diam. (in)	Bell Len. (ft)
1	10.00	-5.10	0.00	48.00	48.00	0.00
2	11.00	-6.10	0.00	48.00	48.00	0.00
3	12.00	-7.10	0.00	48.00	48.00	0.00
4	13.00	-8.10	0.00	48.00	48.00	0.00
5	14.00	-9.10	0.00	48.00	48.00	0.00
6	15.00	-10.10	0.00	48.00	48.00	0.00
7	16.00	-11.10	0.00	48.00	48.00	0.00
8	17.00	-12.10	0.00	48.00	48.00	0.00
9	18.00	-13.10	0.00	48.00	48.00	0.00
10	19.00	-14.10	0.00	48.00	48.00	0.00
11	20.00	-15.10	0.00	48.00	48.00	0.00
12	21.00	-16.10	0.00	48.00	48.00	0.00
13	22.00	-17.10	0.00	48.00	48.00	0.00
14	23.00	-18.10	0.00	48.00	48.00	0.00
15	24.00	-19.10	0.00	48.00	48.00	0.00
16	25.00	-20.10	0.00	48.00	48.00	0.00
17	26.00	-21.10	0.00	48.00	48.00	0.00
18	27.00	-22.10	0.00	48.00	48.00	0.00
19	28.00	-23.10	0.00	48.00	48.00	0.00
20	29.00	-24.10	0.00	48.00	48.00	0.00
21	30.00	-25.10	0.00	48.00	48.00	0.00
22	31.00	-26.10	0.00	48.00	48.00	0.00

"BB-01_Drilled_48in_Void=-60ft.out"

23	32.00	-27.10	0.00	48.00	48.00	0.00
24	33.00	-28.10	0.00	48.00	48.00	0.00
25	34.00	-29.10	0.00	48.00	48.00	0.00
26	35.00	-30.10	0.00	48.00	48.00	0.00
27	36.00	-31.10	0.00	48.00	48.00	0.00
28	37.00	-32.10	0.00	48.00	48.00	0.00
29	38.00	-33.10	0.00	48.00	48.00	0.00
30	39.00	-34.10	0.00	48.00	48.00	0.00
31	40.00	-35.10	0.00	48.00	48.00	0.00
32	41.00	-36.10	0.00	48.00	48.00	0.00
33	42.00	-37.10	0.00	48.00	48.00	0.00
34	43.00	-38.10	0.00	48.00	48.00	0.00
35	44.00	-39.10	0.00	48.00	48.00	0.00
36	45.00	-40.10	0.00	48.00	48.00	0.00
37	46.00	-41.10	0.00	48.00	48.00	0.00
38	47.00	-42.10	0.00	48.00	48.00	0.00
39	48.00	-43.10	0.00	48.00	48.00	0.00
40	49.00	-44.10	0.00	48.00	48.00	0.00
41	50.00	-45.10	0.00	48.00	48.00	0.00
42	51.00	-46.10	0.00	48.00	48.00	0.00
43	52.00	-47.10	0.00	48.00	48.00	0.00
44	53.00	-48.10	0.00	48.00	48.00	0.00
45	54.00	-49.10	0.00	48.00	48.00	0.00
46	55.00	-50.10	0.00	48.00	48.00	0.00
47	56.00	-51.10	0.00	48.00	48.00	0.00
48	57.00	-52.10	0.00	48.00	48.00	0.00
49	58.00	-53.10	0.00	48.00	48.00	0.00
50	59.00	-54.10	0.00	48.00	48.00	0.00
51	60.00	-55.10	0.00	48.00	48.00	0.00
52	61.00	-56.10	0.00	48.00	48.00	0.00
53	62.00	-57.10	0.00	48.00	48.00	0.00
54	63.00	-58.10	0.00	48.00	48.00	0.00
55	64.00	-59.10	0.00	48.00	48.00	0.00
56	65.00	-60.10	0.00	48.00	48.00	0.00
57	66.00	-61.10	0.00	48.00	48.00	0.00
58	67.00	-62.10	0.00	48.00	48.00	0.00
59	68.00	-63.10	0.00	48.00	48.00	0.00
60	69.00	-64.10	0.00	48.00	48.00	0.00
61	70.00	-65.10	0.00	48.00	48.00	0.00
62	71.00	-66.10	0.00	48.00	48.00	0.00
63	72.00	-67.10	0.00	48.00	48.00	0.00
64	73.00	-68.10	0.00	48.00	48.00	0.00
65	74.00	-69.10	0.00	48.00	48.00	0.00
66	75.00	-70.10	0.00	48.00	48.00	0.00
67	76.00	-71.10	0.00	48.00	48.00	0.00
68	77.00	-72.10	0.00	48.00	48.00	0.00
69	78.00	-73.10	0.00	48.00	48.00	0.00
70	79.00	-74.10	0.00	48.00	48.00	0.00
71	80.00	-75.10	0.00	48.00	48.00	0.00
72	81.00	-76.10	0.00	48.00	48.00	0.00
73	82.00	-77.10	0.00	48.00	48.00	0.00
74	83.00	-78.10	0.00	48.00	48.00	0.00

"BB-01_Drilled_48in_Void=-60ft.out"

75	84.00	-79.10	0.00	48.00	48.00	0.00
76	85.00	-80.10	0.00	48.00	48.00	0.00
77	86.00	-81.10	0.00	48.00	48.00	0.00
78	87.00	-82.10	0.00	48.00	48.00	0.00
79	88.00	-83.10	0.00	48.00	48.00	0.00
80	89.00	-84.10	0.00	48.00	48.00	0.00
81	90.00	-85.10	0.00	48.00	48.00	0.00
82	91.00	-86.10	0.00	48.00	48.00	0.00
83	92.00	-87.10	0.00	48.00	48.00	0.00
84	93.00	-88.10	0.00	48.00	48.00	0.00
85	94.00	-89.10	0.00	48.00	48.00	0.00
86	95.00	-90.10	0.00	48.00	48.00	0.00
87	96.00	-91.10	0.00	48.00	48.00	0.00
88	97.00	-92.10	0.00	48.00	48.00	0.00
89	98.00	-93.10	0.00	48.00	48.00	0.00
90	99.00	-94.10	0.00	48.00	48.00	0.00

Drilled Shaft Capacity (sorted by shaft diameter):

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Strength reduction factors: Skin-friction = 1.00, End-bearing = 1.00

ID	Diameter (in)	Length (ft)	Skin Fric. (tons)	End Bearing (tons)	Capacity (tons)

1	48.00	10.00	0.000	0.000	0.000
2	48.00	11.00	0.000	0.000	0.000
3	48.00	12.00	0.000	0.000	0.000
4	48.00	13.00	0.000	0.000	0.000
5	48.00	14.00	0.000	0.000	0.000
6	48.00	15.00	0.000	0.000	0.000
7	48.00	16.00	0.000	0.000	0.000
8	48.00	17.00	0.000	0.000	0.000
9	48.00	18.00	0.000	0.000	0.000
10	48.00	19.00	0.000	0.000	0.000
11	48.00	20.00	0.000	0.000	0.000
12	48.00	21.00	0.000	0.000	0.000
13	48.00	22.00	0.000	0.000	0.000
14	48.00	23.00	0.000	0.000	0.000
15	48.00	24.00	0.000	0.000	0.000
16	48.00	25.00	0.000	0.000	0.000
17	48.00	26.00	0.000	0.000	0.000
18	48.00	27.00	0.000	0.000	0.000
19	48.00	28.00	0.000	0.000	0.000
20	48.00	29.00	0.000	0.000	0.000
21	48.00	30.00	0.000	0.000	0.000
22	48.00	31.00	0.000	0.000	0.000
23	48.00	32.00	0.000	0.000	0.000
24	48.00	33.00	0.000	0.000	0.000
25	48.00	34.00	0.000	0.000	0.000
26	48.00	35.00	0.000	0.000	0.000
27	48.00	36.00	0.000	0.000	0.000

"BB-01_Drilled_48in_Void=-60ft.out"

28	48.00	37.00	0.000	0.000	0.000
29	48.00	38.00	0.000	0.000	0.000
30	48.00	39.00	0.000	0.000	0.000
31	48.00	40.00	0.000	0.000	0.000
32	48.00	41.00	0.000	0.000	0.000
33	48.00	42.00	0.000	0.000	0.000
34	48.00	43.00	0.000	0.000	0.000
35	48.00	44.00	0.000	0.000	0.000
36	48.00	45.00	0.000	0.000	0.000
37	48.00	46.00	0.000	0.000	0.000
38	48.00	47.00	0.000	0.000	0.000
39	48.00	48.00	0.000	0.000	0.000
40	48.00	49.00	0.000	0.000	0.000
41	48.00	50.00	0.000	0.000	0.000
42	48.00	51.00	0.000	0.000	0.000
43	48.00	52.00	0.000	0.000	0.000
44	48.00	53.00	0.000	0.000	0.000
45	48.00	54.00	0.000	0.000	0.000
46	48.00	55.00	0.000	0.000	0.000
47	48.00	56.00	0.000	0.000	0.000
48	48.00	57.00	0.000	0.000	0.000
49	48.00	58.00	0.000	0.000	0.000
50	48.00	59.00	0.000	0.000	0.000
51	48.00	60.00	0.000	0.000	0.000
52	48.00	61.00	0.000	0.000	0.000
53	48.00	62.00	0.000	0.000	0.000
54	48.00	63.00	0.000	0.000	0.000
55	48.00	64.00	0.000	0.000	0.000
56	48.00	65.00	4.830	120.763	125.593
57	48.00	66.00	53.134	120.763	173.897
58	48.00	67.00	101.437	120.763	222.200
59	48.00	68.00	157.005	157.080	314.085
60	48.00	69.00	219.837	157.080	376.917
61	48.00	70.00	282.669	157.080	439.748
62	48.00	71.00	345.501	157.080	502.580
63	48.00	72.00	408.333	157.080	565.412
64	48.00	73.00	471.164	157.080	628.244
65	48.00	74.00	533.996	157.080	691.076
66	48.00	75.00	596.828	157.080	753.908
67	48.00	76.00	659.660	157.080	816.740
68	48.00	77.00	722.492	157.080	879.571
69	48.00	78.00	785.324	157.080	942.403
70	48.00	79.00	848.155	157.080	1005.235
71	48.00	80.00	910.987	157.080	1068.067
72	48.00	81.00	973.819	157.080	1130.899
73	48.00	82.00	1036.651	157.080	1193.731
74	48.00	83.00	1099.483	157.080	1256.563
75	48.00	84.00	1162.315	157.080	1319.394
76	48.00	85.00	1225.147	157.080	1382.226
77	48.00	86.00	1287.978	157.080	1445.058
78	48.00	87.00	1350.810	157.080	1507.890
79	48.00	88.00	1413.642	157.080	1570.722

"BB-01_Drilled_48in_Void=-60ft.out"

80	48.00	89.00	1476.474	157.080	1633.554
81	48.00	90.00	1539.306	157.080	1696.386
82	48.00	91.00	1602.138	157.080	1759.217
83	48.00	92.00	1664.970	157.080	1822.049
84	48.00	93.00	1722.876	132.450	1855.326
85	48.00	94.00	1775.858	132.450	1908.307
86	48.00	95.00	1828.839	157.080	1985.919
87	48.00	96.00	1891.671	157.080	2048.750
88	48.00	97.00	1954.503	157.080	2111.582
89	48.00	98.00	2017.335	157.080	2174.414
90	48.00	99.00	2080.166	157.080	2237.246

Drilled Shaft Capacity at User-Defined Settlement (sorted by shaft diameter):

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**** Capacity is NOT modified by the strength reduction factors ****

User-Defined Settlement = 1.04%

ID	Diameter (in)	Length (ft)	Skin Fric. (tons)	End Bearing (tons)	Capacity (tons)

1	48.00	10.00	0.000	0.000	0.000
2	48.00	11.00	0.000	0.000	0.000
3	48.00	12.00	0.000	0.000	0.000
4	48.00	13.00	0.000	0.000	0.000
5	48.00	14.00	0.000	0.000	0.000
6	48.00	15.00	0.000	0.000	0.000
7	48.00	16.00	0.000	0.000	0.000
8	48.00	17.00	0.000	0.000	0.000
9	48.00	18.00	0.000	0.000	0.000
10	48.00	19.00	0.000	0.000	0.000
11	48.00	20.00	0.000	0.000	0.000
12	48.00	21.00	0.000	0.000	0.000
13	48.00	22.00	0.000	0.000	0.000
14	48.00	23.00	0.000	0.000	0.000
15	48.00	24.00	0.000	0.000	0.000
16	48.00	25.00	0.000	0.000	0.000
17	48.00	26.00	0.000	0.000	0.000
18	48.00	27.00	0.000	0.000	0.000
19	48.00	28.00	0.000	0.000	0.000
20	48.00	29.00	0.000	0.000	0.000
21	48.00	30.00	0.000	0.000	0.000
22	48.00	31.00	0.000	0.000	0.000
23	48.00	32.00	0.000	0.000	0.000
24	48.00	33.00	0.000	0.000	0.000
25	48.00	34.00	0.000	0.000	0.000
26	48.00	35.00	0.000	0.000	0.000
27	48.00	36.00	0.000	0.000	0.000
28	48.00	37.00	0.000	0.000	0.000
29	48.00	38.00	0.000	0.000	0.000

"BB-01_Drilled_48in_Void=-60ft.out"

30	48.00	39.00	0.000	0.000	0.000
31	48.00	40.00	0.000	0.000	0.000
32	48.00	41.00	0.000	0.000	0.000
33	48.00	42.00	0.000	0.000	0.000
34	48.00	43.00	0.000	0.000	0.000
35	48.00	44.00	0.000	0.000	0.000
36	48.00	45.00	0.000	0.000	0.000
37	48.00	46.00	0.000	0.000	0.000
38	48.00	47.00	0.000	0.000	0.000
39	48.00	48.00	0.000	0.000	0.000
40	48.00	49.00	0.000	0.000	0.000
41	48.00	50.00	0.000	0.000	0.000
42	48.00	51.00	0.000	0.000	0.000
43	48.00	52.00	0.000	0.000	0.000
44	48.00	53.00	0.000	0.000	0.000
45	48.00	54.00	0.000	0.000	0.000
46	48.00	55.00	0.000	0.000	0.000
47	48.00	56.00	0.000	0.000	0.000
48	48.00	57.00	0.000	0.000	0.000
49	48.00	58.00	0.000	0.000	0.000
50	48.00	59.00	0.000	0.000	0.000
51	48.00	60.00	0.000	0.000	0.000
52	48.00	61.00	0.000	0.000	0.000
53	48.00	62.00	0.000	0.000	0.000
54	48.00	63.00	0.000	0.000	0.000
55	48.00	64.00	0.000	0.000	0.000
56	48.00	65.00	2.409	3108.031	3110.439
57	48.00	66.00	25.824	623.373	649.198
58	48.00	67.00	48.082	404.198	452.280
59	48.00	68.00	72.585	403.933	476.517
60	48.00	69.00	99.132	333.871	433.002
61	48.00	70.00	124.408	287.920	412.328
62	48.00	71.00	148.507	255.064	403.571
63	48.00	72.00	171.511	230.202	401.713
64	48.00	73.00	193.737	212.342	406.079
65	48.00	74.00	217.474	211.671	429.145
66	48.00	75.00	240.834	210.717	451.551
67	48.00	76.00	263.838	209.568	473.406
68	48.00	77.00	286.507	208.285	494.791
69	48.00	78.00	308.858	206.908	515.766
70	48.00	79.00	330.907	205.468	536.375
71	48.00	80.00	352.667	203.986	556.653
72	48.00	81.00	374.152	202.478	576.630
73	48.00	82.00	395.373	200.955	596.327
74	48.00	83.00	416.339	199.426	615.765
75	48.00	84.00	437.062	197.897	634.959
76	48.00	85.00	457.549	196.373	653.922
77	48.00	86.00	477.810	194.858	672.668
78	48.00	87.00	497.852	193.355	691.206
79	48.00	88.00	517.681	191.865	709.546
80	48.00	89.00	537.306	190.390	727.696
81	48.00	90.00	556.731	188.931	745.662

"BB-01_Drilled_48in_Void=-60ft.out"

82	48.00	91.00	575.964	187.489	763.453
83	48.00	92.00	595.010	186.064	781.074
84	48.00	93.00	612.301	155.797	768.098
85	48.00	94.00	627.883	154.817	782.701
86	48.00	95.00	643.345	182.463	825.807
87	48.00	96.00	661.757	181.101	842.858
88	48.00	97.00	680.005	179.756	859.761
89	48.00	98.00	698.093	178.429	876.522
90	48.00	99.00	716.024	177.120	893.144

"BB-01_Drilled_48in_Void=-60ft.out"

General Information:

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Input file: lations\FB-Deep\Drilled Shaft\BB-01_Drilled_60in_Void=-60ft.in
Project number: B-22-074
Job name: Broad Causeway Bridge
Engineer: PV/TC
Units: English

Analysis Information:

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Analysis Type: Drilled Shaft Analysis

Soil Information:

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Boring date: 3/22/2023
Boring number: BB-01
Station number: 111+65 Offset: -10

Ground Elevation: 4.90(ft)
Water table Elevation = 4.90(ft)

Rock side-friction is calculated using: McVay's method

ID	Depth (ft)	Elevation (ft)	SPT Blows (Blows/ft)	Unit Weight (pcf)	Soil Type
1	0.00	4.90	N/A	115.00	5- Cavity layer
2	2.00	2.90	N/A	115.00	5- Cavity layer
3	4.00	0.90	N/A	115.00	5- Cavity layer
4	6.00	-1.10	N/A	115.00	5- Cavity layer
5	8.00	-3.10	N/A	115.00	5- Cavity layer
6	10.00	-5.10	N/A	115.00	5- Cavity layer
7	12.00	-7.10	N/A	115.00	5- Cavity layer
8	14.00	-9.10	N/A	115.00	5- Cavity layer
9	16.00	-11.10	N/A	125.00	5- Cavity layer
10	20.00	-15.10	N/A	125.00	5- Cavity layer
11	22.50	-17.60	N/A	115.00	5- Cavity layer
12	25.00	-20.10	N/A	115.00	5- Cavity layer
13	27.50	-22.60	N/A	115.00	5- Cavity layer
14	30.00	-25.10	N/A	125.00	5- Cavity layer
15	32.50	-27.60	N/A	135.00	5- Cavity layer
16	35.00	-30.10	N/A	135.00	5- Cavity layer
17	37.50	-32.60	N/A	102.00	5- Cavity layer
18	40.00	-35.10	N/A	133.00	5- Cavity layer

"BB-01_Drilled_60in_Void=-60ft.out"

19	42.50	-37.60	N/A	127.00	5- Cavity layer
20	45.00	-40.10	N/A	133.00	5- Cavity layer
21	47.50	-42.60	N/A	133.00	5- Cavity layer
22	50.00	-45.10	N/A	132.00	5- Cavity layer
23	52.50	-47.60	N/A	135.00	5- Cavity layer
24	55.00	-50.10	N/A	135.00	5- Cavity layer
25	57.50	-52.60	N/A	120.00	5- Cavity layer
26	60.00	-55.10	N/A	135.00	5- Cavity layer
27	62.50	-57.60	N/A	125.00	5- Cavity layer
28	64.90	-60.00	N/A	125.00	5- Cavity layer
29	64.90	-60.00	N/A	125.00	4- Lime Stone/Very shelly sand
30	65.00	-60.10	N/A	125.00	4- Lime Stone/Very shelly sand
31	67.50	-62.60	N/A	135.00	4- Lime Stone/Very shelly sand
32	70.00	-65.10	N/A	135.00	4- Lime Stone/Very shelly sand
33	72.50	-67.60	N/A	135.00	4- Lime Stone/Very shelly sand
34	75.00	-70.10	N/A	135.00	4- Lime Stone/Very shelly sand
35	77.50	-72.60	N/A	135.00	4- Lime Stone/Very shelly sand
36	80.00	-75.10	N/A	135.00	4- Lime Stone/Very shelly sand
37	82.50	-77.60	N/A	135.00	4- Lime Stone/Very shelly sand
38	85.00	-80.10	N/A	135.00	4- Lime Stone/Very shelly sand
39	87.50	-82.60	N/A	135.00	4- Lime Stone/Very shelly sand
40	90.00	-85.10	N/A	135.00	4- Lime Stone/Very shelly sand
41	92.50	-87.60	N/A	125.00	4- Lime Stone/Very shelly sand
42	95.00	-90.10	N/A	135.00	4- Lime Stone/Very shelly sand
43	97.50	-92.60	N/A	135.00	4- Lime Stone/Very shelly sand
44	100.00	-95.10	N/A	125.00	4- Lime Stone/Very shelly sand

Top of Rock Socket
elev = -60'

ID	Cu-DIR (tsf)	qu (tsf)	qt (tsf)	Em (ksi)	qb (tsf)
1	N/A	N/A	N/A	N/A	N/A
2	N/A	N/A	N/A	N/A	N/A
3	N/A	N/A	N/A	N/A	N/A
4	N/A	N/A	N/A	N/A	N/A
5	N/A	N/A	N/A	N/A	N/A
6	N/A	N/A	N/A	N/A	N/A
7	N/A	N/A	N/A	N/A	N/A
8	N/A	N/A	N/A	N/A	N/A
9	N/A	N/A	N/A	N/A	N/A
10	N/A	N/A	N/A	N/A	N/A
11	N/A	N/A	N/A	N/A	N/A
12	N/A	N/A	N/A	N/A	N/A
13	N/A	N/A	N/A	N/A	N/A
14	N/A	N/A	N/A	N/A	N/A
15	N/A	N/A	N/A	N/A	N/A
16	N/A	N/A	N/A	N/A	N/A
17	N/A	N/A	N/A	N/A	N/A
18	N/A	N/A	N/A	N/A	N/A
19	N/A	N/A	N/A	N/A	N/A
20	N/A	N/A	N/A	N/A	N/A
21	N/A	N/A	N/A	N/A	N/A
22	N/A	N/A	N/A	N/A	N/A

"BB-01_Drilled_60in_Void=-60ft.out"

23	N/A	N/A	N/A	N/A	N/A
24	N/A	N/A	N/A	N/A	N/A
25	N/A	N/A	N/A	N/A	N/A
26	N/A	N/A	N/A	N/A	N/A
27	N/A	N/A	N/A	N/A	N/A
28	N/A	N/A	N/A	N/A	N/A
29	N/A	19.22	3.08	30.70	9.61
30	N/A	19.22	3.08	30.70	9.61
31	N/A	25.00	4.00	39.93	12.50
32	N/A	25.00	4.00	39.93	12.50
33	N/A	25.00	4.00	39.93	12.50
34	N/A	25.00	4.00	39.93	12.50
35	N/A	25.00	4.00	39.93	12.50
36	N/A	25.00	4.00	39.93	12.50
37	N/A	25.00	4.00	39.93	12.50
38	N/A	25.00	4.00	39.93	12.50
39	N/A	25.00	4.00	39.93	12.50
40	N/A	25.00	4.00	39.93	12.50
41	N/A	21.08	3.37	33.67	10.54
42	N/A	25.00	4.00	39.93	12.50
43	N/A	25.00	4.00	39.93	12.50
44	N/A	15.50	2.48	24.76	7.75

Top of Rock Socket
elev = -60'

ID RQD F.M. S.R.I. Rock Recovery

1	N/A	N/A	N/A
2	N/A	N/A	N/A
3	N/A	N/A	N/A
4	N/A	N/A	N/A
5	N/A	N/A	N/A
6	N/A	N/A	N/A
7	N/A	N/A	N/A
8	N/A	N/A	N/A
9	N/A	N/A	N/A
10	N/A	N/A	N/A
11	N/A	N/A	N/A
12	N/A	N/A	N/A
13	N/A	N/A	N/A
14	N/A	N/A	N/A
15	N/A	N/A	N/A
16	N/A	N/A	N/A
17	N/A	N/A	N/A
18	N/A	N/A	N/A
19	N/A	N/A	N/A
20	N/A	N/A	N/A
21	N/A	N/A	N/A
22	N/A	N/A	N/A
23	N/A	N/A	N/A
24	N/A	N/A	N/A
25	N/A	N/A	N/A
26	N/A	N/A	N/A

"BB-01_Drilled_60in_Void=-60ft.out"

27	N/A	N/A	N/A
28	N/A	N/A	N/A
29	0.50	ROUGH	1.000
30	0.50	ROUGH	1.000
31	0.50	ROUGH	1.000
32	0.50	ROUGH	1.000
33	0.50	ROUGH	1.000
34	0.50	ROUGH	1.000
35	0.50	ROUGH	1.000
36	0.50	ROUGH	1.000
37	0.50	ROUGH	1.000
38	0.50	ROUGH	1.000
39	0.50	ROUGH	1.000
40	0.50	ROUGH	1.000
41	0.50	ROUGH	1.000
42	0.50	ROUGH	1.000
43	0.50	ROUGH	1.000
44	0.50	ROUGH	1.000

Drilled Shaft Data:

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Unit weight of concrete = 145.00(pcf), Concrete Slump = 6.00(in)
Modulus of Elasticity of concrete = 3987.00(ksi)

Shaft Geometry:

ID	Length (ft)	Tip Elev. (ft)	Case Len. (ft)	Diameter (in)	Base Diam. (in)	Bell Len. (ft)
1	10.00	-5.10	0.00	60.00	60.00	0.00
2	11.00	-6.10	0.00	60.00	60.00	0.00
3	12.00	-7.10	0.00	60.00	60.00	0.00
4	13.00	-8.10	0.00	60.00	60.00	0.00
5	14.00	-9.10	0.00	60.00	60.00	0.00
6	15.00	-10.10	0.00	60.00	60.00	0.00
7	16.00	-11.10	0.00	60.00	60.00	0.00
8	17.00	-12.10	0.00	60.00	60.00	0.00
9	18.00	-13.10	0.00	60.00	60.00	0.00
10	19.00	-14.10	0.00	60.00	60.00	0.00
11	20.00	-15.10	0.00	60.00	60.00	0.00
12	21.00	-16.10	0.00	60.00	60.00	0.00
13	22.00	-17.10	0.00	60.00	60.00	0.00
14	23.00	-18.10	0.00	60.00	60.00	0.00
15	24.00	-19.10	0.00	60.00	60.00	0.00
16	25.00	-20.10	0.00	60.00	60.00	0.00
17	26.00	-21.10	0.00	60.00	60.00	0.00
18	27.00	-22.10	0.00	60.00	60.00	0.00
19	28.00	-23.10	0.00	60.00	60.00	0.00
20	29.00	-24.10	0.00	60.00	60.00	0.00
21	30.00	-25.10	0.00	60.00	60.00	0.00
22	31.00	-26.10	0.00	60.00	60.00	0.00

"BB-01_Drilled_60in_Void=-60ft.out"

23	32.00	-27.10	0.00	60.00	60.00	0.00
24	33.00	-28.10	0.00	60.00	60.00	0.00
25	34.00	-29.10	0.00	60.00	60.00	0.00
26	35.00	-30.10	0.00	60.00	60.00	0.00
27	36.00	-31.10	0.00	60.00	60.00	0.00
28	37.00	-32.10	0.00	60.00	60.00	0.00
29	38.00	-33.10	0.00	60.00	60.00	0.00
30	39.00	-34.10	0.00	60.00	60.00	0.00
31	40.00	-35.10	0.00	60.00	60.00	0.00
32	41.00	-36.10	0.00	60.00	60.00	0.00
33	42.00	-37.10	0.00	60.00	60.00	0.00
34	43.00	-38.10	0.00	60.00	60.00	0.00
35	44.00	-39.10	0.00	60.00	60.00	0.00
36	45.00	-40.10	0.00	60.00	60.00	0.00
37	46.00	-41.10	0.00	60.00	60.00	0.00
38	47.00	-42.10	0.00	60.00	60.00	0.00
39	48.00	-43.10	0.00	60.00	60.00	0.00
40	49.00	-44.10	0.00	60.00	60.00	0.00
41	50.00	-45.10	0.00	60.00	60.00	0.00
42	51.00	-46.10	0.00	60.00	60.00	0.00
43	52.00	-47.10	0.00	60.00	60.00	0.00
44	53.00	-48.10	0.00	60.00	60.00	0.00
45	54.00	-49.10	0.00	60.00	60.00	0.00
46	55.00	-50.10	0.00	60.00	60.00	0.00
47	56.00	-51.10	0.00	60.00	60.00	0.00
48	57.00	-52.10	0.00	60.00	60.00	0.00
49	58.00	-53.10	0.00	60.00	60.00	0.00
50	59.00	-54.10	0.00	60.00	60.00	0.00
51	60.00	-55.10	0.00	60.00	60.00	0.00
52	61.00	-56.10	0.00	60.00	60.00	0.00
53	62.00	-57.10	0.00	60.00	60.00	0.00
54	63.00	-58.10	0.00	60.00	60.00	0.00
55	64.00	-59.10	0.00	60.00	60.00	0.00
56	65.00	-60.10	0.00	60.00	60.00	0.00
57	66.00	-61.10	0.00	60.00	60.00	0.00
58	67.00	-62.10	0.00	60.00	60.00	0.00
59	68.00	-63.10	0.00	60.00	60.00	0.00
60	69.00	-64.10	0.00	60.00	60.00	0.00
61	70.00	-65.10	0.00	60.00	60.00	0.00
62	71.00	-66.10	0.00	60.00	60.00	0.00
63	72.00	-67.10	0.00	60.00	60.00	0.00
64	73.00	-68.10	0.00	60.00	60.00	0.00
65	74.00	-69.10	0.00	60.00	60.00	0.00
66	75.00	-70.10	0.00	60.00	60.00	0.00
67	76.00	-71.10	0.00	60.00	60.00	0.00
68	77.00	-72.10	0.00	60.00	60.00	0.00
69	78.00	-73.10	0.00	60.00	60.00	0.00
70	79.00	-74.10	0.00	60.00	60.00	0.00
71	80.00	-75.10	0.00	60.00	60.00	0.00
72	81.00	-76.10	0.00	60.00	60.00	0.00
73	82.00	-77.10	0.00	60.00	60.00	0.00
74	83.00	-78.10	0.00	60.00	60.00	0.00

"BB-01_Drilled_60in_Void=-60ft.out"

75	84.00	-79.10	0.00	60.00	60.00	0.00
76	85.00	-80.10	0.00	60.00	60.00	0.00
77	86.00	-81.10	0.00	60.00	60.00	0.00
78	87.00	-82.10	0.00	60.00	60.00	0.00
79	88.00	-83.10	0.00	60.00	60.00	0.00
80	89.00	-84.10	0.00	60.00	60.00	0.00
81	90.00	-85.10	0.00	60.00	60.00	0.00
82	91.00	-86.10	0.00	60.00	60.00	0.00
83	92.00	-87.10	0.00	60.00	60.00	0.00
84	93.00	-88.10	0.00	60.00	60.00	0.00
85	94.00	-89.10	0.00	60.00	60.00	0.00
86	95.00	-90.10	0.00	60.00	60.00	0.00
87	96.00	-91.10	0.00	60.00	60.00	0.00
88	97.00	-92.10	0.00	60.00	60.00	0.00
89	98.00	-93.10	0.00	60.00	60.00	0.00
90	99.00	-94.10	0.00	60.00	60.00	0.00

Drilled Shaft Capacity (sorted by shaft diameter):

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Strength reduction factors: Skin-friction = 1.00, End-bearing = 1.00

ID	Diameter (in)	Length (ft)	Skin Fric. (tons)	End Bearing (tons)	Capacity (tons)

1	60.00	10.00	0.000	0.000	0.000
2	60.00	11.00	0.000	0.000	0.000
3	60.00	12.00	0.000	0.000	0.000
4	60.00	13.00	0.000	0.000	0.000
5	60.00	14.00	0.000	0.000	0.000
6	60.00	15.00	0.000	0.000	0.000
7	60.00	16.00	0.000	0.000	0.000
8	60.00	17.00	0.000	0.000	0.000
9	60.00	18.00	0.000	0.000	0.000
10	60.00	19.00	0.000	0.000	0.000
11	60.00	20.00	0.000	0.000	0.000
12	60.00	21.00	0.000	0.000	0.000
13	60.00	22.00	0.000	0.000	0.000
14	60.00	23.00	0.000	0.000	0.000
15	60.00	24.00	0.000	0.000	0.000
16	60.00	25.00	0.000	0.000	0.000
17	60.00	26.00	0.000	0.000	0.000
18	60.00	27.00	0.000	0.000	0.000
19	60.00	28.00	0.000	0.000	0.000
20	60.00	29.00	0.000	0.000	0.000
21	60.00	30.00	0.000	0.000	0.000
22	60.00	31.00	0.000	0.000	0.000
23	60.00	32.00	0.000	0.000	0.000
24	60.00	33.00	0.000	0.000	0.000
25	60.00	34.00	0.000	0.000	0.000
26	60.00	35.00	0.000	0.000	0.000
27	60.00	36.00	0.000	0.000	0.000

"BB-01_Drilled_60in_Void=-60ft.out"

28	60.00	37.00	0.000	0.000	0.000
29	60.00	38.00	0.000	0.000	0.000
30	60.00	39.00	0.000	0.000	0.000
31	60.00	40.00	0.000	0.000	0.000
32	60.00	41.00	0.000	0.000	0.000
33	60.00	42.00	0.000	0.000	0.000
34	60.00	43.00	0.000	0.000	0.000
35	60.00	44.00	0.000	0.000	0.000
36	60.00	45.00	0.000	0.000	0.000
37	60.00	46.00	0.000	0.000	0.000
38	60.00	47.00	0.000	0.000	0.000
39	60.00	48.00	0.000	0.000	0.000
40	60.00	49.00	0.000	0.000	0.000
41	60.00	50.00	0.000	0.000	0.000
42	60.00	51.00	0.000	0.000	0.000
43	60.00	52.00	0.000	0.000	0.000
44	60.00	53.00	0.000	0.000	0.000
45	60.00	54.00	0.000	0.000	0.000
46	60.00	55.00	0.000	0.000	0.000
47	60.00	56.00	0.000	0.000	0.000
48	60.00	57.00	0.000	0.000	0.000
49	60.00	58.00	0.000	0.000	0.000
50	60.00	59.00	0.000	0.000	0.000
51	60.00	60.00	0.000	0.000	0.000
52	60.00	61.00	0.000	0.000	0.000
53	60.00	62.00	0.000	0.000	0.000
54	60.00	63.00	0.000	0.000	0.000
55	60.00	64.00	0.000	0.000	0.000
56	60.00	65.00	6.038	188.692	194.730
57	60.00	66.00	66.417	188.692	255.109
58	60.00	67.00	126.797	188.692	315.489
59	60.00	68.00	196.256	245.437	441.693
60	60.00	69.00	274.796	245.437	520.233
61	60.00	70.00	353.336	245.437	598.773
62	60.00	71.00	431.876	245.437	677.313
63	60.00	72.00	510.416	245.437	755.853
64	60.00	73.00	588.955	245.437	834.392
65	60.00	74.00	667.495	245.437	912.932
66	60.00	75.00	746.035	245.437	991.472
67	60.00	76.00	824.575	245.437	1070.012
68	60.00	77.00	903.115	245.437	1148.552
69	60.00	78.00	981.655	245.437	1227.091
70	60.00	79.00	1060.194	245.437	1305.631
71	60.00	80.00	1138.734	245.437	1384.171
72	60.00	81.00	1217.274	245.437	1462.711
73	60.00	82.00	1295.814	245.437	1541.251
74	60.00	83.00	1374.354	245.437	1619.791
75	60.00	84.00	1452.893	245.437	1698.330
76	60.00	85.00	1531.433	245.437	1776.870
77	60.00	86.00	1609.973	245.437	1855.410
78	60.00	87.00	1688.513	245.437	1933.950
79	60.00	88.00	1767.053	245.437	2012.490

"BB-01_Drilled_60in_Void=-60ft.out"

80	60.00	89.00	1845.593	245.437	2091.029
81	60.00	90.00	1924.132	245.437	2169.569
82	60.00	91.00	2002.672	245.437	2248.109
83	60.00	92.00	2081.212	245.437	2326.649
84	60.00	93.00	2153.595	206.952	2360.548
85	60.00	94.00	2219.822	206.952	2426.774
86	60.00	95.00	2286.049	245.437	2531.486
87	60.00	96.00	2364.589	245.437	2610.025
88	60.00	97.00	2443.128	245.437	2688.565
89	60.00	98.00	2521.668	245.437	2767.105
90	60.00	99.00	2600.208	245.437	2845.645

Drilled Shaft Capacity at User-Defined Settlement (sorted by shaft diameter):

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**** Capacity is NOT modified by the strength reduction factors ****

User-Defined Settlement = 0.83%

ID	Diameter (in)	Length (ft)	Skin Fric. (tons)	End Bearing (tons)	Capacity (tons)

1	60.00	10.00	0.000	0.000	0.000
2	60.00	11.00	0.000	0.000	0.000
3	60.00	12.00	0.000	0.000	0.000
4	60.00	13.00	0.000	0.000	0.000
5	60.00	14.00	0.000	0.000	0.000
6	60.00	15.00	0.000	0.000	0.000
7	60.00	16.00	0.000	0.000	0.000
8	60.00	17.00	0.000	0.000	0.000
9	60.00	18.00	0.000	0.000	0.000
10	60.00	19.00	0.000	0.000	0.000
11	60.00	20.00	0.000	0.000	0.000
12	60.00	21.00	0.000	0.000	0.000
13	60.00	22.00	0.000	0.000	0.000
14	60.00	23.00	0.000	0.000	0.000
15	60.00	24.00	0.000	0.000	0.000
16	60.00	25.00	0.000	0.000	0.000
17	60.00	26.00	0.000	0.000	0.000
18	60.00	27.00	0.000	0.000	0.000
19	60.00	28.00	0.000	0.000	0.000
20	60.00	29.00	0.000	0.000	0.000
21	60.00	30.00	0.000	0.000	0.000
22	60.00	31.00	0.000	0.000	0.000
23	60.00	32.00	0.000	0.000	0.000
24	60.00	33.00	0.000	0.000	0.000
25	60.00	34.00	0.000	0.000	0.000
26	60.00	35.00	0.000	0.000	0.000
27	60.00	36.00	0.000	0.000	0.000
28	60.00	37.00	0.000	0.000	0.000
29	60.00	38.00	0.000	0.000	0.000

"BB-01_Drilled_60in_Void=-60ft.out"

30	60.00	39.00	0.000	0.000	0.000
31	60.00	40.00	0.000	0.000	0.000
32	60.00	41.00	0.000	0.000	0.000
33	60.00	42.00	0.000	0.000	0.000
34	60.00	43.00	0.000	0.000	0.000
35	60.00	44.00	0.000	0.000	0.000
36	60.00	45.00	0.000	0.000	0.000
37	60.00	46.00	0.000	0.000	0.000
38	60.00	47.00	0.000	0.000	0.000
39	60.00	48.00	0.000	0.000	0.000
40	60.00	49.00	0.000	0.000	0.000
41	60.00	50.00	0.000	0.000	0.000
42	60.00	51.00	0.000	0.000	0.000
43	60.00	52.00	0.000	0.000	0.000
44	60.00	53.00	0.000	0.000	0.000
45	60.00	54.00	0.000	0.000	0.000
46	60.00	55.00	0.000	0.000	0.000
47	60.00	56.00	0.000	0.000	0.000
48	60.00	57.00	0.000	0.000	0.000
49	60.00	58.00	0.000	0.000	0.000
50	60.00	59.00	0.000	0.000	0.000
51	60.00	60.00	0.000	0.000	0.000
52	60.00	61.00	0.000	0.000	0.000
53	60.00	62.00	0.000	0.000	0.000
54	60.00	63.00	0.000	0.000	0.000
55	60.00	64.00	0.000	0.000	0.000
56	60.00	65.00	3.011	4860.208	4863.219
57	60.00	66.00	32.281	974.805	1007.086
58	60.00	67.00	60.106	632.068	692.174
59	60.00	68.00	90.739	631.653	722.392
60	60.00	69.00	123.929	522.093	646.022
61	60.00	70.00	155.533	450.237	605.770
62	60.00	71.00	185.665	398.859	584.524
63	60.00	72.00	214.430	359.980	574.411
64	60.00	73.00	241.922	329.354	571.276
65	60.00	74.00	268.227	304.494	572.721
66	60.00	75.00	293.772	285.697	579.469
67	60.00	76.00	321.738	285.004	606.742
68	60.00	77.00	349.280	284.052	633.332
69	60.00	78.00	376.421	282.908	659.329
70	60.00	79.00	403.182	281.620	684.802
71	60.00	80.00	429.580	280.226	709.806
72	60.00	81.00	455.633	278.752	734.385
73	60.00	82.00	481.355	277.220	758.575
74	60.00	83.00	506.759	275.646	782.405
75	60.00	84.00	531.859	274.041	805.901
76	60.00	85.00	556.666	272.417	829.083
77	60.00	86.00	581.191	270.780	851.970
78	60.00	87.00	605.443	269.136	874.579
79	60.00	88.00	629.432	267.491	896.923
80	60.00	89.00	653.167	265.848	919.015
81	60.00	90.00	676.655	264.210	940.865

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82	60.00	91.00	699.905	262.580	962.485
83	60.00	92.00	722.924	260.959	983.883
84	60.00	93.00	743.807	218.791	962.598
85	60.00	94.00	762.609	217.669	980.277
86	60.00	95.00	781.262	256.829	1038.091
87	60.00	96.00	803.500	255.251	1058.750
88	60.00	97.00	825.535	253.686	1079.221
89	60.00	98.00	847.373	252.137	1099.510
90	60.00	99.00	869.019	250.603	1119.622

"BB-01_Drilled_60in_Void=-60ft.out"

General Information:

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Input file: lations\FB-Deep\Drilled Shaft\BB-02_Drilled_48in_Void=-62ft.in
Project number: B-22-074
Job name: Broad Causeway Bridge
Engineer: PV/TC
Units: English

Analysis Information:

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Analysis Type: Drilled Shaft Analysis

Soil Information:

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Boring date: 3/21/2023
Boring number: BB-02
Station number: 118+90 Offset: +73

Ground Elevation: 3.80(ft)
Water table Elevation = 3.80(ft)

Cu is calculated using: Direct method.
Rock side-friction is calculated using: McVay's method
Hammer type: Automatic Hammer, Correction factor = 1.24

ID	Depth (ft)	Elevation (ft)	SPT Blows (Blows/ft)	Unit Weight (pcf)	Soil Type

1	0.00	3.80	N/A	110.00	5- Cavity layer
2	2.00	1.80	N/A	110.00	5- Cavity layer
3	4.00	-0.20	N/A	110.00	5- Cavity layer
4	6.00	-2.20	N/A	106.00	5- Cavity layer
5	8.00	-4.20	N/A	92.00	5- Cavity layer
6	10.00	-6.20	N/A	99.00	5- Cavity layer
7	12.00	-8.20	N/A	92.00	5- Cavity layer
8	14.00	-10.20	N/A	86.00	5- Cavity layer
9	16.00	-12.20	N/A	135.00	5- Cavity layer
10	20.00	-16.20	N/A	125.00	5- Cavity layer
11	22.50	-18.70	N/A	115.00	5- Cavity layer
12	25.00	-21.20	N/A	115.00	5- Cavity layer
13	27.50	-23.70	N/A	120.00	5- Cavity layer
14	30.00	-26.20	N/A	115.00	5- Cavity layer
15	32.50	-28.70	N/A	115.00	5- Cavity layer
16	35.00	-31.20	N/A	115.00	5- Cavity layer

"BB-02_Drilled_48in_Void=-62ft.out"

17	37.50	-33.70	N/A	99.00	5- Cavity layer
18	40.00	-36.20	N/A	102.00	5- Cavity layer
19	42.50	-38.70	N/A	119.00	5- Cavity layer
20	45.00	-41.20	N/A	116.00	5- Cavity layer
21	47.50	-43.70	N/A	115.00	5- Cavity layer
22	50.00	-46.20	N/A	115.00	5- Cavity layer
23	52.50	-48.70	N/A	135.00	5- Cavity layer
24	55.00	-51.20	N/A	135.00	5- Cavity layer
25	57.50	-53.70	N/A	119.00	5- Cavity layer
26	60.00	-56.20	N/A	92.00	5- Cavity layer
27	62.50	-58.70	N/A	133.00	5- Cavity layer
28	65.00	-61.20	N/A	119.00	5- Cavity layer
29	65.80	-62.00	N/A	119.00	5- Cavity layer
30	65.80	-62.00	N/A	135.00	4- Lime Stone/Very shelly sand
31	67.50	-63.70	N/A	135.00	4- Lime Stone/Very shelly sand
32	70.00	-66.20	10.00	115.00	3- Clean sand
33	72.50	-68.70	N/A	120.00	4- Lime Stone/Very shelly sand
34	75.00	-71.20	N/A	125.00	4- Lime Stone/Very shelly sand
35	77.50	-73.70	N/A	135.00	4- Lime Stone/Very shelly sand
36	80.00	-76.20	N/A	125.00	4- Lime Stone/Very shelly sand
37	82.50	-78.70	N/A	135.00	4- Lime Stone/Very shelly sand
38	85.00	-81.20	N/A	135.00	4- Lime Stone/Very shelly sand
39	87.50	-83.70	N/A	135.00	4- Lime Stone/Very shelly sand
40	87.50	-83.70	N/A	0.00	1- Plastic Clay
41	87.50	-83.70	10.00	115.00	3- Clean sand
42	90.00	-86.20	10.00	115.00	3- Clean sand
43	90.00	-86.20	N/A	0.00	1- Plastic Clay
44	90.00	-86.20	N/A	135.00	4- Lime Stone/Very shelly sand
45	92.50	-88.70	N/A	135.00	4- Lime Stone/Very shelly sand
46	92.50	-88.70	N/A	0.00	1- Plastic Clay
47	92.50	-88.70	12.00	115.00	3- Clean sand
48	95.00	-91.20	12.00	115.00	3- Clean sand
49	95.00	-91.20	N/A	0.00	1- Plastic Clay
50	95.00	-91.20	N/A	120.00	4- Lime Stone/Very shelly sand
51	97.50	-93.70	N/A	120.00	4- Lime Stone/Very shelly sand
52	100.00	-96.20	N/A	135.00	4- Lime Stone/Very shelly sand
53	102.50	-98.70	N/A	135.00	4- Lime Stone/Very shelly sand
54	105.00	-101.20	N/A	135.00	4- Lime Stone/Very shelly sand
55	107.50	-103.70	N/A	135.00	4- Lime Stone/Very shelly sand
56	110.00	-106.20	N/A	135.00	4- Lime Stone/Very shelly sand
57	112.50	-108.70	N/A	135.00	4- Lime Stone/Very shelly sand
58	115.00	-111.20	N/A	125.00	4- Lime Stone/Very shelly sand
59	117.50	-113.70	N/A	125.00	4- Lime Stone/Very shelly sand
60	120.00	-116.20	N/A	135.00	4- Lime Stone/Very shelly sand
61	122.50	-118.70	N/A	135.00	4- Lime Stone/Very shelly sand
62	125.00	-121.20	N/A	135.00	4- Lime Stone/Very shelly sand

ID	Cu-DIR (tsf)	qu (tsf)	qt (tsf)	Em (ksi)	qb (tsf)

1	N/A	N/A	N/A	N/A	N/A
2	N/A	N/A	N/A	N/A	N/A

"BB-02_Drilled_48in_Void=-62ft.out"

Top of Rock Socket
elev = -62'

3	N/A	N/A	N/A	N/A	N/A
4	N/A	N/A	N/A	N/A	N/A
5	N/A	N/A	N/A	N/A	N/A
6	N/A	N/A	N/A	N/A	N/A
7	N/A	N/A	N/A	N/A	N/A
8	N/A	N/A	N/A	N/A	N/A
9	N/A	N/A	N/A	N/A	N/A
10	N/A	N/A	N/A	N/A	N/A
11	N/A	N/A	N/A	N/A	N/A
12	N/A	N/A	N/A	N/A	N/A
13	N/A	N/A	N/A	N/A	N/A
14	N/A	N/A	N/A	N/A	N/A
15	N/A	N/A	N/A	N/A	N/A
16	N/A	N/A	N/A	N/A	N/A
17	N/A	N/A	N/A	N/A	N/A
18	N/A	N/A	N/A	N/A	N/A
19	N/A	N/A	N/A	N/A	N/A
20	N/A	N/A	N/A	N/A	N/A
21	N/A	N/A	N/A	N/A	N/A
22	N/A	N/A	N/A	N/A	N/A
23	N/A	N/A	N/A	N/A	N/A
24	N/A	N/A	N/A	N/A	N/A
25	N/A	N/A	N/A	N/A	N/A
26	N/A	N/A	N/A	N/A	N/A
27	N/A	N/A	N/A	N/A	N/A
28	N/A	N/A	N/A	N/A	N/A
29	N/A	N/A	N/A	N/A	N/A
30	N/A	25.00	4.00	39.93	12.50
31	N/A	25.00	4.00	39.93	12.50
32	N/A	N/A	N/A	N/A	N/A
33	N/A	13.64	2.18	21.79	6.82
34	N/A	17.36	2.78	27.73	8.68
35	N/A	25.00	4.00	39.93	12.50
36	N/A	19.22	3.08	30.70	9.61
37	N/A	25.00	4.00	39.93	12.50
38	N/A	25.00	4.00	39.93	12.50
39	N/A	25.00	4.00	39.93	12.50
40	0.00	N/A	N/A	N/A	N/A
41	N/A	N/A	N/A	N/A	N/A
42	N/A	N/A	N/A	N/A	N/A
43	0.00	N/A	N/A	N/A	N/A
44	N/A	25.00	4.00	39.93	12.50
45	N/A	25.00	4.00	39.93	12.50
46	0.00	N/A	N/A	N/A	N/A
47	N/A	N/A	N/A	N/A	N/A
48	N/A	N/A	N/A	N/A	N/A
49	0.00	N/A	N/A	N/A	N/A
50	N/A	13.64	2.18	21.79	6.82
51	N/A	13.64	2.18	21.79	6.82
52	N/A	25.00	4.00	39.93	12.50
53	N/A	25.00	4.00	39.93	12.50
54	N/A	25.00	4.00	39.93	12.50

"BB-02_Drilled_48in_Void=-62ft.out"

Top of Rock Socket
elev = -62'

55	N/A	25.00	4.00	39.93	12.50
56	N/A	25.00	4.00	39.93	12.50
57	N/A	25.00	4.00	39.93	12.50
58	N/A	16.74	2.68	26.74	8.37
59	N/A	19.84	3.17	31.69	9.92
60	N/A	25.00	4.00	39.93	12.50
61	N/A	25.00	4.00	39.93	12.50
62	N/A	25.00	4.00	39.93	12.50

ID	RQD F.M.	S.R.I.	Rock Recovery
1	N/A	N/A	N/A
2	N/A	N/A	N/A
3	N/A	N/A	N/A
4	N/A	N/A	N/A
5	N/A	N/A	N/A
6	N/A	N/A	N/A
7	N/A	N/A	N/A
8	N/A	N/A	N/A
9	N/A	N/A	N/A
10	N/A	N/A	N/A
11	N/A	N/A	N/A
12	N/A	N/A	N/A
13	N/A	N/A	N/A
14	N/A	N/A	N/A
15	N/A	N/A	N/A
16	N/A	N/A	N/A
17	N/A	N/A	N/A
18	N/A	N/A	N/A
19	N/A	N/A	N/A
20	N/A	N/A	N/A
21	N/A	N/A	N/A
22	N/A	N/A	N/A
23	N/A	N/A	N/A
24	N/A	N/A	N/A
25	N/A	N/A	N/A
26	N/A	N/A	N/A
27	N/A	N/A	N/A
28	N/A	N/A	N/A
29	N/A	N/A	N/A
30	0.50	ROUGH	1.000
31	0.50	ROUGH	1.000
32	N/A	N/A	N/A
33	0.50	ROUGH	1.000
34	0.50	ROUGH	1.000
35	0.50	ROUGH	1.000
36	0.50	ROUGH	1.000
37	0.50	ROUGH	1.000
38	0.50	ROUGH	1.000
39	0.50	ROUGH	1.000
40	N/A	N/A	N/A

"BB-02_Drilled_48in_Void=-62ft.out"

41	N/A	N/A	N/A
42	N/A	N/A	N/A
43	N/A	N/A	N/A
44	0.50	ROUGH	1.000
45	0.50	ROUGH	1.000
46	N/A	N/A	N/A
47	N/A	N/A	N/A
48	N/A	N/A	N/A
49	N/A	N/A	N/A
50	0.50	ROUGH	1.000
51	0.50	ROUGH	1.000
52	0.50	ROUGH	1.000
53	0.50	ROUGH	1.000
54	0.50	ROUGH	1.000
55	0.50	ROUGH	1.000
56	0.50	ROUGH	1.000
57	0.50	ROUGH	1.000
58	0.50	ROUGH	1.000
59	0.50	ROUGH	1.000
60	0.50	ROUGH	1.000
61	0.50	ROUGH	1.000
62	0.50	ROUGH	1.000

Drilled Shaft Data:

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Unit weight of concrete = 145.00(pcf), Concrete Slump = 6.00(in)
Modulus of Elasticity of concrete = 3987.00(ksi)

Shaft Geometry:

ID	Length (ft)	Tip Elev. (ft)	Case Len. (ft)	Diameter (in)	Base Diam. (in)	Bell Len. (ft)

1	5.00	-1.20	0.00	48.00	48.00	0.00
2	7.00	-3.20	0.00	48.00	48.00	0.00
3	9.00	-5.20	0.00	48.00	48.00	0.00
4	11.00	-7.20	0.00	48.00	48.00	0.00
5	13.00	-9.20	0.00	48.00	48.00	0.00
6	15.00	-11.20	0.00	48.00	48.00	0.00
7	17.00	-13.20	0.00	48.00	48.00	0.00
8	19.00	-15.20	0.00	48.00	48.00	0.00
9	21.00	-17.20	0.00	48.00	48.00	0.00
10	23.00	-19.20	0.00	48.00	48.00	0.00
11	25.00	-21.20	0.00	48.00	48.00	0.00
12	27.00	-23.20	0.00	48.00	48.00	0.00
13	29.00	-25.20	0.00	48.00	48.00	0.00
14	31.00	-27.20	0.00	48.00	48.00	0.00
15	33.00	-29.20	0.00	48.00	48.00	0.00
16	35.00	-31.20	0.00	48.00	48.00	0.00
17	37.00	-33.20	0.00	48.00	48.00	0.00
18	39.00	-35.20	0.00	48.00	48.00	0.00

"BB-02_Drilled_48in_Void=-62ft.out"

19	41.00	-37.20	0.00	48.00	48.00	0.00
20	43.00	-39.20	0.00	48.00	48.00	0.00
21	45.00	-41.20	0.00	48.00	48.00	0.00
22	47.00	-43.20	0.00	48.00	48.00	0.00
23	49.00	-45.20	0.00	48.00	48.00	0.00
24	51.00	-47.20	0.00	48.00	48.00	0.00
25	53.00	-49.20	0.00	48.00	48.00	0.00
26	55.00	-51.20	0.00	48.00	48.00	0.00
27	57.00	-53.20	0.00	48.00	48.00	0.00
28	59.00	-55.20	0.00	48.00	48.00	0.00
29	61.00	-57.20	0.00	48.00	48.00	0.00
30	63.00	-59.20	0.00	48.00	48.00	0.00
31	65.00	-61.20	0.00	48.00	48.00	0.00
32	67.00	-63.20	0.00	48.00	48.00	0.00
33	69.00	-65.20	0.00	48.00	48.00	0.00
34	71.00	-67.20	0.00	48.00	48.00	0.00
35	73.00	-69.20	0.00	48.00	48.00	0.00
36	75.00	-71.20	0.00	48.00	48.00	0.00
37	77.00	-73.20	0.00	48.00	48.00	0.00
38	79.00	-75.20	0.00	48.00	48.00	0.00
39	81.00	-77.20	0.00	48.00	48.00	0.00
40	83.00	-79.20	0.00	48.00	48.00	0.00
41	85.00	-81.20	0.00	48.00	48.00	0.00
42	87.00	-83.20	0.00	48.00	48.00	0.00
43	89.00	-85.20	0.00	48.00	48.00	0.00
44	91.00	-87.20	0.00	48.00	48.00	0.00
45	93.00	-89.20	0.00	48.00	48.00	0.00
46	95.00	-91.20	0.00	48.00	48.00	0.00
47	97.00	-93.20	0.00	48.00	48.00	0.00
48	99.00	-95.20	0.00	48.00	48.00	0.00
49	101.00	-97.20	0.00	48.00	48.00	0.00
50	103.00	-99.20	0.00	48.00	48.00	0.00
51	105.00	-101.20	0.00	48.00	48.00	0.00
52	107.00	-103.20	0.00	48.00	48.00	0.00
53	109.00	-105.20	0.00	48.00	48.00	0.00
54	111.00	-107.20	0.00	48.00	48.00	0.00
55	113.00	-109.20	0.00	48.00	48.00	0.00
56	115.00	-111.20	0.00	48.00	48.00	0.00
57	117.00	-113.20	0.00	48.00	48.00	0.00
58	119.00	-115.20	0.00	48.00	48.00	0.00

Drilled Shaft Capacity (sorted by shaft diameter):

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Strength reduction factors: Skin-friction = 1.00, End-bearing = 1.00

ID	Diameter (in)	Length (ft)	Skin Fric. (tons)	End Bearing (tons)	Capacity (tons)

1	48.00	5.00	0.000	0.000	0.000
2	48.00	7.00	0.000	0.000	0.000
3	48.00	9.00	0.000	0.000	0.000

"BB-02_Drilled_48in_Void=-62ft.out"

4	48.00	11.00	0.000	0.000	0.000
5	48.00	13.00	0.000	0.000	0.000
6	48.00	15.00	0.000	0.000	0.000
7	48.00	17.00	0.000	0.000	0.000
8	48.00	19.00	0.000	0.000	0.000
9	48.00	21.00	0.000	0.000	0.000
10	48.00	23.00	0.000	0.000	0.000
11	48.00	25.00	0.000	0.000	0.000
12	48.00	27.00	0.000	0.000	0.000
13	48.00	29.00	0.000	0.000	0.000
14	48.00	31.00	0.000	0.000	0.000
15	48.00	33.00	0.000	0.000	0.000
16	48.00	35.00	0.000	0.000	0.000
17	48.00	37.00	0.000	0.000	0.000
18	48.00	39.00	0.000	0.000	0.000
19	48.00	41.00	0.000	0.000	0.000
20	48.00	43.00	0.000	0.000	0.000
21	48.00	45.00	0.000	0.000	0.000
22	48.00	47.00	0.000	0.000	0.000
23	48.00	49.00	0.000	0.000	0.000
24	48.00	51.00	0.000	0.000	0.000
25	48.00	53.00	0.000	0.000	0.000
26	48.00	55.00	0.000	0.000	0.000
27	48.00	57.00	0.000	0.000	0.000
28	48.00	59.00	0.000	0.000	0.000
29	48.00	61.00	0.000	0.000	0.000
30	48.00	63.00	0.000	0.000	0.000
31	48.00	65.00	0.000	0.000	0.000
32	48.00	67.00	75.398	157.080	232.478
33	48.00	69.00	201.062	157.080	358.141
34	48.00	71.00	264.524	44.020	308.544
35	48.00	73.00	282.768	85.703	368.470
36	48.00	75.00	351.323	109.076	460.400
37	48.00	77.00	438.591	109.076	547.667
38	48.00	79.00	554.655	157.080	711.735
39	48.00	81.00	665.791	120.763	786.553
40	48.00	83.00	769.662	157.080	926.741
41	48.00	85.00	895.326	157.080	1052.405
42	48.00	87.00	1020.989	157.080	1178.069
43	48.00	89.00	1055.886	93.494	1149.380
44	48.00	91.00	1121.142	157.080	1278.222
45	48.00	93.00	1216.775	112.193	1328.968
46	48.00	95.00	1222.524	85.703	1308.226
47	48.00	97.00	1291.080	85.703	1376.782
48	48.00	99.00	1359.635	85.703	1445.338
49	48.00	101.00	1456.745	157.080	1613.825
50	48.00	103.00	1582.409	157.080	1739.489
51	48.00	105.00	1708.073	157.080	1865.152
52	48.00	107.00	1833.736	157.080	1990.816
53	48.00	109.00	1959.400	157.080	2116.480
54	48.00	111.00	2085.064	157.080	2242.143
55	48.00	113.00	2210.727	157.080	2367.807

"BB-02_Drilled_48in_Void=-62ft.out"

56	48.00	115.00	2336.391	105.181	2441.572
57	48.00	117.00	2420.529	105.181	2525.710
58	48.00	119.00	2516.354	124.658	2641.013

Drilled Shaft Capacity at User-Defined Settlement (sorted by shaft diameter):

***** Capacity is NOT modified by the strength reduction factors *****

User-Defined Settlement = 1.04%

ID	Diameter (in)	Length (ft)	Skin Fric. (tons)	End Bearing (tons)	Capacity (tons)
1	48.00	5.00	0.000	0.000	0.000
2	48.00	7.00	0.000	0.000	0.000
3	48.00	9.00	0.000	0.000	0.000
4	48.00	11.00	0.000	0.000	0.000
5	48.00	13.00	0.000	0.000	0.000
6	48.00	15.00	0.000	0.000	0.000
7	48.00	17.00	0.000	0.000	0.000
8	48.00	19.00	0.000	0.000	0.000
9	48.00	21.00	0.000	0.000	0.000
10	48.00	23.00	0.000	0.000	0.000
11	48.00	25.00	0.000	0.000	0.000
12	48.00	27.00	0.000	0.000	0.000
13	48.00	29.00	0.000	0.000	0.000
14	48.00	31.00	0.000	0.000	0.000
15	48.00	33.00	0.000	0.000	0.000
16	48.00	35.00	0.000	0.000	0.000
17	48.00	37.00	0.000	0.000	0.000
18	48.00	39.00	0.000	0.000	0.000
19	48.00	41.00	0.000	0.000	0.000
20	48.00	43.00	0.000	0.000	0.000
21	48.00	45.00	0.000	0.000	0.000
22	48.00	47.00	0.000	0.000	0.000
23	48.00	49.00	0.000	0.000	0.000
24	48.00	51.00	0.000	0.000	0.000
25	48.00	53.00	0.000	0.000	0.000
26	48.00	55.00	0.000	0.000	0.000
27	48.00	57.00	0.000	0.000	0.000
28	48.00	59.00	0.000	0.000	0.000
29	48.00	61.00	0.000	0.000	0.000
30	48.00	63.00	0.000	0.000	0.000
31	48.00	65.00	0.000	0.000	0.000
32	48.00	67.00	36.501	753.824	790.324
33	48.00	69.00	92.451	390.724	483.175
34	48.00	71.00	118.995	13.982	132.977
35	48.00	73.00	126.444	165.225	291.669
36	48.00	75.00	150.660	167.086	317.746
37	48.00	77.00	181.779	148.635	330.413

"BB-02_Drilled_48in_Void=-62ft.out"

38	48.00	79.00	225.552	212.516	438.068
39	48.00	81.00	266.190	161.764	427.954
40	48.00	83.00	303.088	208.181	511.268
41	48.00	85.00	347.053	205.060	552.113
42	48.00	87.00	389.924	201.891	591.815
43	48.00	89.00	403.886	29.697	433.583
44	48.00	91.00	427.209	199.521	626.730
45	48.00	93.00	459.551	35.636	495.188
46	48.00	95.00	465.174	107.575	572.749
47	48.00	97.00	486.986	106.782	593.768
48	48.00	99.00	508.571	106.001	614.572
49	48.00	101.00	539.111	192.039	731.150
50	48.00	103.00	578.180	189.025	767.205
51	48.00	105.00	616.505	186.099	802.604
52	48.00	107.00	654.126	183.258	837.384
53	48.00	109.00	691.079	180.499	871.579
54	48.00	111.00	727.399	177.818	905.217
55	48.00	113.00	763.114	175.212	938.326
56	48.00	115.00	798.253	115.625	913.878
57	48.00	117.00	821.190	114.584	935.775
58	48.00	119.00	847.077	134.387	981.464

"BB-02_Drilled_48in_Void=-62ft.out"

General Information:

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Input file: lations\FB-Deep\Drilled Shaft\BB-02_Drilled_60in_Void=-62ft.in
Project number: B-22-074
Job name: Broad Causeway Bridge
Engineer: PV/TC
Units: English

Analysis Information:

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Analysis Type: Drilled Shaft Analysis

Soil Information:

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Boring date: 3/21/2023
Boring number: BB-02
Station number: 118+90 Offset: +73

Ground Elevation: 3.80(ft)
Water table Elevation = 3.80(ft)

Cu is calculated using: Direct method.
Rock side-friction is calculated using: McVay's method
Hammer type: Automatic Hammer, Correction factor = 1.24

ID	Depth (ft)	Elevation (ft)	SPT Blows (Blows/ft)	Unit Weight (pcf)	Soil Type

1	0.00	3.80	N/A	110.00	5- Cavity layer
2	2.00	1.80	N/A	110.00	5- Cavity layer
3	4.00	-0.20	N/A	110.00	5- Cavity layer
4	6.00	-2.20	N/A	106.00	5- Cavity layer
5	8.00	-4.20	N/A	92.00	5- Cavity layer
6	10.00	-6.20	N/A	99.00	5- Cavity layer
7	12.00	-8.20	N/A	92.00	5- Cavity layer
8	14.00	-10.20	N/A	86.00	5- Cavity layer
9	16.00	-12.20	N/A	135.00	5- Cavity layer
10	20.00	-16.20	N/A	125.00	5- Cavity layer
11	22.50	-18.70	N/A	115.00	5- Cavity layer
12	25.00	-21.20	N/A	115.00	5- Cavity layer
13	27.50	-23.70	N/A	120.00	5- Cavity layer
14	30.00	-26.20	N/A	115.00	5- Cavity layer
15	32.50	-28.70	N/A	115.00	5- Cavity layer
16	35.00	-31.20	N/A	115.00	5- Cavity layer

"BB-02_Drilled_60in_Void=-62ft.out"

17	37.50	-33.70	N/A	99.00	5- Cavity layer
18	40.00	-36.20	N/A	102.00	5- Cavity layer
19	42.50	-38.70	N/A	119.00	5- Cavity layer
20	45.00	-41.20	N/A	116.00	5- Cavity layer
21	47.50	-43.70	N/A	115.00	5- Cavity layer
22	50.00	-46.20	N/A	115.00	5- Cavity layer
23	52.50	-48.70	N/A	135.00	5- Cavity layer
24	55.00	-51.20	N/A	135.00	5- Cavity layer
25	57.50	-53.70	N/A	119.00	5- Cavity layer
26	60.00	-56.20	N/A	92.00	5- Cavity layer
27	62.50	-58.70	N/A	133.00	5- Cavity layer
28	65.00	-61.20	N/A	119.00	5- Cavity layer
29	65.80	-62.00	N/A	119.00	5- Cavity layer
30	65.80	-62.00	N/A	135.00	4- Lime Stone/Very shelly sand
31	67.50	-63.70	N/A	135.00	4- Lime Stone/Very shelly sand
32	70.00	-66.20	10.00	115.00	3- Clean sand
33	72.50	-68.70	N/A	120.00	4- Lime Stone/Very shelly sand
34	75.00	-71.20	N/A	125.00	4- Lime Stone/Very shelly sand
35	77.50	-73.70	N/A	135.00	4- Lime Stone/Very shelly sand
36	80.00	-76.20	N/A	125.00	4- Lime Stone/Very shelly sand
37	82.50	-78.70	N/A	135.00	4- Lime Stone/Very shelly sand
38	85.00	-81.20	N/A	135.00	4- Lime Stone/Very shelly sand
39	87.50	-83.70	N/A	135.00	4- Lime Stone/Very shelly sand
40	87.50	-83.70	N/A	0.00	1- Plastic Clay
41	87.50	-83.70	10.00	115.00	3- Clean sand
42	90.00	-86.20	10.00	115.00	3- Clean sand
43	90.00	-86.20	N/A	0.00	1- Plastic Clay
44	90.00	-86.20	N/A	135.00	4- Lime Stone/Very shelly sand
45	92.50	-88.70	N/A	135.00	4- Lime Stone/Very shelly sand
46	92.50	-88.70	N/A	0.00	1- Plastic Clay
47	92.50	-88.70	12.00	115.00	3- Clean sand
48	95.00	-91.20	12.00	115.00	3- Clean sand
49	95.00	-91.20	N/A	0.00	1- Plastic Clay
50	95.00	-91.20	N/A	120.00	4- Lime Stone/Very shelly sand
51	97.50	-93.70	N/A	120.00	4- Lime Stone/Very shelly sand
52	100.00	-96.20	N/A	135.00	4- Lime Stone/Very shelly sand
53	102.50	-98.70	N/A	135.00	4- Lime Stone/Very shelly sand
54	105.00	-101.20	N/A	135.00	4- Lime Stone/Very shelly sand
55	107.50	-103.70	N/A	135.00	4- Lime Stone/Very shelly sand
56	110.00	-106.20	N/A	135.00	4- Lime Stone/Very shelly sand
57	112.50	-108.70	N/A	135.00	4- Lime Stone/Very shelly sand
58	115.00	-111.20	N/A	125.00	4- Lime Stone/Very shelly sand
59	117.50	-113.70	N/A	125.00	4- Lime Stone/Very shelly sand
60	120.00	-116.20	N/A	135.00	4- Lime Stone/Very shelly sand
61	122.50	-118.70	N/A	135.00	4- Lime Stone/Very shelly sand
62	125.00	-121.20	N/A	135.00	4- Lime Stone/Very shelly sand

Top of Rock Socket
elev = -62'

ID	Cu-DIR (tsf)	qu (tsf)	qt (tsf)	Em (ksi)	qb (tsf)

1	N/A	N/A	N/A	N/A	N/A
2	N/A	N/A	N/A	N/A	N/A

"BB-02_Drilled_60in_Void=-62ft.out"

3	N/A	N/A	N/A	N/A	N/A
4	N/A	N/A	N/A	N/A	N/A
5	N/A	N/A	N/A	N/A	N/A
6	N/A	N/A	N/A	N/A	N/A
7	N/A	N/A	N/A	N/A	N/A
8	N/A	N/A	N/A	N/A	N/A
9	N/A	N/A	N/A	N/A	N/A
10	N/A	N/A	N/A	N/A	N/A
11	N/A	N/A	N/A	N/A	N/A
12	N/A	N/A	N/A	N/A	N/A
13	N/A	N/A	N/A	N/A	N/A
14	N/A	N/A	N/A	N/A	N/A
15	N/A	N/A	N/A	N/A	N/A
16	N/A	N/A	N/A	N/A	N/A
17	N/A	N/A	N/A	N/A	N/A
18	N/A	N/A	N/A	N/A	N/A
19	N/A	N/A	N/A	N/A	N/A
20	N/A	N/A	N/A	N/A	N/A
21	N/A	N/A	N/A	N/A	N/A
22	N/A	N/A	N/A	N/A	N/A
23	N/A	N/A	N/A	N/A	N/A
24	N/A	N/A	N/A	N/A	N/A
25	N/A	N/A	N/A	N/A	N/A
26	N/A	N/A	N/A	N/A	N/A
27	N/A	N/A	N/A	N/A	N/A
28	N/A	N/A	N/A	N/A	N/A
29	N/A	N/A	N/A	N/A	N/A
30	N/A	25.00	4.00	39.93	12.50
31	N/A	25.00	4.00	39.93	12.50
32	N/A	N/A	N/A	N/A	N/A
33	N/A	13.64	2.18	21.79	6.82
34	N/A	17.36	2.78	27.73	8.68
35	N/A	25.00	4.00	39.93	12.50
36	N/A	19.22	3.08	30.70	9.61
37	N/A	25.00	4.00	39.93	12.50
38	N/A	25.00	4.00	39.93	12.50
39	N/A	25.00	4.00	39.93	12.50
40	0.00	N/A	N/A	N/A	N/A
41	N/A	N/A	N/A	N/A	N/A
42	N/A	N/A	N/A	N/A	N/A
43	0.00	N/A	N/A	N/A	N/A
44	N/A	25.00	4.00	39.93	12.50
45	N/A	25.00	4.00	39.93	12.50
46	0.00	N/A	N/A	N/A	N/A
47	N/A	N/A	N/A	N/A	N/A
48	N/A	N/A	N/A	N/A	N/A
49	0.00	N/A	N/A	N/A	N/A
50	N/A	13.64	2.18	21.79	6.82
51	N/A	13.64	2.18	21.79	6.82
52	N/A	25.00	4.00	39.93	12.50
53	N/A	25.00	4.00	39.93	12.50
54	N/A	25.00	4.00	39.93	12.50

"BB-02_Drilled_60in_Void=-62ft.out"

Top of Rock Socket
elev = -62'

55	N/A	25.00	4.00	39.93	12.50
56	N/A	25.00	4.00	39.93	12.50
57	N/A	25.00	4.00	39.93	12.50
58	N/A	16.74	2.68	26.74	8.37
59	N/A	19.84	3.17	31.69	9.92
60	N/A	25.00	4.00	39.93	12.50
61	N/A	25.00	4.00	39.93	12.50
62	N/A	25.00	4.00	39.93	12.50

ID RQD F.M. S.R.I. Rock Recovery

1	N/A	N/A	N/A
2	N/A	N/A	N/A
3	N/A	N/A	N/A
4	N/A	N/A	N/A
5	N/A	N/A	N/A
6	N/A	N/A	N/A
7	N/A	N/A	N/A
8	N/A	N/A	N/A
9	N/A	N/A	N/A
10	N/A	N/A	N/A
11	N/A	N/A	N/A
12	N/A	N/A	N/A
13	N/A	N/A	N/A
14	N/A	N/A	N/A
15	N/A	N/A	N/A
16	N/A	N/A	N/A
17	N/A	N/A	N/A
18	N/A	N/A	N/A
19	N/A	N/A	N/A
20	N/A	N/A	N/A
21	N/A	N/A	N/A
22	N/A	N/A	N/A
23	N/A	N/A	N/A
24	N/A	N/A	N/A
25	N/A	N/A	N/A
26	N/A	N/A	N/A
27	N/A	N/A	N/A
28	N/A	N/A	N/A
29	N/A	N/A	N/A
30	0.50	ROUGH	1.000
31	0.50	ROUGH	1.000
32	N/A	N/A	N/A
33	0.50	ROUGH	1.000
34	0.50	ROUGH	1.000
35	0.50	ROUGH	1.000
36	0.50	ROUGH	1.000
37	0.50	ROUGH	1.000
38	0.50	ROUGH	1.000
39	0.50	ROUGH	1.000
40	N/A	N/A	N/A

"BB-02_Drilled_60in_Void=-62ft.out"

41	N/A	N/A	N/A
42	N/A	N/A	N/A
43	N/A	N/A	N/A
44	0.50	ROUGH	1.000
45	0.50	ROUGH	1.000
46	N/A	N/A	N/A
47	N/A	N/A	N/A
48	N/A	N/A	N/A
49	N/A	N/A	N/A
50	0.50	ROUGH	1.000
51	0.50	ROUGH	1.000
52	0.50	ROUGH	1.000
53	0.50	ROUGH	1.000
54	0.50	ROUGH	1.000
55	0.50	ROUGH	1.000
56	0.50	ROUGH	1.000
57	0.50	ROUGH	1.000
58	0.50	ROUGH	1.000
59	0.50	ROUGH	1.000
60	0.50	ROUGH	1.000
61	0.50	ROUGH	1.000
62	0.50	ROUGH	1.000

Drilled Shaft Data:

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Unit weight of concrete = 145.00(pcf), Concrete Slump = 6.00(in)

Modulus of Elasticity of concrete = 3987.00(ksi)

Shaft Geometry:

ID	Length (ft)	Tip Elev. (ft)	Case Len. (ft)	Diameter (in)	Base Diam. (in)	Bell Len. (ft)
1	5.00	-1.20	0.00	60.00	60.00	0.00
2	7.00	-3.20	0.00	60.00	60.00	0.00
3	9.00	-5.20	0.00	60.00	60.00	0.00
4	11.00	-7.20	0.00	60.00	60.00	0.00
5	13.00	-9.20	0.00	60.00	60.00	0.00
6	15.00	-11.20	0.00	60.00	60.00	0.00
7	17.00	-13.20	0.00	60.00	60.00	0.00
8	19.00	-15.20	0.00	60.00	60.00	0.00
9	21.00	-17.20	0.00	60.00	60.00	0.00
10	23.00	-19.20	0.00	60.00	60.00	0.00
11	25.00	-21.20	0.00	60.00	60.00	0.00
12	27.00	-23.20	0.00	60.00	60.00	0.00
13	29.00	-25.20	0.00	60.00	60.00	0.00
14	31.00	-27.20	0.00	60.00	60.00	0.00
15	33.00	-29.20	0.00	60.00	60.00	0.00
16	35.00	-31.20	0.00	60.00	60.00	0.00
17	37.00	-33.20	0.00	60.00	60.00	0.00
18	39.00	-35.20	0.00	60.00	60.00	0.00

"BB-02_Drilled_60in_Void=-62ft.out"

19	41.00	-37.20	0.00	60.00	60.00	0.00
20	43.00	-39.20	0.00	60.00	60.00	0.00
21	45.00	-41.20	0.00	60.00	60.00	0.00
22	47.00	-43.20	0.00	60.00	60.00	0.00
23	49.00	-45.20	0.00	60.00	60.00	0.00
24	51.00	-47.20	0.00	60.00	60.00	0.00
25	53.00	-49.20	0.00	60.00	60.00	0.00
26	55.00	-51.20	0.00	60.00	60.00	0.00
27	57.00	-53.20	0.00	60.00	60.00	0.00
28	59.00	-55.20	0.00	60.00	60.00	0.00
29	61.00	-57.20	0.00	60.00	60.00	0.00
30	63.00	-59.20	0.00	60.00	60.00	0.00
31	65.00	-61.20	0.00	60.00	60.00	0.00
32	67.00	-63.20	0.00	60.00	60.00	0.00
33	69.00	-65.20	0.00	60.00	60.00	0.00
34	71.00	-67.20	0.00	60.00	60.00	0.00
35	73.00	-69.20	0.00	60.00	60.00	0.00
36	75.00	-71.20	0.00	60.00	60.00	0.00
37	77.00	-73.20	0.00	60.00	60.00	0.00
38	79.00	-75.20	0.00	60.00	60.00	0.00
39	81.00	-77.20	0.00	60.00	60.00	0.00
40	83.00	-79.20	0.00	60.00	60.00	0.00
41	85.00	-81.20	0.00	60.00	60.00	0.00
42	87.00	-83.20	0.00	60.00	60.00	0.00
43	89.00	-85.20	0.00	60.00	60.00	0.00
44	91.00	-87.20	0.00	60.00	60.00	0.00
45	93.00	-89.20	0.00	60.00	60.00	0.00
46	95.00	-91.20	0.00	60.00	60.00	0.00
47	97.00	-93.20	0.00	60.00	60.00	0.00
48	99.00	-95.20	0.00	60.00	60.00	0.00
49	101.00	-97.20	0.00	60.00	60.00	0.00
50	103.00	-99.20	0.00	60.00	60.00	0.00
51	105.00	-101.20	0.00	60.00	60.00	0.00
52	107.00	-103.20	0.00	60.00	60.00	0.00
53	109.00	-105.20	0.00	60.00	60.00	0.00
54	111.00	-107.20	0.00	60.00	60.00	0.00
55	113.00	-109.20	0.00	60.00	60.00	0.00
56	115.00	-111.20	0.00	60.00	60.00	0.00
57	117.00	-113.20	0.00	60.00	60.00	0.00
58	119.00	-115.20	0.00	60.00	60.00	0.00

Drilled Shaft Capacity (sorted by shaft diameter):

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Strength reduction factors: Skin-friction = 1.00, End-bearing = 1.00

ID	Diameter (in)	Length (ft)	Skin Fric. (tons)	End Bearing (tons)	Capacity (tons)
1	60.00	5.00	0.000	0.000	0.000
2	60.00	7.00	0.000	0.000	0.000
3	60.00	9.00	0.000	0.000	0.000

"BB-02_Drilled_60in_Void=-62ft.out"

4	60.00	11.00	0.000	0.000	0.000
5	60.00	13.00	0.000	0.000	0.000
6	60.00	15.00	0.000	0.000	0.000
7	60.00	17.00	0.000	0.000	0.000
8	60.00	19.00	0.000	0.000	0.000
9	60.00	21.00	0.000	0.000	0.000
10	60.00	23.00	0.000	0.000	0.000
11	60.00	25.00	0.000	0.000	0.000
12	60.00	27.00	0.000	0.000	0.000
13	60.00	29.00	0.000	0.000	0.000
14	60.00	31.00	0.000	0.000	0.000
15	60.00	33.00	0.000	0.000	0.000
16	60.00	35.00	0.000	0.000	0.000
17	60.00	37.00	0.000	0.000	0.000
18	60.00	39.00	0.000	0.000	0.000
19	60.00	41.00	0.000	0.000	0.000
20	60.00	43.00	0.000	0.000	0.000
21	60.00	45.00	0.000	0.000	0.000
22	60.00	47.00	0.000	0.000	0.000
23	60.00	49.00	0.000	0.000	0.000
24	60.00	51.00	0.000	0.000	0.000
25	60.00	53.00	0.000	0.000	0.000
26	60.00	55.00	0.000	0.000	0.000
27	60.00	57.00	0.000	0.000	0.000
28	60.00	59.00	0.000	0.000	0.000
29	60.00	61.00	0.000	0.000	0.000
30	60.00	63.00	0.000	0.000	0.000
31	60.00	65.00	0.000	0.000	0.000
32	60.00	67.00	94.248	245.437	339.684
33	60.00	69.00	251.327	245.437	496.764
34	60.00	71.00	330.655	57.318	387.973
35	60.00	73.00	353.459	133.910	487.370
36	60.00	75.00	439.154	170.431	609.586
37	60.00	77.00	548.238	170.431	718.670
38	60.00	79.00	693.319	245.437	938.756
39	60.00	81.00	832.238	188.692	1020.930
40	60.00	83.00	962.077	245.437	1207.514
41	60.00	85.00	1119.157	245.437	1364.594
42	60.00	87.00	1276.237	245.437	1521.673
43	60.00	89.00	1319.858	121.737	1441.594
44	60.00	91.00	1401.427	245.437	1646.864
45	60.00	93.00	1520.969	146.084	1667.053
46	60.00	95.00	1528.155	133.910	1662.065
47	60.00	97.00	1613.849	133.910	1747.760
48	60.00	99.00	1699.544	133.910	1833.455
49	60.00	101.00	1820.931	245.437	2066.368
50	60.00	103.00	1978.011	245.437	2223.448
51	60.00	105.00	2135.091	245.437	2380.528
52	60.00	107.00	2292.170	245.437	2537.607
53	60.00	109.00	2449.250	245.437	2694.687
54	60.00	111.00	2606.330	245.437	2851.767
55	60.00	113.00	2763.409	245.437	3008.846

"BB-02_Drilled_60in_Void=-62ft.out"

56	60.00	115.00	2920.489	164.345	3084.833
57	60.00	117.00	3025.662	164.345	3190.006
58	60.00	119.00	3145.443	194.779	3340.221

Drilled Shaft Capacity at User-Defined Settlement (sorted by shaft diameter):

***** Capacity is NOT modified by the strength reduction factors *****

User-Defined Settlement = 0.83%

ID	Diameter (in)	Length (ft)	Skin Fric. (tons)	End Bearing (tons)	Capacity (tons)
1	60.00	5.00	0.000	0.000	0.000
2	60.00	7.00	0.000	0.000	0.000
3	60.00	9.00	0.000	0.000	0.000
4	60.00	11.00	0.000	0.000	0.000
5	60.00	13.00	0.000	0.000	0.000
6	60.00	15.00	0.000	0.000	0.000
7	60.00	17.00	0.000	0.000	0.000
8	60.00	19.00	0.000	0.000	0.000
9	60.00	21.00	0.000	0.000	0.000
10	60.00	23.00	0.000	0.000	0.000
11	60.00	25.00	0.000	0.000	0.000
12	60.00	27.00	0.000	0.000	0.000
13	60.00	29.00	0.000	0.000	0.000
14	60.00	31.00	0.000	0.000	0.000
15	60.00	33.00	0.000	0.000	0.000
16	60.00	35.00	0.000	0.000	0.000
17	60.00	37.00	0.000	0.000	0.000
18	60.00	39.00	0.000	0.000	0.000
19	60.00	41.00	0.000	0.000	0.000
20	60.00	43.00	0.000	0.000	0.000
21	60.00	45.00	0.000	0.000	0.000
22	60.00	47.00	0.000	0.000	0.000
23	60.00	49.00	0.000	0.000	0.000
24	60.00	51.00	0.000	0.000	0.000
25	60.00	53.00	0.000	0.000	0.000
26	60.00	55.00	0.000	0.000	0.000
27	60.00	57.00	0.000	0.000	0.000
28	60.00	59.00	0.000	0.000	0.000
29	60.00	61.00	0.000	0.000	0.000
30	60.00	63.00	0.000	0.000	0.000
31	60.00	65.00	0.000	0.000	0.000
32	60.00	67.00	45.628	1178.798	1224.425
33	60.00	69.00	115.574	610.998	726.572
34	60.00	71.00	148.759	14.965	163.724
35	60.00	73.00	158.068	258.372	416.440
36	60.00	75.00	188.350	261.282	449.632
37	60.00	77.00	225.348	219.801	445.150

"BB-02_Drilled_60in_Void=-62ft.out"

38	60.00	79.00	275.213	287.764	562.978
39	60.00	81.00	324.590	220.217	544.806
40	60.00	83.00	369.361	284.644	654.005
41	60.00	85.00	422.702	281.660	704.361
42	60.00	87.00	474.672	278.446	753.118
43	60.00	89.00	491.705	31.785	523.489
44	60.00	91.00	520.041	275.956	795.997
45	60.00	93.00	559.254	38.141	597.396
46	60.00	95.00	566.257	149.183	715.440
47	60.00	97.00	592.595	148.354	740.949
48	60.00	99.00	618.642	147.520	766.163
49	60.00	101.00	655.546	267.887	923.433
50	60.00	103.00	702.784	264.464	967.249
51	60.00	105.00	749.104	261.107	1010.211
52	60.00	107.00	794.555	257.820	1052.375
53	60.00	109.00	839.186	254.604	1093.790
54	60.00	111.00	883.037	251.459	1134.496
55	60.00	113.00	926.147	248.385	1174.532
56	60.00	115.00	968.550	164.308	1132.858
57	60.00	117.00	996.147	163.072	1159.219
58	60.00	119.00	1027.312	191.582	1218.893

"BB-02_Drilled_60in_Void=-62ft.out"

General Information:

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Input file: lations\FB-Deep\Drilled Shaft\BB-03_Drilled_48in_Void=-56ft.in
Project number: B-22-074
Job name: Broad Causeway Bridge
Engineer: PV/TC
Units: English

Analysis Information:

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Analysis Type: Drilled Shaft Analysis

Soil Information:

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Boring date: 3/24/2023
Boring number: BB-03
Station number: 121+53 Offset: +32

Ground Elevation: 4.60(ft)
Water table Elevation = 4.60(ft)

Cu is calculated using: Direct method.
Rock side-friction is calculated using: McVay's method
Hammer type: Automatic Hammer, Correction factor = 1.24

ID	Depth (ft)	Elevation (ft)	SPT Blows (Blows/ft)	Unit Weight (pcf)	Soil Type

1	0.00	4.60	N/A	119.00	5- Cavity layer
2	2.00	2.60	N/A	119.00	5- Cavity layer
3	4.00	0.60	N/A	110.00	5- Cavity layer
4	6.00	-1.40	N/A	92.00	5- Cavity layer
5	8.00	-3.40	N/A	92.00	5- Cavity layer
6	10.00	-5.40	N/A	92.00	5- Cavity layer
7	12.00	-7.40	N/A	99.00	5- Cavity layer
8	14.00	-9.40	N/A	92.00	5- Cavity layer
9	16.00	-11.40	N/A	120.00	5- Cavity layer
10	20.00	-15.40	N/A	115.00	5- Cavity layer
11	22.50	-17.90	N/A	120.00	5- Cavity layer
12	25.00	-20.40	N/A	120.00	5- Cavity layer
13	27.50	-22.90	N/A	115.00	5- Cavity layer
14	30.00	-25.40	N/A	115.00	5- Cavity layer
15	32.50	-27.90	N/A	115.00	5- Cavity layer
16	35.00	-30.40	N/A	106.00	5- Cavity layer

"BB-03_Drilled_48in_Void=-56ft.out"

17	37.50	-32.90	N/A	117.00	5- Cavity layer
18	40.00	-35.40	N/A	116.00	5- Cavity layer
19	42.50	-37.90	N/A	118.00	5- Cavity layer
20	45.00	-40.40	N/A	124.00	5- Cavity layer
21	47.50	-42.90	N/A	119.00	5- Cavity layer
22	50.00	-45.40	N/A	116.00	5- Cavity layer
23	52.50	-47.90	N/A	133.00	5- Cavity layer
24	55.00	-50.40	N/A	133.00	5- Cavity layer
25	57.50	-52.90	N/A	119.00	5- Cavity layer
26	60.00	-55.40	N/A	133.00	5- Cavity layer
27	60.60	-56.00	N/A	135.00	5- Cavity layer
28	60.60	-56.00	N/A	0.00	1- Plastic Clay
29	60.60	-56.00	N/A	135.00	4- Lime Stone/Very shelly sand
30	62.50	-57.90	N/A	135.00	4- Lime Stone/Very shelly sand
31	65.00	-60.40	N/A	135.00	4- Lime Stone/Very shelly sand
32	67.50	-62.90	N/A	135.00	4- Lime Stone/Very shelly sand
33	70.00	-65.40	N/A	135.00	4- Lime Stone/Very shelly sand
34	72.50	-67.90	N/A	135.00	4- Lime Stone/Very shelly sand
35	75.00	-70.40	N/A	135.00	4- Lime Stone/Very shelly sand
36	77.50	-72.90	N/A	135.00	4- Lime Stone/Very shelly sand
37	80.00	-75.40	N/A	135.00	4- Lime Stone/Very shelly sand
38	82.50	-77.90	N/A	135.00	4- Lime Stone/Very shelly sand
39	85.00	-80.40	N/A	135.00	4- Lime Stone/Very shelly sand
40	87.50	-82.90	N/A	135.00	4- Lime Stone/Very shelly sand
41	90.00	-85.40	N/A	120.00	4- Lime Stone/Very shelly sand
42	92.50	-87.90	N/A	120.00	4- Lime Stone/Very shelly sand
43	92.50	-87.90	N/A	0.00	1- Plastic Clay
44	92.50	-87.90	17.00	120.00	3- Clean sand
45	95.00	-90.40	17.00	120.00	3- Clean sand
46	95.00	-90.40	N/A	0.00	1- Plastic Clay
47	95.00	-90.40	N/A	135.00	4- Lime Stone/Very shelly sand
48	97.50	-92.90	N/A	135.00	4- Lime Stone/Very shelly sand
49	100.00	-95.40	N/A	120.00	4- Lime Stone/Very shelly sand
50	102.50	-97.90	N/A	135.00	4- Lime Stone/Very shelly sand
51	105.00	-100.40	N/A	135.00	4- Lime Stone/Very shelly sand
52	107.50	-102.90	N/A	135.00	4- Lime Stone/Very shelly sand
53	107.50	-102.90	N/A	0.00	1- Plastic Clay
54	107.50	-102.90	12.00	115.00	3- Clean sand
55	110.00	-105.40	12.00	115.00	3- Clean sand
56	112.50	-107.90	N/A	0.00	1- Plastic Clay
57	112.50	-107.90	N/A	125.00	4- Lime Stone/Very shelly sand
58	112.50	-107.90	N/A	125.00	4- Lime Stone/Very shelly sand
59	115.00	-110.40	N/A	135.00	4- Lime Stone/Very shelly sand
60	117.50	-112.90	N/A	135.00	4- Lime Stone/Very shelly sand
61	120.00	-115.40	N/A	125.00	4- Lime Stone/Very shelly sand
62	122.50	-117.90	N/A	135.00	4- Lime Stone/Very shelly sand
63	125.00	-120.40	N/A	135.00	4- Lime Stone/Very shelly sand

Top of Rock Socket
elev = -56'

ID	Cu-DIR (tsf)	qu (tsf)	qt (tsf)	Em (ksi)	qb (tsf)

1	N/A	N/A	N/A	N/A	N/A

"BB-03_Drilled_48in_Void=-56ft.out"

2	N/A	N/A	N/A	N/A	N/A
3	N/A	N/A	N/A	N/A	N/A
4	N/A	N/A	N/A	N/A	N/A
5	N/A	N/A	N/A	N/A	N/A
6	N/A	N/A	N/A	N/A	N/A
7	N/A	N/A	N/A	N/A	N/A
8	N/A	N/A	N/A	N/A	N/A
9	N/A	N/A	N/A	N/A	N/A
10	N/A	N/A	N/A	N/A	N/A
11	N/A	N/A	N/A	N/A	N/A
12	N/A	N/A	N/A	N/A	N/A
13	N/A	N/A	N/A	N/A	N/A
14	N/A	N/A	N/A	N/A	N/A
15	N/A	N/A	N/A	N/A	N/A
16	N/A	N/A	N/A	N/A	N/A
17	N/A	N/A	N/A	N/A	N/A
18	N/A	N/A	N/A	N/A	N/A
19	N/A	N/A	N/A	N/A	N/A
20	N/A	N/A	N/A	N/A	N/A
21	N/A	N/A	N/A	N/A	N/A
22	N/A	N/A	N/A	N/A	N/A
23	N/A	N/A	N/A	N/A	N/A
24	N/A	N/A	N/A	N/A	N/A
25	N/A	N/A	N/A	N/A	N/A
26	N/A	N/A	N/A	N/A	N/A
27	N/A	N/A	N/A	N/A	N/A
28	0.00	N/A	N/A	N/A	N/A
29	N/A	25.00	4.00	39.93	12.50
30	N/A	25.00	4.00	39.93	12.50
31	N/A	25.00	4.00	39.93	12.50
32	N/A	25.00	4.00	39.93	12.50
33	N/A	25.00	4.00	39.93	12.50
34	N/A	25.00	4.00	39.93	12.50
35	N/A	25.00	4.00	39.93	12.50
36	N/A	25.00	4.00	39.93	12.50
37	N/A	25.00	4.00	39.93	12.50
38	N/A	25.00	4.00	39.93	12.50
39	N/A	25.00	4.00	39.93	12.50
40	N/A	25.00	4.00	39.93	12.50
41	N/A	13.02	2.08	20.80	6.51
42	N/A	12.40	1.98	19.81	6.20
43	0.00	N/A	N/A	N/A	N/A
44	N/A	N/A	N/A	N/A	N/A
45	N/A	N/A	N/A	N/A	N/A
46	0.00	N/A	N/A	N/A	N/A
47	N/A	25.00	4.00	39.93	12.50
48	N/A	25.00	4.00	39.93	12.50
49	N/A	13.02	2.08	20.80	6.51
50	N/A	25.00	4.00	39.93	12.50
51	N/A	25.00	4.00	39.93	12.50
52	N/A	25.00	4.00	39.93	12.50
53	0.00	N/A	N/A	N/A	N/A

"BB-03_Drilled_48in_Void=-56ft.out"

Top of Rock Socket
elev = -56'

54	N/A	N/A	N/A	N/A	N/A
55	N/A	N/A	N/A	N/A	N/A
56	0.00	N/A	N/A	N/A	N/A
57	N/A	17.36	2.78	27.73	8.68
58	N/A	17.36	2.78	27.73	8.68
59	N/A	25.00	4.00	39.93	12.50
60	N/A	25.00	4.00	39.93	12.50
61	N/A	16.12	2.58	25.75	8.06
62	N/A	25.00	4.00	39.93	12.50
63	N/A	25.00	4.00	39.93	12.50

ID	RQD F.M.	S.R.I.	Rock Recovery
1	N/A	N/A	N/A
2	N/A	N/A	N/A
3	N/A	N/A	N/A
4	N/A	N/A	N/A
5	N/A	N/A	N/A
6	N/A	N/A	N/A
7	N/A	N/A	N/A
8	N/A	N/A	N/A
9	N/A	N/A	N/A
10	N/A	N/A	N/A
11	N/A	N/A	N/A
12	N/A	N/A	N/A
13	N/A	N/A	N/A
14	N/A	N/A	N/A
15	N/A	N/A	N/A
16	N/A	N/A	N/A
17	N/A	N/A	N/A
18	N/A	N/A	N/A
19	N/A	N/A	N/A
20	N/A	N/A	N/A
21	N/A	N/A	N/A
22	N/A	N/A	N/A
23	N/A	N/A	N/A
24	N/A	N/A	N/A
25	N/A	N/A	N/A
26	N/A	N/A	N/A
27	N/A	N/A	N/A
28	N/A	N/A	N/A
29	0.50	ROUGH	1.000
30	0.50	ROUGH	1.000
31	0.50	ROUGH	1.000
32	0.50	ROUGH	1.000
33	0.50	ROUGH	1.000
34	0.50	ROUGH	1.000
35	0.50	ROUGH	1.000
36	0.50	ROUGH	1.000
37	0.50	ROUGH	1.000
38	0.50	ROUGH	1.000

"BB-03_Drilled_48in_Void=-56ft.out"

39	0.50	ROUGH	1.000
40	0.50	ROUGH	1.000
41	0.50	ROUGH	1.000
42	0.50	ROUGH	1.000
43	N/A	N/A	N/A
44	N/A	N/A	N/A
45	N/A	N/A	N/A
46	N/A	N/A	N/A
47	0.50	ROUGH	1.000
48	0.50	ROUGH	1.000
49	0.50	ROUGH	1.000
50	0.50	ROUGH	1.000
51	0.50	ROUGH	1.000
52	0.50	ROUGH	1.000
53	N/A	N/A	N/A
54	N/A	N/A	N/A
55	N/A	N/A	N/A
56	N/A	N/A	N/A
57	0.50	ROUGH	1.000
58	0.50	ROUGH	1.000
59	0.50	ROUGH	1.000
60	0.50	ROUGH	1.000
61	0.50	ROUGH	1.000
62	0.50	ROUGH	1.000
63	0.50	ROUGH	1.000

Drilled Shaft Data:

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Unit weight of concrete = 145.00(pcf), Concrete Slump = 6.00(in)
Modulus of Elasticity of concrete = 3987.00(ksi)

Shaft Geometry:

ID	Length (ft)	Tip Elev. (ft)	Case Len. (ft)	Diameter (in)	Base Diam. (in)	Bell Len. (ft)
1	5.00	-0.40	0.00	48.00	48.00	0.00
2	7.00	-2.40	0.00	48.00	48.00	0.00
3	9.00	-4.40	0.00	48.00	48.00	0.00
4	11.00	-6.40	0.00	48.00	48.00	0.00
5	13.00	-8.40	0.00	48.00	48.00	0.00
6	15.00	-10.40	0.00	48.00	48.00	0.00
7	17.00	-12.40	0.00	48.00	48.00	0.00
8	19.00	-14.40	0.00	48.00	48.00	0.00
9	21.00	-16.40	0.00	48.00	48.00	0.00
10	23.00	-18.40	0.00	48.00	48.00	0.00
11	25.00	-20.40	0.00	48.00	48.00	0.00
12	27.00	-22.40	0.00	48.00	48.00	0.00
13	29.00	-24.40	0.00	48.00	48.00	0.00
14	31.00	-26.40	0.00	48.00	48.00	0.00
15	33.00	-28.40	0.00	48.00	48.00	0.00

"BB-03_Drilled_48in_Void=-56ft.out"

16	35.00	-30.40	0.00	48.00	48.00	0.00
17	37.00	-32.40	0.00	48.00	48.00	0.00
18	39.00	-34.40	0.00	48.00	48.00	0.00
19	41.00	-36.40	0.00	48.00	48.00	0.00
20	43.00	-38.40	0.00	48.00	48.00	0.00
21	45.00	-40.40	0.00	48.00	48.00	0.00
22	47.00	-42.40	0.00	48.00	48.00	0.00
23	49.00	-44.40	0.00	48.00	48.00	0.00
24	51.00	-46.40	0.00	48.00	48.00	0.00
25	53.00	-48.40	0.00	48.00	48.00	0.00
26	55.00	-50.40	0.00	48.00	48.00	0.00
27	57.00	-52.40	0.00	48.00	48.00	0.00
28	59.00	-54.40	0.00	48.00	48.00	0.00
29	61.00	-56.40	0.00	48.00	48.00	0.00
30	63.00	-58.40	0.00	48.00	48.00	0.00
31	65.00	-60.40	0.00	48.00	48.00	0.00
32	67.00	-62.40	0.00	48.00	48.00	0.00
33	69.00	-64.40	0.00	48.00	48.00	0.00
34	71.00	-66.40	0.00	48.00	48.00	0.00
35	73.00	-68.40	0.00	48.00	48.00	0.00
36	75.00	-70.40	0.00	48.00	48.00	0.00
37	77.00	-72.40	0.00	48.00	48.00	0.00
38	79.00	-74.40	0.00	48.00	48.00	0.00
39	81.00	-76.40	0.00	48.00	48.00	0.00
40	83.00	-78.40	0.00	48.00	48.00	0.00
41	85.00	-80.40	0.00	48.00	48.00	0.00
42	87.00	-82.40	0.00	48.00	48.00	0.00
43	89.00	-84.40	0.00	48.00	48.00	0.00
44	91.00	-86.40	0.00	48.00	48.00	0.00
45	93.00	-88.40	0.00	48.00	48.00	0.00
46	95.00	-90.40	0.00	48.00	48.00	0.00
47	97.00	-92.40	0.00	48.00	48.00	0.00
48	99.00	-94.40	0.00	48.00	48.00	0.00
49	101.00	-96.40	0.00	48.00	48.00	0.00
50	103.00	-98.40	0.00	48.00	48.00	0.00
51	105.00	-100.40	0.00	48.00	48.00	0.00
52	107.00	-102.40	0.00	48.00	48.00	0.00
53	109.00	-104.40	0.00	48.00	48.00	0.00
54	111.00	-106.40	0.00	48.00	48.00	0.00
55	113.00	-108.40	0.00	48.00	48.00	0.00
56	115.00	-110.40	0.00	48.00	48.00	0.00
57	117.00	-112.40	0.00	48.00	48.00	0.00
58	119.00	-114.40	0.00	48.00	48.00	0.00

Drilled Shaft Capacity (sorted by shaft diameter):

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Strength reduction factors: Skin-friction = 1.00, End-bearing = 1.00

ID	Diameter (in)	Length (ft)	Skin Fric. (tons)	End Bearing (tons)	Capacity (tons)

"BB-03_Drilled_48in_Void=-56ft.out"

1	48.00	5.00	0.000	0.000	0.000
2	48.00	7.00	0.000	0.000	0.000
3	48.00	9.00	0.000	0.000	0.000
4	48.00	11.00	0.000	0.000	0.000
5	48.00	13.00	0.000	0.000	0.000
6	48.00	15.00	0.000	0.000	0.000
7	48.00	17.00	0.000	0.000	0.000
8	48.00	19.00	0.000	0.000	0.000
9	48.00	21.00	0.000	0.000	0.000
10	48.00	23.00	0.000	0.000	0.000
11	48.00	25.00	0.000	0.000	0.000
12	48.00	27.00	0.000	0.000	0.000
13	48.00	29.00	0.000	0.000	0.000
14	48.00	31.00	0.000	0.000	0.000
15	48.00	33.00	0.000	0.000	0.000
16	48.00	35.00	0.000	0.000	0.000
17	48.00	37.00	0.000	0.000	0.000
18	48.00	39.00	0.000	0.000	0.000
19	48.00	41.00	0.000	0.000	0.000
20	48.00	43.00	0.000	0.000	0.000
21	48.00	45.00	0.000	0.000	0.000
22	48.00	47.00	0.000	0.000	0.000
23	48.00	49.00	0.000	0.000	0.000
24	48.00	51.00	0.000	0.000	0.000
25	48.00	53.00	0.000	0.000	0.000
26	48.00	55.00	0.000	0.000	0.000
27	48.00	57.00	0.000	0.000	0.000
28	48.00	59.00	0.000	0.000	0.000
29	48.00	61.00	25.133	157.080	182.212
30	48.00	63.00	150.797	157.080	307.876
31	48.00	65.00	276.460	157.080	433.540
32	48.00	67.00	402.124	157.080	559.204
33	48.00	69.00	527.788	157.080	684.867
34	48.00	71.00	653.451	157.080	810.531
35	48.00	73.00	779.115	157.080	936.195
36	48.00	75.00	904.779	157.080	1061.858
37	48.00	77.00	1030.442	157.080	1187.522
38	48.00	79.00	1156.106	157.080	1313.186
39	48.00	81.00	1281.770	157.080	1438.850
40	48.00	83.00	1407.434	157.080	1564.513
41	48.00	85.00	1533.097	157.080	1690.177
42	48.00	87.00	1658.761	157.080	1815.841
43	48.00	89.00	1784.425	157.080	1941.504
44	48.00	91.00	1879.978	81.807	1961.785
45	48.00	93.00	1930.861	123.817	2054.677
46	48.00	95.00	1938.290	157.080	2095.370
47	48.00	97.00	2063.954	157.080	2221.033
48	48.00	99.00	2189.617	157.080	2346.697
49	48.00	101.00	2285.170	81.807	2366.977
50	48.00	103.00	2365.668	157.080	2522.748
51	48.00	105.00	2491.332	157.080	2648.412
52	48.00	107.00	2616.996	157.080	2774.075

"BB-03_Drilled_48in_Void=-56ft.out"

53	48.00	109.00	2656.262	92.158	2748.420
54	48.00	111.00	2667.019	69.720	2736.738
55	48.00	113.00	2697.120	109.076	2806.196
56	48.00	115.00	2784.387	157.080	2941.467
57	48.00	117.00	2910.051	157.080	3067.130
58	48.00	119.00	3035.714	157.080	3192.794

Drilled Shaft Capacity at User-Defined Settlement (sorted by shaft diameter):

***** Capacity is NOT modified by the strength reduction factors *****

User-Defined Settlement = 1.04%

ID	Diameter (in)	Length (ft)	Skin Fric. (tons)	End Bearing (tons)	Capacity (tons)
1	48.00	5.00	0.000	0.000	0.000
2	48.00	7.00	0.000	0.000	0.000
3	48.00	9.00	0.000	0.000	0.000
4	48.00	11.00	0.000	0.000	0.000
5	48.00	13.00	0.000	0.000	0.000
6	48.00	15.00	0.000	0.000	0.000
7	48.00	17.00	0.000	0.000	0.000
8	48.00	19.00	0.000	0.000	0.000
9	48.00	21.00	0.000	0.000	0.000
10	48.00	23.00	0.000	0.000	0.000
11	48.00	25.00	0.000	0.000	0.000
12	48.00	27.00	0.000	0.000	0.000
13	48.00	29.00	0.000	0.000	0.000
14	48.00	31.00	0.000	0.000	0.000
15	48.00	33.00	0.000	0.000	0.000
16	48.00	35.00	0.000	0.000	0.000
17	48.00	37.00	0.000	0.000	0.000
18	48.00	39.00	0.000	0.000	0.000
19	48.00	41.00	0.000	0.000	0.000
20	48.00	43.00	0.000	0.000	0.000
21	48.00	45.00	0.000	0.000	0.000
22	48.00	47.00	0.000	0.000	0.000
23	48.00	49.00	0.000	0.000	0.000
24	48.00	51.00	0.000	0.000	0.000
25	48.00	53.00	0.000	0.000	0.000
26	48.00	55.00	0.000	0.000	0.000
27	48.00	57.00	0.000	0.000	0.000
28	48.00	59.00	0.000	0.000	0.000
29	48.00	61.00	12.429	1573.762	1586.191
30	48.00	63.00	70.716	473.782	544.499
31	48.00	65.00	123.290	315.651	438.940
32	48.00	67.00	170.974	245.573	416.546
33	48.00	69.00	215.518	211.233	426.751
34	48.00	71.00	261.924	209.369	471.293

"BB-03_Drilled_48in_Void=-56ft.out"

35	48.00	73.00	306.958	206.838	513.795
36	48.00	75.00	350.759	203.988	554.747
37	48.00	77.00	393.440	200.999	594.439
38	48.00	79.00	435.091	197.966	633.057
39	48.00	81.00	475.789	194.943	670.732
40	48.00	83.00	515.601	191.958	707.559
41	48.00	85.00	554.585	189.028	743.613
42	48.00	87.00	592.790	186.163	778.953
43	48.00	89.00	630.261	183.367	813.628
44	48.00	91.00	658.011	94.428	752.440
45	48.00	93.00	673.628	39.329	712.957
46	48.00	95.00	680.895	180.316	861.211
47	48.00	97.00	716.992	177.664	894.656
48	48.00	99.00	752.474	175.081	927.555
49	48.00	101.00	778.922	90.202	869.124
50	48.00	103.00	800.889	171.678	972.567
51	48.00	105.00	835.027	169.245	1004.272
52	48.00	107.00	868.640	166.872	1035.512
53	48.00	109.00	884.643	29.273	913.916
54	48.00	111.00	895.164	22.145	917.309
55	48.00	113.00	908.968	115.199	1024.167
56	48.00	115.00	931.645	164.359	1096.004
57	48.00	117.00	964.349	162.101	1126.450
58	48.00	119.00	996.593	159.896	1156.489

"BB-03_Drilled_48in_Void=-56ft.out"

General Information:

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Input file: lations\FB-Deep\Drilled Shaft\BB-03_Drilled_60in_Void=-56ft.in
Project number: B-22-074
Job name: Broad Causeway Bridge
Engineer: PV/TC
Units: English

Analysis Information:

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Analysis Type: Drilled Shaft Analysis

Soil Information:

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Boring date: 3/24/2023
Boring number: BB-03
Station number: 121+53 Offset: +32

Ground Elevation: 4.60(ft)
Water table Elevation = 4.60(ft)

Cu is calculated using: Direct method.
Rock side-friction is calculated using: McVay's method
Hammer type: Automatic Hammer, Correction factor = 1.24

ID	Depth (ft)	Elevation (ft)	SPT Blows (Blows/ft)	Unit Weight (pcf)	Soil Type

1	0.00	4.60	N/A	119.00	5- Cavity layer
2	2.00	2.60	N/A	119.00	5- Cavity layer
3	4.00	0.60	N/A	110.00	5- Cavity layer
4	6.00	-1.40	N/A	92.00	5- Cavity layer
5	8.00	-3.40	N/A	92.00	5- Cavity layer
6	10.00	-5.40	N/A	92.00	5- Cavity layer
7	12.00	-7.40	N/A	99.00	5- Cavity layer
8	14.00	-9.40	N/A	92.00	5- Cavity layer
9	16.00	-11.40	N/A	120.00	5- Cavity layer
10	20.00	-15.40	N/A	115.00	5- Cavity layer
11	22.50	-17.90	N/A	120.00	5- Cavity layer
12	25.00	-20.40	N/A	120.00	5- Cavity layer
13	27.50	-22.90	N/A	115.00	5- Cavity layer
14	30.00	-25.40	N/A	115.00	5- Cavity layer
15	32.50	-27.90	N/A	115.00	5- Cavity layer
16	35.00	-30.40	N/A	106.00	5- Cavity layer

"BB-03_Drilled_60in_Void=-56ft.out"

17	37.50	-32.90	N/A	117.00	5- Cavity layer
18	40.00	-35.40	N/A	116.00	5- Cavity layer
19	42.50	-37.90	N/A	118.00	5- Cavity layer
20	45.00	-40.40	N/A	124.00	5- Cavity layer
21	47.50	-42.90	N/A	119.00	5- Cavity layer
22	50.00	-45.40	N/A	116.00	5- Cavity layer
23	52.50	-47.90	N/A	133.00	5- Cavity layer
24	55.00	-50.40	N/A	133.00	5- Cavity layer
25	57.50	-52.90	N/A	119.00	5- Cavity layer
26	60.00	-55.40	N/A	133.00	5- Cavity layer
27	60.60	-56.00	N/A	135.00	5- Cavity layer
28	60.60	-56.00	N/A	0.00	1- Plastic Clay
29	60.60	-56.00	N/A	135.00	4- Lime Stone/Very shelly sand
30	62.50	-57.90	N/A	135.00	4- Lime Stone/Very shelly sand
31	65.00	-60.40	N/A	135.00	4- Lime Stone/Very shelly sand
32	67.50	-62.90	N/A	135.00	4- Lime Stone/Very shelly sand
33	70.00	-65.40	N/A	135.00	4- Lime Stone/Very shelly sand
34	72.50	-67.90	N/A	135.00	4- Lime Stone/Very shelly sand
35	75.00	-70.40	N/A	135.00	4- Lime Stone/Very shelly sand
36	77.50	-72.90	N/A	135.00	4- Lime Stone/Very shelly sand
37	80.00	-75.40	N/A	135.00	4- Lime Stone/Very shelly sand
38	82.50	-77.90	N/A	135.00	4- Lime Stone/Very shelly sand
39	85.00	-80.40	N/A	135.00	4- Lime Stone/Very shelly sand
40	87.50	-82.90	N/A	135.00	4- Lime Stone/Very shelly sand
41	90.00	-85.40	N/A	120.00	4- Lime Stone/Very shelly sand
42	92.50	-87.90	N/A	120.00	4- Lime Stone/Very shelly sand
43	92.50	-87.90	N/A	0.00	1- Plastic Clay
44	92.50	-87.90	17.00	120.00	3- Clean sand
45	95.00	-90.40	17.00	120.00	3- Clean sand
46	95.00	-90.40	N/A	0.00	1- Plastic Clay
47	95.00	-90.40	N/A	135.00	4- Lime Stone/Very shelly sand
48	97.50	-92.90	N/A	135.00	4- Lime Stone/Very shelly sand
49	100.00	-95.40	N/A	120.00	4- Lime Stone/Very shelly sand
50	102.50	-97.90	N/A	135.00	4- Lime Stone/Very shelly sand
51	105.00	-100.40	N/A	135.00	4- Lime Stone/Very shelly sand
52	107.50	-102.90	N/A	135.00	4- Lime Stone/Very shelly sand
53	107.50	-102.90	N/A	0.00	1- Plastic Clay
54	107.50	-102.90	12.00	115.00	3- Clean sand
55	110.00	-105.40	12.00	115.00	3- Clean sand
56	112.50	-107.90	N/A	0.00	1- Plastic Clay
57	112.50	-107.90	N/A	125.00	4- Lime Stone/Very shelly sand
58	112.50	-107.90	N/A	125.00	4- Lime Stone/Very shelly sand
59	115.00	-110.40	N/A	135.00	4- Lime Stone/Very shelly sand
60	117.50	-112.90	N/A	135.00	4- Lime Stone/Very shelly sand
61	120.00	-115.40	N/A	125.00	4- Lime Stone/Very shelly sand
62	122.50	-117.90	N/A	135.00	4- Lime Stone/Very shelly sand
63	125.00	-120.40	N/A	135.00	4- Lime Stone/Very shelly sand

ID	Cu-DIR (tsf)	qu (tsf)	qt (tsf)	Em (ksi)	qb (tsf)

1	N/A	N/A	N/A	N/A	N/A

"BB-03_Drilled_60in_Void=-56ft.out"

Top of Rock Socket
elev = -56'

2	N/A	N/A	N/A	N/A	N/A
3	N/A	N/A	N/A	N/A	N/A
4	N/A	N/A	N/A	N/A	N/A
5	N/A	N/A	N/A	N/A	N/A
6	N/A	N/A	N/A	N/A	N/A
7	N/A	N/A	N/A	N/A	N/A
8	N/A	N/A	N/A	N/A	N/A
9	N/A	N/A	N/A	N/A	N/A
10	N/A	N/A	N/A	N/A	N/A
11	N/A	N/A	N/A	N/A	N/A
12	N/A	N/A	N/A	N/A	N/A
13	N/A	N/A	N/A	N/A	N/A
14	N/A	N/A	N/A	N/A	N/A
15	N/A	N/A	N/A	N/A	N/A
16	N/A	N/A	N/A	N/A	N/A
17	N/A	N/A	N/A	N/A	N/A
18	N/A	N/A	N/A	N/A	N/A
19	N/A	N/A	N/A	N/A	N/A
20	N/A	N/A	N/A	N/A	N/A
21	N/A	N/A	N/A	N/A	N/A
22	N/A	N/A	N/A	N/A	N/A
23	N/A	N/A	N/A	N/A	N/A
24	N/A	N/A	N/A	N/A	N/A
25	N/A	N/A	N/A	N/A	N/A
26	N/A	N/A	N/A	N/A	N/A
27	N/A	N/A	N/A	N/A	N/A
28	0.00	N/A	N/A	N/A	N/A
29	N/A	25.00	4.00	39.93	12.50
30	N/A	25.00	4.00	39.93	12.50
31	N/A	25.00	4.00	39.93	12.50
32	N/A	25.00	4.00	39.93	12.50
33	N/A	25.00	4.00	39.93	12.50
34	N/A	25.00	4.00	39.93	12.50
35	N/A	25.00	4.00	39.93	12.50
36	N/A	25.00	4.00	39.93	12.50
37	N/A	25.00	4.00	39.93	12.50
38	N/A	25.00	4.00	39.93	12.50
39	N/A	25.00	4.00	39.93	12.50
40	N/A	25.00	4.00	39.93	12.50
41	N/A	13.02	2.08	20.80	6.51
42	N/A	12.40	1.98	19.81	6.20
43	0.00	N/A	N/A	N/A	N/A
44	N/A	N/A	N/A	N/A	N/A
45	N/A	N/A	N/A	N/A	N/A
46	0.00	N/A	N/A	N/A	N/A
47	N/A	25.00	4.00	39.93	12.50
48	N/A	25.00	4.00	39.93	12.50
49	N/A	13.02	2.08	20.80	6.51
50	N/A	25.00	4.00	39.93	12.50
51	N/A	25.00	4.00	39.93	12.50
52	N/A	25.00	4.00	39.93	12.50
53	0.00	N/A	N/A	N/A	N/A

"BB-03_Drilled_60in_Void=-56ft.out"

Top of Rock Socket
elev = -56'

54	N/A	N/A	N/A	N/A	N/A
55	N/A	N/A	N/A	N/A	N/A
56	0.00	N/A	N/A	N/A	N/A
57	N/A	17.36	2.78	27.73	8.68
58	N/A	17.36	2.78	27.73	8.68
59	N/A	25.00	4.00	39.93	12.50
60	N/A	25.00	4.00	39.93	12.50
61	N/A	16.12	2.58	25.75	8.06
62	N/A	25.00	4.00	39.93	12.50
63	N/A	25.00	4.00	39.93	12.50

ID RQD F.M. S.R.I. Rock Recovery

1	N/A	N/A	N/A
2	N/A	N/A	N/A
3	N/A	N/A	N/A
4	N/A	N/A	N/A
5	N/A	N/A	N/A
6	N/A	N/A	N/A
7	N/A	N/A	N/A
8	N/A	N/A	N/A
9	N/A	N/A	N/A
10	N/A	N/A	N/A
11	N/A	N/A	N/A
12	N/A	N/A	N/A
13	N/A	N/A	N/A
14	N/A	N/A	N/A
15	N/A	N/A	N/A
16	N/A	N/A	N/A
17	N/A	N/A	N/A
18	N/A	N/A	N/A
19	N/A	N/A	N/A
20	N/A	N/A	N/A
21	N/A	N/A	N/A
22	N/A	N/A	N/A
23	N/A	N/A	N/A
24	N/A	N/A	N/A
25	N/A	N/A	N/A
26	N/A	N/A	N/A
27	N/A	N/A	N/A
28	N/A	N/A	N/A
29	0.50	ROUGH	1.000
30	0.50	ROUGH	1.000
31	0.50	ROUGH	1.000
32	0.50	ROUGH	1.000
33	0.50	ROUGH	1.000
34	0.50	ROUGH	1.000
35	0.50	ROUGH	1.000
36	0.50	ROUGH	1.000
37	0.50	ROUGH	1.000
38	0.50	ROUGH	1.000

"BB-03_Drilled_60in_Void=-56ft.out"

39	0.50	ROUGH	1.000
40	0.50	ROUGH	1.000
41	0.50	ROUGH	1.000
42	0.50	ROUGH	1.000
43	N/A	N/A	N/A
44	N/A	N/A	N/A
45	N/A	N/A	N/A
46	N/A	N/A	N/A
47	0.50	ROUGH	1.000
48	0.50	ROUGH	1.000
49	0.50	ROUGH	1.000
50	0.50	ROUGH	1.000
51	0.50	ROUGH	1.000
52	0.50	ROUGH	1.000
53	N/A	N/A	N/A
54	N/A	N/A	N/A
55	N/A	N/A	N/A
56	N/A	N/A	N/A
57	0.50	ROUGH	1.000
58	0.50	ROUGH	1.000
59	0.50	ROUGH	1.000
60	0.50	ROUGH	1.000
61	0.50	ROUGH	1.000
62	0.50	ROUGH	1.000
63	0.50	ROUGH	1.000

Drilled Shaft Data:

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Unit weight of concrete = 145.00(pcf), Concrete Slump = 6.00(in)
Modulus of Elasticity of concrete = 3987.00(ksi)

Shaft Geometry:

ID	Length (ft)	Tip Elev. (ft)	Case Len. (ft)	Diameter (in)	Base Diam. (in)	Bell Len. (ft)

1	5.00	-0.40	0.00	60.00	60.00	0.00
2	7.00	-2.40	0.00	60.00	60.00	0.00
3	9.00	-4.40	0.00	60.00	60.00	0.00
4	11.00	-6.40	0.00	60.00	60.00	0.00
5	13.00	-8.40	0.00	60.00	60.00	0.00
6	15.00	-10.40	0.00	60.00	60.00	0.00
7	17.00	-12.40	0.00	60.00	60.00	0.00
8	19.00	-14.40	0.00	60.00	60.00	0.00
9	21.00	-16.40	0.00	60.00	60.00	0.00
10	23.00	-18.40	0.00	60.00	60.00	0.00
11	25.00	-20.40	0.00	60.00	60.00	0.00
12	27.00	-22.40	0.00	60.00	60.00	0.00
13	29.00	-24.40	0.00	60.00	60.00	0.00
14	31.00	-26.40	0.00	60.00	60.00	0.00
15	33.00	-28.40	0.00	60.00	60.00	0.00

"BB-03_Drilled_60in_Void=-56ft.out"

16	35.00	-30.40	0.00	60.00	60.00	0.00
17	37.00	-32.40	0.00	60.00	60.00	0.00
18	39.00	-34.40	0.00	60.00	60.00	0.00
19	41.00	-36.40	0.00	60.00	60.00	0.00
20	43.00	-38.40	0.00	60.00	60.00	0.00
21	45.00	-40.40	0.00	60.00	60.00	0.00
22	47.00	-42.40	0.00	60.00	60.00	0.00
23	49.00	-44.40	0.00	60.00	60.00	0.00
24	51.00	-46.40	0.00	60.00	60.00	0.00
25	53.00	-48.40	0.00	60.00	60.00	0.00
26	55.00	-50.40	0.00	60.00	60.00	0.00
27	57.00	-52.40	0.00	60.00	60.00	0.00
28	59.00	-54.40	0.00	60.00	60.00	0.00
29	61.00	-56.40	0.00	60.00	60.00	0.00
30	63.00	-58.40	0.00	60.00	60.00	0.00
31	65.00	-60.40	0.00	60.00	60.00	0.00
32	67.00	-62.40	0.00	60.00	60.00	0.00
33	69.00	-64.40	0.00	60.00	60.00	0.00
34	71.00	-66.40	0.00	60.00	60.00	0.00
35	73.00	-68.40	0.00	60.00	60.00	0.00
36	75.00	-70.40	0.00	60.00	60.00	0.00
37	77.00	-72.40	0.00	60.00	60.00	0.00
38	79.00	-74.40	0.00	60.00	60.00	0.00
39	81.00	-76.40	0.00	60.00	60.00	0.00
40	83.00	-78.40	0.00	60.00	60.00	0.00
41	85.00	-80.40	0.00	60.00	60.00	0.00
42	87.00	-82.40	0.00	60.00	60.00	0.00
43	89.00	-84.40	0.00	60.00	60.00	0.00
44	91.00	-86.40	0.00	60.00	60.00	0.00
45	93.00	-88.40	0.00	60.00	60.00	0.00
46	95.00	-90.40	0.00	60.00	60.00	0.00
47	97.00	-92.40	0.00	60.00	60.00	0.00
48	99.00	-94.40	0.00	60.00	60.00	0.00
49	101.00	-96.40	0.00	60.00	60.00	0.00
50	103.00	-98.40	0.00	60.00	60.00	0.00
51	105.00	-100.40	0.00	60.00	60.00	0.00
52	107.00	-102.40	0.00	60.00	60.00	0.00
53	109.00	-104.40	0.00	60.00	60.00	0.00
54	111.00	-106.40	0.00	60.00	60.00	0.00
55	113.00	-108.40	0.00	60.00	60.00	0.00
56	115.00	-110.40	0.00	60.00	60.00	0.00
57	117.00	-112.40	0.00	60.00	60.00	0.00
58	119.00	-114.40	0.00	60.00	60.00	0.00

Drilled Shaft Capacity (sorted by shaft diameter):

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Strength reduction factors: Skin-friction = 1.00, End-bearing = 1.00

ID	Diameter (in)	Length (ft)	Skin Fric. (tons)	End Bearing (tons)	Capacity (tons)

"BB-03_Drilled_60in_Void=-56ft.out"

1	60.00	5.00	0.000	0.000	0.000
2	60.00	7.00	0.000	0.000	0.000
3	60.00	9.00	0.000	0.000	0.000
4	60.00	11.00	0.000	0.000	0.000
5	60.00	13.00	0.000	0.000	0.000
6	60.00	15.00	0.000	0.000	0.000
7	60.00	17.00	0.000	0.000	0.000
8	60.00	19.00	0.000	0.000	0.000
9	60.00	21.00	0.000	0.000	0.000
10	60.00	23.00	0.000	0.000	0.000
11	60.00	25.00	0.000	0.000	0.000
12	60.00	27.00	0.000	0.000	0.000
13	60.00	29.00	0.000	0.000	0.000
14	60.00	31.00	0.000	0.000	0.000
15	60.00	33.00	0.000	0.000	0.000
16	60.00	35.00	0.000	0.000	0.000
17	60.00	37.00	0.000	0.000	0.000
18	60.00	39.00	0.000	0.000	0.000
19	60.00	41.00	0.000	0.000	0.000
20	60.00	43.00	0.000	0.000	0.000
21	60.00	45.00	0.000	0.000	0.000
22	60.00	47.00	0.000	0.000	0.000
23	60.00	49.00	0.000	0.000	0.000
24	60.00	51.00	0.000	0.000	0.000
25	60.00	53.00	0.000	0.000	0.000
26	60.00	55.00	0.000	0.000	0.000
27	60.00	57.00	0.000	0.000	0.000
28	60.00	59.00	0.000	0.000	0.000
29	60.00	61.00	31.416	245.437	276.853
30	60.00	63.00	188.496	245.437	433.933
31	60.00	65.00	345.575	245.437	591.012
32	60.00	67.00	502.655	245.437	748.092
33	60.00	69.00	659.735	245.437	905.172
34	60.00	71.00	816.814	245.437	1062.251
35	60.00	73.00	973.894	245.437	1219.331
36	60.00	75.00	1130.973	245.437	1376.410
37	60.00	77.00	1288.053	245.437	1533.490
38	60.00	79.00	1445.133	245.437	1690.570
39	60.00	81.00	1602.212	245.437	1847.649
40	60.00	83.00	1759.292	245.437	2004.729
41	60.00	85.00	1916.372	245.437	2161.809
42	60.00	87.00	2073.451	245.437	2318.888
43	60.00	89.00	2230.531	245.437	2475.968
44	60.00	91.00	2349.972	127.824	2477.796
45	60.00	93.00	2413.576	167.677	2581.252
46	60.00	95.00	2422.862	245.437	2668.299
47	60.00	97.00	2579.942	245.437	2825.379
48	60.00	99.00	2737.022	245.437	2982.459
49	60.00	101.00	2856.463	127.824	2984.287
50	60.00	103.00	2957.085	245.437	3202.522
51	60.00	105.00	3114.165	245.437	3359.602
52	60.00	107.00	3271.245	245.437	3516.681

"BB-03_Drilled_60in_Void=-56ft.out"

53	60.00	109.00	3320.328	119.998	3440.325
54	60.00	111.00	3333.773	90.781	3424.554
55	60.00	113.00	3371.400	170.431	3541.831
56	60.00	115.00	3480.484	245.437	3725.921
57	60.00	117.00	3637.563	245.437	3883.000
58	60.00	119.00	3794.643	245.437	4040.080

Drilled Shaft Capacity at User-Defined Settlement (sorted by shaft diameter):

***** Capacity is NOT modified by the strength reduction factors *****

User-Defined Settlement = 0.83%

ID	Diameter (in)	Length (ft)	Skin Fric. (tons)	End Bearing (tons)	Capacity (tons)
1	60.00	5.00	0.000	0.000	0.000
2	60.00	7.00	0.000	0.000	0.000
3	60.00	9.00	0.000	0.000	0.000
4	60.00	11.00	0.000	0.000	0.000
5	60.00	13.00	0.000	0.000	0.000
6	60.00	15.00	0.000	0.000	0.000
7	60.00	17.00	0.000	0.000	0.000
8	60.00	19.00	0.000	0.000	0.000
9	60.00	21.00	0.000	0.000	0.000
10	60.00	23.00	0.000	0.000	0.000
11	60.00	25.00	0.000	0.000	0.000
12	60.00	27.00	0.000	0.000	0.000
13	60.00	29.00	0.000	0.000	0.000
14	60.00	31.00	0.000	0.000	0.000
15	60.00	33.00	0.000	0.000	0.000
16	60.00	35.00	0.000	0.000	0.000
17	60.00	37.00	0.000	0.000	0.000
18	60.00	39.00	0.000	0.000	0.000
19	60.00	41.00	0.000	0.000	0.000
20	60.00	43.00	0.000	0.000	0.000
21	60.00	45.00	0.000	0.000	0.000
22	60.00	47.00	0.000	0.000	0.000
23	60.00	49.00	0.000	0.000	0.000
24	60.00	51.00	0.000	0.000	0.000
25	60.00	53.00	0.000	0.000	0.000
26	60.00	55.00	0.000	0.000	0.000
27	60.00	57.00	0.000	0.000	0.000
28	60.00	59.00	0.000	0.000	0.000
29	60.00	61.00	15.537	2460.983	2476.520
30	60.00	63.00	88.402	740.881	829.283
31	60.00	65.00	154.132	493.602	647.734
32	60.00	67.00	213.755	384.016	597.771
33	60.00	69.00	268.112	320.054	588.166
34	60.00	71.00	319.418	284.517	603.935

"BB-03_Drilled_60in_Void=-56ft.out"

35	60.00	73.00	374.123	282.647	656.771
36	60.00	75.00	427.275	280.102	707.377
37	60.00	77.00	479.020	277.181	756.200
38	60.00	79.00	529.477	274.056	803.533
39	60.00	81.00	578.746	270.829	849.576
40	60.00	83.00	626.914	267.564	894.477
41	60.00	85.00	674.053	264.298	938.351
42	60.00	87.00	720.230	261.056	981.286
43	60.00	89.00	765.501	257.854	1023.355
44	60.00	91.00	798.972	133.059	932.031
45	60.00	93.00	817.828	43.779	861.607
46	60.00	95.00	826.878	254.341	1081.219
47	60.00	97.00	870.456	251.243	1121.699
48	60.00	99.00	913.278	248.206	1161.485
49	60.00	101.00	945.149	128.110	1073.259
50	60.00	103.00	971.585	244.184	1215.769
51	60.00	105.00	1012.760	241.288	1254.048
52	60.00	107.00	1053.293	238.452	1291.746
53	60.00	109.00	1072.893	31.330	1104.223
54	60.00	111.00	1085.996	23.702	1109.698
55	60.00	113.00	1102.943	164.771	1267.714
56	60.00	115.00	1130.215	235.440	1365.654
57	60.00	117.00	1169.645	232.724	1402.369
58	60.00	119.00	1208.516	230.064	1438.580

"BB-03_Drilled_60in_Void=-56ft.out"

General Information:

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Input file: lations\FB-Deep\Drilled Shaft\BB-04_Drilled_48in_Void=-60ft.in
Project number: B-22-074
Job name: Broad Causeway Bridge
Engineer: PV/TC
Units: English

Analysis Information:

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Analysis Type: Drilled Shaft Analysis

Soil Information:

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Boring date: 3/28/2023
Boring number: BB-04
Station number: 123+79 Offset: +35

Ground Elevation: 2.70(ft)
Water table Elevation = 2.70(ft)

Cu is calculated using: Direct method.
Rock side-friction is calculated using: McVay's method
Hammer type: Automatic Hammer, Correction factor = 1.24

ID	Depth (ft)	Elevation (ft)	SPT Blows (Blows/ft)	Unit Weight (pcf)	Soil Type

1	0.00	2.70	N/A	116.00	5- Cavity layer
2	2.00	0.70	N/A	116.00	5- Cavity layer
3	4.00	-1.30	N/A	102.00	5- Cavity layer
4	6.00	-3.30	N/A	92.00	5- Cavity layer
5	8.00	-5.30	N/A	99.00	5- Cavity layer
6	10.00	-7.30	N/A	86.00	5- Cavity layer
7	12.00	-9.30	N/A	92.00	5- Cavity layer
8	14.00	-11.30	N/A	120.00	5- Cavity layer
9	16.00	-13.30	N/A	125.00	5- Cavity layer
10	20.00	-17.30	N/A	115.00	5- Cavity layer
11	22.50	-19.80	N/A	120.00	5- Cavity layer
12	25.00	-22.30	N/A	120.00	5- Cavity layer
13	27.50	-24.80	N/A	115.00	5- Cavity layer
14	30.00	-27.30	N/A	120.00	5- Cavity layer
15	32.50	-29.80	N/A	115.00	5- Cavity layer
16	35.00	-32.30	N/A	115.00	5- Cavity layer

"BB-04_Drilled_48in_Void=-60ft.out"

17	37.50	-34.80	N/A	115.00	5- Cavity layer
18	40.00	-37.30	N/A	115.00	5- Cavity layer
19	42.50	-39.80	N/A	92.00	5- Cavity layer
20	45.00	-42.30	N/A	86.00	5- Cavity layer
21	47.50	-44.80	N/A	109.00	5- Cavity layer
22	50.00	-47.30	N/A	106.00	5- Cavity layer
23	52.50	-49.80	N/A	119.00	5- Cavity layer
24	55.00	-52.30	N/A	129.00	5- Cavity layer
25	57.50	-54.80	N/A	120.00	5- Cavity layer
26	60.00	-57.30	N/A	120.00	5- Cavity layer
27	62.50	-59.80	N/A	135.00	5- Cavity layer
28	62.70	-60.00	N/A	135.00	5- Cavity layer
29	62.70	-60.00	N/A	0.00	1- Plastic Clay
30	62.70	-60.00	N/A	135.00	4- Lime Stone/Very shelly sand
31	65.00	-62.30	N/A	135.00	4- Lime Stone/Very shelly sand
32	67.50	-64.80	N/A	135.00	4- Lime Stone/Very shelly sand
33	70.00	-67.30	N/A	135.00	4- Lime Stone/Very shelly sand
34	72.50	-69.80	N/A	120.00	4- Lime Stone/Very shelly sand
35	72.50	-69.80	N/A	0.00	1- Plastic Clay
36	72.50	-69.80	1.00	115.00	3- Clean sand
37	75.00	-72.30	1.00	115.00	3- Clean sand
38	75.00	-72.30	N/A	0.00	1- Plastic Clay
39	75.00	-72.30	N/A	135.00	4- Lime Stone/Very shelly sand
40	77.50	-74.80	N/A	135.00	4- Lime Stone/Very shelly sand
41	80.00	-77.30	N/A	135.00	4- Lime Stone/Very shelly sand
42	82.50	-79.80	N/A	135.00	4- Lime Stone/Very shelly sand
43	85.00	-82.30	N/A	135.00	4- Lime Stone/Very shelly sand
44	87.50	-84.80	N/A	135.00	4- Lime Stone/Very shelly sand
45	90.00	-87.30	N/A	135.00	4- Lime Stone/Very shelly sand
46	92.50	-89.80	N/A	135.00	4- Lime Stone/Very shelly sand
47	95.00	-92.30	N/A	135.00	4- Lime Stone/Very shelly sand
48	97.50	-94.80	N/A	125.00	4- Lime Stone/Very shelly sand
49	97.50	-94.80	N/A	0.00	1- Plastic Clay
50	97.50	-94.80	19.00	120.00	3- Clean sand
51	100.00	-97.30	19.00	120.00	3- Clean sand
52	100.00	-97.30	N/A	0.00	1- Plastic Clay
53	100.00	-97.30	N/A	135.00	4- Lime Stone/Very shelly sand
54	102.50	-99.80	N/A	135.00	4- Lime Stone/Very shelly sand
55	105.00	-102.30	N/A	135.00	4- Lime Stone/Very shelly sand
56	107.50	-104.80	N/A	130.00	4- Lime Stone/Very shelly sand
57	110.00	-107.30	N/A	120.00	4- Lime Stone/Very shelly sand
58	110.00	-107.30	N/A	0.00	1- Plastic Clay
59	110.00	-107.30	2.00	115.00	3- Clean sand
60	112.50	-109.80	2.00	115.00	3- Clean sand
61	112.50	-109.80	N/A	0.00	1- Plastic Clay
62	112.50	-109.80	N/A	135.00	4- Lime Stone/Very shelly sand
63	115.00	-112.30	N/A	135.00	4- Lime Stone/Very shelly sand
64	115.00	-112.30	N/A	0.00	1- Plastic Clay
65	115.00	-112.30	17.00	120.00	3- Clean sand
66	117.50	-114.80	17.00	120.00	3- Clean sand
67	117.50	-114.80	N/A	0.00	1- Plastic Clay
68	117.50	-114.80	N/A	135.00	4- Lime Stone/Very shelly sand

Top of Rock Socket
elev = -60'

"BB-04_Drilled_48in_Void=-60ft.out"

69	120.00	-117.30	N/A	135.00	4- Lime Stone/Very shelly sand
70	122.50	-119.80	N/A	135.00	4- Lime Stone/Very shelly sand
71	125.00	-122.30	N/A	135.00	4- Lime Stone/Very shelly sand

ID	Cu-DIR (tsf)	qu (tsf)	qt (tsf)	Em (ksi)	qb (tsf)
1	N/A	N/A	N/A	N/A	N/A
2	N/A	N/A	N/A	N/A	N/A
3	N/A	N/A	N/A	N/A	N/A
4	N/A	N/A	N/A	N/A	N/A
5	N/A	N/A	N/A	N/A	N/A
6	N/A	N/A	N/A	N/A	N/A
7	N/A	N/A	N/A	N/A	N/A
8	N/A	N/A	N/A	N/A	N/A
9	N/A	N/A	N/A	N/A	N/A
10	N/A	N/A	N/A	N/A	N/A
11	N/A	N/A	N/A	N/A	N/A
12	N/A	N/A	N/A	N/A	N/A
13	N/A	N/A	N/A	N/A	N/A
14	N/A	N/A	N/A	N/A	N/A
15	N/A	N/A	N/A	N/A	N/A
16	N/A	N/A	N/A	N/A	N/A
17	N/A	N/A	N/A	N/A	N/A
18	N/A	N/A	N/A	N/A	N/A
19	N/A	N/A	N/A	N/A	N/A
20	N/A	N/A	N/A	N/A	N/A
21	N/A	N/A	N/A	N/A	N/A
22	N/A	N/A	N/A	N/A	N/A
23	N/A	N/A	N/A	N/A	N/A
24	N/A	N/A	N/A	N/A	N/A
25	N/A	N/A	N/A	N/A	N/A
26	N/A	N/A	N/A	N/A	N/A
27	N/A	N/A	N/A	N/A	N/A
28	N/A	N/A	N/A	N/A	N/A
29	0.00	N/A	N/A	N/A	N/A
30	N/A	25.00	4.00	39.93	12.50
31	N/A	25.00	4.00	39.93	12.50
32	N/A	25.00	4.00	39.93	12.50
33	N/A	25.00	4.00	39.93	12.50
34	N/A	12.40	1.98	19.81	6.20
35	0.00	N/A	N/A	N/A	N/A
36	N/A	N/A	N/A	N/A	N/A
37	N/A	N/A	N/A	N/A	N/A
38	0.00	N/A	N/A	N/A	N/A
39	N/A	25.00	4.00	39.93	12.50
40	N/A	25.00	4.00	39.93	12.50
41	N/A	25.00	4.00	39.93	12.50
42	N/A	25.00	4.00	39.93	12.50
43	N/A	25.00	4.00	39.93	12.50
44	N/A	25.00	4.00	39.93	12.50
45	N/A	25.00	4.00	39.93	12.50

"BB-04_Drilled_48in_Void=-60ft.out"

Top of Rock Socket
elev = -60'

46	N/A	25.00	4.00	39.93	12.50
47	N/A	25.00	4.00	39.93	12.50
48	N/A	16.74	2.68	26.74	8.37
49	0.00	N/A	N/A	N/A	N/A
50	N/A	N/A	N/A	N/A	N/A
51	N/A	N/A	N/A	N/A	N/A
52	0.00	N/A	N/A	N/A	N/A
53	N/A	25.00	4.00	39.93	12.50
54	N/A	25.00	4.00	39.93	12.50
55	N/A	25.00	4.00	39.93	12.50
56	N/A	25.00	4.00	39.93	12.50
57	N/A	12.40	1.98	19.81	6.20
58	0.00	N/A	N/A	N/A	N/A
59	N/A	N/A	N/A	N/A	N/A
60	N/A	N/A	N/A	N/A	N/A
61	0.00	N/A	N/A	N/A	N/A
62	N/A	25.00	4.00	39.93	12.50
63	N/A	25.00	4.00	39.93	12.50
64	0.00	N/A	N/A	N/A	N/A
65	N/A	N/A	N/A	N/A	N/A
66	N/A	N/A	N/A	N/A	N/A
67	0.00	N/A	N/A	N/A	N/A
68	N/A	25.00	4.00	39.93	12.50
69	N/A	25.00	4.00	39.93	12.50
70	N/A	25.00	4.00	39.93	12.50
71	N/A	25.00	4.00	39.93	12.50

ID	RQD F.M.	S.R.I.	Rock Recovery
1	N/A	N/A	N/A
2	N/A	N/A	N/A
3	N/A	N/A	N/A
4	N/A	N/A	N/A
5	N/A	N/A	N/A
6	N/A	N/A	N/A
7	N/A	N/A	N/A
8	N/A	N/A	N/A
9	N/A	N/A	N/A
10	N/A	N/A	N/A
11	N/A	N/A	N/A
12	N/A	N/A	N/A
13	N/A	N/A	N/A
14	N/A	N/A	N/A
15	N/A	N/A	N/A
16	N/A	N/A	N/A
17	N/A	N/A	N/A
18	N/A	N/A	N/A
19	N/A	N/A	N/A
20	N/A	N/A	N/A
21	N/A	N/A	N/A
22	N/A	N/A	N/A

"BB-04_Drilled_48in_Void=-60ft.out"

23	N/A	N/A	N/A
24	N/A	N/A	N/A
25	N/A	N/A	N/A
26	N/A	N/A	N/A
27	N/A	N/A	N/A
28	N/A	N/A	N/A
29	N/A	N/A	N/A
30	0.50	ROUGH	1.000
31	0.50	ROUGH	1.000
32	0.50	ROUGH	1.000
33	0.50	ROUGH	1.000
34	0.50	ROUGH	1.000
35	N/A	N/A	N/A
36	N/A	N/A	N/A
37	N/A	N/A	N/A
38	N/A	N/A	N/A
39	0.50	ROUGH	1.000
40	0.50	ROUGH	1.000
41	0.50	ROUGH	1.000
42	0.50	ROUGH	1.000
43	0.50	ROUGH	1.000
44	0.50	ROUGH	1.000
45	0.50	ROUGH	1.000
46	0.50	ROUGH	1.000
47	0.50	ROUGH	1.000
48	0.50	ROUGH	1.000
49	N/A	N/A	N/A
50	N/A	N/A	N/A
51	N/A	N/A	N/A
52	N/A	N/A	N/A
53	0.50	ROUGH	1.000
54	0.50	ROUGH	1.000
55	0.50	ROUGH	1.000
56	0.50	ROUGH	1.000
57	0.50	ROUGH	1.000
58	N/A	N/A	N/A
59	N/A	N/A	N/A
60	N/A	N/A	N/A
61	N/A	N/A	N/A
62	0.50	ROUGH	1.000
63	0.50	ROUGH	1.000
64	N/A	N/A	N/A
65	N/A	N/A	N/A
66	N/A	N/A	N/A
67	N/A	N/A	N/A
68	0.50	ROUGH	1.000
69	0.50	ROUGH	1.000
70	0.50	ROUGH	1.000
71	0.50	ROUGH	1.000

Drilled Shaft Data:

"BB-04_Drilled_48in_Void=-60ft.out"

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Unit weight of concrete = 145.00(pcf), Concrete Slump = 6.00(in)

Modulus of Elasticity of concrete = 3987.00(ksi)

Shaft Geometry:

ID	Length (ft)	Tip Elev. (ft)	Case Len. (ft)	Diameter (in)	Base Diam. (in)	Bell Len. (ft)
1	5.00	-2.30	0.00	48.00	48.00	0.00
2	7.00	-4.30	0.00	48.00	48.00	0.00
3	9.00	-6.30	0.00	48.00	48.00	0.00
4	11.00	-8.30	0.00	48.00	48.00	0.00
5	13.00	-10.30	0.00	48.00	48.00	0.00
6	15.00	-12.30	0.00	48.00	48.00	0.00
7	17.00	-14.30	0.00	48.00	48.00	0.00
8	19.00	-16.30	0.00	48.00	48.00	0.00
9	21.00	-18.30	0.00	48.00	48.00	0.00
10	23.00	-20.30	0.00	48.00	48.00	0.00
11	25.00	-22.30	0.00	48.00	48.00	0.00
12	27.00	-24.30	0.00	48.00	48.00	0.00
13	29.00	-26.30	0.00	48.00	48.00	0.00
14	31.00	-28.30	0.00	48.00	48.00	0.00
15	33.00	-30.30	0.00	48.00	48.00	0.00
16	35.00	-32.30	0.00	48.00	48.00	0.00
17	37.00	-34.30	0.00	48.00	48.00	0.00
18	39.00	-36.30	0.00	48.00	48.00	0.00
19	41.00	-38.30	0.00	48.00	48.00	0.00
20	43.00	-40.30	0.00	48.00	48.00	0.00
21	45.00	-42.30	0.00	48.00	48.00	0.00
22	47.00	-44.30	0.00	48.00	48.00	0.00
23	49.00	-46.30	0.00	48.00	48.00	0.00
24	51.00	-48.30	0.00	48.00	48.00	0.00
25	53.00	-50.30	0.00	48.00	48.00	0.00
26	55.00	-52.30	0.00	48.00	48.00	0.00
27	57.00	-54.30	0.00	48.00	48.00	0.00
28	59.00	-56.30	0.00	48.00	48.00	0.00
29	61.00	-58.30	0.00	48.00	48.00	0.00
30	63.00	-60.30	0.00	48.00	48.00	0.00
31	65.00	-62.30	0.00	48.00	48.00	0.00
32	67.00	-64.30	0.00	48.00	48.00	0.00
33	69.00	-66.30	0.00	48.00	48.00	0.00
34	71.00	-68.30	0.00	48.00	48.00	0.00
35	73.00	-70.30	0.00	48.00	48.00	0.00
36	75.00	-72.30	0.00	48.00	48.00	0.00
37	77.00	-74.30	0.00	48.00	48.00	0.00
38	79.00	-76.30	0.00	48.00	48.00	0.00
39	81.00	-78.30	0.00	48.00	48.00	0.00
40	83.00	-80.30	0.00	48.00	48.00	0.00
41	85.00	-82.30	0.00	48.00	48.00	0.00
42	87.00	-84.30	0.00	48.00	48.00	0.00
43	89.00	-86.30	0.00	48.00	48.00	0.00

"BB-04_Drilled_48in_Void=-60ft.out"

44	91.00	-88.30	0.00	48.00	48.00	0.00
45	93.00	-90.30	0.00	48.00	48.00	0.00
46	95.00	-92.30	0.00	48.00	48.00	0.00
47	97.00	-94.30	0.00	48.00	48.00	0.00
48	99.00	-96.30	0.00	48.00	48.00	0.00
49	101.00	-98.30	0.00	48.00	48.00	0.00
50	103.00	-100.30	0.00	48.00	48.00	0.00
51	105.00	-102.30	0.00	48.00	48.00	0.00
52	107.00	-104.30	0.00	48.00	48.00	0.00
53	109.00	-106.30	0.00	48.00	48.00	0.00
54	111.00	-108.30	0.00	48.00	48.00	0.00
55	113.00	-110.30	0.00	48.00	48.00	0.00
56	115.00	-112.30	0.00	48.00	48.00	0.00
57	117.00	-114.30	0.00	48.00	48.00	0.00
58	119.00	-116.30	0.00	48.00	48.00	0.00

Drilled Shaft Capacity (sorted by shaft diameter):

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Strength reduction factors: Skin-friction = 1.00, End-bearing = 1.00

ID	Diameter (in)	Length (ft)	Skin Fric. (tons)	End Bearing (tons)	Capacity (tons)
1	48.00	5.00	0.000	0.000	0.000
2	48.00	7.00	0.000	0.000	0.000
3	48.00	9.00	0.000	0.000	0.000
4	48.00	11.00	0.000	0.000	0.000
5	48.00	13.00	0.000	0.000	0.000
6	48.00	15.00	0.000	0.000	0.000
7	48.00	17.00	0.000	0.000	0.000
8	48.00	19.00	0.000	0.000	0.000
9	48.00	21.00	0.000	0.000	0.000
10	48.00	23.00	0.000	0.000	0.000
11	48.00	25.00	0.000	0.000	0.000
12	48.00	27.00	0.000	0.000	0.000
13	48.00	29.00	0.000	0.000	0.000
14	48.00	31.00	0.000	0.000	0.000
15	48.00	33.00	0.000	0.000	0.000
16	48.00	35.00	0.000	0.000	0.000
17	48.00	37.00	0.000	0.000	0.000
18	48.00	39.00	0.000	0.000	0.000
19	48.00	41.00	0.000	0.000	0.000
20	48.00	43.00	0.000	0.000	0.000
21	48.00	45.00	0.000	0.000	0.000
22	48.00	47.00	0.000	0.000	0.000
23	48.00	49.00	0.000	0.000	0.000
24	48.00	51.00	0.000	0.000	0.000
25	48.00	53.00	0.000	0.000	0.000
26	48.00	55.00	0.000	0.000	0.000
27	48.00	57.00	0.000	0.000	0.000
28	48.00	59.00	0.000	0.000	0.000

"BB-04_Drilled_48in_Void=-60ft.out"

29	48.00	61.00	0.000	0.000	0.000
30	48.00	63.00	18.850	157.080	175.929
31	48.00	65.00	144.513	157.080	301.593
32	48.00	67.00	270.177	157.080	427.257
33	48.00	69.00	395.841	157.080	552.920
34	48.00	71.00	521.504	157.080	678.584
35	48.00	73.00	616.321	9.349	625.671
36	48.00	75.00	618.804	157.080	775.884
37	48.00	77.00	744.468	157.080	901.548
38	48.00	79.00	870.132	157.080	1027.211
39	48.00	81.00	995.795	157.080	1152.875
40	48.00	83.00	1121.459	157.080	1278.539
41	48.00	85.00	1247.123	157.080	1404.202
42	48.00	87.00	1372.787	157.080	1529.866
43	48.00	89.00	1498.450	157.080	1655.530
44	48.00	91.00	1624.114	157.080	1781.194
45	48.00	93.00	1749.778	157.080	1906.857
46	48.00	95.00	1875.441	157.080	2032.521
47	48.00	97.00	2001.105	157.080	2158.185
48	48.00	99.00	2038.458	155.528	2193.986
49	48.00	101.00	2105.361	157.080	2262.440
50	48.00	103.00	2231.024	157.080	2388.104
51	48.00	105.00	2356.688	157.080	2513.768
52	48.00	107.00	2482.352	157.080	2639.431
53	48.00	109.00	2608.016	157.080	2765.095
54	48.00	111.00	2676.126	18.699	2694.824
55	48.00	113.00	2715.614	157.080	2872.694
56	48.00	115.00	2841.278	122.775	2964.053
57	48.00	117.00	2852.916	140.150	2993.066
58	48.00	119.00	2950.130	157.080	3107.210

Drilled Shaft Capacity at User-Defined Settlement (sorted by shaft diameter):

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**** Capacity is NOT modified by the strength reduction factors ****

User-Defined Settlement = 1.04%

ID	Diameter (in)	Length (ft)	Skin Fric. (tons)	End Bearing (tons)	Capacity (tons)
1	48.00	5.00	0.000	0.000	0.000
2	48.00	7.00	0.000	0.000	0.000
3	48.00	9.00	0.000	0.000	0.000
4	48.00	11.00	0.000	0.000	0.000
5	48.00	13.00	0.000	0.000	0.000
6	48.00	15.00	0.000	0.000	0.000
7	48.00	17.00	0.000	0.000	0.000
8	48.00	19.00	0.000	0.000	0.000
9	48.00	21.00	0.000	0.000	0.000
10	48.00	23.00	0.000	0.000	0.000

"BB-04_Drilled_48in_Void=-60ft.out"

11	48.00	25.00	0.000	0.000	0.000
12	48.00	27.00	0.000	0.000	0.000
13	48.00	29.00	0.000	0.000	0.000
14	48.00	31.00	0.000	0.000	0.000
15	48.00	33.00	0.000	0.000	0.000
16	48.00	35.00	0.000	0.000	0.000
17	48.00	37.00	0.000	0.000	0.000
18	48.00	39.00	0.000	0.000	0.000
19	48.00	41.00	0.000	0.000	0.000
20	48.00	43.00	0.000	0.000	0.000
21	48.00	45.00	0.000	0.000	0.000
22	48.00	47.00	0.000	0.000	0.000
23	48.00	49.00	0.000	0.000	0.000
24	48.00	51.00	0.000	0.000	0.000
25	48.00	53.00	0.000	0.000	0.000
26	48.00	55.00	0.000	0.000	0.000
27	48.00	57.00	0.000	0.000	0.000
28	48.00	59.00	0.000	0.000	0.000
29	48.00	61.00	0.000	0.000	0.000
30	48.00	63.00	9.348	1908.314	1917.662
31	48.00	65.00	67.961	487.487	555.447
32	48.00	67.00	120.831	320.551	441.382
33	48.00	69.00	168.788	248.177	416.965
34	48.00	71.00	213.304	211.297	424.601
35	48.00	73.00	248.890	2.970	251.859
36	48.00	75.00	251.318	210.022	461.340
37	48.00	77.00	296.841	207.642	504.483
38	48.00	79.00	341.100	204.864	545.964
39	48.00	81.00	384.211	201.904	586.115
40	48.00	83.00	426.272	198.877	625.149
41	48.00	85.00	467.362	195.847	663.209
42	48.00	87.00	507.551	192.848	700.399
43	48.00	89.00	546.896	189.901	736.797
44	48.00	91.00	585.451	187.016	772.467
45	48.00	93.00	623.262	184.198	807.460
46	48.00	95.00	660.369	181.451	841.820
47	48.00	97.00	696.811	178.773	875.584
48	48.00	99.00	711.628	49.401	761.029
49	48.00	101.00	733.544	176.810	910.353
50	48.00	103.00	768.959	174.250	943.209
51	48.00	105.00	803.796	171.756	975.552
52	48.00	107.00	838.080	169.323	1007.403
53	48.00	109.00	871.835	166.951	1038.786
54	48.00	111.00	893.685	5.939	899.624
55	48.00	113.00	909.893	165.209	1075.101
56	48.00	115.00	942.839	38.998	981.836
57	48.00	117.00	954.222	44.517	998.739
58	48.00	119.00	981.571	161.263	1142.834

"BB-04_Drilled_48in_Void=-60ft.out"

General Information:

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Input file: lations\FB-Deep\Drilled Shaft\BB-04_Drilled_60in_Void=-60ft.in
Project number: B-22-074
Job name: Broad Causeway Bridge
Engineer: PV/TC
Units: English

Analysis Information:

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Analysis Type: Drilled Shaft Analysis

Soil Information:

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Boring date: 3/28/2023
Boring number: BB-04
Station number: 123+79 Offset: +35

Ground Elevation: 2.70(ft)
Water table Elevation = 2.70(ft)

Cu is calculated using: Direct method.
Rock side-friction is calculated using: McVay's method
Hammer type: Automatic Hammer, Correction factor = 1.24

ID	Depth (ft)	Elevation (ft)	SPT Blows (Blows/ft)	Unit Weight (pcf)	Soil Type

1	0.00	2.70	N/A	116.00	5- Cavity layer
2	2.00	0.70	N/A	116.00	5- Cavity layer
3	4.00	-1.30	N/A	102.00	5- Cavity layer
4	6.00	-3.30	N/A	92.00	5- Cavity layer
5	8.00	-5.30	N/A	99.00	5- Cavity layer
6	10.00	-7.30	N/A	86.00	5- Cavity layer
7	12.00	-9.30	N/A	92.00	5- Cavity layer
8	14.00	-11.30	N/A	120.00	5- Cavity layer
9	16.00	-13.30	N/A	125.00	5- Cavity layer
10	20.00	-17.30	N/A	115.00	5- Cavity layer
11	22.50	-19.80	N/A	120.00	5- Cavity layer
12	25.00	-22.30	N/A	120.00	5- Cavity layer
13	27.50	-24.80	N/A	115.00	5- Cavity layer
14	30.00	-27.30	N/A	120.00	5- Cavity layer
15	32.50	-29.80	N/A	115.00	5- Cavity layer
16	35.00	-32.30	N/A	115.00	5- Cavity layer

"BB-04_Drilled_60in_Void=-60ft.out"

17	37.50	-34.80	N/A	115.00	5- Cavity layer
18	40.00	-37.30	N/A	115.00	5- Cavity layer
19	42.50	-39.80	N/A	92.00	5- Cavity layer
20	45.00	-42.30	N/A	86.00	5- Cavity layer
21	47.50	-44.80	N/A	109.00	5- Cavity layer
22	50.00	-47.30	N/A	106.00	5- Cavity layer
23	52.50	-49.80	N/A	119.00	5- Cavity layer
24	55.00	-52.30	N/A	129.00	5- Cavity layer
25	57.50	-54.80	N/A	120.00	5- Cavity layer
26	60.00	-57.30	N/A	120.00	5- Cavity layer
27	62.50	-59.80	N/A	135.00	5- Cavity layer
28	62.70	-60.00	N/A	135.00	5- Cavity layer
29	62.70	-60.00	N/A	0.00	1- Plastic Clay
30	62.70	-60.00	N/A	135.00	4- Lime Stone/Very shelly sand
31	65.00	-62.30	N/A	135.00	4- Lime Stone/Very shelly sand
32	67.50	-64.80	N/A	135.00	4- Lime Stone/Very shelly sand
33	70.00	-67.30	N/A	135.00	4- Lime Stone/Very shelly sand
34	72.50	-69.80	N/A	120.00	4- Lime Stone/Very shelly sand
35	72.50	-69.80	N/A	0.00	1- Plastic Clay
36	72.50	-69.80	1.00	115.00	3- Clean sand
37	75.00	-72.30	1.00	115.00	3- Clean sand
38	75.00	-72.30	N/A	0.00	1- Plastic Clay
39	75.00	-72.30	N/A	135.00	4- Lime Stone/Very shelly sand
40	77.50	-74.80	N/A	135.00	4- Lime Stone/Very shelly sand
41	80.00	-77.30	N/A	135.00	4- Lime Stone/Very shelly sand
42	82.50	-79.80	N/A	135.00	4- Lime Stone/Very shelly sand
43	85.00	-82.30	N/A	135.00	4- Lime Stone/Very shelly sand
44	87.50	-84.80	N/A	135.00	4- Lime Stone/Very shelly sand
45	90.00	-87.30	N/A	135.00	4- Lime Stone/Very shelly sand
46	92.50	-89.80	N/A	135.00	4- Lime Stone/Very shelly sand
47	95.00	-92.30	N/A	135.00	4- Lime Stone/Very shelly sand
48	97.50	-94.80	N/A	125.00	4- Lime Stone/Very shelly sand
49	97.50	-94.80	N/A	0.00	1- Plastic Clay
50	97.50	-94.80	19.00	120.00	3- Clean sand
51	100.00	-97.30	19.00	120.00	3- Clean sand
52	100.00	-97.30	N/A	0.00	1- Plastic Clay
53	100.00	-97.30	N/A	135.00	4- Lime Stone/Very shelly sand
54	102.50	-99.80	N/A	135.00	4- Lime Stone/Very shelly sand
55	105.00	-102.30	N/A	135.00	4- Lime Stone/Very shelly sand
56	107.50	-104.80	N/A	130.00	4- Lime Stone/Very shelly sand
57	110.00	-107.30	N/A	120.00	4- Lime Stone/Very shelly sand
58	110.00	-107.30	N/A	0.00	1- Plastic Clay
59	110.00	-107.30	2.00	115.00	3- Clean sand
60	112.50	-109.80	2.00	115.00	3- Clean sand
61	112.50	-109.80	N/A	0.00	1- Plastic Clay
62	112.50	-109.80	N/A	135.00	4- Lime Stone/Very shelly sand
63	115.00	-112.30	N/A	135.00	4- Lime Stone/Very shelly sand
64	115.00	-112.30	N/A	0.00	1- Plastic Clay
65	115.00	-112.30	17.00	120.00	3- Clean sand
66	117.50	-114.80	17.00	120.00	3- Clean sand
67	117.50	-114.80	N/A	0.00	1- Plastic Clay
68	117.50	-114.80	N/A	135.00	4- Lime Stone/Very shelly sand

"BB-04_Drilled_60in_Void=-60ft.out"

Top of Rock Socket
elev = -60'

69	120.00	-117.30	N/A	135.00	4- Lime Stone/Very shelly sand
70	122.50	-119.80	N/A	135.00	4- Lime Stone/Very shelly sand
71	125.00	-122.30	N/A	135.00	4- Lime Stone/Very shelly sand

ID	Cu-DIR (tsf)	qu (tsf)	qt (tsf)	Em (ksi)	qb (tsf)
1	N/A	N/A	N/A	N/A	N/A
2	N/A	N/A	N/A	N/A	N/A
3	N/A	N/A	N/A	N/A	N/A
4	N/A	N/A	N/A	N/A	N/A
5	N/A	N/A	N/A	N/A	N/A
6	N/A	N/A	N/A	N/A	N/A
7	N/A	N/A	N/A	N/A	N/A
8	N/A	N/A	N/A	N/A	N/A
9	N/A	N/A	N/A	N/A	N/A
10	N/A	N/A	N/A	N/A	N/A
11	N/A	N/A	N/A	N/A	N/A
12	N/A	N/A	N/A	N/A	N/A
13	N/A	N/A	N/A	N/A	N/A
14	N/A	N/A	N/A	N/A	N/A
15	N/A	N/A	N/A	N/A	N/A
16	N/A	N/A	N/A	N/A	N/A
17	N/A	N/A	N/A	N/A	N/A
18	N/A	N/A	N/A	N/A	N/A
19	N/A	N/A	N/A	N/A	N/A
20	N/A	N/A	N/A	N/A	N/A
21	N/A	N/A	N/A	N/A	N/A
22	N/A	N/A	N/A	N/A	N/A
23	N/A	N/A	N/A	N/A	N/A
24	N/A	N/A	N/A	N/A	N/A
25	N/A	N/A	N/A	N/A	N/A
26	N/A	N/A	N/A	N/A	N/A
27	N/A	N/A	N/A	N/A	N/A
28	N/A	N/A	N/A	N/A	N/A
29	0.00	N/A	N/A	N/A	N/A
30	N/A	25.00	4.00	39.93	12.50
31	N/A	25.00	4.00	39.93	12.50
32	N/A	25.00	4.00	39.93	12.50
33	N/A	25.00	4.00	39.93	12.50
34	N/A	12.40	1.98	19.81	6.20
35	0.00	N/A	N/A	N/A	N/A
36	N/A	N/A	N/A	N/A	N/A
37	N/A	N/A	N/A	N/A	N/A
38	0.00	N/A	N/A	N/A	N/A
39	N/A	25.00	4.00	39.93	12.50
40	N/A	25.00	4.00	39.93	12.50
41	N/A	25.00	4.00	39.93	12.50
42	N/A	25.00	4.00	39.93	12.50
43	N/A	25.00	4.00	39.93	12.50
44	N/A	25.00	4.00	39.93	12.50
45	N/A	25.00	4.00	39.93	12.50

"BB-04_Drilled_60in_Void=-60ft.out"

Top of Rock Socket
elev = -60'

46	N/A	25.00	4.00	39.93	12.50
47	N/A	25.00	4.00	39.93	12.50
48	N/A	16.74	2.68	26.74	8.37
49	0.00	N/A	N/A	N/A	N/A
50	N/A	N/A	N/A	N/A	N/A
51	N/A	N/A	N/A	N/A	N/A
52	0.00	N/A	N/A	N/A	N/A
53	N/A	25.00	4.00	39.93	12.50
54	N/A	25.00	4.00	39.93	12.50
55	N/A	25.00	4.00	39.93	12.50
56	N/A	25.00	4.00	39.93	12.50
57	N/A	12.40	1.98	19.81	6.20
58	0.00	N/A	N/A	N/A	N/A
59	N/A	N/A	N/A	N/A	N/A
60	N/A	N/A	N/A	N/A	N/A
61	0.00	N/A	N/A	N/A	N/A
62	N/A	25.00	4.00	39.93	12.50
63	N/A	25.00	4.00	39.93	12.50
64	0.00	N/A	N/A	N/A	N/A
65	N/A	N/A	N/A	N/A	N/A
66	N/A	N/A	N/A	N/A	N/A
67	0.00	N/A	N/A	N/A	N/A
68	N/A	25.00	4.00	39.93	12.50
69	N/A	25.00	4.00	39.93	12.50
70	N/A	25.00	4.00	39.93	12.50
71	N/A	25.00	4.00	39.93	12.50

ID	RQD F.M.	S.R.I.	Rock Recovery
1	N/A	N/A	N/A
2	N/A	N/A	N/A
3	N/A	N/A	N/A
4	N/A	N/A	N/A
5	N/A	N/A	N/A
6	N/A	N/A	N/A
7	N/A	N/A	N/A
8	N/A	N/A	N/A
9	N/A	N/A	N/A
10	N/A	N/A	N/A
11	N/A	N/A	N/A
12	N/A	N/A	N/A
13	N/A	N/A	N/A
14	N/A	N/A	N/A
15	N/A	N/A	N/A
16	N/A	N/A	N/A
17	N/A	N/A	N/A
18	N/A	N/A	N/A
19	N/A	N/A	N/A
20	N/A	N/A	N/A
21	N/A	N/A	N/A
22	N/A	N/A	N/A

"BB-04_Drilled_60in_Void=-60ft.out"

23	N/A	N/A	N/A
24	N/A	N/A	N/A
25	N/A	N/A	N/A
26	N/A	N/A	N/A
27	N/A	N/A	N/A
28	N/A	N/A	N/A
29	N/A	N/A	N/A
30	0.50	ROUGH	1.000
31	0.50	ROUGH	1.000
32	0.50	ROUGH	1.000
33	0.50	ROUGH	1.000
34	0.50	ROUGH	1.000
35	N/A	N/A	N/A
36	N/A	N/A	N/A
37	N/A	N/A	N/A
38	N/A	N/A	N/A
39	0.50	ROUGH	1.000
40	0.50	ROUGH	1.000
41	0.50	ROUGH	1.000
42	0.50	ROUGH	1.000
43	0.50	ROUGH	1.000
44	0.50	ROUGH	1.000
45	0.50	ROUGH	1.000
46	0.50	ROUGH	1.000
47	0.50	ROUGH	1.000
48	0.50	ROUGH	1.000
49	N/A	N/A	N/A
50	N/A	N/A	N/A
51	N/A	N/A	N/A
52	N/A	N/A	N/A
53	0.50	ROUGH	1.000
54	0.50	ROUGH	1.000
55	0.50	ROUGH	1.000
56	0.50	ROUGH	1.000
57	0.50	ROUGH	1.000
58	N/A	N/A	N/A
59	N/A	N/A	N/A
60	N/A	N/A	N/A
61	N/A	N/A	N/A
62	0.50	ROUGH	1.000
63	0.50	ROUGH	1.000
64	N/A	N/A	N/A
65	N/A	N/A	N/A
66	N/A	N/A	N/A
67	N/A	N/A	N/A
68	0.50	ROUGH	1.000
69	0.50	ROUGH	1.000
70	0.50	ROUGH	1.000
71	0.50	ROUGH	1.000

Drilled Shaft Data:

"BB-04_Drilled_60in_Void=-60ft.out"

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Unit weight of concrete = 145.00(pcf), Concrete Slump = 6.00(in)

Modulus of Elasticity of concrete = 3987.00(ksi)

Shaft Geometry:

ID	Length (ft)	Tip Elev. (ft)	Case Len. (ft)	Diameter (in)	Base Diam. (in)	Bell Len. (ft)
1	5.00	-2.30	0.00	60.00	60.00	0.00
2	7.00	-4.30	0.00	60.00	60.00	0.00
3	9.00	-6.30	0.00	60.00	60.00	0.00
4	11.00	-8.30	0.00	60.00	60.00	0.00
5	13.00	-10.30	0.00	60.00	60.00	0.00
6	15.00	-12.30	0.00	60.00	60.00	0.00
7	17.00	-14.30	0.00	60.00	60.00	0.00
8	19.00	-16.30	0.00	60.00	60.00	0.00
9	21.00	-18.30	0.00	60.00	60.00	0.00
10	23.00	-20.30	0.00	60.00	60.00	0.00
11	25.00	-22.30	0.00	60.00	60.00	0.00
12	27.00	-24.30	0.00	60.00	60.00	0.00
13	29.00	-26.30	0.00	60.00	60.00	0.00
14	31.00	-28.30	0.00	60.00	60.00	0.00
15	33.00	-30.30	0.00	60.00	60.00	0.00
16	35.00	-32.30	0.00	60.00	60.00	0.00
17	37.00	-34.30	0.00	60.00	60.00	0.00
18	39.00	-36.30	0.00	60.00	60.00	0.00
19	41.00	-38.30	0.00	60.00	60.00	0.00
20	43.00	-40.30	0.00	60.00	60.00	0.00
21	45.00	-42.30	0.00	60.00	60.00	0.00
22	47.00	-44.30	0.00	60.00	60.00	0.00
23	49.00	-46.30	0.00	60.00	60.00	0.00
24	51.00	-48.30	0.00	60.00	60.00	0.00
25	53.00	-50.30	0.00	60.00	60.00	0.00
26	55.00	-52.30	0.00	60.00	60.00	0.00
27	57.00	-54.30	0.00	60.00	60.00	0.00
28	59.00	-56.30	0.00	60.00	60.00	0.00
29	61.00	-58.30	0.00	60.00	60.00	0.00
30	63.00	-60.30	0.00	60.00	60.00	0.00
31	65.00	-62.30	0.00	60.00	60.00	0.00
32	67.00	-64.30	0.00	60.00	60.00	0.00
33	69.00	-66.30	0.00	60.00	60.00	0.00
34	71.00	-68.30	0.00	60.00	60.00	0.00
35	73.00	-70.30	0.00	60.00	60.00	0.00
36	75.00	-72.30	0.00	60.00	60.00	0.00
37	77.00	-74.30	0.00	60.00	60.00	0.00
38	79.00	-76.30	0.00	60.00	60.00	0.00
39	81.00	-78.30	0.00	60.00	60.00	0.00
40	83.00	-80.30	0.00	60.00	60.00	0.00
41	85.00	-82.30	0.00	60.00	60.00	0.00
42	87.00	-84.30	0.00	60.00	60.00	0.00
43	89.00	-86.30	0.00	60.00	60.00	0.00

"BB-04_Drilled_60in_Void=-60ft.out"

44	91.00	-88.30	0.00	60.00	60.00	0.00
45	93.00	-90.30	0.00	60.00	60.00	0.00
46	95.00	-92.30	0.00	60.00	60.00	0.00
47	97.00	-94.30	0.00	60.00	60.00	0.00
48	99.00	-96.30	0.00	60.00	60.00	0.00
49	101.00	-98.30	0.00	60.00	60.00	0.00
50	103.00	-100.30	0.00	60.00	60.00	0.00
51	105.00	-102.30	0.00	60.00	60.00	0.00
52	107.00	-104.30	0.00	60.00	60.00	0.00
53	109.00	-106.30	0.00	60.00	60.00	0.00
54	111.00	-108.30	0.00	60.00	60.00	0.00
55	113.00	-110.30	0.00	60.00	60.00	0.00
56	115.00	-112.30	0.00	60.00	60.00	0.00

Drilled Shaft Capacity (sorted by shaft diameter):

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Strength reduction factors: Skin-friction = 1.00, End-bearing = 1.00

ID	Diameter (in)	Length (ft)	Skin Fric. (tons)	End Bearing (tons)	Capacity (tons)

1	60.00	5.00	0.000	0.000	0.000
2	60.00	7.00	0.000	0.000	0.000
3	60.00	9.00	0.000	0.000	0.000
4	60.00	11.00	0.000	0.000	0.000
5	60.00	13.00	0.000	0.000	0.000
6	60.00	15.00	0.000	0.000	0.000
7	60.00	17.00	0.000	0.000	0.000
8	60.00	19.00	0.000	0.000	0.000
9	60.00	21.00	0.000	0.000	0.000
10	60.00	23.00	0.000	0.000	0.000
11	60.00	25.00	0.000	0.000	0.000
12	60.00	27.00	0.000	0.000	0.000
13	60.00	29.00	0.000	0.000	0.000
14	60.00	31.00	0.000	0.000	0.000
15	60.00	33.00	0.000	0.000	0.000
16	60.00	35.00	0.000	0.000	0.000
17	60.00	37.00	0.000	0.000	0.000
18	60.00	39.00	0.000	0.000	0.000
19	60.00	41.00	0.000	0.000	0.000
20	60.00	43.00	0.000	0.000	0.000
21	60.00	45.00	0.000	0.000	0.000
22	60.00	47.00	0.000	0.000	0.000
23	60.00	49.00	0.000	0.000	0.000
24	60.00	51.00	0.000	0.000	0.000
25	60.00	53.00	0.000	0.000	0.000
26	60.00	55.00	0.000	0.000	0.000
27	60.00	57.00	0.000	0.000	0.000
28	60.00	59.00	0.000	0.000	0.000
29	60.00	61.00	0.000	0.000	0.000
30	60.00	63.00	23.562	245.437	268.999

"BB-04_Drilled_60in_Void=-60ft.out"

31	60.00	65.00	180.642	245.437	426.078
32	60.00	67.00	337.721	245.437	583.158
33	60.00	69.00	494.801	245.437	740.238
34	60.00	71.00	651.880	245.437	897.317
35	60.00	73.00	770.402	12.174	782.575
36	60.00	75.00	773.505	245.437	1018.942
37	60.00	77.00	930.585	245.437	1176.022
38	60.00	79.00	1087.665	245.437	1333.102
39	60.00	81.00	1244.744	245.437	1490.181
40	60.00	83.00	1401.824	245.437	1647.261
41	60.00	85.00	1558.904	245.437	1804.340
42	60.00	87.00	1715.983	245.437	1961.420
43	60.00	89.00	1873.063	245.437	2118.500
44	60.00	91.00	2030.142	245.437	2275.579
45	60.00	93.00	2187.222	245.437	2432.659
46	60.00	95.00	2344.302	245.437	2589.739
47	60.00	97.00	2501.381	245.437	2746.818
48	60.00	99.00	2548.072	200.595	2748.668
49	60.00	101.00	2631.701	245.437	2877.138
50	60.00	103.00	2788.780	245.437	3034.217
51	60.00	105.00	2945.860	245.437	3191.297
52	60.00	107.00	3102.940	245.437	3348.377
53	60.00	109.00	3260.019	245.437	3505.456
54	60.00	111.00	3345.157	24.347	3369.504
55	60.00	113.00	3394.518	245.437	3639.954
56	60.00	115.00	3551.597	159.788	3711.385

Drilled Shaft Capacity at User-Defined Settlement (sorted by shaft diameter):

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**** Capacity is NOT modified by the strength reduction factors ****

User-Defined Settlement = 0.83%

ID	Diameter (in)	Length (ft)	Skin Fric. (tons)	End Bearing (tons)	Capacity (tons)

1	60.00	5.00	0.000	0.000	0.000
2	60.00	7.00	0.000	0.000	0.000
3	60.00	9.00	0.000	0.000	0.000
4	60.00	11.00	0.000	0.000	0.000
5	60.00	13.00	0.000	0.000	0.000
6	60.00	15.00	0.000	0.000	0.000
7	60.00	17.00	0.000	0.000	0.000
8	60.00	19.00	0.000	0.000	0.000
9	60.00	21.00	0.000	0.000	0.000
10	60.00	23.00	0.000	0.000	0.000
11	60.00	25.00	0.000	0.000	0.000
12	60.00	27.00	0.000	0.000	0.000
13	60.00	29.00	0.000	0.000	0.000
14	60.00	31.00	0.000	0.000	0.000

"BB-04_Drilled_60in_Void=-60ft.out"

15	60.00	33.00	0.000	0.000	0.000
16	60.00	35.00	0.000	0.000	0.000
17	60.00	37.00	0.000	0.000	0.000
18	60.00	39.00	0.000	0.000	0.000
19	60.00	41.00	0.000	0.000	0.000
20	60.00	43.00	0.000	0.000	0.000
21	60.00	45.00	0.000	0.000	0.000
22	60.00	47.00	0.000	0.000	0.000
23	60.00	49.00	0.000	0.000	0.000
24	60.00	51.00	0.000	0.000	0.000
25	60.00	53.00	0.000	0.000	0.000
26	60.00	55.00	0.000	0.000	0.000
27	60.00	57.00	0.000	0.000	0.000
28	60.00	59.00	0.000	0.000	0.000
29	60.00	61.00	0.000	0.000	0.000
30	60.00	63.00	11.685	2984.862	2996.546
31	60.00	65.00	84.959	762.495	847.454
32	60.00	67.00	151.064	501.385	652.448
33	60.00	69.00	211.033	388.183	599.216
34	60.00	71.00	265.709	322.710	588.419
35	60.00	73.00	304.359	3.179	307.539
36	60.00	75.00	307.384	288.718	596.102
37	60.00	77.00	361.994	283.366	645.360
38	60.00	79.00	415.732	280.983	696.714
39	60.00	81.00	468.028	278.151	746.179
40	60.00	83.00	519.008	275.074	794.082
41	60.00	85.00	568.777	271.869	840.646
42	60.00	87.00	617.423	268.610	886.032
43	60.00	89.00	665.023	265.340	930.362
44	60.00	91.00	711.643	262.088	973.731
45	60.00	93.00	757.344	258.872	1016.216
46	60.00	95.00	802.177	255.704	1057.881
47	60.00	97.00	846.191	252.590	1098.781
48	60.00	99.00	864.303	52.391	916.694
49	60.00	101.00	890.918	250.292	1141.210
50	60.00	103.00	933.676	247.280	1180.956
51	60.00	105.00	975.723	244.328	1220.051
52	60.00	107.00	1017.093	241.437	1258.530
53	60.00	109.00	1057.818	238.605	1296.422
54	60.00	111.00	1084.376	6.359	1090.735
55	60.00	113.00	1104.237	236.519	1340.756
56	60.00	115.00	1143.977	41.733	1185.710

"BB-04_Drilled_60in_Void=-60ft.out"

General Information:

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Input file: lations\FB-Deep\Drilled Shaft\BB-12_Drilled_48in_Void=-82ft.in
Project number: B-22-074
Job name: Broad Causeway Bridge
Engineer: PV/TC
Units: English

Analysis Information:

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Analysis Type: Drilled Shaft Analysis

Soil Information:

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Boring date: 3/29/2023
Boring number: BB-12
Station number: 140+71 Offset: +32

Ground Elevation: 2.70(ft)
Water table Elevation = 2.70(ft)

Cu is calculated using: Direct method.
Rock side-friction is calculated using: McVay's method
Hammer type: Automatic Hammer, Correction factor = 1.24

ID	Depth (ft)	Elevation (ft)	SPT Blows (Blows/ft)	Unit Weight (pcf)	Soil Type

1	0.00	2.70	N/A	118.00	5- Cavity layer
2	2.00	0.70	N/A	118.00	5- Cavity layer
3	4.00	-1.30	N/A	102.00	5- Cavity layer
4	6.00	-3.30	N/A	99.00	5- Cavity layer
5	8.00	-5.30	N/A	86.00	5- Cavity layer
6	10.00	-7.30	N/A	86.00	5- Cavity layer
7	12.00	-9.30	N/A	86.00	5- Cavity layer
8	14.00	-11.30	N/A	86.00	5- Cavity layer
9	16.00	-13.30	N/A	86.00	5- Cavity layer
10	20.00	-17.30	N/A	115.00	5- Cavity layer
11	22.50	-19.80	N/A	120.00	5- Cavity layer
12	25.00	-22.30	N/A	125.00	5- Cavity layer
13	27.50	-24.80	N/A	120.00	5- Cavity layer
14	30.00	-27.30	N/A	115.00	5- Cavity layer
15	32.50	-29.80	N/A	120.00	5- Cavity layer
16	35.00	-32.30	N/A	115.00	5- Cavity layer

"BB-12_Drilled_48in_Void=-82ft.out"

17	37.50	-34.80	N/A	115.00	5- Cavity layer
18	40.00	-37.30	N/A	115.00	5- Cavity layer
19	42.50	-39.80	N/A	116.00	5- Cavity layer
20	45.00	-42.30	N/A	119.00	5- Cavity layer
21	47.50	-44.80	N/A	119.00	5- Cavity layer
22	50.00	-47.30	N/A	124.00	5- Cavity layer
23	52.50	-49.80	N/A	121.00	5- Cavity layer
24	55.00	-52.30	N/A	131.00	5- Cavity layer
25	57.50	-54.80	N/A	124.00	5- Cavity layer
26	60.00	-57.30	N/A	126.00	5- Cavity layer
27	62.50	-59.80	N/A	121.00	5- Cavity layer
28	65.00	-62.30	N/A	119.00	5- Cavity layer
29	67.50	-64.80	N/A	130.00	5- Cavity layer
30	70.00	-67.30	N/A	135.00	5- Cavity layer
31	72.50	-69.80	N/A	125.00	5- Cavity layer
32	75.00	-72.30	N/A	130.00	5- Cavity layer
33	77.50	-74.80	N/A	135.00	5- Cavity layer
34	80.00	-77.30	N/A	115.00	5- Cavity layer
35	82.50	-79.80	N/A	119.00	5- Cavity layer
36	84.70	-82.00	N/A	127.00	5- Cavity layer
37	84.70	-82.00	N/A	0.00	1- Plastic Clay
38	84.70	-82.00	31.00	127.00	3- Clean sand
39	85.00	-82.30	31.00	127.00	3- Clean sand
40	85.00	-82.30	N/A	0.00	1- Plastic Clay
41	85.00	-82.30	N/A	125.00	4- Lime Stone/Very shelly sand
42	87.50	-84.80	N/A	125.00	4- Lime Stone/Very shelly sand
43	90.00	-87.30	N/A	130.00	4- Lime Stone/Very shelly sand
44	92.50	-89.80	N/A	135.00	4- Lime Stone/Very shelly sand
45	95.00	-92.30	N/A	125.00	4- Lime Stone/Very shelly sand
46	95.00	-92.30	N/A	0.00	1- Plastic Clay
47	95.00	-92.30	4.00	115.00	3- Clean sand
48	97.50	-94.80	4.00	115.00	3- Clean sand
49	100.00	-97.30	19.00	120.00	3- Clean sand
50	100.00	-97.30	N/A	0.00	1- Plastic Clay
51	100.00	-97.30	N/A	130.00	4- Lime Stone/Very shelly sand
52	102.50	-99.80	N/A	130.00	4- Lime Stone/Very shelly sand
53	105.00	-102.30	N/A	135.00	4- Lime Stone/Very shelly sand
54	107.50	-104.80	N/A	135.00	4- Lime Stone/Very shelly sand
55	110.00	-107.30	N/A	135.00	4- Lime Stone/Very shelly sand
56	112.50	-109.80	N/A	135.00	4- Lime Stone/Very shelly sand
57	115.00	-112.30	N/A	135.00	4- Lime Stone/Very shelly sand
58	117.50	-114.80	N/A	135.00	4- Lime Stone/Very shelly sand
59	120.00	-117.30	N/A	135.00	4- Lime Stone/Very shelly sand
60	122.50	-119.80	N/A	125.00	4- Lime Stone/Very shelly sand
61	125.00	-122.30	N/A	135.00	4- Lime Stone/Very shelly sand

Top of Rock Socket
elev = -82'

ID	Cu-DIR (tsf)	qu (tsf)	qt (tsf)	Em (ksi)	qb (tsf)

1	N/A	N/A	N/A	N/A	N/A
2	N/A	N/A	N/A	N/A	N/A
3	N/A	N/A	N/A	N/A	N/A

"BB-12_Drilled_48in_Void=-82ft.out"

4	N/A	N/A	N/A	N/A	N/A
5	N/A	N/A	N/A	N/A	N/A
6	N/A	N/A	N/A	N/A	N/A
7	N/A	N/A	N/A	N/A	N/A
8	N/A	N/A	N/A	N/A	N/A
9	N/A	N/A	N/A	N/A	N/A
10	N/A	N/A	N/A	N/A	N/A
11	N/A	N/A	N/A	N/A	N/A
12	N/A	N/A	N/A	N/A	N/A
13	N/A	N/A	N/A	N/A	N/A
14	N/A	N/A	N/A	N/A	N/A
15	N/A	N/A	N/A	N/A	N/A
16	N/A	N/A	N/A	N/A	N/A
17	N/A	N/A	N/A	N/A	N/A
18	N/A	N/A	N/A	N/A	N/A
19	N/A	N/A	N/A	N/A	N/A
20	N/A	N/A	N/A	N/A	N/A
21	N/A	N/A	N/A	N/A	N/A
22	N/A	N/A	N/A	N/A	N/A
23	N/A	N/A	N/A	N/A	N/A
24	N/A	N/A	N/A	N/A	N/A
25	N/A	N/A	N/A	N/A	N/A
26	N/A	N/A	N/A	N/A	N/A
27	N/A	N/A	N/A	N/A	N/A
28	N/A	N/A	N/A	N/A	N/A
29	N/A	N/A	N/A	N/A	N/A
30	N/A	N/A	N/A	N/A	N/A
31	N/A	N/A	N/A	N/A	N/A
32	N/A	N/A	N/A	N/A	N/A
33	N/A	N/A	N/A	N/A	N/A
34	N/A	N/A	N/A	N/A	N/A
35	N/A	N/A	N/A	N/A	N/A
36	N/A	N/A	N/A	N/A	N/A
37	0.00	N/A	N/A	N/A	N/A
38	N/A	N/A	N/A	N/A	N/A
39	N/A	N/A	N/A	N/A	N/A
40	0.00	N/A	N/A	N/A	N/A
41	N/A	17.36	2.78	27.73	8.68
42	N/A	17.36	2.78	27.73	8.68
43	N/A	25.00	4.00	39.93	12.50
44	N/A	25.00	4.00	39.93	12.50
45	N/A	18.60	2.98	29.71	9.30
46	0.00	N/A	N/A	N/A	N/A
47	N/A	N/A	N/A	N/A	N/A
48	N/A	N/A	N/A	N/A	N/A
49	N/A	N/A	N/A	N/A	N/A
50	0.00	N/A	N/A	N/A	N/A
51	N/A	25.00	4.00	39.93	12.50
52	N/A	25.00	4.00	39.93	12.50
53	N/A	25.00	4.00	39.93	12.50
54	N/A	25.00	4.00	39.93	12.50
55	N/A	25.00	4.00	39.93	12.50

"BB-12_Drilled_48in_Void=-82ft.out"

Top of Rock Socket
elev = -82'

56	N/A	25.00	4.00	39.93	12.50
57	N/A	25.00	4.00	39.93	12.50
58	N/A	25.00	4.00	39.93	12.50
59	N/A	25.00	4.00	39.93	12.50
60	N/A	17.36	2.78	27.73	8.68
61	N/A	25.00	4.00	39.93	12.50

ID	RQD F.M.	S.R.I.	Rock Recovery
1	N/A	N/A	N/A
2	N/A	N/A	N/A
3	N/A	N/A	N/A
4	N/A	N/A	N/A
5	N/A	N/A	N/A
6	N/A	N/A	N/A
7	N/A	N/A	N/A
8	N/A	N/A	N/A
9	N/A	N/A	N/A
10	N/A	N/A	N/A
11	N/A	N/A	N/A
12	N/A	N/A	N/A
13	N/A	N/A	N/A
14	N/A	N/A	N/A
15	N/A	N/A	N/A
16	N/A	N/A	N/A
17	N/A	N/A	N/A
18	N/A	N/A	N/A
19	N/A	N/A	N/A
20	N/A	N/A	N/A
21	N/A	N/A	N/A
22	N/A	N/A	N/A
23	N/A	N/A	N/A
24	N/A	N/A	N/A
25	N/A	N/A	N/A
26	N/A	N/A	N/A
27	N/A	N/A	N/A
28	N/A	N/A	N/A
29	N/A	N/A	N/A
30	N/A	N/A	N/A
31	N/A	N/A	N/A
32	N/A	N/A	N/A
33	N/A	N/A	N/A
34	N/A	N/A	N/A
35	N/A	N/A	N/A
36	N/A	N/A	N/A
37	N/A	N/A	N/A
38	N/A	N/A	N/A
39	N/A	N/A	N/A
40	N/A	N/A	N/A
41	0.50	ROUGH	1.000
42	0.50	ROUGH	1.000

"BB-12_Drilled_48in_Void=-82ft.out"

43	0.50	ROUGH	1.000
44	0.50	ROUGH	1.000
45	0.50	ROUGH	1.000
46	N/A	N/A	N/A
47	N/A	N/A	N/A
48	N/A	N/A	N/A
49	N/A	N/A	N/A
50	N/A	N/A	N/A
51	0.50	ROUGH	1.000
52	0.50	ROUGH	1.000
53	0.50	ROUGH	1.000
54	0.50	ROUGH	1.000
55	0.50	ROUGH	1.000
56	0.50	ROUGH	1.000
57	0.50	ROUGH	1.000
58	0.50	ROUGH	1.000
59	0.50	ROUGH	1.000
60	0.50	ROUGH	1.000
61	0.50	ROUGH	1.000

Drilled Shaft Data:

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Unit weight of concrete = 145.00(pcf), Concrete Slump = 6.00(in)

Modulus of Elasticity of concrete = 3987.00(ksi)

Shaft Geometry:

ID	Length (ft)	Tip Elev. (ft)	Case Len. (ft)	Diameter (in)	Base Diam. (in)	Bell Len. (ft)
1	5.00	-2.30	0.00	48.00	48.00	0.00
2	7.00	-4.30	0.00	48.00	48.00	0.00
3	9.00	-6.30	0.00	48.00	48.00	0.00
4	11.00	-8.30	0.00	48.00	48.00	0.00
5	13.00	-10.30	0.00	48.00	48.00	0.00
6	15.00	-12.30	0.00	48.00	48.00	0.00
7	17.00	-14.30	0.00	48.00	48.00	0.00
8	19.00	-16.30	0.00	48.00	48.00	0.00
9	21.00	-18.30	0.00	48.00	48.00	0.00
10	23.00	-20.30	0.00	48.00	48.00	0.00
11	25.00	-22.30	0.00	48.00	48.00	0.00
12	27.00	-24.30	0.00	48.00	48.00	0.00
13	29.00	-26.30	0.00	48.00	48.00	0.00
14	31.00	-28.30	0.00	48.00	48.00	0.00
15	33.00	-30.30	0.00	48.00	48.00	0.00
16	35.00	-32.30	0.00	48.00	48.00	0.00
17	37.00	-34.30	0.00	48.00	48.00	0.00
18	39.00	-36.30	0.00	48.00	48.00	0.00
19	41.00	-38.30	0.00	48.00	48.00	0.00
20	43.00	-40.30	0.00	48.00	48.00	0.00
21	45.00	-42.30	0.00	48.00	48.00	0.00

"BB-12_Drilled_48in_Void=-82ft.out"

22	47.00	-44.30	0.00	48.00	48.00	0.00
23	49.00	-46.30	0.00	48.00	48.00	0.00
24	51.00	-48.30	0.00	48.00	48.00	0.00
25	53.00	-50.30	0.00	48.00	48.00	0.00
26	55.00	-52.30	0.00	48.00	48.00	0.00
27	57.00	-54.30	0.00	48.00	48.00	0.00
28	59.00	-56.30	0.00	48.00	48.00	0.00
29	61.00	-58.30	0.00	48.00	48.00	0.00
30	63.00	-60.30	0.00	48.00	48.00	0.00
31	65.00	-62.30	0.00	48.00	48.00	0.00
32	67.00	-64.30	0.00	48.00	48.00	0.00
33	69.00	-66.30	0.00	48.00	48.00	0.00
34	71.00	-68.30	0.00	48.00	48.00	0.00
35	73.00	-70.30	0.00	48.00	48.00	0.00
36	75.00	-72.30	0.00	48.00	48.00	0.00
37	77.00	-74.30	0.00	48.00	48.00	0.00
38	79.00	-76.30	0.00	48.00	48.00	0.00
39	81.00	-78.30	0.00	48.00	48.00	0.00
40	83.00	-80.30	0.00	48.00	48.00	0.00
41	85.00	-82.30	0.00	48.00	48.00	0.00
42	87.00	-84.30	0.00	48.00	48.00	0.00
43	89.00	-86.30	0.00	48.00	48.00	0.00
44	91.00	-88.30	0.00	48.00	48.00	0.00
45	93.00	-90.30	0.00	48.00	48.00	0.00
46	95.00	-92.30	0.00	48.00	48.00	0.00
47	97.00	-94.30	0.00	48.00	48.00	0.00
48	99.00	-96.30	0.00	48.00	48.00	0.00
49	101.00	-98.30	0.00	48.00	48.00	0.00
50	103.00	-100.30	0.00	48.00	48.00	0.00
51	105.00	-102.30	0.00	48.00	48.00	0.00
52	107.00	-104.30	0.00	48.00	48.00	0.00
53	109.00	-106.30	0.00	48.00	48.00	0.00
54	111.00	-108.30	0.00	48.00	48.00	0.00
55	113.00	-110.30	0.00	48.00	48.00	0.00
56	115.00	-112.30	0.00	48.00	48.00	0.00
57	117.00	-114.30	0.00	48.00	48.00	0.00
58	119.00	-116.30	0.00	48.00	48.00	0.00

Drilled Shaft Capacity (sorted by shaft diameter):

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Strength reduction factors: Skin-friction = 1.00, End-bearing = 1.00

ID	Diameter (in)	Length (ft)	Skin Fric. (tons)	End Bearing (tons)	Capacity (tons)
1	48.00	5.00	0.000	0.000	0.000
2	48.00	7.00	0.000	0.000	0.000
3	48.00	9.00	0.000	0.000	0.000
4	48.00	11.00	0.000	0.000	0.000
5	48.00	13.00	0.000	0.000	0.000
6	48.00	15.00	0.000	0.000	0.000

"BB-12_Drilled_48in_Void=-82ft.out"

7	48.00	17.00	0.000	0.000	0.000
8	48.00	19.00	0.000	0.000	0.000
9	48.00	21.00	0.000	0.000	0.000
10	48.00	23.00	0.000	0.000	0.000
11	48.00	25.00	0.000	0.000	0.000
12	48.00	27.00	0.000	0.000	0.000
13	48.00	29.00	0.000	0.000	0.000
14	48.00	31.00	0.000	0.000	0.000
15	48.00	33.00	0.000	0.000	0.000
16	48.00	35.00	0.000	0.000	0.000
17	48.00	37.00	0.000	0.000	0.000
18	48.00	39.00	0.000	0.000	0.000
19	48.00	41.00	0.000	0.000	0.000
20	48.00	43.00	0.000	0.000	0.000
21	48.00	45.00	0.000	0.000	0.000
22	48.00	47.00	0.000	0.000	0.000
23	48.00	49.00	0.000	0.000	0.000
24	48.00	51.00	0.000	0.000	0.000
25	48.00	53.00	0.000	0.000	0.000
26	48.00	55.00	0.000	0.000	0.000
27	48.00	57.00	0.000	0.000	0.000
28	48.00	59.00	0.000	0.000	0.000
29	48.00	61.00	0.000	0.000	0.000
30	48.00	63.00	0.000	0.000	0.000
31	48.00	65.00	0.000	0.000	0.000
32	48.00	67.00	0.000	0.000	0.000
33	48.00	69.00	0.000	0.000	0.000
34	48.00	71.00	0.000	0.000	0.000
35	48.00	73.00	0.000	0.000	0.000
36	48.00	75.00	0.000	0.000	0.000
37	48.00	77.00	0.000	0.000	0.000
38	48.00	79.00	0.000	0.000	0.000
39	48.00	81.00	0.000	0.000	0.000
40	48.00	83.00	0.000	0.000	0.000
41	48.00	85.00	0.005	109.076	109.081
42	48.00	87.00	87.272	109.076	196.348
43	48.00	89.00	174.539	109.076	283.615
44	48.00	91.00	281.004	157.080	438.084
45	48.00	93.00	406.668	157.080	563.748
46	48.00	95.00	532.332	109.780	642.112
47	48.00	97.00	534.642	66.614	601.257
48	48.00	99.00	537.284	101.382	638.666
49	48.00	101.00	601.560	157.080	758.639
50	48.00	103.00	727.224	157.080	884.303
51	48.00	105.00	852.887	157.080	1009.967
52	48.00	107.00	978.551	157.080	1135.631
53	48.00	109.00	1104.215	157.080	1261.294
54	48.00	111.00	1229.878	157.080	1386.958
55	48.00	113.00	1355.542	157.080	1512.622
56	48.00	115.00	1481.206	157.080	1638.285
57	48.00	117.00	1606.869	157.080	1763.949
58	48.00	119.00	1732.533	157.080	1889.613

"BB-12_Drilled_48in_Void=-82ft.out"

Drilled Shaft Capacity at User-Defined Settlement (sorted by shaft diameter):

***** Capacity is NOT modified by the strength reduction factors *****

User-Defined Settlement = 1.04%

ID	Diameter (in)	Length (ft)	Skin Fric. (tons)	End Bearing (tons)	Capacity (tons)
1	48.00	5.00	0.000	0.000	0.000
2	48.00	7.00	0.000	0.000	0.000
3	48.00	9.00	0.000	0.000	0.000
4	48.00	11.00	0.000	0.000	0.000
5	48.00	13.00	0.000	0.000	0.000
6	48.00	15.00	0.000	0.000	0.000
7	48.00	17.00	0.000	0.000	0.000
8	48.00	19.00	0.000	0.000	0.000
9	48.00	21.00	0.000	0.000	0.000
10	48.00	23.00	0.000	0.000	0.000
11	48.00	25.00	0.000	0.000	0.000
12	48.00	27.00	0.000	0.000	0.000
13	48.00	29.00	0.000	0.000	0.000
14	48.00	31.00	0.000	0.000	0.000
15	48.00	33.00	0.000	0.000	0.000
16	48.00	35.00	0.000	0.000	0.000
17	48.00	37.00	0.000	0.000	0.000
18	48.00	39.00	0.000	0.000	0.000
19	48.00	41.00	0.000	0.000	0.000
20	48.00	43.00	0.000	0.000	0.000
21	48.00	45.00	0.000	0.000	0.000
22	48.00	47.00	0.000	0.000	0.000
23	48.00	49.00	0.000	0.000	0.000
24	48.00	51.00	0.000	0.000	0.000
25	48.00	53.00	0.000	0.000	0.000
26	48.00	55.00	0.000	0.000	0.000
27	48.00	57.00	0.000	0.000	0.000
28	48.00	59.00	0.000	0.000	0.000
29	48.00	61.00	0.000	0.000	0.000
30	48.00	63.00	0.000	0.000	0.000
31	48.00	65.00	0.000	0.000	0.000
32	48.00	67.00	0.000	0.000	0.000
33	48.00	69.00	0.000	0.000	0.000
34	48.00	71.00	0.000	0.000	0.000
35	48.00	73.00	0.000	0.000	0.000
36	48.00	75.00	0.000	0.000	0.000
37	48.00	77.00	0.000	0.000	0.000
38	48.00	79.00	0.000	0.000	0.000
39	48.00	81.00	0.000	0.000	0.000
40	48.00	83.00	0.000	0.000	0.000

"BB-12_Drilled_48in_Void=-82ft.out"

41	48.00	85.00	0.005	497.774	497.778
42	48.00	87.00	41.622	379.360	420.981
43	48.00	89.00	79.576	238.430	318.006
44	48.00	91.00	122.494	260.649	383.143
45	48.00	93.00	169.527	213.975	383.502
46	48.00	95.00	217.761	34.870	252.630
47	48.00	97.00	220.021	21.159	241.180
48	48.00	99.00	222.604	32.203	254.806
49	48.00	101.00	247.611	211.417	459.027
50	48.00	103.00	293.792	208.775	502.567
51	48.00	105.00	338.742	205.833	544.575
52	48.00	107.00	382.572	202.763	585.335
53	48.00	109.00	425.372	199.658	625.030
54	48.00	111.00	467.217	196.569	663.787
55	48.00	113.00	508.174	193.525	701.699
56	48.00	115.00	548.299	190.542	738.841
57	48.00	117.00	587.642	187.627	775.269
58	48.00	119.00	626.247	184.784	811.032

"BB-12_Drilled_48in_Void=-82ft.out"

General Information:

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Input file: lations\FB-Deep\Drilled Shaft\BB-12_Drilled_60in_Void=-82ft.in
Project number: B-22-074
Job name: Broad Causeway Bridge
Engineer: PV/TC
Units: English

Analysis Information:

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Analysis Type: Drilled Shaft Analysis

Soil Information:

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Boring date: 3/29/2023
Boring number: BB-12
Station number: 140+71 Offset: +32

Ground Elevation: 2.70(ft)
Water table Elevation = 2.70(ft)

Cu is calculated using: Direct method.
Rock side-friction is calculated using: McVay's method
Hammer type: Automatic Hammer, Correction factor = 1.24

ID	Depth (ft)	Elevation (ft)	SPT Blows (Blows/ft)	Unit Weight (pcf)	Soil Type

1	0.00	2.70	N/A	118.00	5- Cavity layer
2	2.00	0.70	N/A	118.00	5- Cavity layer
3	4.00	-1.30	N/A	102.00	5- Cavity layer
4	6.00	-3.30	N/A	99.00	5- Cavity layer
5	8.00	-5.30	N/A	86.00	5- Cavity layer
6	10.00	-7.30	N/A	86.00	5- Cavity layer
7	12.00	-9.30	N/A	86.00	5- Cavity layer
8	14.00	-11.30	N/A	86.00	5- Cavity layer
9	16.00	-13.30	N/A	86.00	5- Cavity layer
10	20.00	-17.30	N/A	115.00	5- Cavity layer
11	22.50	-19.80	N/A	120.00	5- Cavity layer
12	25.00	-22.30	N/A	125.00	5- Cavity layer
13	27.50	-24.80	N/A	120.00	5- Cavity layer
14	30.00	-27.30	N/A	115.00	5- Cavity layer
15	32.50	-29.80	N/A	120.00	5- Cavity layer
16	35.00	-32.30	N/A	115.00	5- Cavity layer

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17	37.50	-34.80	N/A	115.00	5- Cavity layer
18	40.00	-37.30	N/A	115.00	5- Cavity layer
19	42.50	-39.80	N/A	116.00	5- Cavity layer
20	45.00	-42.30	N/A	119.00	5- Cavity layer
21	47.50	-44.80	N/A	119.00	5- Cavity layer
22	50.00	-47.30	N/A	124.00	5- Cavity layer
23	52.50	-49.80	N/A	121.00	5- Cavity layer
24	55.00	-52.30	N/A	131.00	5- Cavity layer
25	57.50	-54.80	N/A	124.00	5- Cavity layer
26	60.00	-57.30	N/A	126.00	5- Cavity layer
27	62.50	-59.80	N/A	121.00	5- Cavity layer
28	65.00	-62.30	N/A	119.00	5- Cavity layer
29	67.50	-64.80	N/A	130.00	5- Cavity layer
30	70.00	-67.30	N/A	135.00	5- Cavity layer
31	72.50	-69.80	N/A	125.00	5- Cavity layer
32	75.00	-72.30	N/A	130.00	5- Cavity layer
33	77.50	-74.80	N/A	135.00	5- Cavity layer
34	80.00	-77.30	N/A	115.00	5- Cavity layer
35	82.50	-79.80	N/A	119.00	5- Cavity layer
36	84.70	-82.00	N/A	127.00	5- Cavity layer
37	84.70	-82.00	N/A	0.00	1- Plastic Clay
38	84.70	-82.00	31.00	127.00	3- Clean sand
39	85.00	-82.30	31.00	127.00	3- Clean sand
40	85.00	-82.30	N/A	0.00	1- Plastic Clay
41	85.00	-82.30	N/A	125.00	4- Lime Stone/Very shelly sand
42	87.50	-84.80	N/A	125.00	4- Lime Stone/Very shelly sand
43	90.00	-87.30	N/A	130.00	4- Lime Stone/Very shelly sand
44	92.50	-89.80	N/A	135.00	4- Lime Stone/Very shelly sand
45	95.00	-92.30	N/A	125.00	4- Lime Stone/Very shelly sand
46	95.00	-92.30	N/A	0.00	1- Plastic Clay
47	95.00	-92.30	4.00	115.00	3- Clean sand
48	97.50	-94.80	4.00	115.00	3- Clean sand
49	100.00	-97.30	19.00	120.00	3- Clean sand
50	100.00	-97.30	N/A	0.00	1- Plastic Clay
51	100.00	-97.30	N/A	130.00	4- Lime Stone/Very shelly sand
52	102.50	-99.80	N/A	130.00	4- Lime Stone/Very shelly sand
53	105.00	-102.30	N/A	135.00	4- Lime Stone/Very shelly sand
54	107.50	-104.80	N/A	135.00	4- Lime Stone/Very shelly sand
55	110.00	-107.30	N/A	135.00	4- Lime Stone/Very shelly sand
56	112.50	-109.80	N/A	135.00	4- Lime Stone/Very shelly sand
57	115.00	-112.30	N/A	135.00	4- Lime Stone/Very shelly sand
58	117.50	-114.80	N/A	135.00	4- Lime Stone/Very shelly sand
59	120.00	-117.30	N/A	135.00	4- Lime Stone/Very shelly sand
60	122.50	-119.80	N/A	125.00	4- Lime Stone/Very shelly sand
61	125.00	-122.30	N/A	135.00	4- Lime Stone/Very shelly sand

Top of Rock Socket
elev = -82'

ID	Cu-DIR (tsf)	qu (tsf)	qt (tsf)	Em (ksi)	qb (tsf)

1	N/A	N/A	N/A	N/A	N/A
2	N/A	N/A	N/A	N/A	N/A
3	N/A	N/A	N/A	N/A	N/A

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4	N/A	N/A	N/A	N/A	N/A
5	N/A	N/A	N/A	N/A	N/A
6	N/A	N/A	N/A	N/A	N/A
7	N/A	N/A	N/A	N/A	N/A
8	N/A	N/A	N/A	N/A	N/A
9	N/A	N/A	N/A	N/A	N/A
10	N/A	N/A	N/A	N/A	N/A
11	N/A	N/A	N/A	N/A	N/A
12	N/A	N/A	N/A	N/A	N/A
13	N/A	N/A	N/A	N/A	N/A
14	N/A	N/A	N/A	N/A	N/A
15	N/A	N/A	N/A	N/A	N/A
16	N/A	N/A	N/A	N/A	N/A
17	N/A	N/A	N/A	N/A	N/A
18	N/A	N/A	N/A	N/A	N/A
19	N/A	N/A	N/A	N/A	N/A
20	N/A	N/A	N/A	N/A	N/A
21	N/A	N/A	N/A	N/A	N/A
22	N/A	N/A	N/A	N/A	N/A
23	N/A	N/A	N/A	N/A	N/A
24	N/A	N/A	N/A	N/A	N/A
25	N/A	N/A	N/A	N/A	N/A
26	N/A	N/A	N/A	N/A	N/A
27	N/A	N/A	N/A	N/A	N/A
28	N/A	N/A	N/A	N/A	N/A
29	N/A	N/A	N/A	N/A	N/A
30	N/A	N/A	N/A	N/A	N/A
31	N/A	N/A	N/A	N/A	N/A
32	N/A	N/A	N/A	N/A	N/A
33	N/A	N/A	N/A	N/A	N/A
34	N/A	N/A	N/A	N/A	N/A
35	N/A	N/A	N/A	N/A	N/A
36	N/A	N/A	N/A	N/A	N/A
37	0.00	N/A	N/A	N/A	N/A
38	N/A	N/A	N/A	N/A	N/A
39	N/A	N/A	N/A	N/A	N/A
40	0.00	N/A	N/A	N/A	N/A
41	N/A	17.36	2.78	27.73	8.68
42	N/A	17.36	2.78	27.73	8.68
43	N/A	25.00	4.00	39.93	12.50
44	N/A	25.00	4.00	39.93	12.50
45	N/A	18.60	2.98	29.71	9.30
46	0.00	N/A	N/A	N/A	N/A
47	N/A	N/A	N/A	N/A	N/A
48	N/A	N/A	N/A	N/A	N/A
49	N/A	N/A	N/A	N/A	N/A
50	0.00	N/A	N/A	N/A	N/A
51	N/A	25.00	4.00	39.93	12.50
52	N/A	25.00	4.00	39.93	12.50
53	N/A	25.00	4.00	39.93	12.50
54	N/A	25.00	4.00	39.93	12.50
55	N/A	25.00	4.00	39.93	12.50

"BB-12_Drilled_60in_Void=-82ft.out"

Top of Rock Socket
elev = -82'

56	N/A	25.00	4.00	39.93	12.50
57	N/A	25.00	4.00	39.93	12.50
58	N/A	25.00	4.00	39.93	12.50
59	N/A	25.00	4.00	39.93	12.50
60	N/A	17.36	2.78	27.73	8.68
61	N/A	25.00	4.00	39.93	12.50

ID	RQD F.M.	S.R.I.	Rock Recovery
1	N/A	N/A	N/A
2	N/A	N/A	N/A
3	N/A	N/A	N/A
4	N/A	N/A	N/A
5	N/A	N/A	N/A
6	N/A	N/A	N/A
7	N/A	N/A	N/A
8	N/A	N/A	N/A
9	N/A	N/A	N/A
10	N/A	N/A	N/A
11	N/A	N/A	N/A
12	N/A	N/A	N/A
13	N/A	N/A	N/A
14	N/A	N/A	N/A
15	N/A	N/A	N/A
16	N/A	N/A	N/A
17	N/A	N/A	N/A
18	N/A	N/A	N/A
19	N/A	N/A	N/A
20	N/A	N/A	N/A
21	N/A	N/A	N/A
22	N/A	N/A	N/A
23	N/A	N/A	N/A
24	N/A	N/A	N/A
25	N/A	N/A	N/A
26	N/A	N/A	N/A
27	N/A	N/A	N/A
28	N/A	N/A	N/A
29	N/A	N/A	N/A
30	N/A	N/A	N/A
31	N/A	N/A	N/A
32	N/A	N/A	N/A
33	N/A	N/A	N/A
34	N/A	N/A	N/A
35	N/A	N/A	N/A
36	N/A	N/A	N/A
37	N/A	N/A	N/A
38	N/A	N/A	N/A
39	N/A	N/A	N/A
40	N/A	N/A	N/A
41	0.50	ROUGH	1.000
42	0.50	ROUGH	1.000

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43	0.50	ROUGH	1.000
44	0.50	ROUGH	1.000
45	0.50	ROUGH	1.000
46	N/A	N/A	N/A
47	N/A	N/A	N/A
48	N/A	N/A	N/A
49	N/A	N/A	N/A
50	N/A	N/A	N/A
51	0.50	ROUGH	1.000
52	0.50	ROUGH	1.000
53	0.50	ROUGH	1.000
54	0.50	ROUGH	1.000
55	0.50	ROUGH	1.000
56	0.50	ROUGH	1.000
57	0.50	ROUGH	1.000
58	0.50	ROUGH	1.000
59	0.50	ROUGH	1.000
60	0.50	ROUGH	1.000
61	0.50	ROUGH	1.000

Drilled Shaft Data:

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Unit weight of concrete = 145.00(pcf), Concrete Slump = 6.00(in)

Modulus of Elasticity of concrete = 3987.00(ksi)

Shaft Geometry:

ID	Length (ft)	Tip Elev. (ft)	Case Len. (ft)	Diameter (in)	Base Diam. (in)	Bell Len. (ft)
1	5.00	-2.30	0.00	60.00	60.00	0.00
2	7.00	-4.30	0.00	60.00	60.00	0.00
3	9.00	-6.30	0.00	60.00	60.00	0.00
4	11.00	-8.30	0.00	60.00	60.00	0.00
5	13.00	-10.30	0.00	60.00	60.00	0.00
6	15.00	-12.30	0.00	60.00	60.00	0.00
7	17.00	-14.30	0.00	60.00	60.00	0.00
8	19.00	-16.30	0.00	60.00	60.00	0.00
9	21.00	-18.30	0.00	60.00	60.00	0.00
10	23.00	-20.30	0.00	60.00	60.00	0.00
11	25.00	-22.30	0.00	60.00	60.00	0.00
12	27.00	-24.30	0.00	60.00	60.00	0.00
13	29.00	-26.30	0.00	60.00	60.00	0.00
14	31.00	-28.30	0.00	60.00	60.00	0.00
15	33.00	-30.30	0.00	60.00	60.00	0.00
16	35.00	-32.30	0.00	60.00	60.00	0.00
17	37.00	-34.30	0.00	60.00	60.00	0.00
18	39.00	-36.30	0.00	60.00	60.00	0.00
19	41.00	-38.30	0.00	60.00	60.00	0.00
20	43.00	-40.30	0.00	60.00	60.00	0.00
21	45.00	-42.30	0.00	60.00	60.00	0.00

"BB-12_Drilled_60in_Void=-82ft.out"

22	47.00	-44.30	0.00	60.00	60.00	0.00
23	49.00	-46.30	0.00	60.00	60.00	0.00
24	51.00	-48.30	0.00	60.00	60.00	0.00
25	53.00	-50.30	0.00	60.00	60.00	0.00
26	55.00	-52.30	0.00	60.00	60.00	0.00
27	57.00	-54.30	0.00	60.00	60.00	0.00
28	59.00	-56.30	0.00	60.00	60.00	0.00
29	61.00	-58.30	0.00	60.00	60.00	0.00
30	63.00	-60.30	0.00	60.00	60.00	0.00
31	65.00	-62.30	0.00	60.00	60.00	0.00
32	67.00	-64.30	0.00	60.00	60.00	0.00
33	69.00	-66.30	0.00	60.00	60.00	0.00
34	71.00	-68.30	0.00	60.00	60.00	0.00
35	73.00	-70.30	0.00	60.00	60.00	0.00
36	75.00	-72.30	0.00	60.00	60.00	0.00
37	77.00	-74.30	0.00	60.00	60.00	0.00
38	79.00	-76.30	0.00	60.00	60.00	0.00
39	81.00	-78.30	0.00	60.00	60.00	0.00
40	83.00	-80.30	0.00	60.00	60.00	0.00
41	85.00	-82.30	0.00	60.00	60.00	0.00
42	87.00	-84.30	0.00	60.00	60.00	0.00
43	89.00	-86.30	0.00	60.00	60.00	0.00
44	91.00	-88.30	0.00	60.00	60.00	0.00
45	93.00	-90.30	0.00	60.00	60.00	0.00
46	95.00	-92.30	0.00	60.00	60.00	0.00
47	97.00	-94.30	0.00	60.00	60.00	0.00
48	99.00	-96.30	0.00	60.00	60.00	0.00
49	101.00	-98.30	0.00	60.00	60.00	0.00
50	103.00	-100.30	0.00	60.00	60.00	0.00
51	105.00	-102.30	0.00	60.00	60.00	0.00
52	107.00	-104.30	0.00	60.00	60.00	0.00
53	109.00	-106.30	0.00	60.00	60.00	0.00
54	111.00	-108.30	0.00	60.00	60.00	0.00
55	113.00	-110.30	0.00	60.00	60.00	0.00
56	115.00	-112.30	0.00	60.00	60.00	0.00
57	117.00	-114.30	0.00	60.00	60.00	0.00
58	119.00	-116.30	0.00	60.00	60.00	0.00

Drilled Shaft Capacity (sorted by shaft diameter):

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Strength reduction factors: Skin-friction = 1.00, End-bearing = 1.00

ID	Diameter (in)	Length (ft)	Skin Fric. (tons)	End Bearing (tons)	Capacity (tons)
1	60.00	5.00	0.000	0.000	0.000
2	60.00	7.00	0.000	0.000	0.000
3	60.00	9.00	0.000	0.000	0.000
4	60.00	11.00	0.000	0.000	0.000
5	60.00	13.00	0.000	0.000	0.000
6	60.00	15.00	0.000	0.000	0.000

"BB-12_Drilled_60in_Void=-82ft.out"

7	60.00	17.00	0.000	0.000	0.000
8	60.00	19.00	0.000	0.000	0.000
9	60.00	21.00	0.000	0.000	0.000
10	60.00	23.00	0.000	0.000	0.000
11	60.00	25.00	0.000	0.000	0.000
12	60.00	27.00	0.000	0.000	0.000
13	60.00	29.00	0.000	0.000	0.000
14	60.00	31.00	0.000	0.000	0.000
15	60.00	33.00	0.000	0.000	0.000
16	60.00	35.00	0.000	0.000	0.000
17	60.00	37.00	0.000	0.000	0.000
18	60.00	39.00	0.000	0.000	0.000
19	60.00	41.00	0.000	0.000	0.000
20	60.00	43.00	0.000	0.000	0.000
21	60.00	45.00	0.000	0.000	0.000
22	60.00	47.00	0.000	0.000	0.000
23	60.00	49.00	0.000	0.000	0.000
24	60.00	51.00	0.000	0.000	0.000
25	60.00	53.00	0.000	0.000	0.000
26	60.00	55.00	0.000	0.000	0.000
27	60.00	57.00	0.000	0.000	0.000
28	60.00	59.00	0.000	0.000	0.000
29	60.00	61.00	0.000	0.000	0.000
30	60.00	63.00	0.000	0.000	0.000
31	60.00	65.00	0.000	0.000	0.000
32	60.00	67.00	0.000	0.000	0.000
33	60.00	69.00	0.000	0.000	0.000
34	60.00	71.00	0.000	0.000	0.000
35	60.00	73.00	0.000	0.000	0.000
36	60.00	75.00	0.000	0.000	0.000
37	60.00	77.00	0.000	0.000	0.000
38	60.00	79.00	0.000	0.000	0.000
39	60.00	81.00	0.000	0.000	0.000
40	60.00	83.00	0.000	0.000	0.000
41	60.00	85.00	0.006	170.431	170.437
42	60.00	87.00	109.090	170.431	279.521
43	60.00	89.00	218.174	170.431	388.605
44	60.00	91.00	351.256	245.437	596.692
45	60.00	93.00	508.335	245.437	753.772
46	60.00	95.00	665.415	139.866	805.281
47	60.00	97.00	668.303	86.737	755.040
48	60.00	99.00	671.604	132.008	803.613
49	60.00	101.00	751.950	245.437	997.387
50	60.00	103.00	909.029	245.437	1154.466
51	60.00	105.00	1066.109	245.437	1311.546
52	60.00	107.00	1223.189	245.437	1468.626
53	60.00	109.00	1380.268	245.437	1625.705
54	60.00	111.00	1537.348	245.437	1782.785
55	60.00	113.00	1694.428	245.437	1939.865
56	60.00	115.00	1851.507	245.437	2096.944
57	60.00	117.00	2008.587	245.437	2254.024
58	60.00	119.00	2165.666	245.437	2411.103

"BB-12_Drilled_60in_Void=-82ft.out"

Drilled Shaft Capacity at User-Defined Settlement (sorted by shaft diameter):

***** Capacity is NOT modified by the strength reduction factors *****

User-Defined Settlement = 0.83%

ID	Diameter (in)	Length (ft)	Skin Fric. (tons)	End Bearing (tons)	Capacity (tons)
1	60.00	5.00	0.000	0.000	0.000
2	60.00	7.00	0.000	0.000	0.000
3	60.00	9.00	0.000	0.000	0.000
4	60.00	11.00	0.000	0.000	0.000
5	60.00	13.00	0.000	0.000	0.000
6	60.00	15.00	0.000	0.000	0.000
7	60.00	17.00	0.000	0.000	0.000
8	60.00	19.00	0.000	0.000	0.000
9	60.00	21.00	0.000	0.000	0.000
10	60.00	23.00	0.000	0.000	0.000
11	60.00	25.00	0.000	0.000	0.000
12	60.00	27.00	0.000	0.000	0.000
13	60.00	29.00	0.000	0.000	0.000
14	60.00	31.00	0.000	0.000	0.000
15	60.00	33.00	0.000	0.000	0.000
16	60.00	35.00	0.000	0.000	0.000
17	60.00	37.00	0.000	0.000	0.000
18	60.00	39.00	0.000	0.000	0.000
19	60.00	41.00	0.000	0.000	0.000
20	60.00	43.00	0.000	0.000	0.000
21	60.00	45.00	0.000	0.000	0.000
22	60.00	47.00	0.000	0.000	0.000
23	60.00	49.00	0.000	0.000	0.000
24	60.00	51.00	0.000	0.000	0.000
25	60.00	53.00	0.000	0.000	0.000
26	60.00	55.00	0.000	0.000	0.000
27	60.00	57.00	0.000	0.000	0.000
28	60.00	59.00	0.000	0.000	0.000
29	60.00	61.00	0.000	0.000	0.000
30	60.00	63.00	0.000	0.000	0.000
31	60.00	65.00	0.000	0.000	0.000
32	60.00	67.00	0.000	0.000	0.000
33	60.00	69.00	0.000	0.000	0.000
34	60.00	71.00	0.000	0.000	0.000
35	60.00	73.00	0.000	0.000	0.000
36	60.00	75.00	0.000	0.000	0.000
37	60.00	77.00	0.000	0.000	0.000
38	60.00	79.00	0.000	0.000	0.000
39	60.00	81.00	0.000	0.000	0.000
40	60.00	83.00	0.000	0.000	0.000

"BB-12_Drilled_60in_Void=-82ft.out"

41	60.00	85.00	0.006	670.304	670.310
42	60.00	87.00	52.030	593.227	645.256
43	60.00	89.00	99.481	372.847	472.328
44	60.00	91.00	153.142	407.592	560.734
45	60.00	93.00	211.951	334.606	546.557
46	60.00	95.00	265.875	36.518	302.393
47	60.00	97.00	268.689	22.646	291.336
48	60.00	99.00	271.907	34.466	306.373
49	60.00	101.00	302.383	286.814	589.196
50	60.00	103.00	358.542	284.833	643.375
51	60.00	105.00	413.148	282.194	695.342
52	60.00	107.00	466.346	279.192	745.538
53	60.00	109.00	518.252	275.996	794.248
54	60.00	111.00	568.966	272.704	841.671
55	60.00	113.00	618.573	269.379	887.952
56	60.00	115.00	667.145	266.058	933.203
57	60.00	117.00	714.748	262.765	977.513
58	60.00	119.00	761.437	259.516	1020.953

"BB-12_Drilled_60in_Void=-82ft.out"

General Information:

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Input file: ed Shaft\DS Water\BB-04_Drilled_48in_BOC=-15.5ft_Void=-60ft.in
Project number: B-22-074
Job name: Broad Causeway Bridge
Engineer: PV/TC
Units: English

Analysis Information:

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Analysis Type: Drilled Shaft Analysis

Soil Information:

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Boring date: 3/28/2023
Boring number: BB-04
Station number: 123+79 Offset: +35

Ground Elevation: 2.70(ft)
Water table Elevation = 2.70(ft)

Cu is calculated using: Direct method.
Rock side-friction is calculated using: McVay's method
Hammer type: Automatic Hammer, Correction factor = 1.24

ID	Depth (ft)	Elevation (ft)	SPT Blows (Blows/ft)	Unit Weight (pcf)	Soil Type

1	0.00	2.70	N/A	0.00	5- Cavity layer
2	2.00	0.70	N/A	0.00	5- Cavity layer
3	4.00	-1.30	N/A	0.00	5- Cavity layer
4	6.00	-3.30	N/A	0.00	5- Cavity layer
5	8.00	-5.30	N/A	0.00	5- Cavity layer
6	10.00	-7.30	N/A	0.00	5- Cavity layer
7	12.00	-9.30	N/A	0.00	5- Cavity layer
8	14.00	-11.30	N/A	0.00	5- Cavity layer
9	16.00	-13.30	N/A	0.00	5- Cavity layer
10	18.20	-15.50	N/A	0.00	5- Cavity layer
11	18.20	-15.50	N/A	115.00	5- Cavity layer
12	20.00	-17.30	N/A	115.00	5- Cavity layer
13	22.50	-19.80	N/A	120.00	5- Cavity layer
14	25.00	-22.30	N/A	120.00	5- Cavity layer
15	27.50	-24.80	N/A	115.00	5- Cavity layer
16	30.00	-27.30	N/A	120.00	5- Cavity layer

"BB-04_Drilled_48in_BOC=-15.5ft_Void=-60ft.out"

17	32.50	-29.80	N/A	115.00	5- Cavity layer
18	35.00	-32.30	N/A	115.00	5- Cavity layer
19	37.50	-34.80	N/A	115.00	5- Cavity layer
20	40.00	-37.30	N/A	115.00	5- Cavity layer
21	42.50	-39.80	N/A	92.00	5- Cavity layer
22	45.00	-42.30	N/A	86.00	5- Cavity layer
23	47.50	-44.80	N/A	109.00	5- Cavity layer
24	50.00	-47.30	N/A	106.00	5- Cavity layer
25	52.50	-49.80	N/A	119.00	5- Cavity layer
26	55.00	-52.30	N/A	129.00	5- Cavity layer
27	57.50	-54.80	N/A	120.00	5- Cavity layer
28	60.00	-57.30	N/A	120.00	5- Cavity layer
29	62.50	-59.80	N/A	135.00	5- Cavity layer
30	62.70	-60.00	N/A	135.00	5- Cavity layer
31	62.70	-60.00	N/A	0.00	1- Plastic Clay
32	62.70	-60.00	N/A	135.00	4- Lime Stone/Very shelly sand
33	65.00	-62.30	N/A	135.00	4- Lime Stone/Very shelly sand
34	67.50	-64.80	N/A	135.00	4- Lime Stone/Very shelly sand
35	70.00	-67.30	N/A	135.00	4- Lime Stone/Very shelly sand
36	72.50	-69.80	N/A	120.00	5- Cavity layer
37	72.50	-69.80	N/A	0.00	1- Plastic Clay
38	72.50	-69.80	1.00	115.00	3- Clean sand
39	75.00	-72.30	1.00	115.00	3- Clean sand
40	75.00	-72.30	N/A	0.00	1- Plastic Clay
41	75.00	-72.30	N/A	135.00	4- Lime Stone/Very shelly sand
42	77.50	-74.80	N/A	135.00	4- Lime Stone/Very shelly sand
43	80.00	-77.30	N/A	135.00	4- Lime Stone/Very shelly sand
44	82.50	-79.80	N/A	135.00	4- Lime Stone/Very shelly sand
45	85.00	-82.30	N/A	135.00	4- Lime Stone/Very shelly sand
46	87.50	-84.80	N/A	135.00	4- Lime Stone/Very shelly sand
47	90.00	-87.30	N/A	135.00	4- Lime Stone/Very shelly sand
48	92.50	-89.80	N/A	135.00	4- Lime Stone/Very shelly sand
49	95.00	-92.30	N/A	135.00	4- Lime Stone/Very shelly sand
50	97.50	-94.80	N/A	125.00	4- Lime Stone/Very shelly sand
51	97.50	-94.80	N/A	0.00	1- Plastic Clay
52	97.50	-94.80	19.00	120.00	3- Clean sand
53	100.00	-97.30	19.00	120.00	3- Clean sand
54	100.00	-97.30	N/A	0.00	1- Plastic Clay
55	100.00	-97.30	N/A	135.00	4- Lime Stone/Very shelly sand
56	102.50	-99.80	N/A	135.00	4- Lime Stone/Very shelly sand
57	105.00	-102.30	N/A	135.00	4- Lime Stone/Very shelly sand
58	107.50	-104.80	N/A	130.00	4- Lime Stone/Very shelly sand
59	110.00	-107.30	N/A	120.00	4- Lime Stone/Very shelly sand
60	110.00	-107.30	N/A	0.00	1- Plastic Clay
61	110.00	-107.30	2.00	115.00	3- Clean sand
62	112.50	-109.80	2.00	115.00	3- Clean sand
63	112.50	-109.80	N/A	0.00	1- Plastic Clay
64	112.50	-109.80	N/A	135.00	4- Lime Stone/Very shelly sand
65	115.00	-112.30	N/A	135.00	4- Lime Stone/Very shelly sand
66	115.00	-112.30	N/A	0.00	1- Plastic Clay
67	115.00	-112.30	17.00	120.00	3- Clean sand
68	117.50	-114.80	17.00	120.00	3- Clean sand

"BB-04_Drilled_48in_BOC=-15.5ft_Void=-60ft.out"

Top of Rock Socket
elev = -60'

Bottom of Canal
elev = -15.5'

69	117.50	-114.80	N/A	0.00	1- Plastic Clay
70	117.50	-114.80	N/A	135.00	4- Lime Stone/Very shelly sand
71	120.00	-117.30	N/A	135.00	4- Lime Stone/Very shelly sand
72	122.50	-119.80	N/A	135.00	4- Lime Stone/Very shelly sand
73	125.00	-122.30	N/A	135.00	4- Lime Stone/Very shelly sand

ID	Cu-Dir (tsf)	qu (tsf)	qt (tsf)	Em (ksi)	qb (tsf)

1	N/A	N/A	N/A	N/A	N/A
2	N/A	N/A	N/A	N/A	N/A
3	N/A	N/A	N/A	N/A	N/A
4	N/A	N/A	N/A	N/A	N/A
5	N/A	N/A	N/A	N/A	N/A
6	N/A	N/A	N/A	N/A	N/A
7	N/A	N/A	N/A	N/A	N/A
8	N/A	N/A	N/A	N/A	N/A
9	N/A	N/A	N/A	N/A	N/A
10	N/A	N/A	N/A	N/A	N/A
11	N/A	N/A	N/A	N/A	N/A
12	N/A	N/A	N/A	N/A	N/A
13	N/A	N/A	N/A	N/A	N/A
14	N/A	N/A	N/A	N/A	N/A
15	N/A	N/A	N/A	N/A	N/A
16	N/A	N/A	N/A	N/A	N/A
17	N/A	N/A	N/A	N/A	N/A
18	N/A	N/A	N/A	N/A	N/A
19	N/A	N/A	N/A	N/A	N/A
20	N/A	N/A	N/A	N/A	N/A
21	N/A	N/A	N/A	N/A	N/A
22	N/A	N/A	N/A	N/A	N/A
23	N/A	N/A	N/A	N/A	N/A
24	N/A	N/A	N/A	N/A	N/A
25	N/A	N/A	N/A	N/A	N/A
26	N/A	N/A	N/A	N/A	N/A
27	N/A	N/A	N/A	N/A	N/A
28	N/A	N/A	N/A	N/A	N/A
29	N/A	N/A	N/A	N/A	N/A
30	N/A	N/A	N/A	N/A	N/A
31	0.00	N/A	N/A	N/A	N/A
32	N/A	25.00	4.00	39.93	12.50
33	N/A	25.00	4.00	39.93	12.50
34	N/A	25.00	4.00	39.93	12.50
35	N/A	25.00	4.00	39.93	12.50
36	N/A	12.40	1.98	19.81	6.20
37	0.00	N/A	N/A	N/A	N/A
38	N/A	N/A	N/A	N/A	N/A
39	N/A	N/A	N/A	N/A	N/A
40	0.00	N/A	N/A	N/A	N/A
41	N/A	25.00	4.00	39.93	12.50
42	N/A	25.00	4.00	39.93	12.50
43	N/A	25.00	4.00	39.93	12.50

"BB-04_Drilled_48in_BOC=-15.5ft_Void=-60ft.out"

Top of Rock Socket
elev = -60'

44	N/A	25.00	4.00	39.93	12.50
45	N/A	25.00	4.00	39.93	12.50
46	N/A	25.00	4.00	39.93	12.50
47	N/A	25.00	4.00	39.93	12.50
48	N/A	25.00	4.00	39.93	12.50
49	N/A	25.00	4.00	39.93	12.50
50	N/A	16.74	2.68	26.74	8.37
51	0.00	N/A	N/A	N/A	N/A
52	N/A	N/A	N/A	N/A	N/A
53	N/A	N/A	N/A	N/A	N/A
54	0.00	N/A	N/A	N/A	N/A
55	N/A	25.00	4.00	39.93	12.50
56	N/A	25.00	4.00	39.93	12.50
57	N/A	25.00	4.00	39.93	12.50
58	N/A	25.00	4.00	39.93	12.50
59	N/A	12.40	1.98	19.81	6.20
60	0.00	N/A	N/A	N/A	N/A
61	N/A	N/A	N/A	N/A	N/A
62	N/A	N/A	N/A	N/A	N/A
63	0.00	N/A	N/A	N/A	N/A
64	N/A	25.00	4.00	39.93	12.50
65	N/A	25.00	4.00	39.93	12.50
66	0.00	N/A	N/A	N/A	N/A
67	N/A	N/A	N/A	N/A	N/A
68	N/A	N/A	N/A	N/A	N/A
69	0.00	N/A	N/A	N/A	N/A
70	N/A	25.00	4.00	39.93	12.50
71	N/A	25.00	4.00	39.93	12.50
72	N/A	25.00	4.00	39.93	12.50
73	N/A	25.00	4.00	39.93	12.50

ID	RQD F.M.	S.R.I.	Rock Recovery

1	N/A	N/A	N/A
2	N/A	N/A	N/A
3	N/A	N/A	N/A
4	N/A	N/A	N/A
5	N/A	N/A	N/A
6	N/A	N/A	N/A
7	N/A	N/A	N/A
8	N/A	N/A	N/A
9	N/A	N/A	N/A
10	N/A	N/A	N/A
11	N/A	N/A	N/A
12	N/A	N/A	N/A
13	N/A	N/A	N/A
14	N/A	N/A	N/A
15	N/A	N/A	N/A
16	N/A	N/A	N/A
17	N/A	N/A	N/A
18	N/A	N/A	N/A

"BB-04_Drilled_48in_BOC=-15.5ft_Void=-60ft.out"

19	N/A	N/A	N/A
20	N/A	N/A	N/A
21	N/A	N/A	N/A
22	N/A	N/A	N/A
23	N/A	N/A	N/A
24	N/A	N/A	N/A
25	N/A	N/A	N/A
26	N/A	N/A	N/A
27	N/A	N/A	N/A
28	N/A	N/A	N/A
29	N/A	N/A	N/A
30	N/A	N/A	N/A
31	N/A	N/A	N/A
32	0.50	ROUGH	1.000
33	0.50	ROUGH	1.000
34	0.50	ROUGH	1.000
35	0.50	ROUGH	1.000
36	0.50	ROUGH	1.000
37	N/A	N/A	N/A
38	N/A	N/A	N/A
39	N/A	N/A	N/A
40	N/A	N/A	N/A
41	0.50	ROUGH	1.000
42	0.50	ROUGH	1.000
43	0.50	ROUGH	1.000
44	0.50	ROUGH	1.000
45	0.50	ROUGH	1.000
46	0.50	ROUGH	1.000
47	0.50	ROUGH	1.000
48	0.50	ROUGH	1.000
49	0.50	ROUGH	1.000
50	0.50	ROUGH	1.000
51	N/A	N/A	N/A
52	N/A	N/A	N/A
53	N/A	N/A	N/A
54	N/A	N/A	N/A
55	0.50	ROUGH	1.000
56	0.50	ROUGH	1.000
57	0.50	ROUGH	1.000
58	0.50	ROUGH	1.000
59	0.50	ROUGH	1.000
60	N/A	N/A	N/A
61	N/A	N/A	N/A
62	N/A	N/A	N/A
63	N/A	N/A	N/A
64	0.50	ROUGH	1.000
65	0.50	ROUGH	1.000
66	N/A	N/A	N/A
67	N/A	N/A	N/A
68	N/A	N/A	N/A
69	N/A	N/A	N/A
70	0.50	ROUGH	1.000

"BB-04_Drilled_48in_BOC=-15.5ft_Void=-60ft.out"

71	0.50	ROUGH	1.000
72	0.50	ROUGH	1.000
73	0.50	ROUGH	1.000

Drilled Shaft Data:

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Unit weight of concrete = 145.00(pcf), Concrete Slump = 6.00(in)
Modulus of Elasticity of concrete = 3987.00(ksi)

Shaft Geometry:

ID	Length (ft)	Tip Elev. (ft)	Case Len. (ft)	Diameter (in)	Base Diam. (in)	Bell Len. (ft)
1	5.00	-2.30	0.00	48.00	48.00	0.00
2	7.00	-4.30	0.00	48.00	48.00	0.00
3	9.00	-6.30	0.00	48.00	48.00	0.00
4	11.00	-8.30	0.00	48.00	48.00	0.00
5	13.00	-10.30	0.00	48.00	48.00	0.00
6	15.00	-12.30	0.00	48.00	48.00	0.00
7	17.00	-14.30	0.00	48.00	48.00	0.00
8	19.00	-16.30	0.00	48.00	48.00	0.00
9	21.00	-18.30	0.00	48.00	48.00	0.00
10	23.00	-20.30	0.00	48.00	48.00	0.00
11	25.00	-22.30	0.00	48.00	48.00	0.00
12	27.00	-24.30	0.00	48.00	48.00	0.00
13	29.00	-26.30	0.00	48.00	48.00	0.00
14	31.00	-28.30	0.00	48.00	48.00	0.00
15	33.00	-30.30	0.00	48.00	48.00	0.00
16	35.00	-32.30	0.00	48.00	48.00	0.00
17	37.00	-34.30	0.00	48.00	48.00	0.00
18	39.00	-36.30	0.00	48.00	48.00	0.00
19	41.00	-38.30	0.00	48.00	48.00	0.00
20	43.00	-40.30	0.00	48.00	48.00	0.00
21	45.00	-42.30	0.00	48.00	48.00	0.00
22	47.00	-44.30	0.00	48.00	48.00	0.00
23	49.00	-46.30	0.00	48.00	48.00	0.00
24	51.00	-48.30	0.00	48.00	48.00	0.00
25	53.00	-50.30	0.00	48.00	48.00	0.00
26	55.00	-52.30	0.00	48.00	48.00	0.00
27	57.00	-54.30	0.00	48.00	48.00	0.00
28	59.00	-56.30	0.00	48.00	48.00	0.00
29	61.00	-58.30	0.00	48.00	48.00	0.00
30	63.00	-60.30	0.00	48.00	48.00	0.00
31	65.00	-62.30	0.00	48.00	48.00	0.00
32	67.00	-64.30	0.00	48.00	48.00	0.00
33	69.00	-66.30	0.00	48.00	48.00	0.00
34	71.00	-68.30	0.00	48.00	48.00	0.00
35	73.00	-70.30	0.00	48.00	48.00	0.00
36	75.00	-72.30	0.00	48.00	48.00	0.00
37	77.00	-74.30	0.00	48.00	48.00	0.00

"BB-04_Drilled_48in_BOC=-15.5ft_Void=-60ft.out"

38	79.00	-76.30	0.00	48.00	48.00	0.00
39	81.00	-78.30	0.00	48.00	48.00	0.00
40	83.00	-80.30	0.00	48.00	48.00	0.00
41	85.00	-82.30	0.00	48.00	48.00	0.00
42	87.00	-84.30	0.00	48.00	48.00	0.00
43	89.00	-86.30	0.00	48.00	48.00	0.00
44	91.00	-88.30	0.00	48.00	48.00	0.00
45	93.00	-90.30	0.00	48.00	48.00	0.00
46	95.00	-92.30	0.00	48.00	48.00	0.00
47	97.00	-94.30	0.00	48.00	48.00	0.00
48	99.00	-96.30	0.00	48.00	48.00	0.00
49	101.00	-98.30	0.00	48.00	48.00	0.00
50	103.00	-100.30	0.00	48.00	48.00	0.00
51	105.00	-102.30	0.00	48.00	48.00	0.00
52	107.00	-104.30	0.00	48.00	48.00	0.00
53	109.00	-106.30	0.00	48.00	48.00	0.00
54	111.00	-108.30	0.00	48.00	48.00	0.00
55	113.00	-110.30	0.00	48.00	48.00	0.00
56	115.00	-112.30	0.00	48.00	48.00	0.00
57	117.00	-114.30	0.00	48.00	48.00	0.00
58	119.00	-116.30	0.00	48.00	48.00	0.00

Drilled Shaft Capacity (sorted by shaft diameter):

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Strength reduction factors: Skin-friction = 1.00, End-bearing = 1.00

ID	Diameter (in)	Length (ft)	Skin Fric. (tons)	End Bearing (tons)	Capacity (tons)
1	48.00	5.00	0.000	0.000	0.000
2	48.00	7.00	0.000	0.000	0.000
3	48.00	9.00	0.000	0.000	0.000
4	48.00	11.00	0.000	0.000	0.000
5	48.00	13.00	0.000	0.000	0.000
6	48.00	15.00	0.000	0.000	0.000
7	48.00	17.00	0.000	0.000	0.000
8	48.00	19.00	0.000	0.000	0.000
9	48.00	21.00	0.000	0.000	0.000
10	48.00	23.00	0.000	0.000	0.000
11	48.00	25.00	0.000	0.000	0.000
12	48.00	27.00	0.000	0.000	0.000
13	48.00	29.00	0.000	0.000	0.000
14	48.00	31.00	0.000	0.000	0.000
15	48.00	33.00	0.000	0.000	0.000
16	48.00	35.00	0.000	0.000	0.000
17	48.00	37.00	0.000	0.000	0.000
18	48.00	39.00	0.000	0.000	0.000
19	48.00	41.00	0.000	0.000	0.000
20	48.00	43.00	0.000	0.000	0.000
21	48.00	45.00	0.000	0.000	0.000
22	48.00	47.00	0.000	0.000	0.000

"BB-04_Drilled_48in_B0C=-15.5ft_Void=-60ft.out"

23	48.00	49.00	0.000	0.000	0.000
24	48.00	51.00	0.000	0.000	0.000
25	48.00	53.00	0.000	0.000	0.000
26	48.00	55.00	0.000	0.000	0.000
27	48.00	57.00	0.000	0.000	0.000
28	48.00	59.00	0.000	0.000	0.000
29	48.00	61.00	0.000	0.000	0.000
30	48.00	63.00	18.850	157.080	175.929
31	48.00	65.00	144.513	157.080	301.593
32	48.00	67.00	270.177	157.080	427.257
33	48.00	69.00	395.841	157.080	552.920
34	48.00	71.00	521.504	157.080	678.584
35	48.00	73.00	616.321	9.349	625.671
36	48.00	75.00	618.804	157.080	775.884
37	48.00	77.00	744.468	157.080	901.548
38	48.00	79.00	870.132	157.080	1027.211
39	48.00	81.00	995.795	157.080	1152.875
40	48.00	83.00	1121.459	157.080	1278.539
41	48.00	85.00	1247.123	157.080	1404.202
42	48.00	87.00	1372.787	157.080	1529.866
43	48.00	89.00	1498.450	157.080	1655.530
44	48.00	91.00	1624.114	157.080	1781.194
45	48.00	93.00	1749.778	157.080	1906.857
46	48.00	95.00	1875.441	157.080	2032.521
47	48.00	97.00	2001.105	157.080	2158.185
48	48.00	99.00	2038.458	155.528	2193.986
49	48.00	101.00	2105.361	157.080	2262.440
50	48.00	103.00	2231.024	157.080	2388.104
51	48.00	105.00	2356.688	157.080	2513.768
52	48.00	107.00	2482.352	157.080	2639.431
53	48.00	109.00	2608.016	157.080	2765.095
54	48.00	111.00	2676.126	18.699	2694.824
55	48.00	113.00	2715.614	157.080	2872.694
56	48.00	115.00	2841.278	122.775	2964.053
57	48.00	117.00	2852.916	140.150	2993.066
58	48.00	119.00	2950.130	157.080	3107.210

Drilled Shaft Capacity at User-Defined Settlement (sorted by shaft diameter):

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**** Capacity is NOT modified by the strength reduction factors ****

User-Defined Settlement = 1.04%

ID	Diameter (in)	Length (ft)	Skin Fric. (tons)	End Bearing (tons)	Capacity (tons)
1	48.00	5.00	0.000	0.000	0.000
2	48.00	7.00	0.000	0.000	0.000
3	48.00	9.00	0.000	0.000	0.000
4	48.00	11.00	0.000	0.000	0.000

"BB-04_Drilled_48in_B0C=-15.5ft_Void=-60ft.out"

5	48.00	13.00	0.000	0.000	0.000
6	48.00	15.00	0.000	0.000	0.000
7	48.00	17.00	0.000	0.000	0.000
8	48.00	19.00	0.000	0.000	0.000
9	48.00	21.00	0.000	0.000	0.000
10	48.00	23.00	0.000	0.000	0.000
11	48.00	25.00	0.000	0.000	0.000
12	48.00	27.00	0.000	0.000	0.000
13	48.00	29.00	0.000	0.000	0.000
14	48.00	31.00	0.000	0.000	0.000
15	48.00	33.00	0.000	0.000	0.000
16	48.00	35.00	0.000	0.000	0.000
17	48.00	37.00	0.000	0.000	0.000
18	48.00	39.00	0.000	0.000	0.000
19	48.00	41.00	0.000	0.000	0.000
20	48.00	43.00	0.000	0.000	0.000
21	48.00	45.00	0.000	0.000	0.000
22	48.00	47.00	0.000	0.000	0.000
23	48.00	49.00	0.000	0.000	0.000
24	48.00	51.00	0.000	0.000	0.000
25	48.00	53.00	0.000	0.000	0.000
26	48.00	55.00	0.000	0.000	0.000
27	48.00	57.00	0.000	0.000	0.000
28	48.00	59.00	0.000	0.000	0.000
29	48.00	61.00	0.000	0.000	0.000
30	48.00	63.00	9.348	1908.314	1917.662
31	48.00	65.00	67.961	487.487	555.447
32	48.00	67.00	120.831	320.551	441.382
33	48.00	69.00	168.788	248.177	416.965
34	48.00	71.00	213.304	211.297	424.601
35	48.00	73.00	248.890	2.970	251.859
36	48.00	75.00	251.318	210.022	461.340
37	48.00	77.00	296.841	207.642	504.483
38	48.00	79.00	341.100	204.864	545.964
39	48.00	81.00	384.211	201.904	586.115
40	48.00	83.00	426.272	198.877	625.149
41	48.00	85.00	467.362	195.847	663.209
42	48.00	87.00	507.551	192.848	700.399
43	48.00	89.00	546.896	189.901	736.797
44	48.00	91.00	585.451	187.016	772.467
45	48.00	93.00	623.262	184.198	807.460
46	48.00	95.00	660.369	181.451	841.820
47	48.00	97.00	696.811	178.773	875.584
48	48.00	99.00	711.628	49.401	761.029
49	48.00	101.00	733.544	176.810	910.353
50	48.00	103.00	768.959	174.250	943.209
51	48.00	105.00	803.796	171.756	975.552
52	48.00	107.00	838.080	169.323	1007.403
53	48.00	109.00	871.835	166.951	1038.786
54	48.00	111.00	893.685	5.939	899.624
55	48.00	113.00	909.893	165.209	1075.101
56	48.00	115.00	942.839	38.998	981.836

"BB-04_Drilled_48in_BOC=-15.5ft_Void=-60ft.out"

57	48.00	117.00	954.222	44.517	998.739
58	48.00	119.00	981.571	161.263	1142.834

"BB-04_Drilled_48in_BOC=-15.5ft_Void=-60ft.out"

General Information:

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Input file: ed Shaft\DS Water\BB-04_Drilled_60in_BOC=-15.5ft_Void=-60ft.in
Project number: B-22-074
Job name: Broad Causeway Bridge
Engineer: PV/TC
Units: English

Analysis Information:

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Analysis Type: Drilled Shaft Analysis

Soil Information:

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Boring date: 3/28/2023
Boring number: BB-04
Station number: 123+79 Offset: +35

Ground Elevation: 2.70(ft)
Water table Elevation = 2.70(ft)

Cu is calculated using: Direct method.
Rock side-friction is calculated using: McVay's method
Hammer type: Automatic Hammer, Correction factor = 1.24

ID	Depth (ft)	Elevation (ft)	SPT Blows (Blows/ft)	Unit Weight (pcf)	Soil Type

1	0.00	2.70	N/A	0.00	5- Cavity layer
2	2.00	0.70	N/A	0.00	5- Cavity layer
3	4.00	-1.30	N/A	0.00	5- Cavity layer
4	6.00	-3.30	N/A	0.00	5- Cavity layer
5	8.00	-5.30	N/A	0.00	5- Cavity layer
6	10.00	-7.30	N/A	0.00	5- Cavity layer
7	12.00	-9.30	N/A	0.00	5- Cavity layer
8	14.00	-11.30	N/A	0.00	5- Cavity layer
9	16.00	-13.30	N/A	0.00	5- Cavity layer
10	18.20	-15.50	N/A	0.00	5- Cavity layer
11	18.20	-15.50	N/A	115.00	5- Cavity layer
12	20.00	-17.30	N/A	115.00	5- Cavity layer
13	22.50	-19.80	N/A	120.00	5- Cavity layer
14	25.00	-22.30	N/A	120.00	5- Cavity layer
15	27.50	-24.80	N/A	115.00	5- Cavity layer
16	30.00	-27.30	N/A	120.00	5- Cavity layer

"BB-04_Drilled_60in_BOC=-15.5ft_Void=-60ft.out"

17	32.50	-29.80	N/A	115.00	5- Cavity layer
18	35.00	-32.30	N/A	115.00	5- Cavity layer
19	37.50	-34.80	N/A	115.00	5- Cavity layer
20	40.00	-37.30	N/A	115.00	5- Cavity layer
21	42.50	-39.80	N/A	92.00	5- Cavity layer
22	45.00	-42.30	N/A	86.00	5- Cavity layer
23	47.50	-44.80	N/A	109.00	5- Cavity layer
24	50.00	-47.30	N/A	106.00	5- Cavity layer
25	52.50	-49.80	N/A	119.00	5- Cavity layer
26	55.00	-52.30	N/A	129.00	5- Cavity layer
27	57.50	-54.80	N/A	120.00	5- Cavity layer
28	60.00	-57.30	N/A	120.00	5- Cavity layer
29	62.50	-59.80	N/A	135.00	5- Cavity layer
30	62.70	-60.00	N/A	135.00	5- Cavity layer
31	62.70	-60.00	N/A	0.00	1- Plastic Clay
32	62.70	-60.00	N/A	135.00	4- Lime Stone/Very shelly sand
33	65.00	-62.30	N/A	135.00	4- Lime Stone/Very shelly sand
34	67.50	-64.80	N/A	135.00	4- Lime Stone/Very shelly sand
35	70.00	-67.30	N/A	135.00	4- Lime Stone/Very shelly sand
36	72.50	-69.80	N/A	120.00	5- Cavity layer
37	72.50	-69.80	N/A	0.00	1- Plastic Clay
38	72.50	-69.80	1.00	115.00	3- Clean sand
39	75.00	-72.30	1.00	115.00	3- Clean sand
40	75.00	-72.30	N/A	0.00	1- Plastic Clay
41	75.00	-72.30	N/A	135.00	4- Lime Stone/Very shelly sand
42	77.50	-74.80	N/A	135.00	4- Lime Stone/Very shelly sand
43	80.00	-77.30	N/A	135.00	4- Lime Stone/Very shelly sand
44	82.50	-79.80	N/A	135.00	4- Lime Stone/Very shelly sand
45	85.00	-82.30	N/A	135.00	4- Lime Stone/Very shelly sand
46	87.50	-84.80	N/A	135.00	4- Lime Stone/Very shelly sand
47	90.00	-87.30	N/A	135.00	4- Lime Stone/Very shelly sand
48	92.50	-89.80	N/A	135.00	4- Lime Stone/Very shelly sand
49	95.00	-92.30	N/A	135.00	4- Lime Stone/Very shelly sand
50	97.50	-94.80	N/A	125.00	4- Lime Stone/Very shelly sand
51	97.50	-94.80	N/A	0.00	1- Plastic Clay
52	97.50	-94.80	19.00	120.00	3- Clean sand
53	100.00	-97.30	19.00	120.00	3- Clean sand
54	100.00	-97.30	N/A	0.00	1- Plastic Clay
55	100.00	-97.30	N/A	135.00	4- Lime Stone/Very shelly sand
56	102.50	-99.80	N/A	135.00	4- Lime Stone/Very shelly sand
57	105.00	-102.30	N/A	135.00	4- Lime Stone/Very shelly sand
58	107.50	-104.80	N/A	130.00	4- Lime Stone/Very shelly sand
59	110.00	-107.30	N/A	120.00	4- Lime Stone/Very shelly sand
60	110.00	-107.30	N/A	0.00	1- Plastic Clay
61	110.00	-107.30	2.00	115.00	3- Clean sand
62	112.50	-109.80	2.00	115.00	3- Clean sand
63	112.50	-109.80	N/A	0.00	1- Plastic Clay
64	112.50	-109.80	N/A	135.00	4- Lime Stone/Very shelly sand
65	115.00	-112.30	N/A	135.00	4- Lime Stone/Very shelly sand
66	115.00	-112.30	N/A	0.00	1- Plastic Clay
67	115.00	-112.30	17.00	120.00	3- Clean sand
68	117.50	-114.80	17.00	120.00	3- Clean sand

"BB-04_Drilled_60in_BOC=-15.5ft_Void=-60ft.out"

Top of Rock Socket
elev = -60'

Bottom of Canal
elev = -15.5'

69	117.50	-114.80	N/A	0.00	1- Plastic Clay
70	117.50	-114.80	N/A	135.00	4- Lime Stone/Very shelly sand
71	120.00	-117.30	N/A	135.00	4- Lime Stone/Very shelly sand
72	122.50	-119.80	N/A	135.00	4- Lime Stone/Very shelly sand
73	125.00	-122.30	N/A	135.00	4- Lime Stone/Very shelly sand

ID	Cu-Dir (tsf)	qu (tsf)	qt (tsf)	Em (ksi)	qb (tsf)
1	N/A	N/A	N/A	N/A	N/A
2	N/A	N/A	N/A	N/A	N/A
3	N/A	N/A	N/A	N/A	N/A
4	N/A	N/A	N/A	N/A	N/A
5	N/A	N/A	N/A	N/A	N/A
6	N/A	N/A	N/A	N/A	N/A
7	N/A	N/A	N/A	N/A	N/A
8	N/A	N/A	N/A	N/A	N/A
9	N/A	N/A	N/A	N/A	N/A
10	N/A	N/A	N/A	N/A	N/A
11	N/A	N/A	N/A	N/A	N/A
12	N/A	N/A	N/A	N/A	N/A
13	N/A	N/A	N/A	N/A	N/A
14	N/A	N/A	N/A	N/A	N/A
15	N/A	N/A	N/A	N/A	N/A
16	N/A	N/A	N/A	N/A	N/A
17	N/A	N/A	N/A	N/A	N/A
18	N/A	N/A	N/A	N/A	N/A
19	N/A	N/A	N/A	N/A	N/A
20	N/A	N/A	N/A	N/A	N/A
21	N/A	N/A	N/A	N/A	N/A
22	N/A	N/A	N/A	N/A	N/A
23	N/A	N/A	N/A	N/A	N/A
24	N/A	N/A	N/A	N/A	N/A
25	N/A	N/A	N/A	N/A	N/A
26	N/A	N/A	N/A	N/A	N/A
27	N/A	N/A	N/A	N/A	N/A
28	N/A	N/A	N/A	N/A	N/A
29	N/A	N/A	N/A	N/A	N/A
30	N/A	N/A	N/A	N/A	N/A
31	0.00	N/A	N/A	N/A	N/A
32	N/A	25.00	4.00	39.93	12.50
33	N/A	25.00	4.00	39.93	12.50
34	N/A	25.00	4.00	39.93	12.50
35	N/A	25.00	4.00	39.93	12.50
36	N/A	12.40	1.98	19.81	6.20
37	0.00	N/A	N/A	N/A	N/A
38	N/A	N/A	N/A	N/A	N/A
39	N/A	N/A	N/A	N/A	N/A
40	0.00	N/A	N/A	N/A	N/A
41	N/A	25.00	4.00	39.93	12.50
42	N/A	25.00	4.00	39.93	12.50
43	N/A	25.00	4.00	39.93	12.50

"BB-04_Drilled_60in_BOC=-15.5ft_Void=-60ft.out"

44	N/A	25.00	4.00	39.93	12.50
45	N/A	25.00	4.00	39.93	12.50
46	N/A	25.00	4.00	39.93	12.50
47	N/A	25.00	4.00	39.93	12.50
48	N/A	25.00	4.00	39.93	12.50
49	N/A	25.00	4.00	39.93	12.50
50	N/A	16.74	2.68	26.74	8.37
51	0.00	N/A	N/A	N/A	N/A
52	N/A	N/A	N/A	N/A	N/A
53	N/A	N/A	N/A	N/A	N/A
54	0.00	N/A	N/A	N/A	N/A
55	N/A	25.00	4.00	39.93	12.50
56	N/A	25.00	4.00	39.93	12.50
57	N/A	25.00	4.00	39.93	12.50
58	N/A	25.00	4.00	39.93	12.50
59	N/A	12.40	1.98	19.81	6.20
60	0.00	N/A	N/A	N/A	N/A
61	N/A	N/A	N/A	N/A	N/A
62	N/A	N/A	N/A	N/A	N/A
63	0.00	N/A	N/A	N/A	N/A
64	N/A	25.00	4.00	39.93	12.50
65	N/A	25.00	4.00	39.93	12.50
66	0.00	N/A	N/A	N/A	N/A
67	N/A	N/A	N/A	N/A	N/A
68	N/A	N/A	N/A	N/A	N/A
69	0.00	N/A	N/A	N/A	N/A
70	N/A	25.00	4.00	39.93	12.50
71	N/A	25.00	4.00	39.93	12.50
72	N/A	25.00	4.00	39.93	12.50
73	N/A	25.00	4.00	39.93	12.50

ID	RQD F.M.	S.R.I.	Rock Recovery
1	N/A	N/A	N/A
2	N/A	N/A	N/A
3	N/A	N/A	N/A
4	N/A	N/A	N/A
5	N/A	N/A	N/A
6	N/A	N/A	N/A
7	N/A	N/A	N/A
8	N/A	N/A	N/A
9	N/A	N/A	N/A
10	N/A	N/A	N/A
11	N/A	N/A	N/A
12	N/A	N/A	N/A
13	N/A	N/A	N/A
14	N/A	N/A	N/A
15	N/A	N/A	N/A
16	N/A	N/A	N/A
17	N/A	N/A	N/A
18	N/A	N/A	N/A

"BB-04_Drilled_60in_BOC=-15.5ft_Void=-60ft.out"

Top of Rock Socket
elev = -60'

19	N/A	N/A	N/A
20	N/A	N/A	N/A
21	N/A	N/A	N/A
22	N/A	N/A	N/A
23	N/A	N/A	N/A
24	N/A	N/A	N/A
25	N/A	N/A	N/A
26	N/A	N/A	N/A
27	N/A	N/A	N/A
28	N/A	N/A	N/A
29	N/A	N/A	N/A
30	N/A	N/A	N/A
31	N/A	N/A	N/A
32	0.50	ROUGH	1.000
33	0.50	ROUGH	1.000
34	0.50	ROUGH	1.000
35	0.50	ROUGH	1.000
36	0.50	ROUGH	1.000
37	N/A	N/A	N/A
38	N/A	N/A	N/A
39	N/A	N/A	N/A
40	N/A	N/A	N/A
41	0.50	ROUGH	1.000
42	0.50	ROUGH	1.000
43	0.50	ROUGH	1.000
44	0.50	ROUGH	1.000
45	0.50	ROUGH	1.000
46	0.50	ROUGH	1.000
47	0.50	ROUGH	1.000
48	0.50	ROUGH	1.000
49	0.50	ROUGH	1.000
50	0.50	ROUGH	1.000
51	N/A	N/A	N/A
52	N/A	N/A	N/A
53	N/A	N/A	N/A
54	N/A	N/A	N/A
55	0.50	ROUGH	1.000
56	0.50	ROUGH	1.000
57	0.50	ROUGH	1.000
58	0.50	ROUGH	1.000
59	0.50	ROUGH	1.000
60	N/A	N/A	N/A
61	N/A	N/A	N/A
62	N/A	N/A	N/A
63	N/A	N/A	N/A
64	0.50	ROUGH	1.000
65	0.50	ROUGH	1.000
66	N/A	N/A	N/A
67	N/A	N/A	N/A
68	N/A	N/A	N/A
69	N/A	N/A	N/A
70	0.50	ROUGH	1.000

"BB-04_Drilled_60in_BOC=-15.5ft_Void=-60ft.out"

71	0.50	ROUGH	1.000
72	0.50	ROUGH	1.000
73	0.50	ROUGH	1.000

Drilled Shaft Data:

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Unit weight of concrete = 145.00(pcf), Concrete Slump = 6.00(in)

Modulus of Elasticity of concrete = 3987.00(ksi)

Shaft Geometry:

ID	Length (ft)	Tip Elev. (ft)	Case Len. (ft)	Diameter (in)	Base Diam. (in)	Bell Len. (ft)
1	5.00	-2.30	0.00	60.00	60.00	0.00
2	7.00	-4.30	0.00	60.00	60.00	0.00
3	9.00	-6.30	0.00	60.00	60.00	0.00
4	11.00	-8.30	0.00	60.00	60.00	0.00
5	13.00	-10.30	0.00	60.00	60.00	0.00
6	15.00	-12.30	0.00	60.00	60.00	0.00
7	17.00	-14.30	0.00	60.00	60.00	0.00
8	19.00	-16.30	0.00	60.00	60.00	0.00
9	21.00	-18.30	0.00	60.00	60.00	0.00
10	23.00	-20.30	0.00	60.00	60.00	0.00
11	25.00	-22.30	0.00	60.00	60.00	0.00
12	27.00	-24.30	0.00	60.00	60.00	0.00
13	29.00	-26.30	0.00	60.00	60.00	0.00
14	31.00	-28.30	0.00	60.00	60.00	0.00
15	33.00	-30.30	0.00	60.00	60.00	0.00
16	35.00	-32.30	0.00	60.00	60.00	0.00
17	37.00	-34.30	0.00	60.00	60.00	0.00
18	39.00	-36.30	0.00	60.00	60.00	0.00
19	41.00	-38.30	0.00	60.00	60.00	0.00
20	43.00	-40.30	0.00	60.00	60.00	0.00
21	45.00	-42.30	0.00	60.00	60.00	0.00
22	47.00	-44.30	0.00	60.00	60.00	0.00
23	49.00	-46.30	0.00	60.00	60.00	0.00
24	51.00	-48.30	0.00	60.00	60.00	0.00
25	53.00	-50.30	0.00	60.00	60.00	0.00
26	55.00	-52.30	0.00	60.00	60.00	0.00
27	57.00	-54.30	0.00	60.00	60.00	0.00
28	59.00	-56.30	0.00	60.00	60.00	0.00
29	61.00	-58.30	0.00	60.00	60.00	0.00
30	63.00	-60.30	0.00	60.00	60.00	0.00
31	65.00	-62.30	0.00	60.00	60.00	0.00
32	67.00	-64.30	0.00	60.00	60.00	0.00
33	69.00	-66.30	0.00	60.00	60.00	0.00
34	71.00	-68.30	0.00	60.00	60.00	0.00
35	73.00	-70.30	0.00	60.00	60.00	0.00
36	75.00	-72.30	0.00	60.00	60.00	0.00
37	77.00	-74.30	0.00	60.00	60.00	0.00

"BB-04_Drilled_60in_BOC=-15.5ft_Void=-60ft.out"

38	79.00	-76.30	0.00	60.00	60.00	0.00
39	81.00	-78.30	0.00	60.00	60.00	0.00
40	83.00	-80.30	0.00	60.00	60.00	0.00
41	85.00	-82.30	0.00	60.00	60.00	0.00
42	87.00	-84.30	0.00	60.00	60.00	0.00
43	89.00	-86.30	0.00	60.00	60.00	0.00
44	91.00	-88.30	0.00	60.00	60.00	0.00
45	93.00	-90.30	0.00	60.00	60.00	0.00
46	95.00	-92.30	0.00	60.00	60.00	0.00
47	97.00	-94.30	0.00	60.00	60.00	0.00
48	99.00	-96.30	0.00	60.00	60.00	0.00
49	101.00	-98.30	0.00	60.00	60.00	0.00
50	103.00	-100.30	0.00	60.00	60.00	0.00
51	105.00	-102.30	0.00	60.00	60.00	0.00
52	107.00	-104.30	0.00	60.00	60.00	0.00
53	109.00	-106.30	0.00	60.00	60.00	0.00
54	111.00	-108.30	0.00	60.00	60.00	0.00
55	113.00	-110.30	0.00	60.00	60.00	0.00
56	115.00	-112.30	0.00	60.00	60.00	0.00

Drilled Shaft Capacity (sorted by shaft diameter):

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Strength reduction factors: Skin-friction = 1.00, End-bearing = 1.00

ID	Diameter (in)	Length (ft)	Skin Fric. (tons)	End Bearing (tons)	Capacity (tons)

1	60.00	5.00	0.000	0.000	0.000
2	60.00	7.00	0.000	0.000	0.000
3	60.00	9.00	0.000	0.000	0.000
4	60.00	11.00	0.000	0.000	0.000
5	60.00	13.00	0.000	0.000	0.000
6	60.00	15.00	0.000	0.000	0.000
7	60.00	17.00	0.000	0.000	0.000
8	60.00	19.00	0.000	0.000	0.000
9	60.00	21.00	0.000	0.000	0.000
10	60.00	23.00	0.000	0.000	0.000
11	60.00	25.00	0.000	0.000	0.000
12	60.00	27.00	0.000	0.000	0.000
13	60.00	29.00	0.000	0.000	0.000
14	60.00	31.00	0.000	0.000	0.000
15	60.00	33.00	0.000	0.000	0.000
16	60.00	35.00	0.000	0.000	0.000
17	60.00	37.00	0.000	0.000	0.000
18	60.00	39.00	0.000	0.000	0.000
19	60.00	41.00	0.000	0.000	0.000
20	60.00	43.00	0.000	0.000	0.000
21	60.00	45.00	0.000	0.000	0.000
22	60.00	47.00	0.000	0.000	0.000
23	60.00	49.00	0.000	0.000	0.000
24	60.00	51.00	0.000	0.000	0.000

"BB-04_Drilled_60in_B0C=-15.5ft_Void=-60ft.out"

25	60.00	53.00	0.000	0.000	0.000
26	60.00	55.00	0.000	0.000	0.000
27	60.00	57.00	0.000	0.000	0.000
28	60.00	59.00	0.000	0.000	0.000
29	60.00	61.00	0.000	0.000	0.000
30	60.00	63.00	23.562	245.437	268.999
31	60.00	65.00	180.642	245.437	426.078
32	60.00	67.00	337.721	245.437	583.158
33	60.00	69.00	494.801	245.437	740.238
34	60.00	71.00	651.880	245.437	897.317
35	60.00	73.00	770.402	12.174	782.575
36	60.00	75.00	773.505	245.437	1018.942
37	60.00	77.00	930.585	245.437	1176.022
38	60.00	79.00	1087.665	245.437	1333.102
39	60.00	81.00	1244.744	245.437	1490.181
40	60.00	83.00	1401.824	245.437	1647.261
41	60.00	85.00	1558.904	245.437	1804.340
42	60.00	87.00	1715.983	245.437	1961.420
43	60.00	89.00	1873.063	245.437	2118.500
44	60.00	91.00	2030.142	245.437	2275.579
45	60.00	93.00	2187.222	245.437	2432.659
46	60.00	95.00	2344.302	245.437	2589.739
47	60.00	97.00	2501.381	245.437	2746.818
48	60.00	99.00	2548.072	200.595	2748.668
49	60.00	101.00	2631.701	245.437	2877.138
50	60.00	103.00	2788.780	245.437	3034.217
51	60.00	105.00	2945.860	245.437	3191.297
52	60.00	107.00	3102.940	245.437	3348.377
53	60.00	109.00	3260.019	245.437	3505.456
54	60.00	111.00	3345.157	24.347	3369.504
55	60.00	113.00	3394.518	245.437	3639.954
56	60.00	115.00	3551.597	159.788	3711.385

Drilled Shaft Capacity at User-Defined Settlement (sorted by shaft diameter):

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***** Capacity is NOT modified by the strength reduction factors *****

User-Defined Settlement = 0.83%

ID	Diameter (in)	Length (ft)	Skin Fric. (tons)	End Bearing (tons)	Capacity (tons)

1	60.00	5.00	0.000	0.000	0.000
2	60.00	7.00	0.000	0.000	0.000
3	60.00	9.00	0.000	0.000	0.000
4	60.00	11.00	0.000	0.000	0.000
5	60.00	13.00	0.000	0.000	0.000
6	60.00	15.00	0.000	0.000	0.000
7	60.00	17.00	0.000	0.000	0.000
8	60.00	19.00	0.000	0.000	0.000

"BB-04_Drilled_60in_B0C=-15.5ft_Void=-60ft.out"

9	60.00	21.00	0.000	0.000	0.000
10	60.00	23.00	0.000	0.000	0.000
11	60.00	25.00	0.000	0.000	0.000
12	60.00	27.00	0.000	0.000	0.000
13	60.00	29.00	0.000	0.000	0.000
14	60.00	31.00	0.000	0.000	0.000
15	60.00	33.00	0.000	0.000	0.000
16	60.00	35.00	0.000	0.000	0.000
17	60.00	37.00	0.000	0.000	0.000
18	60.00	39.00	0.000	0.000	0.000
19	60.00	41.00	0.000	0.000	0.000
20	60.00	43.00	0.000	0.000	0.000
21	60.00	45.00	0.000	0.000	0.000
22	60.00	47.00	0.000	0.000	0.000
23	60.00	49.00	0.000	0.000	0.000
24	60.00	51.00	0.000	0.000	0.000
25	60.00	53.00	0.000	0.000	0.000
26	60.00	55.00	0.000	0.000	0.000
27	60.00	57.00	0.000	0.000	0.000
28	60.00	59.00	0.000	0.000	0.000
29	60.00	61.00	0.000	0.000	0.000
30	60.00	63.00	11.685	2984.142	2995.826
31	60.00	65.00	84.957	762.311	847.268
32	60.00	67.00	151.058	501.264	652.322
33	60.00	69.00	211.022	388.089	599.111
34	60.00	71.00	265.692	322.632	588.324
35	60.00	73.00	304.336	3.178	307.515
36	60.00	75.00	307.361	288.648	596.009
37	60.00	77.00	361.964	283.298	645.262
38	60.00	79.00	415.696	280.915	696.611
39	60.00	81.00	467.986	278.084	746.070
40	60.00	83.00	518.959	275.008	793.967
41	60.00	85.00	568.721	271.804	840.525
42	60.00	87.00	617.360	268.545	885.905
43	60.00	89.00	664.953	265.276	930.228
44	60.00	91.00	711.566	262.025	973.591
45	60.00	93.00	757.260	258.810	1016.070
46	60.00	95.00	802.086	255.642	1057.728
47	60.00	97.00	846.092	252.529	1098.621
48	60.00	99.00	864.202	52.374	916.576
49	60.00	101.00	890.814	250.231	1141.045
50	60.00	103.00	933.563	247.220	1180.783
51	60.00	105.00	975.603	244.269	1219.872
52	60.00	107.00	1016.966	241.379	1258.344
53	60.00	109.00	1057.683	238.547	1296.230
54	60.00	111.00	1084.237	6.357	1090.594
55	60.00	113.00	1104.096	236.462	1340.557
56	60.00	115.00	1143.828	41.719	1185.548

"BB-04_Drilled_60in_BOC=-15.5ft_Void=-60ft.out"

General Information:
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Input file: d Shaft\DS Water\BB-05_Drilled_48in_BOC=-5.3ft_Void=-58.3ft.in
Project number: B-22-074
Job name: Broad Causeway Bridge
Engineer: PV/TC
Units: English

Analysis Information:
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Analysis Type: Drilled Shaft Analysis

Soil Information:
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Boring date: 12/6/23
Boring number: BB-05
Station number: 126+43 Offset: 28 LT

Ground Elevation: -5.30(ft)
Water table Elevation = 1.70(ft)

Cu is calculated using: Direct method.
Rock side-friction is calculated using: McVay's method
Hammer type: Automatic Hammer, Correction factor = 1.24

ID	Depth (ft)	Elevation (ft)	SPT Blows (Blows/ft)	Unit Weight (pcf)	Soil Type
-----	-----	-----	-----	-----	-----
1	0.00	-5.30	N/A	130.00	5- Cavity layer
2	2.00	-7.30	N/A	130.00	5- Cavity layer
3	4.00	-9.30	N/A	130.00	5- Cavity layer
4	6.00	-11.30	N/A	130.00	5- Cavity layer
5	8.00	-13.30	N/A	125.00	5- Cavity layer
6	10.00	-15.30	N/A	125.00	5- Cavity layer
7	12.00	-17.30	N/A	115.00	5- Cavity layer
8	14.00	-19.30	N/A	125.00	5- Cavity layer
9	16.00	-21.30	N/A	125.00	5- Cavity layer
10	20.00	-25.30	N/A	115.00	5- Cavity layer
11	22.50	-27.80	N/A	115.00	5- Cavity layer
12	25.00	-30.30	N/A	115.00	5- Cavity layer
13	27.50	-32.80	N/A	120.00	5- Cavity layer

BB-05_Drilled_48in_BOC=-5.3ft_Void=-58.3ft.out

14	30.00	-35.30	N/A	120.00	5- Cavity layer
15	32.50	-37.80	N/A	115.00	5- Cavity layer
16	35.00	-40.30	N/A	120.00	5- Cavity layer
17	37.50	-42.80	N/A	115.00	5- Cavity layer
18	40.00	-45.30	N/A	115.00	5- Cavity layer
19	42.50	-47.80	N/A	115.00	5- Cavity layer
20	45.00	-50.30	N/A	115.00	5- Cavity layer
21	47.50	-52.80	N/A	92.00	5- Cavity layer
22	50.00	-55.30	N/A	86.00	5- Cavity layer
23	52.50	-57.80	N/A	0.00	5- Cavity layer
24	53.00	-58.30	N/A	0.00	5- Cavity layer
25	53.00	-58.30	N/A	0.00	1- Plastic Clay
26	53.00	-58.30	N/A	135.00	4- Lime Stone/Very shelly sand
27	55.00	-60.30	N/A	135.00	4- Lime Stone/Very shelly sand
28	57.50	-62.80	N/A	135.00	4- Lime Stone/Very shelly sand
29	60.00	-65.30	N/A	135.00	4- Lime Stone/Very shelly sand
30	60.00	-65.30	N/A	0.00	1- Plastic Clay
31	60.00	-65.30	8.00	115.00	3- Clean sand
32	62.50	-67.80	8.00	115.00	3- Clean sand
33	62.50	-67.80	N/A	0.00	1- Plastic Clay
34	62.50	-67.80	N/A	135.00	4- Lime Stone/Very shelly sand
35	65.00	-70.30	N/A	135.00	4- Lime Stone/Very shelly sand
36	67.50	-72.80	N/A	135.00	4- Lime Stone/Very shelly sand
37	70.00	-75.30	N/A	135.00	4- Lime Stone/Very shelly sand
38	72.50	-77.80	N/A	135.00	4- Lime Stone/Very shelly sand
39	72.50	-77.80	N/A	0.00	1- Plastic Clay
40	72.50	-77.80	91.00	133.00	3- Clean sand
41	75.00	-80.30	91.00	133.00	3- Clean sand
42	75.00	-80.30	N/A	0.00	1- Plastic Clay
43	75.00	-80.30	N/A	135.00	4- Lime Stone/Very shelly sand
44	77.50	-82.80	N/A	135.00	4- Lime Stone/Very shelly sand
45	80.00	-85.30	N/A	135.00	4- Lime Stone/Very shelly sand
46	82.50	-87.80	N/A	135.00	4- Lime Stone/Very shelly sand
47	85.00	-90.30	N/A	135.00	4- Lime Stone/Very shelly sand
48	85.00	-90.30	N/A	0.00	1- Plastic Clay
49	85.00	-90.30	16.00	115.00	3- Clean sand
50	87.50	-92.80	16.00	115.00	3- Clean sand
51	90.00	-95.30	16.00	115.00	3- Clean sand
52	90.00	-95.30	N/A	0.00	1- Plastic Clay
53	90.00	-95.30	N/A	135.00	4- Lime Stone/Very shelly sand
54	92.50	-97.80	N/A	135.00	4- Lime Stone/Very shelly sand
55	95.00	-100.30	N/A	120.00	4- Lime Stone/Very shelly sand
56	97.50	-102.80	N/A	120.00	4- Lime Stone/Very shelly sand
57	97.50	-102.80	N/A	0.00	1- Plastic Clay
58	97.50	-102.80	3.00	115.00	3- Clean sand
59	100.00	-105.30	3.00	115.00	3- Clean sand
60	102.50	-107.80	3.00	115.00	3- Clean sand
61	102.50	-107.80	N/A	0.00	1- Plastic Clay
62	102.50	-107.80	24.00	125.00	3- Clean sand

BB-05_Drilled_48in_BOC=-5.3ft_Void=-58.3ft.out

Top of Rock Socket
elev = -58.3'

Bottom of Canal
elev = -5.3'

63	105.00	-110.30	24.00	125.00	3- Clean sand
64	105.00	-110.30	N/A	0.00	1- Plastic Clay
65	105.00	-110.30	N/A	130.00	4- Lime Stone/Very shelly sand
66	107.50	-112.80	N/A	130.00	4- Lime Stone/Very shelly sand
67	107.50	-112.80	N/A	0.00	1- Plastic Clay
68	107.50	-112.80	13.00	118.00	3- Clean sand
69	110.00	-115.30	13.00	118.00	3- Clean sand
70	112.50	-117.80	13.00	118.00	3- Clean sand
71	112.50	-117.80	N/A	0.00	1- Plastic Clay
72	112.50	-117.80	24.00	125.00	3- Clean sand
73	115.00	-120.30	24.00	125.00	3- Clean sand
74	115.00	-120.30	N/A	0.00	1- Plastic Clay
75	115.00	-120.30	11.00	117.00	3- Clean sand
76	117.50	-122.80	11.00	117.00	3- Clean sand
77	120.00	-125.30	10.00	116.00	3- Clean sand
78	120.00	-125.30	N/A	0.00	1- Plastic Clay
79	120.00	-125.30	20.00	122.00	3- Clean sand
80	122.50	-127.80	20.00	122.00	3- Clean sand
81	125.00	-130.30	17.00	121.00	3- Clean sand

ID	Cu-DIR (tsf)	qu (tsf)	qt (tsf)	Em (ksi)	qb (tsf)
1	N/A	N/A	N/A	N/A	N/A
2	N/A	N/A	N/A	N/A	N/A
3	N/A	N/A	N/A	N/A	N/A
4	N/A	N/A	N/A	N/A	N/A
5	N/A	N/A	N/A	N/A	N/A
6	N/A	N/A	N/A	N/A	N/A
7	N/A	N/A	N/A	N/A	N/A
8	N/A	N/A	N/A	N/A	N/A
9	N/A	N/A	N/A	N/A	N/A
10	N/A	N/A	N/A	N/A	N/A
11	N/A	N/A	N/A	N/A	N/A
12	N/A	N/A	N/A	N/A	N/A
13	N/A	N/A	N/A	N/A	N/A
14	N/A	N/A	N/A	N/A	N/A
15	N/A	N/A	N/A	N/A	N/A
16	N/A	N/A	N/A	N/A	N/A
17	N/A	N/A	N/A	N/A	N/A
18	N/A	N/A	N/A	N/A	N/A
19	N/A	N/A	N/A	N/A	N/A
20	N/A	N/A	N/A	N/A	N/A
21	N/A	N/A	N/A	N/A	N/A
22	N/A	N/A	N/A	N/A	N/A
23	N/A	N/A	N/A	N/A	N/A
24	N/A	N/A	N/A	N/A	N/A
25	0.00	N/A	N/A	N/A	N/A
26	N/A	25.00	4.00	39.93	12.50

BB-05_Drilled_48in_BOC=-5.3ft_Void=-58.3ft.out

Top of Rock Socket
elev = -58.3'



27	N/A	25.00	4.00	39.93	12.50
28	N/A	25.00	4.00	39.93	12.50
29	N/A	25.00	4.00	39.93	12.50
30	0.00	N/A	N/A	N/A	N/A
31	N/A	N/A	N/A	N/A	N/A
32	N/A	N/A	N/A	N/A	N/A
33	0.00	N/A	N/A	N/A	N/A
34	N/A	25.00	4.00	39.93	12.50
35	N/A	25.00	4.00	39.93	12.50
36	N/A	25.00	4.00	39.93	12.50
37	N/A	25.00	4.00	39.93	12.50
38	N/A	25.00	4.00	39.93	12.50
39	0.00	N/A	N/A	N/A	N/A
40	N/A	N/A	N/A	N/A	N/A
41	N/A	N/A	N/A	N/A	N/A
42	0.00	N/A	N/A	N/A	N/A
43	N/A	25.00	4.00	39.93	12.50
44	N/A	25.00	4.00	39.93	12.50
45	N/A	25.00	4.00	39.93	12.50
46	N/A	25.00	4.00	39.93	12.50
47	N/A	25.00	4.00	39.93	12.50
48	0.00	N/A	N/A	N/A	N/A
49	N/A	N/A	N/A	N/A	N/A
50	N/A	N/A	N/A	N/A	N/A
51	N/A	N/A	N/A	N/A	N/A
52	0.00	N/A	N/A	N/A	N/A
53	N/A	25.00	4.00	39.93	12.50
54	N/A	25.00	4.00	39.93	12.50
55	N/A	14.26	2.28	22.78	7.13
56	N/A	14.26	2.28	22.78	7.13
57	0.00	N/A	N/A	N/A	N/A
58	N/A	N/A	N/A	N/A	N/A
59	N/A	N/A	N/A	N/A	N/A
60	N/A	N/A	N/A	N/A	N/A
61	0.00	N/A	N/A	N/A	N/A
62	N/A	N/A	N/A	N/A	N/A
63	N/A	N/A	N/A	N/A	N/A
64	0.00	N/A	N/A	N/A	N/A
65	N/A	25.00	4.00	39.93	12.50
66	N/A	25.00	4.00	39.93	12.50
67	0.00	N/A	N/A	N/A	N/A
68	N/A	N/A	N/A	N/A	N/A
69	N/A	N/A	N/A	N/A	N/A
70	N/A	N/A	N/A	N/A	N/A
71	0.00	N/A	N/A	N/A	N/A
72	N/A	N/A	N/A	N/A	N/A
73	N/A	N/A	N/A	N/A	N/A
74	0.00	N/A	N/A	N/A	N/A
75	N/A	N/A	N/A	N/A	N/A

BB-05_Drilled_48in_BOC=-5.3ft_Void=-58.3ft.out

76	N/A	N/A	N/A	N/A	N/A
77	N/A	N/A	N/A	N/A	N/A
78	0.00	N/A	N/A	N/A	N/A
79	N/A	N/A	N/A	N/A	N/A
80	N/A	N/A	N/A	N/A	N/A
81	N/A	N/A	N/A	N/A	N/A

ID	RQD F.M.	S.R.I.	Rock Recovery

1	N/A	N/A	N/A
2	N/A	N/A	N/A
3	N/A	N/A	N/A
4	N/A	N/A	N/A
5	N/A	N/A	N/A
6	N/A	N/A	N/A
7	N/A	N/A	N/A
8	N/A	N/A	N/A
9	N/A	N/A	N/A
10	N/A	N/A	N/A
11	N/A	N/A	N/A
12	N/A	N/A	N/A
13	N/A	N/A	N/A
14	N/A	N/A	N/A
15	N/A	N/A	N/A
16	N/A	N/A	N/A
17	N/A	N/A	N/A
18	N/A	N/A	N/A
19	N/A	N/A	N/A
20	N/A	N/A	N/A
21	N/A	N/A	N/A
22	N/A	N/A	N/A
23	N/A	N/A	N/A
24	N/A	N/A	N/A
25	N/A	N/A	N/A
26	0.50	ROUGH	1.000
27	0.50	ROUGH	1.000
28	0.50	ROUGH	1.000
29	0.50	ROUGH	1.000
30	N/A	N/A	N/A
31	N/A	N/A	N/A
32	N/A	N/A	N/A
33	N/A	N/A	N/A
34	0.50	ROUGH	1.000
35	0.50	ROUGH	1.000
36	0.50	ROUGH	1.000
37	0.50	ROUGH	1.000
38	0.50	ROUGH	1.000
39	N/A	N/A	N/A

BB-05_Drilled_48in_BOC=-5.3ft_Void=-58.3ft.out

40	N/A	N/A	N/A
41	N/A	N/A	N/A
42	N/A	N/A	N/A
43	0.50	ROUGH	1.000
44	0.50	ROUGH	1.000
45	0.50	ROUGH	1.000
46	0.50	ROUGH	1.000
47	0.50	ROUGH	1.000
48	N/A	N/A	N/A
49	N/A	N/A	N/A
50	N/A	N/A	N/A
51	N/A	N/A	N/A
52	N/A	N/A	N/A
53	0.50	ROUGH	1.000
54	0.50	ROUGH	1.000
55	0.50	ROUGH	1.000
56	0.50	ROUGH	1.000
57	N/A	N/A	N/A
58	N/A	N/A	N/A
59	N/A	N/A	N/A
60	N/A	N/A	N/A
61	N/A	N/A	N/A
62	N/A	N/A	N/A
63	N/A	N/A	N/A
64	N/A	N/A	N/A
65	0.50	ROUGH	1.000
66	0.50	ROUGH	1.000
67	N/A	N/A	N/A
68	N/A	N/A	N/A
69	N/A	N/A	N/A
70	N/A	N/A	N/A
71	N/A	N/A	N/A
72	N/A	N/A	N/A
73	N/A	N/A	N/A
74	N/A	N/A	N/A
75	N/A	N/A	N/A
76	N/A	N/A	N/A
77	N/A	N/A	N/A
78	N/A	N/A	N/A
79	N/A	N/A	N/A
80	N/A	N/A	N/A
81	N/A	N/A	N/A

Drilled Shaft Data:

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Unit weight of concrete = 145.00(pcf), Concrete Slump = 6.00(in)
Modulus of Elasticity of concrete = 3987.00(ksi)

BB-05_Drilled_48in_BOC=-5.3ft_Void=-58.3ft.out

Shaft Geometry:

ID	Length (ft)	Tip Elev. (ft)	Case Len. (ft)	Diameter (in)	Base Diam. (in)	Bell Len. (ft)
1	5.00	-10.30	0.00	48.00	48.00	0.00
2	7.00	-12.30	0.00	48.00	48.00	0.00
3	9.00	-14.30	0.00	48.00	48.00	0.00
4	11.00	-16.30	0.00	48.00	48.00	0.00
5	13.00	-18.30	0.00	48.00	48.00	0.00
6	15.00	-20.30	0.00	48.00	48.00	0.00
7	17.00	-22.30	0.00	48.00	48.00	0.00
8	19.00	-24.30	0.00	48.00	48.00	0.00
9	21.00	-26.30	0.00	48.00	48.00	0.00
10	23.00	-28.30	0.00	48.00	48.00	0.00
11	25.00	-30.30	0.00	48.00	48.00	0.00
12	27.00	-32.30	0.00	48.00	48.00	0.00
13	29.00	-34.30	0.00	48.00	48.00	0.00
14	31.00	-36.30	0.00	48.00	48.00	0.00
15	33.00	-38.30	0.00	48.00	48.00	0.00
16	35.00	-40.30	0.00	48.00	48.00	0.00
17	37.00	-42.30	0.00	48.00	48.00	0.00
18	39.00	-44.30	0.00	48.00	48.00	0.00
19	41.00	-46.30	0.00	48.00	48.00	0.00
20	43.00	-48.30	0.00	48.00	48.00	0.00
21	45.00	-50.30	0.00	48.00	48.00	0.00
22	47.00	-52.30	0.00	48.00	48.00	0.00
23	49.00	-54.30	0.00	48.00	48.00	0.00
24	51.00	-56.30	0.00	48.00	48.00	0.00
25	53.00	-58.30	0.00	48.00	48.00	0.00
26	55.00	-60.30	0.00	48.00	48.00	0.00
27	57.00	-62.30	0.00	48.00	48.00	0.00
28	59.00	-64.30	0.00	48.00	48.00	0.00
29	61.00	-66.30	0.00	48.00	48.00	0.00
30	63.00	-68.30	0.00	48.00	48.00	0.00
31	65.00	-70.30	0.00	48.00	48.00	0.00
32	67.00	-72.30	0.00	48.00	48.00	0.00
33	69.00	-74.30	0.00	48.00	48.00	0.00
34	71.00	-76.30	0.00	48.00	48.00	0.00
35	73.00	-78.30	0.00	48.00	48.00	0.00
36	75.00	-80.30	0.00	48.00	48.00	0.00
37	77.00	-82.30	0.00	48.00	48.00	0.00
38	79.00	-84.30	0.00	48.00	48.00	0.00
39	81.00	-86.30	0.00	48.00	48.00	0.00
40	83.00	-88.30	0.00	48.00	48.00	0.00
41	85.00	-90.30	0.00	48.00	48.00	0.00
42	87.00	-92.30	0.00	48.00	48.00	0.00
43	89.00	-94.30	0.00	48.00	48.00	0.00
44	91.00	-96.30	0.00	48.00	48.00	0.00

BB-05_Drilled_48in_BOC=-5.3ft_Void=-58.3ft.out

45	93.00	-98.30	0.00	48.00	48.00	0.00
46	95.00	-100.30	0.00	48.00	48.00	0.00
47	97.00	-102.30	0.00	48.00	48.00	0.00
48	99.00	-104.30	0.00	48.00	48.00	0.00
49	101.00	-106.30	0.00	48.00	48.00	0.00
50	103.00	-108.30	0.00	48.00	48.00	0.00
51	105.00	-110.30	0.00	48.00	48.00	0.00
52	107.00	-112.30	0.00	48.00	48.00	0.00
53	109.00	-114.30	0.00	48.00	48.00	0.00
54	111.00	-116.30	0.00	48.00	48.00	0.00
55	113.00	-118.30	0.00	48.00	48.00	0.00
56	115.00	-120.30	0.00	48.00	48.00	0.00

Drilled Shaft Capacity (sorted by shaft diameter):

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Strength reduction factors: Skin-friction = 1.00, End-bearing = 1.00

ID	Diameter (in)	Length (ft)	Skin Fric. (tons)	End Bearing (tons)	Capacity (tons)
1	48.00	5.00	0.000	0.000	0.000
2	48.00	7.00	0.000	0.000	0.000
3	48.00	9.00	0.000	0.000	0.000
4	48.00	11.00	0.000	0.000	0.000
5	48.00	13.00	0.000	0.000	0.000
6	48.00	15.00	0.000	0.000	0.000
7	48.00	17.00	0.000	0.000	0.000
8	48.00	19.00	0.000	0.000	0.000
9	48.00	21.00	0.000	0.000	0.000
10	48.00	23.00	0.000	0.000	0.000
11	48.00	25.00	0.000	0.000	0.000
12	48.00	27.00	0.000	0.000	0.000
13	48.00	29.00	0.000	0.000	0.000
14	48.00	31.00	0.000	0.000	0.000
15	48.00	33.00	0.000	0.000	0.000
16	48.00	35.00	0.000	0.000	0.000
17	48.00	37.00	0.000	0.000	0.000
18	48.00	39.00	0.000	0.000	0.000
19	48.00	41.00	0.000	0.000	0.000
20	48.00	43.00	0.000	0.000	0.000
21	48.00	45.00	0.000	0.000	0.000
22	48.00	47.00	0.000	0.000	0.000
23	48.00	49.00	0.000	0.000	0.000
24	48.00	51.00	0.000	0.000	0.000
25	48.00	53.00	0.000	157.080	157.080
26	48.00	55.00	125.664	157.080	282.743
27	48.00	57.00	251.327	157.080	408.407
28	48.00	59.00	376.991	157.080	534.071

BB-05_Drilled_48in_BOC=-5.3ft_Void=-58.3ft.out

29	48.00	61.00	440.822	74.795	515.617
30	48.00	63.00	473.883	157.080	630.963
31	48.00	65.00	599.547	157.080	756.626
32	48.00	67.00	725.210	157.080	882.290
33	48.00	69.00	850.874	157.080	1007.954
34	48.00	71.00	976.538	157.080	1133.617
35	48.00	73.00	1072.300	193.732	1266.032
36	48.00	75.00	1078.565	157.080	1235.645
37	48.00	77.00	1204.229	157.080	1361.309
38	48.00	79.00	1329.893	157.080	1486.973
39	48.00	81.00	1455.557	157.080	1612.636
40	48.00	83.00	1581.220	157.080	1738.300
41	48.00	85.00	1706.884	153.335	1860.219
42	48.00	87.00	1714.175	146.659	1860.834
43	48.00	89.00	1721.797	139.160	1860.956
44	48.00	91.00	1788.563	157.080	1945.643
45	48.00	93.00	1914.227	157.080	2071.306
46	48.00	95.00	2039.890	89.598	2129.489
47	48.00	97.00	2111.575	89.598	2201.174
48	48.00	99.00	2136.748	28.048	2164.796
49	48.00	101.00	2146.706	28.048	2174.754
50	48.00	103.00	2156.996	102.128	2259.124
51	48.00	105.00	2167.662	157.080	2324.742
52	48.00	107.00	2293.326	157.080	2450.406
53	48.00	109.00	2333.385	121.542	2454.927
54	48.00	111.00	2345.216	121.542	2466.758
55	48.00	113.00	2357.397	133.396	2490.792
56	48.00	115.00	2369.959	132.450	2502.408

Drilled Shaft Capacity at User-Defined Settlement (sorted by shaft diameter):

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***** Capacity is NOT modified by the strength reduction factors *****

User-Defined Settlement = 1.04%

ID	Diameter (in)	Length (ft)	Skin Fric. (tons)	End Bearing (tons)	Capacity (tons)

1	48.00	5.00	0.000	0.000	0.000
2	48.00	7.00	0.000	0.000	0.000
3	48.00	9.00	0.000	0.000	0.000
4	48.00	11.00	0.000	0.000	0.000
5	48.00	13.00	0.000	0.000	0.000
6	48.00	15.00	0.000	0.000	0.000
7	48.00	17.00	0.000	0.000	0.000
8	48.00	19.00	0.000	0.000	0.000
9	48.00	21.00	0.000	0.000	0.000

BB-05_Drilled_48in_BOC=-5.3ft_Void=-58.3ft.out

10	48.00	23.00	0.000	0.000	0.000
11	48.00	25.00	0.000	0.000	0.000
12	48.00	27.00	0.000	0.000	0.000
13	48.00	29.00	0.000	0.000	0.000
14	48.00	31.00	0.000	0.000	0.000
15	48.00	33.00	0.000	0.000	0.000
16	48.00	35.00	0.000	0.000	0.000
17	48.00	37.00	0.000	0.000	0.000
18	48.00	39.00	0.000	0.000	0.000
19	48.00	41.00	0.000	0.000	0.000
20	48.00	43.00	0.000	0.000	0.000
21	48.00	45.00	0.000	0.000	0.000
22	48.00	47.00	0.000	0.000	0.000
23	48.00	49.00	0.000	0.000	0.000
24	48.00	51.00	0.000	0.000	0.000
25	48.00	53.00	0.000	703.348	703.348
26	48.00	55.00	59.509	536.030	595.539
27	48.00	57.00	113.059	336.899	449.958
28	48.00	59.00	161.528	256.755	418.282
29	48.00	61.00	185.062	23.797	208.859
30	48.00	63.00	197.574	221.100	418.674
31	48.00	65.00	243.326	210.593	453.919
32	48.00	67.00	288.858	208.300	497.158
33	48.00	69.00	333.096	205.560	538.657
34	48.00	71.00	376.164	202.615	578.779
35	48.00	73.00	409.238	61.639	470.877
36	48.00	75.00	415.366	200.349	615.715
37	48.00	77.00	456.667	197.310	653.977
38	48.00	79.00	497.037	194.292	691.329
39	48.00	81.00	536.540	191.319	727.859
40	48.00	83.00	575.231	188.404	763.635
41	48.00	85.00	613.158	48.786	661.944
42	48.00	87.00	620.289	46.662	666.951
43	48.00	89.00	627.744	44.276	672.020
44	48.00	91.00	650.341	184.157	834.498
45	48.00	93.00	687.319	181.413	868.733
46	48.00	95.00	723.638	101.950	825.588
47	48.00	97.00	743.592	101.125	844.718
48	48.00	99.00	755.650	8.924	764.574
49	48.00	101.00	765.390	8.924	774.314
50	48.00	103.00	775.455	32.494	807.949
51	48.00	105.00	785.888	176.939	962.827
52	48.00	107.00	821.338	174.378	995.715
53	48.00	109.00	838.564	38.671	877.235
54	48.00	111.00	850.135	38.671	888.806
55	48.00	113.00	862.050	42.442	904.492
56	48.00	115.00	874.337	42.141	916.478

BB-05_Drilled_48in_BOC=-5.3ft_Void=-58.3ft.out

General Information:

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Input file: d Shaft\DS Water\BB-05_Drilled_60in_BOC=-5.3ft_Void=-58.3ft.in
Project number: B-22-074
Job name: Broad Causeway Bridge
Engineer: PV/TC
Units: English

Analysis Information:

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Analysis Type: Drilled Shaft Analysis

Soil Information:

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Boring date: 12/6/23
Boring number: BB-05
Station number: 126+43 Offset: 28 LT

Ground Elevation: -5.30(ft)
Water table Elevation = 1.70(ft)

Cu is calculated using: Direct method.
Rock side-friction is calculated using: McVay's method
Hammer type: Automatic Hammer, Correction factor = 1.24

ID	Depth (ft)	Elevation (ft)	SPT Blows (Blows/ft)	Unit Weight (pcf)	Soil Type
1	0.00	-5.30	N/A	130.00	5- Cavity layer
2	2.00	-7.30	N/A	130.00	5- Cavity layer
3	4.00	-9.30	N/A	130.00	5- Cavity layer
4	6.00	-11.30	N/A	130.00	5- Cavity layer
5	8.00	-13.30	N/A	125.00	5- Cavity layer
6	10.00	-15.30	N/A	125.00	5- Cavity layer
7	12.00	-17.30	N/A	115.00	5- Cavity layer
8	14.00	-19.30	N/A	125.00	5- Cavity layer
9	16.00	-21.30	N/A	125.00	5- Cavity layer
10	20.00	-25.30	N/A	115.00	5- Cavity layer
11	22.50	-27.80	N/A	115.00	5- Cavity layer
12	25.00	-30.30	N/A	115.00	5- Cavity layer
13	27.50	-32.80	N/A	120.00	5- Cavity layer

BB-05_Drilled_60in_BOC=-5.3ft_Void=-58.3ft.out

14	30.00	-35.30	N/A	120.00	5- Cavity layer
15	32.50	-37.80	N/A	115.00	5- Cavity layer
16	35.00	-40.30	N/A	120.00	5- Cavity layer
17	37.50	-42.80	N/A	115.00	5- Cavity layer
18	40.00	-45.30	N/A	115.00	5- Cavity layer
19	42.50	-47.80	N/A	115.00	5- Cavity layer
20	45.00	-50.30	N/A	115.00	5- Cavity layer
21	47.50	-52.80	N/A	92.00	5- Cavity layer
22	50.00	-55.30	N/A	86.00	5- Cavity layer
23	52.50	-57.80	N/A	0.00	5- Cavity layer
24	53.00	-58.30	N/A	0.00	5- Cavity layer
25	53.00	-58.30	N/A	0.00	1- Plastic Clay
26	53.00	-58.30	N/A	135.00	4- Lime Stone/Very shelly sand
27	55.00	-60.30	N/A	135.00	4- Lime Stone/Very shelly sand
28	57.50	-62.80	N/A	135.00	4- Lime Stone/Very shelly sand
29	60.00	-65.30	N/A	135.00	4- Lime Stone/Very shelly sand
30	60.00	-65.30	N/A	0.00	1- Plastic Clay
31	60.00	-65.30	8.00	115.00	3- Clean sand
32	62.50	-67.80	8.00	115.00	3- Clean sand
33	62.50	-67.80	N/A	0.00	1- Plastic Clay
34	62.50	-67.80	N/A	135.00	4- Lime Stone/Very shelly sand
35	65.00	-70.30	N/A	135.00	4- Lime Stone/Very shelly sand
36	67.50	-72.80	N/A	135.00	4- Lime Stone/Very shelly sand
37	70.00	-75.30	N/A	135.00	4- Lime Stone/Very shelly sand
38	72.50	-77.80	N/A	135.00	4- Lime Stone/Very shelly sand
39	72.50	-77.80	N/A	0.00	1- Plastic Clay
40	72.50	-77.80	91.00	133.00	3- Clean sand
41	75.00	-80.30	91.00	133.00	3- Clean sand
42	75.00	-80.30	N/A	0.00	1- Plastic Clay
43	75.00	-80.30	N/A	135.00	4- Lime Stone/Very shelly sand
44	77.50	-82.80	N/A	135.00	4- Lime Stone/Very shelly sand
45	80.00	-85.30	N/A	135.00	4- Lime Stone/Very shelly sand
46	82.50	-87.80	N/A	135.00	4- Lime Stone/Very shelly sand
47	85.00	-90.30	N/A	135.00	4- Lime Stone/Very shelly sand
48	85.00	-90.30	N/A	0.00	1- Plastic Clay
49	85.00	-90.30	16.00	115.00	3- Clean sand
50	87.50	-92.80	16.00	115.00	3- Clean sand
51	90.00	-95.30	16.00	115.00	3- Clean sand
52	90.00	-95.30	N/A	0.00	1- Plastic Clay
53	90.00	-95.30	N/A	135.00	4- Lime Stone/Very shelly sand
54	92.50	-97.80	N/A	135.00	4- Lime Stone/Very shelly sand
55	95.00	-100.30	N/A	120.00	4- Lime Stone/Very shelly sand
56	97.50	-102.80	N/A	120.00	4- Lime Stone/Very shelly sand
57	97.50	-102.80	N/A	0.00	1- Plastic Clay
58	97.50	-102.80	3.00	115.00	3- Clean sand
59	100.00	-105.30	3.00	115.00	3- Clean sand
60	102.50	-107.80	3.00	115.00	3- Clean sand
61	102.50	-107.80	N/A	0.00	1- Plastic Clay
62	102.50	-107.80	24.00	125.00	3- Clean sand

BB-05_Drilled_60in_BOC=-5.3ft_Void=-58.3ft.out

Top of Rock Socket
elev = -58.3'

Bottom of Canal
elev = -5.3'

63	105.00	-110.30	24.00	125.00	3- Clean sand
64	105.00	-110.30	N/A	0.00	1- Plastic Clay
65	105.00	-110.30	N/A	130.00	4- Lime Stone/Very shelly sand
66	107.50	-112.80	N/A	130.00	4- Lime Stone/Very shelly sand
67	107.50	-112.80	N/A	0.00	1- Plastic Clay
68	107.50	-112.80	13.00	118.00	3- Clean sand
69	110.00	-115.30	13.00	118.00	3- Clean sand
70	112.50	-117.80	13.00	118.00	3- Clean sand
71	112.50	-117.80	N/A	0.00	1- Plastic Clay
72	112.50	-117.80	24.00	125.00	3- Clean sand
73	115.00	-120.30	24.00	125.00	3- Clean sand
74	115.00	-120.30	N/A	0.00	1- Plastic Clay
75	115.00	-120.30	11.00	117.00	3- Clean sand
76	117.50	-122.80	11.00	117.00	3- Clean sand
77	120.00	-125.30	10.00	116.00	3- Clean sand
78	120.00	-125.30	N/A	0.00	1- Plastic Clay
79	120.00	-125.30	20.00	122.00	3- Clean sand
80	122.50	-127.80	20.00	122.00	3- Clean sand
81	125.00	-130.30	17.00	121.00	3- Clean sand

ID	Cu-DIR (tsf)	qu (tsf)	qt (tsf)	Em (ksi)	qb (tsf)
1	N/A	N/A	N/A	N/A	N/A
2	N/A	N/A	N/A	N/A	N/A
3	N/A	N/A	N/A	N/A	N/A
4	N/A	N/A	N/A	N/A	N/A
5	N/A	N/A	N/A	N/A	N/A
6	N/A	N/A	N/A	N/A	N/A
7	N/A	N/A	N/A	N/A	N/A
8	N/A	N/A	N/A	N/A	N/A
9	N/A	N/A	N/A	N/A	N/A
10	N/A	N/A	N/A	N/A	N/A
11	N/A	N/A	N/A	N/A	N/A
12	N/A	N/A	N/A	N/A	N/A
13	N/A	N/A	N/A	N/A	N/A
14	N/A	N/A	N/A	N/A	N/A
15	N/A	N/A	N/A	N/A	N/A
16	N/A	N/A	N/A	N/A	N/A
17	N/A	N/A	N/A	N/A	N/A
18	N/A	N/A	N/A	N/A	N/A
19	N/A	N/A	N/A	N/A	N/A
20	N/A	N/A	N/A	N/A	N/A
21	N/A	N/A	N/A	N/A	N/A
22	N/A	N/A	N/A	N/A	N/A
23	N/A	N/A	N/A	N/A	N/A
24	N/A	N/A	N/A	N/A	N/A
25	0.00	N/A	N/A	N/A	N/A
26	N/A	25.00	4.00	39.93	12.50

BB-05_Drilled_60in_BOC=-5.3ft_Void=-58.3ft.out

Top of Rock Socket
elev = -58.3'

27	N/A	25.00	4.00	39.93	12.50
28	N/A	25.00	4.00	39.93	12.50
29	N/A	25.00	4.00	39.93	12.50
30	0.00	N/A	N/A	N/A	N/A
31	N/A	N/A	N/A	N/A	N/A
32	N/A	N/A	N/A	N/A	N/A
33	0.00	N/A	N/A	N/A	N/A
34	N/A	25.00	4.00	39.93	12.50
35	N/A	25.00	4.00	39.93	12.50
36	N/A	25.00	4.00	39.93	12.50
37	N/A	25.00	4.00	39.93	12.50
38	N/A	25.00	4.00	39.93	12.50
39	0.00	N/A	N/A	N/A	N/A
40	N/A	N/A	N/A	N/A	N/A
41	N/A	N/A	N/A	N/A	N/A
42	0.00	N/A	N/A	N/A	N/A
43	N/A	25.00	4.00	39.93	12.50
44	N/A	25.00	4.00	39.93	12.50
45	N/A	25.00	4.00	39.93	12.50
46	N/A	25.00	4.00	39.93	12.50
47	N/A	25.00	4.00	39.93	12.50
48	0.00	N/A	N/A	N/A	N/A
49	N/A	N/A	N/A	N/A	N/A
50	N/A	N/A	N/A	N/A	N/A
51	N/A	N/A	N/A	N/A	N/A
52	0.00	N/A	N/A	N/A	N/A
53	N/A	25.00	4.00	39.93	12.50
54	N/A	25.00	4.00	39.93	12.50
55	N/A	14.26	2.28	22.78	7.13
56	N/A	14.26	2.28	22.78	7.13
57	0.00	N/A	N/A	N/A	N/A
58	N/A	N/A	N/A	N/A	N/A
59	N/A	N/A	N/A	N/A	N/A
60	N/A	N/A	N/A	N/A	N/A
61	0.00	N/A	N/A	N/A	N/A
62	N/A	N/A	N/A	N/A	N/A
63	N/A	N/A	N/A	N/A	N/A
64	0.00	N/A	N/A	N/A	N/A
65	N/A	25.00	4.00	39.93	12.50
66	N/A	25.00	4.00	39.93	12.50
67	0.00	N/A	N/A	N/A	N/A
68	N/A	N/A	N/A	N/A	N/A
69	N/A	N/A	N/A	N/A	N/A
70	N/A	N/A	N/A	N/A	N/A
71	0.00	N/A	N/A	N/A	N/A
72	N/A	N/A	N/A	N/A	N/A
73	N/A	N/A	N/A	N/A	N/A
74	0.00	N/A	N/A	N/A	N/A
75	N/A	N/A	N/A	N/A	N/A

BB-05_Drilled_60in_BOC=-5.3ft_Void=-58.3ft.out

76	N/A	N/A	N/A	N/A	N/A
77	N/A	N/A	N/A	N/A	N/A
78	0.00	N/A	N/A	N/A	N/A
79	N/A	N/A	N/A	N/A	N/A
80	N/A	N/A	N/A	N/A	N/A
81	N/A	N/A	N/A	N/A	N/A

ID	RQD F.M.	S.R.I.	Rock Recovery

1	N/A	N/A	N/A
2	N/A	N/A	N/A
3	N/A	N/A	N/A
4	N/A	N/A	N/A
5	N/A	N/A	N/A
6	N/A	N/A	N/A
7	N/A	N/A	N/A
8	N/A	N/A	N/A
9	N/A	N/A	N/A
10	N/A	N/A	N/A
11	N/A	N/A	N/A
12	N/A	N/A	N/A
13	N/A	N/A	N/A
14	N/A	N/A	N/A
15	N/A	N/A	N/A
16	N/A	N/A	N/A
17	N/A	N/A	N/A
18	N/A	N/A	N/A
19	N/A	N/A	N/A
20	N/A	N/A	N/A
21	N/A	N/A	N/A
22	N/A	N/A	N/A
23	N/A	N/A	N/A
24	N/A	N/A	N/A
25	N/A	N/A	N/A
26	0.50	ROUGH	1.000
27	0.50	ROUGH	1.000
28	0.50	ROUGH	1.000
29	0.50	ROUGH	1.000
30	N/A	N/A	N/A
31	N/A	N/A	N/A
32	N/A	N/A	N/A
33	N/A	N/A	N/A
34	0.50	ROUGH	1.000
35	0.50	ROUGH	1.000
36	0.50	ROUGH	1.000
37	0.50	ROUGH	1.000
38	0.50	ROUGH	1.000
39	N/A	N/A	N/A

BB-05_Drilled_60in_BOC=-5.3ft_Void=-58.3ft.out

40	N/A	N/A	N/A
41	N/A	N/A	N/A
42	N/A	N/A	N/A
43	0.50	ROUGH	1.000
44	0.50	ROUGH	1.000
45	0.50	ROUGH	1.000
46	0.50	ROUGH	1.000
47	0.50	ROUGH	1.000
48	N/A	N/A	N/A
49	N/A	N/A	N/A
50	N/A	N/A	N/A
51	N/A	N/A	N/A
52	N/A	N/A	N/A
53	0.50	ROUGH	1.000
54	0.50	ROUGH	1.000
55	0.50	ROUGH	1.000
56	0.50	ROUGH	1.000
57	N/A	N/A	N/A
58	N/A	N/A	N/A
59	N/A	N/A	N/A
60	N/A	N/A	N/A
61	N/A	N/A	N/A
62	N/A	N/A	N/A
63	N/A	N/A	N/A
64	N/A	N/A	N/A
65	0.50	ROUGH	1.000
66	0.50	ROUGH	1.000
67	N/A	N/A	N/A
68	N/A	N/A	N/A
69	N/A	N/A	N/A
70	N/A	N/A	N/A
71	N/A	N/A	N/A
72	N/A	N/A	N/A
73	N/A	N/A	N/A
74	N/A	N/A	N/A
75	N/A	N/A	N/A
76	N/A	N/A	N/A
77	N/A	N/A	N/A
78	N/A	N/A	N/A
79	N/A	N/A	N/A
80	N/A	N/A	N/A
81	N/A	N/A	N/A

Drilled Shaft Data:

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Unit weight of concrete = 145.00(pcf), Concrete Slump = 6.00(in)
Modulus of Elasticity of concrete = 3987.00(ksi)

BB-05_Drilled_60in_BOC=-5.3ft_Void=-58.3ft.out

Shaft Geometry:

ID	Length (ft)	Tip Elev. (ft)	Case Len. (ft)	Diameter (in)	Base Diam. (in)	Bell Len. (ft)
1	5.00	-10.30	0.00	60.00	60.00	0.00
2	7.00	-12.30	0.00	60.00	60.00	0.00
3	9.00	-14.30	0.00	60.00	60.00	0.00
4	11.00	-16.30	0.00	60.00	60.00	0.00
5	13.00	-18.30	0.00	60.00	60.00	0.00
6	15.00	-20.30	0.00	60.00	60.00	0.00
7	17.00	-22.30	0.00	60.00	60.00	0.00
8	19.00	-24.30	0.00	60.00	60.00	0.00
9	21.00	-26.30	0.00	60.00	60.00	0.00
10	23.00	-28.30	0.00	60.00	60.00	0.00
11	25.00	-30.30	0.00	60.00	60.00	0.00
12	27.00	-32.30	0.00	60.00	60.00	0.00
13	29.00	-34.30	0.00	60.00	60.00	0.00
14	31.00	-36.30	0.00	60.00	60.00	0.00
15	33.00	-38.30	0.00	60.00	60.00	0.00
16	35.00	-40.30	0.00	60.00	60.00	0.00
17	37.00	-42.30	0.00	60.00	60.00	0.00
18	39.00	-44.30	0.00	60.00	60.00	0.00
19	41.00	-46.30	0.00	60.00	60.00	0.00
20	43.00	-48.30	0.00	60.00	60.00	0.00
21	45.00	-50.30	0.00	60.00	60.00	0.00
22	47.00	-52.30	0.00	60.00	60.00	0.00
23	49.00	-54.30	0.00	60.00	60.00	0.00
24	51.00	-56.30	0.00	60.00	60.00	0.00
25	53.00	-58.30	0.00	60.00	60.00	0.00
26	55.00	-60.30	0.00	60.00	60.00	0.00
27	57.00	-62.30	0.00	60.00	60.00	0.00
28	59.00	-64.30	0.00	60.00	60.00	0.00
29	61.00	-66.30	0.00	60.00	60.00	0.00
30	63.00	-68.30	0.00	60.00	60.00	0.00
31	65.00	-70.30	0.00	60.00	60.00	0.00
32	67.00	-72.30	0.00	60.00	60.00	0.00
33	69.00	-74.30	0.00	60.00	60.00	0.00
34	71.00	-76.30	0.00	60.00	60.00	0.00
35	73.00	-78.30	0.00	60.00	60.00	0.00
36	75.00	-80.30	0.00	60.00	60.00	0.00
37	77.00	-82.30	0.00	60.00	60.00	0.00
38	79.00	-84.30	0.00	60.00	60.00	0.00
39	81.00	-86.30	0.00	60.00	60.00	0.00
40	83.00	-88.30	0.00	60.00	60.00	0.00
41	85.00	-90.30	0.00	60.00	60.00	0.00
42	87.00	-92.30	0.00	60.00	60.00	0.00
43	89.00	-94.30	0.00	60.00	60.00	0.00
44	91.00	-96.30	0.00	60.00	60.00	0.00

BB-05_Drilled_60in_BOC=-5.3ft_Void=-58.3ft.out

45	93.00	-98.30	0.00	60.00	60.00	0.00
46	95.00	-100.30	0.00	60.00	60.00	0.00
47	97.00	-102.30	0.00	60.00	60.00	0.00
48	99.00	-104.30	0.00	60.00	60.00	0.00
49	101.00	-106.30	0.00	60.00	60.00	0.00
50	103.00	-108.30	0.00	60.00	60.00	0.00
51	105.00	-110.30	0.00	60.00	60.00	0.00
52	107.00	-112.30	0.00	60.00	60.00	0.00
53	109.00	-114.30	0.00	60.00	60.00	0.00
54	111.00	-116.30	0.00	60.00	60.00	0.00
55	113.00	-118.30	0.00	60.00	60.00	0.00
56	115.00	-120.30	0.00	60.00	60.00	0.00

Drilled Shaft Capacity (sorted by shaft diameter):

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Strength reduction factors: Skin-friction = 1.00, End-bearing = 1.00

ID	Diameter (in)	Length (ft)	Skin Fric. (tons)	End Bearing (tons)	Capacity (tons)
1	60.00	5.00	0.000	0.000	0.000
2	60.00	7.00	0.000	0.000	0.000
3	60.00	9.00	0.000	0.000	0.000
4	60.00	11.00	0.000	0.000	0.000
5	60.00	13.00	0.000	0.000	0.000
6	60.00	15.00	0.000	0.000	0.000
7	60.00	17.00	0.000	0.000	0.000
8	60.00	19.00	0.000	0.000	0.000
9	60.00	21.00	0.000	0.000	0.000
10	60.00	23.00	0.000	0.000	0.000
11	60.00	25.00	0.000	0.000	0.000
12	60.00	27.00	0.000	0.000	0.000
13	60.00	29.00	0.000	0.000	0.000
14	60.00	31.00	0.000	0.000	0.000
15	60.00	33.00	0.000	0.000	0.000
16	60.00	35.00	0.000	0.000	0.000
17	60.00	37.00	0.000	0.000	0.000
18	60.00	39.00	0.000	0.000	0.000
19	60.00	41.00	0.000	0.000	0.000
20	60.00	43.00	0.000	0.000	0.000
21	60.00	45.00	0.000	0.000	0.000
22	60.00	47.00	0.000	0.000	0.000
23	60.00	49.00	0.000	0.000	0.000
24	60.00	51.00	0.000	0.000	0.000
25	60.00	53.00	0.000	245.437	245.437
26	60.00	55.00	157.080	245.437	402.517
27	60.00	57.00	314.159	245.437	559.596
28	60.00	59.00	471.239	245.437	716.676

BB-05_Drilled_60in_BOC=-5.3ft_Void=-58.3ft.out

29	60.00	61.00	551.028	97.389	648.417
30	60.00	63.00	592.354	245.437	837.791
31	60.00	65.00	749.433	245.437	994.870
32	60.00	67.00	906.513	245.437	1151.950
33	60.00	69.00	1063.593	245.437	1309.029
34	60.00	71.00	1220.672	245.437	1466.109
35	60.00	73.00	1340.375	242.710	1583.085
36	60.00	75.00	1348.207	245.437	1593.644
37	60.00	77.00	1505.286	245.437	1750.723
38	60.00	79.00	1662.366	245.437	1907.803
39	60.00	81.00	1819.446	245.437	2064.883
40	60.00	83.00	1976.525	245.437	2221.962
41	60.00	85.00	2133.605	196.601	2330.206
42	60.00	87.00	2142.719	183.914	2326.632
43	60.00	89.00	2152.246	170.091	2322.337
44	60.00	91.00	2235.704	245.437	2481.141
45	60.00	93.00	2392.783	245.437	2638.220
46	60.00	95.00	2549.863	139.997	2689.860
47	60.00	97.00	2639.469	139.997	2779.466
48	60.00	99.00	2670.935	36.521	2707.456
49	60.00	101.00	2683.383	36.521	2719.904
50	60.00	103.00	2696.245	129.194	2825.440
51	60.00	105.00	2709.578	245.437	2955.015
52	60.00	107.00	2866.658	245.437	3112.095
53	60.00	109.00	2916.732	158.258	3074.990
54	60.00	111.00	2931.520	158.258	3089.777
55	60.00	113.00	2946.746	173.692	3120.438
56	60.00	115.00	2962.448	166.881	3129.329

Drilled Shaft Capacity at User-Defined Settlement (sorted by shaft diameter):

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**** Capacity is NOT modified by the strength reduction factors ****

User-Defined Settlement = 0.83%

ID	Diameter (in)	Length (ft)	Skin Fric. (tons)	End Bearing (tons)	Capacity (tons)

1	60.00	5.00	0.000	0.000	0.000
2	60.00	7.00	0.000	0.000	0.000
3	60.00	9.00	0.000	0.000	0.000
4	60.00	11.00	0.000	0.000	0.000
5	60.00	13.00	0.000	0.000	0.000
6	60.00	15.00	0.000	0.000	0.000
7	60.00	17.00	0.000	0.000	0.000
8	60.00	19.00	0.000	0.000	0.000
9	60.00	21.00	0.000	0.000	0.000

BB-05_Drilled_60in_BOC=-5.3ft_Void=-58.3ft.out

10	60.00	23.00	0.000	0.000	0.000
11	60.00	25.00	0.000	0.000	0.000
12	60.00	27.00	0.000	0.000	0.000
13	60.00	29.00	0.000	0.000	0.000
14	60.00	31.00	0.000	0.000	0.000
15	60.00	33.00	0.000	0.000	0.000
16	60.00	35.00	0.000	0.000	0.000
17	60.00	37.00	0.000	0.000	0.000
18	60.00	39.00	0.000	0.000	0.000
19	60.00	41.00	0.000	0.000	0.000
20	60.00	43.00	0.000	0.000	0.000
21	60.00	45.00	0.000	0.000	0.000
22	60.00	47.00	0.000	0.000	0.000
23	60.00	49.00	0.000	0.000	0.000
24	60.00	51.00	0.000	0.000	0.000
25	60.00	53.00	0.000	945.913	945.913
26	60.00	55.00	74.384	837.143	911.527
27	60.00	57.00	141.314	526.150	667.464
28	60.00	59.00	201.889	400.985	602.874
29	60.00	61.00	231.296	25.428	256.723
30	60.00	63.00	246.925	345.302	592.227
31	60.00	65.00	298.488	294.724	593.211
32	60.00	67.00	352.003	283.598	635.601
33	60.00	69.00	405.669	281.308	686.976
34	60.00	71.00	457.861	278.528	736.389
35	60.00	73.00	497.963	63.370	561.333
36	60.00	75.00	505.595	276.259	781.854
37	60.00	77.00	555.579	273.095	828.674
38	60.00	79.00	604.404	269.852	874.255
39	60.00	81.00	652.150	266.582	918.732
40	60.00	83.00	698.889	263.322	962.211
41	60.00	85.00	744.684	51.331	796.015
42	60.00	87.00	753.565	48.018	801.584
43	60.00	89.00	762.849	44.410	807.259
44	60.00	91.00	790.277	258.491	1048.768
45	60.00	93.00	834.909	255.329	1090.237
46	60.00	95.00	878.727	143.863	1022.590
47	60.00	97.00	902.712	142.903	1045.615
48	60.00	99.00	917.511	9.535	927.046
49	60.00	101.00	929.641	9.535	939.176
50	60.00	103.00	942.176	33.732	975.908
51	60.00	105.00	955.169	250.124	1205.293
52	60.00	107.00	997.927	247.111	1245.037
53	60.00	109.00	1019.034	41.320	1060.354
54	60.00	111.00	1033.445	41.320	1074.765
55	60.00	113.00	1048.283	45.350	1093.633
56	60.00	115.00	1063.585	43.571	1107.157

BB-05_Drilled_60in_BOC=-5.3ft_Void=-58.3ft.out

General Information:

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Input file: d Shaft\DS Water\BB-06_Drilled_48in_BOC=-6.3ft_Void=-66.3ft.in
Project number: B-22-074
Job name: Broad Causeway Bridge
Engineer: PV/TC
Units: English

Analysis Information:

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Analysis Type: Drilled Shaft Analysis

Soil Information:

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Boring date: 12/8/23
Boring number: BB-06
Station number: 127+95 Offset: 15 LT

Ground Elevation: -6.30(ft)
Water table Elevation = 1.70(ft)

Cu is calculated using: Direct method.
Rock side-friction is calculated using: McVay's method
Hammer type: Automatic Hammer, Correction factor = 1.24

ID	Depth (ft)	Elevation (ft)	SPT Blows (Blows/ft)	Unit Weight (pcf)	Soil Type
-----	-----	-----	-----	-----	-----
1	0.00	-6.30	N/A	118.00	5- Cavity layer
2	2.00	-8.30	N/A	118.00	5- Cavity layer
3	4.00	-10.30	N/A	126.00	5- Cavity layer
4	6.00	-12.30	N/A	126.00	5- Cavity layer
5	8.00	-14.30	N/A	124.00	5- Cavity layer
6	10.00	-16.30	N/A	125.00	5- Cavity layer
7	12.00	-18.30	N/A	126.00	5- Cavity layer
8	14.00	-20.30	N/A	123.00	5- Cavity layer
9	16.00	-22.30	N/A	124.00	5- Cavity layer
10	20.00	-26.30	N/A	117.00	5- Cavity layer
11	22.50	-28.80	N/A	115.00	5- Cavity layer
12	25.00	-31.30	N/A	115.00	5- Cavity layer
13	27.50	-33.80	N/A	120.00	5- Cavity layer

BB-06_Drilled_48in_BOC=-6.3ft_Void=-66.3ft.out

14	30.00	-36.30	N/A	120.00	5- Cavity layer
15	32.50	-38.80	N/A	115.00	5- Cavity layer
16	35.00	-41.30	N/A	120.00	5- Cavity layer
17	37.50	-43.80	N/A	115.00	5- Cavity layer
18	40.00	-46.30	N/A	115.00	5- Cavity layer
19	42.50	-48.80	N/A	115.00	5- Cavity layer
20	45.00	-51.30	N/A	115.00	5- Cavity layer
21	47.50	-53.80	N/A	92.00	5- Cavity layer
22	50.00	-56.30	N/A	86.00	5- Cavity layer
23	52.50	-58.80	N/A	0.00	5- Cavity layer
24	55.00	-61.30	N/A	135.00	5- Cavity layer
25	57.50	-63.80	N/A	135.00	5- Cavity layer
26	60.00	-66.30	N/A	133.00	5- Cavity layer
27	60.00	-66.30	N/A	0.00	1- Plastic Clay
28	60.00	-66.30	N/A	135.00	4- Lime Stone/Very shelly sand
29	62.50	-68.80	N/A	135.00	4- Lime Stone/Very shelly sand
30	65.00	-71.30	N/A	135.00	4- Lime Stone/Very shelly sand
31	67.50	-73.80	N/A	135.00	4- Lime Stone/Very shelly sand
32	67.50	-73.80	N/A	0.00	1- Plastic Clay
33	67.50	-73.80	14.00	119.00	3- Clean sand
34	70.00	-76.30	14.00	119.00	3- Clean sand
35	72.50	-78.80	5.00	106.00	3- Clean sand
36	72.50	-78.80	N/A	0.00	1- Plastic Clay
37	72.50	-78.80	N/A	133.00	4- Lime Stone/Very shelly sand
38	75.00	-81.30	N/A	133.00	4- Lime Stone/Very shelly sand
39	75.00	-81.30	N/A	0.00	1- Plastic Clay
40	75.00	-81.30	17.00	121.00	3- Clean sand
41	77.50	-83.80	17.00	121.00	3- Clean sand
42	77.50	-83.80	N/A	0.00	1- Plastic Clay
43	77.50	-83.80	3.00	99.00	3- Clean sand
44	80.00	-86.30	3.00	99.00	3- Clean sand
45	80.00	-86.30	N/A	0.00	1- Plastic Clay
46	80.00	-86.30	17.00	120.00	3- Clean sand
47	82.50	-88.80	17.00	120.00	3- Clean sand
48	85.00	-91.30	17.00	120.00	3- Clean sand
49	85.00	-91.30	N/A	0.00	1- Plastic Clay
50	85.00	-91.30	N/A	135.00	4- Lime Stone/Very shelly sand
51	87.50	-93.80	N/A	135.00	4- Lime Stone/Very shelly sand
52	90.00	-96.30	N/A	125.00	4- Lime Stone/Very shelly sand
53	92.50	-98.80	N/A	135.00	4- Lime Stone/Very shelly sand
54	95.00	-101.30	N/A	135.00	4- Lime Stone/Very shelly sand
55	95.00	-101.30	N/A	0.00	1- Plastic Clay
56	95.00	-101.30	22.00	0.00	3- Clean sand
57	97.50	-103.80	22.00	124.00	3- Clean sand
58	100.00	-106.30	4.00	102.00	3- Clean sand
59	100.00	-106.30	N/A	0.00	1- Plastic Clay
60	100.00	-106.30	N/A	135.00	4- Lime Stone/Very shelly sand
61	102.50	-108.80	N/A	135.00	4- Lime Stone/Very shelly sand
62	102.50	-108.80	N/A	0.00	1- Plastic Clay

BB-06_Drilled_48in_BOC=-6.3ft_Void=-66.3ft.out

63	102.50	-108.80	7.00	115.00	3- Clean sand
64	105.00	-111.30	7.00	115.00	3- Clean sand
65	105.00	-111.30	N/A	0.00	1- Plastic Clay
66	105.00	-111.30	N/A	135.00	4- Lime Stone/Very shelly sand
67	107.50	-113.80	N/A	135.00	4- Lime Stone/Very shelly sand
68	110.00	-116.30	N/A	135.00	4- Lime Stone/Very shelly sand
69	112.50	-118.80	N/A	135.00	4- Lime Stone/Very shelly sand
70	115.00	-121.30	N/A	125.00	4- Lime Stone/Very shelly sand
71	117.50	-123.80	N/A	120.00	4- Lime Stone/Very shelly sand
72	117.50	-123.80	N/A	0.00	1- Plastic Clay
73	117.50	-123.80	9.00	115.00	3- Clean sand
74	120.00	-126.30	9.00	115.00	3- Clean sand
75	120.00	-126.30	N/A	0.00	1- Plastic Clay
76	120.00	-126.30	18.00	120.00	3- Clean sand
77	122.50	-128.80	18.00	120.00	3- Clean sand
78	122.50	-128.80	N/A	0.00	1- Plastic Clay
79	122.50	-128.80	8.00	115.00	3- Clean sand
80	125.00	-131.30	8.00	115.00	3- Clean sand

ID	Cu-DIR (tsf)	qu (tsf)	qt (tsf)	Em (ksi)	qb (tsf)
1	N/A	N/A	N/A	N/A	N/A
2	N/A	N/A	N/A	N/A	N/A
3	N/A	N/A	N/A	N/A	N/A
4	N/A	N/A	N/A	N/A	N/A
5	N/A	N/A	N/A	N/A	N/A
6	N/A	N/A	N/A	N/A	N/A
7	N/A	N/A	N/A	N/A	N/A
8	N/A	N/A	N/A	N/A	N/A
9	N/A	N/A	N/A	N/A	N/A
10	N/A	N/A	N/A	N/A	N/A
11	N/A	N/A	N/A	N/A	N/A
12	N/A	N/A	N/A	N/A	N/A
13	N/A	N/A	N/A	N/A	N/A
14	N/A	N/A	N/A	N/A	N/A
15	N/A	N/A	N/A	N/A	N/A
16	N/A	N/A	N/A	N/A	N/A
17	N/A	N/A	N/A	N/A	N/A
18	N/A	N/A	N/A	N/A	N/A
19	N/A	N/A	N/A	N/A	N/A
20	N/A	N/A	N/A	N/A	N/A
21	N/A	N/A	N/A	N/A	N/A
22	N/A	N/A	N/A	N/A	N/A
23	N/A	N/A	N/A	N/A	N/A
24	N/A	N/A	N/A	N/A	N/A
25	N/A	N/A	N/A	N/A	N/A
26	N/A	N/A	N/A	N/A	N/A
27	0.00	N/A	N/A	N/A	N/A

BB-06_Drilled_48in_BOC=-6.3ft_Void=-66.3ft.out

Top of Rock Socket
elev = -66.3'



28	N/A	25.00	4.00	39.93	12.50
29	N/A	25.00	4.00	39.93	12.50
30	N/A	25.00	4.00	39.93	12.50
31	N/A	25.00	4.00	39.93	12.50
32	0.00	N/A	N/A	N/A	N/A
33	N/A	N/A	N/A	N/A	N/A
34	N/A	N/A	N/A	N/A	N/A
35	N/A	N/A	N/A	N/A	N/A
36	0.00	N/A	N/A	N/A	N/A
37	N/A	25.00	4.00	39.93	12.50
38	N/A	25.00	4.00	39.93	12.50
39	0.00	N/A	N/A	N/A	N/A
40	N/A	N/A	N/A	N/A	N/A
41	N/A	N/A	N/A	N/A	N/A
42	0.00	N/A	N/A	N/A	N/A
43	N/A	N/A	N/A	N/A	N/A
44	N/A	N/A	N/A	N/A	N/A
45	0.00	N/A	N/A	N/A	N/A
46	N/A	N/A	N/A	N/A	N/A
47	N/A	N/A	N/A	N/A	N/A
48	N/A	N/A	N/A	N/A	N/A
49	0.00	N/A	N/A	N/A	N/A
50	N/A	25.00	4.00	39.93	12.50
51	N/A	25.00	4.00	39.93	12.50
52	N/A	22.32	3.57	35.65	11.16
53	N/A	25.00	4.00	39.93	12.50
54	N/A	25.00	4.00	39.93	12.50
55	0.00	N/A	N/A	N/A	N/A
56	N/A	N/A	N/A	N/A	N/A
57	N/A	N/A	N/A	N/A	N/A
58	N/A	N/A	N/A	N/A	N/A
59	0.00	N/A	N/A	N/A	N/A
60	N/A	25.00	4.00	39.93	12.50
61	N/A	25.00	4.00	39.93	12.50
62	0.00	N/A	N/A	N/A	N/A
63	N/A	N/A	N/A	N/A	N/A
64	N/A	N/A	N/A	N/A	N/A
65	0.00	N/A	N/A	N/A	N/A
66	N/A	25.00	4.00	39.93	12.50
67	N/A	25.00	4.00	39.93	12.50
68	N/A	25.00	4.00	39.93	12.50
69	N/A	25.00	4.00	39.93	12.50
70	N/A	16.74	2.68	26.74	8.37
71	N/A	12.40	1.98	19.81	6.20
72	0.00	N/A	N/A	N/A	N/A
73	N/A	N/A	N/A	N/A	N/A
74	N/A	N/A	N/A	N/A	N/A
75	0.00	N/A	N/A	N/A	N/A
76	N/A	N/A	N/A	N/A	N/A

BB-06_Drilled_48in_BOC=-6.3ft_Void=-66.3ft.out

77	N/A	N/A	N/A	N/A	N/A
78	0.00	N/A	N/A	N/A	N/A
79	N/A	N/A	N/A	N/A	N/A
80	N/A	N/A	N/A	N/A	N/A

ID	RQD F.M.	S.R.I.	Rock Recovery

1	N/A	N/A	N/A
2	N/A	N/A	N/A
3	N/A	N/A	N/A
4	N/A	N/A	N/A
5	N/A	N/A	N/A
6	N/A	N/A	N/A
7	N/A	N/A	N/A
8	N/A	N/A	N/A
9	N/A	N/A	N/A
10	N/A	N/A	N/A
11	N/A	N/A	N/A
12	N/A	N/A	N/A
13	N/A	N/A	N/A
14	N/A	N/A	N/A
15	N/A	N/A	N/A
16	N/A	N/A	N/A
17	N/A	N/A	N/A
18	N/A	N/A	N/A
19	N/A	N/A	N/A
20	N/A	N/A	N/A
21	N/A	N/A	N/A
22	N/A	N/A	N/A
23	N/A	N/A	N/A
24	N/A	N/A	N/A
25	N/A	N/A	N/A
26	N/A	N/A	N/A
27	N/A	N/A	N/A
28	0.50	ROUGH	1.000
29	0.50	ROUGH	1.000
30	0.50	ROUGH	1.000
31	0.50	ROUGH	1.000
32	N/A	N/A	N/A
33	N/A	N/A	N/A
34	N/A	N/A	N/A
35	N/A	N/A	N/A
36	N/A	N/A	N/A
37	0.50	ROUGH	1.000
38	0.50	ROUGH	1.000
39	N/A	N/A	N/A
40	N/A	N/A	N/A
41	N/A	N/A	N/A

BB-06_Drilled_48in_BOC=-6.3ft_Void=-66.3ft.out

42	N/A	N/A	N/A
43	N/A	N/A	N/A
44	N/A	N/A	N/A
45	N/A	N/A	N/A
46	N/A	N/A	N/A
47	N/A	N/A	N/A
48	N/A	N/A	N/A
49	N/A	N/A	N/A
50	0.50	ROUGH	1.000
51	0.50	ROUGH	1.000
52	0.50	ROUGH	1.000
53	0.50	ROUGH	1.000
54	0.50	ROUGH	1.000
55	N/A	N/A	N/A
56	N/A	N/A	N/A
57	N/A	N/A	N/A
58	N/A	N/A	N/A
59	N/A	N/A	N/A
60	0.50	ROUGH	1.000
61	0.50	ROUGH	1.000
62	N/A	N/A	N/A
63	N/A	N/A	N/A
64	N/A	N/A	N/A
65	N/A	N/A	N/A
66	0.50	ROUGH	1.000
67	0.50	ROUGH	1.000
68	0.50	ROUGH	1.000
69	0.50	ROUGH	1.000
70	0.50	ROUGH	1.000
71	0.50	ROUGH	1.000
72	N/A	N/A	N/A
73	N/A	N/A	N/A
74	N/A	N/A	N/A
75	N/A	N/A	N/A
76	N/A	N/A	N/A
77	N/A	N/A	N/A
78	N/A	N/A	N/A
79	N/A	N/A	N/A
80	N/A	N/A	N/A

Drilled Shaft Data:

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Unit weight of concrete = 145.00(pcf), Concrete Slump = 6.00(in)
Modulus of Elasticity of concrete = 3987.00(ksi)

Shaft Geometry:

ID	Length	Tip Elev.	Case Len.	Diameter	Base Diam.	Bell Len.

BB-06_Drilled_48in_BOC=-6.3ft_Void=-66.3ft.out

	(ft)	(ft)	(ft)	(in)	(in)	(ft)
1	5.00	-11.30	0.00	48.00	48.00	0.00
2	7.00	-13.30	0.00	48.00	48.00	0.00
3	9.00	-15.30	0.00	48.00	48.00	0.00
4	11.00	-17.30	0.00	48.00	48.00	0.00
5	13.00	-19.30	0.00	48.00	48.00	0.00
6	15.00	-21.30	0.00	48.00	48.00	0.00
7	17.00	-23.30	0.00	48.00	48.00	0.00
8	19.00	-25.30	0.00	48.00	48.00	0.00
9	21.00	-27.30	0.00	48.00	48.00	0.00
10	23.00	-29.30	0.00	48.00	48.00	0.00
11	25.00	-31.30	0.00	48.00	48.00	0.00
12	27.00	-33.30	0.00	48.00	48.00	0.00
13	29.00	-35.30	0.00	48.00	48.00	0.00
14	31.00	-37.30	0.00	48.00	48.00	0.00
15	33.00	-39.30	0.00	48.00	48.00	0.00
16	35.00	-41.30	0.00	48.00	48.00	0.00
17	37.00	-43.30	0.00	48.00	48.00	0.00
18	39.00	-45.30	0.00	48.00	48.00	0.00
19	41.00	-47.30	0.00	48.00	48.00	0.00
20	43.00	-49.30	0.00	48.00	48.00	0.00
21	45.00	-51.30	0.00	48.00	48.00	0.00
22	47.00	-53.30	0.00	48.00	48.00	0.00
23	49.00	-55.30	0.00	48.00	48.00	0.00
24	51.00	-57.30	0.00	48.00	48.00	0.00
25	53.00	-59.30	0.00	48.00	48.00	0.00
26	55.00	-61.30	0.00	48.00	48.00	0.00
27	57.00	-63.30	0.00	48.00	48.00	0.00
28	59.00	-65.30	0.00	48.00	48.00	0.00
29	61.00	-67.30	0.00	48.00	48.00	0.00
30	63.00	-69.30	0.00	48.00	48.00	0.00
31	65.00	-71.30	0.00	48.00	48.00	0.00
32	67.00	-73.30	0.00	48.00	48.00	0.00
33	69.00	-75.30	0.00	48.00	48.00	0.00
34	71.00	-77.30	0.00	48.00	48.00	0.00
35	73.00	-79.30	0.00	48.00	48.00	0.00
36	75.00	-81.30	0.00	48.00	48.00	0.00
37	77.00	-83.30	0.00	48.00	48.00	0.00
38	79.00	-85.30	0.00	48.00	48.00	0.00
39	81.00	-87.30	0.00	48.00	48.00	0.00
40	83.00	-89.30	0.00	48.00	48.00	0.00
41	85.00	-91.30	0.00	48.00	48.00	0.00
42	87.00	-93.30	0.00	48.00	48.00	0.00
43	89.00	-95.30	0.00	48.00	48.00	0.00
44	91.00	-97.30	0.00	48.00	48.00	0.00
45	93.00	-99.30	0.00	48.00	48.00	0.00
46	95.00	-101.30	0.00	48.00	48.00	0.00
47	97.00	-103.30	0.00	48.00	48.00	0.00

BB-06_Drilled_48in_BOC=-6.3ft_Void=-66.3ft.out

48	99.00	-105.30	0.00	48.00	48.00	0.00
49	101.00	-107.30	0.00	48.00	48.00	0.00
50	103.00	-109.30	0.00	48.00	48.00	0.00
51	105.00	-111.30	0.00	48.00	48.00	0.00
52	107.00	-113.30	0.00	48.00	48.00	0.00
53	109.00	-115.30	0.00	48.00	48.00	0.00
54	111.00	-117.30	0.00	48.00	48.00	0.00
55	113.00	-119.30	0.00	48.00	48.00	0.00
56	115.00	-121.30	0.00	48.00	48.00	0.00

Drilled Shaft Capacity (sorted by shaft diameter):

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Strength reduction factors: Skin-friction = 1.00, End-bearing = 1.00

ID	Diameter (in)	Length (ft)	Skin Fric. (tons)	End Bearing (tons)	Capacity (tons)
1	48.00	5.00	0.000	0.000	0.000
2	48.00	7.00	0.000	0.000	0.000
3	48.00	9.00	0.000	0.000	0.000
4	48.00	11.00	0.000	0.000	0.000
5	48.00	13.00	0.000	0.000	0.000
6	48.00	15.00	0.000	0.000	0.000
7	48.00	17.00	0.000	0.000	0.000
8	48.00	19.00	0.000	0.000	0.000
9	48.00	21.00	0.000	0.000	0.000
10	48.00	23.00	0.000	0.000	0.000
11	48.00	25.00	0.000	0.000	0.000
12	48.00	27.00	0.000	0.000	0.000
13	48.00	29.00	0.000	0.000	0.000
14	48.00	31.00	0.000	0.000	0.000
15	48.00	33.00	0.000	0.000	0.000
16	48.00	35.00	0.000	0.000	0.000
17	48.00	37.00	0.000	0.000	0.000
18	48.00	39.00	0.000	0.000	0.000
19	48.00	41.00	0.000	0.000	0.000
20	48.00	43.00	0.000	0.000	0.000
21	48.00	45.00	0.000	0.000	0.000
22	48.00	47.00	0.000	0.000	0.000
23	48.00	49.00	0.000	0.000	0.000
24	48.00	51.00	0.000	0.000	0.000
25	48.00	53.00	0.000	0.000	0.000
26	48.00	55.00	0.000	0.000	0.000
27	48.00	57.00	0.000	0.000	0.000
28	48.00	59.00	0.000	0.000	0.000
29	48.00	61.00	62.832	157.080	219.911
30	48.00	63.00	188.496	157.080	345.575
31	48.00	65.00	314.159	157.080	471.239

BB-06_Drilled_48in_BOC=-6.3ft_Void=-66.3ft.out

32	48.00	67.00	439.823	157.080	596.903
33	48.00	69.00	473.367	115.866	589.233
34	48.00	71.00	476.562	99.037	575.599
35	48.00	73.00	510.618	157.080	667.698
36	48.00	75.00	636.282	108.883	745.165
37	48.00	77.00	640.596	93.145	733.742
38	48.00	79.00	644.492	28.048	672.540
39	48.00	81.00	648.720	111.254	759.974
40	48.00	83.00	653.454	126.337	779.791
41	48.00	85.00	658.317	157.080	815.396
42	48.00	87.00	783.980	157.080	941.060
43	48.00	89.00	909.644	157.080	1066.724
44	48.00	91.00	1028.571	140.241	1168.811
45	48.00	93.00	1144.129	157.080	1301.208
46	48.00	95.00	1269.792	153.381	1423.174
47	48.00	97.00	1276.605	153.792	1430.398
48	48.00	99.00	1283.245	123.959	1407.204
49	48.00	101.00	1349.530	157.080	1506.610
50	48.00	103.00	1445.681	65.446	1511.127
51	48.00	105.00	1453.502	157.080	1610.582
52	48.00	107.00	1579.166	157.080	1736.245
53	48.00	109.00	1704.829	157.080	1861.909
54	48.00	111.00	1830.493	157.080	1987.573
55	48.00	113.00	1956.157	157.080	2113.236
56	48.00	115.00	2081.820	105.181	2187.001

Drilled Shaft Capacity at User-Defined Settlement (sorted by shaft diameter):

=====

***** Capacity is NOT modified by the strength reduction factors *****

User-Defined Settlement = 1.04%

ID	Diameter (in)	Length (ft)	Skin Fric. (tons)	End Bearing (tons)	Capacity (tons)

1	48.00	5.00	0.000	0.000	0.000
2	48.00	7.00	0.000	0.000	0.000
3	48.00	9.00	0.000	0.000	0.000
4	48.00	11.00	0.000	0.000	0.000
5	48.00	13.00	0.000	0.000	0.000
6	48.00	15.00	0.000	0.000	0.000
7	48.00	17.00	0.000	0.000	0.000
8	48.00	19.00	0.000	0.000	0.000
9	48.00	21.00	0.000	0.000	0.000
10	48.00	23.00	0.000	0.000	0.000
11	48.00	25.00	0.000	0.000	0.000
12	48.00	27.00	0.000	0.000	0.000

BB-06_Drilled_48in_BOC=-6.3ft_Void=-66.3ft.out

13	48.00	29.00	0.000	0.000	0.000
14	48.00	31.00	0.000	0.000	0.000
15	48.00	33.00	0.000	0.000	0.000
16	48.00	35.00	0.000	0.000	0.000
17	48.00	37.00	0.000	0.000	0.000
18	48.00	39.00	0.000	0.000	0.000
19	48.00	41.00	0.000	0.000	0.000
20	48.00	43.00	0.000	0.000	0.000
21	48.00	45.00	0.000	0.000	0.000
22	48.00	47.00	0.000	0.000	0.000
23	48.00	49.00	0.000	0.000	0.000
24	48.00	51.00	0.000	0.000	0.000
25	48.00	53.00	0.000	0.000	0.000
26	48.00	55.00	0.000	0.000	0.000
27	48.00	57.00	0.000	0.000	0.000
28	48.00	59.00	0.000	0.000	0.000
29	48.00	61.00	30.572	852.863	883.436
30	48.00	63.00	87.053	408.515	495.568
31	48.00	65.00	138.089	290.115	428.204
32	48.00	67.00	184.455	231.560	416.015
33	48.00	69.00	197.475	36.864	234.339
34	48.00	71.00	200.600	31.510	232.110
35	48.00	73.00	213.899	211.743	425.642
36	48.00	75.00	260.699	34.643	295.342
37	48.00	77.00	264.919	29.636	294.554
38	48.00	79.00	268.729	8.924	277.653
39	48.00	81.00	272.864	35.397	308.262
40	48.00	83.00	277.495	40.196	317.691
41	48.00	85.00	282.251	210.082	492.333
42	48.00	87.00	327.840	207.644	535.485
43	48.00	89.00	372.195	204.837	577.032
44	48.00	91.00	413.009	180.382	593.391
45	48.00	93.00	451.704	199.273	650.977
46	48.00	95.00	493.069	48.801	541.870
47	48.00	97.00	499.733	48.932	548.664
48	48.00	99.00	506.227	39.440	545.667
49	48.00	101.00	530.001	194.720	724.721
50	48.00	103.00	562.058	20.823	582.880
51	48.00	105.00	569.707	192.476	762.183
52	48.00	107.00	609.311	189.534	798.845
53	48.00	109.00	648.148	186.658	834.806
54	48.00	111.00	686.261	183.851	870.112
55	48.00	113.00	723.691	181.114	904.804
56	48.00	115.00	760.470	119.489	879.959

BB-06_Drilled_48in_BOC=-6.3ft_Void=-66.3ft.out

General Information:

Input file: d Shaft\DS Water\BB-06_Drilled_60in_BOC=-6.3ft_Void=-66.3ft.in
Project number: B-22-074
Job name: Broad Causeway Bridge
Engineer: PV/TC
Units: English

Analysis Information:

Analysis Type: Drilled Shaft Analysis

Soil Information:

Boring date: 12/8/23
Boring number: BB-06
Station number: 127+95 Offset: 15 LT

Ground Elevation: -6.30(ft)
Water table Elevation = 1.70(ft)

Cu is calculated using: Direct method.
Rock side-friction is calculated using: McVay's method
Hammer type: Automatic Hammer, Correction factor = 1.24

ID	Depth (ft)	Elevation (ft)	SPT Blows (Blows/ft)	Unit Weight (pcf)	Soil Type
1	0.00	-6.30	N/A	118.00	5- Cavity layer
2	2.00	-8.30	N/A	118.00	5- Cavity layer
3	4.00	-10.30	N/A	126.00	5- Cavity layer
4	6.00	-12.30	N/A	126.00	5- Cavity layer
5	8.00	-14.30	N/A	124.00	5- Cavity layer
6	10.00	-16.30	N/A	125.00	5- Cavity layer
7	12.00	-18.30	N/A	126.00	5- Cavity layer
8	14.00	-20.30	N/A	123.00	5- Cavity layer
9	16.00	-22.30	N/A	124.00	5- Cavity layer
10	20.00	-26.30	N/A	117.00	5- Cavity layer
11	22.50	-28.80	N/A	115.00	5- Cavity layer
12	25.00	-31.30	N/A	115.00	5- Cavity layer
13	27.50	-33.80	N/A	120.00	5- Cavity layer
14	30.00	-36.30	N/A	120.00	5- Cavity layer
15	32.50	-38.80	N/A	115.00	5- Cavity layer
16	35.00	-41.30	N/A	120.00	5- Cavity layer

"BB-06_Drilled_60in_BOC=-6.3ft_Void=-66.3ft.out"

17	37.50	-43.80	N/A	115.00	5- Cavity layer
18	40.00	-46.30	N/A	115.00	5- Cavity layer
19	42.50	-48.80	N/A	115.00	5- Cavity layer
20	45.00	-51.30	N/A	115.00	5- Cavity layer
21	47.50	-53.80	N/A	92.00	5- Cavity layer
22	50.00	-56.30	N/A	86.00	5- Cavity layer
23	52.50	-58.80	N/A	0.00	5- Cavity layer
24	55.00	-61.30	N/A	135.00	5- Cavity layer
25	57.50	-63.80	N/A	135.00	5- Cavity layer
26	60.00	-66.30	N/A	133.00	5- Cavity layer
27	60.00	-66.30	N/A	0.00	1- Plastic Clay
28	60.00	-66.30	N/A	135.00	4- Lime Stone/Very shelly sand
29	62.50	-68.80	N/A	135.00	4- Lime Stone/Very shelly sand
30	65.00	-71.30	N/A	135.00	4- Lime Stone/Very shelly sand
31	67.50	-73.80	N/A	135.00	4- Lime Stone/Very shelly sand
32	67.50	-73.80	N/A	0.00	1- Plastic Clay
33	67.50	-73.80	14.00	119.00	3- Clean sand
34	70.00	-76.30	14.00	119.00	3- Clean sand
35	72.50	-78.80	5.00	106.00	3- Clean sand
36	72.50	-78.80	N/A	0.00	1- Plastic Clay
37	72.50	-78.80	N/A	133.00	4- Lime Stone/Very shelly sand
38	75.00	-81.30	N/A	133.00	4- Lime Stone/Very shelly sand
39	75.00	-81.30	N/A	0.00	1- Plastic Clay
40	75.00	-81.30	17.00	121.00	3- Clean sand
41	77.50	-83.80	17.00	121.00	3- Clean sand
42	77.50	-83.80	N/A	0.00	1- Plastic Clay
43	77.50	-83.80	3.00	99.00	3- Clean sand
44	80.00	-86.30	3.00	99.00	3- Clean sand
45	80.00	-86.30	N/A	0.00	1- Plastic Clay
46	80.00	-86.30	17.00	120.00	3- Clean sand
47	82.50	-88.80	17.00	120.00	3- Clean sand
48	85.00	-91.30	17.00	120.00	3- Clean sand
49	85.00	-91.30	N/A	0.00	1- Plastic Clay
50	85.00	-91.30	N/A	135.00	4- Lime Stone/Very shelly sand
51	87.50	-93.80	N/A	135.00	4- Lime Stone/Very shelly sand
52	90.00	-96.30	N/A	125.00	4- Lime Stone/Very shelly sand
53	92.50	-98.80	N/A	135.00	4- Lime Stone/Very shelly sand
54	95.00	-101.30	N/A	135.00	4- Lime Stone/Very shelly sand
55	95.00	-101.30	N/A	0.00	1- Plastic Clay
56	95.00	-101.30	22.00	0.00	3- Clean sand
57	97.50	-103.80	22.00	124.00	3- Clean sand
58	100.00	-106.30	4.00	102.00	3- Clean sand
59	100.00	-106.30	N/A	0.00	1- Plastic Clay
60	100.00	-106.30	N/A	135.00	4- Lime Stone/Very shelly sand
61	102.50	-108.80	N/A	135.00	4- Lime Stone/Very shelly sand
62	102.50	-108.80	N/A	0.00	1- Plastic Clay
63	102.50	-108.80	7.00	115.00	3- Clean sand
64	105.00	-111.30	7.00	115.00	3- Clean sand
65	105.00	-111.30	N/A	0.00	1- Plastic Clay
66	105.00	-111.30	N/A	135.00	4- Lime Stone/Very shelly sand
67	107.50	-113.80	N/A	135.00	4- Lime Stone/Very shelly sand
68	110.00	-116.30	N/A	135.00	4- Lime Stone/Very shelly sand

"BB-06_Drilled_60in_BOC=-6.3ft_Void=-66.3ft.out"

Top of Rock Socket
elev = -66.3'

Bottom of Canal
elev = -6.3'

69	112.50	-118.80	N/A	135.00	4- Lime Stone/Very shelly sand
70	115.00	-121.30	N/A	125.00	4- Lime Stone/Very shelly sand
71	117.50	-123.80	N/A	120.00	4- Lime Stone/Very shelly sand
72	117.50	-123.80	N/A	0.00	1- Plastic Clay
73	117.50	-123.80	9.00	115.00	3- Clean sand
74	120.00	-126.30	9.00	115.00	3- Clean sand
75	120.00	-126.30	N/A	0.00	1- Plastic Clay
76	120.00	-126.30	18.00	120.00	3- Clean sand
77	122.50	-128.80	18.00	120.00	3- Clean sand
78	122.50	-128.80	N/A	0.00	1- Plastic Clay
79	122.50	-128.80	8.00	115.00	3- Clean sand
80	125.00	-131.30	8.00	115.00	3- Clean sand

ID	Cu-DIR (tsf)	qu (tsf)	qt (tsf)	Em (ksi)	qb (tsf)
1	N/A	N/A	N/A	N/A	N/A
2	N/A	N/A	N/A	N/A	N/A
3	N/A	N/A	N/A	N/A	N/A
4	N/A	N/A	N/A	N/A	N/A
5	N/A	N/A	N/A	N/A	N/A
6	N/A	N/A	N/A	N/A	N/A
7	N/A	N/A	N/A	N/A	N/A
8	N/A	N/A	N/A	N/A	N/A
9	N/A	N/A	N/A	N/A	N/A
10	N/A	N/A	N/A	N/A	N/A
11	N/A	N/A	N/A	N/A	N/A
12	N/A	N/A	N/A	N/A	N/A
13	N/A	N/A	N/A	N/A	N/A
14	N/A	N/A	N/A	N/A	N/A
15	N/A	N/A	N/A	N/A	N/A
16	N/A	N/A	N/A	N/A	N/A
17	N/A	N/A	N/A	N/A	N/A
18	N/A	N/A	N/A	N/A	N/A
19	N/A	N/A	N/A	N/A	N/A
20	N/A	N/A	N/A	N/A	N/A
21	N/A	N/A	N/A	N/A	N/A
22	N/A	N/A	N/A	N/A	N/A
23	N/A	N/A	N/A	N/A	N/A
24	N/A	N/A	N/A	N/A	N/A
25	N/A	N/A	N/A	N/A	N/A
26	N/A	N/A	N/A	N/A	N/A
27	0.00	N/A	N/A	N/A	N/A
28	N/A	25.00	4.00	39.93	12.50
29	N/A	25.00	4.00	39.93	12.50
30	N/A	25.00	4.00	39.93	12.50
31	N/A	25.00	4.00	39.93	12.50
32	0.00	N/A	N/A	N/A	N/A
33	N/A	N/A	N/A	N/A	N/A
34	N/A	N/A	N/A	N/A	N/A
35	N/A	N/A	N/A	N/A	N/A
36	0.00	N/A	N/A	N/A	N/A

"BB-06_Drilled_60in_BOC=-6.3ft_Void=-66.3ft.out"

Top of Rock Socket
elev = -66.3'

37	N/A	25.00	4.00	39.93	12.50
38	N/A	25.00	4.00	39.93	12.50
39	0.00	N/A	N/A	N/A	N/A
40	N/A	N/A	N/A	N/A	N/A
41	N/A	N/A	N/A	N/A	N/A
42	0.00	N/A	N/A	N/A	N/A
43	N/A	N/A	N/A	N/A	N/A
44	N/A	N/A	N/A	N/A	N/A
45	0.00	N/A	N/A	N/A	N/A
46	N/A	N/A	N/A	N/A	N/A
47	N/A	N/A	N/A	N/A	N/A
48	N/A	N/A	N/A	N/A	N/A
49	0.00	N/A	N/A	N/A	N/A
50	N/A	25.00	4.00	39.93	12.50
51	N/A	25.00	4.00	39.93	12.50
52	N/A	22.32	3.57	35.65	11.16
53	N/A	25.00	4.00	39.93	12.50
54	N/A	25.00	4.00	39.93	12.50
55	0.00	N/A	N/A	N/A	N/A
56	N/A	N/A	N/A	N/A	N/A
57	N/A	N/A	N/A	N/A	N/A
58	N/A	N/A	N/A	N/A	N/A
59	0.00	N/A	N/A	N/A	N/A
60	N/A	25.00	4.00	39.93	12.50
61	N/A	25.00	4.00	39.93	12.50
62	0.00	N/A	N/A	N/A	N/A
63	N/A	N/A	N/A	N/A	N/A
64	N/A	N/A	N/A	N/A	N/A
65	0.00	N/A	N/A	N/A	N/A
66	N/A	25.00	4.00	39.93	12.50
67	N/A	25.00	4.00	39.93	12.50
68	N/A	25.00	4.00	39.93	12.50
69	N/A	25.00	4.00	39.93	12.50
70	N/A	16.74	2.68	26.74	8.37
71	N/A	12.40	1.98	19.81	6.20
72	0.00	N/A	N/A	N/A	N/A
73	N/A	N/A	N/A	N/A	N/A
74	N/A	N/A	N/A	N/A	N/A
75	0.00	N/A	N/A	N/A	N/A
76	N/A	N/A	N/A	N/A	N/A
77	N/A	N/A	N/A	N/A	N/A
78	0.00	N/A	N/A	N/A	N/A
79	N/A	N/A	N/A	N/A	N/A
80	N/A	N/A	N/A	N/A	N/A

ID	RQD F.M.	S.R.I.	Rock Recovery
1	N/A	N/A	N/A
2	N/A	N/A	N/A
3	N/A	N/A	N/A
4	N/A	N/A	N/A

"BB-06_Drilled_60in_BOC=-6.3ft_Void=-66.3ft.out"

5	N/A	N/A	N/A
6	N/A	N/A	N/A
7	N/A	N/A	N/A
8	N/A	N/A	N/A
9	N/A	N/A	N/A
10	N/A	N/A	N/A
11	N/A	N/A	N/A
12	N/A	N/A	N/A
13	N/A	N/A	N/A
14	N/A	N/A	N/A
15	N/A	N/A	N/A
16	N/A	N/A	N/A
17	N/A	N/A	N/A
18	N/A	N/A	N/A
19	N/A	N/A	N/A
20	N/A	N/A	N/A
21	N/A	N/A	N/A
22	N/A	N/A	N/A
23	N/A	N/A	N/A
24	N/A	N/A	N/A
25	N/A	N/A	N/A
26	N/A	N/A	N/A
27	N/A	N/A	N/A
28	0.50	ROUGH	1.000
29	0.50	ROUGH	1.000
30	0.50	ROUGH	1.000
31	0.50	ROUGH	1.000
32	N/A	N/A	N/A
33	N/A	N/A	N/A
34	N/A	N/A	N/A
35	N/A	N/A	N/A
36	N/A	N/A	N/A
37	0.50	ROUGH	1.000
38	0.50	ROUGH	1.000
39	N/A	N/A	N/A
40	N/A	N/A	N/A
41	N/A	N/A	N/A
42	N/A	N/A	N/A
43	N/A	N/A	N/A
44	N/A	N/A	N/A
45	N/A	N/A	N/A
46	N/A	N/A	N/A
47	N/A	N/A	N/A
48	N/A	N/A	N/A
49	N/A	N/A	N/A
50	0.50	ROUGH	1.000
51	0.50	ROUGH	1.000
52	0.50	ROUGH	1.000
53	0.50	ROUGH	1.000
54	0.50	ROUGH	1.000
55	N/A	N/A	N/A
56	N/A	N/A	N/A

"BB-06_Drilled_60in_BOC=-6.3ft_Void=-66.3ft.out"

57	N/A	N/A	N/A
58	N/A	N/A	N/A
59	N/A	N/A	N/A
60	0.50	ROUGH	1.000
61	0.50	ROUGH	1.000
62	N/A	N/A	N/A
63	N/A	N/A	N/A
64	N/A	N/A	N/A
65	N/A	N/A	N/A
66	0.50	ROUGH	1.000
67	0.50	ROUGH	1.000
68	0.50	ROUGH	1.000
69	0.50	ROUGH	1.000
70	0.50	ROUGH	1.000
71	0.50	ROUGH	1.000
72	N/A	N/A	N/A
73	N/A	N/A	N/A
74	N/A	N/A	N/A
75	N/A	N/A	N/A
76	N/A	N/A	N/A
77	N/A	N/A	N/A
78	N/A	N/A	N/A
79	N/A	N/A	N/A
80	N/A	N/A	N/A

Drilled Shaft Data:

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Unit weight of concrete = 145.00(pcf), Concrete Slump = 6.00(in)
Modulus of Elasticity of concrete = 3987.00(ksi)

Shaft Geometry:

ID	Length (ft)	Tip Elev. (ft)	Case Len. (ft)	Diameter (in)	Base Diam. (in)	Bell Len. (ft)
1	5.00	-11.30	0.00	60.00	60.00	0.00
2	7.00	-13.30	0.00	60.00	60.00	0.00
3	9.00	-15.30	0.00	60.00	60.00	0.00
4	11.00	-17.30	0.00	60.00	60.00	0.00
5	13.00	-19.30	0.00	60.00	60.00	0.00
6	15.00	-21.30	0.00	60.00	60.00	0.00
7	17.00	-23.30	0.00	60.00	60.00	0.00
8	19.00	-25.30	0.00	60.00	60.00	0.00
9	21.00	-27.30	0.00	60.00	60.00	0.00
10	23.00	-29.30	0.00	60.00	60.00	0.00
11	25.00	-31.30	0.00	60.00	60.00	0.00
12	27.00	-33.30	0.00	60.00	60.00	0.00
13	29.00	-35.30	0.00	60.00	60.00	0.00
14	31.00	-37.30	0.00	60.00	60.00	0.00
15	33.00	-39.30	0.00	60.00	60.00	0.00
16	35.00	-41.30	0.00	60.00	60.00	0.00

"BB-06_Drilled_60in_BOC=-6.3ft_Void=-66.3ft.out"

17	37.00	-43.30	0.00	60.00	60.00	0.00
18	39.00	-45.30	0.00	60.00	60.00	0.00
19	41.00	-47.30	0.00	60.00	60.00	0.00
20	43.00	-49.30	0.00	60.00	60.00	0.00
21	45.00	-51.30	0.00	60.00	60.00	0.00
22	47.00	-53.30	0.00	60.00	60.00	0.00
23	49.00	-55.30	0.00	60.00	60.00	0.00
24	51.00	-57.30	0.00	60.00	60.00	0.00
25	53.00	-59.30	0.00	60.00	60.00	0.00
26	55.00	-61.30	0.00	60.00	60.00	0.00
27	57.00	-63.30	0.00	60.00	60.00	0.00
28	59.00	-65.30	0.00	60.00	60.00	0.00
29	61.00	-67.30	0.00	60.00	60.00	0.00
30	63.00	-69.30	0.00	60.00	60.00	0.00
31	65.00	-71.30	0.00	60.00	60.00	0.00
32	67.00	-73.30	0.00	60.00	60.00	0.00
33	69.00	-75.30	0.00	60.00	60.00	0.00
34	71.00	-77.30	0.00	60.00	60.00	0.00
35	73.00	-79.30	0.00	60.00	60.00	0.00
36	75.00	-81.30	0.00	60.00	60.00	0.00
37	77.00	-83.30	0.00	60.00	60.00	0.00
38	79.00	-85.30	0.00	60.00	60.00	0.00
39	81.00	-87.30	0.00	60.00	60.00	0.00
40	83.00	-89.30	0.00	60.00	60.00	0.00
41	85.00	-91.30	0.00	60.00	60.00	0.00
42	87.00	-93.30	0.00	60.00	60.00	0.00
43	89.00	-95.30	0.00	60.00	60.00	0.00
44	91.00	-97.30	0.00	60.00	60.00	0.00
45	93.00	-99.30	0.00	60.00	60.00	0.00
46	95.00	-101.30	0.00	60.00	60.00	0.00
47	97.00	-103.30	0.00	60.00	60.00	0.00
48	99.00	-105.30	0.00	60.00	60.00	0.00
49	101.00	-107.30	0.00	60.00	60.00	0.00
50	103.00	-109.30	0.00	60.00	60.00	0.00
51	105.00	-111.30	0.00	60.00	60.00	0.00
52	107.00	-113.30	0.00	60.00	60.00	0.00
53	109.00	-115.30	0.00	60.00	60.00	0.00
54	111.00	-117.30	0.00	60.00	60.00	0.00
55	113.00	-119.30	0.00	60.00	60.00	0.00
56	115.00	-121.30	0.00	60.00	60.00	0.00

Drilled Shaft Capacity (sorted by shaft diameter):

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Strength reduction factors: Skin-friction = 1.00, End-bearing = 1.00

ID	Diameter (in)	Length (ft)	Skin Fric. (tons)	End Bearing (tons)	Capacity (tons)

1	60.00	5.00	0.000	0.000	0.000
2	60.00	7.00	0.000	0.000	0.000
3	60.00	9.00	0.000	0.000	0.000

"BB-06_Drilled_60in_BOC=-6.3ft_Void=-66.3ft.out"

4	60.00	11.00	0.000	0.000	0.000
5	60.00	13.00	0.000	0.000	0.000
6	60.00	15.00	0.000	0.000	0.000
7	60.00	17.00	0.000	0.000	0.000
8	60.00	19.00	0.000	0.000	0.000
9	60.00	21.00	0.000	0.000	0.000
10	60.00	23.00	0.000	0.000	0.000
11	60.00	25.00	0.000	0.000	0.000
12	60.00	27.00	0.000	0.000	0.000
13	60.00	29.00	0.000	0.000	0.000
14	60.00	31.00	0.000	0.000	0.000
15	60.00	33.00	0.000	0.000	0.000
16	60.00	35.00	0.000	0.000	0.000
17	60.00	37.00	0.000	0.000	0.000
18	60.00	39.00	0.000	0.000	0.000
19	60.00	41.00	0.000	0.000	0.000
20	60.00	43.00	0.000	0.000	0.000
21	60.00	45.00	0.000	0.000	0.000
22	60.00	47.00	0.000	0.000	0.000
23	60.00	49.00	0.000	0.000	0.000
24	60.00	51.00	0.000	0.000	0.000
25	60.00	53.00	0.000	0.000	0.000
26	60.00	55.00	0.000	0.000	0.000
27	60.00	57.00	0.000	0.000	0.000
28	60.00	59.00	0.000	0.000	0.000
29	60.00	61.00	78.540	245.437	323.977
30	60.00	63.00	235.619	245.437	481.056
31	60.00	65.00	392.699	245.437	638.136
32	60.00	67.00	549.779	245.437	795.216
33	60.00	69.00	591.709	150.867	742.575
34	60.00	71.00	595.703	128.954	724.657
35	60.00	73.00	638.273	245.437	883.710
36	60.00	75.00	795.353	142.637	937.990
37	60.00	77.00	800.745	119.101	919.847
38	60.00	79.00	805.615	36.521	842.136
39	60.00	81.00	810.900	143.110	954.010
40	60.00	83.00	816.818	164.509	981.327
41	60.00	85.00	822.896	245.437	1068.333
42	60.00	87.00	979.976	245.437	1225.413
43	60.00	89.00	1137.055	245.437	1382.492
44	60.00	91.00	1285.713	219.126	1504.839
45	60.00	93.00	1430.161	245.437	1675.598
46	60.00	95.00	1587.241	188.089	1775.330
47	60.00	97.00	1595.757	196.478	1792.235
48	60.00	99.00	1604.056	158.537	1762.593
49	60.00	101.00	1686.912	245.437	1932.349
50	60.00	103.00	1807.102	85.216	1892.317
51	60.00	105.00	1816.877	245.437	2062.314
52	60.00	107.00	1973.957	245.437	2219.394
53	60.00	109.00	2131.037	245.437	2376.474
54	60.00	111.00	2288.116	245.437	2533.553
55	60.00	113.00	2445.196	245.437	2690.633

"BB-06_Drilled_60in_BOC=-6.3ft_Void=-66.3ft.out"

56 60.00 115.00 2602.276 164.345 2766.620

Drilled Shaft Capacity at User-Defined Settlement (sorted by shaft diameter):

***** Capacity is NOT modified by the strength reduction factors *****

User-Defined Settlement = 0.83%

ID	Diameter (in)	Length (ft)	Skin Fric. (tons)	End Bearing (tons)	Capacity (tons)
1	60.00	5.00	0.000	0.000	0.000
2	60.00	7.00	0.000	0.000	0.000
3	60.00	9.00	0.000	0.000	0.000
4	60.00	11.00	0.000	0.000	0.000
5	60.00	13.00	0.000	0.000	0.000
6	60.00	15.00	0.000	0.000	0.000
7	60.00	17.00	0.000	0.000	0.000
8	60.00	19.00	0.000	0.000	0.000
9	60.00	21.00	0.000	0.000	0.000
10	60.00	23.00	0.000	0.000	0.000
11	60.00	25.00	0.000	0.000	0.000
12	60.00	27.00	0.000	0.000	0.000
13	60.00	29.00	0.000	0.000	0.000
14	60.00	31.00	0.000	0.000	0.000
15	60.00	33.00	0.000	0.000	0.000
16	60.00	35.00	0.000	0.000	0.000
17	60.00	37.00	0.000	0.000	0.000
18	60.00	39.00	0.000	0.000	0.000
19	60.00	41.00	0.000	0.000	0.000
20	60.00	43.00	0.000	0.000	0.000
21	60.00	45.00	0.000	0.000	0.000
22	60.00	47.00	0.000	0.000	0.000
23	60.00	49.00	0.000	0.000	0.000
24	60.00	51.00	0.000	0.000	0.000
25	60.00	53.00	0.000	0.000	0.000
26	60.00	55.00	0.000	0.000	0.000
27	60.00	57.00	0.000	0.000	0.000
28	60.00	59.00	0.000	0.000	0.000
29	60.00	61.00	38.211	1328.740	1366.951
30	60.00	63.00	108.780	636.457	745.237
31	60.00	65.00	172.521	451.991	624.512
32	60.00	67.00	230.407	360.765	591.172
33	60.00	69.00	246.653	39.263	285.916
34	60.00	71.00	250.544	33.560	284.104
35	60.00	73.00	267.134	329.891	597.024
36	60.00	75.00	317.810	37.121	354.931
37	60.00	77.00	323.064	30.996	354.060
38	60.00	79.00	327.808	9.505	337.313
39	60.00	81.00	332.957	37.244	370.201

"BB-06_Drilled_60in_BOC=-6.3ft_Void=-66.3ft.out"

40	60.00	83.00	338.722	42.813	381.536
41	60.00	85.00	344.644	284.080	628.723
42	60.00	87.00	399.976	282.405	682.381
43	60.00	89.00	453.746	279.970	733.716
44	60.00	91.00	503.160	247.580	750.740
45	60.00	93.00	549.960	274.518	824.478
46	60.00	95.00	599.970	48.950	648.920
47	60.00	97.00	608.266	51.133	659.400
48	60.00	99.00	616.352	41.259	657.611
49	60.00	101.00	645.208	269.681	914.889
50	60.00	103.00	684.004	22.177	706.181
51	60.00	105.00	693.528	267.230	960.758
52	60.00	107.00	741.352	263.963	1005.315
53	60.00	109.00	788.224	260.722	1048.946
54	60.00	111.00	834.200	257.521	1091.721
55	60.00	113.00	879.330	254.369	1133.699
56	60.00	115.00	923.658	168.254	1091.912

"BB-06_Drilled_60in_BOC=-6.3ft_Void=-66.3ft.out"

General Information:
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Input file: d Shaft\DS Water\BB-07_Drilled_48in_BOC=-8.8ft_Void=-73.8ft.in
Project number: B-22-074
Job name: Broad Causeway Bridge
Engineer: PV/TC
Units: English

Analysis Information:
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Analysis Type: Drilled Shaft Analysis

Soil Information:
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Boring date: 12/12/23
Boring number: BB-07
Station number: 130+41 Offset: 38 LT

Ground Elevation: -8.80(ft)
Water table Elevation = 2.70(ft)

Cu is calculated using: Direct method.
Rock side-friction is calculated using: McVay's method
Hammer type: Automatic Hammer, Correction factor = 1.24

ID	Depth (ft)	Elevation (ft)	SPT Blows (Blows/ft)	Unit Weight (pcf)	Soil Type
-----	-----	-----	-----	-----	-----
1	0.00	-8.80	N/A	80.00	5- Cavity layer
2	2.00	-10.80	N/A	80.00	5- Cavity layer
3	4.00	-12.80	N/A	127.00	5- Cavity layer
4	6.00	-14.80	N/A	126.00	5- Cavity layer
5	8.00	-16.80	N/A	127.00	5- Cavity layer
6	10.00	-18.80	N/A	124.00	5- Cavity layer
7	12.00	-20.80	N/A	126.00	5- Cavity layer
8	14.00	-22.80	N/A	122.00	5- Cavity layer
9	16.00	-24.80	N/A	121.00	5- Cavity layer
10	20.00	-28.80	N/A	116.00	5- Cavity layer
11	22.50	-31.30	N/A	115.00	5- Cavity layer
12	25.00	-33.80	N/A	115.00	5- Cavity layer
13	27.50	-36.30	N/A	120.00	5- Cavity layer

BB-07_Drilled_48in_BOC=-8.8ft_Void=-73.8ft.out

14	30.00	-38.80	N/A	120.00	5- Cavity layer
15	32.50	-41.30	N/A	115.00	5- Cavity layer
16	35.00	-43.80	N/A	120.00	5- Cavity layer
17	37.50	-46.30	N/A	115.00	5- Cavity layer
18	40.00	-48.80	N/A	115.00	5- Cavity layer
19	42.50	-51.30	N/A	115.00	5- Cavity layer
20	45.00	-53.80	N/A	115.00	5- Cavity layer
21	47.50	-56.30	N/A	92.00	5- Cavity layer
22	50.00	-58.80	N/A	86.00	5- Cavity layer
23	52.50	-61.30	N/A	0.00	5- Cavity layer
24	55.00	-63.80	N/A	135.00	5- Cavity layer
25	57.50	-66.30	N/A	135.00	5- Cavity layer
26	60.00	-68.80	N/A	0.00	5- Cavity layer
27	62.50	-71.30	N/A	135.00	5- Cavity layer
28	65.00	-73.80	N/A	135.00	5- Cavity layer
29	65.00	-73.80	N/A	0.00	1- Plastic Clay
30	65.00	-73.80	N/A	135.00	4- Lime Stone/Very shelly sand
31	67.50	-76.30	N/A	135.00	4- Lime Stone/Very shelly sand
32	70.00	-78.80	N/A	135.00	4- Lime Stone/Very shelly sand
33	72.50	-81.30	N/A	135.00	4- Lime Stone/Very shelly sand
34	72.50	-81.30	N/A	0.00	1- Plastic Clay
35	72.50	-81.30	18.00	120.00	3- Clean sand
36	75.00	-83.80	18.00	120.00	3- Clean sand
37	75.00	-83.80	N/A	0.00	1- Plastic Clay
38	75.00	-83.80	N/A	130.00	4- Lime Stone/Very shelly sand
39	77.50	-86.30	N/A	130.00	4- Lime Stone/Very shelly sand
40	80.00	-88.80	N/A	125.00	4- Lime Stone/Very shelly sand
41	80.00	-88.80	N/A	0.00	1- Plastic Clay
42	80.00	-88.80	6.00	115.00	3- Clean sand
43	82.50	-91.30	6.00	115.00	3- Clean sand
44	85.00	-93.80	7.00	115.00	3- Clean sand
45	85.00	-93.80	N/A	0.00	1- Plastic Clay
46	85.00	-93.80	N/A	135.00	4- Lime Stone/Very shelly sand
47	87.50	-96.30	N/A	135.00	4- Lime Stone/Very shelly sand
48	90.00	-98.80	N/A	135.00	4- Lime Stone/Very shelly sand
49	92.50	-101.30	N/A	135.00	4- Lime Stone/Very shelly sand
50	95.00	-103.80	N/A	135.00	4- Lime Stone/Very shelly sand
51	97.50	-106.30	N/A	125.00	4- Lime Stone/Very shelly sand
52	100.00	-108.80	N/A	135.00	4- Lime Stone/Very shelly sand
53	102.50	-111.30	N/A	135.00	4- Lime Stone/Very shelly sand
54	105.00	-113.80	N/A	135.00	4- Lime Stone/Very shelly sand
55	107.50	-116.30	N/A	135.00	4- Lime Stone/Very shelly sand
56	110.00	-118.80	N/A	125.00	4- Lime Stone/Very shelly sand
57	112.50	-121.30	N/A	130.00	4- Lime Stone/Very shelly sand
58	115.00	-123.80	N/A	135.00	4- Lime Stone/Very shelly sand
59	117.50	-126.30	N/A	135.00	4- Lime Stone/Very shelly sand
60	120.00	-128.80	N/A	135.00	4- Lime Stone/Very shelly sand
61	120.00	-128.80	N/A	0.00	1- Plastic Clay
62	120.00	-128.80	13.00	115.00	3- Clean sand

BB-07_Drilled_48in_BOC=-8.8ft_Void=-73.8ft.out

Top of Rock Socket
elev = -73.8'

Bottom of Canal
elev = -8.8'

63	122.50	-131.30	13.00	115.00	3- Clean sand
64	125.00	-133.80	19.00	120.00	3- Clean sand

ID	Cu-DIR (tsf)	qu (tsf)	qt (tsf)	Em (ksi)	qb (tsf)
1	N/A	N/A	N/A	N/A	N/A
2	N/A	N/A	N/A	N/A	N/A
3	N/A	N/A	N/A	N/A	N/A
4	N/A	N/A	N/A	N/A	N/A
5	N/A	N/A	N/A	N/A	N/A
6	N/A	N/A	N/A	N/A	N/A
7	N/A	N/A	N/A	N/A	N/A
8	N/A	N/A	N/A	N/A	N/A
9	N/A	N/A	N/A	N/A	N/A
10	N/A	N/A	N/A	N/A	N/A
11	N/A	N/A	N/A	N/A	N/A
12	N/A	N/A	N/A	N/A	N/A
13	N/A	N/A	N/A	N/A	N/A
14	N/A	N/A	N/A	N/A	N/A
15	N/A	N/A	N/A	N/A	N/A
16	N/A	N/A	N/A	N/A	N/A
17	N/A	N/A	N/A	N/A	N/A
18	N/A	N/A	N/A	N/A	N/A
19	N/A	N/A	N/A	N/A	N/A
20	N/A	N/A	N/A	N/A	N/A
21	N/A	N/A	N/A	N/A	N/A
22	N/A	N/A	N/A	N/A	N/A
23	N/A	N/A	N/A	N/A	N/A
24	N/A	N/A	N/A	N/A	N/A
25	N/A	N/A	N/A	N/A	N/A
26	N/A	N/A	N/A	N/A	N/A
27	N/A	N/A	N/A	N/A	N/A
28	N/A	N/A	N/A	N/A	N/A
29	0.00	N/A	N/A	N/A	N/A
30	N/A	25.00	4.00	39.93	12.50
31	N/A	25.00	4.00	39.93	12.50
32	N/A	25.00	4.00	39.93	12.50
33	N/A	25.00	4.00	39.93	12.50
34	0.00	N/A	N/A	N/A	N/A
35	N/A	N/A	N/A	N/A	N/A
36	N/A	N/A	N/A	N/A	N/A
37	0.00	N/A	N/A	N/A	N/A
38	N/A	25.00	4.00	39.93	12.50
39	N/A	25.00	4.00	39.93	12.50
40	N/A	16.74	2.68	26.74	8.37
41	0.00	N/A	N/A	N/A	N/A
42	N/A	N/A	N/A	N/A	N/A
43	N/A	N/A	N/A	N/A	N/A

BB-07_Drilled_48in_BOC=-8.8ft_Void=-73.8ft.out

Top of Rock Socket
elev = -73.8'

44	N/A	N/A	N/A	N/A	N/A
45	0.00	N/A	N/A	N/A	N/A
46	N/A	25.00	4.00	39.93	12.50
47	N/A	25.00	4.00	39.93	12.50
48	N/A	25.00	4.00	39.93	12.50
49	N/A	25.00	4.00	39.93	12.50
50	N/A	25.00	4.00	39.93	12.50
51	N/A	19.84	3.17	31.69	9.92
52	N/A	25.00	4.00	39.93	12.50
53	N/A	25.00	4.00	39.93	12.50
54	N/A	25.00	4.00	39.93	12.50
55	N/A	25.00	4.00	39.93	12.50
56	N/A	20.46	3.27	32.68	10.23
57	N/A	25.00	4.00	39.93	12.50
58	N/A	25.00	4.00	39.93	12.50
59	N/A	25.00	4.00	39.93	12.50
60	N/A	25.00	4.00	39.93	12.50
61	0.00	N/A	N/A	N/A	N/A
62	N/A	N/A	N/A	N/A	N/A
63	N/A	N/A	N/A	N/A	N/A
64	N/A	N/A	N/A	N/A	N/A

ID	RQD F.M.	S.R.I.	Rock Recovery
1	N/A	N/A	N/A
2	N/A	N/A	N/A
3	N/A	N/A	N/A
4	N/A	N/A	N/A
5	N/A	N/A	N/A
6	N/A	N/A	N/A
7	N/A	N/A	N/A
8	N/A	N/A	N/A
9	N/A	N/A	N/A
10	N/A	N/A	N/A
11	N/A	N/A	N/A
12	N/A	N/A	N/A
13	N/A	N/A	N/A
14	N/A	N/A	N/A
15	N/A	N/A	N/A
16	N/A	N/A	N/A
17	N/A	N/A	N/A
18	N/A	N/A	N/A
19	N/A	N/A	N/A
20	N/A	N/A	N/A
21	N/A	N/A	N/A
22	N/A	N/A	N/A
23	N/A	N/A	N/A
24	N/A	N/A	N/A

BB-07_Drilled_48in_BOC=-8.8ft_Void=-73.8ft.out

25	N/A	N/A	N/A
26	N/A	N/A	N/A
27	N/A	N/A	N/A
28	N/A	N/A	N/A
29	N/A	N/A	N/A
30	0.50	ROUGH	1.000
31	0.50	ROUGH	1.000
32	0.50	ROUGH	1.000
33	0.50	ROUGH	1.000
34	N/A	N/A	N/A
35	N/A	N/A	N/A
36	N/A	N/A	N/A
37	N/A	N/A	N/A
38	0.50	ROUGH	1.000
39	0.50	ROUGH	1.000
40	0.50	ROUGH	1.000
41	N/A	N/A	N/A
42	N/A	N/A	N/A
43	N/A	N/A	N/A
44	N/A	N/A	N/A
45	N/A	N/A	N/A
46	0.50	ROUGH	1.000
47	0.50	ROUGH	1.000
48	0.50	ROUGH	1.000
49	0.50	ROUGH	1.000
50	0.50	ROUGH	1.000
51	0.50	ROUGH	1.000
52	0.50	ROUGH	1.000
53	0.50	ROUGH	1.000
54	0.50	ROUGH	1.000
55	0.50	ROUGH	1.000
56	0.50	ROUGH	1.000
57	0.50	ROUGH	1.000
58	0.50	ROUGH	1.000
59	0.50	ROUGH	1.000
60	0.50	ROUGH	1.000
61	N/A	N/A	N/A
62	N/A	N/A	N/A
63	N/A	N/A	N/A
64	N/A	N/A	N/A

Drilled Shaft Data:

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Unit weight of concrete = 145.00(pcf), Concrete Slump = 6.00(in)
Modulus of Elasticity of concrete = 3987.00(ksi)

Shaft Geometry:

BB-07_Drilled_48in_BOC=-8.8ft_Void=-73.8ft.out

ID	Length (ft)	Tip Elev. (ft)	Case Len. (ft)	Diameter (in)	Base Diam. (in)	Bell Len. (ft)
1	5.00	-13.80	0.00	48.00	48.00	0.00
2	7.00	-15.80	0.00	48.00	48.00	0.00
3	9.00	-17.80	0.00	48.00	48.00	0.00
4	11.00	-19.80	0.00	48.00	48.00	0.00
5	13.00	-21.80	0.00	48.00	48.00	0.00
6	15.00	-23.80	0.00	48.00	48.00	0.00
7	17.00	-25.80	0.00	48.00	48.00	0.00
8	19.00	-27.80	0.00	48.00	48.00	0.00
9	21.00	-29.80	0.00	48.00	48.00	0.00
10	23.00	-31.80	0.00	48.00	48.00	0.00
11	25.00	-33.80	0.00	48.00	48.00	0.00
12	27.00	-35.80	0.00	48.00	48.00	0.00
13	29.00	-37.80	0.00	48.00	48.00	0.00
14	31.00	-39.80	0.00	48.00	48.00	0.00
15	33.00	-41.80	0.00	48.00	48.00	0.00
16	35.00	-43.80	0.00	48.00	48.00	0.00
17	37.00	-45.80	0.00	48.00	48.00	0.00
18	39.00	-47.80	0.00	48.00	48.00	0.00
19	41.00	-49.80	0.00	48.00	48.00	0.00
20	43.00	-51.80	0.00	48.00	48.00	0.00
21	45.00	-53.80	0.00	48.00	48.00	0.00
22	47.00	-55.80	0.00	48.00	48.00	0.00
23	49.00	-57.80	0.00	48.00	48.00	0.00
24	51.00	-59.80	0.00	48.00	48.00	0.00
25	53.00	-61.80	0.00	48.00	48.00	0.00
26	55.00	-63.80	0.00	48.00	48.00	0.00
27	57.00	-65.80	0.00	48.00	48.00	0.00
28	59.00	-67.80	0.00	48.00	48.00	0.00
29	61.00	-69.80	0.00	48.00	48.00	0.00
30	63.00	-71.80	0.00	48.00	48.00	0.00
31	65.00	-73.80	0.00	48.00	48.00	0.00
32	67.00	-75.80	0.00	48.00	48.00	0.00
33	69.00	-77.80	0.00	48.00	48.00	0.00
34	71.00	-79.80	0.00	48.00	48.00	0.00
35	73.00	-81.80	0.00	48.00	48.00	0.00
36	75.00	-83.80	0.00	48.00	48.00	0.00
37	77.00	-85.80	0.00	48.00	48.00	0.00
38	79.00	-87.80	0.00	48.00	48.00	0.00
39	81.00	-89.80	0.00	48.00	48.00	0.00
40	83.00	-91.80	0.00	48.00	48.00	0.00
41	85.00	-93.80	0.00	48.00	48.00	0.00
42	87.00	-95.80	0.00	48.00	48.00	0.00
43	89.00	-97.80	0.00	48.00	48.00	0.00
44	91.00	-99.80	0.00	48.00	48.00	0.00
45	93.00	-101.80	0.00	48.00	48.00	0.00
46	95.00	-103.80	0.00	48.00	48.00	0.00

BB-07_Drilled_48in_BOC=-8.8ft_Void=-73.8ft.out

47	97.00	-105.80	0.00	48.00	48.00	0.00
48	99.00	-107.80	0.00	48.00	48.00	0.00
49	101.00	-109.80	0.00	48.00	48.00	0.00
50	103.00	-111.80	0.00	48.00	48.00	0.00
51	105.00	-113.80	0.00	48.00	48.00	0.00
52	107.00	-115.80	0.00	48.00	48.00	0.00
53	109.00	-117.80	0.00	48.00	48.00	0.00
54	111.00	-119.80	0.00	48.00	48.00	0.00
55	113.00	-121.80	0.00	48.00	48.00	0.00
56	115.00	-123.80	0.00	48.00	48.00	0.00

Drilled Shaft Capacity (sorted by shaft diameter):

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Strength reduction factors: Skin-friction = 1.00, End-bearing = 1.00

ID	Diameter (in)	Length (ft)	Skin Fric. (tons)	End Bearing (tons)	Capacity (tons)

1	48.00	5.00	0.000	0.000	0.000
2	48.00	7.00	0.000	0.000	0.000
3	48.00	9.00	0.000	0.000	0.000
4	48.00	11.00	0.000	0.000	0.000
5	48.00	13.00	0.000	0.000	0.000
6	48.00	15.00	0.000	0.000	0.000
7	48.00	17.00	0.000	0.000	0.000
8	48.00	19.00	0.000	0.000	0.000
9	48.00	21.00	0.000	0.000	0.000
10	48.00	23.00	0.000	0.000	0.000
11	48.00	25.00	0.000	0.000	0.000
12	48.00	27.00	0.000	0.000	0.000
13	48.00	29.00	0.000	0.000	0.000
14	48.00	31.00	0.000	0.000	0.000
15	48.00	33.00	0.000	0.000	0.000
16	48.00	35.00	0.000	0.000	0.000
17	48.00	37.00	0.000	0.000	0.000
18	48.00	39.00	0.000	0.000	0.000
19	48.00	41.00	0.000	0.000	0.000
20	48.00	43.00	0.000	0.000	0.000
21	48.00	45.00	0.000	0.000	0.000
22	48.00	47.00	0.000	0.000	0.000
23	48.00	49.00	0.000	0.000	0.000
24	48.00	51.00	0.000	0.000	0.000
25	48.00	53.00	0.000	0.000	0.000
26	48.00	55.00	0.000	0.000	0.000
27	48.00	57.00	0.000	0.000	0.000
28	48.00	59.00	0.000	0.000	0.000
29	48.00	61.00	0.000	0.000	0.000
30	48.00	63.00	0.000	0.000	0.000

BB-07_Drilled_48in_BOC=-8.8ft_Void=-73.8ft.out

31	48.00	65.00	0.000	157.080	157.080
32	48.00	67.00	125.664	157.080	282.743
33	48.00	69.00	251.327	157.080	408.407
34	48.00	71.00	376.991	157.080	534.071
35	48.00	73.00	471.851	148.582	620.433
36	48.00	75.00	474.538	157.080	631.617
37	48.00	77.00	600.201	157.080	757.281
38	48.00	79.00	725.865	157.080	882.945
39	48.00	81.00	790.351	57.557	847.908
40	48.00	83.00	793.906	58.979	852.885
41	48.00	85.00	797.792	157.080	954.872
42	48.00	87.00	923.456	157.080	1080.535
43	48.00	89.00	1049.119	157.080	1206.199
44	48.00	91.00	1174.783	157.080	1331.863
45	48.00	93.00	1300.447	157.080	1457.526
46	48.00	95.00	1426.110	157.080	1583.190
47	48.00	97.00	1551.774	157.080	1708.854
48	48.00	99.00	1657.980	124.658	1782.639
49	48.00	101.00	1770.672	157.080	1927.752
50	48.00	103.00	1896.336	157.080	2053.416
51	48.00	105.00	2022.000	157.080	2179.080
52	48.00	107.00	2147.664	157.080	2304.743
53	48.00	109.00	2273.327	157.080	2430.407
54	48.00	111.00	2387.584	128.554	2516.138
55	48.00	113.00	2496.137	157.080	2653.217
56	48.00	115.00	2621.801	157.080	2778.880

Drilled Shaft Capacity at User-Defined Settlement (sorted by shaft diameter):

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**** Capacity is NOT modified by the strength reduction factors ****

User-Defined Settlement = 1.04%

ID	Diameter (in)	Length (ft)	Skin Fric. (tons)	End Bearing (tons)	Capacity (tons)

1	48.00	5.00	0.000	0.000	0.000
2	48.00	7.00	0.000	0.000	0.000
3	48.00	9.00	0.000	0.000	0.000
4	48.00	11.00	0.000	0.000	0.000
5	48.00	13.00	0.000	0.000	0.000
6	48.00	15.00	0.000	0.000	0.000
7	48.00	17.00	0.000	0.000	0.000
8	48.00	19.00	0.000	0.000	0.000
9	48.00	21.00	0.000	0.000	0.000
10	48.00	23.00	0.000	0.000	0.000
11	48.00	25.00	0.000	0.000	0.000

BB-07_Drilled_48in_BOC=-8.8ft_Void=-73.8ft.out

12	48.00	27.00	0.000	0.000	0.000
13	48.00	29.00	0.000	0.000	0.000
14	48.00	31.00	0.000	0.000	0.000
15	48.00	33.00	0.000	0.000	0.000
16	48.00	35.00	0.000	0.000	0.000
17	48.00	37.00	0.000	0.000	0.000
18	48.00	39.00	0.000	0.000	0.000
19	48.00	41.00	0.000	0.000	0.000
20	48.00	43.00	0.000	0.000	0.000
21	48.00	45.00	0.000	0.000	0.000
22	48.00	47.00	0.000	0.000	0.000
23	48.00	49.00	0.000	0.000	0.000
24	48.00	51.00	0.000	0.000	0.000
25	48.00	53.00	0.000	0.000	0.000
26	48.00	55.00	0.000	0.000	0.000
27	48.00	57.00	0.000	0.000	0.000
28	48.00	59.00	0.000	0.000	0.000
29	48.00	61.00	0.000	0.000	0.000
30	48.00	63.00	0.000	0.000	0.000
31	48.00	65.00	0.000	703.348	703.348
32	48.00	67.00	59.576	536.030	595.606
33	48.00	69.00	113.300	336.899	450.198
34	48.00	71.00	162.017	256.755	418.771
35	48.00	73.00	196.288	47.274	243.561
36	48.00	75.00	198.916	221.100	420.016
37	48.00	77.00	244.940	210.593	455.533
38	48.00	79.00	290.744	208.300	499.044
39	48.00	81.00	314.775	18.313	333.088
40	48.00	83.00	318.252	18.765	337.017
41	48.00	85.00	322.053	206.967	529.020
42	48.00	87.00	366.079	204.104	570.183
43	48.00	89.00	409.003	201.107	610.110
44	48.00	91.00	450.915	198.070	648.984
45	48.00	93.00	491.887	195.043	686.930
46	48.00	95.00	531.985	192.057	724.042
47	48.00	97.00	571.264	189.127	760.391
48	48.00	99.00	603.519	148.180	751.699
49	48.00	101.00	637.309	184.212	821.521
50	48.00	103.00	674.580	181.464	856.044
51	48.00	105.00	711.191	178.788	889.979
52	48.00	107.00	747.177	176.180	923.357
53	48.00	109.00	782.567	173.639	956.206
54	48.00	111.00	814.079	140.267	954.346
55	48.00	113.00	843.515	169.316	1012.831
56	48.00	115.00	877.395	166.946	1044.341

BB-07_Drilled_48in_BOC=-8.8ft_Void=-73.8ft.out

General Information:
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Input file: d Shaft\DS Water\BB-07_Drilled_60in_BOC=-8.8ft_Void=-73.8ft.in
Project number: B-22-074
Job name: Broad Causeway Bridge
Engineer: PV/TC
Units: English

Analysis Information:
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Analysis Type: Drilled Shaft Analysis

Soil Information:
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Boring date: 12/12/23
Boring number: BB-07
Station number: 130+41 Offset: 38 LT

Ground Elevation: -8.80(ft)
Water table Elevation = 2.70(ft)

Cu is calculated using: Direct method.
Rock side-friction is calculated using: McVay's method
Hammer type: Automatic Hammer, Correction factor = 1.24

ID	Depth (ft)	Elevation (ft)	SPT Blows (Blows/ft)	Unit Weight (pcf)	Soil Type
1	0.00	-8.80	N/A	80.00	5- Cavity layer
2	2.00	-10.80	N/A	80.00	5- Cavity layer
3	4.00	-12.80	N/A	127.00	5- Cavity layer
4	6.00	-14.80	N/A	126.00	5- Cavity layer
5	8.00	-16.80	N/A	127.00	5- Cavity layer
6	10.00	-18.80	N/A	124.00	5- Cavity layer
7	12.00	-20.80	N/A	126.00	5- Cavity layer
8	14.00	-22.80	N/A	122.00	5- Cavity layer
9	16.00	-24.80	N/A	121.00	5- Cavity layer
10	20.00	-28.80	N/A	116.00	5- Cavity layer
11	22.50	-31.30	N/A	115.00	5- Cavity layer
12	25.00	-33.80	N/A	115.00	5- Cavity layer
13	27.50	-36.30	N/A	120.00	5- Cavity layer
14	30.00	-38.80	N/A	120.00	5- Cavity layer
15	32.50	-41.30	N/A	115.00	5- Cavity layer
16	35.00	-43.80	N/A	120.00	5- Cavity layer

"BB-07_Drilled_60in_BOC=-8.8ft_Void=-73.8ft.out"

17	37.50	-46.30	N/A	115.00	5- Cavity layer
18	40.00	-48.80	N/A	115.00	5- Cavity layer
19	42.50	-51.30	N/A	115.00	5- Cavity layer
20	45.00	-53.80	N/A	115.00	5- Cavity layer
21	47.50	-56.30	N/A	92.00	5- Cavity layer
22	50.00	-58.80	N/A	86.00	5- Cavity layer
23	52.50	-61.30	N/A	0.00	5- Cavity layer
24	55.00	-63.80	N/A	135.00	5- Cavity layer
25	57.50	-66.30	N/A	135.00	5- Cavity layer
26	60.00	-68.80	N/A	0.00	5- Cavity layer
27	62.50	-71.30	N/A	135.00	5- Cavity layer
28	65.00	-73.80	N/A	135.00	5- Cavity layer
29	65.00	-73.80	N/A	0.00	1- Plastic Clay
30	65.00	-73.80	N/A	135.00	4- Lime Stone/Very shelly sand
31	67.50	-76.30	N/A	135.00	4- Lime Stone/Very shelly sand
32	70.00	-78.80	N/A	135.00	4- Lime Stone/Very shelly sand
33	72.50	-81.30	N/A	135.00	4- Lime Stone/Very shelly sand
34	72.50	-81.30	N/A	0.00	1- Plastic Clay
35	72.50	-81.30	18.00	120.00	3- Clean sand
36	75.00	-83.80	18.00	120.00	3- Clean sand
37	75.00	-83.80	N/A	0.00	1- Plastic Clay
38	75.00	-83.80	N/A	130.00	4- Lime Stone/Very shelly sand
39	77.50	-86.30	N/A	130.00	4- Lime Stone/Very shelly sand
40	80.00	-88.80	N/A	125.00	4- Lime Stone/Very shelly sand
41	80.00	-88.80	N/A	0.00	1- Plastic Clay
42	80.00	-88.80	6.00	115.00	3- Clean sand
43	82.50	-91.30	6.00	115.00	3- Clean sand
44	85.00	-93.80	7.00	115.00	3- Clean sand
45	85.00	-93.80	N/A	0.00	1- Plastic Clay
46	85.00	-93.80	N/A	135.00	4- Lime Stone/Very shelly sand
47	87.50	-96.30	N/A	135.00	4- Lime Stone/Very shelly sand
48	90.00	-98.80	N/A	135.00	4- Lime Stone/Very shelly sand
49	92.50	-101.30	N/A	135.00	4- Lime Stone/Very shelly sand
50	95.00	-103.80	N/A	135.00	4- Lime Stone/Very shelly sand
51	97.50	-106.30	N/A	125.00	4- Lime Stone/Very shelly sand
52	100.00	-108.80	N/A	135.00	4- Lime Stone/Very shelly sand
53	102.50	-111.30	N/A	135.00	4- Lime Stone/Very shelly sand
54	105.00	-113.80	N/A	135.00	4- Lime Stone/Very shelly sand
55	107.50	-116.30	N/A	135.00	4- Lime Stone/Very shelly sand
56	110.00	-118.80	N/A	125.00	4- Lime Stone/Very shelly sand
57	112.50	-121.30	N/A	130.00	4- Lime Stone/Very shelly sand
58	115.00	-123.80	N/A	135.00	4- Lime Stone/Very shelly sand
59	117.50	-126.30	N/A	135.00	4- Lime Stone/Very shelly sand
60	120.00	-128.80	N/A	135.00	4- Lime Stone/Very shelly sand
61	120.00	-128.80	N/A	0.00	1- Plastic Clay
62	120.00	-128.80	13.00	115.00	3- Clean sand
63	122.50	-131.30	13.00	115.00	3- Clean sand
64	125.00	-133.80	19.00	120.00	3- Clean sand

ID	Cu-DIR (tsf)	qu (tsf)	qt (tsf)	Em (ksi)	qb (tsf)

"BB-07_Drilled_60in_BOC=-8.8ft_Void=-73.8ft.out"

1	N/A	N/A	N/A	N/A	N/A
2	N/A	N/A	N/A	N/A	N/A
3	N/A	N/A	N/A	N/A	N/A
4	N/A	N/A	N/A	N/A	N/A
5	N/A	N/A	N/A	N/A	N/A
6	N/A	N/A	N/A	N/A	N/A
7	N/A	N/A	N/A	N/A	N/A
8	N/A	N/A	N/A	N/A	N/A
9	N/A	N/A	N/A	N/A	N/A
10	N/A	N/A	N/A	N/A	N/A
11	N/A	N/A	N/A	N/A	N/A
12	N/A	N/A	N/A	N/A	N/A
13	N/A	N/A	N/A	N/A	N/A
14	N/A	N/A	N/A	N/A	N/A
15	N/A	N/A	N/A	N/A	N/A
16	N/A	N/A	N/A	N/A	N/A
17	N/A	N/A	N/A	N/A	N/A
18	N/A	N/A	N/A	N/A	N/A
19	N/A	N/A	N/A	N/A	N/A
20	N/A	N/A	N/A	N/A	N/A
21	N/A	N/A	N/A	N/A	N/A
22	N/A	N/A	N/A	N/A	N/A
23	N/A	N/A	N/A	N/A	N/A
24	N/A	N/A	N/A	N/A	N/A
25	N/A	N/A	N/A	N/A	N/A
26	N/A	N/A	N/A	N/A	N/A
27	N/A	N/A	N/A	N/A	N/A
28	N/A	N/A	N/A	N/A	N/A
29	0.00	N/A	N/A	N/A	N/A
30	N/A	25.00	4.00	39.93	12.50
31	N/A	25.00	4.00	39.93	12.50
32	N/A	25.00	4.00	39.93	12.50
33	N/A	25.00	4.00	39.93	12.50
34	0.00	N/A	N/A	N/A	N/A
35	N/A	N/A	N/A	N/A	N/A
36	N/A	N/A	N/A	N/A	N/A
37	0.00	N/A	N/A	N/A	N/A
38	N/A	25.00	4.00	39.93	12.50
39	N/A	25.00	4.00	39.93	12.50
40	N/A	16.74	2.68	26.74	8.37
41	0.00	N/A	N/A	N/A	N/A
42	N/A	N/A	N/A	N/A	N/A
43	N/A	N/A	N/A	N/A	N/A
44	N/A	N/A	N/A	N/A	N/A
45	0.00	N/A	N/A	N/A	N/A
46	N/A	25.00	4.00	39.93	12.50
47	N/A	25.00	4.00	39.93	12.50
48	N/A	25.00	4.00	39.93	12.50
49	N/A	25.00	4.00	39.93	12.50
50	N/A	25.00	4.00	39.93	12.50
51	N/A	19.84	3.17	31.69	9.92
52	N/A	25.00	4.00	39.93	12.50

"BB-07_Drilled_60in_BOC=-8.8ft_Void=-73.8ft.out"

Top of Rock Socket
elev = -73.8'

53	N/A	25.00	4.00	39.93	12.50
54	N/A	25.00	4.00	39.93	12.50
55	N/A	25.00	4.00	39.93	12.50
56	N/A	20.46	3.27	32.68	10.23
57	N/A	25.00	4.00	39.93	12.50
58	N/A	25.00	4.00	39.93	12.50
59	N/A	25.00	4.00	39.93	12.50
60	N/A	25.00	4.00	39.93	12.50
61	0.00	N/A	N/A	N/A	N/A
62	N/A	N/A	N/A	N/A	N/A
63	N/A	N/A	N/A	N/A	N/A
64	N/A	N/A	N/A	N/A	N/A

ID RQD F.M. S.R.I. Rock Recovery

1	N/A	N/A	N/A
2	N/A	N/A	N/A
3	N/A	N/A	N/A
4	N/A	N/A	N/A
5	N/A	N/A	N/A
6	N/A	N/A	N/A
7	N/A	N/A	N/A
8	N/A	N/A	N/A
9	N/A	N/A	N/A
10	N/A	N/A	N/A
11	N/A	N/A	N/A
12	N/A	N/A	N/A
13	N/A	N/A	N/A
14	N/A	N/A	N/A
15	N/A	N/A	N/A
16	N/A	N/A	N/A
17	N/A	N/A	N/A
18	N/A	N/A	N/A
19	N/A	N/A	N/A
20	N/A	N/A	N/A
21	N/A	N/A	N/A
22	N/A	N/A	N/A
23	N/A	N/A	N/A
24	N/A	N/A	N/A
25	N/A	N/A	N/A
26	N/A	N/A	N/A
27	N/A	N/A	N/A
28	N/A	N/A	N/A
29	N/A	N/A	N/A
30	0.50	ROUGH	1.000
31	0.50	ROUGH	1.000
32	0.50	ROUGH	1.000
33	0.50	ROUGH	1.000
34	N/A	N/A	N/A
35	N/A	N/A	N/A
36	N/A	N/A	N/A

"BB-07_Drilled_60in_BOC=-8.8ft_Void=-73.8ft.out"

37	N/A	N/A	N/A
38	0.50	ROUGH	1.000
39	0.50	ROUGH	1.000
40	0.50	ROUGH	1.000
41	N/A	N/A	N/A
42	N/A	N/A	N/A
43	N/A	N/A	N/A
44	N/A	N/A	N/A
45	N/A	N/A	N/A
46	0.50	ROUGH	1.000
47	0.50	ROUGH	1.000
48	0.50	ROUGH	1.000
49	0.50	ROUGH	1.000
50	0.50	ROUGH	1.000
51	0.50	ROUGH	1.000
52	0.50	ROUGH	1.000
53	0.50	ROUGH	1.000
54	0.50	ROUGH	1.000
55	0.50	ROUGH	1.000
56	0.50	ROUGH	1.000
57	0.50	ROUGH	1.000
58	0.50	ROUGH	1.000
59	0.50	ROUGH	1.000
60	0.50	ROUGH	1.000
61	N/A	N/A	N/A
62	N/A	N/A	N/A
63	N/A	N/A	N/A
64	N/A	N/A	N/A

Drilled Shaft Data:

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Unit weight of concrete = 145.00(pcf), Concrete Slump = 6.00(in)
Modulus of Elasticity of concrete = 3987.00(ksi)

Shaft Geometry:

ID	Length (ft)	Tip Elev. (ft)	Case Len. (ft)	Diameter (in)	Base Diam. (in)	Bell Len. (ft)
1	5.00	-13.80	0.00	60.00	60.00	0.00
2	7.00	-15.80	0.00	60.00	60.00	0.00
3	9.00	-17.80	0.00	60.00	60.00	0.00
4	11.00	-19.80	0.00	60.00	60.00	0.00
5	13.00	-21.80	0.00	60.00	60.00	0.00
6	15.00	-23.80	0.00	60.00	60.00	0.00
7	17.00	-25.80	0.00	60.00	60.00	0.00
8	19.00	-27.80	0.00	60.00	60.00	0.00
9	21.00	-29.80	0.00	60.00	60.00	0.00
10	23.00	-31.80	0.00	60.00	60.00	0.00
11	25.00	-33.80	0.00	60.00	60.00	0.00
12	27.00	-35.80	0.00	60.00	60.00	0.00

"BB-07_Drilled_60in_BOC=-8.8ft_Void=-73.8ft.out"

13	29.00	-37.80	0.00	60.00	60.00	0.00
14	31.00	-39.80	0.00	60.00	60.00	0.00
15	33.00	-41.80	0.00	60.00	60.00	0.00
16	35.00	-43.80	0.00	60.00	60.00	0.00
17	37.00	-45.80	0.00	60.00	60.00	0.00
18	39.00	-47.80	0.00	60.00	60.00	0.00
19	41.00	-49.80	0.00	60.00	60.00	0.00
20	43.00	-51.80	0.00	60.00	60.00	0.00
21	45.00	-53.80	0.00	60.00	60.00	0.00
22	47.00	-55.80	0.00	60.00	60.00	0.00
23	49.00	-57.80	0.00	60.00	60.00	0.00
24	51.00	-59.80	0.00	60.00	60.00	0.00
25	53.00	-61.80	0.00	60.00	60.00	0.00
26	55.00	-63.80	0.00	60.00	60.00	0.00
27	57.00	-65.80	0.00	60.00	60.00	0.00
28	59.00	-67.80	0.00	60.00	60.00	0.00
29	61.00	-69.80	0.00	60.00	60.00	0.00
30	63.00	-71.80	0.00	60.00	60.00	0.00
31	65.00	-73.80	0.00	60.00	60.00	0.00
32	67.00	-75.80	0.00	60.00	60.00	0.00
33	69.00	-77.80	0.00	60.00	60.00	0.00
34	71.00	-79.80	0.00	60.00	60.00	0.00
35	73.00	-81.80	0.00	60.00	60.00	0.00
36	75.00	-83.80	0.00	60.00	60.00	0.00
37	77.00	-85.80	0.00	60.00	60.00	0.00
38	79.00	-87.80	0.00	60.00	60.00	0.00
39	81.00	-89.80	0.00	60.00	60.00	0.00
40	83.00	-91.80	0.00	60.00	60.00	0.00
41	85.00	-93.80	0.00	60.00	60.00	0.00
42	87.00	-95.80	0.00	60.00	60.00	0.00
43	89.00	-97.80	0.00	60.00	60.00	0.00
44	91.00	-99.80	0.00	60.00	60.00	0.00
45	93.00	-101.80	0.00	60.00	60.00	0.00
46	95.00	-103.80	0.00	60.00	60.00	0.00
47	97.00	-105.80	0.00	60.00	60.00	0.00
48	99.00	-107.80	0.00	60.00	60.00	0.00
49	101.00	-109.80	0.00	60.00	60.00	0.00
50	103.00	-111.80	0.00	60.00	60.00	0.00
51	105.00	-113.80	0.00	60.00	60.00	0.00
52	107.00	-115.80	0.00	60.00	60.00	0.00
53	109.00	-117.80	0.00	60.00	60.00	0.00
54	111.00	-119.80	0.00	60.00	60.00	0.00
55	113.00	-121.80	0.00	60.00	60.00	0.00
56	115.00	-123.80	0.00	60.00	60.00	0.00

Drilled Shaft Capacity (sorted by shaft diameter):

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Strength reduction factors: Skin-friction = 1.00, End-bearing = 1.00

ID	Diameter (in)	Length (ft)	Skin Fric. (tons)	End Bearing (tons)	Capacity (tons)

"BB-07_Drilled_60in_BOC=-8.8ft_Void=-73.8ft.out"

1	60.00	5.00	0.000	0.000	0.000
2	60.00	7.00	0.000	0.000	0.000
3	60.00	9.00	0.000	0.000	0.000
4	60.00	11.00	0.000	0.000	0.000
5	60.00	13.00	0.000	0.000	0.000
6	60.00	15.00	0.000	0.000	0.000
7	60.00	17.00	0.000	0.000	0.000
8	60.00	19.00	0.000	0.000	0.000
9	60.00	21.00	0.000	0.000	0.000
10	60.00	23.00	0.000	0.000	0.000
11	60.00	25.00	0.000	0.000	0.000
12	60.00	27.00	0.000	0.000	0.000
13	60.00	29.00	0.000	0.000	0.000
14	60.00	31.00	0.000	0.000	0.000
15	60.00	33.00	0.000	0.000	0.000
16	60.00	35.00	0.000	0.000	0.000
17	60.00	37.00	0.000	0.000	0.000
18	60.00	39.00	0.000	0.000	0.000
19	60.00	41.00	0.000	0.000	0.000
20	60.00	43.00	0.000	0.000	0.000
21	60.00	45.00	0.000	0.000	0.000
22	60.00	47.00	0.000	0.000	0.000
23	60.00	49.00	0.000	0.000	0.000
24	60.00	51.00	0.000	0.000	0.000
25	60.00	53.00	0.000	0.000	0.000
26	60.00	55.00	0.000	0.000	0.000
27	60.00	57.00	0.000	0.000	0.000
28	60.00	59.00	0.000	0.000	0.000
29	60.00	61.00	0.000	0.000	0.000
30	60.00	63.00	0.000	0.000	0.000
31	60.00	65.00	0.000	245.437	245.437
32	60.00	67.00	157.080	245.437	402.517
33	60.00	69.00	314.159	245.437	559.596
34	60.00	71.00	471.239	245.437	716.676
35	60.00	73.00	589.814	182.560	772.374
36	60.00	75.00	593.172	245.437	838.609
37	60.00	77.00	750.252	245.437	995.689
38	60.00	79.00	907.331	245.437	1152.768
39	60.00	81.00	987.938	74.944	1062.883
40	60.00	83.00	992.383	76.796	1069.178
41	60.00	85.00	997.240	245.437	1242.677
42	60.00	87.00	1154.320	245.437	1399.756
43	60.00	89.00	1311.399	245.437	1556.836
44	60.00	91.00	1468.479	245.437	1713.916
45	60.00	93.00	1625.558	245.437	1870.995
46	60.00	95.00	1782.638	245.437	2028.075
47	60.00	97.00	1939.718	245.437	2185.155
48	60.00	99.00	2072.475	194.779	2267.254
49	60.00	101.00	2213.341	245.437	2458.778
50	60.00	103.00	2370.420	245.437	2615.857
51	60.00	105.00	2527.500	245.437	2772.937

"BB-07_Drilled_60in_BOC=-8.8ft_Void=-73.8ft.out"

52	60.00	107.00	2684.579	245.437	2930.016
53	60.00	109.00	2841.659	245.437	3087.096
54	60.00	111.00	2984.480	200.866	3185.345
55	60.00	113.00	3120.171	245.437	3365.608
56	60.00	115.00	3277.251	245.437	3522.688

Drilled Shaft Capacity at User-Defined Settlement (sorted by shaft diameter):

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**** Capacity is NOT modified by the strength reduction factors ****

User-Defined Settlement = 0.83%

ID	Diameter (in)	Length (ft)	Skin Fric. (tons)	End Bearing (tons)	Capacity (tons)
1	60.00	5.00	0.000	0.000	0.000
2	60.00	7.00	0.000	0.000	0.000
3	60.00	9.00	0.000	0.000	0.000
4	60.00	11.00	0.000	0.000	0.000
5	60.00	13.00	0.000	0.000	0.000
6	60.00	15.00	0.000	0.000	0.000
7	60.00	17.00	0.000	0.000	0.000
8	60.00	19.00	0.000	0.000	0.000
9	60.00	21.00	0.000	0.000	0.000
10	60.00	23.00	0.000	0.000	0.000
11	60.00	25.00	0.000	0.000	0.000
12	60.00	27.00	0.000	0.000	0.000
13	60.00	29.00	0.000	0.000	0.000
14	60.00	31.00	0.000	0.000	0.000
15	60.00	33.00	0.000	0.000	0.000
16	60.00	35.00	0.000	0.000	0.000
17	60.00	37.00	0.000	0.000	0.000
18	60.00	39.00	0.000	0.000	0.000
19	60.00	41.00	0.000	0.000	0.000
20	60.00	43.00	0.000	0.000	0.000
21	60.00	45.00	0.000	0.000	0.000
22	60.00	47.00	0.000	0.000	0.000
23	60.00	49.00	0.000	0.000	0.000
24	60.00	51.00	0.000	0.000	0.000
25	60.00	53.00	0.000	0.000	0.000
26	60.00	55.00	0.000	0.000	0.000
27	60.00	57.00	0.000	0.000	0.000
28	60.00	59.00	0.000	0.000	0.000
29	60.00	61.00	0.000	0.000	0.000
30	60.00	63.00	0.000	0.000	0.000
31	60.00	65.00	0.000	945.913	945.913
32	60.00	67.00	74.467	837.143	911.611
33	60.00	69.00	141.614	526.150	667.765
34	60.00	71.00	202.500	400.985	603.486
35	60.00	73.00	245.327	47.665	292.992

"BB-07_Drilled_60in_BOC=-8.8ft_Void=-73.8ft.out"

36	60.00	75.00	248.600	345.302	593.902
37	60.00	77.00	300.571	294.724	595.295
38	60.00	79.00	354.462	283.598	638.060
39	60.00	81.00	383.685	19.567	403.252
40	60.00	83.00	388.016	20.051	408.067
41	60.00	85.00	392.749	282.533	675.282
42	60.00	87.00	446.163	279.963	726.126
43	60.00	89.00	498.192	277.028	775.220
44	60.00	91.00	548.951	273.896	822.847
45	60.00	93.00	598.538	270.667	869.204
46	60.00	95.00	647.036	267.400	914.436
47	60.00	97.00	694.516	264.135	958.651
48	60.00	99.00	733.447	207.465	940.912
49	60.00	101.00	774.229	258.563	1032.792
50	60.00	103.00	819.223	255.395	1074.618
51	60.00	105.00	863.405	252.283	1115.688
52	60.00	107.00	906.818	249.229	1156.047
53	60.00	109.00	949.499	246.236	1195.735
54	60.00	111.00	987.467	199.343	1186.810
55	60.00	113.00	1022.912	241.111	1264.024
56	60.00	115.00	1063.743	238.284	1302.026

"BB-07_Drilled_60in_BOC=-8.8ft_Void=-73.8ft.out"

General Information:
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Input file: d Shaft\DS Water\BB-08_Drilled_48in_BOC=-8.6ft_Void=-73.8ft.in
Project number: B-22-074
Job name: Broad Causeway Bridge
Engineer: PV/TC
Units: English

Analysis Information:
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Analysis Type: Drilled Shaft Analysis

Soil Information:
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Boring date: 12/19/23
Boring number: BB-08
Station number: 132+49 Offset: 39 RT

Ground Elevation: -8.60(ft)
Water table Elevation = 1.70(ft)

Cu is calculated using: Direct method.
Rock side-friction is calculated using: McVay's method
Hammer type: Automatic Hammer, Correction factor = 1.24

ID	Depth (ft)	Elevation (ft)	SPT Blows (Blows/ft)	Unit Weight (pcf)	Soil Type
1	0.00	-8.60	N/A	123.00	5- Cavity layer
2	2.00	-10.60	N/A	123.00	5- Cavity layer
3	4.00	-12.60	N/A	109.00	5- Cavity layer
4	6.00	-14.60	N/A	127.00	5- Cavity layer
5	8.00	-16.60	N/A	126.00	5- Cavity layer
6	10.00	-18.60	N/A	133.00	5- Cavity layer
7	12.00	-20.60	N/A	133.00	5- Cavity layer
8	14.00	-22.60	N/A	133.00	5- Cavity layer
9	16.00	-24.60	N/A	121.00	5- Cavity layer
10	20.00	-28.60	N/A	119.00	5- Cavity layer
11	22.50	-31.10	N/A	115.00	5- Cavity layer
12	25.00	-33.60	N/A	115.00	5- Cavity layer
13	27.50	-36.10	N/A	120.00	5- Cavity layer

BB-08_Drilled_48in_BOC=-8.6ft_Void=-73.8ft.out

14	30.00	-38.60	N/A	120.00	5- Cavity layer
15	32.50	-41.10	N/A	115.00	5- Cavity layer
16	35.00	-43.60	N/A	120.00	5- Cavity layer
17	37.50	-46.10	N/A	115.00	5- Cavity layer
18	40.00	-48.60	N/A	115.00	5- Cavity layer
19	42.50	-51.10	N/A	115.00	5- Cavity layer
20	45.00	-53.60	N/A	115.00	5- Cavity layer
21	47.50	-56.10	N/A	92.00	5- Cavity layer
22	50.00	-58.60	N/A	86.00	5- Cavity layer
23	52.50	-61.10	N/A	0.00	5- Cavity layer
24	55.00	-63.60	N/A	135.00	5- Cavity layer
25	57.50	-66.10	N/A	135.00	5- Cavity layer
26	60.00	-68.60	N/A	0.00	5- Cavity layer
27	62.50	-71.10	N/A	135.00	5- Cavity layer
28	65.00	-73.60	N/A	135.00	5- Cavity layer
29	65.00	-73.60	N/A	0.00	1- Plastic Clay
30	65.00	-73.60	N/A	135.00	4- Lime Stone/Very shelly sand
31	67.50	-76.10	N/A	135.00	4- Lime Stone/Very shelly sand
32	70.00	-78.60	N/A	135.00	4- Lime Stone/Very shelly sand
33	70.00	-78.60	N/A	0.00	1- Plastic Clay
34	70.00	-78.60	6.00	115.00	3- Clean sand
35	72.50	-81.10	6.00	115.00	3- Clean sand
36	72.50	-81.10	N/A	0.00	1- Plastic Clay
37	72.50	-81.10	N/A	125.00	4- Lime Stone/Very shelly sand
38	75.00	-83.60	N/A	125.00	4- Lime Stone/Very shelly sand
39	77.50	-86.10	N/A	135.00	4- Lime Stone/Very shelly sand
40	80.00	-88.60	N/A	135.00	4- Lime Stone/Very shelly sand
41	80.00	-88.60	N/A	0.00	1- Plastic Clay
42	80.00	-88.60	3.00	115.00	3- Clean sand
43	82.50	-91.10	3.00	115.00	3- Clean sand
44	82.50	-91.10	N/A	0.00	1- Plastic Clay
45	82.50	-91.10	N/A	135.00	4- Lime Stone/Very shelly sand
46	85.00	-93.60	N/A	135.00	4- Lime Stone/Very shelly sand
47	87.50	-96.10	N/A	135.00	4- Lime Stone/Very shelly sand
48	90.00	-98.60	N/A	135.00	4- Lime Stone/Very shelly sand
49	92.50	-101.10	N/A	135.00	4- Lime Stone/Very shelly sand
50	95.00	-103.60	N/A	135.00	4- Lime Stone/Very shelly sand
51	97.50	-106.10	N/A	135.00	4- Lime Stone/Very shelly sand
52	100.00	-108.60	N/A	135.00	4- Lime Stone/Very shelly sand
53	102.50	-111.10	N/A	135.00	4- Lime Stone/Very shelly sand
54	105.00	-113.60	N/A	135.00	4- Lime Stone/Very shelly sand
55	107.50	-116.10	N/A	135.00	4- Lime Stone/Very shelly sand
56	110.00	-118.60	N/A	135.00	4- Lime Stone/Very shelly sand
57	112.50	-121.10	N/A	125.00	4- Lime Stone/Very shelly sand
58	115.00	-123.60	N/A	135.00	4- Lime Stone/Very shelly sand
59	115.00	-123.60	N/A	0.00	1- Plastic Clay
60	115.00	-123.60	19.00	120.00	3- Clean sand
61	117.50	-126.10	19.00	120.00	3- Clean sand
62	120.00	-128.60	14.00	119.00	3- Clean sand

BB-08_Drilled_48in_BOC=-8.6ft_Void=-73.8ft.out

63	120.00	-128.60	N/A	0.00	1- Plastic Clay
64	120.00	-128.60	N/A	135.00	4- Lime Stone/Very shelly sand
65	122.50	-131.10	N/A	135.00	4- Lime Stone/Very shelly sand
66	122.50	-131.10	N/A	0.00	1- Plastic Clay
67	122.50	-131.10	15.00	115.00	3- Clean sand
68	125.00	-133.60	15.00	115.00	3- Clean sand

ID	Cu-Dir (tsf)	qu (tsf)	qt (tsf)	Em (ksi)	qb (tsf)

1	N/A	N/A	N/A	N/A	N/A
2	N/A	N/A	N/A	N/A	N/A
3	N/A	N/A	N/A	N/A	N/A
4	N/A	N/A	N/A	N/A	N/A
5	N/A	N/A	N/A	N/A	N/A
6	N/A	N/A	N/A	N/A	N/A
7	N/A	N/A	N/A	N/A	N/A
8	N/A	N/A	N/A	N/A	N/A
9	N/A	N/A	N/A	N/A	N/A
10	N/A	N/A	N/A	N/A	N/A
11	N/A	N/A	N/A	N/A	N/A
12	N/A	N/A	N/A	N/A	N/A
13	N/A	N/A	N/A	N/A	N/A
14	N/A	N/A	N/A	N/A	N/A
15	N/A	N/A	N/A	N/A	N/A
16	N/A	N/A	N/A	N/A	N/A
17	N/A	N/A	N/A	N/A	N/A
18	N/A	N/A	N/A	N/A	N/A
19	N/A	N/A	N/A	N/A	N/A
20	N/A	N/A	N/A	N/A	N/A
21	N/A	N/A	N/A	N/A	N/A
22	N/A	N/A	N/A	N/A	N/A
23	N/A	N/A	N/A	N/A	N/A
24	N/A	N/A	N/A	N/A	N/A
25	N/A	N/A	N/A	N/A	N/A
26	N/A	N/A	N/A	N/A	N/A
27	N/A	N/A	N/A	N/A	N/A
28	N/A	N/A	N/A	N/A	N/A
29	0.00	N/A	N/A	N/A	N/A
30	N/A	25.00	4.00	39.93	12.50
31	N/A	25.00	4.00	39.93	12.50
32	N/A	25.00	4.00	39.93	12.50
33	0.00	N/A	N/A	N/A	N/A
34	N/A	N/A	N/A	N/A	N/A
35	N/A	N/A	N/A	N/A	N/A
36	0.00	N/A	N/A	N/A	N/A
37	N/A	16.74	2.68	26.74	8.37
38	N/A	16.74	2.68	26.74	8.37
39	N/A	25.00	4.00	39.93	12.50

BB-08_Drilled_48in_BOC=-8.6ft_Void=-73.8ft.out

Top of Rock Socket
elev = -73.6'

40	N/A	25.00	4.00	39.93	12.50
41	0.00	N/A	N/A	N/A	N/A
42	N/A	N/A	N/A	N/A	N/A
43	N/A	N/A	N/A	N/A	N/A
44	0.00	N/A	N/A	N/A	N/A
45	N/A	25.00	4.00	39.93	12.50
46	N/A	25.00	4.00	39.93	12.50
47	N/A	25.00	4.00	39.93	12.50
48	N/A	25.00	4.00	39.93	12.50
49	N/A	25.00	4.00	39.93	12.50
50	N/A	25.00	4.00	39.93	12.50
51	N/A	25.00	4.00	39.93	12.50
52	N/A	25.00	4.00	39.93	12.50
53	N/A	25.00	4.00	39.93	12.50
54	N/A	25.00	4.00	39.93	12.50
55	N/A	25.00	4.00	39.93	12.50
56	N/A	25.00	4.00	39.93	12.50
57	N/A	17.36	2.78	27.73	8.68
58	N/A	25.00	4.00	39.93	12.50
59	0.00	N/A	N/A	N/A	N/A
60	N/A	N/A	N/A	N/A	N/A
61	N/A	N/A	N/A	N/A	N/A
62	N/A	N/A	N/A	N/A	N/A
63	0.00	N/A	N/A	N/A	N/A
64	N/A	25.00	4.00	39.93	12.50
65	N/A	25.00	4.00	39.93	12.50
66	0.00	N/A	N/A	N/A	N/A
67	N/A	N/A	N/A	N/A	N/A
68	N/A	N/A	N/A	N/A	N/A

ID	RQD F.M.	S.R.I.	Rock Recovery

1	N/A	N/A	N/A
2	N/A	N/A	N/A
3	N/A	N/A	N/A
4	N/A	N/A	N/A
5	N/A	N/A	N/A
6	N/A	N/A	N/A
7	N/A	N/A	N/A
8	N/A	N/A	N/A
9	N/A	N/A	N/A
10	N/A	N/A	N/A
11	N/A	N/A	N/A
12	N/A	N/A	N/A
13	N/A	N/A	N/A
14	N/A	N/A	N/A
15	N/A	N/A	N/A
16	N/A	N/A	N/A

BB-08_Drilled_48in_BOC=-8.6ft_Void=-73.8ft.out

17	N/A	N/A	N/A
18	N/A	N/A	N/A
19	N/A	N/A	N/A
20	N/A	N/A	N/A
21	N/A	N/A	N/A
22	N/A	N/A	N/A
23	N/A	N/A	N/A
24	N/A	N/A	N/A
25	N/A	N/A	N/A
26	N/A	N/A	N/A
27	N/A	N/A	N/A
28	N/A	N/A	N/A
29	N/A	N/A	N/A
30	0.50	ROUGH	1.000
31	0.50	ROUGH	1.000
32	0.50	ROUGH	1.000
33	N/A	N/A	N/A
34	N/A	N/A	N/A
35	N/A	N/A	N/A
36	N/A	N/A	N/A
37	0.50	ROUGH	1.000
38	0.50	ROUGH	1.000
39	0.50	ROUGH	1.000
40	0.50	ROUGH	1.000
41	N/A	N/A	N/A
42	N/A	N/A	N/A
43	N/A	N/A	N/A
44	N/A	N/A	N/A
45	0.50	ROUGH	1.000
46	0.50	ROUGH	1.000
47	0.50	ROUGH	1.000
48	0.50	ROUGH	1.000
49	0.50	ROUGH	1.000
50	0.50	ROUGH	1.000
51	0.50	ROUGH	1.000
52	0.50	ROUGH	1.000
53	0.50	ROUGH	1.000
54	0.50	ROUGH	1.000
55	0.50	ROUGH	1.000
56	0.50	ROUGH	1.000
57	0.50	ROUGH	1.000
58	0.50	ROUGH	1.000
59	N/A	N/A	N/A
60	N/A	N/A	N/A
61	N/A	N/A	N/A
62	N/A	N/A	N/A
63	N/A	N/A	N/A
64	0.50	ROUGH	1.000
65	0.50	ROUGH	1.000

BB-08_Drilled_48in_BOC=-8.6ft_Void=-73.8ft.out

66	N/A	N/A	N/A
67	N/A	N/A	N/A
68	N/A	N/A	N/A

Drilled Shaft Data:

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Unit weight of concrete = 145.00(pcf), Concrete Slump = 6.00(in)
Modulus of Elasticity of concrete = 3987.00(ksi)

Shaft Geometry:

ID	Length (ft)	Tip Elev. (ft)	Case Len. (ft)	Diameter (in)	Base Diam. (in)	Bell Len. (ft)
1	5.00	-13.60	0.00	48.00	48.00	0.00
2	7.00	-15.60	0.00	48.00	48.00	0.00
3	9.00	-17.60	0.00	48.00	48.00	0.00
4	11.00	-19.60	0.00	48.00	48.00	0.00
5	13.00	-21.60	0.00	48.00	48.00	0.00
6	15.00	-23.60	0.00	48.00	48.00	0.00
7	17.00	-25.60	0.00	48.00	48.00	0.00
8	19.00	-27.60	0.00	48.00	48.00	0.00
9	21.00	-29.60	0.00	48.00	48.00	0.00
10	23.00	-31.60	0.00	48.00	48.00	0.00
11	25.00	-33.60	0.00	48.00	48.00	0.00
12	27.00	-35.60	0.00	48.00	48.00	0.00
13	29.00	-37.60	0.00	48.00	48.00	0.00
14	31.00	-39.60	0.00	48.00	48.00	0.00
15	33.00	-41.60	0.00	48.00	48.00	0.00
16	35.00	-43.60	0.00	48.00	48.00	0.00
17	37.00	-45.60	0.00	48.00	48.00	0.00
18	39.00	-47.60	0.00	48.00	48.00	0.00
19	41.00	-49.60	0.00	48.00	48.00	0.00
20	43.00	-51.60	0.00	48.00	48.00	0.00
21	45.00	-53.60	0.00	48.00	48.00	0.00
22	47.00	-55.60	0.00	48.00	48.00	0.00
23	49.00	-57.60	0.00	48.00	48.00	0.00
24	51.00	-59.60	0.00	48.00	48.00	0.00
25	53.00	-61.60	0.00	48.00	48.00	0.00
26	55.00	-63.60	0.00	48.00	48.00	0.00
27	57.00	-65.60	0.00	48.00	48.00	0.00
28	59.00	-67.60	0.00	48.00	48.00	0.00
29	61.00	-69.60	0.00	48.00	48.00	0.00
30	63.00	-71.60	0.00	48.00	48.00	0.00
31	65.00	-73.60	0.00	48.00	48.00	0.00
32	67.00	-75.60	0.00	48.00	48.00	0.00
33	69.00	-77.60	0.00	48.00	48.00	0.00
34	71.00	-79.60	0.00	48.00	48.00	0.00

BB-08_Drilled_48in_BOC=-8.6ft_Void=-73.8ft.out

35	73.00	-81.60	0.00	48.00	48.00	0.00
36	75.00	-83.60	0.00	48.00	48.00	0.00
37	77.00	-85.60	0.00	48.00	48.00	0.00
38	79.00	-87.60	0.00	48.00	48.00	0.00
39	81.00	-89.60	0.00	48.00	48.00	0.00
40	83.00	-91.60	0.00	48.00	48.00	0.00
41	85.00	-93.60	0.00	48.00	48.00	0.00
42	87.00	-95.60	0.00	48.00	48.00	0.00
43	89.00	-97.60	0.00	48.00	48.00	0.00
44	91.00	-99.60	0.00	48.00	48.00	0.00
45	93.00	-101.60	0.00	48.00	48.00	0.00
46	95.00	-103.60	0.00	48.00	48.00	0.00
47	97.00	-105.60	0.00	48.00	48.00	0.00
48	99.00	-107.60	0.00	48.00	48.00	0.00
49	101.00	-109.60	0.00	48.00	48.00	0.00
50	103.00	-111.60	0.00	48.00	48.00	0.00
51	105.00	-113.60	0.00	48.00	48.00	0.00
52	107.00	-115.60	0.00	48.00	48.00	0.00
53	109.00	-117.60	0.00	48.00	48.00	0.00
54	111.00	-119.60	0.00	48.00	48.00	0.00
55	113.00	-121.60	0.00	48.00	48.00	0.00
56	115.00	-123.60	0.00	48.00	48.00	0.00

Drilled Shaft Capacity (sorted by shaft diameter):

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Strength reduction factors: Skin-friction = 1.00, End-bearing = 1.00

ID	Diameter (in)	Length (ft)	Skin Fric. (tons)	End Bearing (tons)	Capacity (tons)

1	48.00	5.00	0.000	0.000	0.000
2	48.00	7.00	0.000	0.000	0.000
3	48.00	9.00	0.000	0.000	0.000
4	48.00	11.00	0.000	0.000	0.000
5	48.00	13.00	0.000	0.000	0.000
6	48.00	15.00	0.000	0.000	0.000
7	48.00	17.00	0.000	0.000	0.000
8	48.00	19.00	0.000	0.000	0.000
9	48.00	21.00	0.000	0.000	0.000
10	48.00	23.00	0.000	0.000	0.000
11	48.00	25.00	0.000	0.000	0.000
12	48.00	27.00	0.000	0.000	0.000
13	48.00	29.00	0.000	0.000	0.000
14	48.00	31.00	0.000	0.000	0.000
15	48.00	33.00	0.000	0.000	0.000
16	48.00	35.00	0.000	0.000	0.000
17	48.00	37.00	0.000	0.000	0.000
18	48.00	39.00	0.000	0.000	0.000

BB-08_Drilled_48in_BOC=-8.6ft_Void=-73.8ft.out

19	48.00	41.00	0.000	0.000	0.000
20	48.00	43.00	0.000	0.000	0.000
21	48.00	45.00	0.000	0.000	0.000
22	48.00	47.00	0.000	0.000	0.000
23	48.00	49.00	0.000	0.000	0.000
24	48.00	51.00	0.000	0.000	0.000
25	48.00	53.00	0.000	0.000	0.000
26	48.00	55.00	0.000	0.000	0.000
27	48.00	57.00	0.000	0.000	0.000
28	48.00	59.00	0.000	0.000	0.000
29	48.00	61.00	0.000	0.000	0.000
30	48.00	63.00	0.000	0.000	0.000
31	48.00	65.00	0.000	157.080	157.080
32	48.00	67.00	125.664	157.080	282.743
33	48.00	69.00	251.327	157.080	408.407
34	48.00	71.00	314.771	56.096	370.867
35	48.00	73.00	336.877	105.181	442.058
36	48.00	75.00	421.016	105.181	526.196
37	48.00	77.00	505.154	105.181	610.334
38	48.00	79.00	620.436	157.080	777.516
39	48.00	81.00	684.863	28.048	712.911
40	48.00	83.00	718.826	157.080	875.905
41	48.00	85.00	844.490	157.080	1001.569
42	48.00	87.00	970.153	157.080	1127.233
43	48.00	89.00	1095.817	157.080	1252.897
44	48.00	91.00	1221.481	157.080	1378.560
45	48.00	93.00	1347.144	157.080	1504.224
46	48.00	95.00	1472.808	157.080	1629.888
47	48.00	97.00	1598.472	157.080	1755.551
48	48.00	99.00	1724.135	157.080	1881.215
49	48.00	101.00	1849.799	157.080	2006.879
50	48.00	103.00	1975.463	157.080	2132.543
51	48.00	105.00	2101.127	157.080	2258.206
52	48.00	107.00	2226.790	157.080	2383.870
53	48.00	109.00	2352.454	157.080	2509.534
54	48.00	111.00	2478.118	157.080	2635.197
55	48.00	113.00	2594.182	109.076	2703.258
56	48.00	115.00	2681.449	149.325	2830.775

Drilled Shaft Capacity at User-Defined Settlement (sorted by shaft diameter):

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**** Capacity is NOT modified by the strength reduction factors ****

User-Defined Settlement = 1.04%

ID	Diameter (in)	Length (ft)	Skin Fric. (tons)	End Bearing (tons)	Capacity (tons)

BB-08_Drilled_48in_BOC=-8.6ft_Void=-73.8ft.out

1	48.00	5.00	0.000	0.000	0.000
2	48.00	7.00	0.000	0.000	0.000
3	48.00	9.00	0.000	0.000	0.000
4	48.00	11.00	0.000	0.000	0.000
5	48.00	13.00	0.000	0.000	0.000
6	48.00	15.00	0.000	0.000	0.000
7	48.00	17.00	0.000	0.000	0.000
8	48.00	19.00	0.000	0.000	0.000
9	48.00	21.00	0.000	0.000	0.000
10	48.00	23.00	0.000	0.000	0.000
11	48.00	25.00	0.000	0.000	0.000
12	48.00	27.00	0.000	0.000	0.000
13	48.00	29.00	0.000	0.000	0.000
14	48.00	31.00	0.000	0.000	0.000
15	48.00	33.00	0.000	0.000	0.000
16	48.00	35.00	0.000	0.000	0.000
17	48.00	37.00	0.000	0.000	0.000
18	48.00	39.00	0.000	0.000	0.000
19	48.00	41.00	0.000	0.000	0.000
20	48.00	43.00	0.000	0.000	0.000
21	48.00	45.00	0.000	0.000	0.000
22	48.00	47.00	0.000	0.000	0.000
23	48.00	49.00	0.000	0.000	0.000
24	48.00	51.00	0.000	0.000	0.000
25	48.00	53.00	0.000	0.000	0.000
26	48.00	55.00	0.000	0.000	0.000
27	48.00	57.00	0.000	0.000	0.000
28	48.00	59.00	0.000	0.000	0.000
29	48.00	61.00	0.000	0.000	0.000
30	48.00	63.00	0.000	0.000	0.000
31	48.00	65.00	0.000	703.348	703.348
32	48.00	67.00	59.576	536.030	595.606
33	48.00	69.00	113.300	336.899	450.198
34	48.00	71.00	138.836	17.848	156.684
35	48.00	73.00	147.543	182.553	330.096
36	48.00	75.00	176.608	149.011	325.619
37	48.00	77.00	207.138	142.761	349.899
38	48.00	79.00	249.894	211.316	461.210
39	48.00	81.00	274.341	8.924	283.265
40	48.00	83.00	288.164	209.287	497.451
41	48.00	85.00	332.725	206.336	539.061
42	48.00	87.00	376.145	203.255	579.400
43	48.00	89.00	418.517	200.139	618.656
44	48.00	91.00	459.921	197.038	656.959
45	48.00	93.00	500.423	193.983	694.406
46	48.00	95.00	540.082	190.989	731.071
47	48.00	97.00	578.950	188.064	767.014
48	48.00	99.00	617.073	185.211	802.284

BB-08_Drilled_48in_BOC=-8.6ft_Void=-73.8ft.out

49	48.00	101.00	654.490	182.432	836.922
50	48.00	103.00	691.241	179.726	870.966
51	48.00	105.00	727.357	177.090	904.447
52	48.00	107.00	762.870	174.523	937.393
53	48.00	109.00	797.807	172.022	969.829
54	48.00	111.00	832.195	169.584	1001.779
55	48.00	113.00	863.399	116.241	979.640
56	48.00	115.00	886.311	47.510	933.821

BB-08_Drilled_48in_BOC=-8.6ft_Void=-73.8ft.out

General Information:
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Input file: d Shaft\DS Water\BB-08_Drilled_60in_BOC=-8.6ft_Void=-73.8ft.in
Project number: B-22-074
Job name: Broad Causeway Bridge
Engineer: PV/TC
Units: English

Analysis Information:
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Analysis Type: Drilled Shaft Analysis

Soil Information:
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Boring date: 12/19/23
Boring number: BB-08
Station number: 132+49 Offset: 39 RT

Ground Elevation: -8.60(ft)
Water table Elevation = 1.70(ft)

Cu is calculated using: Direct method.
Rock side-friction is calculated using: McVay's method
Hammer type: Automatic Hammer, Correction factor = 1.24

ID	Depth (ft)	Elevation (ft)	SPT Blows (Blows/ft)	Unit Weight (pcf)	Soil Type
-----	-----	-----	-----	-----	-----
1	0.00	-8.60	N/A	123.00	5- Cavity layer
2	2.00	-10.60	N/A	123.00	5- Cavity layer
3	4.00	-12.60	N/A	109.00	5- Cavity layer
4	6.00	-14.60	N/A	127.00	5- Cavity layer
5	8.00	-16.60	N/A	126.00	5- Cavity layer
6	10.00	-18.60	N/A	133.00	5- Cavity layer
7	12.00	-20.60	N/A	133.00	5- Cavity layer
8	14.00	-22.60	N/A	133.00	5- Cavity layer
9	16.00	-24.60	N/A	121.00	5- Cavity layer
10	20.00	-28.60	N/A	119.00	5- Cavity layer
11	22.50	-31.10	N/A	115.00	5- Cavity layer
12	25.00	-33.60	N/A	115.00	5- Cavity layer
13	27.50	-36.10	N/A	120.00	5- Cavity layer

BB-08_Drilled_60in_BOC=-8.6ft_Void=-73.8ft.out

14	30.00	-38.60	N/A	120.00	5- Cavity layer
15	32.50	-41.10	N/A	115.00	5- Cavity layer
16	35.00	-43.60	N/A	120.00	5- Cavity layer
17	37.50	-46.10	N/A	115.00	5- Cavity layer
18	40.00	-48.60	N/A	115.00	5- Cavity layer
19	42.50	-51.10	N/A	115.00	5- Cavity layer
20	45.00	-53.60	N/A	115.00	5- Cavity layer
21	47.50	-56.10	N/A	92.00	5- Cavity layer
22	50.00	-58.60	N/A	86.00	5- Cavity layer
23	52.50	-61.10	N/A	0.00	5- Cavity layer
24	55.00	-63.60	N/A	135.00	5- Cavity layer
25	57.50	-66.10	N/A	135.00	5- Cavity layer
26	60.00	-68.60	N/A	0.00	5- Cavity layer
27	62.50	-71.10	N/A	135.00	5- Cavity layer
28	65.00	-73.60	N/A	135.00	5- Cavity layer
29	65.00	-73.60	N/A	0.00	1- Plastic Clay
30	65.00	-73.60	N/A	135.00	4- Lime Stone/Very shelly sand
31	67.50	-76.10	N/A	135.00	4- Lime Stone/Very shelly sand
32	70.00	-78.60	N/A	135.00	4- Lime Stone/Very shelly sand
33	70.00	-78.60	N/A	0.00	1- Plastic Clay
34	70.00	-78.60	6.00	115.00	3- Clean sand
35	72.50	-81.10	6.00	115.00	3- Clean sand
36	72.50	-81.10	N/A	0.00	1- Plastic Clay
37	72.50	-81.10	N/A	125.00	4- Lime Stone/Very shelly sand
38	75.00	-83.60	N/A	125.00	4- Lime Stone/Very shelly sand
39	77.50	-86.10	N/A	135.00	4- Lime Stone/Very shelly sand
40	80.00	-88.60	N/A	135.00	4- Lime Stone/Very shelly sand
41	80.00	-88.60	N/A	0.00	1- Plastic Clay
42	80.00	-88.60	3.00	115.00	3- Clean sand
43	82.50	-91.10	3.00	115.00	3- Clean sand
44	82.50	-91.10	N/A	0.00	1- Plastic Clay
45	82.50	-91.10	N/A	135.00	4- Lime Stone/Very shelly sand
46	85.00	-93.60	N/A	135.00	4- Lime Stone/Very shelly sand
47	87.50	-96.10	N/A	135.00	4- Lime Stone/Very shelly sand
48	90.00	-98.60	N/A	135.00	4- Lime Stone/Very shelly sand
49	92.50	-101.10	N/A	135.00	4- Lime Stone/Very shelly sand
50	95.00	-103.60	N/A	135.00	4- Lime Stone/Very shelly sand
51	97.50	-106.10	N/A	135.00	4- Lime Stone/Very shelly sand
52	100.00	-108.60	N/A	135.00	4- Lime Stone/Very shelly sand
53	102.50	-111.10	N/A	135.00	4- Lime Stone/Very shelly sand
54	105.00	-113.60	N/A	135.00	4- Lime Stone/Very shelly sand
55	107.50	-116.10	N/A	135.00	4- Lime Stone/Very shelly sand
56	110.00	-118.60	N/A	135.00	4- Lime Stone/Very shelly sand
57	112.50	-121.10	N/A	125.00	4- Lime Stone/Very shelly sand
58	115.00	-123.60	N/A	135.00	4- Lime Stone/Very shelly sand
59	115.00	-123.60	N/A	0.00	1- Plastic Clay
60	115.00	-123.60	19.00	120.00	3- Clean sand
61	117.50	-126.10	19.00	120.00	3- Clean sand
62	120.00	-128.60	14.00	119.00	3- Clean sand

BB-08_Drilled_60in_BOC=-8.6ft_Void=-73.8ft.out

Top of Rock Socket
elev = -73.6'

Bottom of Canal
elev = -8.6'

63	120.00	-128.60	N/A	0.00	1- Plastic Clay
64	120.00	-128.60	N/A	135.00	4- Lime Stone/Very shelly sand
65	122.50	-131.10	N/A	135.00	4- Lime Stone/Very shelly sand
66	122.50	-131.10	N/A	0.00	1- Plastic Clay
67	122.50	-131.10	15.00	115.00	3- Clean sand
68	125.00	-133.60	15.00	115.00	3- Clean sand

ID	Cu-Dir (tsf)	qu (tsf)	qt (tsf)	Em (ksi)	qb (tsf)
1	N/A	N/A	N/A	N/A	N/A
2	N/A	N/A	N/A	N/A	N/A
3	N/A	N/A	N/A	N/A	N/A
4	N/A	N/A	N/A	N/A	N/A
5	N/A	N/A	N/A	N/A	N/A
6	N/A	N/A	N/A	N/A	N/A
7	N/A	N/A	N/A	N/A	N/A
8	N/A	N/A	N/A	N/A	N/A
9	N/A	N/A	N/A	N/A	N/A
10	N/A	N/A	N/A	N/A	N/A
11	N/A	N/A	N/A	N/A	N/A
12	N/A	N/A	N/A	N/A	N/A
13	N/A	N/A	N/A	N/A	N/A
14	N/A	N/A	N/A	N/A	N/A
15	N/A	N/A	N/A	N/A	N/A
16	N/A	N/A	N/A	N/A	N/A
17	N/A	N/A	N/A	N/A	N/A
18	N/A	N/A	N/A	N/A	N/A
19	N/A	N/A	N/A	N/A	N/A
20	N/A	N/A	N/A	N/A	N/A
21	N/A	N/A	N/A	N/A	N/A
22	N/A	N/A	N/A	N/A	N/A
23	N/A	N/A	N/A	N/A	N/A
24	N/A	N/A	N/A	N/A	N/A
25	N/A	N/A	N/A	N/A	N/A
26	N/A	N/A	N/A	N/A	N/A
27	N/A	N/A	N/A	N/A	N/A
28	N/A	N/A	N/A	N/A	N/A
29	0.00	N/A	N/A	N/A	N/A
30	N/A	25.00	4.00	39.93	12.50
31	N/A	25.00	4.00	39.93	12.50
32	N/A	25.00	4.00	39.93	12.50
33	0.00	N/A	N/A	N/A	N/A
34	N/A	N/A	N/A	N/A	N/A
35	N/A	N/A	N/A	N/A	N/A
36	0.00	N/A	N/A	N/A	N/A
37	N/A	16.74	2.68	26.74	8.37
38	N/A	16.74	2.68	26.74	8.37
39	N/A	25.00	4.00	39.93	12.50

BB-08_Drilled_60in_BOC=-8.6ft_Void=-73.8ft.out

40	N/A	25.00	4.00	39.93	12.50
41	0.00	N/A	N/A	N/A	N/A
42	N/A	N/A	N/A	N/A	N/A
43	N/A	N/A	N/A	N/A	N/A
44	0.00	N/A	N/A	N/A	N/A
45	N/A	25.00	4.00	39.93	12.50
46	N/A	25.00	4.00	39.93	12.50
47	N/A	25.00	4.00	39.93	12.50
48	N/A	25.00	4.00	39.93	12.50
49	N/A	25.00	4.00	39.93	12.50
50	N/A	25.00	4.00	39.93	12.50
51	N/A	25.00	4.00	39.93	12.50
52	N/A	25.00	4.00	39.93	12.50
53	N/A	25.00	4.00	39.93	12.50
54	N/A	25.00	4.00	39.93	12.50
55	N/A	25.00	4.00	39.93	12.50
56	N/A	25.00	4.00	39.93	12.50
57	N/A	17.36	2.78	27.73	8.68
58	N/A	25.00	4.00	39.93	12.50
59	0.00	N/A	N/A	N/A	N/A
60	N/A	N/A	N/A	N/A	N/A
61	N/A	N/A	N/A	N/A	N/A
62	N/A	N/A	N/A	N/A	N/A
63	0.00	N/A	N/A	N/A	N/A
64	N/A	25.00	4.00	39.93	12.50
65	N/A	25.00	4.00	39.93	12.50
66	0.00	N/A	N/A	N/A	N/A
67	N/A	N/A	N/A	N/A	N/A
68	N/A	N/A	N/A	N/A	N/A

ID	RQD F.M.	S.R.I.	Rock Recovery
1	N/A	N/A	N/A
2	N/A	N/A	N/A
3	N/A	N/A	N/A
4	N/A	N/A	N/A
5	N/A	N/A	N/A
6	N/A	N/A	N/A
7	N/A	N/A	N/A
8	N/A	N/A	N/A
9	N/A	N/A	N/A
10	N/A	N/A	N/A
11	N/A	N/A	N/A
12	N/A	N/A	N/A
13	N/A	N/A	N/A
14	N/A	N/A	N/A
15	N/A	N/A	N/A
16	N/A	N/A	N/A

BB-08_Drilled_60in_BOC=-8.6ft_Void=-73.8ft.out

17	N/A	N/A	N/A
18	N/A	N/A	N/A
19	N/A	N/A	N/A
20	N/A	N/A	N/A
21	N/A	N/A	N/A
22	N/A	N/A	N/A
23	N/A	N/A	N/A
24	N/A	N/A	N/A
25	N/A	N/A	N/A
26	N/A	N/A	N/A
27	N/A	N/A	N/A
28	N/A	N/A	N/A
29	N/A	N/A	N/A
30	0.50	ROUGH	1.000
31	0.50	ROUGH	1.000
32	0.50	ROUGH	1.000
33	N/A	N/A	N/A
34	N/A	N/A	N/A
35	N/A	N/A	N/A
36	N/A	N/A	N/A
37	0.50	ROUGH	1.000
38	0.50	ROUGH	1.000
39	0.50	ROUGH	1.000
40	0.50	ROUGH	1.000
41	N/A	N/A	N/A
42	N/A	N/A	N/A
43	N/A	N/A	N/A
44	N/A	N/A	N/A
45	0.50	ROUGH	1.000
46	0.50	ROUGH	1.000
47	0.50	ROUGH	1.000
48	0.50	ROUGH	1.000
49	0.50	ROUGH	1.000
50	0.50	ROUGH	1.000
51	0.50	ROUGH	1.000
52	0.50	ROUGH	1.000
53	0.50	ROUGH	1.000
54	0.50	ROUGH	1.000
55	0.50	ROUGH	1.000
56	0.50	ROUGH	1.000
57	0.50	ROUGH	1.000
58	0.50	ROUGH	1.000
59	N/A	N/A	N/A
60	N/A	N/A	N/A
61	N/A	N/A	N/A
62	N/A	N/A	N/A
63	N/A	N/A	N/A
64	0.50	ROUGH	1.000
65	0.50	ROUGH	1.000

BB-08_Drilled_60in_BOC=-8.6ft_Void=-73.8ft.out

66	N/A	N/A	N/A
67	N/A	N/A	N/A
68	N/A	N/A	N/A

Drilled Shaft Data:

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Unit weight of concrete = 145.00(pcf), Concrete Slump = 6.00(in)
Modulus of Elasticity of concrete = 3987.00(ksi)

Shaft Geometry:

ID	Length (ft)	Tip Elev. (ft)	Case Len. (ft)	Diameter (in)	Base Diam. (in)	Bell Len. (ft)
1	5.00	-13.60	0.00	60.00	60.00	0.00
2	7.00	-15.60	0.00	60.00	60.00	0.00
3	9.00	-17.60	0.00	60.00	60.00	0.00
4	11.00	-19.60	0.00	60.00	60.00	0.00
5	13.00	-21.60	0.00	60.00	60.00	0.00
6	15.00	-23.60	0.00	60.00	60.00	0.00
7	17.00	-25.60	0.00	60.00	60.00	0.00
8	19.00	-27.60	0.00	60.00	60.00	0.00
9	21.00	-29.60	0.00	60.00	60.00	0.00
10	23.00	-31.60	0.00	60.00	60.00	0.00
11	25.00	-33.60	0.00	60.00	60.00	0.00
12	27.00	-35.60	0.00	60.00	60.00	0.00
13	29.00	-37.60	0.00	60.00	60.00	0.00
14	31.00	-39.60	0.00	60.00	60.00	0.00
15	33.00	-41.60	0.00	60.00	60.00	0.00
16	35.00	-43.60	0.00	60.00	60.00	0.00
17	37.00	-45.60	0.00	60.00	60.00	0.00
18	39.00	-47.60	0.00	60.00	60.00	0.00
19	41.00	-49.60	0.00	60.00	60.00	0.00
20	43.00	-51.60	0.00	60.00	60.00	0.00
21	45.00	-53.60	0.00	60.00	60.00	0.00
22	47.00	-55.60	0.00	60.00	60.00	0.00
23	49.00	-57.60	0.00	60.00	60.00	0.00
24	51.00	-59.60	0.00	60.00	60.00	0.00
25	53.00	-61.60	0.00	60.00	60.00	0.00
26	55.00	-63.60	0.00	60.00	60.00	0.00
27	57.00	-65.60	0.00	60.00	60.00	0.00
28	59.00	-67.60	0.00	60.00	60.00	0.00
29	61.00	-69.60	0.00	60.00	60.00	0.00
30	63.00	-71.60	0.00	60.00	60.00	0.00
31	65.00	-73.60	0.00	60.00	60.00	0.00
32	67.00	-75.60	0.00	60.00	60.00	0.00
33	69.00	-77.60	0.00	60.00	60.00	0.00
34	71.00	-79.60	0.00	60.00	60.00	0.00

BB-08_Drilled_60in_BOC=-8.6ft_Void=-73.8ft.out

35	73.00	-81.60	0.00	60.00	60.00	0.00
36	75.00	-83.60	0.00	60.00	60.00	0.00
37	77.00	-85.60	0.00	60.00	60.00	0.00
38	79.00	-87.60	0.00	60.00	60.00	0.00
39	81.00	-89.60	0.00	60.00	60.00	0.00
40	83.00	-91.60	0.00	60.00	60.00	0.00
41	85.00	-93.60	0.00	60.00	60.00	0.00
42	87.00	-95.60	0.00	60.00	60.00	0.00
43	89.00	-97.60	0.00	60.00	60.00	0.00
44	91.00	-99.60	0.00	60.00	60.00	0.00
45	93.00	-101.60	0.00	60.00	60.00	0.00
46	95.00	-103.60	0.00	60.00	60.00	0.00
47	97.00	-105.60	0.00	60.00	60.00	0.00
48	99.00	-107.60	0.00	60.00	60.00	0.00
49	101.00	-109.60	0.00	60.00	60.00	0.00
50	103.00	-111.60	0.00	60.00	60.00	0.00
51	105.00	-113.60	0.00	60.00	60.00	0.00
52	107.00	-115.60	0.00	60.00	60.00	0.00
53	109.00	-117.60	0.00	60.00	60.00	0.00
54	111.00	-119.60	0.00	60.00	60.00	0.00
55	113.00	-121.60	0.00	60.00	60.00	0.00
56	115.00	-123.60	0.00	60.00	60.00	0.00

Drilled Shaft Capacity (sorted by shaft diameter):

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Strength reduction factors: Skin-friction = 1.00, End-bearing = 1.00

ID	Diameter (in)	Length (ft)	Skin Fric. (tons)	End Bearing (tons)	Capacity (tons)

1	60.00	5.00	0.000	0.000	0.000
2	60.00	7.00	0.000	0.000	0.000
3	60.00	9.00	0.000	0.000	0.000
4	60.00	11.00	0.000	0.000	0.000
5	60.00	13.00	0.000	0.000	0.000
6	60.00	15.00	0.000	0.000	0.000
7	60.00	17.00	0.000	0.000	0.000
8	60.00	19.00	0.000	0.000	0.000
9	60.00	21.00	0.000	0.000	0.000
10	60.00	23.00	0.000	0.000	0.000
11	60.00	25.00	0.000	0.000	0.000
12	60.00	27.00	0.000	0.000	0.000
13	60.00	29.00	0.000	0.000	0.000
14	60.00	31.00	0.000	0.000	0.000
15	60.00	33.00	0.000	0.000	0.000
16	60.00	35.00	0.000	0.000	0.000
17	60.00	37.00	0.000	0.000	0.000
18	60.00	39.00	0.000	0.000	0.000

BB-08_Drilled_60in_BOC=-8.6ft_Void=-73.8ft.out

19	60.00	41.00	0.000	0.000	0.000
20	60.00	43.00	0.000	0.000	0.000
21	60.00	45.00	0.000	0.000	0.000
22	60.00	47.00	0.000	0.000	0.000
23	60.00	49.00	0.000	0.000	0.000
24	60.00	51.00	0.000	0.000	0.000
25	60.00	53.00	0.000	0.000	0.000
26	60.00	55.00	0.000	0.000	0.000
27	60.00	57.00	0.000	0.000	0.000
28	60.00	59.00	0.000	0.000	0.000
29	60.00	61.00	0.000	0.000	0.000
30	60.00	63.00	0.000	0.000	0.000
31	60.00	65.00	0.000	245.437	245.437
32	60.00	67.00	157.080	245.437	402.517
33	60.00	69.00	314.159	245.437	559.596
34	60.00	71.00	393.463	36.521	429.984
35	60.00	73.00	421.097	164.345	585.441
36	60.00	75.00	526.270	164.345	690.614
37	60.00	77.00	631.442	164.345	795.787
38	60.00	79.00	775.545	245.437	1020.982
39	60.00	81.00	856.078	36.521	892.599
40	60.00	83.00	898.532	245.437	1143.969
41	60.00	85.00	1055.612	245.437	1301.049
42	60.00	87.00	1212.692	245.437	1458.129
43	60.00	89.00	1369.771	245.437	1615.208
44	60.00	91.00	1526.851	245.437	1772.288
45	60.00	93.00	1683.930	245.437	1929.367
46	60.00	95.00	1841.010	245.437	2086.447
47	60.00	97.00	1998.090	245.437	2243.527
48	60.00	99.00	2155.169	245.437	2400.606
49	60.00	101.00	2312.249	245.437	2557.686
50	60.00	103.00	2469.329	245.437	2714.766
51	60.00	105.00	2626.408	245.437	2871.845
52	60.00	107.00	2783.488	245.437	3028.925
53	60.00	109.00	2940.568	245.437	3186.004
54	60.00	111.00	3097.647	245.437	3343.084
55	60.00	113.00	3242.728	170.431	3413.159
56	60.00	115.00	3351.812	194.261	3546.072

Drilled Shaft Capacity at User-Defined Settlement (sorted by shaft diameter):

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**** Capacity is NOT modified by the strength reduction factors ****

User-Defined Settlement = 0.83%

ID	Diameter (in)	Length (ft)	Skin Fric. (tons)	End Bearing (tons)	Capacity (tons)

BB-08_Drilled_60in_BOC=-8.6ft_Void=-73.8ft.out

1	60.00	5.00	0.000	0.000	0.000
2	60.00	7.00	0.000	0.000	0.000
3	60.00	9.00	0.000	0.000	0.000
4	60.00	11.00	0.000	0.000	0.000
5	60.00	13.00	0.000	0.000	0.000
6	60.00	15.00	0.000	0.000	0.000
7	60.00	17.00	0.000	0.000	0.000
8	60.00	19.00	0.000	0.000	0.000
9	60.00	21.00	0.000	0.000	0.000
10	60.00	23.00	0.000	0.000	0.000
11	60.00	25.00	0.000	0.000	0.000
12	60.00	27.00	0.000	0.000	0.000
13	60.00	29.00	0.000	0.000	0.000
14	60.00	31.00	0.000	0.000	0.000
15	60.00	33.00	0.000	0.000	0.000
16	60.00	35.00	0.000	0.000	0.000
17	60.00	37.00	0.000	0.000	0.000
18	60.00	39.00	0.000	0.000	0.000
19	60.00	41.00	0.000	0.000	0.000
20	60.00	43.00	0.000	0.000	0.000
21	60.00	45.00	0.000	0.000	0.000
22	60.00	47.00	0.000	0.000	0.000
23	60.00	49.00	0.000	0.000	0.000
24	60.00	51.00	0.000	0.000	0.000
25	60.00	53.00	0.000	0.000	0.000
26	60.00	55.00	0.000	0.000	0.000
27	60.00	57.00	0.000	0.000	0.000
28	60.00	59.00	0.000	0.000	0.000
29	60.00	61.00	0.000	0.000	0.000
30	60.00	63.00	0.000	0.000	0.000
31	60.00	65.00	0.000	945.913	945.913
32	60.00	67.00	74.467	837.143	911.611
33	60.00	69.00	141.614	526.150	667.765
34	60.00	71.00	173.527	9.535	183.062
35	60.00	73.00	184.404	285.102	469.506
36	60.00	75.00	220.726	232.718	453.444
37	60.00	77.00	254.205	199.222	453.427
38	60.00	79.00	304.680	286.652	591.332
39	60.00	81.00	334.419	9.535	343.954
40	60.00	83.00	351.279	285.086	636.365
41	60.00	85.00	405.345	282.449	687.794
42	60.00	87.00	457.978	279.445	737.422
43	60.00	89.00	509.298	276.244	785.542
44	60.00	91.00	559.410	272.947	832.357
45	60.00	93.00	608.398	269.616	878.014
46	60.00	95.00	656.340	266.289	922.630
47	60.00	97.00	703.302	262.990	966.292
48	60.00	99.00	749.342	259.735	1009.077

BB-08_Drilled_60in_BOC=-8.6ft_Void=-73.8ft.out

49	60.00	101.00	794.512	256.533	1051.045
50	60.00	103.00	838.860	253.389	1092.249
51	60.00	105.00	882.428	250.306	1132.734
52	60.00	107.00	925.255	247.286	1172.541
53	60.00	109.00	967.377	244.327	1211.704
54	60.00	111.00	1008.825	241.431	1250.256
55	60.00	113.00	1046.410	165.839	1212.249
56	60.00	115.00	1073.941	50.720	1124.661

BB-08_Drilled_60in_BOC=-8.6ft_Void=-73.8ft.out

General Information:
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Input file: d Shaft\DS Water\BB-09_Drilled_48in_BOC=-6.6ft_Void=-71.6ft.in
Project number: B-22-074
Job name: Broad Causeway Bridge
Engineer: PV/TC
Units: English

Analysis Information:
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Analysis Type: Drilled Shaft Analysis

Soil Information:
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Boring date: 12/20/23
Boring number: BB-09
Station number: 134+48 Offset: 25 LT

Ground Elevation: -6.60(ft)
Water table Elevation = 3.70(ft)

Cu is calculated using: Direct method.
Rock side-friction is calculated using: McVay's method
Hammer type: Automatic Hammer, Correction factor = 1.24

ID	Depth (ft)	Elevation (ft)	SPT Blows (Blows/ft)	Unit Weight (pcf)	Soil Type
-----	-----	-----	-----	-----	-----
1	0.00	-6.60	N/A	119.00	5- Cavity layer
2	2.00	-8.60	N/A	119.00	5- Cavity layer
3	4.00	-10.60	N/A	118.00	5- Cavity layer
4	6.00	-12.60	N/A	122.00	5- Cavity layer
5	8.00	-14.60	N/A	122.00	5- Cavity layer
6	10.00	-16.60	N/A	124.00	5- Cavity layer
7	12.00	-18.60	N/A	119.00	5- Cavity layer
8	14.00	-20.60	N/A	121.00	5- Cavity layer
9	16.00	-22.60	N/A	133.00	5- Cavity layer
10	20.00	-26.60	N/A	116.00	5- Cavity layer
11	22.50	-29.10	N/A	115.00	5- Cavity layer
12	25.00	-31.60	N/A	115.00	5- Cavity layer
13	27.50	-34.10	N/A	120.00	5- Cavity layer

BB-09_Drilled_48in_BOC=-6.6ft_Void=-71.6ft.out

14	30.00	-36.60	N/A	120.00	5- Cavity layer
15	32.50	-39.10	N/A	115.00	5- Cavity layer
16	35.00	-41.60	N/A	120.00	5- Cavity layer
17	37.50	-44.10	N/A	115.00	5- Cavity layer
18	40.00	-46.60	N/A	115.00	5- Cavity layer
19	42.50	-49.10	N/A	115.00	5- Cavity layer
20	45.00	-51.60	N/A	115.00	5- Cavity layer
21	47.50	-54.10	N/A	92.00	5- Cavity layer
22	50.00	-56.60	N/A	86.00	5- Cavity layer
23	52.50	-59.10	N/A	0.00	5- Cavity layer
24	55.00	-61.60	N/A	135.00	5- Cavity layer
25	57.50	-64.10	N/A	135.00	5- Cavity layer
26	60.00	-66.60	N/A	0.00	5- Cavity layer
27	62.50	-69.10	N/A	135.00	5- Cavity layer
28	65.00	-71.60	N/A	135.00	5- Cavity layer
29	65.00	-71.60	N/A	0.00	1- Plastic Clay
30	65.00	-71.60	N/A	135.00	4- Lime Stone/Very shelly sand
31	67.50	-74.10	N/A	135.00	4- Lime Stone/Very shelly sand
32	70.00	-76.60	N/A	135.00	4- Lime Stone/Very shelly sand
33	72.50	-79.10	N/A	135.00	4- Lime Stone/Very shelly sand
34	75.00	-81.60	N/A	0.00	1- Plastic Clay
35	75.00	-81.60	45.00	131.00	3- Clean sand
36	77.50	-84.10	45.00	131.00	3- Clean sand
37	77.50	-84.10	N/A	0.00	1- Plastic Clay
38	77.50	-84.10	N/A	130.00	4- Lime Stone/Very shelly sand
39	80.00	-86.60	N/A	135.00	4- Lime Stone/Very shelly sand
40	82.50	-89.10	N/A	135.00	4- Lime Stone/Very shelly sand
41	85.00	-91.60	N/A	135.00	4- Lime Stone/Very shelly sand
42	87.50	-94.10	N/A	135.00	4- Lime Stone/Very shelly sand
43	90.00	-96.60	N/A	135.00	4- Lime Stone/Very shelly sand
44	92.50	-99.10	N/A	135.00	4- Lime Stone/Very shelly sand
45	95.00	-101.60	N/A	135.00	4- Lime Stone/Very shelly sand
46	97.50	-104.10	N/A	135.00	4- Lime Stone/Very shelly sand
47	100.00	-106.60	N/A	135.00	4- Lime Stone/Very shelly sand
48	102.50	-109.10	N/A	135.00	4- Lime Stone/Very shelly sand
49	105.00	-111.60	N/A	135.00	4- Lime Stone/Very shelly sand
50	107.50	-114.10	N/A	135.00	4- Lime Stone/Very shelly sand
51	110.00	-116.60	N/A	135.00	4- Lime Stone/Very shelly sand
52	110.00	-116.60	N/A	0.00	1- Plastic Clay
53	110.00	-116.60	100.00	133.00	3- Clean sand
54	112.50	-119.10	100.00	133.00	3- Clean sand
55	115.00	-121.60	20.00	122.00	3- Clean sand
56	115.00	-121.60	N/A	0.00	1- Plastic Clay
57	115.00	-121.60	N/A	135.00	4- Lime Stone/Very shelly sand
58	117.50	-124.10	N/A	135.00	4- Lime Stone/Very shelly sand
59	120.00	-126.60	N/A	130.00	4- Lime Stone/Very shelly sand
60	122.50	-129.10	N/A	135.00	4- Lime Stone/Very shelly sand
61	125.00	-131.60	N/A	135.00	4- Lime Stone/Very shelly sand

BB-09_Drilled_48in_BOC=-6.6ft_Void=-71.6ft.out

Top of Rock Socket
elev = -71.6'

Bottom of Canal
elev = -6.6'

ID	Cu-DIR (tsf)	qu (tsf)	qt (tsf)	Em (ksi)	qb (tsf)
1	N/A	N/A	N/A	N/A	N/A
2	N/A	N/A	N/A	N/A	N/A
3	N/A	N/A	N/A	N/A	N/A
4	N/A	N/A	N/A	N/A	N/A
5	N/A	N/A	N/A	N/A	N/A
6	N/A	N/A	N/A	N/A	N/A
7	N/A	N/A	N/A	N/A	N/A
8	N/A	N/A	N/A	N/A	N/A
9	N/A	N/A	N/A	N/A	N/A
10	N/A	N/A	N/A	N/A	N/A
11	N/A	N/A	N/A	N/A	N/A
12	N/A	N/A	N/A	N/A	N/A
13	N/A	N/A	N/A	N/A	N/A
14	N/A	N/A	N/A	N/A	N/A
15	N/A	N/A	N/A	N/A	N/A
16	N/A	N/A	N/A	N/A	N/A
17	N/A	N/A	N/A	N/A	N/A
18	N/A	N/A	N/A	N/A	N/A
19	N/A	N/A	N/A	N/A	N/A
20	N/A	N/A	N/A	N/A	N/A
21	N/A	N/A	N/A	N/A	N/A
22	N/A	N/A	N/A	N/A	N/A
23	N/A	N/A	N/A	N/A	N/A
24	N/A	N/A	N/A	N/A	N/A
25	N/A	N/A	N/A	N/A	N/A
26	N/A	N/A	N/A	N/A	N/A
27	N/A	N/A	N/A	N/A	N/A
28	N/A	N/A	N/A	N/A	N/A
29	0.00	N/A	N/A	N/A	N/A
30	N/A	25.00	4.00	39.93	12.50
31	N/A	25.00	4.00	39.93	12.50
32	N/A	25.00	4.00	39.93	12.50
33	N/A	25.00	4.00	39.93	12.50
34	0.00	N/A	N/A	N/A	N/A
35	N/A	N/A	N/A	N/A	N/A
36	N/A	N/A	N/A	N/A	N/A
37	0.00	N/A	N/A	N/A	N/A
38	N/A	25.00	4.00	39.93	12.50
39	N/A	25.00	4.00	39.93	12.50
40	N/A	25.00	4.00	39.93	12.50
41	N/A	25.00	4.00	39.93	12.50
42	N/A	25.00	4.00	39.93	12.50
43	N/A	25.00	4.00	39.93	12.50
44	N/A	25.00	4.00	39.93	12.50
45	N/A	25.00	4.00	39.93	12.50
46	N/A	25.00	4.00	39.93	12.50

BB-09_Drilled_48in_BOC=-6.6ft_Void=-71.6ft.out

47	N/A	25.00	4.00	39.93	12.50
48	N/A	25.00	4.00	39.93	12.50
49	N/A	25.00	4.00	39.93	12.50
50	N/A	25.00	4.00	39.93	12.50
51	N/A	25.00	4.00	39.93	12.50
52	0.00	N/A	N/A	N/A	N/A
53	N/A	N/A	N/A	N/A	N/A
54	N/A	N/A	N/A	N/A	N/A
55	N/A	N/A	N/A	N/A	N/A
56	0.00	N/A	N/A	N/A	N/A
57	N/A	25.00	4.00	39.93	12.50
58	N/A	25.00	4.00	39.93	12.50
59	N/A	25.00	4.00	39.93	12.50
60	N/A	25.00	4.00	39.93	12.50
61	N/A	25.00	4.00	39.93	12.50

ID	RQD F.M.	S.R.I.	Rock Recovery
1	N/A	N/A	N/A
2	N/A	N/A	N/A
3	N/A	N/A	N/A
4	N/A	N/A	N/A
5	N/A	N/A	N/A
6	N/A	N/A	N/A
7	N/A	N/A	N/A
8	N/A	N/A	N/A
9	N/A	N/A	N/A
10	N/A	N/A	N/A
11	N/A	N/A	N/A
12	N/A	N/A	N/A
13	N/A	N/A	N/A
14	N/A	N/A	N/A
15	N/A	N/A	N/A
16	N/A	N/A	N/A
17	N/A	N/A	N/A
18	N/A	N/A	N/A
19	N/A	N/A	N/A
20	N/A	N/A	N/A
21	N/A	N/A	N/A
22	N/A	N/A	N/A
23	N/A	N/A	N/A
24	N/A	N/A	N/A
25	N/A	N/A	N/A
26	N/A	N/A	N/A
27	N/A	N/A	N/A
28	N/A	N/A	N/A
29	N/A	N/A	N/A
30	0.50	ROUGH	1.000

BB-09_Drilled_48in_BOC=-6.6ft_Void=-71.6ft.out

31	0.50	ROUGH	1.000
32	0.50	ROUGH	1.000
33	0.50	ROUGH	1.000
34	N/A	N/A	N/A
35	N/A	N/A	N/A
36	N/A	N/A	N/A
37	N/A	N/A	N/A
38	0.50	ROUGH	1.000
39	0.50	ROUGH	1.000
40	0.50	ROUGH	1.000
41	0.50	ROUGH	1.000
42	0.50	ROUGH	1.000
43	0.50	ROUGH	1.000
44	0.50	ROUGH	1.000
45	0.50	ROUGH	1.000
46	0.50	ROUGH	1.000
47	0.50	ROUGH	1.000
48	0.50	ROUGH	1.000
49	0.50	ROUGH	1.000
50	0.50	ROUGH	1.000
51	0.50	ROUGH	1.000
52	N/A	N/A	N/A
53	N/A	N/A	N/A
54	N/A	N/A	N/A
55	N/A	N/A	N/A
56	N/A	N/A	N/A
57	0.50	ROUGH	1.000
58	0.50	ROUGH	1.000
59	0.50	ROUGH	1.000
60	0.50	ROUGH	1.000
61	0.50	ROUGH	1.000

Drilled Shaft Data:

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Unit weight of concrete = 145.00(pcf), Concrete Slump = 6.00(in)
Modulus of Elasticity of concrete = 3987.00(ksi)

Shaft Geometry:

ID	Length (ft)	Tip Elev. (ft)	Case Len. (ft)	Diameter (in)	Base Diam. (in)	Bell Len. (ft)

1	5.00	-11.60	0.00	48.00	48.00	0.00
2	7.00	-13.60	0.00	48.00	48.00	0.00
3	9.00	-15.60	0.00	48.00	48.00	0.00
4	11.00	-17.60	0.00	48.00	48.00	0.00
5	13.00	-19.60	0.00	48.00	48.00	0.00
6	15.00	-21.60	0.00	48.00	48.00	0.00

BB-09_Drilled_48in_BOC=-6.6ft_Void=-71.6ft.out

7	17.00	-23.60	0.00	48.00	48.00	0.00
8	19.00	-25.60	0.00	48.00	48.00	0.00
9	21.00	-27.60	0.00	48.00	48.00	0.00
10	23.00	-29.60	0.00	48.00	48.00	0.00
11	25.00	-31.60	0.00	48.00	48.00	0.00
12	27.00	-33.60	0.00	48.00	48.00	0.00
13	29.00	-35.60	0.00	48.00	48.00	0.00
14	31.00	-37.60	0.00	48.00	48.00	0.00
15	33.00	-39.60	0.00	48.00	48.00	0.00
16	35.00	-41.60	0.00	48.00	48.00	0.00
17	37.00	-43.60	0.00	48.00	48.00	0.00
18	39.00	-45.60	0.00	48.00	48.00	0.00
19	41.00	-47.60	0.00	48.00	48.00	0.00
20	43.00	-49.60	0.00	48.00	48.00	0.00
21	45.00	-51.60	0.00	48.00	48.00	0.00
22	47.00	-53.60	0.00	48.00	48.00	0.00
23	49.00	-55.60	0.00	48.00	48.00	0.00
24	51.00	-57.60	0.00	48.00	48.00	0.00
25	53.00	-59.60	0.00	48.00	48.00	0.00
26	55.00	-61.60	0.00	48.00	48.00	0.00
27	57.00	-63.60	0.00	48.00	48.00	0.00
28	59.00	-65.60	0.00	48.00	48.00	0.00
29	61.00	-67.60	0.00	48.00	48.00	0.00
30	63.00	-69.60	0.00	48.00	48.00	0.00
31	65.00	-71.60	0.00	48.00	48.00	0.00
32	67.00	-73.60	0.00	48.00	48.00	0.00
33	69.00	-75.60	0.00	48.00	48.00	0.00
34	71.00	-77.60	0.00	48.00	48.00	0.00
35	73.00	-79.60	0.00	48.00	48.00	0.00
36	75.00	-81.60	0.00	48.00	48.00	0.00
37	77.00	-83.60	0.00	48.00	48.00	0.00
38	79.00	-85.60	0.00	48.00	48.00	0.00
39	81.00	-87.60	0.00	48.00	48.00	0.00
40	83.00	-89.60	0.00	48.00	48.00	0.00
41	85.00	-91.60	0.00	48.00	48.00	0.00
42	87.00	-93.60	0.00	48.00	48.00	0.00
43	89.00	-95.60	0.00	48.00	48.00	0.00
44	91.00	-97.60	0.00	48.00	48.00	0.00
45	93.00	-99.60	0.00	48.00	48.00	0.00
46	95.00	-101.60	0.00	48.00	48.00	0.00
47	97.00	-103.60	0.00	48.00	48.00	0.00
48	99.00	-105.60	0.00	48.00	48.00	0.00
49	101.00	-107.60	0.00	48.00	48.00	0.00
50	103.00	-109.60	0.00	48.00	48.00	0.00
51	105.00	-111.60	0.00	48.00	48.00	0.00
52	107.00	-113.60	0.00	48.00	48.00	0.00
53	109.00	-115.60	0.00	48.00	48.00	0.00
54	111.00	-117.60	0.00	48.00	48.00	0.00
55	113.00	-119.60	0.00	48.00	48.00	0.00

BB-09_Drilled_48in_BOC=-6.6ft_Void=-71.6ft.out

56 115.00 -121.60 0.00 48.00 48.00 0.00

Drilled Shaft Capacity (sorted by shaft diameter):

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Strength reduction factors: Skin-friction = 1.00, End-bearing = 1.00

ID	Diameter (in)	Length (ft)	Skin Fric. (tons)	End Bearing (tons)	Capacity (tons)
1	48.00	5.00	0.000	0.000	0.000
2	48.00	7.00	0.000	0.000	0.000
3	48.00	9.00	0.000	0.000	0.000
4	48.00	11.00	0.000	0.000	0.000
5	48.00	13.00	0.000	0.000	0.000
6	48.00	15.00	0.000	0.000	0.000
7	48.00	17.00	0.000	0.000	0.000
8	48.00	19.00	0.000	0.000	0.000
9	48.00	21.00	0.000	0.000	0.000
10	48.00	23.00	0.000	0.000	0.000
11	48.00	25.00	0.000	0.000	0.000
12	48.00	27.00	0.000	0.000	0.000
13	48.00	29.00	0.000	0.000	0.000
14	48.00	31.00	0.000	0.000	0.000
15	48.00	33.00	0.000	0.000	0.000
16	48.00	35.00	0.000	0.000	0.000
17	48.00	37.00	0.000	0.000	0.000
18	48.00	39.00	0.000	0.000	0.000
19	48.00	41.00	0.000	0.000	0.000
20	48.00	43.00	0.000	0.000	0.000
21	48.00	45.00	0.000	0.000	0.000
22	48.00	47.00	0.000	0.000	0.000
23	48.00	49.00	0.000	0.000	0.000
24	48.00	51.00	0.000	0.000	0.000
25	48.00	53.00	0.000	0.000	0.000
26	48.00	55.00	0.000	0.000	0.000
27	48.00	57.00	0.000	0.000	0.000
28	48.00	59.00	0.000	0.000	0.000
29	48.00	61.00	0.000	0.000	0.000
30	48.00	63.00	0.000	0.000	0.000
31	48.00	65.00	0.000	157.080	157.080
32	48.00	67.00	125.664	157.080	282.743
33	48.00	69.00	251.327	157.080	408.407
34	48.00	71.00	376.991	157.080	534.071
35	48.00	73.00	502.655	157.080	659.734
36	48.00	75.00	628.319	175.078	803.397
37	48.00	77.00	631.545	184.241	815.786
38	48.00	79.00	726.661	157.080	883.741
39	48.00	81.00	852.325	157.080	1009.405

BB-09_Drilled_48in_BOC=-6.6ft_Void=-71.6ft.out

40	48.00	83.00	977.989	157.080	1135.068
41	48.00	85.00	1103.653	157.080	1260.732
42	48.00	87.00	1229.316	157.080	1386.396
43	48.00	89.00	1354.980	157.080	1512.060
44	48.00	91.00	1480.644	157.080	1637.723
45	48.00	93.00	1606.307	157.080	1763.387
46	48.00	95.00	1731.971	157.080	1889.051
47	48.00	97.00	1857.635	157.080	2014.714
48	48.00	99.00	1983.299	157.080	2140.378
49	48.00	101.00	2108.962	157.080	2266.042
50	48.00	103.00	2234.626	157.080	2391.706
51	48.00	105.00	2360.290	157.080	2517.369
52	48.00	107.00	2485.953	157.080	2643.033
53	48.00	109.00	2611.617	157.080	2768.697
54	48.00	111.00	2679.601	215.539	2895.140
55	48.00	113.00	2690.237	224.504	2914.742
56	48.00	115.00	2701.317	157.080	2858.397

Drilled Shaft Capacity at User-Defined Settlement (sorted by shaft diameter):

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**** Capacity is NOT modified by the strength reduction factors ****

User-Defined Settlement = 1.04%

ID	Diameter (in)	Length (ft)	Skin Fric. (tons)	End Bearing (tons)	Capacity (tons)
1	48.00	5.00	0.000	0.000	0.000
2	48.00	7.00	0.000	0.000	0.000
3	48.00	9.00	0.000	0.000	0.000
4	48.00	11.00	0.000	0.000	0.000
5	48.00	13.00	0.000	0.000	0.000
6	48.00	15.00	0.000	0.000	0.000
7	48.00	17.00	0.000	0.000	0.000
8	48.00	19.00	0.000	0.000	0.000
9	48.00	21.00	0.000	0.000	0.000
10	48.00	23.00	0.000	0.000	0.000
11	48.00	25.00	0.000	0.000	0.000
12	48.00	27.00	0.000	0.000	0.000
13	48.00	29.00	0.000	0.000	0.000
14	48.00	31.00	0.000	0.000	0.000
15	48.00	33.00	0.000	0.000	0.000
16	48.00	35.00	0.000	0.000	0.000
17	48.00	37.00	0.000	0.000	0.000
18	48.00	39.00	0.000	0.000	0.000
19	48.00	41.00	0.000	0.000	0.000
20	48.00	43.00	0.000	0.000	0.000

BB-09_Drilled_48in_BOC=-6.6ft_Void=-71.6ft.out

21	48.00	45.00	0.000	0.000	0.000
22	48.00	47.00	0.000	0.000	0.000
23	48.00	49.00	0.000	0.000	0.000
24	48.00	51.00	0.000	0.000	0.000
25	48.00	53.00	0.000	0.000	0.000
26	48.00	55.00	0.000	0.000	0.000
27	48.00	57.00	0.000	0.000	0.000
28	48.00	59.00	0.000	0.000	0.000
29	48.00	61.00	0.000	0.000	0.000
30	48.00	63.00	0.000	0.000	0.000
31	48.00	65.00	0.000	703.348	703.348
32	48.00	67.00	59.576	536.030	595.606
33	48.00	69.00	113.300	336.899	450.198
34	48.00	71.00	162.017	256.755	418.771
35	48.00	73.00	206.418	211.743	418.161
36	48.00	75.00	253.238	55.704	308.942
37	48.00	77.00	256.393	58.619	315.013
38	48.00	79.00	291.466	208.300	499.766
39	48.00	81.00	335.986	205.560	541.547
40	48.00	83.00	379.347	202.615	581.962
41	48.00	85.00	421.646	199.589	621.235
42	48.00	87.00	462.965	196.553	659.518
43	48.00	89.00	503.375	193.544	696.918
44	48.00	91.00	542.935	190.584	733.519
45	48.00	93.00	581.698	187.686	769.384
46	48.00	95.00	619.712	184.854	804.567
47	48.00	97.00	657.018	182.093	839.111
48	48.00	99.00	693.653	179.401	873.054
49	48.00	101.00	729.652	176.778	906.430
50	48.00	103.00	765.046	174.222	939.268
51	48.00	105.00	799.862	171.731	971.593
52	48.00	107.00	834.128	169.301	1003.429
53	48.00	109.00	867.867	166.931	1034.798
54	48.00	111.00	889.585	68.577	958.162
55	48.00	113.00	899.988	71.430	971.418
56	48.00	115.00	910.826	165.768	1076.594

BB-09_Drilled_48in_BOC=-6.6ft_Void=-71.6ft.out

General Information:
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Input file: d Shaft\DS Water\BB-09_Drilled_60in_BOC=-6.6ft_Void=-71.6ft.in
Project number: B-22-074
Job name: Broad Causeway Bridge
Engineer: PV/TC
Units: English

Analysis Information:
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Analysis Type: Drilled Shaft Analysis

Soil Information:
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Boring date: 12/20/23
Boring number: BB-09
Station number: 134+48 Offset: 25 LT

Ground Elevation: -6.60(ft)
Water table Elevation = 3.70(ft)

Cu is calculated using: Direct method.
Rock side-friction is calculated using: McVay's method
Hammer type: Automatic Hammer, Correction factor = 1.24

ID	Depth (ft)	Elevation (ft)	SPT Blows (Blows/ft)	Unit Weight (pcf)	Soil Type
-----	-----	-----	-----	-----	-----
1	0.00	-6.60	N/A	119.00	5- Cavity layer
2	2.00	-8.60	N/A	119.00	5- Cavity layer
3	4.00	-10.60	N/A	118.00	5- Cavity layer
4	6.00	-12.60	N/A	122.00	5- Cavity layer
5	8.00	-14.60	N/A	122.00	5- Cavity layer
6	10.00	-16.60	N/A	124.00	5- Cavity layer
7	12.00	-18.60	N/A	119.00	5- Cavity layer
8	14.00	-20.60	N/A	121.00	5- Cavity layer
9	16.00	-22.60	N/A	133.00	5- Cavity layer
10	20.00	-26.60	N/A	116.00	5- Cavity layer
11	22.50	-29.10	N/A	115.00	5- Cavity layer
12	25.00	-31.60	N/A	115.00	5- Cavity layer
13	27.50	-34.10	N/A	120.00	5- Cavity layer

BB-09_Drilled_60in_BOC=-6.6ft_Void=-71.6ft.out

14	30.00	-36.60	N/A	120.00	5- Cavity layer
15	32.50	-39.10	N/A	115.00	5- Cavity layer
16	35.00	-41.60	N/A	120.00	5- Cavity layer
17	37.50	-44.10	N/A	115.00	5- Cavity layer
18	40.00	-46.60	N/A	115.00	5- Cavity layer
19	42.50	-49.10	N/A	115.00	5- Cavity layer
20	45.00	-51.60	N/A	115.00	5- Cavity layer
21	47.50	-54.10	N/A	92.00	5- Cavity layer
22	50.00	-56.60	N/A	86.00	5- Cavity layer
23	52.50	-59.10	N/A	0.00	5- Cavity layer
24	55.00	-61.60	N/A	135.00	5- Cavity layer
25	57.50	-64.10	N/A	135.00	5- Cavity layer
26	60.00	-66.60	N/A	0.00	5- Cavity layer
27	62.50	-69.10	N/A	135.00	5- Cavity layer
28	65.00	-71.60	N/A	135.00	5- Cavity layer
29	65.00	-71.60	N/A	0.00	1- Plastic Clay
30	65.00	-71.60	N/A	135.00	4- Lime Stone/Very shelly sand
31	67.50	-74.10	N/A	135.00	4- Lime Stone/Very shelly sand
32	70.00	-76.60	N/A	135.00	4- Lime Stone/Very shelly sand
33	72.50	-79.10	N/A	135.00	4- Lime Stone/Very shelly sand
34	75.00	-81.60	N/A	135.00	4- Lime Stone/Very shelly sand
35	75.00	-81.60	N/A	0.00	1- Plastic Clay
36	75.00	-81.60	45.00	131.00	3- Clean sand
37	77.50	-84.10	45.00	131.00	3- Clean sand
38	77.50	-84.10	N/A	0.00	1- Plastic Clay
39	77.50	-84.10	N/A	135.00	4- Lime Stone/Very shelly sand
40	80.00	-86.60	N/A	135.00	4- Lime Stone/Very shelly sand
41	82.50	-89.10	N/A	135.00	4- Lime Stone/Very shelly sand
42	85.00	-91.60	N/A	135.00	4- Lime Stone/Very shelly sand
43	87.50	-94.10	N/A	135.00	4- Lime Stone/Very shelly sand
44	90.00	-96.60	N/A	135.00	4- Lime Stone/Very shelly sand
45	92.50	-99.10	N/A	135.00	4- Lime Stone/Very shelly sand
46	95.00	-101.60	N/A	135.00	4- Lime Stone/Very shelly sand
47	97.50	-104.10	N/A	135.00	4- Lime Stone/Very shelly sand
48	100.00	-106.60	N/A	135.00	4- Lime Stone/Very shelly sand
49	102.50	-109.10	N/A	135.00	4- Lime Stone/Very shelly sand
50	105.00	-111.60	N/A	135.00	4- Lime Stone/Very shelly sand
51	107.50	-114.10	N/A	135.00	4- Lime Stone/Very shelly sand
52	110.00	-116.60	N/A	135.00	4- Lime Stone/Very shelly sand
53	110.00	-116.60	N/A	0.00	1- Plastic Clay
54	110.00	-116.60	100.00	133.00	3- Clean sand
55	112.50	-119.10	100.00	133.00	3- Clean sand
56	115.00	-121.60	20.00	122.00	3- Clean sand
57	115.00	-121.60	N/A	0.00	1- Plastic Clay
58	115.00	-121.60	N/A	135.00	4- Lime Stone/Very shelly sand
59	117.50	-124.10	N/A	135.00	4- Lime Stone/Very shelly sand
60	120.00	-126.60	N/A	130.00	4- Lime Stone/Very shelly sand
61	122.50	-129.10	N/A	135.00	4- Lime Stone/Very shelly sand
62	125.00	-131.60	N/A	135.00	4- Lime Stone/Very shelly sand

BB-09_Drilled_60in_BOC=-6.6ft_Void=-71.6ft.out

ID	Cu-DIR (tsf)	qu (tsf)	qt (tsf)	Em (ksi)	qb (tsf)
1	N/A	N/A	N/A	N/A	N/A
2	N/A	N/A	N/A	N/A	N/A
3	N/A	N/A	N/A	N/A	N/A
4	N/A	N/A	N/A	N/A	N/A
5	N/A	N/A	N/A	N/A	N/A
6	N/A	N/A	N/A	N/A	N/A
7	N/A	N/A	N/A	N/A	N/A
8	N/A	N/A	N/A	N/A	N/A
9	N/A	N/A	N/A	N/A	N/A
10	N/A	N/A	N/A	N/A	N/A
11	N/A	N/A	N/A	N/A	N/A
12	N/A	N/A	N/A	N/A	N/A
13	N/A	N/A	N/A	N/A	N/A
14	N/A	N/A	N/A	N/A	N/A
15	N/A	N/A	N/A	N/A	N/A
16	N/A	N/A	N/A	N/A	N/A
17	N/A	N/A	N/A	N/A	N/A
18	N/A	N/A	N/A	N/A	N/A
19	N/A	N/A	N/A	N/A	N/A
20	N/A	N/A	N/A	N/A	N/A
21	N/A	N/A	N/A	N/A	N/A
22	N/A	N/A	N/A	N/A	N/A
23	N/A	N/A	N/A	N/A	N/A
24	N/A	N/A	N/A	N/A	N/A
25	N/A	N/A	N/A	N/A	N/A
26	N/A	N/A	N/A	N/A	N/A
27	N/A	N/A	N/A	N/A	N/A
28	N/A	N/A	N/A	N/A	N/A
29	0.00	N/A	N/A	N/A	N/A
30	N/A	25.00	4.00	39.93	12.50
31	N/A	25.00	4.00	39.93	12.50
32	N/A	25.00	4.00	39.93	12.50
33	N/A	25.00	4.00	39.93	12.50
34	N/A	25.00	4.00	39.93	12.50
35	0.00	N/A	N/A	N/A	N/A
36	N/A	N/A	N/A	N/A	N/A
37	N/A	N/A	N/A	N/A	N/A
38	0.00	N/A	N/A	N/A	N/A
39	N/A	25.00	4.00	39.93	12.50
40	N/A	25.00	4.00	39.93	12.50
41	N/A	25.00	4.00	39.93	12.50
42	N/A	25.00	4.00	39.93	12.50
43	N/A	25.00	4.00	39.93	12.50
44	N/A	25.00	4.00	39.93	12.50
45	N/A	25.00	4.00	39.93	12.50

BB-09_Drilled_60in_BOC=-6.6ft_Void=-71.6ft.out

46	N/A	25.00	4.00	39.93	12.50
47	N/A	25.00	4.00	39.93	12.50
48	N/A	25.00	4.00	39.93	12.50
49	N/A	25.00	4.00	39.93	12.50
50	N/A	25.00	4.00	39.93	12.50
51	N/A	25.00	4.00	39.93	12.50
52	N/A	25.00	4.00	39.93	12.50
53	0.00	N/A	N/A	N/A	N/A
54	N/A	N/A	N/A	N/A	N/A
55	N/A	N/A	N/A	N/A	N/A
56	N/A	N/A	N/A	N/A	N/A
57	0.00	N/A	N/A	N/A	N/A
58	N/A	25.00	4.00	39.93	12.50
59	N/A	25.00	4.00	39.93	12.50
60	N/A	25.00	4.00	39.93	12.50
61	N/A	25.00	4.00	39.93	12.50
62	N/A	25.00	4.00	39.93	12.50

ID	RQD F.M.	S.R.I.	Rock Recovery
1	N/A	N/A	N/A
2	N/A	N/A	N/A
3	N/A	N/A	N/A
4	N/A	N/A	N/A
5	N/A	N/A	N/A
6	N/A	N/A	N/A
7	N/A	N/A	N/A
8	N/A	N/A	N/A
9	N/A	N/A	N/A
10	N/A	N/A	N/A
11	N/A	N/A	N/A
12	N/A	N/A	N/A
13	N/A	N/A	N/A
14	N/A	N/A	N/A
15	N/A	N/A	N/A
16	N/A	N/A	N/A
17	N/A	N/A	N/A
18	N/A	N/A	N/A
19	N/A	N/A	N/A
20	N/A	N/A	N/A
21	N/A	N/A	N/A
22	N/A	N/A	N/A
23	N/A	N/A	N/A
24	N/A	N/A	N/A
25	N/A	N/A	N/A
26	N/A	N/A	N/A
27	N/A	N/A	N/A
28	N/A	N/A	N/A

BB-09_Drilled_60in_BOC=-6.6ft_Void=-71.6ft.out

29	N/A	N/A	N/A
30	0.50	ROUGH	1.000
31	0.50	ROUGH	1.000
32	0.50	ROUGH	1.000
33	0.50	ROUGH	1.000
34	0.50	ROUGH	1.000
35	N/A	N/A	N/A
36	N/A	N/A	N/A
37	N/A	N/A	N/A
38	N/A	N/A	N/A
39	0.50	ROUGH	1.000
40	0.50	ROUGH	1.000
41	0.50	ROUGH	1.000
42	0.50	ROUGH	1.000
43	0.50	ROUGH	1.000
44	0.50	ROUGH	1.000
45	0.50	ROUGH	1.000
46	0.50	ROUGH	1.000
47	0.50	ROUGH	1.000
48	0.50	ROUGH	1.000
49	0.50	ROUGH	1.000
50	0.50	ROUGH	1.000
51	0.50	ROUGH	1.000
52	0.50	ROUGH	1.000
53	N/A	N/A	N/A
54	N/A	N/A	N/A
55	N/A	N/A	N/A
56	N/A	N/A	N/A
57	N/A	N/A	N/A
58	0.50	ROUGH	1.000
59	0.50	ROUGH	1.000
60	0.50	ROUGH	1.000
61	0.50	ROUGH	1.000
62	0.50	ROUGH	1.000

Drilled Shaft Data:

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Unit weight of concrete = 145.00(pcf), Concrete Slump = 6.00(in)

Modulus of Elasticity of concrete = 3987.00(ksi)

Shaft Geometry:

ID	Length (ft)	Tip Elev. (ft)	Case Len. (ft)	Diameter (in)	Base Diam. (in)	Bell Len. (ft)

1	5.00	-11.60	0.00	60.00	60.00	0.00
2	7.00	-13.60	0.00	60.00	60.00	0.00
3	9.00	-15.60	0.00	60.00	60.00	0.00

BB-09_Drilled_60in_BOC=-6.6ft_Void=-71.6ft.out

4	11.00	-17.60	0.00	60.00	60.00	0.00
5	13.00	-19.60	0.00	60.00	60.00	0.00
6	15.00	-21.60	0.00	60.00	60.00	0.00
7	17.00	-23.60	0.00	60.00	60.00	0.00
8	19.00	-25.60	0.00	60.00	60.00	0.00
9	21.00	-27.60	0.00	60.00	60.00	0.00
10	23.00	-29.60	0.00	60.00	60.00	0.00
11	25.00	-31.60	0.00	60.00	60.00	0.00
12	27.00	-33.60	0.00	60.00	60.00	0.00
13	29.00	-35.60	0.00	60.00	60.00	0.00
14	31.00	-37.60	0.00	60.00	60.00	0.00
15	33.00	-39.60	0.00	60.00	60.00	0.00
16	35.00	-41.60	0.00	60.00	60.00	0.00
17	37.00	-43.60	0.00	60.00	60.00	0.00
18	39.00	-45.60	0.00	60.00	60.00	0.00
19	41.00	-47.60	0.00	60.00	60.00	0.00
20	43.00	-49.60	0.00	60.00	60.00	0.00
21	45.00	-51.60	0.00	60.00	60.00	0.00
22	47.00	-53.60	0.00	60.00	60.00	0.00
23	49.00	-55.60	0.00	60.00	60.00	0.00
24	51.00	-57.60	0.00	60.00	60.00	0.00
25	53.00	-59.60	0.00	60.00	60.00	0.00
26	55.00	-61.60	0.00	60.00	60.00	0.00
27	57.00	-63.60	0.00	60.00	60.00	0.00
28	59.00	-65.60	0.00	60.00	60.00	0.00
29	61.00	-67.60	0.00	60.00	60.00	0.00
30	63.00	-69.60	0.00	60.00	60.00	0.00
31	65.00	-71.60	0.00	60.00	60.00	0.00
32	67.00	-73.60	0.00	60.00	60.00	0.00
33	69.00	-75.60	0.00	60.00	60.00	0.00
34	71.00	-77.60	0.00	60.00	60.00	0.00
35	73.00	-79.60	0.00	60.00	60.00	0.00
36	75.00	-81.60	0.00	60.00	60.00	0.00
37	77.00	-83.60	0.00	60.00	60.00	0.00
38	79.00	-85.60	0.00	60.00	60.00	0.00
39	81.00	-87.60	0.00	60.00	60.00	0.00
40	83.00	-89.60	0.00	60.00	60.00	0.00
41	85.00	-91.60	0.00	60.00	60.00	0.00
42	87.00	-93.60	0.00	60.00	60.00	0.00
43	89.00	-95.60	0.00	60.00	60.00	0.00
44	91.00	-97.60	0.00	60.00	60.00	0.00
45	93.00	-99.60	0.00	60.00	60.00	0.00
46	95.00	-101.60	0.00	60.00	60.00	0.00
47	97.00	-103.60	0.00	60.00	60.00	0.00
48	99.00	-105.60	0.00	60.00	60.00	0.00
49	101.00	-107.60	0.00	60.00	60.00	0.00
50	103.00	-109.60	0.00	60.00	60.00	0.00
51	105.00	-111.60	0.00	60.00	60.00	0.00
52	107.00	-113.60	0.00	60.00	60.00	0.00

BB-09_Drilled_60in_BOC=-6.6ft_Void=-71.6ft.out

53	109.00	-115.60	0.00	60.00	60.00	0.00
54	111.00	-117.60	0.00	60.00	60.00	0.00
55	113.00	-119.60	0.00	60.00	60.00	0.00
56	115.00	-121.60	0.00	60.00	60.00	0.00

Drilled Shaft Capacity (sorted by shaft diameter):

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Strength reduction factors: Skin-friction = 1.00, End-bearing = 1.00

ID	Diameter (in)	Length (ft)	Skin Fric. (tons)	End Bearing (tons)	Capacity (tons)

1	60.00	5.00	0.000	0.000	0.000
2	60.00	7.00	0.000	0.000	0.000
3	60.00	9.00	0.000	0.000	0.000
4	60.00	11.00	0.000	0.000	0.000
5	60.00	13.00	0.000	0.000	0.000
6	60.00	15.00	0.000	0.000	0.000
7	60.00	17.00	0.000	0.000	0.000
8	60.00	19.00	0.000	0.000	0.000
9	60.00	21.00	0.000	0.000	0.000
10	60.00	23.00	0.000	0.000	0.000
11	60.00	25.00	0.000	0.000	0.000
12	60.00	27.00	0.000	0.000	0.000
13	60.00	29.00	0.000	0.000	0.000
14	60.00	31.00	0.000	0.000	0.000
15	60.00	33.00	0.000	0.000	0.000
16	60.00	35.00	0.000	0.000	0.000
17	60.00	37.00	0.000	0.000	0.000
18	60.00	39.00	0.000	0.000	0.000
19	60.00	41.00	0.000	0.000	0.000
20	60.00	43.00	0.000	0.000	0.000
21	60.00	45.00	0.000	0.000	0.000
22	60.00	47.00	0.000	0.000	0.000
23	60.00	49.00	0.000	0.000	0.000
24	60.00	51.00	0.000	0.000	0.000
25	60.00	53.00	0.000	0.000	0.000
26	60.00	55.00	0.000	0.000	0.000
27	60.00	57.00	0.000	0.000	0.000
28	60.00	59.00	0.000	0.000	0.000
29	60.00	61.00	0.000	0.000	0.000
30	60.00	63.00	0.000	0.000	0.000
31	60.00	65.00	0.000	245.437	245.437
32	60.00	67.00	157.080	245.437	402.517
33	60.00	69.00	314.159	245.437	559.596
34	60.00	71.00	471.239	245.437	716.676
35	60.00	73.00	628.319	245.437	873.755
36	60.00	75.00	785.398	240.324	1025.722

BB-09_Drilled_60in_BOC=-6.6ft_Void=-71.6ft.out

37	60.00	77.00	789.431	249.868	1039.299
38	60.00	79.00	908.327	245.437	1153.764
39	60.00	81.00	1065.406	245.437	1310.843
40	60.00	83.00	1222.486	245.437	1467.923
41	60.00	85.00	1379.566	245.437	1625.003
42	60.00	87.00	1536.645	245.437	1782.082
43	60.00	89.00	1693.725	245.437	1939.162
44	60.00	91.00	1850.805	245.437	2096.242
45	60.00	93.00	2007.884	245.437	2253.321
46	60.00	95.00	2164.964	245.437	2410.401
47	60.00	97.00	2322.043	245.437	2567.480
48	60.00	99.00	2479.123	245.437	2724.560
49	60.00	101.00	2636.203	245.437	2881.640
50	60.00	103.00	2793.282	245.437	3038.719
51	60.00	105.00	2950.362	245.437	3195.799
52	60.00	107.00	3107.442	245.437	3352.879
53	60.00	109.00	3264.521	245.437	3509.958
54	60.00	111.00	3349.526	265.426	3614.952
55	60.00	113.00	3362.870	274.765	3637.635
56	60.00	115.00	3376.769	245.437	3622.206

Drilled Shaft Capacity at User-Defined Settlement (sorted by shaft diameter):

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**** Capacity is NOT modified by the strength reduction factors ****

User-Defined Settlement = 0.83%

ID	Diameter (in)	Length (ft)	Skin Fric. (tons)	End Bearing (tons)	Capacity (tons)

1	60.00	5.00	0.000	0.000	0.000
2	60.00	7.00	0.000	0.000	0.000
3	60.00	9.00	0.000	0.000	0.000
4	60.00	11.00	0.000	0.000	0.000
5	60.00	13.00	0.000	0.000	0.000
6	60.00	15.00	0.000	0.000	0.000
7	60.00	17.00	0.000	0.000	0.000
8	60.00	19.00	0.000	0.000	0.000
9	60.00	21.00	0.000	0.000	0.000
10	60.00	23.00	0.000	0.000	0.000
11	60.00	25.00	0.000	0.000	0.000
12	60.00	27.00	0.000	0.000	0.000
13	60.00	29.00	0.000	0.000	0.000
14	60.00	31.00	0.000	0.000	0.000
15	60.00	33.00	0.000	0.000	0.000
16	60.00	35.00	0.000	0.000	0.000
17	60.00	37.00	0.000	0.000	0.000

BB-09_Drilled_60in_BOC=-6.6ft_Void=-71.6ft.out

18	60.00	39.00	0.000	0.000	0.000
19	60.00	41.00	0.000	0.000	0.000
20	60.00	43.00	0.000	0.000	0.000
21	60.00	45.00	0.000	0.000	0.000
22	60.00	47.00	0.000	0.000	0.000
23	60.00	49.00	0.000	0.000	0.000
24	60.00	51.00	0.000	0.000	0.000
25	60.00	53.00	0.000	0.000	0.000
26	60.00	55.00	0.000	0.000	0.000
27	60.00	57.00	0.000	0.000	0.000
28	60.00	59.00	0.000	0.000	0.000
29	60.00	61.00	0.000	0.000	0.000
30	60.00	63.00	0.000	0.000	0.000
31	60.00	65.00	0.000	945.913	945.913
32	60.00	67.00	74.467	837.143	911.611
33	60.00	69.00	141.614	526.150	667.765
34	60.00	71.00	202.500	400.985	603.486
35	60.00	73.00	257.989	330.689	588.678
36	60.00	75.00	308.791	62.747	371.538
37	60.00	77.00	312.721	65.239	377.960
38	60.00	79.00	355.356	283.598	638.954
39	60.00	81.00	409.387	281.308	690.695
40	60.00	83.00	461.957	278.528	740.486
41	60.00	85.00	513.196	275.480	788.676
42	60.00	87.00	563.210	272.289	835.499
43	60.00	89.00	612.090	269.035	881.125
44	60.00	91.00	659.914	265.765	925.680
45	60.00	93.00	706.751	262.510	969.261
46	60.00	95.00	752.659	259.289	1011.948
47	60.00	97.00	797.693	256.114	1053.808
48	60.00	99.00	841.901	252.992	1094.894
49	60.00	101.00	885.327	249.928	1135.254
50	60.00	103.00	928.008	246.923	1174.931
51	60.00	105.00	969.983	243.978	1213.960
52	60.00	107.00	1011.282	241.093	1252.375
53	60.00	109.00	1051.938	238.267	1290.205
54	60.00	111.00	1078.333	69.301	1147.633
55	60.00	113.00	1091.337	71.739	1163.076
56	60.00	115.00	1104.882	236.876	1341.758

BB-09_Drilled_60in_BOC=-6.6ft_Void=-71.6ft.out

General Information:
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Input file: d Shaft\DS Water\BB-10_Drilled_48in_BOC=-7.1ft_Void=-77.1ft.in
Project number: B-22-074
Job name: Broad Causeway Bridge
Engineer: PV/TC
Units: English

Analysis Information:
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Analysis Type: Drilled Shaft Analysis

Soil Information:
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Boring date: 12/21/23
Boring number: BB-10
Station number: 136+34 Offset: 40 RT

Ground Elevation: -7.10(ft)
Water table Elevation = 2.70(ft)

Rock side-friction is calculated using: McVay's method

ID	Depth (ft)	Elevation (ft)	SPT Blows (Blows/ft)	Unit Weight (pcf)	Soil Type
1	0.00	-7.10	N/A	119.00	5- Cavity layer
2	2.00	-9.10	N/A	119.00	5- Cavity layer
3	4.00	-11.10	N/A	126.00	5- Cavity layer
4	6.00	-13.10	N/A	106.00	5- Cavity layer
5	8.00	-15.10	N/A	119.00	5- Cavity layer
6	10.00	-17.10	N/A	121.00	5- Cavity layer
7	12.00	-19.10	N/A	119.00	5- Cavity layer
8	14.00	-21.10	N/A	122.00	5- Cavity layer
9	16.00	-23.10	N/A	122.00	5- Cavity layer
10	20.00	-27.10	N/A	120.00	5- Cavity layer
11	22.50	-29.60	N/A	115.00	5- Cavity layer
12	25.00	-32.10	N/A	115.00	5- Cavity layer
13	27.50	-34.60	N/A	120.00	5- Cavity layer
14	30.00	-37.10	N/A	120.00	5- Cavity layer
15	32.50	-39.60	N/A	115.00	5- Cavity layer
16	35.00	-42.10	N/A	120.00	5- Cavity layer
17	37.50	-44.60	N/A	115.00	5- Cavity layer
18	40.00	-47.10	N/A	115.00	5- Cavity layer

"BB-10_Drilled_48in_BOC=-7.1ft_Void=-77.1ft.out"

19	42.50	-49.60	N/A	115.00	5- Cavity layer
20	45.00	-52.10	N/A	115.00	5- Cavity layer
21	47.50	-54.60	N/A	92.00	5- Cavity layer
22	50.00	-57.10	N/A	86.00	5- Cavity layer
23	52.50	-59.60	N/A	0.00	5- Cavity layer
24	55.00	-62.10	N/A	135.00	5- Cavity layer
25	55.00	-62.10	N/A	0.00	5- Cavity layer
26	55.00	-62.10	N/A	135.00	5- Cavity layer
27	57.50	-64.60	N/A	135.00	5- Cavity layer
28	60.00	-67.10	N/A	135.00	5- Cavity layer
29	62.50	-69.60	N/A	135.00	5- Cavity layer
30	62.50	-69.60	N/A	0.00	5- Cavity layer
31	62.50	-69.60	N/A	117.00	5- Cavity layer
32	65.00	-72.10	N/A	117.00	5- Cavity layer
33	67.50	-74.60	N/A	115.00	5- Cavity layer
34	70.00	-77.10	N/A	115.00	5- Cavity layer
35	70.00	-77.10	N/A	0.00	5- Cavity layer
36	70.00	-77.10	N/A	135.00	4- Lime Stone/Very shelly sand
37	72.50	-79.60	N/A	135.00	4- Lime Stone/Very shelly sand
38	75.00	-82.10	N/A	135.00	4- Lime Stone/Very shelly sand
39	77.50	-84.60	N/A	135.00	4- Lime Stone/Very shelly sand
40	80.00	-87.10	N/A	135.00	4- Lime Stone/Very shelly sand
41	82.50	-89.60	N/A	130.00	4- Lime Stone/Very shelly sand
42	85.00	-92.10	N/A	135.00	4- Lime Stone/Very shelly sand
43	87.50	-94.60	N/A	135.00	4- Lime Stone/Very shelly sand
44	90.00	-97.10	N/A	135.00	4- Lime Stone/Very shelly sand
45	92.50	-99.60	N/A	135.00	4- Lime Stone/Very shelly sand
46	95.00	-102.10	N/A	135.00	4- Lime Stone/Very shelly sand
47	97.50	-104.60	N/A	135.00	4- Lime Stone/Very shelly sand
48	100.00	-107.10	N/A	135.00	4- Lime Stone/Very shelly sand
49	102.50	-109.60	N/A	135.00	4- Lime Stone/Very shelly sand
50	105.00	-112.10	N/A	135.00	4- Lime Stone/Very shelly sand
51	107.50	-114.60	N/A	135.00	4- Lime Stone/Very shelly sand
52	110.00	-117.10	N/A	135.00	4- Lime Stone/Very shelly sand
53	112.50	-119.60	N/A	135.00	4- Lime Stone/Very shelly sand
54	115.00	-122.10	N/A	135.00	4- Lime Stone/Very shelly sand
55	117.50	-124.60	N/A	135.00	4- Lime Stone/Very shelly sand
56	120.00	-127.10	N/A	135.00	4- Lime Stone/Very shelly sand
57	122.50	-129.60	N/A	135.00	4- Lime Stone/Very shelly sand
58	125.00	-132.10	N/A	135.00	4- Lime Stone/Very shelly sand

ID	Cu-DIR (tsf)	qu (tsf)	qt (tsf)	Em (ksi)	qb (tsf)
1	N/A	N/A	N/A	N/A	N/A
2	N/A	N/A	N/A	N/A	N/A
3	N/A	N/A	N/A	N/A	N/A
4	N/A	N/A	N/A	N/A	N/A
5	N/A	N/A	N/A	N/A	N/A
6	N/A	N/A	N/A	N/A	N/A
7	N/A	N/A	N/A	N/A	N/A
8	N/A	N/A	N/A	N/A	N/A

"BB-10_Drilled_48in_BOC=-7.1ft_Void=-77.1ft.out"

9	N/A	N/A	N/A	N/A	N/A
10	N/A	N/A	N/A	N/A	N/A
11	N/A	N/A	N/A	N/A	N/A
12	N/A	N/A	N/A	N/A	N/A
13	N/A	N/A	N/A	N/A	N/A
14	N/A	N/A	N/A	N/A	N/A
15	N/A	N/A	N/A	N/A	N/A
16	N/A	N/A	N/A	N/A	N/A
17	N/A	N/A	N/A	N/A	N/A
18	N/A	N/A	N/A	N/A	N/A
19	N/A	N/A	N/A	N/A	N/A
20	N/A	N/A	N/A	N/A	N/A
21	N/A	N/A	N/A	N/A	N/A
22	N/A	N/A	N/A	N/A	N/A
23	N/A	N/A	N/A	N/A	N/A
24	N/A	N/A	N/A	N/A	N/A
25	N/A	N/A	N/A	N/A	N/A
26	N/A	N/A	N/A	N/A	N/A
27	N/A	N/A	N/A	N/A	N/A
28	N/A	N/A	N/A	N/A	N/A
29	N/A	N/A	N/A	N/A	N/A
30	N/A	N/A	N/A	N/A	N/A
31	N/A	N/A	N/A	N/A	N/A
32	N/A	N/A	N/A	N/A	N/A
33	N/A	N/A	N/A	N/A	N/A
34	N/A	N/A	N/A	N/A	N/A
35	N/A	N/A	N/A	N/A	N/A
36	N/A	25.00	4.00	39.93	12.50
37	N/A	25.00	4.00	39.93	12.50
38	N/A	25.00	4.00	39.93	12.50
39	N/A	25.00	4.00	39.93	12.50
40	N/A	25.00	4.00	39.93	12.50
41	N/A	22.94	3.67	36.64	11.47
42	N/A	25.00	4.00	39.93	12.50
43	N/A	25.00	4.00	39.93	12.50
44	N/A	25.00	4.00	39.93	12.50
45	N/A	25.00	4.00	39.93	12.50
46	N/A	25.00	4.00	39.93	12.50
47	N/A	25.00	4.00	39.93	12.50
48	N/A	25.00	4.00	39.93	12.50
49	N/A	25.00	4.00	39.93	12.50
50	N/A	25.00	4.00	39.93	12.50
51	N/A	25.00	4.00	39.93	12.50
52	N/A	25.00	4.00	39.93	12.50
53	N/A	25.00	4.00	39.93	12.50
54	N/A	25.00	4.00	39.93	12.50
55	N/A	25.00	4.00	39.93	12.50
56	N/A	25.00	4.00	39.93	12.50
57	N/A	25.00	4.00	39.93	12.50
58	N/A	25.00	4.00	39.93	12.50

Top of Rock Socket
elev = -77.1'

ID	RQD F.M.	S.R.I.	Rock Recovery		
"BB-10_Drilled_48in_BOC=-7.1ft_Void=-77.1ft.out"					

Top of Rock Socket
elev = -77.1'

1	N/A	N/A	N/A
2	N/A	N/A	N/A
3	N/A	N/A	N/A
4	N/A	N/A	N/A
5	N/A	N/A	N/A
6	N/A	N/A	N/A
7	N/A	N/A	N/A
8	N/A	N/A	N/A
9	N/A	N/A	N/A
10	N/A	N/A	N/A
11	N/A	N/A	N/A
12	N/A	N/A	N/A
13	N/A	N/A	N/A
14	N/A	N/A	N/A
15	N/A	N/A	N/A
16	N/A	N/A	N/A
17	N/A	N/A	N/A
18	N/A	N/A	N/A
19	N/A	N/A	N/A
20	N/A	N/A	N/A
21	N/A	N/A	N/A
22	N/A	N/A	N/A
23	N/A	N/A	N/A
24	N/A	N/A	N/A
25	N/A	N/A	N/A
26	N/A	N/A	N/A
27	N/A	N/A	N/A
28	N/A	N/A	N/A
29	N/A	N/A	N/A
30	N/A	N/A	N/A
31	N/A	N/A	N/A
32	N/A	N/A	N/A
33	N/A	N/A	N/A
34	N/A	N/A	N/A
35	N/A	N/A	N/A
36	0.50	ROUGH	1.000
37	0.50	ROUGH	1.000
38	0.50	ROUGH	1.000
39	0.50	ROUGH	1.000
40	0.50	ROUGH	1.000
41	0.50	ROUGH	1.000
42	0.50	ROUGH	1.000
43	0.50	ROUGH	1.000
44	0.50	ROUGH	1.000
45	0.50	ROUGH	1.000
46	0.50	ROUGH	1.000
47	0.50	ROUGH	1.000
48	0.50	ROUGH	1.000
49	0.50	ROUGH	1.000
50	0.50	ROUGH	1.000
"BB-10_Drilled_48in_BOC=-7.1ft_Void=-77.1ft.out"			

51	0.50	ROUGH	1.000
52	0.50	ROUGH	1.000
53	0.50	ROUGH	1.000
54	0.50	ROUGH	1.000
55	0.50	ROUGH	1.000
56	0.50	ROUGH	1.000
57	0.50	ROUGH	1.000
58	0.50	ROUGH	1.000

Drilled Shaft Data:

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Unit weight of concrete = 145.00(pcf), Concrete Slump = 6.00(in)
Modulus of Elasticity of concrete = 3987.00(ksi)

Shaft Geometry:

ID	Length (ft)	Tip Elev. (ft)	Case Len. (ft)	Diameter (in)	Base Diam. (in)	Bell Len. (ft)

1	5.00	-12.10	0.00	48.00	48.00	0.00
2	7.00	-14.10	0.00	48.00	48.00	0.00
3	9.00	-16.10	0.00	48.00	48.00	0.00
4	11.00	-18.10	0.00	48.00	48.00	0.00
5	13.00	-20.10	0.00	48.00	48.00	0.00
6	15.00	-22.10	0.00	48.00	48.00	0.00
7	17.00	-24.10	0.00	48.00	48.00	0.00
8	19.00	-26.10	0.00	48.00	48.00	0.00
9	21.00	-28.10	0.00	48.00	48.00	0.00
10	23.00	-30.10	0.00	48.00	48.00	0.00
11	25.00	-32.10	0.00	48.00	48.00	0.00
12	27.00	-34.10	0.00	48.00	48.00	0.00
13	29.00	-36.10	0.00	48.00	48.00	0.00
14	31.00	-38.10	0.00	48.00	48.00	0.00
15	33.00	-40.10	0.00	48.00	48.00	0.00
16	35.00	-42.10	0.00	48.00	48.00	0.00
17	37.00	-44.10	0.00	48.00	48.00	0.00
18	39.00	-46.10	0.00	48.00	48.00	0.00
19	41.00	-48.10	0.00	48.00	48.00	0.00
20	43.00	-50.10	0.00	48.00	48.00	0.00
21	45.00	-52.10	0.00	48.00	48.00	0.00
22	47.00	-54.10	0.00	48.00	48.00	0.00
23	49.00	-56.10	0.00	48.00	48.00	0.00
24	51.00	-58.10	0.00	48.00	48.00	0.00
25	53.00	-60.10	0.00	48.00	48.00	0.00
26	55.00	-62.10	0.00	48.00	48.00	0.00
27	57.00	-64.10	0.00	48.00	48.00	0.00
28	59.00	-66.10	0.00	48.00	48.00	0.00
29	61.00	-68.10	0.00	48.00	48.00	0.00
30	63.00	-70.10	0.00	48.00	48.00	0.00
31	65.00	-72.10	0.00	48.00	48.00	0.00
32	67.00	-74.10	0.00	48.00	48.00	0.00

"BB-10_Drilled_48in_BOC=-7.1ft_Void=-77.1ft.out"

33	69.00	-76.10	0.00	48.00	48.00	0.00
34	71.00	-78.10	0.00	48.00	48.00	0.00
35	73.00	-80.10	0.00	48.00	48.00	0.00
36	75.00	-82.10	0.00	48.00	48.00	0.00
37	77.00	-84.10	0.00	48.00	48.00	0.00
38	79.00	-86.10	0.00	48.00	48.00	0.00
39	81.00	-88.10	0.00	48.00	48.00	0.00
40	83.00	-90.10	0.00	48.00	48.00	0.00
41	85.00	-92.10	0.00	48.00	48.00	0.00
42	87.00	-94.10	0.00	48.00	48.00	0.00
43	89.00	-96.10	0.00	48.00	48.00	0.00
44	91.00	-98.10	0.00	48.00	48.00	0.00
45	93.00	-100.10	0.00	48.00	48.00	0.00
46	95.00	-102.10	0.00	48.00	48.00	0.00
47	97.00	-104.10	0.00	48.00	48.00	0.00
48	99.00	-106.10	0.00	48.00	48.00	0.00
49	101.00	-108.10	0.00	48.00	48.00	0.00
50	103.00	-110.10	0.00	48.00	48.00	0.00
51	105.00	-112.10	0.00	48.00	48.00	0.00
52	107.00	-114.10	0.00	48.00	48.00	0.00
53	109.00	-116.10	0.00	48.00	48.00	0.00
54	111.00	-118.10	0.00	48.00	48.00	0.00
55	113.00	-120.10	0.00	48.00	48.00	0.00
56	115.00	-122.10	0.00	48.00	48.00	0.00

Drilled Shaft Capacity (sorted by shaft diameter):

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Strength reduction factors: Skin-friction = 1.00, End-bearing = 1.00

ID	Diameter (in)	Length (ft)	Skin Fric. (tons)	End Bearing (tons)	Capacity (tons)

1	48.00	5.00	0.000	0.000	0.000
2	48.00	7.00	0.000	0.000	0.000
3	48.00	9.00	0.000	0.000	0.000
4	48.00	11.00	0.000	0.000	0.000
5	48.00	13.00	0.000	0.000	0.000
6	48.00	15.00	0.000	0.000	0.000
7	48.00	17.00	0.000	0.000	0.000
8	48.00	19.00	0.000	0.000	0.000
9	48.00	21.00	0.000	0.000	0.000
10	48.00	23.00	0.000	0.000	0.000
11	48.00	25.00	0.000	0.000	0.000
12	48.00	27.00	0.000	0.000	0.000
13	48.00	29.00	0.000	0.000	0.000
14	48.00	31.00	0.000	0.000	0.000
15	48.00	33.00	0.000	0.000	0.000
16	48.00	35.00	0.000	0.000	0.000
17	48.00	37.00	0.000	0.000	0.000
18	48.00	39.00	0.000	0.000	0.000
19	48.00	41.00	0.000	0.000	0.000

"BB-10_Drilled_48in_BOC=-7.1ft_Void=-77.1ft.out"

20	48.00	43.00	0.000	0.000	0.000
21	48.00	45.00	0.000	0.000	0.000
22	48.00	47.00	0.000	0.000	0.000
23	48.00	49.00	0.000	0.000	0.000
24	48.00	51.00	0.000	0.000	0.000
25	48.00	53.00	0.000	0.000	0.000
26	48.00	55.00	0.000	0.000	0.000
27	48.00	57.00	0.000	0.000	0.000
28	48.00	59.00	0.000	0.000	0.000
29	48.00	61.00	0.000	0.000	0.000
30	48.00	63.00	0.000	0.000	0.000
31	48.00	65.00	0.000	0.000	0.000
32	48.00	67.00	0.000	0.000	0.000
33	48.00	69.00	0.000	0.000	0.000
34	48.00	71.00	62.832	157.080	219.911
35	48.00	73.00	188.496	157.080	345.575
36	48.00	75.00	314.159	157.080	471.239
37	48.00	77.00	439.823	157.080	596.903
38	48.00	79.00	565.487	157.080	722.566
39	48.00	81.00	691.150	157.080	848.230
40	48.00	83.00	814.224	144.136	958.360
41	48.00	85.00	929.527	157.080	1086.606
42	48.00	87.00	1055.190	157.080	1212.270
43	48.00	89.00	1180.854	157.080	1337.934
44	48.00	91.00	1306.518	157.080	1463.597
45	48.00	93.00	1432.181	157.080	1589.261
46	48.00	95.00	1557.845	157.080	1714.925
47	48.00	97.00	1683.509	157.080	1840.588
48	48.00	99.00	1809.173	157.080	1966.252
49	48.00	101.00	1934.836	157.080	2091.916
50	48.00	103.00	2060.500	157.080	2217.580
51	48.00	105.00	2186.164	157.080	2343.243
52	48.00	107.00	2311.827	157.080	2468.907
53	48.00	109.00	2437.491	157.080	2594.571
54	48.00	111.00	2563.155	157.080	2720.234
55	48.00	113.00	2688.818	157.080	2845.898
56	48.00	115.00	2814.482	157.080	2971.562

Drilled Shaft Capacity at User-Defined Settlement (sorted by shaft diameter):

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**** Capacity is NOT modified by the strength reduction factors ****

User-Defined Settlement = 1.04%

ID	Diameter (in)	Length (ft)	Skin Fric. (tons)	End Bearing (tons)	Capacity (tons)

1	48.00	5.00	0.000	0.000	0.000
2	48.00	7.00	0.000	0.000	0.000
3	48.00	9.00	0.000	0.000	0.000

"BB-10_Drilled_48in_BOC=-7.1ft_Void=-77.1ft.out"

4	48.00	11.00	0.000	0.000	0.000
5	48.00	13.00	0.000	0.000	0.000
6	48.00	15.00	0.000	0.000	0.000
7	48.00	17.00	0.000	0.000	0.000
8	48.00	19.00	0.000	0.000	0.000
9	48.00	21.00	0.000	0.000	0.000
10	48.00	23.00	0.000	0.000	0.000
11	48.00	25.00	0.000	0.000	0.000
12	48.00	27.00	0.000	0.000	0.000
13	48.00	29.00	0.000	0.000	0.000
14	48.00	31.00	0.000	0.000	0.000
15	48.00	33.00	0.000	0.000	0.000
16	48.00	35.00	0.000	0.000	0.000
17	48.00	37.00	0.000	0.000	0.000
18	48.00	39.00	0.000	0.000	0.000
19	48.00	41.00	0.000	0.000	0.000
20	48.00	43.00	0.000	0.000	0.000
21	48.00	45.00	0.000	0.000	0.000
22	48.00	47.00	0.000	0.000	0.000
23	48.00	49.00	0.000	0.000	0.000
24	48.00	51.00	0.000	0.000	0.000
25	48.00	53.00	0.000	0.000	0.000
26	48.00	55.00	0.000	0.000	0.000
27	48.00	57.00	0.000	0.000	0.000
28	48.00	59.00	0.000	0.000	0.000
29	48.00	61.00	0.000	0.000	0.000
30	48.00	63.00	0.000	0.000	0.000
31	48.00	65.00	0.000	0.000	0.000
32	48.00	67.00	0.000	0.000	0.000
33	48.00	69.00	0.000	0.000	0.000
34	48.00	71.00	30.587	852.863	883.450
35	48.00	73.00	87.171	408.515	495.687
36	48.00	75.00	138.386	290.115	428.500
37	48.00	77.00	184.982	231.560	416.542
38	48.00	79.00	230.395	211.048	441.443
39	48.00	81.00	276.607	208.928	485.534
40	48.00	83.00	320.537	189.335	509.872
41	48.00	85.00	360.485	203.712	564.197
42	48.00	87.00	403.210	200.693	603.903
43	48.00	89.00	444.931	197.647	642.578
44	48.00	91.00	485.722	194.620	680.342
45	48.00	93.00	525.645	191.638	717.283
46	48.00	95.00	564.754	188.715	753.469
47	48.00	97.00	603.100	185.858	788.958
48	48.00	99.00	640.724	183.071	823.794
49	48.00	101.00	677.666	180.354	858.019
50	48.00	103.00	713.960	177.706	891.666
51	48.00	105.00	749.639	175.126	924.765
52	48.00	107.00	784.732	172.612	957.344
53	48.00	109.00	819.265	170.161	989.426
54	48.00	111.00	853.264	167.770	1021.034
55	48.00	113.00	886.750	165.437	1052.188

"BB-10_Drilled_48in_BOC=-7.1ft_Void=-77.1ft.out"

56 48.00 115.00 919.746 163.159 1082.906

"BB-10_Drilled_48in_BOC=-7.1ft_Void=-77.1ft.out"

General Information:
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Input file: d Shaft\DS Water\BB-10_Drilled_60in_BOC=-7.1ft_Void=-77.1ft.in
Project number: B-22-074
Job name: Broad Causeway Bridge
Engineer: PV/TC
Units: English

Analysis Information:
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Analysis Type: Drilled Shaft Analysis

Soil Information:
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Boring date: 12/21/23
Boring number: BB-10
Station number: 136+34 Offset: 40 RT

Ground Elevation: -7.10(ft)
Water table Elevation = 2.70(ft)

Rock side-friction is calculated using: McVay's method

ID	Depth (ft)	Elevation (ft)	SPT Blows (Blows/ft)	Unit Weight (pcf)	Soil Type

1	0.00	-7.10	N/A	119.00	5- Cavity layer
2	2.00	-9.10	N/A	119.00	5- Cavity layer
3	4.00	-11.10	N/A	126.00	5- Cavity layer
4	6.00	-13.10	N/A	106.00	5- Cavity layer
5	8.00	-15.10	N/A	119.00	5- Cavity layer
6	10.00	-17.10	N/A	121.00	5- Cavity layer
7	12.00	-19.10	N/A	119.00	5- Cavity layer
8	14.00	-21.10	N/A	122.00	5- Cavity layer
9	16.00	-23.10	N/A	122.00	5- Cavity layer
10	20.00	-27.10	N/A	120.00	5- Cavity layer
11	22.50	-29.60	N/A	115.00	5- Cavity layer
12	25.00	-32.10	N/A	115.00	5- Cavity layer
13	27.50	-34.60	N/A	120.00	5- Cavity layer
14	30.00	-37.10	N/A	120.00	5- Cavity layer
15	32.50	-39.60	N/A	115.00	5- Cavity layer
16	35.00	-42.10	N/A	120.00	5- Cavity layer
17	37.50	-44.60	N/A	115.00	5- Cavity layer
18	40.00	-47.10	N/A	115.00	5- Cavity layer

"BB-10_Drilled_60in_BOC=-7.1ft_Void=-77.1ft.out"

19	42.50	-49.60	N/A	115.00	5- Cavity layer
20	45.00	-52.10	N/A	115.00	5- Cavity layer
21	47.50	-54.60	N/A	92.00	5- Cavity layer
22	50.00	-57.10	N/A	86.00	5- Cavity layer
23	52.50	-59.60	N/A	0.00	5- Cavity layer
24	55.00	-62.10	N/A	135.00	5- Cavity layer
25	55.00	-62.10	N/A	0.00	5- Cavity layer
26	55.00	-62.10	N/A	135.00	5- Cavity layer
27	57.50	-64.60	N/A	135.00	5- Cavity layer
28	60.00	-67.10	N/A	135.00	5- Cavity layer
29	62.50	-69.60	N/A	135.00	5- Cavity layer
30	62.50	-69.60	N/A	0.00	5- Cavity layer
31	62.50	-69.60	N/A	117.00	5- Cavity layer
32	65.00	-72.10	N/A	117.00	5- Cavity layer
33	67.50	-74.60	N/A	115.00	5- Cavity layer
34	70.00	-77.10	N/A	115.00	5- Cavity layer
35	70.00	-77.10	N/A	0.00	5- Cavity layer
36	70.00	-77.10	N/A	135.00	4- Lime Stone/Very shelly sand
37	72.50	-79.60	N/A	135.00	4- Lime Stone/Very shelly sand
38	75.00	-82.10	N/A	135.00	4- Lime Stone/Very shelly sand
39	77.50	-84.60	N/A	135.00	4- Lime Stone/Very shelly sand
40	80.00	-87.10	N/A	135.00	4- Lime Stone/Very shelly sand
41	82.50	-89.60	N/A	130.00	4- Lime Stone/Very shelly sand
42	85.00	-92.10	N/A	135.00	4- Lime Stone/Very shelly sand
43	87.50	-94.60	N/A	135.00	4- Lime Stone/Very shelly sand
44	90.00	-97.10	N/A	135.00	4- Lime Stone/Very shelly sand
45	92.50	-99.60	N/A	135.00	4- Lime Stone/Very shelly sand
46	95.00	-102.10	N/A	135.00	4- Lime Stone/Very shelly sand
47	97.50	-104.60	N/A	135.00	4- Lime Stone/Very shelly sand
48	100.00	-107.10	N/A	135.00	4- Lime Stone/Very shelly sand
49	102.50	-109.60	N/A	135.00	4- Lime Stone/Very shelly sand
50	105.00	-112.10	N/A	135.00	4- Lime Stone/Very shelly sand
51	107.50	-114.60	N/A	135.00	4- Lime Stone/Very shelly sand
52	110.00	-117.10	N/A	135.00	4- Lime Stone/Very shelly sand
53	112.50	-119.60	N/A	135.00	4- Lime Stone/Very shelly sand
54	115.00	-122.10	N/A	135.00	4- Lime Stone/Very shelly sand
55	117.50	-124.60	N/A	135.00	4- Lime Stone/Very shelly sand
56	120.00	-127.10	N/A	135.00	4- Lime Stone/Very shelly sand
57	122.50	-129.60	N/A	135.00	4- Lime Stone/Very shelly sand
58	125.00	-132.10	N/A	135.00	4- Lime Stone/Very shelly sand

ID	Cu-DIR (tsf)	qu (tsf)	qt (tsf)	Em (ksi)	qb (tsf)

1	N/A	N/A	N/A	N/A	N/A
2	N/A	N/A	N/A	N/A	N/A
3	N/A	N/A	N/A	N/A	N/A
4	N/A	N/A	N/A	N/A	N/A
5	N/A	N/A	N/A	N/A	N/A
6	N/A	N/A	N/A	N/A	N/A
7	N/A	N/A	N/A	N/A	N/A
8	N/A	N/A	N/A	N/A	N/A

"BB-10_Drilled_60in_BOC=-7.1ft_Void=-77.1ft.out"

9	N/A	N/A	N/A	N/A	N/A
10	N/A	N/A	N/A	N/A	N/A
11	N/A	N/A	N/A	N/A	N/A
12	N/A	N/A	N/A	N/A	N/A
13	N/A	N/A	N/A	N/A	N/A
14	N/A	N/A	N/A	N/A	N/A
15	N/A	N/A	N/A	N/A	N/A
16	N/A	N/A	N/A	N/A	N/A
17	N/A	N/A	N/A	N/A	N/A
18	N/A	N/A	N/A	N/A	N/A
19	N/A	N/A	N/A	N/A	N/A
20	N/A	N/A	N/A	N/A	N/A
21	N/A	N/A	N/A	N/A	N/A
22	N/A	N/A	N/A	N/A	N/A
23	N/A	N/A	N/A	N/A	N/A
24	N/A	N/A	N/A	N/A	N/A
25	N/A	N/A	N/A	N/A	N/A
26	N/A	N/A	N/A	N/A	N/A
27	N/A	N/A	N/A	N/A	N/A
28	N/A	N/A	N/A	N/A	N/A
29	N/A	N/A	N/A	N/A	N/A
30	N/A	N/A	N/A	N/A	N/A
31	N/A	N/A	N/A	N/A	N/A
32	N/A	N/A	N/A	N/A	N/A
33	N/A	N/A	N/A	N/A	N/A
34	N/A	N/A	N/A	N/A	N/A
35	N/A	N/A	N/A	N/A	N/A
36	N/A	25.00	4.00	39.93	12.50
37	N/A	25.00	4.00	39.93	12.50
38	N/A	25.00	4.00	39.93	12.50
39	N/A	25.00	4.00	39.93	12.50
40	N/A	25.00	4.00	39.93	12.50
41	N/A	22.94	3.67	36.64	11.47
42	N/A	25.00	4.00	39.93	12.50
43	N/A	25.00	4.00	39.93	12.50
44	N/A	25.00	4.00	39.93	12.50
45	N/A	25.00	4.00	39.93	12.50
46	N/A	25.00	4.00	39.93	12.50
47	N/A	25.00	4.00	39.93	12.50
48	N/A	25.00	4.00	39.93	12.50
49	N/A	25.00	4.00	39.93	12.50
50	N/A	25.00	4.00	39.93	12.50
51	N/A	25.00	4.00	39.93	12.50
52	N/A	25.00	4.00	39.93	12.50
53	N/A	25.00	4.00	39.93	12.50
54	N/A	25.00	4.00	39.93	12.50
55	N/A	25.00	4.00	39.93	12.50
56	N/A	25.00	4.00	39.93	12.50
57	N/A	25.00	4.00	39.93	12.50
58	N/A	25.00	4.00	39.93	12.50

Top of Rock Socket
elev = -77.1'

ID RQD F.M. S.R.I. Rock Recovery
"BB-10_Drilled_60in_BOC=-7.1ft_Void=-77.1ft.out"

1	N/A	N/A	N/A
2	N/A	N/A	N/A
3	N/A	N/A	N/A
4	N/A	N/A	N/A
5	N/A	N/A	N/A
6	N/A	N/A	N/A
7	N/A	N/A	N/A
8	N/A	N/A	N/A
9	N/A	N/A	N/A
10	N/A	N/A	N/A
11	N/A	N/A	N/A
12	N/A	N/A	N/A
13	N/A	N/A	N/A
14	N/A	N/A	N/A
15	N/A	N/A	N/A
16	N/A	N/A	N/A
17	N/A	N/A	N/A
18	N/A	N/A	N/A
19	N/A	N/A	N/A
20	N/A	N/A	N/A
21	N/A	N/A	N/A
22	N/A	N/A	N/A
23	N/A	N/A	N/A
24	N/A	N/A	N/A
25	N/A	N/A	N/A
26	N/A	N/A	N/A
27	N/A	N/A	N/A
28	N/A	N/A	N/A
29	N/A	N/A	N/A
30	N/A	N/A	N/A
31	N/A	N/A	N/A
32	N/A	N/A	N/A
33	N/A	N/A	N/A
34	N/A	N/A	N/A
35	N/A	N/A	N/A
36	0.50	ROUGH	1.000
37	0.50	ROUGH	1.000
38	0.50	ROUGH	1.000
39	0.50	ROUGH	1.000
40	0.50	ROUGH	1.000
41	0.50	ROUGH	1.000
42	0.50	ROUGH	1.000
43	0.50	ROUGH	1.000
44	0.50	ROUGH	1.000
45	0.50	ROUGH	1.000
46	0.50	ROUGH	1.000
47	0.50	ROUGH	1.000
48	0.50	ROUGH	1.000
49	0.50	ROUGH	1.000
50	0.50	ROUGH	1.000

"BB-10_Drilled_60in_BOC=-7.1ft_Void=-77.1ft.out"

51	0.50	ROUGH	1.000
52	0.50	ROUGH	1.000
53	0.50	ROUGH	1.000
54	0.50	ROUGH	1.000
55	0.50	ROUGH	1.000
56	0.50	ROUGH	1.000
57	0.50	ROUGH	1.000
58	0.50	ROUGH	1.000

Drilled Shaft Data:

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Unit weight of concrete = 145.00(pcf), Concrete Slump = 6.00(in)
Modulus of Elasticity of concrete = 3987.00(ksi)

Shaft Geometry:

ID	Length (ft)	Tip Elev. (ft)	Case Len. (ft)	Diameter (in)	Base Diam. (in)	Bell Len. (ft)
1	5.00	-12.10	0.00	60.00	60.00	0.00
2	7.00	-14.10	0.00	60.00	60.00	0.00
3	9.00	-16.10	0.00	60.00	60.00	0.00
4	11.00	-18.10	0.00	60.00	60.00	0.00
5	13.00	-20.10	0.00	60.00	60.00	0.00
6	15.00	-22.10	0.00	60.00	60.00	0.00
7	17.00	-24.10	0.00	60.00	60.00	0.00
8	19.00	-26.10	0.00	60.00	60.00	0.00
9	21.00	-28.10	0.00	60.00	60.00	0.00
10	23.00	-30.10	0.00	60.00	60.00	0.00
11	25.00	-32.10	0.00	60.00	60.00	0.00
12	27.00	-34.10	0.00	60.00	60.00	0.00
13	29.00	-36.10	0.00	60.00	60.00	0.00
14	31.00	-38.10	0.00	60.00	60.00	0.00
15	33.00	-40.10	0.00	60.00	60.00	0.00
16	35.00	-42.10	0.00	60.00	60.00	0.00
17	37.00	-44.10	0.00	60.00	60.00	0.00
18	39.00	-46.10	0.00	60.00	60.00	0.00
19	41.00	-48.10	0.00	60.00	60.00	0.00
20	43.00	-50.10	0.00	60.00	60.00	0.00
21	45.00	-52.10	0.00	60.00	60.00	0.00
22	47.00	-54.10	0.00	60.00	60.00	0.00
23	49.00	-56.10	0.00	60.00	60.00	0.00
24	51.00	-58.10	0.00	60.00	60.00	0.00
25	53.00	-60.10	0.00	60.00	60.00	0.00
26	55.00	-62.10	0.00	60.00	60.00	0.00
27	57.00	-64.10	0.00	60.00	60.00	0.00
28	59.00	-66.10	0.00	60.00	60.00	0.00
29	61.00	-68.10	0.00	60.00	60.00	0.00
30	63.00	-70.10	0.00	60.00	60.00	0.00
31	65.00	-72.10	0.00	60.00	60.00	0.00
32	67.00	-74.10	0.00	60.00	60.00	0.00

"BB-10_Drilled_60in_BOC=-7.1ft_Void=-77.1ft.out"

33	69.00	-76.10	0.00	60.00	60.00	0.00
34	71.00	-78.10	0.00	60.00	60.00	0.00
35	73.00	-80.10	0.00	60.00	60.00	0.00
36	75.00	-82.10	0.00	60.00	60.00	0.00
37	77.00	-84.10	0.00	60.00	60.00	0.00
38	79.00	-86.10	0.00	60.00	60.00	0.00
39	81.00	-88.10	0.00	60.00	60.00	0.00
40	83.00	-90.10	0.00	60.00	60.00	0.00
41	85.00	-92.10	0.00	60.00	60.00	0.00
42	87.00	-94.10	0.00	60.00	60.00	0.00
43	89.00	-96.10	0.00	60.00	60.00	0.00
44	91.00	-98.10	0.00	60.00	60.00	0.00
45	93.00	-100.10	0.00	60.00	60.00	0.00
46	95.00	-102.10	0.00	60.00	60.00	0.00
47	97.00	-104.10	0.00	60.00	60.00	0.00
48	99.00	-106.10	0.00	60.00	60.00	0.00
49	101.00	-108.10	0.00	60.00	60.00	0.00
50	103.00	-110.10	0.00	60.00	60.00	0.00
51	105.00	-112.10	0.00	60.00	60.00	0.00
52	107.00	-114.10	0.00	60.00	60.00	0.00
53	109.00	-116.10	0.00	60.00	60.00	0.00
54	111.00	-118.10	0.00	60.00	60.00	0.00
55	113.00	-120.10	0.00	60.00	60.00	0.00
56	115.00	-122.10	0.00	60.00	60.00	0.00

Drilled Shaft Capacity (sorted by shaft diameter):

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Strength reduction factors: Skin-friction = 1.00, End-bearing = 1.00

ID	Diameter (in)	Length (ft)	Skin Fric. (tons)	End Bearing (tons)	Capacity (tons)
1	60.00	5.00	0.000	0.000	0.000
2	60.00	7.00	0.000	0.000	0.000
3	60.00	9.00	0.000	0.000	0.000
4	60.00	11.00	0.000	0.000	0.000
5	60.00	13.00	0.000	0.000	0.000
6	60.00	15.00	0.000	0.000	0.000
7	60.00	17.00	0.000	0.000	0.000
8	60.00	19.00	0.000	0.000	0.000
9	60.00	21.00	0.000	0.000	0.000
10	60.00	23.00	0.000	0.000	0.000
11	60.00	25.00	0.000	0.000	0.000
12	60.00	27.00	0.000	0.000	0.000
13	60.00	29.00	0.000	0.000	0.000
14	60.00	31.00	0.000	0.000	0.000
15	60.00	33.00	0.000	0.000	0.000
16	60.00	35.00	0.000	0.000	0.000
17	60.00	37.00	0.000	0.000	0.000
18	60.00	39.00	0.000	0.000	0.000
19	60.00	41.00	0.000	0.000	0.000

"BB-10_Drilled_60in_BOC=-7.1ft_Void=-77.1ft.out"

20	60.00	43.00	0.000	0.000	0.000
21	60.00	45.00	0.000	0.000	0.000
22	60.00	47.00	0.000	0.000	0.000
23	60.00	49.00	0.000	0.000	0.000
24	60.00	51.00	0.000	0.000	0.000
25	60.00	53.00	0.000	0.000	0.000
26	60.00	55.00	0.000	0.000	0.000
27	60.00	57.00	0.000	0.000	0.000
28	60.00	59.00	0.000	0.000	0.000
29	60.00	61.00	0.000	0.000	0.000
30	60.00	63.00	0.000	0.000	0.000
31	60.00	65.00	0.000	0.000	0.000
32	60.00	67.00	0.000	0.000	0.000
33	60.00	69.00	0.000	0.000	0.000
34	60.00	71.00	78.540	245.437	323.977
35	60.00	73.00	235.619	245.437	481.056
36	60.00	75.00	392.699	245.437	638.136
37	60.00	77.00	549.779	245.437	795.216
38	60.00	79.00	706.858	245.437	952.295
39	60.00	81.00	863.938	245.437	1109.375
40	60.00	83.00	1017.780	225.213	1242.993
41	60.00	85.00	1161.908	245.437	1407.345
42	60.00	87.00	1318.988	245.437	1564.425
43	60.00	89.00	1476.067	245.437	1721.504
44	60.00	91.00	1633.147	245.437	1878.584
45	60.00	93.00	1790.227	245.437	2035.664
46	60.00	95.00	1947.306	245.437	2192.743
47	60.00	97.00	2104.386	245.437	2349.823
48	60.00	99.00	2261.466	245.437	2506.903
49	60.00	101.00	2418.545	245.437	2663.982
50	60.00	103.00	2575.625	245.437	2821.062
51	60.00	105.00	2732.705	245.437	2978.141
52	60.00	107.00	2889.784	245.437	3135.221
53	60.00	109.00	3046.864	245.437	3292.301
54	60.00	111.00	3203.943	245.437	3449.380
55	60.00	113.00	3361.023	245.437	3606.460
56	60.00	115.00	3518.103	245.437	3763.540

Drilled Shaft Capacity at User-Defined Settlement (sorted by shaft diameter):

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**** Capacity is NOT modified by the strength reduction factors ****

User-Defined Settlement = 0.83%

ID	Diameter (in)	Length (ft)	Skin Fric. (tons)	End Bearing (tons)	Capacity (tons)

1	60.00	5.00	0.000	0.000	0.000
2	60.00	7.00	0.000	0.000	0.000
3	60.00	9.00	0.000	0.000	0.000

"BB-10_Drilled_60in_BOC=-7.1ft_Void=-77.1ft.out"

4	60.00	11.00	0.000	0.000	0.000
5	60.00	13.00	0.000	0.000	0.000
6	60.00	15.00	0.000	0.000	0.000
7	60.00	17.00	0.000	0.000	0.000
8	60.00	19.00	0.000	0.000	0.000
9	60.00	21.00	0.000	0.000	0.000
10	60.00	23.00	0.000	0.000	0.000
11	60.00	25.00	0.000	0.000	0.000
12	60.00	27.00	0.000	0.000	0.000
13	60.00	29.00	0.000	0.000	0.000
14	60.00	31.00	0.000	0.000	0.000
15	60.00	33.00	0.000	0.000	0.000
16	60.00	35.00	0.000	0.000	0.000
17	60.00	37.00	0.000	0.000	0.000
18	60.00	39.00	0.000	0.000	0.000
19	60.00	41.00	0.000	0.000	0.000
20	60.00	43.00	0.000	0.000	0.000
21	60.00	45.00	0.000	0.000	0.000
22	60.00	47.00	0.000	0.000	0.000
23	60.00	49.00	0.000	0.000	0.000
24	60.00	51.00	0.000	0.000	0.000
25	60.00	53.00	0.000	0.000	0.000
26	60.00	55.00	0.000	0.000	0.000
27	60.00	57.00	0.000	0.000	0.000
28	60.00	59.00	0.000	0.000	0.000
29	60.00	61.00	0.000	0.000	0.000
30	60.00	63.00	0.000	0.000	0.000
31	60.00	65.00	0.000	0.000	0.000
32	60.00	67.00	0.000	0.000	0.000
33	60.00	69.00	0.000	0.000	0.000
34	60.00	71.00	38.229	1328.740	1366.970
35	60.00	73.00	108.929	636.457	745.385
36	60.00	75.00	172.893	451.991	624.884
37	60.00	77.00	231.068	360.765	591.833
38	60.00	79.00	284.232	304.858	589.090
39	60.00	81.00	336.976	283.367	620.343
40	60.00	83.00	390.245	258.143	648.388
41	60.00	85.00	438.616	278.956	717.572
42	60.00	87.00	490.322	275.969	766.291
43	60.00	89.00	540.770	272.810	813.580
44	60.00	91.00	590.056	269.569	859.625
45	60.00	93.00	638.260	266.302	904.562
46	60.00	95.00	685.454	263.042	948.496
47	60.00	97.00	731.701	259.812	991.513
48	60.00	99.00	777.056	256.625	1033.680
49	60.00	101.00	821.568	253.489	1075.057
50	60.00	103.00	865.284	250.410	1115.693
51	60.00	105.00	908.242	247.390	1155.632
52	60.00	107.00	950.481	244.430	1194.911
53	60.00	109.00	992.034	241.531	1233.564
54	60.00	111.00	1032.932	238.691	1271.623
55	60.00	113.00	1073.204	235.909	1309.113

"BB-10_Drilled_60in_BOC=-7.1ft_Void=-77.1ft.out"

56	60.00	115.00	1112.878	233.184	1346.062

"BB-10_Drilled_60in_BOC=-7.1ft_Void=-77.1ft.out"

General Information:

Input file: Shaft\DS Water\BB-11_Drilled_48in_BOC=-10.3ft_Void=-82.8ft.in
Project number: B-22-074
Job name: Broad Causeway Bridge
Engineer: PV/TC
Units: English

Analysis Information:

Analysis Type: Drilled Shaft Analysis

Soil Information:

Boring date: 12/26/23
Boring number: BB-11
Station number: 138+55 Offset: 34 LT

Ground Elevation: -10.30(ft)
Water table Elevation = 3.70(ft)

Cu is calculated using: Direct method.
Rock side-friction is calculated using: McVay's method
Hammer type: Automatic Hammer, Correction factor = 1.24

ID	Depth (ft)	Elevation (ft)	SPT Blows (Blows/ft)	Unit Weight (pcf)	Soil Type
1	0.00	-10.30	N/A	118.00	5- Cavity layer
2	2.00	-12.30	N/A	118.00	5- Cavity layer
3	4.00	-14.30	N/A	126.00	5- Cavity layer
4	6.00	-16.30	N/A	124.00	5- Cavity layer
5	8.00	-18.30	N/A	121.00	5- Cavity layer
6	10.00	-20.30	N/A	116.00	5- Cavity layer
7	12.00	-22.30	N/A	119.00	5- Cavity layer
8	14.00	-24.30	N/A	119.00	5- Cavity layer
9	16.00	-26.30	N/A	116.00	5- Cavity layer
10	20.00	-30.30	N/A	117.00	5- Cavity layer
11	22.50	-32.80	N/A	115.00	5- Cavity layer
12	25.00	-35.30	N/A	115.00	5- Cavity layer
13	27.50	-37.80	N/A	120.00	5- Cavity layer
14	30.00	-40.30	N/A	120.00	5- Cavity layer
15	32.50	-42.80	N/A	115.00	5- Cavity layer
16	35.00	-45.30	N/A	120.00	5- Cavity layer

"BB-11_Drilled_48in_BOC=-10.3ft_Void=-82.8ft.out"

17	37.50	-47.80	N/A	115.00	5- Cavity layer
18	40.00	-50.30	N/A	115.00	5- Cavity layer
19	42.50	-52.80	N/A	115.00	5- Cavity layer
20	45.00	-55.30	N/A	115.00	5- Cavity layer
21	47.50	-57.80	N/A	135.00	5- Cavity layer
22	50.00	-60.30	N/A	135.00	5- Cavity layer
23	52.50	-62.80	N/A	135.00	5- Cavity layer
24	55.00	-65.30	N/A	135.00	5- Cavity layer
25	57.50	-67.80	N/A	135.00	5- Cavity layer
26	60.00	-70.30	N/A	135.00	5- Cavity layer
27	62.50	-72.80	N/A	135.00	5- Cavity layer
28	62.50	-72.80	N/A	0.00	5- Cavity layer
29	62.50	-72.80	N/A	122.00	5- Cavity layer
30	65.00	-75.30	N/A	122.00	5- Cavity layer
31	67.50	-77.80	N/A	133.00	5- Cavity layer
32	70.00	-80.30	N/A	133.00	5- Cavity layer
33	72.50	-82.80	N/A	115.00	5- Cavity layer
34	72.50	-82.80	N/A	0.00	5- Cavity layer
35	72.50	-82.80	N/A	135.00	4- Lime Stone/Very shelly sand
36	75.00	-85.30	N/A	135.00	4- Lime Stone/Very shelly sand
37	75.00	-85.30	N/A	0.00	1- Plastic Clay
38	75.00	-85.30	100.00	133.00	3- Clean sand
39	77.50	-87.80	100.00	133.00	3- Clean sand
40	77.50	-87.80	N/A	0.00	1- Plastic Clay
41	77.50	-87.80	N/A	135.00	4- Lime Stone/Very shelly sand
42	80.00	-90.30	N/A	135.00	4- Lime Stone/Very shelly sand
43	82.50	-92.80	N/A	135.00	4- Lime Stone/Very shelly sand
44	85.00	-95.30	N/A	135.00	4- Lime Stone/Very shelly sand
45	87.50	-97.80	N/A	135.00	4- Lime Stone/Very shelly sand
46	90.00	-100.30	N/A	135.00	4- Lime Stone/Very shelly sand
47	92.50	-102.80	N/A	125.00	4- Lime Stone/Very shelly sand
48	92.50	-102.80	N/A	0.00	1- Plastic Clay
49	92.50	-102.80	14.00	115.00	3- Clean sand
50	95.00	-105.30	14.00	115.00	3- Clean sand
51	95.00	-105.30	N/A	0.00	1- Plastic Clay
52	95.00	-105.30	N/A	135.00	4- Lime Stone/Very shelly sand
53	97.50	-107.80	N/A	135.00	4- Lime Stone/Very shelly sand
54	100.00	-110.30	N/A	135.00	4- Lime Stone/Very shelly sand
55	102.50	-112.80	N/A	135.00	4- Lime Stone/Very shelly sand
56	105.00	-115.30	N/A	135.00	4- Lime Stone/Very shelly sand
57	107.50	-117.80	N/A	135.00	4- Lime Stone/Very shelly sand
58	107.50	-117.80	N/A	0.00	1- Plastic Clay
59	107.50	-117.80	10.00	115.00	3- Clean sand
60	110.00	-120.30	10.00	115.00	3- Clean sand
61	110.00	-120.30	N/A	0.00	1- Plastic Clay
62	110.00	-120.30	N/A	125.00	4- Lime Stone/Very shelly sand
63	112.50	-122.80	N/A	125.00	4- Lime Stone/Very shelly sand
64	112.50	-122.80	N/A	0.00	1- Plastic Clay
65	112.50	-122.80	12.00	115.00	3- Clean sand
66	115.00	-125.30	12.00	115.00	3- Clean sand
67	117.50	-127.80	5.00	115.00	3- Clean sand
68	117.50	-127.80	N/A	0.00	1- Plastic Clay

"BB-11_Drilled_48in_BOC=-10.3ft_Void=-82.8ft.out"

Top of Rock Socket
elev = -82.8'

Bottom of Canal
elev = -10.3'

69	117.50	-127.80	N/A	135.00	4- Lime Stone/Very shelly sand
70	120.00	-130.30	N/A	135.00	4- Lime Stone/Very shelly sand
71	120.00	-130.30	N/A	0.00	1- Plastic Clay
72	120.00	-130.30	13.00	115.00	3- Clean sand
73	122.50	-132.80	13.00	115.00	3- Clean sand
74	125.00	-135.30	12.00	115.00	3- Clean sand

ID	Cu-DIR (tsf)	qu (tsf)	qt (tsf)	Em (ksi)	qb (tsf)
1	N/A	N/A	N/A	N/A	N/A
2	N/A	N/A	N/A	N/A	N/A
3	N/A	N/A	N/A	N/A	N/A
4	N/A	N/A	N/A	N/A	N/A
5	N/A	N/A	N/A	N/A	N/A
6	N/A	N/A	N/A	N/A	N/A
7	N/A	N/A	N/A	N/A	N/A
8	N/A	N/A	N/A	N/A	N/A
9	N/A	N/A	N/A	N/A	N/A
10	N/A	N/A	N/A	N/A	N/A
11	N/A	N/A	N/A	N/A	N/A
12	N/A	N/A	N/A	N/A	N/A
13	N/A	N/A	N/A	N/A	N/A
14	N/A	N/A	N/A	N/A	N/A
15	N/A	N/A	N/A	N/A	N/A
16	N/A	N/A	N/A	N/A	N/A
17	N/A	N/A	N/A	N/A	N/A
18	N/A	N/A	N/A	N/A	N/A
19	N/A	N/A	N/A	N/A	N/A
20	N/A	N/A	N/A	N/A	N/A
21	N/A	N/A	N/A	N/A	N/A
22	N/A	N/A	N/A	N/A	N/A
23	N/A	N/A	N/A	N/A	N/A
24	N/A	N/A	N/A	N/A	N/A
25	N/A	N/A	N/A	N/A	N/A
26	N/A	N/A	N/A	N/A	N/A
27	N/A	N/A	N/A	N/A	N/A
28	N/A	N/A	N/A	N/A	N/A
29	N/A	N/A	N/A	N/A	N/A
30	N/A	N/A	N/A	N/A	N/A
31	N/A	N/A	N/A	N/A	N/A
32	N/A	N/A	N/A	N/A	N/A
33	N/A	N/A	N/A	N/A	N/A
34	N/A	N/A	N/A	N/A	N/A
35	N/A	25.00	4.00	39.93	12.50
36	N/A	25.00	4.00	39.93	12.50
37	0.00	N/A	N/A	N/A	N/A
38	N/A	N/A	N/A	N/A	N/A
39	N/A	N/A	N/A	N/A	N/A
40	0.00	N/A	N/A	N/A	N/A
41	N/A	25.00	4.00	39.93	12.50
42	N/A	25.00	4.00	39.93	12.50

"BB-11_Drilled_48in_BOC=-10.3ft_Void=-82.8ft.out"

Top of Rock Socket
elev = -82.8'

43	N/A	25.00	4.00	39.93	12.50
44	N/A	25.00	4.00	39.93	12.50
45	N/A	25.00	4.00	39.93	12.50
46	N/A	25.00	4.00	39.93	12.50
47	N/A	15.50	2.48	24.76	7.75
48	0.00	N/A	N/A	N/A	N/A
49	N/A	N/A	N/A	N/A	N/A
50	N/A	N/A	N/A	N/A	N/A
51	0.00	N/A	N/A	N/A	N/A
52	N/A	25.00	4.00	39.93	12.50
53	N/A	25.00	4.00	39.93	12.50
54	N/A	25.00	4.00	39.93	12.50
55	N/A	25.00	4.00	39.93	12.50
56	N/A	25.00	4.00	39.93	12.50
57	N/A	25.00	4.00	39.93	12.50
58	0.00	N/A	N/A	N/A	N/A
59	N/A	N/A	N/A	N/A	N/A
60	N/A	N/A	N/A	N/A	N/A
61	0.00	N/A	N/A	N/A	N/A
62	N/A	16.74	2.68	26.74	8.37
63	N/A	16.74	2.68	26.74	8.37
64	0.00	N/A	N/A	N/A	N/A
65	N/A	N/A	N/A	N/A	N/A
66	N/A	N/A	N/A	N/A	N/A
67	N/A	N/A	N/A	N/A	N/A
68	0.00	N/A	N/A	N/A	N/A
69	N/A	25.00	4.00	39.93	12.50
70	N/A	25.00	4.00	39.93	12.50
71	0.00	N/A	N/A	N/A	N/A
72	N/A	N/A	N/A	N/A	N/A
73	N/A	N/A	N/A	N/A	N/A
74	N/A	N/A	N/A	N/A	N/A

ID	RQD F.M.	S.R.I.	Rock Recovery
1	N/A	N/A	N/A
2	N/A	N/A	N/A
3	N/A	N/A	N/A
4	N/A	N/A	N/A
5	N/A	N/A	N/A
6	N/A	N/A	N/A
7	N/A	N/A	N/A
8	N/A	N/A	N/A
9	N/A	N/A	N/A
10	N/A	N/A	N/A
11	N/A	N/A	N/A
12	N/A	N/A	N/A
13	N/A	N/A	N/A
14	N/A	N/A	N/A
15	N/A	N/A	N/A
16	N/A	N/A	N/A

"BB-11_Drilled_48in_BOC=-10.3ft_Void=-82.8ft.out"

17	N/A	N/A	N/A
18	N/A	N/A	N/A
19	N/A	N/A	N/A
20	N/A	N/A	N/A
21	N/A	N/A	N/A
22	N/A	N/A	N/A
23	N/A	N/A	N/A
24	N/A	N/A	N/A
25	N/A	N/A	N/A
26	N/A	N/A	N/A
27	N/A	N/A	N/A
28	N/A	N/A	N/A
29	N/A	N/A	N/A
30	N/A	N/A	N/A
31	N/A	N/A	N/A
32	N/A	N/A	N/A
33	N/A	N/A	N/A
34	N/A	N/A	N/A
35	0.50	ROUGH	1.000
36	0.50	ROUGH	1.000
37	N/A	N/A	N/A
38	N/A	N/A	N/A
39	N/A	N/A	N/A
40	N/A	N/A	N/A
41	0.50	ROUGH	1.000
42	0.50	ROUGH	1.000
43	0.50	ROUGH	1.000
44	0.50	ROUGH	1.000
45	0.50	ROUGH	1.000
46	0.50	ROUGH	1.000
47	0.50	ROUGH	1.000
48	N/A	N/A	N/A
49	N/A	N/A	N/A
50	N/A	N/A	N/A
51	N/A	N/A	N/A
52	0.50	ROUGH	1.000
53	0.50	ROUGH	1.000
54	0.50	ROUGH	1.000
55	0.50	ROUGH	1.000
56	0.50	ROUGH	1.000
57	0.50	ROUGH	1.000
58	N/A	N/A	N/A
59	N/A	N/A	N/A
60	N/A	N/A	N/A
61	N/A	N/A	N/A
62	0.50	ROUGH	1.000
63	0.50	ROUGH	1.000
64	N/A	N/A	N/A
65	N/A	N/A	N/A
66	N/A	N/A	N/A
67	N/A	N/A	N/A
68	N/A	N/A	N/A

"BB-11_Drilled_48in_BOC=-10.3ft_Void=-82.8ft.out"

69	0.50	ROUGH	1.000
70	0.50	ROUGH	1.000
71	N/A	N/A	N/A
72	N/A	N/A	N/A
73	N/A	N/A	N/A
74	N/A	N/A	N/A

Drilled Shaft Data:

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Unit weight of concrete = 145.00(pcf), Concrete Slump = 6.00(in)
Modulus of Elasticity of concrete = 3987.00(ksi)

Shaft Geometry:

ID	Length (ft)	Tip Elev. (ft)	Case Len. (ft)	Diameter (in)	Base Diam. (in)	Bell Len. (ft)
1	5.00	-15.30	0.00	48.00	48.00	0.00
2	7.00	-17.30	0.00	48.00	48.00	0.00
3	9.00	-19.30	0.00	48.00	48.00	0.00
4	11.00	-21.30	0.00	48.00	48.00	0.00
5	13.00	-23.30	0.00	48.00	48.00	0.00
6	15.00	-25.30	0.00	48.00	48.00	0.00
7	17.00	-27.30	0.00	48.00	48.00	0.00
8	19.00	-29.30	0.00	48.00	48.00	0.00
9	21.00	-31.30	0.00	48.00	48.00	0.00
10	23.00	-33.30	0.00	48.00	48.00	0.00
11	25.00	-35.30	0.00	48.00	48.00	0.00
12	27.00	-37.30	0.00	48.00	48.00	0.00
13	29.00	-39.30	0.00	48.00	48.00	0.00
14	31.00	-41.30	0.00	48.00	48.00	0.00
15	33.00	-43.30	0.00	48.00	48.00	0.00
16	35.00	-45.30	0.00	48.00	48.00	0.00
17	37.00	-47.30	0.00	48.00	48.00	0.00
18	39.00	-49.30	0.00	48.00	48.00	0.00
19	41.00	-51.30	0.00	48.00	48.00	0.00
20	43.00	-53.30	0.00	48.00	48.00	0.00
21	45.00	-55.30	0.00	48.00	48.00	0.00
22	47.00	-57.30	0.00	48.00	48.00	0.00
23	49.00	-59.30	0.00	48.00	48.00	0.00
24	51.00	-61.30	0.00	48.00	48.00	0.00
25	53.00	-63.30	0.00	48.00	48.00	0.00
26	55.00	-65.30	0.00	48.00	48.00	0.00
27	57.00	-67.30	0.00	48.00	48.00	0.00
28	59.00	-69.30	0.00	48.00	48.00	0.00
29	61.00	-71.30	0.00	48.00	48.00	0.00
30	63.00	-73.30	0.00	48.00	48.00	0.00
31	65.00	-75.30	0.00	48.00	48.00	0.00
32	67.00	-77.30	0.00	48.00	48.00	0.00
33	69.00	-79.30	0.00	48.00	48.00	0.00
34	71.00	-81.30	0.00	48.00	48.00	0.00

"BB-11_Drilled_48in_BOC=-10.3ft_Void=-82.8ft.out"

35	73.00	-83.30	0.00	48.00	48.00	0.00
36	75.00	-85.30	0.00	48.00	48.00	0.00
37	77.00	-87.30	0.00	48.00	48.00	0.00
38	79.00	-89.30	0.00	48.00	48.00	0.00
39	81.00	-91.30	0.00	48.00	48.00	0.00
40	83.00	-93.30	0.00	48.00	48.00	0.00
41	85.00	-95.30	0.00	48.00	48.00	0.00
42	87.00	-97.30	0.00	48.00	48.00	0.00
43	89.00	-99.30	0.00	48.00	48.00	0.00
44	91.00	-101.30	0.00	48.00	48.00	0.00
45	93.00	-103.30	0.00	48.00	48.00	0.00
46	95.00	-105.30	0.00	48.00	48.00	0.00
47	97.00	-107.30	0.00	48.00	48.00	0.00
48	99.00	-109.30	0.00	48.00	48.00	0.00
49	101.00	-111.30	0.00	48.00	48.00	0.00
50	103.00	-113.30	0.00	48.00	48.00	0.00
51	105.00	-115.30	0.00	48.00	48.00	0.00
52	107.00	-117.30	0.00	48.00	48.00	0.00
53	109.00	-119.30	0.00	48.00	48.00	0.00
54	111.00	-121.30	0.00	48.00	48.00	0.00
55	113.00	-123.30	0.00	48.00	48.00	0.00
56	115.00	-125.30	0.00	48.00	48.00	0.00

Drilled Shaft Capacity (sorted by shaft diameter):

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Strength reduction factors: Skin-friction = 1.00, End-bearing = 1.00

ID	Diameter (in)	Length (ft)	Skin Fric. (tons)	End Bearing (tons)	Capacity (tons)

1	48.00	5.00	0.000	0.000	0.000
2	48.00	7.00	0.000	0.000	0.000
3	48.00	9.00	0.000	0.000	0.000
4	48.00	11.00	0.000	0.000	0.000
5	48.00	13.00	0.000	0.000	0.000
6	48.00	15.00	0.000	0.000	0.000
7	48.00	17.00	0.000	0.000	0.000
8	48.00	19.00	0.000	0.000	0.000
9	48.00	21.00	0.000	0.000	0.000
10	48.00	23.00	0.000	0.000	0.000
11	48.00	25.00	0.000	0.000	0.000
12	48.00	27.00	0.000	0.000	0.000
13	48.00	29.00	0.000	0.000	0.000
14	48.00	31.00	0.000	0.000	0.000
15	48.00	33.00	0.000	0.000	0.000
16	48.00	35.00	0.000	0.000	0.000
17	48.00	37.00	0.000	0.000	0.000
18	48.00	39.00	0.000	0.000	0.000
19	48.00	41.00	0.000	0.000	0.000
20	48.00	43.00	0.000	0.000	0.000
21	48.00	45.00	0.000	0.000	0.000

"BB-11_Drilled_48in_BOC=-10.3ft_Void=-82.8ft.out"

22	48.00	47.00	0.000	0.000	0.000
23	48.00	49.00	0.000	0.000	0.000
24	48.00	51.00	0.000	0.000	0.000
25	48.00	53.00	0.000	0.000	0.000
26	48.00	55.00	0.000	0.000	0.000
27	48.00	57.00	0.000	0.000	0.000
28	48.00	59.00	0.000	0.000	0.000
29	48.00	61.00	0.000	0.000	0.000
30	48.00	63.00	0.000	0.000	0.000
31	48.00	65.00	0.000	0.000	0.000
32	48.00	67.00	0.000	0.000	0.000
33	48.00	69.00	0.000	0.000	0.000
34	48.00	71.00	0.000	0.000	0.000
35	48.00	73.00	31.416	157.080	188.496
36	48.00	75.00	157.080	112.901	269.981
37	48.00	77.00	158.103	85.412	243.515
38	48.00	79.00	252.688	157.080	409.768
39	48.00	81.00	378.352	157.080	535.432
40	48.00	83.00	504.016	157.080	661.095
41	48.00	85.00	629.679	157.080	786.759
42	48.00	87.00	755.343	157.080	912.423
43	48.00	89.00	881.007	157.080	1038.086
44	48.00	91.00	1006.670	157.080	1163.750
45	48.00	93.00	1102.065	130.891	1232.956
46	48.00	95.00	1106.859	157.080	1263.938
47	48.00	97.00	1232.523	157.080	1389.602
48	48.00	99.00	1358.186	157.080	1515.266
49	48.00	101.00	1483.850	157.080	1640.930
50	48.00	103.00	1609.514	157.080	1766.593
51	48.00	105.00	1735.177	157.080	1892.257
52	48.00	107.00	1860.841	157.080	2017.921
53	48.00	109.00	1898.207	93.494	1991.701
54	48.00	111.00	1944.347	105.181	2049.527
55	48.00	113.00	2009.639	97.260	2106.899
56	48.00	115.00	2018.602	92.812	2111.414

Drilled Shaft Capacity at User-Defined Settlement (sorted by shaft diameter):

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**** Capacity is NOT modified by the strength reduction factors ****

User-Defined Settlement = 1.04%

ID	Diameter (in)	Length (ft)	Skin Fric. (tons)	End Bearing (tons)	Capacity (tons)

1	48.00	5.00	0.000	0.000	0.000
2	48.00	7.00	0.000	0.000	0.000
3	48.00	9.00	0.000	0.000	0.000
4	48.00	11.00	0.000	0.000	0.000
5	48.00	13.00	0.000	0.000	0.000

"BB-11_Drilled_48in_BOC=-10.3ft_Void=-82.8ft.out"

6	48.00	15.00	0.000	0.000	0.000
7	48.00	17.00	0.000	0.000	0.000
8	48.00	19.00	0.000	0.000	0.000
9	48.00	21.00	0.000	0.000	0.000
10	48.00	23.00	0.000	0.000	0.000
11	48.00	25.00	0.000	0.000	0.000
12	48.00	27.00	0.000	0.000	0.000
13	48.00	29.00	0.000	0.000	0.000
14	48.00	31.00	0.000	0.000	0.000
15	48.00	33.00	0.000	0.000	0.000
16	48.00	35.00	0.000	0.000	0.000
17	48.00	37.00	0.000	0.000	0.000
18	48.00	39.00	0.000	0.000	0.000
19	48.00	41.00	0.000	0.000	0.000
20	48.00	43.00	0.000	0.000	0.000
21	48.00	45.00	0.000	0.000	0.000
22	48.00	47.00	0.000	0.000	0.000
23	48.00	49.00	0.000	0.000	0.000
24	48.00	51.00	0.000	0.000	0.000
25	48.00	53.00	0.000	0.000	0.000
26	48.00	55.00	0.000	0.000	0.000
27	48.00	57.00	0.000	0.000	0.000
28	48.00	59.00	0.000	0.000	0.000
29	48.00	61.00	0.000	0.000	0.000
30	48.00	63.00	0.000	0.000	0.000
31	48.00	65.00	0.000	0.000	0.000
32	48.00	67.00	0.000	0.000	0.000
33	48.00	69.00	0.000	0.000	0.000
34	48.00	71.00	0.000	0.000	0.000
35	48.00	73.00	15.499	1356.968	1372.467
36	48.00	75.00	73.582	35.921	109.504
37	48.00	77.00	74.584	27.175	101.759
38	48.00	79.00	114.799	336.899	451.697
39	48.00	81.00	163.711	256.755	420.466
40	48.00	83.00	208.353	211.743	420.096
41	48.00	85.00	255.386	210.082	465.468
42	48.00	87.00	301.035	207.644	508.679
43	48.00	89.00	345.442	204.837	550.279
44	48.00	91.00	388.721	201.863	590.584
45	48.00	93.00	421.619	41.645	463.264
46	48.00	95.00	426.308	199.589	625.897
47	48.00	97.00	467.880	196.553	664.433
48	48.00	99.00	508.549	193.544	702.093
49	48.00	101.00	548.374	190.584	738.958
50	48.00	103.00	587.406	187.686	775.092
51	48.00	105.00	625.693	184.854	810.547
52	48.00	107.00	663.275	182.093	845.367
53	48.00	109.00	678.385	29.747	708.131
54	48.00	111.00	694.561	120.882	815.443
55	48.00	113.00	714.873	30.945	745.818
56	48.00	115.00	723.640	29.530	753.169

"BB-11_Drilled_48in_BOC=-10.3ft_Void=-82.8ft.out"

General Information:

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Input file: Shaft\DS Water\BB-11_Drilled_60in_BOC=-10.3ft_Void=-82.8ft.in
Project number: B-22-074
Job name: Broad Causeway Bridge
Engineer: PV/TC
Units: English

Analysis Information:

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Analysis Type: Drilled Shaft Analysis

Soil Information:

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Boring date: 12/26/23
Boring number: BB-11
Station number: 138+55 Offset: 34 LT

Ground Elevation: -10.30(ft)
Water table Elevation = 3.70(ft)

Cu is calculated using: Direct method.
Rock side-friction is calculated using: McVay's method
Hammer type: Automatic Hammer, Correction factor = 1.24

ID	Depth (ft)	Elevation (ft)	SPT Blows (Blows/ft)	Unit Weight (pcf)	Soil Type
-----	-----	-----	-----	-----	-----
1	0.00	-10.30	N/A	118.00	5- Cavity layer
2	2.00	-12.30	N/A	118.00	5- Cavity layer
3	4.00	-14.30	N/A	126.00	5- Cavity layer
4	6.00	-16.30	N/A	124.00	5- Cavity layer
5	8.00	-18.30	N/A	121.00	5- Cavity layer
6	10.00	-20.30	N/A	116.00	5- Cavity layer
7	12.00	-22.30	N/A	119.00	5- Cavity layer
8	14.00	-24.30	N/A	119.00	5- Cavity layer
9	16.00	-26.30	N/A	116.00	5- Cavity layer
10	20.00	-30.30	N/A	117.00	5- Cavity layer
11	22.50	-32.80	N/A	115.00	5- Cavity layer
12	25.00	-35.30	N/A	115.00	5- Cavity layer
13	27.50	-37.80	N/A	120.00	5- Cavity layer
14	30.00	-40.30	N/A	120.00	5- Cavity layer
15	32.50	-42.80	N/A	115.00	5- Cavity layer
16	35.00	-45.30	N/A	120.00	5- Cavity layer

"BB-11_Drilled_60in_BOC=-10.3ft_Void=-82.8ft.out"

17	37.50	-47.80	N/A	115.00	5- Cavity layer
18	40.00	-50.30	N/A	115.00	5- Cavity layer
19	42.50	-52.80	N/A	115.00	5- Cavity layer
20	45.00	-55.30	N/A	115.00	5- Cavity layer
21	47.50	-57.80	N/A	135.00	5- Cavity layer
22	50.00	-60.30	N/A	135.00	5- Cavity layer
23	52.50	-62.80	N/A	135.00	5- Cavity layer
24	55.00	-65.30	N/A	135.00	5- Cavity layer
25	57.50	-67.80	N/A	135.00	5- Cavity layer
26	60.00	-70.30	N/A	135.00	5- Cavity layer
27	62.50	-72.80	N/A	135.00	5- Cavity layer
28	62.50	-72.80	N/A	0.00	5- Cavity layer
29	62.50	-72.80	N/A	122.00	5- Cavity layer
30	65.00	-75.30	N/A	122.00	5- Cavity layer
31	67.50	-77.80	N/A	133.00	5- Cavity layer
32	70.00	-80.30	N/A	133.00	5- Cavity layer
33	72.50	-82.80	N/A	115.00	5- Cavity layer
34	72.50	-82.80	N/A	0.00	5- Cavity layer
35	72.50	-82.80	N/A	135.00	4- Lime Stone/Very shelly sand
36	75.00	-85.30	N/A	135.00	4- Lime Stone/Very shelly sand
37	75.00	-85.30	N/A	0.00	1- Plastic Clay
38	75.00	-85.30	100.00	133.00	3- Clean sand
39	77.50	-87.80	100.00	133.00	3- Clean sand
40	77.50	-87.80	N/A	0.00	1- Plastic Clay
41	77.50	-87.80	N/A	135.00	4- Lime Stone/Very shelly sand
42	80.00	-90.30	N/A	135.00	4- Lime Stone/Very shelly sand
43	82.50	-92.80	N/A	135.00	4- Lime Stone/Very shelly sand
44	85.00	-95.30	N/A	135.00	4- Lime Stone/Very shelly sand
45	87.50	-97.80	N/A	135.00	4- Lime Stone/Very shelly sand
46	90.00	-100.30	N/A	135.00	4- Lime Stone/Very shelly sand
47	92.50	-102.80	N/A	125.00	4- Lime Stone/Very shelly sand
48	92.50	-102.80	N/A	0.00	1- Plastic Clay
49	92.50	-102.80	14.00	115.00	3- Clean sand
50	95.00	-105.30	14.00	115.00	3- Clean sand
51	95.00	-105.30	N/A	0.00	1- Plastic Clay
52	95.00	-105.30	N/A	135.00	4- Lime Stone/Very shelly sand
53	97.50	-107.80	N/A	135.00	4- Lime Stone/Very shelly sand
54	100.00	-110.30	N/A	135.00	4- Lime Stone/Very shelly sand
55	102.50	-112.80	N/A	135.00	4- Lime Stone/Very shelly sand
56	105.00	-115.30	N/A	135.00	4- Lime Stone/Very shelly sand
57	107.50	-117.80	N/A	135.00	4- Lime Stone/Very shelly sand
58	107.50	-117.80	N/A	0.00	1- Plastic Clay
59	107.50	-117.80	10.00	115.00	3- Clean sand
60	110.00	-120.30	10.00	115.00	3- Clean sand
61	110.00	-120.30	N/A	0.00	1- Plastic Clay
62	110.00	-120.30	N/A	125.00	4- Lime Stone/Very shelly sand
63	112.50	-122.80	N/A	125.00	4- Lime Stone/Very shelly sand
64	112.50	-122.80	N/A	0.00	1- Plastic Clay
65	112.50	-122.80	12.00	115.00	3- Clean sand
66	115.00	-125.30	12.00	115.00	3- Clean sand
67	117.50	-127.80	5.00	115.00	3- Clean sand
68	117.50	-127.80	N/A	0.00	1- Plastic Clay

"BB-11_Drilled_60in_BOC=-10.3ft_Void=-82.8ft.out"

Top of Rock Socket
elev = -82.8'

Bottom of Canal
elev = -10.3'

69	117.50	-127.80	N/A	135.00	4- Lime Stone/Very shelly sand
70	120.00	-130.30	N/A	135.00	4- Lime Stone/Very shelly sand
71	120.00	-130.30	N/A	0.00	1- Plastic Clay
72	120.00	-130.30	13.00	115.00	3- Clean sand
73	122.50	-132.80	13.00	115.00	3- Clean sand
74	125.00	-135.30	12.00	115.00	3- Clean sand

ID	Cu-DIR (tsf)	qu (tsf)	qt (tsf)	Em (ksi)	qb (tsf)
1	N/A	N/A	N/A	N/A	N/A
2	N/A	N/A	N/A	N/A	N/A
3	N/A	N/A	N/A	N/A	N/A
4	N/A	N/A	N/A	N/A	N/A
5	N/A	N/A	N/A	N/A	N/A
6	N/A	N/A	N/A	N/A	N/A
7	N/A	N/A	N/A	N/A	N/A
8	N/A	N/A	N/A	N/A	N/A
9	N/A	N/A	N/A	N/A	N/A
10	N/A	N/A	N/A	N/A	N/A
11	N/A	N/A	N/A	N/A	N/A
12	N/A	N/A	N/A	N/A	N/A
13	N/A	N/A	N/A	N/A	N/A
14	N/A	N/A	N/A	N/A	N/A
15	N/A	N/A	N/A	N/A	N/A
16	N/A	N/A	N/A	N/A	N/A
17	N/A	N/A	N/A	N/A	N/A
18	N/A	N/A	N/A	N/A	N/A
19	N/A	N/A	N/A	N/A	N/A
20	N/A	N/A	N/A	N/A	N/A
21	N/A	N/A	N/A	N/A	N/A
22	N/A	N/A	N/A	N/A	N/A
23	N/A	N/A	N/A	N/A	N/A
24	N/A	N/A	N/A	N/A	N/A
25	N/A	N/A	N/A	N/A	N/A
26	N/A	N/A	N/A	N/A	N/A
27	N/A	N/A	N/A	N/A	N/A
28	N/A	N/A	N/A	N/A	N/A
29	N/A	N/A	N/A	N/A	N/A
30	N/A	N/A	N/A	N/A	N/A
31	N/A	N/A	N/A	N/A	N/A
32	N/A	N/A	N/A	N/A	N/A
33	N/A	N/A	N/A	N/A	N/A
34	N/A	N/A	N/A	N/A	N/A
35	N/A	25.00	4.00	39.93	12.50
36	N/A	25.00	4.00	39.93	12.50
37	0.00	N/A	N/A	N/A	N/A
38	N/A	N/A	N/A	N/A	N/A
39	N/A	N/A	N/A	N/A	N/A
40	0.00	N/A	N/A	N/A	N/A
41	N/A	25.00	4.00	39.93	12.50
42	N/A	25.00	4.00	39.93	12.50

"BB-11_Drilled_60in_BOC=-10.3ft_Void=-82.8ft.out"

Top of Rock Socket
elev = -82.8'

43	N/A	25.00	4.00	39.93	12.50
44	N/A	25.00	4.00	39.93	12.50
45	N/A	25.00	4.00	39.93	12.50
46	N/A	25.00	4.00	39.93	12.50
47	N/A	15.50	2.48	24.76	7.75
48	0.00	N/A	N/A	N/A	N/A
49	N/A	N/A	N/A	N/A	N/A
50	N/A	N/A	N/A	N/A	N/A
51	0.00	N/A	N/A	N/A	N/A
52	N/A	25.00	4.00	39.93	12.50
53	N/A	25.00	4.00	39.93	12.50
54	N/A	25.00	4.00	39.93	12.50
55	N/A	25.00	4.00	39.93	12.50
56	N/A	25.00	4.00	39.93	12.50
57	N/A	25.00	4.00	39.93	12.50
58	0.00	N/A	N/A	N/A	N/A
59	N/A	N/A	N/A	N/A	N/A
60	N/A	N/A	N/A	N/A	N/A
61	0.00	N/A	N/A	N/A	N/A
62	N/A	16.74	2.68	26.74	8.37
63	N/A	16.74	2.68	26.74	8.37
64	0.00	N/A	N/A	N/A	N/A
65	N/A	N/A	N/A	N/A	N/A
66	N/A	N/A	N/A	N/A	N/A
67	N/A	N/A	N/A	N/A	N/A
68	0.00	N/A	N/A	N/A	N/A
69	N/A	25.00	4.00	39.93	12.50
70	N/A	25.00	4.00	39.93	12.50
71	0.00	N/A	N/A	N/A	N/A
72	N/A	N/A	N/A	N/A	N/A
73	N/A	N/A	N/A	N/A	N/A
74	N/A	N/A	N/A	N/A	N/A

ID	RQD F.M.	S.R.I.	Rock Recovery
1	N/A	N/A	N/A
2	N/A	N/A	N/A
3	N/A	N/A	N/A
4	N/A	N/A	N/A
5	N/A	N/A	N/A
6	N/A	N/A	N/A
7	N/A	N/A	N/A
8	N/A	N/A	N/A
9	N/A	N/A	N/A
10	N/A	N/A	N/A
11	N/A	N/A	N/A
12	N/A	N/A	N/A
13	N/A	N/A	N/A
14	N/A	N/A	N/A
15	N/A	N/A	N/A
16	N/A	N/A	N/A

"BB-11_Drilled_60in_BOC=-10.3ft_Void=-82.8ft.out"

17	N/A	N/A	N/A
18	N/A	N/A	N/A
19	N/A	N/A	N/A
20	N/A	N/A	N/A
21	N/A	N/A	N/A
22	N/A	N/A	N/A
23	N/A	N/A	N/A
24	N/A	N/A	N/A
25	N/A	N/A	N/A
26	N/A	N/A	N/A
27	N/A	N/A	N/A
28	N/A	N/A	N/A
29	N/A	N/A	N/A
30	N/A	N/A	N/A
31	N/A	N/A	N/A
32	N/A	N/A	N/A
33	N/A	N/A	N/A
34	N/A	N/A	N/A
35	0.50	ROUGH	1.000
36	0.50	ROUGH	1.000
37	N/A	N/A	N/A
38	N/A	N/A	N/A
39	N/A	N/A	N/A
40	N/A	N/A	N/A
41	0.50	ROUGH	1.000
42	0.50	ROUGH	1.000
43	0.50	ROUGH	1.000
44	0.50	ROUGH	1.000
45	0.50	ROUGH	1.000
46	0.50	ROUGH	1.000
47	0.50	ROUGH	1.000
48	N/A	N/A	N/A
49	N/A	N/A	N/A
50	N/A	N/A	N/A
51	N/A	N/A	N/A
52	0.50	ROUGH	1.000
53	0.50	ROUGH	1.000
54	0.50	ROUGH	1.000
55	0.50	ROUGH	1.000
56	0.50	ROUGH	1.000
57	0.50	ROUGH	1.000
58	N/A	N/A	N/A
59	N/A	N/A	N/A
60	N/A	N/A	N/A
61	N/A	N/A	N/A
62	0.50	ROUGH	1.000
63	0.50	ROUGH	1.000
64	N/A	N/A	N/A
65	N/A	N/A	N/A
66	N/A	N/A	N/A
67	N/A	N/A	N/A
68	N/A	N/A	N/A

"BB-11_Drilled_60in_BOC=-10.3ft_Void=-82.8ft.out"

69	0.50	ROUGH	1.000
70	0.50	ROUGH	1.000
71	N/A	N/A	N/A
72	N/A	N/A	N/A
73	N/A	N/A	N/A
74	N/A	N/A	N/A

Drilled Shaft Data:

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Unit weight of concrete = 145.00(pcf), Concrete Slump = 6.00(in)
Modulus of Elasticity of concrete = 3987.00(ksi)

Shaft Geometry:

ID	Length (ft)	Tip Elev. (ft)	Case Len. (ft)	Diameter (in)	Base Diam. (in)	Bell Len. (ft)
1	5.00	-15.30	0.00	60.00	60.00	0.00
2	7.00	-17.30	0.00	60.00	60.00	0.00
3	9.00	-19.30	0.00	60.00	60.00	0.00
4	11.00	-21.30	0.00	60.00	60.00	0.00
5	13.00	-23.30	0.00	60.00	60.00	0.00
6	15.00	-25.30	0.00	60.00	60.00	0.00
7	17.00	-27.30	0.00	60.00	60.00	0.00
8	19.00	-29.30	0.00	60.00	60.00	0.00
9	21.00	-31.30	0.00	60.00	60.00	0.00
10	23.00	-33.30	0.00	60.00	60.00	0.00
11	25.00	-35.30	0.00	60.00	60.00	0.00
12	27.00	-37.30	0.00	60.00	60.00	0.00
13	29.00	-39.30	0.00	60.00	60.00	0.00
14	31.00	-41.30	0.00	60.00	60.00	0.00
15	33.00	-43.30	0.00	60.00	60.00	0.00
16	35.00	-45.30	0.00	60.00	60.00	0.00
17	37.00	-47.30	0.00	60.00	60.00	0.00
18	39.00	-49.30	0.00	60.00	60.00	0.00
19	41.00	-51.30	0.00	60.00	60.00	0.00
20	43.00	-53.30	0.00	60.00	60.00	0.00
21	45.00	-55.30	0.00	60.00	60.00	0.00
22	47.00	-57.30	0.00	60.00	60.00	0.00
23	49.00	-59.30	0.00	60.00	60.00	0.00
24	51.00	-61.30	0.00	60.00	60.00	0.00
25	53.00	-63.30	0.00	60.00	60.00	0.00
26	55.00	-65.30	0.00	60.00	60.00	0.00
27	57.00	-67.30	0.00	60.00	60.00	0.00
28	59.00	-69.30	0.00	60.00	60.00	0.00
29	61.00	-71.30	0.00	60.00	60.00	0.00
30	63.00	-73.30	0.00	60.00	60.00	0.00
31	65.00	-75.30	0.00	60.00	60.00	0.00
32	67.00	-77.30	0.00	60.00	60.00	0.00
33	69.00	-79.30	0.00	60.00	60.00	0.00
34	71.00	-81.30	0.00	60.00	60.00	0.00

"BB-11_Drilled_60in_BOC=-10.3ft_Void=-82.8ft.out"

35	73.00	-83.30	0.00	60.00	60.00	0.00
36	75.00	-85.30	0.00	60.00	60.00	0.00
37	77.00	-87.30	0.00	60.00	60.00	0.00
38	79.00	-89.30	0.00	60.00	60.00	0.00
39	81.00	-91.30	0.00	60.00	60.00	0.00
40	83.00	-93.30	0.00	60.00	60.00	0.00
41	85.00	-95.30	0.00	60.00	60.00	0.00
42	87.00	-97.30	0.00	60.00	60.00	0.00
43	89.00	-99.30	0.00	60.00	60.00	0.00
44	91.00	-101.30	0.00	60.00	60.00	0.00
45	93.00	-103.30	0.00	60.00	60.00	0.00
46	95.00	-105.30	0.00	60.00	60.00	0.00
47	97.00	-107.30	0.00	60.00	60.00	0.00
48	99.00	-109.30	0.00	60.00	60.00	0.00
49	101.00	-111.30	0.00	60.00	60.00	0.00
50	103.00	-113.30	0.00	60.00	60.00	0.00
51	105.00	-115.30	0.00	60.00	60.00	0.00
52	107.00	-117.30	0.00	60.00	60.00	0.00
53	109.00	-119.30	0.00	60.00	60.00	0.00
54	111.00	-121.30	0.00	60.00	60.00	0.00
55	113.00	-123.30	0.00	60.00	60.00	0.00
56	115.00	-125.30	0.00	60.00	60.00	0.00

Drilled Shaft Capacity (sorted by shaft diameter):

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Strength reduction factors: Skin-friction = 1.00, End-bearing = 1.00

ID	Diameter (in)	Length (ft)	Skin Fric. (tons)	End Bearing (tons)	Capacity (tons)

1	60.00	5.00	0.000	0.000	0.000
2	60.00	7.00	0.000	0.000	0.000
3	60.00	9.00	0.000	0.000	0.000
4	60.00	11.00	0.000	0.000	0.000
5	60.00	13.00	0.000	0.000	0.000
6	60.00	15.00	0.000	0.000	0.000
7	60.00	17.00	0.000	0.000	0.000
8	60.00	19.00	0.000	0.000	0.000
9	60.00	21.00	0.000	0.000	0.000
10	60.00	23.00	0.000	0.000	0.000
11	60.00	25.00	0.000	0.000	0.000
12	60.00	27.00	0.000	0.000	0.000
13	60.00	29.00	0.000	0.000	0.000
14	60.00	31.00	0.000	0.000	0.000
15	60.00	33.00	0.000	0.000	0.000
16	60.00	35.00	0.000	0.000	0.000
17	60.00	37.00	0.000	0.000	0.000
18	60.00	39.00	0.000	0.000	0.000
19	60.00	41.00	0.000	0.000	0.000
20	60.00	43.00	0.000	0.000	0.000
21	60.00	45.00	0.000	0.000	0.000

"BB-11_Drilled_60in_BOC=-10.3ft_Void=-82.8ft.out"

22	60.00	47.00	0.000	0.000	0.000
23	60.00	49.00	0.000	0.000	0.000
24	60.00	51.00	0.000	0.000	0.000
25	60.00	53.00	0.000	0.000	0.000
26	60.00	55.00	0.000	0.000	0.000
27	60.00	57.00	0.000	0.000	0.000
28	60.00	59.00	0.000	0.000	0.000
29	60.00	61.00	0.000	0.000	0.000
30	60.00	63.00	0.000	0.000	0.000
31	60.00	65.00	0.000	0.000	0.000
32	60.00	67.00	0.000	0.000	0.000
33	60.00	69.00	0.000	0.000	0.000
34	60.00	71.00	0.000	0.000	0.000
35	60.00	73.00	39.270	245.437	284.707
36	60.00	75.00	196.350	138.058	334.408
37	60.00	77.00	197.629	109.424	307.053
38	60.00	79.00	315.860	245.437	561.297
39	60.00	81.00	472.940	245.437	718.377
40	60.00	83.00	630.020	245.437	875.457
41	60.00	85.00	787.099	245.437	1032.536
42	60.00	87.00	944.179	245.437	1189.616
43	60.00	89.00	1101.258	245.437	1346.695
44	60.00	91.00	1258.338	245.437	1503.775
45	60.00	93.00	1377.581	170.431	1548.013
46	60.00	95.00	1383.574	245.437	1629.010
47	60.00	97.00	1540.653	245.437	1786.090
48	60.00	99.00	1697.733	245.437	1943.170
49	60.00	101.00	1854.812	245.437	2100.249
50	60.00	103.00	2011.892	245.437	2257.329
51	60.00	105.00	2168.972	245.437	2414.409
52	60.00	107.00	2326.051	245.437	2571.488
53	60.00	109.00	2372.759	121.737	2494.496
54	60.00	111.00	2430.433	164.345	2594.778
55	60.00	113.00	2512.049	126.640	2638.689
56	60.00	115.00	2523.253	119.201	2642.453

Drilled Shaft Capacity at User-Defined Settlement (sorted by shaft diameter):

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**** Capacity is NOT modified by the strength reduction factors ****

User-Defined Settlement = 0.83%

ID	Diameter (in)	Length (ft)	Skin Fric. (tons)	End Bearing (tons)	Capacity (tons)

1	60.00	5.00	0.000	0.000	0.000
2	60.00	7.00	0.000	0.000	0.000
3	60.00	9.00	0.000	0.000	0.000
4	60.00	11.00	0.000	0.000	0.000
5	60.00	13.00	0.000	0.000	0.000

"BB-11_Drilled_60in_BOC=-10.3ft_Void=-82.8ft.out"

6	60.00	15.00	0.000	0.000	0.000
7	60.00	17.00	0.000	0.000	0.000
8	60.00	19.00	0.000	0.000	0.000
9	60.00	21.00	0.000	0.000	0.000
10	60.00	23.00	0.000	0.000	0.000
11	60.00	25.00	0.000	0.000	0.000
12	60.00	27.00	0.000	0.000	0.000
13	60.00	29.00	0.000	0.000	0.000
14	60.00	31.00	0.000	0.000	0.000
15	60.00	33.00	0.000	0.000	0.000
16	60.00	35.00	0.000	0.000	0.000
17	60.00	37.00	0.000	0.000	0.000
18	60.00	39.00	0.000	0.000	0.000
19	60.00	41.00	0.000	0.000	0.000
20	60.00	43.00	0.000	0.000	0.000
21	60.00	45.00	0.000	0.000	0.000
22	60.00	47.00	0.000	0.000	0.000
23	60.00	49.00	0.000	0.000	0.000
24	60.00	51.00	0.000	0.000	0.000
25	60.00	53.00	0.000	0.000	0.000
26	60.00	55.00	0.000	0.000	0.000
27	60.00	57.00	0.000	0.000	0.000
28	60.00	59.00	0.000	0.000	0.000
29	60.00	61.00	0.000	0.000	0.000
30	60.00	63.00	0.000	0.000	0.000
31	60.00	65.00	0.000	0.000	0.000
32	60.00	67.00	0.000	0.000	0.000
33	60.00	69.00	0.000	0.000	0.000
34	60.00	71.00	0.000	0.000	0.000
35	60.00	73.00	19.372	2114.123	2133.495
36	60.00	75.00	91.953	35.930	127.883
37	60.00	77.00	93.199	28.478	121.677
38	60.00	79.00	143.432	524.880	668.312
39	60.00	81.00	204.510	400.017	604.528
40	60.00	83.00	260.237	329.891	590.127
41	60.00	85.00	311.309	284.080	595.389
42	60.00	87.00	366.711	282.405	649.116
43	60.00	89.00	420.541	279.970	700.512
44	60.00	91.00	472.950	277.115	750.065
45	60.00	93.00	512.794	44.355	557.149
46	60.00	95.00	518.632	274.814	793.446
47	60.00	97.00	568.902	271.632	840.534
48	60.00	99.00	618.044	268.386	886.430
49	60.00	101.00	666.134	265.124	931.258
50	60.00	103.00	713.241	261.877	975.117
51	60.00	105.00	759.422	258.663	1018.085
52	60.00	107.00	804.732	255.496	1060.228
53	60.00	109.00	823.175	31.682	854.857
54	60.00	111.00	842.797	169.873	1012.670
55	60.00	113.00	867.309	32.958	900.267
56	60.00	115.00	878.224	31.022	909.246

"BB-11_Drilled_60in_BOC=-10.3ft_Void=-82.8ft.out"

General Information:

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Input file: ed Shaft\DS Water\BB-12_Drilled_48in_BOC=-15.5ft_Void=-82ft.in
Project number: B-22-074
Job name: Broad Causeway Bridge
Engineer: PV/TC
Units: English

Analysis Information:

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Analysis Type: Drilled Shaft Analysis

Soil Information:

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Boring date: 3/29/2023
Boring number: BB-12
Station number: 140+71 Offset: +32

Ground Elevation: 2.70(ft)
Water table Elevation = 2.70(ft)

Cu is calculated using: Direct method.
Rock side-friction is calculated using: McVay's method
Hammer type: Automatic Hammer, Correction factor = 1.24

ID	Depth (ft)	Elevation (ft)	SPT Blows (Blows/ft)	Unit Weight (pcf)	Soil Type

1	0.00	2.70	N/A	0.00	5- Cavity layer
2	2.00	0.70	N/A	0.00	5- Cavity layer
3	4.00	-1.30	N/A	0.00	5- Cavity layer
4	6.00	-3.30	N/A	0.00	5- Cavity layer
5	8.00	-5.30	N/A	0.00	5- Cavity layer
6	10.00	-7.30	N/A	0.00	5- Cavity layer
7	12.00	-9.30	N/A	0.00	5- Cavity layer
8	14.00	-11.30	N/A	0.00	5- Cavity layer
9	16.00	-13.30	N/A	0.00	5- Cavity layer
10	18.20	-15.50	N/A	0.00	5- Cavity layer
11	18.20	-15.50	N/A	115.00	5- Cavity layer
12	20.00	-17.30	N/A	115.00	5- Cavity layer
13	22.50	-19.80	N/A	120.00	5- Cavity layer
14	25.00	-22.30	N/A	125.00	5- Cavity layer
15	27.50	-24.80	N/A	120.00	5- Cavity layer
16	30.00	-27.30	N/A	115.00	5- Cavity layer

"BB-12_Drilled_48in_BOC=-15.5ft_Void=-82ft.out"

17	32.50	-29.80	N/A	120.00	5- Cavity layer
18	35.00	-32.30	N/A	115.00	5- Cavity layer
19	37.50	-34.80	N/A	115.00	5- Cavity layer
20	40.00	-37.30	N/A	115.00	5- Cavity layer
21	42.50	-39.80	N/A	116.00	5- Cavity layer
22	45.00	-42.30	N/A	119.00	5- Cavity layer
23	47.50	-44.80	N/A	119.00	5- Cavity layer
24	50.00	-47.30	N/A	124.00	5- Cavity layer
25	52.50	-49.80	N/A	121.00	5- Cavity layer
26	55.00	-52.30	N/A	131.00	5- Cavity layer
27	57.50	-54.80	N/A	124.00	5- Cavity layer
28	60.00	-57.30	N/A	126.00	5- Cavity layer
29	62.50	-59.80	N/A	121.00	5- Cavity layer
30	65.00	-62.30	N/A	119.00	5- Cavity layer
31	67.50	-64.80	N/A	130.00	5- Cavity layer
32	70.00	-67.30	N/A	135.00	5- Cavity layer
33	72.50	-69.80	N/A	125.00	5- Cavity layer
34	75.00	-72.30	N/A	130.00	5- Cavity layer
35	77.50	-74.80	N/A	135.00	5- Cavity layer
36	80.00	-77.30	N/A	115.00	5- Cavity layer
37	82.50	-79.80	N/A	119.00	5- Cavity layer
38	84.70	-82.00	N/A	127.00	5- Cavity layer
39	84.70	-82.00	N/A	0.00	1- Plastic Clay
40	84.70	-82.00	31.00	127.00	3- Clean sand
41	85.00	-82.30	31.00	127.00	3- Clean sand
42	85.00	-82.30	N/A	0.00	1- Plastic Clay
43	85.00	-82.30	N/A	125.00	4- Lime Stone/Very shelly sand
44	87.50	-84.80	N/A	125.00	4- Lime Stone/Very shelly sand
45	90.00	-87.30	N/A	130.00	4- Lime Stone/Very shelly sand
46	92.50	-89.80	N/A	135.00	4- Lime Stone/Very shelly sand
47	95.00	-92.30	N/A	125.00	4- Lime Stone/Very shelly sand
48	95.00	-92.30	N/A	0.00	1- Plastic Clay
49	95.00	-92.30	4.00	115.00	3- Clean sand
50	97.50	-94.80	4.00	115.00	3- Clean sand
51	100.00	-97.30	19.00	120.00	3- Clean sand
52	100.00	-97.30	N/A	0.00	1- Plastic Clay
53	100.00	-97.30	N/A	130.00	4- Lime Stone/Very shelly sand
54	102.50	-99.80	N/A	130.00	4- Lime Stone/Very shelly sand
55	105.00	-102.30	N/A	135.00	4- Lime Stone/Very shelly sand
56	107.50	-104.80	N/A	135.00	4- Lime Stone/Very shelly sand
57	110.00	-107.30	N/A	135.00	4- Lime Stone/Very shelly sand
58	112.50	-109.80	N/A	135.00	4- Lime Stone/Very shelly sand
59	115.00	-112.30	N/A	135.00	4- Lime Stone/Very shelly sand
60	117.50	-114.80	N/A	135.00	4- Lime Stone/Very shelly sand
61	120.00	-117.30	N/A	135.00	4- Lime Stone/Very shelly sand
62	122.50	-119.80	N/A	125.00	4- Lime Stone/Very shelly sand
63	125.00	-122.30	N/A	135.00	4- Lime Stone/Very shelly sand

ID	Cu-DIR (tsf)	qu (tsf)	qt (tsf)	Em (ksi)	qb (tsf)

1	N/A	N/A	N/A	N/A	N/A

"BB-12_Drilled_48in_BOC=-15.5ft_Void=-82ft.out"

Top of Rock Socket
elev = -82'

Bottom of Canal
elev = -15.5'

2	N/A	N/A	N/A	N/A	N/A
3	N/A	N/A	N/A	N/A	N/A
4	N/A	N/A	N/A	N/A	N/A
5	N/A	N/A	N/A	N/A	N/A
6	N/A	N/A	N/A	N/A	N/A
7	N/A	N/A	N/A	N/A	N/A
8	N/A	N/A	N/A	N/A	N/A
9	N/A	N/A	N/A	N/A	N/A
10	N/A	N/A	N/A	N/A	N/A
11	N/A	N/A	N/A	N/A	N/A
12	N/A	N/A	N/A	N/A	N/A
13	N/A	N/A	N/A	N/A	N/A
14	N/A	N/A	N/A	N/A	N/A
15	N/A	N/A	N/A	N/A	N/A
16	N/A	N/A	N/A	N/A	N/A
17	N/A	N/A	N/A	N/A	N/A
18	N/A	N/A	N/A	N/A	N/A
19	N/A	N/A	N/A	N/A	N/A
20	N/A	N/A	N/A	N/A	N/A
21	N/A	N/A	N/A	N/A	N/A
22	N/A	N/A	N/A	N/A	N/A
23	N/A	N/A	N/A	N/A	N/A
24	N/A	N/A	N/A	N/A	N/A
25	N/A	N/A	N/A	N/A	N/A
26	N/A	N/A	N/A	N/A	N/A
27	N/A	N/A	N/A	N/A	N/A
28	N/A	N/A	N/A	N/A	N/A
29	N/A	N/A	N/A	N/A	N/A
30	N/A	N/A	N/A	N/A	N/A
31	N/A	N/A	N/A	N/A	N/A
32	N/A	N/A	N/A	N/A	N/A
33	N/A	N/A	N/A	N/A	N/A
34	N/A	N/A	N/A	N/A	N/A
35	N/A	N/A	N/A	N/A	N/A
36	N/A	N/A	N/A	N/A	N/A
37	N/A	N/A	N/A	N/A	N/A
38	N/A	N/A	N/A	N/A	N/A
39	0.00	N/A	N/A	N/A	N/A
40	N/A	N/A	N/A	N/A	N/A
41	N/A	N/A	N/A	N/A	N/A
42	0.00	N/A	N/A	N/A	N/A
43	N/A	17.36	2.78	27.73	8.68
44	N/A	17.36	2.78	27.73	8.68
45	N/A	25.00	4.00	39.93	12.50
46	N/A	25.00	4.00	39.93	12.50
47	N/A	18.60	2.98	29.71	9.30
48	0.00	N/A	N/A	N/A	N/A
49	N/A	N/A	N/A	N/A	N/A
50	N/A	N/A	N/A	N/A	N/A
51	N/A	N/A	N/A	N/A	N/A
52	0.00	N/A	N/A	N/A	N/A
53	N/A	25.00	4.00	39.93	12.50

"BB-12_Drilled_48in_BOC=-15.5ft_Void=-82ft.out"

54	N/A	25.00	4.00	39.93	12.50
55	N/A	25.00	4.00	39.93	12.50
56	N/A	25.00	4.00	39.93	12.50
57	N/A	25.00	4.00	39.93	12.50
58	N/A	25.00	4.00	39.93	12.50
59	N/A	25.00	4.00	39.93	12.50
60	N/A	25.00	4.00	39.93	12.50
61	N/A	25.00	4.00	39.93	12.50
62	N/A	17.36	2.78	27.73	8.68
63	N/A	25.00	4.00	39.93	12.50

ID RQD F.M. S.R.I. Rock Recovery

1	N/A	N/A	N/A
2	N/A	N/A	N/A
3	N/A	N/A	N/A
4	N/A	N/A	N/A
5	N/A	N/A	N/A
6	N/A	N/A	N/A
7	N/A	N/A	N/A
8	N/A	N/A	N/A
9	N/A	N/A	N/A
10	N/A	N/A	N/A
11	N/A	N/A	N/A
12	N/A	N/A	N/A
13	N/A	N/A	N/A
14	N/A	N/A	N/A
15	N/A	N/A	N/A
16	N/A	N/A	N/A
17	N/A	N/A	N/A
18	N/A	N/A	N/A
19	N/A	N/A	N/A
20	N/A	N/A	N/A
21	N/A	N/A	N/A
22	N/A	N/A	N/A
23	N/A	N/A	N/A
24	N/A	N/A	N/A
25	N/A	N/A	N/A
26	N/A	N/A	N/A
27	N/A	N/A	N/A
28	N/A	N/A	N/A
29	N/A	N/A	N/A
30	N/A	N/A	N/A
31	N/A	N/A	N/A
32	N/A	N/A	N/A
33	N/A	N/A	N/A
34	N/A	N/A	N/A
35	N/A	N/A	N/A
36	N/A	N/A	N/A
37	N/A	N/A	N/A
38	N/A	N/A	N/A

"BB-12_Drilled_48in_BOC=-15.5ft_Void=-82ft.out"

39	N/A	N/A	N/A
40	N/A	N/A	N/A
41	N/A	N/A	N/A
42	N/A	N/A	N/A
43	0.50	ROUGH	1.000
44	0.50	ROUGH	1.000
45	0.50	ROUGH	1.000
46	0.50	ROUGH	1.000
47	0.50	ROUGH	1.000
48	N/A	N/A	N/A
49	N/A	N/A	N/A
50	N/A	N/A	N/A
51	N/A	N/A	N/A
52	N/A	N/A	N/A
53	0.50	ROUGH	1.000
54	0.50	ROUGH	1.000
55	0.50	ROUGH	1.000
56	0.50	ROUGH	1.000
57	0.50	ROUGH	1.000
58	0.50	ROUGH	1.000
59	0.50	ROUGH	1.000
60	0.50	ROUGH	1.000
61	0.50	ROUGH	1.000
62	0.50	ROUGH	1.000
63	0.50	ROUGH	1.000

Drilled Shaft Data:

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Unit weight of concrete = 145.00(pcf), Concrete Slump = 6.00(in)
Modulus of Elasticity of concrete = 3987.00(ksi)

Shaft Geometry:

ID	Length (ft)	Tip Elev. (ft)	Case Len. (ft)	Diameter (in)	Base Diam. (in)	Bell Len. (ft)
1	5.00	-2.30	0.00	48.00	48.00	0.00
2	7.00	-4.30	0.00	48.00	48.00	0.00
3	9.00	-6.30	0.00	48.00	48.00	0.00
4	11.00	-8.30	0.00	48.00	48.00	0.00
5	13.00	-10.30	0.00	48.00	48.00	0.00
6	15.00	-12.30	0.00	48.00	48.00	0.00
7	17.00	-14.30	0.00	48.00	48.00	0.00
8	19.00	-16.30	0.00	48.00	48.00	0.00
9	21.00	-18.30	0.00	48.00	48.00	0.00
10	23.00	-20.30	0.00	48.00	48.00	0.00
11	25.00	-22.30	0.00	48.00	48.00	0.00
12	27.00	-24.30	0.00	48.00	48.00	0.00
13	29.00	-26.30	0.00	48.00	48.00	0.00
14	31.00	-28.30	0.00	48.00	48.00	0.00
15	33.00	-30.30	0.00	48.00	48.00	0.00

"BB-12_Drilled_48in_BOC=-15.5ft_Void=-82ft.out"

16	35.00	-32.30	0.00	48.00	48.00	0.00
17	37.00	-34.30	0.00	48.00	48.00	0.00
18	39.00	-36.30	0.00	48.00	48.00	0.00
19	41.00	-38.30	0.00	48.00	48.00	0.00
20	43.00	-40.30	0.00	48.00	48.00	0.00
21	45.00	-42.30	0.00	48.00	48.00	0.00
22	47.00	-44.30	0.00	48.00	48.00	0.00
23	49.00	-46.30	0.00	48.00	48.00	0.00
24	51.00	-48.30	0.00	48.00	48.00	0.00
25	53.00	-50.30	0.00	48.00	48.00	0.00
26	55.00	-52.30	0.00	48.00	48.00	0.00
27	57.00	-54.30	0.00	48.00	48.00	0.00
28	59.00	-56.30	0.00	48.00	48.00	0.00
29	61.00	-58.30	0.00	48.00	48.00	0.00
30	63.00	-60.30	0.00	48.00	48.00	0.00
31	65.00	-62.30	0.00	48.00	48.00	0.00
32	67.00	-64.30	0.00	48.00	48.00	0.00
33	69.00	-66.30	0.00	48.00	48.00	0.00
34	71.00	-68.30	0.00	48.00	48.00	0.00
35	73.00	-70.30	0.00	48.00	48.00	0.00
36	75.00	-72.30	0.00	48.00	48.00	0.00
37	77.00	-74.30	0.00	48.00	48.00	0.00
38	79.00	-76.30	0.00	48.00	48.00	0.00
39	81.00	-78.30	0.00	48.00	48.00	0.00
40	83.00	-80.30	0.00	48.00	48.00	0.00
41	85.00	-82.30	0.00	48.00	48.00	0.00
42	87.00	-84.30	0.00	48.00	48.00	0.00
43	89.00	-86.30	0.00	48.00	48.00	0.00
44	91.00	-88.30	0.00	48.00	48.00	0.00
45	93.00	-90.30	0.00	48.00	48.00	0.00
46	95.00	-92.30	0.00	48.00	48.00	0.00
47	97.00	-94.30	0.00	48.00	48.00	0.00
48	99.00	-96.30	0.00	48.00	48.00	0.00
49	101.00	-98.30	0.00	48.00	48.00	0.00
50	103.00	-100.30	0.00	48.00	48.00	0.00
51	105.00	-102.30	0.00	48.00	48.00	0.00
52	107.00	-104.30	0.00	48.00	48.00	0.00
53	109.00	-106.30	0.00	48.00	48.00	0.00
54	111.00	-108.30	0.00	48.00	48.00	0.00
55	113.00	-110.30	0.00	48.00	48.00	0.00
56	115.00	-112.30	0.00	48.00	48.00	0.00
57	117.00	-114.30	0.00	48.00	48.00	0.00
58	119.00	-116.30	0.00	48.00	48.00	0.00

Drilled Shaft Capacity (sorted by shaft diameter):

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Strength reduction factors: Skin-friction = 1.00, End-bearing = 1.00

ID	Diameter (in)	Length (ft)	Skin Fric. (tons)	End Bearing (tons)	Capacity (tons)
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"BB-12_Drilled_48in_BOC=-15.5ft_Void=-82ft.out"

1	48.00	5.00	0.000	0.000	0.000
2	48.00	7.00	0.000	0.000	0.000
3	48.00	9.00	0.000	0.000	0.000
4	48.00	11.00	0.000	0.000	0.000
5	48.00	13.00	0.000	0.000	0.000
6	48.00	15.00	0.000	0.000	0.000
7	48.00	17.00	0.000	0.000	0.000
8	48.00	19.00	0.000	0.000	0.000
9	48.00	21.00	0.000	0.000	0.000
10	48.00	23.00	0.000	0.000	0.000
11	48.00	25.00	0.000	0.000	0.000
12	48.00	27.00	0.000	0.000	0.000
13	48.00	29.00	0.000	0.000	0.000
14	48.00	31.00	0.000	0.000	0.000
15	48.00	33.00	0.000	0.000	0.000
16	48.00	35.00	0.000	0.000	0.000
17	48.00	37.00	0.000	0.000	0.000
18	48.00	39.00	0.000	0.000	0.000
19	48.00	41.00	0.000	0.000	0.000
20	48.00	43.00	0.000	0.000	0.000
21	48.00	45.00	0.000	0.000	0.000
22	48.00	47.00	0.000	0.000	0.000
23	48.00	49.00	0.000	0.000	0.000
24	48.00	51.00	0.000	0.000	0.000
25	48.00	53.00	0.000	0.000	0.000
26	48.00	55.00	0.000	0.000	0.000
27	48.00	57.00	0.000	0.000	0.000
28	48.00	59.00	0.000	0.000	0.000
29	48.00	61.00	0.000	0.000	0.000
30	48.00	63.00	0.000	0.000	0.000
31	48.00	65.00	0.000	0.000	0.000
32	48.00	67.00	0.000	0.000	0.000
33	48.00	69.00	0.000	0.000	0.000
34	48.00	71.00	0.000	0.000	0.000
35	48.00	73.00	0.000	0.000	0.000
36	48.00	75.00	0.000	0.000	0.000
37	48.00	77.00	0.000	0.000	0.000
38	48.00	79.00	0.000	0.000	0.000
39	48.00	81.00	0.000	0.000	0.000
40	48.00	83.00	0.000	0.000	0.000
41	48.00	85.00	0.005	109.076	109.081
42	48.00	87.00	87.272	109.076	196.348
43	48.00	89.00	174.539	109.076	283.615
44	48.00	91.00	281.004	157.080	438.084
45	48.00	93.00	406.668	157.080	563.748
46	48.00	95.00	532.332	109.780	642.112
47	48.00	97.00	534.642	66.614	601.257
48	48.00	99.00	537.284	101.382	638.666
49	48.00	101.00	601.560	157.080	758.639
50	48.00	103.00	727.224	157.080	884.303
51	48.00	105.00	852.887	157.080	1009.967
52	48.00	107.00	978.551	157.080	1135.631

"BB-12_Drilled_48in_BOC=-15.5ft_Void=-82ft.out"

53	48.00	109.00	1104.215	157.080	1261.294
54	48.00	111.00	1229.878	157.080	1386.958
55	48.00	113.00	1355.542	157.080	1512.622
56	48.00	115.00	1481.206	157.080	1638.285
57	48.00	117.00	1606.869	157.080	1763.949
58	48.00	119.00	1732.533	157.080	1889.613

Drilled Shaft Capacity at User-Defined Settlement (sorted by shaft diameter):

***** Capacity is NOT modified by the strength reduction factors *****

User-Defined Settlement = 1.04%

ID	Diameter (in)	Length (ft)	Skin Fric. (tons)	End Bearing (tons)	Capacity (tons)
1	48.00	5.00	0.000	0.000	0.000
2	48.00	7.00	0.000	0.000	0.000
3	48.00	9.00	0.000	0.000	0.000
4	48.00	11.00	0.000	0.000	0.000
5	48.00	13.00	0.000	0.000	0.000
6	48.00	15.00	0.000	0.000	0.000
7	48.00	17.00	0.000	0.000	0.000
8	48.00	19.00	0.000	0.000	0.000
9	48.00	21.00	0.000	0.000	0.000
10	48.00	23.00	0.000	0.000	0.000
11	48.00	25.00	0.000	0.000	0.000
12	48.00	27.00	0.000	0.000	0.000
13	48.00	29.00	0.000	0.000	0.000
14	48.00	31.00	0.000	0.000	0.000
15	48.00	33.00	0.000	0.000	0.000
16	48.00	35.00	0.000	0.000	0.000
17	48.00	37.00	0.000	0.000	0.000
18	48.00	39.00	0.000	0.000	0.000
19	48.00	41.00	0.000	0.000	0.000
20	48.00	43.00	0.000	0.000	0.000
21	48.00	45.00	0.000	0.000	0.000
22	48.00	47.00	0.000	0.000	0.000
23	48.00	49.00	0.000	0.000	0.000
24	48.00	51.00	0.000	0.000	0.000
25	48.00	53.00	0.000	0.000	0.000
26	48.00	55.00	0.000	0.000	0.000
27	48.00	57.00	0.000	0.000	0.000
28	48.00	59.00	0.000	0.000	0.000
29	48.00	61.00	0.000	0.000	0.000
30	48.00	63.00	0.000	0.000	0.000
31	48.00	65.00	0.000	0.000	0.000
32	48.00	67.00	0.000	0.000	0.000
33	48.00	69.00	0.000	0.000	0.000
34	48.00	71.00	0.000	0.000	0.000

"BB-12_Drilled_48in_BOC=-15.5ft_Void=-82ft.out"

35	48.00	73.00	0.000	0.000	0.000
36	48.00	75.00	0.000	0.000	0.000
37	48.00	77.00	0.000	0.000	0.000
38	48.00	79.00	0.000	0.000	0.000
39	48.00	81.00	0.000	0.000	0.000
40	48.00	83.00	0.000	0.000	0.000
41	48.00	85.00	0.005	497.774	497.778
42	48.00	87.00	41.622	379.360	420.981
43	48.00	89.00	79.576	238.430	318.006
44	48.00	91.00	122.494	260.649	383.143
45	48.00	93.00	169.527	213.975	383.502
46	48.00	95.00	217.761	34.870	252.630
47	48.00	97.00	220.021	21.159	241.180
48	48.00	99.00	222.604	32.203	254.806
49	48.00	101.00	247.611	211.417	459.027
50	48.00	103.00	293.792	208.775	502.567
51	48.00	105.00	338.742	205.833	544.575
52	48.00	107.00	382.572	202.763	585.335
53	48.00	109.00	425.372	199.658	625.030
54	48.00	111.00	467.217	196.569	663.787
55	48.00	113.00	508.174	193.525	701.699
56	48.00	115.00	548.299	190.542	738.841
57	48.00	117.00	587.642	187.627	775.269
58	48.00	119.00	626.247	184.784	811.032

"BB-12_Drilled_48in_BOC=-15.5ft_Void=-82ft.out"

General Information:

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Input file: ed Shaft\DS Water\BB-12_Drilled_60in_BOC=-15.5ft_Void=-82ft.in
Project number: B-22-074
Job name: Broad Causeway Bridge
Engineer: PV/TC
Units: English

Analysis Information:

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Analysis Type: Drilled Shaft Analysis

Soil Information:

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Boring date: 3/29/2023
Boring number: BB-12
Station number: 140+71 Offset: +32

Ground Elevation: 2.70(ft)
Water table Elevation = 2.70(ft)

Cu is calculated using: Direct method.
Rock side-friction is calculated using: McVay's method
Hammer type: Automatic Hammer, Correction factor = 1.24

ID	Depth (ft)	Elevation (ft)	SPT Blows (Blows/ft)	Unit Weight (pcf)	Soil Type

1	0.00	2.70	N/A	0.00	5- Cavity layer
2	2.00	0.70	N/A	0.00	5- Cavity layer
3	4.00	-1.30	N/A	0.00	5- Cavity layer
4	6.00	-3.30	N/A	0.00	5- Cavity layer
5	8.00	-5.30	N/A	0.00	5- Cavity layer
6	10.00	-7.30	N/A	0.00	5- Cavity layer
7	12.00	-9.30	N/A	0.00	5- Cavity layer
8	14.00	-11.30	N/A	0.00	5- Cavity layer
9	16.00	-13.30	N/A	0.00	5- Cavity layer
10	18.20	-15.50	N/A	0.00	5- Cavity layer
11	18.20	-15.50	N/A	115.00	5- Cavity layer
12	20.00	-17.30	N/A	115.00	5- Cavity layer
13	22.50	-19.80	N/A	120.00	5- Cavity layer
14	25.00	-22.30	N/A	125.00	5- Cavity layer
15	27.50	-24.80	N/A	120.00	5- Cavity layer
16	30.00	-27.30	N/A	115.00	5- Cavity layer

"BB-12_Drilled_60in_BOC=-15.5ft_Void=-82ft.out"

17	32.50	-29.80	N/A	120.00	5- Cavity layer
18	35.00	-32.30	N/A	115.00	5- Cavity layer
19	37.50	-34.80	N/A	115.00	5- Cavity layer
20	40.00	-37.30	N/A	115.00	5- Cavity layer
21	42.50	-39.80	N/A	116.00	5- Cavity layer
22	45.00	-42.30	N/A	119.00	5- Cavity layer
23	47.50	-44.80	N/A	119.00	5- Cavity layer
24	50.00	-47.30	N/A	124.00	5- Cavity layer
25	52.50	-49.80	N/A	121.00	5- Cavity layer
26	55.00	-52.30	N/A	131.00	5- Cavity layer
27	57.50	-54.80	N/A	124.00	5- Cavity layer
28	60.00	-57.30	N/A	126.00	5- Cavity layer
29	62.50	-59.80	N/A	121.00	5- Cavity layer
30	65.00	-62.30	N/A	119.00	5- Cavity layer
31	67.50	-64.80	N/A	130.00	5- Cavity layer
32	70.00	-67.30	N/A	135.00	5- Cavity layer
33	72.50	-69.80	N/A	125.00	5- Cavity layer
34	75.00	-72.30	N/A	130.00	5- Cavity layer
35	77.50	-74.80	N/A	135.00	5- Cavity layer
36	80.00	-77.30	N/A	115.00	5- Cavity layer
37	82.50	-79.80	N/A	119.00	5- Cavity layer
38	84.70	-82.00	N/A	127.00	5- Cavity layer
39	84.70	-82.00	N/A	0.00	1- Plastic Clay
40	84.70	-82.00	31.00	127.00	3- Clean sand
41	85.00	-82.30	31.00	127.00	3- Clean sand
42	85.00	-82.30	N/A	0.00	1- Plastic Clay
43	85.00	-82.30	N/A	125.00	4- Lime Stone/Very shelly sand
44	87.50	-84.80	N/A	125.00	4- Lime Stone/Very shelly sand
45	90.00	-87.30	N/A	130.00	4- Lime Stone/Very shelly sand
46	92.50	-89.80	N/A	135.00	4- Lime Stone/Very shelly sand
47	95.00	-92.30	N/A	125.00	4- Lime Stone/Very shelly sand
48	95.00	-92.30	N/A	0.00	1- Plastic Clay
49	95.00	-92.30	4.00	115.00	3- Clean sand
50	97.50	-94.80	4.00	115.00	3- Clean sand
51	100.00	-97.30	19.00	120.00	3- Clean sand
52	100.00	-97.30	N/A	0.00	1- Plastic Clay
53	100.00	-97.30	N/A	130.00	4- Lime Stone/Very shelly sand
54	102.50	-99.80	N/A	130.00	4- Lime Stone/Very shelly sand
55	105.00	-102.30	N/A	135.00	4- Lime Stone/Very shelly sand
56	107.50	-104.80	N/A	135.00	4- Lime Stone/Very shelly sand
57	110.00	-107.30	N/A	135.00	4- Lime Stone/Very shelly sand
58	112.50	-109.80	N/A	135.00	4- Lime Stone/Very shelly sand
59	115.00	-112.30	N/A	135.00	4- Lime Stone/Very shelly sand
60	117.50	-114.80	N/A	135.00	4- Lime Stone/Very shelly sand
61	120.00	-117.30	N/A	135.00	4- Lime Stone/Very shelly sand
62	122.50	-119.80	N/A	125.00	4- Lime Stone/Very shelly sand
63	125.00	-122.30	N/A	135.00	4- Lime Stone/Very shelly sand

ID	Cu-DIR (tsf)	qu (tsf)	qt (tsf)	Em (ksi)	qb (tsf)

1	N/A	N/A	N/A	N/A	N/A

"BB-12_Drilled_60in_BOC=-15.5ft_Void=-82ft.out"

Top of Rock Socket
elev = -82'

Bottom of Canal
elev = -15.5'

2	N/A	N/A	N/A	N/A	N/A
3	N/A	N/A	N/A	N/A	N/A
4	N/A	N/A	N/A	N/A	N/A
5	N/A	N/A	N/A	N/A	N/A
6	N/A	N/A	N/A	N/A	N/A
7	N/A	N/A	N/A	N/A	N/A
8	N/A	N/A	N/A	N/A	N/A
9	N/A	N/A	N/A	N/A	N/A
10	N/A	N/A	N/A	N/A	N/A
11	N/A	N/A	N/A	N/A	N/A
12	N/A	N/A	N/A	N/A	N/A
13	N/A	N/A	N/A	N/A	N/A
14	N/A	N/A	N/A	N/A	N/A
15	N/A	N/A	N/A	N/A	N/A
16	N/A	N/A	N/A	N/A	N/A
17	N/A	N/A	N/A	N/A	N/A
18	N/A	N/A	N/A	N/A	N/A
19	N/A	N/A	N/A	N/A	N/A
20	N/A	N/A	N/A	N/A	N/A
21	N/A	N/A	N/A	N/A	N/A
22	N/A	N/A	N/A	N/A	N/A
23	N/A	N/A	N/A	N/A	N/A
24	N/A	N/A	N/A	N/A	N/A
25	N/A	N/A	N/A	N/A	N/A
26	N/A	N/A	N/A	N/A	N/A
27	N/A	N/A	N/A	N/A	N/A
28	N/A	N/A	N/A	N/A	N/A
29	N/A	N/A	N/A	N/A	N/A
30	N/A	N/A	N/A	N/A	N/A
31	N/A	N/A	N/A	N/A	N/A
32	N/A	N/A	N/A	N/A	N/A
33	N/A	N/A	N/A	N/A	N/A
34	N/A	N/A	N/A	N/A	N/A
35	N/A	N/A	N/A	N/A	N/A
36	N/A	N/A	N/A	N/A	N/A
37	N/A	N/A	N/A	N/A	N/A
38	N/A	N/A	N/A	N/A	N/A
39	0.00	N/A	N/A	N/A	N/A
40	N/A	N/A	N/A	N/A	N/A
41	N/A	N/A	N/A	N/A	N/A
42	0.00	N/A	N/A	N/A	N/A
43	N/A	17.36	2.78	27.73	8.68
44	N/A	17.36	2.78	27.73	8.68
45	N/A	25.00	4.00	39.93	12.50
46	N/A	25.00	4.00	39.93	12.50
47	N/A	18.60	2.98	29.71	9.30
48	0.00	N/A	N/A	N/A	N/A
49	N/A	N/A	N/A	N/A	N/A
50	N/A	N/A	N/A	N/A	N/A
51	N/A	N/A	N/A	N/A	N/A
52	0.00	N/A	N/A	N/A	N/A
53	N/A	25.00	4.00	39.93	12.50

"BB-12_Drilled_60in_BOC=-15.5ft_Void=-82ft.out"

54	N/A	25.00	4.00	39.93	12.50
55	N/A	25.00	4.00	39.93	12.50
56	N/A	25.00	4.00	39.93	12.50
57	N/A	25.00	4.00	39.93	12.50
58	N/A	25.00	4.00	39.93	12.50
59	N/A	25.00	4.00	39.93	12.50
60	N/A	25.00	4.00	39.93	12.50
61	N/A	25.00	4.00	39.93	12.50
62	N/A	17.36	2.78	27.73	8.68
63	N/A	25.00	4.00	39.93	12.50

ID RQD F.M. S.R.I. Rock Recovery

1	N/A	N/A	N/A
2	N/A	N/A	N/A
3	N/A	N/A	N/A
4	N/A	N/A	N/A
5	N/A	N/A	N/A
6	N/A	N/A	N/A
7	N/A	N/A	N/A
8	N/A	N/A	N/A
9	N/A	N/A	N/A
10	N/A	N/A	N/A
11	N/A	N/A	N/A
12	N/A	N/A	N/A
13	N/A	N/A	N/A
14	N/A	N/A	N/A
15	N/A	N/A	N/A
16	N/A	N/A	N/A
17	N/A	N/A	N/A
18	N/A	N/A	N/A
19	N/A	N/A	N/A
20	N/A	N/A	N/A
21	N/A	N/A	N/A
22	N/A	N/A	N/A
23	N/A	N/A	N/A
24	N/A	N/A	N/A
25	N/A	N/A	N/A
26	N/A	N/A	N/A
27	N/A	N/A	N/A
28	N/A	N/A	N/A
29	N/A	N/A	N/A
30	N/A	N/A	N/A
31	N/A	N/A	N/A
32	N/A	N/A	N/A
33	N/A	N/A	N/A
34	N/A	N/A	N/A
35	N/A	N/A	N/A
36	N/A	N/A	N/A
37	N/A	N/A	N/A
38	N/A	N/A	N/A

"BB-12_Drilled_60in_BOC=-15.5ft_Void=-82ft.out"

39	N/A	N/A	N/A
40	N/A	N/A	N/A
41	N/A	N/A	N/A
42	N/A	N/A	N/A
43	0.50	ROUGH	1.000
44	0.50	ROUGH	1.000
45	0.50	ROUGH	1.000
46	0.50	ROUGH	1.000
47	0.50	ROUGH	1.000
48	N/A	N/A	N/A
49	N/A	N/A	N/A
50	N/A	N/A	N/A
51	N/A	N/A	N/A
52	N/A	N/A	N/A
53	0.50	ROUGH	1.000
54	0.50	ROUGH	1.000
55	0.50	ROUGH	1.000
56	0.50	ROUGH	1.000
57	0.50	ROUGH	1.000
58	0.50	ROUGH	1.000
59	0.50	ROUGH	1.000
60	0.50	ROUGH	1.000
61	0.50	ROUGH	1.000
62	0.50	ROUGH	1.000
63	0.50	ROUGH	1.000

Drilled Shaft Data:

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Unit weight of concrete = 145.00(pcf), Concrete Slump = 6.00(in)
Modulus of Elasticity of concrete = 3987.00(ksi)

Shaft Geometry:

ID	Length (ft)	Tip Elev. (ft)	Case Len. (ft)	Diameter (in)	Base Diam. (in)	Bell Len. (ft)

1	5.00	-2.30	0.00	60.00	60.00	0.00
2	7.00	-4.30	0.00	60.00	60.00	0.00
3	9.00	-6.30	0.00	60.00	60.00	0.00
4	11.00	-8.30	0.00	60.00	60.00	0.00
5	13.00	-10.30	0.00	60.00	60.00	0.00
6	15.00	-12.30	0.00	60.00	60.00	0.00
7	17.00	-14.30	0.00	60.00	60.00	0.00
8	19.00	-16.30	0.00	60.00	60.00	0.00
9	21.00	-18.30	0.00	60.00	60.00	0.00
10	23.00	-20.30	0.00	60.00	60.00	0.00
11	25.00	-22.30	0.00	60.00	60.00	0.00
12	27.00	-24.30	0.00	60.00	60.00	0.00
13	29.00	-26.30	0.00	60.00	60.00	0.00
14	31.00	-28.30	0.00	60.00	60.00	0.00
15	33.00	-30.30	0.00	60.00	60.00	0.00

"BB-12_Drilled_60in_BOC=-15.5ft_Void=-82ft.out"

16	35.00	-32.30	0.00	60.00	60.00	0.00
17	37.00	-34.30	0.00	60.00	60.00	0.00
18	39.00	-36.30	0.00	60.00	60.00	0.00
19	41.00	-38.30	0.00	60.00	60.00	0.00
20	43.00	-40.30	0.00	60.00	60.00	0.00
21	45.00	-42.30	0.00	60.00	60.00	0.00
22	47.00	-44.30	0.00	60.00	60.00	0.00
23	49.00	-46.30	0.00	60.00	60.00	0.00
24	51.00	-48.30	0.00	60.00	60.00	0.00
25	53.00	-50.30	0.00	60.00	60.00	0.00
26	55.00	-52.30	0.00	60.00	60.00	0.00
27	57.00	-54.30	0.00	60.00	60.00	0.00
28	59.00	-56.30	0.00	60.00	60.00	0.00
29	61.00	-58.30	0.00	60.00	60.00	0.00
30	63.00	-60.30	0.00	60.00	60.00	0.00
31	65.00	-62.30	0.00	60.00	60.00	0.00
32	67.00	-64.30	0.00	60.00	60.00	0.00
33	69.00	-66.30	0.00	60.00	60.00	0.00
34	71.00	-68.30	0.00	60.00	60.00	0.00
35	73.00	-70.30	0.00	60.00	60.00	0.00
36	75.00	-72.30	0.00	60.00	60.00	0.00
37	77.00	-74.30	0.00	60.00	60.00	0.00
38	79.00	-76.30	0.00	60.00	60.00	0.00
39	81.00	-78.30	0.00	60.00	60.00	0.00
40	83.00	-80.30	0.00	60.00	60.00	0.00
41	85.00	-82.30	0.00	60.00	60.00	0.00
42	87.00	-84.30	0.00	60.00	60.00	0.00
43	89.00	-86.30	0.00	60.00	60.00	0.00
44	91.00	-88.30	0.00	60.00	60.00	0.00
45	93.00	-90.30	0.00	60.00	60.00	0.00
46	95.00	-92.30	0.00	60.00	60.00	0.00
47	97.00	-94.30	0.00	60.00	60.00	0.00
48	99.00	-96.30	0.00	60.00	60.00	0.00
49	101.00	-98.30	0.00	60.00	60.00	0.00
50	103.00	-100.30	0.00	60.00	60.00	0.00
51	105.00	-102.30	0.00	60.00	60.00	0.00
52	107.00	-104.30	0.00	60.00	60.00	0.00
53	109.00	-106.30	0.00	60.00	60.00	0.00
54	111.00	-108.30	0.00	60.00	60.00	0.00
55	113.00	-110.30	0.00	60.00	60.00	0.00
56	115.00	-112.30	0.00	60.00	60.00	0.00
57	117.00	-114.30	0.00	60.00	60.00	0.00
58	119.00	-116.30	0.00	60.00	60.00	0.00

Drilled Shaft Capacity (sorted by shaft diameter):

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Strength reduction factors: Skin-friction = 1.00, End-bearing = 1.00

ID	Diameter (in)	Length (ft)	Skin Fric. (tons)	End Bearing (tons)	Capacity (tons)

"BB-12_Drilled_60in_BOC=-15.5ft_Void=-82ft.out"

1	60.00	5.00	0.000	0.000	0.000
2	60.00	7.00	0.000	0.000	0.000
3	60.00	9.00	0.000	0.000	0.000
4	60.00	11.00	0.000	0.000	0.000
5	60.00	13.00	0.000	0.000	0.000
6	60.00	15.00	0.000	0.000	0.000
7	60.00	17.00	0.000	0.000	0.000
8	60.00	19.00	0.000	0.000	0.000
9	60.00	21.00	0.000	0.000	0.000
10	60.00	23.00	0.000	0.000	0.000
11	60.00	25.00	0.000	0.000	0.000
12	60.00	27.00	0.000	0.000	0.000
13	60.00	29.00	0.000	0.000	0.000
14	60.00	31.00	0.000	0.000	0.000
15	60.00	33.00	0.000	0.000	0.000
16	60.00	35.00	0.000	0.000	0.000
17	60.00	37.00	0.000	0.000	0.000
18	60.00	39.00	0.000	0.000	0.000
19	60.00	41.00	0.000	0.000	0.000
20	60.00	43.00	0.000	0.000	0.000
21	60.00	45.00	0.000	0.000	0.000
22	60.00	47.00	0.000	0.000	0.000
23	60.00	49.00	0.000	0.000	0.000
24	60.00	51.00	0.000	0.000	0.000
25	60.00	53.00	0.000	0.000	0.000
26	60.00	55.00	0.000	0.000	0.000
27	60.00	57.00	0.000	0.000	0.000
28	60.00	59.00	0.000	0.000	0.000
29	60.00	61.00	0.000	0.000	0.000
30	60.00	63.00	0.000	0.000	0.000
31	60.00	65.00	0.000	0.000	0.000
32	60.00	67.00	0.000	0.000	0.000
33	60.00	69.00	0.000	0.000	0.000
34	60.00	71.00	0.000	0.000	0.000
35	60.00	73.00	0.000	0.000	0.000
36	60.00	75.00	0.000	0.000	0.000
37	60.00	77.00	0.000	0.000	0.000
38	60.00	79.00	0.000	0.000	0.000
39	60.00	81.00	0.000	0.000	0.000
40	60.00	83.00	0.000	0.000	0.000
41	60.00	85.00	0.006	170.431	170.437
42	60.00	87.00	109.090	170.431	279.521
43	60.00	89.00	218.174	170.431	388.605
44	60.00	91.00	351.256	245.437	596.692
45	60.00	93.00	508.335	245.437	753.772
46	60.00	95.00	665.415	139.866	805.281
47	60.00	97.00	668.303	86.737	755.040
48	60.00	99.00	671.604	132.008	803.613
49	60.00	101.00	751.950	245.437	997.387
50	60.00	103.00	909.029	245.437	1154.466
51	60.00	105.00	1066.109	245.437	1311.546
52	60.00	107.00	1223.189	245.437	1468.626

"BB-12_Drilled_60in_B0C=-15.5ft_Void=-82ft.out"

53	60.00	109.00	1380.268	245.437	1625.705
54	60.00	111.00	1537.348	245.437	1782.785
55	60.00	113.00	1694.428	245.437	1939.865
56	60.00	115.00	1851.507	245.437	2096.944
57	60.00	117.00	2008.587	245.437	2254.024
58	60.00	119.00	2165.666	245.437	2411.103

Drilled Shaft Capacity at User-Defined Settlement (sorted by shaft diameter):

***** Capacity is NOT modified by the strength reduction factors *****

User-Defined Settlement = 0.83%

ID	Diameter (in)	Length (ft)	Skin Fric. (tons)	End Bearing (tons)	Capacity (tons)
1	60.00	5.00	0.000	0.000	0.000
2	60.00	7.00	0.000	0.000	0.000
3	60.00	9.00	0.000	0.000	0.000
4	60.00	11.00	0.000	0.000	0.000
5	60.00	13.00	0.000	0.000	0.000
6	60.00	15.00	0.000	0.000	0.000
7	60.00	17.00	0.000	0.000	0.000
8	60.00	19.00	0.000	0.000	0.000
9	60.00	21.00	0.000	0.000	0.000
10	60.00	23.00	0.000	0.000	0.000
11	60.00	25.00	0.000	0.000	0.000
12	60.00	27.00	0.000	0.000	0.000
13	60.00	29.00	0.000	0.000	0.000
14	60.00	31.00	0.000	0.000	0.000
15	60.00	33.00	0.000	0.000	0.000
16	60.00	35.00	0.000	0.000	0.000
17	60.00	37.00	0.000	0.000	0.000
18	60.00	39.00	0.000	0.000	0.000
19	60.00	41.00	0.000	0.000	0.000
20	60.00	43.00	0.000	0.000	0.000
21	60.00	45.00	0.000	0.000	0.000
22	60.00	47.00	0.000	0.000	0.000
23	60.00	49.00	0.000	0.000	0.000
24	60.00	51.00	0.000	0.000	0.000
25	60.00	53.00	0.000	0.000	0.000
26	60.00	55.00	0.000	0.000	0.000
27	60.00	57.00	0.000	0.000	0.000
28	60.00	59.00	0.000	0.000	0.000
29	60.00	61.00	0.000	0.000	0.000
30	60.00	63.00	0.000	0.000	0.000
31	60.00	65.00	0.000	0.000	0.000
32	60.00	67.00	0.000	0.000	0.000
33	60.00	69.00	0.000	0.000	0.000
34	60.00	71.00	0.000	0.000	0.000

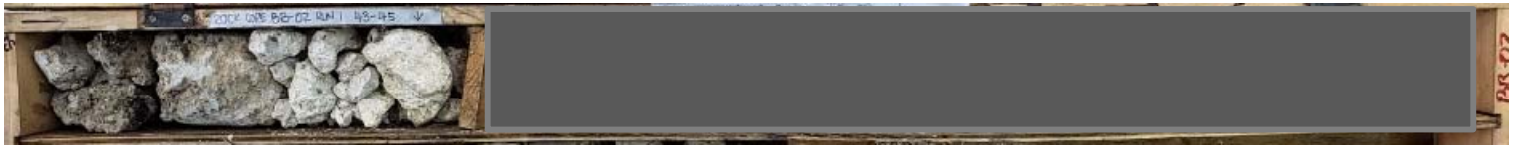
"BB-12_Drilled_60in_B0C=-15.5ft_Void=-82ft.out"

35	60.00	73.00	0.000	0.000	0.000
36	60.00	75.00	0.000	0.000	0.000
37	60.00	77.00	0.000	0.000	0.000
38	60.00	79.00	0.000	0.000	0.000
39	60.00	81.00	0.000	0.000	0.000
40	60.00	83.00	0.000	0.000	0.000
41	60.00	85.00	0.006	670.304	670.310
42	60.00	87.00	52.030	593.227	645.256
43	60.00	89.00	99.481	372.847	472.328
44	60.00	91.00	153.142	407.592	560.734
45	60.00	93.00	211.951	334.606	546.557
46	60.00	95.00	265.875	36.518	302.393
47	60.00	97.00	268.689	22.646	291.336
48	60.00	99.00	271.907	34.466	306.373
49	60.00	101.00	302.383	286.814	589.196
50	60.00	103.00	358.542	284.833	643.375
51	60.00	105.00	413.148	282.194	695.342
52	60.00	107.00	466.346	279.192	745.538
53	60.00	109.00	518.252	275.996	794.248
54	60.00	111.00	568.966	272.704	841.671
55	60.00	113.00	618.573	269.379	887.952
56	60.00	115.00	667.145	266.058	933.203
57	60.00	117.00	714.748	262.765	977.513
58	60.00	119.00	761.437	259.516	1020.953

"BB-12_Drilled_60in_BOC=-15.5ft_Void=-82ft.out"

APPENDIX E

Photos of Rock Cores



RUN 1: DEPTH (FT): 43 TO 45

RECOVERY (%): 79

RQD (%): 0

*This run is only 2 feet long. Recovery and RQD obtained in relationship to this length and not 5 feet.



RUN 2: DEPTH (FT): 45 TO 50

RECOVERY (%): 47

RQD (%): 17



RUN 3: DEPTH (FT): 50 TO 55

RECOVERY (%): 47

RQD (%): 8



RUN 4: DEPTH (FT): 65 TO 70

RECOVERY (%): 56

RQD (%): 23



RUN 5: DEPTH (FT): 70 TO 75

RECOVERY (%): 88

RQD (%): 58



RUN 6: DEPTH (FT): 75 TO 80

RECOVERY (%): 77

RQD (%): 37

BROAD CAUSEWAY BRIDGE
TOWN OF BAY HARBOR ISLANDS, FL

Client: Atkins
AREHNA Project No: B-22-074
Dates: 05/10/2023-05/11/2023


AREHNA | Engineering, Inc.

12296 Wiles Road, Coral Springs, Florida 33076
Phone 954.417.8412 ▪ Fax 813.944.4959

ROCK CORE PHOTOGRAPHS
E-1

Drawn By: PV
Checked By: TC

Sheet #:
1



RUN 7: DEPTH (FT): 80 TO 85

RECOVERY (%): 68

RQD (%): 15



RUN 8: DEPTH (FT): 85 TO 90

RECOVERY (%): 54

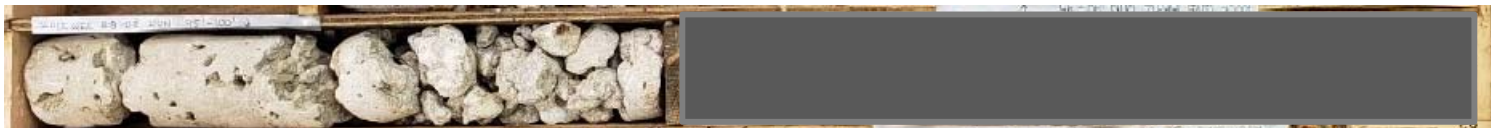
RQD (%): 8



RUN 9: DEPTH (FT): 90 TO 95

RECOVERY (%): 73

RQD (%): 38



RUN 10: DEPTH (FT): 95 TO 100

RECOVERY (%): 43

RQD (%): 12

BROAD CAUSEWAY BRIDGE
TOWN OF BAY HARBOR ISLANDS, FL

Client: Atkins
AREHNA Project No: B-22-074
Dates: 05/10/2023-05/11/2023


AREHNA | Engineering, Inc.
12296 Wiles Road, Coral Springs, Florida 33076
Phone 954.417.8412 ▪ Fax 813.944.4959

ROCK CORE PHOTOGRAPHS
E-2

Drawn By: PV
Checked By: TC

Sheet #:
2



RUN 1: DEPTH (FT): 56.5 TO 60

RECOVERY (%): 69

RQD (%): 0

*This run is only 3.5 feet long. Recovery and RQD obtained in relationship to this length and not 5 feet.



RUN 2: DEPTH (FT): 60 TO 65

RECOVERY (%): 63

RQD (%): 42



RUN 3: DEPTH (FT): 65 TO 70

RECOVERY (%): 62

RQD (%): 43



RUN 4: DEPTH (FT): 70 TO 75

RECOVERY (%): 85

RQD (%): 20



RUN 5: DEPTH (FT): 75 TO 80

RECOVERY (%): 90

RQD (%): 77



RUN 6: DEPTH (FT): 80 TO 85

RECOVERY (%): 90

RQD (%): 57

BROAD CAUSEWAY BRIDGE
TOWN OF BAY HARBOR ISLANDS, FL

Client: Atkins
AREHNA Project No: B-22-074
Dates: 05/22/2023-05/23/2023


AREHNA | Engineering, Inc.

12296 Wiles Road, Coral Springs, Florida 33076
Phone 954.417.8412 ▪ Fax 813.944.4959

ROCK CORE PHOTOGRAPHS
E-3

Drawn By: PV
Checked By: TC

Sheet #:
1



RUN 7: DEPTH (FT): 85 TO 90

RECOVERY (%): 62

RQD (%): 22



RUN 8: DEPTH (FT): 90 TO 95

RECOVERY (%): 45

RQD (%): 23



RUN 9: DEPTH (FT): 95 TO 100

RECOVERY (%): 67

RQD (%): 23

BROAD CAUSEWAY BRIDGE
TOWN OF BAY HARBOR ISLANDS, FL

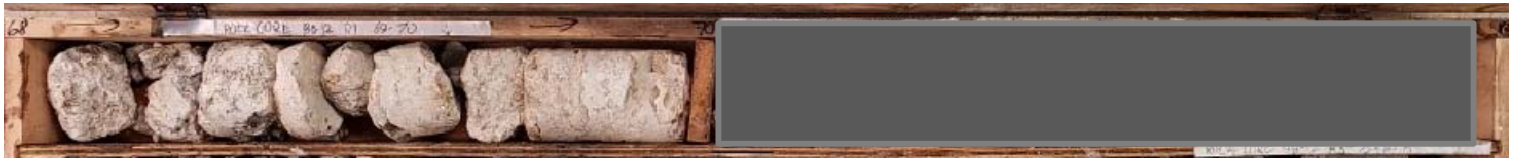
Client: Atkins
AREHNA Project No: B-22-074
Dates: 05/22/2023-05/23/2023


AREHNA | Engineering, Inc.
12296 Wiles Road, Coral Springs, Florida 33076
Phone 954.417.8412 ▪ Fax 813.944.4959

ROCK CORE PHOTOGRAPHS
E-4

Drawn By: PV
Checked By: TC

Sheet #:
2

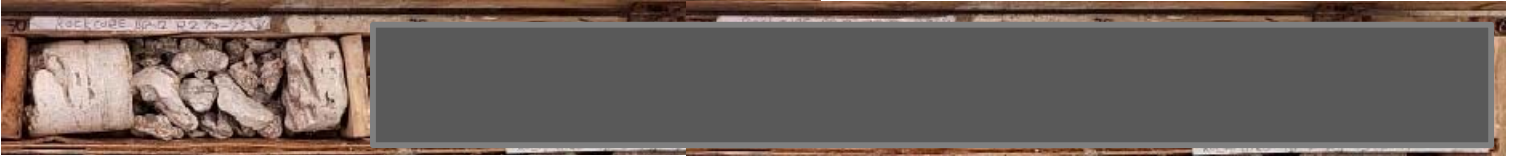


RUN 1: DEPTH (FT): 68 TO 70

RECOVERY (%): 100

RQD (%): 25

*This run is only 2 feet long. Recovery and RQD obtained in relationship to this length and not 5 feet.



RUN 2: DEPTH (FT): 70 TO 75

RECOVERY (%): 20

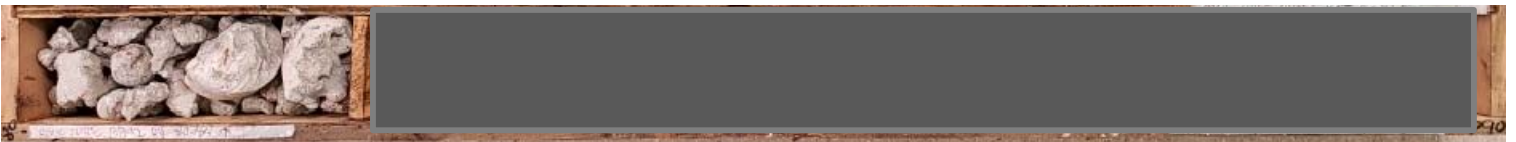
RQD (%): 0



RUN 3: DEPTH (FT): 75 TO 80

RECOVERY (%): 27

RQD (%): 0



RUN 4: DEPTH (FT): 80 TO 85

RECOVERY (%): 20

RQD (%): 0



RUN 5: DEPTH (FT): 85 TO 90

RECOVERY (%): 55

RQD (%): 13



RUN 6: DEPTH (FT): 90 TO 93

RECOVERY (%): 42

RQD (%): 0

*This run is only 3 feet long. Recovery and RQD obtained in relationship to this length and not 5 feet.

BROAD CAUSEWAY BRIDGE
TOWN OF BAY HARBOR ISLANDS, FL

Client: Atkins
AREHNA Project No: B-22-074
Dates: 05/08/2023-05/09/2023



12296 Wiles Road, Coral Springs, Florida 33076
Phone 954.417.8412 ▪ Fax 813.944.4959

ROCK CORE PHOTOGRAPHS
E-5

Drawn By: PV
Checked By: TC

Sheet #:
1

APPENDIX F

FHWA CHECKLIST

TABLE OF CONTENTS

"GEOTECHNICAL REPORT REVIEW CHECKLISTS"

The following checklists cover the major information and recommendations which should be addressed in project geotechnical reports.

Section A covers site investigation information which will be common to all geotechnical reports for any type of geotechnical feature.

Sections B through I cover the basic information and recommendations which should be presented in geotechnical reports for specific geotechnical features: centerline cuts and embankments, embankments over soft ground, landslides, retaining walls, structure foundations and material sites.

<u>Subject</u>	<u>Page</u>
SECTION A, Site Investigation Information.....	1
SECTION B, Centerline Cuts and Embankments	3
SECTION C, Embankments Over Soft Ground	5
SECTION D, Landslide Corrections.....	7
SECTION E, Retaining Walls.....	9
SECTION F, Structure Foundations - Spread Footings.....	10
SECTION G, Structure Foundations - Piles	11
SECTION H, Structure Foundations - Drilled Shafts.....	14
SECTION I, Material Sites	15

In most sections and subsections the user has been provided supplemental page references to the Soils and Foundations Workshop Manual. These page numbers appear in parentheses () immediately adjacent to the section or subsection topic. Generalist engineers are particularly encouraged to read these references. Additional reference information on these topics is available in the Geotechnical Notebook, a copy of which is kept in all Division Offices by either the Bridge Engineer or the engineer with the soils responsibility.

Certain checklist items are of vital importance to have been included in the geotechnical report. These checklist items have been marked with an asterisk (*). A negative response to any of these asterisked items is cause to contact the geotechnical engineer for clarification of this omission.

*A response other than (yes) or (N/A) for any of these checklist questions is cause to contact the appropriate geotechnical engineer for a clarification and/or to discuss the project.

"GTR REVIEW CHECKLIST" (SITE INVESTIGATION)

A. Site Investigation Information

Since the most important step in the geotechnical design process is the conduct of an adequate site investigation, presentation of the subsurface information in the geotechnical report and on the plans deserves careful attention.

<u>Geotechnical Report Text (Introduction) (Pages 322-325)</u>		<u>Yes</u>	<u>No</u>	<u>Unknown or N/A</u>
1.	Is the general location of the investigation described an/or a vicinity map included?	☒	☐	☐
2.	Is scope and purpose of the investigation summarized?	☒	☐	☐
3.	Is concise description given of geologic setting and topography of area?	☒	☐	☐
4.	Are the field explorations and laboratory tests on which the report is based listed?	☒	☐	☐
5.	Is general description of subsurface soil, rock, and groundwater conditions given?	☒	☐	☐
*6.	Is the following information included with the geotechnical report (typically included in report appendices):			
a.	Test hole logs? (Pages 25-33)	☒	☐	☐
b.	Field test data?	☒	☐	☐
c.	Laboratory test data? (Pages 74-75)	☒	☐	☐
d.	Photographs (if pertinent)?	☐	☐	☒

Plan and Subsurface Profile (Pages 24, 47-49, 335)

*7.	Is a plan and subsurface profile of the investigation site provided?	☒	☐	☐

*A response other than (yes) or (N/A) for any of these checklist questions is cause to contact the appropriate geotechnical engineer for a clarification and/or to discuss the project.

A.	<u>Site Investigation Information (Cont.)</u>	Unknown		
		<u>Yes</u>	<u>No</u>	<u>or N/A</u>
	8. Are the field explorations located on the plan view?	☒	☐	☐
	*9. Does the conducted site investigation meet minimum criteria outlined in Table 2?	☒	☐	☐
	10. Are the explorations plotted and correctly numbered on the profile at their true elevation and location?	☒	☐	☐
	11. Does the subsurface profile contain a word description and/or graphic depiction of soil and rock types?	☒	☐	☐
	12. Are groundwater levels and date measured shown on the subsurface profile?	☒	☐	☐

Subsurface Profile or Field Boring Log (Pages 16-17, 25-29)

13.	Are sample types and depths noted?	☒	☐	☐
*14.	Are SPT blow counts, percent core recovery, and RQD values shown?	☒	☐	☐
15.	If cone penetration tests were made, are plots of cone resistance and friction ratio shown with depth?	☐	☐	☒

Laboratory Test Data (Pages 60, 74-75)

*16.	Were lab soil classification tests such as natural moisture content, gradation, Atterberg limits, performed on selected representative samples to verify field visual soil identifications?	☒	☐	☐
17.	Are laboratory test results such as shear strength (Page 62), consolidation (Page 68), etc., included and/or summarized?	☐	☐	☒

*A response other than (yes) or (N/A) for any of these checklist questions is cause to contact the appropriate geotechnical engineer for a clarification and/or to discuss the project.

"GTR REVIEW CHECKLIST" (CENTERLINE CUTS AND EMBANKMENTS)

B. Centerline Cuts and Embankments (Pages 6-9)

In addition to the basic information listed in Section A, is the following information provided in the project geotechnical report?

	<u>Yes</u>	<u>No</u>	<u>Unknown or N/A</u>
Are station to station descriptions included for:			
1. Existing surface and subsurface drainage?	☐	☐	☒
2. Evidence of springs and excessively wet areas?	☐	☐	☒
3. Slides, slumps, and faults noted along the alignment?	☐	☐	☒
Are station to station <u>recommendations</u> included for the following:	☐	☐	☒

General Soil Cut or Fill

4. Specific surface/subsurface drainage recommendations.	☐	☐	☒
5. Excavation limits of unsuitable materials?	☐	☐	☒
*6. Erosion protection measures for backslopes, side slopes, and ditches, including riprap recommendations or special slope treatments?	☐	☐	☒

Soil Cuts (Pages 101-102)

*7. Recommended cut slope design?	☐	☐	☒
8. Are clay cut slopes designed for minimum F.S. = 1.50?	☐	☐	☒
9. Special usage of excavated soils?	☐	☐	☒
10. Estimated shrink-swell factors for excavated materials?	☐	☐	☒
11. If answer to 3 is <u>yes</u> , are recommendations provided for design treatments?	☐	☐	☒

*A response other than (yes) or (N/A) for any of these checklist questions is cause to contact the appropriate geotechnical engineer for a clarification and/or to discuss the project.

B. Centerline Cuts and Embankments (Cont.)

Yes No Unknown
or N/A

Fills (Pages 77-79)

12. Recommended fill slope design?	☐	☐	☒
13. Will fill slope design provide minimum F.S. = 1.25?	☐	☐	☒

Rock Slopes

*14. Are recommended slope designs and blasting specifications provided?	☐	☐	☒
*15. Is the need for special rock slope stabilization measures, e.g., rockfall catch ditch, wire mesh slope protection, shotcrete, rock bolts, addressed?	☐	☐	☒
16. Has the use of "template" designs been avoided (such as designing all rock slopes on ¼ to 1 rather than designing based on orientation of major rock jointing)?	☐	☐	☒
*17. Have effects of blast induced vibrations on adjacent structures been evaluated?	☐	☐	☒

*A response other than (yes) or (N/A) for any of these checklist questions is cause to contact the appropriate geotechnical engineer for a clarification and/or to discuss the project.

"GTR REVIEW CHECKLIST" (EMBANKMENTS OVER SOFT GROUND)

C. Embankments Over Soft Ground

Where embankments must be built over soft ground (such as soft clays, organic silts, or peat), stability and settlement of the fill should be carefully evaluated. In addition to the basic information listed in Section A, is the following information provided in the project geotechnical report?

<u>Embankment Stability</u> (Pages 77-79, 95-97)	<u>Yes</u>	<u>No</u>	<u>Unknown or N/A</u>
*1. Has the stability of the embankment been evaluated for minimum safety factors of 1.25 for side slope stability and 1.30 for end slope stability of bridge approach embankments?	☐	☐	☒
*2. Has the shear strength of the foundation soil been determined from lab testing and/or field vane shear or static cone penetrometer tests?	☐	☐	☒
*3. If the proposed embankment does not provide minimum factors or safety given above, are recommendations given for feasible treatment alternates which will increase factor of safety to minimum acceptable (such as change alignment, lower grade, use stabilizing counterberms, excavate and replace weak subsoil, fill stage construction, lightweight fill, geotextile fabric reinforcement, etc.)?	☐	☐	☒
*4. Are cost comparisons of treatment alternates given and a specific alternate recommended?	☐	☐	☒
<u>Settlement of Subsoil</u> (Pages 146-160)			
5. Have consolidation properties of fine grained soils been determined from laboratory consolidation tests?	☐	☐	☒
*6. Have settlement amount and settlement time been estimated?	☐	☐	☒
7. For bridge approach embankments, are recommendations made to get the settlement out before the bridge abutment is constructed (waiting period, surcharge, or wick drains)?	☐	☐	☒

*A response other than (yes) or (N/A) for any of these checklist questions is cause to contact the appropriate geotechnical engineer for a clarification and/or to discuss the project.

C.	<u>Embankments Over Soft Ground (Cont.)</u>	<u>Yes</u>	<u>No</u>	<u>Unknown or N/A</u>
8.	If geotechnical instrumentation is proposed to monitor fill stability and settlement, are detailed recommendations provided on the number, type, and specific locations of the proposed instruments?	☐	☐	☒
9.	<u>Construction Considerations:</u> (Pages 183, 331-334)			
a.	If excavation and replacement of unsuitable shallow surface deposits (peat, muck, topsoil) is recommended - are vertical and lateral limits of recommended excavation provided?	☐	☐	☒
b.	Where a surcharge treatment is recommended, are plan and cross-section of surcharge treatment provided in geotechnical report for benefit of the roadway designer?	☐	☐	☒
c.	Are instructions or specifications provided concerning instrumentation, fill placement rates and estimated delay times for the contractor?	☐	☐	☒
d.	Are recommendations provided for disposal of surcharge material after the settlement period is complete?	☐	☐	☒

*A response other than (yes) or (N/A) for any of these checklist questions is cause to contact the appropriate geotechnical engineer for a clarification and/or to discuss the project.

"GTR REVIEW CHECKLIST" (LANDSLIDE CORRECTIONS)

D. Landslide Corrections (Pages 77-80, 103-105)

In addition to the basic information listed in Section A, is the following information provided in the landslide study geotechnical report? (Refer to Table 4 for guidance on the necessary technical support data for correction of slope instabilities.)

	<u>Yes</u>	<u>No</u>	<u>Unknown or N/A</u>
*1. Is a site plan and scaled cross-section provided showing ground surface conditions both before and after failure?	☐	☐	☒
*2. Is the past history of the slide area summarized - including movement history, summary of maintenance work and costs, and previous corrective measures taken (if any)?	☐	☐	☒
*3. Is a summary given of results of a site investigation, field and lab testing, and stability analysis, including cause(s) of the slide?	☐	☐	☒

Plan

4. Are detailed slide features - including location of ground surface cracks, head scarp, and toe bulge - shown on the site plan?	☐	☐	☒

Cross Section

*5. Are the cross sections used for stability analysis included with the soil profile, water table, soil unit weights, soil shear strengths, and failure plane shown as it exists?	☐	☐	☒
6. Is slide failure plane location determined from slope indicators?	☐	☐	☒
*7. For an active slide, was soil strength along the slide failure plane backfigured using a safety factor equal to 1.0 at the time of failure?	☐	☐	☒

*A response other than (yes) or (N/A) for any of these checklist questions is cause to contact the appropriate geotechnical engineer for a clarification and/or to discuss the project.

D. <u>Landslide Corrections (Cont.)</u>	<u>Yes</u>	<u>No</u>	<u>Unknown or N/A</u>
<u>Text</u>			
*8. Is the following information presented for each proposed correction alternate: (typical correction methods include buttress, shear key, rebuild slope, surface drainage, subsurface drainage-interceptor, drain trenches or horizontal drains and retaining structures)?	☐	☐	☒
a. Cross-section of proposed alternate?	☐	☐	☒
b. Estimated safety factor?	☐	☐	☒
c. Estimated cost?	☐	☐	☒
d. Advantages and disadvantages?	☐	☐	☒
9. Is a recommended correction alternate(s) given which provide a minimum F.S. = 1.25?	☐	☐	☒
10. If horizontal drains are proposed as part of slide correction, has subsurface investigation located definite water bearing strata that can be tapped with horizontal drains?	☐	☐	☒
11. If toe counter berm is proposed to stabilize an active slide, has field investigation confirmed that the toe of the existing slide does <u>not</u> extend beyond the toe of the proposed counter berm?	☐	☐	☒
12. <u>Construction Considerations:</u>			
a. Where proposed correction will require excavation into the toe of an active slide (such as for buttress or shear key), has the "during construction backslope F.S." with open excavation been determined?	☐	☐	☒
b. If open excavation F.S. is near 1.0, has excavation stage construction been proposed?	☐	☐	☒
c. Has seasonal fluctuation of groundwater table been considered?	☐	☐	☒
d. Is stability of excavation backslope to be monitored?	☐	☐	☒
e. Are special construction features, techniques and materials described and specified?	☐	☐	☒

*A response other than (yes) or (N/A) for any of these checklist questions is cause to contact the appropriate geotechnical engineer for a clarification and/or to discuss the project.

"GTR REVIEW CHECKLIST" (RETAINING WALLS)

E. Retaining Walls (See Section 5 of "Geotechnical Engineering Notebook")

In addition to the basic information listed in Section A, is the following information provided in the project geotechnical report?

	<u>Yes</u>	<u>No</u>	<u>Unknown or N/A</u>
*1. Does the geotechnical report include recommended soil strength parameters and groundwater elevation for use in computing wall design lateral earth pressures and factor of safety for overturning, sliding, and external slope stability?	☐	☐	☒
2. Is it proposed to bid alternate wall designs?	☐	☐	☒
*3. Are acceptable reasons given for the choice and/or exclusion of certain wall types (gravity, reinforced soil, tieback, cantilever, etc.)?	☐	☐	☒
*4. Is an analysis of the wall stability included with minimum acceptable factors of safety against overturning (F.S. = 2.0), sliding (F.S. = 1.5), and external slope stability (F.S. = 1.5)?	☐	☐	☒
5. If wall will be placed on compressible foundation soils, is estimated total settlement, differential settlement, and time rate of settlement given?	☐	☐	☒
6. Will wall types selected for compressible foundation soils allow differential movement without distress?	☐	☐	☒
7. Are wall drainage details including materials and compaction provided?	☐	☐	☒
8. <u>Construction Considerations:</u>			
a. Are excavation requirements covered - safe slopes for open excavations, need for sheeting or shoring?	☐	☐	☒
b. Fluctuation of groundwater table?	☐	☐	☒

*A response other than (yes) or (N/A) for any of these checklist questions is cause to contact the appropriate geotechnical engineer for a clarification and/or to discuss the project.

"GTR REVIEW CHECKLIST" (SPREAD FOOTINGS)

F. Structure Foundations - Spread Footings (Pages 191-205)

In addition to the basic information listed in Section A, is the following information provided in the project foundation report?

	<u>Yes</u>	<u>No</u>	<u>Unknown or N/A</u>
*1. Are spread footings recommended for foundation support? If not, are reasons for not using them discussed?	☐	☐	☒
<u>If spread footing supports are recommended, are conclusions/recommendations given for the following:</u>	☐	☐	☒
*2. Is recommended bottom of footing elevation and reason for recommendation (e.g., based on frost depth, estimated scour depth, or depth to competent bearing material) given?	☐	☐	☒
*3. Is recommended allowable soil or rock bearing pressure given?	☐	☐	☒
*4. Is estimated footing settlement and time given?	☐	☐	☒
*5. Where spread footings are recommended to support abutments placed in the bridge end fills, are special gradation and compaction requirements provided for select end fill and backwall drainage material? (Pages 137-141)	☐	☐	☒
6. <u>Construction Considerations:</u>			
a. Have the materials been adequately described on which the footing is to be placed so the project inspector can verify that material is as expected?	☐	☐	☒
b. Have excavation requirements been included for safe slopes in open excavations, need for sheeting or shoring, etc?	☐	☐	☒
c. Has fluctuation of the groundwater table been addressed?	☐	☐	☒

*A response other than (yes) or (N/A) for any of these checklist questions is cause to contact the appropriate geotechnical engineer for a clarification and/or to discuss the project.

"GTR REVIEW CHECKLIST" (PILE FOUNDATIONS)

G. Structure Foundations - Piles (Pages 224-311)

In addition to the basic information listed in Section A, if pile support is recommended or given as an alternate, conclusions/recommendations should be provided in the project geotechnical report for the following:

	<u>Yes</u>	<u>No</u>	<u>Unknown or N/A</u>
*1. Is the recommended pile type given (displacement, nondisplacement, pipe pile, concrete pile, H-pile, etc.) with valid reasons given for choice and/or exclusion? (Pages 224-226)	☒	☐	☐
2. Do you consider the recommended pile type(s) to be the most suitable and economical?	☒	☐	☐
*3. Are estimated pile lengths and estimated tip elevations given for the recommended allowable pile design loads?	☒	☐	☐
4. Do you consider the recommended design loads to be reasonable?	☒	☐	☐
5. Has pile group settlement been estimated (only of practical significance for friction pile groups ending in cohesive soil)? (Pages 245-247)	☒	☐	☐
6. If a specified or minimum pile tip elevation is recommended, is a clear reason given for the required tip elevation, such as underlying soft layers, scour, downdrag, piles uneconomically long, etc.?	☒	☐	☐
*7. Has design analysis (wave equation analysis) verified that the recommended pile section can be driven to the estimated or specified tip elevation without damage (especially applicable where dense gravel-cobble-boulder layers or other obstructions have to be penetrated)?	☐	☐	☒
8. Where scour piles are required, have pile design and driving criteria been established based on mobilizing the full pile design capacity below the scour zone?	☒	☐	☐

*A response other than (yes) or (N/A) for any of these checklist questions is cause to contact the appropriate geotechnical engineer for a clarification and/or to discuss the project.

G. <u>Pile Foundations - Piles (Cont.)</u>	<u>Yes</u>	<u>No</u>	<u>Unknown or N/A</u>
9. Where lateral load capacity of large diameter piles is an important design consideration, are p-y curves (load vs. deflection) or soil parameters given in the geotechnical report to allow the structural engineer to evaluate lateral load capacity of all piles?	☒	☐	☐
*10. For pile supported bridge abutments over soft ground:			
a. Has abutment pile downdrag load been estimated and solutions such as bitumen coating considered in design? Not generally required if surcharging of the fill is being performed. (Pages 248-251)	☒	☐	☐
b. Is bridge approach slab recommended to moderate differential settlement between bridge ends and fill?	☐	☐	☒
c. If the majority of subsoil settlement will not be removed prior to abutment construction (by surcharging), has estimate been made of the amount of abutment rotation that can occur due to lateral squeeze of soft subsoil? (Pages 114-115)	☐	☐	☒
d. Does the geotechnical report specifically alert the structural designer to the estimated horizontal abutment movement?	☐	☐	☒
11. If bridge project is large, has pile load test program been recommended? (Pages 299-302)	☒	☐	☐
12. For a major structure in high seismic risk area, has assessment been made of liquefaction potential of foundation soil during design earthquake (note: only loose saturated sands and silts are "susceptible" to liquefaction)?	☐	☐	☒

*A response other than (yes) or (N/A) for any of these checklist questions is cause to contact the appropriate geotechnical engineer for a clarification and/or to discuss the project.

G. Structure Foundations - Piles - (Cont.)

	<u>Yes</u>	<u>No</u>	<u>Unknown or N/A</u>
13. <u>Construction Considerations:</u> (Pages 279-311)			
Have the following important construction considerations been adequately addressed?			
a. Pile driving details such as: boulders or obstructions which may be encountered during driving - need for preaugering, jetting, spudding, need for pile tip reinforcement, driving shoes, etc.?	☒	☐	☐
b. Excavation requirements - safe slope for open excavations, need for sheeting or shoring? Fluctuation of groundwater table?	☒	☐	☐
c. Have effects of pile driving operation on adjacent structures been evaluated - such as protection against damage caused by footing excavations or pile driving vibrations?	☐	☐	☒
d. Is preconstruction condition survey to be made of adjacent structures to prevent unwarranted damage claims?	☒	☐	☐
e. On large pile driving projects have other methods of pile driving control been considered such as dynamic testing or wave equation analysis?	☒	☐	☐

*A response other than (yes) or (N/A) for any of these checklist questions is cause to contact the appropriate geotechnical engineer for a clarification and/or to discuss the project.

"GTR REVIEW CHECKLIST" (DRILLED SHAFTS)

H. Structure Foundations - Drilled Shafts (Pages 252-260)

In addition to the basic information listed in Section A, if drilled shaft support is recommended or given as an alternate, are conclusions/recommendations provided in the project foundation report for the following:

	<u>Yes</u>	<u>No</u>	<u>Unknown or N/A</u>
*1. Are recommended shaft diameter(s) and length(s) for allowable design loads based on an analysis using soil parameters for side friction and end bearing?	☒	☐	☐
*2. Settlement estimated for recommended design load?	☒	☐	☐
*3. Where lateral load capacity of shaft is an important design consideration, are P-Y (load vs. deflection) curves or soils data provided in geotechnical report which will allow structural engineer to evaluate lateral load capacity of shaft?	☒	☐	☐
4. Is static load test (to plunging failure) recommended?	☒	☐	☐
5. <u>Construction Considerations:</u>			
a. Have construction methods been evaluated, i.e., can less expensive dry method or slurry method be used or will casing be required?	☒	☐	☐
b. If casing will be required, can casing be pulled as shaft is concreted (this can result in significant cost savings on very large diameter shafts)?	☐	☐	☒
c. If artesian water was encountered in explorations, have design provisions been included to handle it (such as by requiring casing and tremie seal)?	☐	☐	☒
d. Will boulders be encountered? (Note: If boulders will be encountered, then the use of shafts should be seriously questioned due to construction installation difficulties and resultant higher cost the boulders can cause.)	☐	☒	☐

*A response other than (yes) or (N/A) for any of these checklist questions is cause to contact the appropriate geotechnical engineer for a clarification and/or to discuss the project.

"GTR REVIEW CHECKLIST" (MATERIAL SITES)

I. Material Sites

In addition to the basic information listed in Section A, is the following information provided in the project Material Site Report?:

	<u>Yes</u>	<u>No</u>	<u>Unknown or N/A</u>
1. Material site location, including description of existing or proposed access routes and bridge load limits (if any)?	☐	☐	☒
*2. Have soil samples representative of all materials encountered during the pit investigation been submitted and tested?	☐	☐	☒
*3. Are laboratory quality test results included in the report?	☐	☐	☒
4. For aggregate sources, do the laboratory quality test results (such as L.A. abrasion, sodium sulfate, degradation, absorption, reactive aggregate, etc.) indicate if specification materials can be obtained from the deposit using normal processing methods?	☐	☐	☒
5. If the lab quality test results indicate that specification material <u>cannot</u> be obtained from the pit materials as they exist naturally - has the source been rejected or are detailed recommendations provided for processing or controlling production so as to ensure a satisfactory product?	☐	☐	☒
*6. For soil borrow sources, have possible difficulties been noted - such as above optimum moisture content clay-silt soils, waste due to high PI, boulders, etc?	☐	☐	☒
*7. Where high moisture content clay-silt soils must be used, are recommendations provided on the need for aeration to allow the materials to dry out sufficiently to meet compaction requirements?	☐	☐	☒
8. Are estimated shrink-swell factors provided?	☐	☐	☒

*A response other than (yes) or (N/A) for any of these checklist questions is cause to contact the appropriate geotechnical engineer for a clarification and/or to discuss the project.

I. Material Sites (Cont.)

	<u>Yes</u>	<u>No</u>	<u>Unknown or N/A</u>
*9. Do the proven material site quantities satisfy the estimated project quantity needs?	☐	☐	☒
10. Where materials will be excavated from below the water table, has seasonal fluctuation of the water table been determined?	☐	☐	☒
11. Are special permit requirements covered?	☐	☐	☒
12. Have pit reclamation requirements been covered adequately?	☐	☐	☒
13. Has material site sketch (plan and profile) been provided for inclusion in the plans, which contains:			
• Material site number?	☐	☐	☒
• North arrow and legal subdivision?	☐	☐	☒
• Test hole or test pit logs, location, number and date?	☐	☐	☒
• Water table elevation and date?	☐	☐	☒
• Depth of unsuitable overburden which will have to be stripped?	☐	☐	☒
• Suggested overburden disposal area?	☐	☐	☒
• Proposed mining area and previously mined areas?	☐	☐	☒
• Existing stockpile locations?	☐	☐	☒
• Existing or suggested access roads?	☐	☐	☒
• Bridge load limits?	☐	☐	☒
• Reclamation details?	☐	☐	☒
14. Are recommended special provisions provided?	☐	☐	☒

*A response other than (yes) or (N/A) for any of these checklist questions is cause to contact the appropriate geotechnical engineer for a clarification and/or to discuss the project.

Plans and specifications (PS&E) reviews of projects with major or unusual geotechnical features¹ should preferably be made by examining the plans, special provisions, and geotechnical report together.***

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Certain checklist items are of vital importance to have been included in the geotechnical report. These checklist items have been marked with an asterisk (*). A negative response to any of these asterisked items is cause to contact the geotechnical engineer for clarification of this omission.

** For purposes of this document PS&E refers to a plan and specification review at any time during a project's development. Hence, the review may be at a preliminary or partial stage of plan development.

*** When plan reviews are conducted at a partial stage the final geotechnical report may not be available.

¹ Major and unusual geotechnical features are defined in Table 1.

A. PS&E Review - General

	<u>Yes</u>	<u>No</u>	<u>Unknown or N/A</u>
*1. Has the appropriate geotechnical engineer reviewed the PS&E to insure that design and construction recommendations have been incorporated as intended and that the subsurface information has been presented correctly? <u>This is an absolute necessity.</u>	☐	☐	☒
2. Are the finished profile exploration logs and locations included in the plans.	☐	☐	☒
*3. Have geotechnical designs prepared by region/district offices or consultants been reviewed and approved by the State Headquarters' geotechnical engineer?	☐	☐	☒
4. Do the contract documents contain the special provisions (SP's) as provided in the project geotechnical report?	☐	☐	☒
5. Have the following common claim pitfalls been avoided:	☐	☐	☒
a. Has an adequate site investigation been conducted (reasonably meeting or exceeding the minimum criteria given in Table 2 – page 6)?	☐	☐	☒
b. Has the use of “subjective” subsurface terminology (such as relatively soft rock or gravel with occasional boulders) been avoided?	☐	☐	☒
c. If alignment has been shifted, have additional subsurface explorations been conducted along new alignment?	☐	☐	☒
d. Has a note been included in the contract indicating all subsurface information is available to bidders?	☐	☐	☒
e. Do you think the wording of the geotechnical special provisions (SP's) are clear, specific, and unambiguous?	☐	☐	☒

*A response other than (yes) or (N/A) for any of these checklist questions is cause to contact the appropriate geotechnical engineer for a clarification and/or to discuss the project.

PS&E Review – Specific Features

The information covered in the previous general section will apply to all geotechnical features. The following are some additional important PS&E review items, which pertain to specific geotechnical features.

	<u>Yes</u>	<u>No</u>	<u>Unknown or N/A</u>
B. PS&E – Centerline Cuts and Embankments			
1. Where excavation is required, are excavation limits and description of unsuitable organic soils shown on the plans?	☐	☐	☒
2. Are plan details and SP's provided for special drainage details – such as, lined surface ditches, drainage blanket under sidehill fill, interceptor trench drains, etc.?	☐	☐	☒
3. Is SP included for fill materials requiring special treatment, such as nondurable shales, lightweight fill, etc.?	☐	☐	☒
4. Are SP's provided for any special rock slope excavation and stabilization measures called for in plans, such as controlled blasting, wire mesh slope protection, rock bolts, shotcrete, etc.?	☐	☐	☒
C. PS&E - Embankments Over Soft Ground			
*1. Where excavation is required, are excavation limits and description of unsuitable soils clearly shown on the plans?	☐	☐	☒
*2. Where settlement waiting period will be required, has estimated settlement time been stated in the SP's to allow bidders to fairly bid the project?	☐	☐	☒
*3. If instrumentation will be used to control the rate of fill placement, do SP's clearly spell out how this will be done and how the readings will be used to control the contractors operation?	☐	☐	☒
4. Do SP's clearly state that any instrumentation damaged by contractor personnel will be repaired at the contractor's expense?	☐	☐	☒

*A response other than (yes) or (N/A) for any of these checklist questions is cause to contact the appropriate geotechnical engineer for a clarification and/or to discuss the project.

	<u>Yes</u>	<u>No</u>	<u>Unknown or N/A</u>
D. PS&E – Landslide Corrections			
1. Are plan details and SP's provided for special drainage details, such as lined surface ditches, drainage blankets, horizontal drains, etc.?	☐	☐	☒
*2. Where excavation is to be made into the toe of an active slide (such as for buttress or shear key construction) – and stage construction is required – do the SP's clearly spell out the stage construction sequence to be followed?	☐	☐	☒
*3. Where a toe buttress is to be constructed, do the SP's clearly state gradation and compaction requirements for the buttress materials?	☐	☐	☒
*4. If the geotechnical report recommended that slide repair work not be allowed during the wet time of the year, is the proposed construction schedule in accord with the recommendation?	☐	☐	☒
E. PS&E – Retaining Walls			
*1. Are select materials specified for wall backfill with gradation and compaction requirements covered in the specifications?	☐	☐	☒
2. Are limits of required select backfill zones clearly detailed on the plans?	☐	☐	☒
3. Are excavation requirements specified, i.e., safe slopes for excavations, need for sheeting?	☐	☐	☒
*4. Where alternate wall types will be allowed, are fully detailed plans included for all alternates?	☐	☐	☒
a. Were designs prepared by wall supplier?	☐	☐	☒
b. Were wall supplier's design calculations and specifications reviewed and approved by the structural and geotechnical engineer?	☐	☐	☒
5. Where proprietary retaining walls are bid as alternates, does bid schedule require bidders to designate which alternate their bid is for (to prevent bid shopping after contract award)?	☐	☐	☒
6. Have FHWA guidelines for experimental designations for certain proprietary wall types been followed?	☐	☐	☒
7. Is ROW limit shown on plans and mentioned in specification where tiebacks are to be installed?	☐	☐	☒

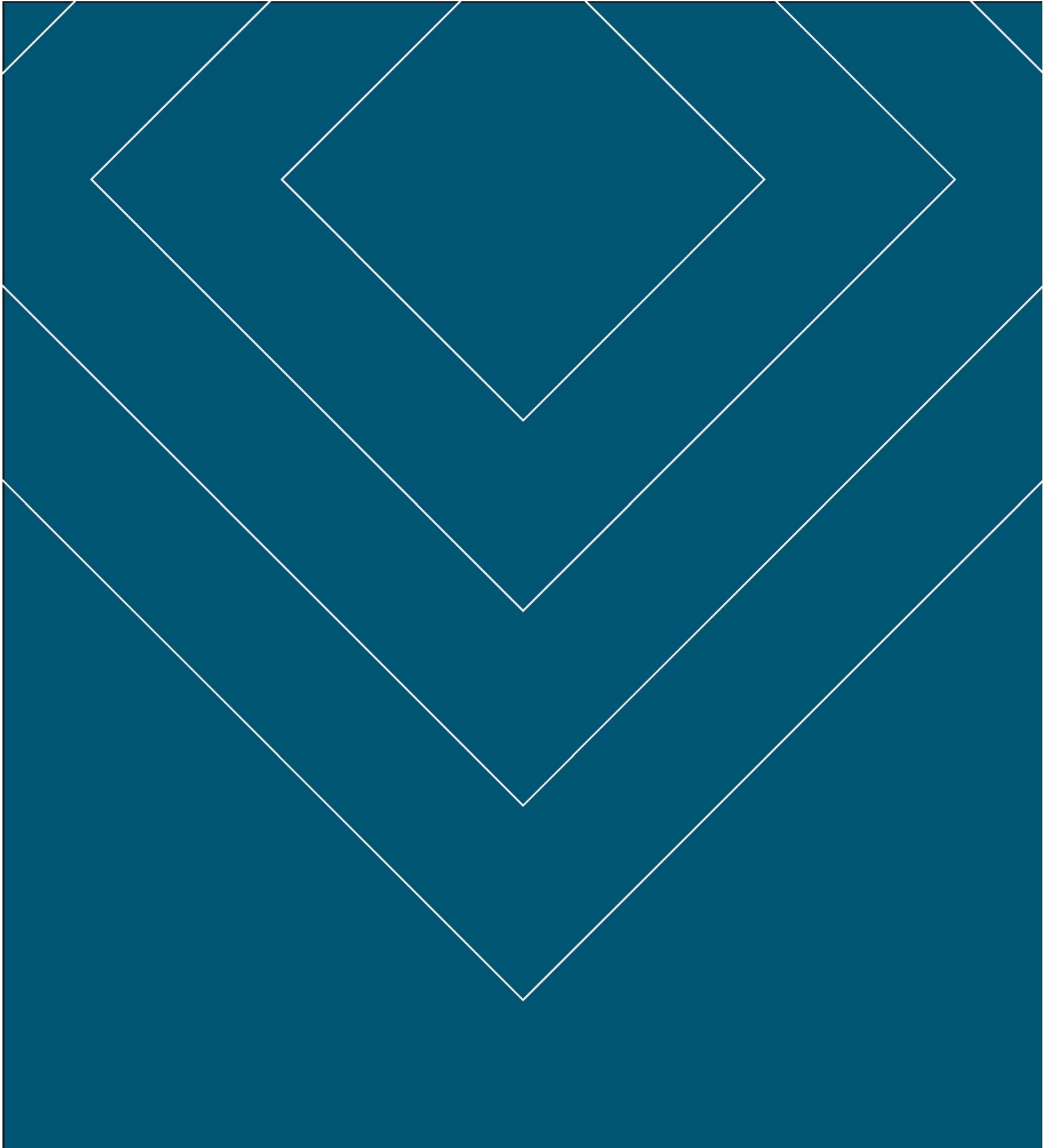
*A response other than (yes) or (N/A) for any of these checklist questions is cause to contact the appropriate geotechnical engineer for a clarification and/or to discuss the project.

	<u>Yes</u>	<u>No</u>	<u>Unknown or N/A</u>
F. PS&E – Spread Footings			
*1. Where spread footings are to be placed in natural soil, is the specific bearing strata in which the footing is to be founded clearly described (i.e., placed on Br. Sandy gravel deposit, etc.)?	☐	☐	☒
*2. Where spread footings are to be placed in the bridge end fill, are gradation and compaction requirements – for the select fill and backfill drainage material – covered in the SP's, standard specifications, or standard structure sheets?	☐	☐	☒
G. PS&E – Pile Foundations			
1. Do plan details adequately cover pile splices, tip reinforcement, driving shoes, etc.?	☐	☐	☒
*2. Where friction piles are to be driven in silty or clayey soils – significant setup or soils freeze affecting long-term capacity may occur – do specifications require retapping the piles after 24 to 48 hour waiting period when required bearing is not obtained at estimated length at end of initial driving?	☐	☐	☒
3. Where friction piles are to be load tested, has a reaction load of four times design load been specified to allow load testing the pile to plunging failure so that the ultimate soil capacity can be determined?	☐	☐	☒
4. Where end bearing steel piles are to be load tested, has load test been designed to determine if higher than 9 ksi allowable steel stress can be used (e.g., 12 – 15 ksi)?	☐	☐	☒
*5. Where cofferdam construction will be required, have soil gradation results been included in the plans or been made available to bidders to assist them in determining dewatering procedures?	☐	☐	☒
*6. If a wave equation analysis will be used to approve the contractor's pile driving hammer – has a minimum hammer energy or estimated soil resistance (tons) to be overcome to drive the piles to the estimated length – been given in the SP's?	☐	☐	☒

*A response other than (yes) or (N/A) for any of these checklist questions is cause to contact the appropriate geotechnical engineer for a clarification and/or to discuss the project.

H. <u>PS&E – Drilled Shaft Foundations</u>	<u>Yes</u>	<u>No</u>	<u>Unknown or N/A</u>
*1. Where drilled shafts are to be placed in soil, is the specific bearing strata in which the drilled shaft is to be found clearly described (i.e., placed on Br. Sandy gravel deposit, etc.)?	☐	☐	☒
2. Where end bearing drilled shafts are to be founded on rock, has the rock elevation at the shaft pier locations been determined from borings at the pier location?	☐	☐	☒
3. Where drilled shafts are to be socketed some depth into rock – have rock cores been extracted at depths to 10 feet below proposed rock socket at location within 10 feet of the shaft?	☐	☐	☒
I. <u>PS&E – Material Sites</u>			
*1. Is a material site sketch (containing the basic information listed on page 27) included in the plans?	☐	☐	☒
*2. Has the material site investigation established a proven quantity of material sufficient to satisfy the project estimated quantity needs?	☐	☐	☒
3. Where specification material cannot be obtained directly from the natural deposit, do SP's clearly spell out that processing will be required?	☐	☐	☒
4. Are contractor special permit requirements covered in the SP's?	☐	☐	☒
5. Are pit reclamation requirements clearly spelled out on the plans and in the SP's?	☐	☐	☒

*A response other than (yes) or (N/A) for any of these checklist questions is cause to contact the appropriate geotechnical engineer for a clarification and/or to discuss the project.



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