SELMON EXPRESSWAY

Whiting Street PD&E Study

Geotechnical Technical Memorandum

September 2021

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Subject: **Geotechnical Technical Memorandum**
THEA Whiting Street PD&E Study
Hillsborough County, FL
Authority Project No. HI-0141
AREHNA Project B-19-051

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 July 17, 2019.

This report presents our preliminary analyses for the Project Development and Environment (PD&E) Study for Whiting Street including our understanding of the project, an outline of our exploratory procedures, summary of field and laboratory data obtained as well as our preliminary recommendations for site preparation, design and construction.

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 Summary

1.1 Project Description

The Tampa Hillsborough Expressway Authority (THEA), in coordination with the City of Tampa, is conducting a Project Development and Environment (PD&E) Study to evaluate the needs, costs, and effects of extending Whiting Street and reconfiguring the on-ramps of the Selmon Expressway at Jefferson Street and off-ramps at Florida Avenue and Channelside Drive. The study considers extending Whiting Street to North Meridian Avenue and includes improvements and realignment of the existing segment of Whiting Street, from Jefferson Street to North Brush Street. The extension will provide a direct connection of the Whiting Street corridor to North Meridian Avenue which will improve traffic flow and safety for all transportation modes and offer additional connections within the street network.

The study will also evaluate reconfiguring the on-ramp to the Selmon Expressway at Jefferson Street and the off-ramps at Florida Avenue and Channelside Drive. It is anticipated that the Florida Avenue off-ramp will be widened to two lanes, the Channelside Drive off-ramp will be removed, and the new Whiting Street off-ramp will extend from the Selmon Expressway, near Morgan Street, to Nebraska Avenue and intersect with the new Whiting Street alignment to provide a direct connection from the Selmon Expressway. See **Figure 1.1** for the project location map.



Figure 1.1: Project Location Map

1.2 Project Purpose & Need

The purpose of this project is to provide a direct connection of the Whiting Street corridor to North Meridian Avenue to improve traffic flow and safety for all transportation modes and offer additional connections within the street network. The project will also reconfigure the on-ramps to the Selmon Expressway at Jefferson Street and the off-ramps at Florida Avenue and Channelside Drive to improve safety, traffic circulation, and access to Whiting Street and North Meridian Avenue.

The need for the project is based on the following criteria:

System Linkage

Based upon the Tampa Bay Regional Planning Model (TBRPM) Version 8.2, the existing roadway network will be over capacity by the 2046 design year. Additional network connectivity such as the Whiting Street extension and ramp reconfigurations, are necessary to provide additional route choice and access to alleviate the congestion.

Safety

Safety and operational concerns with the Florida Avenue and Channelside Drive off-ramps include a substandard radius and a free-flow merge movement onto Florida Avenue with a sidewalk/crosswalk conflict. The ramp termini onto Channelside Drive terminates into a 5-leg intersection at Channelside Drive and Morgan Street, which is a major pedestrian access point to the Amalie Arena. Six (6) years of data (2013-2018) were reviewed, and 14 crashes have occurred at this ramp. As the Water Street Project builds out to the east of the ramp system, the adverse impact of geometric issues and pedestrian conflicts are expected to be exacerbated. Also, the planned widening of the Selmon Expressway south of the downtown ramps will alleviate congestion issues and result in higher speed, higher volume interactions at this ramp. As such, improving the ramp geometry, eliminating pedestrian conflicts, and redirecting Downtown east traffic beyond the Water Street District is critical to proactively address safety concerns as both the Selmon Expressway and Downtown Tampa continue to develop.

Transportation Demand

Based upon the Tampa Bay Regional Planning Model (TBRPM) Version 8.2, Jefferson Street (39,000 AADT) and Kennedy Boulevard (AADT 34,000) are expected to reach their operational capacity by 2040. As the Water Street Project develops, the vehicle demand is expected to increase. The proposed connection of Whiting Street could carry up to 14,800 AADT, providing valuable route divergence and congestion relief to the parallel facilities.

1.3 Preferred Alternative

THEA has committed to provide a new connection to Meridian Avenue, by extending Whiting Street between Meridian Avenue and Brush Street. In order to construct the extension of Whiting Street, the existing railroad tracks will need to be removed. Removing the railroad tracks and completing the extension

to Meridian Avenue will offer an additional connection within the street network, providing additional route choice and alleviating congestion.

The preferred alternative proposes improvements to existing ramp configurations and the existing street network at multiple locations in the Downtown/Channelside area. The improvements can be broken up into four distinct locations. See **Figure 1.2** for each location of proposed improvements.



Figure 1.2: Project Location Map

Location A

Whiting Street currently ends at Brush Street, west of the railroad tracks. The preferred alternative proposes to extend Whiting Street, from Brush Street to Meridian Avenue, with a new signal at the T-intersection of Whiting Street and Meridian Avenue. The proposed typical section for the Whiting Street extension includes two 11-foot wide travel lanes in each direction, a 15-foot wide raised median, curb and gutter, and 10-foot wide sidewalks on both the north and south sides of the road. The eastbound approach to Meridian Avenue includes two 11-foot wide dedicated left turn lanes and one 11-foot wide dedicated right turn lane. If necessary, the proposed 15-foot wide raised median can be converted to an additional dedicated left turn lane in the future. The existing grassed median on Meridian Avenue will be split in order to accommodate the proposed signalized intersection. The preferred alternative includes the addition of a southbound

dedicated right turn lane and a northbound dedicated left turn lane. The preferred alternative does not propose any other improvements to Meridian Avenue.

Location B

Whiting Street is currently a two-lane roadway with on-street parking on both the north and south sides of the road. East of the Selmon Expressway, Whiting Street is a brick road in much need of repair. The preferred alternative proposes to widen/reconstruct Whiting Street from two to four lanes with two 11-foot wide travel lanes in each direction, curb and gutter, and 10-foot wide sidewalks on both the north and south sides of the road. The preferred alternative also includes installing two new traffic signals; one at the intersection of Whiting Street and the terminus of the proposed Whiting off-ramp, just east of the Selmon Expressway, and the other at the intersection of Whiting Street and Brush Street. A dedicated eastbound left turn lane is proposed at the intersection of Whiting Street and Brush Street.

Location C

The existing exit ramp 6B provides users the ability to travel east along Channelside Drive, towards Amalie Arena and the Florida Aquarium. The preferred alternative proposes relocating exit ramp 6B approximately 700 feet north and providing a direct connection to Whiting Street. The proposed ramp includes a single 15-foot wide ramp lane, which will remain on structure beyond the existing Jefferson Street on ramp. From this point the ramp profile begins to decrease and the ramp will be supported by Mechanically Stabilized Earth (MSE) wall, which ends approximately 100 feet south of Whiting Street. The ramp widens to three 12-foot wide lanes at the intersection, with one dedicated left turn lane and two dedicated right turn lanes. The proposed ramp will cut off access north, along Nebraska Avenue, and therefore requires a horizontal curve to connect Nebraska Avenue to Finley Street. The existing Jefferson Street on ramp entrance will be shifted to the north to accommodate the new Whiting Street off-ramp.

Location D

The current configuration of exit ramp 6A includes a tight single lane loop ramp that merges onto Florida Avenue under a free-flow condition. The short, tight curve provides little room for vehicles to slow down and queue if there is any backup when trying to merge onto Florida Avenue. The preferred alternative proposes widening the ramp from one to two lanes as well as lengthening the ramp to provide a wider curve. The loop ramp terminates at Florida Avenue at a proposed signalized intersection. The proposed loop ramp includes two 12-foot wide ramp lanes and will remain on structure beyond the existing exit ramp 6B to provide an open area underneath for mixed use and to promote pedestrian travel. Approximately 300 feet north of Florida Avenue, the ramp widens to three lanes to provide more vehicle storage and efficient queue dispersion onto Florida Avenue. The increased ramp length as well as the additional lanes will minimize backup and potential vehicle queueing onto the Selmon Expressway. The preferred alternative includes a 10-foot wide sidewalk on the inside edge of the proposed loop ramp, crossing underneath the ramp at the location of the existing exit ramp 6B. Pedestrians will have the ability to cross the loop ramp, to access Channelside Drive, at a proposed crosswalk. No right of way is required to construct the proposed loop ramp.

2.0 Scope of Work

2.1 Summary of Scope

The purpose of our limited geotechnical exploration was to obtain preliminary information on the general subsurface conditions at the project site for the planned sidewalk, ramp, wall, and stormwater pond improvements. 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 groundwater levels.
- Preliminary geotechnical recommendations for foundation design and construction.

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

- Reviewed published topographic and soils information from the United States Geological Survey (USGS) and the 'Soil Survey of Hillsborough County, Florida' published by the United States Department of Agriculture (USDA) Soil Conservation Service (SCS).
- Completed a general visual reconnaissance of the site.
- Requested utility location services from Sunshine 811.
- Performed ten (10) auger borings to depths of 1.5 to 8 feet along the proposed sidewalk alignments and roadway improvement areas.
- Performed two (2) Standard Penetration Test (SPT) borings to a depth of 20 feet in the proposed stormwater management areas.
- Performed five (5) SPT borings extending to depths of approximately 20 to 40 feet below existing grade for the proposed Mechanically Stabilized Earth (MSE) and shoulder barrier wall improvements. 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.
- Performed four (4) SPT borings extending to a depth of approximately 100 feet below existing grades for the proposed Ramp improvements. 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 rock coring at select ramp boring locations. The rock core samples were returned to the laboratory for determination of the percent of recovery (REC) and rock quality designation (RQD).
- Performed two (2) Double Ring Infiltration (DRI) tests at a depth of 2 feet in the proposed stormwater ponds at accessible locations.
- Performed one (1) auger boring to a depth of 5 feet adjacent to DRI-01 location.
- Visually classified and stratified soil samples in the laboratory using the Unified Soil Classification System for the wall and ramp borings and American Association of State Highway and Transportation Officials (AASHTO) for the sidewalk, roadway and stormwater pond borings.

- Performed a laboratory testing program consisting of natural moisture content tests, full grain-size analyses, organics content tests and Atterberg Limits to supplement the engineer's visual classifications.
- Performed pH, chlorides, sulfates, and resistivity testing to determine the corrosion parameters of representative soil samples.
- 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.

3.0 Field Exploration & Laboratory Testing

3.1 Field Exploration

We performed a total of eleven (11) SPT borings to explore subsurface conditions encountered at the proposed ramps, MSE and shoulder barrier wall alignments, and stormwater ponds during the period of June 9, 2021 through July 12, 2021 and August 9 and 10, 2021. The borings extended to depths of approximately 100 feet below the existing ground surface near the proposed ramps, 20 to 40 feet near the proposed wall alignments and 20 feet within the stormwater pond study areas.

The SPT borings were performed with the use of a Power Truck Mounted Drill Rig equipped with an automatic hammer using Bentonite "Mud" drilling procedures and 3-inch ID casing. Samples for the ramp 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. Samples for the wall and drainage borings were collected and Standard Penetration Test resistances were measured at approximate intervals of two feet for the top 10 feet and at approximate intervals of 5 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. Upon completion of drilling, the boreholes were backfilled with cement grout.

Rock cores were obtained using a 2.4-inch double tube core barrel, equipped with a tungsten-carbide drill bit. As the rock core advances, fluid is used between the inner and outer tubes to cool the drill bit while the ground-up material is washed to the surface. The inner tube protects the rock core as drilling progresses. The rock core sampling was performed in accordance with ASTM D 2113, titled "Standard Practice for Rock Core Drilling and Sampling of Rock for Site Exploration". The rock core samples were returned to the laboratory for determination of the percent of recovery (REC) and rock quality designation (RQD). A summary of the rock core data is presented in **Table 4** in **Appendix B**.

A total of eleven (11) hand auger borings were performed along the proposed sidewalk alignments, roadway improvement area and within the Florida Avenue Loop stormwater pond location. The hand auger borings were generally performed to depths of 1.5 to 8 feet by manually advancing a 3-inch diameter, 6-inch long sampler into the soil until the sampler was full. The sampler was then retrieved and the soils in the sampler were removed and visually classified. Borings SH-04 and SH-09 were terminated at depths of 1.5 and 3 feet, respectively, due to encountered buried debris at those depths. The debris consisted of concrete fragments, brick fragments and gravel. Representative portions of these soil samples were sealed in glass jars, labeled and transferred for appropriate classification. Upon completion of drilling, the boreholes were backfilled with auger spoils. It should be noted buried debris consisting of construction materials (concrete fragments, brick fragments, gravel) was encountered at borings SH-04 and SH-09 from the existing ground surface to detphs of approximtely 1.5 feet and 3 feet, respectively.

Two DRI tests were performed by installing a 12-inch diameter inner steel ring and a 24-inch diameter outer steel ring concentrically into the ground to the desired test depth. Water was then added to a desired level in both rings and held constant. The amount of water added to the inner ring versus time was then recorded. This procedure was repeated every 15 minutes for the first hour and every 30 minutes for ensuing hours for a total of 4 hours or until a stabilized infiltration rate was achieved. The DRI tests were performed in general accordance with ASTM D-3385, entitled "Standard Test Method for Infiltration Rate of Soils in Field Using Double Ring Infiltrometer." Test results are summarized in **Appendix A**.

The soil boring locations were staked in the field at the completion of drilling services and subsequently surveyed by the project surveyor (Echo UES, Inc.). The vertical and horizontal locations of the borings shown on the Report of Core Boring and Roadway Soil Survey sheets are based on the results of the survey program. **Appendix A** provides a boring location site plan showing the relationship of existing features to the exploration borings.

3.2 Laboratory Testing

Our laboratory testing program included natural moisture content tests (AASHTO T-265/ASTM D-2974), full sieve gradation (AASHTO T-088/ASTM D-422), organic content (AASHTO T-267/ASTM D-2974), and Atterberg Limits test (AASHTO T-89/ASTM D-4318 and AASHTO T-90/ASTM D-4318). To determine the corrosion parameters of representative soil samples, we performed pH, chlorides, sulfates and resistivity testing (FM5-550, FM5-551, FM5-552, FM5-553). The results of these tests are provided on the Roadway Soil Survey Sheet and Report of Core Boring Sheets in Appendix A. Laboratory test results are also summarized on **Tables 1** and **2** in **Appendix B**.

Unconfined compression tests (ASTM 7012) and splitting tensile strength (ASTM D 3967) tests were also performed on select intact rock core samples. The results of unconfined compression tests and splitting tensile tests are presented on **Table 5** in **Appendix B**.

4.0 Subsurface Conditions

4.1 USGS Topographic Data

The topographic survey map published by the United States Geological Survey 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 +15 to +20 feet National Geodetic Vertical Datum (NGVD) of 1929 (approximately +14.1 to +19.1 feet North American Vertical Datum (NAVD) of 1988).

4.2 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 Urban Land, 0 to 2 percent slopes (56). Urban Land (56) comprises of up to 85 percent impervious surfaces such as asphalt and concrete. Urban land (56) surfaces are covered by streets, parking lots, buildings and other structures. Most areas classified as Urban land (56) are artificially drained by sewer systems, gutters and other man-made drainage systems. Annual precipitation as well as depth to seasonal high water table in naturally drained areas are not reported by the USDA on soils consisting or Urban Land.

4.3 Regional Geology

Tampa, Florida is located within the Gulf Coast Lowlands Physiographic Province. Below a depth of 100 feet is the Suwannee limestone of the Oligocene Epoch. In Tampa, this formation is generally 250 feet in thickness and is part of the Floridan Aquifer, which is a significant water supply source. The overlying deposits of the Miocene Epoch are known as the Tampa Member of the Hawthorne Formation. Limestone in this formation is interbedded with indurated silts and clays. The top of this formation typically is found 10 to 50 feet below existing grades. Silts, sands and clays of the upper portion of the Hawthorne Formation overlie the Tampa Member, and the sandy terraces of Pleistocene Epoch sediments form the surface topography of the Tampa area.

4.4 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:

Table 4.4.1 Sidewalk and Roadway Borings (SH-01 through SH-10)

Elevation (feet, NAVD 88)		Material Description
11 to 18	12 to 6	Fine SAND to Fine SAND (A-3) with Silt.

Table 4.4.2 Stormwater Pond Borings (PB-01, PB-02, DRI-01)

Elevation (feet, NAVD 88)		Material Description
11 to 18	12 to 6	Fine SAND to Fine SAND (A-3) with Silt.

Table 4.4.3 Florida Avenue Loop Off-Ramp Borings (BB-01, BB-02)

Elevation (feet, NAVD 88)		Material Description
15 to 17	1 to -8	Medium dense to dense SAND (SP), SAND with silt (SP-SM), Silty SAND (SM) and clayey SAND (SC)
1 to -8	-83 to -85	Very Stiff to Hard Highly weathered limestone, weathered limestone and Limestone. Zones of hard SILT (ML, MH) were also encountered.

Table 4.4.4 Whiting Street Off-Ramp Borings (BB-03, BB-04)

Elevation (feet, NAVD 88)		Material Description
16	-4 to -19	Very loose to dense SAND (SP), SAND with silt (SP-SM), Silty SAND (SM) and clayey SAND (SC). Zones of firm to very stiff CLAY (CH) were also encountered.
-4 to -19	Up to -84	Hard Highly weathered limestone, weathered limestone and limestone with zones of very stiff to hard CLAY (CH), hard SILT (MH) and very dense Clayey SAND (SC).

Table 4.4.5 Florida Avenue Loop Ramp MSE Wall Borings (WB-01, WB-02)

Elevation (feet, NAVD 88)		Material Description
16 to 18	-1 to -6	Very loose to medium dense SAND (SP), SAND with silt (SP-SM) and Clayey SAND (SC).
-1 to -6	-16	Very soft CLAY (CH).
-16	Up to -24	Hard weathered Limestone.

Table 4.4.6 Whiting Street Off-Ramp MSE and Barrier Wall Borings (WB-03 through WB-05))

Elevation (feet, NAVD 88)		Material Description
14 to 18	1 to 2	Loose to medium dense SAND (SP), SAND with silt (SP-SM), silty SAND (SM) and clayey SAND (SC).
1 to 2	-2 to -31	Very soft to hard highly weathered limestone and limestone.

4.5 Groundwater Conditions

The groundwater level was encountered at depths ranging from approximately 2.5 to 5 feet below existing grades (i.e., elevation ranging from approximately 8.4 to 12.8 ft, NAVD 88) in five (5) of the sidewalk and roadway hang auger borings performed. The groundwater table was not encountered within the depths of the remaining hand auger borings. Pond boring PB-02 encountered the groundwater table at a depth of approximately 8 feet below existing grades (elevation of 9.0 feet NAVD 88). The majority of the ramp and wall SPT borings encountered the groundwater table at depths of 3.5 feet to 9 feet below existing grades (i.e., elevation ranging from approximately 8.3 to 14 ft, NAVD 88). Drilling fluid is utilized in SPT borings to advance the borehole. The addition of drilling fluid makes it difficult to obtain accurate groundwater measurements when the drilling fluid is introduced into the hole prior to encountering the groundwater table. As a result, GNA (Groundwater Not Apparent) is shown adjacent to the SPT soil profiles where the drilling fluid was introduced prior to encountering the groundwater table. The groundwater was not apparent in boring BB-03 and pond boring PB-01.

Fluctuation in ground water levels should be expected due to seasonal climatic changes, construction activity, rainfall variations, surface water runoff, and other site-specific factors. 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.

4.6 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 Hillsborough County Soil Survey indicated that the project site is located within an area classified as Urban Land, 0 to 2 percent slopes (56). Most areas classified as Urban land (56) are artificially drained by sewer systems, gutters and other man-made drainage systems. Annual precipitation as well as depth to seasonal high water table in naturally drained areas are not reported by the USDA on soils consisting or Urban Land.

SHWT depths/elevations were estimated based on the groundwater table encountered within the borings, field observations, our experience in the area and indicators present within the soil auger borings performed and are presented on **Table 3** in **Appendix B**.

5.0 Roadway And Sidewalk Recommendations

5.1 General Information

In general, the existing shallow subsurface soils encountered in the auger borings are suitable to support the proposed roadway and sidewalk improvements after proper subgrade preparation. If the final sidewalk alignment, roadway improvement areas, or system improvements are significantly different from those described, or if the subsurface conditions during construction are different from those revealed by our borings, we should be notified immediately so that we might review our recommendations presented in this report.

5.2 Pavement Design Considerations

In accordance with the FDOT's Florida Design Manual (FDM) section 210.10.3 a minimum separation of 3 feet should be maintained between the bottom of the roadway base course and the Base Clearance Water Elevation except for the following facilities:

- 2-lane roadways in context classification C1 (Natural), C2 (Rural), C2T (Rural Town), and C3 (Suburban), and all ramps may be reduced to a 2-foot clearance.
- Low point on ramps at cross roads may be reduced to a 1-foot clearance.
- All other facilities in context classifications C4 through C6 (Urban General, Urban Center, and Urban Core, respectively) may be reduced to a 1-foot clearance.

A minimum separation of 1 foot should be maintained for the proposed roadway improvements. The base clearance water elevation is typically considered the normal seasonal high. The base should also be maintained at this minimum separation above water levels within roadside ditches to allow for positive drainage.

5.3 Soil Suitability

FDOT Standard Indices 120-001 and 120-002 should be followed for soil suitability along the vertical and horizontal extent of the roadway and sidewalk alignments. In this regard, the soil strata encountered during our geotechnical exploration and their suitability have been summarized and are presented on the Cross Section Soil Survey sheet presented in **Appendix A**. .

It should be noted buried debris consisting of construction materials (concrete fragments, brick fragments, gravel) was encountered at borings SH-04 and SH-09 from the ground surface to detphs of 1.5 feet and 3 feet, respectively. These materials should be removed from the construction areas in accordance with Section 110 of the FDOT Standard Specifications for Road and Bridge Construction.

6.0 Stormwater Ponds

Pond 100 at the Florida Avenue Loop and Pond 200 at the Whiting Street improvements are proposed. The two pond borings (PB-01 and PB-02) performed encountered fine sand and fine sand with silt (A-3) from the existing ground surface to the boring termination depth of 20 feet. The ground water table was measured at a depth of approximately 8 feet in boring PB-02. The groundwater table was not apparent (GNA) in boring PB-01 performed at the Pond 100 location. Bridge boring BB-01 was performed within the limits of Pond 100 to the southwest of boring PB-01 and encountered the groundwater table at a depth of 6 feet below the existing ground surface.

6.1 Double Ring Infiltration (DRI) Test Results

DRI tests were performed at the proposed stormwater improvement areas on August 6 and August 9, 2021 in order to determine the infiltration of the shallow soils.

The following table summarizes the DRI test results:

Table 6.1.1 DRI Test Results

Test Location	Depth Below Ground Surface, feet	Measured Vertical Infiltration Rate, in/hr	Estimated Horizontal Infiltration Rate, in/hr
DRI-01	2.0	15.1	15.1
DRI-02	2.0	0.4	0.6

The vertical infiltration rate is the actual rate, as measured in the field. No factor of safety has been applied. The horizontal infiltration rate was then estimated based on the vertical infiltration rate and soil types encountered. It should be noted numerous clay and rock fragments were encountered in the shallow soils at the location of DR-02. A summary of each DRI test is attached in **Appendix A**.

6.2 Base of Aquifer

The base of the aquifer can be determined by the depth to the confining layer. A confining layer is generally regarded as a soil stratum that will significantly impede the infiltration of water. The two pond borings did not encounter a confining layer within the 20 ft depth of the borings. However, bridge boring BB-01 was performed within the limits of the proposed Pond 100 and encountered a confining layer consisting of clayey sand (A-2-6) at depths of approximately 18 to 23 feet below existing grades (elevation -2.7 to -7.7 feet, NAVD 88) underlain by weathered limestone and limestone. Wall borings WB-04 and WB-05 were performed near proposed Pond 200 and encountered a confining layer consisting of clay (A-7-6) and weathered limestone at a depths of approximately 12.5 feet (elevations 5.5 to 1.8 feet, NAVD 88) below existing grades. We recommend that depths of 20 feet (elevation -5 feet, NAVD 88) and 12.5 feet (elevation 2 feet, NAVD 88), respectively, be used as the confining layer for proposed Ponds 100 and 200.

7.0 Preliminary Foundation Evaluation (Bridge Structures)

7.1 General Information

Our preliminary geotechnical evaluation for feasibility of typical foundation alternatives for the proposed bridge/ramp 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 ramp improvements using various foundation alternatives such as shallow foundations, including Geosynthetic Reinforced Soil (GRS) supported abutments, and deep foundations, including square driven precast prestressed concrete piles (PCP), steel pipe piles, steel H-piles and drilled shafts.
- Soil corrosion potential and the environmental classification of the substructure and superstructure.

7.2 Existing Bridge Structure

The original bridge (SR 618 EB over Hillsborough River and Downtown Tampa, No. 100333) was originally constructed in 1975 and reconstructed in 1981.

7.3 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. Challenges will include differential settlement with adjacent pile supported foundations, potential conflict with wet utilities, dewatering to cast the spread footing in the dry, which may affect feasibility. Therefore, shallow foundations are not considered further in this report.

7.4 Precast Concrete and Steel Driven Piles

Driven displacement piles are a widely used foundation type for bridges in Florida and typically consist of prestressed concrete driven piles, steel pipe and H-piles. Prestressed concrete piles area a widely used and proven foundation system in Central and South Florida. Steel pipe and H-piles produce less vibration than concrete driven piles and are easier to splice in highly variable site conditions, or where pile lengths will be longer than can be transported. However, they are typically less cost efficient than concrete driven piles from a cost per capacity standpoint. In addition, sacrificial thickness requirements are needed for the steel piles due to the extremely aggressive nature of the tested soils.

7.4.1 Axial Capacity of PSC, Steel Pipe and Steel H-piles

We have evaluated 18 and 24-inch square Prestressed Concrete (PSC) piles for support of the proposed ramp bridge foundation system. In addition, 20 inch diameter steeel pipe piles and HP14x89 steel H-piles were also evaluateed. 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.2.04), was used. This method generates pile capacities through the use of empirical correlations between 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. To account for predrilling in our FB-Deep analysis, we did not include the soils within the upper 10 feet.

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

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

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 18 and 24-inch PSC piles per the Structure Design Guidelines of 300 and 450 tons, respectively may be achieved within the depths explored. The FB-Deep analyses also indicate 20-inch diameter steel Pipe piles and HP14x89 H-pile may achieve a nominal bearing resistance of 300 tons at approxiamte tip elevations of -40 to -50 feet, NAVD 88. Based on the SPT N-values, refusal conditions may be anticipated at elevations below approximately 0 to -10 feet, NAVD 88 at the Florida Avenue Loop and from below approximately -10 to -20 feet, NAVD 88 at the Whiting Street improvements.

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

7.4.2 Lateral Stability of PSC, Steel Pipe and Steel H-piles

We have provided geotechnical parameters for use in performing lateral load analyses for the driven piles. The Recommended Soil Parameters for FB-MultiPier Analysis are presented **Appendix C** for 18 and 24-inch

square piles as well as 20-inch diamater steel pipe and HP14x89 steel H-piles. These parameters are based on correlations with SPT N-values.

7.5 Drilled Shafts

Drilled concrete shafts are another 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.

A disadvantage is the dependency on construction procedures and quality control to ensure required capacities are reached. It is often used at sites where there is limestone or very dense strata at relatively shallow depths. In addition, specialized equipment may be required to reduce vibrations during placement of the temporary steel casing using non-vibratory methods, such as rotary or oscillatory methods.

7.5.1 Axial Capacity of Drilled Shafts

We have evaluated 48 and 60-inch diameter drilled shafts for support of the proposed ramp bridge foundation system. In order to evaluate the axial capacities, FB-Deep (v.2.04) was used, along with correlations of soil and rock strength parameters to SPT N-values, within the sands and limestone encountered. Based on the relatively low SPT N-values (N<25 blows per foot) within the sandy limestone, this layer was conservatively modeled as sand since corable rock samples may be difficult to obtain. In addition, 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 upper 10 feet was neglected in our analyses due to potential disturbances during shaft construction such as excavation and temporary casing installation. 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. However, slurry construction or temporary casing will likely be necessary for construction, considering the sandy nature of the soils, and relatively high groundwater table. The graphical and tabular outputs from our FB-Deep analyses are presented in **Appendix C** and **Appendix D**, respectively.

7.5.2 Lateral Stability of Drilled Shafts

We have provided geotechnical parameters for use in performing lateral load analyses for the drilled shafts. The Recommended Soil Parameters for FB-MultiPier Analysis are presented in **Appendix C**.

8.0 Preliminary Foundation Evaluations (Walls)

8.1 General Information

Our preliminary geotechnical evaluation is based upon the previously presented project information as well as the field and laboratory data obtained during this geotechnical exploration. The table below presents the furnished retaining wall information.

Table 8.1.1 Furnished Retaining Wall

Wall Designation	Wall Type	Approx. Begin Wall Station	Approx. End Wall Station	Approx. Overall Wall Length (feet)	Approx. Wall Heights (feet)
Florida Avenue Loop Ramp	MSE (Left)	109+00	112+00	300	5 - 23
	MSE (Right)	109+00	112+00	300	5 - 23
Whiting Street Off-Ramp	MSE (Left)	208+60	212+80	420	5 - 23
	MSE (Right)	208+60	212+80	420	5 - 23
South Jefferson Street to Eastbound SR 618 On-Ramp	Shoulder Barrier	206+87	213+30	643	9

The wall SPT borings generally encountered loose to medium dense sandy soils (SP, SP-SM, SC) to depths of approximately 13 to 22 feet below existing grades underlain by stiff to very hard highly weathered and weathered limestone to the boring termination depths of 20 to 45 feet below existing grades. Boring WB-02 performed at the proposed Florida Avenue Loop encountered very soft clay (CH) at depths of approximately 22 feet to 32 feet (elevation -6 to -16 ft, NAVD 88) below existing grades. This stratum had an SPT resistance (N-value) of WH (the sampler fell under the weight of the rod and hammer). Borings WB-03 and WB-04 at the proposed Whiting Street Off-Ramp encountered zones of very soft highly weathered limestone at depths of approximately 23 to 28 feet (elevation -3.4 to -8.6 feet, NAVD 88) and 19 to 24 feet (elevation -4.7 to -9.7 feet, NAVD 88), respectively, below existing grades. The SPT resistance (N-values) in the very soft zones of the limestone stratum was WR (the sampler fell under the weight of the rod) to 1 blow per foot.

8.2 External And Global Stability Analyses

Preliminary analyses were performed to evaluate the external stability of the MSE walls with respect to overturning, sliding and bearing resistance. A preliminary global stability analysis was also completed. The computer program 'SLOPE/W' and FDOT spreadsheet 'MSE Wall – LRFD External Stability Analysis, Version 2.5.1' were used for these analyses. A reduction to the base angel of friction in the External Stability Analysis was applied to account for plastic reinforcement (as per AASHTO LRFD Bridge Design Specifications 11-64). The base angle of friction of 21 degrees is conservative for metallic reinforcement but applies to both metallic and plastic reinforcement in the event plastic reinforcement is required. Once the project design has progressed beyond the PD&E phase and the wall subsurface environmental classification has been determined, the base angle of friction can be adjusted accordingly based on the selected reinforcement type. Soil strength properties were derived from empirical correlations with the SPT N-values of the soil

borings and a traffic surcharge load of 250 psf was included. As shown in **Figure 3.13.2-6** of the Structural Design Guidelines (SDG), both proposed MSE walls for the Florida Avenue Loop and the Whiting Street Ramp are Case 1 back-to-back walls. As shown in **Figure 3.13.2-6** of the SDG, the distance between the two walls is less than $D = H_1 \tan(45° - \Phi°/2)$ where H_1 is the height of the taller wall. In this case, the active wedges at the back of each wall cannot fully spread out and active thrust is reduced.

In addition, the analyses were performed in accordance with LRFD Design. The current load and resistance factors for external and global stability analyses per the FDOT SDG and AASHTO Load and Resistance Factor Design (LRFD) Bridge Design Specifications are as follows:

Table 8.2.1 Load And Resistance Factors for Global Stability Analyses

Load Factors				
Group	Earth Vertical, Ev	Earth Horizontal, Eh	Live Load Surcharge Vertical, Lsv	Live Load Surcharge Horizontal, Lsh
S-1-a	1.00	1.50	1.75	1.75
S-1-b	1.35	1.50	1.75	1.75
S-IV	1.35	1.50	---	---
Resistance Factors				
Resistance Factor for Sliding				1.00
Resistance Factor for Bearing (per FDOT)				0.55
Resistance Factor Slope Stability				0.65

The results of our External and Global stability analyses are presented in **Appendix E**.

8.3 Settlement

A preliminary analysis was performed to evaluate the potential settlements of the walls due to backfill and traffic surcharge loading. Settlements for the Florida Avenue Loop wall will generally be caused by long term settlement of the plastic soils and elastic compression of the granular soils which should occur immediately as the wall backfill is placed. The computer program 'FoSSA' was used for this analysis. Settlements for the Whiting Street Ramp walls will generally be caused by elastic compression of the underlying granular soils which should occur immediately as the wall backfill is placed. This analysis was performed utilizing a spreadsheet developed specifically for estimation of elastic settlement. The following table presents a summary of the results of our settlement analyses.

Table 8.3.1 Summary of MSE Wall Settlement Analysis Results

Summary of MSE Wall Settlement Analysis Results					
Wall	Reference Boring	Maximum Wall Height (feet)	Estimated Wall Settlement		
			Long Term Settlement (inches)	Short Term Settlement (inches)	Differential Settlement Longitudinal % (ft./100ft.)
Florida Avenue Loop	WB-02	23	> 12	5	0.4%
Whiting Street Off-Ramp	WB-03	23	< ¼	7	0.3%

Due to the very soft plastic soil stratum encountered in boring WB-02 and the very soft zones in the limestone stratum of borings WB-03 and WB-04 at approximate elevations between -3 and -7 feet, NAVD 88, excessive settlements on the order of 7 inches or greater should be expected for the proposed MSE walls necessitating the need for phased wall construction. Example calculations of our preliminary settlement analyses are attached in **Appendix E**.

8.4 General Recommendations

The minimum wall footings/leveling pads width and depth to top of leveling pad should be 12-inches and 24-inches, respectively, for design purposes. Preparation of the footing subgrade should be performed in accordance with the FDOT Standard Specifications for Road and Bridge Construction. In accordance with the Structure Design Guidelines, Sand backfill may be assumed for proprietary internal wall design with a moist unit weight of 105 pcf and friction angle of 30°.

For the wall sequence of construction, any large drainage structures near the toe of the proposed walls shall be constructed prior to the walls.

8.5 Recommended Soil Parameters

The recommended soil parameters for use in design, including the backfill material parameters for the backfill utilized behind the proposed retaining structures are included in **Appendix E**. In addition, the recommended soil parameters for the existing subsurface conditions are also included for the proposed MSE retaining walls.

9.0 Environmental Classification

Corrosion parameter tests were performed by AREHNA on select soil samples obtained from the bridge borings at the project site. A water sample from Garrison Channel in Hillsborough Bay was also collected for testing. The results of the soil and water tests are provided on the Report of Core Boring sheets in **Appendix A** and in **Appendix B** on **Table 2**. According to the soil test results, the substructure environmental classification is slightly aggressive for both the Florida Avenue Loop and Whiting Street Improvement sites. The aforementioned water sample was colleced from Garrison Channel which is less than 2,500 feet from the project site. The Chloride test result for this sample was 5,495 ppm. As per Section 1.3.2 B-3 of the Structures Design Guidelines (SDG), the superstructure is classified as moderately aggressive for both the Florida Avenue Loop and Whiting Street structures. As per SDG Section 1.3.1 D, the substructure classification for both Florida Avenue Loop and Whiting Street will be presented as Moderately Aggressive.

10.0 Preliminary Construction Considerations

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

10.1 Protection of Existing Structures and Vibration Monitoring

After the final design option is selected, recommendations for protection of the existing structures and a vibration monitoring program should be provided. Several existing commercial building structures are located within 100 feet of the proposed structure, pavement and pond improvements. Existing bridge structures are also located adjacent to the proposed improvement areas. During construction near the existing buildings, precautions must 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.

2. Vibration monitoring in accordance with FDM Chapter 307.

The table below summarizes the vibration monitoring recommendations. The addresses listed below should not be considered final and all encompassing. As the project design continues, additional properties may be added/deleted and/or additional monitoring measured added:

Table 10.1.1 Summary of Vibration Monitoring Recommendations

Summary of Vibration Monitoring Recommendations			
Site No.	**Location (Address)**	**Structures Usage**	**Remarks**
1	401 S Florida Avenue	Commercial	Drilled Shaft installation, Casing installation, Pile driving, MSE Wall construction, pavement/sidewalk vibratory compaction.
2	513 S Florida Avenue	Commercial	Drilled Shaft installation, Casing installation, Pile driving, MSE Wall construction, pavement/sidewalk vibratory compaction.
3	301 Channelside Drive	Commercial	Drilled Shaft installation, Casing installation, Pile driving, MSE Wall construction, pavement/sidewalk vibratory compaction.
4	200 S Nebraska Avenue	Commercial	Drilled Shaft installation, Casing installation, Pile driving, MSE Wall construction, pavement/sidewalk vibratory compaction.
5	110 S Nebraska Avenue	Commercial	Drilled Shaft installation, Casing installation, Pile driving, MSE Wall construction, pavement/sidewalk vibratory compaction.

10.2 Site Preparation

10.2.1 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, pavement, structure remnants, debris including the encountered concrete, gravel and brick fragments and deleterious materials. These materials

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.

10.2.2 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.

10.2.3 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 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.

10.2.4 Erosion Control

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

10.2.5 Temporary Excavation Stability

Excavations shall be performed in accordance with Section 120 of the FDOT Standard Specifications.

11.0 Recommendations For Additional Geotechnical Exploration

This preliminary geotechnical exploration was based on limited soil borings and laboratory testing 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. As part of the recommended detailed geotechnical exploration, the very soft clay stratum encountered in wall boring WB-02 should be further tested and evaluated.

12.0 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, Section C-Embankments over Soft Ground, Section E-Retaining Walls, Section G-Structure Foundations – Driven Piles and Section H, Structure Foundations – Drilled Shafts in **Appendix F**.

13.0 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 THEA and their consultants.

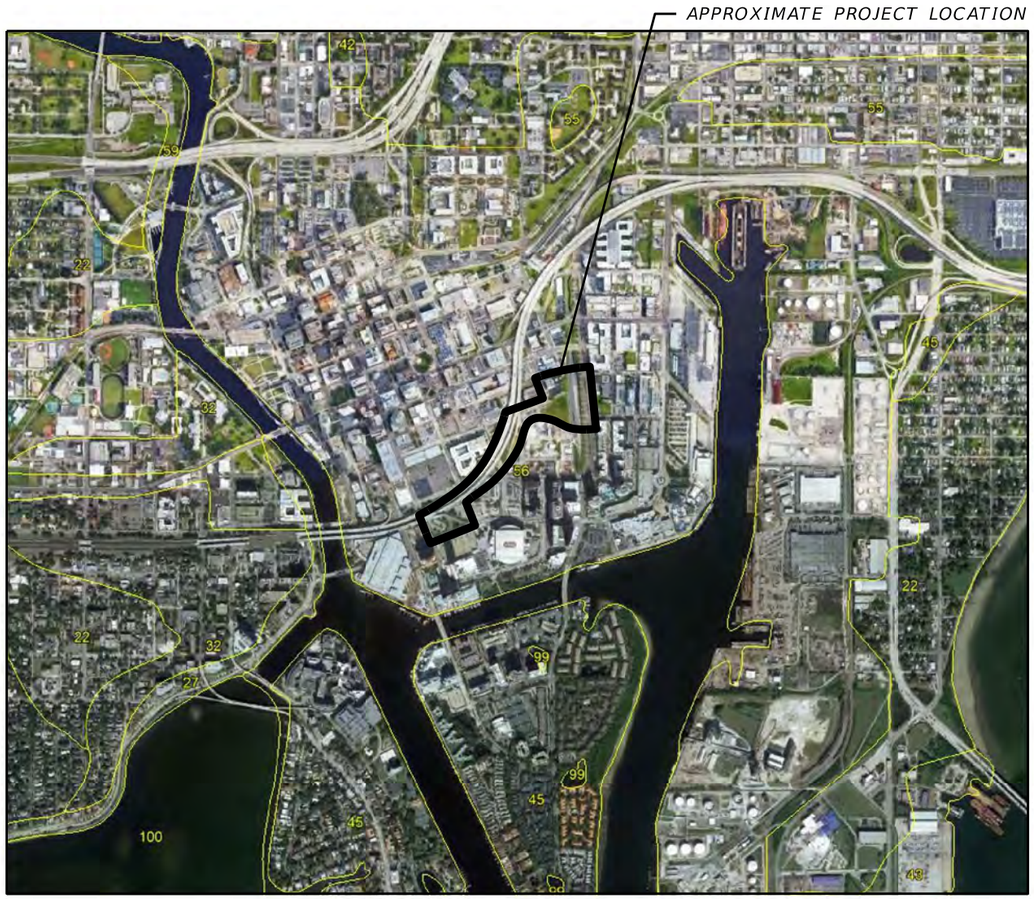
This report was prepared exclusively for H.W. Lochner Incorporated and THEA by AREHNA. The quality of information, conclusions and estimates contained herein is consistent with the level of effort involved in AREHNA's services and based on: i) information available at the time of preparation, ii) data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

Appendices

Appendix A

USDA & USGS Site Vicinity Maps
Roadway and Pond Boring Location Plan
Soil Boring Profiles
Roadway Soil Survey
Structures Boring Location Plan
Report of Core Borings
DRI Test Results

USDA SOIL SURVEY MAP



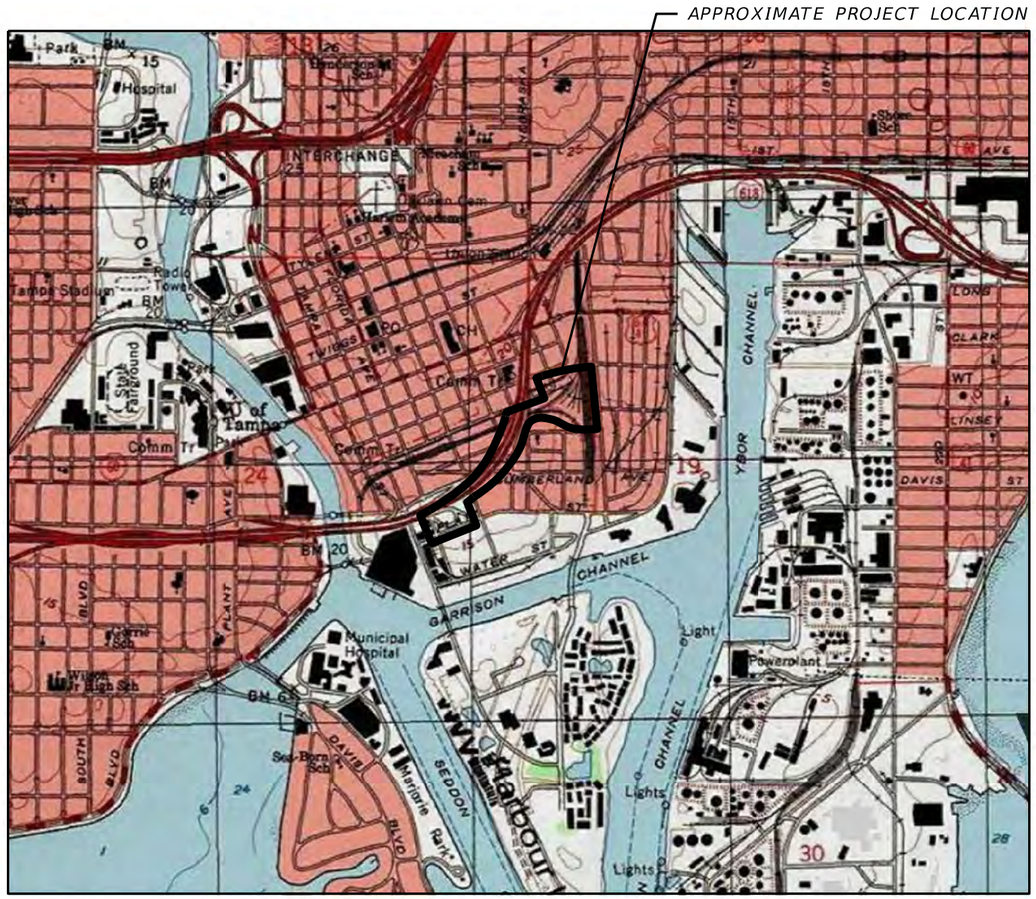
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TOWNSHIP:	29 S	29 S
RANGE:	18 E	19 E
SECTION:	24	19

0 500 2000
Feet

N

USGS TOPOGRAPHIC MAP



REFERENCE: "TAMPA, FLORIDA" USGS QUADRANGLE MAP

TOWNSHIP:	29 S	29 S
RANGE:	18 E	19 E
SECTION:	24	19

0 500 2000
Feet

N

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P.E. LICENSE NUMBER 50733
AREHNA ENGINEERING, INC.
5012 W. LEMON STREET
TAMPA, FLORIDA 33609

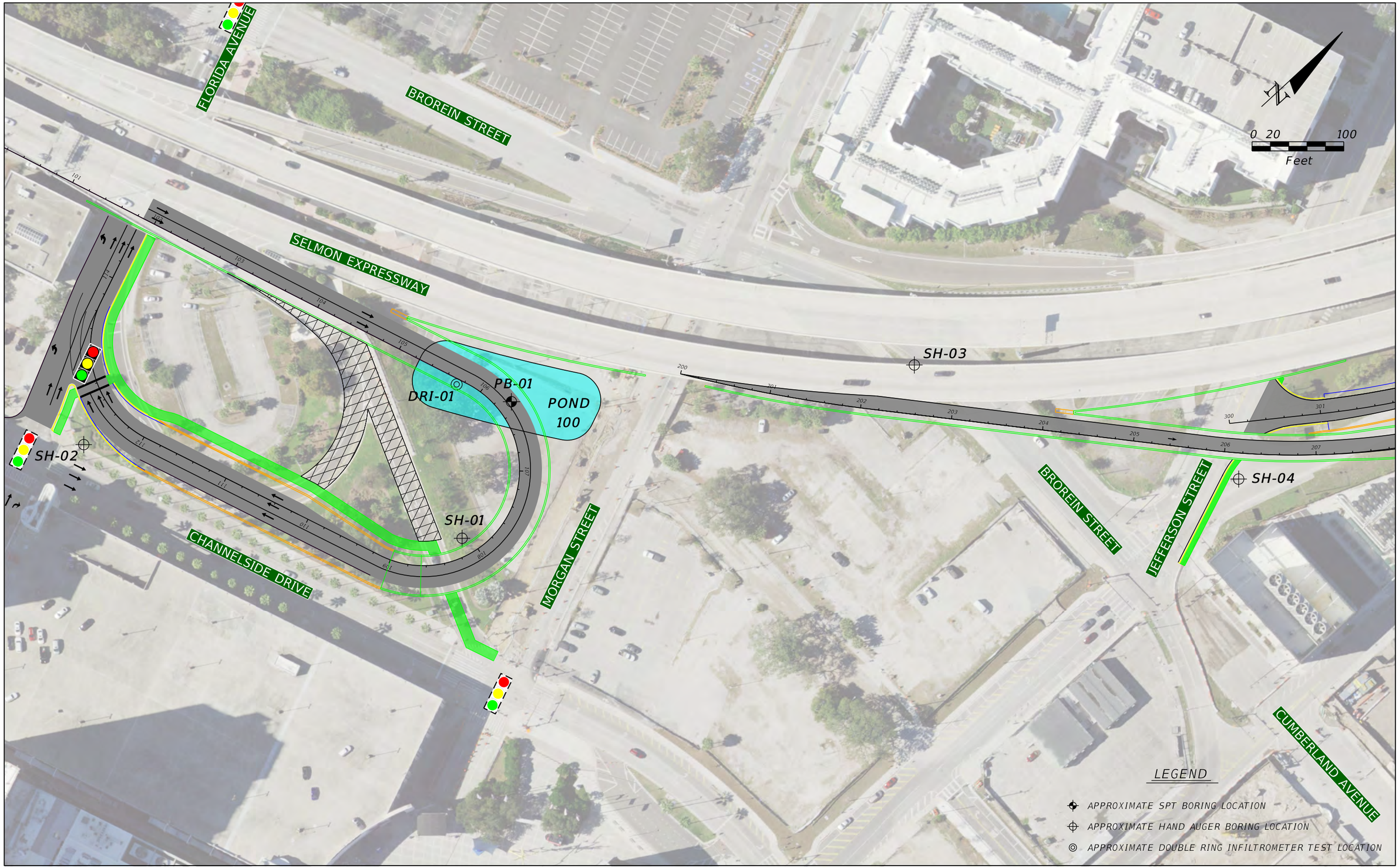
TAMPA HILLSBOROUGH EXPRESSWAY AUTHORITY

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
	HILLSBOROUGH	

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USDA & USGS VICINITY MAPS

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BORING LOCATION PLAN

SHEET NO.

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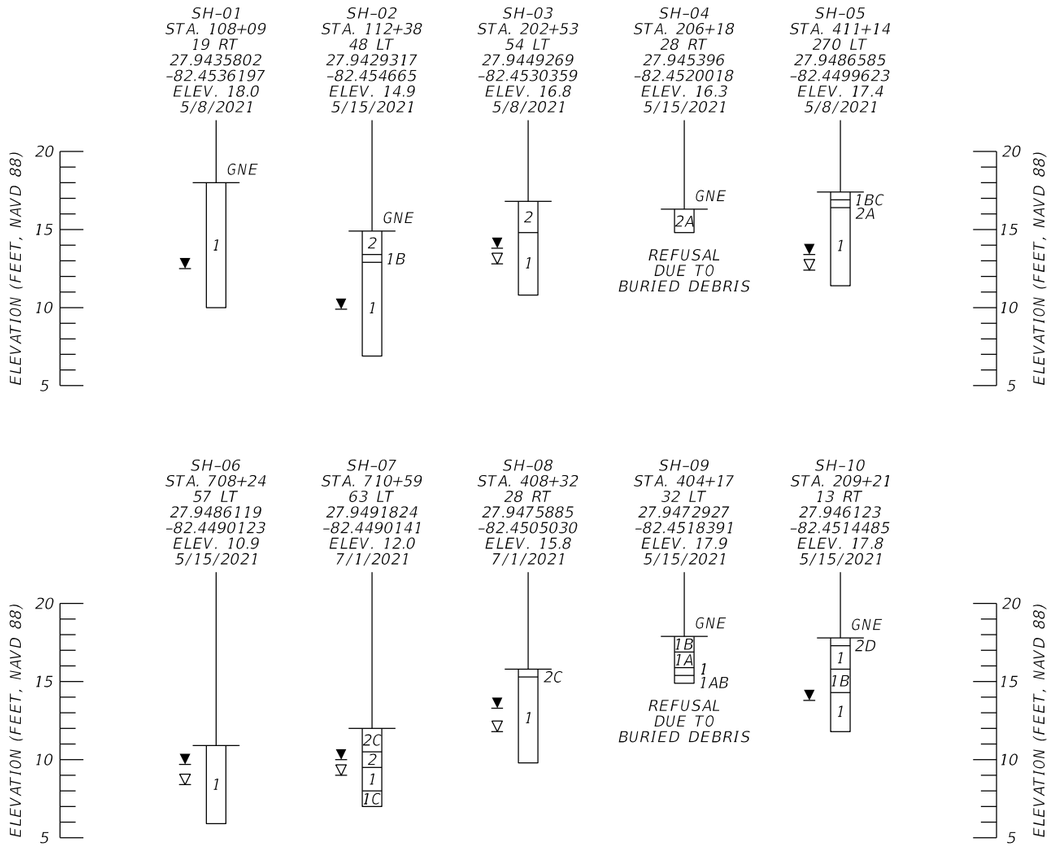
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	HILLSBOROUGH	

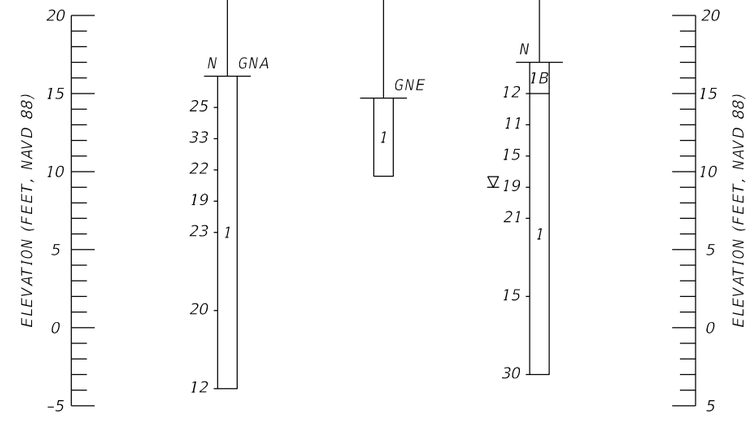
BORING LOCATION PLAN

SHEET NO.

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LEGEND

1. DARK BROWN TO BROWN TO LIGHT BROWN FINE SAND TO FINE SAND WITH SILT (A-3)
2. DARK BROWN TO BROWN TO LIGHT BROWN FINE SAND TO FINE SAND WITH SILT AND GRAVEL (A-3)

A TRACE CONSTRUCTION DEBRIS

B TRACE SHELL

C TRACE ROOTS

D TRACE CEMENTED FRAGMENTS

A-3 AASHTO SOIL CLASSIFICATION GROUP SYMBOL AS DETERMINED BY VISUAL REVIEW AND/OR LABORATORY TESTING

▽ GROUNDWATER LEVEL ENCOUNTERED DURING INVESTIGATION

▼ ESITMATED SEASONAL HIGH GROUNDWATER TABLE

GNA GROUNDWATER TABLE NOT APPARENT DUE TO THE USE OF DRILLING FLUID

GNE GROUNDWATER TABLE NOT ENCOUNTERED

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

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	HILLSBOROUGH	

ROADWAY SOIL SURVEY

SHEET NO.

DATE OF SURVEY: 5/2021 TO 8/2021
SURVEY MADE BY: AREHNA ENGINEERING, INC.
SUBMITTED BY: KIRK M. EASTMAN, P.E.

TAMPA HILLSBOROUGH EXPRESSWAY AUTHORITY

DISTRICT: VII
ROAD NO.: N/A
COUNTY: HILLSBOROUGH

FINANCIAL PROJECT ID: N/A
PROJECT NAME: WHITING STREET

CROSS SECTION SOIL SURVEY FOR THE DESIGN OF ROADS

SURVEY BEGINS STA. : N/A SURVEY ENDS STA. : N/A

REFERENCE: N/A

	ORGANIC CONTENT		MOISTURE CONTENT		SIEVE ANALYSIS RESULTS PERCENT PASS (%)						ATTERBERG LIMITS (%)					CORROSION TEST RESULTS				
STRATUM NO.	NO. OF TESTS	% ORGANIC	NO. OF TESTS	MOISTURE CONTENT	NO. OF TESTS	10 MESH	40 MESH	60 MESH	100 MESH	200 MESH	NO. OF TESTS	LIQUID LIMIT	PLASTIC INDEX	AASHTO GROUP	DESCRIPTION	NO. OF TESTS	RESISTIVITY ohm-cm	CHLORIDE ppm	SULFATES ppm	pH
1	--	--	2	19-21	2	100	95	77	34-38	3-6	--	--	--	A-3	DARK BROWN TO BROWN TO LIGHT BROWN FINE SAND TO FINE SAND WITH SILT	--	--	--	--	--
2	--	--	1	3	1	86	78	67	39	10	--	--	--	A-3	DARK BROWN TO BROWN TO LIGHT BROWN FINE SAND TO FINE SAND WITH SILT AND GRAVEL	--	--	--	--	--

EMBANKMENT AND SUBGRADE MATERIAL

STRATA BOUNDARIES ARE APPROXIMATE. MAKE FINAL CHECK AFTER GRADING.

▽ - WATER TABLE ENCOUNTERED

▼ - ESTIMATED SEASONAL HIGH WATER TABLE

GNE - GROUNDWATER NOT ENCOUNTERED

A - TRACE CONSTRUCTION DEBRIS

B - TRACE SHELL

C - TRACE ROOTS

D - TRACE CEMENTED FRAGMENTS

NOTES:

1. THE MATERIAL FROM STRATA 1 AND 2 (A-3) APPEARS SATISFACTORY FOR USE IN THE EMBANKMENT WHEN UTILIZED IN ACCORDANCE WITH STANDARD PLANS, INDEX 120-001.

2. DEBRIS MATERIALS IF ENCOUNTERED DURING CONSTRUCTION SHALL BE REMOVED AND NOT RE-USED WITHIN THE PROJECT LIMITS. ADDITIONAL DELINEATIONS AND DETERMINATION OF THE NATURE OF THE DEBRIS MATERIAL SHALL BE PERFORMED DURING THE DESIGN PHASE.

REVISIONS			
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P.E. LICENSE NUMBER 50733
AREHNA ENGINEERING, INC.
5012 W. LEMON STREET
TAMPA, FLORIDA 33609

TAMPA HILLSBOROUGH EXPRESSWAY AUTHORITY

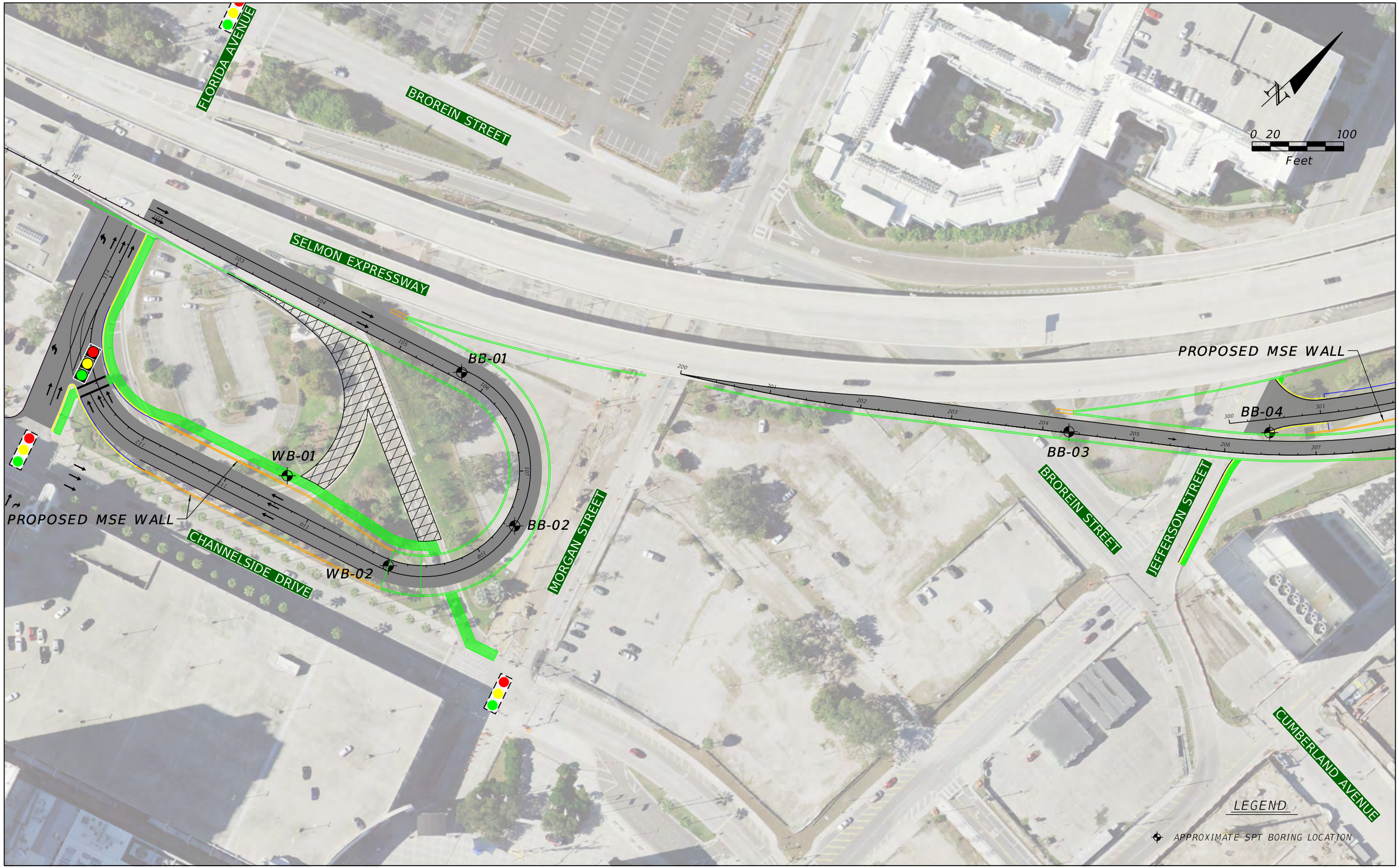
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
	HILLSBOROUGH	

ROADWAY SOIL SURVEY

SHEET NO.

$USER$ $DATE$ $TIME$ $FILE$

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REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

KIRK M. EASTMAN, P.E.
P.E. LICENSE NUMBER 50733
AREHNA ENGINEERING, INC.
5012 W. LEMON STREET
TAMPA, FLORIDA 33609

DRAWN BY: DG
CHECKED BY: KE
DESIGNED BY: JB
CHECKED BY: KE

TAMPA HILLSBOROUGH EXPRESSWAY AUTHORITY

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
	HILLSBOROUGH	

SHEET TITLE: BORING LOCATION PLAN

REF. DWG. NO.

PROJECT NAME: WHITING STREET

SHEET NO.



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REVISIONS					
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5012 W. LEMON STREET
TAMPA, FLORIDA 33609

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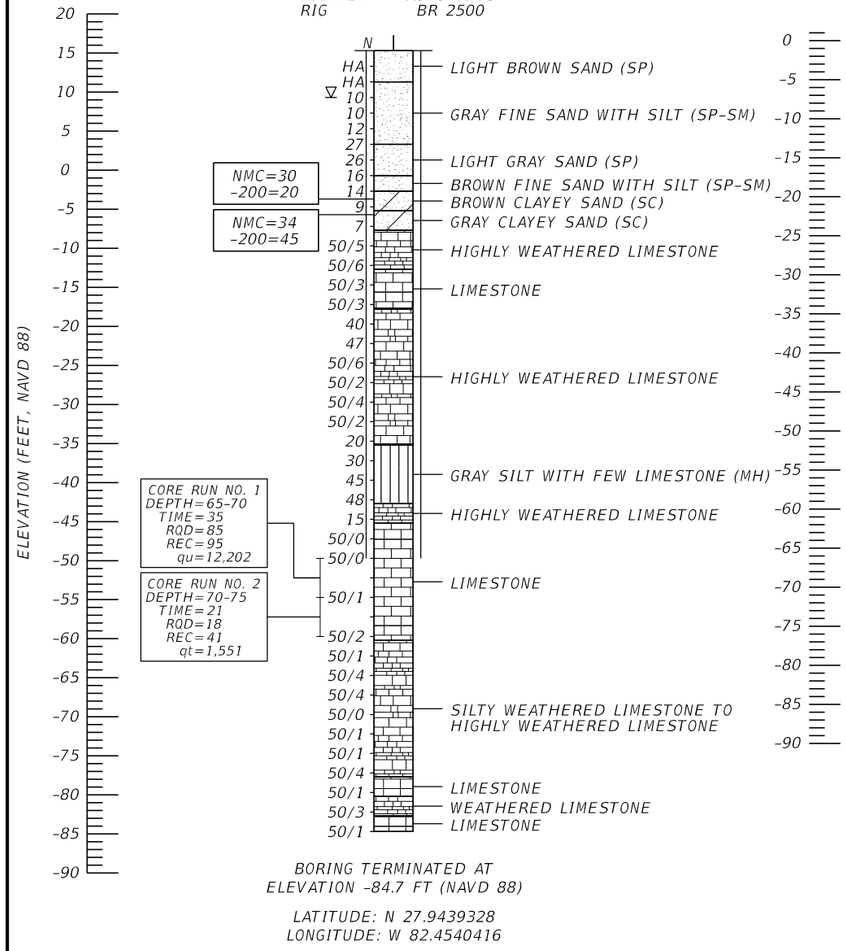
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
	HILLSBOROUGH	

SHEET TITLE: BORING LOCATION PLAN

PROJECT NAME: WHITING STREET

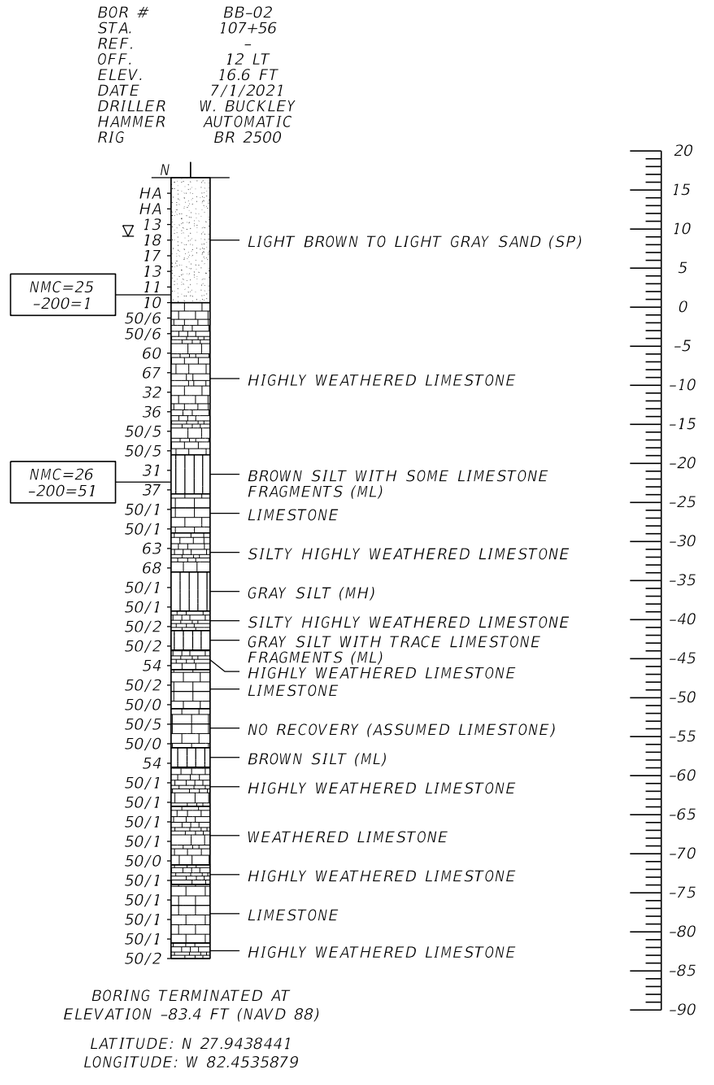
REF. DWG. NO.

SHEET NO.



BORING TERMINATED AT
ELEVATION -84.7 FT (NAVD 88)

LATITUDE: N 27.9439328
LONGITUDE: W 82.4540416



BORING TERMINATED AT
ELEVATION -83.4 FT (NAVD 88)

LATITUDE: N 27.9438441
LONGITUDE: W 82.4535879

LEGEND

- SAND
- SILTY SAND
- CLAYEY SAND
- SANDY CLAY
- CLAY
- SILT
- LIMESTONE
- WEATHERED LIMESTONE
- NO RECOVERY

SP	UNIFIED SOIL CLASSIFICATION SYSTEM (ASTM D 2488) GROUP SYMBOL AS DETERMINED BY VISUAL REVIEW
HA	HAND AUGER
▽	GROUNDWATER TABLE
GNA	GROUNDWATER TABLE NOT APPARENT
N	NUMBERS TO THE LEFT OF BORINGS INDICATE SPT VALUE FOR 12 INCHES OF PENETRATION (UNLESS OTHERWISE NOTED).
WR	FELL UNDER WEIGHT OF ROD
50/4	NUMBER OF BLOWS FOR 4 INCHES OF PENETRATION
T00	LOSS OF CIRCULATION OF DRILLING FLUID (%)
| |	CASING
NMC	NATURAL MOISTURE CONTENT (%)
-200	FINES PASSING THE #200 STANDARD SIEVE (%)
LL	LIQUID LIMIT (%)
PI	PLASTICITY INDEX (%)
I	ROCK CORE RUN
DEPTH	CORE RUN DEPTH INTERVAL IN FEET
RQD	ROCK QUALITY DESIGNATION (%)
REC	CORE RECOVERY (%)
TIME	ROCK CORING TIME IN MINUTES
qu	UNCONFINED COMPRESSIVE STRENGTH (PSI)
qt	SPLITTING TENSILE STRENGTH (PSI)
⌖	APPROXIMATE SPT BORING LOCATION

	SAFETY HAMMER	AUTOMATIC HAMMER
GRANULAR MATERIALS– RELATIVE DENSITY	SPT N-VALUE (BLOWS/FT.)	SPT N-VALUE (BLOWS/FT.)
VERY LOOSE	LESS THAN 4	LESS THAN 3
LOOSE	4 to 10	3 to 8
MEDIUM DENSE	10 to 30	8 to 24
DENSE	30 to 50	24 to 40
VERY DENSE	GREATER THAN 50	GREATER THAN 40
SILTS AND CLAYS CONSISTENCY	SPT N-VALUE (BLOWS/FT.)	SPT N-VALUE (BLOWS/FT.)
VERY SOFT	LESS THAN 2	LESS THAN 1
SOFT	2 to 4	1 to 3
FIRM	4 to 8	3 to 6
STIFF	8 to 15	6 to 12
VERY STIFF	16 to 30	12 to 24
HARD	GREATER THAN 30	GREATER THAN 24

ENVIRONMENTAL CLASSIFICATION:
SUBSTRUCTURE CONCRETE: MODERATELY AGGRESSIVE
SUBSTRUCTURE STEEL: MODERATELY AGGRESSIVE
SUPERSTRUCTURE MODERATELY AGGRESSIVE

TEST RESULTS:	SOIL:	WATER:
RESISTIVITY	13,000 OHMS-CM	63 OHMS-CM
CHLORIDES	15 PPM	5,495 PPM
SULFATES	< 3 PPM	10 PPM
pH	8.3	7.4

NOTE: FOR THE ENVIRONMENTAL CLASSIFICATION, THE WATER SAMPLE WAS COLLECTED AT GARRISON CHANNEL LESS THAN 2,500 FT FROM THE PROJECT SITE. WITH A CHLORIDE TEST RESULT OF 5,495 PPM, THE SUPERSTRUCTURE IS CLASSIFIED AS MODERATELY AGGRESSIVE (SDG 1.3.2 B-3). AS PER SDG 1.3.1 D, THE SUBSTRUCTURE CLASSIFICATION IS PRESENTED AS MODERATELY AGGRESSIVE.

BRIDGE NO. ######

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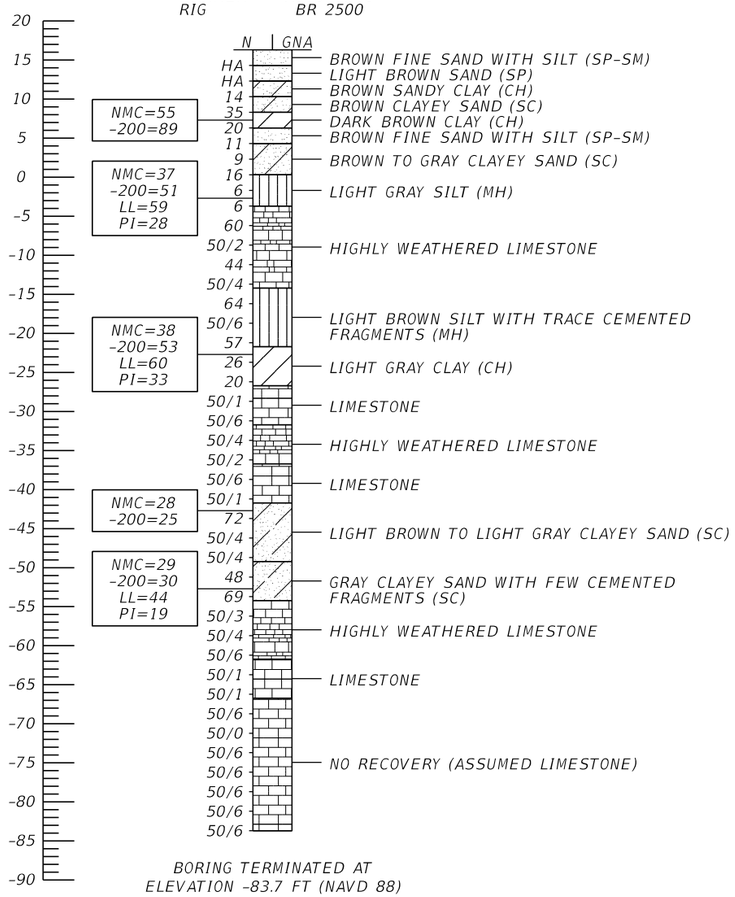
DRAWN BY: DG
CHECKED BY: KE
DESIGNED BY: JB
CHECKED BY: KE

TAMPA HILLSBOROUGH EXPRESSWAY AUTHORITY

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
	HILLSBOROUGH	

SHEET TITLE: REPORT OF CORE BORINGS
REF. DWG. NO.
PROJECT NAME: WHITING STREET
SHEET NO.

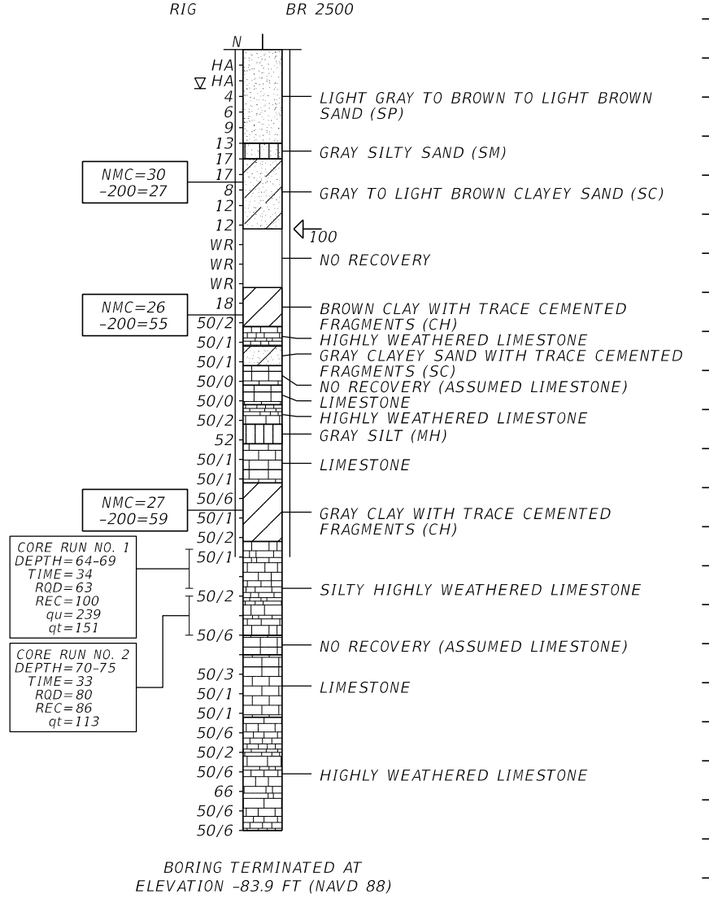
BOR # BB-03
STA. 204+29
REF. –
OFF. 1 LT
ELEV. 16.3 FT
DATE 6/24/2021
DRILLER W. BUCKLEY
HAMMER AUTOMATIC
RIG BR 2500



BORING TERMINATED AT
ELEVATION -83.7 FT (NAVD 88)

LATITUDE: N 27.945126
LONGITUDE: W 82.4525256

BOR # BB-04
STA. 206+48
REF. –
OFF. 24 LT
ELEV. 16.1 FT
DATE 6/22/2021
DRILLER W. BUCKLEY
HAMMER AUTOMATIC
RIG BR 2500



BORING TERMINATED AT
ELEVATION -83.9 FT (NAVD 88)

LATITUDE: N 27.9456003
LONGITUDE: W 82.4519609

LEGEND

- SAND
- SILTY SAND
- CLAYEY SAND
- SANDY CLAY
- CLAY
- SILT
- LIMESTONE
- WEATHERED LIMESTONE
- NO RECOVERY

SP	UNIFIED SOIL CLASSIFICATION SYSTEM (ASTM D 2488) GROUP SYMBOL AS DETERMINED BY VISUAL REVIEW
HA	HAND AUGER
▽	GROUNDWATER TABLE
GNA	GROUNDWATER TABLE NOT APPARENT
N	NUMBERS TO THE LEFT OF BORINGS INDICATE SPT VALUE FOR 12 INCHES OF PENETRATION (UNLESS OTHERWISE NOTED).
WR	FELL UNDER WEIGHT OF ROD
50/4	NUMBER OF BLOWS FOR 4 INCHES OF PENETRATION
←100	LOSS OF CIRCULATION OF DRILLING FLUID (%)
| |	CASING
NMC	NATURAL MOISTURE CONTENT (%)
-200	FINES PASSING THE #200 STANDARD SIEVE (%)
LL	LIQUID LIMIT (%)
PI	PLASTICITY INDEX (%)
	ROCK CORE RUN
DEPTH	CORE RUN DEPTH INTERVAL IN FEET
RQD	ROCK QUALITY DESIGNATION (%)
REC	CORE RECOVERY (%)
TIME	ROCK CORING TIME IN MINUTES
qu	UNCONFINED COMPRESSIVE STRENGTH (PSI)
qt	SPLITTING TENSILE STRENGTH (PSI)
⌖	APPROXIMATE SPT BORING LOCATION

	SAFETY HAMMER	AUTOMATIC HAMMER
GRANULAR MATERIALS- RELATIVE DENSITY	SPT N-VALUE (BLOWS/FT.)	SPT N-VALUE (BLOWS/FT.)
VERY LOOSE	LESS THAN 4	LESS THAN 3
LOOSE	4 to 10	3 to 8
MEDIUM DENSE	10 to 30	8 to 24
DENSE	30 to 50	24 to 40
VERY DENSE	GREATER THAN 50	GREATER THAN 40
SILTS AND CLAYS CONSISTENCY	SPT N-VALUE (BLOWS/FT.)	SPT N-VALUE (BLOWS/FT.)
VERY SOFT	LESS THAN 2	LESS THAN 1
SOFT	2 to 4	1 to 3
FIRM	4 to 8	3 to 6
STIFF	8 to 15	6 to 12
VERY STIFF	16 to 30	12 to 24
HARD	GREATER THAN 30	GREATER THAN 24

ENVIRONMENTAL CLASSIFICATION:
SUBSTRUCTURE CONCRETE: MODERATELY AGGRESSIVE
SUBSTRUCTURE STEEL: MODERATELY AGGRESSIVE
SUPERSTRUCTURE MODERATELY AGGRESSIVE

TEST RESULTS:	SOIL:	WATER:
RESISTIVITY	11,000 OHMS-CM	63 OHMS-CM
CHLORIDES	30 PPM	5,495 PPM
SULFATES	0 PPM	10 PPM
pH	8.1	7.4

NOTE: FOR THE ENVIRONMENTAL CLASSIFICATION, THE WATER SAMPLE WAS COLLECTED AT GARRISON CHANNEL LESS THAN 2,500 FT FROM THE PROJECT SITE. WITH A CHLORIDE TEST RESULT OF 5,495 PPM, THE SUPERSTRUCTURE IS CLASSIFIED AS MODERATELY AGGRESSIVE (SDG 1.3.2 B-3). AS PER SDG 1.3.1 D, THE SUBSTRUCTURE CLASSIFICATION IS PRESENTED AS MODERATELY AGGRESSIVE.

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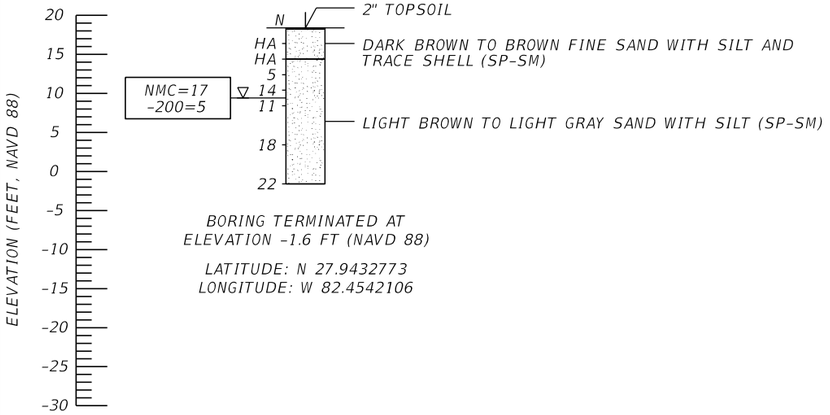
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TAMPA HILLSBOROUGH EXPRESSWAY AUTHORITY

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
	HILLSBOROUGH	

SHEET TITLE: REPORT OF CORE BORINGS
REF. DWG. NO.
PROJECT NAME: WHITING STREET
SHEET NO.

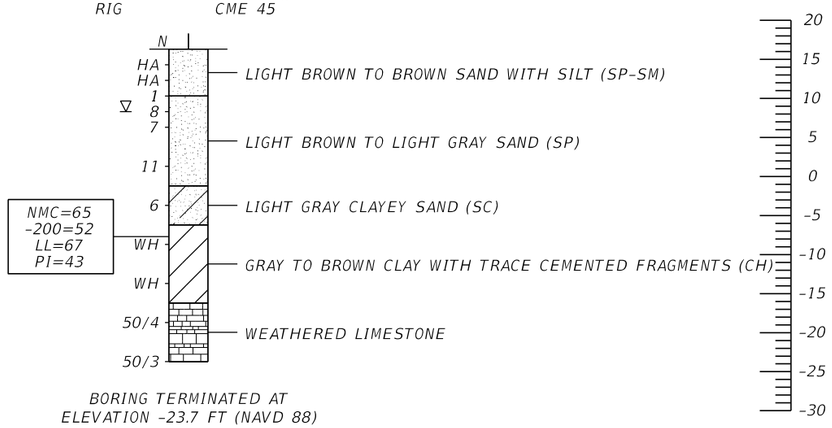
BOR # WB-01
STA. 110+42
REF. –
OFF. 32 RT
ELEV. 18.4 FT
DATE 7/2/2021
DRILLER J. WEST
HAMMER AUTOMATIC
RIG CME 45



BORING TERMINATED AT
ELEVATION -1.6 FT (NAVD 88)

LATITUDE: N 27.9432773
LONGITUDE: W 82.4542106

BOR # WB-02
STA. 109+00
REF. –
OFF. 7 LT
ELEV. 16.3 FT
DATE 7/2/2021
DRILLER J. WEST
HAMMER AUTOMATIC
RIG CME 45



BORING TERMINATED AT
ELEVATION -23.7 FT (NAVD 88)

LATITUDE: N 27.9433574
LONGITUDE: W 82.4536915

NOTE: FOR THE ENVIRONMENTAL CLASSIFICATION, THE WATER SAMPLE WAS COLLECTED AT GARRISON CHANNEL LESS THAN 2,500 FT FROM THE PROJECT SITE. WITH A CHLORIDE TEST RESULT OF 5,495 PPM, THE SUPERSTRUCTURE IS CLASSIFIED AS MODERATELY AGGRESSIVE (SDG 1.3.2 B-3). AS PER SDG 1.3.1 D, THE SUBSTRUCTURE CLASSIFICATION IS PRESENTED AS MODERATELY AGGRESSIVE.

LEGEND

SAND
CLAYEY SAND
LIMESTONE
SILTY SAND
CLAY
WEATHERED LIMESTONE

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

HA HAND AUGER

GROUNDWATER TABLE

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

WH FELL UNDER WEIGHT OF ROD AND HAMMER

WR FELL UNDER WEIGHT OF ROD

50/4 NUMBER OF BLOWS FOR 4 INCHES OF PENETRATION

T00 LOSS OF CIRCULATION OF DRILLING FLUID (%)

CASING

NMC NATURAL MOISTURE CONTENT (%)

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

LL LIQUID LIMIT (%)

PI PLASTICITY INDEX (%)

APPROXIMATE SPT BORING LOCATION

	SAFETY HAMMER	AUTOMATIC HAMMER
GRANULAR MATERIALS- RELATIVE DENSITY	SPT N-VALUE (BLOWS/FT.)	SPT N-VALUE (BLOWS/FT.)
VERY LOOSE	LESS THAN 4	LESS THAN 3
LOOSE	4 to 10	3 to 8
MEDIUM DENSE	10 to 30	8 to 24
DENSE	30 to 50	24 to 40
VERY DENSE	GREATER THAN 50	GREATER THAN 40
SILTS AND CLAYS CONSISTENCY	SPT N-VALUE (BLOWS/FT.)	SPT N-VALUE (BLOWS/FT.)
VERY SOFT	LESS THAN 2	LESS THAN 1
SOFT	2 to 4	1 to 3
FIRM	4 to 8	3 to 6
STIFF	8 to 15	6 to 12
VERY STIFF	16 to 30	12 to 24
HARD	GREATER THAN 30	GREATER THAN 24

ENVIRONMENTAL CLASSIFICATION:

SUBSTRUCTURE	CONCRETE: MODERATELY AGGRESSIVE
SUBSTRUCTURE	STEEL: MODERATELY AGGRESSIVE
SUPERSTRUCTURE	MODERATELY AGGRESSIVE

TEST RESULTS:	SOIL:	WATER:
RESISTIVITY	13,000 OHMS-CM	63 OHMS-CM
CHLORIDES	15 PPM	5,495 PPM
SULFATES	< 3 PPM	10 PPM
pH	8.3	7.4

MSE WALLS

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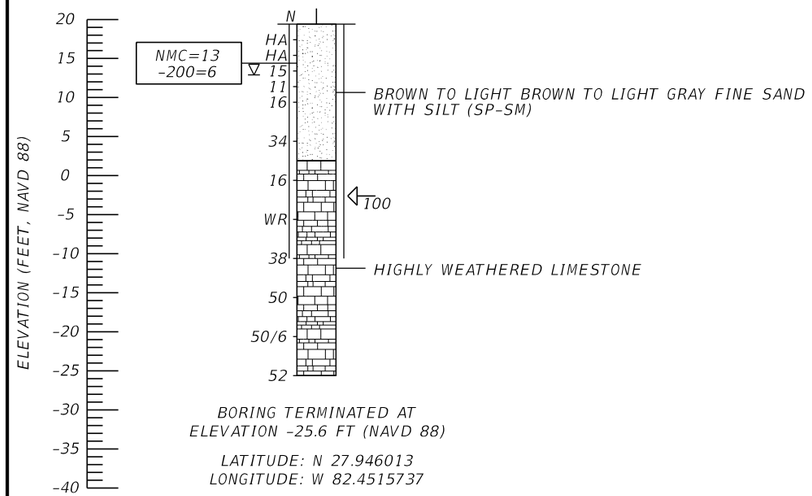
DRAWN BY: DG
CHECKED BY: KE
DESIGNED BY: JB
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TAMPA HILLSBOROUGH EXPRESSWAY AUTHORITY

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
	HILLSBOROUGH	

SHEET TITLE: REPORT OF CORE BORINGS
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PROJECT NAME: WHITING STREET
SHEET NO.

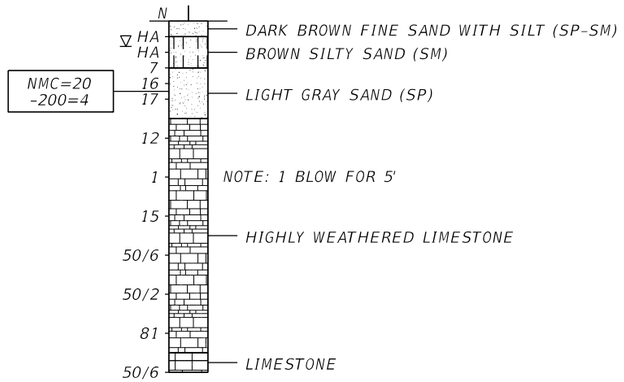
BOR # WB-03
STA. 208+55
REF. –
OFF. 8 RT
ELEV. 19.4 FT
DATE 7/5/2021
DRILLER W. BUCKLEY
HAMMER AUTOMATIC
RIG BR 2500



BORING TERMINATED AT ELEVATION -25.6 FT (NAVD 88)

LATITUDE: N 27.946013
LONGITUDE: W 82.4515737

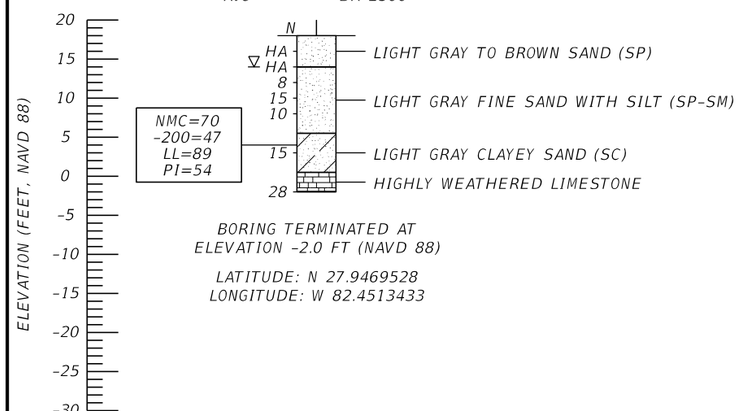
BOR # WB-04
STA. 210+21
REF. –
OFF. 17 RT
ELEV. 14.3 FT
DATE 7/8/2021
DRILLER W. BUCKLEY
HAMMER AUTOMATIC
RIG BR 2500



BORING TERMINATED AT ELEVATION -30.7 FT (NAVD 88)

LATITUDE: N 27.9463893
LONGITUDE: W 82.4513128

BOR # WB-05
STA. 212+71
REF. –
OFF. 34 LT
ELEV. 18.0 FT
DATE 7/12/2021
DRILLER W. BUCKLEY
HAMMER AUTOMATIC
RIG BR 2500



BORING TERMINATED AT ELEVATION -2.0 FT (NAVD 88)

LATITUDE: N 27.9469528
LONGITUDE: W 82.4513433

NOTE: FOR THE ENVIRONMENTAL CLASSIFICATION, THE WATER SAMPLE WAS COLLECTED AT GARRISON CHANNEL LESS THAN 2,500 FT FROM THE PROJECT SITE. WITH A CHLORIDE TEST RESULT OF 5,495 PPM, THE SUPERSTRUCTURE IS CLASSIFIED AS MODERATELY AGGRESSIVE (SDG 1.3.2 B-3). AS PER SDG 1.3.1 D, THE SUBSTRUCTURE CLASSIFICATION IS PRESENTED AS MODERATELY AGGRESSIVE.





LEGEND

SAND
CLAYEY SAND
LIMESTONE
SILTY SAND
CLAY
WEATHERED LIMESTONE

SP UNIFIED SOIL CLASSIFICATION SYSTEM (ASTM D 2488) GROUP SYMBOL AS DETERMINED BY VISUAL REVIEW
HA HAND AUGER
∇ GROUNDWATER TABLE
N NUMBERS TO THE LEFT OF BORINGS INDICATE SPT VALUE FOR 12 INCHES OF PENETRATION (UNLESS OTHERWISE NOTED).
WH FELL UNDER WEIGHT OF ROD AND HAMMER
WR FELL UNDER WEIGHT OF ROD
50/4 NUMBER OF BLOWS FOR 4 INCHES OF PENETRATION
T00 LOSS OF CIRCULATION OF DRILLING FLUID (%)
CASING
NMC NATURAL MOISTURE CONTENT (%)
-200 FINES PASSING THE #200 STANDARD SIEVE (%)
LL LIQUID LIMIT (%)
PI PLASTICITY INDEX (%)
APPROXIMATE SPT BORING LOCATION

	SAFETY HAMMER	AUTOMATIC HAMMER
GRANULAR MATERIALS- RELATIVE DENSITY	SPT N-VALUE (BLOWS/FT.)	SPT N-VALUE (BLOWS/FT.)
VERY LOOSE	LESS THAN 4	LESS THAN 3
LOOSE	4 to 10	3 to 8
MEDIUM DENSE	10 to 30	8 to 24
DENSE	30 to 50	24 to 40
VERY DENSE	GREATER THAN 50	GREATER THAN 40
SILTS AND CLAYS CONSISTENCY	SPT N-VALUE (BLOWS/FT.)	SPT N-VALUE (BLOWS/FT.)
VERY SOFT	LESS THAN 2	LESS THAN 1
SOFT	2 to 4	1 to 3
FIRM	4 to 8	3 to 6
STIFF	8 to 15	6 to 12
VERY STIFF	16 to 30	12 to 24
HARD	GREATER THAN 30	GREATER THAN 24

ENVIRONMENTAL CLASSIFICATION:
SUBSTRUCTURE CONCRETE: MODERATELY AGGRESSIVE
SUBSTRUCTURE STEEL: MODERATELY AGGRESSIVE
SUPERSTRUCTURE MODERATELY AGGRESSIVE

TEST RESULTS:	SOIL:	WATER:
RESISTIVITY	11,000 OHMS-CM	63 OHMS-CM
CHLORIDES	30 PPM	5,495 PPM
SULFATES	0 PPM	10 PPM
pH	8.1	7.4

MSE AND SHOULDER BARRIER WALLS

REVISIONS

DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

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5012 W. LEMON STREET
TAMPA, FLORIDA 33609

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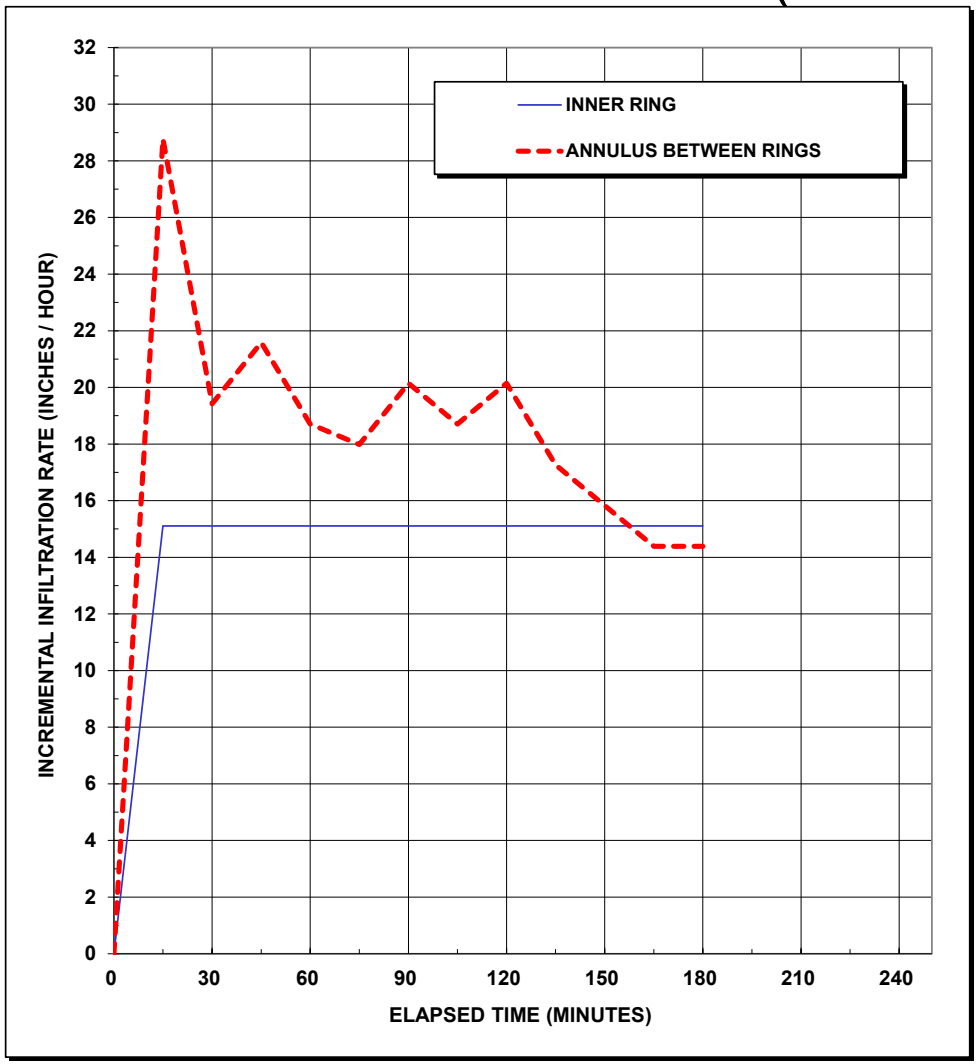
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
	HILLSBOROUGH	

SHEET TITLE: REPORT OF CORE BORINGS
REF. DWG. NO.
PROJECT NAME: WHITING STREET
SHEET NO.

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DOUBLE-RING INFILTROMETER TEST RESULTS (ASTM D 3385)

Elapsed Time (min)	INNER RING		ANNULUS BETWEEN RINGS	
	Incremental Water Qty. (ml)	Infiltration Rate (in/hr)	Incremental Water Qty. (ml)	Infiltration Rate (in/hr)
0	0		0	
15	7,000	15.1	40,000	28.8
30	7,000	15.1	27,000	19.4
45	7,000	15.1	30,000	21.6
60	7,000	15.1	26,000	18.7
75	7,000	15.1	25,000	18.0
90	7,000	15.1	28,000	20.1
105	7,000	15.1	26,000	18.7
120	7,000	15.1	28,000	20.1
135	7,000	15.1	24,000	17.3
150	7,000	15.1	22,000	15.8
165	7,000	15.1	20,000	14.4
180	7,000	15.1	20,000	14.4



SUBSURFACE PROFILE	
DEPTH (ft)	SOIL DESCRIPTION
0-5	(A-3)
Boring Terminated at 5 feet	
Groundwater Not Encountered	

TEST INFORMATION

TEST DATE:	08/06/21
WEATHER:	Sunny, warm
TECHNICIAN(S):	S. Davidson
LIQUID TYPE:	Water
RING DIAMETERS	
-- INNER RING:	12"
-- OUTER RING:	24"
LIQUID DEPTHS	
-- INNER RING:	4"
-- OUTER RING:	4"
TEST DEPTH:	2' below existing grade

AREHNA | Engineering, Inc.

5012 West Lemon Street

Tampa, Florida 33609

Phone: (813) 944-3464 Fax: (813) 944-4959

PROJECT NAME: THEA Whiting Street PD&E

PROJECT LOCATION: Tampa, Florida

AREHNA PROJECT NO.: **B-20-051**

CLIENT: Lochner

TEST NO.: **DRI-01**

TEST LOCATION: **-**

WATER TEMPERATURE / pH: **-**

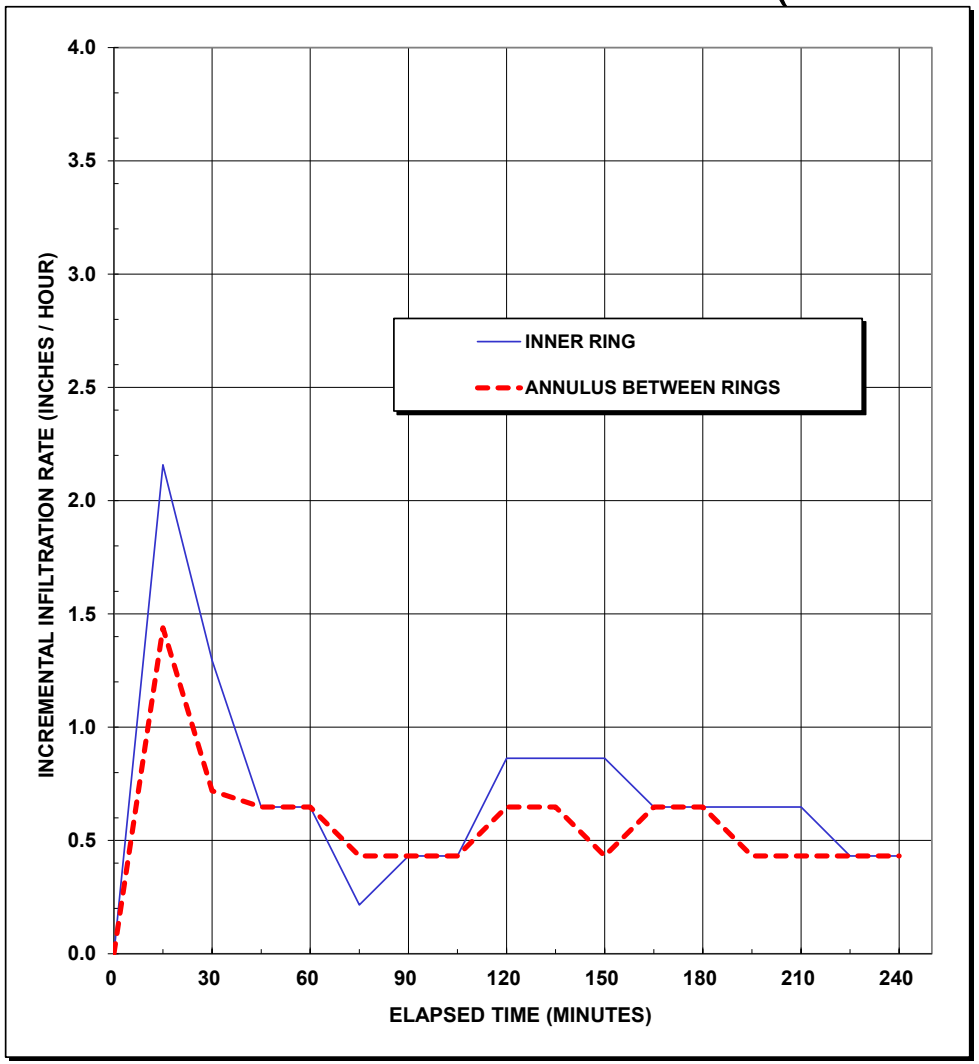
INFILTRATION RATE: **15.1 in/hr**

PREPARED BY/ DATE: AH / **8/18/21**

CHECKED BY/ DATE: **KE / 8/18/21**

DOUBLE-RING INFILTROMETER TEST RESULTS (ASTM D 3385)

Elapsed Time (min)	INNER RING		ANNULUS BETWEEN RINGS	
	Incremental Water Qty. (ml)	Infiltration Rate (in/hr)	Incremental Water Qty. (ml)	Infiltration Rate (in/hr)
0	0		0	
15	1,000	2.2	2,000	1.4
30	600	1.3	1,000	0.7
45	300	0.6	900	0.6
60	300	0.6	900	0.6
75	100	0.2	600	0.4
90	200	0.4	600	0.4
105	200	0.4	600	0.4
120	400	0.9	900	0.6
135	400	0.9	900	0.6
150	400	0.9	600	0.4
165	300	0.6	900	0.6
180	300	0.6	900	0.6
195	300	0.6	600	0.4
210	300	0.6	600	0.4
225	200	0.4	600	0.4
240	200	0.4	600	0.4



SUBSURFACE PROFILE	
DEPTH (ft)	SOIL DESCRIPTION
0-5	(A-3) ROCKS AND CLAYEY SAND ENCOUNTERED DURING RING INSTALLATION
Boring Terminated at 5 feet	
Groundwater Not Encountered	

TEST INFORMATION	
TEST DATE:	08/09/21
WEATHER:	Sunny, warm
TECHNICIAN(S):	S. Davidson
LIQUID TYPE:	Water
RING DIAMETERS	
-- INNER RING:	12"
-- OUTER RING:	24"
LIQUID DEPTHS	
-- INNER RING:	4"
-- OUTER RING:	4"
TEST DEPTH:	2' below existing grade

AREHNA | Engineering, Inc.
5012 West Lemon Street
Tampa, Florida 33609
Phone: (813) 944-3464 Fax: (813) 944-4959

PROJECT NAME: THEA Whiting Street PD&E

PROJECT LOCATION: Tampa, Florida

AREHNA PROJECT NO.: B-20-051

CLIENT: Lochner

TEST NO.: DRI-02

TEST LOCATION: -

WATER TEMPERATURE / pH: -

INFILTRATION RATE: 0.4 in/hr

PREPARED BY/ DATE: AH / 8/18/21

CHECKED BY/ DATE: KE / 8/18/21

Appendix B

Summary of Laboratory Test Results – Table 1
Summary of Corrosion Test Results – Table 2
Summary of Seasonal High Water Tables – Table 3
Summary of Rock Coring Data – Table 4
Summary of Unconfined Compression and Splitting Tensile Test Results – Table 5
Laboratory Test Results

TABLE 1
SUMMARY OF LABORATORY TEST RESULTS
THEA WHITING STREET PD&E STUDY
HILLSBOROUGH COUNTY, FLORIDA
AUTHORITY PROJECT NO. HI-0141
AREHNA PROJECT NUMBER: B-19-051

Boring No.	Boring Location		Sample Depth (feet)	AASHTO / USCS	Sieve Analysis (% Passing)					Atterberg Limits		Organic Content (%)	Natural Moisture Content (%)
	Station (feet)	Offset (feet)			#10	#40	#60	#100	#200	Liquid Limit	Plasticity Index		
Sidewalk and Roadway													
SH-02	112+38	48 LT	0.5 - 1.0	A-3	86	78	67	39	10	-	-	-	3
SH-03	202+53	54 LT	3.5 - 4.0	A-3	100	95	77	39	6	-	-	-	21
SH-08	408+32	28 RT	3.0 - 3.5	A-3	100	95	77	34	3	-	-	-	19
Bridges													
BB-01	105+72	8 LT	18.0 - 20.0	SC	100	100	99	69	20	-	-	-	30
BB-01	105+72	8 LT	20.0 - 22.0	SC	100	100	99	78	45	-	-	-	34
BB-02	107+56	12 LT	14.0 - 16.0	SP	94	79	31	11	1	-	-	-	25
BB-02	107+56	12 LT	38.0 - 40.0	ML	85	77	73	64	51	-	-	-	26
BB-03	204+29	1 LT	8.0 - 10.0	CH	100	100	99	97	89	-	-	-	55
BB-03	204+29	1 LT	18.0 - 20.0	MH	100	99	97	78	51	59	28	-	37
BB-03	204+29	1 LT	38.0 - 40.0	CH	100	100	99	80	53	60	33	-	38
BB-03	204+29	1 LT	58.0 - 60.0	SC	98	97	96	64	25	-	-	-	28
BB-03	204+29	1 LT	68.0 - 70.0	SC	74	69	67	58	30	44	19	-	29
BB-04	206+48	24 LT	16.0 - 18.0	SC	86	77	72	45	27	-	-	-	30
BB-04	206+48	24 LT	33.0 - 35.0	CH	92	88	85	68	55	-	-	-	26
BB-04	206+48	24 LT	58.0 - 60.0	CH	100	100	99	82	59	-	-	-	27
Walls													
WB-01	110+42	32 RT	8.0 - 10.0	SP-SM	100	97	80	35	5	-	-	-	17
WB-02	109+00	7 LT	23.0 - 25.0	CH	95	93	92	75	52	67	43	-	65
WB-03	208+55	8 RT	4.0 - 6.0	SP-SM	100	96	81	43	6	-	-	-	13
WB-04	210+21	17 RT	8.0 - 10.0	SP	100	93	71	34	4	-	-	-	20
WB-05	212+71	34 LT	15.0 - 18.0	SC	100	97	93	73	47	89	54	-	70

TABLE 2
SUMMARY OF CORROSION TEST RESULTS
THEA WHITING STREET PD&E STUDY
HILLSBOROUGH COUNTY, FLORIDA
AUTHORITY PROJECT NO. HI-0141
AREHNA Project Number: B-19-051

Boring No.	Station (feet)	Offset (feet)	Sample Depth (feet)	USCS	pH	Resistivity (ohm-cm)	Chlorides (ppm)	Sulfates (ppm)	Environmental Classification - Concrete	Environmental Classification - Steel
BB-02	107+56	12 LT	1.0 - 7.0	SP/SP-SM	8.3	13,000	15	0	Slightly Aggressive	Slightly Aggressive
BB-04	206+48	24 LT	2.0 - 10.0	SP/SP-SM	8.1	11,000	30	0	Slightly Aggressive	Slightly Aggressive
Water Sample**	-	-	-	-	7.4	63*	5,495*	10	Extremely Aggressive	Extremely Aggressive

* - Test result that led to an increased environmental classification.

** - Water sample obtained from Garrison Channel in Hillsborough Bay (less than 2,500 feet from the project location).

NOTE: As per the Structures Design Guidelines (SDG) Section 1.3.2 B3, the superstructure is classified as Moderately Aggressive due to the water chloride test result of 5,495 ppm.
As per SDG Section 1.3.1 D, the project substructure environmental classification will be presented as Moderately Aggressive.

TABLE 3
SUMMARY OF SEASONAL HIGH GROUNDWATER TABLE ESTIMATE
THEA WHITING STREET PD&E STUDY
HILLSBOROUGH COUNTY, FLORIDA
AUTHORITY PROJECT NO. HI-0141
AREHNA Project Number: B-19-051

Boring No.	Boring Location		Ground Elevation[1] (feet, NAVD 88)	Boring Depth (feet)	Measured Groundwater Table			USDA Soil Survey		Estimated Seasonal High Water Table		
	Station (feet)	Offset (feet)			Date Recorded	Depth[2] (feet)	Elevation (feet, NAVD 88)	Map Symbol	Estimated SHGWT[3] Depth (feet)	Depth (feet)	Elevation (feet, NAVD 88)	
SH-01	108+09	19 RT	18	8.0	5/19/2021	GNE	-	56	-	5.5	12.5	+/-0.5
SH-02	112+38	48 LT	14.9	8.0	5/19/2021	GNE	-	56	-	4.0	< 10.9	+/-0.5
SH-03	202+53	54 LT	16.8	6.0	5/19/2021	4.0	12.8	56	-	3.0	13.8	+/-0.5
SH-04	206+18	28 RT	16.3	1.5	5/19/2021	GNE	-	56	-	> 1.5	< 14.8	+/-0.5
SH-05	411+14	270 LT	17.4	6.0	5/19/2021	5.0	12.4	56	-	4.0	13.4	+/-0.5
SH-06	708+24	57 LT	10.9	5.0	5/19/2021	2.5	8.4	56	-	1.0	9.9	+/-0.5
SH-07	710+59	63 LT	12	5.0	6/30/2021	3.0	9	56	-	2.0	10.0	+/-0.5
SH-08	408+32	28 RT	15.8	6.0	6/30/2021	4.0	11.8	56	-	2.5	13.3	+/-0.5
SH-09	404+17	32 LT	17.9	3.0	5/19/2021	GNE	-	56	-	> 3.0	< 14.9	+/-0.5
SH-10	209+21	13 RT	17.8	6.0	5/19/2021	GNE	-	56	-	4.0	13.8	+/-0.5
DRI-01	105+73	6 RT	14.7	5.0	8/6/2021	GNE	-	56	-	2.5	12.2	+/-0.5
PB-01	106+29	16 LT	16.1	20.0	8/10/2021	GNA	-	56	-	4.0	12.1	+/-0.5
PB-02	408+28	118 FT	17	20.0	8/12/2021	8.0	9.0	56	-	4.0	13.0	+/-0.5

(1) Existing Ground Surface Elevations were based on survey data provided by Echo UES, Inc.

(2) Depth below existing grade at time of field work.

(3) Seasonal high water table depth per Hillsborough County, Florida USDA Soil Survey information. (No data provided for this Map Symbol).

GNE: Groundwater table not encountered within the depth of the boring performed.

GNA: Groundwater table not apparent within the depth of the boring performed.

TABLE 4
SUMMARY OF ROCK CORE TEST RESULTS
THEA WHITING STREET PD&E STUDY
HILLSBOROUGH COUNTY, FLORIDA
AUTHORITY PROJECT NO. HI-0141
AREHNA Project No.: B-19-051

Boring No	Core Run		% REC	RQD	Time (min)
	Number	Sample Depth (ft)			
BB-01	1	65.0 - 70.0	95	85	35
BB-01	2	70.0 - 75.0	41	18	21
BB-04	1	64.0 - 69.0	100	63	34
BB-04	2	70.0 - 75.0	86	80	33

TABLE 5
SUMMARY OF UNCONFINDED COMPRESSION AND SPLITTING TENSILE TEST RESULTS
THEA WHITING STREET PD&E STUDY
HILLSBOROUGH COUNTY, FLORIDA
AUTHORITY PROJECT NO. HI-0141
AREHNA Project No.: B-19-051

Boring No	Rock Core Run Depth (ft)	Sample Depth (ft)	Cut Length (in)	Core Diameter (in)	L/D Ratio	Applied Load (lbf)	Unconfined Compressive Strength, qu (psi)	Splitting Tensile Strength, qt	
								(psi)	(ksf)
BB-01	65.0 - 70.0	66.0 - 66.4	5.34	2.39	2.2	54,740	12,202	-	-
BB-01	65.0 - 70.0	67.8 - 67.9	1.62	2.39	0.68	9,430	-	1,551	223.3
BB-04	64.0 - 69.0	67.8 - 68.3	5.08	2.33	2.2	1,020	239	-	-
BB-04	64.0 - 69.0	68.6 - 68.7	1.67	2.38	0.7	940	-	151	21.7
BB-04	70.0 - 75.0	73.8 - 73.9	1.71	2.38	0.72	720	-	113	16.2

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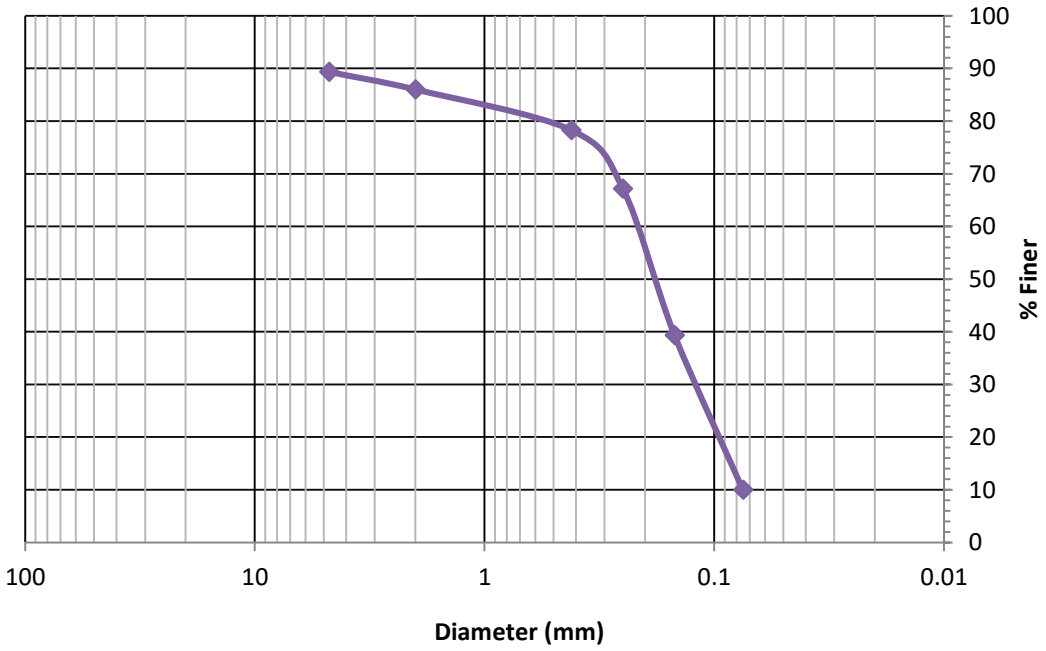
5012 W. Lemon Street
Tampa, Florida 33609
Ph 813.944.3464

Laboratory Test Report

Project Name: THEA PD&E Whiting Street
Client: LOCHNER
AREHNA Project No.: B-19-051

Report Date: 7/12/2021

Particle-Size Analysis of Soils (AASHTO T27)



Sieve Analysis

Sieve	Dia.	% Finer
#4	4.76	89.4
#10	2.0	86.0
#40	0.42	78.3
#60	0.25	67.2
#100	0.149	39.4
#200	0.075	10.0

Material Information

Soil Classification:
AASHTO: A-3/A-2-4
Natural Moisture: 3

Boring No.: SH-2
Sample No.:
Depth: 0.5' - 1.0'
Soil Description: Brown Slightly Silty Sand w/ Limerock & Roots

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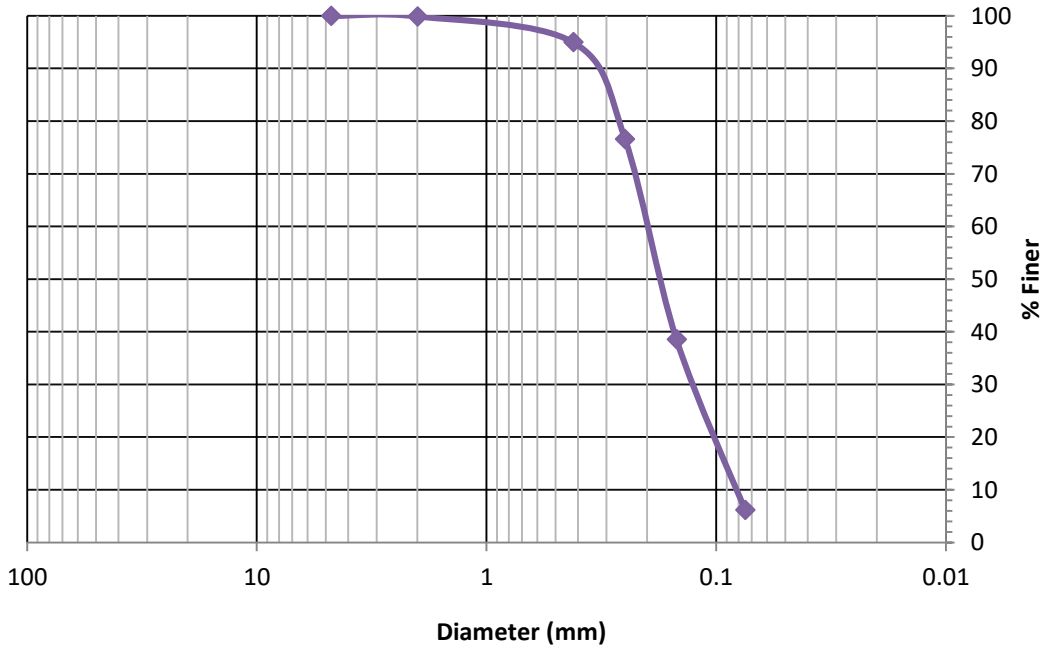
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Laboratory Test Report

Project Name: THEA PD&E Whiting Street
Client: LOCHNER
AREHNA Project No.: B-19-051

Report Date: 7/12/2021

Particle-Size Analysis of Soils (AASHTO T27)



Sieve Analysis

Sieve	Dia.	% Finer
#4	4.76	100.0
#10	2.0	99.9
#40	0.42	95.0
#60	0.25	76.6
#100	0.149	38.5
#200	0.075	6.2

Material Information

Soil Classification:
AASHTO: A-3
Natural Moisture: 20.9

Boring No.: SH-03
Sample No.:
Depth: 3.5' - 4.0'
Soil Description: Very Pale Brown Fine Sand

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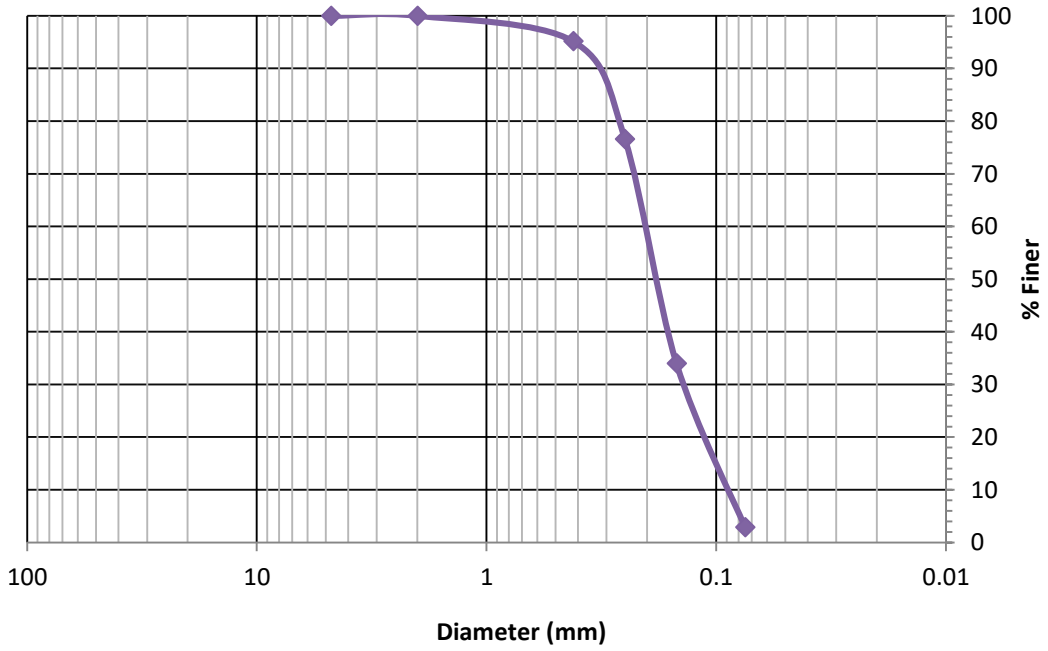
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Laboratory Test Report

Project Name: THEA PD&E Whiting Street
Client: LOCHNER
AREHNA Project No.: B-19-051

Report Date: 7/12/2021

Particle-Size Analysis of Soils (AASHTO T27)



Sieve Analysis

Sieve	Dia.	% Finer
#4	4.76	100.0
#10	2.0	100.0
#40	0.42	95.2
#60	0.25	76.6
#100	0.149	34.0
#200	0.075	2.9

Material Information

Soil Classification:
AASHTO: A-3
Natural Moisture: 19.1

Boring No.: SH-08
Sample No.:
Depth: 3.0' - 3.5'
Soil Description: Brown Fine Sand

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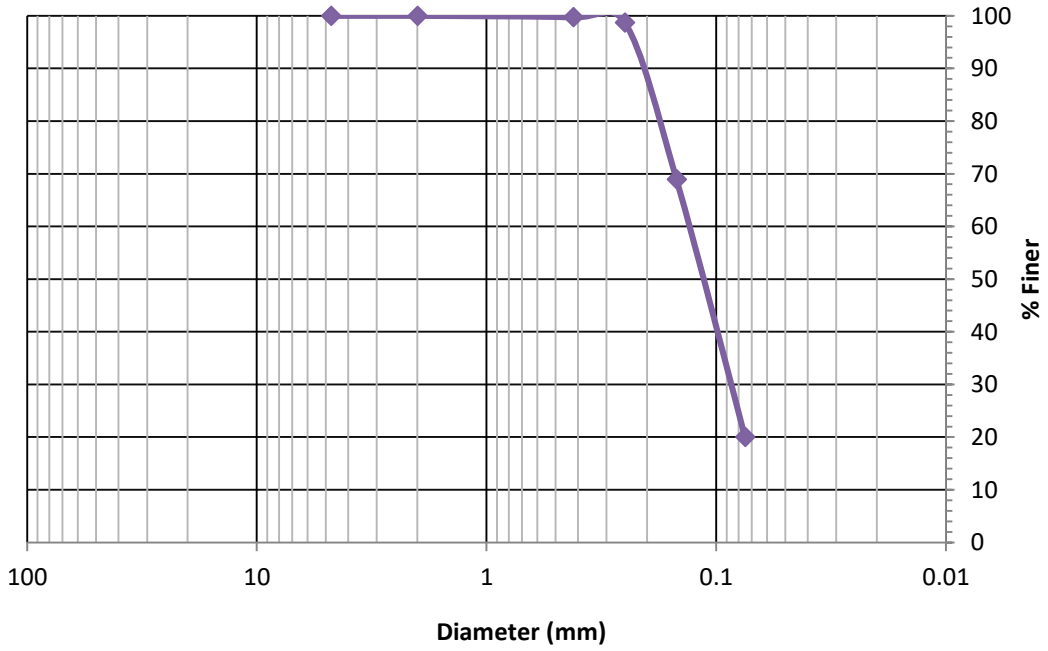
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Laboratory Test Report

Project Name: THEA PD&E Whiting Street
Client: LOCHNER
AREHNA Project No.: B-19-051

Report Date: 7/12/2021

Particle-Size Analysis of Soils (ASTM D6913)



Sieve Analysis

Sieve	Dia.	% Finer
#4	4.76	100.0
#10	2.0	100.0
#40	0.42	99.7
#60	0.25	98.7
#100	0.149	68.9
#200	0.075	20.0

Material Information

Soil Classification:
Unified: SC
Natural Moisture: 29.6

Boring No.: BB-01
Sample No.:
Depth: 18.0' - 20.0'
Soil Description: Brown Clayey Sand

AREHNA | Engineering, Inc.

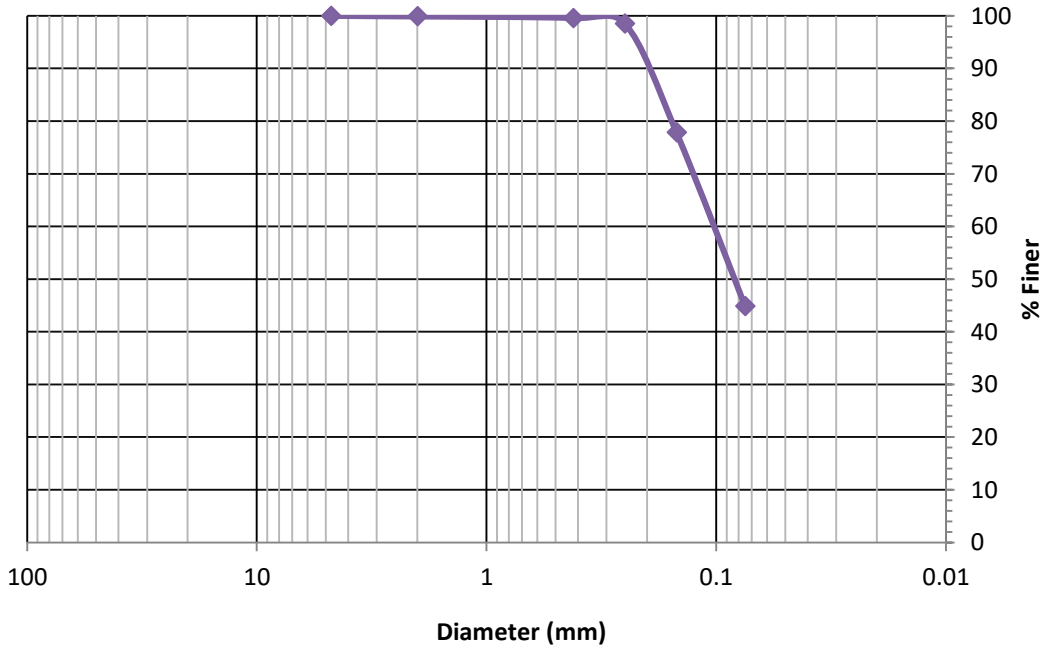
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Laboratory Test Report

Project Name: THEA PD&E Whiting Street
Client: LOCHNER
AREHNA Project No.: B-19-051

Report Date: 7/12/2021

Particle-Size Analysis of Soils (ASTM D6913)



Sieve Analysis

Sieve	Dia.	% Finer
#4	4.76	100.0
#10	2.0	99.9
#40	0.42	99.6
#60	0.25	98.5
#100	0.149	77.9
#200	0.075	44.9

Material Information

Soil Classification:
Unified: SC
Natural Moisture: 33.9

Boring No.: BB-01
Sample No.:
Depth: 20.0' - 22.0'
Soil Description: Light Gray/Greenish Gray Clayey Sand

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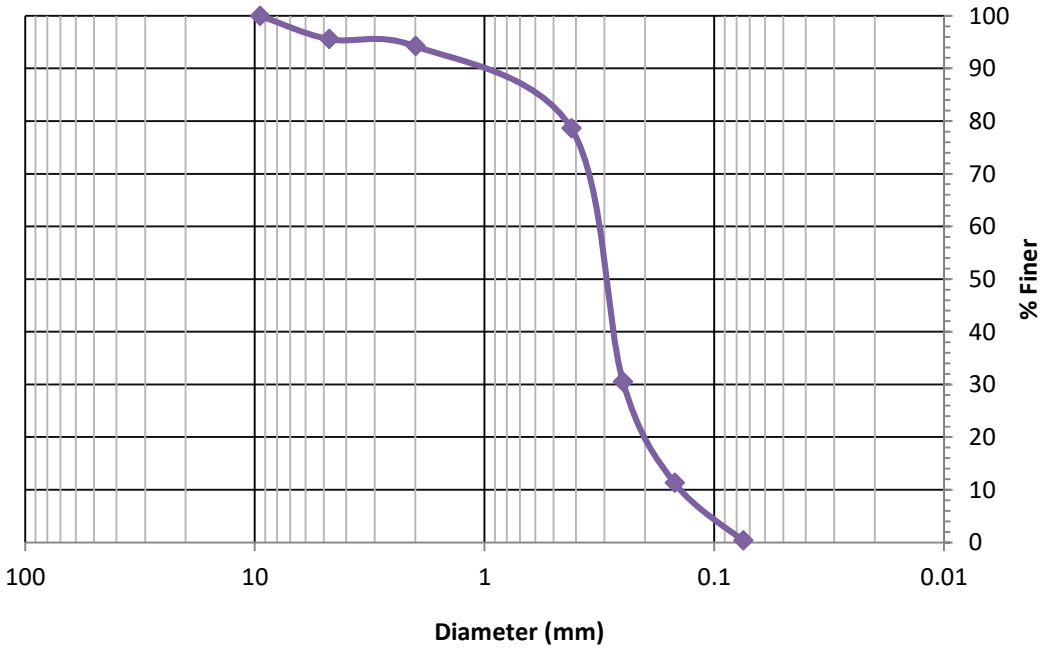
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Laboratory Test Report

Project Name: THEA PD&E Whiting Street
Client: LOCHNER
AREHNA Project No.: B-19-051

Report Date: 7/12/2021

Particle-Size Analysis of Soils (ASTM D6913)



Sieve Analysis

Sieve	Dia.	% Finer
3/8"	9.51	100.0
#4	4.76	95.6
#10	2.0	94.2
#40	0.42	78.7
#60	0.25	30.5
#100	0.149	11.3
#200	0.075	0.4

Material Information

Soil Classification:
Unified: SP
Natural Moisture: 24.6

D50: 0.319 mm
Cc: 1.217 mm
Cu: 2.529 mm

Boring No.: BB-02
Sample No.:
Depth: 14.0' - 16.0'
Soil Description: Light Brownish Gray Sand

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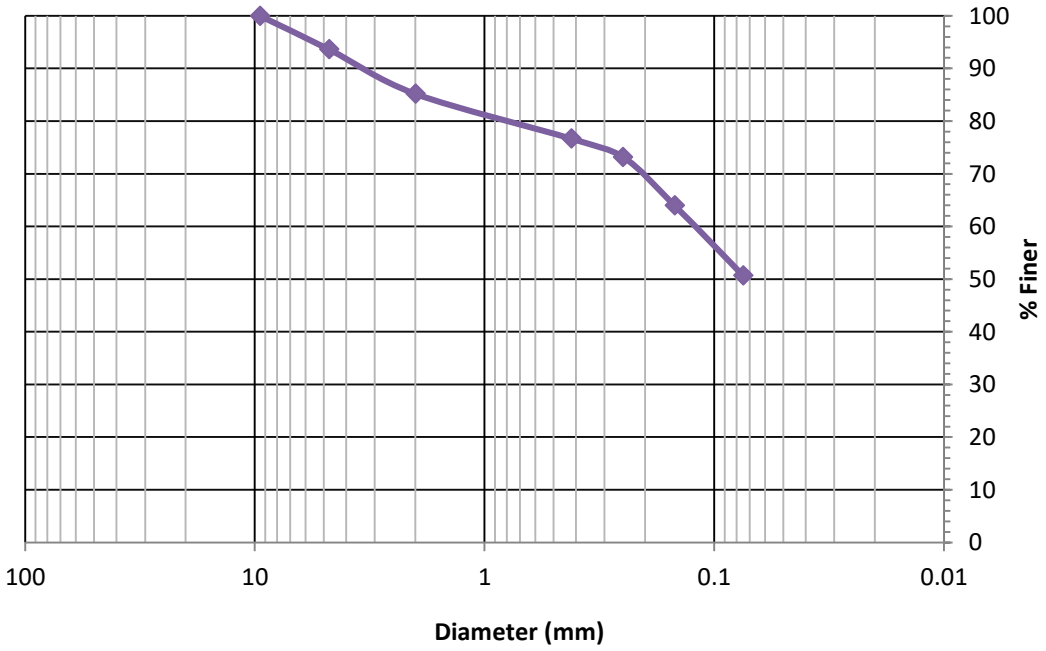
5012 W. Lemon Street
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Laboratory Test Report

Project Name: THEA PD&E Whiting Street
Client: LOCHNER
AREHNA Project No.: B-19-051

Report Date: 7/12/2021

Particle-Size Analysis of Soils (ASTM D6913)



Sieve Analysis

Sieve	Dia.	% Finer
3/8"	9.51	100.0
#4	4.76	93.7
#10	2.0	85.2
#40	0.42	76.7
#60	0.25	73.2
#100	0.149	64.0
#200	0.075	50.7

Material Information

Soil Classification:
Unified: CL/CH
Natural Moisture: 26.3

Boring No.: BB-02
Sample No.:
Depth: 38.0' - 40.0'
Soil Description: Light Yellowish Brown Sandy Clay w/Limerock

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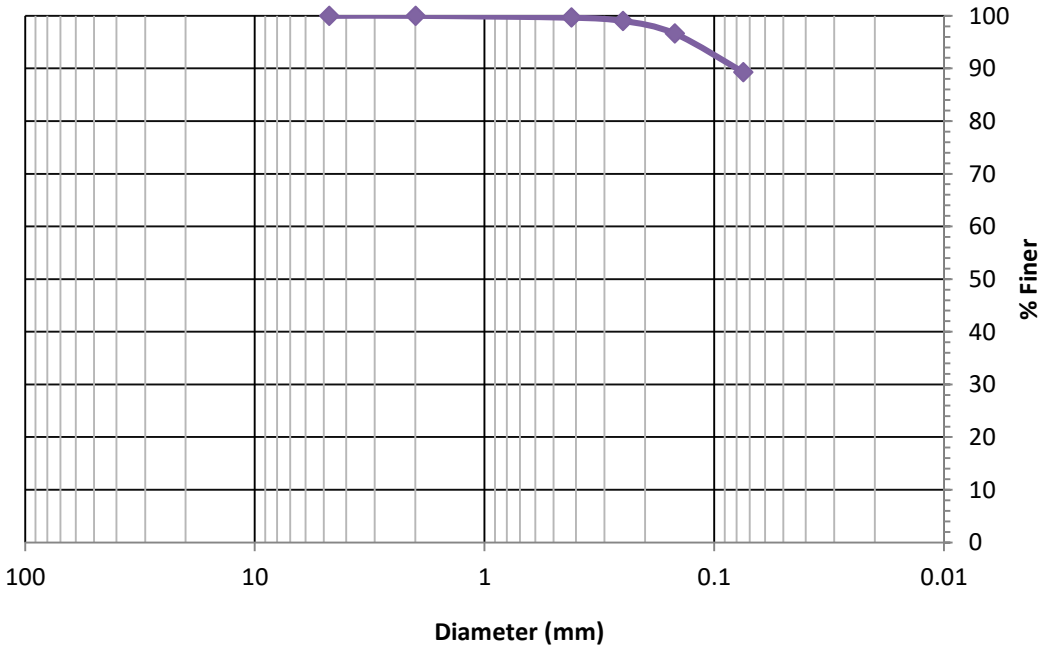
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Laboratory Test Report

Project Name: THEA PD&E Whiting Street
Client: LOCHNER
AREHNA Project No.: B-19-051

Report Date: 7/12/2021

Particle-Size Analysis of Soils (ASTM D6913)



Sieve Analysis

Sieve	Dia.	% Finer
#4	4.76	100.0
#10	2.0	100.0
#40	0.42	99.7
#60	0.25	99.0
#100	0.149	96.7
#200	0.075	89.3

Material Information

Soil Classification:
Unified: CL/CH
Natural Moisture: 55

Boring No.: BB-03
Sample No.:
Depth: 8.0' - 10.0'
Soil Description: Very Dark Brown Clay

AREHNA | Engineering, Inc.

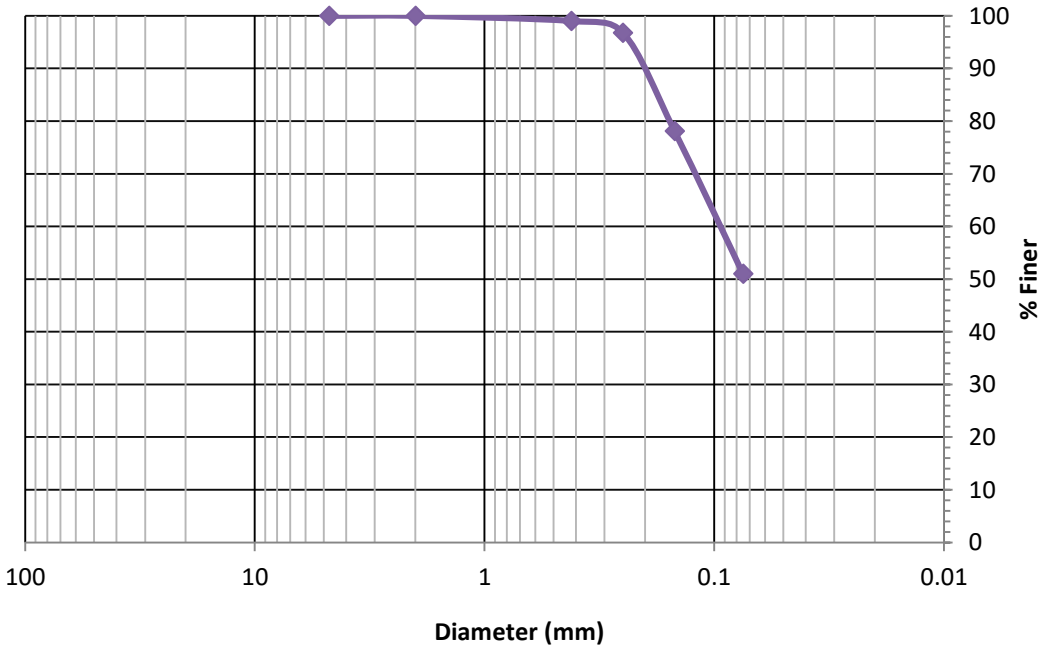
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Laboratory Test Report

Project Name: THEA PD&E Whiting Street
Client: LOCHNER
AREHNA Project No.: B-19-051

Report Date: 7/12/2021

Particle-Size Analysis of Soils (ASTM D6913)



Sieve Analysis

Sieve	Dia.	% Finer
#4	4.76	100.0
#10	2.0	100.0
#40	0.42	99.0
#60	0.25	96.8
#100	0.149	78.1
#200	0.075	51.0

Material Information

Soil Classification:
Unified: CH
Natural Moisture: 37

Liquid Limit: 59
Plastic Limit: 31
Plasticity Index: 28

Boring No.: BB-03
Sample No.:
Depth: 18.0' - 20.0'
Soil Description: Greenish Gray Sandy Clay

Report Date:	07/12/21
Boring No.:	BB-03
Sample No.:	
Depth:	18.0' - 20.0'

Soil Classificaton

AASHTO	
Unified	CH

Test Method:	ASTM D6913
Minus #10 Split:	No

Auto Classification:

AASHTO	A-7-5
Unified	CH

Corrosion Class

Steel	
Concrete	

Soil Description:	Greenish Gray Sandy Clay

Sample Type

Soil or Water	

pH (FM 5-550)

pH Reading	

Natural Moisture

Tare + Wet Soil (g)	50.8
Tare Mass (g)	15.5
Tare + Dry Soil (g)	41.3
Weight of Water (g)	9.6
Dry Soil (g)	25.8
Moisture (%)	37.0

200 Wash

Tare Mass (g)	0.0
Tare + Dry Soil Before Wash (g)	71.8
Tare + Dry Soil After Wash (g)	35.4
Loss (g)	36.4
Dry Soil Before Wash (g)	71.8
Loss + Pan Weight (g)	36.6
Percent Finer than -200 (%)	51.0

Hygroscopic Moisture

Tare + Air Dry (g)	
Tare + Oven Dry (g)	
Tare Mass (g)	
Hygroscopic Moisture (%)	--
Correction Factor	1.000

Sieve Analysis

Sieve	Mass Ret. (g)	% Ret. (g)	% Finer
3 1/2"			
3"			
2"			
1 1/2"			
1"			
3/4"			
1/2"			
3/8"			
#4	0.0	0.0	100.0
#8			
#10	0.0	0.0	100.0
#16			
#30			
#40	0.7	1.0	99.0
#50			
#60	2.3	3.2	96.8
#100	15.7	21.9	78.1
#200	35.2	49.0	51.0
Pan Wt	0.2		

Liquid Limit

	1	2	3
Wet Mass + Tare (g)	33.74	34.94	38.28
Dry Mass + Tare (g)	29.23	29.87	31.72
Tare Mass (g)	21.17	21.48	21.24
Water Mass (g)	4.51	5.07	6.56
Dry Mass (g)	8.06	8.39	10.48
Content (%)	56	60	63
Number of Blows	35	23	16
Determined	Yes		

Plastic Limit

	1	2
Wet Mass + Tare (g)	27.73	28.27
Dry Mass + Tare (g)	26.32	26.67
Tare Mass (g)	21.59	21.76
Mass Water (g)	1.41	1.60
Dry Mass (g)	4.73	4.91
Content (%)	30	33
Determined	Yes	

Summary

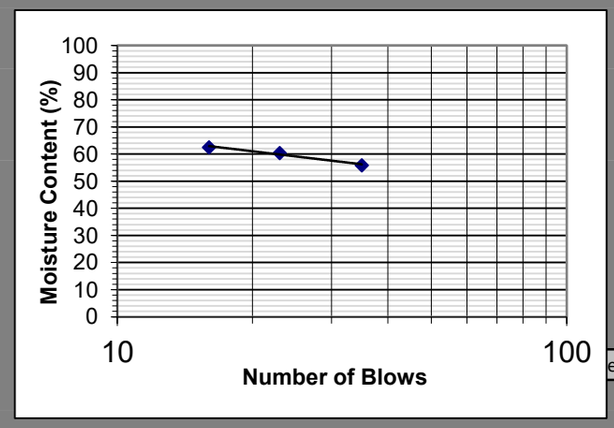
LL	59
PL	31
PI	28

Chlorides (FM 5-552)

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

Sulfates (FM 5-553)

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



Minus #10 Material

Tare + Air Dry (g)	
Tare Mass (g)	
Air Dry Mass (g)	--
Corrected Minus #10 Mass (g)	--

Original Sample Mass (g)	
Corrected Sample Mass (g)	--

D50	
Cc	
Cu	

Organic Content

	1	2	3
Mass of Crucible (g)			
Mass of Soil + Crucible (g)			
Mass After Ignition (g)			
Organic Content (%)			
Average Organic Content (%)			

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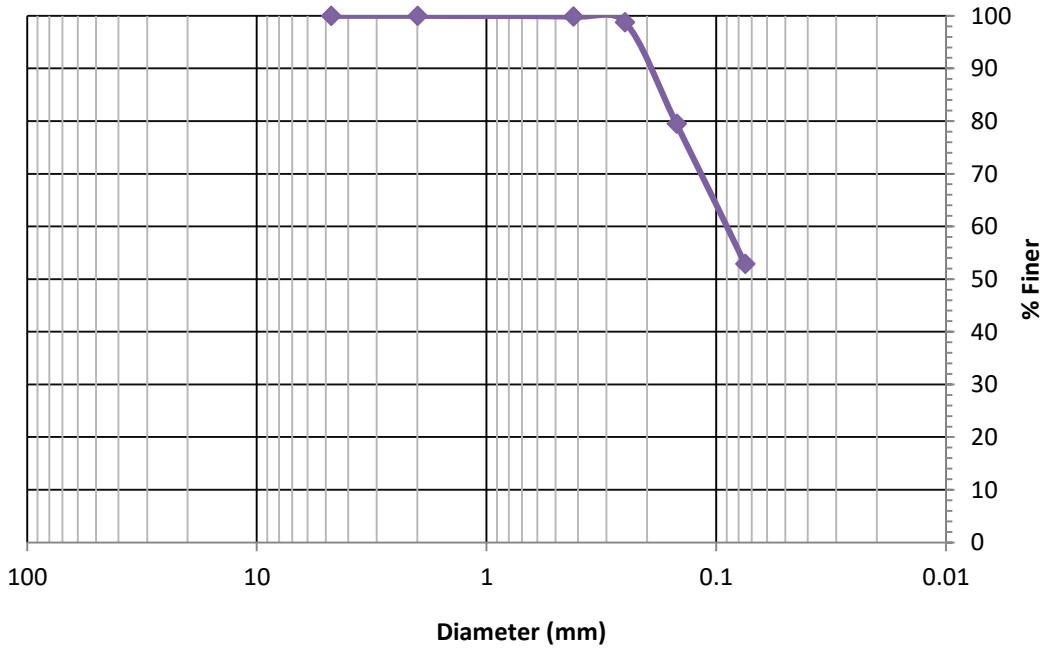
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Tampa, Florida 33609
Ph 813.944.3464

Laboratory Test Report

Project Name: THEA PD&E Whiting Street
Client: LOCHNER
AREHNA Project No.: B-19-051

Report Date: 7/12/2021

Particle-Size Analysis of Soils (ASTM D6913)



Sieve Analysis

Sieve	Dia.	% Finer
#4	4.76	100.0
#10	2.0	100.0
#40	0.42	99.8
#60	0.25	98.8
#100	0.149	79.5
#200	0.075	52.9

Material Information

Soil Classification:
Unified: CH
Natural Moisture: 37.5

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

Boring No.: BB-03
Sample No.:
Depth: 38.0' - 40.0'
Soil Description: Greensih Gray Sandy Clay

Report Date:	07/12/21
Boring No.:	BB-03
Sample No.:	
Depth:	38.0' - 40.0'

Soil Description:	Greensih Gray Sandy Clay

Soil Classificaton

AASHTO	
Unified	CH

Test Method:	ASTM D6913
Minus #10 Split:	No

Auto Classification:

AASHTO	A-7-6
Unified	CH

Corrosion Class

Steel	
Concrete	

Natural Moisture

Tare + Wet Soil (g)	43.9
Tare Mass (g)	15.4
Tare + Dry Soil (g)	36.1
Weight of Water (g)	7.8
Dry Soil (g)	20.7
Moisture (%)	37.5

200 Wash

Tare Mass (g)	0.0
Tare + Dry Soil Before Wash (g)	66.3
Tare + Dry Soil After Wash (g)	31.7
Loss (g)	34.6
Dry Soil Before Wash (g)	66.3
Loss + Pan Weight (g)	35.1
Percent Finer than -200 (%)	52.9

Hygroscopic Moisture

Tare + Air Dry (g)	
Tare + Oven Dry (g)	
Tare Mass (g)	
Hygroscopic Moisture (%)	--
Correction Factor	1.000

Sieve Analysis

Sieve	Mass Ret. (g)	% Ret. (g)	% Finer
3 1/2"			
3"			
2"			
1 1/2"			
1"			
3/4"			
1/2"			
3/8"			
#4	0.0	0.0	100.0
#8			
#10	0.0	0.0	100.0
#16			
#30			
#40	0.1	0.2	99.8
#50			
#60	0.8	1.2	98.8
#100	13.6	20.5	79.5
#200	31.2	47.1	52.9
Pan Wt	0.5		

Liquid Limit

	1	2	3
Wet Mass + Tare (g)	30.40	34.71	32.57
Dry Mass + Tare (g)	27.24	29.79	28.33
Tare Mass (g)	21.21	21.23	21.56
Water Mass (g)	3.16	4.92	4.24
Dry Mass (g)	6.03	8.56	6.77
Content (%)	52	57	63
Number of Blows	35	29	21
Determined	Yes		

Plastic Limit

	1	2
Wet Mass + Tare (g)	28.93	27.52
Dry Mass + Tare (g)	27.23	26.20
Tare Mass (g)	21.49	20.83
Mass Water (g)	1.70	1.32
Dry Mass (g)	5.74	5.37
Content (%)	30	25
Determined	Yes	

Summary

LL	60
PL	27
PI	33

Sample Type

Soil or Water	

pH (FM 5-550)

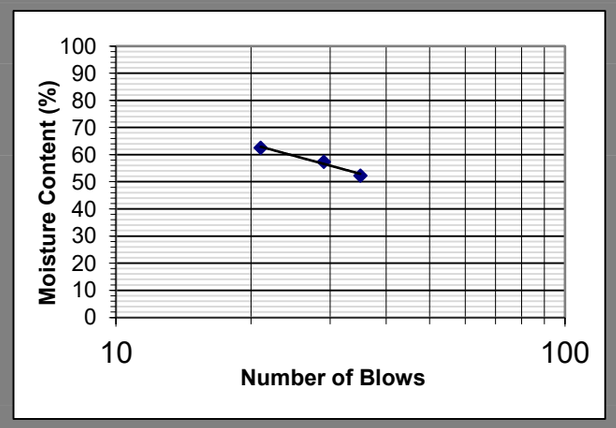
pH Reading	

Chlorides (FM 5-552)

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

Sulfates (FM 5-553)

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



Minus #10 Material

Tare + Air Dry (g)	
Tare Mass (g)	
Air Dry Mass (g)	--
Corrected Minus #10 Mass (g)	--

Original Sample Mass (g)	
Corrected Sample Mass (g)	--

D50	
Cc	
Cu	

Organic Content

	1	2	3
Mass of Crucible (g)			
Mass of Soil + Crucible (g)			
Mass After Ignition (g)			
Organic Content (%)			
Average Organic Content (%)			

Final Reading

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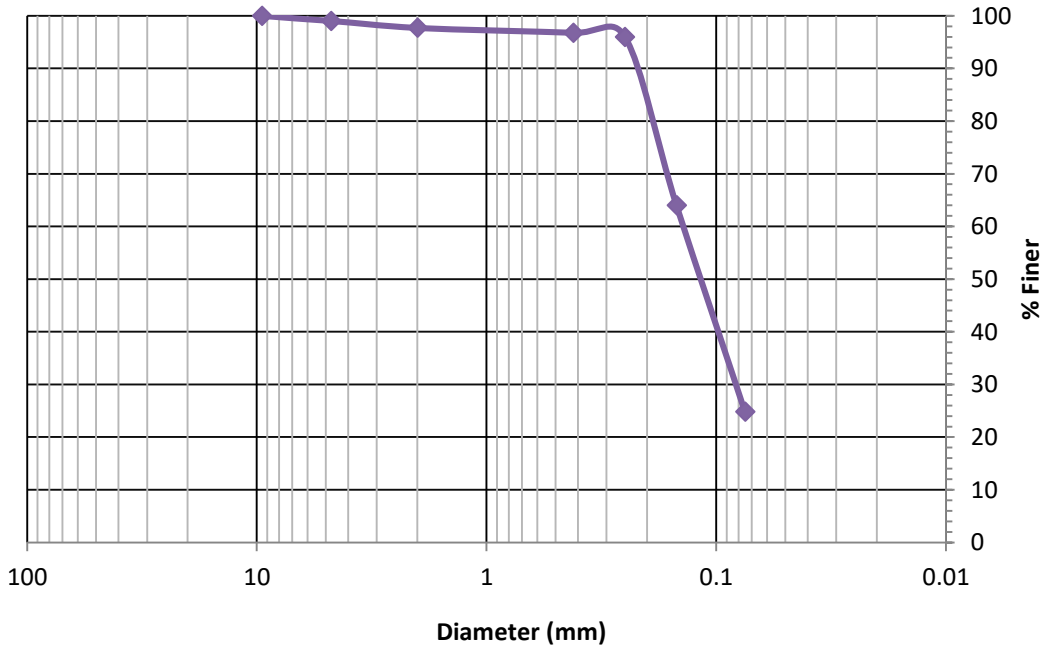
5012 W. Lemon Street
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Laboratory Test Report

Project Name: THEA PD&E Whiting Street
Client: LOCHNER
AREHNA Project No.: B-19-051

Report Date: 7/12/2021

Particle-Size Analysis of Soils (ASTM D6913)



Sieve Analysis

Sieve	Dia.	% Finer
3/8"	9.51	100.0
#4	4.76	99.0
#10	2.0	97.7
#40	0.42	96.8
#60	0.25	96.0
#100	0.149	64.0
#200	0.075	24.8

Material Information

Soil Classification:
Unified: SC
Natural Moisture: 27.8

D50: 0.123 mm

Boring No.: BB-03
Sample No.:
Depth: 58.0' - 60.0'
Soil Description: Gray Clayey Sand

AREHNA | Engineering, Inc.

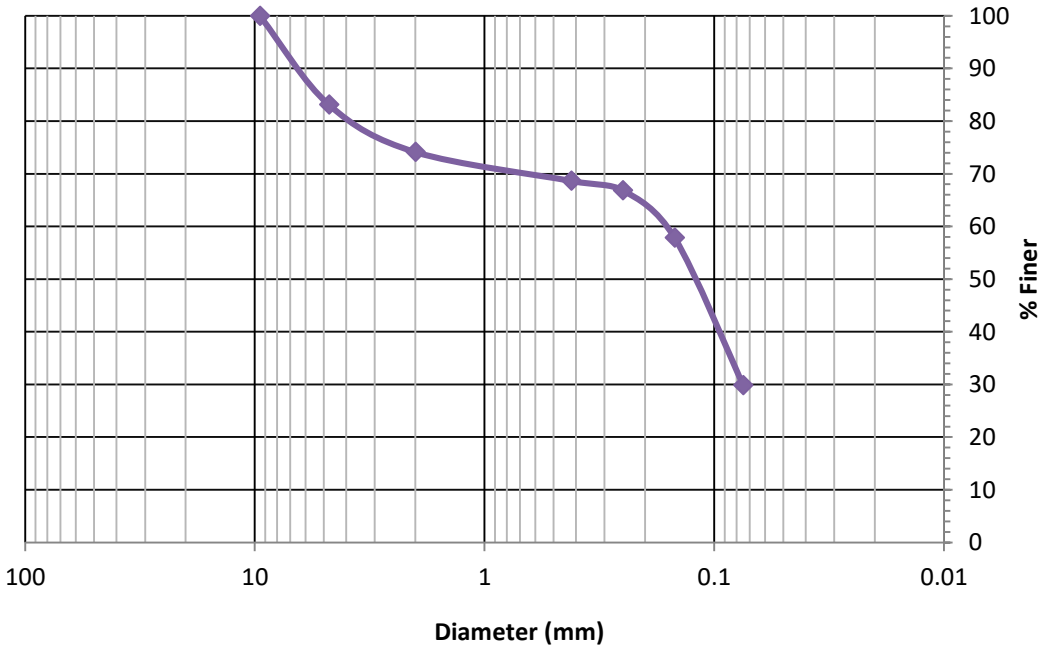
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Laboratory Test Report

Project Name: THEA PD&E Whiting Street
Client: LOCHNER
AREHNA Project No.: B-19-051

Report Date: 7/12/2021

Particle-Size Analysis of Soils (ASTM D6913)



Sieve Analysis

Sieve	Dia.	% Finer
3/8"	9.51	100.0
#4	4.76	83.1
#10	2.0	74.2
#40	0.42	68.7
#60	0.25	66.9
#100	0.149	57.9
#200	0.075	29.9

Material Information

Soil Classification:
Unified: SC
Natural Moisture: 29.1

D50: 0.128 mm

Liquid Limit: 44
Plastic Limit: 25
Plasticity Index: 19

Boring No.: BB-03
Sample No.:
Depth: 68.0' - 70.0'
Soil Description: Light Gray Clayey Sand w/ Rock Fragments

Report Date:	07/12/21
Boring No.:	BB-03
Sample No.:	
Depth:	68.0' - 70.0'

Soil Description:	Light Gray Clayey Sand w/ Rock Fragments

Soil Classificaton

AASHTO	
Unified	SC

Test Method:	ASTM D6913
Minus #10 Split:	No

Auto Classification:

AASHTO	A-2-7
Unified	SC

Corrosion Class

Steel	
Concrete	

Sample Type

Soil or Water	

pH (FM 5-550)

pH Reading	

Natural Moisture

Tare + Wet Soil (g)	46.9
Tare Mass (g)	16.9
Tare + Dry Soil (g)	40.2
Weight of Water (g)	6.8
Dry Soil (g)	23.2
Moisture (%)	29.1

200 Wash

Tare Mass (g)	0.0
Tare + Dry Soil Before Wash (g)	65.8
Tare + Dry Soil After Wash (g)	46.4
Loss (g)	19.4
Dry Soil Before Wash (g)	65.8
Loss + Pan Weight (g)	19.7
Percent Finer than -200 (%)	29.9

Hygroscopic Moisture

Tare + Air Dry (g)	
Tare + Oven Dry (g)	
Tare Mass (g)	
Hygroscopic Moisture (%)	--
Correction Factor	1.000

Minus #10 Material

Tare + Air Dry (g)	
Tare Mass (g)	
Air Dry Mass (g)	--
Corrected Minus #10 Mass (g)	--

Original Sample Mass (g)	
Corrected Sample Mass (g)	--

Sieve Analysis

Sieve	Mass Ret. (g)	% Ret. (g)	% Finer
3 1/2"			
3"			
2"			
1 1/2"			
1"			
3/4"			
1/2"			
3/8"	0.0	0.0	100.0
#4	11.1	16.9	83.1
#8			
#10	17.0	25.8	74.2
#16			
#30			
#40	20.6	31.3	68.7
#50			
#60	21.8	33.1	66.9
#100	27.7	42.1	57.9
#200	46.1	70.1	29.9
Pan Wt	0.3		

D50	0.13
Cc	
Cu	

Liquid Limit

	1	2	3
Wet Mass + Tare (g)	31.55	28.51	31.56
Dry Mass + Tare (g)	28.61	26.36	28.40
Tare Mass (g)	21.65	21.53	21.37
Water Mass (g)	2.94	2.15	3.16
Dry Mass (g)	6.96	4.83	7.03
Content (%)	42	45	45
Number of Blows	34	26	18
Determined	Yes		

Plastic Limit

	1	2
Wet Mass + Tare (g)	28.88	29.29
Dry Mass + Tare (g)	27.32	27.75
Tare Mass (g)	21.00	21.43
Mass Water (g)	1.56	1.54
Dry Mass (g)	6.32	6.32
Content (%)	25	24
Determined	Yes	

Summary

LL	44
PL	25
PI	19

Organic Content

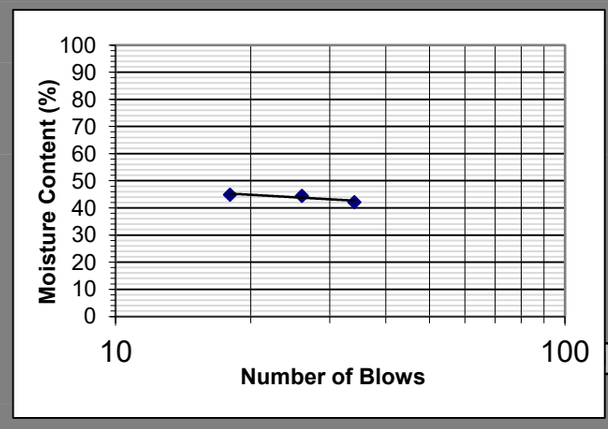
	1	2	3
Mass of Crucible (g)			
Mass of Soil + Crucible (g)			
Mass After Ignition (g)			
Organic Content (%)			
Average Organic Content (%)			

Chlorides (FM 5-552)

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

Sulfates (FM 5-553)

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



Reading

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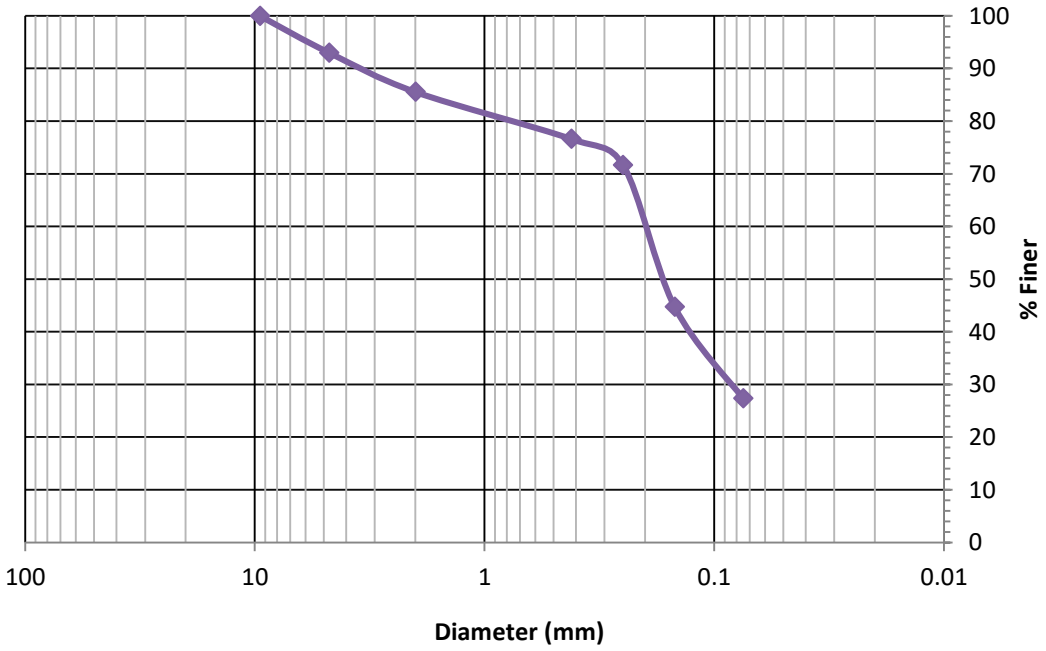
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Laboratory Test Report

Project Name: THEA PD&E Whiting Street
Client: LOCHNER
AREHNA Project No.: B-19-051

Report Date: 7/12/2021

Particle-Size Analysis of Soils (ASTM D6913)



Sieve Analysis

Sieve	Dia.	% Finer
3/8"	9.51	100.0
#4	4.76	93.0
#10	2.0	85.6
#40	0.42	76.6
#60	0.25	71.7
#100	0.149	44.8
#200	0.075	27.4

Material Information

Soil Classification:
Unified: SC
Natural Moisture: 30.3

D50: 0.169 mm

Boring No.: BB-04
Sample No.:
Depth: 16.0' - 18.0'
Soil Description: Greenish Gray/Yellowish Brown Clayey Sand

AREHNA | Engineering, Inc.

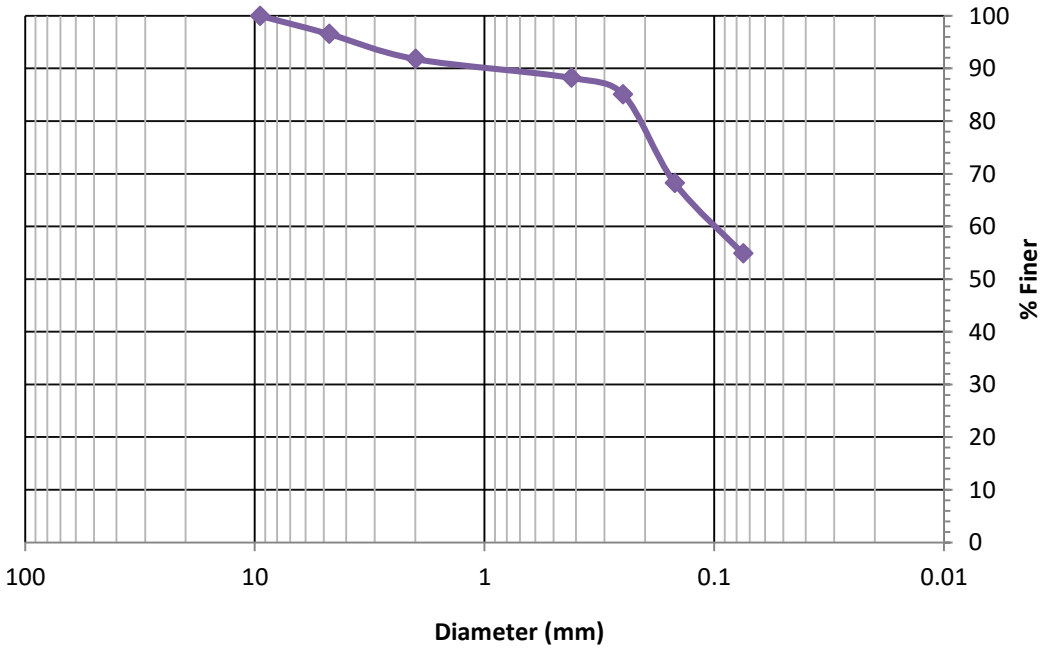
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Tampa, Florida 33609
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Laboratory Test Report

Project Name: THEA PD&E Whiting Street
Client: LOCHNER
AREHNA Project No.: B-19-051

Report Date: 7/12/2021

Particle-Size Analysis of Soils (ASTM D6913)



Sieve Analysis

Sieve	Dia.	% Finer
3/8"	9.51	100.0
#4	4.76	96.6
#10	2.0	91.8
#40	0.42	88.2
#60	0.25	85.1
#100	0.149	68.3
#200	0.075	54.9

Material Information

Soil Classification:
Unified: CL/CH
Natural Moisture: 25.7

Boring No.: BB-04
Sample No.:
Depth: 33.5' - 35.0'
Soil Description: Very Pale Brown Sandy Clay

AREHNA | Engineering, Inc.

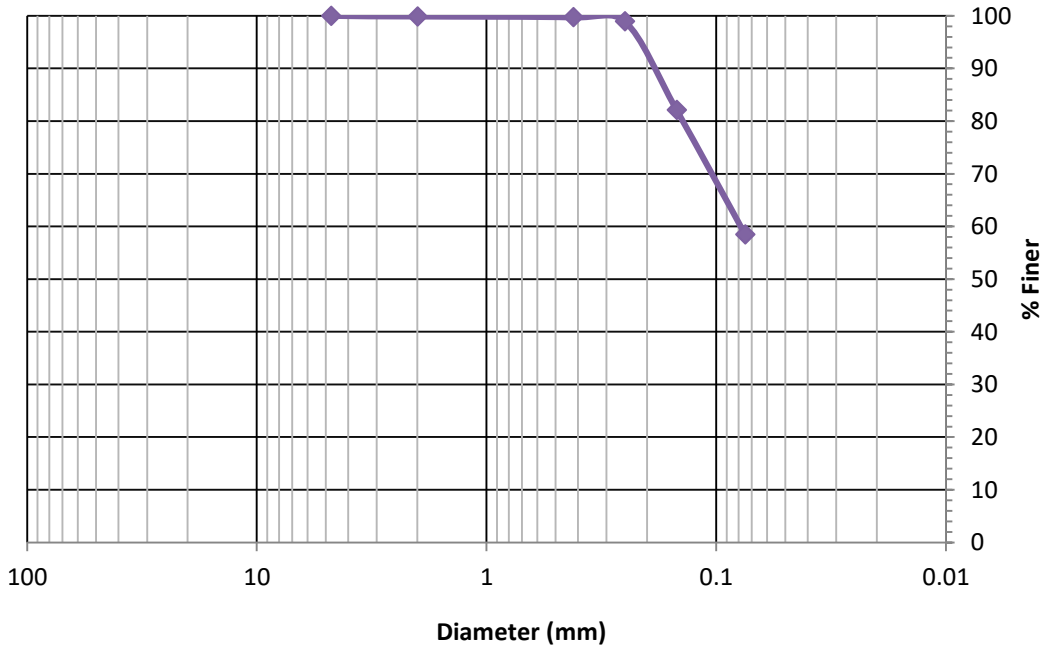
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Laboratory Test Report

Project Name: THEA PD&E Whiting Street
Client: LOCHNER
AREHNA Project No.: B-19-051

Report Date: 7/12/2021

Particle-Size Analysis of Soils (ASTM D6913)



Sieve Analysis

Sieve	Dia.	% Finer
#4	4.76	100.0
#10	2.0	99.9
#40	0.42	99.7
#60	0.25	98.9
#100	0.149	82.2
#200	0.075	58.5

Material Information

Soil Classification:
Unified: CL/CH
Natural Moisture: 26.8

Boring No.: BB-04
Sample No.:
Depth: 58.0' - 60.0'
Soil Description: Light Gray Sandy Clay w/ Rock

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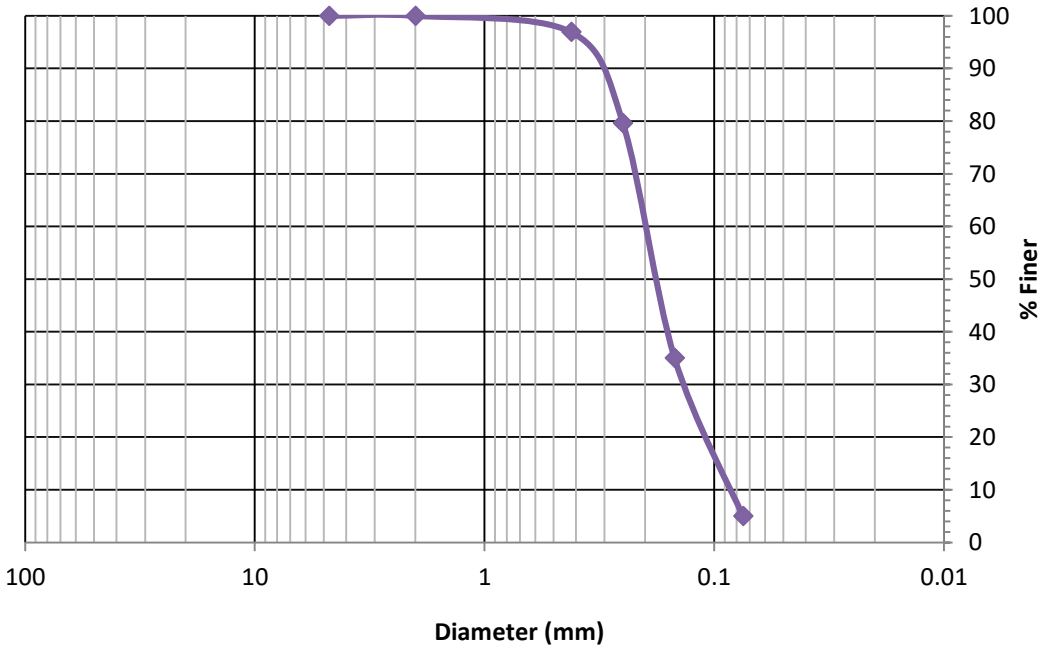
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Laboratory Test Report

Project Name: THEA PD&E Whiting Street
Client: LOCHNER
AREHNA Project No.: B-19-051

Report Date: 7/12/2021

Particle-Size Analysis of Soils (ASTM D6913)



Sieve Analysis

Sieve	Dia.	% Finer
#4	4.76	100.0
#10	2.0	100.0
#40	0.42	96.9
#60	0.25	79.6
#100	0.149	35.1
#200	0.075	5.0

Material Information

Soil Classification:
Unified: SP
Natural Moisture: 16.7

Boring No.: WB-01
Sample No.:
Depth: 8.0' - 10.0'
Soil Description: Pinkish Gray Sand

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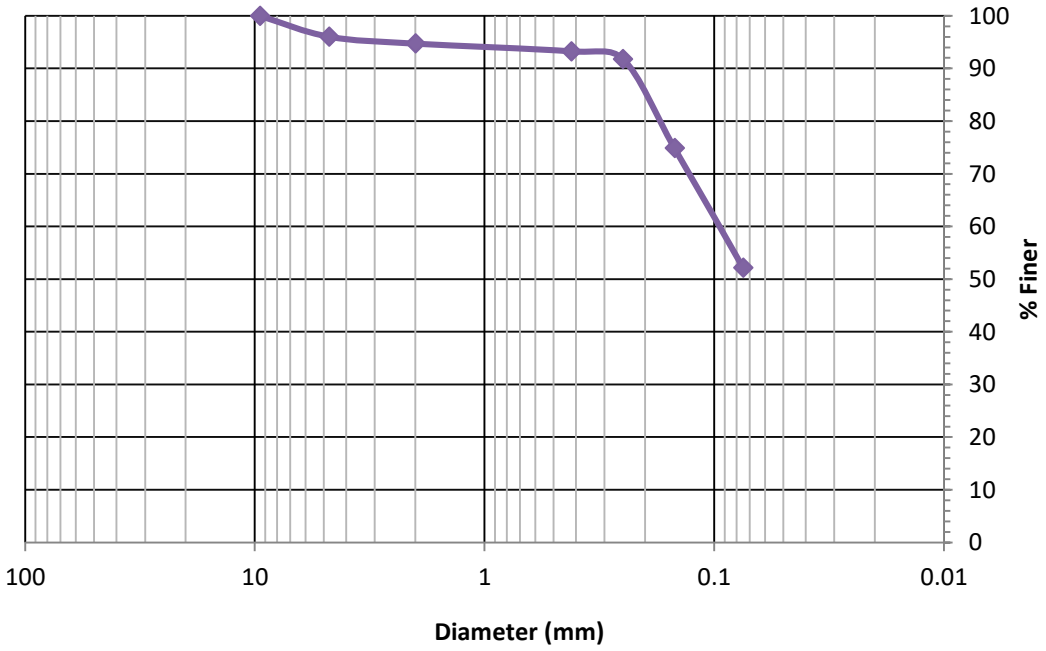
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Laboratory Test Report

Project Name: THEA PD&E Whiting Street
Client: LOCHNER
AREHNA Project No.: B-19-051

Report Date: 7/12/2021

Particle-Size Analysis of Soils (ASTM D6913)



Sieve Analysis

Sieve	Dia.	% Finer
3/8"	9.51	100.0
#4	4.76	96.1
#10	2.0	94.7
#40	0.42	93.3
#60	0.25	91.8
#100	0.149	74.9
#200	0.075	52.2

Material Information

Soil Classification:
Unified: CH
Natural Moisture: 65.3

Liquid Limit: 67
Plastic Limit: 24
Plasticity Index: 43

Boring No.: WB-02
Sample No.:
Depth: 23.0' - 25.0'
Soil Description: Very Pale Brown Sandy Clay

Report Date:	07/12/21
Boring No.:	WB-02
Sample No.:	
Depth:	23.0' - 25.0'

Soil Classificaton	
AASHTO	
Unified	CH

Test Method:	ASTM D6913
Minus #10 Split:	No

Auto Classification:	
AASHTO	A-7-6
Unified	CH

Corrosion Class	
Steel	
Concrete	

Soil Description:	Very Pale Brown Sandy Clay

Sample Type

Soil or Water	

pH (FM 5-550)

pH Reading	

Natural Moisture

Tare + Wet Soil (g)	55.1
Tare Mass (g)	15.3
Tare + Dry Soil (g)	39.4
Weight of Water (g)	15.7
Dry Soil (g)	24.1
Moisture (%)	65.3

200 Wash

Tare Mass (g)	0.0
Tare + Dry Soil Before Wash (g)	60.9
Tare + Dry Soil After Wash (g)	29.2
Loss (g)	31.7
Dry Soil Before Wash (g)	60.9
Loss + Pan Weight (g)	31.8
Percent Finer than -200 (%)	52.2

Hygroscopic Moisture

Tare + Air Dry (g)	
Tare + Oven Dry (g)	
Tare Mass (g)	
Hygroscopic Moisture (%)	--
Correction Factor	1.000

Sieve Analysis

Sieve	Mass Ret. (g)	% Ret. (g)	% Finer
3 1/2"			
3"			
2"			
1 1/2"			
1"			
3/4"			
1/2"			
3/8"	0.0	0.0	100.0
#4	2.4	3.9	96.1
#8			
#10	3.2	5.3	94.7
#16			
#30			
#40	4.1	6.7	93.3
#50			
#60	5.0	8.2	91.8
#100	15.3	25.1	74.9
#200	29.1	47.8	52.2
Pan Wt	0.1		

Liquid Limit

	1	2	3
Wet Mass + Tare (g)	32.30	31.48	32.18
Dry Mass + Tare (g)	28.09	27.30	27.57
Tare Mass (g)	21.54	21.12	21.08
Water Mass (g)	4.21	4.18	4.61
Dry Mass (g)	6.55	6.18	6.49
Content (%)	64	68	71
Number of Blows	35	24	16
Determined	Yes		

Plastic Limit

	1	2
Wet Mass + Tare (g)	29.04	28.49
Dry Mass + Tare (g)	27.55	27.12
Tare Mass (g)	21.45	21.43
Mass Water (g)	1.49	1.37
Dry Mass (g)	6.10	5.69
Content (%)	24	24
Determined	Yes	

Summary

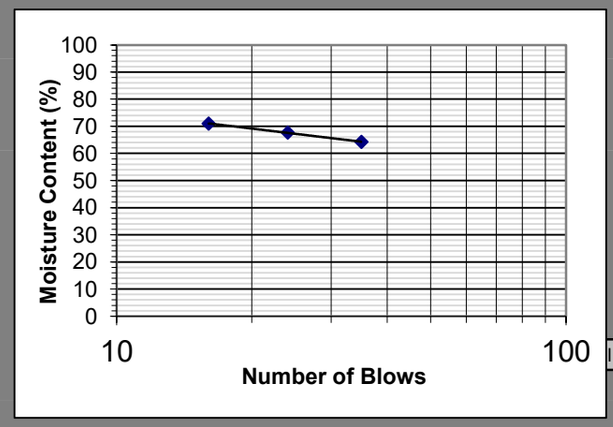
LL	67
PL	24
PI	43

Chlorides (FM 5-552)

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

Sulfates (FM 5-553)

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



Minus #10 Material

Tare + Air Dry (g)	
Tare Mass (g)	
Air Dry Mass (g)	--
Corrected Minus #10 Mass (g)	--

Original Sample Mass (g)	
Corrected Sample Mass (g)	--

D50	
Cc	
Cu	

Organic Content

	1	2	3
Mass of Crucible (g)			
Mass of Soil + Crucible (g)			
Mass After Ignition (g)			
Organic Content (%)			
Average Organic Content (%)			

l Reading

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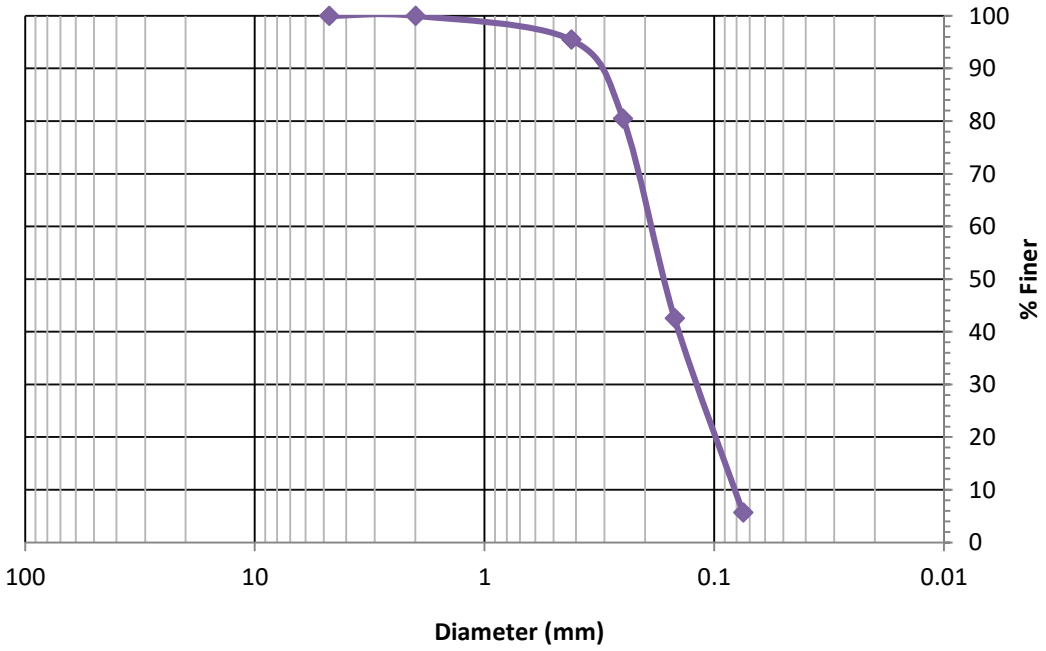
5012 W. Lemon Street
Tampa, Florida 33609
Ph 813.944.3464

Laboratory Test Report

Project Name: THEA PD&E Whiting Street
Client: LOCHNER
AREHNA Project No.: B-19-051

Report Date: 7/12/2021

Particle-Size Analysis of Soils (ASTM D6913)



Sieve Analysis

Sieve	Dia.	% Finer
#4	4.76	100.0
#10	2.0	100.0
#40	0.42	95.5
#60	0.25	80.5
#100	0.149	42.6
#200	0.075	5.7

Material Information

Soil Classification:
Unified: SP-SM
Natural Moisture: 12.8

Boring No.: WB-03
Sample No.:
Depth: 4.0' - 6.0'
Soil Description: Dark Brown Slightly Silty Sand

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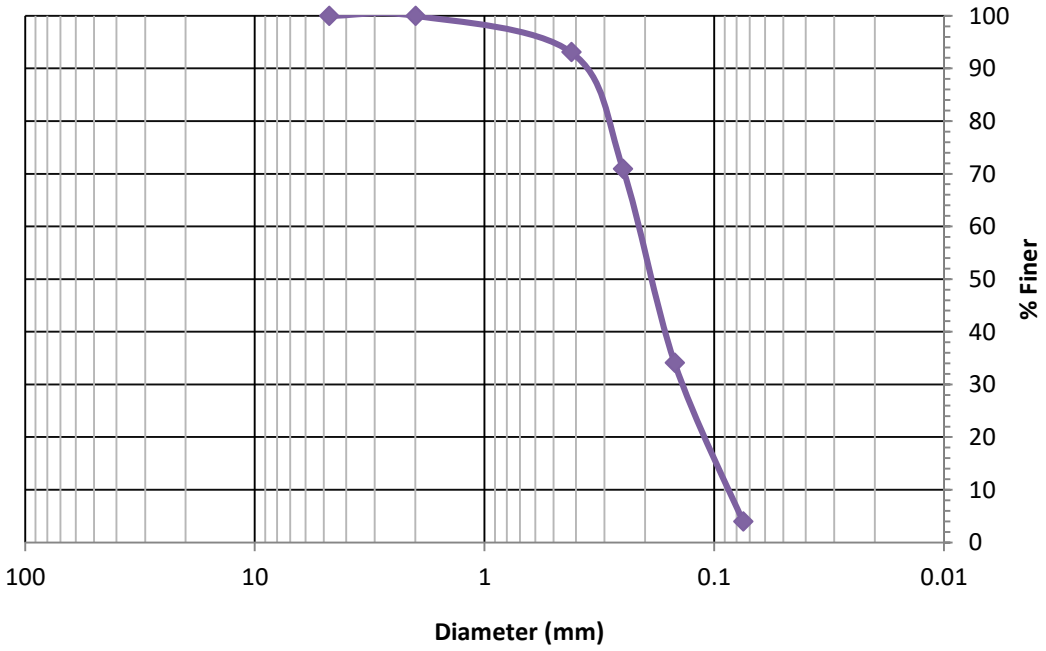
5012 W. Lemon Street
Tampa, Florida 33609
Ph 813.944.3464

Laboratory Test Report

Project Name: THEA PD&E Whiting Street
Client: LOCHNER
AREHNA Project No.: B-19-051

Report Date: 7/12/2021

Particle-Size Analysis of Soils (ASTM D6913)



Sieve Analysis

Sieve	Dia.	% Finer
#4	4.76	100.0
#10	2.0	100.0
#40	0.42	93.1
#60	0.25	70.9
#100	0.149	34.1
#200	0.075	4.0

Material Information

Soil Classification:
Unified: SP
Natural Moisture: 19.7

Boring No.: WB-04
Sample No.:
Depth: 8.0' - 10.0'
Soil Description: White Very Pale Brown Sand

AREHNA | Engineering, Inc.

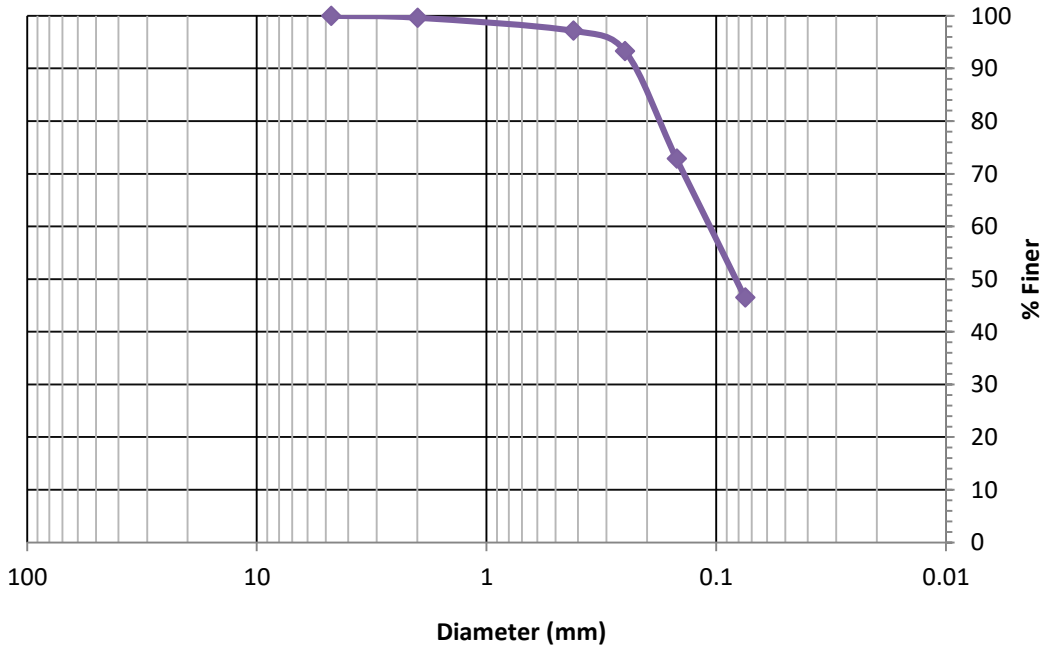
5012 W. Lemon Street
Tampa, Florida 33609
Ph 813.944.3464

Laboratory Test Report

Project Name: THEA PD&E Whiting Street
Client: LOCHNER
AREHNA Project No.: B-19-051

Report Date: 7/14/2021

Particle-Size Analysis of Soils (ASTM D6913)



Sieve Analysis

Sieve	Dia.	% Finer
#4	4.76	100.0
#10	2.0	99.6
#40	0.42	97.2
#60	0.25	93.3
#100	0.149	72.9
#200	0.075	46.5

Material Information

Soil Classification:
Unified: SC
Natural Moisture: 69.5

Liquid Limit: 89
Plastic Limit: 35
Plasticity Index: 54

Boring No.: WB-05
Sample No.:
Depth: 18.0' - 15.0'
Soil Description: Brownish Gray/Blue Clayey Sand

Report Date:	07/14/21
Boring No.:	WB-05
Sample No.:	
Depth:	18.0' - 15.0'

Soil Classificaton	
AASHTO	
Unified	SC

Test Method:	ASTM D6913
Minus #10 Split:	No

Auto Classification:

AASHTO	A-7-5
Unified	SC

Corrosion Class

Steel	
Concrete	

Soil Description:	Brownish Gray/Blue Clayey Sand

Sample Type

Soil or Water	

pH (FM 5-550)

pH Reading	

Natural Moisture

Tare + Wet Soil (g)	28.8
Tare Mass (g)	16.9
Tare + Dry Soil (g)	23.9
Weight of Water (g)	4.9
Dry Soil (g)	7.0
Moisture (%)	69.5

200 Wash

Tare Mass (g)	0.0
Tare + Dry Soil Before Wash (g)	28.4
Tare + Dry Soil After Wash (g)	15.2
Loss (g)	13.2
Dry Soil Before Wash (g)	28.4
Loss + Pan Weight (g)	13.2
Percent Finer than -200 (%)	46.5

Hygroscopic Moisture

Tare + Air Dry (g)	
Tare + Oven Dry (g)	
Tare Mass (g)	
Hygroscopic Moisture (%)	--
Correction Factor	1.000

Minus #10 Material

Tare + Air Dry (g)	
Tare Mass (g)	
Air Dry Mass (g)	--
Corrected Minus #10 Mass (g)	--

Original Sample Mass (g)	
Corrected Sample Mass (g)	--

Sieve Analysis

Sieve	Mass Ret. (g)	% Ret. (g)	% Finer
3 1/2"			
3"			
2"			
1 1/2"			
1"			
3/4"			
1/2"			
3/8"			
#4	0.0	0.0	100.0
#8			
#10	0.1	0.4	99.6
#16			
#30			
#40	0.8	2.8	97.2
#50			
#60	1.9	6.7	93.3
#100	7.7	27.1	72.9
#200	15.3	53.9	46.1
Pan Wt	0.0		

D50	
Cc	
Cu	

Liquid Limit

	1	2	3
Wet Mass + Tare (g)	30.91	28.86	31.67
Dry Mass + Tare (g)	26.39	25.20	26.82
Tare Mass (g)	21.02	21.10	21.54
Water Mass (g)	4.52	3.66	4.85
Dry Mass (g)	5.37	4.10	5.28
Content (%)	84	89	92
Number of Blows	33	26	19
Determined	Yes		

Plastic Limit

	1	2
Wet Mass + Tare (g)	27.43	26.20
Dry Mass + Tare (g)	25.95	24.82
Tare Mass (g)	21.75	20.83
Mass Water (g)	1.48	1.38
Dry Mass (g)	4.20	3.99
Content (%)	35	35
Determined	Yes	

Summary

LL	89
PL	35
PI	54

Organic Content

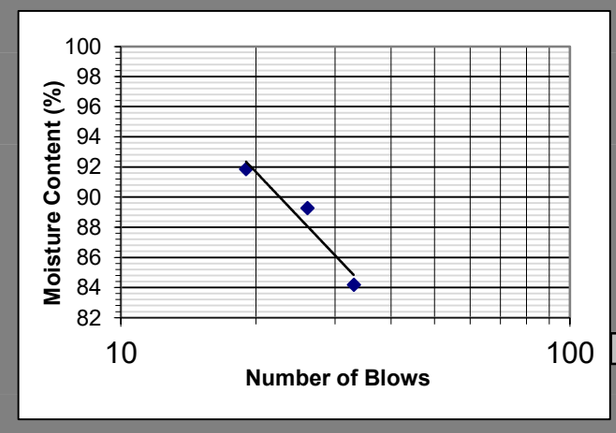
	1	2	3
Mass of Crucible (g)			
Mass of Soil + Crucible (g)			
Mass After Ignition (g)			
Organic Content (%)			
Average Organic Content (%)			

Chlorides (FM 5-552)

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

Sulfates (FM 5-553)

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



Report Date:	09/15/21
Boring No.:	BB-02
Sample No.:	
Depth:	1.0' - 7.0'

Soil Classificaton

AASHTO	
Unified	

Test Method:	
Minus #10 Split:	No

Auto Classification:

AASHTO	
Unified	

Corrosion Classification

Steel	Slightly
Concrete	Slightly

Soil Description:	Light Brown Sand

Sample Type

Soil or Water	Soil

Natural Moisture

Tare + Wet Soil (g)	
Tare Mass (g)	
Tare + Dry Soil (g)	
Weight of Water (g)	
Dry Soil (g)	--
Moisture (%)	

Sieve Analysis

Sieve	Mass Ret. (g)	% Ret. (g)	% Finer
3 1/2"			
3"			
2"			
1 1/2"			
1"			
3/4"			
1/2"			
3/8"			
#4			
#8			
#10			
#16			
#30			
#40			
#50			
#60			
#100			
#200			
Pan Wt			

Liquid Limit

	1	2	3
Wet Mass + Tare (g)			
Dry Mass + Tare (g)			
Tare Mass (g)			
Water Mass (g)			
Dry Mass (g)			
Content (%)			
Number of Blows			
Determined			

pH (FM 5-550)

pH Reading	8.29

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

200 Wash

Tare Mass (g)	
Tare + Dry Soil Before Wash (g)	
Tare + Dry Soil After Wash (g)	
Loss (g)	
Dry Soil Before Wash (g)	
Loss + Pan Weight (g)	
Percent Finer than -200 (%)	

Plastic Limit

	1	2
Wet Mass + Tare (g)		
Dry Mass + Tare (g)		
Tare Mass (g)		
Mass Water (g)		
Dry Mass (g)		
Content (%)		
Determined		

Sulfates (FM 5-553)

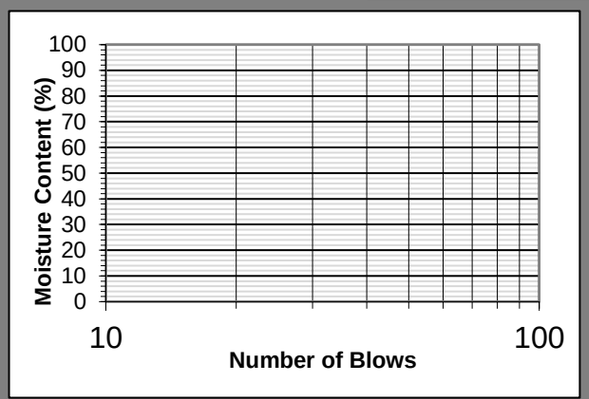
	Meter Reading	No. Dilutions	Reading
Low Range (2 to 70 ppm)	0	3	0
High Range (70+ ppm)		30	
		Final Reading	0

Hygroscopic Moisture

Tare + Air Dry (g)	
Tare + Oven Dry (g)	
Tare Mass (g)	
Hygroscopic Moisture (%)	--
Correction Factor	1.000

Summary

LL	
PL	
PI	



Resistivity (FM 5-551)

Ohmns
57000
31000
19000
13000
16000
Final Reading 13000

Minus #10 Material

Tare + Air Dry (g)	
Tare Mass (g)	
Air Dry Mass (g)	--
Corrected Minus #10 Mass (g)	--

D50	
Cc	
Cu	

Organic Content

	1	2	3
Mass of Crucible (g)			
Mass of Soil + Crucible (g)			
Mass After Ignition (g)			
Organic Content (%)			
Average Organic Content (%)			

Original Sample Mass (g)	
Corrected Sample Mass (g)	--

07/12/21
BB-04
2.0' - 10.0'

Soil Classificaton

AASHTO	
Unified	

Test Method:	ASTM D6913
Minus #10 Split:	No

Auto Classification:

AASHTO	
Unified	

Corrosion Classification

Steel	Slightly
Concrete	Slightly

Brown/Very Pale Brown Sand

Sample Type

Soil or Water	Soil

pH (FM 5-550)

pH Reading	8.09

Sieve Analysis

	Sieve	Mass Ret. (g)	% Ret. (g)	% Finer
	3 1/2"			
	3"			
--	2"			
	1 1/2"			
	1"			
	3/4"			
	1/2"			
	3/8"			
	#4			
	#8			
	#10			
	#16			
	#30			
	#40			
	#50			
	#60			
	#100			
	#200			
--	Pan Wt			
1.000				

Liquid Limit

	1	2	3
Wet Mass + Tare (g)			
Dry Mass + Tare (g)			
Tare Mass (g)			
Water Mass (g)			
Dry Mass (g)			
Content (%)			
Number of Blows			
Determined			

Plastic Limit

	1	2
Wet Mass + Tare (g)		
Dry Mass + Tare (g)		
Tare Mass (g)		
Mass Water (g)		
Dry Mass (g)		
Content (%)		
Determined		

Summary

LL	
PL	
PI	

Chlorides (FM 5-552)

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

Sulfates (FM 5-553)

	Meter Reading	No. Dilutions	Reading
Low Range (2 to 70 ppm)	0	3	0
High Range (70+ ppm)		30	
		Final Reading	0

Resistivity (FM 5-551)

Ohmns
130000
37000
22000
11000
13000
Final Reading: 11000

D50	
Cc	
Cu	

Organic Content

	1	2	3
Mass of Crucible (g)			
Mass of Soil + Crucible (g)			
Mass After Ignition (g)			
Organic Content (%)			
Average Organic Content (%)			

Report Date:	09/15/21
Boring No.:	Water Sample
Sample No.:	
Depth:	N/A

Soil Classificaton

AASHTO	
Unified	

Test Method:	
Minus #10 Split:	No

Auto Classification:

AASHTO	
Unified	

Corrosion Classification

Steel	Extremely
Concrete	Extremely

Soil Description:	Water Sample

Sample Type

Soil or Water	Water

Natural Moisture

Tare + Wet Soil (g)	
Tare Mass (g)	
Tare + Dry Soil (g)	
Weight of Water (g)	
Dry Soil (g)	--
Moisture (%)	

200 Wash

Tare Mass (g)	
Tare + Dry Soil Before Wash (g)	
Tare + Dry Soil After Wash (g)	
Loss (g)	
Dry Soil Before Wash (g)	
Loss + Pan Weight (g)	
Percent Finer than -200 (%)	

Hygroscopic Moisture

Tare + Air Dry (g)	
Tare + Oven Dry (g)	
Tare Mass (g)	
Hygroscopic Moisture (%)	--
Correction Factor	1.000

Minus #10 Material

Tare + Air Dry (g)	
Tare Mass (g)	
Air Dry Mass (g)	--
Corrected Minus #10 Mass (g)	--

Original Sample Mass (g)	
Corrected Sample Mass (g)	--

Sieve Analysis

Sieve	Mass Ret. (g)	% Ret. (g)	% Finer
3 1/2"			
3"			
2"			
1 1/2"			
1"			
3/4"			
1/2"			
3/8"			
#4			
#8			
#10			
#16			
#30			
#40			
#50			
#60			
#100			
#200			
Pan Wt			

D50	
Cc	
Cu	

Liquid Limit

	1	2	3
Wet Mass + Tare (g)			
Dry Mass + Tare (g)			
Tare Mass (g)			
Water Mass (g)			
Dry Mass (g)			
Content (%)			
Number of Blows			
Determined			

Plastic Limit

	1	2
Wet Mass + Tare (g)		
Dry Mass + Tare (g)		
Tare Mass (g)		
Mass Water (g)		
Dry Mass (g)		
Content (%)		
Determined		

Summary

LL	
PL	
PI	

Organic Content

	1	2	3
Mass of Crucible (g)			
Mass of Soil + Crucible (g)			
Mass After Ignition (g)			
Organic Content (%)			
Average Organic Content (%)			

pH (FM 5-550)

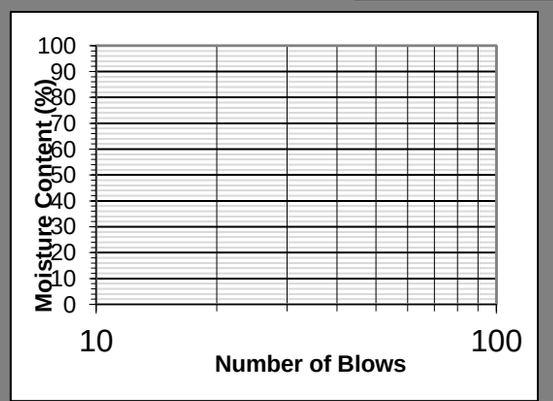
pH Reading	7.36

Chlorides (FM 5-552)

	Drops Required	Multiplier	No. Dilutions	Reading
0-100 ppm	21	5	1	100
100-400 ppm	20	20	1	395
500-10,000 ppm	11	500	1	5495
5,000-100,000ppm		5000	10	
			Final Reading	5495

Sulfates (FM 5-553)

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



Resistivity (FM 5-551)

Ohmns
63
Final Reading 63

Appendix C

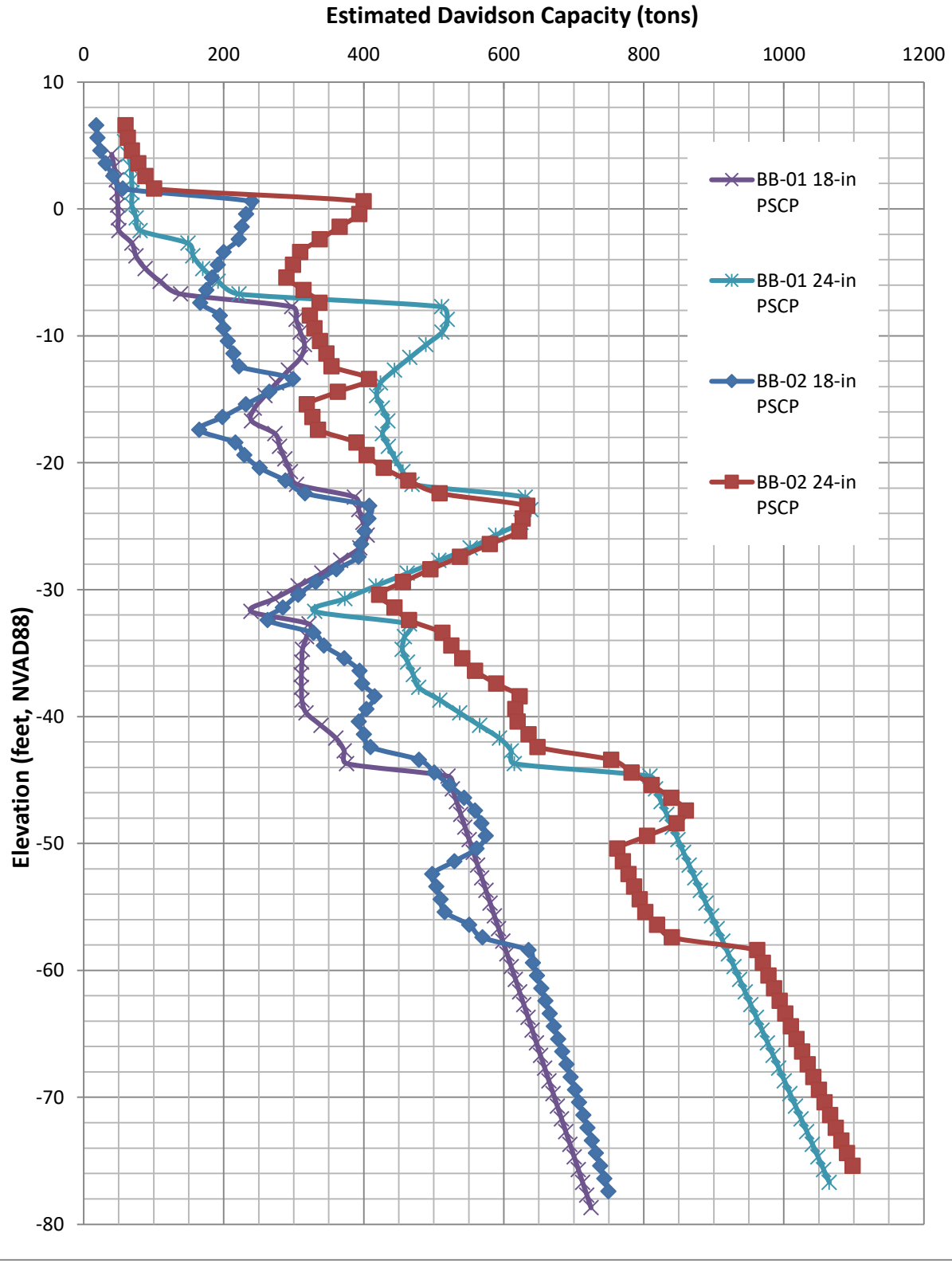
Driven Pile Capacity Curves
Drilled Shaft Capacity Curves
FB-MultiPier Soil Parameters

Pre-Stressed Concrete Pile Capacity

AREHNA Project No. B-19-051

Figure 1

THEA PD&E Whiting Street (Florida Ave. Loop)

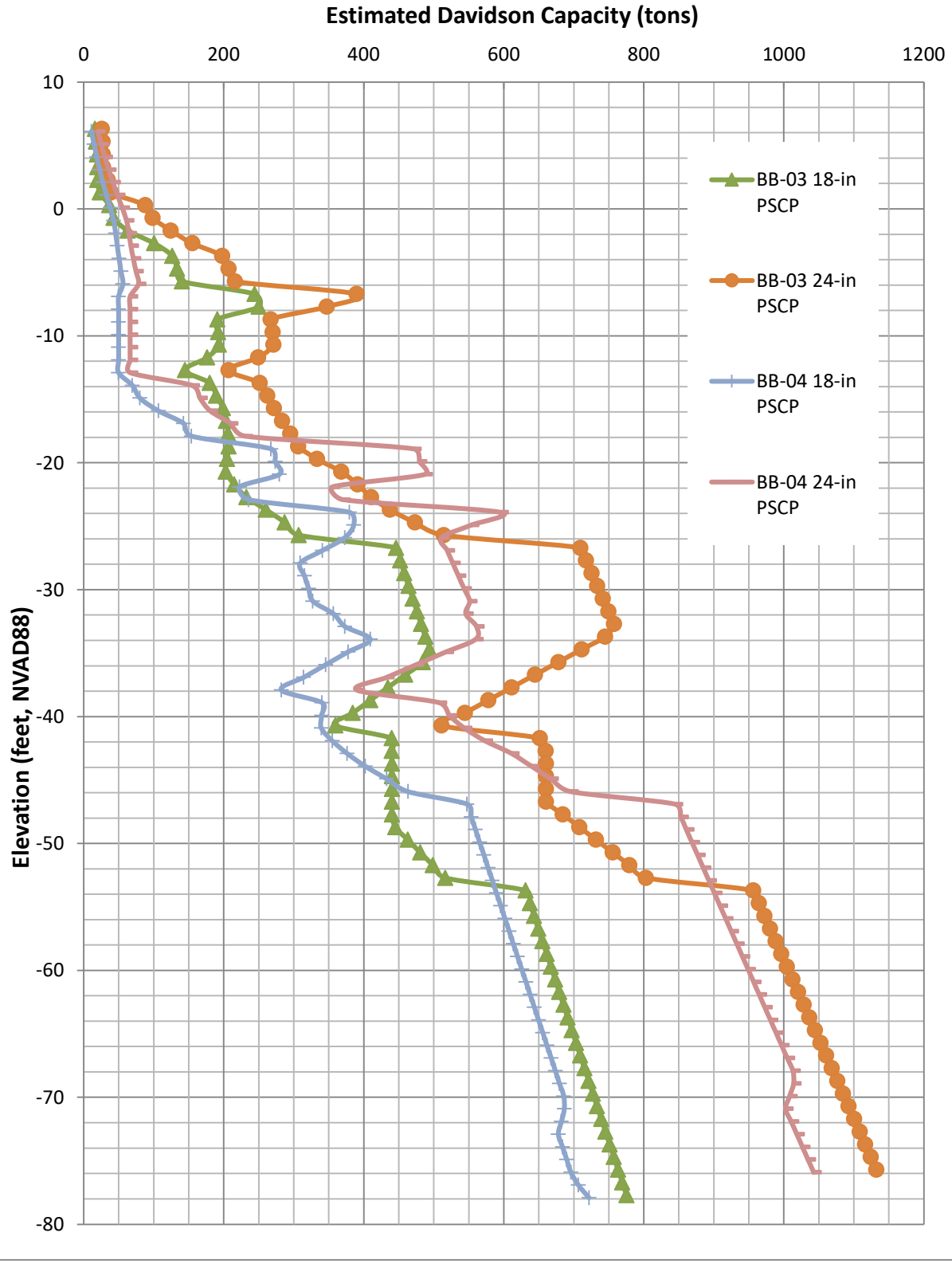


Pre-Stressed Concrete Pile Capacity

AREHNA Project No. B-19-051

Figure 2

THEA PD&E Whiting Street

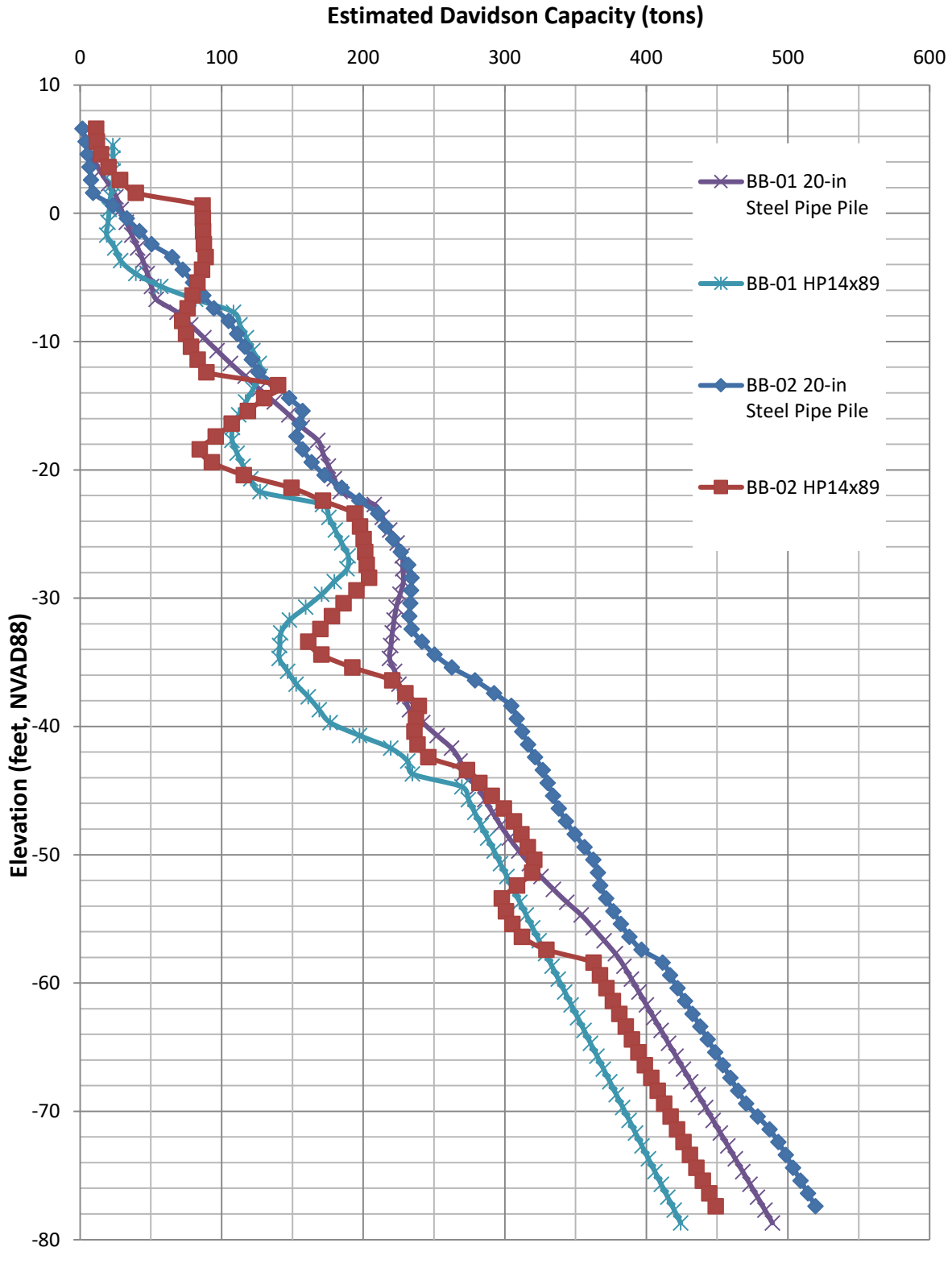


Steel Pipe and H Pile Capacity

AREHNA Project No. B-19-051

Figure 3

THEA PD&E Whiting Street (Florida Ave. Loop)

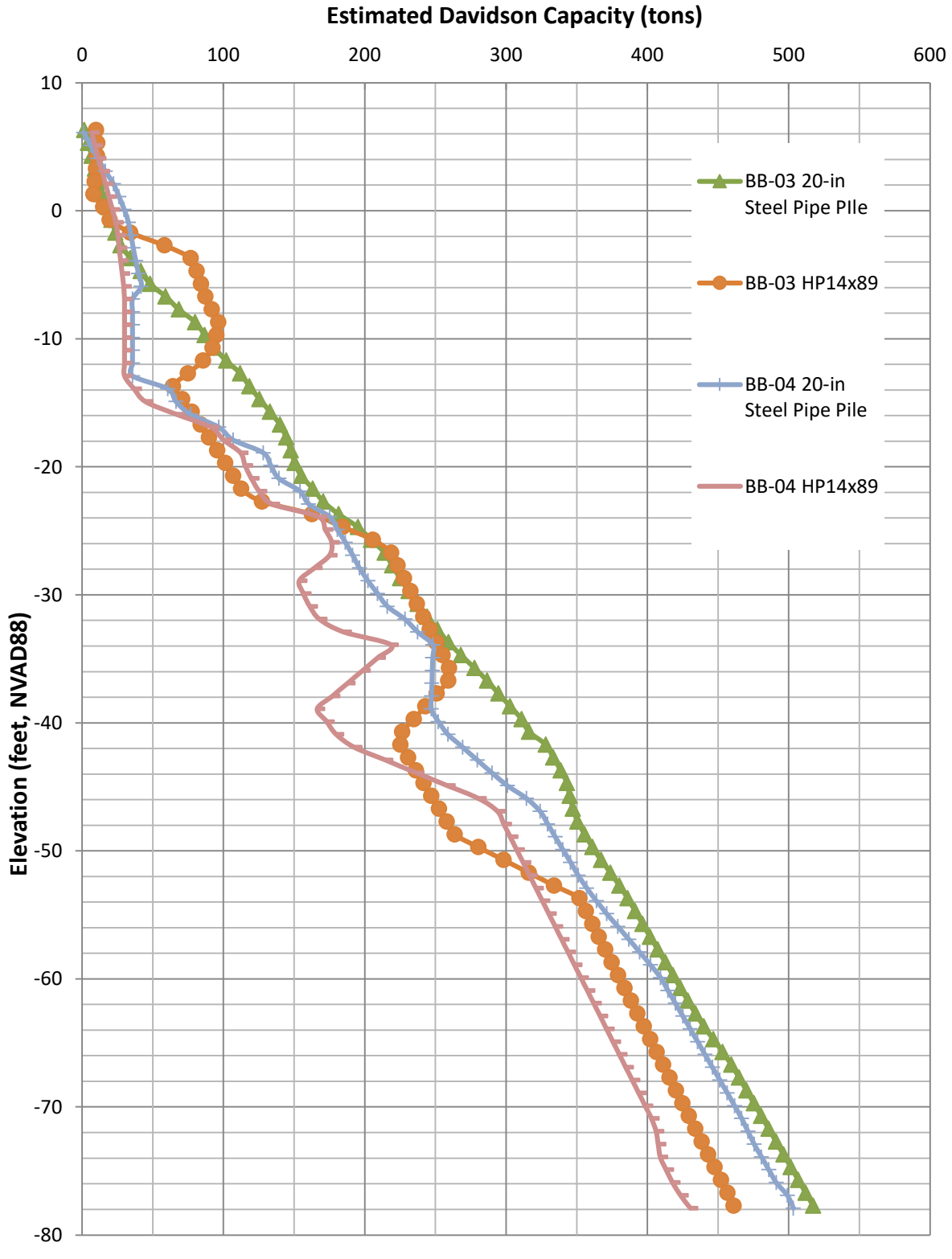


Steel Pipe and H Pile Capacity

AREHNA Project No. B-19-051

Figure 4

THEA PD&E Whiting Street

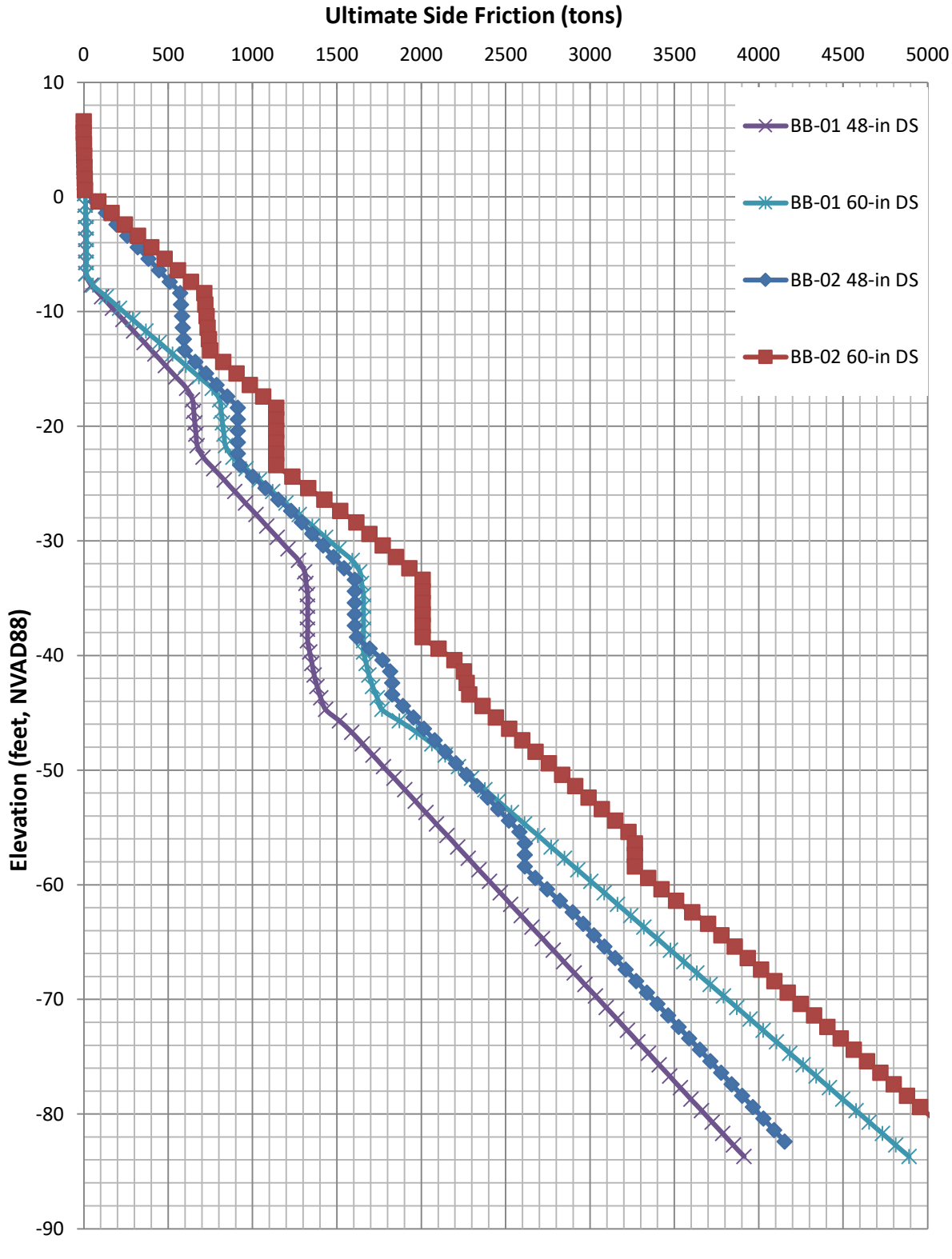


Drilled Shaft Capacity

AREHNA Project No. B-19-051

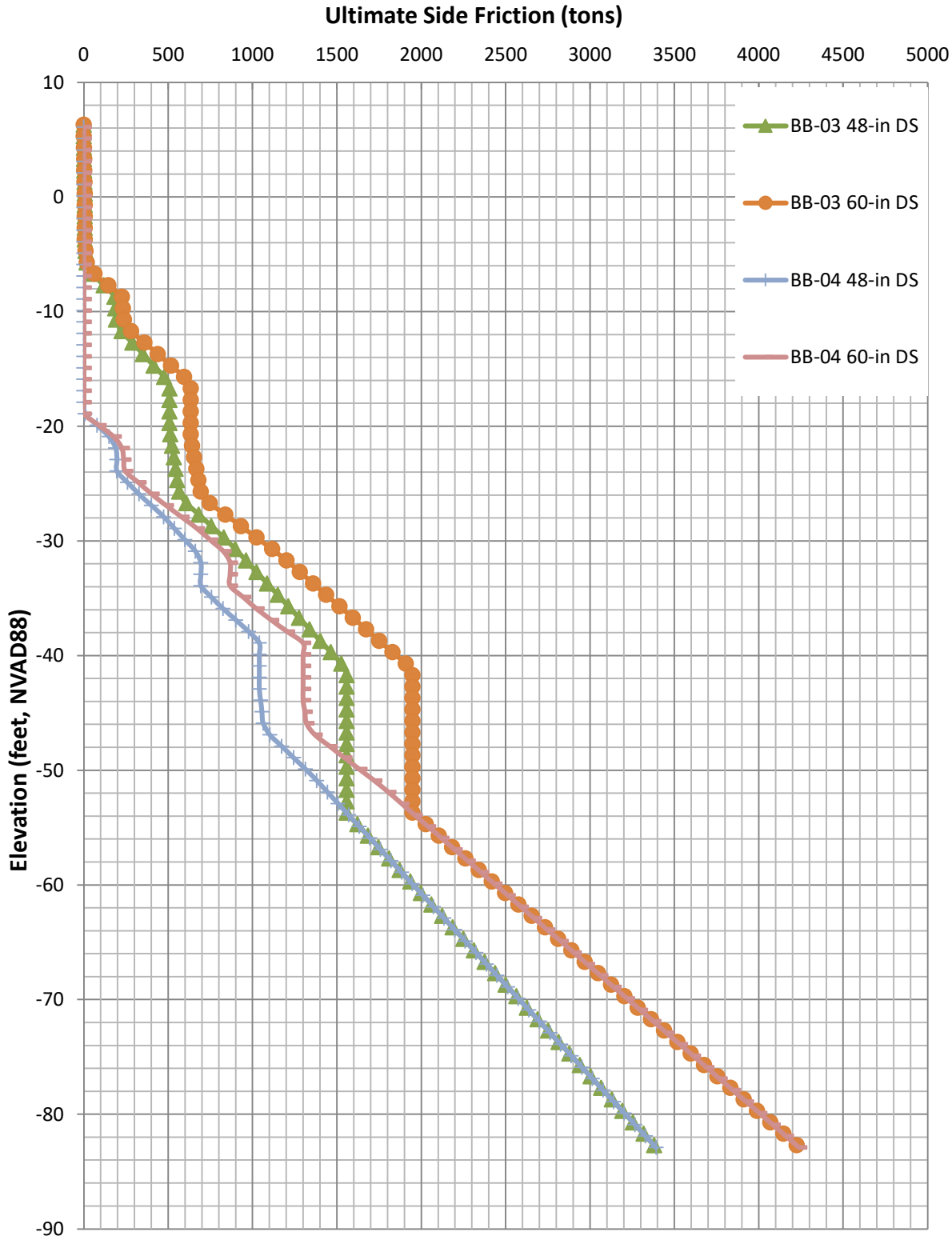
Figure 5

THEA PD&E Whiting Street (Florida Ave. Loop)



Drilled Shaft Capacity
AREHNA Project No. B-19-051
Figure 6

THEA PD&E Whiting Street



AREHNA Engineering, Inc.
5012 W. Lemon Street
Tampa, Florida 33609

Project Name:	THEA PD&E Whiting Street
Project Number:	B-19-051
Prepared by/ Date:	JB 9-17-21
Checked by/ Date:	KE 9-17-21

Boring Number:	BB-01
Boring GSE (ft, NAVD):	15.3
Bridge End/ Pier No.:	-
Station and Offset (Baseline):	105+72
Preforming Elevation (ft):	-7.7
Pile Size (in):	18
Pile Tip (CLOSED or OPEN or N/A):	N/A
Pile Thickness (in):	N/A
Pile Tip Area (in^2):	324

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

ELEVATIONS AND SOIL TYPE:	**Sample 1**	**Sample 2**	**Sample 3**	**Sample 4**	**Sample 5**
Depth at top of layer (ft)	**0**	**23**	**50**	**58**	**60.5**
Depth at bottom of layer (ft)	**23**	**50**	**58**	**60.5**	**100**
Depth at design water table (ft)	6	6	6	6	6
Elevation at top of layer (ft, NAVD)	15.3	-7.7	-34.7	-42.7	-45.2
Elevation at bottom of layer (ft, NAVD)	-7.7	-34.7	-42.7	-45.2	-84.7
Water Table Elevation (ft, NAVD)	9.3	9.3	9.3	9.3	9.3
Soil Layer Type (0-Cohesionless, 1 -Cohesive, 2 -Rock)	0-Cohesionless	2 -Rock	1 -Cohesive	0-Cohesionless	2 -Rock
USCS Soil Layer Type (GW,GP, SP, SP-SM, SM, SC, ML, CL, CH, N/A for Rock)	SP-SM	N/A	ML	SP	N/A
Average SPT N value (automatic), Blows/ ft	15	82	41	15	100
SOIL PROPERTIES FOR LATERAL SOIL MODEL:					
Lateral Soil Model	1 (O'Neill)	8 (McVay)	3(O'Neill)	1 (O'Neill)	8 (McVay)
Internal Friction Angle, ϕ (degrees)	33	------	-----	33	------
Subgrade Soil Modulus, RK (pci)	54	------	------	54	------
Undrained Strength, C (psf)	-----	16667	1125	-----	16667
Strain @ 50% Failure, ε 50 (in/in)	-----	-----	0.005	-----	-----
Strain @ 100% Failure, ε 100 (in/in)	-----	-----	0.015	-----	-----
Total Unit Weight, γ_t (pcf)	115	------	140	115	------
Effective Unit Weight, γ_{eff} (pci) [1]	0.0304	-----	0.0449	0.0304	-----
Unconfined Compressive Strength, Limestone (psf)	------	33333	2250	------	33333
SOIL PROPERTIES FOR THE AXIAL MODEL:					
Axial Soil Model	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989
Shear Modulus, G (ksi)	1.5	11.1	4.6	1.5	11.1
Poisson's Ratio, ν	0.3	0.2	0.5	0.3	0.2
Vertical Failure Shear Stress (psf)	707	2000	2625	372	2000
Internal Friction Angle, ϕ (degrees)	33	40	-----	33	40
Total Unit Weight, γ_t (pcf)	115	120	140	115	120
SOIL PROPERTIES FOR THE TORSIONAL MODEL:					
Torsional Soil Model	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic
Shear Modulus, G (ksi)	1.5	11.1	4.6	1.5	11.1
Torsional Shear Stress (psf)	495	700	1837	260	700
SOIL PROPERTIES FOR THE TIP MODEL:					
Tip Soil Model	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989
Shear Modulus, G (ksi)	1.5	11.1	4.6	1.5	11.1
Poisson's Ratio, ν	0.3	0.2	0.5	0.3	0.2
Axial Bearing Failure Load, Qult (kip)	268	1549	366	268	1549

AREHNA Engineering, Inc.
5012 W. Lemon Street
Tampa, Florida 33609

Project Name:	THEA PD&E Whiting Street
Project Number:	B-19-051
Prepared by/ Date:	JB 9-17-21
Checked by/ Date:	KE 9-17-21

Boring Number:	BB-02
Boring GSE (ft, NAVD):	16.6
Bridge End/ Pier No.:	-
Station and Offset (Baseline):	107+56
Preforming Elevation (ft):	0.6
Pile Size (in):	18
Pile Tip (CLOSED or OPEN or N/A):	N/A
Pile Thickness (in):	N/A
Pile Tip Area (in^2):	324

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

ELEVATIONS AND SOIL TYPE:	**Sample 1**	**Sample 2**	**Sample 3**	**Sample 4**	**Sample 5**	**Sample 6**
Depth at top of layer (ft)	**0**	**16**	**35.5**	**40**	**50**	**55**
Depth at bottom of layer (ft)	**16**	**35.5**	**40**	**50**	**55**	**100**
Depth at design water table (ft)	7.5	7.5	7.5	7.5	7.5	7.5
Elevation at top of layer (ft, NAVD)	16.6	0.6	-18.9	-23.4	-33.4	-38.4
Elevation at bottom of layer (ft, NAVD)	0.6	-18.9	-23.4	-33.4	-38.4	-83.4
Water Table Elevation (ft, NAVD)	9.1	9.1	9.1	9.1	9.1	9.1
Soil Layer Type (0-Cohesionless, 1 -Cohesive, 2 -Rock)	0-Cohesionless	2 -Rock	1 -Cohesive	2 -Rock	1 -Cohesive	2 -Rock
USCS Soil Layer Type (GW,GP, SP, SP-SM, SM, SC, ML, CL, CH, N/A for Rock)	SP	N/A	ML	N/A	ML	N/A
Average SPT N value (automatic), Blows/ ft	14	74	34	83	100	97
SOIL PROPERTIES FOR LATERAL SOIL MODEL:						
Lateral Soil Model	1 (O'Neill)	8 (McVay)	3(O'Neill)	8 (McVay)	3(O'Neill)	8 (McVay)
Internal Friction Angle, ϕ (degrees)	32	------	-----	------	-----	------
Subgrade Soil Modulus, RK (pci)	50	------	------	------	------	------
Undrained Strength, C (psf)	-----	16667	1125	16667	1125	16667
Strain @ 50% Failure, ε 50 (in/in)	-----	-----	0.005	-----	0.005	-----
Strain @ 100% Failure, ε 100 (in/in)	-----	-----	0.015	-----	0.015	-----
Total Unit Weight, γ_t (pcf)	112	------	140	------	140	------
Effective Unit Weight, γ_{eff} (pci) [1]	0.0287	-----	0.0449	-----	0.0449	-----
Unconfined Compressive Strength, Limestone (psf)	------	33333	2250	33333	2250	33333
SOIL PROPERTIES FOR THE AXIAL MODEL:						
Axial Soil Model	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989
Shear Modulus, G (ksi)	1.5	11.1	4.6	11.1	4.6	11.1
Poisson's Ratio, ν	0.2	0.2	0.5	0.2	0.5	0.2
Vertical Failure Shear Stress (psf)	660	1835	2496	2000	2618	2000
Internal Friction Angle, ϕ (degrees)	32	40	-----	40	-----	40
Total Unit Weight, γ_t (pcf)	112	120	140	120	140	120
SOIL PROPERTIES FOR THE TORSIONAL MODEL:						
Torsional Soil Model	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic
Shear Modulus, G (ksi)	1.5	11.1	4.6	11.1	4.6	11.1
Torsional Shear Stress (psf)	462	700	1747	700	1833	700
SOIL PROPERTIES FOR THE TIP MODEL:						
Tip Soil Model	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989
Shear Modulus, G (ksi)	1.5	11.1	4.6	11.1	4.6	11.1
Poisson's Ratio, ν	0.2	0.2	0.5	0.2	0.5	0.2
Axial Bearing Failure Load, Qult (kip)	250	1375	304	1549	432	1549

AREHNA Engineering, Inc.
5012 W. Lemon Street
Tampa, Florida 33609

Project Name:	THEA PD&E Whiting Street
Project Number:	B-19-051
Prepared by/ Date:	JB 9-17-21
Checked by/ Date:	KE 9-17-21

Boring Number:	BB-03
Boring GSE (ft, NAVD):	16.3
Bridge End/ Pier No.:	-
Station and Offset (Baseline):	204+29
Preforming Elevation (ft):	-3.7
Pile Size (in):	18
Pile Tip (CLOSED or OPEN or N/A):	N/A
Pile Thickness (in):	N/A
Pile Tip Area (in^2):	324

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

ELEVATIONS AND SOIL TYPE:	**Sample 1**	**Sample 2**	**Sample 3**	**Sample 4**	**Sample 5**	**Sample 6**	**Sample 7**	**Sample 8**
Depth at top of layer (ft)	**0**	**16**	**20**	**30.5**	**38**	**43**	**58**	**70**
Depth at bottom of layer (ft)	**16**	**20**	**30.5**	**38**	**43**	**58**	**70**	**100**
Depth at design water table (ft)								
Elevation at top of layer (ft, NAVD)	16.3	0.3	-3.7	-14.2	-21.7	-26.7	-41.7	-53.7
Elevation at bottom of layer (ft, NAVD)	0.3	-3.7	-14.2	-21.7	-26.7	-41.7	-53.7	-83.7
Water Table Elevation (ft, NAVD)								
Soil Layer Type (0-Cohesionless, 1 -Cohesive, 2 -Rock)	0-Cohesionless	1 -Cohesive	2 -Rock	1 -Cohesive	1 -Cohesive	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-SM	ML	N/A	ML	CH	N/A	SC	N/A
Average SPT N value (automatic), Blows/ ft	16	6	76	74	23	100	78	100
SOIL PROPERTIES FOR LATERAL SOIL MODEL:								
Lateral Soil Model	1 (O'Neill)	3(O'Neill)	8 (McVay)	3(O'Neill)	3(O'Neill)	8 (McVay)	1 (O'Neill)	8 (McVay)
Internal Friction Angle, ϕ (degrees)	33	-----	------	-----	-----	------	35	------
Subgrade Soil Modulus, RK (pci)	58	------	------	------	------	------	185	------
Undrained Strength, C (psf)	-----	558	16667	1125	1965	16667	-----	16667
Strain @ 50% Failure, ε 50 (in/in)	-----	0.008	-----	0.005	0.005	-----	-----	-----
Strain @ 100% Failure, ε 100 (in/in)	-----	0.019	-----	0.015	0.015	-----	-----	-----
Total Unit Weight, γ_t (pcf)	115	119	------	140	140	------	130	------
Effective Unit Weight, γ_{eff} (pci) [1]	0.0304	0.0329	-----	0.0449	0.0449	-----	0.0391	-----
Unconfined Compressive Strength, Limestone (psf)	------	1116	33333	2250	3930	33333	------	33333
SOIL PROPERTIES FOR THE AXIAL MODEL:								
Axial Soil Model	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989
Shear Modulus, G (ksi)	1.6	1.4	11.1	4.6	4.6	11.1	4.3	11.1
Poisson's Ratio, ν	0.3	0.5	0.2	0.5	0.5	0.2	0.4	0.2
Vertical Failure Shear Stress (psf)	754	666	1885	2618	2320	2000	2618	2000
Internal Friction Angle, ϕ (degrees)	33	-----	40	-----	-----	40	35	40
Total Unit Weight, γ_t (pcf)	115	119	120	140	140	120	130	120
SOIL PROPERTIES FOR THE TORSIONAL MODEL:								
Torsional Soil Model	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic
Shear Modulus, G (ksi)	1.6	1.4	11.1	4.6	4.6	11.1	4.3	11.1
Torsional Shear Stress (psf)	528	466	700	1833	1624	700	1833	700
SOIL PROPERTIES FOR THE TIP MODEL:								
Tip Soil Model	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989
Shear Modulus, G (ksi)	1.6	1.4	11.1	4.6	4.6	11.1	4.3	11.1
Poisson's Ratio, ν	0.3	0.5	0.2	0.5	0.5	0.2	0.4	0.2
Axial Bearing Failure Load, Qult (kip)	286	54	1426	432	90	1549	432	1549

AREHNA Engineering, Inc.
5012 W. Lemon Street
Tampa, Florida 33609

Project Name:	THEA PD&E Whiting Street
Project Number:	B-19-051
Prepared by/ Date:	JB 9-17-21
Checked by/ Date:	KE 9-17-21

Boring Number:	BB-04
Boring GSE (ft, NAVD):	16.1
Bridge End/ Pier No.:	-
Station and Offset (Baseline):	206+48
Preforming Elevation (ft):	-18.9
Pile Size (in):	18
Pile Tip (CLOSED or OPEN or N/A):	N/A
Pile Thickness (in):	N/A
Pile Tip Area (in^2):	324

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

ELEVATIONS AND SOIL TYPE:	**Sample 1**	**Sample 2**	**Sample 3**	**Sample 4**	**Sample 5**	**Sample 6**	**Sample 7**
Depth at top of layer (ft)	**0**	**34**	**38**	**50**	**62**	**70**	**75**
Depth at bottom of layer (ft)	**34**	**38**	**50**	**62**	**70**	**75**	**100**
Depth at design water table (ft)	5	5	5	5	5	5	5
Elevation at top of layer (ft, NAVD)	16.1	-17.9	-21.9	-33.9	-45.9	-53.9	-58.9
Elevation at bottom of layer (ft, NAVD)	-17.9	-21.9	-33.9	-45.9	-53.9	-58.9	-83.9
Water Table Elevation (ft, NAVD)	11.1	11.1	11.1	11.1	11.1	11.1	11.1
Soil Layer Type (0-Cohesionless, 1 -Cohesive, 2 -Rock)	0-Cohesionless	0-Cohesionless	0-Cohesionless	1 -Cohesive	2 -Rock	1 -Cohesive	0-Cohesionless
USCS Soil Layer Type (GW,GP, SP, SP-SM, SM, SC, ML, CL, CH, N/A for Rock)	SP	SC	SP	CH	N/A	CH	N/A
Average SPT N value (automatic), Blows/ ft	6	13	1	59	95	100	97
SOIL PROPERTIES FOR LATERAL SOIL MODEL:							
Lateral Soil Model	1 (O'Neill)	1 (O'Neill)	1 (O'Neill)	3(O'Neill)	8 (McVay)	3(O'Neill)	1 (O'Neill)
Internal Friction Angle, ϕ (degrees)	30	30	28	-----	------	-----	38
Subgrade Soil Modulus, RK (pci)	18	46	10	------	------	------	185
Undrained Strength, C (psf)	-----	-----	-----	1965	16667	1965	-----
Strain @ 50% Failure, ε 50 (in/in)	-----	-----	-----	0.005	-----	0.005	-----
Strain @ 100% Failure, ε 100 (in/in)	-----	-----	-----	0.015	-----	0.015	-----
Total Unit Weight, γ_t (pcf)	105	112	102	140	------	140	130
Effective Unit Weight, γ_{eff} (pci) [1]	0.0247	0.0287	0.0229	0.0449	-----	0.0449	0.0391
Unconfined Compressive Strength, Limestone (psf)	------	------	------	3930	33333	3930	------
SOIL PROPERTIES FOR THE AXIAL MODEL:							
Axial Soil Model	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989
Shear Modulus, G (ksi)	0.6	1.4	0.1	4.6	11.1	4.6	4.3
Poisson's Ratio, ν	0.2	0.2	0.2	0.5	0.2	0.5	0.4
Vertical Failure Shear Stress (psf)	283	1321	47	2995	2000	2995	2280
Internal Friction Angle, ϕ (degrees)	30	30	28	-----	40	-----	38
Total Unit Weight, γ_t (pcf)	105	112	102	140	120	140	130
SOIL PROPERTIES FOR THE TORSIONAL MODEL:							
Torsional Soil Model	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic
Shear Modulus, G (ksi)	0.6	1.4	0.1	4.6	11.1	4.6	4.3
Torsional Shear Stress (psf)	198	925	33	2097	700	2097	1596
SOIL PROPERTIES FOR THE TIP MODEL:							
Tip Soil Model	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989
Shear Modulus, G (ksi)	0.6	1.4	0.1	4.6	11.1	4.6	4.3
Poisson's Ratio, ν	0.2	0.2	0.2	0.5	0.2	0.5	0.4
Axial Bearing Failure Load, Qult (kip)	107	116	18	189	1549	189	#VALUE!

AREHNA Engineering, Inc.
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Project Name:	THEA PD&E Whiting Street
Project Number:	B-19-051
Prepared by/ Date:	JB 9-17-21
Checked by/ Date:	KE 9-17-21

Boring Number:	BB-01
Boring GSE (ft, NAVD):	15.3
Bridge End/ Pier No.:	-
Station and Offset (Baseline):	105+72
Preforming Elevation (ft):	-7.7
Pile Size (in):	24
Pile Tip (CLOSED or OPEN or N/A):	N/A
Pile Thickness (in):	N/A
Pile Tip Area (in^2):	576

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

ELEVATIONS AND SOIL TYPE:	**Sample 1**	**Sample 2**	**Sample 3**	**Sample 4**	**Sample 5**
Depth at top of layer (ft)	**0**	**23**	**50**	**58**	**60.5**
Depth at bottom of layer (ft)	**23**	**50**	**58**	**60.5**	**100**
Depth at design water table (ft)	6	6	6	6	6
Elevation at top of layer (ft, NAVD)	15.3	-7.7	-34.7	-42.7	-45.2
Elevation at bottom of layer (ft, NAVD)	-7.7	-34.7	-42.7	-45.2	-84.7
Water Table Elevation (ft, NAVD)	9.3	9.3	9.3	9.3	9.3
Soil Layer Type (0-Cohesionless, 1 -Cohesive, 2 -Rock)	0-Cohesionless	2 -Rock	1 -Cohesive	0-Cohesionless	2 -Rock
USCS Soil Layer Type (GW,GP, SP, SP-SM, SM, SC, ML, CL, CH, N/A for Rock)	SP-SM	N/A	ML	SP	N/A
Average SPT N value (automatic), Blows/ ft	15	82	41	15	100
SOIL PROPERTIES FOR LATERAL SOIL MODEL:					
Lateral Soil Model	1 (O'Neill)	8 (McVay)	3(O'Neill)	1 (O'Neill)	8 (McVay)
Internal Friction Angle, ϕ (degrees)	33	------	-----	33	------
Subgrade Soil Modulus, RK (pci)	54	------	------	54	------
Undrained Strength, C (psf)	-----	16667	1125	-----	16667
Strain @ 50% Failure, ε 50 (in/in)	-----	-----	0.005	-----	-----
Strain @ 100% Failure, ε 100 (in/in)	-----	-----	0.015	-----	-----
Total Unit Weight, γ_t (pcf)	115	------	140	115	------
Effective Unit Weight, γ_{eff} (pci) [1]	0.0304	-----	0.0449	0.0304	-----
Unconfined Compressive Strength, Limestone (psf)	------	33333	2250	------	33333
SOIL PROPERTIES FOR THE AXIAL MODEL:					
Axial Soil Model	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989
Shear Modulus, G (ksi)	1.5	11.1	4.6	1.5	11.1
Poisson's Ratio, ν	0.3	0.2	0.5	0.3	0.2
Vertical Failure Shear Stress (psf)	707	2000	2625	372	2000
Internal Friction Angle, ϕ (degrees)	33	40	-----	33	40
Total Unit Weight, γ_t (pcf)	115	120	140	115	120
SOIL PROPERTIES FOR THE TORSIONAL MODEL:					
Torsional Soil Model	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic
Shear Modulus, G (ksi)	1.5	11.1	4.6	1.5	11.1
Torsional Shear Stress (psf)	495	700	1837	260	700
SOIL PROPERTIES FOR THE TIP MODEL:					
Tip Soil Model	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989
Shear Modulus, G (ksi)	1.5	11.1	4.6	1.5	11.1
Poisson's Ratio, ν	0.3	0.2	0.5	0.3	0.2
Axial Bearing Failure Load, Qult (kip)	476	2754	651	476	2754

AREHNA Engineering, Inc.
5012 W. Lemon Street
Tampa, Florida 33609

Project Name:	THEA PD&E Whiting Street
Project Number:	B-19-051
Prepared by/ Date:	JB 9-17-21
Checked by/ Date:	KE 9-17-21

Boring Number:	BB-02
Boring GSE (ft, NAVD):	16.6
Bridge End/ Pier No.:	-
Station and Offset (Baseline):	107+56
Preforming Elevation (ft):	0.6
Pile Size (in):	24
Pile Tip (CLOSED or OPEN or N/A):	N/A
Pile Thickness (in):	N/A
Pile Tip Area (in^2):	576

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

ELEVATIONS AND SOIL TYPE:	**Sample 1**	**Sample 2**	**Sample 3**	**Sample 4**	**Sample 5**	**Sample 6**
Depth at top of layer (ft)	**0**	**16**	**35.5**	**40**	**50**	**55**
Depth at bottom of layer (ft)	**16**	**35.5**	**40**	**50**	**55**	**100**
Depth at design water table (ft)	7.5	7.5	7.5	7.5	7.5	7.5
Elevation at top of layer (ft, NAVD)	16.6	0.6	-18.9	-23.4	-33.4	-38.4
Elevation at bottom of layer (ft, NAVD)	0.6	-18.9	-23.4	-33.4	-38.4	-83.4
Water Table Elevation (ft, NAVD)	9.1	9.1	9.1	9.1	9.1	9.1
Soil Layer Type (0-Cohesionless, 1 -Cohesive, 2 -Rock)	0-Cohesionless	2 -Rock	1 -Cohesive	2 -Rock	1 -Cohesive	2 -Rock
USCS Soil Layer Type (GW,GP, SP, SP-SM, SM, SC, ML, CL, CH, N/A for Rock)	SP	N/A	ML	N/A	ML	N/A
Average SPT N value (automatic), Blows/ ft	14	74	34	83	100	97
SOIL PROPERTIES FOR LATERAL SOIL MODEL:						
Lateral Soil Model	1 (O'Neill)	8 (McVay)	3(O'Neill)	8 (McVay)	3(O'Neill)	8 (McVay)
Internal Friction Angle, ϕ (degrees)	32	------	-----	------	-----	------
Subgrade Soil Modulus, RK (pci)	50	------	------	------	------	------
Undrained Strength, C (psf)	-----	16667	1125	16667	1125	16667
Strain @ 50% Failure, ε 50 (in/in)	-----	-----	0.005	-----	0.005	-----
Strain @ 100% Failure, ε 100 (in/in)	-----	-----	0.015	-----	0.015	-----
Total Unit Weight, γ_t (pcf)	112	------	140	------	140	------
Effective Unit Weight, γ_{eff} (pci) [1]	0.0287	-----	0.0449	-----	0.0449	-----
Unconfined Compressive Strength, Limestone (psf)	------	33333	2250	33333	2250	33333
SOIL PROPERTIES FOR THE AXIAL MODEL:						
Axial Soil Model	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989
Shear Modulus, G (ksi)	1.5	11.1	4.6	11.1	4.6	11.1
Poisson's Ratio, ν	0.2	0.2	0.5	0.2	0.5	0.2
Vertical Failure Shear Stress (psf)	660	1835	2496	2000	2618	2000
Internal Friction Angle, ϕ (degrees)	32	40	-----	40	-----	40
Total Unit Weight, γ_t (pcf)	112	120	140	120	140	120
SOIL PROPERTIES FOR THE TORSIONAL MODEL:						
Torsional Soil Model	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic
Shear Modulus, G (ksi)	1.5	11.1	4.6	11.1	4.6	11.1
Torsional Shear Stress (psf)	462	700	1747	700	1833	700
SOIL PROPERTIES FOR THE TIP MODEL:						
Tip Soil Model	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989
Shear Modulus, G (ksi)	1.5	11.1	4.6	11.1	4.6	11.1
Poisson's Ratio, ν	0.2	0.2	0.5	0.2	0.5	0.2
Axial Bearing Failure Load, Qult (kip)	444	2445	540	2754	768	2754

AREHNA Engineering, Inc.
5012 W. Lemon Street
Tampa, Florida 33609

Project Name:	THEA PD&E Whiting Street
Project Number:	B-19-051
Prepared by/ Date:	JB 9-17-21
Checked by/ Date:	KE 9-17-21

Boring Number:	BB-03
Boring GSE (ft, NAVD):	16.3
Bridge End/ Pier No.:	-
Station and Offset (Baseline):	204+29
Preforming Elevation (ft):	-3.7
Pile Size (in):	24
Pile Tip (CLOSED or OPEN or N/A):	N/A
Pile Thickness (in):	N/A
Pile Tip Area (in^2):	576

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

ELEVATIONS AND SOIL TYPE:	**Sample 1**	**Sample 2**	**Sample 3**	**Sample 4**	**Sample 5**	**Sample 6**	**Sample 7**	**Sample 8**
Depth at top of layer (ft)	**0**	**16**	**20**	**30.5**	**38**	**43**	**58**	**70**
Depth at bottom of layer (ft)	**16**	**20**	**30.5**	**38**	**43**	**58**	**70**	**100**
Depth at design water table (ft)								
Elevation at top of layer (ft, NAVD)	16.3	0.3	-3.7	-14.2	-21.7	-26.7	-41.7	-53.7
Elevation at bottom of layer (ft, NAVD)	0.3	-3.7	-14.2	-21.7	-26.7	-41.7	-53.7	-83.7
Water Table Elevation (ft, NAVD)								
Soil Layer Type (0-Cohesionless, 1 -Cohesive, 2 -Rock)	0-Cohesionless	1 -Cohesive	2 -Rock	1 -Cohesive	1 -Cohesive	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-SM	ML	N/A	ML	CH	N/A	SC	N/A
Average SPT N value (automatic), Blows/ ft	16	6	76	74	23	100	78	100
SOIL PROPERTIES FOR LATERAL SOIL MODEL:								
Lateral Soil Model	1 (O'Neill)	3(O'Neill)	8 (McVay)	3(O'Neill)	3(O'Neill)	8 (McVay)	1 (O'Neill)	8 (McVay)
Internal Friction Angle, ϕ (degrees)	33	-----	------	-----	-----	------	35	------
Subgrade Soil Modulus, RK (pci)	58	------	------	------	------	------	185	------
Undrained Strength, C (psf)	-----	558	16667	1125	1965	16667	-----	16667
Strain @ 50% Failure, ε 50 (in/in)	-----	0.008	-----	0.005	0.005	-----	-----	-----
Strain @ 100% Failure, ε 100 (in/in)	-----	0.019	-----	0.015	0.015	-----	-----	-----
Total Unit Weight, γ_t (pcf)	115	119	------	140	140	------	130	------
Effective Unit Weight, γ_{eff} (pci) [1]	0.0304	0.0329	-----	0.0449	0.0449	-----	0.0391	-----
Unconfined Compressive Strength, Limestone (psf)	------	1116	33333	2250	3930	33333	------	33333
SOIL PROPERTIES FOR THE AXIAL MODEL:								
Axial Soil Model	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989
Shear Modulus, G (ksi)	1.6	1.4	11.1	4.6	4.6	11.1	4.3	11.1
Poisson's Ratio, ν	0.3	0.5	0.2	0.5	0.5	0.2	0.4	0.2
Vertical Failure Shear Stress (psf)	754	666	1885	2618	2320	2000	2618	2000
Internal Friction Angle, ϕ (degrees)	33	-----	40	-----	-----	40	35	40
Total Unit Weight, γ_t (pcf)	115	119	120	140	140	120	130	120
SOIL PROPERTIES FOR THE TORSIONAL MODEL:								
Torsional Soil Model	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic
Shear Modulus, G (ksi)	1.6	1.4	11.1	4.6	4.6	11.1	4.3	11.1
Torsional Shear Stress (psf)	528	466	700	1833	1624	700	1833	700
SOIL PROPERTIES FOR THE TIP MODEL:								
Tip Soil Model	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989
Shear Modulus, G (ksi)	1.6	1.4	11.1	4.6	4.6	11.1	4.3	11.1
Poisson's Ratio, ν	0.3	0.5	0.2	0.5	0.5	0.2	0.4	0.2
Axial Bearing Failure Load, Qult (kip)	508	95	2536	768	160	2754	768	2754

AREHNA Engineering, Inc.
5012 W. Lemon Street
Tampa, Florida 33609

Project Name:	THEA PD&E Whiting Street
Project Number:	B-19-051
Prepared by/ Date:	JB 9-17-21
Checked by/ Date:	KE 9-17-21

Boring Number:	BB-04
Boring GSE (ft, NAVD):	16.1
Bridge End/ Pier No.:	-
Station and Offset (Baseline):	206+48
Preforming Elevation (ft):	-18.9
Pile Size (in):	24
Pile Tip (CLOSED or OPEN or N/A):	N/A
Pile Thickness (in):	N/A
Pile Tip Area (in^2):	576

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

ELEVATIONS AND SOIL TYPE:	**Sample 1**	**Sample 2**	**Sample 3**	**Sample 4**	**Sample 5**	**Sample 6**	**Sample 7**
Depth at top of layer (ft)	**0**	**34**	**38**	**50**	**62**	**70**	**75**
Depth at bottom of layer (ft)	**34**	**38**	**50**	**62**	**70**	**75**	**100**
Depth at design water table (ft)	5	5	5	5	5	5	5
Elevation at top of layer (ft, NAVD)	16.1	-17.9	-21.9	-33.9	-45.9	-53.9	-58.9
Elevation at bottom of layer (ft, NAVD)	-17.9	-21.9	-33.9	-45.9	-53.9	-58.9	-83.9
Water Table Elevation (ft, NAVD)	11.1	11.1	11.1	11.1	11.1	11.1	11.1
Soil Layer Type (0-Cohesionless, 1 -Cohesive, 2 -Rock)	0-Cohesionless	0-Cohesionless	0-Cohesionless	1 -Cohesive	2 -Rock	1 -Cohesive	0-Cohesionless
USCS Soil Layer Type (GW,GP, SP, SP-SM, SM, SC, ML, CL, CH, N/A for Rock)	SP	SC	SP	CH	N/A	CH	N/A
Average SPT N value (automatic), Blows/ ft	6	13	1	59	95	100	97
SOIL PROPERTIES FOR LATERAL SOIL MODEL:							
Lateral Soil Model	1 (O'Neill)	1 (O'Neill)	1 (O'Neill)	3(O'Neill)	8 (McVay)	3(O'Neill)	1 (O'Neill)
Internal Friction Angle, ϕ (degrees)	30	30	28	-----	------	-----	38
Subgrade Soil Modulus, RK (pci)	18	46	10	------	------	------	185
Undrained Strength, C (psf)	-----	-----	-----	1965	16667	1965	-----
Strain @ 50% Failure, ε 50 (in/in)	-----	-----	-----	0.005	-----	0.005	-----
Strain @ 100% Failure, ε 100 (in/in)	-----	-----	-----	0.015	-----	0.015	-----
Total Unit Weight, γ_t (pcf)	105	112	102	140	------	140	130
Effective Unit Weight, γ_{eff} (pci) [1]	0.0247	0.0287	0.0229	0.0449	-----	0.0449	0.0391
Unconfined Compressive Strength, Limestone (psf)	------	------	------	3930	33333	3930	------
SOIL PROPERTIES FOR THE AXIAL MODEL:							
Axial Soil Model	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989
Shear Modulus, G (ksi)	0.6	1.4	0.1	4.6	11.1	4.6	4.3
Poisson's Ratio, ν	0.2	0.2	0.2	0.5	0.2	0.5	0.4
Vertical Failure Shear Stress (psf)	283	1321	47	2995	2000	2995	2280
Internal Friction Angle, ϕ (degrees)	30	30	28	-----	40	-----	38
Total Unit Weight, γ_t (pcf)	105	112	102	140	120	140	130
SOIL PROPERTIES FOR THE TORSIONAL MODEL:							
Torsional Soil Model	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic
Shear Modulus, G (ksi)	0.6	1.4	0.1	4.6	11.1	4.6	4.3
Torsional Shear Stress (psf)	198	925	33	2097	700	2097	1596
SOIL PROPERTIES FOR THE TIP MODEL:							
Tip Soil Model	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989
Shear Modulus, G (ksi)	0.6	1.4	0.1	4.6	11.1	4.6	4.3
Poisson's Ratio, ν	0.2	0.2	0.2	0.5	0.2	0.5	0.4
Axial Bearing Failure Load, Qult (kip)	190	206	32	336	2754	336	#VALUE!

AREHNA Engineering, Inc.
5012 W. Lemon Street
Tampa, Florida 33609

Project Name:	THEA PD&E Whiting Street
Project Number:	B-19-051
Prepared by/ Date:	JB 9-17-21
Checked by/ Date:	KE 9-17-21

Boring Number:	BB-01
Boring GSE (ft, NAVD):	15.3
Bridge End/ Pier No.:	-
Station and Offset (Baseline):	105+72
Preforming Elevation (ft):	-7.7
Pile Size (in):	20
Pile Tip (CLOSED or OPEN):	OPEN
Pile Thickness (in):	0.50
Pile Tip Area (in^2):	31

Summary of Recommended Soil Parameters for FB-Pier Analysis STEEL PIPE PILES

ELEVATIONS AND SOIL TYPE:	**Sample 1**	**Sample 2**	**Sample 3**	**Sample 4**	**Sample 5**
Depth at top of layer (ft)	**0**	**23**	**50**	**58**	**60.5**
Depth at bottom of layer (ft)	**23**	**50**	**58**	**60.5**	**100**
Depth at design water table (ft)	6	6	6	6	6
Elevation at top of layer (ft, NAVD)	15.3	-7.7	-34.7	-42.7	-45.2
Elevation at bottom of layer (ft, NAVD)	-7.7	-34.7	-42.7	-45.2	-84.7
Water Table Elevation (ft, NAVD)	9.3	9.3	9.3	9.3	9.3
Soil Layer Type (0-Cohesionless, 1 -Cohesive, 2 -Rock)	0-Cohesionless	2 -Rock	1 -Cohesive	0-Cohesionless	2 -Rock
USCS Soil Layer Type (GW,GP, SP, SP-SM, SM, SC, ML, CL, CH, N/A for Rock)	SP-SM	N/A	ML	SP	N/A
Average SPT N value (automatic), Blows/ ft	15	82	41	15	100
SOIL PROPERTIES FOR LATERAL SOIL MODEL:					
Lateral Soil Model	1 (O'Neill)	8 (McVay)	3(O'Neill)	1 (O'Neill)	8 (McVay)
Internal Friction Angle, ϕ (degrees)	33	------	-----	33	------
Subgrade Soil Modulus, RK (pci)	54	------	------	54	------
Total Unit Weight, γ_t (pcf)	115	------	140	115	------
Effective Unit Weight, γ_{eff} (pci) [1]	0.0304	-----	0.0449	0.0304	-----
Unconfined Compressive Strength, Limestone (psf)	------	33333	2250	------	33333
SOIL PROPERTIES FOR THE AXIAL MODEL:					
Axial Soil Model	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989
Shear Modulus, G (ksi)	1.5	11.1	4.6	1.5	11.1
Poisson's Ratio, ν	0.3	0.2	0.5	0.3	0.2
Vertical Failure Shear Stress (psf)	696	2000	1678	366	2000
Internal Friction Angle, ϕ (degrees)	33	40	-----	33	40
Total Unit Weight, γ_t (pcf)	115	120	140	115	120
SOIL PROPERTIES FOR THE TORSIONAL MODEL:					
Torsional Soil Model	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic
Shear Modulus, G (ksi)	1.5	11.1	4.6	1.5	11.1
Torsional Shear Stress (psf)	487	700	1175	256	700
SOIL PROPERTIES FOR THE TIP MODEL:					
Tip Soil Model	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989
Shear Modulus, G (ksi)	1.5	11.1	4.6	1.5	11.1
Poisson's Ratio, ν	0.3	0.2	0.5	0.3	0.2
Axial Bearing Failure Load, Qult (kip)	25	67	35	25	67

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Project Name:	THEA PD&E Whiting Street
Project Number:	B-19-051
Prepared by/ Date:	JB 9-17-21
Checked by/ Date:	KE 9-17-21

Boring Number:	BB-02
Boring GSE (ft, NAVD):	16.6
Bridge End/ Pier No.:	-
Station and Offset (Baseline):	107+56
Preforming Elevation (ft):	0.6
Pile Size (in):	20
Pile Tip (CLOSED or OPEN):	OPEN
Pile Thickness (in):	0.50
Pile Tip Area (in^2):	31

Summary of Recommended Soil Parameters for FB-Pier Analysis STEEL PIPE PILES

ELEVATIONS AND SOIL TYPE:	**Sample 1**	**Sample 2**	**Sample 3**	**Sample 4**	**Sample 5**	**Sample 6**
Depth at top of layer (ft)	**0**	**16**	**35.5**	**40**	**50**	**55**
Depth at bottom of layer (ft)	**16**	**35.5**	**40**	**50**	**55**	**100**
Depth at design water table (ft)	7.5	7.5	7.5	7.5	7.5	7.5
Elevation at top of layer (ft, NAVD)	16.6	0.6	-18.9	-23.4	-33.4	-38.4
Elevation at bottom of layer (ft, NAVD)	0.6	-18.9	-23.4	-33.4	-38.4	-83.4
Water Table Elevation (ft, NAVD)	9.1	9.1	9.1	9.1	9.1	9.1
Soil Layer Type (0-Cohesionless, 1 -Cohesive, 2 -Rock)	0-Cohesionless	2 -Rock	1 -Cohesive	2 -Rock	1 -Cohesive	2 -Rock
USCS Soil Layer Type (GW,GP, SP, SP-SM, SM, SC, ML, CL, CH, N/A for Rock)	SP	N/A	ML	N/A	ML	N/A
Average SPT N value (automatic), Blows/ ft	14	74	34	83	100	97
SOIL PROPERTIES FOR LATERAL SOIL MODEL:						
Lateral Soil Model	1 (O'Neill)	8 (McVay)	3(O'Neill)	8 (McVay)	3(O'Neill)	8 (McVay)
Internal Friction Angle, ϕ (degrees)	32	------	-----	------	-----	------
Subgrade Soil Modulus, RK (pci)	50	------	------	------	------	------
Total Unit Weight, γ_t (pcf)	112	------	140	------	140	------
Effective Unit Weight, γ_{eff} (pci) [1]	0.0287	-----	0.0449	-----	0.0449	-----
Unconfined Compressive Strength, Limestone (psf)	------	33333	2250	33333	2250	33333
SOIL PROPERTIES FOR THE AXIAL MODEL:						
Axial Soil Model	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989
Shear Modulus, G (ksi)	1.5	11.1	4.6	11.1	4.6	11.1
Poisson's Ratio, ν	0.2	0.2	0.5	0.2	0.5	0.2
Vertical Failure Shear Stress (psf)	653	1835	1616	2000	2034	2000
Internal Friction Angle, ϕ (degrees)	32	40	-----	40	-----	40
Total Unit Weight, γ_t (pcf)	112	120	140	120	140	120
SOIL PROPERTIES FOR THE TORSIONAL MODEL:						
Torsional Soil Model	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic
Shear Modulus, G (ksi)	1.5	11.1	4.6	11.1	4.6	11.1
Torsional Shear Stress (psf)	457	700	1131	700	1424	700
SOIL PROPERTIES FOR THE TIP MODEL:						
Tip Soil Model	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989
Shear Modulus, G (ksi)	1.5	11.1	4.6	11.1	4.6	11.1
Poisson's Ratio, ν	0.2	0.2	0.5	0.2	0.5	0.2
Axial Bearing Failure Load, Qult (kip)	24	64	29	67	68	67

AREHNA Engineering, Inc.
5012 W. Lemon Street
Tampa, Florida 33609

Project Name: THEA PD&E Whiting Street
Project Number: B-19-051
Prepared by/ Date: JB 9-17-21
Checked by/ Date: KE 9-17-21

Boring Number: BB-03
Boring GSE (ft, NAVD): 16.3
Bridge End/ Pier No.: -
Station and Offset (Baseline): 204+29
Preforming Elevation (ft): -3.7
Pile Size (in): 20
Pile Tip (CLOSED or OPEN): OPEN
Pile Thickness (in): 0.50
Pile Tip Area (in^2): 31

Summary of Recommended Soil Parameters for FB-Pier Analysis STEEL PIPE PILES

ELEVATIONS AND SOIL TYPE:	**Sample 1**	**Sample 2**	**Sample 3**	**Sample 4**	**Sample 5**	**Sample 6**	**Sample 7**	**Sample 8**
Depth at top of layer (ft)	**0**	**16**	**20**	**30.5**	**38**	**43**	**58**	**70**
Depth at bottom of layer (ft)	**16**	**20**	**30.5**	**38**	**43**	**58**	**70**	**100**
Depth at design water table (ft)								
Elevation at top of layer (ft, NAVD)	16.3	0.3	-3.7	-14.2	-21.7	-26.7	-41.7	-53.7
Elevation at bottom of layer (ft, NAVD)	0.3	-3.7	-14.2	-21.7	-26.7	-41.7	-53.7	-83.7
Water Table Elevation (ft, NAVD)								
Soil Layer Type (0-Cohesionless, 1 -Cohesive, 2 -Rock)	0-Cohesionless	1 -Cohesive	2 -Rock	1 -Cohesive	1 -Cohesive	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-SM	ML	N/A	ML	CH	N/A	SC	N/A
Average SPT N value (automatic), Blows/ ft	16	6	76	74	23	100	78	100
SOIL PROPERTIES FOR LATERAL SOIL MODEL:								
Lateral Soil Model	1 (O'Neill)	3(O'Neill)	8 (McVay)	3(O'Neill)	3(O'Neill)	8 (McVay)	1 (O'Neill)	8 (McVay)
Internal Friction Angle, ϕ (degrees)	33	-----	------	-----	-----	------	35	------
Subgrade Soil Modulus, RK (pci)	58	------	------	------	------	------	185	------
Total Unit Weight, γ_t (pcf)	115	119	------	140	140	------	130	------
Effective Unit Weight, γ_{eff} (pci) [1]	0.0304	0.0329	-----	0.0449	0.0449	-----	0.0391	-----
Unconfined Compressive Strength, Limestone (psf)	------	1116	33333	2250	3930	33333	------	33333
SOIL PROPERTIES FOR THE AXIAL MODEL:								
Axial Soil Model	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989
Shear Modulus, G (ksi)	1.6	1.4	11.1	4.6	4.6	11.1	4.3	11.1
Poisson's Ratio, ν	0.3	0.5	0.2	0.5	0.5	0.2	0.4	0.2
Vertical Failure Shear Stress (psf)	737	633	1885	1975	1758	2000	2011	2000
Internal Friction Angle, ϕ (degrees)	33	-----	40	-----	-----	40	35	40
Total Unit Weight, γ_t (pcf)	115	119	120	140	140	120	130	120
SOIL PROPERTIES FOR THE TORSIONAL MODEL:								
Torsional Soil Model	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic
Shear Modulus, G (ksi)	1.6	1.4	11.1	4.6	4.6	11.1	4.3	11.1
Torsional Shear Stress (psf)	516	443	700	1382	1230	700	1407	700
SOIL PROPERTIES FOR THE TIP MODEL:								
Tip Soil Model	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989
Shear Modulus, G (ksi)	1.6	1.4	11.1	4.6	4.6	11.1	4.3	11.1
Poisson's Ratio, ν	0.3	0.5	0.2	0.5	0.5	0.2	0.4	0.2
Axial Bearing Failure Load, Qult (kip)	27	5	65	62	8	67	66	67

AREHNA Engineering, Inc.
5012 W. Lemon Street
Tampa, Florida 33609

Project Name:	THEA PD&E Whiting Street
Project Number:	B-19-051
Prepared by/ Date:	JB 9-17-21
Checked by/ Date:	KE 9-17-21

Boring Number:	BB-04
Boring GSE (ft, NAVD):	16.1
Bridge End/ Pier No.:	-
Station and Offset (Baseline):	206+48
Preforming Elevation (ft):	-18.9
Pile Size (in):	20
Pile Tip (CLOSED or OPEN):	OPEN
Pile Thickness (in):	0.50
Pile Tip Area (in^2):	31

Summary of Recommended Soil Parameters for FB-Pier Analysis STEEL PIPE PILES

ELEVATIONS AND SOIL TYPE:	**Sample 1**	**Sample 2**	**Sample 3**	**Sample 4**	**Sample 5**	**Sample 6**	**Sample 7**
Depth at top of layer (ft)	**0**	**34**	**38**	**50**	**62**	**70**	**75**
Depth at bottom of layer (ft)	**34**	**38**	**50**	**62**	**70**	**75**	**100**
Depth at design water table (ft)	5	5	5	5	5	5	5
Elevation at top of layer (ft, NAVD)	16.1	-17.9	-21.9	-33.9	-45.9	-53.9	-58.9
Elevation at bottom of layer (ft, NAVD)	-17.9	-21.9	-33.9	-45.9	-53.9	-58.9	-83.9
Water Table Elevation (ft, NAVD)	11.1	11.1	11.1	11.1	11.1	11.1	11.1
Soil Layer Type (0-Cohesionless, 1 -Cohesive, 2 -Rock)	0-Cohesionless	0-Cohesionless	0-Cohesionless	1 -Cohesive	2 -Rock	1 -Cohesive	2 -Rock
USCS Soil Layer Type (GW,GP, SP, SP-SM, SM, SC, ML, CL, CH, N/A for Rock)	SP	SC	SP	CH	N/A	CH	N/A
Average SPT N value (automatic), Blows/ ft	6	13	1	59	95	100	97
SOIL PROPERTIES FOR LATERAL SOIL MODEL:							
Lateral Soil Model	1 (O'Neill)	1 (O'Neill)	1 (O'Neill)	3(O'Neill)	8 (McVay)	3(O'Neill)	8 (McVay)
Internal Friction Angle, ϕ (degrees)	30	32	28	-----	------	-----	------
Subgrade Soil Modulus, RK (pci)	18	46	10	------	------	------	------
Total Unit Weight, γ_t (pcf)	105	112	102	140	------	140	------
Effective Unit Weight, γ_{eff} (pci) [1]	0.0247	0.0287	0.0229	0.0449	-----	0.0449	-----
Unconfined Compressive Strength, Limestone (psf)	------	------	------	3930	33333	3930	33333
SOIL PROPERTIES FOR THE AXIAL MODEL:							
Axial Soil Model	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989
Shear Modulus, G (ksi)	0.6	1.4	0.1	4.6	11.1	4.6	11.1
Poisson's Ratio, ν	0.2	0.2	0.2	0.5	0.2	0.5	0.2
Vertical Failure Shear Stress (psf)	274	1095	5	2556	2000	2821	2000
Internal Friction Angle, ϕ (degrees)	30	32	28	-----	40	-----	40
Total Unit Weight, γ_t (pcf)	105	112	102	140	120	140	120
SOIL PROPERTIES FOR THE TORSIONAL MODEL:							
Torsional Soil Model	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic
Shear Modulus, G (ksi)	0.6	1.4	0.1	4.6	11.1	4.6	11.1
Torsional Shear Stress (psf)	192	767	3	1789	700	1974	700
SOIL PROPERTIES FOR THE TIP MODEL:							
Tip Soil Model	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989
Shear Modulus, G (ksi)	0.6	1.4	0.1	4.6	11.1	4.6	11.1
Poisson's Ratio, ν	0.2	0.2	0.2	0.5	0.2	0.5	0.2
Axial Bearing Failure Load, Qult (kip)	10	11	2	22	67	30	67

AREHNA Engineering, Inc.
5012 W. Lemon Street
Tampa, Florida 33609

Project Name:	**THEA PD&E Whiting Street**		
Project Number:	B-19-051		
Prepared by:	JB	Date:	9/17/2021
Checked by:	KE	Date:	9/17/2021

Boring Number:	**BB-01**					
Boring GSE (ft, NAVD):	15.3					
Bridge No.:	-					
End Bent/ Pier No.:	-					
Station and Offset (Baseline):	105+72					
Preforming Elevation (ft):	-7.7					
Pile Size (in):	15	(14.695")	**Pile Tip Area (in^2):**	102	**H8 Pile**	**(50% Plugged Condition)**

Summary of Recommended Soil Parameters for FB-Multipier Analysis for Driven Steel H Piles

ELEVATIONS AND SOIL TYPE:	**LAYER 1**	**LAYER 2**	**LAYER 3**	**LAYER 4**	**LAYER 5**
Depth at top of layer (ft)	0.0	23.0	50.0	58.0	60.5
Depth at bottom of layer (ft)	23.0	50.0	58.0	60.5	100.0
Depth at water table (ft):	6.0	6.0	6.0	6.0	6.0
Elevation at top of layer (ft, NGVD)	15.3	-7.7	-34.7	-42.7	-45.2
Elevation at bottom of layer (ft, NGVD)	-7.7	-34.7	-42.7	-45.2	-84.7
Water Table Elevation (ft, NGVD)	9.3	9.3	9.3	9.3	9.3
Soil Layer Type (0-Cohesionless, 2 -Rock)	0-Cohesionless	2 -Rock	1 -Cohesive	0-Cohesionless	2 -Rock
USCS Soil Layer Type (GW, SP, SP-SM, SM, ML, NA)	SP-SM	N/A	ML	SP	N/A
Average SPT N value (automatic) [3], Blows/ ft	15	82	41	15	100
SOIL PROPERTIES FOR LATERAL SOIL MODEL:					
Lateral Soil Model	1 (O'Neill)	8 (McVay)	1 (O'Neill)	1 (O'Neill)	8 (McVay)
Internal Friction Angle, ϕ (degrees)	33	------	35	33	------
Subgrade Soil Modulus, RK (pci)	54	------	156	54	------
Total Unit Weight, γ_t (pcf)	115	------	140	115	------
Effective Unit Weight, γ_{eff} (pci)	0.0304	------	0.0449	0.0304	------
Unconfined Compressive Strength, Limestone (psf)	------	33333	------	------	33333
SOIL PROPERTIES FOR THE AXIAL MODEL:					
Axial Soil Model	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989
Shear Modulus, G (ksi)	1.5	11.1	4.6	1.5	11.1
Poisson's Ratio, ν	0.3	0.2	0.3	0.3	0.2
Vertical Failure Shear Stress (psf)	417	912	1139	219	912
Internal Friction Angle, ϕ (degrees)	33	40	35	33	40
Total Unit Weight, γ_t (pcf)	115	120	140	115	120
SOIL PROPERTIES FOR THE TORSIONAL MODEL:					
Torsional Soil Model	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic
Shear Modulus, G (ksi)	1.5	11.1	4.6	1.5	11.1
Torsional Shear Stress (psf)	417	912	1139	219	912
SOIL PROPERTIES FOR THE TIP MODEL:					
Tip Soil Model	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989
Shear Modulus, G (ksi)	1.5	11.1	4.6	1.5	11.1
Poisson's Ratio, ν	0.3	0.2	0.3	0.3	0.2
Axial Bearing Failure Load, Qult (kip)	84	183	230	84	183

AREHNA Engineering, Inc.
5012 W. Lemon Street
Tampa, Florida 33609

Project Name:	**THEA PD&E Whiting Street**		
Project Number:	B-19-051		
Prepared by:	JB	Date:	9/17/2021
Checked by:	KE	Date:	9/17/2021

Boring Number:	**BB-02**					
Boring GSE (ft, NAVD):	16.6					
Bridge No.:	-					
End Bent/ Pier No.:	-					
Station and Offset (Baseline):	107+56					
Preforming Elevation (ft):	0.6					
Pile Size (in):	15	(14.695")	**Pile Tip Area (in^2):**	102	**H8 Pile**	**(50% Plugged Condition)**

Summary of Recommended Soil Parameters for FB-Multipier Analysis for Driven Steel H Piles

ELEVATIONS AND SOIL TYPE:	**LAYER 1**	**LAYER 2**	**LAYER 3**	**LAYER 4**	**LAYER 5**	**LAYER 6**
Depth at top of layer (ft)	0.0	16.0	35.5	40.0	50.0	55.0
Depth at bottom of layer (ft)	16.0	35.5	40.0	50.0	55.0	100.0
Depth at water table (ft):	7.5	7.5	7.5	7.5	7.5	7.5
Elevation at top of layer (ft, NGVD)	16.6	0.6	-18.9	-23.4	-33.4	-38.4
Elevation at bottom of layer (ft, NGVD)	0.6	-18.9	-23.4	-33.4	-38.4	-83.4
Water Table Elevation (ft, NGVD)	9.1	9.1	9.1	9.1	9.1	9.1
Soil Layer Type (0-Cohesionless, 2 -Rock)	0-Cohesionless	2 -Rock	1 -Cohesive	2 -Rock	1 -Cohesive	2 -Rock
USCS Soil Layer Type (GW, SP, SP-SM, SM, ML, NA)	SP	N/A	ML	N/A	ML	N/A
Average SPT N value (automatic) [3], Blows/ ft	14	74	34	83	100	97
SOIL PROPERTIES FOR LATERAL SOIL MODEL:						
Lateral Soil Model	1 (O'Neill)	8 (McVay)	1 (O'Neill)	8 (McVay)	1 (O'Neill)	8 (McVay)
Internal Friction Angle, ϕ (degrees)	32	------	35	------	35	------
Subgrade Soil Modulus, RK (pci)	50	------	129	------	185	------
Total Unit Weight, γ_t (pcf)	112	------	140	------	140	------
Effective Unit Weight, γ_{eff} (pci)	0.0287	------	0.0449	------	0.0449	------
Unconfined Compressive Strength, Limestone (psf)	------	33333	------	33333	------	33333
SOIL PROPERTIES FOR THE AXIAL MODEL:						
Axial Soil Model	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989
Shear Modulus, G (ksi)	1.5	11.1	4.6	11.1	4.6	11.1
Poisson's Ratio, ν	0.3	0.2	0.3	0.2	0.3	0.2
Vertical Failure Shear Stress (psf)	389	912	944	912	1344	912
Internal Friction Angle, ϕ (degrees)	32	40	35	40	35	40
Total Unit Weight, γ_t (pcf)	112	120	140	120	140	120
SOIL PROPERTIES FOR THE TORSIONAL MODEL:						
Torsional Soil Model	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic
Shear Modulus, G (ksi)	1.5	11.1	4.6	11.1	4.6	11.1
Torsional Shear Stress (psf)	389	912	944	912	1344	912
SOIL PROPERTIES FOR THE TIP MODEL:						
Tip Soil Model	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989
Shear Modulus, G (ksi)	1.5	11.1	4.6	11.1	4.6	11.1
Poisson's Ratio, ν	0.3	0.2	0.3	0.2	0.3	0.2
Axial Bearing Failure Load, Qult (kip)	79	183	191	183	272	183

AREHNA Engineering, Inc.
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Tampa, Florida 33609

Project Name:	**THEA PD&E Whiting Street**		
Project Number:	B-19-051		
Prepared by:	JB	Date:	9/17/2021
Checked by:	KE	Date:	9/17/2021

Boring Number:	**BB-03**					
Boring GSE (ft, NAVD):	16.3					
Bridge No.:	-					
End Bent/ Pier No.:	-					
Station and Offset (Baseline):	204+29					
Preforming Elevation (ft):	-3.7					
Pile Size (in):	15	(14.695")	**Pile Tip Area (in^2):**	102	**H8 Pile**	**(50% Plugged Condition)**

Summary of Recommended Soil Parameters for FB-Multipier Analysis for Driven Steel H Piles

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)	0.0	16.0	20.0	30.5	38.0	43.0	58.0	70.0
Depth at bottom of layer (ft)	16.0	20.0	30.5	38.0	43.0	58.0	70.0	100.0
Depth at water table (ft):								
Elevation at top of layer (ft, NGVD)	16.3	0.3	-3.7	-14.2	-21.7	-26.7	-41.7	-53.7
Elevation at bottom of layer (ft, NGVD)	0.3	-3.7	-14.2	-21.7	-26.7	-41.7	-53.7	-83.7
Water Table Elevation (ft, NGVD)								
Soil Layer Type (0-Cohesionless, 2 -Rock)	0-Cohesionless	1 -Cohesive	2 -Rock	1 -Cohesive	1 -Cohesive	2 -Rock	0-Cohesionless	2 -Rock
USCS Soil Layer Type (GW, SP, SP-SM, SM, ML, NA)	SP-SM	ML	N/A	ML	CH	N/A	SC	N/A
Average SPT N value (automatic) [3], Blows/ ft	16	6	76	74	23	100	78	100
SOIL PROPERTIES FOR LATERAL SOIL MODEL:								
Lateral Soil Model	1 (O'Neill)	1 (O'Neill)	8 (McVay)	1 (O'Neill)	1 (O'Neill)	8 (McVay)	1 (O'Neill)	8 (McVay)
Internal Friction Angle, ϕ (degrees)	33	30	------	35	35	------	38	------
Subgrade Soil Modulus, RK (pci)	58	18	------	185	85	------	185	------
Total Unit Weight, γ_t (pcf)	115	119	------	140	140	------	130	------
Effective Unit Weight, γ_{eff} (pci)	0.0304	0.0329	------	0.0449	0.0449	------	0.0391	------
Unconfined Compressive Strength, Limestone (psf)	------	------	33333	------	------	33333	------	33333
SOIL PROPERTIES FOR THE AXIAL MODEL:								
Axial Soil Model	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989
Shear Modulus, G (ksi)	1.6	1.4	11.1	4.6	4.6	11.1	4.3	11.1
Poisson's Ratio, ν	0.3	0.3	0.2	0.3	0.3	0.2	0.3	0.2
Vertical Failure Shear Stress (psf)	444	167	912	1344	639	912	1344	912
Internal Friction Angle, ϕ (degrees)	33	30	40	35	35	40	38	40
Total Unit Weight, γ_t (pcf)	115	119	120	140	140	120	130	120
SOIL PROPERTIES FOR THE TORSIONAL MODEL:								
Torsional Soil Model	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic
Shear Modulus, G (ksi)	1.6	1.4	11.1	4.6	4.6	11.1	4.3	11.1
Torsional Shear Stress (psf)	444	167	912	1344	639	912	1344	912
SOIL PROPERTIES FOR THE TIP MODEL:								
Tip Soil Model	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989
Shear Modulus, G (ksi)	1.6	1.4	11.1	4.6	4.6	11.1	4.3	11.1
Poisson's Ratio, ν	0.3	0.3	0.2	0.3	0.3	0.2	0.3	0.2
Axial Bearing Failure Load, Qult (kip)	90	34	183	272	129	183	272	183

AREHNA Engineering, Inc.
5012 W. Lemon Street
Tampa, Florida 33609

Project Name:	**THEA PD&E Whiting Street**		
Project Number:	B-19-051		
Prepared by:	JB	Date:	9/17/2021
Checked by:	KE	Date:	9/17/2021

Boring Number:	**BB-04**					
Boring GSE (ft, NAVD):	16.1					
Bridge No.:	-					
End Bent/ Pier No.:	-					
Station and Offset (Baseline):	206+48					
Preforming Elevation (ft):	-18.9					
Pile Size (in):	15	(14.695")	**Pile Tip Area (in^2):**	102	**H8 Pile**	**(50% Plugged Condition)**

Summary of Recommended Soil Parameters for FB-Multipier Analysis for Driven Steel H Piles

ELEVATIONS AND SOIL TYPE:	**LAYER 1**	**LAYER 2**	**LAYER 3**	**LAYER 4**	**LAYER 5**	**LAYER 6**	**LAYER 7**
Depth at top of layer (ft)	0.0	34.0	38.0	50.0	62.0	70.0	75.0
Depth at bottom of layer (ft)	34.0	38.0	50.0	62.0	70.0	75.0	100.0
Depth at water table (ft):	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Elevation at top of layer (ft, NGVD)	16.1	-17.9	-21.9	-33.9	-45.9	-53.9	-58.9
Elevation at bottom of layer (ft, NGVD)	-17.9	-21.9	-33.9	-45.9	-53.9	-58.9	-83.9
Water Table Elevation (ft, NGVD)	11.1	11.1	11.1	11.1	11.1	11.1	11.1
Soil Layer Type (0-Cohesionless, 2 -Rock)	0-Cohesionless	0-Cohesionless	0-Cohesionless	1 -Cohesive	2 -Rock	1 -Cohesive	2 -Rock
USCS Soil Layer Type (GW, SP, SP-SM, SM, ML, NA)	SP	SC	SP	CH	N/A	CH	N/A
Average SPT N value (automatic) [3], Blows/ ft	6	13	1	59	95	100	97
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)	30	32	28	38	------	38	------
Subgrade Soil Modulus, RK (pci)	18	46	0	185	------	185	------
Total Unit Weight, γ_t (pcf)	105	112	102	140	------	140	------
Effective Unit Weight, γ_{eff} (pci)	0.0247	0.0287	0.0229	0.0449	------	0.0449	------
Unconfined Compressive Strength, Limestone (psf)	------	------	------	------	33333	------	33333
SOIL PROPERTIES FOR THE AXIAL MODEL:							
Axial Soil Model	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989
Shear Modulus, G (ksi)	0.6	1.4	0.1	4.6	11.1	4.6	11.1
Poisson's Ratio, ν	0.3	0.3	0.3	0.3	0.2	0.3	0.2
Vertical Failure Shear Stress (psf)	167	361	28	1344	912	1344	912
Internal Friction Angle, ϕ (degrees)	30	32	28	38	40	38	40
Total Unit Weight, γ_t (pcf)	105	112	102	140	120	140	120
SOIL PROPERTIES FOR THE TORSIONAL MODEL:							
Torsional Soil Model	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic
Shear Modulus, G (ksi)	0.6	1.4	0.1	4.6	11.1	4.6	11.1
Torsional Shear Stress (psf)	167	361	28	1344	912	1344	912
SOIL PROPERTIES FOR THE TIP MODEL:							
Tip Soil Model	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989	1-McVay et al 1989
Shear Modulus, G (ksi)	0.6	1.4	0.1	4.6	11.1	4.6	11.1
Poisson's Ratio, ν	0.3	0.3	0.3	0.3	0.2	0.3	0.2
Axial Bearing Failure Load, Qult (kip)	34	73	6	272	183	272	183

AREHNA Engineering, Inc.
5012 W Lemon Street
Tamp, Florida 33609

Project Name:	THEA PD&E Whiting Street
Project Number:	B-19-051
Prepared by/ Date:	JB 9-17-2021
Checked by/ Date:	KE 9-17-2021

Boring Number:	BB-01
Boring GSE (ft, NAVD):	15.3
Bridge No:	-
End Bent/Pier No.:	-
Station and Offset (Baseline):	105+72

Summary of Recommended Soil Parameters for FB-Pier Analysis- DRILLED SHAFTS (48-inch and 60-inch)

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**	**23**	**50**	**58**	**60.5**
Depth at bottom of layer (ft)	**23**	**50**	**58**	**60.5**	**100**
Depth at design water table (ft)	6	6	6	6	6
Elevation at top of layer (ft, NAVD)	15.3	-7.7	-34.7	-42.7	-45.2
Elevation at bottom of layer (ft, NAVD)	-7.7	-34.7	-42.7	-45.2	-84.7
Design Water Table Elevation (ft, NAVD)	9.3	9.3	9.3	9.3	9.3
Soil Layer Type (Cohesionless, Cohesive, Rock)	Cohesionless	Rock	Cohesive	Cohesionless	Rock
USCS Soil Layer Type (GW, SP, SP-SM, SM, SC, ML, CL, CH, NA)	SP-SM	NA	ML	SP	NA
Average SPT N value (automatic), Blows/ ft	15	82	41	15	100
SOIL PROPERTIES FOR LATERAL SOIL MODEL:					
Lateral Soil Model	1 (O'Neill)	Limestone (McVay)	3(O'Neill)	1 (O'Neill)	Limestone (McVay)
Internal Friction Angle, ϕ (degrees)	33	------	-----	33	------
Subgrade Soil Modulus, RK (pci)	54	------	------	54	------
Unconfined Compressive Strength, qu (psf)	-----	33333	2250	-----	33333
Undrained Strength, C (psf)	-----	16667	1125	-----	16667
Strain @ 50% Failure, ε 50 (in/in)	-----	-----	0.005	-----	-----
Strain @ 100% Failure, ε 100 (in/in)	-----	-----	0.015	-----	-----
Total Unit Weight, γ_t (pcf)	115	125	140	115	125
Effective Unit Weight, γ_{eff} (pci) [1]	0.0304	0.0362	0.0449	0.0304	0.0362
SOIL PROPERTIES FOR THE AXIAL MODEL:					
Axial Soil Model	Drilled Shaft Sand	Drilled Shaft Limestone	Drilled Shaft Clay	Drilled Shaft Sand	Drilled Shaft Limestone
Ultimate Unit Skin Friction, fsmax (psf)	630	10000	619	1436	10000
Undrained Strength, C (psf)	-----	16667	1125	-----	16667
Internal Friction Angle, ϕ (degrees)	33	------	-----	33	------
Total Unit Weight, γ_t (pcf)	115	125	140	115	125
SOIL PROPERTIES FOR THE TORSIONAL MODEL:					
Torsional Soil Model	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic
Shear Modulus, G (ksi)	1.5	11.1	4.6	1.5	11.1
Torsional Shear Stress (psf)	441	7000	433	1005	7000
SOIL PROPERTIES FOR THE TIP MODEL:					
Tip Soil Model [3]	Drilled Shaft Sand	Drilled Shaft Limestone	Drilled Shaft Clay	Drilled Shaft Sand	Drilled Shaft Limestone
Uncorrected SPT N value (blows/ft) [2]	19	------	------	19	------
Undrained Shear Strength at the tip elevation (psf)	-----	16667	1125	-----	16667

AREHNA Engineering, Inc.
5012 W Lemon Street
Tamp, Florida 33609

Project Name: THEA PD&E Whiting Street
Project Number: B-19-051
Prepared by/ Date: JB 9-17-2021
Checked by/ Date: KE 9-17-2021

Boring Number: BB-02
Boring GSE (ft, NAVD): 16.6
Bridge No: -
End Bent/Pier No.: -
Station and Offset (Baseline): 107+56

Summary of Recommended Soil Parameters for FB-Pier Analysis- DRILLED SHAFTS (48-inch and 60-inch)

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**	**16**	**35.5**	**40**	**50**	**55**
Depth at bottom of layer (ft)	**16**	**35.5**	**40**	**50**	**55**	**100**
Depth at design water table (ft)	7.5	7.5	7.5	7.5	7.5	7.5
Elevation at top of layer (ft, NAVD)	16.6	0.6	-18.9	-23.4	-33.4	-38.4
Elevation at bottom of layer (ft, NAVD)	0.6	-18.9	-23.4	-33.4	-38.4	-83.4
Design Water Table Elevation (ft, NAVD)	9.1	9.1	9.1	9.1	9.1	9.1
Soil Layer Type (Cohesionless, Cohesive, Rock)	Cohesionless	Rock	Cohesive	Rock	Cohesive	Rock
USCS Soil Layer Type (GW, SP, SP-SM, SM, SC, ML, CL, CH, NA)	SP	NA	ML	NA	ML	NA
Average SPT N value (automatic), Blows/ ft	14	74	34	83	100	97
SOIL PROPERTIES FOR LATERAL SOIL MODEL:						
Lateral Soil Model	1 (O'Neill)	Limestone (McVay)	3(O'Neill)	Limestone (McVay)	3(O'Neill)	Limestone (McVay)
Internal Friction Angle, ϕ (degrees)	32	------	-----	------	-----	------
Subgrade Soil Modulus, RK (pci)	50	------	------	------	------	------
Unconfined Compressive Strength, qu (psf)	-----	33333	2250	33333	2250	33333
Undrained Strength, C (psf)	-----	16667	1125	16667	1125	16667
Strain @ 50% Failure, ε 50 (in/in)	-----	-----	0.005	-----	0.005	-----
Strain @ 100% Failure, ε 100 (in/in)	-----	-----	0.015	-----	0.015	-----
Total Unit Weight, γ_t (pcf)	112	125	140	125	140	125
Effective Unit Weight, γ_{eff} (pci) [1]	0.0287	0.0362	0.0449	0.0362	0.0449	0.0362
SOIL PROPERTIES FOR THE AXIAL MODEL:						
Axial Soil Model	Drilled Shaft Sand	Drilled Shaft Limestone	Drilled Shaft Clay	Drilled Shaft Limestone	Drilled Shaft Clay	Drilled Shaft Limestone
Ultimate Unit Skin Friction, fsmax (psf)	444	10000	619	10000	619	10000
Undrained Strength, C (psf)	-----	16667	1125	16667	1125	16667
Internal Friction Angle, ϕ (degrees)	32	------	-----	------	-----	------
Total Unit Weight, γ_t (pcf)	112	125	140	125	140	125
SOIL PROPERTIES FOR THE TORSIONAL MODEL:						
Torsional Soil Model	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic
Shear Modulus, G (ksi)	1.5	11.1	4.6	11.1	4.6	11.1
Torsional Shear Stress (psf)	311	7000	433	7000	433	7000
SOIL PROPERTIES FOR THE TIP MODEL:						
Tip Soil Model [3]	Drilled Shaft Sand	Drilled Shaft Limestone	Drilled Shaft Clay	Drilled Shaft Limestone	Drilled Shaft Clay	Drilled Shaft Limestone
Uncorrected SPT N value (blows/ft) [2]	17	------	------	------	------	------
Undrained Shear Strength at the tip elevation (psf)	-----	16667	1125	16667	1125	16667

AREHNA Engineering, Inc.
5012 W Lemon Street
Tamp, Florida 33609

Project Name: THEA PD&E Whiting Street
Project Number: B-19-051
Prepared by/ Date: JB 9-17-2021
Checked by/ Date: KE 9-17-2021

Boring Number: BB-03
Boring GSE (ft, NAVD): 16.3
Bridge No: -
End Bent/Pier No.: -
Station and Offset (Baseline): 204+29

Summary of Recommended Soil Parameters for FB-Pier Analysis- DRILLED SHAFTS (48-inch and 60-inch)

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**	**20**	**30.5**	**38**	**43**	**58**	**70**
Depth at bottom of layer (ft)	**16**	**20**	**30.5**	**38**	**43**	**58**	**70**	**100**
Depth at design water table (ft)								
Elevation at top of layer (ft, NAVD)	16.3	0.3	-3.7	-14.2	-21.7	-26.7	-41.7	-53.7
Elevation at bottom of layer (ft, NAVD)	0.3	-3.7	-14.2	-21.7	-26.7	-41.7	-53.7	-83.7
Design Water Table Elevation (ft, NAVD)								
Soil Layer Type (Cohesionless, Cohesive, Rock)	Cohesionless	Cohesive	Rock	Cohesive	Cohesive	Rock	Cohesionless	Rock
USCS Soil Layer Type (GW, SP, SP-SM, SM, SC, ML, CL, CH, NA)	SP-SM	ML	NA	ML	CH	NA	SC	NA
Average SPT N value (automatic), Blows/ ft	16	6	76	74	23	100	78	100
SOIL PROPERTIES FOR LATERAL SOIL MODEL:								
Lateral Soil Model	1 (O'Neill)	3(O'Neill)	Limestone (McVay)	3(O'Neill)	3(O'Neill)	Limestone (McVay)	1 (O'Neill)	Limestone (McVay)
Internal Friction Angle, ϕ (degrees)	33	-----	------	-----	-----	------	35	------
Subgrade Soil Modulus, RK (pci)	58	------	------	------	------	------	185	------
Unconfined Compressive Strength, qu (psf)	-----	1116	33333	2250	3930	33333	-----	33333
Undrained Strength, C (psf)	-----	558	16667	1125	1965	16667	-----	16667
Strain @ 50% Failure, ε 50 (in/in)	-----	0.008	-----	0.005	0.005	-----	-----	-----
Strain @ 100% Failure, ε 100 (in/in)	-----	0.019	-----	0.015	0.015	-----	-----	-----
Total Unit Weight, γ_t (pcf)	115	119	125	140	140	125	130	125
Effective Unit Weight, γ_{eff} (pci) [1]	0.0304	0.0329	0.0362	0.0449	0.0449	0.0362	0.0391	0.0362
SOIL PROPERTIES FOR THE AXIAL MODEL:								
Axial Soil Model	Drilled Shaft Sand	Drilled Shaft Clay	Drilled Shaft Limestone	Drilled Shaft Clay	Drilled Shaft Clay	Drilled Shaft Limestone	Drilled Shaft Sand	Drilled Shaft Limestone
Ultimate Unit Skin Friction, fsmax (psf)	471	307	10000	619	1081	10000	1817	10000
Undrained Strength, C (psf)	-----	558	16667	1125	1965	16667	-----	16667
Internal Friction Angle, ϕ (degrees)	33	-----	------	-----	-----	------	35	------
Total Unit Weight, γ_t (pcf)	115	119	125	140	140	125	130	125
SOIL PROPERTIES FOR THE TORSIONAL MODEL:								
Torsional Soil Model	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic
Shear Modulus, G (ksi)	1.6	1.4	11.1	4.6	4.6	11.1	4.3	11.1
Torsional Shear Stress (psf)	329	215	7000	433	757	7000	1272	7000
SOIL PROPERTIES FOR THE TIP MODEL:								
Tip Soil Model [3]	Drilled Shaft Sand	Drilled Shaft Clay	Drilled Shaft Limestone	Drilled Shaft Clay	Drilled Shaft Clay	Drilled Shaft Limestone	Drilled Shaft Sand	Drilled Shaft Limestone
Uncorrected SPT N value (blows/ft) [2]	20	------	------	------	------	------	60	------
Undrained Shear Strength at the tip elevation (psf)	-----	558	16667	1125	1965	16667	-----	16667

AREHNA Engineering, Inc.
5012 W Lemon Street
Tamp, Florida 33609

Project Name: THEA PD&E Whiting Street
Project Number: B-19-051
Prepared by/ Date: JB 9-17-2021
Checked by/ Date: KE 9-17-2021

Boring Number: BB-04
Boring GSE (ft, NAVD): 16.1
Bridge No: -
End Bent/Pier No.: -
Station and Offset (Baseline): 206+48

Summary of Recommended Soil Parameters for FB-Pier Analysis- DRILLED SHAFTS (48-inch and 60-inch)

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**	**34**	**38**	**50**	**62**	**70**	**75**
Depth at bottom of layer (ft)	**34**	**38**	**50**	**62**	**70**	**75**	**100**
Depth at design water table (ft)	5	5	5	5	5	5	5
Elevation at top of layer (ft, NAVD)	16.1	-17.9	-21.9	-33.9	-45.9	-53.9	-58.9
Elevation at bottom of layer (ft, NAVD)	-17.9	-21.9	-33.9	-45.9	-53.9	-58.9	-83.9
Design Water Table Elevation (ft, NAVD)	11.1	11.1	11.1	11.1	11.1	11.1	11.1
Soil Layer Type (Cohesionless, Cohesive, Rock)	Cohesionless	Cohesionless	Cohesionless	Cohesive	Rock	Cohesive	Rock
USCS Soil Layer Type (GW, SP, SP-SM, SM, SC, ML, CL, CH, NA)	SP	SC	SP	CH	NA	CH	NA
Average SPT N value (automatic), Blows/ ft	6	13	1	59	95	100	97
SOIL PROPERTIES FOR LATERAL SOIL MODEL:							
Lateral Soil Model	1 (O'Neill)	1 (O'Neill)	1 (O'Neill)	3(O'Neill)	Limestone (McVay)	3(O'Neill)	Limestone (McVay)
Internal Friction Angle, ϕ (degrees)	30	32	28	-----	------	-----	------
Subgrade Soil Modulus, RK (pci)	18	46	10	------	------	------	------
Unconfined Compressive Strength, qu (psf)	-----	-----	-----	3930	33333	3930	33333
Undrained Strength, C (psf)	-----	-----	-----	1965	16667	1965	16667
Strain @ 50% Failure, ε 50 (in/in)	-----	-----	-----	0.005	-----	0.005	-----
Strain @ 100% Failure, ε 100 (in/in)	-----	-----	-----	0.015	-----	0.015	-----
Total Unit Weight, γ_t (pcf)	105	112	102	140	125	140	125
Effective Unit Weight, γ_{eff} (pci) [1]	0.0247	0.0287	0.0229	0.0449	0.0362	0.0449	0.0362
SOIL PROPERTIES FOR THE AXIAL MODEL:							
Axial Soil Model	Drilled Shaft Sand	Drilled Shaft Sand	Drilled Shaft Sand	Drilled Shaft Clay	Drilled Shaft Limestone	Drilled Shaft Clay	Drilled Shaft Limestone
Ultimate Unit Skin Friction, fsmax (psf)	339	1232	87	1081	10000	1081	10000
Undrained Strength, C (psf)	-----	-----	-----	1965	16667	1965	16667
Internal Friction Angle, ϕ (degrees)	30	32	28	-----	------	-----	------
Total Unit Weight, γ_t (pcf)	105	112	102	140	125	140	125
SOIL PROPERTIES FOR THE TORSIONAL MODEL:							
Torsional Soil Model	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic	Hyperbolic
Shear Modulus, G (ksi)	0.6	1.4	0.1	4.6	11.1	4.6	11.1
Torsional Shear Stress (psf)	237	862	61	757	7000	757	7000
SOIL PROPERTIES FOR THE TIP MODEL:							
Tip Soil Model [3]	Drilled Shaft Sand	Drilled Shaft Sand	Drilled Shaft Sand	Drilled Shaft Clay	Drilled Shaft Limestone	Drilled Shaft Clay	Drilled Shaft Limestone
Uncorrected SPT N value (blows/ft) [2]	7	16	1	------	------	------	------
Undrained Shear Strength at the tip elevation (psf)	-----	-----	-----	1965	16667	1965	16667

Appendix D

FB-Deep Analysis and Output – Driven Piles
FB-Deep Analysis and Output – Drilled Shafts

Florida Bridge Software Institute — Date: August 19, 2021
Shaft and Pile Analysis (FB-Deep v.2.05) — Time: 16:21:59

General Information:
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  Input file: .....et - LOCHNER\12 - Calculations\FB-Deep\PSCP\BB-01_PSCP_REV.spc
  Project number: B-19-051
  Job name: THEA Whiting Street
  Engineer: Kirk M. Eastman
  Units: English

Analysis Information:
==========
Analysis Type: SPT

Soil Information:
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  Boring date: 6/9/21, Boring Number: BB-01
  Station number: 105+72 Offset: 8 LT

  Ground Elevation: 15.300(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	5.00	5- Cavity layer
3	4.00	5.00	5- Cavity layer
4	6.00	10.00	5- Cavity layer
5	8.00	10.00	5- Cavity layer
6	10.00	12.00	5- Cavity layer
7	10.00	0.00	1- Plastic Clay
8	10.00	27.00	3- Clean sand
9	12.00	27.00	3- Clean sand
10	14.00	26.00	3- Clean sand
11	14.00	0.00	1- Plastic Clay
12	14.00	16.00	3- Clean sand
13	16.00	16.00	3- Clean sand
14	18.00	14.00	3- Clean sand
15	18.00	0.00	1- Plastic Clay
16	18.00	9.00	2- Clay and silty sand
17	20.00	9.00	2- Clay and silty sand
18	22.50	7.00	2- Clay and silty sand
19	22.50	0.00	1- Plastic Clay
20	22.50	100.00	4- Lime Stone/Very shelly sand
21	25.00	100.00	4- Lime Stone/Very shelly sand
22	27.50	100.00	4- Lime Stone/Very shelly sand
23	30.00	100.00	4- Lime Stone/Very shelly sand
24	32.50	100.00	4- Lime Stone/Very shelly sand
25	32.50	0.00	1- Plastic Clay
26	32.50	40.00	3- Clean sand
27	35.00	40.00	3- Clean sand
28	37.50	47.00	3- Clean sand
29	37.50	0.00	1- Plastic Clay
30	37.50	100.00	4- Lime Stone/Very shelly sand
31	40.00	100.00	4- Lime Stone/Very shelly sand
32	42.50	100.00	4- Lime Stone/Very shelly sand
33	45.00	100.00	4- Lime Stone/Very shelly sand
34	47.50	100.00	4- Lime Stone/Very shelly sand
35	47.50	0.00	1- Plastic Clay
36	47.50	20.00	3- Clean sand
37	50.00	20.00	3- Clean sand
38	50.00	0.00	2- Clay and silty sand
39	50.00	30.00	1- Plastic Clay
40	52.50	30.00	1- Plastic Clay
41	55.00	45.00	1- Plastic Clay
42	57.50	48.00	1- Plastic Clay
43	57.50	0.00	2- Clay and silty sand
44	57.50	15.00	3- Clean sand
45	60.00	15.00	3- Clean sand
46	60.00	0.00	1- Plastic Clay
47	60.00	100.00	4- Lime Stone/Very shelly sand
48	62.50	100.00	4- Lime Stone/Very shelly sand
49	65.00	100.00	4- Lime Stone/Very shelly sand
50	67.50	100.00	4- Lime Stone/Very shelly sand
51	70.00	100.00	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	100.00	4- Lime Stone/Very shelly sand
56	82.50	100.00	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	92.50	100.00	4- Lime Stone/Very shelly sand
61	95.00	100.00	4- Lime Stone/Very shelly sand
62	97.50	100.00	4- Lime Stone/Very shelly sand
63	100.00	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	15.30	5.30	10.00	6.00	5-Void
2	5.30	5.30	0.00	27.00	1-Plastic Clay
3	5.30	1.30	4.00	27.00	3-Clean Sand
4	1.30	1.30	0.00	16.00	1-Plastic Clay
5	1.30	-2.70	4.00	16.00	3-Clean Sand
6	-2.70	-2.70	0.00	9.00	1-Plastic Clay
7	-2.70	-7.20	4.50	9.00	2-Clay and Silty Sand
8	-7.20	-7.20	0.00	100.00	1-Plastic Clay
9	-7.20	-17.20	10.00	100.00	4-Limestone, Very Shelly Sand
10	-17.20	-17.20	0.00	40.00	1-Plastic Clay
11	-17.20	-22.20	5.00	40.00	3-Clean Sand
12	-22.20	-22.20	0.00	100.00	1-Plastic Clay
13	-22.20	-32.20	10.00	100.00	4-Limestone, Very Shelly Sand
14	-32.20	-32.20	0.00	20.00	1-Plastic Clay
15	-32.20	-34.70	2.50	20.00	3-Clean Sand
16	-34.70	-34.70	0.00	30.00	2-Clay and Silty Sand
17	-34.70	-42.20	7.50	35.00	1-Plastic Clay
18	-42.20	-42.20	0.00	15.00	2-Clay and Silty Sand
19	-42.20	-44.70	2.50	15.00	3-Clean Sand
20	-44.70	-44.70	0.00	100.00	1-Plastic Clay
21	-44.70	-84.70	40.00	100.00	4-Limestone, Very Shelly Sand

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

Pile Geometry:

Width (in)	Length (ft)	Tip Elev. (ft)
18.00	10.00	5.30
18.00	11.00	4.30
18.00	12.00	3.30
18.00	13.00	2.30
18.00	14.00	1.30
18.00	15.00	0.30
18.00	16.00	-0.70
18.00	17.00	-1.70
18.00	18.00	-2.70
18.00	19.00	-3.70
18.00	20.00	-4.70
18.00	21.00	-5.70
18.00	22.00	-6.70
18.00	23.00	-7.70
18.00	24.00	-8.70
18.00	25.00	-9.70
18.00	26.00	-10.70
18.00	27.00	-11.70
18.00	28.00	-12.70
18.00	29.00	-13.70
18.00	30.00	-14.70
18.00	31.00	-15.70
18.00	32.00	-16.70
18.00	33.00	-17.70
18.00	34.00	-18.70
18.00	35.00	-19.70
18.00	36.00	-20.70
18.00	37.00	-21.70
18.00	38.00	-22.70
18.00	39.00	-23.70
18.00	40.00	-24.70
18.00	41.00	-25.70
18.00	42.00	-26.70
18.00	43.00	-27.70
18.00	44.00	-28.70
18.00	45.00	-29.70
18.00	46.00	-30.70
18.00	47.00	-31.70
18.00	48.00	-32.70
18.00	49.00	-33.70
18.00	50.00	-34.70
18.00	51.00	-35.70
18.00	52.00	-36.70
18.00	53.00	-37.70
18.00	54.00	-38.70
18.00	55.00	-39.70
18.00	56.00	-40.70
18.00	57.00	-41.70
18.00	58.00	-42.70
18.00	59.00	-43.70
18.00	60.00	-44.70
18.00	61.00	-45.70
18.00	62.00	-46.70
18.00	63.00	-47.70
18.00	64.00	-48.70
18.00	65.00	-49.70
18.00	66.00	-50.70
18.00	67.00	-51.70
18.00	68.00	-52.70
18.00	69.00	-53.70

18.00	70.00	-54.70
18.00	71.00	-55.70
18.00	72.00	-56.70
18.00	73.00	-57.70
18.00	74.00	-58.70
18.00	75.00	-59.70
18.00	76.00	-60.70
18.00	77.00	-61.70
18.00	78.00	-62.70
18.00	79.00	-63.70
18.00	80.00	-64.70
18.00	81.00	-65.70
18.00	82.00	-66.70
18.00	83.00	-67.70
18.00	84.00	-68.70
18.00	85.00	-69.70
18.00	86.00	-70.70
18.00	87.00	-71.70
18.00	88.00	-72.70
18.00	89.00	-73.70
18.00	90.00	-74.70
18.00	91.00	-75.70
18.00	92.00	-76.70
18.00	93.00	-77.70
18.00	94.00	-78.70
18.00	95.00	-79.70
18.00	96.00	-80.70
18.00	97.00	-81.70
18.00	98.00	-82.70
18.00	99.00	-83.70
18.00	100.00	-84.70
24.00	10.00	5.30
24.00	11.00	4.30
24.00	12.00	3.30
24.00	13.00	2.30
24.00	14.00	1.30
24.00	15.00	0.30
24.00	16.00	-0.70
24.00	17.00	-1.70
24.00	18.00	-2.70
24.00	19.00	-3.70
24.00	20.00	-4.70
24.00	21.00	-5.70
24.00	22.00	-6.70
24.00	23.00	-7.70
24.00	24.00	-8.70
24.00	25.00	-9.70
24.00	26.00	-10.70
24.00	27.00	-11.70
24.00	28.00	-12.70
24.00	29.00	-13.70
24.00	30.00	-14.70
24.00	31.00	-15.70
24.00	32.00	-16.70
24.00	33.00	-17.70
24.00	34.00	-18.70
24.00	35.00	-19.70
24.00	36.00	-20.70
24.00	37.00	-21.70
24.00	38.00	-22.70
24.00	39.00	-23.70
24.00	40.00	-24.70
24.00	41.00	-25.70
24.00	42.00	-26.70
24.00	43.00	-27.70
24.00	44.00	-28.70
24.00	45.00	-29.70
24.00	46.00	-30.70
24.00	47.00	-31.70
24.00	48.00	-32.70
24.00	49.00	-33.70
24.00	50.00	-34.70
24.00	51.00	-35.70
24.00	52.00	-36.70
24.00	53.00	-37.70
24.00	54.00	-38.70
24.00	55.00	-39.70
24.00	56.00	-40.70
24.00	57.00	-41.70
24.00	58.00	-42.70
24.00	59.00	-43.70
24.00	60.00	-44.70
24.00	61.00	-45.70
24.00	62.00	-46.70
24.00	63.00	-47.70
24.00	64.00	-48.70
24.00	65.00	-49.70
24.00	66.00	-50.70
24.00	67.00	-51.70
24.00	68.00	-52.70
24.00	69.00	-53.70
24.00	70.00	-54.70
24.00	71.00	-55.70
24.00	72.00	-56.70
24.00	73.00	-57.70
24.00	74.00	-58.70
24.00	75.00	-59.70
24.00	76.00	-60.70
24.00	77.00	-61.70
24.00	78.00	-62.70

24.00	79.00	-63.70
24.00	80.00	-64.70
24.00	81.00	-65.70
24.00	82.00	-66.70
24.00	83.00	-67.70
24.00	84.00	-68.70
24.00	85.00	-69.70
24.00	86.00	-70.70
24.00	87.00	-71.70
24.00	88.00	-72.70
24.00	89.00	-73.70
24.00	90.00	-74.70
24.00	91.00	-75.70
24.00	92.00	-76.70

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)
10.00	18.0	0.00	36.00	36.00	18.00	107.99
11.00	18.0	3.76	36.02	39.79	19.89	111.84
12.00	18.0	7.59	36.02	43.61	21.80	115.65
13.00	18.0	11.41	35.34	46.76	23.38	117.45
14.00	18.0	15.13	32.43	47.56	23.78	112.43
15.00	18.0	17.39	31.16	48.54	24.27	110.85
16.00	18.0	19.65	29.80	49.44	24.72	109.04
17.00	18.0	21.84	28.40	50.24	25.12	107.04
18.00	18.0	23.89	44.78	68.67	34.33	158.23
19.00	18.0	25.86	48.76	74.62	37.31	172.13
20.00	18.0	27.18	60.69	87.87	43.94	209.26
21.00	18.0	28.49	80.60	109.09	54.54	270.28
22.00	18.0	29.94	108.51	138.45	69.23	355.48
23.00	18.0	39.15	258.14	297.30	148.65	813.58
24.00	18.0	45.15	258.14	303.30	151.65	819.58
25.00	18.0	51.15	258.14	309.30	154.65	825.58
26.00	18.0	57.15	258.14	315.30	157.65	831.58
27.00	18.0	63.15	246.55	309.70	154.85	802.81
28.00	18.0	69.15	223.37	292.52	146.26	739.25
29.00	18.0	75.15	200.18	275.34	137.67	675.70
30.00	18.0	81.15	177.69	258.85	129.42	614.24
31.00	18.0	87.15	156.59	243.75	121.87	556.93
32.00	18.0	93.15	146.56	239.72	119.86	532.85
33.00	18.0	98.85	174.08	272.93	136.47	621.10
34.00	18.0	103.56	176.05	279.61	139.81	631.72
35.00	18.0	107.87	179.28	287.15	143.58	645.71
36.00	18.0	112.34	182.86	295.20	147.60	660.92
37.00	18.0	117.01	187.13	304.15	152.07	678.42
38.00	18.0	128.66	258.14	386.81	193.40	903.09
39.00	18.0	134.66	258.14	392.81	196.40	909.09
40.00	18.0	140.66	258.14	398.81	199.40	915.09
41.00	18.0	146.66	258.14	404.81	202.40	921.09
42.00	18.0	152.66	241.59	394.25	197.13	877.43
43.00	18.0	158.66	208.49	367.15	183.57	784.12
44.00	18.0	164.66	175.38	340.05	170.02	690.81
45.00	18.0	170.66	135.61	306.28	153.14	577.51
46.00	18.0	176.66	95.85	272.51	136.25	464.20
47.00	18.0	182.66	56.16	238.82	119.41	351.14
48.00	18.0	187.08	134.64	321.71	160.86	590.99
49.00	18.0	189.90	128.29	318.20	159.10	574.78
50.00	18.0	192.73	119.54	312.27	156.14	551.36
51.00	18.0	200.84	110.59	311.43	155.71	532.60
52.00	18.0	208.95	101.71	310.66	155.33	514.07
53.00	18.0	217.11	93.81	310.92	155.46	498.53
54.00	18.0	225.60	86.05	311.65	155.82	483.74
55.00	18.0	234.47	83.16	317.63	158.82	483.95
56.00	18.0	243.52	95.40	338.92	169.46	529.72
57.00	18.0	252.54	107.60	360.14	180.07	575.33
58.00	18.0	258.05	113.89	371.94	185.97	599.73
59.00	18.0	259.83	115.59	375.41	187.71	606.59
60.00	18.0	262.34	258.14	520.49	260.24	1036.77
61.00	18.0	268.34	258.14	526.49	263.24	1042.77
62.00	18.0	274.34	258.14	532.49	266.24	1048.77
63.00	18.0	280.34	258.14	538.49	269.24	1054.77
64.00	18.0	286.34	258.14	544.49	272.24	1060.77
65.00	18.0	292.34	258.14	550.49	275.24	1066.77
66.00	18.0	298.34	258.14	556.49	278.24	1072.77
67.00	18.0	304.34	258.14	562.49	281.24	1078.77
68.00	18.0	310.34	258.14	568.49	284.24	1084.77
69.00	18.0	316.34	258.14	574.49	287.24	1090.77
70.00	18.0	322.34	258.14	580.49	290.24	1096.77
71.00	18.0	328.34	258.14	586.49	293.24	1102.77
72.00	18.0	334.34	258.14	592.49	296.24	1108.77
73.00	18.0	340.34	258.14	598.49	299.24	1114.77
74.00	18.0	346.34	258.14	604.49	302.24	1120.77
75.00	18.0	352.34	258.14	610.49	305.24	1126.77
76.00	18.0	358.34	258.14	616.49	308.24	1132.77
77.00	18.0	364.34	258.14	622.49	311.24	1138.77

78.00	18.0	370.34	258.14	628.49	314.24	1144.77
79.00	18.0	376.34	258.14	634.49	317.24	1150.77
80.00	18.0	382.34	258.14	640.49	320.24	1156.77
81.00	18.0	388.34	258.14	646.49	323.24	1162.77
82.00	18.0	394.34	258.14	652.49	326.24	1168.77
83.00	18.0	400.34	258.14	658.49	329.24	1174.77
84.00	18.0	406.34	258.14	664.49	332.24	1180.77
85.00	18.0	412.34	258.14	670.49	335.24	1186.77
86.00	18.0	418.34	258.14	676.49	338.24	1192.77
87.00	18.0	424.34	258.14	682.49	341.24	1198.77
88.00	18.0	430.34	258.14	688.49	344.24	1204.77
89.00	18.0	436.34	258.14	694.49	347.24	1210.77
90.00	18.0	442.34	258.14	700.49	350.24	1216.77
91.00	18.0	448.34	258.14	706.49	353.24	1222.77
92.00	18.0	454.34	258.14	712.49	356.24	1228.77
93.00	18.0	460.34	258.14	718.49	359.24	1234.77
94.00	18.0	466.34	258.14	724.49	362.24	1240.77
95.00	18.0	Soil Elevations Must Extend At or Below Contribution Zone				
96.00	18.0	Soil Elevations Must Extend At or Below Contribution Zone				
97.00	18.0	Soil Elevations Must Extend At or Below Contribution Zone				
98.00	18.0	Soil Elevations Must Extend At or Below Contribution Zone				
99.00	18.0	Soil Elevations Must Extend At or Below Contribution Zone				
100.00	18.0	Soil Elevations Must Extend At or Below Contribution Zone				

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	58.39	58.39	29.19	175.16
11.00	24.0	4.94	58.46	63.40	31.70	180.32
12.00	24.0	10.18	57.06	67.24	33.62	181.37
13.00	24.0	15.22	53.18	68.40	34.20	174.77
14.00	24.0	20.17	48.67	68.84	34.42	166.19
15.00	24.0	23.18	45.58	68.76	34.38	159.91
16.00	24.0	25.29	49.70	74.99	37.49	174.39
17.00	24.0	25.49	55.12	80.61	40.30	190.86
18.00	24.0	31.85	117.07	148.92	74.46	383.07
19.00	24.0	34.93	121.05	155.98	77.99	398.08
20.00	24.0	37.18	132.98	170.16	85.08	436.13
21.00	24.0	39.09	152.89	191.98	95.99	497.76
22.00	24.0	40.85	180.80	221.66	110.83	583.26
23.00	24.0	52.21	458.92	511.13	255.56	1428.97
24.00	24.0	60.21	458.92	519.13	259.56	1436.97
25.00	24.0	68.21	443.46	511.67	255.83	1398.60
26.00	24.0	76.21	412.55	488.76	244.38	1313.86
27.00	24.0	84.21	381.64	465.85	232.92	1229.13
28.00	24.0	92.21	351.66	443.86	221.93	1147.17
29.00	24.0	100.21	323.52	423.73	211.86	1070.77
30.00	24.0	108.21	310.15	418.35	209.18	1038.65
31.00	24.0	116.21	310.15	426.35	213.18	1046.65
32.00	24.0	124.21	310.15	434.35	217.18	1054.65
33.00	24.0	131.84	294.89	426.73	213.36	1016.50
34.00	24.0	138.42	296.71	435.13	217.56	1028.54
35.00	24.0	144.19	300.52	444.71	222.36	1045.76
36.00	24.0	149.61	306.26	455.86	227.93	1068.38
37.00	24.0	155.02	313.82	468.85	234.42	1096.49
38.00	24.0	171.55	458.92	630.47	315.24	1548.31
39.00	24.0	179.55	458.92	638.47	319.24	1556.31
40.00	24.0	187.55	436.85	624.40	312.20	1498.10
41.00	24.0	195.55	392.71	588.26	294.13	1373.69
42.00	24.0	203.55	348.57	552.12	276.06	1249.27
43.00	24.0	211.55	295.55	507.10	253.55	1098.20
44.00	24.0	219.55	242.52	462.07	231.04	947.12
45.00	24.0	227.55	189.61	417.16	208.58	796.37
46.00	24.0	235.55	137.45	373.00	186.50	647.90
47.00	24.0	243.55	86.16	329.71	164.86	502.04
48.00	24.0	249.44	215.82	465.25	232.63	896.88
49.00	24.0	253.21	204.86	458.06	229.03	867.78
50.00	24.0	256.97	197.86	454.84	227.42	850.56
51.00	24.0	267.79	194.66	462.45	231.22	851.76
52.00	24.0	278.60	192.09	470.69	235.35	854.87
53.00	24.0	289.48	189.02	478.50	239.25	856.54
54.00	24.0	299.62	209.13	508.75	254.37	927.00
55.00	24.0	311.43	225.61	537.04	268.52	988.26
56.00	24.0	323.47	241.93	565.40	282.70	1049.26
57.00	24.0	335.49	258.19	593.68	296.84	1110.07
58.00	24.0	344.10	266.51	610.61	305.31	1143.64
59.00	24.0	346.64	268.21	614.85	307.43	1151.27
60.00	24.0	349.79	458.92	808.71	404.36	1726.55
61.00	24.0	357.79	458.92	816.71	408.36	1734.55
62.00	24.0	365.79	458.92	824.71	412.36	1742.55
63.00	24.0	373.79	458.92	832.71	416.36	1750.55
64.00	24.0	381.79	458.92	840.71	420.36	1758.55
65.00	24.0	389.79	458.92	848.71	424.36	1766.55
66.00	24.0	397.79	458.92	856.71	428.36	1774.55
67.00	24.0	405.79	458.92	864.71	432.36	1782.55
68.00	24.0	413.79	458.92	872.71	436.36	1790.55
69.00	24.0	421.79	458.92	880.71	440.36	1798.55
70.00	24.0	429.79	458.92	888.71	444.36	1806.55
71.00	24.0	437.79	458.92	896.71	448.36	1814.55
72.00	24.0	445.79	458.92	904.71	452.36	1822.55
73.00	24.0	453.79	458.92	912.71	456.36	1830.55
74.00	24.0	461.79	458.92	920.71	460.36	1838.55

75.00	24.0	469.79	458.92	928.71	464.36	1846.55
76.00	24.0	477.79	458.92	936.71	468.36	1854.55
77.00	24.0	485.79	458.92	944.71	472.36	1862.55
78.00	24.0	493.79	458.92	952.71	476.36	1870.55
79.00	24.0	501.79	458.92	960.71	480.36	1878.55
80.00	24.0	509.79	458.92	968.71	484.36	1886.55
81.00	24.0	517.79	458.92	976.71	488.36	1894.55
82.00	24.0	525.79	458.92	984.71	492.36	1902.55
83.00	24.0	533.79	458.92	992.71	496.36	1910.55
84.00	24.0	541.79	458.92	1000.71	500.36	1918.55
85.00	24.0	549.79	458.92	1008.71	504.36	1926.55
86.00	24.0	557.79	458.92	1016.71	508.36	1934.55
87.00	24.0	565.79	458.92	1024.71	512.36	1942.55
88.00	24.0	573.79	458.92	1032.71	516.36	1950.55
89.00	24.0	581.79	458.92	1040.71	520.36	1958.55
90.00	24.0	589.79	458.92	1048.71	524.36	1966.55
91.00	24.0	597.79	458.92	1056.71	528.36	1974.55
92.00	24.0	605.79	458.92	1064.71	532.36	1982.55

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.

Florida Bridge Software Institute Date: August 19, 2021
Shaft and Pile Analysis (FB-Deep v.2.05) Time: 16:26:45

General Information:
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Input file: .....et - LOCHNER\12 - Calculations\FB-Deep\PSCP\BB-02_PSCP_REV.spc
Project number: B-19-051
Job name: THEA Whiting Street
Engineer: Kirk M. Eastman
Units: English

Analysis Information:
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Analysis Type: SPT

Soil Information:
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Boring date: 7/1/21, Boring Number: BB-02
Station number: 107+56 Offset: 12 LT

Ground Elevation: 16.600(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	5.00	5- Cavity layer
3	4.00	5.00	5- Cavity layer
4	6.00	13.00	5- Cavity layer
5	8.00	18.00	5- Cavity layer
6	10.00	17.00	5- Cavity layer
7	10.00	0.00	1- Plastic Clay
8	10.00	13.00	3- Clean sand
9	12.00	13.00	3- Clean sand
10	14.00	11.00	3- Clean sand
11	16.00	10.00	3- Clean sand
12	16.00	0.00	1- Plastic Clay
13	16.00	100.00	4- Lime Stone/Very shelly sand
14	18.00	100.00	4- Lime Stone/Very shelly sand
15	20.00	100.00	4- Lime Stone/Very shelly sand
16	20.00	0.00	1- Plastic Clay
17	20.00	60.00	4- Lime Stone/Very shelly sand
18	22.50	60.00	4- Lime Stone/Very shelly sand
19	25.00	67.00	4- Lime Stone/Very shelly sand
20	25.00	0.00	1- Plastic Clay
21	25.00	32.00	3- Clean sand
22	27.50	32.00	3- Clean sand
23	30.00	36.00	3- Clean sand
24	30.00	0.00	1- Plastic Clay
25	30.00	100.00	4- Lime Stone/Very shelly sand
26	32.50	100.00	4- Lime Stone/Very shelly sand
27	35.00	100.00	4- Lime Stone/Very shelly sand
28	35.00	0.00	2- Clay and silty sand
29	35.00	31.00	1- Plastic Clay
30	37.50	31.00	1- Plastic Clay
31	40.00	37.00	1- Plastic Clay
32	40.00	0.00	2- Clay and silty sand
33	40.00	100.00	4- Lime Stone/Very shelly sand
34	42.50	100.00	4- Lime Stone/Very shelly sand
35	45.00	100.00	4- Lime Stone/Very shelly sand
36	47.50	63.00	4- Lime Stone/Very shelly sand
37	50.00	68.00	4- Lime Stone/Very shelly sand
38	50.00	0.00	2- Clay and silty sand
39	50.00	100.00	1- Plastic Clay
40	52.50	100.00	1- Plastic Clay
41	55.00	100.00	1- Plastic Clay
42	55.00	0.00	3- Clean sand
43	55.00	100.00	4- Lime Stone/Very shelly sand
44	57.50	100.00	4- Lime Stone/Very shelly sand
45	57.50	0.00	1- Plastic Clay
46	57.50	100.00	2- Clay and silty sand
47	60.00	100.00	2- Clay and silty sand
48	60.00	0.00	1- Plastic Clay
49	60.00	54.00	4- Lime Stone/Very shelly sand
50	62.50	54.00	4- Lime Stone/Very shelly sand
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	2- Clay and silty sand
56	72.50	54.00	1- Plastic Clay
57	75.00	54.00	1- Plastic Clay
58	75.00	0.00	2- Clay and silty sand
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	90.00	100.00	4- Lime Stone/Very shelly sand
66	92.50	100.00	4- Lime Stone/Very shelly sand
67	95.00	100.00	4- Lime Stone/Very shelly sand
68	97.50	100.00	4- Lime Stone/Very shelly sand
69	100.00	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	16.60	6.60	10.00	8.20	5-Void
2	6.60	6.60	0.00	13.00	1-Plastic Clay
3	6.60	0.60	6.00	12.33	3-Clean Sand
4	0.60	0.60	0.00	100.00	1-Plastic Clay
5	0.60	-3.40	4.00	100.00	4-Limestone, Very Shelly Sand
6	-3.40	-3.40	0.00	60.00	1-Plastic Clay
7	-3.40	-8.40	5.00	60.00	4-Limestone, Very Shelly Sand
8	-8.40	-8.40	0.00	32.00	1-Plastic Clay
9	-8.40	-13.40	5.00	32.00	3-Clean Sand
10	-13.40	-13.40	0.00	100.00	1-Plastic Clay
11	-13.40	-18.40	5.00	100.00	4-Limestone, Very Shelly Sand
12	-18.40	-18.40	0.00	31.00	2-Clay and Silty Sand
13	-18.40	-23.40	5.00	31.00	1-Plastic Clay
14	-23.40	-23.40	0.00	100.00	2-Clay and Silty Sand
15	-23.40	-33.40	10.00	90.75	4-Limestone, Very Shelly Sand
16	-33.40	-33.40	0.00	100.00	2-Clay and Silty Sand
17	-33.40	-38.40	5.00	100.00	1-Plastic Clay
18	-38.40	-38.40	0.00	100.00	3-Clean Sand
19	-38.40	-40.90	2.50	100.00	4-Limestone, Very Shelly Sand
20	-40.90	-40.90	0.00	100.00	1-Plastic Clay
21	-40.90	-43.40	2.50	100.00	2-Clay and Silty Sand
22	-43.40	-43.40	0.00	54.00	1-Plastic Clay
23	-43.40	-55.90	12.50	81.60	4-Limestone, Very Shelly Sand
24	-55.90	-55.90	0.00	54.00	2-Clay and Silty Sand
25	-55.90	-58.40	2.50	54.00	1-Plastic Clay
26	-58.40	-58.40	0.00	100.00	2-Clay and Silty Sand
27	-58.40	-83.40	25.00	100.00	4-Limestone, Very Shelly Sand

Driven Pile Data:

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

Pile Geometry:

Width (in)	Length (ft)	Tip Elev. (ft)
18.00	10.00	6.60
18.00	11.00	5.60
18.00	12.00	4.60
18.00	13.00	3.60
18.00	14.00	2.60
18.00	15.00	1.60
18.00	16.00	0.60
18.00	17.00	-0.40
18.00	18.00	-1.40
18.00	19.00	-2.40
18.00	20.00	-3.40
18.00	21.00	-4.40
18.00	22.00	-5.40
18.00	23.00	-6.40
18.00	24.00	-7.40
18.00	25.00	-8.40
18.00	26.00	-9.40
18.00	27.00	-10.40
18.00	28.00	-11.40
18.00	29.00	-12.40
18.00	30.00	-13.40
18.00	31.00	-14.40
18.00	32.00	-15.40
18.00	33.00	-16.40
18.00	34.00	-17.40
18.00	35.00	-18.40
18.00	36.00	-19.40
18.00	37.00	-20.40
18.00	38.00	-21.40
18.00	39.00	-22.40
18.00	40.00	-23.40
18.00	41.00	-24.40
18.00	42.00	-25.40
18.00	43.00	-26.40
18.00	44.00	-27.40
18.00	45.00	-28.40
18.00	46.00	-29.40
18.00	47.00	-30.40
18.00	48.00	-31.40
18.00	49.00	-32.40
18.00	50.00	-33.40
18.00	51.00	-34.40
18.00	52.00	-35.40
18.00	53.00	-36.40

18.00	54.00	-37.40
18.00	55.00	-38.40
18.00	56.00	-39.40
18.00	57.00	-40.40
18.00	58.00	-41.40
18.00	59.00	-42.40
18.00	60.00	-43.40
18.00	61.00	-44.40
18.00	62.00	-45.40
18.00	63.00	-46.40
18.00	64.00	-47.40
18.00	65.00	-48.40
18.00	66.00	-49.40
18.00	67.00	-50.40
18.00	68.00	-51.40
18.00	69.00	-52.40
18.00	70.00	-53.40
18.00	71.00	-54.40
18.00	72.00	-55.40
18.00	73.00	-56.40
18.00	74.00	-57.40
18.00	75.00	-58.40
18.00	76.00	-59.40
18.00	77.00	-60.40
18.00	78.00	-61.40
18.00	79.00	-62.40
18.00	80.00	-63.40
18.00	81.00	-64.40
18.00	82.00	-65.40
18.00	83.00	-66.40
18.00	84.00	-67.40
18.00	85.00	-68.40
18.00	86.00	-69.40
18.00	87.00	-70.40
18.00	88.00	-71.40
18.00	89.00	-72.40
18.00	90.00	-73.40
18.00	91.00	-74.40
18.00	92.00	-75.40
18.00	93.00	-76.40
18.00	94.00	-77.40
18.00	95.00	-78.40
18.00	96.00	-79.40
18.00	97.00	-80.40
18.00	98.00	-81.40
18.00	99.00	-82.40
18.00	100.00	-83.40
24.00	10.00	6.60
24.00	11.00	5.60
24.00	12.00	4.60
24.00	13.00	3.60
24.00	14.00	2.60
24.00	15.00	1.60
24.00	16.00	0.60
24.00	17.00	-0.40
24.00	18.00	-1.40
24.00	19.00	-2.40
24.00	20.00	-3.40
24.00	21.00	-4.40
24.00	22.00	-5.40
24.00	23.00	-6.40
24.00	24.00	-7.40
24.00	25.00	-8.40
24.00	26.00	-9.40
24.00	27.00	-10.40
24.00	28.00	-11.40
24.00	29.00	-12.40
24.00	30.00	-13.40
24.00	31.00	-14.40
24.00	32.00	-15.40
24.00	33.00	-16.40
24.00	34.00	-17.40
24.00	35.00	-18.40
24.00	36.00	-19.40
24.00	37.00	-20.40
24.00	38.00	-21.40
24.00	39.00	-22.40
24.00	40.00	-23.40
24.00	41.00	-24.40
24.00	42.00	-25.40
24.00	43.00	-26.40
24.00	44.00	-27.40
24.00	45.00	-28.40
24.00	46.00	-29.40
24.00	47.00	-30.40
24.00	48.00	-31.40
24.00	49.00	-32.40
24.00	50.00	-33.40
24.00	51.00	-34.40
24.00	52.00	-35.40
24.00	53.00	-36.40
24.00	54.00	-37.40
24.00	55.00	-38.40
24.00	56.00	-39.40
24.00	57.00	-40.40
24.00	58.00	-41.40
24.00	59.00	-42.40
24.00	60.00	-43.40
24.00	61.00	-44.40
24.00	62.00	-45.40

24.00	63.00	-46.40
24.00	64.00	-47.40
24.00	65.00	-48.40
24.00	66.00	-49.40
24.00	67.00	-50.40
24.00	68.00	-51.40
24.00	69.00	-52.40
24.00	70.00	-53.40
24.00	71.00	-54.40
24.00	72.00	-55.40
24.00	73.00	-56.40
24.00	74.00	-57.40
24.00	75.00	-58.40
24.00	76.00	-59.40
24.00	77.00	-60.40
24.00	78.00	-61.40
24.00	79.00	-62.40
24.00	80.00	-63.40
24.00	81.00	-64.40
24.00	82.00	-65.40
24.00	83.00	-66.40
24.00	84.00	-67.40
24.00	85.00	-68.40
24.00	86.00	-69.40
24.00	87.00	-70.40
24.00	88.00	-71.40
24.00	89.00	-72.40
24.00	90.00	-73.40
24.00	91.00	-74.40
24.00	92.00	-75.40

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)
10.00	18.0	0.00	17.96	17.96	8.98	53.87
11.00	18.0	1.37	18.43	19.80	9.90	56.67
12.00	18.0	1.58	22.22	23.80	11.90	68.23
13.00	18.0	1.86	29.37	31.23	15.61	89.96
14.00	18.0	2.22	39.91	42.13	21.07	121.96
15.00	18.0	2.70	53.12	55.83	27.91	162.08
16.00	18.0	10.04	229.91	239.95	119.97	699.76
17.00	18.0	16.04	216.02	232.05	116.03	664.09
18.00	18.0	22.04	203.70	225.74	112.87	633.14
19.00	18.0	28.04	193.19	221.22	110.61	607.59
20.00	18.0	34.04	166.03	200.07	100.04	532.14
21.00	18.0	38.50	153.00	191.50	95.75	497.50
22.00	18.0	42.96	140.06	183.03	91.51	463.15
23.00	18.0	47.45	127.60	175.05	87.53	430.24
24.00	18.0	52.13	114.35	166.48	83.24	395.17
25.00	18.0	57.01	137.51	194.51	97.26	469.53
26.00	18.0	61.02	138.51	199.53	99.76	476.55
27.00	18.0	64.27	141.53	205.80	102.90	488.86
28.00	18.0	67.07	146.57	213.64	106.82	506.79
29.00	18.0	70.24	151.48	221.71	110.86	524.66
30.00	18.0	80.33	218.48	298.81	149.41	735.78
31.00	18.0	86.33	178.82	265.15	132.58	622.80
32.00	18.0	92.33	139.19	231.53	115.76	509.91
33.00	18.0	98.33	99.79	198.13	99.06	397.72
34.00	18.0	104.33	60.66	164.99	82.49	286.30
35.00	18.0	110.33	106.26	216.60	108.30	429.13
36.00	18.0	117.68	111.54	229.22	114.61	452.30
37.00	18.0	124.32	127.07	251.38	125.69	505.52
38.00	18.0	131.08	156.99	288.07	144.04	602.06
39.00	18.0	139.52	176.45	315.97	157.98	668.86
40.00	18.0	152.24	255.70	407.94	203.97	919.34
41.00	18.0	158.24	248.37	406.61	203.30	903.34
42.00	18.0	164.24	236.92	401.16	200.58	874.99
43.00	18.0	170.24	226.01	396.25	198.12	848.26
44.00	18.0	176.24	216.40	392.64	196.32	825.45
45.00	18.0	182.24	178.63	360.87	180.43	718.12
46.00	18.0	187.98	143.30	331.28	165.64	617.87
47.00	18.0	193.19	112.86	306.05	153.02	531.76
48.00	18.0	197.96	86.53	284.49	142.25	457.56
49.00	18.0	202.80	59.67	262.47	131.23	381.81
50.00	18.0	207.78	120.15	327.93	163.97	568.23
51.00	18.0	215.61	127.48	343.09	171.54	598.04
52.00	18.0	222.55	149.43	371.97	185.99	670.82
53.00	18.0	231.20	162.91	394.11	197.06	719.93
54.00	18.0	240.19	157.32	397.51	198.76	712.16
55.00	18.0	252.71	162.83	415.53	207.77	741.19
56.00	18.0	258.71	145.07	403.78	201.89	693.91
57.00	18.0	264.71	128.20	392.91	196.45	649.31
58.00	18.0	271.60	128.66	400.26	200.13	657.58
59.00	18.0	278.88	130.58	409.45	204.73	670.60
60.00	18.0	287.35	191.55	478.90	239.45	862.00
61.00	18.0	291.36	209.31	500.67	250.34	919.29

62.00	18.0	295.38	227.07	522.45	261.22	976.58
63.00	18.0	299.50	243.94	543.43	271.72	1031.31
64.00	18.0	304.31	254.59	558.90	279.45	1068.08
65.00	18.0	309.91	258.14	568.05	284.03	1084.34
66.00	18.0	315.91	258.14	574.05	287.03	1090.34
67.00	18.0	321.91	239.26	561.17	280.58	1039.68
68.00	18.0	327.91	201.48	529.39	264.70	932.36
69.00	18.0	333.91	163.71	497.62	248.81	825.04
70.00	18.0	339.91	163.71	503.62	251.81	831.04
71.00	18.0	345.91	163.71	509.62	254.81	837.04
72.00	18.0	351.91	163.71	515.62	257.81	843.04
73.00	18.0	359.23	191.13	550.37	275.18	932.63
74.00	18.0	367.22	202.19	569.41	284.70	973.78
75.00	18.0	377.37	258.14	635.52	317.76	1151.80
76.00	18.0	383.37	258.14	641.52	320.76	1157.80
77.00	18.0	389.37	258.14	647.52	323.76	1163.80
78.00	18.0	395.37	258.14	653.52	326.76	1169.80
79.00	18.0	401.37	258.14	659.52	329.76	1175.80
80.00	18.0	407.37	258.14	665.52	332.76	1181.80
81.00	18.0	413.37	258.14	671.52	335.76	1187.80
82.00	18.0	419.37	258.14	677.52	338.76	1193.80
83.00	18.0	425.37	258.14	683.52	341.76	1199.80
84.00	18.0	431.37	258.14	689.52	344.76	1205.80
85.00	18.0	437.37	258.14	695.52	347.76	1211.80
86.00	18.0	443.37	258.14	701.52	350.76	1217.80
87.00	18.0	449.37	258.14	707.52	353.76	1223.80
88.00	18.0	455.37	258.14	713.52	356.76	1229.80
89.00	18.0	461.37	258.14	719.52	359.76	1235.80
90.00	18.0	467.37	258.14	725.52	362.76	1241.80
91.00	18.0	473.37	258.14	731.52	365.76	1247.80
92.00	18.0	479.37	258.14	737.52	368.76	1253.80
93.00	18.0	485.37	258.14	743.52	371.76	1259.80
94.00	18.0	491.37	258.14	749.52	374.76	1265.80
95.00	18.0	Soil Elevations Must Extend At or Below Contribution Zone				
96.00	18.0	Soil Elevations Must Extend At or Below Contribution Zone				
97.00	18.0	Soil Elevations Must Extend At or Below Contribution Zone				
98.00	18.0	Soil Elevations Must Extend At or Below Contribution Zone				
99.00	18.0	Soil Elevations Must Extend At or Below Contribution Zone				
100.00	18.0	Soil Elevations Must Extend At or Below Contribution Zone				

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	59.61	59.61	29.81	178.83
11.00	24.0	1.64	61.33	62.97	31.48	185.63
12.00	24.0	2.55	66.44	68.99	34.50	201.87
13.00	24.0	3.23	74.88	78.11	39.05	227.87
14.00	24.0	3.98	84.26	88.23	44.12	256.75
15.00	24.0	4.69	95.76	100.45	50.23	291.98
16.00	24.0	13.38	386.33	399.71	199.86	1172.38
17.00	24.0	21.38	372.31	393.69	196.85	1138.31
18.00	24.0	29.38	336.11	365.49	182.75	1037.71
19.00	24.0	37.38	299.91	337.29	168.64	937.10
20.00	24.0	45.38	263.84	309.22	154.61	836.89
21.00	24.0	51.33	247.51	298.85	149.42	793.88
22.00	24.0	57.29	232.25	289.54	144.77	754.04
23.00	24.0	63.27	250.77	314.05	157.02	815.59
24.00	24.0	69.50	267.19	336.70	168.35	871.09
25.00	24.0	76.01	247.07	323.08	161.54	817.23
26.00	24.0	81.48	248.15	329.63	164.82	825.94
27.00	24.0	86.13	251.22	337.36	168.68	839.80
28.00	24.0	90.24	256.27	346.51	173.26	859.05
29.00	24.0	95.69	258.23	353.92	176.96	870.38
30.00	24.0	107.11	300.32	407.43	203.72	1008.08
31.00	24.0	115.11	247.79	362.90	181.45	858.48
32.00	24.0	123.11	195.60	318.71	159.36	709.92
33.00	24.0	131.11	195.60	326.71	163.36	717.92
34.00	24.0	139.11	195.60	334.71	167.36	725.92
35.00	24.0	147.11	242.37	389.48	194.74	874.23
36.00	24.0	157.46	246.62	404.09	202.04	897.34
37.00	24.0	166.81	261.72	428.54	214.27	951.98
38.00	24.0	175.99	287.67	463.66	231.83	1038.99
39.00	24.0	185.90	322.42	508.31	254.16	1153.15
40.00	24.0	202.99	430.62	633.61	316.80	1494.85
41.00	24.0	210.99	416.07	627.06	313.53	1459.20
42.00	24.0	218.99	403.27	622.25	311.13	1428.78
43.00	24.0	226.99	352.90	579.89	289.94	1285.69
44.00	24.0	234.99	302.54	537.52	268.76	1142.59
45.00	24.0	242.99	252.17	495.16	247.58	999.50
46.00	24.0	250.64	205.06	455.70	227.85	865.83
47.00	24.0	257.59	164.48	422.06	211.03	751.02
48.00	24.0	263.95	179.74	443.69	221.84	803.17
49.00	24.0	270.40	194.29	464.69	232.34	853.27
50.00	24.0	277.04	235.28	512.32	256.16	982.88
51.00	24.0	288.83	236.37	525.20	262.60	997.94
52.00	24.0	300.26	240.35	540.61	270.30	1021.31
53.00	24.0	311.56	247.21	558.77	279.39	1053.20
54.00	24.0	322.11	267.06	589.17	294.59	1123.29
55.00	24.0	336.94	285.66	622.61	311.30	1193.93
56.00	24.0	344.94	271.46	616.40	308.20	1159.31
57.00	24.0	352.94	266.72	619.67	309.83	1153.11
58.00	24.0	362.07	273.27	635.34	317.67	1181.89

59.00	24.0	371.72	276.51	648.23	324.11	1201.25
60.00	24.0	383.13	370.13	753.26	376.63	1493.53
61.00	24.0	388.48	393.81	782.29	391.15	1569.91
62.00	24.0	393.84	417.49	811.33	405.66	1646.30
63.00	24.0	399.33	439.98	839.31	419.65	1719.27
64.00	24.0	405.74	454.18	859.93	429.96	1768.30
65.00	24.0	413.21	433.74	846.95	423.48	1714.43
66.00	24.0	421.21	383.37	804.59	402.29	1571.33
67.00	24.0	429.21	333.01	762.22	381.11	1428.24
68.00	24.0	437.21	333.01	770.22	385.11	1436.24
69.00	24.0	445.21	333.01	778.22	389.11	1444.24
70.00	24.0	453.21	333.01	786.22	393.11	1452.24
71.00	24.0	461.21	333.01	794.22	397.11	1460.24
72.00	24.0	469.21	333.01	802.22	401.11	1468.24
73.00	24.0	479.07	339.93	819.01	409.50	1498.87
74.00	24.0	490.02	349.97	839.98	419.99	1539.91
75.00	24.0	503.17	458.92	962.09	481.04	1879.93
76.00	24.0	511.17	458.92	970.09	485.04	1887.93
77.00	24.0	519.17	458.92	978.09	489.04	1895.93
78.00	24.0	527.17	458.92	986.09	493.04	1903.93
79.00	24.0	535.17	458.92	994.09	497.04	1911.93
80.00	24.0	543.17	458.92	1002.09	501.04	1919.93
81.00	24.0	551.17	458.92	1010.09	505.04	1927.93
82.00	24.0	559.17	458.92	1018.09	509.04	1935.93
83.00	24.0	567.17	458.92	1026.09	513.04	1943.93
84.00	24.0	575.17	458.92	1034.09	517.04	1951.93
85.00	24.0	583.17	458.92	1042.09	521.04	1959.93
86.00	24.0	591.17	458.92	1050.09	525.04	1967.93
87.00	24.0	599.17	458.92	1058.09	529.04	1975.93
88.00	24.0	607.17	458.92	1066.09	533.04	1983.93
89.00	24.0	615.17	458.92	1074.09	537.04	1991.93
90.00	24.0	623.17	458.92	1082.09	541.04	1999.93
91.00	24.0	631.17	458.92	1090.09	545.04	2007.93
92.00	24.0	639.17	458.92	1098.09	549.04	2015.93

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.

Florida Bridge Software Institute Date: August 19, 2021
Shaft and Pile Analysis (FB-Deep v.2.05) Time: 16:28:22

General Information:
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Input file: .....et - LOCHNER\12 - Calculations\FB-Deep\PSCP\BB-03_PSCP_REV.spc
Project number: B-19-051
Job name: THEA Whiting Street
Engineer: Kirk M. Eastman
Units: English

Analysis Information:
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Analysis Type: SPT

Soil Information:
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Boring date: 6/24/21, Boring Number: BB-03
Station number: 204+29 Offset: 1 LT

Ground Elevation: 16.300(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	5.00	5- Cavity layer
3	4.00	5.00	5- Cavity layer
4	6.00	14.00	5- Cavity layer
5	8.00	35.00	5- Cavity layer
6	10.00	20.00	5- Cavity layer
7	10.00	0.00	1- Plastic Clay
8	10.00	11.00	3- Clean sand
9	12.00	11.00	3- Clean sand
10	14.00	9.00	3- Clean sand
11	16.00	16.00	3- Clean sand
12	16.00	0.00	2- Clay and silty sand
13	16.00	6.00	1- Plastic Clay
14	18.00	6.00	1- Plastic Clay
15	20.00	6.00	1- Plastic Clay
16	20.00	0.00	2- Clay and silty sand
17	20.00	60.00	3- Clean sand
18	22.50	60.00	3- Clean sand
19	22.50	0.00	1- Plastic Clay
20	22.50	100.00	4- Lime Stone/Very shelly sand
21	25.00	100.00	4- Lime Stone/Very shelly sand
22	25.00	0.00	1- Plastic Clay
23	25.00	44.00	3- Clean sand
24	27.50	44.00	3- Clean sand
25	27.50	0.00	1- Plastic Clay
26	27.50	100.00	4- Lime Stone/Very shelly sand
27	30.00	100.00	4- Lime Stone/Very shelly sand
28	30.00	0.00	2- Clay and silty sand
29	30.00	64.00	1- Plastic Clay
30	32.50	64.00	1- Plastic Clay
31	35.00	100.00	1- Plastic Clay
32	37.50	57.00	1- Plastic Clay
33	37.50	0.00	2- Clay and silty sand
34	37.50	26.00	1- Plastic Clay
35	40.00	26.00	1- Plastic Clay
36	42.50	20.00	1- Plastic Clay
37	42.50	0.00	2- Clay and silty sand
38	42.50	100.00	4- Lime Stone/Very shelly sand
39	45.00	100.00	4- Lime Stone/Very shelly sand
40	47.50	100.00	4- Lime Stone/Very shelly sand
41	50.00	100.00	4- Lime Stone/Very shelly sand
42	52.50	100.00	4- Lime Stone/Very shelly sand
43	55.00	100.00	4- Lime Stone/Very shelly sand
44	57.50	100.00	4- Lime Stone/Very shelly sand
45	57.50	0.00	1- Plastic Clay
46	57.50	72.00	2- Clay and silty sand
47	60.00	72.00	2- Clay and silty sand
48	62.50	100.00	2- Clay and silty sand
49	65.00	100.00	2- Clay and silty sand
50	67.50	48.00	2- Clay and silty sand
51	70.00	69.00	2- Clay and silty sand
52	70.00	0.00	1- Plastic Clay
53	70.00	100.00	4- Lime Stone/Very shelly sand
54	72.50	100.00	4- Lime Stone/Very shelly sand
55	75.00	100.00	4- Lime Stone/Very shelly sand
56	77.50	100.00	4- Lime Stone/Very shelly sand
57	80.00	100.00	4- Lime Stone/Very shelly sand
58	82.50	100.00	4- Lime Stone/Very shelly sand
59	85.00	100.00	4- Lime Stone/Very shelly sand
60	87.50	100.00	4- Lime Stone/Very shelly sand
61	90.00	100.00	4- Lime Stone/Very shelly sand
62	92.50	100.00	4- Lime Stone/Very shelly sand
63	95.00	100.00	4- Lime Stone/Very shelly sand
64	97.50	100.00	4- Lime Stone/Very shelly sand
65	100.00	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	16.30	6.30	10.00	11.80	5-Void
2	6.30	6.30	0.00	11.00	1-Plastic Clay
3	6.30	0.30	6.00	10.33	3-Clean Sand
4	0.30	0.30	0.00	6.00	2-Clay and Silty Sand
5	0.30	-3.70	4.00	6.00	1-Plastic Clay
6	-3.70	-3.70	0.00	60.00	2-Clay and Silty Sand
7	-3.70	-6.20	2.50	60.00	3-Clean Sand
8	-6.20	-6.20	0.00	100.00	1-Plastic Clay
9	-6.20	-8.70	2.50	100.00	4-Limestone, Very Shelly Sand
10	-8.70	-8.70	0.00	44.00	1-Plastic Clay
11	-8.70	-11.20	2.50	44.00	3-Clean Sand
12	-11.20	-11.20	0.00	100.00	1-Plastic Clay
13	-11.20	-13.70	2.50	100.00	4-Limestone, Very Shelly Sand
14	-13.70	-13.70	0.00	64.00	2-Clay and Silty Sand
15	-13.70	-21.20	7.50	76.00	1-Plastic Clay
16	-21.20	-21.20	0.00	26.00	2-Clay and Silty Sand
17	-21.20	-26.20	5.00	26.00	1-Plastic Clay
18	-26.20	-26.20	0.00	100.00	2-Clay and Silty Sand
19	-26.20	-41.20	15.00	100.00	4-Limestone, Very Shelly Sand
20	-41.20	-41.20	0.00	72.00	1-Plastic Clay
21	-41.20	-53.70	12.50	78.40	2-Clay and Silty Sand
22	-53.70	-53.70	0.00	100.00	1-Plastic Clay
23	-53.70	-83.70	30.00	100.00	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)
18.00	10.00	6.30
18.00	11.00	5.30
18.00	12.00	4.30
18.00	13.00	3.30
18.00	14.00	2.30
18.00	15.00	1.30
18.00	16.00	0.30
18.00	17.00	-0.70
18.00	18.00	-1.70
18.00	19.00	-2.70
18.00	20.00	-3.70
18.00	21.00	-4.70
18.00	22.00	-5.70
18.00	23.00	-6.70
18.00	24.00	-7.70
18.00	25.00	-8.70
18.00	26.00	-9.70
18.00	27.00	-10.70
18.00	28.00	-11.70
18.00	29.00	-12.70
18.00	30.00	-13.70
18.00	31.00	-14.70
18.00	32.00	-15.70
18.00	33.00	-16.70
18.00	34.00	-17.70
18.00	35.00	-18.70
18.00	36.00	-19.70
18.00	37.00	-20.70
18.00	38.00	-21.70
18.00	39.00	-22.70
18.00	40.00	-23.70
18.00	41.00	-24.70
18.00	42.00	-25.70
18.00	43.00	-26.70
18.00	44.00	-27.70
18.00	45.00	-28.70
18.00	46.00	-29.70
18.00	47.00	-30.70
18.00	48.00	-31.70
18.00	49.00	-32.70
18.00	50.00	-33.70
18.00	51.00	-34.70
18.00	52.00	-35.70
18.00	53.00	-36.70
18.00	54.00	-37.70
18.00	55.00	-38.70
18.00	56.00	-39.70
18.00	57.00	-40.70
18.00	58.00	-41.70
18.00	59.00	-42.70
18.00	60.00	-43.70
18.00	61.00	-44.70
18.00	62.00	-45.70
18.00	63.00	-46.70
18.00	64.00	-47.70

18.00	65.00	-48.70
18.00	66.00	-49.70
18.00	67.00	-50.70
18.00	68.00	-51.70
18.00	69.00	-52.70
18.00	70.00	-53.70
18.00	71.00	-54.70
18.00	72.00	-55.70
18.00	73.00	-56.70
18.00	74.00	-57.70
18.00	75.00	-58.70
18.00	76.00	-59.70
18.00	77.00	-60.70
18.00	78.00	-61.70
18.00	79.00	-62.70
18.00	80.00	-63.70
18.00	81.00	-64.70
18.00	82.00	-65.70
18.00	83.00	-66.70
18.00	84.00	-67.70
18.00	85.00	-68.70
18.00	86.00	-69.70
18.00	87.00	-70.70
18.00	88.00	-71.70
18.00	89.00	-72.70
18.00	90.00	-73.70
18.00	91.00	-74.70
18.00	92.00	-75.70
18.00	93.00	-76.70
18.00	94.00	-77.70
18.00	95.00	-78.70
18.00	96.00	-79.70
18.00	97.00	-80.70
18.00	98.00	-81.70
18.00	99.00	-82.70
18.00	100.00	-83.70
24.00	10.00	6.30
24.00	11.00	5.30
24.00	12.00	4.30
24.00	13.00	3.30
24.00	14.00	2.30
24.00	15.00	1.30
24.00	16.00	0.30
24.00	17.00	-0.70
24.00	18.00	-1.70
24.00	19.00	-2.70
24.00	20.00	-3.70
24.00	21.00	-4.70
24.00	22.00	-5.70
24.00	23.00	-6.70
24.00	24.00	-7.70
24.00	25.00	-8.70
24.00	26.00	-9.70
24.00	27.00	-10.70
24.00	28.00	-11.70
24.00	29.00	-12.70
24.00	30.00	-13.70
24.00	31.00	-14.70
24.00	32.00	-15.70
24.00	33.00	-16.70
24.00	34.00	-17.70
24.00	35.00	-18.70
24.00	36.00	-19.70
24.00	37.00	-20.70
24.00	38.00	-21.70
24.00	39.00	-22.70
24.00	40.00	-23.70
24.00	41.00	-24.70
24.00	42.00	-25.70
24.00	43.00	-26.70
24.00	44.00	-27.70
24.00	45.00	-28.70
24.00	46.00	-29.70
24.00	47.00	-30.70
24.00	48.00	-31.70
24.00	49.00	-32.70
24.00	50.00	-33.70
24.00	51.00	-34.70
24.00	52.00	-35.70
24.00	53.00	-36.70
24.00	54.00	-37.70
24.00	55.00	-38.70
24.00	56.00	-39.70
24.00	57.00	-40.70
24.00	58.00	-41.70
24.00	59.00	-42.70
24.00	60.00	-43.70
24.00	61.00	-44.70
24.00	62.00	-45.70
24.00	63.00	-46.70
24.00	64.00	-47.70
24.00	65.00	-48.70
24.00	66.00	-49.70
24.00	67.00	-50.70
24.00	68.00	-51.70
24.00	69.00	-52.70
24.00	70.00	-53.70
24.00	71.00	-54.70
24.00	72.00	-55.70
24.00	73.00	-56.70

24.00	74.00	-57.70
24.00	75.00	-58.70
24.00	76.00	-59.70
24.00	77.00	-60.70
24.00	78.00	-61.70
24.00	79.00	-62.70
24.00	80.00	-63.70
24.00	81.00	-64.70
24.00	82.00	-65.70
24.00	83.00	-66.70
24.00	84.00	-67.70
24.00	85.00	-68.70
24.00	86.00	-69.70
24.00	87.00	-70.70
24.00	88.00	-71.70
24.00	89.00	-72.70
24.00	90.00	-73.70
24.00	91.00	-74.70
24.00	92.00	-75.70

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)
10.00	18.0	0.00	15.87	15.87	7.93	47.60
11.00	18.0	1.42	15.99	17.40	8.70	49.37
12.00	18.0	3.10	15.88	18.97	9.49	50.73
13.00	18.0	4.59	14.65	19.24	9.62	48.53
14.00	18.0	5.94	13.50	19.44	9.72	46.45
15.00	18.0	7.46	15.50	22.95	11.48	53.95
16.00	18.0	9.47	26.94	36.41	18.20	90.29
17.00	18.0	11.12	31.44	42.56	21.28	105.44
18.00	18.0	12.32	50.38	62.70	31.35	163.46
19.00	18.0	13.97	86.48	100.44	50.22	273.40
20.00	18.0	18.61	107.82	126.44	63.22	342.09
21.00	18.0	25.17	108.09	133.26	66.63	349.44
22.00	18.0	31.25	108.88	140.13	70.06	357.89
23.00	18.0	38.71	205.14	243.86	121.93	654.14
24.00	18.0	44.71	205.14	249.86	124.93	660.14
25.00	18.0	50.71	140.21	190.92	95.46	471.34
26.00	18.0	56.93	135.02	191.95	95.97	461.98
27.00	18.0	63.15	129.67	192.82	96.41	452.16
28.00	18.0	69.26	107.05	176.31	88.15	390.40
29.00	18.0	75.26	69.27	144.54	72.27	283.08
30.00	18.0	81.26	98.50	179.76	89.88	376.75
31.00	18.0	90.16	98.88	189.04	94.52	386.80
32.00	18.0	98.96	100.03	198.99	99.49	399.04
33.00	18.0	108.22	95.07	203.28	101.64	393.42
34.00	18.0	117.20	88.99	206.19	103.10	384.17
35.00	18.0	126.19	80.53	206.72	103.36	367.79
36.00	18.0	135.17	69.59	204.76	102.38	343.94
37.00	18.0	144.16	58.50	202.66	101.33	319.65
38.00	18.0	151.96	62.91	214.87	107.43	340.68
39.00	18.0	157.31	75.05	232.36	116.18	382.47
40.00	18.0	162.92	97.14	260.06	130.03	454.34
41.00	18.0	169.72	117.26	286.98	143.49	521.49
42.00	18.0	176.61	130.30	306.92	153.46	567.53
43.00	18.0	187.72	258.14	445.86	222.93	962.15
44.00	18.0	193.72	258.14	451.86	225.93	968.15
45.00	18.0	199.72	258.14	457.86	228.93	974.15
46.00	18.0	205.72	258.14	463.86	231.93	980.15
47.00	18.0	211.72	258.14	469.86	234.93	986.15
48.00	18.0	217.72	258.14	475.86	237.93	992.15
49.00	18.0	223.72	258.14	481.86	240.93	998.15
50.00	18.0	229.72	258.14	487.86	243.93	1004.15
51.00	18.0	235.72	258.14	493.86	246.93	1010.15
52.00	18.0	241.72	242.63	484.35	242.17	969.61
53.00	18.0	247.72	211.61	459.33	229.66	882.54
54.00	18.0	253.72	180.58	434.30	217.15	795.47
55.00	18.0	259.72	149.56	409.28	204.64	708.40
56.00	18.0	265.72	118.54	384.25	192.13	621.33
57.00	18.0	271.72	87.51	359.23	179.62	534.25
58.00	18.0	278.65	161.19	439.84	219.92	762.23
59.00	18.0	286.50	153.44	439.94	219.97	746.81
60.00	18.0	294.36	145.68	440.04	220.02	731.40
61.00	18.0	302.21	137.91	440.12	220.06	715.93
62.00	18.0	310.06	130.11	440.18	220.09	700.41
63.00	18.0	317.92	122.31	440.23	220.11	684.85
64.00	18.0	325.77	114.53	440.30	220.15	669.35
65.00	18.0	333.63	111.20	444.82	222.41	667.22
66.00	18.0	341.49	121.17	462.66	231.33	705.01
67.00	18.0	349.35	131.17	480.51	240.26	742.84
68.00	18.0	357.21	141.16	498.38	249.19	780.71
69.00	18.0	365.07	151.16	516.23	258.11	818.54
70.00	18.0	372.93	258.14	631.07	315.54	1147.36
71.00	18.0	378.93	258.14	637.07	318.54	1153.36
72.00	18.0	384.93	258.14	643.07	321.54	1159.36

73.00	18.0	390.93	258.14	649.07	324.54	1165.36
74.00	18.0	396.93	258.14	655.07	327.54	1171.36
75.00	18.0	402.93	258.14	661.07	330.54	1177.36
76.00	18.0	408.93	258.14	667.07	333.54	1183.36
77.00	18.0	414.93	258.14	673.07	336.54	1189.36
78.00	18.0	420.93	258.14	679.07	339.54	1195.36
79.00	18.0	426.93	258.14	685.07	342.54	1201.36
80.00	18.0	432.93	258.14	691.07	345.54	1207.36
81.00	18.0	438.93	258.14	697.07	348.54	1213.36
82.00	18.0	444.93	258.14	703.07	351.54	1219.36
83.00	18.0	450.93	258.14	709.07	354.54	1225.36
84.00	18.0	456.93	258.14	715.07	357.54	1231.36
85.00	18.0	462.93	258.14	721.07	360.54	1237.36
86.00	18.0	468.93	258.14	727.07	363.54	1243.36
87.00	18.0	474.93	258.14	733.07	366.54	1249.36
88.00	18.0	480.93	258.14	739.07	369.54	1255.36
89.00	18.0	486.93	258.14	745.07	372.54	1261.36
90.00	18.0	492.93	258.14	751.07	375.54	1267.36
91.00	18.0	498.93	258.14	757.07	378.54	1273.36
92.00	18.0	504.93	258.14	763.07	381.54	1279.36
93.00	18.0	510.93	258.14	769.07	384.54	1285.36
94.00	18.0	516.93	258.14	775.07	387.54	1291.36
95.00	18.0	Soil Elevations Must Extend At or Below Contribution Zone				
96.00	18.0	Soil Elevations Must Extend At or Below Contribution Zone				
97.00	18.0	Soil Elevations Must Extend At or Below Contribution Zone				
98.00	18.0	Soil Elevations Must Extend At or Below Contribution Zone				
99.00	18.0	Soil Elevations Must Extend At or Below Contribution Zone				
100.00	18.0	Soil Elevations Must Extend At or Below Contribution Zone				

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	25.82	25.82	12.91	77.45
11.00	24.0	2.07	24.80	26.87	13.44	76.47
12.00	24.0	4.15	23.34	27.49	13.75	74.18
13.00	24.0	6.13	21.64	27.76	13.88	71.03
14.00	24.0	5.70	28.45	34.15	17.08	91.04
15.00	24.0	5.53	33.43	38.97	19.48	105.84
16.00	24.0	12.63	75.17	87.79	43.90	238.13
17.00	24.0	14.87	83.29	98.16	49.08	264.74
18.00	24.0	16.60	107.67	124.27	62.13	339.60
19.00	24.0	18.80	136.18	154.98	77.49	427.34
20.00	24.0	24.82	172.87	197.68	98.84	543.41
21.00	24.0	33.25	173.47	206.72	103.36	553.65
22.00	24.0	39.98	175.94	215.92	107.96	567.80
23.00	24.0	51.62	337.89	389.51	194.75	1065.28
24.00	24.0	59.62	287.52	347.14	173.57	922.19
25.00	24.0	67.62	199.32	266.93	133.47	665.57
26.00	24.0	75.91	193.96	269.87	134.94	657.80
27.00	24.0	84.20	186.79	271.00	135.50	644.58
28.00	24.0	92.35	156.73	249.08	124.54	562.54
29.00	24.0	100.35	106.37	206.71	103.36	419.44
30.00	24.0	108.35	142.89	251.24	125.62	537.03
31.00	24.0	120.33	141.94	262.27	131.14	546.15
32.00	24.0	132.31	139.48	271.79	135.90	550.76
33.00	24.0	144.29	139.17	283.46	141.73	561.79
34.00	24.0	156.27	138.75	295.02	147.51	572.52
35.00	24.0	168.25	138.14	306.39	153.19	582.66
36.00	24.0	180.23	152.91	333.14	166.57	638.96
37.00	24.0	192.21	175.44	367.65	183.83	718.53
38.00	24.0	202.93	188.18	391.11	195.55	767.46
39.00	24.0	211.42	198.77	410.20	205.10	807.75
40.00	24.0	219.63	217.59	437.22	218.61	872.40
41.00	24.0	227.79	245.07	472.85	236.43	962.99
42.00	24.0	236.21	277.87	514.08	257.04	1069.82
43.00	24.0	250.29	458.92	709.21	354.61	1627.05
44.00	24.0	258.29	458.92	717.21	358.61	1635.05
45.00	24.0	266.29	458.92	725.21	362.61	1643.05
46.00	24.0	274.29	458.92	733.21	366.61	1651.05
47.00	24.0	282.29	458.92	741.21	370.61	1659.05
48.00	24.0	290.29	458.92	749.21	374.61	1667.05
49.00	24.0	298.29	458.92	757.21	378.61	1675.05
50.00	24.0	306.29	438.24	744.53	372.26	1621.00
51.00	24.0	314.29	396.87	711.16	355.58	1504.91
52.00	24.0	322.29	355.51	677.80	338.90	1388.81
53.00	24.0	330.29	314.14	644.43	322.22	1272.72
54.00	24.0	338.29	272.78	611.07	305.53	1156.62
55.00	24.0	346.29	231.41	577.70	288.85	1040.53
56.00	24.0	354.29	190.05	544.34	272.17	924.43
57.00	24.0	362.29	148.68	510.97	255.49	808.34
58.00	24.0	371.50	279.99	651.48	325.74	1211.46
59.00	24.0	382.00	277.93	659.93	329.97	1215.80
60.00	24.0	392.47	267.55	660.02	330.01	1195.12
61.00	24.0	402.95	257.14	660.09	330.04	1174.37
62.00	24.0	413.42	246.76	660.18	330.09	1153.69
63.00	24.0	423.89	236.40	660.29	330.15	1133.09
64.00	24.0	434.36	249.70	684.06	342.03	1183.45
65.00	24.0	444.84	262.99	707.83	353.91	1233.81
66.00	24.0	455.31	276.30	731.61	365.80	1284.20
67.00	24.0	465.80	289.62	755.41	377.71	1334.65
68.00	24.0	476.28	302.95	779.23	389.62	1385.13
69.00	24.0	486.77	316.27	803.04	401.52	1435.58

70.00	24.0	497.24	458.92	956.16	478.08	1874.00
71.00	24.0	505.24	458.92	964.16	482.08	1882.00
72.00	24.0	513.24	458.92	972.16	486.08	1890.00
73.00	24.0	521.24	458.92	980.16	490.08	1898.00
74.00	24.0	529.24	458.92	988.16	494.08	1906.00
75.00	24.0	537.24	458.92	996.16	498.08	1914.00
76.00	24.0	545.24	458.92	1004.16	502.08	1922.00
77.00	24.0	553.24	458.92	1012.16	506.08	1930.00
78.00	24.0	561.24	458.92	1020.16	510.08	1938.00
79.00	24.0	569.24	458.92	1028.16	514.08	1946.00
80.00	24.0	577.24	458.92	1036.16	518.08	1954.00
81.00	24.0	585.24	458.92	1044.16	522.08	1962.00
82.00	24.0	593.24	458.92	1052.16	526.08	1970.00
83.00	24.0	601.24	458.92	1060.16	530.08	1978.00
84.00	24.0	609.24	458.92	1068.16	534.08	1986.00
85.00	24.0	617.24	458.92	1076.16	538.08	1994.00
86.00	24.0	625.24	458.92	1084.16	542.08	2002.00
87.00	24.0	633.24	458.92	1092.16	546.08	2010.00
88.00	24.0	641.24	458.92	1100.16	550.08	2018.00
89.00	24.0	649.24	458.92	1108.16	554.08	2026.00
90.00	24.0	657.24	458.92	1116.16	558.08	2034.00
91.00	24.0	665.24	458.92	1124.16	562.08	2042.00
92.00	24.0	673.24	458.92	1132.16	566.08	2050.00

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.

Florida Bridge Software Institute Date: August 19, 2021
Shaft and Pile Analysis (FB-Deep v.2.05) Time: 16:33:19

General Information:
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Input file: .....et - LOCHNER\12 - Calculations\FB-Deep\PSCP\BB-04_PSCP_REV.spc
Project number: B-19-051
Job name: THEA Whiting Street
Engineer: Kirk M. Eastman
Units: English

Analysis Information:
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Analysis Type: SPT

Soil Information:
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Boring date: 6/22/21, Boring Number: BB-04
Station number: 206+48 Offset: 24 LT

Ground Elevation: 16.100(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	5.00	5- Cavity layer
3	4.00	5.00	5- Cavity layer
4	6.00	4.00	5- Cavity layer
5	8.00	6.00	5- Cavity layer
6	10.00	9.00	5- Cavity layer
7	10.00	0.00	1- Plastic Clay
8	10.00	13.00	2- Clay and silty sand
9	12.00	13.00	2- Clay and silty sand
10	14.00	17.00	2- Clay and silty sand
11	16.00	17.00	2- Clay and silty sand
12	18.00	8.00	2- Clay and silty sand
13	20.00	12.00	2- Clay and silty sand
14	22.50	12.00	2- Clay and silty sand
15	22.50	0.00	1- Plastic Clay
16	22.50	0.00	5- Cavity layer
17	25.00	0.00	5- Cavity layer
18	27.50	0.00	5- Cavity layer
19	30.00	0.00	5- Cavity layer
20	30.00	0.00	2- Clay and silty sand
21	30.00	18.00	1- Plastic Clay
22	32.50	18.00	1- Plastic Clay
23	32.50	0.00	2- Clay and silty sand
24	32.50	100.00	1- Plastic Clay
25	35.00	100.00	1- Plastic Clay
26	35.00	0.00	2- Clay and silty sand
27	35.00	100.00	4- Lime Stone/Very shelly sand
28	37.50	100.00	4- Lime Stone/Very shelly sand
29	37.50	0.00	1- Plastic Clay
30	37.50	100.00	2- Clay and silty sand
31	40.00	100.00	2- Clay and silty sand
32	40.00	0.00	1- Plastic Clay
33	40.00	100.00	4- Lime Stone/Very shelly sand
34	42.50	100.00	4- Lime Stone/Very shelly sand
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	2- Clay and silty sand
38	47.50	52.00	1- Plastic Clay
39	50.00	52.00	1- Plastic Clay
40	50.00	0.00	2- Clay and silty sand
41	50.00	100.00	4- Lime Stone/Very shelly sand
42	52.50	100.00	4- Lime Stone/Very shelly sand
43	55.00	100.00	4- Lime Stone/Very shelly sand
44	55.00	0.00	2- Clay and silty sand
45	55.00	100.00	1- Plastic Clay
46	57.50	100.00	1- Plastic Clay
47	60.00	100.00	1- Plastic Clay
48	62.50	100.00	1- Plastic Clay
49	62.50	0.00	2- Clay and silty sand
50	62.50	100.00	4- Lime Stone/Very shelly sand
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	75.00	100.00	4- Lime Stone/Very shelly sand
56	77.50	100.00	4- Lime Stone/Very shelly sand
57	80.00	100.00	4- Lime Stone/Very shelly sand
58	82.50	100.00	4- Lime Stone/Very shelly sand
59	85.00	100.00	4- Lime Stone/Very shelly sand
60	87.50	100.00	4- Lime Stone/Very shelly sand
61	90.00	100.00	4- Lime Stone/Very shelly sand
62	92.50	100.00	4- Lime Stone/Very shelly sand
63	92.50	0.00	1- Plastic Clay
64	92.50	66.00	4- Lime Stone/Very shelly sand
65	95.00	66.00	4- Lime Stone/Very shelly sand
66	95.00	0.00	1- Plastic Clay
67	95.00	100.00	4- Lime Stone/Very shelly sand
68	97.50	100.00	4- Lime Stone/Very shelly sand
69	100.00	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	16.10	6.10	10.00	4.00	5-Void
2	6.10	6.10	0.00	13.00	1-Plastic Clay
3	6.10	-6.40	12.50	13.28	2-Clay and Silty Sand
4	-6.40	-6.40	0.00	0.00	1-Plastic Clay
5	-6.40	-13.90	7.50	0.00	5-Void
6	-13.90	-13.90	0.00	18.00	2-Clay and Silty Sand
7	-13.90	-16.40	2.50	18.00	1-Plastic Clay
8	-16.40	-16.40	0.00	100.00	2-Clay and Silty Sand
9	-16.40	-18.90	2.50	100.00	1-Plastic Clay
10	-18.90	-18.90	0.00	100.00	2-Clay and Silty Sand
11	-18.90	-21.40	2.50	100.00	4-Limestone, Very Shelly Sand
12	-21.40	-21.40	0.00	100.00	1-Plastic Clay
13	-21.40	-23.90	2.50	100.00	2-Clay and Silty Sand
14	-23.90	-23.90	0.00	100.00	1-Plastic Clay
15	-23.90	-31.40	7.50	100.00	4-Limestone, Very Shelly Sand
16	-31.40	-31.40	0.00	52.00	2-Clay and Silty Sand
17	-31.40	-33.90	2.50	52.00	1-Plastic Clay
18	-33.90	-33.90	0.00	100.00	2-Clay and Silty Sand
19	-33.90	-38.90	5.00	100.00	4-Limestone, Very Shelly Sand
20	-38.90	-38.90	0.00	100.00	2-Clay and Silty Sand
21	-38.90	-46.40	7.50	100.00	1-Plastic Clay
22	-46.40	-46.40	0.00	100.00	2-Clay and Silty Sand
23	-46.40	-76.40	30.00	100.00	4-Limestone, Very Shelly Sand
24	-76.40	-76.40	0.00	66.00	1-Plastic Clay
25	-76.40	-78.90	2.50	66.00	4-Limestone, Very Shelly Sand
26	-78.90	-78.90	0.00	100.00	1-Plastic Clay
27	-78.90	-83.90	5.00	100.00	4-Limestone, Very Shelly Sand

Driven Pile Data:

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

Pile Geometry:

Width (in)	Length (ft)	Tip Elev. (ft)
18.00	10.00	6.10
18.00	11.00	5.10
18.00	12.00	4.10
18.00	13.00	3.10
18.00	14.00	2.10
18.00	15.00	1.10
18.00	16.00	0.10
18.00	17.00	-0.90
18.00	18.00	-1.90
18.00	19.00	-2.90
18.00	20.00	-3.90
18.00	21.00	-4.90
18.00	22.00	-5.90
18.00	23.00	-6.90
18.00	24.00	-7.90
18.00	25.00	-8.90
18.00	26.00	-9.90
18.00	27.00	-10.90
18.00	28.00	-11.90
18.00	29.00	-12.90
18.00	30.00	-13.90
18.00	31.00	-14.90
18.00	32.00	-15.90
18.00	33.00	-16.90
18.00	34.00	-17.90
18.00	35.00	-18.90
18.00	36.00	-19.90
18.00	37.00	-20.90
18.00	38.00	-21.90
18.00	39.00	-22.90
18.00	40.00	-23.90
18.00	41.00	-24.90
18.00	42.00	-25.90
18.00	43.00	-26.90
18.00	44.00	-27.90
18.00	45.00	-28.90
18.00	46.00	-29.90
18.00	47.00	-30.90
18.00	48.00	-31.90
18.00	49.00	-32.90
18.00	50.00	-33.90
18.00	51.00	-34.90
18.00	52.00	-35.90
18.00	53.00	-36.90
18.00	54.00	-37.90

18.00	55.00	-38.90
18.00	56.00	-39.90
18.00	57.00	-40.90
18.00	58.00	-41.90
18.00	59.00	-42.90
18.00	60.00	-43.90
18.00	61.00	-44.90
18.00	62.00	-45.90
18.00	63.00	-46.90
18.00	64.00	-47.90
18.00	65.00	-48.90
18.00	66.00	-49.90
18.00	67.00	-50.90
18.00	68.00	-51.90
18.00	69.00	-52.90
18.00	70.00	-53.90
18.00	71.00	-54.90
18.00	72.00	-55.90
18.00	73.00	-56.90
18.00	74.00	-57.90
18.00	75.00	-58.90
18.00	76.00	-59.90
18.00	77.00	-60.90
18.00	78.00	-61.90
18.00	79.00	-62.90
18.00	80.00	-63.90
18.00	81.00	-64.90
18.00	82.00	-65.90
18.00	83.00	-66.90
18.00	84.00	-67.90
18.00	85.00	-68.90
18.00	86.00	-69.90
18.00	87.00	-70.90
18.00	88.00	-71.90
18.00	89.00	-72.90
18.00	90.00	-73.90
18.00	91.00	-74.90
18.00	92.00	-75.90
18.00	93.00	-76.90
18.00	94.00	-77.90
18.00	95.00	-78.90
18.00	96.00	-79.90
18.00	97.00	-80.90
18.00	98.00	-81.90
18.00	99.00	-82.90
18.00	100.00	-83.90
24.00	10.00	6.10
24.00	11.00	5.10
24.00	12.00	4.10
24.00	13.00	3.10
24.00	14.00	2.10
24.00	15.00	1.10
24.00	16.00	0.10
24.00	17.00	-0.90
24.00	18.00	-1.90
24.00	19.00	-2.90
24.00	20.00	-3.90
24.00	21.00	-4.90
24.00	22.00	-5.90
24.00	23.00	-6.90
24.00	24.00	-7.90
24.00	25.00	-8.90
24.00	26.00	-9.90
24.00	27.00	-10.90
24.00	28.00	-11.90
24.00	29.00	-12.90
24.00	30.00	-13.90
24.00	31.00	-14.90
24.00	32.00	-15.90
24.00	33.00	-16.90
24.00	34.00	-17.90
24.00	35.00	-18.90
24.00	36.00	-19.90
24.00	37.00	-20.90
24.00	38.00	-21.90
24.00	39.00	-22.90
24.00	40.00	-23.90
24.00	41.00	-24.90
24.00	42.00	-25.90
24.00	43.00	-26.90
24.00	44.00	-27.90
24.00	45.00	-28.90
24.00	46.00	-29.90
24.00	47.00	-30.90
24.00	48.00	-31.90
24.00	49.00	-32.90
24.00	50.00	-33.90
24.00	51.00	-34.90
24.00	52.00	-35.90
24.00	53.00	-36.90
24.00	54.00	-37.90
24.00	55.00	-38.90
24.00	56.00	-39.90
24.00	57.00	-40.90
24.00	58.00	-41.90
24.00	59.00	-42.90
24.00	60.00	-43.90
24.00	61.00	-44.90
24.00	62.00	-45.90
24.00	63.00	-46.90

24.00	64.00	-47.90
24.00	65.00	-48.90
24.00	66.00	-49.90
24.00	67.00	-50.90
24.00	68.00	-51.90
24.00	69.00	-52.90
24.00	70.00	-53.90
24.00	71.00	-54.90
24.00	72.00	-55.90
24.00	73.00	-56.90
24.00	74.00	-57.90
24.00	75.00	-58.90
24.00	76.00	-59.90
24.00	77.00	-60.90
24.00	78.00	-61.90
24.00	79.00	-62.90
24.00	80.00	-63.90
24.00	81.00	-64.90
24.00	82.00	-65.90
24.00	83.00	-66.90
24.00	84.00	-67.90
24.00	85.00	-68.90
24.00	86.00	-69.90
24.00	87.00	-70.90
24.00	88.00	-71.90
24.00	89.00	-72.90
24.00	90.00	-73.90
24.00	91.00	-74.90
24.00	92.00	-75.90

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)
10.00	18.0	0.00	10.95	10.95	5.47	32.84
11.00	18.0	3.54	11.19	14.73	7.36	37.10
12.00	18.0	6.80	11.70	18.50	9.25	41.89
13.00	18.0	10.46	12.17	22.63	11.32	46.98
14.00	18.0	14.70	12.63	27.33	13.66	52.59
15.00	18.0	19.13	13.27	32.40	16.20	58.95
16.00	18.0	23.65	14.08	37.73	18.87	65.90
17.00	18.0	27.99	14.61	42.60	21.30	71.81
18.00	18.0	31.27	14.22	45.48	22.74	73.92
19.00	18.0	34.25	13.50	47.75	23.87	74.74
20.00	18.0	37.72	12.62	50.34	25.17	75.59
21.00	18.0	41.45	11.66	53.11	26.56	76.44
22.00	18.0	45.17	10.71	55.88	27.94	77.30
23.00	18.0	49.69	0.00	49.69	24.84	49.69
24.00	18.0	49.69	0.00	49.69	24.84	49.69
25.00	18.0	49.69	0.00	49.69	24.84	49.69
26.00	18.0	49.69	0.00	49.69	24.84	49.69
27.00	18.0	49.69	0.00	49.69	24.84	49.69
28.00	18.0	49.69	0.00	49.69	24.84	49.69
29.00	18.0	49.69	0.00	49.69	24.84	49.69
30.00	18.0	49.69	19.54	69.22	34.61	108.29
31.00	18.0	52.89	27.34	80.22	40.11	134.89
32.00	18.0	55.90	50.65	106.55	53.28	207.86
33.00	18.0	68.71	73.75	142.47	71.23	289.97
34.00	18.0	76.98	76.70	153.68	76.84	307.09
35.00	18.0	86.80	180.58	267.39	133.69	628.55
36.00	18.0	92.80	180.58	273.39	136.69	634.55
37.00	18.0	98.80	180.58	279.39	139.69	640.55
38.00	18.0	105.42	117.01	222.43	111.21	456.44
39.00	18.0	111.41	123.92	235.32	117.66	483.16
40.00	18.0	121.44	258.14	379.58	189.79	895.87
41.00	18.0	127.44	258.14	385.58	192.79	901.87
42.00	18.0	133.44	239.26	372.69	186.35	851.21
43.00	18.0	139.44	201.48	340.92	170.46	743.88
44.00	18.0	145.44	163.71	309.15	154.57	636.56
45.00	18.0	151.44	163.71	315.15	157.57	642.56
46.00	18.0	157.44	163.71	321.15	160.57	648.56
47.00	18.0	163.44	163.71	327.15	163.57	654.56
48.00	18.0	170.80	185.80	356.60	178.30	728.21
49.00	18.0	179.01	193.90	372.91	186.45	760.70
50.00	18.0	188.90	220.37	409.27	204.64	850.01
51.00	18.0	194.90	182.59	377.50	188.75	742.69
52.00	18.0	200.90	144.82	345.72	172.86	635.37
53.00	18.0	206.90	107.05	313.95	156.97	528.04
54.00	18.0	212.90	69.27	282.18	141.09	420.72
55.00	18.0	218.90	121.21	340.11	170.06	582.54
56.00	18.0	227.89	111.77	339.66	169.83	563.19
57.00	18.0	236.87	102.33	339.20	169.60	543.85
58.00	18.0	245.86	109.07	354.93	177.46	573.07
59.00	18.0	254.84	121.21	376.06	188.03	618.48
60.00	18.0	263.83	138.08	401.90	200.95	678.06
61.00	18.0	272.81	159.66	432.47	216.24	751.80
62.00	18.0	281.80	181.25	463.04	231.52	825.54

63.00	18.0	289.29	258.14	547.43	273.72	1063.72
64.00	18.0	295.29	258.14	553.43	276.72	1069.72
65.00	18.0	301.29	258.14	559.43	279.72	1075.72
66.00	18.0	307.29	258.14	565.43	282.72	1081.72
67.00	18.0	313.29	258.14	571.43	285.72	1087.72
68.00	18.0	319.29	258.14	577.43	288.72	1093.72
69.00	18.0	325.29	258.14	583.43	291.72	1099.72
70.00	18.0	331.29	258.14	589.43	294.72	1105.72
71.00	18.0	337.29	258.14	595.43	297.72	1111.72
72.00	18.0	343.29	258.14	601.43	300.72	1117.72
73.00	18.0	349.29	258.14	607.43	303.72	1123.72
74.00	18.0	355.29	258.14	613.43	306.72	1129.72
75.00	18.0	361.29	258.14	619.43	309.72	1135.72
76.00	18.0	367.29	258.14	625.43	312.72	1141.72
77.00	18.0	373.29	258.14	631.43	315.72	1147.72
78.00	18.0	379.29	258.14	637.43	318.72	1153.72
79.00	18.0	385.29	258.14	643.43	321.72	1159.72
80.00	18.0	391.29	258.14	649.43	324.72	1165.72
81.00	18.0	397.29	258.14	655.43	327.72	1171.72
82.00	18.0	403.29	258.14	661.43	330.72	1177.72
83.00	18.0	409.29	258.14	667.43	333.72	1183.72
84.00	18.0	415.29	258.14	673.43	336.72	1189.72
85.00	18.0	421.29	258.14	679.43	339.72	1195.72
86.00	18.0	427.29	258.14	685.43	342.72	1201.72
87.00	18.0	433.29	253.00	686.30	343.15	1192.30
88.00	18.0	439.29	242.73	682.02	341.01	1167.48
89.00	18.0	445.29	232.45	677.74	338.87	1142.65
90.00	18.0	451.29	232.45	683.74	341.87	1148.65
91.00	18.0	457.29	232.45	689.74	344.87	1154.65
92.00	18.0	463.29	232.45	695.74	347.87	1160.65
93.00	18.0	468.75	237.59	706.34	353.17	1181.52
94.00	18.0	473.66	247.87	721.52	360.76	1217.26
95.00	18.0	Soil Elevations Must Extend At or Below Contribution Zone				
96.00	18.0	Soil Elevations Must Extend At or Below Contribution Zone				
97.00	18.0	Soil Elevations Must Extend At or Below Contribution Zone				
98.00	18.0	Soil Elevations Must Extend At or Below Contribution Zone				
99.00	18.0	Soil Elevations Must Extend At or Below Contribution Zone				
100.00	18.0	Soil Elevations Must Extend At or Below Contribution Zone				

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	19.79	19.79	9.90	59.38
11.00	24.0	5.03	19.92	24.96	12.48	64.80
12.00	24.0	9.88	20.19	30.07	15.03	70.45
13.00	24.0	14.84	20.63	35.46	17.73	76.72
14.00	24.0	20.38	21.14	41.52	20.76	83.80
15.00	24.0	26.40	21.60	48.00	24.00	91.20
16.00	24.0	33.61	21.16	54.77	27.39	97.08
17.00	24.0	40.96	20.01	60.98	30.49	101.00
18.00	24.0	45.49	18.95	64.44	32.22	102.35
19.00	24.0	49.32	18.00	67.32	33.66	103.32
20.00	24.0	53.90	16.83	70.72	35.36	104.38
21.00	24.0	58.84	15.55	74.39	37.19	105.50
22.00	24.0	63.78	14.28	78.06	39.03	106.61
23.00	24.0	66.25	0.00	66.25	33.12	66.25
24.00	24.0	66.25	0.00	66.25	33.12	66.25
25.00	24.0	66.25	0.00	66.25	33.12	66.25
26.00	24.0	66.25	0.00	66.25	33.12	66.25
27.00	24.0	66.25	0.00	66.25	33.12	66.25
28.00	24.0	66.25	0.00	66.25	33.12	66.25
29.00	24.0	66.25	0.00	66.25	33.12	66.25
30.00	24.0	66.25	88.29	154.54	77.27	331.12
31.00	24.0	72.87	92.97	165.84	82.92	351.78
32.00	24.0	79.24	101.10	180.34	90.17	382.54
33.00	24.0	91.64	117.77	209.41	104.70	444.94
34.00	24.0	100.59	129.62	230.21	115.10	489.44
35.00	24.0	115.74	355.51	471.24	235.62	1182.26
36.00	24.0	123.74	355.51	479.24	239.62	1190.26
37.00	24.0	131.74	355.51	487.24	243.62	1198.26
38.00	24.0	140.67	214.05	354.72	177.36	782.82
39.00	24.0	149.18	220.80	369.98	184.99	811.58
40.00	24.0	161.92	433.74	595.66	297.83	1463.13
41.00	24.0	169.92	383.37	553.29	276.65	1320.04
42.00	24.0	177.92	333.01	510.93	255.46	1176.94
43.00	24.0	185.92	333.01	518.93	259.46	1184.94
44.00	24.0	193.92	333.01	526.93	263.46	1192.94
45.00	24.0	201.92	333.01	534.93	267.46	1200.94
46.00	24.0	209.92	333.01	542.93	271.46	1208.94
47.00	24.0	217.92	333.01	550.93	275.46	1216.94
48.00	24.0	227.66	317.82	545.47	272.74	1181.10
49.00	24.0	239.21	321.76	560.96	280.48	1204.48
50.00	24.0	251.87	307.82	559.69	279.85	1175.34
51.00	24.0	259.87	257.46	517.33	258.66	1032.25
52.00	24.0	267.87	207.09	474.96	237.48	889.15
53.00	24.0	275.87	156.73	432.60	216.30	746.06
54.00	24.0	283.87	106.37	390.23	195.12	602.96
55.00	24.0	291.87	215.64	507.51	253.75	938.79
56.00	24.0	303.29	218.68	521.97	260.98	959.32
57.00	24.0	313.74	229.81	543.55	271.77	1003.16
58.00	24.0	323.97	249.03	572.99	286.50	1071.05
59.00	24.0	334.53	276.35	610.87	305.44	1163.57

60.00	24.0	346.51	292.54	639.04	319.52	1224.11
61.00	24.0	358.49	308.72	667.21	333.61	1284.66
62.00	24.0	370.47	324.91	695.38	347.69	1345.21
63.00	24.0	385.72	458.92	844.64	422.32	1762.48
64.00	24.0	393.72	458.92	852.64	426.32	1770.48
65.00	24.0	401.72	458.92	860.64	430.32	1778.48
66.00	24.0	409.72	458.92	868.64	434.32	1786.48
67.00	24.0	417.72	458.92	876.64	438.32	1794.48
68.00	24.0	425.72	458.92	884.64	442.32	1802.48
69.00	24.0	433.72	458.92	892.64	446.32	1810.48
70.00	24.0	441.72	458.92	900.64	450.32	1818.48
71.00	24.0	449.72	458.92	908.64	454.32	1826.48
72.00	24.0	457.72	458.92	916.64	458.32	1834.48
73.00	24.0	465.72	458.92	924.64	462.32	1842.48
74.00	24.0	473.72	458.92	932.64	466.32	1850.48
75.00	24.0	481.72	458.92	940.64	470.32	1858.48
76.00	24.0	489.72	458.92	948.64	474.32	1866.48
77.00	24.0	497.72	458.92	956.64	478.32	1874.48
78.00	24.0	505.72	458.92	964.64	482.32	1882.48
79.00	24.0	513.72	458.92	972.64	486.32	1890.48
80.00	24.0	521.72	458.92	980.64	490.32	1898.48
81.00	24.0	529.72	458.92	988.64	494.32	1906.48
82.00	24.0	537.72	458.92	996.64	498.32	1914.48
83.00	24.0	545.72	458.92	1004.64	502.32	1922.48
84.00	24.0	553.72	458.92	1012.64	506.32	1930.48
85.00	24.0	561.72	452.07	1013.79	506.90	1917.93
86.00	24.0	569.72	438.37	1008.09	504.04	1884.83
87.00	24.0	577.72	424.67	1002.39	501.19	1851.72
88.00	24.0	585.72	424.67	1010.39	505.19	1859.72
89.00	24.0	593.72	424.67	1018.39	509.19	1867.72
90.00	24.0	601.72	424.67	1026.39	513.19	1875.72
91.00	24.0	609.72	424.67	1034.39	517.19	1883.72
92.00	24.0	617.72	424.67	1042.39	521.19	1891.72

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.

Date: September 23, 2021
Time: 18:45:21

General Information:
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Input file: .....ming - Original FB Deep Runs\PIpe Pile\BB-01_PSCP_REV_PIPE.spc
Project number: B-19-051
Job name: THEA Whiting Street
Engineer: Kirk M. Eastman
Units: English

Analysis Information:
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Analysis Type: SPT

Soil Information:
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Boring date: 6/9/21, Boring Number: BB-01
Station number: 105+72 Offset: 8 LT

Ground Elevation: 15.300(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	5.00	5- Cavity layer
3	4.00	5.00	5- Cavity layer
4	6.00	10.00	5- Cavity layer
5	8.00	10.00	5- Cavity layer
6	10.00	12.00	5- Cavity layer
7	10.00	0.00	1- Plastic Clay
8	10.00	27.00	3- Clean sand
9	12.00	27.00	3- Clean sand
10	14.00	26.00	3- Clean sand
11	14.00	0.00	1- Plastic Clay
12	14.00	16.00	3- Clean sand
13	16.00	16.00	3- Clean sand
14	18.00	14.00	3- Clean sand
15	18.00	0.00	1- Plastic Clay
16	18.00	9.00	2- Clay and silty sand
17	20.00	9.00	2- Clay and silty sand
18	22.50	7.00	2- Clay and silty sand
19	22.50	0.00	1- Plastic Clay
20	22.50	100.00	4- Lime Stone/Very shelly sand
21	25.00	100.00	4- Lime Stone/Very shelly sand
22	27.50	100.00	4- Lime Stone/Very shelly sand
23	30.00	100.00	4- Lime Stone/Very shelly sand
24	32.50	100.00	4- Lime Stone/Very shelly sand
25	32.50	0.00	1- Plastic Clay
26	32.50	40.00	3- Clean sand
27	35.00	40.00	3- Clean sand
28	37.50	47.00	3- Clean sand
29	37.50	0.00	1- Plastic Clay
30	37.50	100.00	4- Lime Stone/Very shelly sand
31	40.00	100.00	4- Lime Stone/Very shelly sand
32	42.50	100.00	4- Lime Stone/Very shelly sand
33	45.00	100.00	4- Lime Stone/Very shelly sand
34	47.50	100.00	4- Lime Stone/Very shelly sand
35	47.50	0.00	1- Plastic Clay
36	47.50	20.00	3- Clean sand
37	50.00	20.00	3- Clean sand
38	50.00	0.00	2- Clay and silty sand

39	50.00	30.00	1- Plastic Clay
40	52.50	30.00	1- Plastic Clay
41	55.00	45.00	1- Plastic Clay
42	57.50	48.00	1- Plastic Clay
43	57.50	0.00	2- Clay and silty sand
44	57.50	15.00	3- Clean sand
45	60.00	15.00	3- Clean sand
46	60.00	0.00	1- Plastic Clay
47	60.00	100.00	4- Lime Stone/Very shelly sand
48	62.50	100.00	4- Lime Stone/Very shelly sand
49	65.00	100.00	4- Lime Stone/Very shelly sand
50	67.50	100.00	4- Lime Stone/Very shelly sand
51	70.00	100.00	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	100.00	4- Lime Stone/Very shelly sand
56	82.50	100.00	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	92.50	100.00	4- Lime Stone/Very shelly sand
61	95.00	100.00	4- Lime Stone/Very shelly sand
62	97.50	100.00	4- Lime Stone/Very shelly sand
63	100.00	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	15.30	5.30	10.00	6.00	5-Void
2	5.30	5.30	0.00	27.00	1-Plastic Clay
3	5.30	1.30	4.00	27.00	3-Clean Sand
4	1.30	1.30	0.00	16.00	1-Plastic Clay
5	1.30	-2.70	4.00	16.00	3-Clean Sand
6	-2.70	-2.70	0.00	9.00	1-Plastic Clay
7	-2.70	-7.20	4.50	9.00	2-Clay and Silty Sand
8	-7.20	-7.20	0.00	100.00	1-Plastic Clay
9	-7.20	-17.20	10.00	100.00	4-Limestone, Very Shelly Sand
10	-17.20	-17.20	0.00	40.00	1-Plastic Clay
11	-17.20	-22.20	5.00	40.00	3-Clean Sand
12	-22.20	-22.20	0.00	100.00	1-Plastic Clay
13	-22.20	-32.20	10.00	100.00	4-Limestone, Very Shelly Sand
14	-32.20	-32.20	0.00	20.00	1-Plastic Clay
15	-32.20	-34.70	2.50	20.00	3-Clean Sand
16	-34.70	-34.70	0.00	30.00	2-Clay and Silty Sand
17	-34.70	-42.20	7.50	35.00	1-Plastic Clay
18	-42.20	-42.20	0.00	15.00	2-Clay and Silty Sand
19	-42.20	-44.70	2.50	15.00	3-Clean Sand
20	-44.70	-44.70	0.00	100.00	1-Plastic Clay
21	-44.70	-84.70	40.00	100.00	4-Limestone, Very Shelly Sand

Driven Pile Data:

Pile unit weight = 490.00(pcf), Section Type: Pipe

Pile Geometry:

Width (in)	Length (ft)	Tip Elev. (ft)	Thickness (in)	Pile End
20.00	10.00	5.30	0.50	OPEN
20.00	11.00	4.30	0.50	OPEN

20.00	12.00	3.30	0.50	OPEN
20.00	13.00	2.30	0.50	OPEN
20.00	14.00	1.30	0.50	OPEN
20.00	15.00	0.30	0.50	OPEN
20.00	16.00	-0.70	0.50	OPEN
20.00	17.00	-1.70	0.50	OPEN
20.00	18.00	-2.70	0.50	OPEN
20.00	19.00	-3.70	0.50	OPEN
20.00	20.00	-4.70	0.50	OPEN
20.00	21.00	-5.70	0.50	OPEN
20.00	22.00	-6.70	0.50	OPEN
20.00	23.00	-7.70	0.50	OPEN
20.00	24.00	-8.70	0.50	OPEN
20.00	25.00	-9.70	0.50	OPEN
20.00	26.00	-10.70	0.50	OPEN
20.00	27.00	-11.70	0.50	OPEN
20.00	28.00	-12.70	0.50	OPEN
20.00	29.00	-13.70	0.50	OPEN
20.00	30.00	-14.70	0.50	OPEN
20.00	31.00	-15.70	0.50	OPEN
20.00	32.00	-16.70	0.50	OPEN
20.00	33.00	-17.70	0.50	OPEN
20.00	34.00	-18.70	0.50	OPEN
20.00	35.00	-19.70	0.50	OPEN
20.00	36.00	-20.70	0.50	OPEN
20.00	37.00	-21.70	0.50	OPEN
20.00	38.00	-22.70	0.50	OPEN
20.00	39.00	-23.70	0.50	OPEN
20.00	40.00	-24.70	0.50	OPEN
20.00	41.00	-25.70	0.50	OPEN
20.00	42.00	-26.70	0.50	OPEN
20.00	43.00	-27.70	0.50	OPEN
20.00	44.00	-28.70	0.50	OPEN
20.00	45.00	-29.70	0.50	OPEN
20.00	46.00	-30.70	0.50	OPEN
20.00	47.00	-31.70	0.50	OPEN
20.00	48.00	-32.70	0.50	OPEN
20.00	49.00	-33.70	0.50	OPEN
20.00	50.00	-34.70	0.50	OPEN
20.00	51.00	-35.70	0.50	OPEN
20.00	52.00	-36.70	0.50	OPEN
20.00	53.00	-37.70	0.50	OPEN
20.00	54.00	-38.70	0.50	OPEN
20.00	55.00	-39.70	0.50	OPEN
20.00	56.00	-40.70	0.50	OPEN
20.00	57.00	-41.70	0.50	OPEN
20.00	58.00	-42.70	0.50	OPEN
20.00	59.00	-43.70	0.50	OPEN
20.00	60.00	-44.70	0.50	OPEN
20.00	61.00	-45.70	0.50	OPEN
20.00	62.00	-46.70	0.50	OPEN
20.00	63.00	-47.70	0.50	OPEN
20.00	64.00	-48.70	0.50	OPEN
20.00	65.00	-49.70	0.50	OPEN
20.00	66.00	-50.70	0.50	OPEN
20.00	67.00	-51.70	0.50	OPEN
20.00	68.00	-52.70	0.50	OPEN
20.00	69.00	-53.70	0.50	OPEN
20.00	70.00	-54.70	0.50	OPEN
20.00	71.00	-55.70	0.50	OPEN
20.00	72.00	-56.70	0.50	OPEN
20.00	73.00	-57.70	0.50	OPEN
20.00	74.00	-58.70	0.50	OPEN
20.00	75.00	-59.70	0.50	OPEN
20.00	76.00	-60.70	0.50	OPEN
20.00	77.00	-61.70	0.50	OPEN
20.00	78.00	-62.70	0.50	OPEN
20.00	79.00	-63.70	0.50	OPEN
20.00	80.00	-64.70	0.50	OPEN

20.00	81.00	-65.70	0.50	OPEN
20.00	82.00	-66.70	0.50	OPEN
20.00	83.00	-67.70	0.50	OPEN
20.00	84.00	-68.70	0.50	OPEN
20.00	85.00	-69.70	0.50	OPEN
20.00	86.00	-70.70	0.50	OPEN
20.00	87.00	-71.70	0.50	OPEN
20.00	88.00	-72.70	0.50	OPEN
20.00	89.00	-73.70	0.50	OPEN
20.00	90.00	-74.70	0.50	OPEN
20.00	91.00	-75.70	0.50	OPEN
20.00	92.00	-76.70	0.50	OPEN
20.00	93.00	-77.70	0.50	OPEN
20.00	94.00	-78.70	0.50	OPEN
20.00	95.00	-79.70	0.50	OPEN
20.00	96.00	-80.70	0.50	OPEN
20.00	97.00	-81.70	0.50	OPEN
20.00	98.00	-82.70	0.50	OPEN
20.00	99.00	-83.70	0.50	OPEN
20.00	100.00	-84.70	0.50	OPEN

Driven Pile Capacity:
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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	20.0	0.00	3.07	3.07	1.54	9.22
11.00	20.0	5.53	3.08	8.61	4.30	14.76
12.00	20.0	10.99	3.08	14.08	7.04	20.24
13.00	20.0	17.08	2.97	20.05	10.02	25.99
14.00	20.0	22.67	2.73	25.40	12.70	30.86
15.00	20.0	26.44	2.62	29.05	14.53	34.29
16.00	20.0	30.20	2.50	32.70	16.35	37.69
17.00	20.0	33.86	2.66	36.52	18.26	41.84
18.00	20.0	37.30	3.42	40.72	20.36	47.56
19.00	20.0	40.84	3.55	44.39	22.19	51.50
20.00	20.0	43.50	3.95	47.45	23.73	55.36
21.00	20.0	45.85	4.63	50.48	25.24	59.73
22.00	20.0	48.15	5.57	53.72	26.86	64.86
23.00	20.0	61.03	7.47	68.49	34.25	83.42
24.00	20.0	70.56	7.52	78.08	39.04	93.13
25.00	20.0	79.89	7.61	87.50	43.75	102.71
26.00	20.0	89.03	7.72	96.75	48.38	112.20
27.00	20.0	98.47	7.83	106.29	53.15	121.94
28.00	20.0	108.64	7.85	116.49	58.24	132.19
29.00	20.0	118.86	7.87	126.74	63.37	142.48
30.00	20.0	129.21	7.89	137.09	68.55	152.87
31.00	20.0	139.57	7.90	147.47	73.73	163.27
32.00	20.0	148.93	8.08	157.01	78.51	173.17
33.00	20.0	82.77	85.16	167.94	83.97	338.26
34.00	20.0	85.82	85.73	171.55	85.78	343.01
35.00	20.0	88.57	86.87	175.43	87.72	349.17
36.00	20.0	91.16	88.47	179.63	89.81	356.56
37.00	20.0	93.99	89.83	183.82	91.91	363.49
38.00	20.0	197.27	10.44	207.70	103.85	228.58
39.00	20.0	106.40	107.04	213.44	106.72	427.53
40.00	20.0	111.63	107.04	218.68	109.34	432.76
41.00	20.0	116.87	107.04	223.91	111.96	438.00
42.00	20.0	122.11	105.43	227.54	113.77	438.40
43.00	20.0	127.34	100.59	227.93	113.97	429.11
44.00	20.0	132.58	95.75	228.33	114.16	419.83
45.00	20.0	137.81	88.14	225.96	112.98	402.24
46.00	20.0	143.05	80.22	223.27	111.64	383.71

47.00	20.0	148.29	73.53	221.81	110.91	368.86
48.00	20.0	152.07	68.44	220.52	110.26	357.40
49.00	20.0	154.41	65.04	219.45	109.72	349.52
50.00	20.0	156.74	61.83	218.58	109.29	342.24
51.00	20.0	161.94	60.30	222.24	111.12	342.84
52.00	20.0	167.13	58.06	225.19	112.59	341.31
53.00	20.0	172.36	56.55	228.92	114.46	342.03
54.00	20.0	177.91	54.89	232.80	116.40	342.58
55.00	20.0	183.83	58.10	241.93	120.96	358.13
56.00	20.0	189.94	62.22	252.16	126.08	376.60
57.00	20.0	196.12	66.30	262.42	131.21	395.02
58.00	20.0	200.12	68.38	268.50	134.25	405.27
59.00	20.0	201.78	68.84	270.62	135.31	408.30
60.00	20.0	203.79	76.87	280.66	140.33	434.39
61.00	20.0	209.00	76.90	285.90	142.95	439.71
62.00	20.0	213.96	77.36	291.33	145.66	446.05
63.00	20.0	218.74	78.25	296.99	148.49	453.48
64.00	20.0	223.21	79.94	303.15	151.57	463.03
65.00	20.0	227.46	82.49	309.95	154.98	474.94
66.00	20.0	231.65	85.76	317.41	158.70	488.92
67.00	20.0	235.86	89.67	325.53	162.77	504.88
68.00	20.0	240.16	94.17	334.33	167.16	522.67
69.00	20.0	244.58	99.23	343.81	171.90	542.27
70.00	20.0	249.15	104.90	354.05	177.02	563.84
71.00	20.0	254.39	107.97	362.36	181.18	578.30
72.00	20.0	259.62	110.63	370.25	185.13	591.51
73.00	20.0	264.86	113.29	378.15	189.07	604.72
74.00	20.0	270.09	114.17	384.27	192.13	612.62
75.00	20.0	275.33	114.17	389.50	194.75	617.85
76.00	20.0	280.57	114.17	394.74	197.37	623.09
77.00	20.0	285.80	114.17	399.98	199.99	628.32
78.00	20.0	291.04	114.17	405.21	202.61	633.56
79.00	20.0	296.27	114.17	410.45	205.22	638.80
80.00	20.0	301.51	114.17	415.68	207.84	644.03
81.00	20.0	306.75	114.17	420.92	210.46	649.27
82.00	20.0	311.98	114.17	426.16	213.08	654.50
83.00	20.0	317.22	114.17	431.39	215.70	659.74
84.00	20.0	322.45	114.17	436.63	218.31	664.98
85.00	20.0	327.69	114.17	441.86	220.93	670.21
86.00	20.0	332.93	114.17	447.10	223.55	675.45
87.00	20.0	338.16	114.17	452.34	226.17	680.68
88.00	20.0	343.40	114.17	457.57	228.79	685.92
89.00	20.0	348.63	114.17	462.81	231.40	691.16
90.00	20.0	353.87	114.17	468.04	234.02	696.39
91.00	20.0	359.11	114.17	473.28	236.64	701.63
92.00	20.0	364.34	114.17	478.52	239.26	706.86
93.00	20.0	369.58	114.17	483.75	241.88	712.10
94.00	20.0	374.81	114.17	488.99	244.49	717.34
95.00	20.0 Soil Elevations Must Extend At or Below Contribution Zone					
96.00	20.0 Soil Elevations Must Extend At or Below Contribution Zone					
97.00	20.0 Soil Elevations Must Extend At or Below Contribution Zone					
98.00	20.0 Soil Elevations Must Extend At or Below Contribution Zone					
99.00	20.0 Soil Elevations Must Extend At or Below Contribution Zone					
100.00	20.0 Soil Elevations Must Extend At or Below Contribution Zone					

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.

General Information:
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Input file: .....ming - Original FB Deep Runs\PIpe Pile\BB-02_PSCP_REV_PIPE.spc
Project number: B-19-051
Job name: THEA Whiting Street
Engineer: Kirk M. Eastman
Units: English

Analysis Information:
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Analysis Type: SPT

Soil Information:
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Boring date: 7/1/21, Boring Number: BB-02
Station number: 107+56 Offset: 12 LT

Ground Elevation: 16.600(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	5.00	5- Cavity layer
3	4.00	5.00	5- Cavity layer
4	6.00	13.00	5- Cavity layer
5	8.00	18.00	5- Cavity layer
6	10.00	17.00	5- Cavity layer
7	10.00	0.00	1- Plastic Clay
8	10.00	13.00	3- Clean sand
9	12.00	13.00	3- Clean sand
10	14.00	11.00	3- Clean sand
11	16.00	10.00	3- Clean sand
12	16.00	0.00	1- Plastic Clay
13	16.00	100.00	4- Lime Stone/Very shelly sand
14	18.00	100.00	4- Lime Stone/Very shelly sand
15	20.00	100.00	4- Lime Stone/Very shelly sand
16	20.00	0.00	1- Plastic Clay
17	20.00	60.00	4- Lime Stone/Very shelly sand
18	22.50	60.00	4- Lime Stone/Very shelly sand
19	25.00	67.00	4- Lime Stone/Very shelly sand
20	25.00	0.00	1- Plastic Clay
21	25.00	32.00	3- Clean sand
22	27.50	32.00	3- Clean sand
23	30.00	36.00	3- Clean sand
24	30.00	0.00	1- Plastic Clay
25	30.00	100.00	4- Lime Stone/Very shelly sand
26	32.50	100.00	4- Lime Stone/Very shelly sand
27	35.00	100.00	4- Lime Stone/Very shelly sand
28	35.00	0.00	2- Clay and silty sand
29	35.00	31.00	1- Plastic Clay
30	37.50	31.00	1- Plastic Clay
31	40.00	37.00	1- Plastic Clay
32	40.00	0.00	2- Clay and silty sand
33	40.00	100.00	4- Lime Stone/Very shelly sand
34	42.50	100.00	4- Lime Stone/Very shelly sand
35	45.00	100.00	4- Lime Stone/Very shelly sand
36	47.50	63.00	4- Lime Stone/Very shelly sand
37	50.00	68.00	4- Lime Stone/Very shelly sand
38	50.00	0.00	2- Clay and silty sand

39	50.00	100.00	1- Plastic Clay
40	52.50	100.00	1- Plastic Clay
41	55.00	100.00	1- Plastic Clay
42	55.00	0.00	3- Clean sand
43	55.00	100.00	4- Lime Stone/Very shelly sand
44	57.50	100.00	4- Lime Stone/Very shelly sand
45	57.50	0.00	1- Plastic Clay
46	57.50	100.00	2- Clay and silty sand
47	60.00	100.00	2- Clay and silty sand
48	60.00	0.00	1- Plastic Clay
49	60.00	54.00	4- Lime Stone/Very shelly sand
50	62.50	54.00	4- Lime Stone/Very shelly sand
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	2- Clay and silty sand
56	72.50	54.00	1- Plastic Clay
57	75.00	54.00	1- Plastic Clay
58	75.00	0.00	2- Clay and silty sand
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	90.00	100.00	4- Lime Stone/Very shelly sand
66	92.50	100.00	4- Lime Stone/Very shelly sand
67	95.00	100.00	4- Lime Stone/Very shelly sand
68	97.50	100.00	4- Lime Stone/Very shelly sand
69	100.00	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	16.60	6.60	10.00	8.20	5-Void
2	6.60	6.60	0.00	13.00	1-Plastic Clay
3	6.60	0.60	6.00	12.33	3-Clean Sand
4	0.60	0.60	0.00	100.00	1-Plastic Clay
5	0.60	-3.40	4.00	100.00	4-Limestone, Very Shelly Sand
6	-3.40	-3.40	0.00	60.00	1-Plastic Clay
7	-3.40	-8.40	5.00	60.00	4-Limestone, Very Shelly Sand
8	-8.40	-8.40	0.00	32.00	1-Plastic Clay
9	-8.40	-13.40	5.00	32.00	3-Clean Sand
10	-13.40	-13.40	0.00	100.00	1-Plastic Clay
11	-13.40	-18.40	5.00	100.00	4-Limestone, Very Shelly Sand
12	-18.40	-18.40	0.00	31.00	2-Clay and Silty Sand
13	-18.40	-23.40	5.00	31.00	1-Plastic Clay
14	-23.40	-23.40	0.00	100.00	2-Clay and Silty Sand
15	-23.40	-33.40	10.00	90.75	4-Limestone, Very Shelly Sand
16	-33.40	-33.40	0.00	100.00	2-Clay and Silty Sand
17	-33.40	-38.40	5.00	100.00	1-Plastic Clay
18	-38.40	-38.40	0.00	100.00	3-Clean Sand
19	-38.40	-40.90	2.50	100.00	4-Limestone, Very Shelly Sand
20	-40.90	-40.90	0.00	100.00	1-Plastic Clay
21	-40.90	-43.40	2.50	100.00	2-Clay and Silty Sand
22	-43.40	-43.40	0.00	54.00	1-Plastic Clay
23	-43.40	-55.90	12.50	81.60	4-Limestone, Very Shelly Sand
24	-55.90	-55.90	0.00	54.00	2-Clay and Silty Sand
25	-55.90	-58.40	2.50	54.00	1-Plastic Clay
26	-58.40	-58.40	0.00	100.00	2-Clay and Silty Sand
27	-58.40	-83.40	25.00	100.00	4-Limestone, Very Shelly Sand

Driven Pile Data:
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Pile unit weight = 490.00(pcf), Section Type: Pipe

Pile Geometry:

Width (in)	Length (ft)	Tip Elev. (ft)	Thickness (in)	Pile End
20.00	10.00	6.60	0.50	OPEN
20.00	11.00	5.60	0.50	OPEN
20.00	12.00	4.60	0.50	OPEN
20.00	13.00	3.60	0.50	OPEN
20.00	14.00	2.60	0.50	OPEN
20.00	15.00	1.60	0.50	OPEN
20.00	16.00	0.60	0.50	OPEN
20.00	17.00	-0.40	0.50	OPEN
20.00	18.00	-1.40	0.50	OPEN
20.00	19.00	-2.40	0.50	OPEN
20.00	20.00	-3.40	0.50	OPEN
20.00	21.00	-4.40	0.50	OPEN
20.00	22.00	-5.40	0.50	OPEN
20.00	23.00	-6.40	0.50	OPEN
20.00	24.00	-7.40	0.50	OPEN
20.00	25.00	-8.40	0.50	OPEN
20.00	26.00	-9.40	0.50	OPEN
20.00	27.00	-10.40	0.50	OPEN
20.00	28.00	-11.40	0.50	OPEN
20.00	29.00	-12.40	0.50	OPEN
20.00	30.00	-13.40	0.50	OPEN
20.00	31.00	-14.40	0.50	OPEN
20.00	32.00	-15.40	0.50	OPEN
20.00	33.00	-16.40	0.50	OPEN
20.00	34.00	-17.40	0.50	OPEN
20.00	35.00	-18.40	0.50	OPEN
20.00	36.00	-19.40	0.50	OPEN
20.00	37.00	-20.40	0.50	OPEN
20.00	38.00	-21.40	0.50	OPEN
20.00	39.00	-22.40	0.50	OPEN
20.00	40.00	-23.40	0.50	OPEN
20.00	41.00	-24.40	0.50	OPEN
20.00	42.00	-25.40	0.50	OPEN
20.00	43.00	-26.40	0.50	OPEN
20.00	44.00	-27.40	0.50	OPEN
20.00	45.00	-28.40	0.50	OPEN
20.00	46.00	-29.40	0.50	OPEN
20.00	47.00	-30.40	0.50	OPEN
20.00	48.00	-31.40	0.50	OPEN
20.00	49.00	-32.40	0.50	OPEN
20.00	50.00	-33.40	0.50	OPEN
20.00	51.00	-34.40	0.50	OPEN
20.00	52.00	-35.40	0.50	OPEN
20.00	53.00	-36.40	0.50	OPEN
20.00	54.00	-37.40	0.50	OPEN
20.00	55.00	-38.40	0.50	OPEN
20.00	56.00	-39.40	0.50	OPEN
20.00	57.00	-40.40	0.50	OPEN
20.00	58.00	-41.40	0.50	OPEN
20.00	59.00	-42.40	0.50	OPEN
20.00	60.00	-43.40	0.50	OPEN
20.00	61.00	-44.40	0.50	OPEN
20.00	62.00	-45.40	0.50	OPEN
20.00	63.00	-46.40	0.50	OPEN
20.00	64.00	-47.40	0.50	OPEN
20.00	65.00	-48.40	0.50	OPEN
20.00	66.00	-49.40	0.50	OPEN
20.00	67.00	-50.40	0.50	OPEN
20.00	68.00	-51.40	0.50	OPEN

20.00	69.00	-52.40	0.50	OPEN
20.00	70.00	-53.40	0.50	OPEN
20.00	71.00	-54.40	0.50	OPEN
20.00	72.00	-55.40	0.50	OPEN
20.00	73.00	-56.40	0.50	OPEN
20.00	74.00	-57.40	0.50	OPEN
20.00	75.00	-58.40	0.50	OPEN
20.00	76.00	-59.40	0.50	OPEN
20.00	77.00	-60.40	0.50	OPEN
20.00	78.00	-61.40	0.50	OPEN
20.00	79.00	-62.40	0.50	OPEN
20.00	80.00	-63.40	0.50	OPEN
20.00	81.00	-64.40	0.50	OPEN
20.00	82.00	-65.40	0.50	OPEN
20.00	83.00	-66.40	0.50	OPEN
20.00	84.00	-67.40	0.50	OPEN
20.00	85.00	-68.40	0.50	OPEN
20.00	86.00	-69.40	0.50	OPEN
20.00	87.00	-70.40	0.50	OPEN
20.00	88.00	-71.40	0.50	OPEN
20.00	89.00	-72.40	0.50	OPEN
20.00	90.00	-73.40	0.50	OPEN
20.00	91.00	-74.40	0.50	OPEN
20.00	92.00	-75.40	0.50	OPEN
20.00	93.00	-76.40	0.50	OPEN
20.00	94.00	-77.40	0.50	OPEN
20.00	95.00	-78.40	0.50	OPEN
20.00	96.00	-79.40	0.50	OPEN
20.00	97.00	-80.40	0.50	OPEN
20.00	98.00	-81.40	0.50	OPEN
20.00	99.00	-82.40	0.50	OPEN
20.00	100.00	-83.40	0.50	OPEN

Driven Pile Capacity:
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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	20.0	0.00	1.67	1.67	0.84	5.02
11.00	20.0	2.23	1.72	3.95	1.98	7.39
12.00	20.0	3.51	1.87	5.38	2.69	9.11
13.00	20.0	4.47	2.12	6.59	3.30	10.83
14.00	20.0	5.30	2.48	7.78	3.89	12.73
15.00	20.0	6.18	2.92	9.10	4.55	14.93
16.00	20.0	17.04	6.12	23.15	11.58	35.39
17.00	20.0	26.78	6.15	32.93	16.46	45.22
18.00	20.0	35.74	6.24	41.98	20.99	54.47
19.00	20.0	44.12	6.41	50.52	25.26	63.33
20.00	20.0	57.88	7.20	65.08	32.54	79.47
21.00	20.0	65.35	7.21	72.56	36.28	86.98
22.00	20.0	72.59	7.25	79.84	39.92	94.34
23.00	20.0	79.70	7.32	87.01	43.51	101.65
24.00	20.0	87.25	7.37	94.62	47.31	109.37
25.00	20.0	96.97	7.90	104.87	52.44	120.68
26.00	20.0	102.95	7.93	110.88	55.44	126.73
27.00	20.0	108.32	8.00	116.32	58.16	132.32
28.00	20.0	113.22	8.12	121.35	60.67	137.60
29.00	20.0	117.83	8.30	126.13	63.06	142.72
30.00	20.0	128.87	9.50	138.37	69.19	157.38
31.00	20.0	139.08	8.71	147.79	73.90	165.21
32.00	20.0	149.29	7.92	157.21	78.61	173.06
33.00	20.0	81.80	73.25	155.04	77.52	301.53
34.00	20.0	87.03	65.70	152.73	76.37	284.13

35.00	20.0	92.27	64.89	157.16	78.58	286.94
36.00	20.0	97.21	66.41	163.61	81.81	296.42
37.00	20.0	101.81	70.92	172.73	86.37	314.58
38.00	20.0	106.45	78.38	184.82	92.41	341.58
39.00	20.0	111.70	85.51	197.21	98.61	368.24
40.00	20.0	119.08	91.35	210.43	105.22	393.14
41.00	20.0	124.26	91.46	215.72	107.86	398.64
42.00	20.0	129.38	91.70	221.08	110.54	404.48
43.00	20.0	134.45	92.07	226.52	113.26	410.66
44.00	20.0	139.64	92.21	231.85	115.92	416.26
45.00	20.0	145.26	88.85	234.11	117.05	411.81
46.00	20.0	150.26	83.54	233.80	116.90	400.87
47.00	20.0	154.81	78.44	233.25	116.62	390.12
48.00	20.0	158.98	73.51	232.49	116.25	379.52
49.00	20.0	163.20	70.93	234.13	117.07	376.00
50.00	20.0	167.55	73.99	241.54	120.77	389.52
51.00	20.0	174.42	75.97	250.39	125.20	402.33
52.00	20.0	180.75	81.92	262.67	131.34	426.52
53.00	20.0	187.12	91.91	279.03	139.51	462.85
54.00	20.0	194.25	98.28	292.53	146.27	489.09
55.00	20.0	204.47	100.16	304.63	152.31	504.95
56.00	20.0	209.71	98.72	308.42	154.21	505.86
57.00	20.0	214.94	97.31	312.25	156.13	506.87
58.00	20.0	220.22	96.29	316.52	158.26	509.11
59.00	20.0	225.55	95.84	321.39	160.70	513.07
60.00	20.0	230.88	95.92	326.80	163.40	518.64
61.00	20.0	234.34	96.04	330.38	165.19	522.46
62.00	20.0	237.74	96.40	334.13	167.07	526.92
63.00	20.0	241.16	96.97	338.13	169.07	532.06
64.00	20.0	245.02	98.18	343.20	171.60	539.56
65.00	20.0	249.41	100.01	349.42	174.71	549.45
66.00	20.0	254.07	102.26	356.33	178.16	560.84
67.00	20.0	259.08	103.37	362.45	181.23	569.19
68.00	20.0	265.00	100.84	365.84	182.92	567.52
69.00	20.0	271.49	95.99	367.48	183.74	559.46
70.00	20.0	276.75	94.85	371.60	185.80	561.30
71.00	20.0	281.98	94.84	376.82	188.41	566.50
72.00	20.0	287.22	94.76	381.98	190.99	571.49
73.00	20.0	293.03	95.00	388.03	194.01	578.02
74.00	20.0	299.12	97.48	396.60	198.30	591.56
75.00	20.0	306.08	105.35	411.43	205.71	622.13
76.00	20.0	311.28	105.41	416.70	208.35	627.53
77.00	20.0	316.45	105.57	422.02	211.01	633.16
78.00	20.0	321.62	105.74	427.36	213.68	638.85
79.00	20.0	326.81	105.88	432.69	216.35	644.44
80.00	20.0	332.01	106.01	438.02	219.01	650.04
81.00	20.0	337.22	106.14	443.36	221.68	655.64
82.00	20.0	342.43	106.27	448.71	224.35	661.25
83.00	20.0	347.65	106.40	454.06	227.03	666.86
84.00	20.0	352.88	106.53	459.41	229.71	672.48
85.00	20.0	358.11	106.67	464.78	232.39	678.11
86.00	20.0	363.35	107.17	470.52	235.26	684.85
87.00	20.0	368.58	110.17	478.75	239.38	699.09
88.00	20.0	373.82	113.17	486.99	243.50	713.34
89.00	20.0	379.06	114.17	493.23	246.62	721.58
90.00	20.0	384.29	114.17	498.47	249.23	726.81
91.00	20.0	389.53	114.17	503.70	251.85	732.05
92.00	20.0	394.76	114.17	508.94	254.47	737.29
93.00	20.0	400.00	114.17	514.17	257.09	742.52
94.00	20.0	405.24	114.17	519.41	259.71	747.76
95.00	20.0	Soil Elevations Must Extend At or Below Contribution Zone				
96.00	20.0	Soil Elevations Must Extend At or Below Contribution Zone				
97.00	20.0	Soil Elevations Must Extend At or Below Contribution Zone				
98.00	20.0	Soil Elevations Must Extend At or Below Contribution Zone				
99.00	20.0	Soil Elevations Must Extend At or Below Contribution Zone				
100.00	20.0	Soil Elevations Must Extend At or Below Contribution Zone				

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.

Date: September 23, 2021
Time: 18:50:43

General Information:
==========
Input file: .....ming - Original FB Deep Runs\PIpe Pile\BB-03_PSCP_REV_PIPE.spc
Project number: B-19-051
Job name: THEA Whiting Street
Engineer: Kirk M. Eastman
Units: English

Analysis Information:
==========
Analysis Type: SPT

Soil Information:
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Boring date: 6/24/21, Boring Number: BB-03
Station number: 204+29 Offset: 1 LT

Ground Elevation: 16.300(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	5.00	5- Cavity layer
3	4.00	5.00	5- Cavity layer
4	6.00	14.00	5- Cavity layer
5	8.00	35.00	5- Cavity layer
6	10.00	20.00	5- Cavity layer
7	10.00	0.00	1- Plastic Clay
8	10.00	11.00	3- Clean sand
9	12.00	11.00	3- Clean sand
10	14.00	9.00	3- Clean sand
11	16.00	16.00	3- Clean sand
12	16.00	0.00	2- Clay and silty sand
13	16.00	6.00	1- Plastic Clay
14	18.00	6.00	1- Plastic Clay
15	20.00	6.00	1- Plastic Clay
16	20.00	0.00	2- Clay and silty sand
17	20.00	60.00	3- Clean sand
18	22.50	60.00	3- Clean sand
19	22.50	0.00	1- Plastic Clay
20	22.50	100.00	4- Lime Stone/Very shelly sand
21	25.00	100.00	4- Lime Stone/Very shelly sand
22	25.00	0.00	1- Plastic Clay
23	25.00	44.00	3- Clean sand
24	27.50	44.00	3- Clean sand
25	27.50	0.00	1- Plastic Clay
26	27.50	100.00	4- Lime Stone/Very shelly sand
27	30.00	100.00	4- Lime Stone/Very shelly sand
28	30.00	0.00	2- Clay and silty sand
29	30.00	64.00	1- Plastic Clay
30	32.50	64.00	1- Plastic Clay
31	35.00	100.00	1- Plastic Clay
32	37.50	57.00	1- Plastic Clay
33	37.50	0.00	2- Clay and silty sand
34	37.50	26.00	1- Plastic Clay
35	40.00	26.00	1- Plastic Clay
36	42.50	20.00	1- Plastic Clay
37	42.50	0.00	2- Clay and silty sand
38	42.50	100.00	4- Lime Stone/Very shelly sand

39	45.00	100.00	4- Lime Stone/Very shelly sand
40	47.50	100.00	4- Lime Stone/Very shelly sand
41	50.00	100.00	4- Lime Stone/Very shelly sand
42	52.50	100.00	4- Lime Stone/Very shelly sand
43	55.00	100.00	4- Lime Stone/Very shelly sand
44	57.50	100.00	4- Lime Stone/Very shelly sand
45	57.50	0.00	1- Plastic Clay
46	57.50	72.00	2- Clay and silty sand
47	60.00	72.00	2- Clay and silty sand
48	62.50	100.00	2- Clay and silty sand
49	65.00	100.00	2- Clay and silty sand
50	67.50	48.00	2- Clay and silty sand
51	70.00	69.00	2- Clay and silty sand
52	70.00	0.00	1- Plastic Clay
53	70.00	100.00	4- Lime Stone/Very shelly sand
54	72.50	100.00	4- Lime Stone/Very shelly sand
55	75.00	100.00	4- Lime Stone/Very shelly sand
56	77.50	100.00	4- Lime Stone/Very shelly sand
57	80.00	100.00	4- Lime Stone/Very shelly sand
58	82.50	100.00	4- Lime Stone/Very shelly sand
59	85.00	100.00	4- Lime Stone/Very shelly sand
60	87.50	100.00	4- Lime Stone/Very shelly sand
61	90.00	100.00	4- Lime Stone/Very shelly sand
62	92.50	100.00	4- Lime Stone/Very shelly sand
63	95.00	100.00	4- Lime Stone/Very shelly sand
64	97.50	100.00	4- Lime Stone/Very shelly sand
65	100.00	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	16.30	6.30	10.00	11.80	5-Void
2	6.30	6.30	0.00	11.00	1-Plastic Clay
3	6.30	0.30	6.00	10.33	3-Clean Sand
4	0.30	0.30	0.00	6.00	2-Clay and Silty Sand
5	0.30	-3.70	4.00	6.00	1-Plastic Clay
6	-3.70	-3.70	0.00	60.00	2-Clay and Silty Sand
7	-3.70	-6.20	2.50	60.00	3-Clean Sand
8	-6.20	-6.20	0.00	100.00	1-Plastic Clay
9	-6.20	-8.70	2.50	100.00	4-Limestone, Very Shelly Sand
10	-8.70	-8.70	0.00	44.00	1-Plastic Clay
11	-8.70	-11.20	2.50	44.00	3-Clean Sand
12	-11.20	-11.20	0.00	100.00	1-Plastic Clay
13	-11.20	-13.70	2.50	100.00	4-Limestone, Very Shelly Sand
14	-13.70	-13.70	0.00	64.00	2-Clay and Silty Sand
15	-13.70	-21.20	7.50	76.00	1-Plastic Clay
16	-21.20	-21.20	0.00	26.00	2-Clay and Silty Sand
17	-21.20	-26.20	5.00	26.00	1-Plastic Clay
18	-26.20	-26.20	0.00	100.00	2-Clay and Silty Sand
19	-26.20	-41.20	15.00	100.00	4-Limestone, Very Shelly Sand
20	-41.20	-41.20	0.00	72.00	1-Plastic Clay
21	-41.20	-53.70	12.50	78.40	2-Clay and Silty Sand
22	-53.70	-53.70	0.00	100.00	1-Plastic Clay
23	-53.70	-83.70	30.00	100.00	4-Limestone, Very Shelly Sand

Driven Pile Data:
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Pile unit weight = 490.00(pcf), Section Type: Pipe

Pile Geometry:

Width	Length	Tip Elev.	Thickness	Pile End

(in)	(ft)	(ft)	(in)	
20.00	10.00	6.30	0.50	OPEN
20.00	11.00	5.30	0.50	OPEN
20.00	12.00	4.30	0.50	OPEN
20.00	13.00	3.30	0.50	OPEN
20.00	14.00	2.30	0.50	OPEN
20.00	15.00	1.30	0.50	OPEN
20.00	16.00	0.30	0.50	OPEN
20.00	17.00	-0.70	0.50	OPEN
20.00	18.00	-1.70	0.50	OPEN
20.00	19.00	-2.70	0.50	OPEN
20.00	20.00	-3.70	0.50	OPEN
20.00	21.00	-4.70	0.50	OPEN
20.00	22.00	-5.70	0.50	OPEN
20.00	23.00	-6.70	0.50	OPEN
20.00	24.00	-7.70	0.50	OPEN
20.00	25.00	-8.70	0.50	OPEN
20.00	26.00	-9.70	0.50	OPEN
20.00	27.00	-10.70	0.50	OPEN
20.00	28.00	-11.70	0.50	OPEN
20.00	29.00	-12.70	0.50	OPEN
20.00	30.00	-13.70	0.50	OPEN
20.00	31.00	-14.70	0.50	OPEN
20.00	32.00	-15.70	0.50	OPEN
20.00	33.00	-16.70	0.50	OPEN
20.00	34.00	-17.70	0.50	OPEN
20.00	35.00	-18.70	0.50	OPEN
20.00	36.00	-19.70	0.50	OPEN
20.00	37.00	-20.70	0.50	OPEN
20.00	38.00	-21.70	0.50	OPEN
20.00	39.00	-22.70	0.50	OPEN
20.00	40.00	-23.70	0.50	OPEN
20.00	41.00	-24.70	0.50	OPEN
20.00	42.00	-25.70	0.50	OPEN
20.00	43.00	-26.70	0.50	OPEN
20.00	44.00	-27.70	0.50	OPEN
20.00	45.00	-28.70	0.50	OPEN
20.00	46.00	-29.70	0.50	OPEN
20.00	47.00	-30.70	0.50	OPEN
20.00	48.00	-31.70	0.50	OPEN
20.00	49.00	-32.70	0.50	OPEN
20.00	50.00	-33.70	0.50	OPEN
20.00	51.00	-34.70	0.50	OPEN
20.00	52.00	-35.70	0.50	OPEN
20.00	53.00	-36.70	0.50	OPEN
20.00	54.00	-37.70	0.50	OPEN
20.00	55.00	-38.70	0.50	OPEN
20.00	56.00	-39.70	0.50	OPEN
20.00	57.00	-40.70	0.50	OPEN
20.00	58.00	-41.70	0.50	OPEN
20.00	59.00	-42.70	0.50	OPEN
20.00	60.00	-43.70	0.50	OPEN
20.00	61.00	-44.70	0.50	OPEN
20.00	62.00	-45.70	0.50	OPEN
20.00	63.00	-46.70	0.50	OPEN
20.00	64.00	-47.70	0.50	OPEN
20.00	65.00	-48.70	0.50	OPEN
20.00	66.00	-49.70	0.50	OPEN
20.00	67.00	-50.70	0.50	OPEN
20.00	68.00	-51.70	0.50	OPEN
20.00	69.00	-52.70	0.50	OPEN
20.00	70.00	-53.70	0.50	OPEN
20.00	71.00	-54.70	0.50	OPEN
20.00	72.00	-55.70	0.50	OPEN
20.00	73.00	-56.70	0.50	OPEN
20.00	74.00	-57.70	0.50	OPEN
20.00	75.00	-58.70	0.50	OPEN
20.00	76.00	-59.70	0.50	OPEN

20.00	77.00	-60.70	0.50	OPEN
20.00	78.00	-61.70	0.50	OPEN
20.00	79.00	-62.70	0.50	OPEN
20.00	80.00	-63.70	0.50	OPEN
20.00	81.00	-64.70	0.50	OPEN
20.00	82.00	-65.70	0.50	OPEN
20.00	83.00	-66.70	0.50	OPEN
20.00	84.00	-67.70	0.50	OPEN
20.00	85.00	-68.70	0.50	OPEN
20.00	86.00	-69.70	0.50	OPEN
20.00	87.00	-70.70	0.50	OPEN
20.00	88.00	-71.70	0.50	OPEN
20.00	89.00	-72.70	0.50	OPEN
20.00	90.00	-73.70	0.50	OPEN
20.00	91.00	-74.70	0.50	OPEN
20.00	92.00	-75.70	0.50	OPEN
20.00	93.00	-76.70	0.50	OPEN
20.00	94.00	-77.70	0.50	OPEN
20.00	95.00	-78.70	0.50	OPEN
20.00	96.00	-79.70	0.50	OPEN
20.00	97.00	-80.70	0.50	OPEN
20.00	98.00	-81.70	0.50	OPEN
20.00	99.00	-82.70	0.50	OPEN
20.00	100.00	-83.70	0.50	OPEN

Driven Pile Capacity:
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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	20.0	0.00	1.55	1.55	0.78	4.66
11.00	20.0	2.65	1.52	4.17	2.08	7.20
12.00	20.0	5.30	1.40	6.70	3.35	9.50
13.00	20.0	7.82	1.27	9.10	4.55	11.64
14.00	20.0	10.11	1.17	11.28	5.64	13.61
15.00	20.0	12.34	1.57	13.91	6.95	17.05
16.00	20.0	16.04	2.10	18.14	9.07	22.34
17.00	20.0	18.48	2.33	20.81	10.41	25.47
18.00	20.0	20.38	3.12	23.50	11.75	29.74
19.00	20.0	22.62	4.47	27.09	13.55	36.04
20.00	20.0	28.69	5.41	34.10	17.05	44.92
21.00	20.0	36.00	5.42	41.43	20.71	52.28
22.00	20.0	42.51	5.47	47.99	23.99	58.93
23.00	20.0	52.76	6.32	59.08	29.54	71.72
24.00	20.0	62.00	6.39	68.39	34.19	81.17
25.00	20.0	73.34	6.64	79.99	39.99	93.27
26.00	20.0	80.25	6.51	86.75	43.38	99.76
27.00	20.0	87.15	6.38	93.53	46.77	106.29
28.00	20.0	95.71	6.19	101.91	50.95	114.29
29.00	20.0	105.92	5.92	111.84	55.92	123.68
30.00	20.0	59.56	58.75	118.30	59.15	235.80
31.00	20.0	66.27	59.23	125.50	62.75	243.95
32.00	20.0	72.96	60.03	132.99	66.50	253.06
33.00	20.0	79.93	60.04	139.96	69.98	260.04
34.00	20.0	87.05	57.32	144.37	72.19	259.02
35.00	20.0	94.33	53.23	147.56	73.78	254.01
36.00	20.0	101.56	48.85	150.41	75.21	248.12
37.00	20.0	108.48	46.56	155.04	77.52	248.16
38.00	20.0	114.39	48.76	163.15	81.58	260.68
39.00	20.0	118.56	52.01	170.57	85.29	274.59
40.00	20.0	122.52	58.99	181.51	90.76	299.50
41.00	20.0	126.70	68.43	195.14	97.57	332.00
42.00	20.0	131.26	73.26	204.52	102.26	351.03

43.00	20.0	138.31	75.69	214.01	107.00	365.40
44.00	20.0	143.38	75.97	219.35	109.67	371.29
45.00	20.0	148.13	76.85	224.98	112.49	378.67
46.00	20.0	152.68	78.28	230.96	115.48	387.51
47.00	20.0	157.12	80.21	237.33	118.67	397.75
48.00	20.0	161.53	82.59	244.12	122.06	409.30
49.00	20.0	165.94	85.43	251.36	125.68	422.22
50.00	20.0	170.34	88.90	259.23	129.62	437.03
51.00	20.0	174.73	93.19	267.92	133.96	454.30
52.00	20.0	179.16	98.45	277.61	138.81	474.52
53.00	20.0	184.11	102.43	286.54	143.27	491.41
54.00	20.0	189.34	105.23	294.57	147.29	505.03
55.00	20.0	194.58	108.23	302.81	151.40	519.26
56.00	20.0	199.82	111.07	310.89	155.44	533.03
57.00	20.0	205.05	111.16	316.21	158.11	538.54
58.00	20.0	216.79	111.28	328.07	164.04	550.63
59.00	20.0	221.86	111.49	333.34	166.67	556.32
60.00	20.0	226.94	111.69	338.62	169.31	561.99
61.00	20.0	232.21	110.81	343.02	171.51	564.64
62.00	20.0	237.45	107.51	344.97	172.48	559.99
63.00	20.0	242.77	104.45	347.22	173.61	556.13
64.00	20.0	248.09	102.40	350.50	175.25	555.30
65.00	20.0	253.42	102.08	355.49	177.75	559.64
66.00	20.0	258.59	102.42	361.01	180.51	565.86
67.00	20.0	263.46	103.68	367.14	183.57	574.50
68.00	20.0	268.08	105.66	373.74	186.87	585.06
69.00	20.0	272.83	107.24	380.08	190.04	594.56
70.00	20.0	277.79	108.24	386.03	193.01	602.50
71.00	20.0	283.02	108.25	391.27	195.63	607.76
72.00	20.0	288.22	108.33	396.55	198.27	613.21
73.00	20.0	293.39	108.49	401.88	200.94	618.86
74.00	20.0	298.55	108.71	407.26	203.63	624.68
75.00	20.0	303.73	108.91	412.64	206.32	630.47
76.00	20.0	308.94	109.04	417.97	208.99	636.05
77.00	20.0	314.17	109.11	423.28	211.64	641.51
78.00	20.0	319.41	109.17	428.58	214.29	646.93
79.00	20.0	324.62	109.36	433.97	216.99	652.69
80.00	20.0	329.68	110.22	439.90	219.95	660.35
81.00	20.0	334.91	111.66	446.57	223.28	669.88
82.00	20.0	340.15	113.04	453.19	226.59	679.26
83.00	20.0	345.38	113.97	459.35	229.67	687.28
84.00	20.0	350.62	114.17	464.79	232.40	693.14
85.00	20.0	355.86	114.17	470.03	235.01	698.38
86.00	20.0	361.09	114.17	475.27	237.63	703.61
87.00	20.0	366.33	114.17	480.50	240.25	708.85
88.00	20.0	371.56	114.17	485.74	242.87	714.08
89.00	20.0	376.80	114.17	490.97	245.49	719.32
90.00	20.0	382.04	114.17	496.21	248.10	724.56
91.00	20.0	387.27	114.17	501.45	250.72	729.79
92.00	20.0	392.51	114.17	506.68	253.34	735.03
93.00	20.0	397.74	114.17	511.92	255.96	740.26
94.00	20.0	402.98	114.17	517.15	258.58	745.50
95.00	20.0 Soil Elevations Must Extend At or Below Contribution Zone					
96.00	20.0 Soil Elevations Must Extend At or Below Contribution Zone					
97.00	20.0 Soil Elevations Must Extend At or Below Contribution Zone					
98.00	20.0 Soil Elevations Must Extend At or Below Contribution Zone					
99.00	20.0 Soil Elevations Must Extend At or Below Contribution Zone					
100.00	20.0 Soil Elevations Must Extend At or Below Contribution Zone					

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.

Date: September 23, 2021
Time: 18:51:17

General Information:
==========
Input file: .....ming - Original FB Deep Runs\PIpe Pile\BB-04_PSCP_REV_PIPE.spc
Project number: B-19-051
Job name: THEA Whiting Street
Engineer: Kirk M. Eastman
Units: English

Analysis Information:
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Analysis Type: SPT

Soil Information:
==========
Boring date: 6/22/21, Boring Number: BB-04
Station number: 206+48 Offset: 24 LT

Ground Elevation: 16.100(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	5.00	5- Cavity layer
3	4.00	5.00	5- Cavity layer
4	6.00	4.00	5- Cavity layer
5	8.00	6.00	5- Cavity layer
6	10.00	9.00	5- Cavity layer
7	10.00	0.00	1- Plastic Clay
8	10.00	13.00	2- Clay and silty sand
9	12.00	13.00	2- Clay and silty sand
10	14.00	17.00	2- Clay and silty sand
11	16.00	17.00	2- Clay and silty sand
12	18.00	8.00	2- Clay and silty sand
13	20.00	12.00	2- Clay and silty sand
14	22.50	12.00	2- Clay and silty sand
15	22.50	0.00	1- Plastic Clay
16	22.50	0.00	5- Cavity layer
17	25.00	0.00	5- Cavity layer
18	27.50	0.00	5- Cavity layer
19	30.00	0.00	5- Cavity layer
20	30.00	0.00	2- Clay and silty sand
21	30.00	18.00	1- Plastic Clay
22	32.50	18.00	1- Plastic Clay
23	32.50	0.00	2- Clay and silty sand
24	32.50	100.00	1- Plastic Clay
25	35.00	100.00	1- Plastic Clay
26	35.00	0.00	2- Clay and silty sand
27	35.00	100.00	4- Lime Stone/Very shelly sand
28	37.50	100.00	4- Lime Stone/Very shelly sand
29	37.50	0.00	1- Plastic Clay
30	37.50	100.00	2- Clay and silty sand
31	40.00	100.00	2- Clay and silty sand
32	40.00	0.00	1- Plastic Clay
33	40.00	100.00	4- Lime Stone/Very shelly sand
34	42.50	100.00	4- Lime Stone/Very shelly sand
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	2- Clay and silty sand
38	47.50	52.00	1- Plastic Clay

39	50.00	52.00	1- Plastic Clay
40	50.00	0.00	2- Clay and silty sand
41	50.00	100.00	4- Lime Stone/Very shelly sand
42	52.50	100.00	4- Lime Stone/Very shelly sand
43	55.00	100.00	4- Lime Stone/Very shelly sand
44	55.00	0.00	2- Clay and silty sand
45	55.00	100.00	1- Plastic Clay
46	57.50	100.00	1- Plastic Clay
47	60.00	100.00	1- Plastic Clay
48	62.50	100.00	1- Plastic Clay
49	62.50	0.00	2- Clay and silty sand
50	62.50	100.00	4- Lime Stone/Very shelly sand
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	75.00	100.00	4- Lime Stone/Very shelly sand
56	77.50	100.00	4- Lime Stone/Very shelly sand
57	80.00	100.00	4- Lime Stone/Very shelly sand
58	82.50	100.00	4- Lime Stone/Very shelly sand
59	85.00	100.00	4- Lime Stone/Very shelly sand
60	87.50	100.00	4- Lime Stone/Very shelly sand
61	90.00	100.00	4- Lime Stone/Very shelly sand
62	92.50	100.00	4- Lime Stone/Very shelly sand
63	92.50	0.00	1- Plastic Clay
64	92.50	66.00	4- Lime Stone/Very shelly sand
65	95.00	66.00	4- Lime Stone/Very shelly sand
66	95.00	0.00	1- Plastic Clay
67	95.00	100.00	4- Lime Stone/Very shelly sand
68	97.50	100.00	4- Lime Stone/Very shelly sand
69	100.00	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	16.10	6.10	10.00	4.00	5-Void
2	6.10	6.10	0.00	13.00	1-Plastic Clay
3	6.10	-6.40	12.50	13.28	2-Clay and Silty Sand
4	-6.40	-6.40	0.00	0.00	1-Plastic Clay
5	-6.40	-13.90	7.50	0.00	5-Void
6	-13.90	-13.90	0.00	18.00	2-Clay and Silty Sand
7	-13.90	-16.40	2.50	18.00	1-Plastic Clay
8	-16.40	-16.40	0.00	100.00	2-Clay and Silty Sand
9	-16.40	-18.90	2.50	100.00	1-Plastic Clay
10	-18.90	-18.90	0.00	100.00	2-Clay and Silty Sand
11	-18.90	-21.40	2.50	100.00	4-Limestone, Very Shelly Sand
12	-21.40	-21.40	0.00	100.00	1-Plastic Clay
13	-21.40	-23.90	2.50	100.00	2-Clay and Silty Sand
14	-23.90	-23.90	0.00	100.00	1-Plastic Clay
15	-23.90	-31.40	7.50	100.00	4-Limestone, Very Shelly Sand
16	-31.40	-31.40	0.00	52.00	2-Clay and Silty Sand
17	-31.40	-33.90	2.50	52.00	1-Plastic Clay
18	-33.90	-33.90	0.00	100.00	2-Clay and Silty Sand
19	-33.90	-38.90	5.00	100.00	4-Limestone, Very Shelly Sand
20	-38.90	-38.90	0.00	100.00	2-Clay and Silty Sand
21	-38.90	-46.40	7.50	100.00	1-Plastic Clay
22	-46.40	-46.40	0.00	100.00	2-Clay and Silty Sand
23	-46.40	-76.40	30.00	100.00	4-Limestone, Very Shelly Sand
24	-76.40	-76.40	0.00	66.00	1-Plastic Clay
25	-76.40	-78.90	2.50	66.00	4-Limestone, Very Shelly Sand
26	-78.90	-78.90	0.00	100.00	1-Plastic Clay
27	-78.90	-83.90	5.00	100.00	4-Limestone, Very Shelly Sand

Driven Pile Data:
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Pile unit weight = 490.00(pcf), Section Type: Pipe

Pile Geometry:

Width (in)	Length (ft)	Tip Elev. (ft)	Thickness (in)	Pile End
20.00	10.00	6.10	0.50	OPEN
20.00	11.00	5.10	0.50	OPEN
20.00	12.00	4.10	0.50	OPEN
20.00	13.00	3.10	0.50	OPEN
20.00	14.00	2.10	0.50	OPEN
20.00	15.00	1.10	0.50	OPEN
20.00	16.00	0.10	0.50	OPEN
20.00	17.00	-0.90	0.50	OPEN
20.00	18.00	-1.90	0.50	OPEN
20.00	19.00	-2.90	0.50	OPEN
20.00	20.00	-3.90	0.50	OPEN
20.00	21.00	-4.90	0.50	OPEN
20.00	22.00	-5.90	0.50	OPEN
20.00	23.00	-6.90	0.50	OPEN
20.00	24.00	-7.90	0.50	OPEN
20.00	25.00	-8.90	0.50	OPEN
20.00	26.00	-9.90	0.50	OPEN
20.00	27.00	-10.90	0.50	OPEN
20.00	28.00	-11.90	0.50	OPEN
20.00	29.00	-12.90	0.50	OPEN
20.00	30.00	-13.90	0.50	OPEN
20.00	31.00	-14.90	0.50	OPEN
20.00	32.00	-15.90	0.50	OPEN
20.00	33.00	-16.90	0.50	OPEN
20.00	34.00	-17.90	0.50	OPEN
20.00	35.00	-18.90	0.50	OPEN
20.00	36.00	-19.90	0.50	OPEN
20.00	37.00	-20.90	0.50	OPEN
20.00	38.00	-21.90	0.50	OPEN
20.00	39.00	-22.90	0.50	OPEN
20.00	40.00	-23.90	0.50	OPEN
20.00	41.00	-24.90	0.50	OPEN
20.00	42.00	-25.90	0.50	OPEN
20.00	43.00	-26.90	0.50	OPEN
20.00	44.00	-27.90	0.50	OPEN
20.00	45.00	-28.90	0.50	OPEN
20.00	46.00	-29.90	0.50	OPEN
20.00	47.00	-30.90	0.50	OPEN
20.00	48.00	-31.90	0.50	OPEN
20.00	49.00	-32.90	0.50	OPEN
20.00	50.00	-33.90	0.50	OPEN
20.00	51.00	-34.90	0.50	OPEN
20.00	52.00	-35.90	0.50	OPEN
20.00	53.00	-36.90	0.50	OPEN
20.00	54.00	-37.90	0.50	OPEN
20.00	55.00	-38.90	0.50	OPEN
20.00	56.00	-39.90	0.50	OPEN
20.00	57.00	-40.90	0.50	OPEN
20.00	58.00	-41.90	0.50	OPEN
20.00	59.00	-42.90	0.50	OPEN
20.00	60.00	-43.90	0.50	OPEN
20.00	61.00	-44.90	0.50	OPEN
20.00	62.00	-45.90	0.50	OPEN
20.00	63.00	-46.90	0.50	OPEN
20.00	64.00	-47.90	0.50	OPEN
20.00	65.00	-48.90	0.50	OPEN
20.00	66.00	-49.90	0.50	OPEN
20.00	67.00	-50.90	0.50	OPEN
20.00	68.00	-51.90	0.50	OPEN

20.00	69.00	-52.90	0.50	OPEN
20.00	70.00	-53.90	0.50	OPEN
20.00	71.00	-54.90	0.50	OPEN
20.00	72.00	-55.90	0.50	OPEN
20.00	73.00	-56.90	0.50	OPEN
20.00	74.00	-57.90	0.50	OPEN
20.00	75.00	-58.90	0.50	OPEN
20.00	76.00	-59.90	0.50	OPEN
20.00	77.00	-60.90	0.50	OPEN
20.00	78.00	-61.90	0.50	OPEN
20.00	79.00	-62.90	0.50	OPEN
20.00	80.00	-63.90	0.50	OPEN
20.00	81.00	-64.90	0.50	OPEN
20.00	82.00	-65.90	0.50	OPEN
20.00	83.00	-66.90	0.50	OPEN
20.00	84.00	-67.90	0.50	OPEN
20.00	85.00	-68.90	0.50	OPEN
20.00	86.00	-69.90	0.50	OPEN
20.00	87.00	-70.90	0.50	OPEN
20.00	88.00	-71.90	0.50	OPEN
20.00	89.00	-72.90	0.50	OPEN
20.00	90.00	-73.90	0.50	OPEN
20.00	91.00	-74.90	0.50	OPEN
20.00	92.00	-75.90	0.50	OPEN
20.00	93.00	-76.90	0.50	OPEN
20.00	94.00	-77.90	0.50	OPEN
20.00	95.00	-78.90	0.50	OPEN
20.00	96.00	-79.90	0.50	OPEN
20.00	97.00	-80.90	0.50	OPEN
20.00	98.00	-81.90	0.50	OPEN
20.00	99.00	-82.90	0.50	OPEN
20.00	100.00	-83.90	0.50	OPEN

Driven Pile Capacity:
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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	20.0	0.00	1.05	1.05	0.53	3.15
11.00	20.0	5.09	1.07	6.16	3.08	8.30
12.00	20.0	9.94	1.10	11.04	5.52	13.24
13.00	20.0	15.28	1.12	16.40	8.20	18.65
14.00	20.0	20.99	1.15	22.14	11.07	24.45
15.00	20.0	13.75	12.34	26.08	13.04	50.75
16.00	20.0	16.78	12.92	29.70	14.85	55.53
17.00	20.0	19.62	13.12	32.74	16.37	58.97
18.00	20.0	22.06	12.41	34.46	17.23	59.27
19.00	20.0	24.34	11.78	36.12	18.06	59.68
20.00	20.0	26.92	11.01	37.94	18.97	59.97
21.00	20.0	29.66	10.18	39.84	19.92	60.20
22.00	20.0	32.39	9.34	41.74	20.87	60.43
23.00	20.0	35.63	0.00	35.63	17.82	35.63
24.00	20.0	35.63	0.00	35.63	17.82	35.63
25.00	20.0	35.63	0.00	35.63	17.82	35.63
26.00	20.0	35.63	0.00	35.63	17.82	35.63
27.00	20.0	35.63	0.00	35.63	17.82	35.63
28.00	20.0	35.63	0.00	35.63	17.82	35.63
29.00	20.0	35.63	0.00	35.63	17.82	35.63
30.00	20.0	35.63	25.00	60.63	30.31	110.62
31.00	20.0	38.81	27.58	66.39	33.19	121.54
32.00	20.0	41.41	35.46	76.87	38.44	147.79
33.00	20.0	49.24	47.40	96.63	48.32	191.43
34.00	20.0	55.30	51.53	106.83	53.42	209.90

35.00	20.0	64.24	63.93	128.17	64.09	256.04
36.00	20.0	69.20	64.31	133.51	66.75	262.12
37.00	20.0	73.66	65.54	139.20	69.60	270.27
38.00	20.0	79.92	74.25	154.18	77.09	302.68
39.00	20.0	84.77	75.51	160.27	80.14	311.28
40.00	20.0	90.64	84.54	175.18	87.59	344.25
41.00	20.0	95.64	84.96	180.61	90.30	350.54
42.00	20.0	100.47	85.78	186.25	93.13	357.82
43.00	20.0	105.81	85.60	191.42	95.71	362.62
44.00	20.0	111.48	84.77	196.24	98.12	365.77
45.00	20.0	116.09	86.17	202.26	101.13	374.60
46.00	20.0	120.41	88.66	209.07	104.53	386.39
47.00	20.0	124.95	91.01	215.96	107.98	397.97
48.00	20.0	133.02	95.44	228.47	114.23	419.35
49.00	20.0	138.96	98.51	237.47	118.73	434.48
50.00	20.0	145.94	102.23	248.18	124.09	452.64
51.00	20.0	151.18	96.80	247.97	123.99	441.57
52.00	20.0	156.41	91.29	247.71	123.85	430.29
53.00	20.0	161.65	85.79	247.44	123.72	419.01
54.00	20.0	166.89	80.34	247.22	123.61	407.90
55.00	20.0	172.12	74.91	247.04	123.52	396.86
56.00	20.0	179.51	72.54	252.05	126.02	397.13
57.00	20.0	186.89	71.98	258.87	129.43	402.82
58.00	20.0	194.26	75.01	269.27	134.64	419.30
59.00	20.0	201.48	78.08	279.55	139.78	435.71
60.00	20.0	208.86	81.13	289.99	144.99	452.24
61.00	20.0	216.25	84.69	300.93	150.47	470.31
62.00	20.0	223.63	90.79	314.42	157.21	495.99
63.00	20.0	230.08	93.91	324.00	162.00	511.83
64.00	20.0	235.17	94.22	329.39	164.69	517.83
65.00	20.0	240.30	94.47	334.77	167.38	523.71
66.00	20.0	245.43	94.73	340.16	170.08	529.62
67.00	20.0	250.59	94.98	345.57	172.78	535.53
68.00	20.0	255.75	95.24	350.99	175.50	541.46
69.00	20.0	260.57	96.52	357.09	178.55	550.13
70.00	20.0	265.19	98.71	363.90	181.95	561.32
71.00	20.0	269.80	101.38	371.18	185.59	573.93
72.00	20.0	274.46	104.52	378.97	189.49	588.01
73.00	20.0	279.42	107.45	386.87	193.44	601.78
74.00	20.0	284.66	109.82	394.48	197.24	614.13
75.00	20.0	289.90	112.20	402.09	201.05	626.49
76.00	20.0	295.13	114.17	409.31	204.65	637.65
77.00	20.0	300.37	114.17	414.54	207.27	642.89
78.00	20.0	305.60	114.17	419.78	209.89	648.13
79.00	20.0	310.84	114.17	425.01	212.51	653.36
80.00	20.0	316.08	114.17	430.25	215.12	658.60
81.00	20.0	321.31	114.17	435.49	217.74	663.83
82.00	20.0	326.55	114.17	440.72	220.36	669.07
83.00	20.0	331.78	114.17	445.96	222.98	674.31
84.00	20.0	337.02	114.17	451.19	225.60	679.54
85.00	20.0	342.26	114.17	456.43	228.21	684.78
86.00	20.0	347.49	114.17	461.67	230.83	690.01
87.00	20.0	352.73	113.91	466.64	233.32	694.46
88.00	20.0	357.96	113.12	471.08	235.54	697.32
89.00	20.0	363.20	112.32	475.52	237.76	700.17
90.00	20.0	368.44	112.19	480.63	240.31	705.01
91.00	20.0	373.67	112.19	485.86	242.93	710.25
92.00	20.0	378.91	112.19	491.10	245.55	715.49
93.00	20.0	386.73	112.20	498.93	249.46	723.34
94.00	20.0	390.98	112.29	503.27	251.64	727.86
95.00	20.0	Soil Elevations Must Extend At or Below Contribution Zone				
96.00	20.0	Soil Elevations Must Extend At or Below Contribution Zone				
97.00	20.0	Soil Elevations Must Extend At or Below Contribution Zone				
98.00	20.0	Soil Elevations Must Extend At or Below Contribution Zone				
99.00	20.0	Soil Elevations Must Extend At or Below Contribution Zone				
100.00	20.0	Soil Elevations Must Extend At or Below Contribution Zone				

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.

Date: September 23, 2021
Time: 18:34:05

General Information:
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Input file: .....Preforming - Original FB Deep Runs\H-pile\BB-01_PSCP_REV_H.spc
Project number: B-19-051
Job name: THEA Whiting Street
Engineer: Kirk M. Eastman
Units: English

Analysis Information:
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Analysis Type: SPT

Soil Information:
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Boring date: 6/9/21, Boring Number: BB-01
Station number: 105+72 Offset: 8 LT

Ground Elevation: 15.300(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	5.00	5- Cavity layer
3	4.00	5.00	5- Cavity layer
4	6.00	10.00	5- Cavity layer
5	8.00	10.00	5- Cavity layer
6	10.00	12.00	5- Cavity layer
7	10.00	0.00	1- Plastic Clay
8	10.00	27.00	3- Clean sand
9	12.00	27.00	3- Clean sand
10	14.00	26.00	3- Clean sand
11	14.00	0.00	1- Plastic Clay
12	14.00	16.00	3- Clean sand
13	16.00	16.00	3- Clean sand
14	18.00	14.00	3- Clean sand
15	18.00	0.00	1- Plastic Clay
16	18.00	9.00	2- Clay and silty sand
17	20.00	9.00	2- Clay and silty sand
18	22.50	7.00	2- Clay and silty sand
19	22.50	0.00	1- Plastic Clay
20	22.50	100.00	4- Lime Stone/Very shelly sand
21	25.00	100.00	4- Lime Stone/Very shelly sand
22	27.50	100.00	4- Lime Stone/Very shelly sand
23	30.00	100.00	4- Lime Stone/Very shelly sand
24	32.50	100.00	4- Lime Stone/Very shelly sand
25	32.50	0.00	1- Plastic Clay
26	32.50	40.00	3- Clean sand
27	35.00	40.00	3- Clean sand
28	37.50	47.00	3- Clean sand
29	37.50	0.00	1- Plastic Clay
30	37.50	100.00	4- Lime Stone/Very shelly sand
31	40.00	100.00	4- Lime Stone/Very shelly sand
32	42.50	100.00	4- Lime Stone/Very shelly sand
33	45.00	100.00	4- Lime Stone/Very shelly sand
34	47.50	100.00	4- Lime Stone/Very shelly sand
35	47.50	0.00	1- Plastic Clay
36	47.50	20.00	3- Clean sand
37	50.00	20.00	3- Clean sand
38	50.00	0.00	2- Clay and silty sand

39	50.00	30.00	1- Plastic Clay
40	52.50	30.00	1- Plastic Clay
41	55.00	45.00	1- Plastic Clay
42	57.50	48.00	1- Plastic Clay
43	57.50	0.00	2- Clay and silty sand
44	57.50	15.00	3- Clean sand
45	60.00	15.00	3- Clean sand
46	60.00	0.00	1- Plastic Clay
47	60.00	100.00	4- Lime Stone/Very shelly sand
48	62.50	100.00	4- Lime Stone/Very shelly sand
49	65.00	100.00	4- Lime Stone/Very shelly sand
50	67.50	100.00	4- Lime Stone/Very shelly sand
51	70.00	100.00	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	100.00	4- Lime Stone/Very shelly sand
56	82.50	100.00	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	92.50	100.00	4- Lime Stone/Very shelly sand
61	95.00	100.00	4- Lime Stone/Very shelly sand
62	97.50	100.00	4- Lime Stone/Very shelly sand
63	100.00	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	15.30	5.30	10.00	6.00	5-Void
2	5.30	5.30	0.00	27.00	1-Plastic Clay
3	5.30	1.30	4.00	27.00	3-Clean Sand
4	1.30	1.30	0.00	16.00	1-Plastic Clay
5	1.30	-2.70	4.00	16.00	3-Clean Sand
6	-2.70	-2.70	0.00	9.00	1-Plastic Clay
7	-2.70	-7.20	4.50	9.00	2-Clay and Silty Sand
8	-7.20	-7.20	0.00	100.00	1-Plastic Clay
9	-7.20	-17.20	10.00	100.00	4-Limestone, Very Shelly Sand
10	-17.20	-17.20	0.00	40.00	1-Plastic Clay
11	-17.20	-22.20	5.00	40.00	3-Clean Sand
12	-22.20	-22.20	0.00	100.00	1-Plastic Clay
13	-22.20	-32.20	10.00	100.00	4-Limestone, Very Shelly Sand
14	-32.20	-32.20	0.00	20.00	1-Plastic Clay
15	-32.20	-34.70	2.50	20.00	3-Clean Sand
16	-34.70	-34.70	0.00	30.00	2-Clay and Silty Sand
17	-34.70	-42.20	7.50	35.00	1-Plastic Clay
18	-42.20	-42.20	0.00	15.00	2-Clay and Silty Sand
19	-42.20	-44.70	2.50	15.00	3-Clean Sand
20	-44.70	-44.70	0.00	100.00	1-Plastic Clay
21	-44.70	-84.70	40.00	100.00	4-Limestone, Very Shelly Sand

Driven Pile Data:

Pile unit weight = 490.00(pcf), Section Type: H-Section

Pile Geometry:

Width (in)	Length (ft)	Tip Elev. (ft)	Depth (in)
14.69	10.00	5.30	13.83
14.69	11.00	4.30	13.83

14.69	12.00	3.30	13.83
14.69	13.00	2.30	13.83
14.69	14.00	1.30	13.83
14.69	15.00	0.30	13.83
14.69	16.00	-0.70	13.83
14.69	17.00	-1.70	13.83
14.69	18.00	-2.70	13.83
14.69	19.00	-3.70	13.83
14.69	20.00	-4.70	13.83
14.69	21.00	-5.70	13.83
14.69	22.00	-6.70	13.83
14.69	23.00	-7.70	13.83
14.69	24.00	-8.70	13.83
14.69	25.00	-9.70	13.83
14.69	26.00	-10.70	13.83
14.69	27.00	-11.70	13.83
14.69	28.00	-12.70	13.83
14.69	29.00	-13.70	13.83
14.69	30.00	-14.70	13.83
14.69	31.00	-15.70	13.83
14.69	32.00	-16.70	13.83
14.69	33.00	-17.70	13.83
14.69	34.00	-18.70	13.83
14.69	35.00	-19.70	13.83
14.69	36.00	-20.70	13.83
14.69	37.00	-21.70	13.83
14.69	38.00	-22.70	13.83
14.69	39.00	-23.70	13.83
14.69	40.00	-24.70	13.83
14.69	41.00	-25.70	13.83
14.69	42.00	-26.70	13.83
14.69	43.00	-27.70	13.83
14.69	44.00	-28.70	13.83
14.69	45.00	-29.70	13.83
14.69	46.00	-30.70	13.83
14.69	47.00	-31.70	13.83
14.69	48.00	-32.70	13.83
14.69	49.00	-33.70	13.83
14.69	50.00	-34.70	13.83
14.69	51.00	-35.70	13.83
14.69	52.00	-36.70	13.83
14.69	53.00	-37.70	13.83
14.69	54.00	-38.70	13.83
14.69	55.00	-39.70	13.83
14.69	56.00	-40.70	13.83
14.69	57.00	-41.70	13.83
14.69	58.00	-42.70	13.83
14.69	59.00	-43.70	13.83
14.69	60.00	-44.70	13.83
14.69	61.00	-45.70	13.83
14.69	62.00	-46.70	13.83
14.69	63.00	-47.70	13.83
14.69	64.00	-48.70	13.83
14.69	65.00	-49.70	13.83
14.69	66.00	-50.70	13.83
14.69	67.00	-51.70	13.83
14.69	68.00	-52.70	13.83
14.69	69.00	-53.70	13.83
14.69	70.00	-54.70	13.83
14.69	71.00	-55.70	13.83
14.69	72.00	-56.70	13.83
14.69	73.00	-57.70	13.83
14.69	74.00	-58.70	13.83
14.69	75.00	-59.70	13.83
14.69	76.00	-60.70	13.83
14.69	77.00	-61.70	13.83
14.69	78.00	-62.70	13.83
14.69	79.00	-63.70	13.83
14.69	80.00	-64.70	13.83

14.69	81.00	-65.70	13.83
14.69	82.00	-66.70	13.83
14.69	83.00	-67.70	13.83
14.69	84.00	-68.70	13.83
14.69	85.00	-69.70	13.83
14.69	86.00	-70.70	13.83
14.69	87.00	-71.70	13.83
14.69	88.00	-72.70	13.83
14.69	89.00	-73.70	13.83
14.69	90.00	-74.70	13.83
14.69	91.00	-75.70	13.83
14.69	92.00	-76.70	13.83
14.69	93.00	-77.70	13.83
14.69	94.00	-78.70	13.83
14.69	95.00	-79.70	13.83
14.69	96.00	-80.70	13.83
14.69	97.00	-81.70	13.83
14.69	98.00	-82.70	13.83
14.69	99.00	-83.70	13.83
14.69	100.00	-84.70	13.83

Driven Pile Capacity:
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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	14.7	0.00	23.13	23.13	11.56	46.25
11.00	14.7	2.24	21.03	23.27	11.64	44.30
12.00	14.7	4.48	18.86	23.34	11.67	42.20
13.00	14.7	6.70	16.54	23.25	11.62	39.79
14.00	14.7	8.88	12.58	21.47	10.73	34.05
15.00	14.7	10.21	10.39	20.61	10.30	31.00
16.00	14.7	11.54	8.17	19.71	9.86	27.88
17.00	14.7	12.83	5.97	18.80	9.40	24.77
18.00	14.7	14.03	10.51	24.54	12.27	45.55
19.00	14.7	14.82	13.86	28.68	14.34	56.40
20.00	14.7	15.42	23.92	39.34	19.67	87.19
21.00	14.7	16.24	40.72	56.96	28.48	138.40
22.00	14.7	17.31	64.30	81.61	40.80	210.20
23.00	14.7	23.70	84.68	108.38	54.19	193.06
24.00	14.7	28.25	84.68	112.93	56.46	197.61
25.00	14.7	32.79	84.68	117.47	58.74	202.15
26.00	14.7	37.34	84.68	122.02	61.01	206.70
27.00	14.7	41.88	84.68	126.56	63.28	211.24
28.00	14.7	46.42	80.83	127.25	63.63	208.08
29.00	14.7	50.97	71.16	122.13	61.07	193.30
30.00	14.7	55.51	61.50	117.01	58.50	178.51
31.00	14.7	60.05	52.05	112.10	56.05	164.15
32.00	14.7	64.60	43.13	107.73	53.86	150.86
33.00	14.7	68.38	39.00	107.38	53.69	146.39
34.00	14.7	70.62	40.26	110.89	55.44	151.15
35.00	14.7	72.33	42.84	115.16	57.58	158.00
36.00	14.7	73.88	46.66	120.55	60.27	167.21
37.00	14.7	75.54	51.60	127.14	63.57	178.74
38.00	14.7	86.48	84.68	171.16	85.58	255.84
39.00	14.7	91.02	84.68	175.70	87.85	260.38
40.00	14.7	95.56	84.68	180.24	90.12	264.92
41.00	14.7	100.11	84.68	184.79	92.39	269.47
42.00	14.7	104.65	84.68	189.33	94.67	274.01
43.00	14.7	109.19	79.31	188.51	94.25	267.82
44.00	14.7	113.74	65.84	179.57	89.79	245.41
45.00	14.7	118.28	52.36	170.64	85.32	223.00
46.00	14.7	122.83	36.58	159.41	79.70	195.99

47.00	14.7	127.37	20.54	147.92	73.96	168.46
48.00	14.7	130.47	11.27	141.74	70.87	153.00
49.00	14.7	132.13	8.93	141.06	70.53	149.99
50.00	14.7	133.79	6.84	140.64	70.32	154.33
51.00	14.7	139.45	7.11	146.55	73.28	160.77
52.00	14.7	144.76	7.94	152.69	76.35	168.57
53.00	14.7	152.04	9.24	161.27	80.64	179.74
54.00	14.7	158.39	10.59	168.98	84.49	190.17
55.00	14.7	165.02	11.70	176.72	88.36	200.13
56.00	14.7	171.79	25.62	197.41	98.71	248.65
57.00	14.7	178.54	40.96	219.50	109.75	301.41
58.00	14.7	182.46	48.93	231.39	115.70	280.32
59.00	14.7	183.24	51.55	234.80	117.40	286.35
60.00	14.7	185.03	84.68	269.71	134.85	354.39
61.00	14.7	189.57	84.68	274.25	137.12	358.93
62.00	14.7	194.11	84.68	278.79	139.40	363.47
63.00	14.7	198.66	84.68	283.34	141.67	368.02
64.00	14.7	203.20	84.68	287.88	143.94	372.56
65.00	14.7	207.75	84.68	292.42	146.21	377.10
66.00	14.7	212.29	84.68	296.97	148.48	381.65
67.00	14.7	216.83	84.68	301.51	150.76	386.19
68.00	14.7	221.38	84.68	306.06	153.03	390.74
69.00	14.7	225.92	84.68	310.60	155.30	395.28
70.00	14.7	230.46	84.68	315.14	157.57	399.82
71.00	14.7	235.01	84.68	319.69	159.84	404.37
72.00	14.7	239.55	84.68	324.23	162.12	408.91
73.00	14.7	244.10	84.68	328.78	164.39	413.46
74.00	14.7	248.64	84.68	333.32	166.66	418.00
75.00	14.7	253.18	84.68	337.86	168.93	422.54
76.00	14.7	257.73	84.68	342.41	171.20	427.09
77.00	14.7	262.27	84.68	346.95	173.48	431.63
78.00	14.7	266.82	84.68	351.50	175.75	436.17
79.00	14.7	271.36	84.68	356.04	178.02	440.72
80.00	14.7	275.90	84.68	360.58	180.29	445.26
81.00	14.7	280.45	84.68	365.13	182.56	449.81
82.00	14.7	284.99	84.68	369.67	184.84	454.35
83.00	14.7	289.53	84.68	374.21	187.11	458.89
84.00	14.7	294.08	84.68	378.76	189.38	463.44
85.00	14.7	298.62	84.68	383.30	191.65	467.98
86.00	14.7	303.17	84.68	387.85	193.92	472.53
87.00	14.7	307.71	84.68	392.39	196.19	477.07
88.00	14.7	312.25	84.68	396.93	198.47	481.61
89.00	14.7	316.80	84.68	401.48	200.74	486.16
90.00	14.7	321.34	84.68	406.02	203.01	490.70
91.00	14.7	325.89	84.68	410.57	205.28	495.25
92.00	14.7	330.43	84.68	415.11	207.55	499.79
93.00	14.7	334.97	84.68	419.65	209.83	504.33
94.00	14.7	339.52	84.68	424.20	212.10	508.88
95.00	14.7	344.06	84.68	428.74	214.37	513.42
96.00	14.7 Soil Elevations Must Extend At or Below Contribution Zone					
97.00	14.7 Soil Elevations Must Extend At or Below Contribution Zone					
98.00	14.7 Soil Elevations Must Extend At or Below Contribution Zone					
99.00	14.7 Soil Elevations Must Extend At or Below Contribution Zone					
100.00	14.7 Soil Elevations Must Extend At or Below Contribution Zone					

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.

Date: September 23, 2021
Time: 18:35:42

General Information:
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Input file: .....Preforming - Original FB Deep Runs\H-pile\BB-02_PSCP_REV_H.spc
Project number: B-19-051
Job name: THEA Whiting Street
Engineer: Kirk M. Eastman
Units: English

Analysis Information:
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Analysis Type: SPT

Soil Information:
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Boring date: 7/1/21, Boring Number: BB-02
Station number: 107+56 Offset: 12 LT

Ground Elevation: 16.600(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	5.00	5- Cavity layer
3	4.00	5.00	5- Cavity layer
4	6.00	13.00	5- Cavity layer
5	8.00	18.00	5- Cavity layer
6	10.00	17.00	5- Cavity layer
7	10.00	0.00	1- Plastic Clay
8	10.00	13.00	3- Clean sand
9	12.00	13.00	3- Clean sand
10	14.00	11.00	3- Clean sand
11	16.00	10.00	3- Clean sand
12	16.00	0.00	1- Plastic Clay
13	16.00	100.00	4- Lime Stone/Very shelly sand
14	18.00	100.00	4- Lime Stone/Very shelly sand
15	20.00	100.00	4- Lime Stone/Very shelly sand
16	20.00	0.00	1- Plastic Clay
17	20.00	60.00	4- Lime Stone/Very shelly sand
18	22.50	60.00	4- Lime Stone/Very shelly sand
19	25.00	67.00	4- Lime Stone/Very shelly sand
20	25.00	0.00	1- Plastic Clay
21	25.00	32.00	3- Clean sand
22	27.50	32.00	3- Clean sand
23	30.00	36.00	3- Clean sand
24	30.00	0.00	1- Plastic Clay
25	30.00	100.00	4- Lime Stone/Very shelly sand
26	32.50	100.00	4- Lime Stone/Very shelly sand
27	35.00	100.00	4- Lime Stone/Very shelly sand
28	35.00	0.00	2- Clay and silty sand
29	35.00	31.00	1- Plastic Clay
30	37.50	31.00	1- Plastic Clay
31	40.00	37.00	1- Plastic Clay
32	40.00	0.00	2- Clay and silty sand
33	40.00	100.00	4- Lime Stone/Very shelly sand
34	42.50	100.00	4- Lime Stone/Very shelly sand
35	45.00	100.00	4- Lime Stone/Very shelly sand
36	47.50	63.00	4- Lime Stone/Very shelly sand
37	50.00	68.00	4- Lime Stone/Very shelly sand
38	50.00	0.00	2- Clay and silty sand

39	50.00	100.00	1- Plastic Clay
40	52.50	100.00	1- Plastic Clay
41	55.00	100.00	1- Plastic Clay
42	55.00	0.00	3- Clean sand
43	55.00	100.00	4- Lime Stone/Very shelly sand
44	57.50	100.00	4- Lime Stone/Very shelly sand
45	57.50	0.00	1- Plastic Clay
46	57.50	100.00	2- Clay and silty sand
47	60.00	100.00	2- Clay and silty sand
48	60.00	0.00	1- Plastic Clay
49	60.00	54.00	4- Lime Stone/Very shelly sand
50	62.50	54.00	4- Lime Stone/Very shelly sand
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	2- Clay and silty sand
56	72.50	54.00	1- Plastic Clay
57	75.00	54.00	1- Plastic Clay
58	75.00	0.00	2- Clay and silty sand
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	90.00	100.00	4- Lime Stone/Very shelly sand
66	92.50	100.00	4- Lime Stone/Very shelly sand
67	95.00	100.00	4- Lime Stone/Very shelly sand
68	97.50	100.00	4- Lime Stone/Very shelly sand
69	100.00	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	16.60	6.60	10.00	8.20	5-Void
2	6.60	6.60	0.00	13.00	1-Plastic Clay
3	6.60	0.60	6.00	12.33	3-Clean Sand
4	0.60	0.60	0.00	100.00	1-Plastic Clay
5	0.60	-3.40	4.00	100.00	4-Limestone, Very Shelly Sand
6	-3.40	-3.40	0.00	60.00	1-Plastic Clay
7	-3.40	-8.40	5.00	60.00	4-Limestone, Very Shelly Sand
8	-8.40	-8.40	0.00	32.00	1-Plastic Clay
9	-8.40	-13.40	5.00	32.00	3-Clean Sand
10	-13.40	-13.40	0.00	100.00	1-Plastic Clay
11	-13.40	-18.40	5.00	100.00	4-Limestone, Very Shelly Sand
12	-18.40	-18.40	0.00	31.00	2-Clay and Silty Sand
13	-18.40	-23.40	5.00	31.00	1-Plastic Clay
14	-23.40	-23.40	0.00	100.00	2-Clay and Silty Sand
15	-23.40	-33.40	10.00	90.75	4-Limestone, Very Shelly Sand
16	-33.40	-33.40	0.00	100.00	2-Clay and Silty Sand
17	-33.40	-38.40	5.00	100.00	1-Plastic Clay
18	-38.40	-38.40	0.00	100.00	3-Clean Sand
19	-38.40	-40.90	2.50	100.00	4-Limestone, Very Shelly Sand
20	-40.90	-40.90	0.00	100.00	1-Plastic Clay
21	-40.90	-43.40	2.50	100.00	2-Clay and Silty Sand
22	-43.40	-43.40	0.00	54.00	1-Plastic Clay
23	-43.40	-55.90	12.50	81.60	4-Limestone, Very Shelly Sand
24	-55.90	-55.90	0.00	54.00	2-Clay and Silty Sand
25	-55.90	-58.40	2.50	54.00	1-Plastic Clay
26	-58.40	-58.40	0.00	100.00	2-Clay and Silty Sand
27	-58.40	-83.40	25.00	100.00	4-Limestone, Very Shelly Sand

Driven Pile Data:
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  Pile unit weight = 490.00(pcf), Section Type: H-Section

Pile Geometry:

Width (in)	Length (ft)	Tip Elev. (ft)	Depth (in)
14.69	10.00	6.60	13.83
14.69	11.00	5.60	13.83
14.69	12.00	4.60	13.83
14.69	13.00	3.60	13.83
14.69	14.00	2.60	13.83
14.69	15.00	1.60	13.83
14.69	16.00	0.60	13.83
14.69	17.00	-0.40	13.83
14.69	18.00	-1.40	13.83
14.69	19.00	-2.40	13.83
14.69	20.00	-3.40	13.83
14.69	21.00	-4.40	13.83
14.69	22.00	-5.40	13.83
14.69	23.00	-6.40	13.83
14.69	24.00	-7.40	13.83
14.69	25.00	-8.40	13.83
14.69	26.00	-9.40	13.83
14.69	27.00	-10.40	13.83
14.69	28.00	-11.40	13.83
14.69	29.00	-12.40	13.83
14.69	30.00	-13.40	13.83
14.69	31.00	-14.40	13.83
14.69	32.00	-15.40	13.83
14.69	33.00	-16.40	13.83
14.69	34.00	-17.40	13.83
14.69	35.00	-18.40	13.83
14.69	36.00	-19.40	13.83
14.69	37.00	-20.40	13.83
14.69	38.00	-21.40	13.83
14.69	39.00	-22.40	13.83
14.69	40.00	-23.40	13.83
14.69	41.00	-24.40	13.83
14.69	42.00	-25.40	13.83
14.69	43.00	-26.40	13.83
14.69	44.00	-27.40	13.83
14.69	45.00	-28.40	13.83
14.69	46.00	-29.40	13.83
14.69	47.00	-30.40	13.83
14.69	48.00	-31.40	13.83
14.69	49.00	-32.40	13.83
14.69	50.00	-33.40	13.83
14.69	51.00	-34.40	13.83
14.69	52.00	-35.40	13.83
14.69	53.00	-36.40	13.83
14.69	54.00	-37.40	13.83
14.69	55.00	-38.40	13.83
14.69	56.00	-39.40	13.83
14.69	57.00	-40.40	13.83
14.69	58.00	-41.40	13.83
14.69	59.00	-42.40	13.83
14.69	60.00	-43.40	13.83
14.69	61.00	-44.40	13.83
14.69	62.00	-45.40	13.83
14.69	63.00	-46.40	13.83
14.69	64.00	-47.40	13.83
14.69	65.00	-48.40	13.83
14.69	66.00	-49.40	13.83
14.69	67.00	-50.40	13.83
14.69	68.00	-51.40	13.83

14.69	69.00	-52.40	13.83
14.69	70.00	-53.40	13.83
14.69	71.00	-54.40	13.83
14.69	72.00	-55.40	13.83
14.69	73.00	-56.40	13.83
14.69	74.00	-57.40	13.83
14.69	75.00	-58.40	13.83
14.69	76.00	-59.40	13.83
14.69	77.00	-60.40	13.83
14.69	78.00	-61.40	13.83
14.69	79.00	-62.40	13.83
14.69	80.00	-63.40	13.83
14.69	81.00	-64.40	13.83
14.69	82.00	-65.40	13.83
14.69	83.00	-66.40	13.83
14.69	84.00	-67.40	13.83
14.69	85.00	-68.40	13.83
14.69	86.00	-69.40	13.83
14.69	87.00	-70.40	13.83
14.69	88.00	-71.40	13.83
14.69	89.00	-72.40	13.83
14.69	90.00	-73.40	13.83
14.69	91.00	-74.40	13.83
14.69	92.00	-75.40	13.83
14.69	93.00	-76.40	13.83
14.69	94.00	-77.40	13.83
14.69	95.00	-78.40	13.83
14.69	96.00	-79.40	13.83
14.69	97.00	-80.40	13.83
14.69	98.00	-81.40	13.83
14.69	99.00	-82.40	13.83
14.69	100.00	-83.40	13.83

Driven Pile Capacity:
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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	14.7	0.00	11.37	11.37	5.69	22.74
11.00	14.7	1.08	10.86	11.94	5.97	22.79
12.00	14.7	1.12	13.68	14.80	7.40	28.49
13.00	14.7	1.24	18.90	20.14	10.07	39.03
14.00	14.7	1.47	26.88	28.35	14.17	55.23
15.00	14.7	1.78	37.67	39.46	19.73	77.13
16.00	14.7	5.90	80.70	86.60	43.30	167.30
17.00	14.7	10.44	76.28	86.72	43.36	163.00
18.00	14.7	14.98	71.90	86.88	43.44	158.78
19.00	14.7	19.53	68.01	87.54	43.77	155.56
20.00	14.7	24.07	64.73	88.80	44.40	153.53
21.00	14.7	27.45	58.80	86.25	43.13	145.05
22.00	14.7	30.83	52.04	82.87	41.43	134.90
23.00	14.7	34.23	45.22	79.45	39.73	124.67
24.00	14.7	37.77	38.13	75.90	37.95	114.03
25.00	14.7	41.47	30.74	72.21	36.11	102.96
26.00	14.7	43.49	31.43	74.92	37.46	106.36
27.00	14.7	44.75	33.65	78.40	39.20	112.04
28.00	14.7	45.77	37.37	83.14	41.57	120.52
29.00	14.7	46.80	42.55	89.34	44.67	131.89
30.00	14.7	55.17	84.68	139.85	69.92	224.53
31.00	14.7	59.71	70.31	130.02	65.01	200.33
32.00	14.7	64.25	54.32	118.57	59.29	172.89
33.00	14.7	68.80	38.33	107.13	53.56	145.45
34.00	14.7	73.34	22.42	95.77	47.88	118.19

35.00	14.7	77.89	6.62	84.50	42.25	97.74
36.00	14.7	80.69	12.49	93.18	46.59	118.17
37.00	14.7	84.22	31.43	115.66	57.83	178.52
38.00	14.7	96.40	52.99	149.39	74.70	255.37
39.00	14.7	102.74	68.88	171.62	85.81	309.39
40.00	14.7	109.24	84.68	193.92	96.96	278.60
41.00	14.7	113.79	84.07	197.86	98.93	281.93
42.00	14.7	118.33	81.95	200.28	100.14	282.24
43.00	14.7	122.87	78.48	201.35	100.68	279.83
44.00	14.7	127.42	75.08	202.50	101.25	277.58
45.00	14.7	131.96	72.11	204.08	102.04	276.19
46.00	14.7	136.31	58.87	195.18	97.59	254.06
47.00	14.7	140.26	45.87	186.13	93.06	232.00
48.00	14.7	143.87	34.14	178.01	89.01	212.15
49.00	14.7	147.53	22.22	169.76	84.88	191.98
50.00	14.7	151.31	9.88	161.19	80.59	180.94
51.00	14.7	154.92	15.48	170.40	85.20	201.36
52.00	14.7	158.82	33.55	192.37	96.18	259.47
53.00	14.7	171.47	49.09	220.56	110.28	318.74
54.00	14.7	178.20	51.68	229.88	114.94	333.24
55.00	14.7	184.92	54.28	239.20	119.60	293.47
56.00	14.7	189.46	47.86	237.32	118.66	285.17
57.00	14.7	194.01	42.14	236.15	118.08	278.29
58.00	14.7	198.80	39.66	238.46	119.23	317.79
59.00	14.7	202.81	43.17	245.98	122.99	332.33
60.00	14.7	210.00	63.27	273.28	136.64	336.55
61.00	14.7	213.05	68.97	282.02	141.01	350.99
62.00	14.7	216.09	74.68	290.77	145.39	365.46
63.00	14.7	219.21	80.11	299.32	149.66	379.43
64.00	14.7	222.85	83.54	306.39	153.19	389.93
65.00	14.7	227.09	84.68	311.77	155.89	396.45
66.00	14.7	231.64	84.68	316.32	158.16	401.00
67.00	14.7	236.18	84.68	320.86	160.43	405.54
68.00	14.7	240.73	78.60	319.32	159.66	397.92
69.00	14.7	245.27	63.33	308.60	154.30	371.92
70.00	14.7	249.81	48.06	297.87	148.93	345.92
71.00	14.7	254.36	46.50	300.86	150.43	347.36
72.00	14.7	258.90	46.50	305.40	152.70	351.91
73.00	14.7	264.11	48.06	312.17	156.09	408.29
74.00	14.7	268.95	60.53	329.48	164.74	450.54
75.00	14.7	277.98	84.68	362.66	181.33	447.34
76.00	14.7	282.52	84.68	367.20	183.60	451.88
77.00	14.7	287.07	84.68	371.75	185.87	456.43
78.00	14.7	291.61	84.68	376.29	188.15	460.97
79.00	14.7	296.16	84.68	380.84	190.42	465.52
80.00	14.7	300.70	84.68	385.38	192.69	470.06
81.00	14.7	305.24	84.68	389.92	194.96	474.60
82.00	14.7	309.79	84.68	394.47	197.23	479.15
83.00	14.7	314.33	84.68	399.01	199.51	483.69
84.00	14.7	318.87	84.68	403.55	201.78	488.23
85.00	14.7	323.42	84.68	408.10	204.05	492.78
86.00	14.7	327.96	84.68	412.64	206.32	497.32
87.00	14.7	332.51	84.68	417.19	208.59	501.87
88.00	14.7	337.05	84.68	421.73	210.86	506.41
89.00	14.7	341.59	84.68	426.27	213.14	510.95
90.00	14.7	346.14	84.68	430.82	215.41	515.50
91.00	14.7	350.68	84.68	435.36	217.68	520.04
92.00	14.7	355.23	84.68	439.91	219.95	524.59
93.00	14.7	359.77	84.68	444.45	222.22	529.13
94.00	14.7	364.31	84.68	448.99	224.50	533.67
95.00	14.7	368.86	84.68	453.54	226.77	538.22
96.00	14.7	Soil Elevations Must Extend At or Below Contribution Zone				
97.00	14.7	Soil Elevations Must Extend At or Below Contribution Zone				
98.00	14.7	Soil Elevations Must Extend At or Below Contribution Zone				
99.00	14.7	Soil Elevations Must Extend At or Below Contribution Zone				
100.00	14.7	Soil Elevations Must Extend At or Below Contribution Zone				

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.

Date: September 23, 2021
Time: 18:36:31

General Information:
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Input file: .....Preforming - Original FB Deep Runs\H-pile\BB-03_PSCP_REV_H.spc
Project number: B-19-051
Job name: THEA Whiting Street
Engineer: Kirk M. Eastman
Units: English

Analysis Information:
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Analysis Type: SPT

Soil Information:
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Boring date: 6/24/21, Boring Number: BB-03
Station number: 204+29 Offset: 1 LT

Ground Elevation: 16.300(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	5.00	5- Cavity layer
3	4.00	5.00	5- Cavity layer
4	6.00	14.00	5- Cavity layer
5	8.00	35.00	5- Cavity layer
6	10.00	20.00	5- Cavity layer
7	10.00	0.00	1- Plastic Clay
8	10.00	11.00	3- Clean sand
9	12.00	11.00	3- Clean sand
10	14.00	9.00	3- Clean sand
11	16.00	16.00	3- Clean sand
12	16.00	0.00	2- Clay and silty sand
13	16.00	6.00	1- Plastic Clay
14	18.00	6.00	1- Plastic Clay
15	20.00	6.00	1- Plastic Clay
16	20.00	0.00	2- Clay and silty sand
17	20.00	60.00	3- Clean sand
18	22.50	60.00	3- Clean sand
19	22.50	0.00	1- Plastic Clay
20	22.50	100.00	4- Lime Stone/Very shelly sand
21	25.00	100.00	4- Lime Stone/Very shelly sand
22	25.00	0.00	1- Plastic Clay
23	25.00	44.00	3- Clean sand
24	27.50	44.00	3- Clean sand
25	27.50	0.00	1- Plastic Clay
26	27.50	100.00	4- Lime Stone/Very shelly sand
27	30.00	100.00	4- Lime Stone/Very shelly sand
28	30.00	0.00	2- Clay and silty sand
29	30.00	64.00	1- Plastic Clay
30	32.50	64.00	1- Plastic Clay
31	35.00	100.00	1- Plastic Clay
32	37.50	57.00	1- Plastic Clay
33	37.50	0.00	2- Clay and silty sand
34	37.50	26.00	1- Plastic Clay
35	40.00	26.00	1- Plastic Clay
36	42.50	20.00	1- Plastic Clay
37	42.50	0.00	2- Clay and silty sand
38	42.50	100.00	4- Lime Stone/Very shelly sand

39	45.00	100.00	4- Lime Stone/Very shelly sand
40	47.50	100.00	4- Lime Stone/Very shelly sand
41	50.00	100.00	4- Lime Stone/Very shelly sand
42	52.50	100.00	4- Lime Stone/Very shelly sand
43	55.00	100.00	4- Lime Stone/Very shelly sand
44	57.50	100.00	4- Lime Stone/Very shelly sand
45	57.50	0.00	1- Plastic Clay
46	57.50	72.00	2- Clay and silty sand
47	60.00	72.00	2- Clay and silty sand
48	62.50	100.00	2- Clay and silty sand
49	65.00	100.00	2- Clay and silty sand
50	67.50	48.00	2- Clay and silty sand
51	70.00	69.00	2- Clay and silty sand
52	70.00	0.00	1- Plastic Clay
53	70.00	100.00	4- Lime Stone/Very shelly sand
54	72.50	100.00	4- Lime Stone/Very shelly sand
55	75.00	100.00	4- Lime Stone/Very shelly sand
56	77.50	100.00	4- Lime Stone/Very shelly sand
57	80.00	100.00	4- Lime Stone/Very shelly sand
58	82.50	100.00	4- Lime Stone/Very shelly sand
59	85.00	100.00	4- Lime Stone/Very shelly sand
60	87.50	100.00	4- Lime Stone/Very shelly sand
61	90.00	100.00	4- Lime Stone/Very shelly sand
62	92.50	100.00	4- Lime Stone/Very shelly sand
63	95.00	100.00	4- Lime Stone/Very shelly sand
64	97.50	100.00	4- Lime Stone/Very shelly sand
65	100.00	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	16.30	6.30	10.00	11.80	5-Void
2	6.30	6.30	0.00	11.00	1-Plastic Clay
3	6.30	0.30	6.00	10.33	3-Clean Sand
4	0.30	0.30	0.00	6.00	2-Clay and Silty Sand
5	0.30	-3.70	4.00	6.00	1-Plastic Clay
6	-3.70	-3.70	0.00	60.00	2-Clay and Silty Sand
7	-3.70	-6.20	2.50	60.00	3-Clean Sand
8	-6.20	-6.20	0.00	100.00	1-Plastic Clay
9	-6.20	-8.70	2.50	100.00	4-Limestone, Very Shelly Sand
10	-8.70	-8.70	0.00	44.00	1-Plastic Clay
11	-8.70	-11.20	2.50	44.00	3-Clean Sand
12	-11.20	-11.20	0.00	100.00	1-Plastic Clay
13	-11.20	-13.70	2.50	100.00	4-Limestone, Very Shelly Sand
14	-13.70	-13.70	0.00	64.00	2-Clay and Silty Sand
15	-13.70	-21.20	7.50	76.00	1-Plastic Clay
16	-21.20	-21.20	0.00	26.00	2-Clay and Silty Sand
17	-21.20	-26.20	5.00	26.00	1-Plastic Clay
18	-26.20	-26.20	0.00	100.00	2-Clay and Silty Sand
19	-26.20	-41.20	15.00	100.00	4-Limestone, Very Shelly Sand
20	-41.20	-41.20	0.00	72.00	1-Plastic Clay
21	-41.20	-53.70	12.50	78.40	2-Clay and Silty Sand
22	-53.70	-53.70	0.00	100.00	1-Plastic Clay
23	-53.70	-83.70	30.00	100.00	4-Limestone, Very Shelly Sand

Driven Pile Data:

Pile unit weight = 490.00(pcf), Section Type: H-Section

Pile Geometry:

Width	Length	Tip Elev.	Depth

(in)	(ft)	(ft)	(in)
14.69	10.00	6.30	13.83
14.69	11.00	5.30	13.83
14.69	12.00	4.30	13.83
14.69	13.00	3.30	13.83
14.69	14.00	2.30	13.83
14.69	15.00	1.30	13.83
14.69	16.00	0.30	13.83
14.69	17.00	-0.70	13.83
14.69	18.00	-1.70	13.83
14.69	19.00	-2.70	13.83
14.69	20.00	-3.70	13.83
14.69	21.00	-4.70	13.83
14.69	22.00	-5.70	13.83
14.69	23.00	-6.70	13.83
14.69	24.00	-7.70	13.83
14.69	25.00	-8.70	13.83
14.69	26.00	-9.70	13.83
14.69	27.00	-10.70	13.83
14.69	28.00	-11.70	13.83
14.69	29.00	-12.70	13.83
14.69	30.00	-13.70	13.83
14.69	31.00	-14.70	13.83
14.69	32.00	-15.70	13.83
14.69	33.00	-16.70	13.83
14.69	34.00	-17.70	13.83
14.69	35.00	-18.70	13.83
14.69	36.00	-19.70	13.83
14.69	37.00	-20.70	13.83
14.69	38.00	-21.70	13.83
14.69	39.00	-22.70	13.83
14.69	40.00	-23.70	13.83
14.69	41.00	-24.70	13.83
14.69	42.00	-25.70	13.83
14.69	43.00	-26.70	13.83
14.69	44.00	-27.70	13.83
14.69	45.00	-28.70	13.83
14.69	46.00	-29.70	13.83
14.69	47.00	-30.70	13.83
14.69	48.00	-31.70	13.83
14.69	49.00	-32.70	13.83
14.69	50.00	-33.70	13.83
14.69	51.00	-34.70	13.83
14.69	52.00	-35.70	13.83
14.69	53.00	-36.70	13.83
14.69	54.00	-37.70	13.83
14.69	55.00	-38.70	13.83
14.69	56.00	-39.70	13.83
14.69	57.00	-40.70	13.83
14.69	58.00	-41.70	13.83
14.69	59.00	-42.70	13.83
14.69	60.00	-43.70	13.83
14.69	61.00	-44.70	13.83
14.69	62.00	-45.70	13.83
14.69	63.00	-46.70	13.83
14.69	64.00	-47.70	13.83
14.69	65.00	-48.70	13.83
14.69	66.00	-49.70	13.83
14.69	67.00	-50.70	13.83
14.69	68.00	-51.70	13.83
14.69	69.00	-52.70	13.83
14.69	70.00	-53.70	13.83
14.69	71.00	-54.70	13.83
14.69	72.00	-55.70	13.83
14.69	73.00	-56.70	13.83
14.69	74.00	-57.70	13.83
14.69	75.00	-58.70	13.83
14.69	76.00	-59.70	13.83

14.69	77.00	-60.70	13.83
14.69	78.00	-61.70	13.83
14.69	79.00	-62.70	13.83
14.69	80.00	-63.70	13.83
14.69	81.00	-64.70	13.83
14.69	82.00	-65.70	13.83
14.69	83.00	-66.70	13.83
14.69	84.00	-67.70	13.83
14.69	85.00	-68.70	13.83
14.69	86.00	-69.70	13.83
14.69	87.00	-70.70	13.83
14.69	88.00	-71.70	13.83
14.69	89.00	-72.70	13.83
14.69	90.00	-73.70	13.83
14.69	91.00	-74.70	13.83
14.69	92.00	-75.70	13.83
14.69	93.00	-76.70	13.83
14.69	94.00	-77.70	13.83
14.69	95.00	-78.70	13.83
14.69	96.00	-79.70	13.83
14.69	97.00	-80.70	13.83
14.69	98.00	-81.70	13.83
14.69	99.00	-82.70	13.83
14.69	100.00	-83.70	13.83

Driven Pile Capacity:
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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	14.7	0.00	9.81	9.81	4.91	19.63
11.00	14.7	0.87	9.86	10.73	5.36	20.59
12.00	14.7	1.83	8.80	10.63	5.31	19.43
13.00	14.7	2.70	7.05	9.75	4.87	16.80
14.00	14.7	3.49	5.49	8.98	4.49	14.46
15.00	14.7	4.38	3.69	8.07	4.04	11.76
16.00	14.7	5.56	9.28	14.85	7.42	33.41
17.00	14.7	6.60	12.95	19.55	9.77	45.44
18.00	14.7	7.58	26.56	34.13	17.07	87.25
19.00	14.7	10.69	47.47	58.17	29.08	153.11
20.00	14.7	12.40	64.51	76.91	38.46	141.43
21.00	14.7	16.42	64.52	80.93	40.47	145.45
22.00	14.7	20.44	63.74	84.18	42.09	147.93
23.00	14.7	24.72	62.42	87.14	43.57	149.56
24.00	14.7	29.26	62.42	91.68	45.84	154.11
25.00	14.7	33.81	62.42	96.23	48.11	158.65
26.00	14.7	37.46	57.61	95.07	47.53	152.67
27.00	14.7	41.11	51.24	92.35	46.18	143.59
28.00	14.7	45.21	40.42	85.63	42.82	126.05
29.00	14.7	49.76	25.15	74.91	37.45	100.06
30.00	14.7	54.30	9.88	64.18	32.09	83.94
31.00	14.7	61.02	9.88	70.90	35.45	90.66
32.00	14.7	67.75	9.88	77.63	38.81	97.38
33.00	14.7	74.47	9.51	83.98	41.99	102.99
34.00	14.7	81.19	8.57	89.77	44.88	106.92
35.00	14.7	87.91	7.64	95.56	47.78	110.84
36.00	14.7	94.64	6.67	101.31	50.65	114.64
37.00	14.7	101.36	5.59	106.95	53.48	118.14
38.00	14.7	106.11	6.33	112.45	56.22	125.11
39.00	14.7	108.36	18.88	127.25	63.62	165.01
40.00	14.7	118.77	43.86	162.62	81.31	250.34
41.00	14.7	124.21	60.11	184.32	92.16	304.54
42.00	14.7	129.30	76.47	205.76	102.88	358.69

43.00	14.7	133.98	84.68	218.66	109.33	303.34
44.00	14.7	138.52	84.68	223.20	111.60	307.88
45.00	14.7	143.07	84.68	227.75	113.87	312.43
46.00	14.7	147.61	84.68	232.29	116.15	316.97
47.00	14.7	152.16	84.68	236.84	118.42	321.52
48.00	14.7	156.70	84.68	241.38	120.69	326.06
49.00	14.7	161.24	84.68	245.92	122.96	330.60
50.00	14.7	165.79	84.68	250.47	125.23	335.15
51.00	14.7	170.33	84.68	255.01	127.51	339.69
52.00	14.7	174.87	84.68	259.55	129.78	344.23
53.00	14.7	179.42	79.63	259.05	129.52	338.68
54.00	14.7	183.96	66.95	250.91	125.46	317.87
55.00	14.7	188.51	54.28	242.78	121.39	297.06
56.00	14.7	193.05	41.60	234.65	117.32	276.25
57.00	14.7	197.59	28.92	226.51	113.26	255.43
58.00	14.7	202.61	22.58	225.19	112.60	270.35
59.00	14.7	208.10	22.58	230.68	115.34	275.84
60.00	14.7	213.59	22.58	236.17	118.09	281.33
61.00	14.7	219.08	22.58	241.66	120.83	286.81
62.00	14.7	224.57	22.55	247.12	123.56	292.23
63.00	14.7	230.06	22.52	252.58	126.29	297.62
64.00	14.7	235.55	22.50	258.05	129.02	303.04
65.00	14.7	241.04	22.49	263.53	131.76	308.51
66.00	14.7	246.44	33.89	280.32	140.16	348.09
67.00	14.7	251.65	46.58	298.23	149.12	391.40
68.00	14.7	256.72	59.30	316.01	158.01	434.60
69.00	14.7	261.92	72.00	333.92	166.96	477.91
70.00	14.7	267.32	84.68	352.00	176.00	436.68
71.00	14.7	271.86	84.68	356.54	178.27	441.22
72.00	14.7	276.41	84.68	361.09	180.54	445.77
73.00	14.7	280.95	84.68	365.63	182.82	450.31
74.00	14.7	285.50	84.68	370.18	185.09	454.86
75.00	14.7	290.04	84.68	374.72	187.36	459.40
76.00	14.7	294.58	84.68	379.26	189.63	463.94
77.00	14.7	299.13	84.68	383.81	191.90	468.49
78.00	14.7	303.67	84.68	388.35	194.18	473.03
79.00	14.7	308.22	84.68	392.90	196.45	477.58
80.00	14.7	312.76	84.68	397.44	198.72	482.12
81.00	14.7	317.30	84.68	401.98	200.99	486.66
82.00	14.7	321.85	84.68	406.53	203.26	491.21
83.00	14.7	326.39	84.68	411.07	205.54	495.75
84.00	14.7	330.93	84.68	415.61	207.81	500.29
85.00	14.7	335.48	84.68	420.16	210.08	504.84
86.00	14.7	340.02	84.68	424.70	212.35	509.38
87.00	14.7	344.57	84.68	429.25	214.62	513.93
88.00	14.7	349.11	84.68	433.79	216.90	518.47
89.00	14.7	353.65	84.68	438.33	219.17	523.01
90.00	14.7	358.20	84.68	442.88	221.44	527.56
91.00	14.7	362.74	84.68	447.42	223.71	532.10
92.00	14.7	367.29	84.68	451.97	225.98	536.65
93.00	14.7	371.83	84.68	456.51	228.25	541.19
94.00	14.7	376.37	84.68	461.05	230.53	545.73
95.00	14.7	380.92	84.68	465.60	232.80	550.28
96.00	14.7 Soil Elevations Must Extend At or Below Contribution Zone					
97.00	14.7 Soil Elevations Must Extend At or Below Contribution Zone					
98.00	14.7 Soil Elevations Must Extend At or Below Contribution Zone					
99.00	14.7 Soil Elevations Must Extend At or Below Contribution Zone					
100.00	14.7 Soil Elevations Must Extend At or Below Contribution Zone					

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.

Date: September 23, 2021
Time: 18:37:20

General Information:
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Input file: .....Preforming - Original FB Deep Runs\H-pile\BB-04_PSCP_REV_H.spc
Project number: B-19-051
Job name: THEA Whiting Street
Engineer: Kirk M. Eastman
Units: English

Analysis Information:
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Analysis Type: SPT

Soil Information:
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Boring date: 6/22/21, Boring Number: BB-04
Station number: 206+48 Offset: 24 LT

Ground Elevation: 16.100(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	5.00	5- Cavity layer
3	4.00	5.00	5- Cavity layer
4	6.00	4.00	5- Cavity layer
5	8.00	6.00	5- Cavity layer
6	10.00	9.00	5- Cavity layer
7	10.00	0.00	1- Plastic Clay
8	10.00	13.00	2- Clay and silty sand
9	12.00	13.00	2- Clay and silty sand
10	14.00	17.00	2- Clay and silty sand
11	16.00	17.00	2- Clay and silty sand
12	18.00	8.00	2- Clay and silty sand
13	20.00	12.00	2- Clay and silty sand
14	22.50	12.00	2- Clay and silty sand
15	22.50	0.00	1- Plastic Clay
16	22.50	0.00	5- Cavity layer
17	25.00	0.00	5- Cavity layer
18	27.50	0.00	5- Cavity layer
19	30.00	0.00	5- Cavity layer
20	30.00	0.00	2- Clay and silty sand
21	30.00	18.00	1- Plastic Clay
22	32.50	18.00	1- Plastic Clay
23	32.50	0.00	2- Clay and silty sand
24	32.50	100.00	1- Plastic Clay
25	35.00	100.00	1- Plastic Clay
26	35.00	0.00	2- Clay and silty sand
27	35.00	100.00	4- Lime Stone/Very shelly sand
28	37.50	100.00	4- Lime Stone/Very shelly sand
29	37.50	0.00	1- Plastic Clay
30	37.50	100.00	2- Clay and silty sand
31	40.00	100.00	2- Clay and silty sand
32	40.00	0.00	1- Plastic Clay
33	40.00	100.00	4- Lime Stone/Very shelly sand
34	42.50	100.00	4- Lime Stone/Very shelly sand
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	2- Clay and silty sand
38	47.50	52.00	1- Plastic Clay

39	50.00	52.00	1- Plastic Clay
40	50.00	0.00	2- Clay and silty sand
41	50.00	100.00	4- Lime Stone/Very shelly sand
42	52.50	100.00	4- Lime Stone/Very shelly sand
43	55.00	100.00	4- Lime Stone/Very shelly sand
44	55.00	0.00	2- Clay and silty sand
45	55.00	100.00	1- Plastic Clay
46	57.50	100.00	1- Plastic Clay
47	60.00	100.00	1- Plastic Clay
48	62.50	100.00	1- Plastic Clay
49	62.50	0.00	2- Clay and silty sand
50	62.50	100.00	4- Lime Stone/Very shelly sand
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	75.00	100.00	4- Lime Stone/Very shelly sand
56	77.50	100.00	4- Lime Stone/Very shelly sand
57	80.00	100.00	4- Lime Stone/Very shelly sand
58	82.50	100.00	4- Lime Stone/Very shelly sand
59	85.00	100.00	4- Lime Stone/Very shelly sand
60	87.50	100.00	4- Lime Stone/Very shelly sand
61	90.00	100.00	4- Lime Stone/Very shelly sand
62	92.50	100.00	4- Lime Stone/Very shelly sand
63	92.50	0.00	1- Plastic Clay
64	92.50	66.00	4- Lime Stone/Very shelly sand
65	95.00	66.00	4- Lime Stone/Very shelly sand
66	95.00	0.00	1- Plastic Clay
67	95.00	100.00	4- Lime Stone/Very shelly sand
68	97.50	100.00	4- Lime Stone/Very shelly sand
69	100.00	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	16.10	6.10	10.00	4.00	5-Void
2	6.10	6.10	0.00	13.00	1-Plastic Clay
3	6.10	-6.40	12.50	13.28	2-Clay and Silty Sand
4	-6.40	-6.40	0.00	0.00	1-Plastic Clay
5	-6.40	-13.90	7.50	0.00	5-Void
6	-13.90	-13.90	0.00	18.00	2-Clay and Silty Sand
7	-13.90	-16.40	2.50	18.00	1-Plastic Clay
8	-16.40	-16.40	0.00	100.00	2-Clay and Silty Sand
9	-16.40	-18.90	2.50	100.00	1-Plastic Clay
10	-18.90	-18.90	0.00	100.00	2-Clay and Silty Sand
11	-18.90	-21.40	2.50	100.00	4-Limestone, Very Shelly Sand
12	-21.40	-21.40	0.00	100.00	1-Plastic Clay
13	-21.40	-23.90	2.50	100.00	2-Clay and Silty Sand
14	-23.90	-23.90	0.00	100.00	1-Plastic Clay
15	-23.90	-31.40	7.50	100.00	4-Limestone, Very Shelly Sand
16	-31.40	-31.40	0.00	52.00	2-Clay and Silty Sand
17	-31.40	-33.90	2.50	52.00	1-Plastic Clay
18	-33.90	-33.90	0.00	100.00	2-Clay and Silty Sand
19	-33.90	-38.90	5.00	100.00	4-Limestone, Very Shelly Sand
20	-38.90	-38.90	0.00	100.00	2-Clay and Silty Sand
21	-38.90	-46.40	7.50	100.00	1-Plastic Clay
22	-46.40	-46.40	0.00	100.00	2-Clay and Silty Sand
23	-46.40	-76.40	30.00	100.00	4-Limestone, Very Shelly Sand
24	-76.40	-76.40	0.00	66.00	1-Plastic Clay
25	-76.40	-78.90	2.50	66.00	4-Limestone, Very Shelly Sand
26	-78.90	-78.90	0.00	100.00	1-Plastic Clay
27	-78.90	-83.90	5.00	100.00	4-Limestone, Very Shelly Sand

Driven Pile Data:
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  Pile unit weight = 490.00(pcf), Section Type: H-Section

Pile Geometry:

Width (in)	Length (ft)	Tip Elev. (ft)	Depth (in)
14.69	10.00	6.10	13.83
14.69	11.00	5.10	13.83
14.69	12.00	4.10	13.83
14.69	13.00	3.10	13.83
14.69	14.00	2.10	13.83
14.69	15.00	1.10	13.83
14.69	16.00	0.10	13.83
14.69	17.00	-0.90	13.83
14.69	18.00	-1.90	13.83
14.69	19.00	-2.90	13.83
14.69	20.00	-3.90	13.83
14.69	21.00	-4.90	13.83
14.69	22.00	-5.90	13.83
14.69	23.00	-6.90	13.83
14.69	24.00	-7.90	13.83
14.69	25.00	-8.90	13.83
14.69	26.00	-9.90	13.83
14.69	27.00	-10.90	13.83
14.69	28.00	-11.90	13.83
14.69	29.00	-12.90	13.83
14.69	30.00	-13.90	13.83
14.69	31.00	-14.90	13.83
14.69	32.00	-15.90	13.83
14.69	33.00	-16.90	13.83
14.69	34.00	-17.90	13.83
14.69	35.00	-18.90	13.83
14.69	36.00	-19.90	13.83
14.69	37.00	-20.90	13.83
14.69	38.00	-21.90	13.83
14.69	39.00	-22.90	13.83
14.69	40.00	-23.90	13.83
14.69	41.00	-24.90	13.83
14.69	42.00	-25.90	13.83
14.69	43.00	-26.90	13.83
14.69	44.00	-27.90	13.83
14.69	45.00	-28.90	13.83
14.69	46.00	-29.90	13.83
14.69	47.00	-30.90	13.83
14.69	48.00	-31.90	13.83
14.69	49.00	-32.90	13.83
14.69	50.00	-33.90	13.83
14.69	51.00	-34.90	13.83
14.69	52.00	-35.90	13.83
14.69	53.00	-36.90	13.83
14.69	54.00	-37.90	13.83
14.69	55.00	-38.90	13.83
14.69	56.00	-39.90	13.83
14.69	57.00	-40.90	13.83
14.69	58.00	-41.90	13.83
14.69	59.00	-42.90	13.83
14.69	60.00	-43.90	13.83
14.69	61.00	-44.90	13.83
14.69	62.00	-45.90	13.83
14.69	63.00	-46.90	13.83
14.69	64.00	-47.90	13.83
14.69	65.00	-48.90	13.83
14.69	66.00	-49.90	13.83
14.69	67.00	-50.90	13.83
14.69	68.00	-51.90	13.83

14.69	69.00	-52.90	13.83
14.69	70.00	-53.90	13.83
14.69	71.00	-54.90	13.83
14.69	72.00	-55.90	13.83
14.69	73.00	-56.90	13.83
14.69	74.00	-57.90	13.83
14.69	75.00	-58.90	13.83
14.69	76.00	-59.90	13.83
14.69	77.00	-60.90	13.83
14.69	78.00	-61.90	13.83
14.69	79.00	-62.90	13.83
14.69	80.00	-63.90	13.83
14.69	81.00	-64.90	13.83
14.69	82.00	-65.90	13.83
14.69	83.00	-66.90	13.83
14.69	84.00	-67.90	13.83
14.69	85.00	-68.90	13.83
14.69	86.00	-69.90	13.83
14.69	87.00	-70.90	13.83
14.69	88.00	-71.90	13.83
14.69	89.00	-72.90	13.83
14.69	90.00	-73.90	13.83
14.69	91.00	-74.90	13.83
14.69	92.00	-75.90	13.83
14.69	93.00	-76.90	13.83
14.69	94.00	-77.90	13.83
14.69	95.00	-78.90	13.83
14.69	96.00	-79.90	13.83
14.69	97.00	-80.90	13.83
14.69	98.00	-81.90	13.83
14.69	99.00	-82.90	13.83
14.69	100.00	-83.90	13.83

Driven Pile Capacity:
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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	14.7	0.00	6.79	6.79	3.40	20.37
11.00	14.7	2.28	6.87	9.15	4.57	22.89
12.00	14.7	4.49	7.03	11.52	5.76	25.58
13.00	14.7	7.13	6.96	14.09	7.04	28.00
14.00	14.7	10.13	6.38	16.51	8.26	29.28
15.00	14.7	13.08	5.79	18.87	9.43	30.45
16.00	14.7	16.02	5.31	21.34	10.67	31.97
17.00	14.7	18.62	5.05	23.68	11.84	33.78
18.00	14.7	20.54	4.76	25.30	12.65	34.83
19.00	14.7	22.27	3.91	26.18	13.09	33.99
20.00	14.7	24.35	2.86	27.20	13.60	32.92
21.00	14.7	26.59	1.71	28.30	14.15	31.73
22.00	14.7	28.83	0.57	29.40	14.70	30.55
23.00	14.7	29.95	0.00	29.95	14.98	29.95
24.00	14.7	29.95	0.00	29.95	14.98	29.95
25.00	14.7	29.95	0.00	29.95	14.98	29.95
26.00	14.7	29.95	0.00	29.95	14.98	29.95
27.00	14.7	29.95	0.00	29.95	14.98	29.95
28.00	14.7	29.95	0.00	29.95	14.98	29.95
29.00	14.7	29.95	0.00	29.95	14.98	29.95
30.00	14.7	29.95	6.71	36.67	18.33	50.09
31.00	14.7	31.93	12.83	44.76	22.38	70.42
32.00	14.7	34.45	32.45	66.90	33.45	131.81
33.00	14.7	44.12	47.03	91.15	45.58	185.21
34.00	14.7	50.30	49.68	99.97	49.99	199.32

35.00	14.7	57.72	54.28	112.00	56.00	166.27
36.00	14.7	62.27	52.99	115.25	57.63	168.24
37.00	14.7	66.81	52.99	119.80	59.90	172.78
38.00	14.7	71.55	53.63	125.18	62.59	232.45
39.00	14.7	75.48	58.81	134.29	67.14	251.90
40.00	14.7	82.81	84.68	167.49	83.74	252.17
41.00	14.7	87.35	84.68	172.03	86.02	256.71
42.00	14.7	91.90	84.68	176.58	88.29	261.26
43.00	14.7	96.44	78.60	175.04	87.52	253.63
44.00	14.7	100.98	63.33	164.31	82.15	227.64
45.00	14.7	105.53	48.06	153.58	76.79	201.64
46.00	14.7	110.07	46.50	156.57	78.29	203.08
47.00	14.7	114.61	46.50	161.12	80.56	207.62
48.00	14.7	119.82	48.06	167.88	83.94	264.01
49.00	14.7	124.66	60.53	185.19	92.60	306.26
50.00	14.7	133.69	84.68	218.37	109.19	303.05
51.00	14.7	138.24	70.96	209.20	104.60	280.16
52.00	14.7	142.78	55.69	198.47	99.24	254.16
53.00	14.7	147.33	40.42	187.75	93.87	228.17
54.00	14.7	151.87	25.15	177.02	88.51	202.17
55.00	14.7	156.41	9.88	166.29	83.15	186.05
56.00	14.7	163.14	9.88	173.02	86.51	192.77
57.00	14.7	169.86	9.88	179.74	89.87	199.50
58.00	14.7	176.58	15.96	192.54	96.27	224.47
59.00	14.7	183.30	31.23	214.54	107.27	277.00
60.00	14.7	190.03	46.50	236.53	118.27	329.54
61.00	14.7	196.75	61.77	258.52	129.26	382.07
62.00	14.7	203.47	77.04	280.52	140.26	434.61
63.00	14.7	209.11	84.68	293.79	146.89	378.47
64.00	14.7	213.65	84.68	298.33	149.17	383.01
65.00	14.7	218.19	84.68	302.87	151.44	387.55
66.00	14.7	222.74	84.68	307.42	153.71	392.10
67.00	14.7	227.28	84.68	311.96	155.98	396.64
68.00	14.7	231.83	84.68	316.51	158.25	401.19
69.00	14.7	236.37	84.68	321.05	160.52	405.73
70.00	14.7	240.91	84.68	325.59	162.80	410.27
71.00	14.7	245.46	84.68	330.14	165.07	414.82
72.00	14.7	250.00	84.68	334.68	167.34	419.36
73.00	14.7	254.55	84.68	339.22	169.61	423.90
74.00	14.7	259.09	84.68	343.77	171.88	428.45
75.00	14.7	263.63	84.68	348.31	174.16	432.99
76.00	14.7	268.18	84.68	352.86	176.43	437.54
77.00	14.7	272.72	84.68	357.40	178.70	442.08
78.00	14.7	277.26	84.68	361.94	180.97	446.62
79.00	14.7	281.81	84.68	366.49	183.24	451.17
80.00	14.7	286.35	84.68	371.03	185.52	455.71
81.00	14.7	290.90	84.68	375.58	187.79	460.26
82.00	14.7	295.44	84.68	380.12	190.06	464.80
83.00	14.7	299.98	84.68	384.66	192.33	469.34
84.00	14.7	304.53	84.68	389.21	194.60	473.89
85.00	14.7	309.07	84.68	393.75	196.88	478.43
86.00	14.7	313.62	84.68	398.30	199.15	482.97
87.00	14.7	318.16	84.68	402.84	201.42	487.52
88.00	14.7	322.70	83.43	406.13	203.07	489.56
89.00	14.7	327.25	80.29	407.54	203.77	487.83
90.00	14.7	331.79	77.15	408.94	204.47	486.09
91.00	14.7	336.33	76.83	413.17	206.58	490.00
92.00	14.7	340.88	76.83	417.71	208.85	494.54
93.00	14.7	345.01	78.40	423.41	211.71	501.81
94.00	14.7	348.73	81.54	430.27	215.13	511.81
95.00	14.7	352.45	84.68	437.13	218.56	521.81
96.00	14.7	Soil Elevations Must Extend At or Below Contribution Zone				
97.00	14.7	Soil Elevations Must Extend At or Below Contribution Zone				
98.00	14.7	Soil Elevations Must Extend At or Below Contribution Zone				
99.00	14.7	Soil Elevations Must Extend At or Below Contribution Zone				
100.00	14.7	Soil Elevations Must Extend At or Below Contribution Zone				

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.

Florida Bridge Software Institute Date: August 19, 2021
Shaft and Pile Analysis (FB-Deep v.2.05) Time: 16:56:34

General Information:
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Input file: .....reet - LOCHNER\12 - Calculations\FB-Deep\DS\BB-01_DS - Rev.spc
Project number: B-19-051
Job name: THEA Whiting Street
Engineer: Kirk M. Eastman
Units: English

Analysis Information:
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Analysis Type: Drilled Shaft Analysis

Soil Information:
==========
Boring date: 6/9/21
Boring number: BB-01
Station number: 105+72 Offset: 8 LT

Ground Elevation: 15.30(ft)
Water table Elevation = 9.30(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	15.30	N/A	0.00	5- Cavity layer
2	2.00	13.30	N/A	0.00	5- Cavity layer
3	4.00	11.30	N/A	0.00	5- Cavity layer
4	6.00	9.30	N/A	0.00	5- Cavity layer
5	8.00	7.30	N/A	0.00	5- Cavity layer
6	10.00	5.30	N/A	0.00	5- Cavity layer
7	10.00	5.30	N/A	0.00	1- Plastic Clay
8	10.00	5.30	27.00	126.00	3- Clean sand
9	12.00	3.30	27.00	126.00	3- Clean sand
10	14.00	1.30	26.00	126.00	3- Clean sand
11	14.00	1.30	N/A	0.00	1- Plastic Clay
12	14.00	1.30	16.00	120.00	3- Clean sand
13	16.00	-0.70	16.00	120.00	3- Clean sand
14	18.00	-2.70	14.00	119.00	3- Clean sand
15	18.00	-2.70	N/A	0.00	1- Plastic Clay
16	18.00	-2.70	N/A	120.00	2- Clay and silty sand
17	20.00	-4.70	N/A	120.00	2- Clay and silty sand
18	22.50	-7.20	N/A	115.00	2- Clay and silty sand
19	22.50	-7.20	N/A	0.00	1- Plastic Clay
20	22.50	-7.20	N/A	130.00	4- Lime Stone/Very shelly sand
21	25.00	-9.70	N/A	130.00	4- Lime Stone/Very shelly sand
22	27.50	-12.20	N/A	130.00	4- Lime Stone/Very shelly sand
23	30.00	-14.70	N/A	130.00	4- Lime Stone/Very shelly sand
24	32.50	-17.20	N/A	130.00	4- Lime Stone/Very shelly sand
25	32.50	-17.20	N/A	0.00	1- Plastic Clay
26	32.50	-17.20	40.00	129.00	3- Clean sand
27	35.00	-19.70	40.00	129.00	3- Clean sand
28	37.50	-22.20	47.00	129.00	3- Clean sand
29	37.50	-22.20	N/A	0.00	1- Plastic Clay
30	37.50	-22.20	N/A	130.00	4- Lime Stone/Very shelly sand
31	40.00	-24.70	N/A	130.00	4- Lime Stone/Very shelly sand
32	42.50	-27.20	N/A	130.00	4- Lime Stone/Very shelly sand
33	45.00	-29.70	N/A	130.00	4- Lime Stone/Very shelly sand
34	47.50	-32.20	N/A	130.00	4- Lime Stone/Very shelly sand
35	47.50	-32.20	N/A	0.00	1- Plastic Clay
36	47.50	-32.20	20.00	123.00	3- Clean sand
37	50.00	-34.70	20.00	123.00	3- Clean sand
38	50.00	-34.70	N/A	0.00	2- Clay and silty sand
39	50.00	-34.70	N/A	125.00	1- Plastic Clay
40	52.50	-37.20	N/A	125.00	1- Plastic Clay
41	55.00	-39.70	N/A	125.00	1- Plastic Clay
42	57.50	-42.20	N/A	125.00	1- Plastic Clay
43	57.50	-42.20	N/A	0.00	2- Clay and silty sand
44	57.50	-42.20	15.00	119.00	3- Clean sand
45	60.00	-44.70	15.00	119.00	3- Clean sand
46	60.00	-44.70	N/A	0.00	1- Plastic Clay
47	60.00	-44.70	N/A	130.00	4- Lime Stone/Very shelly sand
48	62.50	-47.20	N/A	130.00	4- Lime Stone/Very shelly sand
49	65.00	-49.70	N/A	130.00	4- Lime Stone/Very shelly sand
50	67.50	-52.20	N/A	130.00	4- Lime Stone/Very shelly sand
51	70.00	-54.70	N/A	130.00	4- Lime Stone/Very shelly sand
52	72.50	-57.20	N/A	130.00	4- Lime Stone/Very shelly sand
53	75.00	-59.70	N/A	130.00	4- Lime Stone/Very shelly sand
54	77.50	-62.20	N/A	130.00	4- Lime Stone/Very shelly sand
55	80.00	-64.70	N/A	130.00	4- Lime Stone/Very shelly sand
56	82.50	-67.20	N/A	130.00	4- Lime Stone/Very shelly sand
57	85.00	-69.70	N/A	130.00	4- Lime Stone/Very shelly sand
58	87.50	-72.20	N/A	130.00	4- Lime Stone/Very shelly sand
59	90.00	-74.70	N/A	130.00	4- Lime Stone/Very shelly sand
60	92.50	-77.20	N/A	130.00	4- Lime Stone/Very shelly sand
61	95.00	-79.70	N/A	130.00	4- Lime Stone/Very shelly sand
62	97.50	-82.20	N/A	130.00	4- Lime Stone/Very shelly sand
63	100.00	-84.70	N/A	130.00	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	0.00	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	0.00	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	0.00	N/A	N/A	N/A	N/A
16	0.00	N/A	N/A	N/A	N/A
17	0.00	N/A	N/A	N/A	N/A
18	0.35	N/A	N/A	N/A	N/A
19	0.00	N/A	N/A	N/A	N/A
20	N/A	25.00	4.00	39.93	12.50
21	N/A	25.00	4.00	39.93	12.50
22	N/A	25.00	4.00	39.93	12.50
23	N/A	25.00	4.00	39.93	12.50
24	N/A	25.00	4.00	39.93	12.50
25	0.00	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	1.88	N/A	N/A	N/A	N/A
40	1.88	N/A	N/A	N/A	N/A
41	2.81	N/A	N/A	N/A	N/A
42	3.00	N/A	N/A	N/A	N/A
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	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
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
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	1.00		ROUGH	1.000
21	1.00		ROUGH	1.000
22	1.00		ROUGH	1.000
23	1.00		ROUGH	1.000
24	1.00		ROUGH	1.000
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	1.00		ROUGH	1.000

31	1.00	ROUGH	1.000
32	1.00	ROUGH	1.000
33	1.00	ROUGH	1.000
34	1.00	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	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	1.00	ROUGH	1.000
48	1.00	ROUGH	1.000
49	1.00	ROUGH	1.000
50	1.00	ROUGH	1.000
51	1.00	ROUGH	1.000
52	1.00	ROUGH	1.000
53	1.00	ROUGH	1.000
54	1.00	ROUGH	1.000
55	1.00	ROUGH	1.000
56	1.00	ROUGH	1.000
57	1.00	ROUGH	1.000
58	1.00	ROUGH	1.000
59	1.00	ROUGH	1.000
60	1.00	ROUGH	1.000
61	1.00	ROUGH	1.000
62	1.00	ROUGH	1.000
63	1.00	ROUGH	1.000

Drilled Shaft Data:
==========
Unit weight of concrete = 150.00(pcf), Concrete Slump = 8.50(in)
Modulus of Elasticity of concrete = 3640.00(ksi)

Shaft Geometry:

ID	Length (ft)	Tip Elev. (ft)	Case Len. (ft)	Diameter (in)	Base Diam. (in)	Bell Len. (ft)
1	10.00	5.30	10.00	48.00	48.00	0.00
2	11.00	4.30	10.00	48.00	48.00	0.00
3	12.00	3.30	10.00	48.00	48.00	0.00
4	13.00	2.30	10.00	48.00	48.00	0.00
5	14.00	1.30	10.00	48.00	48.00	0.00
6	15.00	0.30	10.00	48.00	48.00	0.00
7	16.00	-0.70	10.00	48.00	48.00	0.00
8	17.00	-1.70	10.00	48.00	48.00	0.00
9	18.00	-2.70	10.00	48.00	48.00	0.00
10	19.00	-3.70	10.00	48.00	48.00	0.00
11	20.00	-4.70	10.00	48.00	48.00	0.00
12	21.00	-5.70	10.00	48.00	48.00	0.00
13	22.00	-6.70	10.00	48.00	48.00	0.00
14	23.00	-7.70	10.00	48.00	48.00	0.00
15	24.00	-8.70	10.00	48.00	48.00	0.00
16	25.00	-9.70	10.00	48.00	48.00	0.00
17	26.00	-10.70	10.00	48.00	48.00	0.00
18	27.00	-11.70	10.00	48.00	48.00	0.00
19	28.00	-12.70	10.00	48.00	48.00	0.00
20	29.00	-13.70	10.00	48.00	48.00	0.00
21	30.00	-14.70	10.00	48.00	48.00	0.00
22	31.00	-15.70	10.00	48.00	48.00	0.00
23	32.00	-16.70	10.00	48.00	48.00	0.00
24	33.00	-17.70	10.00	48.00	48.00	0.00
25	34.00	-18.70	10.00	48.00	48.00	0.00
26	35.00	-19.70	10.00	48.00	48.00	0.00
27	36.00	-20.70	10.00	48.00	48.00	0.00
28	37.00	-21.70	10.00	48.00	48.00	0.00
29	38.00	-22.70	10.00	48.00	48.00	0.00
30	39.00	-23.70	10.00	48.00	48.00	0.00
31	40.00	-24.70	10.00	48.00	48.00	0.00
32	41.00	-25.70	10.00	48.00	48.00	0.00
33	42.00	-26.70	10.00	48.00	48.00	0.00
34	43.00	-27.70	10.00	48.00	48.00	0.00
35	44.00	-28.70	10.00	48.00	48.00	0.00
36	45.00	-29.70	10.00	48.00	48.00	0.00
37	46.00	-30.70	10.00	48.00	48.00	0.00
38	47.00	-31.70	10.00	48.00	48.00	0.00
39	48.00	-32.70	10.00	48.00	48.00	0.00
40	49.00	-33.70	10.00	48.00	48.00	0.00
41	50.00	-34.70	10.00	48.00	48.00	0.00
42	51.00	-35.70	10.00	48.00	48.00	0.00
43	52.00	-36.70	10.00	48.00	48.00	0.00
44	53.00	-37.70	10.00	48.00	48.00	0.00
45	54.00	-38.70	10.00	48.00	48.00	0.00
46	55.00	-39.70	10.00	48.00	48.00	0.00
47	56.00	-40.70	10.00	48.00	48.00	0.00
48	57.00	-41.70	10.00	48.00	48.00	0.00
49	58.00	-42.70	10.00	48.00	48.00	0.00
50	59.00	-43.70	10.00	48.00	48.00	0.00
51	60.00	-44.70	10.00	48.00	48.00	0.00
52	61.00	-45.70	10.00	48.00	48.00	0.00
53	62.00	-46.70	10.00	48.00	48.00	0.00
54	63.00	-47.70	10.00	48.00	48.00	0.00
55	64.00	-48.70	10.00	48.00	48.00	0.00

56	65.00	-49.70	10.00	48.00	48.00	0.00
57	66.00	-50.70	10.00	48.00	48.00	0.00
58	67.00	-51.70	10.00	48.00	48.00	0.00
59	68.00	-52.70	10.00	48.00	48.00	0.00
60	69.00	-53.70	10.00	48.00	48.00	0.00
61	70.00	-54.70	10.00	48.00	48.00	0.00
62	71.00	-55.70	10.00	48.00	48.00	0.00
63	72.00	-56.70	10.00	48.00	48.00	0.00
64	73.00	-57.70	10.00	48.00	48.00	0.00
65	74.00	-58.70	10.00	48.00	48.00	0.00
66	75.00	-59.70	10.00	48.00	48.00	0.00
67	76.00	-60.70	10.00	48.00	48.00	0.00
68	77.00	-61.70	10.00	48.00	48.00	0.00
69	78.00	-62.70	10.00	48.00	48.00	0.00
70	79.00	-63.70	10.00	48.00	48.00	0.00
71	80.00	-64.70	10.00	48.00	48.00	0.00
72	81.00	-65.70	10.00	48.00	48.00	0.00
73	82.00	-66.70	10.00	48.00	48.00	0.00
74	83.00	-67.70	10.00	48.00	48.00	0.00
75	84.00	-68.70	10.00	48.00	48.00	0.00
76	85.00	-69.70	10.00	48.00	48.00	0.00
77	86.00	-70.70	10.00	48.00	48.00	0.00
78	87.00	-71.70	10.00	48.00	48.00	0.00
79	88.00	-72.70	10.00	48.00	48.00	0.00
80	89.00	-73.70	10.00	48.00	48.00	0.00
81	90.00	-74.70	10.00	48.00	48.00	0.00
82	91.00	-75.70	10.00	48.00	48.00	0.00
83	92.00	-76.70	10.00	48.00	48.00	0.00
84	93.00	-77.70	10.00	48.00	48.00	0.00
85	94.00	-78.70	10.00	48.00	48.00	0.00
86	95.00	-79.70	10.00	48.00	48.00	0.00
87	96.00	-80.70	10.00	48.00	48.00	0.00
88	97.00	-81.70	10.00	48.00	48.00	0.00
89	98.00	-82.70	10.00	48.00	48.00	0.00
90	99.00	-83.70	10.00	48.00	48.00	0.00
91	100.00	-84.70	10.00	48.00	48.00	0.00
92	10.00	5.30	10.00	60.00	60.00	0.00
93	11.00	4.30	10.00	60.00	60.00	0.00
94	12.00	3.30	10.00	60.00	60.00	0.00
95	13.00	2.30	10.00	60.00	60.00	0.00
96	14.00	1.30	10.00	60.00	60.00	0.00
97	15.00	0.30	10.00	60.00	60.00	0.00
98	16.00	-0.70	10.00	60.00	60.00	0.00
99	17.00	-1.70	10.00	60.00	60.00	0.00
100	18.00	-2.70	10.00	60.00	60.00	0.00
101	19.00	-3.70	10.00	60.00	60.00	0.00
102	20.00	-4.70	10.00	60.00	60.00	0.00
103	21.00	-5.70	10.00	60.00	60.00	0.00
104	22.00	-6.70	10.00	60.00	60.00	0.00
105	23.00	-7.70	10.00	60.00	60.00	0.00
106	24.00	-8.70	10.00	60.00	60.00	0.00
107	25.00	-9.70	10.00	60.00	60.00	0.00
108	26.00	-10.70	10.00	60.00	60.00	0.00
109	27.00	-11.70	10.00	60.00	60.00	0.00
110	28.00	-12.70	10.00	60.00	60.00	0.00
111	29.00	-13.70	10.00	60.00	60.00	0.00
112	30.00	-14.70	10.00	60.00	60.00	0.00
113	31.00	-15.70	10.00	60.00	60.00	0.00
114	32.00	-16.70	10.00	60.00	60.00	0.00
115	33.00	-17.70	10.00	60.00	60.00	0.00
116	34.00	-18.70	10.00	60.00	60.00	0.00
117	35.00	-19.70	10.00	60.00	60.00	0.00
118	36.00	-20.70	10.00	60.00	60.00	0.00
119	37.00	-21.70	10.00	60.00	60.00	0.00
120	38.00	-22.70	10.00	60.00	60.00	0.00
121	39.00	-23.70	10.00	60.00	60.00	0.00
122	40.00	-24.70	10.00	60.00	60.00	0.00
123	41.00	-25.70	10.00	60.00	60.00	0.00
124	42.00	-26.70	10.00	60.00	60.00	0.00
125	43.00	-27.70	10.00	60.00	60.00	0.00
126	44.00	-28.70	10.00	60.00	60.00	0.00
127	45.00	-29.70	10.00	60.00	60.00	0.00
128	46.00	-30.70	10.00	60.00	60.00	0.00
129	47.00	-31.70	10.00	60.00	60.00	0.00
130	48.00	-32.70	10.00	60.00	60.00	0.00
131	49.00	-33.70	10.00	60.00	60.00	0.00
132	50.00	-34.70	10.00	60.00	60.00	0.00
133	51.00	-35.70	10.00	60.00	60.00	0.00
134	52.00	-36.70	10.00	60.00	60.00	0.00
135	53.00	-37.70	10.00	60.00	60.00	0.00
136	54.00	-38.70	10.00	60.00	60.00	0.00
137	55.00	-39.70	10.00	60.00	60.00	0.00
138	56.00	-40.70	10.00	60.00	60.00	0.00
139	57.00	-41.70	10.00	60.00	60.00	0.00
140	58.00	-42.70	10.00	60.00	60.00	0.00
141	59.00	-43.70	10.00	60.00	60.00	0.00
142	60.00	-44.70	10.00	60.00	60.00	0.00
143	61.00	-45.70	10.00	60.00	60.00	0.00
144	62.00	-46.70	10.00	60.00	60.00	0.00
145	63.00	-47.70	10.00	60.00	60.00	0.00
146	64.00	-48.70	10.00	60.00	60.00	0.00
147	65.00	-49.70	10.00	60.00	60.00	0.00
148	66.00	-50.70	10.00	60.00	60.00	0.00
149	67.00	-51.70	10.00	60.00	60.00	0.00
150	68.00	-52.70	10.00	60.00	60.00	0.00
151	69.00	-53.70	10.00	60.00	60.00	0.00
152	70.00	-54.70	10.00	60.00	60.00	0.00
153	71.00	-55.70	10.00	60.00	60.00	0.00
154	72.00	-56.70	10.00	60.00	60.00	0.00
155	73.00	-57.70	10.00	60.00	60.00	0.00

156	74.00	-58.70	10.00	60.00	60.00	0.00
157	75.00	-59.70	10.00	60.00	60.00	0.00
158	76.00	-60.70	10.00	60.00	60.00	0.00
159	77.00	-61.70	10.00	60.00	60.00	0.00
160	78.00	-62.70	10.00	60.00	60.00	0.00
161	79.00	-63.70	10.00	60.00	60.00	0.00
162	80.00	-64.70	10.00	60.00	60.00	0.00
163	81.00	-65.70	10.00	60.00	60.00	0.00
164	82.00	-66.70	10.00	60.00	60.00	0.00
165	83.00	-67.70	10.00	60.00	60.00	0.00
166	84.00	-68.70	10.00	60.00	60.00	0.00
167	85.00	-69.70	10.00	60.00	60.00	0.00
168	86.00	-70.70	10.00	60.00	60.00	0.00
169	87.00	-71.70	10.00	60.00	60.00	0.00
170	88.00	-72.70	10.00	60.00	60.00	0.00
171	89.00	-73.70	10.00	60.00	60.00	0.00
172	90.00	-74.70	10.00	60.00	60.00	0.00
173	91.00	-75.70	10.00	60.00	60.00	0.00
174	92.00	-76.70	10.00	60.00	60.00	0.00
175	93.00	-77.70	10.00	60.00	60.00	0.00
176	94.00	-78.70	10.00	60.00	60.00	0.00
177	95.00	-79.70	10.00	60.00	60.00	0.00
178	96.00	-80.70	10.00	60.00	60.00	0.00
179	97.00	-81.70	10.00	60.00	60.00	0.00
180	98.00	-82.70	10.00	60.00	60.00	0.00
181	99.00	-83.70	10.00	60.00	60.00	0.00
182	100.00	-84.70	10.00	60.00	60.00	0.00

Drilled Shaft Capacity (sorted by shaft diameter):

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	98.753	98.753
2	48.00	11.00	0.212	82.976	83.188
3	48.00	12.00	0.841	67.199	68.040
4	48.00	13.00	1.863	52.062	53.925
5	48.00	14.00	3.270	38.208	41.478
6	48.00	15.00	5.025	31.970	36.995
7	48.00	16.00	7.102	100.177	107.278
8	48.00	17.00	9.484	90.838	100.322
9	48.00	18.00	12.166	77.955	90.121
10	48.00	19.00	12.166	7.069	19.235
11	48.00	20.00	12.166	9.896	22.062
12	48.00	21.00	12.166	15.174	27.340
13	48.00	22.00	12.166	21.771	33.937
14	48.00	23.00	43.582	157.080	200.661
15	48.00	24.00	106.414	157.080	263.493
16	48.00	25.00	169.246	157.080	326.325
17	48.00	26.00	232.077	157.080	389.157
18	48.00	27.00	294.909	157.080	451.989
19	48.00	28.00	357.741	157.080	514.821
20	48.00	29.00	420.573	157.080	577.653
21	48.00	30.00	483.405	157.080	640.484
22	48.00	31.00	546.237	157.080	703.316
23	48.00	32.00	609.069	157.080	766.148
24	48.00	33.00	643.768	227.354	871.122
25	48.00	34.00	650.481	231.873	882.354
26	48.00	35.00	657.385	236.392	893.777
27	48.00	36.00	664.465	240.923	905.388
28	48.00	37.00	671.718	245.479	917.198
29	48.00	38.00	706.825	157.080	863.904
30	48.00	39.00	769.656	157.080	926.736
31	48.00	40.00	832.488	157.080	989.568
32	48.00	41.00	895.320	157.080	1052.400
33	48.00	42.00	958.152	157.080	1115.232
34	48.00	43.00	1020.984	157.080	1178.064
35	48.00	44.00	1083.816	157.080	1240.895
36	48.00	45.00	1146.648	157.080	1303.727
37	48.00	46.00	1209.479	157.080	1366.559
38	48.00	47.00	1272.311	157.080	1429.391
39	48.00	48.00	1308.082	173.280	1481.362
40	48.00	49.00	1316.840	175.772	1492.612
41	48.00	50.00	1325.658	196.379	1522.037
42	48.00	51.00	1325.658	198.670	1524.328
43	48.00	52.00	1325.658	200.960	1526.619
44	48.00	53.00	1325.658	203.472	1529.130
45	48.00	54.00	1325.658	206.279	1531.937
46	48.00	55.00	1338.617	209.602	1548.219
47	48.00	56.00	1351.577	213.985	1565.562
48	48.00	57.00	1364.536	216.638	1581.174
49	48.00	58.00	1382.058	140.241	1522.299
50	48.00	59.00	1404.142	140.241	1544.383
51	48.00	60.00	1432.682	157.080	1589.761
52	48.00	61.00	1514.935	157.080	1672.014
53	48.00	62.00	1587.477	157.080	1744.557
54	48.00	63.00	1650.309	157.080	1807.389
55	48.00	64.00	1713.141	157.080	1870.221
56	48.00	65.00	1775.973	157.080	1933.053
57	48.00	66.00	1838.805	157.080	1995.884
58	48.00	67.00	1901.637	157.080	2058.716
59	48.00	68.00	1964.468	157.080	2121.548
60	48.00	69.00	2027.300	157.080	2184.380
61	48.00	70.00	2090.132	157.080	2247.212
62	48.00	71.00	2152.964	157.080	2310.044
63	48.00	72.00	2215.796	157.080	2372.876
64	48.00	73.00	2278.628	157.080	2435.707

65	48.00	74.00	2341.460	157.080	2498.539
66	48.00	75.00	2404.291	157.080	2561.371
67	48.00	76.00	2467.123	157.080	2624.203
68	48.00	77.00	2529.955	157.080	2687.035
69	48.00	78.00	2592.787	157.080	2749.867
70	48.00	79.00	2655.619	157.080	2812.699
71	48.00	80.00	2718.451	157.080	2875.530
72	48.00	81.00	2781.283	157.080	2938.362
73	48.00	82.00	2844.114	157.080	3001.194
74	48.00	83.00	2906.946	157.080	3064.026
75	48.00	84.00	2969.778	157.080	3126.858
76	48.00	85.00	3032.610	157.080	3189.690
77	48.00	86.00	3095.442	157.080	3252.521
78	48.00	87.00	3158.274	157.080	3315.353
79	48.00	88.00	3221.106	157.080	3378.185
80	48.00	89.00	3283.937	157.080	3441.017
81	48.00	90.00	3346.769	157.080	3503.849
82	48.00	91.00	3409.601	157.080	3566.681
83	48.00	92.00	3472.433	157.080	3629.513
84	48.00	93.00	3535.265	157.080	3692.344
85	48.00	94.00	3598.097	157.080	3755.176
86	48.00	95.00	3660.929	157.080	3818.008
87	48.00	96.00	3723.760	157.080	3880.840
88	48.00	97.00	3786.592	157.080	3943.672
89	48.00	98.00	3849.424	157.080	4006.504
90	48.00	99.00	3912.256	157.080	4069.336
91	48.00	100.00	Soil Elevations Must Extend At or Below Contribution		

Zone

=== Shaft diameter = 60.0(in) ===

92	60.00	10.00	0.000	102.868	102.868
93	60.00	11.00	0.265	86.948	87.214
94	60.00	12.00	1.051	72.060	73.112
95	60.00	13.00	2.328	59.934	62.263
96	60.00	14.00	4.088	48.188	52.276
97	60.00	15.00	6.281	41.628	47.909
98	60.00	16.00	8.877	33.049	41.926
99	60.00	17.00	11.855	21.904	33.759
100	60.00	18.00	15.207	121.805	137.013
101	60.00	19.00	15.207	11.045	26.252
102	60.00	20.00	15.207	15.463	30.670
103	60.00	21.00	15.207	23.709	38.917
104	60.00	22.00	15.207	34.018	49.225
105	60.00	23.00	54.477	245.437	299.914
106	60.00	24.00	133.017	245.437	378.454
107	60.00	25.00	211.557	245.437	456.994
108	60.00	26.00	290.097	245.437	535.534
109	60.00	27.00	368.637	245.437	614.074
110	60.00	28.00	447.176	245.437	692.613
111	60.00	29.00	525.716	245.437	771.153
112	60.00	30.00	604.256	245.437	849.693
113	60.00	31.00	682.796	245.437	928.233
114	60.00	32.00	761.336	245.437	1006.773
115	60.00	33.00	804.710	277.734	1082.443
116	60.00	34.00	813.101	282.441	1095.542
117	60.00	35.00	821.731	287.148	1108.879
118	60.00	36.00	830.581	291.868	1122.448
119	60.00	37.00	839.648	296.614	1136.262
120	60.00	38.00	883.531	245.437	1128.968
121	60.00	39.00	962.071	245.437	1207.508
122	60.00	40.00	1040.610	245.437	1286.047
123	60.00	41.00	1119.150	245.437	1364.587
124	60.00	42.00	1197.690	245.437	1443.127
125	60.00	43.00	1276.230	245.437	1521.667
126	60.00	44.00	1354.770	245.437	1600.207
127	60.00	45.00	1433.310	245.437	1678.746
128	60.00	46.00	1511.849	245.437	1757.286
129	60.00	47.00	1590.389	245.437	1835.826
130	60.00	48.00	1635.102	225.300	1860.403
131	60.00	49.00	1646.050	227.896	1873.946
132	60.00	50.00	1657.073	294.561	1951.634
133	60.00	51.00	1657.073	297.425	1954.498
134	60.00	52.00	1657.073	300.288	1957.361
135	60.00	53.00	1657.073	303.427	1960.500
136	60.00	54.00	1657.073	308.493	1965.566
137	60.00	55.00	1657.073	315.763	1972.836
138	60.00	56.00	1673.272	321.242	1994.514
139	60.00	57.00	1689.471	327.169	2016.640
140	60.00	58.00	1711.374	182.605	1893.979
141	60.00	59.00	1738.979	182.605	1921.584
142	60.00	60.00	1766.575	245.437	2012.012
143	60.00	61.00	1869.392	245.437	2114.829
144	60.00	62.00	1972.208	245.437	2217.645
145	60.00	63.00	2062.887	245.437	2308.323
146	60.00	64.00	2141.426	245.437	2386.863
147	60.00	65.00	2219.966	245.437	2465.403
148	60.00	66.00	2298.506	245.437	2543.943
149	60.00	67.00	2377.046	245.437	2622.483
150	60.00	68.00	2455.586	245.437	2701.023
151	60.00	69.00	2534.125	245.437	2779.562
152	60.00	70.00	2612.665	245.437	2858.102
153	60.00	71.00	2691.205	245.437	2936.642
154	60.00	72.00	2769.745	245.437	3015.182
155	60.00	73.00	2848.285	245.437	3093.722
156	60.00	74.00	2926.825	245.437	3172.261
157	60.00	75.00	3005.364	245.437	3250.801
158	60.00	76.00	3083.904	245.437	3329.341
159	60.00	77.00	3162.444	245.437	3407.881
160	60.00	78.00	3240.984	245.437	3486.421
161	60.00	79.00	3319.524	245.437	3564.961
162	60.00	80.00	3398.063	245.437	3643.500

163	60.00	81.00	3476.603	245.437	3722.040
164	60.00	82.00	3555.143	245.437	3800.580
165	60.00	83.00	3633.683	245.437	3879.120
166	60.00	84.00	3712.223	245.437	3957.660
167	60.00	85.00	3790.762	245.437	4036.199
168	60.00	86.00	3869.302	245.437	4114.739
169	60.00	87.00	3947.842	245.437	4193.279
170	60.00	88.00	4026.382	245.437	4271.819
171	60.00	89.00	4104.922	245.437	4350.359
172	60.00	90.00	4183.462	245.437	4428.898
173	60.00	91.00	4262.001	245.437	4507.438
174	60.00	92.00	4340.541	245.437	4585.978
175	60.00	93.00	4419.081	245.437	4664.518
176	60.00	94.00	4497.621	245.437	4743.058
177	60.00	95.00	4576.161	245.437	4821.598
178	60.00	96.00	4654.700	245.437	4900.137
179	60.00	97.00	4733.240	245.437	4978.677
180	60.00	98.00	4811.780	245.437	5057.217
181	60.00	99.00	4890.320	245.437	5135.757
182	60.00	100.00	Soil Elevations Must Extend At or Below Contribution		

Zone

Drilled Shaft Capacity at User-Defined Settlement (sorted by shaft diameter):

***** Capacity is NOT modified by the strength reduction factors *****

User-Defined Settlement = 2.40%

ID	Diameter (in)	Length (ft)	Skin Fric. (tons)	End Bearing (tons)	Capacity (tons)
1	48.00	10.00	0.000	61.465	61.465
2	48.00	11.00	0.208	51.645	51.853
3	48.00	12.00	0.823	41.825	42.648
4	48.00	13.00	1.822	32.404	34.226
5	48.00	14.00	3.199	23.781	26.980
6	48.00	15.00	4.915	19.899	24.813
7	48.00	16.00	6.946	62.351	69.297
8	48.00	17.00	9.276	56.539	65.815
9	48.00	18.00	11.900	67.166	79.066
10	48.00	19.00	11.900	6.090	17.990
11	48.00	20.00	11.900	8.526	20.426
12	48.00	21.00	11.900	13.074	24.973
13	48.00	22.00	11.900	18.758	30.658
14	48.00	23.00	42.923	2361.265	2404.188
15	48.00	24.00	102.708	1131.028	1233.736
16	48.00	25.00	159.666	803.221	962.886
17	48.00	26.00	214.006	641.105	855.110
18	48.00	27.00	265.916	541.754	807.670
19	48.00	28.00	315.567	473.600	789.167
20	48.00	29.00	363.109	423.451	786.559
21	48.00	30.00	408.684	384.737	793.420
22	48.00	31.00	454.945	367.729	822.674
23	48.00	32.00	502.744	365.896	868.640
24	48.00	33.00	529.593	141.508	671.102
25	48.00	34.00	536.159	144.321	680.480
26	48.00	35.00	542.912	147.133	690.046
27	48.00	36.00	549.837	149.954	699.791
28	48.00	37.00	556.932	152.790	709.722
29	48.00	38.00	584.069	363.695	947.764
30	48.00	39.00	630.643	361.244	991.887
31	48.00	40.00	676.602	358.624	1035.226
32	48.00	41.00	721.986	355.891	1077.878
33	48.00	42.00	766.822	353.088	1119.910
34	48.00	43.00	811.133	350.242	1161.375
35	48.00	44.00	854.943	347.375	1202.318
36	48.00	45.00	898.271	344.503	1242.774
37	48.00	46.00	941.137	341.637	1282.774
38	48.00	47.00	983.557	338.786	1322.344
39	48.00	48.00	1008.865	107.852	1116.717
40	48.00	49.00	1017.431	109.403	1126.834
41	48.00	50.00	1026.057	169.199	1195.256
42	48.00	51.00	1026.057	171.173	1197.229
43	48.00	52.00	1026.057	173.146	1199.203
44	48.00	53.00	1026.057	175.310	1201.367
45	48.00	54.00	1026.057	177.728	1203.785
46	48.00	55.00	1036.852	180.592	1217.443
47	48.00	56.00	1047.647	184.368	1232.015
48	48.00	57.00	1058.442	186.654	1245.095
49	48.00	58.00	1073.700	87.288	1160.988
50	48.00	59.00	1093.420	87.288	1180.708
51	48.00	60.00	1118.517	337.369	1455.886
52	48.00	61.00	1176.922	334.552	1511.474
53	48.00	62.00	1226.843	331.763	1558.606
54	48.00	63.00	1268.293	329.005	1597.298
55	48.00	64.00	1309.372	326.279	1635.651
56	48.00	65.00	1350.093	323.587	1673.679
57	48.00	66.00	1390.465	320.929	1711.395
58	48.00	67.00	1430.499	318.307	1748.807
59	48.00	68.00	1470.206	315.721	1785.926
60	48.00	69.00	1509.593	313.169	1822.762
61	48.00	70.00	1548.669	310.653	1859.322
62	48.00	71.00	1587.444	308.171	1895.615
63	48.00	72.00	1625.925	305.724	1931.648
64	48.00	73.00	1664.119	303.310	1967.429
65	48.00	74.00	1702.034	300.929	2002.963
66	48.00	75.00	1739.677	298.580	2038.257
67	48.00	76.00	1777.054	296.263	2073.317

68	48.00	77.00	1814.172	293.977	2108.149
69	48.00	78.00	1851.037	291.721	2142.758
70	48.00	79.00	1887.655	289.494	2177.149
71	48.00	80.00	1924.031	287.297	2211.328
72	48.00	81.00	1960.172	285.127	2245.299
73	48.00	82.00	1996.081	282.985	2279.066
74	48.00	83.00	2031.765	280.870	2312.634
75	48.00	84.00	2067.228	278.780	2346.008
76	48.00	85.00	2102.475	276.716	2379.191
77	48.00	86.00	2137.510	274.677	2412.187
78	48.00	87.00	2172.338	272.662	2445.001
79	48.00	88.00	2206.964	270.671	2477.635
80	48.00	89.00	2241.391	268.702	2510.093
81	48.00	90.00	2275.623	266.756	2542.379
82	48.00	91.00	2309.664	264.832	2574.496
83	48.00	92.00	2343.518	262.929	2606.447
84	48.00	93.00	2377.188	261.047	2638.235
85	48.00	94.00	2410.679	259.185	2669.863
86	48.00	95.00	2443.993	257.343	2701.335
87	48.00	96.00	2477.133	255.520	2732.653
88	48.00	97.00	2510.104	253.716	2763.820
89	48.00	98.00	2542.908	251.930	2794.838
90	48.00	99.00	2575.548	250.162	2825.710
91	48.00	100.00	Soil Elevations Must Extend At or Below Contribution		

Zone

=== Shaft diameter = 60.0(in) ===

92	60.00	10.00	0.000	64.026	64.026
93	60.00	11.00	0.260	54.118	54.377
94	60.00	12.00	1.028	44.851	45.879
95	60.00	13.00	2.277	37.304	39.581
96	60.00	14.00	3.999	29.993	33.991
97	60.00	15.00	6.144	25.910	32.053
98	60.00	16.00	8.683	20.570	29.253
99	60.00	17.00	11.595	13.633	25.229
100	60.00	18.00	14.875	104.947	119.821
101	60.00	19.00	14.875	9.516	24.391
102	60.00	20.00	14.875	13.322	28.197
103	60.00	21.00	14.875	20.428	35.302
104	60.00	22.00	14.875	29.309	44.184
105	60.00	23.00	53.751	4284.444	4338.195
106	60.00	24.00	129.219	2052.217	2181.436
107	60.00	25.00	201.799	1457.420	1659.218
108	60.00	26.00	271.666	1163.265	1434.931
109	60.00	27.00	338.982	982.997	1321.978
110	60.00	28.00	403.895	859.333	1263.228
111	60.00	29.00	466.539	768.338	1234.877
112	60.00	30.00	527.042	698.093	1225.135
113	60.00	31.00	585.519	641.939	1227.458
114	60.00	32.00	642.080	595.840	1237.920
115	60.00	33.00	673.687	172.865	846.552
116	60.00	34.00	681.895	175.795	857.690
117	60.00	35.00	690.336	178.724	869.060
118	60.00	36.00	698.992	181.662	880.654
119	60.00	37.00	707.861	184.616	892.477
120	60.00	38.00	742.711	574.821	1317.532
121	60.00	39.00	802.846	572.642	1375.488
122	60.00	40.00	862.290	570.052	1432.342
123	60.00	41.00	921.086	567.159	1488.245
124	60.00	42.00	979.264	564.044	1543.308
125	60.00	43.00	1036.849	560.768	1597.617
126	60.00	44.00	1093.867	557.375	1651.242
127	60.00	45.00	1150.339	553.901	1704.240
128	60.00	46.00	1206.287	550.371	1756.657
129	60.00	47.00	1261.729	546.806	1808.534
130	60.00	48.00	1294.590	140.230	1434.820
131	60.00	49.00	1305.298	141.846	1447.144
132	60.00	50.00	1316.080	253.792	1569.872
133	60.00	51.00	1316.080	256.259	1572.339
134	60.00	52.00	1316.080	258.726	1574.806
135	60.00	53.00	1316.080	261.431	1577.511
136	60.00	54.00	1316.080	265.796	1581.876
137	60.00	55.00	1316.080	272.059	1588.139
138	60.00	56.00	1329.573	276.780	1606.354
139	60.00	57.00	1343.067	281.887	1624.954
140	60.00	58.00	1362.141	113.656	1475.796
141	60.00	59.00	1386.790	113.656	1500.446
142	60.00	60.00	1411.432	545.015	1956.447
143	60.00	61.00	1486.892	541.427	2028.319
144	60.00	62.00	1561.903	537.837	2099.740
145	60.00	63.00	1626.366	534.255	2160.621
146	60.00	64.00	1680.296	530.687	2210.983
147	60.00	65.00	1733.817	527.139	2260.956
148	60.00	66.00	1786.939	523.614	2310.554
149	60.00	67.00	1839.675	520.117	2359.793
150	60.00	68.00	1892.035	516.650	2408.685
151	60.00	69.00	1944.029	513.214	2457.243
152	60.00	70.00	1995.667	509.810	2505.478
153	60.00	71.00	2046.958	506.441	2553.399
154	60.00	72.00	2097.911	503.106	2601.017
155	60.00	73.00	2148.534	499.807	2648.341
156	60.00	74.00	2198.835	496.543	2695.377
157	60.00	75.00	2248.821	493.314	2742.135
158	60.00	76.00	2298.502	490.120	2788.622
159	60.00	77.00	2347.882	486.961	2834.844
160	60.00	78.00	2396.970	483.838	2880.807
161	60.00	79.00	2445.771	480.748	2926.520
162	60.00	80.00	2494.293	477.693	2971.986
163	60.00	81.00	2542.540	474.672	3017.212
164	60.00	82.00	2590.520	471.683	3062.203
165	60.00	83.00	2638.237	468.727	3106.964

166	60.00	84.00	2685.698	465.803	3151.501
167	60.00	85.00	2732.906	462.911	3195.817
168	60.00	86.00	2779.869	460.049	3239.918
169	60.00	87.00	2826.590	457.218	3283.808
170	60.00	88.00	2873.074	454.417	3327.491
171	60.00	89.00	2919.326	451.644	3370.971
172	60.00	90.00	2965.351	448.901	3414.252
173	60.00	91.00	3011.152	446.186	3457.338
174	60.00	92.00	3056.735	443.498	3500.232
175	60.00	93.00	3102.102	440.837	3542.939
176	60.00	94.00	3147.259	438.203	3585.462
177	60.00	95.00	3192.209	435.594	3627.803
178	60.00	96.00	3236.955	433.011	3669.967
179	60.00	97.00	3281.502	430.453	3711.955
180	60.00	98.00	3325.853	427.919	3753.773
181	60.00	99.00	3370.012	425.409	3795.421
182	60.00	100.00	Soil Elevations Must Extend At or Below Contribution Zone		

Florida Bridge Software Institute Date: September 21, 2021
Shaft and Pile Analysis (FB-Deep v.2.05) Time: 12:50:36

General Information:
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Input file: .....reet - LOCHNER\12 - Calculations\FB-Deep\DS\BB-02_DS - Rev.spc
Project number: B-19-051
Job name: THEA Whiting Street
Engineer: Kirk M. Eastman
Units: English

Analysis Information:
==========
Analysis Type: Drilled Shaft Analysis

Soil Information:
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Boring date: 7/1/21
Boring number: BB-02
Station number: 107+56 Offset: 12 LT

Ground Elevation: 16.60(ft)
Water table Elevation = 9.10(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	16.60	N/A	0.00	5- Cavity layer
2	2.00	14.60	N/A	0.00	5- Cavity layer
3	4.00	12.60	N/A	0.00	5- Cavity layer
4	6.00	10.60	N/A	0.00	5- Cavity layer
5	8.00	8.60	N/A	0.00	5- Cavity layer
6	10.00	6.60	N/A	0.00	5- Cavity layer
7	10.00	6.60	N/A	0.00	1- Plastic Clay
8	10.00	6.60	13.00	118.00	3- Clean sand
9	12.00	4.60	13.00	118.00	3- Clean sand
10	14.00	2.60	11.00	117.00	3- Clean sand
11	16.00	0.60	10.00	117.00	3- Clean sand
12	16.00	0.60	N/A	0.00	1- Plastic Clay
13	16.00	0.60	N/A	130.00	4- Lime Stone/Very shelly sand
14	18.00	-1.40	N/A	130.00	4- Lime Stone/Very shelly sand
15	20.00	-3.40	N/A	130.00	4- Lime Stone/Very shelly sand
16	20.00	-3.40	N/A	0.00	1- Plastic Clay
17	20.00	-3.40	N/A	130.00	4- Lime Stone/Very shelly sand
18	22.50	-5.90	N/A	130.00	4- Lime Stone/Very shelly sand
19	25.00	-8.40	N/A	130.00	4- Lime Stone/Very shelly sand
20	25.00	-8.40	N/A	0.00	1- Plastic Clay
21	25.00	-8.40	32.00	125.00	3- Clean sand
22	27.50	-10.90	32.00	125.00	3- Clean sand
23	30.00	-13.40	36.00	125.00	3- Clean sand
24	30.00	-13.40	N/A	0.00	1- Plastic Clay
25	30.00	-13.40	N/A	130.00	4- Lime Stone/Very shelly sand
26	32.50	-15.90	N/A	130.00	4- Lime Stone/Very shelly sand
27	35.00	-18.40	N/A	130.00	4- Lime Stone/Very shelly sand
28	35.00	-18.40	N/A	0.00	2- Clay and silty sand
29	35.00	-18.40	N/A	125.00	1- Plastic Clay
30	37.50	-20.90	N/A	125.00	1- Plastic Clay
31	40.00	-23.40	N/A	125.00	1- Plastic Clay
32	40.00	-23.40	N/A	0.00	2- Clay and silty sand
33	40.00	-23.40	N/A	130.00	4- Lime Stone/Very shelly sand
34	42.50	-25.90	N/A	130.00	4- Lime Stone/Very shelly sand
35	45.00	-28.40	N/A	130.00	4- Lime Stone/Very shelly sand
36	47.50	-30.90	N/A	130.00	4- Lime Stone/Very shelly sand
37	50.00	-33.40	N/A	130.00	4- Lime Stone/Very shelly sand
38	50.00	-33.40	N/A	0.00	2- Clay and silty sand
39	50.00	-33.40	N/A	125.00	1- Plastic Clay
40	52.50	-35.90	N/A	125.00	1- Plastic Clay
41	55.00	-38.40	N/A	125.00	1- Plastic Clay
42	55.00	-38.40	0.00	0.00	3- Clean sand
43	55.00	-38.40	N/A	130.00	4- Lime Stone/Very shelly sand
44	57.50	-40.90	N/A	130.00	4- Lime Stone/Very shelly sand
45	57.50	-40.90	N/A	0.00	1- Plastic Clay
46	57.50	-40.90	N/A	125.00	2- Clay and silty sand
47	60.00	-43.40	N/A	125.00	2- Clay and silty sand
48	60.00	-43.40	N/A	0.00	1- Plastic Clay
49	60.00	-43.40	N/A	130.00	4- Lime Stone/Very shelly sand
50	62.50	-45.90	N/A	130.00	4- Lime Stone/Very shelly sand
51	65.00	-48.40	N/A	130.00	4- Lime Stone/Very shelly sand
52	67.50	-50.90	N/A	130.00	4- Lime Stone/Very shelly sand
53	70.00	-53.40	N/A	130.00	4- Lime Stone/Very shelly sand
54	72.50	-55.90	N/A	125.00	4- Lime Stone/Very shelly sand
55	72.50	-55.90	N/A	0.00	2- Clay and silty sand
56	72.50	-55.90	N/A	130.00	1- Plastic Clay
57	75.00	-58.40	N/A	130.00	1- Plastic Clay
58	75.00	-58.40	N/A	0.00	2- Clay and silty sand
59	75.00	-58.40	N/A	130.00	4- Lime Stone/Very shelly sand
60	77.50	-60.90	N/A	130.00	4- Lime Stone/Very shelly sand
61	80.00	-63.40	N/A	130.00	4- Lime Stone/Very shelly sand
62	82.50	-65.90	N/A	130.00	4- Lime Stone/Very shelly sand
63	85.00	-68.40	N/A	130.00	4- Lime Stone/Very shelly sand
64	87.50	-70.90	N/A	130.00	4- Lime Stone/Very shelly sand

65	90.00	-73.40	N/A	130.00	4- Lime Stone/Very shelly sand
66	92.50	-75.90	N/A	130.00	4- Lime Stone/Very shelly sand
67	95.00	-78.40	N/A	130.00	4- Lime Stone/Very shelly sand
68	97.50	-80.90	N/A	130.00	4- Lime Stone/Very shelly sand
69	100.00	-83.40	N/A	130.00	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	0.00	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	0.00	N/A	N/A	N/A	N/A
13	N/A	25.00	4.00	39.93	12.50
14	N/A	25.00	4.00	39.93	12.50
15	N/A	25.00	4.00	39.93	12.50
16	0.00	N/A	N/A	N/A	N/A
17	N/A	25.00	4.00	39.93	12.50
18	N/A	25.00	4.00	39.93	12.50
19	N/A	25.00	4.00	39.93	12.50
20	0.00	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	0.00	N/A	N/A	N/A	N/A
25	N/A	25.00	4.00	39.93	12.50
26	N/A	25.00	4.00	39.93	12.50
27	N/A	25.00	4.00	39.93	12.50
28	0.00	N/A	N/A	N/A	N/A
29	1.88	N/A	N/A	N/A	N/A
30	1.88	N/A	N/A	N/A	N/A
31	1.88	N/A	N/A	N/A	N/A
32	0.00	N/A	N/A	N/A	N/A
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	0.00	N/A	N/A	N/A	N/A
39	1.88	N/A	N/A	N/A	N/A
40	1.88	N/A	N/A	N/A	N/A
41	1.88	N/A	N/A	N/A	N/A
42	N/A	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	0.00	N/A	N/A	N/A	N/A
46	0.00	N/A	N/A	N/A	N/A
47	0.00	N/A	N/A	N/A	N/A
48	0.00	N/A	N/A	N/A	N/A
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	0.00	N/A	N/A	N/A	N/A
56	1.88	N/A	N/A	N/A	N/A
57	1.88	N/A	N/A	N/A	N/A
58	0.00	N/A	N/A	N/A	N/A
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
63	N/A	25.00	4.00	39.93	12.50
64	N/A	25.00	4.00	39.93	12.50
65	N/A	25.00	4.00	39.93	12.50
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

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	1.00	ROUGH	1.000	
14	1.00	ROUGH	1.000	
15	1.00	ROUGH	1.000	
16	N/A	N/A	N/A	
17	1.00	ROUGH	1.000	
18	1.00	ROUGH	1.000	

19	1.00	ROUGH	1.000
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	1.00	ROUGH	1.000
26	1.00	ROUGH	1.000
27	1.00	ROUGH	1.000
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	1.00	ROUGH	1.000
34	1.00	ROUGH	1.000
35	1.00	ROUGH	1.000
36	1.00	ROUGH	1.000
37	1.00	ROUGH	1.000
38	N/A	N/A	N/A
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	1.00	ROUGH	1.000
44	1.00	ROUGH	1.000
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	1.00	ROUGH	1.000
50	1.00	ROUGH	1.000
51	1.00	ROUGH	1.000
52	1.00	ROUGH	1.000
53	1.00	ROUGH	1.000
54	1.00	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	1.00	ROUGH	1.000
60	1.00	ROUGH	1.000
61	1.00	ROUGH	1.000
62	1.00	ROUGH	1.000
63	1.00	ROUGH	1.000
64	1.00	ROUGH	1.000
65	1.00	ROUGH	1.000
66	1.00	ROUGH	1.000
67	1.00	ROUGH	1.000
68	1.00	ROUGH	1.000
69	1.00	ROUGH	1.000

Drilled Shaft Data:
==========
Unit weight of concrete = 150.00(pcf), Concrete Slump = 8.50(in)
Modulus of Elasticity of concrete = 3640.00(ksi)

Shaft Geometry:

ID	Length (ft)	Tip Elev. (ft)	Case Len. (ft)	Diameter (in)	Base Diam. (in)	Bell Len. (ft)
1	10.00	6.60	10.00	48.00	48.00	0.00
2	11.00	5.60	10.00	48.00	48.00	0.00
3	12.00	4.60	10.00	48.00	48.00	0.00
4	13.00	3.60	10.00	48.00	48.00	0.00
5	14.00	2.60	10.00	48.00	48.00	0.00
6	15.00	1.60	10.00	48.00	48.00	0.00
7	16.00	0.60	10.00	48.00	48.00	0.00
8	17.00	-0.40	10.00	48.00	48.00	0.00
9	18.00	-1.40	10.00	48.00	48.00	0.00
10	19.00	-2.40	10.00	48.00	48.00	0.00
11	20.00	-3.40	10.00	48.00	48.00	0.00
12	21.00	-4.40	10.00	48.00	48.00	0.00
13	22.00	-5.40	10.00	48.00	48.00	0.00
14	23.00	-6.40	10.00	48.00	48.00	0.00
15	24.00	-7.40	10.00	48.00	48.00	0.00
16	25.00	-8.40	10.00	48.00	48.00	0.00
17	26.00	-9.40	10.00	48.00	48.00	0.00
18	27.00	-10.40	10.00	48.00	48.00	0.00
19	28.00	-11.40	10.00	48.00	48.00	0.00
20	29.00	-12.40	10.00	48.00	48.00	0.00
21	30.00	-13.40	10.00	48.00	48.00	0.00
22	31.00	-14.40	10.00	48.00	48.00	0.00
23	32.00	-15.40	10.00	48.00	48.00	0.00
24	33.00	-16.40	10.00	48.00	48.00	0.00
25	34.00	-17.40	10.00	48.00	48.00	0.00
26	35.00	-18.40	10.00	48.00	48.00	0.00
27	36.00	-19.40	10.00	48.00	48.00	0.00
28	37.00	-20.40	10.00	48.00	48.00	0.00
29	38.00	-21.40	10.00	48.00	48.00	0.00
30	39.00	-22.40	10.00	48.00	48.00	0.00
31	40.00	-23.40	10.00	48.00	48.00	0.00
32	41.00	-24.40	10.00	48.00	48.00	0.00
33	42.00	-25.40	10.00	48.00	48.00	0.00
34	43.00	-26.40	10.00	48.00	48.00	0.00
35	44.00	-27.40	10.00	48.00	48.00	0.00
36	45.00	-28.40	10.00	48.00	48.00	0.00
37	46.00	-29.40	10.00	48.00	48.00	0.00

38	47.00	-30.40	10.00	48.00	48.00	0.00
39	48.00	-31.40	10.00	48.00	48.00	0.00
40	49.00	-32.40	10.00	48.00	48.00	0.00
41	50.00	-33.40	10.00	48.00	48.00	0.00
42	51.00	-34.40	10.00	48.00	48.00	0.00
43	52.00	-35.40	10.00	48.00	48.00	0.00
44	53.00	-36.40	10.00	48.00	48.00	0.00
45	54.00	-37.40	10.00	48.00	48.00	0.00
46	55.00	-38.40	10.00	48.00	48.00	0.00
47	56.00	-39.40	10.00	48.00	48.00	0.00
48	57.00	-40.40	10.00	48.00	48.00	0.00
49	58.00	-41.40	10.00	48.00	48.00	0.00
50	59.00	-42.40	10.00	48.00	48.00	0.00
51	60.00	-43.40	10.00	48.00	48.00	0.00
52	61.00	-44.40	10.00	48.00	48.00	0.00
53	62.00	-45.40	10.00	48.00	48.00	0.00
54	63.00	-46.40	10.00	48.00	48.00	0.00
55	64.00	-47.40	10.00	48.00	48.00	0.00
56	65.00	-48.40	10.00	48.00	48.00	0.00
57	66.00	-49.40	10.00	48.00	48.00	0.00
58	67.00	-50.40	10.00	48.00	48.00	0.00
59	68.00	-51.40	10.00	48.00	48.00	0.00
60	69.00	-52.40	10.00	48.00	48.00	0.00
61	70.00	-53.40	10.00	48.00	48.00	0.00
62	71.00	-54.40	10.00	48.00	48.00	0.00
63	72.00	-55.40	10.00	48.00	48.00	0.00
64	73.00	-56.40	10.00	48.00	48.00	0.00
65	74.00	-57.40	10.00	48.00	48.00	0.00
66	75.00	-58.40	10.00	48.00	48.00	0.00
67	76.00	-59.40	10.00	48.00	48.00	0.00
68	77.00	-60.40	10.00	48.00	48.00	0.00
69	78.00	-61.40	10.00	48.00	48.00	0.00
70	79.00	-62.40	10.00	48.00	48.00	0.00
71	80.00	-63.40	10.00	48.00	48.00	0.00
72	81.00	-64.40	10.00	48.00	48.00	0.00
73	82.00	-65.40	10.00	48.00	48.00	0.00
74	83.00	-66.40	10.00	48.00	48.00	0.00
75	84.00	-67.40	10.00	48.00	48.00	0.00
76	85.00	-68.40	10.00	48.00	48.00	0.00
77	86.00	-69.40	10.00	48.00	48.00	0.00
78	87.00	-70.40	10.00	48.00	48.00	0.00
79	88.00	-71.40	10.00	48.00	48.00	0.00
80	89.00	-72.40	10.00	48.00	48.00	0.00
81	90.00	-73.40	10.00	48.00	48.00	0.00
82	91.00	-74.40	10.00	48.00	48.00	0.00
83	92.00	-75.40	10.00	48.00	48.00	0.00
84	93.00	-76.40	10.00	48.00	48.00	0.00
85	94.00	-77.40	10.00	48.00	48.00	0.00
86	95.00	-78.40	10.00	48.00	48.00	0.00
87	96.00	-79.40	10.00	48.00	48.00	0.00
88	97.00	-80.40	10.00	48.00	48.00	0.00
89	98.00	-81.40	10.00	48.00	48.00	0.00
90	99.00	-82.40	10.00	48.00	48.00	0.00
91	100.00	-83.40	10.00	48.00	48.00	0.00
92	10.00	6.60	10.00	60.00	60.00	0.00
93	11.00	5.60	10.00	60.00	60.00	0.00
94	12.00	4.60	10.00	60.00	60.00	0.00
95	13.00	3.60	10.00	60.00	60.00	0.00
96	14.00	2.60	10.00	60.00	60.00	0.00
97	15.00	1.60	10.00	60.00	60.00	0.00
98	16.00	0.60	10.00	60.00	60.00	0.00
99	17.00	-0.40	10.00	60.00	60.00	0.00
100	18.00	-1.40	10.00	60.00	60.00	0.00
101	19.00	-2.40	10.00	60.00	60.00	0.00
102	20.00	-3.40	10.00	60.00	60.00	0.00
103	21.00	-4.40	10.00	60.00	60.00	0.00
104	22.00	-5.40	10.00	60.00	60.00	0.00
105	23.00	-6.40	10.00	60.00	60.00	0.00
106	24.00	-7.40	10.00	60.00	60.00	0.00
107	25.00	-8.40	10.00	60.00	60.00	0.00
108	26.00	-9.40	10.00	60.00	60.00	0.00
109	27.00	-10.40	10.00	60.00	60.00	0.00
110	28.00	-11.40	10.00	60.00	60.00	0.00
111	29.00	-12.40	10.00	60.00	60.00	0.00
112	30.00	-13.40	10.00	60.00	60.00	0.00
113	31.00	-14.40	10.00	60.00	60.00	0.00
114	32.00	-15.40	10.00	60.00	60.00	0.00
115	33.00	-16.40	10.00	60.00	60.00	0.00
116	34.00	-17.40	10.00	60.00	60.00	0.00
117	35.00	-18.40	10.00	60.00	60.00	0.00
118	36.00	-19.40	10.00	60.00	60.00	0.00
119	37.00	-20.40	10.00	60.00	60.00	0.00
120	38.00	-21.40	10.00	60.00	60.00	0.00
121	39.00	-22.40	10.00	60.00	60.00	0.00
122	40.00	-23.40	10.00	60.00	60.00	0.00
123	41.00	-24.40	10.00	60.00	60.00	0.00
124	42.00	-25.40	10.00	60.00	60.00	0.00
125	43.00	-26.40	10.00	60.00	60.00	0.00
126	44.00	-27.40	10.00	60.00	60.00	0.00
127	45.00	-28.40	10.00	60.00	60.00	0.00
128	46.00	-29.40	10.00	60.00	60.00	0.00
129	47.00	-30.40	10.00	60.00	60.00	0.00
130	48.00	-31.40	10.00	60.00	60.00	0.00
131	49.00	-32.40	10.00	60.00	60.00	0.00
132	50.00	-33.40	10.00	60.00	60.00	0.00
133	51.00	-34.40	10.00	60.00	60.00	0.00
134	52.00	-35.40	10.00	60.00	60.00	0.00
135	53.00	-36.40	10.00	60.00	60.00	0.00
136	54.00	-37.40	10.00	60.00	60.00	0.00
137	55.00	-38.40	10.00	60.00	60.00	0.00

138	56.00	-39.40	10.00	60.00	60.00	0.00
139	57.00	-40.40	10.00	60.00	60.00	0.00
140	58.00	-41.40	10.00	60.00	60.00	0.00
141	59.00	-42.40	10.00	60.00	60.00	0.00
142	60.00	-43.40	10.00	60.00	60.00	0.00
143	61.00	-44.40	10.00	60.00	60.00	0.00
144	62.00	-45.40	10.00	60.00	60.00	0.00
145	63.00	-46.40	10.00	60.00	60.00	0.00
146	64.00	-47.40	10.00	60.00	60.00	0.00
147	65.00	-48.40	10.00	60.00	60.00	0.00
148	66.00	-49.40	10.00	60.00	60.00	0.00
149	67.00	-50.40	10.00	60.00	60.00	0.00
150	68.00	-51.40	10.00	60.00	60.00	0.00
151	69.00	-52.40	10.00	60.00	60.00	0.00
152	70.00	-53.40	10.00	60.00	60.00	0.00
153	71.00	-54.40	10.00	60.00	60.00	0.00
154	72.00	-55.40	10.00	60.00	60.00	0.00
155	73.00	-56.40	10.00	60.00	60.00	0.00
156	74.00	-57.40	10.00	60.00	60.00	0.00
157	75.00	-58.40	10.00	60.00	60.00	0.00
158	76.00	-59.40	10.00	60.00	60.00	0.00
159	77.00	-60.40	10.00	60.00	60.00	0.00
160	78.00	-61.40	10.00	60.00	60.00	0.00
161	79.00	-62.40	10.00	60.00	60.00	0.00
162	80.00	-63.40	10.00	60.00	60.00	0.00
163	81.00	-64.40	10.00	60.00	60.00	0.00
164	82.00	-65.40	10.00	60.00	60.00	0.00
165	83.00	-66.40	10.00	60.00	60.00	0.00
166	84.00	-67.40	10.00	60.00	60.00	0.00
167	85.00	-68.40	10.00	60.00	60.00	0.00
168	86.00	-69.40	10.00	60.00	60.00	0.00
169	87.00	-70.40	10.00	60.00	60.00	0.00
170	88.00	-71.40	10.00	60.00	60.00	0.00
171	89.00	-72.40	10.00	60.00	60.00	0.00
172	90.00	-73.40	10.00	60.00	60.00	0.00
173	91.00	-74.40	10.00	60.00	60.00	0.00
174	92.00	-75.40	10.00	60.00	60.00	0.00
175	93.00	-76.40	10.00	60.00	60.00	0.00
176	94.00	-77.40	10.00	60.00	60.00	0.00
177	95.00	-78.40	10.00	60.00	60.00	0.00
178	96.00	-79.40	10.00	60.00	60.00	0.00
179	97.00	-80.40	10.00	60.00	60.00	0.00
180	98.00	-81.40	10.00	60.00	60.00	0.00
181	99.00	-82.40	10.00	60.00	60.00	0.00
182	100.00	-83.40	10.00	60.00	60.00	0.00

Drilled Shaft Capacity (sorted by shaft diameter):

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	55.317	55.317
2	48.00	11.00	0.186	54.226	54.412
3	48.00	12.00	0.735	52.590	53.325
4	48.00	13.00	1.628	50.642	52.271
5	48.00	14.00	2.859	49.084	51.943
6	48.00	15.00	4.266	47.916	52.181
7	48.00	16.00	5.952	157.080	163.032
8	48.00	17.00	68.784	157.080	225.863
9	48.00	18.00	131.616	157.080	288.695
10	48.00	19.00	194.448	157.080	351.527
11	48.00	20.00	257.279	157.080	414.359
12	48.00	21.00	320.111	157.080	477.191
13	48.00	22.00	382.943	157.080	540.023
14	48.00	23.00	445.775	157.080	602.855
15	48.00	24.00	508.607	157.080	665.686
16	48.00	25.00	571.439	204.408	775.846
17	48.00	26.00	576.433	207.368	783.801
18	48.00	27.00	581.664	210.329	791.993
19	48.00	28.00	587.124	216.266	803.390
20	48.00	29.00	592.800	220.184	812.984
21	48.00	30.00	598.690	157.080	755.769
22	48.00	31.00	661.522	157.080	818.601
23	48.00	32.00	724.353	157.080	881.433
24	48.00	33.00	787.185	157.080	944.265
25	48.00	34.00	850.017	157.080	1007.097
26	48.00	35.00	912.849	168.533	1081.382
27	48.00	36.00	912.849	170.824	1083.673
28	48.00	37.00	912.849	173.115	1085.964
29	48.00	38.00	912.849	175.406	1088.255
30	48.00	39.00	912.849	177.905	1090.754
31	48.00	40.00	925.808	157.080	1082.888
32	48.00	41.00	1001.599	157.080	1158.679
33	48.00	42.00	1077.390	157.080	1234.470
34	48.00	43.00	1153.181	157.080	1310.260
35	48.00	44.00	1228.972	157.080	1386.051
36	48.00	45.00	1291.804	157.080	1448.883
37	48.00	46.00	1354.635	157.080	1511.715
38	48.00	47.00	1417.467	157.080	1574.547
39	48.00	48.00	1480.299	157.080	1637.379
40	48.00	49.00	1543.131	157.080	1700.211
41	48.00	50.00	1605.963	151.189	1757.152
42	48.00	51.00	1605.963	152.062	1758.025
43	48.00	52.00	1605.963	152.007	1757.970
44	48.00	53.00	1605.963	150.628	1756.591
45	48.00	54.00	1605.963	147.262	1753.225
46	48.00	55.00	1618.922	157.080	1776.002

47	48.00	56.00	1694.713	157.080	1851.793
48	48.00	57.00	1770.504	157.080	1927.583
49	48.00	58.00	1814.879	0.000	1814.879
50	48.00	59.00	1827.838	0.000	1827.838
51	48.00	60.00	1827.838	157.080	1984.918
52	48.00	61.00	1890.670	157.080	2047.749
53	48.00	62.00	1953.502	157.080	2110.581
54	48.00	63.00	2016.333	157.080	2173.413
55	48.00	64.00	2079.165	157.080	2236.245
56	48.00	65.00	2141.997	157.080	2299.077
57	48.00	66.00	2204.829	157.080	2361.909
58	48.00	67.00	2267.661	157.080	2424.740
59	48.00	68.00	2330.493	157.080	2487.572
60	48.00	69.00	2393.325	157.080	2550.404
61	48.00	70.00	2456.156	157.080	2613.236
62	48.00	71.00	2518.988	157.080	2676.068
63	48.00	72.00	2581.820	157.080	2738.900
64	48.00	73.00	2613.236	163.952	2777.188
65	48.00	74.00	2613.236	166.243	2779.479
66	48.00	75.00	2613.236	157.080	2770.316
67	48.00	76.00	2676.068	157.080	2833.148
68	48.00	77.00	2745.379	157.080	2902.459
69	48.00	78.00	2821.170	157.080	2978.250
70	48.00	79.00	2896.961	157.080	3054.041
71	48.00	80.00	2959.793	157.080	3116.873
72	48.00	81.00	3022.625	157.080	3179.704
73	48.00	82.00	3085.457	157.080	3242.536
74	48.00	83.00	3148.289	157.080	3305.368
75	48.00	84.00	3211.120	157.080	3368.200
76	48.00	85.00	3273.952	157.080	3431.032
77	48.00	86.00	3336.784	157.080	3493.864
78	48.00	87.00	3399.616	157.080	3556.696
79	48.00	88.00	3462.448	157.080	3619.527
80	48.00	89.00	3525.280	157.080	3682.359
81	48.00	90.00	3588.112	157.080	3745.191
82	48.00	91.00	3650.943	157.080	3808.023
83	48.00	92.00	3713.775	157.080	3870.855
84	48.00	93.00	3776.607	157.080	3933.687
85	48.00	94.00	3839.439	157.080	3996.519
86	48.00	95.00	3902.271	157.080	4059.350
87	48.00	96.00	3965.103	157.080	4122.182
88	48.00	97.00	4027.934	157.080	4185.014
89	48.00	98.00	4090.766	157.080	4247.846
90	48.00	99.00	4153.598	157.080	4310.678
91	48.00	100.00	Soil Elevations Must Extend At or Below Contribution		

Zone

=== Shaft diameter = 60.0(in) ===

92	60.00	10.00	0.000	72.028	72.028
93	60.00	11.00	0.232	70.607	70.839
94	60.00	12.00	0.919	68.477	69.396
95	60.00	13.00	2.035	65.941	67.976
96	60.00	14.00	3.574	63.912	67.486
97	60.00	15.00	5.332	62.390	67.722
98	60.00	16.00	7.440	245.437	252.877
99	60.00	17.00	85.980	245.437	331.417
100	60.00	18.00	164.520	245.437	409.957
101	60.00	19.00	243.059	245.437	488.496
102	60.00	20.00	321.599	245.437	567.036
103	60.00	21.00	400.139	245.437	645.576
104	60.00	22.00	478.679	245.437	724.116
105	60.00	23.00	557.219	245.437	802.656
106	60.00	24.00	635.759	245.437	881.195
107	60.00	25.00	714.298	253.831	968.129
108	60.00	26.00	720.541	260.494	981.035
109	60.00	27.00	727.081	267.157	994.238
110	60.00	28.00	733.905	272.305	1006.209
111	60.00	29.00	741.000	273.997	1014.997
112	60.00	30.00	748.362	245.437	993.799
113	60.00	31.00	826.902	245.437	1072.339
114	60.00	32.00	905.442	245.437	1150.879
115	60.00	33.00	983.982	245.437	1229.419
116	60.00	34.00	1062.521	245.437	1307.958
117	60.00	35.00	1141.061	259.754	1400.815
118	60.00	36.00	1141.061	264.867	1405.929
119	60.00	37.00	1141.061	267.621	1408.682
120	60.00	38.00	1141.061	269.776	1410.837
121	60.00	39.00	1141.061	272.249	1413.310
122	60.00	40.00	1141.061	245.437	1386.498
123	60.00	41.00	1235.800	245.437	1481.237
124	60.00	42.00	1330.539	245.437	1575.975
125	60.00	43.00	1425.277	245.437	1670.714
126	60.00	44.00	1520.016	245.437	1765.453
127	60.00	45.00	1614.755	245.437	1860.191
128	60.00	46.00	1693.294	245.437	1938.731
129	60.00	47.00	1771.834	245.437	2017.271
130	60.00	48.00	1850.374	245.437	2095.811
131	60.00	49.00	1928.914	245.437	2174.351
132	60.00	50.00	2007.454	236.233	2243.687
133	60.00	51.00	2007.454	236.165	2243.618
134	60.00	52.00	2007.454	234.648	2242.102
135	60.00	53.00	2007.454	231.061	2238.515
136	60.00	54.00	2007.454	224.370	2231.824
137	60.00	55.00	2007.454	245.437	2252.891
138	60.00	56.00	2102.192	245.437	2347.629
139	60.00	57.00	2196.931	245.437	2442.368
140	60.00	58.00	2252.400	0.000	2252.400
141	60.00	59.00	2268.598	0.000	2268.599
142	60.00	60.00	2284.797	245.437	2530.234
143	60.00	61.00	2363.337	245.437	2608.774
144	60.00	62.00	2441.877	245.437	2687.314

145	60.00	63.00	2520.417	245.437	2765.854
146	60.00	64.00	2598.957	245.437	2844.394
147	60.00	65.00	2677.496	245.437	2922.933
148	60.00	66.00	2756.036	245.437	3001.473
149	60.00	67.00	2834.576	245.437	3080.013
150	60.00	68.00	2913.116	245.437	3158.553
151	60.00	69.00	2991.656	245.437	3237.093
152	60.00	70.00	3070.195	245.437	3315.632
153	60.00	71.00	3148.735	245.437	3394.172
154	60.00	72.00	3227.275	245.437	3472.712
155	60.00	73.00	3266.545	254.027	3520.572
156	60.00	74.00	3266.545	256.891	3523.436
157	60.00	75.00	3266.545	245.437	3511.982
158	60.00	76.00	3345.085	245.437	3590.522
159	60.00	77.00	3423.625	245.437	3669.062
160	60.00	78.00	3510.264	245.437	3755.701
161	60.00	79.00	3605.003	245.437	3850.439
162	60.00	80.00	3699.741	245.437	3945.178
163	60.00	81.00	3778.281	245.437	4023.718
164	60.00	82.00	3856.821	245.437	4102.258
165	60.00	83.00	3935.361	245.437	4180.798
166	60.00	84.00	4013.900	245.437	4259.337
167	60.00	85.00	4092.440	245.437	4337.877
168	60.00	86.00	4170.980	245.437	4416.417
169	60.00	87.00	4249.520	245.437	4494.957
170	60.00	88.00	4328.060	245.437	4573.497
171	60.00	89.00	4406.600	245.437	4652.036
172	60.00	90.00	4485.139	245.437	4730.576
173	60.00	91.00	4563.679	245.437	4809.116
174	60.00	92.00	4642.219	245.437	4887.656
175	60.00	93.00	4720.759	245.437	4966.196
176	60.00	94.00	4799.299	245.437	5044.736
177	60.00	95.00	4877.838	245.437	5123.275
178	60.00	96.00	4956.378	245.437	5201.815
179	60.00	97.00	5034.918	245.437	5280.355
180	60.00	98.00	5113.458	245.437	5358.895
181	60.00	99.00	5191.998	245.437	5437.435
182	60.00	100.00	Soil Elevations Must Extend At or Below Contribution Zone		

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 = 2.40%

ID	Diameter (in)	Length (ft)	Skin Fric. (tons)	End Bearing (tons)	Capacity (tons)
1	48.00	10.00	0.000	34.430	34.430
2	48.00	11.00	0.182	33.751	33.933
3	48.00	12.00	0.719	32.733	33.452
4	48.00	13.00	1.593	31.521	33.113
5	48.00	14.00	2.796	30.551	33.347
6	48.00	15.00	4.172	29.823	33.996
7	48.00	16.00	5.822	1223.899	1229.721
8	48.00	17.00	67.072	1484.071	1551.143
9	48.00	18.00	125.325	932.749	1058.074
10	48.00	19.00	180.809	710.859	891.668
11	48.00	20.00	233.731	586.239	819.970
12	48.00	21.00	284.276	504.830	789.105
13	48.00	22.00	332.612	446.780	779.392
14	48.00	23.00	378.893	402.939	781.832
15	48.00	24.00	423.258	368.455	791.713
16	48.00	25.00	471.201	127.226	598.427
17	48.00	26.00	476.085	129.069	605.154
18	48.00	27.00	481.203	130.911	612.114
19	48.00	28.00	486.542	134.607	621.149
20	48.00	29.00	492.094	137.045	629.140
21	48.00	30.00	497.855	366.868	864.723
22	48.00	31.00	545.219	364.833	910.052
23	48.00	32.00	591.915	362.495	954.410
24	48.00	33.00	637.980	359.951	997.930
25	48.00	34.00	683.444	357.269	1040.712
26	48.00	35.00	728.336	145.207	873.543
27	48.00	36.00	728.336	147.181	875.517
28	48.00	37.00	728.336	149.155	877.491
29	48.00	38.00	728.336	151.128	879.465
30	48.00	39.00	728.336	153.281	881.618
31	48.00	40.00	739.131	354.496	1093.627
32	48.00	41.00	794.401	351.668	1146.069
33	48.00	42.00	849.159	348.810	1197.968
34	48.00	43.00	903.426	345.939	1249.365
35	48.00	44.00	957.223	343.069	1300.292
36	48.00	45.00	999.772	340.209	1339.982
37	48.00	46.00	1041.885	337.369	1379.254
38	48.00	47.00	1083.578	334.552	1418.130
39	48.00	48.00	1124.864	331.763	1456.627
40	48.00	49.00	1165.758	329.005	1494.762
41	48.00	50.00	1206.272	130.264	1336.536
42	48.00	51.00	1206.272	131.016	1337.288
43	48.00	52.00	1206.272	130.969	1337.241
44	48.00	53.00	1206.272	129.780	1336.052
45	48.00	54.00	1206.272	126.880	1333.152
46	48.00	55.00	1217.067	326.279	1543.346
47	48.00	56.00	1268.195	323.587	1591.782
48	48.00	57.00	1318.971	320.929	1639.900
49	48.00	58.00	1349.627	0.000	1349.627

50	48.00	59.00	1360.422	0.000	1360.422
51	48.00	60.00	1360.422	319.614	1680.036
52	48.00	61.00	1399.990	317.010	1716.999
53	48.00	62.00	1439.231	314.441	1753.672
54	48.00	63.00	1478.156	311.907	1790.063
55	48.00	64.00	1516.773	309.408	1826.181
56	48.00	65.00	1555.091	306.943	1862.034
57	48.00	66.00	1593.116	304.512	1897.629
58	48.00	67.00	1630.858	302.115	1932.973
59	48.00	68.00	1668.322	299.750	1968.072
60	48.00	69.00	1705.516	297.417	2002.934
61	48.00	70.00	1742.447	295.116	2037.563
62	48.00	71.00	1779.120	292.845	2071.965
63	48.00	72.00	1815.543	290.604	2106.146
64	48.00	73.00	1833.662	141.260	1974.921
65	48.00	74.00	1833.662	143.234	1976.895
66	48.00	75.00	1833.662	289.494	2123.156
67	48.00	76.00	1869.822	287.297	2157.119
68	48.00	77.00	1911.145	285.127	2196.272
69	48.00	78.00	1957.635	282.985	2240.619
70	48.00	79.00	2003.899	280.870	2284.768
71	48.00	80.00	2039.147	278.780	2317.927
72	48.00	81.00	2074.180	276.716	2350.896
73	48.00	82.00	2109.001	274.677	2383.679
74	48.00	83.00	2143.616	272.662	2416.278
75	48.00	84.00	2178.028	270.671	2448.699
76	48.00	85.00	2212.242	268.702	2480.944
77	48.00	86.00	2246.261	266.756	2513.018
78	48.00	87.00	2280.090	264.832	2544.922
79	48.00	88.00	2313.732	262.929	2576.661
80	48.00	89.00	2347.191	261.047	2608.238
81	48.00	90.00	2380.470	259.185	2639.655
82	48.00	91.00	2413.574	257.343	2670.916
83	48.00	92.00	2446.504	255.520	2702.024
84	48.00	93.00	2479.265	253.716	2732.980
85	48.00	94.00	2511.859	251.930	2763.789
86	48.00	95.00	2544.290	250.162	2794.452
87	48.00	96.00	2576.560	248.412	2824.972
88	48.00	97.00	2608.673	246.679	2855.351
89	48.00	98.00	2640.631	244.962	2885.593
90	48.00	99.00	2672.437	243.262	2915.699
91	48.00	100.00	Soil Elevations Must Extend At or Below Contribution		

Zone

=== Shaft diameter = 60.0(in) ===

92	60.00	10.00	0.000	44.831	44.831
93	60.00	11.00	0.227	43.947	44.174
94	60.00	12.00	0.899	42.621	43.520
95	60.00	13.00	1.991	41.042	43.033
96	60.00	14.00	3.496	39.780	43.275
97	60.00	15.00	5.215	38.832	44.048
98	60.00	16.00	7.277	1912.343	1919.620
99	60.00	17.00	84.228	2692.802	2777.029
100	60.00	18.00	158.136	1692.444	1850.580
101	60.00	19.00	229.192	1289.832	1519.024
102	60.00	20.00	297.574	1063.712	1361.286
103	60.00	21.00	363.441	915.998	1279.439
104	60.00	22.00	426.943	810.668	1237.611
105	60.00	23.00	488.216	731.120	1219.336
106	60.00	24.00	547.388	668.550	1215.938
107	60.00	25.00	604.575	157.988	762.562
108	60.00	26.00	610.680	162.135	772.815
109	60.00	27.00	617.077	166.282	783.359
110	60.00	28.00	623.752	169.486	793.238
111	60.00	29.00	630.692	170.539	801.231
112	60.00	30.00	637.893	617.820	1255.713
113	60.00	31.00	693.359	575.711	1269.070
114	60.00	32.00	753.625	573.792	1327.416
115	60.00	33.00	813.179	571.391	1384.570
116	60.00	34.00	872.057	568.637	1440.694
117	60.00	35.00	930.289	223.803	1154.092
118	60.00	36.00	930.289	228.208	1158.497
119	60.00	37.00	930.289	230.580	1160.869
120	60.00	38.00	930.289	232.437	1162.727
121	60.00	39.00	930.289	234.568	1164.857
122	60.00	40.00	930.289	565.625	1495.914
123	60.00	41.00	1001.548	562.423	1563.971
124	60.00	42.00	1072.229	559.084	1631.313
125	60.00	43.00	1142.354	555.646	1698.000
126	60.00	44.00	1211.945	552.141	1764.086
127	60.00	45.00	1281.022	548.591	1829.613
128	60.00	46.00	1336.109	545.015	1881.125
129	60.00	47.00	1390.718	541.427	1932.144
130	60.00	48.00	1444.863	537.837	1982.700
131	60.00	49.00	1498.561	534.255	2032.815
132	60.00	50.00	1551.824	203.537	1755.361
133	60.00	51.00	1551.824	203.478	1755.302
134	60.00	52.00	1551.824	202.171	1753.995
135	60.00	53.00	1551.824	199.081	1750.905
136	60.00	54.00	1551.824	193.316	1745.140
137	60.00	55.00	1551.824	530.687	2082.511
138	60.00	56.00	1618.379	527.139	2145.518
139	60.00	57.00	1684.531	523.614	2208.146
140	60.00	58.00	1724.206	0.000	1724.206
141	60.00	59.00	1737.700	0.000	1737.700
142	60.00	60.00	1751.193	521.862	2273.056
143	60.00	61.00	1803.380	518.380	2321.760
144	60.00	62.00	1855.193	514.928	2370.120
145	60.00	63.00	1906.642	511.508	2418.150
146	60.00	64.00	1957.737	508.121	2465.858
147	60.00	65.00	2008.487	504.769	2513.256

148	60.00	66.00	2058.900	501.452	2560.352
149	60.00	67.00	2108.986	498.170	2607.156
150	60.00	68.00	2158.751	494.924	2653.675
151	60.00	69.00	2208.204	491.712	2699.916
152	60.00	70.00	2257.352	488.536	2745.888
153	60.00	71.00	2306.201	485.395	2791.597
154	60.00	72.00	2354.760	482.289	2837.049
155	60.00	73.00	2378.932	218.868	2597.800
156	60.00	74.00	2378.932	221.335	2600.267
157	60.00	75.00	2378.932	480.748	2859.680
158	60.00	76.00	2427.190	477.693	2904.883
159	60.00	77.00	2475.173	474.672	2949.845
160	60.00	78.00	2529.636	471.683	3001.319
161	60.00	79.00	2590.583	468.727	3059.309
162	60.00	80.00	2651.273	465.803	3117.076
163	60.00	81.00	2698.217	462.911	3161.128
164	60.00	82.00	2744.916	460.049	3204.965
165	60.00	83.00	2791.372	457.218	3248.590
166	60.00	84.00	2837.593	454.417	3292.009
167	60.00	85.00	2883.581	451.644	3335.225
168	60.00	86.00	2929.342	448.901	3378.242
169	60.00	87.00	2974.879	446.186	3421.065
170	60.00	88.00	3020.198	443.498	3463.696
171	60.00	89.00	3065.302	440.837	3506.139
172	60.00	90.00	3110.195	438.203	3548.397
173	60.00	91.00	3154.881	435.594	3590.475
174	60.00	92.00	3199.365	433.011	3632.376
175	60.00	93.00	3243.648	430.453	3674.101
176	60.00	94.00	3287.736	427.919	3715.656
177	60.00	95.00	3331.632	425.409	3757.041
178	60.00	96.00	3375.339	422.923	3798.262
179	60.00	97.00	3418.860	420.460	3839.319
180	60.00	98.00	3462.198	418.019	3880.217
181	60.00	99.00	3505.357	415.600	3920.957
182	60.00	100.00	Soil Elevations Must Extend At or Below Contribution Zone		

Florida Bridge Software Institute Date: August 19, 2021
Shaft and Pile Analysis (FB-Deep v.2.05) Time: 17:00:59

General Information:
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Input file: .....reet - LOCHNER\12 - Calculations\FB-Deep\DS\BB-03_DS - Rev.spc
Project number: B-19-051
Job name: THEA Whiting Street
Engineer: Kirk M. Eastman
Units: English

Analysis Information:
==========
Analysis Type: Drilled Shaft Analysis

Soil Information:
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Boring date: 6/24/21
Boring number: BB-03
Station number: 204+29 Offset: 1 LT

Ground Elevation: 16.30(ft)
Water table Elevation = 6.30(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	16.30	N/A	0.00	5- Cavity layer
2	2.00	14.30	N/A	0.00	5- Cavity layer
3	4.00	12.30	N/A	0.00	5- Cavity layer
4	6.00	10.30	N/A	0.00	5- Cavity layer
5	8.00	8.30	N/A	0.00	5- Cavity layer
6	10.00	6.30	N/A	0.00	5- Cavity layer
7	10.00	6.30	N/A	0.00	1- Plastic Clay
8	10.00	6.30	11.00	117.00	3- Clean sand
9	12.00	4.30	11.00	117.00	3- Clean sand
10	14.00	2.30	9.00	116.00	3- Clean sand
11	16.00	0.30	16.00	120.00	3- Clean sand
12	16.00	0.30	N/A	0.00	2- Clay and silty sand
13	16.00	0.30	N/A	115.00	1- Plastic Clay
14	18.00	-1.70	N/A	115.00	1- Plastic Clay
15	20.00	-3.70	N/A	115.00	1- Plastic Clay
16	20.00	-3.70	N/A	0.00	2- Clay and silty sand
17	20.00	-3.70	60.00	130.00	3- Clean sand
18	22.50	-6.20	60.00	130.00	3- Clean sand
19	22.50	-6.20	N/A	0.00	1- Plastic Clay
20	22.50	-6.20	N/A	130.00	4- Lime Stone/Very shelly sand
21	25.00	-8.70	N/A	130.00	4- Lime Stone/Very shelly sand
22	25.00	-8.70	N/A	0.00	1- Plastic Clay
23	25.00	-8.70	44.00	125.00	3- Clean sand
24	27.50	-11.20	44.00	125.00	3- Clean sand
25	27.50	-11.20	N/A	0.00	1- Plastic Clay
26	27.50	-11.20	N/A	130.00	4- Lime Stone/Very shelly sand
27	30.00	-13.70	N/A	130.00	4- Lime Stone/Very shelly sand
28	32.50	-16.20	N/A	0.00	2- Clay and silty sand
29	32.50	-16.20	N/A	125.00	1- Plastic Clay
30	35.00	-18.70	N/A	125.00	1- Plastic Clay
31	37.50	-21.20	N/A	125.00	1- Plastic Clay
32	37.50	-21.20	N/A	0.00	2- Clay and silty sand
33	37.50	-21.20	N/A	125.00	1- Plastic Clay
34	40.00	-23.70	N/A	125.00	1- Plastic Clay
35	42.50	-26.20	N/A	125.00	1- Plastic Clay
36	42.50	-26.20	N/A	0.00	2- Clay and silty sand
37	42.50	-26.20	N/A	135.00	4- Lime Stone/Very shelly sand
38	45.00	-28.70	N/A	135.00	4- Lime Stone/Very shelly sand
39	47.50	-31.20	N/A	135.00	4- Lime Stone/Very shelly sand
40	50.00	-33.70	N/A	135.00	4- Lime Stone/Very shelly sand
41	52.50	-36.20	N/A	135.00	4- Lime Stone/Very shelly sand
42	55.00	-38.70	N/A	135.00	4- Lime Stone/Very shelly sand
43	57.50	-41.20	N/A	135.00	4- Lime Stone/Very shelly sand
44	57.50	-41.20	N/A	0.00	1- Plastic Clay
45	57.50	-41.20	N/A	130.00	2- Clay and silty sand
46	60.00	-43.70	N/A	130.00	2- Clay and silty sand
47	62.50	-46.20	N/A	130.00	2- Clay and silty sand
48	65.00	-48.70	N/A	130.00	2- Clay and silty sand
49	67.50	-51.20	N/A	130.00	2- Clay and silty sand
50	70.00	-53.70	N/A	130.00	2- Clay and silty sand
51	70.00	-53.70	N/A	0.00	1- Plastic Clay
52	70.00	-53.70	N/A	135.00	4- Lime Stone/Very shelly sand
53	72.50	-56.20	N/A	135.00	4- Lime Stone/Very shelly sand
54	75.00	-58.70	N/A	135.00	4- Lime Stone/Very shelly sand
55	77.50	-61.20	N/A	135.00	4- Lime Stone/Very shelly sand
56	80.00	-63.70	N/A	135.00	4- Lime Stone/Very shelly sand
57	82.50	-66.20	N/A	135.00	4- Lime Stone/Very shelly sand
58	85.00	-68.70	N/A	135.00	4- Lime Stone/Very shelly sand
59	87.50	-71.20	N/A	135.00	4- Lime Stone/Very shelly sand
60	90.00	-73.70	N/A	135.00	4- Lime Stone/Very shelly sand
61	92.50	-76.20	N/A	135.00	4- Lime Stone/Very shelly sand
62	95.00	-78.70	N/A	135.00	4- Lime Stone/Very shelly sand
63	97.50	-81.20	N/A	135.00	4- Lime Stone/Very shelly sand
64	100.00	-83.70	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	0.00	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	0.00	N/A	N/A	N/A	N/A
13	0.38	N/A	N/A	N/A	N/A
14	0.38	N/A	N/A	N/A	N/A
15	0.38	N/A	N/A	N/A	N/A
16	0.00	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	0.00	N/A	N/A	N/A	N/A
20	N/A	25.00	4.00	39.93	12.50
21	N/A	25.00	4.00	39.93	12.50
22	0.00	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
27	N/A	25.00	4.00	39.93	12.50
28	0.00	N/A	N/A	N/A	N/A
29	1.50	N/A	N/A	N/A	N/A
30	1.50	N/A	N/A	N/A	N/A
31	1.50	N/A	N/A	N/A	N/A
32	0.00	N/A	N/A	N/A	N/A
33	1.63	N/A	N/A	N/A	N/A
34	1.63	N/A	N/A	N/A	N/A
35	1.25	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	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	0.00	N/A	N/A	N/A	N/A
45	0.00	N/A	N/A	N/A	N/A
46	0.00	N/A	N/A	N/A	N/A
47	0.00	N/A	N/A	N/A	N/A
48	0.00	N/A	N/A	N/A	N/A
49	0.00	N/A	N/A	N/A	N/A
50	0.00	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	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
63	N/A	25.00	4.00	39.93	12.50
64	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	N/A
2	N/A	N/A	N/A	N/A
3	N/A	N/A	N/A	N/A
4	N/A	N/A	N/A	N/A
5	N/A	N/A	N/A	N/A
6	N/A	N/A	N/A	N/A
7	N/A	N/A	N/A	N/A
8	N/A	N/A	N/A	N/A
9	N/A	N/A	N/A	N/A
10	N/A	N/A	N/A	N/A
11	N/A	N/A	N/A	N/A
12	N/A	N/A	N/A	N/A
13	N/A	N/A	N/A	N/A
14	N/A	N/A	N/A	N/A
15	N/A	N/A	N/A	N/A
16	N/A	N/A	N/A	N/A
17	N/A	N/A	N/A	N/A
18	N/A	N/A	N/A	N/A
19	N/A	N/A	N/A	N/A
20	1.00	ROUGH	1.000	
21	1.00	ROUGH	1.000	
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	1.00	ROUGH	1.000	
27	1.00	ROUGH	1.000	
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	1.00	ROUGH	1.000
38	1.00	ROUGH	1.000
39	1.00	ROUGH	1.000
40	1.00	ROUGH	1.000
41	1.00	ROUGH	1.000
42	1.00	ROUGH	1.000
43	1.00	ROUGH	1.000
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	N/A	N/A	N/A
51	N/A	N/A	N/A
52	1.00	ROUGH	1.000
53	1.00	ROUGH	1.000
54	1.00	ROUGH	1.000
55	1.00	ROUGH	1.000
56	1.00	ROUGH	1.000
57	1.00	ROUGH	1.000
58	1.00	ROUGH	1.000
59	1.00	ROUGH	1.000
60	1.00	ROUGH	1.000
61	1.00	ROUGH	1.000
62	1.00	ROUGH	1.000
63	1.00	ROUGH	1.000
64	1.00	ROUGH	1.000

Drilled Shaft Data:
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Unit weight of concrete = 150.00(pcf), Concrete Slump = 8.50(in)
Modulus of Elasticity of concrete = 3640.00(ksi)

Shaft Geometry:

ID	Length (ft)	Tip Elev. (ft)	Case Len. (ft)	Diameter (in)	Base Diam. (in)	Bell Len. (ft)
1	10.00	6.30	10.00	48.00	48.00	0.00
2	11.00	5.30	10.00	48.00	48.00	0.00
3	12.00	4.30	10.00	48.00	48.00	0.00
4	13.00	3.30	10.00	48.00	48.00	0.00
5	14.00	2.30	10.00	48.00	48.00	0.00
6	15.00	1.30	10.00	48.00	48.00	0.00
7	16.00	0.30	10.00	48.00	48.00	0.00
8	17.00	-0.70	10.00	48.00	48.00	0.00
9	18.00	-1.70	10.00	48.00	48.00	0.00
10	19.00	-2.70	10.00	48.00	48.00	0.00
11	20.00	-3.70	10.00	48.00	48.00	0.00
12	21.00	-4.70	10.00	48.00	48.00	0.00
13	22.00	-5.70	10.00	48.00	48.00	0.00
14	23.00	-6.70	10.00	48.00	48.00	0.00
15	24.00	-7.70	10.00	48.00	48.00	0.00
16	25.00	-8.70	10.00	48.00	48.00	0.00
17	26.00	-9.70	10.00	48.00	48.00	0.00
18	27.00	-10.70	10.00	48.00	48.00	0.00
19	28.00	-11.70	10.00	48.00	48.00	0.00
20	29.00	-12.70	10.00	48.00	48.00	0.00
21	30.00	-13.70	10.00	48.00	48.00	0.00
22	31.00	-14.70	10.00	48.00	48.00	0.00
23	32.00	-15.70	10.00	48.00	48.00	0.00
24	33.00	-16.70	10.00	48.00	48.00	0.00
25	34.00	-17.70	10.00	48.00	48.00	0.00
26	35.00	-18.70	10.00	48.00	48.00	0.00
27	36.00	-19.70	10.00	48.00	48.00	0.00
28	37.00	-20.70	10.00	48.00	48.00	0.00
29	38.00	-21.70	10.00	48.00	48.00	0.00
30	39.00	-22.70	10.00	48.00	48.00	0.00
31	40.00	-23.70	10.00	48.00	48.00	0.00
32	41.00	-24.70	10.00	48.00	48.00	0.00
33	42.00	-25.70	10.00	48.00	48.00	0.00
34	43.00	-26.70	10.00	48.00	48.00	0.00
35	44.00	-27.70	10.00	48.00	48.00	0.00
36	45.00	-28.70	10.00	48.00	48.00	0.00
37	46.00	-29.70	10.00	48.00	48.00	0.00
38	47.00	-30.70	10.00	48.00	48.00	0.00
39	48.00	-31.70	10.00	48.00	48.00	0.00
40	49.00	-32.70	10.00	48.00	48.00	0.00
41	50.00	-33.70	10.00	48.00	48.00	0.00
42	51.00	-34.70	10.00	48.00	48.00	0.00
43	52.00	-35.70	10.00	48.00	48.00	0.00
44	53.00	-36.70	10.00	48.00	48.00	0.00
45	54.00	-37.70	10.00	48.00	48.00	0.00
46	55.00	-38.70	10.00	48.00	48.00	0.00
47	56.00	-39.70	10.00	48.00	48.00	0.00
48	57.00	-40.70	10.00	48.00	48.00	0.00
49	58.00	-41.70	10.00	48.00	48.00	0.00
50	59.00	-42.70	10.00	48.00	48.00	0.00
51	60.00	-43.70	10.00	48.00	48.00	0.00
52	61.00	-44.70	10.00	48.00	48.00	0.00

53	62.00	-45.70	10.00	48.00	48.00	0.00
54	63.00	-46.70	10.00	48.00	48.00	0.00
55	64.00	-47.70	10.00	48.00	48.00	0.00
56	65.00	-48.70	10.00	48.00	48.00	0.00
57	66.00	-49.70	10.00	48.00	48.00	0.00
58	67.00	-50.70	10.00	48.00	48.00	0.00
59	68.00	-51.70	10.00	48.00	48.00	0.00
60	69.00	-52.70	10.00	48.00	48.00	0.00
61	70.00	-53.70	10.00	48.00	48.00	0.00
62	71.00	-54.70	10.00	48.00	48.00	0.00
63	72.00	-55.70	10.00	48.00	48.00	0.00
64	73.00	-56.70	10.00	48.00	48.00	0.00
65	74.00	-57.70	10.00	48.00	48.00	0.00
66	75.00	-58.70	10.00	48.00	48.00	0.00
67	76.00	-59.70	10.00	48.00	48.00	0.00
68	77.00	-60.70	10.00	48.00	48.00	0.00
69	78.00	-61.70	10.00	48.00	48.00	0.00
70	79.00	-62.70	10.00	48.00	48.00	0.00
71	80.00	-63.70	10.00	48.00	48.00	0.00
72	81.00	-64.70	10.00	48.00	48.00	0.00
73	82.00	-65.70	10.00	48.00	48.00	0.00
74	83.00	-66.70	10.00	48.00	48.00	0.00
75	84.00	-67.70	10.00	48.00	48.00	0.00
76	85.00	-68.70	10.00	48.00	48.00	0.00
77	86.00	-69.70	10.00	48.00	48.00	0.00
78	87.00	-70.70	10.00	48.00	48.00	0.00
79	88.00	-71.70	10.00	48.00	48.00	0.00
80	89.00	-72.70	10.00	48.00	48.00	0.00
81	90.00	-73.70	10.00	48.00	48.00	0.00
82	91.00	-74.70	10.00	48.00	48.00	0.00
83	92.00	-75.70	10.00	48.00	48.00	0.00
84	93.00	-76.70	10.00	48.00	48.00	0.00
85	94.00	-77.70	10.00	48.00	48.00	0.00
86	95.00	-78.70	10.00	48.00	48.00	0.00
87	96.00	-79.70	10.00	48.00	48.00	0.00
88	97.00	-80.70	10.00	48.00	48.00	0.00
89	98.00	-81.70	10.00	48.00	48.00	0.00
90	99.00	-82.70	10.00	48.00	48.00	0.00
91	100.00	-83.70	10.00	48.00	48.00	0.00
92	10.00	6.30	10.00	60.00	60.00	0.00
93	11.00	5.30	10.00	60.00	60.00	0.00
94	12.00	4.30	10.00	60.00	60.00	0.00
95	13.00	3.30	10.00	60.00	60.00	0.00
96	14.00	2.30	10.00	60.00	60.00	0.00
97	15.00	1.30	10.00	60.00	60.00	0.00
98	16.00	0.30	10.00	60.00	60.00	0.00
99	17.00	-0.70	10.00	60.00	60.00	0.00
100	18.00	-1.70	10.00	60.00	60.00	0.00
101	19.00	-2.70	10.00	60.00	60.00	0.00
102	20.00	-3.70	10.00	60.00	60.00	0.00
103	21.00	-4.70	10.00	60.00	60.00	0.00
104	22.00	-5.70	10.00	60.00	60.00	0.00
105	23.00	-6.70	10.00	60.00	60.00	0.00
106	24.00	-7.70	10.00	60.00	60.00	0.00
107	25.00	-8.70	10.00	60.00	60.00	0.00
108	26.00	-9.70	10.00	60.00	60.00	0.00
109	27.00	-10.70	10.00	60.00	60.00	0.00
110	28.00	-11.70	10.00	60.00	60.00	0.00
111	29.00	-12.70	10.00	60.00	60.00	0.00
112	30.00	-13.70	10.00	60.00	60.00	0.00
113	31.00	-14.70	10.00	60.00	60.00	0.00
114	32.00	-15.70	10.00	60.00	60.00	0.00
115	33.00	-16.70	10.00	60.00	60.00	0.00
116	34.00	-17.70	10.00	60.00	60.00	0.00
117	35.00	-18.70	10.00	60.00	60.00	0.00
118	36.00	-19.70	10.00	60.00	60.00	0.00
119	37.00	-20.70	10.00	60.00	60.00	0.00
120	38.00	-21.70	10.00	60.00	60.00	0.00
121	39.00	-22.70	10.00	60.00	60.00	0.00
122	40.00	-23.70	10.00	60.00	60.00	0.00
123	41.00	-24.70	10.00	60.00	60.00	0.00
124	42.00	-25.70	10.00	60.00	60.00	0.00
125	43.00	-26.70	10.00	60.00	60.00	0.00
126	44.00	-27.70	10.00	60.00	60.00	0.00
127	45.00	-28.70	10.00	60.00	60.00	0.00
128	46.00	-29.70	10.00	60.00	60.00	0.00
129	47.00	-30.70	10.00	60.00	60.00	0.00
130	48.00	-31.70	10.00	60.00	60.00	0.00
131	49.00	-32.70	10.00	60.00	60.00	0.00
132	50.00	-33.70	10.00	60.00	60.00	0.00
133	51.00	-34.70	10.00	60.00	60.00	0.00
134	52.00	-35.70	10.00	60.00	60.00	0.00
135	53.00	-36.70	10.00	60.00	60.00	0.00
136	54.00	-37.70	10.00	60.00	60.00	0.00
137	55.00	-38.70	10.00	60.00	60.00	0.00
138	56.00	-39.70	10.00	60.00	60.00	0.00
139	57.00	-40.70	10.00	60.00	60.00	0.00
140	58.00	-41.70	10.00	60.00	60.00	0.00
141	59.00	-42.70	10.00	60.00	60.00	0.00
142	60.00	-43.70	10.00	60.00	60.00	0.00
143	61.00	-44.70	10.00	60.00	60.00	0.00
144	62.00	-45.70	10.00	60.00	60.00	0.00
145	63.00	-46.70	10.00	60.00	60.00	0.00
146	64.00	-47.70	10.00	60.00	60.00	0.00
147	65.00	-48.70	10.00	60.00	60.00	0.00
148	66.00	-49.70	10.00	60.00	60.00	0.00
149	67.00	-50.70	10.00	60.00	60.00	0.00
150	68.00	-51.70	10.00	60.00	60.00	0.00
151	69.00	-52.70	10.00	60.00	60.00	0.00
152	70.00	-53.70	10.00	60.00	60.00	0.00

153	71.00	-54.70	10.00	60.00	60.00	0.00
154	72.00	-55.70	10.00	60.00	60.00	0.00
155	73.00	-56.70	10.00	60.00	60.00	0.00
156	74.00	-57.70	10.00	60.00	60.00	0.00
157	75.00	-58.70	10.00	60.00	60.00	0.00
158	76.00	-59.70	10.00	60.00	60.00	0.00
159	77.00	-60.70	10.00	60.00	60.00	0.00
160	78.00	-61.70	10.00	60.00	60.00	0.00
161	79.00	-62.70	10.00	60.00	60.00	0.00
162	80.00	-63.70	10.00	60.00	60.00	0.00
163	81.00	-64.70	10.00	60.00	60.00	0.00
164	82.00	-65.70	10.00	60.00	60.00	0.00
165	83.00	-66.70	10.00	60.00	60.00	0.00
166	84.00	-67.70	10.00	60.00	60.00	0.00
167	85.00	-68.70	10.00	60.00	60.00	0.00
168	86.00	-69.70	10.00	60.00	60.00	0.00
169	87.00	-70.70	10.00	60.00	60.00	0.00
170	88.00	-71.70	10.00	60.00	60.00	0.00
171	89.00	-72.70	10.00	60.00	60.00	0.00
172	90.00	-73.70	10.00	60.00	60.00	0.00
173	91.00	-74.70	10.00	60.00	60.00	0.00
174	92.00	-75.70	10.00	60.00	60.00	0.00
175	93.00	-76.70	10.00	60.00	60.00	0.00
176	94.00	-77.70	10.00	60.00	60.00	0.00
177	95.00	-78.70	10.00	60.00	60.00	0.00
178	96.00	-79.70	10.00	60.00	60.00	0.00
179	97.00	-80.70	10.00	60.00	60.00	0.00
180	98.00	-81.70	10.00	60.00	60.00	0.00
181	99.00	-82.70	10.00	60.00	60.00	0.00
182	100.00	-83.70	10.00	60.00	60.00	0.00

Drilled Shaft Capacity (sorted by shaft diameter):

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	44.452	44.452
2	48.00	11.00	0.166	40.675	40.841
3	48.00	12.00	0.657	36.898	37.555
4	48.00	13.00	1.454	35.157	36.611
5	48.00	14.00	2.553	33.615	36.168
6	48.00	15.00	3.683	30.287	33.971
7	48.00	16.00	5.038	73.406	78.444
8	48.00	17.00	5.038	42.412	47.449
9	48.00	18.00	5.038	42.412	47.449
10	48.00	19.00	5.038	42.412	47.449
11	48.00	20.00	5.038	154.723	159.761
12	48.00	21.00	10.812	174.437	185.249
13	48.00	22.00	16.907	173.835	190.742
14	48.00	23.00	52.784	157.080	209.864
15	48.00	24.00	118.208	157.080	275.287
16	48.00	25.00	181.039	179.562	360.601
17	48.00	26.00	185.694	198.019	383.712
18	48.00	27.00	190.592	198.095	388.687
19	48.00	28.00	224.546	157.080	381.626
20	48.00	29.00	287.378	157.080	444.458
21	48.00	30.00	350.210	157.080	507.290
22	48.00	31.00	413.042	157.080	570.121
23	48.00	32.00	475.874	157.080	632.953
24	48.00	33.00	507.290	146.084	653.374
25	48.00	34.00	507.290	148.571	655.861
26	48.00	35.00	507.290	149.618	656.908
27	48.00	36.00	507.290	150.666	657.955
28	48.00	37.00	512.473	154.331	666.804
29	48.00	38.00	522.841	160.336	683.176
30	48.00	39.00	533.208	166.815	700.023
31	48.00	40.00	543.575	166.881	710.456
32	48.00	41.00	553.942	165.287	719.229
33	48.00	42.00	564.742	160.103	724.845
34	48.00	43.00	607.389	157.080	764.468
35	48.00	44.00	681.452	157.080	838.531
36	48.00	45.00	755.515	157.080	912.594
37	48.00	46.00	829.578	157.080	986.657
38	48.00	47.00	898.025	157.080	1055.105
39	48.00	48.00	960.857	157.080	1117.937
40	48.00	49.00	1023.689	157.080	1180.769
41	48.00	50.00	1086.521	157.080	1243.600
42	48.00	51.00	1149.353	157.080	1306.432
43	48.00	52.00	1212.184	157.080	1369.264
44	48.00	53.00	1275.016	157.080	1432.096
45	48.00	54.00	1337.848	157.080	1494.928
46	48.00	55.00	1400.680	157.080	1557.760
47	48.00	56.00	1463.512	157.080	1620.592
48	48.00	57.00	1526.344	157.080	1683.423
49	48.00	58.00	1557.760	0.000	1557.760
50	48.00	59.00	1557.760	0.000	1557.760
51	48.00	60.00	1557.760	0.000	1557.760
52	48.00	61.00	1557.760	0.000	1557.760
53	48.00	62.00	1557.760	0.000	1557.760
54	48.00	63.00	1557.760	0.000	1557.760
55	48.00	64.00	1557.760	0.000	1557.760
56	48.00	65.00	1557.760	0.000	1557.760
57	48.00	66.00	1557.760	0.000	1557.760
58	48.00	67.00	1557.760	0.000	1557.760
59	48.00	68.00	1557.760	0.000	1557.760
60	48.00	69.00	1557.760	0.000	1557.760
61	48.00	70.00	1557.760	157.080	1714.839

62	48.00	71.00	1620.592	157.080	1777.671
63	48.00	72.00	1683.423	157.080	1840.503
64	48.00	73.00	1746.255	157.080	1903.335
65	48.00	74.00	1809.087	157.080	1966.167
66	48.00	75.00	1871.919	157.080	2028.999
67	48.00	76.00	1934.751	157.080	2091.830
68	48.00	77.00	1997.583	157.080	2154.662
69	48.00	78.00	2060.415	157.080	2217.494
70	48.00	79.00	2123.246	157.080	2280.326
71	48.00	80.00	2186.078	157.080	2343.158
72	48.00	81.00	2248.910	157.080	2405.990
73	48.00	82.00	2311.742	157.080	2468.822
74	48.00	83.00	2374.574	157.080	2531.653
75	48.00	84.00	2437.406	157.080	2594.485
76	48.00	85.00	2500.237	157.080	2657.317
77	48.00	86.00	2563.069	157.080	2720.149
78	48.00	87.00	2625.901	157.080	2782.981
79	48.00	88.00	2688.733	157.080	2845.813
80	48.00	89.00	2751.565	157.080	2908.645
81	48.00	90.00	2814.397	157.080	2971.476
82	48.00	91.00	2877.229	157.080	3034.308
83	48.00	92.00	2940.060	157.080	3097.140
84	48.00	93.00	3002.892	157.080	3159.972
85	48.00	94.00	3065.724	157.080	3222.804
86	48.00	95.00	3128.556	157.080	3285.636
87	48.00	96.00	3191.388	157.080	3348.468
88	48.00	97.00	3254.220	157.080	3411.299
89	48.00	98.00	3317.052	157.080	3474.131
90	48.00	99.00	3379.883	157.080	3536.963
91	48.00	100.00	Soil Elevations Must Extend At or Below Contribution		

Zone

=== Shaft diameter = 60.0(in) ===

92	60.00	10.00	0.000	51.826	51.826
93	60.00	11.00	0.207	50.145	50.353
94	60.00	12.00	0.821	48.044	48.865
95	60.00	13.00	1.818	45.777	47.595
96	60.00	14.00	3.191	43.770	46.961
97	60.00	15.00	4.604	39.437	44.041
98	60.00	16.00	6.297	33.134	39.431
99	60.00	17.00	6.297	33.134	39.431
100	60.00	18.00	6.297	66.268	72.565
101	60.00	19.00	6.297	66.268	72.565
102	60.00	20.00	6.297	201.463	207.760
103	60.00	21.00	10.275	227.131	237.406
104	60.00	22.00	17.894	222.586	240.479
105	60.00	23.00	62.740	245.437	308.177
106	60.00	24.00	144.520	245.437	389.957
107	60.00	25.00	226.299	229.586	455.885
108	60.00	26.00	232.117	256.993	489.110
109	60.00	27.00	238.240	257.936	496.176
110	60.00	28.00	280.683	245.437	526.120
111	60.00	29.00	359.223	245.437	604.660
112	60.00	30.00	437.763	245.437	683.199
113	60.00	31.00	516.302	245.437	761.739
114	60.00	32.00	594.842	245.437	840.279
115	60.00	33.00	634.112	228.256	862.368
116	60.00	34.00	634.112	233.920	868.032
117	60.00	35.00	634.112	238.074	872.186
118	60.00	36.00	634.112	239.383	873.495
119	60.00	37.00	634.112	240.692	874.804
120	60.00	38.00	640.592	237.235	877.827
121	60.00	39.00	653.551	245.171	898.722
122	60.00	40.00	666.510	259.652	926.162
123	60.00	41.00	679.469	257.193	936.662
124	60.00	42.00	692.428	249.388	941.816
125	60.00	43.00	745.197	245.437	990.634
126	60.00	44.00	837.776	245.437	1083.213
127	60.00	45.00	930.354	245.437	1175.791
128	60.00	46.00	1022.933	245.437	1268.370
129	60.00	47.00	1115.512	245.437	1360.949
130	60.00	48.00	1201.071	245.437	1446.508
131	60.00	49.00	1279.611	245.437	1525.048
132	60.00	50.00	1358.151	245.437	1603.588
133	60.00	51.00	1436.691	245.437	1682.128
134	60.00	52.00	1515.231	245.437	1760.668
135	60.00	53.00	1593.770	245.437	1839.207
136	60.00	54.00	1672.310	245.437	1917.747
137	60.00	55.00	1750.850	245.437	1996.287
138	60.00	56.00	1829.390	245.437	2074.827
139	60.00	57.00	1907.930	245.437	2153.367
140	60.00	58.00	1947.200	0.000	1947.200
141	60.00	59.00	1947.200	0.000	1947.200
142	60.00	60.00	1947.200	0.000	1947.200
143	60.00	61.00	1947.200	0.000	1947.200
144	60.00	62.00	1947.200	0.000	1947.200
145	60.00	63.00	1947.200	0.000	1947.200
146	60.00	64.00	1947.200	0.000	1947.200
147	60.00	65.00	1947.200	0.000	1947.200
148	60.00	66.00	1947.200	0.000	1947.200
149	60.00	67.00	1947.200	0.000	1947.200
150	60.00	68.00	1947.200	0.000	1947.200
151	60.00	69.00	1947.200	0.000	1947.200
152	60.00	70.00	1947.200	245.437	2192.637
153	60.00	71.00	2025.739	245.437	2271.176
154	60.00	72.00	2104.279	245.437	2349.716
155	60.00	73.00	2182.819	245.437	2428.256
156	60.00	74.00	2261.359	245.437	2506.796
157	60.00	75.00	2339.899	245.437	2585.336
158	60.00	76.00	2418.439	245.437	2663.875
159	60.00	77.00	2496.978	245.437	2742.415

160	60.00	78.00	2575.518	245.437	2820.955
161	60.00	79.00	2654.058	245.437	2899.495
162	60.00	80.00	2732.598	245.437	2978.035
163	60.00	81.00	2811.138	245.437	3056.575
164	60.00	82.00	2889.677	245.437	3135.114
165	60.00	83.00	2968.217	245.437	3213.654
166	60.00	84.00	3046.757	245.437	3292.194
167	60.00	85.00	3125.297	245.437	3370.734
168	60.00	86.00	3203.837	245.437	3449.274
169	60.00	87.00	3282.376	245.437	3527.813
170	60.00	88.00	3360.916	245.437	3606.353
171	60.00	89.00	3439.456	245.437	3684.893
172	60.00	90.00	3517.996	245.437	3763.433
173	60.00	91.00	3596.536	245.437	3841.973
174	60.00	92.00	3675.076	245.437	3920.513
175	60.00	93.00	3753.615	245.437	3999.052
176	60.00	94.00	3832.155	245.437	4077.592
177	60.00	95.00	3910.695	245.437	4156.132
178	60.00	96.00	3989.235	245.437	4234.672
179	60.00	97.00	4067.775	245.437	4313.212
180	60.00	98.00	4146.314	245.437	4391.751
181	60.00	99.00	4224.854	245.437	4470.291
182	60.00	100.00	Soil Elevations Must Extend At or Below Contribution		

Zone

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 = 2.40%

ID	Diameter (in)	Length (ft)	Skin Fric. (tons)	End Bearing (tons)	Capacity (tons)
1	48.00	10.00	0.000	27.667	27.667
2	48.00	11.00	0.162	25.317	25.479
3	48.00	12.00	0.642	22.966	23.608
4	48.00	13.00	1.422	21.882	23.305
5	48.00	14.00	2.497	20.922	23.420
6	48.00	15.00	3.603	18.851	22.454
7	48.00	16.00	4.928	63.247	68.174
8	48.00	17.00	4.928	36.541	41.469
9	48.00	18.00	4.928	36.541	41.469
10	48.00	19.00	4.928	36.541	41.469
11	48.00	20.00	4.928	96.302	101.230
12	48.00	21.00	10.199	108.572	118.771
13	48.00	22.00	15.784	108.197	123.982
14	48.00	23.00	50.798	2361.265	2412.064
15	48.00	24.00	112.763	1131.028	1243.792
16	48.00	25.00	169.762	111.762	281.523
17	48.00	26.00	174.314	123.249	297.564
18	48.00	27.00	179.105	123.297	302.402
19	48.00	28.00	209.114	710.859	919.973
20	48.00	29.00	262.321	586.239	848.560
21	48.00	30.00	313.209	504.830	818.039
22	48.00	31.00	361.935	446.780	808.715
23	48.00	32.00	408.643	402.939	811.581
24	48.00	33.00	431.281	125.865	557.146
25	48.00	34.00	431.281	128.008	559.289
26	48.00	35.00	431.281	128.910	560.191
27	48.00	36.00	431.281	129.813	561.093
28	48.00	37.00	435.599	132.970	568.569
29	48.00	38.00	444.235	138.144	582.379
30	48.00	39.00	452.871	143.727	596.598
31	48.00	40.00	461.506	143.783	605.290
32	48.00	41.00	470.142	142.410	612.553
33	48.00	42.00	479.138	137.944	617.082
34	48.00	43.00	510.786	368.455	879.241
35	48.00	44.00	568.690	366.868	935.558
36	48.00	45.00	625.907	364.833	990.740
37	48.00	46.00	682.478	362.495	1044.973
38	48.00	47.00	733.760	359.951	1093.711
39	48.00	48.00	779.785	357.269	1137.053
40	48.00	49.00	825.257	354.496	1179.753
41	48.00	50.00	870.202	351.668	1221.871
42	48.00	51.00	914.643	348.810	1263.453
43	48.00	52.00	958.601	345.939	1304.539
44	48.00	53.00	1002.094	343.069	1345.162
45	48.00	54.00	1045.140	340.209	1385.349
46	48.00	55.00	1087.755	337.369	1425.124
47	48.00	56.00	1129.956	334.552	1464.508
48	48.00	57.00	1171.755	331.763	1503.518
49	48.00	58.00	1192.508	0.000	1192.508
50	48.00	59.00	1192.508	0.000	1192.508
51	48.00	60.00	1192.508	0.000	1192.508
52	48.00	61.00	1192.508	0.000	1192.508
53	48.00	62.00	1192.508	0.000	1192.508
54	48.00	63.00	1192.508	0.000	1192.508
55	48.00	64.00	1192.508	0.000	1192.508
56	48.00	65.00	1192.508	0.000	1192.508
57	48.00	66.00	1192.508	0.000	1192.508
58	48.00	67.00	1192.508	0.000	1192.508
59	48.00	68.00	1192.508	0.000	1192.508
60	48.00	69.00	1192.508	0.000	1192.508
61	48.00	70.00	1192.508	330.380	1522.888
62	48.00	71.00	1234.186	327.637	1561.824
63	48.00	72.00	1275.505	324.928	1600.434
64	48.00	73.00	1316.476	322.254	1638.729

65	48.00	74.00	1357.108	319.614	1676.722
66	48.00	75.00	1397.411	317.010	1714.421
67	48.00	76.00	1437.395	314.441	1751.836
68	48.00	77.00	1477.068	311.907	1788.975
69	48.00	78.00	1516.439	309.408	1825.846
70	48.00	79.00	1555.514	306.943	1862.458
71	48.00	80.00	1594.303	304.512	1898.816
72	48.00	81.00	1632.812	302.115	1934.927
73	48.00	82.00	1671.048	299.750	1970.798
74	48.00	83.00	1709.018	297.417	2006.435
75	48.00	84.00	1746.728	295.116	2041.844
76	48.00	85.00	1784.184	292.845	2077.029
77	48.00	86.00	1821.392	290.604	2111.995
78	48.00	87.00	1858.357	288.392	2146.749
79	48.00	88.00	1895.086	286.208	2181.295
80	48.00	89.00	1931.584	284.053	2215.636
81	48.00	90.00	1967.854	281.924	2249.778
82	48.00	91.00	2003.903	279.822	2283.725
83	48.00	92.00	2039.735	277.745	2317.480
84	48.00	93.00	2075.354	275.694	2351.048
85	48.00	94.00	2110.766	273.667	2384.432
86	48.00	95.00	2145.973	271.664	2417.637
87	48.00	96.00	2180.981	269.684	2450.664
88	48.00	97.00	2215.792	267.726	2483.519
89	48.00	98.00	2250.412	265.791	2516.204
90	48.00	99.00	2284.844	263.878	2548.722
91	48.00	100.00	Soil Elevations Must Extend At or Below Contribution		

Zone

=== Shaft diameter = 60.0(in) ===

92	60.00	10.00	0.000	32.257	32.257
93	60.00	11.00	0.203	31.211	31.414
94	60.00	12.00	0.803	29.903	30.706
95	60.00	13.00	1.778	28.493	30.270
96	60.00	14.00	3.121	27.243	30.364
97	60.00	15.00	4.503	24.546	29.049
98	60.00	16.00	6.160	28.548	34.708
99	60.00	17.00	6.160	28.548	34.708
100	60.00	18.00	6.160	57.096	63.256
101	60.00	19.00	6.160	57.096	63.256
102	60.00	20.00	6.160	125.393	131.553
103	60.00	21.00	10.050	141.370	151.420
104	60.00	22.00	17.032	138.540	155.572
105	60.00	23.00	60.896	4284.444	4345.340
106	60.00	24.00	139.085	2052.217	2191.301
107	60.00	25.00	214.404	142.897	357.301
108	60.00	26.00	220.095	159.956	380.051
109	60.00	27.00	226.084	160.543	386.626
110	60.00	28.00	264.492	1289.832	1554.324
111	60.00	29.00	333.173	1063.712	1396.885
112	60.00	30.00	399.405	915.998	1315.403
113	60.00	31.00	463.327	810.668	1273.995
114	60.00	32.00	525.065	731.120	1256.185
115	60.00	33.00	555.153	196.664	751.817
116	60.00	34.00	555.153	201.544	756.697
117	60.00	35.00	555.153	205.123	760.276
118	60.00	36.00	555.153	206.251	761.404
119	60.00	37.00	555.153	207.379	762.532
120	60.00	38.00	560.550	204.400	764.951
121	60.00	39.00	571.345	211.238	782.583
122	60.00	40.00	582.140	223.714	805.855
123	60.00	41.00	592.935	221.596	814.531
124	60.00	42.00	603.730	214.872	818.602
125	60.00	43.00	644.680	668.550	1313.230
126	60.00	44.00	714.366	617.820	1332.186
127	60.00	45.00	782.243	575.711	1357.954
128	60.00	46.00	854.808	573.792	1428.599
129	60.00	47.00	926.686	571.391	1498.077
130	60.00	48.00	992.066	568.637	1560.703
131	60.00	49.00	1050.977	565.625	1616.602
132	60.00	50.00	1109.294	562.423	1671.717
133	60.00	51.00	1167.042	559.084	1726.125
134	60.00	52.00	1224.243	555.646	1779.889
135	60.00	53.00	1280.919	552.141	1833.060
136	60.00	54.00	1337.088	548.591	1885.680
137	60.00	55.00	1392.769	545.015	1937.784
138	60.00	56.00	1447.978	541.427	1989.405
139	60.00	57.00	1502.730	537.837	2040.567
140	60.00	58.00	1529.940	0.000	1529.940
141	60.00	59.00	1529.940	0.000	1529.940
142	60.00	60.00	1529.940	0.000	1529.940
143	60.00	61.00	1529.940	0.000	1529.940
144	60.00	62.00	1529.940	0.000	1529.940
145	60.00	63.00	1529.940	0.000	1529.940
146	60.00	64.00	1529.940	0.000	1529.940
147	60.00	65.00	1529.940	0.000	1529.940
148	60.00	66.00	1529.940	0.000	1529.940
149	60.00	67.00	1529.940	0.000	1529.940
150	60.00	68.00	1529.940	0.000	1529.940
151	60.00	69.00	1529.940	0.000	1529.940
152	60.00	70.00	1529.940	536.045	2065.985
153	60.00	71.00	1584.571	532.469	2117.039
154	60.00	72.00	1638.792	528.910	2167.702
155	60.00	73.00	1692.616	525.373	2217.990
156	60.00	74.00	1746.055	521.862	2267.917
157	60.00	75.00	1799.117	518.380	2317.497
158	60.00	76.00	1851.815	514.928	2366.742
159	60.00	77.00	1904.156	511.508	2415.664
160	60.00	78.00	1956.151	508.121	2464.273
161	60.00	79.00	2007.808	504.769	2512.578
162	60.00	80.00	2059.136	501.452	2560.588

163	60.00	81.00	2110.142	498.170	2608.312
164	60.00	82.00	2160.834	494.924	2655.758
165	60.00	83.00	2211.220	491.712	2702.932
166	60.00	84.00	2261.306	488.536	2749.842
167	60.00	85.00	2311.099	485.395	2796.494
168	60.00	86.00	2360.606	482.289	2842.895
169	60.00	87.00	2409.833	479.217	2889.050
170	60.00	88.00	2458.787	476.178	2934.965
171	60.00	89.00	2507.472	473.173	2980.645
172	60.00	90.00	2555.895	470.201	3026.096
173	60.00	91.00	2604.061	467.261	3071.322
174	60.00	92.00	2651.975	464.353	3116.328
175	60.00	93.00	2699.642	461.476	3161.118
176	60.00	94.00	2747.068	458.630	3205.698
177	60.00	95.00	2794.257	455.813	3250.070
178	60.00	96.00	2841.213	453.027	3294.240
179	60.00	97.00	2887.941	450.269	3338.210
180	60.00	98.00	2934.446	447.540	3381.986
181	60.00	99.00	2980.732	444.838	3425.570
182	60.00	100.00	Soil Elevations Must Extend At or Below Contribution		

Zone

Florida Bridge Software Institute Date: August 19, 2021
Shaft and Pile Analysis (FB-Deep v.2.05) Time: 17:07:47

General Information:
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Input file: .....reet - LOCHNER\12 - Calculations\FB-Deep\DS\BB-04_DS - Rev.spc
Project number: B-19-051
Job name: THEA Whiting Street
Engineer: Kirk M. Eastman
Units: English

Analysis Information:
==========
Analysis Type: Drilled Shaft Analysis

Soil Information:
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Boring date: 16/22/21
Boring number: BB-04
Station number: 206+48 Offset: 24 LT

Ground Elevation: 16.10(ft)
Water table Elevation = 11.10(ft)

Cu is calculated using: Direct method.
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	16.10	N/A	0.00	5- Cavity layer
2	2.00	14.10	N/A	0.00	5- Cavity layer
3	4.00	12.10	N/A	0.00	5- Cavity layer
4	6.00	10.10	N/A	0.00	5- Cavity layer
5	8.00	8.10	N/A	0.00	5- Cavity layer
6	10.00	6.10	N/A	0.00	5- Cavity layer
7	10.00	6.10	N/A	0.00	1- Plastic Clay
8	10.00	6.10	N/A	118.00	2- Clay and silty sand
9	12.00	4.10	N/A	118.00	2- Clay and silty sand
10	14.00	2.10	N/A	121.00	2- Clay and silty sand
11	16.00	0.10	N/A	121.00	2- Clay and silty sand
12	18.00	-1.90	N/A	114.00	2- Clay and silty sand
13	20.00	-3.90	N/A	117.00	2- Clay and silty sand
14	22.50	-6.40	N/A	117.00	2- Clay and silty sand
15	22.50	-6.40	N/A	0.00	1- Plastic Clay
16	22.50	-6.40	N/A	0.00	5- Cavity layer
17	25.00	-8.90	N/A	0.00	5- Cavity layer
18	27.50	-11.40	N/A	0.00	5- Cavity layer
19	30.00	-13.90	N/A	0.00	5- Cavity layer
20	30.00	-13.90	N/A	0.00	2- Clay and silty sand
21	30.00	-13.90	N/A	125.00	1- Plastic Clay
22	32.50	-16.40	N/A	125.00	1- Plastic Clay
23	32.50	-16.40	N/A	0.00	2- Clay and silty sand
24	32.50	-16.40	N/A	125.00	1- Plastic Clay
25	35.00	-18.90	N/A	125.00	1- Plastic Clay
26	35.00	-18.90	N/A	0.00	2- Clay and silty sand
27	35.00	-18.90	N/A	130.00	4- Lime Stone/Very shelly sand
28	37.50	-21.40	N/A	130.00	4- Lime Stone/Very shelly sand
29	37.50	-21.40	N/A	0.00	1- Plastic Clay
30	37.50	-21.40	N/A	129.00	2- Clay and silty sand
31	40.00	-23.90	N/A	129.00	2- Clay and silty sand
32	40.00	-23.90	N/A	0.00	1- Plastic Clay
33	40.00	-23.90	N/A	130.00	4- Lime Stone/Very shelly sand
34	42.50	-26.40	N/A	130.00	4- Lime Stone/Very shelly sand
35	45.00	-28.90	N/A	130.00	4- Lime Stone/Very shelly sand
36	47.50	-31.40	N/A	130.00	4- Lime Stone/Very shelly sand
37	47.50	-31.40	N/A	0.00	2- Clay and silty sand
38	47.50	-31.40	N/A	125.00	1- Plastic Clay
39	50.00	-33.90	N/A	125.00	1- Plastic Clay
40	50.00	-33.90	N/A	0.00	2- Clay and silty sand
41	50.00	-33.90	N/A	130.00	4- Lime Stone/Very shelly sand
42	52.50	-36.40	N/A	130.00	4- Lime Stone/Very shelly sand
43	55.00	-38.90	N/A	130.00	4- Lime Stone/Very shelly sand
44	55.00	-38.90	N/A	0.00	2- Clay and silty sand
45	55.00	-38.90	N/A	125.00	1- Plastic Clay
46	57.50	-41.40	N/A	125.00	1- Plastic Clay
47	60.00	-43.90	N/A	125.00	1- Plastic Clay
48	62.50	-46.40	N/A	125.00	1- Plastic Clay
49	62.50	-46.40	N/A	0.00	2- Clay and silty sand
50	62.50	-46.40	N/A	130.00	4- Lime Stone/Very shelly sand
51	65.00	-48.90	N/A	130.00	4- Lime Stone/Very shelly sand
52	67.50	-51.40	N/A	130.00	4- Lime Stone/Very shelly sand
53	70.00	-53.90	N/A	130.00	4- Lime Stone/Very shelly sand
54	72.50	-56.40	N/A	130.00	4- Lime Stone/Very shelly sand
55	75.00	-58.90	N/A	130.00	4- Lime Stone/Very shelly sand
56	77.50	-61.40	N/A	130.00	4- Lime Stone/Very shelly sand
57	80.00	-63.90	N/A	130.00	4- Lime Stone/Very shelly sand
58	82.50	-66.40	N/A	130.00	4- Lime Stone/Very shelly sand
59	85.00	-68.90	N/A	130.00	4- Lime Stone/Very shelly sand
60	87.50	-71.40	N/A	130.00	4- Lime Stone/Very shelly sand
61	90.00	-73.90	N/A	130.00	4- Lime Stone/Very shelly sand
62	92.50	-76.40	N/A	130.00	4- Lime Stone/Very shelly sand
63	92.50	-76.40	N/A	0.00	1- Plastic Clay
64	92.50	-76.40	N/A	130.00	4- Lime Stone/Very shelly sand
65	95.00	-78.90	N/A	130.00	4- Lime Stone/Very shelly sand

66	95.00	-78.90	N/A	0.00	1- Plastic Clay
67	95.00	-78.90	N/A	130.00	4- Lime Stone/Very shelly sand
68	97.50	-81.40	N/A	130.00	4- Lime Stone/Very shelly sand
69	100.00	-83.90	N/A	130.00	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	0.00	N/A	N/A	N/A	N/A
8	0.00	N/A	N/A	N/A	N/A
9	0.00	N/A	N/A	N/A	N/A
10	0.00	N/A	N/A	N/A	N/A
11	0.00	N/A	N/A	N/A	N/A
12	0.00	N/A	N/A	N/A	N/A
13	0.00	N/A	N/A	N/A	N/A
14	0.00	N/A	N/A	N/A	N/A
15	0.00	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	0.00	N/A	N/A	N/A	N/A
21	1.13	N/A	N/A	N/A	N/A
22	1.13	N/A	N/A	N/A	N/A
23	0.00	N/A	N/A	N/A	N/A
24	1.13	N/A	N/A	N/A	N/A
25	1.13	N/A	N/A	N/A	N/A
26	0.00	N/A	N/A	N/A	N/A
27	N/A	25.00	4.00	39.93	12.50
28	N/A	25.00	4.00	39.93	12.50
29	0.00	N/A	N/A	N/A	N/A
30	1.50	N/A	N/A	N/A	N/A
31	1.50	N/A	N/A	N/A	N/A
32	0.00	N/A	N/A	N/A	N/A
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	0.00	N/A	N/A	N/A	N/A
38	1.88	N/A	N/A	N/A	N/A
39	1.88	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
44	0.00	N/A	N/A	N/A	N/A
45	1.13	N/A	N/A	N/A	N/A
46	1.13	N/A	N/A	N/A	N/A
47	1.13	N/A	N/A	N/A	N/A
48	1.13	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	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
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
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	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

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	1.00	ROUGH	1.000
28	1.00	ROUGH	1.000
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	1.00	ROUGH	1.000
34	1.00	ROUGH	1.000
35	1.00	ROUGH	1.000
36	1.00	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	1.00	ROUGH	1.000
42	1.00	ROUGH	1.000
43	1.00	ROUGH	1.000
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	1.00	ROUGH	1.000
51	1.00	ROUGH	1.000
52	1.00	ROUGH	1.000
53	1.00	ROUGH	1.000
54	1.00	ROUGH	1.000
55	1.00	ROUGH	1.000
56	1.00	ROUGH	1.000
57	1.00	ROUGH	1.000
58	1.00	ROUGH	1.000
59	1.00	ROUGH	1.000
60	1.00	ROUGH	1.000
61	1.00	ROUGH	1.000
62	1.00	ROUGH	1.000
63	N/A	N/A	N/A
64	1.00	ROUGH	1.000
65	1.00	ROUGH	1.000
66	N/A	N/A	N/A
67	1.00	ROUGH	1.000
68	1.00	ROUGH	1.000
69	1.00	ROUGH	1.000

Drilled Shaft Data:
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  Unit weight of concrete = 150.00(pcf), Concrete Slump = 8.50(in)
  Modulus of Elasticity of concrete = 3640.00(ksi)

Shaft Geometry:

ID	Length (ft)	Tip Elev. (ft)	Case Len. (ft)	Diameter (in)	Base Diam. (in)	Bell Len. (ft)
1	10.00	6.10	10.00	48.00	48.00	0.00
2	11.00	5.10	10.00	48.00	48.00	0.00
3	12.00	4.10	10.00	48.00	48.00	0.00
4	13.00	3.10	10.00	48.00	48.00	0.00
5	14.00	2.10	10.00	48.00	48.00	0.00
6	15.00	1.10	10.00	48.00	48.00	0.00
7	16.00	0.10	10.00	48.00	48.00	0.00
8	17.00	-0.90	10.00	48.00	48.00	0.00
9	18.00	-1.90	10.00	48.00	48.00	0.00
10	19.00	-2.90	10.00	48.00	48.00	0.00
11	20.00	-3.90	10.00	48.00	48.00	0.00
12	21.00	-4.90	10.00	48.00	48.00	0.00
13	22.00	-5.90	10.00	48.00	48.00	0.00
14	23.00	-6.90	10.00	48.00	48.00	0.00
15	24.00	-7.90	10.00	48.00	48.00	0.00
16	25.00	-8.90	10.00	48.00	48.00	0.00
17	26.00	-9.90	10.00	48.00	48.00	0.00
18	27.00	-10.90	10.00	48.00	48.00	0.00
19	28.00	-11.90	10.00	48.00	48.00	0.00
20	29.00	-12.90	10.00	48.00	48.00	0.00
21	30.00	-13.90	10.00	48.00	48.00	0.00
22	31.00	-14.90	10.00	48.00	48.00	0.00
23	32.00	-15.90	10.00	48.00	48.00	0.00
24	33.00	-16.90	10.00	48.00	48.00	0.00
25	34.00	-17.90	10.00	48.00	48.00	0.00
26	35.00	-18.90	10.00	48.00	48.00	0.00
27	36.00	-19.90	10.00	48.00	48.00	0.00
28	37.00	-20.90	10.00	48.00	48.00	0.00
29	38.00	-21.90	10.00	48.00	48.00	0.00
30	39.00	-22.90	10.00	48.00	48.00	0.00
31	40.00	-23.90	10.00	48.00	48.00	0.00
32	41.00	-24.90	10.00	48.00	48.00	0.00
33	42.00	-25.90	10.00	48.00	48.00	0.00
34	43.00	-26.90	10.00	48.00	48.00	0.00
35	44.00	-27.90	10.00	48.00	48.00	0.00
36	45.00	-28.90	10.00	48.00	48.00	0.00
37	46.00	-29.90	10.00	48.00	48.00	0.00
38	47.00	-30.90	10.00	48.00	48.00	0.00

39	48.00	-31.90	10.00	48.00	48.00	0.00
40	49.00	-32.90	10.00	48.00	48.00	0.00
41	50.00	-33.90	10.00	48.00	48.00	0.00
42	51.00	-34.90	10.00	48.00	48.00	0.00
43	52.00	-35.90	10.00	48.00	48.00	0.00
44	53.00	-36.90	10.00	48.00	48.00	0.00
45	54.00	-37.90	10.00	48.00	48.00	0.00
46	55.00	-38.90	10.00	48.00	48.00	0.00
47	56.00	-39.90	10.00	48.00	48.00	0.00
48	57.00	-40.90	10.00	48.00	48.00	0.00
49	58.00	-41.90	10.00	48.00	48.00	0.00
50	59.00	-42.90	10.00	48.00	48.00	0.00
51	60.00	-43.90	10.00	48.00	48.00	0.00
52	61.00	-44.90	10.00	48.00	48.00	0.00
53	62.00	-45.90	10.00	48.00	48.00	0.00
54	63.00	-46.90	10.00	48.00	48.00	0.00
55	64.00	-47.90	10.00	48.00	48.00	0.00
56	65.00	-48.90	10.00	48.00	48.00	0.00
57	66.00	-49.90	10.00	48.00	48.00	0.00
58	67.00	-50.90	10.00	48.00	48.00	0.00
59	68.00	-51.90	10.00	48.00	48.00	0.00
60	69.00	-52.90	10.00	48.00	48.00	0.00
61	70.00	-53.90	10.00	48.00	48.00	0.00
62	71.00	-54.90	10.00	48.00	48.00	0.00
63	72.00	-55.90	10.00	48.00	48.00	0.00
64	73.00	-56.90	10.00	48.00	48.00	0.00
65	74.00	-57.90	10.00	48.00	48.00	0.00
66	75.00	-58.90	10.00	48.00	48.00	0.00
67	76.00	-59.90	10.00	48.00	48.00	0.00
68	77.00	-60.90	10.00	48.00	48.00	0.00
69	78.00	-61.90	10.00	48.00	48.00	0.00
70	79.00	-62.90	10.00	48.00	48.00	0.00
71	80.00	-63.90	10.00	48.00	48.00	0.00
72	81.00	-64.90	10.00	48.00	48.00	0.00
73	82.00	-65.90	10.00	48.00	48.00	0.00
74	83.00	-66.90	10.00	48.00	48.00	0.00
75	84.00	-67.90	10.00	48.00	48.00	0.00
76	85.00	-68.90	10.00	48.00	48.00	0.00
77	86.00	-69.90	10.00	48.00	48.00	0.00
78	87.00	-70.90	10.00	48.00	48.00	0.00
79	88.00	-71.90	10.00	48.00	48.00	0.00
80	89.00	-72.90	10.00	48.00	48.00	0.00
81	90.00	-73.90	10.00	48.00	48.00	0.00
82	91.00	-74.90	10.00	48.00	48.00	0.00
83	92.00	-75.90	10.00	48.00	48.00	0.00
84	93.00	-76.90	10.00	48.00	48.00	0.00
85	94.00	-77.90	10.00	48.00	48.00	0.00
86	95.00	-78.90	10.00	48.00	48.00	0.00
87	96.00	-79.90	10.00	48.00	48.00	0.00
88	97.00	-80.90	10.00	48.00	48.00	0.00
89	98.00	-81.90	10.00	48.00	48.00	0.00
90	99.00	-82.90	10.00	48.00	48.00	0.00
91	100.00	-83.90	10.00	48.00	48.00	0.00
92	10.00	6.10	10.00	60.00	60.00	0.00
93	11.00	5.10	10.00	60.00	60.00	0.00
94	12.00	4.10	10.00	60.00	60.00	0.00
95	13.00	3.10	10.00	60.00	60.00	0.00
96	14.00	2.10	10.00	60.00	60.00	0.00
97	15.00	1.10	10.00	60.00	60.00	0.00
98	16.00	0.10	10.00	60.00	60.00	0.00
99	17.00	-0.90	10.00	60.00	60.00	0.00
100	18.00	-1.90	10.00	60.00	60.00	0.00
101	19.00	-2.90	10.00	60.00	60.00	0.00
102	20.00	-3.90	10.00	60.00	60.00	0.00
103	21.00	-4.90	10.00	60.00	60.00	0.00
104	22.00	-5.90	10.00	60.00	60.00	0.00
105	23.00	-6.90	10.00	60.00	60.00	0.00
106	24.00	-7.90	10.00	60.00	60.00	0.00
107	25.00	-8.90	10.00	60.00	60.00	0.00
108	26.00	-9.90	10.00	60.00	60.00	0.00
109	27.00	-10.90	10.00	60.00	60.00	0.00
110	28.00	-11.90	10.00	60.00	60.00	0.00
111	29.00	-12.90	10.00	60.00	60.00	0.00
112	30.00	-13.90	10.00	60.00	60.00	0.00
113	31.00	-14.90	10.00	60.00	60.00	0.00
114	32.00	-15.90	10.00	60.00	60.00	0.00
115	33.00	-16.90	10.00	60.00	60.00	0.00
116	34.00	-17.90	10.00	60.00	60.00	0.00
117	35.00	-18.90	10.00	60.00	60.00	0.00
118	36.00	-19.90	10.00	60.00	60.00	0.00
119	37.00	-20.90	10.00	60.00	60.00	0.00
120	38.00	-21.90	10.00	60.00	60.00	0.00
121	39.00	-22.90	10.00	60.00	60.00	0.00
122	40.00	-23.90	10.00	60.00	60.00	0.00
123	41.00	-24.90	10.00	60.00	60.00	0.00
124	42.00	-25.90	10.00	60.00	60.00	0.00
125	43.00	-26.90	10.00	60.00	60.00	0.00
126	44.00	-27.90	10.00	60.00	60.00	0.00
127	45.00	-28.90	10.00	60.00	60.00	0.00
128	46.00	-29.90	10.00	60.00	60.00	0.00
129	47.00	-30.90	10.00	60.00	60.00	0.00
130	48.00	-31.90	10.00	60.00	60.00	0.00
131	49.00	-32.90	10.00	60.00	60.00	0.00
132	50.00	-33.90	10.00	60.00	60.00	0.00
133	51.00	-34.90	10.00	60.00	60.00	0.00
134	52.00	-35.90	10.00	60.00	60.00	0.00
135	53.00	-36.90	10.00	60.00	60.00	0.00
136	54.00	-37.90	10.00	60.00	60.00	0.00
137	55.00	-38.90	10.00	60.00	60.00	0.00
138	56.00	-39.90	10.00	60.00	60.00	0.00

139	57.00	-40.90	10.00	60.00	60.00	0.00
140	58.00	-41.90	10.00	60.00	60.00	0.00
141	59.00	-42.90	10.00	60.00	60.00	0.00
142	60.00	-43.90	10.00	60.00	60.00	0.00
143	61.00	-44.90	10.00	60.00	60.00	0.00
144	62.00	-45.90	10.00	60.00	60.00	0.00
145	63.00	-46.90	10.00	60.00	60.00	0.00
146	64.00	-47.90	10.00	60.00	60.00	0.00
147	65.00	-48.90	10.00	60.00	60.00	0.00
148	66.00	-49.90	10.00	60.00	60.00	0.00
149	67.00	-50.90	10.00	60.00	60.00	0.00
150	68.00	-51.90	10.00	60.00	60.00	0.00
151	69.00	-52.90	10.00	60.00	60.00	0.00
152	70.00	-53.90	10.00	60.00	60.00	0.00
153	71.00	-54.90	10.00	60.00	60.00	0.00
154	72.00	-55.90	10.00	60.00	60.00	0.00
155	73.00	-56.90	10.00	60.00	60.00	0.00
156	74.00	-57.90	10.00	60.00	60.00	0.00
157	75.00	-58.90	10.00	60.00	60.00	0.00
158	76.00	-59.90	10.00	60.00	60.00	0.00
159	77.00	-60.90	10.00	60.00	60.00	0.00
160	78.00	-61.90	10.00	60.00	60.00	0.00
161	79.00	-62.90	10.00	60.00	60.00	0.00
162	80.00	-63.90	10.00	60.00	60.00	0.00
163	81.00	-64.90	10.00	60.00	60.00	0.00
164	82.00	-65.90	10.00	60.00	60.00	0.00
165	83.00	-66.90	10.00	60.00	60.00	0.00
166	84.00	-67.90	10.00	60.00	60.00	0.00
167	85.00	-68.90	10.00	60.00	60.00	0.00
168	86.00	-69.90	10.00	60.00	60.00	0.00
169	87.00	-70.90	10.00	60.00	60.00	0.00
170	88.00	-71.90	10.00	60.00	60.00	0.00
171	89.00	-72.90	10.00	60.00	60.00	0.00
172	90.00	-73.90	10.00	60.00	60.00	0.00
173	91.00	-74.90	10.00	60.00	60.00	0.00
174	92.00	-75.90	10.00	60.00	60.00	0.00
175	93.00	-76.90	10.00	60.00	60.00	0.00
176	94.00	-77.90	10.00	60.00	60.00	0.00
177	95.00	-78.90	10.00	60.00	60.00	0.00
178	96.00	-79.90	10.00	60.00	60.00	0.00
179	97.00	-80.90	10.00	60.00	60.00	0.00
180	98.00	-81.90	10.00	60.00	60.00	0.00
181	99.00	-82.90	10.00	60.00	60.00	0.00
182	100.00	-83.90	10.00	60.00	60.00	0.00

Drilled Shaft Capacity (sorted by shaft diameter):

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	63.617	63.617
22	48.00	31.00	0.000	63.617	63.617
23	48.00	32.00	0.000	63.617	63.617
24	48.00	33.00	0.000	63.617	63.617
25	48.00	34.00	0.000	63.617	63.617
26	48.00	35.00	7.775	157.080	164.855
27	48.00	36.00	78.383	157.080	235.462
28	48.00	37.00	148.990	157.080	306.070
29	48.00	38.00	188.181	151.465	339.646
30	48.00	39.00	195.957	154.415	350.372
31	48.00	40.00	195.957	157.080	353.036
32	48.00	41.00	258.789	157.080	415.868
33	48.00	42.00	326.804	157.080	483.884
34	48.00	43.00	400.003	157.080	557.083
35	48.00	44.00	473.202	157.080	630.282
36	48.00	45.00	536.034	157.080	693.114
37	48.00	46.00	598.866	157.080	755.946
38	48.00	47.00	661.698	157.080	818.778
39	48.00	48.00	693.114	157.734	850.848
40	48.00	49.00	693.114	158.781	851.895
41	48.00	50.00	693.114	157.080	850.194
42	48.00	51.00	755.946	157.080	913.025
43	48.00	52.00	825.257	157.080	982.337
44	48.00	53.00	901.048	157.080	1058.128
45	48.00	54.00	976.839	157.080	1133.919
46	48.00	55.00	1039.671	142.157	1181.828
47	48.00	56.00	1039.671	127.235	1166.905

48	48.00	57.00	1039.671	127.235	1166.905
49	48.00	58.00	1039.671	127.235	1166.905
50	48.00	59.00	1039.671	127.235	1166.905
51	48.00	60.00	1047.446	127.235	1174.681
52	48.00	61.00	1055.222	127.235	1182.456
53	48.00	62.00	1062.997	127.235	1190.232
54	48.00	63.00	1102.189	157.080	1259.268
55	48.00	64.00	1172.796	157.080	1329.875
56	48.00	65.00	1243.403	157.080	1400.483
57	48.00	66.00	1314.010	157.080	1471.090
58	48.00	67.00	1380.730	157.080	1537.810
59	48.00	68.00	1443.562	157.080	1600.641
60	48.00	69.00	1506.394	157.080	1663.473
61	48.00	70.00	1569.226	157.080	1726.305
62	48.00	71.00	1632.057	157.080	1789.137
63	48.00	72.00	1694.889	157.080	1851.969
64	48.00	73.00	1757.721	157.080	1914.801
65	48.00	74.00	1820.553	157.080	1977.633
66	48.00	75.00	1883.385	157.080	2040.464
67	48.00	76.00	1946.217	157.080	2103.296
68	48.00	77.00	2009.049	157.080	2166.128
69	48.00	78.00	2071.880	157.080	2228.960
70	48.00	79.00	2134.712	157.080	2291.792
71	48.00	80.00	2197.544	157.080	2354.624
72	48.00	81.00	2260.376	157.080	2417.456
73	48.00	82.00	2323.208	157.080	2480.287
74	48.00	83.00	2386.040	157.080	2543.119
75	48.00	84.00	2448.871	157.080	2605.951
76	48.00	85.00	2511.703	157.080	2668.783
77	48.00	86.00	2574.535	157.080	2731.615
78	48.00	87.00	2637.367	157.080	2794.447
79	48.00	88.00	2700.199	157.080	2857.279
80	48.00	89.00	2763.031	157.080	2920.110
81	48.00	90.00	2825.863	157.080	2982.942
82	48.00	91.00	2888.694	157.080	3045.774
83	48.00	92.00	2951.526	157.080	3108.606
84	48.00	93.00	3014.358	157.080	3171.438
85	48.00	94.00	3077.190	157.080	3234.270
86	48.00	95.00	3140.022	157.080	3297.101
87	48.00	96.00	3202.854	157.080	3359.933
88	48.00	97.00	3265.686	157.080	3422.765
89	48.00	98.00	3328.517	157.080	3485.597
90	48.00	99.00	3391.349	157.080	3548.429
91	48.00	100.00	Soil Elevations Must Extend At or Below Contribution		

Zone

=== Shaft diameter = 60.0(in) ===

92	60.00	10.00	0.000	0.000	0.000
93	60.00	11.00	0.000	0.000	0.000
94	60.00	12.00	0.000	0.000	0.000
95	60.00	13.00	0.000	0.000	0.000
96	60.00	14.00	0.000	0.000	0.000
97	60.00	15.00	0.000	0.000	0.000
98	60.00	16.00	0.000	0.000	0.000
99	60.00	17.00	0.000	0.000	0.000
100	60.00	18.00	0.000	0.000	0.000
101	60.00	19.00	0.000	0.000	0.000
102	60.00	20.00	0.000	0.000	0.000
103	60.00	21.00	0.000	0.000	0.000
104	60.00	22.00	0.000	0.000	0.000
105	60.00	23.00	0.000	0.000	0.000
106	60.00	24.00	0.000	0.000	0.000
107	60.00	25.00	0.000	0.000	0.000
108	60.00	26.00	0.000	0.000	0.000
109	60.00	27.00	0.000	0.000	0.000
110	60.00	28.00	0.000	0.000	0.000
111	60.00	29.00	0.000	0.000	0.000
112	60.00	30.00	0.000	99.402	99.402
113	60.00	31.00	0.000	99.402	99.402
114	60.00	32.00	0.000	99.402	99.402
115	60.00	33.00	0.000	99.402	99.402
116	60.00	34.00	0.000	99.402	99.402
117	60.00	35.00	0.000	245.437	245.437
118	60.00	36.00	88.259	245.437	333.696
119	60.00	37.00	176.518	245.437	421.955
120	60.00	38.00	225.507	234.168	459.676
121	60.00	39.00	235.227	237.674	472.901
122	60.00	40.00	244.946	245.437	490.383
123	60.00	41.00	323.486	245.437	568.923
124	60.00	42.00	402.026	245.437	647.463
125	60.00	43.00	487.045	245.437	732.482
126	60.00	44.00	578.544	245.437	823.981
127	60.00	45.00	670.043	245.437	915.480
128	60.00	46.00	748.583	245.437	994.020
129	60.00	47.00	827.122	245.437	1072.559
130	60.00	48.00	866.392	242.164	1108.557
131	60.00	49.00	866.392	244.255	1110.648
132	60.00	50.00	866.392	245.437	1111.829
133	60.00	51.00	944.932	245.437	1190.369
134	60.00	52.00	1023.472	245.437	1268.909
135	60.00	53.00	1110.111	245.437	1355.548
136	60.00	54.00	1204.850	245.437	1450.287
137	60.00	55.00	1299.589	222.120	1521.709
138	60.00	56.00	1299.589	198.804	1498.392
139	60.00	57.00	1299.589	198.804	1498.392
140	60.00	58.00	1299.589	198.804	1498.392
141	60.00	59.00	1299.589	198.804	1498.392
142	60.00	60.00	1299.589	198.804	1498.392
143	60.00	61.00	1309.308	198.804	1508.112
144	60.00	62.00	1319.027	198.804	1517.831
145	60.00	63.00	1368.016	245.437	1613.453

146	60.00	64.00	1456.275	245.437	1701.712
147	60.00	65.00	1544.535	245.437	1789.972
148	60.00	66.00	1632.794	245.437	1878.231
149	60.00	67.00	1721.053	245.437	1966.490
150	60.00	68.00	1804.452	245.437	2049.889
151	60.00	69.00	1882.992	245.437	2128.429
152	60.00	70.00	1961.532	245.437	2206.969
153	60.00	71.00	2040.072	245.437	2285.509
154	60.00	72.00	2118.612	245.437	2364.048
155	60.00	73.00	2197.151	245.437	2442.588
156	60.00	74.00	2275.691	245.437	2521.128
157	60.00	75.00	2354.231	245.437	2599.668
158	60.00	76.00	2432.771	245.437	2678.208
159	60.00	77.00	2511.311	245.437	2756.748
160	60.00	78.00	2589.850	245.437	2835.287
161	60.00	79.00	2668.390	245.437	2913.827
162	60.00	80.00	2746.930	245.437	2992.367
163	60.00	81.00	2825.470	245.437	3070.907
164	60.00	82.00	2904.010	245.437	3149.447
165	60.00	83.00	2982.550	245.437	3227.986
166	60.00	84.00	3061.089	245.437	3306.526
167	60.00	85.00	3139.629	245.437	3385.066
168	60.00	86.00	3218.169	245.437	3463.606
169	60.00	87.00	3296.709	245.437	3542.146
170	60.00	88.00	3375.249	245.437	3620.686
171	60.00	89.00	3453.788	245.437	3699.225
172	60.00	90.00	3532.328	245.437	3777.765
173	60.00	91.00	3610.868	245.437	3856.305
174	60.00	92.00	3689.408	245.437	3934.845
175	60.00	93.00	3767.948	245.437	4013.385
176	60.00	94.00	3846.488	245.437	4091.924
177	60.00	95.00	3925.027	245.437	4170.464
178	60.00	96.00	4003.567	245.437	4249.004
179	60.00	97.00	4082.107	245.437	4327.544
180	60.00	98.00	4160.647	245.437	4406.084
181	60.00	99.00	4239.187	245.437	4484.624
182	60.00	100.00	Soil Elevations Must Extend At or Below Contribution Zone		

Drilled Shaft Capacity at User-Defined Settlement (sorted by shaft diameter):

***** Capacity is NOT modified by the strength reduction factors *****

User-Defined Settlement = 2.40%

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	54.812	54.812
22	48.00	31.00	0.000	54.812	54.812
23	48.00	32.00	0.000	54.812	54.812
24	48.00	33.00	0.000	54.812	54.812
25	48.00	34.00	0.000	54.812	54.812
26	48.00	35.00	6.477	1223.899	1230.376
27	48.00	36.00	74.283	1484.071	1558.354
28	48.00	37.00	139.232	932.749	1071.981
29	48.00	38.00	173.938	130.501	304.439
30	48.00	39.00	180.415	133.043	313.458
31	48.00	40.00	180.415	803.221	983.636
32	48.00	41.00	235.007	641.105	876.112
33	48.00	42.00	291.553	541.754	833.308
34	48.00	43.00	350.214	473.600	823.814
35	48.00	44.00	406.818	423.451	830.269
36	48.00	45.00	452.864	384.737	837.601
37	48.00	46.00	499.580	367.729	867.309
38	48.00	47.00	547.801	365.896	913.697
39	48.00	48.00	571.658	135.903	707.561
40	48.00	49.00	571.658	136.805	708.463
41	48.00	50.00	571.658	364.833	936.491
42	48.00	51.00	618.961	362.495	981.456
43	48.00	52.00	671.051	359.951	1031.002
44	48.00	53.00	727.959	357.269	1085.227
45	48.00	54.00	784.314	354.496	1138.811
46	48.00	55.00	829.348	122.482	951.829
47	48.00	56.00	829.348	109.624	938.972
48	48.00	57.00	829.348	109.624	938.972
49	48.00	58.00	829.348	109.624	938.972
50	48.00	59.00	829.348	109.624	938.972

51	48.00	60.00	835.824	109.624	945.449
52	48.00	61.00	842.301	109.624	951.926
53	48.00	62.00	848.778	109.624	958.403
54	48.00	63.00	877.703	350.242	1227.945
55	48.00	64.00	928.715	347.375	1276.089
56	48.00	65.00	979.261	344.503	1323.763
57	48.00	66.00	1029.359	341.637	1370.996
58	48.00	67.00	1075.788	338.786	1414.574
59	48.00	68.00	1118.562	335.957	1454.519
60	48.00	69.00	1160.934	333.154	1494.088
61	48.00	70.00	1202.918	330.380	1533.298
62	48.00	71.00	1244.525	327.637	1572.163
63	48.00	72.00	1285.769	324.928	1610.697
64	48.00	73.00	1326.659	322.254	1648.912
65	48.00	74.00	1367.206	319.614	1686.820
66	48.00	75.00	1407.420	317.010	1724.430
67	48.00	76.00	1447.311	314.441	1761.752
68	48.00	77.00	1486.887	311.907	1798.794
69	48.00	78.00	1526.157	309.408	1835.565
70	48.00	79.00	1565.129	306.943	1872.073
71	48.00	80.00	1603.811	304.512	1908.324
72	48.00	81.00	1642.211	302.115	1944.326
73	48.00	82.00	1680.334	299.750	1980.084
74	48.00	83.00	1718.188	297.417	2015.606
75	48.00	84.00	1755.780	295.116	2050.896
76	48.00	85.00	1793.116	292.845	2085.961
77	48.00	86.00	1830.201	290.604	2120.805
78	48.00	87.00	1867.042	288.392	2155.434
79	48.00	88.00	1903.644	286.208	2189.852
80	48.00	89.00	1940.012	284.053	2224.065
81	48.00	90.00	1976.152	281.924	2258.076
82	48.00	91.00	2012.068	279.822	2291.890
83	48.00	92.00	2047.765	277.745	2325.511
84	48.00	93.00	2083.249	275.694	2358.942
85	48.00	94.00	2118.522	273.667	2392.189
86	48.00	95.00	2153.591	271.664	2425.254
87	48.00	96.00	2188.458	269.684	2458.141
88	48.00	97.00	2223.128	267.726	2490.854
89	48.00	98.00	2257.604	265.791	2523.396
90	48.00	99.00	2291.891	263.878	2555.769
91	48.00	100.00	Soil Elevations Must Extend At or Below Contribution		

Zone

=== Shaft diameter = 60.0(in) ===

92	60.00	10.00	0.000	0.000	0.000
93	60.00	11.00	0.000	0.000	0.000
94	60.00	12.00	0.000	0.000	0.000
95	60.00	13.00	0.000	0.000	0.000
96	60.00	14.00	0.000	0.000	0.000
97	60.00	15.00	0.000	0.000	0.000
98	60.00	16.00	0.000	0.000	0.000
99	60.00	17.00	0.000	0.000	0.000
100	60.00	18.00	0.000	0.000	0.000
101	60.00	19.00	0.000	0.000	0.000
102	60.00	20.00	0.000	0.000	0.000
103	60.00	21.00	0.000	0.000	0.000
104	60.00	22.00	0.000	0.000	0.000
105	60.00	23.00	0.000	0.000	0.000
106	60.00	24.00	0.000	0.000	0.000
107	60.00	25.00	0.000	0.000	0.000
108	60.00	26.00	0.000	0.000	0.000
109	60.00	27.00	0.000	0.000	0.000
110	60.00	28.00	0.000	0.000	0.000
111	60.00	29.00	0.000	0.000	0.000
112	60.00	30.00	0.000	85.644	85.644
113	60.00	31.00	0.000	85.644	85.644
114	60.00	32.00	0.000	85.644	85.644
115	60.00	33.00	0.000	85.644	85.644
116	60.00	34.00	0.000	85.644	85.644
117	60.00	35.00	0.000	1912.343	1912.343
118	60.00	36.00	85.126	2692.802	2777.928
119	60.00	37.00	167.354	1692.444	1859.798
120	60.00	38.00	211.483	201.758	413.241
121	60.00	39.00	219.580	204.779	424.358
122	60.00	40.00	227.676	1457.420	1685.095
123	60.00	41.00	297.806	1163.265	1461.071
124	60.00	42.00	365.457	982.997	1348.454
125	60.00	43.00	436.168	859.333	1295.501
126	60.00	44.00	510.069	768.338	1278.407
127	60.00	45.00	581.882	698.093	1279.975
128	60.00	46.00	640.924	641.939	1282.862
129	60.00	47.00	698.094	595.840	1293.934
130	60.00	48.00	726.007	208.647	934.655
131	60.00	49.00	726.007	210.449	936.456
132	60.00	50.00	726.007	575.711	1301.718
133	60.00	51.00	786.980	573.792	1360.771
134	60.00	52.00	847.266	571.391	1418.657
135	60.00	53.00	913.648	568.637	1482.286
136	60.00	54.00	986.156	565.625	1551.781
137	60.00	55.00	1058.070	191.378	1249.447
138	60.00	56.00	1058.070	171.288	1229.358
139	60.00	57.00	1058.070	171.288	1229.358
140	60.00	58.00	1058.070	171.288	1229.358
141	60.00	59.00	1058.070	171.288	1229.358
142	60.00	60.00	1058.070	171.288	1229.358
143	60.00	61.00	1066.166	171.288	1237.454
144	60.00	62.00	1074.262	171.288	1245.550
145	60.00	63.00	1111.496	560.768	1672.264
146	60.00	64.00	1177.459	557.375	1734.834
147	60.00	65.00	1242.897	553.901	1796.798
148	60.00	66.00	1307.829	550.371	1858.200

149	60.00	67.00	1372.273	546.806	1919.078
150	60.00	68.00	1432.197	543.222	1975.418
151	60.00	69.00	1487.617	539.631	2027.248
152	60.00	70.00	1542.595	536.045	2078.639
153	60.00	71.00	1597.145	532.469	2129.614
154	60.00	72.00	1651.281	528.910	2180.191
155	60.00	73.00	1705.014	525.373	2230.387
156	60.00	74.00	1758.355	521.862	2280.218
157	60.00	75.00	1811.317	518.380	2329.696
158	60.00	76.00	1863.908	514.928	2378.835
159	60.00	77.00	1916.138	511.508	2427.646
160	60.00	78.00	1968.018	508.121	2476.140
161	60.00	79.00	2019.556	504.769	2524.326
162	60.00	80.00	2070.761	501.452	2572.213
163	60.00	81.00	2121.640	498.170	2619.811
164	60.00	82.00	2172.202	494.924	2667.126
165	60.00	83.00	2222.454	491.712	2714.167
166	60.00	84.00	2272.404	488.536	2760.940
167	60.00	85.00	2322.057	485.395	2807.452
168	60.00	86.00	2371.422	482.289	2853.710
169	60.00	87.00	2420.503	479.217	2899.720
170	60.00	88.00	2469.308	476.178	2945.486
171	60.00	89.00	2517.843	473.173	2991.016
172	60.00	90.00	2566.112	470.201	3036.313
173	60.00	91.00	2614.122	467.261	3081.383
174	60.00	92.00	2661.878	464.353	3126.231
175	60.00	93.00	2709.386	461.476	3170.862
176	60.00	94.00	2756.649	458.630	3215.279
177	60.00	95.00	2803.674	455.813	3259.487
178	60.00	96.00	2850.464	453.027	3303.491
179	60.00	97.00	2897.024	450.269	3347.293
180	60.00	98.00	2943.359	447.540	3390.899
181	60.00	99.00	2989.473	444.838	3434.311
182	60.00	100.00	Soil Elevations Must Extend At or Below Contribution		

Zone

Appendix E

External Stability Analysis (LRFD-MSE-External-Stability-version2.5.1)
Global Stability Analysis (ReSSA 3.0)
MSE Wall Settlement Analyses
Wall Recommended Soil Parameters

MSE WALL - LRFD External Stability Analysis

version 2.5.1 Florida Loop Wall

Note: The external stability analysis did not incorporate a reduction of active thrust for the back-to-back walls.

	H (ft)	* Ho (ft)	* D (ft)	* L (ft)	Minimum Reinforcement Length Requirement	Over-turning CDR > = 1	Eccen-tricity CDR < = 1	Sliding CDR > = 1	Bearing Resitance CDR > = 1	* β (deg)	* λ (ft)	* Water d (ft)	* γ[rf] (pcf)	* γ[bf] (pcf)	* ϕ [bf] (deg)	* γ[fs] (pcf)	* ϕ [fs] (deg)	* c[fs] (psf)	* ϕ u (deg)	* q1 (psf)	* q2 (psf)	CW
1	**10.0**	6.0	4.0	**11.0**	**OK**	**3.96**	**0.51**	**1.09**	**3.37**	0.0	0.0	0.0	105.0	105.0	30.0	105.0	30.0	0.0	21.0	250	250	0.50
2	**12.0**	8.0	4.0	**12.0**	**OK**	**3.54**	**0.56**	**1.05**	**2.92**	0.0	0.0	0.0	105.0	105.0	30.0	105.0	30.0	0.0	21.0	250	250	0.50
3	**14.0**	10.0	4.0	**13.0**	**OK**	**3.24**	**0.62**	**1.02**	**2.57**	0.0	0.0	0.0	105.0	105.0	30.0	105.0	30.0	0.0	21.0	250	250	0.50
4	**16.0**	12.0	4.0	**14.0**	**OK**	**3.02**	**0.66**	**1.00**	**2.30**	0.0	0.0	0.0	105.0	105.0	30.0	105.0	30.0	0.0	21.0	250	250	0.50
5	**18.0**	14.0	4.0	**16.0**	**OK**	**3.24**	**0.62**	**1.04**	**2.27**	0.0	0.0	0.0	105.0	105.0	30.0	105.0	30.0	0.0	21.0	250	250	0.50
6	**20.0**	16.0	4.0	**17.0**	**OK**	**3.06**	**0.65**	**1.02**	**2.08**	0.0	0.0	0.0	105.0	105.0	30.0	105.0	30.0	0.0	21.0	250	250	0.50
7	**22.0**	18.0	4.0	**18.0**	**OK**	**2.91**	**0.69**	**1.00**	**1.92**	0.0	0.0	0.0	105.0	105.0	30.0	105.0	30.0	0.0	21.0	250	250	0.50
8	**23.0**	19.0	4.0	**19.0**	**OK**	**3.01**	**0.67**	**1.02**	**1.92**	0.0	0.0	0.0	105.0	105.0	30.0	105.0	30.0	0.0	21.0	250	250	0.50
9	**0.0**				**OK**	**#DIV/0!**	**#DIV/0!**	**#DIV/0!**	**#DIV/0!**	0.0	0.0	5.0	105.0	105.0	30.0	105.0	30.0	0.0	21.0	250	250	1.00
10	**0.0**				**OK**	**#DIV/0!**	**#DIV/0!**	**#DIV/0!**	**#DIV/0!**	0.0	0.0	3.0	105.0	105.0	30.0	105.0	30.0	0.0	21.0	250	250	1.00
11	**0.0**				**OK**	**#DIV/0!**	**#DIV/0!**	**#DIV/0!**	**#DIV/0!**	0.0	0.0	3.0	105.0	105.0	30.0	105.0	30.0	0.0	21.0	250	250	1.00
12	**0.0**				**OK**	**#DIV/0!**	**#DIV/0!**	**#DIV/0!**	**#DIV/0!**	0.0	0.0	3.0	105.0	105.0	30.0	105.0	30.0	0.0	21.0	250	250	1.00
13	**0.0**				**OK**	**#DIV/0!**	**#DIV/0!**	**#DIV/0!**	**#DIV/0!**	0.0	0.0	3.0	105.0	105.0	30.0	105.0	30.0	0.0	21.0	250	250	1.00
14	**0.0**				**OK**	**#DIV/0!**	**#DIV/0!**	**#DIV/0!**	**#DIV/0!**	0.0	0.0	3.0	105.0	105.0	30.0	105.0	30.0	0.0	21.0	250	250	1.00
15	**0.0**				**OK**	**#DIV/0!**	**#DIV/0!**	**#DIV/0!**	**#DIV/0!**	0.0	0.0	3.0	105.0	105.0	30.0	105.0	30.0	0.0	21.0	250	250	1.00
16	**0.0**				**OK**	**#DIV/0!**	**#DIV/0!**	**#DIV/0!**	**#DIV/0!**	0.0	0.0	3.0	105.0	105.0	30.0	105.0	30.0	0.0	21.0	250	250	1.00
17	**0.0**				**OK**	**#DIV/0!**	**#DIV/0!**	**#DIV/0!**	**#DIV/0!**	0.0	0.0	3.0	105.0	105.0	30.0	105.0	30.0	0.0	21.0	250	250	1.00
18	**0.0**				**OK**	**#DIV/0!**	**#DIV/0!**	**#DIV/0!**	**#DIV/0!**	0.0	0.0	5.0	105.0	105.0	30.0	105.0	30.0	0.0	28.0	250	250	1.00
19	**0.0**				**OK**	**#DIV/0!**	**#DIV/0!**	**#DIV/0!**	**#DIV/0!**	0.0	0.0	5.0	105.0	105.0	30.0	105.0	30.0	0.0	28.0	250	250	1.00
20	**0.0**				**OK**	**#DIV/0!**	**#DIV/0!**	**#DIV/0!**	**#DIV/0!**	0.0	0.0	5.0	105.0	105.0	30.0	105.0	30.0	0.0	28.0	250	250	1.00

* Indicates required input

Note:

Disclaimer: No Warranty, expressed or implied, is made by the author or the Florida Department of Transportation (FDOT) as to the accuracy and the functioning of this program or the results it produces; nor shall the fact of distribution constitute any such warranty, and no responsibility is assumed by the author or the FDOT in any connection therewith.

H Wall Height H = Ho + D

Ho Wall Height above ground (feet)

D Wall Embeddment Depth (feet)

L Reinforcing Strap Length (feet)

CDR Capacity-Demand Ratio for :

- Overturning = Mr / Mo => 1.0
- Eccentricity = e / (L/4) =< 1.0
- Sliding = Fr / Fd => 1.0
- Bearing Resistance = qr / q_{vb} => 1.0

β Slope of backfill soil (degrees)

λ Horizontal distance from the back of the wall to the top of the slope (for broken-back slopes) (feet)
Use λ >= 2*H when modeling infinite slopes

d Water depth below base of leveling pad (feet)

γ[rf] Reinforced fill unit weight (pounds per cubic foot)

γ[bf] Backfill soil unit weight (pounds per cubic foot)

ϕ[bf] Backfill soil angle of internal friction (degrees)

γ[fs] Foundation Soil unit weight (pounds per cubic foot)

ϕ[fs] Foundation Soil angle of internal friction (degrees)

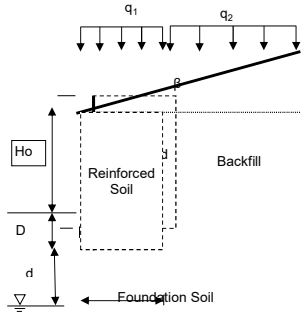
c[fs] Foundation Soil cohesion (pounds per square foot)

ϕu Base Angle of Internal Friction (degrees) (Sliding)

q1 Surcharge load over reinforced soil mass (pounds per square foot) - Should be zero when modeling infinite slopes

q2 Surcharge load behind reinforced soil mass (pounds per square foot) - Should be zero when modeling infinite slopes

Cw Cw = 0.5 for d =< 0, Cw=1.0 for d => 1.5*L + D



MSE WALL - LRFD External Stability Analysis
version 2.5.1 Florida Loop Wall

qvb (psf)	**qr (psf)**	h (ft)	W1 (lbs/ft)	W2 (lbs/ft)	W3 (lbs/ft)	q_{1V} (lbs/ft)	α (deg)	Ft (lbs/ft)	qt (lbs/ft)	Fd (lbs/ft)	Fr (lbs/ft)	Rv (lbs/ft)	Rv2 (lbs/ft)	Mr (lbs-ft/ft)	Mr_2	Mo (lbs-ft/ft)	Mo_2 (lbs-ft/ft)	e (ft)	e_2 (ft)	L' (ft)	Nc [fs]	Nq [fs]	Ng [fs]	Kabh [bf]	Kabs [bf]	Kabs2 [bf]
2164	**7174**	0.00	11550	0	0	4813	0.0	1750	833	2625	4434	11550	20405	63525	112228	16042	16042	1.39	0.79	9.43	30.14	18.40	22.40	0.333	0.000	0.000
2565	**7318**	0.00	15120	0	0	5250	0.0	2520	1000	3780	5804	15120	25662	90720	153972	25620	25620	1.69	1.00	10.00	30.14	18.40	22.40	0.333	0.000	0.000
2980	**7456**	0.00	19110	0	0	5688	0.0	3430	1167	5145	7336	19110	31486	124215	204659	38302	38302	2.00	1.22	10.57	30.14	18.40	22.40	0.333	0.000	0.000
3406	**7589**	0.00	23520	0	0	6125	0.0	4480	1333	6720	9028	23520	37877	164640	265139	54507	54507	2.32	1.44	11.12	30.14	18.40	22.40	0.333	0.000	0.000
3714	**8129**	0.00	30240	0	0	7000	0.0	5670	1500	8505	11608	30240	47824	241920	382592	74655	74655	2.47	1.56	12.88	30.14	18.40	22.40	0.333	0.000	0.000
4141	**8262**	0.00	35700	0	0	7438	0.0	7000	1667	10500	13704	35700	55633	303450	472876	99167	99167	2.78	1.78	13.43	30.14	18.40	22.40	0.333	0.000	0.000
4577	**8392**	0.00	41580	0	0	7875	0.0	8470	1833	12705	15961	41580	64008	374220	576072	128462	128462	3.09	2.01	13.99	30.14	18.40	22.40	0.333	0.000	0.000
4724	**8665**	0.00	45885	0	0	8313	0.0	9258	1917	13886	17614	45885	70257	435908	667444	145034	145034	3.16	2.06	14.87	30.14	18.40	22.40	0.333	0.000	0.000
#DIV/0!	**#DIV/0!**	0.00	0	0	0	0	#DIV/0!	0	0	0	0	0	0	0	0	0	0	#DIV/0!	#DIV/0!	#DIV/0!	30.14	18.40	22.40	0.333	0.000	0.000
#DIV/0!	**#DIV/0!**	0.00	0	0	0	0	#DIV/0!	0	0	0	0	0	0	0	0	0	0	#DIV/0!	#DIV/0!	#DIV/0!	30.14	18.40	22.40	0.333	0.000	0.000
#DIV/0!	**#DIV/0!**	0.00	0	0	0	0	#DIV/0!	0	0	0	0	0	0	0	0	0	0	#DIV/0!	#DIV/0!	#DIV/0!	30.14	18.40	22.40	0.333	0.000	0.000
#DIV/0!	**#DIV/0!**	0.00	0	0	0	0	#DIV/0!	0	0	0	0	0	0	0	0	0	0	#DIV/0!	#DIV/0!	#DIV/0!	30.14	18.40	22.40	0.333	0.000	0.000
#DIV/0!	**#DIV/0!**	0.00	0	0	0	0	#DIV/0!	0	0	0	0	0	0	0	0	0	0	#DIV/0!	#DIV/0!	#DIV/0!	30.14	18.40	22.40	0.333	0.000	0.000
#DIV/0!	**#DIV/0!**	0.00	0	0	0	0	#DIV/0!	0	0	0	0	0	0	0	0	0	0	#DIV/0!	#DIV/0!	#DIV/0!	30.14	18.40	22.40	0.333	0.000	0.000
#DIV/0!	**#DIV/0!**	0.00	0	0	0	0	#DIV/0!	0	0	0	0	0	0	0	0	0	0	#DIV/0!	#DIV/0!	#DIV/0!	30.14	18.40	22.40	0.333	0.000	0.000
#DIV/0!	**#DIV/0!**	0.00	0	0	0	0	#DIV/0!	0	0	0	0	0	0	0	0	0	0	#DIV/0!	#DIV/0!	#DIV/0!	30.14	18.40	22.40	0.333	0.000	0.000
#DIV/0!	**#DIV/0!**	0.00	0	0	0	0	#DIV/0!	0	0	0	0	0	0	0	0	0	0	#DIV/0!	#DIV/0!	#DIV/0!	30.14	18.40	22.40	0.333	0.000	0.000
#DIV/0!	**#DIV/0!**	0.00	0	0	0	0	#DIV/0!	0	0	0	0	0	0	0	0	0	0	#DIV/0!	#DIV/0!	#DIV/0!	30.14	18.40	22.40	0.333	0.000	0.000

** **Note: This spreadsheet does not analyze Global Stability or Wall Settlement.**

qvb Maximum Vertical Pressure at base of the structure (psf): qvb = Rv_2 / L'
qr Minimum Factored bearing resistance including footing embedment (i.e. overburden) term (qNq)
h h = Wall height for backfill stress calculations (H+Ltanβ for infinite slopes and H+λTanα for broken back slopes with λ < 2*H) (ft)
W_1 Reinforced fill weight (lbs/ft)
W_2 Sloped backfill weight over reinforced area (lbs/ft)
W_3 Flat backfill weight over reinforced area (lbs/ft)
q_{1V} Surcharge vertical force over reinforced area (lbs/ft)
α Resultant earth pressure inclination (deg)
Ft Total resultant horizontal backfill force (lbs/ft)
qt Total resultant horizontal surcharge force (q_2) (lbs/ft)
Fd Driving force (Sum of factored horizontal components of total horizontal foces) (lbs/ft)
Fr Resisting foce (Sum of factored resisting foces * Tan ϕ_u) (lbs/ft)
Rv Sum of factored vertical forces acting within reingorced soil mass without live load (q1L) used in sliding CDR calculation (lbs/ft)
Rv_2 Sum of factored vertical forces acting within reingorced soil mass including live load - used in calculation of qvb for bearing CDR (lbs/ft)
Mr Sum of Resisting Moments without live load (lbs-ft/ft)
Mr_2 Sum of Resisting Moments including live load - used in calculation of e_2 for bearing CDR (lbs-ft/ft)
Mo Sum of Overturning Moments(lbs-ft/ft)
Mo_2 Sum of Overturning Moments from case S-1-b (lbs-ft/ft)
e Eccentricity {L/2 - [(Mr-Mo)/Rv]} (ft) [for overturning]
e_2 Eccentricity {L/2 - [(Mr_2-Mo_2)/Rv_2]} (ft) [for bearing stress calculation]
L' Effective foundation width (feet): L'= L - 2*e_2

Nc Cohesion Bearing Resistance Factor : Nc = (Nq-1)cot(ϕ) if f>0; for f=0 Nc=5.14
Ng Footing Width Bearing Resistance Factor : Ng = 2*(Nq+1)*tan(ϕ)
Nq Embedment Bearing Resistance Factor : Nq = [e^PI*tan(ϕ)]*N(ϕ); N(ϕ)=tan^2(PI/4 + ϕ/2)
Kabh Backfill earth pressure coefficient when retained soil is horizontal
Kabs Backfill earth pressure coefficient when retained soil is at slope β (infinite slope)
Kabs2 Backfill earth pressure coefficient for broken back slopes

MSE WALL - LRFD External Stability Analysis

version 2.5.1 Whiting Street Wall

Note: The external stability analysis did not incorporate a reduction of active thrust for the back-to-back walls.

	H (ft)	* Ho (ft)	* D (ft)	* L (ft)	Minimum Reinforcement Length Requirement	Over-turning CDR > = 1	Eccen-tricity CDR < = 1	Sliding CDR > = 1	Bearing Resitance CDR > = 1	* β (deg)	* λ (ft)	* Water d (ft)	* γ[rf] (pcf)	* γ[bf] (pcf)	* ϕ [bf] (deg)	* γ[fs] (pcf)	* ϕ [fs] (deg)	* c[fs] (psf)	* ϕ u (deg)	* q1 (psf)	* q2 (psf)	CW
1	**8.0**	6.0	2.0	**9.0**	**OK**	**3.72**	**0.54**	**1.02**	**2.92**	0.0	0.0	4.0	105.0	105.0	30.0	105.0	30.0	0.0	21.0	250	250	0.65
2	**10.0**	8.0	2.0	**11.0**	**OK**	**3.96**	**0.51**	**1.09**	**2.73**	0.0	0.0	4.0	105.0	105.0	30.0	105.0	30.0	0.0	21.0	250	250	0.62
3	**12.0**	10.0	2.0	**12.0**	**OK**	**3.54**	**0.56**	**1.05**	**2.37**	0.0	0.0	4.0	105.0	105.0	30.0	105.0	30.0	0.0	21.0	250	250	0.61
4	**14.0**	12.0	2.0	**13.0**	**OK**	**3.24**	**0.62**	**1.02**	**2.10**	0.0	0.0	4.0	105.0	105.0	30.0	105.0	30.0	0.0	21.0	250	250	0.60
5	**16.0**	14.0	2.0	**15.0**	**OK**	**3.47**	**0.58**	**1.07**	**2.07**	0.0	0.0	4.0	105.0	105.0	30.0	105.0	30.0	0.0	21.0	250	250	0.59
6	**18.0**	16.0	2.0	**16.0**	**OK**	**3.24**	**0.62**	**1.04**	**1.88**	0.0	0.0	4.0	105.0	105.0	30.0	105.0	30.0	0.0	21.0	250	250	0.58
7	**20.0**	18.0	2.0	**17.0**	**OK**	**3.06**	**0.65**	**1.02**	**1.73**	0.0	0.0	4.0	105.0	105.0	30.0	105.0	30.0	0.0	21.0	250	250	0.58
8	**22.0**	20.0	2.0	**19.0**	**OK**	**3.25**	**0.62**	**1.06**	**1.74**	0.0	0.0	4.0	105.0	105.0	30.0	105.0	30.0	0.0	21.0	250	250	0.57
9	**23.0**	21.0	2.0	**19.0**	**OK**	**3.01**	**0.67**	**1.02**	**1.61**	0.0	0.0	4.0	105.0	105.0	30.0	105.0	30.0	0.0	21.0	250	250	0.57
10	**0.0**				**OK**	**#DIV/0!**	**#DIV/0!**	**#DIV/0!**	**#DIV/0!**	0.0	0.0	3.0	105.0	105.0	30.0	105.0	30.0	0.0	21.0	250	250	1.00
11	**0.0**				**OK**	**#DIV/0!**	**#DIV/0!**	**#DIV/0!**	**#DIV/0!**	0.0	0.0	3.0	105.0	105.0	30.0	105.0	30.0	0.0	21.0	250	250	1.00
12	**0.0**				**OK**	**#DIV/0!**	**#DIV/0!**	**#DIV/0!**	**#DIV/0!**	0.0	0.0	3.0	105.0	105.0	30.0	105.0	30.0	0.0	21.0	250	250	1.00
13	**0.0**				**OK**	**#DIV/0!**	**#DIV/0!**	**#DIV/0!**	**#DIV/0!**	0.0	0.0	3.0	105.0	105.0	30.0	105.0	30.0	0.0	21.0	250	250	1.00
14	**0.0**				**OK**	**#DIV/0!**	**#DIV/0!**	**#DIV/0!**	**#DIV/0!**	0.0	0.0	3.0	105.0	105.0	30.0	105.0	30.0	0.0	21.0	250	250	1.00
15	**0.0**				**OK**	**#DIV/0!**	**#DIV/0!**	**#DIV/0!**	**#DIV/0!**	0.0	0.0	3.0	105.0	105.0	30.0	105.0	30.0	0.0	21.0	250	250	1.00
16	**0.0**				**OK**	**#DIV/0!**	**#DIV/0!**	**#DIV/0!**	**#DIV/0!**	0.0	0.0	3.0	105.0	105.0	30.0	105.0	30.0	0.0	21.0	250	250	1.00
17	**0.0**				**OK**	**#DIV/0!**	**#DIV/0!**	**#DIV/0!**	**#DIV/0!**	0.0	0.0	3.0	105.0	105.0	30.0	105.0	30.0	0.0	21.0	250	250	1.00
18	**0.0**				**OK**	**#DIV/0!**	**#DIV/0!**	**#DIV/0!**	**#DIV/0!**	0.0	0.0	5.0	105.0	105.0	30.0	105.0	30.0	0.0	28.0	250	250	1.00
19	**0.0**				**OK**	**#DIV/0!**	**#DIV/0!**	**#DIV/0!**	**#DIV/0!**	0.0	0.0	5.0	105.0	105.0	30.0	105.0	30.0	0.0	28.0	250	250	1.00
20	**0.0**				**OK**	**#DIV/0!**	**#DIV/0!**	**#DIV/0!**	**#DIV/0!**	0.0	0.0	5.0	105.0	105.0	30.0	105.0	30.0	0.0	28.0	250	250	1.00

* Indicates required input

Note:

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H Wall Height H = Ho + D

Ho Wall Height above ground (feet)

D Wall Embeddment Depth (feet)

L Reinforcing Strap Length (feet)

CDR Capacity-Demand Ratio for :

- Overturning = Mr / Mo => 1.0
- Eccentricity = e / (L/4) =< 1.0
- Sliding = Fr / Fd => 1.0
- Bearing Resistance = qr / q_{vb} => 1.0

β Slope of backfill soil (degrees)

λ Horizontal distance from the back of the wall to the top of the slope (for broken-back slopes) (feet)
Use λ >= 2*H when modeling infinite slopes

d Water depth below base of leveling pad (feet)

γ[rf] Reinforced fill unit weight (pounds per cubic foot)

γ[bf] Backfill soil unit weight (pounds per cubic foot)

ϕ[bf] Backfill soil angle of internal friction (degrees)

γ[fs] Foundation Soil unit weight (pounds per cubic foot)

ϕ[fs] Foundation Soil angle of internal friction (degrees)

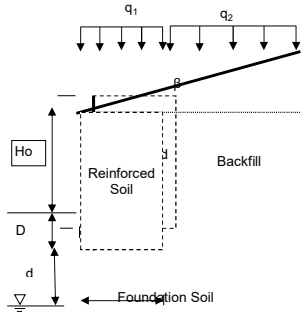
c[fs] Foundation Soil cohesion (pounds per square foot)

ϕu Base Angle of Internal Friction (degrees) (Sliding)

q1 Surcharge load over reinforced soil mass (pounds per square foot) - Should be zero when modeling infinite slopes

q2 Surcharge load behind reinforced soil mass (pounds per square foot) - Should be zero when modeling infinite slopes

Cw Cw = 0.5 for d =< 0, Cw=1.0 for d => 1.5*L + D



MSE WALL - LRFD External Stability Analysis
version 2.5.1 Whiting Street Wall

qvb (psf)	**qr (psf)**	h (ft)	W1 (lbs/ft)	W2 (lbs/ft)	W3 (lbs/ft)	q_{1V} (lbs/ft)	α (deg)	Ft (lbs/ft)	qt (lbs/ft)	Fd (lbs/ft)	Fr (lbs/ft)	Rv (lbs/ft)	Rv2 (lbs/ft)	Mr (lbs-ft/ft)	Mr_2	Mo (lbs-ft/ft)	Mo_2 (lbs-ft/ft)	e (ft)	e_2 (ft)	L' (ft)	Nc [fs]	Nq [fs]	Ng [fs]	Kabh [bf]	Kabs [bf]	Kabs2 [bf]
1835	**5232**	0.00	7560	0	0	3938	0.0	1120	667	1680	2902	7560	14144	34020	63646	9147	9147	1.21	0.65	7.71	30.14	18.40	22.40	0.333	0.000	0.000
2164	**5758**	0.00	11550	0	0	4813	0.0	1750	833	2625	4434	11550	20405	63525	112228	16042	16042	1.39	0.79	9.43	30.14	18.40	22.40	0.333	0.000	0.000
2565	**5875**	0.00	15120	0	0	5250	0.0	2520	1000	3780	5804	15120	25662	90720	153972	25620	25620	1.69	1.00	10.00	30.14	18.40	22.40	0.333	0.000	0.000
2980	**5988**	0.00	19110	0	0	5688	0.0	3430	1167	5145	7336	19110	31486	124215	204659	38302	38302	2.00	1.22	10.57	30.14	18.40	22.40	0.333	0.000	0.000
3296	**6532**	0.00	25200	0	0	6563	0.0	4480	1333	6720	9673	25200	40583	189000	304369	54507	54507	2.16	1.34	12.31	30.14	18.40	22.40	0.333	0.000	0.000
3714	**6650**	0.00	30240	0	0	7000	0.0	5670	1500	8505	11608	30240	47824	241920	382592	74655	74655	2.47	1.56	12.88	30.14	18.40	22.40	0.333	0.000	0.000
4141	**6766**	0.00	35700	0	0	7438	0.0	7000	1667	10500	13704	35700	55633	303450	472876	99167	99167	2.78	1.78	13.43	30.14	18.40	22.40	0.333	0.000	0.000
4446	**7318**	0.00	43890	0	0	8313	0.0	8470	1833	12705	16848	43890	67564	416955	641858	128462	128462	2.93	1.90	15.20	30.14	18.40	22.40	0.333	0.000	0.000
4724	**7159**	0.00	45885	0	0	8313	0.0	9258	1917	13886	17614	45885	70257	435908	667444	145034	145034	3.16	2.06	14.87	30.14	18.40	22.40	0.333	0.000	0.000
#DIV/0!	**#DIV/0!**	0.00	0	0	0	0	#DIV/0!	0	0	0	0	0	0	0	0	0	0	#DIV/0!	#DIV/0!	#DIV/0!	30.14	18.40	22.40	0.333	0.000	0.000
#DIV/0!	**#DIV/0!**	0.00	0	0	0	0	#DIV/0!	0	0	0	0	0	0	0	0	0	0	#DIV/0!	#DIV/0!	#DIV/0!	30.14	18.40	22.40	0.333	0.000	0.000
#DIV/0!	**#DIV/0!**	0.00	0	0	0	0	#DIV/0!	0	0	0	0	0	0	0	0	0	0	#DIV/0!	#DIV/0!	#DIV/0!	30.14	18.40	22.40	0.333	0.000	0.000
#DIV/0!	**#DIV/0!**	0.00	0	0	0	0	#DIV/0!	0	0	0	0	0	0	0	0	0	0	#DIV/0!	#DIV/0!	#DIV/0!	30.14	18.40	22.40	0.333	0.000	0.000
#DIV/0!	**#DIV/0!**	0.00	0	0	0	0	#DIV/0!	0	0	0	0	0	0	0	0	0	0	#DIV/0!	#DIV/0!	#DIV/0!	30.14	18.40	22.40	0.333	0.000	0.000
#DIV/0!	**#DIV/0!**	0.00	0	0	0	0	#DIV/0!	0	0	0	0	0	0	0	0	0	0	#DIV/0!	#DIV/0!	#DIV/0!	30.14	18.40	22.40	0.333	0.000	0.000
#DIV/0!	**#DIV/0!**	0.00	0	0	0	0	#DIV/0!	0	0	0	0	0	0	0	0	0	0	#DIV/0!	#DIV/0!	#DIV/0!	30.14	18.40	22.40	0.333	0.000	0.000
#DIV/0!	**#DIV/0!**	0.00	0	0	0	0	#DIV/0!	0	0	0	0	0	0	0	0	0	0	#DIV/0!	#DIV/0!	#DIV/0!	30.14	18.40	22.40	0.333	0.000	0.000
#DIV/0!	**#DIV/0!**	0.00	0	0	0	0	#DIV/0!	0	0	0	0	0	0	0	0	0	0	#DIV/0!	#DIV/0!	#DIV/0!	30.14	18.40	22.40	0.333	0.000	0.000
#DIV/0!	**#DIV/0!**	0.00	0	0	0	0	#DIV/0!	0	0	0	0	0	0	0	0	0	0	#DIV/0!	#DIV/0!	#DIV/0!	30.14	18.40	22.40	0.333	0.000	0.000

** **Note: This spreadsheet does not analyze Global Stability or Wall Settlement.**

qvb Maximum Vertical Pressure at base of the structure (psf): qvb = Rv_2 / L'
qr Minimum Factored bearing resistance including footing embedment (i.e. overburden) term (qNq)
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W_2 Sloped backfill weight over reinforced area (lbs/ft)
W_3 Flat backfill weight over reinforced area (lbs/ft)
q_{1V} Surcharge vertical force over reinforced area (lbs/ft)
α Resultant earth pressure inclination (deg)
Ft Total resultant horizontal backfill force (lbs/ft)
qt Total resultant horizontal surcharge force (q_2) (lbs/ft)
Fd Driving force (Sum of factored horizontal components of total horizontal foces) (lbs/ft)
Fr Resisting foce (Sum of factored resisting foces * Tan ϕ_u) (lbs/ft)
Rv Sum of factored vertical forces acting within reingorced soil mass without live load (q1L) used in sliding CDR calculation (lbs/ft)
Rv_2 Sum of factored vertical forces acting within reingorced soil mass including live load - used in calculation of qvb for bearing CDR (lbs/ft)
Mr Sum of Resisting Moments without live load (lbs-ft/ft)
Mr_2 Sum of Resisting Moments including live load - used in calculation of e_2 for bearing CDR (lbs-ft/ft)
Mo Sum of Overturning Moments(lbs-ft/ft)
Mo_2 Sum of Overturning Moments from case S-1-b (lbs-ft/ft)
e Eccentricity {L/2 - [(Mr-Mo)/Rv]} (ft) [for overturning]
e_2 Eccentricity {L/2 - [(Mr_2-Mo_2)/Rv_2]} (ft) [for bearing stress calculation]
L' Effective foundation width (feet): L'= L - 2*e_2

Nc Cohesion Bearing Resistance Factor : Nc = (Nq-1)cot(ϕ) if f>0; for f=0 Nc=5.14
Ng Footing Width Bearing Resistance Factor : Ng = 2*(Nq+1)*tan(ϕ)
Nq Embedment Bearing Resistance Factor : Nq = [e^PI*tan(ϕ)]*N(ϕ); N(ϕ)=tan^2(PI/4 + ϕ/2)
Kabh Backfill earth pressure coefficient when retained soil is horizontal
Kabs Backfill earth pressure coefficient when retained soil is at slope β (infinite slope)
Kabs2 Backfill earth pressure coefficient for broken back slopes

SLOPE/W Analysis

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File Information

File Version: 11.02
Created By: geostudio
Last Edited By: geostudio
Revision Number: 115
Date: 09/24/2021
Time: 01:41:46 PM
Tool Version: 11.2.1.23288
File Name: Kirk2.gsz
Directory: Z:\Projects\B - Geotechnical\2020\B-20-129 BC Port Everglades Bulkhead - T.Y. Lin\13 - Calculations\GeoStudio\Berth 3\
Last Solved Date: 09/24/2021
Last Solved Time: 01:41:48 PM

Project Settings

Unit System: U.S. Customary Units

Analysis Settings

SLOPE/W Analysis

Description: Florida Avenue Loop MSE Wall (Boring WB-02). Wall height = 23 ft.
Kind: SLOPE/W
Analysis Type: Morgenstern-Price
Settings
- Side Function
  - Interslice force function option: Half-Sine
- PWP Conditions from: Piezometric Line
- Apply Phreatic Correction: No
- Use Staged Rapid Drawdown: No
- Unit Weight of Water: 62.430189 pcf

Slip Surface
- Direction of movement: Left to Right
- Use Passive Mode: No
- Slip Surface Option: Entry and Exit
- Critical slip surfaces saved: 1
- Optimize Critical Slip Surface Location: No
- Tension Crack Option: (none)

Distribution
- F of S Calculation Option: Constant

Advanced
- Geometry Settings
  - Minimum Slip Surface Depth: 0.1 ft
  - Number of Slices: 30
- Factor of Safety Convergence Settings
  - Maximum Number of Iterations: 100

Tolerable difference in F of S: 0.001
Under-Relaxation Criteria
Initial Rate: 1
Minimum Rate: 0.1
Rate Reduction Factor: 0.65
Reduction Frequency (iterations): 50
Solution Settings
Search Method: Root Finder
Tolerable difference between starting and converged F of S: 3
Maximum iterations to calculate converged lambda: 20
Max Absolute Lambda: 2

Materials

Weathered Limestone

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 40 °
Phi-B: 0 °
Pore Water Pressure
Piezometric Line: 1

Very Soft Clay (CH)

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 100 pcf
Effective Cohesion: 163 psf
Effective Friction Angle: 0 °
Phi-B: 0 °
Pore Water Pressure
Piezometric Line: 1

Clayey Sand (SC)

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 105 pcf
Effective Cohesion: 75 psf
Effective Friction Angle: 28 °
Phi-B: 0 °
Pore Water Pressure
Piezometric Line: 1

Fine Sand (SP)

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 112 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 31 °
Phi-B: 0 °
Pore Water Pressure
Piezometric Line: 1

Backfill

Slope Stability Material Model: Mohr-Coulomb

Unit Weight: 105 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 30 °
Phi-B: 0 °
Pore Water Pressure
Piezometric Line: 1

Reinforced Zone Left

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 120 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 32 °
Phi-B: 0 °
Pore Water Pressure
Piezometric Line: 1

Reinforced Zone Right

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 120 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 32 °
Phi-B: 0 °
Pore Water Pressure
Piezometric Line: 1

Slip Surface Entry and Exit

Left Type: Range
Left-Zone Left Coordinate: (30, 38) ft
Left-Zone Right Coordinate: (48, 38) ft
Left-Zone Increment: 8
Right Type: Range
Right-Zone Left Coordinate: (98, 40) ft
Right-Zone Right Coordinate: (115, 40) ft
Right-Zone Increment: 8
Radius Increments: 4

Slip Surface Limits

Left Coordinate: (0, 38) ft
Right Coordinate: (150, 40) ft

Piezometric Lines

Piezometric Line 1

Coordinates

	X	Y
Coordinate 1	0 ft	35 ft
Coordinate 2	150 ft	35 ft

Surcharge Loads

Surcharge Load 1

Surcharge (Unit Weight): 250 pcf
Direction: Vertical

Coordinates

	X	Y
	53 ft	62 ft
	97 ft	62 ft

Geometry

Name: 2D Geometry

Settings

View: 2D
Element Thickness: 1 ft

Points

	X	Y
Point 1	0 ft	0 ft
Point 2	0 ft	7 ft
Point 3	150 ft	7 ft
Point 4	150 ft	0 ft
Point 5	0 ft	17 ft
Point 6	150 ft	17 ft
Point 7	0 ft	22 ft
Point 8	150 ft	22 ft
Point 9	0 ft	38 ft
Point 10	150 ft	40 ft
Point 11	53 ft	38 ft
Point 12	53 ft	35 ft
Point 13	97 ft	35 ft
Point 14	97 ft	40 ft
Point 15	107 ft	40 ft
Point 16	110 ft	36 ft
Point 17	112 ft	36 ft
Point 18	115 ft	40 ft
Point 19	53 ft	58 ft
Point 20	72 ft	58 ft
Point 21	72 ft	35 ft
Point 22	78 ft	58 ft
Point 23	78 ft	35 ft
Point 24	53 ft	40 ft
Point 25	51 ft	40 ft
Point 26	48 ft	38 ft
Point 27	97 ft	58 ft

Regions

	Material	Points	Area

Region 1	Weathered Limestone	1,2,3,4	1,050 ft²
Region 2	Very Soft Clay (CH)	2,5,6,3	1,500 ft²
Region 3	Clayey Sand (SC)	5,7,8,6	750 ft²
Region 4	Fine Sand (SP)	7,9,26,11,12,21,23,13,14,15,16,17,18,10,8	2,354 ft²
Region 5	Reinforced Zone Left	12,21,20,19,24,11	437 ft²
Region 6	Backfill	21,20,22,23	138 ft²
Region 7	Backfill	11,24,25,26	7 ft²
Region 8	Reinforced Zone Right	23,13,14,27,22	437 ft²

Slip Results

Slip Surfaces Analysed: 73 of 405 converged

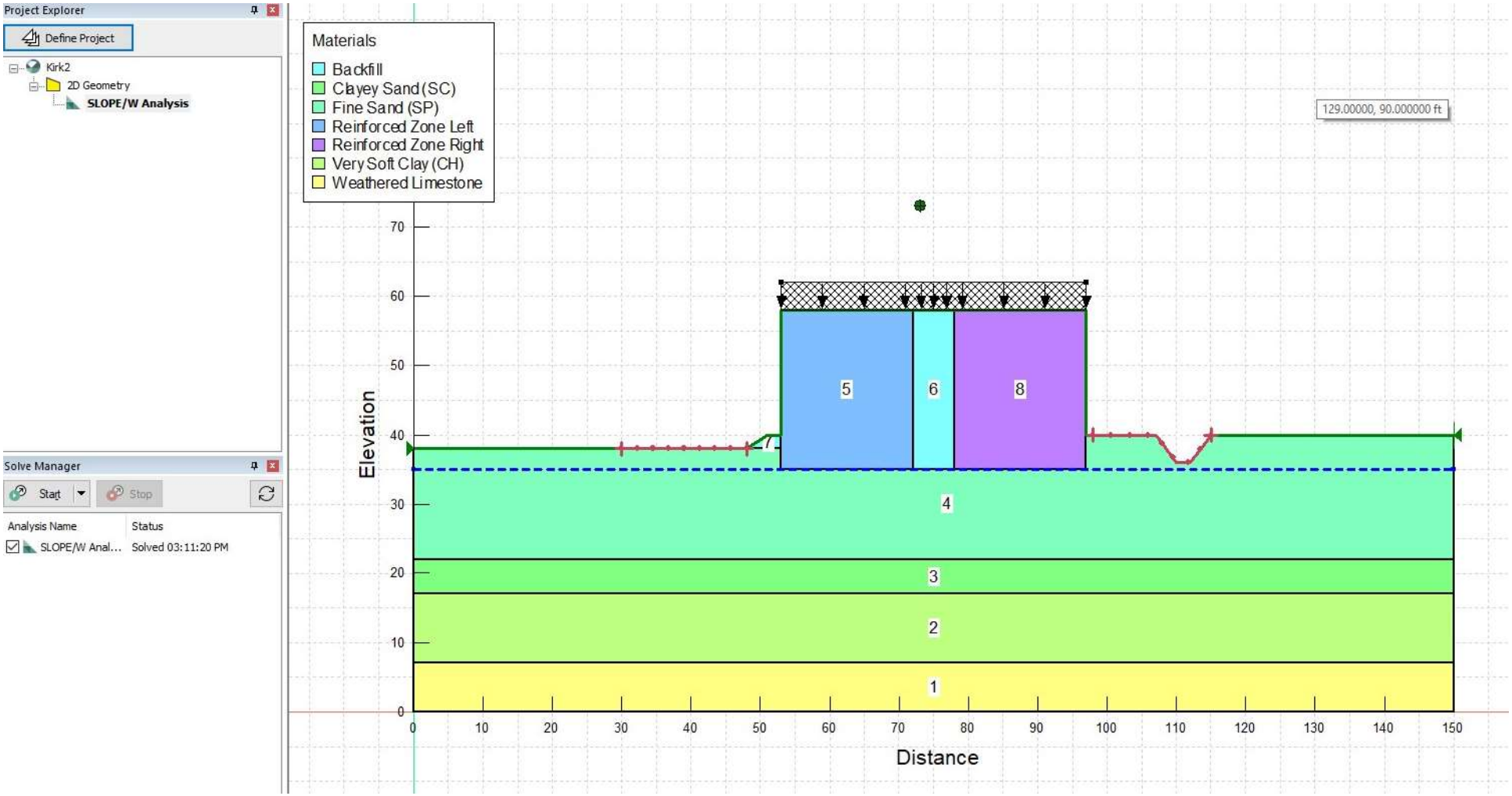
Current Slip Surface

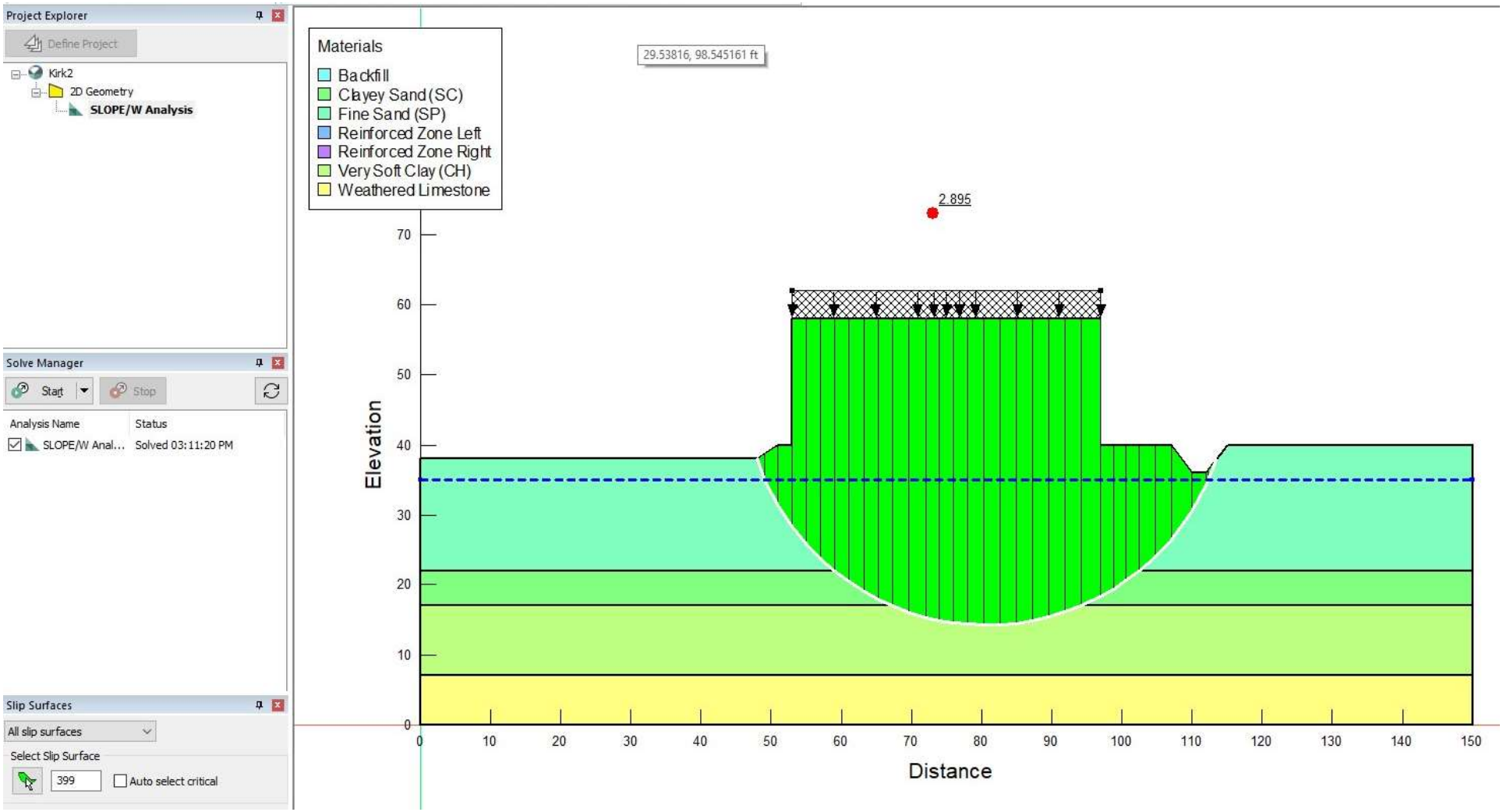
Slip Surface: 399
Factor of Safety: 2.896
Volume: 2,036.9996 ft³
Weight: 232,273.16 lbf
Resisting Moment: 3,261,645.8 lbf·ft
Activating Moment: 1,126,401.1 lbf·ft
Resisting Force: 55,533.062 lbf
Activating Force: 19,179.324 lbf
Slip Rank: 1 of 405 slip surfaces
Exit: (113.425, 37.9) ft
Entry: (48, 38) ft
Radius: 34.435064 ft
Center: (73, 65) ft

Slip Slices

	X	Y	PWP	Base Normal Stress	Frictional Strength	Cohesive Strength	Suction Strength	Base Material
Slice 1	48.569254 ft	36.5 ft	-93.645283 psf	134.05179 psf	80.546441 psf	0 psf	0 psf	Fine Sand (SP)
Slice 2	50.069254 ft	33.163788 ft	114.63507 psf	517.33435 psf	241.96614 psf	0 psf	0 psf	Fine Sand (SP)
Slice 3	52 ft	29.807315 ft	324.18033 psf	926.17743 psf	361.71635 psf	0 psf	0 psf	Fine Sand (SP)
Slice 4	53.998134 ft	27.054679 ft	496.02791 psf	3,768.2197 psf	1,966.1312 psf	0 psf	0 psf	Fine Sand (SP)
Slice 5	55.994401 ft	24.789954 ft	637.4151 psf	4,102.0897 psf	2,081.7865 psf	0 psf	0 psf	Fine Sand (SP)
Slice 6	57.990669 ft	22.878802 ft	756.72869 psf	4,386.2127 psf	2,180.814 psf	0 psf	0 psf	Fine Sand (SP)
Slice 7	60.026537 ft	21.218388 ft	860.38862 psf	4,674.8184 psf	2,028.1683 psf	75 psf	0 psf	Clayey Sand (SC)
Slice 8	62.102008 ft	19.768755 ft	950.88949 psf	4,889.109 psf	2,093.9884 psf	75 psf	0 psf	Clayey Sand (SC)
Slice 9	64.177478 ft	18.531486 ft	1,028.1325 psf	5,080.015 psf	2,154.4242 psf	75 psf	0 psf	Clayey Sand (SC)
Slice 10	66.252949 ft	17.481119 ft	1,093.7071 psf	5,251.4664 psf	2,210.7198 psf	75 psf	0 psf	Clayey Sand (SC)

Slice 11	68.468013 ft	16.551057 ft	1,151.771 psf	5,679.2057 psf	0 psf	163 psf	0 psf	Very Soft Clay (CH)
Slice 12	70.822671 ft	15.748225 ft	1,201.8919 psf	5,774.8865 psf	0 psf	163 psf	0 psf	Very Soft Clay (CH)
Slice 13	73 ft	15.163902 ft	1,238.3714 psf	5,507.6441 psf	0 psf	163 psf	0 psf	Very Soft Clay (CH)
Slice 14	75 ft	14.764672 ft	1,263.2954 psf	5,564.9937 psf	0 psf	163 psf	0 psf	Very Soft Clay (CH)
Slice 15	77 ft	14.486899 ft	1,280.6368 psf	5,611.629 psf	0 psf	163 psf	0 psf	Very Soft Clay (CH)
Slice 16	79.154799 ft	14.325048 ft	1,290.7412 psf	5,993.7491 psf	0 psf	163 psf	0 psf	Very Soft Clay (CH)
Slice 17	81.464398 ft	14.296857 ft	1,292.5011 psf	6,020.6631 psf	0 psf	163 psf	0 psf	Very Soft Clay (CH)
Slice 18	83.773997 ft	14.424118 ft	1,284.5562 psf	6,031.7927 psf	0 psf	163 psf	0 psf	Very Soft Clay (CH)
Slice 19	86.083596 ft	14.708586 ft	1,266.7968 psf	6,026.1234 psf	0 psf	163 psf	0 psf	Very Soft Clay (CH)
Slice 20	88.393195 ft	15.154279 ft	1,238.9721 psf	6,002.4321 psf	0 psf	163 psf	0 psf	Very Soft Clay (CH)
Slice 21	90.702794 ft	15.767774 ft	1,200.6715 psf	5,959.2828 psf	0 psf	163 psf	0 psf	Very Soft Clay (CH)
Slice 22	93.012393 ft	16.558734 ft	1,151.2917 psf	5,895.0011 psf	0 psf	163 psf	0 psf	Very Soft Clay (CH)
Slice 23	95.583596 ft	17.678135 ft	1,081.4073 psf	6,254.5399 psf	2,750.6034 psf	75 psf	0 psf	Clayey Sand (SC)
Slice 24	97.911512 ft	18.881435 ft	1,006.285 psf	2,589.8724 psf	842.00833 psf	75 psf	0 psf	Clayey Sand (SC)
Slice 25	99.734537 ft	20.010338 ft	935.80745 psf	2,493.2145 psf	828.08802 psf	75 psf	0 psf	Clayey Sand (SC)
Slice 26	101.55756 ft	21.307037 ft	854.85425 psf	2,378.7128 psf	810.24996 psf	75 psf	0 psf	Clayey Sand (SC)
Slice 27	103.60181 ft	23.008266 ft	748.64623 psf	2,226.6878 psf	888.09699 psf	0 psf	0 psf	Fine Sand (SP)
Slice 28	105.86727 ft	25.229514 ft	609.97327 psf	2,003.8629 psf	837.5334 psf	0 psf	0 psf	Fine Sand (SP)
Slice 29	108.5 ft	28.504707 ft	405.50237 psf	1,356.654 psf	571.50954 psf	0 psf	0 psf	Fine Sand (SP)
Slice 30	111 ft	32.42653 ft	160.66225 psf	561.03694 psf	240.56939 psf	0 psf	0 psf	Fine Sand (SP)
Slice 31	112.15968 ft	34.643071 ft	22.28314 psf	312.77938 psf	174.54775 psf	0 psf	0 psf	Fine Sand (SP)
Slice 32	112.87218 ft	36.45 ft	-90.523773 psf	176.84474 psf	106.25904 psf	0 psf	0 psf	Fine Sand (SP)


Project Explorer
Define Project
Kirk2
2D Geometry
SLOPE/W Analysis
Solve Manager
Start
Stop
Analysis Name
Status
SLOPE/W Anal...
Solved 03:11:20 PM
Materials
Backfill
Clayey Sand (SC)
Fine Sand (SP)
Reinforced Zone Left
Reinforced Zone Right
Very Soft Clay (CH)
Weathered Limestone
129.00000, 90.000000 ft
Elevation
Distance
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
1
2
3
4
5
6
8


Project Explorer
Define Project
Kirk2
2D Geometry
SLOPE/W Analysis
Solve Manager
Start
Stop
Analysis Name
Status
SLOPE/W Anal...
Solved 03:11:20 PM
Slip Surfaces
All slip surfaces
Select Slip Surface
399
Auto select critical
Materials
Backfill
Clayey Sand (SC)
Fine Sand (SP)
Reinforced Zone Left
Reinforced Zone Right
Very Soft Clay (CH)
Weathered Limestone
29.53816, 98.545161 ft
2.895
Elevation
Distance
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150

SLOPE/W Analysis

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File Information

File Version: 11.02
Created By: geostudio
Last Edited By: geostudio
Revision Number: 13
Date: 09/24/2021
Time: 02:40:53 PM
Tool Version: 11.2.1.23288
File Name: Kirk3.gsz
Directory: Z:\Projects\B - Geotechnical\2020\B-20-129 BC Port Everglades Bulkhead - T.Y. Lin\13 - Calculations\GeoStudio\Berth 3\
Last Solved Date: 09/24/2021
Last Solved Time: 02:40:55 PM

Project Settings

Unit System: U.S. Customary Units

Analysis Settings

SLOPE/W Analysis

Description: Whiting Street Improvements MSE Wall (Boring WB-03). Wall height = 23 ft. Global Stability.
Kind: SLOPE/W
Analysis Type: Morgenstern-Price
Settings
- Side Function
  - Interslice force function option: Half-Sine
- PWP Conditions from: Piezometric Line
- Apply Phreatic Correction: No
- Use Staged Rapid Drawdown: No
- Unit Weight of Water: 62.430189 pcf

Slip Surface
- Direction of movement: Left to Right
- Use Passive Mode: No
- Slip Surface Option: Entry and Exit
- Critical slip surfaces saved: 1
- Optimize Critical Slip Surface Location: No
- Tension Crack Option: (none)

Distribution
- F of S Calculation Option: Constant

Advanced
- Geometry Settings
  - Minimum Slip Surface Depth: 0.1 ft
  - Number of Slices: 30
- Factor of Safety Convergence Settings
  - Maximum Number of Iterations: 100

Tolerable difference in F of S: 0.001
Under-Relaxation Criteria
Initial Rate: 1
Minimum Rate: 0.1
Rate Reduction Factor: 0.65
Reduction Frequency (iterations): 50
Solution Settings
Search Method: Root Finder
Tolerable difference between starting and converged F of S: 3
Maximum iterations to calculate converged lambda: 20
Max Absolute Lambda: 2

Materials

Highly Weathered Limestone

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 40 °
Phi-B: 0 °
Pore Water Pressure
Piezometric Line: 1

Highly Weathered Limestone (2)

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 39 °
Phi-B: 0 °
Pore Water Pressure
Piezometric Line: 1

Highly Weathered Limestone (3)

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 102 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 28 °
Phi-B: 0 °
Pore Water Pressure
Piezometric Line: 1

Highly Weathered Limestone (4)

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 38 °
Phi-B: 0 °
Pore Water Pressure
Piezometric Line: 1

Dense Fine Sand (SP)

Slope Stability Material Model: Mohr-Coulomb

Unit Weight: 125 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 38 °
Phi-B: 0 °
Pore Water Pressure
Piezometric Line: 1

Fine Sand (SP)

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 112 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 32 °
Phi-B: 0 °
Pore Water Pressure
Piezometric Line: 1

Reinforced Soil

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 120 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 32 °
Phi-B: 0 °
Pore Water Pressure
Piezometric Line: 1

Backfill

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 105 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 30 °
Phi-B: 0 °
Pore Water Pressure
Piezometric Line: 1

Slip Surface Entry and Exit

Left Type: Range
Left-Zone Left Coordinate: (30, 52) ft
Left-Zone Right Coordinate: (49, 52) ft
Left-Zone Increment: 8
Right Type: Range
Right-Zone Left Coordinate: (140, 45) ft
Right-Zone Right Coordinate: (150, 45) ft
Right-Zone Increment: 8
Radius Increments: 4

Slip Surface Limits

Left Coordinate: (0, 52) ft
Right Coordinate: (150, 45) ft

Piezometric Lines

Piezometric Line 1

Coordinates

	X	Y
Coordinate 1	0 ft	41 ft
Coordinate 2	150 ft	41 ft

Surcharge Loads

Surcharge Load 1

Surcharge (Unit Weight): 250 pcf
Direction: Vertical

Coordinates

	X	Y
	55 ft	72 ft
	95 ft	72 ft

Geometry

Name: 2D Geometry

Settings

View: 2D
Element Thickness: 1 ft

Points

	X	Y
Point 1	0 ft	0 ft
Point 2	0 ft	12 ft
Point 3	150 ft	12 ft
Point 4	150 ft	0 ft
Point 5	0 ft	17 ft
Point 6	150 ft	17 ft
Point 7	0 ft	22 ft
Point 8	150 ft	22 ft
Point 9	0 ft	27 ft
Point 10	150 ft	27 ft
Point 11	0 ft	32 ft
Point 12	150 ft	32 ft
Point 13	0 ft	45 ft
Point 14	150 ft	45 ft
Point 15	0 ft	52 ft
Point 16	55 ft	52 ft
Point 17	55 ft	45 ft
Point 18	55 ft	68 ft
Point 19	74 ft	68 ft
Point 20	74 ft	45 ft
Point 21	76 ft	68 ft

Point 22	76 ft	45 ft
Point 23	95 ft	68 ft
Point 24	95 ft	45 ft
Point 25	95 ft	49 ft
Point 26	97 ft	49 ft
Point 27	100 ft	45 ft

Regions

	Material	Points	Area
Region 1	Highly Weathered Limestone	1,2,3,4	1,800 ft²
Region 2	Highly Weathered Limestone (2)	2,5,6,3	750 ft²
Region 3	Highly Weathered Limestone (3)	5,7,8,6	750 ft²
Region 4	Highly Weathered Limestone (4)	7,9,10,8	750 ft²
Region 5	Dense Fine Sand (SP)	9,11,12,10	750 ft²
Region 6	Fine Sand (SP)	11,13,17,20,22,24,27,14,12	1,950 ft²
Region 7	Backfill	13,15,16,17	385 ft²
Region 8	Reinforced Soil	17,20,19,18,16	437 ft²
Region 9	Backfill	20,19,21,22	46 ft²
Region 10	Reinforced Soil	22,21,23,25,24	437 ft²
Region 11	Backfill	24,25,26,27	14 ft²

Slip Results

Slip Surfaces Analysed: 324 of 405 converged

Current Slip Surface

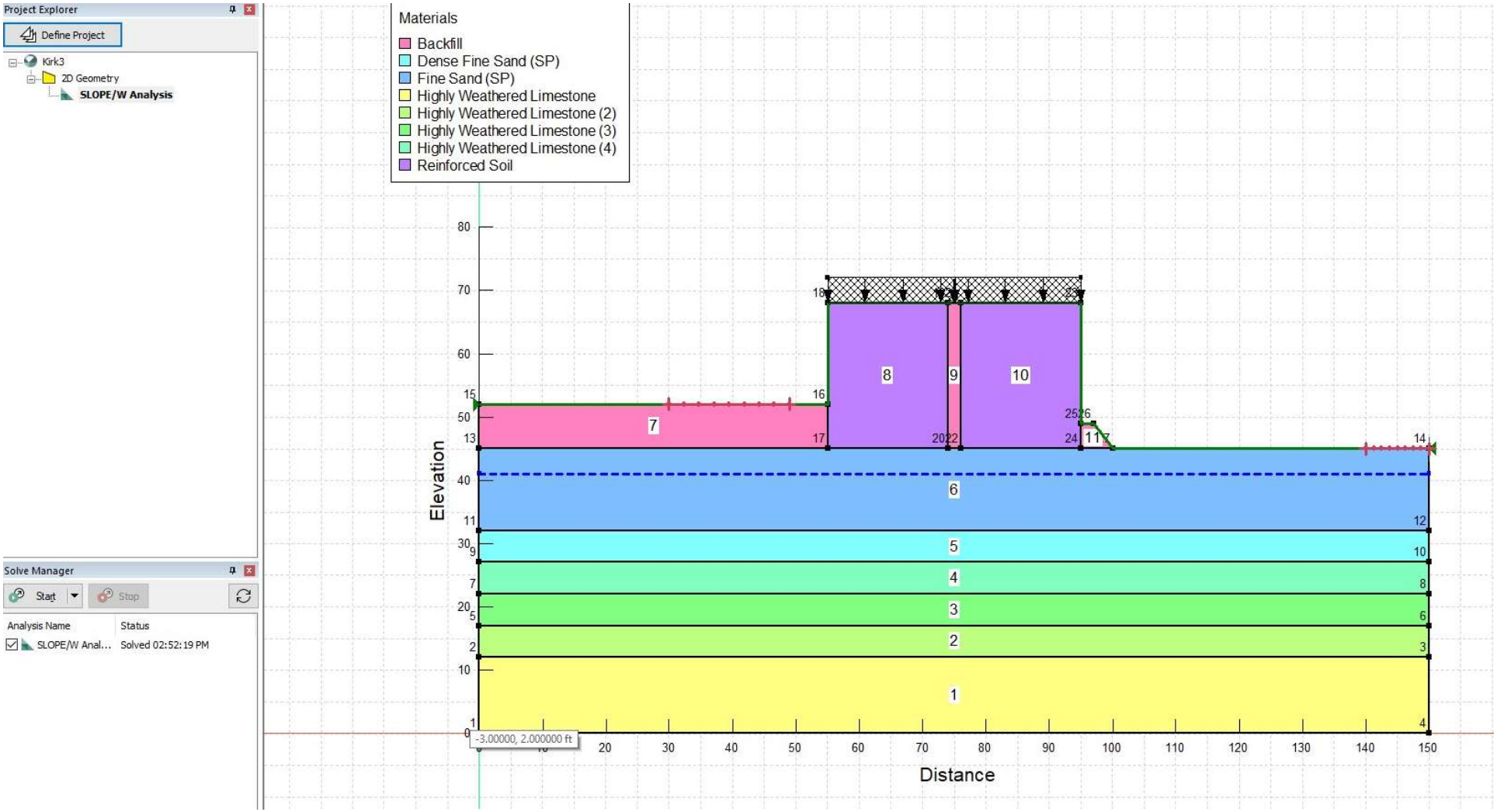
Slip Surface: 369
Factor of Safety: 2.802
Volume: 2,730.4159 ft³
Weight: 318,397.18 lbf
Resisting Moment: 9,454,312.9 lbf·ft
Activating Moment: 3,374,612.7 lbf·ft
Resisting Force: 159,882.43 lbf
Activating Force: 57,067.38 lbf
Slip Rank: 1 of 405 slip surfaces
Exit: (141.25, 45) ft
Entry: (49, 52) ft
Radius: 49.958426 ft
Center: (96.552769, 67.315956) ft

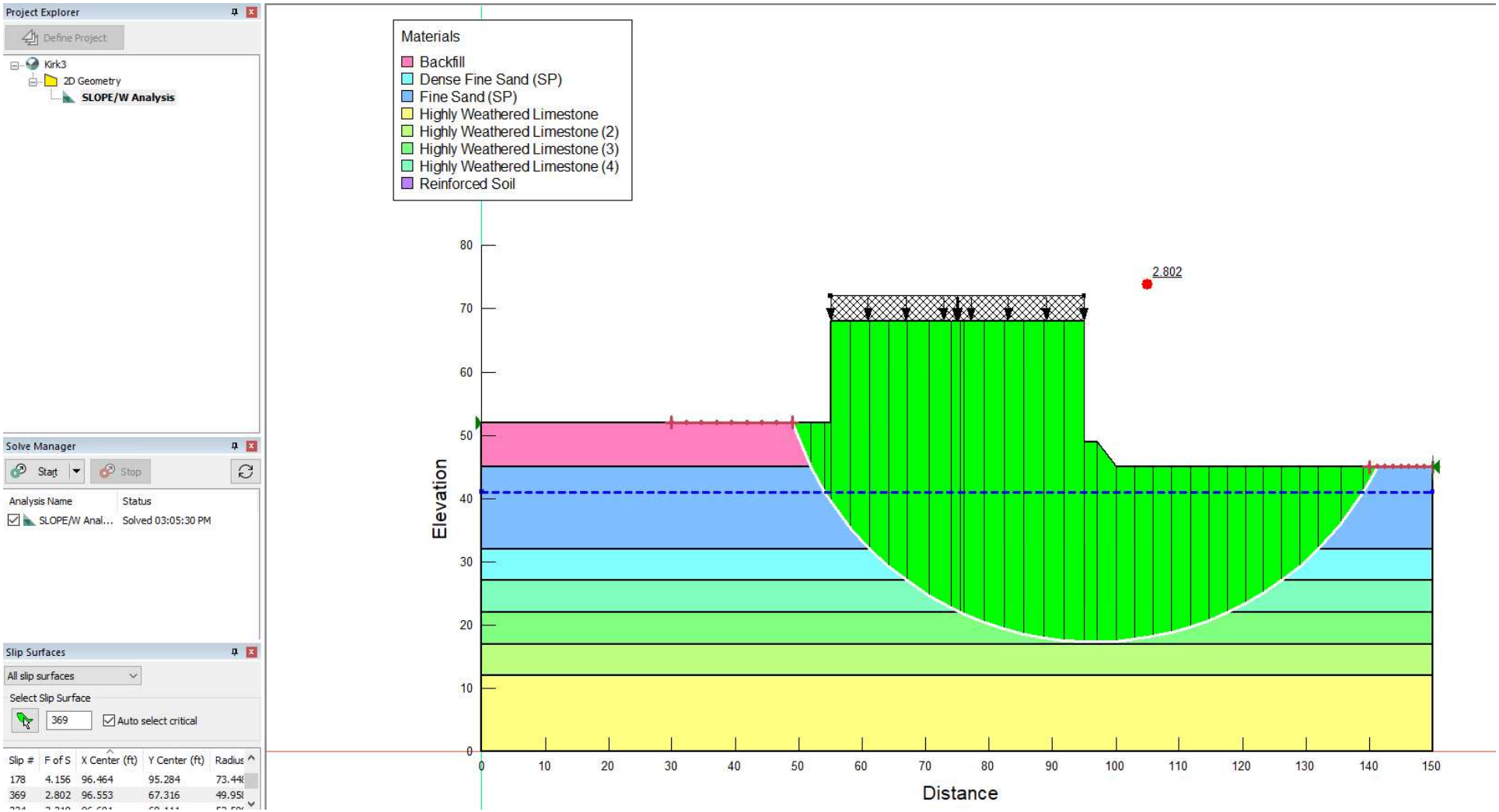
Slip Slices

	X	Y	PWP	Base Normal Stress	Frictional Strength	Cohesive Strength	Suction Strength	Base Material
Slice 1	50.427769 ft	48.5 ft	-468.22641 psf	241.21756 psf	139.26702 psf	0 psf	0 psf	Backfill
Slice 2	52.971426 ft	43 ft	-124.86038 psf	671.09495 psf	419.34667 psf	0 psf	0 psf	Fine Sand (SP)
Slice 3	54.543657 ft	40.290645 ft	44.285182 psf	925.00727 psf	550.33624 psf	0 psf	0 psf	Fine Sand (SP)
Slice 4	56.554211 ft	37.496534 ft	218.72203 psf	3,502.4539 psf	2,051.9034 psf	0 psf	0 psf	Fine Sand (SP)

Slice 5	59.662633 ft	33.705889 ft	455.3727 psf	3,991.184 psf	2,209.4201 psf	0 psf	0 psf	Fine Sand (SP)
Slice 6	62.674902 ft	30.652714 ft	645.98302 psf	4,259.3976 psf	2,823.1089 psf	0 psf	0 psf	Dense Fine Sand (SP)
Slice 7	65.591017 ft	28.152714 ft	802.05849 psf	4,636.5054 psf	2,995.7982 psf	0 psf	0 psf	Dense Fine Sand (SP)
Slice 8	68.786805 ft	25.836771 ft	946.64324 psf	5,004.7278 psf	3,170.5231 psf	0 psf	0 psf	Highly Weathered Limestone (4)
Slice 9	72.262268 ft	23.705643 ft	1,079.6899 psf	5,368.4418 psf	3,350.7401 psf	0 psf	0 psf	Highly Weathered Limestone (4)
Slice 10	74.760819 ft	22.368872 ft	1,163.1448 psf	5,313.3159 psf	3,242.469 psf	0 psf	0 psf	Highly Weathered Limestone (4)
Slice 11	75.760819 ft	21.890523 ft	1,193.0082 psf	5,534.6793 psf	2,308.5074 psf	0 psf	0 psf	Highly Weathered Limestone (3)
Slice 12	77.583333 ft	21.130731 ft	1,240.4422 psf	5,975.0555 psf	2,517.4386 psf	0 psf	0 psf	Highly Weathered Limestone (3)
Slice 13	80.75 ft	19.952143 ft	1,314.0217 psf	6,190.1636 psf	2,592.6906 psf	0 psf	0 psf	Highly Weathered Limestone (3)
Slice 14	83.916667 ft	19.009696 ft	1,372.8588 psf	6,390.2355 psf	2,667.7865 psf	0 psf	0 psf	Highly Weathered Limestone (3)
Slice 15	87.083333 ft	18.289701 ft	1,417.8082 psf	6,575.6371 psf	2,742.4662 psf	0 psf	0 psf	Highly Weathered Limestone (3)
Slice 16	90.25 ft	17.782413 ft	1,449.4783 psf	6,745.9196 psf	2,816.1678 psf	0 psf	0 psf	Highly Weathered Limestone (3)
Slice 17	93.416667 ft	17.481306 ft	1,468.2765 psf	6,899.9567 psf	2,888.0756 psf	0 psf	0 psf	Highly Weathered Limestone (3)
Slice 18	96 ft	17.370599 ft	1,475.1879 psf	3,630.5711 psf	1,146.0375 psf	0 psf	0 psf	Highly Weathered Limestone (3)
Slice 19	98.5 ft	17.418068 ft	1,472.2244 psf	3,463.5198 psf	1,058.7905 psf	0 psf	0 psf	Highly Weathered Limestone (3)
Slice 20	101.46532 ft	17.62146 ft	1,459.5267 psf	3,283.0824 psf	969.60178 psf	0 psf	0 psf	Highly Weathered Limestone (3)

Slice 21	104.39597 ft	17.999357 ft	1,435.9345 psf	3,298.1559 psf	990.16067 psf	0 psf	0 psf	Highly Weathered Limestone (3)
Slice 22	107.32662 ft	18.556174 ft	1,401.1723 psf	3,291.8558 psf	1,005.2943 psf	0 psf	0 psf	Highly Weathered Limestone (3)
Slice 23	110.25727 ft	19.29816 ft	1,354.85 psf	3,262.218 psf	1,014.1655 psf	0 psf	0 psf	Highly Weathered Limestone (3)
Slice 24	113.18792 ft	20.234105 ft	1,296.4187 psf	3,207.1141 psf	1,015.9347 psf	0 psf	0 psf	Highly Weathered Limestone (3)
Slice 25	116.11857 ft	21.37592 ft	1,225.135 psf	3,124.2494 psf	1,009.777 psf	0 psf	0 psf	Highly Weathered Limestone (3)
Slice 26	118.99599 ft	22.710495 ft	1,141.8173 psf	3,107.5886 psf	1,535.8289 psf	0 psf	0 psf	Highly Weathered Limestone (4)
Slice 27	121.82018 ft	24.249475 ft	1,045.7384 psf	2,937.2836 psf	1,477.8371 psf	0 psf	0 psf	Highly Weathered Limestone (4)
Slice 28	124.64437 ft	26.03898 ft	934.01927 psf	2,724.0569 psf	1,398.5307 psf	0 psf	0 psf	Highly Weathered Limestone (4)
Slice 29	127.51452 ft	28.152714 ft	802.05849 psf	2,457.2476 psf	1,293.1754 psf	0 psf	0 psf	Dense Fine Sand (SP)
Slice 30	130.43064 ft	30.652714 ft	645.98302 psf	2,126.6695 psf	1,156.839 psf	0 psf	0 psf	Dense Fine Sand (SP)
Slice 31	133.67108 ft	33.984906 ft	437.95361 psf	1,595.9637 psf	723.60504 psf	0 psf	0 psf	Fine Sand (SP)
Slice 32	137.23584 ft	38.484906 ft	157.01777 psf	1,039.7736 psf	551.60706 psf	0 psf	0 psf	Fine Sand (SP)
Slice 33	140.13411 ft	43 ft	-124.86038 psf	381.36559 psf	238.30367 psf	0 psf	0 psf	Fine Sand (SP)


Project Explorer
Define Project
Kirk3
2D Geometry
SLOPE/W Analysis
Solve Manager
Start
Stop
Analysis Name
Status
SLOPE/W Anal...
Solved 02:52:19 PM
Materials
Backfill
Dense Fine Sand (SP)
Fine Sand (SP)
Highly Weathered Limestone
Highly Weathered Limestone (2)
Highly Weathered Limestone (3)
Highly Weathered Limestone (4)
Reinforced Soil
Elevation
Distance
-3.00000, 2.000000 ft


Project Explorer
Define Project
Kirk3
2D Geometry
SLOPE/W Analysis
Solve Manager
Start
Stop
Analysis Name
Status
SLOPE/W Anal...
Solved 03:05:30 PM
Slip Surfaces
All slip surfaces
Select Slip Surface
369
Auto select critical
Slip #
F of S
X Center (ft)
Y Center (ft)
Radius
178
4.156
96.464
95.284
73.44
369
2.802
96.553
67.316
49.95
Materials
Backfill
Dense Fine Sand (SP)
Fine Sand (SP)
Highly Weathered Limestone
Highly Weathered Limestone (2)
Highly Weathered Limestone (3)
Highly Weathered Limestone (4)
Reinforced Soil
2.802
Elevation
Distance
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150

Whiting Street (Florida Ave. Loop)

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PROJECT IDENTIFICATION

Title: Whiting Street (Florida Ave. Loop)
Project Number: B-19 - 051
Client:
Designer: AT
Station Number: 109+00

Description:
WB-02

Company's information:

Name: Arehna Engineering
Street: 5012 West Lemon Street
Tampa, FL 33609
Telephone #:
Fax #:
E-Mail:

Original file path and name: Z:\Project ..... ns\Wall Calculations\B-19-051 WB-02 Settlement.2ST
Original date and time of creating this file: Thu Aug 05 15:07:52 2021

GEOMETRY: Analysis of a 2D geometry

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ELASTIC SETTLEMENT OF RECTANGULAR FOOTING
Whiting Street MSE Walls

Hillsborough County, Florida

AREHNA Project No. B-19-051

Applicable Boring No.:	WB-03	
Applied Pressure, p =	2.6	ksf
Foundation Width, B =	43	feet
Foundation Length, L =	200	feet
Foundation Depth, D_f =	1.3	feet (Below top of boring)
Boring Elevation =	19.3	feet
N-Value Energy Correction =	1.24	

Summary of Analysis Results	
Location	**ΔH (in)**
Under Corner	1.982
Under Center of Long Edge	3.958
Under Center of Short Edge	3.455
Under Center	6.903

												Under Corner of Footing					Under Center of Long Edge of Footing					Under Center of Short Edge of Footing					Under Center of Footing				
Soil Stratum No.	Depth Range[1] (feet)		Elevation Range (feet)		Layer Thickness, H_i (feet)	Soil or Rock	Avg. N_{auto} (bpf)	Avg. N_{manual}[2] (bpf)	N_{corr}[3] (bpf)	E_s (ksf)	z to Layer Mid-depth (feet)	Vertical Normal Stress Calculation[4]				Settlement, $\Delta H_i = (H_i*12*\Delta\sigma_z)/E_s$ (in)	Vertical Normal Stress Calculation[4]				Settlement, $\Delta H_i = (H_i*12*\Delta\sigma_z)/E_s$ (in)	Vertical Normal Stress Calculation[4]					Settlement, $\Delta H_i = (H_i*12*\Delta\sigma_z)/E_s$ (in)	Vertical Normal Stress Calculation[4]					Settlement, $\Delta H_i = (H_i*12*\Delta\sigma_z)/E_s$ (in)
												Influence Factor			$\Delta\sigma_z = p*I_{corner}$ (ksf)		Influence Factor			$\Delta\sigma_z = p*I_{corner}$ (ksf)	Influence Factor			$\Delta\sigma_z = p*I_{corner}$ (ksf)		Influence Factor			$\Delta\sigma_z = p*4*I_{corner}$ (ksf)	
No.	from	to	from	to								m=B/z	n=L/z	I_{corner}[5]			m=B/z	n=(½L)/z	I_{corner}[5]			m=(½B)/z	n=L/z	I_{corner}[5]			m=(½B)/z	n=(½L)/z	I_{corner}[5]		
1	0	2	19.3	17.3	0.7	Soil	10	12.4	12.4	248	0.35	122.86	571.43	0.250	0.650	0.022	122.86	285.71	0.250	1.300	0.044	61.43	571.43	0.250	1.300	0.044	61.43	285.71	0.250	2.600	0.088
2	2	4.0	17.3	15.3	2	Soil	10	12.4	12.4	248	1.7	25.29	117.65	0.250	0.650	0.063	25.29	58.82	0.250	1.300	0.126	12.65	117.65	0.250	1.300	0.126	12.65	58.82	0.250	2.599	0.252
3	4	6.0	15.3	13.3	2	Soil	15	18.6	18.6	372	3.7	11.62	54.05	0.250	0.650	0.042	11.62	27.03	0.250	1.300	0.084	5.81	54.05	0.249	1.297	0.084	5.81	27.03	0.249	2.595	0.167
4	6	8.0	13.3	11.3	2	Soil	11	13.6	13.6	273	5.7	7.54	35.09	0.250	0.649	0.057	7.54	17.54	0.250	1.299	0.114	3.77	35.09	0.248	1.291	0.114	3.77	17.54	0.248	2.581	0.227
5	8	10.0	11.3	9.3	2	Soil	16	19.8	19.8	397	7.7	5.58	25.97	0.249	0.648	0.039	5.58	12.99	0.249	1.297	0.078	2.79	25.97	0.246	1.278	0.077	2.79	12.99	0.246	2.556	0.155
6	10	15.0	9.3	4.3	5	Soil	34	42.2	42.2	843	11.2	3.84	17.86	0.248	0.645	0.046	3.84	8.93	0.248	1.291	0.092	1.92	17.86	0.239	1.242	0.088	1.92	8.93	0.239	2.483	0.177
7	15	20.0	4.3	-0.7	5	Soil	16	19.8	19.8	397	16.2	2.65	12.35	0.245	0.637	0.096	2.65	6.17	0.245	1.274	0.193	1.33	12.35	0.224	1.163	0.176	1.33	6.17	0.224	2.326	0.352
8	20	25.0	-0.7	-5.7	5	Soil	1	1.2	1.2	25	21.2	2.03	9.43	0.240	0.625	1.511	2.03	4.72	0.240	1.247	3.017	1.01	9.43	0.206	1.069	2.587	1.01	4.72	0.205	2.137	5.170
9	25	30.0	-5.7	-10.7	5	Soil	38.0	47.1	47.1	942	26.2	1.64	7.63	0.234	0.607	0.039	1.64	3.82	0.233	1.211	0.077	0.82	7.63	0.187	0.974	0.062	0.82	3.82	0.187	1.945	0.124
10	30	35.0	-10.7	-15.7	5	Soil	50.0	62.0	62.0	1,240	31.2	1.38	6.41	0.226	0.587	0.028	1.38	3.21	0.225	1.168	0.056	0.69	6.41	0.170	0.886	0.043	0.69	3.21	0.170	1.765	0.085
11	35	40.0	-15.7	-20.7	5	Soil	100.0	124.0	124.0	2,480	36.2	1.19	5.52	0.217	0.564	0.014	1.19	2.76	0.215	1.119	0.027	0.59	5.52	0.155	0.807	0.020	0.59	2.76	0.154	1.604	0.039
12	40	45.0	-20.7	-25.7	5	Soil	52.0	64.5	64.5	1,290	41.2	1.04	4.85	0.208	0.540	0.025	1.04	2.43	0.205	1.068	0.050	0.52	4.85	0.142	0.737	0.034	0.52	2.43	0.140	1.461	0.068
															Σ=	1.982				Σ=	3.958				Σ=	3.455				Σ=	6.903

[1] Depths relative to existing ground surface at time of boring

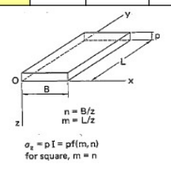
[2] N_{manual} = 1.24 x(N_{auto}), based on drill rig hammer energy correlations

[3] N_{corr} = Corrected N-value for overburden pressure (NOT DONE FOR THIS PROJECT…CONSERVATIVE)

[4] Fadum, R.E. (1948) *Influence Values for Estimating Stresses in Elastic Foundations, 2nd ICSMFE*, Vol. 2.

[5] I_{corner} = Influence Factor:

$$I_{corner} = \left[\frac{mn}{\sqrt{(m^2+n^2+1)}} \frac{(m^2+n^2+2)}{m^2+n^2+m^2n^2+1} + \sin^{-1} \frac{mn}{\sqrt{(m^2+n^2+m^2n^2+1)}} \right] \frac{1}{2\pi}$$



$\sigma_z = p\,I = pf(m, n)$
for square, m = n

Performed by:	AT	Date:	3/31/2021
Reviewed by:	KE	Date:	3/31/2021

AREHNA Engineering, Inc.
5012 W Lemon Street
Tampa, Florida 33609

Project Name: THEA PD&E Whiting Street
Project Number: B-19-051

Boring Number: WB-01

Note: The Earth Pressure Coefficients shown are for level ground and vertical walls.

RECOMMENDED WALL SOIL PARAMETERS

No.	Approx. Depth (feet)	Approx. Elevation (NAVD 88) (feet)	USCS Soil Type	Total Unit Weight (pcf)	Internal Friction ϕ (deg)	Cohesion, Su (psf)	Adhesion (psf)	Friction Ratio δ/ϕ		Angle of Wall Friction (Degrees) δ		Earth Pressure Coefficients		
								Steel	Concrete	Steel	Concrete	Active (Ka)	Passive (Kp)	At Rest (Ko)
1	6	12.4	SP-SM	105	30	0	N/A	0.5	0.5	15.0	15	0.33	3.00	0.50
2	17.5	0.9	SP-SM	112	31	0	N/A	0.5	0.5	16.0	16	0.32	3.12	0.48
3	20	-1.6	SP-SM	115	35	0	N/A	0.5	0.5	18.0	18	0.27	3.69	0.43
4														
5														
6														
7														
8														
9														
BACKFILL: SAND FILL				105	30	0	N/A	0.5	0.5	15.0	15	0.33	3.00	0.50
BACKFILL: LIMEROCK FILL (Miami-Dade & Monroe Counties Only)				115	34	0	N/A	0.5	0.5	17.0	17	0.28	3.54	0.44

Notes:

(1) The tabulated values assume smooth, formed concrete or concrete sheet piling against granular fill, without appreciable cohesion, compacted to the specifications outlined in the Standard Specifications. In addition, friction ratio for steel interface is also provided. The angle of wall friction was determined using Table 3-2 (after Allen, Duncan, and Snacio 1988) of EM 1110-2-2504, prepared by the US Army Corps of Engineers.

(2) The above earth pressure coefficient values represent ultimate conditions. Therefore, appropriate factor of safety should be applied for design.

(3) If passive pressures are determined using Coulomb Method, the wall friction should to be reduced and not exceed more than 1/3 the soil friction angle (Reference: FHWA NHA-07-071, page 3-21).

(4) Compacted fill placed above the existing grade behind the retaining wall.

(5) Rock with N (manual) less or equal to 10 modelled as cohesionless (SP).

(6) Rock with N (manual) between 11 to 25 was modelled as cohesionless (GW).

AREHNA Engineering, Inc.
5012 W Lemon Street
Tampa, Florida 33609

Project Name: THEA PD&E Whiting Street
Project Number: B-19-051

Boring Number: WB-02

Note: The Earth Pressure Coefficients shown are for level ground and vertical walls.

RECOMMENDED WALL SOIL PARAMETERS

No.	Approx. Depth (feet)	Approx. Elevation (NAVD 88) (feet)	USCS Soil Type	Total Unit Weight (pcf)	Internal Friction ϕ (deg)	Cohesion, Su (psf)	Adhesion (psf)	Friction Ratio δ/ϕ		Angle of Wall Friction (Degrees) δ		Earth Pressure Coefficients		
								Steel	Concrete	Steel	Concrete	Active (Ka)	Passive (Kp)	At Rest (Ko)
1	6	10.3	SP-SM	102	29	0	N/A	0.5	0.5	15.0	15	0.35	2.88	0.52
2	17.5	-1.2	SP	112	30	0	N/A	0.5	0.5	15.0	15	0.33	3.00	0.50
3	22.5	-6.2	SC	105	28	0	N/A	0.5	0.5	14.0	14	0.36	2.77	0.53
4	32.5	-16.2	CH	100	0	163	161	N/A	N/A	N/A	N/A	1.00	1.00	1.00
5	40	-23.7	Limestone	125	40	0	N/A	0.5	0.5	20.0	20	0.22	4.60	0.36
6														
7														
8														
9														
BACKFILL: SAND FILL				105	30	0	N/A	0.5	0.5	15.0	15	0.33	3.00	0.50
BACKFILL: LIMEROCK FILL (Miami-Dade & Monroe Counties Only)				115	34	0	N/A	0.5	0.5	17.0	17	0.28	3.54	0.44

Notes:

(1) The tabulated values assume smooth, formed concrete or concrete sheet piling against granular fill, without appreciable cohesion, compacted to the specifications outlined in the Standard Specifications. In addition, friction ratio for steel interface is also provided. The angle of wall friction was determined using Table 3-2 (after Allen, Duncan, and Snacio 1988) of EM 1110-2-2504, prepared by the US Army Corps of Engineers.

(2) The above earth pressure coefficient values represent ultimate conditions. Therefore, appropriate factor of safety should be applied for design.

(3) If passive pressures are determined using Coulomb Method, the wall friction should to be reduced and not exceed more than 1/3 the soil friction angle (Reference: FHWA NHA-07-071, page 3-21).

(4) Compacted fill placed above the existing grade behind the retaining wall.

(5) Rock with N (manual) less or equal to 10 modelled as cohesionless (SP).

(6) Rock with N (manual) between 11 to 25 was modelled as cohesionless (GW).

AREHNA Engineering, Inc.
5012 W Lemon Street
Tampa, Florida 33609

Project Name: THEA PD&E Whiting Street
Project Number: B-19-051

Boring Number: WB-03

Note: The Earth Pressure Coefficients shown are for level ground and vertical walls.

RECOMMENDED WALL SOIL PARAMETERS

No.	Approx. Depth (feet)	Approx. Elevation (NAVD 88) (feet)	USCS Soil Type	Total Unit Weight (pcf)	Internal Friction ϕ (deg)	Cohesion, Su (psf)	Adhesion (psf)	Friction Ratio δ/ϕ		Angle of Wall Friction (Degrees) δ		Earth Pressure Coefficients		
								Steel	Concrete	Steel	Concrete	Active (Ka)	Passive (Kp)	At Rest (Ko)
1	12.5	6.9	SP-SM	112	31	0	N/A	0.5	0.5	16.0	16	0.32	3.12	0.48
2	17.5	1.9	SP-SM	125	38	0	N/A	0.5	0.5	19.0	19	0.24	4.20	0.38
3	22.5	-3.1	Limestone	115	38	0	N/A	0.5	0.5	19.0	19	0.24	4.20	0.38
4	27.5	-8.1	Limestone	102	28	0	N/A	0.5	0.5	14.0	14	0.36	2.77	0.53
5	45	-25.6	Limestone	125	40	0	N/A	0.5	0.5	20.0	20	0.22	4.60	0.36
6														
7														
8														
9														
BACKFILL: SAND FILL				105	30	0	N/A	0.5	0.5	15.0	15	0.33	3.00	0.50
BACKFILL: LIMEROCK FILL (Miami-Dade & Monroe Counties Only)				115	34	0	N/A	0.5	0.5	17.0	17	0.28	3.54	0.44

Notes:

(1) The tabulated values assume smooth, formed concrete or concrete sheet piling against granular fill, without appreciable cohesion, compacted to the specifications outlined in the Standard Specifications. In addition, friction ratio for steel interface is also provided. The angle of wall friction was determined using Table 3-2 (after Allen, Duncan, and Snacio 1988) of EM 1110-2-2504, prepared by the US Army Corps of Engineers.

(2) The above earth pressure coefficient values represent ultimate conditions. Therefore, appropriate factor of safety should be applied for design.

(3) If passive pressures are determined using Coulomb Method, the wall friction should to be reduced and not exceed more than 1/3 the soil friction angle (Reference: FHWA NHA-07-071, page 3-21).

(4) Compacted fill placed above the existing grade behind the retaining wall.

(5) Rock with N (manual) less or equal to 10 modelled as cohesionless (SP).

(6) Rock with N (manual) between 11 to 25 was modelled as cohesionless (GW).

AREHNA Engineering, Inc.
5012 W Lemon Street
Tampa, Florida 33609

Project Name: THEA PD&E Whiting Street
Project Number: B-19-051

Boring Number: WB-04

Note: The Earth Pressure Coefficients shown are for level ground and vertical walls.

RECOMMENDED WALL SOIL PARAMETERS

No.	Approx. Depth (feet)	Approx. Elevation (NAVD 88) (feet)	USCS Soil Type	Total Unit Weight (pcf)	Internal Friction ϕ (deg)	Cohesion, Su (psf)	Adhesion (psf)	Friction Ratio δ/ϕ		Angle of Wall Friction (Degrees) δ		Earth Pressure Coefficients		
								Steel	Concrete	Steel	Concrete	Active (Ka)	Passive (Kp)	At Rest (Ko)
1	2	12.3	SP-SM	102	29	0	N/A	0.5	0.5	15.0	15	0.35	2.88	0.52
2	6	8.3	SM	105	28	0	N/A	0.5	0.5	14.0	14	0.36	2.77	0.53
3	12.5	1.8	SP	115	33	0	N/A	0.5	0.5	17.0	17	0.29	3.39	0.46
4	17.5	-3.2	Limestone	115	37	0	N/A	0.5	0.5	19.0	19	0.25	4.02	0.40
5	22.5	-8.2	Limestone	102	28	0	N/A	0.5	0.5	14.0	14	0.36	2.77	0.53
6	27.5	-13.2	Limestone	115	38	0	N/A	0.5	0.5	19.0	19	0.24	4.20	0.38
7	45	-30.7	Limestone	125	40	0	N/A	0.5	0.5	20.0	20	0.22	4.60	0.36
8														
9														
BACKFILL: SAND FILL				105	30	0	N/A	0.5	0.5	15.0	15	0.33	3.00	0.50
BACKFILL: LIMEROCK FILL (Miami-Dade & Monroe Counties Only)				115	34	0	N/A	0.5	0.5	17.0	17	0.28	3.54	0.44

Notes:

(1) The tabulated values assume smooth, formed concrete or concrete sheet piling against granular fill, without appreciable cohesion, compacted to the specifications outlined in the Standard Specifications. In addition, friction ratio for steel interface is also provided. The angle of wall friction was determined using Table 3-2 (after Allen, Duncan, and Snacio 1988) of EM 1110-2-2504, prepared by the US Army Corps of Engineers.

(2) The above earth pressure coefficient values represent ultimate conditions. Therefore, appropriate factor of safety should be applied for design.

(3) If passive pressures are determined using Coulomb Method, the wall friction should to be reduced and not exceed more than 1/3 the soil friction angle (Reference: FHWA NHA-07-071, page 3-21).

(4) Compacted fill placed above the existing grade behind the retaining wall.

(5) Rock with N (manual) less or equal to 10 modelled as cohesionless (SP).

(6) Rock with N (manual) between 11 to 25 was modelled as cohesionless (GW).

AREHNA Engineering, Inc.
5012 W Lemon Street
Tampa, Florida 33609

Project Name: THEA PD&E Whiting Street
Project Number: B-19-051

Boring Number: WB-05

Note: The Earth Pressure Coefficients shown are for level ground and vertical walls.

RECOMMENDED WALL SOIL PARAMETERS

No.	Approx. Depth (feet)	Approx. Elevation (NAVD 88) (feet)	USCS Soil Type	Total Unit Weight (pcf)	Internal Friction ϕ (deg)	Cohesion, Su (psf)	Adhesion (psf)	Friction Ratio δ/ϕ		Angle of Wall Friction (Degrees) δ		Earth Pressure Coefficients		
								Steel	Concrete	Steel	Concrete	Active (Ka)	Passive (Kp)	At Rest (Ko)
1	6	12	SP	112	30	0	N/A	0.5	0.5	15.0	15	0.33	3.00	0.50
2	12.5	5.5	SP-SM	112	32	0	N/A	0.5	0.5	16.0	16	0.31	3.25	0.47
3	17.5	0.5	SC	115	31	0	N/A	0.5	0.5	16.0	16	0.32	3.12	0.48
4	20	-2	Limestone	125	40	0	N/A	0.5	0.5	20.0	20	0.22	4.60	0.36
5														
6														
7														
8														
9														
BACKFILL: SAND FILL				105	30	0	N/A	0.5	0.5	15.0	15	0.33	3.00	0.50
BACKFILL: LIMEROCK FILL (Miami-Dade & Monroe Counties Only)				115	34	0	N/A	0.5	0.5	17.0	17	0.28	3.54	0.44

Notes:

(1) The tabulated values assume smooth, formed concrete or concrete sheet piling against granular fill, without appreciable cohesion, compacted to the specifications outlined in the Standard Specifications. In addition, friction ratio for steel interface is also provided. The angle of wall friction was determined using Table 3-2 (after Allen, Duncan, and Snacio 1988) of EM 1110-2-2504, prepared by the US Army Corps of Engineers.

(2) The above earth pressure coefficient values represent ultimate conditions. Therefore, appropriate factor of safety should be applied for design.

(3) If passive pressures are determined using Coulomb Method, the wall friction should to be reduced and not exceed more than 1/3 the soil friction angle (Reference: FHWA NHA-07-071, page 3-21).

(4) Compacted fill placed above the existing grade behind the retaining wall.

(5) Rock with N (manual) less or equal to 10 modelled as cohesionless (SP).

(6) Rock with N (manual) between 11 to 25 was modelled as cohesionless (GW).

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.

Subject Page

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.

Geotechnical Report Text (Introduction) (Pages 322-325)		Yes	No	Unknown or N/A
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. Site Investigation Information (Cont.)

		Yes	No	Unknown or N/A
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.

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?

Embankment Stability (Pages 77-79, 95-97)	Yes	No	Unknown or N/A
*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?	☐	☐	☒
Settlement of Subsoil (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. Embankments Over Soft Ground (Cont.)	Yes	No	Unknown or N/A
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. Construction Considerations: (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.

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?

		Yes	No	Unknown or N/A
*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.	Construction Considerations:			
	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.

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:

		Yes	No	Unknown or N/A
*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. Pile Foundations - Piles (Cont.)	Yes	No	Unknown or N/A
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.)

	Yes	No	Unknown or N/A
13. Construction Considerations: (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.

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:

		Yes	No	Unknown or N/A
*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.	Construction Considerations:			
	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.

Plans and specifications (PS&E) reviews of projects with major or unusual geotechnical features[1] 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

		Yes	No	Unknown or N/A
*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? This is an absolute necessity.	☐	☐	☒
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.

		Yes	No	Unknown or N/A
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.

		Yes	No	Unknown or N/A
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.

		Yes	No	Unknown or N/A
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 deign 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.

		Yes	No	Unknown or N/A
H.	PS&E – Drilled Shaft Foundations			
*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.	PS&E – Material Sites			
*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.