CITY OF DELRAY BEACH
100 N.W. 1st AVENUE, DELRAY BEACH, FL 33444

Solicitation Addendum

Addendum No.:	1
Solicitation No.:	2017-030
Project No.:	2017-021
Solicitation Title:	Engineering Services for Marine Way Seawall and Dock
Addendum Date:	February 28, 2017
Purchasing Contact:	dowdell@mydelraybeach.com

THE FOLLOWING ITEMS ARE MADE AND HEREBY BECOME A PART OF THIS SOLICITATION:

QUESTIONS AND RESPONSES:

Q1. Who owns the land east of Marina Way?

R1. The City of Delray Beach owns the land east of Marine Way and an easement has been granted to the United States of America for the Intracoastal Waterway.

Q2. Provide study

R2. Delray Beach Marine Way Walkway Study Phase 2 (pages 1-20)

Q3. Did the City have any pre applications meeting with any of the regulatory agencies?

R3. No pre application meetings have occurred on this project.

Q4. Is the City planning to fund all the construction or will grants be involved?

R4. The City is planning to fund construction. The City would not be opposed to any grant funding applied to the project.

NOTE: Items that are ~~struck through~~ are deleted. Items that are <u>underlined</u> have been added. All other terms and conditions remain as stated in the RFP.

End of Addendum

INSTRUCTIONS:
Receipt of this addendum must be acknowledged as instructed in the solicitation document. Failure to acknowledge receipt of this Addendum may result in the disqualification of Respondent's response.

CITY OF DELRAY BEACH
100 N.W. 1st AVENUE, DELRAY BEACH, FL 33444

Solicitation Addendum

Addendum No.:	1
Solicitation No.:	2017-046
Project No.:	N/A
Solicitation Title:	Island Drive Seawall Repairs
Addendum Date:	April 13, 2017
Purchasing Contact:	Ja'Anal Dowdell dowdell@mydelraybeach.com

THE FOLLOWING ITEMS ARE MADE AND HEREBY BECOME A PART OF THIS SOLICITATION:

QUESTIONS AND RESPONSES:

Q1. Does the City have any soil borings for this area?

R1. See attached geotechnical report, soil boring information included.

WGI #
4101 1004.17

Geotechnical Engineering Report

Island Drive Bridge – Wingwall Replacement
City of Delray Beach, Florida
June 16, 2016
Terracon Project No. HD165049

Prepared for:
Wantman Group, Inc.
West Palm Beach, Florida

Prepared by:
Terracon Consultants, Inc.
West Palm Beach, Florida

June 16, 2016

Terracon

Wantman Group, Inc.
2035 Vista Parkway
West Palm Beach, FL 33411

Attn: Mr. Jeff Bergmann, P.E.
P: [561] 687-2220
E: Jeffrey.Bergmann@WantmanGroup.com

Re: Geotechnical Engineering Report
Island Drive Bridge – Wingwall Replacement
City of Delray Beach, Florida
Terracon Project Number: HD165049

Dear Mr. Bergmann:

Terracon Consultants, Inc. (Terracon) has completed geotechnical engineering services for the above referenced project. This study was performed in general accordance with our proposal dated December 11, 2016, and the Agreement Between Consultant and Subconsultant for Professional Services dated April 12, 2016.

This report presents the findings of the subsurface exploration and provides geotechnical engineering recommendations related to the design and construction of the wingwall replacement.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning this report, or if we may be of further service, please contact us.

Sincerely,
Terracon Consultants, Inc.

Daniel J. Marieni, P.E.
Geotechnical Department Manager
FL Registration No. 66416

Kevin E. Aubry, P.E.
Senior Project Engineer
FL Registration No. 38175

Enclosures
cc: 1 – Client (PDF)
1 – File

TABLE OF CONTENTS

EXECUTIVE SUMMARY

The exploration for this study indicates the site of the proposed Wingwall replacement is mostly underlain by about 11 feet of sands over Coquina limestone to about 17 feet and then sands and another Coquina formation starting at about 27 feet deep.

In general, the subsoils and rock formations should provide suitable support to the proposed Wingwalls when incorporating either 14 or 18-inch square driven Precast Prestressed Concrete (PPC) piles. We estimate that 18-inch square PPC piles should attain a nominal bearing resistance (Davisson Capacity) of about 65 tons when driven to a tip depth of about 40 feet below pavement grade. The 14-inch square PPC piles should attain a nominal bearing resistance (Davisson Capacity) of about 45 tons when driven to a tip depth of about 40 feet below existing pavement grade. Higher capacities may be achieved at greater pile lengths.

The Coquina limestone formation between about 12 and 17 feet below grade is hard and will need to be predrilled at each pile location to facilitate pile installation. From the standpoint of lateral stability, the piles should be not less than 28 feet long, measured from the existing pavement grade.

Vibrations associated with pile driving operations could damage adjacent structures via seismic densification of the sandy soils beneath their foundations (causing settlement). We recommend that the vibrations be monitored using a seismometer to verify that they are below the threshold levels that could cause damage. We also recommend that surveying equipment be used to monitor vertical movement of the surrounding structures during pile driving. A pre-construction survey should be performed for the nearby structures to identify any pre-existing cracks prior to pile driving. It should be noted that ground vibrations and noise due to pile driving may be a nuisance to occupants of the existing structures even if they do not cause structural damage to those structures.

This summary should be used in conjunction with the entire report for design purposes. It should be recognized that details were not included or fully developed in this section, and the report must be read in its entirety for a comprehensive understanding of the items contained herein. The section titled **GENERAL COMMENTS** should be read for an understanding of the report limitations.

GEOTECHNICAL ENGINEERING REPORT
ISLAND DRIVE BRIDGE – WINGWALL RECPLACEMENT
CITY OF DELRAY BEACH, FLORIDA
Terracon Project No. HD165049
June 16, 2016

1.0 INTRODUCTION

This geotechnical engineering report has been prepared for the proposed replacement of the Island Drive bridge wingwall located in the City of Delray Beach, Florida. This report describes the methods of study and key findings from the subsurface exploration and provides geotechnical engineering recommendations for the proposed wingwall replacement.

2.0 PROJECT INFORMATION

We understand the project will consist of replacing the southeast wing wall of the Island Drive Bridge, which is located about 200 ft west of the intersection of Island Drive and Andrews Avenue in the City of Delray Beach, Florida. The site location is presented on Exhibit 1. The existing wall consists of concrete panels and king piles. Subsurface information in the form of stratigraphy, lateral earth pressure design criteria and estimated pile vertical capacity are needed at this time for the design of the seawall replacement project. We understand that the replacement piles would consist of either 14-inch or 18-inch wide square prestressed precast concrete (PPC) piles.

3.0 SUBSURFACE CONDITIONS

3.1 Soil Survey

Per the USDA Natural Resources Conservation Service Websoil Survey the site is mapped with the soil unit Arents-Urban lands complex, organic substratum. Arents-Urban land complex unit consists of a mixture of urban land and sandy soils overlying organic soils.

It should be noted that the Soil Survey is not intended as a substitute for site-specific geotechnical exploration; rather it is a useful tool in planning a project scope in that it provides information on soil types likely to be present.

3.2 Field Exploration

A single Standard Penetration Test (SPT) boring was drilled to characterize the subsurface conditions for design of the wingwall replacement. The boring was drilled to a depth of 70 feet at the location shown on Exhibit A-2 using a truck mounted Central Mine Equipment (CME) 45B drilling rig. The boring was drilled using mud rotary methods and samples of the subsurface materials were obtained at frequent vertical intervals using SPT procedures described in ASTM D 1586. Additional information regarding the field exploration procedure is described in Exhibit A-3.

Samples collected from the borings were classified using the Unified Soil Classification System (ASTM D 2487) and appropriate geologic nomenclature. The subsurface profile for the boring is provided on Exhibit A-4-1 through A-4-3.

3.3 Stratigraphy

Subsurface conditions disclosed by the boring indicate a pavement section of 6 inches of asphalt concrete over 7 inches limerock base course. Fine sand with some shell fragments was found below the pavement and was followed by a slightly silty sand layer with some finely divided organic matter from 6 to 8 feet deep. Silty sand followed until about 11.5 feet where a formation of cemented sand and shell (locally referred to as coquina) enters the profile. The coquina extends to a depth of 17 feet. Sand with silt, shell and trace amounts of coquina fragments is found next in the profile and is followed by clean sand. A second formation of coquina enters the profile at about 27.5 feet and extends to the maximum depth explored of 70 feet. The following table provides the basic subsurface profile components in terms of depths, material descriptions and relative density/consistency.

Table 1 – Generalized Subsurface Conditions

Approximate Depth (feet)	Material Description	Relative Density
0 – 1.1	Pavement	--
1.1 – 6.0	Light brown to brown fine SAND, some shell fragments (SP)	Loose
6.0 – 8.0	Dark brown slightly silty fine SAND, some finely divided organic matter, trace fibrous roots (SP-SM)	Very Loose
8 – 11.5	Dark gray silty fine SAND, trace fibrous roots (SM)	Very Loose
11.5 – 17	Light brown cemented sand and shell (COQUINA)	Well Cemented
17 – 22	Light gray fine SAND with silt, shell fragments and trace cemented sand and shell fragments (SP-SM)	Loose
22 – 27.5	Light brown fine SAND (SP)	Medium Dense
27.5 – 70*	Light brown cemented sand and shell (COQUINA)	Weakly to Moderately Well Cemented

Note: *Maximum depth explored

3.4 Groundwater

Groundwater was measured in the boring on the date the boring was drilled (May 13, 2016). The groundwater depth was 4.6 feet below surface grade. We expect that groundwater levels at the project site will mimic those in the adjacent canal, which is hydraulically connected to the Intracoastal Waterway, and therefore tidally influenced.

4.0 RECOMMENDATIONS FOR DESIGN AND CONSTRUCTION

4.1 Geotechnical Overview

The results of this study indicate that the site is suitable for the proposed construction when viewed from a geotechnical engineering perspective. The field exploration indicates the site is underlain by very loose to loose sands to a depth of 11.5 feet, where a formation of very well cemented coquina enters the profile. Loose to medium dense sands follow the coquina starting at a depth of 17 feet. At 27.5 feet, a second formation of coquina was found which extends to the maximum depth explored of 70 feet. This second formation ranges between weakly to moderately well cemented.

In general, the subsoils should provide suitable support to the proposed Wingwalls when incorporating either 14 or 18-inch square driven Precast Prestressed Concrete (PPC) piles. However, vibrations associated with pile driving operations could damage adjacent structures via seismic densification of the sandy soils beneath their foundations (causing settlement). We recommend that the vibrations be monitored using a seismometer to verify that they are below the threshold levels that could cause damage. We also recommend that surveying equipment be used to monitor vertical movement of the surrounding structures during pile driving. A pre-construction survey should be performed for the nearby structures to identify any pre-existing cracks prior to pile driving. It should be noted that ground vibrations and noise due to pile driving may be a nuisance to occupants of the existing structures even if they do not cause structural damage to those structures.

The Coquina limestone formation between about 12 and 17 feet below grade is hard and will need to be predrilled at each pile location to facilitate pile installation.

Detailed recommendations for design and construction of the project components are provided in the sections that follow.

4.2 Driven Piling Axial Nominal Bearing Resistances

The computer program FB-Deep version 2.04 developed by the Bridge Software Institute at the University of Florida was used to estimate axial capacities for 14-inch and 18-inch square PPC piles. The program (which is used by the FDOT) uses a methodology based on empirical correlations between cone penetrometer tests and Standard Penetration Tests for typical Florida soils and limestone to estimate driven pile capacities. The output values from the program include the pile ultimate side friction, mobilized end bearing, estimated Davisson capacity (Nominal Bearing Resistance), allowable capacity (for Allowable Stress Design) and the ultimate pile capacity (normally used for driveability analysis). The Davisson Capacity is the sum of the pile's ultimate side friction resistance plus its mobilized end-bearing capacity (which is 1/3 of the ultimate end bearing capacity).

The FB-Deep program was used to estimate the pile axial capacities using the subsurface profile at the location of Boring TB-1 with the exception that the uppermost 8 feet of soil profile was ignored since the canal mudline is about 8 feet below the grade of the boring location. The depth of scour was assumed to be zero in our analysis. The estimated Nominal Bearing Resistance (Davisson Capacity) values are provided in the Table 2. Full FB-Deep output results are provided in Appendix C.

The capacity estimates assume that the pile locations are predrilled through the Coquina to 20 ft below grade prior to pile driving and the broken up Coquina gravel is left in place within the pile locations.

Table 2 – Estimated Nominal Bearing Resistance (Davisson Capacity) for 14 and 18-inch Square Driven PPC Piles in Tons

Pile Length (feet)	14-Inch Square	18-Inch Square
30	46.8	67.3
35	52.6	76.6
40	45.8	66.2
45	44.1	67.1
50	61.3	87.5
55	64.9	90.3
60	65.5	96.3
65	67.2	99.1

Note: Pile Length measured from the top of pavement grade.

The capacities presented are based solely on stresses mobilized in the subsurface materials. Structural stresses induced in the piles by driving may place greater restrictions on the capacities and should be verified by the designer.

Based on the analysis results 18-inch square PPC piles should attain a nominal bearing resistance (Davisson Capacity) of about 65 tons when driven to a tip depth of about 40 feet below pavement grade. The 14-inch square PPC piles should attain a nominal bearing resistance (Davisson Capacity) of about 45 tons when driven to a tip depth of about 40 feet below existing pavement grade.

During pile design, the nominal bearing resistance values provided herein should be greater than the factored design load divided by a phi factor of 0.65 (LRFD Design Methodology). Use of this phi factor is dependent on not less than 10 percent of the production piles being dynamically load tested using either Embedded Data Collector (EDC) or the Pile Driving Analyzer (PDA) with accompanying CAPWAP analyses. A greater phi factor of 0.75 may be used if 100 percent of the piles are dynamically load tested.

4.3 Driven Piling Lateral Load Resistances

The driven piles will resist lateral loads through a combination of pile stiffness (EI) and earth pressure. To model the pile-soil-lateral load interaction, we utilized the computer program LPILE (developed by Ensoft, Inc.), which incorporates the *p*-y method of lateral load analysis. Variables in the analysis included soil properties (soil unit weight, friction angle and lateral soil modulus), pile parameters (i.e. pile length, width, elastic modulus and moment of inertia) and the lateral load acting on the pile. For our analysis we considered two head conditions: 1) the pile head is free to rotate and 2) the head is fixed against rotation within a rigid pile cap. The lateral load acting on the pile was estimated by calculating the lateral earth pressure acting on the panels using the parameters provided in Table 3 of this report, and assuming a king pile spacing of 8 feet. The contributory width of panel pressing on a pile (also equal to the spacing between piles) was assumed to be 8 feet. The mudline was assumed to be 8 feet lower than the ground surface level behind the wall. The groundwater level was assumed to be 4 feet below pavement grade while the surface water level in the waterway was assumed to be at 6 feet below pavement grade. Results of the lateral load analyses are presented below.

Table 3 – Estimated Lateral Load Response of Piles

Pile Width (inches)	Pile Head	Pile Head Deflection (inch)	Maximum Moment in Pile (inch-kips)
14	Fixed	1.32	831
	Free	3.98	1,538
18	Fixed	0.57	893
	Free	1.71	1,535

Notes: 1. Pile head elevation assumed to be the same as pavement grade.
2. Minimum pile length required for lateral stability is 28 feet, measured from the existing pavement grade at the boring location.

The lateral resistance estimates assume that the pile locations are predrilled through the Coquina to 20 ft below grade prior to pile driving and the broken up Coquina gravel is left in place within the pile locations.

Additional resistance to lateral earth pressure can be attained using anchors.

4.4 Pile Driving Considerations

Wave equation analysis should be performed at the time of hammer selection to ensure that the target bearing depth for lateral stability and vertical capacity can be reached with the hammer chosen and that the piles will not be overstressed during driving. We recommend that the piles be installed in accordance with Section 455 of the latest edition of the FDOT's *Standard Specifications for Road and Bridge Construction* (SSRBC). The pile locations should be predrilled to 20 feet below pavement grade (and their annular spaces infilled) in accordance with Section 455-5 of the SSRBC. Below this depth the piles should be driven to a minimum blow count criteria to be established by driving test piles equipped with either EDC or PDA in conjunction with the PDA-CAPWAP analysis method. Dynamic load testing should be performed for at least 10 percent of the piles.

A fixed template capable of maintaining the piles in proper position and alignment during setup and driving with swinging or semi-fixed leads should be provided by the Contractor.

Vibrations associated with pile driving operations could damage adjacent structures via seismic densification of the sandy soils beneath their foundations (causing settlement). We therefore recommend that protection of nearby residential structures be implemented in accordance with *Section 455-1.1 Protection of Existing Structures* of the SSRBC. Protection of nearby residential structures should also include:

- Monitoring vibrations using a seismometer to verify that they are below the threshold levels that could cause damage. It has been our experience that ground vibrations at the location of structures supported on shallow foundations constructed upon loose sandy soils will need to be maintained at a peak particle velocity of 0.15 inch per second or less if seismic densification is to be avoided. Existing retaining structures such as seawalls may also experience additional stress related to pile driving as a result of increased lateral earth pressures owing to seismic densification of sandy soils as well as seismic induced inertial forces.
- Surveying of the existing structures to monitor vertical movement during pile driving.
- Conducting a pre-construction survey of the nearby structures (including seawalls) to identify any pre-existing cracks prior to pile driving. The survey should consist of photographic documentation of the existing facilities and should be made in a concerted effort with the owners of those facilities.

It should be noted that ground vibrations and noise due to pile driving may be a nuisance to occupants of the existing structures even if they do not cause structural damage to those structures. Further, the use of diesel hammers has been known to spray diesel fuel on adjacent properties, boats and other facilities, particularly on windy days.

4.5 Bridge Wingwalls

We recommend that the lateral earth pressures that will act on the bridge wing walls be calculated using the parameters in Table 4. Surcharge loads and unbalanced hydrostatic pressures should be added to the lateral pressures as appropriate.

Table 4 – Lateral Earth Pressure Parameters

Depth Below Pavement Grade (feet)	Soil Type	Unit Weight (pcf)	Friction Angle (degrees)	Cohesion (psf)	Earth Pressure Coefficients		
					Ka	Kp	Ko
0 to 4	SAND	**105**, 38	28	0	0.36	2.77	0.53
4 to 11.5	SAND	**100**, 33	27	0	0.38	2.66	0.55
11.5 to 17	COQUINA	**135**, 68	0	10,000	1.00	1.00	1.00
17 to 22	SAND	**105**, 38	28	0	0.36	2.77	0.53
22 to 27.5	SAND	**110**, 43	32	0	0.31	3.25	0.47
27.5 to 40	COQUINA	**110**, 43	37	0	0.25	4.02	0.40

Notes: 1. Bold unit weight values indicate Moist Unit Weight above water table. Non-bold indicates buoyant unit weight.
2. Ka – Active Earth Pressure Coefficient
3. Kp – Passive Earth Pressure Coefficient
4. Ko – At-Rest Earth Pressure Coefficient

Backfill placed behind the bridge Wingwalls should consist of sands (ASTM D 2487) or sand with gravel having a maximum size of 1 inch and not more than 10 percent passing the U.S. Standard No. 200 sieve. The organic content of the fill should be less than 2 percent (by dry weight). The backfill should be placed in 12-inch thick (loose measure) horizontal lifts and be compacted to at least 95 percent of the maximum dry density determined in accordance with the Modified Proctor test (ASTM D 1557). Within a horizontal distance of 8 feet, the backfill lift thickness (loose measure) should be limited to 8 inches, and only relatively light, hand led compaction equipment should be used for compaction. Backfill placed below the water table (if any) should consist of FDOT No. 57 Coarse Aggregate that is completely enveloped within a filter fabric.

5.0 GENERAL COMMENTS

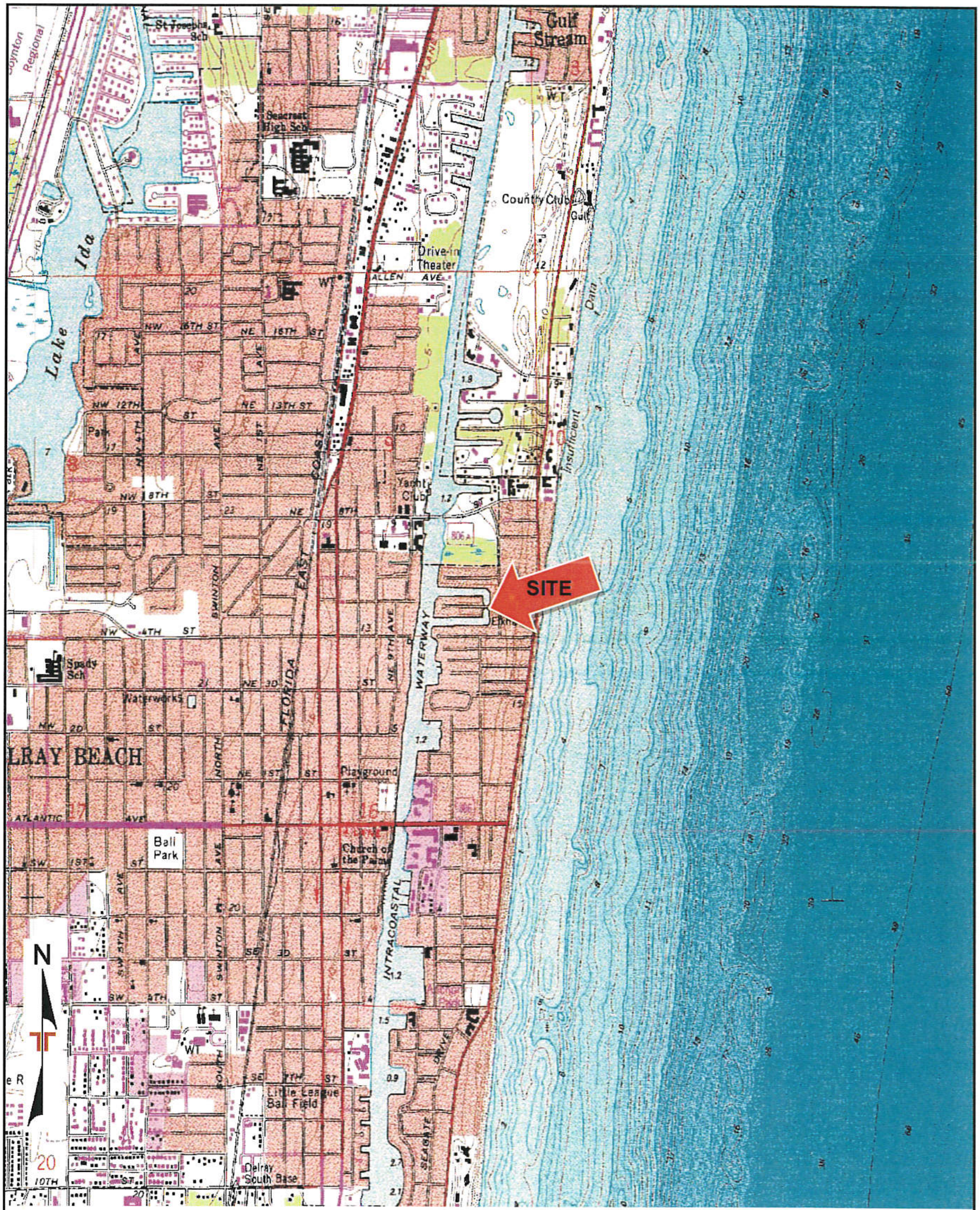
Terracon should be retained to review the final design plans and specifications so comments can be made regarding interpretation and implementation of our geotechnical recommendations in the design and specifications. Terracon also should be retained to provide observation and testing services during Wingwall construction and other earth-related construction phases of the project.

The analysis and recommendations presented in this report are based upon the data obtained from the boring performed at the indicated location and from other information discussed in this report. This report does not reflect variations that may occur across the site, or due to the modifying effects of construction or weather. The nature and extent of such variations may not become evident until during or after construction. If variations appear, we should be immediately notified so that further evaluation and supplemental recommendations can be provided.

The scope of services for this project does not include either specifically or by implication any environmental assessment of the site or identification or prevention of pollutants, hazardous materials or conditions. If the owner is concerned about the potential for such contamination or pollution, other studies should be undertaken.

This report has been prepared for the exclusive use of our client for specific application to the project discussed and has been prepared in accordance with generally accepted geotechnical engineering practices. No warranties, either expressed or implied, are intended or made. Site safety, excavation support, and dewatering requirements are the responsibility of others. In the event that changes in the nature, design, or location of the project as outlined in this report are planned, the conclusions and recommendations contained in this report shall not be considered valid unless Terracon reviews the changes and either verifies or modifies the conclusions of this report in writing.

APPENDIX A
FIELD EXPLORATION



TOPOGRAPHIC MAP IMAGE COURTESY OF THE U.S. GEOLOGICAL SURVEY
QUADRANGLES INCLUDE: DELRAY BEACH, FL (1/1/1983).

Project Manager: DM	Project No. HD165049	Terracon 1225 Omar Rd West Palm Beach, FL 33405-1046	SITE LOCATION	Exhibit
Drawn by: DM	Scale: 1"=2,000'		Island Drive Bridge – Wingwall Replacement City of Delray Beach, FL	A-1
Checked by: KA	File Name: 06/15/16			
Approved by: KA	Date: 06/15/16			

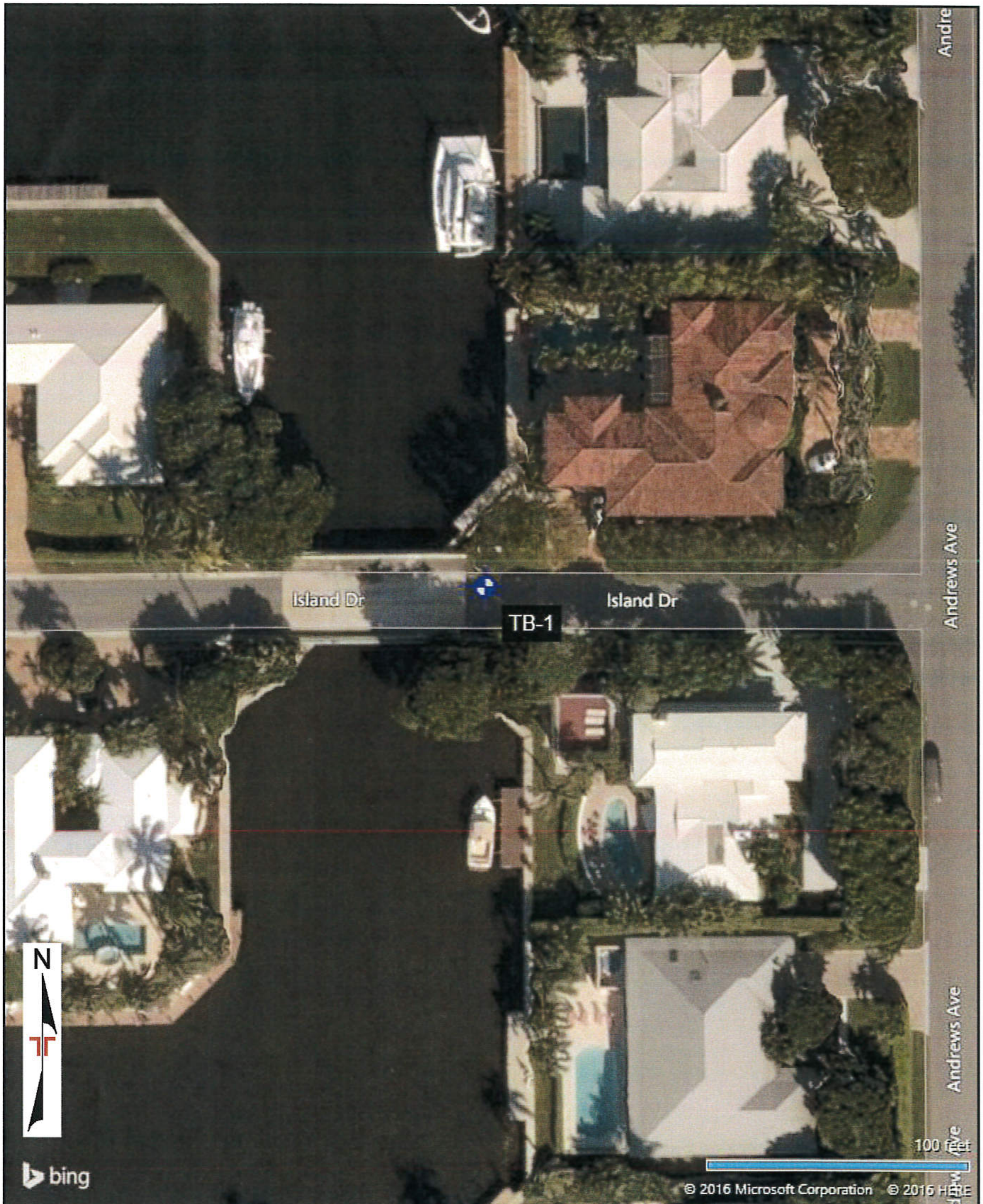


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

AERIAL PHOTOGRAPHY PROVIDED BY MICROSOFT BING MAPS

Project Manager: DM	Project No. HD165049	Terracon 1225 Omar Rd West Palm Beach, FL 33405-1046	EXPLORATION PLAN	Exhibit
Drawn by: DM	Scale: AS SHOWN		Island Drive Bridge – Wingwall Replacement City of Delray Beach, FL	A-2
Checked by: KA	File Name: 06/15/16			
Approved by: KA	Date: 06/15/16			

Field Exploration Description

The boring location was determined prior to visiting the site by a Terracon engineer using Google Earth. The boring location was then staked at the project site by a Terracon representative using existing site features as reference points.

The engineering boring was drilled with a truck mounted Central Mine Equipment Model 45B (CME 45B) rotary drilling rig equipped with an automatic hammer. The borehole was advanced with a cutting head and stabilized with the use of bentonite (drillers' mud). Soil samples were obtained by the split spoon sampling procedure in general accordance with the Standard Penetration Test (SPT) procedure. In the split spoon sampling procedure, the number of blows required to advance the sampling spoon the last 12 inches of an 18-inch penetration or the middle 12 inches of a 24-inch penetration by means of a 140-pound hammer with a free fall of 30 inches, is the standard penetration resistance value (N). This value is used to estimate the in-situ relative density of cohesionless soils and the consistency of cohesive soils. The sampling depths and penetration distance, plus the standard penetration resistance values, are shown on the boring logs.

Portions of the samples from the boring were sealed in jars to reduce moisture loss, and then the jars were taken to our laboratory for further observation and classification. Upon completion, the borehole was backfilled with cement-bentonite grout.

A field log of the boring were prepared by the drill crew. It included visual classifications of the materials encountered during drilling as well as the driller's interpretation of the subsurface conditions between samples. The boring log included with this report represents an interpretation of the field log and includes modifications based on laboratory observation of the samples.

BORING LOG NO. TB-1

PROJECT: Island Drive Bridge

CLIENT: Wantman Group, Inc.
West Palm Beach, Florida

SITE: Delray Beach, Florida

LOCATION See Exhibit A-4

Latitude: 26.470484° Longitude: -80.059331°

DEPTH	Description	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY ()	FIELD TEST RESULTS
0.5	**ASPHALT CONCRETE**, 6 inches					
1.1	**LIMEROCK BASE COURSE**, 7 inches					
	POORLY GRADED SAND (SP), fine grained, light brown to brown, some shell fragments			X	18	19-6-5-5 N=11
				X	19	4-3-3-2 N=6
6.0		5	▽	X	21	2-1-2-1 N=3
8.0	**POORLY GRADED SAND WITH SILT (SP-SM)**, fine grained, brown to dark brown, some finely divided organic matter, trace fibrous roots			X	18	1-1-1-1 N=2
11.5	**SILTY SAND (SM)**, fine grained, dark gray, trace fibrous roots	10		X	18	WOH/24" N=WOH/24"
17.0	**CEMENTED SAND AND SHELL (COQUINA)**, light brown	15		X	18	17-40-50 N=90
21.0	**POORLY GRADED SAND WITH SILT (SP-SM)**, fine grained, light gray, with shell fragments, trace cemented sand and shell fragments	20		X	16	1-3-3 N=6
	POORLY GRADED SAND (SP), fine grained, light brown	25		X	13	4-7-9 N=16

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
SPT

Abandonment Method:
Borings backfilled with cement-bentonite grout upon completion.

See Exhibit A-3 for description of field procedures.
See Appendix B for description of laboratory procedures and additional data (if any).
See Appendix C for explanation of symbols and abbreviations.

Notes:
100% circulation loss from 12.5 to 13.5 ft

WATER LEVEL OBSERVATIONS

▽ *Groundwater observed at 4.6 feet at 10:14 AM*

Terracon
1225 Omar Rd
West Palm Beach, FL

Boring Started: 5/13/2016	Boring Completed: 5/13/2016
Drill Rig: CME-45B	Driller: BP
Project No.: HD165049	Exhibit: A-4-1

BORING LOG NO. TB-1

PROJECT: Island Drive Bridge

CLIENT: Wantman Group, Inc. West Palm Beach, Florida

SITE: Delray Beach, Florida

LOCATION See Exhibit A-4

Latitude: 26.470484° Longitude: -80.059331°

GRAPHIC LOG	DEPTH	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY ()	FIELD TEST RESULTS
	POORLY GRADED SAND (SP), fine grained, light brown *(continued)*					
	27.5					
	CEMENTED SAND AND SHELL (COQUINA), light brown					
		30		X	13	16-10-10 N=20
		35		X	12	7-8-8 N=16
		40		X		7-5-7 N=12
		45		X	11	2-2-2 N=4
		50		X	12	26-15-13 N=28

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
SPT

Abandonment Method:
Borings backfilled with cement-bentonite grout upon completion.

See Exhibit A-3 for description of field procedures.
See Appendix B for description of laboratory procedures and additional data (if any).
See Appendix C for explanation of symbols and abbreviations.

Notes:
100% circulation loss from 28.5 to 32 ft
50 to 100% circulation loss from 42 to 55 ft

WATER LEVEL OBSERVATIONS

▽ *Groundwater observed at 4.6 feet at 10:14 AM*

Terracon
1225 Omar Rd
West Palm Beach, FL

Boring Started: 5/13/2016	Boring Completed: 5/13/2016
Drill Rig: CME-45B	Driller: BP
Project No.: HD165049	Exhibit: A-4-2

BORING LOG NO. TB-1

PROJECT: Island Drive Bridge

**CLIENT: Wantman Group, Inc.
West Palm Beach, Florida**

SITE: Delray Beach, Florida

LOCATION See Exhibit A-4

Latitude: 26.470484° Longitude: -80.059331°

GRAPHIC LOG	DEPTH	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY ()	FIELD TEST RESULTS
	CEMENTED SAND AND SHELL (COQUINA), light brown *(continued)*					
		55		X	10	6-4-7 N=11
		60		X	10	7-10-6 N=16
		65		X		4-2-3 N=5
	70.0	70		X	14	11-14-21 N=35
	Boring Terminated at 70 Feet					

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
SPT

Abandonment Method:
Borings backfilled with cement-bentonite grout upon completion.

See Exhibit A-3 for description of field procedures.
See Appendix B for description of laboratory procedures and additional data (if any).
See Appendix C for explanation of symbols and abbreviations.

Notes:
50% circulation loss from 61 to 70 ft

WATER LEVEL OBSERVATIONS

▽ *Groundwater observed at 4.6 feet at 10:14 AM*

Terracon
1225 Omar Rd
West Palm Beach, FL

Boring Started: 5/13/2016	Boring Completed: 5/13/2016
Drill Rig: CME-45B	Driller: BP
Project No.: HD165049	Exhibit: A-4-3

APPENDIX B
SUPPORTING DOCUMENTS

GENERAL NOTES

DESCRIPTION OF SYMBOLS AND ABBREVIATIONS

SAMPLING

Auger Cuttings	Rock Core
Grab Sample	No Recovery
Shelby Tube	Standard Penetration Test

WATER LEVEL

- **Water Initially Encountered**
- **Water Level After a Specified Period of Time**
- **Water Level After a Specified Period of Time**

Water levels indicated on the soil boring logs are the levels measured in the borehole at the times indicated. Groundwater level variations will occur over time. In low permeability soils, accurate determination of groundwater levels is not possible with short term water level observations.

FIELD TESTS

(HP)	**Hand Penetrometer**
(T)	**Torvane**
(DCP)	**Dynamic Cone Penetrometer**
(PID)	**Photo-Ionization Detector**
(OVA)	**Organic Vapor Analyzer**

DESCRIPTIVE SOIL CLASSIFICATION

Soil classification is based on the Unified Soil Classification System. Coarse Grained Soils have more than 50% of their dry weight retained on a #200 sieve; their principal descriptors are: boulders, cobbles, gravel or sand. Fine Grained Soils have less than 50% of their dry weight retained on a #200 sieve; they are principally described as clays if they are plastic, and silts if they are slightly plastic or non-plastic. Major constituents may be added as modifiers and minor constituents may be added according to the relative proportions based on grain size. In addition to gradation, coarse-grained soils are defined on the basis of their in-place relative density and fine-grained soils on the basis of their consistency.

LOCATION AND ELEVATION NOTES

Unless otherwise noted, Latitude and Longitude are approximately determined using a hand-held GPS device. The accuracy of such devices is variable. Surface elevation data annotated with +/- indicates that no actual topographical survey was conducted to confirm the surface elevation. Instead, the surface elevation was approximately determined from topographic maps of the area.

STRENGTH TERMS

RELATIVE DENSITY OF COARSE-GRAINED SOILS (More than 50% retained on No. 200 sieve.) Density determined by Standard Penetration Resistance		CONSISTENCY OF FINE-GRAINED SOILS (50% or more passing the No. 200 sieve.) Consistency determined by laboratory shear strength testing, field visual-manual procedures or standard penetration resistance		
Descriptive Term (Density)	**Automatic Hammer SPT N-Value (Blows/Ft.)**	**Descriptive Term (Consistency)**	**Unconfined Compressive Strength Qu, (psf)**	**Automatic Hammer SPT N-Value (Blows/Ft.)**
Very Loose	< 3	Very Soft	less than 500	< 1
Loose	3 - 8	Soft	500 to 1,000	1 - 3
Medium Dense	8 - 24	Medium Stiff	1,000 to 2,000	3 - 6
Dense	24 - 40	Stiff	2,000 to 4,000	6 - 12
Very Dense	> 40	Very Stiff	4,000 to 8,000	12 - 24
		Hard	> 8,000	> 24

RELATIVE PROPORTIONS OF SAND AND GRAVEL

Descriptive Term(s) of other constituents	Percent of Dry Weight
Trace	< 15
With	15 - 29
Modifier	> 30

GRAIN SIZE TERMINOLOGY

Major Component of Sample	Particle Size
Boulders	Over 12 in. (300 mm)
Cobbles	12 in. to 3 in. (300mm to 75mm)
Gravel	3 in. to #4 sieve (75mm to 4.75 mm)
Sand	#4 to #200 sieve (4.75mm to 0.075mm
Silt or Clay	Passing #200 sieve (0.075mm)

RELATIVE PROPORTIONS OF FINES

Descriptive Term(s) of other constituents	Percent of Dry Weight
Trace	< 5
With	5 - 12
Modifier	> 12

PLASTICITY DESCRIPTION

Term	Plasticity Index
Non-plastic	0
Low	1 - 10
Medium	11 - 30
High	> 30

Terracon

UNIFIED SOIL CLASSIFICATION SYSTEM

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests [A]					Soil Classification: Group Symbol	Soil Classification: Group Name [B]
Coarse Grained Soils: More than 50% retained on No. 200 sieve	**Gravels:** More than 50% of coarse fraction retained on No. 4 sieve	**Clean Gravels:** Less than 5% fines [C]	Cu ≥ 4 and 1 ≤ Cc ≤ 3 [E]		GW	Well-graded gravel [F]
			Cu < 4 and/or 1 > Cc > 3 [E]		GP	Poorly graded gravel [F]
		Gravels with Fines: More than 12% fines [C]	Fines classify as ML or MH		GM	Silty gravel [F,G,H]
			Fines classify as CL or CH		GC	Clayey gravel [F,G,H]
	Sands: 50% or more of coarse fraction passes No. 4 sieve	**Clean Sands:** Less than 5% fines [D]	Cu ≥ 6 and 1 ≤ Cc ≤ 3 [E]		SW	Well-graded sand [I]
			Cu < 6 and/or 1 > Cc > 3 [E]		SP	Poorly graded sand [I]
		Sands with Fines: More than 12% fines [D]	Fines classify as ML or MH		SM	Silty sand [G,H,I]
			Fines classify as CL or CH		SC	Clayey sand [G,H,I]
Fine-Grained Soils: 50% or more passes the No. 200 sieve	**Silts and Clays:** Liquid limit less than 50	**Inorganic:**	PI > 7 and plots on or above "A" line [J]		CL	Lean clay [K,L,M]
			PI < 4 or plots below "A" line [J]		ML	Silt [K,L,M]
		Organic:	Liquid limit - oven dried	< 0.75	OL	Organic clay [K,L,M,N]
			Liquid limit - not dried			Organic silt [K,L,M,O]
	Silts and Clays: Liquid limit 50 or more	**Inorganic:**	PI plots on or above "A" line		CH	Fat clay [K,L,M]
			PI plots below "A" line		MH	Elastic Silt [K,L,M]
		Organic:	Liquid limit - oven dried	< 0.75	OH	Organic clay [K,L,M,P]
			Liquid limit - not dried			Organic silt [K,L,M,Q]
Highly organic soils:	Primarily organic matter, dark in color, and organic odor				PT	Peat

[A] Based on the material passing the 3-inch (75-mm) sieve

[B] If field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.

[C] Gravels with 5 to 12% fines require dual symbols: GW-GM well-graded gravel with silt, GW-GC well-graded gravel with clay, GP-GM poorly graded gravel with silt, GP-GC poorly graded gravel with clay.

[D] Sands with 5 to 12% fines require dual symbols: SW-SM well-graded sand with silt, SW-SC well-graded sand with clay, SP-SM poorly graded sand with silt, SP-SC poorly graded sand with clay

[E] $Cu = D_{60}/D_{10} \quad Cc = \frac{(D_{30})^2}{D_{10} \times D_{60}}$

[F] If soil contains ≥ 15% sand, add "with sand" to group name.

[G] If fines classify as CL-ML, use dual symbol GC-GM, or SC-SM.

[H] If fines are organic, add "with organic fines" to group name.

[I] If soil contains ≥ 15% gravel, add "with gravel" to group name.

[J] If Atterberg limits plot in shaded area, soil is a CL-ML, silty clay.

[K] If soil contains 15 to 29% plus No. 200, add "with sand" or "with gravel," whichever is predominant.

[L] If soil contains ≥ 30% plus No. 200 predominantly sand, add "sandy" to group name.

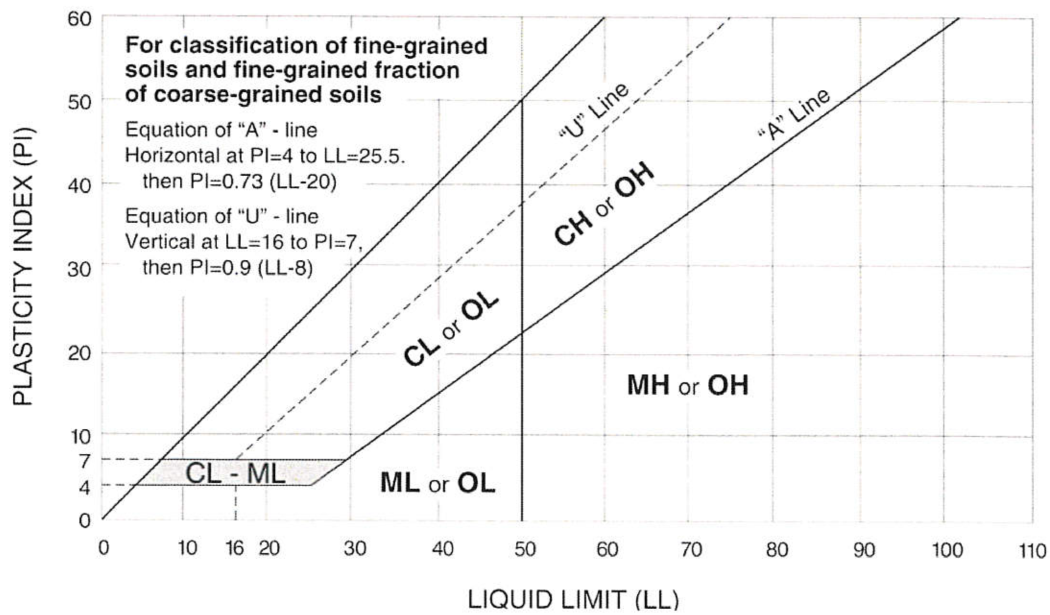
[M] If soil contains ≥ 30% plus No. 200, predominantly gravel, add "gravelly" to group name.

[N] PI ≥ 4 and plots on or above "A" line.

[O] PI < 4 or plots below "A" line.

[P] PI plots on or above "A" line.

[Q] PI plots below "A" line.



Terracon

Exhibit: B-2

APPENDIX C
FB DEEP ANALYSIS RESULTS

FB DEEP ANALYSIS RESULTS - 14-INCH SQUARE PPC PILES

Predrilled through LS.out

Florida Bridge Software Institute — Date: June 14, 2016
Shaft and Pile Analysis (FB-Deep v.2.04) — Time: 14:21:06

General Information:

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Input file: ..... Files\Calculations-Analyses\FB Deep\Predrilled through LS.spc
Project number: HD165049
Job name: Island Drive Bridge
Engineer: Brent Langlois
Units: English

Analysis Information:

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Analysis Type: SPT

Soil Information:

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Boring date: 5/13/16, Boring Number: TB-1
Station number: - Offset: -

Ground Elevation: 0.000(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	8.00	6.00	5- Cavity layer
3	8.10	0.00	2- Clay and silty sand
4	11.50	0.00	2- Clay and silty sand
5	11.50	4.00	4- Lime Stone/Very shelly sand
6	14.50	4.00	4- Lime Stone/Very shelly sand
7	17.00	4.00	4- Lime Stone/Very shelly sand
8	17.00	6.00	3- Clean sand
9	19.50	6.00	3- Clean sand
10	22.00	6.00	3- Clean sand
11	22.00	0.00	2- Clay and silty sand
12	22.00	16.00	3- Clean sand
13	24.50	16.00	3- Clean sand
14	27.00	16.00	3- Clean sand
15	27.00	20.00	4- Lime Stone/Very shelly sand
16	29.50	20.00	4- Lime Stone/Very shelly sand
17	34.50	16.00	4- Lime Stone/Very shelly sand
18	39.50	12.00	4- Lime Stone/Very shelly sand
19	42.00	12.00	4- Lime Stone/Very shelly sand
20	42.00	0.00	3- Clean sand
21	42.00	4.00	4- Lime Stone/Very shelly sand
22	44.50	4.00	4- Lime Stone/Very shelly sand
23	47.00	4.00	4- Lime Stone/Very shelly sand
24	47.00	0.00	3- Clean sand
25	47.00	28.00	4- Lime Stone/Very shelly sand
26	49.50	28.00	4- Lime Stone/Very shelly sand
27	52.00	28.00	4- Lime Stone/Very shelly sand
28	52.00	0.00	3- Clean sand
29	52.00	11.00	4- Lime Stone/Very shelly sand
30	54.50	11.00	4- Lime Stone/Very shelly sand
31	59.50	16.00	4- Lime Stone/Very shelly sand
32	62.00	16.00	4- Lime Stone/Very shelly sand
33	62.00	0.00	3- Clean sand
34	62.00	5.00	4- Lime Stone/Very shelly sand
35	64.50	5.00	4- Lime Stone/Very shelly sand
36	67.00	5.00	4- Lime Stone/Very shelly sand
37	67.00	0.00	3- Clean sand
38	67.00	35.00	4- Lime Stone/Very shelly sand
39	70.00	35.00	4- Lime Stone/Very shelly sand
40	71.00	0.00	5- Cavity layer

Blowcount Average Per Soil Layer

Layer Num.	Starting Elevation	Bottom Elevation	Thickness	Average Blowcount	Soil Type

FIGURE C1

	(ft)	(ft)	(ft)	Predrilled through LS.out (Blows/ft)	
1	0.00	-8.10	8.10	0.07	5-Void
2	-8.10	-11.50	3.40	0.00	2-Clay and Silty Sand
3	-11.50	-17.00	5.50	4.00	4-Limestone, Very Shelly Sand
4	-17.00	-22.00	5.00	6.00	3-Clean Sand
5	-22.00	-22.00	0.00	16.00	2-Clay and Silty Sand
6	-22.00	-27.00	5.00	16.00	3-Clean Sand
7	-27.00	-42.00	15.00	17.33	4-Limestone, Very Shelly Sand
8	-42.00	-42.00	0.00	4.00	3-Clean Sand
9	-42.00	-47.00	5.00	4.00	4-Limestone, Very Shelly Sand
10	-47.00	-47.00	0.00	28.00	3-Clean Sand
11	-47.00	-52.00	5.00	28.00	4-Limestone, Very Shelly Sand
12	-52.00	-52.00	0.00	11.00	3-Clean Sand
13	-52.00	-62.00	10.00	12.25	4-Limestone, Very Shelly Sand
14	-62.00	-62.00	0.00	5.00	3-Clean Sand
15	-62.00	-67.00	5.00	5.00	4-Limestone, Very Shelly Sand
16	-67.00	-67.00	0.00	35.00	3-Clean Sand
17	-67.00	-71.00	4.00	35.00	4-Limestone, Very Shelly Sand
18	-71.00	-71.00	0.00	0.00	5-

Driven Pile Data:
=================

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

Pile Geometry:

Width (in)	Length (ft)	Tip Elev. (ft)
14.00	15.00	-15.00
14.00	16.00	-16.00
14.00	17.00	-17.00
14.00	18.00	-18.00
14.00	19.00	-19.00
14.00	20.00	-20.00
14.00	21.00	-21.00
14.00	22.00	-22.00
14.00	23.00	-23.00
14.00	24.00	-24.00
14.00	25.00	-25.00
14.00	26.00	-26.00
14.00	27.00	-27.00
14.00	28.00	-28.00
14.00	29.00	-29.00
14.00	30.00	-30.00
14.00	31.00	-31.00
14.00	32.00	-32.00
14.00	33.00	-33.00
14.00	34.00	-34.00
14.00	35.00	-35.00
14.00	36.00	-36.00
14.00	37.00	-37.00
14.00	38.00	-38.00
14.00	39.00	-39.00
14.00	40.00	-40.00
14.00	41.00	-41.00
14.00	42.00	-42.00
14.00	43.00	-43.00
14.00	44.00	-44.00
14.00	45.00	-45.00
14.00	46.00	-46.00
14.00	47.00	-47.00
14.00	48.00	-48.00
14.00	49.00	-49.00
14.00	50.00	-50.00
14.00	51.00	-51.00
14.00	52.00	-52.00
14.00	53.00	-53.00
14.00	54.00	-54.00
14.00	55.00	-55.00
14.00	56.00	-56.00
14.00	57.00	-57.00
14.00	58.00	-58.00
14.00	59.00	-59.00
14.00	60.00	-60.00
14.00	61.00	-61.00
14.00	62.00	-62.00

Predrilled through LS.out

14.00	63.00	-63.00
14.00	64.00	-64.00
14.00	65.00	-65.00
14.00	66.00	-66.00
14.00	67.00	-67.00
14.00	68.00	-68.00
14.00	69.00	-69.00
14.00	70.00	-70.00

Driven Pile Capacity:
=====================

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)
15.00	14.0	0.00	1.38	1.38	0.69	4.13
16.00	14.0	0.00	2.62	2.62	1.31	7.87
17.00	14.0	0.00	5.40	5.40	2.70	16.20
18.00	14.0	0.58	5.51	6.09	3.05	17.11
19.00	14.0	0.87	6.41	7.29	3.64	20.11
20.00	14.0	1.14	8.11	9.25	4.63	25.48
21.00	14.0	1.46	10.61	12.06	6.03	33.28
22.00	14.0	3.30	17.30	20.59	10.30	55.19
23.00	14.0	4.91	17.45	22.36	11.18	57.27
24.00	14.0	6.14	18.18	24.32	12.16	60.68
25.00	14.0	7.19	19.47	26.66	13.33	65.61
26.00	14.0	8.18	21.32	29.49	14.75	72.13
27.00	14.0	12.09	30.23	42.32	21.16	102.78
28.00	14.0	13.21	30.40	43.61	21.80	104.40
29.00	14.0	14.28	30.84	45.12	22.56	106.81
30.00	14.0	15.32	31.49	46.81	23.41	109.80
31.00	14.0	16.32	32.31	48.63	24.32	113.25
32.00	14.0	17.35	32.81	50.16	25.08	115.77
33.00	14.0	18.39	32.94	51.34	25.67	117.22
34.00	14.0	19.42	32.87	52.29	26.14	118.02
35.00	14.0	20.35	32.25	52.60	26.30	117.10
36.00	14.0	21.24	31.58	52.82	26.41	115.97
37.00	14.0	22.08	30.58	52.66	26.33	113.83
38.00	14.0	22.87	29.24	52.11	26.06	110.60
39.00	14.0	23.62	25.29	48.91	24.45	99.49
40.00	14.0	24.32	21.49	45.81	22.91	88.79
41.00	14.0	25.02	17.79	42.81	21.41	78.40
42.00	14.0	25.98	14.18	40.16	20.08	68.52
43.00	14.0	25.98	12.91	38.89	19.44	64.70
44.00	14.0	25.98	15.29	41.28	20.64	71.87
45.00	14.0	25.98	18.11	44.09	22.05	80.31
46.00	14.0	25.98	22.48	48.46	24.23	93.42
47.00	14.0	25.98	34.14	60.12	30.06	128.41
48.00	14.0	27.55	34.32	61.87	30.94	130.52
49.00	14.0	29.22	32.90	62.12	31.06	127.93
50.00	14.0	30.84	30.42	61.26	30.63	122.11
51.00	14.0	32.46	27.98	60.45	30.22	116.41
52.00	14.0	34.08	26.64	60.72	30.36	114.00
53.00	14.0	34.68	26.88	61.57	30.78	115.34
54.00	14.0	35.22	27.69	62.91	31.46	118.29
55.00	14.0	35.73	29.15	64.88	32.44	123.18
56.00	14.0	36.26	31.29	67.54	33.77	130.12
57.00	14.0	36.94	32.54	69.47	34.74	134.55
58.00	14.0	37.76	32.65	70.41	35.20	135.70
59.00	14.0	38.86	29.76	68.62	34.31	128.14
60.00	14.0	39.77	25.75	65.52	32.76	117.01
61.00	14.0	40.69	21.72	62.40	31.20	105.84
62.00	14.0	41.90	18.92	60.81	30.41	98.64
63.00	14.0	42.18	18.88	61.07	30.53	98.84
64.00	14.0	42.34	20.85	63.19	31.59	104.88
65.00	14.0	42.48	24.69	67.17	33.58	116.55
66.00	14.0	42.63	30.37	73.00	36.50	133.75
67.00	14.0	********** Not enough soil data *******				
68.00	14.0	0.00	0.00	0.00	0.00	0.00
69.00	14.0	0.00	0.00	0.00	0.00	0.00
70.00	14.0	0.00	0.00	0.00	0.00	0.00

NOTES

Predrilled through LS.out

14.00	63.00	-63.00
14.00	64.00	-64.00
14.00	65.00	-65.00
14.00	66.00	-66.00
14.00	67.00	-67.00
14.00	68.00	-68.00
14.00	69.00	-69.00
14.00	70.00	-70.00

Driven Pile Capacity:
====================

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)
15.00	14.0	0.00	1.38	1.38	0.69	4.13
16.00	14.0	0.00	2.62	2.62	1.31	7.87
17.00	14.0	0.00	5.40	5.40	2.70	16.20
18.00	14.0	0.58	5.51	6.09	3.05	17.11
19.00	14.0	0.87	6.41	7.29	3.64	20.11
20.00	14.0	1.14	8.11	9.25	4.63	25.48
21.00	14.0	1.46	10.61	12.06	6.03	33.28
22.00	14.0	3.30	17.30	20.59	10.30	55.19
23.00	14.0	4.91	17.45	22.36	11.18	57.27
24.00	14.0	6.14	18.18	24.32	12.16	60.68
25.00	14.0	7.19	19.47	26.66	13.33	65.61
26.00	14.0	8.18	21.32	29.49	14.75	72.13
27.00	14.0	12.09	30.23	42.32	21.16	102.78
28.00	14.0	13.21	30.40	43.61	21.80	104.40
29.00	14.0	14.28	30.84	45.12	22.56	106.81
30.00	14.0	15.32	31.49	46.81	23.41	109.80
31.00	14.0	16.32	32.31	48.63	24.32	113.25
32.00	14.0	17.35	32.81	50.16	25.08	115.77
33.00	14.0	18.39	32.94	51.34	25.67	117.22
34.00	14.0	19.42	32.87	52.29	26.14	118.02
35.00	14.0	20.35	32.25	52.60	26.30	117.10
36.00	14.0	21.24	31.58	52.82	26.41	115.97
37.00	14.0	22.08	30.58	52.66	26.33	113.83
38.00	14.0	22.87	29.24	52.11	26.06	110.60
39.00	14.0	23.62	25.29	48.91	24.45	99.49
40.00	14.0	24.32	21.49	45.81	22.91	88.79
41.00	14.0	25.02	17.79	42.81	21.41	78.40
42.00	14.0	25.98	14.18	40.16	20.08	68.52
43.00	14.0	25.98	12.91	38.89	19.44	64.70
44.00	14.0	25.98	15.29	41.28	20.64	71.87
45.00	14.0	25.98	18.11	44.09	22.05	80.31
46.00	14.0	25.98	22.48	48.46	24.23	93.42
47.00	14.0	25.98	34.14	60.12	30.06	128.41
48.00	14.0	27.55	34.32	61.87	30.94	130.52
49.00	14.0	29.22	32.90	62.12	31.06	127.93
50.00	14.0	30.84	30.42	61.26	30.63	122.11
51.00	14.0	32.46	27.98	60.45	30.22	116.41
52.00	14.0	34.08	26.64	60.72	30.36	114.00
53.00	14.0	34.68	26.88	61.57	30.78	115.34
54.00	14.0	35.22	27.69	62.91	31.46	118.29
55.00	14.0	35.73	29.15	64.88	32.44	123.18
56.00	14.0	36.26	31.29	67.54	33.77	130.12
57.00	14.0	36.94	32.54	69.47	34.74	134.55
58.00	14.0	37.76	32.65	70.41	35.20	135.70
59.00	14.0	38.86	29.76	68.62	34.31	128.14
60.00	14.0	39.77	25.75	65.52	32.76	117.01
61.00	14.0	40.69	21.72	62.40	31.20	105.84
62.00	14.0	41.90	18.92	60.81	30.41	98.64
63.00	14.0	42.18	18.88	61.07	30.53	98.84
64.00	14.0	42.34	20.85	63.19	31.59	104.88
65.00	14.0	42.48	24.69	67.17	33.58	116.55
66.00	14.0	42.63	30.37	73.00	36.50	133.75
67.00	14.0	********** Not enough soil data *******				
68.00	14.0	0.00	0.00	0.00	0.00	0.00
69.00	14.0	0.00	0.00	0.00	0.00	0.00
70.00	14.0	0.00	0.00	0.00	0.00	0.00

NOTES

FB DEEP ANALYSIS RESULTS - 14-INCH SQUARE PPC PILES (cont.)

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.

FB DEEP ANALYSIS RESULTS - 18-INCH SQUARE PPC PILES

Predrilled through LS.out

Florida Bridge Software Institute — Date: June 14, 2016
Shaft and Pile Analysis (FB-Deep v.2.04) — Time: 14:22:16

General Information:
====================
Input file: ..... Files\Calculations-Analyses\FB Deep\Predrilled through LS.spc
Project number: HD165049
Job name: Island Drive Bridge
Engineer: Brent Langlois
Units: English

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

Soil Information:
=================
Boring date: 5/13/16, Boring Number: TB-1
Station number: - Offset: -

Ground Elevation: 0.000(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	8.00	6.00	5- Cavity layer
3	8.10	0.00	2- Clay and silty sand
4	11.50	0.00	2- Clay and silty sand
5	11.50	4.00	4- Lime Stone/Very shelly sand
6	14.50	4.00	4- Lime Stone/Very shelly sand
7	17.00	4.00	4- Lime Stone/Very shelly sand
8	17.00	6.00	3- Clean sand
9	19.50	6.00	3- Clean sand
10	22.00	6.00	3- Clean sand
11	22.00	0.00	2- Clay and silty sand
12	22.00	16.00	3- Clean sand
13	24.50	16.00	3- Clean sand
14	27.00	16.00	3- Clean sand
15	27.00	20.00	4- Lime Stone/Very shelly sand
16	29.50	20.00	4- Lime Stone/Very shelly sand
17	34.50	16.00	4- Lime Stone/Very shelly sand
18	39.50	12.00	4- Lime Stone/Very shelly sand
19	42.00	12.00	4- Lime Stone/Very shelly sand
20	42.00	0.00	3- Clean sand
21	42.00	4.00	4- Lime Stone/Very shelly sand
22	44.50	4.00	4- Lime Stone/Very shelly sand
23	47.00	4.00	4- Lime Stone/Very shelly sand
24	47.00	0.00	3- Clean sand
25	47.00	28.00	4- Lime Stone/Very shelly sand
26	49.50	28.00	4- Lime Stone/Very shelly sand
27	52.00	28.00	4- Lime Stone/Very shelly sand
28	52.00	0.00	3- Clean sand
29	52.00	11.00	4- Lime Stone/Very shelly sand
30	54.50	11.00	4- Lime Stone/Very shelly sand
31	59.50	16.00	4- Lime Stone/Very shelly sand
32	62.00	16.00	4- Lime Stone/Very shelly sand
33	62.00	0.00	3- Clean sand
34	62.00	5.00	4- Lime Stone/Very shelly sand
35	64.50	5.00	4- Lime Stone/Very shelly sand
36	67.00	5.00	4- Lime Stone/Very shelly sand
37	67.00	0.00	3- Clean sand
38	67.00	35.00	4- Lime Stone/Very shelly sand
39	70.00	35.00	4- Lime Stone/Very shelly sand
40	71.00	0.00	5- Cavity layer

Blowcount Average Per Soil Layer

Layer Num.	Starting Elevation	Bottom Elevation	Thickness	Average Blowcount	Soil Type

FIGURE C5

Predrilled through LS.out

	(ft)	(ft)	(ft)	(Blows/ft)	
1	0.00	-8.10	8.10	0.07	5-Void
2	-8.10	-11.50	3.40	0.00	2-Clay and Silty Sand
3	-11.50	-17.00	5.50	4.00	4-Limestone, Very Shelly Sand
4	-17.00	-22.00	5.00	6.00	3-Clean Sand
5	-22.00	-22.00	0.00	16.00	2-Clay and Silty Sand
6	-22.00	-27.00	5.00	16.00	3-Clean Sand
7	-27.00	-42.00	15.00	17.33	4-Limestone, Very Shelly Sand
8	-42.00	-42.00	0.00	4.00	3-Clean Sand
9	-42.00	-47.00	5.00	4.00	4-Limestone, Very Shelly Sand
10	-47.00	-47.00	0.00	28.00	3-Clean Sand
11	-47.00	-52.00	5.00	28.00	4-Limestone, Very Shelly Sand
12	-52.00	-52.00	0.00	11.00	3-Clean Sand
13	-52.00	-62.00	10.00	12.25	4-Limestone, Very Shelly Sand
14	-62.00	-62.00	0.00	5.00	3-Clean Sand
15	-62.00	-67.00	5.00	5.00	4-Limestone, Very Shelly Sand
16	-67.00	-67.00	0.00	35.00	3-Clean Sand
17	-67.00	-71.00	4.00	35.00	4-Limestone, Very Shelly Sand
18	-71.00	-71.00	0.00	0.00	5-

Driven Pile Data:

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

Pile Geometry:

Width (in)	Length (ft)	Tip Elev. (ft)
18.00	15.00	-15.00
18.00	16.00	-16.00
18.00	17.00	-17.00
18.00	18.00	-18.00
18.00	19.00	-19.00
18.00	20.00	-20.00
18.00	21.00	-21.00
18.00	22.00	-22.00
18.00	23.00	-23.00
18.00	24.00	-24.00
18.00	25.00	-25.00
18.00	26.00	-26.00
18.00	27.00	-27.00
18.00	28.00	-28.00
18.00	29.00	-29.00
18.00	30.00	-30.00
18.00	31.00	-31.00
18.00	32.00	-32.00
18.00	33.00	-33.00
18.00	34.00	-34.00
18.00	35.00	-35.00
18.00	36.00	-36.00
18.00	37.00	-37.00
18.00	38.00	-38.00
18.00	39.00	-39.00
18.00	40.00	-40.00
18.00	41.00	-41.00
18.00	42.00	-42.00
18.00	43.00	-43.00
18.00	44.00	-44.00
18.00	45.00	-45.00
18.00	46.00	-46.00
18.00	47.00	-47.00
18.00	48.00	-48.00
18.00	49.00	-49.00
18.00	50.00	-50.00
18.00	51.00	-51.00
18.00	52.00	-52.00
18.00	53.00	-53.00
18.00	54.00	-54.00
18.00	55.00	-55.00
18.00	56.00	-56.00
18.00	57.00	-57.00
18.00	58.00	-58.00
18.00	59.00	-59.00
18.00	60.00	-60.00
18.00	61.00	-61.00
18.00	62.00	-62.00

Predrilled through LS.out

18.00	63.00	-63.00
18.00	64.00	-64.00
18.00	65.00	-65.00
18.00	66.00	-66.00
18.00	67.00	-67.00
18.00	68.00	-68.00
18.00	69.00	-69.00
18.00	70.00	-70.00

Driven Pile Capacity:
=====================

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)
15.00	18.0	0.00	2.15	2.15	1.07	6.45
16.00	18.0	0.00	3.61	3.61	1.81	10.84
17.00	18.0	0.00	9.64	9.64	4.82	28.91
18.00	18.0	0.63	10.03	10.67	5.33	30.73
19.00	18.0	1.05	11.23	12.28	6.14	34.73
20.00	18.0	1.43	13.21	14.64	7.32	41.07
21.00	18.0	1.82	16.00	17.81	8.91	49.81
22.00	18.0	4.24	27.99	32.23	16.11	88.21
23.00	18.0	6.24	28.27	34.51	17.26	91.06
24.00	18.0	7.87	29.12	36.99	18.49	95.23
25.00	18.0	9.28	30.52	39.80	19.90	100.85
26.00	18.0	10.61	32.41	43.02	21.51	107.83
27.00	18.0	15.55	46.16	61.71	30.85	154.02
28.00	18.0	16.98	46.37	63.35	31.68	156.10
29.00	18.0	18.33	46.97	65.30	32.65	159.24
30.00	18.0	19.68	47.62	67.30	33.65	162.54
31.00	18.0	20.99	48.37	69.36	34.68	166.10
32.00	18.0	22.25	49.19	71.44	35.72	169.83
33.00	18.0	23.47	50.05	73.52	36.76	173.62
34.00	18.0	24.66	50.90	75.56	37.78	177.37
35.00	18.0	25.95	50.67	76.62	38.31	177.97
36.00	18.0	27.18	50.35	77.53	38.77	178.24
37.00	18.0	28.26	48.66	76.92	38.46	174.23
38.00	18.0	29.28	44.23	73.52	36.76	161.99
39.00	18.0	30.25	39.95	70.20	35.10	150.11
40.00	18.0	31.16	34.99	66.15	33.08	136.14
41.00	18.0	32.06	30.05	62.11	31.06	122.21
42.00	18.0	33.41	27.36	60.76	30.38	115.47
43.00	18.0	33.41	28.05	61.46	30.73	117.56
44.00	18.0	33.41	30.16	63.56	31.78	123.88
45.00	18.0	33.41	33.72	67.12	33.56	134.56
46.00	18.0	33.41	38.76	72.17	36.08	149.70
47.00	18.0	33.41	58.36	91.77	45.89	208.50
48.00	18.0	35.49	54.73	90.22	45.11	199.68
49.00	18.0	37.57	51.21	88.78	44.39	191.19
50.00	18.0	39.66	47.88	87.54	43.77	183.31
51.00	18.0	41.74	44.98	86.72	43.36	176.69
52.00	18.0	43.82	42.50	86.32	43.16	171.31
53.00	18.0	44.62	42.60	87.22	43.61	172.42
54.00	18.0	45.39	42.97	88.36	44.18	174.29
55.00	18.0	46.06	44.23	90.30	45.15	178.76
56.00	18.0	46.76	46.12	92.88	46.44	185.13
57.00	18.0	47.55	48.08	95.63	47.82	191.79
58.00	18.0	48.55	48.59	97.14	48.57	194.32
59.00	18.0	49.67	48.75	98.42	49.21	195.92
60.00	18.0	51.21	45.06	96.27	48.14	186.39
61.00	18.0	52.68	40.20	92.87	46.44	173.26
62.00	18.0	53.87	37.41	91.27	45.64	166.08
63.00	18.0	54.19	38.11	92.30	46.15	168.52
64.00	18.0	54.44	40.23	94.67	47.34	175.14
65.00	18.0	54.65	44.44	99.08	49.54	187.96
66.00	18.0	********** Not enough soil data *******				
67.00	18.0	0.00	0.00	0.00	0.00	0.00
68.00	18.0	0.00	0.00	0.00	0.00	0.00
69.00	18.0	0.00	0.00	0.00	0.00	0.00
70.00	18.0	0.00	0.00	0.00	0.00	0.00

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.

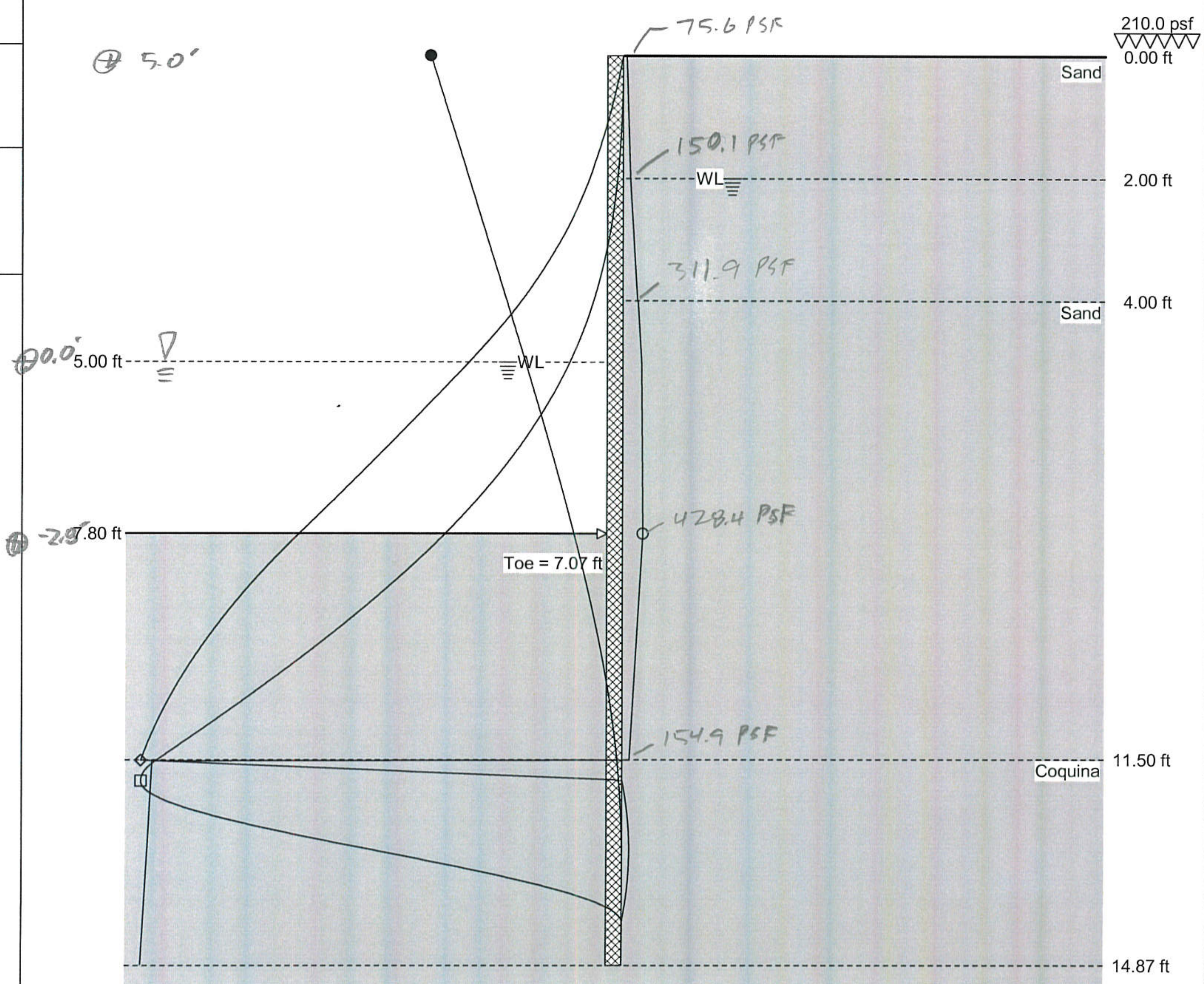
Client: City of Delray Beach

Title: Island Drive Bridge Seawall
Designer: CBL
Ref: 1004.17
Date: 7.12.16

Sheet: Concrete Wall
Works: Permanent
Pressure: Coulomb
Analysis: Net Pressure
Toe: Cantilever

	Maximum	d (ft)
○	428.4 psf	7.80
□	17407.4 ftlb/ft	11.84
◇	3264.0 lb/ft	11.51
●	0.6 in	0.00

Wing Wall Analysis



Wantman Group, Inc.

2035 Vista Parkway
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EMail: chris.laforte@wantmangroup.com

SupportIT, v2.36

Client: City of Delray Beach

Title: Island Drive Bridge Seawall
Designer: CBL
Ref: 1004.17
Date: 7.12.16

Sheet: Concrete Wall
Works: Permanent
Pressure: Coulomb
Analysis: Net Pressure
Toe: Cantilever

Wing Wall Analysis

Input Data

Depth Of Excavation = 7.80ft
Surcharge = 210.0psf

Depth Of Active Water = 2.00ft
Depth Of Passive Water = 5.00ft

Water Density = 64.00pcf
Minimum Fluid Density = 31.82pcf

Soil Profile

Depth (ft)	Soil Name	γ (pcf)	γ' (pcf)	C (psf)	C_a (psf)	ϕ (°)	δ (°)	K_a	K_{ac}	K_p	K_{pc}
0.00	Sand	105.00	38.00	0.0	0.0	28.0	0.0	0.36	0.00	2.77	0.00
4.00	Sand	100.00	33.00	0.0	0.0	27.0	0.0	0.38	0.00	2.66	0.00
11.50	Coquina	135.00	68.00	10000.0	0.0	0.0	0.0	1.00	1.00	1.00	1.00
17.00	Sand	105.00	38.00	0.0	0.0	28.0	0.0	0.36	0.00	2.77	0.00
22.00	Sand	110.00	43.00	0.0	0.0	32.0	0.0	0.31	0.00	3.25	0.00
27.50	Coquina	110.00	43.00	0.0	0.0	37.0	0.0	0.25	0.00	4.02	0.00

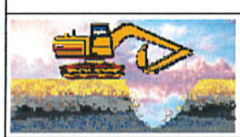
Solution

Sheet

Sheet Name	E (psi)	I (in^4/ft)	f (psi)	Z (in^3/ft)	Allowed M_{max} (ftlb/ft)	b (in)	A (in^2/ft)	W (lb/ft)	Upstand (ft)	Toe (ft)	Length (ft)
Concrete Wall	4.42E+06	512.00	5500.0	128.00	58666.7				0.00	7.07	14.87

Maxima

	Maximum	Depth (ft)
Pressure	428.4 psf	7.80
Bending Moment	17407.4 ftlb/ft	11.84
Deflection	0.6 in	0.00
Shear Force	3264.0 lb/ft	11.51



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SupportIT, v2.36

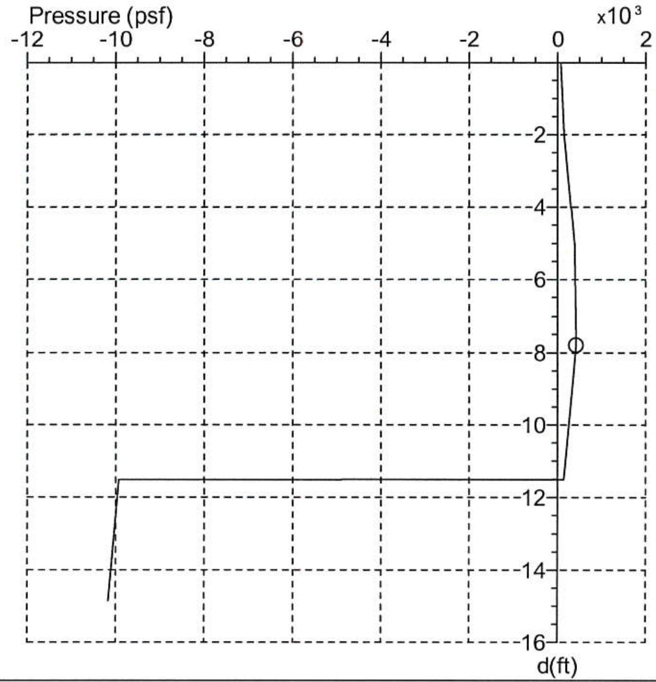
Client: City of Delray Beach

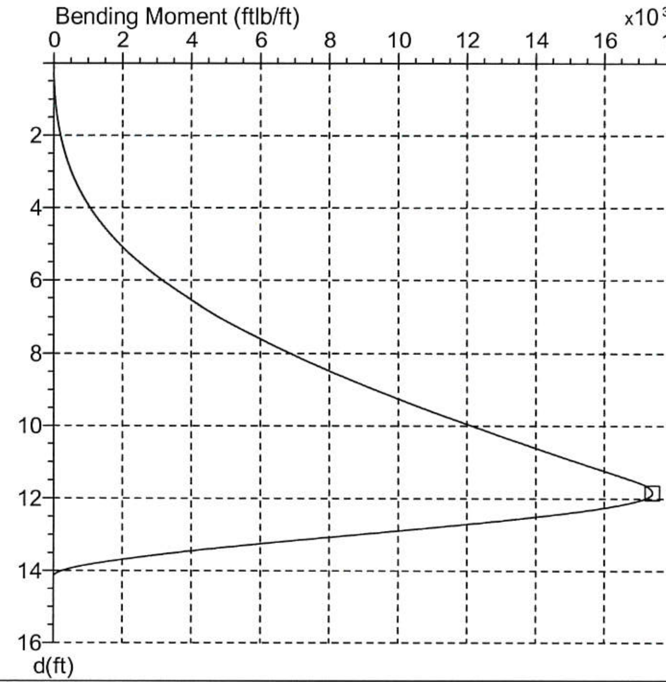
Title: Island Drive Bridge Seawall
Designer: CBL
Ref: 1004.17
Date: 7.12.16

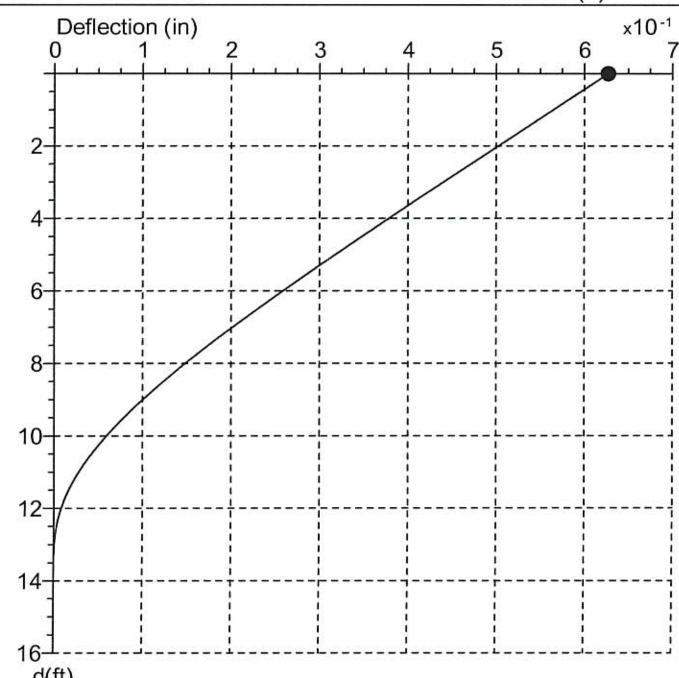
Sheet: Concrete Wall
Works: Permanent
Pressure: Coulomb
Analysis: Net Pressure
Toe: Cantilever

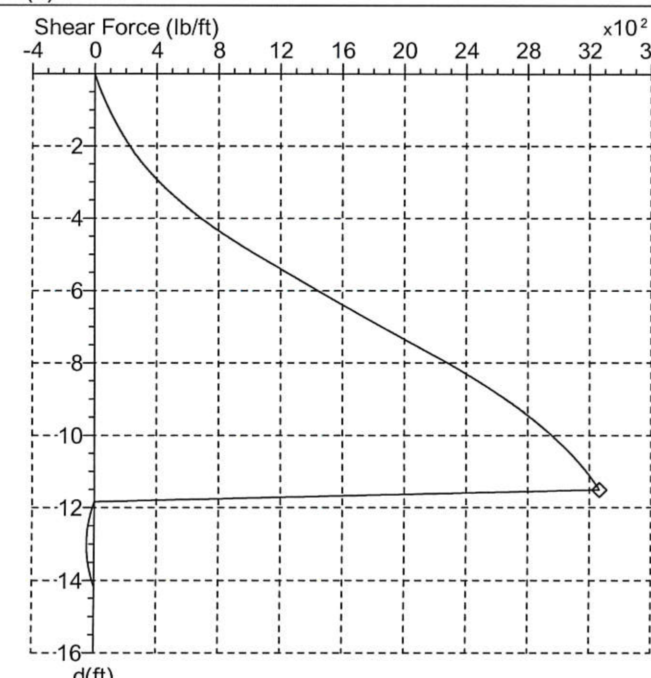
	Maximum	d (ft)
○	428.4 psf	7.80
□	17407.4 ftlb/ft	11.84
◇	3264.0 lb/ft	11.51
●	0.6 in	0.00

Wing Wall Analysis









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SupportIT, v2.36

Client: City of Delray Beach

Title: Island Drive Bridge Seawall
Designer: CBL
Ref: 1004.17
Date: 7.12.16

Sheet: Concrete Wall
Works: Permanent
Pressure: Coulomb
Analysis: Net Pressure
Toe: Cantilever

Wing Wall Analysis

depth (ft)	P (psf)	M (ftlb/ft)	D (in)	F (lb/ft)
0.00	75.6	0.7	0.6	0.0
0.10	79.3	1.1	0.6	7.7
0.21	83.6	2.4	0.6	16.8
0.31	87.3	4.4	0.6	25.3
0.42	91.5	7.7	0.6	35.3
0.52	95.3	11.6	0.6	44.6
0.62	99.0	16.4	0.6	54.2
0.73	103.2	23.0	0.6	65.5
0.83	107.0	30.0	0.6	76.0
0.94	111.2	39.1	0.6	88.2
1.04	114.9	48.3	0.6	99.4
1.14	118.7	58.6	0.6	111.0
1.25	122.9	71.7	0.5	124.5
1.35	126.6	84.6	0.5	136.9
1.46	130.4	98.7	0.5	149.7
1.56	134.6	116.1	0.5	164.5
1.66	138.3	133.0	0.5	178.0
1.77	142.6	153.6	0.5	193.7
1.87	146.3	173.4	0.5	208.0
1.98	150.1	194.7	0.5	222.8
2.08	157.9	220.3	0.5	239.9
2.18	165.6	244.8	0.5	256.0
2.29	174.2	274.3	0.5	275.0
2.39	181.9	302.3	0.5	292.7
2.49	189.6	332.1	0.5	311.2
2.60	198.3	367.8	0.5	332.8
2.70	206.0	401.7	0.5	352.9
2.81	214.6	442.2	0.5	376.4
2.91	222.3	480.4	0.4	398.1
3.01	230.0	520.9	0.4	420.6
3.12	238.7	569.0	0.4	446.8
3.22	246.4	614.4	0.4	470.9
3.33	255.0	668.2	0.4	498.9
3.43	262.7	718.8	0.4	524.6
3.53	270.4	771.9	0.4	551.1
3.64	279.1	834.9	0.4	581.8
3.74	286.8	893.7	0.4	609.9
3.85	294.5	955.4	0.4	638.7
3.95	303.1	1028.3	0.4	672.1
4.05	320.7	1096.2	0.4	703.0
4.16	329.2	1176.4	0.4	739.3
4.26	336.8	1251.1	0.4	772.4
4.37	344.4	1329.1	0.4	806.2
4.47	352.9	1420.9	0.3	845.1
4.57	360.5	1506.2	0.3	880.5
4.68	369.0	1606.3	0.3	921.3
4.78	376.6	1699.2	0.3	958.3
4.89	384.2	1795.8	0.3	996.0

depth (ft)	P (psf)	M (ftlb/ft)	D (in)	F (lb/ft)
4.99	392.7	1909.0	0.3	1039.4
5.09	394.7	2013.7	0.3	1078.5
5.20	396.1	2136.1	0.3	1122.6
5.30	397.4	2249.1	0.3	1161.9
5.41	398.6	2365.9	0.3	1201.4
5.51	400.0	2502.1	0.3	1245.9
5.61	401.2	2627.3	0.3	1285.6
5.72	402.6	2772.8	0.3	1330.5
5.82	403.9	2906.4	0.3	1370.4
5.93	405.1	3044.0	0.3	1410.5
6.03	406.5	3203.5	0.3	1455.8
6.13	407.7	3349.5	0.3	1496.2
6.24	409.0	3499.5	0.2	1536.6
6.34	410.3	3673.1	0.2	1582.3
6.45	411.6	3831.7	0.2	1623.1
6.55	413.0	4014.9	0.2	1669.1
6.65	414.2	4182.1	0.2	1710.1
6.76	415.5	4353.3	0.2	1751.2
6.86	416.8	4550.9	0.2	1797.6
6.96	418.1	4730.8	0.2	1839.0
7.07	419.5	4938.2	0.2	1885.7
7.17	420.7	5126.8	0.2	1927.4
7.28	421.9	5319.7	0.2	1969.2
7.38	423.3	5541.5	0.2	2016.3
7.48	424.6	5743.2	0.2	2058.3
7.59	426.0	5975.0	0.2	2105.8
7.69	427.2	6185.5	0.2	2148.1
7.80	428.4	6400.2	0.2	2190.5
7.90	420.8	6646.8	0.2	2237.8
8.00	413.3	6870.4	0.1	2279.1
8.11	404.9	7126.7	0.1	2324.7
8.21	397.4	7358.9	0.1	2364.4
8.32	390.0	7594.9	0.1	2403.4
8.42	381.6	7865.0	0.1	2446.4
8.52	374.1	8109.0	0.1	2483.8
8.63	365.7	8388.0	0.1	2525.0
8.73	358.3	8639.8	0.1	2560.8
8.84	350.8	8895.1	0.1	2595.9
8.94	342.4	9186.4	0.1	2634.5
9.04	334.9	9449.0	0.1	2668.1
9.15	327.5	9714.8	0.1	2700.8
9.25	319.1	10017.7	0.1	2736.8
9.36	311.6	10290.3	0.1	2768.1
9.46	303.2	10600.6	0.1	2802.3
9.56	295.8	10879.6	0.1	2831.9
9.67	288.3	11161.5	0.1	2860.8
9.77	279.9	11482.0	0.1	2892.5
9.88	272.5	11769.9	0.1	2919.8

depth (ft)	P (psf)	M (ftlb/ft)	D (in)	F (lb/ft)
9.98	264.1	12096.9	0.1	2949.7
10.08	256.6	12390.3	0.1	2975.4
10.19	249.1	12686.3	0.1	3000.4
10.29	240.7	13022.2	0.0	3027.7
10.40	233.3	13323.2	0.0	3051.2
10.50	224.9	13664.7	0.0	3076.6
10.60	217.4	13970.5	0.0	3098.5
10.71	210.0	14278.5	0.0	3119.7
10.81	201.6	14627.5	0.0	3142.6
10.92	194.1	14939.8	0.0	3162.1
11.02	185.7	15293.4	0.0	3183.2
11.12	178.2	15609.6	0.0	3201.2
11.23	170.8	15927.6	0.0	3218.5
11.33	162.4	16287.4	0.0	3237.0
11.43	154.9	16608.9	0.0	3252.7
11.54	-9932.3	16930.3	0.0	3018.0
11.64	-9940.3	17211.9	0.0	1910.2
11.75	-9947.3	17358.5	0.0	924.8
11.85	-9955.2	17407.4	0.0	-1.0
11.95	-9962.3	17303.1	0.0	-8.7
12.06	-9969.3	17025.1	0.0	-15.7
12.16	-9977.2	16524.9	0.0	-22.8
12.27	-9984.3	15931.9	0.0	-28.3
12.37	-9992.2	15118.9	0.0	-33.7
12.47	-9999.2	14284.8	0.0	-37.8
12.58	-10006.3	13362.8	0.0	-41.2
12.68	-10014.2	12240.7	0.0	-44.1
12.79	-10021.2	11186.2	0.0	-46.0
12.89	-10029.1	9956.6	0.0	-47.2
12.99	-10036.2	8843.4	0.0	-47.6
13.10	-10043.2	7728.1	0.0	-47.3
13.20	-10051.1	6491.4	0.0	-46.2
13.31	-10058.2	5426.1	0.0	-44.4
13.41	-10066.1	4287.0	0.0	-41.5
13.51	-10073.1	3345.5	0.0	-38.3
13.62	-10080.2	2487.9	0.0	-34.3
13.72	-10088.1	1643.6	0.0	-29.0
13.83	-10095.1	1018.3	0.0	-23.5
13.93	-10102.2	528.1	0.0	-17.4
14.03	-10110.1	158.1	0.0	-9.6
14.14	-10117.1	8.9	0.0	-2.0
14.24	-10125.0	0.0	0.0	0.0
14.35	-10132.1	0.0	0.0	0.0
14.45	-10139.1	0.0	0.0	0.0
14.55	-10147.0	0.0	0.0	0.0
14.66	-10154.1	0.0	0.0	0.0
14.76	-10162.0	0.0	0.0	0.0
14.87	-10168.2	0.0	0.0	0.0

Wantman Group, Inc.

2035 Vista Parkway
West Palm Beach, FL 33411
Tel: 561-687-2220
Fax: 561-687-1110
EMail: chris.laforte@wantmangroup.com

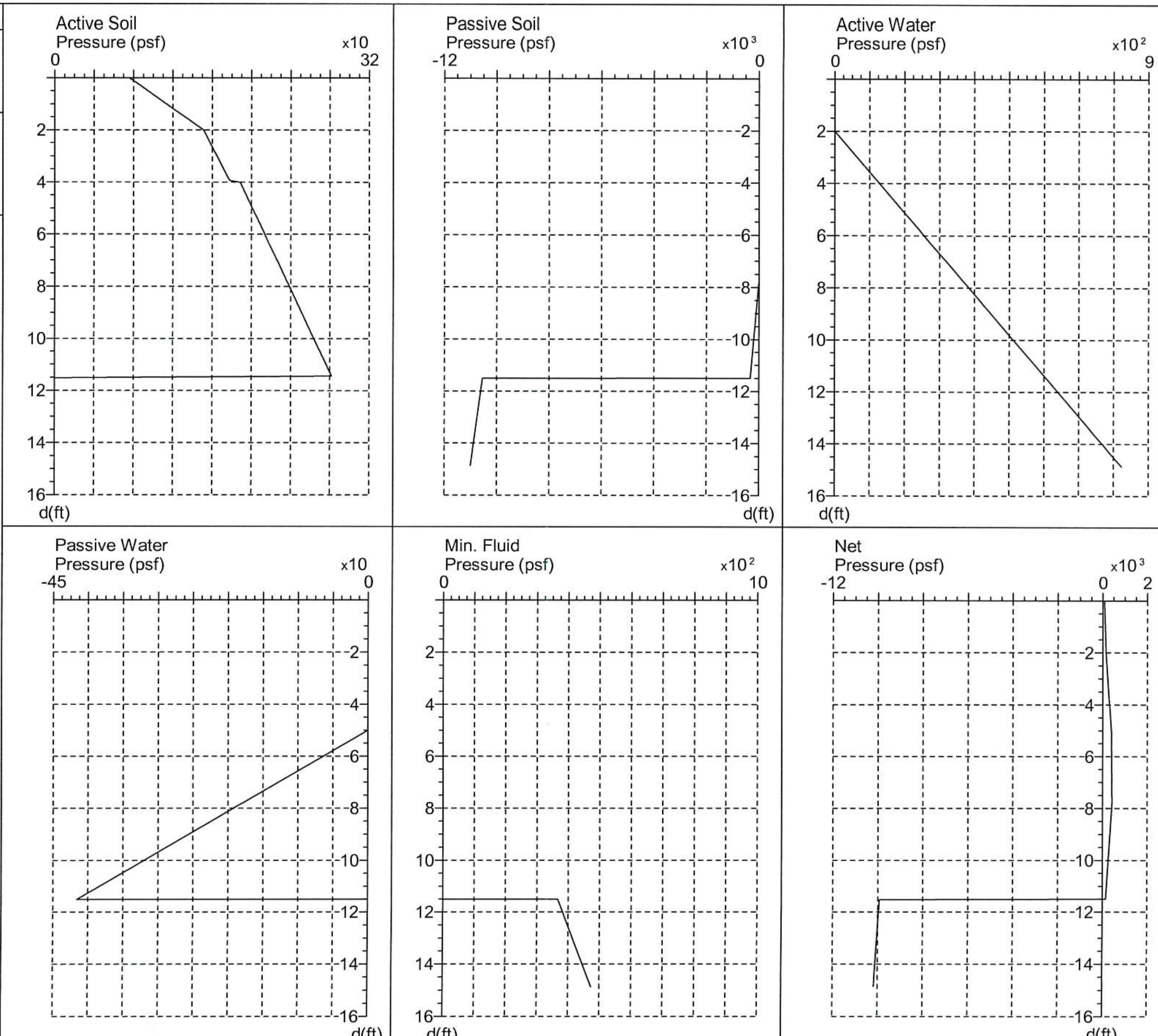
SupportIT, v2.36

Client: City of Delray Beach

Title: Island Drive Bridge Seawall
Designer: CBL
Ref: 1004.17
Date: 7.12.16

Sheet: Concrete Wall
Works: Permanent
Pressure: Coulomb
Analysis: Net Pressure
Toe: Cantilever

Wing Wall Analysis



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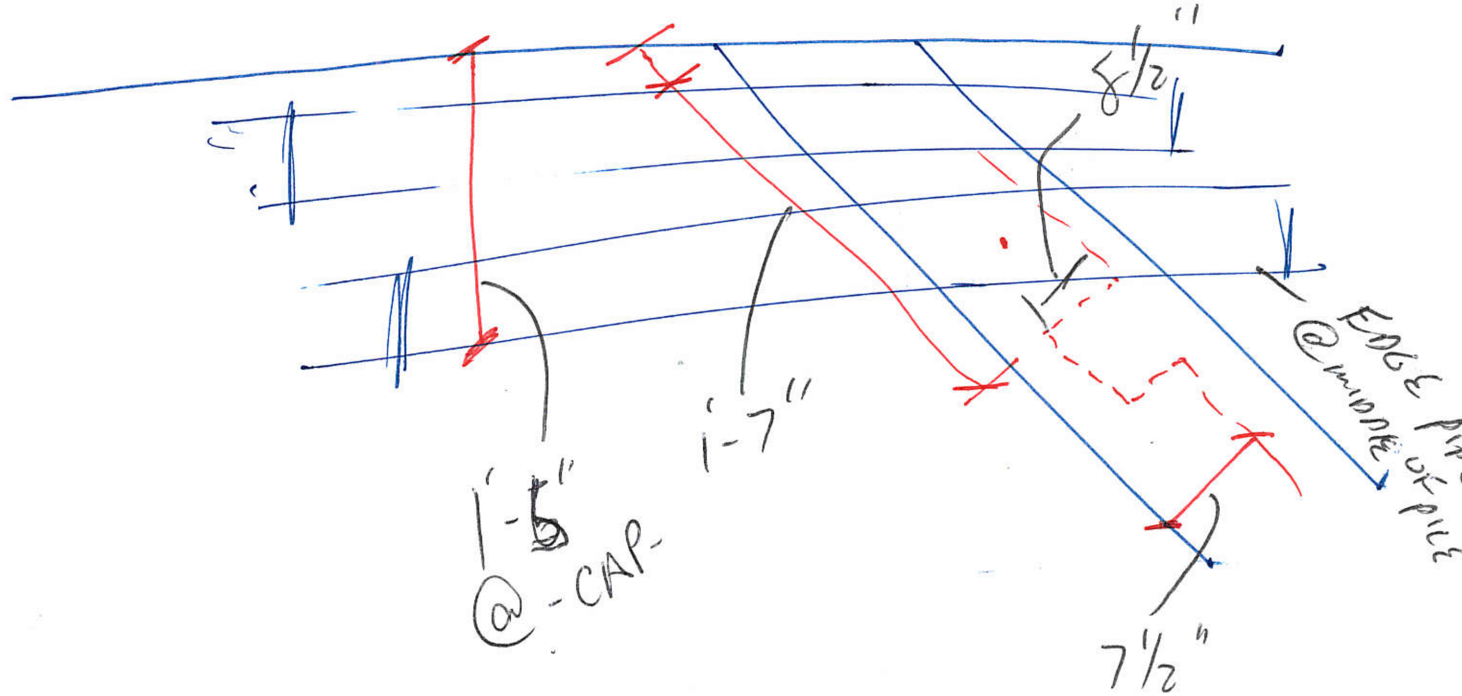
SupportIT, v2.36

ISLAND DRIVE
SOUTH OF GEORGE BUSH

– PIPES – SOUTH SIDE + SP./PILE



TSS FIELD NOTES 7/28/16


1'-5"
@CAP

11-1/2"
7-1/2"
1'-7"

NOTE: Items that are ~~struck through~~ are deleted. Items that are <u>underlined</u> have been added. All other terms and conditions remain as stated in the RFP.

End of Addendum

INSTRUCTIONS:
Receipt of this addendum must be acknowledged as instructed in the solicitation document. Failure to acknowledge receipt of this Addendum may result in the disqualification of Respondent's response.

CITY OF DELRAY BEACH
100 N.W. 1st AVENUE, DELRAY BEACH, FL 33444

Solicitation Addendum

Addendum No.:	3
Solicitation No.:	2017-046
Project No.:	N/A
Solicitation Title:	Island Drive Seawall Repairs
Addendum Date:	April 20, 2017
Purchasing Contact:	Ja'Anal Dowdell

THE FOLLOWING ITEMS ARE MADE AND HEREBY BECOME A PART OF THIS SOLICITATION:

Change to:

INVITATION TO BID INSTRUCTIONS, DUE DATE

The Due Date has been changed to April 26, 2017, at 2:00 P.M. ET

Change to:

INVITATION TO BID INSTRUCTIONS, ITEM 15, SOLICITATION SCHEDULE

The Solicitation Schedule has been changes as follows:

15. SOLICITATION SCHEDULE:

ACTIVITY	**DATE**
Issue ITB	March 28, 2017
Pre-solicitation Conference	April 6, 2017 2:00 P.M.ET City Hall Conference Room
Deadline for Delivery of Questions	April 18, 2017
Due Date and Time (for delivery of Bids)	April ~~25~~ 27, 2017 2:00 P.M., ET
Institute Cone of Silence	April ~~25~~ 27, 2017 2:00 P.M., ET
Phase 1 Evaluation Complete	~~April 28~~ May 4, 2017
Phase 2 Bid Tabulation Complete	May ~~2~~ 5, 2017

Change to:

FORM 12, QUESTIONNAIRE

Replace Form 12 - Questionnaire with the attached revised Form 12 – Questionnaire, revised per Addendum 3.

Change to:

SECTION 2: BID FORMAT, ITEM 3, BID FORMAT

3. BID FORMAT: Bids must adhere to the following format:

Chapter 1	Letter of Intent Form 1, Bid Submittal Signature Page
Chapter 2	Form 11, Bidder Information Form 12, Questionnaire Evidence of Insurance, Professional Licenses, and Certificates W-9
Chapter 3	Form 2, Public Entity Crimes Form 3, Drug-Free Workplace Form 4, Conflict of Interest
Chapter 4	Form 5, Acknowledgement of Addenda
Chapter 5	Form 7, Genuine Bid Form 8, Bid Guaranty Form 9, Cone of Silence Form 10, Non-Collusion Affidavit ~~Form 12, Questionnaire~~
Chapter 6	Form 6, Schedule of Pricing

NOTE: Items that are ~~struck through~~ are deleted. Items that are underlined have been added. All other terms and conditions remain as stated in the RFP.

QUESTIONS AND RESPONSES:

Q1. On Form 12 – Questionnaire, Question 2 its states that we should identify the most recent pedestrian walkway projects. Should the information be related to seawalls?

R1. Yes. This item has been corrected per this Addendum No. 3.

Q2. In Section 2, Bid Format it states that Form 12, Questionnaire should be placed in Chapters 2 and Chapter 5. Should we put a copy of the Questionnaire in both chapters?

R2. No. The Bid Format has been revised per this Addendum No. 3.

End of Addendum

INSTRUCTIONS:

Receipt of this addendum must be acknowledged as instructed in the solicitation document. Failure to acknowledge receipt of this Addendum may result in the disqualification of Respondent's response.

CITY OF DELRAY BEACH
100 N.W. 1st AVENUE, DELRAY BEACH, FL 33444

Solicitation Addendum

Addendum No.:	4
Solicitation No.:	2017-046
Project No.:	N/A
Solicitation Title:	Island Drive Seawall Repairs
Addendum Date:	April 24, 2017
Purchasing Contact:	Ja'Anal Dowdell

THE FOLLOWING ITEMS ARE MADE AND HEREBY BECOME A PART OF THIS SOLICITATION:

Replace:

APPENDIX B, PRICING PAGE

Replace the Appendix B, Pricing Page, with the attached Appendix B, Pricing Page revised per this Addendum No. 4.

QUESTIONS AND RESPONSES:

Q1. During our discovery period on the project, we have determined that the overhead electric will be too close to our pile driving equipment to perform the job safely. We have reached out to FP&L for a solution to temporarily reroute the power of discharge while we work underneath. Their process for a solution on this will take several additional weeks. In talking to FP&L, they have suggested that a request to change that portion of overhead electric to underground may be the best solution. Has the City discussed this option and can a line item be added for the electric provision? Will there be an extension on this bid to deal with this issue?

R1. The Pricing Page has been revised per this Addendum and has an allowance for relocating the line of $35,000. The City at its sole discretion will determine whether to either temporarily relocate the electrical or go underground.

End of Addendum

INSTRUCTIONS:
Receipt of this addendum must be acknowledged as instructed in the solicitation document. Failure to acknowledge receipt of this Addendum may result in the disqualification of Respondent's response.