FLORIDA DEPARTMENT OF TRANSPORTATION
Procurement Office
605 Suwannee Street, MS 20
Tallahassee, Florida 32399-0450

ADDENDUM NO. 2 **DATE: May 16, 2018**

RE: ITB-DOT-17/18-9081-GH
POMPANO TOWER REMOVAL & REPLACEMENT

- **NOTICE: The Geotechnical Report for the soil conditions near Legs A and C is enclosed below and has become a part of the bid documents.**

Proposers should acknowledge receipt of this Addendum by completing and submitting with their proposal (or Addendum may be sent via email to greg.hill@dot.state.fl.us) no later than the time and date of the proposal opening.

____________________________________Bidder/Proposer

____________________________________Submitted by (Signature)

Failure to file a protest within the time prescribed in Section 120.57(3), Florida Statutes, or failure to post the bond or other security required by law within the time allowed for filing a bond shall constitute a waiver of proceedings under Chapter 120, Florida Statutes.

REPORT OF GEOTECHNICAL EXPLORATION

Pompano Beach Tower Structure

Pompano Beach Service Plaza
Pompano Beach, Broward County, Florida
Financial Project ID: 431987-1-52-08

Prepared for:

Florida's Turnpike Enterprise
P.O. Box 613069
Ocoee, Florida 34761

Prepared by:

Amec Foster Wheeler Environment & Infrastructure, Inc.
2580 Metrocentre Boulevard Suite #6
West Palm Beach, Florida 33407
(561) 242-7713

May 15, 2018

Project No. 6784-17-2930.04.01

May 15, 2018

Mr. Roger S. Gobin, Ph.D., P.E.
Geotechnical Engineer WSP USA
P.O. Box 613069
Ocoee, Florida 34761

Subject: **Report of Geotechnical Exploration**
Pompano Beach Tower Structure
Pompano Beach Service Plaza
Pompano Beach, Broward County, Florida
Financial Project ID: 431987-1-52-08
Amec Foster Wheeler Project No. 6784-17-2930.04.01

Dear Mr. Gobin:

Amec Foster Wheeler Environment & Infrastructure, Inc., (now Wood Environment and Infrastructure Solutions, Inc.) has performed a geotechnical exploration for the subject project. This report presents our understanding of the project, outlines our exploratory procedures, documents the field and laboratory test data obtained, and provides geotechnical recommendations pertaining to the planned drilled shaft foundation construction for the subject structure. .

We have enjoyed assisting you on this phase of the project and look forward to serving as your geotechnical consultant on the remainder of this contract. If you have any questions concerning this report, please contact us.

Sincerely,

Amec Foster Wheeler Environment & Infrastructure, Inc.
Florida Board of Professional Engineers Certificate of Authorization No. 5392

BRIAN S. HATHAWAY
LICENSE
No 60724
STATE OF FLORIDA
PROFESSIONAL ENGINEER

Printed copies of this document are not considered signed and sealed and the signature must be verified on any electronic copies.

Brian S. Hathaway, P.E.
Senior Engineer – Geotechnical
Florida License No. 60483

Bon Lien, Ph.D., P.E.
Principal Engineer – Geotechnical

SIGNED FOR
WITH PERMISSION

Distribution: FTE – Mr. Roger Gobin, P.E. (email)
File (1)

Amec Foster Wheeler Environment & Infrastructure, Inc.
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APPENDICES

A Site Location Map

B Report of Core Borings Sheets
Field Procedures

C Summary of Laboratory Classification Test Results Sheets
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D FHWA Checklist

1.0 PROJECT INFORMATION

Project information has been provided in correspondence occurring during the period from April 4, 2018 to May 2, 2018 by Mr. Roger Gobin of Florida's Turnpike Enterprise (FTE). We were provided the following project-related documents:

- Pompano Beach Soil Boring Detail
  Prepared By: FDOT
  Undated
  Received: April 4, 2018

- Pompano Beach Site Layout
  Prepared By: unknown
  Undated
  Received: April 4, 2018

As shown on the Site Location Map in Appendix A, the self-supported tower structure site is located directly west of the Florida's Turnpike Pompano Beach Toll Plaza and northeast of the Coconut Creek Parkway Bridge over the Florida's Turnpike in Pompano Beach, Broward County, Florida. The Pompano Beach Soil Boring Detail sheet provided to us includes a drawing depicted the planned tower foundation support locations, the request soil test boring locations, and general site features. Limited information regarding the tower structure was provided to us. We understand that the tower structure will be supported on drilled shaft foundations to be designed by others.

2.0 FIELD EXPLORATION

For our field exploration, two Standard Penetration Test (SPT) borings, designated as Leg A and Leg C, were drilled to a depth of 100 feet each below the existing ground surface. The borings were drilled by our subcontractor, Ardaman and Associates, Inc. The drilling operations were coordinated and monitored in the field by a geotechnical engineer from our office.

The proposed boring locations were provided to us on the Pompano Beach Soil Boring Detail sheet. Two of the three tower support locations (Leg A and Leg C) were designated as proposed boring locations. These boring locations and ground surface elevation at both locations were determined in the field by Amec Foster Wheeler surveyors. Following boring layout, Amec Foster Wheeler performed Ground Penetrating Radar (GPR) scanning in the vicinity of the proposed boring locations to identify and clear potential underground utility conflicts. Both borings needed to be offset slightly from the original layout locations due to their proximity to the exiting chain-link fence and inability to access with the drill rig. The as-drilled boring locations are provide on the Core Boring Sheets in Appendix B. The Report of Core Borings sheet in Appendix B presents the boring locations and subsurface profiles. A brief description of the drilling procedure used is presented in the Field Procedures section in Appendix B.

3.0 Laboratory Testing

3.1 Classification and Index Property Testing

Laboratory classification and index property tests were performed on representative soil samples obtained from the borings to assist in classifying the soils according to the Unified Soil Classification System and to help quantify and correlate engineering properties. The index property and classification testing consisted of the following tests:

- 21 moisture content tests
- 14 fines content (percentage of soil particles finer than the No. 200 mesh sieve) tests
- 7 grain size distribution tests

The results of the classification and index property tests are summarized on the Summary of Laboratory Classification Test Results sheet in Appendix C. The Report of Core Borings sheet in Appendix B also includes the laboratory classification and index property test results. Brief descriptions of the laboratory testing procedures used are presented in the Laboratory Procedures section in Appendix C.

3.2 Electro-Chemical Property Testing

Electro-chemical property testing, was not performed on soil samples obtained from the borings at the request of FTE's representative. We understand that the foundation design will assume an "Extremely Aggressive" environmental classification.

4.0 SITE AND SUBSURFACE CONDITIONS

4.1 Site Conditions

The existing site conditions were observed by a representative from our office during the period of April 18 to 20, 2018. The subject area is located immediately west of the Pompano Beach Toll Plaza. The topography in the area of the planned tower structure was relatively flat. Standing water was not observed at the time of our visits. The surface soils (where exposed) generally consisted of brown to light gray sands.

4.2 USGS Topographic Data

We have reviewed the U.S. Geological Survey topographic map of the subject area. The proposed facility is located within the Fort Lauderdale North Quadrangle Maps. Based on the 2015 maps, the ground elevation in the vicinity of the proposed tower structure is approximately +10 feet.

4.3 General Area Geomorphology and Geology

The area of the proposed tower structure is located near the western edge of the Atlantic Coastal Ridge physiographic region of the Florida Platform, the Everglades is to the west. The Atlantic Coastal Ridge forms the highest ground in the county, ranging from 10 feet to 22 feet above sea level. It is a natural barrier to drainage of the interior, except where it is breached by shallow sloughs or rivers.

The region is blanketed by undifferentiated sands with varying silt and clay content, which is underlain by limestone, interbedded with sand, silts, and clays.

Table 4-1: Summary of Geologic Stratigraphy

	Approximate Depth Range (feet)	Stratigraphic Unit/Hydrogeologic Unit	General Material Description
Biscayne Aquifer	0 to -50	Pamlico Sand and Undifferentiated Deposits	Pleistocene and recent age quartz sand, shell, and organic deposits. This is underlain by Pleistocene formations. Occasionally interbedded with Miami Limestone and Key Largo Limestone.
	-50 to -125	Fort Thompson Formation	Pleistocene marine limestone and minor gastropod-rich freshwater limestone.

References

Duncan, Joel (1993). *Geologic Map of Broward County, Florida*, Florida Geological Survey.

Reese, R.S., and Cunningham, K.J. (2000), Hydrology of the Gray Limestone Aquifer in Southern Florida (Figure 12), U.S. Geological Survey Water-Resources Investigations Report 99-4213,

The Biscayne Aquifer is the primary source of drinking water for Broward County. The Biscayne Aquifer is a highly transmissive, surficial aquifer composed primarily of limestone, sandstone, clay-like sand and silts. Regionally, groundwater in the Biscayne Aquifer flows in a southeasterly direction, from the Everglades in the west to the Atlantic Ocean in the east, although local conditions can alter this trend. Local gradients counter to general groundwater flow may occur due to natural or man-made diversions such as nearby surface water bodies, irrigation wells, public wellfields, and stormwater control structures. In addition, groundwater flow can be affected by periods of heavy rain or drought. Based on our experience in this area, the general groundwater flow in Broward County is to the southeast and the groundwater depth at the site is expected to be between five to ten feet below ground surface.

4.4 Sinkhole Discussion

Sinkholes are a natural geologic feature within the State of Florida. They are surficial expressions of subsurface dissolution of limestone or similar soluble rock types (e.g., dolomite, gypsum, etc.). Groundwater and meteoric water permeate pore spaces within these rock types and dissolve the rock surfaces of the pore spaces. Dissolution is primarily a function of exposed rock surface (as well as chemical conditions such as pH, temperature, rock mineralogy, etc.) and so occurs preferentially at pre-existing pore space features, such as fractures, intergranular voids, or vugs. Over time, this process results in cavities, caverns and other dissolution features. This process is known as karst, and dissolution features are commonly referred to as karst features.

When karst features grow large enough to encroach on the ground surface or the upper surface of the rock unit, this encroachment is termed sinkhole activity. Sinkhole activity may occur quickly or slowly, depending on the geologic setting. Three major types of sinkholes occur in Florida: cover-collapse sinkholes, cover-subsidence sinkholes, and solution sinkholes.

Cover-Collapse: A sudden failure of a unit of the rock or soil roof covering a karst feature is commonly termed a "cover collapse" sinkhole. This type of sinkhole activity results in a rapidly formed (over time periods of minutes to days) depression in the ground surface above a karst feature. In Florida, this type of sinkhole commonly occurs in areas where the limestone formation is at relatively shallow depth or is covered by fine-grained, cohesive soils.

Cover-Subsidence: A gradual failure caused by erosion of soils into underlying karst features is commonly termed "cover subsidence" sinkhole activity. This type of sinkhole activity results in the slow, gradual development (over time periods of months to centuries) of a depression in the ground surface above a karst feature. In Florida, this type of sinkhole activity commonly occurs in areas where the limestone formation is covered by granular, or non-cohesive, soils.

Solution: Solution sinkholes occur in areas where limestone is exposed at land surface or is covered by thin layers of soil and permeable sand. It typically is most pronounced along joints, fractures and other openings within the rock. Large voids do not commonly occur as a result of solution sinkholes because the soil layer tends to subside as the limestone surface dissolves, resulting in a gradual downward movement of the land surface.

Due to the thickness of the overburden in the project area, the type of sinkhole of potential concern in the project area is the Cover-Subsidence sinkhole.

The Florida Department of Environmental Protection (FDEP) maintains a database of reported sinkholes and subsidence incidences in Florida. This database provides a summary by county and city of officially reported sinkhole activity. Based on the FDEP Subsidence Incident report, dated May 3, 2018, there are no sinkhole activities reported within a 2-mile radius of the project location.

4.5 Subsurface Conditions

4.5.1 General

An Illustrated representation of the subsurface conditions encountered at the proposed tower structure location is shown on the Report of Core Borings sheet in Appendix B. This sheet and the soil conditions outlined below highlight the major subsurface stratification.

The attached Report of Core Borings sheet should be consulted for detailed descriptions of the subsurface conditions encountered at the boring locations. When reviewing the Report of Core Borings sheet, it should be understood that soil conditions may vary between and away from the boring locations.

4.5.2 Soils and Limestone

From the existing ground surface to the boring termination depth of 100 feet, the borings generally encountered alternating layers of very loose to very dense, brown to pale brown, gray to light gray, fine sand (Unified Soil Classification System symbol, SP), fine sand with silt (SP-SM), fine sand with clay (SP-SC), clayey fine sand (SC) and silty fine sand (SM). The SPT N-values in the borings ranged from 1 to 50+ blows/foot. Partially cemented sands with trace phosphate were encountered below 50 feet. Weakly cemented to cemented sandstone (limestone) was encountered approximately between the depth ranges of 72 to 80 feet below site grade. The SPT N-values in the depth range of about 72 to 80 feet ranged from 11 to 50+ blows/foot.

4.5.3 Groundwater

The depth to groundwater was measured at the boring locations at the time of drilling. The observed groundwater level ranged from 5.5 to 6.5 feet below existing grade. Fluctuation in groundwater levels should be expected due to seasonal climatic changes, construction activity, rainfall variations, surface water runoff, and other site-specific factors. Since groundwater 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.

4.5.4 Estimated Seasonal High Groundwater Table

The seasonal high groundwater is estimated to be proximately 0 to 12 inches below the existing grade. The seasonal high groundwater information was determined from the United States Department of Agriculture Soil Conservation Service Soil Survey of Broward County, Florida.

5.0 EVALUATIONS AND RECOMMENDATIONS

5.1 General

The following evaluations and recommendations are based upon the previously presented project information and subsurface conditions along with the data obtained in this exploration. The field and laboratory data have been compared with previous performances of similar tower structures bearing on or within materials similar to those encountered at this site. If the location or configuration of the proposed structure is changed, please contact us so that our recommendations may be reviewed for continued applicability. The discovery of any site or subsurface condition during construction that deviates from the data obtained in this exploration should also be reported to us for our evaluation. The assessment of site environmental conditions or the presence of pollutants in the soil or groundwater of the site is beyond the proposed scope of this geotechnical exploration. In addition, the assessment of the presence, extent, or quality of the jurisdictional wetlands in the project vicinity is also beyond the scope of this geotechnical exploration.

5.2 Drilled Shaft Design

We understand that proposed tower structure will be supported with constant-diameter drilled shaft foundations at each tower leg. The foundations shall be designed to resist lateral, compression, and uplift forces due to wind loading. Based on our previous experience with similar towers, constant-diameter drilled shafts in this application (embedded in soils) are typically 4 to 8 feet in diameter. Tables 5-1 and 5-2 present our recommended drilled shaft geotechnical design parameters for subsurface conditions encountered in the borings.

Table 5-1: Recommended Geotechnical Parameters for Drilled Shaft Design

Boring Leg A

Depth Range (ft)	Soil Type	Undrained Cohesion, C_u (psf)	ϕ (deg)	γ_{total} (pcf)	k (pci)	ε_{50} (in/in)	Ultimate Unit Skin Friction, f_{sz} (ksf)	Ultimate Unit End Bearing, q_b (ksf)
0 - 10	LOOSE to MEDIUM DENSE fine SAND (SP / SP-SM)	0	33	115	30	0	.34	12
10 - 34	LOOSE to MEDIUM DENSE fine SAND (SP / SP-SC)	0	33	118	45	0	1.07	19
34 - 38	MEDIUM DENSE fine SAND (SP)	0	36	126	93	0	1.41	40
38 - 42	MEDIUM DENSE fine SAND (SP)	0	34	122	65	0	1.48	28
42 - 50	MEDIUM DENSE fine SAND (SP)	0	31	117	40	0	1.53	17
50 - 60	VERY LOOSE fine SAND (SP)	0	28	91	6	0	1.49	2
60 - 74	MEDIUM DENSE TO DENSE fine SAND (SP-SM) – partially cemented	0	32	121	61	0	1.40	26
74 -80	VERY DENSE Cemented SAND / Limestone	0	38	132	125	0	1.31	90
80 - 100	MEDIUM DENSE to VERY DENSE fine SAND (SP-SM) - partially cemented	0	34	126	98	0	1.24	42

Legend: ϕ = friction angle; γ_{total} = total unit weight; k = modulus of lateral subgrade reaction; ε_{50} = axial strain corresponding to ½ the principal stress difference (applicable only to cohesive soils and weak rock)

Table 5-2: Recommended Geotechnical Parameters for Drilled Shaft Design

Boring Leg C

Depth Range (ft)	Soil Type	Undrained Cohesion, C_u (psf)	ϕ (deg)	γ_{total} (pcf)	k (pci)	ε_{50} (in/in)	Ultimate Unit Skin Friction, f_{sz} (ksf)	Ultimate Unit End Bearing, q_b (ksf)
0 - 10	VERY LOOSE to LOOSE fine SAND (SP / SP-SM)	0	32	112	24	0	0.32	10
10 - 32	MEDIUM DENSE fine SAND (SP / SP-SC)	0	34	119	52	0	1.04	22
32 - 36	DENSE fine SAND (SP)	0	38	127	112	0	1.40	48
36 - 46	MEDIUM DENSE fine SAND (SP)	0	33	121	64	0	1.50	27
46 - 50	LOOSE fine SAND (SP)	0	30	115	28	0	1.57	11
50 - 68	MEDIUM DENSET TO VERY DENSE fine SAND (SP)	0	35	126	98	0	1.60	42
68 - 72	VERY DENSE fine SAND (SP-SM) – partially cemented	0	38	132	125	0	1.53	81
72 -80	MEDIUM DENSE TO VERY DENSE Cemented SAND / Limestone	0	38	132	125	0	1.47	90
80 - 100	MEDIUM DENSE TO VERY DENSE fine SAND (SP-SM) - partially cemented	0	33	126	100	0	1.35	43

Legend: ϕ = friction angle; γ_{total} = total unit weight; k = modulus of lateral subgrade reaction; ε_{50} = axial strain corresponding to ½ the principal stress difference (applicable only to cohesive soils and weak rock)

We anticipate that lateral load resistances will be calculated using the program LPILE by ENSOFT. We have therefore provided soil parameters in Table 5-1 and Table 5-2 that are suitable for input into the LPILE program.

The ultimate unit skin friction and end bearing values were estimated using the recommended procedures in FHWA's *Drilled Shafts: Construction Procedures and LRFD Design Methods*, FHWA-NHI-10-016 (May, 2010). Values for the lateral subgrade reaction modulus (k) and ε_{50} were estimated using the recommendations in the FHWA's *Handbook on Design of Piles and Drilled Shafts Under Lateral Load*, FHWA-1P-84-11 (July 1984).

5.2.1 Drilled Shaft Construction

The drilled shafts should be constructed with the materials and procedures outlined in Sections 455-13 through 455-24 of the Standard Specifications. As noted previously, constant-diameter drilled shafts are a technically feasible foundation alternative for this project. These shafts should be installed using the slurry displacement or wet method of construction. The wet method utilizes a thick clay mineral drilling fluid or slurry to stabilize the drilled hole below the groundwater level. Alternatively, a polymer-based slurry may be used.

The drilling slurry also facilitates the augering process and flushes the soil cuttings. Circulation, screening, and desanding of the drilling fluid should preferably be performed to minimize the detrimental accumulation of sand in the shaft. A bailing, slurry, or "clean-out" bucket is used to remove residual cuttings at the shaft bottom not removed by the slurry circulation. If a polymer slurry is used, the contractor should let the slurry in the drilled hole stand without agitation for a minimum of 30 minutes prior to concrete placement. After 30 minutes, the drilled hole bottom should be cleaned of sand, preferably with a submersible pump. The slurry must be slowly circulated, re-circulated, and cleaned of sand prior to concreting, or discontinuities in the shaft may result.

5.2.2 Protection of Existing Structures and Utilities

All nearby structures and or existing utilities should be monitored in accordance with the FDOT Standard Specifications for Road and Bridge Construction Section 108 Protection of Existing Structures. We note that various existing structures, including communication shelters, generator / generator pad, guyed tower structure, and other ancillary structures and probable underground utilities are located in close proximity (10 to 50 feet) northeast of the planned drilled shaft installation locations.

Prior to any construction, we recommend that the contractor perform pre-construction condition and structural surveys of the adjacent structures. The contractor should prepare and submit a vibration and settlement monitoring plan for review and approval prior to commencement of any vibratory or impact casing installation and prior to drilled shaft excavations. The Contractor should monitor all structures within their radius of responsibility and adhere to FDOT criteria.

5.2.3 Drilled Shaft Installation Monitoring

Close observation and monitoring by a geotechnical engineer (or engineering technician working under the direction of a geotechnical engineer) from this office familiar with the subsurface conditions and installation procedures at the site is considered necessary during drilled shaft installation in order to confirm that the shafts are installed satisfactorily to meet the design intent and criteria. During shaft installation, the engineer (or technician) should perform the following tasks:

- Confirm that the shafts are within the specified tolerances for location and verticality;
- Measure the shaft dimensions;
- Record the shaft tip elevations;
- Log and record the soil stratification encountered by the drilling process to confirm that the shafts bear in the desired formation;
- Perform the drilling slurry viscosity, pH, and density tests. If a polymer-based slurry is used, the volumetric sand content should also be measured;
- Document the amount of concrete placed in each shaft and compare it to the theoretical volume of each shaft to evaluate for possible discontinuities in the shaft;
- Confirm acceptable tremie concreting or pumping procedures; and
- Check and document the reinforcing steel placed into each shaft to confirm that it matches what is shown on the plans.

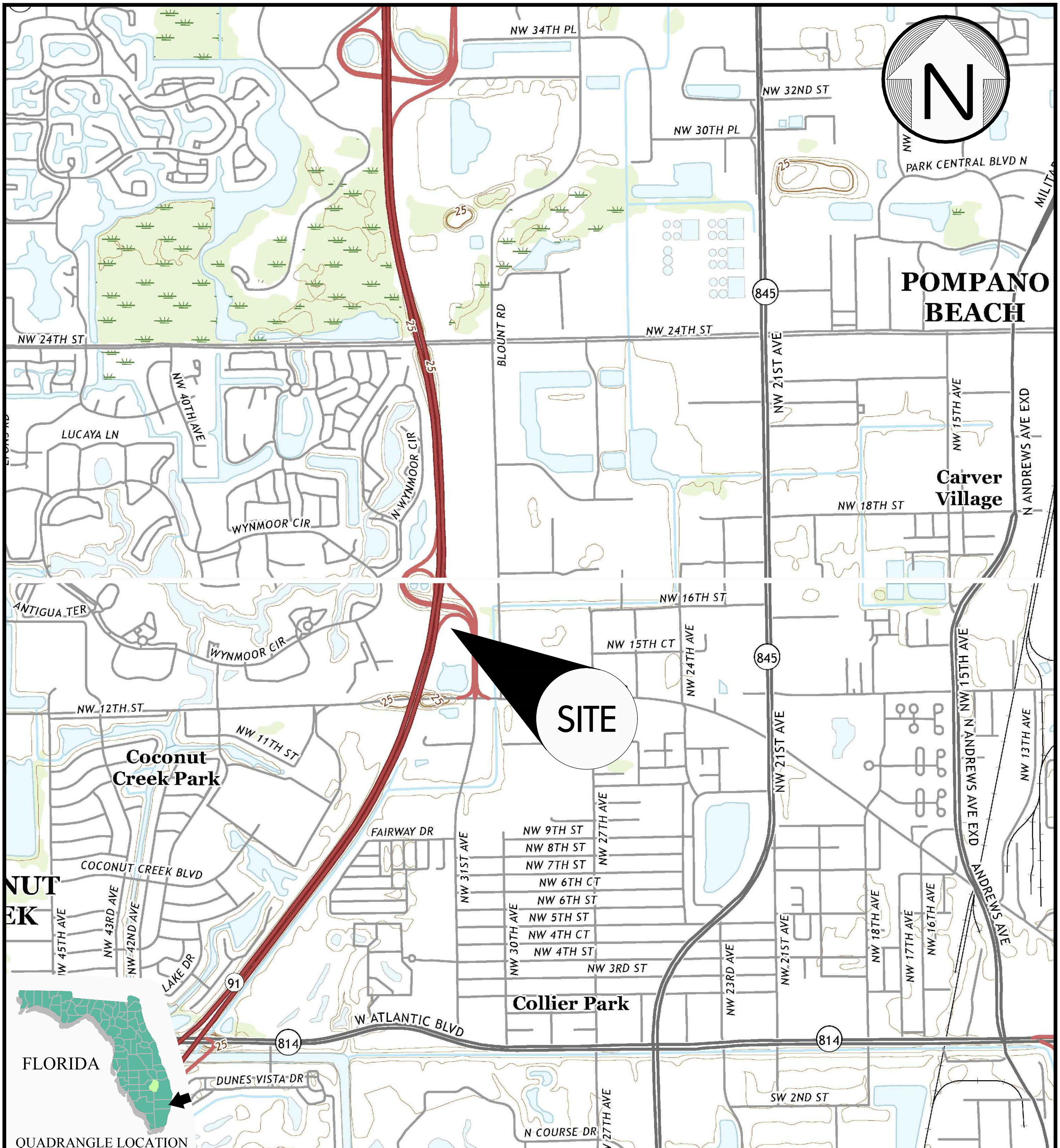
5.2.4 Drilled Shaft Load Test Program

A load test program is not considered to be necessary for the drilled shafts that will support the proposed tower structure.

5.3 Environmental Corrosion Classification

We understand that the design will assume substructure environmental classifications of extremely aggressive for concrete, and extremely aggressive for steel.

APPENDIX A



REFERENCE:
FT. LAUDERDALE NORTH QUADRANGLE; FLORIDA
TOPOGRAPHIC MAP
DATED: 2018
U.S. GEOLOGICAL SURVEY

0 1000' 2000'
GRAPHIC SCALE

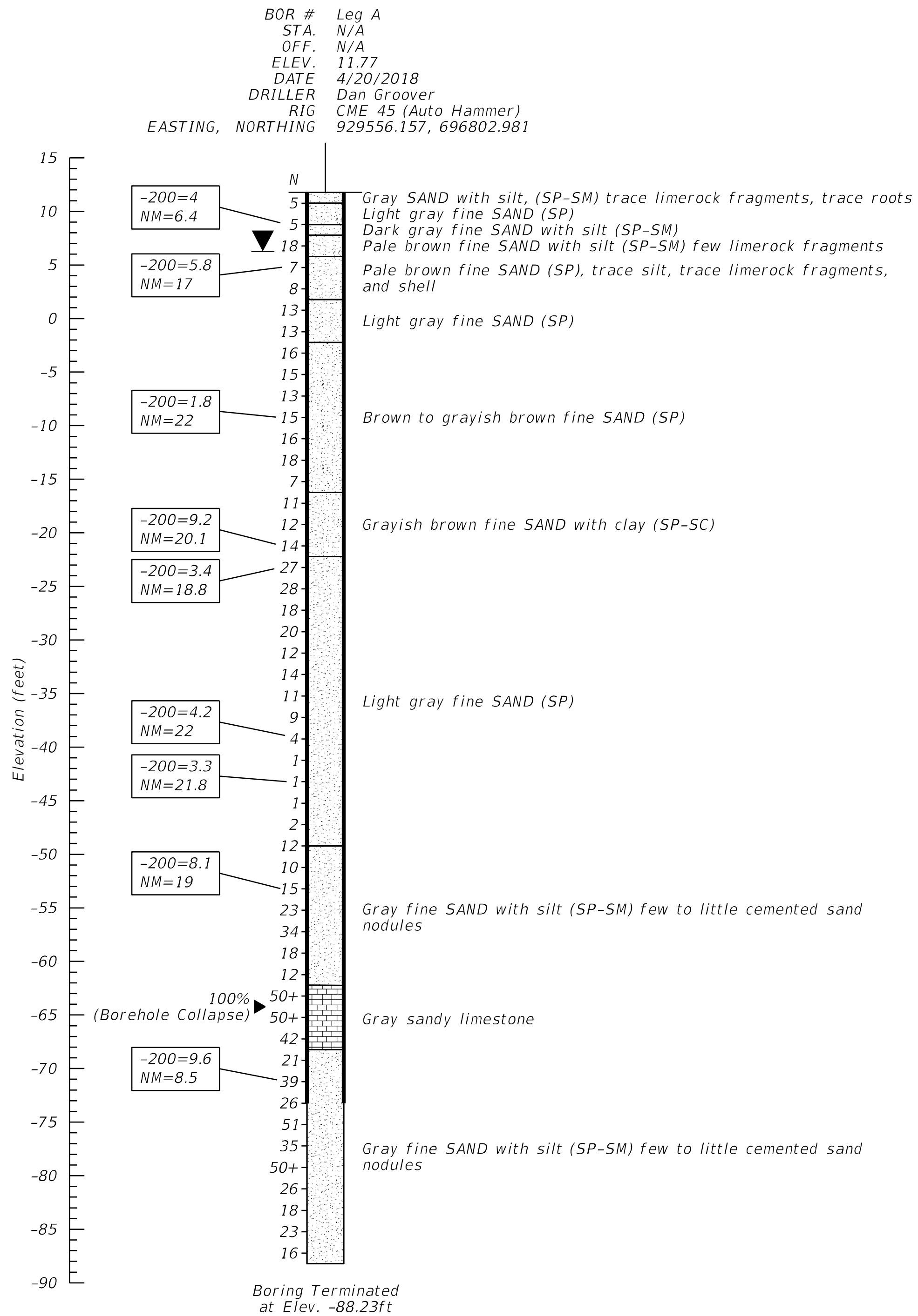
Amec Foster Wheeler Environment & Infrastructure, Inc.
2580 METROCENTRE BLVD., SUITE 6
WEST PALM BEACH, FL 33407 (561) 242-7713

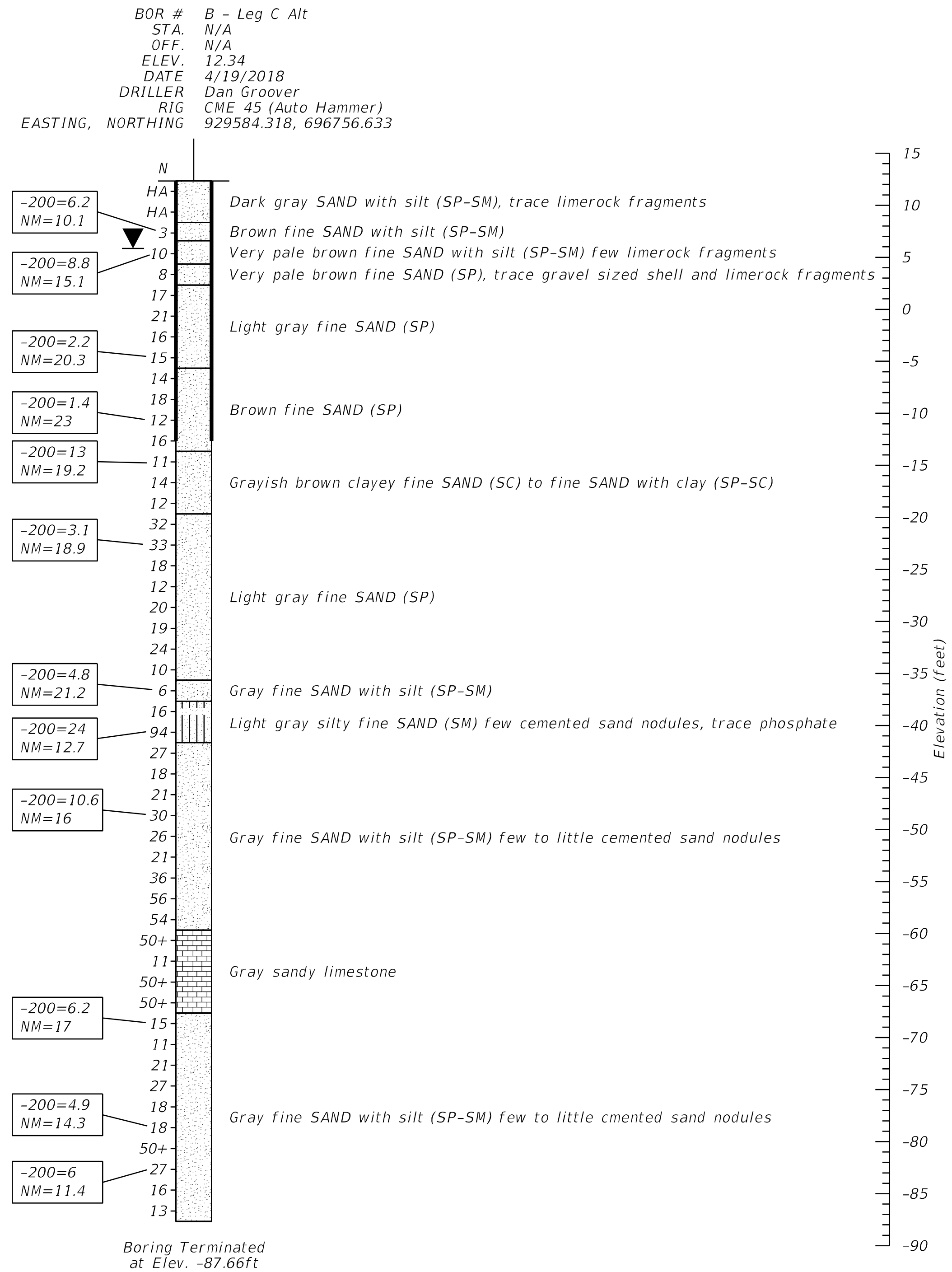
SITE LOCATION MAP

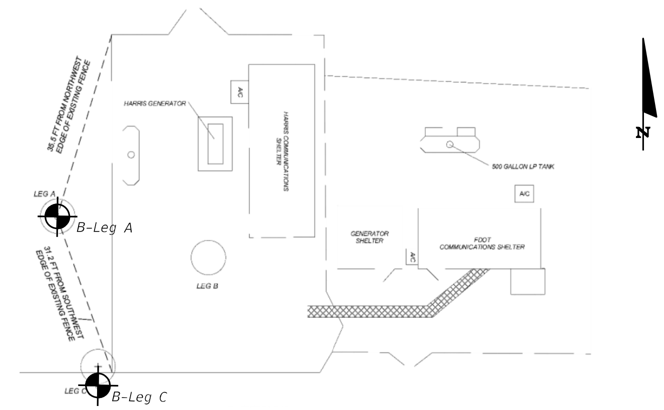
Tower Site
Financial Project ID: 431987-1
Broward County, Florida

DRAWN: JP	DATE: 5/11/18	SCALE: 1"=2000'
CHECKED: BSH	PROJ. NO. 6784-17-2930	APPROX.

APPENDIX B







NOTES:

1. Subsurface conditions shown on the borings represents the conditions at the boring locations. Subsurface variations between borings should be anticipated as indicated in Section 2-4 of the FDOT Specifications.

2. Northing and Easting state plane coordinates of borings are in feet, referenced to Florida East Zone NAD of 1983 1990 adjustment (NAD 83/90).

3. The limestone corresponds to a rock formation that typically offers high resistance to excavation. Special equipment and breaking tools may be required to excavate it. This material is also difficult to dewater due to its high porosity and permeability.

4. Limestone content provided for non-limestone material (e.g. SAND with little limestone fragments) is decriptive of the materials within the retrieved SPT sample. Insitu, the limestone may be present as lenses or seams (thin strata).

5. Cohesionless/granular soils may cave in during drilling. Stabilization measures may be required.

ENGINEERING CLASSIFICATION

GRANULAR MATERIALS

Relative Density	Safety Hammer SPT N-Value (Blows/Foot)	Automatic Hammer SPT N-Value (Blows/Foot)
VERY LOOSE	Less than 4	Less than 3
LOOSE	4 - 10	3 - 8
MEDIUM DENSE	10 - 30	8 - 24
DENSE	30 - 50	24 - 40
VERY DENSE	Greater than 50	Greater than 40

SILTS AND CLAYS

Consistency	Safety Hammer SPT N-Value (Blows/Foot)	Automatic Hammer SPT N-Value (Blows/Foot)
VERY SOFT	Less than 2	Less than 1
SOFT	2 - 4	1 - 3
FIRM	4 - 8	3 - 6
STIFF	8 - 15	6 - 12
VERY STIFF	15 - 30	12 - 24
HARD	Greater than 30	Greater than 24

ENVIRONMENTAL CLASSIFICATION

SUBSTRUCTURE:
Extremely Aggressive - Steel & Concrete

SUPERSTRUCTURE: Extremely Aggressive

LEGEND

- Standard Penetration Test (SPT) boring location
- (SP) Unified soil classification system group based on observation and laboratory tests
- N Standard penetration resistance in blows per foot (ASTM D1586), unless noted otherwise
- ▼ Groundwater level at time of drilling
- 100%▶ Percent loss of drilling fluid
- HA Hand Auger
- 3" Casing
- -200 Percent passing No. 200 Sieve
- NM Natural Moisture Content (%)
- Sand
- Silty Sand
- Limestone

SPOON:
Inside diameter - 1-3/8"
Outside diameter - 2"
Length - 18"
No Liner Used

HAMMER:
Weight - 140 lbs.
Average drop - 30"
Type - Automatic Hammer

REVISIONS

DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

Amec Foster Wheeler Environment & Infrastructure, Inc.
2580 Metrocentre Blvd., Suite #6
West Palm Beach, FL 33407
Phone: (561) 242-7713 / Fax: (561) 242-5591
CERTIFICATE OF AUTHORIZATION NO. 5392
E.O.R.: BRIAN S. HATHAWAY, FL. PE NO. 60724

DRAWN BY: JP 05-2018
CHECKED BY: BSH 05-2018
DESIGNED BY: JP 05-2018
CHECKED BY: BSH 05-2018

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
	BREVARD	431987-1-52-08

SHEET TITLE: REPORT OF CORE BORINGS

PROJECT NAME: POMPANO BEACH TOWER

REF. DWG. NO.

SHEET NO.

Field Procedures

Standard Penetration Test (SPT) Borings - The SPT borings were performed in general accordance with ASTM D-1586, "Penetration Test and Split-Barrel Sampling of Soils." The borings were initially advanced by sampling with the split-barrel sampler. A rotary drilling process was subsequently used and bentonite drilling fluid was circulated in the boreholes to stabilize the sides and flush the cuttings. At the specified intervals (every 2-feet center to center spacing), the drilling tools were removed and soil and rock samples were obtained with a standard 1.4-inch I.D., 2.0-inch O.D., split-tube sampler. The sampler was first seated 6 inches and then driven an additional 1.5 feet with blows of a 140-pound automatically tripped hammer falling 30 inches. The number of hammer blows required to drive the sampler the final foot is designated the "Penetration Resistance." The penetration resistance, when properly interpreted, is an index to the soil strength and density.

Representative portions of the soil samples, obtained from the sampler, were placed in glass jars and transported to our laboratory. The samples were then examined by a geotechnical engineer in order to confirm the field classifications.

APPENDIX C

SUMMARY OF LABORATORY INDEX TEST RESULTS

Pompano Beach Tower Site
Broward County, Florida
FPID No. 431987-1-52-08
Amec Foster Wheeler Project No. 6784172930.04.01

Boring No.	Sample No.	Approx. Depth (ft)	Percent Passing						Moisture Content (%)	ASTM Classification
			#4	#10	#40	#60	#100	#200		
Leg - A	2	3.0 - 4.0						4.0	6.4	SP
Leg - A	4	6.0 - 8.0						5.8	17.0	SP-SM
Leg - A	11	20.0 - 22.0						1.8	22	SP
Leg - A	17	32.0 - 34.0						9.2	20.1	SP-SC
Leg - A	18	34.0 - 36.0						3.4	18.8	SP
Leg - A	26	50.0 - 52.0						4.2	22.0	SP
Leg - A	28	54.0 - 56.0						3.3	21.8	SP
Leg - A	33	64.0 - 66.0	85	83	77	69	59	8.1	19	SP-SM
Leg - A	42	82.0 - 84.0	55	46	36	30	18	9.6	8.5	SP-SM
Leg - C	3	4.0 - 6.0						6.2	10.1	SP-SM
Leg - C	4	6.0 - 8.0						8.8	15.1	SP-SM
Leg - C	9	16.0 - 18.0						2.2	20.3	SP
Leg - C	12	22.0 - 24.0						1.4	23	SP
Leg - C	14	26.0 - 28.0						13	19.2	SC
Leg - C	18	34.0 - 36.0						3.1	18.9	SP
Leg - C	25	48.0 - 50.0						4.8	21.2	SP-SM
Leg - C	27	52.0 - 54.0	95	88	69	54	37	24	12.7	SM
Leg - C	31	60.0 - 62.0	83	78	73	63	40	11	16	SP-SM
Leg - C	41	80.0 - 82.0	82	63	43	27	17	6.2	17	SP-SM
Leg - C	46	90.0 - 92.0	58	55	50	44	22	4.9	14.3	SP-SM
Leg - C	48	94.0 - 96.0	59	44	25	16	11	6.0	11.4	SP-SM

Prepared by:	BSH	Date:	05/08/18
Checked by:	BL	Date:	05/10/18

Laboratory Procedures

Grain Size Distribution – The grain size distribution test was performed to determine the particle size and distribution of the sample tested. The sample was dried, weighed, and washed over a No. 200 mesh sieve. The dried sample was then passed through a standard set of nested sieves to determine the grain size distribution of the soil particles coarser than the No. 200 sieve. This test was conducted in general accordance with ASTM D-6913.

Fines Content
In this test, the sample is dried and then washed over a No. 200 mesh sieve. The percentage of soil by weight passing the sieve is the percentage of fines or portion of the sample in the silt and clay size range. This test was conducted in general accordance with ASTM D-1140.

Moisture (Water) Content Test – The water content is the ratio, expressed as a percentage, of the weight of water in a given mass of soil to the weight of the solid particles. This test was conducted in general accordance with ASTM D-2216.

APPENDIX D

GTR REVIEW CHECKLIST FOR SITE INVESTIGATION

A. Site Investigation Information

Since the most important step in the geotechnical design process is to conduct an adequate site investigation, presentation of the subsurface information in the geotechnical report and on the plans deserves careful attention.

Geotechnical Report Text (Introduction) (Pgs. 10-1 to 10-4)	Yes	No	Unknown or N/A
1. Is the general location of the investigation described and/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 the general description of subsurface soil, rock, and groundwater conditions given?	√		
*6. Is the following information included with the geotechnical report (typically included in the report appendices):			
a. Test hole logs? (Pgs. 2-24 to 2-32)	√		
b. Field test data?	√		
c. Laboratory test data? (Pgs. 4-22 to 4-23)	√		
d. Photographs (if pertinent)?			√
Plan and Subsurface Profile (Pgs. 2-19, 3-9 to 3-12, 10-13)			
*7. Is a plan and subsurface profile of the investigation site provided?	√		
8. Are the field explorations located on the plan view?	√		

*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
*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 (Pgs. 2-14, 2-15, 2-24 to 2-31)			
13. Are sample types and depths recorded?	√		
*14. Are SPT blow count, 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 (Pgs. 4-6, 4-22, 4-23)			
*16. Were lab soil classification tests such as natural moisture content, gradation, Atterberg limits, performed on selected representative samples to verify field visual soil identification?	√		
17. Are laboratory test results such as shear strength (Pg. 4-14), consolidation (Pg. 4-9), etc., included and/or summarized?			√

*A response other than (yes) or (N/A) for any of these checklist questions is cause to contact the appropriate geotechnical engineer for a clarification and/or to discuss the project.

GTR REVIEW CHECKLIST FOR DRILLED SHAFTS

H. Structure Foundations – Drilled Shafts (Pgs. 8-23 to 8-29)

In addition to the basic information listed in Section A, if drilled shaft support is recommended or given as an alternative, are conclusion/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 loads?	___	✓	___
*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 that will allow structural engineer to evaluate lateral load capacity of shaft?	✓	___	___
4.	Is static load test (to plunging failure) recommended?	___	✓	___
	Construction Considerations			
5.	Have construction methods been evaluated, i.e., can less expensive dry method or slurry method be used or will casing be required?	✓	___	___
6.	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)?	___	___	✓
7.	If artesian water was encountered in explorations, have design provisions been included to handle it (such as by requiring casing and a tremie seal)?	___	___	✓
8.	Will boulders be encountered? (If boulders will be encountered, then the use of shafts should be seriously questioned due to construction installation difficulties and resultant higher cost to 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.