



Town of Surfside

ITB 2023-05

Town Stormwater Improvements

Abbott Avenue Pump Station Project

Addendum No. 5

Date Issued: November 20, 2023

To All Proposers:

Proposers for the above-referenced ITB shall take note of the following changes, additions, deletions or clarifications to ITB No. 2023-05, which in accordance with the ITB Documents shall become a part of and have precedence over anything shown or described otherwise in the ITB.

THE FOLLOWING RESPONSES/CLARIFICATIONS ARE PROVIDED BY THE TOWN IN RESPONSE TO QUESTIONS/COMMENTS RECEIVED:

- 1. Bid submission deadline is extended until Monday, December 11th, 2023, at 2:00 P.M.**
2. During the pre-bid conference meeting, a question arose about the size of the manholes and the tee inside of them.
Response: The plans have been revised to accurately depict the appropriate manhole size. Refer to Sheet CP-502.
3. At the pre-bid conference meeting, there was a question about the asphalt mix design specifications.
Response: The General Specifications have been revised to accurately depict the current FDOT Standards. Refer to Sheet GI-003
4. In the pre-bid conference meeting, there was a question concerning the force main pipe on 92nd Street.
Response: Chlorination has been removed from Bid Section 33 01 11.
5. It is impossible to determine how much flowable fill might be directed by the owner. The quantity of flowable fill is not defined and is "as directed" in the measurement and payment. If we were to price flowable fill as backfill in all areas, due to its cost compared to traditional backfill, it would be astronomical and not be fair to the owner or bidders and create an unfair and noncompetitive bid for all. Please include a unit price line item for Flowable fill or remove/amend the following language. Currently all the Measurement & Payment descriptions include the following language: "The unit price for this item shall include the cost

of labor, equipment, ...excavation [including sheeting, shoring, bracing, dewatering, and any measures associated with dewatering; backfill (including flowable fill if so directed by the OWNER) compaction and testing; the cost of temporary pavement ...”

Response: The language stating “(including flowable fill if so directed by the OWNER)” has been replaced with “suitable backfill” The means and methods are left to the contractor’s discretion. Please refer to the revised Measurements and Payments Section 01 29 00.

6. Asbestos: Are there any existing Asbestos pipes within the work area of this project besides the AC lines to grouted?

Response: At this time there are no asbestos pipes affiliated with this project.

7. Contamination: Are there any known existing contamination within the vicinity of the work on this project?

Response: As confirmed with DERM-RER there are no documented contaminated sites within the project extents.

8. What is the anticipated award date for this project?

Response: We anticipate awarding a contract sometime in January of 2024.

9. What is the anticipated start date for construction?

Response: We anticipate construction commencing within FY 2024.

10. Will you be providing payment of stored materials?

Response: Yes.

11. Is there any known construction with other contractors within this project that may impact the work on this contract? If so:

- a. Where is the work involved?
- b. What type of work is it?
- c. What are the dates anticipated?

Response: No.

12. Is there any tree removal required in this project?

Response: No.

13. Is there any Owner or Utility companies work planned in the project boundaries.

Response: No work is planned to conflict with this Project.

14. PDF 120, 01 29 00 – 9, MEASUREMENT AND PAVEMENT, No.24 states: “Any additional costs including but not limited to barricades, lights, off duty police officers...shall be incorporated into the cost for this item” In order to include this cost in the bid please provide:

- a. Number of hours the police will be required?
- b. At what locations this is necessary?
- c. What are the costs & fees applicable?
- d. Preferably to avoid unforeseen controversies, please provide an allowance account as other municipalities like WASD provides for this effort.

Response: All Maintenance of Traffic (MOT) officers will be paid directly by the Town. Contractor is to assume responsibility for barricades and cones. A line item within the Bid Form has been provided for this allowance.

15. There is no mention of use of water for construction. If not provided at no cost, then please provide any costs associated with the use of water, so we can include it in the bid?
Response: The Town of Surfside will directly pay for water consumed by the Project. The Contractor will be provided with a water meter to use during construction. Fire hydrants will be accessible for use.
16. Is a field office required for this Project? If it is, is there Town property available for such use?
Response: A field office is not required for this Project.
17. There are no soil borings, please provide.
Response: See attached Geotechnical Reports.
18. Is there any required night work?
Response: No night work is anticipated for this Project.
19. PDF 167, 1.10 ABANDONMENT AND SALVAGE OF EXISTING FACILITIES- D, States: "...Items to be salvaged shall be stockpiled at a location as designated by the OWNER..." In order to include the salvage costs in the bid proposal please:
- Identify the type of materials to be salvaged?
 - The quantity to salvage
 - Location (how far from project materials are to be transported)?
 - Whether materials are to be transported as found or at bidder's convenience?
- Response: The Town is not seeking to salvage any material for this Project.**
20. PDF368 on Plans, Page GI-002, #3.9, states: "ALL EXCESS MATERIAL IS TO BE DISPOSED BY THE CONTRACTOR WITHIN 72 HOURS." Since this project consists of installing pipe below the water table, considerable amounts of excavated fill will be too wet to backfill with, is the engineer approving wet fill? Otherwise, it will be wise to save all excavated fill and allow to dry in order to immediately backfill the trench with dry fill and compact it. Please clarify / revise this requirement.
Response: Material can be stored for longer than 72 hours as approved by the Town. The intent is to be able to use fill if adequately suited.
21. PDF368 on Plans, Page GI-002, #3.10, states: "IN AREAS WHERE THE BASE IS EXPOSED BY THE MILLING OPERATION, THE CONTRACTOR SHALL RESTORE THE BASE TO ITS ORIGINAL THICKNESS AND STRUCTURAL CAPACITY..." In the past we have confronted several areas within the Town with this condition (insufficient pavement depth). Based on that information we are anticipating approximately 25 sy which is 10% of the 256 sy in the pay item for milling for this of this circumstance. In order to correctly include the true cost in the bid, we request a separate pay item be provided for this undetermined quantity.
Response: Please see attached revised Bid Form with additional line item No 32 specifying an additional 10% of the Quantity of item 20. (Asphalt in Tons).
22. Please provide "GEOTECHNICAL REPORTS".
Response: See attached Geotechnical Reports.
23. Could you please provide the calculations for the drain wells so we will have an idea how deep we will have to go to achieve the 300 GMP per Foot of Head or if you can't provide that information, can you base the length of the drain well at 100 ft and anything after that would be treated as an unforeseen condition.

Response: The design incorporates drainage wells with a capacity of 500 Gallons Per Minutes (GPM) per foot of head, extending to a planned depth of 60 feet. Please refer to the attached stormwater report for the drainage well capacity.

24. Will we be required to provide formation samples, water quality samples, including water quality analysis (TDS), preparation of a water quality profile and lithologic profile and abandonment, and the required FDEP special conditions "Reasonable Assurance Report" written by a Professional Geologist Engineer which will be required if not provided by the Design Engineer.

Response: Not required.

PROPOSER:

NAME: _____

TITLE: _____

DATE: _____

**QUOTATION FORM
FOR**

ABBOTT AVENUE DRAINAGE IMPROVEMENTS

<u>Item No.</u>	<u>Estimated Quantity</u>	<u>Item Units</u>	<u>Description</u>	<u>Total</u>
1.	1	Each	For furnishing and installing pump station structure(s) (including all pumps, piping, pressure transducers, access hatch, control panel and other electrical equipment / wiring / conduits needed for the pump station) _____ Dollars and _____ Cents (_____ \$/each)	\$ _____
2.	1	Each	For furnishing and installing valve vault(s) (including all piping, access hatch, and two (2) 24-inch check valves) _____ Dollars and _____ Cents (_____ \$/each)	\$ _____
3.	1	Each	For furnishing and installing bypass structure(s) (Including Structure and 24-inch Sluice Gate) _____ Dollars and _____ Cents (_____ \$/each)	\$ _____
4.	1	Each	For furnishing and installing downstream defender(s) (Including manhole and Downstream Defender) _____ Dollars and _____ Cents (_____ \$/each)	\$ _____
5.	1	Each	For furnishing and installing control structure(s) (including all Tide Flex valves, flap gates) _____ Dollars and _____ Cents (_____ \$/each)	\$ _____

**QUOTATION FORM
FOR**

ABBOTT AVENUE DRAINAGE IMPROVEMENTS

<u>Item No.</u>	<u>Estimated Quantity</u>	<u>Item Units</u>	<u>Description</u>	<u>Total</u>
6.	1	Each	For furnishing and installing trash rack structure(s) (including all grates and sluice gate, access hatch) _____ Dollars and _____ Cents (_____ \$/each)	\$ _____
7.	6	Each	For furnishing and installing drainage injection well(s) (including all manhole structure, vent pipes) _____ Dollars and _____ Cents (_____ \$/each)	\$ _____
8.	16	Each	For furnishing and installing Manhole(s)/Catch Basin(s) (including inlet tops, and manhole covers) _____ Dollars and _____ Cents (_____ \$/each)	\$ _____
9.	1,622	LF	For furnishing and installing 12-inch PVC (C-900) stormwater forcemain pipe _____ Dollars and _____ Cents (_____ \$/LF)	\$ _____
10.	147	LF	For furnishing and installing 18-inch PVC (C-900) stormwater forcemain pipe _____ Dollars and _____ Cents (_____ \$/LF)	\$ _____

**QUOTATION FORM
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ABBOTT AVENUE DRAINAGE IMPROVEMENTS

<u>Item No.</u>	<u>Estimated Quantity</u>	<u>Item Units</u>	<u>Description</u>	<u>Total</u>
11.	388	LF	For furnishing and installing 24-inch PVC (C-900) stormwater forcemain pipe _____ Dollars and _____ Cents (_____ \$/LF)	\$ _____
12.	278	LF	For furnishing and installing 30-inch PVC (C-900) stormwater forcemain pipe _____ Dollars and _____ Cents (_____ \$/LF)	\$ _____
13.	1,061	LF	For furnishing and installing 24-inch HDPE stormwater pipe _____ Dollars and _____ Cents (_____ \$/LF)	\$ _____
14.	24	Each	For furnish and installing 12-inch fittings (bends, wyes, tees, plugs, etc.) _____ Dollars and _____ Cents (_____ \$/each)	\$ _____
15.	9	Each	For furnish and installing 18-inch fittings (bends, wyes, tees, plugs, etc.) _____ Dollars and _____ Cents (_____ \$/each)	\$ _____

**QUOTATION FORM
FOR**

ABBOTT AVENUE DRAINAGE IMPROVEMENTS

<u>Item No.</u>	<u>Estimated Quantity</u>	<u>Item Units</u>	<u>Description</u>	<u>Total</u>
16.	4	Each	For furnish and installing 24-inch fittings (bends, wyes, tees, plugs, etc.) _____ Dollars and _____ Cents (_____ \$/each)	\$ _____
17.	3	Each	For furnish and installing 30-inch fittings (bends, wyes, tees, plugs, etc.) _____ Dollars and _____ Cents (_____ \$/each)	\$ _____
18.	2	Each	For furnish and installing Air release Valves _____ Dollars and _____ Cents (_____ \$/each)	\$ _____
19.	4,469	SY	For pipe bedding; temporary pavement materials if apply; material for restoration of asphalt (including limerock base, asphaltic concrete surface course and asphaltic concrete structural course) _____ Dollars and _____ Cents (_____ \$/SY)	\$ _____
20.	256	TN	For asphalt, milling and resurfacing (Including all areas from 1 1/2" restoration to 1" milling & resurfacing) _____ Dollars and _____ Cents (_____ \$/TN)	\$ _____

**QUOTATION FORM
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ABBOTT AVENUE DRAINAGE IMPROVEMENTS

<u>Item No.</u>	<u>Estimated Quantity</u>	<u>Item Units</u>	<u>Description</u>	<u>Total</u>
21.	1	LS	For pavement marking _____ Dollars and _____ Cents (_____ \$/TN)	\$ _____
22.	Subtotal		Bid Items 1 through 21, the sum of:	\$ _____
23.	1	LS	Mobilization _____ Dollars and _____ Cents	\$ _____
24.	1	LS	Maintenance of Traffic _____ Dollars and _____ Cents	\$ _____
25.	1	LS	Erosion Control/BMPs/SWPPP Measures _____ Dollars and _____ Cents	\$ _____
26.	1	LS	Construction Surveying / Stake-out / As-Built _____ Dollars and _____ Cents	\$ _____
27.	1	LS	Construction Material Testing _____ Dollars and _____ Cents	\$ _____

**QUOTATION FORM
FOR**

ABBOTT AVENUE DRAINAGE IMPROVEMENTS

<u>Item No.</u>	<u>Estimated Quantity</u>	<u>Item Units</u>	<u>Description</u>	<u>Total</u>
28.	Dedicated Allowance	LS	For providing a certified industrial hygienist or State of Florida licensed engineer in environmental discipline to develop health and safety plan; the aggregate sum of. _____ <u>Twenty-Five Thousand</u> Dollars and _____ <u>Zero</u> Cents	\$ <u>25,000.00</u>
29.	Dedicated Allowance		For all costs of required permit fees, inspections, impact fees, if authorized by the Engineer, the sum of 5% of the Subtotal Item 22; (0.05) X (Subtotal, Item 20). _____ Dollars and _____ Cents	\$ _____
30.	256	TN	For asphalt, milling and resurfacing (Including all areas from 1 ½" restoration to 1" milling & resurfacing) _____ Dollars and _____ Cents (_____ \$/TN)	\$ _____
31.	Owner Contingency Allowance		For unforeseen improvements, for minor construction changes and quantities adjustments at other intersections along 92 nd Street, if ordered by the Town, the aggregate sum of _____ <u>One-Hundred Thousand</u> Dollars and _____ <u>Zero</u> Cents	\$ <u>100,000.00</u>

**QUOTATION FORM
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ABBOTT AVENUE DRAINAGE IMPROVEMENTS

<u>Item No.</u>	<u>Estimated Quantity</u>	<u>Item Units</u>	<u>Description</u>	<u>Total</u>
32.	26	TN	For unforeseen conditions, for insufficient pavement depth.	
			_____ Dollars and	
			_____ Cents	\$ _____
33.	TOTAL BID		Bid Items 22 through 32, the sum of:	\$ _____

Time Allowance Account For unforeseen conditions, for minor construction changes and for Quantity adjustments, if ordered by the Engineer the total of Forty (40) Calendar Days.

NOTE: For a detailed description of each Quotation Item, refer to Section 01 29 00 "Measurement and Payment" of the Specifications

**QUOTATION FORM
FOR**

ABBOTT AVENUE DRAINAGE IMPROVEMENTS

FLORIDA TRENCH SAFETY ACT

Bidder acknowledges that included in the various items of the Quotation and in the Total Bid Price are costs for complying with the Florida Trench Safety Act (90-96, Laws of Florida) effective October 1, 1990. The bidder further identifies the costs to be summarized below:

Trench Safety Measure (Description)	Units of Measure (LF, SY)	Unit (Quantity)	Unit Cost	Extended Cost
A.	_____	_____	_____	_____
B.	_____	_____	_____	_____
C.	_____	_____	_____	_____
D.	_____	_____	_____	_____
TOTAL \$			_____	_____

3.5 MATERIAL DELIVERY, STORAGE, AND PROTECTION

- A. All piping materials, fittings, valves, and accessories shall be delivered in a clean and undamaged condition and stored off the ground for protection against oxidation caused by ground contact. All defective or damaged materials shall be replaced with new materials.

END OF SECTION

40 05 06 REPAIR CLAMPS AND TRANSITION COUPLINGS

PART 1 - GENERAL

1.1 THE REQUIREMENT

- A. The WORK includes abandoning existing 2-inch galvanized potable water piping and potable water service connections connected to existing 6-inch, 8-inch, and 10-inch asbestos concrete (AC) pipe. The CONTRACTOR shall remove the existing tapping saddles on the existing asbestos concrete pipe and furnish and install full circle repair clamps to repair the taps and abandon the existing piping as shown on the Drawings, in accordance with the Contract Documents.
- B. The WORK includes connecting new PVC and ductile iron piping to existing 6-inch, 8-inch, and 10-inch AC pipe as part of the new potable water and force main installation. The CONTRACTOR shall furnish and install PVC to AC pipe and DIP to AC pipe transition couplings as required to complete the designed connections of new piping to the existing AC pipe as shown on the Drawings, in accordance with the Contract Documents.
- C. It is the CONTRACTOR's responsibility to develop the details necessary to construct the connections and to provide and install all spools, spacers, adapters, and connectors for a complete and functional system.
- D. The provisions of this Section shall apply to all piping sections in Divisions 33 and 40.

1.2 CONTRACTOR SUBMITTALS

- A. Shop Drawings: Submit manufacturer's catalog sheets providing information on materials and installation procedures.

PART 2 - PRODUCTS

2.1 REPAIR CLAMPS

- A. Repair clamps shall be full circle clamps sized for asbestos concrete outside diameter.
- B. Repair clamps shall be constructed of 18-8 Type 304 stainless steel. Gaskets shall be Buna-N. Bolts and nuts shall be 18-8 Type 304 stainless steel.
- C. Manufacturers or Equal:
 - 1. Cascade Waterworks Manufacturing
 - 2. Ford Meter Box Company
 - 3. JCM Industries

4. Smith Blair

2.2 TRANSITION COUPLINGS

- A. Transition couplings shall be designed and sized for PVC to asbestos concrete pipe and ductile iron to asbestos concrete pipe transitions.
- B. Transition couplings shall be constructed of ductile iron pipe in accordance with ASTM A 536. Gaskets shall be Buna-N. Bolts and nuts shall be Type 18-8 type 304 stainless steel.
- C. Manufacturers or Equal:
 - 1. Cascade Waterworks Manufacturing
 - 2. Ford Meter Box Company
 - 3. Romac Industries
 - 4. Smith Blair

PART 3 - EXECUTION

3.1 MATERIAL DELIVERY, STORAGE, AND PROTECTION

- A. Piping materials, fittings, valves, and accessories shall be delivered in a clean and undamaged condition and stored off the ground for protection against oxidation caused by ground contact.
- B. Defective or damaged materials shall be replaced with new materials.

3.2 INSTALLATION

- A. Repair clamps, transition couplings, and accessories shall be installed in accordance with the requirements of the applicable Sections of Divisions 2 and 15, and in accordance with the manufacturer's instructions.
- B. Piping and gaskets shall be carefully cleaned and inspected prior to making connections.

END OF SECTION

DIVISION 41 – PROCESS EQUIPMENT (NOT USED)

DIVISION 42 – PROCESS HEATING, COOLING AND DRYING EQUIPMENT (NOT USED)

DIVISION 43 – MATERIAL HANDLING EQUIPMENT

43 30 00 VALVES, GENERAL

PART 1 - GENERAL

1.1 THE SUMMARY

- A. Provide valves, actuators, and appurtenances, complete and operable, as indicated in accordance with the Contract Documents.
- B. The provisions of this Section shall apply to all valves and valve actuators except where otherwise indicated.
- C. Valves and actuators in particular locations may require a combination of units, sensors, limit switches, and controls, as indicated.
- D. Unit Responsibility
 - 1. A single manufacturer shall be responsible for the coordination of design, assembly, testing, and furnishing of each valve; however, the CONTRACTOR shall be responsible to the OWNER for compliance with the requirements of each valve Section.
 - 2. Unless indicated otherwise, the responsible manufacturer shall be the manufacturer of the valve.
- E. Single Manufacturer
 - 1. Where 2 or more valves of the same type and size are required, the valves shall be furnished by the same manufacturer.

1.2 CONTRACTOR SUBMITTALS

- A. Furnish the following information on Shop Drawings:
 - 1. Valve name, size, Cv factor, pressure rating, identification number (if any), and specification section number;

2. Complete information on the valve actuator, including size, manufacturer, model number, limit switches, and mounting;
 3. Assembly drawings showing part nomenclature, materials, dimensions, weights, and relationships of valve handles, hand wheels, position indicators, limit switches, integral control systems, needle valves, and control systems;
- B. Furnish a technical manual containing the required information for each valve, as indicated.
- C. Furnish a spare parts list, containing the required information for each valve assembly, as indicated.
- D. Factory Test Data
1. Where indicated, submit signed, dated, and certified factory test data for each valve requiring certification, before shipping the valve.
 2. Furnish a certification of quality and test results for factory-applied coatings.

PART 2 - PRODUCTS

2.1 PRODUCTS

A. General

1. Provide valves and gates of new and current manufacture.
2. Provide buried valves with valve boxes and covers containing position indicators and valve extensions.

B. Protective Coating

1. Coat the exterior surfaces of valves and the wet interior surfaces of ferrous valves of sizes 4-inch and larger in accordance with the requirements of Specification 09 96 00 – Protective Coating.
2. The valve manufacturer shall certify in writing that the required coating has been applied and tested in the manufacturing plant prior to shipment, in accordance with the indicated requirements.
3. Do not epoxy-coat the flange faces of valves.

C. Valve Labeling

1. Buried valves shall be equipped with a valve tag indicating size and type of valve located at the valve box in accordance with the detail on the Drawings.

D. Valve Testing

1. As a minimum, unless otherwise indicated or recommended by the reference standards, test valves 3 inches in diameter and smaller in accordance with the manufacturer's standard procedure.
2. Factory-test valves 4 inches in diameter and larger as follows:
 - a. Hydrostatic Testing
 - 1) Subject valve bodies to an internal hydrostatic pressure equivalent to twice the water-rated pressure of the valve.
 - 2) Metallic valves rating pressures shall be based at 100 degrees F.
 - 3) Plastic valves rating pressures shall be based at 73 degrees F, or at a higher temperature according to material type.
 - 4) During the hydrostatic test, there shall be no visible leakage through the valve body, end joints, or shaft seals, nor shall parts of the valve be permanently deformed.
 - 5) Allow test duration of at least 10 minutes, in order to allow visual examination for leakage.
 - b. Seat Testing
 - 1) Test the valves for leaks in the closed position, with the pressure differential across the seat equal to the water rated pressure of the valve.
 - 2) Provide test duration of at least 10 minutes, in order to allow visual examination for leakage.
 - 3) The leakage rate shall be the more stringent of the following:
 - a). As recommended by the reference standard for that type of valve; or
 - b). Leakage past the closed valve not to exceed one fluid ounce per hour per inch diameter for metal seated valves, and drop-tight for resilient seated valves.
 - c. Performance Testing
 - 1) Shop-operate the valves from the fully-closed to the fully-open position, and reverse under no-flow conditions in order to demonstrate that the valve assembly operates properly.

E. Certification

1. Prior to shipment of valves with sizes larger than 12-inches in diameter, submit certified, notarized copies of the hydrostatic factory tests, showing compliance with the applicable standards of AWWA, ANSI, or ASTM.

F. Valve Markings

1. Permanently mark valve bodies in accordance with MSS SP25 - Standard Marking Systems for Valves, Fittings, Flanges, and Unions.

2.2 MATERIALS

A. General

1. Provide materials suitable for the intended application.
2. Provide materials in contact with potable water listed as compliant with NSF Standard 61.
3. Ensure that materials not indicated are of high-grade standard commercial quality, free from defects and imperfections that might affect the serviceability of the product for the purpose for which it is intended.
4. Unless otherwise indicated, provide valve and actuator bodies conforming to the following requirements:
 - a. Cast Iron: Close-grained gray cast iron, conforming to ASTM A 48 - Gray Iron Castings, Class 30, or to ASTM A 126 - Gray Iron Castings for Valves, Flanges, and Pipe Fittings
 - b. Ductile Iron: ASTM A 536 - Ductile Iron Castings, or to ASTM A 395 - Ferritic Ductile Iron Pressure-Retaining Castings for Use at Elevated Temperatures
 - c. Steel: ASTM A 216 - Steel Castings, Carbon Suitable for Fusion Welding for High-Temperature Service, or to ASTM A 515 - Pressure Vessel Plates, Carbon Steel, for Intermediate- and Higher-Temperature Service
 - d. Bronze: ASTM B 62 - Composition Bronze or Ounce Metal Castings, and valve stems not subject to dezincification shall conform to ASTM B 584 - Copper Alloy Sand Castings for General Applications. Bronze materials in contact with potable water service shall be free of lead content meeting the Lead Reduction Act.
 - e. Stainless Steel: Stainless steel valve and operator bodies and trim shall conform to ASTM A 351 - Steel Castings, Austenitic, for High-Temperature Service, Grade CF8M, or shall be Type 316 stainless steel

- f. PVC: Polyvinyl chloride materials for valve body, flanges, and cover shall conform to Cell Classification 12454
- g. CPVC: Chlorinated Poly Vinyl Chloride materials for valve body, flanges, and cover shall conform to Cell Classification 23447
- h. NSF Standard 61: Materials shall be listed for use in contact with potable water.

2.3 VALVE CONSTRUCTION

A. Bodies

1. Provide valve bodies that are cast, molded (in the case of plastic valves), forged, or welded, of the materials indicated, and with smooth interior passages.
2. Provide wall thicknesses uniform and in agreement with the applicable standards for each type of valve, without casting defects, pinholes, and other defects that could weaken the body.
3. Perform welds on welded bodies by certified welders and ground welds smooth.
4. Provide valve ends as indicated, and rated for the maximum temperature and pressure to which the valve will be subjected.

B. Valve End Connections

1. Unless otherwise indicated, valves 2-1/2 inches in diameter and smaller may be provided with threaded end connections.
2. Provide valves 3 inches in diameter and larger with flanged end connections.
3. Flanges, bolts and gaskets shall be as specified in Section 40 05 00 - Piping, General.

C. Bonnets

1. Connect valve bonnets to the body by clamping, screwing, or flanging.
2. Provide bonnets of the same material, temperature, and pressure rating as the body.
3. Make provisions for the stem seal with the necessary glands, packing nuts, and yokes.

D. Stems

1. Provide valve stems of the materials indicated, or, if not indicated, of the best commercially-available material for the specific service, with adjustable stem packing, O-rings, chevron V-type packing, or other suitable seal. Bronze materials in contact

with potable water shall be NSF 61 approved and free of lead. Elastomeric materials shall be compatible with fluid service.

2. Where subject to dezincification, ensure that bronze valve stems conform to ASTM B 62, containing not more than 5 percent of zinc or more than 2 percent of aluminum, with a minimum tensile strength of 30,000 psi, a minimum yield strength of 14,000 psi, and an elongation of at least 10 percent in 2 inches.
3. Where dezincification is not a problem, bronze conforming to ASTM B 584 may be used, except that the zinc content shall not exceed 16 percent.

E. Stem Guides

1. Provide stem guides paced 10 feet on centers, unless the manufacturer can demonstrate by calculation that a different spacing is acceptable.

F. Internal Parts

1. Provide internal parts and valve trim as indicated for each individual valve.

G. Nuts and Bolts

1. Unless otherwise indicated, provide nuts and bolts on valve flanges and supports in accordance with the requirements of Section 05 50 00 – Miscellaneous Metalwork and Section 40 05 00 – Piping, General.

2.4 VALVE ACTUATORS

- A. Valve actuators shall be as indicated and as specified in Section 43 30 12 – Valve and Gate Actuators

2.5 VALVE ACCESSORIES

- A. Provide valves complete with the accessories required to provide a functional system.

2.6 SPARE PARTS

- A. Furnish the required spare parts, suitably packaged and labeled with the valve name, location, and identification number.
- B. Furnish the name, address, and telephone number of the nearest distributor for the spare parts of each valve.
- C. Spare parts are intended for use by the OWNER, after expiration of the correction of defects period.

2.7 MANUFACTURERS

- A. Valve manufacturers shall have a successful record of not less than 5 years in the manufacture of the indicated valves.

PART 3 - EXECUTION

3.1 VALVE INSTALLATION AND TRIAL OPERATION

A. General

1. Install valves, actuating units, stem extensions, valve boxes, and accessories in accordance with the manufacturer's written instructions and as indicated.
2. Adequately brace gates in order to prevent warpage and bending under the intended use.
3. Firmly support valves in order to avoid undue stresses on the pipe.

B. Access

1. Install valves in a manner to provide easy access for actuation, removal, and maintenance, and to avoid interference between valve actuators and structural members, handrails, and other equipment.

C. Valve Accessories

1. Where combinations of valves, sensors, switches, and controls are indicated, properly assemble and install such items such that systems are compatible and operating properly.
2. Clearly note the relationship between interrelated items on Shop Drawing submittals.

END OF SECTION

43 30 12 VALVES AND GATE ACTUATORS

PART 1 - GENERAL

1.1 THE SUMMARY

- A. Provide valve and gate actuators and appurtenances, complete and operable, as indicated in accordance with the Contract Documents.
- B. The provisions of this Section apply to valves and gates except where otherwise indicated in the Contract Documents.
- C. Unit Responsibility
 - 1. Make the valve or gate manufacturer responsible for the coordination of design, assembly, testing, and installation of actuators on the valves and gates; however, the CONTRACTOR shall be responsible to the OWNER for compliance of the valves, gates, and actuators with the Contract Documents.
- D. Where 2 or more valve or gate actuators of the same type or size are required, the actuators shall be produced by the same manufacturer.

1.2 CONTRACTOR SUBMITTALS

- A. Furnish submittals in accordance with the requirements of Specification 43 30 00 – Valves, General.
- B. Submit Shop Drawing information for actuators with the valve and gate submittals as a complete package.
- C. Submit calculations showing dynamic seating and unseating torques versus the output torque of the actuator.

PART 2 - PRODUCTS

2.1 GENERAL

- A. Provide actuators complete and operable with mounting hardware, gears, nuts, and extensions, as applicable.
- B. Provide actuators with torque ratings equal to or greater than required for valve seating and dynamic torques, whichever is greater, and capable of holding the valve in any intermediate position between fully-open and fully-closed without creeping or fluttering.
- C. Actuator torque ratings for butterfly valves shall be determined in accordance with AWWA C504 - Rubber-Seated Butterfly Valves.

D. Manufacturers

1. Where indicated, certain valves and gates may be provided with actuators manufactured by the valve or gate manufacturer.
2. Where actuators are furnished by different manufacturers, coordinate the selection to result in the fewest number of manufacturers possible.

E. Materials

1. Provide actuators of current models, of the best commercial quality materials, and liberally sized for the required torque.
2. Provide materials suitable for the environment in which the valve or gate is to be installed.

F. Actuator Mounting and Position Indicators

1. Securely mount actuators by means of brackets or hardware specially designed and sized for this purpose and of ample strength.
2. Cast the word "OPEN" on each valve or actuator, with an arrow indicating the direction to open in the counter-clockwise direction.
3. Equip gear and power actuators with position indicators.

G. Standards

1. Provide fasteners in accordance with the requirements of Section 05 50 00 – Miscellaneous Metalwork.
2. Provide coatings in accordance with the requirements of Section 09 96 00 – Protective Coating.

2.2 MANUAL ACTUATORS

A. General

1. Unless otherwise indicated, provide valves and gates with manual actuators.
2. Provide valves in sizes up to and including 4 inches with direct-acting lever or hand wheel actuators of the manufacturer's best standard design.
3. Provide valves and gates larger than 4-inch with gear-assisted manual actuators, with an operating pull of maximum 60 pounds on the rim of the hand wheel.

4. Provide buried valves with worm gear actuators, hermetically-sealed water-tight and grease-packed.

B. Buried Valves

1. Buried valves with extension stems to grade, with square nuts, position indicators, and cast-iron or steel pipe extensions with valve boxes, covers, and operating keys as detailed on the Drawings.
2. Provide wrench-nuts in compliance with AWWA C 500 - Metal-Seated Gate Valves for Water Supply Service.

C. Manual Worm Gear Actuator

1. Provide an actuator consisting of a single- or double-reduction gear unit contained in a weatherproof cast iron or steel body with cover, and a minimum 12-inch diameter hand wheel.
2. Provide the actuator to be capable of a 90-degree rotation, and equip the actuator with travel stops capable of limiting the valve opening and closing.
3. Provide the actuator with spur or helical gears and worm gearing.
4. Provide a self-locking gear ratio in order to prevent "back-driving."
5. Construct the spur or helical gears of hardened alloy steel, and the worm gear of alloy bronze.
6. Construct the worm gear shaft and the hand wheel shaft from 17-4 PH or similar stainless steel.
7. Accurately cut gearing with hobbing machines.
8. Use ball or roller bearings throughout.
9. Provide the output shaft end with a spline in order to allow adjustable alignment.
10. Actuator output gear changes shall be mechanically possible by simply changing the exposed or helical gear set ratio without further disassembly of the actuator.
11. Design gearing for a 100 percent overload.
12. The entire gear assembly shall be sealed weatherproof.
13. Design and rate buried gear actuators for buried service, provide with a stainless steel input shaft, and double-seal on shaft and top cap.

D. Traveling-Nut Actuator

1. Provide the actuator with a traveling-nut and screw (Scotch yoke), contained in a weatherproof cast iron or steel housing with a spur gear and a minimum 12-inch diameter hand wheel.
2. The screw shall run in 2 end bearings, and provide a self-locking actuator in order to maintain the valve position under any flow condition.
3. Construct the screw and gear from hardened alloy steel or stainless steel, and the construct the nut and bushings from alloy bronze.
4. The bearings and gear shall be grease-lubricated by means of nipples.
5. Design gearing for a 100 percent overload.

2.3 VALVE BOXES

- A. Cast iron valve boxes shall be provided for all valves that are below finished grade elevations. Valve boxes shall be a two-piece screw type consisting of a cast iron base and adjustable cast iron top section with cover that shall be marked "WATER" or "SEWER" as appropriate.
- B. Manufacturers of Valve Boxes for Water, or equal:
 1. Tyler
 2. U.S. Foundry
 3. Wager Company

PART 3 - EXECUTION

3.1 MATERIAL DELIVERY, STORAGE, AND PROTECTION

- A. All valves, valve boxes, and accessories shall be delivered in a clean and undamaged condition and stored off the ground for protection against oxidation caused by ground contact. All defective or damaged materials shall be replaced with new materials.

3.2 SERVICES OF MANUFACTURER

- A. The adjustment of actuator controls and limit switches in the field for the required function shall be performed by field representatives of the manufacturers of valves or gates with pneumatic, hydraulic, or electric actuators.

3.3 INSTALLATION

- A. Install valve and gate actuators and accessories in accordance with the requirements of Section 43 30 00 – Valves, General. Install valves and valve boxes as detailed on the Drawings and in accordance with the manufacturer's recommendations.

END OF SECTION

43 30 22 GATE VALVES

PART 1 - GENERAL

1.1 THE SUMMARY

- A. The CONTRACTOR shall provide gate valves and appurtenances, complete and operable, in accordance with the Contract Documents.
- B. The requirements of Section 43 30 00 - Valves, General apply to this Section.
- C. The requirements of Section 43 30 12 - Valve and Gate Actuators apply to this Section.

1.2 CONTRACTOR SUBMITTALS

- A. Furnish submittals in accordance with Section 43 30 00 – Valves, General.

PART 2 - PRODUCTS

2.1 GENERAL

- A. Buried valves shall be of the inside screw, non-rising stem type. The valve actuators shall be as indicated, with counter-clockwise opening stems, in accordance with Section 43 30 12 – Valve and Gate Actuators.
- B. All gate valves shall be resilient-seated gate valves as specified below.

2.2 RESILIENT-SEATED GATE VALVES

- A. Construction: Resilient-seated gate valves shall conform to AWWA C509 - Resilient-Seated Gate Valves for Water and Sewerage Systems. The valves shall be suitable for a minimum design working water pressure of 200 psig, with flanged, bell and spigot, or mechanical joint ends as indicated. The valve body, bonnet, and disc shall be of cast iron or ductile iron and the disc or body shall be rubber-coated. Body and bonnet wall thickness shall be equal to or greater than the minimum wall thickness as listed in Table 1 of AWWA C509. The stem, stem nuts, glands, and bushings shall be bronze, with the stem seal per AWWA C509.
- B. Pressure Ratings: AWWA C509 valves that are 3, 4, 6, 8, and 12 inches in size shall be rated for 200 psig minimum design working water pressure, and 16-, 20-, 24-, and 30-inch valves shall be rated for 150 psig minimum design working water pressure.
- C. Protective Coating: Valve interior and exterior of body and bonnet shall be coated with a fusion bonded epoxy coating in accordance with Section 09800 - Protective Coating.

D. Actuators: Unless otherwise indicated, resilient-seated gate valves shall have manual actuators in accordance with Section 43 30 12.

E. Manufacturers, or Equal

1. Mueller Company
2. Clow, F-6100
3. Kennedy Valve, Ken-Seal
4. American Flow Products, 500/2500 Series
5. U.S. Pipe, Metroseal

2.3 GATE VALVES (SMALLER THAN 3-INCHES)

A. Construction: Gate valves smaller than 3-inches, for general purpose use, shall be non-rising stem, heavy-duty type for industrial service, with screwed or soldered ends to match the piping. The bodies shall have union bonnets of bronze conforming to ASTM B 62 - Composition Bronze or Ounce Metal Castings. The stems shall be of bronze conforming to ASTM B 62, or ASTM B 371 - Copper-Zinc-Silicon Alloy Rod. The solid wedges shall be of bronze conforming to ASTM B 62. The valves shall have malleable iron handwheels unless otherwise indicated, and stem seals shall be of Teflon-impregnated or other acceptable non-asbestos packing. Valves shall have a pressure rating of minimum 125 psi steam and 200 psi coldwater, unless otherwise indicated.

B. Manufacturers, or Equal

1. Crane Company
2. Milwaukee Valve Company
3. Wm. Powell Company
4. Stockham Valves and Fittings
5. Walworth Company

PART 3 - EXECUTION

3.1 GENERAL

- A. Gate valves shall be installed in accordance with the provisions of Section 43 30 00 – Valves, General. Care shall be taken that valves in plastic lines are well supported at each end of the valve.

END OF SECTION

43 30 52 MISCELLANEOUS VALVES GENERAL

PART 1 - GENERAL

1.1 THE SUMMARY

- A. The CONTRACTOR shall provide miscellaneous valves and appurtenances, complete and operable, in accordance with the Contract Documents.
- B. The requirements of Section 43 30 00 - Valves, General, apply to this Section.
CONTRACTOR SUBMITTALS
- C. Furnish submittals in accordance with Section 43 30 00 - Valves, General.

PART 2 - PRODUCTS

2.1 AIR-VACUUM AND AIR-RELEASE VALVES

- A. Air and Vacuum Valves: Air and vacuum valves shall be capable of venting large quantities of air while pipelines are being filled, and allowing air to re-enter while pipelines are being drained. They shall be of the size indicated, with flanged or screwed ends to match piping. Bodies shall be of high-strength cast iron. The float, seat, and moving parts shall be constructed of Type 316 stainless steel. Seat washers and gaskets shall be of a material insuring water tightness with a minimum of maintenance. Valves shall be designed for minimum 150 psi water-working pressure, unless otherwise indicated.
- B. Air-Release Valves: Air-release valves shall vent accumulating air while system is in service under pressure and be of the size indicated. Valves shall meet the same general requirements as indicated for air and vacuum valves except that the vacuum feature will not be required. Valves shall be designed for a minimum water-working pressure of 150 psi, unless otherwise indicated.
- C. Combination Air Valves: Combination air valves shall combine the characteristics of air and vacuum valves and air release valves by exhausting accumulated air in systems under pressure and releasing or re-admitting large quantities of air while a system is being filled or drained, respectively. Valves shall have the same general requirements as indicated for air and vacuum valves.

2.2 METAL BALL VALVES (4-INCH AND SMALLER)

- A. General: Unless otherwise indicated, general purpose metal ball valves in sizes up to 4-inches shall have actuators in accordance with Section 15201 - Valve and Gate Actuators.
- B. Body: Ball valves up to and including 1-1/2 inches in size shall have bronze or carbon steel 2 or 3 piece bodies with screwed ends for a pressure rating of not less than 600 psi WOG. Valves 2-inches to 4-inches in size shall have bronze or carbon steel 2 or 3 piece

bodies with flanged ends for a pressure rating of ANSI 125 psi or 150 psi unless otherwise indicated.

- C. Balls: The balls shall be solid chrome-plated brass or bronze, or stainless steel, with standard port (single reduction) or full port openings.
- D. Stems: The valve stems shall be of the blow-out proof design, of bronze, stainless steel, or other acceptable construction, with reinforced teflon seal.
- E. Seats: The valve seats shall be of teflon or Buna-N, for bi-directional service and easy replacement.
- F. Manufacturers, or Equal
 - 1. Conbraco Industries, Inc. (Apollo)
 - 2. ITT Engineered Valves
 - 3. Neles-Jamesbury, Inc.
 - 4. Watts Regulator
 - 5. Worcester Controls

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Backflow preventers shall be installed in potable water lines where required by applicable codes or regulations, wherever there is any danger of contamination, and where indicated.
- B. Valves shall be installed in accordance with the manufacturer's printed recommendations, and with Section 43 30 52 - Miscellaneous Valves.
- C. Backflow preventers, as well as air and vacuum release valves, shall have piped outlets to the nearest acceptable drain, firmly-supported, and installed in such a way as to avoid splashing and wetting of floors and obstruction of traffic.

END OF SECTION

33 01 11 PRESSURE PIPE TESTING AND DISINFECTION

PART 1 - GENERAL

1.1 THE REQUIREMENT

- A. The CONTRACTOR shall test pipelines and appurtenant piping, in accordance with the Contract Documents.
- B. The CONTRACTOR shall be responsible for obtaining permits for discharging excess testing water if required to satisfy permit limits.
- C. The CONTRACTOR shall coordinate all disinfection with the OWNER a minimum of 48 hours before starting the work. The 48 hours' notice shall apply to normal working days only; weekends and holidays exempted.

1.2 CONTRACTOR SUBMITTALS

- A. Furnish: A testing plan and schedule, including method for conveyance, control, and disposal, shall be submitted in writing to the ENGINEER for review and approval. The plan shall be submitted a minimum of ten (10) working days prior to the scheduled date of testing.

PART 2 - PRODUCTS

2.1 MATERIAL REQUIREMENTS

- A. All test equipment, temporary valves, bulkheads, and other water control equipment shall be as determined by the CONTRACTOR. No materials shall be used which would be injurious to the WORK for future conveyance.

PART 3 - EXECUTION

3.1 GENERAL

- A. All pressure pipelines shall be tested. All testing operations shall be performed in the presence of the ENGINEER or OWNER.
- B. Disposal of flushing water in the testing plan and meet the requirements of South Florida Water Control and DERM and all other applicable permitting agencies.

3.2 HYDROSTATIC TESTING OF PIPELINES

- A. Prior to hydrostatic testing, pipelines shall be flushed or blown out as appropriate.
- B. The CONTRACTOR shall test pipelines in sections. Sections to be tested shall be defined by isolation valves in the pipeline. Where such valves are not present, the CONTRACTOR

shall install temporary bulkheads or plugs for the purpose of testing. Sections that do not have isolation valves shall be tested in lengths not to exceed 2,000 feet. Sections that have a zero-leakage allowance may be tested as a unit.

- C. No section of the pipeline shall be tested until field-placed concrete or mortar has attained an age of 14 Days.
- D. The test shall be made by closing valves when available or by placing bulkheads and filling the line slowly with water. The CONTRACTOR shall be responsible for ascertaining that test bulkheads are suitably restrained to resist the thrust of the test pressure without damage to or movement of the adjacent pipe. Unharnessed sleeve-type couplings, expansion joints, or other sliding joints shall be restrained or suitably anchored prior to the test to avoid movement and damage to piping and equipment.
- E. Remove or protect any pipeline-mounted devices that may be damaged by the test pressure.
- F. The pipeline shall be filled at a rate which will not cause any surges or exceed the rate at which the air can be released through the release valves at a reasonable velocity. All the air within the pipeline shall be allowed to escape completely. The CONTRACTOR shall provide sufficient temporary tappings in the pipelines to allow for trapped air to exit. After completion of the tests, such taps shall be permanently plugged. The differential pressure across the orifices in the air release valves shall not be allowed to exceed 5 psi at any time during filling.
- G. The CONTRACTOR shall furnish the pressure gauge to be used for pressure testing. The pressure gauge must be in 2 psi increments with a minimum of 200 psi total reading.
- H. The OWNER'S procedures for Official Pressure Testing is as follows:
 - 1. Pipeline segment to be pressure tested must be in a backfilled and compacted trench. If beneath a roadway, finished limerock must be installed unless prior approval from the OWNER has been granted.
 - 2. Fill pipeline segment to be pressure tested.
 - a. If the pipeline segment under test is tied into an existing main with the required double valves, then there must always be at least one fill and flush with a vent to atmosphere with all required ports for testing between the double valves and a single vent to atmosphere between all other double valve connections. All vents to atmosphere must always be open while the pipeline section under test is pressurized and all double valves must be closed.
 - b. If the pipeline segment under test is not tied into the existing live main, then a fill and flush with a vent to atmosphere must be installed with all required ports for testing. This vent to atmosphere must always be open while the pipeline section is pressurized.

3. After the pipeline or section thereof has been filled, it shall be allowed to stand under a slight pressure for at least 24 hours to allow the concrete or mortar lining, as applicable, to absorb water and to allow the escape of air from air pockets. All air shall be expelled from the pipeline segment. During this period, bulkheads, valves, and connections shall be examined for leaks. If leaks are found, corrective measures satisfactory to the ENGINEER shall be taken.
4. The pipeline segment shall be pressurized to the test pressure of 155 psi. The official pressure test shall not begin until the pipeline segment has held the pressure to the allowable leakage for a minimum of 48 hours.
5. The official hydrostatic pressure test shall consist of holding the indicated test pressure on the pipeline segment for a period of two (2) hours. The test pressure shall be 155 psi, measured at the lowest point of the pipeline section being tested. At no point during the official pressure test shall the total pressure loss be more than 5 psi (pressure drop below 150 psi).
6. Pressure testing requirements and allowable leakage are summarized in the following table:

Pipe Type	Testing Standard	Test Pressure (P)	Test Duration	Allowed Leakage
Ductile iron, all joint types	AWWA C600	155 psi	2 hours	See Equation A
PVC	AWWA C605	155 psi	2 hours	See Equation A

Equation A:
$$Q = \frac{(L * D * \sqrt{P})}{148,000}$$

Where: Q = allowable leakage (make-up water), gallons per hour
 L = length tested or maximum test length allowed (2,000 feet), whichever is smaller, feet
 D = nominal pipe diameter, inches
 P = test pressure, psi

7. There shall be no intermediate pumping during the official pressure test. The CONTRACTOR may pump the allowable makeup water at the end of the two-hour test. The amount of allowable makeup water shall be based on the total footage of the pipeline segment under test, with a maximum of 2,000 feet. There shall be no allowable makeup water for valves, fittings, short lines less than 10 linear feet and any line less than 4-inches in diameter.

8. All sections of the pipeline under test must vent water and show a pressure loss on the pressure gauge at the end of the test. The gauge must read zero after all water pressure is expelled at the end of the test.

- I. In the case of pipelines that fail to pass the leakage test, the CONTRACTOR shall determine the cause of the leakage, shall take corrective measures necessary to repair the leaks, and shall again test the pipelines; repeating as necessary until the pipeline passes the pressure test.

END OF SECTION

Table with columns: NO., DESCRIPTION, DATE, REVISIONS

RESPONSIBILITY FOR THE USE OF THESE PLANS PRIOR TO OBTAINING PERMITS FROM ALL AGENCIES HAVING JURISDICTION OVER THE PROJECT WILL FALL SOLELY UPON THE USER.

ISSUE DATE: 10/09/2023 DESIGNED BY: XOM CHECKED BY: XOM BID-CONTRACT: XOM



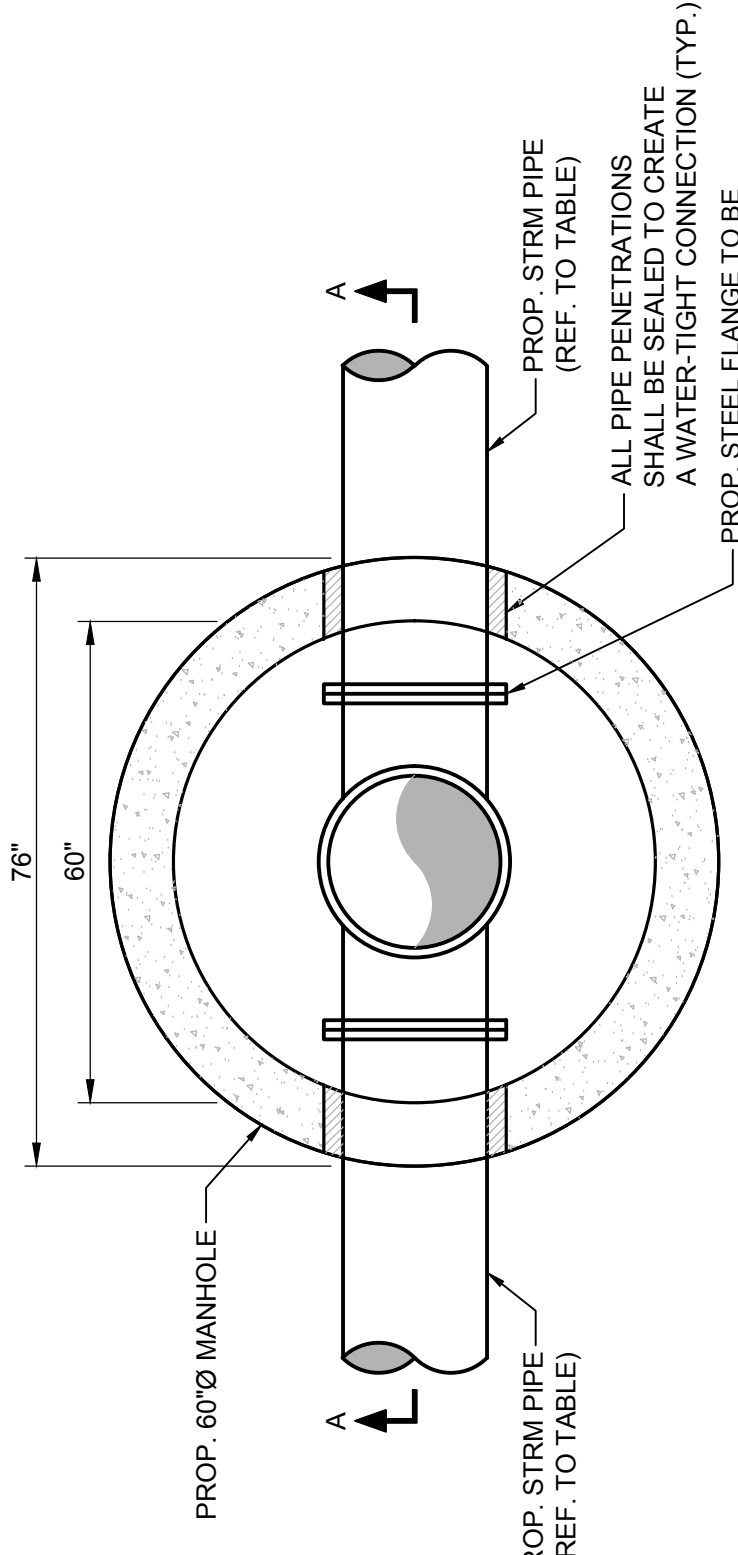
CLIENT: RIVERBERG PERRIN, MISSIE, P.E. FLEETMAN HARRIS & ASSOCIATES, INC. (FOR THE FIRM)

PROJECT: ABBOTT AVENUE DRAINAGE IMPROVEMENTS

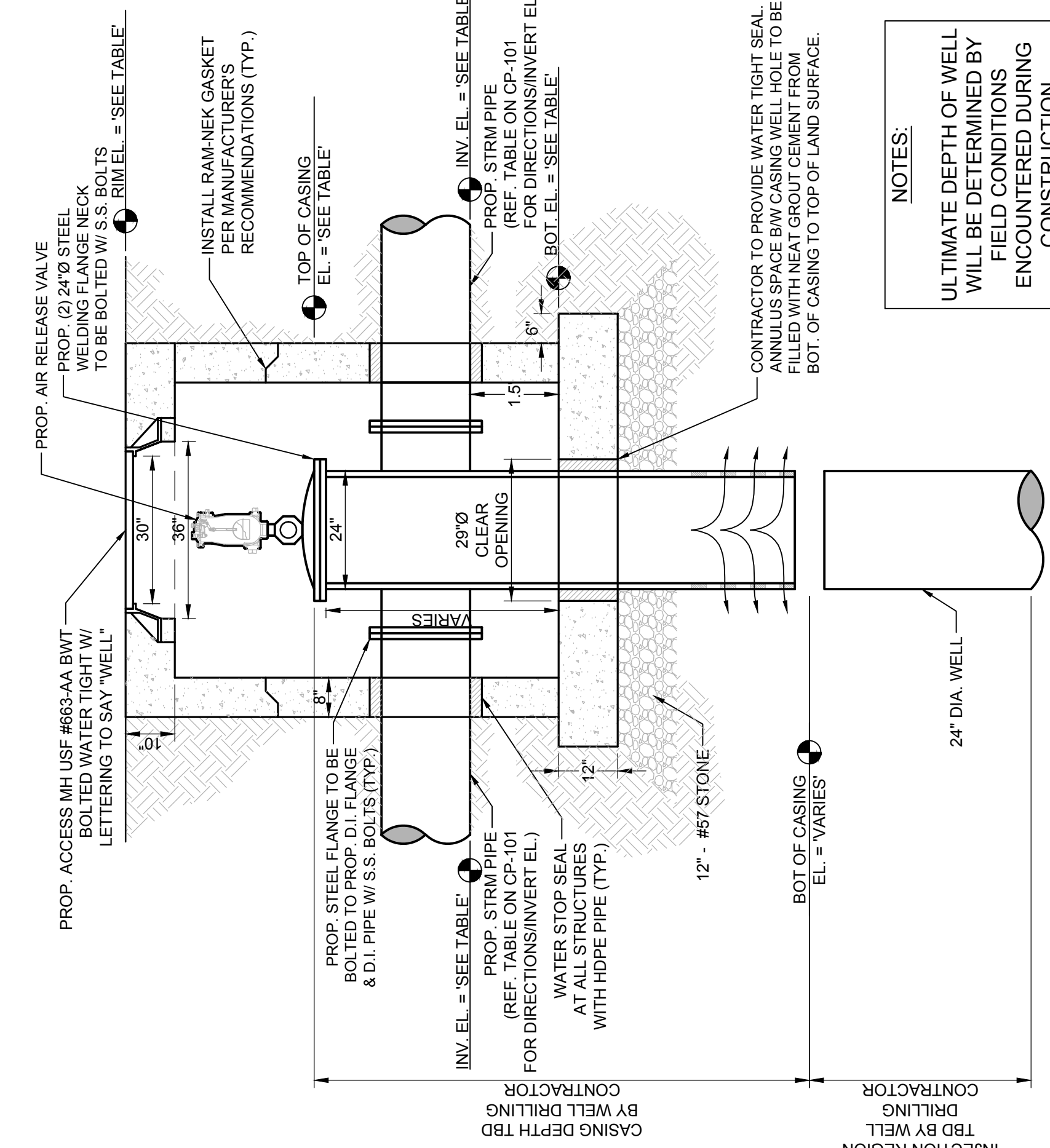
SHEET TITLE: DRAINAGE DETAILS

SHEET NUMBER: CP-502 PROJECT NUMBER: 11494.01

Table: DRAINAGE WELL TABLE. Columns: NO., STR. DESCRIPTION, RIM EL., INSIDE DIMENSIONS, INVERTS EL., P.R.B., TOP OF CASING EL., BOTTOM EL., COORDINATES (LATITUDE/LONGITUDE), COMMENTS.



PLAN VIEW



SECTION A-A

NOTES: ULTIMATE DEPTH OF WELL WILL BE DETERMINED BY FIELD CONDITIONS ENCOUNTERED DURING CONSTRUCTION

- NOTES: REFER TO SHEET CP-101 DRAINAGE STRUCTURE TABLE. WELL BOX REINFORCEMENT SHALL BE DESIGNED BY PIPE CASTER TO MEET FOOT STANDARDS AND SPECIFICATIONS. 24" DIAMETER WELL, CONTRACTOR TO DEVELOP WELL CAPABLE OF DISCHARGING 300 GPM PER FOOT OF HEAD. FINAL WELL DIMENSIONS TO BE DETERMINED BY A LICENSED WELL CONTRACTOR. FINAL DEPTH OF CASING TO BE FIELD DETERMINED. WELL CONTRACTOR TO PROVIDE A MINIMUM OF 10,000 mg/L TOTAL DISSOLVED SOLIDS (TDS). DRAINAGE WELL TO BE CONSTRUCTED IN ACCORDANCE WITH ALL APPLICABLE REGULATORY STANDARDS AND PERMITS. LIDS TO BE BOLTED DOWN (PENTA HEAD BOLTS, 4 ON INNER COVER AND 4 ON OUTER COVER). THE CONTRACTOR IS SOLELY RESPONSIBLE TO PREVENT ANY FLUID FROM DISCHARGING INTO THE DRAINAGE WELL WITHOUT WRITTEN AUTHORIZATION FROM FDEP TO USE THE WELL. THE WELL CASING SHALL BE 24" DIAMETER AND IN ACCORDANCE WITH RULE 62-532.500(1)(A), FAC WHICH SPECIFIES ALL WELL CASING SHALL BE NEW AND CONFORM TO AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM) SPECIFICATION A524-98, A524-98 OR AMERICAN PETROLEUM INSTITUTE (API) 5L-2000. REFER TO RULE FOR MORE DETAILS. THE CONTRACTOR SHALL PROVIDE ALL NECESSARY EQUIPMENT FOR CONDUCTING THE WELL TEST AND SATISFACTORILY DISPOSING OF THE WATER SHALL BE PUMPED FROM THE WELL. THE CONTRACTOR SHALL PROVIDE A MINIMUM OF 24 HOURS NOTICE TO THE CITY ENGINEERING DEPARTMENT AND TO ALL AGENCIES PRIOR TO THE START OF THE TEST. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO SECURE THE NECESSARY WELL DRILLING PERMITS AND COMPLY WITH ALL PROVISIONS THEREOF. THIS SHALL INCLUDE (BUT NOT LIMITED TO) SECURING THE FINAL CONSTRUCTION CLEARANCE PERMIT FOR A CLASS V CONSTRUCTION APPLICATION FORM (62SR-900) THROUGH FDEP. IN ADDITION, THE CONTRACTOR IS REQUIRED TO PREPARE/PROVIDE THE REASONABLE ASSURANCE REPORT IN ACCORDANCE WITH FDEP REQUIREMENTS. THE CONTRACTOR SHALL HIRE A QUALIFIED FLORIDA LICENSED PROFESSIONAL GEOLOGIST/ENGINEER WITH THE REQUIRED HYDROLOGICAL EXPERTISE TO DEVELOP THIS REPORT AND PROVIDE THE NECESSARY SIGNED AND SEALED COPIES.

NOT TO SCALE

DRAINAGE WELL

Table: TEST LOG INVENTORY. Columns: Hole No., Method By, Morning, Evening, Utility, Material, Size (Inch), Direction, Cross Section, Elevation, Depth (Feet), Utility, Comments.

1

Table: MINIMUM LENGTH OF PIPE (FEET) TO BE RESTRAINED. Columns: FITTING TYPE, RESTRAINT LENGTH (FEET).

- NOTES: 1. THE DATA IN THE ABOVE TABLE ARE BASED UPON THE FOLLOWING INSTALLATION CONDITIONS: 1A. SOIL TYPE-SAND 100 FPM 1B. TYPE-SAND 100 FPM 1C. DEPTH OF BURIAL-3' 1D. BENCH TYPE-3 1E. SAFETY FACTOR-1.5 1F. VERTICAL OFFSET-5' 2. THE RESTRAINED PIPE LENGTHS APPLY TO MANTELE IRON AND PVC PIPE. 3. ALL JOINTS BETWEEN UPPER AND LOWER BENDS SHALL BE RESTRAINED. 4. RESTRAINED PIPE LENGTHS APPLY TO PIPE ON BOTH SIDES OF VALVES AND FITTINGS.

Universal Engineering Sciences

Florida's Leading Engineering Source

Geotechnical Exploration Report

Abbott Avenue Stormwater Improvements

Miami, Florida

September 15, 2022

UES Project No.: 2130.2200041.0000

Prepared for: Keith and Associates



A Universal
Engineering
Sciences
Company





A Universal Engineering Sciences Company

Geotechnical Engineering | Construction Materials Testing and Inspections
Building Code Compliance | Environmental, Health & Safety | Facilities Consulting

LOCATIONS

Atlanta, GA	Hagerstown, MD	Pensacola, FL
Buford, GA	Irvine, CA	Port St. Lucie, FL
Chantilly, VA	Jacksonville, FL	Reno, NV
Charlotte, NC	Kennesaw, GA	Rockledge, FL
Clewiston, FL	Las Vegas, NV	Sarasota, FL
Daytona, FL	Miami, FL	St. Petersburg, FL
Delray Beach, FL	Ocala, FL	Tampa, FL
Douglasville, GA	Orlando, FL	Tifton, GA
Fort Myers, FL	Palm Coast, FL	West Palm Beach, FL
Fort Pierce, FL	Panama City, FL	
Gainesville, FL	Pelham, AL	

September 15, 2022

Mr. Carlos Morales
Keith and Associates, Inc.
301 East Atlantic Boulevard
Pompano Beach, FL 33060
Phone: (305) 310-1531
Email: cmorales@keithteam.com

**RE: Geotechnical Exploration for
Abbott Avenue Stormwater Improvements
Abbott Avenue with 91st and 92nd Street
Miami, FL 33154
UES Project No. 2130.2200041.0000**

Dear Mr. Morales,

In accordance with your authorization, Universal Engineering Sciences (UES) has completed the subsurface exploration and geotechnical engineering evaluation for the above referenced project in accordance with the signed geotechnical and engineering service agreement for this project. The scope of UES's services was planned in conjunction with and authorized by you.

The purpose of UES's subsurface exploration was to classify the nature of the subsurface soils and general geomorphic conditions and to evaluate their impact upon the proposed installation of underground pump stations. This report contains the results and UES's engineering interpretation of subsurface conditions of the site with respect to the project characteristics as described to UES and site preparation procedures.

1.0 PROJECT DESCRIPTION

The site is located at Abbott Avenue with 91st and 92nd Street and Bay Drive with 91st St and 92nd St, Miami, FL, as shown in **Figure 1**. The proposed development consists of the installation of two underground storm water pump stations connected to three drainage wells. No drainage or pavement information was provided at the time of UES's exploration or report preparation.



ABBOTT AVENUE STORMWATER IMPROVEMENTS
MIAMI, FL
UES PROJECT No. : 2130.2200041.0000

FIGURE 1 – SITE LOCATION PLAN



2.0 Observations

2.1 Site Observation and Historical Data

The subject property is located at Abbott Avenue with 91st and 92nd Street, Bay Drive with 91st St and 92nd St in Miami, Florida. The site is currently an existing roadway used by residents. No soil staining or visual evidence of chemical or petroleum spillage was apparent. The recovered samples were not examined, either visually or analytically, for chemical composition or environmental hazards. UES would be pleased to perform these services if required.

UES reviewed historic aerials from 1940 through 2022. The 1940 aerial depicts the site is an existing paved roadway and the site has remained relatively unchanged.

2.2 Laboratory Testing and Procedures

Soil samples recovered from UES's field exploration were returned to the laboratory. A geotechnical engineer visually examined and reviewed the field descriptions of the recovered soils in general accordance with ASTM D-2488. Samples were visually examined to accurately evaluate the subsurface soil properties and site geomorphic conditions. The following tests were performed to aid in classifying the soils and to help evaluate the general engineering characteristics of the site soils: natural moisture content (ASTM D-2216), percent passing the No. 200 sieve (ASTM D-1140), and organic content (ASTM D-2974). Table 1 below presents the summary of laboratory test results of the soils samples tested.

Boring	Sample Depth (feet)	Moisture Content (%)	Percent Passing No. 200 Sieve (%)	Organic Content (%)
B01	4 – 6	149.5	2.8	7
B03	2 – 4	55.3	17.3	4

Representative samples of the soils encountered during the field exploration will be held in the laboratory for your inspection for 30 days unless UES is notified otherwise.

2.3 Field Exploration

UES performed four (4) standard penetration test (SPT) borings to depths of 30 feet below ground surface (BGS). **Figure 2** shows the approximate location of the borings performed at the site.



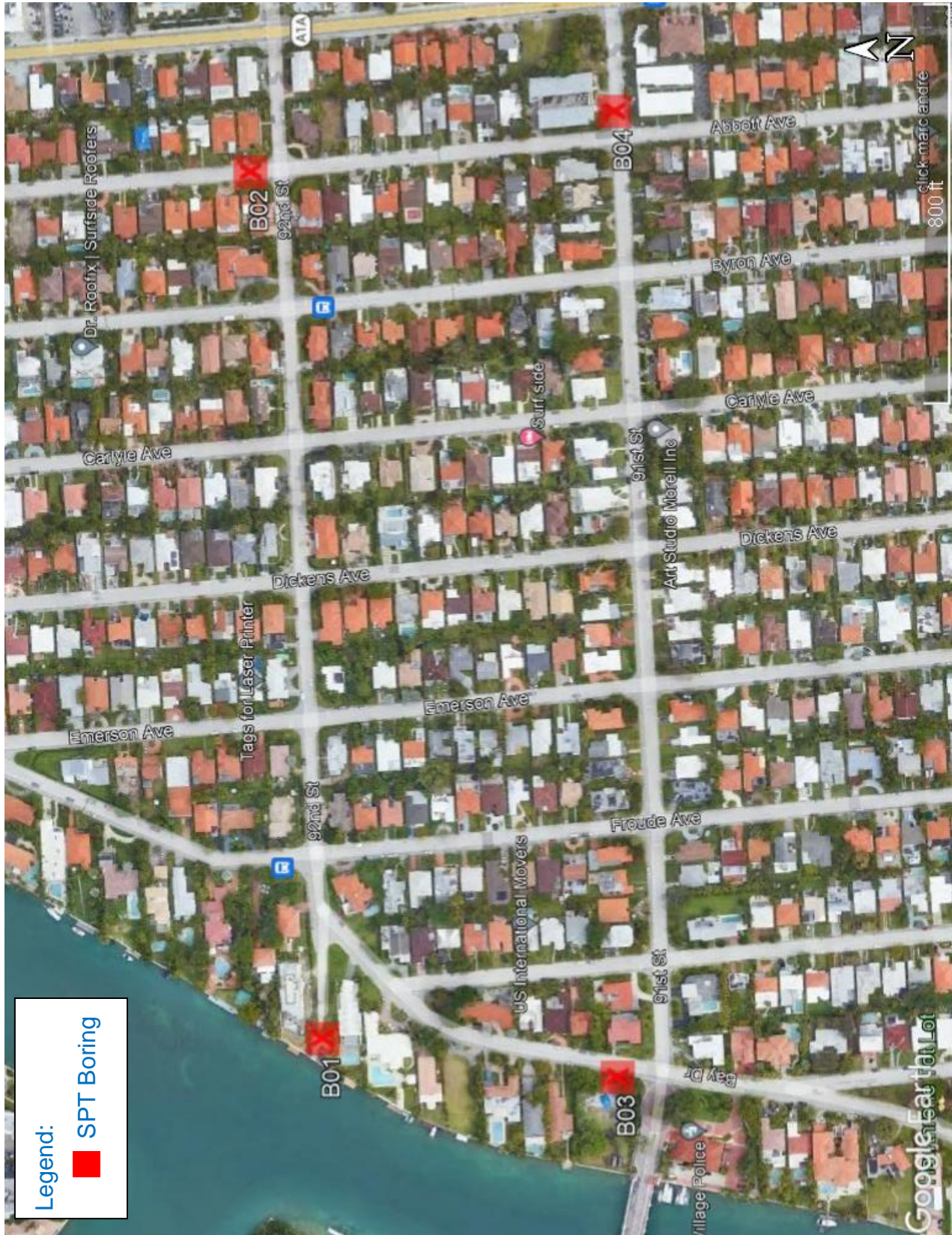


FIGURE 2 – BORING LOCATION PLAN

NOTE: BORING LOCATIONS WERE LOCATED USING A MEASURING TAPE AND EXISTING LANDMARKS AS REFERENCE POINTS. IN ADDITION, THE LATITUDE, LONGITUDE, AND ELEVATION NOTED ON THE BORING LOGS WERE TAKEN FROM GOOGLE EARTH. THEREFORE, LOCATIONS SHOWN ON THE PLAN ARE APPROXIMATE.



The SPT boring method was used as the investigative tool within the borings. Penetration tests were performed in substantial accordance with ASTM Procedure D-1586, "Penetration Test and Split-Barrel Sampling of Soils". This test procedure consists of driving a 1.4-inch I.D. split-tube sampler into the soil profile using a 140-pound automatic hammer falling 30 inches. The number of blows per foot, for the second and third 6-inch increments, is an indication of soil strength. The SPT borings were performed using a B-57 truck-mounted drill rig equipped with an automatic hammer. The soil samples recovered from the soil borings were classified and stratified by a geotechnical engineer. Following completion of the field services, all boreholes were backfilled with excavated soil/rock, and the site generally cleaned, as required.

The results of the classification and stratification are encountered during UES's exploration are presented in **Appendix A** "Record of Test Boring". It should be noted that soil conditions might vary between what is depicted on the attached log and other areas of the site. The soil boring data reflect information from a specific test location only. Site specific survey staking for the test location was not provided for UES's field exploration. The boring location was determined in the field by a project engineer by measuring distances and estimating right angles from existing site features. The latitude, longitude, and elevation noted in UES's boring logs were taken from Google Earth. Google Earth uses WGS-84 or Local Mean Sea Level (MSL) as datum. It should be noted that elevations may not always be correct if fill is added or site grades change to a site after Google captures the image. The boring location and elevations noted should, therefore, be considered approximate. The boring depths were confined to the zone of soil likely to be stressed by the proposed construction.

The boring logs depicts the observed soils in graphic detail. The Standard Penetration Test boring indicates the penetration resistance, or N-values logged during the drilling and sampling activities. Please refer to **Appendix B** "Notes Related to the Test Borings" for further clarification of UES's field exploration. The classifications and descriptions shown on the log are generally based upon visual characterizations of the recovered soil samples. All soil samples reviewed have been depicted and classified in accordance with the Unified Soil Classification System symbols (i.e. SP, SP-SM, SC, etc.). See in **Appendix C** "Discussion of Soil Groups", for a detailed description of various soil groups.

3.0 SUBSURFACE CONDITIONS

The soils at the explored locations generally consisted of up to 4" to 6" of asphalt atop very loose to medium dense, fine to medium grained sand with varying amounts of limestone and shell fragments from ground surface to depths of 4 feet below ground surface (BGS), underlain by very loose, fine to medium grained sand with variable amounts of shell fragments to an approximate depths of 6 to 8 feet BGS. The following layer consisted of loose. The next layer consisted of medium dense, fine to medium grained sand with varying amounts of shell fragments to the approximate depths of 13 to 23 feet BGS. The final layer consisted limestone fragments with varying amounts of sand to the termination depth of the borings at 30 feet BGS.



It should be noted that boring B01 encountered unsuitable, loose organic soils and debris at a depth of nearly 2 to 6 feet BGS, and boring B03 encountered unsuitable, loose organics and silty soils at a depth of nearly 2 to 6 feet BGS. The SPT N-values ranged between 0 (weight of hammer) to more than 50 blows per foot (refusal).

For a more precise description of the conditions encountered within the soil test borings, refer to the “Record of Test Boring” logs included in **Appendix A**.

3.1 Groundwater Considerations

Groundwater at the time of testing (August 2022) was encountered at an approximate depth of 2’2” to 4’2” BGS. The groundwater table will fluctuate seasonally depending upon local rainfall. The groundwater table will fluctuate seasonally depending upon local rainfall heavy rainfall can lead to its formation which can dissipate with time under the influence of downward percolation and evaporation from the surface.

No additional investigation was conducted in relation to any existing well field in the vicinity. Well fields can influence water table levels and cause significant fluctuations. If a more comprehensive water table analysis is necessary, UES recommends contacting a registered professional specialized in hydrogeology.

4.0 FOUNDATION RECOMMENDATIONS

It is UES’s understanding that the proposed bottom elevation of the new pump station will be approximately 10 to 11 feet below existing ground surface. UES has assumed that the foundation loading will be in the order of **50 kips**. Based on the borings, UES recommends the pump station be supported on a shallow foundation system. UES recommends using a maximum net allowable soil pressure of **2,500 psf**. The allowable soil pressure recommended will yield settlement values less than 1-inch total and ½-inch differential. Footing dimensions shall be determined in accordance with the aforementioned allowable soil pressure, the Florida Building Code (latest edition), and any local municipal ordinance. In addition, to minimize the possibility of connections to uncouple or detach, UES recommends the use of flexible connections to tolerate any disturbance or additional stress that might be caused by settlement or heave of the underlying in-situ soils. The site contractor should review the soils information to determine the appropriate method of installation. Control of the groundwater (dewatering) will be necessary.

As for lateral loads, the wet well has to withstand the lateral pressures produced by the backfill pressing against the wet well’s walls. To calculate these pressures, the designer may use the following parameters:

Cohesion, $c' = 0$ psf

Angle of shearing resistance, $\Phi' = 32^\circ$

Soil’s unit weight, $\gamma' = 115$ pcf

At-rest earth pressure coefficient, $k_0 = 0.47$



These parameters may be used if granular soils (either fill material or the in-situ granular soils) are used as backfill. The at-rest coefficient is used since the wet well is braced against the opposite wall as it is backfilled, not allowing rotation of the wall.

If fill is to be brought in to be used as backfill (if needed), it should be inorganic (classified as SP/SW) containing not more than 5 percent (by weight) fibrous organic materials. Fill materials with silt-size soil fines in excess of 10% should not be used, this includes cyclone sand material. Place fill and compact each lift to a minimum density of 98 percent of the Modified Proctor maximum dry density (ASTM D-1557) with a tamper. Dewatering techniques will be necessary.

5.0 SITE PREPARATION RECOMMENDATIONS

Pipe bedding and backfill requirements to one (1) foot above the crown of pipe should be specified by the civil engineer. UES suggests the use of a “self” compacting material such as coarse aggregate (i.e. FDOT No. 57 stone) for backfill material placed below the groundwater table. A filter fabric (geotextile) should be used to avoid migration of the existing soils into the newly placed backfill. “Self” compacting material placed below the groundwater should consist of inorganic, non-plastic material, free of any man-made debris, limerock with a three (3) inch maximum particle size with ASTM classification (USCS) of GP, GW or FDOT 57 Stone with less than 5% material finer than the No. 200 Sieve and a maximum particle size of 3 inches. The No. 57 stone should not be placed more than one foot above the groundwater.

Fill placed in one (1) foot above the crown of the pipe shall consist of select material having no more than 12 percent passing the No. 200 sieve, with a maximum particle size of 3 inches. **Some of the material removed during trench excavation is unsuitable for use as backfill.** The trench backfill shall be placed in maximum loose lifts of 12 inches and compacted to at least 95% of the Modified Proctor (ASTM D1557) maximum dry density or as specified by the civil engineer.

Organic soils and fines should be removed from the utility runs and replaced with clean, compacted fill to provide adequate support for the proposed pipe system. A more detailed description of this work is as follows:

1. Utility runs installed below the groundwater table should be dewatered to allow excavation, inspection and backfill in the dry.
2. Organic soils and fines found 1 foot beneath the proposed utility invert depth should be removed and replaced with clean compacted fill., assuming the existing grade elevation is to remain unchanged.
3. After excavation to design invert elevations, in-situ bedding soils should be compacted to at least 95 percent of the Modified Proctor test maximum dry density (ASTM D 1557) to a depth of 12 inches below the bedding level. Compaction in confined areas should be accomplished using equipment such as jumping jacks and ‘walk-behind’ vibratory plates and rollers.



4. Utility backfill may consist of excavated, non-organic materials that include rock fragments no larger than 3 inches in diameter. Offsite fill material (if required) should consist of clean granular soils with less than 10 percent soil fines. Place fill in uniform 6-inch thick (loose) lifts and compact each lift to a minimum density of 95 percent of the Modified Proctor maximum dry density (ASTM D1557).
5. In paved areas, the pavement subgrade should be reestablished using approved materials and specific compactive effort.

6.0 EXCAVATION CONDITIONS

In Federal Register, Volume 54, No. 209 (October 1989), the United States Department of Labor, Occupational Safety and Health Administration (OSHA) amended its "Construction Standards for Excavations, 29 CFR, part 1926, Subpart P". This document was issued to better insure the safety of workmen entering trenches or excavations. It is mandated by this federal regulation that all excavations, whether they be utility trenches, basement excavations or footing excavations, be constructed in accordance with the OSHA guidelines. It is UES's understanding that these regulations are being strictly enforced and if they are not closely followed, the owner and the contractor could be liable for substantial penalties.

The contractor is solely responsible for designing and constructing stable, temporary excavations and should shore, slope, or bench the sides of the excavations as required to maintain stability of both the excavation sides and bottom. The contractor's responsible person, as defined in 29 CFR Part 1926, should evaluate the soil exposed in the excavations as part of the contractor's safety procedures. In no case should slope height, slope inclination, or excavation depth, including utility trench excavation depth, exceed those specified in local, state, and federal safety regulations.

UES is providing this information solely as a service to UES's client. UES is not assuming responsibility for construction site safety or the contractor's activities; such responsibility is not being implied and should not be inferred. **The SPT methodology (ASTM D-1586) used in performing UES's borings and for determining penetration resistance is specific to the sampling tools utilized and does not reflect the ease or difficulty to advance other tools, equipment or materials.**

7.0 BACKFILL

Some of the soils encountered during UES's exploration appear to be unsuitable for re-use as backfill soils. Material required for backfilling should consist of clean sands with no more than 10% passing the U.S. No. 200 sieve (**Note: Excavated soils may be re-used provided that the maximum particle size is less than 3 inches in diameter**). The backfill should be placed in uncompacted lifts of not more than 12 inches in thickness and should be uniformly compacted to the requirements stated in the contract specifications. Heavy compaction equipment should be operated no closer than 3 feet of any installed structure. Compaction adjacent to structures should be performed with small compaction equipment (e.g., jumping-jack or heavy plate tamper). The contractor should use caution during the backfilling operations to prevent any damage to adjacent structures.



Testing of backfill should be performed in accordance with the FDOT Standard Specifications for Road and Bridge Construction, latest edition.

8.0 REPORT LIMITATIONS

This consulting report has been prepared for the exclusive use of the current project owners and other members of the design team for this project. This report has been prepared in accordance with generally accepted local geotechnical engineering practices; no other warranty is expressed or implied. The evaluation submitted in this report, is based in part upon the data collected during a field exploration, however, the nature and extent of variations throughout the subsurface profile may not become evident until the time of construction. If variations then appear evident, it may be necessary to reevaluate information and professional opinions as provided in this report. In the event changes are made in the nature, design, or locations of the proposed structure, the evaluation and opinions contained in this report shall not be considered valid, unless the changes are reviewed and conclusions modified or verified in writing by Universal Engineering Sciences. Lastly, in accepting this report, the client understands that the data obtained from the soil borings is intended for foundation analysis only and is not to be used for excavating or backfilling pricing estimates.

The analysis and recommendations submitted in this report are based on the data obtained from the tests performed at the location indicated on the attached figure. This report does not reflect any variations, which may occur between borings. While the borings are representative of the subsurface conditions at their respective locations and for their vertical reaches, local variations characteristic of the subsurface soils of the region are anticipated and may be encountered. The delineation between soil types shown on the soil logs is approximate and the description represents UES's interpretation of the subsurface conditions at the designated boring locations on the particular date drilled.

Any third-party reliance of UES's geotechnical report or parts thereof is strictly prohibited without the expressed written consent of Universal Engineering Sciences. The SPT methodology (ASTM D-1586) used in performing UES's borings and for determining penetration resistance is specific to the sampling tools utilized and does not reflect the ease or difficulty to advance other tools, equipment or materials.

Respectfully Submitted,
Universal Engineering Sciences
Registry #4930



Vineetha Garikapati, M.S, E.I.T.
Project Manager

Estela G. León Aguilar, P.E.
Geotechnical Department Manager
Professional Engineer #83307
State of Florida

Appendices

Appendix A	Record of Test Borings
Appendix B	Notes Related to the Test Borings
Appendix C	Discussion of Soil Groups



APPENDIX A
Record of Test Borings



GFA GEOTECH BH - GFA DATA TEMPLATE.GDT - 9/15/22 12:23 - C:\USERS\GARIKAPATI\UNIVERSAL ENGINEERING-TEAM DESUES SFL GEO - DOCUMENTS\ACTIVE PROJECTS\2130.2200041.0000 - ABBOTT AVENUE STORMWATER IMPROVEMENTS\6 - GINT1



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 1215 Wallace Drive
 Delray Beach, 33444
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LOG OF BORING B01

CLIENT <u>Keith & Associates</u>	PROJECT NAME <u>Abbot Avenue Stormwater Improvements</u>
PROJECT NUMBER <u>2130.2200041.0000</u>	PROJECT LOCATION <u>Bay Dr & Abbott Ave. with 91st St & 92nd St, Miami, FL</u>
DRILLING CONTRACTOR <u>Florida Geotechnical Drilling</u>	HOLE DEPTH <u>30 ft</u> HOLE DIAMETER _____
DRILLER <u>Lazaro Tarajano</u>	DATE STARTED <u>8/19/22</u> COMPLETED <u>8/19/22</u>
DRILL RIG <u>B57</u>	GROUND WATER LEVEL: <u>▽ AT TIME OF DRILLING 2.17 ft / Elev 0.83 ft</u>
METHOD <u>Standard Penetration Test</u>	LATITUDE <u>25.879556</u> LONGITUDE <u>-80.129139</u>
NOTE: _____	HAMMER TYPE <u>140# with 30 in Drop - Automatic Hammer</u>

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS	N VALUE	MOISTURE CONTENT (%)	ORGANIC CONTENT (%)	▲ SPT N VALUE ▲					
										20	40	60	80		
0	2.0		6" of asphalt atop, medium dense, gray, fine to medium grained SAND (SP) with some limestone fragments.	1	90	14 9 4 5	13								
0	4.0		Very loose, brown, fine to medium grained SAND (SP) with some debris (plastic), trace of limestone fragments	2	90	3 2 1 2	3								
5	6.0		Very loose, dark brown, fine to medium grained SAND (SP) with ROOTS, trace of organics.	3	90	0 0 0 2	WOH	149.5	6.6						
5	8.0		Loose, gray, fine to medium grained SAND (SP) with SHELL fragments, trace of organics.	4	90	2 2 2 3	4								
10			Medium dense, gray, fine to medium grained SAND (SP) with some shell fragments.	5	90	7 9 9 9	18								
13			Hard, LIMESTONE.	6	90	20 50/2"									
18			LIMESTONE fragments with trace of sand.	7	90	17 12 20 48	32								
25				8	90	11 12 7 3	19								
30				9	90	3 2 1 1	3								

Bottom of borehole at 30.0 feet.

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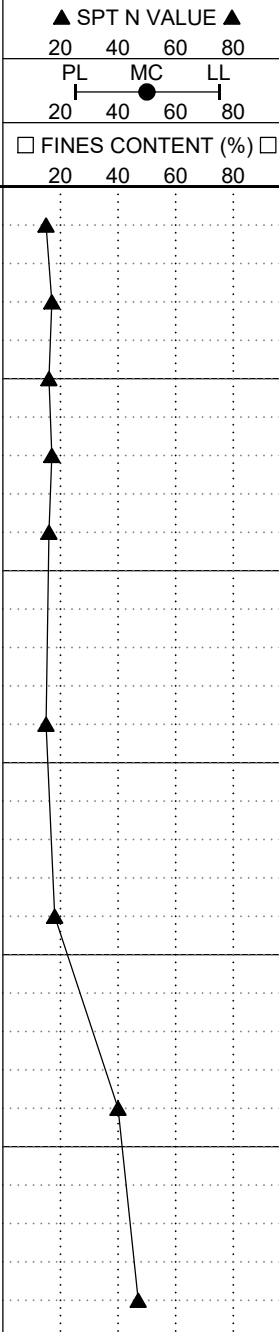
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LOG OF BORING B02

CLIENT <u>Keith & Associates</u>	PROJECT NAME <u>Abbot Avenue Stormwater Improvements</u>
PROJECT NUMBER <u>2130.2200041.0000</u>	PROJECT LOCATION <u>Bay Dr & Abbott Ave. with 91st St & 92nd St, Miami, FL</u>
DRILLING CONTRACTOR <u>Florida Geotechnical Drilling</u>	HOLE DEPTH <u>30 ft</u> HOLE DIAMETER _____
DRILLER <u>Lazaro Tarajano</u>	DATE STARTED <u>8/19/22</u> COMPLETED <u>8/19/22</u>
DRILL RIG <u>B57</u>	GROUND WATER LEVEL: <u>▽</u> AT TIME OF DRILLING <u>2.83 ft / Elev 2.17 ft</u>
METHOD <u>Standard Penetration Test</u>	LATITUDE <u>25.879941</u> LONGITUDE <u>-80.123864</u>
NOTE: _____	HAMMER TYPE <u>140# with 30 in Drop - Automatic Hammer</u>

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS	N VALUE	MOISTURE CONTENT (%)	ORGANIC CONTENT (%)	▲ SPT N VALUE ▲						
										20	40	60	80			
0	5		4.5" of asphalt atop, medium dense, gray, fine to medium grained SAND (SP).	1	90	8 9 6 6	15									
2.0	3.0	▽	Medium dense, tan, fine to medium grained SAND (SP) with some shell fragments, trace of roots.	2	90	4 8 9 10	17									
4.0	1.0		Medium dense, gray, fine to medium grained SAND (SP) with some shell fragments.	3	90	8 8 8 9	16									
6.0	-1.0		Medium dense, gray, fine to medium grained SAND (SP) with SHELL fragments.	4	90	6 8 9 11	17									
8.0	-3.0			5	90	3 6 10 12	16									
13.0	-8.0		Medium dense, light gray, fine to medium grained SAND (SP) with some shell fragments.	6	90	8 8 7 6	15									
18.0	-13.0		LIMESTONE fragments with sand.	7	90	7 7 11 9	18									
23.0	-18.0		LIMESTONE fragments with trace of sand.	8	90	9 12 28 21	40									
30.0	-25.0			9	90	27 30 17 15	47									

Bottom of borehole at 30.0 feet.





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LOG OF BORING B03

CLIENT Keith & Associates **PROJECT NAME** Abbot Avenue Stormwater Improvements
PROJECT NUMBER 2130.2200041.0000 **PROJECT LOCATION** Bay Dr & Abbott Ave. with 91st St & 92nd St, Miami, FL
DRILLING CONTRACTOR Florida Geotechnical Drilling **HOLE DEPTH** 30 ft **HOLE DIAMETER** _____
DRILLER Lazaro Tarajano **DATE STARTED** 8/19/22 **COMPLETED** 8/19/22
DRILL RIG B57 **GROUND WATER LEVEL:** ▽ AT TIME OF DRILLING 4.17 ft / Elev 0.83 ft
METHOD Standard Penetration Test **LATITUDE** 25.877979 **LONGITUDE** -80.129375
NOTE: _____ **HAMMER TYPE** 140# with 30 in Drop - Automatic Hammer

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS	N VALUE	MOISTURE CONTENT (%)	ORGANIC CONTENT (%)	▲ SPT N VALUE ▲			
										20	40	60	80
5	0		Medium dense, gray, fine to medium grained SAND (SP) with some silt.	1	90	6 5 4 4	9	55.3	3.5	PL — MC — LL			
			Loose, dark gray, fine to medium grained SILTY SAND (SM).	2	90	4 3 1 1	4			20	40	60	80
			Very loose, dark brown, fine to medium grained SAND (SP) with ROOTS, trace of organics.	3	90	0 0 0 2	WOH						
			Medium dense, dark gray, fine to medium grained SAND (SP) with some shell fragments.	4	90	3 5 7 7	12						
				5	90	6 5 6 6	11						
				6	90	5 6 7 5	13						
			LIMESTONE fragment with trace of sand.	7	90	17 23 25 19	48						
				8	90	17 10 11 14	21						
				9	90	13 13 10 16	23						

Bottom of borehole at 30.0 feet.

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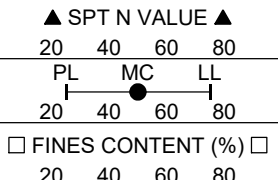


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LOG OF BORING B04

CLIENT <u>Keith & Associates</u>	PROJECT NAME <u>Abbot Avenue Stormwater Improvements</u>
PROJECT NUMBER <u>2130.2200041.0000</u>	PROJECT LOCATION <u>Bay Dr & Abbott Ave. with 91st St & 92nd St, Miami, FL</u>
DRILLING CONTRACTOR <u>Florida Geotechnical Drilling</u>	HOLE DEPTH <u>30 ft</u> HOLE DIAMETER _____
DRILLER <u>Lazaro Tarajano</u>	DATE STARTED <u>8/19/22</u> COMPLETED <u>8/19/22</u>
DRILL RIG <u>B57</u>	GROUND WATER LEVEL: ∇ AT TIME OF DRILLING <u>2.83 ft / Elev 5.17 ft</u>
METHOD <u>Standard Penetration Test</u>	LATITUDE <u>25.877995</u> LONGITUDE <u>-80.123496</u>
NOTE: _____	HAMMER TYPE <u>140# with 30 in Drop - Automatic Hammer</u>

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS	N VALUE	MOISTURE CONTENT (%)	ORGANIC CONTENT (%)	▲ SPT N VALUE ▲					
										20	40	60	80		
			4" of asphalt atop, medium dense, dark gray, fine to medium grained SAND (SP) with trace of shell fragments.	1	90	6 7 4 13	11								
5	2.0	∇	Medium dense, gray, fine to medium grained SAND (SP) with SHELL fragments.	2	90	4 4 6 8	10								
5				3	90	3 6 7 10	13								
0				4	90	7 8 10 9	18								
10				5	90	9 6 10 10	16								
-5				6	90	3 4 5 5	9								
15				7	90	8 9 4 3	13								
-10	18.0		Medium dense, gray, fine to medium grained SAND (SP) with trace of shell fragments.												
20				8	90	17 44 40 26	84								
-15	23.0		LIMESTONE fragments with some sand.												
25				9	90	6 8 10 12	18								
-20															
30	30.0		Bottom of borehole at 30.0 feet.												



APPENDIX B
Notes Related to Test Borings



**NOTES RELATED TO
RECORDS OF TEST BORING AND
GENERALIZED SUBSURFACE PROFILE**

1. Groundwater level was encountered and recorded (if shown) following the completion of the soil test boring on the date indicated. Fluctuations in groundwater levels are common; consult report text for a discussion.
2. The boring location was identified and located in the field based on measured and estimated distances from existing site features.
3. The borehole was backfilled to site grade following boring completion, patched with asphalt cold patch mix when pavement was encountered.
4. The Record of Test Boring represents our interpretation of field conditions based on engineering examination of the soil samples.
5. The Record of Test Boring is subject to the limitations, conclusions, and recommendations presented in the report text.
6. The Standard Penetration Test (SPT) was performed in accordance ASTM Procedure D-1586. SPT testing procedure consists of driving a 1.4-inch I.D. split-tube sampler into the soil profile using a 140-pound hammer falling 30 inches.
7. On the Record of Test Boring listed as "Blow Counts", the N-value is the sum of the SPT hammer blows required to drive the split-tube sampler through the second and third 6-inch increment of the sampling layer, and is an indication of soil strength.
8. Shown on the Record of Test Boring an SPT N-value expressed as 50/2" is descriptive of the fact that 50 hammer blows were required to drive the split-spoon sampler a distance of approximately 2 inches.
9. The soil/rock strata interfaces shown on the Records of Test Boring are approximate and may vary from those in the field. The soil/rock conditions shown on the Records of Test Boring refer to conditions at the specific location tested; soil/rock conditions may vary between test locations.

10. Relative density and consistency for sands/gravels, silts/clays, and limestone are described as follows:

Cohesionless Soils		Silts and Clays		Limestone	
SPT (N-Value)	Relative Density	SPT (N-Value)	Consistency	SPT (N-Value)	Relative Density
0 – 3	Very Loose	0 – 1	Very Soft	0 – 19	Very Soft
4 – 8	Loose	2 – 4	Soft	20 – 49	Soft
9 – 24	Medium Dense	4 – 6	Firm	50 – 100	Medium Hard
25 – 40	Dense	7 – 12	Stiff	50 for 3 to 5"	Moderately Hard
Over 40	Very Dense	13 – 24	Very Stiff	50 for 0 to 2"	Hard
		Over 24	Hard		

11. Definition of descriptive terms of modifiers for silts/clays/shells/gravels are described as follows:

Percentage of Modifier Material	First Qualifier	Second Qualifier
0 – 5	With a Trace of + Silt, Clay, Shell	With a Trace
5 – 12	Slightly + Silty, Clayey, Shelly	With Some
12 – 30	Silty, Clayey, Shelly	With
30 – 50	Very + Silty, Clayey, Shelly	And

12. Descriptive characteristics for organic content percentages are described as follows:

Percentage of Organic Material	Descriptor
0 – 5	With a Trace
5 – 20	With Organics
20 – 75	Highly Organic
75 – 100	Peat

APPENDIX C
Discussion of Soil Groups



DISCUSSION OF SOIL GROUPS

COARSE GRAINED SOILS

GW and SW GROUPS. These groups comprise well-graded gravelly and sandy soils having little or no plastic fines (less than 5 percent passing the No. 200 sieve). The presence of the fines must not noticeably change the strength characteristics of the coarse-grained fraction and must not interfere with its free-draining characteristics.

GP and SP GROUPS. Poorly graded gravels and sands containing little or no plastic fines (less than 5 percent passing the No. 200 sieve) are classed in GP and SP groups. The materials may be called uniform gravels, uniform sands or non-uniform mixtures of very coarse material and very fine sands, with intermediate sizes lacking (sometimes called skip-graded, gap-graded or step-graded). This last group often results from borrow pit excavation in which gravel and sand layers are mixed.

GM and SM GROUPS. In general, the GM and SM groups comprise gravels or sands with fines (more than 12 percent passing the No. 200 sieve) having low or no plasticity. The plasticity index and liquid limit of soils in the group should plot below the "A" line on the plasticity chart. The gradation of the material is not considered significant and both well and poorly graded materials are included.

GC and SC GROUPS. In general, the GC and SC groups comprise gravelly or sandy soils with fines (more than 12 percent passing the No. 200 sieve), which have a fairly high plasticity. The liquid limit and plasticity index should plot above the "A" line on the plasticity chart.

FINE GRAINED SOILS

ML and MH GROUPS. In these groups, the symbol M has been used to designate predominantly silty material. The symbols L and H represent low and high liquid limits, respectively, and an arbitrary dividing line between the two is set at a liquid limit of 50. The soils in the ML and MH groups are sandy silts, clayey silts or inorganic silts with relatively low plasticity. Also included are loess type soils and rock flours.

CL and CH GROUPS. In these groups the symbol C stands for clay, with L and H denoting low or high liquid limits, with the dividing line again set at a liquid limit of 50. The soils are primarily inorganic clays. Low plasticity clays are classified as CL and are usually lean clays, sandy clays or silty clays. The medium and high plasticity clays are classified as CH. These include the fat clays, gumbo clays and some volcanic clays.

