July 15, 2016

BOARD OF COUNTY COMMISSIONERS
ORANGE COUNTY, FLORIDA

ADDENDUM NO. 3 / IFB NO. Y16-776-PH
INTERNATIONAL DRIVE POTABLE WATER BOOSTER PUMP STATION

BID OPENING DATE: JULY 26, 2016

This addendum is hereby incorporated into the bid documents of the project referenced above. The following items are clarifications, corrections, additions, deletions and/or revisions to and shall take precedence over the original documents. Additions are indicated by **<u>underlining</u>**, deletions are indicated by ~~strikethrough~~.

A. CLARIFICATIONS

1. **Q: Please clarify the 36" flanged valves? C103 calls for butterfly valves; C105 and C106 call for gate valves.**

   A: Two 36" flanged gate valves should be provided outside the building – one on the suction piping and one on the discharge piping. The labels have been corrected on the attached revised Drawing C103. A single 36" butterfly valve should be provided on the suction piping between pumps 2 and pump 3 and is labeled correctly on Drawing C103.

   The 36" flanged gate valves are labeled correctly on revised sheets C105 and C106.

2. **Q: The specified cushioned swing check valve for item 12 on C103 is not a product that can be buried. Please advise if a vault is required or an alternate product is desired.**

   A**:** The 36" bypass pipe and 36" check valve and all associated fittings and appurtenances have been revised to be installed above grade. Attached are the revised Drawings associated with this change (Drawings C103, C104, C105, C106, and X100).

3. **Q: Will the County consider adding an allowance bid item for electrical costs associated with providing power to the site through Duke Power?**

   A**:** The County will <u>not</u> add an allowance bid item associated with providing permanent electrical services from Duke Power. However, the County will directly pay all charges incurred directly from Duke or Century Link (communications to the site) related to the permanent power to the project site and permanent communications to the site. The Contractor is

responsible for coordinating with Duke and Century Link to provide power and communications to the site. This effort to coordinate with Duke and Century Link are to be incorporated in the Contractor's bid amount.

The County will pay the exact amount charged by Duke and Century Link for the permanent power and communications to the site. County will write the check directly, therefore, the actual amounts charged by Duke and Century Link for permanent power to the site will not be included in the Contractors bid amount. Contractor is to allow the County up to 5 weeks to provide payment to Duke and Century Link upon notification from the Contractor. Contractor shall incorporate this time into his schedule, and shall not request additional time to the Contract associated with the County's time to write the check for Duke and Century Link (assumed to be no more than 5 weeks from notification).

All temporary power and temporary communications necessary for construction activities are the responsibility of the contractor and are to be paid for by the Contractor and included in his bid price.

4. **Q: In the specifications there is reference to providing the County an office trailer. It further specifies desk, file cabinet's, copiers, etc. However, it does not specify the size of the trailer needed, how much parking area is needed or what size fenced area is required. Please advise.**

A**:** County has their own office space in a nearby location and will not require an office trailer at the site, however, the County will need access to the Contractor's restroom facilities. Contractor shall determine size of temporary parking based on his needs, and provide up to three additional temporary parking locations for the County and Engineer. All temporary fencing is to be provided at the discretion of the Contractor. Please see the attached revised Section 01590.

5. **Q: In the technical specs there were references to appendices. However, there none attached, i.e, soils report's etc. Please advise.**

A**:** See attached Appendices 1, 2, 3, and 4.

6. **Q: On plan page G300 Note 30. States that "All pipe joints to be mechanically restrained". And Plan page D130 has a restrained pipe table. Are "all" joints restrained or do we follow the table? Please advise.**

A**:** Contractor shall restrain all pipe.

7. Q: **I am looking to see if Orange County has an approved pump manufacturer list for Horizontal Split Case pumps. I located a file from the Orange County website but it only referenced sump pumps. In this project the specs state:**
"11210, 2.02, D., 1.: Acceptable Manufacturer's for this Project shall be per Orange County approved list of manufacturers."

The listed manufacturer at this time is Aurora pumps or approved equal. I would like to submit Flowserve as an equal for this competitive bid. Please let me know what steps are required or if there is an approved manufacturer's list that I can review.

A: The three manufacturers allowed by the County on this project will be Peerless, Aurora, or Goulds. No "or equals" will be allowed.

8. Q: **On sheet G200 It states "Install approximately 2,000 ft of chainlink fence on both sides of gravel road". For bidding purposes are we to assume that we only have to install 4,000 lf in this area? Also, Should we use the same detail for this fence as described on sheet D120?**

A: For bidding purposes, contractor shall assume that they are to provide up to 3,000 lf of chain link fence at the access road entrance off of Hunter Creek subdivision. Use the same fencing detail shown on Sheet D120.

For additional clarification with regards to fencing, Contractor shall provide temporary fencing for the site as described in Specification Section 01590. Also, Contractor shall provide permanent fencing around the new pump building in the amounts depicted on Drawing C102.

9. Q: **On sheet C102 the curb is shown as 12". On the detail on sheet D110 the "ribbon curb" is shown as 18". Please advise.**

A: The ribbon curbing located northwest of the pump building outside of the fenced area is to be 18" tall due to the steep slopes. The remaining ribbon curbing located within the fenced area is to be 12" tall.

10. Q: **The following documents are missing from the Specification Manual – Part H:**

1. **Permits**
2. **Geotechnical Soils Report**
3. **List of Approved Products**
4. **Applicable Forms from Orange County**

A: See Appendices 1 through 4, attached to Addendum No. 3.

11. Q: The following documents is missing from the Plan Set – Drawing A4.0 – Wall Section (page 24).

A: See Drawing A4.0, attached to Addendum No. 3.

12. Q: Would we be allowed to substitute 8" limerock base instead of 8" of soil cement for the roadways?

A: No. Bid project as specified with regards to the roadway base.

13. Q: Section 13330 identifies Curry Controls as the sole source SCADA programmer. Section 13300 also identifies Curry Controls as one of 3 approved System Suppliers. Precluding other System Suppliers to provide a cost for SCADA programming potentially allows a portion of I&C costing to be offloaded to the SCADA programming budget for which no other System Suppliers are approved. Please advise.

A: The three System Suppliers allowed by the County on this project will be Curry Controls, Revere Control Systems, and Electro Design. No others will be allowed. See attached revised Specification 13330.

14. Q: Please provide a model # for the air devices and the exhaust fans as we do not see them on the plans or in specs.

A: See table below for a list of approved manufacturers and model numbers for the various air devices and exhaust fans.

Tag	**Manufacturer and Model number**
SD-1	Titus 300FL, or equal
SD-2	Titus TMS, or equal
SD-3	Titus 300FL, or equal
RG-1	Titus 350FL, or equal
EF-1	Greenheck TBI-CA-3M18, or equal
EF-2	Greenheck TBI-CA-3M18, or equal
EF-3	Greenheck SP-B50, or equal
AHU-1	Trane GAM5A0C60M51SA, or equal
AHU-2	Trane GAM5A0C60M51SA, or equal
CU-1	Trane 4TTA3060, or equal

CU-2	Trane 4TTA3060, or equal

B. PROJECT SPECIFICATIONS

1. Delete Technical Specification 01590 and replace in its entirety with the attached Technical Specification 01590.

2. Delete Technical Specification 11210 and replace in its entirety with the attached technical Specification 11210.

3. Delete Technical Specification 11226 and replace in its entirety with the attached technical Specification 11226.

4. Delete Technical Specification 13330 and replace in its entirety with the attached Technical Specification 13330.

5. Add Appendices 1 through 4 (see attachment).

C. PROJECT DRAWINGS

DRAWING A4.0

Amend: Delete duplicate Drawing H-04 and insert attached Drawing A4.0 in its place.

DRAWINGS C103, C104, C105, C106, C107, C108, and X100

Amend: Delete Drawings C103, C104, C105, C106, C107, C108, D110, and X100 and replace with the revised Drawings C103, C104, C105, C106, C107, C108, D110, and X100. The drawing revisions generally include the following:

- Modifications to the holding tank dimensions and manufacturer in order to meet FDOH permit requirements. See clouded revisions to Drawings C103 and C108.
- Updates to tags, identification numbers, callouts, and fitting locations where clouded. See clouded revisions to Drawings C103, C104, C105, C106, C107, C108, and X100.
- Deleted 36” blind flange callout (Item 28 on the Pipe, Fitting, and Equipment Legend on Drawing C103) and deleted associated Identification Number WM-29. See clouded revisions to Drawings C103 and X100.
- Revised 36” bypass pipe and 36” check valve above grade. Several other revisions to nearby fittings were also revised to be above grade. See clouded revisions to Drawings C103, C105, and C106.
- Added gravel and ribbon curb around modified 36” bypass pipe and check valve that were raised above grade. See revisions to C103.

- Added two additional 36” 45 degree bends to the discharge piping (see Drawing C105 and C107).
- Added size, manufacturer and model numbers to injection quills. See clouded revision to item 30 on the Pipe, Fitting, and Equipment Legend on Drawing C103.
- Added size, manufacturer and model numbers to air release valve. Relocated air release valve to new tee. See clouded revision and added Item 37 on the Pipe, Fitting, and Equipment Legend on Drawing C103. Also, see revisions to Drawing C105 showing new air release valve location.
- Added three additional air release valves to the suction and bypass piping.
- Deleted two 36” 45 degree bends downstream of the flow meter station. Replaced them with (1) a 36” flanged tee with 36” blind flange, above grade and (2) 90 degree bend, below grade, mechanical joint.
- Added additional requirements to the static mixer. See revisions to Item 15 in the Pipe, Fitting, and Equipment Legend on Drawing C103.
- Added additional bollards to Drawing C103.
- Expanded the gravel and curb area between the revised above ground bypass piping, the above ground discharge piping and the above ground suction piping.
- Added filter fabric beneath gravel as shown on the Ribbon Curb Detail on Drawing D110.

D. ACKNOWLEDGEMENT OF ADDENDA

The Proposer shall acknowledge receipt of this addendum by completing the applicable section in the solicitation or by completion of the acknowledgement information on the addendum. Either form of acknowledgement must be completed and returned not later than the date and time for receipt of proposal.
All other terms, conditions and specifications remain the same.

Receipt acknowledged by:

_____ _____
Authorized Signature Date Signed

_____
Title

_____
Name of Firm

SECTION 01590

CONSTRUCTION FIELD OFFICE

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Contractor provision of temporary utilities to include electricity, lighting, internet connectivity, heat, ventilation, telephone service, water, and sanitary facilities.

B. Contractor provision of temporary controls to include barriers, enclosures and fencing, and water control.

C. Contractor provision of temporary facilities to include access roads, parking, and temporary buildings.

E. Restrictions on the use of existing adjacent facilities.

F. Project identification signs.

1.02 TEMPORARY ELECTRICITY

A. Provide and pay for power service required for Construction and testing from local utility source.

B. Provide temporary electric feeder from existing electrical service at location as directed by utility company. Power consumption will not disrupt the County's need for continuous service. Coordinate with the County before making taps or disturbing existing service.

C. Provide separate metering and pay for cost of energy used until substantial completion. If electric service is turned over to and paid for by the County prior to substantial completion, reimburse the County for energy used up to substantial completion.

D. Provide power outlets for Construction operations, with branch wiring, distribution boxes located as required and grounding as required by NEC and local electrical codes. Provide OSHA approved flexible power cords as required.

E. Contractor-installed permanent convenience receptacles may be used during Construction.

1.03 TEMPORARY LIGHTING

A. Provide and maintain adequate lighting for Construction operations to achieve a minimum lighting level of one (1) watt/sq ft.

B. Provide and maintain 2 foot candle lighting to exterior staging and storage areas after dark for security purposes.

C. Provide and maintain 0.25 watt/sq ft H.I.D. lighting to interior Work areas after dark for security purposes.

D. Provide branch wiring from power source to distribution boxes with lighting conductors, pigtails, and lamps as required.

E. Maintain lighting and provide routine repairs.

F. Permanent building lighting may be used during Construction.

1.04 TEMPORARY HEAT AND COOLING

A. Provide and pay for heating and cooling as required to maintain specified conditions for Construction operations or as required for proper conduct of operations included in the Work.

B. Prior to operation of permanent equipment for temporary purposes, verify that installation is approved for operation, equipment is lubricated and temporary filters are in place. Provide and pay for operation, maintenance, and regular replacement of filters and worn or consumed parts.

C. Maintain minimum ambient temperature of 50 degrees F and maximum relative humidity of 50 percent in areas where Construction is closed in and final finishes are to be placed, unless indicated otherwise in specifications.

1.05 TEMPORARY VENTILATION

A. Ventilate enclosed areas to assist cure of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.

1.06 TEMPORARY WATER SERVICE

A. Provide, maintain, and pay for suitable quality water service required for Construction operations. Coordinate with the County if water supply is not separately metered. Pay all costs and expenses associated with such use.

B. Extend branch piping with outlets located so water is available by hoses with threaded connections.

1.07 TEMPORARY SANITARY FACILITIES

A. Provide and maintain required facilities and enclosures on-site. Maintain daily in clean and sanitary condition.

1.08 BARRIERS

A. Provide barriers to prevent unauthorized entry to Construction areas and to protect existing facilities and adjacent properties from damage from Construction operations.

B. Provide barricades required by governing authorities for public rights-of-way.

C. Provide protection for plant life designated to remain. Replace damaged plant life.

D. Protect non-owned vehicular traffic, stored materials, site and structures from damage.

1.09 FENCING

A. Unless directed otherwise in other sections of the Contract Documents, provide a 6 foot high fence completely around Construction site; provide with hinged vehicular and pedestrian gates with locks. Fencing will be galvanized, 2-inch mesh, chain link with solid top rail. Provide line posts and end posts as needed to maintain stretched and uniform fencing with no sags.

B. Fencing plan will be approved by the County for each phase of the project. Submit fencing layout diagram prior to the Pre-Construction meeting.

C. Provide visual fabric barrier at least 6 foot high on all fencing separating parking areas from Construction activities. Submit barrier fabric for approval before starting fencing. Barrier fabric will be capable of retaining physical integrity and color during the entire Construction period.

1.10 ACCESS ROADS

A. Provide and maintain uninterrupted public access to the existing Orange County properties, OOCEA's roadways, Hunter's Creek properties, and the properties located off of the Project's site access roads. Construction activities will not interfere with access to any properties. If Contractor fails to maintain access after 2 written notices within a 24 hour period, the County reserves the right to correct such situation and back charge the Contractor.

B. Contractor shall maintain the existing access roads and any temporary access roads throughout the duration of the construction activies. Contractor shall maintain Orange County's two existing access roads throughout construction to the project site for both the Contractor's deliveries and for the Owner's use of their Westerly Effluent Disposal Site.. One access road is located west of the site, off of International Drive crossing beneath the 417 and it's off ramps; the second access road is located within the Hunter's Creek subdivision off of Town Center Drive. Refer to Drawing No. G200 for location of access roads.

C. Contractor shall regrade and restore existing Orange County Utility Department's gravel access roads to existing conditions following construction activities.

D. Extend and relocate access roads as Work progress requires. Provide detours necessary for unimpeded traffic flow.

E. Provide and maintain access to fire hydrants, free of obstructions.

F. Designated existing on-site roads may be used for Construction traffic. Repair or restore any damaged areas caused as a result of Construction activity. Such repair will be to a like-new condition.

1.11 PARKING

A. Provide temporary surface parking areas to accommodate Construction personnel.

B. Do not allow Construction vehicle parking on existing pavement unless approved by County.

~~1.13 SPECIFIC REQUIREMENTS FOR THE FIELD OFFICES~~

~~Provide the following for the exclusive use of the County: (Unless otherwise noted, the~~

quantity should be sufficient for the duration of the Work.)

A. Office Furnishings: The furniture will be delivered and placed as directed by the County.

B. Desks: Flat top, double pedestal, with one box and one file drawer in each pedestal, 36-inches by 60-inches. Total quantity will be two (2).

C. Chairs: Two (2) slegged-type chairs, adjustable heights, on rollers, with armrests.

D. Conference Table and Chairs: Two (2) tables (3' x 8' minimum), scratch and stain resistant and fifteen (15) meeting-type chairs.

E. Drawing Table: Two (2) plywood or standard drawing tables, 3-feet by 6-feet, with all required appurtenances and two (2) extended height stools suitable for use at the drawing tables.

F. Printer: One (1) color laser printer with capability to copy, scan, and print pages up to and including 11-inch by 17-inch with autofeeding capability. The color printer will have a minimum color print speed of 10 pages per minute. All warranties, maintenance, servicing and sufficient appropriate ink/toner cartridges and paper for the duration of the Work.

G. One (1) each refrigerator, microwave, coffee machine, and toaster oven.

H. Computer Systems and Software:
   1. One (1) complete HP Desktop Computer with Intel Dual Core Processor, 3.0 GHz processor speed, 1.0 GB memory, 4 GB memory upgrade, 250 GB hard drive capacity, Windows XP Media Center Edition 2005 operating system, or equal, including a warranty to cover the duration of the Work.
   2. One (1) HP 17-inch LCD flat panel monitors, including a warranty to cover the duration of the Work.
   3. Provide three (1) each Microsoft wireless mouse, including a warranty to cover the duration of the Work.
   4. One (1) surge protectors, monitor wipes, and compressed gas duster in sufficient quantities for the duration of the Work.
   5. The latest version of Windows software, as required, for the operation of each computer system. The software will include the latest versions of Microsoft Office Professional (Word, Excel, Access, PowerPoint, Publisher, Outlook, etc.), Visio Professional, Adobe Acrobat latest version, Norton Virus Protection (with annual renewal of updates), Audio and DVD Player, Expedition (or appropriate software to be compatible with the Contractor's Management Plan) and an Internet Browser.
   6. Install and maintain for the duration of the Contract an office network that allows all computers to access the Internet with appropriate WiFi router and security firewalls, print to the network printers, and file documents on a common server of at least 300 GB capacity. Provide separate network hard drive backup system of sufficient size using appropriate software loaded on each computer that will backup each changed file. Provide Information Technology (IT) support to respond promptly (within two business hours) to network, connectivity or computer related problems.

I. File Cabinets, Storage, Bookcases:
   1. Three (3) Lateral Files: HON 600 Series, or equal, 42-inch wide, four-drawer.

~~1. Two (2) steel vertical, hanging mobile plan stand, with approximately 12 hanging clamps. Provide all required clamps, of sufficient length to hold the Contract Drawings.~~

~~2. Storage: two (2) industrial grade steel cabinets, locking handles, 36-inches wide by 18-inches deep by 72-inches high.~~

~~3. Bookcases: three (3) HON metal bookcases, or equal, 34-1/2-inches wide by 12-5/8-inches deep by 71-inches high, color to be selected by the Engineer.~~

~~J. Miscellaneous Field Supplies:~~

~~1. One (1) minimum/maximum digital thermometer, with batteries for the duration of the Work.~~

~~2. One (1) rain gauge.~~

~~3. One (1) paint gauge, magnetic, non-destructive type.~~

~~4. Three (3) Durabeam lanterns and three (3) rubberized, water-resistant flashlights, with batteries.~~

~~K. Digital Camera.~~

~~1. One (1) Canon Powershot, 4.0 Megapixel Digital Camera, color, built in flash, rechargeable battery.~~

~~2. Two (2) compatible Digital Memory Cards, 2 GB per each.~~

~~3. One (1) compatible Digital Camera Bag.~~

1.14**2** REMOVAL OF TEMPORARY UTILITIES, FACILITIES, AND CONTROLS

A. Remove all temporary utilities, equipment, facilities, and materials prior to submitting Final Application for Payment.

B. Remove temporary underground installations to minimum depth of 2 feet and Re-grade site.

C. Clean and repair damage caused by installation or use of temporary Work.

D. Restore any existing facilities used during Construction to original condition, unless otherwise directed in other sections of Contract Documents. Restore existing landscaping, drainage, paving, etc. to an "as-was" condition, unless otherwise directed in other sections of Contract Documents.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

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SECTION 11210

HORIZONTAL SPLIT-CASE PUMPS

PART 1 - GENERAL

1.01 DESCRIPTION

A. Scope of Work

1. The Work covered in this Section shall include, but is not limited to, furnishing all labor, materials, equipment, tools, and all incidental items and work required for construction, installation and testing of VFD-controlled horizontal split-case pumps, motors, control systems and related equipment and appurtenances and all items shown or inferred on the Contract Drawings or reasonably specified herein for the Potable Water Booster Pump Station. **VFDs are to be provided per Specification Section 16370.**
2. It is the intent of these Contract Drawings that a complete, functional and fully operational Potable Water Booster Pump Station be constructed. If any items for a complete job are omitted or not shown, the Contractor shall furnish and install the same without additional cost to the County.
3. The Contractor shall provide all pipe supports required for "fully" supporting all suction and discharge piping, valving, and appurtenances associated with the Potable Water Booster Pump Station pumping system.
4. The Contractor shall have the sole responsibility for the proper functioning of the equipment.

B. Equipment furnished and installed under this Section shall be fabricated, assembled, erected and placed in proper operating condition in full conformance with detail drawings, specifications, engineering data, instructions and recommendations of the equipment manufacturer as approved by the County.

C. Related Work Specified Elsewhere

1. Potable Water System - Section 02660
2. **Special Construction – Division 13**
3. Electrical - Division 16

1.02 QUALITY ASSURANCE

A. Material Service Requirements

1. The pumps, motors, and all related equipment shall be suitably constructed of materials to withstand the operating conditions which shall be experienced during the pump's performance.

B. Balancing

1. All pump and motor units shall be statically and dynamically balanced.
2. The vibration allowance in the units shall not exceed the upper limits as established by the Hydraulic Institute Standards.

C. Tests
1. Each pump with its own factory calibrated drive motor shall be fully tested on water at the pump manufacturer's plant before shipment. Tests shall consist of checking the unit at its rated speed for head, capacity, efficiency, and brake horsepower, and at such other conditions of head and capacity to properly establish the performance curve.
2. Certified copies of test reports shall be submitted to the Engineer prior to delivery of the pumps.
3. The Standards of the Hydraulic Institute shall govern the procedures and calculations for these tests. During these tests the pumps with drive motors shall be checked for balance.
4. Motors shall be given a short commercial test in accordance with IEEE standards.

D. Unit Responsibility
1. The entire pump, motor and assembly shall be supplied by the pump manufacturer to insure unit responsibility.

E. The equipment specified under this section shall be provided by manufacturers who are fully experienced, reputable, qualified, and regularly engaged in the manufacture of the components and equipment to be furnished. All equipment and manufacturers shall be approved by the County.

D. The horizontal split-case pumps shall be manufactured in accordance with these specifications by a manufacturer whose high quality has been demonstrated by at least five (5) years of service in similar installations.

E. Minor Changes and Equipment Drawings
1. The structures shown on the Contract Drawings for the various items of equipment are the result of the best obtainable information from various sources. Due to the variances in equipment details between equipment manufacturers, the Contractor may find it necessary to make minor changes in order to accommodate the piping and the equipment furnished. The Contractor shall not undertake to construct any structure containing equipment until he has obtained approved, certified dimension prints of the equipment involved. Any structural changes necessary to accommodate the equipment furnished shall be approved by the County and shall be made at no additional cost to the County.
2. The equipment suppliers for the various items of equipment shall assume all responsibility in informing the Contractor of any changes that may be required in the structures, mechanical system, electrical or controls systems to accommodate their equipment. Where details of equipment

vary considerably from that shown, the equipment supplier shall prepare complete installation drawings, following the form of the Contract Drawings and such other drawings as may be required by the County to provide complete installation drawings. Where changes require such drawings, the equipment supplier shall furnish to the Engineer AutoCAD drawings in addition to approval prints.

1.03 SUBMITTALS

A. Materials and Shop Drawings

1. The Contractor shall submit the following to the Engineer for approval prior to fabrication and purchase.
   a. Manufacturer's specification data and descriptive literature, illustrations, and applicable data for each pump. Show details of construction by ASTM reference and grade. Show outline dimensions and weights of pumps, bases and motors.
   b. The Shop Drawings shall include details of pump assembly, installation layout and procedures, piping and electrical connections and requirements, types of materials used in the construction of the pump, details on all pump accessories; dimensions of major components, weights, structural and operating features, space required, clearances, type of finish or shop coat, and other pertinent data. Where applicable, and the pump is provided as part of a complete package inclusive of controls, control diagrams will be provided.
   c. Lubricants
      1) Pumps and drive units shall be delivered with the equipment fully lubricated insofar as possible. If any point cannot be so serviced, it shall be clearly marked to the effect that it is not lubricated and requires servicing prior to operation.
      2) An adequate supply of proper lubricant, with instructions for its application, shall be supplied with the equipment for each point not lubricated prior to shipment.
   d. A list of manufacturer’s recommended spare parts to be supplied, with the manufacturer’s part number (SKU #) and current price for each item. See Article 2.02(H) of this specification section. List bearings by the bearing manufacturer’s numbers only. Information about the nature and location of parts, service crews and repair facilities shall also be supplied.
   e. The following data shall be provided on the drive motor:
      1) Manufacturer’s name and model number
      2) Materials of construction
      3) Dimensions
      4) RPM at full load
      5) Frequency

6) Voltage
7) Full load current
8) Code and design letter
9) Efficiency
10) Horsepower Output
11) Number of phases
12) Time rating
13) Temperature rise
14) Service factor
15) Bearing life rating
16) Results of commercial test

f. The submittal shall include the motor manufacturer's recommended lubrication requirements and motor efficiencies and power factors at 50%, 75% and 100% of full load. Submit verification of minimum requirements for Duke Energy's motor efficiency credit.

g. Submit operation and maintenance data as specified in Section 01730, "Operation and Maintenance Data". Submit the equipment supplier's certificate that the installation is in accordance with suppliers recommendations.

h. Performance Curves

1) The Contractor shall submit the following to the County for approval, prior to shipment from the factory:

a) Submit manufacturer's certified pump performance curves for each pump and motor combination furnished illustrating pump characteristics of head, discharge flow, efficiency from 0 - 110% of the design capacity, required NPSH, available suction lift, impeller size, motor speed, and horsepower for the full range of head conditions specified. Provide performance curves for the full operating range.

b) The manufacturer's certified pump curves shall be submitted on 8½" x 11" sheets, at as large a scale as is practical. The certified curves shall be plotted from no flow at shut off head to maximum pump runout head and gallonage allowed by the manufacturer.

c) Points of operation which cause bearing stress or shaft deflection in excess of the manufacturer's tolerances for continuous operation shall be indicated on the submitted certification curves.

i. Manufacturer's guarantee and warranty.

j. Drawings showing general dimensions, connections, setting diagrams and wiring directions.

k. Procedures for proper installation.

l. The shop drawing submittals shall be complete in one (1)

submittal.

B. Factory Performance Test Data
   1. After acceptance of the pump shop drawings, factory performance test data will be submitted for approval on the pumping unit.
   2. The test shall be a non-witnessed performance test.
   3. Tests shall be in accordance with the standards of the Hydraulic Institute including head, capacity, brake horsepower, **and** pump efficiency ~~and NPSH~~.

1.04 OPERATION AND MAINTENANCE DATA

A. O&M Manuals shall be furnished for this Project in accordance with Section 01700, "Project Closeout" and shall be submitted in accordance with Section 01300, "Submittals". Contractor to submit three (3) complete bound sets of O&M manuals as well as a PDF that is searchable by keyword.

B. The O&M Manuals shall be ***prepared specifically for this installation*** and shall include but not be limited to the following:
   1. Equipment function.
   2. Description.
   3. Normal and limiting operating characteristics.
   4. Installation instructions (assembly, alignment and adjustment procedures).
   5. Detailed operating and maintenance instructions (normal start-up and shutdown procedures, normal operating conditions and emergency situations)
   6. Specifications relative to the assembly, alignment, checking, lubrication, placing in operation, adjustment, and maintenance of equipment and auxiliaries furnished under this Contract.
   7. Parts list with catalog numbers and predicted life of parts subject to wear.
   8. Copies of shop drawings, certified dimensions drawings and design calculations, required cut sheets, drawings (cross sectional view, assembly, wire list and wiring diagrams), equipment lists, descriptions, etc. that are required to instruct operation and maintenance personnel unfamiliar with such equipment.
   9. Lubrication and maintenance instructions.
   10. Troubleshooting guide.
   11. Performance curves.
   12. Instruction bulletins Manuals.

C. All such material shall be in addition to any instructions or parts lists packaged with or attached to the equipment when delivered.

D. The "final" O&M Manuals shall contain plastic laminated pull-out lubrication and maintenance cards detailing all lubrication points, lubricant type, and frequency of lubrications and all additional required maintenance and frequency intervals.

E. SCADA System O&M Manuals

1. In addition to standard O&M Manuals, all manufacturers supplying equipment and products specified herein shall submit their operation and maintenance manuals to the SCADA System Integrator (Curry Controls or Revere) for this Project on CD's in Corel WordPerfect (latest version), Microsoft Word (latest version), or text, "txt", formats. All graphic files shall be in BMP, PCX, CDR, JPEG, DWG or DXF formats (integrators preference for the system shall be required).
2. The SCADA System Integrator shall be responsible to configure and compile the O&M Manuals into "hypertext" window help files and pdf files for use as computer "on-line" help screens for equipment operation and maintenance. The SCADA System Integrator shall return all files to the equipment and product manufacturer's for review and approval prior to introducing them into the SCADA System.

1.05 DOCUMENTATION AND MANUFACTURER'S SERVICES

A. The horizontal split-case pump manufacturer shall provide full documentation for all hardware, components, and equipment, including complete manuals for installation, operation, calibration, troubleshooting. All documentation shall be neatly organized, readable and complete.

B. Complete hardware installation, operation, maintenance and troubleshooting manuals shall be provided in accordance with Section 01650 and 01700.

C. Operation and maintenance manuals shall be prepared specifically for this Project, and shall include all required cut sheets, drawings, equipment lists, descriptions, safety requirements, special handling practices, etc., which are required to instruct operators and maintenance personnel on the proper operation and maintenance of these systems.

D. The manufacturer of the high service pumps shall provide the services of a factory-trained service representative to check and adjust the equipment and system when ready to be placed into operation. The manufacturer shall notify the County when the service representative will be at the project site. The serviceman shall train the County's operator in the operation and maintenance of the equipment, inspect thoroughly for damage and missing items, check integral equipment supplied by other manufacturers, and make any necessary adjustments.

E. Conduct an operational test, under the observation of the County. Test shall demonstrate that the equipment and work is not defective and is in a safe and satisfactory operating condition.

F. A factory representative of the horizontal split-case pump manufacturer, who has complete knowledge of the proper operation and maintenance requirements for that specific pumping system, shall be provided for a minimum total of four (4)

hours to instruct representatives of the County on proper operation and maintenance of the pumping systems. Training shall be organized, well structured and executed, so that the treatment facility staff is well qualified and confident to operate these systems. The training is to be conducted in two separate presentations as not all the staff are able to be present at once. This four (4) hour training allowance is in addition to the eight (8) hours required for inspection of the installed equipment and the four (4) hour system start-up.

G. If there are difficulties in the operation of the equipment, due to the inadequate level of training or the manufacturer's design or fabrication, additional training and/or services shall be provided to resolve the difficulties, at no additional cost to the County.

H. Training sessions shall be scheduled at the convenience of the County, so that the appropriate personnel can be available. All training shall be video-taped, on DVD format, by the Contractor and DVD's shall be turned over to the County for future use.

1.06 DELIVERY, STORAGE, AND HANDLING

A. The split-case horizontal pumps and related equipment and accessories shall be factory assembled and tested, and shall be delivered to the site for installation. Deliver a complete system ready to install as job progress requires.

B. All parts and equipment shall be properly protected, in a weathertight building, so that no damage or deterioration will occur during a prolonged delay from the time of shipment until installation is complete and the units and equipment are ready for operation. Protect the equipment from being contaminated by dust, vibration and moisture.

C. Factory assembled parts and components shall not be dismantled for shipment unless permission is received in writing from the County. Pumps shall be prepared for shipment in accordance with API Standard 610.

D. Exposed openings for connection to piping shall be properly plugged or protected by wooden blanks, etc., strongly built and securely bolted to the flanged surfaces.

E. Finished iron or steel surfaces not painted shall be properly protected to prevent rust and corrosion.

F. After hydrostatic or other tests, all entrapped water shall be drained prior to shipment, and proper care shall be taken to protect parts from the entrance of water during shipment, storage, and handling.

G. Each box or package shall be properly marked to show its net weight in addition to its contents.

H. The Contractor shall handle the equipment during delivery, storage and installation in a manner to prevent damage of any nature in accordance with the manufacturer's approved written instructions and in accordance with instructions given on-site by the manufacturer's representative.

1.07 WARRANTY AND GUARANTEES

A. All equipment supplied under this section shall be warranted for a period of two (2) years by the manufacturer. The warranty period shall commence upon Final Project Acceptance by the County. The Contractor shall refer the County's requirements for "Warranties and Bonds", for additional requirements.

B. The equipment shall be under warranty to be free from defects in workmanship, design and materials. If any part of the equipment should fail during the warranty period, it shall be replaced at no expense to the County.

C. The replacement or repair, including the cost of parts and labor, of those items normally consumed in service, such as pump packing, oil, grease, and the like, shall be considered as part of routine preventive maintenance by the County.

D. Certifications

1. Furnish certifications as specified in Section 01650, "Pump Station Start-up and Testing". Furnish the Engineer with a written certification signed by the manufacturer's representative, that the installed equipment:
   a. Has been installed per manufacturer's requirements.
   b. Has been lubricated per manufacturer's instructions
   c. Has been accurately aligned and proper running clearances set.
   d. Is free from undue stress imposed by piping or mounting bolts.
   e. Suction lines and seal water lines have been flushed and all debris removed prior to startup.
   f. Is ready to be operated on a continuous basis, and is free from any known defects.

PART 2 - PRODUCTS

2.01 EQUIPMENT GENERAL REQUIREMENT'S

A. All pump curves shall have no more than one specific flow rate corresponding to one specific head condition except for shut-off head.

B. Pumps and all related equipment shall be constructed of materials suitable for the intended applications.

C. Piping and fittings shall be ductile iron with flanges and shall conform to the requirements of the Contract Documents.

D. Data Plates

1. All data plates shall be of stainless steel suitably attached to the pump with stainless steel screws. Pump data plates shall contain the manufacturer's name, serial number, pump size and type, speed, impeller diameter, design capacity and head, and other pertinent data.
2. Motor data plates shall contain the manufacturer's name and model number, serial number, rpm, hp, frequency, voltage, phase, efficiency, and service factor.
3. A special data plate shall be attached to the pump frame which shall contain identification of the frame and bearing numbers.

E. Hardware

1. All machine bolts, nuts, and cap screws shall be of the hex head type and shall be non-corrosive.
2. Hardware requiring special tools or wrenches shall not be used.

F. Parts Numbering

1. Parts shall be completely identified with a numerical system to facilitate parts inventory control and stocking.
2. Each part shall be properly identified by a separate number and those parts that are identical for more than one size unit shall have the same number to effect minimum spare parts inventory.

G. Miscellaneous Parts

1. The equipment shall be furnished with shims, stainless steel anchor bolts, couplings, sheaves, belts, motor flanges, drive and belt guards and any other miscellaneous materials necessary to properly mount and install the pumps and motors.

H. Painting

1. All external parts of the pump, motor, drive unit, base, and accessories shall be primed ~~and finish painted (1 coat)~~ at the factory prior to shipping. **Finish coatings to be field applied by the Contractor.**
2. Surface preparation, priming, and finish coating shall be in accordance with Section 09900 Painting.
3. All coatings used for shop painting shall be the products of the same manufacturer as the coating to be used for field painting to assure coating compatibility of the systems. The color of the finish coating shall be selected by the County.

2.02 HORIZONTAL SPLIT-CASE PUMPS

A. Furnish and install two (2) horizontal split-case pumps. Pumps shall be of the horizontal, lubricated single stage, double suction, axially split-case centrifugal pump type.

B. Suction and discharge nozzles shall be cast, bore and machined integrally with the lower half casing.

C. Potable Water Booster Pumps

1. Each pump shall be capable of the characteristics specified below and shall meet all governing agency requirements for the type of pumping system identified and shall be capable of pumping from the location and in the configuration shown on the Contract Drawings at designed capacities as noted:

INTERNATIONAL DRIVE POTABLE WATER BOOSTER PUMP STATION		
Item	**Pumps 2 & 3**	
Pumps Required	2	
Minimum Pump Capacity (gpm)	**Minimum Pump Total Head (ft)**	**Minimum Pump Efficiency (%)**
1,600	**100**	**58**
4,000*	**70**	**81**
4,500	**63**	**79**
~~Design Point Capacity (gpm)~~	~~4000~~	
~~Design TDH (ft)~~	~~70~~	
~~Minimum Efficiency at Design Point (%)~~	~~88%~~	
~~Shutoff Head (ft)~~	~~94.5~~	
Maximum Required NPSH (ft) at pump runout	**20 ft**	
Suction Pressure	Positive	
Liquid Handled	Potable Water	
Max. Motor Horsepower (hp)	100	
Max. Speed (rpm)	1180	
Voltage (V)	460	
Phase	3	
Frequency (Hz)	60	
Motor Type	Variable Speed	

INTERNATIONAL DRIVE POTABLE WATER BOOSTER PUMP STATION	
Item	**Pumps 2 & 3**
Approved Manufacturer & Model	Aurora (410 1 Stage Split Case, 10x12x15B), **Peerless (10AE16), or Goulds**, ~~or equal~~

***Pump Design Point**

D. Pump Construction

1. Acceptable Manufacturer's for this Project shall be per Orange County approved list of manufacturers.
2. Pumps shall be single stage, double suction pumps with mechanical seals for water at ambient temperature.
3. Casing
   a. The casing shall be close-grained cast iron for working pressures up to 175 psig and shall be of the double volute, axially split design with suction and discharge flanges and mounting feet cast integrally with the lower half casing.
   b. Tapered and plugged holes shall be provided for priming, drain and gauge connections for the suction and discharge sides of pump.
   c. The upper and lower half casings shall be doweled and bolted together and the upper half removable without disturbing the suction or discharge piping.
4. Casing Connections
   a. Flanges shall be of the 125 pound ANSI Standard B 16.1 type.
   b. Suction and discharge shall be on a common centerline in the horizontal plane.
   c. A ½-inch tap for a pressure gauge shall be provided on both flanges.
5. Internally drilled liquid passage in the upper half casing shall provide lubrication to the packing area.
6. Impeller
   a. Impeller shall be of the enclosed, double suction type made of one-piece cast bronze non-overloading in operating characteristics and statically and hydraulically balanced. **Bronze type shall be suitable for use in chlorinated water.**
   b. The impeller shall be accurately machined and balanced to minimize thrust and shall be keyed to the shaft and positioned axially by the threaded shaft sleeves which are, in turn, locked in place by shaft nuts.
   c. The hub shall have sufficient metal thickness to allow machining for installation of impeller rings.
   d. The maximum diameter shall be less than ninety percent (90%) of

the shaft to casing lip distance for quiet operation.

7. Shaft
   a. The shaft shall be made of SAE-4140 high grade carbon steel of ample size to operate under load with a minimum of deflection.
   b. The pump manufacturer shall furnish and publish a two (2) year warranty on shaft breakage.
8. Shaft Sleeves
   a. Shaft sleeves shall be made of 416 stainless steel, and shall protect the shaft from wear and from contact with the pumped liquid.
   b. The shaft shall be protected by renewable shaft sleeves that are threaded and tightened with shaft rotation and are free to expand at the stuffing box end.
9. Housing
   a. Seal housings and bearing housings shall be cast integral with the pump casing.
   b. Mechanical seals shall be mounted on a corrosion-resistant shaft sleeve, located with respect to the casing so that seal lubrication liquid is directed immediately over the seal.
10. Casing Wear Rings
   a. Casing wear rings shall be made of bronze and shall be installed with an anti-rotation device and designed to prevent leakage across the ring fit.
   b. There shall be not less than fifty (50) points Brinell hardness between the casing wear rings and the impeller wear rings.
11. Impeller Wear Rings
   a. Impeller wear rings shall be made of bronze and mounted on the impeller hubs to provide for renewable clearances.
12. Bearings
   a. Bearings shall be grease lubricated.
   b. Bearings shall be ball type, single row or double row, selected to carry radial and thrust loads and shall have a minimum L-10 bearing life rating or ten (10) years in continuous operation at the rated pump conditions.
   c. The outboard bearing shall be a double row bearing, locked in position by bearing lock nuts.
   d. The inboard bearing shall be a single row bearing, free to move axially in the bearing housing.
   e. Labyrinth type deflectors shall seal the bearing housings against dirt and moisture.
   f. Removable bearing caps and bearing covers shall permit inspection or service of the bearings without disturbing the pump casing or piping.
   g. Bearing housings shall be designed for grease lubrication. Grease relief shall prevent over-lubrication.
13. Miscellaneous
   a. Each pump shall be provided with single inside unbalanced

mechanical shaft seals for leak-less operation. **Mechanical seals shall have carbon/ceramic seal faces and EPDM elastomers.**

b. A suitable arrangement shall be provided to furnish a portion of the pumped liquid to lubricate and cool the seal faces. Seals shall be suitable for the conditions stated.

c. A heavy fabricated steel base with drip lip and grout openings to mount the pump and driver shall be furnished with each pump.

d. A flexible shaft coupling shall be furnished to connect the driver to the pump.

e. The coupling shall be enclosed in a standard coupling guard.

E. Baseplate, Coupling and Guard

1. The baseplate shall be heavy-duty fabricated steel sufficiently rigid to support each pump and driver. The final alignment of the pump and driver shall be made after grouting and installation, and shall be approved by the Engineer prior to operation. It shall be of the drain type with a tapped hole to pipe away leakage and condensation.
2. The coupling shall be a heavy duty flexible type with cast iron flanges connected by a rubber sleeve for torque transmission.
3. The coupling guard shall be all metal, ANSI type, and fastened to the baseplate and in accordance with OSHA Standards.

F. Rotation

1. Clockwise rotation, viewed from its drive end, shall be provided based on the orientation shown on the Contract Drawings.

G. Motor

1. The pump manufacturer shall be responsible for supplying the motor and ensure proper coordination for mounting of the motor on the pump. Manufacturer shall properly select and size the drive unit (VFD) for the pump, inclusive of thrust bearing capacity for all conditions as start-up, runout, and shutoff. Motors shall meet the requirements of Section 16370, "Variable Frequency Drives", unless otherwise specified herein.
2. The drive motor for the pump shall be of the NEMA Design B squirrel cage induction type, **open** drip-proof **enclosure**, designed for operation on 460 volt, 3-phase, 60 Hertz power supply with a maximum speed of ~~1780~~ **1180** rpm for the potable water pumps. The motor shall be designed for use with a VFD and shall be Inverter Duty Rated.
3. Motors to have internal heat strips. Motor size shall be sufficient to prevent overloading at operating conditions or at the lowest listed head conditions, whichever point requires greater horsepower. Motors to include temperature sensors in the windings for overload protection. There shall be space heaters on the motors.
4. The pump motor shall be suitable for operation on a power supply as specified in Section 2.02(C) with a service factor of 1.00 or greater. The pump manufacturer shall approve the VFD to be used with the pumps. See

Section 16370 “Variable Frequency Drives” for approved manufacturers.

5. The motor shall be premium efficiency, non-overloading, without use of the service factor, at any point on the driven pump's performance curve. The motor shall be standard tropicalized and shall be designed, constructed and tested in accordance with applicable IEEE, NEMA, AFBMA and ANSI standards ~~as manufactured by U.S. Electrical Motors, or an equal approved by the County~~ **as specified further in Technical Specification Section 16150**.
6. Following installation, grouting and connection of all piping, pump and motor must be checked for alignment in accord with standards of the Hydraulic Institute.
7. Motors shall be given a short commercial test in accordance with IEEE standards and furnished with the following construction features:

Feature	Description
1. Construction	All cast iron construction for the frame, end brackets, conduit box and fan shroud. The motor shall be supplied with lifting lugs or “O” type bolts on the top of the motor.
2. Enclosure	~~NEMA 4X,~~ **Open drip proof** with a dynamically balanced fan and 120V operated space heaters.
3. Motor Type	Variable Frequency Drive (see Specification Section 16370)
4. Horsepower	100
5. Efficiency	Premium, ~~88%~~ **94.1% (minimum motor efficiency)** at rated capacity, suitable for meeting Duke Energy minimum requirements for motor efficiency credit
6. Insulation	Class F
7. Temperature Rise	Class B, based upon 40°C ambient
8. Service Factor	1.15 with alternate rating of 1.0 for VFD controlled pump
9. Windings	Epoxy coated rotor and stator windings
10. Motor Windings	Motor windings for rotor, stator and motor leads shall be manufactured using solid copper wire.
10. Shaft Slinger	Neoprene shaft slinger shall be provided and lead wires shall be non-braided and non-wicking to prevent entrance of moisture and contaminants.
11. Conduit Box	Cast iron construction and sized at 150% of the NEMA minimum
12. Terminal Box	All leads shall be brought out to a separate terminal

Feature	Description
	box and shall be marked and identified. The terminal box shall be split construction, double gasketed, containing provisions for grounding the motor and shall have a volume of 150% of the NEMA minimum.
13. Breather Drains	Motors shall have stainless steel breather drains at both ends to allow proper drainage of condensation
14. Ball Bearings	Shielded, regreasable, vacuum degassed steel ball bearings. Minimum B-10 bearing life of 100,000 hours.
15. Hardware	Corrosion resistant hardware, insect screens and grease plugs
16. Gaskets	a. Gasket between the motor frame and conduit box b. Gasketed cast iron conduit box
17. Accessories	a. Each motor shall be provided with a heat overload protection device to protect the motor from overheating during operation. The device shall immediately stop the drive motor in the event of excessive heat buildup. b. The motor shall be provided with a 120 volt single phase strip heater to maintain a motor temperature of at least 40°C or 10 °C above ambient, whichever is greater.

H. Spare Parts

1. Furnish for each pump, the recommended spare parts, properly boxed and labeled for each pump, which are to include, as a minimum, the following:
   a. Two (2) sets of gaskets and O-rings.
   b. Two (2) **sets of** mechanical seals.
   ~~c. Two (2) sets of shaft sleeves, keys, and accessories.~~
   c. One (1) year supply of each type of lubricant required

PART 3 - EXECUTION

3.01 INSTALLATION

A. Installation of pumping equipment shall be in strict accordance with the respective manufacturer's instructions and recommendations in the locations shown on the Contract Drawings. Equipment shall be installed by experienced

and mechanically skilled workmen with previous experience in similar installations. The Installation shall include furnishing the required oil and grease for initial operation. The grades of oil and grease shall be in accordance with the manufacturer's recommendations.

B. Install pressure gauges on the pump suction and discharge nozzles including an isolation valve at each location.

C. All anchor bolts, nuts, washers, brackets, and other hardware items shall be Type 316 stainless steel.

D. Conduct cement grouting of pump base in accordance with Appendix G, Precision Cementitious Grouting of API Standard 610.

E. All necessary piping, fittings, conduit, valves, air relief valves, air and vacuum valves, vents, concrete foundation, anchor bolts, supports, grouting, etc. shall be provided to ensure a complete and satisfactory installation of the pumping equipment.

F. Align the pump and motor in accordance with the manufacturer's instructions, except angular alignment (coupling face) shall be within 0.001 inch at outermost point on coupling and parallel alignment (coupling runout) shall be within 0.001 inch per inch of shaft diameter, unless otherwise directed by the equipment (pump and motor) manufacturer's instructions. No more than two shims of proper thickness shall be used to secure proper alignment. Prior to placing the pump in operation, recheck the alignment after piping and other external connections have been made up to the pump, and after the pump base has been grouted. Adjust and realign as required if alignment has changed. All alignments and adjustments made to the pump shall be by technicians with prior experience and training in making such alignments and adjustments for the specific equipment provided.

G. Noise and Vibrations

1. All equipment containing moving parts shall be installed level and plumb, unless otherwise indicated in the Contract Drawings or in the specifications, and shall be anchored securely in order that noise be suppressed to a minimum and that vibrations do not cause damage while in operation.

3.02 FACTORY SERVICE REPRESENTATIVE

A. The equipment manufacturer shall furnish the services of a competent and experienced representative who has complete knowledge of proper operation and maintenance of the equipment for a period of not less than two (2) eight (8) hour days in two separate visits to inspect the installed equipment, supervise the initial test run, and to provide instructions to the plant personnel. The first visit will be

for checking and inspecting the equipment after it is installed. The second visit will be to operate and supervise the initial field test. At least four (4) hours of the second day shall be allocated solely to the instruction of plant personnel in operation and maintenance of the equipment. The training is to be conducted in two separate presentations as not all the staff are able to be present at once. This instruction period shall be scheduled at least ten (10) days in advance with the County and shall take place prior to acceptance by the County. The final copies of Operation and Maintenance manuals specified in this section and in Section 01700 must have been delivered to the County prior to scheduling the instruction period with the County.

B. The duties of the service representative shall be as follows:

1. After the equipment has been installed but before it is operated by others, the representative shall inspect the completed installation for soundness (no damaged or cracked components), completeness, correctness of setting and alignment, that the pumps are free from stresses imposed by attached piping, and for the adequacy and correctness of mechanical seal alignment and lubricants.
2. The service representative shall **be present during** start-up the equipment. All pumps shall be **field** tested with their respective driver or with a test driver (in such case, complete performance characteristics of the motor shall also be provided). This test shall include, but not be limited to, **vibration per ANSI/HI Standard 9.6.4**, voltage, speed, current, ~~horsepower, power factor, etc.~~, in accordance with the latest Standards of the Hydraulic Institute. **Vibration test results shall be provided following pump startup**. ~~Certified~~ **Field pump** test results shall ~~contain at least the following items: 1) Head-capacity curve, 2) pump efficiency, 3) brake horsepower from 0 gpm to 130 percent of design capacity, and 4) overall efficiency, wire-to-water~~ **include the items required in Section 3.03 herein.**
3. All of this information shall be obtained in accordance with the recommended procedures of the Hydraulic Institute, **as applicable**. ~~These certified~~ **Field pump** test results shall be furnished in triplicate to the County. If, upon completion of the tests, the results indicate the specified performance is not obtained, the pump shall be considered as having failed to fulfill the requirements.
4. The service representative shall instruct the County's personnel in proper operation and maintenance procedures.
5. The responsibility of the Contractor with regards to start up shall be fulfilled when the startup is complete, the equipment is functioning properly and has been accepted by the County.

A. The service representative shall submit to the County six (6) copies of a signed report of the result of his inspection, adjustments and startup. The report shall include descriptions of the inspection, adjustments made, and the startup. The report shall also include a statement that the equipment is ready for permanent

operation and that nothing in the installation will render the manufacturer's warranty null and void. Final payment shall not be made to the Contractor until this report has been submitted to and approved by the County.

3.03 INSPECTION AND TESTING

A. After the pumps have been completely installed, the service representative and Contractor shall conduct, in the presence of the County, field testing of all mechanical equipment and piping as in operation to demonstrate discharge capacity, ~~pump efficiency,~~ correct alignment, smooth operation, proper adjustment, and freedom from noise, vibration, over-heating and leaking, and to ensure satisfactory compliance with the Specifications. All defects shall be corrected. The Contractor shall supply all oil, grease, electric power, water, and all other material necessary to complete the field tests.

B. If the pump performance does not meet the Specifications, corrective measures shall be taken by the Contractor, or pump shall be removed and replaced with a pump which satisfies the conditions specified.

C. Motor Field Testing
   1. The motor shall be disconnected from the pump and run for four (4) hours.
   2. Following the run-in test, reconnect the motor to the pumping equipment and reinstall all coupling guards.

D. Pump Field Testing
   1. Upon completion of all the mechanical work, the service representative and Contractor shall conduct testing as specified herein to demonstrate that the equipment performs in accordance with all Specifications.
   2. The Contractor shall perform initial testing of the equipment to ensure himself that the tests listed in the Demonstration Test paragraph below can be completed.
   3. The Demonstration Test shall demonstrate that all items of these Specifications have been met by the equipment, as installed, and shall include the following tests:
      a. That the pump can deliver the specified pressure and discharge flow ~~at rated efficiency~~.
      b. That the pump controls perform satisfactorily.
   4. In the event that the equipment does not meet the Demonstration Test, the Contractor shall, at his own expense, make sure changes and adjustments in the equipment which he deems necessary and shall conduct further tests until written certification is received from the Engineer.

E. All piping, fittings and valves shall be hydrostatically tested in accordance with Section 02660, “Potable Water Systems.”

3.04 PUMP CURVES

A. Submit to the County, in accordance with Section 01300, “Submittals”, six (6) copies of the ***certified*** pump performance curve for each pump.

B. The pump curve shall indicate the pump number, type of service, manufacturer, model number, serial number, location in the plant and other data specific to the pump as required above for submittals.

3.05 MAINTENANCE CARDS

A. Submit to the County six (6) copies of the maintenance requirements for each pump, 8½” x 11" in size, for approval by the County at least thirty (30) days prior to the startup of the pumps.

B. After approval of the maintenance cards, the Contractor shall submit to the County six (6) copies of the maintenance requirements for each pump, 8½” x 11" in size, laminated in plastic.

END OF SECTION

SECTION 11226

STATIC INJECTION MIXERS

PART 1 - GENERAL

1.01 DESCRIPTION

This section includes materials and installation of wafer style in-line static injection mixers for chemical injection into pressurized pipelines.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Potable Water System: 02660.

1.03 SUBMITTALS

A. Submit shop drawings in accordance with the General Conditions and Section 01300.

B. Submit dimensional drawings and installation details. Submit manufacturer's catalog data and descriptive literature, describing materials of construction by ASTM reference and grade.

C. Show material of construction, with ASTM reference and grade. Submit manufacturer's certificates of compliance with referenced standards, e.g., ASTM A312 and A778. Show thickness of steel shell.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

Mixers shall be as manufactured by Westfall, Komax, **or UET PAC**~~, or equal~~.

2.02 MIXER DESIGN

A. The mixers shall be of a compact ring body design **(wafer-style)** for mounting between two standard pipe flanges. The ring body shall be a minimum thickness of 0.875 inches and shall be fabricated from Beta PVC or other material inert to **12.5%** sodium hypochlorite solution**, such as Fiber Reinforced Plastic (FRP). Static mixer shall be pressure rated capable of handling pressures not to exceed, but up to 150 psi. Manufacturer shall provide a safety factor of 5. All materials shall meet NSF 61 approved materials.**

B. The mixer plate shall be designed to provide a geometric shape which will create mixing vortices to effectively mix the injected fluid with the main process fluid. The mixing plate shall be no less than 0.125 inches thick and formed from .8 Beta PVC ~~or~~, Kynar**, or FRP**. The mixer plate shall be mounted in a machined cavity on the upstream side of the ring body. The body shall include ~~one or more~~ **two**

flanged, 2-inch injection outlets **of the same resin as the static mixer's body material. Mixer manufacturer shall install the two (2) injection nozzles located at 180 degrees apart, bolted and secured with gaskets. Static mixer manufacturer shall provide two 1/8" thick EPDM gaskets**. ~~The mixer body and plate materials shall be suitable for handling potable water as the process fluid at the rate of 12,000 gpm and 30 psi.~~ The injection fluid is 12.5% sodium hypochlorite and may be added in the future.

PART 3 – EXECUTION

3.01 EQUIPMENT INSTALLATION

Install static mixer per manufacturer's instructions.

END OF SECTION

SECTION 13330

SUPERVISORY CONTROL AND DATA ACQUISITION (SCADA) SYSTEM MODIFICATIONS

PART 1 - GENERAL

1.01 SCOPE OF WORK

A. Work includes all modifications to the County's existing SCADA system necessary to incorporate the Pump Control Panel (PCP), at Orange County, Florida's International Drive Potable Water Booster Pump Station.

B. As the County's existing SCADA service provider the Work defined herein shall be performed by **one of the following:**

- **Curry Controls, Lakeland, Florida**
- **Revere Control Systems**
- **Electro Design**

1.02 RELATED WORK

A. Specification Section 13300 defines requirements associated with the PCP, including operator interface functions.

1.03 FINAL DOCUMENTATION

A. Furnish a complete system network diagram of the SCADA system identifying locations, network equipment, and IP addresses of all nodes.

PART 2 – PRODUCTS - THIS PART NOT USED

PART 3 - EXECUTION

3.01 GENERAL

A. The County shall coordinate with the communications provider for provision of a T-1 link between the PCP and the EWRSF SCADA master site.

B. Coordinate closely with the SYSTEM SUPPLIER defined under Specification Section 13300 to ensure PCP compatibility with the SCADA system.

C. Modify all existing reports and databases (e.g. trends, historical, graphics, etc.) to accommodate the new site.

D. Perform all network modifications necessary to add the new site into the system.

3.02 OPERATOR GRAPHICS

A. Provide operator graphic screens on the HMI to allow local monitoring and control of the station.

B. The graphic screens shall support all the operator interface functions associated with the PLC control strategies as defined in Specification Section 13300.

C. Provide graphic screens that replicate those provided with the PCP while taking advantage of the improved graphic capabilities of the SCADA HMI over those of the PCP Operator Interface Unit.

D. Provide on-site time for County review and approval of the new graphics.

3.03 DEMONSTRATION TESTS

A. As part of the final system testing required by Specification Section 13300 paragraph 3.07, demonstrate that the operator interface capabilities from the master SCADA site match those at the pump station.

END OF SECTION

APPENDIX 1

PERMITS

- **FDEP PERMIT TO CONSTRUCT PWS COMPONENTS**
- **10-2 CERTIFICATION**
- **FDOH HOLDING TANK PERMIT**

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STATE OF FLORIDA
DEPARTMENT OF HEALTH
ONSITE SEWAGE TREATMENT AND DISPOSAL SYSTEM
CONSTRUCTION PERMIT

15-1082

PERMIT #: 48-SX-1611548
APPLICATION #: AP1192177
DATE PAID:
FEE PAID:
RECEIPT #:
DOCUMENT #: PR1022500

CONSTRUCTION PERMIT FOR: OSTDS Holding Tank

APPLICANT: Orange County (Orange County Utilities)

PROPERTY ADDRESS: 7996 World Center Dr Orlando, FL 32821

LOT: _____ BLOCK: _____ SUBDIVISION: _____

PROPERTY ID #: 35-24-28-5844-00-600 [SECTION, TOWNSHIP, RANGE, PARCEL NUMBER] [OR TAX ID NUMBER]

SYSTEM MUST BE CONSTRUCTED IN ACCORDANCE WITH SPECIFICATIONS AND STANDARDS OF SECTION 381.0065, F.S., AND CHAPTER 64E-6, F.A.C. DEPARTMENT APPROVAL OF SYSTEM DOES NOT GUARANTEE SATISFACTORY PERFORMANCE FOR ANY SPECIFIC PERIOD OF TIME. ANY CHANGE IN MATERIAL FACTS, WHICH SERVED AS A BASIS FOR ISSUANCE OF THIS PERMIT, REQUIRE THE APPLICANT TO MODIFY THE PERMIT APPLICATION. SUCH MODIFICATIONS MAY RESULT IN THIS PERMIT BEING MADE NULL AND VOID. ISSUANCE OF THIS PERMIT DOES NOT EXEMPT THE APPLICANT FROM COMPLIANCE WITH OTHER FEDERAL, STATE, OR LOCAL PERMITTING REQUIRED FOR DEVELOPMENT OF THIS PROPERTY.

SYSTEM DESIGN AND SPECIFICATIONS

T [1,200] GALLONS / GPD Holding Tank, no baffle CAPACITY
A [ ] GALLONS / GPD _____ CAPACITY
N [ ] GALLONS GREASE INTERCEPTOR CAPACITY [MAXIMUM CAPACITY SINGLE TANK:1250 GALLONS]
K [ ] GALLONS DOSING TANK CAPACITY [ ]GALLONS @[ ]DOSES PER 24 HRS #Pumps [ ]

D [ ] SQUARE FEET Not applilcable SYSTEM
R [ ] SQUARE FEET _____ SYSTEM
A TYPE SYSTEM: [ ] STANDARD [ ] FILLED [ ] MOUND [ ] _____
I CONFIGURATION: [ ] TRENCH [ ] BED [ ] _____
N
F LOCATION OF BENCHMARK:
I ELEVATION OF PROPOSED SYSTEM SITE [ ][/][ABOVE/BELOW]BENCHMARK/REFERENCE POINT
E BOTTOM OF DRAINFIELD TO BE [ ][/][ABOVE/BELOW]BENCHMARK/REFERENCE POINT
L
D FILL REQUIRED: [0.00] INCHES EXCAVATION REQUIRED: [ ] INCHES

O T H E R

Variance Application #12898 and Septic Permit #16-1082.
The permanent holding tank will serve a potable water booster pump station with one restroom. Per variance approval, the stationary holding tank shall meet Department of Health construction standards and shall be pumped as often as necessary to prevent the creation of a sanitary nuisance. In addition, persons servicing stationary holding tank shall obtain an annual permit from the Department of Health - Orange County.
** Please be aware that your permit meets all state requirements but may not meet the requirements for the county or city where your project is located. (Comments Continued on Page 2.)

SPECIFICATIONS BY: Natalie Urick TITLE: P.E.

APPROVED BY: CBSantiago Corazon B Santiago TITLE: Environmental Specialist III Orange CHD

DATE ISSUED: 06/17/2016 EXPIRATION DATE: 10/15/2016

DH 4016, 08/09 (Obsoletes all previous editions which may not be used)
Incorporated: 64E-6.003, FAC

DOCUMENT #: PR1022500

It is your obligation to follow up with local or county departments BEFORE commencing your project. The Florida Department of Health in Orange County is not liable for losses you incur for failure to comply with the rules and regulations of other agencies.

This permit CAN be used to obtain a building permit.

Stationary holding tank should be subsurface. Per 64E-6.013, F.A.C. use category 3 tank; if more than 8" of cover, use riser. If more than 18 inches of cover, use category 4 tank with riser.

Maintain all required setbacks per 64E-6, F.A.C. A re-inspection fee will be charged for additional inspections.

If water line is within 2-10 ft of the tank, must be schedule 40 PVC or stronger, or be sleeved within a similar material pipe and sealed with a water proof sealant. Waterline inspection required for construction approval.

Maintain 75 ft from mean annual flood line and wet ditches/swales and 15 ft from dry ditches/swales.

Specifications by Natalie Urick, P.E.

NOTE: For inspection, please call 407-858-1450.

NOTICE OF RIGHTS

A party whose substantial interest is affected by this order may petition for an administrative hearing pursuant to sections 120.569 and 120.57, Florida Statutes. Such proceedings are governed by Rule 28-106, Florida Administrative Code. A petition for administrative hearing must be in writing and must be received by the Agency Clerk for the Department, within twenty-one (21) days from the receipt of this order. The address of the Agency Clerk is 4052 Bald Cypress Way, BIN # A02, Tallahassee, Florida 32399-1703. The Agency Clerk's facsimile number is 850-410-1448.

Mediation is not available as an alternative remedy.

Your failure to submit a petition for hearing within 21 days from receipt of this order will constitute a waiver of your right to an administrative hearing, and this order shall become a 'final order'.

Should this order become a final order, a party who is adversely affected by it is entitled to judicial review pursuant to Section 120.68, Florida Statutes. Review proceedings are governed by the Florida Rules of Appellate Procedure. Such proceedings may be commenced by filing one copy of a Notice of Appeal with the Agency Clerk of the Department of Health and a second copy, accompanied by the filing fees required by law, with the Court of Appeal in the appropriate District Court. The notice must be filed within 30 days of rendition of the final order.

Florida Department of Environmental Protection

CENTRAL DISTRICT
3319 MAGUIRE BOULEVARD, SUITE 232
ORLANDO, FLORIDA 32803-3767

Rick Scott
Governor

Carlos Lopez-Cantera
Lt. Governor

Jonathan P. Steverson
Interim Secretary

July 1, 2015
ELECTRONIC CORRESPONDENCE

In the matter of an
Application for Permit by:

Christine Doan, P.E.
Chief Engineer
Orange County Utilities Division
9150 East Curry Ford Road
Orlando, FL 32825
Christine.Doan@ocfl.net

DEP File No. 0080780-1022-WC
County: Orange

NOTICE OF PERMIT ISSUANCE

Enclosed is Permit Number 0080780-1022-WC for the construction of a booster pump station and 1,400 linear feet of 36-inch ductile iron pipe for the International Drive Potable Water Booster Pump Station near the Orange County Westerly Effluent Disposal System and State Road 417, issued pursuant to Section 403.861(9), Florida Statutes.

This permit is final and effective on the date filed with the clerk of the Department unless a petition is filed in accordance with the paragraphs below or unless a request for extension of time in which to file a petition is filed within the required timeframe and conforms to Rule 62-110.106(4), F.A.C. Upon timely filing of a petition or a request for an extension, this permit will not be effective until further Order of the Department.

A person whose substantial interests are affected by this permit may petition for an administrative proceeding (hearing) in accordance with sections 120.569 and 120.57 of the Florida Statutes. The petition must contain the information set forth below and must be filed (received) with the Agency Clerk for the Department of Environmental Protection, Office of General Counsel, Mail Station 35, 3900 Commonwealth Boulevard, Tallahassee, Florida 32399-3000, within 14 days of receipt of this Notice. Petitioner shall mail a copy of the petition to the applicant at the address indicated above at the time of filing. Failure to file a petition within this time period shall constitute a waiver of any right such person may have to request an administrative determination (hearing) under sections 120.569 and 120.57 of the Florida Statutes. Any subsequent intervention will only be at the approval of the presiding officer upon motion filed pursuant to Rule 28-106.205, F.A.C.

A petition must contain the following information:

(a) The name and address of each agency affected and each agency's file or identification number, if known;
(b) The name, address, and telephone number of the petitioner; the name, address, and telephone number of the petitioner's representative, if any, which shall be the address for service

purposes during the course of the proceeding; and an explanation of how the petitioner's substantial interests will be affected by the agency determination;

(c) A statement of how and when the petitioner received notice of the agency decision;
(d) A statement of all disputed issues of material fact. If there are none, the petition must so indicate;
(e) A concise statement of the ultimate facts alleged, including the specific facts which petitioner contends warrant reversal or modification of the Department's action;
(f) A statement of the specific rules or statutes the petitioner contends requires reversal or modification of the Department's action, including an explanation of how the alleged facts relate to the specific rules or statutes; and
(g) A statement of the relief sought by petitioner, stating precisely the action that the petitioner wants the Department to take.

A petition that does not dispute the materials facts on which the Department's action is based shall state that no such facts are in dispute and otherwise contain the same information as set forth above, as required by Rule 28-106.301, F.A.C.

Because the administrative hearing process is designed to formulate final agency action, the filing of a petition means that, the Department's final action may be different from the position taken by it in this Notice. Persons whose substantial interests will be affected by any such final decision of the Department on the petition have the right to petition to become a party to the proceeding, in accordance with the requirements set forth above.

When the Order (Permit) is final, any party to the Order has the right to seek judicial review of the Order pursuant to section 120.68 of the Florida Statutes, by filing a Notice of Appeal pursuant to Rule 9.110 of the Florida Rules of Appellate Procedure, with the Clerk of the Department in the Office of General Counsel, Mail Station 35, 3900 Commonwealth Boulevard, Tallahassee, Florida 32399-3000; and by filing a copy of the notice of appeal accompanied by the applicable filing fees with the appropriate district court of appeal. The notice of appeal must be filed within 30 days from the date when the final order is filed with the Clerk of the Department.

Executed in Orlando, Florida.

STATE OF FLORIDA DEPARTMENT
OF ENVIRONMENTAL PROTECTION

Caroline Shine

Caroline Shine, Environmental Administrator
Drinking Water/Environmental Resource Permitting
Permit and Waste Cleanup Program
(407)897-2927

Enclosures: DEP Permit No. 0080780-1022-WC

FILING AND ACKNOWLEDGEMENT

FILED, on this date, under Section 120.52(7), Florida Statutes, with the designated Department Clerk, receipt of which is hereby acknowledged.

7/1/2015

Clerk Date

CERTIFICATION OF SERVICE

The undersigned hereby acknowledges that this **Notice of Permit Issuance** and all copies were /electronically transmitted before the close of business on **7/1/2015** to those persons listed.

Copies Furnished to:

David Mahler, P.E., CPH. Inc. [dmahler@cphcorp.com]
FDEP: Richard Lott; Jill Farris, Nathan Hess, Javed Mayet, P.E.

Florida Department of Environmental Protection

CENTRAL DISTRICT
3319 MAGUIRE BOULEVARD, SUITE 232
ORLANDO, FLORIDA 32803-3767

Rick Scott
Governor

Carlos Lopez-Cantera
Lt. Governor

Jonathan P. Steverson
Interim Secretary

July1, 2015
ELECTRONIC CORRESPONDENCE

PERMITTEE:
Christine Doan, P.E.
9150 East Curry Ford Road
Orlando, FL 32825
Christine.Doan@ocfl.net

PWS ID NUMBER: 3484119, 3484132
PERMIT NUMBER: 0080780-1022-WC
DATE OF ISSUE: July1, 2015
EXPIRATION DATE: June 30, 2020
COUNTY: Orange
PROJECT: International Drive Potable Water Booster Pump Station

This permit is issued under the provisions of Chapter 403, Florida Statutes (F.S.), and Florida Administrative Code (F.A.C.) Chapters 62-4, 62-550, 62-555 and 62-560. The above named permittee is hereby authorized to perform the work or operate the facility shown on the application and approved drawings, plans, and other documents attached hereto or on file with the Department and made a part hereof and specifically described as follows:

TO CONSTRUCT: a booster pump station and 1,400 linear feet of 36-inch ductile iron pipe for the International Drive Potable Water Booster Pump Station near the Orange County Westerly Effluent Disposal System and State Road 417. This pump station is for both the Orange County Southern system (PWS ID 3484119) and Eastern system (PWS ID 3484132).

PROPOSED CONSTRUCTION INCLUDES (or their equivalents):

- Two new 100 HP Aurora (410, 1 stage split case) pumps rated at 4,000 gpm at 70' TDH at 88% efficiency, 1180 rpm which will be incorporated into the County's SCADA system;
- Approximately 1,400 linear feet of 36-inch ductile iron pipe

IN ACCORDANCE WITH: documents received by the Department on June 3 and 6, 2015.

Work must be conducted in accordance with the General and Specific Conditions, attached hereto.

The permittee shall be aware of and operate under the Permit Conditions below. These applicable conditions are binding upon the permittee and enforceable pursuant to Chapter 403, Florida Statutes. [F.A.C. Rule 62-555.533(1)].

A. GENERAL CONDITIONS

1. The terms, conditions, requirements, limitations and restrictions set forth in this permit, are "permit conditions" and are binding and enforceable pursuant to Sections 403.141, 403.727, or 403.859 through 403.861, F.S. The permittee is placed on notice that the Department will review this permit periodically and may initiate enforcement action for any violation of these conditions.

2. This permit is valid only for the specific processes and operations applied for and indicated in the approved drawings or exhibits. Any unauthorized deviation from the approved drawings, exhibits, specifications, or conditions of this permit may constitute grounds for revocation and enforcement action by the Department.

3. As provided in Subsections 403.087(6) and 403.722(5), F.S., the issuance of this permit does not convey any vested rights or any exclusive privileges. Neither does it authorize any injury to public or private property or any invasion of personal rights, nor any infringement of federal, state, or local laws or regulations. This permit is not a waiver of or approval of any other department permit that may be required for other aspects of the total project which are not addressed in this permit.

4. This permit conveys no title to land or water, does not constitute State recognition or acknowledgment of title, and does not constitute authority for the use of submerged lands unless herein provided and the necessary title or leasehold interests have been obtained from the State. Only the Trustees of the Internal Improvement Trust Fund may express State opinion as to title.

5. This permit does not relieve the permittee from liability for harm or injury to human health or welfare, animal, or plant life, or property caused by the construction or operation of this permitted source, or from penalties therefore; nor does it allow the permittee to cause pollution in contravention of Florida Statutes and Department rules, unless specifically authorized by an order from the Department.

6. The permittee shall properly operate and maintain the facility and systems of treatment and control (and related appurtenances) that are installed and used by the permittee to achieve compliance with the conditions of this permit, as required by Department rules. This provision includes the operation of backup or auxiliary facilities or similar systems when necessary to achieve compliance with the conditions of the permit and when required by Department rules.

7. The permittee, by accepting this permit, specifically agrees to allow authorized Department personnel, upon presentation of credentials or other documents as may be required by law and at reasonable times (reasonable time may depend on the nature of the concern being investigated), access to the premises where the permitted activity is located or conducted to:

a. Have access to and copy any records that must be kept under conditions of the permit;
b. Inspect the facility, equipment, practices, or operations regulated or required under this permit; and
c. Sample or monitor any substances or parameters at any location reasonably necessary to assure compliance with this permit or Department rules.

8. If, for any reason, the permittee does not comply with or will be unable to comply with any condition or limitation specified in this permit, the permittee shall immediately provide the Department with the following information:

    a. A description of and cause of noncompliance; and
    b. The period of noncompliance, including dates and times; or, if not corrected, the anticipated time the noncompliance is expected to continue, and steps being taken to reduce, eliminate, and prevent recurrence of the noncompliance. The permittee shall be responsible for any and all damages which may result and may be subject to enforcement action by the Department for penalties or for revocation of this permit.

9. In accepting this permit, the permittee understands and agrees that all records, notes, monitoring data and other information relating to the construction or operation of this permitted source which are submitted to the Department may be used by the Department as evidence in any enforcement case involving the permitted source arising under the Florida Statutes or Department rules, except where such use is prescribed by Sections 403.111 and 403.73, F.S. Such evidence shall only be used to the extent it is consistent with the Florida Rules of Civil Procedure and appropriate evidentiary rules.

10. The permittee agrees to comply with changes in Department rules and Florida Statutes after a reasonable time for compliance; provided, however, the permittee does not waive any other rights granted by Florida Statutes or Department rules. A reasonable time for compliance with a new or amended surface water quality standard, other than those standards addressed in Rule 62-302.500, shall include a reasonable time to obtain or be denied a mixing zone for the new or amended standard.

11. This permit is transferable only upon Department approval in accordance with Rule 62-4.120 and 62-730.300, F.A.C., as applicable. The permittee shall be liable for any non-compliance of the permitted activity until the transfer is approved by the Department.

12. This permit or a copy thereof shall be kept at the work site of the permitted activity.

13. This permit also constitutes:

    a. Determination of Best Available Control Technology (BACT)
    b. Determination of Prevention of Significant Deterioration (PSD)

c. Certification of compliance with State Water Quality Standards (Section 401, PL 92-500)
d. Compliance with New Source Performance Standards

14. The permittee shall comply with the following:

a. Upon request, the permittee shall furnish all records and plans required under Department rules. During enforcement actions, the retention period for all records will be extended automatically unless otherwise stipulated by the Department.

b. The permittee shall hold at the facility or other location designated by this permit records of all monitoring information (including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation) required by the permit, copies of all reports required by this permit, and records of all data used to complete the application for this permit. These materials shall be retained at least three years from the date of the sample, measurement, report, or application unless otherwise specified by Department rule.

c. Records of monitoring information shall include:
   i. the date, exact place, and time of sampling or measurements;
   ii. the person responsible for performing the sampling or measurements;
   iii. the dates analyses were performed;
   iv. the person responsible for performing the analyses;
   v. the analytical techniques or methods used;
   vi. the results of such analyses.

15. When requested by the Department, the permittee shall within a reasonable time furnish any information required by law which is needed to determine compliance with the permit. If the permittee becomes aware the relevant facts were not submitted or were incorrect in the permit application or in any report to the Department, such facts or information shall be corrected promptly.

SPECIFIC CONDITIONS

B. Construction Activities

1. Permit Modification

All construction must be in accordance with this permit. Before commencing work on project changes for which a construction permit modification is required per 62-555.536(1), the permittee shall submit to the Department a written request for a permit modification. Each such request shall be accompanied by one copy of a revised construction permit application, the proper processing fee and one copy of either a revised preliminary design report or revised drawings, specifications and design data. [F.A.C. Rule 62-555.536].

2. Professional Engineer Supervision

Permitted construction or alteration of public water supply systems must be supervised during construction by a professional engineer registered in the State of Florida if the project was designed under the responsible charge of a professional engineer licensed in the State of Florida. The permittee must retain the service of a professional engineer registered in the State of Florida to observe that construction of the project is in accordance with the engineering plans and specifications as submitted in support of the application for this permit. [F.A.C. Rule 62-555.520(3)].

3. Artifacts

If prehistoric or historic artifacts, such as pottery or ceramics, stone tools or metal implements, dugout canoe remains, or any other physical remains that could be associated with Native American cultures, or early colonial or American settlement are encountered at any time within the project site area, the permitted project should cease all activities involving subsurface disturbance in the immediate vicinity of such discoveries. The permittee, or other designee, should contact the Florida Department of State, Division of Historical Resources, Compliance and Review Section at 850.245.6333 or 800.847.7278, as well as the appropriate permitting agency office. Project activities should not resume without verbal and/or written authorization from the Division of Historical Resources and the permitting agency. In the event that unmarked human remains are encountered during permitted activities, all work shall stop immediately and the proper authorities notified in accordance with Section 872.05, *Florida Statutes.*

4. Delays and Extension of Permit

If delays will cause project completion to extend beyond the expiration date of this permit, the permittee shall submit to the Department a request to extend the expiration date of this permit including the appropriate processing fee. This request shall specify the reasons for the delay and shall be submitted to the Department for approval prior to the expiration date of this permit. Note that no specific construction permit shall be extended so as to remain in effect longer than five years. [F.A.C. Rule 62-555.536(4)].

5. Permit Transfer

In accordance with General Condition #11 of this permit, this permit is transferable only upon Department approval. Persons proposing to transfer this permit must apply jointly for a transfer of the permit within 30 days after the sale or legal transfer of ownership of the permitted project that has not been cleared for service by the Department using form, 62-555.900(8), Application for Transfer of a PWS Construction Permit along with the appropriate fee. [F.A.C. Rule 62-555.536(5)]

6. Obligation to Obtain Other Permits

This permit satisfies Drinking Water permitting requirements only and does not authorize construction or operation of this facility prior to obtaining all other necessary permits from

other program areas within the Department, or required permits from other state, federal, or local agencies.

7. Limits on Authorizing Connections

This permit is for CONSTRUCTION ONLY of the components found on page 1 of this permit. This permit shall not infer that the clearance necessary for connection will be granted. Partial clearance may be granted, if required.

8. Gasoline Contamination

If gasoline contamination is found at the construction site, work shall be stopped and the proper authorities notified. With the approval of the Department, ductile iron pipe and fittings, and solvent resistant gaskets materials shall be used in the contaminated area. The ductile pipe shall be used in the contaminated area. The ductile iron pipe shall extend 100 feet beyond any solvent noted. Any contaminated soil that is excavated shall be placed on an impermeable mat, covered with waterproof covering, and held for disposal. <u>If the site cannot be properly cleaned, then consultation with the Department is necessary prior to continuing with the project construction.</u>

9. Wetlands Jurisdiction

This permit does not constitute approval of construction on jurisdictional wetland areas; therefore such approval must be obtained separately from the Water Management District or from DEP Environmental Resource Permitting (ERP) Section, as applicable, the Permittee shall provide a copy of the permit approval to the Department when water main installation involves activities on wetlands.

10. Security

Permittee shall ensure that the well and drinking water treatment facilities will be protected to prevent tampering, vandalism, and sabotage as required by Rule 62-555.315(1) & 62-555.320(5), F.A.C.

C. Construction Standards

1. National Sanitation Foundation (NSF)

All products, including paints, which shall come into contact with potable water, either directly or indirectly, shall conform to National Sanitation Foundation (NSF) International, Water Chemicals Codex, Food Chemicals Codex, American Water Works Association (AWWA) Standards and the Food and Drug Administration, as provided in Rule 62-555.320(3), F.A.C.

2. American Water Works Association (AWWA)

Water supply facilities, including mains, pipe, fittings, valves, fire hydrants and other materials shall be installed in accordance with the latest applicable AWWA Standards and Department rules and regulations. The system shall be pressure and leak tested in accordance with AWWA Standard C600 C603, or C605, as applicable, and disinfected in

accordance with AWWA Standard C651-653, as well as in accordance with Rule 62-555.340, F.A.C.

3. Lead Free

The installation or repairs of any public water system, or any plumbing in residential or nonresidential facilities providing water for human consumption, which is connected to a public water system shall be lead free in accordance with Rule 62-555.322, F.A.C.

4. Asbestos

If any existing asbestos cement (AC) pipes are replaced under this permit, the permittee shall do so in accordance with the applicable rules of Federal Asbestos Regulation and Florida DEP requirements. For specific requirements applicable to AC pipes, **the permittee should contact Mary Lawrence of the Air and Waste Management section prior to commencing any such activities at (407) 897-4179.** Please be aware that a notification is required to be submitted to the Department for a regulated project

5. Hazard and Reuse Setbacks

Setback distances between potable water wells and sanitary hazards shall be in accordance with 62-555.312, F.A.C. Reclaimed water land application areas, if applicable, must not be located within the setback distance from potable water supply wells established in Chapter 62-610, F.A.C.

6. Line Separation

Permittee shall maintain vertical clearance and horizontal separation between water mains and sanitary sewers, storm sewers, etc. unless approved otherwise by the Department, as provided in Rule 62-555.314, F.A.C., and Section 8.6 of *Recommended Standards for Water Works*, a manual adopted by reference in Rule 62-555.330(3), F.A.C.

7. Color Coding of Pipes

The new or altered aboveground piping at the drinking water treatment plant shall be color coded and labeled as recommended in Section 2.14 of "Recommended Standards for Water Works, 1997 Edition". [F.A.C. Rule 62-555.320(10)]

8. Cross Connections

Permittee shall ensure that there shall be no cross-connection with any non-potable water source in accordance with Rule 62-555.360, F.A.C.

D. Operational Requirements

1. Operation and Maintenance to comply with Water Quality Standards

The supplier of water shall operate and maintain the public water system so as to comply with applicable standards in F.A.C. Rule 62-550 and 62-555.350.

2. Operation and Maintenance Manual

The permittee shall provide an operation and maintenance manual for the new or altered treatment facilities to fulfill the requirements under subsection 62-555.350(13), F.A.C. The manual shall contain operation and control procedures, and preventative maintenance and repair procedures, for all plant equipment and shall be made available for reference at the plant or at a convenient location near the plant. Bound and indexed equipment manufacturer manuals shall be considered sufficient to meet the requirements of the subsection.

3. Monthly Operating Reports (MORs)

The permittee shall submit monthly operation reports (MORs) DEP Form 62-555.900(3) for the groundwater treatment, to the Department, no later than the tenth of each succeeding month. Systems with multiple treatment plants must also submit DEP Form 62-555.900(11) entitled "Monthly Operation Report for Summation of Finished-Water Production by CWSs That Have Multiple Treatment Plants."

4. Record Drawings

The permittee shall have complete record drawings produced for the project in accordance with Rule 62-555.530(4), F.A.C.

5. State Watch Office

The permittee or suppliers of water shall telephone the State Watch Office (SWO), at 1-800-320-0519 immediately (i.e., within two hours) after discovery of any actual or suspected sabotage or security breach, or any suspicious incident, involving a public water system in accordance with the F.A.C. Rule 62-555.350(10).

E. Monitoring Provisions

1. Compliance Monitoring by System Type

Permittee shall follow the guidelines of Chapters 62-550, 62-555, and 62-560, F.A.C., regarding public drinking water system standards, monitoring, reporting, permitting, construction, and operation. This facility is a part of a Community Water System as defined in F.A.C. Rule 62-550.200(12) and shall comply with the applicable chemical, radiological, lead and copper, and bacteriological monitoring requirements of F.A.C. Rule 62-550.

F. Clearance Requirements

1. Clearance Letter

The permittee must instruct the engineer of record to request system clearance from the Department within sixty (60) days of completion of construction, testing and disinfecting the system. Bacteriological test results shall be considered unacceptable if the test were

completed more than 60 days before the Department received the results. [F.A.C. Rule 62-555.340(2)(c)]

Permitted construction or alteration of a public water system may not be placed into service until a letter of clearance has been issued by this Department. [F.A.C. Rule 62-555.345]

2. Requirements to Obtain Clearance

After submitting the permit clearance package, the permittee will contact Javed Mayet at 407.897.4128 or Javed.Mayet@dep.state.fl.us to establish a date/time for an inspection of the components contained in this permit.

a. the engineer's *Certification of Construction Completion and Request for Clearance to Place Permitted PWS Components Into Operation* {DEP Form 62-555.900(9)};

b. certified record drawings, if there are any changes noted for the permitted project.

c. copy of a satisfactory pressure test of the process piping performed in accordance with AWWA Standards. [F.A.C. Rule 62-555.320(21)(a)(1)]

d. analytical results from two consecutive days of satisfactory bacteriological samples from locations found in paragraph 3 below.

3. Cleaning, Disinfecting, and Bacteriological Samples

The new facilities shall be cleaned, disinfected, and bacteriologically cleared in accordance with Chapter 62-555, F.A.C. The bacteriological clearance data shall be submitted to the Department with the engineer's certification of construction completion. [Section 62-555.340 and 62-555.315(6)(b), F.A.C.]

Bacteriological Sampling Locations: Copies of results from satisfactory bacteriological samples shall be submitted with the clearance package. Samples shall be taken from locations listed below, in accordance with Rules 62-555.315 (6), 62-555.340 and 62-555.330, F.A.C. and American Water Works Association (AWWA) Standard C 651-92. These locations are (1) near the intersection of the 36-inch discharge line and the pump station; (2) near the intersection of the 36-inch supply line and the pump station; and (3) near the point of connection to the existing water main.

Each location shall be sampled on two separate days (at least 6 hours apart) with sample point locations and chlorine residual readings **clearly indicated** on the report and/or drawings.

Bacteriological sample results will be considered unacceptable if the tests were completed more than 60 days before the Department receives the results.

In order to facilitate the issuance of a letter of clearance, the Department requests that all of the above information be submitted as one package.

DEP forms can be found at the Department website .

The entire clearance document package can be submitted in Portable Document Format (pdf) to DEP_CD@dep.state.fl.us , with a copy to javed.mayet@dep.state.fl.us for faster processing. Any submitted drawings (**must be sized 11" x 17**"), the engineer of record's signed seal and dates on the required document, plus a separate engineer's seal sheet must be legible for acceptance.

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION

Caroline Shine, Environmental Administrator
Drinking Water/Environmental Resource Permitting
Permitting and Waste Cleanup Program
(407)897-2927

FLORIDA DEPARTMENT OF
ENVIRONMENTAL PROTECTION

BOB MARTINEZ CENTER
2600 BLAIRSTONE ROAD
TALLAHASSEE, FLORIDA 32399-2400

RICK SCOTT
GOVERNOR

CARLOS LOPEZ-CANTERA
LT. GOVERNOR

JONATHAN P. STEVERSON
SECRETARY

SELF CERTIFICATION FOR A STORMWATER MANAGEMENT SYSTEM IN UPLANDS SERVING LESS THAN 10 ACRES OF TOTAL PROJECT AREA AND LESS THAN 2 ACRES OF IMPERVIOUS SURFACES

Owner(s)/Permittee(s):	ORANGE COUNTY UTILITIES
File No:	TBD
File Name:	TBD
Site Address:	S.R. 417 Orlando FL - 32837
County:	Orange
Latitude:	28° 21' 20.6653"
Longitude:	-81° 28' 43.2811"
Total Project Area:	3.79
Total Impervious Surface Area:	0.27
Approximate Date of Commencement of Construction:	01/04/2016
Registered Florida Professional:	David Mahler
License No.:	50041
Company:	CPH Inc.

Date: TBD: DATE OF SUBMISSION

David Mahler certified through the Department's Enterprise Self-Service Application portal that the project described above was designed by the above-named Florida registered professional to meet the following requirements:

1. The total project area involves less than 10 acres and less than 2 acres of impervious surface;
2. No activities will impact wetlands or other surface waters;
3. No activities are conducted in, on, or over wetlands or other surface waters;
4. Drainage facilities will not include pipes having diameters greater than 24 inches, or the hydraulic equivalent, and will not use pumps in any manner;
5. The project is not part of a larger common plan, development, or sale; and
6. The project does not:
    1. Cause adverse water quantity or flooding impacts to receiving water and adjacent lands;
    2. Cause adverse impacts to existing surface water storage and conveyance capabilities;
    3. Cause a violation of state water quality standards; or

4. Cause an adverse impact to the maintenance of surface or ground water levels or surface water flows established pursuant to s. 373.042 or a work of the district established pursuant to s. 373.086, F.S.

This certification was submitted within approximately 30 days after initiation of construction of the above project. As such, construction, alteration, and maintenance of the stormwater management system serving this project is authorized in accordance with s. 403.814(12), F.S., and that there is a rebuttable presumption that the discharge from such system will comply with state water quality standards when the stormwater management system for this project is designed, operated, and maintained in accordance with applicable rules adopted pursuant to part IV of chapter 373, F.S.

Applicants are advised to contact the applicable water management district for requirements that must be followed to properly abandon any existing water wells that need to be removed because they are located where construction is occurring.

In accordance with s. 373.416(2), F.S., if ownership of the property or the stormwater management system is sold or transferred to another party, continued operation of the system is authorized only if notice is provided to the Department within 30 days of the sale or transfer.

This notice can be submitted to:
FDEP Central District
3319 Maguire Blvd Orlando 32803

This certification was submitted along with the following electronic documents:

File Description
Stormwater Package

If you have submitted this certification as a Florida Registered Professional, you may wish to sign and seal this certification, and return a copy to the Department, in accordance with your professional practice act requirements under Florida Statutes.

I, David Mahler, License No. 50041, do hereby certify that the above information is true and accurate, based upon my knowledge, information and belief. In the space below, affix signature, date, seal, company name, address and certificate of authorization (if applicable).

This sealed certification may be submitted to the Department, either electronically (as an attachment in Adobe PDF or other secure, digital format) at Erp.selfcerts@dep.state.fl.us, or as a hardcopy, at the postal address below:

Florida Department of Environmental Protection
Office of Submerged Lands and Environmental Resources
2600 Blair Stone Road MS 2500
Tallahassee FL 32399-2400

APPENDIX 2

GEOTECHNICAL SOILS REPORT

- **GEOTECHNICAL ENGINEERING REPORT I-DRIVE POTABLE WATER BOOSTER PUMP STATION (APRIL 8, 2014)**
- **GROUNDWATER SAMPLING/TESTING I-DRIVE POTABLE WATER REPUMP FACILITY (NOVEMBER 7, 2013)**

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Geotechnical Engineering Report

I-Drive Potable Water Booster Pump Station
Orange County, Florida

April 8, 2014
Terracon Project No. H1135173

Prepared for:
CPH, Inc.
Orlando, Florida

Prepared by:
Terracon Consultants, Inc.
Winter Park, Florida

April 8, 2014

CPH, Inc.
1117 East Robinson Street, Suite C
Orlando, FL 32801

Attn: Ben C. Buencamino
P: [407] 425-0452
F: [407] 648-1036
E: bbuencamino@cphcorp.com

Re: Report of Subsurface Exploration and Geotechnical Engineering Evaluation
I-Drive Potable Water Booster Pump Station
Orlando, Florida
Terracon Project Number: H1135173

Dear Mr. Buencamino:

Terracon Consultants, Inc. (Terracon) has completed the geotechnical engineering services for the above referenced project. This study was performed in general accordance with our proposal number PH1130265 dated April 9, 2013.

The purposes of this study were to investigate subsurface conditions in the area of the proposed building foundation, stormwater pond, driveway, and pipeline locations and to use the data obtained to provide geotechnical engineering recommendations to assist in the design and construction of the proposed improvements at the above-referenced project site. This report describes our exploration procedures; exhibits the data obtained and presents our geotechnical engineering recommendations for the proposed re-pump facility in Orange County, Florida.

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

Sincerely,
Terracon Consultants, Inc.
Certificate of Authorization Number 8830

Eric J. Lavoie
Staff Engineer

Elias N. Jammal, P.E.
Senior Geotechnical Engineer
FL Registration No. 60126

ELIAS NABIL JAMMAL LICENSE No. 60126 STATE OF FLORIDA PROFESSIONAL ENGINEER 4/8/14

Enclosures

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EXECUTIVE SUMMARY

A geotechnical evaluation has been performed for the proposed Potable Water Booster Pump Station planned to be constructed on the south of State Road 417, approximately 3,500 feet east of the I-Drive and World Center Drive intersection in Orange County, Florida. Eight (8) borings, designated TB-1, TB-2, AB-1, AB-2 and HA-1 through HA-4, have been performed to depths of about 5 and 20 feet below the existing ground surface in the proposed building, stormwater pond, driveway and pipeline areas.

Based on the information obtained from our geotechnical exploration, it appears that the site can be developed for the proposed project. The following geotechnical considerations were identified:

- The majority of in-place sands appear suitable for re-use as general engineered fill.
- The soil conditions appear suitable for support of the proposed building structure on shallow foundations.
- All excavations required for pipe construction and installation should be performed in accordance with the appropriate Occupational Safety and Health Administration (OSHA) standards.
- Groundwater was observed in the borings at depths of about 1 to 2.5 feet below existing grade. The normal seasonal high groundwater level at the boring locations is estimated to be near depths of about 0.5 to 1.5 feet below existing grade.
- Dewatering will be required to facilitate construction, backfill and compaction in the dry.
- Soil materials with cementation (hardpan) were encountered in several of the borings. The Contractor shall anticipate the need for special equipment and/or procedures to facilitate excavations, dewatering, and penetration.
- The general guidelines included in this report are not intended to supersede any more stringent requirements mandated by Orange County specifications.

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

GEOTECHNICAL ENGINEERING REPORT
I-DRIVE POTABLE WATER BOOSTER PUMP STATION
ORANGE COUNTY, FLORIDA

Terracon Project No. H1135173
April 8, 2014

1.0 INTRODUCTION

This geotechnical engineering report has been prepared for the proposed Potable Water Booster Pump Station which will be located on the south of State Road 417, approximately 3,500 feet east of the I-Drive and World Center Drive intersection in Orange County, Florida, as shown on the Topographic Vicinity Map included as Exhibit A-1 in Appendix A. Eight (8) borings, designated TB-1, TB-2, AB-1, AB-2 and HA-1 through HA-4 were performed to depths of about 5 and 20 feet below the existing ground surface within the areas of the proposed building, stormwater pond, driveway, and pipeline areas. Logs of the borings along with a Boring Location Plan (Exhibit A-4) are included in Appendix A of this report. Laboratory testing procedures are included in Exhibit B-1 in Appendix B.

- Two (2) Standard Penetration Test (SPT) borings were performed to depths of about 20 feet within the building location.
- Two (2) machine auger borings were performed to depths of about 20 feet within the stormwater pond area. A soil sample was also obtained for permeability testing.
- Four (4) manual auger borings were performed to depths of about 5 feet in the driveway and pipeline areas.

The purpose of these services is to provide information and geotechnical engineering recommendations relative to:

- Subsurface soil conditions encountered.
- Groundwater levels.
- General site preparation.
- Pipe subgrade and backfill recommendations.
- Temporary dewatering.
- Foundation design.
- Soil parameters to assist in stormwater pond design.
- Difficult excavation.
- General pavement design.

2.0 PROJECT INFORMATION

2.1 Project Description

Item	Description
Site Layout	See Appendix A, Exhibit A-4: Boring Location Plan.
Structure	The project will include a single-story masonry block building with a proposed foot print of 2,200 square feet. Associated pavements for parking and drive lanes will also be included, as well as associated pipelines.
Building Construction	Masonry block is anticipated.
Finished Floor Elevation	At or just above existing grade (assumed).
Stormwater Management	One stormwater pond will be located in the northwest area of the project site.

2.2 Site Location and Description

Item	Description
Location	The project site is located on the south of State Road 417, approximately 3,500 feet east of the I-Drive and World Center Drive intersection in Orange County, Florida.
Current Ground Cover	The area of the proposed Potable Water Booster Pump Station consists of medium to dense tree coverage at mostly natural grade.
Existing Topography	The site currently appears nearly level. The USGS topographic quadrangle map "Kissimmee, Florida" depicts the ground surface elevations ranging about +85 to +90 feet referencing the National Geodetic Vertical Datum of 1929 (NGVD29).
Surface Water	The USGS topographic quadrangle map "Kissimmee, Florida" depicts wetland areas to the north and to the east of the site.
Potentiometric Surface	Based on review of the St. Johns River Water management District (SJRWMD) potentiometric maps of the upper Floridan Aquifer for the project area, the estimated elevation of the artesian head is near +60 feet, NGVD. Based on these maps, results of the borings, and the proposed construction, artesian conditions are not anticipated to be a concern for this project.

3.0 SUBSURFACE CONDITIONS

3.1 Soil Survey

The Soil Survey of Orange County Area, Florida as prepared by the United States Department of Agriculture (USDA), Soil Conservation Service (SCS; later renamed the Natural Resource Conservation Service - NRCS), identifies the soil types at the subject site as Pomello fine sand, 0 to 5% slopes (34), Smyrna fine sand (44), and Zolfo fine sand (54). It should be noted that the Soil Survey is not intended as a substitute for site-specific geotechnical exploration; rather it is a useful tool in planning a project scope in that it provides information on soil types likely to be encountered. Boundaries between adjacent soil types on the Soil Survey maps are approximate (included in Appendix as Exhibit A-2). Descriptions of the mapped soil units are included in Appendix A as Exhibit A-3.

3.2 Typical Profile

Based on the results of the borings, subsurface conditions on the project site can be generalized as follows:

Stratum	Approximate Depth to Bottom of Stratum (feet)	Material Description	Consistency/ Density
SP	0 to 9	Light gray to brown fine sand	Loose
SP-SM	7 to 20	Light gray to reddish brown with traces of cementation	Medium dense to Very dense
SM	7 to 20	Dark gray to reddish brown with cementation	Medium dense to Very dense

1. Borings TB-1, TB-2, and AB-1 encountered hardpan between depths of about 2 to 18 feet

Conditions encountered at each boring location and results of laboratory testing are indicated on the individual boring logs. Stratification boundaries on the boring logs represent the approximate location of changes in soil types; in-situ, the transition between materials may be gradual. Details for each of the borings can be found on the boring logs in Appendix A of this report. Descriptions of our field exploration are included as Exhibit A-6 in Appendix A. Descriptions of our laboratory testing procedures are included as Exhibit B-1 in Appendix B.

3.3 Groundwater

The boreholes were observed during drilling for the presence and level of groundwater. Groundwater was observed in the borings, between the depths of about 1 to 2.5 feet below existing grade at the time of drilling (October 2013). Longer term monitoring in cased holes or piezometers, possibly installed to greater depths than explored under this project scope, would be required to better define groundwater conditions at the site.

It should be recognized that fluctuations of the groundwater table will occur due to seasonal variations in the amount of rainfall, runoff and other factors not evident at the time the boring was performed. In addition, perched water can develop within higher permeability soils overlying less permeable soils (i.e. hardpan). Therefore, groundwater levels during construction or at other times in the future may be higher or lower than the levels indicated on the boring profiles. Perched groundwater conditions are anticipated for brief periods during extended periods of heavy rainfall and during the wet season. Perched groundwater levels are anticipated to be temporary and are not indicative of apparent (sustained) surficial conditions. Where appropriate, anticipated perched groundwater levels are shown on the boring profiles.

We estimate that during the normal wet season with rainfall and recharge at a maximum, groundwater levels will be about 0.5 to 1.5 feet below the existing grade. Our estimates of the seasonal groundwater conditions are based on the USDA Soil Survey, available survey data, the encountered soil types, recent weather conditions, and the observed water levels.

The seasonal water table estimates do not represent the temporary rise in water table that occurs immediately following a storm event, including adjacent to other stormwater management facilities. This is different from static groundwater levels in wet ponds and/or drainage canals which can affect the design water levels of new, nearby ponds. The seasonal high water table may vary from normal when affected by extreme weather changes, localized or regional flooding, karst activity, future grading, drainage improvements, or other construction that may occur on our around the site following the date of this report.

4.0 RECOMMENDATIONS FOR DESIGN AND CONSTRUCTION

4.1 Geotechnical Considerations

Borings generally encountered fine sand to silty fine sand, and cemented sands (hardpan). These materials are generally suitable for construction of the proposed foundations, pavements, and stormwater system, as well as installation of the proposed pipelines, following the recommendations of this report.

Given the somewhat consistent soils encountered in the test borings, spread footings bearing on natural sands or engineered fill are recommended for support of the proposed building. The engineered fill should be placed as outlined in Section 4.2, **Earthwork,** of this report.

We recommend that the exposed subgrade be thoroughly evaluated after stripping of any topsoil and creation of all cut areas, but prior to the start of structural fill operations (if any). We recommend that Terracon be retained to evaluate the satisfactory preparation of the bearing material for the pavements, foundations, and floor slab subgrade soils. Subsurface conditions, as identified by the field and laboratory testing programs, have been reviewed and evaluated with respect to the proposed building plans known to us at this time.

Design and construction recommendations for foundation systems and other earth connected phases of the project are outlined below.

4.2 Earthwork

4.2.1 Site Preparation

Prior to placing any fill, all vegetation, topsoil, possible fill material and any otherwise unsuitable material should be removed from the construction areas. Wet or dry material should either be removed or moisture conditioned and re-compacted. After stripping and grubbing and achieving cut grades, the exposed surface should be proofrolled where possible to aid in locating loose or soft areas. Proof-rolling can be performed with appropriate heavy equipment to obtain a minimum compaction as defined in Section 4.2.3. Unstable soil (pumping) should be removed or moisture conditioned and compacted in place prior to placing fill.

Where fill is placed on existing slopes, we recommend that fill slopes be over filled and then cut back to develop an adequately compacted slope face. Slopes should be provided with appropriate erosion protection.

4.2.2 Material Requirements

Compacted structural fill should meet the following material property requirements:

Fill Type [1]	USCS Classification	Acceptable Location for Placement	Maximum Lift Thickness (in.)
General [1]	SP (fines content < 5%)	All locations and elevations	12[3]
	SP-SM (fines content between 5 and 12%)[2]	All locations and elevations, except strict moisture control will be required during placement, particularly during the rainy season.	8 to 12[3]
Limited	SM, SC (fines content >12%)	Limited to mass fill greater than 2 feet below final grade; strict moisture control will be required during placement.	6 to 8[4]
Severely Limited	CH, CL, MH, ML	Limited to special applications greater than 4 feet below final grade; strict moisture control and specialized equipment will be required during placement.	4 to 6[4]

1. Controlled, compacted fill should consist of approved materials that are free of organic matter and debris.
2. If fines contents are greater than 12 percent, special design and construction procedures may be necessary.
3. Loose thickness when heavy compaction equipment is used in vibratory mode. Lift thickness should be decreased if static compaction is being used, typically to no more than 8 inches, and the required compaction must still be achieved. Use 4 to 6 inches in loose thickness when hand-guided equipment (i.e. jumping jack or plate compactor) is required.
4. Static equipment should be used.

4.2.3 Utility Trench Backfill

All trench excavations should be made with sufficient working space to permit construction including backfill placement and compaction. Utility trenches are a common source of water infiltration and migration. All utility trenches that penetrate beneath the building should be backfilled with native soils to avoid creating a preferred flow path through the trenches.

4.2.4 Grading and Drainage

Final surrounding grades should be sloped away from the structure on all sides to prevent ponding of water. Gutters, downspouts, or other appropriate methods that direct water a minimum of 10 feet beyond the footprint of the proposed structures are recommended. Site grades should be set considering the estimated normal seasonal high groundwater presented in Section 3.3.

4.2.5 Temporary Dewatering

Ground water was observed between depths of about 1 to 2.5 feet below existing grade. Normal seasonal high groundwater levels are anticipated to be about 0.5 to 1.5 feet below existing grade throughout the project site. Based on this information and construction depths, dewatering will likely be required to facilitate construction, backfilling, and compaction in the dry. Regarding dewatering, we offer the following recommendations

- Dewatering operations at this site should be accomplished with the properly designed dewatering system operating outside the excavation limits.

- The dewatering system should be adequate to lower groundwater levels to at least 2 feet below the lowest excavation surface and keep it there during backfilling to facilitate excavations in the dry and proper compaction of bedding and backfill soils.

- The contractor should review the boring profiles prior to implementing the dewatering system to be aware of anticipated soils.

- The construction should be sequenced so that the dewatering system is not turned off until the pipe has enough weight placed over it to counteract an uplift force equivalent to the height of standing water above the base of the pipe. The resisting weight of soil over the pipe should be calculated using the buoyant unit weight of the soil.

- Special dewatering considerations should be anticipated in areas where very dense soil/hardpan layers are encountered. The Contractor should review the boring profiles prior to implementing the dewatering system. Very dense/hardpan soils may also be encountered in other locations along the alignments. These soils may cause difficulty for the installation of well points, and specialized equipment may be necessary to penetrate these soils. Additionally, these soils may act as a relatively impermeable confining layer, requiring well point screening both above and below these layers.

4.2.6 Earthwork Construction Considerations

After initial proofrolling and compaction, unstable subgrade conditions could develop during general construction operations, particularly if the soils are wetted and/or subjected to repetitive construction traffic. Upon completion of filling and grading, care should be taken to maintain the subgrade moisture content prior to construction of floor slabs and pavements. Construction traffic over the completed subgrade should be avoided to the extent practical. The site should also be graded to prevent ponding of surface water on the prepared subgrades or in excavations. If the subgrade should become desiccated, saturated, or disturbed, the affected material should be removed or these materials should be scarified, moisture conditioned, and re-compacted prior to floor slab and pavement construction.

Trees or other vegetation whose root systems have the ability to remove excessive moisture from the subgrade and foundation soils should not be planted next to the structure. Trees and shrubbery should be kept away from the exterior edges of the foundation element a distance at least equal to 1.5 times their expected mature height.

As a minimum, all temporary excavations should be sloped or braced as required by Occupational Health and Safety Administration (OSHA) regulations to provide stability and safe working conditions. Temporary excavations will probably be required during grading operations. The grading contractor, by his contract, is usually 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. All excavations should comply with applicable local, state and federal safety regulations, including the current OSHA Excavation and Trench Safety Standards.

Terracon should be retained during the construction phase of the project to observe earthwork and to perform necessary tests and observations during subgrade preparation; proof-rolling; placement and compaction of controlled compacted fills; backfilling of excavations into the completed subgrade, and just prior to construction of building floor slabs.

4.3 Foundations

In our opinion, the proposed re-pump facility can be supported by a shallow foundation system bearing on native soil or newly placed fill extending to native soil. Design recommendations for shallow foundations for the proposed structure are presented in the following sections.

4.3.1 Foundation Design Recommendations

Description	Column Footing	Wall Footing	Monolithic Slab Foundation [3]
Net Allowable Bearing Pressure [1]	2,500 psf	2,500 psf	2,500 psf
Minimum Width	30 inches	18 inches	24 inches
Minimum Embedment Below Finished Grade [2]	18 inches	18 inches	12 inches
Compaction Requirements	95 percent of the materials maximum Modified Proctor dry density for a depth of 12 inches below footing.		
Minimum Testing Frequency	One field density test per footing for a minimum depth of 1 foot below the footing subgrade.	One field density test per 50 linear feet for a minimum depth of 1 foot below the footing subgrade.	One field density test per 50 linear feet for a minimum depth of 1 foot below the footing subgrade.

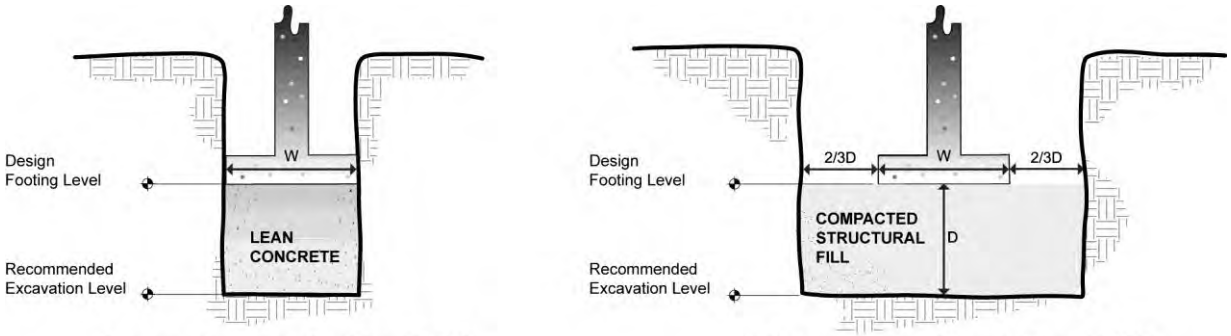
1. The recommended net allowable bearing pressure is the pressure in excess of the minimum surrounding overburden pressure at the footing base elevation. Assumes any unsuitable fill or soft soils, if encountered, will be undercut and replaced with engineered fill.
2. For erosion protection and to reduce effects of seasonal moisture variations in subgrade soils.
3. Turned-down portion of slab. For slab requirements see Section 4.5.1.

4.3.2 Foundation Construction Considerations

The base of all foundation excavations should be free of water and loose soil and debris prior to placing concrete. Concrete should be placed soon after excavating to reduce bearing soil disturbance. Should the soils at bearing level become excessively dry, disturbed or saturated, the affected soil should be removed or moisture conditioned and re-compacted prior to placing concrete. Place a lean concrete mud-mat over the bearing soils if the excavations must remain open over night or for an extended period of time. It is recommended that the geotechnical engineer be retained to observe and test the soil foundation bearing materials.

If unsuitable bearing soils are encountered in footing excavations, the excavations should be extended deeper to suitable soils and the footings could bear directly on these soils at the lower level or on lean concrete backfill placed in the excavations. The footings could also bear on properly compacted backfill extending down to the suitable soils. Overexcavation for compacted backfill placement below footings should extend laterally beyond all edges of the footings at least 8 inches per foot of overexcavation depth below footing base elevation. The overexcavation should then be backfilled up to the footing base elevation with granular material placed in lifts of 6 inches or less in loose thickness and compacted to at least 95 percent of the material's modified effort maximum dry density (ASTM D-1557). The overexcavation and backfill procedures are described in the figures below. Compaction tests should be performed at a frequency of 1 test per footing per 1-foot lift for square footings, and 1 test per 50 linear feet per 1-foot lift for wall or continuous footings.

The base of all foundation excavations should be free of water and loose soil prior to placing concrete. Concrete should be placed soon after excavating to reduce bearing soil disturbance. Should the soils at bearing level become excessively dry, disturbed or saturated, the affected soil should be removed prior to placing concrete. It is recommended that Terracon be retained to observe and test the soil foundation bearing materials.



NOTE: Excavations in sketches shown vertical for convenience. Excavations should be sloped as necessary for safety.

4.4 Pavements

4.4.1 Subgrade Preparation

Site grading is typically accomplished relatively early in the construction phase. Fills are placed and compacted in a uniform manner. However, as construction proceeds, excavations are made into these areas, rainfall and surface water saturates some areas, heavy traffic from concrete trucks and other delivery vehicles disturbs the subgrade and many surface irregularities are filled in with loose soils to temporarily improve ride comfort. As a result, the pavement subgrades, initially prepared early in the project, should be carefully evaluated as the time for pavement construction approaches.

We recommend the moisture content and density of the top 12 inches of the subgrade be evaluated and the pavement subgrades be proofrolled and tested within two days prior to commencement of actual paving operations. Compaction tests should be performed at a frequency of 1 test per 10,000 square feet or fraction thereof. Areas not in compliance with the required ranges of moisture or density should be moisture conditioned and recompacted. Particular attention should be paid to high traffic areas that were rutted and disturbed earlier and to areas where backfilled trenches are located. Areas where unsuitable conditions are found should be repaired by removing and replacing the materials with properly compacted fills.

After proofrolling and repairing deep subgrade deficiencies, the entire subgrade should be scarified and prepared as recommended in Section **4.2** of the **Earthwork** section this report to provide a uniform subgrade for pavement construction. Areas that appear severely desiccated following site stripping may require further undercutting and moisture conditioning. If a significant precipitation event occurs after the evaluation or if the surface becomes disturbed, the subgrade should be reviewed by qualified personnel immediately prior to paving. The subgrade should be in its finished form at the time of the final review.

4.4.2 Estimates of Minimum Pavement Thickness

Typical Pavement Section (inches)						
Traffic Area	**Alternative**	**Asphalt Concrete Surface Course**	**Limerock, Soil-Cement or Crushed Concrete Base Course**	**Stabilized Subbase Course[2,3,4]**	**Portland Cement Concrete**	**Free Draining Subgrade**
Car Parking	PCC	--	--		5.0	18.0
	AC	1.5	6.0	12.0	--	--
Truck and Drive Areas	PCC	--	--		6.0	18.0
	AC	2.5	8.0	12.0	--	--
Trash Container Pad [1]	PCC	--	--		6.0	18.0

1. The trash container pad should be large enough to support the container and the tipping axle of the collection truck.
2. Often referred to as Stabilized Subgrade.
3. Use coarse granular materials such as recycled crushed concrete, shell, or gravel when seasonal high groundwater is within 4 feet of the profile grade. Clay stabilization is acceptable with deeper seasonal high groundwater.
4. Some municipalities do not require stabilized subbase beneath soil-cement base.

4.4.3 Asphalt Concrete (AC) Design Recommendations

The following items are applicable to asphalt concrete pavement sections.

- Terracon recommends a minimum separation of 12 inches for this purpose between the bottom of the base course and the seasonal high water table.

- Natural or fill subgrade soils to a depth of 18 inches below the base should be clean, free draining sands with a fines content passing a No. 200 sieve of 7 percent or less.

- Stabilized subgrade soils (also identified as stabilized subbase) should be stabilized to a minimum Limerock Bearing Ratio (LBR; Florida Method of Test Designation FM 5-515) value of 40 if they do not already meet this criterion, or modified/replaced with new compacted fill that meets the minimum LBR value. Although LBR testing has not been performed, our experience with similar soils indicates that the near surficial sands encountered in the soil borings are likely to meet this requirement.

- The stabilized subgrade course should be compacted to at least 98 percent of the Modified Proctor maximum dry density (AASHTO T-180 or ASTM D-1557). Any underlying, newly-placed subgrade fill need only be compacted to a minimum of 95 percent of the Modified Proctor maximum dry density. Compaction tests should be performed at a frequency of 1 test per 10,000 square feet or fraction thereof.

- Limerock base courses from an approved FDOT source should have a minimum LBR value of 100, and be compacted to a minimum of 98 percent of the maximum dry density as determined by the Modified Proctor test. Limerock should be placed in uniform lifts not to exceed 6 inches loose thickness. Recycled limerock is not a suitable substitute for virgin limerock for base courses but may be used as a granular stabilizing admixture.

- Soil cement base courses typically experience shrinkage cracking due to hydration curing of the cement. This shrinkage cracking typically propagates through the overlying asphalt course and reflects in the pavement surface. This reflective cracking is not necessarily indicative of a pavement structural failure, though it is sometimes considered to be aesthetically undesirable.

- Soil cement bases should have 7-day design strength of 300 psi. Soil cement base should be compacted to a minimum of 98 percent of the material's maximum dry density as determined by the Standard Proctor Test for Soil Cement (AASHTO T-134). Higher design strengths may result in increased cracking.

- Crushed (recycled) concrete base should meet the current FDOT specification 204 for recycled materials.

- Asphalt should be compacted to a minimum of 95 percent of the design mix density. Asphalt surface courses should be Type SP, Type S, or other suitable mix design according to FDOT and local requirements.

- To verify thicknesses, after placement and compaction of the pavement courses, core the wearing surface to evaluate material thickness and composition at a minimum frequency of 5,000 square feet or two locations per day's production.

- Underdrains or strip drains should be considered along all landscaped areas in, or adjacent to pavements to reduce moisture migration to subgrade soils. Underdrains will also be required below pavement if the separation between the bottom of the base course and the seasonal high groundwater table is less than 1 foot.

- All curbing should be full depth. Use of extruded curb sections which lie on top of asphalt surface courses can allow migration of water between the surface and base courses, leading to rippling and pavement deterioration.

4.4.4 Portland Cement Concrete (PCC) Design Recommendations

The following items are applicable to rigid concrete pavement sections.

- At least 18 inches of free-draining material should be included directly beneath rigid concrete pavement. Fill meeting the requirements presented in Section 4.2 (Earthwork) of this report may be considered free-draining for this purpose. Limerock should not be considered free draining for this purpose.

- The PCC should be a minimum of 4,000 psi at 28 days. PCC pavements are recommended for trash container pads and in any other areas subjected to heavy wheel loads and/or turning traffic.

- The upper 1 foot of rigid pavement subgrade soils should be compacted to at least 98 percent of the Modified Proctor maximum dry density (AASHTO T-180 or ASTM D-1557). Compaction tests should be performed at a frequency of 1 test per 10,000 square feet or fraction thereof.

- Rigid PCC pavements will perform better than AC in areas where short-radii turning and braking are expected (i.e. entrance/exit aprons) due to better resistance to rutting and shoving. In addition, PCC pavement will perform better in areas subject to large or sustained loads. An adequate number of longitudinal and transverse control joints should be placed in the rigid pavement in accordance with ACI and/or AASHTO requirements. Expansion (isolation) joints must be full depth and should only be used to isolate fixed objects abutting or within the paved area.

- Adequate separation should be provided between the bottom of the concrete and the seasonal high water table. Terracon recommends that in no case should less than 1 foot of separation be provided.

- Sawcut patterns should generally be square or rectangular but nearly square, and extend to a depth equal to a quarter of the slab thickness. If the bottom of the concrete pavement is separated from the seasonal high water table by at least 1 foot, filter fabric will not be necessary beneath the expansion joints.

4.4.5 Pavement Drainage

Pavements should be sloped to provide rapid drainage of surface water. Water allowed to pond on or adjacent to the pavements could saturate the subgrade and contribute to premature pavement deterioration. In addition, the pavement subgrade should be graded to provide positive drainage within the granular base section. The subgrade and the pavement surface should have a minimum ¼ inch per foot slope to promote drainage. Appropriate sub-drainage or connection to a suitable daylight outlet should be provided to remove water from the base layer.

4.4.6 Pavement Maintenance

The pavement sections provided in this report represent minimum recommended thicknesses and, as such, periodic maintenance should be anticipated. Therefore preventive maintenance should be planned and provided for through an on-going pavement management program. Maintenance activities are intended to slow the rate of pavement deterioration, and to preserve the pavement investment. Maintenance consists of both localized maintenance (e.g., crack and joint sealing and patching) and global maintenance (e.g., surface sealing). Preventive maintenance is usually the first priority when implementing a pavement maintenance program. Additional engineering observation is recommended to determine the type and extent of a cost effective program. Even with periodic maintenance, some movements and related cracking may still occur and repairs may be required.

4.5 Stormwater Management

For the design of the stormwater management system it is our understanding that the pond type (wet or dry) has not yet been determined. Dry retention ponds generally need to be at least 1 foot and sometimes as much as 3 feet (or more for large ponds) above the seasonal high water table to recover within the time required by SJRWMD.

A sample of anticipated pump bottom soils (Boring Location AB-1, at about 1 foot below existing grade) had a measured permeability rate of 19 feet/day. It has been our experience that SJRWMD requires use of an appropriate factor of safety, generally reducing measured permeability rates or recovery time by a factor of safety of 2 for design of artificial recovery systems such and exfiltration trenches or under drains, although this does not presently apply to ponds recovering by infiltration. Therefore, we recommend using an unsaturated vertical infiltration rate, k_V, of 10 feet/day for the purpose of designing the proposed underground exfiltration system.

For clean sands as encountered at this site, vertical and horizontal permeability are similar. As the fines content of the soil increases (silt and/or clay), the ratio of the horizontal to vertical permeability rate generally increases. Also, similar practical limits apply to horizontal permeability rates as apply to vertical permeability rates. Therefore, we recommend using an unsaturated vertical infiltration rate, k_V, of 10 feet/day and a horizontal saturated hydraulic conductivity rate, k_H, of 15 feet/day for the purpose of designing the proposed underground exfiltration system.

4.6 Difficult Excavation

The Contractor should be made aware that cemented fine sand (hardpan) was encountered in some of the soil borings during our field exploration and will be encountered in other locations along the project alignment. Hardpan materials encountered in pipe bedding areas should be over-excavated to a depth of 12 inches in order to avoid uneven loading (point loads) of pipes and fittings.

The Contractor should be made aware that this material will be present throughout the project area and should take the appropriate steps to handle it during construction. The Contractor shall anticipate the need for special equipment and/or procedures to facilitate excavations, dewatering, and penetration along the alignment.

5.0 GENERAL COMMENTS

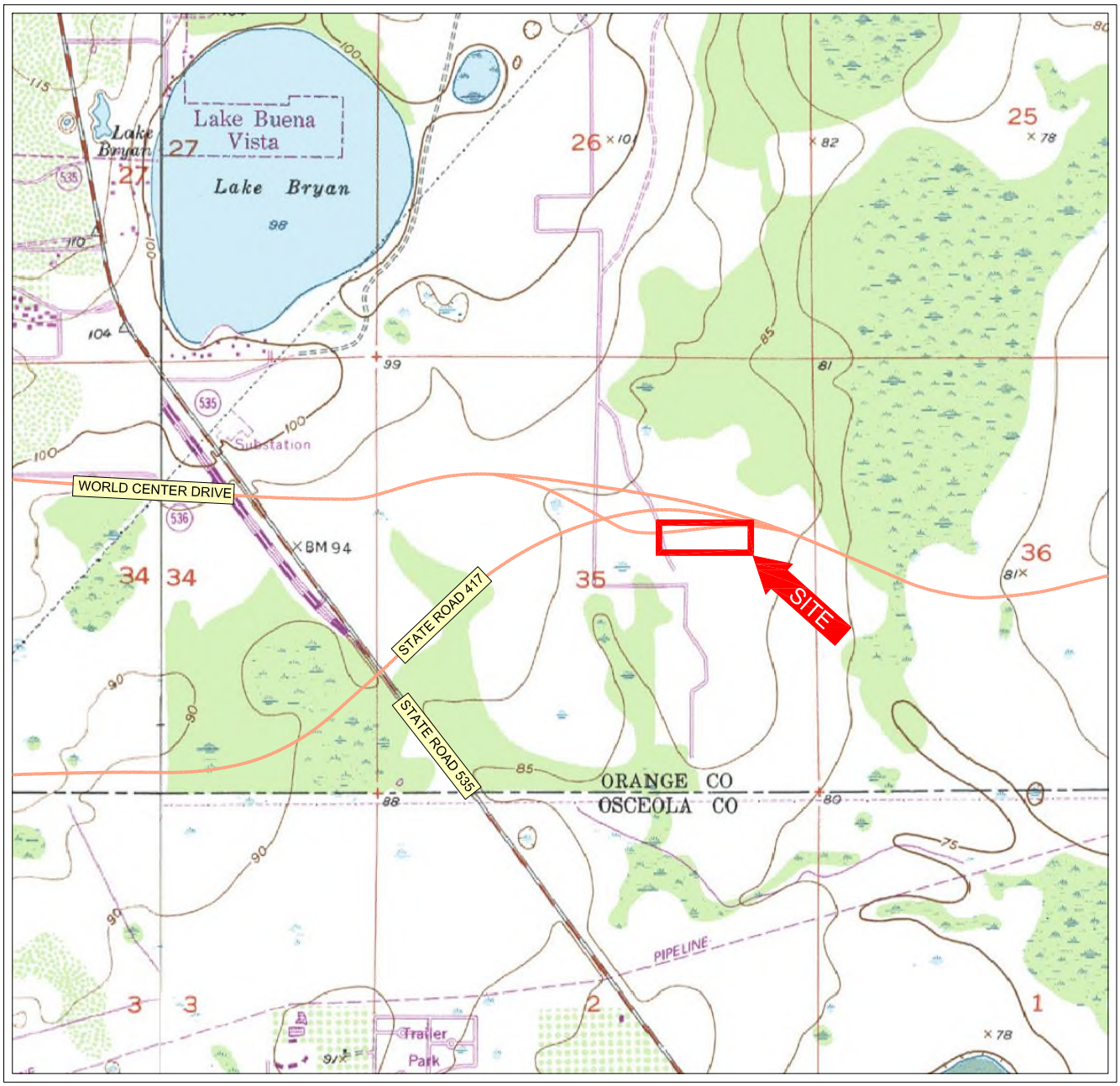
Terracon should be retained to review the final design plans and specifications so comments can be made regarding interpretation and implementation of our geotechnical recommendations in the design and specifications. Terracon also should be retained to provide observation and testing services during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

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

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

APPENDIX A
FIELD EXPLORATION

UNITED STATES – DEPARTMENT OF THE INTERIOR – GEOLOGICAL SURVEY



SCALE 1:24 000

KILOMETERS 1 .5 0 1 2

MILES 1000 0 1000 2000

FEET 1 .5 0 1

1000 0 1000 2000 3000 4000 5000 6000 7000 8000 9000 10000

CONTOUR INTERVAL 5 FEET

NATIONAL GEODETIC VERTICAL DATUM OF 1929

SECTION: 35
TOWNSHIP: 24 SOUTH
RANGE: 28 EAST

KISSIMMEE, FLORIDA
1953; PHOTOREVISED 1987
7.5 MINUTE SERIES (QUADRANGLE)

N

N:\Projects\2013\H1135173\PROJECT DOCUMENTS (Reports-Letters-Drafts to Clients)\Cad\H1135173-Exhibit-A-1.dwg

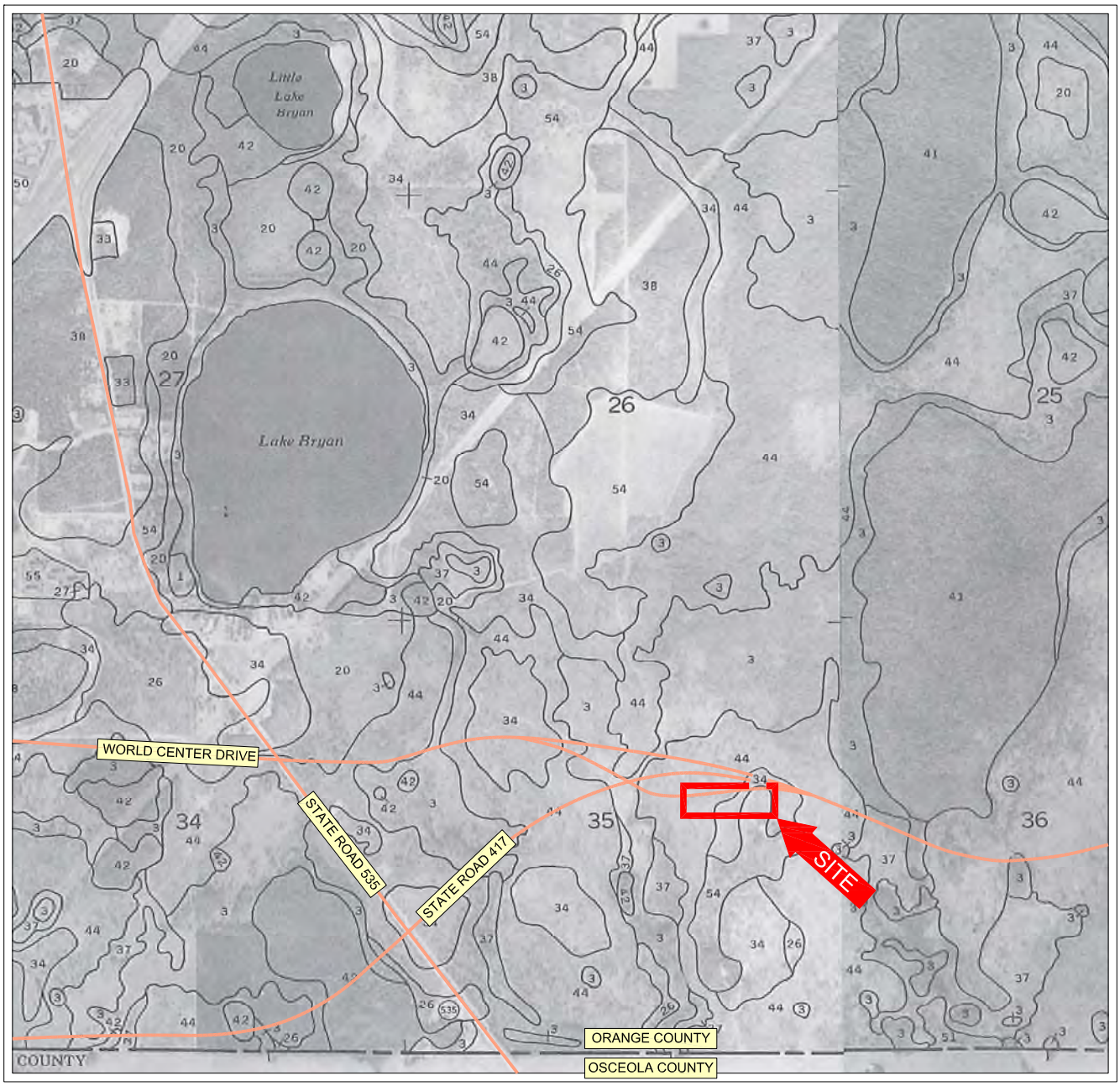
Project Mngr:	EJ
Drawn By:	MG
Checked By:	EJ
Approved By:	RA

Project No.	H1135173
Scale:	AS SHOWN
File No.	H1135173
Date:	11-4-13

Terracon
Consulting Engineers and Scientists
1675 LEE ROAD WINTER PARK, FLORIDA 32789
PH. (407) 740-6110 FAX. (407) 740-6112

TOPOGRAPHIC VICINITY MAP
GEOTECHNICAL ENGINEERING REPORT
I-DRIVE POTABLE WATER BOOSTER PUMP STATION
ORLANDO, ORANGE COUNTY, FLORIDA

EXHIBIT
A-1



SCALE 1" = 2000'

1000 0 1000 2000 3000 4000 5000 6000 7000 8000 9000 10000

U.S.D.A. SOIL SURVEY FOR ORANGE COUNTY, FLORIDA
ISSUED: AUGUST 1989

N

SECTION: 35
TOWNSHIP: 24 SOUTH
RANGE: 28 EAST

SOIL LEGEND

34	POMELLO FINE SAND, 0 TO 5 PERCENT SLOPES
44	SMYRNA FINE SAND
54	ZOLFO FINE SAND

N:\Projects\2013\H1135173\PROJECT DOCUMENTS (Reports-Letters-Drafts to Clients)\Cad\H1135173-Exhibit-A-2.dwg

Project Mngr:	EJ
Drawn By:	MG
Checked By:	EJ
Approved By:	RA

Project No.	H1135173
Scale:	AS SHOWN
File No.	H1135173
Date:	11-4-13

Terracon
Consulting Engineers and Scientists
1675 LEE ROAD WINTER PARK, FLORIDA 32789
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SOILS MAP
GEOTECHNICAL ENGINEERING REPORT
I-DRIVE POTABLE WATER BOOSTER PUMP STATION
ORLANDO, ORANGE COUNTY, FLORIDA

EXHIBIT
A-2

Soil Survey Descriptions

34 Pomello fine sand, 0 to 5 percent slopes. This soil is nearly level to gently sloping and moderately well drained. It is typically found on low ridges and knolls on the flatwoods. In its natural state and during years of normal rainfall, this soil type has a seasonal high water table at a depth of 20 to 40 inches for 1 to 4 months and recedes during the dry months to depths of 40 to 60 inches.

44 Smyrna fine sand. This soil is nearly level and poorly drained. It is typically found on the broad flatwoods. The slopes are smooth and range from 0 to 2 percent. In its natural state and during years of normal rainfall, this soil type has a seasonal high water table within a depth of 10 inches of the surface for 1 to 4 months. It can recede to a depth of 10 to 40 inches for more than 6 months.

54 Zolfo fine sand. This soil is nearly level and somewhat poorly drained. It is typically found in broad, slightly higher positions adjacent to the flatwoods. The slopes are smooth and range from 0 to 2 percent. In its natural state and during years of normal rainfall, this soil type has a seasonal high of 24 to 40 inches for 2 to 6 months. It recedes to a depth of 60 inches during extended dry periods.

SCALE IN FEET

0 30 60

LEGEND

APPROXIMATE LOCATION OF STANDARD PENETRATION TEST BORING

APPROXIMATE LOCATION OF AUGER BORING

Apr08, 2014 - 9:56am

REVISIONS

DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

RICHARD G. ACREE, P.E.
P.E. LICENSE NUMBER 53962
1675 LEE ROAD
WINTER PARK, FLORIDA 32789
TERRACON
CERTIFICATE OF AUTHORIZATION No. 8830

DRAWN BY: MG 11-4-13
CHECKED BY: EJ 11-4-13
DESIGNED BY:
CHECKED BY:

ORANGE COUNTY
UTILITIES DEPARTMENT

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
–	ORANGE	–

SHEET TITLE: BORING LOCATION PLAN

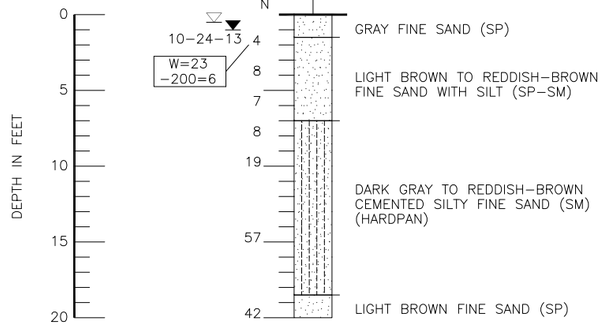
REF. DWG. NO.

PROJECT NAME: I-DRIVE POTABLE WATER BOOSTER PUMP STATION

SHEET NO. –

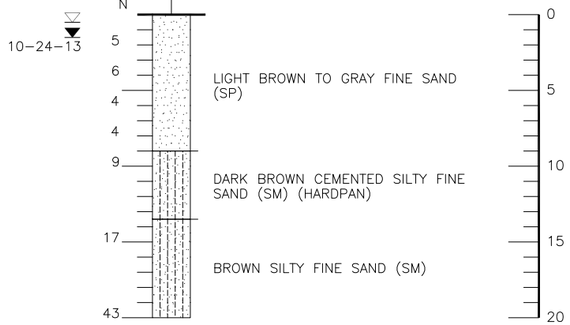
TERRACON No. H1135173 EXHIBIT: A-4

BORING No.: TB-1



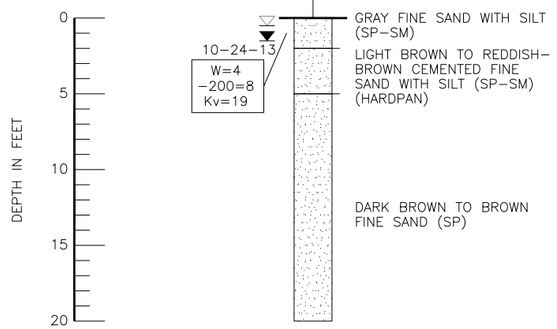
BORING TERM. @ 20.0'
NO CASING
BORING DRILLED: 10-24-13
HAMMER TYPE: AUTOMATIC
RIG TYPE: D-50

BORING No.: TB-2



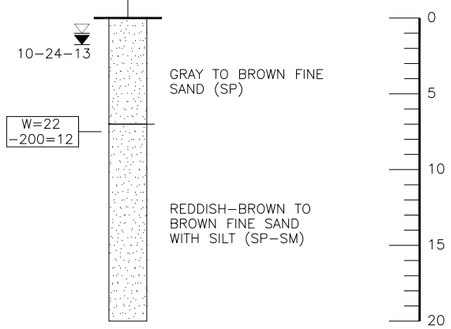
BORING TERM. @ 20.0'
NO CASING
BORING DRILLED: 10-24-13
HAMMER TYPE: AUTOMATIC
RIG TYPE: D-50

BORING No.: AB-1



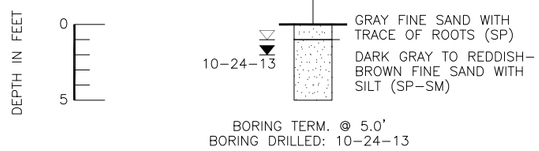
BORING TERM. @ 20.0'
BORING DRILLED: 10-24-13

BORING No.: AB-2



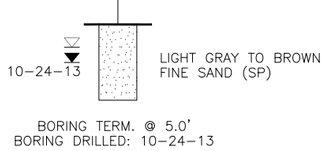
BORING TERM. @ 20.0'
BORING DRILLED: 10-24-13

BORING No.: HA-1



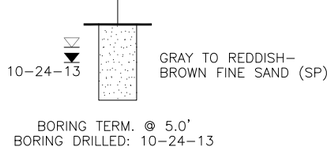
BORING TERM. @ 5.0'
BORING DRILLED: 10-24-13

BORING No.: HA-2



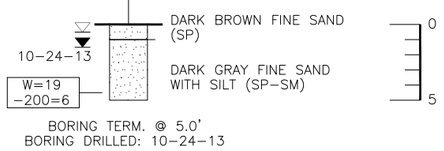
BORING TERM. @ 5.0'
BORING DRILLED: 10-24-13

BORING No.: HA-3



BORING TERM. @ 5.0'
BORING DRILLED: 10-24-13

BORING No.: HA-4



BORING TERM. @ 5.0'
BORING DRILLED: 10-24-13

LEGEND

- SAND
- SILTY SAND
- (SP) UNIFIED SOIL CLASSIFICATION GROUP SYMBOL
- 10-24-13 ENCOUNTERED GROUNDWATER LEVEL (DATE OF READING)
- ESTIMATED SEASONAL HIGH GROUNDWATER LEVEL
- W=0 -200=0 Kv=0 NATURAL MOISTURE CONTENT (%) FINES PASSING No. 200 SIEVE (%) VERTICAL PERMEABILITY (FT./DAY)
- N STANDARD PENETRATION RESISTANCE IN BLOWS PER FOOT UNLESS OTHERWISE NOTED

DRILLED BY: TERRACON

AUTOMATIC HAMMER

STANDARD PENETRATION TEST DATA

SPOON INSIDE DIA.	1 3/8 in.
SPOON OUTSIDE DIA.	2 in.
ASTM STANDARD DROP	AUTOMATIC HAMMER
AVG. HAMMER DROP	30 in.
HAMMER WEIGHT	140 lbs.

GRANULAR MATERIALS

RELATIVE DENSITY	SPT (BLOWS/FOOT)
VERY LOOSE	LESS THAN 3
LOOSE	3-8
MEDIUM DENSE	8-24
DENSE	24-40
VERY DENSE	GREATER THAN 40

SILTS AND CLAYS

CONSISTENCY	SPT (BLOWS/FOOT)
VERY SOFT	LESS THAN 1
SOFT	1-3
FIRM	3-6
STIFF	6-12
VERY STIFF	12-24
HARD	GREATER THAN 24

NOTES:

1) LAYER BOUNDARIES ARE APPROXIMATE AND REPRESENT SOIL LAYERS AT EACH TEST HOLE LOCATION ONLY. SUBSURFACE VARIATIONS BETWEEN BORINGS SHOULD BE ANTICIPATED.

2) BASED ON A REVIEW OF THE ST. JOHNS RIVER WATER MANAGEMENT DISTRICT POTENTIOMETRIC MAPS OF THE UPPER FLORIDAN AQUIFER FOR THIS PROJECT AREA, THE POTENTIAL ARTESIAN HEAD ELEVATION IS ESTIMATED TO BE +60 FEET NGVD. THE CONTRACTOR SHALL BE PREPARED TO HANDLE ARTESIAN WATER LEVELS UP TO ELEVATION +60 FEET NGVD.

Apr08, 2014 - 9:23am

REVISIONS

DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

RICHARD G. ACREE, P.E.
P.E. LICENSE NUMBER 53962
1675 LEE ROAD
WINTER PARK, FLORIDA 32789
TERRACON
CERTIFICATE OF AUTHORIZATION No. 8830

DRAWN BY: MG 11-4-13
CHECKED BY: EJ 11-4-13
DESIGNED BY:
CHECKED BY:

ORANGE COUNTY
UTILITIES DEPARTMENT

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
-	ORANGE	-

SHEET TITLE: REPORT OF BORINGS

REF. DWG. NO.

PROJECT NAME: I-DRIVE POTABLE WATER BOOSTER PUMP STATION

SHEET NO. -

TERRACON No. H1135173 EXHIBIT: A-5

Field Exploration Description

The boring locations were laid out at the project site by Terracon personnel. The locations indicated on the attached diagram are approximate and were measured by pacing distances and estimating right angles, across vegetated/wooded terrain. The locations of the borings should be considered accurate only to the degree implied by the means and methods used to define them.

Standard Penetration Tests (SPT) were performed continuously in the SPT borings from the ground surface to a depth of about 10 feet and at 5 foot depth intervals thereafter. Each sample was removed from the sampler in the field and was examined and visually classified by an engineering technician. Representative portions of each sample were packaged and sealed for transportation to our laboratory for further examination and visual classification. Water levels were measured in the boreholes at the time of our field exploration to evaluate the depth to groundwater.

The machine auger borings were performed by hydraulically turning a 4-inch diameter continuous flight auger into the ground in 5-foot increments. Additional flights were added until the desired termination depth was achieved. The auger was then extracted without further rotation and representative soil samples were retrieved from the auger. Samples were visually classified in the field and were then packaged and returned to our soils laboratory for further classification and testing. Water levels were measured in the boreholes at the time of our field exploration to evaluate the depth to groundwater.

The hand auger boring procedure consisted of manually turning a 3-inch diameter, 6-inch long sampler into the soil until it was full. The sampler was then retrieved and the soils in the sampler were visually examined and classified. The procedure was repeated until the desired termination depth was achieved or shallow groundwater levels caused collapse of the borehole. Samples of representative strata were obtained for further visual examination and classification in our laboratory.

A Detrick automatic SPT hammer was used to advance the split-barrel sampler in the SPT borings performed on this site. A significantly greater efficiency is achieved with the automatic hammer compared to the conventional safety hammer operated with a cathead and rope. This higher efficiency has an appreciable effect on the SPT-N value. The effect of the automatic hammer's efficiency has been considered in the interpretation and analysis of the subsurface information for this report.

Portions of the samples from the borings were sealed in glass jars to reduce moisture loss, and then the jars were taken to our laboratory for further observation and classification. Upon completion, the boreholes were backfilled with the site soil.

Field logs of each boring were prepared by the drill crew. These logs included visual classifications of the materials encountered during drilling as well as the driller's interpretation of the subsurface conditions between samples. The boring logs included with this report represent an interpretation of the field logs and include modifications based on laboratory observation of the samples.

APPENDIX B – LABORATORY TESTING

Laboratory Testing

During the field exploration, a portion of each recovered sample was sealed in a glass jar and transported to our laboratory for further visual observation and laboratory testing. Selected samples retrieved from the borings were tested for moisture (water) content, fines content (soil passing a US standard #200 sieve), and laboratory permeability. Those results are included in this report and on the respective boring logs. The visual-manual classifications were modified as appropriate based upon the laboratory testing results.

The soil samples were classified in general accordance with the Unified Soil Classification System based on the material's texture and plasticity. The estimated group symbol for the Unified Soil Classification System is shown on the boring logs. The results of our laboratory testing are presented on the corresponding borings logs.

Permeability testing was performed on a bulk sample obtained from Boring AB-1, from between depths of 0 and 1 foot below existing grade. The bulk sample was remolded in a permeameter to subjectively approximate in-place relative density of the sampled soil. Water was allowed to flow into the soil sample until the sample was apparently saturated. Once saturated, water flow was halted and incremental drops in the supply water level were timed.

Groundwater Sampling / Testing

International Drive Potable Water Repump Facility
Orange County, Florida

November 7, 2013
Terracon Project No. H1137312

Prepared for:
CPH Engineers, Inc.
Orlando, Florida

Prepared by:
Terracon Consultants, Inc.
Winter Park, Florida

November 7, 2013

CPH Engineers, Inc.
1117 East Robinson Street, Suite C
Orlando, Florida 32801

Attn: Mr. David Mahler, P.E.
P: [407] 425-0452
Email: dmahler@cphengineers.com

Re: Groundwater Sampling/Testing
International Drive Potable Water Repump Facility
Orange County, Florida
Terracon Project No. H1137312

Dear Mr. Mahler:

Terracon Consultants, Inc. (Terracon) is providing this report to CPH Engineers, Inc. (client) documenting groundwater testing results at the above-referenced force main project. The work was conducted in general accordance with our proposal PH1130265 dated April 9, 2013, incorporated into the Subconsultant Agreement dated September 17, 2013, authorized by CPH Engineers, Inc.

PROJECT INFORMATION

The project concerns proposed construction of a potable water repump facility located to the south of State Road 417, approximately 3,500 feet east of the intersection of International Drive and World Center Drive in Orange County, Florida. The area of the proposed repump station is indicated on a portion of a U.S. Geological Survey quadrangle provided as Exhibit 1 in Appendix A.

Terracon understands that dewatering may be conducted to replace/construct the pump stations that would require a NPDES Permit for off-site discharge. The intent of this groundwater sampling event was to test groundwater for parameters listed in the NPDES Generic Permit for Discharge of Produced Groundwater from Any Non-contaminated Site Activity [62-621.300(2)], Florida Administrative Code (FAC).

REGULATORY DATABASE SEARCH

A review of the Florida Department of Environmental Protection's (FDEP's) Map Direct website was conducted to identify regulated facilities and contaminated properties in proximity of the project

area to help determine if groundwater contaminant plumes could be mobilized by proposed dewatering activities. Locations of contaminated and regulated facilities on the FDEP's databases identified in the area of the proposed project area are identified on maps obtained from the Map Direct website, which is provided with a database legend in Appendix B.

TEMPORARY MONITORING WELL INSTALLATION AND SAMPLING

Terracon installed shallow temporary monitoring wells TMW-1 and TMW-2 on October 24, 2013 in the area of the proposed repump facility. The temporary monitoring well locations are indicated on a schematic of the proposed facility layout on an aerial photograph base map provided as Exhibit 2 in Appendix A.

The temporary monitoring wells were constructed as follows:

- Installation of 10 feet of 2-inch diameter, 0.006-inch machine slotted polyvinyl chloride (PVC) well screen with a threaded bottom cap. The screen for temporary monitoring wells was set approximately 0.5 to 10.5 feet below ground surface (bgs) to bracket the groundwater table encountered approximately 1 foot bgs at TMW-1 and 2 ½ feet bgs at TMW-2.
- Installation of 2-inch diameter, threaded, flush-joint PVC riser pipe to stickup approximately 3 feet above the surface.
- Addition of pre-sieved 30/45 graded silica sand for annular sand pack around the well screen.
- Each temporary monitoring well was developed by swabbing and over-pumping. Development and sampling purge water was spread on the surface adjacent to the well to evaporate or infiltrate.
- The temporary monitoring wells were removed after sampling and the boreholes backfilled with native soils to surface.

Groundwater samples were collected from temporary monitor wells TMW-1 and TMW-2 on October 25, 2013. Groundwater depth measurements indicated on the field sampling logs are relative to the top of well casing, which stick up above ground surface. Sampling procedures were conducted in accordance with the FDEP standard operating procedures DEP-SOP-001/01, FS2200. Physical parameters including temperature, pH, conductivity, dissolved oxygen, and turbidity were monitored while purging during groundwater sampling efforts. Groundwater pH measurements at temporary monitoring wells TMW-1 and TMW-2 were below the allowable 6.0 to 8.5 standard units referenced in the permit conditions. Elevated turbidity measurements persisted above 20 nephelometric turbidity units (NTU) wile purging TMW-1, possibly associated with a hard pan layer encountered approximately 8 feet bgs while advancing the well boring. Groundwater

samples were collected upon equilibration of field parameter measurements. Groundwater field equipment calibration logs and field sampling logs are included in Appendix C.

The groundwater samples were placed in laboratory prepared glassware and stored on ice in a cooler. The sample cooler and completed chain-of-custody record were delivered to Accutest Laboratories for analysis of parameters listed in the NPDES Generic Permit for the Discharge of Produced Ground Water from any Non-Contaminated Site Activity. Groundwater analysis included EPA Methods 8260 (benzene and naphthalene), 6010 (cadmium, copper, lead, zinc), 1631 (low level mercury), 7196A (hexavalent chromium), SM5310B total organic carbon (TOC) and SM4500H (pH). Additionally, total recoverable petroleum hydrocarbons (TRPH) analysis was performed by the FL-PRO method to evaluate samples in the event TOC concentration exceeded the NPDES screening value for fresh water. The laboratory report and chain-of-custody record is included in Appendix D.

GROUNDWATER ANALYTICAL RESULTS

The groundwater analytical results were compared to threshold screening concentrations listed in the NPDES Generic Permit for Discharge of Produced Groundwater from Any Non-contaminated Site Activity [Table 1, 62-621.300(2)]. A summary of the laboratory results is provided on the following table.

Laboratory Analytical Results Summary – October 25, 2013

Parameter	TW-1	TW-2	NPDES Screening Values for Fresh Water	GCTLs	SWCTLs
Total Organic Carbon [TOC (mg/L)]	**87.1**	3.5	10	None	None
TRPH (mg/L)	0.166 I	0.14 U	5.0	5.0	5.0
pH, (standard units) Field/Laboratory levels	**3.76 / 4.39**	**5.97 / 5.36**	6.0-8.5	None	None
Total Recoverable Mercury (ug/L)	**0.420**	0.0023	0.012	2	0.12
Total Recoverable Cadmium (ug/L)	0.50 U	0.50 U	9.3	5	**
Total Recoverable Copper (ug/L)	**8.2 I**	1.0 U	2.9	1000	**
Total Recoverable Lead (mg/L)	0.0113	0.0011 U	0.03	0.015	**
Total Recoverable Zinc (ug/L)	14.5 I	17.0 I	86	5000	**
Total Recoverable Chromium (Hex.) (ug/L)	**92**	8.0 U	11.1	100	11
Benzene (ug/L)	0.21 U	0.21 U	1	1	71.28
Naphthalene (ug/L)	1.0 U	1.0 U	100	14	26

Bold numbers exceed NPDES Generic Permit Discharge Criteria

mg/L – milligrams per liter
ug/L – micrograms per liter
U - Indicates the compound was analyzed for, but not detected at reported concentration.
I - The reported value is between the laboratory method detection limit and the laboratory practical quantitation limit.
GCTLs-Groundwater Cleanup Target Levels
SWCTLs – Surface Water Cleanup Target Levels
NA – Not Applicable
** - Hardness dependent

As indicated on the table, reported concentrations exceeded the NPDES Generic Permit screening values for discharges as follows:

- Groundwater pH measurements at both temporary monitoring wells were below the NPDES screening value range for freshwater.
- Turbidity above 20 NTU persisted while purging temporary monitoring well TMW-1.
- Total copper, total mercury and hexavalent chromium concentrations at temporary monitoring well TMW-1 were reported above the NPDES screening value range for freshwater. The laboratory has indicated that a dilution was applied for analysis of mercury for sample TMW-1 because the mercury concentration in the sample exceeded the upper calibration point of 100 nanograns per liter (parts per trillion).
- The TOC concentration for temporary monitoring well TMW-1 was reported above the NPDES screening value range for freshwater. However, compared to the TRPH result for the groundwater sample collected the same well, the TOC concentration appears naturally occurring.

CONCLUSIONS

Based on the groundwater analytical results:

- The pH measurements at both monitoring wells were below the NPDES screening value range for freshwater. Elevated turbidity persisted while purging monitoring well TMW-1, where total mercury, total copper, and hexavalent chromium concentrations exceeded the NPDES screening value range for freshwater.
- Regulatory authorization to conduct groundwater treatment may be required in conjunction with NPDES discharge at each of the pump station areas.
- Terracon did not consult the FDEP on the placement of monitoring wells. The sampling results in this report may not satisfy the NPDES Notice of Intent (NOI) requirements. Additional sampling may be necessary prior to dewatering discharge.

Terracon

RECOMMENDATIONS

Based on the sampling results, Terracon recommends the following:

- The pH measurements indicate buffering will likely be required in order to meet the NPDES discharge criteria, which combined with bag filtration may be sufficient to reduce turbidity but may or may not be sufficient to reduce mercury, copper and hexavalent chromium concentrations to meet discharge criteria. Upon startup of the dewatering system a sample of the discharge water should be collected and analyzed to evaluate whether mercury, copper and hexavalent chromium concentration meets the permit discharge criteria. In the event the metals concentrations do not meet the discharge criteria, the following options should be considered:
  - Use of additional treatment equipment such as ion exchange vessels to remove metals to an acceptable concentration for NPDES discharge. The size of the vessels would depend on the dewatering flow rate.
  - Reported metals concentrations in the groundwater samples collected from the temporary monitoring wells do not exceed groundwater cleanup target levels, thus the groundwater withdrawn for dewatering could be infiltrated at the site.
  - Obtain a permit to discharge into the sanitary sewer.

Terracon appreciates the opportunity to conduct these sampling activities requested by CPH Engineers, Inc. If you have questions concerning the work performed, please call the undersigned at 407-740-6110.

Sincerely,
Terracon Consultants, Inc.

Igor Karimov
Project Engineer

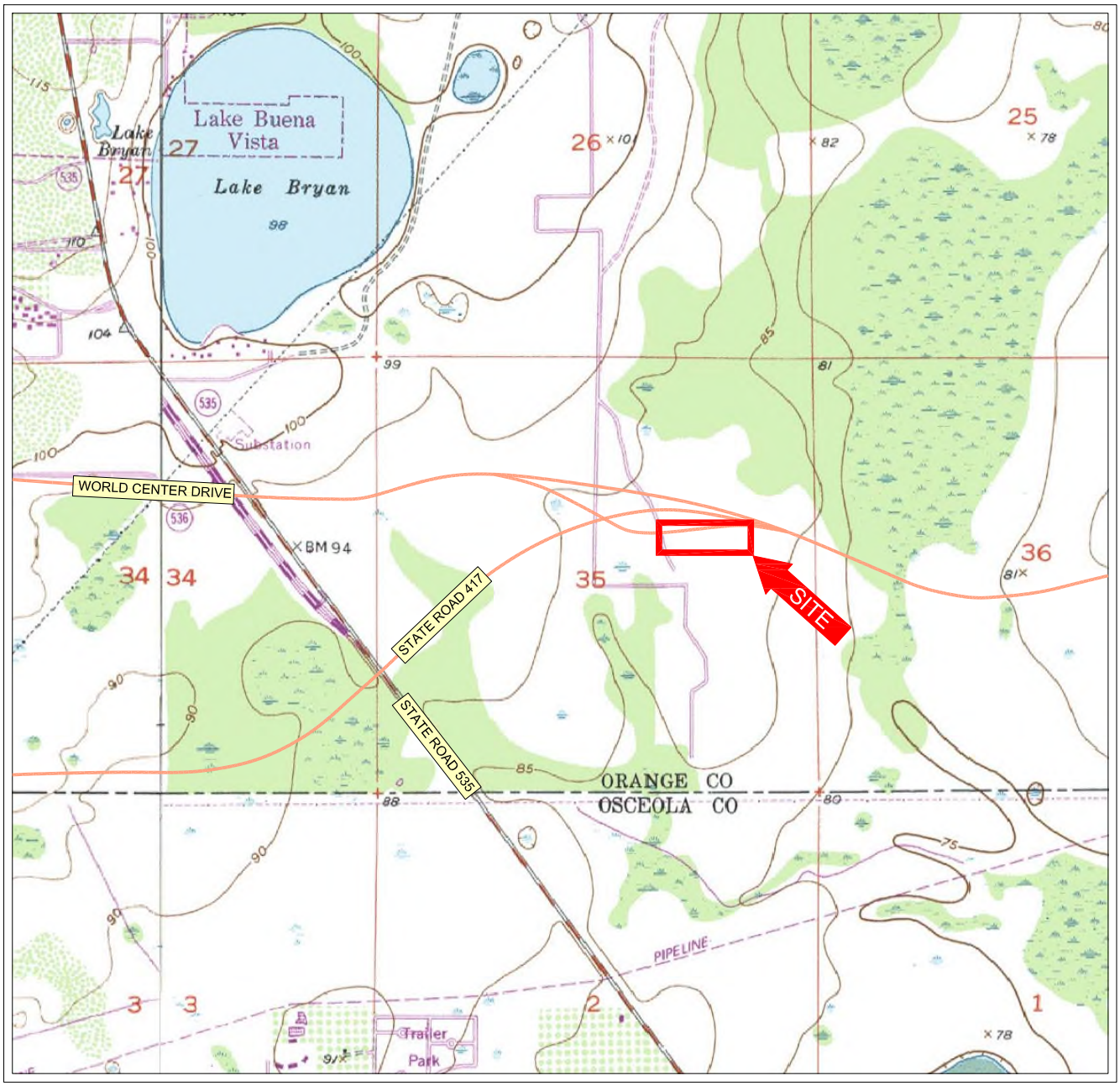
Eric R. Krebill, P.G. 11/7/13
Florida Registration No. 1162

ERIC KREBILL LICENSE NO. 1162 STATE OF FLORIDA PROFESSIONAL GEOLOGIST

Appendix A Site Map Exhibits
Appendix B FDEP Map Direct Summary
Appendix C Groundwater Sampling and Equipment Calibration Logs
Appendix D Laboratory Results

APPENDIX A

UNITED STATES – DEPARTMENT OF THE INTERIOR – GEOLOGICAL SURVEY



SCALE 1:24 000

1 .5 0 KILOMETERS 1 2

1000 0 MILES 1000 2000

1 .5 0 1

FEET

1000 0 1000 2000 3000 4000 5000 6000 7000 8000 9000 10000

CONTOUR INTERVAL 5 FEET

NATIONAL GEODETIC VERTICAL DATUM OF 1929

SECTION: 35
TOWNSHIP: 24 SOUTH
RANGE: 28 EAST

KISSIMMEE, FLORIDA
1953; PHOTOREVISED 1987
7.5 MINUTE SERIES (QUADRANGLE)

N

N:\Projects\2013\H1137312\PROJECT DOCUMENTS (Reports-Letters-Drafts to Clients)\Cad\H1137312-Exhibit-1.dwg

Project Mngr:	EK
Drawn By:	MG
Checked By:	EK
Approved By:	EK

Project No.	H1137312
Scale:	AS SHOWN
File No.	H1137312
Date:	11-4-13

Terracon
Consulting Engineers and Scientists
1675 LEE ROAD WINTER PARK, FLORIDA 32789
PH. (407) 740-6110 FAX. (407) 740-6112

TOPOGRAPHIC VICINITY MAP
GROUNDWATER SAMPLING / TESTING
I-DRIVE REPUMP FACILITY
ORLANDO, ORANGE COUNTY, FLORIDA

EXHIBIT
1

LEGEND

APPROXIMATE LOCATION OF MONITORING WELL

N

SCALE IN FEET

0 50 100

Project Mngr:	EK
Drawn By:	MG
Checked By:	EK
Approved By:	EK

Project No.	H1137312
Scale:	AS SHOWN
File No.	H1137312
Date:	11-4-13

Terracon
Consulting Engineers and Scientists
1675 LEE ROAD WINTER PARK, FLORIDA 32789
PH. (407) 740-6110 FAX. (407) 740-6112

TEMPORARY MONITORING WELL LOCATION PLAN

GROUNDWATER SAMPLING / TESTING

I-DRIVE REPUMP FACILITY

ORLANDO, ORANGE COUNTY, FLORIDA

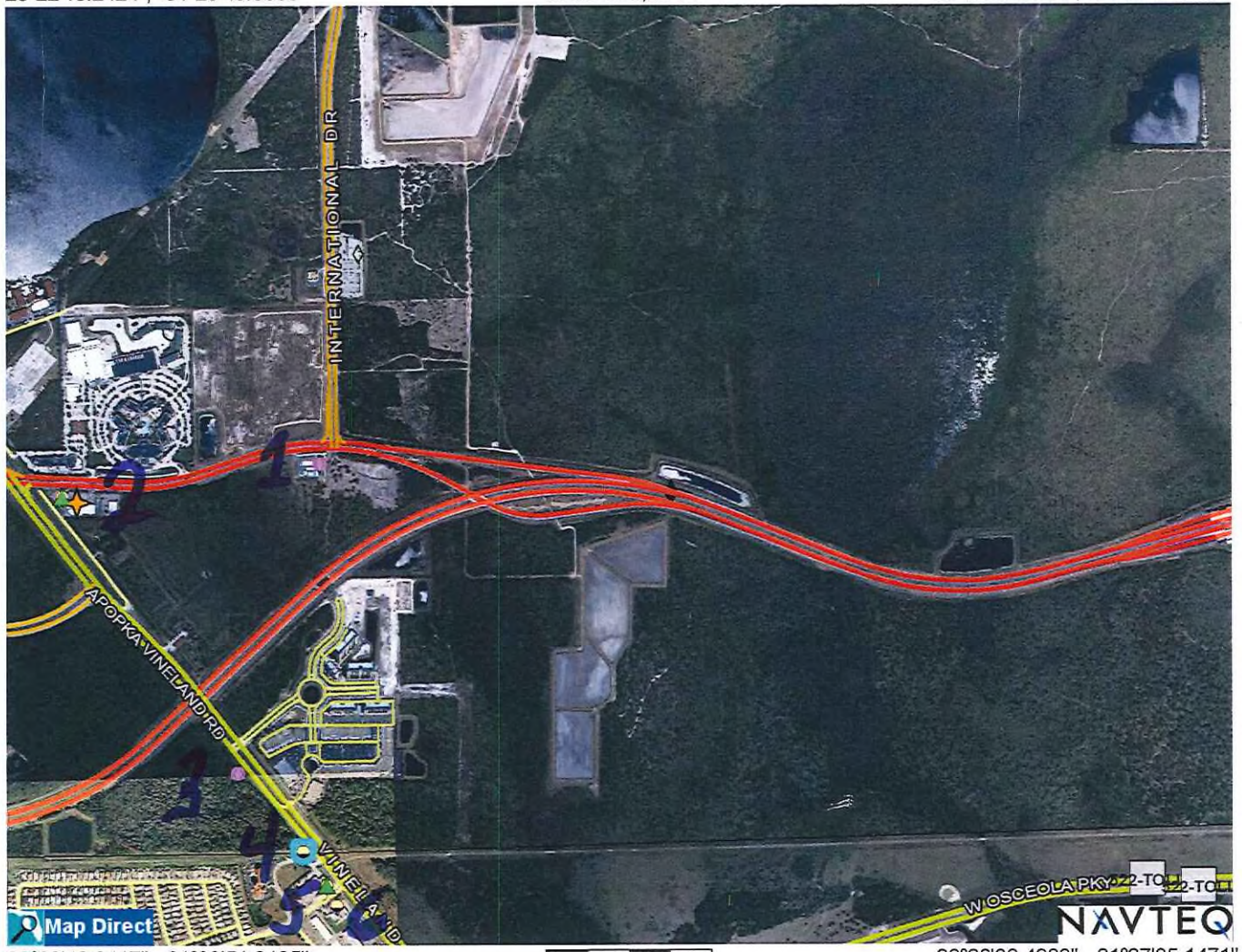
EXHIBIT 2

N:\Projects\2013\H1137312\PROJECT DOCUMENTS (Reports-Letters-Drafts to Clients)\Cad\H1137312-Exhibit-2.dwg

APPENDIX B

Map Direct: Water Data Central

28°22'13.2424", -81°29'49.0866" Scale 1:19,934 28°22'10.7904", -81°27'32.9881"



28°20'40.9417", -81°29'51.2135" 1 inch = 1661 feet 28°20'38.4903", -81°27'35.1471"

- Aerial Imagery 2004-2009
- DEP Cleanup Sites - Contamination Locator Map
- PETROLEUM
- OTHER WASTE CLEANUP
- BROWNFIELD SITES
- SUPERFUND
- Waste Cleanup OPEN Responsible Party Sites
- Waste Cleanup CLOSED Responsible Party Sites
- Waste Cleanup INACTIVE Responsible Party Sites
- Contaminations from STCM
- Drycleaning Solvent Program Cleanup Sites
- NPL and State Funded Waste Cleanup Sites
- State Funded Hazardous Waste Sites
- Superfund (NPL) Hazardous Waste Sites
- Site Investigation Section Sites
- Solid Waste Facilities
- Facility
- General Disposal Area
- Waste Processing Area
- Storage Tank Contamination Monitoring (STCM)

1 - Hess #09567 3 - Racetrac #2305 5 - RMA
2 - 7Eleven #24775 4 - Central FL Pipeline 6 - Hess #09267

LEGEND

DEP Cleanup Sites - Contamination Locator Map

- PETROLEUM
- OTHER WASTE CLEANUP
- BROWNFIELD SITES
- SUPERFUND

Waste Cleanup OPEN Responsible Party Sites

Waste Cleanup CLOSED Responsible Party Sites

Waste Cleanup INACTIVE Responsible Party Sites

Contaminations from STCM

Drycleaning Solvent Program Cleanup Sites

NPL and State Funded Waste Cleanup Sites

- State Funded Hazardous Waste Sites
- Superfund (NPL) Hazardous Waste Sites

Site Investigation Section Sites

Solid Waste Facilities

- Facility
- General Disposal Area
- Waste Processing Area

Storage Tank Contamination Monitoring (STCM)

Retail Petroleum Facilities

Large Quantity Generators (LQGs) from CHAZ IMS

County SQGS

Small Quantity Generators (SQGs) from CHAZ IMS

Brownfield Sites

Counties

Aerial Imagery Flight Dates 2004-2009

APPENDIX C

Form FD 9000-24

GROUNDWATER SAMPLING LOG

Riser Above ground 3.0'

SITE NAME: I-Drive Re Pump Facility	SITE LOCATION: Orlando, FL	
WELL NO: TMW-1	SAMPLE ID: TMW-1	DATE: 10/25/13

PURGING DATA

WELL DIAMETER (inches): 2"	TUBING DIAMETER (inches): 3/16	WELL SCREEN INTERVAL DEPTH: 0.2 feet to 10.2 feet	STATIC DEPTH TO WATER (feet): 4.11	PURGE PUMP TYPE OR BAILER: PP

WELL VOLUME PURGE: 1 WELL VOLUME = (TOTAL WELL DEPTH – STATIC DEPTH TO WATER) X WELL CAPACITY
(only fill out if applicable)
= (10.2 feet – 4.11 feet) X .16 gallons/foot = 0.97 gallons

EQUIPMENT VOLUME PURGE: 1 EQUIPMENT VOL. = PUMP VOLUME + (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
(only fill out if applicable)
= gallons + (gallons/foot X feet) + gallons = gallons

INITIAL PUMP OR TUBING DEPTH IN WELL (feet): 7.0'	FINAL PUMP OR TUBING DEPTH IN WELL (feet): 7.0'	PURGING INITIATED AT: 1115	PURGING ENDED AT: 1140	TOTAL VOLUME PURGED (gallons): 2.47

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet)	pH (standard units)	TEMP. (°C)	COND. (circle units) mhos/cm or S/cm	DISSOLVED OXYGEN (circle units) mg/l or % saturation	TURBIDITY (NTUs)	COLOR (describe)	ODOR (describe)
1125	0.97	0.97	0.10	4.33	3.84	23.0	53	16.6%/1.42	958	Brown	None
1130	0.50	1.47	|	4.33	3.85	23.20	54	14.9%/1.28	773	Brn.	"
1135	0.50	1.97	|	4.33	3.75	23.19	53	14.8%/1.27	769	"	"
1140	0.50	2.47	|	4.34	3.76	23.16	53	14.5%/1.24	715	"	"

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016

PURGING EQUIPMENT CODES: B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; PP = Peristaltic Pump; O = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Mike Burns / Terracon	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: 1141	SAMPLING ENDED AT: 1151
PUMP OR TUBING DEPTH IN WELL (feet): 7.0'	TUBING MATERIAL CODE: PE/S	FIELD-FILTERED: Y (N) Filtration Equipment Type:	FILTER SIZE: ____ m
FIELD DECONTAMINATION: PUMP Y (N)	TUBING Y (N) (replaced)	DUPLICATE: Y (N)	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION					
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH	INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	SAMPLE PUMP FLOW RATE (mL per minute)
TMW-1	3	CG	40mL	HCL	—	—	8260 Benz+MAP	RFPP	<100 mL
	2	AG	40mL	HCL	—	—	TOC	|	|
	2	AG	1Ltr.	H2SO4	—	—	FL-PRO	PP	0.1 GPM
	1	AG	500mL	None	—	—	LL Hg	|	|
	1	PE	500mL	None	—	—	XCR, PH	|	|
	1	PE	250mL	HNO3	—	—	Metals	|	|

REMARKS:
Turbidity within 10%

MATERIAL CODES: AG = Amber Glass; CG = Clear Glass; PE = Polyethylene; PP = Polypropylene; S = Silicone; T = Teflon; O = Other (Specify)

SAMPLING EQUIPMENT CODES: APP = After Peristaltic Pump; B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; RFPP = Reverse Flow Peristaltic Pump; SM = Straw Method (Tubing Gravity Drain); O = Other (Specify)

NOTES: 1. **The above do not constitute all of the information required by Chapter 62-160, F.A.C.**
2. STABILIZATION CRITERIA FOR RANGE OF VARIATION OF LAST THREE CONSECUTIVE READINGS (SEE FS 2212, SECTION 3)
pH: ± 0.2 units **Temperature:** ± 0.2 °C **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 20% saturation (see Table FS 2200-2); optionally, ± 0.2 mg/L or ± 10% (whichever is greater) **Turbidity:** all readings ≤ 20 NTU; optionally ± 5 NTU or ± 10% (whichever is greater)

Revision Date: February 12, 2009

NA-038

Form FD 9000-24

GROUNDWATER SAMPLING LOG

Above ground Riser 3.2'

SITE NAME: I-Drive Re Pump Station	SITE LOCATION: Orlando, FL.	
WELL NO: TMW-2	SAMPLE ID: TMW-2	DATE: 10/25/13

PURGING DATA

WELL DIAMETER (inches): 2"	TUBING DIAMETER (inches): 3/16	WELL SCREEN INTERVAL DEPTH: 1 feet to 11 feet	STATIC DEPTH TO WATER (feet): 5.78	PURGE PUMP TYPE OR BAILER: PP

WELL VOLUME PURGE: 1 WELL VOLUME = (TOTAL WELL DEPTH – STATIC DEPTH TO WATER) X WELL CAPACITY
(only fill out if applicable)
= (14.2 feet – 5.78 feet) X .16 gallons/foot = 1.34 gallons

EQUIPMENT VOLUME PURGE: 1 EQUIPMENT VOL. = PUMP VOLUME + (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
(only fill out if applicable)
= gallons + (gallons/foot X feet) + gallons = gallons

INITIAL PUMP OR TUBING DEPTH IN WELL (feet): 10'	FINAL PUMP OR TUBING DEPTH IN WELL (feet): 10'	PURGING INITIATED AT: 0946	PURGING ENDED AT: 1014	TOTAL VOLUME PURGED (gallons): 2.84

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet)	pH (standard units)	TEMP. (°C)	COND. (circle units) mhos/cm or S/cm	DISSOLVED OXYGEN (circle units) mg/L or % saturation	TURBIDITY (NTUs)	COLOR (describe)	ODOR (describe)
0959	1.34	1.34	0.10	5.97	5.10	25.38	156	57.6%/4.72	8.93	Clear	None
1004	0.50	1.84	|	5.97	5.10	25.55	153	57.2%/4.67	7.45	CL	"
1009	0.50	2.34	|	5.97	5.04	25.55	155	55.0%/4.50	5.79	CL	"
1014	0.50	2.84	|	5.97	5.02	25.58	154	54.9%/4.49	5.34	CL	"

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP** = Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Mike Burns / Terracon	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: 1015	SAMPLING ENDED AT: 1023
PUMP OR TUBING DEPTH IN WELL (feet): 10'	TUBING MATERIAL CODE: PE/S	FIELD-FILTERED: Y (N) Filtration Equipment Type:	FILTER SIZE: ____ m
FIELD DECONTAMINATION: PUMP Y (N)	TUBING Y (N) (replaced)	DUPLICATE: Y (N)	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION					
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH	INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	SAMPLE PUMP FLOW RATE (mL per minute)
TMW-2	3	CG	40 ML	HCL	–	–	8260	RFPP	<100mL
	2	AG	40mL	HCL	–	–	TOC	"	"
	2	AG	1Ltr	H2SO4	–	–	EC-Rio	PP	0.10 GPM
	1	AG	500mL	None	–	–	LL Hg	|	|
	1	PE	500mL	None	–	–	NCR, pH	|	|
	1	PE	250mL	HNO3	–	–	metals	|	|

REMARKS:

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: 1. **The above do not constitute all of the information required by Chapter 62-160, F.A.C.**

2. STABILIZATION CRITERIA FOR RANGE OF VARIATION OF LAST THREE CONSECUTIVE READINGS (SEE FS 2212, SECTION 3)

pH: ± 0.2 units **Temperature:** ± 0.2 °C **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 20% saturation (see Table FS 2200-2); optionally, ± 0.2 mg/L or ± 10% (whichever is greater) **Turbidity:** all readings ≤ 20 NTU; optionally ± 5 NTU or ± 10% (whichever is greater)

Revision Date: February 12, 2009

NA-038

Form FD 9000-8: FIELD INSTRUMENT CALIBRATION RECORDS

INSTRUMENT (MAKE/MODEL#) HACH 2100P **INSTRUMENT #** 08080C017245

PARAMETER: *[check only one]*

☐ TEMPERATURE ☐ CONDUCTIVITY ☐ SALINITY ☐ pH ☐ ORP

☒ TURBIDITY ☐ RESIDUAL Cl ☐ DO ☐ OTHER _____

STANDARDS: *[Specify the type(s) of standards used for calibration, the origin of the standards, the standard values, and the date the standards were prepared or purchased]*

Standard A <0.1

Standard B 20.0

Standard C 100

DATE (yy/mm/dd)	TIME (hr:min)	STD (A, B, C)	STD VALUE	INSTRUMENT RESPONSE	% DEV	CALIBRATED (YES, NO)	TYPE (INIT, CONT)	SAMPLER INITIALS
13/10/25	0915	A	0.1	0.1	<1	Yes	Init	MB
↓	0917	B	20.0	20.1	<1	↓	↓	↓
↓	0918	C	100	100	<1	↓	↓	↓
13/10/25	1156	A	0.1	0.1	<1	Yes	Cont	MB
↓	1157	B	20.0	20.1	<1	↓	↓	↓
↓	1158	C	100	100	<1	↓	↓	↓

Form FD 9000-8: FIELD INSTRUMENT CALIBRATION RECORDS

INSTRUMENT (MAKE/MODEL#) YSI 556MPS **INSTRUMENT #** 06H2510AF

PARAMETER: *[check only one]*

☐ TEMPERATURE ☒ CONDUCTIVITY ☐ SALINITY ☒ pH ☐ ORP
☐ TURBIDITY ☐ RESIDUAL CI ☒ DO ☐ OTHER _____

STANDARDS: *[Specify the type(s) of standards used for calibration, the origin of the standards, the standard values, and the date the standards were prepared or purchased]*

Standard A DO 100%
Standard B pH 4, 7, 10
Standard C Conductivity 1413

DATE (yy/mm/dd)	TIME (hr:min)	STD (A, B, C)	STD VALUE	INSTRUMENT RESPONSE	% DEV	CALIBRATED (YES, NO)	TYPE (INIT, CONT)	SAMPLER INITIALS
13/10/25	0922	A	100%	101.4% / 100%	1.4%/<1	Yes	Init	MP
↓	0925	B	4	4.14 / 4.0	3.5%/<1	↓	↓	↓
	0928	B	7	7.07	1%			
	0932	B	10	10.02	<1			
↓	0935	C	1413	1416	<1	↓	↓	↓
13/10/25	1200	A	100%	100.3%	<1	Yes	Cont	MP
↓	1203	B	4	3.97	<1	↓	↓	↓
	1206	B	7	7.01	<1			
	1209	B	10	10.01	<1			
↓	1211	C	1413	1413	<1	↓	↓	↓

APPENDIX D

Accutest Laboratories Southeast, Inc.		Nov 04, 2013 17:09 pm	
Job Number:	FA9439		
Account:	Terracon Consulting		
Project:	I-Drive Re-Pump Facility; Orlando, FL		
Project Number:	H1137312		
		Legend:	Hit
Client Sample ID:		TMW-1	TMW-2
Lab Sample ID:		FA9439-1	FA9439-2
Date Sampled:		10/25/2013	10/25/2013
Matrix:		Ground Water	Ground Water
GC/MS Volatiles (SW846 8260B)			
Benzene	ug/l	0.21 U	0.21 U
Naphthalene	ug/l	1.0 U	1.0 U
GC Semi-volatiles (FLORIDA-PRO)			
TPH (C8-C40)	mg/l	0.166 I	0.14 U
Metals Analysis			
Cadmium	ug/l	0.50 U	0.50 U
Copper	ug/l	8.2 I	1.0 U
Lead	ug/l	11.3	1.1 U
Mercury	ng/l	420 [a]	2.3 [b]
Zinc	ug/l	14.5 I	17.0 I
General Chemistry			
Chromium, Hexavalent	mg/l	0.092	0.0080 U
Total Organic Carbon	mg/l	87.1	3.5
pH	su	4.39 [c]	5.36 [c]
Footnotes:			
[a] Elevated sample detection limit due to difficult sample matrix. Analysis performed at Accutest Laboratories, Dayton, NJ.			
[b] Analysis performed at Accutest Laboratories, Dayton, NJ.			
[c] Field analysis required. Received out of hold time and analyzed by request.			

Southeast ACCUTEST LABORATORIES

11/04/13

Technical Report for

Terracon Consulting

I-Drive Re-Pump Facility; Orlando, FL

H1137312

Accutest Job Number: FA9439

Sampling Date: 10/25/13

Report to:

Terracon
1675 Lee Rd
Winter Park, FL 32789
erkrebill@terracon.com

ATTN: Eric Krebill

Total number of pages in report: **44**

Test results contained within this data package meet the requirements of the National Environmental Laboratory Accreditation Conference and/or state specific certification programs as applicable.

Harry Behzadi, Ph.D.
Laboratory Director

Client Service contact: Andrea Colby 407-425-6700

Certifications: FL (E83510), LA (03051), KS (E-10327), IA (366), IL (200063), NC (573), NJ (FL002), SC (96038001) DoD ELAP (L-A-B L2229), CA (04226CA), TX (T104704404), PA (68-03573), VA (460177), AK, AR, GA, KY, MA, NV, OK, UT, WA

Sections: 1 2 3 4 5 6 7 8 9 10

Table of Contents

Sample Summary

Terracon Consulting

Job No: FA9439

I-Drive Re-Pump Facility; Orlando, FL
Project No: H1137312

Sample Number	Collected Date	Time	By	Received	Matrix Code	Type	Client Sample ID
FA9439-1	10/25/13	11:41	MB	10/25/13	AQ	Ground Water	TMW-1
FA9439-2	10/25/13	10:15	MB	10/25/13	AQ	Ground Water	TMW-2

Summary of Hits

Job Number: FA9439
Account: Terracon Consulting
Project: I-Drive Re-Pump Facility; Orlando, FL
Collected: 10/25/13

Lab Sample ID / Analyte	Client Sample ID	Result/ Qual	PQL	MDL	Units	Method
FA9439-1	**TMW-1**					
TPH (C8-C40)		0.166 I	0.23	0.14	mg/l	FLORIDA-PRO
Copper		8.2 I	25	1.0	ug/l	SW846 6010C
Lead		11.3	5.0	1.1	ug/l	SW846 6010C
Mercury [a]		420	10	5.6	ng/l	EPA 1631
Zinc		14.5 I	20	5.0	ug/l	SW846 6010C
Chromium, Hexavalent		0.092	0.020	0.016	mg/l	SW846 7196A
Total Organic Carbon		87.1	2.0	0.47	mg/l	SM19 5310B/SW 9060A
pH [b]		4.39			su	SM 4500H B/SW 9040C
FA9439-2	**TMW-2**					
Mercury [c]		2.3	0.50	0.28	ng/l	EPA 1631
Zinc		17.0 I	20	5.0	ug/l	SW846 6010C
Total Organic Carbon		3.5	1.0	0.23	mg/l	SM19 5310B/SW 9060A
pH [b]		5.36			su	SM 4500H B/SW 9040C

(a) Elevated sample detection limit due to difficult sample matrix. Analysis performed at Accutest Laboratories, Dayton, NJ.
(b) Field analysis required. Received out of hold time and analyzed by request.
(c) Analysis performed at Accutest Laboratories, Dayton, NJ.

Southeast ACCUTEST LABORATORIES

Sample Results

Report of Analysis

Report of Analysis

Client Sample ID:	TMW-1		
Lab Sample ID:	FA9439-1	**Date Sampled:**	10/25/13
Matrix:	AQ - Ground Water	**Date Received:**	10/25/13
Method:	SW846 8260B	**Percent Solids:**	n/a
Project:	I-Drive Re-Pump Facility; Orlando, FL		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	J089897.D	1	10/31/13	MM	n/a	n/a	VJ4513
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

CAS No.	Compound	Result	PQL	MDL	Units	Q
71-43-2	Benzene	0.21 U	1.0	0.21	ug/l	
91-20-3	Naphthalene	1.0 U	5.0	1.0	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	102%		83-118%
17060-07-0	1,2-Dichloroethane-D4	97%		79-125%
2037-26-5	Toluene-D8	101%		85-112%
460-00-4	4-Bromofluorobenzene	103%		83-118%

(a) Sample was treated with an anti-foaming agent.

U = Not detected MDL - Method Detection Limit
PQL = Practical Quantitation Limit
L = Indicates value exceeds calibration range
I = Result > = MDL but < PQL J = Estimated value
V = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	TMW-1		
Lab Sample ID:	FA9439-1	**Date Sampled:**	10/25/13
Matrix:	AQ - Ground Water	**Date Received:**	10/25/13
Method:	FLORIDA-PRO SW846 3510C	**Percent Solids:**	n/a
Project:	I-Drive Re-Pump Facility; Orlando, FL		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	ZF636808.D	1	11/01/13	FEA	11/01/13	OP49270	GZF2219
Run #2							

	Initial Volume	Final Volume
Run #1	1070 ml	1.0 ml
Run #2		

CAS No.	Compound	Result	PQL	MDL	Units	Q
	TPH (C8-C40)	0.166	0.23	0.14	mg/l	I

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	65%		43-123%

U = Not detected MDL - Method Detection Limit
PQL = Practical Quantitation Limit
L = Indicates value exceeds calibration range
I = Result > = MDL but < PQL J = Estimated value
V = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: TMW-1
Lab Sample ID: FA9439-1
Matrix: AQ - Ground Water
Project: I-Drive Re-Pump Facility; Orlando, FL

Date Sampled: 10/25/13
Date Received: 10/25/13
Percent Solids: n/a

Total Metals Analysis

Analyte	Result	PQL	MDL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Cadmium	0.50 U	5.0	0.50	ug/l	1	10/31/13	10/31/13	LM	SW846 6010C [1]	SW846 3010A [3]
Copper	8.2 I	25	1.0	ug/l	1	10/31/13	10/31/13	LM	SW846 6010C [1]	SW846 3010A [3]
Lead	11.3	5.0	1.1	ug/l	1	10/31/13	10/31/13	LM	SW846 6010C [1]	SW846 3010A [3]
Mercury [a]	420	10	5.6	ng/l	20	10/30/13	11/04/13	ANJ	EPA 1631 [2]	EPA 1631 [4]
Zinc	14.5 I	20	5.0	ug/l	1	10/31/13	10/31/13	LM	SW846 6010C [1]	SW846 3010A [3]

(1) Instrument QC Batch: MA11167
(2) Instrument QC Batch: N:MA32542
(3) Prep QC Batch: MP26216
(4) Prep QC Batch: N:MP75792

(a) Elevated sample detection limit due to difficult sample matrix. Analysis performed at Accutest Laboratories, Dayton, NJ.

PQL = Practical Quantitation Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
I = Indicates a result > = MDL but < PQL

Report of Analysis

Client Sample ID:	TMW-1		
Lab Sample ID:	FA9439-1	**Date Sampled:**	10/25/13
Matrix:	AQ - Ground Water	**Date Received:**	10/25/13
		Percent Solids:	n/a
Project:	I-Drive Re-Pump Facility; Orlando, FL		

General Chemistry

Analyte	Result	PQL	MDL	Units	DF	Analyzed	By	Method
Chromium, Hexavalent	0.092	0.020	0.016	mg/l	2	10/25/13 14:40	KC	SW846 7196A
Total Organic Carbon	87.1	2.0	0.47	mg/l	2	11/02/13 00:05	FN	SM19 5310B/SW 9060A
pH [a]	4.39			su	1	10/25/13 11:10	LE	SM 4500H B/SW 9040C

(a) Field analysis required. Received out of hold time and analyzed by request.

PQL = Practical Quantitation Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
I = Indicates a result > = MDL but < PQL

Report of Analysis

Client Sample ID: TMW-2
Lab Sample ID: FA9439-2
Matrix: AQ - Ground Water
Method: SW846 8260B
Project: I-Drive Re-Pump Facility; Orlando, FL

Date Sampled: 10/25/13
Date Received: 10/25/13
Percent Solids: n/a

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	J089898.D	1	10/31/13	MM	n/a	n/a	VJ4513
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

CAS No.	Compound	Result	PQL	MDL	Units	Q
71-43-2	Benzene	0.21 U	1.0	0.21	ug/l	
91-20-3	Naphthalene	1.0 U	5.0	1.0	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	105%		83-118%
17060-07-0	1,2-Dichloroethane-D4	97%		79-125%
2037-26-5	Toluene-D8	99%		85-112%
460-00-4	4-Bromofluorobenzene	105%		83-118%

U = Not detected MDL - Method Detection Limit
PQL = Practical Quantitation Limit
L = Indicates value exceeds calibration range
I = Result > = MDL but < PQL J = Estimated value
V = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	TMW-2		
Lab Sample ID:	FA9439-2	**Date Sampled:**	10/25/13
Matrix:	AQ - Ground Water	**Date Received:**	10/25/13
Method:	FLORIDA-PRO SW846 3510C	**Percent Solids:**	n/a
Project:	I-Drive Re-Pump Facility; Orlando, FL		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	ZF636805.D	1	11/01/13	FEA	11/01/13	OP49270	GZF2219
Run #2							

	Initial Volume	Final Volume
Run #1	1070 ml	1.0 ml
Run #2		

CAS No.	Compound	Result	PQL	MDL	Units	Q
	TPH (C8-C40)	0.14 U	0.23	0.14	mg/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	97%		43-123%

U = Not detected MDL - Method Detection Limit
PQL = Practical Quantitation Limit
L = Indicates value exceeds calibration range
I = Result > = MDL but < PQL J = Estimated value
V = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: TMW-2
Lab Sample ID: FA9439-2
Matrix: AQ - Ground Water
Project: I-Drive Re-Pump Facility; Orlando, FL

Date Sampled: 10/25/13
Date Received: 10/25/13
Percent Solids: n/a

Total Metals Analysis

Analyte	Result	PQL	MDL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Cadmium	0.50 U	5.0	0.50	ug/l	1	10/31/13	10/31/13	LM	SW846 6010C [1]	SW846 3010A [3]
Copper	1.0 U	25	1.0	ug/l	1	10/31/13	10/31/13	LM	SW846 6010C [1]	SW846 3010A [3]
Lead	1.1 U	5.0	1.1	ug/l	1	10/31/13	10/31/13	LM	SW846 6010C [1]	SW846 3010A [3]
Mercury [a]	2.3	0.50	0.28	ng/l	1	10/30/13	11/04/13	ANJ	EPA 1631 [2]	EPA 1631 [4]
Zinc	17.0 I	20	5.0	ug/l	1	10/31/13	10/31/13	LM	SW846 6010C [1]	SW846 3010A [3]

(1) Instrument QC Batch: MA11167
(2) Instrument QC Batch: N:MA32542
(3) Prep QC Batch: MP26216
(4) Prep QC Batch: N:MP75792

(a) Analysis performed at Accutest Laboratories, Dayton, NJ.

PQL = Practical Quantitation Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
I = Indicates a result > = MDL but < PQL

Report of Analysis

Client Sample ID:	TMW-2		
Lab Sample ID:	FA9439-2	**Date Sampled:**	10/25/13
Matrix:	AQ - Ground Water	**Date Received:**	10/25/13
		Percent Solids:	n/a
Project:	I-Drive Re-Pump Facility; Orlando, FL		

General Chemistry

Analyte	Result	PQL	MDL	Units	DF	Analyzed	By	Method
Chromium, Hexavalent	0.0080 U	0.010	0.0080	mg/l	1	10/25/13 14:40	KC	SW846 7196A
Total Organic Carbon	3.5	1.0	0.23	mg/l	1	11/01/13 22:32	FN	SM19 5310B/SW 9060A
pH [a]	5.36			su	1	10/25/13 11:10	LE	SM 4500H B/SW 9040C

(a) Field analysis required. Received out of hold time and analyzed by request.

PQL = Practical Quantitation Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
I = Indicates a result > = MDL but < PQL

Southeast ACCUTEST LABORATORIES

Misc. Forms

Custody Documents and Other Forms

Includes the following where applicable:

- Chain of Custody

Accutest Laboratories Southeast
Chain of Custody

ACCUTEST LABORATORIES

4405 Vineland Road, Suite C-15 Orlando, Fl 32811
TEL. 407-425-6700 • FAX: 407-425-0707
www.accutest.com

Accutest JOB # FA9439 PAGE 1 OF 1

Accutest Quote #

SKIFF#

Client / Reporting Information

Company Name: Terracon
Address: 1675 Lee Rd
City: Winter Park State: FL Zip: 32789
Project Contact: Eric Krebill E-mail: erkrebill@terracon.com
Phone#: 407-618-8358
Sampler(s) Name(s) (Printed): Mike Burns

Project Information

Project Name: I-Drive RePump Facility
Street:
City: Orlando State: FL
Project #: H1137312
Fax #: 407-740-6112
Client Purchase Order #:

Analytical Information: 8260 Benz + NAP; TOC; FL PRO; XCR, PH; metals Ba, Cu, Pb, Zn; LL Hg

Accutest Sample #	Field ID / Point of Collection	Date	Time	Sampled By	Matrix	Total # of Bottles	Other	None	HCl	NaOH	HNO3	H2SO4	NAOH+ZNAC	DI Water	MEOH	8260 Benz + NAP	TOC	FL PRO	XCR, PH	metals Ba, Cu, Pb, Zn	LL Hg	LAB USE ONLY
1	TMW-1	10/25/13	1141	MB	GW	10		X	X		X	X				X	X	X	X	X	X	
2	TMW-2	↓	1015	↓	↓	10		X	X		X	X				X	X	X	X	X	X	

Matrix Codes
DW - Drinking Water
GW - Ground Water
WW - Water
SW - Surface Water
SO - Soil
SL - Sludge
OI - Oil
LIQ - Other Liquid
AIR - Air
SOL - Other Solid
WP - Wipe

TURNAROUND TIME (Business Days) — Approved By: / Rush Code

- ☐ 10 Days Standard
- ☐ 7 Day RUSH
- ☐ 5 Day RUSH — 6 day TAT
- ☐ 3 Day EMERGENCY
- ☐ 2 Day EMERGENCY
- ☐ 1 Day EMERGENCY
- ☐ OTHER

Emergency or Rush T/A Data Available VIA Email or Lablink

Data Deliverable Information

- ☐ COMMERCIAL "A" (RESULTS ONLY)
- ☐ COMMERCIAL "B" (RESULTS PLUS QC)
- ☐ REDT1 (EPA LEVEL 3)
- ☐ FULT1 (EPA LEVEL 4)
- ☐ EDD'S

Comments / Remarks

Sample Custody must be documented below each time samples change possession, including courier delivery.

Relinquished by	Date Time	Received By	Relinquished by	Date Time	Received By
Relinquished by Sampler: 1 Mike Burns	10/25/13 1248	2 [signature] 10/25/13 12:48	3		4
5		6	7		8

Lab Use Only: Custody Seal in Place: Y N Temp Blank Provided: Y N Preserved where Applicable: Y N Total # of Coolers: 1 Cooler Temperature (s) Celsius: 3.2

FA9439: Chain of Custody
Page 1 of 2

ACCUTEST LABORATORIES SAMPLE RECEIPT CONFIRMATION

ACCUTEST'S JOB NUMBER: FA9439 CLIENT: TERRACON PROJECT: I DRIVE

DATE/TIME RECEIVED: 10.25.13 12:48 (MM/DD/YY 24:00) NUMBER OF COOLERS RECEIVED: 1

METHOD OF DELIVERY: FEDEX UPS ACCUTEST COURIER GREYHOUND DELIVERY OTHER

AIRBILL NUMBERS:

COOLER INFORMATION

- [ ] CUSTODY SEAL NOT PRESENT OR NOT INTACT
- [ ] CHAIN OF CUSTODY NOT RECEIVED (COC)
- [ ] ANALYSIS REQUESTED IS UNCLEAR OR MISSING
- [ ] SAMPLE DATES OR TIMES UNCLEAR OR MISSING
- [ ] TEMPERATURE CRITERIA NOT MET
- [ ] WET ICE PRESENT

TRIP BLANK INFORMATION

- [ ] TRIP BLANK PROVIDED
- [X] TRIP BLANK NOT PROVIDED
- [X] TRIP BLANK NOT ON COC
- [ ] TRIP BLANK INTACT
- [ ] TRIP BLANK NOT INTACT
- [ ] RECEIVED WATER TRIP BLANK
- [ ] RECEIVED SOIL TRIP BLANK

MISC. INFORMATION

NUMBER OF ENCORES ? 25-GRAM 5-GRAM

NUMBER OF 5035 FIELD KITS ?

NUMBER OF LAB FILTERED METALS ?

TEMPERATURE INFORMATION

- [ ] IR THERM ID 1 CORR. FACTOR +0.4
- [ ] OBSERVED TEMPS: 2.8
- [ ] CORRECTED TEMPS: 3.2

SAMPLE INFORMATION

- [ ] SAMPLE LABELS PRESENT ON ALL BOTTLES
- [ ] INCORRECT NUMBER OF CONTAINERS USED
- [ ] SAMPLE RECEIVED IMPROPERLY PRESERVED
- [ ] INSUFFICIENT VOLUME FOR ANALYSIS
- [ ] DATES/TIMES ON COC DO NOT MATCH SAMPLE LABEL
- [ ] ID'S ON COC DO NOT MATCH LABEL
- [ ] VOC VIALS HAVE HEADSPACE (MACRO BUBBLES)
- [ ] BOTTLES RECEIVED BUT ANALYSIS NOT REQUESTED
- [ ] NO BOTTLES RECEIVED FOR ANALYSIS REQUESTED
- [ ] UNCLEAR FILTERING OR COMPOSITING INSTRUCTIONS
- [ ] SAMPLE CONTAINER(S) RECEIVED BROKEN
- [ ] % SOLIDS JAR NOT RECEIVED
- [ ] 5035 FIELD KIT FROZEN WITHIN 48 HOUR'S
- [ ] RESIDUAL CHLORINE PRESENT

(APPICABLE TO EPA 600 SERIES OR NORTH CAROLINA ORGANICS)

SUMMARY OF COMMENTS:

TECHNICIAN SIGNATURE/DATE 10-25-13 REVIEWER SIGNATURE/DATE 10.25.13

NF 12/10

receipt confirmation 122910.xls

FA9439: Chain of Custody
Page 2 of 2

Southeast ACCUTEST LABORATORIES

GC/MS Volatiles

QC Data Summaries

Includes the following where applicable:

- Method Blank Summaries
- Blank Spike Summaries
- Matrix Spike and Duplicate Summaries

Method Blank Summary

Job Number: FA9439
Account: TERCFLWP Terracon Consulting
Project: I-Drive Re-Pump Facility; Orlando, FL

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
VJ4513-MB	J089888.D	1	10/31/13	MM	n/a	n/a	VJ4513

The QC reported here applies to the following samples: **Method:** SW846 8260B

FA9439-1, FA9439-2

CAS No.	Compound	Result	RL	MDL	Units	Q
71-43-2	Benzene	ND	1.0	0.21	ug/l	
91-20-3	Naphthalene	ND	5.0	1.0	ug/l	

CAS No.	Surrogate Recoveries		Limits
1868-53-7	Dibromofluoromethane	103%	83-118%
17060-07-0	1,2-Dichloroethane-D4	96%	79-125%
2037-26-5	Toluene-D8	99%	85-112%
460-00-4	4-Bromofluorobenzene	105%	83-118%

Blank Spike Summary

Job Number: FA9439
Account: TERCFLWP Terracon Consulting
Project: I-Drive Re-Pump Facility; Orlando, FL

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
VJ4513-BS	J089887.D	1	10/31/13	MM	n/a	n/a	VJ4513

The QC reported here applies to the following samples: **Method:** SW846 8260B

FA9439-1, FA9439-2

CAS No.	Compound	Spike ug/l	BSP ug/l	BSP %	Limits
71-43-2	Benzene	25	25.1	100	81-122
91-20-3	Naphthalene	25	18.8	75	63-132

CAS No.	Surrogate Recoveries	BSP	Limits
1868-53-7	Dibromofluoromethane	101%	83-118%
17060-07-0	1,2-Dichloroethane-D4	95%	79-125%
2037-26-5	Toluene-D8	96%	85-112%
460-00-4	4-Bromofluorobenzene	100%	83-118%

* = Outside of Control Limits.

Matrix Spike/Matrix Spike Duplicate Summary

Job Number: FA9439
Account: TERCFLWP Terracon Consulting
Project: I-Drive Re-Pump Facility; Orlando, FL

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
FA9303-1MS	J089909.D	1	10/31/13	MM	n/a	n/a	VJ4513
FA9303-1MSD	J089910.D	1	10/31/13	MM	n/a	n/a	VJ4513
FA9303-1	J089889.D	1	10/31/13	MM	n/a	n/a	VJ4513

The QC reported here applies to the following samples: **Method:** SW846 8260B

FA9439-1, FA9439-2

CAS No.	Compound	FA9303-1 ug/l	Q	Spike ug/l	MS ug/l	MS %	MSD ug/l	MSD %	RPD	Limits Rec/RPD
71-43-2	Benzene	1.0 U		25	25.3	101	24.6	98	3	81-122/14
91-20-3	Naphthalene	3.0 U		25	19.1	76	20.3	81	6	63-132/25

CAS No.	Surrogate Recoveries	MS	MSD	FA9303-1	Limits
1868-53-7	Dibromofluoromethane	101%	100%	102%	83-118%
17060-07-0	1,2-Dichloroethane-D4	97%	95%	95%	79-125%
2037-26-5	Toluene-D8	95%	96%	101%	85-112%
460-00-4	4-Bromofluorobenzene	99%	98%	104%	83-118%

* = Outside of Control Limits.

Southeast ACCUTEST LABORATORIES

GC Semi-volatiles

QC Data Summaries

Includes the following where applicable:

- Method Blank Summaries
- Blank Spike Summaries
- Matrix Spike and Duplicate Summaries

Method Blank Summary

Job Number: FA9439
Account: TERCFLWP Terracon Consulting
Project: I-Drive Re-Pump Facility; Orlando, FL

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP49270-MB	ZF636804.D	1	11/01/13	FEA	11/01/13	OP49270	GZF2219

The QC reported here applies to the following samples: **Method:** FLORIDA-PRO

FA9439-1, FA9439-2

CAS No.	Compound	Result	RL	MDL	Units	Q
	TPH (C8-C40)	ND	0.25	0.15	mg/l	

CAS No.	Surrogate Recoveries		Limits
84-15-1	o-Terphenyl	85%	43-123%

Blank Spike Summary

Job Number: FA9439
Account: TERCFLWP Terracon Consulting
Project: I-Drive Re-Pump Facility; Orlando, FL

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP49270-BS	ZF636803.D	1	11/01/13	FEA	11/01/13	OP49270	GZF2219

The QC reported here applies to the following samples: **Method:** FLORIDA-PRO

FA9439-1, FA9439-2

CAS No.	Compound	Spike mg/l	BSP mg/l	BSP %	Limits
	TPH (C8-C40)	0.85	0.842	99	48-113

CAS No.	Surrogate Recoveries	BSP	Limits
84-15-1	o-Terphenyl	114%	43-123%

* = Outside of Control Limits.

Matrix Spike/Matrix Spike Duplicate Summary

Job Number: FA9439
Account: TERCFLWP Terracon Consulting
Project: I-Drive Re-Pump Facility; Orlando, FL

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP49270-MS	ZF636806.D	1	11/01/13	FEA	11/01/13	OP49270	GZF2219
OP49270-MSD	ZF636807.D	1	11/01/13	FEA	11/01/13	OP49270	GZF2219
FA9439-2	ZF636805.D	1	11/01/13	FEA	11/01/13	OP49270	GZF2219

The QC reported here applies to the following samples: **Method:** FLORIDA-PRO

FA9439-1, FA9439-2

CAS No.	Compound	FA9439-2 mg/l	Q	Spike mg/l	MS mg/l	MS %	MSD mg/l	MSD %	RPD	Limits Rec/RPD
	TPH (C8-C40)	0.23	U	1.6	1.52	95	1.40	87	8	48-113/27

CAS No.	Surrogate Recoveries	MS	MSD	FA9439-2	Limits
84-15-1	o-Terphenyl	101%	91% [a]	97%	43-123%

(a) Surrogate recoveries corrected for double spike.

* = Outside of Control Limits.

Southeast ACCUTEST LABORATORIES

Metals Analysis

QC Data Summaries

Includes the following where applicable:

- Method Blank Summaries
- Matrix Spike and Duplicate Summaries
- Blank Spike and Lab Control Sample Summaries
- Serial Dilution Summaries

BLANK RESULTS SUMMARY
Part 2 - Method Blanks

Login Number: FA9439
Account: TERCFLWP - Terracon Consulting
Project: I-Drive Re-Pump Facility; Orlando, FL

QC Batch ID: MP26216
Matrix Type: AQUEOUS

Methods: SW846 6010C
Units: ug/l

Prep Date: 10/31/13

Metal	RL	IDL	MDL	MB raw	final
Aluminum	200	15	15		
Antimony	6.0	1.3	1.3		
Arsenic	10	1.6	2.5		
Barium	200	1	1		
Beryllium	4.0	.5	.5		
Cadmium	5.0	.5	.5	0.0	<5.0
Calcium	1000	50	50		
Chromium	10	1.8	2		
Cobalt	50	.5	.5		
Copper	25	1	1	0.10	<25
Iron	300	29	29		
Lead	5.0	1.1	1.1	0.10	<5.0
Magnesium	5000	74	74		
Manganese	15	.7	.7		
Molybdenum	50	.6	1		
Nickel	40	.5	.5		
Potassium	10000	200	200		
Selenium	10	2	2		
Silver	10	.5	.5		
Sodium	10000	500	500		
Strontium	10	.5	.5		
Thallium	10	1.3	1.3		
Tin	50	.7	1.8		
Titanium	10	.9	1		
Vanadium	50	.5	1		
Zinc	20	3	5	1.3	<20

Associated samples MP26216: FA9439-1, FA9439-2

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(anr) Analyte not requested

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: FA9439
Account: TERCFLWP - Terracon Consulting
Project: I-Drive Re-Pump Facility; Orlando, FL

QC Batch ID: MP26216
Matrix Type: AQUEOUS

Methods: SW846 6010C
Units: ug/l

Prep Date:			10/31/13					10/31/13	
Metal	FA9439-1 Original	DUP	RPD	QC Limits	FA9439-1 Original	MS	Spikelot MPFLICP2	% Rec	QC Limits
Aluminum									
Antimony	anr								
Arsenic	anr								
Barium									
Beryllium	anr								
Cadmium	0.0	0.0	NC	0-20	0.0	50.6	50	101.2	80-120
Calcium									
Chromium	anr								
Cobalt									
Copper	8.2	8.8	7.1	0-20	8.2	268	250	103.9	80-120
Iron	anr								
Lead	11.3	11.6	2.6	0-20	11.3	514	500	100.5	80-120
Magnesium									
Manganese	anr								
Molybdenum									
Nickel	anr								
Potassium									
Selenium	anr								
Silver	anr								
Sodium									
Strontium									
Thallium	anr								
Tin									
Titanium									
Vanadium									
Zinc	14.5	15.8	8.6	0-20	14.5	523	500	101.7	80-120

Associated samples MP26216: FA9439-1, FA9439-2

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(N) Matrix Spike Rec. outside of QC limits
(anr) Analyte not requested

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: FA9439
Account: TERCFLWP - Terracon Consulting
Project: I-Drive Re-Pump Facility; Orlando, FL

QC Batch ID: MP26216 Methods: SW846 6010C
Matrix Type: AQUEOUS Units: ug/l

Prep Date: 10/31/13

Metal	FA9439-1 Original	MSD	Spikelot MPFLICP2	% Rec	MSD RPD	QC Limit
Aluminum						
Antimony	anr					
Arsenic	anr					
Barium						
Beryllium	anr					
Cadmium	0.0	50.3	50	100.6	0.6	20
Calcium						
Chromium	anr					
Cobalt						
Copper	8.2	270	250	104.7	0.7	20
Iron	anr					
Lead	11.3	513	500	100.3	0.2	20
Magnesium						
Manganese	anr					
Molybdenum						
Nickel	anr					
Potassium						
Selenium	anr					
Silver	anr					
Sodium						
Strontium						
Thallium	anr					
Tin						
Titanium						
Vanadium						
Zinc	14.5	521	500	101.3	0.4	20

Associated samples MP26216: FA9439-1, FA9439-2

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(N) Matrix Spike Rec. outside of QC limits
(anr) Analyte not requested

SPIKE BLANK AND LAB CONTROL SAMPLE SUMMARY

Login Number: FA9439
Account: TERCFLWP - Terracon Consulting
Project: I-Drive Re-Pump Facility; Orlando, FL

QC Batch ID: MP26216
Matrix Type: AQUEOUS

Methods: SW846 6010C
Units: ug/l

Prep Date: 10/31/13

Metal	BSP Result	Spikelot MPFLICP2	% Rec	QC Limits
Aluminum				
Antimony	anr			
Arsenic	anr			
Barium				
Beryllium	anr			
Cadmium	50.9	50	101.8	80-120
Calcium				
Chromium	anr			
Cobalt				
Copper	264	250	105.6	80-120
Iron	anr			
Lead	503	500	100.6	80-120
Magnesium				
Manganese	anr			
Molybdenum				
Nickel	anr			
Potassium				
Selenium	anr			
Silver	anr			
Sodium				
Strontium				
Thallium	anr			
Tin				
Titanium				
Vanadium				
Zinc	515	500	103.0	80-120

Associated samples MP26216: FA9439-1, FA9439-2

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(anr) Analyte not requested

SERIAL DILUTION RESULTS SUMMARY

Login Number: FA9439
Account: TERCFLWP - Terracon Consulting
Project: I-Drive Re-Pump Facility; Orlando, FL

QC Batch ID: MP26216
Matrix Type: AQUEOUS

Methods: SW846 6010C
Units: ug/l

Prep Date: 10/31/13

Metal	FA9439-1 Original	SDL 1:5	%DIF	QC Limits
Aluminum				
Antimony	anr			
Arsenic	anr			
Barium				
Beryllium	anr			
Cadmium	0.00	0.00	NC	0-10
Calcium				
Chromium	anr			
Cobalt				
Copper	8.20	10.6	29.3 (a)	0-10
Iron	anr			
Lead	11.3	10.1	10.6 (a)	0-10
Magnesium				
Manganese	anr			
Molybdenum				
Nickel	anr			
Potassium				
Selenium	anr			
Silver	anr			
Sodium				
Strontium				
Thallium	anr			
Tin				
Titanium				
Vanadium				
Zinc	14.5	23.7	63.4 (a)	0-10

Associated samples MP26216: FA9439-1, FA9439-2

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(anr) Analyte not requested
(a) Percent difference acceptable due to low initial sample concentration (< 50 times IDL).

POST DIGESTATE SPIKE SUMMARY

Login Number: FA9439
Account: TERCFLWP - Terracon Consulting
Project: I-Drive Re-Pump Facility; Orlando, FL

QC Batch ID: MP26216
Matrix Type: AQUEOUS

Methods: SW846 6010C
Units: ug/l

Prep Date: 10/31/13

Metal	Sample ml	Final ml	FA9439-1 Raw	Corr.**	PS ug/l	Spike ml	Spike ug/ml	Spike ug/l	% Rec	QC Limits
Aluminum										
Antimony										
Arsenic										
Barium										
Beryllium										
Cadmium	9.8	10			50.5	0.2	2.5	50	101.0	80-120
Calcium										
Chromium										
Cobalt										
Copper	9.8	10	8.2	8.036	107.2	0.2	5	100	99.2	80-120
Iron										
Lead	9.8	10	11.3	11.074	59.2	0.2	2.5	50	96.3	80-120
Magnesium										
Manganese										
Molybdenum										
Nickel										
Potassium										
Selenium										
Silver										
Sodium										
Strontium										
Thallium										
Tin										
Titanium										
Vanadium										
Zinc	9.8	10	14.5	14.21	263.6	0.2	12.5	250	99.8	80-120

Associated samples MP26216: FA9439-1, FA9439-2

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(**) Corr. sample result = Raw * (sample volume / final volume)
(anr) Analyte not requested

Southeast ACCUTEST LABORATORIES

General Chemistry

QC Data Summaries

Includes the following where applicable:

- Method Blank and Blank Spike Summaries
- Duplicate Summaries
- Matrix Spike Summaries

METHOD BLANK AND SPIKE RESULTS SUMMARY
GENERAL CHEMISTRY

Login Number: FA9439
Account: TERCFLWP - Terracon Consulting
Project: I-Drive Re-Pump Facility; Orlando, FL

Analyte	Batch ID	RL	MB Result	Units	Spike Amount	BSP Result	BSP %Recov	QC Limits
Chromium, Hexavalent	GN58486	0.010	0.0	mg/l	0.100	0.096	95.6	85-115%
Total Organic Carbon	GP22818/GN58610	1.0	0.0	mg/l	15	15.9	106.0	90-110%

Associated Samples:
Batch GN58486: FA9439-1, FA9439-2
Batch GP22818: FA9439-1, FA9439-2
(*) Outside of QC limits

DUPLICATE RESULTS SUMMARY
GENERAL CHEMISTRY

Login Number: FA9439
Account: TERCFLWP - Terracon Consulting
Project: I-Drive Re-Pump Facility; Orlando, FL

Analyte	Batch ID	QC Sample	Units	Original Result	DUP Result	RPD	QC Limits
Total Organic Carbon	GP22818/GN58610	FA9552-1	mg/l	57.4	57.4	0.0	0-20%
pH	GN58484	FA9419-1	su	8.10	8.10	0.0	0-10%

Associated Samples:
Batch GN58484: FA9439-1, FA9439-2
Batch GP22818: FA9439-1, FA9439-2
(*) Outside of QC limits

MATRIX SPIKE RESULTS SUMMARY
GENERAL CHEMISTRY

Login Number: FA9439
Account: TERCFLWP - Terracon Consulting
Project: I-Drive Re-Pump Facility; Orlando, FL

Analyte	Batch ID	QC Sample	Units	Original Result	Spike Amount	MS Result	%Rec	QC Limits
Chromium, Hexavalent	GN58486	FA9439-2	mg/l	0.0080 U	0.100	0.10	97.5	85-115%
Total Organic Carbon	GP22818/GN58610	FA9552-1	mg/l	57.4	15	77.6	134.7N(a)	90-110%

Associated Samples:
Batch GN58486: FA9439-1, FA9439-2
Batch GP22818: FA9439-1, FA9439-2
(*) Outside of QC limits
(N) Matrix Spike Rec. outside of QC limits
(a) Spike recovery indicates possible matrix interference and/or sample non-homogeneity.

MATRIX SPIKE DUPLICATE RESULTS SUMMARY
GENERAL CHEMISTRY

Login Number: FA9439
Account: TERCFLWP - Terracon Consulting
Project: I-Drive Re-Pump Facility; Orlando, FL

Analyte	Batch ID	QC Sample	Units	Original Result	Spike Amount	MSD Result	RPD	QC Limit
Chromium, Hexavalent	GN58486	FA9439-2	mg/l	0.0080 U	0.100	0.107	3.0	20%

Associated Samples:
Batch GN58486: FA9439-1, FA9439-2
(*) Outside of QC limits
(N) Matrix Spike Rec. outside of QC limits

Southeast ACCUTEST LABORATORIES

Misc. Forms

Custody Documents and Other Forms

(Accutest New Jersey)

Includes the following where applicable:

- Chain of Custody

Accutest Laboratories Southeast
Subcontract Chain of Custody

ACCUTEST Laboratories

4405 Vineland Road, Suite C-15 Orlando, Fl 32811
TEL 407-425-6700 FAX 407-425-0707
www.accutest.com

PAGE 1 OF 1

Client / Reporting Information

Company Name: Accutest Laboratories
Address: 4405 Vineland Rd.
City: Orlando State: FL Zip: 32811
Phone #: (407) 425-6700 Fax#: (407) 425-0707

Project Information

Project Name: FA9439
Please send report to dawnd@accutest.com
For any other issues contact munam@accutest.com

Analytical Information

Matrix Codes

DW - Drinking Water
GW - Ground Water
WW - Water
SW - Surface Water
SO - Soil
SL- Sludge
OI - Oil
LIQ - Other Liquid
AIR - Air
SOL - Other Solid
WP - Wipe

Lab ID #	Sample ID	COLLECTION DATE	TIME	SAMPLED BY:	MATRIX	TOTAL # OF BOTTLES	CONTAINER INFORMATION: OTHER	NONE	HCl	NaOH	HNO3	H2SO4	NaOH+ZnAc	DI WATER	MeOH	HGLL1631	LAB USE ONLY
	FA9439-1	10/25/13	11:41		GW	1		X								X	
	FA9439-2	10/25/13	10:15		GW	1		X								X	

Turnaround Time (Business days)

Std. 10 Business Days
7 Day *RUSH*
5 Day *RUSH*
3 Day *EMERGENCY*
2 Day *EMERGENCY*
1 Day *EMERGENCY*
Other

Approved By: / Date/Rush Code:
11-01-13

Data Deliverable Information

- [ ] COMMERCIAL "A" (RESULTS ONLY)
- [x] COMMERCIAL "B" (RESULTS PLUS QC)
- [ ] REDT1 (EPA LEVEL 3)
- [ ] FULLT1 (EPA LEVEL 4)
- [ ] EDD'S

Comments / Remarks

Ship to Laboratory - ALNJ
Approved by - Munam

Sample Custody must be documented below each time samples change possession, including courier delivery.

Relinquished by Sampler/Affiliation	Date Time:	Received By/Affiliation	Relinquished By/Affiliation	Date Time:	Received By/Affiliation
1	10/29/13 1730	2 FX	3 FX	10/30/13 0955	4 ALNJ
Relinquished by/Affiliation	Date Time:	Received By/Affiliation	Relinquished By/Affiliation	Date Time:	Received By/Affiliation
5		6	7		8

Lab Use Only : Custody Seal in Place: Y N Temp Blank Provided: Y N Preserved Where Applicable: Y N Total # of Coolers:____Cooler Temperature (s) Celsius:_____

Cooler Temp 1.3°C IG

Good

Fed Ex Trk # 7970 2901 4464

On Ice JW3

FA9439: Chain of Custody
Page 1 of 2
Accutest New Jersey

Accutest Laboratories Sample Receipt Summary

Accutest Job Number: FA9439 **Client:** **Project:**

Date / Time Received: 10/30/2013 **Delivery Method:** **Airbill #'s:**

Cooler Temps (Initial/Adjusted): #1: (1.3/1.3); 0

Cooler Security	Y	N		Y	N
1. Custody Seals Present:	☑	☐	3. COC Present:	☑	☐
2. Custody Seals Intact:	☑	☐	4. Smpl Dates/Time OK	☑	☐

Cooler Temperature	Y	N
1. Temp criteria achieved:	☑	☐
2. Cooler temp verification:	IR Gun	
3. Cooler media:	Ice (Bag)	
4. No. Coolers:	1	

Quality Control Preservatio	Y	N	N/A
1. Trip Blank present / cooler:	☐	☑	☐
2. Trip Blank listed on COC:	☐	☑	☐
3. Samples preserved properly:	☑	☐	
4. VOCs headspace free:	☐	☐	☑

Sample Integrity - Documentation	Y	N
1. Sample labels present on bottles:	☑	☐
2. Container labeling complete:	☑	☐
3. Sample container label / COC agree:	☑	☐

Sample Integrity - Condition	Y	N
1. Sample recvd within HT:	☑	☐
2. All containers accounted for:	☑	☐
3. Condition of sample:	Intact	

Sample Integrity - Instructions	Y	N	N/A
1. Analysis requested is clear:	☑	☐	
2. Bottles received for unspecified tests	☐	☑	
3. Sufficient volume recvd for analysis:	☑	☐	
4. Compositing instructions clear:	☐	☐	☑
5. Filtering instructions clear:	☐	☐	☑

Comments

Accutest Laboratories
V:732.329.0200

2235 US Highway 130
F: 732.329.3499

Dayton, New Jersey
www/accutest.com

FA9439: Chain of Custody
Page 2 of 2

Southeast ACCUTEST LABORATORIES

Metals Analysis

QC Data Summaries

(Accutest New Jersey)

Includes the following where applicable:

- Method Blank Summaries
- Matrix Spike and Duplicate Summaries
- Blank Spike and Lab Control Sample Summaries
- Serial Dilution Summaries

BLANK RESULTS SUMMARY
Part 2 - Method Blanks

Login Number: FA9439
Account: ALSE - Accutest Laboratories Southeast, Inc.
Project: TERCFLWP: I-Drive Re-Pump Facility; Orlando, FL

QC Batch ID: MP75792
Matrix Type: AQUEOUS

Methods: EPA 1631
Units: ng/l

Prep Date: 10/30/13

Metal	RL	IDL	MDL	MB raw	final
Mercury	0.50	.086	.28	0.11	<0.50

Associated samples MP75792: FA9439-1, FA9439-2

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(anr) Analyte not requested

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: FA9439
Account: ALSE - Accutest Laboratories Southeast, Inc.
Project: TERCFLWP: I-Drive Re-Pump Facility; Orlando, FL

QC Batch ID: MP75792
Matrix Type: AQUEOUS

Methods: EPA 1631
Units: ng/l

Prep Date: 11/01/13

Metal	FA9439-2 Original	MS	Spikelot HGLL1	% Rec	QC Limits
Mercury	2.3	6.6	5	86.0	71-125

Associated samples MP75792: FA9439-1, FA9439-2

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(N) Matrix Spike Rec. outside of QC limits
(anr) Analyte not requested

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: FA9439
Account: ALSE - Accutest Laboratories Southeast, Inc.
Project: TERCFLWP: I-Drive Re-Pump Facility; Orlando, FL

QC Batch ID: MP75792 Methods: EPA 1631
Matrix Type: AQUEOUS Units: ng/l

Prep Date: 11/01/13

Metal	FA9439-2 Original	MSD	Spikelot HGLL1	% Rec	MSD RPD	QC Limit
Mercury	2.3	6.8	5	90.0	3.0	24

Associated samples MP75792: FA9439-1, FA9439-2

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(N) Matrix Spike Rec. outside of QC limits
(anr) Analyte not requested

SPIKE BLANK AND LAB CONTROL SAMPLE SUMMARY

Login Number: FA9439
Account: ALSE - Accutest Laboratories Southeast, Inc.
Project: TERCFLWP: I-Drive Re-Pump Facility; Orlando, FL

QC Batch ID: MP75792
Matrix Type: AQUEOUS

Methods: EPA 1631
Units: ng/l

Prep Date: 11/01/13

Metal	LCS Result	Spikelot HGLL1	% Rec	QC Limits
Mercury	4.6	5	92.0	77-123

Associated samples MP75792: FA9439-1, FA9439-2

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(anr) Analyte not requested

APPENDIX 3

LIST OF APPROVED PRODUCTS

APPENDIX D OF THE MANUAL OF STANDARDS AND SPECIFICATIONS FOR WATER, WASTEWATER AND RECLAIMED MAIN CONSTRUCTION

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APPENDIX D **LIST OF APPROVED PRODUCTS - TRANSMISSION SYSTEMS** **FEBRUARY 11, 2011**

Cat.	Desc	Manufacturer	Water Model #	Water Comments	Reclaimed Water Model #	Reclaimed Water Comments	Wastewater Model #	Wastewater Comments
Air Release	ARV Enclosure	**All ARV above ground enclosures shall be vented with tamper proof locking device**						
		Water Plus Polyethylene Enclosure	131632 H30-B	Blue 44" Tall	131632 H30-P	Pantone 44"	131632 H30-G	Green 44" Tall
			171730 H40-B	Blue 30" Tall	171730 H40-P	Pantone 30"	171730 H40-G	Green 30" Tall
		Hot Box Vent Guard Fiberglass Enclosure	AVG2036 Encl GP3232 Base	Blue 36" Tall	AVG2036 Encl GP3232 Base	Pantone 36" Tall	AVG2036 Encl GP3232 Base	Green 36" Tall
			AVG2041 Encl GP3232 Base	Blue 41" Tall	AVG2041 Encl GP3232 Base	Pantone 41" Tall	AVG2041 Encl GP3232 Base	Green 41" Tall
		Safety-Guard/Hydro Guard	15100 Encl	Blue 34" Tall	15100 Encl	Pantone 34" Tall	15100 Encl	Green 34" Tall
	Air Release Valves	**Air Release Valves shall be Combination Type, 316 SS**						
		ARI	D-040SS	Combination	D-040SS	Combination	D-020 (SS)	Combination
		H-TEC	NA	NA	NA	NA	986 (316SS)	Combination
		Vent-O-Mat	Series RBX DN50	2"	Series RBX DN50	2"	RGX series	
	ARV Vault	**Air Release Valve Frame and Cover**						
		US Foundry	NA	NA	NA	NA	USF 7665-HH-HJ	
Blow Off	Auto Blow Off	**Automatic Blow Off Valve**						
		Hydro Guard	HG-1 Standard Unit	Automatic	NA	NA	NA	NA
	Blow Off Valve	**Blow Off Valve - Fits standard 5-1/4 inch Valve Box**						
		Kupferle Foundry Co	Truflo Series TF #550		Truflo Series TF #550		NA	NA
		Water Plus Corp	The Hydrant Plus Series VB 2000B		The Hydrant Plus Series VB 2000B		NA	NA
Casing Seals / Spacers	Casing End Seals	**Casing End Seals. Annular space between pipe and steel casing shall be brick and mortar with end seals to secure ends.**						
		Advance Products	Model AC and AW		Model AC and AW		Model AC and AW	
		BWM Company	Model WR and PO		Model WR and PO		Model WR and PO	
		Cascade Water Works	Model CCES		Model CCES		Model CCES	
		CCI Pipeline	Model ESW and ESC		Model ESW and ESC		Model ESW and ESC	
		Pipeline Seal & Insulator, Inc (PSI)	Model C and W		Model C and W		Model C and W	
		Power Seal	Model 4810ES		Model 4810ES		Model 4810ES	

APPENDIX D **LIST OF APPROVED PRODUCTS - TRANSMISSION SYSTEMS** **FEBRUARY 11, 2011**

Cat.	Desc	Manufacturer	Water Model #	Water Comments	Reclaimed Water Model #	Reclaimed Water Comments	Wastewater Model #	Wastewater Comments
Casing Seals / Spacers	Casing spacer	**Casing spacers shall be a min. 8-inches wide for pipe 12" Dia or less or min. 12-inches wide for pipe 16 or greater , shall have a minimum 14 gauge 304 stainless steel shell/band, minimum 10 gauge 304 reinforced risers; minimum thickness of 0.090 EPDM or PVC interior liners, glass reinforces polymer or ultra high molecular weight polyethylene and 304 stainless bolts, nuts and washers.**						
		Advance Products	SSI8 / SSI12		SSI8 / SSI12		SSI8 / SSI12	
		BWM Company	BWM-SS-8 / SS-12		BWM-SS-8 / SS-12		BWM-SS-8 / SS-12	
		Cascade Water Works	Series CCS 8" / 12"		Series CCS 8" / 12"		Series CCS 8" / 12"	
		CCI Pipeline	Model CCS8 / CSS12		Model CCS8 / CSS12		Model CCS8 / CSS12	
		Pipeline Seal & Insulator, Inc (PSI)	Series S8G-2 / S12G-2		Series S8G-2 / S12G-2		Series S8G-2 / S12G-2	
Coatings	Exterior Coatings for Exposed Metal Assets	**Coatings: Aerial pipe, hydrants, above ground piping, fittings, valves and Appurtenances - System 1 Zinc / Urethane / Fluoropolymer application and color code per Section 3119 Coatings & Linings. Coating shall not be in contact with Potable water unless NSF 61 approved.**						
		Carboline	Carbozinc 621	3.0 - 8.0 mils	Carbozinc 621	3.0 - 8.0 mils	Carbozinc 621	3.0 - 8.0 mils
			Carbothane 133 HB	3.0 -5.0 mils	Carbothane 133 HB	3.0 -5.0 mils	Carbothane 133 HB	3.0 -5.0 mils
			Carboxane 950	2.0 - 3.0 mils	Carboxane 950	2.0 - 3.0 mils	Carboxane 950	2.0 - 3.0 mils
		Tnemec	Zinc Series 90-97	2.5 - 3.5 mils	Zinc Series 90-97	2.5 - 3.5 mils	Zinc Series 90-97	2.5 - 3.5 mils
			Typoxy Series 27WB	4.0 -14.0 mils	Typoxy Series 27WB	4.0 -14.0 mils	Typoxy Series 27WB	4.0 -14.0 mils
			EnduraShield Series73	2.0 - 3.0 mils	EnduraShield Series73	2.0 - 3.0 mils	EnduraShield Series73	2.0 - 3.0 mils
			Hydroflon Series 700	2.0 - 3.0 mils	Hydroflon Series 700	2.0 - 3.0 mils	Hydroflon Series 700	2.0 - 3.0 mils
	Exterior Coatings for Exposed Metal Assets	**Coatings: Aerial pipe, hydrants, above ground piping, fittings, valves and Appurtenances - System 2 Zinc / Epoxy / Urethane application and color code per Section 3119 Coatings & Linings. Coating shall not be in contact with Potable water unless NSF 61 approved.**						
		Carboline	Carbozinc 621	3.0 - 8.0 mils	Carbozinc 621	3.0 - 8.0 mils	Carbozinc 621	3.0 - 8.0 mils
			Carboguard 60	4.0 -6.0 mils	Carboguard 60	4.0 -6.0 mils	Carboguard 60	4.0 -6.0 mils
			Carboxane 950	2.0 - 3.0 mils	Carboxane 950	2.0 - 3.0 mils	Carboxane 950	2.0 - 3.0 mils
		Tnemec	Zinc Series 90-97	2.5 - 3.5 mils	Zinc Series 90-97	2.5 - 3.5 mils	Zinc Series 90-97	2.5 - 3.5 mils
			Typoxy Series 27WB	4.0 -14.0 mils	Typoxy Series 27WB	4.0 -14.0 mils	Typoxy Series 27WB	4.0 -14.0 mils
			Hi-Build Epoxoline II Series N69	4.0 - 10.0 mils	Hi-Build Epoxoline II Series N69	4.0 - 10.0 mils	Hi-Build Epoxoline II Series N69	4.0 - 10.0 mils
			EnduraShield Series73	2.0 - 3.0 mils	EnduraShield Series73	2.0 - 3.0 mils	EnduraShield Series73	2.0 - 3.0 mils
		PPG / Ameron	Amercoat 68HS	Min 3.0 mils	Amercoat 68HS	Min 3.0 mils	Amercoat 68HS	Min 3.0 mils
			Amercoat 385	4.0 - 6.0 mils	Amercoat 385	4.0 - 6.0 mils	Amercoat 385	4.0 - 6.0 mils
			Amercoat 450H	2.0 - 3.0 mils	Amercoat 450H	2.0 - 3.0 mils	Amercoat 450H	2.0 - 3.0 mils

Cat.	Desc	Manufacturer	Water Model #	Water Comments	Reclaimed Water Model #	Reclaimed Water Comments	Wastewater Model #	Wastewater Comments
Fittings	Fittings	**Ductile Iron Fittings C153 SSB / C110 FLG: (Water & Reclaimed Water fittings shall cement lined or holiday free fusion bonded epoxy lined) (Wastewater fittings interior shall be Protecto 401 and holiday free)**						
		American	30" & up	FBE / Cement	30" & up	FBE / Cement	30" & up	Protecto 401
		Sigma		FBE / Cement		FBE / Cement		Protecto 401
		Star		FBE / Cement		FBE / Cement		Protecto 401
		Tyler Union & Clow		FBE / Cement		FBE / Cement		Protecto 401
Flow	Flow Meter	**Flow Meters With Replaceable Sensors**						
		EMCO	NA	NA	NA	NA	Unimag 4411E	
Hydrants	Hydrants	**Hydrants Shall open left, 1-1/2 Pentagon operating nut, NST hose & pumper thread, rotate 360 degrees, closed drains, epoxy on shoe in & out and 304 SS nuts & bolts below ground.**						
		American Flow Control	B-84-B (6 inch)		NA	NA	NA	NA
		Clow	Medallion 2545		NA	NA	NA	NA
		Mueller	Super Centurion 250		NA	NA	NA	NA
Joint Restraints	Ductile iron pipe MJ Restraints	**Mechanical Joint Wedge-action Restraining Gland, Epoxy Coated Restrain ductile iron pipe to mechanical joint fittings, pipe and appurtenances.**						
		EBAA Iron Inc	Megalug Series 1100		Megalug Series 1100		Megalug Series 1100	
		Ford / Uni-Flange	UFR-1400		UFR-1400		UFR-1400	
		Sigma	OneLok Series SLD/SLDE		OneLok Series SLD/SLDE		OneLok Series SLD/SLDE	
		Smith Blair	Cam Lok Series 111		Cam Lok Series 111		Cam Lok Series 111	
		Star	Star Grip Series 3000		Star Grip Series 3000		Star Grip Series 3000	
		Tyler Union	TufGrip Series TLD		TufGrip Series TLD		TufGrip Series TLD	
	DIP Bell Joint Restraints (4"-12") (New & Existing)	**Bell Joint Restraints for Ductile Iron Pipe (4"-12") (New & Existing) - All restraints split serrated on bell and spigot ends. Pipe 16" and greater shall have restraint gaskets or locking bells. (Wastewater only for restraint of existing DIP FM)**						
		EBAA Iron Inc	Tru-Dual Series 1500TD		Tru-Dual Series 1500TD		Tru-Dual Series 1500TD	
		Ford / Uni-Flange	Uni-Flange Series 1390C		Uni-Flange Series 1390C		Uni-Flange Series 1390C	
		Sigma	PV-Lok Series PWP-C		PV-Lok Series PWP-C		PV-Lok Series PWP-C	
		Smith Blair	Bell-Lock Series 165		Bell-Lock Series 165		Bell-Lock Series 165	
		Star	StarGrip Series 3100S		StarGrip Series 3100S		StarGrip Series 3100S	
		Tyler Union	TufGrip-Series 300C		TufGrip-Series 300C		TufGrip-Series 300C	
	DIP Bell Joint Restraints (16" & Greater)	**Ductile Iron Pipe Bell Joint Restraints for Ductile Iron Pipe (16" & Greater) - All restraints shall have a split back-up ring for the bell and a serrated or wedge action gland for the spigot end. New installation for water & reclaimed water piping 16" and greater shall have restraint gaskets or locking bells.**						
		EBAA Iron Inc	Series 1100HD	Existing Only	Series 1100HD	Existing Only	Series 1100HD	Existing Only
		Sigma	Series SSLDH	Existing Only	Series SSLDH	Existing Only	Series SSLDH	Existing Only
		Star	Series 3100S	Existing Only	Series 3100S	Existing Only	Series 3100S	Existing Only

Cat.	Desc	Manufacturer	Water Model #	Water Comments	Reclaimed Water Model #	Reclaimed Water Comments	Wastewater Model #	Wastewater Comments
Joint Restraints	Ductile iron pipe Bell Joint Restraint Gaskets and Locking Bell (4" & Above)	**Bell Joint Restraint Gaskets and Locking Bell (4" & Above) Stainless Steel locking wedges built into the gasket-rubber. ANSI/AWWA C111/A21.11 Standard for Rubber-Gasket Joints for Ductile Iron Pressure Pipe. Ductile Iron Bell Joint Restraint for Push-On Pipe- Locking bell joint system that prevents joint separation and allows for joint deflection. Bells shall be painted red to verify restrained gasket.**						
		American	Fast Grip Gasket	Gasket	Fast Grip Gasket	Gasket	NA	NA
			Flex-Ring Joint	Bell Lock	Flex-Ring Joint	Bell Lock	NA	NA
			Lok-Ring Joint	Bell Lock	Lok-Ring Joint	Bell Lock	NA	NA
		Griffin	Talon RJ Gasket	Gasket	Talon RJ Gasket	Gasket	NA	NA
			Snap-Lok	Bell Lock	Snap-Lok	Bell Lock	NA	NA
		McWane Inc. DI Pipe Group	Sure Stop 350 Gasket	Gasket	Sure Stop 350 Gasket	Gasket	NA	NA
			Thrust-Lock	Bell Lock	Thrust-Lock	Bell Lock	NA	NA
			TR-Flex	Bell Lock	TR-Flex	Bell Lock	NA	NA
			Super-Lock	Bell Lock	Super-Lock	Bell Lock	NA	NA
		US Pipe	Field Lok 350 Gasket	Gasket	Field Lok 350 Gasket	Gasket	NA	NA
			Field Lok Gasket	Gasket	Field Lok Gasket	Gasket	NA	NA
			TR-Flex	Bell Lock	TR-Flex	Bell Lock	NA	NA
			HP Lok Restraint Joint	Bell Lock	HP Lok Restraint Joint	Bell Lock	NA	NA
	SS to DIP Transition Restraint	**SS to DIP Transition Restraint -Flanged stainless steel pipe from Wetwell to Valve box restrained joint transition (epoxy coated, SS hardware) Flg x PE RJ.**						
		EBAA Iron Inc	NA	NA	NA	NA	Megaflange 2100	
		Sigma	NA	NA	NA	NA	SigmaFlange with One Lock SLDE	
		Smith Blair	NA	NA	NA	NA	911 Flange - Lock Restrained FCA	
	PVC Pipe MJ Restraints	**Mechanical Joint Wedge-action Restraining Gland, Epoxy Coated Restrain PVC pipe to mechanical joint fittings, and appurtenances.**						
		EBAA Iron Inc	Mega-lug Series 2000PV		Mega-lug Series 2000PV		Mega-lug Series 2000PV	
			NA	NA	NA	NA	Megalug Series 2200	(42"-48")
		Ford / Uni-Flange	UFR 1500 Series		UFR 1500 Series		UFR 1500 Series	
		Sigma	One Lok Series SLC/SLCE		One Lok Series SLC/SLCE		One Lok Series SLC/SLCE	
		Smith Blair	Cam Lok Series 120		Cam Lok Series 120		Cam Lok Series 120	
		Star	Star Grip Series 4000		Star Grip Series 4000		Star Grip Series 4000	
		Tyler Union	TufGrip Series TLP		TufGrip Series TLP		TufGrip Series TLP	
	PVC Bell Joint Restraints (4" - 12") (New & Existing)	**PVC Bell Joint Restraints: PVC pipe Split Serrated on Bell End and Spigot End. (4" - 12") (New & Existing)**						
		EBAA Iron Inc	Tru-Dual Series 1500TD		Tru-Dual Series 1500TD		Tru-Dual Series 1500TD	
		Ford / Uni-Flange	Uni-Flange Series 1390		Uni-Flange Series 1390		Uni-Flange Series 1390	
		Sigma	PV-Lok Series PWP		PV-Lok Series PWP		PV-Lok Series PWP	
		Smith Blair	Bell-Lock Series 165		Bell-Lock Series 165		Bell-Lock Series 165	
		Star	Series 1100C		Series 1100C		Series 1100C	
		Tyler Union	TufGrip 300C		TufGrip 300C		TufGrip 300C	

Cat.	Desc	Manufacturer	Water Model #	Water Comments	Reclaimed Water Model #	Reclaimed Water Comments	Wastewater Model #	Wastewater Comments
Joint Restraints	PVC Bell Joint Restraints (16" & Greater)	**PVC Bell Joint Restraints: (16" & Greater) PVC pipe Split Serrated on Bell End and Spigot End. Water & Reclaimed Water Existing pipe only. Wastewater shall be new and existing pipe.**						
		Ford / Uni-Flange	Series 1390	Existing Only	Series 1390	Existing Only	Series 1390	
		JCM	Sur-Grip Series 621	Existing Only	Sur-Grip Series 621	Existing Only	Sur-Grip Series 621	
		Sigma	PV-Lok PWP	Existing Only	PV-Lok PWP	Existing Only	PV-Lok PWP	
		Smith Blair	Bell-Lock Series 165	Existing Only	Bell-Lock Series 165	Existing Only	Bell-Lock Series 165	
		Star	Series 1100C	Existing Only	Series 1100C	Existing Only	Series 1100C	
Pipe	PVC C900 DR 18 Bell & Spigot (4" - 12")	**C900 Bell & Spigot PVC Pipe: 4 to 12-inch - AWWA C-900, Minimum DR18 for Water, Reclaimed and Wastewater. DR14 for Fire Lines. Manufacturers shall be members in good standing with Uni-Bell to maintain approval status.**						
		Certainteed 4" to 12"	Certa-Lok C900/RJ	Blue	Certa-Lok C900/RJ	Pantone Purple	Certa-Lok C900/RJ	Green
		Diamond Plastics Corp	C-900	Blue	C-900	Pantone Purple	Diamond C900	Green
		Ipex Inc	C-900 Blue Brute	Blue	C-900	Pantone Purple	C900 Blue Brute	Green
		JM Eagle	C-900	Blue	C-900	Pantone Purple	C-900	Green
		National Pipe & Plastics Inc	C-900 Dura- Blue	Blue	C-900	Pantone Purple	C-900 Pipe	Green
		North American Pipe Corp (NAPCO)	C-900	Blue	C-900	Pantone Purple	C-900	Green
		Sanderson Pipe Corp	C-900	Blue	C-900	Pantone Purple	C-900	Green
	PVC C905 DR 18 Bell & Spigot 16" and Larger	**C905 Bell & Spigot PVC Pipe 16" and Larger: AWWA C-905, Minimum DR18 for all Force Mains up to 24". Minimum DR21/DR25 for 30" and greater. Manufacturers shall be members in good standing with Uni-Bell to maintain approval status.**						
		Certainteed 16"	NA	NA	NA	NA	Certa-Lok C905/RJ	NA
		Diamond Plastics Corp	NA	NA	NA	NA	Trans-21 DR18	Green
		Ipex Inc	NA	NA	NA	NA	IPEX Centurion	Green
		JM Eagle	NA	NA	NA	NA	C905 Big Blue	Green
		National Pipe & Plastics Inc	NA	NA	NA	NA	C905	Green
		North American Pipe Corp (NAPCO)	NA	NA	NA	NA	C905 Big Blue	Green
	HDPE C906 DR11	**HDPE Pipe DR11 AWWA C906 shall be Ductile Iron Pipe Size, PE 3408/3608/4710 DIPS manufactured in accordance with ASTM F-714 and listed with NSF. Pipe shall be marked in accordance with either AWWA C901,AWWA C906. Compression type connections are not acceptable in new installations. Pipe joints shall be butt fusion or electro-fusion with flange or adapter. All HDPE shall be color coded to the Utility. Color identifications are in accordance with the APWA/ULCC Uniform Color Code. Manufacturers shall be members in good standing with PPI to maintain approval status.**						
		JM Eagle	HDPE	DR11 Blue	HDPE	DR11 Pantone	HDPE	DR11Green
		Performance Pipe(Chevron)	Driscoplex 4000	DR11 Blue	Driscoplex 4000	DR11 Pantone	Driscoplex 4300	DR11 Green
		PolyPipe, Inc.	EHMW Poly Pipe	DR11 Blue	EHMW	DR11 Pantone	EHMW	DR11Green

APPENDIX D **LIST OF APPROVED PRODUCTS - TRANSMISSION SYSTEMS** **FEBRUARY 11, 2011**

Cat.	Desc	Manufacturer	Water Model #	Water Comments	Reclaimed Water Model #	Reclaimed Water Comments	Wastewater Model #	Wastewater Comments
Pipe	Ductile Iron Pipe	**Ductile iron/Cast iron: (4" to 12" = Class 350, 16" to 24" - Class 250, 30" to 64" = Class 200). Water and Reclaimed water shall be cement lined. Wastewater Piping shall be Protecto 401 and Holiday Free. Exterior coatings as specified. Wastewater DIP piping shall be for pump station piping only. Manufacturers shall be members in good standing with DIPRA to maintain approval status.**						
		American	Cement Lined	Blue	Cement Lined	Pantone Purple	Protecto 401	Pump Station
		Griffin	Cement Lined	Blue	Cement Lined	Pantone Purple	Protecto 401	Pump Station
		McWane Inc. DI Pipe Group	Cement Lined	Blue	Cement Lined	Pantone Purple	Protecto 401	Pump Station
		US Pipe	Cement Lined	Blue	Cement Lined	Pantone Purple	Protecto 401	Pump Station
Sample	Sample Station	**Sample Stations - Bacteriological Sample Station with built in flush system, all internal piping to be 2", brass and includes lockable green enclosures.**						
		Safety-Guard	SG-BSS-05 pedestal #77	green enclosure	NA	NA	NA	NA
		Water Plus Corp	Model 5000	green	NA	NA	NA	NA
Services	Brass Service Saddles	**Brass Service Saddles for 1" & 2" water & reclaimed water services on 4" through 12" Mains - Service saddles can be hinge or bolt controlled OD saddles to be used on C-900 and existing IPS OD PVC pipe.**						
		Ford	Series S-70, S-90	4"-12"	Series S-70, S-90	4"-12"	NA	NA
		AY McDonald	Model 3891 / 3895,3801 / 3805	4"-12"	Model 3891 / 3895,3801 / 3805	4"-12"	NA	NA
		Mueller	Series S-13000/H-13000	4"-12"	Series S-13000/H-13000	4"-12"	NA	NA
	Service Saddles	**Service Saddles for 1" (CC) & 2" (Iron pipe threads) Water & Reclaimed Water services on mains greater than 12". Service saddles for 2" taps (iron pipe threads) on 4" mains and greater for Waste Water. : Epoxy or nylon coated stainless steel 18-8-type 304 double straps, controlled O.D. saddles to be used on C-900 / C905 or DI for all 1-in and -2in taps on pipes over 12in.**						
		Ford	Series FC202	16" & greater	Series FC202	16" & greater	Series FC202	4" & greater
		JCM	Series 406	16" & greater	Series 406	16" & greater	Series 406	4" & greater
		Mueller	DR2S	16" & greater	DR2S	16" & greater	DR2S	4" & greater
		Romac	Series 202NS	16" & greater	Series 202NS	16" & greater	Series 202NS	4" & greater
		Smith Blair	Series 317	16" & greater	Series 317	16" & greater	Series 317	4" & greater
	Service Saddles for HDPE	**Service Saddles for 1" (CC) & 2" (Iron Pipe threads) Water and Reclaimed Water Services: Epoxy or nylon coated stainless steel 18-8-type 304 double straps, controlled O.D. saddles to be used on HDPE for all 1-in and -2in taps. Taps to HDPE pipe shall be approved on a case by case basis.**						
		Ford	Series FCP202		Series FCP202		Series FCP202	
		Romac	Series 202N-H		Series 202N-H		Series 202N-H	
		Smith Blair	Series 317-1 for HDPE		Series 317-1 for HDPE		Series 317-1 for HDPE	
	Corporation Stops Ball Type	**Corporation Stops Ball Type (1-inch with AWWA taper C threads only/pack joint outlet for CTS) 2" Corporation Stop Ball Type shall be 2" MIP X FIP threads.**						
		Ford	FB1000, FB1700-7		FB1000, FB1700-7		FB1700-7	2" ARV
		AY McDonald	4701B-22, 3149B2		4701B-22, 3149B2		3149B2	2" ARV
		Mueller	P25008, B-20046		P25008, B-20046		B-20046	2" ARV

APPENDIX D **LIST OF APPROVED PRODUCTS - TRANSMISSION SYSTEMS** **FEBRUARY 11, 2011**

Cat.	Desc	Manufacturer	Water Model #	Water Comments	Reclaimed Water Model #	Reclaimed Water Comments	Wastewater Model #	Wastewater Comments
Services	Curb Stops	**Curb Stops - Straight Valves: Ball type compression 2" cts O.D. tubing by 2" FIP**						
		Ford	B41-777W		B41-777W		NA	NA
		AY McDonald	6102W-22		6102W-22		NA	NA
		Mueller	P25172		P25172		NA	NA
	Curb Stops	**Curb Stops - Straight Valves: ball type compression x compression**						
		Ford	B44-444W		B44-444W		NA	NA
		AY McDonald	6100W-22		6100W-22		NA	NA
		Mueller	P25146		P25146		NA	NA
	PE tubing	**Polyethylene tubing: AWWA C901. UV protection (SDR-9) 1-inch and 2-inch only. PE 3408 / PE 4710**						
		Charter Plastics	Blue Ice		Lav Ice		NA	NA
		Endot	Endopure Blue		Endocore Lavender		NA	NA
		JM Eagle	Pure-Core		NA	NA	NA	NA
Tapping Sleeves and Valves	Line Stops	**Line Stops**						
		JCM						
		Romac						
		Smith Blair						
	Tapping Sleeves	**Tapping Sleeves: (Mechanical joint for taps on cast iron, ductile iron, PVC & AC pipe, including size on size) with stainless steel nuts and bolts.**						
		American Flow Control	Series 2800		Series 2800		Series 2800	
			Series 1004		Series 1004		Series 1004	
		Clow	Series F-5205	DIP/PVC	Series F-5205	DIP/PVC	Series F-5205	DIP/PVC
			Series F-5207	A/C Pipe	Series F-5207	A/C Pipe	Series F-5207	A/C Pipe
		JCM	Series 414	FBE	Series 414	FBE	Series 414	FBE
		Mueller	Series H-615	DIP/PVC	Series H-615	DIP/PVC	Series H-615	DIP/PVC
			Series H-619	A/C Pipe	Series H-619	A/C Pipe	Series H-619	A/C Pipe
		Smith Blair	Style 623	FBE	Style 623	FBE	Style 623	FBE
	Tapping Valves: 12" and smaller	**Tapping Valves: 12" and smaller - Tapping Valves shall be furnished with an alignment lip and installed in the vertical position for Water and Reclaim Water. Wastewater shall be installed horizontally and abandoned in the open position. Tapping valves shall be resilient seated only and meet the requirements of AWWA C509 or C515**						
		American Flow Control	Series 2500	Alignment Lip	Series 2500	Alignment Lip	Series 2500	Alignment Lip
		Clow	Series F-6114	Alignment Lip	Series F-6114	Alignment Lip	Series F-6114	Alignment Lip
		Mueller	Series T2360 (4"-12")	Alignment Lip	Series T2360 (4"-12")	Alignment Lip	Series T2360 (4"-12")	Alignment Lip

Cat.	Desc	Manufacturer	Water Model #	Water Comments	Reclaimed Water Model #	Reclaimed Water Comments	Wastewater Model #	Wastewater Comments
Tapping Sleeves and Valves	Tapping Valves: 16" and Larger	**Tapping Valves: 16" and Larger - Tapping valves shall be furnished with an alignment lip and be installed in the vertical position for Water and Reclaimed Water. No tapping valve shall be installed horizontally for Water and Reclaim Water unless approved by the engineer. Tapping Valves 16" and larger AWWA C515 resilient seated only (16" and 24" no gearing required) above 24" shall be installed vertically with a spur gear actuator unless noted by the engineer. All tapping valves above 24" shall be furnished with NPT pipe plugs for flushing the tracks when valves are installed horizontally. Tapping valves for Wastewater shall be installed horizontally and abandoned in open position.**						
		American Flow Control	Series 2500	Alignment Lip & flushing port	Series 2500	Alignment Lip & flushing port	Series 2500	Alignment Lip & flushing port
		Clow	Series F-6114	Alignment Lip & flushing port	Series F-6114	Alignment Lip & flushing port	Series F-6114	Alignment Lip & flushing port
		Mueller	Series T2361 (14"&up)	Alignment Lip & flushing port	Series T2361 (14"&up)	Alignment Lip & flushing port	Series T2361 (14"&up)	Alignment Lip & flushing port
Valves	Butterfly Valve 42" and Above	**Butterfly Valves 42"and above. AWWA C504. Actuators input torques based on 150 psi valve pressure and 16 fps velocity with a maximum input of 80 ft-lb on 2" nuts and shall withstand 250 ft-lbs. Valve seats shall be leak-tight in both directions at 150 psi.**						
		Clow	Style #1450		Style #1450		NA	NA
		Dezurik	BAW		BAW		NA	NA
		Mueller / Pratt	LINSEAL III / Groundhog		LINSEAL III / Groundhog		NA	NA
	Check Valves	**Valves (Check) 4-inch and Larger (8 mil epoxy lined)**						
		American Flow Control	NA		NA		Series 600 or 50 line	
		Clow / M&H / Kennedy	NA		NA		106	
		Mueller	NA		NA		Series 2600	
	Gate Valves 4" - 12"	**Gate Valves 12" and smaller - resilient seated only AWWA C509 or C515. Valve seat shall be leak-tight in both directions at 150 psi.**						
		American Flow Control	Series 2500		Series 2500		NA	NA
		Clow	Series F-6100		Series F-6100		NA	NA
		Mueller	Series A-2360		Series A-2360		NA	NA
	Gate Valves (Vertical) 16" and Up	**Gate Valves 16" and larger (Vertical Installation) AWWA C515 resilient seated only (16" and 24" no gearing required) above 24" shall be installed vertically with a gear actuator unless noted by the engineer. Valve seat shall be leak-tight in both directions at 150 psi.**						
		American Flow Control	Series 2500		Series 2500		NA	NA
		Clow	Series F-6100		Series F-6100			
		Mueller	Series A-2361		Series A-2361		NA	NA

Cat.	Desc	Manufacturer	Water Model #	Water Comments	Reclaimed Water Model #	Reclaimed Water Comments	Wastewater Model #	Wastewater Comments
Valves	Plug Valves	**Plug Valves - Bi-directional, MJ & Flanged (min. 8mil fusion bonded epoxy with stainless steel bolts), gear operator to be sized for rated pressure of the valve. Valves 4"-20" shall be 80% Full Port and valves 24" and greater shall be minimum of 70% full port. Valve shall be factory tested to minimium 100 PSI in both directions.**						
		Clow	NA	NA	NA	NA	F-5412 FLG	4" & up
			NA	NA	NA	NA	F-5413 MJ	4" & up
		Dezurik	NA	NA	NA	NA	Series PEF or PEC	4"& up
		Millikan / Pratt	NA	NA	NA	NA	Eccentric / Ballcentric	4"& up
		Val-Matic	NA	NA	NA	NA	5600 or 5800 (FLG)	4" & up
			NA	NA	NA	NA	5700 or 5900 (MJ)	4" & up
Valve Boxes	Valve Boxes with Locking Lids (Cast Iron)	**Two piece standard screw type Heavy Duty Valve Boxes with Locking Lids (Cast Iron) and type of service cast in heavy duty traffic lid (H20 loading) ASTM A48**						
		Bingham/Taylor	Series 4905	Box	NA	NA	Series 4905	Box
			4905-X	Extension	NA	NA	4905-X	Extension
			4904-L	Blue Water Locking Lid	NA	NA	4904-L	Green Sewer locking Lid
		Sigma	Series VB 261X-267X	Box	VB-25031LK-VB-2612	Box	Series VB 261X-267X	Box
			VB 6302	Extension	VB-6302	Extension	VB 6302	Extension
			VB 4650W	Blue Water Locking Lid	VB2503LK	Purple Square Locking Lid	VB 4650S	Green Sewer locking Lid
		Star	Series VB-0002	Box	NA	NA	Series VB-0002	Box
			VBEX 12-24S	Extension	NA	NA	VBEX 12-24S	Extension
			VBLIDLOCK	Blue Water Locking Lid	NA	NA	VBLIDLOCK	Green Sewer locking Lid
		Tyler Union	Series 6850	Box	NA	NA	Series 6850	Box
			58, 59, 60	Extension	NA	NA	58, 59, 60	Extension
			Locking Lid	Blue Water Locking Lid	NA	NA	Locking Lid	Green Sewer locking Lid
	Valve Box	**For mains equal to, or greater than, 16" diameter or equal to greater than 6' feet deep**						
		American Flow Control	# 2A - 9A Retrofit Valve Box Insert	Fit inside std valve boxes	NA		2A - 9A Retrofit Valve Box Insert	Green Sewer locking Lid
		Mueller Company	MVB050C thru MVB130C with Extension Stem MVB875 Guide Plate	Blue Water Locking Lid	MVB050CR thru MVB130CR with Extension Stem MVB875 Guide Plate	Purple Square Locking Reclaim Lid	MVB050C thru MVB130C with Extension Stem MVB875 Guide Plate	Green Sewer locking Lid

Cat.	Desc	Manufacturer	Water Model #	Water Comments	Reclaimed Water Model #	Reclaimed Water Comments	Wastewater Model #	Wastewater Comments
Coatings	Anti-Graffiti Paint	**Block Walls-Anti-Graffiti Paint per Section 3119 Coatings & Linings**						
		American Building Restoration Products	NA	NA	NA	NA	Polyshield Graffiti Preventer for Unpainted Masonry Type B	Super Bio Strip or Strip it all
		Tnemec / Chemprobe	NA	NA	NA	NA	626 DUR A PEL	680 Mark A Way
		Professional Products of Kansas, Inc	NA	NA	NA	NA	Professional Water Seal & Anti-Graffitiant (PWS-15 Super Strength)	Professional Phase II Cleaner
	Coatings for Existing Manholes	**Rehabilitation corrosion protection system per Section 3119 Coatings & Linings. Interior coating for force main connections to existing concrete manholes only. New precast structures and existing pump stations shall be lined.**						
		CCI Spectrum, Inc	NA	NA	NA	NA	Spectrashield	min of 500 mils
		Kerneos Aluminate Technologies	NA	NA	NA	NA	Sewpercoat	1" (1000mil)
		Raven Lining System	NA	NA	NA	NA	Raven 155 Primer Raven 405	min 8 mils min 125 mils
		Sauereisen	NA	NA	NA	NA	210 Series Topcoat Glaze 210G	min 125 mils min 20 mils
		Tnemec	NA	NA	NA	NA	Series 434 Topcoat Glaze 435	min 125 mils 15-20 mils
PVC Pipe and fittings	Pipe SDR 35 Gravity Mains	**PVC Pipe for Gravity SDR26/SDR 35 (Green in color) ASTM-D034. Manufacturers shall be members in good standing with Uni-Bell to maintain approval status.**						
		Certainteed	NA	NA	NA	NA	Gravity Sewer Pipe	
		Diamond Plastics Corp	NA	NA	NA	NA	Sani-21 SDR-35	
		JM Eagle	NA	NA	NA	NA	Gravity Sewer	
		National Pipe & Plastics, Inc.	NA	NA	NA	NA	Ever-Green Sewer Pipe	
		North American Pipe Corp (NAPCO)	NA	NA	NA	NA	Gravity Sewer	
		Sanderson Pipe Corp	NA	NA	NA	NA	Gravity Sewer	
	Locate Balls	**Locating Marker Systems - Wastewater Locator balls placed at all sanitary sewer cleanouts**						
		3M	NA	NA	NA	NA	3M™ EMS 4" Extended Range 5' Ball Marker 1404-XR	
	Fittings SDR 35	**Fittings, Adapters and Plugs - Gravity PVC ASTM-D3034, Min SDR26/ SDR 35**						
		GPK Products, Inc.	NA	NA	NA	NA	SDR26/SDR35 Gasketed sewer fittings	
		Harrington Corporation (HARCO)	NA	NA	NA	NA	SDR26/SDR35 Gasketed sewer fittings	
		Multi Fittings Corp.	NA	NA	NA	NA	SDR26/SDR 35 Trench Tough Sewer Fittings	
		JM Eagle	NA	NA	NA	NA	SDR26/SDR35 Gasketed sewer fittings	
		Plastic Trends Inc	NA	NA	NA	NA	SDR26/SDR35 Gasketed sewer fittings	
		TIGRE USA, Inc.	NA	NA	NA	NA	SDR26/SDR35 Gasketed sewer fittings	

Cat.	Desc	Manufacturer	Water Model #	Water Comments	Reclaimed Water Model #	Reclaimed Water Comments	Wastewater Model #	Wastewater Comments
PVC Pipe a	Flexible Pipe Connectors	**Flexible Pipe Connectors and Transitions**						
		Fernco	NA	NA	NA	NA	1002, 1051, 1056 Series	
		Indiana Seal	NA	NA	NA	NA	102, 151, 156 Series	
		Mission Rubber	NA	NA	NA	NA	MR02, MR51, MR 56 Series	
Precast Concrete Structures	MH Lids	**Frame and Cover**						
		USF Fabrication Inc.	NA	NA	NA	NA	USF 225-AS	
	Adj Ring	**Top Adjusting Rings - HDPE with heavy duty loading (H-20)**						
		Ladtech, Inc	NA	NA	NA	NA	24R, 24S with Rope Sealant CS2455	
	Hatches	**Wet Well and Valve Vault Access Frames and Covers (Include the term "Confined Space" etched or cast into the cover with recessed lock & hasp. Frames and covers per manufacturers specifications.**						
		Halliday Products	NA	NA	NA	NA	S1R or S2R Series	
		USF Fabrication Inc.	NA	NA	NA	NA	APS or APD Series	
	Precast Concrete Structures	**Precast Manhole and Wetwell Structures ASTM C478. Precast concrete shall be batched with concrete dyed crystalline waterproofing admixture with corrosion protection. Concrete without admixture or without color tint /tracer shall be rejected.**						
		Allied Precast	NA	NA	NA	NA	Dyed Admix	
		Atlantic Concrete Products, Inc.	NA	NA	NA	NA	Dyed Admix	
		Delzotto Products, Inc.	NA	NA	NA	NA	Dyed Admix	
		Dura Stress Underground Inc.	NA	NA	NA	NA	Dyed Admix	
		Hanson Pipe & Product	NA	NA	NA	NA	Dyed Admix	
		Mack Concrete	NA	NA	NA	NA	Dyed Admix	
		Oldcastle Precast	NA	NA	NA	NA	Dyed Admix	
		Standard Precast Inc.	NA	NA	NA	NA	Dyed Admix	
	Concrete Admix	**Crystalline Waterproofing Concrete Admix with color dye shall be added to all concrete structures (precast and cast-in-place) to provide waterproofing and corrosion resistance. Concrete without admixture or without color tint / tracer shall be rejected. % concentration of admix with colored dye added to the mix shall be based on weight of cement.**						
		Kryton International	NA	NA	NA	NA	KIM K-301R (with red dye)	2%
		Xypex Chemical Corp	NA	NA	NA	NA	Xypex Admix C-1000Red (with red dye)	3.0 - 3.5%
	Liners	**Interior Liner for New or existing Precast Manhole and Precast Wetwell Structures per Section 3119 Coatings & Linings**						
		AFE	NA	NA	NA	NA	Fiberglass Liner	
		AGRU Liner	NA	NA	NA	NA	HDPE Liner (Min 2 mm for Manhole / Min 5 mm for Pump Station)	
		Containment Solutions Inc. (Flowtite)	NA	NA	NA	NA	Fiberglass Liner	
		GSE Studliner	NA	NA	NA	NA	HDPE Liner (Min 2 mm for Manhole / Min 5 mm for Pump Station)	
		GU Liner	NA	NA	NA	NA	Reinforced Plastic Liner	
		L & F Manufacturing	NA	NA	NA	NA	Fiberglass Liner	

Cat.	Desc	Manufacturer	Water Model #	Water Comments	Reclaimed Water Model #	Reclaimed Water Comments	Wastewater Model #	Wastewater Comments
Precast Concrete Structures	Heat Shrink Seal	**Heat Shrink Seal - Precast structures shall be primed with manufacturer approved primer prior to application of heat shrunk encapsulation.**						
		Canusa-CPS	NA	NA	NA	NA	Wrapid Seal with WrapidSeal Primer (Canusa G Primer)	
		Pipeline Seal & Insulator, Inc (PSI)	NA	NA	NA	NA	Riser Wrap with Polyken 1027 or 1039 primer	
	Jointing Material	**Jointing Material Min. 2" width for all products to ensure squeeze out with manufacturer approved primer.**						
		Henry Company	NA	NA	NA	NA	Ram-Nek	with Primer
		Martin Asphalt Company	NA	NA	NA	NA	Evergrip 990	with Primer
		Trelleborg Pipe Seals	NA	NA	NA	NA	NPC – Bidco C-56	with Primer
	Pipe Seals Gravity	**Resilient Connector Pipe Seals, Manhole - Gravity less than 12-inch and less than 15-ft deep**						
		Atlantic Concrete	NA	NA	NA	NA	A-Lok (cast-in-place)	
		Hail Mary Rubber	NA	NA	NA	NA	Star Seal (cast-in-place)	
		IPS	NA	NA	NA	NA	Wedge Style	
		NPC	NA	NA	NA	NA	Kor-N-Seal Model WS	
		Press seal gasket	NA	NA	NA	NA	PSX Direct Drive	
	Pipe Seals Gravity	**Cast in Place Pipe Seals, Manhole - Gravity Greater Than or Equal to 12-inch and all pipe sizes greater than 15-ft deep**						
		Atlantic Concrete	NA	NA	NA	NA	A-Lok	cast in place
		Hail Mary Rubber	NA	NA	NA	NA	Star Seal	cast in place
	FM Pipe Seals	**Modular Pipe Seals for Wet Well and Valve Box penetrations and all forcemain connections to existing and new precast concrete structures. EPDM Rubber with 316 SS Hardware**						
		CCI Pipeline Systems	NA	NA	NA	NA	Wrap-It Link WL-SS Series	
		Pipeline Seal & Insulator, Inc / Link Seal	NA	NA	NA	NA	Link-Seal S-316 Modular Seal	
		Proco Products, Inc	NA	NA	NA	NA	PenSeal ES-PS Series	

Cat.	Desc	Manufacturer	Water Model #	Water Comments	Reclaimed Water Model #	Reclaimed Water Comments	Wastewater Model #	Wastewater Comments
Generator	Gen	**Generator Systems, Fixed Shall be UL 2200 Certified.**						
		Caterpillar	NA	NA	NA	NA	CAT Diesel Generator Set	
		Cummins Power Generation	NA	NA	NA	NA	Diesel Generator Set	
	Fuel Tanks	**Generator Fuel Tanks. Shall be UL2085 certified.**						
		Convault	NA	NA	NA	NA	CVT-3SF or CVT-3FF	
		Phoenix	NA	NA	NA	NA	Envirovault	
	GR	**Generator Receptacle (GR)**						
		Cooper Crouse-Hinds	NA	NA	NA	NA	AR2042 (230V, 200A, 3P, 4W)	With AJA1 Angle Adaptor
		Cooper Crouse-Hinds	NA	NA	NA	NA	AR2042-S22 (460V, 200A, 3P, 4W)	With AJA1 Angle Adaptor
		Pyle National	NA	NA	NA	NA	JRE-4100 (230V, 100A, 3P, 4W)	
	ATS	**Generator Transfer Switch**						
		Russelectric	NA	NA	NA	NA	RMTD Series with model 2000 controller	NEMA 12/3R 316SS Enclosure
Odor Control Units	Biotrickling Filters	**Biotrickling filters**						
		BioAir	NA	NA	NA	NA		
		Biorem	NA	NA	NA	NA	Biosorbens BTF	
		Envirogen	NA	NA	NA	NA	BTF	
		Siemens	NA	NA	NA	NA	Zabocs BTF	
	Carbon Adsorption Units	**Carbon Adsorption Units**						
		Calgon	NA	NA	NA	NA		
		Pure Air Filtration	NA	NA	NA	NA		
		Siemens	NA	NA	NA	NA		
Pressure Gauges	Pressure Gauges	**Pressure Gauges shall have Diaphragm Seals. Oil filled.**						
		Ashcroft	NA	NA	NA	NA	10 1008SL 02L 60# 25 200SS 02T XYTSE	Gauge Diaphragm Seal
		Trerice	NA	NA	NA	NA	D83LFSS4002LA100 - Gauge M51001SSSS - Diaphragm Seal D99100 Fill and Mount Charge	
		Winter Gauges	NA	NA	NA	NA	PFQ770 0-60 PSI D70950 top D70954 Bottom	
Pumps	Pumps	**Submersible Pumps**						
		ABS	NA	NA	NA	NA		
		Flygt	NA	NA	NA	NA		

Cat.	Desc	Manufacturer	Water Model #	Water Comments	Reclaimed Water Model #	Reclaimed Water Comments	Wastewater Model #	Wastewater Comments
Pumps	Floats	**Float Regulator (FR) - Duplex and Triplex Pump Stations**						
		Atlantic Scientific	NA	NA	NA	NA		Roto-Float
	Radar	**Radar - Pulse Burst Radar Transmitter. Input 24 VDC and Output 4-20 mA**						
		Magnetrol	NA	NA	NA	NA		R82-520A-011
Pump Station Main Ser	Main Srvc Disconne	**Main Service Disconnect Breaker**						
		Square D	NA	NA	NA	NA		H or J Frame 3 Pole 600 Volt (HGL or JGL determined by amperage)
	Surge Protector Device	**Surge Protector - UL 1449, 3rd Edition listed and labeled, minimum 10 year warranty, NEMA LS-1 and IEEEC62, 41/45 tested with NEMA 4X enclosure, internal fusing, voltage and phase to match service. Rated 80,000 amps per mode for Duplex & Triplex stations and 150,000 Amperes per mode for Master Stations. All devices shall be provided with a NEMA 4X Plastic enclosure which is approved in lieu of stainless steel.**						
		Current Technology (Power & Systems	NA	NA	NA	NA		XN-80, TG-150 or CurrentGuard 150 Plus Series
		Josyln AKA (Total Protection Solutions)	NA	NA	NA	NA		TSS-ST 160 Series, ST 300 Series or JSP-300 Series
		Surge Suppressors, Inc	NA	NA	NA	NA		LSE Series or SHL Series
Sub Panel	Sub Panel	**Sub-Panel Enclosure - NEMA 12/3R Enclosure 316SS, white polyester Powder coated-finish inside and out, With 3 Point Pad lockable Handle, and Door Stop**						
		Hoffman	NA	NA	NA	NA		
		Schaefer	NA	NA	NA	NA		
		Universal enclosure systems	NA	NA	NA	NA		
Pump Station Control Panel	Control Panel	**Control Panel Supplier**						
		ECS	NA	NA	NA	NA		
		Sta-Con Inc	NA	NA	NA	NA		
	Enclosure	**Enclosure - NEMA 12/3R Enclosure 316SS, white polyester Powder coated finish inside and out, With 3 Point Pad lockable Handle, and Door Stop**						
		Hoffman	NA	NA	NA	NA		
		Schaefer	NA	NA	NA	NA		
		Universal enclosure systems	NA	NA	NA	NA		
	Mnts	**Mounting Channel for Enclosures**						
		Unistrut Stainless Steel	NA	NA	NA	NA		1" 5/8 x 1" 5/8 316 SS
	Seal-off	**Explosion-Proof Sealoff**						
		Cooper Crouse-Hinds	NA	NA	NA	NA		EYSR - 2 Inch Min.
	FL	**Flasher (FL)**						
		MPE	NA	NA	NA	NA		025-120-105
		SSAC	NA	NA	NA	NA		FS-126

Cat.	Desc	Manufacturer	Water Model #	Water Comments	Reclaimed Water Model #	Reclaimed Water Comments	Wastewater Model #	Wastewater Comments
Pump Station Control Panel	AL	**Alarm Light / With Base and Globe (AL)**						
		American Electric	NA	NA	NA	NA	F32552	
		Red Dot Globe Red Dot Base	NA	NA	NA	NA	VGLR-01 VA-01	
	AH	**Alarm Horn (AH)**						
		Wheelock	NA	NA	NA	NA	3IT-115-R	
	Fuse	**Fuses (F)**						
		Bussmann	NA	NA	NA	NA	FNQ-R or KTK-R	
	HOA	**Hand-Auto-Off Selector (HOA)**						
		Square D	NA	NA	NA	NA	9001-SKS43B	
	HSS	**Horn Silence Button (HSS)**						
		Square D	NA	NA	NA	NA	9001-SKR1RH5	
	Inter-lock	**Mechanical Interlock**						
		Square D	NA	NA	NA	NA	S29354	
	Breakers	**Control Panel Main Circuit Breaker (MCB) With S29450 Circuit Breaker Auxiliary Switch**						
		Square D	NA	NA	NA	NA	H or J Frame 3 Pole 600 Volt (HGL or JGL determined by amperage)	
		Emergency Circuit Breaker (ECB) With S29450 Circuit Breaker Auxiliary Switch						
		Square D	NA	NA	NA	NA	H or J Frame 3 Pole 600 Volt (HGL or JGL determined by amperage)	
		Motor Circuit Breaker (MB)						
		Square D	NA	NA	NA	NA	H or J Frame 3 Pole 600 Volt (HGL or JGL determined by amperage)	
		Control Circuit Breaker/ GFCI Receptacle Breaker/ SCADA Breaker						
		Square D	NA	NA	NA	NA	QOU120	
	MS	**Motor Starter (MS)**						
		Square D	NA	NA	NA	NA	Type S Class 8536	
	OL	**Overload Heater(OL)**						
		Square D	NA	NA	NA	NA	Part number will vary with size needed	
	OR	**Overload Reset**						
		Square D	NA	NA	NA	NA	9066-RA1	
	Transformer	**Control Circuit Transformer (XMFR)**						
		Square D	NA	NA	NA	NA	9070TF75D23	120/24 Volt .075 KVA
		Main Circuit Transformer (MCT)						
		Square D	NA	NA	NA	NA	9070T2000D1	480/120 2KVA
	SPB	**Supplemental Protector Breaker - 3 pole, 1-amp for Phase Monitor**						
		Square D	NA	NA	NA	NA	MG24532	

Cat.	Desc	Manufacturer	Water Model #	Water Comments	Reclaimed Water Model #	Reclaimed Water Comments	Wastewater Model #	Wastewater Comments
Pump Station Control Panel	PM	**Phase Monitor (PM)**						
		MPE 240 V.	NA	NA	NA	NA	001-230-118-OVG5	
		MPE 480 V.	NA	NA	NA	NA	002-480-123-OVG5	
	Pump Alternator	**Pump Automatic Alternator (PAA)**						
		Diversified Duplex	NA	NA	NA	NA	ARA-120-ACA	
		Diversified Triplex	NA	NA	NA	NA	ARA-120-AME	
		MPE Duplex	NA	NA	NA	NA	008-120-13SP	
		MPE Triplex	NA	NA	NA	NA	009-120-23P	
		MPE Triplex Socket	NA	NA	NA	NA	SD-12-PC	
	Alt. Test Switch	**Alt. Test Switch**						
		Carling Technologies	NA	NA	NA	NA	6GG5E-78	
		Honeywell	NA	NA	NA	NA	2TL1-50	
	Relay	**Relay**						
		Potter Brumfield 24 Volt	NA	NA	NA	NA	KRPA-11AN-24	
		Potter Brumfield 120 Volt	NA	NA	NA	NA	KRPA-11AN-120	
		Square D 24 Volt	NA	NA	NA	NA	8501KP12P14V14	
		Square D 120Volt	NA	NA	NA	NA	8501KP12P14V20	
	Relay Base	**Relay Base**						
		IEDC 8 Pin Relay Base 600 Volt	NA	NA	NA	NA	SR2P-06	
	Duplex Receptacle / GFCI	**Duplex Receptacle/GFCI (DR) Upgraded to 20 Amp**						
		Hubbell	NA	NA	NA	NA	GFTR20BK	
		Pass & Seymour	NA	NA	NA	NA	2095TRBK	
	ETM	**Elapse Time Meter (ETM)**						
		Reddington	NA	NA	NA	NA	711-0160	
	Grounding	**Grounding System**						
		Marathon	NA	NA	NA	NA	Neutral Isolation Block 1421570	
		Panduit	NA	NA	NA	NA	Ground Lug LAM2A 1/0 - 014 -6Y	
		Square D	NA	NA	NA	NA	Ground Buss PK7GTA	
	TS	**Terminal Strip (TS)**						
		Marathon	NA	NA	NA	NA	Series 200	
		Square D	NA	NA	NA	NA	9080GR6	
	TS	**Terminal Strip End Blocks and End Clamps**						
		Square D	NA	NA	NA	NA	9080GM6B & 9080GH10	

APPENDIX D **LIST OF APPROVED PRODUCTS - PUMP STATION SYSTEMS** **FEBRUARY 11, 2011**

Cat.	Desc	Manufacturer	Water Model #	Water Comments	Reclaimed Water Model #	Reclaimed Water Comments	Wastewater Model #	Wastewater Comments
Pump Station Control Panel	PL	**Pilot Light (PL) 24 Volt with 1819 Bulb**						
		Dialight	NA	NA	NA	NA	803-1710	
		Lighting Components & Design	NA	NA	NA	NA	Littlelight 930507X	
	RL	**Run Indicator Light (RL) 120 Volt**						
		Dialight	NA	NA	NA	NA	803-1710	
		Lighting Components & Design	NA	NA	NA	NA	Littlelites 930507X With 120MB Bulb	
	MT	**Moisture and Temperature Failure Light (MT) 120 Volt with 120MB Bulb**						
		Dialight	NA	NA	NA	NA	803-1710	
		Lighting Components & Design	NA	NA	NA	NA	Littlelites 930507X	
Sluice	Sluice Gate	**Sluice Gate for Wet Well with Motorized Operator**						
		BNW	NA	NA	NA	NA	Model 77 - 316 SS	
		Fontaine	NA	NA	NA	NA	Model 20 - 316 SS	
VFD	VFD	**Variable Frequency Drives**						
		Square D	NA	NA	NA	NA		

APPENDIX 4

APPLICABLE FORMS FROM ORANGE COUNTY UTILITIES "STANDARDS AND CONSTRUCTION SPECIFICATION MANUAL APPENDIX B – FORMS"

- **DIGITAL DATA SUBMISSION**
- **PRESSURE TEST**
- **PUMP STATION START-UP**
- **RISK MANAGEMENT JUNE 02**
- **WATER MAIN DISINFECTION CERTIFICATION**

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APPENDIX B FORMS

Digital Data Submission February 11, 2011

This form is to be utilized for the submittal of digital data in accordance with the requirements outlined in Chapter 2111, " Project Documents and Submittals".

Date of Submittal: _____

Project Number: _____

Project Name: _____

Project Manager: _____

Consulting Firm: _____

Address: _____

City: _____ State: _____ Zip:

Phone: _____ Email: _____

Type of Submittal: ☐ Construction Plans ☐ Record Drawings

File Format: _____

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APPENDIX B FORMS

Pressure Main Sample Collection Submittal Form

Proposed

Project: _____

Contractor: _____

LOCATION OF SAMPLE

Address: _____ Date: _____ Submitted by: _____

PIPE SAMPLE ID NUMBER _____

GPS NORTHING _____ **EASTING** _____

REASON FOR SAMPLE COLLECTION (e.g. Line Tap, Tie in, Abandonment, etc):

SAMPLE TYPE: ☐Coupon ☐Pipe Section ☐Other (description)_____

SAMPLE SIZE: _____ x _____

PIPE MATERIAL: ☐Ductile Iron ☐Cast Iron ☐PCCP ☐Asbestos Cement

PIPE DIAMETER: _____

SAMPLE LOCATION ON PIPE (Clock position): _____

SITE OBSERVATIONS (Describe any relevant observations (e.g. “Plastic wrap”, “gas main in proximity”, “areas of softness in AC pipe”, etc.)

DIGITIAL PHOTOGRAPHS: (Insert file name)

Overall Work Site _____

Exposed Pipe _____

Exterior of Sample _____

Edge of Pipe _____

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APPENDIX B **FORMS**

Pressure Test February 11, 2011

Project Name: _____

Constructed by: _____

☐ **Force Main**
☐ **Reclaimed Main**
☐ **Water Main**

Allowable Loss – 2 Hours
L = SD (P) 1/2
148,000 ***See Note Below***

DATE	LINE SEGMENT	STATION		LENGTH	N	D	START		END		LOSS (gal)		Pass /Fail
		From	To				Time	PSI	Time	PSI	Allow	Actual	STATUS

COUNTY Inspector's Name:		**Signature:**		**Date:**
Tester's Name:		**Signature:**		**Date:**
Comments:				

Note: L - Allowable leakage in gallons per hour.
S - Length of pipe tested, in feet.
D - Nominal diameter of the pipe in inches.
P - Average test pressure during leakage test in pounds per square inch gauge.

APPENDIX B FORMS

Pump Station Start-Up February 11, 2011

Prior to the pump station start-up, the CONTRACTOR shall submit this completed form to the COUNTY and the following shall have been successfully met.

- ❑ A walk through letter of acceptance; and
- ❑ All wire checks, video inspections and valve locates
- ❑ Video inspections completed;
- ❑ FDEP Water Clearance received;
- ❑ FDEP placard for fuel tank if applicable; and
- ❑ Completed "Pump Station Start-Up" form (Appendix B).

Transfer of utility bills after final acceptance shall be requested by submitting the final utility power billing statement to Utilities Water Reclamation Operations Processing Center located at 8100 Presidents Drive, Suite A, or fax to 407-836-6819.

GENERAL INFORMATION

Inspection Date: _____ Final Acceptance Date: _____

Station Name: _____ PS # _____ FILE # _____

Address: _____ Subdivision: _____

Power Company: _____ Meter Number: _____

Water Company: _____ Meter Number: _____

PRESENT AT START-UP

Contractor Name: _____ Phone Number: _____

Consulting Engineer: _____ Phone Number: _____

Pump Manufacturer Rep: _____ Phone Number: _____

Orange County Utilities Inspector: _____ Phone Number: _____

Orange County Utilities Transmission Reps: _____

ELECTRICAL EQUIPMENT

Control Panel Enclosure Mfg. _____ Control Panel Built By _____

Control Panel SN: _____ Date of Manufacture: _____

Main Service Voltage: _____ Amperage: _____

Main Disconnect Breaker Model #: _____ Amperage: _____

Control Panel Main Breaker Model #: _____ Amperage: _____

Emergency Circuit Breaker Model: _____ Amperage: _____

Pump Breaker Model #: _____ Amperage: _____

ELECTRICAL EQUIPMENT (*Continued*)

Control Breaker Model # _____ Amperage: _____

SPD Type: _____ Model: _____ Receipt Received Yes No

Transformer Model: _____ Primary: _____ Secondary: _____ KVA: _____

Transformer Model: _____ Primary: _____ Secondary: _____ KVA: _____

Alternator Name: _____ Model: _____

Phase Monitor Name: _____ Model: _____

Alarm Horn Manufacturer: _____ Model: _____

Hour Meter Manufacturer: _____ Model: _____

Starter Name: _____ Starter Size: _____ Heater Size: _____

Starter Coil Part Number: _____

Pump Voltage: _____ Phase: _____ Pump F.L.A: _____ Pump HP.: _____

Pressure Transducer Manufacturer: _____ Model: _____

PUMP EQUIPMENT

Pump Manufacturer: _____ Model #: _____

Impeller Size: _____ Number: _____

Pump #1 Serial #: _____ Pump #2 Serial #: _____

Pump #3 Serial #: _____ Pump #4 Serial #: _____

Pump #5 Serial #: _____ Pump #6 Serial #: _____

FLOAT BALLS

Float Ball Manufacturer: _____ Float Ball Type: _____

Off Level Depth: _____ Lead Start Depth: _____

Lag 1 Start Depth: _____ Lag 2 Start Depth: _____

Lag 3 Start Depth: _____ High Level Depth: _____

MECHANICAL

Valve Vault Cover Mfg: _____ Valve Vault Cover Size _____

Wet Well Cover Manufacturer: _____ Wet Well Cover Size: _____

Wet Well Diameter: _____ Wet Well Depth: _____ Guide Rail Size: _____

Base Elbow Size: _____ Riser Pipe Material _____ Riser Pipe Size: _____

Plug Valve Manufacturer: _____

MECHANICAL (*Continued*)

Plug Valve Size: _____ Plug Valve Lay Length _____

Check Valve Manufacturer: _____

Check Valve Size: _____ Check Valve Type: _____

Check Valve Lay Length: _____ Pipe Size Entering Wet-Well: _____

Oil Filled Gauges: Yes No Gauge Manufacturer: _____

Emergency Pump Out Size: Female Cam-Lock Yes No

GENERATOR

Generator Receptacle Mfg. _____ Model: _____

Transfer Switch Mfg. : _____ Model: _____

Fuel Tank Manufacturer: _____ Fuel Tank Capacity: _____

Fuel Tank Model: _____ Fuel Tank SN: _____

Generator Manufacturer: _____ KVA _____ KW _____

Generator Model Number: _____

Generator Serial Number: _____

Engine Manufacturer: _____ Year of Manufacture: _____

Engine Model Number: _____

Engine Serial #: _____

BACKFLOW

Backflow Manufacturer: _____ Size: _____ Model #: _____

FLOW METER

Flow Meter Manufacturer: _____ Flow Meter Model #: _____

BIOFILTER

Biofilter Manufacturer: _____ Biofilter Model: _____

Biofilter Media: _____

Name of Approved Nutrient: _____

Blower Motor Manufacturer: _____

Blower Motor Model: _____ Blower Motor SN: _____

Blower Motor Belt Size: _____ Number of Belts: _____

Blower Horsepower: _____ Blower Voltage: _____

APPENDIX B **FORMS**

Pump Station Start-Up February 11, 2011

For COUNTY Use Only

DESIGN CRITERIA

Point 1 GPM: _____ At TDH: _____

Point 2 GPM: _____ At TDH: _____

Point 3 GPM: _____ At TDH: _____

PUMPING CAPACITY AT STARTUP						
	Pump # 1	Pump # 2	Pump # 3	Pump # 4	Pump # 5	Pump # 6
GPM at Startup:						
TDH at Startup:						
PSI at Startup:						

ELECTRICAL DATA AT STARTUP						
	PHASE A:		**PHASE B:**		**PHASE C:**	
Pump # 1 Amps at Startup						
Pump # 2 Amps at Startup						
Pump # 3 Amps at Startup						
Pump # 4 Amps at Startup						
Pump # 5 Amps at Startup						
Pump # 6 Amps at Startup						
Pump Megs Phase to Ground	Pump # 1:		Pump # 2:		Pump # 3:	
	Pump # 4:		Pump # 5:		Pump # 6	
Incoming Service Voltage	A to GND:		B to GND:		C to GND:	
	A to B:		A to C:		B to C:	

CONTROL PANEL SPARE PARTS TRANSMITTAL

Project Name: _____

Project Number: _____

Quantity	Spec. Section	Manufacturer	Part Number	Part Description
1 set				Indicator pilot lamps of each type and voltage
1 ea				One-hundred percent replacement on lens caps, all colors
1 ea				Phase Monitor
1 ea				Alternator
1 ea				Time delay per starter
1 set				24-volt 8-pin relay
1 set				Fuses (as applicable)
1 set				Overload heaters per starter
1 ea				Elapsed Time Meter per pump
2 ea				Float Balls

Comments*:*

_____

_____

_____

Delivered by: _____ Date: _____
Contractor

Witnessed by: _____ Date: _____
Construction Observation

Received by: _____ Date: _____
Water Reclamation Division

GENERATOR SPARE PARTS TRANSMITTAL

Project Name: _____

Project Number: _____

Quantity	Spec. Section	Manufacturer	Part Number	Part Description
2 ea				Air filter elements
2 ea				Fuel filter elements
3 ea				Complete replacement sets of fuses of each different size and type
1 set				Indicator pilot lamps of each type and voltage
1 ea				Jacket Water Heater
1 ea				One spill kit containing proper quantities and sizes of spill booms, pads, pillows, etc to control spills

Comments*:*

_____

_____

Delivered by: _____ Date: _____
Contractor

Witnessed by: _____ Date: _____
Construction Observation

Received by: _____ Date: _____
Water Reclamation Division

PUMP SPARE PARTS TRANSMITTAL

Project Name: _____

Project Number: _____

Quantity	Spec. Section	Manufacturer	Part Number	Part Description
1 ea				Upper bearing
1 ea				Lower bearing
1 set				Upper and lower shaft seals
1 set				O-Rings or gaskets required for replacement of bearings and seals
1 set				Impeller wear ring or bottom wear plate
1 ea				Shaft sleeve (if applicable)
1 ea				Cable cap for each pump (if applicable)
1 set				Allen sockets
1 ea				Impeller pullers

Comments*:*

_____

_____

_____

Delivered by: _____ Date: _____
Contractor

Witnessed by: _____ Date: _____
Construction Observation

Received by: _____ Date: _____
Water Reclamation Division

BIOFILTER SPARE PARTS TRANSMITTAL

Project Name: _____

Project Number: _____

Quantity	Spec. Section	Manufacturer	Part Number	Part Description
				Belts (One set of each type)
				Pillar block bearings if applicable.
				Spare PLC as applicable with location software preinstalled.
				Fuses (Three sets of each type)
				Couplings (One set if applicable)
				Pilot Lights (One set of each type)
				Lens Caps (Complete replacement for all types)
				Spare Hydrogen Sulfide Sensing Element
				Any specialty tools for normal operation and maintenance
				Sufficient amount of required supplemental nutrients for continued operations to last through monitoring and service period.

Comments*:*

_____

_____

_____

Delivered by: _____ Date: _____
Contractor

Witnessed by: _____ Date: _____
Construction Observation

Received by: _____ Date: _____
Water Reclamation Division

APPENDIX B **FORMS**

Pump Station Start-Up February 11, 2011

List Deficiencies/Discrepancies:

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Risk Management Division Information Sheet

Date:

To:

From: *Susan Martin, Sr. Risk Management Analyst*

Re: _____ *Project*
Builders' Risk/Property Insurance

In order to arrange the builders' risk insurance as required by contract, please provide the following information on the above referenced facility as soon as possible:

New facility or renovation of existing? _____
Address (Street address, City, Zip) _____
Type of Construction (see attached codes) _____
Type of Occupancy (e.g., office, warehouse) _____
Number of Floors _____
Square Footage _____
Date construction started _____
(excluding site work)
Date construction completed (est.) _____
Name of General Contractor _____
Completed value (Hard Cost) _____
(Exclude value of land, site work, underground property, landscaping.)
Does facility have: sprinklers? *Yes*_____ *No*_____
fire alarm? *Yes*_____ *No*_____
burglar alarm? *Yes*_____ *No*_____
Security (describe)? _____
Boiler & Machinery checklist. Does facility have: *Yes / No*
Steam Boilers: _____
Hot Water boilers: _____
Air conditioning/heating units: _____
Pumps,motors,generators,compressors _____
Describe below:

_____
_____
_____

For your convenience, you may jot down the answers on this form and fax it to me at 836-8350. Thanks very much.

*Completed by:*_____ *Date:*_____
Phone: _____

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APPENDIX B FORMS

Water Main Disinfection Certification February 11, 2011

This form is required to schedule and document the disinfection of newly installed water mains to AWWA C-651 – latest revision. The CONTRACTOR shall complete the top portion of this form to document the subject water main, disinfection method and amount of chlorine applied. The UTILITIES inspector will document the residuals at each sample point on the bottom portion of this form.

Date Requested: _____

CONTRACTOR's Name: _____

Project Name: _____

Project Number: _____

Location: _____ Plan Sheet No.(s): _____

Starting Location: _____ Ending Location: _____

Line Length: _____ Line Size: _____

Pipe Material: _____ Type of Joint(s): _____

Gallons to Fill Pipe: _____ Pounds of Chlorine Applied: _____

Method of Disinfection Used: _____

CONTRACTOR's Signature: _____ Date: _____

For COUNTY Use Only

Certification Information

Start Time: _____ *Start PSI:* _____

Stop Time: _____ *Stop PSI:* _____

Sample Point Number	*Sample Point Location*	*Initial Chlorine Reading, Minimum 25 ppm Required*	*24 Hr Chlorine Reading, Minimum 10 ppm Required*

Lab Test Results

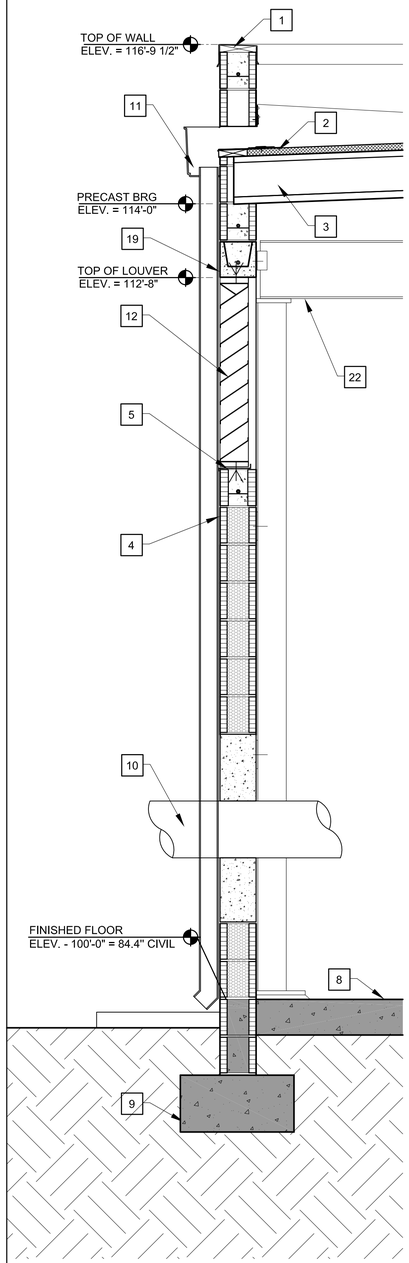
*Passed:*_____ *Failed:*_____ *Incomplete:*_____

Comments:

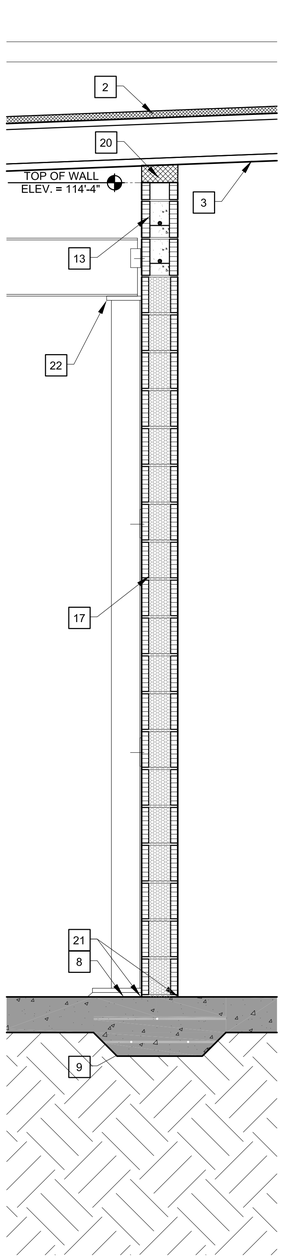
_____

_____

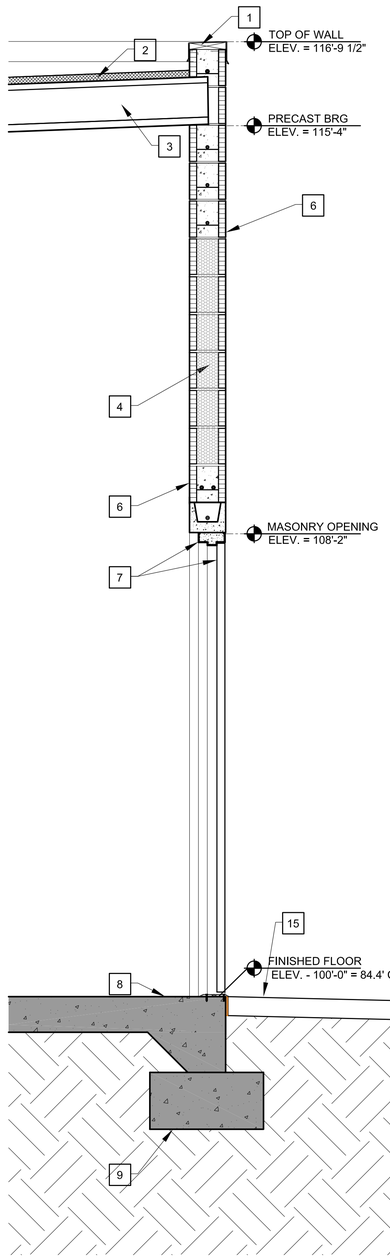
Inspector's Signature: _____ Date: _____



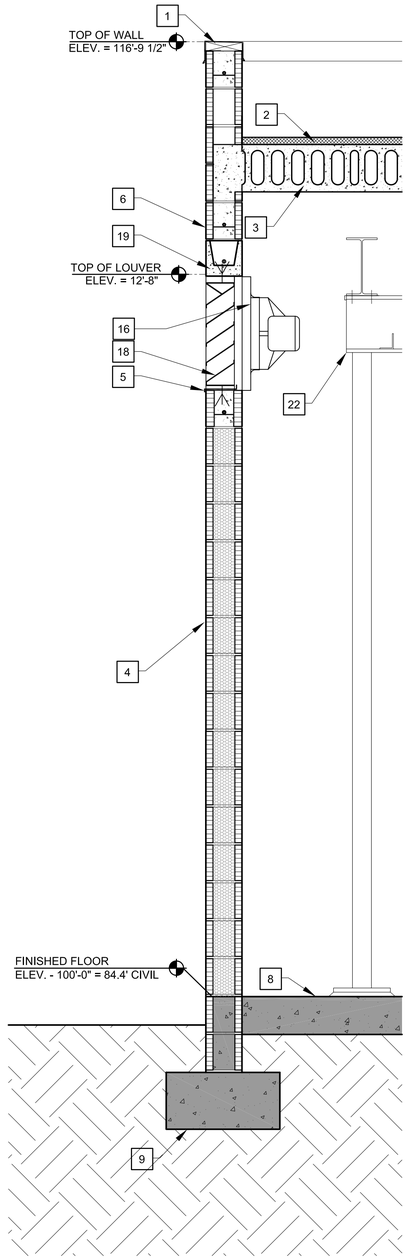
A A4.0 WALL SECTION
SCALE: 3/4" =1'-0"



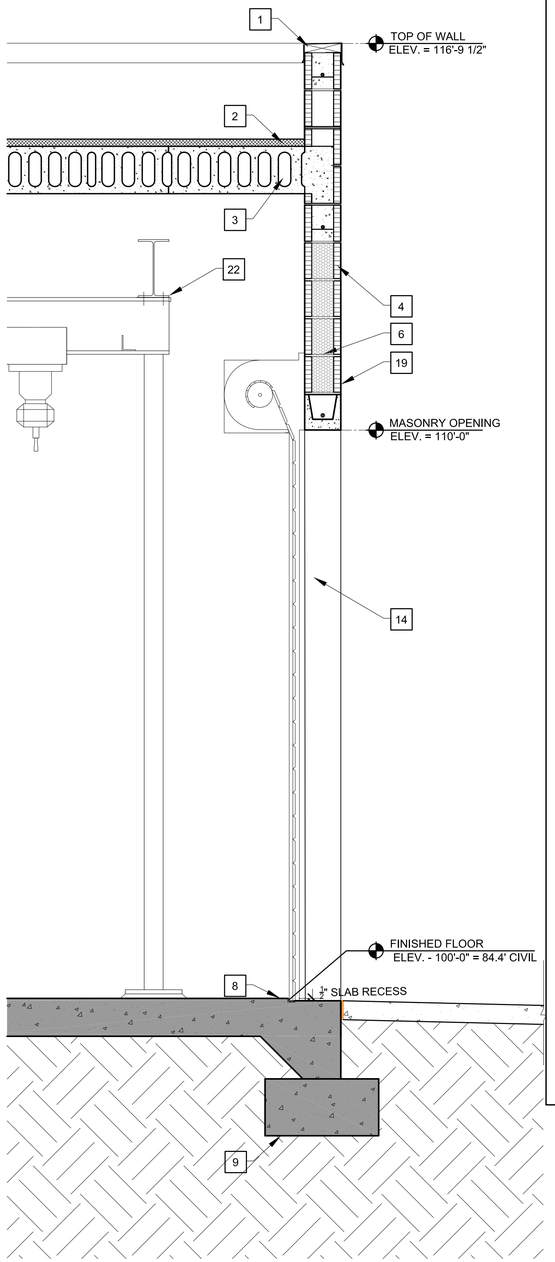
C A4.0 WALL SECTION
SCALE: 3/4" =1'-0"



B A4.0 WALL SECTION
SCALE: 3/4" =1'-0"



D A4.0 WALL SECTION
SCALE: 3/4" =1'-0"



E A4.0 WALL SECTION
SCALE: 3/4" =1'-0"

KEY NOTES

1. PREFINISHED ALUMINUM COPING ON P.T. PARAPET BLOCKING
2. ROOFING SYSTEM: JOHNS MANSVILLE 60 MIL TPO OVER RIGID POLYISOCYANURATE ROOF DECK INSULATION. ANCHOR INSULATION TO PRE-CAST PLANKS WITH GALVANIZED SCREWS AND 3" DIAMETER GALVALUME STRESS PLATES IN PATTERN TO ACHIEVE FM I-90 WIND UPLIFT RATING. ATTACH OVER 40 MIL PEEL AND STICK VAPOR RETARDER ON STRUCTURAL CONCRETE PLANK ROOFING.
3. ROOF SLAB CONSTRUCTION 10" PRE-CAST CONCRETE PLANKS WITH BOTH ENDS BEARING ON CMU WALL
4. EXTERIOR WALL CONSTRUCTION: 8" REGULAR CONCRETE BLOCK WALL W/ LADDER TYPE HORIZONTAL JOINT REINFORCEMENT AND VERTICAL BARS PER STRUCTURAL DESIGN SPECIFICATIONS. INSULATE WITH INJECTED AMINO-PLAST EXPANDABLE FOAM FOR ALL CELLS NOT BEING POURED OR GROUTED. PAINT COLOR TO BE DETERMINED BY ORANGE COUNTY.
5. ALUMINUM PAN FLASHING
6. LINTEL PER STRUCTURAL
7. ALUMINUM DOOR AND FRAME
8. 8" THICK CONC. FLOOR SLAB OVER CONTINUOUS 10 MIL POLYETHYLENE VAPOR BARRIER (WITH JOINTS LAPPED 6" AND SEALED) OVER TERMITE TREATED BACK FILL.
9. FOOTING PER STRUCTURAL
10. 12" CONCRETE PIPE; COORDINATE WITH CIVIL DRAWINGS
11. PREFINISHED ALUMINUM CONDUCTOR HEAD AND DOWNSPOUT
12. INTAKE LOUVER ; REFER TO MECHANICAL
13. DBL KNOCK OUT BLOCK W/ REINFORCING PER STRUCTURAL DRAWINGS
14. 10' X 10' OVERHEAD ROLL-UP DOOR; PAINTED GRAY PER OWNER
15. DOWNSPOUT ADAPTER TO 4" PVC PIPE PER CIVIL DRAWINGS; OUTLET AT CURB
16. EXHAUST FAN BY MECHANICAL; TYPICAL
17. 8" CMU WITH REINFORCING PER STRUCTURAL
18. EXHAUST LOUVER REFER TO MECHANICAL
19. CMU BAND IN CONTRASTING COLOR TO FIELD COLOR; TO BE DETERMINED BY ORANGE COUNTY
20. FIRE STOP
21. SILICONE SEALANT
22. MONORAIL CRANE - REFER TO STRUCTURAL DRAWINGS

REV	DATE	DESCRIPTION
	1.26.16	
3	07.07.16	ADDENDUM 3

LINE IS 2 INCHES
AT FULL SIZE
(IF NOT SCALE ACCORDINGLY)

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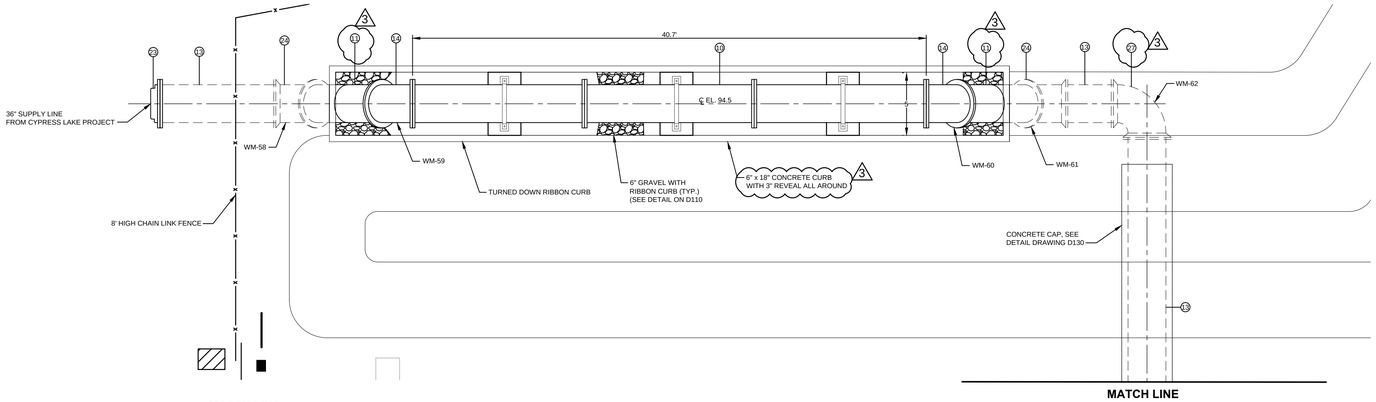
1117 East Robinson Street ~ Orlando, FL 32801 ~ Phone: 407.425.0452

WALL SECTIONS

JOHN A. BAER

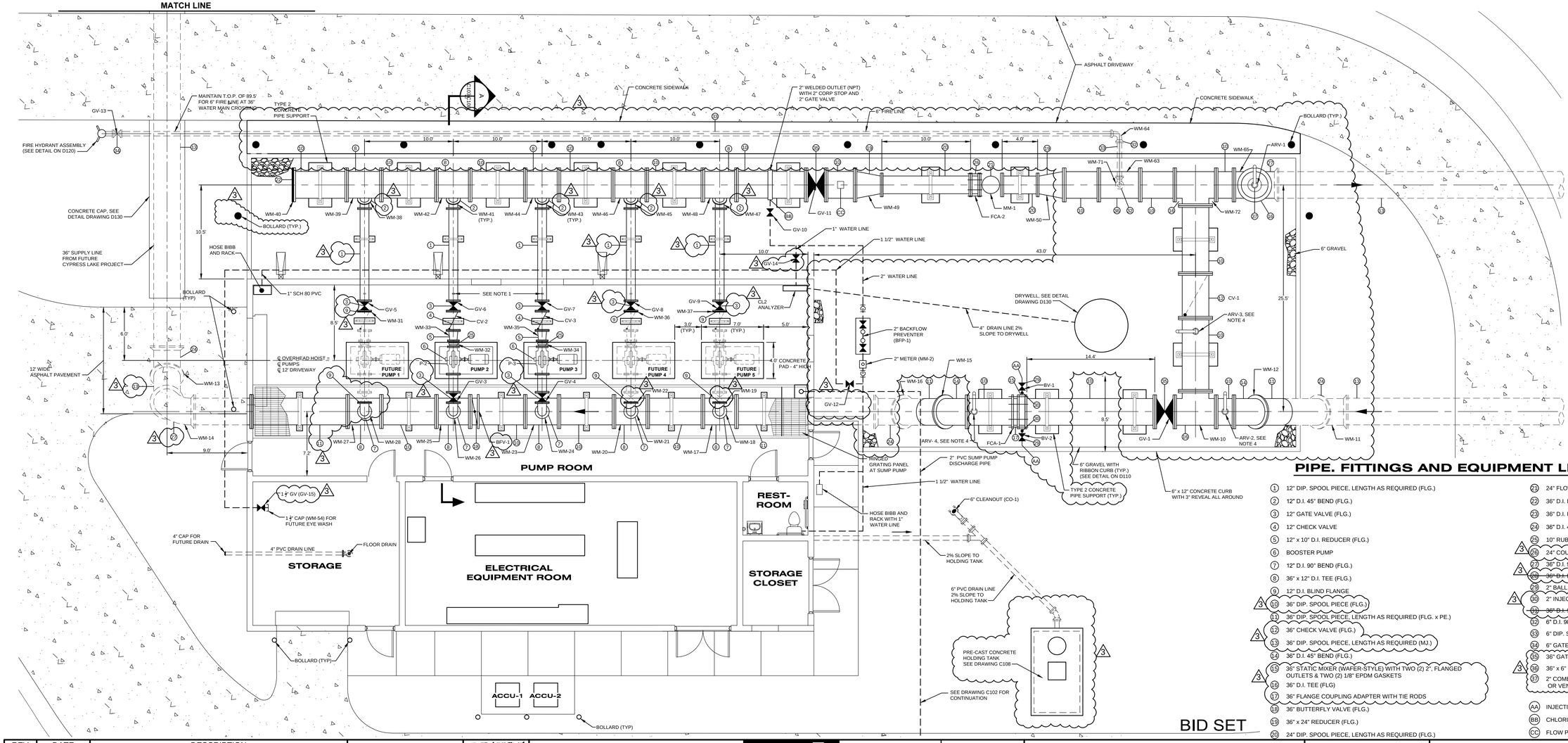
OCU FILE NO.: **74251**
DESIGNED BY: **JAB**
DRAWN BY: **LDM**
CHECKED BY: **JAB**
CADD FILE: **028246–ARCHITECTURE**

SCALE: AS NOTED
DRAWING NO. : A4.0
SHEET: 24 OF 49



NOTES:

1. ADD PRESSURE GAUGES WHERE SHOWN TYPICAL (0-150 PSI)
2. PUMP PAD DIMENSIONS MAY VARY DEPENDING UPON FINAL SELECTION OF THE PUMP. CONTRACTOR SHALL MAINTAIN THE MINIMUM DISTANCES SHOWN BETWEEN THE PUMP PADS AND BETWEEN THE PUMP PADS AND WALLS. CONTRACTOR SHALL CONFIRM PUMP & PUMP BASE DIMENSIONS PRIOR TO CONSTRUCTING THE BUILDING AND SHALL SUBMIT A SHOP DRAWING FOR ENGINEER AND OWNER APPROVAL. SHOP DRAWING SHALL SHOW THE ACTUAL SELECTED PUMP DIMENSIONS AND PUMP BASE DIMENSIONS AND THEIR FINAL LAYOUT WITHIN THE PUMP ROOM.
3. PROVIDE COATING PER SECTION 09900, SYSTEM 9 ON ALL CONCRETE PUMP PADS, PUMP ROOM FLOOR AND TRENCH AND PUMP ROOM WALLS UP TO A HEIGHT OF 4 FT.
4. PROVIDED 2" THREADED OUTLET ON PIPE.



PIPE. FITTINGS AND EQUIPMENT LEGEND

1. 12" DIP. SPOOL PIECE, LENGTH AS REQUIRED (FLG.)
2. 12" D.I. 45° BEND (FLG.)
3. 12" GATE VALVE (FLG.)
4. 12" CHECK VALVE
5. 12" x 10" D.I. REDUCER (FLG.)
6. BOOSTER PUMP
7. 12" D.I. 90° BEND (FLG.)
8. 36" x 12" D.I. TEE (FLG.)
9. 12" D.I. BLIND FLANGE
10. 36" DIP. SPOOL PIECE (FLG.)
11. 36" DIP. SPOOL PIECE, LENGTH AS REQUIRED (FLG. x PE.)
12. 36" CHECK VALVE (FLG.)
13. 36" DIP. SPOOL PIECE, LENGTH AS REQUIRED (MJ.)
14. 36" D.I. 45° BEND (FLG.)
15. 36" STATIC MIXER (WAFER-STYLE) WITH TWO (2) 2", FLANGED OUTLETS & TWO (2) 1/8" EPDM GASKETS
16. 36" D.I. TEE (FLG)
17. 36" FLANGE COUPLING ADAPTER WITH TIE RODS
18. 36" BUTTERFLY VALVE (FLG.)
19. 36" x 24" REDUCER (FLG.)
20. 24" DIP. SPOOL PIECE, LENGTH AS REQUIRED (FLG.)
21. 24" FLOW METER (FLG.)
22. 36" D.I. BLIND FLANGE
23. 36" D.I. PLUG (MJ.)
24. 36" D.I. 45° BEND (MJ.)
25. 10" RUBBER EXPANSION COUPLING
26. 24" COUPLING ADAPTER (FLG.) WITH TIE RODS
27. 36" D.I. 90° BEND (MJ.)
28. ~~36" D.I. BLIND FLANGE~~
29. 2" BALL VALVE (FLANGE X THREADED, TYP. OF 2)
30. 2" INJECTION QUILL (SAF-T-FLO EB 150-H-T-12-0-00)
31. ~~36" D.I. 90° BEND (FLG.)~~
32. 6" D.I. 90° BEND (MJ.)
33. 6" DIP. SPOOL PIECE, LENGTH AS REQUIRED (MJ.)
34. 6" GATE VALVE (MJ.)
35. 36" GATE VALVE (FLG.)
36. 36" x 6" D.I. TEE (FLG)
37. 2" COMBINATION AIR RELEASE VALVE (ARI O-040SS OR VENT -O-MAT RBX DN50)

AA. INJECTION POINTS (FOR FUTURE CHLORINE)
BB. CHLORINE SAMPLE POINT
CC. FLOW PRESSURE SENSOR

BID SET

REV	DATE	DESCRIPTION
3	7/6/2016	ADDENDUM 3

LINE IS 2 INCHES
AT FULL SIZE
(IF NOT SCALE ACCORDINGLY)

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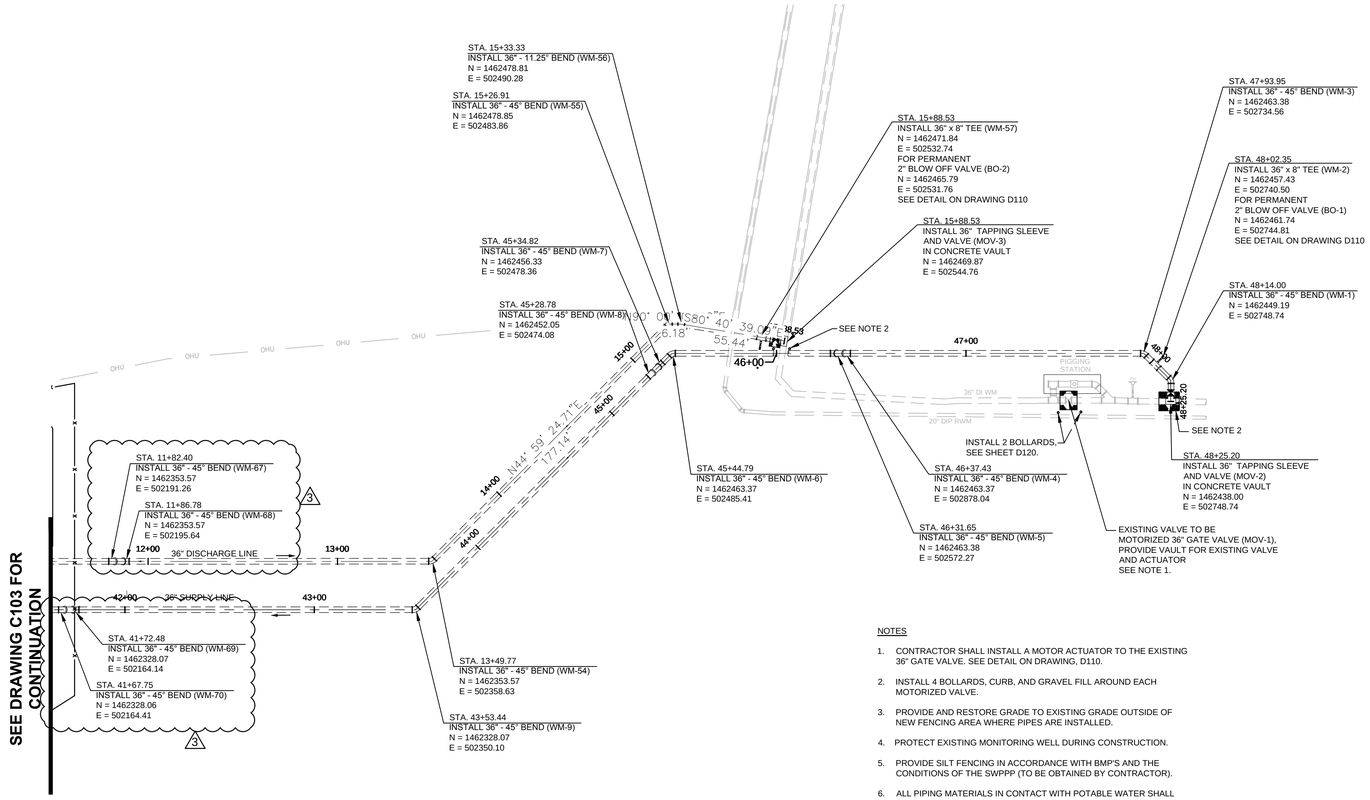
Lndscp. Lic. No. LC0000298
1117 East Robinson Street ~ Orlando, FL 32801 ~ Phone: 407.425.0452

PUMP AND PIPING PLAN
INTERNATIONAL DRIVE POTABLE WATER
BOOSTER PUMP STATION

DAVID E. MAHLER
PROFESSIONAL ENGINEER
FLORIDA LICENSE #50041

OCU FILE NO.: 74251
DESIGNED BY: NAU
DRAWN BY: DGH/GCM
CHECKED BY: DEM
CADD FILE: Piping Plan.dwg

SCALE: 1" = 6'
DRAWING NO. : C103
SHEET: 9 OF 49



NOTES

1. CONTRACTOR SHALL INSTALL A MOTOR ACTUATOR TO THE EXISTING 36" GATE VALVE. SEE DETAIL ON DRAWING, D110.
2. INSTALL 4 BOLLARDS, CURB, AND GRAVEL FILL AROUND EACH MOTORIZED VALVE.
3. PROVIDE AND RESTORE GRADE TO EXISTING GRADE OUTSIDE OF NEW FENCING AREA WHERE PIPES ARE INSTALLED.
4. PROTECT EXISTING MONITORING WELL DURING CONSTRUCTION.
5. PROVIDE SILT FENCING IN ACCORDANCE WITH BMP'S AND THE CONDITIONS OF THE SWPPP (TO BE OBTAINED BY CONTRACTOR).
6. ALL PIPING MATERIALS IN CONTACT WITH POTABLE WATER SHALL MEET NSF 61 STANDARDS.
7. CONTRACTOR SHALL PRESSURE TEST PROVIDE BACTERIOLOGICAL SAMPLES, AND OBTAIN FDEP CLEARANCE PRIOR TO CONNECTING TO THE EXISTING 36" POTABLE WATER MAIN.

BID SET

REV	DATE	DESCRIPTION
3	7/6/2016	ADDENDUM 3

LINE IS 2 INCHES
AT FULL SIZE
(IF NOT SCALE ACCORDINGLY)

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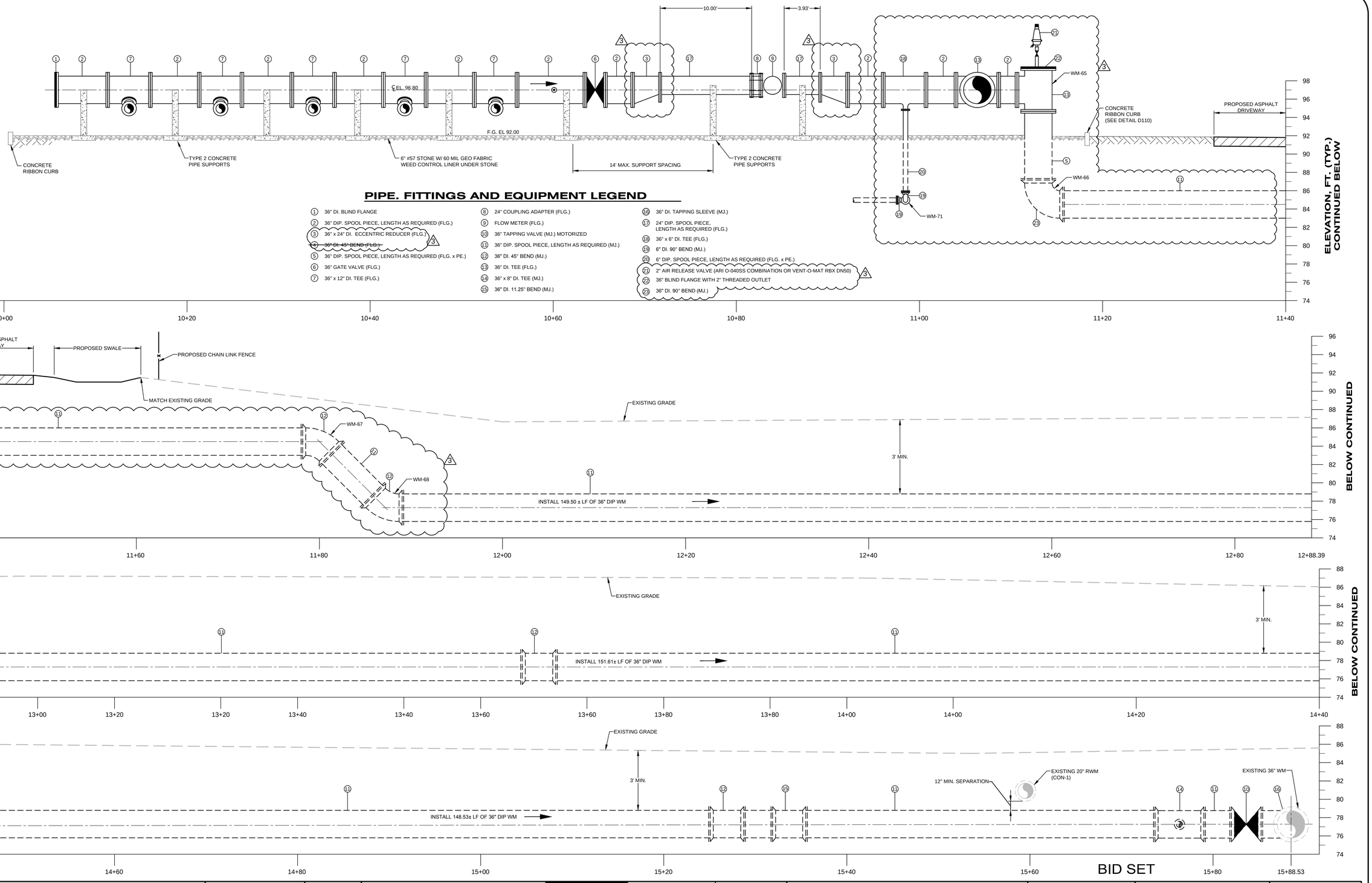
Lndscp. Lic. No. LC0000298
1117 East Robinson Street ~ Orlando, FL 32801 ~ Phone: 407.425.0452

SUPPLY LINE AND DISCHARGE LINE
YARD PIPING PLAN
INTERNATIONAL DRIVE POTABLE WATER
BOOSTER PUMP STATION

DAVID E. MAHLER
PROFESSIONAL ENGINEER
FLORIDA LICENSE #50041

OCU FILE NO.: 74251
DESIGNED BY: NAU
DRAWN BY: DGH/GCM
CHECKED BY: DEM
CADD FILE: Supply Line Plan.dwg

SCALE: 1" = 40'
DRAWING NO. : C104
SHEET: 10 OF 49



PIPE. FITTINGS AND EQUIPMENT LEGEND

1. 36" DI. BLIND FLANGE
2. 36" DIP. SPOOL PIECE, LENGTH AS REQUIRED (FLG.)
3. 36" x 24" DI. ECCENTRIC REDUCER (FLG.)
4. 36" DI. 45° BEND (FLG.)
5. 36" DIP. SPOOL PIECE, LENGTH AS REQUIRED (FLG. x PE.)
6. 36" GATE VALVE (FLG.)
7. 36" x 12" DI. TEE (FLG.)
8. 24" COUPLING ADAPTER (FLG.)
9. FLOW METER (FLG.)
10. 36" TAPPING VALVE (MJ.) MOTORIZED
11. 36" DIP. SPOOL PIECE, LENGTH AS REQUIRED (MJ.)
12. 36" DI. 45° BEND (MJ.)
13. 36" DI. TEE (FLG.)
14. 36" x 8" DI. TEE (MJ.)
15. 36" DI. 11.25° BEND (MJ.)
16. 36" DI. TAPPING SLEEVE (MJ.)
17. 24" DIP. SPOOL PIECE, LENGTH AS REQUIRED (FLG.)
18. 36" x 6" DI. TEE (FLG.)
19. 6" DI. 90° BEND (MJ.)
20. 6" DIP, SPOOL PIECE, LENGTH AS REQUIRED (FLG. x PE.)
21. 2" AIR RELEASE VALVE (ARI O-040SS COMBINATION OR VENT-O-MAT RBX DN50)
22. 36" BLIND FLANGE WITH 2" THREADED OUTLET
23. 36" DI. 90° BEND (MJ.)

BID SET

REV	DATE	DESCRIPTION
3	7/6/2016	ADDENDUM 3

LINE IS 2 INCHES
AT FULL SIZE
(IF NOT SCALE ACCORDINGLY)

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Lndscp. Lic. No. LC0000298

DISCHARGE LINE PROFILE

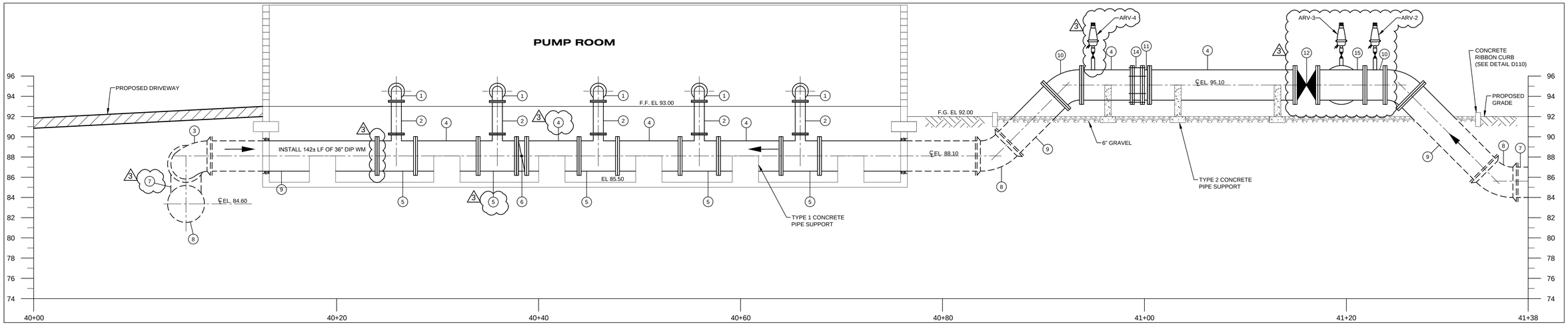
DAVID E. MAHLER
PROFESSIONAL ENGINEER
FLORIDA LICENSE #50041

OCU FILE NO.: 74251
DESIGNED BY: NAU
DRAWN BY: DGH
CHECKED BY: DEM
CADD FILE: Sections.dwg

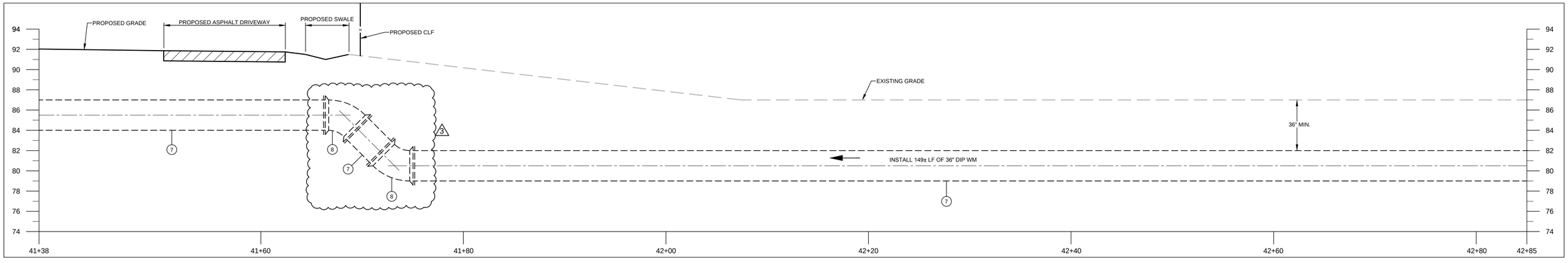
SCALE: 1" = 5'
DRAWING NO.: C105
SHEET: 11 OF 49

PIPE. FITTINGS AND EQUIPMENT LEGEND

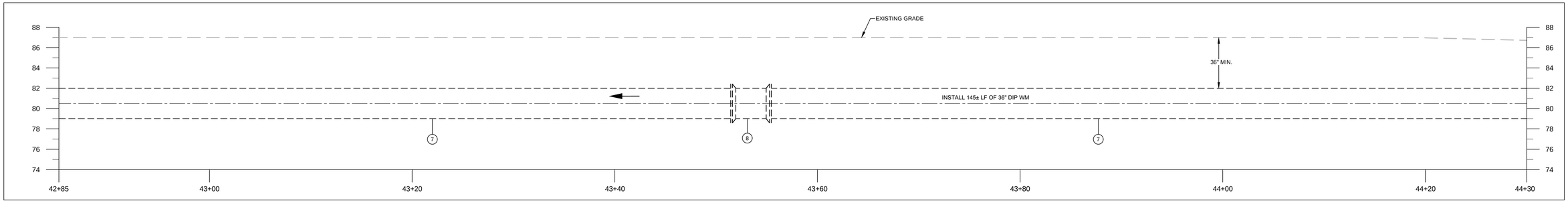
1. 12" DI. 90° BEND (FLG.)
2. 12" DIP. SPOOL PIECE, LENGTH AS REQUIRED (FLG.)
3. 36" DI. 90° BEND (MJ.) ROTATED AT 45°
4. 36" DIP. SPOOL PIECE, LENGTH AS REQUIRED (FLG.)
5. 36" x 12" DI. TEE (FLG.)
6. 36" BUTTERFLY VALVE (MJ.)
7. 36" DIP. SPOOL PIECE, LENGTH AS REQUIRED (MJ.)
8. 36" DI. 45° BEND (MJ.)
9. 36" DIP. SPOOL PIECE, LENGTH AS REQUIRED (FLG. x PE.)
10. 36" DI. 45° BEND (FLG.)
11. 36" STATIC MIXER (FLG.)
12. 36" GATE VALVE (FLG.)
13. ~~36" DI. TEE (MJ.)~~
14. 36" COUPLING ADAPTER (FLG.)
15. 36" D.I. TEE (FLG.)



ELEVATION, FT. (TYP.)
CONTINUED BELOW



BELOW CONTINUED



FOR CONTINUATION
SEE DRAWING C107

BID SET

REV	DATE	DESCRIPTION
3	7/6/2016	ADDENDUM 3

LINE IS 2 INCHES
AT FULL SIZE
(IF NOT SCALE ACCORDINGLY)

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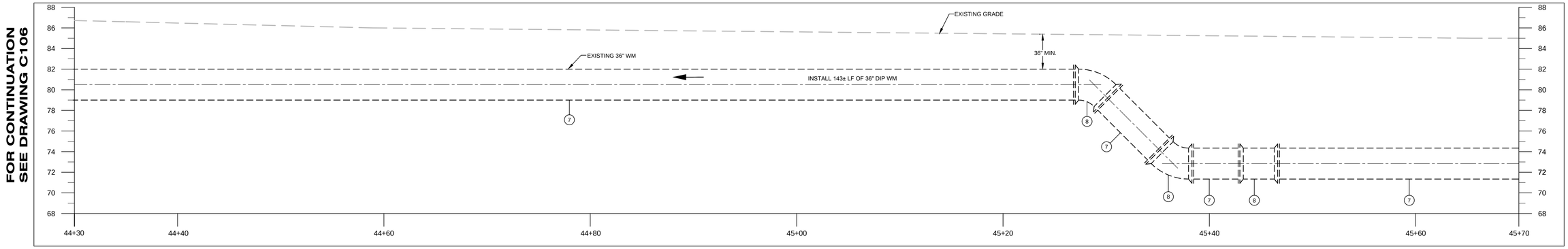
Lndscp. Lic. No. LC0000298

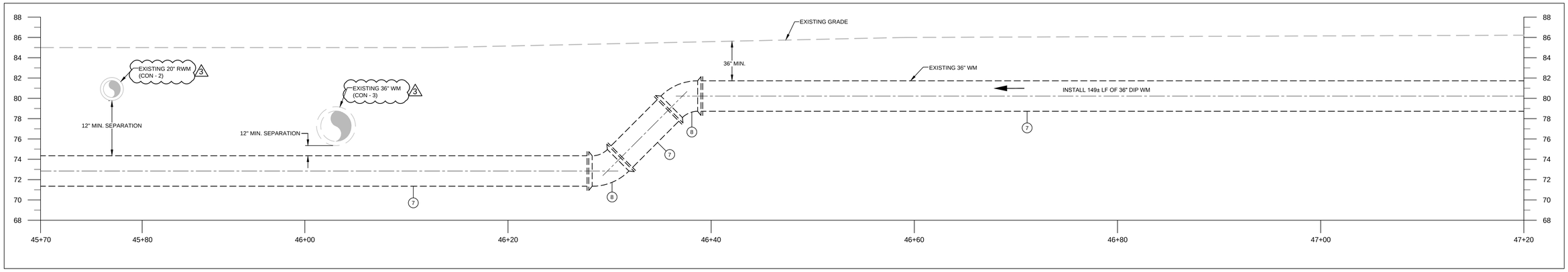
SUPPLY LINE PROFILE

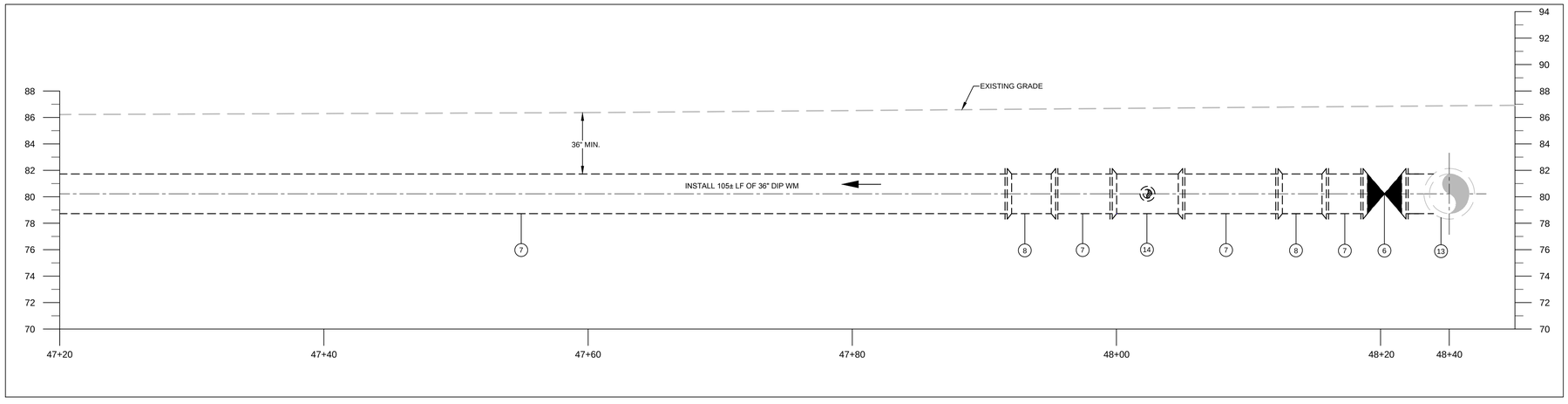
DAVID E. MAHLER
PROFESSIONAL ENGINEER
FLORIDA LICENSE #50041

OCU FILE NO.: 74251
DESIGNED BY: NAU
DRAWN BY: DGH/GCM
CHECKED BY: DEM
CADD FILE: Supply line Profile.dwg

SCALE: 1" = 5'
DRAWING NO. : C106
SHEET: 12 OF 49







PIPE. FITTINGS AND EQUIPMENT LEGEND

3
- ~~1 12" DI. 90° BEND (FLG.)~~
- ~~2 12" DIP. SPOOL PIECE, LENGTH AS REQUIRED (FLG.)~~
- ~~3 36" DI. PLUG (MJ.)~~
- ~~4 36" DIP. SPOOL PIECE, LENGTH AS REQUIRED (FLG.)~~
- ~~5 36" DI. TEE (FLG.)~~
- 6 36" TAPPING VALVE (MJ.) MOTORIZED
- 7 36" DIP. SPOOL PIECE, LENGTH AS REQUIRED (MJ.)

3
- 8 36" DI. 45° BEND (MJ.)
- ~~9 36" DIP. SPOOL PIECE, LENGTH AS REQUIRED (FLG. x PE.)~~
- ~~10 36" DI. 45° BEND (FLG.)~~
- ~~11 36" STATIC MIXER (FLG.)~~
- ~~12 36" GATE VALVE (FLG.)~~
- 13 36" DI. TAPPING SLEEVE (MJ.)
- 14 36" x 8" DI. TEE (MJ.)

BID SET

REV	DATE	DESCRIPTION
3	7/6/2016	ADDENDUM 3

LINE IS 2 INCHES
AT FULL SIZE
(IF NOT SCALE ACCORDINGLY)

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Arch. Lic. No. AA2600926
Lndscp. Lic. No. LC0000298

SUPPLY LINE PROFILE

DAVID E. MAHLER
PROFESSIONAL ENGINEER
FLORIDA LICENSE #50041

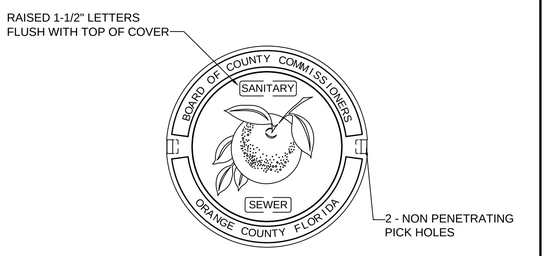
OCU FILE NO.: 74251
DESIGNED BY: NAU
DRAWN BY: DGH
CHECKED BY: DEM
CADD FILE: Profile.dwg

SCALE: 1" = 5'
DRAWING NO. : C107
SHEET: 13 OF 49

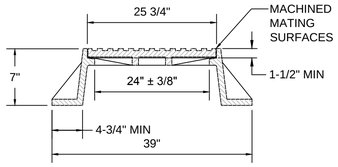
ORANGE COUNTY UTILITIES
STANDARDS AND CONSTRUCTION SPECIFICATIONS MANUAL

APPENDIX A **STANDARD DRAWINGS** **GENERAL**

DATE: February 11, 2011 **STANDARD MANHOLE FRAME AND COVER** **FIGURE A304**



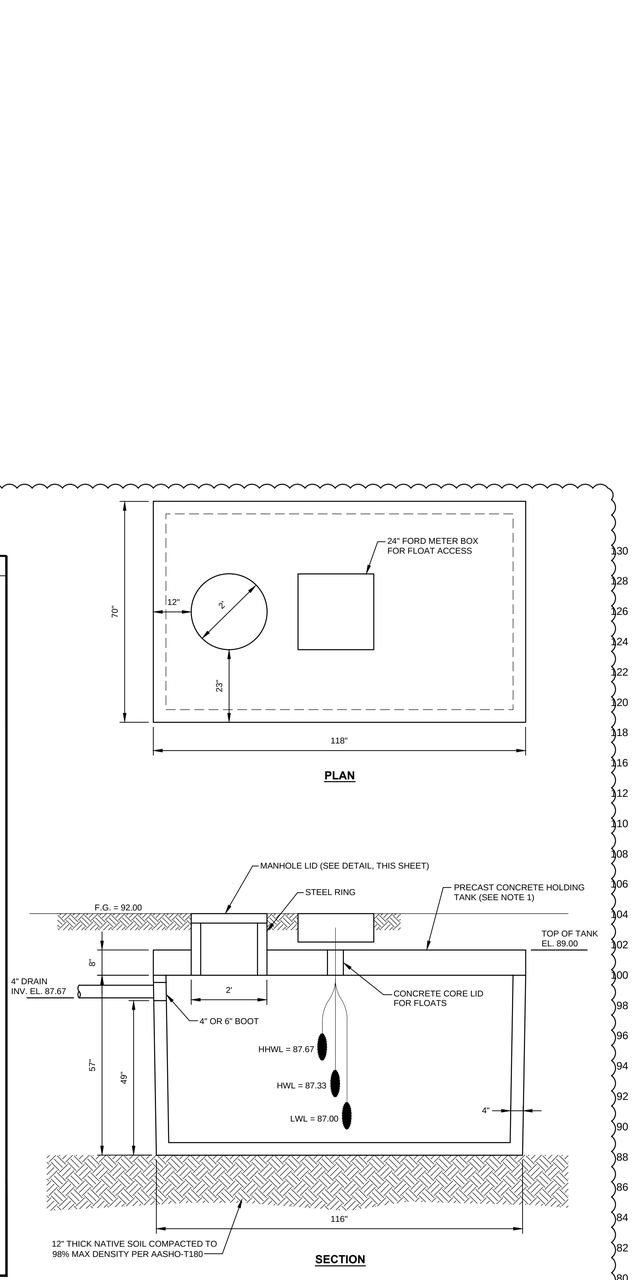
PLAN



ELEVATION

NOTES:
1. ONLY APPLIES TO UTILITIES OWNED AND MAINTAINED MANHOLES. "ORANGE COUNTY" SHALL NOT APPEAR ON PRIVATE MANHOLES.

PLAN



SECTION

NOTES

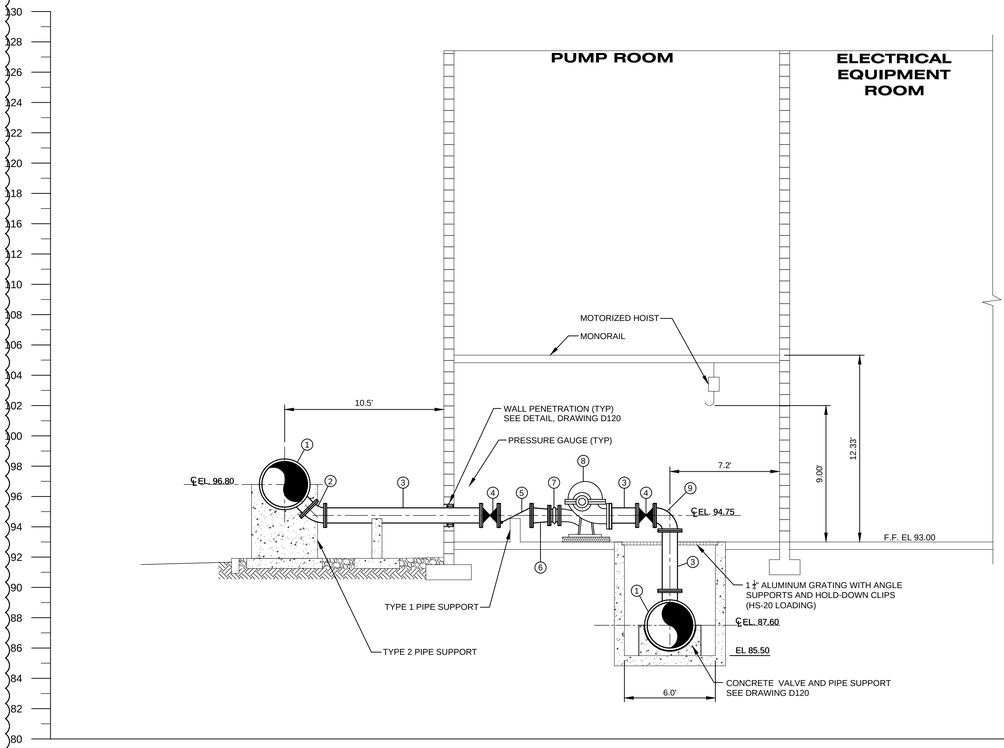
1. PROVIDE PRECAST CONCRETE TANK WITH THE FLORIDA DEPARTMENT OF HEALTH'S DESIGNATED APPROVAL (FDOH #48-029-130-C4) BY A&L SEPTIC WITH H-20 TRAFFIC RATED LID.

3 1200 GAL HOLDING TANK

NOT TO SCALE

PIPE FITTINGS AND EQUIPMENT LEGEND

1. 36" x 12" DI. TEE (FLG.)
2. 12" DI. 45° BEND (FLG.)
3. 12" DIP. SPOOL PIECE, LENGTH AS REQUIRED (FLG.)
4. 12" GATE VALVE (FLG.)
5. 12" CHECK VALVE
6. 12" x 10" DI. REDUCER (FLG.)
7. 10" EXPANSION JOINT / COUPLING
8. PUMP
9. 12" DI. 90° BEND (FLG.)



SECTION

SCALE: 1: = 5'

A C103/C108

BID SET

REV	DATE	DESCRIPTION
3	7/6/2016	ADDENDUM 3

LINE IS 2 INCHES
AT FULL SIZE
(IF NOT SCALE ACCORDINGLY)

ORANGE COUNTY GOVERNMENT FLORIDA

ORANGE COUNTY UTILITIES DEPARTMENT ENGINEERING DIVISION
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Lndscp. Lic. No. LC0000298
1117 East Robinson Street ~ Orlando, FL 32801 ~ Phone: 407.425.0452

SECTIONS
INTERNATIONAL DRIVE POTABLE WATER
BOOSTER PUMP STATION

DAVID E. MAHLER
PROFESSIONAL ENGINEER
FLORIDA LICENSE #50041

OCU FILE NO.: 74251
DESIGNED BY: NAU
DRAWN BY: GCM
CHECKED BY: DEM
CADD FILE: Sections.dwg

SCALE: 1" = 5'
DRAWING NO.: C108
SHEET: 14 OF 49

DATE: February 11, 2011

SEPARATION REQUIREMENTS FOR WATER, WASTEWATER AND RECLAIMED WATER MAINS

FIGURE A116

HORIZONTAL & VERTICAL SEPARATION REQUIREMENTS								
PROPOSED UTILITY	POTABLE WATER		RECLAIMED WATER		WASTEWATER (GRAVITY & FM)		STORM SEWER	
	HORIZ	VERT	HORIZ	VERT	HORIZ	VERT	HORIZ	VERT
POTABLE WATER	3' NOTE 1	12"	3' NOTE 1 & 3	12" NOTE 3	6' NOTE 3	12" NOTE 3	3' NOTE 1 & 3	12"/18" NOTE 2 & 3
RECLAIMED WATER	3' NOTE 1 & 3	12" NOTE 3	3' NOTE 1	12"	3' NOTE 1	12"	3' NOTE 1	12"/18" NOTE 2
WASTEWATER (GRAVITY AND FM)	6' NOTE 3	12" NOTE 3	3' NOTE 1	12"	3' NOTE 1	12"	3' NOTE 1	12"/18" NOTE 2
RIGHT OF WAY	3' NOTE 1	N/A	3' NOTE 1	N/A	3' NOTE 1	N/A	N/A	N/A

NOTES:

1. THIS SEPARATION REQUIREMENT IS TO PROVIDE ACCESSIBILITY FOR CONSTRUCTION AND MAINTENANCE. THREE FEET OF HORIZONTAL SEPARATION IS THE MINIMUM FOR PIPES WITH THREE FEET OF COVER. FOR PIPES INSTALLED AT GREATER DEPTHS, PROVIDE AN ADDITIONAL FOOT OF SEPARATION FOR EACH ADDITIONAL FOOT OF DEPTH.
2. THE 18-INCH SEPARATION REQUIREMENT APPLIES WHEN THE STORM PIPE CROSSES ABOVE THE OCU MAIN, AND WHEN THE STORM PIPE HAS A DIAMETER EQUAL TO OR GREATER THAN 24 INCHES. OTHERWISE, THE REQUIRED SEPARATION IS 12 INCHES.
3. THIS SEPARATION REQUIREMENT COMPLIES WITH MINIMUM FDEP SEPARATION REQUIREMENTS OUTLINED IN 62-555.314, FAC. VARIANCES FROM THE FDEP REQUIREMENTS MUST COMPLY WITH 62-555.314(5), FAC AND MUST BE APPROVED INDIVIDUALLY BY BOTH FDEP AND OCU.
4. DISTANCES GIVEN ARE FROM OUTSIDE OF PIPE TO OUTSIDE OF PIPE.
5. NO WATER PIPE SHALL PASS THROUGH OR COME IN CONTACT WITH ANY PART OF SANITARY OR STORM WATER MANHOLE OR STRUCTURE.

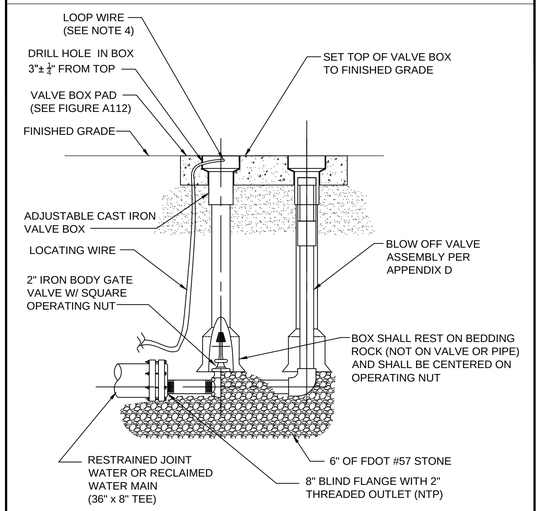
ORANGE COUNTY UTILITIES
STANDARDS AND CONSTRUCTION SPECIFICATIONS MANUAL

APPENDIX A STANDARD DRAWINGS GENERAL

DATE: February 11, 2011

PERMANENT BLOW OFF VALVE, MANUALLY OPERATED, WATER AND RECLAIMED WATER

FIGURE A122-1



NOTES:

1. INSTALL MANUFACTURED BLOW OFF BOXES AS DEPICTED IN APPENDIX D. BRING VALVE BOX TO GRADE AND INSTALL CONCRETE COLLAR.
2. FOR USE AT PERMANENT WATER AND RECLAIMED WATER DEAD-ENDS, SUCH AS CUL-DE-SACS.
3. LOCATING WIRE SHALL BE CONTINUOUS INSIDE THE VALVE BOX AND SHALL EXTEND 12" ABOVE TOP OF COLLAR. WIRE SHALL BE COLOR CODED TO MATCH THE UTILITY INSTALLED.

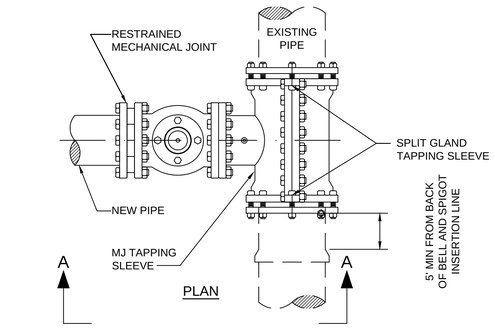
ORANGE COUNTY UTILITIES
STANDARDS AND CONSTRUCTION SPECIFICATIONS MANUAL

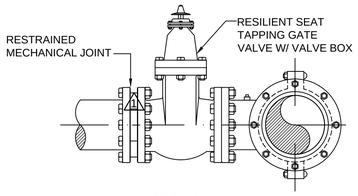
APPENDIX A STANDARD DRAWINGS GENERAL

DATE: February 11, 2011

MJ TAPPING SLEEVE AND GATE VALVE ASSEMBLY FOR WATER AND RECLAIMED WATER

FIGURE A121-1





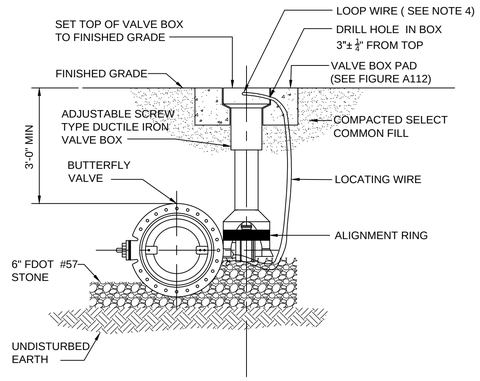
ORANGE COUNTY UTILITIES
STANDARDS AND CONSTRUCTION SPECIFICATIONS MANUAL

APPENDIX A STANDARD DRAWINGS GENERAL

DATE: February 11, 2011

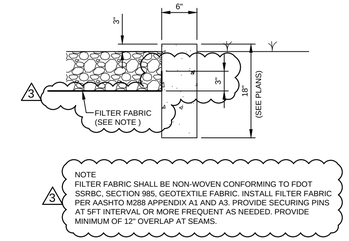
BUTTERFLY VALVE AND BOX WATER AND RECLAIMED WATER MAINS

FIGURE A108



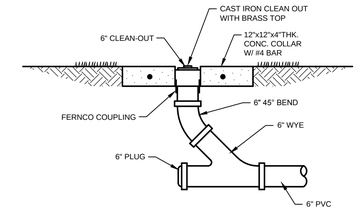
NOTES:

1. PVC PIPE OR DUCTILE IRON PIPE EXTENSIONS SHALL NOT BE USED ON VALVE BOX INSTALLATION.
2. THE VALVE ACTUATING NUT SHALL BE EXTENDED TO BE WITHIN 3' OF FINISHED GRADE.
3. PROVIDE A PLASTIC DEBRIS SHIELD / ALIGNMENT RING WHICH INSTALLS BELOW THE VALVE ACTUATING NUT. THIS SHIELD SHALL CENTER THE RISER PIPE BOX OVER THE ACTUATING NUT AND MINIMIZE INFILTRATION.
4. LOCATING WIRE SHALL BE CONTINUOUS WITH NO SPLICES AND SHALL EXTEND 12" ABOVE TOP OF COLLAR. WIRE SHALL BE COLOR CODED TO MATCH THE UTILITY INSTALLED.
5. FOR NEW CONSTRUCTION, THE VALVE BOX SHALL BE ADJUSTED TO MIDRANGE TO ALLOW FOR FUTURE BOX ADJUSTMENTS.
6. REFER TO FIGURE A111 FOR INSTALLATIONS AT A DEPTH OF 6' OR GREATER.



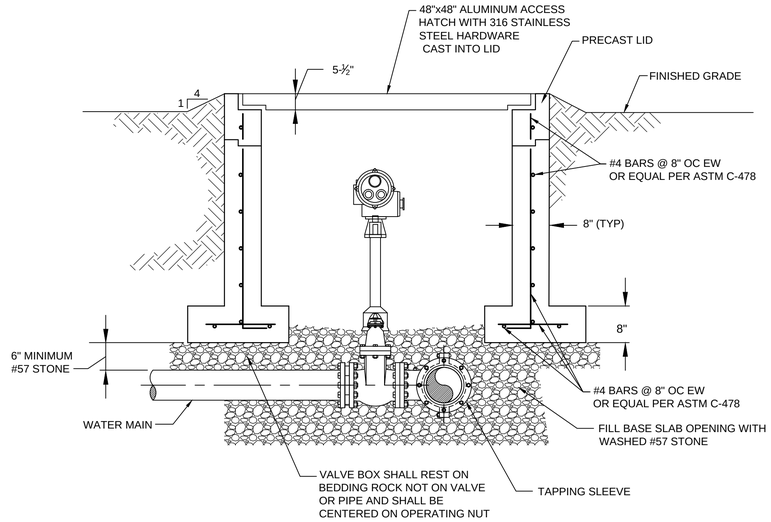
RIBBON CURB DETAIL

SCALE: NONE



CLEAN OUT DETAIL

SCALE: NONE

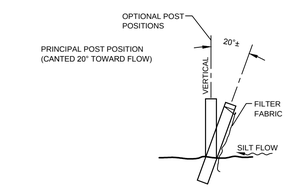


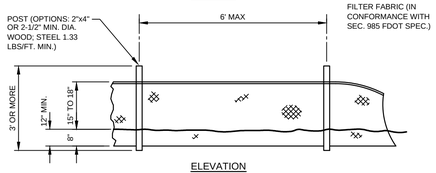
NOTES:

1. EXTENSIONS SHALL USE C-900 OR DIP ON VALVE BOX INSTALLATION.
2. BEDDING MATERIAL SHALL CONFORM TO FDOT NO. 57 AGGREGATE.

GATE VALVE W/ MOTOR ACTUATOR DETAIL

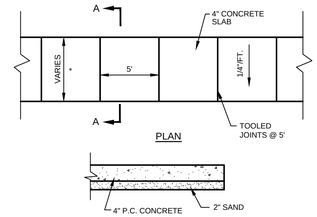
SCALE: NONE





TYPE III SILT FENCE DETAIL

SCALE: N.T.S.



NOTES:

1. 3/4"x4" PREMOLDED EXPANSION MATERIALS AROUND P.P. OR OTHER STRUCTURES IN WALK.
2. EXPANSION JOINTS MAXIMUM DISTANCE = 100', USED 3/4"x4" PREMOLDED EXPANSION MATERIAL.
3. CONTRACTION JOINTS MAXIMUM DISTANCE = 21', SAW CUT 2" DEEP AND FILL WITH HOT POURED SEALER.
4. SAW CUT JOINTS WITHIN 24 HOURS.

CONCRETE SIDEWALK DETAIL

SCALE: NONE

BID SET

REV	DATE	DESCRIPTION
3	7/6/2016	ADDENDUM 3

LINE IS 2 INCHES
AT FULL SIZE
(IF NOT SCALE ACCORDINGLY)

ORANGE COUNTY GOVERNMENT FLORIDA

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CONSTRUCTION DETAILS
INTERNATIONAL DRIVE POTABLE WATER BOOSTER PUMP STATION

ALLEN C. LANE, JR.
PROFESSIONAL ENGINEER
FLORIDA LICENSE #60144

OCU FILE NO.: 74251
DESIGNED BY: NAU
DRAWN BY: DGH/GCM
CHECKED BY: ACL
CADD FILE: Details.dwg

SCALE: NONE
DRAWING NO. : D110
SHEET: 16 OF 49

FITTINGS

ID Number	Plan Sheet #	Easting	Northing	Elevation	Main Type	Fitting Type	Size	Comments
WM-1	C104	502748.74	1462449.19		Water Main	Bend 45˚	36"	
WM-2	C104	502741.33	1462458.26		Water Main	Tee	36"x 8"	
WM-3	C104	502734.56	1462463.38		Water Main	Bend 45˚	36"	
WM-4	C104	502878.04	1462463.37		Water Main	Bend 45˚	36"	
WM-5	C104	502572.27	1462463.38		Water Main	Bend 45˚	36"	
WM-6	C104	502485.41	1462463.37		Water Main	Bend 45˚	36"	
WM-7	C104	502478.36	1462456.33		Water Main	Bend 45˚	36"	
WM-8	C104	502474.08	1462452.05		Water Main	Bend 45˚	36"	
WM-9	C104	502350.10	1462328.07		Water Main	Bend 45˚	36"	
WM-10	C103	502116.16	1462328.07		Water Main	Tee	36"	
WM-11	C103	502130.04	1462328.03		Water Main	Bend 45˚	36"	
WM-12	C103	502122.92	1462328.03		Water Main	Bend 45˚	36"	
WM-13	C103	502103.20	1462328.07		Water Main	Bend 45˚	36"	
WM-14	C103	502098.71	1462328.07		Water Main	Bend 90˚	36"	
FCA-1	C103	502095.88	1462328.06		Water Main	Flg Cplg Adapter	36"	
WM-15	C103	502087.61	1462328.07		Water Main	Bend 45˚	36"	
WM-16	C103	502080.30	1462328.07		Water Main	Bend 45˚	36"	
WM-17	C103	502062.57	1462328.07		Water Main	Tee	36"x12"	
WM-18	C103	502062.57	1462328.07		Water Main	Bend 90˚	12"	
WM-19	C103	502062.57	1462329.17		Water Main	Blind Flange	12"	
WM-20	C103	502052.57	1462328.07		Water Main	Tee	36"x12"	
WM-21	C103	502052.57	1462328.07		Water Main	Bend 90˚	12"	
WM-22	C103	502052.57	1462329.17		Water Main	Blind Flange	12"	
WM-23	C103	502042.57	1462328.07		Water Main	Tee	36"x12"	
WM-24	C103	502042.57	1462328.07		Water Main	Bend 90˚	12"	
WM-25	C103	502032.57	1462328.07		Water Main	Tee	36"x12"	
WM-26	C103	502032.57	1462328.07		Water Main	Bend 90˚	12"	
WM-27	C103	502022.57	1462328.07		Water Main	Tee	36"x12"	
WM-28	C103	502022.57	1462328.07		Water Main	Bend 90˚	12"	
~~WM-29~~	~~C103~~	~~502020.47~~	~~1462328.07~~		~~Water Main~~	~~Blind Flange~~	~~36"~~	REMOVED
~~WM-30~~	~~C103~~	~~502022.57~~	~~1462329.17~~		~~Water Main~~	~~Blind Flange~~	~~12"~~	REMOVED
WM-31	C103	502022.57	1462339.27		Water Main	Blind Flange	12"	
WM-32	C103	502032.57	1462335.80		Water Main	Expansion Cplg	10"	
WM-33	C103	502032.57	1462336.50		Water Main	Reducer	12"x10"	
WM-34	C103	502042.57	1462335.59		Water Main	Expansion Cplg	10"	
WM-35	C103	502042.57	1462336.70		Water Main	Reducer	12"x10"	
WM-36	C103	502052.57	1462339.36		Water Main	Blind Flange	12"	
WM-37	C103	502062.57	1462339.36		Water Main	Blind Flange	12"	
WM-38	C103	502022.57	1462351.35		Water Main	Bend 45˚	12"	
WM-39	C103	502022.57	1462353.57		Water Main	Tee	36"x12"	
WM-40	C103	502014.40	1462353.57		Water Main	Blind Flange	36"	
WM-41	C103	502032.57	1462351.35		Water Main	Bend 45˚	12"	
WM-42	C103	502032.57	1462353.57		Water Main	Tee	36"x12"	
WM-43	C103	502042.57	1462351.35		Water Main	Bend 45˚	12"	
WM-44	C103	502042.57	1462353.57		Water Main	Tee	36"x12"	
WM-45	C103	502052.57	1462351.35		Water Main	Bend 45˚	12"	
WM-46	C103	502052.57	1462353.57		Water Main	Tee	36"x12"	
WM-47	C103	502062.57	1462351.41		Water Main	Bend 45˚	12"	
WM-48	C103	502062.57	1462353.57		Water Main	Tee	36"x12"	
WM-49	C103	502079.44	1462353.57		Water Main	Ecc. Reducer	36"x24"	
WM-50	C103	502099.90	1462353.57		Water Main	Ecc. Reducer	36"x24"	
FCA-2	C103	502091.33	1462353.57		Water Main	Flg Cplg Adapter	24"	
~~WM-51~~	~~C103~~	~~502103.95~~	~~1462353.57~~		~~Water Main~~	~~Bend 45˚~~	~~36"~~	Removed
~~WM-52~~	~~C103~~	~~502119.82~~	~~1462353.57~~		~~Water Main~~	~~Bend 45˚~~	~~36"~~	Removed
~~WM-53~~	~~C103~~	~~502134.57~~	~~146238.07~~		~~Water Main~~	~~Tee~~	~~36"~~	Removed
WM-54	C104	502358.63	1462353.57		Water Main	Bend 45˚	36"	
WM-55	C104	502483.86	1462478.85		Water Main	Bend 45˚	36"	
WM-56	C104	502490.28	1462478.81		Water Main	Bend 11-1/4˚	36"	
WM-57	C104	502532.74	1462471.84		Water Main	Tee	36"x8"	
WM-58	C103	501934.59	1462396.33		Water Main	Bend 45˚	36"	
WM-59	C103	501930.74	1462396.33		Water Main	Bend 45˚	36"	
WM-60	C103	501990.64	1462396.33		Water Main	Bend 45˚	36"	
WM-61	C103	501990.64	1462396.34		Water Main	Bend 45˚	36"	
WM-62	C103	502000.33	1462396.33		Water Main	Bend 90˚	36"	
WM-63	C103	502107.61	1462353.57		Water Main	Tee	36"x6"	
WM-64	C103	502107.61	1462359.33		Water Main	Bend 90˚	6"	
WM-65	C105	502122.83	142353.57		Water Main	Tee	36"	
WM-66	C105	502122.83	1462353.57		Water Main	Bend 90˚	36"	
WM-67	C105	502191.26	1462353.57		Water Main	Bend 45˚	36"	
WM-68	C105	502195.64	1462353.57		Water Main	Bend 45˚	36"	
WM-69	C105	502164.41	1462328.07		Water Main	Bend 45˚	36"	
WM-70	C104	502164.41	1462328.06		Water Main	Bend 45˚	36"	
WM-71	C105	502107.61	1462353.57		Water Main	Bend 90˚	6"	
WM-72	C103	502116.16	1462353.57		Water Main	Tee	36"	

CLEANOUTS

ID Number	Plan Sheet #	Easting	Northing	Elevation	Comments
CO-1	C103	502088.97	1462316.86		6" Gravity Sewer

METERS

ID Number	Plan Sheet #	Easting	Northing	Elevation	Main Type	Comments
MM-1	C-103	502093.11	1462353.57		Water Main	24" Magmeter
MM-2	C-103	502078.70	1462333.39		Water Main	2" Water Meter

EXISTING OC UTILITY CROSSING

ID Number	Plan Sheet #	Easting	Northing	Existing Pipe Elevation	Proposed Crossing Elevation	Existing Main Type	Comments
Confl-1	C105	502516.65	1462473.56	80.0	79.00	20" Reclaimed Water Main	
Confl-2	C107	502514.91	1462461.88	80.0	71.80	20" Reclaimed Water Main	
Confl-3	C107	502542.84	1462461.88	75.5	71.80	36" Water Main	

PUMP STATION

ID Number	Plan Sheet #	Easting	Northing	Elevation	Manufacturer	Comments
Corner-1	C102	502009.33	1462342.98			NW Building Corner
Corner-2	C102	502073.18	1462342.99			NE Building Corner
Corner-3	C102	502009.33	1462303.33			SW Building Corner
Corner-4	C102	502073.19	1462303.33			SE Building Corner
P-2	C103	502032.57	1462333.82			Pump 2
P-3	C103	502042.57	1462333.82			Pump 3

VALVES

ID Number	Plan Sheet #	Easting	Northing	Elevation	Valve Type	Main Type	Valve Size	Valve Manufacturer	Valve Model #	# of Turns to Close	Gear Actuator	Gear Ratio	Side Actuator	Actuator Manufacturer	Comments
MOV-1	C104	502694.50	1462436.83		Motorized GV	Water Main	36"								
MOV-2	C104	502748.74	1462438.00		Motorized GV	Water Main	36"								
MOV-3	C104	502544.76	1462469.87		Motorized GV	Water Main	36"								
CV-1	C103	502130.21	1462340.87		Check Valve	Water Main	36"								
GV-1	C103	502112.68	1462328.07		Gate Valve	Water Main	36"								
BFV-1	C103	502034.98	1462328.07		Butterfly Valve	Water Main	36"								
GV-3	C103	502032.57	1462329.66		Gate Valve	Water Main	12"								
GV-4	C103	502042.57	1462329.66		Gate Valve	Water Main	12"								
CV-2	C103	502032.65	1462338.42		Check Valve	Water Main	12"								
CV-3	C103	502042.58	1462338.30		Check Valve	Water Main	12"								
GV-5	C103	502022.57	1462339.94		Gate Valve	Water Main	12"								
GV-6	C103	502032.57	1462339.94		Gate Valve	Water Main	12"								
GV-7	C103	502042.58	1462339.94		Gate Valve	Water Main	12"								
GV-8	C103	502052.58	1462339.95		Gate Valve	Water Main	12"								
GV-9	C103	502062.58	1462339.95		Gate Valve	Water Main	12"								
GV-10	C103	502068.92	1462350.47		Gate Valve	Water Main	2"								
GV-11	C103	502073.44	1462353.57		Gate Valve	Water Main	36"								
GV-12	C103	502010.92	1462317.25		Gate Valve	Water Main	1-1/2"								
GV-13	C103	501994.70	1462359.33		Gate Valve	Water Main	6"								
PV-1	C103	502102.60	1462295.51		Plug Valve	Force Main	4"								
BO-1	C104	502743.18	1462459.76		Blow-off Valve	Water Main	2"								
BO-2	C104	502531.76	1462465.79		Blow-off Valve	Water Main	2"								
GV-14	C103	202071.17	1462345.28		Gate Valve	Water Main	1"								
ARV-1	C103	502122.83	1462353.57		Air Release Valve	Water Main	2"								
GV-15	C103	502010.92	1462317.24		Gate Valve	Water Main	1-1/2"								
BV-1	C103	502096.63	1462325.15		Ball Valve	Water Main	2"								
BV-2	C103	502096.63	1462330.88		Ball Valve	Water Main	2"								
BFP-1	C103	502078.70	1462336.55		Backflow Preventer	Water Main	2"								
ARV-2	C103	502119.50	1462328.07		Air Release Valve	Water Main	2"								
ARV-3	C103	502116.16	1462337.08		Air Release Valve	Water Main	2"								
ARV-4	C103	502091.19	1462328.07		Air Release Valve	Water Main	2"								

BID SET

REV	DATE	DESCRIPTION
3	7/6/2016	ADDENDUM 3

LINE IS 2 INCHES
AT FULL SIZE
(IF NOT SCALE ACCORDINGLY)

ORANGE COUNTY GOVERNMENT FLORIDA

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1117 East Robinson Street ~ Orlando, FL 32801 ~ Phone: 407.425.0452

ASSET TABLE

DAVID E. MAHLER
PROFESSIONAL ENGINEER
FLORIDA LICENSE #50041

OCU FILE NO.: 74251
DESIGNED BY: NAU
DRAWN BY: GCM
CHECKED BY: DEM
CADD FILE: Asset Table.dwg

SCALE: NONE
DRAWING NO. :
X100
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