

SECTION V - RECLAIMED WATER SYSTEM

A. GENERAL REQUIREMENTS

The design and construction of reclaimed water facilities shall be based on the criteria outlined in Chapter 62-610 Florida Administrative Code. Supplemental specifications for individual components of the reclaimed system will be provided to the EOR at the pre-engineering meeting.

1. PIPE

All materials, fittings and appurtenances intended for use in pressure pipe systems shall be designed and constructed for a minimum working pressure of 150 psi unless the specific application dictates a higher working pressure requirement.

- a. All PVC pipe and fittings shall be factory color coded lavender.
- b. All pipe under paved areas (roadway, parking lots, etc.); within public rights-of-way or privately dedicated roadway easements shall be ductile iron pipe. All below grade DIP shall have lavender stripes applied to the pipe wall. Pipe striped during manufacturing of the pipe shall have continuous stripes that run parallel to the axis of the pipe, that are located at no greater than 90-degree intervals around the pipe, and that will remain intact during and after installation of the pipe. If tape is used to stripe pipe during installation of the pipe, the tape shall be applied in a continuous line that runs parallel to the axis of the pipe and that is located along the top of the pipe; for pipes with an internal diameter of 24 inches or greater, tape shall be applied in continuous lines along each side of the pipe as well as along the top of the pipe. Field painting is not acceptable.

Where acceptable, if used, C900 shall be lavender in color.

- c. Ductile iron pipe shall be Class 51 for sizes up to and including 12 inch and Pressure Class 350 for pipe sizes larger than 12 inch and shall conform to ANSI A21.51 and AWWA C-151. Pipe interior shall have a cement mortar lining.
- d. Flanged pipe shall be cement lined and shall have a minimum wall thickness of 0.32 for 4 inch pipe and incremental increases of 0.02 in thickness for each increase in pipe size up to and including 14 inch. Flanged pipe over 14 inches shall require shop drawing submittal to Authority for approval. All above ground DIP shall be coated as outlined in Section II.
- e. In some installations the use of PVC pipe for underground installation will be acceptable. PVC pipe shall conform to the requirements of SDR 18, ASTM D 2241/AWWA C-900, Latest Revision. Joints shall be rubber gasket type. Solvent welds will not be permitted on PVC pipe four inches and larger.
- f. Contractor shall maintain a minimum of five feet separation between reclaimed mains and force mains or potable water mains.

- g. Where reclaimed mains cross over water mains, that portion of the reclaimed main shall be constructed of ductile iron pipe and centered so that joints are a minimum of ten feet away.
- h. Contractor shall install a locating tape, capable of being located with standard metal locating devices. Tape shall be installed twenty-four inches above reclaimed lines and shall have the words "reclaimed water" printed thereon at one foot intervals. Tape shall be continuous between fittings, valves, etc.

2. FITTINGS

- a. All pressure pipe fittings of size four inch inside diameter and larger shall be ductile iron fittings with mechanical joints, unless the plans specifically call for flanged joints, restrained joints, etc. Mechanical joint fittings shall be used for buried installations. Flanged joints shall be used for above ground service. Fittings shall conform to requirements of ANSI A21.20 and AWWA C-110 and lined inside and outside as specified for the pipe.
- b. Full-face neoprene gaskets shall be used on all flanged connections. The use of other materials is not permitted.
- c. Provide thrust blocks using 2,500 psi at 28 days minimum concrete for reclaimed mains at each fitting per detail shown on construction drawings.

3. VALVES

- a. Manual throttling valves on metering facilities shall be butterfly valves in accordance with AWWA Standard C-504 and shall be Class 150A.
- b. Adjustable cast iron valve boxes with covers marked "reclaimed water" shall be provided for all valves installed underground. The boxes shall be adjustable to fit the depth of earth cover over the valve and shall be designed and installed so as to prevent the transmission of surface loads directly to the valve or piping.
- c. Valve boxes shall be carefully centered over the operating nuts of the plug valves so as to permit a valve key to be easily fitted to the operating nut. The tops of valve boxes shall be set flush with finished grade, with allowance made for the settlement of surrounding backfill or surface. An 8 inch thick concrete collar shall surround the top of the valve box, as shown on Authority's Underground Valve Installation Construction Detail Drawing.
- d. Where valves are deeper than 36 inches an extension is required to bring the operating nut within 24 inches of finished grade.
- e. Air release valves installed below grade shall be of the manual type unless otherwise specified by the Authority. Air release valves shall be installed in a concrete manhole as shown in the detail and conform to manhole requirements as outlined in Section IV D.

4. METERS

- a. Meter shall be flanged tube propeller type rated for 150 psi manufactured by Water Specialties Model M6-04 with TR-16 transmitter or approved equal.
- b. Flow transmitter to have 4-20 mA analog output.

5. TELEMETRY

- a. Telemetry hardware and conduit will conform as specified in control panel requirements. Telemetry system shall be compatible with Authority's central control receiving station manufactured by Data Flow Systems, Inc.
- b. RTU antenna requirements shall be as shown on Authority's Construction Detail Drawing No. 67.

6. CONTROL PANEL

- a. 316 Stainless steel modified NEMA-12 control Panel manufactured by Hoffman or approved equal with dripshield along complete top of panel. Provide 3 point padlocking handles with accessories and doorstop kit. Provide two extra bolted clips on front edge of door panel with all stainless steel hardware. An aluminum inner-hinged door shall contain all operators' controls and the dead front panel outside door shall be blank. Provide duct seal putty on all outgoing conduits to keep out corrosive gases.
- b. Control panel shall be mounted to two three (3) inch diameter aluminum pipe supports (6061-T6-Sch 40). Length of the pipe supports shall be sized so as to provide for 36 inches of burial (in 2500 psi concrete), and extend to three inches above the top of the supports. The panel shall be mounted to the pipe supports with 1 5/8" x 1 5/8" 12 gauge stainless steel unistrut at a height consistent with FP&L's requirements for mounting their meter. Paint below ground portion of supports with asphalt based paint to 3" above grade. All hardware shall be stainless steel.
- c. Provide a back mounting panel for heavy components including RTU.
- d. Panel shall be surface wired with numbered terminals. Terminal strip shall be located at least four (4) inches from the bottom of the enclosure for accessibility.
- e. All wiring shall be copper THWN. Shielded cable shall be Belden 8760 or approved equal.
- f. Panel shall be built by U.L. approved shop and adhere to U.L. label 508. Panel shall have a U.L. 508 label.
- g. Provide circuit breaker disconnecting NEMA-4X stainless steel enclosure outside the control panel. Disconnect shall be service entrance rated.
- h. Submit shop drawings on panel showing electrical schematics, layout, and parts list.

- i. Panel components shall be as listed. No substitutes shall be made without the pre approval of the Authority.
- j. Breakers shall be Square D Type QO.
- k. Pilot lights, selector switches and push buttons shall be Square D type K.
- l. Surge arrestor for power and lighting shall be Square D SDSA1175.

7. METERING FACILITY

- a. Metering facility shall be laid out in accordance with Authority specifications and details.
- b. Authority shall be provided with a perpetual easement to all metering sites. The minimum size shall be twenty feet by twelve feet. Dedicated easements for ingress and egress shall also be provided where necessary.
- c. All metering facilities shall be enclosed by fencing of the chain link design as shown on Authority's Typical Lift Station Site Plan Construction Detail Drawing.
- d. Developer/Contractor shall pay for all cost associated with having electrical power designed and installed to metering facility. This shall included any and all fees or CIAC which may be required and due to Florida Power and Light Company.

Developer/Contractor shall be responsible for all electric bills until Developer receives Final Letter of Acceptance from the Authority.

B. INSTRUMENTATION AND CONTROLS SPECIFICATIONS

1. SCOPE OF WORK

- a. The contractor shall furnish, install and place into service operating process instrumentation, control systems, and panels including accessories related to this project, all as shown on plans and specified herein.

2. INSTRUMENTATION AND CONTROLS

- a. The contractor shall be responsibility for the functional operation of all new instrumentation systems. The contractor shall perform all engineering necessary in order to select, furnish, program, supervise installation, connect, calibrate, and place into operation all sensors, instruments, control panels, accessories, and all other equipment as specified herein and as shown on Authority's layout detail and supplemental specifications.
- b. The PLC controller and radio receiver shall be mounted inside the control panel on the back mounting plate and shall be manufactured by Data Flow Systems, Inc. The panel shall be provided with battery back up, with sufficient input and output cards to provide the as specified monitoring and control signals shown, plus one spare of analog and discreet input and output signals.

- c. The valve shall be CLA-VAL Model 131-04/631-04 with X117D position indicator with solenoid shut off feature to close valve on loss of power and hydraulic pressure maintaining feature to maintain minimum upstream pressure. Valve shall be digitally modulated by a 110 VAC signal from the PLC. Provide an X117D position transmitter with a 4-20mA output to the local display of valve position and transmit a 4-20mA signal to the PLC controller.
- d. Flow rate indicator/totalizer shall be included in the panel.
- e. The lake level detector shall be a metritape Type La Sensor with Model 715 transmitter giving a 4-20mA output to the panel. Provide 24 volt power supply in panel and level readout meter, Red Lion Model IMP-APPOLO 4 1/2 Digit.
- f. For distances greater than 500 feet, signal shall be transmitted by radio signal utilizing separate Data Flow RTU and accessories.
- g. The incoming line pressure transmitter shall be Rosemont Smart differential pressure transmitter or approved equal with mounting brackets. It shall provide a 4-20mA signal using the panel 24 volt power supply.
- h. Surge arresters shall be provided for both ends of the lake level detector line and on lines from the flow meter and pressure transducer. Use EDCO panel and field devices.
- i. Contractor and panel supplier shall adhere to all applicable local codes and the National Electrical Code.

4. INSTALLATION

- a. Contractor shall provide the services of Data Flow Systems, Inc. to check the telemetry components of the panel and to program the PLC, and the central unit. Telemetry supplier shall also provide the antenna and antenna tower.
- b. The specifications shall not be construed as requiring the contractor to utilize personnel supplied by his assigned instrument manufacturer's organization, or any division thereof, to accomplish the physical installation of any elements, instruments, accessories or assemblies specified herein. However, the contractor shall employ installers who are skilled and experienced in the installation and connection of all elements, instruments, accessories and assemblies.

5. SHOP DRAWING SUBMITTALS

- a. The contractor shall submit detailed shop drawings and data. Interface between instruments, control panel and PLC shall be included in the shop drawing submittal. The quantity of submittal sets required shall be six (6). These drawings and data shall be submitted as a complete bound package and shall include:
- b. Drawings showing definite diagrams are required for every instrumentation loop system.

- c. Data sheets for each component must be submitted together with a technical product brochure or bulletin (this includes electronic indicator, manual setpoint station, helical wire resistance level system, panel enclosure and all other devices or equipment which will be used).
- d. Drawings showing both schematic and wiring diagrams are required for all control circuits.

6. ADDITIONAL TECHNICAL SERVICES

- a. The contractor shall provide the services of a qualified technical representative to supervise installation and connection of all instruments, elements, and components of every system, including connection of instrument signals to primary measurement elements and to final control elements such as; valves, level sensors, and flow meters.
- b. Instruct plant operating and maintenance personnel on instrumentation. This time shall be in addition to whatever time is required for other facets of work at the site, and shall be during Authority's normal working days and hours.
- c. Supply four (4) copies of the Operations and Maintenance manuals on all components.

7. METER STATION TESTING AND STARTUP

- a. After all systems specified in this section are installed, connected, calibrated and tested, the contractor shall schedule a start up of the metering facility with EOR, Authority and all necessary manufacturer's representatives.
- b. All systems shall be exercised through operational tests in the presence of the EOR and Authority to demonstrate achievement of the specified performance. The scheduling of tests shall be coordinated by the contractor among all parties involved so that the tests may proceed without delays or disruption by incomplete work.

C. INSTALLATION OF RECLAIMED WATER MAINS

1. Contractor shall comply with Palm Beach County Health Department Technical Memoranda and FDEP.
2. Installation and testing of reclaimed water system pipe and fittings shall be in accordance with AWWA Specification C-600 Latest Revision and Authority's Construction Standards and Specifications.
3. Any pavement cut shall be replaced in accordance with requirements of the Authority's Pavement Replacement Construction Drawing Detail and in accordance with all other applicable governing agency's permitting requirements.
4. Omni Marker #75027 green magnetic markers shall be placed above all bends, changes in alignment, grade, reclaimed services and at the discretion of Authority's representative.

5. All loading or unloading of pipe, fittings, valves and accessories shall be done in such a manner so as to avoid damage. The pipe shall not be skidded or rolled against pipe already unloaded. Special precautions should be taken to avoid damage to cement lined fittings and pipe. The interior of all pipe, fittings and other appurtenances shall be kept free of dirt and foreign matter at all times.

6. All mains, valves, bends, tees, crosses, and dead ends shall be restrained with an approved Authority restrained joint system in accordance with the joint restraint table. On mains greater than 12" in diameter, 2 forms of an approved Authority thrust restraint system shall be utilized at each joint. Where adequate space exists thrust blocks may be allowed with Authority approval.

7. When tie rods are used as a method of joint restraint the tie-back bolts, nuts, washers and all-thread rods shall be constructed of materials meeting ASTM A-242 requirements (CorTen steel or equal) and painted in accordance with the procedures described herein. Tie rods and nuts shall be equal in diameter to the tee bolts and nuts which were supplied with the applicable fittings. Two tie rods per joint are required for sizes 4" through 10" diameter, four tie rods per joint for sizes 12" through 16" diameter and 6 tie rods per joint for sizes 18" through 24" diameter.

8. Air release valves shall be installed at the designed high points. Installation of air release valves to correct high points caused by improper installation of pipe (not at design grade) will not be permitted.

9. All pipe shall be laid to line in a clean dry trench on line and grade with valves and hydrant stems plumb. All pipe shall have a minimum cover of 30 inches and a maximum cover of 48 inches unless otherwise noted on the plans or required by permit.

10. The trench at the top of the pipe shall be kept to a maximum width of 24 inches plus the pipe diameter. The trench shall have a flat bottom, cut true and even, so that the barrel of the pipe shall bear its full length. Pipe bells will be placed in small pockets specifically excavated to receive the bell. All excavations must be in compliance with OSHA regulations.

11. No rocks larger than 2 inches in diameter or other items that may damage the pipe will be permitted over the pipe. In the event pipe is installed in rock excavation, 6 inches of granular material will be provided for bedding for under the pipe. All pipe joints, thrust blocks, conflicts and service connections shall be left exposed until visually inspected and approved by an Authority representative.

12. Tapping Sleeves

- a. Tapping sleeves and tapping crosses shall be of the heavy body ductile iron, mechanical joint type or stainless steel wrap around type as approved.
- b. All tapping assemblies installed on existing reclaimed water mains shall be pressure tested and witnessed by Authority's representative prior to the actual tap of the main. The pipe coupon shall be carefully preserved and submitted to Authority's representative. All tapping sleeves shall be install a minimum of 6 feet from pipe joints.

13. All field cuts and tapping operations on pipe shall require careful repair of the particular lining damaged in strict accordance with the manufacturer's recommendations.

D. CLEANING AND FLUSHING

1. Upon completion of the pipe installation for any section, the mains shall be cannon flushed to remove dirt and any other foreign matter by achieving a minimum velocity of 2.5 feet per second in the pipe. The duration of the flushing shall be sufficient to provide a minimum flush volume equal to three times the internal volume of the pipeline being flushed. Temporary fittings, pipe, etc. may be used to facilitate cannon flushing.

- a. Prior to the actual line flushing operation, the contractor shall notify Authority's representative of such intended water use. No flushing shall take place without an Authority representative present.
- b. The contractor shall exercise due care so as to ensure that the water used in flushing does not cause a nuisance or inflict property damage.

2. No existing valves shall be operated, except observed by Authority personnel.

3. Pigging is required for all water mains 16" and greater in diameter. The Authority may require water, sewer or reclaimed water mains less than 16" in diameter to be pigged if Authority or EOR representatives observe mains being installed under substandard conditions.

E. TESTING

1. All joints, thrust blocks and conflicts with other mains shall remain uncovered for visual inspection by Authority's representative. The contractor shall only backfill after approval by Authority's representative.

2. The contractor shall provide all necessary equipment such as pumps, gauges and water measuring tanks and shall perform all work required for pipe pressure and leakage test. Pressure and leakage tests shall be made between valves and/or connections for each section tested using the procedure outlined in ANSI/AWWA C-600 Latest Revision and Authority requirements. A pretest shall be successfully completed by the contractor and observed by a representative of the EOR prior to scheduling the pressure test with Authority. All tests shall be made under the supervision of the EOR and Authority's representative. The use of PVC pipe and fittings for pressure test temporary piping is not permitted.

3. 1500 LF shall be the maximum length of main to be pressure and leakage tested at any one time. Testing of isolated portions between valves within the test section may be required by Authority, if a portion of that line appears questionable after testing.

- a. **PRESSURE AND LEAKAGE TEST** - A hydrostatic pressure of 150 psi shall be developed by the contractor, within the section of pipeline to be tested and this pressure (150 psi) shall be held for a minimum time period of one hour.

After successfully completing the pressure test, pressure in the pipeline being tested shall be reduced to 100 psi and that pressure shall be held for an additional one hour

time period. All visible leaks, including damp spots shall be corrected regardless of the results of the pressure and leakage tests.

- b. ALLOWABLE LEAKAGE - Leakage during both the pressure and leakage test shall not exceed the following formula for gasketed pipe:

$$L = (SDP^{1/2} / 148000) \times 0.5$$

L = Allowable Leakage (gallons per hour)

S = Length of Pipe to be Tested (feet).

D = Nominal Diameter of Pipe (inches).

P = Average Test Pressure (PSIG).

No allowable leakage for polyethylene or glue jointed pipe.

- c. A loss of 5 psi or more during the 150 psi testing, regardless of the amount of leakage shall be considered a failing test. A loss of 5 psi or more during the 100 psi testing, regardless of the amount of leakage shall be considered a failure. A total loss of 10 psi or more for both test combined shall be considered a failing test.
- d. A gain of pressure during the test shall be considered a failing test.
- e. The pressure test shall be considered not acceptable unless all valves in test section are in the open position. The system must be completed to the full extent of the approved plans on that portion being tested. The contractor shall provide a 1/2" ball valve adjacent to the test pressure gauge for installation of Authority's "check gauge". The use of PVC pipe and fittings for temporary piping for pressure testing is not permitted. Test gauge shall be in 2 pound increments with a minimum 3 inch face.
- f. Failure of the test gauge to zero out upon completion of testing shall be cause for rejection.
- g. The contractor shall, at his own expense, adjust or replace, at the discretion of the EOR, any component of the pipeline which fails the prescribed tests. The pipeline shall then be tested as described above until it successfully conforms to said tests.
- h. Special testing requirements in accordance with FDEP and Palm Beach County Health Department will be necessary for reclaimed mains installed within potable water well zones of influence.
- i. Water for testing reclaimed water main shall be clean fresh water. In no case shall it be tested with saline, brackish or turbid water.
- j. The Authority will not schedule the pressure test until pipe has been properly backfilled, compacted, established finish grade and as-builts accepted.