SECTION 02731
RECLAIMED WATER SYSTEMS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. This section includes the materials and installation standards for pipes, fittings, valves, and appurtenances, as applicable to reclaimed water installations.

B. The data included herein generally makes no reference to the service utilization for the item specified and are to be used as the standards for approved materials indicated under specific facility installations, as set forth in other sections.

C. Required specialty items not included under this section shall be high quality and consistent with approved standards of the industry for the applicable service installation.

1.2 RELATED SECTIONS

Section 02220 Utility Excavation, Backfilling and Compacting
Section 02620 High Density Polyethylene Pressure Pipe
Section 02640 Utility Valves and Appurtenances
Section 02760 Performance Testing of Pressure Pipelines

1.3 SUBMITTALS

A. Submit shop drawings of all pipes, fittings, valves and appurtenances to be installed, showing required sizes and specific type. Include operation and maintenance procedures for all valves and appurtenances with preventive maintenance and parts schedule and assembly instructions.

1.4 SPECIAL PROVISIONS

A. Reference SLCUs Reclaimed Water Protocol for the St. Lucie North Hutchinson Island Water and Wastewater Utility District. Under this Protocol, all new wastewater customers who apply with SLCU for wastewater disposal service, and who do not have an agreement for such service with SLCU prior to January 16, 1996, are required to connect to the reclaimed water system. These customers are required to use a volume of reclaimed water equal to the volume of wastewater discharged from the development. Wastewater customers who had an agreement with SLCU for wastewater service prior to January 16, 1996 are not required to connect to the reclaimed water system, but, subject to availability of sufficient reclaimed water, may voluntarily connect to the reclaimed water system. This Protocol includes requirements for reclaimed water usage, cross-connections, signage, testing, fees, etc. All reclaimed water connections shall be performed in

strict compliance with the Protocol.

PART 2 -- PRODUCTS

2.1 PIPE AND FITTINGS

A. General: All pipe and fittings shall be clearly marked with the name or trademark of the manufacturer, the batch number, the location of the plant, and strength designation, as applicable. All non-metallic pipe, 4 inches and larger, shall be marked by the use of a continuous magnetically detectable polyethylene I.D. tape, lavender in color and bearing the words "RECLAIMED WATER", 4 inches wide, with metallic backing installed in accordance with the manufacturer's instructions. PVC reclaimed water main pipe shall be lavender in color.

B. Polyvinyl Chloride (PVC)

1. PVC Reclaimed Water Main 4 inch to 12-inch diameter (4" – 12") shall be DR-18 manufactured to ductile iron pipe outside dimensions and in compliance with AWWA Standard C900 (Pressure Class 150). The pipe shall have an integral bell end and gasket seal with the joint in compliance with the requirements of ASTM D3139. The pipe color shall be lavender with "Reclaimed Water Main" permanently printed on three sides for the entire length of the pipe.

2. PVC Reclaimed Water Main 14 inch to 20-inch diameter (14" – 20") shall be DR-18 manufactured to ductile iron pipe outside dimensions and in compliance with AWWA C905 (Pressure rating 235). The pipe shall have an integral bell end and gasket seal with the joint in compliance with the requirements of ASTM D3139. The pipe color shall be lavender with "Reclaimed Water Main" permanently printed on three sides for the entire length of the pipe.

3. Connections for pipe two inches or greater in diameter shall be rubber compression ring-type. Pipe shall be extruded with integral thickened wall bells without increase in dimension ration (DR). Rubber ring gaskets shall consist of synthetic compounds meeting the requirements of ASTM Designation D869 and suitable for the designated service.

4. Fittings: Ductile iron fittings shall be used on all PVC C900 & C905 mains. Fittings shall conform to AWWA/ANSI C110/A21.10 or AWWA/ANSI C or AWWA/ANSI C153/A21.53 for compact fittings with a minimum pressure rating of 350 psi.

C. Ductile Iron Pipe and Fittings

1. Ductile iron pipe shall be a minimum Pressure Class 350. SLCU reserves the

right to require a different thickness class for unusual or non-standard laying conditions. Adequate protective measures against corrosion shall be determined by SLCU and the Engineer.

2. Ductile iron pipe shall conform to latest standards of ANSI/AWWA C150/A21.50 for the thickness design of ductile iron pipe and ANSI/AWWA C151/A21.51 for ductile iron pipe centrifugally cast in metal molds or sand-lined molds. Flanged end pipe shall be Class 53, minimum.

3. Ductile iron fittings shall conform to AWWA/ANSI C110/A21.10 or AWWA/ANSI C153/A21.53 for compact fittings, with a minimum pressure rating of 350 psi.

4. Joints for ductile iron pipe shall conform to the latest standard of ANSI/AWWA C111/A21.11 for rubber gasket joints and ANSI/AWWA C115/A21.15 for threaded flanges. All buried joints at fittings must be restrained, mechanical joints. Restrained joint assemblies with mechanical joint pipe shall be by approved restraining devices.

5. Interior and exterior coatings for the ductile iron pipe shall conform to the latest standards of AWWA C210.

6. Flanged pipes and connections, including all bolts, nuts, and gaskets, shall be in accordance with AWWA/ANSI C115/A21.15. Flanges shall be threaded unless otherwise noted. All above ground flanges shall be flat faced unless they are mating up to existing raised flanges. All gaskets shall be full faced 1/8" thick, minimum. All hardware shall be stainless steel.

D. High Density Polyethylene Pipe

1. High-density polyethylene (HDPE) pipe shall meet all requirements of AWWA C906, latest revisions. See Section 02620 of these specifications for other requirements related to HDPE pipe.

E. Coatings and Linings

1. All required polyethylene encasement shall comply with AWWA/ANSI C105/A21.5, "Polyethylene Encasement for Gray and Ductile Cast Iron Piping for Water and other liquids.

2. Ductile iron pipe exposed to the atmosphere and all above ground applications shall be cleaned and given a new inhibitive primer coat at the place of manufacturer. The prime coat shall be compatible with the finish coat of alkyd enamel. A minimum primer dry film thickness of 3 mils. A field prime coat shall be applied in areas where the initial prime coat is

damaged in the field.

3. After installation, all above ground ductile iron piping shall receive two or more coats of a high grade, gloss or semigloss alkyd enamel coating. Each coat shall have a minimum dry thickness of 3 mils. All related piping shall be the same color as specified by SLCU.

F. Special Items:

1. Service Saddles: Saddles for PVC or ductile iron pipe shall be double strap, stainless steel, or brass full circle type saddles, as applicable. Sealing gaskets shall be suitable for the applicable service and straps shall be corrosion resistant alloy steel.

2. Air Release Valves - Air and Vacuum Valves: Valves shall be cast iron or bronze body, suitable for domestic water service, rated for a minimum 150 psi working pressure. Automatic air release valves shall be 2-inch (minimum) valves as manufactured by APCO (Model 200-A),VAL-Matic (Model 38), Crispin Model S20, or approved equal.

2.2 VALVES AND APPURTENANCES

A Valves 3" and larger for reclaimed water mains shall be resilient seat gate valves rated for 200 psi.

B. Valving of all systems shall be designed to facilitate the isolation of each section of pipeline as required.

A. Reference Section 02640 for additional requirements related to valves.

2.3 LOCATER FOR RECLAIMED WATER MAINS

A. On all pipe construction 10 gauge, THWN insulated, stranded copper wire shall be laid on top of the pipe.

2.3 CONNECTIONS FOR PRESSURE SYSTEMS

A. Tapping Tees and Valves: Tapping sleeves shall be split type epoxy coated iron body with flanged outlets for connecting to tapping valve. Finish to be fusion applied epoxy in accordance with AWWA C213.

A. Tapping valves shall be gate valves with resilient seat type with flanged by mechanical joint connections meeting the requirements of Section 02640 and shall be compatible with connecting sleeve and specially designed for wet tapping installations. Valve shall be Mueller H-667, or approved equal. Tapping valves shall have a two-inch operating nut. Working pressure rating shall not be less than 200 psi. Gaskets between the flange faces of the tapping sleeve and tapping valve shall

be 1/8” minimum thickness of neoprene rubber.

B. Size on Size Taps: Taps may be made on the same size main only when the main to be tapped is AWWA C900, C905 or DIP.

PART 3 – EXECUTION

3.1 EXISTING FACILITIES

A. Contractor is required to verify location of existing utility mains and valve configurations in all connection areas prior to beginning of construction in that area. Any discrepancies between the construction drawings and field conditions shall be brought to the attention of the Engineer of Record prior to construction in that area.

B. It will be the Contractor's responsibility to verify all existing utilities (telephone, gas, electric, cable, water, reclaimed water, and sewer services, etc.), whether shown in the construction drawings or not. The locations of all existing utilities indicated on the plans are shown for general informational purposes only. Any damage to existing utilities or services shall be repaired by the particular utility, or the Contractor, under direct authorization and supervision of the particular utility with all repair costs being incurred by the Contractor. Any discrepancies between the construction drawings and existing field conditions shall be brought to the attention of the Engineer of Record or his representative prior to construction in that area.

3.2 INSTALLATION:

A. General Requirements:

1. Piping, fittings, valves, and appurtenances shall be installed in accordance with these Standards and in general with the manufacturer's recommendations for the applicable service.

2. Piping shall be installed along straight line and grade between fittings, valves or other defined points, unless other definite lines of alignment deflection or grade change have been established. Modification to approved alignment or grade during construction shall receive prior approval from the Engineer of record and SLCU. The standard minimum cover for utility mains shall be as follows:

Mains 8" diameter & less	30" cover
Mains 14" diameter & more	48" cover
Low Pressure Mains	48" cover

Protective concrete slabs are required in accordance with the construction

details when the cover is less than the standard minimums shown above. Where waterways, canals, ditches, or other cuts are crossed, protective concrete slabs may also be required across and to ten feet each side of the bottom. Additionally, approved utility crossing signs shall be placed on the pipe alignment at each side of the canal, etc. Signs shall be approved by SLCU and/or the Engineer and the Agency having jurisdiction over said waterway. Aerial crossings shall be allowed on a per case basis pending approval by SLCU.

3. All pipe shall be laid to line in a clean, dry trench on line and grade with all valves and appurtenances plumb. Backfill shall be clean suitable fill.

4. Materials shall be cleaned and maintained clean, with all coatings protected from damage. The interior of the pipe shall be free of dirt and debris, and when work is not in progress, all open ends shall be plugged.

5. Pipe, valves fittings, or other items shall be inspected prior to installation and any items showing a fracture or other defect shall be rejected. Additionally, any pipe or fitting which has received a severe blow that may have caused an incipient fracture indicated beyond that visible, may be salvaged by cutting off the damaged section 12 inches past, providing the remaining pipe is sound.

6. Underground piping shall not be driven to grade by striking it. When the pipe has been properly bedded, enough compacted backfill shall be placed to hold the utility in correct alignment. If necessary, precaution shall be taken to prevent flotation.

3. Jointing shall be by the manufacturer's approved method and shall not require undue force to accomplish full satisfactory seating and assembly. Connections at structures shall be cut accurately and worked into place without forcing and shall align with the connecting point. Flanged joints shall be made up tight, but with care taken to prevent undue strain upon equipment or other items. Suitable flange filler rings shall be installed where required to provide suitable joints. The installation shall be permanently water tight, with no visible leakage at joints, connections with structures, or other locations, under operational or testing conditions. Material that in jointing does not remain completely seated and/or watertight shall be rejected.

4. Underground pressure piping systems shall be securely anchored by acceptable means at all tees, plugs, caps bends and valves, and at all other locations where unbalanced forces exist or as directed by SLCU or the Engineer. Restrained joints shall be used in accordance with manufacturer's recommendations. Reference SLCU Standard Construction Details for minimum pipe restraining requirements.

5. SLCU will accept Uni-Flange, Mega-Lug, or approved equal restraining systems. Shop drawing shall specify the particular system to be utilized and no substitutions will be allowed after approval without resubmittal of shop drawings and written approval by SLCU. Every pipe joint that is required to be restrained shall be inspected by SLCU or Engineer of Record prior to the Contractor backfilling the restrained joint.

6. Exposed systems shall be supported as necessary to hold the piping and appurtenances in a firm, substantial manner to the required lines and grades indicated, with no undue piping stresses transmitted to equipment or other items. Pipe aboveground outside of buildings shall be supported on concrete supports or pre-manufactured adjustable pipe supports.

7. Proper provision for pipe expansion or contraction shall be provided by installation of expansion joints or other suitable methods. Additionally, flexible connections shall be provided to expedite equipment or piping system removal.

8. Subaqueous pipe laying may be permitted where conditions make it impractical to lay pipe "in the dry", provided the Contractor submits his plans for laying pipe under water to SLCU and the Engineer of Record and obtains advance approval thereof. All subaqueous crossings shall be made in accordance with all approved permits.

9. All fittings, joints and restrained joints shall be inspected by SLCU or the Engineer's representative and approved prior to backfilling by Contractor. Record information shall be recorded by the Contractor after each fitting is approved.

13. Special Exterior Protection for Corrosion: Extra protection shall be provided for underground cast or ductile iron pipe and fittings within areas of severe corrosive conditions. This shall be accomplished by the installation of polyethylene encasement in accordance with the requirements of AWWA C105, through the area of concern. Soil-test evaluation to determine the necessity for extra protection in suspect areas shall be as set forth in ANSI Standard A21.5. Additionally, where other existing utilities are known to be cathodically protected, cast or ductile iron pipe crossing said utility shall be protected for a distance of 20 feet to each side, and when installed parallel to and within ten feet of, protection shall also be provided. Steel pipe shall <u>not</u> be installed in severe corrosion areas.

B. Ductile Iron (DI) Pipe: Installation shall be performed in accordance with the applicable provisions of AWWA Standard C600. The opening cut in the pipe wall for installation of tapping saddles and sleeves shall be made by a special tapping machine designed for this specific service. All pipe cutting shall be accomplished by

power operated abrasive wheel or saw cutters, or other methods approved by the pipe manufacturer.

C. Polyvinyl Chloride Pipe (C900 & C905): Installation shall be performed in accordance with the applicable provisions of AWWA C-900, ASTM D-2774, AWWA Manual M23 and the manufacturers recommendations. Lubrication used for pipe and fitting joints shall be nontoxic.

D. Parallel/Horizontal Separation

1. Reference requirements in Section 01100, Design Criteria for horizontal and vertical separation requirements.

E. Valves

1. All valves shall be placed according to plan unless relocation is mutually agreed to. Record or as built drawings shall reflect the actual location and size of all mains, hydrants, services and valves.

F. Connecting Tapping Tees and Valves

1. A SLCU representative shall approve each location proposed for connection of the new system to the existing system before the tapping sleeve is installed. Tapping sleeves shall not be installed within 3 feet of any joint or fitting.

   After the tapping tee is attached to the main, the gate valve shall be closed and tapping tee and gate valve assembly shall be pressured tested at 150 psi for a minimum of 1 hour with water. A SLCU representative shall witness the pressure test. No visible leaks or loss of pressure shall be evident. After pressure testing, the main may be tapped. Only shell type cutters shall be used. The coupon from the hole that is cut shall be delivered to SLCU.

G. Locator for Reclaimed Water Main Pipe

1. THWN insulated, stranded copper wire shall be laid and secured on top of pipe. Wire shall be continuous from valve box to valve box, wrapped two times around each joint of pipe and extended inside each valve box to enable location devices to be attached without digging up the valve box (see Standard Construction Details).

   All wire connections shall be made with Dri-Splice wire connectors, Imperial Snip-Snap fittings filled with waterproof silicone sealant or approved equal. All splices shall be inspected by SLCU before burial.

H. Cleaning and Flushing

1. After its installation, the complete reclaimed water main system (including all mains, services, air release valves and all other appurtenances) shall be thoroughly flushed to remove all foreign matter. SLCU shall be notified at least 24 hours in advance of any flushing activities.

I. Pressure Testing

1. All mains shall be tested for leakage. Water shall be supplied to the main and pumped to the required 150 psi pressure.

2. SLCU shall be notified at least 48 hours in advance of any testing procedures. After flushing is completed, line pressure shall be applied to the complete system to determine if any major defects are present. The complete system shall be tested at a pressure of 150 psi for a period of not less than two hours. SLCU may, at its discretion, increase the period to four hours. No visible movement of the system shall occur and leakage shall not exceed:

$$L = \frac{N * D * \sqrt{P}}{7400}$$

Where:
L = leakage in gallons
N = Number of joints in test section
P = Test pressure in psi
D = diameter of the pipe in inches

(For P = 150 psi, L = ND / 0.001655)

3. Reference Section 02760, Performance Testing of Pressure Pipelines, for additional requirements related to pressure testing.

*** * END OF SECTION * ***