



## PART 1 - GENERAL

The following specification is intended for use for the design, selection of materials, and construction of potable water and reclaimed water mains. Potable water mains and reclaimed water mains, if applicable, shall meet the requirements of the Florida Department of Environmental Protection (FDEP) permit.

### 1.1 SCOPE

#### 1.1.1 General

This specification provides the requirements for potable water and reclaimed water mains construction for the project.

#### 1.1.2 Work Included

The Contractor shall, unless specified otherwise, furnish all labor, materials, equipment, tools, and all other associated appurtenances necessary to do the work required under the contract to include but not limited to unloading, hauling and distributing all pipe, fittings, valves and appurtenances. The Contractor shall also remove any surfacing, as required; excavate the trenches and pits to the required dimensions; construct and maintain all required for traffic control; sheet, brace, and support the adjoining ground or structures where necessary; handle all drainage or ground water; provide barricades, guards, and warning lights; lay and test the pipe, fittings, valves, and appurtenances; backfill and consolidate the trenches and pits; maintain all surfaces over the trench until surface restoration is completed; restore the surfaces unless otherwise stipulated; remove surplus excavated material; and clean the site of the work.

The Contractor shall also furnish all labor, materials, equipment, tools, and all other associated appurtenances required to rearrange sewers, conduits, ducts, pipes or other structures encountered in the installation of the work.

#### 1.1.3 Location of the Work

The location of this work is as shown on the Contract Documents.

#### 1.1.4 Coordination of the Work

The Contractor shall be responsible for the satisfactory coordination of the construction of the potable water and reclaimed water mains with other construction and activities in the area. Delays in work resulting from lack of such harmony shall not in any way be a cause for extra compensation by any of the parties.

### 1.1.5 Working Hours

The work shall be carried out in accordance with local ordinance and not to cause any unreasonable nuisance to affected residents. Under emergency conditions, this limitation may be waived by the consent of Charlotte County Utilities (CCU).

## 1.2 **METHOD OF MEASUREMENT & PAYMENT**

The work shall be measured and the compensation determined in the following manner:

### 1.2.1 Potable Water and/or Reclaimed Water Main

Direct bury and directional bore potable water and reclaimed water pipe shall be paid for at the contract bid price per lineal foot for each size and type of material specified which shall include the cost of furnishing all pipe, pipe bend sections, jointing material, restraints, stainless steel stiffeners, bedding material and all other appurtenances, and of delivering, handling, laying, dewatering, trenching, sheeting and backfilling, furnishing and installing flowable fill used for tunneling/defecting pipe under and adjacent to existing storm piping/structures (unless separate bid item is provided), testing, restoring the surface (unless separate bid item is provided), necessary permits, and all material or work necessary to install the pipe complete in place at the depth specified on the plans and/or as directed by CCU.

The length of pipe for direct bury installation for which payment is made shall be the actual overall length measured along the axis of the pipe without regard to tee sections or bend sections. All lengths shall be measured in a horizontal plane unless the grade of the pipe is more than fifteen percent (15%). No payment consideration will be given to depth zones for the installation of the potable water main and reclaimed water main.

The length of pipe for directional bore of potable water main pipe and reclaimed water main pipe shall be measured by measuring the length pipe before installation and subtracting the lengths of the pipe cut from the ends of pipe when the bore pipe is connected to the pipe on either end. The difference is the length of the pipe in the ground.

### 1.2.2 Automatic Flushing Assembly

The automatic flushing assembly shall be paid for at the contract bid price per each which shall include the cost of furnishing flushing device, piping, tees, fittings, valves, and any other appurtenances and of delivering, handling, excavation, sheeting, backfilling, dewatering, restoring of the surface and all material or work necessary to install the unit complete in place at the depth specified on the plans. Testing shall be included in the piping test.

### 1.2.3 Main End Blow Off Assembly

The main end blow off assembly shall be paid for at the contract bid price per each which shall include the cost of furnishing main end blow off assembly device, piping, tees, fittings, 2" PVC ball valves, meter box, restraints and any other appurtenances and of delivering, handling, excavation, sheeting, backfilling, dewatering, restoring of the surface and all material or work

necessary to install the unit complete in place at the depth specified on the plans. Testing shall be included in the piping test.

#### 1.2.4 Tie Back Assembly (for Existing Facilities Only)

The tie back assembly, if required, for connection to existing facilities which are not properly restrained, shall be paid for at the contract bid price per each which shall include the cost of furnishing tie back assembly device, stainless steel threaded rods, fittings, concrete blocking, restraints and any other appurtenances and of delivering, handling, excavation, sheeting, backfilling, dewatering, restoring of the surface and all material or work necessary to install the unit complete in place at the depth specified on the plans.

#### 1.2.5 Ductile Iron Fittings

Ductile iron fittings shall be paid for by the contract bid price by weight (latest revision of AWWA C153) and shall include all labor, equipment, materials and all associated appurtenances to install the ductile iron fittings. Restraints shall be considered incidental to the ductile iron fittings contract bid price and no direct compensation will be made therefore. Any other items necessary for the installation of the ductile iron fittings that are not included in the manufacturer's specified weight, including but not limited to bolts, gaskets, jointing materials, labor, and testing shall be considered incidental to the project.

#### 1.2.6 Locate Balls and Marker Tape

- a. Locate balls shall be paid for at the contract bid price per each which shall include all labor, equipment, materials and associated appurtenances to install and program the marker balls and submit the marker ball data to Charlotte County Utilities (CCU).
- b. Marker tape shall be considered incidental to the mains.

#### 1.2.7 Service Connections

Service connections shall be paid for as outlined below and shall include all labor, equipment, materials, and all associated appurtenances to completely install service connections. CCU will provide and install all meters.

- a. Service connection piping shall be paid for as per contract bid price per lineal foot installed for each water service size.
- b. Corporations and curb stops shall be paid for as per contract bid price per each installed for each water service size.
- c. U-branch shall be paid for as per contract bid price per each installed for each water service size.
- d. Service saddles shall be paid for as per contract bid price per each installed for each water service size.

- e. Backflow prevention devices, if required, shall be paid for as per contract bid price per each installed for each size.
- f. Meter boxes including lid, shall be paid for as per contract bid price per each installed for each size.

### 1.2.8 Testing

All required testing shall be considered incidental to the project and no direct compensation will be made therefore.

### 1.2.9 Miscellaneous

All other items required for the completion of the project and not included as a specific bid item shall be considered incidental to the project and no direct compensation will be made therefore.

## 1.3 **REFERENCED STANDARDS (Latest Revision)**

AWWA/ANSI: C-105, C-110, C-900, C-901, C-905, C-909, C-906-90, C-151, C-153, C-111, C-600, C-651, and C-652

ASTM: A-139, B-1785, D-1869, D-1120, D-2241, D-3350, D-1248-68, D-1598, D-1599

AASHTO Code

NSF: Standard 61

Florida Administrative Code

Ten States Recommended Standards for Water Works

## 1.4 **PARTIAL LISTING OF RELATED SECTIONS**

001570 - Erosion and Sediment Control  
001760 – Surveying and Record Drawings  
002340 – Valves  
002240 – Dewatering  
002345 – Fire Hydrants  
002930 – Grassing  
009900 – Surface Preparation, Painting and Coating

Note: This is only a partial listing of related sections. The Contractor shall be responsible to review the entire contract documents.

## 1.5 SUBMITTALS

For only those materials that the Contractor is requesting deviations from these specifications, the Contractor shall submit in writing documentation to justify approval of these materials by Charlotte County Utilities (CCU) prior to the start of the project. The Contractor shall submit four (4) signed copies of the material submittals.

The contractor submittals shall include the statement that the submittals have been reviewed and the materials meet the contract specifications and/or standard details.

The Contractor shall provide proof of supplier certification/training for buttfusing pipe for any employee fusing pipe.

Final approval is at the discretion of CCU.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

#### 2.1.1 General

The materials used in this work shall be all new and conform to the requirements for class, kind, size and material as specified below:

All pipes furnished for potable water and reclaimed water mains and for service connection installations shall be of the type, kind, size, and class indicated for each particular line segment as shown on the engineering drawings and/or designated in the Contract items. Potable water mains shall be a minimum of six (6) inches in diameter.

#### 2.1.2 Polyvinyl Chloride (PVC) Pressure Pipe and Fittings

- a. PVC Pipe: PVC pipe for potable water and reclaimed water mains shall conform to the requirements of AWWA C-900 (4" through 12"), AWWA C-905 (14" through 36"), and AWWA C-909 (4" through 24") and shall be Class 150 DR 18 for all open cut and direct bury installations with a minimum of thirty six inches (36") of cover for potable water mains and forty-eight (48") inches of cover for reclaimed water mains. For shallower depth, the type of pipe and installation shall require prior CCU approval. The manufacturer shall insure all quality control test and AWWA requirements are complied with during the production of PVC pipe.
- b. C-900, C-905, and C-909 pipes shall have an integral bell formed with a race designed to accept the gasket in accordance with their respective AWWA requirements. The spigot end shall have a bevel and a stop mark on the outside diameter to indicate proper insertion depth. Provisions shall be made for expansion and contraction at each joint. All surfaces of the joint where the gasket may bear shall be smooth, free of cracks, fractures, or imperfections that could adversely affect the performance of the joint.

- c. Pipe Color: All C-900, C-905, and C-909 potable water main pipes shall be blue in color and reclaimed water mains purple in color with a PVC ASTM D-1120 and ASTM D-2241 reference, the class pressure rating, and the DR number permanently and plainly marked on the pipe.
- d. Rubber Gasket Joints: C-900, C-905, and C-909 polyvinylchloride pipe joints shall be the bell and spigot type using rubber gasket push-on type joints. Rubber gaskets shall be molded to a circular form to the proper cross section and shall consist of a vulcanized high grade elastomeric compound conforming to ASTM D-1869 and AWWA C-900 elastomeric seals for joining plastic pipe.
- e. Fittings: All ductile iron fittings shall be in accordance with AWWA Specification C-153 and as a minimum have the same pressure rating of the connecting pipe. All ductile iron fittings shall be cement mortar or fusion bonded epoxy coated. All coatings in contact with potable water shall be certified to NSF 61. All exposed fasteners such as bolts, nuts, washers, and threaded rod shall be Type 316 stainless steel and all buried fasteners such as bolts, nuts, fasteners, washers, and threaded rod shall be "Cor-Ten" steel or Cor-blue coated. Mechanical joint bolts shall not protrude more than ½ inch through the nut after joints are assembled.
- f. Fastener Threads: All stainless steel fastener threads shall be coated with an anti-seize compound as approved by CCU.

### 2.1.3 High Density Polyethylene (HDPE) Pipe and Fittings

- a. High Density Polyethylene (HDPE) pipe shall meet the requirements of AWWA C-906 for polyethylene pressure pipe and fittings and for PE-3408 SDR 11. HDPE pipe shall meet ASTM D-3350 cell classification of 345434C. Permanent identification of the pipe shall be provided by co-extruding blue longitudinal stripes into the pipe's outside surface for potable water and purple longitudinal stripes into the pipe's outside surface for reclaimed water. All polyethylene piping shall have ductile iron pipe nominal outside diameters.

Individual sections of HDPE piping shall be joined together by thermal butt-fusion to make a continuous section of pipe as recommended by the pipe manufacturer. Bends in HDPE pipe shall not be within ten (10) pipe diameters from any fitting or valve. The minimum radius of curvature shall be thirty (30) pipe diameters and bending shall not cause kinking. HDPE piping shall not be joined by solvent cements, adhesive or threaded type connections.

The color marking stripes shall be aligned during the fusing process and the pipe shall be pulled through the bore to allow identification of the type of system utilizing the HDPE pipe.

- b. All fittings and sleeves used with high density polyethylene (HDPE) pipe shall be cement mortar or fusion bonded epoxy coated ductile iron with mechanical joints rated to 350 psi and conforming to AWWA C-153 and C-111. All coatings in contact with potable water shall be certified to NSF-61. All MJ fitting connections to polyethylene pipe shall be restrained with Mega-Lug restrainers. The HDPE pipe shall be reinforced on the ends using stainless steel wedge internal stiffeners.

The mechanical connection to MJ fittings and sleeves shall use mechanical restraints that meet specification requirements. Size-on-size mechanical connection to PVC or DI pipe shall be by compact ductile iron solid sleeves with Mega-Lug restrainers.

No electro fusion fittings shall be used with HDPE unless specific written approval is provided by CCU.

HDPE molded butt fittings and couplings for non-standard fittings and couplings shall require special approval from CCU for installation.

#### 2.1.4 Polyethylene (PE) Pipe and Fittings for Service Connections

- a. PE pipe two inches or less in size shall meet AWWA C-901, ASTM D-3350 cell classification of 334434C and be permanently marked with the type/size/use of the pipe. PE pipe two and one half (2 ½) inches or three (3) inches in size shall meet AWW C-901, ASTM D-3350 cell classification of 334434C and be permanently marked with the type/size/use of the pipe and shall only be permitted by specific written approval by CCU. The minimum radius of curvature shall be thirty (30) pipe diameters and bending shall not cause kinking. The potable water pipe shall be blue in color, and the reclaimed water pipe shall be purple in color.
- b. Brass Compression Coupling Fittings: Brass compression coupling fittings shall be permitted as approved by CCU.

The following product(s) are approved:

- Mueller INSTA-TITE
- A.Y. McDonald
- Ford ULTRA-TITE

- c. HDPE Compression Coupling Fittings: PE piping with HDPE compression fittings shall be permitted as approved by CCU. PE piping with the HDPE 4710 molded fittings does not require stainless steel stiffeners.

The following product(s) are approved:

- Hydrosert Polyethylene Water Fittings as manufactured by Elster

- d. Mechanical Coupling Fittings: The mechanical coupling fittings shall meet and/or exceed the maximum design pressure requirements of the piping system. The couplings shall prevent the entry of dust, dirt, and moisture. Mechanical coupling fittings shall not be permitted unless specifically approved in writing by CCU.
- e. PVC Compression Coupling Fittings: PE piping with PVC compression fittings shall not be permitted unless specifically approved in writing by CCU.

2.1.5 Ductile Iron Pipe and Fittings

- a. The ductile iron (DI) pipe covered by this specification shall be the push-on joint type or mechanical joint type, centrifugally cast to conform to all requirements of AWWA Specifications C-151 and C-153, latest revisions.

The maximum allowable deflection of the pipe shall not exceed two percent (2%) of the pipe diameter. Ductile iron pipe will be fully encased in an 8 mil polyethylene sleeve, in accordance with AWWA C-105, Method A. The pipe and the polyethylene sleeve shall be color coded blue for potable water and color coded purple for reclaimed water by a means acceptable to CCU.

- b. All pipes shall have a cement mortar or fusion bonded epoxy coating in accordance with the AWWA Specifications, latest revision. All coatings in touch with potable water shall be certified to NSF-61.
- c. Polyethylene material shall conform to ASTM Standard Specification D1248-68, latest revision. All ductile iron piping shall be marked "DUCTILE IRON" in large letters. The nominal wall thickness shall be plainly marked on each piece of pipe and the pipe installed so that the markings can be read from the top of the trench.

Minimum thickness of ductile iron pipe shall be as follows:

3" Ductile Iron Pipe	0.27"	Class 52
4" Ductile Iron Pipe	0.29"	Class 52
6" Ductile Iron Pipe	0.31"	Class 52
8" Ductile Iron Pipe	0.33"	Class 52
10" Ductile Iron Pipe	0.35"	Class 52
12" Ductile Iron Pipe	0.37"	Class 52
14" Ductile Iron Pipe	0.36"	Class 51
16" Ductile Iron Pipe	0.37"	Class 51
18" Ductile Iron Pipe	0.38"	Class 51
20" Ductile Iron Pipe	0.39"	Class 51
24" Ductile Iron Pipe	0.41"	Class 51
30" Ductile Iron Pipe	0.43"	Class 51
36" Ductile Iron Pipe	0.48"	Class 51
42" Ductile Iron Pipe	0.53"	Class 51

- d. Rubber gasket joints shall be in accordance with AWWA Specification C111 latest revision.
- e. All fittings shall be in accordance with AWWA Specification C-153 latest revision and have the same pressure rating of the connecting pipe. All ductile iron fittings shall be cement mortar or fusion bonded epoxy coated. All coatings in touch with potable water shall be certified to NSF-61. All exposed fasteners such as bolts, nuts, washers, and threaded rod shall be Type 316 stainless steel. All buried fasteners such as bolts, nuts, washers, and threaded rod shall be "Cor-Ten" steel or Cor-blue coated steel. Mechanical joint bolts shall not protrude more than 1/2 inch through the nut after joints are assembled.



- f. All stainless steel fasteners threads shall be coated with an anti-seize compound as approved by CCU.

### 2.1.6 Service Connections

Existing CCU approved products are listed below for each category. Other products shall not be used until a thorough evaluation is completed by CCU to determine if the same standards are met. Final approval by CCU is required in writing to confirm acceptability.

#### a. Corporation Stops

All corporation stops shall conform to AWWA standards and shall comply with CCU standard details as determined by CCU.

The following product(s) are approved:

- Mueller H15024 3/4" or 1"
- Mueller H10045 1/2" to 2"
- Mueller H10046 1-1/2 to 2"
- Mueller H15014 1-1/2 or 2"
- Mueller H15015 1-1/2 or 2"
- Ford F1100-X

#### b. Curb Stops

All curb stops shall conform to AWWA standards and shall meet CCU standard details as determined by CCU.

The following product(s) are approved:

- Mueller B25170
- Ford B13-332W
- Ford B53-232W
- Ford B41-XXX

#### c. Service Saddles

All service saddles shall conform to AWWA standards and shall meet CCU standard details as determined by CCU.

The following product(s) are approved:

- Ford FC202
- A.Y. McDonald 4855A
- Cascade CSC2
- Power Seal 3417DI
- A.Y. McDonald 4835A
- Romac 202NS

Service Saddles for HDPE pipe include fusion bonded HDPE saddles as per AWWA standards.

d. U Branch

All U Branches shall conform to AWWA standards and shall meet CCU standard details as determined by CCU.

The following product(s) are approved:

- Mueller H15365

e. Backflow Prevention Devices

All backflow prevention devices shall conform to AWWA standards, FDEP regulations, and shall meet CCU standard details as determined by CCU.

The following product(s) are approved:

Reduced Pressure Principle (RPZ):

- Wilkins 975 XL Series
- Wilkins 375 OSY Series
- Ames 4000 B Series
- Watts 009 Series
- Watts 919 Series
- Watts 957 Series
- Combraco 40-200 Series

Double Check Valve:

- Wilkins 950 Series
- Wilkins 350 DA OSY Series

Double Detector Check Valve:

- Ames 3000SS Series
- Watts 757 DCDA Series
- Combraco 40-600 Series

Pressure Vacuum Breaker:

- Wilkins Model 420
- Wilkins Model 720A
- Watts 800M4QT

### 2.1.7 Pipe and Fittings Unloading at Site

The contractor shall inspect each shipment of pipe and fittings and make provisions for a timely replacement of any damaged material. The contractor shall unload by hand or use canvas slings to avoid scratching the pipe. The contractor shall not sling or drag pipe over an abrasive surface. Pipe or fittings damaged during handling shall be removed from the site and replaced with new pipe and/or fittings. The contractor shall follow the manufacturer's storage specification and store pipe and fittings in such a manner that prevents damage due to crushing, piercing, excessive heat, harmful chemicals, and exposure to sunlight.

### 2.1.8 Marker Balls and Marker Tape

- a. Potable water marker balls shall be 3M 4 inch marker ball model 1423XR/ID blue in color and reclaimed water marker balls shall be 3M 4 inch marker ball model 1428XR/ID purple in color.
- b. Marker tape stripes shall be blue in color for potable water and purple in color for reclaimed water.

### 2.1.9 Automatic Flushing Assembly

The automatic flushing assembly shall meet the requirements of the CCU standard details or as determined by CCU. The flushing device shall be a Kupferle Model 9400-WC, Hydro-Guard or CCU approved equal.

### 2.1.10 Potable Water and Reclaimed Water Service Connections

- a. All potable water service connections up to 2 inches in size shall be constructed with polyethylene pipe. Service connections two and one half (2 ½) inches or 3 inches in size shall be constructed with polyethylene pipe and shall only be permitted by specific written approval by CCU. Service connections 4 inches or greater in size shall be constructed of PVC pipe meeting AWWA C-900 requirements.
- b. Service connections including backflow prevention devices shall meet the marking, color, materials, configuration, and installation requirements of these standard technical specifications and CCU standard details.
- c. Potable water and reclaimed water meter boxes and covers installation shall be rated as follow:

For low vehicle traffic areas such as side walk, property line/easement shall be at a minimum ANSI/SCTE Tier 8 rated potable water and reclaimed water meter boxes and covers.

The following product(s) are approved for Tier 8:

- GlasMasters model numbers:
- S151712F3N08-4 (box potable water)
- S1517RN08-4-CCU (lid potable water)
- S151712F3N08-2 (box reclaim water)

➤ S1517RN08-2-CCR (lid reclaim water)

or CCU approved equal.

For medium vehicle traffic areas such as residential driveways, roadways, and parking lots shall be at a minimum ANSI/SCTE Tier 15 rated water meter boxes and covers.

For high vehicle traffic areas such as county arterial roadways, state roads, commercial driveways, industrial parks shall be at a minimum ANSI/SCTE Tier 22 rated water meter boxes and covers.

- d. Water meter boxes and covers shall be color impregnated or painted based on the meter box and cover materials and be blue in color for potable water and purple in color for reclaimed water
- e. Water meter box covers shall have a hinged access panel to facilitate the reading of the meter. All water meter boxes shall be delivered with the water source and service access holes installed.
- f. Water meters, required purchase from CCU, shall be installed either in a double or single configuration as determined by CCU.

## **PART 3 - EXECUTION**

### **3.1 CONSTRUCTION REQUIREMENTS**

Direct Bury, Directional Bore, Jack and Bore, and Moling: All direct bury, directional bore, jack and bore, and moling potable water and/or reclaimed water main pipe shall be installed to a minimum depth of thirty-six (36) inches to the top of the potable water main and/or forty-eight (48) inches to the top of the reclaimed water main or as approved by CCU. If additional fittings are required where not shown on the engineering drawings to maintain alignment around curves, the Contractor shall provide the required number and be compensated at the contract bid price as proposed on the bid form.

NOTE: If the new construction is tying into existing utilities, the Contractor shall verify the existing utilities, such as fittings and valves, are restrained prior to the start of installation of the valve or piping. If not properly restrained, the contractor shall notify CCU in writing and shall restrain the existing utility as approved by CCU.

#### **3.1.1 Direct Bury of Material**

- a. Open cut PVC potable water and/or reclaimed water main piping shall be Class 150 DR 18 for all areas with a minimum of thirty-six (36) inches of cover for potable water mains and forty-eight (48) inches of cover for reclaimed water mains. For shallower depth, the type of pipe and installation shall require prior CCU approval.

- b. Proper implements, tools, and facilities satisfactory to CCU shall be provided and used by the Contractor for the safe and convenient execution of the work and the testing. All pipe, fittings, and valves shall be carefully lowered into the trench in such a manner as to prevent damage to potable water main and reclaimed water main materials and protective coatings and linings. Under no circumstances shall potable water main and reclaimed water main materials be dropped or dumped into the trench. The pipe shall be laid with the manufacturers lettering designating the type and size of pipe visible from the top of the open trench. Wherever it is necessary to deflect pipe from a straight line in either the vertical or horizontal plane to avoid obstructions or where long-radius curves are permitted, the amount of pipe or joint deflection shall not exceed fifty (50) percent of the manufacturer's recommended limit. Pipelines intended to be straight shall not deviate from the straight line at any point in excess of one (1) inch.
- c. Open cutting of roads for trenching and direct bury of potable water and reclaimed water mains shall not exceed eight feet (8') in width. All effort shall be made to minimize the width of the trench and in-turn, the amount of restoration.
- d. All existing materials removed to facilitate the tunneling or deflecting of direct bury piping under or adjacent to an existing storm piping and/or structures shall be replaced by flowable fill. Prior to placing flowable fill the area between the direct bury piping and existing piping or structure shall be hollowed out to a defined cavity along the length of the direct bury piping. The Contractor is responsible for filling the cavity with flowable fill and replacing the flowable fill as necessary throughout the contract and warranty period should erosion occur.
- e. PVC pipe may be laid in the trench in single sections or preassembled multiple sections including no more than 1 full stick of pipe, 1 partial stick of pipe, and intervening required fittings and/or valves. Preassembled sections of pipe shall be carefully fed by hand or with the use of approved equipment on the pipe bed. The contractor shall provide pockets in the pipe bed material to eliminate any concentration of loads on the bell ends or joints. The ends of mechanical joint pipe and fittings and rubber gasket joint pipe and fittings shall be clean of all dirt, grease and foreign matter prior to installing fittings or joining of pipe sections. A joint lubricant shall be applied to all gaskets prior to joining two pipe sections together. The joint lubricant shall have been tested and approved for potable water service. No lubricant shall be used that will harbor bacteria or damage the gaskets.
- f. Cutting pipe for inserting valves, fittings, or closure pieces shall be in a neat and workmanlike manner without damaging the pipe or lining and so as to leave a smooth end at right angles to the axes of the cut pipe. The cut end of mechanical joint pipe shall be dressed to remove sharp edges or projections which may damage the rubber gasket. For push-on joints, the Contractor shall dress the pipe cut ends by beveling as recommended by the manufacturer.

### 3.1.2 Directional Bore of Material

- a. Proper implements, tools, and facilities shall be provided and used by the Contractor for the safe and convenient execution of the work. The Contractor shall meet the jointing and cutting pipe direct bury potable water and reclaimed water main piping requirements as they apply to the directional bore. A log of the bore depths shall be based on one foot intervals staking from the entry and exit locations and intermediate centerline. The vertical and horizontal location

readings shall be plotted on a one inch (1") equals twenty feet (20') natural scale drawing which shall be provided to CCU within 48 hours of completion of the bore.

No electro fusion fittings shall be used with HDPE unless specific written approval is provided by CCU.

- b. For potable water and/or reclaimed water mains eight (8") inches in size or smaller, the HDPE pipe shall have the same outside diameter as the connecting mains. For larger sizes, the HDPE pipe shall have the same size or larger inside diameter as the connecting mains unless otherwise noted on the plans; provided for in the Special Provisions; or approved by CCU.
- c. The depth of all directional bores for FDOT roads shall be in accordance with the FDOT permit requirements.
- d. The slurry may be recycled for reuse in additional hole opening operations if approved by CCU or it shall be removed and disposed of at an approved dump site. No fluids shall be allowed to enter any unapproved areas or natural waterways.
- e. For directional bores under any surface water (subaqueous) the drilling contractor must submit a 'frac-out' response plan for review and approval prior to starting the directional bore. During execution of all subaqueous directional bores, the drilling contractor must have at the site the necessary material, equipment, and manpower to properly respond to a 'frac-out' in accordance with the 'frac-out' response plan.

### 3.1.3 Moling

- a. Moling shall be used to install smaller diameter potable water and/or reclaimed water service connection pipe under road surfaces from the potable water and/or reclaimed water main in the right-of-way. The moling process consists of punching a hole beneath the surface to be spanned, installing the casing (schedule 40 PVC pipe), and installing the polyethylene (PE) potable water and/or reclaimed water service connection pipe. The casing shall be sized to allow the PE pipe to be installed with no chafing or damage.
- b. To connect new construction potable water and/or reclaimed water piping to an existing potable water or reclaimed water stub-out of a different diameter, the Contractor shall use CCU approved materials.

### 3.1.4 Fire Hydrants

Fire hydrant potable water main piping between the fire hydrant tee and the fire hydrant shall be installed level.

### 3.1.5 Marker Balls and Metallic Marker Tape

- a. Marker balls and metallic marker tape: Contractor shall provide and install metallic marker tape and provide, program, and install marker balls for all installed trenched pipe. For trenchless pipe installations the Contractor shall provide, program, and install marker balls. Metallic marker tape is not required on trenchless pipe installations. The tape shall be marked

blue for potable water and purple for reclaimed water. The metallic tape shall be laid 12 to 18 inches above the pipe and the ball markers placed directly on top of the pipe or fitting. For trenchless pipe installations the marker balls shall be placed with a minimum of 18 inches of cover with the exception that no marker balls are required for that portion of pipe that lies beneath the water surface at a subaqueous crossing.

- b. Installation: The balls shall be installed at all changes of direction and fittings absent of any valve. For cul-de-sacs having continuous fused or roll piping with no in-line fittings, the balls shall be placed starting at the point of curvature of the cul-de-sac and every 50 linear foot to the end of the line. On straight runs of pipe, the balls shall be installed at every power pole. If power poles do not exist, the balls shall be placed every 150 feet from the nearest change of direction or fitting. At road and driveway crossings the marker balls shall be placed on each side of the road or driveway, two feet from the pavement or driveway edge, or as otherwise approved by CCU. On vertical deflections the marker ball shall be placed on the top fitting only.
- c. Programming: The Contractor shall program all balls and provide a copy of the programmed data in each marker ball in either Microsoft EXCEL or Access electronic format to CCU. The Contractor as-built drawings shall show the location of all marker balls.

### 3.1.6 Fittings

When tightening bolts, the contractor shall bring the gland up toward the flange evenly while maintaining approximately the same distance between the gland and the face of the flange at all points around the socket. Tighten all nuts progressively a little at a time. DO NOT over stress bolts to compensate for poor alignment. If effective sealing is not attained at the maximum torque, disassemble the joint and reassemble again after cleaning. Fittings shall be installed in accordance with the manufacturer's printed instructions.

### 3.1.7 Restraints

Piping shall be restrained in accordance with the CCU standard details restraint table. The table is based on a safety factor of 2.0 and takes into account variables such as type of soil, type and depth of the trench, and depth and type of pipe. In addition, the restraints may be supplemented with thrust blocks. CCU may require the engineer to provide the dimensions of the thrust block for approval prior to construction.

### 3.1.8 Storm Sewer Conflicts

Potable water and reclaimed water mains that must be installed with less than 12 inches of clearance under storm sewer pipes or structures due to existing physical limitations that prohibit deflection or directional drilling, require construction of a bridging structure that is acceptable to CCU to support the storm sewer prior to installation of the potable water or reclaimed water main. The potable water or reclaimed water main pipe section under the storm sewer pipe or structure shall be replaced with a single 20 LF stick of ductile iron pipe centered under the storm sewer pipe or structure. The ductile iron pipe shall be fully encased in an 8 mil polyethylene sleeve in accordance with AWWA C-105, Method A. Polyethylene material shall conform to ASTM Standard Specification D 1248-68. The contractor shall

submit details of the proposed bridging structure and potable water main or reclaimed water main pipe installation to CCU for review and approval prior to the start of construction at the conflict location.

### 3.1.9 Water Main Crossing

All reclaimed water mains shall cross water mains at ninety (90) degrees and with a minimum angle of forty-five (45) degrees.

### 3.1.10 Service Connections

- a. The meter boxes and covers and backflow prevention devices shall be installed/positioned in accordance with the CCU standard details.
- b. The long services shall be installed in a three (3) inch schedule 40 PVC carrier pipe extending beyond the edge-of-pavement in accordance with the CCU standard details.
- c. The installed water meter boxes and covers shall meet the loading requirements for side walk and property line/easement installation and high vehicle traffic locations such as driveways, roadways, and parking lots.

## 3.2 **TESTING MAINS AND TAPPING SLEEVES**

All pressure and bacteriological tests shall be in accordance with AWWA Standards C-600, C-651, and C-652, latest revision. A pressure test shall be required for all installations of potable water and reclaimed water mains and all appurtenances. Bacteriological testing shall be done for all installations of potable water mains except as noted hereafter. No bacteriological testing is required for certain limited pipe installations as approved by CCU such as a new potable water service connection installation, the addition of a fire hydrant assembly to an existing potable water main, or the installation of limited additional piping and fittings such as a dive under new storm sewer to an existing potable water main. Upon completion of the installation of the potable water service connection, the service connection shall be flushed prior to connection to the on-site potable water service connection. The inside of the fire hydrant assembly or the inside of the new limited potable water main piping and fittings shall be wiped clean and shall be wiped with a chlorine soaked rag in compliance with FDEP regulations prior to installation. All such potable water mains and service connections and potable water mains taken out of service for inspection, alteration, or any other activity exposing the interior pipeline to the possibility of contamination shall be disinfected in compliance with FDEP regulations before they are placed in and/or returned to service.

### 3.2.1 Pressure Test

- a. Pipe:

The contractor shall hydrostatically pressure test all PVC, HDPE, and DI potable and reclaim water mains in accordance with the latest revision of AWWA C-600 series as applicable. Oil filled gauges shall only be used for all pressure tests. The tests shall be at 150 psi for a period



of two (2) hours. The allowable loss for one (1) hour shall be determined by the following formula:

$$\text{Allowable Leakage} = \frac{(D)(L)(PY)}{133,200}$$

Where: D = nominal diameter of the pipe in inches  
 L = length of pipe in feet  
 PY = square root of test pressure during the leakage test in pounds per square inch

Calibrated test equipment shall be on site to verify the loss of water during the testing period.

Pressure testing shall not exceed 1500 linear feet unless otherwise approved by CCU.

b. Tapping Sleeves:

All potable and reclaim water tapping sleeves shall be hydrostatically pressure tested in accordance with the latest revision of AWWA C-600. The test shall be conducted at 150 psi for a period of two (2) hours. No loss of pressure is allowed.

c. Procedures:

Each section of pipe between valves, between the tapping sleeve and the pipe, and/or the valve and the tapping sleeve shall be slowly filled with water from a safe source, and the specified test pressure shall be applied by means of a water pump in a manner satisfactory to CCU. In the case of testing a pipe where valves do not exist, the contractor shall plug the end of the line as approved by CCU. The pump, pipe, and/or tapping sleeve connections, gauge, and all necessary apparatus shall be furnished by the contractor and shall be approved by CCU prior to the conduct of any test. All necessary pipe taps for testing shall be made by the contractor as approved by CCU. CCU may request testing of isolated portions between valves within the test section if a portion of that main has critical components such as multiple fittings at an extreme deflection. The contractor shall be responsible to remove any pipe taps installed for this purpose upon completion of the test as approved by CCU.

Pressure shall be measured from sample points, blow-off assemblies, water services, or fire and flush hydrants for potable water and reclaimed water main pressure tests. CCU shall witness all tapping sleeve and potable water and reclaimed water main pressure tests.

3.2.2 Bacteriological Test

- a. All disinfection shall be in accordance with AWWA C-651, the Ten States Recommended Standards for Water Works as incorporated by FDEP, other pertinent FDEP regulations, and the Florida Administrative Code unless other specific written approval by CCU is issued. Materials and equipment for keeping the pipe clean (during construction), chlorinating the main, flushing/disposing of the heavily chlorinated water, bacteriological sampling and any re-disinfection, if required, shall be provided by the contractor. Chlorination shall be done by the continuous feed method using either a liquid chlorine gas-water mixture or a calcium or sodium hypochlorite solution. Direct feed chlorination or placing concentrated quantities of commercial

disinfectants such as calcium hypochlorite granules in the line prior to filling with water shall not be used.

- b. Chlorine residuals shall be tested using a chloridimeter. NOTE: A color wheel shall not be used.
- c. Sample points shall be located on the far side of all loops, at all dead ends, and not further than 1200 linear feet apart unless otherwise approved by CCU. Samples shall be collected from sample points, blow-off assemblies, or water services. Fire hydrants or flushing devices shall not be used as bacteriological sample points. Test samples shall be collected and transported by certified laboratory personnel. CCU shall witness the collection of all samples.

**END OF SECTION**