Section VI

WATER DISTRIBUTION SYSTEM

MATERIALS FOR CONSTRUCTION

A. GENERAL

1. All design criteria, materials, and construction shall be in accordance with DHEC regulations, AWWA and ASTM standards.

2. Unless otherwise noted or approved by the Hilton Head No.1 Public Service District all materials shall be manufactured in the United States.

3. All material or products which come into contact with drinking water shall be third party certified as meeting the specifications of the American National Institute/National Sanitation Foundation Standard 61, Drinking Water System Components - Health Effects. The certifying party shall be accredited by the American National Standards Institute.

4. Materials Standards - Pipe, fittings, packing, jointing materials, valves, and fire hydrants shall conform to Section C of the American Water Works Association (AWWA) Standards. All materials or products which come into contact with drinking water shall be certified as meeting the specifications of the American National Standard Institute/National Sanitation Foundation Standard 61, Drinking Water System Components – Health Effects. The certifying party shall be accredited by the American National Standards Institute. In the absence of AWWA Standards, materials meeting applicable Product Standards and acceptable to the Department may be selected. SD 26 Class 160 and SD 21 Class 200 PVC pipe meeting ASTM Standard D1785 or D2241 are acceptable in size twelve (12) inches and smaller. Asbestos cement pipe shall not be used in potable water systems except in the repair of existing asbestos cement lines.

5. Used Materials - Water mains which have been previously used for conveying potable water may be reused provided they meet the above standards and have been thoroughly cleaned and restored practically to their original condition.

6. Asbestos cement pipe shall not be used.

7. Thermoplastic pipe shall not be used above grade.

8. Steel pipe will not be used.

9. Natural rubber or other material which will support microbiological growth may not be used for any gaskets, O-rings, and other products used for jointing pipes, setting meters or valves, or other appurtenances which will expose the material to the water.

10. Lubricants which will support microbiological growth shall not be used for slip-on joints.

11. The use of vegetable shortening is prohibited.

12. Gaskets and Joints - Gaskets, O-rings, and other products used for jointing pipes, setting meters or valves, or other appurtenances which will expose the material to the water shall comply with the requirements of R.61-58.4(D)(1) and shall not be made of natural rubber or any other material which will support microbiological growth. Lubricants which will support microbiological growth shall not be used for slip-on joints. The use of vegetable shortening to lubricate joints is prohibited. The use of solvent-weld PVC pipe and fittings in water mains four (4) inches and larger is prohibited.

13. Metallic pipe and fittings shall be lead free in accordance with DHEC Reg.61-58.4(F). Thermoplastic pipe shall not be used above grade.

B. <u>DUCTILE IRON PIPE (DIP):</u>

1. Provide for twelve (12) inches and larger pipe.

2. Comply with ANSI/AWWA C151/A21.51.

3. Wall thickness in accordance with Table 51.1 of ANSI/AWWA C151/A21.51 with working pressure of one hundred fifty (150) pounds per square inch, depth of cover indicated and Type 2 bedding conditions, minimum thickness Class 50.

4. Use cement mortar lining: ANSI/AWWA C104/A21.4, standard thickness.

5. Use mechanical or push-on joints: ANSI/AWWA C111/A21.11 as modified by ANSI/AWWA C151/A21.51.

6. Use rubber gaskets and lubricant: ANSI/AWWA C111/A21.11.

    a. Natural rubber gaskets are not acceptable.

C. PLASTIC PIPE

1. General:

    a. Use integral bell or coupling type with elastomeric gaskets.

    b. Integral bells: ASTM D2672.

    c. NSF approved.

    d. Couplings: ANSI/AWWA C900.

    e. Gaskets: ASTM F477

        i. Natural rubber gaskets are not acceptable.

    f. Gaskets to be factory installed and integral with the pipe.

    g. Lubricants shall be compatible with pipe and gasket materials, shall not support bacteria growth and shall not adversely affect potable quality of line contents.

        i. NSF approved.

2. PVC four (4) inches and larger:

    a. Comply with ANSI/AWWA C900, Table 2, Pressure Class 150.

3. PVC three (3) inches and smaller:

    a. Comply with ASTM D 1785 for PVC 1120.

    b. Schedule 40 with solvent weld joints.

    c. Mark with National Sanitation Foundation approval at eighteen (18) inch intervals.

4. Service pipe:

    a. Minimum size – one (1) inch"

b. Provide PVC as specified above for services one and a half (1½) inches and larger.

c. Provide high molecular weight flexible polyethylene pipe.

i. ASTM D1248 and AWWA C901, Type III, SDR 9, copper tubing size (CTS).

d. Mark with National Sanitation Foundation approval at eighteen (18) inch intervals.

D. FITTINGS AND SPECIALS

1. General:

a. Cast iron fittings are not acceptable.

2. Ductile iron pipe:

a. Use two hundred fifty (250) pounds per square inch pressure rated ductile iron fittings or specials unless otherwise indicated.
1) ANSI/AWWA C110/A21.10.
2) ANSI/AWWA C153.

b. Fittings for use with push-on joint pipe.
1) ANSI/AWWA C111/A21.11.

c. Compact fittings for piping three (3) to sixteen (16) inches may be provided in accordance with ANSI/AWWA C153/A21.53.88.

d. Use cement mortar lining: ANSI/AWWA C104/A21.4, Standard thickness.

3. Plastic pipe four (4) inches and larger:

a. Use one hundred fifty (150) pounds per square inch pressure rated ductile iron fittings or specials unless otherwise indicated.
1) ANSI/AWWA C110/A21.10.

b. Provide adapter glands, gaskets, etc. as required to accommodate any differences in pipe and fitting dimensions.

4. Plastic pipe three (3) inches and smaller:

a. Use PVC fittings, one hundred sixty (160) pounds per square inch at 73F pressure rating, joint design to conform to pipe joints, solvent weld.

E. RESTRAINED JOINT PIPE AND FITTINGS

1. Provide restrained joint pipe and fittings on all piping at each fitting, including valve connections and on the pipe joints to a distance of thirty six 936) feet on each side of the fitting.

2. Ductile iron pipe and fittings:

a. Fittings:

1) Provide for use with mechanical joint pipe and fittings.

2) Provide "MEGALUG" as manufactured by EBAA Iron Sales, Inc. of Eastland, Texas, ROMAGRIP, or other approved equal.

b. Pipe:

1) Provide retainer gaskets with stainless steel locking elements on the inner surface, for use with slip joint pipe.
   i) Provide gaskets for two hundred fifty (250) pounds per square iinch minimum working pressure.
   ii) Provide gaskets conforming to ANSI/AWWA C111/A21.11.
   iii) Approved gaskets are the Field Lok Gasket manufactured by U.S. Pipe and Fast-Grip Gasket manufactured by American Ductile Iron Pipe, or approved equal.

3. PVC pipe and fittings:

   a. Fittings:
      1) Provide for use with mechanical joint fittings and PVC pipe.
         i) Provide "Series 2000 PV" as manufactured by EBAA Iron Sales, Inc. of Eastland, Texas.
   b. Pipe:
      1) Provide for use with PVC pipe bells.
         i) Provide "Series 1600" as manufactured by EBAA Iron Sales, Inc., of Eastland, Texas.

F. <u>COUPLINGS - 4" AND LARGER</u>

1. Provide couplings where needed to make piping connections.

2. Provide full-length mechanical joint ductile iron sleeve, twelve (12) inches minimum length.

3. Provide cutting-in sleeve where installing fittings in an existing line.

   a. Provide ductile iron with mechanical joint.

4. Provide restrained joint couplings: where restrained joints are indicated on the plans or when coupling is located within eighteen (18) feet for twelve (12) inch piping and less and thirty six (36) feet for larger piping of a bend, tee or valve.

5. Compact fittings are not acceptable.

6. Acceptable product – Transition Coupling: Viking Johnson*
   *Note: Fittings must be manufactured in USA

G. PLUGS OR CAPS – FOUR (4) INCHES AND LARGER

1. Provide at all pipe ends and unused branches of fittings.

2. Tap and provide with two (2) inch plug.

3. Provide restrained joint.

H. METALLIC DETECTION TAPE

1. Provide 2-inch wide metallic detection tape on all buried PVC and polyethylene piping.

   a. Provide 5.0 mil overall thickness with no less than a 50-gauge solid aluminum foil core.

   b. Foil to be visible from both sides.

   c. No inks or printing extended to the edges of the tape.

   d. Encase printing to avoid ink rub-off.

   e. Tensile strength - 28 lbs/inch.

   f. Use heat set mylar inks.

2. Color to be Safety Precaution Blue.

3. Wording on tape to indicate “Potable Water” at no greater than 24" on center.

I. COPPER TRACER WIRE

1. Provide a continuous 12 gauge insulated copper tracer wire on all buried PVC and polyethylene piping.

2. Tracer wire is to be approved for direct burial by the manufacturer.

J. VALVES

1. General:

   a. 2½” and smaller: Use ball valves.

b. 3" through 12": Use gate valves.

c. 14" and larger: Use gate valves.

d. Open by turning counterclockwise.

e. End connections as required for the piping in which they are installed.

f. Two (2) inch metal operating nut with arrow indicating direction of opening.

g. Use valves designed for a working pressure of not less than 150 psi unless otherwise specified herein.

h. Provide stem extensions on all valves where the top of the operator nut is located greater than 36 inches below the top of the valve box.

2. Ball valves, two and a half (2½) inches and smaller:

a. Use all bronze ball valves, quarter (¼)-inch turn with stop.

b. Provide two (2)-inch square nut.

c. Acceptable Products: Ford Model B11-QT67 or Mueller Model B-20200.

3. Gate valves:

a. Use resilient seated wedge valves: ANSI/AWWA C500/C509.

b. Internal ferrous metal surfaces to be fully coated with two part thermosetting epoxy.

c. Provide two-part thermosetting epoxy coating on valve exterior.

d. Provide integrally cast bronze stem nut.

e. Design for external stem failure when excessive closing torque is applied with no failure of the pressure retaining parts.

f. Double disc valves to have bevel gears with grease case, provide all necessary appurtenances for horizontal installation.

g. Provide double disc valves on fourteen (14)-inches and larger with valved bypass.

h. Provide valves for two hundred fifty (250)pounds per square inch maximum working pressure and five hundred (500) pounds per square inch static test pressure.

i. Provide stainless steel fasteners.

j. Acceptable product: Mueller or AVK.

4. Butterfly valves:

a. Provide butterfly valves conforming to AWWA Standard C504, latest revision, for Class 150B, unless otherwise specified.

b. Resilient seats are to be synthetic rubber (BUNA N).

c. Shafts to be turned, ground and polished, constructed of 18-8 Type 304 stainless steel.

1) Shafts to be of one piece design.

2) Attach disc to shaft with stainless steel tapered pins and locking nuts.

d. Spray coat all interior wetted ferrous surface with two component epoxy applied to a nominal thickness of 3 to 4 mils.

1) Coating material to be AWWA and U.S. Food and Drug Administration approved for use with potable water.

e. Provide operators with not less than maximum operator torque, as determined in accordance with Appendix A of AWWA C504, to operate valves under actual line pressures and velocities.

1) Provide worm and gear, or traveling nut type, self-locking to prevent the valve disc from creeping or fluttering when it is in any intermediate position between open and closed.

2) Gear operators to be permanently lubricated, totally enclosed, with adjustable stops for the open and closed position, and

except on units for buried service, shall have a valve disc position indicator.

f. Provide position indicator and extension shaft for all valves and operators.

1) Position indicator shall be hermetically sealed for installation in a C.I. valve box.

2) Show valve disc position, direction of rotation and number of turns from full open to full close.

3) Shaft extension and pins to be stainless steel.

4) Base plate and housing to be aluminum.

5) Provide all bronze gearing.

6) Provide two (2)-inch AWWA square nut.

7) Approved manufacturer: Dyna-Torque, Inc. of Mukegon, Michigan.

g. Acceptable product: DeZurik

K. VALVE OPERATOR

1. Provide one T-handle operator for each ten buried valves with nut operator.

2. Operator to be epoxy coated.

L. FIRE HYDRANTS

1. Comply with ANSI/AWWA C502.

2. Waterway valve opening, 5¼".

3. Six inch bell connection, two 2½" hose connections, one 4½" steamer connection with cap chain on all connections.

4. National Standard screw threads on outlet nozzles.

5. Open by turning counterclockwise, with arrow cast in top indicating direction of opening.

6. Two part breakable safety flange shall be an integral part of barrel casting.

7. Depth of bury, three (3) feet six (6) inches.

8. Install with break away flange at least two (2) inches above grade.

9. Finish coat with industrial enamel, yellow color ("old yeller") to match the District's standard.

10. Provide one hydrant wrench for each ten hydrants.

11. Acceptable product: Mueller Model Super Centurion, AVK Series 2780.

12. See valve box section below for color requirement.

M. FIRE HYDRANT REFLECTOR

1. Provide industry standard blue hydrant reflector for paved roadway.

N. FIRE HYDRANT OFFSET FITTING

1. Locate between the shut-off valve and each hydrant.

2. Provide a twelve (12)-inch offset.

3. Provide Grade Lok as manufactured by Assured Flow Sales, Inc., or approved equal.

O. VALVE BOXES

1. Provide at each buried valve.

2. Cast iron extension type, suitable for minimum cover of three (3) feet six (6)-inches over the pipe.

3. Minimum inside diameter at the top of five (5) inches, minimum wall thickness 3/16 inches.

4. Have the word "WATER" cast into the cover.

5. Coat box and cover with two (2) shop coats of bitumastic paint.

6. Acceptable product: Tyler Model 461S.

7. Fire hydrant valve boxes shall be painted the same color as the hydrant.

P. VALVE BOX PROTECTION RING

1. Provide at each valve box a precast concrete protection ring.

2. Provide two (2) rings of #3 reinforcing steel, one 21" in diameter, and one 15" in diameter; or one (1) ring of #3 reinforcing steel, 22" in diameter with fibermesh concrete.

3. Inside dimensions to be 9¼”.

4. Outside diameter to be 27".

5. Provide 5" thickness at interior with a continuous slope to 2" thickness at the outside.

6. Minimum weight of 110 lbs.

Q. SERVICE AND TAPPING SADDLES

1. Provide of the following materials:
   a. Body - Ductile Iron ASTM-A536.

   b. Bales and straps - Type 304 stainless steel.

   c. Studs - Type 304L stainless steel.

   d. Hardware - Type 304 stainless steel.

2. Provide double strap for sizes 5" and larger. One strap is acceptable if width of the strap matches the width of the saddle.

3. Finish - Provide fusion bonded nylon to an average thickness of 12 mils.

4. Provide a 6" long brass nipple on the outlet for PVC pipe outlet connections.

5. Acceptable products: Smith Blair (Rockwell) 317, JCM 406, or Romac style 202N, Ford.

R. TAPPING SLEEVE AND VALVE

1. Tapping sleeve:

   a. Provide Type 304 stainless steel sleeve with stainless steel flanged outlet.

   b. Provide full circumferential gasket.

   c. Provide for maximum working pressure of 150 psi.

   d. Provide Type 304 stainless steel nuts and bolts.

   e. Provide ¾" NPT test plug.

   f. Acceptable Products: JCM 432, Romac SST III, or approved equal.

2. Tapping valve:

   a. Construct of material compatible with tapping sleeve.

   b. Valve to conform to gate valve specifications above.

   c. Joints - Flange to tapping sleeve, for pipe end.

3. Tie rods:

   a. Provide steel rods complying with ASTM Designation A242, galvanized in accordance with ASTM Designation A123.

   b. Acceptable products: Super Star Tie Rod Figure No. SS12 and Tie Bolt Figure No. SST7 as manufactured by Star National Products or approved equal.

S. AIR RELEASE VALVES

1. Provide cast iron body with stainless steel internal trim and float.

2. Provide stainless steel seat with BUNA-N rubber valve.

3. Provide Crispin Type “N” Model PL10.
    a. ¼” orifice.
    b. 0 to 150 psi working pressure.
    c. 1" NPT connection.
4. Provide a heavy duty cast iron meter box to house valve.

T. BLOW-OFF HYDRANT

1. Provide non-freezing, self-draining type.
2. Provide all working parts of bronze-to-bronze design.
3. Hydrant shall be lockable.
4. Provide Eclipse No. 78 as manufactured by Kupferle Foundry Company.
    a. 2" FIP inlet.
    b. Bronze 2½" NST outlet.
    c. Non-turning operating rod.
    d. Open left.
5. Set below grade in a cast iron meter box.
    a. Coat meter box with two (2) coats of bitumastic paint.
    b. Minimum opening in meter box of 10".

U. CORPORATION STOPS

1. Acceptable product:
    a. Ford Model F1000, CCxCTS.
    b. Mueller Model H-15008.

V. CURB STOPS

1. Acceptable product:

   a. Ford Model B41-444W CTS x female IPS.

   b. Mueller Model B25170.

W. REPAIR COUPLINGS

1. Pipe 2½” and smaller: PVC

2. Pipe larger than 2½":

   a. Full length mechanical joint ductile iron couplings, 12" minimum length, or mechanical sleeve.

   b. Ductile iron transition couplings for joining plain end pipe, as manufactured by JCM, or equal.

X. MISCELLANEOUS PARTS AND ACCESSORIES

1. Use standard commercial grade suitable for the type of installation or system involved, and conforming to the applicable standards and specifications of the AWWA.