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****NOTE ADDENDUM TO ALL SPECIFICATIONS PAGE B-15*****

SECTION 02626

RIGID POLYSTYRENE FOAM INSULATION

PART 1 GENERAL

1.01 WORK INCLUDED

A. Furnishing rigid polystyrene foam insulation.

B. Installation.

PART 2 PRODUCTS

2.01 MATERIALS

A. Rigid polystyrene foam insulation - Trench width (pipe diameter plus 2 feet, minimum) x 8 feet x 2-inch thickness (blue board) as manufactured by Dow Chemical or U.S. Gypsum.

B. Products of equal quality, detail, function and performance may be proposed.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install where indicated on Drawings and as directed by the Designated Representative of the Town of Hooksett.

B. Backfill and compact the total width of the trench to crown of pipe; place center of insulation over centerline of pipe. Complete installation of compacted backfill material.

C. Take special care when backfilling so as not to damage insulating materials.

END OF SECTION

SECTION 02645

HYDRANTS

PART 1 GENERAL

1.01 WORK INCLUDED

A. Furnishing hydrants and appurtenances.

B. Furnishing tool kit.

C. Installation.

1.02 REFERENCE STANDARDS

A. AWWA C502 - Dry-Barrel Fire Hydrants.

1.03 SUBMITTALS

A. Submit Shop Drawings and product data.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Darling B-62-B

B. Substitutions: Products of equal quality, detail, function and performance may be proposed for substitution.

2.02 MATERIALS

A. Hydrants:

1. Meet or exceed requirements of AWWA C502.

2. Inlet connection shall be 6-inch, mechanical joint. **All hydrant legs shall be ductile iron (added 11-3-15).**

3. Valve opening shall be 5-1/4 inches minimum.

4. Barrel ID shall be 7 inches minimum. Barrel shall have an integrally cast flange which attaches to the hydrant shoe.

5. Depth of bury shall be **6'-0" minimum** (rev. 10-14-15), unless otherwise shown on the Drawings.

6. Shall be dry barrel type with removable drain plugs, which shall be installed prior to installing hydrant.

7. Outlets - Shall have two 2-1/2-inch, one 4-1/2-inch, National Standard thread with chained caps.

8. Operating nut shall be pentagon, 1-1/2-inch, open left (counterclockwise).

9. Shall have square valve rods and bronze to bronze sub-seats.

10. Painting: Shop and field painted fire hydrant red in accordance with AWWA C502.

11. Hydrants shall have safety breakaway construction at grade.

B. Tool Kit: One (1) complete tool kit including hydrant wrench, cap screw wrench, seat wrench, bottom plate wrench, and brass sleeve.

PART 3 EXECUTION

3.01 INSTALLATION

A. Hydrant gates shall be thrust blocked in place (added 7-6-15).
Hydrants shall be set at the location shown and bedded on a firm foundation. Each hydrant shall be set in true vertical alignment and properly braced. All nuts and bolts located below finish grade shall be given a heavy bituminous coating after installation. **All hydrant legs shall be ductile iron (added 11-3-15).**

B. A drainage pit, three feet in diameter and two feet deep below and to the rear of the hydrant, shall be filled with pea stone and compacted.

C. Precast concrete thrust blocks with hooks shall be placed between the rear of the hydrant inlet and undisturbed soil at the end of the trench. Minimum bearing area shall be as shown on the Drawings. Roofing felt shall be placed around hydrant elbow before placing concrete. Care shall be taken to insure that concrete does not plug the drain ports.

D. No hydrant shall be backfilled until directed by the Designated Representative of the Hooksett Village Precinct. During backfilling, additional pea stone shall be placed to a point 6 inches above the drain port.

E. The Developer **shall not install plugs** in the hydrant drain ports.

END OF SECTION

SECTION 02665

WATER DISTRIBUTION SYSTEM

PART 1 GENERAL

1.01 WORK INCLUDED

A. Furnishing pipe and miscellaneous appurtenances.

B. Installation.

C. Testing.

1.02 REFERENCE STANDARDS

A. ANSI A21.4/AWWA C104 - Cement-Mortar Lining for Ductile Iron Pipe and Fittings for Water

B. ANSI A21.10/AWWA C110 - Gray Iron and Ductile Iron Fittings, 3" through 48", for Water and Other Liquids.

C. ANSI A21.11/AWWA C111 - Rubber Gasket Joints for Ductile Iron and Gray Iron Pressure Pipe and Fittings.

D. ANSI A21.51/AWWA C151 - Ductile Iron Pipe, Centrifugally Cast in Metal Molds and Sand Lined Molds, for Water and Other Liquids

E. ANSI A21.53/AWWA C153 - Ductile Iron Compact Fittings, 3 in. through 12 in., for water and other liquids.

F. ASTM F477 - Standard Specifications for Elastomeric Seals (Gaskets) for Jointing Plastic Pipe.

G. AWWA C509 - Resilient-Seated Gate Valves, 3 inch through 12 inch NPS, for Water and Sewage Systems.

H. AWWA C502 - Dry-Barrel Fire Hydrants.

I. AWWA C600 - Installation of Ductile Iron Water Mains and their Appurtenances.

J. AWWA C651 (or current) - Disinfecting Water Mains.

K. AWWA C900 - Polyvinyl Chloride (PVC) Pressure Pipe, 4 inch through 12 inch, for water.

1.03 SUBMITTALS

A. Submit shop drawings and product data.

PART 2 PRODUCTS

2.01 GENERAL

A. All products included in this section shall conform to the requirements of the standard specifications referenced herein.

B. Pipe size shall be as shown on the Drawings.

C. All pipe materials and methods of jointing shall be as shown on the Drawings.

2.02 ACCEPTABLE MANUFACTURERS

A. Specifications: Products specified in this section are based on those manufactured by the following firms:

1. Ductile Iron Pipe - Atlantic States, U.S. Pipe, or Griffin. **No previously used or belled (connected) pipe will be accepted. (added 11-3-15)**

2. Ductile Iron Fittings - Tyler.

3. Gate Valves - American Flow Control

4. Hydrants - American Darling (B-62-B)

5. Brass Fittings - McDonald

6. Valve boxes –QWP, Bibby Lapearle.

7. Corporation stops - McDonald

8. Curb Stops - McDonald

9. Service Saddle –ROMAC

10. AWWA-approved C900 PVC Pipe- Ipex Blue Brute or North American Pipe Company (rev. 10-19-15). **No previously used or belled (connected) pipe will be accepted. (added 11-3-15)**

11. Mechanical Joint Restraints – Romac RomaGrip (rev. 10-19-15).

12. Curb Boxes- QWP, Bibby Lapearle, **CURB BOX RODS MUST BE STAINLESS STEEL. PVC PIPE (BLUE OR PAINTED BLUE) MUST BE INSTALLED OVER CURB BOXES, EXTENDING AT LEAST 2 FEET ABOVE AND BELOW GROUND LEVEL (added 7-6-15).**

13. **AWWA-approved HDPE Pipe (main). No previously used or belled (connected) pipe will be accepted. (added 11-3-15).**

B. Substitutions: Products of equal function, quality and performance may be proposed for substitution.

2.03 MATERIALS

A. Ductile Iron Pipe: Pipe shall conform to ANSI A21.51/AWWA C151, Class 52, and shall have push-on joints. Pipe shall be double cement-lined with seal coat inside and out in accordance with ANSI A 21.4/AWWA C104. Push-on joints and rubber gaskets shall be in accordance with ANSI A 21.11/AWWA C 111. Each push-on joint shall include two (2) serrated brass wedges to provide electrical continuity.

B. Polyvinyl Chloride (PVC) Pipe: Pipe and fittings shall conform to the most current AWWA C900 standard. Pipe shall be a minimum Class 150 and shall meet the requirements of Dimension Ratio (DR) 18.

| Pipe (inches) | Size (inches) | Thickness DR | Outside Diameter (inches) |
|---|---|---|---|
| 4 | 0.267 | 18 | 4.80 |
| 6 | 0.383 | 18 | 6.90 |
| 8 | 0.503 | 18 | 9.05 |
| 10 | 0.617 | 18 | 11.10 |
| 12 | 0.733 | 18 | 13.20 |

PVC Pipe shall have an integrally formed bell of hydrostatic design strength equivalent to the pipe barrel. The joint shall use a solid cross section elastomeric sealing ring meeting the requirements of ASTM F-477. Sufficient lubricant shall be a member in good standing of the Uni-Bell PVC Pipe Association.

The Pipe manufacturer shall be a member in good standing of the Uni-Bell PVC Pipe Association.

If requested by the ENGINEER, the manufacturer shall submit a certificate of compliance for the pipe to ensure that it meets the requirements of AWWA C900, and bears approval of National Sanitation Foundation, Underwriters Laboratory and Factory Manual.

The pipe shall be blue in color, the universal standard for potable water.

C. Ductile Iron Fittings: Fittings shall be ductile iron, three hundred and fifty (350) psi pressure rating, conforming to ANSI A21.10/AWWA C110 or ANSI A21.53/ AWWA C153 with mechanical joints. Fittings shall be double cement-lined with seal coat inside and out in accordance with ANSI A21.4/AWWA C104. Fitting shall be manufactured by Tyler or approved equal. Tees for hydrant branches shall have mechanical joints on the run with a plain end having an integral rotating gland on the branch. The gland shall anchor mechanical joint pipe or valve ends to the plain end of the tee.

D. Joints shall be furnished with "Grip Ring" for 4” to 12”, and "Megalug" , or "Wedge Action" pipe restrainer glands for pipe greater than 12”. Grip Rings, as manufactured by Romac. Megalugs, as manufactured by EBAA Iron Sales, Inc. Wedge Action, as manufactured by Uni-Flange. Joints and gaskets shall conform to ANSI A21.11/AWWA C111. Glands shall be made of ductile iron conforming to ASTM A536-80. The ring of the Grip Ring shall be ductile iron grade 65-45-12 conform to ASTM A536-80.

E. Gate Valves: Gate valves shall be no more than 1,000 feet apart. Gate valves shall be resilient wedge type with a ductile iron body, and a non-rising bronze stem. The valves shall meet the requirements of AWWA C509 except for the body thickness which meets the requirements of AWWA C153. Valves shall be rated for a minimum of 250 psi working pressure. Valves shall have mechanical joints and gaskets as specified above. Valves shall open left. Valves shall be American Flow Control AFC - 2500 or equal.

F. Valve Boxes: Boxes shall be cast iron, of heavy pattern, adjustable type, thoroughly coated with bitumastic paint, and shall be provided with cast iron cover. The upper section of the box shall be top-flange valve box type to prevent settlement. The lower section of the box shall be a belled base section that encloses the operating nut of the valve. Boxes shall have a barrel of not less than five (5) inch diameter and cast iron valve box extensions shall be provided to bring the cover to grade. Boxes shall be of the sliding adjustable type with a lap of at least six (6) inches when in the extended position. Covers shall have the word "WATER" cast into them. Valve boxes shall be QWP, Bibby Lapearle.

G. Hydrants: Hydrants shall conform to AWWA C502. Hydrants shall be furnished with a teflon-coated 5-1/4 inch valve, one 4-inch steamer connection, two 2-1/2-inch hose connections, plugged drain holes, and shall opening left. Inlet shall be mechanical joint conforming to ANSI A21.11/AWWA C111. Hydrants shall be compatible with specified depth of bury of water main. Hydrants shall be American Darling B-62-B. The hydrant shall be painted to match the standard of the OWNER. Painting shall be done at the factory.

H. Corporation stops shall be ball valve type with PTFE coated brass ball, CC (AWWA tapered) threads, double O-ring seal, a blow-out proof stem design, and compression-type fittings with a gripper band (or grip joint). Corporations shall be supplied with pack-joint eighth or quarter bends where required.

I. Service saddles shall be required for corporation stops in accordance with the table in paragraph 3.07. Service saddles shall be double strap type with 360 degree contact with the main line. The saddle body shall be constructed from nylon coated ductile iron and tapped for the size and thread type as noted above. The straps shall be constructed from stainless steel.

J. Copper tubing for house services and chlorine injection points shall be Type "K" soft conforming to ASTM B88. The name or trademark of the manufacturer and type shall be stamped at intervals along the pipe. House services can be HDPE tubing DR 11 min. or PE tubing stamped 250 psi.(added 11-3-15).

K. Curb stops shall be ball valve type with a drain hole, PTFE coated brass ball, double O-ring seal, a blow-out proof stem design, and compression-type fittings with a gripper band (or grip joint). Curb stops shall open left.

L. Curb boxes shall be adjustable Erie style with a 9/16" diameter by 24" long stainless steel operator rod and a plug type cover. The box shall be furnished to meet the required depth of the curb stop. **PVC PIPE (BLUE OR PAINTED BLUE) MUST BE INSTALLED OVER CURB BOXES, EXTENDING AT LEAST 2 FEET ABOVE AND BELOW GROUND LEVEL (added 7-6-15).**

M. Adapter couplings may be required for fitting new services to existing service lines. Such fittings shall be provided with compression-type fittings with a gripper band (or grip joint) connection.

N. Couplings used to connect plain ends of cast or ductile iron pipe shall be of the long body solid sleeve type (ie. 12" long). The fitting, glands, and nuts shall be as specified above. Couplings used to connect plain ends of pit cast pipe to ductile iron pipe shall be a flexible ductile iron transition coupling as manufactured by Dresser.

O. Tapping Sleeve: Tapping sleeve shall be Romac type 304 stainless steel with stainless steel nuts and bolts.

PART 3 EXECUTION

3.01 GENERAL

A. Pipe and accessories shall be handled and stored in such a manner as to insure that pipe is installed in sound, undamaged condition. Care shall be taken not to injure the pipe coating or lining.

B. Ductile iron pipe and fittings and the cement linings are comparatively brittle. Every care shall be taken in handling and laying pipe and fittings to avoid damaging the pipe or lining, scratching or marring machined surfaces, and abrasion of the pipe coating or lining.

C. Any pipe showing a distinct crack with no evidence of incipient fracture beyond the limits of the visible crack, if approved, may have the cracked portion cut off before the pipe is laid so that the pipe used is perfectly sound. The cut shall be made in the sound barrel at a point at least twelve (12) inches from the visible limits of the crack.

D. If authorized, cutting of the pipe shall be done so that the cut is square and clean, without causing damage to the pipe lining. All pipe cutting shall be done by means of an approved type of power cutter. The use of hammer and chisel, or any other method which results in rough edges, chips and damaged pipe, is prohibited.

E. Each pipe section shall be placed into position in the trench in such manner and by such means required to cause no damage to the pipe, person or to property.

F. The Developer shall furnish slings, straps and/or approved devices to provide satisfactory support of the pipe when it is lifted. Transportation from delivery areas to the trench shall be restricted to operations which can cause no damage to the pipe units.

G. Pipe shall not be dropped from trucks onto the ground or into the trench.

H. The Developer shall have on the job site, with each laying crew, all the proper tools to handle and cut the pipe.

I. Damaged pipe coating and/or lining shall be restored before installation only as approved or directed by the Designated Representative of the Hooksett Village Precinct.

K. **Depth of bury of water main shall be a minimum of six (6) feet measured from top of pipe.** (added 10-14-15).

3.02 CONTROL OF ALIGNMENT AND GRADE

A. The Drawings show easement and property and other control lines necessary for locating the work as well as elevations and benchmarks used in the design of the work on the Drawings.

B. During construction, the Developer shall provide the Designated Representative of the Hooksett Village Precinct, at his request, all reasonable and necessary materials, opportunities, and assistance for setting stakes and making measurements, including the furnishing of one (1) or two (2) rodmen or chainmen as needed at intermittent times. He shall not proceed until he has made timely request of the Designated Representative of the Hooksett Village Precinct for, and has received from him, such controls and instructions as may be necessary for the work to progress. The work shall then be done in strict conformity with such controls and instructions.

C. The Developer shall carefully preserve benchmarks, reference points and stakes, and in case of willful or careless destruction by his own men, he will be charged with the resulting expense and shall be responsible for any mistakes or delay that may be caused by their unnecessary loss or disturbance.

3.03 PREPARATION OF BED

A. As soon as excavation has been completed to required depth, place and compact bedding material to the elevation necessary to bring the pipe to grade as specified in a manner as

determined by the Designated Representative of the Hooksett Village Precinct. **All pipe shall be placed on a 6-inch bed of sand.**

B. The compacted bed shall be rounded so that at least the bottom quadrant of the pipe shall rest firmly for the full length of the barrel (the pipe shall be chinked to the spring line with sand). Suitable holes for bells or couplings shall be dug around the pipe joints to provide ample space for making tight joints.

3.04 LAYING PIPE

A. Laying of pipe and fittings shall be in accordance with the requirements of AWWA Specifications and as specified herein.

B. Each pipe length shall be inspected for cracks, defects in coating or lining, and any other evidences of unsuitability.

C. Pipe shall be laid in the dry and at no time shall water in the trench be permitted to flow into the pipe.

D. The pipe shall then be laid on the trench bedding, and the pipe pushed home. Jointing shall be in accordance with the manufacturer's instructions and appropriate ASTM or AWWA Standards, and the CONTRACTOR shall have on hand for each pipe laying crew, the necessary tools, gauges, pipe cutters, etc. necessary to install the pipe in a workmanlike manner. Pipe laying shall proceed upgrade with spigot ends pointing in the direction of flow.

E. **Tracer wire (Copperhead) shall be placed over the water main. Caution tape (stating "Buried Water Line" shall be placed 1ft to 1.5 ft. over the top of the water line. (added 10-22-15).**

F. Blocking under the pipe will not be permitted except where a concrete cradle is proposed, in which case precast concrete blocks shall be used.

G. After placement of the blanket material, the pipe shall be checked for any debris, tools, etc. which shall be removed.

H. **The pipe laying crew shall record the elevation of each 20-foot length of pipe placed, to verify that the top of the pipe is a minimum of 6 feet below finished grade. (added 10-22-15).**

I. If inspection of the pipe indicates that the pipe has been properly installed as determined by the Designated Representative of the Hooksett Village Precinct, the Developer may then refill or backfill the remainder of the trench in a manner as determined by the Designated Representative of the Hooksett Village Precinct.

J. At any time that work is not in progress, the end of the pipe shall be suitably closed to prevent the entry of animals, earth, etc.

K. Acceptable alignment shall be preserved in laying. The deflection at joints shall not exceed the manufacturer's recommendations or three (3) degrees, or Twelve (12) inches for an eighteen (18) foot length of pipe. Deflection shall be determined by taking into account the vertical and horizontal deflections of the joint. Fittings, in addition to those shown on the Drawings, shall be provided, if required, in crossings utilities which may be encountered upon opening the trench. Solid sleeves shall be used only where approved by the Designated Representative of the Hooksett Village Precinct.

L. Precast concrete thrust blocks with hooks shall be installed at all fittings and other locations as directed by the Designated Representative of the Hooksett Village Precinct. Minimum bearing area shall be as shown on the Drawings. Joints shall be protected by felt roofing paper prior to placing concrete. Concrete shall be placed against undisturbed material, and shall not cover joints, bolt, or nuts, or interfere with the removal of any joint.

M. Push-on joints shall be made in strict accordance with the manufacturer's instructions. Pipe shall be laid with bell ends on the upstream side. A rubber gasket shall be inserted in the groove of the bell end of the pipe and joint surfaces shall be cleaned and lubricated. The plain end of the pipe to be entered shall then be lubricated and inserted in alignment with the bell of the pipe to which it is to be jointed and pushed home with a jack or by other means. After jointing the pipe, a metal feeler shall be used to make certain that the rubber gasket is located properly. The pipe shall then be deflected, if need be and two (2) brass wedges shall be inserted in the joint of the two pipes.

N. Mechanical joints at valves, fittings and where designated shall be in accordance with AWWA recommendations and the instructions of the manufacturer. To assemble the joints in the field, the Developer/Contractor shall thoroughly clean the joint surfaces and rubber gasket with soapy water before tightening the bolts. Bolts shall be tightened to the specified torques. Under no conditions shall extension wrenches or pipe over handle or ordinary ratchet wrench be used to secure greater leverage.

O. Apply a bituminous coating to all buried rods, nuts, and bolts.

3.05 INSTALLATION OF VALVES AND FITTINGS:

A. Valves shall be no more than 1,000 feet apart (rev. 8-12-15). Valves and boxes shall be set with the stem vertical and box vertically centered over operating nut. Valves shall be set on a firm foundation and supported by tamping selected excavated material under and at the sides of the valve. The gate box shall be supported during backfilling and maintained in vertical alignment with the top flush with finish grade. All valves shall be furnished and installed with a POSI- CAP.

B. Install couplings and fittings in accordance with manufacturer's instructions.

C. All valves and fittings shall be installed in order to assure electrical continuity using mechanical joint retainer glands, grounding straps and brass wedges (push-on joints only).

D. Valve and hydrant tees shall be utilized at all hydrant installations. Hydrant and valve tees shall have an integrally attached, rotatable gland which, after bolting to valve or adjoining fitting, the joint is effectively restrained from separation.

E. Before backfilling, all exposed portions of any bolts shall be heavily coated with two (2) coats of bituminous paint.

F. Tapping Sleeves and Tapping Valves:

1. Shall be set vertically and squarely centered on the main to be tapped. Adequate support shall be provided under the sleeve and valve during the tapping operation. Sleeves shall be no closer than three feet from water main joints.

2. Installations shall be made under pressure and the flow of water through the existing main shall be maintained at all times.

3. Precast concrete thrust blocks with hooks shall be provided behind all tapping sleeves. Proper tamping of supporting earth around and under the valve and sleeve is mandatory. After completing the tap, the valve shall be flushed to ensure that the valve seat is clean.

3.06 INSTALLATION OF HYDRANTS

A. **All hydrant legs shall be ductile iron. (added 11-3-15)**. Hydrants shall be set at the location shown and bedded on a firm foundation. Each hydrant shall be set in true vertical alignment and properly braced. All nuts and bolts located below finish grade shall be given a heavy bituminous coating after installation.

C. Precast concrete thrust blocks with hooks shall be placed between the rear of the hydrant inlet and undisturbed soil at the end of the trench. Minimum bearing area shall be as shown on the Drawings. Roofing felt shall be placed around hydrant elbow before placing concrete.

D. No hydrant shall be backfilled until directed by the Designated Representative of the Hooksett Village Precinct.

E. The Developer/Contractor **shall not install plugs** in the hydrant drain ports.

3.07 INSTALLATION OF MANUAL AIR RELEASE/ CHLORINATION INJECTION POINTS

A. Install each valve box vertically, centered over the operating key, with the elevation of the top adjusted to conform to the finished surface at the completion of the Work. Adequately support the box during backfilling to maintain vertical alignment.

B. Tapping pipe:

1. Tapping ductile iron pipe: Corporation stops shall be installed in ductile iron pipe with a direct tap except as indicated on the following table where a service saddle shall be installed.

Tapping Saddle Requirements vs Pipe Size and Class

| Pipe Size | Saddle Requirements for Class 50 Pipe | Saddle Requirements for Class 51 Pipe | Saddle Requirements for Class 52 Pipe |
|---|---|---|---|
| 6-inch | All taps | All taps | Taps > 3/4 inch |
| 8-inch | All taps | Taps > 3/4 inch | Taps > 3/4 inch |
| 10-inch | Taps > 3/4 inch | Taps > 3/4 inch | Taps > 1 inch |
| 12-inch | Taps > 3/4 inch | Taps > 1 inch | Taps > 1-1/4 inches |
| 16-inch | Taps > 1-1/4 inches | Taps > 1-1/2 inches | Taps > 2 inches |
| 20-inch | Taps > 2-1/2 inches | Taps > 3 inches | Taps > 3 inches |

2. Tapping PVC pipe: All taps on PVC pipe must utilize a service saddle (rev. 8-12-15). Corporation stops shall be installed in PVC pipe using a service clamp or saddle in accordance with the recommendations of the PVC pipe manufacturer.

3. Service saddles shall be no closer than three feet from water main joints. Service saddles shall be securely fastened to the water main. Securely attach the tapping machine to the corporation, open corporation and tap pipe. Corporations shall be tightened only sufficiently to be watertight. Corporations and service saddles must have electrical continuity to facilitate thawing and tracing. **Service saddles shall be installed and all taps performed in accordance with the recommendations of the saddle and PVC pipe manufacturers** (added 10-22-15).

C. Ductile Iron Pipe: When installing the corporation stop without a service saddle, rigidly fasten the tapping machine to the pipe as near the vertical diameter as possible. The corporation stops shall be installed in the pipe at the twelve (12) o'clock. The length of travel of the tap should be so established that when the corporation stop is inserted and tightened with a fourteen (14) inch wrench, a minimum of one (1) thread and a maximum of three (3) threads will be exposed on the outside. When a wet tapping machine is used, the corporation stop shall be inserted with the machine while it is still in place. The stop shall be tightened only sufficiently to be watertight and care must be constantly exercised not to over tighten.

D. The chlorination connections shall be constructed in accordance with detail shown on the Drawings.

3.08 INSTALLATION OF SERVICES

A. Install corporation stops in the new water main either at the time of installation or later when service connections are constructed. Service connections shall be constructed after the new pipe has been tested and disinfected.

B. When installing the corporation stop without a service saddle, follow the requirements stated in paragraph 3.07 C except that the corporation stops shall be installed in the pipe at the ten (10) o'clock or two (2) o'clock position.

C. Service saddle shall be used in accordance with the table in paragraph 3.07 B.

D. All work on service connections shall be properly coordinated with Hooksett Village Precinct.

E. Install copper tubing from the corporation stop to the curb stop for a new service, or connect to the existing water service pipe for service changeover. Install to a depth of six (6) feet minimum. A "goose neck" shall be installed in the new service pipe. Care shall be exercised in the placing and laying of tubing to be sure that the pipe does not have any kinks and is not installed near sharp stones or ledge which would cause damage to the pipe. Place sand as shown on the Drawings adjacent to and above the tubing. No stones shall be placed or dropped on the tubing until the depth of sand backfill above the tubing is in excess of twelve (12) inches.

F. Install curb stop and curb box (new service installation) at the approximate property line or as otherwise directed by the Designated Representative of the Hooksett Village Precinct and connect with new tubing. Install curb box vertically, centered over the operating key, with the elevation of the top adjusted to conform to the finished grade. **Bricks are to be placed under all curb stops** (added 10-22-15)**.** Adequately support the box during backfilling to maintain vertical alignment. Care must be taken to insure that the curb box does not rest on the curb stop. **PVC PIPE (BLUE OR PAINTED BLUE) MUST BE INSTALLED OVER CURB BOXES, EXTENDING AT LEAST 2 FEET ABOVE AND BELOW GROUND LEVEL (added 7-6-15).**

G. Use couplings as required to connect new tubing with existing services.

H. For copper services, use only fittings and lines which have been specifically designed to provide electrical continuity. Install all items in strict conformance with the manufacturer's literature in order to ensure electrical continuity.

3.09 TESTING

A. The Developer/ Contractor shall hire a third party testing company to perform and furnish all necessary equipment and labor for carrying out a pressure test and leakage test on the pipeline in accordance with AWWA C600 Specifications.

B. The Developer shall make any taps and furnish all necessary caps, plugs, etc., as required in conjunction with testing. He shall also furnish a test pump, gauges and any other equipment required in conjunction with carrying out the hydrostatic tests. He shall at all times protect the new water mains and the existing water mains against the entrance of polluting material.

C. Testing requirements:

1. Test duration: Two (2) hours, minimum.

2. Test pressure: One hundred and fifty percent (150%) of maximum operating pressure as determined by the Designated Representative of the Hooksett Village Precinct, or one hundred (100) psi which ever is higher.

3. Allowable pressure loss: Pressure shall not vary more than ±5 psi for the duration of the pressure test.

4. Allowable leakage: Allowable leakage shall be determined by the following formula:

$$L = \frac{SD(P)^{0.5}}{133200}$$

L = allowable leakage, in gallons per hour.
S = length of pipe tested, in feet.
D = nominal pipe diameter, in inches.
P = average test pressure, in psi (gauge).

5. Allowable leakage in gallon per hour per one thousand (1,000) feet of pipeline can be determined from the following chart.

| Avg. Test Pressure psi | Nominal Pipe Diameter-in. 3 | 4 | 6 | 8 | 10 | 12 | 14 | 16 | 18 | 20 | 24 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 450 | 0.48 | 0.64 | 0.95 | 1.27 | 1.59 | 1.91 | 2.23 | 2.55 | 2.87 | 3.18 | 3.82 |
| 400 | 0.45 | 0.60 | 0.90 | 1.20 | 1.50 | 1.80 | 2.10 | 2.40 | 2.70 | 3.00 | 3.60 |
| 350 | 0.42 | 0.56 | 0.84 | 1.12 | 1.40 | 1.69 | 1.97 | 2.25 | 2.53 | 2.81 | 3.37 |
| 300 | 0.39 | 0.52 | 0.78 | 1.04 | 1.30 | 1.56 | 1.82 | 2.08 | 2.34 | 2.60 | 3.12 |
| 275 | 0.37 | 0.50 | 0.75 | 1.00 | 1.24 | 1.49 | 1.74 | 1.99 | 2.24 | 2.49 | 2.99 |
| 250 | 0.36 | 0.47 | 0.71 | 0.95 | 1.19 | 1.42 | 1.66 | 1.90 | 2.14 | 2.37 | 2.85 |
| 225 | 0.34 | 0.45 | 0.68 | 0.90 | 1.13 | 1.35 | 1.58 | 1.80 | 2.03 | 2.25 | 2.70 |
| 200 | 0.32 | 0.43 | 0.64 | 0.85 | 1.06 | 1.28 | 1.48 | 1.70 | 1.91 | 2.12 | 2.55 |
| 175 | 0.30 | 0.40 | 0.59 | 0.80 | 0.99 | 1.19 | 1.39 | 1.59 | 1.79 | 1.98 | 2.38 |
| 150 | 0.28 | 0.37 | 0.55 | 0.74 | 0.92 | 1.10 | 1.29 | 1.47 | 1.66 | 1.84 | 2.21 |
| 125 | 0.25 | 0.34 | 0.50 | 0.67 | 0.84 | 1.01 | 1.18 | 1.34 | 1.51 | 1.68 | 2.01 |
| 100 | 0.23 | 0.30 | 0.45 | 0.60 | 0.75 | 0.90 | 1.05 | 1.20 | 1.35 | 1.50 | 1.80 |

6. Acceptance of installation shall be determined on the basis of allowable leakage. If any test of pipe laid discloses leakage greater than that specified, the CONTRACTOR shall, at

his own expense, locate and make repairs as necessary until the leakage is within the specified allowance.

7. All visible leaks are to be repaired regardless of the amount of leakage.

8. The leakage test shall be conducted concurrently with the pressure test.

3.10 CHLORINATION

A. Before being placed in service, all new water pipelines shall be chlorinated in accordance with the requirements of AWWA C651-14 **(or current standard)** rev. 10-22-15. The procedure shall be discussed with the Designated Representative of the Hooksett Village Precinct prior to proceeding with the work.

B. The location of the chlorination and sampling points will be determined by the Designated Representative of the Hooksett Village Precinct in the field. Taps for chlorination and sampling shall be uncovered and backfilled by the Developer as required.

C. The general procedure for chlorination shall be first to flush all dirty or discolored water from the lines, and then introduce chlorine in approved dosages through a tap at one end, while water is being withdrawn at the other end of the line. The chlorine solution shall remain in the pipeline for at least twenty-four (24) hours.

D. Following the chlorination period, all treated water shall be flushed from the lines at their extremities, with proper dechlorination of the super chlorinated water, then replaced with clean potable water. Bacteriological sampling and analysis of the replacement water shall be made after the replacement water has occupied the chlorinated pipeline for a minimum of sixteen (16) hours by the Developer in full accordance with AWWA C651-14 **(or current standard) rev. 10-22-15**. The Developer will be required to rechlorinate if the test fails to achieve satisfactory results. The line shall not be placed in service until the requirements of the Hooksett Village Precinct and the New Hampshire Department of Environmental Services, Water Supply and Pollution Control Division, are met.

E. Special disinfection procedures, such as soaking or swabbing, approved by the Designated Representative of the Hooksett Village Precinct shall be used in connections to existing mains and where the method outlined above is not practicable.

F. Form of chlorine: Calcium hypochlorite granules or sodium hypochlorite solution.

G. Method of chlorine application: Continuous feed method or slug method.

H. The Developer/ Contractor must hire a third party testing company to perform all chlorination and dechlorination of all water pipe within the HVWP.

END OF SECTION

*******NOTE:** ADDENDUM AS FOLLOWS DATED 3/7/2012:

**ALL WATER SYSTEM DISTRIBUTION COMPONENTS MUST MEET ALL CURRENT EPA LEAD-FREE "SAFE WATER DRINKING ACT" STANDARDS AS WELL AS SAFE DRINKING WATER ACT,SECTION 1417 (42 U.S.C.300g) PROVISIONS TO TAKE EFFECT JANUARY 4TH, 2014. IT IS THE RESPONSIBILITY OF THE PROJECT DEVELOPER TO ENSURE THAT THESE STANDARDS ARE FOLLOWED.**

**ADDENDUM 7-6-15:**
**All Hooksett Village Water Precinct specifications are subject to change without notice.**

**NOTICE 10-22-15: ALL AWWA STANDARDS LISTED IN THIS DOCUMENT ARE TO BE VERIFIED WITH AWWA BY THE ENTITY PERFORMING THE WORK AS BEING THE CURRENT AWWA STANDARD, AND THE ENTITY PERFORMING THE WORK SHALL BE RESPONSIBLE FOR UTILIZING THE CURRENT AWWA STANDARD.**

**NOTICE 10-22-15: IT IS THE RESPONSIBILITY OF THE ENTITY PERFORMING THE WORK TO FOLLOW ALL MANUFACTURER'S RECOMMENDATIONS RELATING TO ALL WORK PERFORMED.**

**Last revised 11-3-15 (END OF DOCUMENT)**