# CHAPTER 5

# WATER DISTRIBUTION SYSTEM

## 5.0 GENERAL

5.0.1 All work performed and materials supplied shall conform to the latest edition of Standard Specifications for Sewer and Water Construction in Wisconsin, unless otherwise called for in the plans, specifications or special provisions of the City of Franklin.

5.0.2 Any substitutions or equals not specified must be approved prior to final approval of plans and these specifications.

5.0.3 The City requires a full-time inspector on the job site during pipe unloading and on the job site during construction of the water main and water laterals. The contractor responsible for the construction of the water main and water laterals is also responsible for notifying the City as per the notification policy of the City of Franklin. Contractor shall supply material certification sheets prior to construction.

5.0.4 All buried metal components (pipe, hydrants, fittings, valve boxes, valves, etc.) shall be produced, manufactured, and produced in the USA, single-wrapped with V-Bio Enhanced Polyethylene Encasement meeting AWWA C-105.Installation of the wrap shall conform to Section 4.4.4.

5.0.5 All buried fittings shall be accurately located by the contractor. The contractor will work with the assistance of the City's site representative to accurately **GPS these locations.** At the completion of the water main and water lateral installation for the project, the contractor will be responsible for contacting the city representative and requesting the collection of the GPS data.

## 5.1 WATER MAIN

5.1.1 Ductile Iron (DI) pipe shall be Pressure Class 350 for pipe diameter 12-inches and below, and Pressure Class 250 for pipe diameter 16-inches and larger,, cement mortar lined, push-on-joint and shall meet all the requirements set forth in Chapter **8**.18.0 of the Standard Specifications.

Polyvinyl Chloride (PVC) water pipe shall conform to the requirements of A.W.W.A. C-900 pressure Class 150 for pipe through 8-inch diameter ratio. All water mains larger than 12 inches shall be ductile iron pipe

pressure class 250. **Tracer wire shall rest directly on top of pipe and be secured with tape approximately every 10 feet.**

5.1.2 All water laterals shall be a minimum of 1-1/4”**in diameter.** The plastic pressure class 200 HDPE tubing conforming to the requirements of AWWA C901 and ASTM D2737 shall be **used.** Service pipe shall have an **SDR of 9 DIMENSIONS.** Coupling and fittings shall be compression type, insert stiffeners for plastic tubing shall be AISI type 304 stainless steel. All laterals shall include a corporation stop, a curb stop and a curb box **most commonly found** at the property line. Pipe saddles will be required for pipe taps 1 inch and over in PVC pipe. **A full face stainless tapping sleeve shall be used, Smith-Blair Model 372 or equivalent.** A minimum of 6' of cover shall be maintained on all water laterals. Backfill materials and methods shall be identical to that specified for the main sewer and waterlines. A maple heart shall be installed extending a minimum of 3 feet above grade; the top foot to be painted orange upon completion of lateral installation. **Tracer wire shall be placed on top of the lateral and be secured with tape approximately every 5 feet and shall be wrapped around exterior of the curb box to the surface.**

5.1.3 All corporation stops are to be Ford FB 1000-45 for 1” and, FB 1000-55 for 1-1/4” or **A Y McDonald 74701BQ.** All curb stops shall be Ford or a seal curb valve No. B-44-555M or **A Y McDonald 76104Q.** All curb boxes for services shall be Mueller H-10388 or approved equivalent. These boxes shall be set to grade with adjustment at mid-range. Curb boxes shall then be adjusted to finish grade after topsoil is installed.

5.1.4 Trench insulation where specified or required by shallow cover shall consist of 2' x 8' x 2" thick planks of Styrofoam plastic foam (Dow Chemical Company Hybrand or approved equivalent).

5.1.5 All water main trenches located in a proposed roadway shall be backfilled with **1 1/4** inch **TB** stone. If the water main is to be located in an off-road easement area, the spoil backfill shall be mechanically compacted. The cover material over the water main pipe shall be 2 **feet** and care shall be taken not to exert undue stress on the pipe during any compaction operation. No frozen spoil material will be allowed for backfill material. During the mechanical compaction of granular material, the first compacted lift shall be 18". The contractor shall use smaller lifts if the required compaction cannot be obtained. Granular material shall be compacted to 95% of the modified proctor density. Open graded, washed crushed stone may be allowed with permission of the City Engineer.

5.1.6 The material used to backfill water main or water laterals repair trenches located in an existing roadway shall be a **lean concrete mix backfill (**aggregate slurry backfill**)** conforming to Section 8.43.**9 and 10.14.1** of **these** Specifications of Sewer and Water Construction in Wisconsin, **current** Edition. **Also lateral trenches below proposed sidewalk shall be backfilled with 1 1/4 inch TB.**

5.1.7 During water main installation a watertight plug shall be installed in the open end(s) between each pipe installation and at the end of each work period.

5.1.8 Hydrants shall be installed on all water main ends that have service connections.

5.1.9 Contractor shall obtain a permit from the Franklin Water Utility for the use of water for the purpose of obtaining safe water samples. The cost of such water shall be billed to the contractor based on metered use or upon approval, a volume based on three (3) times the total water main on the project. All existing water utility valves shall be operated by Franklin Utility personnel only.

5.1.10 Should water main be placed in a casing pipe, approved casing spacer system shall be used. RACI spacers or approved equal shall be required.

**5.1.11 All new water services shall be located out of hard surface areas, i.e. driveways, sidewalks, etc. as much as possible.**

5.2 VALVES

5.2.1 All gate valves body casting shall be ductile iron or cast iron. All underground trim (nuts, bolts, etc.) for valves shall be stainless steel. All gate valves shall have non-rising stems, turn left (counter clockwise) to open, have a 2" square operating nut and be constructed for a working pressure of 200 p.s.i. unless otherwise directed in writing by the City Engineer. All 6" through 12" gate valves shall be resilient seated, conform to A.W.W.A. C509-80, and have stems sealed by at least two O-rings. All valves 16" and larger shall be of butterfly-type. **Installation of butterfly valves operator nut shall be either to the north or east of roadside positioning.**

5.2.2 Unless otherwise noted on the plans, all valve boxes shall be size DD, three piece screw type box with Number Six base, as manufactured by Tyler and shall be

U.S. manufactured or equal. Plastic valve box assemblies will not be allowed. Top section shall be threaded to receive screw on type riser. Covers shall be 5¾" diameter and be marked "WATER", and shall be of the Stay Put type.

5.2.3 Valve boxes shall be set truly vertical and so supported until sufficient backfill has been placed to insure the vertical alignment of the box. All boxes shall be supported by valve box adapters.

5.2.4. Valve boxes shall be set 2-1/4" below finished pavement grade (binder grade) until final lift of asphalt is completed. Top section shall be set to midpoint relative to the top of lower section. No ramping will be allowed. **Top section will be raised to a ¼" of finish grade at time of final paving. No paving rings or screw in repair tops are allowed.**

5.2.5 All valves on stub ends shall be restrained with Mega-Lugs and shall be placed up stream of valve. All stub ends shall be extended one full pipe length.

5.2.6 **All new water valves or water valve adjusted in reconstruction shall have an extension rod installed to keep the depth of the valve nut no deeper than 8' with a minimum of no less than 6'.**

5.3 FITTINGS

5.3.1 All fittings and their installation shall conform to all appropriate requirements of Part IV of the Standard Specifications. All fittings shall be jointed by a means of a compression type push on rubber gasket.

5.3.2 All fittings shall be cement-lined ductile iron, no **less** than Class D, A.W.W.A. Specifications designed for a service pressure of 150 p.s.i. Anchor tees or elbows may be mechanical joint. All other fittings may be mechanical joint as approved by City Engineer.

5.3.3 Mechanical joints shall be made with Cor-Blue nuts and bolts, which conform to C-111, A.W.W.A. Specifications.

5.3.4 Solid plugs or tapped test plugs shall be mechanical joint, as required.

5.3.5 Any non-stainless anchor fittings or rods shall be sprayed or coated with a rubberized or tar based sealant to prevent corrosion.

5.3.6 All fittings using a mechanical joint shall use a Mega lug type joint restraint system.

5.4 MARKERS

5.4.1 Detectable diggers caution tape shall be placed directly **over and along the entire length of all water main.** This tape shall be placed 24" below finished ground grade and shall be blue in color and marked "Caution: Buried Water Below" (i.e. Terra Tape "D" Line guard, or equivalent). Tracer wire, coated 10 gauge, shall be placed along the top of mains and laid along the entire length of all water mains including hydrant extensions. Wire shall be taped to the main every 50 feet (3 pipe lengths). Wire shall extend to and from the surface on the outside of hydrants in grassed areas through a 2" PVC pipe, to an inch above surface, as shown in Figure No. 22. The contractor is required to do a conductivity test in the presence of the City of Franklin Water Department **or the City of Franklin Representative.**

Conductivity clamps will be installed on all tracer wire ends. Wire shall extend to and from the surface typically on the outside of hydrants in grassed areas to within one inch of surface through an access box, manufactured by Valvco, or approved equal. See Figure No. 22.

5.4.2 **All applications will use Copperhead 10 gauge tracer wire with Copperhead electrical connectors and or equivalent connectors. Equivalent must be approved by utility personnel.**

5.5 HYDRANTS

5.5.1 All hydrants shall be one of the following: Mueller Centurion Super A423, Kennedy KEI or Waterous Pacer. All hydrants are to be break flange type. Hydrants shall have one 4-1/2", and two 2-1/2" nozzles. All hydrants shall be furnished with hydrant underground trim shall be stainless steel an o-ring, stuffing boxes, shall have bronze to bronze fittings and shall open counter clockwise and be painted bright red. Hydrants shall have a 5-1/4" main valve opening and a 1-1/2" pentagon operating nut and on nozzle caps. **All hydrants must be equipped with drain holes unless otherwise call-out before installation.** Hydrants shall have a minimum of one cubic yard of 1" washed stone placed below the hydrant up to a point 6" above the hydrant drain hole. **A polyethylene (wrap) barrier shall be placed above stone, around the hydrant before backfilling to prevent soil infiltration. Hydrant shall be protected from placement of backfill material.** The 4-1/2" nozzle shall be horizontal and oriented toward the pavement. Hydrants normally shall be placed 4-1/2 feet behind of the back of curb. **This installation is to be consistent with City of Franklin Standard Hydrant Setting, Figure No. 22.**

5.5.2 All metal pipe and fitting shall be double polyethylene wrapped, meeting the requirements of Chapter 8.21.0 of the standard specifications. Installation of the wrap shall conform to Section 4.4.4.

5.5.3 All hydrant tees shall be Clow F012117 mechanical joint anchor tee with valve or approved equivalent. Hydrant leads shall be CL200 PVC and all joints shall be restrained with mega lugs per manufacturer's recommendations.

5.5.4 All hydrants shall be located at property line intersections and meet the following location requirements:

At the end of cul-de-sacs.
As near to all high points of the system as possible
At a 400' interval for residential areas
At a 300' interval for commercial and industrial areas
Near all roadway intersections

5.5.5 All hydrant nozzle elevations shall be located 18" - 24" above finished grade or top of curb. Break-away flange shall be just above finished grade. If extensions are added, breakaway coupling shall be set at break flange.

5.5.6 Specify exact hydrant lengths where possible. Use extensions only when necessary. Hydrant extensions, ("spools") when called for on plans, shall be used to accommodate the future lowering of street grade.

5.5.7 Hydrant markers **('RoDon' or equal), spring loaded**, red, **white, 5** feet high with reflectorized log shall be installed facing traffic on each hydrant.

5.5.8 Where a hydrant with lead crosses a roadside ditch, a paved access ramp with an appropriate sized culvert **and approved by the City** shall be installed. This ramp shall be six (6) feet wide and extend from edge of street pavement to two (2) feet beyond the back of hydrant. The ramp shall be constructed of three (3) inches of asphalt on a minimum of six (6) inches of crushed stone.

## 5.6 CONNECTION TO EXISTING MAINS

5.6.1 Water main construction shall be free standing until approved unless existing conditions warrant testing after wet connection is made. This determination will be made by the Franklin Water Department staff. In this case the contractor will install an appropriate size valve before the connection to existing system, assuring the test will be made against a new valve.

All connections to the existing City water mains shall be made under full water service pressure. Connection can be made only after safe water and pressure test reports have been approved by the City. A City of Franklin Water Utility representative shall be present at the time of connection.

**5.6.2 New or existing water mains: All air releases installed during construction projects will be removed after approval of testing is completed satisfactory to the standards set in the standard specifications. The air release removal shall be built into the cost of the project. If this occurs at the end of the water line a suitable marker shall be placed to mark the end of the pipe for location purposes only.**

5.7 TESTING

5.7.1 All water main and laterals shall be tested in full accordance with the requirements of Chapter 4.15.0 and Section 5.5.18 of the Standard Specifications latest edition. {**Mainline testing 150 p.s.i. 2 hours} {Leakage test (complete deflation) 100 p.s.i. sustained for 1 hour} {Tapping Tee Air or Hydro testing with 100 P.S.I. sustained for 5 mins.}.**

**5.7.2 The contractor shall demonstrate the continuity of the tracer wire.**