

SECTION 611 - CONSTRUCTION OF WATER MAINS AND WATER SERVICES

ALL PERMANENT WATER DISTRIBUTION PRODUCTS SHALL BE MANUFACTURED IN THE USA. NO EXCEPTIONS. MegaLug retainer glands or equal, as approved in writing by the Engineer, shall be required at all mechanical joints.

New water construction must be completed prior to the general pavement removal operation. Preparation of the Right-of-Way, saw-cutting and removals shall be in accordance with Section 620 of these specifications.

Backfill used on this contract for water work shall be either mechanically compacted (unless directed to use flooding by the Engineer) crushed recycled concrete 1-1/4 inch dense meeting the gradation requirements for granular material as specified in Table 37 in Section 8.43.4 of the Standard Specs, or aggregate slurry backfill as specified in Section 8.43.8 of the Standard Specs. The backfill shall be consolidated by mechanical compaction of the trench backfill as specified in Section 2.6.14(b) of the Standard Specs unless otherwise specified by the Engineer. Flooding of trenches shall not be permitted.

Excavation and backfilling relating to utility installation is incidental to the utility bid item.

610.2.01 - EXCAVATION

A. GENERAL

The Contractor will be responsible for cleaning all water structures in the Project Area of all debris.

Excavation required for this work for the most part is unclassified. Complete all excavation regardless of the type of materials encountered. The Contractor shall make their own estimate of the kind and extent of the various materials which will be encountered in the excavation, including the presence or absence of water. The surface type as shown on the plans is presented only as a guide for the Contractor and does not guarantee the type or depth of material beneath the surface course. Removal of buttresses and thrust blocks present on existing water mains shall be incidental to the removal of the water main. No additional compensation will be made for differing surface materials. No additional compensation will be made for any rails, ties, or other unknown structures and objects that may be encountered. The Contractor may make written requests to the Engineer for exceptions to this rule, however the Engineer is under no obligation to approve exceptions.

The Contractor shall expose existing water mains to which the new main will be connected before commencing any pipe laying so that line and grade may be adjusted.

Water mains, services, branch services, and leads which are not installed to the alignment, slope, and depth as shown on the plans shall NOT be paid for or accepted by the Engineer. The Engineer reserves the right to shut down the project, at the Contractor's expense, if the Contractor or any of their subcontractors refuse to

use, or are repeatedly caught not using, Standard Specs construction methods requiring properly set up lasers as guides for excavating and laying pipe. The Contractor shall check the pipe with the laser at least every other pipe section which is laid, and at every fitting and valve. The Contractor shall be required to use the same methods for laying any pressurized system pipe as they would for gravity fed pipe as outlined in the Standard Specs – NO EXCEPTIONS. Any pipes laid to the incorrect alignment, slope, or depth shall be dug up and properly re-installed at the Contractor's expense before they will receive ANY payment for ANY water system work.

The location, size, and elevation of all underground structures shown on the plans have been located to a reasonable degree of accuracy, but the City does not guarantee their exact location and data or the location and data of others not shown. Concrete support columns shall be placed on all mains where shown on the plans and at all other locations not shown where a utility in a rigid conduit is discovered to pass beneath the new main by less than 12 inches. The costs of these supports will be considered incidental to the contract.

Bridging, where needed or where directed to be placed, shall be provided and installed by the Contractor at no additional cost to the City.

The water service relay shall be in a straight line grade from the downstream end of the new pipe to the right-of-way.

If any damage occurs to an underground facility, or the damage is found to exist, such that the protective coating of an electrical line is penetrated or gases or liquids are escaping from a broken line which endangers life, health or property, the Contractor shall immediately call "911" to report the damage location. This call shall be made prior to contacting the utility involved.

610.2.02 - LAYING OF WATER MAIN

A. BEDDING COVER AND FOUNDATION MATERIAL

All water main pipe shall be laid in a standard section conforming File No. 36 of the Standard Specs unless otherwise noted on the plans. 3/8" limestone chips conforming to Table 32 of the Standard Specs shall be used as the bedding and cover material on all water main installations.

Backfill used on this contract for water main work shall be either mechanically compacted crushed concrete meeting the gradation requirements for granular material as specified in Table 37 in Section 8.43.4 of the Standard Specs, or aggregate slurry backfill as specified in Section 8.43.8 of the Standard Specs.

The backfill shall be consolidated by mechanical compaction of the trench as specified in Section 2.6.14(b) of the Standard Specs unless otherwise stated.

Lumps of clay, loam, spoils (unless otherwise stated), garbage, organic material, or

any other material the Engineer deems unsuitable are not allowed in the backfill, and the Engineer reserves the right to order the Contractor to remove such items from the trench before paving commences, at the Contractor's expense, should the pieces be deemed unreasonably large and/or numerous. Material resulting from incidents such as, but not limited to, trench wall collapses is NOT excluded from this rule. For instances where the Contractor does not remove unacceptable backfill when directed, they shall be charged a percentage of the price for the pipe over the lineal footage in which the fill is present, to be deducted from monies owed to the Contractor.

B. INSULATION AROUND WATER MAINS & APPURTENANCES

The Contractor shall provide and install extruded polystyrene rigid insulation with a minimum of 25 PSI compressive strength, two layers of 2 inch thick by 6 feet long by the width of the trench, between storm sewer and structure installations and all water mains and services at all locations shown on the plans, and at any other location where a water main or service is exposed, or as directed by the Engineer. Insulation shall also be placed under water mains and services where they cross over the storm sewer and have a separation of less than 12 inches. Include costs with the price of the storm sewer relay, repair, extension or structure, or water main relay, repair, or extension.

If the vertical separation is greater than 12 inches and the service or main has a minimum of 6 feet of cover, the insulation need not be installed unless shown on the plans. Unless otherwise noted by the Engineer, insulation shall be considered incidental to the work.

C. CHLORINATION AND DISINFECTION

This section shall be incidental to the contract.

Disinfection of water mains shall be in accordance with Sections 4.3.12 and 4.16 of the Standard Specs. The Contractor shall take the necessary samples, under the supervision of the Engineer, and provide all costs for testing. Copies of the test reports shall be furnished to the Engineer and City Water Department. Calcium hypochlorite tablets shall be attached by a food-grade adhesive. Examples of food-grade adhesives are Permatex Form-A-Gasket No. 2 and Permatex Clear RTV Silicone Adhesive Sealant, which are manufactured by Loctite Corporation, Kansas City, KS 66115. These products have both been approved by USDA for uses that may contact edible products. **Other company products, such as Permatex Form-A-Gasket No. 1 are not allowable even though they are listed in the Standard Specs as being acceptable.**

Disinfection of all new, cleaned or repaired water mains shall be in conformance with the latest revisions of Chapter 4.16.0 of the Standard Specs, NR 811.07(3) and AWWA Standard C651.

D. FLUSHING

This section shall be incidental to the contract.

1. REQUIREMENTS FOR FLUSHING

Prior to flushing ANY water from the newly installed water main or existing water main system, the contractor shall adhere to the following requirements:

- The Contractor shall apply for a General Wastewater Permit by submitting an eNOI or NOI along with any other additional information required to the Wisconsin Department of Natural Resources (WDNR) separately of the City of Wauwatosa WDPES Permit. Contractor shall follow all requirements set forth within the issued permit and the Contractor is solely liable for any violations of the requirements set forth within the permit by the WDNR. A copy of the permit shall be supplied to the City as record that the contractor has successfully received an approved permit from the WDNR. Contractor's shall plan to submit an eNOI or NOI form to the WDNR at least thirty (30) business days before the expected start date of discharge.

Submit the completed eNOI or NOI to Maya Welch, WDNR, by email at maya.welch@wisconsin.gov.

- If approved by the Engineer, the contractor may elect to discharge flush water into the sanitary sewer system without being required to apply for a WDPES Permit. Prior to discharging, the Contractor must submit a local sewer flush plan that includes the discharge location into the sanitary sewer, the flow rate of the discharge, and the expected volume of the discharge. Discharge to the sanitary sewer shall not be permitted during a rain event or within 24 hours of a 1 inch or greater rainfall event within MMSDs service area. Discharge into the sanitary sewer system requires a minimum of 3 days notice to the Engineer & MMSD. The Contractor shall contact Micki Klappa-Sullivan at 414-225-2178 or mklappasullivan@mmsd.com and provide the date(s) of the planned flushing event and an approximate of how much water will be discharged into the sanitary sewer system.

2. CLEARING THE MAIN OF HEAVILY CHLORINATED WATER

After the applicable retention period, heavily chlorinated water should not remain in prolonged contact with pipe. In order to prevent damage to the pipe lining or corrosion damage to the pipe itself, the heavily chlorinated water shall be flushed from the main until chlorine measurements show that the concentration in the water leaving the main is no higher than that generally prevailing in the distribution system and is acceptable for domestic use. Prior to final flushing and before connection to the existing main, the Contractor shall initially flush the new main using the temporary vents and filler pipes specified. The required velocity in a water main being flushed shall be 2.5 feet/sec. This equates to the following required flows:

<u>Water Main Diameter (in.)</u>	<u>Flow Required to Produce 2.5 fps</u>
6	200 GPM
8	400 GPM
10	600 GPM
12	900 GPM
16	1600 GPM

3. DISPOSAL OF HEAVILY CHLORINATED AND FLUSHING WATER

The Wisconsin Department of Natural Resources prohibits discharges of chlorinated and/or contaminated water into any surface waters of the State whether directly or indirectly through storm sewers. To be in compliance with these regulations, the Contractor shall apply for a General Wastewater Permit and follow all requirements of the permit unless discharging into the sanitary sewer system following the notices above to MMSD. Appendix B of AWWA Standard 651 contains a list of neutralizing agents and their required dosages.

In addition to the above, the Contractor shall take grab samples a minimum of 2 times per day during flushing. They shall be taken after the neutralizing chemical has been introduced to the flushing water and at the onset of the initial flushing. The Contractor, at their expense, shall have these grab samples analyzed for the following:

- Total Suspended Solids (mg/L)
- pH (s.u.)
- Oil & Grease (mg/L)
- Dissolve Oxygen (mg/L)
- Total Residual Chlorine (mg/L)
- Any additional sampling requirements as required by permits issued by the WDNR.

Copies of all reports associated with the sampling requirements shall be submitted to the City and also to the WDNR as required by the issued permit.

E. BACTERIOLOGICAL TESTS (SAFE SAMPLE)

Incidental to the contract, after final flushing, before the water services are connected, and before the new main is placed into service, a minimum of 2 consecutive sets of acceptable safe samples, taken at least 24 hours apart, shall be obtained. At least one set of samples shall be collected from every 1200 feet of new water main. All safe samples shall show the absence of coliform organisms. Sample reports shall be delivered to the Engineer and City Water Department and approved before "wet" connections may begin. No "wet" connection greater than 20 feet shall be allowed without the written approval of the Engineer in order to reduce the risk of contamination.

F. DISINFECTION PROCEDURES WHEN CUTTING INTO OR REPAIRING EXISTING MAINS

This section shall be incidental to the contract.

The following procedures apply when existing mains are wholly or partially dewatered. After the appropriate procedures have been completed, the existing main may be returned to service prior to completion of bacteriological testing in order to minimize the time customers are out of water. Leaks or breaks that are repaired with clamping devices while the mains remain full of pressurized water present little danger of contamination and require no disinfection.

1. TRENCH TREATMENT

When an existing main is opened, either by accident or by design, the excavation may contain standing water which may be contaminated from nearby sewers. Liberal quantities of hypochlorite applied to open trench areas will lessen the danger from such pollution. Tablets have the advantage in such a situation because they dissolve slowly and continue to release hypochlorite as water is pumped from the excavation.

2. SWABBING WITH HYPOCHLORITE SOLUTION

The interior of all pipe and fittings (particularly couplings and sleeves) used in making the repair shall be swabbed or sprayed with a 1% hypochlorite solution before they are installed.

3. FLUSHING

Thorough flushing is the most practical means of removing possible contamination introduced during repairs. If valve and hydrant locations permit, flush toward the work location from both directions. Flushing shall be started as soon as the repairs are completed and shall be continued until discolored water is eliminated. Flushing shall follow the requirements for flushing stated in Section 611.2.02.D.1.

G. SPECIAL PROCEDURES FOR TAPPING SLEEVE VALVES

This section shall be incidental to the contract.

Before a tapping sleeve is installed, the exterior of the main to be tapped shall be thoroughly cleaned, and the interior surface of the sleeve shall be lightly dusted with calcium hypochlorite powder.

Tapping sleeves are used to avoid shutting down the main to be tapped. After the tap is made, it is impossible to disinfect the annulus without shutting down the main and removing the sleeve. The space between the tapping sleeve and the tapped pipe is normally ½ in., more or less, so that as little as 100 mg/ft² of calcium hypochlorite powder will provide a chlorine concentration of over 50 mg/L.

610.2.03 - WATER MAIN MATERIALS

A. WATER MAIN PIPE

1. DUCTILE IRON

The type of water main pipe to be used on this contract shall be as noted on the plans. Ductile Iron Pipe shall conform to AWWA C-151 Special Class 55 and of the size shown on the plans. The pipe shall have bell and spigot ends designed for a Tyton rubber gasket push-on-joint. All ductile iron pipe and fittings shall be coated as specified in Chapter 8.18.3 of the Standard Specs. All metal pipe, fittings and materials shall be encased in a double layer of polyethylene wrap as specified in Chapter 8.21.0 of the Standard Specs, before bedding and backfilling.

2. PVC/HDPE/NONMETALLIC

The type of water main pipe to be used on this contract shall be as noted on the plans. The size of the pipe shall be as shown on the plans. PVC Pipe shall be C-900 DR18 or less in conformance with AWWA C-900, ASTM D-3139, and ASTM F-477 for sizes 4" through 60". The pipe shall have integral elastomer bell and spigot ends designed for a rubber gasket push-on-joint. CertaLok® PVC water main pipe shall conform to AWWA C-900 DR18 and installation shall be completed under AWWA C-605. High-Density Polyethylene (HDPE) pipe for directional drilling projects shall be DR11, ductile iron pipe size (DIPS), and pressure class 200 conforming to AWWA C-906. Ductile iron fittings coated as specified in Chapter 8.18.3 of the Standard Specs shall be used with Megalug retainer glands specifically rated for use with selected nonmetallic pipe. All metallic fittings, stand pipes, and other appurtenances used with nonmetallic water main shall be covered in a double, watertight layer of polyethylene wrap, as specified in Chapter 8.21.0 of the Standard Specs, before bedding and backfilling.

a. TRACER WIRE

In open cut/trench construction, all nonmetallic water mains, leads and services shall be installed with a minimum #12 AWG copper clad steel, blue coated, 30 mil minimum HDPE insulated, high strength (minimum 450 lb. break load) tracer wire intended for direct bury, in accordance with Chapter 2.11.2 of the Standard Specs, APWA standards, and the City Specs, as incidental to the cost of the pipe.

For trenchless installation, all nonmetallic water mains, leads, and services shall be installed with tracer wire as noted above, except the tracer wire shall have a minimum break load of 1150lbs. Certain trenchless operations may require a break load above the minimum specified above. The Contractor shall be responsible to select the appropriate break load for the trenchless operation if higher break loads are required for the operation.

Except where the Engineer has given written approval for spliced-in connections, tracer wire systems shall be as continuous as practicable. Connections of tracer wire shall be in a low voltage, lockable, waterproof, underground, dielectric silicone filled connector, and shall be installed in such a manner as to prevent any exposure of uninsulated wire. Copperhead SnakeBite direct bury lug connector 3WB-01 or Engineer approved equal shall be included in the material submittals. No friction fit, twist-on, or taped connectors are allowed. No looping, wrapping, or coiling of tracer wire is allowed. The wire shall be placed along the entire length of the pipe and taped on the top of the pipe at minimum 10 foot intervals. No spray coatings or taped coatings for the wire are allowed. No connections to conductive pipes, fittings, glands, stand pipes, sleeves, or any other non-tracer wire material are allowed – the entire conductive tracer system shall only be constructed of tracer wire and tracer wire connectors as described above.

At the point of connection between metallic water main and any non-metallic water main, the mainline tracer wire shall go to ground using a connection approved in writing by the Engineer to a Copperhead drive-in magnesium grounding anode rod, part # ANO-12, or equal as approved in writing by the Engineer, with 20 feet of #12 AWG copper clad steel wire. Installation of the grounding anode rod shall be directly beneath and in-line with the water main. Excess wire from the grounding anode shall be trimmed to an appropriate length and not coiled.

All mainline dead-ends for non-metallic water mains shall go to ground using the same method described above.

i. TESTING

All new tracer wire installations shall pass testing by locating them using typical 512Hz low frequency line tracing equipment, witnessed by the Contractor and the Engineer before full

payment for all piping will be made. Continuity testing in lieu of actual line tracing shall not be accepted. Testing shall occur prior to construction of the roadway elements.

ii. TERMINATION/ACCESS

Wire shall be brought to the surface at all hydrants and curb stops, unless otherwise directed by the Engineer. At hydrants, wire shall be brought to the surface inside a 2" PVC Schedule 40 vertical sleeve (minimum 3' bury depth) that is opposite the pumper nozzle on the back of the hydrant, with at least 24" of excess wire to allow for future locating and maintenance. A Tracer Wire access box by Bingham & Taylor, Inc. #P2B200NFG, Copperhead SnakePit #LD14BTP, or approved equal must be visible and accessible and be set to no more than 3" above finish grade.

For curb stops, the wire shall be run directly on the outside of the stand pipe all the way to the surface, and a MINIMUM 6" excess "pigtail" coiled below the cap of the stand pipe. Wire shall NOT be terminated in mainline, branch service, or hydrant valve boxes unless otherwise directed in writing by the Engineer.

For mains without services or hydrants, access locations shall use tracer wire access boxes as approved in writing by the Engineer.

b. RESTRAINED BELL-SPIGOT JOINTS

PVC pipe joints shall be restrained as shown in the plans. PVC bell restraints may be a rodded restraint or an internal restraint. Acceptable internal bell-spigot restraints for PVC pipe are Certa-Lok PVC, RieberLok, or Engineer approved equal.

Internal bell-spigot restraints for PVC pipe shall be labeled "Restrained Joint" with tape at least two inches wide wrapped at least 75% around the circumference of the pipe bell. Marking tape shall be white with synthetic rubber and resins adhesive rated for exterior use with a service temperature range from -15° F to 100° F.

B. HYDRANT LEAD

All hydrant leads shall be as specified on the plans. Nonmetallic leads shall, at a minimum, conform to AWWA C-900 DR14. Ductile iron hydrant leads shall be encased in polyethylene wrap. All types of leads shall be buttressed at the tee and

hydrant ends with concrete and/or hardwood blocks and all joints shall be restrained. The hydrant itself shall be set on concrete or brick blocks. This work shall be incidental to the cost of the hydrant or lead.

All hydrant leads shall have a valve of the appropriate pipe size hung directly on the tee from the main to isolate the hydrant from the main. If the plans show the valve not hung on the tee, the Contractor shall immediately consult the Engineer for direction prior to installing the valve for any hydrant lead. Barring field conditions preventing hanging the valve on the tee, the Contractor should plan to hang the valve on the tee.

C. FITTINGS

All fittings shall be cement lined, ductile iron compact fittings furnished with mechanical joints conforming to ANSI/AWWA C153 and C111, in accordance with section 8.22.0 of the Standard Specs and coated in accordance with section 8.18.3 of the Standard Specs. All fittings shall be 350 psi rated water working pressure. Megalug retainer glands shall be used on all fittings. Glands shall be specifically rated for the main and lead material which is being used. All fittings shall be set and buttressed with concrete and/or hardwood blocks. Where sleeves are required, the Contractor shall use solid iron sleeves, dual purpose sleeves, Romac Alpha couplings or Hymax Grip couplings or Engineer approved equal for both metallic and non-metallic mains.

Where shown on the plans or as approved in writing by the Engineer, restraint strapping shall follow section 4.9.0 of the Standard Specs with number and size of retaining rods recommended by pipe restraint manufacturer for the type and size of pipe used. Metallic water main bell-spigot joints may only use restraining glands in lieu of rodded bell restraints when approved in writing by the Engineer.

All fittings and connections to appurtenances shall use coated, corrosion resistant nuts and bolts (Cor-Blue), which will be incidental to the cost of the fittings. All fittings shall be coated in polyethylene wrap per Chapter 8.21.0 of the Standard Specs.

D. VALVES

All gate valves shall be mechanical joint resilient wedge valves manufactured to meet all applicable requirements of Section 8.27 of the STANDARD SPECS and AWWA C509 or C515. All gate valves shall be 200 psi rated water working pressure. Gate valves are required for valves 12" and smaller. Acceptable resilient seat gate valve manufacturers are:

- American Flow Control Series 2500
- Clow Models Series 2639
- Kennedy Models KS-FW or KS-RW 8571
- Mueller Series 2360
- Or equal as approved in writing by the Engineer

All butterfly valves shall be mechanical joint rubber-seated valves manufactured to meet all applicable requirements of Section 8.28 of the Standard Specs and AWWA C504. All butterfly valves shall be 150 psi rated water working pressure and the operating nut shall be oriented towards the centerline of the road. Acceptable butterfly valve manufacturers are:

- Clow Style 4500
- M & H Style 4500
- Mueller Linseal III Series
- Or equal as approved in writing by the Engineer

Each valve shall be tested by hydrostatic pressure equal to twice the specified working pressure. All valves shall have mechanical joints with Cor-Blue bolts and nuts made of coated corrosion resistant steel. All exposed valve hardware shall be T304 stainless steel. **All valves shall have a non-rising stem and shall open to the right (clockwise).**

Valves for hydrants shall be attached directly to the mechanical joint anchoring tee except where shown otherwise on the plans.

All valves shall be furnished with 6860 series roadway box and cover as manufactured by Tyler Union, Inc. or Engineer approved equal, and shall be in accordance with section 8.29 of the Standard Specs. The valve box shall be a ductile iron, three-piece screw type unit with a 5- $\frac{1}{4}$ " shaft and 17- $\frac{1}{4}$ " diameter (#6) base, and set to the correct grade for the finished restoration (1/2 inch below grade in turf). The cover shall be marked "WATER".

Gate valves shall also be furnished with a "6 Base Multifit Adaptor" or "Gate Valve Adapter" as manufactured by Adaptor Inc. or Engineer approved equal. Butterfly valves shall be furnished with a "Butterfly Valve Adaptor" as manufactured by Adaptor Inc. or Engineer approved equal.

Glands, nuts and bolts, valve adaptors, stand pipe bases, stand pipes, blocking, and covers, shall be incidental to the valve work.

E. FIRE HYDRANTS

1. GENERAL

All fire hydrants shall fully comply with AWWA STANDARD C-502 latest revisions. Bury depths shall be as shown on the plans, or as needed to suit the site conditions (with approval of the Engineer), or 6'-6" minimum. Pumper nozzle elevation shall be 18"-24" above finished grade (soil grade in turf areas, not vegetation grade). The center of the hydrant shall be 4' behind the back of curb unless otherwise noted on the plans or directed by the Engineer.

The hydrants shall be designed for 250 psi working pressure and tested to 500 psi hydrostatic pressure test.

The Contractor shall warrant that the fire hydrant and component parts are first quality, conform to the applicable specifications, are free from material defects, faulty construction and poor workmanship, and are suitable for normal usage in a water distribution system. The warranty shall be for 100% of parts and labor. The period of warranty coverage shall be that normally provided by the manufacturer, but not less than 5 years from the date of the hydrant installation. The Contractor agrees to repair or replace within a reasonable time period any hydrant or accessory found to be defective during the warranty period at no cost to the City.

The Contractor shall check the operation of each hydrant and flow test all new hydrants after installation and interconnections are made. In addition, the Contractor shall fully open all new hydrants with all three caps tightened to check for leaks (i.e., pressure test), then fully close the hydrant and loosen all caps.

The Contractor shall make any necessary repairs or replace defective hydrants, and shall conduct the flow testing so as to disturb the surrounding area as little as possible. The Contractor must check the grade in the area to ensure that no soft spots in the grade have been created. Soft areas shall be stabilized or replaced immediately. **All testing shall be performed in the presence of and approved by the Engineer.**

2. TRAFFIC MODEL

The hydrants shall be of the traffic model design consisting of a breakaway safety flange and a safety sleeve coupling. The design shall permit a 360° rotation of the upper nozzle section, or any increment thereof, in any direction. The nozzle placement shall not be restricted by bolt hole placement.

3. EXTENSIONS

Hydrants shall be designed so that an extension may be added to installed hydrants. All extensions shall be made for insertion below the breakaway flange, and shall be available in increments of 6 inches, beginning with 6 inch length.

4. NOZZLE ARRANGEMENT

All hydrants shall have two 2-½ inch hose nozzles and one 4-½ inch pumper nozzle with National Standard threads, with all at the same elevation and the center of the pumper nozzle at least 18 inches from the bury line.

5. NOZZLES

Outlet nozzles shall be made of bronze and be fastened into the nozzle section by mechanical means or caulking. All outlet nozzles shall be safeguarded against

blowing out. For screwed-in outlet nozzles, a pin or other method shall be used to prevent the outlet nozzle from turning or backing out. Screwed-in outlet nozzles shall use "O" rings for pressure seals. Nozzle threads shall be National Standard.

6. INLET CONNECTION

The hydrant shall be furnished with a 6-inch D-150 mechanical joint shoe of the enlarging type designed to accommodate the pipe material shown on the plans.

Shoe bolts and nuts shall be corrosive resistant or 300 Series 18-8 stainless steel or coated, corrosion resistant bolts. The inlet connection shall be 6 inch mechanical joint complete with accessories including gland, gaskets, and corrosion resistant nuts and bolts.

7. HYDRANT VALVE

Hydrants shall have a minimum valve opening of 5-¼ inch diameter. The hydrant valve shall be reversible and designed to close with hydrostatic line pressure. The valve shall be faced with a suitable yielding material. The hydrant valve assembly shall be made of bronze and shall thread into a bronze bushing or drain ring. The valve assembly shall include a drain valve to drain the hydrant automatically each time it is operated. The drain way and cross arm must be constructed of bronze. Lower threads of the operating rod shall be protected by a cap-nut. The main valve and seat ring shall be removable through the upper barrel from above ground without disassembling the ground line flanges. The interface between the ferrous and non-ferrous surfaces shall be coated with anti-seize material. The hydrant shall be equipped with a positive operating drain valve to drain the hydrant when the main valve is closed. The drain valve shall be designed to close when the main valve is opened.

All hydrants shall be of compression type main valve closing with water line pressure.

8. DIRECTION OF OPERATION

Hydrants shall turn counterclockwise (left) to open.

9. OPERATING NUT AND NOZZLE CAP NUTS

All hydrants shall have all bronze 1-½ inch point to flat pentagon shaped operating nut, turn left to open, and shall have 1-½ inch pentagon shape nozzle caps and pumper caps. All operating nuts shall be provided with an internal metal weather shield to protect the operating nut from freezing.

10. LUBRICATION

Hydrants shall be of dry top design with its own lubricating system located in the bonnet which lubricates the upper stem threads each time the hydrant is operated.

Lubricant shall be nontoxic and provide proper lubrication for a temperature range of -30° F to +120° F.

11. BONNET

All threaded and metal to metal bearing surfaces in the bonnet shall be sealed away from the line pressure by no less than two “O” rings. The upper stem shall be provided with a stop.

12. COLOR

The top section of the hydrant shall be primed and painted with a rust inhibitive industrial urethane enamel such as Pennsbury Setter Red No. 9050 or Rustoleum Fire Hydrant Red applied over a base of #1069 Rustoleum Primer, or an approved equal. All exterior parts of the hydrant top section shall be painted as described above.

13. CORROSION RESISTANT NUTS AND BOLTS FOR GLANDS

Cor-Blue corrosion resistant, coated bolts and nuts are required at all locations which will be below ground level under normal conditions. With approval of the Engineer, 300 Series 18-8 stainless steel nuts and bolts may be used. Above ground portions shall have the appropriate grade of stainless steel fastener.

14. ACCEPTABLE HYDRANTS

All hydrants supplied shall be new and unused. Factory rebuilt hydrants are not acceptable. Acceptable hydrants for City of Wauwatosa are as follows:

- Mueller Super Centurion 250™, A423
- AFC Fire Hydrant 5 ¼” Waterous Pacer WB-67 with 16” Breakoff Section

F. WATER SERVICE ALTERATION, RELAY AND RECONNECTION

The reconnection to the existing water main for the corporation stop of the tap service shall be made by the Contractor. Materials and construction shall conform to File No. 52 of the Standard Specs for connecting and replacing original services or File No. 51 for new services with the exception that an approved tapping sleeve shall be used. Reduced Port corporation stops and curb stops shall be **“ball valve type”** with 300 psi rated working pressure. Curb stop boxes shall be Minneapolis Style.

1. SERVICES TO METALLIC AND NON-METALLIC MAINS

Unless otherwise noted on the plans, services shall be High Density Polyethylene (HDPE) SDR 9, copper tube size (CTS) conforming to AWWA C-901. The size for Replace Original Service (ROS) shall be a minimum of 1-1/4 inch, and for a Connect Original Service (COS) a minimum of 1 inch or sized to match existing, if larger, or as shown on the plans. The COS shall also match existing material. The

tap and tapping saddle/sleeve shall be 1 inch. The corporation stops shall be 1 inch by 1-1/4 inch. Sizes of taps, saddles, corporation stops, and curb stops shall match the size of the existing for services larger than 1-1/4 inch. All fittings shall be specifically rated for the appropriate water main material and/or polyethylene services (as applicable), and use Engineer approved compression fittings with stainless steel stiffeners for the services. The Contractor shall provide frost protection as shown on the plans, or in locations as described in section 610.2.02 B of these City Specs as incidental to the work.

2. WATER SERVICE FITTINGS

Corporation Stops shall be a reduced port ball valve with AWWA/CC taper thread inlet by compression quick joint coupling outlet for CTS. Curb Stops shall be a reduced port ball valve compression quick joint coupling for CTS on either ends. Corporation Stops, Curb Stops and couplings for nonmetallic services require tubular stainless steel insert stiffeners.

Acceptable corporation stop manufacturers are:

- Ford Quick Joint Model FB1000-xx-Q-NL
- AY McDonald Model 74701BQ
- Equal as approved in writing by the Engineer

Acceptable curb stop manufacturers are:

- Ford Quick Joint Model B44-xxxM-Q-NL
- AY McDonald Model 76104Q
- Equal as approved in writing by the Engineer

Acceptable stainless steel insert stiffener manufacturers for HDPE tubing are:

- Ford 50 Series INSERT-5x style
- AY McDonald 6133T
- Equal as approved in writing by the Engineer

Acceptable service line compression coupling manufacturers are:

- Ford
- AY McDonald
- Philmac UTC
- Equal as approved in writing by the Engineer

Acceptable 3-inch Minneapolis Style curb stop box manufacturers are:

- Ford Model EM2-xx-56
- AY McDonald 5614A
- Equal as approved in writing by the Engineer

Where designated on the plans or ordered by the Engineer, the Contractor shall install the new or replacement tap water service piping by an approved trenchless method, such as drilling, boring, jacking, auger boring, or fluid boring. The trenchless method used shall be capable of installing the water service piping horizontally and level with the water main to within a 12 inch radius of the target at the proposed location of the new curb stop.

The Contractor shall exercise care in locating and excavating, shoring and bracing the starting and recovery pits to assure underground and aboveground structures and trees are not damaged by their operations. Where a trenchless method of installation is required because of the necessity to protect a tree or as directed on the plans, the Contractor shall not drive heavy equipment or store materials within a radius of 5 feet from tree trunks unless the area is paved or protected from soil compaction by the use of planks or similar materials. To minimize damage to the tree's root zone during the installation of the water service piping no excavation shall be made within the following limits:

<u>Tree Diameter (In.) (@ 4.5' Above Ground)</u>	<u>No Excavation Limits Distance (ft.) from Trunk</u>
0 - 2	1
3 - 4	2
5 - 9	5
10 - 14	10
15 - 19	12
Over 19	15

The Contractor may encroach on the above limits if the water main to which the water service piping will be connected or the house side of the existing City sidewalk is within the specified no excavation zone. The Contractor shall keep these excavations as small as possible and shall contact the Engineer at least 3 days prior to starting the installation so they may notify the City Forester.

The City has obtained or is in the process of obtaining right-of-entry permits from affected property owners in order for the Contractor to complete their work on private property. All trees, bushes, shrubs, lawn, walk, driveway, etc. on private property damaged by the Contractor shall be repaired or replaced by the Contractor at no cost to the private property owner, and to the satisfaction of the Engineer. Costs for this work should be included in the bid price for the water service piping. No additional compensation will be made.

Where trenchless methods are required, payment will be per foot from the centerline of the main to the point of reconnection to the existing service behind the walk as measured horizontally and perpendicular to the street without regard to the amount of piping that may be installed in an open cut trench. Where no method is specified or open cut is specified, the Contractor may select any approved method of installation, however, the payment will be at the

open cut per foot bid price.

Existing curb stops shall be abandoned by the Contractor by removing only the top section of the service box and backfilling the remaining hole with suitable material. The cost of this abandonment shall be included in the price for an ROS or COS. Existing services which are replaced shall be disconnected as detailed in the Standard Specs.

G. SERVICE SADDLE

All water service (re)connections 2" and smaller, as well as air vents, for metallic and nonmetallic pipe shall be wet tapped under pressure using a one piece, double bolt, stainless steel service saddle clamp conforming to Smith-Blair 372, with AWWA/CC taper thread or *equal as approved in writing by the Engineer*. Service saddles shall be furnished by the Contractor as incidental to the service.

Services larger than 2" that are installed under pressure require an Engineer approved 2 piece stainless steel, heavy duty tapping sleeve with slip through bolts and a resilient wedge gate valve. Approved stainless steel tapping sleeves include: Smith-Blair 665 or Romac SST III, both with flanged outlet.

The Contractor shall refer to the manufacturer's instructions for the installation of a specific sleeve.

H. WATER VALVE BOX ADJUSTMENTS

The item for adjusting roadway boxes and curb stop boxes for water valves requires the Contractor to furnish all labor, equipment, and materials necessary to clean, adjust, and repair all boxes for mainline or hydrant gate valves, air vents and curb stop valves lying within the construction limits. This work requires the boxes to be placed at grade and operational (with stable covers) regardless of the amount of cleaning, adjustment, repair, or amount of material required. If no bid item is listed, this work shall be incidental to the contract.

Raising rings, commonly used for resurfacing work, will be reviewed and possibly accepted as an adjustment on a case-by-case basis (existing threaded rings, which are intact, may remain without review) by the Engineer. Also included in this item is any necessary plumbing work in raising or lowering an air vent.

Water curb stop boxes centered less than a foot and a half from the curb face are indicated for adjustment by the Contractor under the item provided. The Contractor shall be held responsible for damage to all water valve boxes.

610.2.04 - HYDROSTATIC TESTS

The Contractor shall provide for the testing of all new mains under the supervision of the Engineer before any "wet" connections are made or new services are relayed or

reconnected, in accordance with Chapter 4.15.0 of the Standard Specs and the following requirements:

- A. The duration of the hydrostatic pressure test shall be 150 psi for at least **2 hours** in conformance with AWWA 600-93 Section 4.1.1. This is an increase from the 1 hour specified in Chapter 4.15.0 of the Standard Specs.
- B. Separate tests on the entire length of new mains between each proposed cut-in connection shall be required. After the service reconnections are made the Contractor will not be allowed to shut down the new proposed main for any reason.
- C. Upon completion of all interconnections or offset installations, the section of new main shall be subject to line pressure prior to backfilling. Any visible defects observed in the connecting main shall immediately be repaired by the Contractor at their expense prior to backfilling.
- D. Cost of all testing and sampling shall be at the Contractor's expense.
- E. After completion of all reconnects and interconnections are completed, the old main shall be abandoned by capping or bulk heading with brick and mortar, a metallic cap with gland appropriate for the main material, or as approved in writing by the Engineer as incidental to the contract.