

**441 MUNI CONSTRUCTION SPECIFICATION FOR WATERMAIN INSTALLATION IN
OPEN CUT**

441.02 References

Add in the following:

CGS Protocol for New Watermain, Water Service and Wastewater Connections

Procedure for Disinfection of Drinking Water Ontario

ASTM F1674-96

ASTM A536

ASTM A36

AWWA-M23 PVC Pipe Design

441.05.02 Ductile Iron Pipe Products

Add in the following:

Ductile Iron Pipe shall not be used on watermains sized 600 mm in diameter and smaller.

Ductile Iron Pipe shall be a minimum Class 52. All pipes shall be cathodically protected as per OPSS 442 Specification for the Application of Corrosion Protection of Watermains and Fittings.

All metallic fittings shall be corrosion protected as per GSSS 442 Specification for the Corrosion Protection of Watermains and Metallic Fittings.

441.05.03 Concrete Pressure Pipe Products

Add in the following:

Concrete pressure pipe shall not be used on watermains sized 600 mm in diameter and smaller.

441.05.04 Polyvinyl Chloride Pipe

441.05.04.01 General

Add in the following:

Polyvinyl Chloride (PVC) Pipe shall be minimum DR18 conforming to AWWA C-900, for all pipe 200 mm in diameter and smaller and shall be certified to CSA B137.3. PVC pipe sizes 250 mm to 600 mm in diameter shall be DR18 conforming to AWWA C-900-16 and shall be certified to CSA B137.2.

Delete Sections c) and d) and replace with:

- c) Injection moulded PVC conforming to AWWA C907 in sizes 100 mm to 200 mm.
- d) Prefabricated PVC conforming to AWWA C907 for sizes 250 and 300 mm and AWWA C900 for sizes 350 to 750 mm.

Polyvinyl Chloride (PVC) fittings may only be used with PVC pipe.

Prefabricated PVC fittings shall have the same pressure rating (minimum) as the pipe.

441.05.05 Polyethylene Plastic Pipe

Add in the following:

Polyethylene may only be used with the prior approval of the General Manager.

Polyethylene (PE) Pressure Pipe shall be minimum DR 11 (160 psi - 1103 kPa), high density Polyethylene.

Add in the following subsection:

441.05.05.02 Cross – Linked Polyethylene (PEX)

Cross-Linked Polyethylene (PEX) potable water service tubing for secure connections shall be in accordance with ASTM F876-05, ASTM F877-05, CSA-B137.5 and NSF 61.

PEX water service tubing is to be used with standard copper O.D. brass fittings. PEX tubing ends to be installed with stainless steel insert and be installed with a copper tracer wire (as per 441.05.19) for its entire length.

Approved PEX sizes are 25 mm to 50 mm and shall be provided by the following manufactures or approved equal:

REHAU Municipex
IPEX BLUE 904

441.05.06 Steel Pipe Products

Delete the entire subsection.

441.05.07 Copper Pipe

Add in the following:

Copper service connection pipe shall be CSA certified.
One 10.9 kg zinc anode shall be installed on each copper service as per GSSD 1104.010.

441.05.09.01 General

Add the following:

Valves for buried installation shall have mechanical ends only and shall conform to a buried valve specification.

Valves installed in valve chambers shall conform to buried valve specifications.

Delete Section c) and replace with:

c) valves greater than 300 mm shall be gate valves.

Delete Section d).

441.05.09.02 Service Line Valves

Add the following:

Rod in the service box shall be stainless steel as per GSSD 1104.010.

441.05.09.03 Gate Valves

Delete the first paragraph.

Add in the following:

Gate valves up to 750 mm in diameter shall be according to AWWA C509.

Gate valves over 750 mm in diameter shall be according to AWWA C500.

Add in the following:

All gate valves 500 mm in diameter and larger shall be installed with spur gears.

441.05.09.04 Butterfly Valves

Delete the entire subsection.

441.05.10 Hydrants

Add in the following:

All hydrants shall have hydrant markers installed. Hydrant makers shall be designed to mount on the base of the hydrant at the back. The markers shall be yellow in colour, 1219 mm in length and constructed of Polycarbonate material or approved equivalent. The material shall be flexible in temperatures of -40 deg. Celsius. The markers shall also be fade resistant and resistant to UV damage.

All hydrants shall have drain holes plugged internally and come with bronze to bronze valves seats.

Hydrant extensions must be located immediately atop the hydrant boot and the rod extended at the top.

The hydrant shall be painted as follows:

The below coating system will be required on the upper barrel and bonnet. All components shall be gloss yellow for the finish and epoxy primer coats.

Zinc Rich Primer Coat: ZNP-300, WFB: 5.5 mils (1 coat), DFB: 3.2 mils

Corrosion Resistance Epoxy Primer: CRE-321, WFB 6.5 mils (1 coat) DFB: 3.3 mils

Finish Coat: Polyurethane DTM, AUE-370, WFB: 7.5 mils (1 coat), DFB: 3.8 mils

All of the above coatings by PPG Commercial Coatings or equivalent

These coatings shall be factory applied in strict conformity to the Manufacturer's coating specifications.

Care shall be taken to ensure that no coating comes in contact with the interior surface of the hydrant unless suitable for contact with drinking water.

Prior to final acceptance, any damage shall be repaired as per manufactures recommendations.

441.05.12 Service Connection Fittings and Appurtenances

Add in the following:

Service connection fittings and appurtenances shall be according to AWWA C800.

Add in the following subsections:

441.05.12.01 Main Stops

Main stops shall be solid brass, key/plug type, chamfered, threaded inlet end, compression outlet end, and shall be high pressure rated.

For Polyethylene service lines, refer to GSSD 1104.020.

441.05.12.02 Curb Stops/Service Boxes

Curb stops shall be solid brass, key/plug type, compression ends and shall be high pressure rated.

For Polyethylene service lines, refer to GSSD 1104.020.

441.05.12.03 Couplings

Couplings shall be solid brass, compression ends and shall be high pressure rated.

For Polyethylene service lines, refer to GSSD 1104.020.

441.05.12.04 Service Boxes

Service boxes shall be cast iron, c/w set screw and brass plug and shall have the top stamped water.

Service box rods shall be stainless steel.

441.05.12.05 Service Saddles

Service saddles shall be used for all service connections 50 mm and under on all mains except ductile/cast iron. Service saddles shall be broad band, stainless steel type, having an internal threaded outlet.

441.05.12.06 Insulated Services

Where services require insulation as per GSSS 441.07.11.01 and 441.07.20.02, the insulating duct shall be 50 mm diameter and suitable for a freeze protection application, high density Polyethylene (HDPE) manufactured from Type 111, Grade P34 in ASTM D1248 high density Polyethylene resin. The duct shall also conform to one of the following standards: AWWA C906-99, ASTM F-714, ASTM D3035, and CSA B137.1. Duct shall be insulated with 50 mm thick, factory-applied, rigid polyurethane insulation, and be protected with 1.27 mm thick black HDPE outer protective jacket as manufactured by Urecon.

Add in the following subsections:

441.05.16 Corrosion Protection

All metallic fittings shall have corrosion protection as per GSSS 442.

441.05.17 Valve Boxes

Valve boxes shall be used on all valves 300 mm in diameter and smaller. All valve boxes shall be cast iron and conform to GSSD 1101.020. All valves and boxes shall be wrapped in geotextile.

441.05.18 Joint Thrust Restraints

All joint restraint devices must meet or exceed the minimum requirements of ASTM F1674-96, (Standard Test Method for Joint Restraint Products for use with PVC Pipe), be UL listed and FM approved. Restraining glands (100 mm to 300 mm) shall be manufactured of high strength ductile iron conforming to the requirements of ASTM A536, Grade 65-45-12 (minimum), (400 mm to 600 mm) shall be manufactured of structural steel conforming to the requirements of ASTM A36. Joints shall be designed for the same design, test and surge pressure ratings as the pipeline in accordance with AWWA-M23 PVC Pipe Design.

All restraints are to be torqued to manufacturer's specifications using a calibrated torque wrench. If power equipment is used during installation, it is to be set as not to over tighten the bolts before they are properly torqued.

Mechanical Joint Restraints shall be provided by the following manufacturers (or approved equal).

- Clow
- Uni-Flange
- Sigma
- Star Pipe

Refer to section 441.07.23 Thrust Restraints, of this section.

441.05.19 Tracer Wire/Cathodic Protection

All watermains, hydrant laterals, water services and associated appurtenances shall be traced with an appropriate tracer wire installed in a continuous fashion. The tracer wire shall be secured to the top centre of the main and taped at 5 metre intervals.

An anode shall be installed at the terminus of the tracer wire which is not otherwise connected to an existing tracer wire. One 5.4 kg zinc anode shall be installed for every 500 metres of tracer wire installed, as per GSSD 1110.000.

Tracer wire shall be RW90XLPE wire, rated at minus 40°C, coated 7 strand, 10 gauge.

If required, splices and other wire to wire connections shall be made by using Dryconn waterproof connectors as shown in GSSD 1110.000 or approved equal.

The wire shall be installed in such a manner as to be able to properly trace all watermains, hydrant laterals, water services and associated appurtenances without loss or deterioration of signal, or without the transmitted signal migrating off the tracer wire.

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Tracer wire conductivity testing is to be conducted by a qualified third party company and witnessed by the City of Greater Sudbury Construction Services Staff.

Results of tracer wire conductivity testing are to be noted on the Tracer Wire Field Inspection Report to be provided by Construction Services.

A continuity signal shall be applied to the tracer wire and the signal confirmed over the entire length of all tracer wire installed. The signal shall be detectable for a distance of at least 350 metres from either side of the signal connection point. At no time shall there be a break in the continuity of the tracer wire.

The Contractor shall demonstrate that the tracer wire in chambers can be accessed from the finished grade and that the signal is detectable on the watermain outside of the chamber.

In the event that the conductivity tests fail, the Contractor shall be responsible to repair or reinstall all required tracer wire at their own expense.

441.05.20 Insulated Watermain

Where the drawings call for insulated watermain, watermain shall be insulated with 50 mm thick, factory-applied, rigid polyurethane insulation suitable for freeze protection application, and shall be protected with a 1.27 mm thick black HDPE outer protective jacket as manufactured by Urecon.

Where insulated watermain is to be used, all appurtenances (including valves) shall then be insulated using a Urecon spray foam, or approved equal, as per manufacturer's installation guidelines.

441.07.07 Transporting, Unloading, Storing and Handling Pipe

Delete the fifth paragraph and replace with the following:

Any watermain pipe delivered to the site with damaged or missing end caps shall be rejected and shall be removed from the site.

Add in the following subsection:

441.07.11.01 Culvert Crossings

All watermain crossing under culverts larger than 450 mm diameter shall be insulated with 50 mm thick, factory-applied, rigid polyurethane insulation suitable for freeze protection application, and be protected with a 1.27 mm thick black HDPE outer protective jacket as manufactured by Urecon for one entire pipe length centred on the culvert crossing or be lowered a minimum of 2 metres below the invert of the culvert.

All water services crossing under culverts larger than 450 mm diameter shall be installed with insulation as per GSSD 1104.011 and only for a 3 metre length on each side of the culvert crossing or be lowered a minimum of 2 metres below the invert of the culvert.

Other methods may be acceptable on a site specific basis only with the approval of the General Manager.

441.07.14 Installation of Pipe

Delete the third paragraph and replace with the following:

When the Engineer raises or lowers the invert of a watermain by up to 500 mm from the original design grade, it shall not constitute a Change in the Work and no adjustment shall be made to the payment. When the invert of a watermain is raised or lowered by more than 500 mm from the original grade, then this shall constitute a Change in the Work for the full extent of the change and an adjustment shall be made to the payment (credit or increase). All of the above also applies to all appurtenances associated with the watermain work.

441.07.15.06 Steel Pipe

Delete the entire subsection.

441.07.15.07 Service Connection Pipe

Add in the following:

Pipe shall be of continuous length with no fittings between the main stop and the curb stop, for all services 20 metres in length or less.

Add in the following subsection:

441.07.15.08 Insulated Water Service Duct

Duct pipe shall be joined by a heat shrink tube. The tube shall have a factory applied sealant.

Insulated duct pipe joints shall be completed using pre-fabricated urethane half shells. The half shells shall be wrapped with adhesive lined heat shrink sleeves as supplied by Urecon. The heat shrink sleeves shall overlap the insulation jacket by a minimum of 75 mm on either side of the joint.

The horizontal goose neck as per GSSD 1104.010 will not be used for the insulated services.

441.07.17.03 Polyvinyl Chloride Pipe – PVC & PVCO

Delete the entire clause and add in the following:

Flexibility shall be limited to one degree (1°) or 100 mm per each 6 metre pipe length. Bends shall be used otherwise.

441.07.17.05 Steel Pipe

Delete the entire subsection.

441.07.18.01 General

Add in the following:

All valves larger than 300 mm shall be installed in a valve chamber. Valves in chambers shall be supported by an adjustable pipe saddle support as per GSSD 1100.012 to 1100.018.

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441.07.19 Installation of Hydrant Sets

Delete the first paragraph:

Add the following paragraphs:

The work of installing hydrant sets shall include the placing of hydrants, hydrant isolating valves, hydrant leads, tees, bends, valve box, restraining devices and support devices.

Supply and install corrosion protection as per GSSS 442.

If the culvert is larger than 450 mm in diameter, the hydrant lead shall be insulated in accordance with GSSS 441.07.11.01 Culvert Crossings.

Add in the following subsection:

441.07.19.01 Hydrant Entrances

Hydrant entrances shall be constructed across ditches at the location and to the elevation shown on the contract drawings. The culvert shall be of the size indicated on the drawings and shall be of the type specified in OPSS MUN 421. Installation of hydrant entrance shall be in accordance with OPSD 217.050. Installation of hydrant shall be in accordance to GSSD 1105.010 Hydrant Installation.

Side slopes in urban areas shall include 100 mm of compacted topsoil and sod, as per GSSD 218.010.

Side slopes in rural areas shall include 100 mm of compacted topsoil and hydro seeding.

The platform area shall include 150 mm of Granular 'A'.

441.07.20 Installation of Service Connections

Add in the following:

Water services may be installed by method of jacking or boring. Washing of services may only be done upon receiving written approval of the General Manager.

All watermain taps on existing mains shall only be performed by City forces, with a minimum 48 hour advance notification. The Contractor shall supply and install the tapping sleeve and valve for the City forces to complete the tap on the existing watermain.

In cases where the existing service box is located on private property, the existing service box is to be left in place in the open position and the valve stem is to be removed. New service box to be installed as shown on the contract drawings.

The work shall include all appurtenances required to connect to the existing services

Supply and install corrosion protection as per GSSS 442 and Cathodic Protection on copper service.

Add in the following subsections:

441.07.20.01 Adjustment of Existing Curb Stop Service Boxes

Where existing curb stop service boxes are to be adjusted, the Contractor shall excavate to sufficient depths to allow for free movement of the service box up and down. Where insufficient adjustment is available on the box, the Contractor shall extend the box using a proper coupling and pipe extension.

441.07.20.02 Service Connections in Rock Trenches

In a water service trench, where rock is encountered having less than 1 metre of overburden in any part of the trench, insulation as that provided by Urecon, must be installed along the whole length of service. The water service shall be installed at full depth as per GSSD 1104.011.

441.07.20.03 Installation of Insulation for Water Services

Insulation for water services shall be installed beginning with a connection to the existing corporation main stop (the service saddle and main stop do not require insulation). The installation shall continue to and include a new curb stop and service box approximately 300 mm from lot line with a connection to the existing water service at lot line. The end of insulation shall be sealed against the elements with an approved waterproof sealant in accordance with the manufacturer's specifications.

Supply and install corrosion protection as per GSSS 442

441.07.21 Shutting Down or Charging Mains

Delete existing paragraph:

Add in the following:

At no time shall watermains that are connected to the existing system be shut down or charged, or valves operated **by anyone other than City forces**.

441.07.22 Connection to Existing Watermains

Delete second paragraph:

Add in the following:

Prior to making any connection, all requirements of section 441.07.24 "Field Testing" must be met.

Final connections shall be less than 6 metres and shall be swabbed with 1% to 5% chlorine solution.

The watermain shall be immediately connected to the existing distribution system after field testing.

All connections to existing watermains must be supervised by a certified City Operations Representative or his designate after having received a minimum 48 hour advance notification.

Where connections to existing piping require the abandonment of part of the existing piping, all abandoned pipes shall be bulkheaded with concrete as part of the work of constructing the new pipeline.

Where the Contractor fails to locate a particular watermain or service, for the purpose of connecting to, within 3 metres of the plan view, payment shall be made in accordance with the appropriate item for "Test Dig".

Bolted transition couplings are an approved alternative to solid sleeves with mechanical joints providing they are epoxy coated with stainless steel components (straps, nuts, etc.). It is expected that most connections to cast iron or ductile iron pipe will require bolted transition connections.

441.07.23 Thrust Restraints

Delete in its entirety and replace with the following:

For all PVC pressure pipe installation greater than 350 mm in diameter, thrust restraints shall be provided at all fittings, bends, tees, couplings, valves, hydrants, crosses, reducers and plugged or capped ends in accordance with the contract drawings.

Thrust restraints shall be mechanical restraint devices. Concrete thrust blocking shall be used in addition to mechanical restraints as per GSSD 1103.010 & 1103.020.

In addition to the above thrust restraint requirements, the Contractor shall be responsible to provide Shop Drawings for PVC pressure pipe installations greater than 350 mm in diameter. PVC Shop Drawings shall include the following:

- Letter of Compliance;
- Pipe design calculations;
- Summary of fittings;
- Installation guide;
- Tabulated layout drawings indicating restrained lengths for fittings and valves, signed and stamped by a Professional Engineer licensed to practice engineering in the Province of Ontario.

PVC Shop Drawings shall be provided to the General Manager prior to construction.

441.07.24 Hydrostatic Testing

Delete all subsections and replace with the following:

Add in the following subsection:

441.07.24.01 General

Testing shall be completed in lengths not to exceed 300 metres with no more than 500 metres of watermain installed before testing must commence. Testing must progress with watermain installation so no more than 500 metres of pipe are installed ahead of testing unless otherwise approved by the General Manager.

Water used for cleaning, flushing, testing and disinfecting of the temporary potable water system and/or new watermain shall not be obtained from an existing hydrant. Water may be obtained from one of the five bulk water loading stations located in the City.

441.07.24.02 Cleaning and Swabbing

Prior to disinfecting and hydrostatic testing of the new watermain, the Contractor shall remove all debris from the interior of the watermain with the use of a hydraulically propelled foam swab (of a diameter larger than the watermain).

Cleaning and swabbing to be carried out in stages as sections of the system are completed. Flushed sections shall be protected from contamination.

441.07.24.03 Disinfecting and Hydrostatic Testing

The forms of chlorine that may be used in the disinfection operations are liquid chlorine, sodium hypochlorite solution, and sodium hypochlorite solution and calcium hypochlorite granules or tablets. **Use of calcium hypochlorite intended for swimming pool disinfection shall not be permitted.**

After cleaning and swabbing is completed, liquid chlorine solution shall be introduced slowly expelling all air by opening fire hydrants and blow offs at high points, dead ends and side street laterals so that the chlorine is distributed throughout the section being disinfected. This water shall not be introduced from a direct connection from the existing distribution system.

The chlorine shall be applied so that the chlorine concentration is 50 mg/L minimum throughout the system.

The chlorinated water shall be retained in the main for a minimum of 24 hours during which time all valves and hydrants in the treated section shall be operated to ensure disinfection of the appurtenances.

Sampling and testing for chlorine residual will be carried out by the Contractor. The chlorine residual will be tested in the section at all hydrants, blow offs and sample points after 24 hours. The maximum allowable decrease in chlorine concentration is 40% of the Initial Chlorine Concentration to a Maximum of 50 mg/L. Therefore, if the initial chlorine concentration is 50 mg/L, and at least 30 mg/L of chlorine is present after 24 hours, proceed with the hydrostatic testing. If the test does not meet the requirements, the chlorination procedure shall be repeated until satisfactory results are obtained.

All hydrostatic testing shall be conducted under the supervision of a Representative of The City of Greater Sudbury after having received a minimum 48 hours advance notification.

The test section shall be subjected to the specified continuous test pressure for 2 hours.

The minimum initial specified test pressure shall be 1035 kPa (150 psi) or as specified in the contract.

The minimum initial specified test pressure shall be maintained to within ± 35 kPa (5 psi) of the initial test pressure for the duration of the test.

The final test pressure reading must be equal to the initial test pressure reading.

The leakage is the amount of water added to the test section to maintain the specified test pressure for the test duration. The measured leakage shall be compared with the allowable leakage as calculated for the test section. The allowable leakage is 0.082 litres per millimetre of pipe diameter per kilometre of watermain for the 2-hour test.

If the measured leakage exceeds the allowable leakage, all leaks shall be located and repaired and the test section shall be re-chlorinated and retested until a satisfactory result is obtained.

The section shall be flushed until chlorine measurements at the extremities of all branches show that the concentration in the water leaving the main is no higher than that generally prevailing in the distribution system (generally less than 1 mg/litre).

All test data is to be recorded on the City of Greater Sudbury's Watermain Test Report and once completed, a copy shall be forwarded to the General Manager.

If the hydrostatic test has met the requirements and the chlorine residual is acceptable, then the Contractor shall be responsible for obtaining satisfactory bacteriological tests which must be obtained from an approved independent lab prior to connections to the existing system. The first of two sets of bacteriological test samples may be taken immediately. A second set of test samples shall be taken **a minimum of 16 hours** after the first set of samples and immediately following (1) minute flush of water from the sampling line. The set of samples shall consist of at least one from approximately every **370 metres** of new watermain, plus one sample from the end of the line and at least one sample from each branch, in excess of 6 metres.

No hose or fire hydrant shall be used in the collection of bacteriological samples. A corporation cock shall be installed in the main or end cap with a copper tube gooseneck assembly. The sampling tube must be dedicated, clean, disinfected and flushed prior to sampling.

The collection of all samples must be witnessed by the Representative of Construction Services (48 hours notice).

The samples shall then be taken to an accredited water testing laboratory by the Representative of Construction Services.

If there is an indication of contamination in the first set of samples, a third set may be taken **16 hours** after the second set.

If there is indication of contamination in the second or third set of samples, the mains must be disinfected again, flushed and bacteriological samples taken as above.

Successful bacteriological test results for all samples must be forwarded to the General Manager who shall issue written authorization to connect the new watermain to the existing municipal system.

If the connections are not completed within five (5) calendar days of the date the last bacteriological sample was collected, the watermain shall be flushed, disinfected, and bacteriological testing performed again.

441.07.28 Depth of Cover

Add in the following:

Watermains shall be constructed as shown on the plan and profile drawings.

DEPTH OF COVER OVER WATERMAINS

AREA	STANDARD COVER (m)	DEAD END COVER (m)
Urban	2.0	2.2
Rural	2.3	2.5
Urban Capreol & Levack - Capreol and Levack	2.3	2.5
Rural Capreol & Levack - Capreol and Levack	2.6	2.8

Watermains may require installation at greater depths to avoid conflict with other services, existing and proposed.

441.07.29 Camera Inspection

Prior to the placement of the final lift of asphalt, the following camera work shall be performed by the Contractor and the video report provided to the City.

- i) Where blasting occurs, all sanitary and storm sewer mains within the limits of construction. The Contractor shall be paid for the camera work.
- ii) All sanitary and storm sewers, laterals and mains, which were crossed above or below by the watermain and all laterals and mains repaired during construction. The Contractor shall be paid for the camera work.

All sewers mentioned above found to be deficient shall be repaired and re-cameraed at the Contractor's expense until acceptable to the General Manager.

Add in the following:

441.07.30 Adjustment of Valve Boxes

Where existing valve boxes require adjustment, the Contractor shall excavate to sufficient depths around the valve box to allow for movement of the upper section. Should there be insufficient length available for adjustment, the Contractor shall dig down to below the first section and replace with a section of adequate length. The Contractor shall ensure that when complete all valve boxes are vertical and flush to final grade.

Where the valve box is plumb, adjustments in height may be made using cast iron road levellers. A maximum of one road leveller will be allowed per box.

441.09.01.02 Valves

Add in the following:

Payment for valves shall include the valve box and corrosion protection.

441.09.01.02.01 Adjustment of Valve Boxes

Measurement shall be by the number of units adjusted. The unit of measurement will be each.

441.09.01.03 Hydrant Sets

Delete existing sentence.

Add the following:

For measurement purposes, a count shall be made of the number of hydrant sets including corrosion protection regardless of the type.

441.09.01.03.01 Hydrant Entrances

Add in the following:

Measurement will be by the number of entrances installed. The unit of measurement will be each.

441.09.01.04 Service Connection Pipes

Add the following:

Measurement of service shall include appurtenance sets and shall include corrosion protection.

441.09.01.05 Service Connection Appurtenance Sets

Delete in its entirety.

441.09.01.05.01 Adjustment of Service Boxes

Add in the following:

Measurement will be by the number of units adjusted. The unit of measurement will be each.

441.09.01.06 Connections to Existing Watermains

Delete in its entirety.

441.09.01.07 Insulating Duct

Measurement of insulating duct is in metres along the horizontal centre line of the duct.

The copper or polyethylene service shall be paid under the appropriate item.

441.10.01 Basis of Payment

Replace with the following:

Watermains (including fittings) – Item

Valves – Item

Hydrant Sets – Item

Hydrant Entrances – Item

Service Connections (including appurtenances) – Item

Insulating Duct - Item

Adjustment of Existing Curb Stop Services Boxes – Item

Payment at the contract price for the above tender items(s) shall be full compensation for all labour, equipment and material to do the work, including the following:

- Thrust restraints and applicable shop drawings
- Removal & disposal or abandoning of existing watermain
- Flushing, disinfecting and testing watermain
- Corrosion protection
- Tracer wire/cathodic protection and associated testing
- Connections to existing watermains
- Temporary caps on existing watermain for isolation purposes