

## **SECTION S913 - WATER SERVICE (2 INCH AND SMALLER)**

### **S913-1 DESCRIPTION**

Work consists of the installation of new water service tubing as required in the Contract Documents and as directed by the Project Manager.

Work is to be in conformance with the requirements of Section S900 General Water Provisions.

### **S913-2 MATERIALS**

#### **S913-2.01 Copper Water Service**

Copper water service tubing is to be Type K in conformance with requirements of ASTM B88, in sizes 3/4 inch, 1 inch, 1-1/2 inch and 2 inch.

Joints are to be of flared type.

Couplings used for connecting copper water service tubing to corporation stop are to be of flared type.

#### **S913-2.02 Polyethylene (PE) and Cross-Linked Polyethylene (PEX) Water Service**

PE water service tubing shall be high density, copper tube size (CTS), SDR 9 (Standard Dimension Ratio), PE 4710 - pressure class 250 psi blue outer layer, in conformance with the requirements of ANSI/AWWA C901 and ASTM D2737 Standard Specification for Polyethylene (PE) Plastic Tubing, in sizes 1 inch, 1-1/2 inch and 2 inches.

PEX water service tubing shall be copper tube size (CTS), SDR 9, PEXa, pressure class 200 psi/73.4°F @ 0.63 design factor, material designation 3306, with blue outer layer, in conformance with the requirements of ANSI/AWWA C904, in sizes 1 inch, 1-1/2 inch and 2 inches.

PE and PEX water service tubing shall bear permanent identification markings that will remain legible during normal handling, storage, installation and service life and that will not reduce strength or otherwise damage tubing. Markings shall be applied at intervals not more than 5 feet and shall include: nominal size, standard material designation, (PE 4710 or PEX 3306), pressure class, AWWA designation number (C901 for PE or C904 for PEX), manufacturer's name or trademark and production record code, seal or mark of testing agency that certified suitability of tubing material for potable water products. For PE pipe, include PE compound oxidative resistance classification per ASTM D3350 (i.e., CC2 or CC3).

Joint couplings for PE and PEX tubing shall be Quick Joint compression type with solid stainless steel internal stiffeners inside ends of PE tubing.

Where soils are contaminated with solvents or petroleum products, copper tubing shall be used instead of PE or PEX tubing.

#### **S913-2.03 Tracer Wire for Polyethylene (PE) and Cross-Linked Polyethylene (PEX) Water Service**

Tracer wire for PE and PEX water service tubing shall be in conformance with the requirements of Section S901 Water Main Pipe and Fittings for tracer wire.

## **S913-3 CONSTRUCTION DETAILS**

### **S913-3.01 General**

Minimum cover over water service tubing and fittings, as measured between finished grade and top of exterior limit of water service tubing and fittings is to be 4 feet 6 inches, unless otherwise shown on plans or as ordered by Project Manager.

Contractor shall have the option to install water service tubing by means of open trenching or tunneling, or a combination thereof, except for those water services where tunneling is required to be used as shown in the Contract Documents.

Water service tubing shall be installed in a single piece without joints between corporation stop and curb stop. Water service tubing may be curved around obstructions in the trench. Water service tubing shall be laid at a right angle to the water main and in a straight path from the corporation stop to the curb stop. There shall be no kinks, joints, gouges or crimps in the water service tubing, and Contractor shall avoid any unnecessary flexing and bending of the water service tubing. Bending radius for PE and PEX tubing shall not be less than 30 times pipe diameter. PE and PEX tubing should be laid with moderate slack or snaking to accommodate any contraction. PE and PEX tubing should be allowed to cool in trench before cutting to required length between fittings to reduce stress from thermal contraction. Distance between bends and fittings in PE and PEX tubing should not be less than 10 pipe diameters to minimize bending stresses at connection point.

Water service tubing shall be connected to corporation stop, curb stop and existing water service tubing by using approved and appropriate gaskets, joint and connection materials, or fittings required to make the connections. Extend installation of water service tubing to include removal of the existing curb stop and box. Water service connections and appurtenances shall be made watertight. Prior to flaring copper tubing, Contractor shall verify that the end of the tube is round and cut at a right angle to the axis of the tubing. For PE and PEX water service connection, internal stiffener shall be required at ends of PE and PEX tubing and stiffener shall not extend beyond end of connection fitting. For connecting PE and PEX water service to existing non-copper inside water service (service pipe on customer's side of curb stop), PE and PEX water service shall extend minimum 1 foot beyond curb stop, eliminating need for dielectric insulator. Prior to connecting new water service to existing service, new service line shall be flushed with clean water making sure all debris is removed from the line.

For connections of water service tubing to new or existing corporation stops, a horizontal expansion curve (goose neck) shall be formed into the water service tubing. Expansion curve shall start at the outlet end of the corporation stop and extend 3 feet along the water service tubing with a horizontal dimension of from 6 inches to 12 inches.

Copper tubing connected to new or existing ductile iron or cast iron water main pipe shall be coated with bitumastic coating or petrolatum wax tape coating system (primer and tape) from tap, including corporation stop and portion of water main immediately surrounding tap, to minimum distance of 3 feet from tap.

Service saddles are required for connecting all water service tubing to PVC/PVCO water main pipe. Service saddles shall be used as specified in Section S912 Corporation Stop and Connection; Abandon Existing Water Service Tap (2 Inch and Smaller) for connecting PE, PEX or copper water service tubing to ductile iron or cast iron water main pipe.

Copper water services that are connected to PVC/PVCO water main shall require one-five pound magnesium anode be connected to copper tubing using copper tube nut (sizes 1 inch or less) or bronze ground clamp (sizes greater than 1 inch). Anode shall be located 2 feet away from water main and at least 6 inches below the bottom of the main and shall be surrounded with native backfill.

Upon completion of the work and testing of the water service, the excavation shall be backfilled and the disturbed surface area restored. Backfilling of the trench shall be done in a manner so as to avoid damage to the water service.

All hazardous waste, including lead water service materials, removed from the excavation shall be disposed of in accordance with all applicable New York State Department of Environmental Conservation (NYSDEC) and United States Environmental Protection Agency (USEPA) solid and/or hazardous waste management regulations. Solid hazardous waste must be disposed of at waste management or recycling facilities permitted to receive specific waste. Proposed disposal or recycling facilities must be approved by the City of Rochester prior to shipment by the Contractor. Disposal or recycling receipts must be provided to the City by the Contractor.

**S913-3.02 Water Service Tubing Sizing**

For sizing of new water service tubing, use the following:

<b>Existing Water Service (nominal outside diameter)</b>	<b>Copper Water Service Tubing (nominal outside diameter)</b>	<b>PE or PEX Water Service Tubing (nominal outside diameter)</b>
5/8 and 3/4 inch	3/4 inch	1 inch
1 inch	1 inch	1-1/2 inch
1-1/2 inch	1-1/2 inch	2 inch
2 inch	2 inch	-

**S913-3.03 Tunneling**

Where the Contractor opts to install water service tubing by means of tunneling, approval shall be obtained from the Project Manager before commencing work.

At locations where tunneling is to be performed, Contractor shall open cut and excavate both boring and receiving pits. Pit excavations shall be kept as small as practical, but large enough so as not to jeopardize safe tunneling operations. Excavations and tunneling operation shall be to a depth to ensure that the water service tubing will be installed at required minimum depth. Contractor has the option of tunneling-in the water service tubing by either boring, drilling or missiling. "Washing-in" of water service tubing is not allowed under any circumstances.

Contractor shall open cut and excavate a sight pit at any location where an existing underground utility line is in the direct path of the tunneling operation. Sight pit shall be large enough and deep enough to be able to ensure that no damage occurs to the existing underground utility line during the tunneling operation.

In most cases, the boring and receiving pits will generally be located at the water main or curb line, and at the curb stop. In some instances the pits may be located in other areas as shown in the Contract Documents or as directed by the Project Manager.

**S913-3.04 Installation of New Water Service Tubing at Existing Appurtenances**

For connection of new water service tubing to existing corporation stop that is to remain, existing corporation stop must not be leaking or damaged, and must be at least 5/8 inch diameter for connecting copper water service tubing or PE/PEX water service tubing. Water service shall be shut down at the existing corporation stop. Existing water service tubing is to be disconnected and removed, new water service tubing connected to the existing corporation stop.

For connection of new water service tubing to existing curb stop that is to remain, existing curb stop must not be leaking or damaged and fully operational. Water service shall be shut down at the existing curb stop. Existing water service tubing is to be disconnected and removed, new water service tubing connected to the existing curb stop, and existing curb stop returned to full open position.

For replacement of an existing water service, installation of the new water service tubing shall be extended to include removal of the existing curb stop and box.

For existing corporation stop that is found to be broken, leaking, undersized, or otherwise determined unsatisfactory by the Project Manager, existing corporation stop shall be abandoned (closed and plugged) and a new corporation stop installed. Cost of abandoning an existing corporation stop under this work shall be included in the unit price bid for a new corporation stop under Section S912 Corporation Stop and Connection; Abandon Existing Water Service at Tap (2 inch and smaller).

Tighten existing corporation stop that is found to be leaking at the threaded tap. If leak cannot be stopped by tightening and existing corporation stop made watertight, existing corporation stop shall be replaced by installing a new tapping saddle and corporation stop.

### **S913-3.05 Tracer Wire Installation with Polyethylene (PE) and Cross-Linked Polyethylene (PEX) Water Service**

Tracer wire shall be installed with PE and PEX water service tubing and secured to the top of the tubing using nylon cable zip ties at intervals not to exceed 8 feet. Tracer wire should not be taped to or wrapped around the service tubing. Tracer wire shall be installed in such a manner as to enable its detection with electronic locating equipment.

Tracer wire shall be from corporation stop extended continuously along PE and PEX water service tubing to the curb stop and up to top of curb stop box. Where PE and PEX water service is installed on ductile iron water mains, tracer wire shall be secured at the corporation stop. Where PE and PEX water service is installed on PVC water mains, tracer wire for PE and PEX water service tubing shall be spliced to the tracer wire for the PVC water main. Tracer wire shall travel up the inside of the curb box with enough extra tracer wire to extend a distance of 4 feet beyond the top of the curb box. The extra tracer wire shall be coiled and stored underside the curb box cover within the curb box.

Number of splices made on the tracer wire shall be kept to a minimum. Splices shall be made using an approved connector and shall be water tight and corrosion resistant. Wire nuts shall not be used. The use of split bolt style connectors shall require the installation of three successive layers each of rubber splicing and vinyl tapes.

After installation of tracer wire on mains and services has been completed, the Contractor shall test the tracer wire for electrical continuity. Upon successful completion of system test and submission of certification form to the City, tracer wire system shall be checked for functionality by a representative of the Bureau of Water. Deficiencies in the tracer wire system shall be repaired by the Contractor at no additional cost to the City and the tracer wire system shall be retested.

### **S913-3.06 Flushing Water Service Lines and Restoration of Service**

After installation of the new water service the Contractor shall flush the new service line before reconnecting the new service and curb stop to the (private) inside service. If the existing service that is replaced with the new water service is composed of lead or galvanized steel the contractor shall perform the following procedure for a complete and final flushing of the entire water service. The final flush out of the service will be through the hose connection to the outside hose bib or through another plumbing fixture approved by the Project Manager. The Contractor must make arrangements to remove the water meter and install a splice pipe. The water service may not be flushed through the water meter. Each service shall be flushed for a period of at least 10 minutes, prior to reinstallation of the water meter. Flushing water shall travel from the charged water main through the new water service and the existing inside water service, through a portion of the internal plumbing and flushed out through an outside hose bib or laundry tub on the inside of the building. The water service curb stop must be left in the full open position for the duration of the flush. Precautions must be taken to ensure the flushing water is directed to the street and directed away from the building and lawn areas.

Following the flush, the splice piece shall be removed and the meter reinstalled. The same procedure will apply in cases where the meter is located in an exterior meter crock.

Multiple services may be flushed at the same time. Water meters shall be reinstalled on the same day that the service flush takes place. If a water meter cannot be installed on the same day, a re-flush of the service will be required.

The contractor will record the size and material of the water service as it enters the premise up stream of the water meter on the *Water Service Identification Cards* provided by the City. These cards will be turned into the project engineer / inspector at the completion of work on each street in the project.

Instructions for interior flushing of the premise plumbing shall be issued to each household following installation of the water meter. The City Water Bureau will provide the contractor with the appropriate *pamphlets and/or door hangers* for distribution. The contractor's representative shall advise the resident not to drink water until the resident has completed the flushing of the internal premise plumbing

### **S913-3.07 Testing Water Services**

Prior to backfilling the trench, water service work, including but not limited to connections, joints and unions, shall be tested for leaks under line pressure in the presence of the Project Manager. Any defective work shall be repaired and retested until installation is accepted.

## **S913-4 METHOD OF MEASUREMENT**

### **S913-4.01 Water Service**

The quantity to be measured for payment shall be the number of linear feet of water service tubing installed.

## **S913-5 BASIS OF PAYMENT**

### **S913-5.01 General all Items**

The unit price bid for all items shall include the cost of: furnishing and installing all water service tubing; pipe specials; flared connections; compression connections; gasket fittings; joint and connection materials; connection to new corporation stops and curb stops; initial and final flushing; connection to existing service; bitumastic or wax tape coating system for copper service; disposal of existing service pipe when removed; removal and disposal of existing curb stop and box where required; verifying location and disposition of water services; preparation and submittal of water service record information and identification cards; distribution of service interruption notices; removal and replacement of water meter; supplying and installing a water meter splice pipe; water service line flushing; distribution of premise plumbing flushing instructions; pavement saw cutting; pressure testing; placement of select backfill excavated from the trench; and furnishing all labor, material and equipment necessary to complete the work.

In those cases where tunneling is used in lieu of, or in combination with open trenching, payment for the tunneled portion only is included in the unit price bid for water service. Excavation, backfill and surface restoration for boring, receiving and sight pits will be paid for as outlined under Subsection S913-5.04 Excavation, Backfill and Surface Restoration.

Payment for furnishing and installing magnesium anode will be made under separate bid item.

### **S913-5.02 Polyethylene (PE) and Cross-Linked Polyethylene (PEX) Water Service**

The unit price bid shall also include the cost of: furnishing and installing all tracer wire; splices and connections. Twenty five (25) percent of the unit price bid will be held in retainage until satisfactory completion of testing and certification of tracer wire continuity.

### **S913-5.03 Connection to Existing Appurtenances**

The unit price bid shall also include the cost of: shutting down the existing water service; and connection to existing corporation stops, curb stops, or water service lines.

### **S913-5.04 Excavation, Backfill, and Surface Restoration**

Excavation, furnishing and placing of sand embedment and select granular backfill, temporary pavement, and permanent surface restoration will be paid for under separate bid items or included in the price bid for the item as indicated in the item description.

Excavation that is included in the pay item does not include rock excavation, except for water services installed by tunneling. Rock excavation will be paid for under separate bid item. For tunneling operation, excavation that is included in the pay item includes rock excavation.

Where excavation, backfill and/or surface restoration is called for to be included in the pay item, it is meant to be inclusive of the tunnel operation, any open trench, and all boring, receiving and sight pits.

Surface restoration that is included in the pay item shall include temporary pavement.

Payment will be made under:

<b>ITEM NO.</b>	<b>ITEM</b>	<b>PAY UNIT</b>
S913.01XXXX	New X" Copper Water Service	Linear Foot
S913.02XXXX	New X" Copper Water Service (Including Excavation and Backfill)	Linear Foot
S913.03XXXX	New X" Copper Water Service (Including Excavation, Backfill and Surface Restoration)	Linear Foot
S913.04XXXX	New X" Copper Water Service at Existing Appurtenances	Linear Foot
S913.05XXXX	New X" Copper Water Service at Existing Appurtenances (Including Excavation and Backfill)	Linear Foot
S913.06XXXX	New X" Copper Water Service at Existing Appurtenances (Including Excavation, Backfill and Surface Restoration)	Linear Foot
S913.11XXXX	New X" Polyethylene or Cross-Linked Polyethylene Water Service	Linear Foot
S913.12XXXX	New X" Polyethylene or Cross-Linked Polyethylene Water Service (Including Excavation and Backfill)	Linear Foot
S913.13XXXX	New X" Polyethylene or Cross-Linked Polyethylene Water Service (Including Excavation, Backfill and Surface Restoration)	Linear Foot
S913.14XXXX	New X" Polyethylene or Cross-Linked Polyethylene Water Service at Existing Appurtenances	Linear Foot
S913.15XXXX	New X" Polyethylene or Cross-Linked Polyethylene Water Service at Existing Appurtenances (Including Excavation and Backfill)	Linear Foot
S913.16XXXX	New X" Polyethylene or Cross-Linked Polyethylene Water Service at Existing Appurtenances (Including Excavation, Backfill and Surface Restoration)	Linear Foot