

## **SECTION R901 - DUCTILE IRON PIPE WATER MAIN AND FITTINGS**

### **R901-1 DESCRIPTION**

The work shall consist of the installation of ductile iron pipe water main as shown on the plans and as directed by the Project Manager.

### **R901-2 MATERIALS**

#### **R901-2.01 Pipe and Fittings**

All pipe and fittings shall be of good quality, strong, of even grain, and soft enough to permit drilling and cutting. Each pipe shall be free from any defects which would make it unfit for the use intended. All pipe shall be straight, and a true circle in section with concentric inner and outer surfaces. Pipe to be cut during installation shall be fully gauged for field cutting. Pipe metal shall be made without any admixture of cinder iron or other inferior material.

Pipe shall be ductile iron pipe conforming to the latest requirements of ANSI/AWWA C151/A21.51. Pipe class thickness shall be Class 52 or 56, as indicated on the plans.

Fittings shall be ductile iron fittings conforming to the requirements of ANSI/AWWA C153/A21.53. Fittings shall equal or exceed the requirements of the main pipe and shall have a rated working pressure of 250 pounds per square inch.

Pipe and pipe fittings shall be cement mortar lined, double thickness, in accordance with the requirements of ANSI/AWWA C104/A21.4, with an asphalt coating on the inside and outside of the pipe.

Joints shall be rubber gasket push-on, mechanical joint, or mechanical joint anchoring type. All joints shall conform to the requirements of ANSI/AWWA C111/A21.11. Electrical conductivity for push-on and mechanical joints shall be maintained by the use of bronze wedges. Use two wedges per joint for pipe sizes up to 12 inches in diameter; and a minimum of four wedges per joint for all pipes over 12 inches in diameter. Lead tipped gaskets will not be allowed.

Mechanical joint anchoring pipe is required for hydrant branches in new water main construction.

All hardware used on water mains, pipe fittings, and appurtenances shall be made of cold formed, high strength, low-alloy steel (Cor-ten), ASTM A242.

The follower gland for mechanical joint pipe shall be made of ductile iron material conforming to the latest requirements of ANSI/ANWA C151/A21.51.

#### **R901-2.02 Polyethylene Tube Encasement**

Polyethylene tube encasement, 8 mil thick, and polyethylene adhesive tape shall be as required for pipe encasement. Material and installation procedures shall be as specified in ANSI/AWWA C105/A21.5.

#### **R901-2.03 Warning Tape**

Warning tape shall be a detectable, metallic-lamination tape, suitable for direct burial, as manufactured by Terra Tape, or approved equivalent. Tape shall be designed to locate and warn excavators of buried water lines. Tape shall be color coded blue and marked "CAUTION WATER LINE BURIED BELOW" in bold readable lettering.

#### **R901-2.04 Material Certification**

Manufacturer's and supplier's certifications shall be furnished to the Project Manager stating that all materials furnished have passed the acceptance tests listed in the appropriate specifications.

#### **R901-2.05 Thrust Restraint**

Concrete used for thrust blocks shall be Class K conforming to the requirements of Section R504. Concrete shall be central, transit, or truck mixed, and poured-in-place.

Push-on joints and mechanical joints restrained by utilizing tie rods and clamps, shall be subject to the approval of the Project Manager prior to their use in the work. Tie rods, clamps and all hardware shall conform to the requirements of ASTM A242. Tie rods are to be 3/4 inch in diameter. The number of tie rods to be used for restrained joints shall be as follows:

<u>Pipe Size (Inches)</u>	<u>Number of Rods</u>
4 to 12	2
16	4
20	6
24	8

Prior to backfilling, tie rods, clamps and all components of dissimilar metal used for restrained joints, shall receive a hand application of a Sikagard 62 protective coating as manufactured by Sika Corporation, or approved equivalent.

#### **R901-2.06 Bedding and Backfill**

Pipe bedding and cover shall be a sand material conforming to the requirements of Section R203.

Select backfill shall be locally excavated material determined suitable by the Project Manager to be used as backfill. It shall consist of hard durable materials and soil, free of organic material, debris, clay, frozen material and stone with any dimension greater than 4 inches.

Select granular backfill shall conform to the requirements of Section R203.

#### **R901-2.07 Surface Restoration Materials**

The following materials shall be used:

- A. Subbase material Type 1 and Type 2 conforming to the requirements of NYSDOT Section 304.
- B. Asphalt base course Type 1 conforming to the requirements of NYSDOT Section 403.
- C. Asphalt binder course Type 3 conforming to the requirements of NYSDOT Section 403.
- D. Asphalt surface course Type 7F conforming to the requirements of NYSDOT Section 403.
- E. Concrete foundation for pavement, Class C or Class F, conforming to the requirements of NYSDOT Section 503.
- F. Concrete sidewalk conforming to the requirements of Section R608.
- G. Asphalt concrete sidewalks conforming to the requirements of Section R608.
- H. Curbing conforming to the requirements of Section R609.
- I. Seeding conforming to the requirements of Section R610.
- J. Topsoil conforming to the requirements of NYSDOT Section 613.
- K. Concrete gutters conforming to the requirements of Section R624.

## **R901-3 CONSTRUCTION DETAILS**

### **R901-3.01 General**

The location and disposition of all water services shall be verified before beginning work.

All work shall be coordinated with the Water Bureau. The Water Bureau will close all valves needed to isolate the section of the water main to be shut down. The Water Bureau shall be notified a minimum of 10 working days in advance of intent to do the work requiring the operation of valves and appurtenances; and a minimum of 2 working days advance notice when operation of valves and appurtenances is required for the actual work. All valves and appurtenances are to be operated only by authorized representatives of the Water Bureau.

Work shall be scheduled so as to maintain adequate water service. All water service interruptions shall be of a minimum duration, and shall be coordinated with the Water Bureau. The Water Bureau shall be notified a minimum of 2 working days in advance of the intent to discontinue water service in any water main or service. All affected water service customers shall be notified by the Contractor a minimum of 24 hours in advance of any service disruption. Temporary water service shall be provided to water service customers whose water service is disconnected for more than 24 hours, and when indicated in the Contract Documents. Methods of temporary service shall be in conformance with Section R916.

Whenever a water main shut down involves more than 25 customers and is to be more than 2 hours in duration, the shut down shall be performed between the hours of 10:00 p.m. and 6:00 a.m. Businesses that require water for their basic operation shall be provided with a temporary water supply, or the water main work requiring the water main shut down shall be coordinated with the affected business so that it occurs outside the normal operating hours of the business.

A permit is required from the Water Bureau to use water from fire hydrants. The permit requires the use of a meter and backflow preventer. The backflow preventer shall be supplied by the Contractor.

The Water Bureau dispatcher shall be immediately notified when existing hydrants are put out of service. The dispatcher shall inform the Fire Department, and the out of service hydrants shall be red tagged. The dispatcher shall be notified when hydrants are placed back in service.

Records of all new, renewed, and extended water services shall be provided. Such records shall identify for each service the address and coordinate location of the service, material used, the length and size of new copper service, and the location of the corporation stop and curb stop. This information shall be recorded on a standard water service card, as shown on the detail drawings. Water service cards shall be supplied by and obtained from the Water Bureau, and shall be submitted on a monthly basis to the Water Bureau Dispatcher, Water Bureau, 10 Felix Street, Rochester, New York.

Appropriate measures shall be taken to prevent dirt, debris, and surface water from entering the water main. Open pipe ends shall be plugged with watertight plugs whenever work is discontinued for any length of time, or when laying conditions may allow foreign matter to enter the pipe. The interior of the open pipe ends, and all new pipe used in making the installation, shall be swabbed with a 5 percent hypochlorite solution before installation.

A temporary pavement shall be placed in all water main trenches located within existing paved areas, immediately after backfilling the trench. Temporary pavement, Item No. R412.01, shall be as directed by the Project Manager.

### **R901-3.02 Installation**

Water mains shall be installed to the required lines and depths as shown on the plans and as ordered by the Project Manager. The locations, lines and depths of the pipe lines, valves, and other appurtenances shown or specified are approximate only. Actual locations, lines and depths may be adjusted to meet field conditions at the time of installation as approved by the Project Engineer. Control points shall be carefully preserved.

Pipe and fittings shall be installed in accordance with the requirements of ANSI/AWWA C600, according to manufacturer's latest instructions and as approved by the Project Manager.

Pipe and fittings shall be handled in such a manner that the coating and lining are not damaged during their delivery, storage and installation. No plugging, filing, burning in or welding of pipe will be allowed to repair damaged pipe or fittings.

Pavement saw cutting shall be required prior to all work, except in areas of reconstruction. All street cuts shall be made by a pavement saw and shall conform to the requirements of Section R622.

Excavation shall be to the required alignment and width, and to a depth that will assure a minimum cover of 4 feet 6 inches over the top of a domestic water main, after construction has been completed. Minimum cover for holly water mains shall be 5 feet. Excavation shall conform to the requirements of Section R206. The trench shall be dewatered, and kept free of water at all times.

Where the trench bottom is determined to be unstable by the Project Manager, all unsuitable material shall be removed and replaced with select granular backfill. The unsuitable material shall be excavated to a width and depth as approved by the Project Manager. All unsuitable material shall be disposed of.

When rock is encountered, all rock shall be removed and disposed of to provide a minimum clearance around the pipe exterior of 12 inches along the sides of the pipe, and 6 inches along the bottom of the pipe.

Where watermain trenches are located in corrosive soil conditions, the watermain and service pipe shall be encased in a polyethylene encasement. Installation of the polyethylene encasement and pipe shall be in accordance with ANSI/AWWA C105/A21.5 and the pipe manufacturer's latest instructions and recommendations.

All tees, bends, offsets, and plugs shall be solidly braced to prevent any movement due to thrust pressure. Bracing shall be accomplished with the use of cast-in-place concrete between the fittings and undisturbed soil. Thrust block dimensions shall be as shown on the detail drawings. Anchor pipe or mechanically restrained joints, shall be used where required. Vertical bends shall require mechanical restraint in addition to concrete thrust blocks. Appropriate materials and installation methods shall be used for mechanically restrained joints.

For sewer crossings, there shall be a minimum of 1 foot 6 inches of vertical separation between new water mains and any existing or proposed sewers, as measured between the outsides of the respective pipes. One full standard length of water main pipe shall be centered over or under the sewer so that both joints will be as far as possible from the sewer. Where the crossing is less than 1 foot 6 inches, all water main pipe joints less than 10 feet horizontally from the sewer shall require "K"-crete encasement. The length of encasement shall be 2 feet minimum, centered on the pipe joint, and shall have a minimum thickness of 6 inches. In all cases, the water main shall not be less than 6 inches from the sewer. Where the water main passes under the sewer, adequate structural support shall be provided to protect the sewer. The sewer shall be provided with a minimum bedding 6 inches of "K"-crete. If approved by the Project Manager, a well compacted backfill of crushed stone (size designation 1, NYSDOT 703-02) may be substituted for the "K"-crete..

Minimum desirable or horizontal separation between parallel water mains and sewer pipes (including sewer manholes and vaults) is 10 feet, as measured between the outsides of the respective pipes, manholes and vaults. Where both the minimum horizontal and vertical separation of water mains and sewers can not be obtained, the new water main pipe joints shall require "K"-crete encasement to the dimensions given in the preceding paragraph.

The interiors of all appurtenances and sections of the water main that cannot be normally disinfected shall be swabbed with a 5 percent solution of hypochlorite before installation.

Disinfection/sampling taps shall be installed at the ends of all new water mains, and at any other locations as required by the Project Manager.

### **R901-3.03 Bedding and Backfill**

Pipe bedding and cover shall be sand, and shall be to 12 inches minimum on each side of the pipe, 6 inches below the bottom of the pipe, and 12 inches above the top of the pipe. All pipe bedding and cover shall be compacted according to the requirements of Section R203. Bedding shall provide a solid bearing through the entire pipe length. Timber blocking shall not be used without the permission of the Project Manager. Timber blocking, if allowed in the work, shall be removed prior to trench backfilling.

Warning tape shall be placed in the open trench 12 inches above the water main. The tape shall run continuously along the centerline of the water main, with wording facing up.

Backfill under paved areas shall be select granular backfill, conforming to the requirements of Section R203. Backfill shall be placed according to the requirements of NYSDOT Section 203-3.15 with the following modifications:

- A. Lift thickness shall not exceed 8 inches.
- B. Minimum density for all backfill materials shall be 95 percent of Standard Proctor Maximum Density.

### **R901-3.04 Testing**

A pressure test shall be conducted in the water main after all required appurtenances are installed. The length section to be tested will be as approved by the Project Manager. If conditions permit, the water main shall be tested before the trench is backfilled. The pressure test will be witnessed by the Project Manager.

The pressure test shall be done in accordance with the requirements of Section 4 of ANSI/AWWA C600. All testing equipment shall be properly calibrated for the work to be accomplished. Prior to the test, methods of testing and equipment to be used, including the latest calibration dates, shall be submitted in writing for the Project Manager's approval.

The section of pipe to be tested shall be filled with water of potable quality, and all air shall be expelled from the pipe. Taps as necessary shall be made for releasing all of the air and for all test purposes as required. Taps may be installed during the laying of the water main pipe.

For the pressure test, the water pressure shall be raised (based on the elevation at the lowest point of the section under test and corrected to the gauge location) to a minimum pressure of 150 pounds per square inch gauge for domestic water mains, and 250 pounds per square inch gauge for holly water mains.

The required pressure shall be maintained for an uninterrupted period of 2 hours. The volume of water required to maintain the specified pressure shall not exceed the limits determined by the following formula as defined in Section 4 of ANSI/AWWA C600:

$$L = \frac{SD\sqrt{P}}{133,200}$$

L is the allowable leakage in gallons per hour; S is the length of pipe tested in feet; D is the nominal diameter of the pipe in inches; and P is the average test pressure during the leakage test in pounds per square inch gauge.

If a section of water main should fail to pass the pressure test, the defective material or work shall be uncovered, located, and repaired. Repeated tests and repairs shall be made until the section passes the required tests.

### **R901-3.05 Disinfection**

After a section of the water main has been pressure tested and found acceptable, it shall be thoroughly flushed. The method of flushing shall be as approved by the Project Manager. Minimum flushing velocity shall be 2.5 feet per second.

Flows to produce A Minimum Velocity Of 2.5 Feet Per Second:

<u>Pipe Size (Inches)</u>	<u>Flow (gallons Per Minute)</u>	<u>Hydrant Openings At 40 Pounds Per Square Inch Residual Pressure</u>
4	100	one - 2-1/2"
6	200	one - 2-1/2"
8	400	one - 2-1/2"
10	600	one - 2-1/2"
12	900	two - 2-1/2"
16	1600	two - 2-1/2"
18	1980	two - 2-1/2"
24	3530	one - 4-1/2"

See Table 3, AWWA C651 for number and size of blow off taps, if required.

Upon completion of flushing operations, the water main shall be disinfected with a chlorine solution using the continuous feed method. The slug method can be used only for water mains 24 inches in diameter or greater. The strength of this solution shall be such that a residual of at least 25 milligrams per liter of chlorine shall be retained in the water main after 24 hours. Disinfection shall be in accordance with the New York State Department of Health and with the requirements of ANSI/AWWA C651, except that the tablet method will not be allowed.

Following disinfection, all treated water shall be thoroughly flushed from the water main. Minimum flushing velocity shall be 2.5 feet per second.

Samples of the water shall be collected from the water main and each hydrant branch, by the Monroe County Department of Health. Hydrants are not to be used as sources for obtaining the water samples. The water main shall not be placed in service until the water has been approved for service and a copy of the approval from the Monroe County Department of Health has been received by the Project Manager and the Agency having jurisdiction over the water system. If tests are unsatisfactory, the water main shall be rechlorinated and flushed until new water samples indicate that the water is acceptable.

The Project Manager and/or the Monroe County Health Department may refuse to collect bacteriological samples if the location of the taps are determined to be improper.

### **R901-4 METHOD OF MEASUREMENT**

#### **R901-4.01 Ductile Iron Pipe Water Main**

The quantity to be measured for payment shall be the number of linear feet of ductile iron pipe installed, as measured along the centerline of the pipe, beginning with the face of the hub forming the commencement of the new work and extending to the face of the hub or spigot constituting the end of this particular line of pipe. Branch lines will be as measured from the centerline of the pipe which the branch joins, along the centerline of the branch, to the face of the hub or spigot constituting the end of that line.

#### **R901-4.02 Additional Ductile Iron Pipe Fittings**

The quantity to be measured for payment shall be the number of pounds of additional ductile iron pipe fittings installed that were not shown on the plans and are approved by the Project Manager. Weight of fittings shall be determined from listed weight in the manufacturer's catalogue information.

### **R901-5 BASIS OF PAYMENT**

#### **R901-5.01 Ductile Iron Pipe Water Main**

The unit price bid shall include the cost of: furnishing and installing all pipe: pipe fittings; anchor pipe; pipe specials; electrical conductivity wedges; hardware; warning tape; select backfill; concrete thrust blocks; joint materials; making pipe joints; restrained joints; furnishing, installing and removing disinfection/sampling, taps; testing the completed water main for pressure and leakage including any necessary blow off taps, chlorinating and flushing the water main as necessary; additional excavation and backfill required for purpose of testing and disinfecting water main; pavement saw cutting; preparation and distribution of service interruption notices; preparation and submittal of service information and cards; and furnishing all labor, material and equipment necessary to complete the work.

Unless provided for under separate payment items in the Proposal, the cost of furnishing, installing, maintaining, and removing temporary pipes, valves, plugs, taps, corporation stops, curb stops and boxes, blow-off pipes, and other fittings necessary for the construction of the new main, or for providing continuous service, shall be included in the unit price bid for Ductile Iron Pipe Water Main.

Excavation including rock excavation, furnishing and placing of bedding and select granular backfill, surface restoration, and connections to existing water mains will be paid for under separate items. The cost of temporary sheeting and trench protection shall be included in the price bid for excavation.

All hand or tunnel excavation in and around water lines, gas lines, sewers, steam lines, electric conduit, telegraph conduit, telephone conduit, tree roots, pipe joints and curbs shall be included in the unit price bid for excavation.

Where, in the opinion of the Project Manager, more concrete for thrust blocks is required than is indicated on the detail drawings, additional payment shall be made for the extra concrete. Additional payment shall be made based on the unit price bid for concrete in the Proposal, or the unit price indicated in the Contingent Item sheet if a unit bid for concrete is not in the Proposal. No payment will be made for additional concrete used due to the unnecessary excavation of trenches beyond required pay limits.

A partial payment of only 50 percent of the unit price bid will be made for installed water main that has not been tested, or has not satisfactorily passed both pressure and health tests.

#### **R901-5.02 Ductile Iron Pipe Water Main with Polyethylene Encasement**

The unit price shall also include the cost of furnishing and installing polyethylene tube encasement and polyethylene adhesive tape.

#### **R901-5.02 Additional Ductile Iron Pipe Fittings**

The unit price bid shall include the cost of: furnishing and installing all additional pipe fittings; pipe specials; concrete thrust blocks; joint materials; making pipe joints; testing with the completed water main for pressure and leakage; disinfection; and furnishing all labor, material and equipment necessary to complete the work.

Excavation, rock excavation, furnishing and placing of bedding and select granular backfill, will be paid for under separate items. The laying length of these fittings will not be deducted from the linear foot measurement for ductile iron pipe water main.

Payment will be made under:

ITEM NO.	ITEM	PAY UNIT
R901.01XX	X" Ductile Iron Pipe Water Main Class 52	Linear Foot
R901.02XX	X" Ductile Iron Pipe Water Main Class 52 (Anchor Pipe)	Linear Foot
R901.03XX	X" Ductile Iron Pipe Water Main Class 56	Linear Foot
R901.04XX	X" Ductile Iron Pipe Water Main Class 52 (Including Polyethylene Encasement)	Linear Foot
R901.05XX	X" Ductile Iron Pipe Water Main Class 52 (Anchor Pipe, Including Encasement Polyethylene)	Linear Foot
R901.06XX	X" Ductile Iron Pipe Water Main Class 56 (Including Polyethylene Encasement)	Linear Foot
R901.07	Additional Ductile Iron Pipe Fittings	Pound

## SECTION R902 - GATE VALVE WITH VALVE BOX

### R902-1 DESCRIPTION

The work shall consist of the installation of new gate valves with valve box and salvaging of existing valves as shown on the plans and as directed by the Project Manager.

### R902-2 MATERIALS

#### R902-2.01 General

Gate valves furnished shall be Metropolitan Pattern double-disk gate valve with non-rising stems, "O" ring seals, standard 2 inch square AWWA operating nut and shall open right (clockwise). Gate valves shall remain watertight under a test pressure of 300 P.S.I.. All valves shall meet or exceed all requirements of ANSI/AWWA C500 requirements for mechanical joint valves. Unless otherwise specified, all valves 16 inches and larger shall be horizontal type, and shall be equipped with bypass pipe and valve.

#### R902-2.02 Vertical Gate Valves

Vertical gate valves 16 inches and larger shall have spur gears, an enclosed gear case for buried installations, and a conventional stuffing box.

#### R902-2.03 Horizontal Gate Valves

Horizontal gate valves shall have a beveled gear operator with a stem cover plate for underground installation. Gate valves shall be equipped with bronze tracks, rollers and scrappers.

#### R902-2.04 Bypass Valves

Bypass valves shall meet all the general requirements for valves except they shall have standard flanged ends.

Bypass pipe and valves shall be sized as follows:

Valve Size (Inches)	Bypass Pipe and Valve Size (Inches)
16 to 20	3
24 to 30	4
36	6

#### R902-2.05 Valve Boxes

Valve boxes shall conform to the material requirements of Section R909.

#### R902-2.06 Hardware

All hardware shall be made of cold formed, high strength, low-alloy steel (Cor-ten), ASTM A242.

#### R902-2.07 Bedding, Backfill, and Surface Restoration

Bedding, backfill, and surface restoration materials, and methods of placement shall conform to the requirements of Section R901.

### R902-3 CONSTRUCTION DETAILS

#### R902-3.01 General

Appropriate measures shall be taken to prevent dirt, debris, and surface water from entering the water main. Open pipe ends shall be plugged with watertight plugs whenever work is discontinued for any length of time, or when

laying conditions may allow foreign matter to enter the pipe. The interior of the valve, open pipe ends, all new pipe, and sleeves used in making the installation, shall be swabbed with a 5 percent hypochlorite solution before installation.

#### **R902-3.02 Installation**

Gate valves shall be installed in the water main in accordance with ANSI/AWWA C500. Valve boxes shall be provided with both main valves and bypass valves.

The gate valve shall be inspected, cleaned, lubricated, and tested before installation to insure that it is in proper working order.

The gate valve shall be installed with its stem in a vertical position. Special attention shall be paid to the backfill under the gate valve to obtain a well compacted bed for the gate valve. All joints shall be made watertight.

#### **R902-3.03 Valve Boxes**

The valve box shall be carefully set over the valve stem. The top section shall be adjustable for elevation, and the base shall be centered over the operating nut. All valve boxes shall be carefully set and braced to insure that they remain in a vertical position centered on the valve stem during and after backfilling. Proper alignment and height of all new boxes shall be maintained, until completion of the project. The top of the valve box shall be flush with the finished surface grade. Backfilling of the trench shall be done in a manner so as to avoid damage to the valve and valve box.

#### **R902-3.04 Salvage Existing X" Valve**

On existing water mains to be abandoned, all valves 16 inch and larger shall be removed and delivered to the Water Bureau, Materials and Equipment Building No. 3, 401 Dewey Avenue, Rochester, New York.

The existing valve and valve box shall be removed. The open ends of the abandoned water main pipe shall be plugged with concrete. Concrete plugs shall completely fill the water main pipe for a length of 12 inches. After the concrete has set, the excavation shall be backfilled and the disturbed surface area restored.

### **R902-4 METHOD OF MEASUREMENT**

The quantity to be measured for payment shall be the number of gate valves with valve box installed.

### **R902-5 BASIS OF PAYMENT**

#### **R902-5.01 Gate Valve with Valve Box**

The unit price bid shall include the cost of: furnishing and installing gate valve with valve box; including bypass valve with valve box, bypass pipe; maintaining proper alignment and height of the valve boxes; pavement saw cutting; and furnishing all labor, material and equipment necessary to complete the work.

Excavation rock excavation, furnishing and placing of bedding and select granular backfill, and surface restoration will be paid for under separate bid items.

#### **R902-5.02 Salvage Existing X" Valve**

The unit price bid shall include the cost of: removal and delivery of existing valve and valve box; furnishing and installing concrete plugs; excavation, backfill, and surface restoration; and furnishing all labor, material and equipment necessary to complete the work.

Payment will be made under:

ITEM NO.	ITEM	PAY UNIT
R902.01XX	X" Gate Valve w/ Valve Box - Vertical Type	Each
R902.02XX	X" Gate Valve w/ Valve Box - Horizontal Type	Each
R902.03XX	Salvage Existing X" Valve	Each

## **SECTION R904 - TAPPING SLEEVE, TAPPING SADDLE WITH TAPPING VALVE AND VALVE BOX**

### **R904-1 DESCRIPTION**

The work shall consist of the installation of tapping sleeves, tapping saddles, with valves and valve box as shown on the plans and as directed by the Project Manager.

### **R904-2 MATERIALS**

#### **R904-2.01 Tapping Sleeves**

Tapping sleeves shall be used for water mains 12 inches in diameter and smaller. Tapping sleeves shall be cast iron or ductile iron split tapping sleeve with an asphalt coating conforming to the requirements of ANSI/AWWA C110. Tapping sleeves shall have rubber gaskets and shall be designed for a working pressure of 150 pounds per square inch for domestic water mains and 250 pounds per square inch for holly water mains. The ends shall be mechanical joints.

#### **R904-2.02 Tapping Saddles**

For water mains 16 inches in diameter and larger, ductile iron tapping saddles with corrosion resistant alloy steel straps shall be used. The tapping saddle shall have an asphalt coating conforming to the requirements of ANSI/AWWA C110. Fittings shall be designed for a working pressure of 150 pounds per square inch for domestic water mains and 250 pounds per square inch for holly water mains.

#### **R904-2.03 Tapping Valves**

Tapping valves shall conform to the material requirements of Section R902.

#### **R904-2.04 Valve Boxes**

Valve boxes shall conform to the material requirements of Section R909.

#### **R904-2.05 Hardware**

All hardware shall be made of cold formed, high strength, low-alloy steel (Cor-ten), ASTM A242.

#### **R904-2.06 Thrust Restraint**

Concrete thrust blocks and restrained joints shall conform to the requirements of Section R901.

#### **R904-2.07 Bedding, Backfill, and Surface Restoration**

Bedding, backfill, and surface restoration materials, and methods of placement shall conform to the requirements of Section R901.

### **R904-3 CONSTRUCTION DETAILS**

#### **R904-3.01 General**

All work shall be coordinated with the Water Bureau. The Water Bureau will close all valves needed to isolate the section of the water main to receive the valve. The Water Bureau shall be notified a minimum of 10 working days in advance of intent to do the work requiring the operation of valves and appurtenances; and a minimum of 2 working days advance notice when operation of valves and appurtenances is required for the actual work. All valves and appurtenances are to be operated only by authorized representatives of the Water Bureau.

#### **R904-3.02 Installation**

Pavement saw cutting shall be required prior to all work, except in areas of reconstruction. All street cuts shall be made by a pavement saw and shall conform to the requirements of Section R622.

Excavation shall be only to a sufficient length, width and depth needed to expose a section of the existing water main, and to install the tapping sleeve/saddle. Excavation shall conform to the requirements of Section R206.

It shall be the Contractor's responsibility to obtain the outside diameter of the existing water main to be tapped for proper sizing of the tapping sleeve/saddle. Excavation is normally required to obtain the actual outside diameter measurement of the pipe.

Prior to installation, the tapping valve shall be inspected, cleaned, lubricated and tested to insure it is in proper working order.

The portion of the water main to receive the sleeve/saddle shall be cleaned prior to the installation of the sleeve/saddle. All loose dirt, scale and rust shall be removed to a minimum distance of 12 inches beyond the ends of the sleeve/saddle.

The interior of the valve and sleeve/saddle shall be swabbed with 5 percent hypochlorite solution before installation.

The sleeve/saddle and tapping valve shall be installed according to the manufacturer's latest instructions and as approved by the Project Manager. Prior to making the tap, the installation shall be pressure tested with compressed air at the designed pressure rating in the presence of the Project Manager, for any leakage. The installation shall be watertight, both prior to and after making the tap.

All sleeves/saddles shall be solidly braced to prevent any deflection due to thrust pressure. Bracing shall be accomplished by the use of cast-in-place concrete poured between the sleeve/saddle and undisturbed soil. Thrust block dimensions shall be as shown on the detail drawings for tees.

The valve shall be installed with its stem in a vertical position. Special attention shall be paid to bedding under the valve in order to obtain a well compacted bed for the valve and to prevent rotation of the sleeve/saddle. The valve box shall be installed according to the requirements of Section R909.

The valve box shall be carefully set over the valve stem. The top section shall be adjustable for elevation, and the base shall be centered over the operating nut. All valve boxes shall be carefully set and braced to insure that they remain in a vertical position centered on the valve stem during and after backfilling. Proper alignment and height of all new boxes shall be maintained, until completion of the project. The top of the valve box shall be flush with the finished surface grade.

Backfilling of the trench shall be done in a manner so as to avoid damage to the valve and valve box.

Upon completion of the work, the excavation shall be backfilled and the surface area restored.

#### **R904-4 METHOD OF MEASUREMENT**

The quantity to be measured for payment shall be the number of tapping sleeves, tapping saddles with tapping valves with valve boxes installed.

#### **R904-5 BASIS OF PAYMENT**

The unit price bid shall include the cost of: furnishing and installing the tapping sleeve/tapping saddle with tapping valve and valve box; making the required tap; concrete thrust block; maintaining proper alignment and height of the valve box; pavement saw cutting; pressure testing; connecting new water main to existing water main; additional excavation and backfill necessary to obtain the outside diameter of water main to be tapped; and furnishing all labor, material and equipment necessary to complete the work.

Excavation, rock excavation, furnishing and placing of bedding and select granular backfill, and surface restoration will be paid for under separate bid items.

Payment will be made under:

ITEM NO.	ITEM	PAY UNIT
R904.01XX	X" x X" Tapping Sleeve and Valve w/ Valve Box	Each
R904.02XX	X" x X" Tapping Saddle and Valve w/ Valve Box	Each

## **SECTION R905 - CUTTING-IN VALVE WITH VALVE BOX AND SLEEVE**

### **R905-1 DESCRIPTION**

The work shall consist of the installation of cutting-in valves with valve box and sleeve(s) in existing water mains as shown on the plans and as directed by the Project Manager.

### **R905-2 MATERIALS**

#### **R905-2.01 Valves**

Cutting-in valves shall conform to the material requirements of Section R902, except that a Metropolitan Pattern will not be required for valves 12 inches in diameter and smaller.

#### **R905-2.02 Valve Boxes**

Valve boxes shall conform to the material requirements of Section R909.

#### **R905-2.03 Cutting-In Sleeves**

For valves 12 inches in diameter and smaller, a cutting-in sleeve shall be required. The cutting-in sleeve shall be made of ductile iron conforming to all applicable sections of AWWA C110, or approved equivalent. One end shall be standard size plain end for mechanical joint pipe and the other end shall be mechanical joint. The sleeve shall be of a type that will lock in place. Valves and sleeves shall include all hardware, glands and gaskets. The manufacturer and model of the sleeves shall be approved by the Project Manager prior to installation.

#### **R905-2.04 Solid Sleeves**

For valve sizes 16 inches in diameter and larger- two mechanical joint ductile iron solid sleeves, long pattern, shall be required. Solid sleeves shall be of dual purpose type for use in plain ends of either centrifugal or pit cast iron pressure pipe, and shall conform to the latest requirements of ANSI/AWWA C110.

#### **R905-2.05 Pipe**

Pipe used in conjunction with solid sleeves shall be ductile iron pipe conforming to the requirements of Section R901.

#### **R905-2.06 Hardware**

All hardware shall be made of cold formed, high strength, low-alloy steel (Cor-ten), ASTM A242.

#### **R905-2.07 Bedding, Backfill, and Surface Restoration**

Bedding, backfill, and surface restoration materials, and method of placement shall conform to the requirements of Section R901.

### **R905-3 CONSTRUCTION DETAILS**

#### **R905-3.01 General**

All work shall be coordinated with the Water Bureau. The Water Bureau will close all valves needed to isolate the section of the water main to receive the valve. The Water Bureau shall be notified a minimum of 10 working days in advance of intent to do the work requiring the operation of valves and appurtenances; and a minimum of 2 working days advance notice when operation of valves and appurtenances is required for the actual work. All valves and appurtenances are to be operated only by authorized representatives of the Water Bureau.

Appropriate measures shall be taken to prevent dirt, debris, and surface water from entering the water main. Open pipe ends shall be plugged with watertight plugs whenever work is discontinued for any length of time, or when laying conditions may allow foreign matter to enter the pipe. The interior of the valve and open pipe ends, all new

pipe, and sleeves used in making the installation, shall be swabbed with a 5 percent hypochlorite solution before installation.

#### **R905-3.02 Installation**

Pavement saw cutting shall be required prior to all work, except in areas of reconstruction. All street cuts shall be made by a pavement saw and shall conform to the requirements of Section R622.

Excavation shall be only to a sufficient length, width and depth needed to expose, cut and remove a section of the existing water main, and to install the cutting-in valve. Excavation shall conform to the requirements of Section R206.

The existing water main shall be measured and cut to the proper length for the new installation. The cut section of pipe shall be removed and disposed of. The cutting-in valve and sleeve shall be installed according to the manufacturer's latest instructions and as approved by the Project Manager.

Before installation, the valves shall be inspected, cleaned, lubricated, and tested to insure that they are in proper working order.

The valve shall be installed with its stem in a vertical position. Special attention shall be paid to the backfill under the valve to obtain a well compacted bed for the valve. All joints shall be made watertight. Prior to backfilling, the water main shall be energized and the installation shall be pressure tested under line pressure, in the presence of the Project Manager.

The valve box shall be carefully set over the valve stem. The top section shall be adjustable for elevation, and the base shall be centered over the operating nut. All valve boxes shall be carefully set and braced to insure that they remain in a vertical position centered on the valve stem during and after backfilling. Proper alignment and height of all new boxes shall be maintained, until completion of the project. The top of the valve box shall be flush with the finished surface grade. Backfilling of the trench shall be done in a manner so as to avoid damage to the valve and valve box.

#### **R905-4 METHOD OF MEASUREMENT**

The quantity to be measured for payment shall be the number of cutting-in valves with valve box and sleeve installed.

#### **R905-5 BASIS OF PAYMENT**

The unit price bid shall include the cost of: measuring, cutting, and removing a section of the existing water main; cleaning the existing pipe; furnishing and using all temporary plugs and disinfectant to prevent contamination of the water main; furnishing and installing the cutting-in valve with valve box and sleeve(s); maintaining proper alignment and height of the valve box; pavement saw cutting; connecting new water main to existing water main; and furnishing all labor, materials and equipment necessary to complete the work.

Excavation, rock excavation, furnishing and placing of bedding and select granular backfill, and surface restoration will be paid for under separate bid items.

Payment will be made under:

ITEM NO.	ITEM	PAY UNIT
R905.01XX	X" Cutting-in Valve w/ Valve Box and Sleeve(s)	Each

## **SECTION R906 - INSERTION SLEEVE**

### **R906-1 DESCRIPTION**

The work shall consist of the installation of insertion sleeves as shown on the plans and as directed by the Project Manager.

### **R906-2 MATERIALS**

#### **R906-2.01 General**

Insertion sleeve shall consist of two solid sleeves and replacement pipe, as required, for each installation.

All pipe, fittings, joints, and hardware shall conform to the requirements of Section R901.

#### **R906-2.02 Sleeves**

Sleeves shall be mechanical joint ductile iron solid sleeves, long pattern. Sleeves shall be of the dual purpose type for use in plain ends of either centrifugal or pit cast iron pressure pipe and shall conform to the latest requirements of ANSI/AWWA C110.

#### **R906-2.03 Replacement Pipe**

Pipe used to replace existing pipe shall be ductile iron pipe of the same size as the existing pipe, and shall conform to the requirements of Section R901.

#### **R906-2.04 Bedding, Backfill, and Surface Restoration**

Bedding, backfill, and surface restoration materials and methods of placement shall conform to the requirements of Section R901.

### **R906-3 CONSTRUCTION DETAILS**

#### **R906-3.01 General**

All work shall be coordinated with the Water Bureau. The Water Bureau will close all valves needed to isolate the section of the water main to receive the insertion sleeve. The Water Bureau shall be notified a minimum of 10 working days in advance of intent to do the work requiring the operation of valves and appurtenances; and a minimum of 2 working days advance notice when operation of valves and appurtenances is required for the actual work. All valves and appurtenances are to be operated only by authorized representatives of the Water Bureau.

Appropriate measures shall be taken to prevent dirt, debris, and surface water from entering the water main. Open pipe ends shall be plugged with watertight plugs whenever work is discontinued for any length of time, or when laying conditions may allow foreign matter to enter the pipe. The interior of the open pipe ends, all new pipe, and sleeves used in making the installation, shall be swabbed with a 5 percent hypochlorite solution before installation.

#### **R906-3.02 Installation**

Pavement saw cutting shall be required prior to all work, except in areas of reconstruction. All street cuts shall be made by a pavement saw and shall conform to the requirements of Section R622.

Excavation shall be only to a sufficient length, width and depth needed to expose, cut and remove a section of the existing water main, and to install the insertion sleeve. Excavation shall conform to the requirements of Section R206.

The existing water main shall be cut, and the tee or section of pipe removed. The new pipe shall be measured and cut to make a tight fit in the existing water main. Pipe cutting equipment and methods shall be as approved by the Project Manager, prior to cutting the pipe. All cuts shall be straight, smooth, and perpendicular to the centerline of the pipe.

The cut end of the abandoned water main pipe shall be plugged with concrete. Concrete plugs shall completely fill the water main pipe for a length of 12 inches. Valves in the abandoned water main shall be permanently closed.

Prior to installation of the sleeves, the open ends of the existing water main shall be cleaned. All loose dirt, scale and rust shall be removed to a minimum distance of 12 inches from the cut ends of the existing pipe. Sleeves shall be centered over the connection, and installed according to the manufacturer's latest instructions and as approved by the Project Manager. Pipe shall be installed according to the requirements of Section R901. The fit between the existing water main and the new pipe nipple shall not exceed a gap of 1/8 inch. All joints shall be made watertight. Prior to backfilling, the water main shall be energized and the installation shall be pressure tested under line pressure in the presence of the Project Manager.

#### **R906-4 METHOD OF MEASUREMENT**

The quantity to be measured for payment shall be the number of insertion sleeve units installed. An insertion unit shall consist of two sleeves and up to a maximum of 5 feet of pipe, as measured between the sleeves. Any pipe installed in excess of 5 feet shall be paid for under Section R901.

#### **R906-5 BASIS OF PAYMENT**

The unit price bid shall include the cost of: furnishing and installing the required sleeves, including pipe; measuring and cutting of existing and new pipe; removal and disposal of existing cut pipe and fittings; cleaning the existing pipe; furnishing and using all temporary plugs and disinfectant to prevent contamination of the water main; pavement saw cutting; connecting new water main to existing water main; plugging the abandoned water main pipe with concrete; pressure testing; and furnishing all labor, material and equipment necessary to complete the work.

Excavation, rock excavation, furnishing and placing of bedding and select granular backfill, and surface restoration will be paid for under separate bid items.

Payment will be made under:

<b>ITEM NO.</b>	<b>ITEM</b>	<b>PAY UNIT</b>
R906.01XX	X" Insertion Sleeve	Each

## **SECTION R907 - CONNECT NEW WATER MAIN TO EXISTING WATER MAIN**

### **R907-1 DESCRIPTION**

The work shall consist of the connection of a newly constructed water main to an existing water main as shown on the plans and as directed by the Project Manager.

### **R907-2 MATERIALS**

#### **R907-2.01 General**

The materials shall conform to the requirements of Section R901.

#### **R907-2.02 Fittings**

All fittings and joint connection materials required to make the connection shall be as approved by the Project Manager prior to installation.

#### **R907-2.03 Thrust Restraint**

Concrete thrust blocks and restrained joints shall conform to the requirements of Section R901.

#### **R907-2.04 Bedding, Backfill, and Surface Restoration**

Bedding, backfill, and surface restoration materials and method of placement shall conform to the requirements of Section R901.

### **R907-3 CONSTRUCTION DETAILS**

#### **R907-3.01 General**

All work shall be coordinated with the Water Bureau. The Water Bureau will close all valves needed to isolate the section of the water main to be shut down. The Water Bureau shall be notified a minimum of 10 working days in advance of intent to do the work requiring the operation of valves and appurtenances; and a minimum of 2 working days advance notice when operation of valves and appurtenances is required for the actual work. All valves and appurtenances are to be operated only by authorized representatives of the Water Bureau.

Appropriate measures shall be taken to prevent dirt, debris, and surface water from entering the water main. Open pipe ends shall be plugged with watertight plugs whenever work is discontinued for any length of time, or when laying condition may allow foreign matter to enter the pipe. The interior of the open pipe ends, all new pipe, fittings and sleeves used in making the installation, shall be swabbed with a 5 percent hypochlorite solution before installation.

#### **R907-3.02 Installation**

Pavement saw cutting shall be required prior to all work, except in areas of reconstruction. All street cuts shall be made by a pavement saw and shall conform to the requirements of Section R622.

Excavation shall be only to a sufficient length, width and depth needed to expose, cut and remove a section of the existing water main, and to connect the new water main. Excavation shall conform to the requirements of Section R206.

Pipe cutting equipment and methods shall be as approved by the Project Manager, prior to cutting the pipe. All cuts shall be straight, smooth and perpendicular to the centerline of the pipe.

Prior to installation of any new pipe, the end of the existing water main shall be cleaned. All loose dirt, scale and rust shall be removed to a length sufficient to properly install the connection fitting.

The new water main shall be connected to the existing main using approved and appropriate gaskets, materials and fittings. The fit between the existing water main and the new pipe shall be tight and shall not exceed a gap of 1/8 inch. All tees, elbows, bends and plugs shall be solidly braced against the trench wall to prevent any deflection due to thrust pressure. Bracing shall be accomplished by the use of cast-in-place concrete thrust blocks or restrained joints, subject to the requirements of Section R901. All pipe joints shall be made watertight. Prior to backfilling the water main shall be energized and the connection shall be pressure tested under line pressure in the presence of the Project Manager.

The open end of the abandoned water main pipe shall be plugged with concrete. Concrete plugs shall completely fill the water main pipe for a length of 12 inches. Valves in the abandoned watermain shall be permanently closed.

#### **R907-4 METHOD OF MEASUREMENT**

The quantity to be measured for payment shall be the number of connections actually made.

#### **R907-5 BASIS OF PAYMENT**

The unit price bid shall include the cost of: cutting and removing a piece of the existing water main; removing the existing plug; cleaning the existing pipe; furnishing and using all temporary plugs and disinfectant to prevent contamination of the water main; connecting the new water main to the existing water main; furnishing and placing all pipe, pipe specials, gaskets, fittings, offsets, bends, tees, crosses, joints, and thrust blocks; restrained joints; plugging the abandoned water main with concrete; pavement saw cutting; pressure testing; and furnishing all labor, material and equipment necessary to complete the work.

Excavation, rock excavation, furnishing and placing of bedding and select granular backfill, and surface restoration will be paid for under separate bid items.

Payment for installation of a tee or cross into existing water main shall be considered as one connection.

Payment will be made under:

<b>ITEM NO.</b>	<b>ITEM</b>	<b>PAY UNIT</b>
R907.01	Connect New Water Main to Existing Water Main	Each

## **SECTION R908 - CUT AND PLUG EXISTING WATER MAIN**

### **R908-1 DESCRIPTION**

The work shall consist of cutting and plugging existing water mains as shown on the plans and as directed by the Project Manager.

### **R908-2 MATERIALS**

#### **R908-2.01 Plugs and Clamps**

Plugs shall be ductile iron and shall conform to the requirements of ANSI/AWWA C110.

Clamps shall be socket clamps with tie rods.

Tapped plugs shall be cast iron with a 2 inch tap and pipe plug.

Tie rods shall be 3/4 inch minimum size.

Tie bars shall be 3 inch steel channels, 5.0 pounds per foot.

#### **R908-2.02 Hardware**

All hardware shall be made of cold formed, high strength, low-alloy steel (Cor-ten), ASTM A242.

#### **R908-2.03 Thrust Restraint**

Concrete thrust blocks and restrained joints shall conform to the requirements of Section R901.

#### **R908-2.04 Bedding, Backfill, and Surface Restoration**

Bedding, backfill, and surface restoration materials and methods of placement shall conform to the requirements of Section R901.

### **R908-3 CONSTRUCTION DETAILS**

#### **R908-3.01 General**

All work shall be coordinated with the Water Bureau. The Water Bureau will close all valves to isolate the section of water main to be shut down. The Water Bureau shall be notified a minimum of 10 working days in advance of intent to do the work requiring the operation of valves and appurtenances; and a minimum of 2 working days advance notice when operation of valves and appurtenances is required for the actual work. All valves and appurtenances are to be operated only by authorized representatives of the Water Bureau.

Whenever possible, the plug shall be installed at a tee, cross or similar connection fitting. Where the water main is to be plugged at a pipe joint, the plug shall be installed in the bell end of the pipe.

Appropriate measures shall be taken to prevent dirt, debris, and surface water from entering the water main. Open pipe ends shall be plugged with watertight plugs whenever work is discontinued for any length of time, or when laying conditions may allow foreign matter to enter the pipe. The interior of the open pipe ends and the new plug used in making the installation, shall be swabbed with a 5 percent hypochlorite solution before installation.

#### **R908-3.02 Installation**

Pavement saw cutting shall be required prior to all work, except in areas of reconstruction. All street cuts shall be made by a pavement saw and shall conform to the requirements of Section R622.

Excavation shall be only to a sufficient length, width and depth needed to expose, cut and plug the water main. Excavation shall conform to the requirements of Section R206.

A section of pipe shall be cut and removed. The pipe or fitting to be plugged shall be cleaned. On pipe fittings where plugs cannot be bolted directly to the pipe joint, the plug shall be installed and held in place by a retaining bar extending across the center of the plug. A socket clamp shall be installed on the pipe or fitting behind the bell, and the retaining bar shall be secured to the socket clamp with steel rods, socket clamp washers, lock washers and nuts. Prior to backfilling, all uncoated materials shall receive a hand application of Sikagard 62 Protective Coating as manufactured by Sika Corporation, or approved equivalent. The new installation shall be made watertight. Upon completion of the work and prior to backfilling, the water main shall be energized and the installation shall be pressure tested under line pressure in the presence of the Project Manager.

In conjunction with mechanical restraints, cast-in-place concrete thrust blocks shall be provided to transmit the thrust due to water pressure to undisturbed earth. Prior to placing the concrete, all wet and undesirable material shall be removed from the excavation. Timber blocking will not be allowed.

The cut end of the abandoned water main pipe shall be plugged with concrete. Concrete plugs shall completely fill the water main pipe for a length of 12 inches. Valves in the abandoned watermain shall be permanently closed.

The use of caps in lieu of plugs shall require approval by the Project Manager.

After the concrete has set, the excavation shall be backfilled and the surface area restored.

#### **R908-4 METHOD OF MEASUREMENT**

The quantity to be measured for payment shall be the number of plugs installed.

#### **R908-5 BASIS OF PAYMENT**

The unit price bid shall include the cost of: cutting and removing a section of the existing water main; cleaning the existing pipe; furnishing and using all temporary plugs and disinfectant to prevent contamination of the water main; furnishing and placing the plug, mechanical restraints and appurtenances; constructing the concrete thrust block; plugging the abandoned water main with concrete; pavement saw cutting; pressure testing; and furnishing all labor, material and equipment necessary to complete the work.

Excavation including rock excavation, furnishing and placing of bedding and select granular backfill, and surface restoration will be paid for under separate bid items.

Payment will be made under:

<b>ITEM NO.</b>	<b>ITEM</b>	<b>PAY UNIT</b>
R908.01XX	Cut and Plug Existing X" Water Main	Each

## **SECTION R909 - VALVE BOX**

### **R909-1 DESCRIPTION**

The work shall consist of the installation of new valve box assembly, remove or adjust existing valve boxes, or installation of new valve box top section and lid as shown on the plans and as directed by the Project Manager.

### **R909-2 MATERIALS**

#### **R909-2.01 Valve Boxes**

Valve boxes shall be two piece Buffalo Style, 5-1/4 inch shaft, cast iron boxes with a slip type extension.

#### **R909-2.02 Adjustment Rings**

Adjustment rings shall be cast iron and be capable of fitting on Buffalo Style valve boxes. Vertical thickness shall be in 1 inch increments.

#### **R909-2.03 Bedding, Backfill, and Surface Restoration**

Bedding, backfill, and surface restoration materials and methods of placement shall conform to the requirements of Section R901.

#### **R909-2.04 Valve Box Top Section**

Replacement valve box top section and lid shall be cast iron, Buffalo Style or approved equivalent.

### **R909-3 CONSTRUCTION DETAILS**

#### **R909-3.01 General**

All work shall be coordinated with the Water Bureau. The Water Bureau shall be notified 2 working days in advance of doing any work.

Prior to adjusting or installing valve boxes on valves to remain in service, the valve shall be operated by the Water Bureau to insure that it is functioning properly. Valves that do not function properly shall be replaced only as approved by the Project Manager. All valves are to be operated only by authorized representatives of the Water Bureau.

#### **R909-3.02 Installation**

Pavement saw cutting shall be required prior to all work, except in areas of reconstruction. All street cuts shall be made by a pavement saw and shall conform to the requirements of Section R622.

Excavation shall be only to a sufficient length, width and depth needed to expose and remove, replace, or adjust an existing valve box assembly. Excavation shall conform to the requirements of Section R206.

Existing valve boxes found damaged, not of sufficient length to be raised to the required finished grade, or determined by the Water Bureau to be in need of replacement, shall be removed and replaced with a new valve box assembly.

The valve box shall be carefully set over the valve stem. The top section shall be adjustable for elevation, and the base shall be centered over the operating nut. All valve boxes shall be carefully set and braced to insure that they remain in a vertical position centered on the valve stem during and after backfilling. Proper alignment and height of all new boxes shall be maintained, until completion of the project. The top of the valve box shall be flush with the finished surface grade. Backfilling of the trench shall be done in a manner so as to avoid damage to the valve and valve box.

Upon completion of the work, the excavation shall be backfilled and the surface area restored.

### **R909-3.03 Removal of Existing Valve Box Assembly**

Existing valve boxes on abandoned valves shall be removed to a minimum of 18 inches below the finished grade.

### **R909-3.04 Installation of New Valve Box Assembly**

The existing valve box shall be removed and a new valve box assembly installed. The new valve box shall be carefully set over the existing valve stem, the base centered over the operating nut and the top section adjusted for elevation.

### **R909-3.05 Replacement of Valve Box Top Section**

A sufficient area shall be excavated to enable the upper section of the valve box to be removed. No debris shall be allowed to fall into the existing valve box. The new top section shall be carefully set over the existing bottom section and adjusted to the proper elevation.

### **R909-3.06 Valve Box Adjustment**

#### **A. Valve Box Adjustment with Cast Iron Rings**

Prior to resurfacing of a pavement surface, the top elevation of an existing valve box shall be adjusted to finished grade by adding or removing cast iron adjustment rings. Cast iron rings required to raise valve boxes other than the Buffalo Style shall be provided by the Water Bureau. The Water Bureau shall be notified 2 working days in advance when rings are required for adjustment. The adjustment ring shall be glued into the existing valve box. The glue shall be Quickbond #612, manufactured by PermaBond.

#### **B. Valve Box Adjustment with Slip or Screw Type Extensions**

The existing valve box shall be raised or lowered to the finished grade. Prior to adjustment, the valve box shall be checked for proper alignment. If a valve box is found to be out of alignment, the Project Manager shall be notified immediately. Flanges on existing valve box sections are not to be broken to facilitate adjustment.

## **R909-4 METHOD OF MEASUREMENT**

The quantity to be measured for payment shall be the number of valve boxes actually installed, removed, or adjusted.

## **R909-5 BASIS OF PAYMENT**

### **R909-5.01 General all Items**

The unit price bid shall include the cost of: furnishing and installing new valve box assemblies or cast iron adjustment rings; having existing valves checked; removal of existing valve boxes; adjustment of new or existing valve boxes to finished grade and alignment; pavement saw cutting; and furnishing all labor, material and equipment necessary to complete the work.

### **R909-5.02 Remove Existing Valve Box**

Payment for valve box removal will be made only for boxes that are removed and not replaced, and are located outside areas of pavement reconstruction or trench and culvert excavation. Valve boxes permanently removed in areas of pavement reconstruction or trench and culvert excavation, shall be paid for under Sections R203 and R206. Payment for valve boxes removed in conjunction with valve salvaging will be made under Section R902.

### **R909-5.03 Valve Box Adjustment with Cast Iron Rings**

The unit price bid shall include the cost of furnishing and installing cast iron adjustment rings up to a thickness of 6 inches.

**R909-5.04 Valve Box Adjustment with Cast Iron Rings Furnished by the Water Bureau**

The unit price bid shall include the cost of installing cast iron adjustment rings up to a thickness of 6 inches. Adjustment rings shall be obtained from the Water Bureau, Materials and Equipment Building No. 3, 401 Dewey Avenue, Rochester, New York.

**R909-5.05 Replacement of Valve Box Top Section**

The unit price bid shall include the cost of removal of existing top sections and lids, furnishing and installing new valve box top sections and lids, adjustment of the new top sections and lids to the satisfactory elevation.

**R909-5.06 Excavation, Backfill and Surface Restoration**

Excavation including rock excavation, furnishing and placing of select granular backfill and surface restoration will be paid for under separate bid items or included in the price bid for the items as indicated in the payment item description.

Payment will be made under:

ITEM NO.	ITEM	PAY UNIT
R909.01	Furnish and Install New Valve Box	Each
R909.02	Furnish and Install New Valve Box (Including Excavation and Backfill)	Each
R909.03	Furnish and Install New Valve Box (Including Excavation, Backfill and Surface Restoration)	Each
R909.04	Remove Existing Valve Box	Each
R909.05	Remove Existing Valve Box (Including Excavation and Backfill)	Each
R909.06	Remove Existing Valve Box (Including Excavation, Backfill and Surface Restoration)	Each
R909.07	Adjust Valve Box to Grade - Extension Adjustment	Each
R909.08	Adjust Valve Box to Grade - Extension Adjustment (Including Excavation and Backfill)	Each
R909.09	Adjust Valve Box to Grade - Extension Adjustment (Including Excavation, Backfill and Surface Restoration)	Each
R909.10	Adjust Valve Box to Grade w/ Adjustment Rings	Each
R909.11	Adjust Valve Box to Grade w/ Adjustment Rings Furnished by Water Bureau	Each
R909.12	Replace Valve Box Top Section	Each
R909.13	Replace Valve Box Top Section (Including Excavation and Backfill)	Each
R909.14	Replace Valve Box Top Section (Including Excavation, Backfill and Surface Restoration)	Each

## **SECTION R912 - CORPORATION STOP AND CONNECTION, ABANDON EXISTING WATER SERVICE AT TAP (2 INCH AND SMALLER)**

### **R912-1 DESCRIPTION**

The work shall consist of the installation of a new corporation stop or the abandonment of an existing water service as shown on the plans and as directed by the Project Manager.

### **R912-2 MATERIALS**

#### **R912-2.01 Corporation Stops**

Corporation stops shall be of cast brass with "O" ring seals and fitted flared couplings for copper pipe connections. Corporation stop manufacturer and model shall be approved by the Project Manager, prior to their use in the work.

The size of the corporation and coupling shall be the same size as the existing service pipe, with minimum size being 3/4 inch.

#### **R912-2.02 Service Saddles**

Service saddles shall be double strap, all brass tapping saddles, with rubber gaskets. Service saddles shall be as approved by the Water Bureau, prior to their use in the work.

#### **R912-2.03 Bedding, Backfill and Surface Restoration**

Bedding, backfill, and surface restoration materials and method of placement shall conform to the requirements of Section R901.

### **R912-3 CONSTRUCTION DETAILS**

#### **R912-3.01 General**

The location and disposition of all water services shall be verified before beginning work.

The Water Bureau shall be notified at least 2 working days in advance of doing any work. If requested, the Water Bureau will check the operation of the service valve. All service valves are to be operated only by authorized representatives of the Water Bureau.

Prior to any disruption of service, all affected water service customers shall be notified by the Contractor at least 24 hours in advance of the disruption, and if necessary shall be provided with temporary water service according to the requirements of Sections R901 and R916.

Records of all new, renewed, and extended water services shall be provided. Such records shall identify for each service the address and coordinate location of the service, material used, the length and size of new copper service, and the location of the corporation stop and curb stop. This information shall be recorded on a standard water service card, as shown on the detail drawings. Water service cards shall be supplied by and obtained from the Water Bureau, and shall be submitted on a monthly basis to the Water Bureau Dispatcher, Water Bureau, 10 Felix Street, Rochester, New York.

#### **R912-3.02 Installation**

Pavement saw cutting shall be required prior to all water service work, except in areas of reconstruction. All street cuts shall be made by a pavement saw and shall conform to the requirements of Section R622.

The water main shall be exposed at the location where the tap is to be made, or the service to be abandoned. Excavation shall conform to the requirements of the Section R206.

Upon completion of the work, the excavation shall be backfilled and the disturbed surface area restored.

#### **R912-3.03 Service Tap at Main**

The tap shall be made in accordance with the requirements of ANSI/AWWA C600. Service taps shall be made at the 10 and 2 o'clock positions on the water main, and shall be made on the customers side of the water main. Only equipment specially designed for this purpose and is in good working condition shall be used. When drilling, care shall be taken to completely cut through the pipe wall. The installation of the corporation stop shall be made watertight. Backfilling of the trench shall be done in a manner so as to avoid damage to the new corporation stop.

Taps made on water main that is encased in polyethylene shall be installed according to the latest instructions and recommendations by the manufacturer of the polyethylene tube or water pipe, and as approved by the Project Manager.

#### **912-3.04 Service Saddles**

A service saddle shall be used in conjunction with a service tap when the tap size exceeds those in the following table:

<b>Water Main Size (Inches)</b>	<b>Maximum Tap Size Allowed Without Service Saddle (Inches)</b>
4 to 6	All taps require saddles
8 to 10	3/4
12	1-1/2
16 or larger	2

#### **R912-3.05 Abandon Existing Water Service at Tap**

The corporation stop shall be completely closed before the service line is disconnected at the corporation stop. If the service line cannot be removed without damaging the corporation stop and creating leaks, the service line shall be sawed off at the corporation stop. The nut on the bottom of the corporation stop, if present, shall be completely tightened. If the corporation stop leaks when fully closed, the corporation stop shall be plugged. Corporation stops leaking at the threaded tap shall be tightened. Existing service lines will not be required to be removed under this item. Existing curb boxes on abandoned services shall be removed. Payment for curb box removal shall be made under Section R914.

### **R912-4 METHOD OF MEASUREMENT**

The quantity to be measured for payment shall be the number of water service taps and installations made, or the number of water services abandoned at the tap.

### **R912-5 BASIS OF PAYMENT**

#### **R912-5.01 General all Items**

The unit price bid shall include the cost of: preparation and submittal of service record information and cards; pavement saw cutting; and furnishing all labor, material and equipment necessary to complete the work.

#### **R912-5.02 Service Tap at Main**

The unit price bid shall include the cost of: making the tap at the main; furnishing and installing the corporation stop; service saddles where required; and connection of the water service to the corporation stop.

#### **R912-5.03 Abandon Existing Water Service at Tap**

The unit price bid shall include the cost of: closing the corporation stop; disconnecting the service pipe from the corporation stop; plugging the corporation stop if necessary; and removal of the curb box if necessary.

No payment will be made for disconnecting water services on abandoned water mains, or for closing corporation stops and disconnecting water services that are to be extended to new or existing water mains, unless a separate excavation is required.

**R912-5.04 Excavation, Backfill and Surface Restoration**

Excavation, rock excavation, furnishing and placing of bedding and select granular backfill, surface restoration will be paid for under separate bid items or included in the price bid for each item as indicated in the item description.

Excavation that is included in the pay item shall include rock excavation.

Payment will be made under:

ITEM NO.	ITEM	PAY UNIT
R912.01XX	X" Service Tap at Main, Corporation Stop and Connection	Each
R912.02XX	X" Service Tap at Main, Corporation Stop and Connection (Including Excavation and Backfill)	Each
R912.03XX	X" Service Tap at Main, Corporation Stop and Connection (Including Excavation, Backfill and Surface Restoration)	Each
R912.04	Abandon Existing Water Service at Tap	Each
R912.05	Abandon Existing Water Service at Tap (Including Excavation and Backfill)	Each
R912.06	Abandon Existing Water Service at Tap (Including Excavation, Backfill and Surface Restoration)	Each

## **SECTION R913 - COPPER WATER SERVICE (2 INCH AND SMALLER)**

### **R913-1 DESCRIPTION**

The work shall consist of the installation of new copper water service or extension of an existing water service as shown on the plans and as directed by the Project Manager.

### **R913-2 MATERIALS**

#### **R913-2.01 Pipe and Fittings**

Pipe shall be copper tubing conforming to the requirements of ASTM B88, Type K. The size of the new tubing shall be the same as the existing service, with minimum size being 3/4 inch.

Joints shall be of the flared type.

Couplings for connecting new copper tubing to new and existing corporation stops shall be flared type.

#### **R913-2.02 Bedding, Backfill, and Surface Restoration**

Bedding, backfill and surface restoration materials and method of placement shall conform to the requirements of Section R901.

### **R913-3 CONSTRUCTION DETAILS**

#### **R913-3.01 General**

The location and disposition of all water services shall be verified before beginning work.

The Water Bureau shall be notified at least 2 working days in advance of doing any work. If requested, the Water Bureau will check the operation of the curb stops. All curb stops are to be operated only by authorized representatives of the Water Bureau.

Prior to any disruption of service, all affected water service customers shall be notified by the Contractor at least 24 hours in advance of the disruption, and if necessary shall be provided with temporary water service according to the requirements of Sections R901 and R916.

Records of all new, renewed, and extended water services shall be provided. Such records shall identify for each service the address and coordinate location of the service, material used, the length and size of new copper service, and the location of the corporation stop and curb stop. This information shall be recorded on a standard water service card, as shown on the detail drawings. Water service cards shall be supplied by and obtained from the Water Bureau, and shall be submitted on a monthly basis to the Water Bureau Dispatcher, Water Bureau, 10 Felix Street, Rochester, New York.

A temporary pavement shall be placed on all water service trenches, located within existing paved areas, immediately after backfilling the trench. Temporary Pavement, Item No. R412.01 shall be as directed by the Project Manager.

#### **R913-3.02 Installation**

Pavement saw cutting shall be required prior to all water service work, except in areas of reconstruction. All street cuts shall be made by a pavement saw and shall conform to the requirements of Section R622.

Excavation shall be to a depth that will provide a minimum of 4 feet 6 inches of cover over the service pipe, and a 6 inch layer of compacted sand underneath. Excavation shall conform to the requirements of Section R206.

All copper tubing for new services or extensions shall be laid in the trench in a single piece without joints between corporation stops and curb stops, or between curb stops on extensions. The tubing may be curved around obstructions in the pipe trench. The service line shall be laid at a right angle to the water main and straight from the tap to the curb stop. The tubing shall be connected to corporation stops, curb stops and to existing service pipe and stops by using approved and appropriate gaskets, joint and connection materials, or fittings required to make the connection. The new service line shall be extended to include removal of the existing curb stop and box.

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

There shall be no kinks or crimps in the installed copper tubing.

Upon completion of the work and testing the service, the excavation shall be backfilled and the disturbed surface area restored.

### **R913-3.03 Drilled Water Services**

In cases where it is desired to drill for the installation or replacement of a water service, approval shall be obtained from the Director of Water before commencing work. Open cut and excavate at the water main and the curb stop. The service shall be "drilled in" in such a manner which will insure that all of the water service is at least 4 feet 6 inches below the ground surface. "Washing in" of water services will not be allowed.

### **R913-3.04 Installation at Existing Appurtenances**

At existing corporation stops, the service shall be shut down at the corporation stop and the existing service pipe removed. The new copper service shall be connected to the existing corporation stop only if the corporation stop is 5/8 inch diameter or larger and found not to be leaking or damaged. At existing curb stops, the curb stop shall be checked for proper operation and the water service shall be shut down. Disconnect the existing service pipe to be replaced and connect the new service pipe to the existing curb stop. Return the corporation stop to full open position.

Where an active water service is in conflict with the location of the proposed curb, the water service shall be extended so that the location of the new curb stop and box is behind the proposed curb.

To extend existing services, the existing curb box and rod shall be removed and new copper tubing shall connect the existing curb stop to the new curb stop, leaving the existing curb stop in the full open position.

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

For service renewal, any existing corporation stop determined unsatisfactory by the Project Manager shall be closed and abandoned. If an existing corporation stop is found to be broken or leaking, it shall be plugged and replaced with a new corporation stop. The cost of abandoning or plugging a defective corporation stop on a service renewal shall be included in the unit price bid for a new tap and corporation stop under Section R912. Corporation stops leaking at the threaded tap shall be tightened. A leaking tap that cannot be tightened so as to be watertight, shall be replaced by a new tapping saddle and corporation stop.

### **R913-3.05 Testing Water Services**

Prior to backfilling the trench, all new water service work which includes all connections, joints, and unions shall be pressure tested under active line pressure in the presence of the Project Manager. All water service pipe and appurtenances shall be made watertight.

## **R913-4 METHOD OF MEASUREMENT**

The quantity to be measured for payment shall be the number of linear feet of new copper tubing installed, as measured along the service line from the tap on the main to the curb stop, from the old curb stop to the new curb stop, and to the limit of installation.

## **R913-5 BASIS OF PAYMENT**

### **R913-5.01 General all Items**

The unit price bid shall include the cost of: furnishing and installing all copper tubing; pipe specials; flared connections; gasket fittings; joint and connection materials; connecting the service to new corporation stops and curb stops; connection to existing service; removal of the existing curb stop and box where required; verifying location and disposition of services; preparation and submittal of service record information and cards; pavement saw cutting; drilling operations; pressure testing; placement of select backfill excavated from the trench; and furnishing all labor, material and equipment necessary to complete the work.

### **R913-5.02 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.

### **R913-5.03 Extension of Existing Water Service**

The unit price shall also include the cost of shutting down the existing water service, removing the existing curb box and rod, joint connection materials, and connections to the existing service.

### **R913-5.04 Excavation, Backfill, and Surface Restoration**

Excavation, rock excavation, furnishing and placing of bedding and select granular backfill, temporary pavement and 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 shall include rock excavation.

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>
R913.01XX	New X" Copper Water Service	Linear Foot
R913.02XX	New X" Copper Water Service (Including Excavation and Backfill)	Linear Foot
R913.03XX	New X" Copper Water Service (Including Excavation, Backfill and Surface Restoration)	Linear Foot
R913.04XX	New X" Copper Water Service at Existing Appurtenances	Linear Foot
R913.05XX	New X" Copper Water Service at Existing Appurtenances (Including Excavation and Backfill)	Linear Foot
R913.06XX	New X" Copper Water Service at Existing Appurtenances (Including Excavation, Backfill and Surface Restoration)	Linear Foot
R913.07XX	Extend Existing Service with New X" Copper Water Service	Linear Foot

<b>ITEM NO.</b>	<b>ITEM</b>	<b>PAY UNIT</b>
R913.08XX	Extend Existing Service with New X" Copper Water Service (Including Excavation and Backfill)	Linear Foot
R913.09XX	Extend Existing Service with New X" Copper Water Service (Including Excavation, Backfill and Surface Restoration)	Linear Foot

## **SECTION R914 - CURB STOP AND BOX**

### **R914-1 DESCRIPTION**

The work shall consist of the installation of new curb stops and curb boxes, adjusting existing curb boxes, removal of existing curb boxes, removal of existing water meter boxes, or adjusting existing water meter boxes as shown on the plans and as directed by the Project Manager.

### **R914-2 MATERIALS**

#### **R914-2.01 General**

Curb stop and box manufacturers and models shall be as approved by the Project Manager, prior to installation.

#### **R914-2.02 Curb Stops**

Curb stops shall have cast brass bodies with "O" ring seals fitted with flared couplings for copper pipe connections.

The size of the curb stop shall be the same size as the existing service pipe, with minimum size being 3/4 inch.

#### **R914-2.03 Curb Boxes**

Curb boxes shall be two piece boxes with a slip type extension, a cast iron arch pattern lower section, a cast iron lid, and a stationary shut off rod. Curb boxes shall have a 1-1/4 inch minimum inside diameter upper section, be capable of extension to 5 feet 6 inches, and be coated with an asphalt base paint. Shut off rods shall be 4 feet long and be provided with a "S" type bend capable of centering the rod in the upper curb box section. Services larger than 1 inch shall require a curb box arch base in addition to the standard curb box unit.

#### **R914-2.04 Bedding, Backfill, and Surface Restoration**

Bedding, backfill and surface restoration materials and methods of placement shall conform to the requirements of Section R901.

### **R914-3 CONSTRUCTION DETAILS**

#### **R914-3.01 General**

The location and disposition of all water services shall be verified before beginning work.

The Water Bureau shall be notified at least 2 working days in advance of doing any work. All service valves are to be operated only by authorized representatives of the Water Bureau and all work shall be coordinated with the Water Bureau.

Prior to any disruption of service, all affected water service customers shall be notified by the Contractor at least 24 hours in advance of the disruption, and if necessary shall be provided with temporary water service according to the requirements of Sections R901 and R916.

Records of all new service work shall be provided. Such records shall identify for each service the address and coordinate location of the service and the material used. This information shall be recorded on a water service card, as shown on the detail drawings. Water service cards shall be supplied by and obtained from the Water Bureau, and shall be submitted on a monthly basis to the Water Bureau Dispatcher, Water Bureau, 10 Felix Street, Rochester, New York.

#### **R914-3.02 Installation**

Pavement saw cutting shall be required prior to all water service work, except in areas of reconstruction. All street cuts shall be made by a pavement saw and shall conform to the requirements of Section R622.

Excavation shall only be to the length, width, and depth necessary to install a new curb box at an existing curb stop, or to install a new curb stop and box, or to remove an existing curb box. Excavation shall conform to the requirements of Section R206.

New curb stops shall be placed in the trench on a precast solid concrete block support at an elevation to provide a minimum cover of 4 feet 6 inches over the service pipe. The installation shall be pressure tested under line pressure in the presence of the Project Manager, prior to backfilling. The installation shall be made watertight.

All curb boxes shall be carefully set and braced to insure that they remain in a vertical position centered on the curb stop during and after backfilling. Proper alignment and height of all new or adjusted boxes shall be maintained, until completion of the project. The top of the curb box shall be flush with the finished surface grade. Backfilling of the trench shall be done in a manner so as to avoid damage to the service pipe, and the curb stop and box.

Upon completion of the work, the excavation shall be backfilled and the disturbed surface area restored.

#### **R914-3.02 New Curb Stop and Box at New Service**

The new curb stop and box shall be connected to the new service pipe as required, and the existing curb stop and box removed. The cost of removing the existing curb stop and box shall be included in Section R913.

#### **R914-3.04 New Curb Stop and Box at Existing Service**

The existing water service shall be shut off at the corporation stop, the existing curb stop and box disconnected and removed, and the new curb stop and box connected to the existing service.

#### **R914-3.05 New Curb Box Assembly**

The existing curb box assembly shall be replaced with a new curb box assembly. Prior to installation, the curb stop shall be checked for proper operation. Defective curb stops shall be replaced as ordered by the Project Manager.

#### **R914-3.06 Adjust Existing Curb Box/Water Meter Box Assembly**

Existing boxes shall be adjusted to the required finished grade elevation. Prior to adjusting the box, the Water Bureau shall check the curb stop and box to insure that it is functioning properly and the shut off rod is attached. The Water Bureau shall be given 10 days advance notice of intent to do the work. Defective curb stops and boxes shall be replaced only as approved by the Project Manager.

#### **R914-3.07 Relocate Existing Curb Box Assembly**

The existing curb box assembly shall be removed and reinstalled in its new location. The existing curb box assembly shall be carefully removed so as not to cause any damage to the assembly.

#### **R914-3.08 Remove Existing Curb Box/Water Meter Box Assembly**

The existing boxes on abandoned services shall be removed.

### **R914-4 METHOD OF MEASUREMENT**

The quantity to be measured for payment shall be the number of curb stops and boxes, or water meter boxes actually installed, adjusted, relocated, or removed.

### **R914-5 BASIS OF PAYMENT**

#### **R914-5.01 General all Items**

The unit price bid shall include the cost of: verifying the location and disposition of services; preparation and submittal of service record information and cards; pavement saw cutting; and furnishing all labor, material and equipment necessary to complete the work.

**R914-5.02 New Curb Stop and Box at New Service**

The unit price bid shall include the cost of: furnishing and installing the curb stop; curb box assembly; concrete block; connecting to water service pipe; pressure testing the curb stop; final adjustment of the curb box to satisfactory grade and alignment; fittings and materials necessary to connect the curb stop; and removal of the existing curb stop and box, and water meter box where required.

**R914-5.03 New Curb Stop and Box at Existing Service**

In addition to the items in Section R914-5.02, the unit price bid shall also include the cost to shut down the service at the corporation stop, or shutting down the water main; and removal of the existing curb stop and box, or water meter box, where required.

**R914-5.04 Install New Curb Stop**

The unit price bid shall include the items in Section R914-5.02, except that a new curb box assembly will not be included.

**R914-5.05 Replace Existing Curb Box Assembly**

The unit price bid shall include the cost of: removing the existing curb box assembly; furnishing and installing the new curb box assembly; checking the existing curb stop for defects; final adjustment of the curb box to satisfactory grade and alignment.

**R914-5.06 Adjust Existing Curb Box Assembly**

The unit price bid shall include the cost of: checking the existing curb stop and box assembly for defects; adjusting existing curb box to finished grade.

**R914-5.07 Relocate Existing Curb Box Assembly**

The unit price bid shall include the cost of: removing and reinstalling the assembly at another location.

**R914-5.08 Remove Existing Curb Box**

The unit price bid shall include the cost of: removing the existing curb box. Abandoned curb boxes removed in areas of surface reconstruction or trench and culvert excavation, shall be considered as general excavation, and removal will be included under Sections R203 or R206.

**R914-5.09 Adjust Existing Water Meter Box**

The unit price bid per each adjustment shall include the cost of: adjusting an existing water meter box to grade.

**R914-5.10 Remove Existing Water Meter Box**

The unit price bid per each removal shall include the cost of: removing the water meter box.

**R914-5.11 Excavation, Backfill and Surface Restoration**

Excavation, furnishing and placing of bedding and select granular backfill, and surface restoration will be paid for under separate bid items or included in the unit price bid for the item as indicated in the item description. No separate payment shall be made for placement of select backfill excavated from the trench

Payment will be under:

ITEM NO.	ITEM	PAY UNIT
R914.01XX	Furnish and Install New X" Curb Stop and Box at New Water Service	Each
R914.02XX	Furnish and Install New X" Curb Stop and Box at New Water Service (Including Excavation and Backfill)	Each

ITEM NO.	ITEM	PAY UNIT
R914.03XX	Furnish and Install New X" Curb Stop and Box at New Water Service (Including Excavation, Backfill and Surface Restoration)	Each
R914.04XX	Furnish and Install New X" Curb Stop and Box at Existing Water Service	Each
R914.05XX	Furnish and Install New X" Curb Stop and Box at Existing Water Service (Including Excavation and Backfill)	Each
R914.06XX	Furnish and Install New X" Curb Stop and Box at Existing Water Service (Including Excavation, Backfill and Surface Restoration)	Each
R914.07XX	Furnish and Install New X" Curb Stop	Each
R914.08XX	Furnish and Install New X" Curb Stop (Including Excavation and Backfill)	Each
R914.09XX	Furnish and Install New X" Curb Stop (Including Excavation, Backfill and Surface Restoration)	Each
R914.10	Replace Existing Curb Box Assembly	Each
R914.11	Replace Existing Curb Box Assembly (Including Excavation and Backfill)	Each
R914.12	Replace Existing Curb Box Assembly (Including Excavation, Backfill and Surface Restoration)	Each
R914.13	Adjust Existing Curb Box	Each
R914.14	Adjust Existing Curb Box (Including Excavation and Backfill)	Each
R914.15	Adjust Existing Curb Box (Including Excavation, Backfill and Surface Restoration)	Each
R914.16	Relocate Existing Curb Box Assembly	Each
R914.17	Relocate Existing Curb Box Assembly (Including Excavation and Backfill)	Each
R914.18	Relocate Existing Curb Box Assembly (Including Excavation, Backfill and Surface Restoration)	Each
R914.19	Remove Existing Curb Box Assembly	Each
R914.20	Remove Existing Curb Box Assembly (Including Excavation and Backfill)	Each
R914.21	Remove Existing Curb Box Assembly (Including Excavation, Backfill and Surface Restoration)	Each
R914.22	Adjust Existing Water Meter Box	Each
R914.23	Adjust Existing Water Meter Box (Including Excavation and Backfill)	Each
R914.24	Adjust Existing Water Meter Box (Including Excavation, Backfill and Surface Restoration)	Each
R914.25	Remove Existing Water Meter Box	Each
R914.26	Remove Existing Water Meter Box (Including Excavation and Backfill)	Each
R914.27	Remove Existing Water Meter Box (Including Excavation, Backfill and Surface Restoration)	Each

## **SECTION R915 - RELOCATE WATER SERVICE METER**

### **R915-1 DESCRIPTION**

The work shall consist of relocating existing service meters at locations as shown on the plans and as directed by the Project Manager.

### **R915-2 MATERIALS**

Inside meter setting shall be a Ford "Handyhorn" with pack joint connections and ball valves. The "Handyhorn" shall be the same size as the existing service entering inside the house or building.

Inlet valve shall be Ford Ball Valve.

Outlet valve shall be Ford Ball Valve with drain and handle.

Pack joints shall be manufactured by Ford as designed for specific type of pipe.

The Contractor shall verify the size and type of materials required for each meter setting before installation.

### **R915-3 CONSTRUCTION DETAILS**

The Water Bureau Meter Department shall be notified before starting the meter relocation. The Contractor shall notify the Water Customer 48 hours in advance that this work is to be done.

The existing meter shall be removed from its meter pit/vault and stored in the customer's house or building unless directed otherwise.

The existing meter pit/vault shall be removed and backfilled and the surface restored.

The existing meter shall be installed inside the house or building unless directed otherwise by the Water Bureau Meter Department or the Project Manager. If the meter requires replacement, it will be furnished by the Water Bureau and be delivered by the Contractor to its designated location. The existing meter (if replaced) shall be delivered to the Water Bureau, 401 Dewey Avenue, Rochester, New York.

The new installation should be as close as possible to the point of entry of the supply line inside the house or building. The meter shall have easy access with a minimum clearance of 24 inches from the floor and 30 inches from the overhead ceiling. The meter shall be installed in the horizontal and up-right position. The length of service cut out shall be the minimum length necessary to install the "Handyhorn" and valves. Caution shall be taken using an electrical jumper across the length of service cut out until installation is complete. A permanent electrical bond strap shall be installed across the completed installation.

All meters lost or damaged as a result of the Contractor's operation shall be replaced at the Contractor's expense.

### **R915-4 METHOD OF MEASUREMENT**

The quantity paid for will be the number of service meters actually relocated.

### **R914-5 BASIS OF PAYMENT**

The unit price bid shall include the cost of notifying the Water Bureau Meter Department and Water Customers; all excavation, backfill and surface restoration; furnishing and installing the inside meter setting including valves, "Handyhorn" and electrical bond straps; removing the existing meter pit/vault; delivering new and existing meters to and from the Water Bureau when replaced; installing the existing meter or new meter in the new setting; and furnishing all labor, material and equipment necessary to complete the work.

Cost to provide new meters shall not be included in this item, as they are furnished by the Water Bureau.

Payment will be under:

ITEM NO.	ITEM	PAY UNIT
R915.01XX	Relocate X" Water Service Meter	Each

## **SECTION R916 - TEMPORARY BYPASS**

### **R916-1 DESCRIPTION**

The work shall consist of the installation of temporary bypass pipe, connections, and fire hydrants as shown on the plans and as directed by the Project Manager.

### **R916-2 MATERIALS**

Pipe, hose, and other materials furnished for use in conjunction with the temporary bypass pipe and connections, shall meet the requirements of Section R901, and shall be fully adequate to withstand the pressure indicated and all other conditions of use. Pipe and fittings shall provide adequate watertightness before being put into service. Hose made of vinyl shall not be allowed. Temporary fire hydrants shall have a 4-1/2 inch diameter National Standard threaded nozzle.

### **R916-3 CONSTRUCTION DETAILS**

#### **R916-3.01 General**

Temporary bypass shall include pipe, hoses, necessary outlets and fittings to each service connection, and available fire hydrant. The temporary bypass lines shall be maintained in safe and operative condition at all times. The bypass shall be mounded over with asphalt wherever it crosses a street, driveway or sidewalk, to minimize interference with vehicle and pedestrian traffic. Where so ordered by the Project Manager, the bypass pipe shall be entrenched and buried. Lights and barricades needed to protect the work and the public, shall be furnished and properly maintained.

Upon completion of the work, the temporary bypass pipe and related appurtenances shall be removed, and the disturbed surface area restored. Surface restoration shall be in accordance with Section R901.

Bypass pipe crossing streets shall be installed in a trench. The existing pavement shall be saw cut and removed to a depth sufficient to contain the bypass pipe.

Bypass lines shall be disinfected and flushed prior to connection to the customers service line.

#### **R916-3.02 Source of Water to Feed Bypass**

The City shall provide a source of water of a sufficient pressure to feed the temporary bypass line. Such source shall be from an existing hydrant, tap, or water main, and shall be at a reasonably close location.

#### **R916-3.03 Temporary Fire Hydrants**

Temporary fire hydrants shall be installed where indicated on the plans, where an existing hydrant is put out of service, or where ordered by the Project Manager. Temporary fire hydrants shall be required on temporary bypass pipe which is 4 inch in diameter or larger in size.

#### **R916-3.04 24 Hour Maintenance**

The Contractor shall be responsible for maintenance and repair of all temporary bypass service and pipe. The Contractor shall be equipped to make all repairs necessary, at the project site, for the duration of the bypass installation. The Water Bureau shall be provided with a 24 hour emergency telephone number at which the Contractor may be reached, in case it is necessary to make any repairs.

#### **R916-3.05 Temporary Service Connection**

The Water Bureau shall be given a minimum of 10 working days advance notice of intent to do any work that will affect service to customers. All affected water service customers shall be notified by the Contractor 24 hours in advance of any service disruption. The customer's service line shall be shut off, and the bypass connected to the service line. After the water main and all water service pipes have been restored to normal conditions, service shall be restored to the customer, and the temporary connection disconnected.

## **R916-4 METHOD OF MEASUREMENT**

### **R916-4.01 Temporary Bypass Pipe**

The quantity to be measured for payment shall be the number of linear feet of temporary bypass pipe installed.

### **R916-4.02 Temporary Service Connections**

The quantity to be measured for payment shall be the number of temporary connections to customers' water services completed.

### **R916-4.03 Temporary Fire Hydrants**

The quantity to be measured for payment shall be the number of temporary fire hydrants installed.

## **R916-5 BASIS OF PAYMENT**

### **R916-5.01 Temporary Bypass Pipe**

The unit price bid shall include the cost of: furnishing and installing bypass pipe; making all connections to water sources; temporary surface restoration; burying bypass pipe where required; protection including but not limited to lights and barricades; 24 hour maintenance; disinfecting and flushing bypass pipe; pavement saw cutting; removal of the temporary bypass lines; all excavation, backfill, and surface restoration; and furnishing all labor, material and equipment necessary to complete the work.

### **R916-5.02 Temporary Service Connections**

The unit price bid shall include the cost of: furnishing and installing all material required to connect the bypass pipe to the customers' water system; including but not limited to hose pipe; shut off of the customers' service line; making the connection; removing the connection; temporary surface restoration; burying service connection pipe where required; lights and barricades; 24 hour maintenance; disinfecting and flushing service connection pipe; pavement saw cutting; all excavation, backfill, and surface restoration; and furnishing all labor, material and equipment necessary to complete the work.

### **R916-5.03 Temporary Fire Hydrants**

The unit price bid shall include the cost: of furnishing, installing, and removing temporary fire hydrants; connections; and furnishing all labor, material and equipment necessary to complete the work.

Payment will be made under:

<b>ITEM NO.</b>	<b>ITEM</b>	<b>PAY UNIT</b>
R916.01XX	X" Temporary Bypass Pipe	Linear Foot
R916.02	Temporary Service Connection - 2" and Smaller	Each
R916.03	Temporary Service Connection - Larger than 2"	Each
R916.04	Temporary Fire Hydrant	Each

## **SECTION R917 - HYDRANT**

### **R917-1 DESCRIPTION**

The work shall consist of the installation of new hydrants, and relocating, or removing existing hydrants, as shown on the plans and as directed by the Project Manager.

### **R917-2 MATERIALS**

#### **R917-2.01 Hydrants**

Hydrants shall conform to the requirements of ANSI/AWWA C502, City of Rochester approved. City of Rochester is standardized on the U.S. Pipe Metropolitan Fire Hydrant.

Hydrants shall be 5-1/4 inch, dry-barrel, breakable hydrants, for 5 foot 6 inch bury. Each hydrant shall have a 1-1/2 inch pentagon operating nut, two 2-1/2 inch National Standard hose connections, and one 4-1/2 inch National Standard pumper connection. Hydrants shall be open-left. Inlet connection shall be mechanical joint.

#### **R917-2.02 Extension Kits**

Extension kits shall be used for height adjustment of Metropolitan Fire Hydrants as manufactured by U.S. Pipe, or approved equivalent.

Extension kits are available in 6 inch increments with maximum of 24 inch allowed; and shall include rod and barrel units, plus nonbreakable rod and barrel couplings complete with gaskets and fasteners.

#### **R917-2.03 Hardware**

All hardware shall be made of cold formed, high strength, low-alloy steel (Cor-ten), ASTM A242.

#### **R917-2.04 Hydrant Marking Post**

Hydrant marking posts shall be painted, uniform flanged channel sections, 10 foot long standard sign posts at 3.0 pounds per foot and without holes. The exposed area (7 feet) shall be repainted with the paint used for the hydrant.

#### **R917-2.05 Paint**

Paint for hydrants shall be Brunning Silathane No. 1235, Yellow; Rustoleum No. 7443, John Deere Yellow; or approved equivalent.

#### **R917-2.06 Thrust Blocks and Plugs**

Thrust blocks and plugs shall conform to the requirements of Section R901.

Thrust blocks at hydrants shall be of the size used for 6" 90° bends.

#### **R917-2.07 Bedding, Backfill, and Surface Restoration**

Hydrant drain material shall be No. 2 crushed stone conforming to the requirements of NYSDOT Section 703-02.

Plastic barrier shall be 6 mil polyethylene.

Bedding, backfill, and surface restoration materials and methods of placement shall conform to the requirements of Section R901.

## **R917-3 CONSTRUCTION DETAILS**

### **R917-3.01 General**

All work shall be coordinated with the Water Bureau. The Water Bureau shall operate all valves and appurtenances needed to do the work. The Water Bureau shall be notified a minimum of 10 working days in advance of intent to do any work requiring the operation of valves and appurtenances; and a minimum of 2 working days advance notice when operation of valves and appurtenances is required for the actual work. All valves and appurtenances are to be operated only by authorized representatives of the Water Bureau.

The Water Bureau dispatcher shall be immediately notified by the Contractor when existing fire hydrants are put out of service. The dispatcher shall inform the Fire Department, and the out of service hydrants shall be red tagged. The dispatcher shall be notified when hydrants are placed back in service.

All removed hydrants shall remain the property of the Water Bureau and shall be delivered to the Water Bureau, 401 Dewey Avenue, Rochester, New York. A written receipt shall be obtained stating the number of castings returned and who received them, and a copy of the receipt shall be filed with the Project Manager.

### **R917-3.02 Installation**

Excavation shall be to a depth which will permit the connection of the hydrant to the branch pipe and provide a minimum of 4 feet 6 inches cover over the branch and valve. Excavation shall conform to the requirements of Section R206.

Excavation for the hydrant shall also be to a depth which will provide a clearance of 2 to 6 inches between the finished ground elevation and the bottom of the breakable flange coupling on the hydrant.

Adjustment for proper height of hydrants may be accomplished by the use of mechanical joint offsets or extension kits. Extension kits shall be installed according to the manufacturer's latest instructions and as approved by the Project Manager.

For new water main installations, hydrant branch main shall be ductile iron anchoring pipe. Hydrants shall be carefully placed in a vertically plumbed position on a solid concrete block support. For hydrants being replaced or relocated on existing hydrant branch, not made of anchoring pipe, solid concrete blocks shall be used for temporary thrust blocking to allow the hydrant to be immediately pressurized. Temporary thrust blocking shall be incorporated in poured concrete thrust blocks in accordance with detail drawings. If the existing branch main is anchoring pipe; extension of the branch main shall also be anchoring pipe. Proper alignment of the hydrant shall be maintained until completion of the project.

One cubic yard of crushed stone shall be placed from the bottom of the excavation at the base of the hydrant, to a point 12 inches above the weep holes. The stone shall be covered with a plastic polyethylene sheet barrier prior to backfilling. If ground water is encountered, the stone may be omitted and the weep holes plugged. The Water Bureau shall be notified in writing when weep holes are plugged.

All hydrants shall be brush painted with a paint approved by the Water Bureau. All scrapes shall be repainted on both new and relocated hydrants, and one overall coat of paint applied to each hydrant. Holly hydrants shall have the dome painted with white enamel paint.

All new hydrant installations shall be pressure tested and shall be made watertight. New hydrant installations shall be red tagged until they are put into active service. Red tags shall be supplied by and obtained from the Water Bureau, and installed on the hydrant.

Hydrant marker posts shall be installed with hydrants, only at the locations as indicated on the plans. Hydrant marker posts shall be set vertically plumbed in position. The selected position will be such as to minimize interference with pedestrian traffic, sidewalk snow plows, etc.

Upon completion of the work, the excavation shall be backfilled and the disturbed surface area restored.

#### **R917-3.03 New Hydrant**

The centerline of the hydrant shall be installed a minimum distance of 2 feet behind face of curb, 5 feet from driveway openings and 10 feet from poles, trees, and point of curvature on the curb radius at street intersections. A minimum distance of 6 feet shall be maintained between hydrants and hydrant branch valves. Hydrants shall be oriented with pumper nozzles at right angles to the curb, facing the pavement.

#### **R917-3.04 Relocate Existing Hydrant**

The existing hydrant and hydrant marking post shall be removed and reinstalled in a new location. Installation of the hydrant shall conform to the same installation requirements as for a new hydrant. On all hydrants to be relocated, the operating stem, main valve, valve seat, drain and drainage passages shall be cleaned and inspected. Hydrants shall be checked for proper operation after reassembly and prior to installation. The Project Manager shall be advised of any hydrants that may be unsuitable for relocation. The Project Manager will determine whether the existing hydrant should be replaced with a new hydrant. The existing hydrant marker post shall be disposed of. A new hydrant marker post shall be installed with the relocated hydrant, only at the locations as indicated on the plans.

#### **R917-3.05 Remove Existing Hydrant**

The existing hydrant, branch valve box and hydrant marking post shall be removed. The branch valve box shall remain only if the branch valve is to remain in use. The hydrant shall be returned to the Water Bureau, Materials and Equipment Building, No. 3, 401 Dewey Avenue, Rochester, New York. The existing valve box and hydrant marker post shall be disposed of.

The water main shall be exposed and the hydrant removed from the branch pipe. On abandoned water mains, the open end of the branch pipe shall be sealed with a 12 inch plug of concrete. On live water mains, the branch line shall be cut and plugged at the branch tee according to the requirements of Section R908; or the tee removed and replaced with a new section of pipe according to the requirements of Section R906.

#### **R917-3.06 Screw-In Type Replacement Hydrant**

The existing hydrant and barrel shall be unscrewed counterclockwise. The existing frost jacket shall remain in place. The existing hydrant shall not be removed by placing a bar through the nozzle openings. The nozzle cap is to remain attached to the nozzle at all times. The existing ground collar may be required to be removed prior to the installation of the new hydrant. The frost jacket shall be covered after the existing hydrant is removed to prevent any objects, debris or material from falling into the frost jacket and to protect the public.

Prior to the installation of the new screw-in hydrant, a barrel of the proper length (4 feet 6 inches, 5 feet, or 5 feet 6 inches) shall be selected such that the centerline of the break collar shall be no less than 2 inches and no more than 6 inches above the finished grade, after the hydrant installation is complete.

After the hydrant installation is complete the hydrant shall be checked for watertightness by opening the hydrant branch valve. Any leaks that are discovered shall be repaired.

### **R917-4 METHOD OF MEASUREMENT**

The quantity to be measured for payment shall be the number of hydrants installed, relocated, replaced, or removed.

### **R917-5 BASIS OF PAYMENT**

#### **R917-5.01 General-all Items**

The unit price bid shall include the cost of furnishing all labor, material and equipment necessary to complete the work.

Excavation, rock excavation, furnishing and placing of bedding and select granular backfill, and surface restoration will be paid for under separate bid items. No separate payment will be made for placement of select backfill excavated from the trench.

New branch pipe, branch valves and valve boxes will be paid for under Sections R901 and R902.

#### **R917-5.02 New Hydrant**

The unit price bid shall include the cost of: furnishing and installing the hydrant; mechanical joint offsets; concrete thrust blocks; crushed stone drain and plastic sheet barrier; plugging weep holes if required; painting the hydrant; pressure testing; and connecting branch pipe to the hydrant.

Extension kits used for adjusting height of a new hydrant shall be paid for under the pay item for extension kits.

#### **R917-5.03 New Hydrant and Screw-In Hydrant Replacement (Including Removal of Existing Hydrant)**

In addition to the requirements of Section R917-5.02, the unit price bid shall also include the cost of removing and delivering existing hydrants to the Water Bureau; and connecting new branch pipe to the existing branch pipe.

Extension kits used for adjusting height of a new hydrant shall be paid for under the pay item for extension kits.

This item applies only to existing hydrants that are replaced by a new hydrant on the same branch line.

#### **R917-5.04 Relocate Existing Hydrant**

The unit price bid shall include the cost of: removing, cleaning, inspecting, reinstalling and painting the hydrant; removing and disposing of existing hydrant marking post; furnishing and installing mechanical joint offsets; concrete thrust blocks; crushed stone drain and plastic sheet barrier; pressure testing; connecting branch pipe to the hydrant; and connecting new branch pipe to the existing branch pipe.

Extension kits used for adjusting height of the hydrant shall be paid for under the pay item for extension kits.

#### **R917-5.05 Remove Existing Hydrant**

The unit price bid shall include the cost of: disconnecting and delivering the hydrant to the Water Bureau; removing and disposing of existing branch valve box and hydrant marking post; and plugging with concrete the open end of hydrant branches that are to be abandoned.

Plugging branch tees, or removing tees and replacement with insertion sleeves on active water mains, shall be paid for under separate bid items.

The Remove Existing Hydrant item will only be paid when an existing hydrant is removed and a new hydrant is not set on the same branch line.

#### **R917-5.06 Hydrant Marking Post**

The unit price bid shall include the cost of: furnishing, installing, and painting hydrant marking posts; excavation, backfill and surface restoration; and furnishing all labor, material and equipment necessary to complete the work.

#### **R917-5.07 Extension Kit**

The unit price bid shall include the cost of: furnishing and installing the extension kit; and removing and reinstalling the existing hydrant where required.

Payment will be made under:

ITEM NO.	ITEM	PAY UNIT
R917.01	New Hydrant	Each
R917.02	New Hydrant (Including Removal of Existing Hydrant)	Each
R917.03	New Screw-In Type Replacement Hydrant (Including Removal of Existing Hydrant)	Each
R917.04	Relocate Existing Hydrant	Each
R917.05	Remove Existing Hydrant	Each
R917.06	Hydrant Marking Post	Each
R917.07	6" Hydrant Extension Kit	Each
R917.08	12" Hydrant Extension Kit	Each
R917.09	18" Hydrant Extension Kit	Each
R917.10	24" Hydrant Extension Kit	Each

# MONROE COUNTY PURE WATERS STANDARD SPECIFICATIONS

## SPECIFICATION LISTING

### GENERAL

The following Monroe County Pure Waters Standard items are acceptable for use as City of Rochester Standard Specifications. The work shall conform to the requirements of the appropriate Monroe County Pure Waters Specification for these items:

ITEM NO.	ITEM	PAY UNIT
C203.0751	Select Granular Fill Over Pipes	CY
C203.0951	Crushed Stone	CY
C206.0501	Trench Excavation	CY
C206.0502	Trench Excavation - Solid Rock Blasting Method	CY
C206.0503	Trench Excavation - Solid Rock Mechanical Method	CY
C206.0504	Test Pit Excavation	CY
C206.0601	Abandon Existing Sewer	CY
C552.0101	Permanent Timber Sheet Piling	SF
C552.0301	Temporary Timber Sheet Piling	SF
C552.0501	Safe Operation Sheet Piling	SF
C555.010301	Concrete Cradle or Encasement	CY
C603.0412XX	Vitrified Clay Pipe, Extra Strength, XX" Diameter	LF
C603.6003XX	Reinforced Concrete Pipe, Class III, Steel Ring Joints, XX" Diameter	LF
C603.6004XX	Reinforced Concrete Pipe, Class III, Rubber Gasket Joints, XX" Diameter	LF
C603.6103XX	Reinforced Concrete Pipe, Class IV, Steel Ring Joints, XX" Diameter	LF
C603.6104XX	Reinforced Concrete Pipe, Class IV, Rubber Gasket Joints, XX" Diameter	LF
C603.6203XX	Reinforced Concrete Pipe, Class V, Steel Ring Joints, XX" Diameter	LF
C603.6204XX	Reinforced Concrete Pipe, Class V, Rubber Gasket Joints, XX" Diameter	LF
C603.945101	Cast Iron Soil Pipe Lateral, Extra Heavy, 4" Diameter to 6" Diameter	LF
C603.9451XX	Cast Iron Soil Pipe Lateral, Extra Heavy, XX" Diameter	LF
C603.945201	Cast Iron Soil Pipe Lateral Riser, Extra Heavy, 4" Diameter to 6" Diameter	LF
C603.9452XX	Cast Iron Soil Pipe Lateral Riser, Extra Heavy, XX" Diameter	LF
C603.9581XX	Ductile Iron Pipe, Class 52, XX" Diameter	LF
C603.9908XX	Polyvinyl Chloride Pipe, SDR 35, XX" Diameter	LF
C603.9909XX	Polyvinyl Chloride Pipe, SDR 26, XX" Diameter	LF
C603.9910XX	Polyvinyl Chloride Pipe, SDR 21, XX" Diameter	LF

ITEM NO.	ITEM	PAY UNIT
C603.992101	Polyvinyl Chloride Pipe Lateral, SDR 21, 4" Diameter to 6" Diameter	LF
C603.9921XX	Polyvinyl Chloride Pipe Lateral, SDR 21, XX" Diameter	LF
C603.992201	Polyvinyl Chloride Pipe Lateral Riser, SDR 21, 4" Diameter to 6" Diameter	LF
C603.9922XX	Polyvinyl Chloride Pipe Lateral Riser, SDR 21, XX" Diameter	LF
C604.044801	Manhole, 4' Diameter, Precast Base, up to 6.0' Deep	EA
C604.044802	Manhole, 4' Diameter, Cast-in-Place Base, up to 6.0' Deep	EA
C604.044803	Additional Depth of 4' Diameter Manhole	LF
C604.046001	Manhole, 5' Diameter, Precast Base, up to 6.0' Deep	EA
C604.046002	Manhole, 5' Diameter, Cast-in-Place Base, up to 6.9' Deep	EA
C604.046003	Additional Depth of 5' Diameter Manhole	LF
C604.0499XX	Junction Chamber No. X	LS
C604.076001	Connect Existing 4" to 6" Lateral to New Sewer	EA
C604.0760XX	Connect Existing XX" Lateral To New Sewer	EA
C604.076103	Connect New 4" to 6" Lateral to Existing or New Sewer	EA
C604.0761XX	Connect New XX" Lateral to Existing or New Sewer	EA
C604.0762XX	Connect New XX" Sewer to Existing Manhole	EA
C604.0763XX	Connect New XX" Sewer to Existing Stone Box Sewer	EA
C604.0764XX	Connect New XX" Sewer to Existing Sewer with Concrete Collar	EA
C604.0765XX	Connect New XX" Sewer to Existing Sewer with Elastomeric Sleeve	EA
C604.0766XX	Connect New Manhole to Existing XX" Sewer	EA
C604.0767XX	Connect New Receiving Basin to Existing Lateral	EA
C604.0768XX	Connect New Manhole to Existing or New XX" Sewer with Outside Drop Connection	EA
C604.0769XX	Connect Existing Manhole to Existing or New XX" Sewer with Outside Drop Connection	EA

# **GENERAL PROVISIONS FOR MONROE COUNTY PURE WATERS SPECIFICATIONS**

## **1. GENERAL**

In general, Sections 200 through 700 of the New York State Department of Transportation (NYSDOT) Specifications of January 2, 1990, and all addenda in effect on the date of advertising for bid shall apply, except where modified in these specifications. In addition, any subsections in NYSDOT Section 100 which are included as part of the requirements in NYSDOT Sections 200 through 700 shall apply. Where reference is made to New York State, State Department of Transportation, Commissioner, et cetera, the appropriate City of Rochester department or official shall be substituted.

## **2. SCOPE OF WORK**

The work to be done in accordance with these specifications consists of furnishing of plant, equipment, superintendence, labor, skill, material, and all other items necessary for the construction and/or replacement of sewers and appurtenances in the Rochester Pure Waters District, Monroe County, New York. The Contractor shall perform all work required for such construction including the furnishing of all engineering necessary for the layout and construction of the work, in accordance with the drawings and specifications and subject to the terms and conditions of the Contract, complete and ready for use.

## **3. CONTRACT DRAWINGS**

The work shall be in accordance with the contract drawings listed on page A-4 of the Agreement.

## **4. TESTING AND CHECKING**

A. Laboratory testing and checking required by the specifications shall be provided and paid for by the Contractor except when testing is specified to be done by the Owner or Engineer. Such tests include but are not necessarily limited to the following:

1. Laboratory Maximum Density Tests. The Contractor shall furnish all necessary samples for laboratory tests and shall provide assistance and cooperation during field tests. The Contractor shall plan his operations to allow adequate time for laboratory tests and to permit taking of field density tests during compaction.

2. Concrete Design, Mix Tests and Field Test Cylinder

- a) Strength. Concrete for manholes, junction chambers and receiving basins shall be Class A with Type II cement proportioned and mixed for a twenty-eight (28) day compressive strength of 4,000 psi when tested in accordance with ASTM, Standard C31 and C39.

- b) Design Mix. All costs in connection with developing concrete mix designs conforming to specification requirements, and for testing materials and mixes for conformance with the specifications prior to use, shall be borne by the Contractor. This work shall be performed by a testing laboratory approved by the Engineer. Except as otherwise specified, design of the mix shall be in accordance with ACI 211.1. At least thirty-five (35) days before the concrete is required, the Contractor shall submit to the Engineer for approval, complete information on the concrete design mix proposed for use. The information shall include, but is not limited to the following:

Proposed design mix and results of strength tests. If a previously established design mix is proposed, copies of recent test results made (within the past six (6) months) by a recognized testing laboratory on a mix identical with that proposed for use, shall be submitted.

Source of aggregates and cement proposed for use.

Adjustments to Mix. If the mix adopted fails to produce concrete meeting the requirements for strength and placability, the Engineer, at his discretion, may order additional cement or adjustment of mix proportions. Any additional costs involved shall be borne by the Contractor.

d) Field Test Cylinders. During the progress of the work, unless otherwise waived by the Engineer, a set of five (5) six (6) inch by twelve (12) inch cylinders shall be taken for each 50 cubic yards of concrete placed or fraction thereof with at least one set taken for each day's placement of concrete. For each set of test cylinders, two cylinders will be tested at 7 days, two at 28 days, and if the 28 day cylinders are unsatisfactory, the remaining cylinder will be tested at 40 days. Making and curing of cylinders shall be in accordance with ASTM Standard C31.

All sampling and testing shall be in accordance with applicable ASTM Standards, except that sampling of fresh concrete shall be taken from the middle two-thirds of the batch.

B. The Owner shall be responsible for field compaction density tests. Where test results indicate insufficient compaction and additional compaction is required, the Contractor shall be responsible for all field compaction density retesting, until sufficient compaction is achieved.

## **5. FINAL LOCATION OF SEWER**

A. The Owner reserves the right to alter the location of the sewer as shown on the drawings, by Addendum during the bidding period, or by Change Order after the receipt of bids, as may be required by procurement of easements, procurement of additional sub-surface information, or as may be required by the NYSDOT, or other considerations.

B. If any changes are made by Change Order, payment for unit price items will be made in accordance with unit prices as bid for the actual work installed. Any change required in payment for lump sum items will be negotiated as per GENERAL CONDITIONS, prior to start of work.

## **6. DUST CONTROL**

The Contractor shall take all necessary measures to control dust resulting from his operations and to prevent spillage of excavated material on public roads. When directed by the Engineer, the Contractor shall sprinkle water where directed and in such quantities and at such frequencies as may be required to control such dust and prevent it from becoming a nuisance to the surrounding area, at no additional cost to the Owner. All roads must be maintained dust free at all times. Daily cleaning will be required.

## **7. EXISTING UTILITIES AND STRUCTURES**

A. Definition. The term "existing utilities" shall be deemed to refer to both publicly and privately owned utilities such as storm drains, sanitary sewers, water lines, steam, gas, electrical and telephone services and appurtenances.

B. Locations. Where existing utilities and structures are indicated on the drawings it shall be understood that all of the existing utilities and structures affecting the work may not be shown, and that the locations of those shown are approximate only. It shall be the responsibility of the Contractor to ascertain the actual extent and exact location of existing utilities and structures. In every instance the Contractor shall notify the proper authority having jurisdiction and obtain all necessary directions and approvals before performing any work in the vicinity of existing utilities.

C. Prevention of Disruption and Damage. The work shall be carried out in a manner to prevent disruption of existing services and to avoid damage to the existing utilities. Any damage resulting from the work shall be promptly repaired by the Contractor at his own expense in a manner approved by the Engineer and further subject to the requirements of any authority having jurisdiction. Where it is required by the authority having jurisdiction that they perform their own repairs or have them done by others, the Contractor shall be responsible for all cost thereof.

D. Support and Protection. Where excavations by the Contractor require any utility lines or appurtenant structures to be temporarily supported and otherwise protected during the construction work, such support and protection shall be provided by the Contractor. All such work shall be performed in a manner satisfactory to the Engineer and the respective authority having jurisdiction over such work. In the event the Contractor fails to provide proper support or protection to any existing utility, the Engineer may at his discretion, have the respective authority provide such support or protection as may be necessary to insure the safety of such utility, and the costs of such measures shall be paid by the Contractor.

## **8. ACCESS ROADS**

A. The Contractor shall construct and maintain such temporary access roads as he may need to install the work. Access roads shall be located within the easement lines obtained by the Owner unless the Contractor independently secures additional easements for his use and convenience. Additional easements must be approved by the Owner.

B. At the completion of the work, the surface of land used for access roads within the boundaries of Owner-obtained easements shall be restored as hereinafter specified.

## **9. WORK ON PRIVATE PROPERTIES AND IN PUBLIC STREETS**

A. Work Areas and Easements. The Contractor shall restrict his operations to the areas within permanent and temporary easements if such easements have been obtained by the Owner, and to areas within existing street rights of way.

B. Temporary Easements Obtained by Contractor. Temporary easements required by the Contractor for additional work areas shall be obtained and paid for by him.

All temporary easements obtained by the Contractor shall contain a provision holding the Rochester Pure Waters District, Monroe County, and the City of Rochester harmless to any and all claims thereto related. The agreement shall bear the signature of the Owner of the land. Copies of all temporary easements shall be supplied to the Engineer prior to utilization of the temporary easements.

### **C. Temporary Fencing**

1. Prior to start of work, the Contractor shall have his job surveyor locate the temporary and permanent easement lines. A continuous snow type fence shall be installed and maintained in place along these lines during construction operations until this area has been restored to its original condition. The fence shall be in place five (5) days in advance of work in any area. No construction activity, access, storage or other use shall take place outside of the fencing.

2. Snow type fencing for individual tree protection during the construction shall be installed and maintained by the Contractor as required or ordered by the Engineer.

D. County and City Roads. The Contractor will be responsible for obtaining all necessary county and city road work permits as required by the agency having jurisdiction. Certain roads and highways are posted by municipal agencies at various times during the year for weight limits. The Contractor is advised to identify these roads and highways which he plans to use as access to the sites of his operations and to schedule his operations accordingly. In some cases, special bonds or indentations to the municipal agencies by the Contractor may be required in order for the Contractor to obtain permission to use these roads and highways when they are posted.

## SELECT GRANULAR FILL OVER PIPES

### GENERAL

The provisions of NYSDOT Section 203 shall apply with the following modifications:

### MATERIALS

The material shall conform with NYSDOT Subsection 203-2.02C except that the gradation shall be as follows:

<u>Sieve Size Designation</u>	<u>Percent Passing By Weight</u>
2 inch	100
1/4 inch	30 - 65
No. 40	5 - 40
No. 200	0 - 10

### METHOD OF MEASUREMENT

The quantity of select granular fill over pipes to be paid for shall be in cubic yards computed in the final compacted position. The quantity shall be obtained by multiplying the net cross sectional area within the payment limits shown on the plans by the actual length installed and accepted.

Payment will be made under:

ITEM NO.	ITEM	PAY UNIT
C203.0751	Select Granular Fill Over Pipes	Cubic Yard

# **CRUSHED STONE**

## **GENERAL**

The provisions of NYSDOT Section 203 shall apply with the following modifications:

## **DESCRIPTION**

This work shall consist of furnishing, placing and compacting crushed stone as shown on the plans or directed by the Engineer.

## **MATERIALS**

The materials shall meet the requirements of NYSDOT Subsection 703-02, Material Designation 703-0201, and shall be furnished in the sizes or combination of sizes indicated on the plans or ordered by the Engineer.

## **CONSTRUCTION DETAILS**

The construction details of NYSDOT Subsection 203-3 shall apply except for the following modifications:

When crushed stone is used for pipe bedding it shall be placed, compacted and shaped to fit the lower half of the pipe to the dimensions shown on the plans. Crushed stone shall be deposited in horizontal layers not exceeding 6 inches in thickness prior to compaction.

## **METHOD OF MEASUREMENT**

The method of measurement of NYSDOT Subsection 203-4 shall apply except for the following modifications:

The quantity of crushed stone to be paid for shall be the number of cubic yards computed in the final compacted position within the payment lines shown on the plans or as ordered by the Engineer.

Payment will be made under:

<b>ITEM NO.</b>	<b>ITEM</b>	<b>PAY UNIT</b>
C203.0951	Crushed Stone	Cubic Yard

# **TRENCH EXCAVATION**

## **DESCRIPTION**

The description of NYSDOT Subsection 206-1 shall apply.

## **MATERIALS**

### **1. Trench Excavation:**

Shall include all earth, unstable and unsuitable material, loose rock, all pavement courses, all types of sewers, debris and all other materials except solid rock.

### **2. Trench Excavation - Solid Rock:**

Shall include all pieces of ledge or bed rock, boulders or masonry larger than one (1) cubic yard in volume that requires drilling and/or blasting for removal.

### **3. Test Pit Excavation:**

Shall be as specified for "Trench Excavation".

## **CONSTRUCTION DETAILS**

The construction details of NYSDOT Subsection 206-3 shall apply with the following modifications:

1. The length of trench to be opened at one time shall be kept within reasonable limits, and unless otherwise permitted or directed by the Engineer, shall not be longer than 1 structure-to-structure run or one hundred feet, whichever is less. Lateral trenches shall not be open on both sides of the street at the same time, unless approved by the Engineer.

2. The Contractor shall be responsible for the adequate shoring and/or bracing of any existing utilities encountered during the excavation. Such utilities shall be braced or shored in a manner acceptable to the local jurisdictional agency having authority over the utility encountered. It shall be the responsibility of the Contractor to prevent damage to or displacement of utilities, and to work with and request the concurrence of the utility company's representative in this matter. No separate payment will be made for shoring and/or bracing for utility lines.

### **3. Rock Removal, Blasting Method:**

A. The Contractor shall make his own independent investigations and assessment of the quantity of rock to be removed and the difficulties and hazards attendant thereto. The Owner and the Engineer reserve the right to require removal of rock by line drilling and wedging if the Contractor performs blasting operations in violation of specification performance requirements.

B. Blasting shall be done only by qualified personnel. Charges shall be of such power, spacing and timing that the blasts will not make the excavation unduly large, shatter adjoining rock, damage or endanger adjacent utilities or other structures. Each blast shall be covered with heavy timber or steel mats. Existing utility lines and other structures exposed during construction shall be adequately protected from damage. The Contractor shall be fully liable for all damage or nuisance caused by the blasting operations, and shall promptly repair all damage at his own expense.

C. Explosives shall be stored, transported, handled, and used as provided in the Labor Law of the State of New York and in the Industrial Code Rules promulgated thereunder by the Board of Standards and Appeals of the New York State Department of Labor relating to the types of work to be performed under this Contract, and the New York State Fire Prevention Code as adopted by the local municipality.

D. Explosives shall be stored in magazines suitable to the local Fire Department. Storage of explosives at individual work sites is not allowed except for that amount of explosives required for a day's work and where the Contractor has demonstrated that such storage shall be in conformity with local and State requirements, as well as requirements of the local Fire Department. Any explosives not used in the day's work shall be removed from the individual work sites overnight and returned to the supplier. In no case shall the Contractor store explosives at unattended sites.

E. The Contractor shall be solely responsible for the consequences of his drilling and blasting operations. He shall conduct such operations in a manner so as not to endanger life or property. The Contractor shall drill holes in locations and place charges of the type and quantity which when detonated shall not cause excavations which are unduly large. All rock disturbed beyond the pay limits shall be removed and the area between the rock and the wall filled with lean or structural concrete, as determined by the Engineer.

F. The Contractor shall give notice of his intention to detonate charges at least 24 hours in advance of the detonation to the Engineer, local municipalities, local Fire Departments, local Police Departments, and owners of all utilities within 200 feet of the work site. The Contractor shall signal his intention to detonate charges with the use of a whistle or siren clearly audible from a distance of 700 feet from the point of detonation. Signals shall be given both five (5) minutes and one (1) minute prior to detonation. An all clear signal shall also be given.

G. All blasting complaints shall be reported to the Engineer within 24 hours of receipt thereof. Such reports shall include the name, address, date, time received, date and time of blast complained about, and a brief description of the alleged damages or other circumstances upon which the complaint is predicated. Each complaint shall be assigned a separate number, and all complaints shall be numbered consecutively in the order of receipt. In the event more than one complaint is received from the same complainant, such later complaint shall show all previous complaint numbers registered by the same complainant. In addition, each month a summary report shall be made to the Engineer which shall indicate the date, time and name of person investigating the complaint, and the amount of damages claimed (or estimate thereof) including the amount of settlement, if any. When settlement of a claim is made, the Engineer shall be furnished with a copy of the release of claim by the claimant. The Engineer shall be notified immediately, throughout the statutory period of liability, of any formal claims or demands made by attorneys on behalf of claimants of the serving of any notice, summons, subpoena, or other legal documents incidental to litigation; and of any out-of-court-settlement or court verdicts resulting from litigation. The Engineer shall immediately be notified of any investigations, hearings or orders received from any Governmental agency, board or body claiming to have authority to regulate blasting operations.

4. Rock Removal, Mechanical Method. The provisions of "Rock Removal, Blasting Method" shall apply except that no blasting will be allowed.

5. Test pits may be ordered by the Engineer or Owner at any time after the "Notice to Proceed" and for the duration of the contract. Backfill materials and compaction shall conform with the requirements that a trench excavation would have in that area.

## **METHOD OF MEASUREMENT**

### **1. General.**

The quantity of excavation shall be the number of cubic yards of material measured in its original position within the payment limits shown on the plans or indicated in this item. The quantity for "Trench Excavation" shall include the hollow space inside of existing sewers and manholes designated to be removed. No payment will be made beyond these limits unless the Engineer specifically states in writing prior to the performance of the work that payment will be made to other reference limits.

## **2. Trench Excavation.**

The bottom payment limit shall be the designed bottom of the excavation or the original rock surface, whichever is higher. The top payment limit shall be the existing surface prior to commencing work on the contract. Side payment limits shall be vertical and located as follows:

A. Pipes. Limits shall be as shown on plans and parallel to each side of pipe barrels.

B. Structures. Limits shall be eighteen (18) inches beyond and parallel to outside of footings.

## **3. Trench Excavation - Solid Rock.**

The bottom payment limit shall be the designed bottom of the excavation. The top payment limit shall be the original rock surface. Side payment limits shall be the same as for number 2.

## **4. Test Pit Excavation.**

The top payment limit shall be the existing surface. The bottom payment limit shall be the bottom of excavation ordered by the Engineer. Side payment limits shall be vertical and spaced four feet by eight feet.

## **BASIS OF PAYMENT**

The unit price bid for this work shall include the cost of all labor, equipment and materials necessary to complete the work, including the costs of guarding and protection of trenches, incidental shoring and bracing for utility line supports, disposal of excavated material, and keeping the site free from earth, water, ice and snow during construction. The cost of backfill, sheeting and surface restoration will be paid for under their appropriate items.

The cost of saw cutting pavement with approved power saws along neat lines which are indicated by payment limits shown on the plans shall be included in the bid prices for Trench Excavation and/or Test Pit Excavation.

Payment will be made under:

ITEM NO.	ITEM	PAY UNIT
C206.0501	Trench Excavation	Cubic Yard
C206.0502	Trench Excavation - Solid Rock Blasting Method	Cubic Yard
C206.0503	Trench Excavation - Solid Rock Mechanical Method	Cubic Yard
C206.0504	Test Pit Excavation	Cubic Yard

# **ABANDON EXISTING SEWER**

## **DESCRIPTION**

This work shall consist of furnishing and placing a controlled density fill in existing sewers to be abandoned as shown on the plans or ordered by the Engineer.

## **MATERIALS**

Controlled density fill shall be K-Krete or approved equal and it shall have a 28 day compressive strength of 50 to 100 p.s.i. Brick shall be first quality, sound hard-burned common brick conforming to ASTM C32 sewer brick, grade SS. Mortar shall conform to the provisions of NYSDOT Subsection 705-21.

## **CONSTRUCTION DETAILS**

Filling shall be accomplished by a pumping method through existing manholes and ends of the existing sewers. Pumping shall be per supplier's specifications.

Open ends of the abandoned sewer shall be plugged with brick masonry.

Manholes in the abandoned portion of the sewer shall be excavated to within 3'-0" of existing ground surface. K-Krete or approved equal, shall be pumped into the sewer and manhole to the top of the sewer and to within 3'-0" of existing ground surface surrounding the manhole. Backfilling at the manhole to existing grade shall be accomplished by using Select Granular Fill.

## **METHOD OF MEASUREMENT**

The quantity of controlled density fill shall be the number of cubic yards actually used to fill abandoned sewers and manholes as shown on the plans and/or as directed by the Engineer.

## **BASIS OF PAYMENT**

The unit price bid for this work shall include the cost of all labor, equipment and materials necessary to complete the work, including the cost of brick masonry. The cost of excavation, backfill and surface restoration will be paid for under their appropriate items.

Payment will be made under:

<b>ITEM NO.</b>	<b>ITEM</b>	<b>PAY UNIT</b>
C206.0601	Abandon Existing Sewer	Cubic Yard

## **SHEET PILING**

### **GENERAL**

The provisions of NYSDOT Section 552 shall apply with the following modifications:

### **MATERIALS**

The section modules of the piling for Temporary Timber Sheet Piling will not be shown on the plans.

### **CONSTRUCTION DETAILS**

Sheet piling installed for permanent or temporary timber sheet piling shall be tight sheeting driven against firm undisturbed earth.

### **METHOD OF MEASUREMENT**

The upper payment line shall be the existing surface prior to commencing work on the contract. The lower payment line shall be the designed bottom of excavation or the original rock surface, whichever is higher. The horizontal length of Safe Operation Sheet Piling shall be as authorized by the Engineer, but no payment lines will be shown on the contract plans. The quantity of sheet piling to be paid for shall be measured in square feet.

Payment will be made under:

<b>ITEM NO.</b>	<b>ITEM</b>	<b>PAY UNIT</b>
C552.0101	Permanent Timber Sheet Piling	Square Foot
C552.0301	Temporary Timber Sheet Piling	Square Foot
C552.0501	Safe Operation Sheet Piling	Square Foot

## CONCRETE CRADLE OR ENCASEMENT

### GENERAL

The provisions of NYSDOT Section 555 shall apply with the following modifications:

### DESCRIPTION

This work shall consist of furnishing and placing Portland Cement Concrete, Class A, for sewer cradle or encasement as indicated with the plans and in accordance with the specifications.

### METHOD OF MEASUREMENT

The quantity to be paid for under this work shall be the number of cubic yards obtained by multiplying the net cross sectional area shown on the plans by the actual length installed and accepted.

Payment will be made under:

ITEM NO.	ITEM	PAY UNIT
C555.010301	Concrete Cradle or Encasement	Cubic Yard

# SEWER PIPE

## DESCRIPTION

This work shall consist of the construction or reconstruction of combined, sanitary and storm sewers in accordance with these specifications and as shown on the plans.

## MATERIALS

### 1. Vitrified Clay Pipe:

Vitrified Clay Pipe and Fittings shall be non-glazed, extra strength and shall conform, to ASTM C700. Pipe and fittings shall be furnished with factory applied compression joint material conforming to the requirements of ASTM C425.

### 2. Polyvinyl Chloride Pipe:

Polyvinyl Chloride Pipe and Fitting shall have bell and spigot joints with flexible elastomeric gaskets. SDR 35 pipe and fittings shall conform to ASTM D3034 type PSM or ASTM F679 with joints conforming to ASTM D3212 and F477. SDR 26 and 21 pipe and fittings shall conform to ASTM D2241, with joints conforming to ASTM D3139 and F477.

### 3. Reinforced, Concrete Pipe with Steel Ring Joints or Rubber Gasket Joints:

Reinforced Concrete Pipe and Fittings shall conform to ASTM C76. Pipe and fittings for steel joint pipe shall be furnished with joints formed by steel joint rings and round rubber gaskets, all in conformance with AWWA C301 or C302. Pipe and fittings for rubber gasket joints shall be furnished with round rubber gaskets conforming to ASTM C443. Reinforced concrete pipe and fittings shall be Wall B, and of the size and class as shown on the plans and/or as directed by the Engineer. Elliptical reinforcement in circular pipe of any size will not be permitted.

### 4. Ductile Iron Pipe:

Ductile iron pipe shall conform to AWWA C115 and/or AWWA C151. Fittings shall conform, to AWWA C110. Joints shall conform to AWWA C111 and/or AWWA C115. Outside and inside coatings shall be asphaltic material with a minimum thickness of 1 mil that conforms to all appropriate requirements for seal coat in AWWA C104. The class of pipe, rating of fittings and type of joint shall be as shown on the plans.

## CONSTRUCTION DETAILS

### 1. General:

A. The manufacturer shall prepare and submit to the Engineer and Contractor a requisite number of approved brochures containing complete information and instructions pertaining to the storage handling, installation and inspection of pipe, fittings, and joints furnished.

B. The manufacturer shall furnish the services of a competent field representative at the start-up of installation of each type of pipe to instruct the Contractor and Engineer with installation and inspection procedures. Prior to the installation of the first section of each type of pipe the Representative, Engineer and Contractor shall inspect the first shipment of pipe as specified hereinafter, and shall check dimensional tolerances. The Representative shall make periodic scheduled visits to the project as the work progresses and shall be present at required infiltration and exfiltration tests.

C. The manufacturer shall furnish the Engineer with required feeler gauges and other equipment that may be required for recommended and approved inspection procedures.

## **2. Vitrified Clay Pipe:**

- A. The manufacturer shall test and furnish test certificates covering all pipe supplied under the contract conforming to the test requirements as specified in ASTM C700 and C301. Test samples shall be selected from the run of pipe proposed to be furnished to the project. Unless the Engineer elects to witness such testing, the manufacturer shall select the samples for testing. The Contractor shall advise the Engineer at least two weeks in advance of the time and location of the testing.
- B. Each length of pipe delivered to the job shall be inspected by the Contractor in the presence of the Engineer for dimensional tolerances and for items listed in ASTM C700. Joint tolerances shall be as specified in ASTM C700 and C425. The Contractor shall provide the Engineer with suitable templates or caliper for checking pipe dimensions. Only lengths of pipe accepted by the Engineer and so marked may be installed in the work.
- C. Laying lengths except for closures and specials shall be a minimum of four (4) feet.
- D. Pipe cutting will not be permitted for the main sewer, except for vitrified clay pipe stubs at manholes. The cutting of the pipe shall be done in accordance with the pipe manufacturer's recommendations and subject to the approval of the Engineer. In general, the cutting of the pipe shall be as follows: the pipe material shall be cut by using a saw or milling process, approved by the pipe manufacturer and not by using any impact device, such as a hammer and chisel, to break the pipe. The pipe shall be cut, not broken. The cut end of the pipe shall be square to the axis of the pipe and any rough edges ground smooth.
- E. All joints shall be installed, made up and inspected in accordance with approved printed instructions of the manufacturer.

## **3. Polyvinyl Chloride Pipe:**

- A. The manufacturer shall test and furnish test certificates covering all pipe supplied under the contract conforming to the test requirements as specified in ASTM D2241, D3034 or F679. Test samples shall be selected from the run of pipe proposed to be furnished to the project. Unless the Engineer elects to witness such testing, the manufacturer shall select the samples for testing. The Contractor shall advise the Engineer at least two (2) weeks in advance of the time and location of the testing.
- B. Each length of pipe delivered to the job shall be inspected by the Contractor in the presence of the Engineer for dimensional tolerances and for items listed in ASTM D2241, D3034 or F679. Joint tolerances shall be as specified in ASTM F477 and D3212 or D3139. The Contractor shall provide the Engineer with suitable templates or caliper for checking pipe dimensions. Only lengths of pipe accepted by the Engineer and so marked shall be installed in the work.
- C. Laying lengths except for closures and specials shall be a minimum of ten (10) feet.
- D. Pipe cutting will not be permitted for the main sewer, except for polyvinyl chloride pipe stubs at manholes. The cutting of the pipe shall be done in accordance with the pipe manufacturer's recommendations and subject to the approval of the Engineer. The pipe lateral shall be cut by using approved power saws. The cut end of the pipe shall be square to the axis of the pipe and any rough edges ground smooth. All cut ends shall be beveled.
- E. All joints shall be installed, made up and inspected in accordance with approved printed instructions of the manufacturer.

## **4. Reinforced Concrete Pipe with Steel Ring Joints or Rubber Gasket Joints:**

- A. If steel ring joints are specified, each length of pipe shall be provided with bell and spigot ends and joints formed by steel joint rings and rubber gaskets circular in cross section, all in conformance with AWWA

C301 or C302. At the spigot end of the pipe the following reinforcing steel shall be welded to the steel joint ring:

- Up to 30 inches in diameter - 6 @ #3 x 15" long
- 33 inches in diameter to 42 inches in diameter - 8 @ #3 x 15" long
- 48 inches in diameter to 60 inches in diameter - 12 @ #3 x 15" long
- 66 inches in diameter to 78 inches in diameter - 15 @ #3 x 15" long
- 84 inches in diameter to 96 inches in diameter - 18 @ #3 x 15" long

All exposed surfaces of both rings shall be protected by a corrosion resistant coating of zinc, a minimum, of .002" thick applied by an approved cleaning and metallizing process.

All joints shall be installed, made up and inspected in accordance with approved printed instructions of the manufacturer except that all joints both inside and out shall be filled with Mainstay, Sikaflex 1-A, Sonolastic NP II by Sonneborn, or approved equal.

B. If rubber gasket joints are specified, each length of pipe shall be provided with bell and spigot ends and round rubber gasket joints conforming to the requirements of ASTM C443. All joints shall be installed, made up and inspected in accordance with approved printed instructions of the manufacturer except that the outside of all joints shall be filled with Pioneer 301 thermosetting joint compound manufactured by the Daubert Chemical Company, or approved equal.

C. The manufacturer shall test and furnish test certificates covering all pipe supplied under this contract conforming to the test requirements as specified in ASTM C76 and C497. Test samples shall be selected from the run of pipe proposed to be furnished to the project. Unless the Engineer elects to witness such testing, the manufacturer shall select the samples for testing. The Contractor shall advise the Engineer at least two (2) weeks in advance of the time and location of the testing.

D. Each length of pipe delivered to the job shall be inspected by the Contractor in the presence of the Engineer for dimensional tolerances and for items listed in ASTM C76. Joint tolerances for steel ring joints shall be as specified in ASTM C76 and AWWA C301 or C302. Joint tolerances for rubber gasket joints shall be as specified in ASTM C76 and C443. The Contractor shall provide the Engineer with suitable templates or caliper for checking pipe dimensions. Only lengths of pipe accepted by the Engineer and so marked shall be installed in the work.

E. Laying lengths except for closures and specials shall be a minimum of five (5) feet.

F. Pipe cutting will not be permitted.

## **5. Ductile Iron Pipe:**

A. All joints shall be installed, made up and inspected in accordance with approved printed instructions of the manufacturer.

B. The manufacturer shall test and furnish test certificates covering all pipe supplied under this contract conforming to the test requirements as specified in AWWA C110, C111, C115, and C151. Test samples shall be selected from the run of pipe proposed to be furnished for the project. Unless the Engineer elects to witness such testing, the manufacturer shall select the samples for testing. The Contractor shall advise the Engineer at least two (2) weeks in advance of the time and location of the testing.

C. Each length of pipe delivered to the job shall be inspected by the Contractor in the presence of the Engineer for dimensional tolerances and for items listed in AWWA C115 and C151. Joint tolerances shall be as specified in AWWA C111 or C115. The Contractor shall provide the Engineer with suitable templates

or caliper for checking pipe dimensions. Only lengths of pipe accepted by the Engineer and so marked may be installed in the work.

D. Ductile iron pipe shall be cut by approved power saws which will produce a clean, true cut, free from irregularities and a smooth end at right angles to the axis of the pipe. All cut ends shall be beveled. No other method of pipe cutting will be accepted.

## **6. Pipe Laying:**

A. All pipes and fittings shall be handled carefully in loading and unloading. They shall be lifted by hoists and lowered on skidways in such a manner as to avoid shock. Derricks, ropes or other suitable equipment shall be used for lowering the pipe into the trench. Pipe and fittings shall not be dropped or dumped.

B. Each pipe and fittings shall be inspected before it is lowered into the trench. The interior of the pipe and all joint surfaces shall be thoroughly cleaned and shall thereafter be maintained clean. Care shall be taken in applying soap to facilitate joining of pipe sections. Soap shall be used sparingly. All pipe shall be laid true to line and grade with bells upstream and shall have a full, firm, even bearing. No length of pipe shall be laid until the previous length has had sufficient backfill material placed and compacted about it to secure it firmly in place to prevent any disturbance. The open ends of pipe shall be securely plugged whenever pipe laying is not in progress. Under no conditions shall pipe be laid in water, and no pipe shall be laid when trench conditions or weather are unsuitable for such work.

C. Pipe laying shall begin at a manhole or other appurtenance unless approved otherwise by the Engineer. Sufficient short lengths of pipe shall be furnished so that pipe entering and leaving manholes shall be as shown on the plans. Also, when laying vitrified clay or polyvinyl chloride pipe, a sufficient number of short lengths of pipe shall be furnished, in order that wyes may be properly placed in the main sewer line for proper alignment of the connection of the existing lateral to the wye.

D. Pipe and fittings shall be selected so that there will be as small a deviation as possible at the joints and so that inverts present a smooth surface. Pipe and fittings which do not fit together to form a tight joint will be rejected.

E. Pipe shall be laid accurately to the lines and grades shown on the plans and/or as directed by the Engineer. Line shall be set by the Contractor and the required invert grades shall be provided adjacent to the stakes. Batter boards shall be placed along the construction at a maximum of fifty (50) foot intervals. The grade line shall be maintained over at least three (3) batter boards at all times. Only a certified operator may use a laser system following the latest operational and safety instruction of the manufacturer of the laser system. The laser system shall be checked for line and grade utilizing batter boards at every set up.

F. Where an existing pipe or duct crosses the trench at an elevation which conflicts with the proposed grade for the new pipeline, either the grade for the new pipeline shall be changed or the existing pipe shall be relocated. In either case, the Contractor must receive written approval from the Engineer before continuing this phase of the project. The new pipeline shall have a clearance from the existing pipe of not less than six (6) inches. The space between the two (2) pipes shall be solidly filled with compacted sand or other material as directed by the Engineer. Before the trench is refilled, the existing pipelines shall be permanently supported as required by the agency operating such pipelines.

G. Any section of the sewer that is found defective in material, alignment, grade, joints or otherwise shall be satisfactorily corrected by the Contractor at no additional cost to the Owner.

H. The Contractor shall furnish the Engineer with a complete laying schedule.

## **7. Testing of Sewers:**

### **A. General:**

- 1) Visual inspection, air and/or water tests, infiltration and/or exfiltration tests, as applicable, shall be required generally on all sewers. The Contractor shall furnish all material and equipment necessary to conduct the sewer test(s) as outlined herein in accordance with the requirements set forth and the instructions of the Engineer and/or requirements of the sewer agency having jurisdiction.
- 2) All equipment and material shall be subject to the approval of the Engineer and the sewer agency having jurisdiction.
- 3) After the pipe trenches have been satisfactorily backfilled to full depth, the sewer line and manholes shall be flushed and cleaned. All water needed to flush the sewer system shall be furnished by the Contractor at no additional cost to the Owner.
- 4) All materials flushed from the sewer system shall be intercepted and received to prevent the laterals from entering any discharge facility or existing sanitary system.
- 5) Those portions of the sewer which cannot be pressure tested, as determined by the Engineer, will be visually inspected. The Contractor shall be responsible to dewater the sewer and bypass sewage flow in accordance with Section 9 of this specification, Televising of Sewers. The Contractor shall repair all visible leaks at no additional cost to the Owner.

### **B. Displacement Tests:**

- 1) All sewer lines shall be checked to determine if any displacement of the pipe has occurred. A bright light shall be flashed between manholes. If the illuminated interior of the pipe line and/or an inspection of the interior by the Engineer shows poor alignment, displaced pipe, or any other defects as designated by the Engineer and/or sewer agency, they shall be remedied by the Contractor and the method approved by the Engineer and/or sewer agency prior to corrective measures at no additional cost to the Owner.

### **C. Deflection Tests:**

- 1) A deflection test shall also be performed on polyvinyl chloride (PVC) sewer pipe after final backfill has been in place for at least thirty (30) days. Deflection of the pipe shall not exceed five percent (5%). Rigid balls or mandrels shall have a diameter equal to ninety-five percent (95%) of the inside diameter of the sewer pipe. The test shall be performed without mechanical pulling devices and in the presence of the Engineer.

### **D. Pressure Testing of Individual Joints:**

- 1) General. The Contractor may perform air and/or water pressure testing of individual joints to those sections of the sewer which have lateral connections and all active flow in lieu of performing infiltration and/or exfiltration tests. The equipment and methods used for air/water pressure testing shall be approved by the Engineer and shall not utilize any untried or experimental equipment. Air/water pressure tests shall be made on each joint separately and at such other locations as the Engineer may direct.
- 2) Method and Equipment:
  - a) Test Medium. A fluid (maximum viscosity of 2 centipoise) shall be used as the test medium. Both liquid (usually water) and air are acceptable, but the test procedure is different for each.

b) Equipment. The basic equipment used shall consist of a television camera, joint testing device (such as a packer), and test monitoring equipment. The equipment shall be constructed in such a way as to provide means for introducing the test medium, under pressure, into the VOID area created by the expanded ends of the joint testing device and means for continuously measuring the actual static pressure of the test medium, at and within the VOID area only.

VOID pressure data shall be transmitted electrically from the VOID to the monitoring equipment. Example: via a TV picture of a pressure gauge located at the VOID, or via an electrical pressure transducer located at the VOID.

All test monitoring shall be above ground and in a location to allow for simultaneous and continuous observation of the television monitor and test monitoring equipment by the Owner's Representative.

3) Test Procedure. Each sewer pipe joint shall be individually tested at a test pressure equal to 1/2 psi per vertical foot of pipe depth (test pressure shall be a minimum of 5 psi and a maximum of 10 psi) in accordance with one of the following procedures:

*a) Control Test.*

Prior to starting the pipe joint testing phase of the work, a two-part control test shall be performed as follows:

(1) To insure the accuracy, integrity, and performance capabilities of the testing equipment, a demonstration test will be performed in a test cylinder constructed in such a manner that a minimum of two known leak sizes can be simulated. This technique will establish the test equipment performance capability in relationship to the test criteria and insure that there is no leakage of the test median from the system or other equipment defects that could affect the joint testing results. If this test cannot be performed successfully, the Contractor shall be instructed to repair or otherwise modify his equipment and reperform the test until the results are satisfactory to the Owner's Representative. This test may be required at any other time during the joint testing work if the Owner's Representative suspects the testing equipment is not functioning properly.

(2) After entering each manhole section with the test equipment, but prior to the commencement of joint testing, the test equipment shall be positioned on a section of sound sewer pipe between pipe joints, and a test performed as specified. This procedure will demonstrate the reality of the test requirement, as no joint will test in excess of the pipe capability. The barrel of the sewer pipe shall meet the requirements specified for joint tests.

*b) Liquid Test Procedure*

(1) The testing device shall be positioned within the line in such a manner as to straddle the pipe joint to be tested.

(2) The testing device ends (end elements, sleeves) shall be expanded so as to isolate the joint from the remainder of the line and create a VOID area between the testing device and the pipe joint. The ends of the testing device shall be expanded against the pipe with sufficient pressure to contain a minimum of 10 psi within the VOID without leakage past the expanded ends.

(3) Water or an equivalent liquid shall then be introduced into the VOID area until a pressure equal to or greater than the required test pressure is observed with the VOID pressure monitoring equipment. If the required test pressure cannot be developed (due to joint leakage), the joint will have failed the test and shall be repaired by approved means.

(4) The flow rate of the test liquid shall then be regulated to a rate at which the VOID pressure is observed to be the required test pressure. Reading of the test liquid flow meter shall then be taken. If the flow rate exceeds 1/4 gallon per minute (due to joint leakage), the joint will have failed the test and shall be repaired and retested.

*c) Air Test Procedure:*

(1) The testing device shall be positioned within the line in such a manner as to straddle the pipe joint to be tested.

(2) The testing device ends (end elements, sleeves), shall be expanded so as to isolate the joint from the remainder of the line and create a VOID area between the testing device and the pipe joint. The ends of the testing device shall be expanded against the pipe with sufficient pressure to contain a minimum of 10 psi within the VOID without leakage past the expanded ends.

(3) Air shall then be introduced into the VOID area until a pressure equal to or greater than the required test pressure is observed with the VOID pressure monitoring equipment. If the required test pressure cannot be developed (due to joint leakage), the joint will have failed the test and shall be repaired by approved means.

(4) After the VOID pressure is observed to be equal to or greater than the required test pressure, the air flow shall be stopped. If the VOID pressure decays by more than 2 psi within 15 seconds (due to joint leakage), the joint will have failed the test and shall be repaired and retested.

**E. Infiltration and Exfiltration Tests:**

**1) General:**

a) After the pipe has been laid and upon satisfactory completion of the displacement inspections, all sewers laid, including manholes, sewer mains and laterals, shall be tested for infiltration, exfiltration or both in sections as directed by the Engineer and/or sewer agency and shall satisfactorily meet the test requirements specified herein prior to final acceptance of the work.

b) All tests shall be conducted in a manner to minimize interference with progress of the work and such tests shall be made prior to making connections with other sewers, pipes or drains unless otherwise permitted by the sewer agency having jurisdiction. All stubs and house connections shall be adequately plugged to resist the hydrostatic test pressure.

c) The Engineer and/or sewer agency will designate the tests to be performed on the basis of the ground water elevations and other physical conditions at the time tests are to be performed. Ground water elevations at the time of testing shall be determined by means of test holes made by the Contractor at intervals of approximately one thousand (1,000) feet or less along the sewer line in locations approved by the Engineer or by means of standpipes placed in manholes designated by the Engineer and/or sewer agency.

**2) Procedure:**

a) The Contractor shall notify the Engineer when the work is ready for testing and tests shall be conducted as soon as possible thereafter, under the direction of the Engineer. Personnel for reading meters, gauges or other measuring devices will be furnished by the Engineer. All other labor, equipment, water and materials, including meters and gauges shall be furnished by the Contractor at his own expense to perform the required tests. The maximum length of pipe to be tested shall not exceed 1,000 feet. The infiltration and exfiltration tests shall extend over a period of not less than

twenty-four (24) hours. The initial reading shall be taken at the start of the working day and followed by not less than seven (7) consecutive hourly readings. An additional reading shall be made twenty-four (24) hours after the initial reading.

b) A reasonably uniform rate of flow must be obtained during the testing period in order for the test to be considered valid. If the measured infiltration or exfiltration exceeds the specified rate, the necessary repairs and replacements shall immediately be made to pipe and manholes and repairs and tests repeated as many times as necessary until the requirements hereinbefore specified have been met, all at no additional cost to the Owner. Depending on field conditions, the Engineer shall order either an infiltration and/or exfiltration test.

**3) Infiltration Tests:**

a) The infiltration tests shall only be used when the depth of ground water is not less than two (2) feet above the top of pipe. Infiltration shall neither exceed a rate of 100 gallons for sanitary sewers, nor 500 gallons for storm sewers, per inch of diameter per day per mile of pipe when the depth of water above the pipe is within one (1) foot of the highest recorded water table as indicated on the pre-bid boring logs or encountered during construction, whichever is higher.

b) If the depth of ground water is not within one (1) foot of the highest recorded water table and infiltration exceeds fifty (50) percent of the above, then an exfiltration test will be mandatory. Infiltration through joints shall be measured by using a watertight weir or any other approved device for volumetric measurement, installed at the lower end of the section under test.

**4) Exfiltration Tests:**

a) The maximum permissible exfiltration rate shall be 100 gallons for sanitary sewers, and 500 gallons for storm sewers, per inch of diameter per day per mile of pipe under a differential head of not less than four (4) feet nor more than ten (10) feet above the top of the pipe or above groundwater, whichever is higher, at the highest point of the pipe under test, and then measuring the loss of water from the sewer. All water needed to run the exfiltration test(s) shall be furnished by the Contractor at no additional cost to the Owner.

5) Combined sewers shall meet the requirements of sanitary sewers.

**8. Maintenance of Sewage Flows:**

A. Sewage flows from upstream sewers and laterals shall be maintained without interruption during the life of the Contract. Any method for bypassing sewage flows shall be submitted in writing to the Engineer or approval prior to the start of bypassing. Included in the submittal shall be the following:

1) A sketch and description indicating:

a) The method for any plugging of sewers and location of same.

b) Pumps and bypass piping, if used - location, size and pump capacity.

2) Method of handling flows after working hours.

3) Method of testing newly installed sewer.

4) Any alternative or back-up measures for handling sewage flows.

B. In the event that the Contractor's temporary modification to the sewer system, or service laterals for maintenance of sewer service, results in any damage to public or private property, the Contractor shall repair the damage including cleaning of basements where sewage has backed up, as directed by the Engineer, at the Contractor's expense.

#### **9. Television of Sewers:**

A. Work Included. This section covers the dewatering, television inspection, inspection report and video cassettes of new sewer line being installed. Televising shall be limited to all pipe installations greater than thirty continuous feet.

##### **B. Dewatering**

1) Dewatering shall be accomplished by the Contractor when sewer line flows are above the minimum requirements or inspection of the complete periphery of the pipe is necessary to effectively conduct inspection operations. Dewatering techniques may not include mopping, or any other which will result in a completely dry pipe.

2) Dewatering shall be accomplished by inserting a sewer line plug into the line at a manhole upstream from the section to be inspected. The plug shall be so designed that the sewer flow can be released quickly to prevent any possible damage to public or private property.

3) The Contractor will furnish all materials, labor, machinery and services necessary for the by-pass pumping of sanitary sewage when necessary and as directed by the Engineer to effectively conduct the television inspection. By-passed sanitary sewage will not be discharged to open ground, street or curb areas, but will usually be discharged into an acceptable sanitary sewer manhole.

##### **C. Television Inspection:**

1) The television camera used for inspection shall be one specifically designed and constructed for sewer inspection. Lighting for the camera shall be suitable to allow a clear picture for the entire periphery of the pipe. The camera shall be operative in 100% humidity conditions. Picture quality and definition shall be to the complete satisfaction of the Engineer. The camera shall be capable of being moved through the sewer line in either direction at a uniform, slow rate of about one-half foot per second.

2) During the actual television inspection, a log shall be maintained by the Contractor's Operating Technician. This log will be a complete record of all structural defects, service connections, abnormal conditions and other pertinent data observed, together with the footage distance of each. This log will be maintained on forms to be supplied by the Contractor.

3) A VHS video cassette shall also be recorded such that the TV inspection may be played back at a later date. This cassette shall have an audio channel which will be used by the Operating Technician to record footage distance to each item noted in the log. The video cassettes and log will become the property of the Owner. The video cassettes shall be furnished on VHS style cassettes and shall be compatible for playback in a VHS video cassette record player.

The Contractor shall submit the video cassettes and logs to the Engineer on a daily basis. Tapes must be of reasonable video clarity in order to be acceptable to the Engineer.

4) The Contractor shall furnish, on loan, all electronic equipment necessary to play back the VHS video cassette. The equipment shall be made available at the Engineer's office. Play back speed shall not be more than normal speed and the equipment shall be capable of displaying a picture with the tape stopped (Pause Position).

## METHOD OF MEASUREMENT

The quantity paid for will be the total horizontal length in linear feet of sewer pipe as measured parallel with the centerline of the installed sewer from inside face to inside face of manhole or structure bases. The payment length shall include the length of wye branch or tee branch sections. The payment length shall not include the length of R.C.P. prefabricated tee sections.

## BASIS OF PAYMENT

1. General. The unit price bid per linear foot shall include the cost of furnishing all labor, materials, and equipment necessary to complete the work. Excavation, bedding, backfill and surface restoration will be paid for separately under their appropriate item.

2. Progress Payment:

A. Seventy-five (75%) percent of the unit price bid for pipe installed, complete in place, will be paid upon acceptable installation of the pipe before successful completion of the required field tests.

B. Ninety-five (95%) percent of the unit price bid for pipe installed will be paid upon satisfactory completion of the required field tests.

C. The full unit price bid for pipe installed will be paid upon successful completion of the required television or photographic inspection.

Payment will be made under:

ITEM NO.	ITEM	PAY UNIT
C603.0412XX	Vitrified Clay Pipe, Extra Strength, XX" Diameter	Linear Foot
C603.6003XX	Reinforced Concrete Pipe, Class III, Steel Ring Joints, XX" Diameter	Linear Foot
C603.6004XX	Reinforced Concrete Pipe, Class III, Rubber Gasket Joints, XX" Diameter	Linear Foot
C603.6103XX	Reinforced Concrete Pipe, Class IV, Steel Ring Joints, XX" Diameter	Linear Foot
C603.6104XX	Reinforced Concrete Pipe, Class IV, Rubber Gasket Joints, XX" Diameter	Linear Foot
C603.6203XX	Reinforced Concrete Pipe, Class V, Steel Ring Joints, XX" Diameter	Linear Foot
C603.6204XX	Reinforced Concrete Pipe, Class V, Rubber Gasket Joints, XX" Diameter	Linear Foot
C603.9581XX	Ductile Iron Pipe, Class 52, XX" Diameter	Linear Foot
C603.9908XX	Polyvinyl Chloride Pipe, SDR 35, XX" Diameter	Linear Foot
C603.9909XX	Polyvinyl Chloride Pipe, SDR 26, XX" Diameter	Linear Foot
C603.9910XX	Polyvinyl Chloride Pipe, SDR 21, XX" Diameter	Linear Foot

# **LATERAL PIPE**

## **DESCRIPTION**

This work shall consist of the construction or reconstruction of pipe laterals and pipe lateral risers in accordance with these specifications and as shown on the plans.

## **MATERIALS**

### **1. Polyvinyl Chloride Pipe:**

Polyvinyl chloride pipe and fittings shall have bell and spigot joints with flexible elastomeric gaskets. SDR 21 pipe and fittings shall conform to ASTM D2241, with joints conforming to ASTM D3139 and F477.

### **2. Cast Iron Soil Pipe:**

Cast iron soil pipe shall be extra heavy conforming to ASTM A74. Joints shall be push-on neoprene gaskets conforming to ASTM C564.

## **CONSTRUCTION DETAILS**

### **1. General:**

A. All joints shall be installed, made up and inspected in accordance with approved printed instructions of the manufacturer. Joint tolerances shall be specified in ASTM C564 for cast iron soil pipe, and in ASTM D3139 and F477 for polyvinyl chloride pipe.

B. The manufacturer shall test and furnish test certificates covering all pipe supplied under this contract conforming to the test requirements as specified in ASTM A74 for cast iron soil pipe, and in ASTM D2241 for polyvinyl chloride pipe.

C. All pipe shall be cut by approved power saws which will produce a clean, true cut, free from irregularities and a smooth end at right angles to the axis of the pipe. All cut ends shall be beveled. No other method of pipe cutting will be accepted.

### **2. Pipe Laying:**

A. All pipes and fittings shall be handled carefully in loading and unloading. They shall be lifted by hoists and lowered on skidways in such a manner as to avoid shock. Derricks, ropes or other suitable equipment shall be used for lowering the pipe into the trench. Pipe and fittings shall not be dropped or dumped.

B. Each pipe and fitting shall be inspected before it is lowered into the trench. The interior of the pipe and all joint surfaces shall be thoroughly cleaned and shall thereafter be maintained clean. Care shall be taken in applying soap to facilitate joining of pipe sections. Soap shall be used sparingly. All pipe shall be laid true to line and grade with bells upstream and shall have a full, firm, even bearing. No length of pipe shall be laid until the previous length has had sufficient backfill material placed and compacted about it to secure it firmly in place to prevent any disturbance. The open ends of pipe shall be securely plugged whenever pipe laying is not in progress. Under no conditions shall pipe be laid in water, and no pipe shall be laid when trench conditions or weather are unsuitable for such work. Pipe and fittings shall be selected so that there will be as small a deviation as possible at the joints and so that inverts present a smooth surface. Pipe and fittings which do not fit together to form a tight joint will be rejected.

C. Where an existing pipe or duct crosses the trench at an elevation which conflicts with the proposed grade for the new lateral, either the grade for the new lateral shall be changed or the existing pipe shall be relocated. In either case, the Contractor must receive written approval from the Engineer before continuing this phase of the project. The new lateral shall have a clearance from the existing pipe of not less than six (6) inches. The space between the two (2) pipes shall be solidly filled with compacted sand or other material as directed

by the Engineer. Before the trench is refilled, the existing pipelines shall be permanently supported as required by the agency operating such pipelines.

D. Any section of the lateral that is found defective in material, alignment, grade, joints or otherwise shall be satisfactorily corrected by the Contractor at no additional cost to the Owner.

E. Where new laterals are to be constructed, they shall be installed as shown on the plans and/or as directed by the Engineer to a permanent easement line, right-of-way line or property line and tested along with the main sewer. The ends of these laterals shall be plugged with a water tight plug to prevent infiltration and exfiltration.

F. Where laterals currently exist, the Contractor shall reconnect the existing lateral to the new sewer. The connection fitting between new and existing laterals shall be a coupling conforming to ASTM C425, using an elastomeric sleeve, corrosion-resistant shear collar and tension bands and tightening mechanism, and it shall be as close as possible to the new sewer. The Contractor shall dye test existing laterals when necessary as directed by the Engineer.

G. Lateral markers shall be placed at the ends of all plugged sewer laterals. The marker shall consist of a twelve (12) foot long, 2 inch x 4 inch timber placed at the invert of the lateral end to mark its location and depth. The top of the marker shall have the word "Sanitary" for sanitary laterals and "Storm" for storm laterals stenciled on it with green paint. The letters shall be one and one-half (1-1/2) inches in size. If the end of the lateral is more than twelve (12) feet deep, the length of the 2 inch x 4 inch timber marker shall be increased by four (4) foot increments until at least two (2) feet of the marker extends above finished surface grade. If the marker is more than twelve (12) feet long, the exact length of the marker shall be painted on the portion of the marker which extends above finished surface grade. The ends of all plugged laterals shall be referenced with direct physical ties. The references and invert elevations of the lateral ends shall be noted on the as-built drawings.

## **METHOD OF MEASUREMENT**

1. The quantity paid for lateral pipe will be the total length measured parallel with the centerline of the installed lateral pipe from the end of the wye branch, tee branch, tee saddle or lateral riser, to the end of the lateral pipe. If a portion of an existing lateral requires replacement beyond the payment limits indicated in the item "Connect Existing Lateral to New Sewer", then the quantity paid for will be measured from a point five feet beyond the main sewer horizontal payment limits for trench excavation or trench excavation solid rock to the connection point between the existing and new lateral pipe. Payment shall include installation of the bends, pipe, watertight plug and lateral marker as required.

2. The quantity paid for lateral riser pipe will be the total length measured parallel with the centerline of the installed riser pipe from the end of the tee branch or tee saddle to the end of its last bend. Payment shall include installation of the bends, pipe, watertight plug and lateral marker as required.

## **BASIS OF PAYMENT**

The unit price bid per linear foot shall include the cost of furnishing all labor, materials, and equipment necessary to complete the work. Excavation, bedding, backfill and surface restoration will be paid for separately under their appropriate items.

Payment will be made under:

<b>ITEM NO.</b>	<b>ITEM</b>	<b>PAY UNIT</b>
C603.945101	Cast Iron Soil Pipe Lateral, Extra Heavy, 4" Diameter to 6" Diameter	Linear Foot

<b>ITEM NO.</b>	<b>ITEM</b>	<b>PAY UNIT</b>
C603.9451XX	Cast Iron Soil Pipe Lateral, Extra Heavy, XX" Diameter	Linear Foot
C603.945201	Cast Iron Soil Pipe Lateral Riser, Extra Heavy, 4" Diameter to 6" Diameter	Linear Foot
C603.9452XX	Cast Iron Soil Pipe Lateral Riser Extra Heavy, XX" Diameter	Linear Foot
C603.992101	Polyvinyl Chloride Pipe Lateral, SDR 21, 4" Diameter to 6" Diameter	Linear Foot
C603.9921XX	Polyvinyl Chloride Pipe Lateral, SDR 21, XX" Diameter	Linear Foot
C603.992201	Polyvinyl Chloride Pipe Lateral Riser, SDR 21, 4" Diameter to 6" Diameter	Linear Foot
C603.9922XX	Polyvinyl Chloride Pipe Lateral Riser, SDR 21, XX" Diameter	Linear Foot

# MANHOLES AND JUNCTION CHAMBERS

## DESCRIPTION

This work shall consist of the construction of manholes and junction chambers as shown on the plans and in accordance with these specifications.

## MATERIALS

### 1. Brick:

Brick shall be first quality, sound, hard-burned common brick conforming to ASTM C32, manhole brick, Grade MS (for grade adjustment) and sewer brick, Grade SS (for inverts and benches). Brick shall be culled of all irregulars and unsound or damaged brick before laying.

### 2. Mortar:

Portland Cement mortar conforming to ASTM C270, Type M, Mortar for Unit Masonry.

### 3. Concrete and Reinforcing Steel:

Concrete and reinforcing steel shall conform to the requirements of NYSDOT Subsection 604-2.

### 4. Castings for Frames, Grates, Covers and Shear Gates:

Castings for frames, grates, covers and shear gates shall be true to pattern in form and dimensions without sharp unfilleted angles or corners; and shall be free from pouring faults, sponginess, cracks, blow holes and other defects in locations affecting their strength and value for the service intended. All old castings and steel frames and grates being replaced in this contract shall become the property of the Rochester Pure Waters District and they shall be delivered to Monroe County Facilities, 444 E. Henrietta Road, Rochester, New York at no extra cost to the Owner.

#### A. Cast Iron Castings:

Cast Iron castings shall conform to the requirements of ASTM A48 Class 30B. All castings shall be coated with a coal tar pitch varnish which will result in a smooth, tough coating that is not tacky or brittle.

#### B. Manufacture:

Castings shall be Syracuse Castings Sales corporation Number 1032 Neenah Number R-1726-A for Standard manhole Castings; or Neenah No. R-1755-FOR or Syracuse Castings Sales Corporation Number 1539-A for water tight manhole castings. Catalog numbers indicated are given to show the required type and configuration only. Castings shall be the product of a recognized manufacturer with satisfactory experience in the production of castings of the type indicated and specified.

#### C. Frames and Covers:

Frames and covers shall be accurately made and covers shall fit in any position without rocking. Horizontal and vertical fitting surfaces shall be milled to a true and even surface to insure uniform bearing. Units shall be interchangeable. Shop drawings shall be submitted for approval together with an affidavit from the manufacturer certifying compliance with the material specifications. All manhole covers shall have concealed or blind pick holes.

#### D. Manhole Cover Imprint:

The word "SANITARY" or "STORM", and the letters "MCPW" in letters not less than two inches (2") high shall be stamped or cast into all sanitary and storm manhole covers so as to be plainly visible.

#### **E. Manhole Steps:**

Manhole steps shall be Neenah R-1981-1 or N.J. Aluminum F14-2-B or approved equal. All steps shall be cast into the walls of the manholes so as to form a continuous ladder with a distance of 12" between steps. The embedded portion of the step shall be coated with a 15 mil coat of coal tar coating.

### **CONSTRUCTION DETAILS**

#### **1. General:**

It is the intent of this specification to secure soundly constructed, watertight manholes and junction chambers constructed in accordance with the plans. Foundations shall not be placed upon frozen or muddy subgrades. Precast concrete sections shall be the product of a recognized manufacturer experienced in the production of precast manhole sections of the type indicated and specified. Complete shop drawings of manholes and junction chambers and complete data on the gaskets proposed for use at the joints between precast sections, shall be submitted for the approval of the Engineer as specified in the General Conditions.

2. The design and construction of all reinforced concrete structures shall conform with the American Concrete Institute standard 318-77 titled "Building Code Requirements for Reinforced Concrete", unless otherwise indicated on the drawings or specified herein.

#### **3. Cast-in-Place Manhole Bases and Chambers.**

Cast-in-place bases and chambers shall be constructed of reinforced concrete as shown on the plans. Concrete manhole foundations shall be placed over a surrounding 4 mil polyethylene sheet.

#### **4. Precast Manhole Bases and Chambers.**

Round precast concrete manhole bases shall conform to the requirements of ASTM C478. Other precast bases and chambers shall be constructed of reinforced concrete as shown on the plans. The bases shall have an approved positive entry seal for main sewer connections except when steel ring joint R.C.P. is used. When steel ring joint R.C.P. is used the bases shall have steel bell wall fittings compatible with the main sewer joints cast in the side walls. Bedding for precast manhole bases shall be as shown on the plans.

#### **5. Precast Manhole Riser and Top Slabs.**

Precast concrete, riser and transition sections, top slabs and grade rings shall conform to the requirements of ASTM C478. Joints between riser section shall be provided with round rubber gaskets conforming to the requirements of ASTM C443. Top slabs shall be designed to support an HS 20-44 vehicular loading unless otherwise shown on the plans.

#### **6. Lifting Holes.**

Lifting holes shall have a maximum depth of one-half of the riser wall thickness and shall be filled with Mainstay or an epoxy mortar after the manhole is set in place.

#### **7. Installation:**

A. The top of the slab or walls of the cast-in-place concrete chamber or base, and precast bases shall be formed to fit the lower end of the first precast concrete riser. The shaping shall be done with an approved cast iron pallet accurately shaped to the required round rubber gasket which, when assembled, shall be selfcentering and make a uniform watertight joint.

B. Joints between precast manhole sections shall be provided with a round rubber gasket conforming to the requirements of ASTM C443 when assembled, shall be self-centering and make a uniform watertight joint. The gasket spaces between the bell and spigot shall be so shaped as to provide either grooves or shoulders that will prevent the gasket from disengaging from its compression surfaces or being blown out by hydrostatic pressure. A coating of Pioneer 301 thermo setting joint compound manufactured by the Daubert Chemical Company, or approved equal, shall be applied to the outside of all manhole joints.

C. Cast-in-place bases shall have pipe stubs integrally cast into the side walls at the time the concrete is poured except when the main sewer is R.C.P. with steel ring joints. When the main sewer is R.C.P. with steel ring joints, steel bell wall fittings shall be cast in the side walls to receive the pipe ends. Bell wall fittings shall be adequately supported with timber or steel struts or by the pipe stub spigot during concrete placing to maintain them true and round. Continuous 6" P.V.C. waterstops shall be formed into all construction joints as indicated on the plans and/or as ordered by the Engineer. Waterstops shall be Greenstreak type 705 P.V.C. or approved equal.

D. The bell at the upper end of the riser sections and cast-in-place concrete base shall be wiped free of all dirt and grit, and sparingly soaped to receive the succeeding section. Prior to snapping the gasket onto the spigot groove of the riser section, the gasket shall be wiped clean and soaped. Care shall be taken to keep soap off of concrete so as to insure proper bonding of the coating materials. A screw driver or similar tool shall be inserted beneath the gasket and run around the pipe to insure even seating. The riser section with gasket in place shall then be lowered into the bell of the previously placed section taking care that no dirt is present in the joint or on the gasket.

E. All joints shall be installed, made up and inspected in accordance with approved printed instructions of the manufacturer.

**F. Dampproofing:**

Dampproofing materials shall be delivered to the site in the manufacturer's sealed containers, clearly marked with name of the product. Application methods and temperature shall be in accordance with the written recommendations of the manufacturer and as approved by the Engineer.

Two coats of exterior coating shall be Bitumastic Super Service Black manufactured by Koppers Company, Inc., or approved equal. The coatings shall be applied according to the manufacturer's latest instructions.

All benches, concrete channel inverts and interior walls of the manhole base up to the top of the highest pipe shall be coated with two coats of Sikagard 62 manufactured by Sika Corporation or Duralkote 312 as manufactured by Dural International Corporation or Engineer approved equal. The material shall be applied according to the manufacturer's instructions. Interior surfaces above the top of the highest pipe shall be coated with one of the materials specified for exterior coating in the above paragraph.

G. Invert Channels and Benches. Invert channels and benches shall be smooth and semicircular in shape conforming to the inside of the adjacent sewer section. Changes in direction of flow shall be made with smooth curves of a large radius as the size of the manhole will permit and the pipes shall stop at the inside face of the manhole where such changes in direction occur. Invert channels and benches shall be constructed of formed concrete.

H. Completed manholes shall be subject to an infiltration or exfiltration test. These tests shall meet the requirements listed under "Testing of Sewers". Manholes which do not meet the test requirements shall be repaired by the Contractor at his expense.

**8. Length of Sections**

Unless otherwise indicated, precast manhole sections shall be of such lengths as will permit the setting of the manhole frame to the required elevation on top of the upper section. The top riser section shall be four (4) foot maximum in length. The manhole frame shall be brought to finish grade with a minimum of two courses of brick and it shall be firmly set in a bed of mortar not less than one-half (1/2) inch thick.

## METHOD OF MEASUREMENT

1. Manholes. The quantity to be paid for under these items shall be the number of manholes completed in accordance with the plans and specifications. Depth of manholes will be measured from the invert elevation of the downstream pipe to the manhole cover top elevation.

2. Additional Depth of Manholes. The quantity to be paid for under these items will be the number of linear feet of depth measured to the nearest tenth of a foot. This quantity will be for additional manhole riser sections when the depth of manhole exceeds 6.0' measured as specified in No. 1 above.

3. Junction Chamber. Payment for junction chambers will be made on additional lump sum basis.

## BASIS OF PAYMENT

1. General. The unit price bid or lump sum price bid shall include all labor, equipment, and materials including frames and covers necessary to complete the work as specified. Excavation, backfill and surface restoration will be paid for separately under their appropriate items .

2. Progress Payment:

A. Seventy-five (75) percent of the unit price bid for structures installed, complete in place, will be paid upon acceptable installation of the structures before successful completion of the required field tests.

B. The full unit price bid for structures installed will be paid upon successful completion of the required field tests and substantial completion of all other work items including restoration.

Payment will be made under:

ITEM NO.	ITEM	PAY UNIT
C604.044801	Manhole, 4' Diameter, Precast Base, up to 6.0' Deep	Each
C604.044802	Manhole, 4' Diameter, Cast-in-Place Base, up to 6.0' Deep	Each
C604.044803	Additional Depth of 4' Diameter Manhole	Linear Foot
C604.046001	Manhole, 5' Diameter, Precast Base, up to 6.0' Deep	Each
C604.046002	Manhole, 5' Diameter, Cast-in-Place Base, up to 6.0' Deep	Each
C604.046003	Additional Depth of 5' Diameter Manhole	Linear Foot
C604.0499XX	Junction Chamber No. X	Lump Sum

# CONNECTIONS

## DESCRIPTION

This work shall consist of lateral connections to existing or new sewers, connecting new sewers to existing sewers or manholes, connecting new manholes to existing sewers and connecting new receiving basins to existing laterals as shown on the plans or as ordered by the Engineer.

## MATERIALS

Elastomeric sleeve connections shall conform to ASTM C425 with corrosion resistant shear collar, tension bands and additional tightening mechanism. Other materials shall be as shown on the plans.

## CONSTRUCTION DETAILS

1. Connections to new polyvinyl chloride pipe or vitrified clay pipe main sewers shall be made with wye branch pipe sections, except for riser type connections where tee branch pipe sections shall be used. Connections to existing vitrified clay pipe or polyvinyl chloride pipe main sewers shall be made with tee saddle hubs, or new wye branch or tee branch pipe sections installed in the main sewer as shown on the plans and/or as directed by the Engineer. The Contractor shall furnish bends as necessary. Tee saddle hub connections shall be cored as specified in the following section for reinforced concrete pipe connections.
2. Connection to existing or new reinforced concrete pipe main sewers shall be made by coring an opening in the main sewer to receive additional tee saddle hub which shall be mortared in place using additional 100% solids epoxy mortar such as Sikadur 33 or an approved equal. The use of impact devices to make the opening will not be permitted. Care shall be taken to insure that neither the lateral or the epoxy mortar shall protrude into the inner circumference of the main sewer, and all debris which may accumulate in the main sewer while making the connection shall be completely removed. The Contractor shall furnish bends as necessary.
3. Connections between new sewers and existing sewers or manholes or between receiving basins and laterals, shall conform to details shown on the plans, or shall be made with elastomeric sleeves. New manholes shall be connected to existing sewers with elastomeric sleeves or concrete collars and this work shall include new lengths of sewer pipe as needed to reach the connection point.

## METHOD OF MEASUREMENT

1. Connect Existing Lateral to New Sewer. The quantity paid for will be the number of existing laterals connected to new sewers. Payment shall include installation of the wye branch, tee branch or tee saddle, the bends, lateral pipe and elastomeric sleeve to connect existing lateral pipe to new lateral pipe. This item shall include new lateral pipe from the main sewer to additional point five feet beyond the main sewer side payment limits for "Trench Excavation" or "Trench Excavation-Solid Rock".
2. Connect New Lateral to Existing or New Sewer. The quantity paid for will be the number of new laterals connected to existing or new sewers. Payment shall include installation of the wye branch, tee branch or tee saddle.
3. All Other Connections. The quantity to be paid for under these items shall be the number of connections completed in accordance with the plans and specifications.

## BASIS OF PAYMENT

The unit price bid shall include the cost of all labor, materials and equipment necessary to complete the work as specified. Excavation, backfill and surface restoration will be paid for separately under their appropriate items.

Payment will be made under:

ITEM NO.	ITEM	PAY UNIT
C604.076001	Connect Existing 4" or 6" Lateral to New Sewer	Each
C604.0760XX	Connect Existing XX" Lateral to New Sewer	Each
C604.076103	Connect New 4" or 6" Lateral to Existing or New Sewer	Each
C604.0761XX	Connect New XX" Lateral to Existing or New Sewer	Each
C604.0762XX	Connect New XX" Sewer to Existing Manhole	Each
C604.0763XX	Connect New XX" Sewer to Existing Stone Box Sewer	Each
C604.0764XX	Connect New XX" Sewer to Existing Sewer with Concrete Collar	Each
C604.0765XX	Connect New XX" Sewer to Existing Sewer with Elastomeric Sleeve	Each
C604.0766XX	Connect New Manhole to Existing XX" Sewer	Each
C604.0767XX	Connect New Receiving Basin to Existing Lateral	Each
C604.0768XX	Connect New Manhole to Existing or New XX" Sewer with Outside Drop Connection	Each
C604.0769XX	Connect Existing Manhole to Existing or New XX" Sewer with Outside Drop Connection	Each

# MONROE COUNTY TRAFFIC ENGINEERING STANDARD SPECIFICATIONS

## SPECIFICATION LISTING

### GENERAL

The following Monroe County Traffic Engineering Standard Items are acceptable for use as City of Rochester Standard Specifications. The work shall conform to the requirements of the appropriate Monroe County Traffic Engineering Specification for these items:

ITEM NO.	ITEM	PAY UNIT
C206.0315	Traffic Signal Conduit Excavation and Restoration in Asphalt Concrete	LF
C206.0316	Traffic Signal Conduit Excavation and Restoration in Portland Cement Concrete	LF
C206.0317	Traffic Signal Conduit Excavation and Restoration in Composite Pavement	LF
C206.0318	Traffic Signal Conduit Excavation and Restoration in Concrete Sidewalks and Driveways	LF
C206.0319	Traffic Signal Conduit Excavation and Restoration in Asphalt Sidewalks and Driveways	LF
C206.0320	Traffic Signal Conduit Excavation and Restoration in Grass and Unpaved Areas	LF
C676.7006	Mast Arm (Street Light) 6' Length	EA
C676.7008	Mast Arm (Street Light) 8' Length	EA
C676.7010	Mast Arm (Street Light) 10' Length	EA
C676.7012	Mast Arm (Street Light) 12' Length	EA
C676.7014	Mast Arm (Street Light) 14' Length	EA
C676.7016	Mast Arm (Street Light) 16' Length	EA
C680.9909	Remove Traffic Signal Pullboxes	EA
C685.03	Sign Post (10')	EA
C685.04	Sign Post (12')	EA
C685.05	Sign Sleeve	EA
C685.06	Sign Post and Sleeve (10')	EA
C685.07	Sign Post and Sleeve (12')	EA
C685.08	Adjust Frames and Covers (Pull Boxes)	EA
C685.3101	Traffic Sign Size 8" x 24"	EA
C685.3102	Traffic Sign Size 8" x 30"	EA
C685.3103	Traffic Sign Size 8" x 36"	EA
C685.3201	Traffic Sign Size 12" x 18"	EA
C685.3202	Traffic Sign Size 12" x 24"	EA
C685.3203	Traffic Sign Size 12" x 30"	EA
C685.3204	Traffic Sign Size 12" x 36"	EA

ITEM NO.	ITEM	PAY UNIT
C685.3301	Traffic Sign Size 18" x 18"	EA
C685.3302	Traffic Sign Size 18" x 24"	EA
C685.3303	Traffic Sign Size 18" x 30"	EA
C685.3304	Traffic Sign Size 18" x 36"	EA
C685.3401	Traffic Sign Size 24" x 24"	EA
C685.3402	Traffic Sign Size 24" x 30"	EA
C685.3403	Traffic Sign Size 24" x 36"	EA
C685.3501	Traffic Sign Size 30" x 30"	EA
C685.3502	Traffic Sign Size 30" x 36"	EA
C685.3601	Traffic Sign Size 36" x 36"	EA
C685.3602	Traffic Sign Size 36" x 48"	EA
C685.3701	Traffic Sign Size 30" Triangle	EA
C685.3702	Traffic Sign Size 36" Triangle	EA
C685.3801	Traffic Sign Size 30" 5 Sides	EA
C685.3901	Traffic Sign Size 24" Octagon	EA
C685.3902	Traffic Sign Size 30" Octagon	EA
C685.3903	Traffic Sign Size 36" Octagon	EA
C685.3904	Traffic Sign Size 30" Circle	EA
C685.3905	Traffic Sign Size 36" Circle	EA
C685.41	Removal of Signs - Size A (0 to 10 S.F.)	EA
C685.42	Removal of Signs - Size B (11 to 20 S.F.)	EA
C685.43	Removal of Signs - Size D (41 to 100 S.F.)	EA
C685.44	Removal of Signs - Size C (21 to 40 S.F.)	EA
C685.45	Removal of Signs - Size E (Over 100 S.F.)	EA
C685.46	Relocating Signs - Size A (0 to 10 S.F.)	EA
C685.47	Relocating Signs - Size B (11 to 20 S.F.)	EA
C685.48	Relocating Signs - Size C (21 to 40 S.F.)	EA
C685.49	Relocating Signs - Size D (41 to 100 S.F.)	EA
C685.50	Relocating Signs - Size E (Over 100 S.F.)	EA
C686.1611	Maintain Traffic Signal Equipment	INTMO
C686.5099	Concrete Base Removal (Pole or Controller)	EA
C686.71	Shielded Lead-in Cable	LF
C686.72	Inductance Loop Installation and Sealing	LF
C686.7201	Inductance Loop Wire	LF
C686.77	Modify Traffic Signal Equipment	LS
C686.79	Signal Equipment Removal	LS
C686.8026	Pedestrian Push Button with Sign	EA
C686.820030	Mast Arm Traffic Signal Pole Anchor Base (22')	EA
C686.820031	Mast Arm Traffic Signal Pole Combination Anchor Base (30')	EA
C686.830000	Concrete Pole Base Extension	EA

ITEM NO.	ITEM	PAY UNIT
C686.850010	Mast Arm Traffic Signal, 10' Length	EA
C686.850012	Mast Arm Traffic Signal, 12' Length	EA
C686.850014	Mast Arm Traffic Signal, 14' Length	EA
C686.850016	Mast Arm Traffic Signal, 16' Length	EA
C686.850018	Mast Arm Traffic Signal, 18' Length	EA
C686.850020	Mast Arm Traffic Signal, 20' Length	EA
C686.850022	Mast Arm Traffic Signal, 22' Length	EA
C686.850024	Mast Arm Traffic Signal, 24' Length	EA
C686.850026	Mast Arm Traffic Signal, 26' Length	EA
C686.850028	Mast Arm Traffic Signal, 28' Length	EA
C686.850030	Mast Arm Traffic Signal, 30' Length	EA
C686.850032	Mast Arm Traffic Signal, 32' Length	EA
C686.850034	Mast Arm Traffic Signal, 34' Length	EA
C686.850036	Mast Arm Traffic Signal, 36' Length	EA
C686.850038	Mast Arm Traffic Signal, 38' Length	EA
C686.850040	Mast Arm Traffic Signal, 40' Length	EA
C686.850042	Mast Arm Traffic Signal, 42' Length	EA
C686.9916	Coaxial Cable Installation	LF
C686.9917	Removal of Coaxial Cable	LF
C686.9941	Galvanized Steel Pedestrian Signal Pole	EA
C686.994401	Pullbox (24")	EA
C686.994402	Pullbox (30")	EA
C686.9950	Milling Existing Pavement for Loops	SY
C686.9955	Modify Traffic Signal Cable	EA

## TRAFFIC SIGNAL CONDUIT EXCAVATION AND RESTORATION

**DESCRIPTION:** This work shall consist of the excavation and necessary backfill and restoration required for traffic signal conduits.

**MATERIALS:** Materials for the restoration of top surfaces shall be as indicated on the plans and as approved by the Engineer.

**CONSTRUCTION DETAILS:** The requirements of NYSDOT Subsection 206-3 shall apply with the following additions:

When the Contractor is required to excavate through pavement or sidewalk, he shall sawcut along neat lines as shown on the plans or as ordered by the Engineer. An approved power saw, as approved by the Engineer prior to actual use, shall be used to saw cut to the depth specified on the plans or as directed by the Engineer.

**METHOD OF MEASUREMENT:** NYSDOT Subsection 206-4.03 shall apply.

**BASIS OF PAYMENT:** The unit price bid per linear foot shall include the cost of furnishing all labor, materials and equipment necessary to complete the work including excavation, backfill, sawcutting and restoring as shown on the plans.

Any damage to existing pavement, sidewalk, curb or other facilities caused by the Contractor's operations shall be repaired by the Contractor to the satisfaction of the Engineer at no additional cost to the County or the City of Rochester.

Payment will be made under:

ITEM NO.	ITEM	PAY UNIT
C206.0315	Traffic Signal Conduit Excavation and Restoration in Asphalt Concrete	Linear Foot
C206.0316	Traffic Signal Conduit Excavation and Restoration in Portland Cement Concrete	Linear Foot
C206.0317	Traffic Signal Conduit Excavation and Restoration in Composite Pavement	Linear Foot
C206.0318	Traffic Signal Conduit Excavation and Restoration in Concrete Sidewalks and Driveways	Linear Foot
C206.0319	Traffic Signal Conduit Excavation and Restoration in Asphalt Sidewalks And Driveways	Linear Foot
C206.0320	Traffic Signal Conduit Excavation and Restoration in Grass and Unpaved Areas	Linear Foot

## MAST ARM (STREET LIGHT)

**DESCRIPTION:** The Contractor shall furnish and install galvanized steel street light mast arms as shown on the plans and/or ordered by the Engineer.

**MATERIAL AND METHOD:** The mast arm shall be a 2" pipe truss type, up curved, for 2 bolt mounting on steel poles. The arm shall consist of an upper and lower member joined by vertical struts. The upper and lower members shall be standard steel pipe 2" I.P.S. Schedule 40. Design shall be up curved with a rise of 3' +/- 6" and spread of 10 feet to 16 feet, as indicated on the plans. Luminaire end shall be arranged for a 2" slipfitter luminaire with a 4" minimum straight section. The members at the pole end shall be equipped with 2 bolt self supporting steel hook type attachments, dimensions and drilling shall conform to the special details. Arm wiring opening shall be 2" diameter and provide a smooth raceway for internal wiring. Assembly to be hot dipped galvanized in accordance with applicable specification for zinc coatings (ASTM A123-53 & A153-53). Furnish 4 Hex. Head plated cap screws 1/2" 13 UNC x 1 1/2" with .875 O.D. plated steel 1/2" flat washers per arm.

**MEASUREMENT AND PAYMENT:** Payment for the galvanized street lighting mast arm will be made at the unit price bid for each unit.

The quantity payment shall be the number of units erected including bolts, brackets, and etc. in accordance with the plans and/or as directed by the Engineer.

Payment will be made under:

ITEM NO.	ITEM	PAY UNIT
C676.7006	Mast Arm (Street Light) 6' Length	Each
C676.7008	Mast Arm (Street Light) 8' Length	Each
C676.7010	Mast Arm (Street Light) 10' Length	Each
C676.7012	Mast Arm (Street Light) 12' Length	Each
C676.7014	Mast Arm (Street Light) 14' Length	Each
C676.7016	Mast Arm (Street Light) 16' Length	Each

## REMOVE TRAFFIC SIGNAL PULLBOXES

**DESCRIPTION:** The Contractor shall remove pullboxes as ordered by the Engineer.

**MATERIALS:** None specified.

**CONSTRUCTION DETAILS:** The Contractor shall remove pullboxes in accordance with the specifications, plans and as ordered by the Engineer. The pullboxes shall become the property of the Contractor and be removed from the site.

The Contractor shall remove the pullboxes located in the roadway area by sawcutting the pavement 24" from the edge of the existing frame. The entire pullbox shall be removed.

The Contractor shall backfill the excavation in accordance with Section 680-3.09 to the top of the subgrade. Final restoration shall be in accordance with the plans and performed under other items in the contract.

The Contractor shall remove pullboxes located in the sidewalk by sawcutting the sidewalk 24" away from the pullbox frame or by breaking the sidewalk at score lines and removing entire sidewalk flags. The Contractor shall backfill the excavation in accordance with Section 680-3.09. Final restoration shall be in accordance with the plans.

**METHOD OF MEASUREMENT:** The quantity shall be measured as the number of pullboxes removed in accordance with the plans, specifications and orders of the Engineer.

**BASIS OF PAYMENT:** The unit price bid for each pullbox removed shall cover the cost of disposal, all labor, backfill and excavation material and equipment necessary. Payment for sawcutting, backfilling with subbase material and restoration shall be included under other items.

Payment will be made under:

ITEM NO.	ITEM	PAY UNIT
C680.9909	Remove Traffic Signal Pullboxes	Each

## SIGN POST

5/90

**DESCRIPTION:** This work shall consist of furnishing and installing Sign Post and Sign Post Base in soil as shown on the Monroe County Traffic Engineering detail drawing and to the satisfaction of the Engineer.

**MATERIAL:** The post shall be 2" square perforated galvanized tube 10'-0" or 12'-0" long. The post base shall be 2 1/4" square perforated galvanized tube 4'-0" long.

**METHOD OF MEASUREMENT:** Method of measurement shall be each post and base installed in soil.

**BASIS OF PAYMENT:** The unit price bid for each post shall include the cost of the post, base, hardware, other materials, labor and equipment necessary to complete the job to the satisfaction of the Engineer.

Payment will be made under:

ITEM NO.	ITEM	PAY UNIT
C685.03	Sign Post (10')	Each
C685.04	Sign Post (12')	Each

## SIGN SLEEVE

**DESCRIPTION:** This work shall consist of furnishing and installing Sign Post Sleeves as shown on the Monroe County Traffic Engineering detail drawing and to the satisfaction of the Engineer.

**MATERIAL:** The sleeve shall be 3'-0" x 3" I.D. pipe, galvanized and standard weight.

Concrete shall be NYSDOT Class A concrete.

**METHOD OF MEASUREMENT:** The quantity paid for will be the number of sign post sleeves installed in accordance with the Contract Documents or directed by the Engineer.

**BASIS OF PAYMENT:** The unit bid price for each sign post sleeve shall include the cost of pipe, concrete and other materials, labor and equipment necessary to complete the work to the satisfaction of the Engineer.

Payment will be made under:

ITEM NO.	ITEM	PAY UNIT
C685.05	Sign Sleeve	Each

## SIGN POST AND SLEEVE

**DESCRIPTION:** This work shall consist of furnishing and installing Sign Post, Sign Post Base and Sleeve, as shown on the Monroe County Traffic Engineering detail drawing and to the satisfaction of the Engineer. A post shall be placed in the sleeve to prevent accidental tripping on the empty sleeve.

**MATERIAL:** The post shall be 2" square perforated galvanized tube 10'-0" or 12'-0" long. The post base shall be 2 1/4" square perforated galvanized tube 4'-0" long. The sleeve shall be 3'-0" x 3" I.D. pipe, galvanized and standard weight.

Concrete shall be Class A concrete.

**METHOD OF MEASUREMENT:** Method of Measurement shall be each sleeve, post base and post installed.

**BASIS OF PAYMENT:** The unit price bid for each sleeve shall include the cost of pipe, concrete, hardware, and other materials, labor and equipment necessary to complete the job to the satisfaction of the Engineer.

Payment will be made under:

ITEM NO.	ITEM	PAY UNIT
C685.06	Sign Post and Sleeve (10')	Each
C685.07	Sign Post and Sleeve (12')	Each

## **ADJUST FRAMES AND COVERS (PULL BOXES)**

**DESCRIPTION:** Under this item the Contractor shall adjust existing pullbox frames to match new grades as ordered by the Engineer.

**MATERIAL AND METHODS:** The Contractor shall adjust existing pullbox to new grades. The Contractor shall repair and perform whatever work related to the pullbox as necessary in order to establish an acceptable repair and adjustment.

**MEASUREMENT AND PAYMENT:** Payment will be per unit bid price and shall include the cost of excavation, the adjustment, any repairs and all the material, equipment and labor necessary to complete the work.

Payment will be made under:

<b>ITEM NO.</b>	<b>ITEM</b>	<b>PAY UNIT</b>
C685.08	Adjust Frames and Covers (Pull Boxes)	Each

## TRAFFIC SIGN

**DESCRIPTION:** Work shall conform to the requirements of NYSDOT Section 645 with the following modifications.

**MATERIAL:** The cut lengths of zinc coated (galvanized) sheet metal, of the sizes listed in the proposal, shall be commercially flat, free from oil, dry and ready for painting or adhesion of reflective sheeting. Trade marks, etc., are not to be stencilled on the sheets. The base metal shall be made by the open hearth, basic oxygen, or electric furnace process.

The sheets shall be 16 gauge (U.S.S.) thick.

A uniform zinc coating shall be applied to both sides of the base metal by one of the following processes. A perfect bond and amalgamation between the base metal and the coating shall be obtained.

- a. *Galvanized Sheet:* A uniform coating of zinc shall be applied to both sides of the base metal, immediately followed by a heating or galvanizing process.
- b. *Mill Phosphatized:* Galvanized sheets which have been chemically processed to obtain a smooth phosphate coating of crystals which are insoluble in water to prepare the surface for immediate painting without further preparation. The coating class shall be 1.25 commercial.

The material shall meet the requirements of G-90ASTM-A526-71 except where modified above.

**METHOD OF MEASUREMENT:** The quantity paid for will be the number of traffic signs installed in accordance with the contract documents or directed by the Engineer.

**BASIS OF PAYMENT:** The unit price bid for each complete sign shall not include the post or post foundations. The post will be paid for under the appropriate item, either Item C685.03, Item C685.04, Item C685.06 or Item C685.07.

Payment will be made under:

ITEM NO.	ITEM	PAY UNIT
C685.3101	Traffic Sign Size 8" x 24"	Each
C685.3102	Traffic Sign Size 8" x 30"	Each
C685.3103	Traffic Sign Size 8" x 36"	Each
C685.3201	Traffic Sign Size 12" x 18"	Each
C685.3202	Traffic Sign Size 12" x 24"	Each
C685.3203	Traffic Sign Size 12" x 30"	Each
C685.3204	Traffic Sign Size 12" x 36"	Each
C685.3301	Traffic Sign Size 18" x 18"	Each
C685.3302	Traffic Sign Size 18" x 24"	Each
C685.3303	Traffic Sign Size 18" x 30"	Each
C685.3304	Traffic Sign Size 18" x 36"	Each
C685.3401	Traffic Sign Size 24" x 24"	Each

<b>UNIT NO.</b>	<b>UNIT</b>	<b>PAY UNIT</b>
C685.3402	Traffic Sign Size 24" x 30"	Each
C685.3403	Traffic Sign Size 24" x 36"	Each
C685.3501	Traffic Sign Size 30" x 30"	Each
C685.3502	Traffic Sign Size 30" x 36"	Each
C685.3601	Traffic Sign Size 36" x 36"	Each
C685.3602	Traffic Sign Size 36" x 48"	Each
C685.3701	Traffic Sign Size 30" Triangle	Each
C685.3702	Traffic Sign Size 36" Triangle	Each
C685.3801	Traffic Sign Size 30" 5 Sides	Each
C685.3901	Traffic Sign Size 24" Octagon	Each
C685.3902	Traffic Sign Size 30" Octagon	Each
C685.3903	Traffic Sign Size 36" Octagon	Each
C685.3904	Traffic Sign Size 30" Circle	Each
C685.3905	Traffic Sign Size 36" Circle	Each

## REMOVAL OF SIGNS

**DESCRIPTION:** This work shall include the removal of existing signs designated on the plans or as specified by the Engineer. The sign components shall include sign panels, upright supports, bracing and structures. Signs designated for removal shall be delivered to the Monroe County Department of Public Works, Sign Fabrication Shop, 350 East Henrietta Road, at no extra cost to the County or the City of Rochester.

**REMOVAL OF SIGNS:** Existing traffic signs requiring removal only, shall be removed from the work site in a neat and workmanlike manner to the satisfaction of the Engineer.

**REMOVAL OF CONCRETE SIGN FOOTINGS:** All concrete sign footings shall be cut to a depth of 6 inches below existing ground and be replaced with suitable material as specified by the Engineer.

**METHOD OF MEASUREMENT:** The quantity to be paid for will be the number of completely removed signs having sign areas of the following sizes:

SIZE A:	0 to 10 Square Feet
SIZE B:	11 to 20 Square Feet
SIZE C:	21 to 40 Square Feet
SIZE D:	41 to 100 Square Feet
SIZE E:	Over 100 Square Feet

**BASIS OF PAYMENT:** The unit price bid for removing an existing installation shall be compensation in full for the furnishing of all labor, equipment and materials necessary to complete the work to the satisfaction of the Engineer.

Payment will be made under:

ITEM NO.	ITEM	PAY UNIT
C685.41	Removal of Signs - Size A (0 to 10 S.F.)	Each
C685.42	Removal of Signs - Size B (11 to 20 S.F.)	Each
C685.43	Removal of Signs - Size D (41 to 100 S.F.)	Each
C685.44	Removal of Signs - Size C (21 to 40 S.F.)	Each
C685.45	Removal of Signs - Size E (Over 100 S.F.)	Each

## RELOCATING SIGNS

**DESCRIPTION:** The work shall conform to the requirements of NYSDOT Section 647 with the following modification for Basis of Payment.

**BASIS OF PAYMENT:** The unit bid price for each relocated sign shall not include the installation of new sign posts. The sign post, if needed, will be paid for under the appropriate item, either Item C685.03 or Item C685.04.

Payment will be made under:

ITEM NO.	ITEM	PAY UNIT
C685.46	Relocating Signs - Size A (0 to 10 S.F.)	Each
C685.47	Relocating Signs - Size B (11 to 20 S.F.)	Each
C685.48	Relocating Signs - Size C (21 to 40 S.F.)	Each
C685.49	Relocating Signs - Size D (41 to 100 S.F.)	Each
C685.50	Relocating Signs - Size E (Over 100 S.F.)	Each

## MAINTAIN TRAFFIC SIGNAL EQUIPMENT

**DESCRIPTION:** Work shall conform to NYSDOT Section 619 with the following modifications:

The contractor shall complete traffic signal maintenance forms which shall be supplied by Monroe County Division of Highways and Traffic Engineering. These forms shall be turned in daily to the Engineer. Failure to comply with these requirements will result in a penalty of \$100 per calendar day for failure to properly maintain traffic signal equipment.

The start date for maintenance of traffic signals by the Contractor will be determined by the Division of Highways and Traffic Engineering and be paid by intersection months.

Payment will be made under:

ITEM NO.	ITEM	PAY UNIT
C686.1611	Maintain Traffic Signal Equipment	Intersection Month

## CONCRETE BASE REMOVAL (POLE OR CONTROLLER)

**DESCRIPTION:** The Contractor shall remove existing anchor bolt type pole bases and controller bases that are no longer required, and restore the area disturbed by the base removal.

**MATERIALS:** All materials used for restoration shall conform to the appropriate section of the New York State Department of Transportation Standard Specifications: Construction and Materials and as ordered by the Engineer.

**CONSTRUCTION DETAILS:** The Contractor shall remove the entire concrete base, or remove the top 22" to 24" of the concrete and anchor bolts. The Contractor shall backfill and restore the entire area disturbed by the base removal to an elevation level with existing ground. The restored surface area shall be replaced with material that matches existing adjacent surfaces. Sub-base course backfill material shall be consistent with the type of material used to restore the surface area.

**METHOD OF MEASUREMENT:** This item will be measured for payment as the number of each concrete base removed in accordance with the contract documents and as directed by the Engineer.

**BASIS OF PAYMENT:** The unit bid price for this item shall include the furnishing of all labor, materials, tools, equipment, and incidentals as necessary to complete the work, including excavation, removal and disposal of bases, and all materials for backfill, and to match adjacent surface area.

Payment will be made under:

ITEM NO.	ITEM	PAY UNIT
C686.5099	Concrete Base Removal (Pole or Controller)	Each

## SHIELDED LEAD-IN CABLE

6/90

**DESCRIPTION:** The Contractor shall furnish Shield Lead-in Cable that conforms to the requirements of NYSDOT Item 680.71 Shielded Lead-In Cable shall apply with the following modification:

**MATERIALS:** Only a polyethylene jacket will be permitted.

Payment will be made under:

ITEM NO.	ITEM	PAY UNIT
C686.71	Shielded Lead-in Cable	Linear Foot

## INDUCTANCE LOOP INSTALLATION AND SEALING

**DESCRIPTION:** The Contractor shall install inductance loops at the locations indicated on the plans and in accordance with the requirements of these specifications for saw cutting, sealing, lead-in conduit and conduit excavation.

**MATERIALS:** Loop embedding: Sealer shall be tar sealer. Tar sealer shall be 702-05 asphalt filler for joints and cracks as described in NYSDOT Section 702. Conduit and hold-down materials shall be as shown in Monroe County Standard Sheet.

**CONSTRUCTION DETAILS:** Inductance loops shall be installed in accordance with the Monroe County Standard Sheet.

**GENERAL:** This paragraph describes the work required for satisfactory completion of individual street loop detector installations. Upon completion of the work, each loop shall have been embedded in the roadway and each loop lead-in shall have been routed to the intersection cabinet location, connected to the appropriate terminal strip at the controller, and in all aspects be completely ready for connection to and operation with a detector amplifier unit. Detector installation tests shall be conducted with the detector terminated in the actual controller cabinet; however, temporary protective enclosures shall be acceptable with the approval of the Engineer in the case of cabinet delivery delays.

The component elements to be completed as part of each detector installation are described below.

**INSTALLATION REQUIREMENTS:** The Contractor shall, with the approval of the Engineer, locate each loop and all conduit and pull boxes in accordance with the plans and carry out all excavation, saw cutting, drilling, laying of wire, entry into existing conduits and new conduit placement as required for each detector installation.

The loop wire shall be laid in the sawed slots and run through a conduit stub to the curbside pullbox. The loop wire shall be applied to the shielded lead-in cable in the pullbox and the shielded lead-in cable pulled through conduit as shown on the plans and terminated at the intersection cabinet location. The sawed slots shall be sealed as specified with an approved material as stated above.

The detector installation must satisfy the requirements of the approved acceptance test described below, and the requirements of the special notes.

**TEST REQUIREMENTS:** The Contractor shall prepare vehicle detector acceptance test procedures and data forms for approval by the Engineer.

The Contractor shall conduct the approved vehicle detector acceptance test at each detector installation prior to acceptance of each installation by the County. The acceptance test shall, as a minimum, include megger checks to ground, and inductance measurement and a demonstration of proper detection of vehicle presence using a representative detector amplifier. All rate measurements shall be made at the termination point at the intersection cabinet location. Data forms approved by the Engineer shall be completed and turned over to the Engineer as the basis of acceptance.

At least one day's notice shall be given prior to all tests to permit the Engineer or his representative to observe each test.

**METHOD OF MEASUREMENT:** Inductance Loop Installation will be measured for payment as the number of linear feet actually installed in accordance with the Contract Documents or as directed by the Engineer.

Measurement will be made beginning at the inside wall of the pullbox. In the case of multiple loops at a single location, each loop will be measured separately along its respective full-depth saw cut beginning at the pavement cut-out, and the conduit between the pullbox and the cut-out will be measured once along the center of the conduit.

**BASIS OF PAYMENT:** The unit price bid per linear foot shall include the cost of pavement sawing, hold-down material, tar sealer, pavement cut-outs, conduit from pavement edge to pullbox, conduit excavation, and the furnishing of all labor, materials, tools, equipment, safety requirements and incidentals as necessary to complete the work. Inductance loop wire, pullboxes, shielded lead-in cable and loop detector modules will be paid for under their respective items.

Payment will be made under:

ITEM NO.	ITEM	PAY UNIT
C686.72	Inductance Loop Installation and Sealing	Linear Foot

**INDUCTANCE LOOP WIRE**

**DESCRIPTION:** The Contractor shall furnish Inductance Loop Wire that conforms to the requirements of NYSDOT Item 680.72 Inductance Loop Wire with the following modification:

**MATERIALS:** No flexible vinyl or polyethylene plastic tubing needed around the wire. The wire shall be XHHW.

Payment will be made under:

<b>ITEM NO.</b>	<b>ITEM</b>	<b>PAY UNIT</b>
C686.7201	Inductance Loop Wire	Linear Foot

## MODIFY TRAFFIC SIGNAL EQUIPMENT

**DESCRIPTION:** This work shall consist of modifying existing traffic signal equipment in accordance with the contract documents or the direction of the Engineer.

**MATERIALS:** All new materials installed under this Item shall conform to the New York State Standard Specifications.

**CONSTRUCTION DETAILS:** Where shown on the project plans or directed by the Engineer, existing traffic signal equipment shall be modified as specified in the contract documents.

Care shall be exercised in modifying equipment and cable so that it will remain in its original form and existing condition wherever possible. The Contractor will be required to replace, at his expense, any traffic signal equipment which is determined by the Engineer to have been damaged or destroyed by reason of the Contractor's operations.

Any existing equipment required to be modified and found to be in unsatisfactory condition by the Engineer through no fault of the Contractor shall be replaced by new equipment. The cost thereof will be paid for under the bid prices established, or if no applicable bid price exists, then paid for as extra work.

Where it is required to locate new cabinets on existing concrete base, it shall be required under this item to install new anchor bolts in a pattern to fit the new cabinet. Such anchor bolts shall be corrosion resistant steel, and installed to a minimum depth of 4" in a manner approved by the Engineer.

**METHOD OF MEASUREMENT:** Payment for modifying traffic signal equipment will be made on a lump sum basis. Payment will be made for the percent of lump sum as specified on the contract plans upon completion of the modified traffic signal equipment work specified at each location.

**BASIS OF PAYMENT:** The lump sum price bid for modified traffic signal equipment shall be full compensation for furnishing, transporting, installing and adjusting all materials; and for all labor, tools, materials, equipment and incidentals necessary to complete the work in accordance with the plans and specifications.

Payment will be made under:

ITEM NO.	ITEM	PAY UNIT
C686.77	Modify Traffic Signal Equipment	Lump Sum

## SIGNAL EQUIPMENT REMOVAL

6/90

**DESCRIPTION:** This work shall consist of removing traffic signal equipment as shown on the plans and as ordered by the Engineer.

**CONSTRUCTION DETAILS:** The Contractor shall carefully remove existing vehicle signal heads, mast arms, signal poles, pedestrian signal heads, pedestrian buttons and signs, sonic detectors, controllers, controller cabinets, span wires, and signal cable as shown on the plans.

The removed equipment shall be returned to the County of Monroe Division of Highways, Bridges and Traffic Engineering, Traffic Signal Complex, 350 East Henrietta Road, Rochester, New York.

Care shall be exercised in removing and salvaging electrical equipment so that it will remain in its original form and existing condition whenever possible. The Contractor will be required to replace at his own expense any traffic signal equipment which is determined by the Engineer to have been damaged or destroyed by the Contractor's operations.

**METHOD OF MEASUREMENT:** Payment for signal equipment removal will be made on a lump sum basis. Payment will be made for the percent of lump sum as specified on the contract plans upon completion of the signal equipment removal work specified at each location.

**BASIS OF PAYMENT:** The lump sum price bid for signal equipment removal shall include removal, handling, transportation and storage and all labor, tools, equipment and incidentals necessary to complete the work in accordance with the plans and specifications.

Payment will be made under:

ITEM NO.	ITEM	PAY UNIT
C686.79	Signal Equipment Removal	Lump Sum

## PEDESTRIAN PUSH BUTTON WITH SIGN

**DESCRIPTION:** Under this item the Contractor shall furnish and install new pedestrian push buttons and signs. The button shall be cast aluminum with a corrosion resistant microswitch.

### **MATERIALS:**

#### Cast Aluminum Case and Cover:

The case shall be an aluminum casting. The depth shall be a minimum of one and three-quarter inches. The rear shall be curved to permit mounting on four inch IPS pole as well as mounting on a flat surface.

At the rear of the case at the center shall be a wire entrance of three-quarter inch diameter.

One the vertical centerline, on one and one-quarters inch approximately centers shall be two holes for securing the case to a pole or cabinet. The case shall be reinforced at these holes to provide adequate bearing surface.

Four drilled and tapped holes shall be provided for mounting the cover upon the case with either boss upward.

#### Cover:

The cover shall be the same size as the case, so as to provide a smooth outline. A corrosion resistant push button shall be located in a well on the case. Over the push shall be smooth lip to minimize entry of water into the case. A drain hole shall be located in the bottom of the well and shall open to the bottom of the case.

Four countersunk holes shall be provided in the front of the case for mounting the cover on the case.

Four stainless steel allen head screws shall be provided to mount the cover.

The push button shall be made of non-corrosive material and the stem of the button that comes in contact with the housing shall be teflon coated or plastic so as to resist a corrosive environment and prevent sticking. As an alternate, a teflon sleeve may be inserted in the housing in lieu of coating the bottom stem.

#### Switch and Push Button:

The single pole momentary contact normally open switch shall be attached to the rear of the cover. The switch shall be entirely enclosed electrically and insulated from the housing and push button. All metal switch parts shall be of corrosion resistant material. Contacts shall be of a material suitable for usage in highway salty air atmosphere. Screw type terminals for lugs shall be provided for wire connections. The switch shall be capable of operating on 12 or 24 voltage circuit. All switches shall be of the micro type and shall be rated for 5 amp 125 VAC. No magnetic switches shall be used. The push button shall have a maximum diameter of 1/2 inch and shall not protrude more than 1/2 inch from outer cover.

#### Finish:

The entire assembly with the exception of the push shall be painted Federal Yellow on the outside as indicated on the plan.

**Sign:**

Pedestrian signs shall be in accordance with the details as shown on the plans.

**Warranty:** If a pedestrian button fails, the pedestrian button will be replaced by the supplier at no expense to maintaining agency, within a period of one year.

**METHOD OF MEASUREMENT:** The buttons and signs will be measured for payment as the number of each unit (button and sign) furnished and installed in accordance with the contract documents or as ordered by the Engineer.

**BASIS OF PAYMENT:** The unit bid price for each button and sign shall include all the items specified in the material and construction details including assembly and erection, as required.

**BASIS OF ACCEPTANCE:** Acceptance of buttons and signs covered by this specification will be based on manufacturer's certification of compliance with the specification requirements signed by an officer of the company. Detailed drawings of the buttons shall be submitted with the certification.

Payment will be made under:

ITEM NO.	ITEM	PAY UNIT
C686.8026	Pedestrian Push Button with Sign	Each

## MAST ARM TRAFFIC SIGNAL POLE ANCHOR BASE

6/90

**DESCRIPTION:** The Contractor shall furnish and install steel traffic signal poles as shown on the plans and as ordered by the Engineer.

**MATERIAL:** The steel poles herein specified are to be used for suspending traffic signal heads and luminaries.

Poles shall be the anchor base type and shall be either round or multisided, continuously tapered construction .14" per foot of length. The pole shall have a steel base electrically welded to the butt end of the pole. The anchor base shall telescope the butt end of the pole shaft and shall be continuously welded on the inside bottom and outside top. The pole shall be 22' in length, "3" gauge steel with a butt diameter of 11" and a bolt circle of 15" and have a minimum yield of 55,000 PSI in accordance with the latest ASTM specification.

The entire structure shall be hot dip galvanized in accordance with ASTM A123. The pole shall be one piece having no transverse joints or welds and no more than one longitudinal seam which shall be continuously welded and ground or rolled flush. Pole shall be of uniform cross section. The pole diameter shall be uniform at any cross section and the pole shall be straight. The poles shall be furnished with galvanized cast iron or aluminum removable pole caps and anchor bolt covers. Anchor bolt covers shall be attached to the base and pole by hex head bolts.

Galvanizing shall be in accordance with ASTM A123 specifications. Poles shall be furnished with a cast aluminum 3/8" dia. "J" hook bolted, or a 3/8" dia. galvanized steel "J" hook welded, inside the top of the pole and at an elevation 6" above the point of attachment of the mast arms. A grounding nut having 1/2" #13 tapped hole shall be located on the inside of the shaft above the handhole. The poles shall have a 4" x 8" reinforced handhole frame and removable cover located 12" to 15" from the butt end of the pole. Pole shall be furnished with 4-1-3/4" x 90", 60,000 p.s.i. anchor bolts. Each anchor bolt shall be threaded 6" minimum at the base-end and supplied with galvanized hexagon nuts and washers and lock nuts for this end. Anchor bolts shall be threaded 6" minimum at the base end and be provided with a 4" x 4" x 1" SQ steel nut for this end. The top 12" of the anchor bolts shall be hot dip galvanized. The pole shall be supplied with 2 brackets placed at right angles for attaching mast arms and at the elevation as shown on the plans. The bracket shall be continuously welded to the pole through the use of gusset plates, and shall be tapped to receive 1-1/4" high strength bolts in accordance with ASTM A325 as shown on the plans. The bracket shall be as shown on the plans. All welding shall be in accordance with the NYS Steel Construction Manual. All material shall be in conformance with Section 724-03 Material Requirements Section A of the New York State Standard Specifications.

**CONSTRUCTION DETAILS:** Poles shall be erected as specified on the Plans, Standard Sheets and as directed by the Engineer. Pole and signal locations shown on the contract plans shall be field checked for any condition that may affect their placement; where changes are necessary the exact location will be determined by the Engineer. When field conditions require a change in pole position from that shown in the contract plans, the pole and mast arm length requirements may vary. It shall be the Contractor's responsibility to verify pole and mast arm length before ordering poles and mast arms.

Pole erection shall include installation of poles and attachment of fittings as specified on the Plans and Standard Sheets as follows:

- a. Anchor bolt covers
- b. Weatherheads and couplings, if required
- c. Service bracket, if required
- d. Pole cap
- e. Cabinet mounting fittings, plates, brackets as needed for the cabinet being installed, if required,
- f. Reinforced couplings for wire entrances to cabinets, if required.
- g. Field galvanizing shall be in accordance with NYSDOT Section 719-01.

**METHOD OF MEASUREMENT:** Poles will be measured for payment as the number of each unit furnished and installed in accordance with the contract documents or as directed by the Engineer.

**BASIS OF PAYMENT:** The unit price for each pole shall include all the items specified in the construction details and the necessary grounding system, anchor bolts, pole assembly and erections and field galvanizing as required.

**BASIS OF ACCEPTANCE:** Acceptance of poles covered by this specification will be based on manufacturer's certification of compliance with the specification requirements signed by an officer of the company. Detailed drawings of the poles shall be submitted with the certifications.

Payment will be made under:

ITEM NO.	ITEM	PAY UNIT
C686.820030	Mast Arm Traffic Signal Pole Anchor Base (22')	Each

## MAST ARM TRAFFIC SIGNAL POLE COMBINATION ANCHOR BASE

6/90

**DESCRIPTION:** The Contractor shall furnish and install steel traffic signal poles as shown on the plans and as ordered by the Engineer.

**MATERIAL:** The steel poles herein specified are to be used for suspending traffic signal heads and luminaries.

Poles shall be the anchor base type and shall be either round or multisided, continuously tapered construction .14" per foot of length. The pole shall have a steel base electrically welded to the butt end of the pole. The anchor base shall telescope the butt end of the pole shaft and shall be continuously welded on the inside bottom and outside top. The pole shall be 30' in length, "3" gauge steel with a butt diameter of 11" and a bolt circle of 15" and have a minimum yield of 55,000 PSI in accordance with the latest ASTM specification.

The entire structure shall be hot dip galvanized in accordance with ASTM A123. The pole shall be one piece having no transverse joints or welds and no more than one longitudinal seam which shall be continuously welded and ground or rolled flush. Pole shall be of uniform cross section. The pole diameter shall be uniform at any cross section and the pole shall be straight. The poles shall be furnished with galvanized cast iron or aluminum removable pole caps and anchor bolt covers. Anchor bolt covers shall be attached to the base and pole by hex head bolts.

Galvanizing shall be in accordance with ASTM A123 specifications. Poles shall be furnished with a cast aluminum 3/8" dia. "J" hook bolted, or a 3/8" dia. galvanized steel "J" hook welded, inside the type of the pole and at an elevation 6" above the point of attachment of the mast arms. A grounding nut having 1/2" #13 tapped hole shall be located on the inside of the shaft above the handhole. The poles shall have a 4" x 8" reinforced handhole frame and removable cover located 12" to 15" from the butt end of the pole. Pole shall be furnished with 4-1-3/4" x 90", 60,000 psi anchor bolts. Each anchor bolt shall be threaded 6" minimum on the top end and supplied with galvanized hexagon nuts and washers and lock nuts for this end. Anchor bolts shall be threaded 6" minimum at the base end and be provided with a 4" x 4" x 1" SQ steel nut for this end. The top 12" of the anchor bolts shall be hot dip galvanized. The pole shall be supplied with 2 brackets placed at right angles for attaching mast arms and at the elevation as shown on the plans. The bracket shall be continuously welded to the pole through the use of gusset plates, and shall be tapped to receive 1-1/4" high strength bolts in accordance with ASTM A325 as shown on the plans. The bracket shall be as shown on the plans. The pole shall be fitted with a simplex fitting (2 bolt type) as shown on the plans or as directed by the Engineer. All welding shall be in accordance with the NYS Steel Construction Manual. All material shall be in conformance with Section 724-03 Material Requirements Section A of the New York State Standard Specifications.

**CONSTRUCTION DETAILS:** Poles shall be erected as specified on the Plans, Standard Sheets and as directed by the Engineer. Pole and signal locations shown on the contract plans shall be field checked for any condition that may affect their placement; where changes are necessary the exact location will be determined by the Engineer.

When field conditions require a change in pole position from that shown in the contract plans, the pole and mast arm length requirements may vary. It shall be the Contractor's responsibility to verify pole and mast arm length before ordering poles and mast arms.

Pole erection shall include installation of poles and attachment of fittings as specified on the Plans and Standard Sheets as follows:

- a. Anchor bolt covers
- b. Weatherheads and couplings, if required
- c. Service bracket, if required

- d. Pole cap
- e. Cabinet mounting fittings, plates, brackets as needed for the cabinet being installed, if required
- f. Reinforced couplings for wire entrances to cabinets, if required
- g. Field galvanizing shall be in accordance with NYSDOT Section 719-01.

**METHOD OF MEASUREMENT:** Poles will be measured for payment as the number of each unit furnished and installed in accordance with the contract documents or as directed by the Engineer.

**BASIS OF PAYMENT:** The unit bid price for each pole shall include all the items specified in the construction details and the necessary grounding system, anchor bolts, pole assembly and erections and field galvanizing as required.

**BASIS OF ACCEPTANCE:** Acceptance of poles covered by this specification will be based on manufacturer's certification of compliance with the specification requirements signed by an officer of the company. Detailed drawings of the poles shall be submitted with the certifications.

Payment will be made under:

ITEM NO.	ITEM	PAY UNIT
C686.820031	Mast Arm Traffic Signal Pole Combination Anchor Base (30')	Each

## CONCRETE POLE BASE EXTENSION

6/90

**DESCRIPTION:** The work under this item shall consist of extending an existing concrete pole base. The work shall conform to the requirements of NYSDOT Section 670 with the following modifications:

**MATERIALS:** The new top shall be Class A cast-in-place concrete.

The slurry bond coat shall be Acryl 60 as manufactured by Thoro System Products, or owner approved equivalent.

The threaded coupling and threaded nipple shall be 50,000 psi galvanized steel conforming to ASTM A449.

**CONSTRUCTION DETAILS:** Concrete pole base extensions shall be installed as shown on the detail drawings in the plans.

The Contractor shall excavate by hand at the locations shown on the drawings or as ordered by the Engineer.

Existing base will be scarified or removed to accommodate a 5" minimum Class A concrete top. Prior to pouring the new top, the existing top shall be covered with a slurry bond coat. Threaded coupling and threaded nipple shall be installed as shown in the drawing on the next page.

**METHOD OF MEASUREMENT:** The quantity paid for will be the number of pole bases actually extended in accordance with the plans, specifications, and as ordered by the Engineer.

**BASIS OF PAYMENT:** The unit price shall include the cost of all material and equipment necessary for making the excavation, extending the concrete pole base, removal and reinstallation of the existing pole (including shims, hardware, and electrical connections), and backfilling and restoring the surface, including topsoil and seed, or sidewalk, or as ordered by the Engineer.

Payment will be made under:

ITEM NO.	ITEM	PAY UNIT
C686.830000	Concrete Pole Base Extension	Each

## MAST ARM TRAFFIC SIGNAL

**DESCRIPTION:** The work shall consist of furnishing and installing new steel mast arms for traffic signals in accordance with the contract documents or directions of the Engineer.

**MATERIALS:** The steel arm masts herein specified are to be used for suspending traffic signal heads. The mast arm shall be galvanized steel of round tapered tubular construction, constructed in accordance with the latest ASTM Specifications. The arm shall be equipped with a steel flange plate electrically welded to the butt end of the mast arm. The steel flange plate shall telescope the butt end of the mast arm shaft and shall be continuously welded on the inside bottom and outside top. The entire mast arm assembly shall be hot dip galvanized in accordance with ASTM A123. The mast arm shall be furnished with four high strength steel bolts in accordance with ASTM A325 for attaching the arm to the pole. The mast arm shall be furnished with clamp and clevis assemblies for attaching traffic signal heads as shown on the plans. The mast arm shall be round continuously tapered construction .14" per foot of length. The arm shall be of one piece, having no more than one longitudinal seam, which shall be continuously welded and ground or rolled flush. Mast arm extension shall be as shown on the plans. Mast arm caps shall be as shown on the plans.

The mast arms shall be constructed to the sizes and dimensions shown on the plans.

All welding shall be performed in accordance with the New York State Steel Construction Manual.

All materials shall be in conformance with NYSDOT Section 724-03.

**CONSTRUCTION DETAILS:** Mast arms shall be erected as specified in the contract documents and as directed by the Engineer.

Mast arm and signal locations shown on the contract plans shall be field checked for any condition that may affect their placement; where changes are necessary the exact location will be determined by the Engineer. When field conditions require a change in mast arm length from that shown in the contract plans, the mast arm length requirement may vary. It shall be the Contractor's responsibility to verify mast arm length before ordering mast arms.

Mast arm erections shall include installation of mast arms and attachment of fittings as specified in the contract documents.

Field galvanizing shall be done in accordance with NYSDOT Section 719-01.

**METHOD OF MEASUREMENT:** The mast arms will be measured for payment as the number of each unit furnished and installed in accordance with the contract documents or as directed by the Engineer.

**BASIS OF PAYMENT:** The unit bid price for each mast arm shall include all the items specified in the material and construction details including assembly and erection, and field galvanizing as required.

**BASIS OF ACCEPTANCE:** Acceptance of arms covered by this specification will be based on manufacturer's certification of compliance with the specification requirements signed by an officer of the company. Detailed drawings of the arms shall be submitted with the certification.

Payment will be made under:

ITEM NO.	ITEM	PAY UNIT
C686.850010	Mast Arm Traffic Signal, 10' Length	Each
C686.850012	Mast Arm Traffic Signal, 12' Length	Each
C686.850014	Mast Arm Traffic Signal, 14' Length	Each
C686.850016	Mast Arm Traffic Signal, 16' Length	Each
C686.850018	Mast Arm Traffic Signal, 18' Length	Each
C686.850020	Mast Arm Traffic Signal, 20' Length	Each
C686.850022	Mast Arm Traffic Signal, 22' Length	Each
C686.850024	Mast Arm Traffic Signal, 24' Length	Each
C686.850026	Mast Arm Traffic Signal, 26' Length	Each
C686.850028	Mast Arm Traffic Signal, 28' Length	Each
C686.850030	Mast Arm Traffic Signal, 30' Length	Each
C686.850032	Mast Arm Traffic Signal, 32' Length	Each
C686.850034	Mast Arm Traffic Signal, 34' Length	Each
C686.850036	Mast Arm Traffic Signal, 36' Length	Each
C686.850038	Mast Arm Traffic Signal, 38' Length	Each
C686.850040	Mast Arm Traffic Signal, 40' Length	Each
C686.850042	Mast Arm Traffic Signal, 42' Length	Each

## COAXIAL CABLE INSTALLATION

### COAXIAL CABLE

**DESCRIPTION:** The Contractor shall furnish and install a one-half inch diameter, 75 ohm, flexible cable and connector to be used for the Rochester TCS communications interconnector.

The 1/2 inch diameter (nominal) cable shall employ an annularly, seam-welded copper outer conductor low density closed cell polyethylene foam dielectric and a copper-clad aluminum inner conductor. An outer plastic jacket shall be used so that the cable will withstand a moderate amount of scuffing when pulled through conduits without incurring any functional damage to the cable. The outer jacket shall be of a material resistant to the deteriorating action of sunlight.

Flooding compound between the plastic outer jack and the copper outer conductor shall not be required, since no direct burial environment exists in the Rochester TCS.

### ELECTRICAL CHARACTERISTICS

**Impedance:** The characteristic impedance shall be  $75 \pm 3$  ohms when tested by measurement of capacitance and resonant frequency per Section 4.6.12 of MIL-C-17D.

**Phase Velocity:**  $88 \pm 2$  percent (velocity of propagation in the cable).

**Cable Attenuation:**

0.22dB/100 ft. at 10MHz Nom.  
0.70dB/100 ft. at 100MHz Nom.  
1.25dB/100 ft. at 300MHz Nom.

**Average Power Rating:** The cable shall be capable of handling 700W at 300 MHz with a VSWR of 1.0, ambient temperature of 40 degrees C, and an inner conductor temperature rise of 60 degrees C.

**Inner Conductor Resistance:** The inner conductor resistance shall be 1.3 ohm/1,000 ft., maximum.

**Outer Conductor Resistance:** The outer conductor resistance shall be 0.65 ohm/1,000 ft., maximum.

**Cable Capacitance:** 15.5 pico farads/ft. (nominal).

**Continuity:** The conductor continuity shall be continuous when tested in accordance with MIL-C-23806.

**Insulation Resistance:** The insulation resistance shall not be less than 100,000 megohms per 1,000 feet when tested in accordance with MIL-C-23806.

**Dielectric Strength:** The cable shall withstand 6,000 volts when tested in accordance with MIL-C-23806 except voltage will be D.C. rather than A.C.

**Jacket Spark:** The jacket shall withstand 8,000 VAC (60Hz) when tested in accordance with MIL-C-23806.

## MECHANICAL CHARACTERISTICS

Center Conductor: The center conductor shall be copper-clad aluminum. The conductor diameter shall be 0.118", nominal.

Dielectric: The dielectric material shall be unicellular foam, flexible, polyethylene. The dielectric shall be mechanically locked to the outer conductor and bonded to the inner conductor to eliminate differential expansion.

Outer Conductor: The outer conductor of the cable shall be seam-welded, annularly corrugated copper (99.9% minimum copper content), 0.010" thick. The outside diameter of the corrugated copper outer conductor shall be 0.540" minimum.

Jacket: The jacket shall be Bakelite DFD 6005, weather resistant polyethylene with a nominal wall thickness of 0.060". The color shall be orange in accordance with Wilson Color Concentrate #30-OR-A115.

Minimum Bend Radius: The minimum bend radius of the cable shall be 5 inches.

Bending Moment: The product of force times moment arm to bend the cable over a 5 inch radius shall not exceed 3 foot-pounds.

Tensile Strength: An axial load of 200 pounds shall not cause more than a 0.2% permanent elongation.

Number of Bends: The cable shall be capable of surviving fifteen 180 degree reverse bends over a 5" radius without breaking the outer or inner conductor, or becoming oval shaped. The cable is oval shaped when diameter measurements taken at 90 degrees from each other vary by more than 10%.

Workmanship: The cable shall be manufactured and processed by best commercial practices, to be of uniform quality and free from defects that will affect life, serviceability or appearance.

Construction Requirements and Materials: The 1/2 inch corrugated coaxial cable shall be installed throughout the conduit system as shown on the plans.

## COAXIAL CABLE INSTALLATION

**DESCRIPTION:** This section describes the requirements for the installation of the 1/2 inch flexible coaxial cable specified for the Rochester TCS interconnect. The routing of this cable is defined in the contract plans. Changes to cable routing shall be made only at the explicit direction of the Engineer.

### Conduit Preparation:

The Contractor shall have prepared the conduit for pulling coaxial cable under other bid items of this contract.

### Cable Pulling Aids and Handling Precautions:

The 1/2 inch flexible cable shall be attached to the pulling cable by means of a braided pulling sleeve of 3 feet minimum length. Pulling force shall not exceed 200 pounds and shall not cause more than a 0.2% permanent elongation. A quick-disconnect pulling harness shall be employed to insure that the pulling force is not exceeded.

The cable jacket shall be lubricated with a neutral lubricant that will not attack the polyethylene jacket to minimize pulling friction. An "elephant trunk" cable guide shall be employed between the top of the manhole and the entrance end of the conduit to prevent cable damage where deemed necessary by the Engineer.

Caution shall be observed by the Contractor in pulling of cable through the conduits to prevent damage to cable jackets, shields and conductors. When a cable is pulled into a conduit the end of the cable shall be covered with polyvinyl chloride shrink sleeving to exclude moisture, and it shall be so kept until connections are made with terminations equipment. Both the shrink sleeving and the manner in which it is applied shall be approved by the Engineer before being used.

Cable pulleys shall be used at all locations where a change in direction of the cable would otherwise create excessive pulling drag. Mechanical pulling aids may be used providing the pulling forces do not exceed the maximum tensile limit of 200 pounds for the coax cable. Reel brakes shall be provided to ensure that the cable does not "kink" coming off the reel.

#### Cable Connections and Splicing:

All cable connections shall be made above ground in the controller cabinets as designated by the plans. The method of connector attachment is described in attachment procedures.

No splicing of the coax cable shall be permitted except at times and in locations approved by the Engineer. When splicing is permitted, it shall be performed using male in-line coaxial connectors. A female 5/8-24 joining connector shall be used between the two cable ends to join them together. All splicing connectors shall be covered with polyvinyl chloride shrink sleeving applied by an approved method to form an immersion-proof connection. The application and method shall be approved by the Engineer before being used in each location where splicing is permitted.

#### Cable Installation Between the Manhole or Pull Box and Cabinet:

When pulling the cable from the nearest manhole or pull box to the equipment or controller cabinet at curb-side, it shall not be broken and spliced to a second interconnecting cable to complete the run.

Instead a length of cable shall be pulled out of the exit end of the primary conduit in the manhole or pull box sufficient in length to reach the designated equipment cabinet at curb side. A pull cable shall be used in the manhole or pull box to conduit to pull this remaining length of cable through and up into the cabinet with sufficient length to reach the amplifier, or tap, to which it is to be connected.

Cable coiling in the manhole or pull box will be as ordered by the Engineer. The coil shall be tied back to prevent interference with other cabling in the manhole or pull box or with access to junction boxes, etc.

#### Attachment Procedure for 5/8" x 24 Connectors:

The following procedure shall be used to prepare the coax cable end and attach the 5/8" x 24 connectors used for all splices and cable connections:

1. Step 1: Measure from end of cable 3 1/8 inch. Remove outer plastic jacket for this length. Make a clean square cut using a sharp metal tubing cutter such as Rigid Tool #104\*. Slit length of jacket to be removed with an Xacto knife, or single edge razor, and remove jacket.  
See diagram at end of section. \* McMasters Catalog #84, Part No. 2764A12.

2. Step 2: Scribe a line on corrugated outer conductor ridge to nearest 1 1/4 inch from jacket cut.  
(Do not put clamping nut on at this stage.)

Align cutting wheel of tubing cutter on scribed line and proceed to cut through copper outer conductor. Avoid cutting deeply into foam dielectric.  
See diagram at end of section.

3. Step 3: Using a BX cable conduit cutter (McMasters - Carr #3760A11, or equivalent\*) make a longitudinal cut from end of cable to circular cut in outer conductor (Point A to Point B in diagram). This cut should be no closer than approximately 1/4 inch to the circular cut at B. Finish longitudinal cut with minisnips, or small diagonal cutters. Peel outer conductor off without use of pliers.

\* McMasters Catalog #84, Part No. 37060A11.

4. Step 4: Detach foam dielectric. Separate all foam dielectric completely from edge of outer conductor to assure good electrical contact with outer body. Refer to enlarge cutaway view in Step 5 which illustrates positive grip of outer conductor between clamping nut and outer body. Use tip of knife and work around entire circumference. Remove burrs from inside edge of outer conductor with knife. Use wire brush to remove copper particles from foam. Clean remainder of foam from center conductor with medium grade garnet cloth, especially outer half inch of conductor. (It is not necessary to strip all of the dielectric from the center conductor along its inner 3/4 inches). Under cut the end of the copper outer conductor with knife and trim with flat file.

See diagram at end of section.

Add thin red "O" ring gasket to second fully exposed corrugation groove jacket. Apply thin coating of silicone grease to outer surface.

5. Step 5: Inspect contact surface. Thread outer body onto clamping nut and tighten with wrenches. Turn outer body only, do not turn clamping nut. While connector is assembled, trim exposed inner conductor to 1 3/16 inch (30mm). Disassemble connection to inspect for good metal-to-metal contact. See diagram at end of section.

6. Step 6: Add "O" ring gaskets. Place small "O" ring gasket into groove in outer body, and thick red "O" ring gasket into groove in clamping nut. Add thin coating of silicone grease to outer surfaces of gaskets.

Grounding: The copper outer conductor must make intimate contact with the back nut contract fingers after assembly of the 5/8 x 24 male cable connectors. The cable ground return is made via the outer copper jacket to the ground rod.

## ENVIRONMENTAL REQUIREMENTS

Operating Temperature: The operating temperature range of the cable shall be -40 degrees F to +165 degrees F.

Installation Temperature: The cable shall be capable of being installed over a temperature range of -40 degrees to +120 degrees F.

Water Immersion: The cable shall be capable of indefinite operation with no measurable change in its electrical characteristics when subjected to immersion in water.

All other environmental conditions for communication cable shall conform to NEC Code 1975, Article 820-10 through 820-22. Refer to National Electrical Code of 1975 (ANSI C1-1975).

## MALE CONNECTORS FOR 1/2 INCH FLEXIBLE COAXIAL CABLE

Mechanical Requirements: The 5/8 inch x 24 connector shall be constructed of brass with a protective plating of nickel, or other suitable non-corrodible plating. A fluorocarbon center conductor spacer, or insert shall be used. Rubber, or neoprene, "O" rings shall be provided for prevention of moisture intrusion between the cable outer conductor and the connector body as well as an "O" ring for sealing the back of the connector to the cable outer plastic jacket.

The connector shall be a male connector which utilizes the center conductor of the cable itself as the center pin of the connector. Connector thread size shall be 5/8 inch diameter x 24 threads/inch to mate with all standard CATV amplifiers and passive hardware, such as taps, power dividers and terminations.

"O" Rings:

The connector will incorporate a minimum of two "O" rings of a material compatible with silicone grease. One must seal the inside connector body to the corrugated outer conductor of the coaxial cable by seating in one of the corrugation grooves. The second "O" ring must seal the back of the connector to the cable outer jacket. A minimum of parts shall be used for the sake of economy of construction and ease of assembly.

Back Part:

The back part, or clamping nut, of the connector shall incorporate some form of finger stock construction which shall make intimate contact to an outer conductor corrugation groove when the connector is fully assembled. This must provide solid electrical (ground) continuity between the cable outer conductor and the connector body when assembled.

Length:

Overall length of the assembled connector shall not exceed 2 1/8 inches.

Electrical Requirements

Impedance:

Characteristic  $Z_0$  of the connector shall be  $75 \pm 2$  ohms when assembled on the end of the 1/2 inch flexible corrugated coaxial cable.

Environmental Requirements:

All passive components shall function normally under the following environmental conditions.

Temperature Range:

-35 degrees F to +165 degrees F.

Humidity:

100 percent at 70 degrees F.

Immersion:

No water shall enter the cable connectors, or cable interfaces, when fully immersed in water at a temperature of 80 degrees F for a period of 2 hours minimum.

**QUALITY ASSURANCE PROVISIONS**

Production Tests: The following tests shall be made by the Contractor on all cable manufactured and furnished for this specifications. These tests shall be made, certified to be in accordance with this specification and signed by an authorized representative of the Contractor. A copy of the test results shall be furnished to the Engineer for all delivered cable.

1. Continuity
2. Insulation Resistance
3. Dielectric Strength
4. Jacket Spark Test

5. Structural Return Loss shall be performed from 5-300MHz in the following manner:

A frequency sweeper and bridge shall be employed to measure structural return loss. All cable reels to be delivered shall be so inspected. Any reading of structural return loss of less than 20dB shall be cause for rejection of said reel of cable.

**Pre-installation Conditions of Acceptance and Post-Installation Tests:**

No cable which shows bruises or shipping damages shall be installed in the Rochester TCS system. All cable shall be visually inspected by the Engineer for such damage as the cable is payed out during installation. The Contractor shall return damaged cable to the Manufacturer and replace it at no cost to the County.

**Post-Installation Tests:** After the cable is installed and connectors attached to the cable shall be subjected to two tests. First the cable shall be tested between equipment cabinets using a Time Domain Reflectometer (TDR), to reveal any electrical discontinuities due to cable damage, or improper connector attachment. The cable shall be properly terminated at the far end of the test run with a 75 ohm termination for this test.

Secondly, each cable run between cabinets shall be subjected to a test for excess losses by means of any automatic electronic Megger (Megohm Ohmmeter) of late design with the ends of the cable open circuited (no termination at either end). The insulation resistance shall not be less than 100,000 megohms per 1,000 feet when tested in accordance with MIL-C-23806. All cable which fails to pass either test shall be removed and replaced at no cost to the County.

**METHOD OF MEASUREMENT:** The quantity to be paid for in this item shall be the lineal feet of furnished and installed cable.

**BASIS OF PAYMENT:** The price bid shall be a unit price per linear foot of furnished, installed, terminated with coaxial cable connectors and tested cable. No payment will be made for cable which fails to pass the specified post-installation tests. The costs of all cable connectors, hooks, racks, and other devices for supporting the cable in manholes, pull wire, material, installation labor, tools and equipment required for cable installation shall be included in the unit price of this item.

Payment shall be made for each installed section upon successful completion of the approved communications network test.

Payment will be made under:

ITEM NO.	ITEM	PAY UNIT
C686.9916	Coaxial Cable Installation	Linear Foot

## REMOVAL OF COAXIAL CABLE

**DESCRIPTION:** Under this item the Contractor shall remove existing coaxial cable as indicated on the plans.

**CONSTRUCTION REQUIREMENTS:** Prior to and after removal the Contractor shall perform the following tests:

1. The cable shall be tested between equipment cabinets using a Time Domain Reflectometer to reveal any electrical discontinuities.
2. The cable shall be tested for excess loss by means of an automatic electronic Megger with the ends of the cable open circuited. The insulation resistance shall be not less than 100,000 megohms per 1,000 feet when tested in accordance with MIL-C-23806.

All cable which fails either test after removal shall be replaced by the Contractor at no cost to the County.

Prior to removing the cable, the connectors shall be removed and returned to County Traffic Engineering. Care shall be taken when removing the cable to avoid kinking or damaging. The cable shall be coiled on large diameter reels and delivered to the County of Monroe, Division of Traffic Engineering. Each piece of cable shall be tagged with the length indicated. The cable shall not be bent less than a 10" radius at any time. Special pulleys or shoes may be used to assure minimum bending. The pulling tension in removal cannot exceed 200 pounds so as not to stretch the cable.

**METHOD OF MEASUREMENT:** The quantity to be paid for shall be the linear feet of cable removed.

**BASIS OF PAYMENT:** The price bid shall be a unit price per linear foot for removing all cable including all labor, tools and equipment required for removal.

Payment shall be made after testing and delivery to the County Division of Traffic Engineering.

Payment will be made under:

ITEM NO.	ITEM	PAY UNIT
C686.9917	Removal Of Coaxial Cable	Linear Foot

## **GALVANIZED STEEL PEDESTRIAN SIGNAL POLE**

**DESCRIPTION:** The Contractor shall furnish and install steel pedestrian signal poles as shown on the plans and as ordered by the Engineer.

**MATERIAL:** The pole shall consist of a shaft of 4 1/2" diameter with anchor base, handhole, and pressed steel pole cap, with cap screws. The pole shall be 14'0" overall. Pole shall maintain a minimum safety factor of 1.82 based on yield strength for basic wind pressure of 33 psf.

The shaft shall be made from the best grade hot rolled basic open hearth steel of not less than #11 Manufacturer's Standard Gauge, and it shall be formed, welded and longitudinally cold rolled under sufficient pressure to flatten the weld, form a round tube and improve the physical characteristics of the metal to insure minimum yield strength of 48,000 psi. Shaft shall be made from one length of steel sheet.

The shaft may be four (4) inch nominal diameter standard weight pipe at the option of the bidder.

A one-piece cast steel anchor base conforming to ASTM A27-58, Grade 65-35, or the latest revision thereof, of adequate strength, shape and size with a scalloped top flange shall be secured to the lower end of the shaft by two continuous electric arc welds. The base shall telescope the shaft. One weld shall be on the inside of the base at the end of the shaft, and the other weld shall be on the outside of the shaft at the top of the base. Four removable cast iron or aluminum covers conforming to ASTM A126-42, Class A, or the latest revisions thereof, shall be provided with each base and shall be attached to the base by hex head cap screws. A ventilation hole shall be provided in the shaft at each anchor bolt location.

A grounding nut having 1/2" #13 tapped hole shall be located on the inside of the shaft immediately above the weld.

Four high strength steel anchor bolts will be included, each fitted with a hexagon nut, a heavy square leveling nut and a lock washer. Each anchor bolt shall have an "L" bend at the ends and all nuts and washers shall be galvanized. The anchor bolts shall be capable of resisting at yield strength and the bending moment of the shaft at its yield strength stress.

A handhole, 3" x 5" in size, consisting of a steel reinforcing frame securely welded into the shaft and with a removable steel handhole cover assembly shall be furnished with each hole.

The pole, including all component parts, shall be hot dipped galvanized inside and outside in accordance with the applicable specifications for zinc coating ASTM A123, or the latest revisions thereof. All threaded holes shall be tapped clean and greased with a silicone grease.

**CONSTRUCTION DETAILS:** Poles shall be erected as specified on the plans, Monroe County Standard Sheets and as directed by the Engineer.

Pole and signal locations shown on the contract plans shall be field checked for any condition that may affect their placement; where changes are necessary the exact location will be determined by the Engineer.

Pole erection shall include installation and attachment of fittings as specified on the plans and standard sheets as follows:

- a. Anchor bolt covers
- b. Weatherheads and couplings, if required

- c. Pole caps
- d. Reinforced couplings for wire entrances, if required

**METHOD OF MEASUREMENT:** Poles will be measured for payment as the number of each unit furnished and installed in accordance with the contract documents or as directed by the Engineer.

**BASIS OF PAYMENT:** The unit price bid for each pole shall include all items specified in the construction details and the necessary grounding system, anchor bolts, pole assembly and erections and field galvanizing as required.

**BASIS OF ACCEPTANCE:** Acceptance of poles covered by the specification will be based on manufacturer's certification of compliance with the specification requirements signed by an officer of the company. Detailed drawings of the poles shall be submitted with the certifications.

Payment will be made under:

ITEM NO.	ITEM	PAY UNIT
C686.9941	Galvanized Steel Pedestrian Signal Pole	Each

## PULLBOX

**DESCRIPTION:** The Contractor shall furnish and place pullboxes as shown on the plans or as directed by the Engineer.

**MATERIALS:** The pullboxes shall be built of Class A concrete, or may be an approved pre-cast pullbox. The Contractor shall submit drawing of pre-cast pullboxes to the Engineer for approval.

Concrete shall be in accordance with NYSDOT Section 501- Portland Cement Concrete and shall be Class A.

Common Brick shall conform to the NYSDOT requirements of 704-01 Common Brick. Approved pre-cast pullboxes may be used with the approval of the Engineer.

The pullbox shall have a cable bracket support on each of the four walls as shown on the Plans.

All frames and covers shall meet the NYSDOT requirements for 715-05 Iron Castings, and shall conform to the detail as shown on the Plans.

**CONSTRUCTION DETAILS:** Pullboxes shall be constructed and installed in accordance with the details specified on the Standard Sheets, Plans, or as directed by the Engineer.

Cast iron frames and covers shall be furnished and placed on each pullbox. They shall be set in mortar and placed true to line and grade and make full and even bearing on the underlying construction surface. The frame and cover shall be as shown on the standard sheet or plans. Frames and covers which do not fit together properly will be rejected by the Engineer and shall be removed from the site.

**METHOD OF MEASUREMENT:** The pullboxes will be measured for payment as the number of each unit furnished and installed in accordance with the contract documents or as directed by the Engineer.

**BASIS OF PAYMENT:** The unit bid price for each pullbox shall include all concrete, reinforcing steel, crushed stone or gravel, or sand, extensions, excavating and backfill, frames, covers, restoration of surfaces, cable, brackets, and furnishing all labor, materials and equipment necessary to complete the work.

Payment will be made under:

ITEM NO.	ITEM	PAY UNIT
C686.994401	Pullbox (24")	Each
C686.994402	Pullbox (30")	Each

## MODIFY TRAFFIC SIGNAL CABLE

**DESCRIPTION:** The Contractor shall modify traffic signal cable as shown on the plans and as ordered by the Engineer.

**MATERIALS:** All new materials used under this item shall conform to NYSDOT Section 680-2.01.

**CONSTRUCTION DETAILS:** The Contractor shall carefully remove the existing traffic signal cables from the existing controller cabinet and pull them back to the pull box or manhole shown on the plans. Any power cable that is to be relocated shall be re-energized before relocation. The Contractor shall reinstall the traffic signal cables and wire to the new controller cabinet as shown on the plans and as ordered by the Engineer. The Contractor shall be responsible for determining if the length of existing cable is adequate to perform the modification before the work is begun. If the existing cable appears too short to perform the modification, he shall notify the Engineer.

**METHOD OF MEASUREMENT:** This item will be measured for payment as the number of each intersections at which signal cables and wire from the existing controllers are modified.

**BASIS OF PAYMENT:** The unit price bid shall include the furnishing of all labor, materials, tools, equipment and incidentals necessary to complete the work. Any cables damaged by the Contractor shall be replaced at the Contractor's expense. No splicing will be allowed.

Payment will be made under:

ITEM NO.	ITEM	PAY UNIT
C686.9955	Modify Traffic Signal Cable	Each