

ITEMIZED SPECIFICATION NUMBER ONE

WATER MAINS

1.1 **SCOPE** - This item shall include furnishing and installation of the water mains, including all fittings and other appurtenances and the making of all connections and providing temporary service, as herein specified and as shown on the Drawings. The water main may be of ductile iron pipe or of PVC Pipe.

1.2 **DUCTILE CAST IRON PIPE** - Ductile cast iron pipe shall be designed in accordance with ANSI/AWWA C151/A21.51. The pipe shall be coated with a bituminous material on the outside and shall be cement mortar lined in accordance with ANSI/AWWA C104/A21.4.

1.3 **PVC PIPE** - PVC pipe shall meet the requirements of ANSI/AWWA C900 and shall be DR 14, 200 pressure class, with cast iron pipe equivalent O.D. for sizes 4-inch through 12-inch. PVC Pipe shall meet the requirements of AWWA C909, 200 pressure class with ductile iron equivalent O.D. for sizes 4-inch through 24-inch. Pipe shall be of the integral wall-thickened bell end type incorporating elastomeric gaskets to affect the pressure seal. Pipe shall have a nominal laying length of 20 feet. Pipe shall be designed for direct connection into ductile cast iron pipe and fittings.

The CONTRACTOR shall be required to install detectable tracer tape directly over and on the center of the PVC Main for its entire length to provide a reflection path (inductive) to determine pipe alignment and location after installation.

Detectable tracer tape shall consist of a continuous aluminum foil core inseparably bonded on both sides with tough high density cross laminated plastic films pigmented in blue warning colors. Bond strength of the tracer tape must prevent pitting or degradation after 300 hours continuous testing per ASTM B-117. Tracer tape shall have final elongation of three times its original length before parting. Detectable tracer tape on the above project shall be equal to ALARMATAPE as manufactured by PAUL POTTER WARNING TAPES, INC., Wheaton, Illinois; or equal. Specify catalog numbers #AT-3100-BW, 3" x 1000 foot rolls with identification "BURIED WATERLINE BELOW". Identifying printing shall be in 1-1/2 inch high bold black letters repeated every 21 inches. 3" wide ALARMATAPE is to be buried 30 inches deep.

All new non-metal water mains shall be installed with tracer wire. In open trench installations, the wire shall be 12 AWG (min.) copper wire coated with a 30-mil (min.) polyethylene jacket designed specifically for buried use. In directional bore installations, the wire shall be 8 AWG (min.) coated with a 30-mil (min.) polyethylene jacket designed specifically for buried use.

The tracer wire shall be connected to the pipe with tape at 15 foot intervals maximum, the wire

shall not be wrapped around the pipe. It shall be installed continuously with access points at 300 feet maximum and any change in direction. The tracer wire shall be brought to the ground surface at the access point. Provide an extra 24" of wire at all access points. Access points may include a valve box, vault, tracer wire access box or other covered access devices and the covers shall be clearly marked WATER.

Metallic pipes do not require a tracer wire. Metallic pipe systems require access points along the route for direct connection.

Splices in the tracer wire shall be connected by means of a split bolt or compression type connector to ensure continuity. Wire nuts shall not be used. A waterproof or corrosion-proof connector for direct bury applications shall be used. After installation, the tracer wire shall be tested to verify continuity of the tracer wire system.

The use of tracer wire shall not eliminate the requirement of tracer tape.

1.4 **FITTINGS** - Fittings shall be of ductile cast iron, shall conform to ANSI/AWWA C153/A21.53 and shall be coated and lined as specified for the pipe. Fittings shall be of mechanical joint or push-on joint type. Provide required standard and tapped mechanical joint plugs and caps to accommodate appurtenances to the main for testing and sterilization.

Mechanical joints and push-on joints shall be in accordance with ANSI/AWWA C111/A21.11, incorporating rubber gaskets. With push-on joints, the surfaces to be in contact with the rubber gasket shall be wiped clean and dry just prior to making the joint and, when making the joint, a lubricant shall be used in accordance with the manufacturer's recommendations. With mechanical joints, the surfaces to be in contact with the rubber gasket shall be brushed with soapy water to remove all sand and grit just prior to making the joint.

When pipe couplings are required, the pipe shall be furnished with grooved or shouldered ends properly machined to receive the couplings.

All costs required for furnishing and installing fittings, plugs, caps and appurtenances shall be included in the price bid per lineal foot for the water mains.

Whenever it is necessary to cut the pipe at fittings, valves, specials or elsewhere, the remaining portions may be used where possible to minimize the number of scrap pieces when the project is complete. **SCRAP PIECES LESS THAN 5-FEET IN LENGTH SHALL NOT BE USED WHERE A FULL PIPE LENGTH CAN BE INSTALLED.**

1.5 **INSPECTION AND REJECTION** - All pipes, fittings, etc. shall be appropriately marked for the purpose of identification.

The materials and methods of manufacture shall be subject to inspection at all times, and the

complete pipes, fittings, etc. shall be subject to inspection and rejection at the factory, trench or other point of delivery.

Further, all are subject to rejection when defects are discovered until the final completion and adjustment of Contract.

1.6 **MANUFACTURER'S AFFIDAVIT** - The manufacturer shall furnish an affidavit indicating that all tests and requirements of the pipe, fittings and appurtenances have been fully met.

1.7 **PIPE LAYING** - Pipe sections shall be strung along the route of the mains so as to interfere least with pedestrians and vehicular traffic and to protect the pipe as fully as possible. Care shall be taken at all times in handling the pipe so as not to injure it in any way and at no time shall other pipes or material be placed in the pipes.

Heavy equipment shall not be driven over streets, but shall be moved by trailer.

The mains shall be laid in the locations and at the grades shown on the Drawings, except as specifically permitted or ordered otherwise by the ENGINEER in order to avoid existing or proposed utility lines or any other obstructions encountered in the progress of the work, to secure a more readily accessible position for trenching, or to facilitate the location of various appurtenances of the mains. CONTRACTOR is cautioned to pay particular attention to proposed utilities to eliminate possible future conflicts.

Wherever new water mains are installed parallel to an existing or proposed sewer they shall be laid at least 10 feet horizontally from any existing or proposed sewer. The distance shall be measured edge to edge.

Water mains crossing sewers shall be laid to provide a minimum vertical distance of 18-inches between the outside of the water main and the outside of the sewer. This shall be the case where the water main is either above or below the sewer. At crossings, one full length of water pipe shall be located so both joints will be as far from the sewer as possible. Special structural support for the water and sewer pipes may be required.

No water pipe shall pass through or come in contact with any part of a sewer manhole.

Existing utilities or other obstructions along the route of the mains shall be located and the elevation determined at least 200 feet in advance of pipe laying. All utilities, when encountered shall be adequately supported, shored up or otherwise protected whenever exposed in the excavation as approved by the ENGINEER. Such supports, shoring, etc. shall be paid for by the CONTRACTOR. The design of shoring and supports shall be the responsibility of the Contractor. While the Drawings indicate the location of existing utilities in accordance with the

best information presently available neither the OWNER nor the ENGINEER assumes any

responsibility for the accuracy of their location or that all utilities are shown.

When abrupt changes in the grade of the main are necessary to avoid existing utilities or other obstructions, suitable fittings, usually 1/16 bends, shall be used unless otherwise specified, so as to secure an easy flow of liquid and to provide sufficient cover below same. Pipe shall be so located with respect to other utilities so as to allow for taps to be inserted. A minimum clearance of one foot in all directions shall be maintained.

All pipes shall be thoroughly cleaned inside and outside before being lowered into the trench; shall be kept clean during and after laying; and the end of the pipe shall be plugged to exclude water, animals or other foreign material from entering the pipe when pipe laying is stopped for any reason.

1.8 **TRENCHES** - Except where otherwise specifically required or permitted by the ENGINEER, the mains shall be laid in open trench excavated to a depth sufficient to provide not less than 4.5 feet of vertical cover, unless otherwise noted. However, pipes shall be installed at a greater depth when shown on Drawings; when necessary to pass under other utilities or obstructions; or where necessary to prevent high points in the main.

Sufficient space shall be provided in the trench for properly making the joints without raising the length of pipe above the solid bottom of the trench. Care shall be taken to detect and remove any large stones or other debris that might be encountered in the bottom of the trench which would damage the pipe or be detrimental to the proper bedding of the pipe.

Where the pipe lines enter the paved limits of a street, alley, driveway or parking area, the pavement shall be neatly saw cut and the main installed in an open trench.

Trenches in rock shall be excavated to a depth of at least 6-inches below the outside bottom of the pipe barrel and joint when the pipe is laid on its final grade. The width of the trench shall not be more than 24-inches greater than the outside diameter of the pipe, except at joints, where sufficient space shall be provided for properly making the joint.

Trench excavation shall include the removal of existing pavements, curbs and sidewalks.

1.9 **MECHANICAL JOINT RESTRAINT** - Pipe shall be anchored at dead ends, bends, tees, valves and other fittings requiring restraint by means of mechanical joint restraint. Mechanical joint restraint shall be incorporated in the design of the follower gland and shall include a restraining mechanism which, when actuated, imparts multiple wedging action against the pipe, increasing its resistance as the pressure increases. Flexibility of the joint shall be maintained after burial. Glands shall be manufactured of ductile iron conforming to ASTM A 536-84 (2004).. Restraining devices shall be of ductile iron heat treated to a minimum hardness of 370 FHN. Dimensions of the gland shall be such that it can be used with the standardized mechanical joint bell and tee-head bolts conforming to ANSI/AWWA A21.11 and ANSI/AWWA C153/A21.53 of latest revision. Twist-off nuts shall be used to insure proper

actuating of the restraining devices. The mechanical joint restraint device shall have a working pressure of at least 250 psi with a minimum safety factor of 2:1.

The cost of all mechanical joint restraints shall be included in the price bid per lineal foot for the water mains.

1.10 WATERLINE SACRIFICIAL ANODES

All valves, hydrant leads and mechanical joints shall be installed with sacrificial anode bags as shown on the detail sheet. Anode bags and copper anode leads shall be provided by Corpro Companies Inc. or approved equal.

MAGNESIUM ANODES

Anode bags shall be 32 pound high potential prepackaged magnesium anodes and shall be installed in accordance with the following:

A. Location:

1. Existing waterlines - Auger the hole, 8" diameter by 6' deep. Set the anode holes a minimum of 5 feet offset from pipeline.
2. New waterlines - Install anodes 6' below final grade and 5' feet offset from the waterline.

B. Do not lift or support anode by the lead wire. Exercise care to prevent damaging the anode and the lead wire insulation.

C. Place prepackaged magnesium anode in hole. Backfill the annular space between the anode and the surrounding hole with stone-free native soil compacted in 6" layers.

D. Connect the anode connector cable to the anode lead wire using a copper crimp. Coat the connection with one wrap of rubber tape followed by one wrap of vinyl tape. Provide one half lap each tape wrap.

ANODE LEADS:

Anode leads shall be #12 TW solid copper and shall be installed in accordance with the following:

- A. Install the anode lead connection cable to the pipe section at a minimum depth of 24-inches below grade. Carefully lay wire in bottom of trench, ensuring the cable does not rest on sharp edges and is free of kinks. Completely fill trench using stone-free native soil.

- B. Pipe coating materials shall be removed from the pipe surface over an area sufficient to make the connection. The steel surface shall be cleaned to white metal with a ceramic grinding wheel, rasp, or coarse file prior to welding the conductor. Use of resin impregnated wheels or discs will not be permitted. The conductor shall be welded to the pipeline by the exothermic process with sufficient insulation removed from the conductor to allow placement in the welding mold. After the weld has cooled, all slag shall be removed, and the weld shall be tested with a sharp hammer blow to assure a proper metallurgical bond. All defective welds shall be removed and replaced at no additional cost. All exposed surfaces of copper and steel shall be covered with a bitumastic filled shield encapsulating the connection.
- C. For anode beds consisting of more than one anode installed in series; install a 3-inch wide non-detectable warning tape as manufactured by Pro-Line Safety Products or approved equal. Warning tape shall be buried 12-inches below final grade and above the anode lead wire. Warning tape for anode leads shall be printed "Caution Cathodic Protection Line Buried Below."

The cost of all anodes, including installation, parts and accessories, shall be included in the price bid for the pertinent water system items.

1.11 **PIPE EMBEDMENT** - After the pipe has been laid and the joints made, the full length of each ductile iron pipe shall be thoroughly bedded by tamping sand as approved by the ENGINEER, around and over the pipe as shown on the waterline trench detail and shall be provided at the expense of the CONTRACTOR.

The full length of each PVC pipe shall be thoroughly bedded by tamping crushed stone, as approved by the ENGINEER, around and over the pipe as shown on the waterline trench detail and shall be provided at the expense of the CONTRACTOR.

The material shall be placed in layers not exceeding 6-inches in thickness, loose measurement, and securely compacted by hand or mechanical tamping to secure a good compaction while taking care not to displace or damage the pipe or joints.

1.12 **BACKFILLING** - Backfilling shall include the material placed above the top of the embedment material.

Trenches coming within paved or stoned streets, alleys, driveways and parking areas or proposed pavements shall be backfilled with granular material conforming to Item 411 as specified in GENERAL SPECIFICATION NUMBER TWO.

1.13 **CONNECTIONS TO EXISTING MAINS** - New mains shall be connected to existing mains, using tapping saddles, sleeves, flanges and valves. Connections shall be made in a manner acceptable to the OWNER or the ENGINEER. No cut-ins or connections to existing mains shall be made unless at least 24-hours notice of such cut-ins or connections is given to the

Superintendent of the Water Department, (419) 354-6278 and to the ENGINEER and the related portion of the new water main has been sterilized as subsequently specified.

One day prior to shutting valves on existing lines, the CONTRACTOR shall notify all affected property owners, the local official in charge of the water system and the ENGINEER of such shut off. The shut off time shall be kept to a minimum and shall be made at off-peak hours. All shut offs shall be done by a representative of the Bowling Green Water Department. The OWNER and the ENGINEER assume no responsibility for any delay occasioned by special requirements or conditions which must be met in making connections.

Extreme care shall be taken in making such connections to prevent contamination of the existing mains. Before making cut-ins or connections to existing mains, all fittings, valves and pipe shall be washed with clean water and then sterilized by washing with a chlorine solution having a residual chlorine strength of not less than 50 ppm.

Plugs removed from the existing mains may be re-used within the project and those remaining after completion of construction shall remain the property of the OWNER.

The cost of the connections shall be included in the unit price bid for the waterline.

1.14 **REINSTATEMENT OF EXISTING SERVICES** - The Contractor shall reinstate all water service lines shown on the plans or discovered to require connection to the new water main. Water service reinstatements shall be constructed in accordance with standard details shown on the plans. Water services shall be reinstated using the following parts depending on the existing water service material.

Tubing: AWWA C800 Type "K" soft copper or AWWA C901 DR9 PE 3408. The minimum diameter of the new tubing shall be 1-inch nominal diameter.

1" Corporation Stop: Mueller B-25000. All corporation stops shall be AWWA copper flare x F.I.P.

Galvanized Service Replacement

1" Curb Stop: Mueller B-25204 Curb Ball Valve. All curb stops shall be copper flare by F.I.P.

Bushing: ¾" x 1" Brass Bushing

Pipe Nipple: ¾" Brass Nipple 7" Long

Coupling: Steel Coupling Ford ¾" x 1" Standard Steel Coupling FC3-105-7

Copper Service Replacement

Coupling: Ford ¾" x 1" Flare Copper Connection C02-43.

Union: Mueller H-14300 ¾" Three Part Union

The price bid for reinstatement of water service shall include all parts and materials required to construct a complete connection to the water main. The price bid for reinstatement of water service shall not include the price of tubing. Other parts of items not specifically listed by required to provide a complete connection shall also be included. Tubing shall be paid under the bid price for Water Service Tubing.

1.15 **WATERLINE ENCASEMENT** - In locations where it is necessary for existing sewers to cross within 18-inches of the proposed waterline, the CONTRACTOR shall encase the waterline in a section of C-900 PVC pipe or approved equal material for a minimum distance of 10' on each side of the sewer crossing. The cost of encasement shall be included in the price bid for water main.

1.16 **WATERLINE THRUST BLOCKS** – Provide thrust blocks as called for on the plans and as defined in the detail sheets. The cost of all thrust blocks shall be included in the price bid for water main, unless a specific bid item is provided.

1.17 **MAINTAINING TRAFFIC** - Maintaining traffic shall be as previously specified in GENERAL SPECIFICATION NUMBER FOUR.

1.18 **REMOVAL OF EXCAVATED MATERIAL AND STORAGE OF MATERIAL** - Removal of excavated material and storage of materials shall be as specified in GENERAL SPECIFICATION NUMBER TWO.

1.19 **PROGRESS** - The CONTRACTOR shall be required to complete backfilling operations and general cleanup within a reasonable distance of trenching and pipe laying operations, and other excavations. The specified limitations of this paragraph shall be at the discretion of the ENGINEER, but the general intent is to require the CONTRACTOR to minimize the inconvenience to nearby residences and alleys or in other locations where the construction produces an inconvenience. The ENGINEER shall be permitted to require the CONTRACTOR to cease trenching and pipe laying operations at such time as he feels that backfilling and cleanup have not progressed satisfactorily.

1.20 **MAINTENANCE OF TRENCHES AND EXCAVATIONS** - Maintenance of trenches and excavations shall be as specified in GENERAL SPECIFICATION NUMBER FIVE.

1.21 **MAINTENANCE OF DRAINAGE AND EXISTING UTILITIES** - Maintenance of drainage and existing utilities shall be as specified in GENERAL SPECIFICATION NUMBER SIX.

1.22 **REPLACEMENT** - With the exception of replacement items subsequently specified; the CONTRACTOR shall be liable for all damage to public and private property caused by movement of equipment or by other construction operations.

All items damaged or disturbed shall be repaired or replaced with new materials, to the satisfaction of the ENGINEER, at the CONTRACTOR'S expense.

1.23 **TEMPORARY WATER SERVICE AND FIRE PROTECTION** - Where water mains and subsequently water service and fire protection will be temporarily disrupted due to construction, it will be the responsibility of the CONTRACTOR to maintain such service in a method as approved by the ENGINEER. The CONTRACTOR shall submit, two weeks prior to any construction in areas where water supply will be affected, a proposal to the DIRECTOR OF PUBLIC WORKS, FIRE CHIEF, AND WATER DEPARTMENT SUPERINTENDENT, describing the methods to be used in supplying temporary water for both service and fire protection. Only after approval of methods can work begin. The CONTRACTOR shall include temporary water service and fire protection in the price bid per lineal foot of water main.

1.24 **DISINFECTION** - All new waterlines shall be disinfected in accordance with procedures outlined in AWWA C651-05. As previously specified, all pipe interiors shall be cleaned before laying and shall be kept clean thereafter. Chlorination may be accomplished by the tablet method, the continuous feed method, or the slug method.

After a main has been completed, it shall be filled with potable water from the public supply while exhausting air from the other end and intermediate places along the main, i.e., at the fire hydrants and corporation stops installed at the extremities of the main for this purpose. After filling, the residual chlorine strength of the solution of clean water and chlorine in the main shall be determined. All filling operations must be conducted under the supervision of the Project Inspector.

Sterilization can be accomplished with a solution of clean water and chlorine having a residual strength of 100 ppm. The solution shall be tested at the extremities of the main and at the intermediate points to make sure the solution has the required strength. If the solution in the main contains less than 50 ppm chlorine, a solution of clean water and chlorine having residual strength of 100 ppm shall be pumped into the main from a cleaned and sterilized container, while exhausting the existing solution, until a chlorine residual of 50 ppm is obtained throughout the main.

During the sterilization process, the main shall be isolated from existing adjacent mains and extreme care shall be used to prevent the pressure in the main from rising above 20 psi. This low pressure is to prevent any possibility of highly chlorinated water from entering adjacent water mains which are in service. After the main has been filled with the chlorine solution, the solution shall remain in the main for at least 12-hours to assure complete sterilization.

After sterilizing the main, it shall be thoroughly flushed with potable water from the public supply until the water in the main has approximately the same chlorine content as water in the existing mains. Bacteriological samples shall not be taken for testing until the main has been tested for leakage.

When the water runs clear, shut off the main and let the water remain in the pipe for at least 3 days. At the end of at least 3 days flush out the entire contents of the main. Care shall be taken during this operation to completely remove the old water from the main. After this is done, shut off the main and let the water remain in the pipe for 24 hours. After 24 hours, an employee of the Bowling Green Water Department will test the water for a determination of the alkalinity and pH. In case the alkalinity and pH are not satisfactory the main shall be flushed again to remove the old water. After this is done, shut off the main and let the water remain in the pipe for at least 4 hours. At the end of at least 4 hours repeat the alkalinity and pH tests. This procedure shall be repeated until the alkalinity and pH are approved by the Bowling Green Water Department.

In all cases, tests for chlorine content shall be performed in accordance with Standard Methods For Examination of Water and Wastewater.

The CONTRACTOR shall furnish all materials, corporation stops, labor and equipment required to sterilize the main.

1.25 **PRESSURE AND LEAKAGE TESTS** - All new waterlines shall be Pressure & Leakage tested in accordance with procedures outlined in AWWA C600-05 and AWWA C605-05. When a main has been sterilized and flushed a leakage test shall be applied to it. The main shall remain isolated from adjacent mains and a pressure of at least 150 pounds per square inch shall be applied by pumping clean water containing 10 ppm chlorine from a cleaned and sterilized container through a 1-inch corporation stop installed in the ends of the main, with the CONTRACTOR to provide an initial pressure of 150-160 psi.

The pressure test shall be started in an afternoon and the pressure shall be on for 18 hours and then the pressure shall be maintained at 150 psi or more for an additional 6-hours by pumping water from the container. A minimum test pressure of 150 psi shall be assured by pumping until a pressure of 150-160 psi is attained. At the end of the 6-hour period, the water shall be measured and the loss by leakage shall not exceed that as determined by the formula:

$$L = \frac{SD(P)^{1/2}}{148,000}$$
 in which L is the allowable leakage, in gallons

per hour; S is the length in feet of main line being tested; 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 gage.

When hydrants are in the test section, the test shall be made against the closed hydrant.

Pressure testing of each side of the intermediate valves shall be done at this time by shutting each valve and exhausting the pressure on one side and then applying the test pressure of 150 psi or

more to the main on the opposite side of the valve. This procedure shall be repeated for each intermediate valve.

If the main valves do not pass the leakage test, the leak or leaks shall be located and repaired and the testing procedure repeated.

Upon completion of the leakage tests, the main shall be thoroughly flushed with potable water from the public supply until the water in the main has approximately the same chlorine content as water in the existing main.

The CONTRACTOR shall furnish all material, labor and equipment for testing.

1.26 **BACTERIOLOGICAL TESTS** - After a water main has been sterilized and tested for leakage, bacteriological samples shall be collected from the extremities and intermediate points along the main by an employee of the Bowling Green Water Department experienced in the taking of water samples. Bacteriological samples shall not be taken by the CONTRACTOR.

If results of two consecutive sets of bacteriological tests show the water to be safe, the main may be placed in service. If bacteriological results show the water to be unsafe, the main shall be completely sterilized and retested again. Sterilizing of the main is the responsibility of the CONTRACTOR, who shall provide all necessary materials and labor, and the main will not be placed in service and accepted until the bacterial quality of the water has been approved by the Bowling Green Water Department. The City of Bowling Green will perform two sets of bacteriological tests at no charge to the CONTRACTOR. Additional tests will be at the expense of the CONTRACTOR.

After the bacteriological tests are satisfactory, a representative of the Bowling Green Water Department will open all valves to place the line in service.

1.27 **COMPLETION OF TESTS** - When all tests on the water main have been successfully completed and the main is placed in service by the OWNER, no further work on the main or valves will be permitted without full knowledge of the work by the Bowling Green Water Department and the ENGINEER.

1.28 **MINOR DETAILS** - Minor details not specifically mentioned in these Specifications nor shown on the Drawings, but necessary to secure a workmanlike job and proper operation, shall be provided by the CONTRACTOR without extra cost.

1.29 **SUBMITTALS** - The Contractor shall submit shop drawings for all materials to be provided under this bid item for review by the Engineer.

1.30 **PRICE BID** - The price bid for Water Mains shall include all necessary excavation, embedment, backfill, materials, labor, fittings, jointing, the sterilization and testing of water mains, providing of temporary service, connections to existing mains, replacement of existing mains, replacement of existing facilities, maintenance of the backfilled trenches, and the construction of the mains, all in accordance with the foregoing specifications and accompanying Drawings, and shall be the price bid per lineal foot, installed complete, for the size of waterline included in the bid items.

<u>ITEM NO.</u>	<u>ODOT NO.</u>	<u>DESCRIPTION</u>	<u>UNIT</u>
1a.	638	8" New Water Main	LF
1b.	638	Connection to Existing Water Main	EA
1c.	638	Reinstatement of Existing Service	EA
1d.	638	Waterline Service Tubing	LF
1e.	SP	Waterline Thrust Blocks	EA