ITEM #1301081A 6" DUCTILE IRON PIPE (WATER MAIN)
ITEM #1301082A 8" DUCTILE IRON PIPE (WATER MAIN)
ITEM #1301084A 12" DUCTILE IRON PIPE (WATER MAIN)
ITEM #1301904A TEMPORARY BY-PASS (WATER MAIN)
ITEM #1302003A 6" GATE VALVE
ITEM #1302004A 8" GATE VALVE
ITEM #1302006A 12" GATE VALVE
ITEM #1302206A 8" x 8" TAPPING SLEEVE AND VALVE

Description

A. This work consists of furnishing and installing ductile iron water mains and appurtenances; removing, resetting, adjusting, or relocating existing water facilities; testing the completed water mains for pressure and leakage requirements; disinfecting all completed water main; in conformity with the requirements of this Specification and other Contract Documents.

B. The Contractor shall coordinate all work with the City of Meriden Water Department. The City shall be responsible for opening and closing all valves as required for the Contractor's work. The Contractor shall notify the City a minimum of 48 hours in advance of any desired valve operations. The Contractor is advised that the Water Department may not be able to respond to valve operation requests within 48 hours because of emergency conditions and that no claim shall be made against the Owner for this occurrence.

C. The Contractor shall notify the City in writing with a copy to the Engineer of any service disruptions related to work on this project at least 48 hours in advance of such disruptions. In addition, a notice concerning service disruptions must be placed in the local newspaper one day before, and also on the actual day of the scheduled disruption.

D. The Contractor shall submit for approval their proposed method and means to provide temporary by-passes as needed.

E. The Contractor shall furnish to the Engineer, in the manner as directed, three (3) notarized Certificates of Conformance and Manufacture that all materials and/or equipment to be furnished under this contract meets the specification requirements. When directed, each shipment of material shall be accompanied by the

manufacturer's notarized Certificate of Conformance and Manufacture. Unless otherwise specifically specified, all testing of materials shall be provided by the Contractor at no additional expense to the Owner. In addition, each manufacturer's Certificate shall be endorsed or accompanied by the Contractor's Certificate that the material certified by the manufacturer will be the material incorporated in the work.

F. The Contractor shall maintain at the jobsite, in good order, one copy of all contract documents. Upon completion of work, the Contractor shall record on a 24" x 36" mylar set of the contract drawings, at scale 1"=40', any field changes of dimensions and detail that may have occurred, changes by change orders, and details not on the original contract drawings.

Specifically, the following information shall be shown on the record drawings for utilities within the contract work area:

1. As-built surface profile of proposed utility.
2. Top of rock profile, if applicable.
3. All building utility services shall be accurately shown on the map.
4. All newly installed water lines shall be shown with curb boxes, valves, reducers, increasers, T's, hydrants and house lines. Accurate dimensions to each valve from ranges of buildings or curb lines shall be shown. The proposed water main shall be located from the curb line and labeled with size and date of installation.
5. Building and lot numbers shall be shown for all lots where applicable.

On a set of specifications or plan the Contractor shall legibly mark each section to record the manufacturer, trade name, catalog number and supplier of products which were actually installed. These record documents consisting of contract drawings and specifications shall be delivered to the Engineer as one of the requirements for final payment.

Materials

A. All materials shall be tested at the place of manufacture. All materials shall be subject to careful inspection in the presence of the Engineer or authorized inspector just before being laid or installed and shall be subject to approval before acceptance. All material found during the progress of the work to have cracks, flaws, or other defects shall be rejected by the Engineer or resident representative, and the Contractor shall promptly remove such defective material from the site of the work.

B. The following material specifications are to be followed:

1. Ductile iron pipe and fittings shall be manufactured in accordance with ANSI / AWWA C151 / A21.51, latest revision, thickness Class 52 per AWWA C150, latest revision.
2. Fittings shall be ductile iron rated at 355 psi (or higher as indicated on plans) conforming to AWWA C110, latest revision.
3. Compact style ductile iron mechanical joint fittings shall be ductile iron class 350 in accordance with ANSI / AWWA C-153 / A21.53 and ANSI / AWWA C104 / A21.4 for cement lining. Mechanical joint nuts and bolts shall be high strength low alloy steel per ANSI / A21.11 and shall include all accessories.
4. Ductile iron pipe and fittings shall be provided with a double thickness of cement-mortar lining conforming to ANSI / AWWA C104 / A21.5, latest revision. The cement-mortar lining shall be seal coated.
5. Joints for ductile iron pipe shall be rubber gasket push-on type unless otherwise indicated on plans and shall conform to ANSI / AWWA C150 / A21.50.
6. Fittings shall have mechanical joints with retainer glands rated at 350 psi. Mechanical joint restraint for ductile iron pipe shall conform to ASTM-A-536-84. It shall be Series 1100 Megalug, EBAA Iron Inc. or approved equal
7. Pipe and fitting joints shall conform to AWWA C111, latest revision.
8. Copper tubing shall be Type K, soft copper, shall meet the requirements of Federal Specification WW-T7996 and shall conform to ASTM specification B-75, B-88 and B-68 as they apply to Type K copper tubing.

C. Anchoring couplings shall be ductile iron mechanical joint couplings that provide a positive restrained connection between fitting and valve. Anchoring tees shall have mechanical joint main run ends. The branch shall have a plain end with an integral gland and mechanical joint gland, which can be rotated, to provide a restrained connection with the adjacent valve; fitting, etc. All pipe and fittings shall be plainly marked for weight and pressure rating. Fittings of substandard weight or dimensions will not be accepted.

D. Transition couplings or connecting sleeves shall be Type 44 mechanical sleeve couplings designed for the specific types of pipe to be joined and shall be manufactured by the Smith Blair or approved equal.

E. Concrete for thrust blocks shall conform to the requirements of Article M.03 for Class “A”.

F. Strap rods shall be ¾” round steel or wrought iron. Clamps shall not be less than 2” wide and 3/8” thick. Bolts securing clamps shall not be less than 5/8” round.

Clamps and rods are to be protected against corrosion by a heavy coat of bituminous asphalt varnish after final assembly.

G. Gate valves (boxes) shall be of the iron body, bronze mounted, resilient seated, solid wedge disc, non-rising stem type, fitted with "O" ring seals, conforming to the requirements of AWWA C509, latest revision. Valves shall be suitable for 250 psi minimum working pressure and 450 psi test pressure. The operating nut shall be two (2) inches square and valves shall open "right" or clockwise. All interior and exterior surfaces of the valve body and bonnet and any exposed metallic surfaces of the gate shall be coated with a fusion bonded epoxy conforming to the requirements of AWWA C550, latest revision.

Valve boxes shall be heavy pattern cast-iron, three piece, screw type construction consisting of top section, mid-section and enlarged base (No. 6 for valve sizes up to 8", and No. 160 for 12" valves) of sufficient length to provide without extension the required cover. The lower section shall be at least 5-1/4" inside diameter belled at the bottom to fit over the valve top. The middle section shall connect securely to the bottom section. The upper section shall screw over the outside threads of the middle section and be provided with a 6" diameter cover with the word "water" cast in raised letters. Valve boxes shall be coated with coal-tar, pitch enamel or equal accepted coating. Valve boxes shall be "Buffalo" type as manufactured by Buffalo Pipe and Foundary, J.C. Clow & Sons, Inc., or equal.

Boxes shall be cast iron, three-piece, screw type 5-1/4" shaft diameter. Boxes shall have the word "WATER" clearly cast into the cover. Boxes must be North American made. Complete box consists of (1) cover, (2) top section, (3) bottom section, (4) #6 base.

Boxes shall have a range of 45" to 66" (26" top, 30" bottom)

H. Curb boxes shall be Buffalo Style screw type, 2-1/2" and must have brass pentagon nut and cover with a flush fit. Curb boxes must be North American made with the top section w/ cover of 2-1/2" x 30" and the base of 2 ½" x 39".

I. Tapping sleeves and valves shall be mechanical joint suitable for 200 psi working pressure. Tapping sleeves shall be similar to Mueller H-615 ductile iron with a Class 125 outlet flange per ANSI B16.1. The operating nut shall be two (2) inches square and shall open "RIGHT" or clockwise. Tapping valves shall be similar to Mueller H-667.

J. Underground-type plastic line marker shall be a manufacturer's standard permanent, bright-colored, continuous-printed plastic tape, not less than 6" wide x 0.1575" thick. Provide blue tape with printing which indicates buried water.

K. Pipe insulation shall conform to the following specifications:

a. Pittsburgh Corning Foamglas Super K insulation, 1.5" thick with an R=4.7 where specified on plans

L. Resilient seat valves shall conform to the following specifications:

a. Open right
b. 250 psi rated working pressure
c. Must comply fully with AWWA C509
d. MJ X MJ
e. Must have oversized, full port opening and smooth waterway
f. Must be epoxy coated inside and outside. Must be certified NSF61, and conform to ANSI / AWWA C550 standard.
g. Wedge must provide a positive stop.

M. Miscellaneous materials not specified herein, shall be of the type, size, material and manufacture as shown on the drawings or as required for the installation. Such miscellaneous material shall be as approved by the Engineer.

Construction Methods

A. The construction of new water mains, services, and appurtenances shall be done by the Contractor subject to these documents. The Meriden Water Department shall retain the right to limit the length of time any main, or mains, shall be out of service, as emergency requirements demand. The length of any section of water main, temporarily removed from service for the operations under the Contract, shall be determined by the capability of the distribution system to supply water by other routes to the areas adjacent to or directly affected by the section of service. Water service to individual customers may be interrupted only during the Contractor's work hours and as allowed by the Water Department.

B. All pipe, fittings, valves and hydrants shall be carefully inspected for defects prior to installation.

C. Each pipe shall be handled into the trench carefully. The Contractor shall furnish all slings, or straps to permit satisfactory support of all parts of pipe when it is being handled. The Contractor shall take all necessary precautions to prevent movement of pipe in the event of the trench flooding. Any length of pipe broken or damaged due to mishandling or negligence on the part of the Contractor shall be replaced at no cost to the Owner.

D. Ends of the pipe shall be thoroughly cleaned before joint is made. The surface of the joint shall be painted with required lubricant applied in accordance with the manufacturer's directions. The lubricant shall be of type recommended by pipe manufacturer. Pipes shall be jointed in strict accordance with pipe manufacturer's directions and work shall be done by skilled personnel.

E. Pipe shall be laid on fine sand bedding as shown on the trench details in the contract drawings with the bedding tamped under, around and up to the springline of the pipe.

F. No pipe or fittings shall be laid in water or on a frozen trench bottom or when, in the opinion of the Engineer, the trench conditions or the weather are unsuitable for such work. All joints shall be checked by feeler ring gauge to insure proper positioning of rubber gaskets. Thrust blocks shall be used in accordance with City of Meriden Standard Details.

G. At locations where water main construction involves abrupt changes in pipe alignment, the changes shall be made with fittings as indicated on the contract drawings or ordered by the Engineer. Changes in pipe alignment shown at other locations shall be made with deflection of pipe joints and short lengths as required.

H. All ductile iron pipe filler pieces that must be cut on-site from full pipe lengths shall be cut with a power saw and prepared in accordance with the pipe manufacturer's recommendations. Insofar as it is practical, the Contractor shall have on hand manufacturer supplied filler pieces (short length of pipe with plain ends) to minimize on-site cutting of pipe.

I. Concrete thrust blocks shall be constructed at all tees, bends, valves, plugs and caps. Thrust blocks shall be of the size indicated on the drawings and shall, in all cases when cast-in-place is approved, be poured against undisturbed earth. Where thrust blocks are in contact with the pipe, concrete shall be kept clear of pipe joints. Thrust blocks shall be used in accordance with City of Meriden Standard Details. Pre-cast blocks are to be used at all locations where water main is to be placed in service within one day and embedded straps are not required.

J. Ductile iron fittings of the proper type shall be furnished and installed wherever shown on the drawings and as required by the Engineer. All mechanical joints of fitting shall be restrained with retainer glands torqued to 72.5 lb-ft or as recommended by the manufacturer. In addition, all pipe joints within 24 feet of bends or tees shall be restrained (coveralls).

K. Vertical bends where shown on the drawings shall be anchored in both directions with pipe clamps and tie rods. The Contractor shall provide the necessary tie rods and clamps. Tie rods and clamps shall be as manufactured by the Grinnell Company, Inc., or equal.

L. Valves shall be installed in the mains approximately where shown on the contract drawings. Each valve shall be installed with a gate box set vertically with top even with finished grade.

M. The existing water main pipe shall be cut using methods approved by the pipe manufacturer with the open pipe end prepared for installation of watertight cap or plug. If the condition of the existing pipe is such that a cap or plug cannot be installed, then the Contractor shall install a flexible coupling and capped filler piece. The Contractor shall close all valves on abandoned water mains and remove the upper sections of their valve boxes.

N. Wherever curves are negotiated by deflecting successive lengths of pipe, the deflection of each length of pipe shall not exceed three (3) degrees at any one joint. Consult manufacturer's literature for allowable deflection in inches for various pipe sizes and lengths to meet this requirement.

O. Installation of tapping sleeve and valve, and tapping of existing water main shall be accomplished using equipment and procedures recommended by the manufacturer. The Contractor shall be responsible to prepare existing water mains for tapping by the City of Meriden Water. The Contractor must excavate, expose and support the existing mains(s) and attach the tapping sleeve and valve in accordance with the manufacturer's recommendations and to the satisfaction of the Water Department. Water Department personnel shall perform the actual tap after which the Contractor shall furnish and install the valve box, back fill the work pit and restore the pavement as specified elsewhere.

P. During trench-filling, install a continuous underground-type plastic line marker, located directly over buried pipe at 36" below finished grade.

Q. Adjusting water gates shall mean the minor adjustment of existing curb stop and gate valve boxes to the proposed grade not involving major reconstruction of the unit. (Examples of adjusting are: screwing/sliding adjustable type boxes up or down to bring the valve box to required grade, or using approved extension pieces to bring valve boxes to required grades).

R. Resetting gate boxes shall mean the minor construction required to re-align the valve boxes so they are set plumb and are centered on the valve-operating nut. Care must be taken to ensure no part of the riser section bears on any part of the valve.

Hydrostatic Testing

A. Test for leakage shall be conducted on all portions of completed water pipelines and appurtenances and all methods and procedures for performing the testing of water mains shall be subject to the acceptance of the Engineer. Unless otherwise permitted, the testing shall be conducted with partial backfilling over the barrel of any new pipe, between new pipes, pipe fittings, valves and appurtenances of the section. Interiors of all pipe shall be cleaned of all dirt and foreign materials. The water pipelines may be tested in convenient sections acceptable to the Engineer.

B. Testing of water mains shall conform to the requirements of Section 4 of the AWWA Specification C 600, latest revision, except as herein specified. The test pressure shall be a minimum of 200 psi or 50% above working pressure, which ever is greater, for at least a two-hour duration. Maximum allowable leakage shall be as specified for the appropriate pipe diameter. Test results shall be accurate to within 0.1 of a gallon.

C. Testing of water mains shall be performed by a third party hired by the Contractor and approved by the City at the Contractor's expense and witnessed by the Engineer. Notarized records of the test results shall be submitted by the Contractor to the Engineer. In case the specified rate of leakage for the portion of the pipeline being tested is exceeded, the Contractor shall find and repair the leaks and the pipelines shall be retested repeatedly if necessary, by the Contractor, until the required conditions are met, at no additional expense to the Owner.

Disinfecting Water Mains and Appurtenances

A. All portions of completed water mains and appurtenances are to be disinfected before acceptance for operation by the City. In particular, the Contractor shall follow all of the disinfection procedures of Section 9 – Disinfection Procedures of AWWA Specification C 601, unless otherwise directed by the Engineer. The Contractor shall be responsible for satisfactory disposal of all flushing water and chlorinated water at no additional expense to the Owner. The Contractor shall submit to the Engineer, the type of chlorine to be used, the disinfection experience for the workers, and the procedures and equipment to be used.

B. After the mains have been flushed clean, samples of the water contained in the mains shall be arranged by the Contractor to be taken for bacterial analysis by a testing laboratory certified in Connecticut. Only after the analyses of the samples are acceptable to the City shall the mains be made part of the system. In the event that positive reports of contamination are received, the Contractor shall flush and rechlorinate the mains as many times as may be necessary to obtain acceptable results. Samples shall be obtained from corporation cocks with copper gooseneck assemblies installed as directed along the main to be disinfected. After samples have been collected, the gooseneck assembly may be removed and retained for future use.

C. The Contractor shall be warned the water main disinfection should be only accomplished by specially trained personnel and that the project's water mains are vital to the safety and well being of the municipality. State Health Department approval of the water main disinfection is to be received by the Contractor in a timely manner so as to quickly place the water mains into service.

D. The Contractor shall submit an affidavit of compliance to the Engineer. The affidavit of compliance shall be the bacteriological test results certifying the water samples from the water main to be free of coliform bacteria contamination.

E. The Contractor's workers who are responsible for the water main work should be aware of the potential health hazards with chlorine and should be trained to observe carefully the prescribed construction practices and disinfection procedures. The effectiveness of disinfection depends in large measure on maintaining clean pipes and avoiding major contamination during construction.

F. The Contractor shall give thorough consideration to the impact of highly chlorinated water flushed to the receiving environment. If there is any question that damage may be caused by a chlorinated water discharge (to fish life, plant life, physical installations, or other downstream water uses of any type), then an adequate amount

of reducing agent should be applied by the Contractor to the water being disposed of to neutralize thoroughly the chlorine residual remaining in the water.

G. To prevent possible backflow or siphonage of contaminants into the water distribution system which is in service, the Contractor will be required to provide a reduced pressure backflow preventer (RPD) on the temporary piping which is supplying water from the distribution system to the water main being treated and to provide such other safety and control measures as directed by the City.

H. The Contractor shall be required to take samples and have testing performed by a certified testing laboratory for a minimum of the following items:

1. Total Coliform
2. Standard Plate Count
3. Gross Hydrocarbons
4. Volatile Organics

I. The Engineer shall take the required water samples after completion of flushing and disinfecting of the water main as directed by the Engineer. The Contractor shall be responsible for coordination and delivery of the samples to the certified testing laboratory. The Contractor shall bear the costs of all water quality testing and analysis expenses by the certified laboratory.

Method of Measurement

A. Ductile iron pipe for water mains shall be measured for payment by the linear foot for each size as measured along the axis of the pipe from the face of the hub forming the beginning of the work to the hub or spigot constituting the end of the line, measured through all fittings and valves in the line. Pipe for side street connections shall be measured from the centerline of the cross or tee to the point of connection to existing pipe.

B. Flexible couplings, transition couplings, crosses, tees, reducers, bends, anchor couplings, joint restraints, thrust blocks will not be measured separately for payment, the cost of which shall be included in the price bid per linear foot for furnishing and installing the various sizes of ductile iron pipe for water mains.

C. Pipe for new hydrant branches shall be measured from the centerline of the hydrant tee to the connection to the hydrant assembly. Pipe for hydrant branch extension

shall be measured for payment from the existing hydrant branch pipe joint to the connection to the hydrant assembly.

D. Gate valves will be measured for payment by the unit of the particular size in place and accepted, including valve box.

E. Tapping sleeve and valves will be measured for payment by the unit of the particular size in place and accepted, including valve box.

F. Testing, flushing and disinfection of new water mains and appurtenances will not be measured for payment.

G. Maintaining temporary service connections and providing temporary water will not be measured for payment.

Basis of Payment

A. Ductile iron pipe for water mains of various sizes measured in place as provided above, shall be paid for at the respective contract unit prices bid, per linear foot, which payment shall constitute full compensation for furnishing and installing all pipe, fittings and appurtenances, including warning tape, joint restraints, thrust blocks, dewatering, support systems, hydrostatic testing and disinfecting and all other costs incidental and necessary to complete the work as specified, as indicated and as directed by the Engineer.

B. Gate valves including valve boxes and masonry units shall be paid for at the contract unit price per each of the particular size, which shall constitute full compensation for furnishing and installing all gate valves and valve boxes including hydrostatic testing and disinfection.

C. Maintaining temporary service, connections, installation of insulation, and plugging and abandoning water mains shall not be paid for separately.

D. Tapping sleeves and valves shall be paid for at the contract price per each of the particular size, which shall constitute full compensation for furnishing and installing, support, hydrostatic testing and disinfecting. Contractor is responsible for all tapping and testing fees.

E. No separate payment will be made for flushing, testing and disinfection of water mains and related work. Compensation for such work as required shall be considered to be included in the contract prices bid for other water main items.

F. Providing temporary by-passes shall be paid for as a lump sum price.

Pay Item	Pay Unit
6” Ductile Iron Pipe (Water Main)	L.F.
8” Ductile Iron Pipe (Water Main)	L.F.
12” Ductile Iron Pipe (Water Main)	L.F.
Temporary By-Pass (Water Main)	L.S.
8” Gate Valve (Water Main)	EA.
12” Gate Valve (Water Main)	EA.
8” x 8” Tapping Sleeve and Valve (Water Main)	EA.