

**MARCH 17, 2020**

**RAILROAD – HIGHWAY GRADE CROSSING IMPROVEMENTS**

**STATE PROJECT NO’S 0099-0114 & 0099-0115**

**FEDERAL AID PROJECT NO’S. 0014(150) & 0014(167)**

**TOWN OF NORTH CANAAN**

**ADDENDUM NO. 2**

**SPECIAL PROVISIONS**

**NEW SPECIAL PROVISIONS**

The following Special Provisions are hereby added to the Contract:

- NOTICE TO CONTRACTOR – UNDERGROUND UTILITIES
- SECTION 1.03 – AWARD AND EXECUTION OF CONTRACT
- ITEM NO. 1300007A – EXCAVATION AND DISPOSAL OF UNSUITABLE MATERIALS (WATER MAIN)
- ITEM NO. 1300015A – ROCK IN TRENCH EXCAVATION 0’-10’ DEEP (WATER MAIN)
- ITEM NO. 1300151A – ADDITIONAL BACKFILL MATERIAL (WATER MAIN)
- ITEM NO. 1301324A – RECONNECT COPPER SERVICE (WATER MAIN)
- ITEM NO. 1301860A – INSTALLATION OF WATER MAIN AND APPURTENANCES
- ITEM NO. 1301861A – FURNISHING DUCTILE IRON PIPE VALVES AND MISCELLANEOUS FITTINGS (WATER MAIN)
- ITEM NO. 1301900A – HYDROSTATIC PRESSURE TEST
- ITEM NO. 1302139A – CUT AND CAP WATER MAIN
- ITEM NO. 1302901A – AIR RELIEF VALVE (WATER MAIN)
- ITEM NO. 1304059A – PERMANENT PAVEMENT REPLACEMENT (WATER MAIN)
- ITEM NO. 1304060A - TEMPORARY PAVEMENT REPAIRS (WATER MAIN)
- ITEM NO. 1304070A – RESTRAINT EXISTING PIPE JOINT
- ITEM NO. 1304111A - CLASS “C” CONCRETE (WATER MAIN)

**REVISED SPECIAL PROVISIONS**

The following Special Provisions are hereby deleted in their entirety and replaced with the attached like-named Special Provisions:

- CONTRACT TIME AND LIQUIDATED DAMAGES
- NOTICE TO CONTRACTOR – COORDINATION WITH RAILROAD CONTRACTOR/WORK
- SECTION 1.05 – CONTROL OF THE WORK
- ITEM NO. 0914018A – ORNAMENTAL METAL FENCE (4’ HIGH)

**CONTRACT ITEMS**

**NEW CONTRACT ITEMS**

<u>ITEM NO.</u>	<u>DESCRIPTION</u>	<u>UNIT</u>	<u>QUANTITY</u>
<u>1300007A</u>	<u>EXCAVATION AND DISPOSAL OF UNSUITABLE MATERIAL (WATER MAIN)</u>	<u>CY</u>	<u>8</u>
<u>1300015A</u>	<u>ROCK IN TRENCH EXCAVATION 0’-10’ DEEP (WATER MAIN)</u>	<u>CY</u>	<u>3</u>
<u>1300151A</u>	<u>ADDITIONAL BACKFILL MATERIAL (WATER MAIN)</u>	<u>CY</u>	<u>4</u>
<u>1301324A</u>	<u>RECONNECT COPPER SERVICE (WATER MAIN)</u>	<u>EA</u>	<u>3</u>
<u>1301860A</u>	<u>INSTALLATION OF WATER MAIN AND APPURTENANCES</u>	<u>LS</u>	<u>LS</u>
<u>1301861A</u>	<u>FURNISHING DUCTILE IRON PIPE, VALVES AND MISCELLANEOUS FITTINGS</u>	<u>LS</u>	<u>LS</u>
<u>1301900A</u>	<u>HYDROSTATIC PRESSURE TEST</u>	<u>EA</u>	<u>1</u>
<u>1302139A</u>	<u>CUT AND CAP WATER MAIN</u>	<u>EA</u>	<u>2</u>
<u>1302901A</u>	<u>AIR RELIEF VALVE (WATER MAIN)</u>	<u>EA</u>	<u>2</u>
<u>1304059A</u>	<u>PERMANENT PAVEMENT REPLACEMENT (WATER MAIN)</u>	<u>SY</u>	<u>45</u>
<u>1304060A</u>	<u>TEMPORARY PAVEMENT REPAIRS (WATER MAIN)</u>	<u>SY</u>	<u>5</u>
<u>1304070A</u>	<u>RESTRAINT EXISTING PIPE JOINT</u>	<u>EA</u>	<u>3</u>
<u>1304111A</u>	<u>CLASS “C” CONCRETE (WATER MAIN)</u>	<u>CY</u>	<u>1</u>

**REVISED CONTRACT ITEMS**

<u>ITEM NO.</u>	<u>DESCRIPTION</u>	<u>ORIGINAL QUANTITY</u>	<u>REVISED QUANTITY</u>
<u>0202522A</u>	<u>REMOVAL OF BITUMINOUS TYPE PAVEMENT</u>	<u>536 SY</u>	<u>280 SY</u>

**PLANS**

**NEW PLANS**

The following Plan Sheets are hereby added to the Contract:

- 06.01.A2
- 06.02.A2
- 06.03.A2
- 06.04.A2
- 06.05.A2
- 06.06.A2
- 06.07.A2

**REVISED PLANS**

The following Plan Sheets are hereby deleted and replaced with the like-numbered Plan Sheet:

- 02.01.A2
- 03.15.A2

**DELETED PLANS**

The following Plan Sheets (identified on Revision Sheet 02.01.A2 as Sheet No. 06.01 thru 06.08) are hereby deleted in their entirety:

- DRAWING NO. IDX-04
- DRAWING NO. AWC-01
- DRAWING NO. AWC-02
- DRAWING NO. AWC-03
- DRAWING NO. AWC-04
- DRAWING NO. AWC-05
- DRAWING NO. AWC-06
- DRAWING NO. AWC-07

The Bid Proposal Form has been revised to reflect these changes.

The Detailed Estimate Sheets do not reflect these changes.

**The number of calendar days has been revised in this Addendum.**

The foregoing is hereby made a part of the contract.

## **CONTRACT TIME AND LIQUIDATED DAMAGES**

For Federal Aid Project No. 0014(0142) State Project No. 0099-114 and Federal Aid Project No. 0014(144) State Project No. 0099-0115, Two Hundred Forty Seven (247) calendar days will be allowed for completion of the work and the liquidated damages charge to apply will be One Thousand Five Hundred Dollars (\$1,500.00) per calendar day.

**NOTICE TO CONTRACTOR – COORDINATION WITH RAILROAD CONTRACTOR/WORK**

The Contractor is hereby alerted that at the same time or immediately prior to the work being done as part of this contract, work will be performed at the railroad-highway grade crossing by others. The Housatonic Railroad Company (HRRC) and/or their subcontractor(s) will be installing vehicular gates, railroad flashing lights, a crossing surface and other miscellaneous railroad appurtenances as indicated on the project plans.

The Contractor is to coordinate the work involved with this project with the HRRC and/or their subcontractors working in the same area.

No claims shall be allowed by the Contractor by reason of delays caused by railroad traffic operations or by the construction being performed by the Railroad as part of the railroad related items depicted on the project plans.

The Contractor's attention is directed to the attached requirements in this Contract for work in the railroad right-of-way. The Contractor shall comply with these requirements, coordinate his/her work with the HRRC, and be responsible for all damages to the railroad or to adjacent properties as a result of damages to the railroad, that may be incurred as a result of his/her operations.

The Contractor must make its own arrangements with the HRRC for use of railroad equipment or changes in the HRRC's facilities made solely to facilitate the Contractor's operations. The expense incurred by making such arrangements shall not be a part of this Contract.

The State of Connecticut will conduct a pre-construction meeting prior to the start of construction to coordinate the work related with this project.

**NOTICE TO CONTRACTOR – UNDERGROUND UTILITIES**

A portion of the work to be accomplished under this Contract is to be performed within the railroad right-of-way. Call-Before-You-Dig (CBYD) does not coordinate the mark out of any underground utilities located within the railroad right-of-way. The Contractor is responsible for coordination with the Housatonic Railroad Company and locating all other utilities throughout the railroad right-of-way prior to performing any excavation.

## **SECTION 1.03—AWARD AND EXECUTION OF CONTRACT**

**Article 1.03.07—Insurance** is supplemented as follows:

*Add the following paragraphs after the second paragraph:*

“...In addition, the Contractor is required to file certificates of insurance with the Housatonic Railroad Company at least 30 days prior to commencing any work within the Railroad right-of-way. Certificates are to be sent to:

Matt Whitney  
PO Box 687  
Old Lyme, CT 06371

“The Contractor is warned that entrance to the railroad property will not be allowed by the Railroad Company if there are outstanding charges remaining against the Contractor for Railroad Services rendered on prior projects. No request for an extension of time will be considered as a result of any delay to the Contractor's operations caused by the Contractor's indebtedness to the railroad. It is agreed that providing of any conductors, flagmen, or other employees shall not relieve the Contractor from liability or payment for any damages previously caused by its operations.”

“If any insurance specified within this Article shall be provided on a claims-made basis, then in addition to coverage requirements, such policy shall provide that:

- 1) The policy retroactive date must coincide with or precede the Contractor's start of work (including subsequent policies purchased as renewals or replacements),
- 2) The Contractor shall maintain insurance for at least 2 years following Project completion,
- 3) If insurance is terminated for any reason, the Contractor agrees to purchase an extended reporting provision of at least 2 years to report claims arising from Work performed in connection with this Contract, and,
- 4) The policy must allow for reporting of circumstances or incidents that might give rise to future claims.”

“The Contractor shall assume any and all deductibles in the described insurance policies contained herein. Except as otherwise indicated in the detailed coverage paragraphs below, self-insured retentions and policy deductibles shall not exceed \$100,000, unless such increased deductible or retention is approved by the State and the Housatonic Railroad Company.”

*Revise the numbered paragraphs as follows:*

### **1. Worker's Compensation Insurance:**

*In the second paragraph, replace the first sentence "Employer's Liability...amounts not less than \$100,000 per accident...\$100,000 per employee..." with the following:*



"...Employer's Liability insurance shall be provided in amounts not less than \$2,000,000 which limit may be met by a combination of primary and excess insurance meeting the statutory limits of the laws of the state in which the work is performed, whichever is greater."

**2. Commercial General Liability Insurance:**

*Add the following to end of the first paragraph:*

"Contractual Liability, Products and Completed Operations, Broad Form Property Damage and Independent Contractors coverages shall have all railroad exclusions deleted. The "named as an additional insured" shall be as noted in Subarticle 15. Any Umbrella/Excess Policy used to meet the minimum Contract requirements must follow form of the underlying policy and be extended to "drop down" to become primary in the event the primary policy is exhausted."

*Replace the "Limits of Coverage" chart with the following:*

Contract Amount (\$)	Minimum Single Occurrence limit (\$)	Minimum Annual Aggregate Limit (\$)
0-10,000,000	3,000,000	3,000,000
>10,000,000	4,000,000	8,000,000

**4. Owner's and Contractor's Protective Liability Insurance for and in the Name of The State:**

*Replace the "Limits of Coverage" chart with the following:*

Contract Amount (\$)	Minimum Single Occurrence limit (\$)	Minimum Annual Aggregate Limit (\$)
0-50,000,000	3,000,000	3,000,000
>50,000,000	4,000,000	4,000,000

**10. Umbrella Liability Insurance:**

*Following every occurrence of "...the State of Connecticut..." add "and the Railroad..."*

**12. Copies of Policies:**

*Following every occurrence of "...the State..." add "and the Railroad..."*

**15. State Named as Additional Insured:**

*Change the last sentence of the only paragraph as follows:*

"Each policy shall waive right of recovery (waiver of subrogation) against the State of Connecticut or the Railroad and the described insurance shall be primary coverage."

*After the only paragraph, add the following:*

"For coverage provided under this Article, Subarticle 5 - Railroad Protective Liability Insurance, as amended herein, the names of the "Additional Insured" shall be as indicated below:

Housatonic Railroad Company  
State of Connecticut

**16. Termination or Change of Insurance:**

*Following every occurrence of "...the Department..." add "and the Railroad..."*

## **NOTICE TO CONTRACTOR - 1.05 CONTROL OF THE WORK**

### **1.05.03 – Conformity with Plans and Specifications (Including Quality Control)**

The Contractor is hereby notified that a Quality Management Plan will be required for this Project in conformance with Standard Specifications (Supplemented July 2017) Article 1.05.03 – “Conformity with Plans and Specifications (including Quality Control).”

**Article 1.05.06—Cooperation with Utilities (Including Railroads) is supplemented as follows:**

*Add the following after the last paragraph:*

### **"Special Requirements Regarding Work in Housatonic Railroad territory:**

#### Description:

This Section covers authority, definitions, regulatory requirements, traffic regulation and coordination of the Contractor’s work schedule with the operation of train service, construction equipment and safety requirements for working within railroad right-of-way, and provisions for storage of materials and equipment and worker safety rules. Subsequent to the Engineer’s Pre-construction meeting and prior to commencement of Contract activities, a working on the railroad meeting will be held by the Engineer to emphasize these Specifications.

#### Permission to Enter Upon Railroad Property:

Permission is hereby granted to the Contractor to enter property of the State, under the custody and control of the Department and managed by the Housatonic Railroad Company (hereinafter called "Railroad"). The purpose of this permission shall be solely for those outlined in this Contract and under the following terms and conditions:

- I. Location and Access. Permission is hereby granted to the Contractor and its subcontractor(s), if any, to enter the property within the Project Limits identified on the Contract Plans for the Railroad, in the vicinity of Crossing #504296V (Main Street) located at Milepost 48.55 of the Berkshire Line and Crossing #504172C (East Main Street) located at Milepost 0.10 of the Lakeville Branch, in the State of Connecticut (hereinafter called the "Property").
- II. Liability. The Contractor covenants and agrees to at all times indemnify, protect and save harmless the “Additional Insureds,” as defined in paragraph V herein, from and against any and all losses, damages, detriments, suits, claims, demands, costs, and charges which the “Additional Insureds” may directly or indirectly suffer, sustain, or be subjected to by or on account of the Contractors entry upon, occupancy or use of the Property, or the conduct thereon of the Contractor, its subcontractors, officers, employees, agents or invitees, whether such loss or damage be suffered or sustained by the “Additional Insureds” directly or persons

(including employees of “Additional Insureds” or Corporations who may seek to hold the “Additional Insureds” liable therefore), and whether attributable to the fault, failure or negligence of the “Additional Insureds” or otherwise.

- III. Consideration. The Contractor shall pay to the Railroad, the sum of Zero Dollars (\$0.00) for the right to enter upon the Property.
- IV. Terms of Permit. The Railroad reserves the right to revoke this permission at any time. Unless subsequently modified, this shall begin with Notice to Proceed and shall end at Contract Completion Date at which time it shall expire automatically. Under no circumstances shall this temporary permission be construed as granting the Contractor any rights, title or interest of any kind or character in, on, or about the land or premises of Railroad thereafter. The Permittee agrees to notify the Railroad when use of the Property or work is completed.
- V. Definitions of Terms and Permissible Abbreviations:

Authority of the Railroad Engineer - This supplements Standard Specification Article 1.05.01 in that all Contract work upon or affecting railroad property, right-of-way or facilities, shall also be subject to the approval of the President of the Railroad or a duly authorized representative, through coordination with the Engineer.

Additional Insureds - Those individuals or entities appearing under Article 1.03.07, Paragraph 15 of the Contract Special Provisions.

Conductor/Flagman - A Railroad employee qualified on the Rules of the Operating Department and qualified on the physical characteristics of the portion of the railroad involved. He/she is the contact employee qualified to obtain the use of track. Each conductor/flagman will have the proper flagging equipment, up-to-date Railroad Operating Rules, Timetables and Safety Rules.

Coordination of Work - This supplements Standard Specification Article 1.05.06 in that the Contractor shall be responsible for the coordination of the work of its sub-contractors with respect to the railroad property, right-of-way or facilities.

Horizontal Clearance Point - A point 10 feet from the centerline of a track, except as authorized by the engineer.

Obstruction - An entering of the traffic envelope, also referred to as fouling.

Occupancy - Any use of track other than direct crossing.

On or Adjacent to - shall be interpreted to include space on, above and below the railroad right-of-way operated by the Railroad, as well as space on, above, and below adjacent property which the Railroad determines to affect the safe operations of service.

Qualified Railroad Employee - For the purpose of these specifications, a Qualified Railroad Employee is a Railroad employee qualified to remove track or tracks from service.

Railroad - Whenever the term "Railroad" is used without further qualification, it shall be taken to mean the Housatonic Railroad Company.

Right-of-Way - The limits of railroad property on either side of tracks.

The Safety Rules - All work shall be performed in accordance with rules, regulations, procedures, and safe practices of the Railroad, FRA, OSHA, NESC and all other government agencies having jurisdiction over this Project.

Track - The space between the rails plus not less than 4 feet outside each rail, except as authorized by the engineer.

Traffic Envelope - The area encompassed by the vertical and the horizontal clearance points.

Vertical Clearance Point - A point 22 feet and 6 inches above the top of a running rail unless otherwise authorized by the Railroad.

Use of Track - Obtaining permission from the proper authority of the Railroad for track occupancy.

## **1. – Requirements for Performing Work on or Adjacent to the Railroad Right-of-Way**

### **(a) General**

- (1) The Contractor should note that the proposed work involves construction operations on or adjacent to property owned by State and operated by the Railroad. In working near an operating railroad, great care must be exercised and the Railroad's safety rules must be strictly observed.
- (2) If while completing the work covered by this Contract, the tracks or other facilities of the Railroad are endangered, the Contractor shall immediately do such work as directed by the Railroad through the Engineer to restore safety. Upon failure of the Contractor to carry out such orders immediately, the Railroad may take whatever steps as are necessary to restore safe conditions. The cost and expense to the Railroad of restoring safe conditions, or of any damage to the Railroad's trains, tracks or other facilities caused by the Contractor's or subcontractor's operations, shall be considered a charge against the Contractor and shall be paid for by him, or may be deducted from any monies due or that may become due him under this Contract.

### **(b) Rules and Regulations**

- (1) Railroad traffic shall be maintained at all times, and the Contractor shall conduct all Project operations on or adjacent to the Railroad right-of-way fully within the rules, regulations, and requirements of the Railroad. The Contractor shall be responsible for acquainting himself with such requirements as the Railroad may demand. The Contractor is advised that the Railroad controls all activity in the respective right-of-way, and that railroad operations may cause delays and temporary shutdowns of the Contractor's construction activities. The Contractor shall include in his bid any expenses occasioned by delay or interruption of his work by reason of the operation or maintenance of the Railroad facilities. The Contractor shall not be entitled to time extensions for delays associated with normal railroad operations.
- (2) The Contractor shall obtain verification of the time and schedule of track occupancy from the Railroad before proceeding with any construction or demolition work on or adjacent to the Railroad right-of-way.
- (3) All work to be done on or adjacent to the Railroad right-of-way shall be performed by the Contractor in a manner satisfactory to the Railroad and shall be performed at such times and in such manner as not to interfere with the movement of trains or traffic upon the tracks of the Railroad. The Contractor shall use all necessary care to avoid accidents, damage, delay or interference with the Railroad's trains or property.
- (4) If deemed necessary by the Railroad, it may furnish or assign an inspector who will be placed on the work during the time the Contractor or any subcontractor is performing work under the Contract on Railroad property.

- (5) Before proceeding with any construction or demolition work on or adjacent to the Railroad Right-of-Way, a pre-construction meeting shall be held at which time the Contractor shall submit for approval of the Railroad, plans, computations, and a detailed description of his method and procedure for accomplishing the specific construction work required under this Contract, including methods of protecting Railroad traffic. Such approval shall not serve, in any way, to relieve the Contractor of his responsibility for the adequacy and safety of his methods and procedures for conducting the work.
- (6) The Contractor shall conduct his work and handle his equipment and materials in such manner that will not foul a live track without the written permission of the Railroad.
- (7) Equipment shall be considered to be potentially fouling the track when located in such a position that its failure, with or without load, brings the equipment within the traffic envelope. No equipment shall be placed in this position without prior approval of the Railroad.
- (8) **Equipment of the Contractor to be used:**
  - (A) Equipment of the Contractor to be used adjacent to the tracks shall be in first-class condition so as to fully prevent failures of defective equipment that might cause delay in the operations of trains or damage to Railroad facilities. Equipment shall not be placed or put into operation adjacent to tracks without first obtaining permission from the Railroad. Under no circumstances shall any equipment or materials be placed or stored within 25 feet from the near rail of a track in operation, unless approved, in advance, by the Railroad.
  - (B) High (“hi”) rail equipment of the Contractor to be used on the tracks shall be subject to prior approval of the Railroad. The equipment must be inspected and approved in advance at the Railroad’s facility by Railroad inspectors. The equipment inspection must be renewed every 3 months.
  - (C) On-track vehicles shall be equipped with a Railroad approved tow bar and coupler. Multiple vehicles shall move in tandem and coupled when directed by the Railroad. Movement of on track vehicles shall proceed only under the direct supervision of a Qualified Railroad Employee.
- (9) Materials and equipment belonging to the Contractor shall not be stored on Railroad property without first having obtained permission from the Engineer and Railroad. Such permission will be on the condition that the Engineer and Railroad will not be liable for damage to such materials and equipment from any cause. The Contractor shall keep the tracks adjacent to the Site clear of all refuse and debris that may accumulate from his operations and shall leave the Railroad property in the condition existing before the start of his operations.
- (10) The Contractor shall coordinate with the Engineer and the Railroad in order to determine the type of protection required to insure safety and continuity of Railroad traffic incidental to the particular methods of operation and equipment to be used on the work.
- (11) The Railroad will require protection during all periods when the Contractor is working on, or over, the right-of-way of the Railroad, or as may be found necessary in the opinion of the Railroad. When protection is required, refer to Paragraph 1(g).

- (12) It shall be expressly understood that this Contract does not include work for which the Railroad is to be billed by the Contractor, and it shall be further understood that the Contractor is not to bill the Railroad for any work which he may perform, unless the Railroad gives a written request that such work be performed at its expense.
- (13) Upon completion of the work, and before final payment is made, the Contractor shall remove from within the limits of the Railroad's right-of-way, all machinery, equipment, surplus materials, falsework, rubbish and temporary buildings, and other property of the Contractor/sub-contractor, and shall leave the right-of-way in a condition satisfactory to the Railroad.
- (c) **Railroad Protective Services** - will be provided in accordance with the Roadway Worker's Protective Act, Title 49, Part 214, Sub-part C. Railroad protective services will also be performed to insure safe operations of trains when construction work would, in the Railroad's opinion, be a hazard to Railroad operations.
- (d) **Definition of Hazard** – the Railroad has furnished the statements quoted below, explaining when they consider a hazard to operations exists:  
“Protective services will be required whenever the Contractor is performing work on or adjacent to the Railroad tracks or right-of-way, such as excavating, sheeting, shoring, erection and removal of forms, handling materials, using equipment which by swinging or by failure could foul the track, and when any other type of work being performed, in the opinion of the Railroad, requires such service.”
- (e) **Contractor Requirements for Work Affecting the Railroad**
  - (1) All matters requiring Railroad Company approval or coordination shall be directed to the Engineer or a duly authorized representative thereof, for forwarding to the Railroad Engineer.
  - (2) Detailed plans and appurtenant data and calculations for any operation which, in the opinion of the Railroad, would affect the Railroad, must be submitted to the Engineer or a duly authorized representative thereof, for forwarding to the Railroad Engineer for approval prior to commencement of the work. All plans and calculations submitted must be stamped by a Connecticut registered Professional Engineer.
  - (3) The Contractor shall maintain a minimum of 1 foot level shoulder from ends of ties to maintain lateral track support for all excavations and shall not excavate any slope steeper than 1 (vertical) on 2 (horizontal) from the edge of the shoulder. Sheeting shall be required on all excavations where the side of the excavation is intercepted by the Railroad live load influence line. The live load influence line is defined as a line originating at the bottom edge of tie and extending downward at a slope of 1 (vertical) on 1½ (horizontal). Such excavations must be designed to withstand, in addition to all common loads such as soil pressure and hydrostatic pressure, a railroad live load of Cooper E-80.
  - (4) All excavation area shall be located by the Contractor and inspected by the Railroad for the purpose of determining conflicts with underground facilities. Exploratory trenches, a minimum of 3 feet deep and 15 inches wide in the form of an “H” with outside dimensions matching and outside of sheeting dimensions are to be hand dug, as directed by the railroad. In some locations, excavations may exceed 3 feet in depth. Specialty excavations such as screw anchors or cat pole foundations will require additional trenching to ensure all possible conflicts are located. These trenches are for

exploratory purposes only and are to be backfilled and compacted immediately. All work outlined above must be done in the presence of a Railroad inspector.

- (5) Cavities adjacent to any sheet piling, created by driving of sheet piling, shall be filled with sand and any distributed ballast must be restored and tamped immediately.
- (6) Sheet piling shall be cut off at top of tie during construction and at 2 feet below bottom of tie after construction just prior to completion of back filling.
- (7) Plans and calculations for any sheeting must be submitted to the Engineer for forwarding to the Railroad for approval prior to construction. Further, plans and calculations must be stamped by a Connecticut registered Professional Engineer.

**(f) Ordering Protective Personnel**

The Railroad will furnish Protective Service Personnel (conductors, flagmen, groundmen, inspectors, maintenance and/or other railroad personnel deemed necessary) to protect the operation of train traffic during the Contractor's construction activities. Railroad Protective Services will also be provided in conformance with the Roadway Worker's Protective Act as stated in Paragraph 1(c). There will be no charge to the Contractor for Railroad Protective Services provided. The providing or failing to provide Protective Services shall not relieve the Contractor from liability or payment for any damage caused by his or his subcontractor's operations conducted in their absence.

- (1) The Contractor must obey all instructions from Railroad representatives on the job Site promptly. Failure to follow instructions shall be deemed sufficient cause for closing the job Site to the Contractor and its employees.
- (2) The Railroad will, at its sole discretion, determine the need for and the availability of protective personnel. The Railroad will provide protective personnel to the extent possible considering its operational and maintenance priorities. The Railroad does not guarantee that protective personnel will be available to meet the Contractor's preferred schedule. Further, no work will commence until the assigned Railroad representative affirmatively advises the Contractor that the necessary protective personnel are stationed and that work may proceed.
- (3) The assessment of the need for protective services will be based upon a weekly Railroad Construction Coordination Meeting. At these meetings, the Contractor shall provide a Bi-weekly Schedule that will begin on the following Saturday. Based on the schedule, the Railroad will determine the Protective Services required for the 2-week period. Protective Services will be reserved for the following week beginning on the Saturday and ordered for the second week of the schedule. It will be the Contractor's responsibility to perform work in accordance with the submitted schedule. Variations from the submitted schedule may result in additional and unnecessary costs to the Engineer, Railroad and Contractor.
  - (A) The Contractor shall base his operations on a 5 consecutive day work week. The hours of operation during this time shall remain constant. Multiple shifts may be worked.
  - (B) The Contractor must demonstrate maximum use of Protective Service Personnel ordered. Failure to do so may result in the inability to consistently obtain services.
  - (C) The Contractor shall be responsible for forwarding all Protective Service requests from his subcontractors and suppliers in his bi-weekly schedule submittal.



- (4) Requests to cancel construction activities, and subsequently the scheduled Protective Service Personnel, will be also submitted at the weekly Railroad Construction Coordination Meeting. At these meetings, the previously scheduled Protective Services for the week beginning on the following Saturday may be cancelled. This will be the only time for cancellation. Once cancelled, no re-ordering of Protective Services for the following week will be allowed.
- (5) Weather conditions will be considered the only basis upon which the Railroad will accept the Contractor's cancellation of scheduled work and will only be recognized on items of work which have been clearly identified and determined to be weather dependent in the Contractor's schedule. Activities not presented on the bi-weekly schedule at the weekly Railroad Construction Coordination Meeting will not be able to commence until it has been inserted into the schedule and presented at the next meeting.
- (6) Work that requires the support of Railroad personnel shall not be scheduled on the following days, unless the work is of an emergency nature:

Holiday's Observed:

- \*New Year's Day
- \*Good Friday, Easter
- \*Memorial Day
- \*Independence Day
- \*Labor Day
- \*Columbus Day
- \*Thanksgiving Day
- \*Christmas Day
- \*The Saturday and Sunday preceding a Monday holiday.
- \*The Saturday and Sunday following a Friday holiday.
- \*The Friday and Monday preceding and following a weekend holiday.

**(h) Requirements for Requesting Track Outages**

Track outages as described in the plans and specifications must be requested at the weekly Railroad Construction Coordination Meeting.

- (1) All procedures, material and equipment must be approved and on Site prior to the Railroad accepting the track outage request(s). This applies to all track outage requests.
- (2) Track outages will be granted based on need for constructability not for convenience.
- (3) The Contractor must demonstrate the maximum use of track outages by coordinating his activities and work so that various elements and multiple activities are performed during approved outages. Failure to consistently use track outages may cause the inability to gain approval of future requests for outages.
- (4) No new track outages may be initiated the weekend preceding or following these holidays:
  - Thanksgiving
  - Christmas
  - New Year's

However, long-term continuous outages may extend through these periods.

**(i) Requirement for Excavated Materials Handling**

All excavated material shall remain within the railroad right-of-way. Material not intended for reuse at the excavation site shall be removed by the railroad.

- (1) The railroad will make available a track mounted rotary dump truck with operator for removal and disposal of excess earth material.
- (2) Work activities with excavation must be scheduled with the railroad in advance. The contractor must include time in the schedule for delivery of excavated material to the designated disposal area.
- (3) The contractor shall coordinate work schedules with the Engineer.

**(j) Safety for Contractor's Employees Working on or Adjacent to the Right-of-Way of the Railroad**

**(1) Personal Protection Equipment**

- (A) Approved hard hats, reflectorized vest and clothing must be worn by all Contractor employees while on the Right-of-Way, in yard, shop facilities, and construction and/or work sites. Approved safety eyewear must be worn by all Contractor employees while on Right-of-Way, in yard, shop facilities and construction and/or work sites and in the operating control cab of a moving locomotive or train. Any exclusion must be jointly approved by Railroad's department head and Director of Safety.
- (B) Other protective equipment such as goggles, face shields, safety belts, floatation vests, gloves and respirators shall be issued by the Contractor when required. Protection devices for hearing conservation may be used when determined necessary and safe to do so.

**(2) Possession or Use of Intoxicants and Illegal Substances**

The use of intoxicants, alcohol, narcotics, marijuana, amphetamines, hallucinogens or other illegal substances while working within the Railroad Right-of-Way, is prohibited and is sufficient cause for immediate removal from the Railroad property. Contractor employees under medication before or while on duty, must be certain that such use will not affect the safe performance of their duties.

**(3) Surveying Equipment**

- (A) Measuring tapes must be non-metallic to avoid shunting the signal system electric circuits. This will occur when a metallic object is laid across the top of 2 rails of any track.
- (B) Electrically rated fiberglass elevation rods must be used to avoid injury in the event contact is made with energized signal/communication lines.

**(4) Conduct On or About Track**

- (A) Contractor employees must not enter the track envelope unless it is absolutely necessary in performance of their duty. If it is deemed necessary, then the Contractor employees must walk on tracks or cross tracks only when accompanied by or with permission from a Qualified Railroad Employee of the Railroad. Always use approved walkways when available; otherwise identify and take the shortest safe route after looking in both directions. If more than 1 track is to be crossed, stop and look before crossing each track.
- (B) The possession of an umbrella on or about tracks is prohibited.
- (C) Do not rest any object on your shoulder while in close proximity to a moving train or high-rail equipment.

- (D) Expect equipment to move on any track, in any direction, at any time. Contractor employees must look in both directions and have permission from a Qualified Railroad Employee before:
  - 1. Fouling track
  - 2. Crossing track
  - 3. Going between or around end of equipment or structure
  - 4. Moving out from between or under equipment of structure
  - 5. Getting on or off equipment
  - 6. Performing any other applicable operation
- (E) When required by a conductor/flagman or other Qualified Railroad Employee to vacate tracks, the Contractor employees must comply immediately.

**(5) Safety Program and Plan**

- (A) Prior to the commencement of work the Contractor shall submit a “Working on the Railroad Safety Plan” that will include a Program which implements the plan. The submission shall be made to the Engineer or a duly authorized representative and forwarded to the Railroad for compliance with this specification. This plan is separate to the Health and Safety Plan required for other aspects of the Project (i.e., lead, excavations, etc.).
- (B) Each employee of the Contractor, subcontractor or others on Site shall be given an initial Railroad Safety Training session administered by a Railroad Safety Representative prior to being allowed to work on the Project. All employees receiving this training will receive a Registered Hard Hat sticker or identification card that will identify them as a trained employees. No Contractor employees are permitted on the Railroad Right-of-Way without evidence of this training. Contractor employees shall renew this training annually.
- (C) All Contractor employees entering the railroad right-of-way must attend and acknowledge the daily job briefings prior to commencing any work. The qualified railroad employees will conduct the job briefings.
- (D) The Contractor shall hold "TOOL BOX" safety meetings for their employees at least once a week that will be documented and attendees listed.
- (E) The Contractor supervisor shall attend a monthly Railroad Safety Meeting.

**2. – Insurance Requirements – Housatonic Railroad Company**

The Contractor engaged in work on the Project shall be required to comply with the requirements set forth under Article 1.03.07 – Insurance of the Standard Specifications, its supplements and special provisions contained herein.

**3. – Cost Associated with this Specification**

- (a) There shall be no direct payment for compliance to this specification. All costs associated with any regulatory requirements, traffic regulation, specification administration, coordination, materials and incidentals required to fulfill the requirements of this specification will be considered as included in the general cost of the work and distributed in all items.

- (b) Any work, materials supplied, inspections and protective services by the Railroad as described in the plans and specifications, expressly needed for the construction of the Project, will be compensated to the Railroad by the Engineer under a separate agreement.

## **ITEM #0914018A – ORNAMENTAL METAL FENCE (4' HIGH)**

### **Description:**

#### **1. Summary**

Work under this item shall consist of furnishing and installing decorative metallic-coated-steel tubular picket fences and gates of the type and height specified where indicated on the plans or as ordered and in conformity with these specifications.

#### **2. Submittals**

Submit Shop Drawings, Manufacturer's Product Data and Installation Instructions for ornamental fencing.

### **Material:**

#### **1. Manufacturer**

The fence system shall conform to Monumental Iron Works, Imperial Style E, 4-rail design sold by Master Halco, Inc, Irving Texas or approved equal. The manufacturer shall supply this total Riveted Ornamental Steel Fence system in compliance with the requirements of ASTM F2408.

#### **2. Material**

Steel material for fence framework shall be galvanized prior to forming in accordance with the requirements of ASTM A653/A653M, with minimum yield strength of 45,000 psi (310 MPa). The steel shall be hot-dip galvanized to meet the requirements of ASTM A653/A653M with a minimum zinc coating weight of 0.90 oz/ft<sup>2</sup>, Coating Designation G-90 for rails; 0.60 oz/ft<sup>2</sup>, Coating Designation G-60 for pickets and posts.

Material for pickets shall be a minimum of 3/4" x 16ga tubing. The cross-sectional shape of the rails shall conform to the manufacturer's U-channel design with outside cross-section dimensions of 1.375" x 1.5" and a minimum thickness of 11 Ga. Picket holes in the U-channel rail shall be spaced 4.687" on center. Picket to channel connection shall be 1/4" diameter aluminum drive rivet. Fence posts shall be a minimum of 2.5" x 2.5" x 16 ga tubing.

#### **3. Fabrication**

Pickets, rails and posts shall be pre-cut to specified lengths. U-channel rails shall be pre-punched to accept pickets. Pickets shall be pre-drilled to accept rivets.

Industrial drive rivets of sufficient length shall attach pickets to rails in a secure fashion to minimize picket movement. Rivet shall have a minimum of 1100 lbs. holding power and a shear strength of 1500 lbs.

Pro-Arc Rail End Brackets: Brackets shall be die cast zinc (ZAMAK #3 alloy) per ASTM B86-83Z 33521. Ball and socket design capable of 30° swivel (up/down-left/right). Bracket to fully encapsulate rail end with snap fit top cap for complete security. Bracket shall be secured to the rail by a #4 Drive Rivet.

The manufactured galvanized framework shall be subjected to the PermaCoat® thermal stratification coating process (high-temperature, in-line, multi-stage, multi-layer) including, as a mini-

mum, a six-stage pretreatment/wash (with zinc phosphate), an electrostatic spray application of an epoxy base, and a separate electrostatic spray application of a polyester finish. The base coat shall

ITEM #0914018A

be a thermosetting epoxy powder coating (gray in color) with a minimum thickness of 2 mils (0.0508mm). The topcoat shall be a “no-mar” TGIC polyester powder coat finish with a minimum thickness of 2 mils (0.0508mm). The color shall be (specify Black, Bronze, White, or Desert Sand). The stratification-coated framework shall be capable of meeting the performance requirements for each quality characteristic shown in Table below.

Quality Characteristics	ASTM Test Method	Performance Requirements
Adhesion	D3359 – Method B	Adhesion (Retention of Coating) over 90% of test area (Tape and knife test).
Corrosion Resistance	B117, D714 & D1654	Corrosion Resistance over 1,000 hours (Scribed per D1654; failure mode is accumulation of 1/8” coating loss from scribe or medium #8 blisters).
Impact Resistance	D2794	Impact Resistance over 60 inch lb. (Forward impact using 0.625” ball).
Weathering Resistance	D822 D2244, D523 (60° Method)	Weathering Resistance over 1,000 hours (Failure mode is 60% loss of gloss or color variance of more than 3 delta-E color units).

**4. Swing Gates**

Swing gates shall be fabricated using channel rail, gate ends, gussets and pickets. All rail and up-right intersections shall be joined by welding. All picket and rail intersections shall also be joined by welding. Height of gate shall match height of fence.

**5. Miscellaneous Materials**

Concrete: Normal-weight, air-entrained, ready-mix concrete with a minimum 28-day compressive strength of 3000 psi, 3-inch slump, and 1-inch maximum aggregate size.

**Construction Methods:**

**1. Examination**

Examine areas and conditions, with Installer present, for compliance with requirements for site clearing, earthwork, pavement work, construction layout, and other conditions affecting performance of the Work. Do not begin installation before final grading is completed unless otherwise permitted by Engineer. Proceed with installation only after unsatisfactory conditions have been corrected.

**2. Preparation**

Stake locations of fence lines, gates, and terminal posts. Do not exceed intervals of 500 feet or line of sight between stakes. Indicate locations of utilities, lawn sprinkler system, underground structures, benchmarks, and property monuments.

**3. Ornamental Fence Installation in Round Concrete Footings:**

Install fences according to manufacturer's written instructions.

Post Excavation: Drill or hand-excavate holes for posts in firm, undisturbed soil. Excavate holes to a diameter of not less than 4 times post size and a depth of not less than 42 inches.

Post Setting: Set posts in concrete at indicated spacing into firm, undisturbed soil. Verify that posts are set plumb, aligned, and at correct height and spacing, and hold in position during setting with concrete or mechanical devices.

Concrete Fill: Place concrete around posts and vibrate or tamp for consolidation. Protect above-

ground portion of posts from concrete splatter.

Concealed Concrete: Top 2 inches below grade to allow covering with surface material. Slope top surface of concrete to drain water away from post.

Posts Set in Concrete: Extend post to within 6 inches of specified excavation depth, but not closer than 3 inches to bottom of concrete.

**4. Ornamental Fence Installation in Existing Concrete Wall Foundation:**

Fence posts are to be mounted on existing concrete wall foundation as detailed. All fastening hardware shall be approved by the Engineer.

**5. Gate Installation**

Gate posts shall be spaced according to the manufacturer's gate drawings, dependent on standard out-to-out gate leaf dimensions and gate hardware selected. Type and quantity of gate hinges shall be based on the application; weight, height, and number of gate cycles. The manufacturer's gate drawings shall identify the necessary gate hardware required for the application. Gate hardware shall be provided by the manufacturer of the gate and shall be installed per the manufacturer's recommendations.

**Method of Measurement:**

This work will be measured for payment by the number of linear feet of completed and accepted ornamental fence of the height specified, measured from the outside to outside of terminal posts, including gates as indicated on the drawings. Gates will not be measured separately for payment, the cost of which shall be included in the unit price of the fence.

**Basis of Payment:**

This work will be paid for at the contract price per linear foot for "Ornamental Fence" of the height specified, complete and in place, which price shall include all materials, equipment, tools, excavation, backfill, disposal of surplus material and labor incidental thereto. Payment will be made under:

**Pay Item**

Ornamental Metal Fence (4' High)

**Pay Unit**

LF

**ITEM #1300007A — EXCAVATION AND DISPOSAL OF UNSUITABLE MATERIAL (WATER MAIN)**

**Description:**

Work under this section shall include all labor, tools, and equipment necessary to excavate and legally dispose of Unsuitable Material.

Unsuitable Material under this section shall be defined as any material deemed unsatisfactory, by the Aquarion Representative, to provide a stable base below the pipe on which to install pipe. Unsuitable Material includes, but is not limited to, boney soil, clay, wet soil, organics, peat, soft or spongy soil, or any other material deemed unsatisfactory to provide a stable base below the pipe on which to install pipe.

The vertical limits of Removal of Unsuitable Material vary, and are below the pipe, as defined in the Typical Trench Detail. The vertical limits of Unsuitable Material shall be as directed by the Aquarion Representative.

Any excavated material that is deemed unsuitable material by the Aquarion Representative shall be removed from the site and properly disposed of. This refers to material throughout the entire depth of the trench. However, the payment limits for Removal of Unsuitable Material are below the pipe, as defined in the Typical Trench Detail. Unsuitable material removed from the rest of the trench to the lower vertical limit of the bedding material is included in the linear foot cost of the pipe installation.

**Materials:**

Work under this section shall include all materials necessary to excavate and legally dispose of unsuitable materials, including trench bracing, shoring, trench boxes, pumps and dewatering equipment.

**Construction Methods:**

Unsuitable Material shall be excavated, removed from the trench, and legally disposed of.

Trench bracing, sheeting and trench boxes shall be used in accordance with OSHA standards.

**Method of Measurement:**

Excavation and Disposal of Unsuitable Material shall be measured for payment per cubic yard of Unsuitable Material removed from the trench below the pipe and to the limits as shown on the Typical Trench Detail or as directed by the Aquarion Representative.

Excavated material, down to the lower limit of bedding material, as defined in the Typical Trench Detail, that is deemed unsuitable material by the Aquarion Representative and removed from the



site shall not be measured separately for payment, but shall be included in the linear foot cost of the pipe installation.

**Basis of Payment:**

Excavation and Disposal of Unsuitable Material will be paid for at the contract unit price per cubic yard of Unsuitable Material removed from the trench below the pipe and to the limits shown on the Typical Trench Detail or as directed by the Aquarion Representative.

No separate payment will be made for excavated material, down to the lower limit of bedding material, as defined in the Typical Trench Detail, that is deemed unsuitable material by the Aquarion Representative and removed from the site, but will be included in the linear foot cost of the pipe installation.

**Pay Item**

**Pay Unit**

Excavation and Disposal of Unsuitable Material

CY

**ITEM #1300015A — ROCK IN TRENCH EXCAVATION 0' — 10' DEEP  
(WATER MAIN)**

**Description:**

Work under this section shall include excavation, removal and disposal of all boulders 1/2 cubic yard or greater in volume, rock removal, drilling and controlled blasting of boulders over 1 cubic yard, ledge formations, hoe ramming, hand chipping, and cement masonry or concrete structures to be removed from within the horizontal and vertical payment limits for pipe installation, as shown on the Typical Trench Detail.

World under this section shall include removal, by hand labor, if required, of ledge rock, boulders, masonry or concrete structures in the vicinity of existing utilities.

Work under this section shall include pre-blast surveys, permits, drilling and blasting, excavation, and disposal of the excavated rock and/or boulders.

Work under this section shall include furnishing and installing bedding material to replace excavated rock to the limits shown on the Typical Trench Detail and compaction in 12" lifts of the entire trench.

Work under this section does not include furnishing and placing of Additional Backfill Material necessary to replace the excavated rock.

**Definition of Rock:**

Rock shall be defined as solid ledge rock or boulders that, in the opinion of the Aquarion Representative, require drilling and blasting, wedging or sledging, and barring for its removal.

The following material shall not be measured or allowed for payment as rock excavation:

- soft or disintegrated rock or boulders which can be removed with a backhoe or excavator bucket
- loose or previously blasted rock
- broken stone in rock fills, walls, or elsewhere
- concrete, asphalt, or brick pavements
- concrete, asphalt, or stone curbs
- concrete, asphalt, or brick sidewalks
- boulders one half (1/2) cu. yd. or less

**Limits of Rock Excavation**

Rock shall be excavated to maintain minimum clearance between the outside of the structure or barrel of the pipe to the vertical side of the excavation, as shown by the horizontal payment limits on the Typical Trench Detail. Isolated points of rock shall not come closer to the outside of the structure or pipes and at joints as shown on the Typical Trench Detail for the purpose of maintaining sufficient room for properly making the joint. Refer to the Typical Trench Detail for

the minimum distance between the bottom of the pipe, including the barrel, and rock at the bottom of the trench. This is the vertical limit of payment for rock.

Rock in miscellaneous excavations shall be excavated in accordance with the directions and to the limits directed by the Aquarion Representative.

The surface of the rock shall be stripped in sections satisfactory to the Aquarion Representative before the rock is excavated so that the proper measurements can be made.

Rock shall be removed to a depth below the pipe shown on the Typical Trench Detail. Bedding material shall be installed and compacted below the bottom of the pipe, and up to the vertical limits for bedding material as shown on the Typical Trench Detail. Replacement of excavated rock in this vertical limit for bedding material is considered bedding material, and is not considered as Additional Backfill Material.

### **Materials:**

Materials under this section include any tools or equipment necessary to excavate, remove, and properly dispose of rock as defined in this section. Materials also include any tools or equipment necessary to backfill and compact material to replace excavated rock.

### **Construction Methods:**

#### **Blasting**

Explosives for blasting shall be stored, handled, and used in accordance with the laws, ordinances, and regulations of the State of Connecticut and all local regulations and with such additional regulations as the Aquarion Representative may require. Blasting shall be conducted so as not to endanger persons or property and, unless otherwise permitted, shall be covered or otherwise satisfactorily confined. The Contractor shall be responsible for and shall make good for any damage caused by blasting or accidental explosions. If rock removal is required near existing utility pipes, cables, or structures, the Contractor may be required to remove such rock without blasting.

#### **Mechanical Removal of Rock**

Mechanical removal of rock shall include removal by hoe ram. The Contractor shall use mechanical means for removal of rock for the following conditions:

- due to the proximity of the pipeline route to existing structures
- due to restrictions against blasting set by federal, state, or local officials, or
- at the request of Aquarion

### Frost Excavation

Frost excavation shall mean removal of frozen earth exceeding twelve (12) inches in depth, which in the opinion of Aquarion, requires for its removal, drilling and blasting or breaking with specialized power operated frost removal equipment.

### Backfilling

Where pipe is laid in rock excavation, bedding material or Additional Backfill Material as specified in these specifications, shall be placed over the rock and compacted to sub grade. The minimum depth of bedding material as directed by the Owner's Representative shall be in accordance with the Typical Trench Detail. Excess rock, which cannot be used with earth to provide satisfactory backfill in the upper portions of the trench, shall be disposed of the same as excess earth excavation. No pieces of rock in excess of 12" shall be used in backfilling.

To replace excavated rock, the Contractor shall place backfill material obtained from excess material from other portions of the work or Additional Backfill Material, as specified in these specifications.

Additional Backfill Material shall be as directed by the Owner's Representative.

### **Method of Measurement:**

Rock In Trench Excavation shall be measured for payment per cubic yard of rock, as defined in this section, removed from the trench.

Bedding material furnished, installed, and compacted to replace excavated rock, to the limits shown on the Typical Trench Detail, shall not be measured separately for payment, but shall be included in the linear foot cost of the pipe installation.

Additional Backfill Material furnished, installed, and compacted to replace excavated rock, to the limits shown on the Typical Trench Detail, shall be measured separately for payment under the appropriate Item for Additional Backfill Material (Water Main).

Any cost beyond the unit prices for Rock Excavation for laborers and equipment that are idle during periods of rock removal shall not be measured separately for payment.

### **Basis of Payment:**

Rock in Trench Excavation will be paid for at the contract unit price per cubic yard of rock, as defined in this section, removed from the trench.

No separate payment will be made for bedding material furnished, installed, and compacted to replace excavated rock, to the bedding material limits shown on the Typical Trench Detail. Bedding material will be included in the linear foot cost of the pipe installation.

Additional Backfill Material furnished, installed, and compacted to replace excavated rock, to the limits shown on the Typical Trench Detail, will be paid for separately at the contract unit price under the appropriate Item for Additional Backfill Material (Water Main).

No separate payment will be made for any cost beyond the unit prices for Rock Excavation for laborers and equipment that are idle during periods of rock removal.

**Pay Item**

**Pay Unit**

Rock In Trench Excavation 0' — 10' Deep

CY

**ITEM #1300151A — ADDITIONAL BACKFILL MATERIAL (WATER MAIN)**

**Description:**

Work under this section shall include furnishing, installing, placing and compacting bank run gravel, clean backfill, ¾" crushed stone, processed aggregate base, or native material as directed by the Aquarion Representative, which is not specifically included under other sections of these specifications as Additional Backfill Material.

Materials furnished and installed for backfill of rock or boulder removal, backfill of frost removal, replacement of unsuitable material, placement of bedding material, backfill, or pavement base are specified under this section. Acceptable material for backfill shall include bank run gravel, ¾" crushed stone, clean backfill, processed aggregate base, or native material.

Native material is acceptable material for Additional Backfill Material as long as it meets the requirements of these specifications.

The vertical pay limits of Additional Backfill Material are from 12" above the top of the installed pipe to the bottom of the Processed Aggregate Base or Rolled Granular Base layer (see the Typical Trench Detail) and the horizontal pay limits are as shown on the Typical Trench Detail.

All Additional Backfill Material shall be placed and compacted in 12" lifts.

**Materials:**

**Bank Run Gravel**

Bank Run Gravel shall consist of sound, tough, durable particles of crushed or uncrushed material free from soft, thin, elongated, laminated, friable, micaceous, or disintegrated pieces, mud, loam, organic matter, clay, or other deleterious material.

Bank Run Gravel shall be the product resulting from the deliberate mechanical crushing of gravel.

Bank Run Gravel shall not have stones larger than 2".

Bank Run Gravel shall meet the following gradation requirements:

<u>Square Mesh Sieve</u>	<u>Percent Passing By Weight</u>
2"	100
1-1/2"	90-100
1"	20-55
3/4"	0-15
3/8"	0-5

Processed Aggregate Base

Processed Aggregate Base is acceptable for use as Additional Backfill Material and shall conform to Connecticut Department of Transportation Form 817, Section 3.04 and Section M.05.01.

Processed Aggregate Base shall not have stones larger than 2-1/2”.

Processed Aggregate Base shall meet the following gradation requirements:

<u>Square Mesh Sieve</u>	<u>Percent Passing By Weight</u>
2-1/2”	100
2”	95-100
3/4”	50-75
1/4”	25-45
No. 40	5-20
No. 100	2-12

Clean Backfill

Clean Backfill shall be of a quality satisfactory to the Aquarion Representative and shall be free from large or frozen lumps, wood and other extraneous material. Clean Backfill shall be free from stones larger than 12 inches. Clean Backfill shall be placed in a manner acceptable to the Aquarion Representative. Unless otherwise ordered by the Aquarion Representative, the Clean Backfill shall be brought to the surface of the surrounding ground and neatly graded. Backfilling will only be done under the supervision of the Aquarion Representative.

3/4” Crushed Stone

3/4” Crushed Stone shall consist of sound, tough, durable particles of crushed or uncrushed material free from soft, thin, elongated, laminated, friable, micaceous, or disintegrated pieces, mud, or other deleterious material.

3/4” Crushed Stone shall be the product resulting from the artificial crushing of rocks, boulders, or large cobblestones, all faces of which have resulted from the crushing operation.

3/4” Crushed Stone shall not have stones larger than 1”.

3/4” Crushed Stone shall meet the following gradation requirements:

<u>Square Mesh Sieve</u>	<u>Percent Passing By Weight</u>
1”	100
3/4”	90-100
1/2”	20-55
3/8”	0-15
No. 4 (3/16”)	0-5

Native Material

Native material is acceptable for Additional Backfill Material as long as it meets the requirements of these specifications. Native material shall consist of natural material that is excavated from the trench or another portion of the job consisting of sound, tough and durable particles of soil and stone, free of clay, loam, or organic matter.

Aquarion reserves the right to require proof that the native material meets the requirements in these specifications through testing for gradation, organic content and compacted density. This testing will be at the expense of the Contractor if they wish to use the native material as backfill.

Native material shall not have stones larger than 3-1/2”.

Native material shall meet the following gradation requirements:

<u>Square Mesh Sieve</u>	<u>Percent Passing By Weight</u>
3-1/2”	100
1-1/2”	55-100
1/4”	25-60
No. 10	15-45
No. 40	5-25
No. 100	0-10
No. 200	0-5

**Construction Methods:**

Bank run gravel, clean backfill, ¾” crushed stone, processed aggregate base, or native material shall be placed to the lines and grades ordered. Backfill shall be placed in layers not exceeding twelve inches (12”) in thickness and shall be compacted in place by hand and/or by mechanical tamping devices.

**Method of Measurement:**

Work under this section shall be measured for payment per cubic yard of Additional Backfill Material (Water Main) (regardless of the type of material used to backfill) installed, complete in place, compacted in the trench, and accepted.

Native material as Additional Backfill Material shall not be measured separately for payment, but shall be included in the linear foot cost of the pipe installation.

**Basis of Payment:**



Work under this section will be paid for at the contract unit price per cubic yard of Additional Backfill Material (Water Main) (regardless of the type of material used to backfill) installed, complete in place, compacted in the trench, and accepted.

No separate payment will be made for native material as Additional Backfill Material, but will be included in the linear foot cost of the pipe installation.

Pav Item

**Pay Unit**

Additional Backfill Material (Water Main)

CY

## **ITEM #1301324A — RECONNECT COPPER SERVICE (WATER MAIN)**

### **DESCRIPTION:**

Under this item of work the Contractor shall reconnect, relocate or switch over service connections including corporation valves, curb valves and valve boxes at the locations called out on the plans or as directed by the Aquarion Representative. This work shall also include the removal of the existing curb valve and valve box, installation of a new curb valve and valve box and new copper service line. All materials shall be provided by the Contractor and shall conform to the List of Approved Materials, contained elsewhere in these special provisions.

The Contractor shall provide assistance to the Aquarion Representative who will be responsible to prepare a sketch on AWC tap card forms showing the location of each new curb stop or meter pit showing swing ties and including all details of any modifications to the service line. In addition, the Contractor shall provide a list of all materials installed. All work performed on service lines shall conform to the Aquarion Standard Details included with the project plans or as directed.

### **MATERIALS:**

All materials shall be provided by the Contractor and shall conform to the List of Approved Materials, including but not limited to, service taps, service saddles, corporation valves, copper service line, fittings, couplings, curb valves, and curb boxes.

All copper tubing shall be Type “K” soft seamless copper with no soldered joints underground, and in accordance with ASTM B88 Standards.

All brass fittings shall be IPS and in accordance with ANSI/ASME B16.15 and WW P 460 Standards, latest revision.

All service brass shall be in accordance with ANSI/AWWA C800 Standards, latest revision.

All curb valves shall be compression, ball type.

All corporation valves shall be ball type with a CC threaded inlet and a compression connection outlet.

All service saddles shall be in accordance with ANSI/AWWA C800 Standards, latest revision and shall be double strapped with a CC thread. All brass fittings shall conform to current AWWA and EPA “Lead Free Brass Standards”. Material used for service connection work shall be copper.

The copper tubing, fittings, corporation stops, curb valves and valve boxes for this work will be supplied by the Contractor. All new material found during the progress of the work to have cracks, flaws or other defects will be rejected by the Aquarion Representative. All defective materials shall be promptly removed from the work site and replaced at no additional expense to Aquarion or the Town.

## **CONSTRUCTION METHODS**

On main replacement projects, for corporation/tap shut-offs on the existing main, the Contractor shall connect the old service connection to the new service tap, crimp the unused portion of the old service connection, and shut off the existing corporation valve at the existing main. This will either be done in the same trench as the new main and tap, or in a separate excavation at the existing main, depending on the location of the existing main.

In instances where the existing service connection is copper, in good condition and the new main is in close proximity to the existing main, the Contractor shall tie the new service connection into the existing service connection leaving the existing curb box and valve in place.

In instances where the existing service connection is lead, iron, galvanized, or plastic, the Contractor shall install a new service connection consisting of a tap, corporation valve, service connection pipe (copper), fittings, couplings, curb valve and curb box. When it is required to replace the curb valve and curb box, connection of the customer's service line to the new curb valve is included in this item. Following acceptance of the new service connection by the Aquarion Representative, the old curb valve and curb box shall be removed and legally disposed of.

The method of service line switchover shall be open cut or pull method as directed by the Aquarion Representative. In all cases, the Contractor shall excavate and close the corporation valve on the existing main. Shutdown of the service connection and service line shall be coordinated with Aquarion and the customer.

The Contractor shall backfill and compact in 12" lifts, all trenches and excavations related to work under this section with approved bedding and backfill material. The Contractor shall be responsible for repairing any settlement of the trenches and excavations related to work under this section for up to 1 year.

The Aquarion Representative shall provide a sketch on an Aquarion approved and provided tap card, showing the location of the tap, dimensions, swing ties, and a list of materials installed, for each service switchover installed by the Contractor.

See the Standard Details for details of water service lines.

## **METHOD OF MEASUREMENT**

Reconnect Copper Service (Water Main) will be measured for payment by each service switched over from the existing main to the new water main, completed, in place and accepted. Each unit shall include tapping the main, installing the corporation stop, the copper service pipe, the curb stop, the service curb box and the tie-in to existing service as required for the complete installation of the service and shutting off the existing corporation valve, removing the existing curb valve, curb box and crimping the unused portion of the old service connection,

Rock In Trench, Removal of Unsuitable Material, Additional Backfill Material, and Temporary and Permanent Pavement shall be measured separately for payment under those appropriate Items. Bedding

material furnished, installed, and compacted, to the bedding material limits shown on the Typical Trench Detail, shall not be measured separately for payment, but shall be included in the cost for the service related work.

**BASIS OF PAYMENT**

Reconnect Copper Service (Water Main) shall be paid for at the contract unit price per each service connection completed and accepted. The price shall include all labor, tools, materials, equipment and excavation necessary to complete the work, including tapping, installing the corporation stop, copper service pipe, curb stop, curb box, disconnecting and reconnecting the new service to the new main. Excavation of Unsuitable Material, Additional Backfill and Rock In Trench Excavation will be paid for as specified under those specific items.

**PAY ITEM**

**PAY UNIT**

Reconnect Copper Service (Water Main)

EACH

## **ITEM #1301860A – INSTALLATION OF WATER MAINS AND APPURTENANCES**

### **Description:**

Work under this section shall include all labor, tools, and equipment necessary for installing ductile iron pipe and all appurtenances, complete in place, as shown on the drawings or as directed by the Aquarion Representative, and in accordance with the Aquarion Standard Details.

Contractor shall submit to the Aquarion Water Company a "LAYING SCHEDULE" of all pipe and accessories to be furnished and installed under this Contract. No work shall be undertaken until the laying schedule has been submitted to and approved by the Aquarion Water Company.

Work under this section shall include all labor, tools, materials, and equipment necessary for:

- obtaining road opening permit
- coordination of Call-Before-You-Dig mark out
- saw-cutting of the roadway, sidewalks, or driveways
- traffic control equipment (signs, barriers, etc.)
- traffic control coordination, including scheduling of policemen and flagmen
- furnishing and maintaining lighting
- mobilization and demobilization
- clearing and grubbing
- excavation for pipeline trenches as measured from the existing grade to the trench subgrade
- furnishing and installing concrete for thrust blocks and installing thrust blocks
- furnishing, installing, operating and maintaining a dewatering system
- furnishing, installing and removing sheeting, bracing and trench boxes
- furnishing, stockpiling, loading, hauling, placing and compacting pipe bedding material
- backfill and compaction of pipeline trenches
- stockpiling, loading, hauling and legally disposing of surplus material
- unloading and storage of pipe, fittings, valves, and other appurtenances
- stringing of pipe
- installing pipe, fittings, joint restraints, hardware and restrained joint pipe
- asphalt and concrete pavement removal and disposal (including necessary saw cutting)
- removal and restoration of walls, fences, signs and any other structures which must be removed to carry out the work
- removal of topsoil and sod
- care and protection of existing pipes, utilities, and other structures
- piling and storage of excavated materials
- removal of and stacking of the designated hydrant(s) or gate valves at locations determined by the Aquarion Representative
- all other work shown, specified, or required for installing the water main, except that which is specifically included for payment under other items of the Contract.

Flushing, disinfection and pressure testing of newly installed water main will be paid for under item 1301900A – Hydrostatic Pressure Test.

All public or private monuments, iron pipes or other types of property line and geodetic markers damaged or disturbed by operations under this Contract shall be reset by a licensed land surveyor, all at no additional cost to Aquarion or the Town.

Aquarion will provide full time inspection on all main replacement projects.

All water mains and appurtenances shall be installed in accordance with these Special Provisions and the Aquarion Standard Details.

**Materials:**

Based on the Contractor’s approved Laying Schedule, the Contractor will furnish materials for the installation conforming to the List of Approved Materials contained elsewhere in these special provisions. Additional materials, if required, shall be provided by the Contractor and shall be ordered by the Contractor from Aquarion’s material supplier. Additional materials must be approved by the Aquarion Representative at the site in order to be invoiced. There shall be no administrative mark up on additional materials ordered. A copy of all material invoices shall be given to Aquarion for review.

The Contractor shall maintain and safely store all pipe, fittings, appurtenances, and other materials at the project site.

Leftover or unused materials that are to be returned to the Contractor’s material supplier for credit shall be stockpiled in a neat and orderly fashion on pallets by the Contractor. These materials shall be picked up and removed from the site as soon as possible after the job ends. The Aquarion Representative shall be present for the pickup of these materials and shall agree on which materials can be returned for credit with the Contractor’s material supplier. The Aquarion Representative and the Contractor’s material supplier shall document the materials on a credit form.

The Contractor shall remove and properly dispose of all trash and debris, including leftover materials that cannot be returned for credit.

**Construction Methods:**

Pipe coating that is damaged during shipment or placement shall be touched up in the field with two (2) coats of an asphaltic coating fully resistant to water and chemicals. Materials used for interior surfaces shall be acceptable for use in a potable drinking water supply and shall not impart any odors to the pipe and water.

At all changes in direction and dead ends an approved length of restrained joints/pipe will be required utilizing the following chart for determining the number of joints to be restrained:

**NUMBER OF RESTRAINED JOINTS AND LENGTHS**

(100 psi, Cohesive Granular Soils, Ductile Iron Pipe)

<u>Pipe Size</u>	<u>90° Bend</u>	<u>45° Bend</u>	<u>22 1/2° Bend</u>	<u>11 1/4° Bend</u>	<u>Dead End</u>
6"	F(11)	F(5)	F(2)	F(1)	F+1(32)
8"	F(14)	F(6)	F(3)	F(1)	F+2(42)
10"	F+1(17)	F(7)	F(3)	F(2)	F+3(50)
12"	F+1(21)	F(9)	F(4)	F(2)	F+3(60)
16"	F+1(27)	F(11)	F(5)	F(3)	F+4(78)
24"	F+2(38)	F+1(16)	F(8)	F(4)	F+6(112)

Notes:

1. F + (any number listed in table) - Means fitting plus (the number of joints listed) on either side of the fitting.
2. (Any number listed in parentheses) - Means the number of feet on either side of the fitting that must be restrained, i.e. no short pieces.
3. For pressure greater than 100 psi. Aquarion will determine the number of restrained joints.

Mechanical joint locking gaskets may be used to restrain pipe joints and shall be Field Lock 350 or Sure Stop 350 and in accordance with ANSI/AWWA C111-12/A21.11 Standards, latest revision.

**Installing Ductile Iron Pipe**

All pipe installation shall conform to AWWA C600 Standards, latest revision, unless otherwise modified by these specifications.

Ductile iron pipe shall be laid to a minimum depth of 4'-6" to the top of the pipe as shown on the Typical Trench Detail, unless otherwise directed by the Aquarion Representative. Where the pipeline crosses existing utilities, a vertical clearance of twelve inches (12") minimum shall be maintained, except for sanitary sewers where if the water main is within ten (10) horizontal feet of the sewer, the water main must be at least eighteen inches (18") above the sewer. The pipe between bell holes shall bear continuously on approved material. If the Contractor excavates below the required limit, the trench bottom shall be brought to the required grade with an approved material

as specified in these specifications at the Contractor's expense. In laying pipe, the deflections given in AWWA Standard C600 latest revision shall not be exceeded.

All pipe, valves and fittings shall be lowered carefully into the trench by means of mechanical equipment in such a manner as to prevent them from being damaged. The insides of all bells and outsides of spigots shall be wiped clean and dry and shall be free from oil or grease. During the laying of the pipe, extra care shall be taken to see that no dirt, debris, tools, clothing, or other illicit materials are allowed to be left in the pipe.

After the pipe is laid in the trench, the spigot end shall be centered in the bell and pushed into the bell. Under no circumstances shall pipe be laid where there is water in the trench. The Contractor shall install and joint the pipe in accordance with the manufacturer's instructions. The joints shall be made continuous by the installation of metal wedges per the manufacturer's instructions.

Aquarion will establish the location of the centerline of the pipeline. The Contractor shall establish bench marks and offsets, as necessary, a suitable distance from the work to be done so that proper lines and grades for the work may be maintained. The Contractor shall, to the best of their ability, protect all survey points from damage.

The Contractor shall be responsible for placing the pipe accurately to the established lines and grades as shown on the drawings or as directed by the Aquarion Representative.

When necessary to cut pipe in the field, the cutting shall be done such that neither the pipe nor the lining shall be damaged and such that a smooth, right angle cut is made. A machine designed for this purpose shall be used for the cutting.

It shall be the Contractor's sole responsibility to procure and maintain a suitable storage area for tools, materials, and equipment necessary to perform the work. The Contractor is responsible for all costs associated with the storage of equipment and materials and shall not invoice these costs to Aquarion or the Town. The storage area obtained by the Contractor shall not obstruct or interfere with pedestrian or vehicle movement, and shall not occupy any space within the public right-of-way, except with specific permission by Aquarion or the Town.

Materials shall be stored so as to insure the preservation of their quality and fitness for the work. When considered necessary, they shall be placed on wooden platforms and covered or stored in a suitable building. The Contractor shall not use the storage area for bulk storage of hazardous materials (e.g., gasoline, solvents, oil, etc.). Stored materials shall be located so as to facilitate prompt inspection.

The Contractor shall be present to unload piping and other materials delivered to the jobsite prior to the Contractor's planned mobilization to the project.

### Excavation

The excavation defined herein shall be deemed earth excavation, which shall include the removal of all material other than rock.



The extent of trenching and excavation, including rock, shall be in accordance with the Typical Trench Detail, and shall be 4" below the bottom of the pipe in earth and 6" below the bottom of the pipe in rock. The depth of trench may be increased or decreased at the discretion of the Aquarion Representative as required to avoid obstructions.

Hand excavation shall be employed whenever, in the opinion of the Aquarion Representative, it is necessary to excavate around and/or expose existing utilities.

Excavated material, to the limits other than the limits defined for Removal of Unsuitable Material that is deemed unsuitable material for use as bedding material or backfill above 12" above the top of the pipe by the Aquarion Representative, shall be removed from the site and properly disposed of.

Special care shall be taken to excavate accurately to grade. If the trench is over-excavated, it shall be brought to grade, at the Contractor's expense, by refilling with approved material in compacted layers, each layer not to exceed 6" in thickness if the depth is less than 12" or 12" in thickness if the depth is greater than 12".

Where the bottom of the trench, below the limit of excavation for placement of bedding material, is found to be unstable or to contain material which, in the judgment of the Aquarion Representative, should be removed, the Contractor shall excavate and remove such material to the width and depth as shown on the Typical Trench Detail, as directed by the Aquarion Representative. This excavated material shall be paid for as Removal of Unsuitable Material (see Typical Trench Detail for vertical limit). Before the pipe is installed, the subgrade shall be prepared by refilling with bedding material, in compacted layers, each layer not to exceed 6" in thickness if the depth is less than 12" or 12" in thickness if the depth is greater than 12". The layers shall be thoroughly compacted so as to provide a uniform and continuous bedding for the pipe. This material shall be paid for under Replacement with Suitable Material (see Typical Trench Detail for vertical limit).

#### Disposal of Contaminated Material

Disposal of Contaminated Material shall consist of the loading, transportation and final off-site disposal of contaminated materials (excluding dewatering fluids) that have been generated from various excavations within the project, brought to the designated disposal area and determined to be contaminated with regulated substances at non-hazardous levels. This contaminated material shall be documented and characterized. The contaminated material, shall then be taken from the designated disposal area, loaded, transported to and treated/recycled/disposed of at a permitted treatment/recycle/disposal facility.

The cost for Disposal of Contaminated Material will be a pass through cost paid by Aquarion.

#### Rock Excavation

Rock excavation and replacement with Additional Backfill Material, including bedding material, is specified under other sections of these specifications.

### Unauthorized Excavation

All unauthorized excavations outside the lines and grades shown and specified shall be at the expense of the Contractor and the Contractor shall refill them with approved material, in a manner as specified at his own expense. All backfill for unauthorized excavations shall be compacted in 12" lifts.

### Storage and Disposal of Excavated Materials

Materials removed from the trenches shall be stored in such a manner that they will not interfere unduly with pedestrian or vehicular traffic. Sufficient material suitable for backfill shall be stored and hauled as necessary to replace excavated material that is unsuitable for backfill. Excess excavated material shall be removed and legally disposed of away from the site by the Contractor on the same day as the backfill has been placed.

### Bedding Material

Bedding material shall be free from soft, thin, elongated, laminated, friable, micaceous, or disintegrated pieces, mud, loam, organic matter, wood, clay, or other deleterious material, and frozen material.

Bedding material shall be used for backfilling trenches under, along and over the pipe to a level of 12" above the top of the pipe, as shown on the drawings or as directed by the Aquarion Representative, and shall be bank run gravel, 3/4" crushed stone, processed aggregate base, or native material.

The Contractor must properly bed the pipe with bedding material and shall take care in doing so. The Contractor shall place bank run gravel, 3/4" crushed stone, processed aggregate base, or native material under, along and over the pipe as bedding material to the minimum depth as shown on the Typical Trench Detail or as directed by the Aquarion Representative. Native material is acceptable as bedding material as long as it meets the requirements of these specifications. The bedding material shall be spread in layers and shall be compacted in place at the proper grade to provide a solid uniform bed for the pipe or structure for the full width and length of the bottom of the excavation. Bell holes shall be carefully dug at the ends of the pipe to provide ample room for properly making and checking of joints and providing room for the minimum depth of compacted bedding material under the bell.

When the pipe has been bedded satisfactorily and the joint completed, the recess under the bell shall be refilled and tamped on each side of the pipe to hold it securely in place, care being taken not to disturb the position of the pipe during the process, and in such a manner that the bearing is distributed evenly over the entire length of the pipe.

Any material used for Bedding Material shall not have stones larger than 4". No stones shall be in contact with the pipe or be within 4" of the pipe.

## Backfilling

Unless otherwise specified or directed, all trenches and excavations shall be backfilled immediately after installation and inspection of the pipe.

The Contractor shall use suitable material from excess excavation from other portions of the work or from approved gravel pits. It shall be carefully deposited in uniform layers not exceeding twelve inches (12") in depth, and unless otherwise permitted, each layer shall be carefully and solidly tamped and compacted with appropriate tools in 12" lifts in such a manner as to avoid disturbing the completed work.

Backfill for the excavation (above the limits of the bedding material) shall be with approved Additional Backfill Material, as specified in these specifications, free from organic matter. No stones larger than 12" shall be used in the trench as backfill from 12" above the top of the pipe to the surface. In depositing stones up to 12", care must be taken not to damage the pipe or any structure. Stones which are used in backfilling shall be so distributed through the mass that all interstices are filled with fine material. Backfill shall be deposited in layers not exceeding 12" in depth and compacted.

Rock and other excavated materials from trenches and excavations may be used as backfill, provided individual pieces of rock are not larger than 12" and that they are placed so that voids are filled with the backfill material. No rock or other excavated materials from trenches and excavations shall be placed within 12" from the top of the pipe.

Backfilling within 2' of structures shall be uniformly deposited on all sides and, unless otherwise permitted, solidly compacted in such manner as to avoid damaging the structure or producing unequal pressures thereon.

When sheeting is drawn, all cavities remaining in or adjoining the trench shall be solidly backfilled and compacted. When sheeting is permitted to be left in place, all cavities behind such sheeting shall be solidly backfilled and compacted.

If the material from the trench excavation is considered, in the opinion of the Aquarion Representative, to be unsuitable for use as backfill, the Aquarion Representative shall order the Contractor to furnish suitable Additional Backfill Material for backfill to the limits shown on the Typical Trench Detail. The removal and disposal of this material, if not suitable for backfill, down to the lower vertical limit of the bedding material is included in the linear foot price of the pipe installation. See the Typical Trench Detail for the vertical limits of Additional Backfill Material and bedding material.

## Trench Bracing, Sheeting and Trench Boxes

Where trench conditions are found to consist of material which is unstable to such a degree that it cannot be removed and replaced with an approved material without creating an occupational hazard, the Contractor shall utilize trench bracing, sheeting or trench boxes to support the trench. The Contractor must conform to all applicable State and OSHA standards for trench conditions.

The sides of the trenches and excavations shall be supported by adequate trench bracing, sheeting, or trench boxes. The Contractor shall be held accountable and responsible for the amount of all trench bracing, sheeting, and trench boxes used and for all damages to persons or property resulting from the improper quality, strength, placing, maintaining, or removing of the trench bracing, sheeting, or trench boxes. When trench bracing, sheeting, or trench boxes are removed, care shall be taken not to disturb the newly installed pipe, appurtenances, or existing utilities and structures.

Trench bracing is defined as planks placed against opposite sides of the excavation and is held in place by timber struts or some extendable brace.

Sheeting is defined as continuous sheet piling of either steel or wood with whalers or shoring. No sheeting is to be left in place unless expressly permitted by the Aquarion Representative.

All materials necessary for trench bracing, sheeting, or trench boxes shall be provided by the Contractor and included in this section.

All construction methods necessary to install and maintain trench bracing, sheeting, or trench boxes shall conform to OSHA Standards.

#### Dewatering

The Contractor shall provide all necessary pumps, drains, well point systems, and other means for removing water from the trenches and from other parts of the work. Before pipes are laid or structures built, the trenches and excavations shall be free from water and, if necessary, suitable drainage facilities shall be provided and maintained. Any drainage system used by the Contractor shall be subject to the approval of the Aquarion Representative. Subgrade damaged by failure to properly dewater will be repaired and replaced at the Contractor's expense.

Water from the trenches and excavations shall be disposed of in such a manner as will neither cause injury to public health nor to public or private property, nor to the work completed or in progress.

#### Thrust Blocks

Concrete for thrust blocks shall be Class C Concrete. Thrust blocks shall be in accordance with these specifications and the Standard Details. Thrust blocks are required at all tees, bends and dead ends.

#### Warning Tape

In accordance with "Call Before You Dig" (CBYD) regulations, all underground utilities must be identified with warning tape during the pipe installation. The Contractor shall provide a suitable continuous length of warning tape located above the pipe, as shown on the Typical Trench Detail. The minimum separation between the facility and warning tape shall be 2'. The warning tape shall be 3" wide (minimum), 4.0 MIL polyethylene film, blue in color in accordance with the APWA National Color Code, durable, designed to withstand extended underground exposure, and marked

with the words "Water Main" durably imprinted in accordance with acceptable standards. Warning tape will be supplied by the Contractor. Warning tape should be installed on all excavations regardless of the length of the water main being exposed.

#### Safety Procedures for Storing Pipe

- Pipe will always be blocked to prevent it from rolling or falling.
- Threaded pipe will be handled with care, because threads are sharp and can easily cause injury.
- Pipes larger than 2 inches in diameter will be stacked in storage with spacing strips between each row.
- Each row of stacked pipe will be arranged and blocked to prevent its rolling from the pile. All blocking should be of reasonably permanent material, such as chemically-treated wood.
- Pipe will always be withdrawn from the top row.
- In pipe storage areas where pipe material is handled by a crane, workers will be conversant with the signals used by operators and be careful to stay clear of the load's path. Standard signals should be used.
- Storage area shall be maintained in a safe condition at all times. Repairs to the storage area shall be made whenever necessary.

The Contractor will conform to all applicable State and OSHA standards for pipe line safety. AWWA-M3, "Safety Practice for Water Utilities" will be enforced.

During the progress of the work, all roads shall be kept open for the passage of traffic and pedestrians and shall not be unnecessarily obstructed unless authorized by the authority having jurisdiction over same. Driveways, sidewalks and crossings shall be closed as short a time as possible while pipe is being placed, and passage shall be restored as soon as possible thereafter by properly placed backfill or approved bridging. The Contractor shall take such measures at their own expense as may be necessary to keep the roads open for traffic, and shall give advance notice to the Connecticut Department of Transportation, town public works department, local police and state police as required.

Warning signs shall be provided along all roads where work is in progress. The Contractor shall notify and make all arrangements with the Connecticut Department of Transportation, town public works department, local police and state police for direction of traffic past the equipment, machinery, or construction operations. Barricades and lights shall be provided to protect traffic. Where trenches have been cut in road shoulders on which traffic may pass at times, warning signs shall be placed at frequent intervals and maintained until the shoulder is safe for travel. All such work and operations shall be in accordance with the requirements of the Connecticut Department of Transportation, public works department, local police and state police.

Should the Contractor or their employees neglect to set out and maintain barricades or lights, as required in these specifications, Aquarion may immediately and without notice, arrange for furnishing, installing and maintaining barricades or lights, and any other precaution deemed necessary. The cost thereof shall be borne by the Contractor and may be deducted from any

amount due or to become due to the Contractor under these specifications or the Master Services Agreement.

The Contractor shall be held responsible for any damages that may have to be paid as a consequence of the Contractor's failure to protect the public.

The Contractor must follow the most recent Connecticut Department of Transportation Traffic Control Pattern as issued by the Connecticut Department of Transportation.

Before starting any work, the Contractor shall arrange with the municipal or state officials having jurisdiction for the use of routes of travel for hauling materials, including surplus earth and rock that will result in minimum inconvenience to the traveling public. Routes of travel so scheduled shall be adhered to throughout the course of the work, unless otherwise approved.

The Contractor shall take all necessary precautions to prevent and abate nuisance caused by dust arising from his operations. Approved methods applicable to various parts of the work such as application of water spray or calcium chloride shall be used. This also applies to maintaining temporary paving nuisance free until permanent paving is placed.

The Contractor shall provide, erect and maintain all necessary barricades, danger signals and signs, provide a sufficient number of watchmen and take all necessary precautions for the protection for the work and workmen and for the safety of the public.

#### Handling and Distribution of Pipe, Valves and Fittings

Pipe shall be handled and supported with woven fiber pipe slings, or approved equals. Hooks, chains, wire rope, or any other device that may cause damage to the pipe during handling and support shall not be used. Care shall be taken when handling the pipe so as not to cut, gouge, or scratch the pipe in any way.

The pipe, valves and fittings shall be handled and protected during loading, transporting, and unloading operations in such manner as to avoid damage. Pipe, specials, and valves shall be unloaded by lifting with hoists or skidding so as to avoid shock or damage. Under no circumstances shall they be dropped nor shall they be permitted to roll against pipe already on the ground. Insofar as practicable, each piece of pipe shall be delivered and unloaded near the place where it is to be installed and where it will not interfere with excavation operations, traffic, or adjacent property owners and may be readily inspected by the Aquarion Representative. If this is not possible, the pipe, valves and fittings shall be stored in a safe area as close to the job site as possible. The Contractor is responsible for identifying a location (staging area) for storage of pipe, valves, fittings, excavated material and borrow material. The Contractor is responsible for delivering all materials to said location. The Contractor is responsible for stringing pipe along the intended pipeline route. All damaged pipe, valves and fittings will be rejected by the Aquarion Representative and such rejected pipe, valves and fittings shall be removed from the site by the Contractor. In the event of slight damage to the coating or lining, Aquarion may permit the damage to be repaired at the site. Such repairs shall be made at the Contractor's expense. Once the

Contractor receives shipment of pipe, valves and fittings, the Contractor shall be responsible for replacing any materials that may be stolen from the Contractor's storage area.

#### Cleaning and Inspection of Pipe, Valves and Fittings

The insides of the pipes, valves and fittings shall be thoroughly cleaned before laying and shall be kept clean until accepted in the completed work. Whenever the work is interrupted, all open ends of pipe shall be temporarily closed by watertight plugs. No trench water shall be permitted to enter the pipe. All pipe and special castings shall be carefully examined for defects and no pipe or special casting shall be laid which is known to be defective. If any such pipe or casting is discovered to be defective after placement, it shall be removed and replaced with a sound pipe or casting by the Contractor at his own expense.

#### Clearing and Grubbing

The Contractor shall remove all trees, brush, shrubs, and debris where encountered in the line of work only to the extent necessary for the prosecution of the work.

Unless otherwise specified, all brush and trees shall be cut within six inches (6") of the ground.

Cutting and removal of cleared materials shall be carried out in such manner as to avoid injury to other trees and structures.

Burning shall not be permitted on the site.

Trees, stumps, brush, and debris shall be disposed of away from the site by the Contractor at no additional cost to Aquarion or the Town.

#### Clean-Up

During progress of the work, the Contractor shall keep the construction areas in a neat condition, free from accumulations of waste material and rubbish.

On or before completion of the work and before acceptance and final payment shall be made, the Contractor shall clean and remove from the site and adjacent property, all surplus and discarded materials, rubbish and temporary structures, restore in an acceptable manner all property and leave the whole in a neat and presentable condition.

Periodically, as the work progresses and immediately after the work has been completed, the Contractor shall remove all excess materials from the area of the work. The area, in general, shall be kept clean and orderly and returned to a neat condition. The area of construction along roadways shall be swept with a broom, either by hand or mechanically, each day after completion of the day's work.

Trees, stumps, brush, and debris shall be disposed of by the Contractor off the site. Burning shall not be permitted.

### **Method of Measurement:**

Work under this section shall not be measured for payment for Ductile Iron Pipe installed, of the size indicated, complete in place, backfilled, tested and accepted.

The following shall not be measured separately for payment, but shall be included in the lump sum cost of the pipe installation:

- saw-cutting of existing pavement
- removal of asphalt and concrete pavement up to and including 6" in depth
- excavating to the depth necessary to install the pipe and bedding material
- stockpiling and storing of the excavated material if suitable for backfill
- removal and disposal of the excavated material if deemed unsuitable for backfill
- furnishing and installing bedding material up to 12" above the top of the pipe
- backfilling with native material if suitable for backfill
- compacting in 12" lifts
- bends, valves, reducers, sleeves, couplings, tees, caps and plugs
- mechanical joint restraints, hardware, bolts, nuts, glands, and gaskets
- thrust blocks excluding concrete
- warning tape
- trench bracing, sheeting and trench boxes
- dewatering

Hydrants, air release valves, line stops, tapping sleeves and service relocations shall be measured separately for payment under those appropriate Items.

Installation of bends, valves, reducers, sleeves, couplings, caps, plugs, mechanical joint restraints and hardware shall not be measured separately for payment, but shall be included in the lump sum cost of the pipe installation.

Bedding material furnished, installed, and compacted, to the bedding material limits shown on the Typical Trench Detail, shall not be measured separately for payment, but shall be included in the lump sum cost of the pipe installation.

Rock In Trench, Removal of Unsuitable Material, Class C Concrete, Additional Backfill Material and Temporary and Permanent Pavement shall be measured separately for payment under those appropriate Item Numbers.

Repairs, due to errors in installation, completed by the Contractor in order to pass the Hydrostatic Test shall not be measured separately for payment.

Disposal of Contaminated Material shall be measured for payment as a pass through cost paid by Aquarion to the Contractor.



**Basis of Payment:**

Work under this section will be paid for at the contract lump sum price for Installation of Water Mains and Appurtenances, of the size indicated, complete in place, backfilled, tested and accepted.

Hydrants, air release valves, line stops and tapping sleeves will be paid for separately at the contract unit price under those appropriate Items.

No separate payment will be made for installing bends, valves, reducers, sleeves, couplings, tees, caps, plugs, mechanical joint restraints and hardware, but will be included in the lump sum cost of the pipe installation.

No separate payment will be made for bedding material furnished, installed, and compacted, to the bedding material limits shown on the Typical Trench Detail, but will be included in the lump sum cost of the pipe installation.

Rock In Trench, Removal of Unsuitable Material, Class C Concrete, Additional Backfill Material and Temporary and Permanent Pavement will be paid for separately at the contract unit price under those appropriate Item Numbers.

No separate payment will be made for repairs, due to errors in installation, completed by the Contractor in order to pass the Hydrostatic Test.

Disposal of Contaminated Material will be paid for as a pass through cost by Aquarion to the Contractor.

**Pay Item**

**Pay Unit**

Installation of Water Mains and Appurtenances

L.S.

**ITEM #1301861A — FURNISH DUCTILE IRON PIPE, VALVES AND MISCELLANEOUS FITTINGS (WATER MAIN)**

**Description:**

- A. Work under this Section covers the acquisition and furnishing of all materials, equipment, appurtenances and incidentals required as shown on the Aquarion Relocation Plans and specified herein, including pipe, valves, tees, sleeves, fittings, bends, plugs, joint restraints, casing pipe and appurtenances of the various types specified in accordance with the drawings, specifications and as directed by the Engineer. Installation of the materials acquired under this special provision is not included in this work, but is paid for under Item #1301089A — 24” Ductile Iron Pipe (Water Main).
- B. Work and materials covered under this Section of the specifications shall be in strict compliance with Aquarion Water Company Standards. All water main materials shall conform to the Aquarion Water Company’s “List of Approved Materials” dated March 2016, which is attached to this specification.
- E. Interruption of and connection to the existing water main system, at the locations indicated on the Relocation Plans, shall be in strict accordance with the Aquarion Water Company's requirements and shall only occur with the prior approval of the Aquarion Water Company.
- F. Under no circumstance shall the completed water main construction be placed into active service until final inspection by and written approval has been obtained from Aquarion.
- G. All standards, codes, specifications, etc., referred to herein shall be the latest issue.
- H. It is not intended that the Relocation Plans and Details shall show every pipe, fitting, valve, special or appurtenance but the State’s Contractor shall acquire all material necessary to complete the Work in accordance with the best practice and the intent of the Relocation Plans, Details and these Special Provisions.
- I. REFERENCES
  - 1. All materials shall conform to the requirements of the Aquarion Water Company’s “List of Approved Materials” (attached).
  - 2. The publications listed below form a part of this specification to the extent referenced. The following publications are referred to in the text by the basic designation only:

AMERICAN NATIONAL STANDARDS INSTITUTE, INC. (ANSI)

ITEM #1301861A

- ANSI A21.4 Cement Mortar Lining for Ductile Iron Pipe and Fittings for Water
- ANSI A21.11 Rubber Gasket Joints for Ductile-Iron and Gray-Iron Pressure Pipe and Fittings
- ANSI A21.51 Ductile-Iron Pipe, Centrifugally Cast in Metal Molds or Sand- Lined Moles, for Water or Other Liquids
- ANSI B18.2.2 Square and Hex Nuts
- ANSI B18.5 Round Head Bolts

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

- ASTM A-48 Gray Iron Castings
- ASTM A-536 Ductile Iron Castings
- ASTM A-563 Carbon and Alloy Steel Nuts

AMERICAN WATER WORKS ASSOCIATION (AWWA)

- AWWA C-104 Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water
- AWWA C-110 Ductile-Iron and Gray-Iron Fittings, 3 inch through 48 inch for Water and Other Liquids
- AWWA C-111 Rubber Gasket Joints for Ductile-Iron and Gray-Iron Pressure Pipe and Fittings
- AWWA C-151 Ductile-Iron Pipe, Centrifugally Cast in Metal Molds or Sand-lined Molds, for Water or Other Liquids
- AWWA C-153 Ductile-Iron Compact Fittings, (3 inch through 12 inch), for Water and Other Liquids
- AWWA C-600 Installation of Ductile Iron Water Mains and Appurtenances

J. QUALITY ASSURANCE

1. The Contractor shall furnish to the Engineer manufacturer's notarized test reports and methods of test to show compliance with all specification requirements, and notarized certificates of conformance stating that all materials to be furnished under this Specification conform to all specification requirements, and each shipment of pipe, fittings, joints and gaskets and accessories meet all requirements of the Specifications.
2. The Contractor shall furnish to the Aquarion Water Company manufacturer's written transcripts in accordance with Section 51-14 of AWWA Standard C151, latest revision.
3. Qualifications of the Installer: Only thoroughly trained and experienced personnel who are completely familiar with the requirements for this work shall be involved with the work. Personnel must be capable of carrying out the recommendations of the manufacturer of the piping, valves, fittings and appurtenances for the proper installation procedures.

4. Comply with State and local controlling authority requirements for materials, installation, fire protection, testing, disinfection and connection to existing water mains.
5. Comply with NFPA 24 for fire-protection water main piping materials and installation.

K. SUBMITTALS

1. Submittals shall be made for the following items in accordance with the provisions of these Specifications and shall include the following:
  - a. Manufacturer's Catalog Data and Standard Drawings for Pipe and Fittings.
  - b. Manufacturer's Catalog Data and Standard Drawings for Joints and Couplings.
  - c. Manufacturer's Catalog Data and Standard Drawings for Mechanical Sleeves and Seals
  - d. Certificates of Compliance for pipe and fittings.
  - f. Certificates of Compliance for shop-applied linings and coatings.
  - g. Certificates of Compliance for pipe joint materials.
  - h. Certificates shall attest that tests set forth in each applicable referenced publication have been performed, whether specified in that publication to be mandatory or otherwise and that production control tests have been performed at the intervals or frequency specified in the publication. Other tests shall have been performed within three (3) years of the date of submittal of certificates on the same type, class, grade, and size of material as is being provided for the project.
  - i. Contractor shall have its pipe supplier prepare and shall submit to the Aquarion Water Company a "LAYING SCHEDULE" of all pipe and accessories to be furnished and installed under this Contract. No work shall be undertaken until the laying schedule has been submitted to and approved by the Aquarion Water Company.

L. DELIVERY, STORAGE AND HANDLING

1. Inspect materials delivered to site for damage. Unload and store with minimum handling. Store materials on site in enclosures or under protective covering. Store

jointing materials and rubber gaskets under cover out of direct sunlight. Do not store materials directly on the ground. Keep inside of pipes and fittings free of dirt and debris.

2. Handle pipe, fittings, and other accessories in a manner to ensure delivery to the site in sound undamaged condition. Take special care to avoid injury to coatings and linings on pipe and fittings and make satisfactory repairs if coatings or linings are damaged. Carry, do not drag, pipe. Store jointing materials and rubber gaskets that are not to be installed promptly, under cover out of direct sunlight.

#### M. PROJECT CONDITIONS

1. Perform site survey research public utility records, and verify existing utility locations. Contact utility-locating service in the project area.
2. Verify that water main piping may be installed in conformance with the Aquarion Relocation Plans, details and Special Conditions.
3. It is not intended that the drawings shall show every pipe, fitting, valve, etc., but the Contractor shall be required to furnish, without additional charge, all material necessary to complete the work in accordance with the best practice and intent of drawings and specifications.
4. All necessary operations of valves required for the world of this contract will be conducted by the Aquarion Water Company. The Contractor shall be responsible for notifying the Aquarion Water Company a minimum of 2 weeks in advance of any desired valve operations.

#### N. SEQUENCING AND SCHEDULING

1. Coordinate connection to existing water main with the Aquarion Water Company.
2. Coordinate with other utility work.
3. Coordinate with the construction staging plans for this project.

#### Materials:

- A. All materials and workmanship, whether or not specifically described or shown, or whether implied, shall be only first quality new and of a grade satisfactory to the Aquarion Water Company. The Aquarion Water Company shall have the right to reject any part of the world in case the materials or workmanship is not of satisfactory quality. The Contractor shall replace the same with acceptable work or materials at his own expense. All materials shall conform to the requirements of the Aquarion Water Company's "List

of Approved Materials”.

- B. APPROVAL OF MATERIALS: Before starting installation of materials or equipment, the Contractor shall submit to the Aquarion Water Company for approval, lists of materials and equipment to be incorporated in the work.**
- C. Should departures from the Relocation Plans be deemed necessary by the Contractor, details of such departures in materials of construction, including changes in related portions of the project and the reasons therefore, shall be submitted to the Aquarion Water Company for prior approval. Said details shall include accurate layout drawings which clearly illustrate the intended departures from the Relocation Plans.
- D. DUCTILE IRON PIPE, JOINTS, FITTINGS AND SPECIALS**
1. All materials shall conform to the attached Aquarion Water Company “List of Approved Materials” attached hereto.
  2. All piping and fittings shall be Class 52/54 Tyton Joint Ductile Iron conforming to AWWA/ANSI C151/A21.5 (latest revision) and shall be CLASS 52 (Rated Working Pressure of 250 psig with a MINIMUM Factor of Safety of 1.50, unless otherwise specified. All fittings shall conform in all respects to AWWA Standard C110, latest revision. All ductile iron pipe, fittings, or specials shall be clearly marked on the outside surface with the class, thickness class designation and initials of manufacturer, in accordance with AWWA C151. Piping and fittings for bridge crossings shall typically be Class 53 ductile iron with TR FLEX style joints, pre-insulated with rigid polyurethane insulation in a HDPE outer jacket. Insulated piping and fittings are paid for as specified under item #1301654A, if included in the project.
  2. Fittings, bends and valves, where so indicated on the drawings, shall be mechanical joint with retaining glands. Retainer glands shall be “Mega-Lug” Series 1100 or 1700 Bell Harness as manufactured by EBAA Iron, or approved equal.
  3. Ductile iron pipe and accessories shall conform to the following additional requirements:
    - a. Laying Length: 20 Feet.
    - b. Thickness Class: 52 or 53.
    - c. Joint Type: Tyton Joint, Mechanical Joint or TR FLEX Joint.
    - d. Interior Surface: Cement Lined (Double Thickness) Seal Coat (Double Coat).
    - e. Exterior Surface: Asphaltic Coating.
    - f. Field cut piping: Restraint of field cut pipe shall be provided with Mega-Lug Series 1700 Bell Harness as manufactured by EBAA Lon, or approved equal. Fittings for water mains shall conform in all respects to AWWA Standard C110, latest revision, and to the additional requirements specified herein.

4. Fittings and accessories shall conform to the following additional requirements specified herein:
  - a. Joint Type: Mechanical with retaining glands and split retaining glands. Retainer glands shall be "Mega lug" Series 1100 as manufactured by EBAA Iron, or approved equal. Locking Tyton type push on gaskets shall be Field Lola as manufactured by U.S. Pipe, or approved equal, where shown on the drawings and as directed by the Engineer.
  - b. Pressure Rating: 350 psi c. Type of Iron: Ductile
  - d. Interior Surface: Cement Lined (Double Thickness) Seal Coat (Double Coat)
  - e. Exterior Surface: Asphaltic Coating
5. Cement mortar lining for pipe and fittings, as specified above shall conform in all respects to AWWA Standard C104 (latest revision). Lining thickness shall be twice that specified in Section 4.7.1 of AWWA Standard C104. Seal coat shall be twice that specified in Section 4.11 of AWWA Standard C104.
6. Rubber gasket joints for the water main pipe and fittings, as specified above, shall conform to AWWA Standard C111/A21.11 Standard for Rubber Gasket Joints for Ductile Iron Pressure Pipe and Fittings (latest revision).
7. Pipe couplings and sleeves shall be installed where required for connection to existing work and as shown on the Drawings. Pipe couplings shall be solid sleeves giving a watertight seal suitable for water pressure to 250 psi. As approved by the Engineer
8. All pipe, pipe fittings, accessories and appurtenances shall be new and unused.
9. All bolts, nuts, rods, and miscellaneous connecting pieces not provided with an approved factory coating shall be given two (2) coats of bit mastic coal-tar after installation.
10. Corporation and curb stops shall be as specified in the attached "List of Approved Materials", "Ball Type". Corporation thread is to be CC (for DIP) and shall be in conformance with AWWA Standard C-800, latest edition. The corporation stop inlet shall have a standard AWWA corporation valve inlet thread and the outlet shall be a compression connection for copper tubing. Curb stops shall have a compression connection for copper tubing at both ends.
12. Copper pipe shall be of soft seamless copper tubes with no soldered joints underground, suitable for use as underground water service connections conforming to ASTM specification B-88-47, "Type K".
13. Curb boxes shall be ASTM A-48 Cast with 358 Class Cast Iron. They shall be 2 piece slip Buffalo style 94E. The top of the cover shall be flush with the top of the box rim with the word "WATER" clearly marked. Top section to be 24", bottom section to be 39". An enlarged base is required for 2" services.

15. Fittings for Service Pipe

- a. Fitting for service pipe shall be of the cast bronze, compression, flared tube type or pack type.

E. HDPE PIPE

- a. HDPE pipe shall be HDPE DR-11, Ductile Iron Pipe Size (DIPS), black, with 2 or more blue stripes for potable water applications.
- b. HDPE pipe shall be manufactured from a polyethylene designation code PE 4710 resin which shall meet ASTM D 350 with a minimum cell classification of 445574C. HDPE pipe shall be manufactured to the dimensions of ASTM F714.
- c. HDPE DR-11 pipe shall have a minimum pressure rating of 200 psi. The pipe shall contain no recycled compounds except that generated in the manufacturer's own plant from resin of the same specification from the same raw material.

F. VALVES

- 1. Gate valves shall conform in all respects to AWWA Standard C509 ULFM and C11 (latest revisions), and to the additional requirements specified in the Aquarion "List of Approved Materials", typically:
- 2. Resilient Seat Gate Valves shall incorporate the following features:
  - a. Type of Valve Ends: Mechanical Joint with Retainer Gland
  - b. Type of Gate: Resilient Seat
  - c. Type of Stem Seal: Double O-Ring
  - d. Type of Mounting: Iron Body, Bronze Mounted
  - e. Type of Stem: Bronze, Non Rising Stem
  - f. Type of Gaskets: Mechanical Joint Gaskets
  - g. Minimum Rated Working Pressure: 250 psi
  - h. Direction of Operating Nut: Open Right
  - i. As a minimum, the inside of the valve body and bonnet are to be coated with a fusion bonded epoxy in accordance with AWWA C550, latest revision
- 3. Wrench nut shall be 2 inch by 2 inch conforming to section 19 of AWWA C 509.
- 4. Butterfly valves shall conform to ANSI/AWWA C504-10 Class 150B for buried service only. Specific requirements shall be in accordance with the attached Aquarion "List of Approved Materials".
- 5. Valve Box



- a. Valve boxes shall be ASTM A-48 Cast with 358 Class cast iron, two piece, slip type, with a 26” top section with bottom flange and 36” bottom section.
- b. Covers shall be cast iron, marked "WATER", with two notched openings.
- c. Valve boxes and covers shall be United States made only.
- d. Valve boxes shall be centered over the operating nut of the valve and set to be flush at final pavement or finished grade.
- e. Valve boxes shall be of good quality cast iron free from all defects in material and workmanship and shall be coated with coal-tar pitch enamel or other approved coating.

G. APPROVED MANUFACTURERS

1. Refer to the Aquarion Water Company “List of Approved Materials”, unless otherwise noted below.
2. Bolt Through MJ Adapter For Joint Restraint
  - a. Infact Corporation Foster Adapter 6-12 inches for the direct connection of MJ fittings, or approved equal.
3. Where there is a specific conflict between this specification and Aquarion Water Company’s “List of Approved Materials”, the List of Approved Materials shall apply.

Construction Methods:

A. INSTALLATION OF PIPE - GENERAL REQUIREMENTS

1. Refer to Item #13018 A — Install 24 inch Water Main and Appurtenances.

B. INSTALLATION - PIPE, FITTINGS AND ACCESSORIES

1. Refer to Item #13018 A — Install 24 inch Water Main and Appurtenances.

C. HYDRANT ASSEMBLY

1. If required for this project, materials and methods required for the installation of hydrants will be detailed elsewhere in these special provisions.

**Method of Measurement**

Work and materials included under this specification will not be measured for payment.

**Basis of Payment**

The acquisition and delivery to the site of all pipe, valves and miscellaneous fittings required for the construction of this project shall be paid for at the contract lump sum price bid. The required materials shall be derived from a “laying schedule”, or material list of all pipe, fittings, materials and accessories to be furnished and installed under this contract, prepared by the Contractor’s supplier and reviewed and approved by Aquarion. Excepted from payment under this item shall be those materials that are specifically included for acquisition as part of another Bid Item included in this project.

**PAY ITEM**

**PAY UNIT**

Furnish Ductile Iron Pipe, Valves and Misc. Fittings (Water Main)

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<b>AQUARION WATER COMPANY LIST OF APPROVED MATERIALS</b>		
<b>Notes:</b>		
Materials Must Be Manufactured in the USA or Canada		
If a State or ARRA Project, Materials Must Be Manufactured in the USA.		
All Stainless Steel hardware shall be Grade 304 or 316.		
The materials described in this list shall supersede any materials specified elsewhere.		
Revised March, 2016		
<b>Material Specification</b>	<b>Approved Manufacturer</b>	<b>Mfg. Part#</b>
<b>SECTION #1 : DUCTILE IRON PIPE</b>		
ANSI/AWWA C151-09/A21.5, Ductile Iron Pipe	McWane Pipe Company	Class 52 / 54 Tyton Joint
ANSI/AWWA C104-08/A21.4, Cement Mortar	American Cast Iron Pipe Company	Class 52 / 54 Tyton Joint
ANSI/AWWA C91-12/A21.22, Rubber Gasket	Clow Pipe Company	Class 52 / 54 Tyton Joint
Nitrile Gasket	Griffin Pipe Company	Class 52 / 54 Tyton Joint
<b>Joints for Ductile-Iron Pressure Pipe</b>	United States Pipe & Foundry Company	Class 52 / 54 Tyton Joint
Class 52 / 54 Tyton Joint		
Pipe Shall be marked with Class, Manufacturer, Weight & Date of Manufacture		
<b>SECTION #2 : GATE VALVES: DUCTILE IRON</b>		
ANSI/AWWA C509 ULFM	Clow Valve	2635-F6100
250 PSIG Max Working Pressure standard (150 PSIG with prior approval)	Kennedy	857101
Full body, ductile iron	Mueller	A2392/A2391
Fusion Epoxy Coated	U.S. Valve & Hydrant Company	AUSP02
All hardware shall be Stainless Steel		
<b>Mechanical Joint Connections</b>		
See Table "Valves & Hydrants by Town"		
<b>SECTION #3: BUTTERFLY VALVES</b>		
ANSI/AWWA C504-10 Class 150B for Buried Service Only	Mueller	B3211 Linseal III
<b>Mechanical Joint Connections</b>	Pratt	Groundhog
Fusion Epoxy Coated Inside & Out	Valmatic	Series 2100
Stainless Steel Shaft Type 304		
With 304 SS Fasteners		
See Table "Valves & Hydrants by Town"		
<b>SECTION #4: VALVE BOXES</b>		
ASTM A-48 Cast with 35B Class Cast Iron	Bibby St. Croix	700 Series
AASHTO H20 Wheel Load	Tyler Union	6850 Series
Type: 2 Piece Slip	Pioneer	S Series
Cover to read: "WATER"		
Top Section 28" with Bottom Flange		
Bottom Section 30"		
<b>SECTION #5: MJ FITTINGS</b>		
ANSI/AWWA C153 - 11/ A21.53-06 and NFPA 3"-16" Listed (EX2111)	Tyler Union	C153 or C10
2" - 24" rated @ 350 psi; 30" - 48" & all fittings with Flanged branches rated @ 250 psi	United States Pipe & Foundry Company	C153 or C10
Asphalt Coating ANSI/AWWA C104-08/A21.4-08- ANSI/AWWA C153		
Cement Lining ANSI/AWWA C104 -08/ A21.4-08		
Ductile Iron		
ANSI/AWWA C110-12/A21.10-08 and NFPA 3"-12" up Listed (EX2111)		
2" - 24" rated @ 350 psi; 30" - 48" all fittings with Flanged branches rated @ 250 psi		
Asphalt Coating ANSI/AWWA C104-08/A21.4-08- ANSI/AWWA C153		
Cement Lining ANSI/AWWA C104 -08/ A21.4-08		
Ductile Iron		
Ductile Iron Tapped Tees		
As available Compact C-153 MJ Fittings are preferred over C-110		
<b>SECTION #6: SERVICE (CURB) BOXES</b>		
ASTM A-48 Cast with 35B Class Cast Iron	Bibby	94E
Type: 2 Piece Slip Buffalo Style 94E	Ford	94E
Cover to read: "WATER"	McDonald	94E
Top Section 24"	Mueller Canada	94E
Bottom Section 39"	Tyler Union	94E
Enlarged Base Required for 2" Services		
<b>SECTION #7 : MJ &amp; TYTON JOINT RESTRAINT</b>		
Design	EBAA Iron, Inc.	MJ: 1100 Series Megalug
1. Restraint devices for nominal pipe sizes 3 inch through 48 inch shall consist of multiple gripping wedges incorporated into a follower E-band meeting the applicable requirement of ANSI/AWWA C110/A21.20.	EBAA Iron, Inc.	Tyton: 1700 Bell Harness
2. The devices shall have a working pressure rating of 350 psi for 3-16 inch and 250 psi for 18-48 inch ratings are for water pressure and must include a minimum safety factor of 2 to 1 in all sizes		
<b>Material</b>		
1. Gland body, wedges, and wedge actuating components shall be cast from grade 65-45 12 ductile		

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<b>Iron material in accordance with ASTM A536.</b>		
2. Ductile iron gripping wedges shall be heat treated within a range of 370 to 470 BHN.		
3. Three(3) test bars shall be incrementally poured per production shift as per Underwriter's Laboratory (U.L.) specifications and ASTM A536. Testing for tensile, yield and elongation shall be done in accordance with ASTM E8.		
4. Chemical and nodularity tests shall be performed as recommended by the Ductile Iron Society. On a per ladle basis.		
<b>Traceability</b>		
1. An identification number consisting of year, day, plant and shift & YYDDDD (plant designation) (Shift number), shall be cast into each gland body.		
2. All physical and chemical test results shall be recorded such that they can be accessed via the Identification number on the casting. These Material Traceability Record (MTR's) are to be made available, in hard copy, to the purchaser that requests such documentation and submits his gland body identification number.		
3. Production pieces that are too small to accommodate individual numbering, such as fasteners shall be controlled in segregate inventory until such time as all quality control tests are passed. These component parts may then be released to a general inventory for final assembly and packaging.		
4. All components shall be manufactured and assembled in the United States. The purchaser shall, with reasonable notice, have the right to plant visitation at his/her expense.		
<b>Coatings:</b>		
The coating system shall be MEGA-BOND by EBBA Iron, Inc.		
Zinc coating.		
<b>SECTION #8: FIELD LOK GASKETS</b>		
ANSI/AWWA C111-12/A21.11 Standard for Rubber Gasket joints for Ductile Iron Pressure Pipe and Fittings	McWane Company United States Pipe & Foundry Company	Sure Stop 350 Field Lok-Field Lok 350
<b>SECTION #9: MJ ACCESSORY SETS (LESS GLANDS)</b>		
Standard T-Bolts & Anti-Rotation T-Bolts	EBBA Iron, Inc.	ANSI/AWWA C111/A21.11
Corrosion Resistant, High Strength, Low-Alloy Steel in accordance with ANSI/AWWA C111/A21.11	Star Pipe Products Tyler Union United States Pipe & Foundry Company	ANSI/AWWA C111/A21.11 ANSI/AWWA C111/A21.11 ANSI/AWWA C111/A21.11
<b>MECHANICAL JOINT GASKETS</b>		
ANSI/AWWA C111-12/A21.11		
<b>SECTION #10: TAPPING SLEEVES</b>		
Stainless Steel Type AWWA C223-13 with MJ outlet	Mueller Company SS	H304MJ
The tapping sleeve body and neck shall be made of heavy 18-8 Type 304 stainless steel	Powercal SS Smith Blair SS	3490 MJ 665 MJ
The Flange shall be 18-8 Type 304 stainless steel, AWWA C207 Class D (ANSI 150# drilling) and recessed to accommodate tapping valves. The bolts shall be 18-8 type 304 stainless steel with NC threads and epoxy coated. The nuts shall be 304 stainless steel, fluoropolymer		
Includes stainless steel full seal tapping valves when tapping size on site.		
Steel Type AWWA C223-13 with MJ or Flanged Outlet	Powercal CS Smith Blair CS Mueller	3460/3460MJ 622/622MU
The tapping sleeve shall have a body made of carbon steel per ASTM A283 C. The neck shall be carbon steel per ASTM A53. The flange shall be carbon steel A36. The flange drilling shall be per AWWA C111 Ductile Fusion bonded Flexi-Coat epoxy per AWWA C213. Average of 12-mil thick. all fasteners must be stainless steel.		
<b>SECTION #11: TAPPING VALVES</b>		
ANSI/AWWA C515 ULEM (4"-12" Valves)	Clow Valve Kennedy	2639-F6114 8500D D1
250 PSIG Max Working Pressure		
Full Body- Ductile Iron	Mueller company	T2362/2361
Fusion Epoxy Coated	U.S. Valve & Hydrant Co.	TUSP02
All hardware shall be Stainless Steel		
MKFLG Connection		
ANSI/AWWA C515 for 12"-18" Valves Only		
See Table "Valves & Hydrants by Town"		
***NO PAPER GASKET MATERIALS SHOULD BE USED		
<b>SECTION #12: REPAIR CLAMPS</b>		
Certified to NSF/ANSI 61-G	Ford	FC2A
The full circle repair clamp shall have an 18-8 Type 304 stainless steel band.	Mueller Company	800/804
Tapped sleeves are to be 1" CC thread	Powercal	3121/3412AS
All hardware shall be Stainless Steel	Smith Blair Smith Blair	226/238 227/239
<b>SECTION #13: CAST BOLT ON COUPLINGS AND END CAPS</b>		
Certified to NSF/ANSI 61-G	Ford	FC2A
Meets applicable AWWA C219 Standards	Powercal	3501
16" & Up must be Wide Type Band	Mueller	MFC
All hardware shall be Stainless Steel	Smith Blair	411/413/441/442
Hymax Grip: AWWA C219, NSF-61, NSF-372	Krausz	
<b>SECTION #14: SERVICE SADDLES</b>		
Certified to NSF/ANSI 61-G	Ford	F202
Meets applicable AWWA C800 Standards	Mueller	DR2A

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Double Strapped with CC thread	Powerseal	3413
Fusion Bonded, Epoxy Coated	Smith Blair	313
Ductile Iron Body per ASTM A536	New Hampshire	317 SS
Must have Stainless Steel nuts, bolts and bands		
<b>SECTION #15: FIRE HYDRANTS (CONNECTICUT)</b>		
ANSI/AWWA C502- ULFM Approved	Kennedy	KR1D
5-1/4" Valve Opening	Mueller	Super Centurion 250
6" MJ D-150 Shoe Connection		
Connecticut Town Hydrants Open LEFT (See Table "Valves & Hydrants By Town")		
3 Way Design (Pumper @ (2) Hose Nozzles) with Chains		
Hydrant fasteners are to be Stainless Steel		
Upper Section finish to be Factory Painted Coating		
Only Lower barrel to be stenciled with:		
AQUARION WATER as well as with "SPEC ONE" or "SPEC TWO" and Distributor ID# for		
Exact Town Spec and Color see Table "Valves & Hydrants by Town"		
<b>SECTION #16: FIRE HYDRANTS (MASSACHUSETTS &amp; NEW HAMPSHIRE)</b>		
ANSI/AWWA C502-ULFM Approved	Mueller	Super Centurion 250
5-1/4" Valve Opening		
6" MJ D-150 Shoe Connection		
For Direction of Opening see "Hydrants by Town" T-28 Revised 6/1/12		
3 Way Design (Pumper @ (2) Hose Nozzles) with Chains		
Hydrant fasteners are to be Stainless Steel		
Upper Section finish to be Factory Painted Coating Only		
Lower barrel to be stenciled with:		
AQUARION WATER as well as with "SPEC ONE" or "SPEC TWO" and Distributor ID# for		
For Exact Town Spec and Color see Table "Valves & Hydrants by Town"		
<b>SECTION #17: AIR VENT &amp; BLOW-OFF ASSEMBLIES</b>		
2" James Jones Reduced Port LLB Blowoff Valve with Rectangular Operating Nut	James Jones Company	E1998L/C
Ductile iron tapped tees		
<b>SECTION #18: METER PITS</b>		
<b>1H" Meter Pits:</b>	Ford	PS BHC 488 20-48
Depth of bury = 52" as per Standard Detail	Mueller	330RS1654FFBN
Pit Size = 20"	McDonald	60-448WWPP 44 x 24
Meter Size: 1" or can be plumbed to reduce and accommodate 3/4" N/A 3/4" N/A 1/2" meter		
Pit Material:		
Co-molded wall with insulated middle section. Black exterior with white interior.		
UV degradation protected. Nominal wall thickness (min.) = 1/2".		
Meter Box Cover is Ductile Iron with 15" non-recessed DI lid.		
Solid lids or lids with 1-3/4" hole are available for Roader "Touch Pads"		
Smooth wall interior/exterior. Vertical crush exceeds 20,000 lbs.		
360 degree anti-settling lip and thermal insulating pack internal shelf.		
<b>2" Meter Pits:</b>	Ford	PM BHC 789-36-48
Depth of bury = 52" as per Standard Detail		
Pit Size = 30"		
Meter Size: 2" x 17" typical meter or can be plumbed for 1-1/2" meter		
Pit Material:		
Co-Extruded PE P.I. Black exterior with white interior. UV degradation protected.		
Nominal wall thickness (min.) = 1/2".		
Meter Box Cover is Ductile Iron, 77 lb.		
Smooth wall interior/exterior. Vertical crush exceeds 20,000 lbs.		
Molded-in internal Anti-settling flange		
<b>SECTION #19: BELL JOINT LEAK CLAMPS</b>		
Ductile Iron Per ASTM 538	Ford	FBC
Pressure rated - 150PSI (water)	Powerseal	3232
Fusion Epoxy Coated	Smith Blair	274
All hardware shall be Stainless Steel		
<b>SECTION #20: SERVICE BRASS</b>		
ANSI/AWWAC600	Cambridge Brass	Compression Type
Compression Joints	Ford	Compression Type
300 PSIG Max Working Pressure	McDonald	Compression Type
Corporations & Curb Stops are to be "Ball Type"	Mueller Company	Compression Type
Corporation Thread is to be CC (for DIP)		
<b>SECTION #21: PRESSURE REDUCING VALVES &amp; BACKFLOW PREVENTORS</b>		
	Febco	
	Watts	
	Ames	
	Wilkins	
	Hershey	
	Cla-Val	
<b>SECTION #22: IPS BRASS FITTINGS</b>		
ANSI/ASME B16.15 & WW-P-460	Merit	Domestic Only
	Mueller industries	Domestic Only

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Fittings must be made from STM 8584 Copper Alloy C84400	Lee Brass	Domestic Only
	SA	Domestic Only
<b>SECTION #23: COPPER TUBING</b>	Cambridge Lee	Type K-Soft
Copper Tubing to be Type "K" Soft	Cerro	Type K-Soft
ASTM B88 - USA & Canada Only	Halstead	Type K-Soft
	Howell	Type K-Soft
	Mueller Industries	Type K-Soft
<b>SECTION #24: HYDROSTATIC TESTING</b>	Great Lakes	Type K-Soft
Hydrostatic Testing per AWWA C600-05 Section 5.2, latest revision		
Please refer to Notice on Illegal Use of fire Hydrants		
Tester must be Certified and Comply with all OSHA Regulations		
State of CT DCP Licensing Required (P1, P6 or P7)		
<b>SECTION #25: INSERTION VALVES</b>	Team Industrial Services	Insert Valve
Material must be AWWA Specifications	Advanced Valve Technologies	EZ-2
Installer must be Licensed, Certified and Comply with all OSHA Regulations		
State of CT DCP Licensing Required (P1, P6 or P7)		
See Table 'Valves & Hydrants by Town'		
All hardware shall be Stainless Steel		
Prior approval from Aquarion needed before any Contractor installs EZ-2 (Easy Valve)		
<b>SECTION #26: MJ x MJ DI CONNECTOR (Foster Adapters)</b>	Infact Corporation	
Ductile Iron 350PSI USA		
<b>SECTION #27: MISC</b>		
Portland Cement Type 1- 94 lbs. Bags	Any	
Invented Tip Marking Spray Paint - All Colors	Rustoleum	17oz
	Krylon	17oz
	Aerovoc	17oz
Underground Marking Tape 2x1000' Detectable to read "WATER" in Blue	Any	
Traffic Cones are to be 28" orange with two (2) reflective bands	Any	
<b>SECTION #28: HDPE PIPE</b>	National Pipe and Plastics	
AWWA C906-15, ASTM D3350, ASTM F2620, ASTM F714, DR11, DIPS, Black with 2 or more Blue Stripes	Performance Pipe	
Resin Code PE4710, minimum cell classification of 445574C	JM Eagle	
	Flying W Plastics	
<b>SECTION #29: HDPE FITTINGS</b>		
Tees, Bends, Reducers, Solid Caps: butt fused directly onto HDPE pipe with electro fusion as an option.	Central Plastics (Georg Fischer)	
For service taps: Electrofused service saddles (2" with a 2" x 1" brass bushing), with IP corp. thread	Integrity Plastics (Div. of Brentwood Ind.)	
Mechanical stainless steel spring loaded saddles are allowable with AWC approval only.	IID Supply	
HDPE to Mechanical Joint Adapters with accessories.	Harrington Corporation	
Restraint rings for HDPE adapters shall be epoxy coated or stainless steel.	Tega	
For air vents/blowoffs: no tapped tees, 2" saddles (with 2" x 1" bushing as needed)	Specified Fittings	
electrofused directly onto HDPE pipe		
For tapping sleeves: electrofused directly onto HDPE pipe (stainless steel with MJ outlet as an option)		
For gate valves: AWWA C509 with HDPE to mechanical joint adapters		
For restraints: 2000 PV Series HDPE Restraints with stainless steel inserts as an option	EBAA Iron, Inc.	2000 PV Series
<b>SECTION #30: TRACER WIRE</b>	Agave Wire	
12 AWG or thicker, insulated copper, UL approved for direct burial		
Waterproof connectors	Dryconn or equal	
<b>SECTION #31: POLYETHYLENE ENCASUREMENT</b>	United States Pipe & Foundry Company	V-BIO

## **ITEM #1301900A — HYDROSTATIC PRESSURE TEST**

### **Description:**

Work under this section shall include furnishing all labor, materials, tools, and equipment necessary for performing the Hydrostatic Testing as specified in AWWA C600-05 Section 5.2, latest revision. The Contractor will be responsible for making sure the new main passes the Hydrostatic Testing.

The Contractor shall supply all tools, labor, equipment and materials necessary for performing the Hydrostatic Test.

After the completion of the water main installation, or a segment thereof, Aquarion will chlorinate and fill the main with water for disinfection. After a satisfactory test by Aquarion's Water Quality Department, the Contractor shall perform a Hydrostatic Test on the new main. Aquarion personnel must be on-site to witness the test.

The test pressure shall not be less than 1.25 times the stated working pressure of the pipeline measured at the highest elevation along the test section and not less than 1.5 times the stated working pressure at the lowest elevation of the test section.

The testing allowance shall be defined as the maximum quantity of makeup water that is added into a pipeline undergoing hydrostatic pressure testing, or any valved section thereof, in order to maintain pressure within 5 psi +/- of the specified test pressure (after the pipeline has been filled with water and the air has been expelled). No pipeline installation will be accepted if the quantity of makeup water is greater than that determined by the following formula:

$$L = \frac{SD\sqrt{P}}{148,000}$$

Where:

L = testing allowance (makeup water), in gallons per hour

S — length of pipe tested, in feet

D = nominal diameter of the pipe, in inches

P = average test pressure during the hydrostatic test, in pounds per square inch (gauge)

For purposes of the Hydrostatic Test, the test pressure in the main shall be maintained for a period of two (2) hours.

All leaks due to errors in installation shall be repaired by the Contractor at his expense until the requirements of the Hydrostatic Testing are met.

### **Materials:**

All materials necessary to complete the Hydrostatic Testing shall be provided by the Contractor.

**Construction Methods:**

All construction methods shall conform to AWWA C600-05 Section 5.2, latest revision.

**Method of Measurement:**

Hydrostatic Testing shall be measured for payment per each hydrostatic test performed.

Performing a re-test of the hydrostatic test shall not be measured for payment.

**Basis of Payment:**

Hydrostatic Testing will be paid for at the contract unit price per each hydrostatic test performed.

Performing a re-test of the hydrostatic test will not be reimbursed.

**Pay Item**

**Pay Unit**

Hydrostatic Pressure Test

EA



## **ITEM #1302139A — CUT AND CAP (WATER MAIN)**

### **Description:**

Work under this section shall include all labor, tools, and equipment necessary for the cutting, capping and abandonment of a main or a portion of a main necessary as a result of a plant improvement, water main replacement or other project.

Work under this section shall include all labor, tools, materials, and equipment necessary for:

- obtaining road opening permit
- coordination of Call-Before-You-Dig mark out
- saw-cutting of the roadway, sidewalks, or driveways
- traffic control equipment (signs, barriers, etc.)
- traffic control coordination, including scheduling of policemen and flagmen
- furnishing and maintaining lighting
- mobilization and demobilization
- clearing and grubbing
- excavation for pipeline trenches and abandonment as measured from the existing grade to the trench subgrade
- installing thrust blocks, including concrete
- furnishing, installing, operating and maintaining a dewatering system
- furnishing, installing and removing sheeting, bracing and trench boxes
- furnishing, stockpiling, loading, hauling, placing and compacting pipe bedding and backfill material
- backfill and compaction of pipe trenches and abandonment excavations
- stockpiling, loading, hauling and legally disposing of surplus material
- unloading and storage of pipe, fittings, plugs, caps and other appurtenances
- asphalt and concrete pavement removal and disposal (including necessary saw cutting)
- removal and restoration of walls, fences, signs and any other structures which must be removed to carry out the work
- removal of topsoil and sod
- care and protection of existing pipes, utilities, and other structures
- piling and storage of excavated materials
- all other work specified or required for completing the abandonment

Unless otherwise specified, "abandonment" implies abandoned-in-place and will generally involve cutting and plugging or cutting and capping an existing main, including bracing the abandonment against thrust from the "live" end.

**Materials:**

Materials for this section include, but are not limited to, mechanical plugs, caps, mechanical joint restraints, mortar, bricks, wood and concrete.

All plugs, caps, mechanical joint restraints and hardware shall be provided by Aquarion to the Contractor.

All hardware shall be stainless steel.

**Construction Methods:**

The Contractor shall cut out a section of the existing main as shown on the drawings or as directed by the Aquarion Representative. The cut section shall be large enough to allow the Contractor to install a restrained mechanical plug or cap on the "live" end of the remaining pipe. The Contractor shall also plug or cap the "dead" end of the main with mortar, bricks and mortar or by installing a mechanical plug or cap. The mechanical plug or cap on the "live" end of the main shall be restrained by any means necessary including, but not limited to blocks, wood or concrete.

The "live" end of the water main shall be sufficiently braced against thrust.

Shutdown of the main shall be coordinated with Aquarion. The required shutdown shall be scheduled with Aquarion so that affected customers may be notified of the shutdown. The shutdown shall not be made until all materials for making the tie in have been secured and approved. As the tie in will not be disinfected with the new pipe and fittings installed, the interior of all pipe and fittings shall be swabbed or sprayed with a 1% hypochlorite solution in accordance with AWWA C65 1 Section 10 Standards, latest revision, prior to installation.

**Method of Measurement:**

Cut and Cap Water Main shall be measured for payment per each, completed and accepted by Aquarion.

Bedding material furnished, installed, and compacted, to the bedding material limits shown on the Typical Trench Detail, shall not be measured separately for payment, but shall be included in the cost for cutting and capping the water main.

Installation of pipe, fittings and appurtenances, including valves, air vent/blowoff assemblies, tees, bends, reducers, sleeves, and adapter couplings shall not be measured separately for payment, but shall be included in the cost for cutting and capping the water main.

Removal of Unsuitable Material, Additional Backfill Material, Rock In Trench and Temporary and Permanent Pavement shall be measured separately for payment under those appropriate Items.

**Basis of Payment:**

Cut and Cap (Water Main) will be paid for at the contract unit price per each, completed and accepted by Aquarion.

No separate payment will be made for bedding material furnished, installed, and compacted, to the bedding material limits shown on the Typical Trench Detail, but will be included in the cost for cutting and capping the water main.

No separate payment will be made for installation of pipe, fittings and appurtenances, including valves, air vent/blowoff assemblies, tees, bends, reducers, sleeves, and adapter couplings, but will be included in the cost for cutting and capping the water main.

Removal of Unsuitable Material, Additional Backfill Material, Rock In Trench and Temporary and Permanent Pavement will be paid for separately at the contract unit price under those appropriate Items.

**Pay Item**

**Pay Unit**

Cut and Cap (Water Main)

EA

## **ITEM #1302901A — AIR RELIEF VALVE (WATER MAIN)**

### **Description:**

Work under this section shall include all labor, tools, materials, and equipment necessary to install the Air Vent/Blow-off Assembly with Blow Off Box complete as shown in the Standard Details or as directed by the Aquarion Representative.

Work under this section shall include all labor, tools, materials, and equipment necessary for:

- obtaining road opening permit
- coordination of Call-Before-You-Dig mark out
- saw-cutting of the roadway, sidewalks, or driveways
- traffic control equipment (signs, barriers, etc.)
- traffic control coordination, including scheduling of policemen and flagmen
- furnishing and maintaining lighting
- mobilization and demobilization
- clearing and grubbing
- excavation as measured from the existing grade to the trench subgrade
- concrete thrust block installation, if required
- furnishing, installing, operating and maintaining a dewatering system
- furnishing, installing and removing sheeting, bracing and trench boxes
- furnishing, stockpiling, loading, hauling, placing and compacting pipe bedding material
- backfill and compaction of excavations
- stockpiling, loading, hauling and legally disposing of surplus material
- unloading and storage of pipe, fittings, and valves
- installing pipe, fittings, joint restraint assemblies, and restrained joint pipe
- asphalt and concrete pavement removal and disposal (including necessary saw cutting)
- removal and restoration of walls, fences, signs and any other structures which must be removed to carry out the work
- removal of topsoil and sod; restoration of area to original condition upon completion of work
- care and protection of existing pipes, utilities, and other structures
- piling and storage of excavated materials

### **Materials:**

Materials for Air Vent/Blow-off Assemblies include, but are not limited to, ductile iron tapped tees, brass accessories including a James Jones valve, or approved equal, 15" PVC riser pipe, cast iron blow-off box, blow-off box cover, and any blocking necessary to provide a suitable base for supporting the 15" PVC riser pipe. Blow-off assemblies at dead ends include a mechanical joint plug, restraints and hardware.

The Contractor will be provided materials compatible with the Aquarion List of Approved Materials for this installation. Additional materials, if required, must be approved by the Aquarion Representative at the site in order to be invoiced. There shall be no administrative mark up on additional materials ordered.

**Construction Methods:**

The Air Vent/Blow-off Assembly shall be installed as shown on the drawings or as directed by the Aquarion Representative. Air Vent/Blow-off Assembly installations shall conform to the Aquarion Standard Details.

Abandonment of Air Vent/Blow-off Assemblies shall include making sure the valve is in the off position, excavating, removing the blow-off box and lid, removing or cutting the 15” PVC down to a level below existing grade to the satisfaction of the Aquarion Representative, and backfilling the excavation with approved bedding and backfill material. Abandonment of Air Vent/Blow-off Assemblies shall also include removal of the old air vent/blow-off assembly and the installation of a plug into the water main. The air vent/blow-off shall no longer be visible at the surface and shall be reported to Utility Operations as abandoned and no longer in service.

Installing an Air Vent/Blow-off Assembly on an existing main shall include excavation and cleaning of the existing main. All debris and buildup shall be removed from the existing main so it is smooth. The existing main shall then be tapped and the appropriate hardware and accessories installed and brought to the surface using the materials and methods as specified herein.

All blow-off boxes shall be set so that they are centered over the valve and standpipe.

**Method of Measurement:**

Work under this section, of the size and type specified, shall be measured for payment per each “Air Relief Valve (Water Main)” installed, complete in place, and accepted.

Bedding material furnished, installed, and compacted, to the bedding material limits shown on the Typical Trench Detail, shall not be measured separately for payment, but shall be included in the cost per each air relief valve installed.

Rock In Trench, Removal of Unsuitable Material, Additional Backfill Material, Temporary pavement Repair and Permanent Pavement Replacement shall be measured separately for payment under those appropriate Items.

**Basis of Payment:**

Work under this section, for the size and type of air relief valve specified, will be paid for at the contract unit price per each installed, complete in place, and accepted.

No separate payment will be made for bedding material furnished, installed, and compacted, to the bedding material limits shown on the Typical Trench Detail, but will be included in the cost per each air relief valve installed.

Rock In Trench, Removal of Unsuitable Material, Replacement With Suitable Material, Additional Backfill Material, Class "C" Concrete (Water Main) and Temporary Pavement Repair and Permanent Pavement Replacement will be paid for separately at the contract unit price under those appropriate Items.

**Pay Item**

**Pay Unit**

Air Relief Valve (Water Main)

EA

**ITEM #1304059A — PERMANENT PAVEMENT REPLACEMENT  
(WATER MAIN)**

**ITEM #1304060A — TEMPORARY PAVEMENT REPAIRS  
(WATER MAIN)**

**Description:**

Work under this section shall include furnishing all labor, materials, tools, and equipment necessary for installing temporary and permanent pavement on Town and State roads disturbed by the Aquarion Contractor's operations. This work shall include:

- furnishing and installing bituminous concrete pavement as specified in this section
- maintaining the temporary pavement, or permanent hot patch, for up to one year after installation
- furnishing and applying tack coat
- saw-cutting or keying of the pavement
- saw-cutting of the roadway, sidewalks, or driveways
- traffic control equipment (signs, barriers, etc.)
- traffic control coordination, including scheduling of policemen and flagmen
- furnishing and maintaining lighting
- mobilization and demobilization
- compacting pavement
- removal of and resetting all manhole frames, catch basins, valve boxes, and air vent/blow-off boxes, etc.
- repairing of traffic loop detectors
- re-striping of traffic pavement markings

The Contractor who installed the pipeline and temporary paving will be responsible for maintaining the temporary paving or permanent hot patch for the period specified herein.

**Materials and Construction Methods:**

**Temporary/Permanent Pavement**

Refer to the following table for the horizontal limits of Temporary Pavement, Permanent Pavement, Processed Aggregate Base and Rolled Granular Base. The Permanent Pavement widths reflect a 1' cut back on either side of the trench.

Add 2 feet to each width below if a trench box is used.

**PAVEMENT AND PROCESSED AGGREGATE BASE LIMITS**

Pipe Size	Temporary Pavement <u>Width Limit</u>	Permanent Pavement <u>Width Limit</u>
6"	4.00 feet	6.00 feet
8"	4.00 feet	6.00 feet
10"	4.00 feet	6.00 feet
12"	4.00 feet	6.00 feet
16"	4.00 feet	6.00 feet
20"	5.00 feet	7.00 feet
24"	5.00 feet	7.50 feet
30"	6.00 feet	8.00 feet
36"	6.00 feet	8.50 feet

In pavement, the Contractor shall, immediately after backfilling, place temporary or permanent pavement as directed by Aquarion’s Representative, unless directed otherwise by the Town or State. In town roads, the Processed Aggregate Base thickness shall be 12". The Processed Aggregate Base shall meet the requirements of the latest State of Connecticut Department of Transportation special provision for Section 3.04. In State Highways, the Processed Aggregate Base thickness shall be 12". At the commencement of the project, Aquarion, the Town, or the State will determine whether the trench repair will be temporary or permanent.

Aquarion will determine the type of material to be used as temporary/permanent pavement. The temporary material will be either "cold patch" or "hot patch". Cold patch shall only be used during extreme cold weather conditions. No additional payment will be made to remove cold patch and replace with hot patch if required by Town or State officials.

Hot patch shall be HMA S0.5 material as per the requirements of the special provision for Section 4.06 - Bituminous Concrete, and Section M.04 - Bituminous Concrete Materials, latest revision. The permanent material under the HMA S0.5 will be HMA S1 as per the requirements of the Connecticut Department of Transportation Form 817, Section 4.06, and Section M.04. During the progress of the work and until construction of the final surface, the Contractor shall maintain the surface of the streets in good and safe condition. The Contractor shall frequently inspect and promptly fill all depressions above and adjacent to trenches caused by settlements to existing grade. The Contractor shall be responsible for maintaining the trench paving for a period of 1 year at their own cost, from the date of original installation of the temporary or permanent hot patch. Any leveling course required will not be reimbursed.

Generally, in town roads, the pavement shall consist of a two (2) to three (3) inches HMA S0.5 surface course on a two (2) to three (3) inch HMS S1.0 base course as directed by Aquarion. In State roads the pavement shall consist of a four inch (4") to six inch (6") HMA S1.0 binder course and a three inch (3") to four inch (4") HMA S0.5 wearing course placed in equal lifts. However, thicknesses may vary depending on more specific Town or State requirements. All stated pavement thickness refer to compacted and rolled thicknesses. On all State construction projects



the paving materials depths required shall conform to the typical section assigned to each project roadway by the Contract Documents.

Where existing pavement is disturbed at the intersection of driveways and street lines, replacement of permanent pavement shall be "lipped".

Pavement in State highways shall meet the approval of the Connecticut Department of Transportation.

#### Processed Aggregate Base

The Aquarion Contractor shall prepare the subgrade by constructing a processed aggregate base course, in conformity with the line, grade, dimensions and compacted thickness shown on the drawings, or as directed by the Engineer.

Materials and construction methods shall conform to Connecticut Department of Transportation Form 817, Section 2.09 for Subgrade and Section 3.04 for Processed Aggregate Base.

#### **Permanent Pavement**

The Aquarion Contractor shall be responsible for coordinating with local and/or State authorities to define when permanent paving can be performed and the bituminous materials to be utilized. Upon completion of the water main installation, the Aquarion Contractor shall inform Aquarion, in writing, of the anticipated date of paving.

In preparation for the permanent pavement, the remaining edges of the existing pavement shall be cut back (saw cut) a minimum of twelve inches (12") from the original edges of the trench. If required, the temporary pavement shall be removed and the subgrade formed to the required line, grade, and cross-section and properly compacted.

The Aquarion Contractor shall exercise care so as not to damage the cut edge of the existing pavement.

After the base has been properly prepared, subject to the approval of Aquarion's Representative, the final courses of bituminous concrete pavement shall be constructed. Immediately prior to laying the binder and wearing courses, the trimmed edges shall be stable and unyielding, free of loose or broken pieces and edges and shall be thoroughly swept and coated with an approved tack coat. The binder course shall be tack coated prior to placing the wearing course.

#### Bituminous Concrete Resurfacing Course

If required for the project, the Aquarion Contractor shall construct a 2" (compacted thickness) course of bituminous concrete pavement. This work shall be performed in conformity with the line, grade and dimensions as shown on the drawings or as directed by Aquarion's Representative.

Materials and method of construction shall conform to applicable provisions of the special provision for Section 4.06, Bituminous Concrete.

All edges of pavement along the existing roadway shall be cut straight, vertically, in a neat and workmanlike manner, and shall receive an approved tack coat prior to constructing the new pavement.

### Paving Equipment

Paving equipment shall be of the self-powered type with an adapter to provide guidance of the screeding action. The screed or strike-off member shall be adjustable to the shape of the cross-section of the finished pavement. The screed shall be tilted while in operation to secure the proper "drag" and to provide the compressive screeded surface required. The machine shall have a sufficient number of driving wheels so there will be no undue amount of slippage. Whenever the design of the equipment and plan of operation are such that the driving wheels travel on the finished surface of a completed pavement, said wheels shall be equipped with rubber tires or other means to protect the finished surface. Screeding members shall be preheated, and means shall be provided for heating the screeding members by some method that will prevent accumulation of bituminous material.

### Automatic Grade and Slope Control

All paving equipment used on divided highways of four or more lanes in excess of one thousand feet long, shall be equipped with automatic grade and slope screed controls with sensors for either or both sides of the paver. These systems shall be capable of overriding the normal function of the self-leveling screed and maintain screed deviation relative to an external reference. This reference may be an existing grade, mat, slab, or curb.

The grade sensor shall react from a reference line or a floating beam or shoe (ski) traveling over the reference plans.

The transverse slope controller shall be capable of maintaining the screed at the desired slope within +/- 0.1 percent.

### **Method of Measurement:**

Work under this section shall be measured for payment per square yard of paving related work performed and installed, complete in place, including all materials and accepted.

Furnishing, installing and compacting the base for the roadway shall not be measured separately for payment.

Processed Aggregate Base, Asphalt and concrete shall not be measured for payment.

**Basis of Payment:**

Work under this section will be paid for at the contract unit price per square yard of paving related work defined herein, performed and installed, including all materials, complete in place, and accepted.

No separate payment will be made for Processed Aggregate Base, Bituminous Concrete, or HMA.

**Pay Item**

Permanent Pavement Replacement (Water Main)

Temporary Pavement Repairs (Water Main)

**Pay Unit**

S.Y

S.Y

## **ITEM #1304070A — RESTRAINT EXISTING PIPE JOINT**

### **Description:**

Work under this item shall include the excavation for the purpose of locating the pipe bells on the existing water main to install restraint devices to prevent the opening of the joints under pressure and backfill. Aquarion will furnish the friction clamps, threaded rod, hex nuts, washers and clamps in the case of cast iron water mains; and will provide split Mega-Lug harnesses for ductile iron pipe bells.

Work under this section shall include all labor, tools, materials, and equipment necessary for:

- obtaining road opening permit
- coordination of Call-Before-You-Dig mark out
- saw-cutting of the roadway, sidewalks, or driveways
- traffic control equipment (signs, barriers, etc.)
- traffic control coordination, including scheduling of policemen and flagmen
- furnishing and maintaining lighting
- mobilization and demobilization
- excavation
- furnishing, installing, operating and maintaining a dewatering system
- furnishing, installing and removing sheeting, bracing and trench boxes
- backfill and compaction of the excavation
- stockpiling, loading, hauling and legally disposing of surplus material
- asphalt and concrete pavement removal and disposal (including necessary saw cutting)
- removal and restoration of walls, fences, signs and any other structures which must be removed to carry out the work
- removal of topsoil and sod
- care and protection of existing pipes, utilities, and other structures
- piling and storage of excavated materials

### **Materials:**

Materials to be used for backfilling test pits shall consist of materials similar to the bedding material and Additional Backfill Material as specified in these specifications. When joint restraints are performed in areas that require pavement restoration, the subbase, base and surface courses must conform to the requirements for Temporary Pavement and Permanent Pavement as specified elsewhere in these specifications.

### **Construction Methods:**

If, in the opinion of the Aquarion Representative, the excavated material is unsuitable for backfill, it shall be removed and disposed of to such limits as directed by the Aquarion Representative.

Excavations at joints to be restrained shall be backfilled in accordance with these specifications.

**Method of Measurement:**

Joint Restraint shall be measured for payment per each joint excavated, properly restrained, complete in place, backfilled and accepted.

The quantity of additional material excavated and replaced, measured in place, as directed by the Aquarion Representative, shall not be measured separately for payment.

Bedding material furnished, installed, and compacted, to the bedding material limits shown on the Typical Trench Detail, shall not be measured separately for payment, but shall be included in the cost per each joint restrained.

Rock In Trench, Removal of Unsuitable Material, Additional Backfill Material Temporary and Permanent Pavement shall be measured separately for payment under those appropriate Item Numbers.

**Basis of Payment:**

Joint Restraint will be paid for at the contract unit price per each joint, excavated, restrained, accepted and backfilled.

No separate payment will be made for the quantity of additional material excavated or replaced, measured in place, as directed by the Aquarion Representative. No separate payment will be made for bedding material furnished, installed, and compacted, to the bedding material limits shown on the Typical Trench Detail, but will be included in the cost per each test pit performed.

Rock In Trench, Removal of Unsuitable Material, Additional Backfill Material and Temporary and Permanent Pavement will be paid for separately at the contract unit price under those appropriate Item Numbers.

**Pav Item**

**Pay Unit**

Restraint Existing Pipe Joint

EA

## **ITEM #1304111A — CLASS “C” CONCRETE (WATER MAIN)**

### **Description:**

Work under this section shall include all materials, tools, and equipment necessary for furnishing and placing the concrete and reinforcing steel for thrust blocks, concrete encasements, and concrete as fill as shown on the drawings or as directed by the Aquarion Representative.

### **Materials:**

Portland cement shall conform to ASTM C150, latest revision, for Type I cement. Aggregate for concrete shall conform to ASTM C33, latest revision. Coarse aggregate shall be size No. 67 according to Connecticut Department of Transportation Form 817, Section M.01.01.

Concrete shall contain at least 4.7 bags of cement per cubic yard. The amount of water used shall not be more than 7.0 gallons per bag of cement. Less shall be used, if required, depending upon the characteristics of the aggregates, the proportion of coarse to fine materials in the aggregates, and the consistency desired for the moisture content in the aggregates. The exact proportions of water, cement, sand, and coarse aggregates shall be varied as ordered to give the best results for the aggregate used. The minimum 28-day compressive strength shall be 2,500 lbs. per square inch.

Reinforcing steel shall be deformed and conform to the requirements of ASTM A 615/A 615M, Grade 60(420).

### **Construction Methods:**

Concrete shall be mixed in an approved rotating type of mixer at least one and one-half (1-1/2) minutes after all ingredients are combined. It shall be deposited immediately after mixing in a manner to avoid separation and shall be compacted through spading and by use of approved mechanical vibration devices. No concrete shall be placed if the temperature is at or below 32° Fahrenheit.

Transit mix concrete may be used providing it meets all of the requirements specified above and the transit mix company and its equipment are approved by the Aquarion Representative. Concrete shall be discharged from the mixer not more than sixty (60) minutes after cement is added to the other ingredients.

### **Method of Measurement:**

Class “C” Concrete (Water Main) shall be measured for payment by the cubic yard, but the installation thereof shall be included in the linear foot cost of the pipe installation, or in the respective pay item unit cost for the item calling for the thrust block. Reinforcing steel will not be measured separately for payment.

**Basis of Payment:**

Class “C” Concrete (Water Main) will be paid for at the unit price bid per cubic yard for the actual number of cubic yards of mix shown on the Aquarion Detail Drawings for thrust blocks, concrete encasements or concrete for fill required for proper completion of the project, which price shall include all specified reinforcing steel.

**Pay Item**

**Pay Unit**

Class “C” Concrete (Water Main)

CY