

University of Rhode Island
Water System Work Specifications

1. Water System Authorization

- a. Only authorized URI employees or approved contractors shall be allowed to make water service repairs, connections or disconnections of service from a URI water main.
- b. Approved contractors shall consult with URI Utilities Department and receive written permission, prior to beginning work.

2. Operation of Water Valves

- a. Only URI employees or designated personnel are authorized to operate URI Water System valves. URI's valves are defined as all water system valves upstream or before the point of delivery to a building to the backflow preventer.

3. Temporary Connections

- a. Filling of tank trucks for any purpose shall only be done at designated locations with approved backflow prevention devices under the direction/supervision of URI Water System personnel.
- b. Any Hydrant use other than fire emergencies shall be coordinated with Water System personnel. Prior to any connection the user must have an approved backflow prevention device with throttling valve attached to the hydrant port.

4. System Design and Modification

- a. No connection/modification shall be permitted to the URI Water System unless reviewed and approved by the Utilities Department.
- b. Specification development shall include a Utility Department review of existing/proposed utility modifications in accordance with these specifications. Separations.
- c. Water distribution system CAD or GIS drawn as-builts must be supplied on every project where modifications have been made to the URI water system. Drawings shall be prepared under the direction of a registered professional engineer or professional land surveyor in the State of Rhode Island and so stamped and signed.
- d. Procedures for installation of water system pipe and connection to the Water System shall conform to all applicable Rules and Regulations of the AWWA Standards, NFPA 24 for fire service mains, NSF 61 for domestic water service, and State regulations and as governed by the RIDOH.

- e. Restraining devices shall be utilized on all mains under the following conditions:
 - Pipeline direction changes (tees, bends), vertical and horizontal
 - Dead end lines (caps or plugs)
 - Transition pieces (reducers)
 - Valves on dead end lines
 - Hydrants
 - Tapping sleeves
- f. Thrust blocks shall be designed to withstand the force imparted by the hydraulic influence encountered within the main. Minimum 1-1/2 times the anticipated working pressure of the main, but not less than 150 PSI. Maximum lateral bearing capacity shall be 1500 lb/sf.
- g. All thrust blocks shall be constructed from concrete 3000 PSI. at 28 days, sized according to the size of pipeline, type of fitting, water pressure and the characteristics of the soil. Bearing surface shall be against undisturbed solid earth for the required bearing area. The concrete shall be properly formed as to slope for the given application and bearing width. The concrete shall be in contact only with the fitting, not with the pipe itself, fasteners or the joint. Curing time shall be a minimum of 7 days.
- h. Stone, timber, concrete block or any materials that deteriorate are strictly forbidden to use as a permanent thrust block or restraint.
- i. Optional thrust restraint shall be via restrained joint, ductile iron pipe meeting ANSI/AWWA C151/A21.51 and ANSI/AWWA C11/A21.11 and approved by the Utilities Department. Restrained joint pipe lengths (restrained length) shall be sufficient to restrain thrust imparted by 1-1/2 times the anticipated working pressure, but not less than 150 psi with a 1.5 factor of safety.
- j. The use of tie rods may be allowed by written permission of the Utilities Department. This type of restraint configuration will only be considered in situations where approved types of restraint systems cannot be used. If allowed, they shall be of sufficient strength to withstand forces imparted to them. A factor of safety shall be 2.0 for all rod thickness calculations. All rods shall be stainless steel or protected from corrosion with two coats of epoxy paint.
- k. Approved thrust restraint shall be by an approved restraining gland system utilizing in combination with mechanical joint pipe and fittings. All calculations must be provided and shall be in conformance with the manufacturing requirements for length, fitting and type of restraint.
- l. Blocking under the pipe shall not be permitted except where a concrete cradle is proposed.
- m. Water Distribution mains shall be designed in a grid or loop type system to prevent the occurrence of dead end lines. When the potential for dead end lines exist, the contractor shall make every effort to pass the main through to the next existing distribution line.
- n. Water mains shall be laid with a minimum of ten-foot horizontal clearance from any existing sewer facilities. The distance shall be measured edge to edge. Water mains crossing under sewers shall be forbidden. Water mains crossing over sewers shall be laid to provide a minimum, vertical separation of eighteen-inches between the invert of the water main and the crown of the sewer. Re-alignment of an existing water main or relocation of the sewer may be necessary to achieve this vertical separation. The Water Manager must approve any deviation from these requirements. Concrete encasement shall not be allowed in the design for sewer and water main crossings.

5. Contamination prevention requirements:

- a. All piping, valves, fittings, etc. delivered for installation shall be kept elevated above the ground and protected from exposure to the elements such as dust, rain and debris.
- b. All piping fittings and valves shall be thoroughly cleaned of any dust, dirt or deposits prior to installation.
- c. Work on mains and services shall include protection of all open ended pipes any time pipe ends are to be exposed for any period of time. Protection shall include approved new watertight plug and/or necessary steps to prevent foreign debris from entering the exposed pipe.

6. Fire Protection Lines

- a. Dedicated fire protection service lines shall follow all the requirements set forth in this construction section for main or service connections, including but not limited to NFPA 24.
- b. All dedicated fire protection service lines shall have a flush port installed at the building for water system maintenance line flushing.
- c. Backflow prevention shall follow requirements set for in Paragraph 8 of section D.
- d. All fittings and pipe connections upstream of the fire protection backflow preventer must meet the URI requirements for approved materials for potable water distribution pipe, fittings, connections and valves.

7. Fire Hydrants

- a. All fire hydrants shall be Kennedy, American Darling or Muller brand and meet or exceed the current AWWA C502 Dry-Barrel Fire Hydrant specifications for compression type main valve, traffic model, dry-barrel hydrants.
- b. In addition to the standards, fire hydrants shall meet or exceed the following specifications. Hydrant manufacturer's specifications shall be reviewed and pre-approved by URI for installation into the water system:
 - National Standard Specification threads
 - Operation nut 1-1/2 inch point to flat
 - Opens counter clockwise (Left)
 - 2 each 2-1/2 inch NST hose ports
 - 1 each 4-1/2 inch NST steamer port
 - All ports shall have cast iron caps
 - All ports shall be mechanically attached
 - All exposed portions of the hydrants shall be painted red with (Rust Olium Safety Red). Hydrants shall be the "High Profile" configuration
- c. Filter fabric shall be wrapped around the drain holes of the boot. Prior to backfilling and compaction, one cubic yard of 1/2" to 1" crushed stone shall be packed around the boot and hydrant valve up to the base of the valve box. Stone shall be wrapped in filter fabric, hole backfilled and compacted.
- d. Hydrant isolation valves shall be connected directly to the swivel or anchor tee. An approved restrained gland style fitting shall be utilized on the hydrant boot side for restraint. Rodding of hydrants is strictly forbidden and the use of positive mechanical restraints, such as an approved restrained gland style fitting, is the only restraint system authorized. A thrust block shall be installed on the backside

of the anchor tee. The manufacturer shall permanently coat all mechanical restraints against corrosion. The installer, prior to backfilling, shall repair any damage to the hydrant coating system.

8. Services

- a. Services shall be sized appropriately to the demand application with a minimum of ¾ inch size. Isolation ball valves shall be provided on the inlet and outlet side of the meter. A reduced pressure zone backflow device shall be installed directly after the outlet valve on the meter before the first tap to any appliance or pumping equipment. All material shall meet the current AWWA C800 *Underground Service Line Valves and Fittings* specifications.
- b. All fittings shall be compression type “CTS” brass material.
- c. All direct tap fittings shall have CC threads for 1 inch only.
- d. All services 1 1/2" or 2" require a saddle unless direct tapping equipment is available. Any service being installed on AC or plastic P.V.C. mains require a service saddle regardless of size.
- e. Approved Teflon joint compound or triple wrap Teflon tape shall be used on all threaded pipe fittings.
- f. NPT threads shall be used on corporation stops when a tapping saddle is used. (This applies to two inch services only.)
- g. All 1 and 2 inch diameter pipe service lines shall be ASTM B88, Type K soft copper.
- h. Each service shall be equipped with a curb stop, which shall be installed two (2) feet behind the face of curb or edge of pavement. Curb stop shall be bronze compression fitted and of no drip configuration. Direction of opening shall be open left.
- i. All service boxes shall be “Buffalo Style” and installed to finish grade. In installations where does not occur within a paved or concrete sidewalk area a 1' x 6" concrete ring or slab shall be installed to support the upper box.
- j. Depth of services shall be at a minimum of five feet to finished grade throughout installation.
- k. All fittings and pipe shall be swabbed with approved chlorine solution and cleaned of all foreign material prior to installation. The service pipe shall be disinfected and pressure tested prior to meter installation.
- l. Identification tape as specified in the material fact sheet shall be utilized for the full length of services and set to a depth from finished grade of no more than 2'-0".
- m. Services 4" and above shall be ductile iron and conform to the requirements for main and valve installation.
- n. Service size shall remain consistent with the service tap size up to the point before the meter where service enters the building or meter pit.

9. Standard Water Distribution Pipe Material

- a. All standard water distribution pipe installed shall be cement mortar lined Ductile Iron Pipe. Brass wedges shall be installed at all gasket joints. URI may deviate from this standard depending upon the design considerations and service requirements. All Ductile Iron Pipe 4 inches and larger shall meet or exceed the current AWWA C151 specification, be cement mortar lined, and be "push on" joint, bell and plain spigot end, unless grooved or flanged ends are approved. Listed below are the specific pipe specifications for water distribution system pipe:

- b. All 4 inch and greater diameter pipes shall be a minimum of Class 52.
- c. Cement mortar lining shall meet or exceed current *AWWA C104 Cement Mortar Lining Standards*.
- d. Rubber Gasket Joints must meet or exceed current *AWWA C111 Rubber Gasket Joints Standards*.
- e. The following is the approved list of pipe manufacturers:
 - Pacific States Cast Iron Pipe Company
 - United States Pipe Company
 - Griffin Pipe Products Company
 - American Cast Iron Pipe Company

10. Fittings

- a. All fittings shall be ductile iron and meet or exceed the current *AWWA C153 Ductile Iron Compact Fittings* standards.
- b. Fittings shall be mechanical joint with rubber gaskets that meet or exceed current *AWWA C111 Rubber Gasket Joints* specifications. In addition, all fittings shall meet the following URI specifications:
 - The exterior of all fittings shall have a petroleum-asphaltic coating.
 - The interior of all fittings shall be cement/mortar petroleum-asphaltic lined in accordance with current *AWWA Specification C104 Cement Mortar Lining for Ductile Iron Pipe*.

11. Gate Valves

- a. All gate valves shall be resilient-seated gate valves and shall meet or exceed current *AWWA C509 Resilient-Seated Gate Valves* specifications or *AWWA C515 Reduced-Wall Resilient-Seated Gate Valves* specifications. Valves shall open in a counterclockwise direction.
- b. All distribution valves 2 inch diameter through 10 inch shall be resilient-seated gate valves.
- c. All valve boxes shall be installed to finish grade.
- d. All tapping valves regardless of size must be resilient-seated gate valves. In addition, all gate valves shall meet or exceed the following URI specifications:
 - The valve body interior shall have epoxy coating.
 - All operating nuts shall be 2 inch square nuts as specified in current *AWWA C509* specifications or *AWWA C515* specifications.
 - All valves shall **open in a counterclockwise** direction.
 - The stem seals shall be O rings as specified in current *AWWA C509* specifications or *AWWA*

12. Tapping Valve and Sleeve:

- a. A visual inspection and air test of the assembled tapping valve and sleeve shall occur prior to cutting into the pipe. A final inspection of the assembled valve shall occur prior to backfill. An authorized representative of the URI Utilities Department shall witness all tests.
- b. Tapping sleeves shall be utilized in all cases where the main cannot be shut down for installation of a standard "T" connection.

- c. All size on size tapping sleeves shall be full size cast iron or ductile iron, mechanical joint with stainless steel fasteners made in the North America, as approved by the URI Utilities Department.
- d. Sleeve couplings and accessories shall be pressure rated to at least equal that of the pipe. Couplings shall be ductile iron. The interior of the coupling shall be epoxy-coated in accordance with American Water Works Association ASTM & ANSI standards. Coating shall be thermosetting epoxy with a minimum dry film thickness of 10 mils and a maximum of 20 mils. Fabricated sleeves will be allowed only on ductile iron mains, cast iron mains or PVC mains with prior approval by the URI Utilities Department.
- e. All sleeves shall be installed in strict compliance with the manufacturer's recommendations; copies of the installation guidance shall be available on site during installation.
- f. Water main on branch side of tapping sleeve shall be restrained in accordance with pertinent sections of the rules and regulations.

13. Installation of Pipe and Appurtenances

- a. Installation of all water conveyances, mains, pipes or lines shall be in accordance with the Ductile Iron Pipe Research Association's installation manual and ANSI/AWWA C600 .
- b. Depth of services shall be at a minimum of five feet to finished grade throughout installation unless approved by the Utilities Department.
- c. Each length of pipe and or fitting shall be inspected for cracks, defects in coating on lining, cleanliness or any other evidence of unsuitability.
- d. Metalized detectable identification tape 2" in width or greater, blue in color and printed with "CAUTION WATER LINE BURIED BELOW" shall be utilized over the full length of all mains and services. Tape shall be set two feet below finished grade.
- e. Line valves shall be installed at all intersections in a configuration that allows for isolation in all directions. On long lengths of main, valves shall be installed at a minimum of 800 feet intervals and at all dead end sections.
- f. Pipe may be deflected in order to make MINOR adjustments in the alignment. All deflections shall be a maximum of 75% of the manufacturer's safe allowable deflection per pipe length as indicated in the following tables. It is required that bends in the pipe be accomplished by fittings wherever possible.

Allowable Deflection For
18-Foot Lengths Pipe

SIZE OF PIPE (In.)	PUSH-ON JOINT (In.)	MECH. JOINT (In.)
4	14	23
6	14	20
8 – 12	14	15
14 – 16	8	10
18 – 20	8	8
24 – 30	8	7

Allowable Deflection For
20-Foot Lengths Pipe

SIZE OF PIPE (In.)	PUSH-ON JOINT (In.)	MECH. JOINT (In.)
4	16	26
6	16	23
8 – 12	16	17
14 – 16	9	11
18 – 20	9	9
24 – 30	9	8

- g. Whenever pipe requires cutting to fit the line, the work shall be done only by experienced (State of Rhode Island, licensed contractor) or plumber, and in such a manner as to leave a smooth end at right angles to the axis of the pipe and on pipe that is center rounded designed specifically for field cutting. The cut ends shall be beveled to conform to the manufactured spigot end. Particular care shall be exercised to prevent damaging the lining when cutting cement-lined cast or ductile iron pipe. Jointing of pipe or fittings shall be made only by persons thoroughly skilled in this work. For pipe diameters 16” and larger, pipe cutting shall be done by machine.
- h. Water main and services shall be installed with a minimum cover of 5 feet to the crown of the pipe in an American Water Works Association "Type 5 Trench". Where unsuitable material is found at or below the grade of the placement of the pipe or fitting, the undesirable material shall be removed to the required width and depth and replaced with thoroughly compacted bank run gravel above the crown of the pipe.
- i. Material shall be deposited across the full width and length of the trench in layers of not more than 12” in depth before compaction. Each layer, to within 12” of sub-grade of the permanent patch, shall be compacted to 95% Standard Proctor. The final 12” shall be processed gravel compacted in two (2) equal courses to 95% Standard Proctor.
- j. A temporary patch shall be installed over the freshly backfilled trench in an existing street or sidewalk using hot bituminous concrete. It shall be at least 3” thick consisting of equal thickness layers of Modified Binder and Type I-1 Wearing Course. After 60 days, the temporary patch shall be removed and replaced with a permanent patch.

13. Pressure and Leakage Testing

- a. URI personnel shall be present during the test.
- b. All water mains and services shall be pressure tested and pass a pressure test in accordance with current ANSI/AWWA C600 Hydrostatic Testing prior to acceptance and being placed into service.
- c. New mains and services shall be kept isolated from the system and protected with reduced pressure zone valves during filling, pressure testing and disinfection.
- d. Prior to pressure testing, all appurtenances to the water system shall be in place, including concrete thrust blocks.
- e. The duration of the hydrostatic test shall be for a minimum of 2 hours with allowable loss as determined by the Utilities Department.
- f. All tests shall be performed or observed by the Utilities Department or its authorized representative.
- g. Provide a written report of test results to URI Utilities Department.

14. Disinfection

- a. URI personnel shall be present during the disinfection process.
- b. Disinfection of all areas affected by construction is mandatory.
- b. All water main replacements, extensions, fire lines and services shall be disinfected pursuant to AWWA Specification C651 Disinfection of Water Mains, prior to being placed into service. URI will accept the Continuous Feed Method of chlorination for all water mains as specified by AWWA C651. These include but are not limited to:
 - Mains
 - Service Piping
 - Buildings served
- c. New mains and services shall be kept isolated from the system and protected with reduced pressure zone valves during flushing, disinfection and purging of chlorinated water.
- d. Mains less than 16 inches in diameter shall be flushed to clear debris. Velocities of 2.5 ft/sec should be reached.
- e. The initial free chlorine concentration shall be at least 25 ppm and not more than 100 ppm. The free chlorine concentration after 24 hours must be at least 10 ppm.
- f. After proper disinfection, chlorine shall be purged to background levels.
- g. Super-chlorinated water shall be neutralized prior to release to the environment. Disposal of all water used in the disinfection process shall be the responsibility of the contractor performing the disinfection procedure. Approval for discharge into the sanitary sewer system must be obtained from the South Kingstown Wastewater Authority.

15. Bacteriological Testing

- a. It is required that an authorized representative of URI be present during the chlorination process and once complete, witness the sampling procedure for bacteriological testing.
- b. Coliform samples must be collected from locations determined by the Water System Manager. Samples will be collected after the water/fire main has been flushed to chlorine levels similar to other parts of the distribution system. A second set of samples must be collected 24 hours after the first set.
- c. URI will not accept a new water main, service or fire protection connection until a certified bacteriological test indicating the absence of coliform organisms is received.
- d. When construction work being performed is an emergency repair, the isolated portion of the main shall be disinfected and flushed per AWWA C651 "Disinfection Procedures When Cutting into or Repairing Existing Mains". This procedure will be done as thoroughly as possible prior to the main being put back into service. Authorized URI personnel must be present for inspection of the procedures prior to any reconnection to the water system.

Any deviations from the above information shall only be allowed upon prior approval from the URI Utilities Department. If material is not noted above then all items not referenced in the above paragraphs will need prior approval of the URI Utilities Department before use/installation.

University of Rhode Island Water System

Regulations/Policies

Definitions

Backflow Prevention Device: Device designed to prevent the flow of water back into the system in the event of a low pressure situation.

Cross Connection Control Device: A Rhode Island Department of Health approved device for the prevention of backflow of a potentially contaminated water source into the water system.

Main: A water pipe owned, operated and maintained by the water system, which is used for the purpose of transmission or distribution of water.

Curb Stop: A shut off valve on the water service line generally located at the curb or where the service connects to the main water line.

Customer: Person(s) served by the water system responsible for the property and its use.

RIDOH: Rhode Island Department of Health

Fire Service Line: A water service pipe used exclusively for fire protection.

Service Connection: The service pipe, including the corporation stop, from the main to the building, including any valves or fittings the water system may require for normal operation.

Tap: The fittings installed at the main to which the service pipe is connected.

Utilities Department: URI Facilities Services Department in charge of all aspects of the URI water system.

Water System: The University of Rhode Island water system that serves the Kingston Campus.

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