Site Utility Design and Construction Standards

Water

Issued: February 11, 2013

Director of Physical Plant: [Signature]
A. ADMINISTRATION

A.1. BACKGROUND

A.1.1. The University of Massachusetts Amherst purchases water from the Town of Amherst. The Town is responsible for water quality and treatment. Water is metered at 5 locations where Town of Amherst Water Distribution Mains enter the Campus. The University installs and maintains all distribution piping and appurtenances within the UMASS Amherst Campus.

A.2. SUBMISSION OF PLANS AND SPECIFICATIONS

A.2.1. Prior to the University of Massachusetts Amherst Facilities Planning Division (UNIVERSITY) issuance of a Water Service Permit, plans and specifications should be submitted for review to the UNIVERSITY’s Office located at the Physical Plant Building, 360 Campus Center Way, Amherst, Massachusetts. The University will determine whether a water main extension or a water service connection is appropriate.

A.2.2. A water main extension involves extending an existing public water main from its terminus to a point in a public road or right of way to serve a specific property or development. Water main extensions shall be installed.

A.2.2.1. A water service connection involves tapping an existing water main and installing copper or ductile iron pipe from the water main to the building. A water service connection shall be installed after applying for a water service permit.

A.2.3. Water service connections must be installed by a Massachusetts licensed site contractor for work outside the building, and a Massachusetts Licensed plumbing contractor for work within the building. All water service locations will be documented on record drawings by the contractor and provided to UNIVERSITY.

A.2.4. Site Plans submitted to the UNIVERSITY as part of a water service application must include complete dimensions, the location of the site and the location of the building on the site, the building name and number.
A.2.5. Separate fire and domestic services are required except by special approval.

A.2.6. All plans should have the seal of a Massachusetts licensed professional engineer or surveyor, as appropriate.

A.3. SAFETY

A.3.1. Only University personnel shall operate water valves or other water appurtenances.

A.3.2. A request for water main or water service shut down shall be submitted in writing to the University's Facilities and Planning Division a minimum of 2 weeks prior to the requested date of the shut down.

A.3.3. The Contractor shall comply with all pertinent provisions of the Department of Labor, Occupational Safety and Health Administration, Title 29 Code of Federal Regulations Chapter XVII Parts 1910 – “General Industry Standards” and Parts 1926 – “Construction Industry Standards”.

A.3.4. The Contractor alone shall be responsible for the safety, efficiency and adequacy of its plant, appliances and methods, and for any damage or injury which may result from their failure or the improper construction, maintenance or operation.

A.3.5. The Contractor shall properly design and furnish all labor, materials, equipment, and tools necessary to completely construct the excavation support system, permanent or temporary, including sheet piling, trench shields (trench boxes), timber trench shoring, pneumatic/hydraulic shoring, steel sheeting or sheeting using other materials, sloping and benching. All of the proper materials and all equipment necessary to protect employees in excavations against cave-ins shall be furnished and installed. Also, all employees and the general public shall be protected from hazards related to the construction. Adequate support systems shall also protect people from equipment which might fall or roll into an excavation, utilities within or adjacent to the excavation or which is impacted by operations under the construction.

A.3.6. If, in the opinion of the UNIVERSITY, the Contractor has failed to maintain a safe trench and work area, department forces shall refuse to enter the trench until safety concerns are satisfied. This requirement shall not in any way relieve the Contractor of complete responsibility and liability for maintaining a safe and adequate trench excavation at all times and at any depth.

B. DESIGN

B.1. CROSS CONNECTION CONTROL AND BACKFLOW PREVENTION

B.1.1. UNIVERSITY Standards relating to Cross-Connection Control and Backflow Prevention indicate that there shall be no cross connection between the public water distribution system or the potable water supplied thereby and any auxiliary water source, unless the installation has been registered with and approved by the UNIVERSITY.
B.1.2. A cross-connection is an actual or potential connection between a potable water system and any other source or systems including well water, through which it is possible to introduce into the potable water system any contaminating or polluting agent.

B.1.3. Contamination will result when a cross-connection exists and backflow or a reversal of flow occurs. There are two types of backflow: backsiphonage and backpressure. Back-siphonage results when there is a negative pressure in the system and the contaminant is pulled into the drinking water supply. Backpressure occurs when the pressure on the non-potable system is greater than the potable system and the contaminant is pushed into the drinking water supply.

B.1.4. The requirements for backflow prevention devices are dictated by the Federal Safe Drinking Water Act, Public Law 93-523 and Section 19-13-B37 of the State of Massachusetts Public Health Regulations. The selection of the appropriate device in a particular installation is based on a combination of the degree of hazard involved and the possibility of contamination.

B.1.5. Installation of any Backflow Prevention device requires the applicant to fill out the attached “Permit Application to Install a Backflow Prevention Device” and receive approval from the University prior to installing the device.

B.1.6. All testable backflow preventers are to be tested upon installation or repair. Results are to be submitted to the UNIVERSITY.

B.1.7. Plumbing plans for new buildings, additions and/or renovations should be submitted for review to the Facilities Planning Division for conformance with Public Health Code cross-connection regulations.

B.2. SEPARATE AND COMBINED FIRE SERVICES

B.2.1. Most public water supply systems are designed for a dual or combined purpose. To supply water for normal domestic demands, and also, to provide water to fire hydrants for emergency use by fire departments and facility fixed fire protection systems, such as automatic sprinklers, foam systems, and fire standpipe systems. Water systems supplying both normal consumption demands and fire protection requirements must satisfy the design objective of providing a system with the capability of meeting the simultaneous demand rates for both purposes with reliability. The UNIVERSITY advocates separate water services for domestic use and fire service. There are special cases where a combined service (one service for both water and fire) is acceptable but only after all other alternatives have been examined. A proper design of a separate or combined service should address the water system pressure and capacity to meet proposed demands.

B.2.2. There are many advantages to providing a completely separate water service for fire protection:

B.2.2.1. Complete control over the water service by those responsible for fire protection.

B.2.2.2. Proper design of the water service to meet all fire demands.
B.2.2.3. There is little danger of introducing a non-potable fire supply into a potable supply through faulting cross connections.

B.2.3. In systems providing for normal consumption demands and for fire protection, that portion of the system extending into private property should be isolated from the public portion of the system. This is done by the installation of listed or approved backflow prevention devices, thereby providing some measure of protection from contamination of the potable source.

B.3. THRUST RESTRAINT

B.3.1. Thrust Restraint shall be designed for a minimum working pressure of 150 PSI.

B.3.2. Where and as shown on the approved drawings or as directed by the UNIVERSITY, retaining glands, eye bolts and lacing rods shall be installed, in accord with the standard details included in Section F. The length of piping that must be restrained shall be noted on the drawings.

B.3.3. When using the mechanical joint retainer gland method retaining glands shall be installed as directed in lieu of the standard mechanical joint gland. The “T” bolts shall be tightened with a ratchet or torque wrench to between 75 and 90-foot pounds. Only then shall the set screws be tightened 180 degrees apart to a maximum of 70 foot-pounds. Once all set screws have been tightened a final check with the torque wrench shall be made to ascertain that all set screws have 70 foot-pounds. The joint is then complete. Torque settings shall be done with the pipe laid in the trench in place.

B.3.4. When restraining push on joints, either mechanical joint glands and lacing rods or retaining glands shall be used. Lacing rods, nuts and bolts shall be coated in the field with an approved coating to protect them from corrosion.

B.4. AIR VALVES

B.4.1. Air valves shall be installed at the high point of the water main, if the grade change is over 4' and no hydrant is available near the high point.

B.4.2. Each case should be reviewed for the required need, since the air valves consist of a box and fittings that must be maintained. Their use is only very occasional, i.e., filling the main originally and then on any shut down. Hydrants or end blow-offs can most often be used if they occur at the high point.

B.5. TAPPING GATE VALVES

B.5.1. When a 4", 6", 8" or 12" tapping gate valve is used for the installation of a new main, a street line gate valve shall also be installed. The street line gate valve shall serve as the operating valve. Gate boxes shall be installed over both gate valves. Taps shall be one size smaller than the main being tapped.

C. PERMITTING CRITERIA

C.1 REQUIREMENTS

C.1.1. All design plans and specifications must be submitted to the UNIVERSITY and review and approved prior to the start of work.
C.1.2. All work shall be designed in accordance with all applicable local, state and federal codes and standards in effect at the time the construction project bid documents are issued for solicitation. The design shall meet the appropriate standards and requirements listed above as well as any specific requirements set forth below. The more stringent standard shall be followed in the event of a conflict.

C.1.3. Design and construction shall comply with 310 CMR 22 “Drinking Water Regulation” and 310 CMR 22.2 “Cross Connection Regulations”, as well as Town of Amherst requirements.

C.1.4. Water re-use conveyance systems shall be designed and constructed in accordance with this standard and be in compliance with 314 CMR 20. “Reclaimed Water Permit Program and Standards”

D. TECHNICAL STANDARDS

D.1. STERILIZATION AND FLUSHING

D.1.1. The Contractor in cooperation with UNIVERSITY shall sterilize the new water service pipelines and sections thereof by using a modification of the Tablet Method as described in Sec 5.1 of the latest edition of ANSI/AWWA C651, “Standard for Disinfecting Water Mains”. The appropriate number of five (5) gram calcium hypochlorite tablets as shown in Table 1 shall be cemented in each length of pipe by the Contractor. Tablets are to be attached by an adhesive such as Permatex No 2c to the top of each pipe. Subsequent to the completion of the water service lines, they shall be filled with water as part of the tablet method of sterilization. The water shall remain in the pipelines a minimum of 24 hours before flushing.

D.1.2. After final flushing and before placing the water service pipelines in service, the contractor shall make the appropriate bacteriological tests. If the water service fails these tests, UNIVERSITY will require additional sterilization flushing and testing. All expense for this additional work will be the responsibility of the Contractor.

Table 1
Number of 5 gram Hypochlorite tablets required for 50 ppm dose

<table>
<thead>
<tr>
<th>PIPE DIAMETER (INCHES)</th>
<th>NUMBER OF TABLETS PER LENGTH OF PIPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>18'</td>
<td>1</td>
</tr>
<tr>
<td>4&quot;</td>
<td>1</td>
</tr>
<tr>
<td>6&quot;</td>
<td>1</td>
</tr>
<tr>
<td>8&quot;</td>
<td>2</td>
</tr>
<tr>
<td>10&quot;</td>
<td>3</td>
</tr>
<tr>
<td>12&quot;</td>
<td>4</td>
</tr>
</tbody>
</table>

D.1.3. The Contractor is reminded that the complete test procedure requires four (4) consecutive working days for the results to be obtained. CAUTION: Tablets
are not to be left in pipes above ground overnight or on the job site where they can come in contact with children or animals.

D.1.4. The Contractor shall make arrangements with UNIVERSITY to flush the system subsequent to sterilization. UNIVERSITY will be responsible for operating the gate valves in the street if necessary, and the contractor shall supply materials for neutralizing the chlorine. The Contractor shall be responsible for supplying equipment necessary to perform the flushing operation and determining where the water will drain during the flushing operation so as not to flood areas or cause damage to property.

D.1.5. All mains and service connection over 50' in length must be sterilized and flushed by a utility contractor experienced in water main installation.

D.2. CHLORINATION

D.2.1. Use if a 3/4" x 1" corporation cock as a sterilization test sample connection at the end of the main is a one-time occurrence and after its use it can be converted to a permanent air valve or abandoned; whichever is dictated by the specific installation.

D.2.2. Chlorination tables, where used, shall be glued to the top of the pipe with Permatex No. 2c adhesive. See page Table 1 for number of tablets required per pipe size. Chlorination inlet valves and chlorination blow-offs are to be used on 16" and larger mains that will require liquid chlorination instead of tablets. Injection of hypochlorite will be observed by the UNIVERSITY personnel on water mains up to the water service corporation.

D.3. GATE VALVES

D.3.1. Existing gate valve shall only be operated by University personnel.

D.3.2. Gate valves are normally installed at street lines of intersecting streets. Upon UNIVERSITY review, additional valves may be required to facilitate future main extensions or maintenance.

D.3.3. Gate valve sizes for 4", 6", 8" and 12" pipe shall be full pipe size and resilient seated or double disc type, as shown in Section F. Gate valve operation shall be to UNIVERSITY standards - Open Right.

D.4. HYDRANTS

D.4.1 All hydrants shall be manufactured by Kennedy, Elmira, NY, Model K81-A, open right and painted red. Hydrants shall have a 6" branch pipe with a 6" gate valve controlling each hydrant.

D.4.2. Through the University's Environmental Health and Safety Department, the Town of Amherst Fire Department shall be contacted for locations of hydrants to be installed.

D.4.3. Hydrants shall be installed on the side of the street closes: to the water main, in the area directly behind the curb or pavement line, a minimum, 2 feet from face of curb to center line of hydrant.
D.4.4. Hydrants, although located where assigned by proper municipal authorities, shall not be located on the radius of intersecting curb lines. UNIVERSITY requires a maximum spacing of 500 feet between hydrants.

D.4.5. All hydrant installations are to be restrained from the branch to the hydrant with approved methods, i.e., rods, retainer glands or hydrant anchoring tee, or a combination of these.

D.4.6. All hydrants, prior to their acceptance and placing in service, shall: have concrete collars installed around the barrel, below grade as indicated on the hydrant detail; be painted according to UNIVERSITY color scheme (Red); and have cap chains in place.

D.4.7. All hydrants shall open counterclockwise and shall have two 2-1/2" nozzles and one 4-1/2" nozzle.

D.5. BLOW-OFFS

D.5.1. All blow-offs installed to the road surface are to be 4" ductile or cast iron pipe with the proper reducer.

D.5.2. All components of the blow-off assembly, including the gate valve, reducer, and 90° bend are to be restrained together with approved methods.

D.5.3. All blow-offs shall be separated from the gate valve by one full length of pipe or a minimum distance of 15 feet whenever possible. In certain cases there may be exceptions based on the practicality of the installation and physical constraints such as green belts in driveways and conflicting utilities, therefore this separating distance may be reduced to 10 feet with approval of the UNIVERSITY.

D.6. MAIN PIPE

D.6.1. All new water mains shall be a minimum of 8" in diameter. Water mains that will supply hydrants must be at least 8" in diameter.

D.6.2. Normally the water main shall be installed on the north or west side of the street. Laying line will normally be 5' off the curb line in the roadway. Line assignment for the proposed main shall be coordinated with UNIVERSITY especially in cases where storm drains and catch basins are proposed.

D.6.3. Water mains shall be installed with minimum clearances of sanitary sewers of ten feet (10') horizontally and eighteen inches (18") vertically.

D.6.4. All mechanical joint fittings shall be installed using approved retainer glands instead of the normal mechanical joint follower glands.

D.6.5. Use of thrust blocks for thrust restraint will generally not be permitted. Use of thrust blocks must be approved by the UNIVERSITY on a case by case basis.

D.6.6. Thrust restraint shall be calculated as required for each project.

D.6.7. All water mains shall have a minimum cover of 5' (60").

D.6.8. All ductile iron pipe shall be Class 54 cement lined ductile iron and conform to the latest ANSI/AWWA Specification C151/A21.51 Ductile Iron Pipe
Centrifugally Cast In Metal Molds Or Sand-lined Molds, For Water Or Other Liquids.


D.6.10 Wye branch and cross fittings shall not be used in the University of Massachusetts-Amherst Campus. All branches shall be tees.

D.6.11. All service connections shall be a minimum of 4” CLDIPE. The use of copper piping outside the building is not allowed by the University except by special permission.

E. CONSTRUCTION

E.1. CONSTRUCTION – GENERAL

E.1.1. The requirements herein established regulate the sizes, materials, methods and workmanship to be used in the construction of domestic and fire water services and appurtenances connected or intended to be connected directly or indirectly to any public water mains of the University of Massachusetts-Amherst.

E.1.2. These requirements are minimum requirements for the construction of water service connections but shall also apply to the construction of any water main or portion of a water main.

E.2. TRENCH EXCAVATION

E.2.1. The Massachusetts licensed Contractor shall fully comply with the in regards to the proper notification to be given to Dig Safe central clearinghouse 888-DIGSAFE prior to any excavation, discharging explosives or demolition and to all other actions concerning work near underground utility facilities.

E.2.2. Trenching in streets or highways shall conform to the requirements and specifications of the authorities having jurisdiction, either Town of Amherst or MassDOT.

E.2.3. The Contractor is responsible for the trench excavation and restoration and shall provide a safe and adequate trench for the tapping of the water main.

E.2.4. UNIVERSITY requires a minimum depth of 5 feet of cover over water service pipes and shall be laid on a sand bed with 1-foot of sand fill over the pipe.

E.2.5. Excavations shall be made in such manner and to such width as required to give suitable room for laying the piping or for construction of structures; all sheeting, bracing, and supports shall be furnished and placed and the bottoms of the excavations shall be rendered firm and dry and acceptable in all respects.

E.2.6. Excavating near existing structures: Attention is directed to the fact that there are pipes, manholes, drains, and other utilities and structures in certain locations. The Contractor should exercise caution when excavating because the completeness or accuracy of the given information is not guaranteed.

E.2.7. Trenches in pavement shall have the traveled way surface cut in a straight line by a concrete saw or equivalent method to the full depth of pavement.
E.2.8. If pipe is to be laid in embankments or other recently filled areas, the fill material shall first be placed to a height of at least three feet above the top of the pipe and compacted before excavation.

E.2.9. The trench for pipes 4-inches and larger shall be at least 18-inches beyond the outside of the barrel of the pipe on each side, the top of the barrel of the pipe shall be as shown on the approved drawings and the bottom of the trench shall be at the bottom of the pipe.

E.2.10. Pipe trenches shall be made as narrow as practicable and shall not be widened by scraping or loosening materials from the sides. Every effort shall be made to keep the sides of the trenches firm and undisturbed until backfilling has been completed and consolidated.

E.2.11. In rock excavation there shall be no projecting rock within six (6) inches of the outside of the pipe on the sides, top and bottom. The bottom six (6) inches of trench shall be refilled with sand or gravel and properly tamped before the pipe is laid. All excavated rock shall be disposed of and the trench refilled with suitable sand or gravel.

E.3. WATER SERVICE TAP SCHEDULE

E.3.1. Subsequent to approval of the water service application, the applicant should contact the University of Massachusetts Facilities Planning Division, located at the Physical Plant Building, 360 Campus Center Way, Amherst, Massachusetts to schedule a water main tap.

E.3.2. All water main taps shall be performed by a qualified utility contractor experienced in water main utility work.

E.3.3. All water main taps shall be observed by UNIVERSITY staff.

E.4. INSPECTION

E.4.1. After the tap has been made by the contractor, the Contractor shall contact the UNIVERSITY to request an inspection. DO NOT backfill the service installation until approved by the UNIVERSITY inspector.

E.4.2. In general, inspection personnel will be available between the hours of 8:00 a.m. to 3:30 p.m. on Monday through Friday inclusive.

E.4.3. Water service connections 2-inch and smaller, serving buildings to be abandoned, demolished or relocated shall be physically severed while witnessed by a UNIVERSITY inspector. Proposed abandoned water service connections larger than 2- inches shall be bulkheaded at the street line or other point approved by the UNIVERSITY. Abandonment of water services must be performed by a Massachusetts licensed plumber under UNIVERSITY permit prior to demolition of the building.

E.4.4. 4" & Larger Services

E.4.4.1. The ductile iron pipe used in 4", 6" and 8" services shall be ANSI/AWWA thickness, Class 54, all fittings shall have a pressure rating of 350 lbs. per square inch. All services 4" and larger whether for
domestic or fire use, shall be provided with a gate valve and gate box at the main, as well as the property line.

E.4.4.2. Bends, tees, and other fittings shall be restrained. Ductile iron pipe shall be laid flat on the solid trench bottom and not on blocks. It shall not be poured or cemented solidly into concrete walls or foundations. Mechanical joint pipe or push on joint pipe may be used. All fittings shall be mechanical joint unless otherwise specified.

E.4.4.3. All underground pipe in fire services and all pipe before the meters in domestic services shall be pressure tested in the presence of the inspector at a pressure of 150 lbs. per square inch for domestic services and 200 lbs. per square inch for fire services. Fire service pressure tests may also require witnessing by the local fire authority.

E.4.4.4. Construction of meter pits including by-pass lines shall be checked and approved by the inspector prior to installation of meter. Meter pit piping details for large diameter water services are shown in Section F. Standard meter pit details showing pipe arrangement and meter dimensions should be used for all installations requiring meter pits. Piping arrangement in pits should be reviewed and approved by UNIVERSITY prior to installation. Approved meter by-passes are required on all services. See detail sheet in Section F for piping and valve layout.

E.4.4.5. Individual uses may receive their supply through one or more service pipes. In case of multiple services, each shall be metered and shall not be interconnected without the installation of approved check valves by the owner.

E.4.4.6. Water services shall not be connected to newly installed water main until the new main has been satisfactorily pressure tested and sterilized.

E.5. BACKFILL OPERATIONS

E.5.1. After the subgrade has been prepared and the water service pipes laid, the fill material shall be placed and built up in successive layers. Backfill for the trench excavation within public streets shall be in compliance with the specifications of the Town of Amherst or State of Massachusetts Department of Transportation.

E.5.2. In general, and unless other material is indicated on the drawings, bank gravel shall be suitable material for backfilling trenches. Bank gravel shall conform to the requirements of MassDOT Spec, Section M1.03.0.

E.5.3. 1½” minus processed gravel shall be used under and around water service pipe, and shall conform to the requirements of MassDOT Spec, Section M1.04.01.

E.5.4. As soon as practicable after the pipes have been laid, warning tape shall be placed approximately 2 feet above the pipe. The trenches shall be refilled in 6-inch layers at least to a level 12-inches above the top of the pipe with 1½” minus processed gravel, compacted in accord with the requirements below, each layer to be leveled and thoroughly compacted to the satisfaction of the UNIVERSITY before the next layer is deposited. The whole work of
backfilling shall be done in a manner which will prevent subsequent settlement and injury to the pipe.

E.5.5. Each layer of material shall be compacted by the use of vibratory compaction equipment or rollers or other means to achieve the required compaction. At such points as cannot be reached by mobile mechanical equipment, the materials shall be thoroughly compacted by the use of suitable power-driven tampers.

E.5.6. All backfill material shall be compacted to at least the specified percent maximum density as determined by ASTM D1557 Method C:

<table>
<thead>
<tr>
<th>PERCENT</th>
<th>LOCATION</th>
<th>MAXIMUM DENSITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Below pipe centerline</td>
<td></td>
<td>95</td>
</tr>
<tr>
<td>Above pipe centerline (below unpaved surface)</td>
<td></td>
<td>92</td>
</tr>
<tr>
<td>Above pipe centerline (below paved surface)</td>
<td></td>
<td>95</td>
</tr>
<tr>
<td>Embankments</td>
<td></td>
<td>92</td>
</tr>
<tr>
<td>Below pipe in embankments</td>
<td></td>
<td>95</td>
</tr>
<tr>
<td>Below structures</td>
<td></td>
<td>95</td>
</tr>
</tbody>
</table>

E.5.7. Previously placed or new materials shall be moistened by sprinkling, if required, to ensure proper bond and compaction. No compacting shall be done when the material is too wet, from either rain or too great an application of water, to compact it properly; at such times the work shall be suspended until the previously placed and new materials have dried out sufficiently to permit proper compaction. The water content of the soil shall be adjusted by wetting or drying as may be necessary to obtain proper compaction.

F. STANDARD CONSTRUCTION DETAILS

F.1. Pipe Trench
F.2. Hydrant
F.3. Restrained Joints
F.4. 1"-2" Service tap and corp. stop
F.5. Tapping Sleeve and Valve
F.6. Gate Valve
F.7. End of Main Blow-Off
F.8. Utility Crossing Detail
F.9. Meter Pit
F.10. Backflow Preventer Pit
F.11. Air Valve
F.12. Bypass Valve Pit
F.13. Concrete Thrust Blocks

G. Attached Forms
   G.1. Water Service Design Review Form
   G.2. Permit Application to Install a Backflow Prevention Device
PAVING AS REQUIRED BY AMHERST/MASS DOT

COMPACTED ROAD BASE

COMPACTED SUB BASE

APPROVED BACKFILL MATERIAL COMPACTED PER UMASS REQUIREMENTS

1 1/2" MINUS PROCESSED GRAVEL COMPACTED IN 6" LIFTS TO 2' ABOVE TOP OF PIPE

UTILITY IDENTIFICATION TAPE (NON DETECTABLE)

PIPE DIA.

5' MIN. COVER

1'-6" MIN.

2'-0" MIN.
CONCRETE COLLAR

BREAK-AWAY FLANGE SHOULD BE 2-INCHES± ABOVE FINISHED GRADE

KENNEDY MODEL K81-A OPEN RIGHT
NOZZLE CAP CHAIN
BREAK AWAY FLANGE
GROUND LINE

CONCRETE COLLAR (1'—8"×3'×1')
1"± ASPHALT IMPREGNATED FELT WRAPPING,
OR EQUAL

3/4" CRUSHED STONE DRAIN POCKET
(12 CUBIC FEET MINIMUM)

VALVE LACING TWO 3/4" ø THREADED
RODS, EYEBOLTS & NUTS.

*ALTERNATE HYDRANT LOCATIONS SHALL BE APPROVED BY UMASS
2~*

ASPHALT IMPREGNATED FELT WRAPPING, OR EQUAL

3/4" CRUSHED STONE DRAIN POCKET (12 CUBIC FEET MINIMUM)

CUT 6" D.I. PIPE LENGTH AS REQUIRED

6" D.I. RETAINING GLAND ON ALL M.J. FITTINGS

* ALTERNATE HYDRANT LOCATIONS SHALL BE APPROVED BY UMASS

KENNEDY MODEL KB1-A OPEN RIGHT

NOZZLE CAP CHAIN

BREAK AWAY FLANGE

BREAK-AWAY FLANGE SHOULD BE 2-INCHES± ABOVE FINISHED GRADE

6" GATE VALVE IN GATE BOX

3-WAY TEE (M.J.)

BURY ON HYDRANTS

2'

12" (MIN.)

CONCRETE COLLAR (1'-8"x3'x1')

1"± ASPHALT IMPREGNATED FELT WRAPPING, OR EQUAL

6" D.I. RETAINING GLAND ON ALL M.J. FITTINGS

CONTRACT NO.

UMASS-AMIIES RT MASSACHUSETTS

KENNEDY MODEL KB1-A
OPEN RIGHT

NOZZLE CAP CHAIN

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CONTRACT NO.

UMASS-AMIIES RT MASSACHUSETTS

KENNEDY MODEL KB1-A
OPEN RIGHT

NOZZLE CAP CHAIN

BREAK AWAY FLANGE

BREAK-AWAY FLANGE SHOULD BE 2-INCHES± ABOVE FINISHED GRADE

6" GATE VALVE IN GATE BOX

3-WAY TEE (M.J.)

BURY ON HYDRANTS

2'

12" (MIN.)

CONCRETE COLLAR (1'-8"x3'x1')

1"± ASPHALT IMPREGNATED FELT WRAPPING, OR EQUAL

6" D.I. RETAINING GLAND ON ALL M.J. FITTINGS

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6" D.I. RETAINING GLAND ON ALL M.J. FITTINGS
BREAK AWAY FLANGE SHOULD BE 2-INCHES± ABOVE FINISHED GRADE.

M.J.xM.J. SWIVEL HYDRANT TEE WITH 6" OUTLET & SPLIT SWIVEL ANCHOR GLAND.

BREAK AWAY FLANGE
NOZZLE CAP CHAIN
GROUND LINE
KENNEDY MODEL K81-A OPEN RIGHT
CONCRETE COLLAR (1'–8"x3'x1')
1"± ASPHALT IMPREGNATED FELT WRAPPING, OR EQUAL
3/4" CRUSHED STONE DRAIN POCKET (12 CUBIC FEET MINIMUM)

HYDRANT LACING TWO–3/4"Ø THREADED RODS OR 6" D.I. RETAINING GLAND ON GATE VALVE AND HYDRANT.

*ALTERNATE HYDRANT LOCATIONS SHALL BE APPROVED BY UMASS
3/4" THREADED RODS W/NUTS AND WASHERS 24" TYPICAL LENGTH

12" MIN LENGTH

ALL LACING RODS SHALL RECEIVE TWO-COATS OF RUST INHIBITING PAINT AFTER ASSEMBLY

PUSH ON JOINT PIPE ANSI/AWWA C151/A 21.11-80 D.I. CLASS 54

TEE BOLTS/NUTS

M.J. FITTING ANSI/AWWA C110-77A 21.10

SET SCREWS

M.J. FOLLOWER GLAND WITH BOLTS

M.J. RETAINER GLAND

THRU RESTRAINT—RESTRAINED JOINT METHODS

1. MECHANICAL JOINT RETAINER GLANDS

2. PUSH-ON JOINT RESTRAINT USING MECHANICAL JOINT RETAINER GLANDS AND LACING

3. PUSH-ON JOINT RETAINER GLANDS

USE EYE-BOLTS, NUTS & WASHERS

EBAA IRON INC.
SERIES 800 RETAINER GLAND OR APPROVED EQUAL

M.J. RETAINER GLAND

DETAIL

UMASS PROJECT NO
UNIVERSITY OF MASSACHUSETTS DESIGN & CONSTRUCTION STANDARD DETAILS
TYPICAL RESTRAINED JOINTS
STANDARD UTILITY DETAILS

UMASS-AMHERST

W-5
FINISHED GRADE

Curb

STREET LINE

GATE VALVE

SLEEVE

GATE BOX

GATE BOX

GATE BOX

MECH. JOINT

MECH. JOINT

测评

MECH. JOINT

MECH. JOINT

TAPPING GATE VALVE

TAPPING SLEEVE

WATER MAIN

TEST PLUG

FLANGE

PIPING TO BE RESTRAINED WITH RODDING OR RETAINING GLANDS
REQUIRED 2-NOTCH OPENINGS

COVER

2'-0"-MIN.

Dwyer gate box
Top section
or approved equal

Extension stem and extra
Long gate box bottom
sections when top of
Operating nut on valve
is 4 1/2' or more below
grade

Gate valve direction
to open right per
UMass standards

D.I. water main
(Class 54)

M.J. ends
with retainer
glands.

D.I. water main
(Class 54)
REQUIRED - 2 NOTCH OPENINGS

FINISHED GRADE OR ROAD SURFACE

TOP SECTION

7 1/4"

7/16"

5/16"

6 3/8"

3 3/4"

2' - 1 1/2"

BOTTOM SECTION

5/16"

6"

3 - 4"

REQUIRED - 2 NOTCH OPENINGS

FINISHED GRADE OR ROAD SURFACE

TOP SECTION

7 1/4"

7/16"

5/16"

6 3/8"

3 3/4"

2' - 1 1/2"

BOTTOM SECTION

5/16"

6"

3 - 4"

8" TO BE USED FOR 8" GATE VALVE AND SMALLER AND ALL BUTTERFLY VALVES.

10" TO BE USED FOR 12" GATE VALVES AND LARGER.
APPROXIMATE WEIGHT
90 LBS

UNIVERSITY OF MASSACHUSETTS DESIGN & CONSTRUCTION STANDARD DETAILS
CAST IRON GATE BOX TOP
SECTION DWYER TYPE
STANDARD UTILITY DETAILS

APPROXIMATE WEIGHT
90 LBS
A maximum of three extension rings can be used per gate box.

Extension ring heights: 1/2", 5/8", 3/4" & 1"

Gate box extension (6-inch diameter)

Extension ring

Approved gate box
STAINLESS STEEL AIR VALVES SHALL BE USED IN AREAS SUBJECT TO ATMOSPHERIC EXPOSURE OR IN AREAS SUBJECT TO EXPOSURE FROM INCREASED ROAD SALT RUN OFF. 3\4" SIZE MAY BE REDUCED TO 1\2".

NOTE:
AWWA (MUELLER) THREAD

<table>
<thead>
<tr>
<th>DIA. OF MAIN</th>
<th>MIN. SIZE AIR VALVE</th>
<th>CORPORATION COCK</th>
<th>ANGLE VALVE SIZE</th>
</tr>
</thead>
<tbody>
<tr>
<td>TO 12&quot; (INCL.)</td>
<td>3\4&quot;</td>
<td>3\4&quot; x 1&quot;</td>
<td>1&quot;</td>
</tr>
<tr>
<td>16&quot; &amp; 20&quot;</td>
<td>1&quot;</td>
<td>1&quot; x 1&quot;</td>
<td>1&quot;</td>
</tr>
<tr>
<td>24&quot; &amp; 30&quot;</td>
<td>1 1\4&quot;</td>
<td>1 1\4&quot; x 1 1\2&quot;</td>
<td>1 1\2&quot;</td>
</tr>
<tr>
<td>36&quot; &amp; 42&quot;</td>
<td>1 1\2&quot;</td>
<td>1 1\2&quot; x 2&quot;</td>
<td>2&quot;</td>
</tr>
<tr>
<td>48&quot; &amp; 54&quot;</td>
<td>2&quot;</td>
<td>2&quot; x 2&quot;</td>
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</table>
Finishing grade or road surface

Gate box top section

Cut piece of 4" D.I. pipe

Cut and remove 1/2" or 3/4" section of gasket, so water will drain from standpipe.

3/4" Crushed stone drain pocket with 6 mil poly cover

4" Gate valve (M.J.) in gate box

Cuts pieces of 4" D.I. pipe (min. 18" long)

Cut 4" D.I. pipe length as required

Three-way tee (M.J.) 4" outlet

Two 1/4" φ threaded rods, eye bolts & nuts or retaining glands on all M.J. fittings

Water main

Gate box

Cuts pieces of 4" D.I. pipe (min. 18" long)

15', min.

Crushed stone pocket with poly cover

4" Blow-off assembly

Branch type

Standard utility details
MINIMUM 3/4" CRUSHED STONE DRAIN POCKET WITH 6 MIL POLY COVER

CUT AND REMOVE 1/2" OR 3/4" SECTION OF GASKET SO WATER WILL DRAIN FROM STANDPIPE

TWO 3/4" THREADED RODS WITH EYEBOLTS AND NUTS OR RETAINER GLANDS

12" OR 8"x4" REDUCER (M.J.)

SET SCREWS, TORQUE TO 70 FT. LBS MAX.

DI. PIPE CLASS 54 (10' MIN. LENGTH)

M.J. RETAINER GLAND

MIN. LENGTH OF CUT PIPE

4"-90 DEGREE BEND (M.J.)

3/4" CRUSHED STONE DRAIN POCKET WITH 6 MIL POLY COVER

GATE VALVE (OPEN RIGHT)
M.J. ENDS WITH APPROVED GATE BOX, COMPLETE

NOTE: THIS BLOW-OFF TO BE USED WHENEVER IT IS POSSIBLE THAT MAIN MAY BE EXTENDED IN THE FUTURE
FOR DUCTILE IRON PIPING

2'-7" SQ. OPENING OR 3'-0" DIA.
FOR HEAVY DUTY CASTING

NOTE: SPECIFICATIONS
CONCRETE MINIMUM STRENGTH - 5,000 P.S.I. @ 28 DAYS
STEEL REINFORCEMENT - ASTM-A-79, GRADE 60, 1" MIN.
COVER
DESIGN LOADING - AASHTO HS20-44
EARTH COVER - 0 TO 5 FEET
WATER TABLE - 3 1/2 FEET BELOW FINISH GRADE
CONSTRUCTION JOINT - SEALED WITH 1" DIA. BUTYL RUBBER
OR EQUIVALENT
BILCO TYPE "J" OR EQUAL

J-2 AL 2'-6" x 2'-6"
WEIGHT 75 LBS.

REMOVEABLE PLUG

REMOVABLE KEY WRENCH

FLUSH LIFT HANDLE (NOT SHOWN)

SLAM LOCK

1/4" DIAMOND PLATE COVER

FORCED BRASS HINGES STAINLESS STEEL PINS

11 3/4"±

PRECAST UNIT SLAB TOP

1 1/2" DRAIN COUPLING WELDED UNDER FRAME FOR PIPE CONNECTION TO DRY WELL OR DISPOSAL SYSTEM

HATCHWAY ADJUSTMENT TO GRADE CAN BE MADE WITH BRICKWORK MAX. 30"

1/4" CHANNEL FRAME (EXTRUDED ALUMINUM)

CONTINUOUS ANCHOR FLANGE LIFTING MECHANISM HOUSING

STEPS

WALL

UNIVERSITY OF MASSACHUSETTS DESIGN & CONSTRUCTION STANDARD DETAILS
ALUMINUM HATCHWAY FOR PRECAST PITS
STANDARD UTILITY DETAILS

UMASS-AMHERST MASSACHUSETTS
R-1696 MANHOLE FRAME, SOLID LID

LIGHT DUTY
TOTAL WEIGHT: 270 POUNDS
FURNISHED WITH MACHINED HORIZONTAL BEARING

LAH 246
TOTAL WEIGHT
258 POUNDS

UNIVERSITY OF MASSACHUSETTS DESIGN & CONSTRUCTION STANDARD DETAILS
LIGHT DUTY MANHOLE FRAME & COVER FOR METER PIT
STANDARD UTILITY DETAILS

UMASS-AMHERST MASSACHUSETTS
.20 in.²/lin. ft. additional reinforcement, 1/2" dia. bar (or equiv.) top & bottom.

.12 in.²/lin. ft. #4 wire x 4" each way each layer

Riser Pipe

5"

4'-0" dia.

2'-0" or 3'-0"

2'-2" for 26"

1'-8" for 24"

24"

University of Massachusetts Design & Construction Standard Details
PreCast Flat Slab
Meter Pit Top
Standard Utility Details

UMASS-AMHERST MASSACHUSETTS
NOTE:
THRUST BLOCKS ARE NOT AN ACCEPTABLE
METHOD OF THRUST RESTRAINT IN MOST
SITUATIONS, AND WILL ONLY BE PERMITTED IN
SPECIAL CASES.

22.5' OR 45' BEND
ANCHORS SHALL BE BASED ON
MAXIMUM ALLOWABLE WATER
PRESSURE OF 150 PSI

TRENCH SHALL BE
EXCAVATED TO
FIRM MATERIAL
IMMEDIATELY PRIOR
TO PLACING
CONCRETE

3-WAY TEE
SHOULD ONLY BE USED WHEN SOIL
CONDITIONS ARE STABLE.

90° BEND
NOTE:
THE BACKFILL AROUND WATER MAIN MUST BE THOROUGHLY COMPACTED WITH SUITABLE MATERIAL.

TEMPORARY SUPPORT INSTALLATION MUST BE APPROVED BY A MASSACHUSETTS REGISTERED PROFESSIONAL ENGINEER.
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TRENCH SHALL BE EXCAVATED TO FIRM MATERIAL IMMEDIATELY PRIOR TO POURING CONCRETE.