# Backflow/Cross Connection Resources

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# *ARTICLE VIII. CROSS-CONNECTION, BACKFLOW AND BACK-SIPHONAGE CONTROL*[1]

## Sec. 23-301. Intent, purpose and control.

(a) It is the intent of this article to recognize that there are varying degrees of hazard to potable water within the water main and water supply systems. It is also the intent to apply the principle that the degree of protection should be commensurate with the degree of hazard.

(b) The purpose of this article is to:

(1) Protect the public potable water supply of the city against actual or potential cross-connections, backflow, and back-siphonage by isolating within the premises of private property contamination or pollution that has occurred or may occur because of some undiscovered or unauthorized cross-connection on the premises of private property;

(2) Eliminate cross-connections, backflow and back-siphonage of any other source of water or process water used for any purpose whatsoever which may jeopardize the safety of the public potable water supply of the city;

(3) Establish a cross-connection, backflow and back-siphonage control program;

(4) Comply with 15A NCAC 18C (the North Carolina Drinking Water Act).

(c) Cross-connection, backflow and back-siphonage control requires cooperation between the city and the consumer. The responsibilities and duties of each shall be as set forth in this article and other applicable regulations.

(Ord. No. 25-19, 11-4-2019)

## Sec. 23-302. Definitions.

The following words, terms and phrases, when used in this article, shall have the meanings ascribed to them in this section, except where the context clearly indicates a different meaning:

*Air gap separation* means the unobstructed, vertical distance through the free atmosphere between the lowest opening from any pipe or faucet supplying water to a tank, plumbing fixture or other device and the flood level rim of the receptacle. An approved air gap separation shall be at least double the diameter of the supply pipe measured vertically above the top rim of the vessel. In no case shall the gap be less than one (1) inch.

*Approved,* as used in reference to a water supply system or backflow prevention device or method, means one (1) that has been approved the executive director of public works/city engineer or his designee.

[1]Editor's note(s)—Ord. No. 25-19, adopted Nov. 4, 2019, repealed the former Art. VIII, §§ 23-301—23-306, and enacted a new Art. VIII as set out herein. The former Art. VIII pertained to similar subject matter and derived from Code 1959, §§ 21-56—21-61; Ord. No. 10-87, adopted March 2, 1987; and Ord. No. 32-02, adopted Aug. 5, 2002.

*Backflow prevention device* means any effective device, method or construction used to prevent backflow into a potable water system. The type of device used shall be based on the degree of hazard, either existing or potential.

*Back-pressure backflow* means backflow caused by a pump, elevated tank, boiler or other means that could create pressure within the system greater than the supply pressure.

*Back-siphonage backflow* means a reversal of the normal direction of flow in the pipeline due to a negative pressure (vacuum) being created in the supply line with the backflow source subject to an atmospheric pressure.

*Check valve, approved* means a check valve that is drip tight in the normal direction of flow when the inlet pressure is one (1) pound per square inch (PSI) and the outlet pressure is zero. The check valve shall permit no leakage in a direction reverse to the normal flow.

*Consumer* means any person, property owner or entity using or receiving water from the city water system. When used in conjunction with the term "consumer" the pronoun "his" is considered gender neutral.

*Contamination* means an impairment of the quality of the water by sewage or industrial fluids or waste to a degree which creates an actual hazard to the public health through poisoning or through the spread of disease, or pathogenic organisms.

*Cross-connection* means:

(1) Any physical connection between a potable water supply system and any other piping system, sewer fixture, container, or device, whereby water or other liquids, mixtures, or substances may flow into or enter the potable water supply system;

(2) Any potable water supply outlet that is submerged or is designed or intended to be submerged in non-potable water or in any source of contamination; or

(3) An air gap that does not meet the requirements of less than twice the diameter of the potable water pipe as defined above ("air gap separation").

*Cross-connection, point of* means the specific point of location in a public or a consumer's potable water system, where a cross-connection exists.

*Director* means the executive director of public works/city engineer.

*Double check detector assembly* means a double check valve assembly which includes a detector check valve. Used primarily in fire flow applications.

*Double check valve assembly* means an assembly composed of two (2) single, independently acting, approved check valves, including tightly closing shut-off valves located at each end of the assembly and suitable connections for testing the water-tightness of each check valve.

*Hazard, degree of* shall be derived from the evaluation of a health, system, plumbing or pollution hazard and are classified as follows:

(1) High-health hazard: A cross-connection or potential cross-connection involving any substance that could, if introduced into the potable water supply, cause illness or death, spread disease, or have a high probability of causing such effects;

(2) Low-health hazard: A cross-connection or potential cross-connection involving any substance that generally would not be a health hazard but would constitute a nuisance or be aesthetically objectionable if introduced into the potable water supply.

*Hazard, health* means an actual or potential threat of contamination or pollution of a physical or toxic nature to the public potable water system or the consumer's potable water system to such a degree or intensity that there would be a danger to health.

*Hazard, plumbing* means a plumbing-type cross-connection in a consumer's potable water system that has not been properly protected by a vacuum breaker, air-gap separation, or other device. Unprotected plumbing-type cross-connections are considered to be a health hazard. They include, but are not limited to, cross-connections to toilets, sinks, lavatories, wash trays, domestic washing machines and lawn-sprinkling systems. Plumbing-type cross-connections can be located in any types of structures including homes, apartment houses, hotels and commercial and industrial establishments.

*Hazard, pollution* means an actual or potential threat to the physical properties of the water system or the potability of the public or the consumer's potable water system but which would not constitute a health or system hazard. The maximum degree or intensity of pollution to which the potable water system could be degraded under this definition would cause a nuisance, be objectionable or could cause minor damage to the system or its appurtenances.

*Hazard, system* means an actual or potential threat of severe danger to the physical properties of the public or the consumer's potable water system or of a pollution or contamination which would have a protracted effect on the quality of the potable water in the system.

*Industrial fluids* means any fluid or solution which may be chemically, biologically or otherwise contaminated or polluted in a form or concentration such as would constitute a health, system, pollution or plumbing hazard, if introduced into an approved water supply. This may include, but is not limited to, polluted or contaminated used waters, all types of process waters and used waters originating from the public potable water system which may deteriorate in sanitary quality, chemicals in fluid form, plating acids and alkalies, circulated cooling waters connected to an open cooling tower and/or cooling waters that are chemically or biologically treated or stabilized with toxic substances, contaminated natural waters such as from wells, springs, streams, rivers, irrigation canals or systems, etc.; oils, gases, glycerine, paraffines, caustic and acid solutions and other liquid and gaseous fluids used in industrial or other processes or for firefighting purposes.

*Industrial piping system, consumer's* means any system used by the consumer for transmission of or to confine or store any fluid, solid or gaseous substance other than an approved water supply. Such a system would include all pipes, conduits, tanks, receptacles, fixtures, equipment and appurtenances used to produce, convey or store substances which are or may be polluted or contaminated.

*Letter, approval to install* means the approval which is issued by the executive director of public works/city engineer (the "director"), or his designee, to install a backflow assembly which has been reviewed and determined to meet city standards and specifications. When a submittal to the City of Statesville Technical Review Committee (TRC) includes the installation and/or alteration of a backflow assembly, approval of the submittal by TRC shall constitute approval to install or alter the backflow assembly.

*Non-potable water supply* means waters not approved for drinking or other household uses.

*Potable water supply* means water approved for drinking and other household uses.

*Pollution* means an impairment of the quality of the water to a degree which does not create an actual hazard to the public health but which does adversely and unreasonably affect such waters for domestic use.

*Reduced pressure principle backflow prevention device* means a device containing within its structure a minimum of two (2) independently acting, approved check valves, together with an automatically operating pressure differential relief valve located between the two (2) check valves. The first check valve reduces the supply pressure a predetermined amount so that during normal flow and at cessation of normal flow, the pressure between the checks shall be less than the supply pressure. In case of leakage of either check valve, the differential relief valve, by discharging to atmosphere, shall operate to maintain the pressure between the checks less than the supply pressure. The unit shall include tightly closing shut-off valves located at each end of the device and each device shall be fitted with properly located test cocks.

*Service connection* means a piped connection from a water main for the purpose of conveying water to a building or onto a premises for human use. A service connection begins: (a) at the point downstream of a service meter; or (b) for unmetered service, at the point of connection to the potable water supply system.

*Service connection, terminal end* means the point where the city loses jurisdiction and sanitary control over the water at its point of delivery to the consumer's water.

*Water supply, auxiliary* means any water supply on or available to the premises other than the city's approved public potable water supply. These auxiliary waters may include water from another purveyor's public potable water supply or any natural source such as well, spring, river, stream, etc., or used waters or industrial fluids. They may be polluted or contaminated or they may be objectionable and constitute an unacceptable water source over which the city does not have sanitary control.

*Water supply, product* means any chemical or substance added to a public water system in conjunction with a treatment technique or material used in construction of a public water system. The term includes any material used in the manufacture of public water system components, appurtenances, any pipe, storage tank, or valve that comes in contact with water intended for use in a public water system.

*Water system, consumer's* includes any water system located on the consumer's premises whether supplied by a public potable water system or an auxiliary water supply. The system or systems may be either a potable water system or an industrial piping system.

*Water system, consumer's potable* means that portion of the privately-owned potable water system lying between the service connection and the point of use. This system will include all pipes, conduits, tanks, receptacles, fixtures, equipment and appurtenances used to produce, convey, store or use potable water.

*Water system, public potable* means any publicly or privately-owned water system operated as a public utility under a valid health permit to supply water for domestic purposes. This system will include all sources, facilities and appurtenances between the source and the service connection such as valves, pumps, pipes, conduits, tanks, receptacles, fixtures, equipment and appurtenances used to produce, convey, treat or store a potable water [supply] for public consumption or use.

*Water, used* means any water supplied by a water purveyor from a public potable water system to a consumer's water system after it has passed through the service connection and is no longer under the control of the water purveyor.

(Ord. No. 25-19, 11-4-2019)

Cross reference(s)—Definitions and rules of construction, generally, § 1-2.

## Sec. 23-302a. Abbreviations.

AG, air gap.

DCA, double check valve assembly.

DCDA, double check detector assembly.

RPA, reduced pressure assembly.

RPDA, Reduced pressure detector assembly.

(Ord. No. 25-19, 11-4-2019)

## Sec. 23-303. Responsibilities of city, consumer; enforcement.

(a) The city is primarily responsible for the prevention of contamination and pollution of the public water system. Such responsibility begins at the point of origin of the public water distribution system and ends at the service connection to the consumer's water system. In addition, the city shall exercise reasonable vigilance to ensure that the consumer has taken the proper steps to protect the public potable water system. When it is determined that a backflow prevention assembly is required for the protection of the public system of the city, the city shall require the consumer, at the consumer's expense, to install an approved backflow prevention assembly at each service connection.

(b) The consumer has the prime responsibility of preventing contaminants and pollutants from entering his potable water system or the public water system at his service connection. The consumer, at his own expense, shall install, operate and maintain an approved backflow prevention assembly at the service connection, as directed by the city. Tests, maintenance and repairs of backflow prevention assemblies shall be made by the consumer at his own expense. A certification of testing and/or maintenance shall be submitted annually to the backflow/cross-connection coordinator.

(c) Enforcement of this article shall be administered by the executive director of public works/city engineer utilizing the staff of the water/sewer maintenance and inspections division.

(Ord. No. 25-19, 11-4-2019)

## Sec. 23-304. Regulations.

(a) No person shall construct, maintain, or operate a physical arrangement whereby the public water system has a cross connection without the use of proper backflow protection.

(1) No person shall introduce any water into the distribution system of the public water supply through any means other than from an approved source of supply or make any physical connection between an approved supply and unapproved supply unless authorized in an emergency by the North Carolina Department of Health or its representative.

(2) No service connection will be provided to any plumbing system that does not comply with the current version of the North Carolina State Building Code and all applicable local plumbing codes. The consumer, at his own expense, shall install, operate and maintain an approved backflow prevention assembly at the service connection.

(3) Design of backflow prevention assemblies for service connections shall require city review and approval prior to making the connection. Installation of a testable backflow prevention assembly or air gap shall be required if the connection is non-potable or unapproved. Engineering plans and specifications shall be submitted in accordance with section 23-306 of this article.

(b) The following requirements shall apply to backflow prevention not addressed by the plumbing code:

(1) Testable backflow prevention assemblies shall meet American Society of Sanitary Engineering (ASSE) standards and carry an ASSE seal, be on the University of Southern California approval list for testable backflow prevention assemblies, or be on the North Carolina State Plumbing Code approval list for approved testable backflow prevention assemblies.

(2) No person shall fill special use tanks or tankers containing pesticides, fertilizers, other toxic chemicals, or their residues except at a location equipped with an over-the-rim free discharge of water or a reduced pressure backflow preventer properly installed on the public water supply.

(c) Hydrants used for construction or other temporary, non-emergency use connections shall have an approved air gap or an installed reduced pressure principle backflow prevention assembly.

(d) Elevated or ground tank or a ground reservoir used only for non-potable purposes shall implement the following precautions:

(1) If the reservoir or tank is filled from a supply other than a public water supply and the public water supply is used as a supplemental supply, the pipeline from the public water supply shall be installed with an air gap;

(e) If the reservoir or tank is filled entirely by water from a public water supply and:

(1) A covered ground reservoir or covered elevated tank is used, an approved reduced pressure back-flow preventer or an approved double check valve assembly shall be used; or

(2) An uncovered ground reservoir or uncovered elevated tank is used, an air gap shall be required.

(f) *Installation.* The following installation requirements shall be met, where applicable:

(1) Backflow prevention assemblies shall be installed in accordance with manufacturers' recommendations and specifications and shall not be modified in the field;

(2) Backflow prevention assemblies shall be located and installed in such a manner as to function as designed, be accessible for testing, maintenance, and inspection, and include all necessary test cocks and drains for testing. Valves shall be installed in the line at both ends of the back-flow prevention device to provide for replacement and maintenance;

(3) Bypass lines parallel to a backflow prevention assembly shall have an approved backflow prevention assembly installed that is equal to that on the main line;

(4) Reduced pressure principle assemblies shall be installed above ground. A reduced pressure principle assembly may be installed as protection for either a high-health or low health hazard;

(5) Double check valve assemblies may be installed either vertically or horizontally per manufacture specifications. Only low-health hazards will be allowed to have a double check valve assembly;

(6) Installation of all cross-connection, backflow and back-siphonage control assemblies shall be licensed mechanical, utility, or plumbing contractors certified to perform such work;

(7) Existing situations, requiring the installation of backflow prevention assemblies shall be considered on a case-by-case basis, but in no case shall the completion date for compliance with the provisions exceed two (2) years from the effective date of this article.

(8) This section sets out the usual device type requirements and methods of correction for backflow protection at the following service connection types (list is not all inclusive; system types not listed will be assessed on a case-by-case basis):

a. Auxiliary water systems:

1. Potentially contaminated source, AG or RPA.

2. Potable but not acceptable as supplemental source for the public water system, DCA.

3. Approved source supplemental to the public potable water system, none.

b. Beverage bottling plants:

1. Subject to backpressure, AG or RPA.

2. Not subject to backpressure, DCA.

c. Breweries, AG or RPA.

d. Buildings—Hotels, apartment houses, public and private buildings or other structures:

    1. Major health hazard exists, AG or RPA.

    2. Minor health hazard exists, DCA.

e. Canneries, packing houses, and reduction plants, AG or RPA.

f. Chemical plants—Manufacturing, processing, compounding or treatment, AG or RPA.

g. Chemically contaminated water systems, AG or RPA.

h. Civil works:

    1. Health hazard exists, AG or RPA.

    2. No health hazard, DCA.

i. Dairies and cold storage plants:

    1. Health hazard exists, AG or RPA.

    2. No health hazard, DCA.

j. Film laboratory, AG or RPA.

k. Fire systems:

    1. Health hazard exists, AG or RPDA.

    2. No health hazard, DCDA.

l. Hospitals, medical buildings, sanitariums, morgues, mortuaries, autopsy facilities, AG or RPA.

m. Nursing and convalescent homes and clinics, RPA.

n. Irrigation systems:

    1. Premises having irrigation systems separate from their domestic systems such as parks, playgrounds, cemeteries, golf courses, schools, estates, ranches, etc., AG or RPA.

    2. Premises with non-sewer meters (i.e., connected to domestic service), RPA.

o. Laundries and dye works, AG or RPA.

p. Metal manufacturing, cleaning, processing and fabricating plants:

    1. Health hazard exists, AG or RPA.

    2. No health hazard, DCA.

q. Paper and paper products plants, AG or RPA.

r. Plating plants, AG or RPA.

s. Power plants, AG or RPA.

t. Radioactive materials or substances—Plants or facilities handling, AG or RPA.

u. Restricted, classified or other closed facilities, AG or RPA.

v. Sand and gravel plants, AG or RPA.

w. Schools and colleges, AG or RPA.

x. Sewage and storm drain facilities, AG or RPA.

(g) *Testing, maintenance, and inspection.*

(1) All cross-connection, backflow and back-siphonage control equipment shall meet the testing requirements of the Foundation for Cross-Connection Control and Hydraulic Research, the American Water Works Association (AWWA), and the state building code, and the United States Environmental Protection Agency (EPA). The director will periodically issue a list of approved backflow control devices.

(2) All cross-connection, backflow and back-siphonage control assemblies, both existing and new, and all parts thereof, shall be maintained in a safe condition and in good working order. The consumer shall be responsible for the maintenance of all backflow prevention assemblies.

(3) All backflow prevention assemblies located at the service connection shall be tested at least once a year, or more often in those instances where inspections indicate a need, by the Department of Public Works. All rubber goods shall be replaced every five (5) years, or more often if needed. All required maintenance and repairs shall be made at the expense of the consumer.

(4) The director, or his authorized representative, shall have the right to enter any building, structure or premises to perform any duty imposed upon him by this article where cross-connection, backflow and back-siphonage is deemed possible.

(5) Nothing herein shall relieve the consumer of the responsibility for conducting, or causing to be conducted, periodic surveys of water use practices on his premises to determine whether there are actual or potential cross-connections in the consumer's water system through which contaminants or pollutants could flow back into the public water system.

(6) On request, the consumer shall furnish to the city any pertinent information regarding the water supply system on such property where cross-connection, backflow, and back-siphonage is deemed possible.

(h) *Reporting.*

(1) In the event of contamination or pollution of a potable water system, the consumer shall immediately notify the city in order that appropriate measures may be taken to overcome the contamination or pollution.

(i) *Remedial actions, fines and penalties.*

(1) Water service may be discontinued after reasonable notice to the consumer if a violation of this article exists on the premises, and such other precautionary measures may be taken as are deemed necessary to eliminate any danger to the potable water system. Water service shall not be restored until the danger has been eliminated in compliance with the provisions of this article.

(Ord. No. 25-19, 11-4-2019)

## Sec. 23-305. Cross-connection with source other than city.

(a) Where any connection to a city water line is made, and the property owner also maintains a well or other source of water, it shall be unlawful for the plumbing serving any building upon such property to be so connected that it be served with water from any source other than the city connection, and it shall also be unlawful to have plumbing cross-connected or so installed that water from the city water system or the private water system may, in any way, become intermingled. Such cross-connections may result in removal of the meter supplying such connections, as well as other penalties, civil or criminal, provided by law. Any and all permits required by the Iredell County plumbing inspector shall be obtained prior to any connections being made.

(b) Upon discovery of a cross-connection upon any property being furnished water through the city water system, the owners of this property shall be notified that the cross-connection must be discontinued immediately. If the correction is not made, the meter shall be removed and shall not be reinstalled until such time a cross-connection is discontinued and payment of a five hundred-dollar ($500.00) charge is received.

(Ord. No. 25-19, 11-4-2019)

## Sec. 23-306 Submittals.

(a) New backflow assemblies, or changes to existing backflow assemblies, shall be reviewed for conformance with city standards and specifications. All persons, including units of local government, intending to install or alter, or expand a water system which subsequently requires the installation or alteration of a backflow assembly shall submit plans and specifications of the proposed backflow installation or alteration for review and approval by the backflow/cross connection coordinator.

(b) All plans, specifications, reports, or other data intended for review shall be submitted in accordance with City of Statesville Technical Review Committee (TRC) requirements.

(c) No construction of or alteration to a backflow assembly shall be initiated until the director or his designee determines the installation or alteration complies with this article and issues the approval to instruct letter. With respect to installation or alteration of a backflow assembly, approval by the TRC shall constitute approval by the director.

(Ord. No. 25-19, 11-4-2019)

## Sec. 23-307. Fees.

Application (submittal) fees for review and approval of proposed construction will be set by [the] city council (including fees for resubmittals).

(Ord. No. 25-19, 11-4-2019)

# Backflow Preventer Freeze Protection

Winter is a rough season on outdoor backflow preventers. Through the years, the design of these assemblies changed to make them more susceptible to freezing conditions. Initially they were made of heavy materials with thick walls that were durable, but this caused them to be large, unwieldy and hard to handle because of their weight. Because of demand, manufacturers modified the design and materials used so backflow preventers are now smaller and lighter. Cast iron has been replaced by brass or plastic. Wall thicknesses that were once thick are now very thin. Even the heaviest and thickest of materials is no match for the overwhelming pressures of freezing water, but unprotected backflow preventers manufactured today are damaged when the temperature barely dips below freezing. Some damage can be repaired by replacing parts, but most often the expansion caused by freezing distorts the assemblies in a way that no reasonable repairs can return the unit to a satisfactory condition.

Most residential installations of backflow preventers are required for lawn irrigation, pools or water wells and are typically installed outside. To assure total protection from contamination on commercial customers, most Water Provider's ordinances, policies and plans require backflow preventers to be installed outside near the meter. So, how do you protect these from freezing?

Units which serve lawn irrigation and swimming pools are used only in late spring, summer and early fall and can be taken out of service when not in use. These are sometimes purged with air to remove water and left in place for the winter. This is usually accomplished by opening the unit to drain water out or by forcing compressed air in. These methods are not without risk because both can leave water in the unit or high velocities of compressed air can damage parts. Other options are to remove the unit and store it in a warm location. Recently, some manufacturers have designed backflow devices to facilitate this method. Some are designed with a module that contains the check valves and relief valve that can easily be removed and stored for the winter.

When removal is not an option, protection must be provided. Enclosures are available that will offer protection from freezing as well as vandalism. These are generally made from aluminum or fiberglass, are insulated, secured to a concrete slab and provide a drainage port within the enclosure wall. Careful consideration needs to be given to the drainage port during landscaping to avoid covering the port. A standard is available that assures enclosures have been lab tested and will protect against specific conditions. That standard is ASSE 1060. Some Water Suppliers have this standard written into their ordinance, policy or plan while others simply state that the backflow preventer must be protected from freezing without giving any details. Since the enclosure alone is generally not adequate freeze protection in the coldest winter conditions, a heat source is likely necessary. ASSE Standard 1060, 2006 edition, Section 1.2.3 states:

"Heat sources provided by the enclosure manufacturers shall be constructed and installed so that water or other liquids do not enter and or accumulate in or on the live wired sections or electrical components or wiring. Electric heat sources and electrical components which are associated with the heat source and supplied by the manufacturer shall be listed by an independent product safety listing and certification agency for use in damp locations."

To assure that this heat source meets these conditions, has been lab tested, is safe and can provide a specific level of performance, look for labeling on the heat sources that states that the heat source is certified by an independent product safety listing and certification agency for use in damp or wet locations.

The bags shown on the left are a good extra resource (besides the insulated enclosure) to help prevent the backflow preventer from freezing.

# City of Statesville – Water/Sewer Maintenance Division
## Certified* Backflow Tester Company List

**This list is not an endorsement of any specific company. For the convenience of our customers, we are providing this list of certified companies.*

| Company | Telephone # | Company | Telephone # | Company | Telephone # |
|---|---|---|---|---|---|
| 1Galliher Backflow Testing | 980-434-4096 | ***C, D, E, F*** | | ***M, N, O, P*** | |
| 24/7 Backflow Service | 704-431-5645 | Cain's Able Plumbing | 704-934-0015 | Matrix Fire Protection | 704-677-4009 |
| $45 Backflow Test | 828-851-7583 | Carolina Fire Control, Inc. | 704-784-4218 | Matt Cartner | 704-880-4373 |
| 50.00 Dollar Backflow Test | 980-241-5201 | Carolina Fire Sprinkler Inspection Inc. | 704-488-2860 | Neal's Irrigation & Landscape | 704-634-6316 |
| ***A, B*** | | Central Carolina Sprinkler Co, Inc. | 704-732-3343 | North 2 South Backflows | 704-769-2460 |
| AAA Backflow LLC | 980-222-4311 | Century Fire Protection LLC | 828-328-3802 | Performance Fire Protection | 704-663-1664 |
| AAA Backflow Testing/Irrigation Doctor | 336-345-1553 | City Fire and Safety | 704-865-4327 | Precision Plumbing | 704-849-7810 |
| Action Service Company LLC | 704-872-4747 | Clearwater Outdoor Services | 704-388-6070 | ***Q, R, S, T*** | |
| Adams Services LLC | 803-547-9796 | DS Graham Construction and Plumbing | 704-202-0042 | SA Comunale | 704-396-7272 |
| All Fire Services LLC | 704-838-1011 | Eagle Fire, Inc. | 704-527-9111 | Sarratt Utilities | 828-447-5184 |
| All Star Backflows LLC | 704-528-0996 | Elco Inc. | 336-468-8002 | South End Plumbing | 704-545-6159 |
| All Star Plumbing Inc. | 704-622-7376 | Elite Fire Control, Inc. | 704-633-1644 | Sunland Fire Protection, Inc. | 336-886-7027 |
| American Fire and Equipment | 828-855-4969 | Elliott Contracting Services | 980-521-1113 | Top Notch Plumbing and Drain Cleaning | 704-360-3022 |
| AMLDCO | 704-622-3092 | Ferguson & Associates | 704-892-3476 | Tucker's Plumbing Service | 704-507-9913 |
| Armor Fire Services, LLC | 704-313-1683 | Fire Control Systems | 800-237-9701 | ***U, V, W X, Y, Z*** | |
| Armstrong Lawn Inc. | 704-872-3950 | ***J, K, L*** | | Unifour Fire & Safety | 828-328-6363 |
| Backflow-Best Value Testing Services | 704-913-3831 | Johnson Irrigation, LLC | 336-909-0656 | Unlimited Fire inspection, LLC | 919-894-2292 |
| Backflow Specialist of The Triad | 336-769-9770 | JP's Plumbing | 704 872-5486 | VSC Fire & Security Inc. | 704-805-9700 |
| Brian Lackey | 828-312-0722 | Lackey Plumbing, Inc. | 828-632-2621 | Wayne Automatic Fire Sprinklers Inc. | 704-782-3032 |
| Burkhard Backflow Testing Services | 704-397-6556 | Lake Norman Fire & Equipment | 704-664-4614 | Wiginton Fire Systems | 704-774-4517 |
| BVS Systems Inc. | 704-896-9989 | LCG of NC Inc. | 704-238-3424 | | |
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Revised 2/28/2022

# CITY OF STATESVILLE
## BACKFLOW PREVENTER TEST AND MAINTENANCE REPORT

Customer: _____
Address of Property: _____
Mailing Address: _____
Meter Number _____ Meter Size: _____
Type of Service: Dom [ ] Irrigation [ ] F. L. [ ] Combination (Dom & F. L.) [ ]
Type of Assembly: RP [ ] RPDA [ ] DC [ ] DCDA [ ] PVB [ ] Size of Assembly: _____
Manufacturer: _____ Model: _____ Serial No.: _____
Location of Assembly: _____ B/G [ ] A/G[ ]
Containment (at meter): [ ] or Isolation (at branch): [ ] Line Pressure: _____ PSI (#1 or #2 Testcock)

| Check Valve #1 | Relief Valve | Check Valve #2 | Pressure Vacuum Breaker |
|---|---|---|---|
| [ ] Leaked<br>[ ] Closed Tight<br><br>Diff. pressure across check Valve _____ psid | Opened at _____psid<br><br>Did Not open [ ]<br><br>Buffer _____ psi | [ ] Leaked<br>[ ] Closed Tight<br><br>Diff. pressure across check Valve _____ psid | Air inlet opened at _____ psid<br>Didn't open [ ]<br>Check Valve Leaked [ ]<br>Held at _____psid |
| [ ] Cleaned Only<br><br>Replaced:<br>Rubber Kit [ ]<br>CV Assembly [ ]<br>- Or –<br>Disc [ ]<br>O-Rings [ ]<br>Seat [ ]<br>Spring [ ]<br>Stem/Guide [ ]<br>Retained [ ]<br>Lock Nuts [ ]<br>Other [ ] | [ ] Cleaned Only<br><br>Replaced:<br>Rubber Kit [ ]<br>RV Assembly [ ]<br>- Or –<br>Disc [ ]<br>O-Rings [ ]<br>Seat [ ]<br>Spring [ ]<br>Guide [ ]<br>Diaphragm [ ]<br>Other [ ] | [ ] Cleaned Only<br><br>Replaced:<br>Rubber Kit [ ]<br>CV Assembly [ ]<br>- Or –<br>Disc [ ]<br>O-Rings [ ]<br>Seat [ ]<br>Spring [ ]<br>Stem/Guide [ ]<br>Retainer [ ]<br>Lock Nuts [ ]<br>Other [ ] | [ ] Cleaned Only<br><br>Replaced:<br>Rubber Kit [ ]<br>CV Assembly [ ]<br>Disc, Air [ ]<br>Disc, CV [ ]<br>Spring, Air [ ]<br>Spring, CV [ ]<br>Retainer [ ]<br>Guide [ ]<br>O-Ring [ ]<br>Other [ ] |
| [ ] Closed Tight<br><br>Diff. pressure across check Valve _____ psid | Opened at _____ psid<br><br>Buffer _____psi | [ ] Closed tight<br><br>Diff. pressure across check Valve _____ psid | Air Inlet _____ psid<br><br>Check Valve _____psid |
| SHUT-OFF #1:<br>Leaked [ ] Held Tight [ ] | | SHUT-OFF #2<br>Leaked [ ] Held Tight [ ] | |

Assembly: PASSED [ ] or FAILED [ ] *NOTE*: All repairs must be completed within ten (10) days.
Remarks: _____

KIT: Diff. [ ] Dupl. [ ] Elec. [ ] Manufacturer: _____
Model: _____ Serial No.: _____

I hereby certify that this data is accurate and reflects the proper operation and maintenance of the assembly.

Time of Test _____ Date _____

Tester _____ Certification No. _____

Mail to: Water/Sewer Maintenance Division
City of Statesville
P. O. Box 1111
Statesville, NC 28687
704 832-3847 or 704 902-2664 FAX 704-872-7009

CITY of Statesville PUBLIC WORKS

# Backflow Assembly Inventory Form

Name _____

Address _____

Contact Person _____ Phone _____

Date _____

New Installation _____

Renewal of Existing Assembly _____

Type of Process/Service: (Fire Line, Irrigation, Domestic, Boilers, etc.)

_____

_____

Type of Assembly: DCA _____ RPA _____ Size _____
Make _____ Model _____
Serial # _____

Physical Location of Assembly (Pump Room, Pit, etc.) _____

_____

_____

By Pass I Assembly Size _____ Make _____ Serial # _____
Model # _____
Meter Serial # _____ Reading _____

Installed By: _____
Telephone No. _____
Address _____
Type of Business _____
Contractor's License # _____
Installation Date _____
Inspected By: _____

Assemblies should be tested after installation and before they are put into service.

After completing the Backflow Assembly Installation Inventory Form and performing the new test on each assembly these forms must be submitted to the Water/Sewer Maintenance Division at City of Statesville, P. O. Box 1111, Statesville, NC 28687-1111.

Any questions should be directed to Regina Hoke at 704-832-3847

Part of the Statesville City Code regarding Backflow Assemblies is printed below for your reference.

ARTICLE VIII. CROSS-CONNECTION, BACKFLOW AND BACK-SIPHONAGE CONTROL

Sec. 23-301. Intent, purpose and control.

(a) It is the intent of this article to recognize that there are varying degrees of hazard to potable water within the water main and water supply systems. It is also the intent to apply the principle that the degree of protection should be commensurate with the degree of hazard.

(b) The purpose of this article is to:

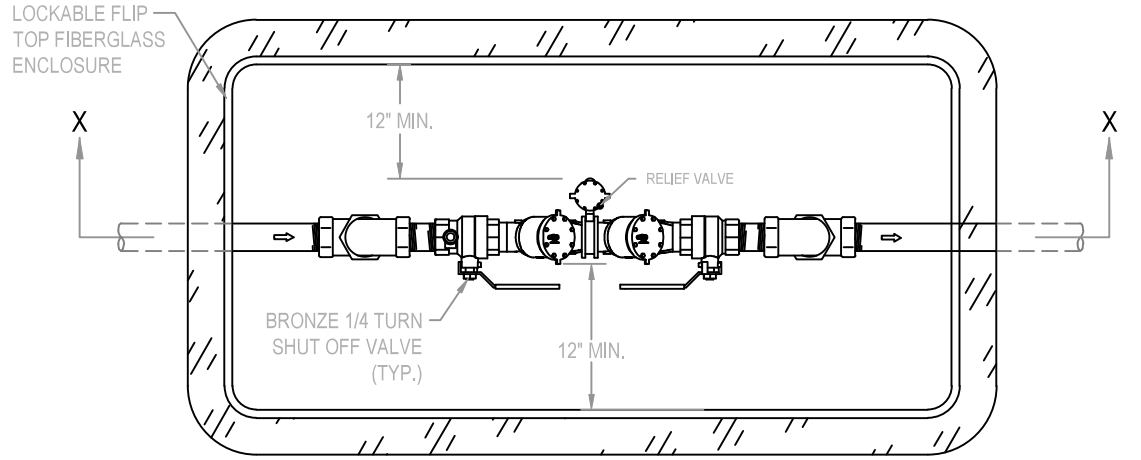
(1) Protect the public potable water supply of the city against actual or potential cross-connections, backflow, and back-siphonage by isolating within the premises of private property contamination or pollution that has occurred or may occur because of some undiscovered or unauthorized cross-connection on the premises of private property;

(2) Eliminate cross-connections, backflow and back-siphonage of any other source of water or process water used for any purpose whatsoever which may jeopardize the safety of the public potable water supply of the city;

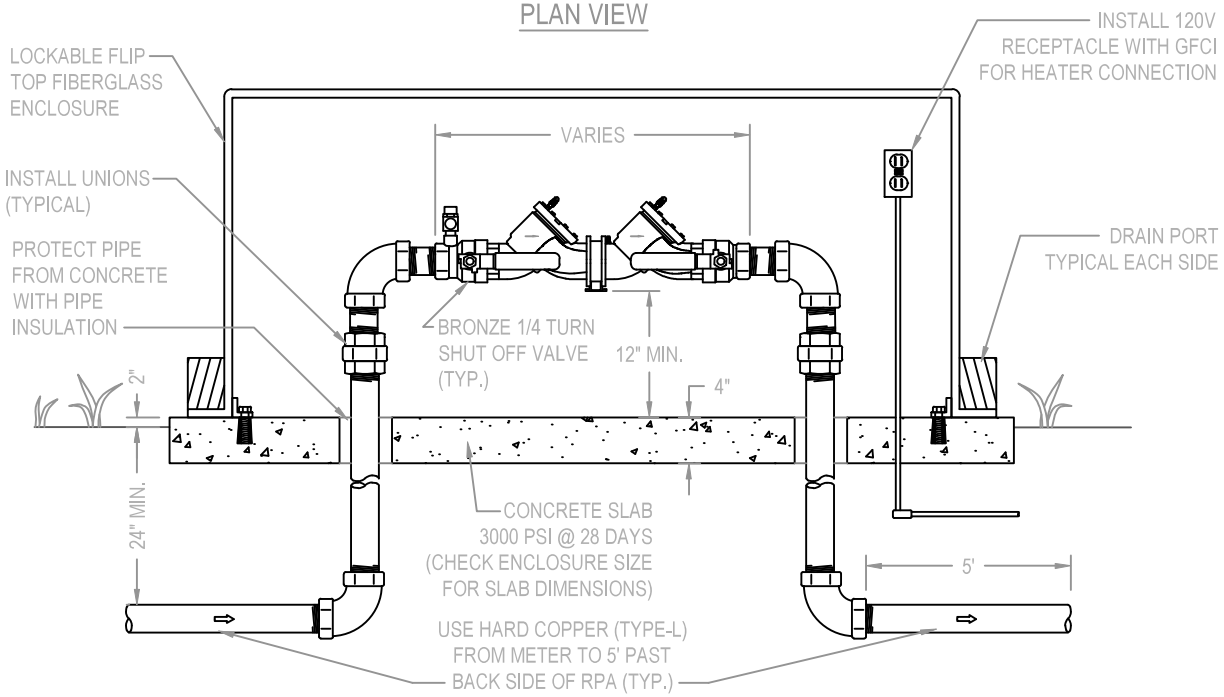
(3) Establish a cross-connection, backflow and back-siphonage control program.

(c) Cross-connection, backflow and back-siphonage control require cooperation between the city and the consumer. The responsibilities and duties of each shall be as set forth in this article and other applicable regulations.

(Code 1959, § 21-56)




PLAN VIEW




SECTION X-X

NOTE:

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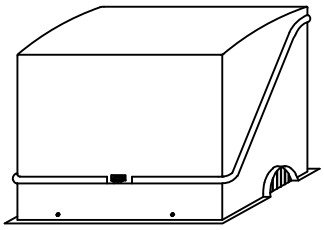
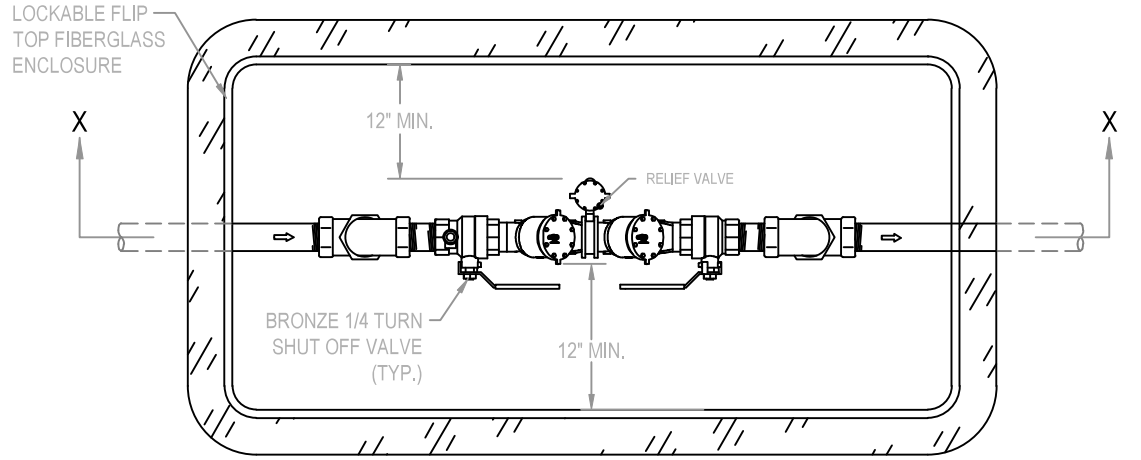
2. ENSURE ASSEMBLY WILL FIT WITHIN AN APPROVED ENCLOSURE. CHECK DIMENSIONS BEFORE ORDERING ENCLOSURE.
3. SLOPE CONCRETE/ OR POLY PAD TO DRAIN PORTS.
4. ASSEMBLY SHALL BE PLACED ON CUSTOMER'S PROPERTY BEHIND THE METER BOX AND INSTALLED WITH A 120V GFCI RECEPTACLE.
5. ASSEMBLY SHALL BE ACCESSIBLE BY CITY INSPECTORS AND CERTIFIED TESTERS.
6. NO GALVANIZED OR PLASTIC PIPE OR FITTINGS.
7. TYPE-L HARD COPPER MUST BE INSTALLED FROM THE METER TO THE COPPER RISERS AND 5' FROM THE BACK SIDE, AND THE RISERS MUST HAVE UNIONS INSTALLED ON EACH SIDE.



ISOMETRIC VIEW OF TYPICAL ENCLOSURE

| | | | | |
|---|---|---|---|---|
| CITY OF STATESVILLE<br>PUBLIC WORKS DEPARTMENT | WATER LINE<br>**3/4" to 1-1/2" Reduced Pressure Assembly (High Hazard Applications)** | DETAIL #<br>W-10D | REVISED<br>NOV 2019 |
| | | SCALE:<br>N.T.S. | SHEET #<br>1 OF 1 |

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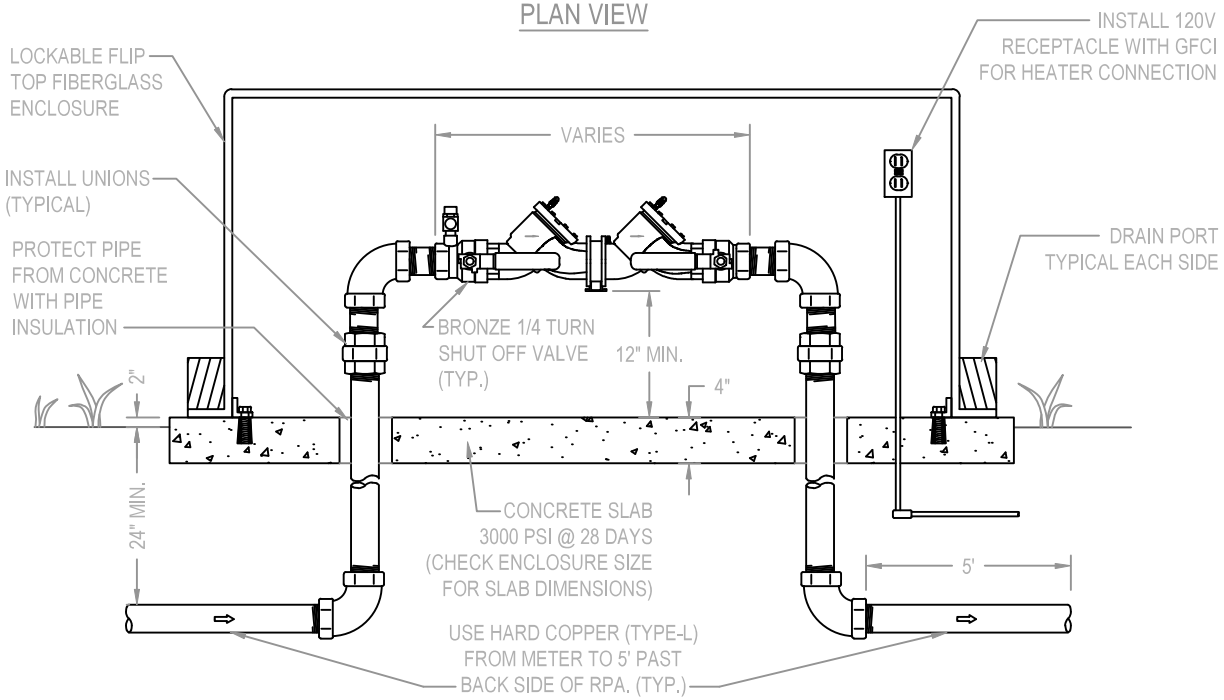


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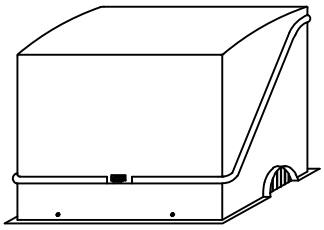
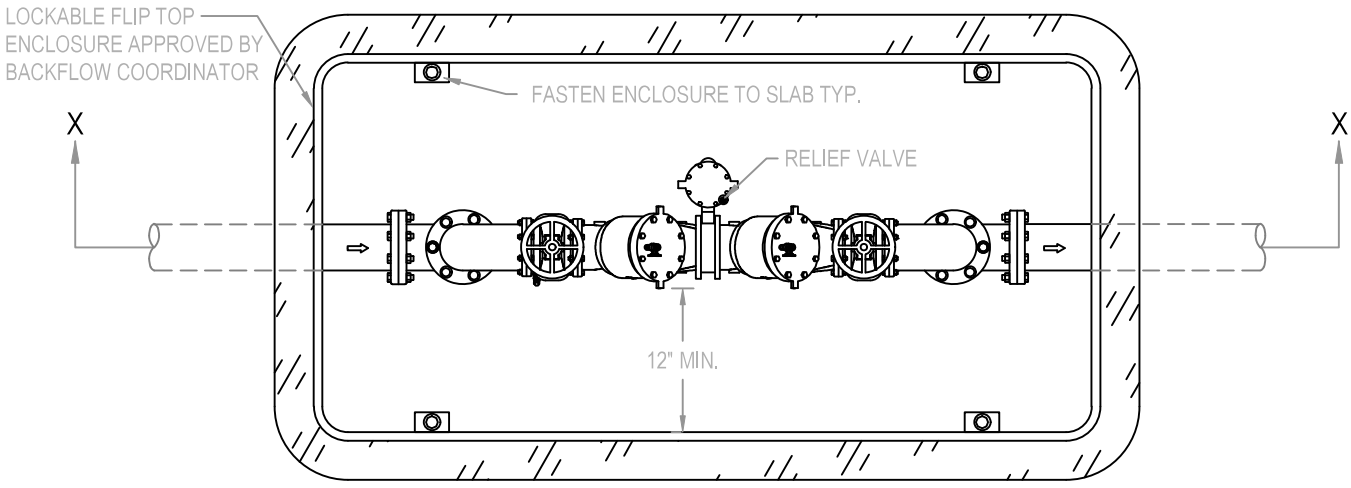
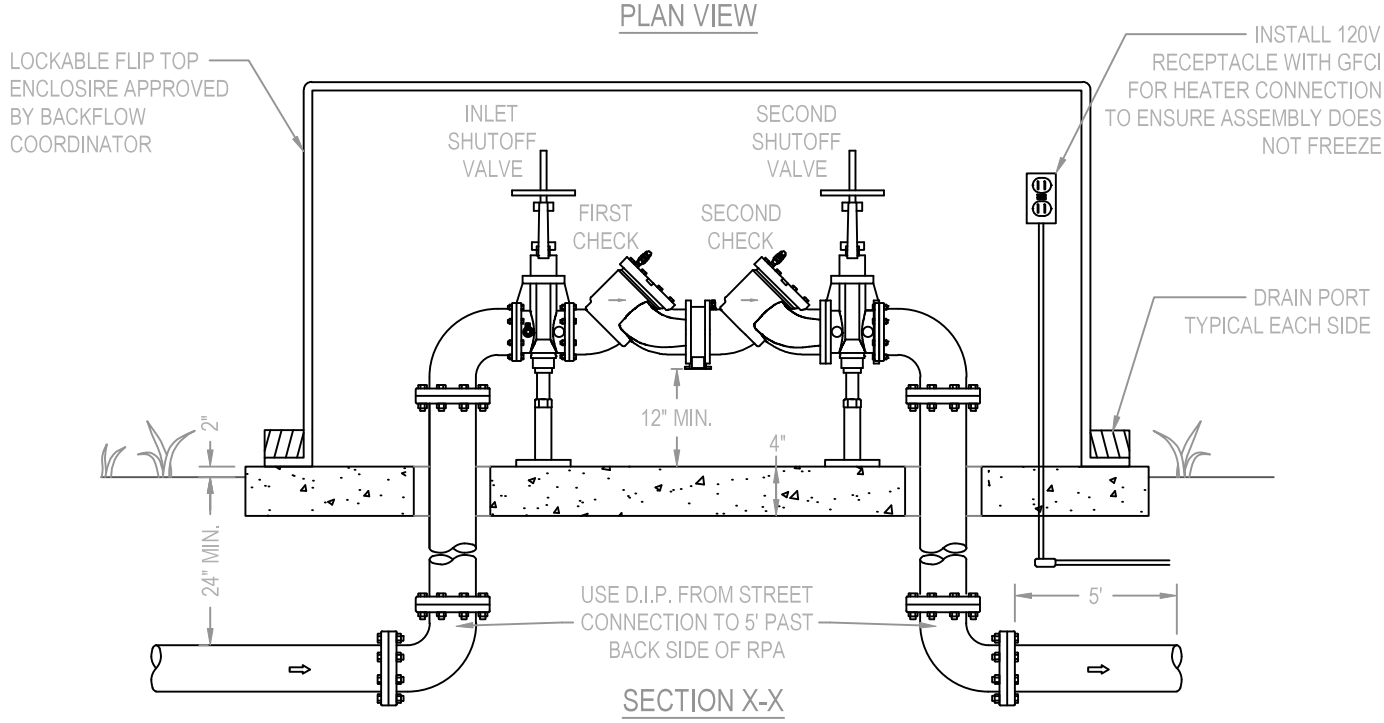


ISOMETRIC VIEW OF TYPICAL ENCLOSURE

| | | | | |
|---|---|---|---|---|
| | **CITY OF STATESVILLE**<br>PUBLIC WORKS DEPARTMENT | WATER LINE<br>**2" Reduced Pressure Assembly (High Hazard Applications)** | **DETAIL #**<br>W-10D | **REVISED**<br>NOV 2019 |
| | | | **SCALE:**<br>N.T.S. | **SHEET #**<br>1 OF 1 |




PLAN VIEW

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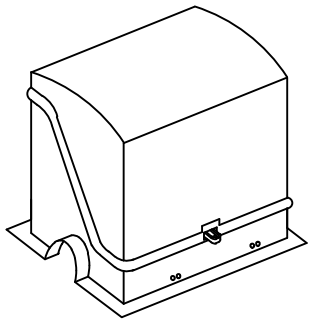
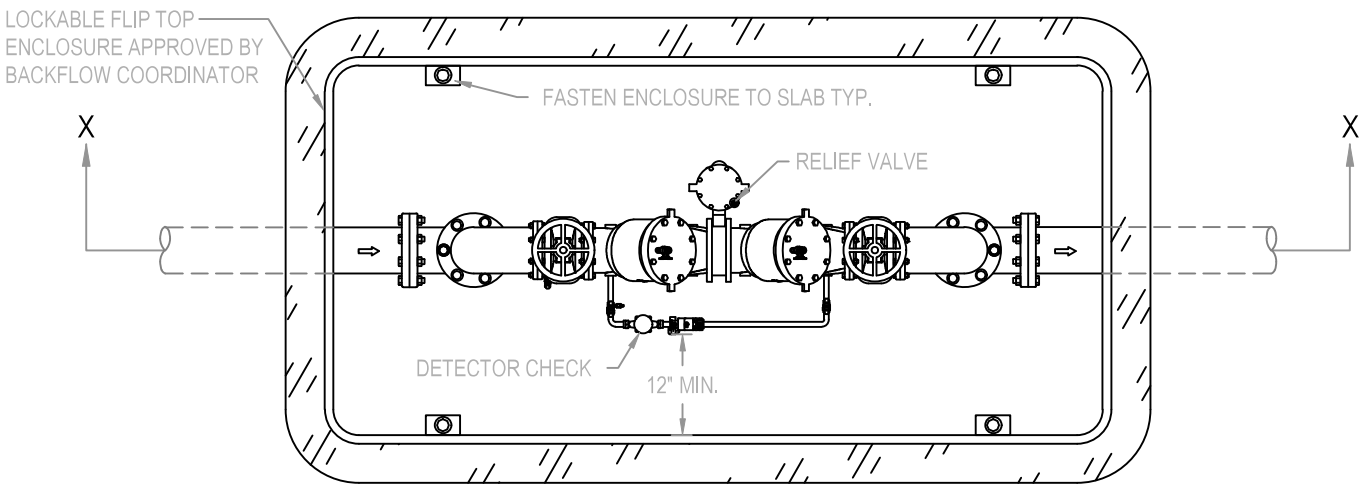
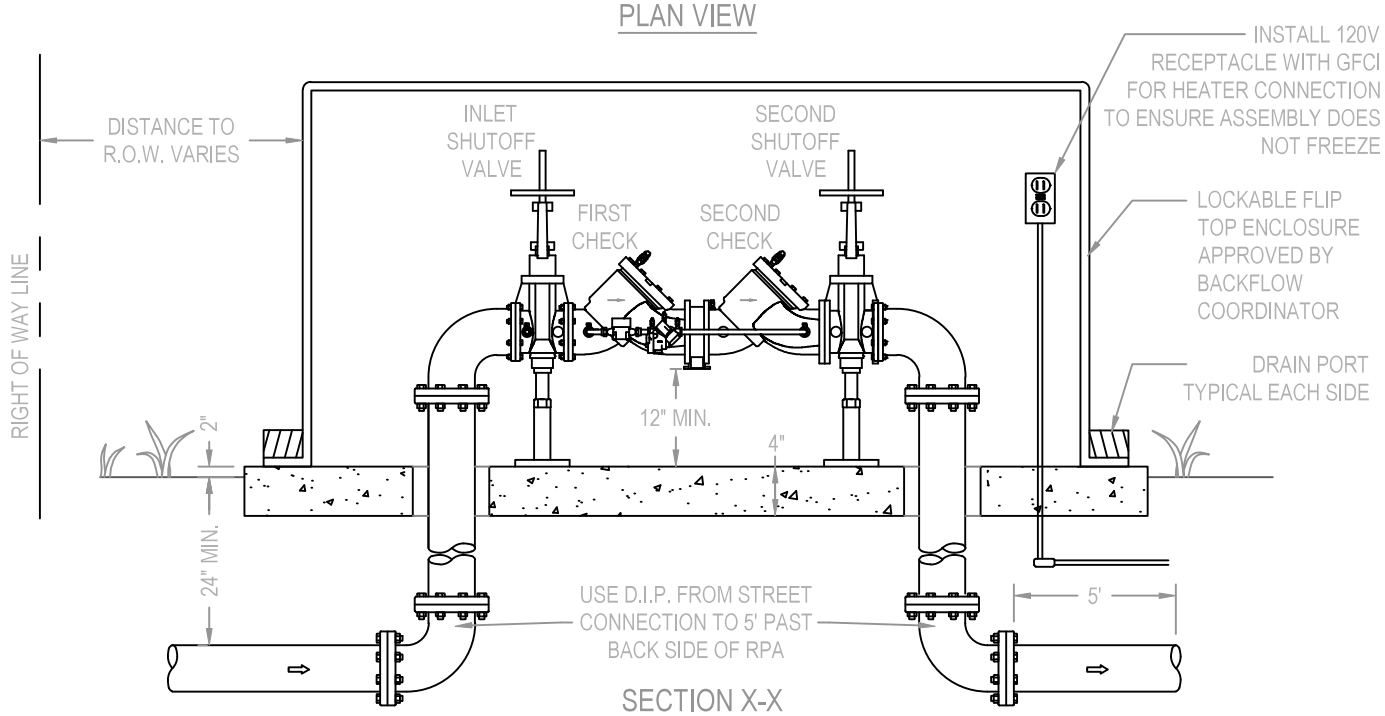


ISOMETRIC VIEW OF TYPICAL ENCLOSURE

| | | | | |
|---|---|---|---|---|
| CITY OF STATESVILLE<br>PUBLIC WORKS DEPARTMENT | DOMESTIC WATER LINE<br>**3" - 10" Reduced Pressure Assembly (High Hazard Applications)** | DETAIL # W-10D | REVISED NOV 2019 |
| | | SCALE: N.T.S. | SHEET # 1 OF 1 |




PLAN VIEW

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6. NO GALVANIZED OR PLASTIC PIPE OR FITTINGS.
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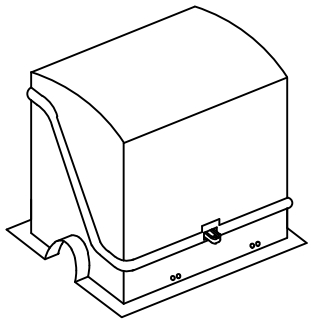
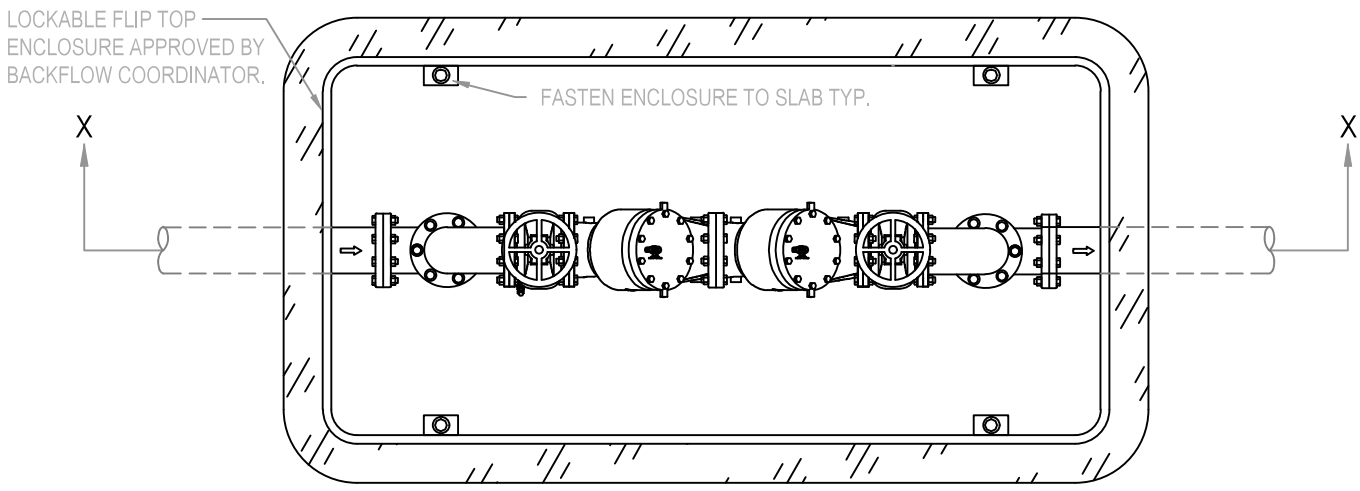
8. TAMPER SWITCHES WITH ALARM SHALL BE SUPPLIED ON THE DEVICE WHEN USED FOR FIRE LINE APPLICATIONS AS PER NC FIRE CODE.
9. DETECTOR METER MUST BE NICOR READY AND READ IN CUBIC FEET.

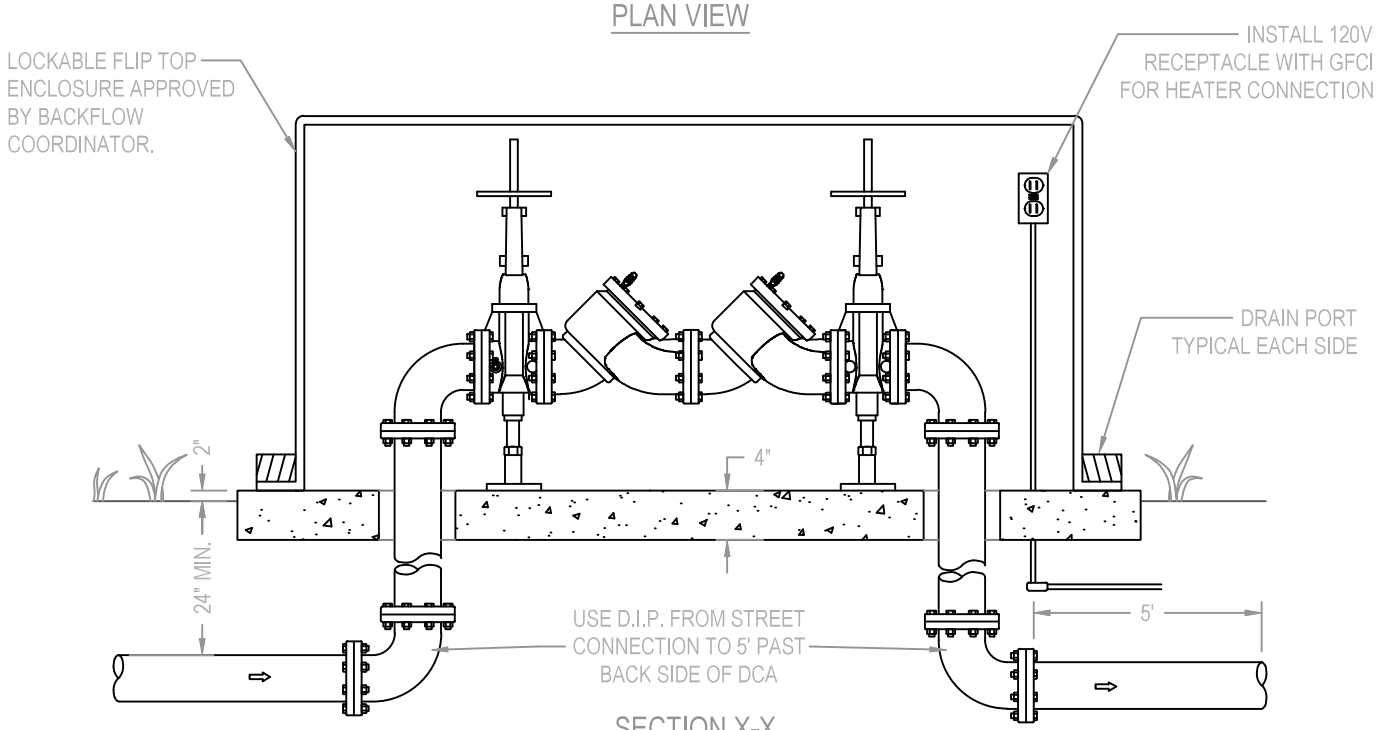


ISOMETRIC VIEW OF TYPICAL ENCLOSURE

| | | | |
|---|---|---|---|
| CITY OF STATESVILLE<br>PUBLIC WORKS DEPARTMENT | FIRE LINE<br>**3" - 10" Reduced Pressure Detector Assembly (High Hazard Applications)** | DETAIL # W-10F | REVISED SEP 2019 |
| | | SCALE: N.T.S. | SHEET # 1 OF 1 |




PLAN VIEW




SECTION X-X

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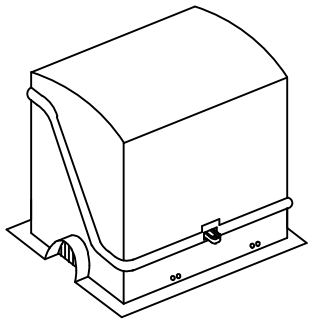
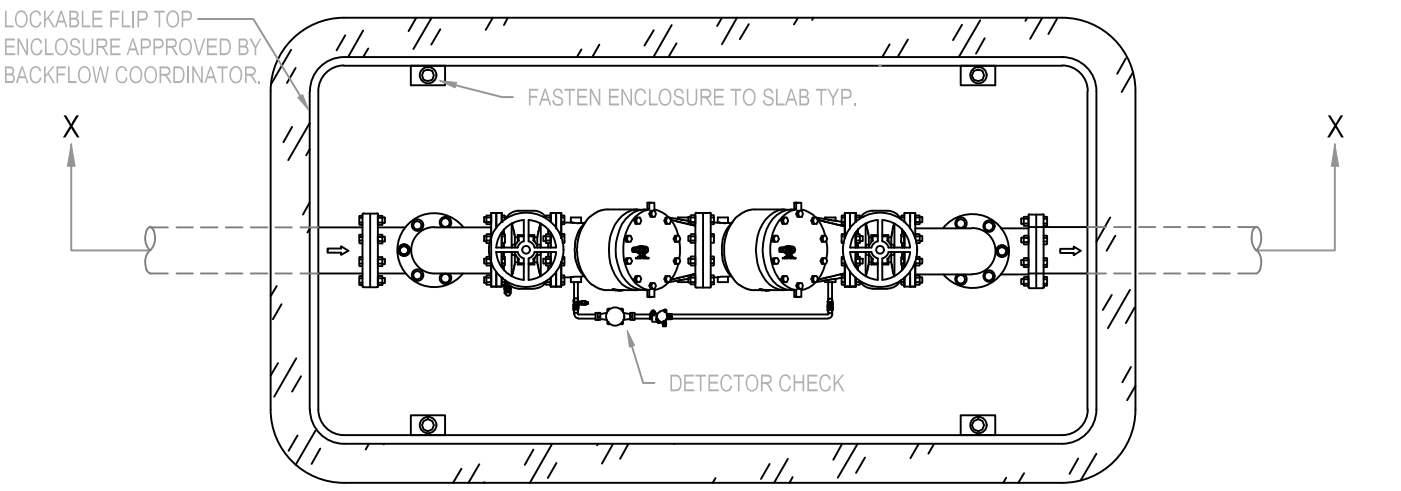
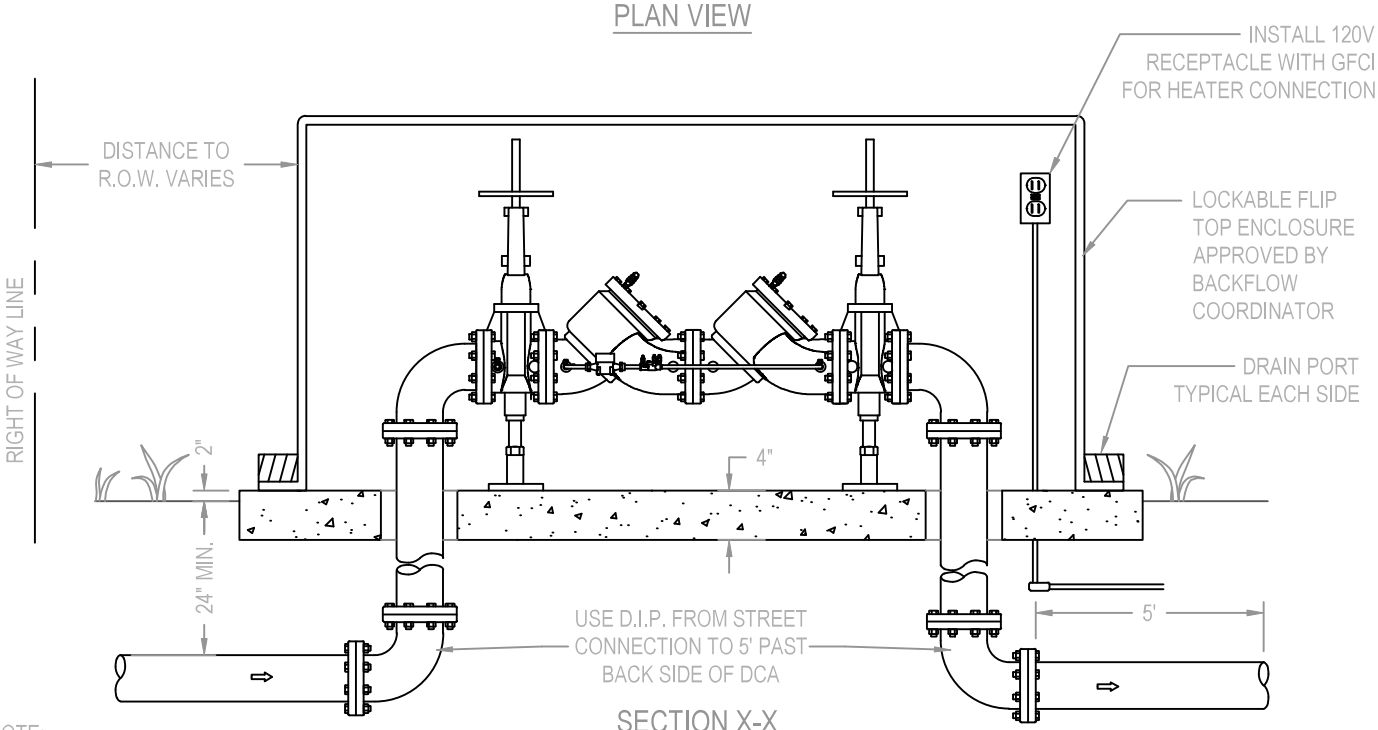


ISOMETRIC VIEW OF TYPICAL ENCLOSURE

| | | | | |
|---|---|---|---|---|
| | **CITY OF STATESVILLE**<br>PUBLIC WORKS DEPARTMENT | DOMESTIC WATER LINE<br>**3" - 10" DC Assembly (Above Ground)** | **DETAIL #**<br>W-11D | **REVISED**<br>NOV 2019 |
| | | | **SCALE:**<br>N.T.S. | **SHEET #**<br>1 OF 1 |




PLAN VIEW

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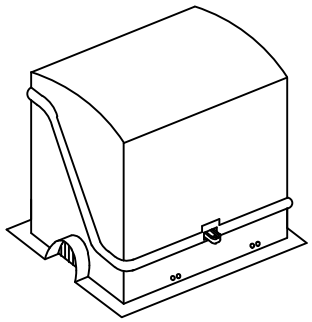
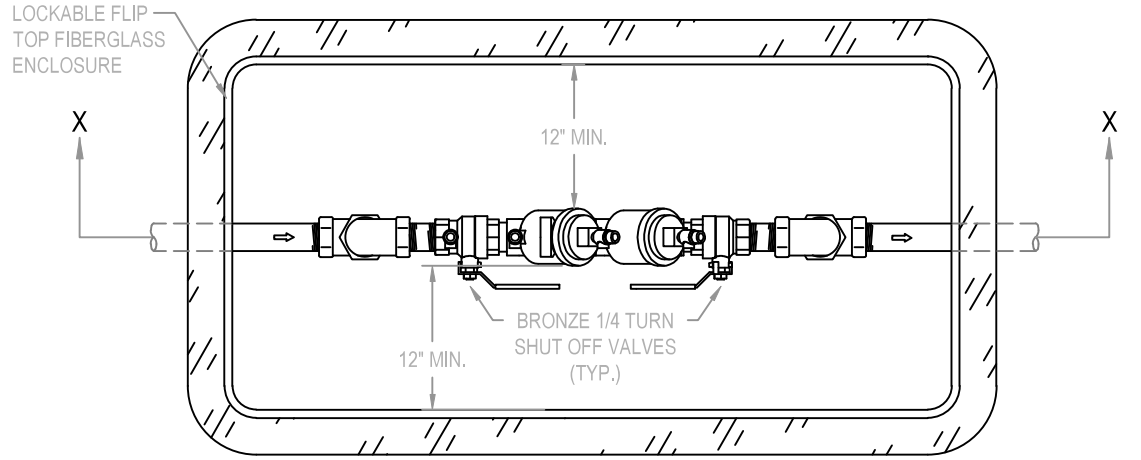


ISOMETRIC VIEW OF TYPICAL ENCLOSURE

| | | | |
|---|---|---|---|
| **CITY OF STATESVILLE**<br>**PUBLIC WORKS DEPARTMENT** | **FIRE LINE**<br>**3" - 10" DC Detector Assembly (Above Ground)** | **DETAIL #**<br>W-11F | **REVISED**<br>NOV 2019 |
| | | **SCALE:**<br>N.T.S. | **SHEET #**<br>1 OF 1 |

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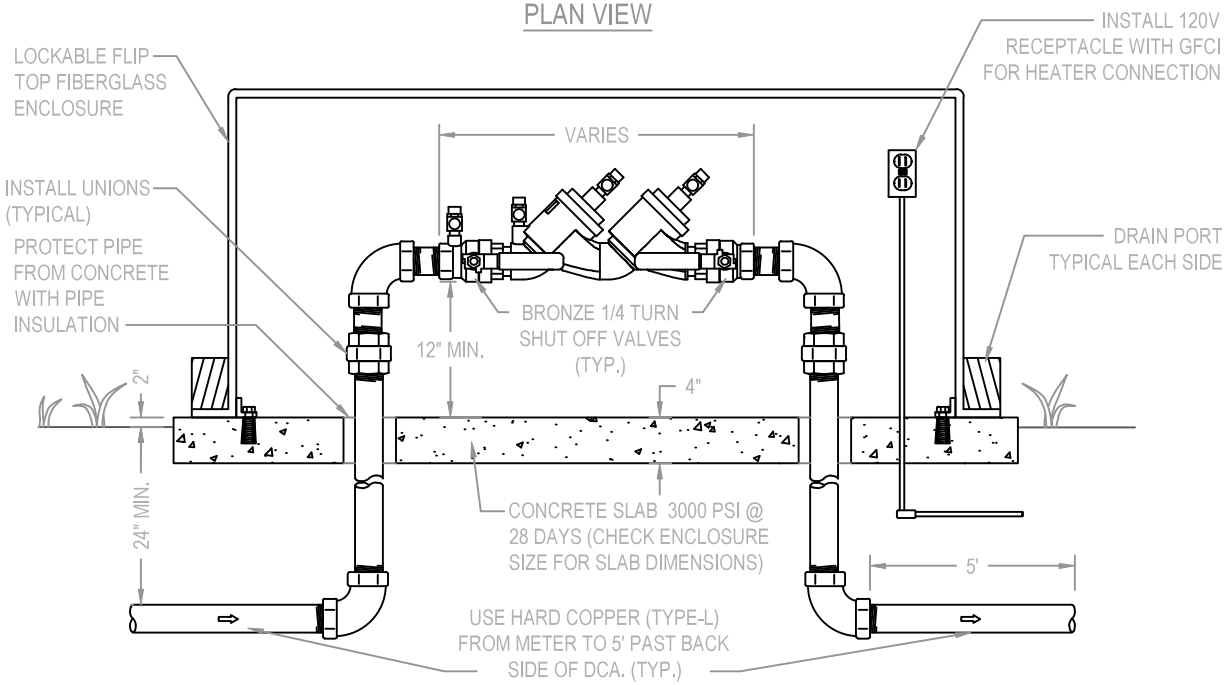


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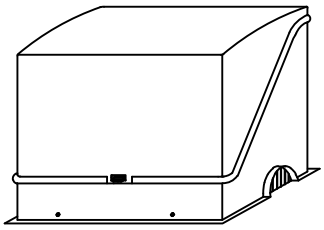
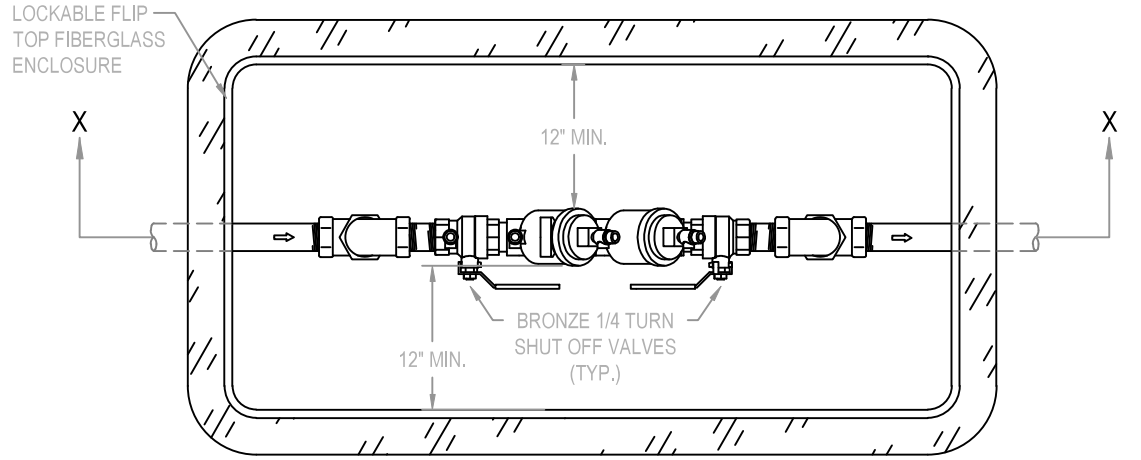


ISOMETRIC VIEW OF TYPICAL ENCLOSURE

| | | | | |
|---|---|---|---|---|
| CITY OF STATESVILLE<br>PUBLIC WORKS DEPARTMENT | WATER LINE<br>3/4" to 1-1/2" DC Assembly (Above Ground) | DETAIL #<br>W-12A | REVISED<br>NOV 2019 |
| | | SCALE:<br>N.T.S. | SHEET #<br>1 OF 1 |

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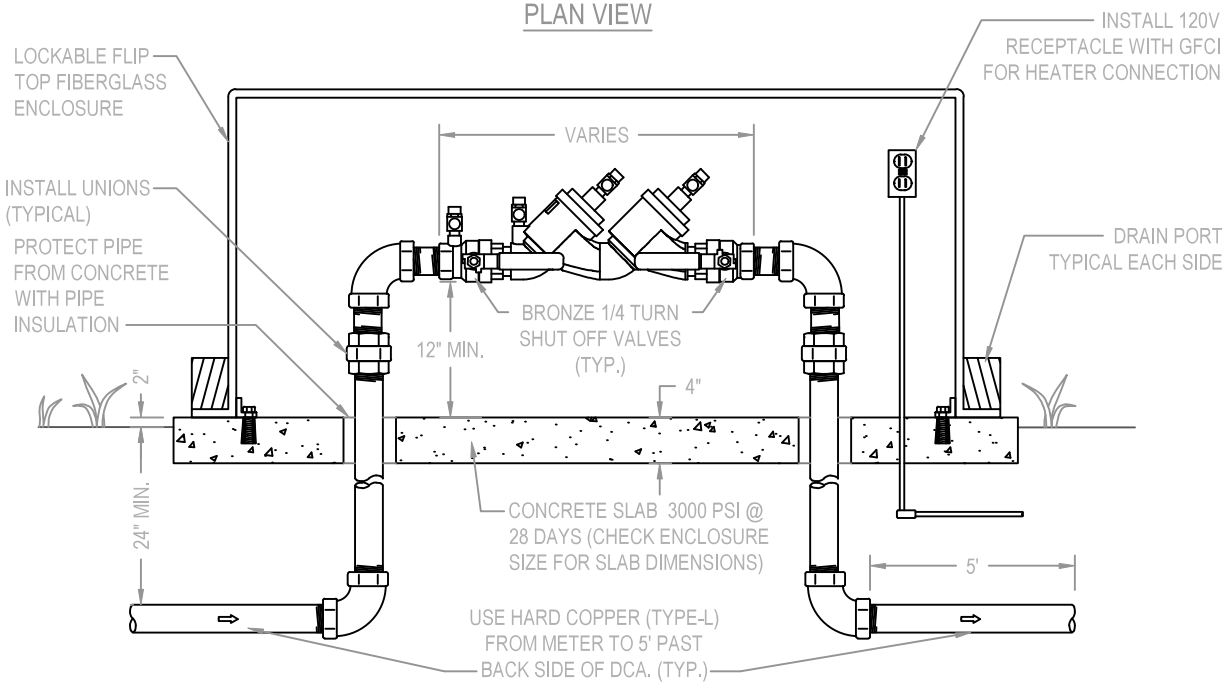


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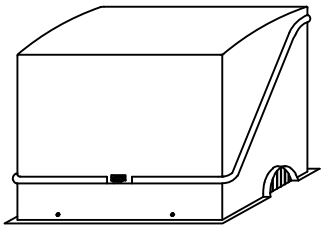


ISOMETRIC VIEW OF TYPICAL ENCLOSURE

| | | | | |
|---|---|---|---|---|
| CITY OF STATESVILLE<br>PUBLIC WORKS DEPARTMENT | WATER LINE<br>2" DC Assembly (Above Ground) | DETAIL #<br>W-12A | REVISED<br>NOV 2019 |
| | | SCALE:<br>N.T.S. | SHEET #<br>1 OF 1 |

# Cross Connection Control - Frequently Ask Questions

**QUESTION: What is a cross-connection?**

**ANSWER:** A cross-connection is any temporary or permanent connection between a public water system or consumer's potable (i.e., drinking) water system and any source or system containing nonpotable water or other substances. An example is the piping between a public water system or consumer's potable water system and an auxiliary water system, cooling system, or irrigation system.

**QUESTION: What is backflow?**

**ANSWER:** Backflow is the undesirable reversal of flow of nonpotable water or other substances through a cross-connection and into the piping of a public water system or consumer's potable water system. There are two types of backflow... backpressure backflow and backsiphonage.

**QUESTION: What is backpressure backflow?**

**ANSWER:** Backpressure backflow is backflow caused by a downstream pressure that is greater than the upstream or supply pressure in a public water system or consumer's potable water system. Backpressure (i.e., downstream pressure that is greater than the potable water supply pressure) can result from an increase in downstream pressure, a reduction in the potable water supply pressure, or a combination of both. Increases in downstream pressure can be created by pumps, temperature increases in boilers, etc. Reductions in potable water supply pressure occur whenever the amount of water being used exceeds the amount of water being supplied, such as during water line flushing, firefighting, or breaks in water mains.

**QUESTION: What is backsiphonage?**

**ANSWER:** Backsiphonage is backflow caused by a negative pressure (i.e., a vacuum ~ or partial vacuum) in a Public water system or consumer's potable water system. The effect is similar to drinking water through a straw. Backsiphonage can occur when there is a stoppage of water supply due to nearby firefighting, a break in a water main, etc.

**QUESTION: Why do water suppliers need to control cross-connections and protect their public water systems against backflow?**

**ANSWER:** Backflow into a public water system can pollute or contaminate the water in that system (i.e., backflow into a public water system can make the water in that system unusable or unsafe to drink), and each water supplier has a responsibility to provide water that is usable and safe to drink under all foreseeable circumstances. Furthermore, consumers generally have absolute faith that water delivered to them through a public water system is always safe to drink. For these reasons, each water supplier must take reasonable precautions to protect its public water system against backflow.

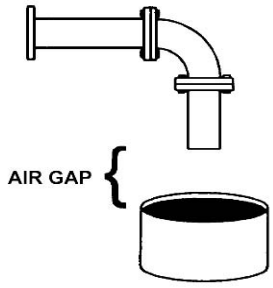
**QUESTION: What should water suppliers do to control cross-connections and protect their public water systems against backflow?**

**ANSWER:** Water suppliers usually do not have the authority or capability to repeatedly inspect every consumer's premises for cross-connections and backflow protection. Alternatively each water supplier should ensure that a proper backflow preventer is installed and maintained at the water service connection to each system or premises that poses a significant hazard to the public water system. Generally, this would include the water service connection to each dedicated fire protection system or irrigation piping system and the water service connection to each of the following types of premises: (I ) premises with an auxiliary or reclaimed water system: (2) industrial, medical, laboratory, marine or other facilities where objectionable substances are handled in a way that could cause pollution or contamination of the public water system; (3) premises exempt from the State Plumbing Code and premises where an internal backflow preventer required under the State Plumbing Code is not properly installed or maintained; (4) classified or restricted facilities; and (S) tall buildings. Each water supplier should also ensure that a proper backflow preventer is installed and maintained at each water loading station owned or operated by the water supplier.

**QUESTION: What is a backflow preventer?**

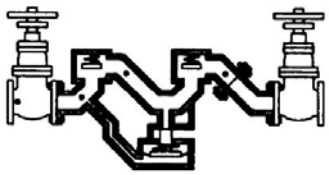
**ANSWER:** A backflow preventer is a means or mechanism to prevent backflow. The basic **means** of preventing backflow is an air gap, which either eliminates a cross-connection or provides a barrier to backflow. The basic **mechanism** for preventing backflow is a mechanical backflow preventer, which provides a physical barrier to backflow. The principal types of mechanical backflow preventer are the reduced-pressure principle assembly, the pressure vacuum breaker assembly, and the double check valve assembly. A secondary type of mechanical backflow preventer is the residential dual check valve.

**QUESTION: What is an air gap?**




**ANSWER:** An air gap is a vertical, physical separation between the end of a water supply outlet and the flood-level rim of a receiving vessel. This separation must be at least twice the diameter of the water supply outlet and never less than one inch. An air gap is considered the maximum protection available against backpressure backflow or backsiphonage but is not always practical and can easily be bypassed.

**QUESTION: What is a reduced principle assembly (RPPA / RP / RPZ) ?**



**ANSWER:** An RP is a mechanical backflow preventer that consists of two independently acting, spring-loaded check valves with a hydraulically operating, mechanically independent, spring-loaded pressure differential relief valve between the check valves and below the first check valve. It includes shutoff valves at each end of the assembly and is equipped with test cocks. An RP is effective against backpressure backflow and backsiphonage and may be used to isolate health or nonhealth hazards.

**QUESTION: What is a double check valve assembly (DC)?**

**ANSWER:** A DC is a mechanical backflow preventer that consists of two independently acting, spring-loaded check valves. It includes shutoff valves at each end of the assembly and is equipped with test cocks. A DC is effective against backpressure backflow and backsiphonage but should be used to isolate only nonhealth hazards.

**QUESTION: What is a residential dual check valve (rdc)?**

**ANSWER:** A rdc is similar to a DC in that it is a mechanical backflow preventer consisting of two independently acting, spring-loaded check valves. However, it usually does not include shutoff valves, may or may not be equipped with test cocks or ports, and is generally less reliable than a DC. A rdc is effective against backpressure backflow and backsiphonage but should be used to isolate only nonhealth hazards and is intended for use only in water service connections to single-family homes.

**QUESTION: Why do backflow preventers have to be tested periodically?**

**ANSWER:** Mechanical backflow preventers have internal seals, springs, and moving parts that are subject to fouling, wear, or fatigue. Also, mechanical backflow preventers and air gaps can be bypassed. Therefore, all backflow preventers have to be tested periodically to ensure that they are functioning properly. A visual check of air gaps is sufficient, but mechanical backflow preventers have to be tested with properly calibrated gauge equipment.

**QUESTION: Where can I get more information about cross-connection control?**

**ANSWER:** One excellent reference manual is the third (2004) edition of the American Water Works Association's (AWWA's) Manual M14, Recommended Practice for Backflow Prevention and Cross-Connection Control, which is available from the AWWA Bookstore; 6666 West Quincy Avenue; Denver, Colorado 80235; 800/926-7337; http://www.awwa.org. Another excellent reference manual is the tenth (2009) edition of the University of Southern California's Manual of Cross-Connection Control, which is available from the Foundation for Cross-Connection Control and Hydraulic Research; University of Southern California; KAP-200 University Park MC-2531; Los Angeles, California 90089-2531; 213/740-2032; http://www.usc.edu/dept/fccchr.

# Backflow Prevention Assembly
# Testing & Maintenance Program Guidelines & Conditions

The City of Statesville requires that all backflow prevention devices connected to the City's water distribution system be tested at least once each year, and that all maintenance and repair of backflow prevention devices be made at the customer's expense (Section 23-304 (j)). Customers who desire their backflow testing and maintenance be conducted by the City may elect to receive this service, subject to the following conditions:

**Eligibility Requirements:**

1. The customer's utility account with the City must be in good standing with no outstanding or past due charges.

2. Each backflow prevention assembly must be installed in accordance with City standards in a location that is readily and safely accessible. Any work necessary to meet this requirement must be performed by the customer at their expense prior to subscribing to the City's testing and maintenance service.

3. The cost for this service will be billed in equal installments on the customer's monthly utility bill. The rate applies to each assembly enrolled in the program, and is subject to review and adjustment on an annual basis.

4. Backflow prevention assemblies on fire protection lines and service connections larger than 2 inches in diameter are not eligible for the testing and maintenance service.

5. Participation in the program is in 12 month increments. Enrollment will automatically renew every 12 months, unless requested otherwise by the customer.

**Services Provided:**

- Annual testing of each eligible backflow assembly.
- Maintenance and retesting of each assembly, as needed.
- Repair or replacement of backflow assembly if leaking or damaged, including damage from freezing.

This service does not include work to bring existing backflow assemblies up to current City code. Repair costs for damages resulting from customer tampering or negligence will be the responsibility of the customer.

***For Rates and more information about the program, go to:***

**Statesvillenc.net/Departments/PublicWorks/BackflowPrevention**

City of Statesville
Backflow Prevention Program
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