

APPENDIX

A

Guidelines and Requirements
for the
Cross Connection Program

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Definitions

As used in this handbook, the following terms shall have the meanings provided in this section unless the context clearly indicates otherwise.

Air-gap: A physical separation sufficient to prevent backflow between the free-flowing discharge end of the potable water system and any other system. Physically defined as a distance equal to twice the diameter of the supply side diameter but never less than one (1) inch.

Approved enclosure: An enclosure that meets or exceeds ASSE Standard 1060 by being on the agency's approval list.

Auxiliary intake: Any piping connection or other device whereby water may be obtained from a source other than the City's public water supply.

Auxiliary water supply: Any water other than the City of Raleigh public water supply as defined herein; including, but not limited to recycled water, grey water, rain water, well water, cistern water, reuse water and any other water supply from other water purveyors other than the City of Raleigh.

Backflow: The flow of water or other liquids, mixtures or substances, under positive or reduced pressure in the distribution pipes of a potable water supply from any source other than its intended source.

Backflow assembly: A mechanical arrangement used to protect the public water supply that meets or exceeds standards set forth by the University of Southern California for Cross Connection control and Hydraulic Research (USFCCHR) and the American Society of Sanitary Engineering (ASSE) by being on the agency's approval list. A backflow assembly used on fire suppression systems must have the additional approval of Factory Mutual (FM) and comply with the National Fire Protection Association (NFPA) code.

Backflow device: A mechanical backflow assembly without shut-off valves or test ports and therefore not inline testable.

Backpressure: A condition in which the owner's system pressure is greater than the supplier's system pressure.

Backsiphonage: The flow of water or other liquids, mixtures or substances into the distribution pipes of a potable water supply system from any source other than its intended source caused by the sudden reduction of pressure in the potable water supply system.

Building story: A building story is equal to 10' for the purpose of this handbook.

Certified tester: A person who has proven his/her competency to test and make reports on containment assemblies as evidenced by certification of successful completion of a training program approved by the Raleigh Director of Public Utilities or his designee.

Containment assembly: A backflow assembly installed at the point of separation between the public water supply and a private service or private distribution system or at the point of metering.

Containment protection: A containment assembly installed at the point of separation between the public water supply and a private service or private distribution system or at the point of metering.

Cross-connection: Any actual or potential connection between the public water supply and a source of contamination or pollution.

Cross connection coordinator: The official position established and authorized by the City and designated by the Raleigh Director of Public Utilities to administer, interpret this section and who shall be a certified tester and may serve as Operator in Responsible Charge as recognized by North Carolina Department of Environment and Natural Resources 15A NCAC 18D.0701.

Double check valve assembly (DCVA): A type of backflow assembly manufactured pursuant to ASSE Standard 1015.

Double check detector assembly (DCDA): A type of backflow assembly manufactured pursuant to ASSE Standard 1048.

Dual check valve: A type of backflow device manufactured pursuant to ASSE Standard 1024.

Fire line: A system of pipes and equipment used to supply water in an emergency for extinguishing fire.

Imminent health hazard: A situation deemed an imminent health hazard by the cross connection coordinator pursuant to the standards set forth in the Raleigh Public Utilities Handbook.

Interconnection: Any system of piping or other arrangement whereby the public water supply is connected directly to a sewer, drain, conduit, pool, heat exchanger, storage reservoir, or other device which does or may contain sewage or other waste or substance which would be capable of imparting contamination to the public water supply.

Isolation assembly: A backflow assembly required by the NC Plumbing Code that is installed within a private plumbing or distribution system to isolate a localized hazard from the remainder of the private system.

Moderate 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 public water supply.

Owner: Any person who has legal title to, or license to operate or inhabit, a property upon which a cross-connection inspection is to be made or upon which a cross-connection is present.

Potable Water: Water which is approved for drinking and other household uses and provided by the City of Raleigh Public Utilities Department.

Public water supply: The water and waterworks system of the City of Raleigh and its customers outside the corporate limits, for general use as potable water and which is recognized as the public water supply by the **North Carolina Department of Environment and Natural Resources as system number 03-92-010.**

Reduced pressure zone principle backflow assembly (RPZ): A type of backflow assembly manufactured pursuant to ASSE Standard 1013.

Reduced pressure detector assembly (RPDA): A type of backflow assembly manufactured pursuant to ASSE Standard 1047.

Severe hazard: A cross-connection or potential cross-connection involving any substance that could, if introduced into the public water supply, cause death or illness, spread disease, or have a high probability of causing such effects.

SECTION 1 – General Installation Requirements for Containment Assemblies

The City of Raleigh Public Utilities Department as the water purveyor for Raleigh, Garner, Rolesville, Wake Forest, Knightdale, Zebulon and Wendell has the primary responsibility of protecting the public water supply from potential sources of contamination and/or pollution. All commercial and residential connections to the public water supply are required to be protected with a containment assembly as determined by Part 8-Public Utilities Article D., Water Quality Protection of the Raleigh City Code and the policies and design criteria identified within this document. This document may be appended by technical bulletin or as published by annual updates of this manual.

Any references to the North Carolina Plumbing, Fire, or Electrical Code, City Code or Public Utilities Handbook shall include subsequent revisions.

For any application not specifically mentioned within this document, level of hazard shall be determined by the Raleigh Public Utilities Director or his designee.

No containment assembly shall be installed in a manner as to allow the assembly to be looped around or by-passed either temporarily or permanently.

Upon identification of the potential for contamination or a hazard to the City of Raleigh's drinking water supply system, or a failure to comply with a requirement of this handbook, the Public Utilities Director or his designee shall notify the owner pursuant to the procedures established in Sec. 8-2151 "Notification of Hazard".

For existing commercial facilities with multiple meters, the Cross Connection Coordinator can propose the option to master meter the facility.

OTHER IMPORTANT NUMBERS:

City of Raleigh Inspections Department-919-996-2495

Town of Garner Inspections Department- 919-773-4433

Town of Wake Forest Inspections Department-919-435-9530

Town of Rolesville Permits- 919-856-6060 (Wake County Inspections Department)

Town of Knightdale Permits- 919-856-6060 (Wake County Inspections Department)

Town of Zebulon Permits- 919-856-6060 (Wake County Inspections Department)

Town of Wendell Permits- 919-856-6060 (Wake County Inspections Department)

SECTION 2 – Irrigation (Residential/Commercial) Containment Assemblies Requirements

Any water fee only service, which is split from the primary domestic service (see detail W-34 and W-35) will be considered an “irrigation service” for the purposes of this cross connection policy. This water fee only service may not be used as domestic water and may not enter or cross under any existing or proposed structure. This also applies to water fee only meters, which are installed for irrigation or yard hydrants, car washing, or similar outdoor use shall be protected with a Severe Hazard containment assembly in the form of an RPZ.

2.1 ACCESSIBILITY:

All *containment* assemblies must be installed where the Raleigh Director of Public Utilities or his designee deems them readily accessible. Readily accessible is having direct access to a containment assembly without the requirement to remove any panel, door or similar covering of the item described, and without requiring the use of portable ladders, chairs, etc. The proper installation of an insulated approved enclosure may be deemed readily accessible. Approved enclosure clearances shall comply with ASSE Standard 1060. Clearances shall allow adequate room for servicing and maintaining the containment assembly in the approved enclosure.

2.2 ALTERATIONS/MODIFICATIONS:

No containment assembly shall be altered or modified from its approved factory configuration unless such modifications are made with strict adherence to manufacturer’s recommendations. All alterations or modifications must be inspected by the Raleigh Director of Public Utilities or his designee.

2.3 APPROVAL OF ALTERNATE INSTALLATIONS:

When a special circumstance precludes the ability to comply with these requirements, the Raleigh Director of Public Utilities or his designee may approve alternate installations.

2.4 AUTHORIZED TO INSTALL, REPLACE, OR REPAIR:

Any containment assembly required to be installed by the provisions of this article or by a corrective order issued by the Raleigh Director of Public Utilities or his designee shall be installed by one of the following:

Licensed Class I Plumber: can install, replace, or repair irrigation, domestic, and fire (outside installations only) containment assemblies for all structures

Licensed Class II Plumber: can only install, replace, or repair irrigation, domestic, and fire containment assemblies for single-family residential dwellings.

Limited Plumbing License: can install, replace, or repair irrigation or domestic containment assemblies of two inch diameter or smaller.

Licensed Fire Sprinkler Contractors: can only install, replace, or repair containment assemblies that are a part of the fire sprinkler system. They cannot install, replace, or repair irrigation or domestic containment assemblies.

Licensed Utility Contractor: can install, replace, or repair irrigation, domestic, and fire containment assemblies within 5’ of the building.

2.5 APPROVED BACKFLOW ASSEMBLIES:

A list of approved backflow assemblies can be found on the City of Raleigh’s website www.raleighnc.gov or contact the Raleigh Cross-Connection Control Office via email at cross.connection@raleighnc.gov.

2.6 AUXILIARY WATER SUPPLY (RECYCLED WATER, GREY WATER, RAIN WATER, REUSE WATER, IRRIGATION WELL, AND CISTERN):

Interconnections between an auxiliary water supply and the public water supply are not permitted and considered unlawful. (Sec. 8-2143) Premises where an auxiliary water supply exists or is installed shall have a containment assembly in the form of an RPZ installed on the public water supply service line. (Sec. 8-2147) Make-up water connections to an auxiliary water supply including but not limited to cisterns, grey water, rain water, reuse water, recycled water, and irrigation well systems shall have a containment assembly in the form of an approved RPZ and an air gap. Any unapproved interconnection between an auxiliary water supply and a public water supply shall be corrected according to City of Raleigh’s Cross Connection Article D, Water Quality Protection.

Residential owners desiring to install a well for irrigation purposes must install a containment assembly in the form of an RPZ on their domestic water service or pay for the installation of a water meter designed to detect back pressure and/or backsiphonage. Those residential customers who chose to install the RPZ on their domestic service must test the backflow annually.

2.7 DRAIN REQUIREMENTS:

RPZ containment assemblies are not allowed to be installed below ground level. RPZ assemblies installed in above ground approved enclosures shall be installed so that the relief outlet of the assembly does not become submerged. A minimum clearance of 12” must be maintained from the most bottom part of the assembly to concrete pad or floor of the approved enclosure. Drain port is a minimum of 4” or two times the size of the containment assembly whichever is greater and provide positive drainage with adequate gravity drainage to atmosphere.

2.8 ENCLOSURES:

Any RPZ Irrigation containment assembly:

1. Minimum non-heated, insulated Class II, approved enclosure. Containment assembly is to be drained during winter months. Approved enclosure to be mounted on a concrete pad, fiberglass, or approved mounting pad.
- OR
2. The containment assembly for a lawn irrigation system may be removed for winterization when installed with unions and an upstream shut off valve not subject to freezing.
3. **Consumer is responsible for protecting the containment assembly from freezing.**

If multiple containment assemblies are installed within one approved enclosure, all components of each containment assembly must be accessible for testing, repair and or replacement without having to remove another containment assembly or piping that serves another assembly. The test ports to all containment assemblies must be accessible. Approved enclosures that are damaged and do not provide adequate freeze protection may be required to be repaired or replaced.

2.9 FLOOD PRONE AREAS:

Containment assemblies installed in a flood plain must be installed at least 2ft above regulatory flood protection elevation.

2.10 IDENTIFICATION TAG:

No manufacturer’s tag or stamp that bears pertinent information shall be removed from the unit. If a manufacturer’s tag or stamp is removed or damaged and rendered unreadable and the containment assembly is an approved model, the containment assembly must be marked with the original serial number or issued a new number by the Cross Connection Program

2.11 LOCATION:

Provided there are no unprotected taps before the containment assembly, lawn irrigation containment assemblies may be installed within 50’ from the most downstream edge of the meter box in a landscaped area. The containment assembly must remain accessible and visible after landscape maturity. Containment assemblies may not be installed in a hazardous location, traffic site triangle or within the right-of-way (ROW). The Raleigh Director of Public Utilities or his designee may approve alternate locations.

2.12 MATERIALS:

Piping materials shall conform to one of the standards listed in NC Plumbing Code table 605.3 for water service pipe and 605.4 for water distribution pipe.

2.13 PERMITS:

A plumbing permit is required for all new, replaced, and relocated containment assemblies. Assemblies that have been winterized are not required to have a permit for installation.

2.14 PRE-EXISTING ISSUES:

Any approved containment assembly that has not been installed in accordance to Sec. 8-2149 of City Code and whose location does not pose an imminent health hazard to the public water supply shall be considered pre-existing and compliant.

2.15 RELIEF OUTLET PIPING AND VALVE:

In some applications, it is practical to install a drain line off of the relief port of the RPZ assembly so that in the event that there is some spillage from the device the water can be directed to a floor drain. When drains from the relief port of an approved containment RPZ are utilized, the following conditions must be met:

An approved pre-fabricated "air gap drain" as available from the backflow assembly manufacturers must be utilized.

All relief port drain lines shall be piped to an outside point of termination.

The RPZ relief valve shall be a minimum of 12" above any material or ground.

2.16 REPAIRS:

If a containment assembly fails its operational test, the property owner will have 15 days to have all repairs made. Defective parts must be replaced with factory approved parts. If repair is not possible, the assembly must be replaced with an approved RPZ backflow assembly according to the City Code, Public Utilities Handbook, and North Carolina Plumbing Code.

2.17 SERVICE VALVE:

The #1 shut-off valve is part of the containment assembly and may not be used as a service valve. A service valve shall be installed after the meter and prior to every containment assembly to allow testing, maintenance and replacement of the containment assembly without the use of a City of Raleigh Public Utilities operating valve. The service valve shall be installed underground and a minimum of 18" distance from the meter.

2.18 SUPPORT:

Containment assemblies shall be properly supported so that stress on surrounding piping does not occur. Adequate support must be provided for the assembly in the approved orientation either vertically or horizontally. The assembly may not be supported by other piping or unapproved methods of support. (See: North Carolina Plumbing Code Section 308.5)

2.19 TESTING:

All residential irrigation containment assemblies are to be tested by July 1st every three years. Containment assemblies on commercial irrigation systems are to be tested annually by July 1st. Testing of containment assemblies shall be conducted by a certified tester at the customer's expense. The owner shall cause such maintenance or repairs to be made, rendering the containment assembly fully operational. Additional testing and maintenance requirements may be requested or imposed as determined by the Raleigh Director of Public Utilities or his designee. It is the owner's responsibility to keep a complete, written record of any repairs and testing of the containment assembly for at least three years.

Any location that does not have a current passing operational test report on file with the Cross Connection Program will be considered noncompliant. Owners that are in noncompliance can come into compliance by:

Testing: Hire a certified tester to perform an operational test and submit the report to the Cross Connection Program. All test and maintenance reports shall be submitted within 15 days of testing.

Inactivating: If an irrigation meter is present, it may be removed by calling 919-996-3245 and the meter will be pulled and the irrigation account marked inactive. Upon notification from the consumer and verification of the Cross Connection Program that the irrigation account is inactive, the resident's information will be removed from the City's backflow records.

Terminating: To permanently remove an irrigation containment assembly, all controls and valves shall be removed with the piping capped or plugged below ground near the source of connection. The meter box, if existing shall be removed. A plumbing permit and inspection is required to cap or plug piping.

Note: Irrigation systems that are re-activated must be done with a separate meter and all City of Raleigh and North Carolina Plumbing Code policies on new installations must be followed.

Failed Operational Test: If a containment assembly fails its operational test, the consumer will have 15 days to have all repairs made.

2.20 WINTERIZATION:

The containment assembly for a lawn irrigation system may be removed for winterization when installed with unions and an upstream shut off valve not subject to freezing.

SECTION 3 – Domestic (Residential/Commercial) Containment Assembly Requirements and Uses

3.1 ACCESSIBILITY:

All *containment* assemblies must be installed where the Raleigh Director of Public Utilities or his designee deems them readily accessible. Readily accessible is having direct access to the containment assembly without the requirement to remove any panel, door or similar covering of the item described, and without requiring the use of portable ladders, chairs, etc. The proper installation of an insulated approved enclosure may be deemed readily accessible. Approved enclosure clearances shall comply with ASSE Standard 1060. Clearances shall allow adequate room for servicing and maintaining the containment assembly in the approved enclosure.

3.2 ALTERATIONS/MODIFICATIONS:

No containment assembly shall be altered or modified from its approved factory configuration unless such modifications are made with strict adherence to manufacturer's recommendations. All alterations or modifications must be approved by the Raleigh Director of Public Utilities or his designee.

3.3 APPROVAL OF ALTERNATE INSTALLATIONS:

When a special circumstance precludes the ability to comply with these requirements, the Raleigh Director of Public Utilities or his designee may approve alternate installations.

3.4 APPROVED BACKFLOW ASSEMBLIES:

A list of approved backflow assemblies can be found on the City of Raleigh's website www.raleighnc.gov or contact the Raleigh Cross-Connection Control Office via email at cross.connection@raleighnc.gov.

3.5 AUTHORIZED TO INSTALL, REPLACE, AND REPAIR

Any assembly required to be installed by the provisions of this article or by a corrective order issued by the Raleigh Director of Public Utilities or his designee shall be installed by one of the following:

Licensed Class I Plumber: can install, replace, or repair irrigation, domestic, and fire (outside installations only) containment assemblies for all structures.

Licensed Class II Plumber: can only install, replace, or repair irrigation, domestic, and fire containment assemblies for single-family residential dwellings.

Limited Plumbing License: can install, replace, or repair irrigation or domestic containment assemblies of two inch diameter or smaller.

Licensed Fire Sprinkler Contractors: can only install, replace, or repair containment assemblies that are a part of the fire sprinkler system. They cannot install, replace, or repair irrigation or domestic containment assemblies.

Licensed Utility Contractor: can install, replace, or repair irrigation, domestic, and fire containment assemblies within 5' of the building.

3.6 AUXILIARY WATER SUPPLY (RECYCLED WATER, GREY WATER, RAIN WATER, REUSE WATER, IRRIGATION WELL, CISTERN):

Interconnections between an auxiliary water supply and the public water supply are not permitted and considered unlawful. (Sec. 8-2143) Premises where an auxiliary water supply exists or is installed shall have an approved containment RPZ installed on the public water supply service line. (Sec. 8-2147) Make-up water connections to an auxiliary water supply including but not limited to cisterns, grey water, rain water, reuse water, recycled water, and irrigation well systems shall have a containment assembly in the form of an approved RPZ and an air gap. Any unapproved interconnection between an auxiliary water supply and a public water supply shall be corrected according to City of Raleigh's Article D- Water Quality Protection.

Residential customers desiring to install a well for irrigation purposes must install an approved RPZ on their domestic water service or pay for the installation of a water meter designed to detect back pressure and/or backsiphonage. Those residential customers who chose to install the RPZ on their domestic service must test the backflow annually.

3.7 BYPASS /PARALLEL INSTALLATION:

Facilities that cannot temporarily shut off the water systems to provide for a containment assembly test or repair shall install a bypass containment assembly of the same type and in some cases the same size as the main line unit. The bypass parallel assembly unit must have the square diameters equal to the square of the supply service "tap". For example, an 8" service would need at a minimum two 6" assemblies in parallel. The total capacity of the assemblies should equal or exceed the required flow for the application.

3.8 CULINARY USE:

Containment assemblies used for culinary purposes such as canned food preparation or in dairies shall have a FDA (Food and Drug Administration) approved coating and shall be stamped with the appropriate seal.

3.9 DEAD END:

A containment assembly shall be installed to contain a private distribution system that dead ends.

3.10 DRAIN REQUIREMENTS:

DCVA BACKFLOW DRAIN REQUIREMENTS:

DCVA assemblies shall be installed so that the assembly does not become submerged. A minimum clearance of 12" must be maintained from the most bottom part of the assembly to the concrete pad or floor. If DCVA is allowed to be installed below grade, the underground enclosure must provide at a minimum the following:

1. Adequate drainage
2. Overlapping locking lid
3. Test ports capped

RPZ BACKFLOW DRAIN REQUIREMENTS:

RPZ containment assemblies are not allowed to be installed below ground level. RPZ assemblies installed in above ground approved enclosures shall be installed so that the relief outlet of the assembly does not become submerged. A minimum clearance of 12" must be maintained from the most bottom part of the assembly to concrete pad or floor. Drain size shall be twice the diameter of the containment assembly or 4" minimum whichever is greater and must provide a means of positive drainage with adequate gravity drainage to atmosphere.

3.11 ENCLOSURES:

Any DCVA or RPZ containment assembly installed outside on a domestic water service must comply with the following:

1. Minimum insulated Class I or II approved enclosure anchored to concrete pad, fiberglass, or approved mounting pad.
2. If Class II approved enclosure is provided, it is recommended that the containment assembly be wrapped in 1" thick pipe insulation. The relief port of the RPZ is not to be obstructed by insulation.
3. If an RPZ is installed, provide drain port for positive drainage out of approved enclosure.
4. If heating the approved enclosure, standard 120v GFCI electrical receptacle to be installed in accordance with the North Carolina Electrical Code.
5. **Consumer is responsible for protecting the containment assembly from freezing.**
6. City of Raleigh Plumbing Inspections Department requires all 2½" and smaller domestic backflows installed outside have a Class I or II approved enclosure with 6" sleeve for conduit and piping. A Class I heated enclosure is required for assemblies larger than 2 ½".
7. If multiple containment assemblies are installed within one approved enclosure, all components of each containment assembly must be accessible for testing, repair and or replacement without having to remove another containment assembly or piping that serves another assembly. The test ports to all containment assemblies must be accessible. Approved enclosures that are damaged and do not provide adequate freeze protection may be required to be repaired or replaced.

3.12 FLOOD PRONE AREAS:

Backflow assemblies installed in a flood plain must be installed at least 2ft above regulatory flood protection elevation.

3.13 HAZARDOUS USES:

Hazards are divided into the following categories:

A) Residential Moderate Hazard- Dual Check Valves

Single service connections that serve no more than two dwelling units without an auxiliary water supply or other severe hazard application within the property boundaries shall have a dual check valve installed.

B) Moderate Hazard – DCVA:

. All other connections not defined as severe hazard, including but not limited to individual office buildings for Lawyers, Insurance Agents, Financial Advisors, Real Estate Agencies, Banks etc. (conditional upon the non-existence of a severe hazard within the building as listed below)

C) Severe Hazard- List includes but is not limited to the following and requires RPZ and/or Air Gap:

1. All lawn sprinkler systems or yard hydrants.
2. Wastewater treatment plants, pumps and tanks or any other container for conveying, storing or otherwise handling sewage, sewer waste lines.
3. Make-up water connections to a private non-potable auxiliary water system water supply including but not limited to cisterns, grey water, rain water collection and irrigation well systems. RPZ and AIR GAP required.
4. Connections to pumps and tanks or any other container for conveying, storing or otherwise handling sewage, radioactive, lethal or toxic substances, boiler and steam connections, sewer waste lines, low inlets to receptacles containing toxic substances, coils or jackets used as heat exchangers, bacterial and viral materials, radioactive materials, private well or other private water supply, irrigation systems, water systems or hose connections with booster pumps such as fire department connections (FDC) and private hydrants used in conjunction with FDCs, carbonation equipment, or similar severe hazards or potential as determined by the cross connection coordinator.
5. Buildings with five or more stories above ground level.
6. Hospitals, dental offices, veterinary clinics and other medical facilities that may have X-ray equipment, laboratory, medical washing equipment, autoclaves, aspirators, vacuum pumps.(Includes psychology and psychiatric offices that administer medications)
7. Morgues, mortuary, autopsy facility, and crematory
8. Metal plating or fabrication facility
9. Bottling plant
10. Cannery, Packing House, Poultry House
11. Battery manufacturer
12. Exterminator
13. Lawn care company, Green house
14. Chemical processing plant
15. Dairy
16. Film laboratory
17. Car wash facility
18. Dye work
19. Laundry facility
20. Swimming pool
21. Tattoo parlor
22. Water front facility
23. Restaurant
24. Beauty Shop, Barber, and Spa
25. Nursing Home, Day Care Facility
26. Flex space occupancies such as strip centers and mall buildings or spaces approved for multiple types of occupancy use or which frequent alterations are made to the plumbing..
27. Power plant, Nuclear Reactor
28. Any location where an approved containment RPZ is required for isolation of a contaminant an approved RPZ is required for containment.
29. Single family residential properties that have an auxiliary water supply or other high hazard application within the property boundaries shall install an approved containment RPZ on the public water supply service line or a meter designed to detect backpressure. A water fee only meter requires an approved containment RPZ regardless of proposed use.

30. Hazard level is unknown at the time of review.
31. No potable water line can be directly or indirectly connected to any piping or equipment that conveys sewage.
32. Special use tanks or tankers containing pesticides, fertilizers, or other toxic chemicals or their residues may not be filled from a public water system except at a location equipped with an approved air gap (2 times diameter of supply pipe with a 1" minimum) and RPZ.
33. No supplier of water shall permit filling of such special use containers except at locations so equipped.

3.14 IDENTIFICATION TAG:

No manufacturer's tag or stamp that bears pertinent information shall be removed from the unit. If a manufacturer's tag or stamp is removed or damaged and rendered unreadable and the containment assembly is an approved model, the containment assembly must be marked with the original serial number or issued a new number by the Cross Connection Program.

3.15 LOCATION:

Containment assemblies may not be installed in a hazardous location, traffic site triangle or within the right-of-way (ROW). Containment assemblies shall be installed within 50' of the downstream (private) side of the meter box. Containment assemblies may be installed inside of buildings provided there are no unprotected taps before the assembly. The containment assembly must remain accessible and visible after landscape maturity. The Raleigh Public Utilities Director or his designee may approve alternate locations for facilities with zero lot line limitations.

3.16 LOOPED SYSTEMS:

A containment assembly shall be installed to contain a private distribution system that is looped.

3.17 MATERIALS:

Piping materials shall conform to one of the standards listed in NC Plumbing Code table 605.3 for water service pipe and 605.4 for water distribution pipe.

3.18 PERMITS:

A plumbing permit is required for all new, replaced, and relocated containment assembly installations.

3.19 PRE-EXISTING ISSUES:

Any containment assembly that has not been installed in accordance to Sec. 8-2149 of City Code and whose location does not pose an imminent health hazard to the public water supply shall be considered pre-existing and compliant.

3.20 RELIEF OUTLET PIPING AND VALVE:

In some applications, it is practical to install a drain line off of the relief port of the RPZ assembly so that in the event that there is some spillage from the device the water can be directed to a floor drain. When drains from the relief port of an approved containment RPZ are utilized, the following conditions must be met:

An approved pre-fabricated "air gap drain" as available from backflow prevention assembly manufacturers must be utilized.

All relief port drain lines shall be piped to an outside point of termination.

The RPZ relief valve shall be a minimum of 12" above any material or ground.

3.21 REPAIRS:

If a containment assembly fails its operational test, the property owner will have 15 days to have all repairs made. Defective parts must be replaced with factory approved parts. If repair is not possible, the assembly must be replaced with a containment assembly according to the City Code, Public Utilities Handbook, and North Carolina Plumbing Code.

3.22 SERVICE VALVE:

The #1 shut-off valve of the containment assembly and may not be used as a service valve. A service valve shall be installed after the meter and prior to every containment assembly to allow testing, maintenance and replacement of the containment assembly without the use of a City of Raleigh Public Utilities operating valve. The service valve shall be installed underground and a minimum of 18" distance from meter.

3.23 SUPPORT:

Containment assemblies shall be properly supported so that stress on surrounding piping does not occur. Adequate support must be provided for the assembly in the approved orientation either vertically or horizontally. The assembly may not be supported by other piping or unapproved methods of support. (See: North Carolina Plumbing Code Section 308.5)

3.24 TESTING:

Testing of containment assemblies shall be conducted by a certified tester at the customer’s expense in accordance with Sec. 8-2154 of City Code. All newly installed containment assemblies are to be tested by a certified tester after the meter is set and annually thereafter in accordance with 3.25 Testing Schedule. The meter will not be set until the containment assembly is installed. Meter jumpers are not approved under any condition. All water use for construction purposes is to be metered. See “construction water” under the policies and procedures section of the Public Utilities Handbook. The owner shall cause such maintenance or repairs to be made, rendering the containment assembly fully operational. Additional testing and maintenance requirements may be requested or imposed as determined by the Raleigh Director of Public Utilities or his designee. It is the owner’s responsibility to keep a complete, written record of any repairs and testing of the containment assembly for at least three years.

Any location that does not have a current passing operational test report on file with the Cross Connection Program will be considered noncompliant. Consumers that are in noncompliance can bring their facility into compliance by:

Testing: hire a City of Raleigh certified tester to perform an operational test and submit the report to the Cross Connection Program. All test and maintenance reports shall be submitted within 15 days of testing.

Terminating: To permanently remove a containment assembly, all controls and valves shall be removed with the piping capped or plugged below ground near the source of connection. The meter box, if existing, shall be removed. A plumbing permit and inspection is required to cap or plug piping.

Failed Operational Test: If a containment assembly fails its operational test, the owner will have 15 days to have all repairs made.

3.25 TESTING SCHEDULE:

Property owners who have containment assemblies installed on fire sprinkler systems as well as domestic services *may* test domestic containment assemblies in accordance with the annual testing date for fire containment assemblies. Property owners or certified testers are to contact the City of Raleigh’s Cross Connection Program or contracted vendor to arrange this testing schedule exception. All other containment assemblies installed on domestic services are to be tested upon installation, replacement, and annually thereafter on or before annual test due date according to zip code:

Zip Code	Annual Test Date	Zip Code	Annual Test Date
27529	September 1st	27606	December 1st
27545	May 1st	27607	December 1st
27560	December 1st	27608	April 1st
27571	January 1st	27608	October 1st
27587	January 1st	27609	April 1st
27591	May 1st	27610	September 1st
27597	May 1st	27612	March 1st
27601	October 1st	27613	March 1st
27602	November 1st	27614	February 1st
27603	November 1st	27615	February 1st
27604	August 1st	27616	February 1st
27605	October 1st	27617	March 1st

3.26 THERMAL EXPANSION:

Where a containment assembly, check valve or other assembly/device is installed within a private water supply system utilizing water storage heating equipment such that thermal expansion causes an increase in pressure, a device for controlling pressure shall be installed.

SECTION 4 – Fire Protection Containment Assembly Requirements

4.1 ACCESSIBILITY:

All containment assemblies must be installed where the Raleigh Director of Public Utilities or his designee deems them readily accessible. Readily accessible is having direct access to a containment assembly without the requirement to remove any panel, door or similar covering of the item described, and without requiring the use of portable ladders, chairs, etc. The proper installation of an insulated approved enclosure may be deemed readily accessible. Approved enclosure clearances shall comply with ASSE Standard 1060. Clearances shall allow adequate room for servicing and maintaining the containment assembly in the approved enclosure.

4.2 ALTERATIONS/MODIFICATIONS:

No containment assembly shall be altered or modified from its approved factory configuration unless such modifications are made with strict adherence to manufacturer's recommendations. All alterations or modifications must be inspected by the Raleigh Director of Public Utilities or his designee.

4.3 APPROVAL OF ALTERNATE INSTALLATIONS:

When a special circumstance precludes the ability to comply with these requirements, the Raleigh Director of Public Utilities or his designee may approve alternate installation.

4.4. APPROVED BACKFLOW ASSEMBLIES:

A list of approved backflow assemblies can be found on the City of Raleigh's website www.raleighnc.gov or contact the Raleigh Cross Connection Control Office via email at cross.connection@raleighnc.gov.

4.5 AUTHORIZED TO INSTALL, REPLACE, AND REPAIR:

Any containment fire sprinkler assembly required to be installed by the provisions of this article or by a corrective order issued by the Raleigh Director of Public Utilities or his designee shall be installed by one of the following:

Licensed Class I Plumber: can install, replace, or repair irrigation, domestic, and fire (outside installations only) containment assemblies for all structures

Licensed Class II Plumber: can only install, replace, or repair irrigation, domestic, and fire containment assemblies for single-family residential dwellings.

Limited Plumbing License: can install, replace, or repair irrigation or domestic containment assemblies of two inch diameter or smaller.

Licensed Fire Sprinkler Contractors: can only install, replace, or repair containment assemblies that are a part of the fire sprinkler system. They cannot install, replace, or repair irrigation or domestic containment assemblies.

Licensed Utility Contractor: can install, replace, or repair irrigation, domestic, and fire containment assemblies within 5' of the building.

4.6 AUXILIARY WATER SUPPLY (RECYCLED WATER, GREY WATER, RAIN WATER, REUSE WATER, IRRIGATION WELL, CISTERN):

Interconnections between an auxiliary water supply and the public water supply are not permitted and considered unlawful. (Sec. 8-2143) Premises where an auxiliary water supply exists or is installed shall have an approved containment RPZ installed on the public water supply service line. (Sec. 8-2147) Make-up water connections to an auxiliary water supply including but not limited to cisterns, grey water, rain water, reuse water, recycled water, and irrigation well systems shall have a containment assembly in form of an approved RPZ and an air gap. Any unapproved interconnection between an auxiliary water supply and a public water supply shall be corrected according to City of Raleigh's Article D- Water Quality Protection.

4.7 BYPASS /PARALLEL INSTALLATION:

Facilities that cannot temporarily shut off the water systems to provide for a containment assembly test or repair shall install a bypass containment assembly of the same type and in some cases the same size as the main line unit. The bypass parallel assembly unit must have the square diameters equal to the square of the supply service "tap". For example, an 8" service would need at a minimum two 6" assemblies in parallel. The total capacity of the assemblies should equal or exceed the required flow for the application.

4.8 DRAIN REQUIREMENTS:

DCVA/DCDA BACKFLOW DRAIN REQUIREMENTS:

DCVA/DCDA assemblies shall be installed so that the assembly does not become submerged. A minimum clearance of 12" must be maintained from the most bottom part of the assembly to the concrete pad or floor. If DCVA is allowed to be installed below ground, the underground enclosure must provide at a minimum the following:

1. Adequate drainage
2. Overlapping locking lid
3. Test ports capped

RPZ/RPDA BACKFLOW DRAIN REQUIREMENTS:

All RPZ/RPDA containment assemblies are not allowed to be installed below ground level. RPZ/RPDA containment assemblies installed in above ground approved enclosures shall be installed so that the relief outlet of the assembly does not become submerged. A minimum clearance of 12" must be maintained from the most bottom part of the assembly to concrete pad or floor. Drain size shall be twice the diameter of the containment assembly or 4" minimum whichever is greater and must provide a means of positive drainage with adequate gravity drainage to atmosphere.

4.9 ENCLOSURES:

All containment assemblies installed above ground shall be centered and secured on a 4" concrete pad. Installing a permanent hard piped electrical service according to North Carolina Electrical Code to a thermostatically controlled heater or heat trace is required to ensure that the unit does not freeze during prolonged periods of extreme cold weather conditions.

If multiple containment assemblies are installed within one approved enclosure, all components of each containment assembly must be accessible for testing, repair and or replacement without having to remove another containment assembly or piping that serves another assembly. The test ports to all containment assemblies must be accessible. Approved enclosures that are damaged and do not provide adequate freeze protection may be required to be repaired or replaced.

4.10 FIRE DEPARTMENT CONNECTIONS:

If an FDC is installed on a heated approved enclosure, there is a minimum of 4' of empty pipe required between check valves and outside of box. (See Detail Drawing FP-17, FP-18) If the building has a fire pump, the FDC must be installed on the system side of the pump and not at the approved enclosure. The FDC cannot be installed on the supply at the street if the containment assembly is inside the building.

4.11 FLOOD PRONE AREAS:

Containment assemblies installed in a flood plain must be installed at least 2ft above regulatory flood protection elevation.

4.12 HAZARDOUS USES

SEVERE HAZARD FIRE SPRINKLER SYSTEMS REQUIRING A CONTAINMENT RPDA:

Systems with booster pump facilities (such as fire department connections [FDCs])

Systems with transfer pumps

Systems with storage tanks (plus air gap)

Systems with antifreeze solutions or chemical additives

Systems serving 5 or more stories above ground level of the containment assembly

Systems that are not behind a master meter (RPZ allowed on systems after a master meter)

MODERATE HAZARD FIRE SPRINKLER SYSTEMS REQUIRING A CONTAINMENT DCDA:

Systems less than 5 stories above ground level with no pumps

Systems without antifreeze solutions or chemical additives

Dry pipe systems

Systems that are not behind a master meter (DCVA allowed on systems after a master meter)

4.13 IDENTIFICATION TAG:

No manufacturer's tag or stamp that bears pertinent information shall be removed from the unit. If a manufacturer's tag or stamp is removed or damaged and rendered unreadable and the containment assembly is an approved model, the containment assembly must be marked with the original serial number or issued a new number by the Cross Connection Program.

4.14 LOCATION:

Containment assemblies may not be installed in a hazardous location, traffic site triangle or within the right-of-way (ROW). Containment assemblies shall be installed within 50' of the downstream (private) side of the meter or ROW. Provided there are no unprotected taps before the containment assembly, containment assemblies may be installed inside of buildings. The containment assembly must remain accessible and visible after landscape maturity. The Raleigh Director of Public Utilities or his designee may approve alternate locations for facilities with zero lot line limitations.

4.15 LOOPED SYSTEMS

An approved containment assembly shall be installed to contain a private distribution system that is looped.

4.16 MATERIALS:

Piping materials shall conform to one of the standards listed in NC Plumbing Code table 605.3 for water service pipe and 605.4 for water distribution pipe.

4.17 MODIFICATION OF DCDA/RPDA UNITS:

When the DCDA/RPDA bypass is in need of replacement, the defective parts must be replaced with factory approved parts (i.e. the bypass containment assembly or bypass meter must be replaced with a unit of the same size, brand and model number) since the detector assembly and main line unit are a matched set from the factory. All components of a containment assembly shall be accessible without having to remove piping that serves the FDC connection.

4.18 PERMITS:

A plumbing permit is required for all new, replaced, and relocated containment assemblies.

4.19 PRE-EXISTING ISSUES:

Any containment assembly that has not been installed in accordance to Sec. 8-2149 of City Code and whose location does not pose an imminent health hazard to the public water supply shall be considered pre-existing and compliant

4.20 PRIVATE FIRE HYDRANTS AND DEAD END MAIN LINES:

All fire systems, fire hydrant lines and dead end mains extending more than 75 feet from the Right of Way (ROW) are considered to be dead end systems. To avoid accumulation of stagnant water in the city main, the containment assembly shall be installed within 50 feet of the ROW/private property line.

4.21 RELIEF OUTLET PIPING:

In some applications, it is practical to install a drain line off of the relief port of the RPZ assembly so that in the event that there is some spillage from the device the water can be directed to a floor drain. When drains from the relief port of a containment RPZ are utilized, the following conditions must be met:

An approved pre-fabricated "air gap drain" as available from the backflow assembly manufacturers must be utilized.

All relief port drain lines shall be piped to an outside point of termination.

The RPZ relief valve shall be a minimum of 12" above any material or ground.

4.22 REPAIRS:

If a containment assembly fails its operational test, the property owner will have 15 days to have all repairs made. Defective parts must be replaced with factory approved parts. If repair is not possible, the containment assembly must be replaced with a containment assembly according to City Code, Public Utilities Handbook, and North Carolina Plumbing Code.

4.23 SERVICE VALVE:

The #1 shut-off valve of the containment assembly and may not be used as a service valve. A service valve shall be installed after the meter and prior to every containment assembly to allow testing, maintenance and replacement of the backflow without the use of a City of Raleigh Public Utilities operating valve. The service valve shall be installed underground, a minimum of 18" distance from meter.

4.24 SUPPORT:

Containment assemblies shall be properly supported so that stress on surrounding piping does not occur. Adequate support must be provided for the containment assembly in the approved orientation either vertically

or horizontally. The containment assembly may not be supported by other piping or unapproved methods of support. (See: North Carolina Plumbing Code Section 308.5)

4.25 TESTING:

Testing of containment assemblies shall be conducted in accordance with Sec. 8-2154 of City Code by a certified tester at the customer’s expense. All newly installed containment assemblies on fire service water lines are to be tested after installation and annually thereafter. A fire service water line may not be used to provide water for any purpose other than fire sprinkler systems. All water use for construction purposes is to be metered. See “construction water” under the policies and procedures section of the Public Utilities Handbook. Additional testing and maintenance requirements may be requested or imposed as determined by the Raleigh Director of Public Utilities or his designee. It is the consumer’s responsibility to keep a complete, written record of any repairs and testing of the containment assembly for at least three years.

Any location that does not have a current passing operational test report on file with the Cross Connection Program will be considered noncompliant. Owners that are in noncompliance can bring their facility into compliance by:

Testing: hire a certified tester to perform an operational test and submit the report to the Cross Connection Program within 15 days of testing.

Terminating: To permanently remove a containment assembly, all controls and valves shall be removed with the piping capped or plugged below ground near the source of connection. The meter box, if existing shall be removed. A plumbing permit and inspection is required to cap or plug piping.

Failed Operational Test: If a containment assembly fails its operational test, the property owner must immediately notify the *Fire Marshal’s* office. The property owner will have 15 days to have all repairs made and the passing operational test turned into the Cross Connection Control Program.

4.26 TESTING SCHEDULE:

Property owners who have containment assemblies on fire sprinkler systems as well as domestic services *may* test domestic containment assemblies in accordance with the annual testing date for the fire containment assembly. Property owners or certified testers are to contact the City of Raleigh’s Cross Connection Program or contracted vendor to arrange this testing schedule exception. All other containment assemblies installed on fire services are to be tested upon installation, replacement, and annually thereafter on or before annual test due date according to zip code:

Zip Code	Annual Test Date	Zip Code	Annual Test Date
27529	September 1st	27606	December 1st
27545	May 1st	27607	December 1st
27560	December 1st	27608	April 1st
27571	January 1st	27608	October 1st
27587	January 1st	27609	April 1st
27591	May 1st	27610	September 1st
27597	May 1st	27612	March 1st
27601	October 1st	27613	March 1st
27602	November 1st	27614	February 1st
27603	November 1st	27615	February 1st
27604	August 1st	27616	February 1st
27605	October 1st	27617	March 1st

4.27 WYE STRAINER:

No strainer shall be allowed on a fire suppression system.

SECTION 5 - Certified Testers

5.1 QUALIFICATIONS:

The City of Raleigh requires that a *certified tester* perform all testing. A certified tester is a person who has proven his/her competency to perform an operational test using a nationally accepted process and accurately complete reports on containment assemblies as evidenced by the successful completion of an approved Cross Connection Control School and compliance with all rules, regulations and policies associated with the Raleigh City Code, North Carolina DENR rules, North Carolina Plumbing Code and the applicable Contractor's licensing board. All contractors who wish to test within the City of Raleigh's water service area must be registered with the City of Raleigh's Cross Connection Control Program and attend an orientation session. Information regarding becoming a certified tester for the City of Raleigh can be found at www.raleighnc.gov under Cross Connection.

5.2 APPROVED BACKFLOW CERTIFICATION SCHOOLS:

Information regarding training programs recognized by the City of Raleigh's Cross Connection Control Program can be found at www.raleighnc.gov under Cross Connection.

5.3 CERTIFIED TESTER RESPONSIBILITIES:

Any certified tester who performs an operational test on any containment assembly connected to the City's public water supply shall file a report regarding the results of that operational test using the City's designated electronic reporting system managed by the currently contracted vendor as published at www.raleighnc.gov. Certified testers shall supply all testing information required by the designated electronic reporting system to included but not limited to test values for containment assembly, size, make, model, serial number and location of containment assembly, name and address of owner as recorded on notice, premise number for fire services, meter number for domestic and irrigation services, and Wake County PIN number for containment assemblies on private distribution and fire sprinkler systems. The fee for any report filed using the electronic reporting system shall be in accordance with Section 8-2154 (b) Testing and Maintenance of Assemblies. In addition, certified testers shall comply with all requirements of this code and the Raleigh Public Utilities handbook. Failure to comply may result in revocation of certified tester status.

5.4 REQUIRED DOCUMENTATION:

A current copy of the following information is required to be on file with the Cross Connection Control Program office in order to be eligible to test within the City of Raleigh's water service area:

- Tester's certificate of training and subsequent recertification training from an approved backflow certification school
- Annual test kit calibration
- Completed orientation packet

5.5 SUSPENSION/PROBATION:

The Raleigh Director of Public Utilities or his designee may suspend or impose probationary provisions to a certified tester found guilty of fraud or deceit or who fails to comply with any provision or requirement of the Raleigh City Code, rule, or policy, North Carolina DENR rules, North Carolina Plumbing Code and the applicable Contractor's licensing boards and for gross negligence, incompetency, or misconduct in the practice of backflow installation, testing, repair or replacement. The City of Raleigh will recognize and comply with any action taken by another agency to suspend or impose probationary provisions to test.

5.6 REVOCATION OF CITY OF RALEIGH BACKFLOW CERTIFICATION:

In 2014, the City of Raleigh established a Cross Connection school for the purpose of certifying and recertifying backflow testers. The City of Raleigh may revoke its certification of a tester who is found guilty of fraud or deceit or who fails to comply with any provision or requirement of the Raleigh City Code, rule, or policy, North Carolina DENR rules, North Carolina Plumbing Code and the applicable Contractor's licensing boards and for gross negligence, incompetency, or misconduct, in the practice of backflow testing.

5.7 RIGHT TO APPEAL

The Raleigh Director of Public Utilities or his designee may provide an opportunity for an approved tester who has been suspended, placed on probation, or had certification revoked to obtain reconsideration of said action upon receipt of a written request received no later than 10 days following the effective date of suspension.

SECTION 6- Exemption for Backflow Installation

Commercial customers who wish to be considered for exemption from installing a domestic containment assembly must apply to the City of Raleigh. Applications can be found at www.raleighnc.gov under Cross Connection.

After receiving a completed application, the Cross Connection Coordinator will decide if a facility will be granted an exemption. Upon acceptance of exemption, a letter of approval will be sent to the facility owner. If a facility is denied exemption, a letter of non-compliance requesting the domestic containment assembly be installed will be sent to the owner. Failure to comply could result in enforcement action.

SECTION 7- Extension of Time for Compliance

Owners of a facility containing a cross-connection that does not pose an imminent health hazard to the public water supply and who wish to apply for an extension of time for compliance not to exceed one year from the date of the original notice issued pursuant to §8-2151 of the Raleigh City Code must provide the Cross Connection Coordinator in writing the following:

1. A completed City of Raleigh Extension Application
2. Three installation bids
3. Completion date for required work
4. Proof of existing or proposed containment assemblies for any severe hazards located within the facility by means a submittal of a passing operational test report.

After receiving the completed application and supporting documentation, the Cross Connection Coordinator will determine if and for how long a facility will be granted an extension considering the length of the estimated time for completion, the cost to achieve compliance and the degree of risk of the cross connection to the public water supply system. In no instance will an extension be granted until all imminent threats at the facility are brought into compliance. The owner who is granted the extension shall indemnify and hold harmless the City from any harm or damages that may result from such person's failure to install any required containment assembly as required by Article D- Water Quality Protection of the Raleigh City Code.