

SENECA
LIGHT WATER

**BACKFLOW
PROTECTION/CROSS
CONNECTION
PROGRAM**

PROTECTING OUR WATER



PROTECTING OUR CUSTOMERS

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City of Seneca
Light and Water Department
Cross-Connection Control
Backflow Prevention Program

The purpose of this document is to outline the policy of the Seneca Light and Water Department (SL&W) Cross-Connection Control/Backflow Prevention Program.

The Backflow Prevention Program was established and implemented in 1985 to protect SL&W's potable water system from contamination and/or pollution due to cross-connection issues. Backflow contamination is a serious plumbing problem that can cause sickness and even death. Backflow can cause contaminants in the potable water distribution system from domestic, industrial, or institutional piping systems with an improperly protected cross-connections system.

Backflow Prevention Assembly installations must meet requirements set by the South Carolina Department of Health and Environmental Control (SC-DHEC), Southern Building Code Congress International's Standard Plumbing Code (SBCCI Current Version) and the City of Seneca Light & Water Department (SL&W).

A list of approved Backflow Prevention Assemblies can be obtained by contacting SL&W's Cross-Connection Control Department. Backflow Prevention Assemblies are listed by SC-DHEC's approval.

We strongly recommend contacting SL&W's Cross-Connection Control Department to verify a particular assembly is approved for use before its purchase and installation.

In response to the changes in water safety regulations and industry technology SL&W Cross-Connection Control Department requirements are subject to change. These requirements are updated periodically, and it is the owners' responsibility to possess the most current revision of these requirements.

The Seneca Light & Water Cross-Connection Control Department deems any Actual or Potential connection between the public water supply and a source of contamination or pollution as a hazard and will require a testable backflow device. The Cross-Connection Control Supervisor will notify you as to which of the devices noted in this Procedure Manual will best protect the potable water of the Seneca Light & Water. Not meeting these compliances with-in a suitable time frame will result in disconnection of the service in question until the device is installed and tested.

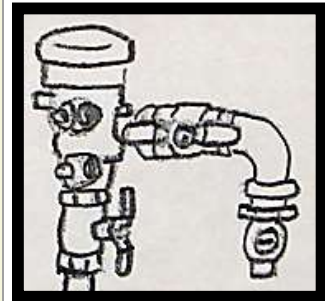
City of Seneca Light and Water Department

Cross-Connection Control Program Requirements For the Installation of Backflow Prevention Assemblies

I. Backflow Prevention Assemblies Selection Requirements

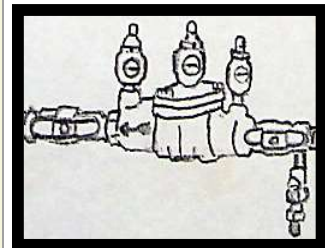
1. PRESSURE VACUUM BREAKER (PVB)

- Versatile
- High hazard systems
- Requires annual testing by a certified tester
- Used most often on irrigation where water source is up-hill
- Cannot be used against backpressure. (lake pumps for irrigation)



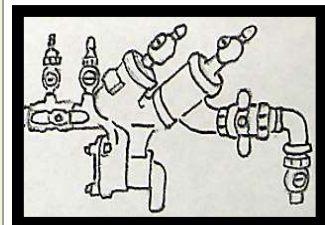
2. DOUBLE CHECK VALVE ASSEMBLY (DCVA)

- Requires annual testing by a certified tester.
- Required on all irrigation systems, water meters supplying more than two residential units, restaurants, two inch or greater water supply line, swimming pools, laundromats, beauty/barber salons, public or private schools, retail stores and all fire line sprinkler systems.
- SL&W requires all commercial customers applying for water service after January 1st 2009 to have a double check valve assembly. This can be waived if the SL&W Cross-Connection Control Supervisor deems it as unnecessary.



3. REDUCED PRESSURE BACKFLOW ASSEMBLY (RPBA)

- Requires annual testing by a certified tester.
- High hazard systems.
- Allows for application of fertilizer or other chemicals into irrigation system. (No other type has this approval)
- Required on all chemical plants, industries using hazardous chemicals, funeral homes, hospitals, medical and veterinary offices/clinics, car washes, sewage treatment plants, dry cleaners, labs, fire line sprinklers which use antifreeze, irrigation systems that are injected with pesticides and/or fertilizers, auto repair garages, and oil changing garages.



II) Backflow Prevention Assemblies Installation Requirements

Seneca Light & Water reserves the right to require a testable Backflow Device on any water service connection deemed to be a hazard by the SL&W Cross-Connection Control Department.

Double Check Valve Assemblies, Reduced Pressure Principal Assemblies, and Pressure Vacuum Breakers

- A) The installation of Backflow Prevention Devices shall meet DHEC's minimum and maximum clearance requirements and shall be accessible for testing and repair. SL&W reserves the right to make exceptions to installation requirements when SL&W determines there are unavoidable piping constraints and/or limited usable space. **All exceptions must be authorized by the SL&W Cross-Connection Control Department prior to work being performed.**
- B) Backflow Prevention Assemblies must be installed on the customer's side of water meter and prior to the first service connection.
- C) Backflow Prevention Assemblies must be installed according to manufacturer's specifications and approved by SL&W.
- D) Backflow Prevention Assemblies must be **Readily Accessible for In-Line Maintenance and Testing.**
- E) SL&W strongly recommend above ground installation of Backflow prevention assemblies be protected from freezing. The Manufacturer's Identification Plate, test cocks, Air-Inlet Valve Bonnet or Relief Valve Vent opening shall not be obstructed with any type of insulation material. In addition to wrapping the assembly, a "heat tape" may be used if power is available at the location of the assembly.

- F) Backflow Prevention Assemblies must be rigid and stable to provide maximum longevity and safety during testing and inspection. The appropriate thrust restraint measures, mechanical supports and concrete slab dimensions are to be determined by the owner/installer to provide rigid and stable support. SL&W reserves the right to require on a case-by-case basis any suitable support and restraint measures as needed.

- G) Connections to any of the Four (4) test cocks will not be permitted. Connections include but are not limited to hose bibs, pipe, wire, gauges or any other fittings.

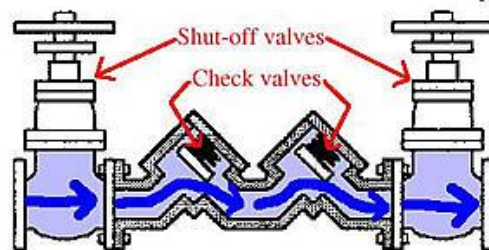
- H) Resilient wedge gate valves and quarter-turn ball valves must be physically attached to the Backflow Prevention Device for operation at the assembly, not on an outside wall or appurtenance. Variations may be granted in the case of piping constraints.

All new installations shall be inspected and approved by a SL&W representative. Upon approval of installation, SL&W will perform the initial test. An annual test is required thereafter.

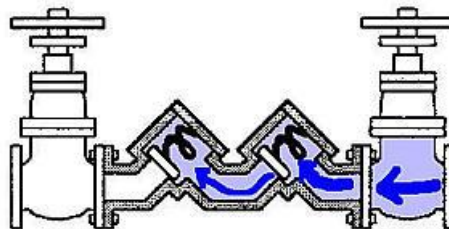
Double Check Valve Assembly Installation (DCVA)

Double check valve assemblies use check valves to prevent water from flowing backwards through pipes. A check valve is a disc or flap that can be pushed open when water flows in the normal direction, allowing water to flow through the pipe, but the check valve is loaded with a spring and closes when water attempts to flow in the opposite direction through the pipe.

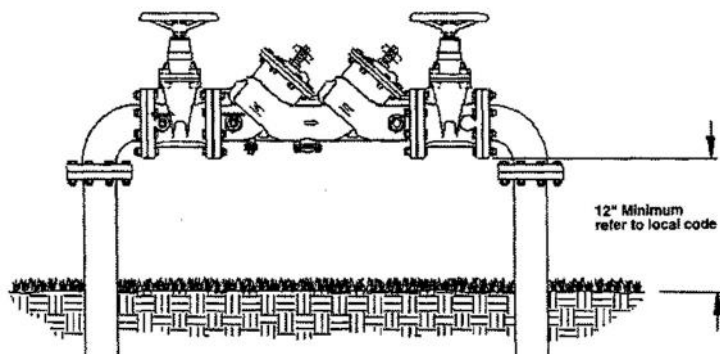
Double Check Valve Assembly:



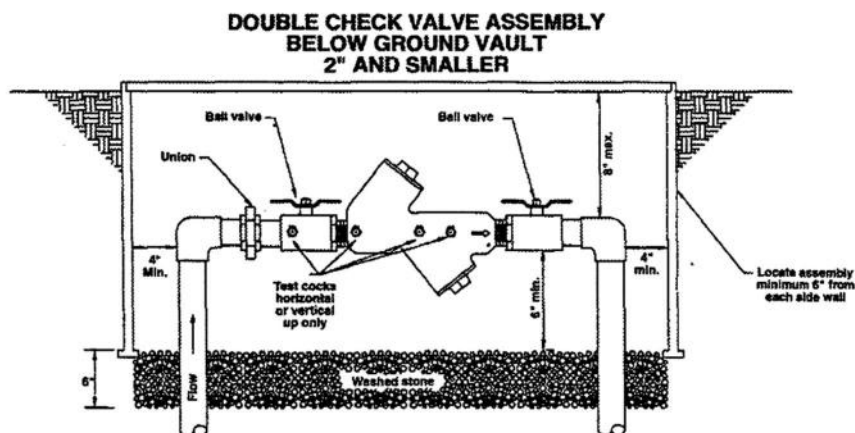
The DCVA is a relatively simple system which can be used to prevent a cross-connection when the backflow would not be hazardous to health. The DCVA consists of a shut-off valve on either end and two check valves in the center. When water flows in the normal direction, as shown above, the check valves are forced open by the flow of the water and water passes through the DCVA without hindrance, but when water attempts to flow in the opposite direction (to backflow), as in the picture above, the springs force the check valves closed. Most of the water is stopped by the second closed check valve. Any water which forces its way through the second check valve will then be stopped by the first check valve.



- A) DCVA should be installed a minimum of one foot (12") above ground level.



- B) DCVA can be installed below ground in a covered box with a minimum six (6) inch clearance under the DCVA and four (4) inch clearance on all sides.



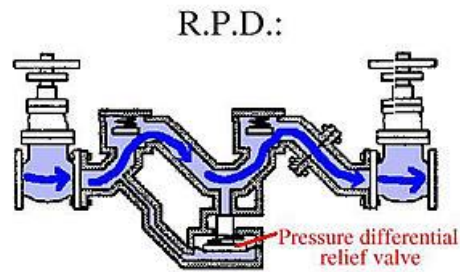
THOROUGHLY FLUSH THE LINES prior to installing a DCVA

Reduced Pressure Principle Assembly Installation (RP)

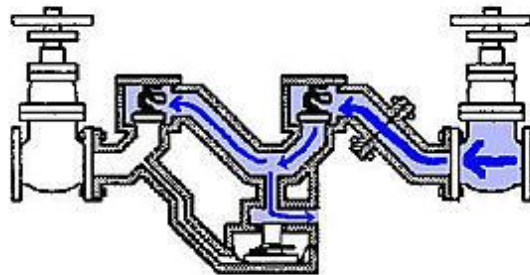
The reduced pressure principle backflow prevention device (R.P.D.) uses check valves to prevent water from flowing backwards through the pipes. A check valve is a disc or flap that can be pushed open when water flows in the normal direction, allowing water to flow through the pipe. But the check valve is loaded with a spring and closes when water attempts to flow in the opposite direction through the pipe.

The R.P.D. is very similar to a double check valve assembly. The R.P.D. has shut-off valves on either end of the assembly and two spring-loaded check valves in the middle like the double check valve assembly. In addition, the R.P.D. contains a hydraulically operating, spring-loaded pressure differential relief valve between the two check valves. This addition makes the R.P.D. suitable for cross-connection control when the backflow could create a danger to public health.

The pressure differential relief valve is a valve which opens and closes in response to a pressure increase on the downstream side of the #1 check valve. A sensory line channels pressure from before the #1 check valve to one side of the relief valve to hold it closed under normal operation. The other side of the relief valve has the same pressure (minus the loss from the #1 check valve spring) trying to open the relief valve. This lower pressure side has a spring helping to open the relief. Under normal condition the relief valve remains closed, but in the case that the #1 check valve fails, or backpressure occurs, it will open and release the pressure before it backflows into the water system.



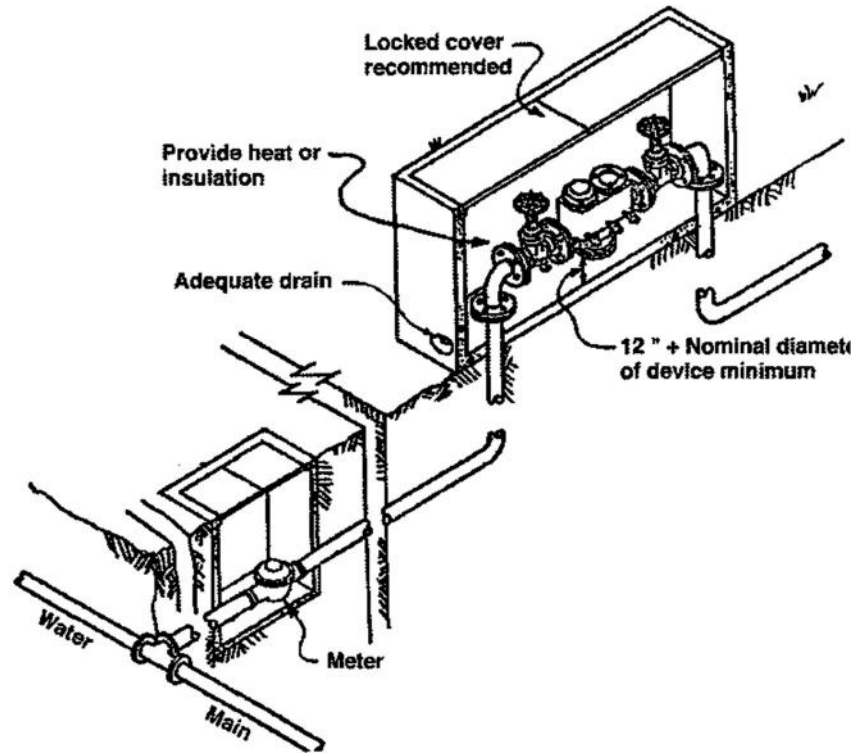
When the water flows through the R.P.D. in the normal direction, as shown above, water forces the check valves open just as it does in a double check valve assembly. In addition, some water flows down a small line onto one side of the relief valve, holding it shut.



However, when water flows in the reverse direction through the R.P.D., the check valves close, as shown on page 7. If the backflow pressure is great, some water could break through the second check valve and flow toward the first. This will increase pressure in the zone between the check valves. The added pressure with the help of the spring will overcome the pressure that is holding the relief closed. This will cause the relief valve to dump and get rid of the water, so as not to risk letting it get past the #1 check valve and entering the drinking water.

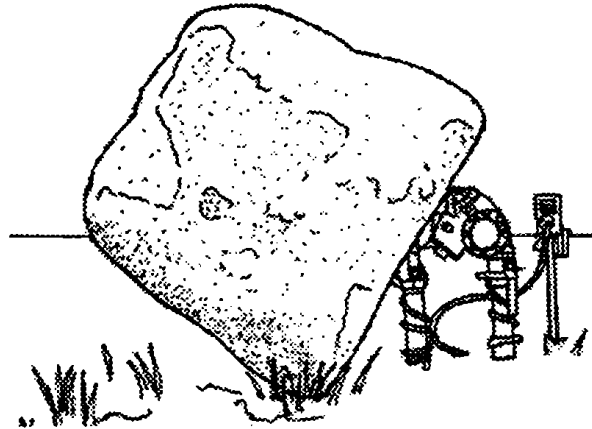
- A) The RP should be installed with adequate space to facilitate maintenance and testing. A space of 12 inches, plus the nominal size of the device, must be allowed on **all** sides of the device. This is necessary for hand tool space as well as removal of some springs, checks, etc.

**TYPICAL INSTALLATION OF
REDUCED PRESSURE PRINCIPLE DEVICE**



- B) All newly installed or replaced Reduced Pressure Principle Devices cannot be installed in a pit below ground level. **All exceptions must be authorized by the SL&W Cross-Connection Control Department prior to work being performed.**

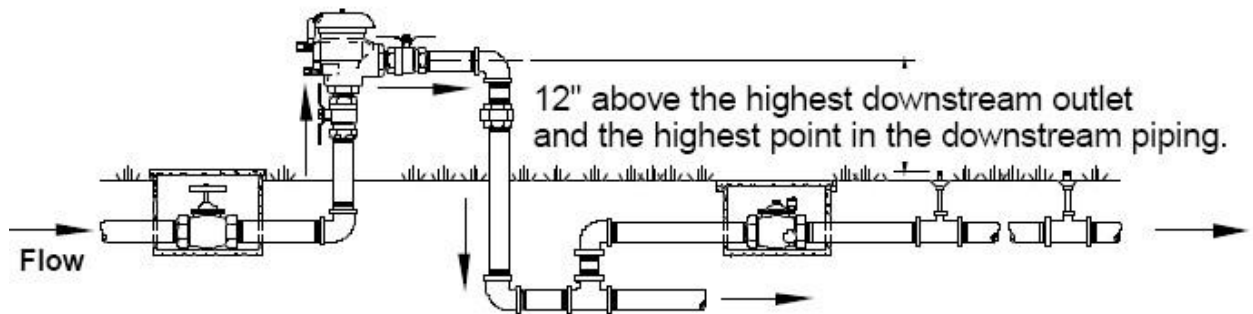
- C) The RP device must be protected from freezing if applicable. There are several different ways to accomplish this. Insulation is often effective. There are several companies which manufacture insulated fiberglass or metal enclosures. These are good because they save the cost of a pit and they keep the RP above the ground for greater ease of testing and repair. If electrical power is readily available heat stripping or heaters may be used as well.



- D) The device must be sized properly in order to accommodate the desired flow. If a facility must have water service on an uninterrupted basis then two or more RP's will be necessary in order for one to be shut down for maintenance, testing or repair.
- E) **THOROUGHLY FLUSH THE LINES** prior the installation of the RP.

Pressure Vacuum Breaker Installation (PVB)

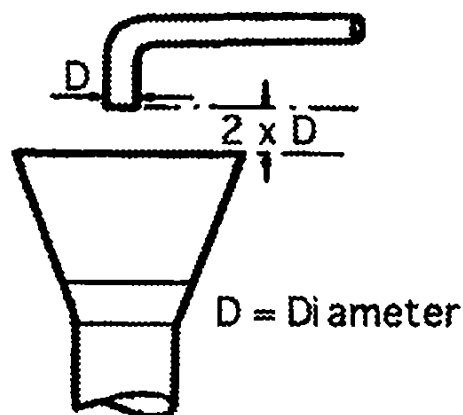
- A) The PVB must be installed vertically, and above ground at least 12" higher than the highest downstream outlet, irrigation, head, or zone.



- B) PVB's are designed to protect against **back siphon only**. Booster pumps shall not be used with a PVB. The PVB may be used for any high, or low hazard application that is not subject to backpressure.
- C) The Air-Inlet Valve Bonnet shall not be covered with any insulation material that could eliminate the admittance of air into the top section of the PVB.

Air Gap

An air gap is a type of isolation control to prevent cross-connections.



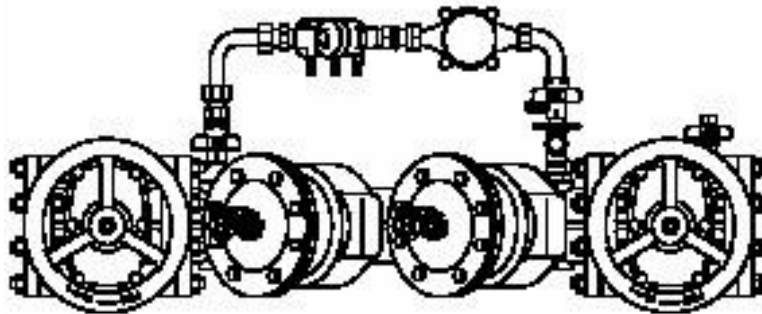
The vertical distance between the supply pipe and the receiving vessel must be at least twice that of the diameter of the supply pipe.

An air gap is the vertical, physical separation between the end of a potable water supply and the flood-level rim of a receiving vessel, as shown above. For example, consider a laboratory in which toxic chemicals may be poured into a sink. As long as the rim of the sink is some distance below the faucet water cannot get sucked back up into the pipe and contaminate the potable water supply.

However, air gaps can be easily bypassed. In one situation, a sink in a bacteriological laboratory was contaminated with undulant fever bacteria. The drain became plugged up, allowing the sink to fill with water. A length of rubber tubing had been added to the end of the faucet in order to allow scientists to easily direct the out-flowing water. In this case, the rubber tubing eliminated the air gap, extending the inflow pipe down into the contaminated water in the sink. Low pressure in the water system caused water to back-flow up through the hose and into the potable water supply. As a result, one person died and eighty others were infected with undulant fever.

Fire Service Installation

- A) SL&W requires an approved Backflow Prevention Assembly on all fire sprinkler systems. This includes wet and dry systems.
- B) All unmetered fire protection service Backflow Prevention Assemblies shall have a Detector Meter with an approved Backflow Prevention Assembly installed.



- C) Installation must be in accordance with DHEC and SL&W specifications. The assembly must be readily accessible for in-line maintenance and testing.
- D) High temperature assemblies must be certified by the manufacturer as capable of withstanding elevated temperatures.
- E) All fire sprinkler services using foaming substances, antifreeze solutions, anti-corrosive additives or other substances determined by SL&W to be a health-hazard shall have a Reduced Pressure Principle Backflow Assembly with a metered bypass also configured with a Reduced Pressure Principle Backflow Assembly. (RPDA)
- F) The resilient wedge gate valves must have an outside stem and

yoke (OS&Y) valve, as required by National Fire Protection Association (NFPA).

- G) No connections will be installed before the Backflow Prevention Assembly such as: lines, gauges, jockey-pumps, booster pumps, Siamese connections, or any other appurtenance such as:
- a. **Unmetered services (Fire Mains)** - no connections between SL&W's connection at the water main and a fire service Backflow Preventer. *
 - b. **Metered Services** - no connections between SL&W's water meter and a domestic Backflow Preventer.
 - c. **Irrigation Meter** - no connections between SL&W's water meter and an irrigation Backflow Preventer.

* The only connection allowed between SL&W's connection at the water main and the fire service Backflow Preventer is a domestic service line with its own separate Backflow Preventer. The domestic service line "tee" must always be prior to the fire service Backflow Preventer.

III) Testing Requirements for Testers

A) Existing Water Services with Backflow Preventer:

1. **Following Establishing Account:** When an account is established by a customer, a work order is created and given to the Cross Connection Supervisor. He or She sets the meter and makes the initial test. All Backflow Protection Assemblies are required to be tested annually thereafter at the owner's expense. The Cross Connection Supervisor will send a notice to customer, as a reminder to have backflow assemblies tested to comply with the State Primary Drinking Water Act Regulations Sec R61-58.7(F). The notice will give customer **45** days to have the backflow assembly tested. These tests are to be performed by a DHEC certified tester adhering to the Seneca Light & Water Code of Ethics only. SL&W reserves the right to require more frequent testing depending upon the degree of hazard.

NOTE: In the event that customer fails to have their device tested and the test report returned to SL&W within **45** days After the due date, SL&W will have the device tested by a certified tester at the cost to the customer. The cost of tester, as well as administrative fees, will be added to the customer's bill. Testers will be chosen by SL&W based on the previous year's results.

2. **Certified Tester:** Backflow Prevention Assemblies protecting the SL&W distribution system shall be tested **only** by those certified testers whose names appear on SL&W's list of Permitted Backflow Prevention Assembly Testers.
3. **Test Results:** Once a certified tester has tested the backflow assembly the results will be entered through our online testing portal. The tester will be set up to enter the test when the tester completes the mandatory backflow orientation that is provided by The City of Seneca Cross-Connection Control Supervisor.

Test reports will not be accepted in office by mail, fax, or email unless given permission by the Cross-Connection Control Supervisor.

4. **SL&W Backflow Preventer Follow-Up Testing:** SL&W Cross-Connection Control Department will conduct random follow-up testing of Backflow Prevention Assemblies to ensure proper operation. The customer will be given advance notification of testing. SL&W personnel may perform follow-up testing at any time and for any reason to ensure water quality and system protection.

5. **Backflow Preventer Repairs:** SC-DHEC and SL&W require all Backflow Prevention Assemblies to be tested after any repair is made to the assembly. The test results must be entered by the Certified Tester performing the test, to our online testing portal within seven (7) days after testing.

6. **Assemblies Found to be Non-Compliant:** Whenever an existing assembly malfunctions, or fails to pass the annual, periodic, or random test, and it becomes necessary to replace the entire assembly, it must be replaced and installed in a manner consistent with the current SL&W Cross-Connection Control Program requirements in effect at that time. Routine check valve/relief valve or gate/ball valve/seat repairs or replacement will not require the assembly to be re-piped. However, whenever the existing assembly is moved from the present location, or when SL&W finds that the assembly, for whatever reason, no longer ensures adequate protection for the actual or potential degree of hazard present, and the assembly is scheduled for replacement, it shall be replaced by an approved Backflow Prevention Assembly meeting current SL&W Cross-Connection Control Department requirements.

B) Requirements for Existing Services With-out Backflow:

The Cross-Connection Supervisor performs surveys on SL&W distribution system to assure that all of SL&W customers have safe drinking water. The surveys sometimes find un-protected services, in which the following procedures is enforced.

1. **Compliance on Existing Water Services:** A Backflow Prevention Assembly required by SL&W on any existing water service must be installed within forty five (45) days from date of written notification. Failure to comply will result in SL&W having an assembly installed and tested by a certified tester at the cost of the customer as well as administrative fees. High hazards may require a more timely installation.
2. **Change-out (retro-fit):** All plumbers, contractors, and installers must notify SL&W's Cross-Connection Control Department whenever they change-out a Backflow Preventer. The device must be tested after change-out. SL&W Cross-Connection Control Department personnel will then inspect the change-out for conformance and to record/verify the Backflow Preventers make, model, size, serial number and physical location. SL&W will make an inspection within two (2) days.
3. **Refer to A) Existing services with backflow preventer for the following.**

C) Requirements for New Services:

- 1. Following Installation:** The SL&W Cross-Connection Control Department shall inspect all new backflow preventer installs and will perform the initial test at this time. All Backflow Protection Assemblies are required to be tested annually. These tests are to be performed by DHEC certified testers adhering to the Seneca Light & Water Code of Ethics only. SL&W reserves the right to require more frequent testing depending upon the degree of hazard.

- 2. Refer to A) Existing services with backflow preventer for the following.**

V) Other Requirements

- 1. By-Pass Piping:** By-Pass piping is not permitted unless it is equipped with an approved Backflow Prevention Assembly of the same class as the main line assembly. In some instances it may be desirable, if necessary, to install two (2) approved Backflow Preventers in order not to interrupt water service.
- 2. Vertical Installation:** Vertical installation of any Backflow Prevention Assembly is not permitted unless the manufacturer's specifications allow such an installation. Before any type of Backflow Prevention Assembly is installed in a vertical position, approval from SL&W must be obtained.
- 3. Backflow Assembly Removal:** NO CONTRACTOR, PLUMBER, TESTER OR ANY OTHER INDIVIDUAL SHALL REPLACE A BACKFLOW PREVENTION ASSEMBLY WITH A STRAIGHT PIPE OR REMOVE A BACKFLOW PREVENTION ASSEMBLY WITHOUT PERMISSION FROM SL&W'S CROSS-CONNECTION CONTROL DEPARTMENT.
- 4. SL&W's List of Certified Backflow Testers:** SL&W reserves the right to remove any certified tester from its approved List of Permitted Backflow Prevention Assembly Testers found falsifying records, making unauthorized repairs to a Backflow Preventer, failing to demonstrate proper test procedures, or demonstrating a lack of knowledge in Backflow Prevention Cross-Connection Control theory and practice. Any certified tester failing to conform to SL&W's Cross-Connection Control Program rules, policies, or standards will also be removed from the list of certified testers. A certified tester will be suspended from testing backflow prevention assemblies when the accuracy of the tester's gauge is

found to be out of tolerance as specified by the gauge manufacturer's specifications. When the gauge has been replaced, repaired/calibrated as per the manufacturer's specification, the tester will be allowed to continue to perform Backflow Preventer tests.

A list of SL&W Permitted Backflow Testers may be obtained by visiting www.senecalightandwater.com.

- 5. Certified Backflow Preventer Assembly Tester's Responsibility:** The plumbing contractor/tester/repair technician will be responsible for testing, repairing, or overhauling Backflow Prevention Assemblies, and making reports of such repairs to the consumer and to SL&W's Cross-Connection Control Department on forms approved by SL&W. The plumbing contractor/tester/repair technician shall include in the test report a list of all materials and replacement parts used. The plumbing contractor/tester/repair technician shall be equipped with and be competent to use all the associated tools, gauges, and other equipment necessary to properly test, repair, and maintain Backflow Prevention Assemblies. It will be the plumbing contractor/tester/repair technician's responsibility to ensure only original manufacturers' specification parts are used in the repair of or replacement of parts in a Backflow Prevention Assembly. It will be the plumbing contractor/tester/repair technician's further responsibility not to change the design, material, or operational characteristics of an assembly during repair or maintenance without prior approval of SL&W. **It is the tester's responsibility to provide SL&W the original passing or failing test report and to provide a copy of the test report to the owner/customer. Testers failing to conform to these policies may be removed from our List of Permitted Backflow Prevention Assembly Testers.**

ADMINISTRATION

Director of Utilities - Robert W. Faires III, PE

TELEPHONE 864.885.2707

CROSS CONNECTION CONTROL PROGRAM

Superintendent: Emily Taylor

Office: 864.885.2705 Cell: 864.710.8854

Cross-Connection Supervisor: Chris Morgan

Office: 864.916.1501 Cell: 864.710.4246

Water Supervisor: Mark White 864.710.8846

Sewer Supervisor: Chris Brabham 864.710.4692

CUSTOMER SERVICE

SUPERVISOR: PATSY HART 864.885.2728

Oconee Joint Regional Sewer Authority

Chris Eleazer

864.972.3900

DISCLAIMER: These specifications are subject to change for the implementation of special provisions and/or conditions hereinafter set forth.

