

# BEACON HILL WATER AND SEWER DISTRICT

## RECOMMENDED INSTALLATION PRACTICE FOR BACKFLOW PREVENTION ASSEMBLIES

### INTRODUCTION

Beacon Hill Water and Sewer District (BHWSO) is required by WAC 246-290-490 to develop and implement a Cross Connection Control program that protects public health by preventing contamination of the public water system through cross connections. This is achieved through premises isolation backflow protection. Premises isolation should not be relied upon for protection of the residence. **PREMISES ISOLATION PROTECTS THE PUBLIC WATER SYSTEM FROM THE PROPERTY ONLY.** Backflow devices for the protection of property residents from specific fixtures fall under the jurisdiction of the Plumbing Code and local building department.

All backflow prevention assemblies must be installed in a manner that will facilitate their proper operation and in-line testing and maintenance. They also must be installed in compliance with safety regulations and all applicable building and plumbing code regulations. An improper assembly installation decreases the reliability of the assembly in preventing backflow because:

- an unsafe or inaccessible location reduces the likelihood of an assembly being tested and maintained;
- improper orientation of an assembly may prevent its proper operation;
- installation in a hazardous environment may allow contaminants to enter the assembly through test cocks, relief valve ports or air inlets, or corrosion damage; and/or
- Freezing temperatures or high temperatures may damage the assembly.

Each manufacturer provides recommendations for the proper installation of their assemblies. While it is important to consult the manufacturer's instructions prior to the installation of any assembly, BHWSO may have installation requirements that differ from the manufacturer's recommendations.

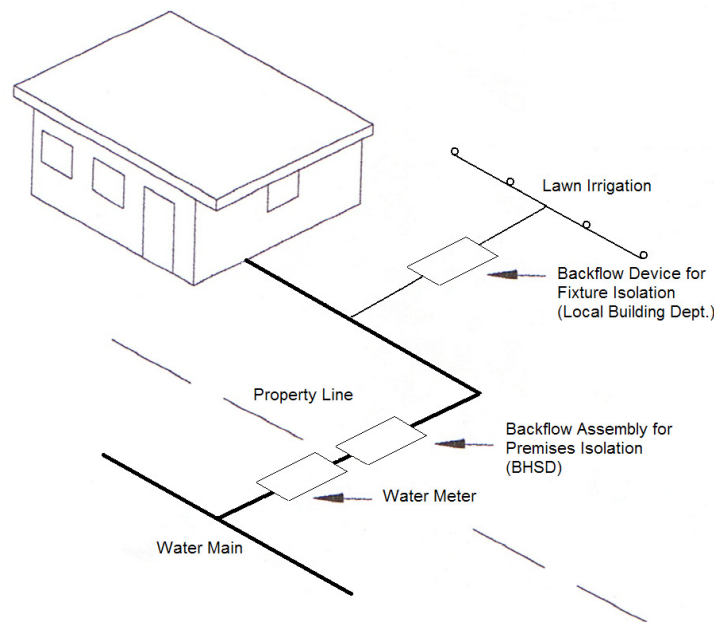
### GENERAL INSTALLATION REQUIREMENTS

The following installation practices are common to all backflow prevention assemblies:

1. All backflow devices must be included on Washington State Department of Health's list of Backflow Prevention Devices Approved for Installation in Washington State.
2. Upon installation, BHWSO personnel must be contacted to witness testing by a Washington State Certified Backflow Tester. Testing is at the property owner's expense. Twenty-four hours notice is required for scheduling.
3. All installations shall meet the minimum requirements found in *Cross-Connection*

*Control Manual, Accepted Procedure and Practice* published by the Pacific Northwest Section of the American Water Works Association (PNWS-AWWA Manual)

4. Premises isolation assemblies (those installed on service connections that directly protect the public water supply) must be installed at the property line immediately adjacent to the water service connection (see Diagram 1). Alternate locations are subject to BHWSO approval.
5. An assembly installed more than five (5) feet above floor or ground level must have a permanent platform under it for the tester or maintenance person to stand on. The platform must comply with all applicable safety standards and codes in effect.



**Diagram 1**

6. When installed in an enclosure, adequate space consideration must be given for proper testing and maintenance.
7. Be careful to insure that the assembly is not installed where the temperature and pressure is maintained above the assembly's rated capacities.
8. The installation of a backflow assembly may alter system-operating pressure, flow, and/or influence other hydraulic functions. Additionally, thermal expansion may result from the installation of a backflow assembly. It is the property owner's responsibility to ensure system-operating requirements are adequate. **WARNING: SERIOUS DAMAGE CAN OCCUR TO A PLUMBING SYSTEM IF THE PRESSURE AND HIGH TEMPERATURE CAUSED BY THERMAL EXPANSION IS NOT RELIEVED. IN PARTICULAR, EXCESSIVE WATER TEMPERATURE AND/OR EXCESSIVE WATER PRESSURE IN HOT WATER HEATERS (TANKS), IF NOT RELIEVED, CAN CAUSE THE HOT WATER TANK TO EXPLODE. THE CUSTOMER'S HOT WATER TANK AND**

**CONNECTED PLUMBING SYSTEM WOULD NORMALLY BE PROTECTED BY A TEMPERATURE- PRESSURE RELIEF VALVE LOCATED AT OR NEAR THE TOP OF THE HOT WATER HEATER. IN ADDITION, UNDER PLUMBING CODES, A THERMAL EXPANSION TANK MAY BE REQUIRED.**

9. Size the assembly hydraulically to avoid excessive pressure loss. The head loss is not necessarily proportional to flow. Some assemblies have a high head loss at low flows and low head loss at high flows.
10. In areas where debris content in the water supply is high, good plumbing practice recommends a strainer with blowout tapping ahead of the assembly.
11. Assemblies 2 1/2 inches and larger shall have support blocks to prevent damage to the assembly or piping. Consult the specific manufacturer for the recommended location of supports.
12. Thoroughly flush the lines before installing the assembly to eliminate debris from the lines. Years of experience have shown that most "failure to test satisfactory" results in new installations are caused by debris fouling one of the check valves or the relief valve.
13. If a customer requires continuous, uninterrupted service, provisions shall be made for the parallel installation of two or more backflow prevention assemblies of the same type. The two or more assemblies shall have a combined capacity to maintain the flow rate of the single service pipe as established by the AWWA specification for that size of pipe. Two separate services, with a single assembly on each, also may be installed. Service to hospitals is one example where this type of installation is required.
14. Backflow prevention assemblies should be protected from accidental physical damage. Assemblies placed in work areas, areas of public access or vehicular traffic should be protected by fenced enclosures, stanchions or other similar means.

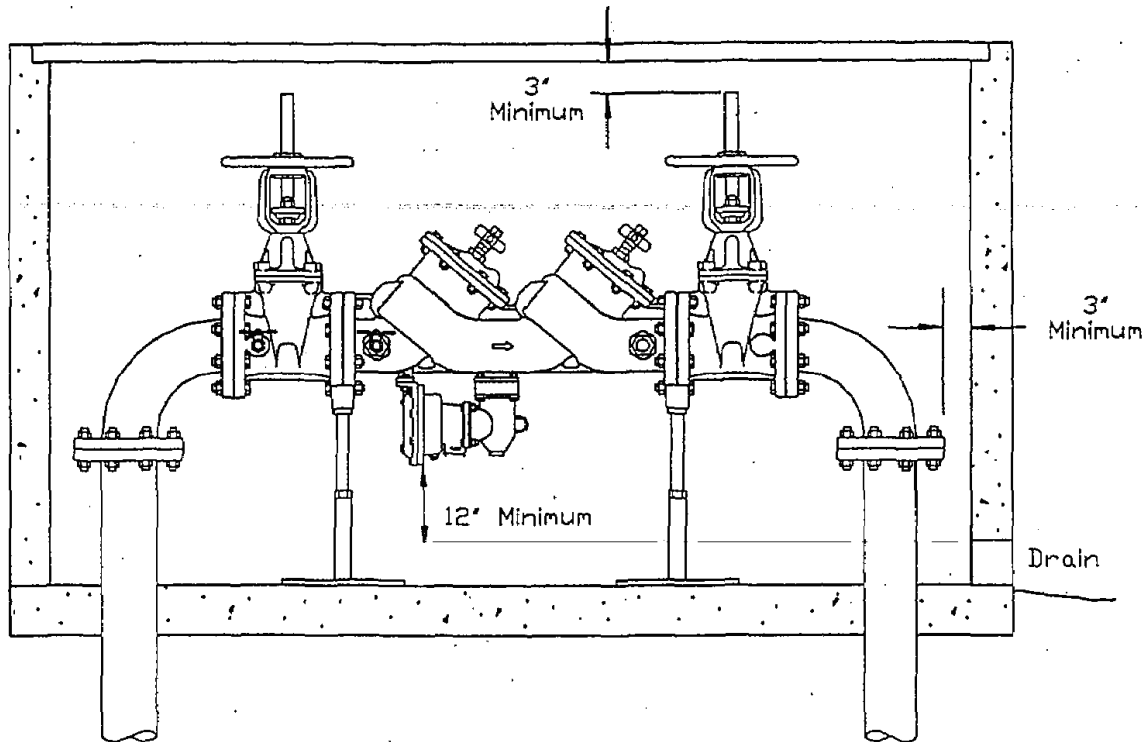
## **INSTALLATION REQUIREMENTS SPECIFIC TO ASSEMBLIES**

### **REDUCED PRESSURE BACKFLOW ASSEMBLY (RPBA) REDUCED PRESSURE DETECTOR ASSEMBLY (RPDA)**

The following installation practices are common to all reduced pressure principle assemblies and reduced pressure detector assemblies:

1. An RPBA shall only be installed in the orientation for which they are approved (e.g., horizontal configuration). Any other orientation may deter the RPBA from preventing backflow. For example, assemblies approved for vertical installation may have the check valve and isolating valve features installed vertically, but the relief valve feature installed horizontal.

2. An approved air gap shall be located directly below the relief valve orifice. The air gap shall be at least twice the inside diameter of the supply piping measured vertically above the top of any drain or receiving vessel. The air gap shall never be less than 1”.
3. When the RPBA is installed in an above ground freestanding enclosure, the enclosure shall drain to finished grade and be able to discharge the full rated flow of the relief valve. The relief valve shall be located at least 12 inches above top of drain opening. For all clearances, see Diagram 2.



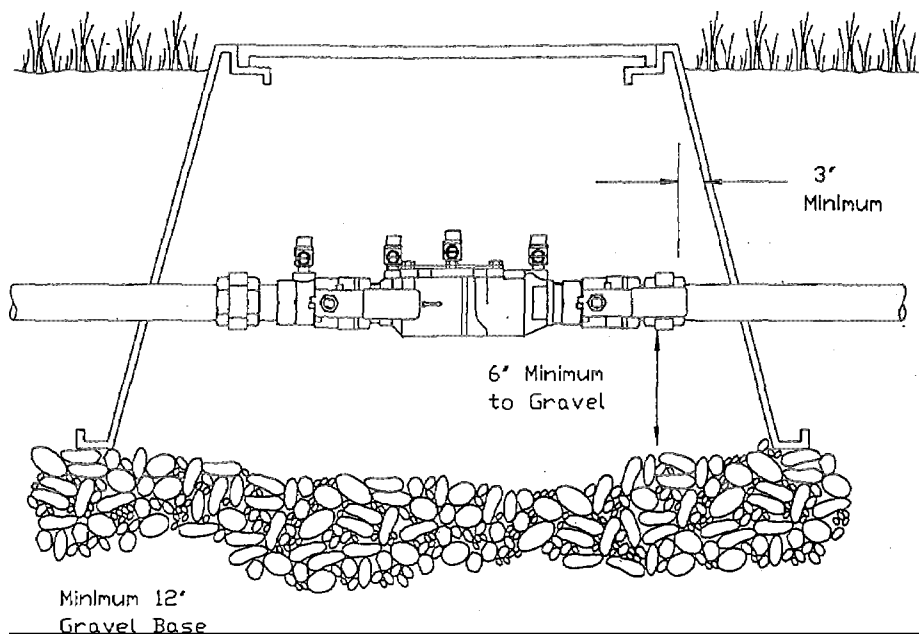
**Diagram 2**

1. When the RPBA is installed in an enclosure in a berm or hillside, the enclosure shall be equipped with a horizontal bore sight drain to daylight, which must discharge to finished grade. The relief valve shall be located at least 12 inches above the top of the drain opening. The discharge end of the bore sight drain must be at least 12 inches above the flood rim of any physical feature such as but not limited to ponds, fountains, lakes, rivers, swales etc. The bore sight drain must be screened off at both ends and not exceed 20 feet in length.
2. Installation of an RPBA may significantly alter the pressure and or volume of the water supply. It is the responsibility of the property owner and or installer to ensure that flow and pressure requirements downstream of an RPBA are adequate.
3. Installation must be at the service connection to the property, immediately adjacent to the service connection and prior to any branches in the water piping system.

**DOUBLE CHECK VALVE ASSEMBLY (DCVA)  
DOUBLE CHECK DETECTOR ASSEMBLY (DCDA)**

The following installation practices are common to all double check valve assemblies and double check detector assemblies:

1. A DCVA shall only be installed in the orientation for which they are approved (e.g., horizontal configuration). Any other orientation may deter the DCVA from preventing backflow.
2. A DCVA may be installed in a pit below ground. If so, adequate room for testing and maintenance must be provided. Plugs should be installed in the test cocks to reduce the risk of groundwater being siphoned through a leaking test cock. See Diagram 3.
3. The following are the recommended minimum size for a meter box for below ground DCVA installation:  
3/4" to 1" Assemblies: 10"x13"  
1-1/4" to 2" Assemblies: 14"x20"
4. The DCVA must be installed with test cocks facing up or to one side. Sufficient drainage must be provided to prevent assembly from being submerged.
5. "Y" pattern DCVA, when installed in a box below ground level, must NOT have the test cocks facing downward.



**Diagram 3**

## **FREEZE PROTECTION**

Backflow prevention assemblies are installed on all types of water services, so it is not always appropriate to shut down a system to drain the assembly to prevent freezing. All backflow prevention assemblies that are installed above ground level, or in shallow boxes or vaults, must have provisions for freeze protection in areas where freezing may occur.

Experience has shown that freeze damaged assemblies are often damaged beyond repair, so they must be replaced. Therefore, it is a major consideration to provide freeze protection when initially installing an assembly. Freeze protection may be provided in two ways: provide a permanent halted location, or shut off and drain the service for winter.

## **SERVICES THAT REQUIRE YEAR-ROUND OPERATION**

In most cases, some type of permanent shelter should be provided for the assembly. There are several types of commercially available enclosures that will usually protect the assembly from freezing.

Several considerations must be taken into account when a backflow prevention assembly is installed at the property line, as in the case of premise isolation:

- Electricity may be required for lighting and heaters. Adequate space must be provided and local electrical codes must be satisfied.
- Drainage is required from above ground shelters for reduced pressure backflow assemblies.
- If the shelter is not removable, room for testing and maintenance must be provided.