GWINNETT COUNTY
BACKFLOW
PREVENTION

Backflow Prevention By Containment

"Policies and Procedures"
and
"Testers and Installers Manual of Practice"

Richard Pate
Backflow Prevention Coordinator
678-376-6757 (office)
678-376-7131 (fax)

Jimmy Helton
Backflow Prevention Specialist
678-376-6936 (office)
678-376-7131 (fax)

Debbie Marlow
Backflow Prevention Specialist
678-376-7147 (office)
678-376-7131 (fax)

September, 2007

Frank Stephens, Director

FOREWARD

In accordance with the Federal Safe Drinking Water Act and requirements of the Georgia Department of Natural Resources, Environmental Protection Division; and Georgia State Plumbing Code; and the Gwinnett County Code of Ordinances; the Gwinnett County Department of Water Resources has established a policy and procedure for the protection of the public potable water supply/system through "BACKFLOW-PREVENTION BY CONTAINMENT".

The Policy and Procedures as outlined herein, along with other applicable codes, rules and regulations are designed to provide reasonable protection for Gwinnett County's public potable water supply/system against Contamination and/or Pollution resulting from backflow and/or back siphonage through uncontrolled plumbing connections and/or cross-connections.

The information contained in this manual constitutes the policies, rules and regulations of Gwinnett County Department of Water Resources Backflow Prevention program. Approved Installers and Testers are expected to be familiar with all of the information contained in this document and in the "Backflow Prevention Installation Guide". Failure to comply with any of these provisions can result in suspension from the Approved Backflow Prevention Contractors List and/or the Approved Certified Testers List.

Frank Stephens, Director
Department of Water Resources

SEPTEMBER, 2007

GWINNETT COUNTY
DEPARTMENT OF WATER RESOURCES
Backflow Prevention
Protecting Water Protecting People

Gwinnett County
Approved Backflow Prevention Assembly Tester
Policies and Code of Conduct

Gwinnett County Department of Water Resources, as requested by the Georgia Environmental Protection Division, established a Backflow Prevention Program for the benefit of its customers. This program is maintained to assure that Gwinnett County exercises its responsibility to provide safe drinking water to its customers. This program requires certain customers to install backflow prevention assemblies that are required to be tested on an annual basis. Gwinnett County requires anyone wishing to test these backflow prevention assemblies to obtain a Statewide Backflow Prevention Tester Certification. In addition, they will be required to adhere to all Gwinnett County Policies and Code of Conduct. Should a tester fail to comply with any of Gwinnett County Policies and Code of Conduct, he or she will be denied inclusion on the Gwinnett County Certified Backflow Prevention Assembly Testers List. As a result, any submitted test reports from such individual would not be recognized or accepted. Gwinnett County Tester Policies and Code of Conduct are provided below:

1. The Approved Tester shall only record data and sign test forms for assemblies that **he or she** has tested. A tester shall not falsify any data or results obtained from the field test and report it on the Test Data and Maintenance Report. All data on the report must be typed, no handwritten reports will be accepted.
2. The Approved Tester shall confirm **ALL DATA** (make, model, size, serial number, meter number, etc.) on the Test Data and Maintenance Report is correct for the assembly being tested. Any test report that is submitted without this information will not be accepted by Gwinnett County and will be returned to the tester. If a device has been replaced, the tester must make a comment on the Test Data and Maintenance Report stating that the old device has been removed and replaced by a new device.
3. Should any Approved Tester be observed doing “drive-by” testing, they will be subject to immediate removal from the Gwinnett County Certified Testers List and the State Certification Board will be notified regarding the incident.
4. The Approved Tester shall submit the appropriate **Passing or Failing** Test Data and Maintenance Report to Gwinnett County Backflow Prevention Office within fifteen (15) days of performing the field test. If a test report is received after this time frame, the test report will not be accepted and the tester will be required to re-test the assembly in question (at no additional charge to the customer) and re-submit the new test report within fifteen (15) days of the subsequent field test.

5. The Approved Tester shall only test backflow assemblies with a properly working and certified test kit. A copy of the annual calibration report must be submitted to the Gwinnett County Backflow Division. Any Test Data and Maintenance Report submitted with an expired test kit will not be accepted by Gwinnett County and will be returned to the tester.
6. The Approved Tester shall observe existing installations to assure the assembly provides the correct type of protection for the degree of hazard present and that the assembly is properly installed & maintained to Gwinnett County's specifications. If the tester finds either situation to be non-compliant, the tester shall proceed with the field test and note the discrepancy on the Test Data & Maintenance Report for the County's review.
7. The Approved Tester shall comply with Gwinnett County Backflow Inspectors in the exercise of their duties as covered by the rules. The tester shall supply any requested information and/or appear on site of the assembly when requested by Gwinnett County Backflow Inspectors.
8. The Approved Tester has neither the responsibility nor the authority to represent or enforce the Gwinnett County Backflow Prevention Program. Enforcement lies solely with Gwinnett County and its appointed officials.

Any Gwinnett County Approved Tester failing to comply with Gwinnett County Policies and Code of Conduct shall be subject to loss of recognition of Test Reports and be removed from the list of testers within Gwinnett County's area of authority. Gwinnett County will establish a notification system of non-compliance to Tester Policies and Code of Conduct that shall operate as follows:

First Offense – Verbal warning and consultation with the Gwinnett County Coordinator or Backflow Inspector.

Second Offense – Written warning and/or suspension of testing privileges for up to thirty (30) days within the Gwinnett County distribution system, depending on the frequency and severity of the offense.

Third Offense – Revocation of testing privileges within the Gwinnett County distribution system.

GWINNETT COUNTY
DEPARTMENT OF WATER RESOURCES
Backflow Prevention
Protecting Water Protecting People

ACKNOWLEDGEMENT

I have received, read and understand the information, policies, rules and regulations contained in the Gwinnett County Department of Water Resources Backflow Prevention Tester and Installers Manual and agree to fully comply with all of the provisions contained therein.

_____ _____
Name (Print) Company (Print)

_____
Name (Signature)

_____
Date

_____
Phone Number

Backflow Prevention by Containment

"Policies and Procedures"
and
"Testers and Installers Manual of Practice"

Table of Contents

SECTION 1

Backflow Prevention Ordinance

GWINNETT COUNTY
DEPARTMENT OF WATER RESOURCES
Backflow Prevention
Protecting Water Protecting People

GWINNETT COUNTY CROSS-CONNECTION CONTROL AND BACKFLOW PREVENTION ORDINANCE

(Revised – November 2004)

BOARD OF COMMISSIONERS

GWINNETT COUNTY

LAWRENCEVILLE, GEORGIA

ORDINANCE ENTITLED: "GWINNETT COUNTY CROSS CONNECTION CONTROL AND BACKFLOW PREVENTION ORDINANCE"

READING AND ADOPTION: November 2, 2004

At the regular meeting of the Gwinnett County Board of Commissioners held in the Commission Meeting Room, 75 Langley Drive, Lawrenceville, Georgia.

	Present	Vote
F. Wayne Hill, Chairman	Yes	Aye
Marcia L. Neaton, District 1	Yes	Aye
Bert Nasuti, District 2	Yes	Aye
John Dunn, District 3	Yes	Aye
Kevin Kenerly, District 4	Yes	Aye

On motion of Kevin Kenerly, which carried 5-0, the following ordinance was adopted:

BE IT ORDAINED by the Gwinnett County Board of Commissioners, this the 2nd day of Nov., 2004, that the Gwinnett County Code be, and it is, hereby amended by adoption of the attached ordinance, entitled "Gwinnett County Cross Connection Control and Backflow Prevention Ordinance."

BOARD OF COMMISSIONERS
GWINNETT COUNTY, GEORGIA

By: F. Wayne Hill
F. WAYNE HILL, CHAIRMAN

ATTEST: Linda D Hardy

Clerk (SEAL)

GWINNETT COUNTY
DEPARTMENT OF WATER RESOURCES
Backflow Prevention
Protecting Water Protecting People

TABLE OF CONTENTS

GWINNETT COUNTY CROSS-CONNECTION CONTROL AND BACKFLOW PREVENTION ORDINANCE

RECITALS

WHEREAS, the Georgia Safe Drinking Water Act of 1977, O.C.G.A. Ch. 12-5, Art. 3, Part 5, and the Georgia Rules for Safe Drinking Water (Ga. Comp. R. & Regs. Ch. 391-3-5) provide that no person shall construct, maintain or operate a physical arrangement whereby a public water system is or may be connected directly or indirectly with a non-potable water system or non-permitted water system which contains or may contain contaminated water which may be capable of imparting contamination to the public water system as the results of backflow or of cross-connections; and

WHEREAS, the Georgia Rules for Safe Drinking Water provide that a supplier of water or any person having possession or control of facilities, which may cause the contamination of a public water system, has the responsibility to prevent water from unapproved sources or any contaminants from entering the public water system by such physical arrangements as bypass or jumper connections, removable sections, swivel or changeover devices, or other temporary, permanent or potential connections through which or because of which backflow or back-siphonage could occur; and

WHEREAS, the Gwinnett County Board of Commissioners supplies drinking water through county-owned facilities to more than 250,000 customers and anticipates that the number of customers will increase significantly in the future; and

WHEREAS, the Gwinnett County Board of Commissioners has determined that cross-connections and backflow of auxiliary water supplies or of non-potable water

source to the public potable water system pose a significant threat to public health, safety and welfare; and

WHEREAS, the Gwinnett County Board of Commissioners, in complying with its responsibilities to the customers of its drinking water system pursuant to the above-cited laws and rules, has determined that the Gwinnett County Department of Water Resources shall be responsible for the protection of the public potable water distribution system from contamination or pollution due to the backflow of contaminants or pollutants through the water service connection; and

WHEREAS, regulations and programs that prevent contamination of the public drinking water system are adopted as an exercise of the police power of the County for the purpose of protecting the public health, safety and welfare.

NOW THEREFORE BE IT ORDAINED by the Board of Commissioners of Gwinnett County that the following Sections are to be inserted into said Gwinnett County Code of Ordinances.

Section 114-52 Short Title, Authority and Applicability

114.-52.1. This Ordinance shall be known and may be cited as the Gwinnett County Cross-Connection Control and Backflow Prevention Ordinance.

114-52.2. This Ordinance shall be codified in the Gwinnett County Code as Chapter 114, Article II, Division 3, to be entitled “Cross Connection Control and Backflow Prevention,” consisting of Sections 114-52 through 114-65, inclusive.

114-52.3. Gwinnett County has the authority to adopt this Ordinance pursuant to Article 9, Section 2, Paragraph I and Article 9, Section 2, Paragraph III of the Constitution of the State of Georgia and Title 12, Chapter 5, Art. 3, Part 5 of the Official Code of Georgia Annotated, which is known as the Georgia Safe Drinking Water Act of 1977 and the Georgia Department of Natural Resources Rules for Safe Drinking Water, Ga. Comp. R & Regs. Ch. 391-3-5 (the "Rules").

114-52.4. The following documents are adopted by reference as if set forth herein: the Rules; the Manual of Cross Connection Control, 9th ed., Foundation for Cross-Connection Control and Hydraulic Research, University of Southern California, 1993; the Recommended Practice for backflow Prevention and Cross Connection Control, American Water Works Association Manual of Water Supply Practices, Manual 14, 2nd ed., 1990; the Georgia State Amendments to the Standard Plumbing Code, 2000 Edition; and the Cross Connection Control Manual, United States Environmental Protection Agency, June 1989.

Section 114-53 Purpose and Intent

114-53.1. The purpose of this Ordinance is to protect the public health, safety, environment and general welfare through the control of cross connections and backflow into the public potable water supply of Gwinnett County. The public potable water supply will be protected from contamination or pollution by isolating within the customer's internal distribution system(s) or the customer's private water

system such contaminants or pollutants which could backflow into the public water systems.

114-53.2. It is the policy of the County to promote the elimination or control of existing cross connections, actual or potential, between the customer's in-plant potable water system(s) and non-potable water system(s), plumbing fixtures and industrial piping systems.

114-53.3. It is the policy of the County to provide for the maintenance of a continuing Program of Cross-Connection Control which will systematically and effectively prevent the contamination or pollution of all potable water systems.

114-53.4. The Board of Commissioners hereby delegates to the Gwinnett County Department of Water Resources the authority and responsibility for the implementation of an effective cross connection control program, for prevention of backflow and for the enforcement of the provisions of this Ordinance.

Section 114-54 Definitions

114-54.1. **Air Gap** means a physical separation between the free flowing discharge end a potable water supply pipeline and an open or non-pressure receiving vessel. An "**Approved Air Gap"** shall be at least double the diameter of the supply pipe measured vertically above the overflow rim of the vessel-in no case less than 1 inch (2.54 cm).

114-54.2. **Approved** as used in reference to a water supply means a water supply that has been approved by the health agency and as used in reference to an air gap, double check valve assembly, a reduced pressure principle backflow prevention assembly or other backflow prevention assemblies or methods shall mean an approval by the Department as provided for in Section 8 of this Ordinance.

114-54.3. **Approved Backflow Prevention Assembly** means an assembly that has been manufactured in full conformance with the standards established by the American Water Works Association entitled:

AWWA/ANSI C510-92 Standard for Double Check Valve Backflow Prevention Assemblies; or

AWWA/ANSI C511-92 Standard for Reduced Pressure Principle Backflow Prevention Assembles; and

has met completely the laboratory and field performance specifications of the Foundation for Cross Connection Control and Hydraulic Research of the University of Southern California (USC FCCCHR) established in Specifications of Backflow Prevention Assemblies-Section 10 of the most current edition of the "Manual of Cross Connection Control."

114-52.4. **Auxiliary Water Supply** means any water supply on or available to the premises other than the purveyor's approved public water supply. These auxiliary water supplies may include water from another spring, river, stream, harbor, etc., or used waters or industrial fluids. These natural waters may be contaminated or polluted or they may

be objectionable and constitute an unacceptable water source over which the water purveyor does not have sanitary control.

114-54.5. **Backflow** means the undesirable reversal of flow of water or mixtures of water and other liquids, gases, or other substances into the distribution pipes of the potable supply of water from any source or sources. See "Backsiphonage" and "Backpressure".

114-54.6. **Backpressure** means any elevation of pressure in the downstream piping system (by pump, elevation of piping, or steam and/or air pressure) above the supply pressure at the point of consideration, which would cause, or tend to cause, a reversal of the normal direction of flow.

114-54.7. **Backsiphonage** means the flow of water or other liquids, mixtures or substances into the distribution system, as 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.

114-54.8. **Backflow Preventer** means an assembly or means designed to prevent backflow.

114-54.9. **Contamination** means an impairment of the quality of the water, which creates an actual hazard to the public health through poisoning or through the spread of disease by sewage, industrial fluids, waste, etc.

114-54.10. **County** means Gwinnett County, Georgia, a body corporate and politic and a political subdivision of the State of Georgia.

114-54.11. **Cross Connection Control by Containment** means installation of an approved backflow prevention device at the water service connection to any customer's premises where it is physically and economically infeasible to find and permanently eliminate or control actual or potential cross connections within the customer's water system.

114-54.12 **Cross Connection Control by Isolation** means installation of an approved backflow prevention device on the service line leading to and supplying all or a portion of a customer's water system where there are actual or potential cross-connections within the customer's premises which cannot be effectively eliminated or controlled at the point of the cross-connection.

114-54.13. **Cross Connection** means any unprotected connection or structural arrangement between a public or a customer's potable water system and any other source or system through which it is possible to introduce into any part of the potable system any used water, industrial fluid, gas or substance other than the intended potable water with which the system is supplied. Bypass arrangements, jumper connections, removal sections, swivel or change-over devices and other temporary or permanent devices through which or because of which backflow can or may cause are considered to be cross connections. A "**Direct Cross Connection**" shall mean a cross connection which is subject to both backsiphonage and backpressure. An "Indirect Cross Connection" shall mean a cross connection which is subject to backsiphonage only.

114-54.14. **Customer** means any owner of premises receiving county water system service or any end-user thereof, including any and all persons, natural or artificial, including any individual firm, association or trust and any municipal or private corporation organized or existing under the laws of this or any other state or country.

114-54.15. **Department** means the Gwinnett County Department of Water Resources which operates the Gwinnett County water system.

114-54.16. **Director** means the Director of the Department, or his/her designee who is vested with the authority and responsibility for the implementation of an effective cross-connection control and backflow prevention program and for the enforcement of the provisions of this Ordinance.

114-54.17. **Double Check Valve Backflow Prevention Assembly** means an assembly composed of two independently acting, approved check valves, including tightly closing resilient seated shutoff valves attached at each end of the assembly and fitted with properly located resilient seated test cocks. This assembly shall only be used to protect against a non-health hazard (i.e. pollutant).

114-54.18. **Degree of hazard** means a term for evaluating the potential risk to public health based on available information and categorization of potential sources of pollution or contamination and the adverse effect of the contamination or pollution upon the potable water system.

114-54.19. **Health agency** means the Georgian Environmental Protection Division ("EPD"), an agency of the State of Georgia which is charged with

administering the Georgia Safe Drinking Water Act of 1977, O.C.G.A. Ch 12-5, Art. 3, Part 5 and the Georgia Rules for Safe Drinking Water.

114-54.20. **Health hazard** means any condition, device or practice affecting the water supply system and its operation which creates or could create, or in the judgment of the Director may create a present or future danger to the health and well-being of the water customer or the County's potable water supply.

114-54.21. **Industrial fluids** means any fluid or solution which may be chemically, biologically or otherwise contaminated or polluted in a form or concentration which would constitute a health, system, pollutional or plumbing hazard if introduced into tn approved water supply. This may include, but is not limited to: polluted or contaminated used water; all types of process waters and "used waters" originating from the public potable water system which may deteriorate in sanitary quality; chemical in fluid form; plating acids and alkalis; circulated cooling water connected to an open cooling tower an/or cooling waters that are chemically or biologically treated or stabilized with toxic substances; contaminated natural waters such as from wells, springs, streams, rivers, bays, harbors, seas, irrigation to canals or systems, etc.; oils, gases glycerin, paraffin, caustic and acid solutions and other liquid and gaseous fluids used industrially for other processes, or for fire fighting purposes.

114-54.22. **Non-Potable Water** means a water supply which has not been approved for human consumption by the EPD.

114-54.23. **Plumbing hazard** means an internal or plumbing type cross connection in a customer's potable water system that may be either pollution or a contamination type hazard. This includes but is not limited to cross connections to toilets, sinks, lavatories, wash trays and lawn sprinkling systems. Plumbing type cross connections can be located in many types of structures including homes, apartment houses, hotels and commercial or industrial establishments. Such a connection, if permitted to exist, must be properly protected by an appropriate type of backflow prevention assembly.

114-54.24. **Pollution hazard** means an actual or potential threat to the physical properties of the water system or to the potability of the public or the customer's potable water system but which would not constitute a health hazard or a system hazard, as defined herein. The maximum degree of intensity of pollution to which the potable water system could be degraded under this definition would cause a nuisance or be aesthetically objectionable or could cause minor damage to the system or its appurtenances.

114-54.25. **Pollution or polluted** means the presence of any foreign substance (organic, inorganic or biological) in water which tends to degrade the water's quality so as to constitute a hazard or to impair the usefulness or quality of the water to a degree which does not create an actual hazard to the public health, but which adversely and unreasonable affects such water's domestic use.

114-54.26. **Potable Water** means any public potable water supply that has been investigated and approved by the EPD. The system must be operating under a valid health permit issued by the EPD. In determining what constitutes an approved water supply, the EPD has final judgment as to its safety and potability.

114-54.27. **Premises** means any location where there is a water service connection.

114-54.28. **Reduced Pressure Principle Backflow Prevention Assembly** means an assembly containing two independently acting approved check valves together with a hydraulically operating, mechanically independent pressure differential relief valve located between the check valves and at the same time below the first check valve. The unit shall include properly located resilient seated test cocks and tightly closing resilient seated shutoff valves at each end of the assembly. This assembly is designated to protect against a non-health (i.e. pollutant) or a health hazard (i.e. contaminant). This device shall be permitted to be installed where subject to continuous pressure conditions.

114-54.29. **System Hazard** means an actual or potential threat of several dangers to the physical properties of the public or the customer's potable water system or of a pollution or contamination that would have a protracted effect on the quality of the potable water in the system.

114-54.30. **Used Water** means any water supplied by a water purveyor from a public potable water system to a customer's water system after it has passed through the service connection and is no longer under the control of the water purveyor.

114-54.31. **Water Purveyor** means a supplier of water, including the Department, but also includes property owners supplying water for their own use.

114-54.32. **Water Service Connection** means the terminal end of a service connection from the public potable water system, (i.e., where the water purveyor may lose jurisdiction and sanitary control of the water at its point of delivery to the customer's water system). If a water meter is installed at the end of the service connection, then the service connection shall mean the downstream end of the water meter. "Water Service Connection" shall also mean water service connections from fire hydrants and all other temporary or emergency water service connections from the public potable water system.

Section 114-55 Water System

This Ordinance shall apply to all water delivery facilities that provide potable water to the public for consumption. It is recognized that the County owns some of these facilities and that the customer may own other of these facilities. The **County's system** shall consist of all those facilities of the water system used for production, treatment, storage and delivery of water, (including the water meter), to the water service connection. The **Customer's system** shall include those parts of the facilities beyond the termination of the County's system that are used in conveying potable water delivered by the Department to customers, (including any required backflow prevention devices used in conjunction therewith).

Section 114-56 Backflow Prevention and Cross Connection Control Required

114-56.1. The Department shall not allow, install or maintain any water service connection tot eh County's system to any premises unless the water supply is protected from potential backflow and cross connection as required by the laws of the State of Georgia, the Rules of the Georgia Environmental Protection Division, the State of Georgia Plumbing Code and this Ordinance. An approved backflow prevention assembly shall be installed on each service line to a Customer's System immediately downstream of the water meter or as close as physically feasible to the water meter. No backflow prevention assembly other than as specified in this section shall be allowed, installed or maintained without the express written approval of the Director.

114-56.2. If in the judgment of the Director, an approved backflow prevention assembly is required at either the customer's water service connection or within the customer's private water system for the safety of the County's system, the Director shall give written notice to said customer to install such an approved backflow prevention assembly(s) at a specific location(s) on his premises. The Director's judgment shall be based on the Rules and on all policies that the County may adopt to implement this Ordinance.

114-56.2.1. Within thirty (30) days after receipt of written notice from the Director that cross connection protection or backflow prevention assemblies are required, a customer shall install such approved protection or assemblies at the customer's sole expense.

114-56.3. In all cases, a backflow prevention assembly shall be installed before the first branch line leading off the service line wherever the following conditions exist:

114-56.3.1. In the case of premises having an auxiliary water supply which is not or may not be of safe bacteriological or chemical quality and which is not acceptable as an additional source by the Department, the public water system shall be protected against backflow from the premises by installing an approved air gap or an approved reduced pressure principle backflow prevention assembly in the service line commensurate with the degree of hazard.

114-56.3.2. In the case of premises on which any industrial fluids or any other objectionable substance are handled in such a fashion as to create an actual or potential hazard to the public water system, the public system shall be protected against backflow from the premises by installing an approved backflow prevention assembly in the service line commensurate with the degree of hazard. This shall include the handling of process waters and waters originating from the water purveyor's system which have been subject to deterioration in quality.

114-56.3.3 In the case of premises having (1) internal cross connections that cannot be permanently corrected or protected against, or (2) intricate plumbing and piping arrangements or where entry to all portions of he premises is not readily accessible for inspection purposes, making it impracticable or impossible to ascertain whether or not dangerous cross connections exist, the public water system shall be protected against backflow from the premises by installing an approved backflow prevention assembly in the service line.

114-56.3.4. In the case of any premises where there is pollution or polluted water that would be objectionable but not hazardous to health, if introduced into the public water system, the public water system shall be protected by an approved double check valve backflow prevention assembly.

114-56.3.5. In the case of any premises where there is any contamination which is handled in such a fashion as to create an actual or potential hazard to the public water system, the public water system shall be protected by an approved air gap or an approved reduced pressure principle backflow prevention assembly. Examples of premises where these conditions will exist include sewage treatment plants, sewage pumping stations, chemical manufacturing plants, hospitals, mortuaries and plating plants.

114-56.3.6. In the case of any premises where there are actual or potential unprotected cross connections, the public water system shall be protected by an approved backflow prevention assembly at the water service connection.

114-56.3.7. In the case of any premises where, because of security requirements or other prohibitions or restrictions, it is impossible or impractical to make a complete implant cross-connection survey, the public water system shall be protected against backflow from the premises by either an approved air gap or an approved reduced pressure principle backflow prevention assembly on each water service connection to the premises.

Section 114-57 Authority to Discontinue Service

The Director may discontinue water service to any premises when a backflow prevention assembly required by this Ordinance is not installed, tested and maintained. The Director may also discontinue water service for failure, refusal, or inability on the part of he customer to install, have tested and maintain said assembly(s), for removal or bypass of said assembly(s) or if an unprotected cross connection exists on the premises. The Director shall not allow water service to be restored until such conditions or defects are corrected.

Section 114-58 Inspection of Customer's System

The Director shall have the right at any reasonable time to enter the customer's premises and to inspect the piping system or systems thereof for cross-connections and for compliance with this Ordinance and the County's backflow prevention policy, unless conditions exist as described in Section 5.3.7 of this Ordinance. The customer's system shall be open for inspection at all reasonable times to authorized representatives of the Department to determine whether unprotected cross connections or other structural or sanitary hazards, including violations of this Ordinance, exist. When such a condition

becomes known, the Department shall deny or immediately discontinue service to the premises by providing for a physical break in the service line until the customer has corrected the condition(s) in conformance with the State of Georgia statutes, regulations and codes relating to plumbing and water supplies and the regulations adopted pursuant thereto.

Section 114-59 Department approval required

Any backflow prevention assembly required herein shall be a make, model and size approved by the Department. The EPD and the Department have approved the following testing laboratory to test and approve backflow prevention assemblies:

Foundation for Cross Connection Control and Hydraulic Research
University of Southern California
KAP-200 University Park MC-2531
Los Angeles, California 90089-2531

Section 114-60 Field test, repair and replacement required

It shall be the duty of the customer at any premises where backflow prevention assemblies are installed to have a field test performed by a certified backflow prevention assembly tester upon installation and at least once per year thereafter. In those instances where the Director deems the hazard to be great enough, he/she may require field tests at more frequent intervals. These tests shall be at the expense of the customer and shall be performed by the Department or by a certified tester approved the Department. The Director shall see that these tests are made in a timely manner. The customer shall repair, overhaul or replace defective assemblies at their expense. Records of such tests, repairs and overhaul shall be kept and made available to the Director upon request.

Section 114-61 Existing approval assemblies may remain

Backflow prevention assemblies that do not meet the requirements of this Ordinance but which were approved by the testing laboratory identified in Section 8 of this Ordinance and were installed before or on the effective date of this Ordinance may, in the discretion of the Director, remain so long as the Director is assured that said assemblies will satisfactorily protect the water purveyor's system. The customer shall be required to establish to the Director's satisfaction that any such backflow prevention assembly has been properly maintained. Moreover, the inspection and testing requirements established in Section 7 and Section 9 of this Ordinance shall apply to any such backflow prevention assemblies. Whenever the existing device is moved from the present location or requires more than the minimum maintenance or when the Director finds that the maintenance constitutes a hazard to health, the unit shall be replaced by an approved backflow prevention assembly meeting the requirement of this Ordinance.

Section 114-62 Authority to Implement Ordinance

The director is authorized to make all necessary and reasonable rules and policies with respect to the enforcement of this Ordinance. All such rules and policies shall be consistent with the provisions of this Ordinance and shall be effective 30 days after being filed with the Department.

114.64.2. All other prior Code sections that may be inconsistent with the terms and conditions of this Ordinance are hereby repealed.

Section 114-65. Code of Gwinnett County.

It is the intention of the Gwinnett County Board of Commissioners and it is hereby ordained that the provisions of this Ordinance shall become and be made a part of the Code of Ordinances of Gwinnett County, Georgia.

BE IT FURTHER RESOLVED that this Ordinance shall become effective on the date set forth below.

BE IT RESOLVED this 2 day of Nov, 2004.

BOARD OF COMMISSIONERS
GWINNETT COUNTY, GEORGIA

By: _____
F. WAYNE HILL, CHAIRMAN

ATTEST:

_____
BRENDA MADDOX,
COUNTY CLERK
[SEAL]

APPROVED AS TO FORM:

_____
FORREST FIELDS,
SENIOR ASSISTANT COUNTY ATTORNEY

SECTION 2

Policies and Procedures

GWINNETT COUNTY
DEPARTMENT OF WATER RESOURCES
Backflow Prevention
Protecting Water Protecting People

POLICY AND PROCEDURES FOR BACKFLOW-PREVENTION BY CONTAINMENT

SECTION I. INTENT, PURPOSE, AND CONTROL:

1. INTENT:

To recognize that all Consumer's water systems connections to apparatus, vessels, etc., that could have impurities in varying degrees and, if not properly controlled and contained, could contaminate or pollute both the Consumer's water system and the Public potable water supply/system. It is also the intent to apply the principle that the type of protection required shall be determined by whether the impurities are hazardous contaminants or non-hazardous pollutants.

2. PURPOSE:

a. To assist the Consumer in protecting his own potable water system against actual or potential backflow and/or backsiphonage of any contamination or pollution by controlling each Cross-Connection or potential Cross-Connection with the Consumer's premises. Referred to as "THE FIRST LINE OF DEFENSE".

b. To protect the Gwinnett County public potable water supply/system against actual or potential backflow by containing, within a Consumer's premises, any pollution or contamination that has entered, or may enter, into the Consumer's potable water system through an undiscovered or uncontrolled Cross-Connection on said premises. Referred to as "THE SECOND LINE OF DEFENSE".

c. To eliminate uncontrolled Cross-Connections to nonpotable systems as well as uncontrolled interconnections to any potable water system that is not a part of Gwinnett County water system; by installing an appropriate Backflow-Prevention Device(s) to isolate such system(s) from that of Gwinnett County's potable water supply/system.

d. To establish , coordinate, execute, and maintain a total Backflow- Prevention Program.

3. CONTROL:

Requires cooperation between Gwinnett County's Department of Water Resources, Plumbing Inspection Department, and its water Consumers in the execution of, and the adherence to the duties and responsibilities of each, as set forth by this Policy and these Procedures, in conjunction with other applicable codes, rules and regulations.

SECTION II. RESPONSIBILITES

1. THE DEPARTMNET of WATER RESOURCES (PURVEYOR);

The Director of the Gwinnett County Department of Water Resources, as authorized through Ordinances adopted by the Gwinnett County Board of Commissioners, is primarily responsible for preventing the contamination and pollution of the Public potable water supply/system by instituting a program of "Backflow-Prevention by Containment". Such responsibility begins at the point or origin of the Public potable water supply and includes all of the distribution system, and terminates at the service-connection for the Consumer's water system. The required consumer-supplied

backflow-prevention device at the service-connection shall provide maximum (Reduced Pressure Zone Assembly-RPZ) or minimum (Double Check Valve Assembly- DCV) protection as concluded by the Director or his authorized representative. In addition, the Director shall exercise reasonable vigilance to ensure that the consumer adheres to this Policy and these Procedures as stated and outlined herein. Section 5-1015, Gwinnett County Ordinance, Revised 1986.

NOTE: In order for the Authority to downgrade from the above required protection a certification of plumbing code compliance, plus annual recertification, will be required.

2. THE PLUMBING INSPECTION DEPARTMENT (INSPECTOR):

The Plumbing Inspection Department is primarily responsible for enforcing the Plumbing Code to prevent contamination and pollution within the Consumer's water system throughout a program of "Backflow-Prevention by Cross-Connection Control", requiring that all plumbing outlets terminate through an approved air gap or be controlled by an approved mechanical backflow-prevention device. Such responsibility begins at the service-connection to the premises and extends to the extremities of the Consumer's potable water system.

3. THE CONSUMER (CUSTOMER):

The Consumer has the responsibility for protecting both the potable water in his own system from degradation due to conditions originating on his premises, by complying with the Plumbing Code, and also for protecting the quality of water in the Gwinnett County water supply/system against any potential or actual health hazard(s) generated on or from his premises through uncontrolled cross-connections, by Backflow-Prevention at the service-connection. Therefore, after the Authority has determined the type of backflow protection that is required at a Consumer's service-connection, the Customer is then responsible for the costs of procurement, installation, testing, repair, and maintenance of said device.

SECTION III. IMPLEMENTATION and ENFORCEMENT

1. This Policy and these Procedures shall be implemented immediately for Backflow-Prevention by Containment; in conjunction with the existing Georgia State Plumbing Codes for Backflow-Prevention by Cross-Connection Control on all new domestic water, fire protection, and irrigation system installations.
2. Implementation of this Policy and these Procedures shall also commence immediately on existing installations. Priority schedules shall be established and evaluations made by the Gwinnett County Department of Water Resources for the Consumer's retrofit requirements at the service-connection, beginning with those Consumers whose premises represent the greatest potential threat to the public potable water supply/system. The Department of Water Resources however, shall

not be responsible for abatement of cross-connections which may exist within a consumer's premises. As a minimum, the evaluation shall consider: the existence of cross-connections; the nature of the materials handled on the property; the probability of a backflow occurring; the degree of piping system complexity; and, the potential for system modification.

3. Enforcement of this policy and these procedures shall be administered by the Gwinnett County Department of Water Resources, utilizing its staff in cooperation with those of the Plumbing Inspection, Environmental Health, and Fire Department of Gwinnett County as authorized by the Gwinnett County Board of Commissioners.

SECTION IV. INSPECTION of FACILITIES:

1. The Consumer, upon request, shall furnish to the Department of Water Resources, any pertinent information regarding the Consumer's water system on such premises where backflow and/or backsiphonage are deemed possible through uncontrolled plumbing connections and/or cross-connections.
2. Nothing herein shall relieve the Consumer of the responsibility for conducting or causing to be conducted periodic surveys of water-use practices on his premises to determine whether there are actual or potential uncontrolled cross-connections within the Consumer's water system through which contaminants or pollutants could flow back into his own and/or the Gwinnett County public potable water supply/system. If the premises is classified restricted or high

security with no admittance, maximum (RPZ) protection at the service connection is required.

3. Facilities considered to pose an actual or potential contamination and/or pollution threat to the Public potable water supply/system will be subject to inspection by an authorized representative(s) of the Water Resources Department and, when deemed necessary, in accompaniment with a representative(s) from the Plumbing Inspection, Health, and/or Fire Departments. Inspections will focus on plumbing outlets and potential contaminating or polluting substances within a facility. Inspections will be scheduled at a time mutually agreeable with the Consumer's representative and the Gwinnett County representative(s). Using information gathered, the Department of Water Resources will determine the degree of potential backflow hazard and specify the type of backflow protection required at the Consumer's service-connection.

4. If, upon inspection, a facility is found not to be in full compliance with the plumbing code, maximum protection will be required. If the owner brings the facility up to full code compliance within a ninety (90) day period, minimum protection may be allowed at the service-connection provided potential hazards within the premises are isolated.

5. After reasonable notice to the Consumer, of a violation of this Policy and/or these Procedures existing on the premises, water service shall be discontinued, and any other such precautionary measures taken that are deemed necessary to protect the quality of the water in the Gwinnett County potable water

supply/system. Water service shall not be restored until the danger has been eliminated in compliance with the provisions of this procedure.

6. While in the course of a routine inspection or special investigation, the Inspector(s) discovers a condition of imminent or actual high hazard system contamination, the inspecting department's representative shall be authorized to IMMEDIATELY DISCONTINUE service to the facility. Service will not be restored until the hazardous condition has been corrected and re-inspected.

7. In the event of accidental contamination or pollution of Public potable water supply/system, the Consumer, if he is so aware, shall IMMEDIATELY NOTIFY the Gwinnett County Department of Water Resources so that appropriate measures may be taken to contain and isolate the contaminant and/or pollutant.

NOTE: Cost liabilities are the Consumer's responsibility, and known failure to report is a criminal offense punishable under County, State, and Federal Law.

SECTION V. WATER from OTHER SOURCES and FIRE HYDRANTS:

1. When any premises is served by the Gwinnett County water system, and the owner of said premises continues to have a well or any other source of water, it shall be in violation of this Policy and/or Procedures for the plumbing on said premises to be installed or so interconnected that water in the Gwinnett County water supply/system and the private water supply can, in any way, become intermingled.
2. Upon discovery of an uncontrolled interconnection on any premises being furnished water through the County water system, as in Item (1) above, the owner of said premises shall be notified that the interconnection must be removed and/or controlled by an approved backflow-prevention device within thirty (30) days, and that failure to remove or correct the interconnection will result in removal of the meter. If the correction is not made within the thirty (30) day period, the meter will be removed and will not be reinstalled until the maximum-type backflow protection is installed at the service-connection, and the owner has paid for all associated costs.
3. Booster pumps installed on the service line to or within any premises, must be approved and permitted by the Gwinnett County Department of Water Resources, and such permitted pumps shall be equipped with a low-pressure cut-off device designed to shut off the booster pump when the pressure in the service line on the suction side of the pump drops to 15 psi or below. It shall be the duty of the water Consumer to maintain the low-pressure cut-off device in proper working order at all times and to certify to the Department of Water Resources, at least once a year that the device is operable.

NOTE: Consumer shall assume all liabilities.

4. Tanks, tanker trucks, seed spraying trucks, and other containers that will be filled with water obtained under the "Fire Hydrant Water Use Permit" Policy must be inspected, approved, and permitted by the Gwinnett County Department of Water Resources for the permanent installation of an approved air gap or reduced pressure zone backflow-prevention device prior to issuance of the hoses, etc., to a fire hydrant for purposes other than filling an approved tank or tank truck shall also include, as a minimum, a prior approved and inspected double check valve backflow preventer. (See illustration; Fig. 7, Appendix.)

SECTION VI. SELECTION of DEVICES (also see Fig. 6, Appendix)

1. Vacuum breakers and backflow preventers shall be selected on the basis of the impurities involved and the type cross-connection. The impurities shall be classified as contaminants (hazardous) and/or pollutants (non-hazardous); and the cross-connection by whether it is a pressure or nonpressure as follows: (See Terminology; Page 17, Appendix.)

   a. CROSS-CONNECTION, NONPRESSURE TYPE: This type of connection, when not protected by a minimum air gap, shall be protected by an appropriate vacuum breaker or an appropriate backflow preventer (BFP).

   b. CROSS-CONNECTION, PRESSURE TYPE: This type connection shall be protected by an appropriate BFP only.

   c. CAUTION: A pressure vacuum breaker shall not be used alone on a pressure-type cross-connection.

   NOTE: Because an irrigation system serves an environment that is open to atmosphere, it would not be classified as a pressure-type cross-connection. However, due to the special nature of the installation, minimum protection against backflow shall include a dual check or double check valve backflow preventer. If chemicals are injected into the system, minimum protection shall include a reduced pressure zone backflow preventer. Section 1105.7, Georgia State Plumbing Code (See illustration, Fig. 8, Appendix.)

2. Vacuum breakers shall be corrosion resistant. Other backflow-prevention devices, including accessories, components, and fittings in sizes through 2 inch shall be bronze with threaded connections. Sizes above 2 inch shall be bronze; or iron that has been fused epoxy-coated inside and out, and have flanged connections.
3. Each device shall have a brass identification tag; securely attached with corrosion-resistant mechanical fasteners, and/or be embossed to notate the manufacturer's name, serial number, and maximum working pressure and temperature.

SECTION VII, APPROVAL of DEVICES:

All backflow-prevention devices shall be approved in accordance with the applicable standard of the American Society of Sanitary Engineering (ASSE), the American National Standards Institute (ANSI), the American Water Works Association (AWWA), the University of Southern California Foundation for Cross-Connection Control and Hydraulic Research (USC), and the Georgia State Plumbing Code.

EXCEPTION: If no standard yet exists for a particular device, or if the device is a derivative of one covered by a national standard, the Department of Water Resources shall determine whether the device will be allowed.

SECTION VIII. LOCATION and INSTALLATION of DEVICES:

1. Location of all backflow-prevention devices shall be in an area that provides a safe working environment for testing and maintenance. The area shall be readily accessible, dry, free from dirt, extreme cold, heat, and/or electrical hazards.

2 Installation of all backflow-prevention devices shall be in accordance with the following procedures, the Georgia State Plumbing Code, and other applicable codes and regulations. Installations for containment shall be by a duly licensed plumber, mechanical and/or utility contractor; and as approved by the Department of Water Resources.

a. When a dual or double check valve backflow preventer is used in the containment concept, it shall be installed at or as close to the service connection as practical, in an approved meter box, covered vault or insulated enclosure.

b. When a reduced pressure zone backflow preventer is installed at the service-connection it shall be above ground in a structure that is protected from freezing. In lieu of the above-ground installation at the service-connection, and at the owner's request, the water purveyor and the plumbing official may allow the RPZ to be installed immediately inside the building, in which case the device would remain under the jurisdiction of the Gwinnett County Department of Water Resources and subject to periodic inspections, and testing by its authorized representative.

NOTE: When a backflow preventer is installed in a service pipe inside a structure on any premises for the purpose of containing said premises, it shall be unlawful to tap into such service pipe between the BFP and the service-connection. Any branch connection(s) on an existing service pipe shall be permanently disconnected or equipped with a backflow preventer(s) commensurate with the degree(s) of hazard. Section 1105.2©, Georgia State Plumbing Code.

3. Facilities that must have a continuous uninterrupted water supply shall install backflow-prevention devices in parallel for testing and maintenance purposes. In no case shall a bypass arrangement be installed unless it is also equipped with an approved backflow-prevention device.
4. Vacuum breakers and backflow preventers equipped with atmospheric vents, or with relief openings, shall be so installed and so located as to prevent any vent or any relief opening from being submerged. They shall be installed in the position as recommended by the Manufacturer, and as prescribed in the following:
   a. VACUUM BREAKER, ATMOSHPERIC TYPE (AVB): This device shall be at least 6 inches above the highest outlet or the overflow level on the nonpotable system. It shall be installed downstream of the last shut-off valve. (Fig. 2, Appendix.)
   b. VACUUM BREAKER, PRESSURE TYPE (PVB): This device shall be installed at least 12 inches above the highest outlet or the overflow level on the nonpotable system. It may be installed upstream of the last shut-off valve. (Fig. 3, Appendix.)
   c. VACUUM BREAKER, HOSE TYPE (HVB): This device shall be installed directly on the hose hydrant, if not an integral part of the valve. It may not be subjected to continuous pressure, static or flowing; and/or to freezing temperatures, unless it is a model that drains automatically.

CAUTION: Freezeless ("frost-proof") hydrants shall include an integral vacuum breaker with automatic drainage feature, per ASSE Standard-1019. (Fig. 2, Appendix.)

d. BACKFLOW PREVENTER, DUAL CHECK (DuC): This device shall not be buried in earth but may be installed below ground as in a meter box. A union shall be provided on each end and a full-port ball valve shall be near the inlet and outlet sides to allow removal for maintenance. The two checking devices shall be capable of independent operation as per ASSE Standard – 1024.

   NOTE: When a meter or other device with bronze strainer, integral or attached, is not immediately upstream of the Dual Check (DuC), a bronze strainer shall be provided between the inlet shut-off and the DuC.

e. BACKFLOW PREVENTER, DOUBLE CHECK VALVE (DCV): This assembly shall not be buried in earth but models with top and/or side access to both checks may be installed below ground as in Para. (2a). When below ground, a flange or swivel coupling nut shall be on the inlet and outlet sides of the checking device and all assembly bolts on bronze DCV's so installed shall be resistant to electrolysis. A full-port ball valve in sizes through 2 inch, and a resilient-seat OS&Y gate valve in sizes above 2 inch, shall be on the inlet and outlet sides of the device. The device shall be provided with three ball valve test cocks and a fourth test cock shall be provided on the upstream side of the inlet shut-off valve. Sizes through 2 inch shall be provided with plastic or brass, plugs

or caps. No intervening connection(s) shall be between the shut-off valves and the backflow preventer.

NOTE: When a meter or other device with bronze strainer, integral or attached, is not immediately upstream of the backflow preventer a bronze strainer shall be provided between the inlet shut-off valve and the DCV on sizes through 2 inch. (Fig. 4, Appendix.)

f. BACKFLOW PREVENTER with INTERMEDIATE ATMOSPHERIC VENT (IAV):

This device shall not be installed below ground. Where relief valve discharge could cause water damage, it shall be piped via an air gap, or a funnel, at the vent/relief port to a floor drain or other approved location. A resilient-seat shut-off valve and union shall be near the inlet and outlet sides of the device. Strainer to be included as in Paragraph (d) above.

g. BACKFLOW PREVENTER, REDUCED PRESSURE ZONE (RPZ): This device shall nor be installed below ground. Where relief valve discharge could cause water damage, it shall be piped via an air gap, or a funnel, at the vent/relief port to a floor drain or other approved location. Resilient-seat valves, test cocks, and strainer shall be provided as in Paragraph (e) above. No intervening branch connection(s) shall be between the shut-offs and the backflow preventer. (Fig. 5, Appendix.)

NOTE: When a reduced pressure zone device is installed in a line subject to periodic no-flow conditions, and supply pressure subject to fluctuations, an auxiliary directional check with soft disc, capable of functioning in any position the BFP may be installed in, shall be provided between the inlet shut-off valve and the BFP head to lock the supply pressure in, and prevent unnecessary discharge through the vent and/relief port. Make-up lines to chilled water systems and hydronic heating systems are examples of installations where a drop in supply pressure may occur during no-flow conditions. When a water pressure reducing valve is required in the same line with the RPZ device, it is usually possible to locate the reducing valve upstream of the device and take advantage of the check valve effect of the reducing valve. In such case, the auxiliary directional check would not be required.

**** SPECIAL CAUTION ****

THERMAL EXPANSION – When water is heated and stored in a consumer's water system, or a branch of the system, that has been closed by the installation of a backflow-prevention device, or any other checking device; an auxiliary relief valve, or expansion chamber, shall be installed to limit thermal expansion of the water being heated to not more than 80 psi static (no-flow) pressure at any fixture on the system. Section 1112.8 of the Georgia State Plumbing Code.

SECTION IX. FIRE PROTECTION SYSTEMS:

1. For the purposes of BACKFLOW-PREVENTION by CONTAINMENT, if the service-connection to a premises, from the Gwinnett County potable water supply/system is intended to be used for fire protection service, it shall be classified and/or defined as follows:
   a. DEDICATED service-connection – one that is designated to supply potable water for fire protection service ONLY.
   b. COMBINATION service-connection – one that is designated to supply potable water for BOTH domestic use and fire protection service.
2. To further associate the sources of water that may be used for fire Protection and classes of fire protection systems, the following Georgia State Fire Code Classes shall also apply for Backflow-Prevention by Containment:

   Class 1 – Directly supplied from Public Water mains only; no pumps, tanks, or reservoirs, no physical connection from other water supplies, no antifreeze or additives of any kind; all sprinkler drains discharging to atmosphere, dry wells, or other safe outlets.

   Class 2 – Directly supplied from Public water mains, same as Class 1, except that authorization has been obtained for a booster pump to be installed in the supply line.

   NOTE: Must have special approval and be permitted by the Department of Water Resources. (Refer. Section V, 3)

Class 3 – Directly supplies from Public water mains, same as Class 1, plus one more of the following: Elevated storage tanks or pressure tanks; fire pumps taking suction from above-ground covered reservoirs or tanks. All storage facilities shall be filled from the potable water supply and maintained in a potable condition.

Class 4 – Directly supplied from Public water mains, similar to classes 1 and 2, and with an auxiliary water supply on or available to the premises; auxiliary water supply located within approximately 1,700 feet of the pumper connection.

Class 5 – Directly supplied from Public Water mains, and interconnected with auxiliary supplies, such as: pumps, taking suction from reservoirs exposed to contamination, or rivers and ponds; driven wells, mills or other industrial water systems; or where antifreeze or additives are used.

Class 6 – Directly supplied from Public water mains only, with or without gravity storage or pump suction tanks, and/or interconnection with industrial systems.

3. The following terminology and definitions for types of fire protection systems shall also be applicable;
   a. Sprinkler System – includes express riser pipes that convey water to the laterals that supply sprinkler heads.
   b. Standpipe System – includes bulk riser pipes equipped with hose connections, usually at each floor and roof, for exclusive use by the fire department; plus laterals on each floor of certain facilities that supply water to hose cabinets for use by the occupants to control incipient fires until the fire department arrives.

c. Combined System – includes bulk and express riser pipes that supply both sprinkler and standpipe systems.

4. Fire systems shall be further classified and defined as:

   a. NON-HAZARDOUS – containing impurities Class 3 and lower. Also see, Terminology for Pollutant – Appendix.

   b. HAZARDOUS – containing impurities Class 4 and higher. Also see, Terminology for Contaminant – Appendix.

5. Fire protection systems as defined by the State Fire Code shall be contained from the Gwinnett County potable water supply/system by backflow-prevention devices as indicated and that have approvals as required under Section VII of this procedure and classified or listed by the Underwriters Laboratories and Factory Mutual Insurance, as follows:

   Class 1, 2, and 3 Sprinkler Systems, and Hazardous Standpipe or Combined Systems: shall be contained by the installation of a DOUBLE DETECTOR CHECK backflow preventer.

   Class 4, 5 and 6 Sprinkler Systems and Hazardous Standpipe or Combined Systems: shall be contained by the installation of a REDUCED PRESSURE ZONE DETECTOR CHECK backflow preventer.

   Class Systems with Combination Hazards: shall be contained from public water mains by procedures applicable to the component that requires the higher degree of protection.

6. The purpose of certain checking devices used, or likely to be used, with fire protection systems is outlined below to call attention to those that are approved for use as backflow-prevention devices and those that are not.
   a. DIRECTIONAL CHECK – to provide directional flow only. Not an approved backflow-prevention device.
   b. ALARM CHECK - to signal an alarm; to summon the fire department, etc., when a sprinkler head flows water; and, NOT an approved backflow-prevention device.
   c. SINGLE DETECTOR CHECK – to detect unauthorized use of water for other than fire service; to detect leaks in fire protection systems; and, with by-pass check, to provide directional flow. Not an approved backflow-preventer.
   d. DOUBLE CHECK VALVE (DCV) – to prevent backflow of polluted water into a potable water supply/system; and to provide directional flow. Approved for use with full service Master or FM meters on a Combination service connection only.
   e. DOUBLE DETECTOR CHECK (DDC) – to prevent backflow of polluted water from a fire protection system into a potable water supply/system; to detect unauthorized use of water; to detect leaks in the fire protection system; and, to provide a directional flow. Approved for use on a Dedicated service connection.
   f. REDUCED PRESSURE ZONE CHECK (RPZ) – to prevent backflow of contaminated water into a potable water supply/system; and to provide directional flow. Approved for use on a Combination service as in item (d).

g. REDUCED PRESSURE DETECTOR CHECK (RPDC) – to prevent backflow of contaminated water from a fire protection system into a potable water supply/system; to detect unauthorized use of water; to detect leaks in the fire protection system; and, to provide directional flow. Approved for use on a Dedicated service as in item (e).

7. Single detector checks that are used on a non-hazardous fire protection Systems Class 1, 2, or 3 may not be considered as a component part of a DDC backflow preventer. Specifically, the addition of a second single check to one of these devices shall not be substituted for a Double Detector Check (DDC) assembly that is approved for backflow-prevention.
8. It is intended that the approved Double Detector Check (DDC) backflow preventer be in lieu of, not in addition to, the two checking devices already required in the supply to Class 1 and 2; or the double check valve BFP already required on Class 3 non-hazardous systems, and that the approved Reduced Pressure Detector Check (RPDC) be in lieu of the RPZ already required on hazardous systems. The only additional checking device intended is a ¾ inch Double Check Valve (DCV) or, Reduced Pressure Zone (RPZ) in the ¾ inch copper bypass line, in conjunction with the bronze detector meter.
9. The two shut-off valves required for periodic testing of the backflow-prevention device shall be OS&Y, FDA approved fused epoxy coated inside and out, with resilient seats and the inlet valve shall include an approved test cock on the upstream side. All components shall be listed for fire protection service by Underwriters Laboratories and Factory Mutual.

SECTION X. TESTS, MAINTENANCE, and REPAIRS:

1. All backflow-prevention devices, both existing and new, and all parts thereof, shall be maintained in a safe and reliable operating condition.
2. The consumer shall be responsible for the cost of testing, maintenance, and repair of all backflow-prevention devices downstream of the service-connection within the premises and on his own private system.
3. The Consumer is responsible for backsiphoned material or contamination and/or pollution through backflow and, if contamination or pollution of the Gwinnett County Public potable water supply/system occurs through an illegal cross-connection and/or an improperly installed, maintained, or repaired device, or a device that has been bypassed, the Consumer shall be liable for all associated costs of clean-up required for the public potable water supply/system.
4. Tests, maintenance, and repairs on BFP devices are to be made in accordance with the following schedule or more frequently where inspections indicate a need or are specified in the manufacturer's instructions:
    a. FIXED AIR GAP SEPARATIONS – shall be inspected at the time of installation and at least annually thereafter.
    b. PRESSURE VACUUM BRAKERS – shall be inspected and tested at time of installation and at least annually thereafter.
    c. DUAL CHECK VALVES – shall be inspected and spot tested as determined by the Public Utilities Department.

d. DOUBLE CHECK VALVE BACKFLOW PREVENTERS – shall be inspected and tested at time of installation and at least annually thereafter.

e. REDUCED PRESSURE ZONE BACKFLOW PREVENTERS – shall be inspected and tested at time of installation and at least annually thereafter.

f. SYNTHETIC COMPONENTS WITHIN A DEVICE – shall be replaced every five (5) years, or sooner if required.

5. Test procedures for all backflow-prevention devices shall be as outlined in the: UNIVERSITY OF SOUTHERN CALIFORNIA, FCCHR; MANUAL OF CROSS-CONNECTION CONTROL.

6. Testing and repairs shall be performed by a specialist who is certified and/or trained to understand the design and intended operation of the device(s) being tested, and has proved his competency to the Department of Water Resources.

7. A test and maintenance record for each RPZ, DCV, and PVB device used in the containment concept shall be maintained by the Consumer. Following each test or repair a report must be sent to the Department of Department of Water Resources, Backflow-Prevention Section and must include the following:

   a. Date of installation and location of device;

   b. Manufacturer's name, model and serial number;

   c. Date and time of each test or visual inspection;

   d. Name of authorized person performing test;

   e. Test results;

   f. Description of repairs or servicing required;

   g. Date repairs completed.

Sample Form – Fig. 9, Appendix; Forms available from GCDWR.

8. All backflow-prevention devices and test data shall be subject to periodic inspection by a representative of the Department of Water Resources. If a device is found to be inoperative or malfunctioning, the Consumer will be given a reasonable time to complete corrections required by the Inspector or Representative. With the exception of cases involving actual or imminent system contamination, the time allotted for corrections will be determined by potential hazard posed to the Public Potable Water Supply/System.
9. If the corrective measures have not been taken in the allotted time, termination of water service will be recommended. If the Director concurs, the Consumer will receive a certified letter of intent to terminate service. Termination procedures will be initiated (10) ten days after receipt. If the Consumer completes the corrections prior to the deadline, termination procedures will be halted.

SECTION XI. ADDITIONAL INFORMATION:

Any questions regarding this Policy and/or these Procedures may be directed to the:

Gwinnett County
DEPARTMENT OF WATER RESOURCES
684 Winder Highway
Lawrenceville, Georgia 30045

Phone: 678-376-6700

SECTION 3

Backflow Specifications

The information contained in this Section, "Backflow Specifications," provides general backflow preventer installation guidelines and specifications. Please refer to the Gwinnett County Backflow Prevention "Requirements for Vault and Backflow Installation Guidelines" document, for more specific details. Approved Installers and Testers are expected to be familiar with all of the information contained in these documents. Failure to comply with any of these provisions can result in suspension from the Approved Backflow Prevention Contractors List, and/or the Approved Certified Testers List.

Copies of the "Requirements for Vault and Backflow Installation Guidelines" document are available through the Gwinnett County Department of Water Resources located at 684 Winder Highway, Lawrenceville, Georgia.

GWINNETT COUNTY
DEPARTMENT OF WATER RESOURCES
Backflow Prevention
Protecting Water Protecting People

INSTALLATION OF BACKFLOW DEVICES

1. DWR requires contractors installing or retrofitting backflow preventers to be on the Approved Backflow Contractors List. You must have a Master Plumbers License or a State of Georgia Utility Contractors License to install backflow devices, and have submitted an Approved Contractors Application. A journeyman license is not acceptable. Applications for the Approved Backflow Contractors List may be obtained by calling 678-518-6150.
2. Upon acceptance to the approved list, you must obtain a retrofit permit for all upgrades on existing services, or a construction permit for all new construction. Permits must be obtained, in person from DWR at 446 W. Crogan Street, One Justice Square, Lawrenceville.
3. A preconstruction meeting with the assigned DWR inspector is mandatory on all installations. Any installation made without the inspector's knowledge may result in suspension from the Approved Backflow Contractors List.
4. The inspector must be given a 24-hour notice prior to beginning any installation.
5. All piping, from the tap valve to the vault, will be left uncovered until after DWR inspection on all new vault installations, unless public safety is an issue. In this instance, a pipe shall be uncovered prior to the arrival of the inspector.
6. All vaults installed require a minimum of twelve (12) inches of # 57 stone underneath the vault.

7. Backflow prevention and metering devices will be supported by metal stands. No wooden supports will be permitted.
8. All backflow devices will have the detector meter mounted on the opposite side from the stairway. The detector meter shall read in gallons, not cubic feet.
9. When bidding on a project, if you are not sure what the county requires, it is advisable to contact DWR Backflow Prevention Section to avoid misunderstandings.

*****All applications for the approved Backflow Contractors List are available by contacting the Gwinnett County Department of Water Resources

Or online at gwinnettbackflow.com

Plan Review at 678-518-6175 Deborah Reeves

or 678-376-6757 Richard Pate.*****

GWINNETT COUNTY
DEPARTMENT OF WATER RESOURCES
Backflow Prevention
Protecting Water Protecting People

COPIES OF CUSTOMER BACKFLOW DEVICE DATABASES

- As of January 1, 2005, the Backflow Prevention department will only publish databases quarterly (4 times per year)
- CDs containing the customer backflow databases are available for purchase at DWR Records located at 684 Winder Highway, Lawrenceville. The cost for each database is $50.00 payable to Gwinnett County DWR.
- The first of each quarter the new CD's will be at the Records counter for purchase.
- There are two databases available for purchase these are: XC2 Customer Database and the Noncompliance Database. Please specify.

GWINNETT COUNTY
DEPARTMENT OF WATER RESOURCES
Backflow Prevention
Protecting Water Protecting People

MINIMUM PROTECTION REQUIREMENT
RESIDENTIAL NEW CONSTRUCTION and RETROFITS

METER SIZE: ¾-inch <> SERVICE PIPE: thru 1-inch
DUAL CHECK (DuC) BACKFLOW PREVENTER

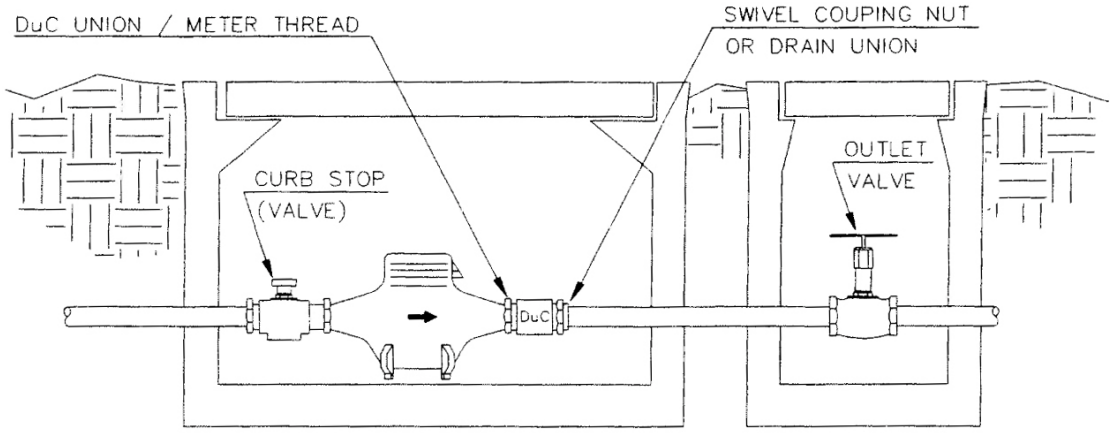
SPECIFICATIONS: The CUSTOMER/owner shall furnish and install a (1) in. NHF x (1) in. NMH – Dual Check (DuC) backflow preventer that meets the requirements of ANSI/ASSE Standard 1024, and bears the seal of approval. It shall be bronze-bodied and include one female union, with the union nut drilled to accept a tamper-proof locking wire. The union adaptor shall be provided with wrench flats to facilitate tightening. The device shall be embossed, or have a brass identification tag securely attached to the valve body corrosion resistant mechanical fasters, and shall include the following information:

1. Name and manufacturer or trademark
2. Type and model number of the device
3. Maximum rated working pressure
4. Maximum rated working temperature
5. Direction of flow through the device
6. Inlet and outlet connection pipe size
7. Date of manufacture or serial number

INSTALLATION INSTRUCTIONS: The DuC – BFP shall be installed downstream and as close to the meter connection as possible. The device shall not be buried in earth, but may be installed below ground as in the Water System's meter box or an adjacent similar enclosure. A positive shut off valve and union shall be near both the inlet and outlet sides. When the DuC – BFP is attached directly to the meter, the Water System's curb stop (valve) may be substituted for the inlet side valve. (See sketch.)

GWINNETT COUNTY
DEPARTMENT OF WATER RESOURCES
Backflow Prevention
Protecting Water Protecting People

TYPICAL METER BOX INSTALLATION



NOTE: FOR FINAL APPROVAL, ASSEMBLY MUST BE CENTERED IN ENCLOSURE

GWINNETT COUNTY
DEPARTMENT OF WATER RESOURCES
Backflow Prevention
Protecting Water Protecting People

MINIMUM CONTAINMENT PROTECTION NEW CONSTRUCTION AND RETROFIT INSTALLATIONS

Service Meter Size: through 2-inch (Institutional and Commercial)
Double Check Valve (DCV) Backflow Preventer (BFP)

SPECIFICATIONS: The Customer/Owner shall provide a Double Check Valve (DCV) Backflow Preventer (BFP) in a size to match that of the required service meter.

The BFP device must meet the following requirements:

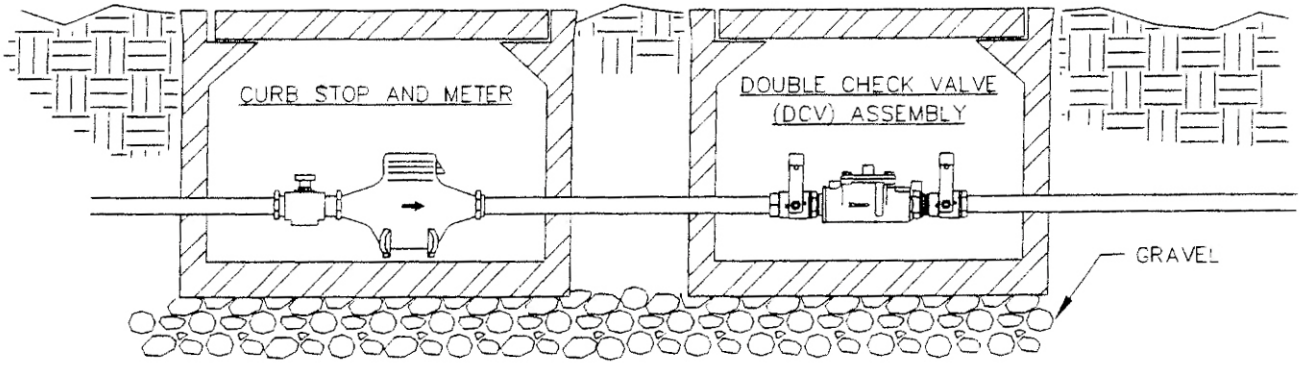
- The DCV checks shall have replaceable seats and captured springs.
- The BFP assembly shall include a full-port ball valve on the inlet and outlet sides, with a union or swivel coupling nut between the device and each valve.
    - Unions or swivel nuts must be integral with the device or valve.
- Device shall have three ball-valve test cocks in the ***vertical position*** fitted with brass or plastic threaded plugs.
    - A fourth vertical test cock shall be provided on the ***up-stream*** side of the ***inlet*** shut-off valve.
- All components of the assembly, including ball valve handles and assembly bolts shall be equal in corrosion resistance to bronze or stainless steel, to resist electrolysis.
- Access to both checking devices shall be by ***top*** or ***side*** entry for maintenance and repair of all interior parts.
- Valve handles, except T-type, shall turn ***up*** to close and ***inboard*** (90 degrees) to open.

NOTE: *The DCV device shall have current approval from the University of Southern California, Foundation for Cross-Connection Control (USC-FCCC). The DCV-BFP assembly to be tested by a nationally recognized testing laboratory in accordance with ASSE Standard 1015, and bear the ASSE seal; be individually factory tested, shipped, and installed as a unit.*

INSTALLATION INSTRUCTIONS: The DCV-BFP assembly shall not be buried in earth, but installed in a ***utility box*** adjacent to or as close as practical to, the outlet side of the meter installation. (See Below)

NOTE: *Under **NO** condition will any connection be allowed between the service meter and a backflow preventer used for system containment.*

GWINNETT COUNTY
DEPARTMENT OF WATER RESOURCES
Backflow Prevention
Protecting Water Protecting People



NOTE: *For final approval, assembly* ***MUST*** *be centered in enclosure.*

GWINNETT COUNTY
DEPARTMENT OF WATER RESOURCES
Backflow Prevention
Protecting Water Protecting People

CONTAINMENT PROTECTION REQUIREMENT
NEW CONSTRUCTION AND RETROFIT INSTALLATIONS
(HAZARDOUS)

Service Meter Size: All (Domestic, Fire Protection and Irrigation Systems)
Reduced Pressure Zone (RPZ) Backflow Preventer (BFP)

SPECIFICATIONS: The Customer/Owner shall provide a Reduced Pressure Zone (RPZ) Backflow Preventer (BFP) in a size to match that of the required service line or meter.

The RPZ-BFP assembly shall consist of a pressure differential relief valve located between two positive seating check valves. The relief valve shall function automatically by sensing the pressure differential across the first check valve and discharge the backflow to atmosphere should the check valve become damaged or fouled. THE RPZ-BFP device must meet the following requirements:

- The relief and check valves shall all have replaceable seats and the check valves provided with captured springs.
- A full-port ball valve in sizes through two-inch, and a resilient-seat OS & Y gate valve in sizes over two inch, shall be on the inlet and outlet sides of the device, with a union, swivel coupling nut, or flanges between the device and each valve.
    - Unions and swivel nuts must be integral with the device or valves.
- The device shall be provided with three ball valve test cocks and a fourth test cock shall be provided on the upstream side of the inlet shut-off valve.
- Test cocks on all assemblies to be provided, with brass or plastic threaded plugs and relief valve vent-ports to have suitable connections for an air-gap.
- ***When a meter or other device with bronze strainer, integral or attached, is not immediately upstream of the backflow preventer, a bronze strainer shall be provided between the inlet shut-off valve and the RPZ on sizes through two inch.***
- All components of the assembly, including ball valve handles and assembly bolts shall be equal in corrosion resistance to stainless steel.
- Access to both checking device shall be by ***top*** and/or ***side*** entry for maintenance and repair.

NOTE: *The RPZ device shall have current approval from the University of Southern California, Foundation for Cross-Connection Control and Hydraulic Research (USC/FCCC & HR). The RPZ-BFP assembly shall be tested by a nationally recognized testing laboratory in accordance with ASSE standard 1015, and bear the ASSE seal; be individually factory tested, shipped and installed as a unit.*

GWINNETT COUNTY
DEPARTMENT OF WATER RESOURCES
Backflow Prevention
Protecting Water Protecting People

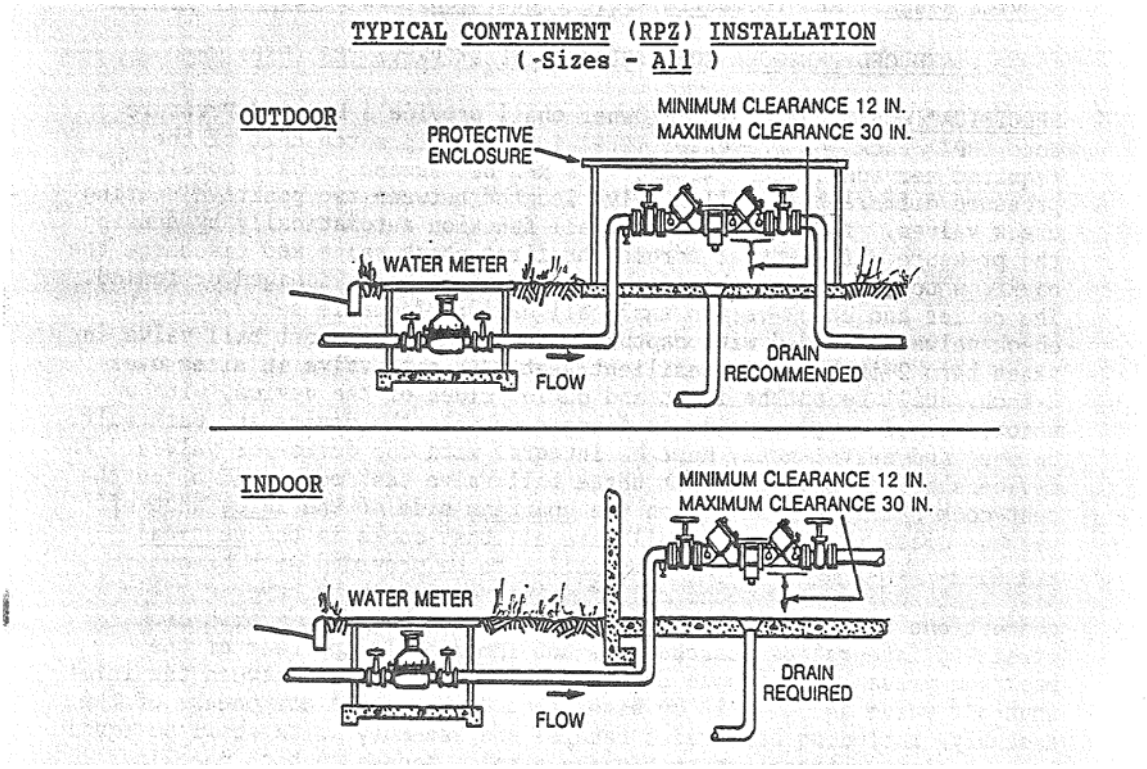
INSTALLATION INSTRUCTIONS: The RPZ-BFP shall not be buried in earth but installed above ground in a structure that allows positive drainage, has freeze protection and is located as close as practical to the outlet side of the meter. In lieu of the above-ground installation, the RPZ may be installed immediately inside the facility provided NO intervening cnnections exist between the meter and the device. Where relief valve discharge could cause water damage, it shall be piped via an air gap at the relieve valve vent-port to a floor drain or other approved location.

REDUCED PRESSURE ZONE (RPZ) – BFP: Service sizes – ALL (Domestic, Fire, and Irrigation Systems)

SUGGESTED DEVICES: HERSEY – Model No.'s: FRP II-U, 6CM, and 6CM-RPDA (or approved equal) WATTS – Series No's." U-009-QT, 909OSY, and 909DDC

SUGGESTED ENCLOSURE BOXES: HOT BOX/ROK Model No.'s.: .75, 1, or 2 (or approved equal); HYDROCOWL Model No.: 100 or 200

TYPICAL CONTAINMENT (RPZ) INSTALLATION
(Sizes-All)



GWINNETT COUNTY
DEPARTMENT OF WATER RESOURCES
Backflow Prevention
Protecting Water Protecting People

*********IMPORTANT*********

DEVICE TESTING: All RPZ-BFP assemblies shall be tested at the time of installation and at least **ANNUALLY** thereafter by a certified tester. A copy of each test and maintenance report must be submitted to:

Gwinnett County Department of Water Resources
Backflow Prevention Division
684 Winder Highway
Lawrenceville, GA 30045

A certified testers list may be obtained through the Department of Water Resources by calling: (678) 376-6753 or by visiting the website: www.gwinnettbackflow.com.

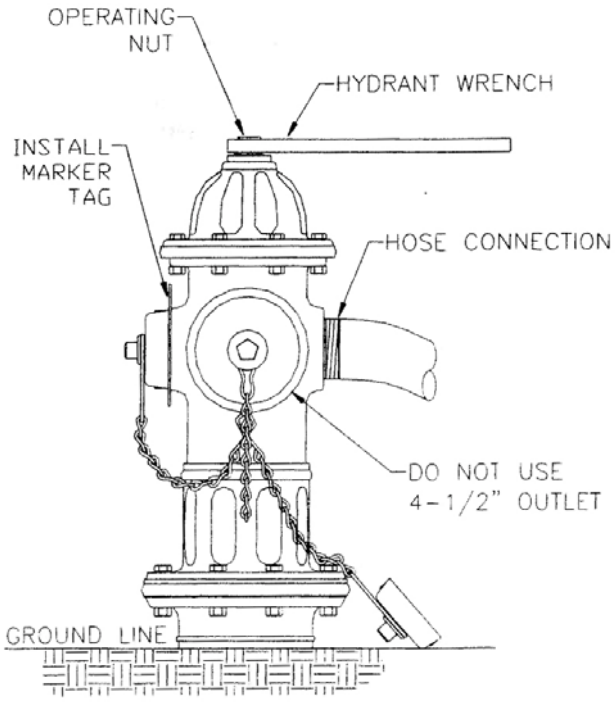
Fire Hydrant Water Use Permit – Policy and Procedure
FIRE HYDRANT USE – OPERATING INSTRUCTION

GWINNETT COUNTY
DEPARTMENT OF WATER RESOURCES
Backflow Prevention
Protecting Water Protecting People

Fire Hydrant Water Use Permit – Policy and Procedure
FIRE HYDRANT USE – OPERATING INSTRUCTION

NOTE: In accordance with the Fire Hydrant Water Use Policy and Procedure, you must notify the Gwinnett County Department of Water Resources at 678-376-6887 of the location of the hydrant, your permit number and the expected duration of usage.

1. Remove one 2-1/2" cap (A), install fire hydrant Marker Tag, reinstall cap.
2. Remove other 2-1/2 "cap.
3. Open Hydrant approximately 5 turns and run until clear then shutdown.
4. Install hose and tighten.
5. Place hydrant wrench on the operating nut. CAUTION: The operating nut is brass. Do not use a pipe wrench. Damage to the operating nut will result in a repair charge of approximately $100.00.
6. Make connection to tank, etc. as noted in the Fire Hydrant Use Policy and Procedures.
7. Open fire hydrant more than 6 full turns and no more than 10 turns.
8. When filling or use completed, SLOWLY close the hydrant.
9. If additional water will be taken from the hydrant during the day, the marker tag and hose may be left in place but the hydrant wrench must be removed to prevent unauthorized use.
10. When all use of hydrant is completed, remove hose and marker tag and replace hydrant caps.



GWINNETT COUNTY
DEPARTMENT OF WATER RESOURCES
Backflow Prevention
Protecting Water Protecting People

TRUCK TANK/TANKER INSPECTION REPORT FOR FIRE HYDRANT WATER USE PERMIT

Inspection: Date: _____ Time: _____

Inspector: _____ Badge Number: _____

Tank Decal Number: _____

Expires Year/Month: _____/_____

Company/Individual: _____
Address: _____
City:_____ State: _____ Zip: _____
Business Phone: ( )_____24-hour Phone: ( ) _____
Location of Inspection: _____

Name of Representative of Company/Individual present during inspection:
_____

CONTAINER/VEHICLE INFORMATION

Type of Container/Vehicle:_____

Container Capacity: _____ Gallons

Vehicle I.D. Tag Number _____Other Markings: _____
_____

Container Markings: _____

Type of fill:
____ 1. Top Fill with Air Gap – Pipe Size: _____ Air Gap Distance: _____

____ 2. Top Fill without Air Gap
Type of protective Device: _____
Serial Number of Device: _____
Manufacturer: _____

____ 3. Side or Bottom fill
Type of Protective Device: _____
Serial Number of Device: _____
Manufacturer: _____

Inspector's Comments: _____

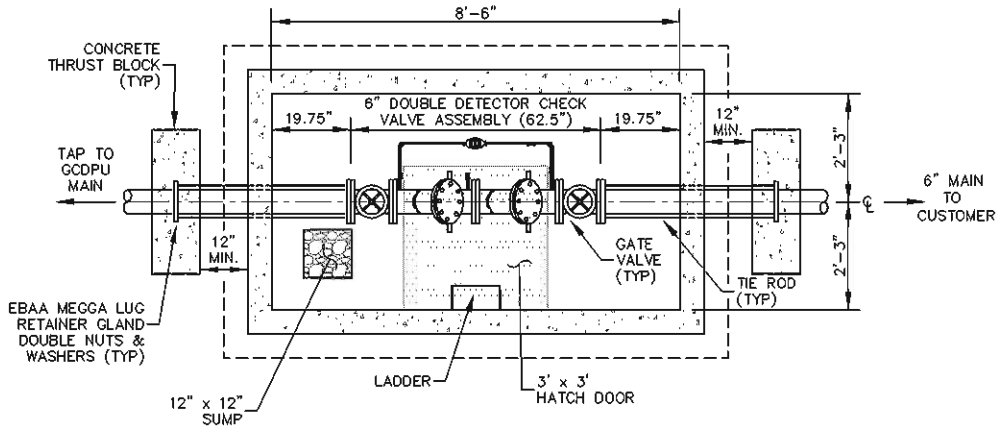
Container/Vehicle: Passed Did not Pass Inspection (cross out one) Fee: _____

Inspector's Signature: _____

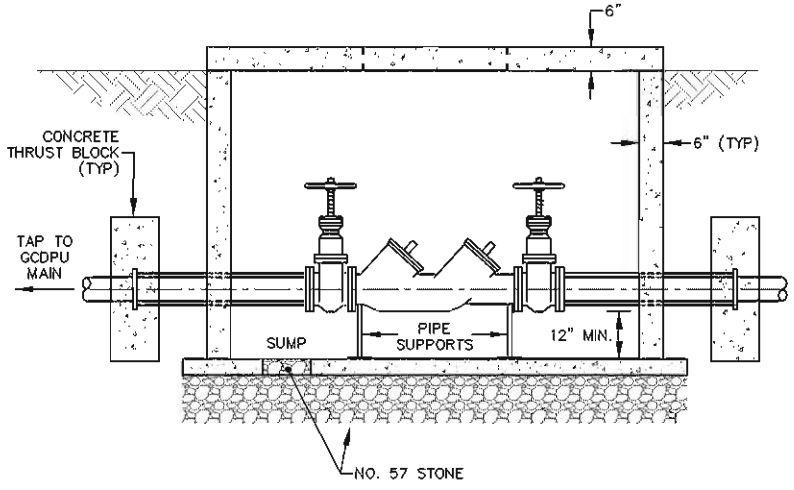
GWINNETT COUNTY
DEPARTMENT OF WATER RESOURCES
Backflow Prevention
Protecting Water Protecting People

BACKFLOW PREVENTER DRAWING REVISIONS

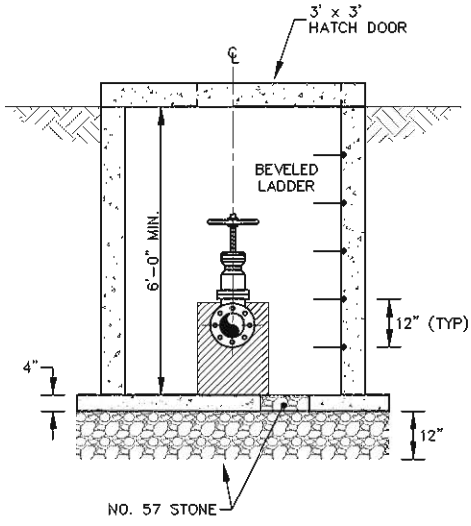
NO	TITLE	REVISED 8/25/04
C-1	6” DOUBLE DETECTOR CHECK VALVE	NO
C-2	8” DOUBLE DETECTOR CHECK VALVE	NO
C-3	10” DOUBLE DETECTOR CHECK VALVE	NO
C-4	6” DOUBLE DETECTOR CHECK VALVE WITH 3” COMPOUND METER	YES
C-5	6” DOUBLE DETECTOR CHECK VALVE WITH 4” COUMPOUND METER	YES
C-6	8” DOUBLE DETECTOR CHECK VALVE WITH 3” COMPOUND METER	YES
C-7	8” DOUBLE DETECTOR CHECK VALVE WITH 4” COMPOUND METER	YES
C-8	8” DOUBLE DETECTOR CHECK VALVE WITH 6” COMPOUND METER	YES
C-9	10” DOUBLE DETECTOR CHECK VALVE WITH 8” FIRE SERVICE METER	YES
C-10	6” FIRE SERVICE METER WITH 4” BY-PASS NON-TRAFFIC BEARING VAULT	NO
C-11	8” FIRE SERVICE METER WITH 6” BY-PASS NON TRAFFIC BEARING VAULT	NO
C-12	6” FIRE SERVICE METER NON-TRAFFIC BEARING VAULT	YES
C-13	8” FIRE SERVICE METER NON-SERVICE BEARING VAULT	YES
C-14	3” COMPOUND METER NON-TRAFFIC BEARING VAULT	YES
C-15	4” COMPOUND METER NON-TRAFFIC BEARING VAULT	YES
C-16	2-8” DOUBLE DETECTOR CHECK VALVE 14’ X 10’ VAULT	NO



PLAN VIEW



SIDE VIEW



END VIEW

VAULT SPECIFICATIONS

1. THIS DRAWING SHALL BE USED FOR INSTALLATION OF 6" DOUBLE DETECTOR CHECK VALVE.
2. ALL PIPE AND FITTINGS SHALL BE FLANGED DUCTILE IRON PIPE.
3. VAULT TOP SHALL BE 6" THICK REINFORCED CONCRETE. MINIMUM INSIDE HEIGHT IS 6'-0". VAULT BOTTOM IS 4" CONCRETE SLAB SLOPED TO 12" x 12" DRAIN SUMP HOLE. SLAB TO BE POURED ON 12" OF COMPACTED NO. 57 STONE. HATCH OPENING SHALL BE TO ONE SIDE OF VAULT AT THE CENTER POINT OF THE WALL.
4. HATCH SHALL BE BILCO ALUMINUM MODEL J-4AL OR EQUAL APPROVED IN ADVANCE BY GCDPU.
5. VAULT INLET/OUTLET OPENINGS SHALL BE SEALED WITH CONCRETE OR BRICK AND MORTAR AROUND PIPE. PIPE MUST NOT SUPPORT VAULT.
6. VAULT SHALL BE PRECAST FOR NON-LOAD BEARING APPLICATION. WHEN VAULT WILL BE SUBJECTED TO LIVE LOAD, CUSTOMER'S ENGINEER SHALL SUBMIT DETAILED VAULT DESIGN FOR GCDPU APPROVAL IN ADVANCE OF CONSTRUCTION.
7. ACCESS LADDER - SHALL BE DOWELED TO WALL AND CENTERED AT HATCH OPENING.
8. DOUBLE DETECTOR CHECK VALVE ASSEMBLY SHALL BE SUPPORTED IN TWO (2) PLACES ON CAP BLOCKS OR STEEL. NO WOOD IS ALLOWED.
9. THRUST BLOCKS - SHALL CONFORM TO GCDPU DRAWING NO. A-24 (LATEST REVISION).
10. THRUST TIE RODS - SHALL CONFORM TO GCDPU DRAWING NO.'S A-33, A-74, AND A-78. RODS SHALL EXTEND FROM FIRST FLANGE INSIDE VAULT TO TAPPING VALVE (WELDED TO CASING ON LONG SIDE BORE).
11. DOUBLE DETECTOR CHECK VALVE ASSEMBLY SHALL BE WATTS MODEL 709 DCDA, HERSEY MODEL DDC-II, FEBCO MODEL 856, AMES MODEL 3000 SS, OR EQUAL APPROVED IN ADVANCE BY GCDPU.

    CHECK VALVE SHALL BE EQUIPPED WITH OS&Y RESILIENT SEATED GATE VALVES.
12. ALL MATERIALS SHALL BE FURNISHED BY CUSTOMER.
13. DOUBLE DETECTOR CHECK VALVE ASSEMBLY DIMENSIONS SHOWN ARE FOR WATTS MODEL 709 DCDA. OTHER VALVE ASSEMBLY DIMENSIONS MAY VARY.
14. VAULT SHALL BE INSTALLED ON PRIVATE PROPERTY. CUSTOMER MUST PROVIDE A 15' x 30' EASEMENT AND/OR RIGHT OF ENTRY CLAUSE.
15. MINIMUM CLEARANCE FROM VAULT FLOOR TO BOTTOM OF FLANGES SHALL BE 12".
16. VALVE PAD AND VALVE MARKER SHALL BE INSTALLED WHERE APPROPRIATE.

NOTES

1. NO WORK SHALL BEGIN WITHOUT OBTAINING "CONSTRUCTION PERMIT" FROM THE DEPARTMENT OF PUBLIC UTILITIES (GCDPU).
2. NO TAPS TO GWINNETT COUNTY WATER MAINS SHALL BE MADE WITHOUT THE INSPECTOR PRESENT.
3. ALL BACKFLOW PREVENTION DEVICES SHALL MEET OR EXCEED GCDPU SPECIFICATIONS.
4. ALL BACKFLOW PREVENTION DEVICES MUST BE TESTED BY A TESTER FROM THE GWINNETT COUNTY APPROVED TESTERS LIST BEFORE A FINAL C.O. WILL BE ISSUED. (AN APPROVED TESTERS LIST MAY BE OBTAINED BY CALLING 678-376-6907.)

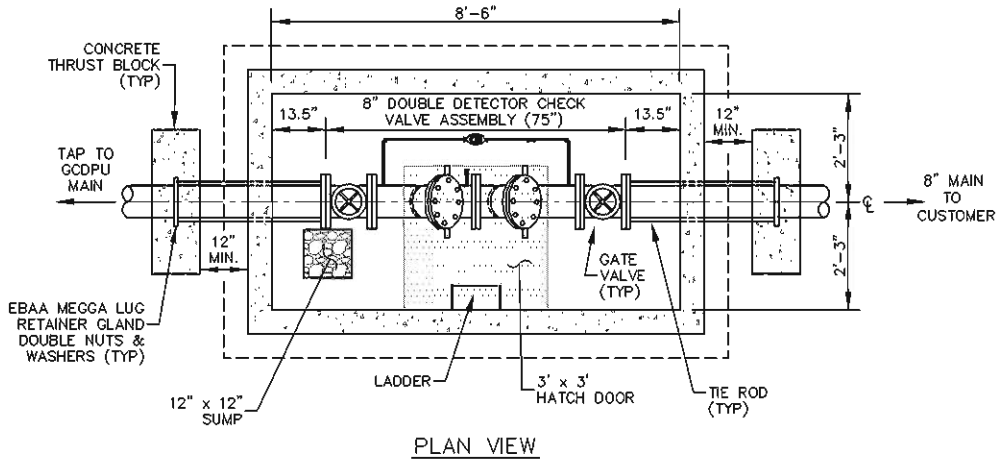
BOARD OF COMMISSIONERS OF GWINNETT COUNTY
GEORGIA

GWINNETT COUNTY
DEPARTMENT OF WATER RESOURCES
BACKFLOW PREVENTION

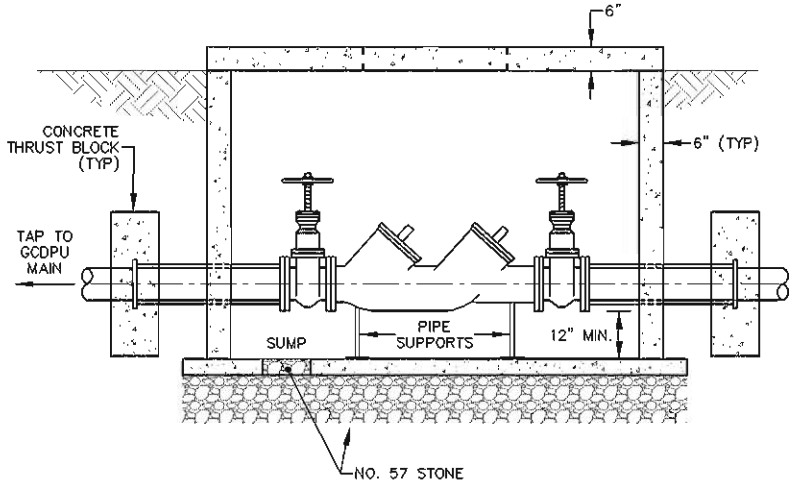
"Protecting water, protecting people"

6" DOUBLE DETECTOR CHECK VALVE

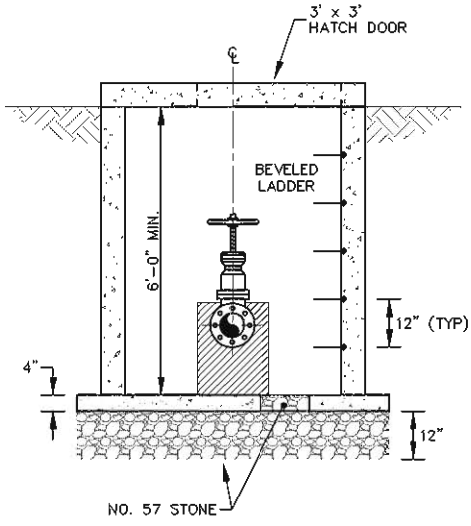
DRAWN BY: JDS	DATE: 07-21-04	SCALE: N.T.S.



PLAN VIEW



SIDE VIEW



END VIEW

VAULT SPECIFICATIONS

1. THIS DRAWING SHALL BE USED FOR INSTALLATION OF 8" DOUBLE DETECTOR CHECK VALVE.
2. ALL PIPE AND FITTINGS SHALL BE FLANGED DUCTILE IRON PIPE.
3. VAULT TOP SHALL BE 6" THICK REINFORCED CONCRETE. MINIMUM INSIDE HEIGHT IS 6'-0". VAULT BOTTOM IS 4" CONCRETE SLAB SLOPED TO 12" x 12" DRAIN SUMP HOLE. SLAB TO BE POURED ON 12" OF COMPACTED NO. 57 STONE. HATCH OPENING SHALL BE TO ONE SIDE OF VAULT AT THE CENTER POINT OF THE WALL.
4. HATCH SHALL BE BILCO ALUMINUM MODEL J-4AL OR EQUAL APPROVED IN ADVANCE BY GCDPU.
5. VAULT INLET/OUTLET OPENINGS SHALL BE SEALED WITH CONCRETE OR BRICK AND MORTAR AROUND PIPE. PIPE MUST NOT SUPPORT VAULT.
6. VAULT SHALL BE PRECAST FOR NON-LOAD BEARING APPLICATION. WHEN VAULT WILL BE SUBJECTED TO LIVE LOAD, CUSTOMER'S ENGINEER SHALL SUBMIT DETAILED VAULT DESIGN FOR GCDPU APPROVAL IN ADVANCE OF CONSTRUCTION.
7. ACCESS LADDER - SHALL BE DOWELED TO WALL AND CENTERED AT HATCH OPENING.
8. DOUBLE DETECTOR CHECK VALVE ASSEMBLY SHALL BE SUPPORTED IN TWO (2) PLACES ON CAP BLOCKS OR STEEL. NO WOOD IS ALLOWED.
9. THRUST BLOCKS - SHALL CONFORM TO GCDPU DRAWING NO. A-24 (LATEST REVISION).
10. THRUST TIE RODS - SHALL CONFORM TO GCDPU DRAWING NO.'S A-33, A-74, AND A-78. RODS SHALL EXTEND FROM FIRST FLANGE INSIDE VAULT TO TAPPING VALVE (WELDED TO CASING ON LONG SIDE BORE).
11. DOUBLE DETECTOR CHECK VALVE ASSEMBLY SHALL BE WATTS MODEL 709 DCDA, HERSEY MODEL DDC-II, FEBCO MODEL 856, AMES MODEL 3000 SS, OR EQUAL APPROVED IN ADVANCE BY GCDPU.

    CHECK VALVE SHALL BE EQUIPPED WITH OS&Y RESILIENT SEATED GATE VALVES.
12. ALL MATERIALS SHALL BE FURNISHED BY CUSTOMER.
13. DOUBLE DETECTOR CHECK VALVE ASSEMBLY DIMENSIONS SHOWN ARE FOR WATTS MODEL 709 DCDA. OTHER VALVE ASSEMBLY DIMENSIONS MAY VARY.
14. VAULT SHALL BE INSTALLED ON PRIVATE PROPERTY. CUSTOMER MUST PROVIDE A 15' x 30' EASEMENT AND/OR RIGHT OF ENTRY CLAUSE.
15. MINIMUM CLEARANCE FROM VAULT FLOOR TO BOTTOM OF FLANGES SHALL BE 12".
16. VALVE PAD AND VALVE MARKER SHALL BE INSTALLED WHERE APPROPRIATE.

NOTES

1. NO WORK SHALL BEGIN WITHOUT OBTAINING "CONSTRUCTION PERMIT" FROM THE DEPARTMENT OF PUBLIC UTILITIES (GCDPU).
2. NO TAPS TO GWINNETT COUNTY WATER MAINS SHALL BE MADE WITHOUT THE INSPECTOR PRESENT.
3. ALL BACKFLOW PREVENTION DEVICES SHALL MEET OR EXCEED GCDPU SPECIFICATIONS.
4. ALL BACKFLOW PREVENTION DEVICES MUST BE TESTED BY A TESTER FROM THE GWINNETT COUNTY APPROVED TESTERS LIST BEFORE A FINAL C.O. WILL BE ISSUED. (AN APPROVED TESTERS LIST MAY BE OBTAINED BY CALLING 678-376-6907.)

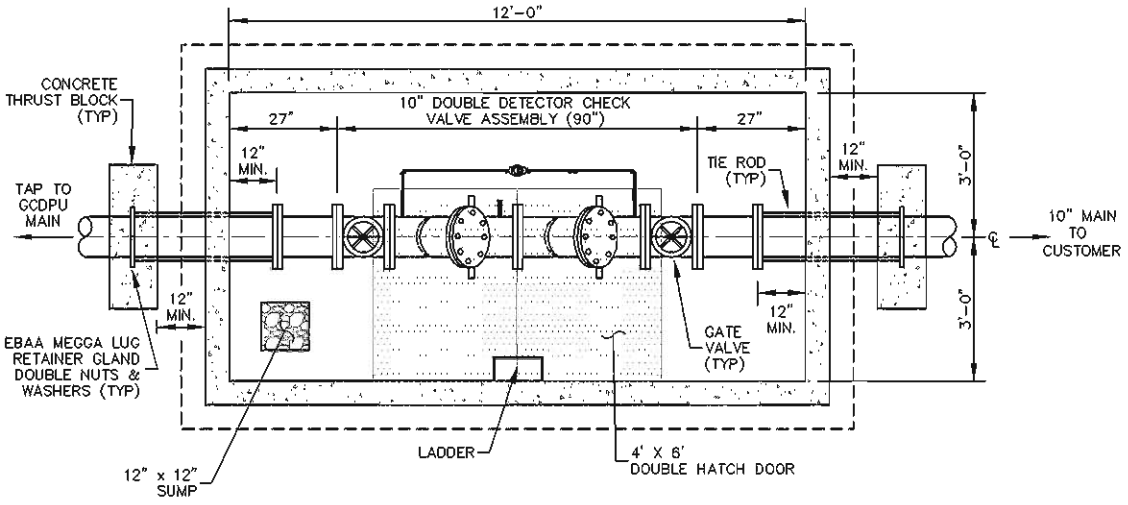
BOARD OF COMMISSIONERS OF GWINNETT COUNTY
DECATUR GA
GEORGIA

GWINNETT COUNTY
DEPARTMENT OF WATER RESOURCES
BACKFLOW PREVENTION

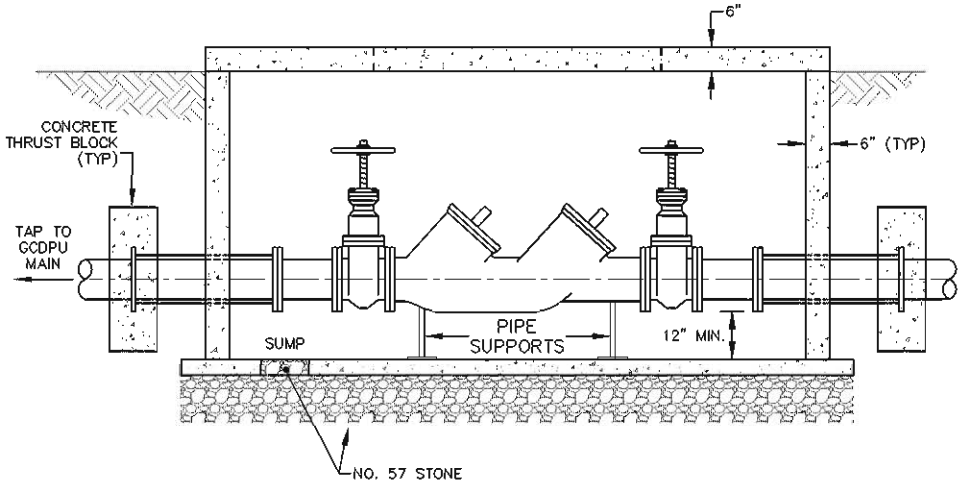
"Protecting water, protecting people"

8" DOUBLE DETECTOR CHECK VALVE

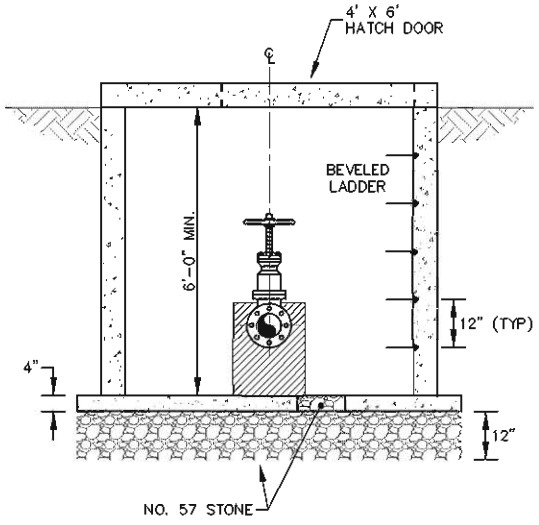
DRAWN BY: JDS	DATE: 07-21-04	SCALE: N.T.S.



PLAN VIEW



SIDE VIEW



END VIEW

VAULT SPECIFICATIONS

1. THIS DRAWING SHALL BE USED FOR INSTALLATION OF 10" DOUBLE DETECTOR CHECK VALVE.
2. ALL PIPE AND FITTINGS SHALL BE FLANGED DUCTILE IRON PIPE.
3. VAULT TOP SHALL BE 6" THICK REINFORCED CONCRETE. MINIMUM INSIDE HEIGHT IS 6'-0". VAULT BOTTOM IS 4" CONCRETE SLAB SLOPED TO 12" x 12" DRAIN SUMP HOLE. SLAB TO BE POURED ON 12" OF COMPACTED NO. 57 STONE. HATCH OPENING SHALL BE TO ONE SIDE OF VAULT AT THE CENTER POINT OF THE WALL.
4. HATCH SHALL BE BILCO ALUMINUM MODEL JD-4AL OR EQUAL APPROVED IN ADVANCE BY GCDPU.
5. VAULT INLET/OUTLET OPENINGS SHALL BE SEALED WITH CONCRETE OR BRICK AND MORTAR AROUND PIPE. PIPE MUST NOT SUPPORT VAULT.
6. VAULT SHALL BE PRECAST FOR NON-LOAD BEARING APPLICATION. WHEN VAULT WILL BE SUBJECTED TO LIVE LOAD, CUSTOMER'S ENGINEER SHALL SUBMIT DETAILED VAULT DESIGN FOR GCDPU APPROVAL IN ADVANCE OF CONSTRUCTION.
7. ACCESS LADDER - SHALL BE DOWELED TO WALL AND CENTERED AT HATCH OPENING.
8. DOUBLE DETECTOR CHECK VALVE ASSEMBLY SHALL BE SUPPORTED IN TWO (2) PLACES ON CAP BLOCKS OR STEEL. NO WOOD IS ALLOWED.
9. THRUST BLOCKS - SHALL CONFORM TO GCDPU DRAWING NO. A-24 (LATEST REVISION).
10. THRUST TIE RODS - SHALL CONFORM TO GCDPU DRAWING NO.'S A-33, A-74, AND A-78. RODS SHALL EXTEND FROM FIRST FLANGE INSIDE VAULT TO TAPPING VALVE (WELDED TO CASING ON LONG SIDE BORE).
11. DOUBLE DETECTOR CHECK VALVE ASSEMBLY SHALL BE WATTS MODEL 709 DCDA, HERSEY MODEL DDC-II, FEBCO MODEL 856, AMES MODEL 3000 SS, OR EQUAL APPROVED IN ADVANCE BY GCDPU.

    CHECK VALVE SHALL BE EQUIPPED WITH OS&Y RESILIENT SEATED GATE VALVES.
12. ALL MATERIALS SHALL BE FURNISHED BY CUSTOMER.
13. DOUBLE DETECTOR CHECK VALVE ASSEMBLY DIMENSIONS SHOWN ARE FOR WATTS MODEL 709 DCDA. OTHER VALVE ASSEMBLY DIMENSIONS MAY VARY.
14. VAULT SHALL BE INSTALLED ON PRIVATE PROPERTY. CUSTOMER MUST PROVIDE A 15' x 30' EASEMENT AND/OR RIGHT OF ENTRY CLAUSE.
15. MINIMUM CLEARANCE FROM VAULT FLOOR TO BOTTOM OF FLANGES SHALL BE 12".
16. VALVE PAD AND VALVE MARKER SHALL BE INSTALLED WHERE APPROPRIATE.

NOTES

1. NO WORK SHALL BEGIN WITHOUT OBTAINING "CONSTRUCTION PERMIT" FROM THE DEPARTMENT OF PUBLIC UTILITIES (GCDPU).
2. NO TAPS TO GWINNETT COUNTY WATER MAINS SHALL BE MADE WITHOUT THE INSPECTOR PRESENT.
3. ALL BACKFLOW PREVENTION DEVICES SHALL MEET OR EXCEED GCDPU SPECIFICATIONS.
4. ALL BACKFLOW PREVENTION DEVICES MUST BE TESTED BY A TESTER FROM THE GWINNETT COUNTY APPROVED TESTERS LIST BEFORE A FINAL C.O. WILL BE ISSUED. (AN APPROVED TESTERS LIST MAY BE OBTAINED BY CALLING 678-376-6907.)

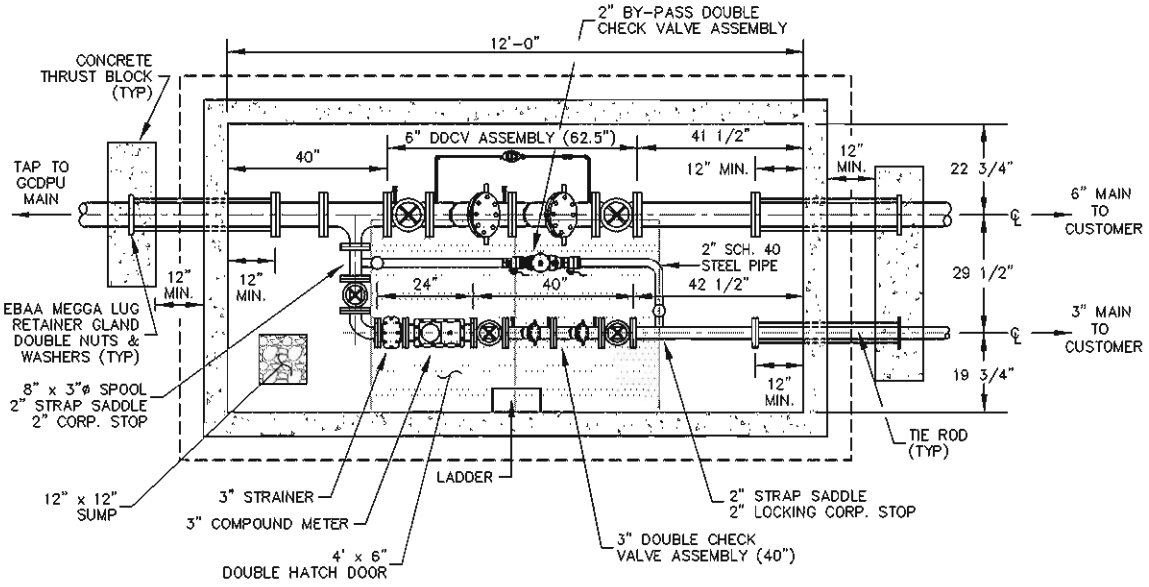
BOARD OF COMMISSIONERS OF GWINNETT COUNTY
GEORGIA

GWINNETT COUNTY
DEPARTMENT OF WATER RESOURCES
BACKFLOW PREVENTION

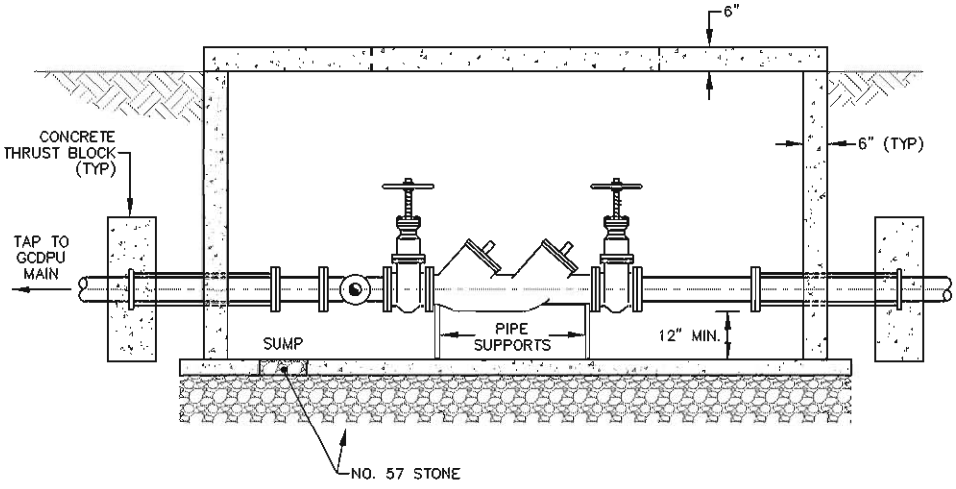
"Protecting water, protecting people"

10" DOUBLE DETECTOR CHECK VALVE

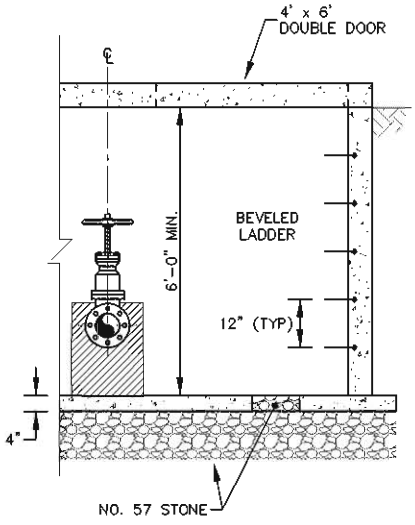
DRAWN BY: JDS	DATE: 07-21-04	SCALE: N.T.S.



PLAN VIEW



SIDE VIEW
TYP.



END VIEW

VAULT SPECIFICATIONS

1. THIS DRAWING SHALL BE USED FOR INSTALLATION OF 6" DOUBLE DETECTOR CHECK VALVE WITH 3" COMPOUND METER.
2. ALL PIPE AND FITTINGS SHALL BE FLANGED DUCTILE IRON PIPE, EXCEPT WHERE NOTED.
3. VAULT TOP SHALL BE 6" THICK REINFORCED CONCRETE. MINIMUM INSIDE HEIGHT IS 6'-0". VAULT BOTTOM IS 4" CONCRETE SLAB SLOPED TO 12" x 12" DRAIN SUMP HOLE. SLAB TO BE POURED ON 12" OF COMPACTED NO. 57 STONE. HATCH OPENING SHALL BE TO ONE SIDE OF VAULT AT THE CENTER POINT OF THE WALL.
4. HATCH SHALL BE BILCO ALUMINUM MODEL JD-4AL OR EQUAL APPROVED IN ADVANCE BY GCDPU.
5. VAULT INLET/OUTLET OPENINGS SHALL BE SEALED WITH CONCRETE OR BRICK AND MORTAR AROUND PIPE. PIPE MUST NOT SUPPORT VAULT.
6. VAULT SHALL BE PRECAST FOR NON-LOAD BEARING APPLICATION. WHEN VAULT WILL BE SUBJECTED TO LIVE LOAD, CUSTOMER'S ENGINEER SHALL SUBMIT DETAILED VAULT DESIGN FOR GCDPU APPROVAL IN ADVANCE OF CONSTRUCTION.
7. ACCESS LADDER - SHALL BE DOWELED TO WALL AND CENTERED AT HATCH OPENING.
8. ALL CHECK VALVE AND METER ASSEMBLIES SHALL BE SUPPORTED IN TWO (2) PLACES ON CAP BLOCKS OR STEEL. NO WOOD IS ALLOWED.
9. THRUST BLOCKS - SHALL CONFORM TO GCDPU DRAWING NO. A-24 (LATEST REVISION).
10. THRUST TIE RODS - SHALL CONFORM TO GCDPU DRAWING NO.'S A-33, A-74, AND A-78. RODS SHALL EXTEND FROM FIRST FLANGE INSIDE VAULT TO TAPPING VALVE (WELDED TO CASING ON LONG SIDE BORE).
11. 6" DOUBLE DETECTOR CHECK VALVE ASSEMBLY SHALL BE WATTS MODEL 709 DCDA, HERSEY MODEL DDC-II, FEBCO MODEL 856, AMES MODEL 3000 SS, OR EQUAL APPROVED IN ADVANCE BY GCDPU.

    3" DOUBLE CHECK VALVE ASSEMBLY SHALL BE WATTS MODEL 709, HERSEY MODEL HDC, FEBCO MODEL 850, AMES MODEL 2000 SS, OR EQUAL APPROVED IN ADVANCE BY GCDPU.

    2" DOUBLE CHECK VALVE ASSEMBLY SHALL BE WATTS MODEL 007U, HERSEY MODEL #2, FEBCO MODEL 850U, AMES MODEL 2000SE, OR EQUAL APPROVED IN ADVANCE BY GCDPU.

    6" AND 3" CHECK VALVES SHALL BE EQUIPPED WITH OS&Y RESILIENT SEATED GATE VALVES.
12. GCDPU SHALL FURNISH FIRE METER WITH STRAINER. ALL OTHER MATERIALS SHALL BE FURNISHED BY CUSTOMER.
13. DOUBLE DETECTOR CHECK VALVE ASSEMBLY DIMENSIONS SHOWN ARE FOR WATTS MODEL 709 DCDA. 3" DOUBLE CHECK VALVE ASSEMBLY DIMENSIONS ARE FOR WATTS MODEL 709. OTHER VALVE ASSEMBLY DIMENSIONS MAY VARY.
14. VAULT SHALL BE INSTALLED ON PRIVATE PROPERTY. CUSTOMER MUST PROVIDE A 15' x 30' EASEMENT AND/OR RIGHT OF ENTRY CLAUSE.
15. MINIMUM CLEARANCE FROM VAULT FLOOR TO BOTTOM OF FLANGES SHALL BE 12".
16. VALVE PAD AND VALVE MARKER SHALL BE INSTALLED WHERE APPROPRIATE.

NOTES

1. NO WORK SHALL BEGIN WITHOUT OBTAINING "CONSTRUCTION PERMIT" FROM THE DEPARTMENT OF PUBLIC UTILITIES (GCDPU).
2. NO TAPS TO GWINNETT COUNTY WATER MAINS SHALL BE MADE WITHOUT THE INSPECTOR PRESENT.
3. ALL BACKFLOW PREVENTION DEVICES SHALL MEET OR EXCEED GCDPU SPECIFICATIONS.
4. ALL BACKFLOW PREVENTION DEVICES MUST BE TESTED BY A TESTER FROM THE GWINNETT COUNTY APPROVED TESTERS LIST BEFORE A FINAL C.O. WILL BE ISSUED. (AN APPROVED TESTERS LIST MAY BE OBTAINED BY CALLING 678-376-6907.)

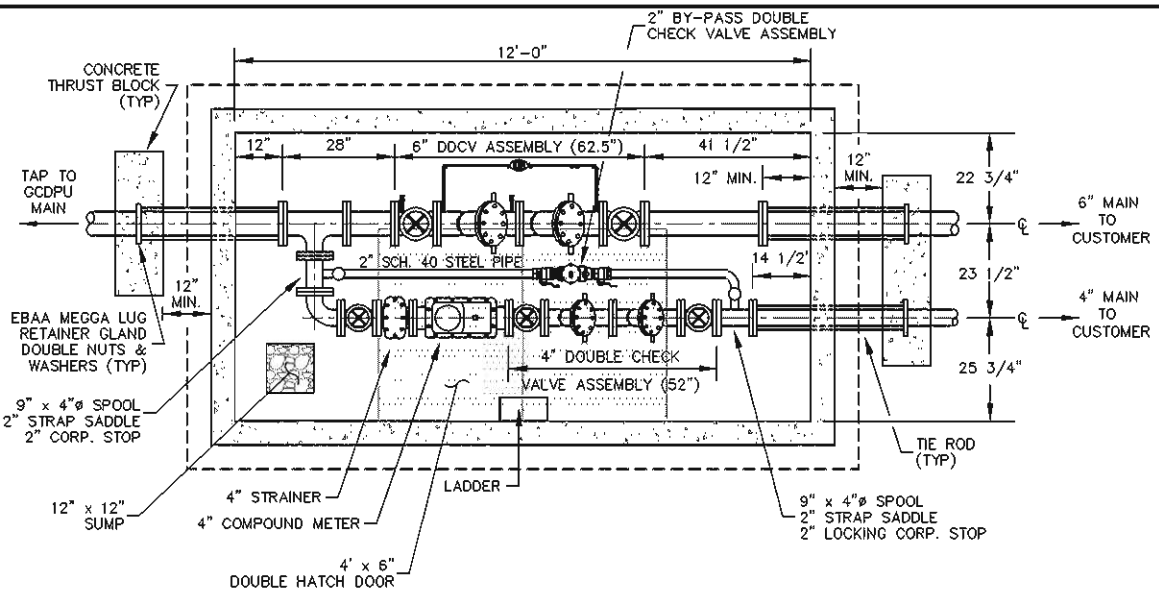
BOARD OF COMMISSIONERS OF GWINNETT COUNTY
GEORGIA

GWINNETT COUNTY
DEPARTMENT OF WATER RESOURCES
BACKFLOW PREVENTION

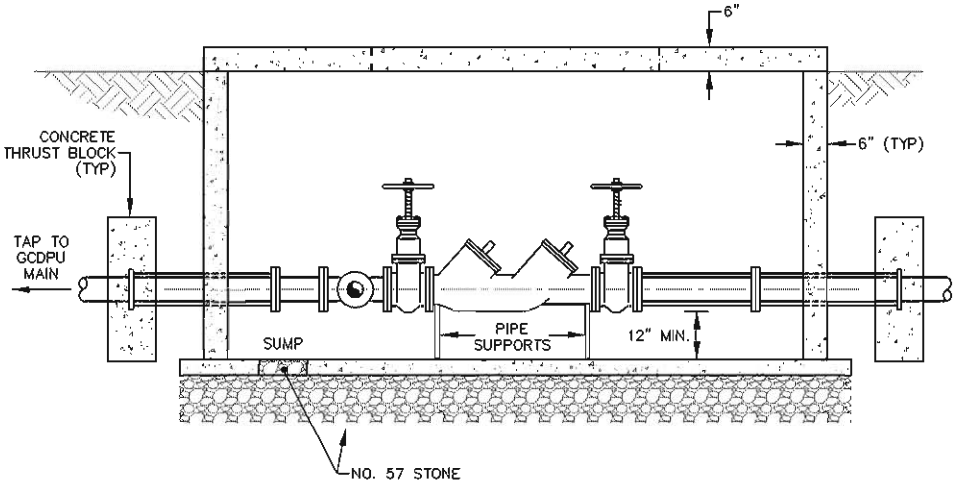
"Protecting water, protecting people"

6" DOUBLE DETECTOR CHECK VALVE WITH 3" COMPOUND METER

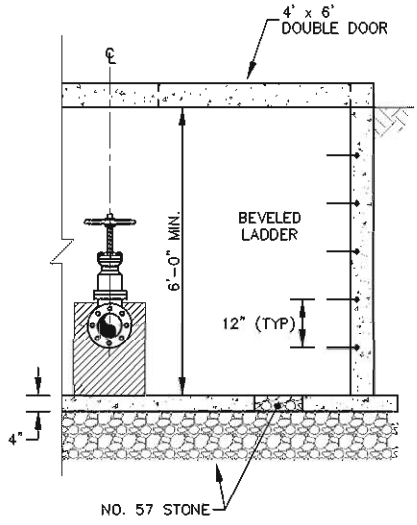
DRAWN BY: JDS	DATE: 08-17-04	SCALE: N.T.S.



PLAN VIEW



SIDE VIEW
TYP.



END VIEW

VAULT SPECIFICATIONS

1. THIS DRAWING SHALL BE USED FOR INSTALLATION OF 6" DOUBLE DETECTOR CHECK VALVE WITH 4" COMPOUND METER.
2. ALL PIPE AND FITTINGS SHALL BE FLANGED DUCTILE IRON PIPE, EXCEPT WHERE NOTED.
3. VAULT TOP SHALL BE 6" THICK REINFORCED CONCRETE. MINIMUM INSIDE HEIGHT IS 6'-0". VAULT BOTTOM IS 4" CONCRETE SLAB SLOPED TO 12" x 12" DRAIN SUMP HOLE. SLAB TO BE POURED ON 12" OF COMPACTED NO. 57 STONE. HATCH OPENING SHALL BE TO ONE SIDE OF VAULT AT THE CENTER POINT OF THE WALL.
4. HATCH SHALL BE BILCO ALUMINUM MODEL JD-4AL OR EQUAL APPROVED IN ADVANCE BY GCDPU.
5. VAULT INLET/OUTLET OPENINGS SHALL BE SEALED WITH CONCRETE OR BRICK AND MORTAR AROUND PIPE. PIPE MUST NOT SUPPORT VAULT.
6. VAULT SHALL BE PRECAST FOR NON-LOAD BEARING APPLICATION. WHEN VAULT WILL BE SUBJECTED TO LIVE LOAD, CUSTOMER'S ENGINEER SHALL SUBMIT DETAILED VAULT DESIGN FOR GCDPU APPROVAL IN ADVANCE OF CONSTRUCTION.
7. ACCESS LADDER - SHALL BE DOWELED TO WALL AND CENTERED AT HATCH OPENING.
8. ALL CHECK VALVE AND METER ASSEMBLIES SHALL BE SUPPORTED IN TWO (2) PLACES ON CAP BLOCKS OR STEEL. NO WOOD IS ALLOWED.
9. THRUST BLOCKS - SHALL CONFORM TO GCDPU DRAWING NO. A-24 (LATEST REVISION).
10. THRUST TIE RODS - SHALL CONFORM TO GCDPU DRAWING NO.'S A-33, A-74, AND A-78. RODS SHALL EXTEND FROM FIRST FLANGE INSIDE VAULT TO TAPPING VALVE (WELDED TO CASING ON LONG SIDE BORE).
11. 6" DOUBLE DETECTOR CHECK VALVE ASSEMBLY SHALL BE WATTS MODEL 709 DCDA, HERSEY MODEL DDC-II, FEBCO MODEL 856, AMES MODEL 3000 SS, OR EQUAL APPROVED IN ADVANCE BY GCDPU.

    4" DOUBLE CHECK VALVE ASSEMBLY SHALL BE WATTS MODEL 709, HERSEY MODEL HDC, FEBCO MODEL 850, AMES MODEL 2000 SS, OR EQUAL APPROVED IN ADVANCE BY GCDPU.

    2" DOUBLE CHECK VALVE ASSEMBLY SHALL BE WATTS MODEL 007U, HERSEY MODEL #2, FEBCO MODEL 850U, AMES MODEL 2000SE, OR EQUAL APPROVED IN ADVANCE BY GCDPU.

    6" AND 4" CHECK VALVES SHALL BE EQUIPPED WITH OS&Y RESILIENT SEATED GATE VALVES.
12. GCDPU SHALL FURNISH FIRE METER WITH STRAINER. ALL OTHER MATERIALS SHALL BE FURNISHED BY CUSTOMER.
13. DOUBLE DETECTOR CHECK VALVE ASSEMBLY DIMENSIONS SHOWN ARE FOR WATTS MODEL 709 DCDA. 4" DOUBLE CHECK VALVE ASSEMBLY DIMENSIONS ARE FOR WATTS MODEL 709. OTHER VALVE ASSEMBLY DIMENSIONS MAY VARY.
14. VAULT SHALL BE INSTALLED ON PRIVATE PROPERTY. CUSTOMER MUST PROVIDE A 15' x 30' EASEMENT AND/OR RIGHT OF ENTRY CLAUSE.
15. MINIMUM CLEARANCE FROM VAULT FLOOR TO BOTTOM OF FLANGES SHALL BE 12".
16. VALVE PAD AND VALVE MARKER SHALL BE INSTALLED WHERE APPROPRIATE.

NOTES

1. NO WORK SHALL BEGIN WITHOUT OBTAINING "CONSTRUCTION PERMIT" FROM THE DEPARTMENT OF PUBLIC UTILITIES (GCDPU).
2. NO TAPS TO GWINNETT COUNTY WATER MAINS SHALL BE MADE WITHOUT THE INSPECTOR PRESENT.
3. ALL BACKFLOW PREVENTION DEVICES SHALL MEET OR EXCEED GCDPU SPECIFICATIONS.
4. ALL BACKFLOW PREVENTION DEVICES MUST BE TESTED BY A TESTER FROM THE GWINNETT COUNTY APPROVED TESTERS LIST BEFORE A FINAL C.O. WILL BE ISSUED. (AN APPROVED TESTERS LIST MAY BE OBTAINED BY CALLING 678-376-6907.)

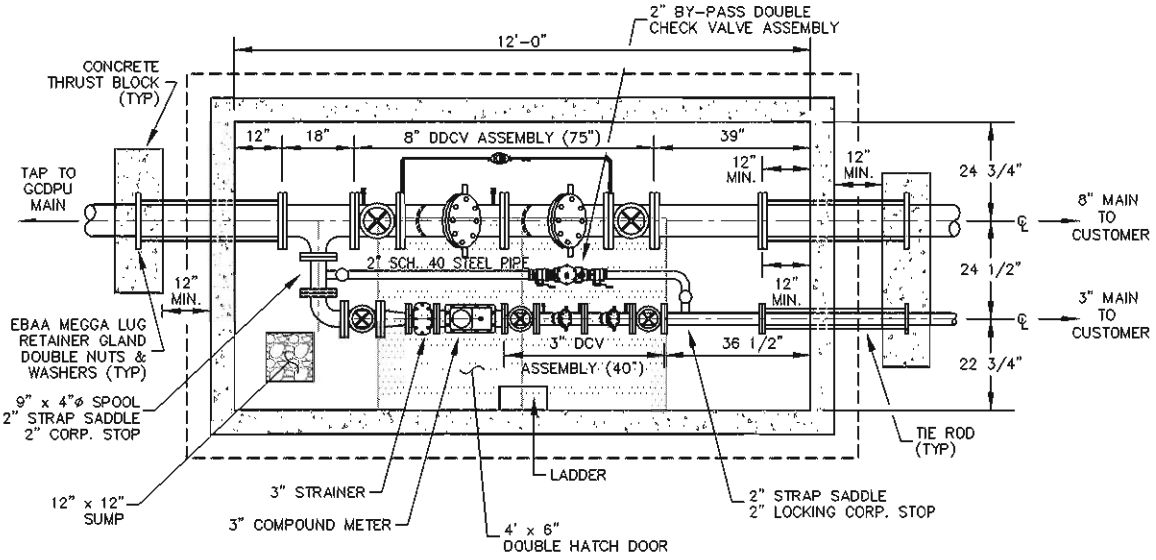
BOARD OF COMMISSIONERS OF GWINNETT COUNTY
DECATUR GEORGIA

GWINNETT COUNTY
DEPARTMENT OF WATER RESOURCES
BACKFLOW PREVENTION

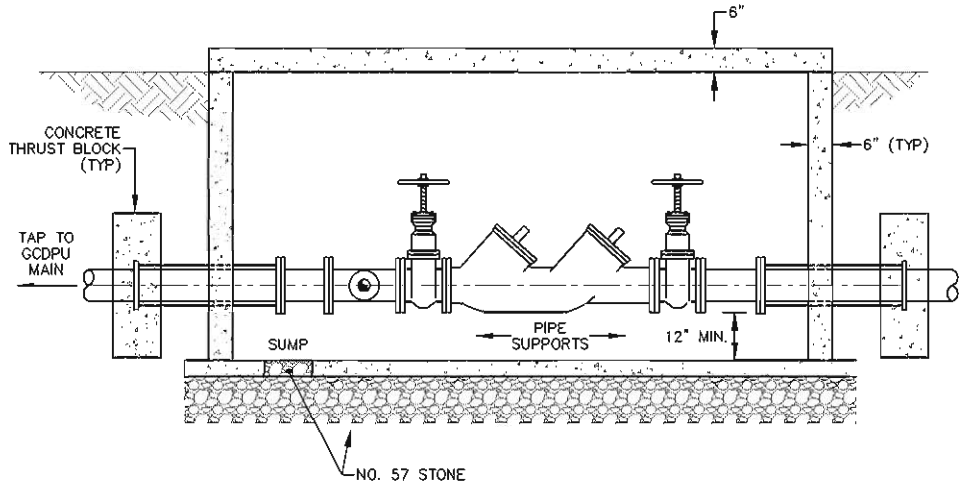
"Protecting water, protecting people"

6" DOUBLE DETECTOR CHECK VALVE WITH 4" COMPOUND METER

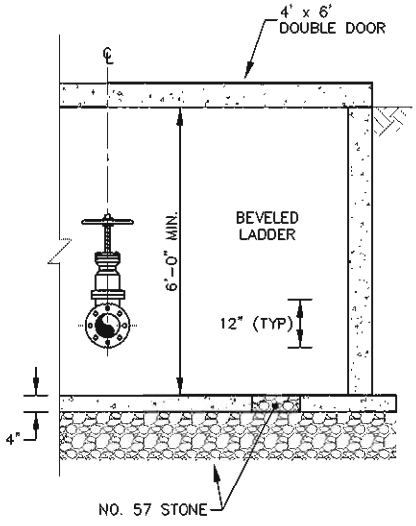
DRAWN BY: JDS	DATE: 08-17-04	SCALE: N.T.S.



PLAN VIEW



SIDE VIEW
TYP.



END VIEW

VAULT SPECIFICATIONS

1. THIS DRAWING SHALL BE USED FOR INSTALLATION OF 8" DOUBLE DETECTOR CHECK VALVE WITH 3" COMPOUND METER.
2. ALL PIPE AND FITTINGS SHALL BE FLANGED DUCTILE IRON PIPE, EXCEPT WHERE NOTED.
3. VAULT TOP SHALL BE 6" THICK REINFORCED CONCRETE. MINIMUM INSIDE HEIGHT IS 6'-0". VAULT BOTTOM IS 4" CONCRETE SLAB SLOPED TO 12" x 12" DRAIN SUMP HOLE. SLAB TO BE POURED ON 12" OF COMPACTED NO. 57 STONE. HATCH OPENING SHALL BE TO ONE SIDE OF VAULT AT THE CENTER POINT OF THE WALL.
4. HATCH SHALL BE BILCO ALUMINUM MODEL JD-4AL OR EQUAL APPROVED IN ADVANCE BY GCDPU.
5. VAULT INLET/OUTLET OPENINGS SHALL BE SEALED WITH CONCRETE OR BRICK AND MORTAR AROUND PIPE. PIPE MUST NOT SUPPORT VAULT.
6. VAULT SHALL BE PRECAST FOR NON-LOAD BEARING APPLICATION. WHEN VAULT WILL BE SUBJECTED TO LIVE LOAD, CUSTOMER'S ENGINEER SHALL SUBMIT DETAILED VAULT DESIGN FOR GCDPU APPROVAL IN ADVANCE OF CONSTRUCTION.
7. ACCESS LADDER - SHALL BE DOWELED TO WALL AND CENTERED AT HATCH OPENING.
8. ALL CHECK VALVE AND METER ASSEMBLIES SHALL BE SUPPORTED IN TWO (2) PLACES ON CAP BLOCKS OR STEEL. NO WOOD IS ALLOWED.
9. THRUST BLOCKS - SHALL CONFORM TO GCDPU DRAWING NO. A-24 (LATEST REVISION).
10. THRUST TIE RODS - SHALL CONFORM TO GCDPU DRAWING NO.'S A-33, A-74, AND A-78. RODS SHALL EXTEND FROM FIRST FLANGE INSIDE VAULT TO TAPPING VALVE (WELDED TO CASING ON LONG SIDE BORE).
11. 8" DOUBLE DETECTOR CHECK VALVE ASSEMBLY SHALL BE WATTS MODEL 709 DCDA, HERSEY MODEL DDC-II, FEBCO MODEL 856, AMES MODEL 3000 SS, OR EQUAL APPROVED IN ADVANCE BY GCDPU.

    3" DOUBLE CHECK VALVE ASSEMBLY SHALL BE WATTS MODEL 709, HERSEY MODEL HDC, FEBCO MODEL 850, AMES MODEL 2000 SS, OR EQUAL APPROVED IN ADVANCE BY GCDPU.

    2" DOUBLE CHECK VALVE ASSEMBLY SHALL BE WATTS MODEL 007U, HERSEY MODEL #2, FEBCO MODEL 850U, AMES MODEL 2000SE, OR EQUAL APPROVED IN ADVANCE BY GCDPU.

    8" AND 3" CHECK VALVES SHALL BE EQUIPPED WITH OS&Y RESILIENT SEATED GATE VALVES.
12. GCDPU SHALL FURNISH FIRE METER WITH STRAINER. ALL OTHER MATERIALS SHALL BE FURNISHED BY CUSTOMER.
13. DOUBLE DETECTOR CHECK VALVE ASSEMBLY DIMENSIONS SHOWN ARE FOR WATTS MODEL 709 DCDA. 3" DOUBLE CHECK VALVE ASSEMBLY DIMENSIONS ARE FOR WATTS MODEL 709. OTHER VALVE ASSEMBLY DIMENSIONS MAY VARY.
14. VAULT SHALL BE INSTALLED ON PRIVATE PROPERTY. CUSTOMER MUST PROVIDE A 15' x 30' EASEMENT AND/OR RIGHT OF ENTRY CLAUSE.
15. MINIMUM CLEARANCE FROM VAULT FLOOR TO BOTTOM OF FLANGES SHALL BE 12".
16. VALVE PAD AND VALVE MARKER SHALL BE INSTALLED WHERE APPROPRIATE.

NOTES

1. NO WORK SHALL BEGIN WITHOUT OBTAINING "CONSTRUCTION PERMIT" FROM THE DEPARTMENT OF PUBLIC UTILITIES (GCDPU).
2. NO TAPS TO GWINNETT COUNTY WATER MAINS SHALL BE MADE WITHOUT THE INSPECTOR PRESENT.
3. ALL BACKFLOW PREVENTION DEVICES SHALL MEET OR EXCEED GCDPU SPECIFICATIONS.
4. ALL BACKFLOW PREVENTION DEVICES MUST BE TESTED BY A TESTER FROM THE GWINNETT COUNTY APPROVED TESTERS LIST BEFORE A FINAL C.O. WILL BE ISSUED. (AN APPROVED TESTERS LIST MAY BE OBTAINED BY CALLING 678-376-6907.)

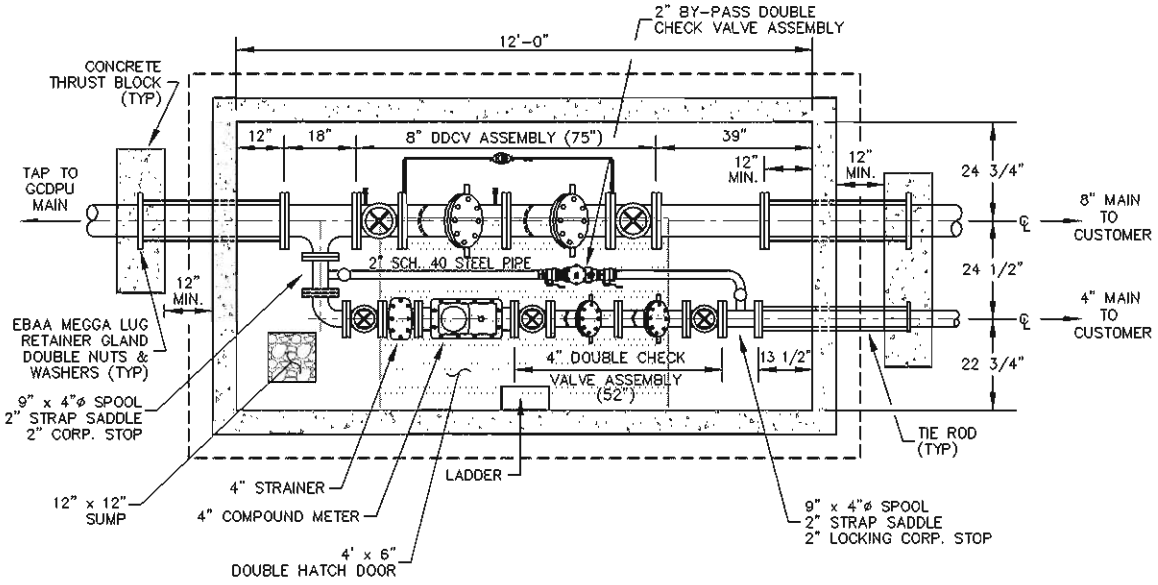
BOARD OF COMMISSIONERS OF GWINNETT COUNTY
GEORGIA

GWINNETT COUNTY
DEPARTMENT OF WATER RESOURCES
BACKFLOW PREVENTION

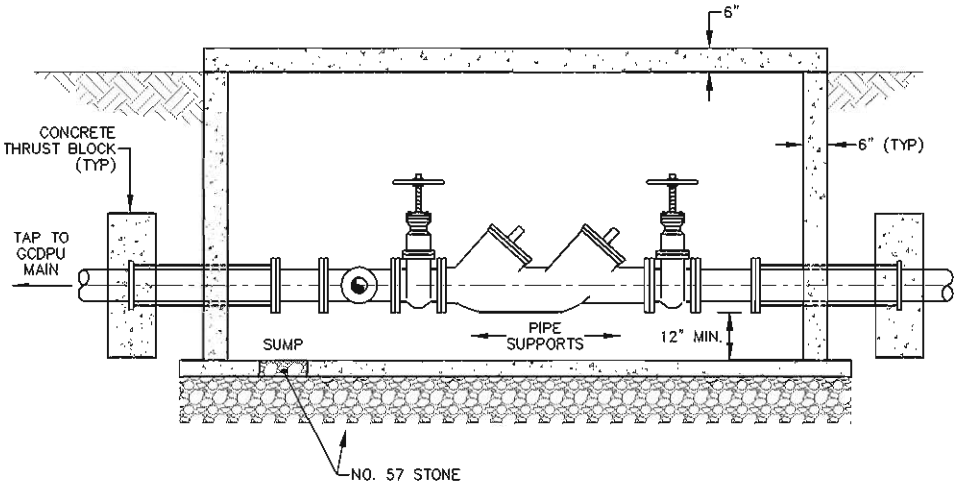
"Protecting water, protecting people"

8" DOUBLE DETECTOR CHECK VALVE WITH 3" COMPOUND METER

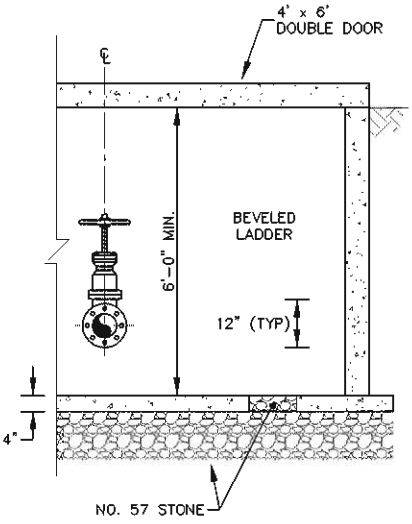
DRAWN BY: JDS	DATE: 08-17-04	SCALE: N.T.S.



PLAN VIEW



SIDE VIEW
TYP.



END VIEW

VAULT SPECIFICATIONS

1. THIS DRAWING SHALL BE USED FOR INSTALLATION OF 8" DOUBLE DETECTOR CHECK VALVE WITH 4" COMPOUND METER.
2. ALL PIPE AND FITTINGS SHALL BE FLANGED DUCTILE IRON PIPE, EXCEPT WHERE NOTED.
3. VAULT TOP SHALL BE 6" THICK REINFORCED CONCRETE. MINIMUM INSIDE HEIGHT IS 6'-0". VAULT BOTTOM IS 4" CONCRETE SLAB SLOPED TO 12" x 12" DRAIN SUMP HOLE. SLAB TO BE POURED ON 12" OF COMPACTED NO. 57 STONE. HATCH OPENING SHALL BE TO ONE SIDE OF VAULT AT THE CENTER POINT OF THE WALL.
4. HATCH SHALL BE BILCO ALUMINUM MODEL JD-4AL OR EQUAL APPROVED IN ADVANCE BY GCDPU.
5. VAULT INLET/OUTLET OPENINGS SHALL BE SEALED WITH CONCRETE OR BRICK AND MORTAR AROUND PIPE. PIPE MUST NOT SUPPORT VAULT.
6. VAULT SHALL BE PRECAST FOR NON-LOAD BEARING APPLICATION. WHEN VAULT WILL BE SUBJECTED TO LIVE LOAD, CUSTOMER'S ENGINEER SHALL SUBMIT DETAILED VAULT DESIGN FOR GCDPU APPROVAL IN ADVANCE OF CONSTRUCTION.
7. ACCESS LADDER - SHALL BE DOWELED TO WALL AND CENTERED AT HATCH OPENING.
8. ALL CHECK VALVE AND METER ASSEMBLIES SHALL BE SUPPORTED IN TWO (2) PLACES ON CAP BLOCKS OR STEEL. NO WOOD IS ALLOWED.
9. THRUST BLOCKS - SHALL CONFORM TO GCDPU DRAWING NO. A-24 (LATEST REVISION).
10. THRUST TIE RODS - SHALL CONFORM TO GCDPU DRAWING NO.'S A-33, A-74, AND A-78. RODS SHALL EXTEND FROM FIRST FLANGE INSIDE VAULT TO TAPPING VALVE (WELDED TO CASING ON LONG SIDE BORE).
11. 8" DOUBLE DETECTOR CHECK VALVE ASSEMBLY SHALL BE WATTS MODEL 709 DCDA, HERSEY MODEL DDC-II, FEBCO MODEL 856, AMES MODEL 3000 SS, OR EQUAL APPROVED IN ADVANCE BY GCDPU.

    4" DOUBLE CHECK VALVE ASSEMBLY SHALL BE WATTS MODEL 709, HERSEY MODEL HDC, FEBCO MODEL 850, AMES MODEL 2000 SS, OR EQUAL APPROVED IN ADVANCE BY GCDPU.

    2" DOUBLE CHECK VALVE ASSEMBLY SHALL BE WATTS MODEL 007U, HERSEY MODEL #2, FEBCO MODEL 850U, AMES MODEL 2000SE, OR EQUAL APPROVED IN ADVANCE BY GCDPU.

    8" AND 4" CHECK VALVES SHALL BE EQUIPPED WITH OS&Y RESILIENT SEATED GATE VALVES.
12. GCDPU SHALL FURNISH FIRE METER WITH STRAINER. ALL OTHER MATERIALS SHALL BE FURNISHED BY CUSTOMER.
13. DOUBLE DETECTOR CHECK VALVE ASSEMBLY DIMENSIONS SHOWN ARE FOR WATTS MODEL 709 DCDA. 4" DOUBLE CHECK VALVE ASSEMBLY DIMENSIONS ARE FOR WATTS MODEL 709. OTHER VALVE ASSEMBLY DIMENSIONS MAY VARY.
14. VAULT SHALL BE INSTALLED ON PRIVATE PROPERTY. CUSTOMER MUST PROVIDE A 15' x 30' EASEMENT AND/OR RIGHT OF ENTRY CLAUSE.
15. MINIMUM CLEARANCE FROM VAULT FLOOR TO BOTTOM OF FLANGES SHALL BE 12".
16. VALVE PAD AND VALVE MARKER SHALL BE INSTALLED WHERE APPROPRIATE.

NOTES

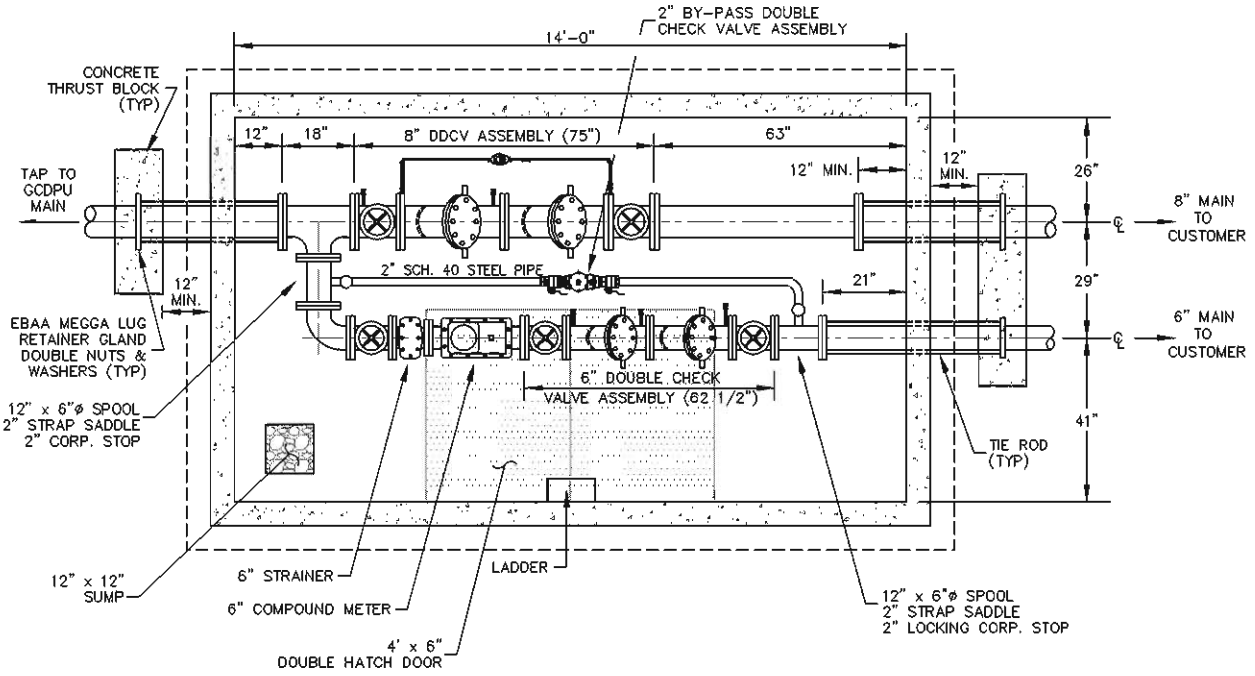
1. NO WORK SHALL BEGIN WITHOUT OBTAINING "CONSTRUCTION PERMIT" FROM THE DEPARTMENT OF PUBLIC UTILITIES (GCDPU).
2. NO TAPS TO GWINNETT COUNTY WATER MAINS SHALL BE MADE WITHOUT THE INSPECTOR PRESENT.
3. ALL BACKFLOW PREVENTION DEVICES SHALL MEET OR EXCEED GCDPU SPECIFICATIONS.
4. ALL BACKFLOW PREVENTION DEVICES MUST BE TESTED BY A TESTER FROM THE GWINNETT COUNTY APPROVED TESTERS LIST BEFORE A FINAL C.O. WILL BE ISSUED. (AN APPROVED TESTERS LIST MAY BE OBTAINED BY CALLING 678-376-6907.)

GWINNETT COUNTY
DEPARTMENT OF WATER RESOURCES
BACKFLOW PREVENTION

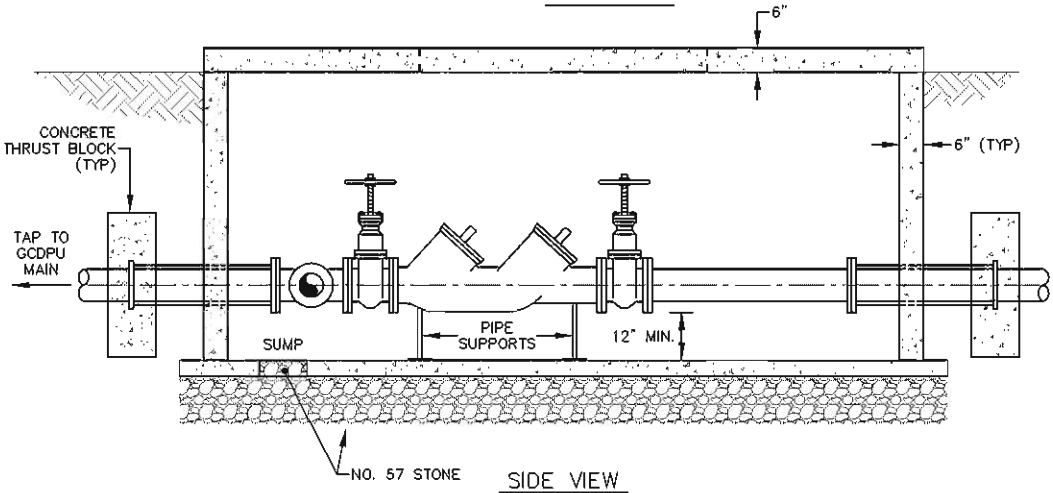
"Protecting water, protecting people"

8" DOUBLE DETECTOR CHECK VALVE WITH 4" COMPOUND METER

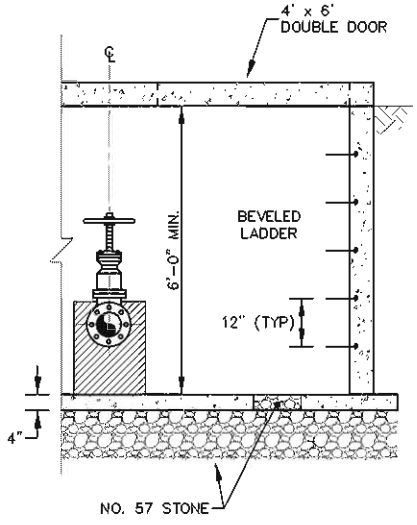
DRAWN BY: JDS	DATE: 08-17-04	SCALE: N.T.S.



PLAN VIEW



SIDE VIEW
TYP.



END VIEW

VAULT SPECIFICATIONS

1. THIS DRAWING SHALL BE USED FOR INSTALLATION OF 8" DOUBLE DETECTOR CHECK VALVE WITH 6" COMPOUND METER.
2. ALL PIPE AND FITTINGS SHALL BE FLANGED DUCTILE IRON PIPE, EXCEPT WHERE NOTED.
3. VAULT TOP SHALL BE 6" THICK REINFORCED CONCRETE. MINIMUM INSIDE HEIGHT IS 6'-0". VAULT BOTTOM IS 4" CONCRETE SLAB SLOPED TO 12" x 12" DRAIN SUMP HOLE. SLAB TO BE POURED ON 12" OF COMPACTED NO. 57 STONE. HATCH OPENING SHALL BE TO ONE SIDE OF VAULT AT THE CENTER POINT OF THE WALL.
4. HATCH SHALL BE BILCO ALUMINUM MODEL JD-4AL OR EQUAL APPROVED IN ADVANCE BY GCDPU.
5. VAULT INLET/OUTLET OPENINGS SHALL BE SEALED WITH CONCRETE OR BRICK AND MORTAR AROUND PIPE. PIPE MUST NOT SUPPORT VAULT.
6. VAULT SHALL BE PRECAST FOR NON-LOAD BEARING APPLICATION. WHEN VAULT WILL BE SUBJECTED TO LIVE LOAD, CUSTOMER'S ENGINEER SHALL SUBMIT DETAILED VAULT DESIGN FOR GCDPU APPROVAL IN ADVANCE OF CONSTRUCTION.
7. ACCESS LADDER – SHALL BE DOWELED TO WALL AND CENTERED AT HATCH OPENING.
8. ALL CHECK VALVE AND METER ASSEMBLIES SHALL BE SUPPORTED IN TWO (2) PLACES ON CAP BLOCKS OR STEEL. NO WOOD IS ALLOWED.
9. THRUST BLOCKS – SHALL CONFORM TO GCDPU DRAWING NO. A-24 (LATEST REVISION).
10. THRUST TIE RODS – SHALL CONFORM TO GCDPU DRAWING NO.'S A-33, A-74, AND A-78. RODS SHALL EXTEND FROM FIRST FLANGE INSIDE VAULT TO TAPPING VALVE (WELDED TO CASING ON LONG SIDE BORE).
11. 8" DOUBLE DETECTOR CHECK VALVE ASSEMBLY SHALL BE WATTS MODEL 709 DCDA, HERSEY MODEL DDC-II, FEBCO MODEL 856, AMES MODEL 3000 SS, OR EQUAL APPROVED IN ADVANCE BY GCDPU.

    6" DOUBLE CHECK VALVE ASSEMBLY SHALL BE WATTS MODEL 709, HERSEY MODEL HDC, FEBCO MODEL 850, AMES MODEL 2000 SS, OR EQUAL APPROVED IN ADVANCE BY GCDPU.

    2" DOUBLE CHECK VALVE ASSEMBLY SHALL BE WATTS MODEL 007U, HERSEY MODEL #2, FEBCO MODEL 850U, AMES MODEL 2000SE, OR EQUAL APPROVED IN ADVANCE BY GCDPU.

    8" AND 6" CHECK VALVES SHALL BE EQUIPPED WITH OS&Y RESILIENT SEATED GATE VALVES.
12. GCDPU SHALL FURNISH FIRE METER WITH STRAINER. ALL OTHER MATERIALS SHALL BE FURNISHED BY CUSTOMER.
13. DOUBLE DETECTOR CHECK VALVE ASSEMBLY DIMENSIONS SHOWN ARE FOR WATTS MODEL 709 DCDA. 6" DOUBLE CHECK VALVE ASSEMBLY DIMENSIONS ARE FOR WATTS MODEL 709. OTHER VALVE ASSEMBLY DIMENSIONS MAY VARY.
14. VAULT SHALL BE INSTALLED ON PRIVATE PROPERTY. CUSTOMER MUST PROVIDE A 15' x 30' EASEMENT AND/OR RIGHT OF ENTRY CLAUSE.
15. MINIMUM CLEARANCE FROM VAULT FLOOR TO BOTTOM OF FLANGES SHALL BE 12".
16. VALVE PAD AND VALVE MARKER SHALL BE INSTALLED WHERE APPROPRIATE.

NOTES

1. NO WORK SHALL BEGIN WITHOUT OBTAINING "CONSTRUCTION PERMIT" FROM THE DEPARTMENT OF PUBLIC UTILITIES (GCDPU).
2. NO TAPS TO GWINNETT COUNTY WATER MAINS SHALL BE MADE WITHOUT THE INSPECTOR PRESENT.
3. ALL BACKFLOW PREVENTION DEVICES SHALL MEET OR EXCEED GCDPU SPECIFICATIONS.
4. ALL BACKFLOW PREVENTION DEVICES MUST BE TESTED BY A TESTER FROM THE GWINNETT COUNTY APPROVED TESTERS LIST BEFORE A FINAL C.O. WILL BE ISSUED. (AN APPROVED TESTERS LIST MAY BE OBTAINED BY CALLING 678-376-6907.)

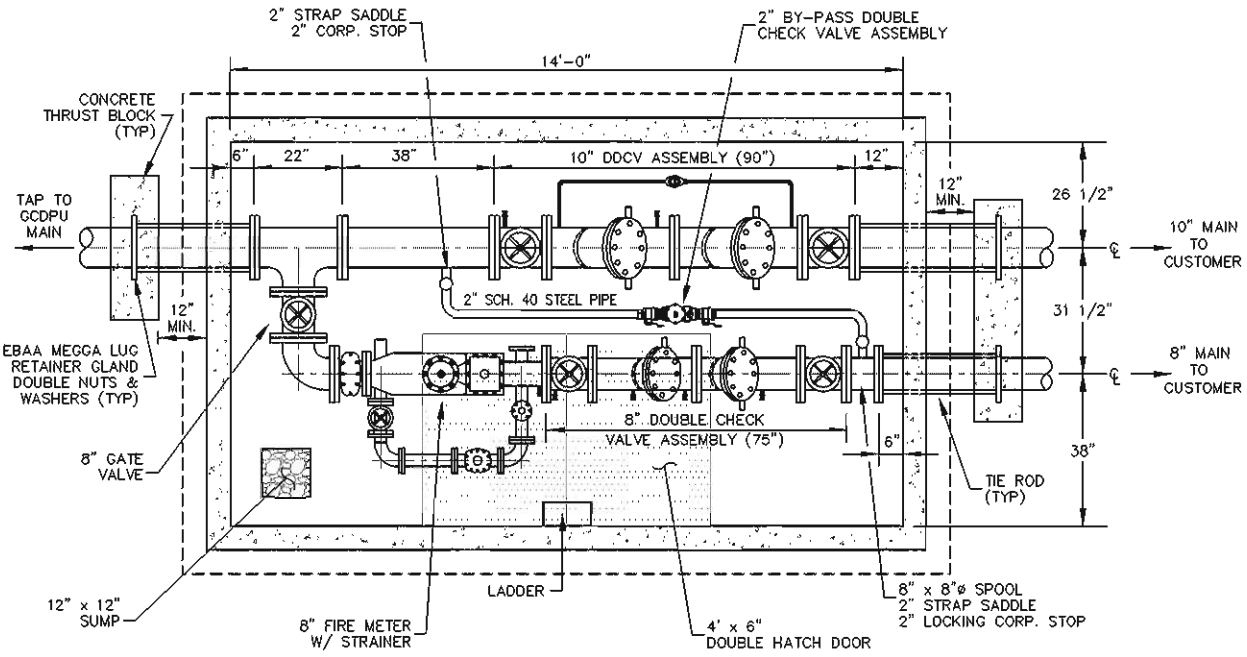
BOARD OF COMMISSIONERS OF GWINNETT COUNTY
GEORGIA

GWINNETT COUNTY
DEPARTMENT OF WATER RESOURCES
BACKFLOW PREVENTION

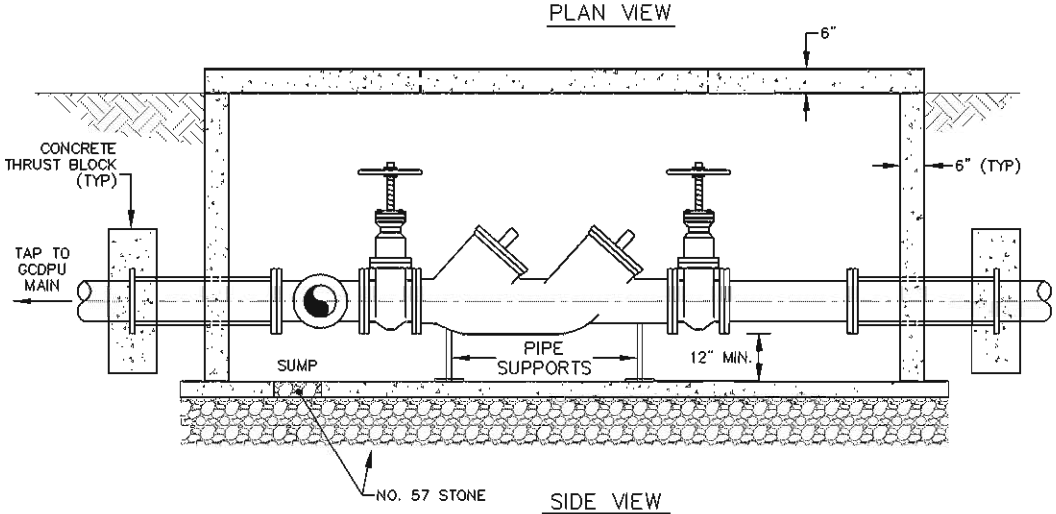
"Protecting water, protecting people"

8" DOUBLE DETECTOR CHECK VALVE WITH 6" COMPOUND METER

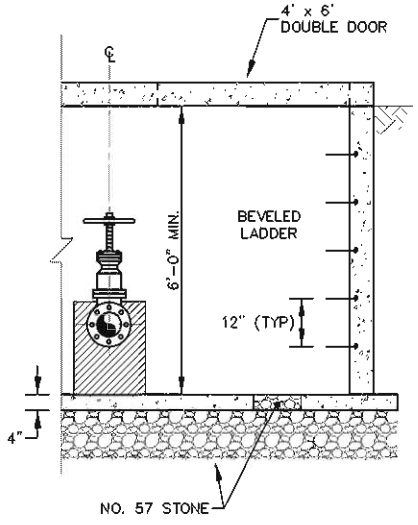
DRAWN BY: JDS	DATE: 08-17-04	SCALE: N.T.S.



PLAN VIEW



SIDE VIEW
TYP.



END VIEW

VAULT SPECIFICATIONS

1. THIS DRAWING SHALL BE USED FOR INSTALLATION OF 10" DOUBLE DETECTOR CHECK VALVE WITH 8" FIRE METER.
2. ALL PIPE AND FITTINGS SHALL BE FLANGED DUCTILE IRON PIPE, EXCEPT WHERE NOTED.
3. VAULT TOP SHALL BE 6" THICK REINFORCED CONCRETE. MINIMUM INSIDE HEIGHT IS 6'-0". VAULT BOTTOM IS 4" CONCRETE SLAB SLOPED TO 12" x 12" DRAIN SUMP HOLE. SLAB TO BE POURED ON 12" OF COMPACTED NO. 57 STONE. HATCH OPENING SHALL BE TO ONE SIDE OF VAULT AT THE CENTER POINT OF THE WALL.
4. HATCH SHALL BE BILCO ALUMINUM MODEL JD-4AL OR EQUAL APPROVED IN ADVANCE BY GCDPU.
5. VAULT INLET/OUTLET OPENINGS SHALL BE SEALED WITH CONCRETE OR BRICK AND MORTAR AROUND PIPE. PIPE MUST NOT SUPPORT VAULT.
6. VAULT SHALL BE PRECAST FOR NON-LOAD BEARING APPLICATION. WHEN VAULT WILL BE SUBJECTED TO LIVE LOAD, CUSTOMER'S ENGINEER SHALL SUBMIT DETAILED VAULT DESIGN FOR GCDPU APPROVAL IN ADVANCE OF CONSTRUCTION.
7. ACCESS LADDER - SHALL BE DOWELED TO WALL AND CENTERED AT HATCH OPENING.
8. ALL CHECK VALVE AND METER ASSEMBLIES SHALL BE SUPPORTED IN TWO (2) PLACES ON CAP BLOCKS OR STEEL. NO WOOD IS ALLOWED.
9. THRUST BLOCKS - SHALL CONFORM TO GCDPU DRAWING NO. A-24 (LATEST REVISION).
10. THRUST TIE RODS - SHALL CONFORM TO GCDPU DRAWING NO.'S A-33, A-74, AND A-78. RODS SHALL EXTEND FROM FIRST FLANGE INSIDE VAULT TO TAPPING VALVE (WELDED TO CASING ON LONG SIDE BORE).
11. 10" DOUBLE DETECTOR CHECK VALVE ASSEMBLY SHALL BE WATTS MODEL 709 DCDA, HERSEY MODEL DDC-II, FEBCO MODEL 856, AMES MODEL 3000 SS, OR EQUAL APPROVED IN ADVANCE BY GCDPU.

    8" DOUBLE CHECK VALVE ASSEMBLY SHALL BE WATTS MODEL 709, HERSEY MODEL HDC, FEBCO MODEL 850, AMES MODEL 2000 SS, OR EQUAL APPROVED IN ADVANCE BY GCDPU.

    2" DOUBLE CHECK VALVE ASSEMBLY SHALL BE WATTS MODEL 007U, HERSEY MODEL #2, FEBCO MODEL 850U, AMES MODEL 2000SE, OR EQUAL APPROVED IN ADVANCE BY GCDPU.

    10" AND 8" CHECK VALVES SHALL BE EQUIPPED WITH OS&Y RESILIENT SEATED GATE VALVES.
12. GCDPU SHALL FURNISH FIRE METER WITH STRAINER. ALL OTHER MATERIALS SHALL BE FURNISHED BY CUSTOMER.
13. DOUBLE DETECTOR CHECK VALVE ASSEMBLY DIMENSIONS SHOWN ARE FOR WATTS MODEL 709 DCDA. 8" DOUBLE CHECK VALVE ASSEMBLY DIMENSIONS ARE FOR WATTS MODEL 709. OTHER VALVE ASSEMBLY DIMENSIONS MAY VARY.
14. VAULT SHALL BE INSTALLED ON PRIVATE PROPERTY. CUSTOMER MUST PROVIDE A 15' x 30' EASEMENT AND/OR RIGHT OF ENTRY CLAUSE.
15. MINIMUM CLEARANCE FROM VAULT FLOOR TO BOTTOM OF FLANGES SHALL BE 12".
16. VALVE PAD AND VALVE MARKER SHALL BE INSTALLED WHERE APPROPRIATE.

NOTES

1. NO WORK SHALL BEGIN WITHOUT OBTAINING "CONSTRUCTION PERMIT" FROM THE DEPARTMENT OF PUBLIC UTILITIES (GCDPU).
2. NO TAPS TO GWINNETT COUNTY WATER MAINS SHALL BE MADE WITHOUT THE INSPECTOR PRESENT.
3. ALL BACKFLOW PREVENTION DEVICES SHALL MEET OR EXCEED GCDPU SPECIFICATIONS.
4. ALL BACKFLOW PREVENTION DEVICES MUST BE TESTED BY A TESTER FROM THE GWINNETT COUNTY APPROVED TESTERS LIST BEFORE A FINAL C.O. WILL BE ISSUED. (AN APPROVED TESTERS LIST MAY BE OBTAINED BY CALLING 678-376-6907.)

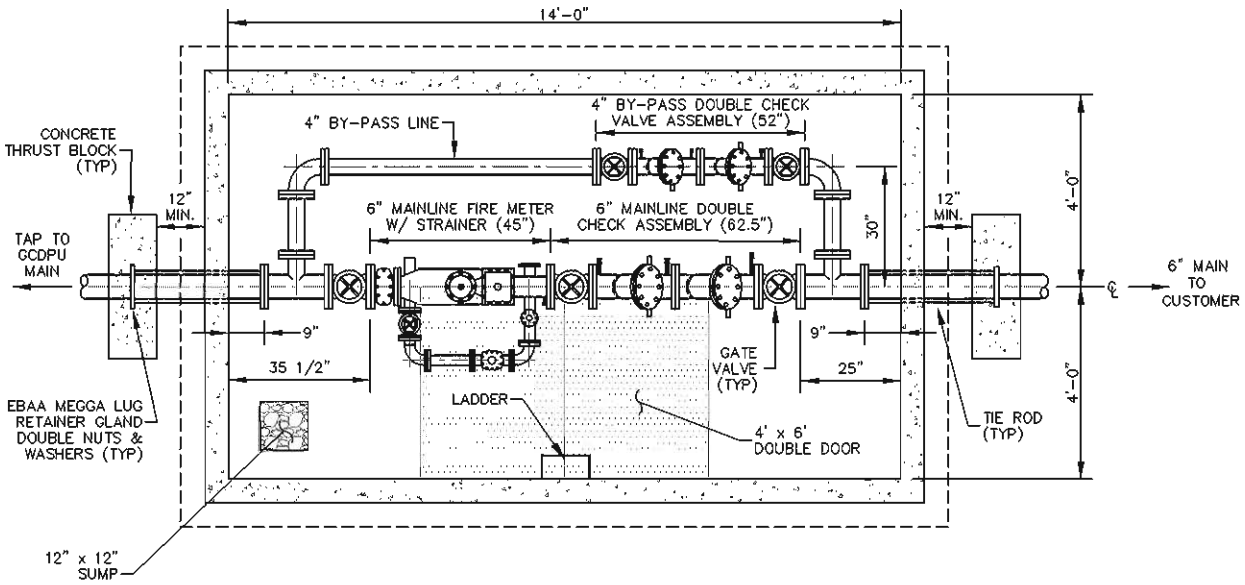
BOARD OF COMMISSIONERS OF GWINNETT COUNTY · GEORGIA

GWINNETT COUNTY
DEPARTMENT OF WATER RESOURCES
BACKFLOW PREVENTION

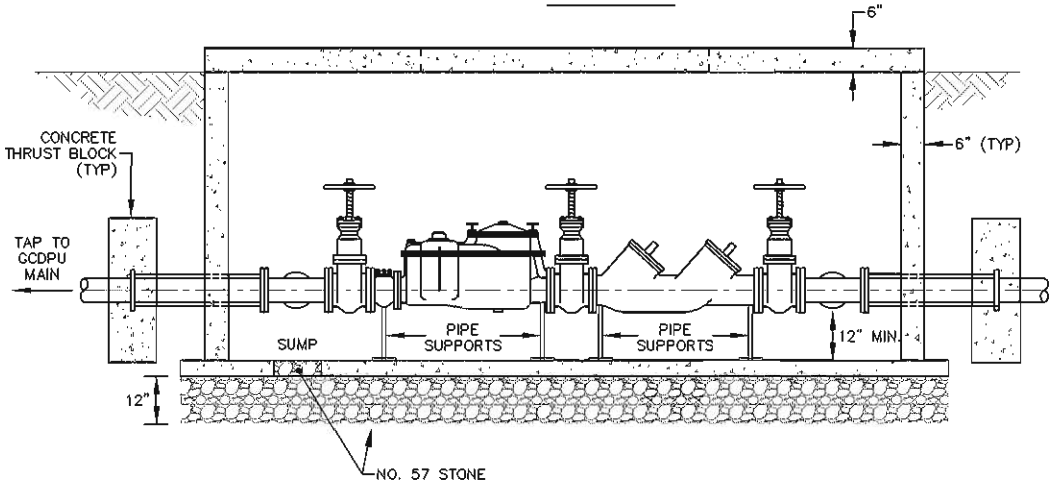
"Protecting water, protecting people"

10" DOUBLE DETECTOR CHECK VALVE WITH 8" FIRE SERVICE METER

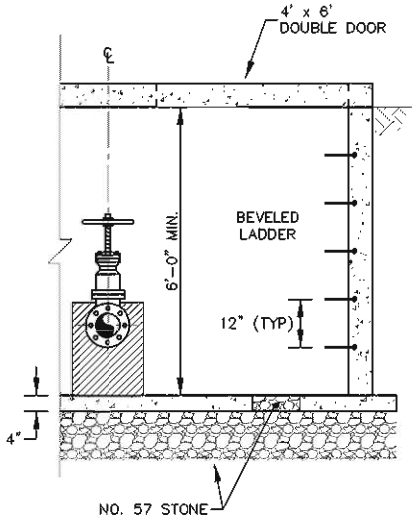
DRAWN BY: JDS	DATE: 08-17-04	SCALE: N.T.S.



PLAN VIEW



SIDE VIEW
TYP.



END VIEW

VAULT SPECIFICATIONS

1. THIS DRAWING SHALL BE USED FOR INSTALLATION OF 6" FIRE METER WITH 4" BY-PASS.
2. ALL PIPE AND FITTINGS SHALL BE FLANGED DUCTILE IRON PIPE.
3. VAULT TOP SHALL BE 6" THICK REINFORCED CONCRETE. MINIMUM INSIDE HEIGHT IS 6'-0". VAULT BOTTOM IS 4" CONCRETE SLAB SLOPED TO 12" x 12" DRAIN SUMP HOLE. SLAB TO BE POURED ON 12" OF COMPACTED NO. 57 STONE. HATCH OPENING SHALL BE TO ONE SIDE OF VAULT AT THE CENTER POINT OF THE WALL.
4. HATCH SHALL BE BILCO ALUMINUM MODEL JD-4AL OR EQUAL APPROVED IN ADVANCE BY GCDPU.
5. VAULT INLET/OUTLET OPENINGS SHALL BE SEALED WITH CONCRETE OR BRICK AND MORTAR AROUND PIPE. PIPE MUST NOT SUPPORT VAULT.
6. VAULT SHALL BE PRECAST FOR NON-LOAD BEARING APPLICATION. WHEN VAULT WILL BE SUBJECTED TO LIVE LOAD, CUSTOMER'S ENGINEER SHALL SUBMIT DETAILED VAULT DESIGN FOR GCDPU APPROVAL IN ADVANCE OF CONSTRUCTION.
7. ACCESS LADDER - SHALL BE DOWELED TO WALL AND CENTERED AT HATCH OPENING.
8. ALL CHECK VALVE AND METER ASSEMBLIES SHALL BE SUPPORTED IN TWO (2) PLACES ON CAP BLOCKS OR STEEL. NO WOOD IS ALLOWED.
9. THRUST BLOCKS - SHALL CONFORM TO GCDPU DRAWING NO. A-24 (LATEST REVISION).
10. THRUST TIE RODS - SHALL CONFORM TO GCDPU DRAWING NO.'S A-33, A-74, AND A-78. RODS SHALL EXTEND FROM FIRST FLANGE INSIDE VAULT TO TAPPING VALVE (WELDED TO CASING ON LONG SIDE BORE).
11. DOUBLE CHECK VALVE ASSEMBLIES SHALL BE WATTS MODEL 709, HERSEY MODEL HDC, FEBCO MODEL 850, AMES MODEL 2000 SS, OR EQUAL APPROVED IN ADVANCE BY GCDPU.

    ALL CHECK VALVES SHALL BE EQUIPPED WITH OS&Y RESILIENT SEATED GATE VALVES.
12. GCDPU SHALL FURNISH FIRE METER WITH STRAINER. ALL OTHER MATERIALS SHALL BE FURNISHED BY CUSTOMER.
13. DOUBLE CHECK VALVE ASSEMBLY DIMENSIONS ARE FOR WATTS MODEL 709. OTHER VALVE ASSEMBLY DIMENSIONS MAY VARY.
14. VAULT SHALL BE INSTALLED ON PRIVATE PROPERTY. CUSTOMER MUST PROVIDE A 15' x 30' EASEMENT AND/OR RIGHT OF ENTRY CLAUSE.
15. MINIMUM CLEARANCE FROM VAULT FLOOR TO BOTTOM OF FLANGES SHALL BE 12".
16. VALVE PAD AND VALVE MARKER SHALL BE INSTALLED WHERE APPROPRIATE.

NOTES

1. NO WORK SHALL BEGIN WITHOUT OBTAINING "CONSTRUCTION PERMIT" FROM THE DEPARTMENT OF PUBLIC UTILITIES (GCDPU).
2. NO TAPS TO GWINNETT COUNTY WATER MAINS SHALL BE MADE WITHOUT THE INSPECTOR PRESENT.
3. ALL BACKFLOW PREVENTION DEVICES SHALL MEET OR EXCEED GCDPU SPECIFICATIONS.
4. ALL BACKFLOW PREVENTION DEVICES MUST BE TESTED BY A TESTER FROM THE GWINNETT COUNTY APPROVED TESTERS LIST BEFORE A FINAL C.O. WILL BE ISSUED. (AN APPROVED TESTERS LIST MAY BE OBTAINED BY CALLING 678-376-6907.)

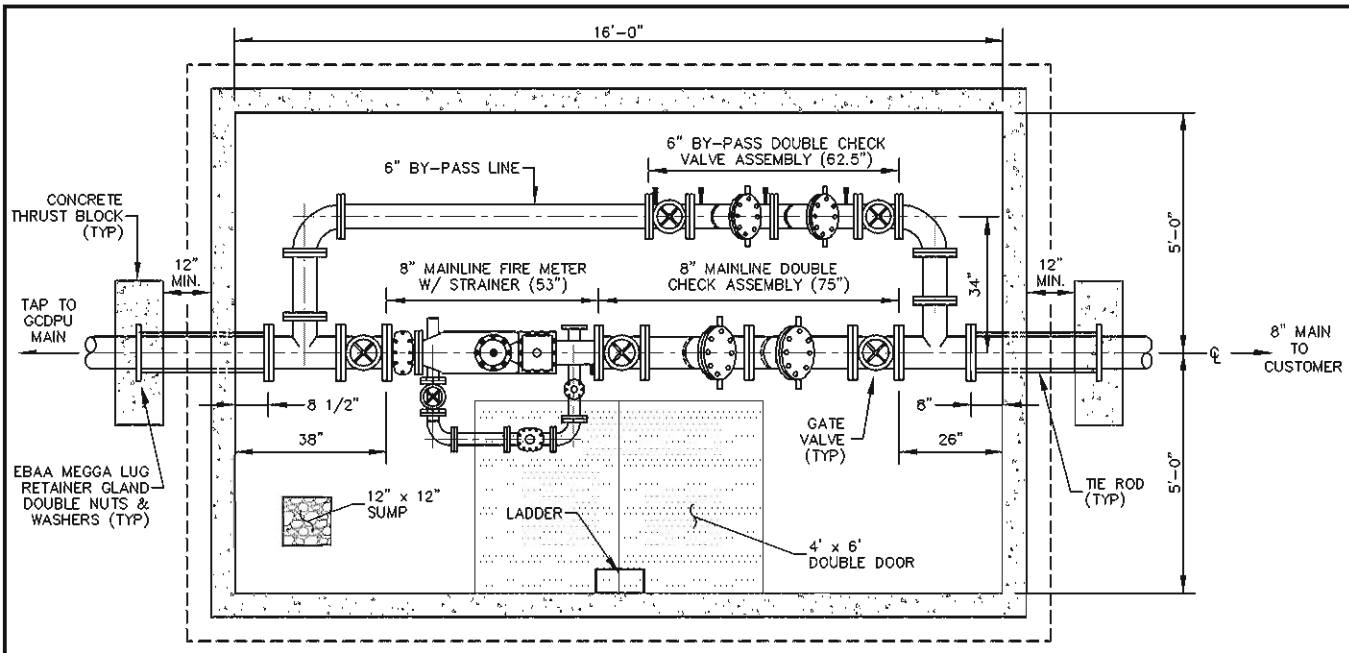
BOARD OF COMMISSIONERS OF GWINNETT COUNTY
DECATUR GEORGIA

GWINNETT COUNTY
DEPARTMENT OF WATER RESOURCES
BACKFLOW PREVENTION

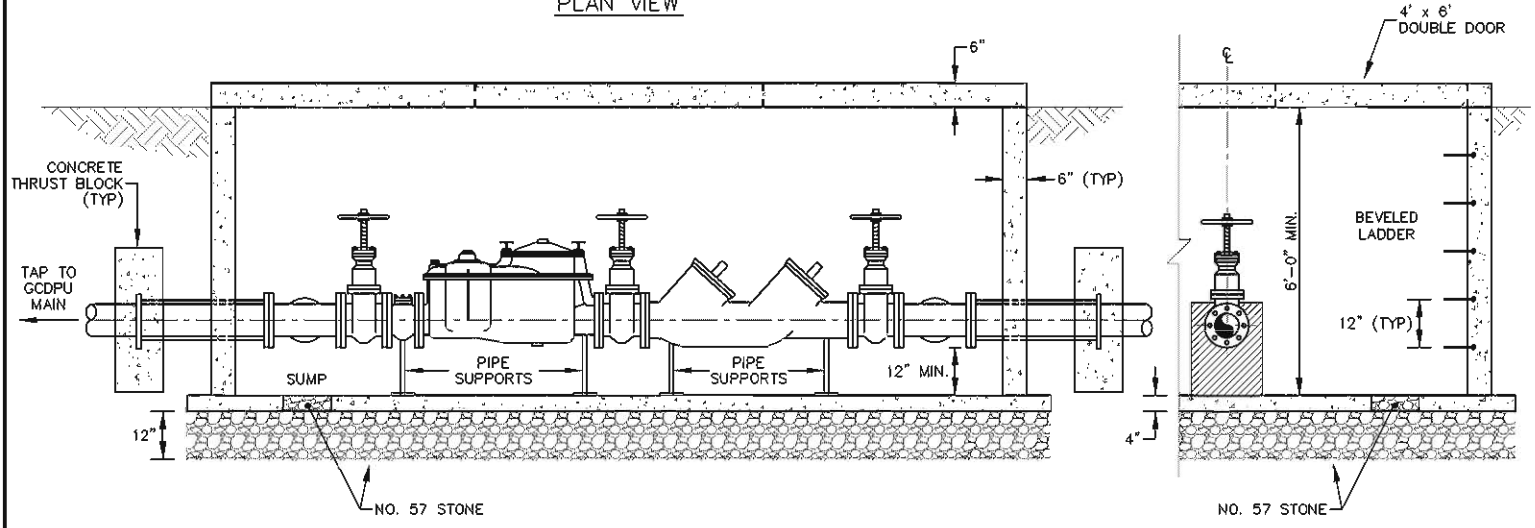
"Protecting water, protecting people"

6" FIRE SERVICE METER WITH 4" BY-PASS NON-TRAFFIC BEARING VAULT

DRAWN BY: JDS	DATE: 07-21-04	SCALE: N.T.S.



PLAN VIEW



SIDE VIEW
TYP.

END VIEW

VAULT SPECIFICATIONS

1. THIS DRAWING SHALL BE USED FOR INSTALLATION OF 8" FIRE METER WITH 6" BY-PASS.
2. ALL PIPE AND FITTINGS SHALL BE FLANGED DUCTILE IRON PIPE.
3. VAULT TOP SHALL BE 6" THICK REINFORCED CONCRETE. MINIMUM INSIDE HEIGHT IS 6'-0". VAULT BOTTOM IS 4" CONCRETE SLAB SLOPED TO 12" x 12" DRAIN SUMP HOLE. SLAB TO BE POURED ON 12" OF COMPACTED NO. 57 STONE. HATCH OPENING SHALL BE TO ONE SIDE OF VAULT AT THE CENTER POINT OF THE WALL.
4. HATCH SHALL BE BILCO ALUMINUM MODEL JD-4AL OR EQUAL APPROVED IN ADVANCE BY GCDPU.
5. VAULT INLET/OUTLET OPENINGS SHALL BE SEALED WITH CONCRETE OR BRICK AND MORTAR AROUND PIPE. PIPE MUST NOT SUPPORT VAULT.
6. VAULT SHALL BE PRECAST FOR NON-LOAD BEARING APPLICATION. WHEN VAULT WILL BE SUBJECTED TO LIVE LOAD, CUSTOMER'S ENGINEER SHALL SUBMIT DETAILED VAULT DESIGN FOR GCDPU APPROVAL IN ADVANCE OF CONSTRUCTION.
7. ACCESS LADDER - SHALL BE DOWELED TO WALL AND CENTERED AT HATCH OPENING.
8. ALL CHECK VALVE AND METER ASSEMBLIES SHALL BE SUPPORTED IN TWO (2) PLACES ON CAP BLOCKS OR STEEL. NO WOOD IS ALLOWED.
9. THRUST BLOCKS - SHALL CONFORM TO GCDPU DRAWING NO. A-24 (LATEST REVISION).
10. THRUST TIE RODS - SHALL CONFORM TO GCDPU DRAWING NO.'S A-33, A-74, AND A-78. RODS SHALL EXTEND FROM FIRST FLANGE INSIDE VAULT TO TAPPING VALVE (WELDED TO CASING ON LONG SIDE BORE).
11. DOUBLE CHECK VALVE ASSEMBLY SHALL BE WATTS MODEL 709, HERSEY MODEL HDC, FEBCO MODEL 850, AMES MODEL 2000 SS, OR EQUAL APPROVED IN ADVANCE BY GCDPU.

    ALL CHECK VALVES SHALL BE EQUIPPED WITH OS&Y RESILIENT SEATED GATE VALVES.
12. GCDPU SHALL FURNISH FIRE METER WITH STRAINER. ALL OTHER MATERIALS SHALL BE FURNISHED BY CUSTOMER.
13. DOUBLE CHECK VALVE ASSEMBLY DIMENSIONS ARE FOR WATTS MODEL 709. OTHER VALVE ASSEMBLY DIMENSIONS MAY VARY.
14. VAULT SHALL BE INSTALLED ON PRIVATE PROPERTY. CUSTOMER MUST PROVIDE A 15' x 30' EASEMENT AND/OR RIGHT OF ENTRY CLAUSE.
15. MINIMUM CLEARANCE FROM VAULT FLOOR TO BOTTOM OF FLANGES SHALL BE 12".
16. VALVE PAD AND VALVE MARKER SHALL BE INSTALLED WHERE APPROPRIATE.

NOTES

1. NO WORK SHALL BEGIN WITHOUT OBTAINING "CONSTRUCTION PERMIT" FROM THE DEPARTMENT OF PUBLIC UTILITIES (GCDPU).
2. NO TAPS TO GWINNETT COUNTY WATER MAINS SHALL BE MADE WITHOUT THE INSPECTOR PRESENT.
3. ALL BACKFLOW PREVENTION DEVICES SHALL MEET OR EXCEED GCDPU SPECIFICATIONS.
4. ALL BACKFLOW PREVENTION DEVICES MUST BE TESTED BY A TESTER FROM THE GWINNETT COUNTY APPROVED TESTERS LIST BEFORE A FINAL C.O. WILL BE ISSUED. (AN APPROVED TESTERS LIST MAY BE OBTAINED BY CALLING 678-376-6907.)

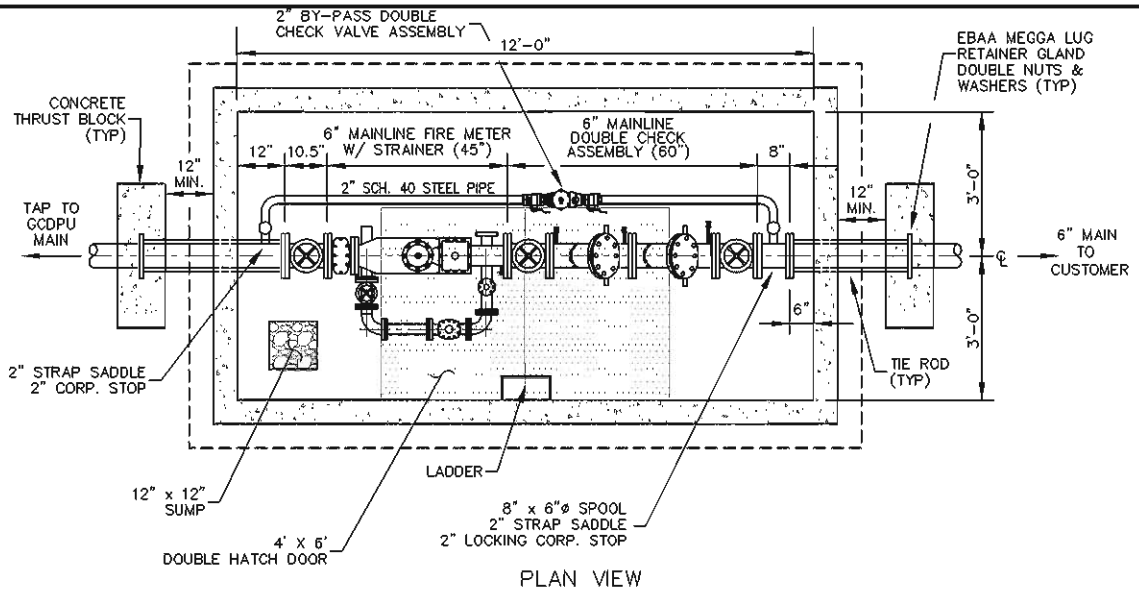
BOARD OF COMMISSIONERS OF GWINNETT COUNTY
GEORGIA

GWINNETT COUNTY
DEPARTMENT OF WATER RESOURCES
BACKFLOW PREVENTION

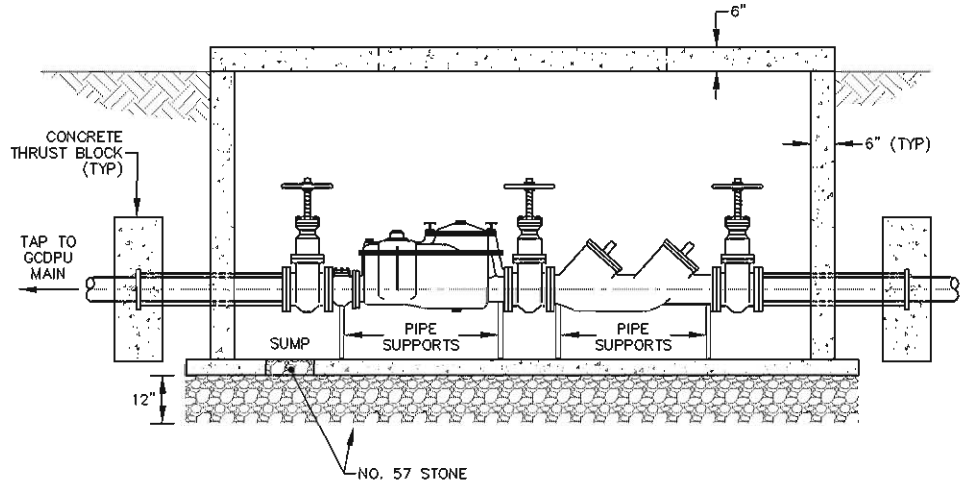
"Protecting water, protecting people"

8" FIRE SERVICE METER WITH 6" BY-PASS NON-TRAFFIC BEARING VAULT

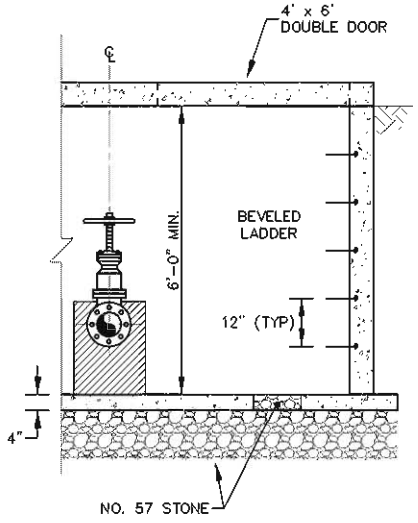
DRAWN BY: JDS	DATE: 07-21-04	SCALE: N.T.S.



PLAN VIEW



SIDE VIEW



END VIEW

VAULT SPECIFICATIONS

1. THIS DRAWING SHALL BE USED FOR INSTALLATION OF 6" FIRE METER WITH A NON-TRAFFIC BEARING VAULT.
2. ALL PIPE AND FITTINGS SHALL BE FLANGED DUCTILE IRON PIPE, EXCEPT WHERE NOTED.
3. VAULT TOP SHALL BE 6" THICK REINFORCED CONCRETE. MINIMUM INSIDE HEIGHT IS 6'-0". VAULT BOTTOM IS 4" CONCRETE SLAB SLOPED TO 12" x 12" DRAIN SUMP HOLE. SLAB TO BE POURED ON 12" OF COMPACTED NO. 57 STONE. HATCH OPENING SHALL BE TO ONE SIDE OF VAULT AT THE CENTER POINT OF THE WALL.
4. HATCH SHALL BE BILCO ALUMINUM MODEL JD-4AL OR EQUAL APPROVED IN ADVANCE BY GCDPU.
5. VAULT INLET/OUTLET OPENINGS SHALL BE SEALED WITH CONCRETE OR BRICK AND MORTAR AROUND PIPE. PIPE MUST NOT SUPPORT VAULT.
6. VAULT SHALL BE PRECAST FOR NON-LOAD BEARING APPLICATION. WHEN VAULT WILL BE SUBJECTED TO LIVE LOAD, CUSTOMER'S ENGINEER SHALL SUBMIT DETAILED VAULT DESIGN FOR GCDPU APPROVAL IN ADVANCE OF CONSTRUCTION.
7. ACCESS LADDER - SHALL BE DOWELED TO WALL AND CENTERED AT HATCH OPENING.
8. CHECK VALVE AND METER ASSEMBLIES SHALL BE SUPPORTED IN TWO (2) PLACES ON CAP BLOCKS OR STEEL. NO WOOD IS ALLOWED.
9. THRUST BLOCKS - SHALL CONFORM TO GCDPU DRAWING NO. A-24 (LATEST REVISION).
10. THRUST TIE RODS - SHALL CONFORM TO GCDPU DRAWING NO.'S A-33, A-74, AND A-78. RODS SHALL EXTEND FROM FIRST FLANGE INSIDE VAULT TO TAPPING VALVE (WELDED TO CASING ON LONG SIDE BORE).
11. 6" DOUBLE CHECK VALVE ASSEMBLY SHALL BE WATTS MODEL 709, HERSEY MODEL HDC, FEBCO MODEL 850, AMES MODEL 2000 SS, OR EQUAL APPROVED IN ADVANCE BY GCDPU.

    2" DOUBLE CHECK VALVE ASSEMBLY SHALL BE WATTS MODEL 007U, HERSEY MODEL #2, FEBCO MODEL 850U, AMES MODEL 2000SE, OR EQUAL APPROVED IN ADVANCE BY GCDPU.

    6" CHECK VALVE SHALL BE EQUIPPED WITH OS&Y RESILIENT SEATED GATE VALVES.
12. GCDPU SHALL FURNISH FIRE METER WITH STRAINER. ALL OTHER MATERIALS SHALL BE FURNISHED BY CUSTOMER.
13. 6" DOUBLE CHECK VALVE ASSEMBLY DIMENSIONS SHOWN ARE FOR WATTS MODEL 709. OTHER VALVE ASSEMBLY DIMENSIONS MAY VARY.
14. VAULT SHALL BE INSTALLED ON PRIVATE PROPERTY. CUSTOMER MUST PROVIDE A 15' x 30' EASEMENT AND/OR RIGHT OF ENTRY CLAUSE.
15. MINIMUM CLEARANCE FROM VAULT FLOOR TO BOTTOM OF FLANGES SHALL BE 12".
16. VALVE PAD AND VALVE MARKER SHALL BE INSTALLED WHERE APPROPRIATE.

NOTES

1. NO WORK SHALL BEGIN WITHOUT OBTAINING "CONSTRUCTION PERMIT" FROM THE DEPARTMENT OF PUBLIC UTILITIES (GCDPU).
2. NO TAPS TO GWINNETT COUNTY WATER MAINS SHALL BE MADE WITHOUT THE INSPECTOR PRESENT.
3. ALL BACKFLOW PREVENTION DEVICES SHALL MEET OR EXCEED GCDPU SPECIFICATIONS.
4. ALL BACKFLOW PREVENTION DEVICES MUST BE TESTED BY A TESTER FROM THE GWINNETT COUNTY APPROVED TESTERS LIST BEFORE A FINAL C.O. WILL BE ISSUED. (AN APPROVED TESTERS LIST MAY BE OBTAINED BY CALLING 678-376-6907.)

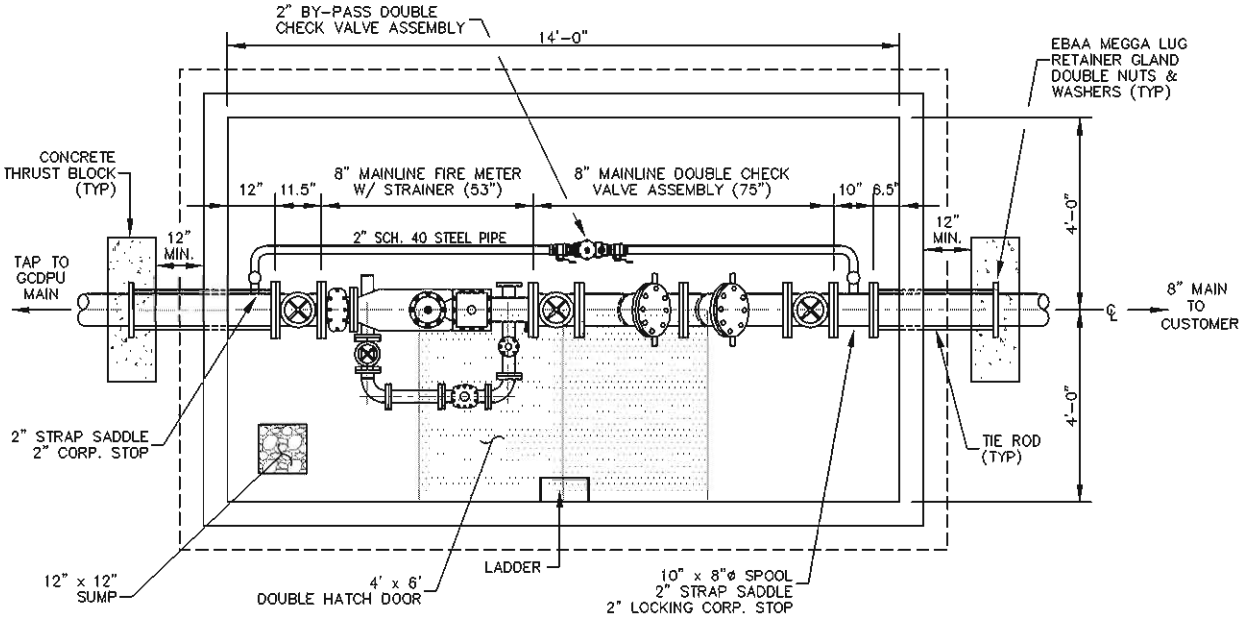
BOARD OF COMMISSIONERS OF GWINNETT COUNTY — DRIVEN BY EXCELLENCE — GEORGIA

GWINNETT COUNTY
DEPARTMENT OF WATER RESOURCES
BACKFLOW PREVENTION

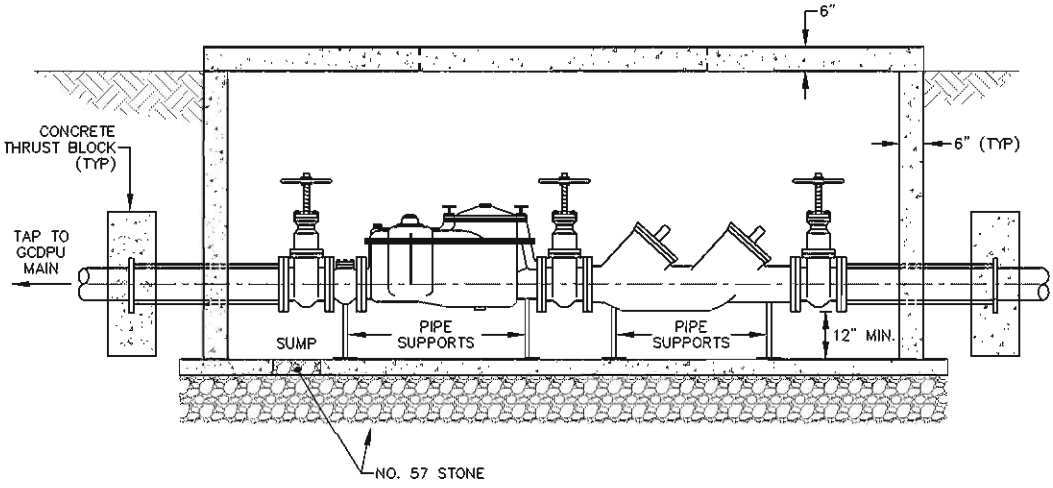
"Protecting water, protecting people"

6" FIRE SERVICE METER NON-TRAFFIC BEARING VAULT

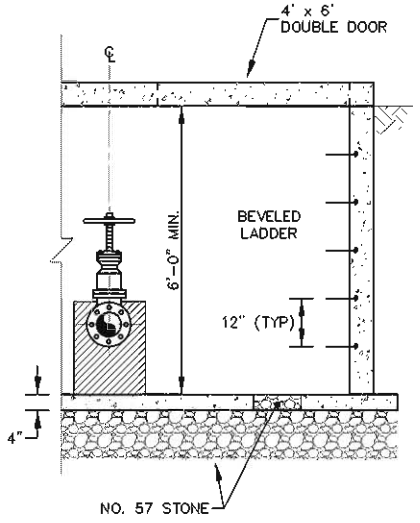
DRAWN BY: JDS	DATE: 08-17-04	SCALE: N.T.S.



PLAN VIEW



SIDE VIEW



END VIEW

VAULT SPECIFICATIONS

1. THIS DRAWING SHALL BE USED FOR INSTALLATION OF 8" FIRE METER WITH A NON-TRAFFIC BEARING VAULT.
2. ALL PIPE AND FITTINGS SHALL BE FLANGED DUCTILE IRON PIPE, EXCEPT WHERE NOTED.
3. VAULT TOP SHALL BE 6" THICK REINFORCED CONCRETE. MINIMUM INSIDE HEIGHT IS 6'-0". VAULT BOTTOM IS 4" CONCRETE SLAB SLOPED TO 12" x 12" DRAIN SUMP HOLE. SLAB TO BE POURED ON 12" OF COMPACTED NO. 57 STONE. HATCH OPENING SHALL BE TO ONE SIDE OF VAULT AT THE CENTER POINT OF THE WALL.
4. HATCH SHALL BE BILCO ALUMINUM MODEL JD-4AL OR EQUAL APPROVED IN ADVANCE BY GCDPU.
5. VAULT INLET/OUTLET OPENINGS SHALL BE SEALED WITH CONCRETE OR BRICK AND MORTAR AROUND PIPE. PIPE MUST NOT SUPPORT VAULT.
6. VAULT SHALL BE PRECAST FOR NON-LOAD BEARING APPLICATION. WHEN VAULT WILL BE SUBJECTED TO LIVE LOAD, CUSTOMER'S ENGINEER SHALL SUBMIT DETAILED VAULT DESIGN FOR GCDPU APPROVAL IN ADVANCE OF CONSTRUCTION.
7. ACCESS LADDER - SHALL BE DOWELED TO WALL AND CENTERED AT HATCH OPENING.
8. CHECK VALVE AND METER ASSEMBLIES SHALL BE SUPPORTED IN TWO (2) PLACES ON CAP BLOCKS OR STEEL. NO WOOD IS ALLOWED.
9. THRUST BLOCKS - SHALL CONFORM TO GCDPU DRAWING NO. A-24 (LATEST REVISION).
10. THRUST TIE RODS - SHALL CONFORM TO GCDPU DRAWING NO.'S A-33, A-74, AND A-78. RODS SHALL EXTEND FROM FIRST FLANGE INSIDE VAULT TO TAPPING VALVE (WELDED TO CASING ON LONG SIDE BORE).
11. 8" DOUBLE CHECK VALVE ASSEMBLY SHALL BE WATTS MODEL 709, HERSEY MODEL HDC, FEBCO MODEL 850, AMES MODEL 2000 SS, OR EQUAL APPROVED IN ADVANCE BY GCDPU.

    2" DOUBLE CHECK VALVE ASSEMBLY SHALL BE WATTS MODEL 007U, HERSEY MODEL #2, FEBCO MODEL 850U, AMES MODEL 2000SE, OR EQUAL APPROVED IN ADVANCE BY GCDPU.

    8" CHECK VALVE SHALL BE EQUIPPED WITH OS&Y RESILIENT SEATED GATE VALVES.
12. GCDPU SHALL FURNISH COMPOUND METER WITH STRAINER. ALL OTHER MATERIALS SHALL BE FURNISHED BY CUSTOMER.
13. 8" DOUBLE CHECK VALVE ASSEMBLY DIMENSIONS SHOWN ARE FOR WATTS MODEL 709. OTHER VALVE ASSEMBLY DIMENSIONS MAY VARY.
14. VAULT SHALL BE INSTALLED ON PRIVATE PROPERTY. CUSTOMER MUST PROVIDE A 15' x 30' EASEMENT AND/OR RIGHT OF ENTRY CLAUSE.
15. MINIMUM CLEARANCE FROM VAULT FLOOR TO BOTTOM OF FLANGES SHALL BE 12".
16. VALVE PAD AND VALVE MARKER SHALL BE INSTALLED WHERE APPROPRIATE.

NOTES

1. NO WORK SHALL BEGIN WITHOUT OBTAINING "CONSTRUCTION PERMIT" FROM THE DEPARTMENT OF PUBLIC UTILITIES (GCDPU).
2. NO TAPS TO GWINNETT COUNTY WATER MAINS SHALL BE MADE WITHOUT THE INSPECTOR PRESENT.
3. ALL BACKFLOW PREVENTION DEVICES SHALL MEET OR EXCEED GCDPU SPECIFICATIONS.
4. ALL BACKFLOW PREVENTION DEVICES MUST BE TESTED BY A TESTER FROM THE GWINNETT COUNTY APPROVED TESTERS LIST BEFORE A FINAL C.O. WILL BE ISSUED. (AN APPROVED TESTERS LIST MAY BE OBTAINED BY CALLING 678-376-6907.)

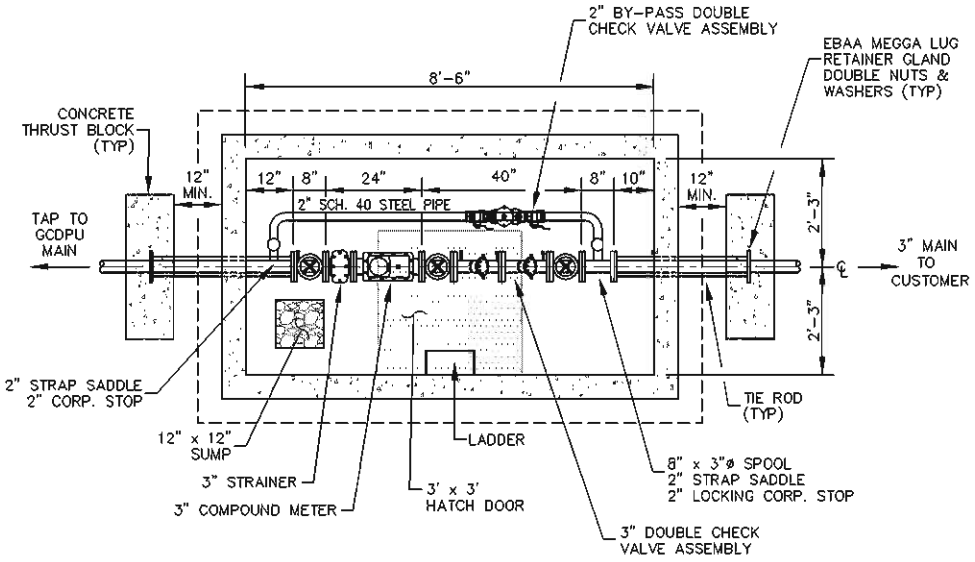
BOARD OF COMMISSIONERS OF GWINNETT COUNTY — DECATUR, GEORGIA

GWINNETT COUNTY
DEPARTMENT OF WATER RESOURCES
BACKFLOW PREVENTION

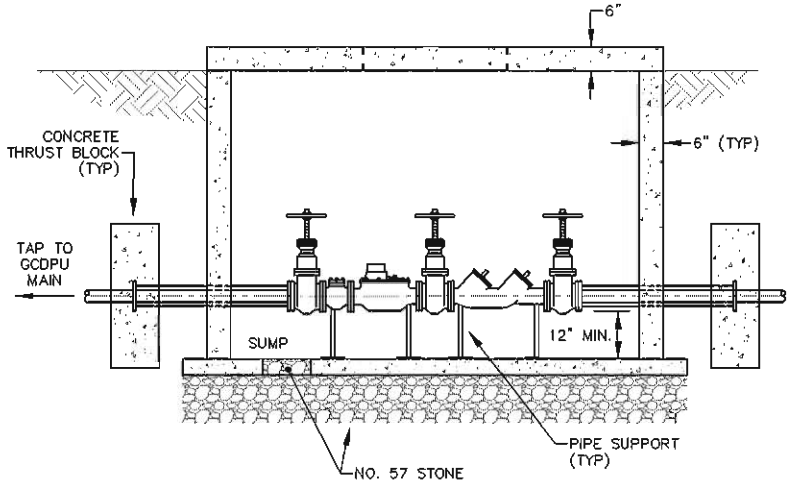
"Protecting water, protecting people"

8" FIRE SERVICE METER NON-TRAFFIC BEARING VAULT

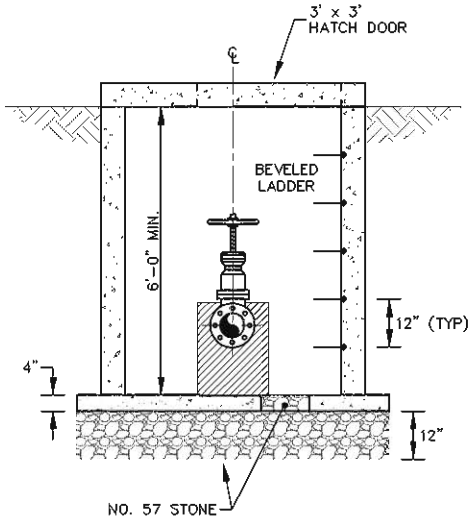
DRAWN BY: JDS	DATE: 08-17-04	SCALE: N.T.S.



PLAN VIEW



SIDE VIEW



END VIEW

VAULT SPECIFICATIONS

1. THIS DRAWING SHALL BE USED FOR INSTALLATION OF 3" COMPOUND METER WITH A NON-TRAFFIC BEARING VAULT.
2. ALL PIPE AND FITTINGS SHALL BE FLANGED DUCTILE IRON PIPE, EXCEPT WHERE NOTED.
3. VAULT TOP SHALL BE 6" THICK REINFORCED CONCRETE. MINIMUM INSIDE HEIGHT IS 6'-0". VAULT BOTTOM IS 4" CONCRETE SLAB SLOPED TO 12" x 12" DRAIN SUMP HOLE. SLAB TO BE POURED ON 12" OF COMPACTED NO. 57 STONE. HATCH OPENING SHALL BE TO ONE SIDE OF VAULT AT THE CENTER POINT OF THE WALL.
4. HATCH SHALL BE BILCO ALUMINUM MODEL J-4AL OR EQUAL APPROVED IN ADVANCE BY GCDPU.
5. VAULT INLET/OUTLET OPENINGS SHALL BE SEALED WITH CONCRETE OR BRICK AND MORTAR AROUND PIPE. PIPE MUST NOT SUPPORT VAULT.
6. VAULT SHALL BE PRECAST FOR NON-LOAD BEARING APPLICATION. WHEN VAULT WILL BE SUBJECTED TO LIVE LOAD, CUSTOMER'S ENGINEER SHALL SUBMIT DETAILED VAULT DESIGN FOR GCDPU APPROVAL IN ADVANCE OF CONSTRUCTION.
7. ACCESS LADDER - SHALL BE DOWELED TO WALL AND CENTERED AT HATCH OPENING.
8. CHECK VALVE AND METER ASSEMBLIES SHALL BE SUPPORTED IN TWO (2) PLACES ON CAP BLOCKS OR STEEL. NO WOOD IS ALLOWED.
9. THRUST BLOCKS - SHALL CONFORM TO GCDPU DRAWING NO. A-24 (LATEST REVISION).
10. THRUST TIE RODS - SHALL CONFORM TO GCDPU DRAWING NO.'S A-33, A-74, AND A-78. RODS SHALL EXTEND FROM FIRST FLANGE INSIDE VAULT TO TAPPING VALVE (WELDED TO CASING ON LONG SIDE BORE).
11. 3" DOUBLE CHECK VALVE ASSEMBLY SHALL BE WATTS MODEL 709, HERSEY MODEL HDC, FEBCO MODEL 850, AMES MODEL 2000 SS, OR EQUAL APPROVED IN ADVANCE BY GCDPU.

    2" DOUBLE CHECK VALVE ASSEMBLY SHALL BE WATTS MODEL 007U, HERSEY MODEL #2, FEBCO MODEL 850U, AMES MODEL 2000SE, OR EQUAL APPROVED IN ADVANCE BY GCDPU.

    3" CHECK VALVE SHALL BE EQUIPPED WITH OS&Y RESILIENT SEATED GATE VALVES.
12. GCDPU SHALL FURNISH FIRE METER WITH STRAINER. ALL OTHER MATERIALS SHALL BE FURNISHED BY CUSTOMER.
13. 3" DOUBLE CHECK VALVE ASSEMBLY DIMENSIONS SHOWN ARE FOR WATTS MODEL 709. OTHER VALVE ASSEMBLY DIMENSIONS MAY VARY.
14. VAULT SHALL BE INSTALLED ON PRIVATE PROPERTY. CUSTOMER MUST PROVIDE A 15' x 30' EASEMENT AND/OR RIGHT OF ENTRY CLAUSE.
15. MINIMUM CLEARANCE FROM VAULT FLOOR TO BOTTOM OF FLANGES SHALL BE 12".
16. VALVE PAD AND VALVE MARKER SHALL BE INSTALLED WHERE APPROPRIATE.

NOTES

1. NO WORK SHALL BEGIN WITHOUT OBTAINING "CONSTRUCTION PERMIT" FROM THE DEPARTMENT OF PUBLIC UTILITIES (GCDPU).
2. NO TAPS TO GWINNETT COUNTY WATER MAINS SHALL BE MADE WITHOUT THE INSPECTOR PRESENT.
3. ALL BACKFLOW PREVENTION DEVICES SHALL MEET OR EXCEED GCDPU SPECIFICATIONS.
4. ALL BACKFLOW PREVENTION DEVICES MUST BE TESTED BY A TESTER FROM THE GWINNETT COUNTY APPROVED TESTERS LIST BEFORE A FINAL C.O. WILL BE ISSUED. (AN APPROVED TESTERS LIST MAY BE OBTAINED BY CALLING 678-376-6907.)

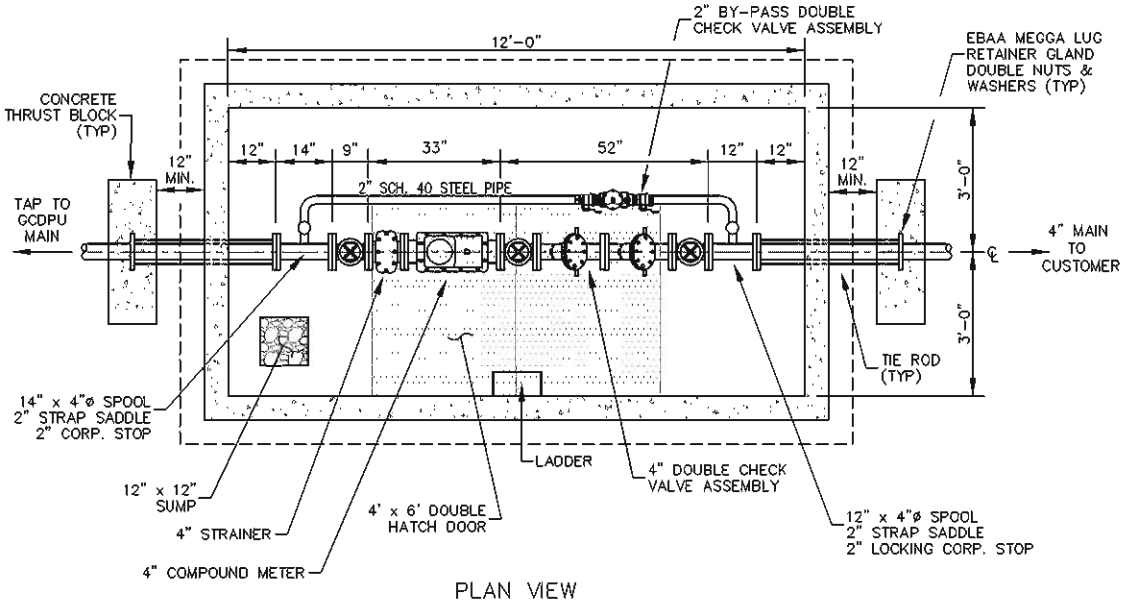
BOARD OF COMMISSIONERS OF GWINNETT COUNTY — DRIVEN BY EXCELLENCE — GEORGIA

GWINNETT COUNTY
DEPARTMENT OF WATER RESOURCES
BACKFLOW PREVENTION

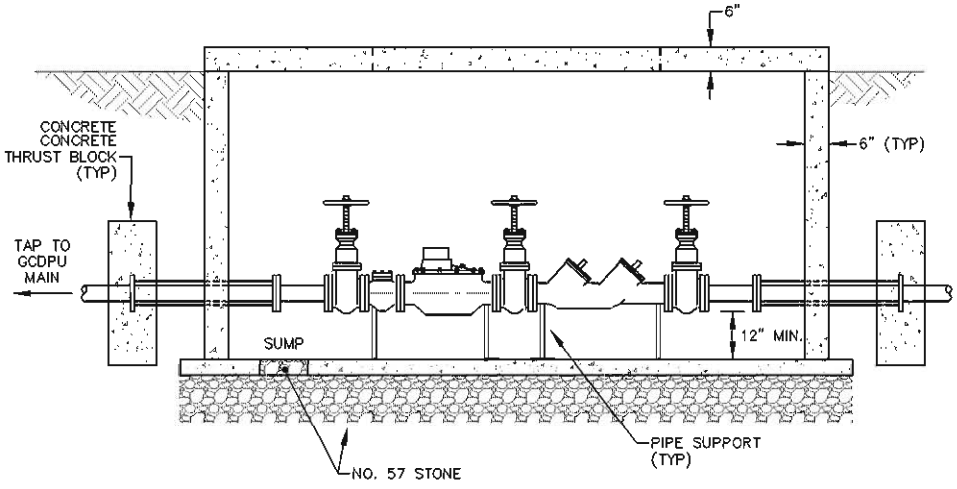
"Protecting water, protecting people"

3" COMPOUND METER NON-TRAFFIC BEARING VAULT

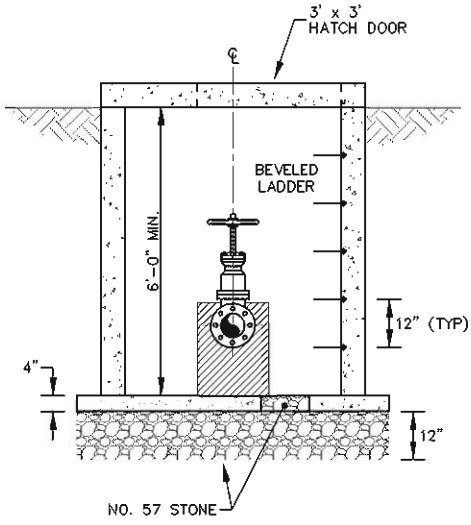
DRAWN BY: JDS	DATE: 08-17-04	SCALE: N.T.S.



PLAN VIEW



SIDE VIEW



END VIEW

VAULT SPECIFICATIONS

1. THIS DRAWING SHALL BE USED FOR INSTALLATION OF 4" COMPOUND METER WITH A NON-TRAFFIC BEARING VAULT.
2. ALL PIPE AND FITTINGS SHALL BE FLANGED DUCTILE IRON PIPE, EXCEPT WHERE NOTED.
3. VAULT TOP SHALL BE 6" THICK REINFORCED CONCRETE. MINIMUM INSIDE HEIGHT IS 6'-0". VAULT BOTTOM IS 4" CONCRETE SLAB SLOPED TO 12" x 12" DRAIN SUMP HOLE. SLAB TO BE POURED ON 12" OF COMPACTED NO. 57 STONE. HATCH OPENING SHALL BE TO ONE SIDE OF VAULT AT THE CENTER POINT OF THE WALL.
4. HATCH SHALL BE BILCO ALUMINUM MODEL JD-4AL OR EQUAL APPROVED IN ADVANCE BY GCDPU.
5. VAULT INLET/OUTLET OPENINGS SHALL BE SEALED WITH CONCRETE OR BRICK AND MORTAR AROUND PIPE. PIPE MUST NOT SUPPORT VAULT.
6. VAULT SHALL BE PRECAST FOR NON-LOAD BEARING APPLICATION. WHEN VAULT WILL BE SUBJECTED TO LIVE LOAD, CUSTOMER'S ENGINEER SHALL SUBMIT DETAILED VAULT DESIGN FOR GCDPU APPROVAL IN ADVANCE OF CONSTRUCTION.
7. ACCESS LADDER - SHALL BE DOWELED TO WALL AND CENTERED AT HATCH OPENING.
8. CHECK VALVE AND METER ASSEMBLIES SHALL BE SUPPORTED IN TWO (2) PLACES ON CAP BLOCKS OR STEEL. NO WOOD IS ALLOWED.
9. THRUST BLOCKS - SHALL CONFORM TO GCDPU DRAWING NO. A-24 (LATEST REVISION).
10. THRUST TIE RODS - SHALL CONFORM TO GCDPU DRAWING NO.'S A-33, A-74, AND A-78. RODS SHALL EXTEND FROM FIRST FLANGE INSIDE VAULT TO TAPPING VALVE (WELDED TO CASING ON LONG SIDE BORE).
11. 4" DOUBLE CHECK VALVE ASSEMBLY SHALL BE WATTS MODEL 709, HERSEY MODEL HDC, FEBCO MODEL 850, AMES MODEL 2000 SS, OR EQUAL APPROVED IN ADVANCE BY GCDPU.

    2" DOUBLE CHECK VALVE ASSEMBLY SHALL BE WATTS MODEL 007U, HERSEY MODEL #2, FEBCO MODEL 850U, AMES MODEL 2000SE, OR EQUAL APPROVED IN ADVANCE BY GCDPU.

    4" CHECK VALVE SHALL BE EQUIPPED WITH OS&Y RESILIENT SEATED GATE VALVES.
12. GCDPU SHALL FURNISH COMPOUND METER WITH STRAINER. ALL OTHER MATERIALS SHALL BE FURNISHED BY CUSTOMER.
13. 4" DOUBLE CHECK VALVE ASSEMBLY DIMENSIONS SHOWN ARE FOR WATTS MODEL 709. OTHER VALVE ASSEMBLY DIMENSIONS MAY VARY.
14. VAULT SHALL BE INSTALLED ON PRIVATE PROPERTY. CUSTOMER MUST PROVIDE A 15' x 30' EASEMENT AND/OR RIGHT OF ENTRY CLAUSE.
15. MINIMUM CLEARANCE FROM VAULT FLOOR TO BOTTOM OF FLANGES SHALL BE 12".
16. VALVE PAD AND VALVE MARKER SHALL BE INSTALLED WHERE APPROPRIATE.

NOTES

1. NO WORK SHALL BEGIN WITHOUT OBTAINING "CONSTRUCTION PERMIT" FROM THE DEPARTMENT OF PUBLIC UTILITIES (GCDPU).
2. NO TAPS TO GWINNETT COUNTY WATER MAINS SHALL BE MADE WITHOUT THE INSPECTOR PRESENT.
3. ALL BACKFLOW PREVENTION DEVICES SHALL MEET OR EXCEED GCDPU SPECIFICATIONS.
4. ALL BACKFLOW PREVENTION DEVICES MUST BE TESTED BY A TESTER FROM THE GWINNETT COUNTY APPROVED TESTERS LIST BEFORE A FINAL C.O. WILL BE ISSUED. (AN APPROVED TESTERS LIST MAY BE OBTAINED BY CALLING 678-376-6907.)

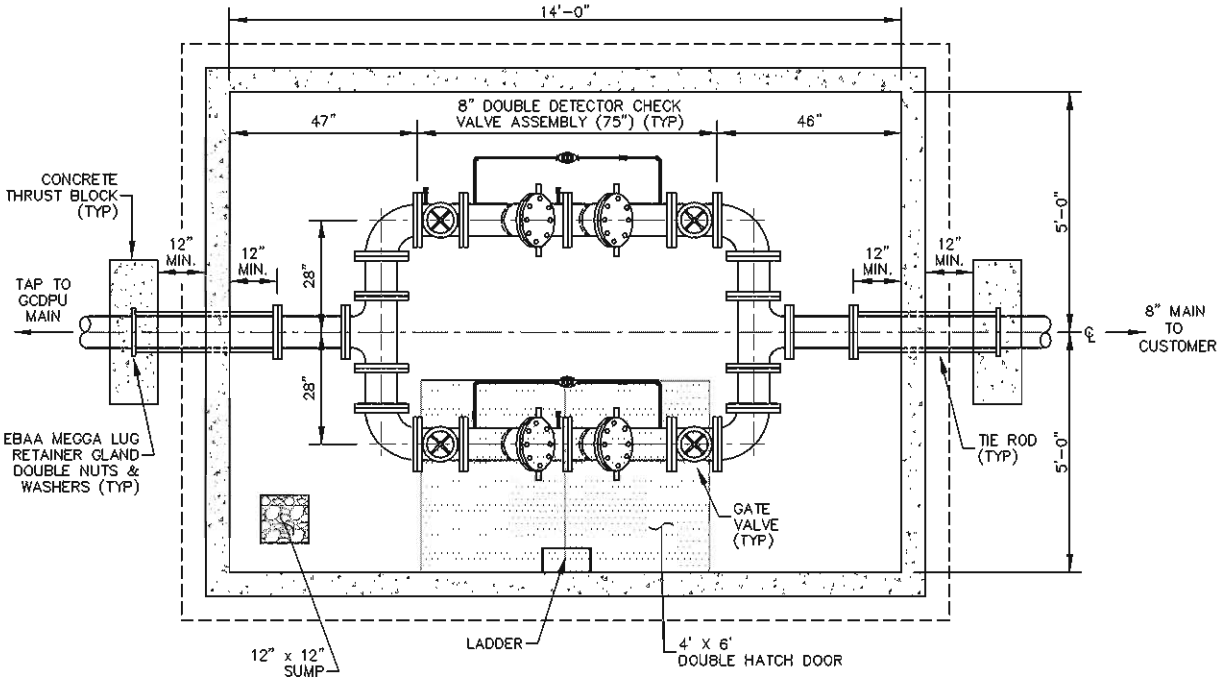
BOARD OF COMMISSIONERS OF GWINNETT COUNTY — DRIVEN BY EXCELLENCE — GEORGIA

GWINNETT COUNTY
DEPARTMENT OF WATER RESOURCES
BACKFLOW PREVENTION

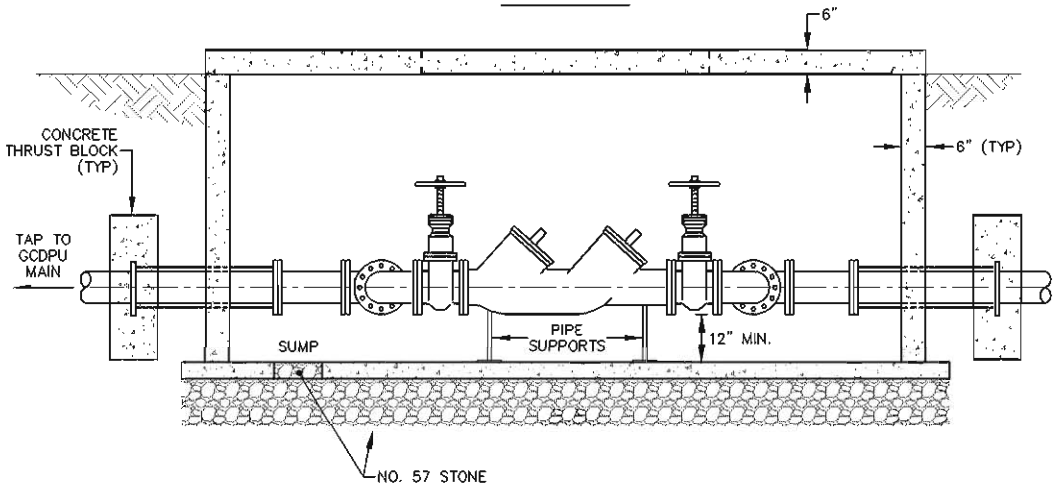
"Protecting water, protecting people"

4" COMPOUND METER NON-TRAFFIC BEARING VAULT

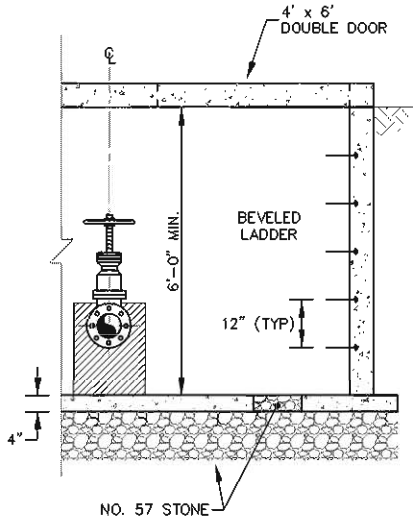
DRAWN BY: JDS	DATE: 08-17-04	SCALE: N.T.S.



PLAN VIEW



SIDE VIEW



END VIEW

VAULT SPECIFICATIONS

1. THIS DRAWING SHALL BE USED FOR INSTALLATION OF TWO 8" DOUBLE DETECTOR CHECK VALVES.
2. ALL PIPE AND FITTINGS SHALL BE FLANGED DUCTILE IRON PIPE.
3. VAULT TOP SHALL BE 6" THICK REINFORCED CONCRETE. MINIMUM INSIDE HEIGHT IS 6'-0". VAULT BOTTOM IS 4" CONCRETE SLAB SLOPED TO 12" x 12" DRAIN SUMP HOLE. SLAB TO BE POURED ON 12" OF COMPACTED NO. 57 STONE. HATCH OPENING SHALL BE TO ONE SIDE OF VAULT AT THE CENTER POINT OF THE WALL.
4. HATCH SHALL BE BILCO ALUMINUM MODEL JD-4AL OR EQUAL APPROVED IN ADVANCE BY GCDPU.
5. VAULT INLET/OUTLET OPENINGS SHALL BE SEALED WITH CONCRETE OR BRICK AND MORTAR AROUND PIPE. PIPE MUST NOT SUPPORT VAULT.
6. VAULT SHALL BE PRECAST FOR NON-LOAD BEARING APPLICATION. WHEN VAULT WILL BE SUBJECTED TO LIVE LOAD, CUSTOMER'S ENGINEER SHALL SUBMIT DETAILED VAULT DESIGN FOR GCDPU APPROVAL IN ADVANCE OF CONSTRUCTION.
7. ACCESS LADDER - SHALL BE DOWELED TO WALL AND CENTERED AT HATCH OPENING.
8. CHECK VALVE AND METER ASSEMBLIES SHALL BE SUPPORTED IN TWO (2) PLACES ON CAP BLOCKS OR STEEL. NO WOOD IS ALLOWED.
9. THRUST BLOCKS - SHALL CONFORM TO GCDPU DRAWING NO. A-24 (LATEST REVISION).
10. THRUST TIE RODS - SHALL CONFORM TO GCDPU DRAWING NO.'S A-33, A-74, AND A-78. RODS SHALL EXTEND FROM FIRST FLANGE INSIDE VAULT TO TAPPING VALVE (WELDED TO CASING ON LONG SIDE BORE).
11. DOUBLE DETECTOR CHECK VALVE ASSEMBLY SHALL BE WATTS MODEL 709 DCDA, HERSEY MODEL DDC-II, FEBCO MODEL 856, AMES MODEL 3000 SS, OR EQUAL APPROVED IN ADVANCE BY GCDPU.

    ALL CHECK VALVES SHALL BE EQUIPPED WITH OS&Y RESILIENT SEATED GATE VALVES.
12. ALL MATERIALS SHALL BE FURNISHED BY CUSTOMER.
13. DOUBLE CHECK VALVE ASSEMBLY DIMENSIONS SHOWN ARE FOR WATTS MODEL 709. OTHER VALVE ASSEMBLY DIMENSIONS MAY VARY.
14. VAULT SHALL BE INSTALLED ON PRIVATE PROPERTY. CUSTOMER MUST PROVIDE A 15' x 30' EASEMENT AND/OR RIGHT OF ENTRY CLAUSE.
15. MINIMUM CLEARANCE FROM VAULT FLOOR TO BOTTOM OF FLANGES SHALL BE 12".
16. VALVE PAD AND VALVE MARKER SHALL BE INSTALLED WHERE APPROPRIATE.

NOTES

1. NO WORK SHALL BEGIN WITHOUT OBTAINING "CONSTRUCTION PERMIT" FROM THE DEPARTMENT OF PUBLIC UTILITIES (GCDPU).
2. NO TAPS TO GWINNETT COUNTY WATER MAINS SHALL BE MADE WITHOUT THE INSPECTOR PRESENT.
3. ALL BACKFLOW PREVENTION DEVICES SHALL MEET OR EXCEED GCDPU SPECIFICATIONS.
4. ALL BACKFLOW PREVENTION DEVICES MUST BE TESTED BY A TESTER FROM THE GWINNETT COUNTY APPROVED TESTERS LIST BEFORE A FINAL C.O. WILL BE ISSUED. (AN APPROVED TESTERS LIST MAY BE OBTAINED BY CALLING 678-376-6907.)

BOARD OF COMMISSIONERS OF GWINNETT COUNTY
GEORGIA

GWINNETT COUNTY
DEPARTMENT OF WATER RESOURCES
BACKFLOW PREVENTION

"Protecting water, protecting people"

2 - 8" DOUBLE DETECTOR CHECK VALVE 14' x 10' VAULT

DRAWN BY: JDS	DATE: 07-21-04	SCALE: N.T.S.

SECTION 4

Testing

GWINNETT COUNTY
DEPARTMENT OF WATER RESOURCES
Backflow Prevention
Protecting Water Protecting People

Due to the large number of testers on DWR's list, you will no longer receive a reminder of expired documents. It is the tester's responsibility to ensure that DWR has the current documents on file:

I. TESTER'S CERTIFICATION
II. CURRENT BUSINESS LICENSE
III. CURRENT CALIBRATION OF GAUGE.
IV. GWINNETT COUNTY ACKNOWLEDGEMENT FORM

GWINNETT COUNTY
DEPARTMENT OF WATER RESOURCES
Backflow Prevention
Protecting Water Protecting People

SOLICITATION OF TESTING

Testers who chose to send letters to DWR customers for the purpose of soliciting backflow prevention testing are prohibited from identifying themselves in any manner that suggests they are representing Gwinnett County. It is requested that sample copies of solicitation letters be submitted to DWR for review and approval prior to distribution.

Misrepresentation of the tester's authority with respect to Gwinnett County, due dates, County response to failure to provide current test reports, etc., may result in the tester being removed from the approved testers list.

GWINNETT COUNTY
DEPARTMENT OF WATER RESOURCES
Backflow Prevention
Protecting Water Protecting People

TEST REPORTS

- As of this year this department will no longer accept test reports without meter locations and meters numbers.
- If a device is located at the meter, you will need to put in writing where the meter is located.
- If the device is located inside the building, where inside is the device located?
- We will no longer take a test report that does not include the meter number.
- If the lid is missing, you will need to indicate that in the remarks section.
- If the device is located inside the building and you do not have a meter number, under meter number, type “internal” so we will know this device is located inside.

GWINNETT COUNTY
DEPARTMENT OF WATER RESOURCES
Backflow Prevention
Protecting Water Protecting People

TEST DATE REPORT SUBMITTALS

1. ALL reports must be submitted to DWR within 15 days of the test date. This does not include faxed copies of the report. Only the typewritten, hard copy of the report is acceptable. Test reports not submitted to our office within 15 days of the test date will be considered null and void. In such cases, it is expected that he tester will perform the test again at no cost to the customer. Anyone charging an additional testing fee to the customer will be removed from our Certified Backflow Device Testers List.
2. Faxed copies of field test are allowed only for the convenience of the Customer for Certificates of Occupancy. This allows the tester to provide the necessary paperwork without causing the customer additional delay. The typewritten copy must be submitted within 15 days.
3. In addition, all FAILED DEVICE reports must be submitted in the same manner (within 15 days), no exception will be made.

GWINNETT COUNTY
DEPARTMENT OF WATER RESOURCES
Backflow Prevention
Protecting Water Protecting People

TESTING FREQUENCY

1. Normal testing is performed on an annual basis. The exception to this rule would be consolidation of tests for a service address that allows for one due date for all tests. This benefits all of us (the customer, the tester and DWR).
2. It is mandatory to get in writing from the customer approval to do early testing on the customer's letterhead, not the tester's letterhead. Without this approval, this office will not accept the test reports. Testing earlier than the due dates on annual tests requires the customer to bear additional testing costs. Testing accounts early without customer's approval will also result in removal from the Certified Backflow Testers List.
3. If there are any questions concerning test due dates, please call DWR at 678-376-7147 to verify when the tests are due.
4. Early testing performed for the purpose of permitting structural additions to existing buildings or facilities must include a written authorization from the owner to be acceptable to DWR.

APPENDIX A

Terminology

TERMINOLOGY
For
BACKFLOW-PREVENTION PROGRAM

AUTHORITY – the individual, official, board department or agency established and authorized by county, city and/or other political subdivision created by law to administer and enforce the provisions of the Plumbing Code, the Federal and State Safe Drinking Water Acts and the Ordinances, Rules, Regulations and Policies of Gwinnett County, in the state of Georgia.

BACKFLOW – a reverse flow in a water system from the normal or intended direction.

BACKFLOW PREVENTER (BFP) – a device designed to prevent reverse flow in a water system. The term should normally be used where backpressure-type backflow is implied.

BACKFLOW PREVENTER, DOUBLE CHECK VALVE (DCV) – a backpressure-type backflow-prevention device designed for continuous or intermittent pressure, including backpressure, where pollutants are involved.

BACKFLOW PREVENTER, DOUBLE DETECTOR CHECK (DDC) – a backpressure-type backflow-prevention device designed to serve also as a detector check on fire protection systems where pollutants are involved. It includes a line-size approved double check valve backflow preventer with a metered bypass, into which has also been incorporated an approved double check valve backflow preventer.

BACKFLOW PREVENTER, DUAL CHECK (DuC) – a backpressure-type backflow-prevention device designed especially for containing water systems to residences, mobile home, etc., as the "second line of defense", and for isolating residential law sprinkler systems, etc., where pollutants only are involved.

BACKFLOW PREVENTER with INTERMEDIATE ATMOSPHERIC VENT (IAV) – a backpressure and backsiphonage-type backflow-prevention device designed to operate under continuous pressure, including backpressure, where low degree contaminants are involved.

BACKFLOW PREVENTER, REDUDCED PRESSURE ZONE (RPZ) – a backpressure and backsiphonage-type backflow-prevention device designed to operate under continuous pressure, including backpressure, where contaminants are involved.

BACKFLOW PREVENTER, REDUCED PRESSURE DETECTOR CHECK (RPDC) – a backpressure and backsiphonage-type backflow-prevention device designed to serve also as a detector check on fire protection systems where contaminants are involved. It includes a line-sized reduced pressure zone backflow preventer with a metered bypass, into which has also been incorporated an approved reduced pressure zone backflow preventer.

BACKFLOW-PREVENTION – a program, an ordinance, a code a policy; designed to discover, to eliminate, to prevent; all unauthorized and uncontrolled backflow and cross-connections.

BACKFLOW-PREVENTION by CROSS-CONNECTION CONTROL – the installation of a backflow-prevention device at each cross-connection on premises to protect both the premises and the Public Water Supply System ("The First Line of Defense").

BACKFLOW-PREVENTION by CONTAINMENT – the installation of a backflow preventer at the service-connection to the premises to protect only the Public Water Supply system, ("The Second Line of Defense").

BACKPRESSURE – an increase in pressure in a Consumer's water system, or a branch of the system, above that at the service-connection. It is generally caused by pumps, thermal expansion, or reasons other than a reduction or loss of the incoming pressure. Backpressure is generally more evident in a closed water system.

BACKSIPHONAGE – a reserve flow in a water system caused by a negative pressure in the incoming pipe, when the point of use is at atmospheric pressure. Backsiphonage is generally more evident in an open water system.

BACKSIPHONAGE PREVENTER – a device designed to prevent reverse flow in a water system. The term should be used only where a negative supply pressure is implied.

BACKFLOW-PREVENTION DEVICE SPECIALIST (CERTIFIED TESTER) – an individual who has been trained and qualified to test and repair backflow-prevention devices and who has proven his/her competency to the Gwinnett County Department of Water Resources.

CLOSED WATER SYSTEM – all potable water piping, valves, fittings and appurtenances on the premises side of the service-connection.

CONSUMER'S WATER SYSTEM – all potable water piping, valves, fittings and appurtenances on the premises side of the service-connection.

CONTAMINANT – any substance that, if introduced into the potable water system, could create a health hazard.

CROSS-CONNECTION – a physical connection or arrangement between two otherwise separate piping systems; one of which contains potable water, the other a non-potable fluid, or water of unknown quality, where there could be backflow into the potable system unless it is protected by an appropriate backflow-prevention device.

CROSS-CONNECTION, NONPRESSURE TYPE – a low-inlet installation where a potable water pipe is connected or extended below the overflow rim of a receptacle, or an environment, that contains a non-potable fluid, and is at atmospheric pressure.

CROSS-CONNECTION, PRESSURE TYPE – an installation where a potable water pipe is connected to a closed vessel, or a piping system, that contains non-potable fluid and is above atmospheric pressure.

DIRECTOR – The Director of the Department of Water Resources for Gwinnett County, in the State of Georgia.

HAZARD, PLUMBING – a danger or potential danger to health, due to contaminants entering the potable water system via uncontrolled cross-connections, which can range in severity from mildly toxic to lethal.

INSPECTOR – an individual qualified in a vocation and authorized to make inspections, interpret codes, regulations and procedures.

OPEN WATER SYSTEM – one with no checking device installed in the service pipe. Water from the Consumer' system is free to backflow into the main, for whatever reason.

POLLUTANT – any substance that, if introduced into the potable water system, could be objectionable but could not create a health hazard.

POTABLE WATER – any water that, according to recognized standards, is safe for human consumption.

PUBLIC WATER SUPPLY/SYSTEM – a water system (including but not limited to supply, treatment, transmission and distribution facilities and appurtenances) operated as a Public Utility that supplies potable water to the service-connection of the Consumer's water system. Herein defined, as the Gwinnett County potable water supply/system as operated by the Water Resources Department.

REPRESENTATIVE – a person authorized to represent the Director of the Gwinnett County Department of Water Resources.

SERVICE-CONNECTION – at the point of delivery of water to premises: the normal location of the meter. It is the end of the water purveyor's jurisdiction and the beginning of the Plumbing Official's and the Consumer's and defined as follows:

> **Dedicated** – a single service connection that is designated for one use only; (i.e., domestic, fire protection or irrigation.)
>
> **Combination** – a single service connection that is designated for more than one use; (i.e., domestic and fire protection.)

VACUUM BREAKER (VB) – a backsiphonage-prevention device that introduces air into the potable water system when the system pressure approaches zero. It is designed for use where the receptacle or environmental being served is subject to atmospheric pressure only.

VACUUM BREAKER, ATMOSPHERIC TYPE (AVB) – a backsiphonage-prevention device designed for use under flow conditions only, not to exceed 12 consecutive hours and where it will be subject to no static pressure and no backpressure.

VACUUM BREAKER, PRESSURE TYPE (PVB) – a backsiphonage-prevention device designed to operate under continuous pressure; static or flowing, but no backpressure.

VACUUM BREAKER, HOSE TYPE (HVB) – a backsiphonage-prevention device designed for those connections only, but not for continuous pressure, static or flowing.

VACUUM RELIEF VALVE – a device designed to limit the degree of vacuum in a vessel or pipe, but not for cross-connection control.

GWINNETT COUNTY
DEPARTMENT OF WATER RESOURCES
Backflow Prevention
Protecting Water Protecting People

FOUR BASIC TYPES OF BACKFLOW PREVENTERS

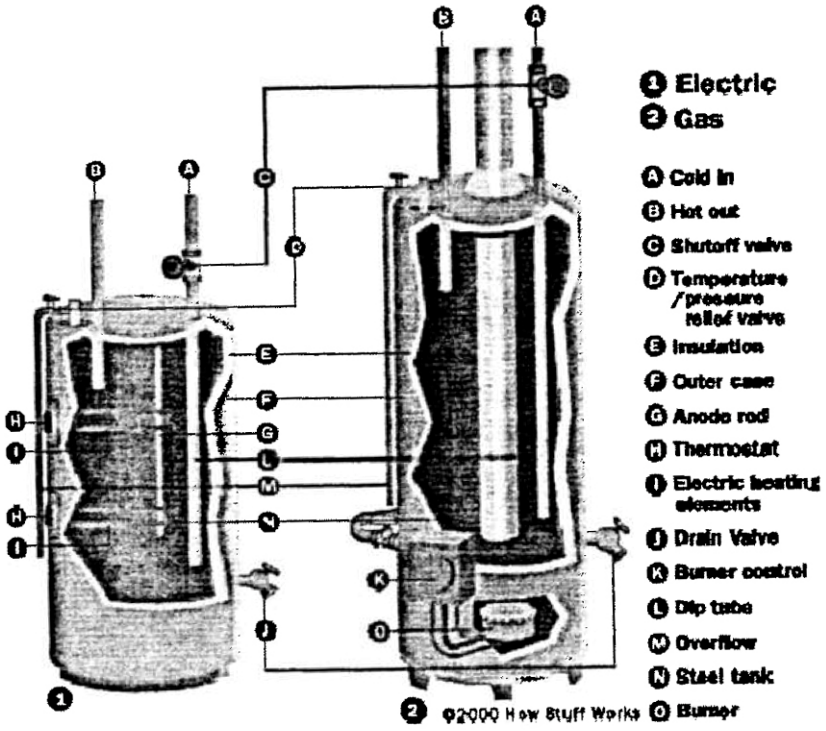
	TYPE & PURPOSE	DESCRIPTION	INSTALLED AT	EXAMPLES OF INSTALLATION
1	**REDUCED PRESSURE PRINCIPLE BACKFLOW PREVENTER** *For high hazard cross connections.*	Two independent check valves with intermediate relief valve. Supplied with shut-off valves and ball type test cocks.	All cross connections subject to back pressure or back siphonage where there is a high potential health hazard from contamination. Continuous pressure.	Main Supply Lines Commercial Boilers Cooling Towers Hospital Equipment Processing Tanks Laboratory Equipment Waste Digesters Car Wash Sewage Treatment
2	**DOUBLE CHECK VALVE ASSEMBLY** *For low hazard cross connections.*	Two independent check valves. Supplied with shut-off valves and ball type test cocks.	All cross connections subject to back pressure where there is a low potential health hazard or nuisance. Continuous pressure.	Main Supply Lines Food Cookers Tanks & Vats Lawn Sprinklers Fire Sprinkler Lines Commercial Pools
	DOUBLE DETECTOR CHECK VALVE ASSEMBLY *For low hazard applications.*	Double check valve assembly with a water meter and double check in by-pass line	Fire protection system supply main. Detects leaks and unauthorized use of water.	Fire sprinkler Lines
	DUAL CHECK VALVE BACKFLOW PREVENTER *For low hazard applications.*	Two independent check valves. Checks are removable for testing.	Cross connections where there is a low potential health hazard and moderate flow requirements.	Residential Supply Lines (at the meter)
3	**BACKFLOW PREVENTER WITH INTERMEDIATE ATMOSPHERIC VENT** *For moderate hazard cross connections in small pipe sizes.*	Two independent check valves with intermediate vacuum breaker and relief valve.	Cross connections subject to back pressure or back siphonage where there is a moderate health hazard. Continuous pressure.	Boilers (small) Cooling Towers (small) Dairy Equipment Residential
			Pump outlet to prevent backflow of carbon dioxide gas and carbonated water into the water supply system to beverage machines.	Post-mix Carbonated Beverage Equipment
	LABORATORY FAUCET AND DOUBLE CHECK VALVE WITH INTERMEDIATE VACUUM BREAKER *In small pipe sizes for moderate to low hazard.*	Two independent check valves with intermediate vacuum breaker and relief vent.	Cross connections subject to back pressure or back siphonage where there is a moderate to low health hazard.	Laboratory Faucets and Pipe Lines Barber Shop and Beauty Parlor Sinks.
4	**ATMOSPHERIC VACUUM BREAKERS** *For moderate to high hazard cross connections.*	Single float and disc with large atmospheric port.	Cross connections not subject to back pressure or continuous pressure. Install at least 6" above fixture rim. Protection against back siphonage only.	Process Tanks Dishwashers Soap Dispensers Washing Machines Lawn Sprinklers
	PRESSURE TYPE VACUUM BREAKERS *For moderate to high hazard cross connections*	Spring loaded single float and disc with independent 1st check. Supplied with shut-off valves and ball type test cocks.	This valve is designed for installation in a continuous pressure potable water supply system 12" above the overflow level of the system being supplied. Protection against back siphonage only.	Laboratory Equipment Cooling Towers Community Laundry Machines Swimming Pools Chemical Plating Tank Large Toilet & Urinal Facilities Degreaser & Photo Tanks Livestock Water Systems Lawn Sprinklers
	HOSE CONNECTION VACUUM BREAKERS *For residential and industrial hose supply outlets.*	Single check with atmospheric vacuum breaker vent.	Install directly on hose bibs, service sinks and wall hydrants. Not for continuous pressure.	Hose Bibbs Service Sinks Hydrants

GWINNETT COUNTY
DEPARTMENT OF WATER RESOURCES
Backflow Prevention
Protecting Water Protecting People

Thermal Expansion

A check valve is designed to only allow water to flow in one direction. On a normal service line to a house or supply line to a device, such as a boiler or water heater, the flow pathway is not blocked. Water can flow into the area, and when needed, flow out again. Due to the risk of contaminating the potable water line, either in the distribution main or in the plant or business, some form of backflow prevention is normally installed to contain the backflow to the property or isolate the device from the other internal plumbing. These devices may range from the Reduced Pressure Backflow Preventer to the Double Check Valve Assembly to the Dual Check Device.

By blocking the flow path away from the higher-pressure area, a closed-loop system has been created. Normal pressure imbalance created by pumps, valves, normal water use and heating systems can no longer find equalization in the upstream piping. Pumps and valves tend to generate pressure waves called water hammer that can damage pipes, valves, fittings and even backflow devices. Other seemingly innocent devices, such as a water heater, can create problems in the system, though these problems do not appear as drastically as they tend to appear more slowly.



A water heater generates pressure through a relationship to Boyles' Law. This law states that *at a constant temperature, the volume occupied by a fixed quantity of gas is inversely proportional to the applied pressure (PV=constant).* When put together with some other laws, the outcome is the Ideal Gas Law (PV=T) which basically states that as the temperature of a gas increases, the pressure and volume increase. Often times this pressure increase shows up at sink and tub faucets in the form of drips. As the pressure increases in the closed-loop system, the pressure begins to seek a way out of the pipes – often distorting the elastomer components of faucets and even toilets.

Whenever a loop of pipe is closed with a backflow prevention assembly, some method is required to deal with thermal expansion. While many devices are sold for this purpose, certain jurisdictions may require a specific device to be used or even not be used. Thermal expansion devices generally include:

- Expansion Tanks
- Ballcock Relief
- Pressure Release Valves (pop-offs)

GWINNETT COUNTY
DEPARTMENT OF WATER RESOURCES
Backflow Prevention
Protecting Water Protecting People

PLANT OR FACILITIES
WHERE BACKFLOW PROTECTION WILL USUALLY BE REQUIRED

PLANT OR FACILITY

1. Aircraft and Missile Plants
2. Automotive Plants
3. Auxiliary Water Systems
4. Beverage Bottling Plants
5. Breweries
6. Buildings – hotels, apartment houses, public and private buildings or any other structures having unprotected cross-connections.
7. Canneries, Packing Houses and Reduction Plants
8. Car Wash Facilities
9. Chemical Plants – manufacturing, processing, compounding or treatment
10. Civil Works
11. Dairies and Cold Storage Plants
12. Film Laboratories
13. Fire Systems
14. Hospitals, Medical Buildings, Sanitariums, Morgues, Mortuaries, Autopsy Facilities, Nursing and Convalescent Homes and Clinics
15. Irrigation Systems – Premises Having Separate System (i.e., - parks, playgrounds, cemeteries, golf courses, schools, estates, ranches, etc.)
16. Laundries and Dye Works
17. Metal Manufacturing, Cleaning, Processing and Fabricating Plants
18. Motion Picture Studios
19. Multi-Storied Buildings
20. Multiple Services – interconnected
21. Oil and Gas Production, Storage or Transmission Properties
22. Paper and Paper Products Plants
23. Plating Plants
24. Power Plants
25. Radioactive Materials or Substances – Plants or Facilities Handling
26. Restricted, Classified or Other Closed Facilities
27. Rubber Plants – Natural or Synthetic
28. Sand and Gravel Plants
29. Schools and Colleges
30. Sewage and Strom Drain Facilities
31. Solar Heating System – Direct and Auxiliary
32. Waterfront Facilities and Industries

5.2.2 Process Waters Recirculated

Air conditioning – refrigerate, air wash, make-up and drains
Ball mills
Cooling Systems – refrigeration, diesel engines, compressors
Any industries practicing water conservation
Ink Mills
Paint Mills

5.2.3 Water Treatment Facilities

Addition of chemicals
Boiler feed treatment
Compound feeders
Scale, corrosion, slime control
Water filtration and water softening

5.2.4 Situation Where Toxic or Objectionable Chemicals Are, or May be, Transmitted, Stored or Used in a Manner Which May Endanger the Water

Brine Line
Foamite Lines
Glycerine Lines
Laboratory Equipment
Mixing Tanks
Oil System
Photo processing and washing
Pickling Tanks
Plating Works
Refrigerants

5.2.5 Situations Where Toxic or Objectionable Chemicals Are, or May be, Transmitted, Stored or Used in a Manner Which May Endanger the Water

Acid Pumps
Air Conditioner Pumps
Air Pumps
Booster Pumps
Cadmium Solution Pumps
Caustic Pumps
Chromic Acid
Cyanide Pumps
Gasoline Lifts
Glycerine Pumps
Hydraulic Elevator Pumps
Sewer Pumps
Sump Ejectors
Venturi Float Lines

5.2.6 Situation Where Toxic or Objectionable Chemicals Are, or May be, Transmitted, Stored or Used in a Manner Which May Endanger the Water

Boilers – high and low pressure	Steam ejectors
Cold and hot water return to steam systems	Steam lines
Compressor	Suction tees
Direct-connected hydraulic elevators	Turbo burners
Elevator air lines	Vacuum systems
Return and surge tank hydraulic elevator systems	

5.2.7 Industrialized Lines

All types of industries
Laboratories

5.2.8 Interstreet Services – Low Pressure and Fringe Areas

Elevation and pressure conditions
More than one service to a premise

5.2.9 Industrial Water Use Connections

Box plants – glue pots, soaking vats, steaming processes
Canneries – pressure cookers, retorts, wash lines, salt wash line.
Creameries – distilled water, ice water, tap water, hot water, steam milk and other products
Laundries – caustic soap solutions, hot and cold water, softened hot and cold water, chlorinated water and boiler room equipment
Metal works – testing lines, cooling system, plating solutions, metal processing lines, cutting oil, lubricant lines and welding machines.
Oil Companies – flushing oil lines, tanks and systems to dehydrators, heating and cooling systems
Packing Houses – rendering vats, pressure reduction vats and hide soaking and pickling vats
Rubber and Rubber Goods Plants – roll cooling machines, cookers, water transmission systems, brine and styrene solutions
Shipyards – salt water systems, tank testing facilities, ship line testing, pierhead outlets, fire systems, prestolite systems
Tanneries – chemical solution and dye lines, lanolin lines and soaking tanks
Hospitals – all types

5.2.10 Cross-Connections Involving Sewage or Sewage Disposal Facilities

Fire Sprinkler Drain Lines
Compressors – cooling systems with direct connection
Diesel Engines – cooling systems with direct connection
Direct Water Lines to Sewers for Drains or Flushing
Flush manholes – water supply to Flush Tanks
Holding Tanks – camper or trailer toilet flushing facilities
Various Blowoffs or Drains to Sewers
Reservoir By-Passes and Drains to sewer or Storm Drains
Sewage Chlorinators – direct injection
Sewer Flushing Equipment – water connection
Sewage Sump Pumps and Ejectors – water-operated
Water Street Mains Drain to Sewer or Storm Drains
Priming Lines

Water-operated pumps
Baptismal fountains
Brewery vats
Brine tanks
Cheese tanks
Culture vats
Dipper vats
Dye tanks
Food mixing tanks
Kitchen equipment
Morticians aspirators
Photographic tanks
Pickling tanks

Plating tanks
Potato peeler
Shrinking tanks
Sinks
Soaking tanks
Spring-loaded glass washers
Steam soap washing devices
Steam table connections
Sewage sump ejectors
Swimming pool gutter drains
Tanks
Therapeutic baths
Vats
Water jacketed tanks, vats and pots

5.2.11 Special Uses Where Cross-Connections Are Usually Found

Baptismal tanks
Blood plasma equipment
Blueprint machines
Car washing equipment – caustic and soap guns, mixers and boiler equipment
Chillers
Commercial vacuum cleaning equipment
Construction equipment lines
Deaerators
Garbage washing with steam and cold water connections
Humidity controls
Hydraulic fertilizer applications
Mortuaries
Oil well leases
Pest control equipment – orchard spray
Pressure and steam cookers
Roof and house tanks
Soap mixing layouts
Solar heating systems
Steamer supply equipment
Storage reservoirs
Veterinary hospitals
Water-operated siphones – all types
Weed control equipment
X-ray equipment

5.2.12 Plumbing and Water Piping Cross-Connections

Aspirators
Autoclaves
Auto shampoo
Basins
Bathtubs
Bedpan washers
Bidets
Cooking kettles
Cuspidors
Dental cuspidors – water operated
Dishwashers - water operated
Drains, tanks, vats
Drinking fountains
Fish ponds
Frostproof toilets
Garbage grinding devices
Grease traps
Hoppers – utility
Hose bibs – certain types
Hydraulic vacuum cleaners
Instrument sterilizers
Blueprint machines
Bottle washers
Carbonators
California washers (below flood level)
Can washers
Coffee urns
Colonic irrigators
Laundry washers
Overflow tanks
Overhead exposed leaking sewage
Pasteurizers
Plumber's enemy – Identical gadgets
Plumber's friend – Removable hose connection between bibb and lavatory or sink drain
Pressure cookers
Refrigeration units
Shampoo units
Soda fountains
Turbo burner drains
Toilets – flush valves low tanks

5.2.13 (Cont.)

Insecticide sprayers – water operated	Urinals
Integral tank and closet bowls	Washing machines
Laboratory operated vacuum pumps	Watering troughs
Lawn sprinklers – at last control valve	Yard outlets – submerged
Laundry trays	Yard sprinkling nozzles

5.3 Group III Chemicals and Chemical Compounds Used in Water Treatment

Chemicals or chemical compounds which may create a hazard to the public water system when injected or otherwise introduced into the consumer's system include:

5.3.1 Agriculture

Solutions of chemicals are used by agriculture for many purposes. The following are some of the chemical compounds which may be injected into irrigation systems for spreading purposes. All of them are toxic in concentrated solutions.

Fertilizers	Ammonium Salts	Phosphate
	Ammonium Gas	Potassium Salts
Herbicides	2,4,D	Sodium Chlorate
	Dinitrophenol	Borax
	Karmex	Sodium Arsenite
	2,4,5,T	Methyl Bromide
	Pentaclorophenol	
Pesticides	DDT	Parathion
	TDE	Malathion
	BHC	Nicotine
	Lindane	MH
	TEPP	

5.3.2 Cooling Systems – Open or Closed

Cooling systems – including cooling towers – usually require some treatment of the water for algae, slime or corrosion control.

Chemicals frequently used for this purpose may include the following **high toxic** chemicals:

Chromium	Pentachorophenol
Mercury	Quaternary ammonium compounds

Or the following chemicals which are **toxic in higher concentrations**:

Chlorine	Permanganate
Bromine	Glucosides
Copper	

5.3.3 Plating Plants

In plating work, materials are first cleaned in acid or caustic solutions at concentration that are **highly toxic**, after which they are immersed in plating solutions which are **highly toxic**. Such solutions may contain:

Cyanides
Fluorides

Or metals in solution such as

Antimony	Copper
Cadmium	Silver salts, etc.
Chromium	

5.3.4 Steam Boiler Plants

Most boiler plants will use some form of boiler feed water treatment. The chemicals normally used for this purpose include:

Highly toxic compounds:

Cyanides	Fluorides

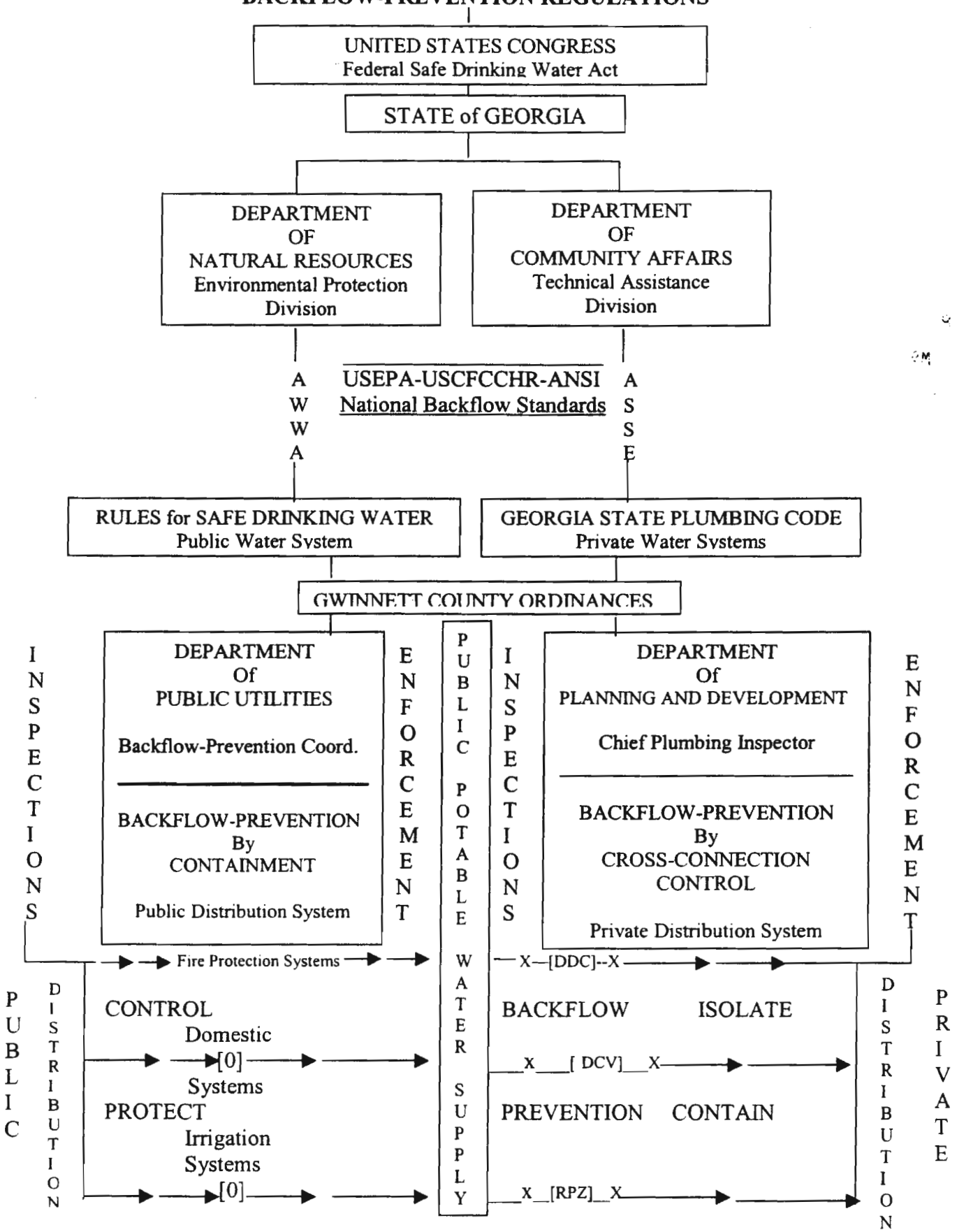
Less toxic compounds:

Acids	Sodium nitrate
Sodium alginate	Sodium phosphate
Sodium aluminate	Sodium sulfate
Sodium hydroxide	

APPENDIX B

Federal and State Regulations

FLOWCHART of WATER SYSTEMS
BACKFLOW-PREVENTION REGULATIONS



S. 1316

One Hundred Fourth Congress of the United States of America

AT THE SECOND SESSION

Begun and held at the City of Washington on Wednesday, the third day of January, one thousand nine hundred and ninety-six

An Act

To reauthorize and amend title XIV of the Public Health Service Act (commonly known as the "Safe Drinking Water Act"), and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

SECTION 1. SHORT TITLE; TABLE OF CONTENTS.

(a) SHORT TITLE.—This Act may be cited as the "Safe Drinking Water Act Amendments of 1996".

(b) TABLE OF CONTENTS.—

SEC. 2. REFERENCES; EFFECTIVE DATE; DISCLAIMER.

(a) REFERENCES TO SAFE DRINKING WATER ACT.—Except as otherwise expressly provided, whenever in this Act an amendment or repeal is expressed in terms of an amendment to, or repeal of, a section or other provision, the reference shall be considered to be made to that section or other provision of title XIV of the Public Health Service Act (commonly known as the "Safe Drinking Water Act") (42 U.S.C. 300f et seq.).

(b) EFFECTIVE DATE.—Except as otherwise specified in this Act or in the amendments made by this Act, this Act and the amendments made by this Act shall take effect on the date of enactment of this Act.

(c) DISCLAIMER.—Except for the provisions of section 302 (relating to transfers of funds), nothing in this Act or in any amendments made by this Act to title XIV of the Public Health Service Act (commonly known as the "Safe Drinking Water Act") or any other law shall be construed by the Administrator of the Environmental Protection Agency or the courts as affecting, modifying, expanding, changing, or altering—

(1) the provisions of the Federal Water Pollution Control Act;

(2) the duties and responsibilities of the Administrator under that Act; or

(3) the regulation or control of point or nonpoint sources of pollution discharged into waters covered by that Act.

The Administrator shall identify in the agency's annual budget all funding and full-time equivalents administering such title XIV separately from funding and staffing for the Federal Water Pollution Control Act.

SEC. 3. FINDINGS.

The Congress finds that—

(1) safe drinking water is essential to the protection of public health;

(2) because the requirements of the Safe Drinking Water Act (42 U.S.C. 300f et seq.) now exceed the financial and technical capacity of some public water systems, especially many small public water systems, the Federal Government needs to provide assistance to communities to help the communities meet Federal drinking water requirements;

(3) the Federal Government commits to maintaining and improving its partnership with the States in the administration and implementation of the Safe Drinking Water Act;

(4) States play a central role in the implementation of safe drinking water programs, and States need increased financial resources and appropriate flexibility to ensure the prompt and effective development and implementation of drinking water programs;

(5) the existing process for the assessment and selection of additional drinking water contaminants needs to be revised and improved to ensure that there is a sound scientific basis for setting priorities in establishing drinking water regulations;

(6) procedures for assessing the health effects of contaminants establishing drinking water standards should be revised to provide greater opportunity for public education and participation;

(7) in considering the appropriate level of regulation for contaminants in drinking water, risk assessment, based on sound and objective science, and benefit-cost analysis are important analytical tools for improving the efficiency and effectiveness of drinking water regulations to protect human health;

(8) more effective protection of public health requires—

(A) a Federal commitment to set priorities that will allow scarce Federal, State, and local resources to be targeted toward the drinking water problems of greatest public health concern;

(B) maximizing the value of the different and complementary strengths and responsibilities of the Federal and State governments in those States that have primary enforcement responsibility for the Safe Drinking Water Act; and

(C) prevention of drinking water contamination through well-trained system operators, water systems with adequate managerial, technical, and financial capacity, and enhanced protection of source waters of public water systems;

(9) compliance with the requirements of the Safe Drinking Water Act continues to be a concern at public water systems experiencing technical and financial limitations, and Federal, State, and local governments need more resources and more effective authority to attain the objectives of the Safe Drinking Water Act; and

(10) consumers served by public water systems should be provided with information on the source of the water they are drinking and its quality and safety, as well as prompt notification of any violation of drinking water regulations.

TITLE I—AMENDMENTS TO SAFE DRINKING WATER ACT

SEC. 101. DEFINITIONS.

(a) IN GENERAL.—Section 1401 (42 U.S.C. 300f) is amended as follows:

(1) In paragraph (1)—

(A) in subparagraph (D), by inserting "accepted methods for" before "quality control"; and

(B) by adding at the end the following: "At any time after promulgation of a regulation referred to in this paragraph, the Administrator may add equally effective quality control and testing procedures by guidance published in the Federal Register. Such procedures shall be treated as an alternative for public water systems to the quality control and testing procedures listed in the regulation.".

(2) In paragraph (13)—

(A) by striking "The" and inserting "(A) Except as provided in subparagraph (B), the"; and

(B) by adding at the end the following:

"(B) For purposes of section 1452, the term 'State' means each of the 50 States, the District of Columbia, and the Commonwealth of Puerto Rico.".

(3) In paragraph (14), by adding at the end the following: "For purposes of section 1452, the term includes any Native village (as defined in section 3(c) of the Alaska Native Claims Settlement Act (43 U.S.C. 1602(c))).".

(4) By adding at the end the following:

"(15) COMMUNITY WATER SYSTEM.—The term 'community water system' means a public water system that—

"(A) serves at least 15 service connections used by year-round residents of the area served by the system; or

"(B) regularly serves at least 25 year-round residents.

"(16) NONCOMMUNITY WATER SYSTEM.—The term 'noncommunity water system' means a public water system that is not a community water system.".

(b) PUBLIC WATER SYSTEM.—

(1) IN GENERAL.—Section 1401(4) (42 U.S.C. 300f(4)) is amended as follows:

(A) In the first sentence, by striking "piped water for human consumption" and inserting "water for human consumption through pipes or other constructed conveyances".

(B) By redesignating subparagraphs (A) and (B) as clauses (i) and (ii), respectively.

(C) By striking "(4) The" and inserting the following: "(4) PUBLIC WATER SYSTEM.—

"(A) IN GENERAL.—The"; and

(D) by adding at the end the following:

"(B) CONNECTIONS.—

"(i) IN GENERAL.—For purposes of subparagraph (A), a connection to a system that delivers water by a constructed conveyance other than a pipe shall not be considered a connection, if—

"(I) the water is used exclusively for purposes other than residential uses (consisting of drinking, bathing, and cooking, or other similar uses);

"(II) the Administrator or the State (in the case of a State exercising primary enforcement responsibility for public water systems) determines that alternative water to achieve the equivalent level of public health protection provided by the applicable national primary drinking water regulation is provided for residential or similar uses for drinking and cooking; or

US ENVIRONMENTAL PROTECTION AGENCY OFFICE OF WATER PROGRAMS WATER SUPPLY DIVISION

Responsibility

Under the provisions of the Safe Drinking Water Act of 1974, the Federal Government has established, through the EPA (Environmental Protection Agency), national standards of safe drinking water. The states are responsible for the enforcement of these standards as well as the supervision of public water supply systems and the sources of drinking water. The water purveyor (supplier) is held responsible for compliance to the provisions of the Safe Drinking water Act, to include a warranty that water quality provided by his operation is in conformance with the EPA standards at the source, and is delivered to the customer without the quality being compromised as a result of its delivery through the distribution system. As specified in the Code of Federal Regulations (Volume 40, Paragraph 141.2, Section c) "Maximum contaminant level, means the maximum permissible level of a contaminant in water which is delivered to the free flowing outlet of the ultimate user of a public water system, except in the case of turbidity where the maximum permissible level is measured at the point of entry to the distribution system. Contaminants added to the water under circumstances controlled by the user, except those resulting from corrosion of piping and plumbing caused by water quality, are excluded from this definition."

Figure 43 depicts several options that are open to a water purveyor when considering cross-connection protection to commercial, industrial, and residential customers. He may elect to work initially on the "containment" theory. This approach utilizes a minimum of backflow devices and isolates the customer from the water main. It virtually insulates the customer from potentially contaminating or polluting the public water supply system. While it is recognized that "containment" does not protect the customer within his building, it does effectively remove him form possible contamination to the public water supply system. If the water purveyor elects to protect his customers on domestic internal protective basis and/or "fixture outlet protective basis", then cross-connection control protective devices are placed at internal high hazard locations as well as at all locations where cross-connections exist at the "last free-flowing outlet." This approach entails extensive cross-connective survey work on behalf of the water superintendent as well as constant policing of the plumbing within each commercial, industrial and residential account. In large water supply systems, fixture outlet protection cross-connection control philosophy, in itself, is a virtual impossibility to achieve and police due to the quantity of systems involved, thru complexity of the plumbing systems inherent in many industrial sites, and the fact that many plumbing changes are made within industrial and commercial establishments that do not require the water department to license or otherwise endorse or ratify when contemplated or completed. In addition, internal plumbing cross-connection control survey work is generally foreign to the average water purveyor and is not normally a portion of his job description or duties. While it is admirable for the water purveyor to accept and perform survey work, he should be aware that he runs the risk of additional liability in an area that may be in conflict with plumbing inspectors, maintenance personnel and other public health officials.

Even where extensive "fixture outlet protection", cross-connection control programs are in effect through the efforts of an aggressive and thorough water supply cross-connection control program, the water authorities should also have active "containment" program in order to address the many plumbing changes that are made and that are inherent within commercial and industrial establishments. In essence, fixture outlet protection becomes an extension beyond the "containment" program.

Also, in order for the supplier of water to provide maximum protection of the water distribution system, consideration should be given to requiring the owner of a premise (commercial, industrial or residential) to provide at his own expense, adequate proof that his internal water system complies with the local or state plumbing code(s). In addition, he may be required to install, have tested, and maintain, all backflow protection devices that would be required- at his own expense!

The supplier of water should have the right of entry to determine degree of hazard and the existence of cross-connections in order to protect the potable water system. By so doing he can assess the overall nature of the facility and its potential impact on the water system (determine degree of hazard), personally see actual cross-connections that could contaminate the water system, and take appropriate action to insure the elimination of the cross-connection or the installation of required backflow devices.

To assist the water purveyor in the total administration of a cross-connection control program requires that all public health officials, plumbing inspectors, building managers, plumbing installers, and maintenance men participate and share in the responsibility to protect the public health and safety of individuals from cross-connections and contamination or pollution of the public water supply system.

Georgia Department of
NATURAL RESOURCES

Rules For Safe Drinking Water

391-3-5-.13 Cross-Connections.

(1) No person shall construct, maintain or operate a physical arrangement whereby a public water system is or may be connected directly or indirectly with a nonpotable water system or non-permitted water system, sewer, drain, conduit, pool, storage reservoir, plumbing fixture, or other device which contains or may contain contaminated water, liquid, gasses, sewage or other waste of unknown or unsafe quality, which may be capable of imparting contamination to the public water system as the results of backflow, bypass arrangements, jumper connections, removable sections, swivel or changeover devices, or other temporary, permanent or potential connections through which or because of which back-flow or back-siphonage could or would occur.

(2) A supplier of water or any person having possession or control of facilities which may cause the contamination of a public water system has the responsibility to prevent water from unapproved sources or any contaminants from entering the public water system by such physical arrangements cited in paragraph (1) of this Section.

(3) Any person connecting to and purchasing water from a public water system and reselling it to others is considered a supplier of the water so purchased as well as a consumer, and is also responsible for the quality of such water.

(4) A supplier shall, when requested by the Division, develop a control program for the elimination and prevention of all cross-connections. A written plan for the program shall be submitted to the Division for review and approval within two (2) years or less in accordance with a written request by the Division. When the plan is approved, the owner shall implement the program immediately.

(5) The procedures for back-flow and back-siphonage prevention and cross-connection control shall conform to those recommended by the American Water Works Association, Manual 14, and the U.S. Environmental Protection Agency Cross-Connection Manual.

(6) The supplier shall require that all backflow prevention assemblies installed pursuant to this section be field tested following installation, repair, or relocation and at least annually thereafter.

(7) After October 1, 2004, all required field testing shall be performed by persons who are certified in the testing of backflow prevention assemblies by the Georgia Statewide Backflow Prevention Assembly Certification Program, as approved by the Division, the American Backflow Prevention Association (ABPA), the American Society of Sanitary Engineers (ASSE) or the University of Florida TREEO Center.

(8) Gauges used in the testing of backflow prevention assemblies shall be tested for accuracy annually in accordance with the University of Southern California Manual of

Cross-Connection Control or American Water Works Association Manual 14. Public water systems shall require testers to include test gauge serial numbers on “Test and Maintenance” report forms and ensure testers have gauges tested for accuracy.

(9) Each water supplier shall maintain records of the following for a minimum of three years:

(a) Most current hazard assessment, conducted pursuant to Section 608 of the Georgia State Minimum Standard Plumbing Code (International Plumbing Code);
(b) Locations and types of backflow protection and associated hazards;
(c) Results of all backflow prevention assembly field testing and air gap inspections;
(d) Repairs made to, or replacement or relocation of, backflow protection.

(10) Summaries of the information in section (9)(a) - (d) shall be available to the Division on request for a minimum of three years.

(11) The supplier shall ensure that backflow prevention assemblies that fail the field test are repaired or replaced within 30 days.

(12) The supplier shall ensure that bypass piping installed around any approved backflow preventer is equipped with a backflow preventer providing an equivalent level of protection.

(13) Reduced pressure principal backflow prevention assemblies shall not be installed in any location subject to possible flooding. This includes pits and/ or vaults which are not provided with a gravity drain to the ground’s surface that is capable of exceeding the discharge rate of the relief valve.

(14) Each supplier shall notify the Division of any known incident of backflow into the public water system as soon as possible but no later than the end of the next business day upon discovery of the incident. If requested to do so by the Division, the supplier shall submit a written report of the incident describing the nature and severity of the backflow, the actions taken by the water supplier in response to the incident, and the action plan intended to prevent such incidents in the future.

(15) The supplier of water shall deny or discontinue water service to a commercial consumer if a required backflow prevention device is not installed or properly maintained. Water service shall not be restored to such premises until the deficiencies have been corrected or eliminated to the satisfaction of the supplier and the Division. Residential connections shall be maintained in accordance with the Georgia State Minimum Standard Plumbing Code (International Plumbing Code)

Authority Ga. L. 1977, p. 351, et seq., O.C.G.A. Sec. 12-5-170 et seq., as amended. **Administrative History.** Original Rule entitled "Storage Tanks and Distribution System" was filed on September 6, 1973; effective September 26, 1973. **Amended:** Rule repealed and a new Rule entitled "Cross Connections" adopted. Filed July 5, 1977; effective July 26, 1977, as specified by Rule 391-3-5-.47. **Amended:** Filed July 15, 1983; effective August 4, 1983. **Amended:** F. Dec. 4, 1990; eff. Dec. 24, 1990. **Amended:** F. Dec. 21, 2004; eff. Jan. 10, 2005.

JOE D. TANNER
Commissioner

J. LEONARD LEDBETTER
Division Director

Department of Natural Resources

ENVIRONMENTAL PROTECTION DIVISION
270 WASHINGTON STREET, S.W.
ATLANTA, GEORGIA 30334

April 8, 1983

During the past few months several public water systems were temporarily contaminated by the back-flow or backsiphonage of hazardous chemicals into the public water supply. In each instance the installation of a backflow prevention device would have probably prevented the development of a dangerous public health hazard and would have also eliminated the need for a costly expenditure of manpower and funds to normalize the affected areas. A concerted effort by suppliers of water is needed to prevent contamination of the public water supply by cross-connections with unapproved sources.

The Georgia Rules for Safe Drinking Water, Chapter 391-3-5-.13, require that a supplier of water prevent water from an unapproved source or any contaminants from entering the public water system. Further, the Rules require that the supplier develop a control program for the elimination and prevention of all cross-connections to the public water system when requested by the Division.

Based on the increased number of incidents of contamination of public water supply systems by cross-connections and the increased hazard to the public health, it is apparent that a number of public water systems need a more effective cross-connection control program. Recently a letter was sent to the larger water supply systems that requires them to develop cross-connection control programs for review by the Division within the next six months. Realizing the limited assets that are available to the smaller water systems, additional time will be allowed for the smaller water systems to prepare their cross-connection plans. Therefore, under the provisions of the Georgia Rules for Safe Drinking Water you are hereby requested to prepare a written plan for the elimination and prevention of cross-conections for your water system within the next twelve (12) months. Your plan should be submitted to this office for review by April 8, 1984. To assist with the preparation of your plan, we have enclosed a copy of the Division's Cross-Connection Control Guidelines.

Sincerely,

J. Leonard Ledbetter
Director

JLL:fld

Attachment

GEORGIA STATE
PLUMBING CODE

Principle No. 5 - PROTECTION OF CONSUMERS OR USERS OF WATER

All consumers or users of water obtained from the potable distribution system shall be protected from the hazards of backflow or back-siphonage by ISOLATING the source of each cross-connection or potential cross-connection.

SECTION 1104. PROTECTION OF POTABLE WATER SUPPLY.

1104.1 General. A potable water supply system shall be designed, installed and maintained in such manner as to prevent contamination by non-potable liquids, solids or gases from being introduced into the potable water supply through cross connections or any other piping connections to the system.

1104.2 Interconnections. Interconnections between two (2) or more public water supplies shall be permitted only with the approval of the health authority having jurisdiction.

1104.3 Cross Connections. Cross connections are prohibited except when and where, as approved by the authority having jurisdiction, suitable protective devices are installed, tested and maintained to insure proper operation on a continuing basis.

1104.4 Individual Water Supplies. Interconnections between an individual water supply and a potable public supply shall not be made unless specifically approved by the authority having jurisdiction.

CROSS CONNECTIONS AND BACKFLOW PREVENTION

AWWA Policy Statement on Cross Connections.

The directors of AWWA approved the following policy statement in 1970:

> "The American Water Works Association", recognizes that the water purveyor has a responsibility to provide its customers at the service connection with water that is safe under all foreseeable circumstances. Thus, in the exercise of this responsibility the water purveyor must take reasonable precaution to protect the community distribution system from the hazards originating on the premises of its customers that may degrade the water in the community distribution system.
>
> "It is realized that cross-connection control and plumbing inspections on the premises of its customers are regulatory in nature and should be handled through the rules, regulations, and recommendations of the health authority or the plumbing-code enforcement agencies having jurisdiction. The water purveyor, however, should be aware of any situation requiring inspections and/or re-inspections necessary to detect hazardous conditions resulting from cross connections. If, in the opinion of the utility, effective measures consistent with the degree of hazard have not been taken by the regulatory agency, the water purveyor should take such measures as he may deem necessary to ensure that the community distribution system is protected from contamination. Such action would include the installation of a backflow prevention device, consistent with the degree of hazard, at the service connection, or discontinuance of the service."

Check Valve is Customer's Responsibility

Clarence Annett and his mother Inez Annett owned two lots in Sunday Canyon. One was unimproved and the other contained a vacation home. The house received water from the Sunday Canyon Water Supply Corporation (SCWSC). SCWSC was required to render continuous and adequate service to every customer in its certified area. In December 1988, SCWSC discontinued the Annetts' service because the Annetts refused to install a check valve in the water line on their side of the water meter. Because SCWSC's water system was gravity operated, a substantial decrease in the system's pressure from a break would allow water to reenter the break in the line and backflow into the water line serving housed below the break. This could potentially contaminate the water system. Thus, SCWSC notified its customers that each property owner was individually responsible for installing a check valve as recommended by the state health division. The valves were to be installed on the landowner's property at his or her own expense. A subsequent notice to customers in April 1988 said failure to install valves could result in termination of service. The Annett's the only customers who refused to install the valves, sued to enjoin the utility from discontinuing service. The trial court ruled against them.

On appeal, the Annetts argued the danger of contamination existed wholly within SCWSC's system and not on individual landowners' properties. Therefore, they asserted, the responsibility for safeguarding against the perceived danger fell upon SCWSC. The appellate court said that although a water purveyor must ensure that no connection is made between a drinking water supply and an establishment where a potential contamination hazard exists, the purveyor is not responsible for installing backflow prevention devices at each individual establishment where a possibility of contamination exists. According to the court, the water supplier has the option to either maintain a cross-connection program or to require backflow protection. Thus, the court said SCWSC acted property in making installation of check valves the responsibility of the customers.

Annett v. Sunday Canyon Water Supp. Corp., Court of Appeals of Texas, Nov. 1, 1991, *rehearing overruled* Dec. 31, 1991 AWW/01/N.-$10)

APPENDIX C

Frequently Asked Questions

50 Cross-Connection Questions, Answers, & Illustrations

Relating To

Backflow Prevention Products

and

Protection of Safe Drinking Water Supply

A LEADER IN VALVE TECHNOLOGY
WATTS® REGULATOR
Since 1874 — Watts Industries, Inc.
Water Products Division • Safety & Control Valves

USA: 815 Chestnut St., No. Andover, MA 01845-6098; www.wattsreg.com
Canada: 5435 North Service Rd., Burlington, ONT. L7L 5H7; www.wattscda.com
ISO 9001 CERTIFIED

1 What is back-siphonage?

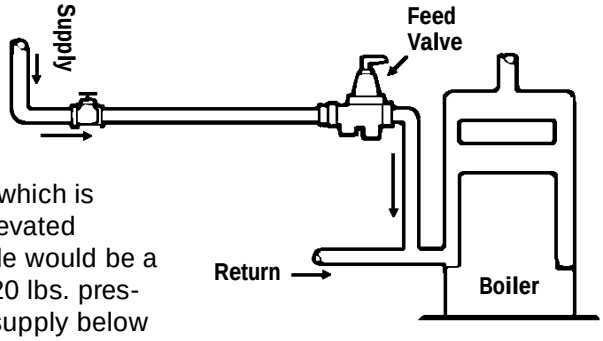
Back-siphonage is the reversal of normal flow in a system caused by a negative pressure (vacuum or partial vacuum) in the supply piping.

2 What factors can cause back-siphonage?

Back-siphonage can be created when there is stoppage of the water supply due to nearby fire-fighting, repairs or breaks in city main, etc. The effect is similar to the sipping of an ice cream soda by inhaling through a straw, which induces a flow in the opposite direction.

3 What is backpressure backflow?

Backpressure backflow is the reversal of normal flow in a system due to an increase in the downstream pressure above that of the supply pressure.

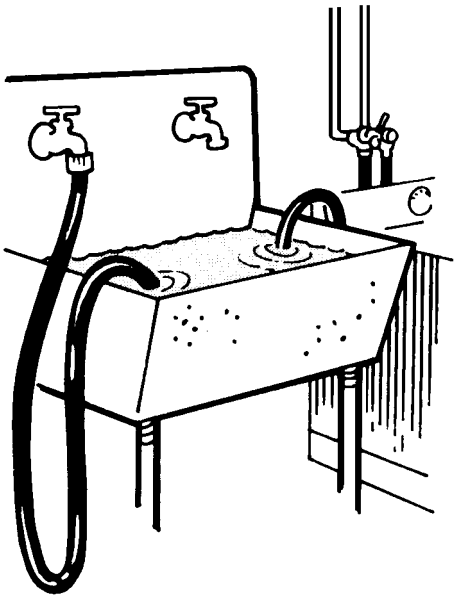


4 What factors can cause a backpressure-backflow condition?

Back pressure-backflow is created whenever the downstream pressure exceeds the supply pressure which is possible in installations such as heating systems, elevated tanks, and pressure-producing systems. An example would be a hot water space-heating boiler operating under 15-20 lbs. pressure coincidental with a reduction of the city water supply below such pressure (or higher in most commercial boilers). As water tends to flow in the direction of least resistance, a backpressure-backflow condition would be created and the contaminated boiler water would flow into the potable water supply.

5 What is a cross connection?

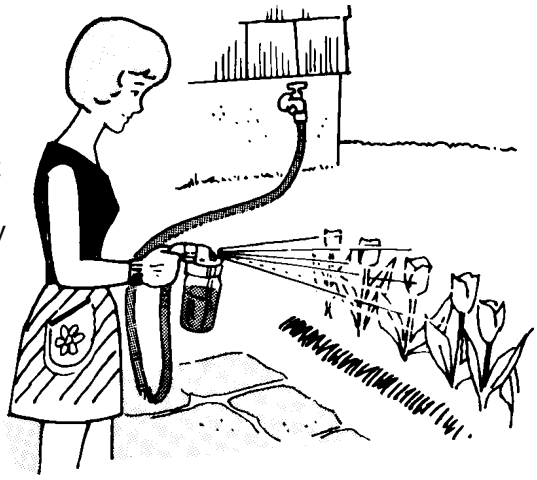
A cross connection is a direct arrangement of a piping line which allows the potable water supply to be connected to a line which contains a contaminant. An example is the common garden hose attached to a sill cock with the end of the hose lying in a cesspool. Other examples are a garden hose attached to a service sink with the end of the hose submerged in a tub full of detergent, supply lines connected to bottom-fed tanks, supply lines to boilers.



6 What is the most common form of a cross connection?

Ironically, the ordinary garden hose is the most common offender as it can be easily connected to the potable water supply and used for a variety of potentially dangerous applications.

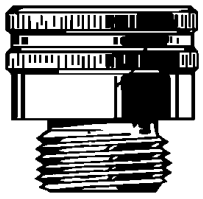
7 What is potentially dangerous about an unprotected sill cock?



The purpose of a sill cock is to permit easy attachment of a hose for outside watering purposes. However, a garden hose can be extremely hazardous because they are left submerged in swimming pools, lay in elevated locations (above the sill cock) watering shrubs, chemical sprayers are attached to hoses for weed-killing, etc.; and hoses are often left laying on the ground which may be contaminated with fertilizer, cesspools, and garden chemicals.

8 What protection is required for sill cocks?

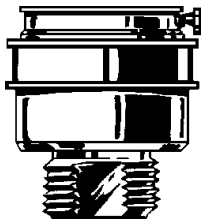
A hose bibb vacuum breaker should be installed on every sill cock to isolate garden hose applications thus protecting the potable water supply from contamination.



Hose Bibb Vacuum Breaker
Watts 8

9 Should a hose bibb vacuum breaker be used on frost-free hydrants?

Definitely, providing the device is equipped with means to permit the line to drain after the hydrant is shut-off. A “removable” type hose bibb vacuum breaker could allow the hydrant to be drained, but the possibility exists that users might fail to remove it for draining purposes, thus defeating the benefit of the frost-proof hydrant feature. If the device is of the “Non-Removable” type, be sure it is equipped with means to drain the line to prevent winter freezing.



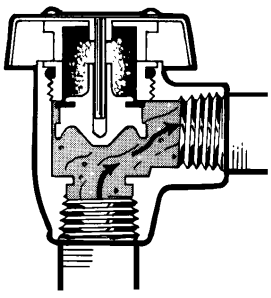
Hose Bibb Vacuum Breaker
for Frost-Proof Hydrants
Watts NF8

10 Can an atmospheric, anti-siphon vacuum breaker be installed on a hose bibb?

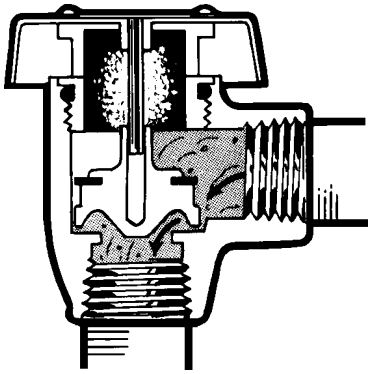
Theoretically yes, but practically no. An anti-siphon vacuum breaker must be elevated above the sill cock to operate properly. This would require elevated piping up to the vacuum breaker and down to the sill cock and is normally not a feasible installation. On the other hand, a hose bibb vacuum breaker can be attached directly to the sill cock, without plumbing changes and at minor cost.

11 What is an atmospheric vacuum breaker?

The most commonly used atmospheric anti-siphon vacuum breakers incorporate an atmospheric vent in combination with a check valve. Its operation depends on a supply of potable water to seal off the atmospheric vent, admitting the water to downstream equipment. If a negative pressure develops in the supply line, the loss of pressure permits the check valve to drop sealing the orifice while at the same time the vent opens admitting air to the system to break the vacuum.



Atmospheric Vacuum Breaker
Watts 288A

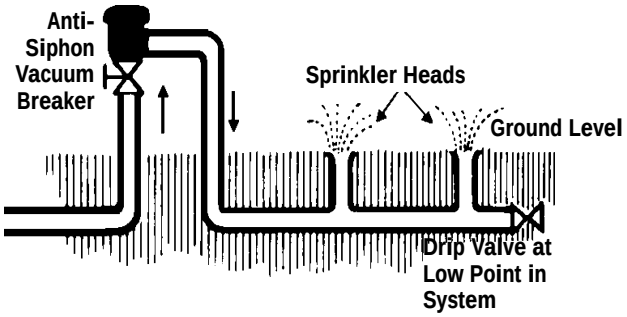


12 Will an anti-siphon vacuum breaker protect against a backpressure backflow condition?

Absolutely not! If there is an increase in the downstream pressure over that of the supply pressure, the check valve would tend to "modulate" thus permitting the backflow of contaminated water to pass through the orifice into the potable water supply line.

13 Can an atmospheric vacuum breaker be used on lawn sprinkler systems?

Yes, if these are properly installed, they will protect the potable water supply. The device shall be installed 6" above the highest sprinkler head and shall have no control valves located downstream from the device.



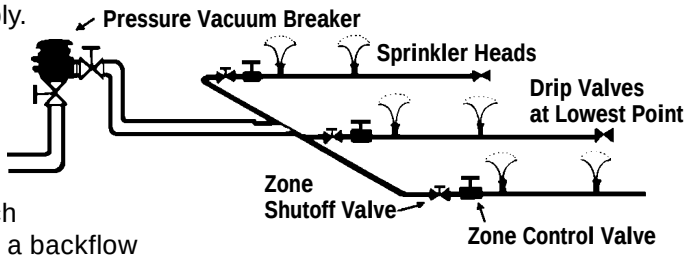
Single Zone System

14 Can an atmospheric vacuum breaker be used under continuous pressure?

No! codes do not permit this as the device could become "frozen", and not function under an emergency condition.

15 Can a pressure vacuum breaker be used on a multi-zone lawn sprinkler system?

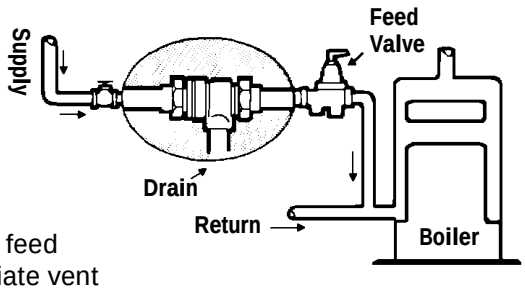
Yes. This type of vacuum breaker can be used under continuous pressure. Therefore, if properly installed, it will protect the potable water supply. The device shall be installed 12" above the highest sprinkler head.



Multi-Zone System

16 What is continuous pressure?

This is a term applied to an installation in which the pressure is being supplied continuously to a backflow preventer for periods of over 12 hours at a time. Laboratory faucet equipment, for example, is entirely suitable for a non-pressure, atmospheric anti-siphon vacuum breaker because the supply is periodically being turned on and shut off. A vacuum breaker should never be subjected to continuous pressure unless it is of the continuous pressure type and clearly identified for this service.

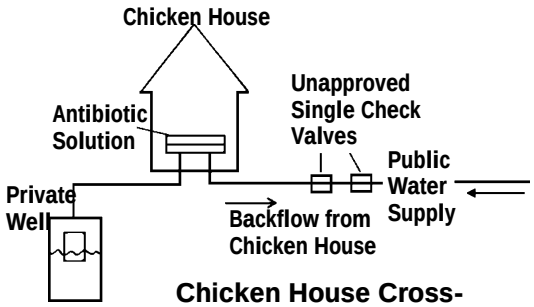


17 Are check valves approved for use on boiler feed lines?

Most jurisdictions require backflow protection on all boiler feed lines. Some will allow a backflow preventer with intermediate vent as minimum protection for residential boilers. A reduced pressure backflow preventer is generally required on commercial and compound boilers. However, low cost, continuous pressure backflow preventers are now available which will perform with maximum protection; thus check valves are not recommended.

18 What is the difference between pollution and contamination?

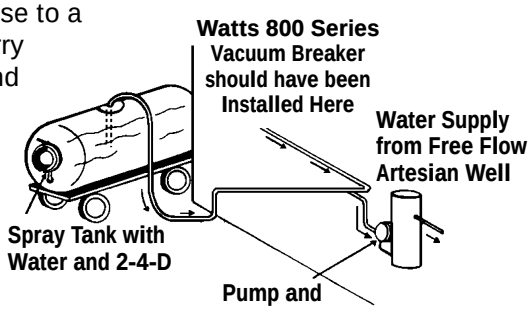
Pollution of the water supply does not constitute an actual health hazard, although the quality of the water is impaired with respect to taste, odor or utility. Contamination of the water supply, however, does constitute an actual health hazard; the consumer being subjected to potentially lethal water borne disease or illness.



Chicken House Cross-Connection, Spring 1991

19 What recent case would reflect users being exposed to contamination of the water supply?

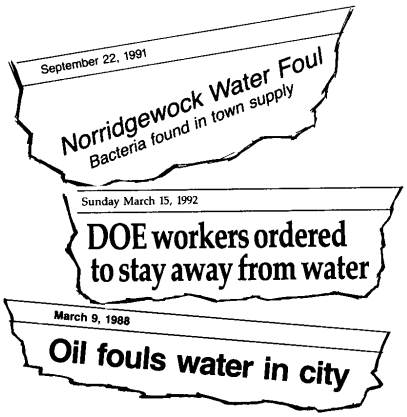
Chicken House Cross-Connection, Spring 1991. In response to a complaint from a customer on the Casa Water System (Perry County), a staff member of the Division of Engineering found that the water systems had been contaminated by backflow from chicken houses. The water system connected to the chicken houses included two single check valves in series for backflow prevention purposes. The water was being used to administer an antibiotic solution to the chickens.



2-4-D Backsiphonage Case

20 What other case reflects users being exposed to "contamination" of the water supply?

On or about the week of the 14th of May, 1991, a back-siphonage problem occurred. A local farmer reported the problem on his farm. He was filling a spray tank on his farm with water and 2-4-D. The wind kept blowing the fill hose away from the fill spout so he extended the hose down into the tank. As the tank filled, he went onto other duties. He went into the house for some reason and his wife told him that the water had become salty tasting. He immediately thought of the 2-4-D and went to the tank and it had began siphoning water from the tank. He told his wife not to use any more water. An artesian well, (free flow) was filling the tank. The artesian well also supplied water to the home through a storage tank and pump system. As the spray tank was filling, the pump in the house came on and created a pull on the well greater than the pressure at the well head. Consequently, as the pump was on, it was also pulling the 2-4-D and water from the spray tank.

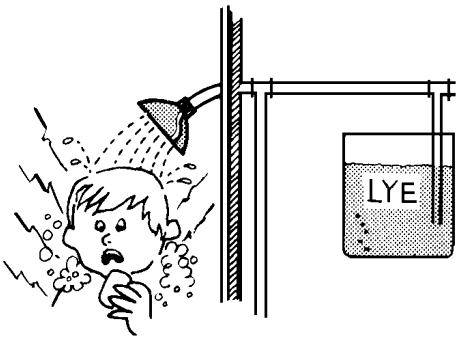


21 Are there any records of recent cases involving unprotected cross connections?

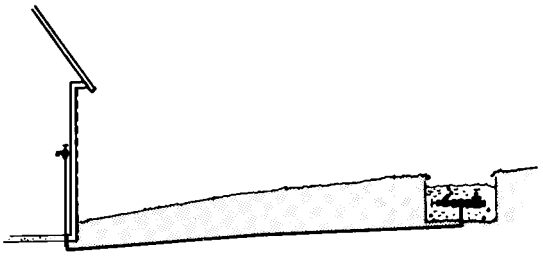
The startling fact is that cross connections continue to occur and there are documented cases involving reverse flow. For other cases, request folder F-SBN.

22 What recently reported cases occurred in a plant?

In addition to the case described in "No. 19", there are other reports but because of the possibility of litigation for pending cases, information can be difficult to obtain. However, in San Francisco, an industrial plant had a submerged water inlet supplying a lye vat. Immediately adjacent to this installation was the employee's shower room. Officials fortunately discovered the cross connection, but were alarmed that employees could potentially be bathing in water contaminated with lye from the vats.



23 What case was reported involving a school?



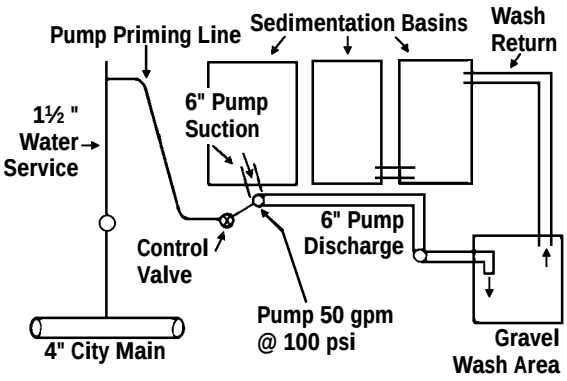
Most people are familiar with the details of the Holy Cross Football Teams' "hepatitis" incident, which was later determined to be caused by a backflow of contaminated water. It took close to nine months for officials to determine that a severe fire in nearby Worcester lowered the pressure in the football field area to the point where a back pressure backflow condition was created allowing contaminants from a sunken hose bibb pit to backflow into the field house drinking bubbler.

24 What case was reported involving a commercial building?

Much to the surprise of the customers of a bank in Atlanta, Georgia they saw yellow water flowing from drinking fountains and green ice rolling out of cafeteria dispensing machines.

It was later reported that a pump, used for the air conditioning system, burned out; and a maintenance man, unaware of the danger, connected the system to another pump used for potable water. The result caused large doses of bichromate of soda to be forced into the potable water supply, causing the dramatic appearance of yellow water and colored ice cubes.

25 Are there any cases involving outside processing activities?

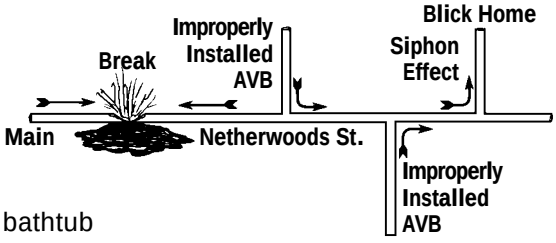


Yes, a case occurred in a gravel pit operation in Illinois. A pump was used in the processing operation supplying 100 lbs. pressure. Contaminated water was forced back through an unprotected "prime line" overcoming the city water pressure of 45 lbs. The contaminated water entered the city main and was channeled into a nearby bottling plant. This probably would have gone undetected except that personnel in the bottling plant noticed that the water was not only dirty but was warm. City officials were immediately called which led to the discovery of the reverse flow from the gravel pit operation.

26 What other typical cases have been reported?

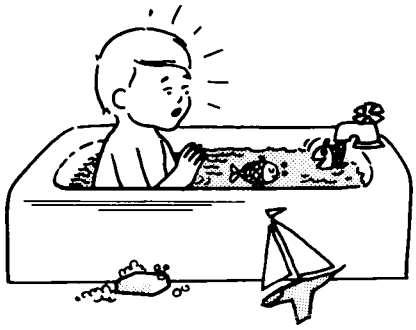
Unwanted Guests (Residents find parasites in tap water) Oct. 1991.

Parasitical worms were found in the water at two homes after a malfunctioning lawn sprinkler coupled with a water main break sucked the nematodes into the water system.



The nematodes first showed up in the evening of Oct. 1 after the backflow prevention system on the privately owned underground sprinkler malfunctioned. When the water pressure dropped, the vacuum in the system sucked some water from the sprinkler into the city water.

A homeower found the worms swimming around in his bathtub when he started filling the tub for his child. He said he was appalled to find the critters, as well as rust and other debris in his water. "The only reason I noticed it is because I have children and was giving my kid a bath. If you have a screen on your faucet or you were taking a shower, you wouldn't see it."



The contractor who installed the sprinkler system didn't pull a city permit and used a "cheap" atmospheric vacuum breaker. When it malfunctioned, which was at the time of the water main break, the nematodes were pulled right in.

In Utah, a doctor reported two gold fish flowing into his bath tub. Earlier in the day he had been filling his gold fish pool with a garden hose when a back-siphonage condition developed resulting in the late emergence of the gold fish into the bath tub.

What is significant, however, is the number of recent cases that are not reported. The number of unprotected cross connections in existence are potential disasters which can occur any time unless adequate protective devices are installed.

Health Hazard

Non-Health Hazard

27 What is meant by "Degree of Hazard"?

The degree of hazard is a commonly used phrase utilized in cross connection programs and is simply a determination on whether the substance in the non-potable system is toxic (health hazard) or non-toxic (non-health hazard).

28 What is the difference between a toxic and a non-toxic substance?

Toxic substance is any liquid, solid or gas, which when introduced into the water supply creates, or may create a danger to health and well-being of the consumer. An example is treated boiler water. A non-toxic substance is any substance that may create a non-health hazard, is a nuisance or is aesthetically objectionable. For example, food stuff, such as sugar, soda pop, etc. Therefore, you must select the proper device according to the type of connection and degree of hazard. There are five basic products that can be used to correct cross connection.

Watts 909AG

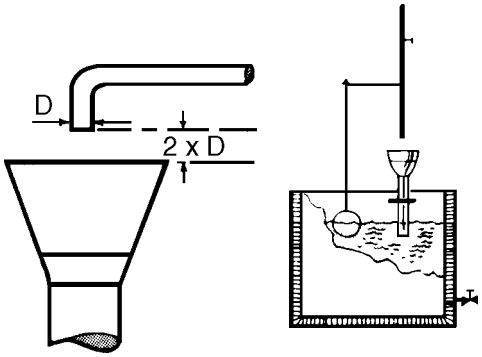
29 What are the five basic products used for protection of cross connections?

The five basic products are:

1. Air Gap
2. Atmospheric Vacuum Breakers -which also includes hose connection vacuum breakers
3. Pressure Vacuum Breakers - which also includes backflow preventer with intermediate atmospheric vent for ½" and ¾" lines
4. Double Check Valve Assembly
5. Reduced Pressure Zone Backflow Preventers

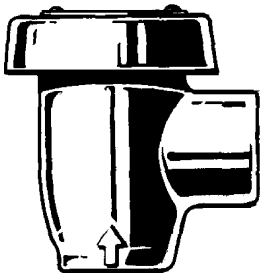
30 What is an Air Gap?

Air Gap is the physical separation of the potable and non-potable system by an air space. The vertical distance between the supply pipe and the flood level rim should be two times the diameter of the supply pipe, but never less than 1". The air gap can be used on a direct or inlet connection and for all toxic substances.



31 Where is an Atmospheric Vacuum Breaker used?

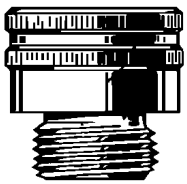
Atmospheric Vacuum Breakers may be used only on connections to a non-potable system where the vacuum breaker is never subjected to backpressure and is installed on the discharge side of the last control valve. It must be installed above the usage point. It cannot be used under continuous pressure. (Also see No. 11)



Watts 288A

32 Where is a Hose Bibb Vacuum Breaker used?

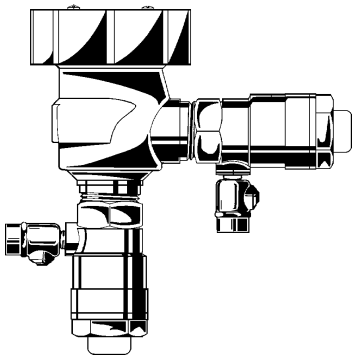
Hose Bibb Vacuum Breakers are small inexpensive devices with hose connections which are simply attached to sill cocks and threaded faucets or wherever there is a possibility of a hose being attached which could be introduced to a contaminant. However, like the Atmospheric Vacuum Breaker they should not be used under continuous pressure.



Watts 8

33 Where is a Pressure Vacuum Breaker used?

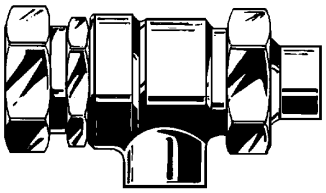
Pressure Vacuum Breakers may be used as protection for connections to all types of non-potable systems where the vacuum breakers are not subject to backpressure. These units may be used under continuous supply pressure. They must be installed above the usage point. (spill resistant models for indoor use are also available).



Watts 800M4QT

34 Where is a Backflow Preventer with Intermediate Atmospheric vent used?

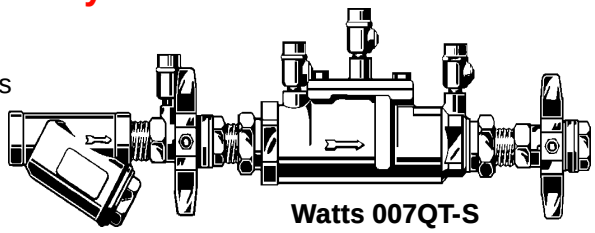
These devices are made for ½" and ¾" lines and may be used as an alternate equal for pressure vacuum breakers. In addition, however, they provide the added advantage of providing protection against backpressure.



Watts 9D

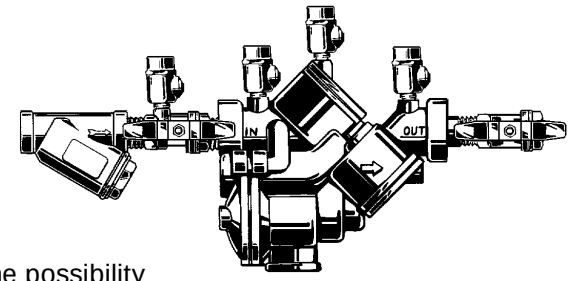
35 Where is a Double Check Valve Assembly used?

A double check valve assembly may be used as protection of all direct connections through which foreign material might enter the potable system in concentration which would constitute a nuisance or be aesthetically objectionable, such as air, steam, food, or other material which does not constitute a health hazard.



Watts 007QT-S

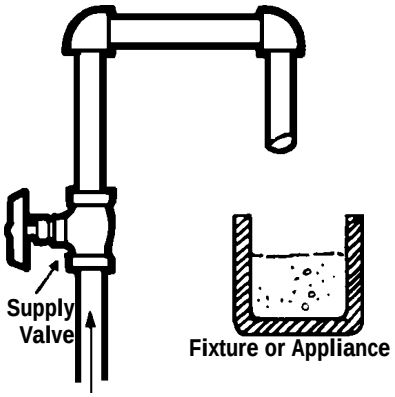
36 Where is a Reduced Pressure Zone Backflow Preventer used?



Watts 909QT-S

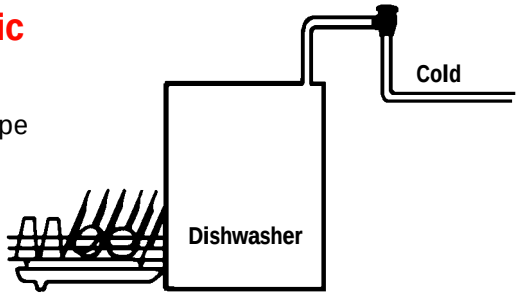
Reduced Pressure Zone Assemblies may be used on all direct connections which may be subject to backpressure or back-siphonage, and where there is the possibility of contamination by the material that does constitute a potential health hazard.

37 What are typical applications for an Air Gap?



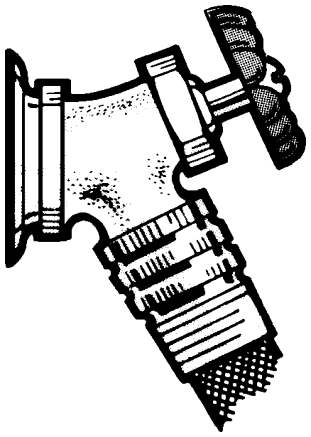
Because today's complex plumbing systems normally require continuous pressure, air gap applications are actually in the minority. It should be remembered, however, that whenever a piping terminates a suitable distance above a contaminant, this itself is actually an air gap. Air Gaps are frequently used on industrial processing applications, but care should be taken that subsequent alterations are not made to the piping which would result in a direct connection.

38 What are typical applications for Atmospheric Vacuum Breakers?



Atmospheric Vacuum Breakers can be used on most inlet type water connections which are not subject to backpressure such as low inlet feeds to receptacles containing toxic and non-toxic substances, valve outlet or fixture with hose attachments, lawn sprinkler systems and commercial dishwashers.

39 What are typical applications for Hose Bibb Vacuum Breakers?

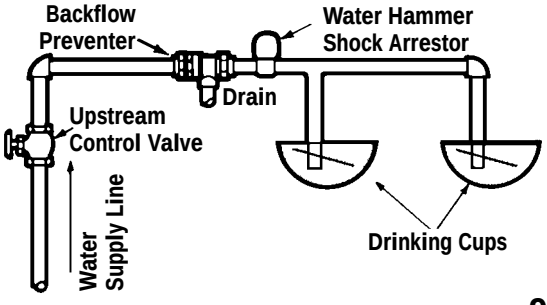


Hose Bibb Vacuum Breakers are popularly used on sill cocks, service sinks and any threaded pipe to which a hose may potentially be attached.

40 What are typical applications for Pressure Vacuum Breakers?

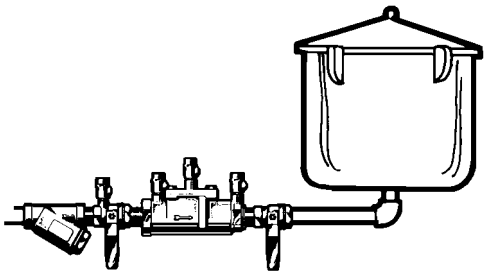
These applications should be similar to the Atmospheric Vacuum Breaker with the exception that these may be used under continuous pressure. However, they should not be subject to backpressure.

41 What are typical applications of Backflow Preventer with Intermediate Vent?



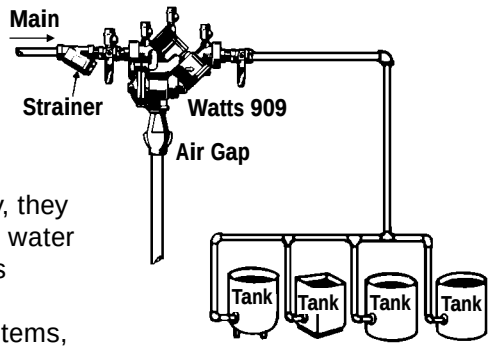
For ½" and ¾" lines these devices are popularly used on boiler feed water supply lines, cattle drinking fountains, trailer park water supply connections and other similar low-flow applications. They will protect against both back-siphonage and backpressure and can be used under continuous pressure.

42 What are typical applications for Double Check Valve Assemblies?



Briefly, Double Check Valve Assemblies may be used where the degree of hazard is low, meaning that the non-potable source is polluted rather than contaminated. The degree of hazard is oftentimes determined by local Inspection Departments and, therefore, such departments should be questioned in order to comply with local regulations.

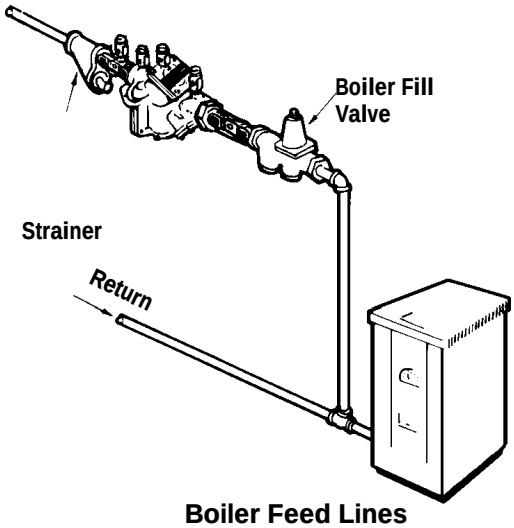
43 What are typical applications for Reduced Pressure Zone Backflow Preventers?



Branch Line Applications

This type should be used whenever the non-potable source is more of a contaminant than a pollutant. Basically, they are applied as main line protection to protect the municipal water supply, but should also be used on branch line applications where non-potable fluid would constitute a health hazard, such as boiler feed lines, commercial garbage disposal systems, industrial boilers, etc.

44 Are there any regulations in OSHA regarding cross connections?



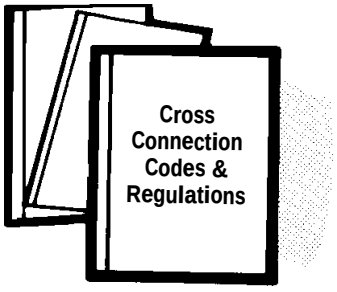
Boiler Feed Lines

Yes, OSHA requires that no cross connection be allowed in an installation unless it is properly protected with an approved backflow preventer. These requirements are also covered in B.O.C.A., Southern Std. Building Code, Uniform Plumbing Code and City, State and Federal Regulations.

45 What Standards are available governing the manufacture of backflow prevention devices?

Table on Page 12 provides a summary of the various standards available relating to specific types of backflow preventers.

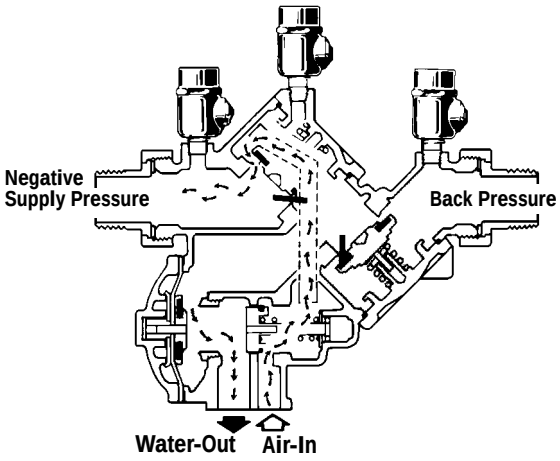
46 What is the benefit of a strainer preceding a backflow preventer?



A strainer will protect the check valves of a backflow preventer from fouling due to foreign matter and debris which may be flowing through the line. This not only protects the valve but eliminates nuisance fouling and subsequent maintenance and shutdown. The use of a strainer with a water pressure reducing valve has been an accepted practice for years. The amount of pressure drop attributed to the strainer is negligible and is far outweighed by the advantages provided by the strainer.

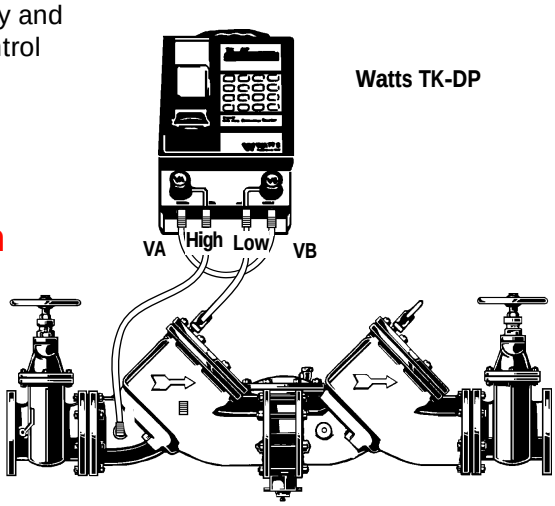
47 What would cause a reduced pressure zone backflow preventer to leak?

Leakage from a backflow preventer is normally attributed to foreign matter lodging on the seating area of either the first or second check valve. Most times this can be corrected by simply flushing the valve which will dislodge any loose particles. It is, therefore, most important on new installations that the piping be thoroughly flushed before installing the unit. It should be remembered, however, that spillage does provide a "warning signal" that the valve is in need of maintenance.



48 Is periodic testing required for reduced pressure zone backflow preventers?

Yes, and this is to ensure that the valve is working properly and is a requirement of many states and cross connection control programs. Test cocks are provided on the valve for this purpose and manufacturers are required to furnish field testing information.



49 Should a backflow preventer be installed in the water supply line to each residence?

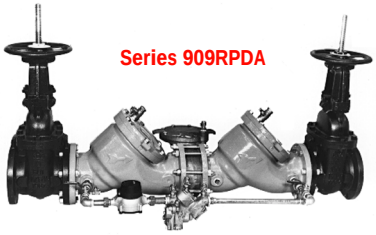
Because of the growing number of serious residential backflow cases, many water purveyors are now requiring the installation of approved dual check valve backflow preventers at residential water meters. They are also educating the public concerning cross connections and the danger of backflow into the local water supply. Since water purveyors cannot possibly be responsible for or monitor the use of water within a residence, the requirements for these cross connection control programs are increasing throughout the country.

50 What is a cross connection control program?

This is a combined cooperative effort between plumbing and health officials, waterworks companies, property owners and certified testers to establish and administer guidelines for controlling cross connections and implementing means to ensure their enforcement so that the public potable water supply will be protected both in the city main and within buildings. The elements of a program define the type of protection required and responsibility for the administration and enforcement. Other elements ensure continuing education programs.

APPLICABLE STANDARDS	SERIES	AVAILABLE PRODUCT SIZES (INCHES)
ASSE Std. 1013, AWWA C511-97, IAPMO PS31, CSA B64.4	**009**	¼ -3
ASSE Std. 1013, AWWA C511-97, CSA B64.4, IAPMO PS31	**909**	¾ - 10
ASSE Std. 1013, AWWA C511-97, IAPMO PS31	**995**	½ - 1
ASSE Std. 1047, CSA B64.4	**909RPDA**	2½ - 10
ASSE Std. 1015, AWWA C510-97, CSA B64.5, IAPMO PS31	**007**	½ - 3
ASSE Std. 1015, AWWA C510-97, CSA B64.5	**709**	2½ - 10
ASSE Std. 1015, AWWA C510-97	**774**	4 - 10
ASSE Std. 1015, AWWA C510-97	**774X**	6 - 8
ASSE Std. 1015, AWWA C510-97, IAPMO PS31	**775**	½ - 1
ASSE Std. 1015, AWWA C510-97	**775**	3 - 8
ASSE Std. 1015, AWWA C510-97	**N775**	3 - 8
ASSE Std. 1048, CSA B64.5	**007DCDA**	2 - 3
ASSE Std. 1048, CSA B64.5	**709DCDA**	3 - 10
ASSE Std. 1048	**774DCDA**	4 - 10
ASSE Std. 1048	**774XDCDA**	6 - 8
ASSE Std. 1048	**775DCDA**	3 - 8
ASSE Std. 1048	**N775DCDA**	3 - 8
ASSE Std. 1024, CSA B64.6	**7**	½ - 1¼
ASSE Std. 1024, CSA B64.6	**7B**	¾
ASSE Std. 1024	**L7**	¾, 1
ASSE Std. 1024, CSA B64.6	**07S**	1, 1¼
ASSE Std. 1024, CSA B64.6	**7C**	⅜
ASSE Std. 1032, NSF-18	**SD2**	¼, ⅜
ASSE Std. 1024	**CU7**	½ - 1
ASSE Std. 1012, CSA B64.8	**9DM3/M2**	½ - ¾
ASSE Std. 1052 (non-continuous pressure only)	**N9-CD**	¾
CSA B64.8	**N9**	¼ - ⅜
ASSE Std. 1022, NSF-18	**SD3**	¼ - ⅜
CSA Std. B64.8	**9BD**	⅜ FCT, ¼, ⅜ NPTM
ASSE Std. 1035, CSA B64.8	**NLF9**	⅜
ANSI/ASSE Std. 1001, CSA B64.1.1	**288A / 289**	¼ -3
ANSI/ASSE Std. 1001, CSA B64.1.1	**N388**	¼ - ⅜
ANSI/ASSE Std. 1001, CSA B64.1	**188A**	¾ -2
ANSI/ASSE 1020, CSA B64.1.2	**800MQT**	½, ¾
ANSI/ASSE 1020, CSA B64.1.2	**800M4QT, 800M4FR**	½ - 2
ASSE 1056, IAPMO Classified	**008QT**	⅜ - 1
ASSE Std. 1011	**S8C, 8, NF8,HB-1**	⅜, ½, ¾ HT
ASSE 1060	**WB, WBT**	-

REDUCED PRESSURE DETECTOR ASSEMBLIES

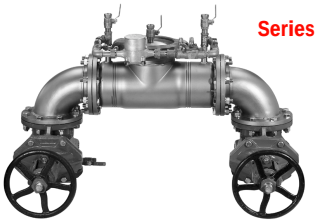


Series 909RPDA

DOUBLE CHECK VALVE ASSEMBLIES

Series 775

DOUBLE CHECK DETECTOR ASSEMBLIES



Series N775DCDA

DUAL CHECK VALVE BACKFLOW PREVENTERS

Series Cu7

Series 07S

SPECIALTY BACKFLOW PREVENTERS with INTERMEDIATE ATMOSPHERIC VENT

Series 9D

ATMOSPHERIC VACUUM BREAKERS

Series 289

Series 288A

PRESSURE VACUUM BREAKERS

Series 800M4QT

Series 008QT

HOSE CONNECTION VACUUM BREAKERS

Series 8

GWINNETT COUNTY
DEPARTMENT OF WATER RESOURCES
Backflow Prevention
Protecting Water Protecting People

QUESTIONS COMMONLY ASKED ABOUT BACKFLOW PREVENTION

Q: What is backflow-prevention?

A: *The prevention of reverse flow in a water system from the normal or intended direction.*

Q: What can cause something like this to happen?

A: *Backflow and/or backsiphonage can be created in a water system by a drop in supply pressure due to heavy demand or use such as fire fighting, repairs or breaks in the supply pipe, etc.*

Q: So, why is back-flow prevention important to me? What does this have to do with us? It's not our problem if you people can't design the system so we have enough pressure, without the pipes bursting all the time.

A: *If everyone would use the same amount of water all the time this could become more of a reality. However, we all know this is not likely to happen. So it becomes every consumer's responsibility to protect his own system as well as other users of the public water supply system against any potential contamination or pollution which my be generated on or from his premises, which could backflow or be backsiphoned into his and/or the main supply system.*

Q: Why am I responsible for backflow-prevention?

A: *The Federal Government passed the Safe Drinking Water Act in 1974, and Georgia adopted these federal standards the same year. In 1977, Georgia passed the Rules for Safe Drinking Water which states:*

"A supplier of water or any person having control of facilities which may cause the contamination of public water system has the responsibility to prevent water from unapproved sources or any contaminants from entering the public water system."

The Georgia Department of Natural Resources; Environmental Protection Division, in 1983 amended this rule and mandated that all public water systems develop Cross Connection Control and/or Backflow Prevention Programs.

Q: Is there a county ordinance that covers this?

A: *Yes, to augment and further reinforce the Georgia State/Gwinnett County Plumbing Code, the Gwinnett County Board of Commissioners in 1983 (the same year the state made these programs mandatory) passed Sec. 5-1012 of the Code of Ordinance, and in 1986 amended and renumbered it to SE. 5-1015, which reads in part as follows;*

"The county water system is further authorized to install or require to be installed suitable backflow-prevention devices at the customer's service-connections) or other areas as needed to prevent contamination or the risk thereof for the public water system."

Q: Is there not a Grandfather Clause in regard to the retrofit requirement?

A: *No, a contaminant and/or pollutant which might enter a system would be just as much a health hazard and create the same amount of damage regardless of the system's age. Older systems could in fact be a greater liability risk due to leakage, unauthorized changes, make-shift connections and etc.*

Q: Why was this not brought to our attention at the time we were constructing the facility or before final approvals were given, and C.O. issued?

A: *If a plan review meeting was held on the facility after 1983 there probably was a comment on the attachment sheet, that a backflow-prevention device would be required at the meter. However, in many incidences it was either omitted inadvertently, never placed on the bid drawings and/or just not installed by the contractor. Inspection of the device(s) prior to Final C.O. was not required in the past due to lack of available manpower and the time lag between setting the meter(s) and actual tie-in of the service to the facility.*

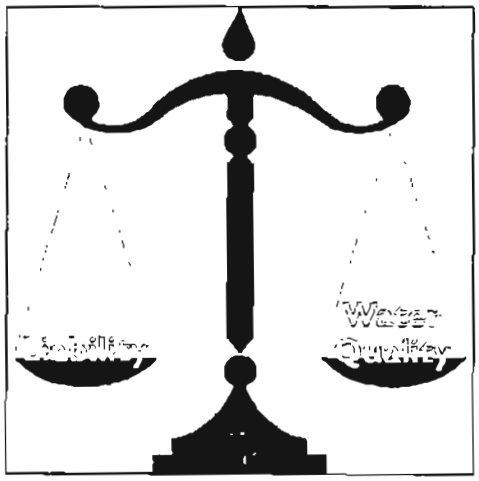
Q: Why has this facility been singled out?

A: *No facility has or is being singled out. This phase of the program requires that all existing service connections of 1-inch and larger be retrofit. Compliance letters are sent in order of evaluations that have been made based on; the type and amount of water use, the nature of material handled on the property, the number of individuals served, the degree of system complexity and/or potential for modification, the probability of existing cross-connections and the hazard involved should a backflow occur.*

APPENDIX D

History

RESPONSIBLITIES ASSIGNED



Who's Responsible for Cross-Connection Control?

Tom Jones,
Howard K. Bell Engineers,
Lexington, Ky.

State and local agencies, water purveyors and water customers are responsible for cross-connection control. That covers all of us one way or another. This article concerns the degree of resposibility of those mentioned above, as defined by federal regulations. It also looks at the relationship between the regulations and the people they affect.

Responsibilities of the States

Every state is responsible for enforcement of the federal standards for safe drinking water. The authority to create standards was established by the *Safe Drinking Water Act of 1974*, through the U.S. Environmental Protection Agency (EPA). Actual standards were published as the *Primary Drinking Water Regualtions*.

The agencies charged with enforcement responsibilities vary from state to state. The states usually discharge their responsibilities by developing regulations designed to ensure water purveyors comply with the water quality provisions of the *Safe Drinking Water Act*, the *Primary Drinking Water Regulations* and other EPA standards.

The fact that each state has enforcement responsibility relating to the *Safe Drinking Water Act* implies another responsibility. States must control cross connections since cross connections most definitely affect water quality.

Responsibilities of the Purveyors

The EPA's *Cross-Connection Control Manual* states that water purveyors must comply with the provisions of the *Safe Drinking Water Act*. Further, it states that purveyors are responsible for the quality of the water throughout their distributions systems.

The *Safe Drinking Water Act*, as revised in 1986, establishes each national interim or revised primary drinking water regulation as a national primary drinking water regulation. According to a publication issued by an association representing another public-safety industry, the *National Interim Primary Drinking Water Regulations* contained the following statement.

"All public water systems shall have a regular program, approved by the state within one year after the effective date of these regulations (June 1, 1977), for the detection and elimination of cross-connections and the prevention of backflow and/or backsiphonage."

That paragraph was not included in the *Code of Federal Regulations* however, and may not be enforcable as law.

These federal regulations do two things. They make the water purveyor responsible for water quality in the distribution system. And, they require a cross-connection control program approved by the state.

Provider/ User Relationships and Responsibilities

Another federal regulation to be considered is Volume 40, paragraph 141.2, Section (c) of the *Code of Federal Regulations*. That section reads as follows.

"Maximum contaminant level means the maximum permissible level of a contaminant in water which is delivered to the free-flowing outlet of the ultimate user of a public water system, except in the case of turbidity, where the maximum permissible level is measured at the point of entry into the distribution system. Contaminants added to the water under circumstances controlled by the user, except those resulting from corrosion of piping and plumbing caused by water quality, are excluded from this definition."

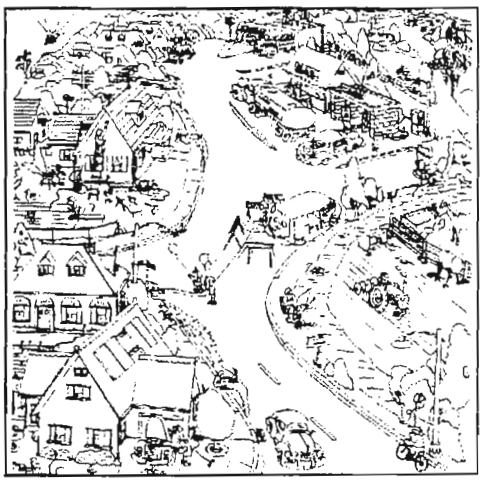
This regulation sets the boundary between the responsibility of the water purveyor and the water customer, as it relates to cross-connection control. Simply stated, water customers would be responsible for contamination of the water supply on their property if the source of the contamination is on their property. If contaminated water backflowed into the water purveyor's sytem and was delivered to other customers, the water purveyor would be held responsible. The purveyor would be responsible for the resulting damages or injuries on customers' property, except for the customer where the contamination originated.

What the Regulations Mean to Us

State and local agencies, water purveyors and all water customers have a responsibility for cross-connection control as defined by federal regulations.

Finally, we each have additional moral responsibilties. We have a responsibility to prevent the hazards to health and property that can result from unprotected cross connections. And, according to our individual expertise, we have the responsibility to educate the general public on the potential hazards of cross connections.

READERS RESPOND



A Hazard Identified

Dear Editor,

I would like to see an article on trap primer valves. The devices are installed to prevent sewer traps from drying out. To do this, most are physically connected to the sewer [and potable supply].

Minimum protection for a potable line from sewage is an RP device, with an air gap being the preferred method. Trap primer valves have neither air gaps nor RPs. The vacuum breaker ports do not equal two times the pipe diameter. And, they could become plugged with dirt, debris or dissolved minerals in the water.

The valves are not testable and are sometimes built into walls, making them inaccessible.

With all these faults, the valves are routinely installed in commercial buildings, including schools and hospitals. I could go on, but believe I have made my point. If you do not print an article on trap primer valves, I would appreciate some feedback of your opinion on the valves.

Sincerely, Stephen J. Brockway
Water Resource Specialist
Consumer Health Protection Services
State of Nevada

Editor's Note: Thanks for giving us an excuse to discuss the potential hazards of trap primer valves, Stephen. See page 22 of this issue of *DW&BP* for the article you requested, written by A.S.S.E. Executive Director Stuart Asay, P.E., Ph.D. Your concerns regarding installation of the device are well founded. We've heard of trap-primer valves buried in concrete!

We know too that the *Uniform Plumbing Code*, and others, allow the use of vacuum breakers on water closets, urinal flushometers and other fixtures connected to the sanitary drainage system. What do our readers think? Is this also a misapplication?

Help!

Dear Editor,

I am the supervisor responsible for the yearly testing, and repair, of about 500, 3- to 16-inch water meters that serve the cities of West Palm Beach, Palm Beach and South Palm Beach, Fla.

Recently, I was also given the duty of maintaining the records for about 5,000 backflow preventers in the same three cities. This includes inspection of new installations, annual testing, and retesting repaired backflow preventers.

My employment with the city will extend another 25 years. During that time, I understand the water meter inventory will increase to over 5,000, 3- to 16-inch water meters, and 500,000 backflow preventers!

I am asking *Drinking Water and Backflow Prevention* magazine and its readers to write to me, tell me what IBM computer "desk top" hardware combination they use. What would they recommend I purchase and use? What water-meter/backflow-preventer software program is best for me, to bring this big job I face down to size? I know I need the *RIGHT* computer and software. HELP!

Sincerely, David F. Dickeson
Utilities Mechanic Supervisor
West Palm Beach Utilities Department
P.O. Box 9303
Port St. Lucie, FL 34985-9303

NSPC Deficiency

Dear Editor,

In general, I was delighted to see the updating of the *National Standard Plumbing Code* in your Nov. '90 issue. One item of concern regarding devices for the protection of the potable water supply from sewage deserves some comment.

Section 10.53(F)3. Sewage, deals with no distinction between sewage and toxic substances. I feel there should be an important distinction between the two. Granted, both can cause illness and/or death. But, there is a difference when they backflow into the potable water.

Toxic substances become diluted when they enter a domestic water system, and therefore may become less of a danger. Sewage pathogens, in contrast, have the ability to multiply and become more concentrated and more of a hazard in the potable water.

I perceive that allowing a reduced-pressure principle assembly to protect against a connection to sewage is a misapplication.

Sam Johnson
Sr. Engineering Tech.-Backflow Control
City of Riverside, Calif.

Editor's Note: We appreciate your feedback on our presentation, Sam. The points you raise concerning dilution of toxins versus concentration of bacteria are valid. We should point out, however, that the NSPC allows the use of either an air gap or an RP. Is an air gap the alternative you have in mind?

Requesting Info.

Dear Editor,

I have a question concerning the vertical installation of reduced-pressure zone backflow preventers.

I realize the horizontal installation is the most ideal, but some manufacturers say their devices will function properly if installed vertically. The need for vertical installations has been noticed with increased frequency in this part of the country.

Is there any data or study results available which would shed light on this subject?

If so, please mail to:

Portland Water District
225 Douglass Street
Portland, ME 04104
Attn: *William Berry,*
Cross-Connection Supervisor

Editor's Note: Thanks for asking William. According to Dr. J.J. Lee, P.E.,

director of U.S.C.'s Foundation for Cross-Connection Control and Hydraulic Research, one assembly has received approval from U.S.C. for vertical installations. That assembly is the Cla-Val model RP-4V, 4-inch assembly, approved in mid-1990. It is approved for flow in the upward direction.

Cla-Val's Marketing Manager Vic Roberts said the company plans to release 6- and 8-inch versions of the same assembly. For additional information on the Cla-Val model RP-4V, contact Mr. Roberts or Mark Wendorf at (714) 548-2201.

According to Dr. Stuart Asay, executive director of the American Society of Sanitary Engineering, ASSE has granted its Seal to the Watts model 909 for vertical applications. That RP is available in 2.5- through 10-inch sizes, specifically for downward flows. Contact your Watts representative for additional information, or call the home office at (508) 688-1811.

As far as hard data or results of studies regarding the effectiveness of vertical flow RPs, we hope our readers can help you. We know of no such data.

Hospital Hazards Revisited

Dear Editor,

Your December 1990 issue again provided those of us working to eliminate cross connections and implement effective backflow prevention with valuable information unavailable from other sources.

Your article on "Backflow Prevention in the Hospital Setting" was of particular interest and importance to those of us working in the field. My experiences in inspecting existing and newly constructed medical facilities has revealed apparent misinterpretations of parts of the BOCA, NPC and other codes, as applied to equipment found in hospitals and clinics.

Specifically, the minimum requirement for pressure sterilizers is an atmospheric vacuum breaker and a single check valve, after the last control valve. Unfortunarely, when looking closely at existing and new sterilizers, I've found units with manual and solenoid control valves downstream of the AVBs installed.

In other instances, the manufacturer designed the system with unprotected branches taken off before vacuum breakers. In discussing the design of the water supply lines with one manufacturer's representative, he stated that the single check valve on the waterline was adequate to "prevent steam from blowing back into the waterlines!"

Obviously, if the check valve requirement has been incorporated into many codes in the past to deal with this potential backpressure backflow, isn't it time we all looked closer and required full, reduced-pressure zone type backflow protection on these systems?

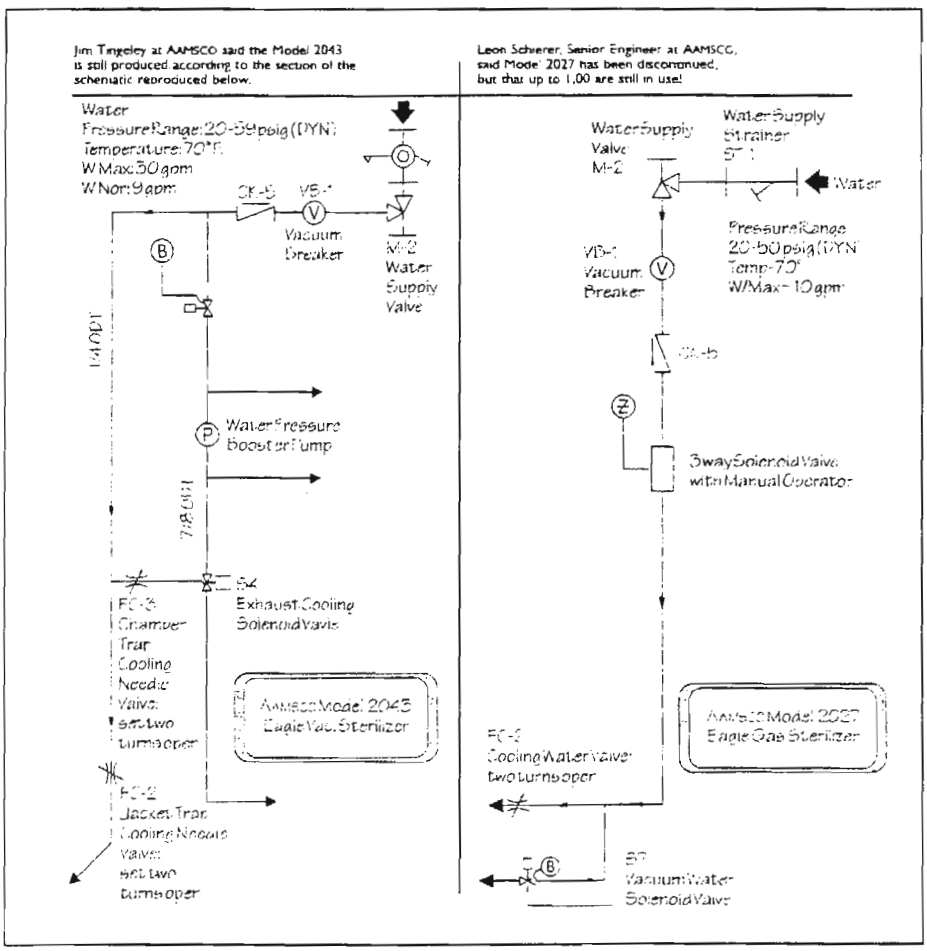
The manufacturer's representative went on to state that the steam potentially blowing back would be "sterile." Well, what if the backflow of steam into the waterline occurred early in the sterilization cycle, before heat-resistant spores and viruses are destroyed? What if it's one of the new ETO (Ethylene Oxide) gas sterilizers using high pressure, toxic gas? What if it's a washer-sterilizer employing a water pressure booster pump, and a detergent or other chemical agents?

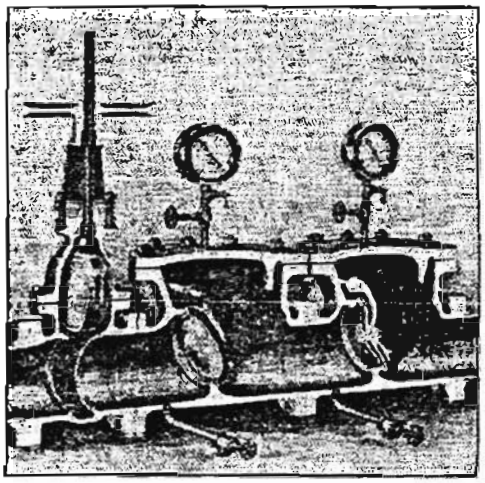
If you examine the examples of schematics I've enclosed, you'll see that inspectors who blindly allow an AVB and check valve to be the only backflow protection on equipment such as this may be underestimating the dangerous backflow that could occur.

Misapplication of atmospheric vacuum breakers and "check valves," as the only backflow protection on water-using equipment and systems, continues to be perhaps the most common violation/hazard found by the Wayne County Cross-Connection Control Program.

Sincerely, Gerald Flis
Cross-Connection Control Program,
Wayne County Environmental Health
Wayne, Michigan

Editor's Note: Below are two of the schematics for a sterilizer sent by Gerald. Note the specified location of each AVB.





Historical Overview of Backflow Protection

Fire Sprinklers Gave Rise to Cross-Connection Control

By Jim Hassig

Doubled over, squirming, twisting, crying out in pain, workers in the late 1800s couldn't call in sick. A lack of phone service didn't keep them from staying home however, suffering tormenting stomach cramps. If they were lucky, the throes of agony passed and typhoid fever struck some other home.

The idea of backflow prevention developed in the late 1800s when large employers discovered that contaminated water caused employee absenteeism.

The need for devices designed to provide a positive barrier against backflow was created by fire-sprinkler systems and the inadequacy of single-check valves. Check valves, like the one pictured on the cover, were originally cast in iron and used metal-to-metal seating.

New England's "barons of industry" enjoyed locating their textile mills on river banks. Raw materials and finished products were economically transported by boat. And, a large, dependable — though usually infested with disease — water supply for both industrial and fire-fighting use was a valuable asset.

With the advent of fire-sprinkler systems drawing river water came increased incidence of typhoid fever. Recognition of the dangers of cross connections soon followed. In 1910, William F. Sullivan, superintendent, Pennichuck Water Works, Nashua, N.H., reported to members of the New England Water Works Association the results of a major fire in Lowell, Mass.

"It happened on a Saturday night in the summer time, when many of the mill officials, familiar with details, were on vacation. Things got a little bit confused. The yard hydrant service and sprinklers drew upon the corporation supply so much that their pressure dropped below the city pressure, thus letting in the city supply in large quantities through these different checks."

"The fire was extinguished, and an engineer in one of the mills started up a fire pump. The canals were drawn off, and it is said that the suction for this fire pump was in a small basin under one of the mills and within a few hundred feet of a sewer outlet. Again it was contended that after the fire was out, the fire pumps could neither replenish the water in the corporation reservoir nor increase the pressure on the corporation lines."

"... that check valves were the invention of the devil!"

"Investigation showed that one of the 12-inch checks failed to work properly, and that the pumpage had been going back through the check valve for an uncertain period of time. I believe nobody dared to say, or wanted to say, how much water passed backwards through the faulty check. Of course, just as soon as it was found out that the check did not operate properly, the gate was closed."

"Whether from the result of that mishap or some other cause, the typhoid fever cases jumped from an average of less than two per week to 75 the third week after."

"... The insurance folks, the corporation, and ourselves were content with the old adage, 'Least said, soonest mended.' We cannot, nevertheless, shut our eyes to the fact that such occurrences are a menace to city and town supplies. Inspection of this check-valve when the cover was taken off, showed that the flapper was locked up, being wedged with tubercles. This check had been in for over 20 years and had never been examined."

"... On the smaller connections to buildings, factories and mills supplying water direct to boilers, what superintendent of water works has not found that check valves do not hold? Generally the result is loss of water in the boilers, twisted and distorted disks and pistons on the meters."

"In Nashua we are trying to divorce primary and secondary [fire-line] supplies absolutely. We believe it to be an unholy alliance."

"... As I have said, we have compromised and put in the double check system... Back of that, toward the inlet, we put on a Hersey detector meter. On the side and around the checks we have a testing apparatus so arranged that we can increase the pressure on either check and tell from the gauges if any water is going back... There is also an electrical connection to a bell which will ring in case of the failure of a check-valve."

"... You probably heard Mr. Coggeshall, of New Bedford, tell about the salt water being pumped into his mains, causing the water in the fire engines' boilers to foam. I am half inclined to believe, as Mr. Brooks once remarked, that check valves were the invention of the devil!"

Devil's Invention Evolves into Double-Check

Efforts to increase the effectiveness of iron, metal-to-metal check valves included stiffening their spring ten-

sions and adding weights to the clappers.

At the same NEWWA meeting, Robert Shirley, works manager, Chapman Valve Manufacturing Co., Indian Orchard, Mass., described a new, double-check valve previously supplied to Hartford, Conn., Water Works and approved by fire insurers.

"As you all know, it is the pressure against the disk which holds the disk to the seat; consequently, if you get a scratch on the brass face of your disk, your check is no longer tight. . . We then went to work and rounded the face of the brass seat of the check, and that allowed it to crowd into the rubber more, giving a perfect seat, so that at pressures under 10 (ten) pounds the check was tight."

"[Each] check was made with a large clearance around the disk, and the side plugs which support the arm or hinge, as some manufacturers call it, was made to project into the check at least 0.25 inch beyond the iron, so that there was no chance for tubercles to form, or for corrosion to effect the working of the disk."

"The disk itself was made of solid bronze instead of the malleable iron or steel arm in general use in standard commercial checks. The disk itself was made of iron, with a cast-iron plate holding the rubber disk in place. The disk is now made of solid bronze, and the holding plate is also bronze, and the danger from corrosion is eliminated."

Edward V. French, vice-president and engineer, Arkwright Mutual Fire Insurance Company, then addressed the meeting with a self-described "opposing viewpoint."

". . . Now, as to what the dangers of [cross connections] are in these cases. In the first place, in the well-arranged private system, the water would enter the yard through one or two connections, seldom more. Those connections can be provided, as has been suggested to-day, with double check valves. Such check valves are put in well, and the plan is to have them frequently and carefully inspected. . . They are placed 18 inches apart on centers and are located in a pit. The necessary drips and gages are provided to permit testing each valve separately for tightness. Several manufacturers are prepared to supply the special check valves for use with this arrangement."

". . . Now we have on the one hand the practical question of fire protection engineering; we have on the other hand the health question; the two need not conflict. Isn't it possible that the very largest use of our public water systems, and the greatest benefit from them, can be secured by putting our energies into the perfecting of the double-check method as it stands, or of developing even better apparatus?"

Clearly, in 1910, fire-sprinkler supporters were arguing for the simple privilege of connecting their systems to the public supply. Some purveyors, wrestling with their responsibilities and the severity of typhoid fever, had forced complete separation of potable water and fire systems.

Prof. Edward W. Bemis, deputy water commissioner, Water Supply, Gas, and Electricity, New York City, described such arrangements to the 1910, NEWWA meeting.

"In Cleveland last year I began to take up this subject. . . Finally an arrangement was entered into, and the Board of Public Services approved of it, for the absolute separation of the supplies, so that the pipes carrying our water would not carry any polluted water."

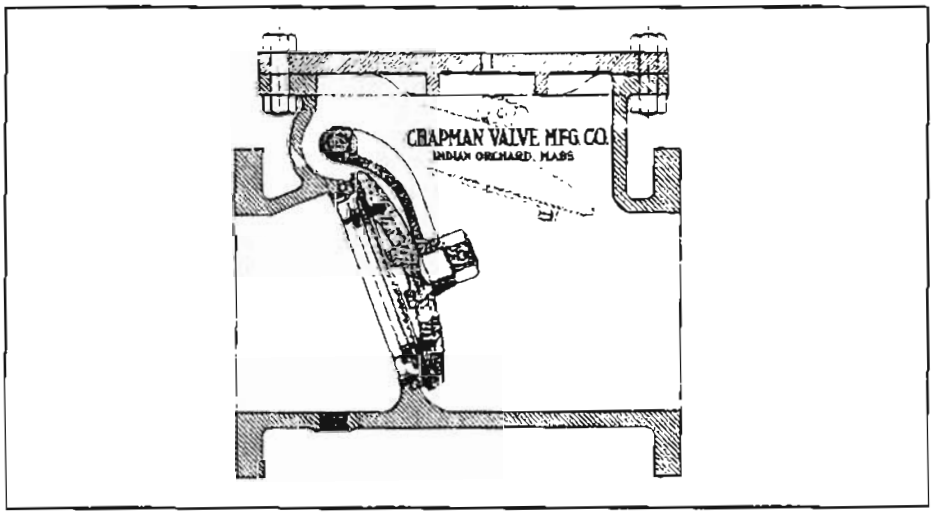
"They can have as many supplies in a factory as they wish, but there must be no connection between the two piping systems. . . . Unless there can be a more efficient invention for a check-valve than seems to be yet before us, I believe the time is coming when that requirement will be the universal practice."

". . . I believe the time is coming when that requirement will be the universal practice."

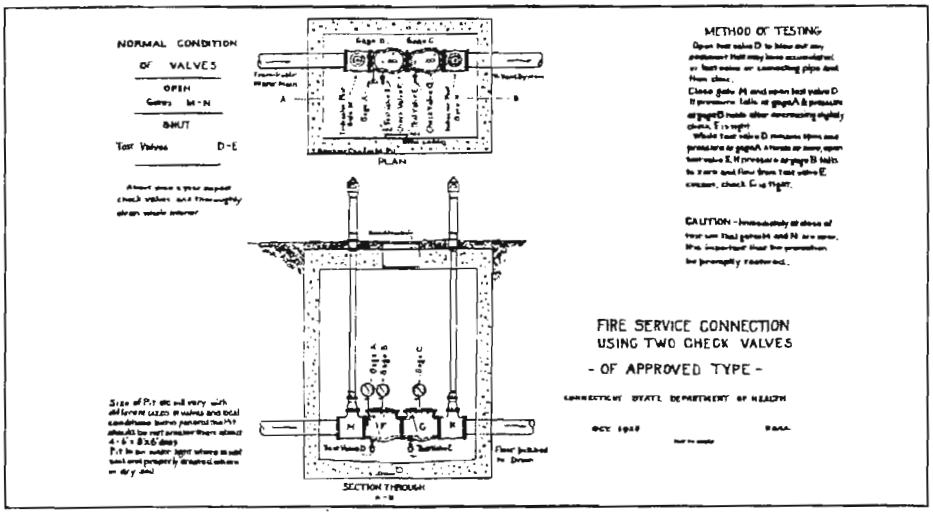
Double Checks Found Failing

Twelve years later, in 1922, Caleb M. Saville, manager, Board of Water Commissioners, Hartford, Conn., presented a paper to another meeting of the NEWWA. Excerpts follow. .

"Historically and briefly stated, the fact that there were a number of emergency connections between the Park River and the City water mains only more or less controlled by check valves of the ordinary type, buried in the ground, was brought to the attention of the Water Board of the City of Hartford in August, 1907, by Mr. E.M. Peck,



"Recent Design for a Check Valve, Approved by the Fire Underwriters."
from, September, 1910 — *Journal of the New England Water Works Association*, page 389



Tester Tip — from, June, 1928 —
Journal of the New England Water Works Association.
page 192

a member of this association and Engineer of the Board at that time."

"An order was issued by the Board soon after, directing discontinuance of the connections; but, after several conferences with the manufacturing interests affected, it was agreed to stay the execution of the order until a trial could be made of a double-check valve combination, which had been designed by the engineers of the Associated Factories Mutual Fire Insurance Company."

"These installations were completed by February, 1909, and their operation was described on page 239, vol. 30, Journal NEWWA (1916)."

"The matter did not come up again until July 1915, when the writer of this paper reported to the Water Board that 'the valves very frequently are found not to close tightly, due to foreign matter being caught on the seat under the clapper.' Owing to the very nature of the service a valve left absolutely tight by the inspector may be found leaking again soon after his visit. . ."

"That there is a real danger in [cross] connections is evidenced by the epidemics of typhoid fever traced to connections between the public water supply and polluted streams, as at Circleville, Ohio, February. 1914, Philadelphia, Pa., 1913, Springfield, Ohio, 1911, New Bedford, Mass., 1903, and others."

Saville went on to describe the fire sprinkler versus backflow prevention controversy that erupted in Hartford. He praised an all brass, double-check valve designed by C.D. Rice, manager of the Underwood Typewriter Plant, as the best mechanism of its kind. He told how Hartford officials voted to sever all cross connections and throw double checks into a scrap heap with other unreliable devices.

At the public hearing in Hartford, as described by Saville, "one of the best known sanitary experts of the country, . . . appeared for the manufacturers to testify as to the very remote chance of pollution and the relative danger of considerable loss by fire. . ."

". . . he believed that such connections could be made of little danger if controlled by a properly designed check valve system; that the present design was not satisfactory. . . He further suggested that 'these difficulties could be largely overcome with the construction of a bronze valve differing somewhat from those at present in use."

"After this hearing the matter was finally closed by reaffirmation of the order to disconnect. . . "

Saville defended the Hartford decision at great length. One aspect of his defense bears repeating.

"The financial loss to the community in case of epidemic is fully as much as, if not greater than that in an exceptional fire. Johnson states that the failure of a double-check valve to act properly at the right time is a greater menace to health than fire, and incidentally he adds that in the United States in the past 30 years [1892-1922] the vital capital dissipated by typhoid fever was over three times the net property loss from fire. So in questions like this, offering a choice between the loss of life and the loss of property, there should be no hesitation in lining up on the side of health."

During discussion following Saville's presentation, it was revealed that several companies made "improved double-check valves." Some of those mentioned: Chapman Valve Co., Indian Orchard, Mass.; Fairbanks Co., Binghamton, N.Y.; Ludlow Valve Mfg. Co., Troy, N.Y.; Pratt & Cady, Hartford, Conn.; Grinnell Co., Providence, R.I.; and Jenkins Brothers, Montreal.

The "sanitary expert's" prediction of a 'bronze valve differing somewhat from those at present in use' was not realized for almost 20 years. Efforts were directed instead toward perfecting and multiplying the theory behind the double check assembly. Single-check valves were sometimes added to supply lines until a series of eight to 10 units were in place.

Despite those efforts, according to a report in the *Journal of the American Water Works Association*, from 1920-1936, backflow into distribution systems was blamed for 2,100 cases of typhoid fever and 8,500 cases of dysentery in the U.S.

The Next Step

American ingenuity soon devised a method for getting around the pressure loss associated with multiple check valves. According to the National Association of Plumbing, Heating and Cooling Contractors Education Foundation's *Manual of Cross-Connection Control* a new assembly design was introduced.

Called a "superior pressure principle backflow preventer," the product used a pressure relief valve sandwiched between two check valves. The relief valve discharged to atmosphere when backpressure grew superior to line pressure.

Unfortunately, when both check valves were fouled it became impossible to develop enough backpressure to activate the relief valve. Still, the idea of an intermediate vent to atmosphere was pursued.

In 1941, probably in California, the prototype for a reduced-pressure principle backflow preventer was developed. The need to provide positive protection against cross connections between ships at dock and potable supplies inspired the design.

It featured two check valves with rubber seats on either side of a relief valve. If either check valve failed, the relief valve discharged to atmosphere before backpressure could match line pressure. Further modifications to the arrangement of its components soon made the RP assembly the most reliable backflow preventer ever devised, a position it occupies today.

Not only does an RP alert those responsible when a check valve fails (by dumping through the relief valve), but it is designed to direct backflow contaminants away from the distribution system.

Another version of RP development is presented by the International Association of Plumbing and Mechanical Officials. In the 1988 edition of its *Uniform Plumbing Code Illustrated Training Manual*, IAPMO gives readers the following insight.

"In the late 1920s it became apparent that something more than two check valves was necessary. The first device was developed in Danville, Ill., where it was successfully tested in 1929. The valve consisted of two check valves with a relief valve located between them, effectively draining the area between the two check valves when a backflow condition occured. This valve was not produced commercially and it was not until the late '30s that the real development of effective vacuum breakers and backflow preventers took place."

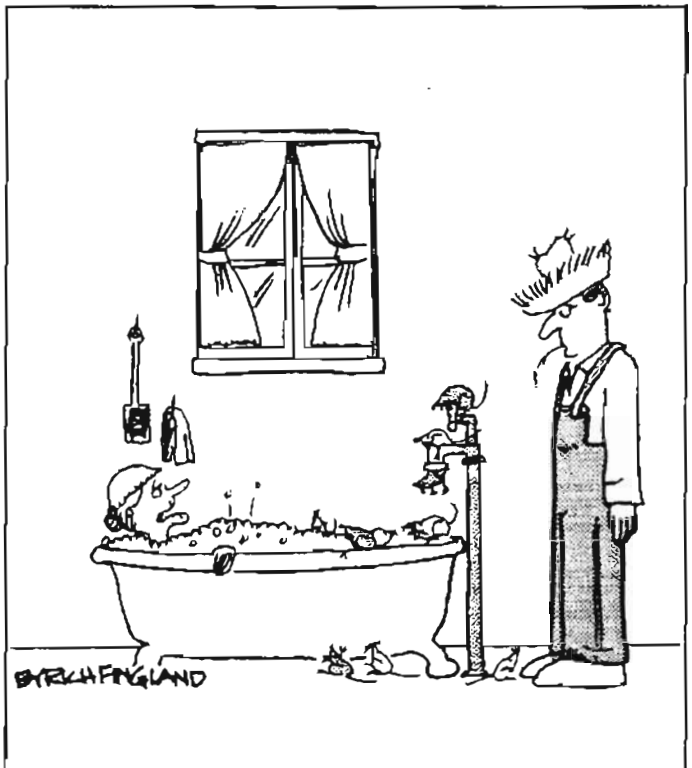
What the Future Holds

From simple air gaps, to single-check valves, to double-check valves, to multiple-check valves to RPs, cross-connection control devices continue to evolve. Barometric loops gave way to atmospheric vacuum breakers as a preventatives of backsiphonage. Venturi-type vacuum breakers were pushed aside. More reliable pressure vacuum breakers were developed to overcome the shortcomings of atmoshperic vacuum breakers.

Better, more convenient designs for dual-check valves are now finding applications in residential meter settings. One manufacturer promises to soon unveil a fire-line valve using the RP principle with only a single check. An Australian agency has designed a new type of RP capable of protecting against simultaneous backpressure and backsiphonage. A French maker enjoys apparent success marketing assemblies with non-tradition configurations.

The evolutionary process continues. Products adapt to changing needs and levels of understanding. Designs for ultimate backflow preventers test the skills of engineers in dozens of firms.

Adaptation remains the key. Water shortages and heightened environmental awareness among the public make completely protected potable supplies more valuable today than anytime in the past.



"This new fangled indoor plumging is just dandy Paw, But I wasn't expecting, hot and cold running critters."

CROSS CONNECTION CASE HISTORY

DATE : January 29, 1981

TYPE: BACKPRESSURE

LOCATION: NORFOLK, VA
FAST FOOD RESTAURANT

CONTAMINATION: SEAWATER

EFFECTS: NO ILLNESS REPORTED

On Thursday morning, Jan. 29, 1981 a nationally renowned fast food restaurant located in Norfolk, VA., complained to the water department that all their drinks were being rejected by customers as tasting "salty". This included soda fountain drinks, coffee, orange juice, etc.

The senior water quality specialist arrived at the restaurant to investigate the complaint. He found that the cold water used in making the drinks was chilled by passing through refrigeration coils and was then automatically blended with other ingredients to make the drinks. The chilled water system as well as all potable water supply lines on the premises was inspected for cross connections; however none were found.

A check was made of the adjacent water customers that revealed an additional salty water complaint had occurred simultaneously at a waterfront ship repair facility. Both the restaurant and the shipyard were being serviced from the same water main lateral that, in turn, came off the main distribution repair facility was promptly conducted and revealed the following:

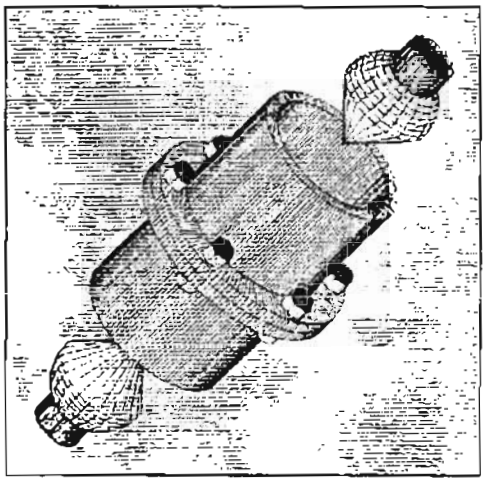
1. The backflow preventer that had been installed on the service line to the shipyard had frozen and burst earlier in the winter. It had been removed and replaced by a sleeve in order to maintain the water supply to the shipyard. All protection against backflow was thereby eliminated.

2. The shipyard fire protection system consisted of high pressure sea water maintained by both electric and diesel driven pumps.

3. The pumps were primed through the use of a city water line that was directly connected to the high-pressure fire system.

With the priming line left open the fire service pumps maintaining high pressure in the fire service lines, raw salt water was being pumped under positive pressure through the sleeve into the public water distribution system.

To correct the problem the city water prime line to the pumps was removed and a new backflow preventer promptly installed on the service line in place of the sleeve. Heat tape was wrapped around the backflow preventer to prevent future freeze-ups. No illnesses were reported.



Assemblies and Installations Defined

Determining Proper Procedures

by Ray Pettie

There are a number of approved assemblies which may be used for backflow protection. They include the reduced-pressure backflow assembly (RPBA), reduced-pressure detector assembly (RPDA), double check-valve assembly (DCVA), double check detector assembly (DCDA), pressure vacuum breaker assembly (PVBA) and atmospheric vacuum breaker (AVB). In addition, some purveyors may allow the use of special application devices such as the dual check or dual check with atmospheric vent. The type of backflow preventer used will depend upon the degree of hazard present.

Air Gap

The best means of protecting against backflow is the air gap. An approved air gap is a physical separation between the free-flowing discharge end of a potable water supply pipeline and the overflow rim of an open or non-pressure receiving vessel.

This separation must be vertically oriented a distance of at least twice the diameter of the effective opening of the inlet pipe, but never less than one inch. When located near walls, the air gap must be increased. It is used to protect against substances that create a high hazard to the water system.

In extreme high-hazard areas such as sewage treatment plants or nuclear reactors, it is mandatory to have an approved air gap on any water lines that may come in contact with contaminating substances such as raw sewage.

An air gap however, is not always practical and is vulnerable to bypass arrangements that nullify its effectiveness. Those arrangements include pipe extensions and hoses. Because of the ease of extending pipes and attaching hoses, all air gaps used instead of an approved backflow prevention assembly must be included in the yearly inspection program for backflow prevention assemblies.

RPBA

The reduced-pressure backflow assembly consists of two, independently-acting, internally-loaded check valves separated by a spring-loaded differential-pressure relief valve. It also includes two resilient-seated shutoff valves and four properly located, resilient-seated test cocks. It must be furnished as a complete unit by the manufacturer.

During normal operation, the pressure in the area between the two check valves, the zone of reduced pressure, is maintained at a lower pressure than the supply pressure. If either check valve leaks, the relief valve maintains a differential pressure of at least 2 psi between the supply pressure and the zone between the two check valves. The relief valve accomplishes this essential task by discharging water to atmosphere.

The reduced-pressure backflow assembly is effective against both backpressure and backsiphonage. It is used to protect the water system against substances that constitute a high hazard, in places where an air gap is impractical.

RPBAs must not be installed in a pit or trench below ground-level, or any area subject to flooding. Flooding of the pit or area could result in a direct cross connection through the relief valve opening. Semi-buried pits may be allowed, upon approval by the local purveyor. Such approval requires the assembly to be installed above the flood level with an approved air gap between the relief valve and the daylight drain.

The daylight drain must be able to be bore sighted. The installer must be able to see daylight through the drain. The daylight drain must be above the ground or flood level (whichever is higher), and be able to handle the volume of water discharged from the relief-valve port.

Generally, an RPBA should not be installed more than five feet above floor level. The 5-foot rule applies unless there is an approved platform for the tester or maintenance person to stand on while servicing the assembly. RPBAs must be installed with the water flowing horizontally only. Any other orientation may deter the assembly from preventing backflow.

When installed inside a building, the assembly must be placed where occasional spitting or constant discharge from the relief valve will not cause water damage to other equipment or

---

Editor's Note: Mr. Ray Pettie is a past-chairman of the Pacific Northwest Section of the American Water Works Association and has served on that section's Cross-Connection Control committee since 1983. A member of the American Backflow Prevention Association, he also serves on the national AWWA backflow prevention standards committee, which recently updated Manual *M14* and performance standards C510 and C511.

Mr. Pettie teaches tester certification and cross-connection control courses in the Tacoma, Wash., area.

Involved in the field of backflow prevention since 1971, he has headed the Tacoma Public Utilities department of cross-connection control for 10 years.

The above paper was reprinted from *Distribution System Symposium Proceedings*, by permission.

property. A properly sized floor drain must be installed to prevent flooding.

RPDA

The reduced-pressure detector assembly is the same as the reduced-pressure backflow assembly with the addition of a factory-installed bypass, usually sized at 3/4-inch. The bypass includes a meter and another RPBA. It is used to detect any unauthorized flows on high-hazard fire systems.

DCVA

The DCVA consists of two internally-loaded check valves, either spring loaded or weighted, two resilient-seated shutoff valves and four properly-located, resilient-seated test cocks. The DCVA must be furnished as a complete unit by the manufacturer.

The DCVA is effective against backpressure and backsiphonage, and is used to protect against objectionable substances constituting low hazards.

A DCVA may be installed in a below-ground vault or box. The local water purveyor should be consulted to determine its requirements.

Installing in Vaults

The vault for large assemblies must be large enough for workers to enter for testing or repairing the assembly. It must have adequate clearance around the assembly for maintenance. And, it must have either a large enough entry way to accommodate workers, or provisions for complete cover removal. Ladders must also be provided. Where check valves must be removed from the bottom, clearance must be allowed below the assembly, or the assembly may be installed with the check valves in a horizontal configuration.

Smaller-sized assemblies, generally 3/4-inch through 2-inch, that are installed in a below-ground box, must also have sufficient clearance around them for testing and maintenance.

Again, DCVAs should not be installed more than five feet above floor level unless they have an approved platform to support the tester or maintenance person. DCVAs must be installed only with water flowing in the horizontal configuration.

DCDA

The DCDA is the same as the double check valve assembly, with the addition of a factory installed bypass, normally sized 3/4-inch. This bypass includes a meter and another double check-valve assembly. It is used to detect any leaks or unauthorized flows on low-hazard fire systems.

Some manufacturers utilize a stronger spring in the number-1 or -2 check valve so low flows pass through the bypass line. When making repairs or replacing the spring, be sure to install the proper spring.

PVBA

Modern designs of the pressure vacuum breaker assembly consist of a single, spring-loaded check valve, an independently operating air inlet valve, two resilient-seated shutoff valves and two properly-located, resilient-seated test cocks. They must be furnished as a complete unit by the manufacturer.

The air inlet valve is spring loaded to the open position. Shutoff valves are allowed to be installed downstream of the assembly. The PVB is effective against backsiphonage only, and is used to protect the water system from substances that constitute a low hazard. Plumbing codes differ with regard to hazards applicable to PVBs.

PVBs "shall" be installed in a vertical configuration, a minimum of 12 inches above ground level or any downstream piping. They should not be installed higher than five feet above ground or floor level, unless an approved platform for the tester or maintenance person to stand on has also been installed. PVBs must not be installed in an enclosure or hooded area that contains toxic or corrosive fumes, in a pit below ground level or other area where they may become flooded.

AVB

The AVB consists of a float check and an air inlet port. It allows air to enter the water line when line pressure drops to zero. The air inlet port is not internally loaded, so the assembly must not be installed with valves downstream or where it will be under constant pressure for more than 12 hours in a 24 hour period. Atmospheric vacuum breakers are effective against backsiphonage only and are used to protect the water system from substances that constitute low hazards. Again, codes differ.

They must be installed in a vertical configuration, a minimum of six inches above the highest downstream piping or ground level. They must not be installed higher than five feet above ground or floor level. Likewise, they must not be installed in any enclosure or hooded area containing toxic or poisonous fumes, in a pit below ground level, or other area which may become flooded.

Installation Notes

All backflow preventers must be installed with adequate space for testing and maintenance. Allow room for removal of pins, check assemblies and/or relief valves. Assemblies shall not be installed in any enclosure containing toxic, poisonous or corrosive fumes.

Other Devices

There are some devices designed for specific applications that are available on the market today. These devices may be considered as a "second line of defense" but they should not be used in place of an approved, RPBA, DCVA or PVB. The local water purveyor and plumbing inspector should be consulted prior to installation.

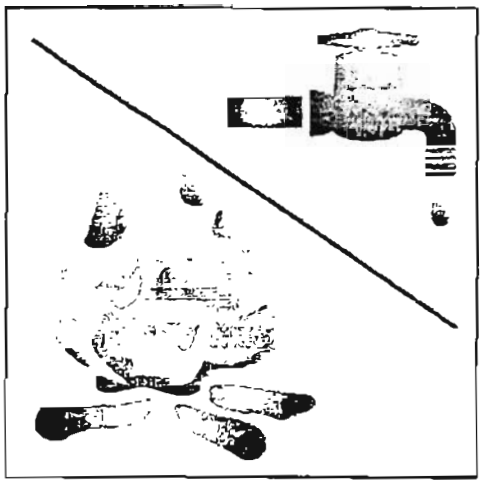
The dual-check valve assembly is designed for 3/4- and 1-inch, residential service lines. It consists of two, spring-loaded, soft-seated, check valves in a single body.

The dual check with atmospheric vent is similar to the dual check. But, it also has a vent opening to atmosphere, which allows air to enter the unit or leakage to be vented to atmosphere. It is also intended to vent low-pressure steam to atmosphere.

Finally, hose-bibb backflow preventers come in several configurations. One is the integral-type, which has a built-in vacuum breaker. Another is the screw-on or adapter-type, which can protect existing hose bibbs.

Conclusion

These installation guidelines are applicable to many areas of the country and specifically the Pacific northwest region. The fundamental workings of each assembly discussed is constant.



AWWA's *M14* Challenged

Major Changes Omitted from NFSA Video

By Jim Hossig, Editor

Don't get fooled!

Unchecked fires of animosity rage, separating two industries claiming dedication to public health and safety.

The National Fire Sprinkler Association's recent release of a video, *Backflow Protection for Fire Protection Systems*, stoked blistering flames of conflict and antagonism. Backflow protection professionals charge the NFSA with manipulating and misinterpreting the meaning of national backflow prevention standards.

Sporting a narrator named "Casey Jones," the video gives the impression that NFSA supports the precepts of backflow prevention as mandated by *M14*.

Manual M14, Recommended Practice for Backflow Prevention and Cross-Connection Control was recently updated and published by the American Water Works Association. It is one of the few nationally-recognized, consensus publications to provide a guide to appropriate applications of most types of backflow preventers. It contains an entire chapter dedicated to fire protection systems and their required backflow prevention assemblies.

The NFSA video and accompanying pamphlet — in a Chapter titled "Recommended Protection — AWWA *M14*," — states that class 1 and 2 sprinkler systems require no backflow preventers. Actually, *M14* lists five special conditions that create the need for protection on class-1 and -2 systems.

In addition to those five special conditions, Chapter 6, page 73 of *M14* includes the statement: ". . . it is recommended that the potable water supply be protected when serving fire [sprinkler] systems."

A statement on page 77 reads: "At any time where the fire sprinkler system piping is not an acceptable potable water system material [such as an estimated 90 percent of all wet-pipe systems using black iron], there **shall** be a backflow-prevention assembly isolating the fire-sprinkler system from the potable water system."

Additionally, a note in the middle of page 77 reads: "Where backflow protection is required on industrial/domestic service that is located on the same premises, backflow protection should be provided on the fire service connection."

Many leaders of the backflow industry were stunned by the NFSA video. One called it "a flagrant disregard for the facts, of which they were undoubtedly aware." Another said the video is "an obvious attempt to misinform the audience." A third thought it "smacked of unethical behavior." Yet another wondered if clever, subliminal messages were sent.

Why the Controversy?

Timing of the video's release and the NFSA personnel involved with the project gave rise to these and other pointed accusations.

To some, it appears NFSA rushed to release the video only weeks before the new *M14* came off the presses. That way, the precepts of a 24-year-old, 16-page manual could be used to play

Fire Systems Classified by *M14*

Class-1 systems incorporate direct connections from public water mains only. They have no connections to other sources of water, no reservoirs or pumps, and no antifreeze or other additives. The sprinkler drains discharge to dry wells, to atmosphere or to other safe outlets

Class-2 systems accommodate booster pumps at the service connection. Otherwise, they are like class-1 systems. *M14* reads: "It is necessary that pressure in the water main is reduced below 10 psi to avoid drawing too much water from the main.

Class-3 systems tie into the public water distribution system. They also access water from elevated storage tanks, pressure tanks and above-ground, covered reservoirs (via fire pumps). The water-storage facilities draw from public supplies and safeguard the water's potability.

Class-4 systems supplement public water supplies with and auxiliary supply located within 1,700 feet of a pumper connection. The auxiliary supply is reserved for fire department use.

Class-5 systems cross-connect potable water with unsanitary water supplies. Or, they use antifreeze or other additives. [Those other additives include chemicals like Aqueous Film-Forming Foaming Agents (AFFF® manufactured by 3M®), used to control fires. Some fire systems may not actually use and store additives, but may have them injected by fire departments to combat a blaze. For example, some rural fire departments use "Light" water. It keeps the same volume as water, but weighs less and helps fire trucks speed to fires without getting stuck or bogged down.]

Class-6 systems commingle potable water with water used for industrial purposes.

down the need for backflow preventers. The narrator, at one point in the video holds up a copy of the old, 1966 edition of *M14*.

Even darker shadows were cast on NFSA's video efforts by one of the organization's technical advisors, Kenneth E. Isman. He served on development committees for both the video and the revamped *M14*.

He is listed on *M14*'s acknowledgments page as a "General Interest Member" of the AWWA Standards Committee on Backflow Preventers, which reviewed and approved the manual. And, according to NFSA President John Viniello, he was a technical advisor for the video's production.

Isman's Role

As associate director of engineering and standards at NFSA, Isman was consulted several times at "technical reviews" before the start of video production, according to Viniello.

"We were aware of changes in the 1990 edition of *M14*," Viniello said, "while we were putting the video together. Our position is: the video is a generalized presentation. We couldn't take time to get into specifics."

The Winter 1990, edition of *Sprinkler Quarterly*, an NFSA publication bills the video as anything but a generalization. A sidebar to an Isman article on backflow reads as follows: "[The video] provides a comprehensive overview of the federal *Safe Drinking Water Act* and includes case studies of water quality in fire sprinkler systems. The video explains how fire sprinkler systems operate and the types of backflow protection which should be required on fire sprinkler systems. The requirements for backflow prevention are taken from the new (1990) edition of AWWA *Manual M14* . . ."

According to one source, Isman was not present at every meeting of the *M14* committee. Still, he would have been informed of the group's actions. And, according to his boss Viniello, he passed along the committee's plans for changes.

Why the NFSA chose not to mention those changes in the video may go beyond Viniello's claims of a generalized presentation.

Casey Jones refers to the 1966 edition of *M14* while "educating" viewers of NFSA's controversial video.

What's in the Video?

With only 30 minutes to cover the topic, the video's producers took time to inject emotional appeals, definitions of cross connections and types of backflow, histories of both industries and descriptions of *M14*'s system classes. Time was found to picture a boy bouncing a ball and quenching his thirst at a fountain, which was left running long enough for the viewer to realize it would never shut off unassisted.

Time was found to quote a paragraph apparently printed in *Rules and Requirements for Automatic Sprinkler Systems* in 1917, which called backflow-prevention devices "schemes" to protect potable water supplies. Time was found to repeatedly picture Casey Jones holding in hand a single-check valve, while extoling its virtues and dependability. Time was found to interpret the federal *Safe Drinking Water Act* of 1974, the "comprehensive overview" mentioned in Isman's article.

To its credit, NFSA also found time to attribute one death to backflow from a fire-sprinkler system, along with 300 cases of illness. Spokesmen for the fire industry often say no deaths have ever been blamed on backflow from a sprinkler system, to support their "no need for preventers" claims. Revelations of death and sickness were immediately counter-balanced however, with 500,000 deaths attributed to fires.

Time was found to detail the sprinkler industry's "concerns" with double-check and reduced-pressure principle assemblies. Time was found to compare other national regulation documents to *M14*.

The video concludes with the summary statement: "The majority of systems, fed only by public water supplies, do not pose the threat of contamination and should not require backflow equipment beyond single-check valves." In one easy breath, single-check valves are wrongly equated with backflow preventers, and the types of protection dictated by *M14* are disregarded.

Industry Reactions

Small wonder backflow professionals and industry leaders around the country are infuriated by the NFSA's insistence that it supports backflow prevention measures, which its video appears to oppose or ignore.

Stuart Asay, P.E., Ph.D., standards coordinator for the American Society of Sanitary Engineering (ASSE), was incensed by the video. ASSE publishes performance standards for backflow preventers.

"I was extremely disappointed with the accuracy of the information presented [in the video]," Asay said. "It was very biased toward sprinkler contractor cost concerns."

"They should have consulted with members of the backflow prevention industry to develop a consensus on what the video needed to include. Since they didn't, the video should be revised or redone with members of the backflow industry participating. There's a real need for a quality video on this subject," Asay added.

John Hartley is president of the International Society for Backflow Prevention and Cross-Connection Control. He said, "One-sided presentations always disturb me. The video lacks an accurate balance. It appears the fire-protection people are only concerned with placing themselves on the top shelf of the public-safety rack."

Larry Stinnett is president of the American Backflow Prevention Association. He said, "I don't like the video because of the stand they're taking against backflow preventers. Fire-sprinkler systems must have backflow prevention. To be truthful, I'm hostile about [the video]. Their regulations are way off base. I just did a complete study on fire lines. You'd be astounded to see the metals in those things."

Paul Schwartz, P.E., chief engineer at the University of California Foundation for Cross-Connection Control and Hydraulic Research, did not return our calls. An assistant said he would respond directly to the NFSA regarding the video. Dr. J.J. Lee, director of the Foundation, said he had not yet seen the video and could not comment.

Howard Hendrickson, chief instructor for the New England Water Works Association's Backflow Prevention Program, condemned the video, calling it inaccurate. He said, "We're upset about it; it blows our minds. In my opinion, the video says black water is a non-concern to potable supplies. Actually, that water is full of anaerobic bacteria, just

Technical Update to Ammend the Booklet *Backflow Protection for Fire Sprinkler Systems*

In September 1990, the American Water Works Association published a new edition of AWWA *M14, Recommended Practice for Backflow Prevention and Cross-Connection Control*. Although this document has been greatly expanded from the 1966 edition, the recommendations for fire sprinkler systems have remained essentially the same. There are still six different classes of fire protection systems, and the type of protection required is consistent with the level of hazard.

The 1990 edition contains two additional pieces of information as compared to the 1966 edition. The first concerns class 1 and 2 systems. The statement is still made that "Class 1 and Class 2 fire protection systems are those systems that generally would not require an approved backflow protection assembly at the fire system user connection in order to protect the public water system." In keeping with the philosophy of requiring protection consistent with the level of hazard, however, the new *M14* contains certain special conditions which may exist in unusual circumstances. When these special conditions exist, the level of hazard may be increased over normal class 1 and class 2 systems and an approved backflow prevention device should be installed. These special conditions are:

1. Underground fire sprinkler pipelines parallel to and within 10 feet (3 meters) horizontally of sewer pipelines or other pipelines carrying significantly toxic materials;
2. When water is supplied to a site or an area from two or more services of a water utility or from two different water utilities, flow problems should be evaluated;
3. Occupancies (or changes in occupancies) that involve the use, storage or handling of types and quantities of materials in a manner that could present a significant health hazard to the domestic supply;
4. Premises with unusually complex piping systems (usually these premises will have an approved backflow-prevention assembly on their domestic service piping); and,
5. Systems with pumper connections in which corrosion inhibitors or other chemicals are added to tanks of fire trucks, or where the water purveyor cannot be assured of the potability of the input to the pumper connection.

The second addition involves the definition of class 4 systems. Previously, class 4 systems were defined as any system with a fire department connection within 1,700 feet of an auxiliary water source (pond, lake or stream). The new class 4 definition says that in order to fall into this classification, the auxiliary source must be within 1,700 feet and "dedicated to fire department use." This means that in order for the system to fall into class 4, the fire department would have to state, as part of its pre-fire plan, that fire protections systems in a building would be supplemented by utilizing the auxiliary source.

Editor's Note: Actually, the 1990 edition of *M14* contains far more than "two additional pieces of information," as stated in the above "Technical Update." See the first few paragraphs of the above article. Also, the update's interpretation of the class-4 definition is not attributable to *M14*, which makes no mention of "pre-fire plans."

like a septic tank. And, sprinkler professionals in our backflow classes say alarm checks leak."

Tom Jones is president of Kentucky's Blue Grass Cross-Connection Prevention Association. He said, "The video takes quantum leaps in some of its assumptions and appears to misuse statistics. The basis for most of the fire industry's arguments is the small number of deaths and illness attributed to backflow from sprinkler systems. We all know it's nearly impossible to trace contamination to its source. It passes through the system, makes people sick and disappears until the next backflow occurs."

The president of one backflow assembly manufacturing firm was so outraged by NFSA's handling of the issues, he wrote a letter to Viniello. He wrote: ". . . you have deliberately misled the unknowledgable viewer. . . [your priorities have] led you to ignore other health and safety issues and to misrepresent recommendations of national organizations."

He cited numerous areas in chapter six of *M14* that contradict the NFSA video. Particularly perplexing to the manufacturer was the video's failure to mention the several special conditions that cause class-1 and -2 systems to require protection.

Viniello said during a telephone interview, "I don't think the *M14* special conditions are enforceable. The stuff they put in there. . . What's 'significantly toxic material' (Sect. 6.3, P. 76), or 'unusually complex piping systems?' They're asking for trouble. I think they're trying to cover themselves."

Viniello said an NFSA meeting was called to evaluate the manufacturer's concerns. At that meeting, the decision was made to print a "Technical Update" for inclusion with the video package. The update (page 16) will be folded and inserted into the booklet that accompanies the tape.

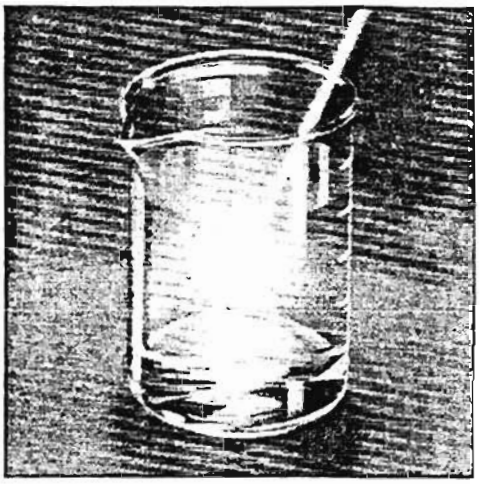
Asay said not only does the update fall short in addressing the video's inconsistencies with *M14*, but few viewers will know it exists or have the opportunity or encouragement to read and study it.

The tape is often shown to large audiences, some members of which accept its discussions as fact. Usually it is presented under the banner of an educational tool. It is shown to lawmakers struggling to understand concepts before enacting legislation. It is viewed by fire marshalls and other fire-protection groups. It's possible property insurers and lenders will hear its apparent inaccuracies. And, small groups of backflow prevention professionals have seen the tape.

Anyone dedicated to the cause of cross-connection control is advised to attend all screenings of *Backflow Protection for Fire Sprinkler Systems* in their areas. The NFSA is promoting the video with enthusiasm.

DW&BP Says 'Two Thumbs Down'

Don't get fooled, or allow anyone with authority to be taken in by Casey Jones. He's engineering a trainload of slanted information down the tracks from Backflow Central to Sprinklerville. Arrive prepared to counter NFSA's "education" with backflow-prevention facts.



CATASTROPHE IN TENNESSEE

Atypical Cross Connection Lays 1,100 Low

Two managers of a posh country club near Nashville, Tenn., were arraigned January 18 and now face felony charges for August 1990 violations of the federal *Safe Drinking Water Act*.

Ken Larish and Richard Evans were charged by a grand jury with supplying water contaminated with raw sewage to an estimated 1,100 guests of Maryland Farms Racquet and Country Club. Most of the guests became ill last August.

Many of those afflicted were local residents, city commissioners and other members of the affluent community. Apparently, two large wedding parties were served disease-infested water within three days.

Of 1,100 people stricken, 10 were hospitalized. The club has reportedly paid $70,000 in related medical bills.

Larish and Evans are charged with felony pollution of a public drinking water system. Misdemeanor charges include harboring a dangerous cross connection and discharging sewage near a public water system intake.

Facing lawsuits totalling "millions in potential damages," six years in jail and a state fine of $40,000, the two were released on $2,000 bonds, according to news reports. Evans has been dismissed as managing partner of the facility.

The City of Brentwood, Tenn., home of the country club, was fined $5,000 by the state health department for failing to protect its water system from a cross connection with the club's contaminated well water.

History

Maryland Farms' potable water problems date back to 1983. According to Robert Foster and Robert Lashlee, P.E., deputy director and environmental engineer for the Tenn. State Drinking Water Program, a series of events led to the catastrophe.

The club was built in an area inadequately supplied with potable water. Foster said the Brentwood Water & Sewer Dept., in years past, was unable to keep water flowing from taps. Pumps pushing well water into the club operated at 90 psi.

Because of its Olympic-size pool, Jacuzzis® and other facilities requiring water, the country club drilled wells to supply its needs. According to several sources, the Brentwood Water and Sewer Dept. was pleased to be relieved of the supply-burden created by the club.

A June 25, 1984, letter from Evans to Brentwood Water and Sewer stated that the club's water consumption in one month of 1983 was nearly 2 million gallons. Evans attributed the club's incredible usage to several leaks. He said the pool leaked 15,000 gallons per day and the whirlpools 1,200 gallons per day, before the leaks were repaired.

He sought relief from the club's sewer bills, which were based on water consumption. If the water was leaking into the ground instead of being treated, he should not be charged.

In his letter, Evans informed Brentwood Water and Sewer he had begun supplying the pool's water needs from a private well. Also, he was drilling another well to further decrease his dependence on the purveyor. Later, the club's water consumption dropped to 100 gallons per month, resulting in minimum billing from the city.

John Grissom, director of Brentwood Water and Sewer, responded to Evans' letter with one of his own.

Dear Dick:

In reading your letter to us dated June 25, 1984, it has come to my attention that this is a definite cross-connection located on your premises.

That is a physical connection between a potable water service (city water) and a non-potable source (well water). Because this is in violation of state and local laws, an approved backflow device must be installed in your service line within 10 feet of your meter.

I will be glad to meet with you at your earliest convenience to help safeguard the city water system from a possible backflow.

Sincerely, John Grissom

Two days later, Evans answered with another letter. Excerpts follow.

Dear Mr. Grissom,

. . . It also upsets me, after requesting help from the city for over a year, that suddenly in your second letter, I am required to install an approved backflow device when this has not been needed for the last seven years and nobody knew the difference until I spent the money on this gigantic water project. I will be happy to meet with you on this subject. However, as you know from the tests performed on the well water, there is no danger to the city even if there were a backflow. In fact, the water from the well is more pure than the water coming from the city. . .

Sincerely, Richard K. Evans

Following the planned meeting between Grissom and Evans, the required backflow preventer was never installed. Brentwood City Manager Mike Walker said he's not sure the meeting ever took place. He excused Grissom for his failure to enforce the law by explaining Brentwood's growth spiral in the mid-80s.

"When Grissom came to Brentwood Water and Sewer in 1985," Walker said, "the department had a staff of three. He was out there reading meters. It's easy to see how something like a backflow preventer could slip through the cracks."

Another possible explanation, according to a reporter covering the story, is that Maryland Farms donated land for new Brentwood city offices. Maryland Farms then built the offices without competing or bidding for the contract.

Walker said his city is now committed to making a "full-faith effort" to comply with all cross-connection control requirements.

"I would only warn my counterparts across the country," Walker added. "You can get into trouble very quickly [with backflow]. Clearly, we failed to follow through with our inspections."

Returning to Evans' letter, the club's well water may have been pure at the time it was tested in 1983 or '84, but tests run in 1990 uncovered different results. And, Evans may have "spent the money on this gigantic water project," but may have been short-changed on the design and materials end of the job.

According to Lashlee, Foster and news reports, one contaminated well was located within 15 feet of a sewage pump station. While investigating the disease outbreak, it was observed that one of the pumps in the lift station was inoperative and the holding tank (wet well) full.

Lashlee said the lift station was not water tight. News and official reports describe a pool of standing water between the lift station and the well. When the well pumps were turned on and off, the water level of the pool rose and fell accordingly.

John Dempsey, a reporter covering the story since August 1990, said the two wells were drilled within 300 feet of residences using septic tanks.

Louis Burnett, the state environmental specialist who conducted the official investigation, said pumps drew water from the wells at depths ranging from 40 to 60 feet. Permeable limestone formations in the area could allow septic tank leakage to contaminate the wells, he added.

In addition to the two large parties of guests stricken in August, Dempsey said smaller groups complained of illness throughout the summer. Some of those were tennis players who drank only distilled water. An investigation revealed club personnel were filling jugs labeled "distilled water" with tap water originating from the wells.

One of the managers tried to bribe Dempsey, to get him to stop covering the Maryland Farms story, Dempsey said.

Water sampled and tested from the fluctuating pool on Aug. 22, 1990, revealed an estimated fecal coliform count of 2,000 per 100 milliliters.

To make matters worse, the club used a water-softening system to disinfect the well water with chlorine bars designed for swimming pools. According to Lashlee, no one sampled and tested the water's quality, or kept records of those tests.

Water samples from a drinking fountain near the well and in the clubhouse kitchen showed no chlorine residual. Fecal coliform bacteria was found in both wells on the property. A pressure tank, immediately downstream of the purification system, contained 1,400 coliform colonies per 100 ml, according to Burnett.

The Complaint Investigation form completed by Burnett concluded with the following statement: "The water samples document that neither the well water nor the treated well water met the requirements of the *Safe Drinking Water Act*."

Lashlee, Foster and Walker said there was no evidence that contaminated water backflowed into the city distribution system through the unprotected cross connection.

Apparently, all 1,100 people affected were guests at the club over a three day period. News reports indicate some members of the club complained of illness following visits in early June.

Discharge lines from the wells were severed with a hacksaw, eliminating the cross connection to the potable supply. The wells are no longer in use.

The City of Brentwood compelled the club to install backflow preventers last October, and installed one on the service to city hall. Those were all tested the same month and all failed, according to Dempsey.

Of 71 assemblies tested by the city by Dec. 19, 51 failed, Dempsey said. No cause for the failures was identified. A shopping center, several buildings in an office park, a car wash and a photo lab were still connected to city water without backflow protectors.

Dempsey said Brentwood passed a cross-connection ordinance in 1986. It developed a plan to implement the ordinance in 1988. Last October, the city manager wrote to state officials promising to devote 16 hours per week to testing and inspecting backflow preventers.

Notes made by Lashlee concerning the incident reveal that the Brentwood "Cross-Connection Plan approved by [the Tenn. Drinking Water Program] stated: 'It is proposed that a minimum of four man-days per week be allocated to the cross-connection program. The effectiveness of the program will be evaluated periodically'. . ."

According to Dempsey, city records for December 1990, show only eight hours per week were spent on cross-connection control.

Dempsey said, Walker now wants to relieve the City of its obligation to certify assemblies every year. That burden would be shifted to property owners whose service connections are protected.

READER IDENTIFIES SOLUTION

Questions raised by USDA Article Answered by USDA Book

The November 1990 issue of *DW&BP* retold the story of "turkey-waters" and reminded readers of hog-scald vats and bacon-floating processes. It raised questions about isolation methods of backflow prevention in meat processing plants.

A reader had informed us of a USDA inspector requiring annual certification of hose-bibb vacuum breakers at an area poultry-packing facility. When the plant management was unable to locate a tester for the devices, the USDA inspector said he could accept self-certification.

We contacted USDA Sanitation Branch Director Dr. Mike Rose for clarification of the Department's rules and regulations. Rose said the requirement for annual testing and certification of hose-bibb vacuum breakers is not actually a regulation. Instead, it is mentioned in the Department's *Approved Water Systems* manual.

Ron Anderson, mechanical engineer, USDA Equipment Branch, said if a backflow-prevention device is applied to a hose bibb, his department requires it to work. Workability is determined by "listening and watching it drain," since there is no approved test procedure for AVBs.

The USDA forwarded a copy of its *Approved Water Systems* manual, which Dr. Rose said included the notation about testing and installing containment devices. The booklet's stated intent is to describe for inspectors "the major areas of concern, the plant's responsibilities, the applicable rules, and the actions to be taken with respect to a plant's water system." It is not billed as a manual of regulations.

The page regarding backsiphonage, however, uses the words "shall" and "must" frequently. "Nonporable water must be prevented from entering the potable water supply. . ."

"Rule: Equipment using potable water shall be so installed as to prevent backsiphonage as needed. The devices must be tested at least yearly and the results noted. . ."

An alert reader in Maine, Earle Rafuse, environmental health consultant, called to say he had encountered similar confusion about USDA regulations.

"I recently surveyed a couple of meat packing plants here," Rafuse said, "at the request of a USDA inspector. He wanted vacuum breakers to be certified, though they weren't the hose-bibb type. The plant also had a potable water line without a vacuum breaker feeding into a series of vats. That was my biggest concern."

Apparently, the inspector referred to a USDA volume titled *Sanitation Hand-*

Excerpts from *Sanitation Handbook for Meat and Poultry Inspectors*

12.3.1 Negative pressure or partial vacuum is a potential occurrence in any supply line and may result from such things as clogged pipes, sudden demand for a large quantity of water elsewhere in the system, pump failure, a rupture in the water line (particularly in main lines), placing a demand on the supply line greater that it is designed to carry, etc.

12.3.2 The problem can also be compounded somewhat in multi-story buildings, as the force of gravity may add to the intensity of the partial vacuum.

12.3.3 The danger of backsiphonage can be prevented through the elimination of submerged water lines or the use of a functional vacuum breaker between the last cutoff valve and the submerged line.

12.3.5 Functional vacuum breakers must be used on installations where submerged water lines are unavoidable (i.e. tripe denuders, defrost tanks, some sterilizers, etc.). A vacuum breaker is a device which will admit air to the water line in the event of a partial vacuum. Since air is much lighter in weight that liquids, it eliminates the sucking of contaminated water into the supply system.

12.3.6 The only vacuum breakers acceptable are those which can continuously be demonstrated to be functional. Attempts to prevent backsiphonage through the use of so-call one-way valves, or sealed vacuum breakers cannot be accepted as the sealed mechanism may become clogged or frozen in the open position.

12.3.7 The most simple and effective type of vacuum breaker consists of an open valve or petcock between the cutoff valve and water outlet. When the water is on, there will be a stream of water flowing through this opening.

book for Meat and Poultry Inspectors. Rafuse was fascinated, and we were too. by chapter 13, which is titled "Plant Water Supply." See below for excerpts from that chapter and a drawing of a remarkable vacuum breaker approved by the USDA.

We called USDA headquarters to inquire about the vacuum breaker diagramed and the handbook. It seemed the Department had an answer to its annual, certification requirements. Unfortunately, none of the backflow prevention professionals we spoke with had seen an AVB like the one illustrated by the USDA.

Apparently, Dr. Linda Madson, at the USDA offices in Washington D.C., was assigned the task of rewriting the *Sanitation Handbook*. She said even though the handbook touts a publication date of July 1982, the AVB diagram was probably drawn in the early 1960s.

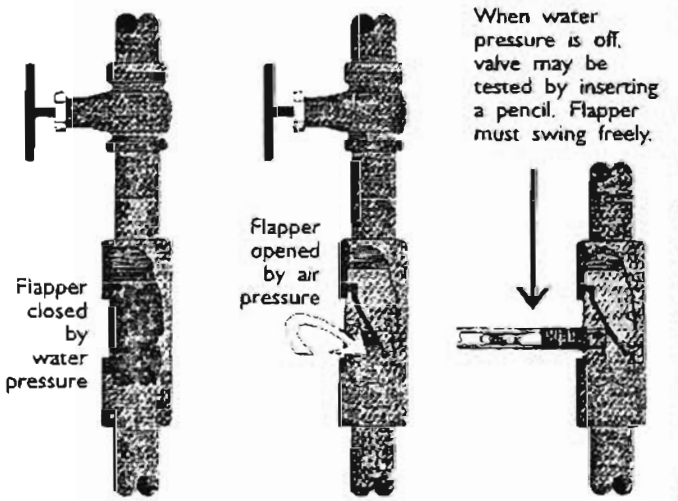
"There's just no way to know if it was drawn from an actual device," Madson said. "Backflow is one of my pet peeves. The man who wrote the *Sanitation Handbook* has long since retired."

We had hoped to find out who manufactured the simple device, which is testable in-line on an annual, monthly or daily basis. No vacuum pumps or sophisticated equipment is required to perform the test. Any USDA inspector with a pencil could verify that the device is functional against backsiphonage. Any supervisor could determine that the water used to rinse a plucked chicken had not been contaminated by "turkey waters" from down the line.

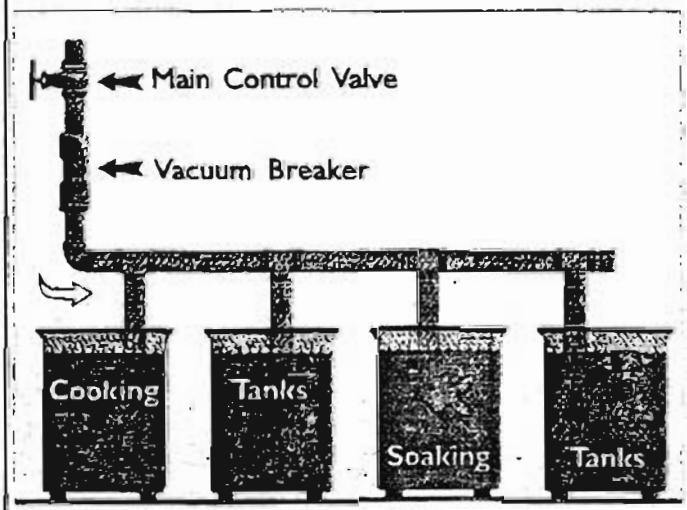
Is the USDA device a dinosaur from the good old days, when life was simple and there was no way hog-scald waters could affect the potability of a plant's water? Can it be special ordered by a poultry packer seeking to comply with the USDA's written statements?

Tell us first. Then, call USDA's Dr. Madson at (202) 447-7905.

Does anyone know where to get an AVB like the one below, diagrammed in the USDA's *Sanitation Handbook for Meat and Poultry Inspectors?*



Vacuum breakers in applications like the one below require annual certifications to comply with USDA's written precepts.



TRAP PRIMER VALVES

Water Supply and Sanitary Sewer Protection

By Stuart F. Asay, P.E., Ph.D.
A.S.S.E. Executive Director

In their book *Standard American Plumbing* (1911), Clow and Donaldson wrote that "Some sanitary engineers go so far as to say that floor drains should never be used. Their objection to them was that the floor is not washed often enough to furnish sufficient water to maintain a water seal at all times against sewer gas ingress. Their argument is well taken. But, floor drains in a basement are very convenient, and should be part of a well-installed sanitary sewer system."

The 19th century method of installing a floor drain or floor outlet consisted of placing a running trap in the line of drain pipe to the catch basin. The drain pipe then continued to floor level, with its opening closed with a bar strainer or grate. However, the grate, even when cemented into the hub end of the pipe would loosen. Dirt and other rubbish then clogged the trap and rendered it useless.

Plumbing manuals from the turn of the century recommended that floor drains should not be used without a backwater valve. Its purpose was to prevent sewer water from backing up into the basement.

A number of different styles of floor drains were developed. One common drain type consisted of a combination floor drain and backwater gate valve. Another method ran a piece of iron soil pipe from the trap on the sewer to floor level. The hub of the pipe was caulked into a brass ferrule with a brass screwed cover, which was screwed tight against a rubber gasket. This type of outlet was only opened when needed for maintenance. The cover was simply unscrewed and removed.

Figure 1 shows a cross section of a floor drain and trap, designed especially for hospital operating rooms and other locations where it was necessary to remove all sediment from the trap for sanitary reasons. The trap was constructed of cast iron, and was enamelled inside.

It is important to note that this sectional view shows the water supplied to the rim of the inlet and the trap itself. The water supply was used for cleansing and removing sediment from the jet inlet at the bottom.

This type of product obviously created a dangerous cross connection. There was no air gap or vacuum breaker. However, many consider it a forerunner of the trap-seal primer valves available today.

The American Society of Sanitary Engineering maintains two (2) product performance standards relating to trap seal primer valves. Specifically, Standard 1018 addresses water supply fed units and Standard 1044 considers the drainage-type primer valve.

A.S.S.E. 1018 — Water Supply Fed

As the name suggests, Standard 1018 is used to evaluate potable water devices supplying water to drainage system trap seals. Valves that comply with this Standard must have a built-in means to prevent backsiphonage into the potable system. See Figure 2.

The performance requirements of Standard 1018 are simple. To comply with the Standard, the device must meet hydrostatic and pressure loss requirements. Perhaps the most import-

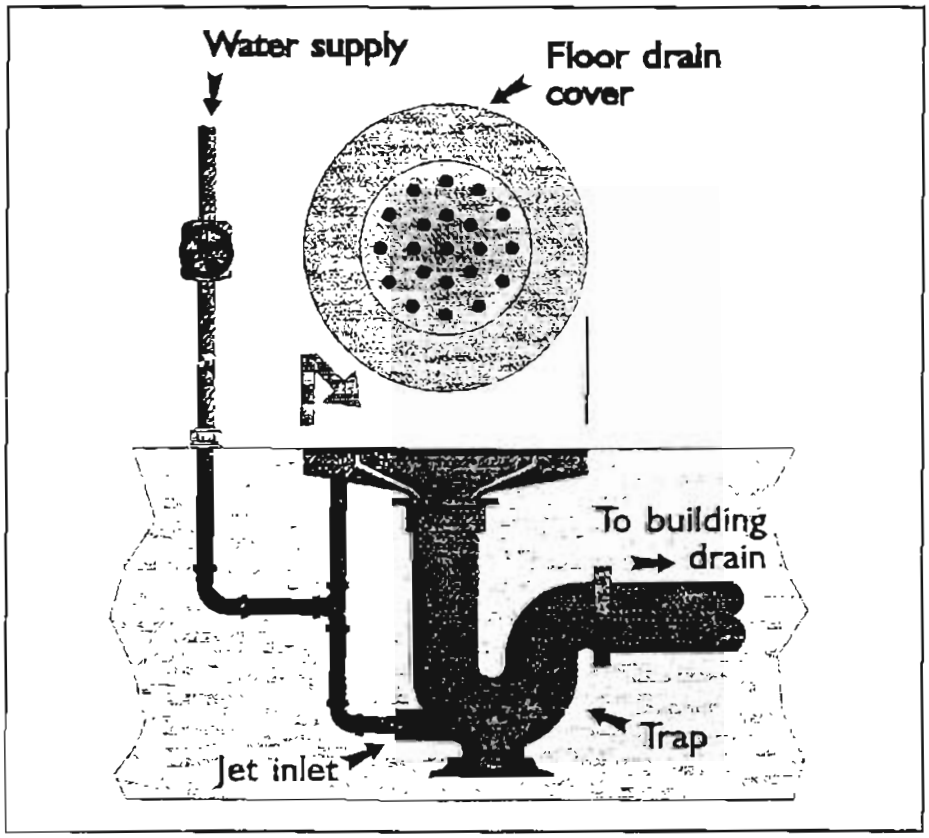


Figure 1

ant performance requirement is the backsiphonage test.

To pass the backsiphonage test, water from the device's outlet piping cannot rise more than three (3) inches when a vacuum is applied at the inlet. The installation instructions must also state that the primer valve shall be installed at least six (6) inches above the grid of a floor drain or the flood rim of the equipment which the trap serves.

The Standard also contains a test to verify the unit's water supply function. These devices are designed to discharge a pre-measured amount of water when a downstream pressure loss is introduced.

A.S.S.E. 1044 — Drainage Type

In 1986, the A.S.S.E. adopted the drainage-type trap primer standard. These devices must be used in installations where non-greasy waste is generated, such as lavatories. A certain percentage of the discharged water through the tailpiece is directed for priming a floor drain or similar traps that are subject to seal loss. See Figure 3.

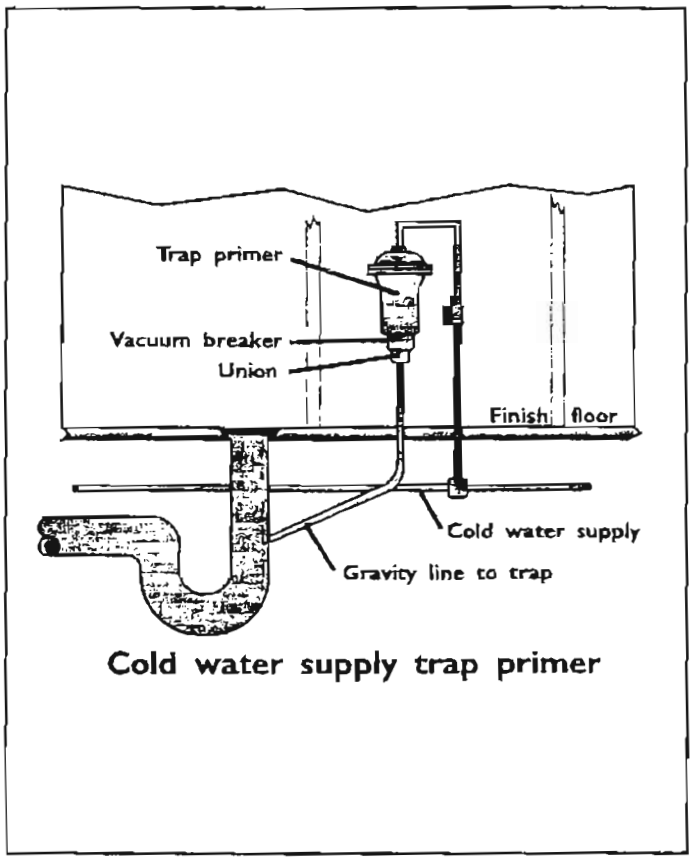
The most difficult performance test for this device may be the hydrostatic test. The primer valve must be subjected to an internal pressure of at least twenty-five (25) p.s.i., and show no signs of leakage.

The three (3) manufacturers that have demonstrated product compliance with A.S.S.E. Standard 1018 are: Jay R. Smith Mfg., Co., Precision Plumbing Products, and Watts Regulator Company. Jay R. Smith Mfg. Co. maintains the only A.S.S.E. listing to date under Standard 1044.

As with all plumbing-system products, it is essential that these devices be installed according to the manufacturers instructions. We've read and heard horror stories. These units are placed inside concrete walls, where a siphon-breaking air supply is not available or the unit is unaccessible for service.

You should become familiar with the manufacturer and code-related requirements for trap primer valves. The valves are relied on to control the cross connection between the porable supply and the sanitary drainage and sewer systems.

If you have questions regarding the A.S.S.E. Standards Program or would like additional information, please write us at: A.S.S.E. Standards Program, 11166 N. Huron, Unit 29, Northglenn, CO 80234.



Cold water supply trap primer

Figure 2

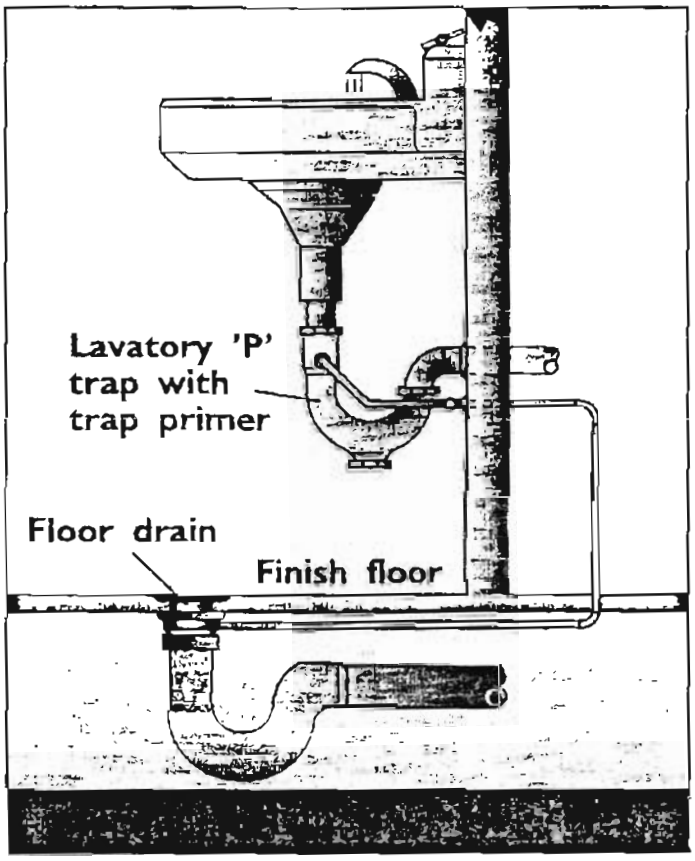


Figure 3

APPENDIX E

References

REFERENCES

CROSS-CONNECTION CONTROL MANUAL, 1975;
U.S. ENVIRONMENTAL PROTECTION AGENCY

RULES FOR SAFE DRINKING WATER, SECTION: 391-3-5-13;
GEORGIA DEPARTMENT OF NATURAL RESOURCES

PRINCIPLE NO. 5 (BACKFLOW-PREVENTION), AND SECTION: 1105; THE GEORGIA STATE PLUMBING CODE

COUNTY CODE OF ORDINANCE, SECTION, 5-1015: REVISED 1986;
BOARD OF COMMISSIONERS; GWINNETT COUNTY, GEORGIA

BACLFLOW-PREVENTION AND CROSS-CONNECTION CONTROL MANUAL M-14, 1996; AMERICAN WATER WORKS ASSOCIATION

Prepared by
Richard Pate, Coordinator
Backflow-Prevention Section
Gwinnett County Department of Water Resources

1987

2nd Printing – 1988
3rd Printing – 1989