City of Tumwater

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Cross Connection Control

Public Works – Water Resources Program

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Chapter 1 – Introduction

PURPOSE AND SCOPE

This document contains a cross connection control plan for the City of Tumwater and is one element of the City's 2001 Comprehensive Water System Plan update. The purpose of the cross connection control plan is to meet the requirement of WAC 246-290-490, provide a clear definition of regulated existing and potential cross connections, provide procedures and design criteria for backflow prevention, and summarize current city, state, and federal policies and regulations regarding cross connections. The importance of having an approved cross connection control plan in place can be further understood by the following AWWA policy statement on cross connections.

> **AWWA recognizes water purveyors have the responsibility to supply potable water to their customers. In the exercise of this responsibility, water purveyors must implement, administer, and maintain ongoing backflow prevention and cross-connection control programs to protect public water systems from the hazards originating on the premises of their customers that may impair or alter the water in the public water systems. The return of any water to the public water system after the water has been used for any purpose on the customer's premises or within the customer's piping system is unacceptable and opposed by AWWA.**
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> The water purveyor shall evaluate and regularly re-evaluate each water service to identify any actual or potential situation or connection that may allow backflow into the public water system. The water purveyor shall assure that effective backflow prevention measures, commensurate with the degree of hazard, are implemented to ensure continual protection of the water in the public water distribution system. Inspections of the customer's plumbing system beyond the point of service are generally the responsibility of state or local regulatory agencies having jurisdiction through rules, regulations, and recommendations (e.g., health official, building official). Most plumbing codes are only enforced on officially permitted new construction and renovation. The water purveyor's cross connection control program does not absolve the customer of the responsibility to prevent contamination of the private plumbing system under its control and of the public water system.
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> If appropriate backflow-prevention measures commensurate with the degree of hazard have not been taken, or the water purveyor has not been provided with reasonable assurance of protection and continual enforcement, the water purveyor shall take necessary measures to ensure that the public water distribution system is protected from any actual or potential backflow hazard. Such action would include the testing, installation, and continual assurance of proper operation and installation of backflow-prevention assemblies and methods commensurate with the degree of hazard at the service connection or at the point of cross connection or both. If these actions are not taken, water service shall ultimately be eliminated.
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> To reduce the risk private plumbing systems pose to the public water distribution system, the water purveyor's cross connection control program should include public education regarding the hazards backflow presents to the safety of drinking water and should include coordination with the cross connection efforts of local authorities, particularly health and plumbing officials. In areas lacking a health or plumbing enforcement agency, the water purveyor should additionally promote the health and safety of private plumbing systems to protect its customers from the hazards of backflow.

The protection and preservation of the public potable water supply is one of the highest priorities of a water purveyor. Once drinking water has been produced, provisions must be made to ensure that it will not be contaminated with tainted water or substances from other sources.

The purpose of the Tumwater cross connection control program is to establish recommended procedures to be used to protect the public potable water supply from the possibility of contamination or pollution due to existing or potential cross connections, as defined under WAC 246-290-010. This protection of the water consumers' health is maintained by ensuring the proper installation and surveillance of backflow prevention assemblies when actual or potential cross connections exists and cannot be eliminated.

DEFINITIONS

The following are definitions for words, which are widely used throughout this document, therefore, it is important to understand these key terms.

Cross Connection	Any actual or potential connection between a potable water line and any pipe, vessel, or machine containing a non-potable fluid, such that it is possible for the non-potable fluid to enter the potable water system by backflow.
Actual Cross Connection	A cross connection that currently exists.
Potential Cross Connection	A cross connection that does not exist at the time of inspection, but which may occur at any time. Examples of potential cross connections include: bypass arrangements, jumper connections, unattached hose connections, intricate piping, existing wells onsite, etc.
Potable Water	Water suitable for human ingestion, free from harmful or objectionable materials.
Non-Potable Water	All liquids and gases that are not potable water. A list of non-potable fluids is virtually infinite, but includes used water, fuel, liquid chemicals, gases, etc. Used water is any potable water that is no longer in the purveyors distribution system. In most cases, this includes any water downstream of the water meter and/or property line. Reclaimed water[1] is another example of "used water", but is still within the purveyor's distribution system for irrigation or other non-potable purposes.
Backflow	Reverse of the normal flow direction of water in a plumbing system or public water distribution system. It occurs due to a differential pressure existing between two different points within a continuous fluid system; a fluid of higher pressure

[1] Reclaimed water is not currently offered by the City of Tumwater, but it is under consideration as the LOTT Wastewater Alliance, in cooperation with the regional utilities, develops processes and timelines for availability.

	flowing to a fluid of lower pressure. Backflow is caused by either backpressure or back-siphonage.
Back Pressure	Results when the pressure (caused by a pump, elevated tank, or piping, boiler, or other means) on the consumer's side of the service connection that is greater than the pressure provided by the public water system and which may cause backflow.
Premise Isolation	A means of protecting the City owned and controlled water system through the installation of approved air gaps or approved backflow prevention assemblies at or near the service connection or alternative location acceptable to the City to isolate the consumer's water system from the City's distribution system.
Back-Siphonage	Results from a partial vacuum (negative pressure) within the piping system. Some common causes are (1) high velocities in pipe lines, (2) line repair or break that is lower than a service point, (3) lowered main pressure due to high water withdrawal rate such as fire fighting or water main flushing, and (4) reduced supply pressure on the suction side of the booster pump.

Appendix A contains examples that clearly illustrate typical cross connection situations.

BACKFLOW PREVENTION ASSEMBLIES

A wide choice of assemblies exists that can be used to prevent potential cross connections within the water system. Generally, the selection of the proper assembly to use is based upon the degree of hazard posed by the cross connection. Additional considerations are based upon piping size, location, and the potential need to periodically test the assembly to ensure proper operation. There are six basic types of assemblies/configurations that can be used to prevent potential cross connections:

1. Reduced Pressure Principle Backflow Assembly (RPBA)
2. Double Check Valve Assembly (DCVA)
3. Pressure Vacuum Breaker Assembly (PVBA)
4. Spill-Resistant Vacuum Breakers (SRVB)
5. Air Gaps[2]
6. Barometric Loops[2]

[2] Air Gaps and Barometric Loops are not considered assemblies, but these configurations are acceptable for the protection of the water supply. As their approval is limited to certain situations, please check with Development Services prior to installation to determine if your site is acceptable for either a barometric loop or air gap configuration.

An up-to-date listing of all approved backflow prevention assemblies is available for download through the USC website at: http://www.usc.edu/dept/fccchr/list/springer.html.

HOW TO USE THIS MANUAL

The intention of this manual is to aid users in implementing an effective cross control program. Using this manual in conjunction with the *Cross Connection Control Manual, Sixth Edition.* Published by the American Water Works Association, Pacific Northwest Section, this manual will provide the information necessary to ensure that the proper steps are taken towards reviewing new and existing developments for potential cross connections. The use of this information will also ensure that the proper procedures are followed during the installation and inspection of backflow prevention assemblies. This plan is arranged into five sections.

Chapter 2 explains the procedures for program implementation and administration. This section also discusses program policies and associated City actions.

Chapter 3 documents procedures for conducting facility surveys and service types, testing backflow assemblies, and record keeping.

Chapter 4 illustrates the current City ordinance for cross connections and provides an example of a new or modified ordinance.

Chapter 5 describes each of the backflow prevention assemblies and contains illustrations of each. The appendices contain other pertinent information regarding cross connections.

Chapter 2 – Program Implementation, Administration, and Policies

PROGRAM RESPONSIBILITY

Federal and state regulations place the responsibility for cross connection control on the City of Tumwater Public Works Operations as the water purveyor and/or on Development Services as the local authority for in-premise cross-connection prevention. When implementing a cross connection control program, the City needs to follow an organized plan that considers the enforcement authority, administration, personnel, certification, facility surveys, assembly testing, and public education.

In accordance with the Washington Administrative Code (WAC) 246-290-490 (1)(d), the City's responsibility for maintaining cross connection control shall begin at the water supply source, prior to treatment and distribution points. The purveyor's responsibility ends at the point of delivery to the customer's service location. The customer's service location begins at the downstream end of the service connection or water meter located in the public right-of-way or City-held easement. Any issues within the customer's service location after the point of delivery falls under the jurisdiction of the City's Development Services Department. Under Chapter 19.27 of the Revised Code of Washington (RCW), the responsibility for cross connection control within the consumer's service location, i.e., within the property lines of the consumer's premises, falls under the jurisdiction of Tumwater's Development Services as the local administrative authority.

ENFORCEMENT AUTHORITY

Tumwater Municipal Code (TMC) details City policy of cross connection control for the purpose of protecting the health of customers receiving water from the City by protecting the public water system from contamination under Chapters 13.04.430 – 13.04.490. As of the date of this publication, TMC revisions are underway to reflect the new regulations on purveyor responsibility and other issues.

ADMINISTRATION

The City's Public Works Department will carry out the functions of the water purveyor's cross connection control program, including survey, enforcement, and record keeping. The Superintendent of Public Works will oversee and manage program administration and designate an employee to carry out daily procedures. This designee will meet the requirements outlined in the section below labeled "Certification".

As with any successful program, the City of Tumwater has developed working relationships with multiple agencies on the federal, state, and local level. **Figure 2.1**, below, illustrates the relationship between the regulatory agencies and the program standards. **Figure 2.2** demonstrates the working relationship between Tumwater's Water Public Works Department and Tumwater's administrative agency, for in-premise cross connection control, Development Services, for the administration of the city's cross connection control program. **Figure 2.3** illustrates the flow of the plan review process for cross connection control.

Table 2.4 is a complete list of all certified cross connection control specialists employed with the City of Tumwater. Updates to this list will continue as necessary and recorded in the City's current edition of the cross connection control plan.

In the execution of this program, the Operations & Maintenance Division, in conjunction with the Engineering Division of the Public Works Department, and Development Services will have regular open communication. Each department is responsible to maintain and survey facilities as stated above under Program Responsibility. **By agreement between Development Services and Public Works, Public Works Operations will have authority, including survey and enforcement, over residential and fire protection service connections beyond the meter, up to and including the backflow protection assembly.** Responsibility for survey and enforcement of in-premise assemblies shall remain with the Development Service Department. In the event of a discrepancy of jurisdictional responsibility, the WAC and RCW directives take precedence. To resolve any conflicts, department directors will discuss appropriate measures to mitigate the current and similar future issues.

CITY POLICIES

The City has enacted varied policies to ensure the safety and quality of drinking water for all its customers. In accordance with the policies adopted in the Comprehensive Plan, the Public Works staff will operate to:

"Provide the highest quality water in sufficient quantity to meet the needs of the City"

The City of Tumwater Public Works Water Department accepts the responsibility to supply safe drinking water throughout the City. Part of this responsibility includes ensuring that the water is not contaminated prior to reaching the consumer due to backflow of contaminated water into the distribution system. To ensure backflow contamination does not occur and to maintain our high quality water supply, the City will enforce the policies outlined below.

Policy: As the Purveyor, the City Public Works Department will know the complete water distribution system in detail.

Action(s): Public Works operators will maintain a complete database of the complex infrastructure of the water system in detail. Operators will identify the type of connection required by each application or land use. Operators will know the various types of customers in the area and the amount of protection that currently exists. Operators will identify the need for greater protection in the event of new development or revisions on the property use.

Policy: Minimize the potential hazards of new cross connections.

Action(s): Review plans for new construction to identify potential cross connections.

Initiate procedures that will route all requests for new service or enlargement of existing services to the Plan Review Section of Development Services for identification of any cross connections.

Continue requiring the submission of plumbing plans with the construction plans for approval before issuance of a building permit.

FIGURE 2.1 - REGULATORY STANDARDS FOR CROSS CONNECTION CONTROL

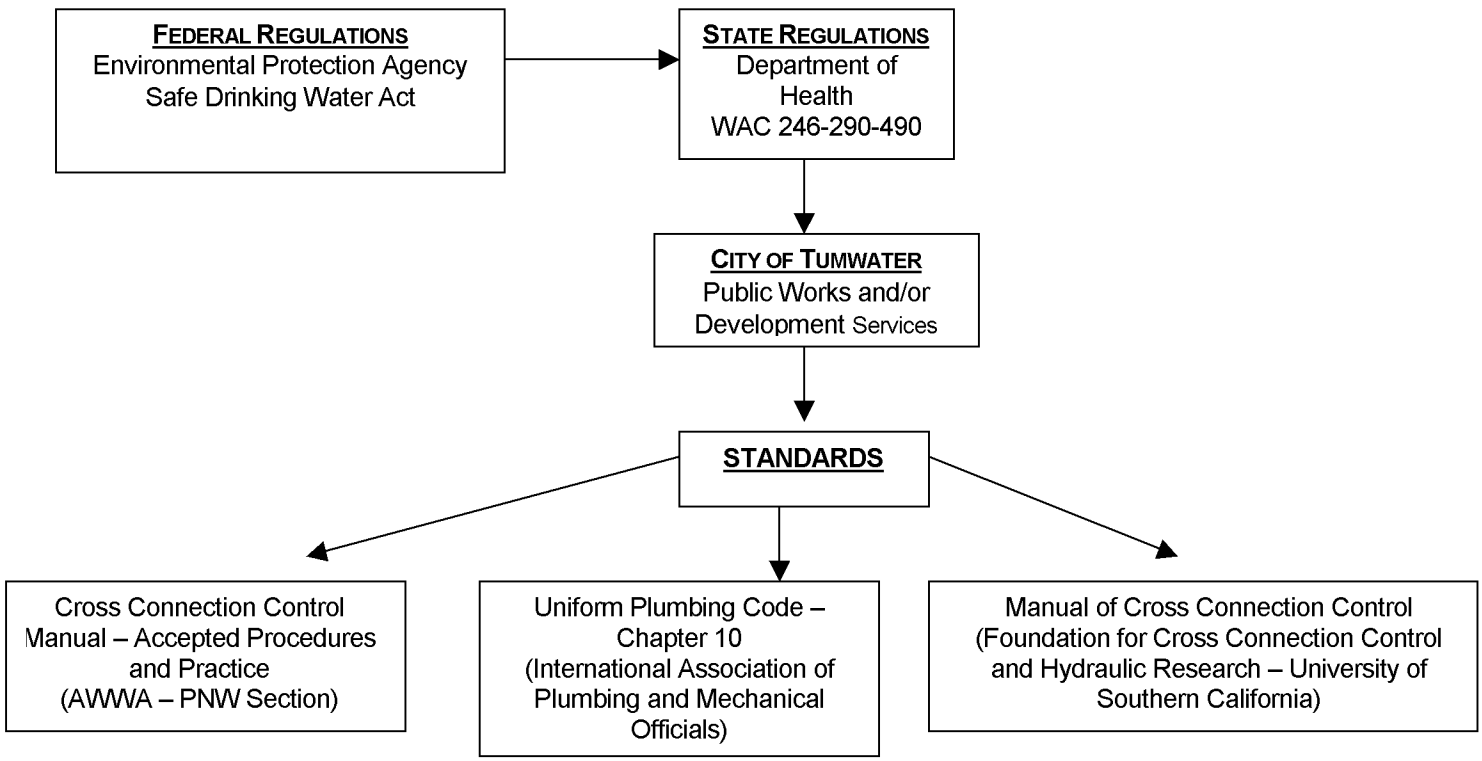

FIGURE 2.2 – DEPARTMENTAL RESPONSIBILITIES FOR CROSS CONNECTION CONTROL

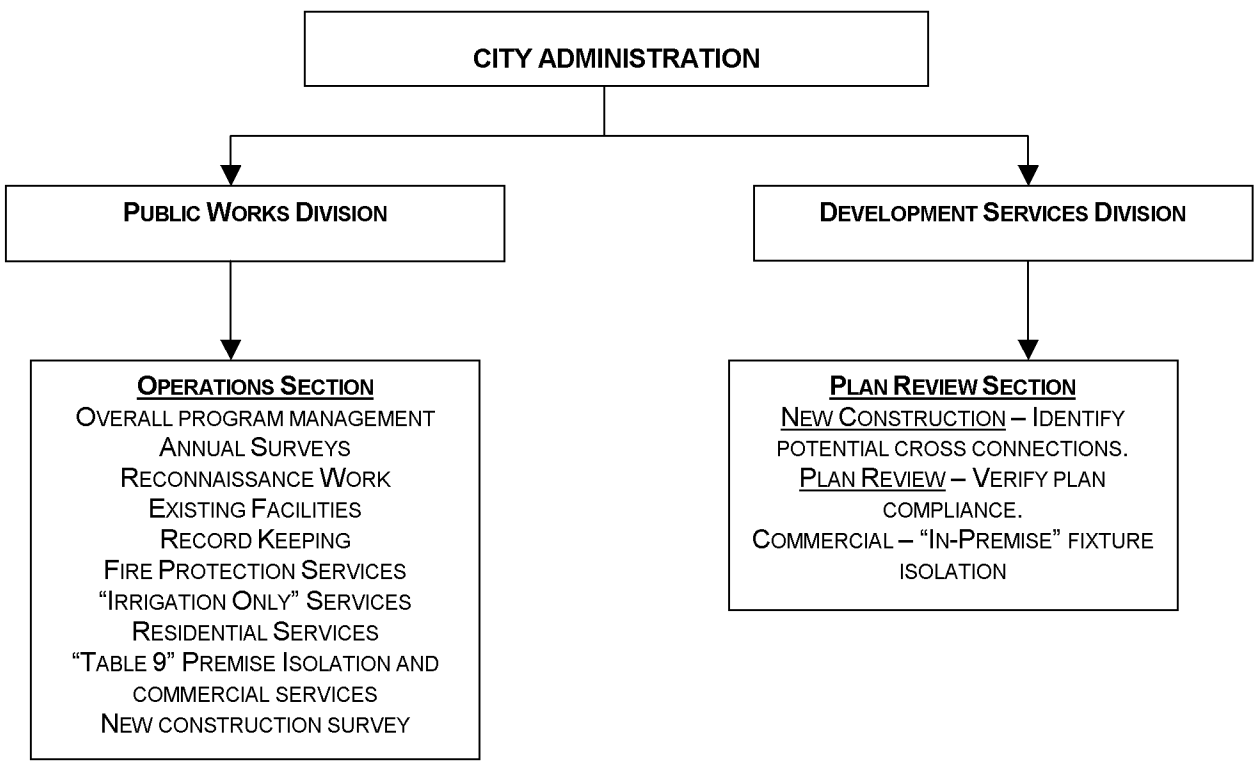

FIGURE 2.3 – PLAN REVIEW PROCESS FOR CROSS CONNECTION CONTROL

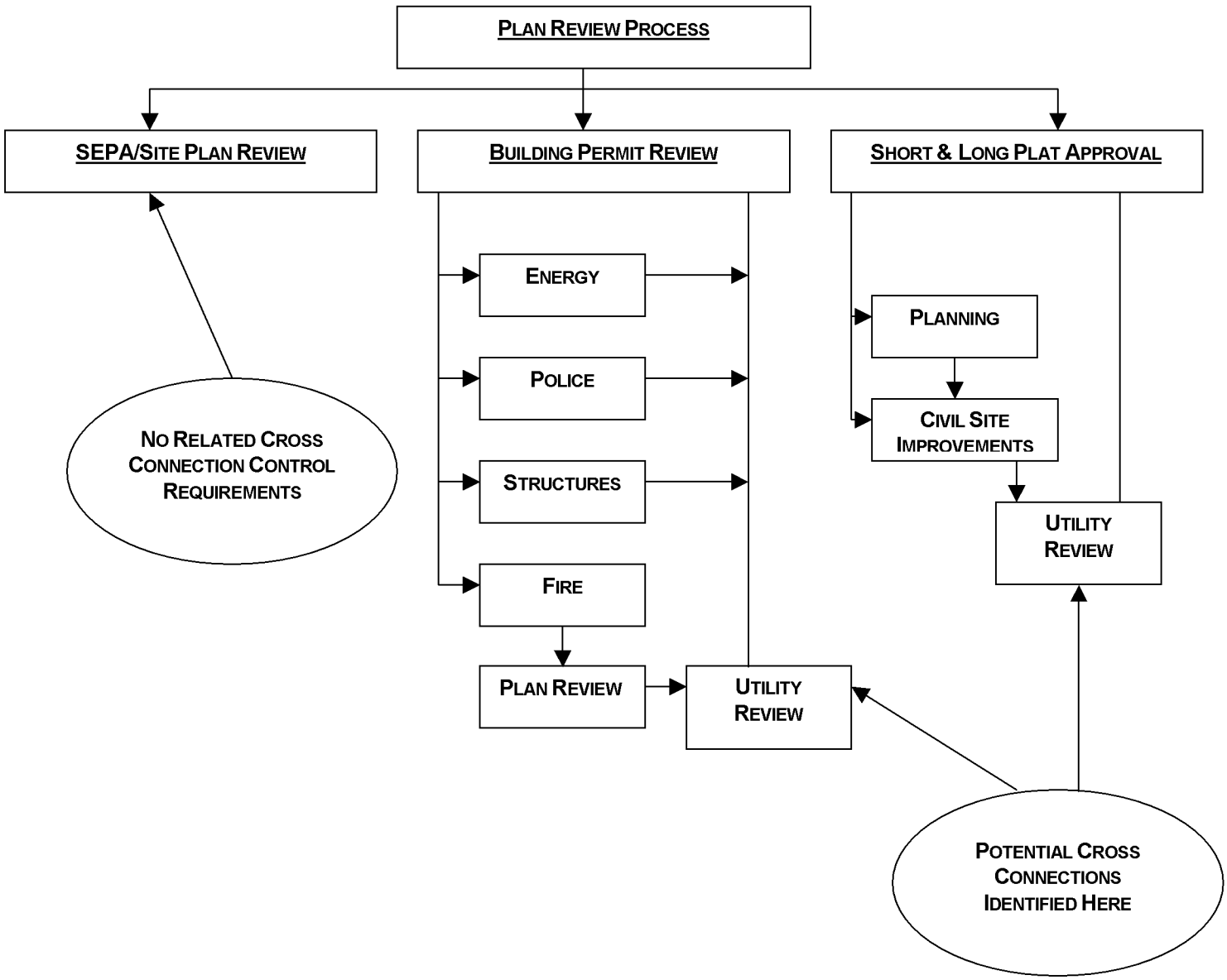

TABLE 2.4 – CITY OF TUMWATER CROSS CONNECTION CONTROL SPECIALISTS

NAME & TITLE	DEPARTMENT	CERTIFICATION NUMBER
Dave Barclift, CCS[3]	Operations & Maintenance	4153
Tiffany Ihly, CCS, BAT[4]	Operations & Maintenance	7488 – CCS, B2350 – BAT
Wayne Lobaugh, BAT	Facilities	B2984

[3] Cross-Connection Specialist
[4] Backflow Assembly Tester

City Policies, Continued.

Policy: Minimize the potential hazards of existing cross connections.

Action(s): Update and maintain a list of all existing cross connections and all backflow prevention assemblies throughout the City's service area.

Establish a reconnaissance program that inspects existing facilities for actual or potential cross connections within the City water system. This is an on-going endeavor that concentrates on all facilities under the authoritative jurisdiction of the City.

Inform all owners of fire sprinkler systems, both commercial and residential, of the new State requirements regarding these systems and require all owners to upgrade to current standards.

Policy: Public Works Operations will take corrective action if an existing cross connection is brought to the City's attention that is not controlled commensurate to the assessed degree of hazard.

Action(s): The City will make every effort to bring the consumer into compliance. Consumer retrofits will be required. The City may offer financial assistance to those who can prove hardship per Tumwater's Finance Department guidelines.

Ultimately, if the consumer does not abide by the regulations set forth by the City, the City may deny or discontinue water service to a customer's premise until the cross-connection hazard is eliminated or controlled to the satisfaction of program staff. As an alternative, the City may opt to install an assembly at the owner's expense to eliminate the potential for cross connection. In this event, the Program staff will notify Development Services in all cases prior to the action, to determine is a permit is needed, except in the event of an emergency.

Policy: Public Works Operations will be responsible for implementing Tumwater's Cross Connection Control Program for the protection of the City's drinking water distribution system.

Action(s): This section will ensure that annual testing is performed, that records of all actions for each assembly are kept on file, and that an on-going search for existing, uncontrolled, or unmonitored cross connections are performed.

Policy: Development Services will be responsible for reviewing all in-coming plans and requests for new construction. It will also be responsible for identifying potential cross connections, and ensuring that development plans meet the cross connection standards and criteria of the City. Other arrangements may be made by agreement between the Public Works Director and the Development Services director, on a case-by-case basis.

Action(s): All requests for new service, repair, or enlargement of existing services requiring a permit will route through the Development Services Department.

All new construction plans shall be reviewed and assessed for cross connections, and backflow prevention assemblies shall be installed correctly and concurrent with that facility.

Policy: The City will make every reasonable effort to ensure that all existing or potential cross connections, including in-premise cross connections, that cannot be eliminated are protected with an approved backflow prevention assembly. Ensure that all existing cross connection assemblies comply with the City's program.

Action(s): The City will make every reasonable effort to eliminate the potential hazard, add protection to the existing system, or disconnect water service at the owner's expense, to any premise where the customer fails to cooperate in the installation, maintenance, testing, inspection, or replacement of any backflow prevention assembly.

Notify the customer of all responsibilities and options required by the City's Cross Connection Control Program.

Make available to the general public, especially those affected by the Cross Connection Control Ordinance, all information necessary to assist them in complying with the City's cross connection control program.

When cross connections cannot be eliminated, the potential hazard will be controlled by the installation of an approved backflow assembly commensurate with the degree of hazard.

Policy: The City will conduct an annual inspection program and maintain testing results with the goal that all existing backflow prevention assemblies maintain proper operating condition compliant with the State regulations.

Action(s): Maintain a testing program wherein the City informs all backflow prevention assembly owners of their responsibility to have their assembly tested annually by a certified tester.

Keep records on all existing assemblies and verify that each passes an annual test.

Provide random spot inspections of existing assemblies to verify that they are properly installed and in working order.

Replace existing assemblies that are no longer on the most current Washington State approved list. However, these assemblies may remain in service until maintenance is required, at which point the owner will be notified that the assembly must be replaced.