City of Phoenix

DEVELOPMENT SERVICES DEPARTMENT

January 24, 2007

TO: **All Concerned**

FROM: **Jay Mundy, CIPE, CPD**
Plumbing/Mechanical Inspections Supervisor

SUBJECT: **Fire Supply Backflow Preventers**

The basic premise for determining which device would provide appropriate backflow protection is to establish whether water downstream of the device is likely to become either polluted or contaminated when in service. There are six (6) classes of fire sprinkler systems. Classes three (3) through six (6) have always required installation of a Reduced Pressure Principle Backflow preventer [R.P.]. Classes one (1) and two (2) required either a Double Check valve assembly [D.C.], or an R.P. Information in City Code Section 37-144 read as follows as regards Class 1 and Class 2 Fire Sprinkler Systems:

- **Shall have a (DC) or (RP) assembly installed ahead of the fire sprinkler riser, with the assembly tested and certified upon initial installation and annually thereafter, in accordance with City Code Section 37-143(c) and 37-144(b); OR**
- **The (DC) or (RP) may be omitted upon initial installation, provided:**
  - **(1) Appropriate *pressure loss* is included in the fire sprinkler system calculations to accommodate *future installation of a (DC) or (RP) assembly; and***
  - **(2) An acceptable location is identified on the site plan where a future (DC) or (RP) assembly can be installed in compliance with all appropriate building, plumbing, zoning, and traffic visibility requirements.**

There has never been a time when the designer was not required to account for the *potential* pressure loss that results from installation of these devices, not even when designing a Class 1 or Class 2 system. The design parameters regarding pressure loss were not influenced by implementation of IBC Code Section 903.3.5. Designers who had been sizing their fire piping systems as mandated by City Code Section 37-144 requirements were already discounting for pressure loss through a (DC) or an (RP), even when these devices were not being installed as part of the initial piping installation.

In summary, pipe sizing is no different now (when these devices are required to actually be installed) than it was when designers were simply applying the requirements of City Code Section 37-144, which required initial pipe sizing to accommodate future installation of these devices, a City Code requirement that has been in force for decades.

Selection of which device to utilize is based upon the basic criteria that any source of potential *contamination* downstream of the device will require use of an (RP). Systems that will likely result in no more than *pollution* downstream of the device may be isolated by installation of either a (DC) or an (RP). Openings into the fire system piping (where chemicals, foam, non-potable water, etc. may be introduced) will require and R.P. Sewer piping installed *above* the fire line will also require use of an R.P. There are other possibilities but these serve as common examples of ways that contamination may be introduced, and where an R.P. will be required.

When there is any uncertainty regarding which is the appropriate device to use the Backflow Division of the Plumbing/Mechanical Inspections Section will be pleased to provide the answer upon request.

City of Phoenix

DEVELOPMENT SERVICES DEPARTMENT

February 22, 2007

TO: **All Concerned**

FROM: **Jay Mundy, CIPE, CPD**
Plumbing/Mechanical Inspections Supervisor

SUBJECT: **Fire System Backflow Preventers**

The State of Arizona Plumbing Code [Section 602.3] reads as follows:

"No plumbing fixture, device, or *construction* shall be installed or maintained or shall be connected to any domestic water supply when such installation or connection may provide a possibility of polluting such water supply or may provide a cross-connection between a distributing system of water for drinking and domestic purposes and water which may become contaminated by such plumbing fixture, device, or *construction* unless there is provided a *backflow prevention device* approved for the potential hazard."

No exception is granted for arbitrary classifications of Fire Sprinkler Systems. Every system shall be equipped with either a Double-Check Valve Assembly (DC) or a Reduced Pressure Principle Backflow Preventer (RP). Section 602.0 of the Arizona State Plumbing Code prohibits direct connection of a potable water supply to any piping that contains "used, unclean, polluted, or contaminated water, mixtures, or substances" . . . . . unless the potable water system is protected by installation of an appropriate backflow prevention device.

The Arizona State Plumbing Code defines POLLUTION as:

"An impairment of the quality of the potable water to a degree which does not create a hazard to public health, but which *does* adversely and unreasonably affect the aesthetic qualities of such potable waters for domestic use." [Also defined as LOW HAZARD.]

The Arizona State Plumbing Code allows a Double Check valve assembly to be utilized when segregating potable water from *polluted* water. The State Code requires installation of a Reduced Pressure Principle Backflow-Preventer when isolating potable water from *contaminated* water. Each of these devices must be listed for use with fire systems when so installed, and each will require testing and

re-certification on no less than an annual basis. All testable backflow preventers require testing and certification at the time of initial installation.

An onsite fire system that is connected to the potable water system at two or more locations [looped] shall have each point of connection equipped with either a Double Check Valve assembly or a Reduced Pressure Principle Backflow Preventer. This is to prevent unintended backflow through the onsite piping when there is a differential in pressure between individual water sources serving an onsite fire system. Additionally, a private fire main that is not looped shall also be equipped with an appropriate backflow device to prevent stagnant water from re-entering the potable water system.

The requirements in this memorandum are effective immediately. .

City of Phoenix

DEVELOPMENT SERVICES DEPARTMENT

March 1, 2007

TO: **All Concerned**

FROM: **Jay Mundy, CIPE, CPD**
Plumbing/Mechanical Inspections Supervisor

SUBJECT: **Single-Check Valves - Backflow Preventers**

Single check valves have a variety of applications, none of which is to serve as a means of protecting a potable water supply from potential contamination or pollution. A more typical application for a check valve with a single checking-gate would be as a diverter valve where two piping systems of potentially differing pressures, temperatures, or content combine. An example would be segregation of hot and cold piping in a hydronic heating/cooling system, or isolation of products in an industrial piping application. Other applications could include use as a foot valve for a pump system or a lift station, installation to prevent unwanted backflow into the low-pressure piping where fuel gases and combustion gases are being blended for ignition, and a variety of different but similar applications where dissimilar products interconnect through a common piping system.

The USC Manual of Cross-Connection Control, ASSE, AWWA, and others define what constitutes a backflow prevention assembly suitable for protection of the potable water system. These entities stipulate the following devices as being appropriate for that purpose:

- **Atmospheric Vacuum Breaker Backsiphonage Prevention Assembly**
- **Double Check Valve Backflow Prevention Assembly**
- **Double Check – Detector Backflow Prevention Assembly**
- **Pressure Vacuum Breaker Backflow Prevention Assembly**
- **Reduced Pressure Principle Backflow Prevention Assembly**
- **Reduced Pressure Principle-Detector Backflow Prevention Assembly**
- **Spill-Resistant Pressure Vacuum Breaker Backsiphonage Prevention Assembly**

No other devices are considered equivalent or capable of providing the same level of protection, therefore, devices not listed above are unacceptable as alternatives.

City of Phoenix

DEVELOPMENT SERVICES DEPARTMENT

March 9, 2007

TO: **All Concerned**

FROM: **Jay Mundy, CIPE, CPD**
Plumbing/Mechanical Inspections Supervisor

SUBJECT: **Backflow Protection of Existing Fire Systems**

Existing water supplies serving fire protection systems that were initially approved as Class I or Class II systems may remain unprotected by a backflow prevention device until the system undergoes significant changes. Significant changes would include; 1) additional demand load on the existing system [more than 5%]; 2) re-piping of an existing system; 3) addition of a fire-pump. All new fire protection systems, and any existing system that no longer complies with the terms of Class I or Class II designation shall be fitted with an appropriate backflow protection device at the time such change in designation occurs.

Systems that are not altered may continue in service without additional backflow protection.

As is true with all existing construction, installations that were Code compliant at the time of initial approval may remain in their original condition unless Code violations or significant changes have occurred since completion of the existing system. Any condition that creates a potential health and safety concern will require installation of appropriate backflow protection on any existing system.

Commentary:

Double Check Valve Assemblies result in a pressure loss of 6# psi or less at full flow velocity through the valve. DSD's Backflow Division is not indifferent to the effect a loss of pressure may have on sprinkler system performance. However, the Backflow Division is also aware that sprinkler systems are designed with a presumption of water pressures ranging from 60 to 80 pounds per square inch, and that the City of Phoenix Water Services Department will not guarantee more than 30# psi at any given location at any given time. A fire system that is designed without a boost pump to assure design pressure represents a far greater risk to life safety than the meager loss created by installation of a double check valve.