



OTTAWA

Mandatory backwater valves on storm and sanitary laterals

THE SCIENCE

Backwater valves are recognized for their effectiveness in reducing the risk of damage from sewers backing up. A backwater valve, however, is not a guarantee that the risk of loss and damage will be eliminated. Some homes that experience damage from basement flooding have a backwater valve in place. In particular, if a backwater valve is not properly maintained, water and sanitary waste can back up into a home during an extreme rainfall event. Homeowners need to be educated about proper maintenance of the valves if the mechanisms are to be effective.

Backwater valves are just one tool in a complex scheme of storm and wastewater management. An assessment by the City of Ottawa seeking to understand why a number of homes in the City with backwater valves experienced basement flood damage identified these valves as a second line of defense. The study by Ottawa emphasized the importance of properly designed and maintained municipal storm and wastewater systems as the primary means to protect homes from damage due to extreme rainfall.

Research and evidence consistently recognize backwater valves as a powerful mechanism for reducing basement flooding, but it is important to understand how they can be most effective and what their role is within the broader system of storm and wastewater management.

THE TRIGGER

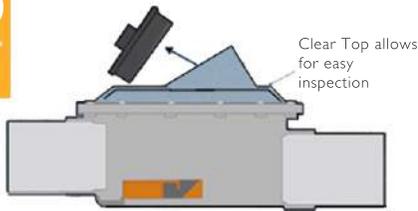
In July 2009, Ottawa experienced a severe rainfall event that resulted in the identification of approximately 1,500 basement flooding incidents in the west end of the City. Out of these known incidents, almost eight percent happened in homes where a backwater valve was installed on the storm sewer lateral. The number of homes with backwater valves experiencing sewer backup was unexpected and suggested the need for additional information about why the valves failed to prevent basement flooding.

A comprehensive review was undertaken by the City to understand what caused water to enter homes protected by a backwater valve, to investigate City standards with regard to current industry technology and practices, and to see what other municipalities were doing to prevent sewer backups. Once this review was completed, the City of Ottawa came up with a five-step plan to optimize the potential of backwater valves and reduce the occurrence of basement flooding in the future.

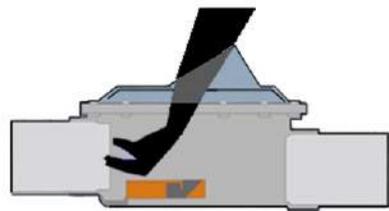
THE APPROACH

The plan developed by the City covered various aspects related to increasing the level of protection against sewer backups. The first recommendation was to keep improving the municipal sewer system in order to reduce the reliance on backwater valves as defense against damage to homes from wastewater backing up during extreme rainfall events. The underground sewer system

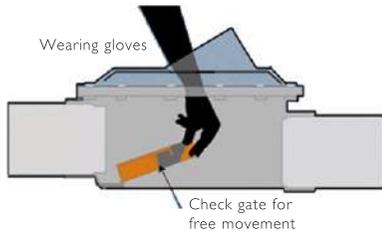
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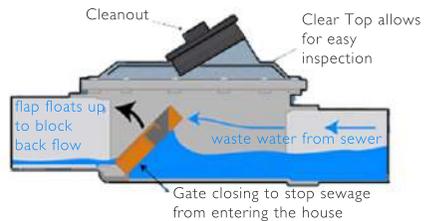
1. Remove cleanout cap



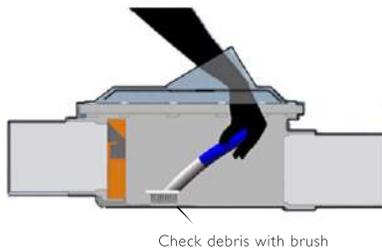
4. Check O-ring for cracks or deterioration



2. Check gate for free movement



5. Normally functioning backwater valve



3. Check for debris with a brush

Figure 5 : The illustration above outlines different steps that need to be taken to ensure the proper maintenance of a backwater valve.
(Source: ICLR)

and overland stormwater management system were identified as the primary mechanisms for preventing damage to homes as a result of extreme rainfall events. Nevertheless, backwater valves were identified as an essential element of a comprehensive risk reduction strategy.

The review also identified the need to increase homeowners' awareness about the importance of backwater valve maintenance. The City determined that the main mode of failure of the backwater valves was likely through the valve cover, as one third of the backwater valves covers inspected were not screwed down tightly, resulting in failure of the valve. Ottawa determined that many homeowners were not aware of the appropriate maintenance and care required to secure the greatest protection from backwater valves.

Finally, an important recommendation of the review was to expand the installation of backwater valves to have better protection against sanitary sewer backup by making them mandatory for new homes on both storm sewer and sanitary sewer laterals.

THE OUTCOME

In 2009, Ottawa introduced a by-law requiring installation of a backwater valve on all new sanitary sewer connections. This applied to all properties, including residential and commercial, if there is a basement with new lateral connections to the sewer system. This expands on earlier requirements in the City where the installation of a sewage backflow prevention device was already mandatory on new foundation drain systems connected to a City storm or combined sewer system.

The recommendation presented by the City was developed to improve protection within areas that have a separated sewer system in place. It was established that installing backwater valves on sanitary sewer service laterals as well as on storm connections in new homes would not have a big impact on costs to the homebuilder. Investing in the installation of a backwater valve in new home construction is also much more economical when compared to retrofitting as installations in new homes were estimated at \$250, compared to an average of \$1,400 for retrofits. The requirement has been well received in the community and there has been no opposition from the building industry.

A Residential Protective Plumbing Program was implemented in Ottawa in 2005 as part of the Sewer Backup Protection By-law. It supported the installation of more than 900 backwater valves. The current program continues to focus on high-risk areas and offers a subsidy of between 50 and 100 percent in areas that experienced basement flooding.

A WORD FROM OTTAWA

When asked what advice he would give to other municipalities considering subsidy programs for basement flood risk reduction, Eric Tousignant, Senior Water Resources Engineer for the City of Ottawa, highlighted the importance of adequate public education when implementing these types of programs. He stated that “when this program started out, people were not aware of it or didn’t understand it. Some residents also refused to buy into the program because they wanted the City to be responsible and accountable for the work. It took some time before property owners understood that the subsidy program was implemented to provide a second line of defence after adequate infrastructure servicing to help residents in high risk areas.”