PRODUCTS
IN ACTION

Rehabilitation MANHOLE COVER

While municipal utilities have many issues to deal with within the sewer network, one of the biggest is excessive infiltration and inflow (I&I), the occurrence of storm or groundwater entering into municipal sewer systems. To many municipal managers, the problem may seem overwhelming; however, while I&I can be controlled, few municipal utilities are taking advantage of the available technologies that can help them achieve this.

By Andy Buchan

The hidden and not-so-hidden costs of I&I

Infiltration and inflow can occur for many reasons, but most of the causes stem from aging infrastructures that need maintenance or replacement. The most common means of infiltration is through cracked or deteriorated manhole chamber walls due to long-term exposure to hydrogen sulfide gas and chamber fracture that is caused by ground movement and constant trafficking. Other causes include surface water runoff through manhole covers and down the sides of the frames because of cracked road surfaces, broken grade rings between the chamber cone and the manhole frame, and cracked pipes and leaking joints.

Essentially, I&I becomes a headache for municipalities looking to reduce or maintain costs and ensure that their processing facilities remain within the design capacity. When rain or groundwater enters the sewer system, the necessary processing of the additional water in sewage treatment facilities often costs more than $3 per 1,000 gal.

Exacerbating the cost issues are the strict environmental standards municipalities must meet. These include capacity management operations and maintenance (cMOM) regulations that require elimination of sanitary sewer overflows (SSOs) and improved overall system efficiency, and new U.S. Environmental Protection Agency requirements for protection of floodplains, creeks, ponds and other sensitive environmental areas.

To meet these standards, municipalities must undergo expensive repairs on often dilapidated infrastructures that date back decades (some parts of lower Manhattan are still served by pipes installed in the 1850s). Federal funding for improvements to wastewater and sewage systems is shrinking, even as the need for such improvements continues to increase. Ignoring a single leaking chamber could cost a town between $5,000 and $15,000 in just processing fees per year. Multiply this by 200 (the typical amount of covers required in a small town), and a town could spend a minimum of $50,000 on treating clean rainwater.

As the infrastructure gets older and repairs are further neglected, the problem only gets worse. Add to that fines for environmental regulation noncompliance, and local governments are looking at quite a future cash risk and tax burden for the local population.

The path of least resistance

Many utilities are taking a less than proactive approach—in other words, ignoring the problem and avoiding it altogether, but those actively seeking answers often see a wide variety of solutions to choose from. Appropriate technology choices must then be made, and not all solutions provide the necessary answers to the problem.

Municipalities resolving cover inflow often use secondary devices such “rain dishes.” These dishes are available in both plastic and stainless steel, and while effective for the most part, they are not always reliable. The plastic ones are often not durable under trafficking, and the expensive stainless steel ones are attractive to thieves. Worse yet, both types risk falling into the chamber and blocking sewer lines, thereby causing SSOs.

Towns trying to resolve chamber leakage often apply of coatings to the inside of the chamber and the grade rings, protect the outside of the chamber with rubber shields and repair cracks on the outside of the chambers through external repair. These tactics need to be carefully considered to ensure they are appropriate for achieving the desired outcome. While these solutions may be effective, they often require specialist installation or require external chamber application. This makes maintenance on existing systems difficult without expensive excavation around the chamber.

Ultimately the municipalities need to determine the local risk and reward to generate a full understanding of the necessary action, particularly as environmental policies get tougher and the cMOM regulations begin to take effect.

Additional alternatives

The most obvious solution when replacing access covers is

Taking advantage of the available technologies that can help excessive infiltration and inflow

to choose products that will help prevent the problem in the first place. Some choices include the PAMREX access covers from CertainTeed. PAMREX provides inflow resistance and does not utilize secondary devices such as infiltration dishes, which can often cause additional problems. In addition, PAMREX covers are made from lightweight, ergonomic ductile iron and contain shock-absorbing gaskets that eliminate routine traffic shock, helping to protect against road surface and chamber breakdown (conditions that can cause an increase in I&I). The presence of the gasket also eliminates metal-to-metal contact between the cover and the frame, which often causes the cover to be beaten with a sledgehammer to release prior to opening. This in itself causes damaging cracks to the chamber and the grade rings, exacerbating the risk of inflow.

PAMREX, through the gasket design, eliminates this problem by always being easy to open without having to beat on the cover and cause breakdown. Also, the easy installation of the frame due to its bedding slots makes the cover more secure and more stable under routine trafficking, which in turn translates to less movement and less I&I. SealGuard has a product that provides a water-tight seal between the manhole frame and concrete called XSeal. This product will allow the manhole chamber to "vac test."

If complete replacement of the infrastructure is impractical, or if municipalities need to plug cracks in the chambers as a stopgap measure, a product called SealGuard can be used. Made from polyurethane plastic, SealGuard has been used for more than 25 years in the mining industry and in water-sealant applications for the past eight years, in both above- and below-grade structures.

One of the advantages of SealGuard is that it does not require specialized contractors to install, which saves money for municipalities. The product, an expandable grout, repairs the outside of the chamber from within, containing leakage. SealGuard does not affect any coatings subsequently applied to the chamber, resolving the issue of chamber breakdown via hydrogen sulfide gas exposure. Rick Schooley, center sanitary sewer manager for Leesburg, Va., was able to stop contracting out his manhole grouting work and instead put in place a dedicated two-man crew that, since January 2004, has grouted 186 manholes in the town and stopped 531 gal per minute (764,640 gal over a 24-hour period) of infiltration, reclaiming, according to Schooley, 17% of the plant's capacity.

Putting the plan into place

While all of the steps it takes to curtail I&I sound difficult and involved, the process really boils down to a basic, four-step plan.

First, municipalities must conduct an analysis of their situation, taking into account current and future liabilities, as well as the potential cost savings that could be achieved by making simple repairs. Second, they should audit the increase in sewage treatment works flow before and after storms. Third, they should replace access covers with durable, secure ones designed to keep out infiltration, then properly seal their chambers with long-lasting manhole grouting material, placed from the inside. And lastly, they should investigate the need to protect the chamber from H_2S gas if the danger for chamber corrosion still exists.

Only after municipalities take into consideration all of the alternatives, make the correct choices and carefully follow all of the above steps to correct problems will they be able to count their I&I problems as, well, water under the bridge. WWD

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