

Hidden Threat

Inflow & infiltration's impact on public health, municipal budgets and property owners' wallets

By Myles Meehan

The U.S. is in dire need of additional investment to improve infrastructure, and the rhetoric almost always centers on roads and bridges. Buried under these infrastructure discussions is a topic unknown to most of the general public—inflow and infiltration (I&I).

Water and wastewater professionals understand the I&I threat to public health, its impact on municipal budgets, and the liability issues for commercial and residential property owners. I&I is becoming an important part of the aging and insufficient wastewater infrastructure challenge in the U.S.

In December 2011, the American Society of Civil Engineers (ASCE) estimated that without adequate investments in water infrastructure, the following may occur by 2020:

- American businesses will pay an additional \$147 billion in higher costs.
- Average homeowners will pay \$900 a year in higher costs.

- The economy will lose up to 700,000 jobs.

The I&I Problem

The simplest definition of I&I is clean, clear water going to the wrong place—the sewer system. Inflow refers to storm water entering sewer systems through direct, often illegal routes such as sump pumps, downspouts and building drains. Infiltration is groundwater entering sewers through leaks in pipes and manholes.

To the layperson, I&I may not sound like a big problem, but this excess water can quickly overload sewer system capabilities, causing untreated overflows onto streets, basements and property. A single residential sump pump can discharge 30 gal of water per minute, or more than 40,000 gal per day. When the discharge is illegally connected to sanitary lines, this additional inflow can create sewer treatment capacity issues for many communities. Untreated wastewater flows directly to streams and lakes, posing a public

health threat and noncompliance with state and federal water quality standards. Treatment plants, utilities and cities bear the increased operating costs, and property owners face liabilities for sewer line I&I remediation, which can potentially

run into thousands of dollars. At worst, economic development can come to a standstill in areas of chronic treatment capacity problems.

Awareness & Solutions

As with many infrastructure challenges, technology is not the main issue. Effective I&I detection techniques include auditing (of illegal connections), visual inspection, flow monitoring, smoke tests, dye tests and even closed-circuit television. Options for remediation range from excavation, replacement or simply eliminating illegal connections, to liner pipes, spray-on pipe linings and sewer line cleaning.

The real challenges are issue awareness, repair costs and incentives to act. These challenges often are complicated because sewer treatment systems typically serve multiple communities.

According to the U.S. Environmental Protection Agency, telltale signs of I&I problems include: overflows at treatment plants after rain, including hydraulic overloading and excessive power costs; combined, sanitary and regular sewer overflows; basement flooding after rain; persistent water quality problems; and odor complaints.

In terms of collective cost and motivation, one successful public approach is the carrot-and-stick program undertaken by the 47 communities connected to the Metropolitan Council Environmental Services (MCES) in the Minneapolis-St. Paul area of Minnesota. Essentially, each community has taken responsibility for their local I&I problems, with proportional surcharges assessed on the communities that fail to address I&I issues.

For instance, the small municipality



An exterior water line overflow is one sign of an I&I problem.

of Eagan, one of the 47 communities, is liable for up to \$1.8 million in I&I surcharges—a heavy burden for its annual budget. In response, Eagan established mandatory I&I home and business inspections, with noncompliance/non-repair penalties of \$150 a month for homeowners and \$500 a month for non-residential property owners.

That's the "stick." The "carrot" portion of the MCES program is up to 50% reimbursement by the state of Minnesota of qualifying construction/repair costs—available to all 47 communities—as part of a \$3 million grant program arranged through MCES. Another reward is post-inspection/post-repair certificates of compliance for property owners, which enhance property values and facilitate property sales. Overall, this program has been very successful, with more than \$50 million in public and private I&I repairs completed during the last five years.

Remediation Programs

Another approach to alleviating I&I cost liabilities for property owners are utility-based I&I remediation programs. For a monthly premium, utility customers get a repair plan that protects them from the cost of eliminating excess or non-code compliant water flow from groundwater and/or storm water into sewer pipes. Typical plans include the cost of fixing broken pipes and connections, as well as disconnecting roof drain downspouts and other property drains directly connected to sewer laterals.

These plans not only remove the anxiety from mandatory I&I inspections and potential repair costs for property owners, but they also offer several advantages for water and wastewater utilities. Most of these I&I remediation plans are outsourced to independent service organizations, with no cost or liability to the utility. Utilities are able to offer their customers a valuable service and help restore structural integrity to the privately owned side laterals of the sewer system, assist municipalities in meeting state and federal environmental mandates, and help cities keep sewer system operating costs to a minimum.

A Stitch in Time ...

Aging infrastructure can be a serious threat to national, state and local economies; public health; and property owners, and will only cost more to repair if neglected. According to ASCE, annual capital investment in water infrastructure, including wastewater infrastructure, must increase from the current \$36.4 billion to \$91 billion just to meet the needs of the growing population and economy. Investment of an additional

\$9.4 billion a year from now through 2020 will avoid an estimated \$21 billion a year in costs to households and businesses, according to ASCE. [SWS]

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