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Supplement to:
MUNICIPAL
**SEWER
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WATER**



CASE STUDIES
Page 26

**CONTRACTOR
SPOTLIGHT:**
**Draining
the swamp**
Page 18

Making a Lateral Move

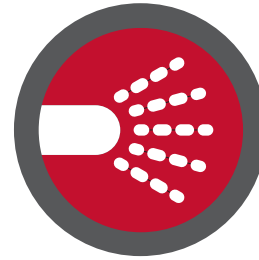
New ordinances thrust plumber
into profitable I&I work

Page 10





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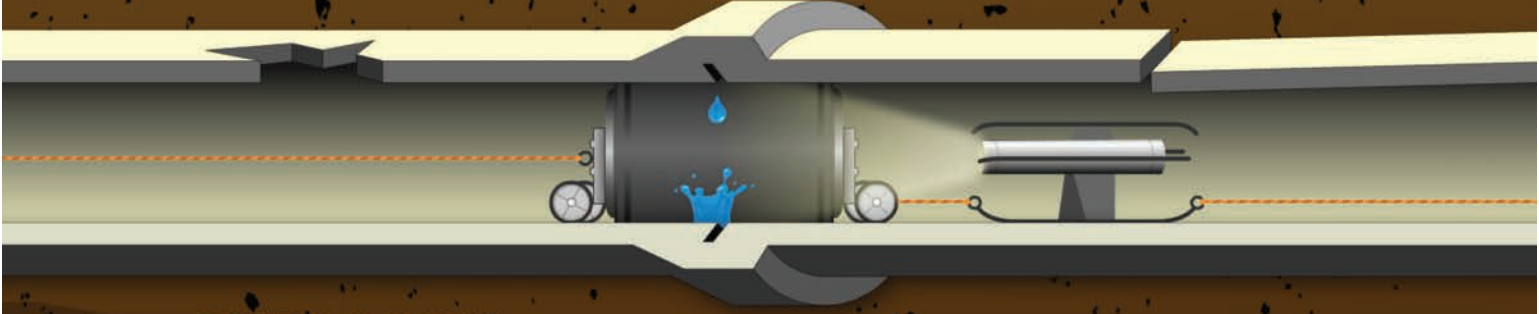
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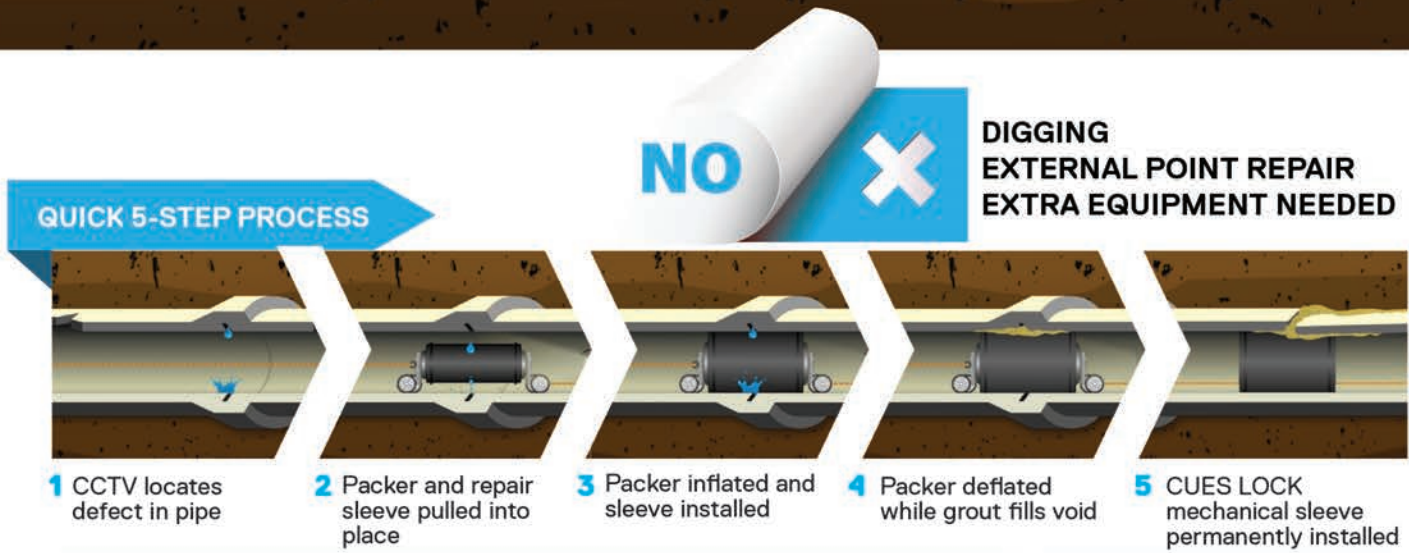


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INFLOW & INFILTRATION
SOLUTIONS AND EQUIPMENT

UTILITY SPOTLIGHT | 8 Making Ends Meet

Proactive CIPP repair is a cost-effective way to keep sewers flowing from point A to point B.

By Traci Browne

BEST PRACTICES | 16 Prudence in Planning

Modify your cost-effective analysis elements to increase I&I mitigation efficiency.

By Jared Raney

CONTRACTOR SPOTLIGHT | 18 Draining the Swamp

Michigan crew digs trenches in tough terrain to address infiltration.

By I&I Staff

BEST PRACTICES | 20 Use Data Modeling to Mitigate I&I

Rather than replicating other projects, a customized method analysis is the way to go.

By Jared Raney

NEXT ISSUE:
Spring 2020

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COVER STORY | 10 Making a Lateral Move

New ordinances inspire Pennsylvania plumber to get into I&I remediation.

By Ken Wysocky

COVER PHOTO: Devyn Hopson (left) and Doug Moyer of C. Carlin Plumbing use a RIDGID SeeSnake inspection camera to assess the condition of a sewer line on a large commercial project in Erie, Pennsylvania. The company has been taking on more lateral rehab work in response to local ordinances that make property owners responsible for repairing their own sewer connections. (Photography by Amy Voigt)



Partnering With the Public | 22

A popular new website created by Metropolitan Council Environmental Services is engaging residents to reduce I&I.

By Sandra Buettner

BEST PRACTICES | 24 Open Doors With Amnesty

Your utility can benefit from offering forgiveness to residents with improper sump pump connections.

By Anthony Drew

CASE STUDIES | 26 By Craig Mandli

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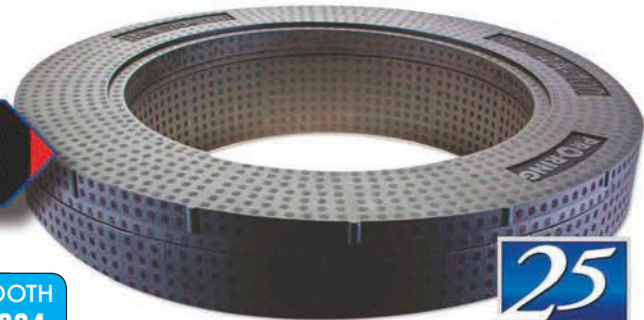
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Advertiser Index Winter 2020

ADS Environmental Services	7	Mr. Manhole	29
Composite Access Products (CAP)	5	Pipeline Renewal Technologies	17
Cretex Specialty Products	6	Rainstopper	21
CUES, Inc.	3	Sealing Systems, Inc.	15
DUKE'S Product. Service. Guarantee.		Southeast Pipe Survey, Inc. ...	25
Duke's Root Control, Inc.	2	Strike Products	Back Cover

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Published four times yearly by COLE Publishing, Inc.
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Call toll free 800-257-7222 | Outside of U.S. or Canada call 715-546-3346
Mon.-Fri., 7:30 a.m.-5 p.m. CST

Website: iandimag.com | Email: info@iandimag.com | Fax: 715-546-3786

SUBSCRIPTIONS: I&I™ is included quarterly (Jan., April, July, Oct.) along with a one-year (12 issues/monthly) subscription to Municipal Sewer & Water™ (MSW). MSW and I&I are free for qualified subscribers in the United States, Canada and Mexico. A qualified subscriber is any individual or company in the United States, Canada and Mexico that maintains, manages, designs or installs municipal or commercial sewer, water and storm infrastructures. To qualify, visit www.mswmag.com or call 800-257-7222.

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EDITORIAL CORRESPONDENCE: Address to Editor, I&I, P.O. Box 220, Three Lakes, WI, 54562 or email editor@iandimag.com.

REPRINTS AND BACK ISSUES: Visit iandimag.com for options and pricing. To order reprints, call Jeff Lane at 800-257-7222 (715-546-3346) or email jeff.lane@colepublishing.com. To order back issues, call Nicole at 800-257-7222 (715-546-3346) or email nicole.maney@colepublishing.com.

CIRCULATION: 10,184 copies, four times yearly.

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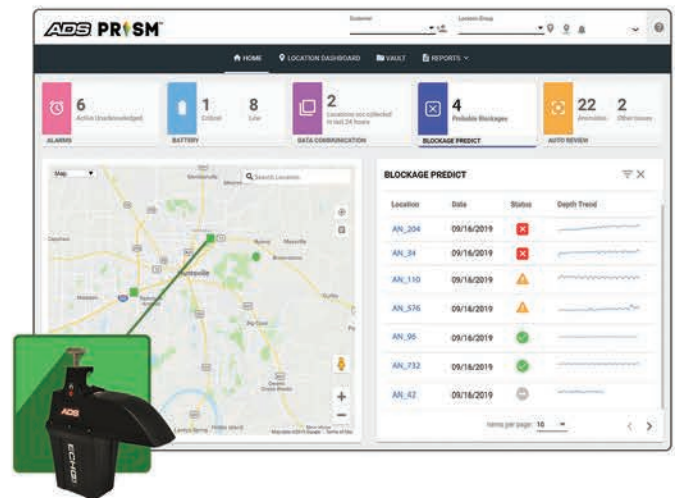
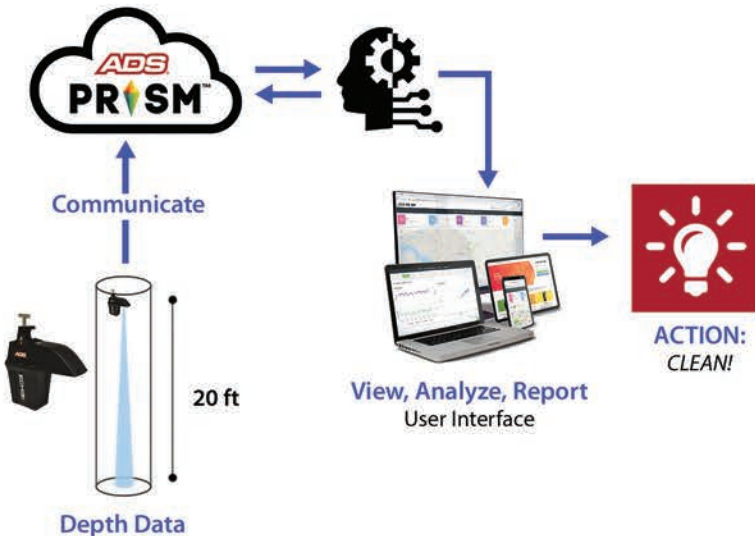
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Fed up with the accumulating expenses of reacting to sewer line breaks, the city of Lawrence (Massachusetts) Water and Sewer Department is taking a proactive approach to its cured-in-place pipe rehabilitation work.

“We would only embark on an infrastructure project when something completely failed, collapsed and started causing backups, which was very costly for the city.”

Brian Peña

MAKING ENDS MEET

Proactive CIPP repair is a cost-effective way to keep sewers flowing from point A to point B

By Traci Browne

For too long, the city of Lawrence (Massachusetts) Water and Sewer Department took a strictly reactive approach when it came to sanitary sewer infrastructure repairs.

“We would only embark on an infrastructure project when something completely failed, collapsed and started causing backups, which was very costly for the city,” says Brian Peña, acting director of Public Works.

With many of the pipes about to reach their 100-year mark, the city needed a drastic change. It turned to engineering and consulting firm Woodard & Curran to help find a solution.

A HOLISTIC APPROACH

The first step in Woodard & Curran’s plan was a sanitary sewer evaluation survey — the first such survey performed in Lawrence in a very long time. The survey included flow isolation, manhole inspections, CCTV inspection, building inspections, and dye flooding and testing.

Data pulled from the survey allowed Woodard & Curran to put together recommendations for rehabilitation and develop a strategy around future proactive investigations.

Justin deMello, project manager at Woodard & Curran, says most municipalities don’t like to invest money in this type of holistic approach, but not only is it cheaper than on-call replacements, it’s far less invasive to the community.

For repairs where open-cut work wasn’t necessary, Woodard & Curran recommended the cured-in-place pipe method for an average cost of \$100 per foot compared to the \$800 per foot the city had been paying for on-call excavation.

Not only was CIPP cheaper, but it was also far less disruptive, Peña says.

In many cases, they were able to line the pipes while traffic continued in both directions. Production rates were significantly higher because workers could complete an entire section of pipe from manhole to manhole in a single day.

As an example of how much money the city of Lawrence saved with a proactive approach, deMello shared some figures in a paper presented at the North American Society for Trenchless Technology’s No-Dig Show in 2018. A 600-foot segment of 8-inch vitrified clay pipe showing signs of structural failure was rehabilitated using CIPP at \$40.40 per linear foot.

The total cost of just under \$25,000 included mobilization; bypass pumping; traffic management; installation of the liner; reinstatement of the service laterals, grouting laterals and pipe ends; and pre-, post- and 1-year warranty CCTV inspection of the pipe segment.

While a proactive CIPP approach was far cheaper in the long run than waiting for a failure, the work still had to be paid for, and the city of Lawrence wasn’t exactly swimming in money.

TIGHTENING OPERATIONS

According to July 2018 census records, the city of Lawrence is one of the most impoverished communities in Massachusetts, with a 24% poverty rate and a median per capita income of \$18,069. Raising rates was something the city wanted to avoid, if at all possible.

To pay for the project, Woodard & Curran recommended going after the low-hanging fruit first. The city looked within and tightened up operations wherever possible. Next, it looked at where it was failing to capture revenue, and one answer became apparent: water meters.

Many of the city's water meters were over 50 years old, and their accuracy had severely depleted. The plan was first to replace the large industrial and commercial meters, and then start replacing aging residential meters.

The city tapped into the State Revolving Fund tailored explicitly to water and wastewater projects and secured a 2% loan. Within the first year, the new meters were generating about \$1 million in revenue.

"To put that in perspective, at that time, we had a \$16 million budget," Peña says.

Some residents were less excited about the accuracy of the new meters. Despite all the communication in advance of the switch, residents still thought the city had raised its rates.

Peña says he understood their frustration, but he noted that fate ended up being on the city's side. The year the community was receiving higher water and sewer bills, the local economy started to recover. Unemployment was on the decline, and residents were getting back to work.

The treatment plant, with pumps that were 40 years old, also was tapped for savings. Not only were the pumps old, but they'd been installed when the plant had previously served two communities. These days, the service area is much smaller and resizing the pumps would realize even more savings.

To pay for new pumps and other equipment, the city of Lawrence paired those upgrades with a project to build a solar array at the plant. They were able to secure state financing at 2% interest and 10% principal forgiveness.

While the city still carries a debt service of about \$60,000 for that project, between the electricity savings from the pumps, the electrical offset of about 30% to 35%, and the fact it's now receiving solar renewable energy credits from the state, it is netting about \$100,000 a year.

It's not quite as dramatic as the meter upgrades, but Peña points out there were other benefits. "We ended up with five brand-new pumps and variable-frequency drives that would have had to be replaced regardless."

That new equipment came at zero or minimal cost based on the credits and taking advantage of the available low-interest principal forgiveness loan.

A METICULOUSLY ORGANIZED SOLUTION

With money in hand, a triage system was put in place to start the repairs on the pipe infrastructure. Woodard & Curran had a seven-year plan to investigate every piece of infrastructure in the community, but it quickly prioritized projects with the highest consequence of failure or likelihood of failure.

To maintain order and manage the complexity of the data, Woodard & Curran uses Innovyze InfoAsset Planner. The database is continuously updated as more data comes in and as projects are completed. Woodard & Curran is also coordinating with and gathering data from other city departments and utilities.

Working across city departments and other utilities is crucial, deMello says. Not only can you coordinate work being done in the same areas, but it's

also valuable for inspection purposes. You can share data between city departments and the gas and electric utilities, which saves everyone time and money.

According to the paper mentioned above, in the first three years of the project, the city has conducted over 300,000 feet of CCTV pipe inspection, 3,500 NASSCO Level I manhole inspections and 160,000 feet of smoke testing — and is well on its way to achieving its goal of inspecting the entire sewer system.

During that same time, the city spent approximately \$1.9 million to assess, prioritize, design and rehabilitate nearly 11,000 feet of pipe using CIPP technologies. That same budget would have gotten them 2,500 feet of open-cut repairs — which is 77% fewer rehabilitated pipes.

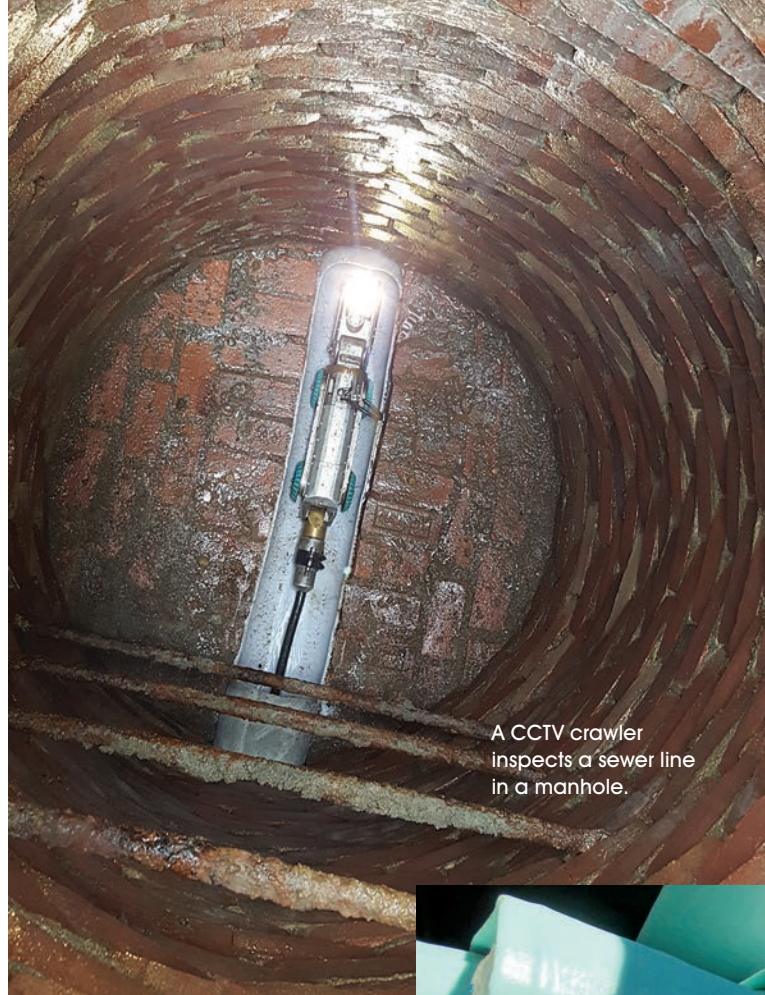
UNEXPECTED BENEFITS

In addition to alleviating infiltration in its sanitary sewers by taking a proactive approach with CIPP pipe rehabilitation, the survey yielded some unforeseen advantages related to inflow and infiltration.

At the same time the city was grappling with repairing its infrastructure, operators noticed that wastewater flows had nearly doubled over a short period of time. Woodard & Curran worked with the city and the Greater Lawrence Sanitary District wastewater treatment facility to narrow down where the infiltration was coming from.

A dye test and about five hours of patiently waiting for results revealed the culprit — an old deteriorated slide gate in one of the city's canals. This one fix shaved about \$500,000 per year off the city's sanitary district payments, according to deMello. Dividing that among the city's 12,000 customers, it equates to a much-needed savings of \$42 per person and appreciative ratepayers.

I&I



A CCTV crawler inspects a sewer line in a manhole.



Workers placed the cured-in-place pipe liners on ice to slow the curing process.



Making a Lateral Move

New ordinances inspire Pennsylvania plumber to get into I&I remediation

STORY Ken Wysocky | PHOTOS Amy Voigt

It's not often a businessman has good things to say about new government regulations. But for Chris Carlin, owner of C. Carlin Plumbing in Erie, Pennsylvania, new ordinances that made Erie-area homeowners responsible for repairing their own sewer laterals thrust his company into a completely different — and more profitable — direction.

The ordinances went into effect during the mid-to-late 1990s as municipalities realized they couldn't afford to fix all the inflow and infiltration issues plaguing thousands of aging lateral lines in the region. "They figured out there were a lot more miles of laterals than there were miles of sewer mainlines," says Carlin, 54. "So they made homeowners responsible for laterals from the house to the main.

"That's when homeowners started to need lateral inspections, so we bought a sewer camera," he says. "That was the start of our I&I work."

After realizing the immense potential in this niche, Carlin slowly steered his company in a U-turn away from new-construction plumbing and never looked back. Doing so required significant investments in drain cleaning machines and pipe rehabilitation technology.

"It starts with a camera, but then you need a jetter because you can't get through tree roots to figure out the problem," he says. "One thing definitely leads to another, but if you want to be in the business, you need all the equipment."

Today, only about 10% of his company's revenue comes from new-construction plumbing, while drain cleaning and sewer repairs generate another 50%. Plumbing service and repair work produces the remainder, he says.

"In this case, more regulations worked out pretty good for us — it created a whole new line of work," he says.





“In this case, more regulations worked out pretty good for us — it created a whole new line of work.”

Chris Carlin

BE READY TO CAPITALIZE

Carlin’s story underscores the importance of remaining alert to changing market conditions and being among the first to adapt to those conditions. It also reflects the value of staying abreast of new technological advancements that increase productivity and profitability while providing customers with more convenient options for sewer repairs.

Take pipe lining, for instance, which C. Carlin Plumbing started doing in 2003. At that point, the company had been doing I&I work for about seven years, and Carlin was weary of busting big holes in concrete basement floors to repair pipes. As he wryly notes, “It was as close to being impossible as possible.”

All that changed when he attended the 2003 Pumper & Cleaner Environmental Expo, now known as the Water & Wastewater Equipment, Treatment & Transport (WWETT) Show.

Chris Carlin, left, founder and owner of C. Carlin Plumbing, and Tyler Sherman use a portable Quik-Shot system to invert a CIPP liner at a large commercial project.

It was there he bought a cured-in-place pipe lining system from Nu Flow Technologies.

“We were the first company in Erie to invest in this kind of equipment,” Carlin says.

Today, the company uses felt liners and a Quik-Shot liner-installation system from Pipe Lining Supply, as well as pipe lining equipment made by MaxLiner USA.

The company also owns a trailer water jetter made by O’Brien (a brand owned by Hi-Vac). It features a 300-gallon water tank and a Giant Industries water pump that generates pressure of up to 4,000 psi and flow of up to 20 gpm.



**C. CARLIN
PLUMBING INC.,
Erie, Pennsylvania**

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1994

OWNER:

Chris Carlin

EMPLOYEES:

14

SPECIALTIES:

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SERVICE AREA:

75-mile radius around Erie

WEBSITE:

www.ccarlinplumbing.com

Alex Presley (left) and Dave Cunningham use a calibration hand roller to ensure the proper amount of resin is evenly applied to the liner.

In addition, the business relies on a Vermeer V500 portable vacuum unit with a 300-gallon debris tank, 200-gallon water tank and vacuum pump made by McLaughlin; two Kubota mini-excavators; 10 RIDGID sectional drain cleaning machines of various sizes; two small RIDGID water jetters; and three RIDGID SeeSnake pipeline inspection cameras.

For service vehicles, the company runs two Ford Transits dedicated to drain cleaning and five Ford E-250 and E-350 cube vans with box bodies made by Unicell and Bay Bridge Mfg. Two Ford F-350 dump trucks with 1-ton dump bodies made by Air-Flo round out the vehicle fleet.

In addition, Carlin prefers hoses made by Piranha Hose Products and jetter nozzles made by NozzTeq.

UNUSUAL CAREER PATH

Carlin got into the plumbing industry in a roundabout way. His father was a teacher who painted homes during summers, and while working for his dad, they did some work for a plumber. The plumber liked Carlin's work ethic and offered him a job.

“You can always count on drain cleaning and pipe rehab and repairs. None of this is going away. The market is huge, and it’s only going to get bigger.”

Chris Carlin

“I had to think about it,” Carlin says. “But my dad told me that whatever I learned from plumbing would take me a lot further than anything I learned from painting. So I took the job.”

After about nine months, the owner of the company took Carlin aside and suggested that plumbing might not be a good career for him after all. “He told me I was too afraid to make mistakes,” Carlin says. “He said all mistakes could be fixed — that’s how you learn.”

After that, something clicked. Within six months, he was supervising a crew of technicians while doing his own service and repair work on the side. That continued for 11 years until Carlin decided to strike out on his own.

“I was making top dollar where I was at, but it was a time thing, not a money thing,” Carlin says. “I was doing too much work on the side because I just couldn’t say no. I was 30 years old and never home. I had 6-year-old daughter and my wife was pregnant.

“After I started my company, I was able to work 40 to 50 hours a week instead of 90 hours a week.”

Carlin figured his company would start out with a solid built-in client base thanks to all the work he’d done for years on the side. But he quickly discovered that customers weren’t willing to pay the higher rates he now had to charge to cover the more expensive overhead costs generated by his new company.

“That was a shocker,” he says. “I lost about 80% of my side customers because they liked my old price more than they liked me. But I generated new business through word-of-mouth referrals.”

The takeaway here? Carlin says if you treat people right and charge a fair rate and do a good job, word-of-mouth referrals will follow.

DIVERSIFICATION IS KEY

Having all of the company’s eggs in the new-construction basket was a risky business model, so Carlin felt good about leaning in harder on drain cleaning, sewer inspections and pipe rehab.

His diversification effort got a boost when another municipality near Erie passed an ordinance requiring lateral inspections whenever a home is sold. That led to a profitable contract to perform lateral inspections for that municipality.

“Through the camera work, we act as the municipality’s eyes,” he says. “An inspector from the municipality has to be there on site with us when we do camera work. Customers pay the municipality, and then the municipality pays us.”

That arrangement also led to more sewer rehab work — mostly lining pipe if a home’s lateral flunked the inspection. “We started to pound out linings because in most cases, it’s cheaper than excavating,” Carlin says. “And we’re still pounding them out.”

About two years ago, two other companies entered the market for pipe rehabilitation. While it may sound counterintuitive, he says the competition is good because it raises consumer awareness about the options available.

“Sure, prices go down a bit with more competitors,” he says. “But I’ve been doing it a lot longer, which I believe gives us a little bit of an edge, with 17 years of experience as opposed to two. That’s a pretty easy sell for me. Plus, I can’t take every job that comes along.”

While getting into the pipe rehabilitation work before anyone else definitely gave Carlin a competitive advan-

tage, he also firmly believes there is enough work for everyone if they treat customers fairly and do good work.

“I don’t have a problem with competition,” he says. “It actually brings me more calls because people want to compare bids.”

FOLLOW THE MONEY

In the bigger picture, Carlin urges other plumbers to diversify and get into sewer inspections and rehab work. “You need to get a camera and get into I&I work,” he says. “The need for repairs isn’t going to go away.”

“I also think more and more municipalities are going to start mandating lateral repairs. If you want steady work, this business is the way to go.”

Unlike many drain cleaners, Carlin doesn’t charge customers an extra fee to run a camera through a line. And he always gives customers a copy of the video that they can keep for future reference. He tells them that they can even show it to other contractors to get a repair bid. *(continued)*



Chris Carlin (center) supervises a large commercial project in which his team rehabilitates a sewer pipe using a CIPP relining system. He believes diversified services are the key to a successful operation and recommends plumbers consider pivoting into more I&I work.

STICKING TO YOUR STRENGTHS

Offering diversified services has been an essential part of C. Carlin Plumbing’s growth during the last 25 years. But not every foray into diversification was successful, according to owner Chris Carlin.

About 18 years ago, Carlin decided to add heating and cooling installations to the services provided by the Erie, Pennsylvania-based company. It seemed like a logical extension of the company’s plumbing installation, drain cleaning and pipe rehab services. Plus, Carlin owns several apartment buildings and was tired of calling in heating companies.

So he hired an experienced technician and an assistant, focusing them on heating installations in new buildings. “It was also nice to have

someone on the payroll who could handle problems in my rental buildings,” he says.

Yet roughly six years later, he jettisoned the business and came away with a valuable business lesson: Stick to what you know best.

“It was a very painful experience,” he says. “An accountant once told me years ago that you should focus on what you do best and pay someone else to do the rest. That was excellent advice.

“My big mistake was getting into something about which I wasn’t fully knowledgeable,” he says. “Plus, if someone didn’t have heat on a weekend, someone had to go in and take care of it, and that person usually was me. It was a lose-lose situation for me. I was not making any

money, and I was working more on weekends. I was already doing that for plumbing calls.”

Eventually, he laid off the two employees. “Everything then fell on me, which I didn’t have time for,” he says. “I didn’t want to look for another technician, so I shut things down. If you can’t make money at something, there’s no use in doing it.”

Carlin says he still has several thousand dollars’ worth of sheet metal, equipment and other materials in his shop that remind him of the failed venture. But in the end, he chalks it all up to nothing ventured, nothing gained.

“If I made money on every venture I tried, I’d be a rich man,” he says. “You can’t win them all, but you can certainly try.”



“You need to get a camera and get into I&I work. ... I also think more and more municipalities are going to start mandating lateral repairs. If you want steady work, this business is the way to go.”

Chris Carlin

“It shows customers we’re being honest with them, and they respect that,” he says. “Besides, if we put a camera in a line, we sell the job more than 50% of the time. We get a lot of work off of providing a second opinion for customers.”

As he looks back at his decision to get into I&I-related work, Carlin has no regrets. He finds it a fulfilling and gratifying career with almost unlimited potential for growth.

“I really like figuring things out — finding solutions to problems,” he says. “Problem-solving is my big thing. So many times we see customers who have had drain problems for a long time, and then we come in and offer them a permanent solution. I just love that challenge.”

Looking ahead, Carlin sees more growth, noting that awareness of the I&I industry is starting to take off. “The infrastructure is failing left and right, and we can’t keep up with it,” he says. “There’s a lot of work out there and a lot of money to be made.

“You can’t count on new-construction work to keep you busy all the time, but you can always count on drain cleaning and pipe rehab and repairs,” he says. “None of this is going away. The market is huge, and it’s only going to get bigger.” **I&I**

From left, Chris Carlin, Doug Moyer and Devyn Hopson use a RIDGID SeeSnake pipeline inspection camera to assess the condition of a sewer line prior to rehabilitation.

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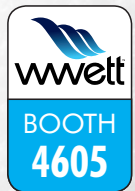
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PRUDENCE IN PLANNING

Modify your cost-effective analysis elements to increase I&I mitigation efficiency

By Jared Raney

Finding the most efficient method for inflow and infiltration mitigation and removal is simply a matter of rethinking your analysis, according to a white paper written by Rick Nelson, director of conveyance technology at CH2M Hill, and presented at a North American Society for Trenchless Technology No-Dig Show.

I&I is one of the most important issues for stormwater utilities, and cost-effective analyses, or CEAs, have long been used to aid in that venture. NASTT provides recommendations for improving your CEA to ensure the best I&I removal strategy.

CEAs are typically fragmented into three areas of concentration. The paper suggests minor alterations to each portion can significantly impact your strategy.

“A CEA is used to determine the percentage of I&I that is cost-effective to remove and the associated reha-



PHOTO BY AMY VOIGT

“The incorporation of refinements into the CEA will enhance the quality of the analysis and provide more confidence in the results.”

ilitation, treatment, storage and relief costs,” according to the paper. “These improvements include more detailed and accurate system modeling, genetic algorithms, enhanced sewer system evaluation procedures and wet-weather treatment technologies.”

It’s not a new concept; CEAs have been used to assess stormwater infrastructure since at least 1991. But for the most part, the mechanics have not changed in that time. The NASTT paper suggests three essential changes to improve efficiency.

NONUNIFORM PERCENTAGE I&I REMOVAL

Though the description may not excite the imagination, in bare-bones form it means instead of calculating the value of I&I removal by type across the entire system, a more accurate method is to predict regionally.

There are inherent issues when trying to extrapolate across an entire system. The variability between basins makes it nearly impossible to accu-

Three ways to improve upon cost-effective analyses are by calculating inflow and infiltration removal by region, using genetic algorithms and considering the long-term costs of future system degradation.

rately quantify the repair cost of a singular method on a broad scale.

Assessing a system regionally, ideally on a basin-by-basin level, allows for a more refined approach.

So essentially, instead of picking the cheapest method and applying it to the entire system, municipalities can get more bang for their buck by finding the basins with the highest rates of I&I, which would be the most cost-effective to address.

OPTIMIZATION USING GENETIC ALGORITHMS

Computer-aided analyses have made great strides, becoming more available to the consumer market. One such technology is data modeling. Again,

the idea of using data to predict I&I removal isn't new, but the paper's writers suggest an upgrade on what many are used to.

They describe genetic algorithms, or GAs, as an enhancement on traditional master planning techniques, which essentially use trial-and-error modeling to evaluate a small number of possible solutions. GAs are a step up in that they can compare nearly every conceivable combination of practices to find the most effective strategy.

The idea of GA optimization is that the model will proceed through various "generations" of simulation, altering the scenario every time until it finds the combination of methods with the lowest total cost.

It can also vary the hydrological profile, for example generating the costs for a spectrum of I&I removal percentages. It can calculate the cost of 15%, 20% and 30% in one area and 30%, 40% and 50% in another.

Optimizations can consider traditional considerations like storage, rehabilitation and treatment, as well as less-considered efforts like best management practices.

"Each simulation represents a different combination of system improvement options, and for each simulation, the total project cost is calculated and the hydraulic performance is evaluated," according to the paper. "In each solution, different combinations of capital improvements and operational settings are evaluated."

GA optimizations can increase cost-efficiency by evaluating a far greater number of possible investments, thus ensuring the best option is on the table.

CONSIDERATION OF FUTURE VALUE

Lastly, an element that seems simple but is frequently overlooked is the idea of incorporating the future value of I&I removal into CEA and strategic planning.

"It is recognized that continual aging of sewers will result in increased I&I in the future, unless this is properly managed through long-term rehabilitation. Eventually, sewers will need rehabilitation and replacement," according to the paper. "In order to account for this future needed renewal, the CEA can include an estimate of when and how much rehabilitation would be required through one or more life cycles, the costs expressed as present worth and incorporated into the CEA."

So instead of looking at I&I as a one-time system improvement plan, it is fiscally sensible to consider the long-term costs of future system degradation, taking into account not only the cost of the initial rehabilitation investments, but the accrual of costs and cost savings over time with each potential option under consideration.

BIG POSSIBILITIES

As I&I becomes an ever-growing concern and system age continues to surpass new infrastructure, finding the most efficient and cost-effective plan is

essential. Fine-tuning your CEAs is a small step that could yield big results in achieving desired levels of system performance.

"Tools and approaches to develop the individual cost curves across the range of I&I removal have improved dramatically," the paper states. "The incorporation of refinements into the CEA will enhance the quality of the analysis and provide more confidence in the results." **I&I**

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Crews from Kamminga & Roodvoets excavated swampland, replaced it with compacted sand and set up a wellpoint system before excavation for the project could begin.

DRAINING THE SWAMP

Michigan crew digs trenches in tough terrain to address infiltration

By I&I Staff

While the sewer infrastructure of Bath Charter Township, Michigan, deteriorated 20 feet under a swamp, workers manually operated a lift station to stave off downstream overflows during heavy rains. It was an unsustainable situation, and the only way construction company Kamminga & Roodvoets could fix it was to dig through the swamp.

Township officials knew they had an infiltration problem on their hands, as concrete pipes and manholes were failing and allowing stormwater into the sanitary sewer system. But the area's extraordinarily challenging terrain meant fixing the problem was no small feat for the Grand Rapids-based K&R.

“We basically had to build a trench by backfilling the excavation with sand and then laying in the pipe.”

Austin Graham

The project also called for the revitalization of a lift station, elimination of another lift station, replacement of failing concrete pipe and installation of composite manhole covers manufactured by U.S. Composite Pipe to further prevent infiltration.

The authority was established back in 1976 as a Michigan Municipal Corp. serving the townships of Bath, DeWitt and Watertown, along with the city of DeWitt. The authority owns, operates and maintains a 5 mgd wastewater treatment plant that discharges into the Looking Glass River in Clinton County. It also owns 51 lift stations, more than 30 miles of force mains and more than 135 miles of sewer collection pipes.



OVERCOMING CHALLENGES

To create the system's new equalization basin, nearly 2,200 feet of 60-inch SaniTite HP pipe made by Advanced Drainage Systems was buried at depths ranging from 18 to 23 feet in swampland. Capable of holding 540,000 gallons, it is large enough to provide sufficient storage volume to prevent sewage backup, and it also allowed for the elimination of an upstream lift station.

The biggest hurdle K&R dealt with on the project was poor field conditions, says Austin Graham, project manager.

“For the most part, the field where we installed the 60-inch triple-wall pipe was in areas covered with water for a good portion of the year,” he says. “It’s a swamp — a mucky area where you have the opportunity to work in that condition just a few months out of the year. There’s standing water there almost all the time.”

Once the crew started excavating, it discovered that the existing soil conditions weren't suitable for dewatering. “During a portion of the sewer installation, we needed to remove the spoils and import sand to the proposed trench,” Graham says. “Once suitable soils were installed, we could then install the wellpoint systems to properly dewater the trench.”

Having been forced to set up the wellpoint system for trenching in the new compacted sand, the crew wasn't finishing as many feet of pipe per day as K&R had anticipated. “We knew we needed an extra crew to work on the lift station portion of the work while this crew focused on the pipe installation.”



The workers used 48- and 60-inch-diameter SaniTite HP pipe manufactured by Advanced Drainage Systems.



Nearly 2,200 feet of thermoplastic pipe was installed to build an equalization basin to address infiltration and overflow issues in the township of Bath, Michigan.

The extra crew had been doing other sanitary work on the project, and bringing it in helped K&R gain back some of its lost time. “We have our foreman, crane operator, backfill operator, loader operator and three laborers,” Graham says. “In total, we typically have seven on a full crew.”

PROJECT DETAILS

Even though Bath’s Lift Station 203 was failing and undersized, the project bid called for its use and for the elimination of Lift Station 216. The flows from Lift Station 216 would be rerouted to Lift Station 203.

The key to accomplishing this was the equalization basin, which was both economically and structurally vital to the success of the project. Replacing the corroding sewer with large-diameter, corrosion-resistant sewer pipe and creating the basin reduced the load on the lift station from increased flows that happen during large rainstorms.

Since the K&R crew had to do significant preparation work on the difficult site soils, its previous experience using SaniTite HP pipe was helpful. “We basically had to build a trench by backfilling the excavation with sand and then laying in the pipe,” Graham says. “It helped that we were familiar with the pipe and that it was manageable.”

For the project, the crew used 48- and 60-inch-diameter pipe, which is built with a triple-wall construction and watertight joints. According to Advanced Drainage Systems, SaniTite HP pipe’s stiffness and beam strength minimizes deflection and enhances long-term performance. It meets ASTM F2764 while exceeding the requirements of ASTM D3212 for watertightness with dual gaskets and a banded reinforced bell.

Another important factor for this project was the pipe’s tight tolerance and double-gasketed connection, which provides protection from the surrounding soil and groundwater. Because of the extended time sewage would be stored in the equalization basin, the plan required the system to be highly resistant to the naturally occurring corrosive hydrogen sulfide gas. The existing pipeline was failing due to hydrogen sulfide that had corroded the concrete pipe, and the township didn’t want that situation to reoccur.

According to Plastics Pipe Institute, the engineering-grade polypropylene resin used to make the pipe is highly resistant to sulfide gas and the concentrations of sulfuric acid found in a sanitary sewer. Its technical report, *TR-19 Thermoplastic Piping for the Transport of Chemicals*, contains information on thermoplastic’s resistance to various concentrations of sulfuric acid and other chemicals.

Additionally, the SaniTite HP pipe is designed to last in excess of 100 years, according to Advanced Drainage Systems.

“We use Advanced Drainage Systems plenty, all the way up to 36 inches,” Graham says. “But this is the first time we used the SaniTite HP triple wall

“We have our foreman, crane operator, backfill operator, loader operator and three laborers. In total, we typically have seven on a full crew.”

Austin Graham

up to 60 inches. We felt confident we would be able to take on a challenge like this, given the tough field conditions, just by having the general familiarity of knowing what we need to do for installing ADS single-wall and double-wall pipe. That’s what gave us the confidence to think we could take on a challenge such as this.” **I&I**



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USE DATA MODELING TO MITIGATE I&I

Rather than replicating other projects, a customized method analysis is the way to go

By Jared Raney

The one constant with inflow and infiltration is that practically every municipality in the U.S. is experiencing problems with it right now. But the similarities end there.

Each town and city has its own specific issues — whether they’re geological, topographical or hydraulic — making it difficult to standardize solutions.

So how can you possibly determine the most efficient type of rehab or replacement technology? The simple answer is you can’t, at least not without a sophisticated decision support system, which is exactly what a white paper by Mahmoud Halfawy and Samar Baker set out to address.

The paper titled *GIS-Based Decision Support System for Evaluating Costs and Benefits of Sewer Renewal Technologies* takes a comprehensive approach to efficiency assessment.

“Renewal technologies are advancing rapidly,” the paper states. “The use of trenchless methods has been steadily increasing around the world. New materials and construction methods are constantly introduced to the market, causing the process of evaluating these technologies and selecting the most appropriate solution to become a daunting task for municipal practitioners.”

QUANTIFYING PIPELINE RENEWAL

The first issue is to decide what factors affect the cost-effectiveness and practicality of sewer renewal, which is done by defining and categorizing all potential renewal options.

“Once renewal categories are determined, the renewal methods within each category are further evaluated in terms of their ‘applicability’ ... technology limitations and compatibility with the pipe physical characteristics, site characteristics, and other social or environmental criteria and user requirements,” according to the paper.

When assessing cost, the condition of the system must also be taken into account, as several studies have shown that renewal costs increase as sewer conditions continue to degrade. The approach by Halfawy and Baker uses a point modifier system for different condition levels, on a scale of 5,

...

Planning year and option (network vs. project level)

Sewers selected for the analysis, with a list of their attributes.

Sewer#	ID	Length	Year	Material	Depth	Condition	Flow	Velocity	Cost	Benefit	Priority	Notes
Sewer#1	2016	116.44	200.0	VCT	Main	M	3.00	0.76	3.25	2.46	2-	
Sewer#2	2345	10.46	200.0	VCT	Main	M	3.00	0.77	3.25	2.51	2-	
Sewer#3	2711	99.06	200.0	VCT	Main	M	3.00	0.77	3.25	2.51	2-	
Sewer#4	1950	21.80	200.0	VCT	Main	M	3.00	0.76	3.25	2.46	2-	
Sewer#5	2772	73.95	200.0	VCT	Main	M	3.00	0.77	3.25	2.51	2-	
Sewer#6	2514	102.13	200.0	VCT	Main	M	3.00	0.76	3.25	2.46	2-	
Sewer#7	2516	39.46	200.0	VCT	Main	M	3.00	0.76	3.25	2.46	2-	
Sewer#8	2522	115.89	200.0	VCT	Main	M	3.00	0.76	3.25	2.46	2-	
Sewer#9	2602	91.59	200.0	VCT	Main	M	3.00	0.76	3.25	2.46	2-	
Sewer#10	2974	102.33	200.0	VCT	Main	M	5.00	1.00	3.25	3.25	3-	
Sewer#11	2076	66.99	200.0	VCT	Main	M	3.00	0.95	3.25	3.08	2-	
Sewer#12	8137	101.80	200.0	VCT	Main	M	3.00	0.77	3.25	2.51	2-	
Sewer#13	8306	24.90	200.0	VCT	Main	M	3.00	1.07	3.25	2.51	2-	
Sewer#14	10046	85.80	200.0	VCT	Main	M	3.00	0.77	3.25	2.51	2-	
Sewer#15	10078	86.90	200.0	VCT	Main	M	3.00	0.77	3.25	2.51	2-	
Sewer#16	10095	106.31	200.0	VCT	Main	M	2.82	0.77	3.25	2.51	1-	
Sewer#17	10175	75.92	200.0	VCT	Main	M	3.00	0.77	3.25	2.51	2-	
Sewer#18	11117	3.05	200.0	VCT	Main	M	3.00	0.76	3.25	2.46	2-	

Possible Renewal Methods for Sewer ID: 8306

Method	SubMethod	SubMethod Name	Type	CI Impr.	New CI	Min Unit	Max Unit	Unit Cost	Res
<input checked="" type="checkbox"/>	INLINE	FB	Pipe Busting	Repla.	New (Cl.)	1		\$1.50	24
<input checked="" type="checkbox"/>	LINING	CFP	Cured In Place Pipe	Sem...	1	2.0	\$1.50	\$1.50	24
<input checked="" type="checkbox"/>	LINING	SL	Slip Lining	Sem...	1	2.0	\$1.40	\$1.40	24
<input checked="" type="checkbox"/>	LINING	CFP	Close Fit Pipe	Sem...	1	2.0	\$0.90	\$0.90	24
<input checked="" type="checkbox"/>	LINING	FIP	Formed In Place	Sem...	1	2.0	\$1.30	\$1.30	24
<input checked="" type="checkbox"/>	LINING	TFP	Thermo Formed Pl...	Sem...	1	2.0	\$0.90	\$0.90	24
<input checked="" type="checkbox"/>	LINING	SL	Slip Lining	Struct.	2	1.0	\$1.80	\$1.80	24
<input checked="" type="checkbox"/>	LINING	CFP	Cured In Place Pipe	Struct.	2	1.0	\$2.10	\$2.10	24
<input checked="" type="checkbox"/>	LINING	CFP	Close Fit Pipe	Struct.	2	1.0	\$1.20	\$1.20	24
<input checked="" type="checkbox"/>	LINING	FIP	Formed In Place	Struct.	2	1.0	\$1.60	\$1.60	24
<input checked="" type="checkbox"/>	LINING	TFP	Thermo Formed Pl...	Struct.	2	1.0	\$1.20	\$1.20	24

Technologies stored in the database. Users could modify their default parameters for specific sewer groups.

Running the technology selection algorithm

Feasible technologies for a specific sewer (ID= 8306), with estimated costs and benefits. Users could modify the estimated costs/benefits or perform more detailed project-level assessment.

A screenshot shows the renewal technologies evaluation and selection module.

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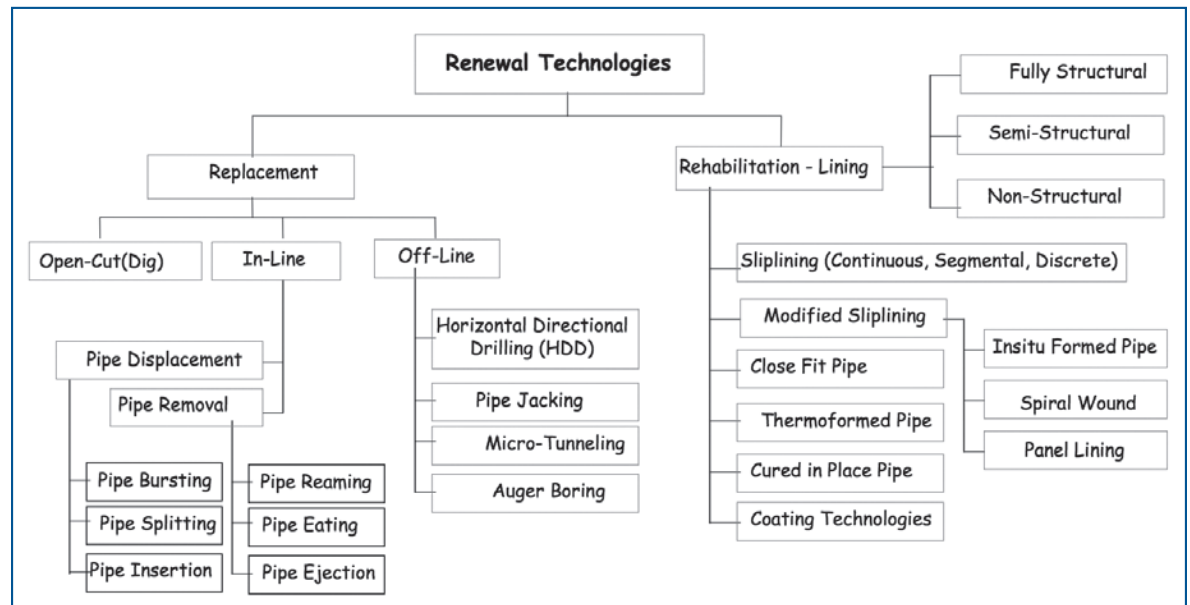


with 1 being the least critical and condition 5 being pipe with impending failure — where a higher cost is assumed.

They suggest formalizing “compatibility rules,” such as what methods are only applicable for pressure pipes, or what applications sliplining can be used for. Some pipe characteristics require a specific rehabilitation method — all of these factors have to be quantified and associated with the relevant categories established previously.

Past approaches have been as simple as “a set of tables and forms with yes or no questions to evaluate the technical compatibility of the renewal methods with the project requirements.”

Halfawy and Baker’s recommendation is a software-based approach using object-based data modeling. Essentially, it attempts to break down every reasonable angle of pipeline renewal, on both existing factors in the aging infrastructure and potential factors of renewal options. **I&I**



Classification of sewer renewal technologies defined by American Water Works Association and European Standards.

“New materials and construction methods are constantly introduced to the market, causing the process of evaluating these technologies and selecting the most appropriate solution to become a daunting task for municipal practitioners.”

PARTNERING WITH THE PUBLIC

A popular new website created by Metropolitan Council Environmental Services is engaging residents to reduce I&I

By Sandra Buettner

Metropolitan Council Environmental Services, the regional wastewater utility in Minnesota's Twin Cities metropolitan area, uses a website (www.metrocouncil.org/iandi) as part of its public outreach to educate residents on the cause and effect of inflow and infiltration and the property owner's role in mitigation.

I&I has become a critical issue as sewer pipes age and the population grows. Although MCES has had an I&I reduction program in place since 2006, its communities asked for help in educating property owners on the issue. The website was born out of a task force of community leaders that included representatives from public works, local wastewater utilities, finance and city management in the region.

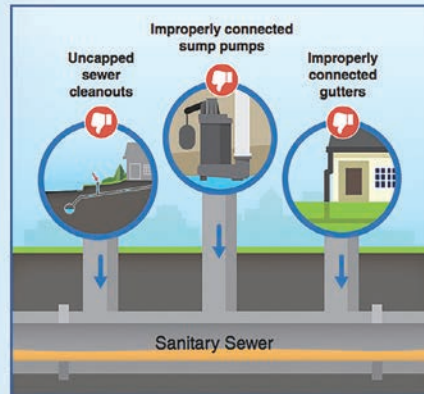
The task force requested financial and technical help from MCES, which serves 109 communities in the seven-county Minneapolis-St. Paul area. The region includes 2.6 million residents and more than 800 industrial customers connected to the regional sanitary sewers. Average daily wastewater flow is about 250 mgd.

WEBSITE CREATED

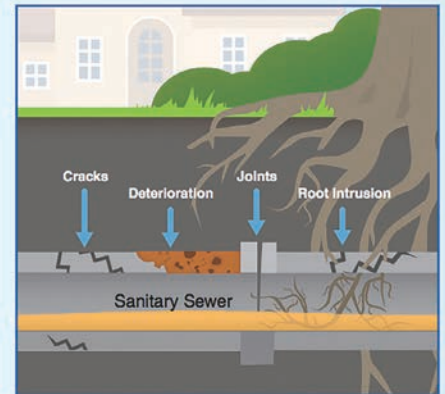
The task force told MCES that residents lacked knowledge about I&I and the responsibility property owners have for their sewer laterals. Acting on the request for help, MCES created the website and rolled it out in July 2018.

I/I costs everyone!

Inflow and infiltration (I/I) is clear water that enters the wastewater system. It overloads the system and can cause costly sewer backups into homes and buildings.



Inflow is clear water that quickly enters the wastewater system after rainfall events from sources such as sewer cleanouts, sump pumps, gutters, building foundation drains, and broken maintenance hole covers.



Infiltration is clear water that gradually enters the wastewater system below ground through cracks and openings in sewer service lines and joints, and public sewer mains and deteriorated maintenance holes.

A screenshot of the www.metrocouncil.org/iandi webpage with links to videos on home sewer repair, home sewer inspection and why they matter.

“It was a big goal of ours to make sure it was accessible and user-friendly to everyone, no matter what level of knowledge they had on I&I.”

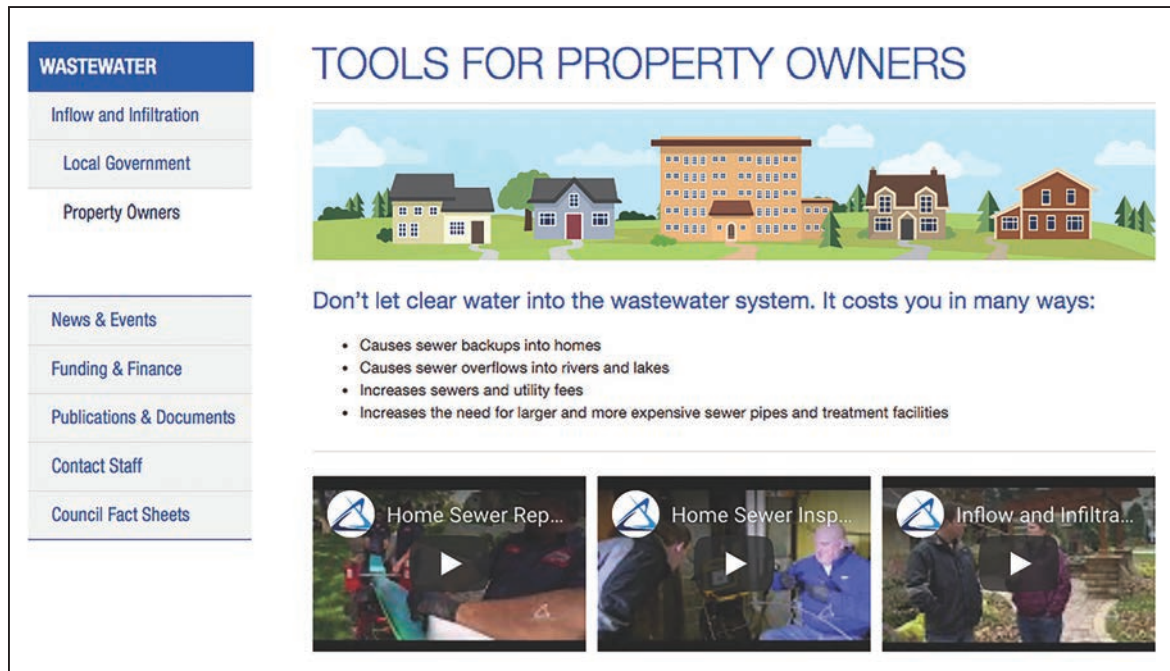
Marcus Bush

The site encourages residents to hire a contractor to check their sewer laterals for leaks and to make sure sump pumps, downspouts and foundation drains are not connected to the sanitary sewer system. It includes three

short videos to show how these measures can help alleviate I&I, reduce costs, protect water quality and help with public health.

The site also contains graphics, printable handouts, photos, newsletter articles and case studies on I&I that cities can share with property owners. The material is generic so that each city can add its own logo when sending the information out to its citizens.

“It was a big goal of ours to make sure it was accessible and user-friendly to everyone, no matter what level of knowledge they had on I&I,” says Marcus Bush, principal engineer for the MCES Engineering Programs group. “We created different levels of content on the site from something as basic as ‘What is I&I, and what can I do to help?’ to deeper detail about the issue to empower residents to take action.”



A screenshot of a public service announcement on the website depicting common sources of inflow and infiltration. Inflow is shown from sump pumps, rain leaders and service laterals. Infiltration is shown from cracks, deterioration, joints and roots in a pipe below ground, under a tree.



A video on the website shows a plumber inserting a liner into an old steel pipe while a collections system worker looks on and asks questions about the installation.

MORE OUTREACH

MCES uses forms of outreach beyond the website to educate the communities on I&I, according to Anna Bessel, assistant manager for Engineering Programs. These include:

- One-page flyers with graphics that break down I&I in simple terms for communities to use and share with residents.
- Workshops in which city staff members learn more about how to educate their property owners about I&I.
- Outreach to schools to educate students about I&I and give them take-home materials for their parents.
- Exhibits at trade shows and career fairs.
- Social media and targeted advertising to reach a broader audience with I&I information.

EARLY SUCCESS

A case study from the website tells how the city of West St. Paul created a grant program for property owners to help them reduce sewer lateral repair costs. The city also provided inspections at no cost to property owners. The community response was very positive: In one area of 900 homes, about 800 owners received inspections. Forty percent found they needed repairs and took care of them. This has already greatly reduced clearwater entering the system.

An analysis in 2018 showed that peak I&I was reduced by one-third in the largest metershed in the community. The balanced approach to I&I mitigation with a focus on sewer laterals yielded a higher return-on-investment for the community and its residents.

Since its launch, the website has been accessed on average more than 200 times per month. “It was always our intent to make the website usable for other localities, as this is not only an issue in the Twin Cities area, but across many communities,” Bush says. “There is a lot of great content out there on I&I. It’s just a matter of sharing it between cities.”

While the website has been live for only a year, it is already being shared and used by other cities across the U.S. and from as far away as New Zealand.

I&I





The fact a utility takes to find and fix improper sump pump connections varies from community to community, but offering amnesty is one good way to open doors.

OPEN DOORS WITH AMNESTY

Your utility can benefit from offering forgiveness to residents with improper sump pump connections

By Anthony Drew

Utilities face myriad, complex challenges when it comes to identifying and eliminating inflow and infiltration issues, and the simplest sounding — but most formidable — of those is gaining access to private properties to address improper sump pump discharges.

Just how big of a problem are improper sump pump hookups? Engineering firm CDM Smith has found across numerous I&I mitigation programs that private properties contribute an estimated 50% to 70% of total I&I for any given municipality. Of that, private sump pumps connected to municipal sewer systems are thought to be the largest contributor.

The success of any private inflow reduction program is directly related to the success of entering private homes and performing inspections.

It sounds simple enough. Get homeowners on board with the program and politely ask them to discharge elsewhere. After all, it makes perfect sense once a taxpayer understands the undue burden sump pumps place on municipal sewer systems and that they're the ones who will eventually have to fund a treatment plant that can handle the unnecessary flow.

But getting that message out in a way that grabs everyone's attention isn't easy, and many homeowners are afraid of getting in trouble or afraid of the money they'll have to spend to find an alternate solution for their flooded basements. That's where amnesty programs can help.

FIGHTING THE FLOW

The Stonington (Connecticut) Water Pollution Control Authority recently initiated such a program after the Mystic Wastewater Treatment Plant (which serves Stonington) exceeded design flows numerous times over an 18-month period. That resulted in the authority instituting a moratorium on all new connections to the facility, according to Doug Nettleton, Water Pollution Control Authority director.

"In order to lift that moratorium, we're doing the amnesty program, conducting an I&I study and reactivating a pipeline from the Mystic plant to our other facility in the Stonington borough," he says. The authority has three treatment facilities in Stonington along with 16 pumping stations, all operated by SUEZ Water Technologies & Solutions.

In an effort to reduce the burden on the Mystic plant — which operates near and sometimes beyond its 800,000 mgd treatment capacity — Nettleton

"I think the majority of people want to do the right thing, but the ones who know they're doing something wrong — you're not as likely to hear from those people."

Doug Nettleton

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came up with the idea to offer amnesty to homeowners who allow sump pump inspections. He wants to get a handle on how many improper connections are out there.

“We sent out 1,400 letters and received 280 replies, and we found out about 30% of those were connected to the sewer system,” Nettleton says. “We were trying to build a spreadsheet and do some data collecting on how many are connected to the sewers. We would have liked more responses, but a program like this is a good start. I think the majority of people want to do the right thing, but the ones who know they’re doing something wrong — you’re not as likely to hear from those people.”

While some municipalities might consider a rate surcharge for homeowners who have sump pumps connected to city sewers, the authority would much rather reduce the inflow than increase revenue, and that’s the case a lot of the time, according to Nettleton.

“I&I — and inflow especially — is a huge issue for almost every community, and it’s a delicate issue,” he says. “People are scared because when it rains, their basements are flooding. And a lot of them just aren’t aware they’re doing anything wrong by connecting to the sewer.”

PROGRAM STRATEGIES

The method behind a potential amnesty program in your own municipality is largely dependent on the needs of the utility and the culture of your community. As Nettleton says, it can be a delicate issue.

In Stonington, the authority mailed a thoughtfully worded letter. In another recent example from Caln Township (Pennsylvania) Municipal Authority, the utility posted a notice online to its customers, reminding them of upcoming I&I testing via dye, flowmeters and camera inspection and offering amnesty to customers who address improper sump pumps, floor drains and downspouts ahead of time. “While these options are viable, initially the

“People are scared because when it rains, their basements are flooding. And a lot of them just aren’t aware they’re doing anything wrong by connecting to the sewer.”

Doug Nettleton

authority does not want to impose on all of our residents in order to identify the violators. ... During the amnesty period, the authority will assist residents in indemnifying and correcting these illegal connections, without penalty,” reads the notice.

Meanwhile, in Revere, Massachusetts — the city that inspired the CDM Smith study — a sump pump amnesty program gave residents a deadline by which they could notify city officials about improper sump pump connections or request inspections. In exchange, the city offered to redirect discharges at no cost to the homeowner. But once the program expired, homeowners were financially responsible for their own solutions.

The town of Burlington, Massachusetts, offers a perpetual pardon to anyone who applies for its sump pump amnesty program, waiving any potential penalties until the homeowner can eventually arrange to have the connection removed.

Whatever route a utility takes to find and fix improper sump pump connections, the challenge remains finding a tactful way to get a foot in the door to address inflow. Sump pump amnesty programs are one way you can ask people to let you in. **I&I**



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By Craig Mandli



SPRAYABLE MORTAR USED TO REHABILITATE MEDIA BASINS

PROBLEM:

The city of Houston Water and Wastewater Utility faced the monumental task of rehabilitating more than 220,000 square feet of hydraulic-abrasion-damaged cast-in-place concrete filter media basins in its filter media and pilot plant rehabilitation for its East Water Purification Plant project. The project required that all of the surface defects in the existing concrete walls, troughs, gullets and discharges be repaired to their original uniform thickness and surface finishes. In addition, the project required the replacement of all expansion joints and the use of chemical grout to stop water infiltration seepage.

SOLUTION:

The general contractor recommended dry, packaged **Reliner MSP** geopolymer mortar from **Standard Cement Materials** for repairing each deteriorated concrete structure. This brought the basins to their initial capacity and adapted the components for new service beyond their original design, reducing their life-cycle cost.

Result: The wet-gunned, sprayable mortar provided a fast, safe and simple procedure for the repair, which corrected the deficient basins, minimizing the potential for deterioration in the future. The project time was approximately 12 months, and the repair method did not adversely affect the other trades or prevent the contractor's ability to achieve substantial completion on time. **888-278-1337; www.standardcement.com**

CHEMICAL GROUT ENABLES MUNICIPALITY TO SEAL MANHOLES

PROBLEM:

A coastal municipality near Long Branch, New Jersey, was facing inflow and infiltration issues that were the result of defects in piping and manholes, allowing groundwater, sand and other debris to enter the system and flow to the treatment facility, causing overflow problems. This municipality was tasked to locate, repair and reduce I&I to minimize the burden and financial replacement costs of aging collections and treatment systems. In addition, freeze-thaw cycles, heavy traffic and ground erosion caused stress on concrete and open joints, creating a path for water infiltration.

SOLUTION:

The municipality decided on a more permanent solution using **chemical grouts** from **Sauereisen**. The polyurethane chemical grouts are water activated and will repel water and push it away. When fully cured, they typically form a rigid system. Hydrophobic grouts have great expansion properties, typically 20 times their original volume; a low viscosity that enable them to flow easily; and a quick set time for filling voids and stopping active leaks. All this saves downtime and allows structural rehabilitation to proceed.

Result: Knowing the causes and solutions to the problem has helped the municipality's engineers and contractors repair and reduce I&I and reduce its economic and environmental impact. **412-963-0303; www.sauereisen.com**



MANHOLE RISERS MAKE THE GRADE AFTER REPAVING PROJECT



PROBLEM:

South Walton Utility Co. is a member-owned, nonprofit corporation serving a small community near Miramar Beach, Florida. It is responsible for raising its own storm and sewer manholes to grade after repaving projects. If they set low, water collects around the manhole lid, causing excessive infiltration.

SOLUTION:

Since 2006, the utility has used **Pivoted Turnbuckle Manhole Risers** made by **American Highway Products** to accomplish this chore quickly and effectively. At-grade risers are better for roads in many ways compared to concrete ring replacement. They don't set low, so water doesn't collect around the manhole lid causing excessive infiltration. The riser is a flexible, galvanized steel ring with adjustability provided by a patented connecting turnbuckle. They're sized in 1/4-inch increments for thickness, starting at 3/4 inch, so that new paving final grades can be matched precisely.

Result: "They're so much easier to set, compared to jackhammering and raising rims with bricks," says Richard Schwartz, project manager. "It takes less than 20 minutes to raise manholes this way, compared to six or seven hours with excavation." **888-272-2397; www.ahp1.com**

MANHOLE AND CATCH BASIN REHAB ACCOMPLISHED WITHOUT BUSINESS DISRUPTION

PROBLEM:

Bay City, Michigan, was experiencing multiple failing sanitary sewer manholes and stormwater catch basins in a heavy-traffic area of its downtown business district. Cave-ins and heavy infiltration were present in most of the structures, and remediation of numerous issues needed to be completed in a short window of time with the least amount of disruption to the business community as possible.

SOLUTION:

Terry Killburn, sewer maintenance manager for Bay City, received a recommendation from Granite Inliner to contact Advanced Rehabilitation Technology (ART) about using **OBIC Armor** — a multilayer, fast-set, spray-applied polyurea trenchless rehabilitation solution from **OBIC** — to resolve the issues. Upon deployment, ART crews first removed debris and pressure-washed all the structures to be rehabilitated. Most required the use of dryers to remove all moisture from the substrate, and crews applied grout in the manholes or catch basins that were missing mortar or experiencing major leaks and infiltration. Once properly prepared, the installation team applied OBIC Armor at a thickness of 500 mils. Each



structure required approximately three to five hours to complete, and OBIC's product application process allowed for zero downtime. All of the assets for the project were renewed successfully within two months.

Result: Bay City's aging downtown underground sanitary and stormwater conveyance system structures have been given an extended life span in excess of 25 years with minimal disruption to the community and lower costs than replacement. "The installers were top notch and had excellent communication skills," Killburn says. "Best of all, we didn't receive any complaints from our business community during the project." **866-636-4854; www.obicproducts.com**

(continued)

CASE STUDY: LINING SOLUTION SPECIFIED FOR LARGE TANK

PROBLEM:

A 13,000-square-foot tank with a 500,000-gallon capacity located in a privately owned southern Florida country club showed signs of severe deterioration, including exposed rebar as a result of hydrogen sulfide damage. The existing coating required removal, and a structural solution to reinforce the concrete was essential.

SOLUTION:

Epoxytec's CPP Sprayliner was chosen as the solution. It was spray-applied as a topcoat. This two-component, moisture-insensitive, reinforced epoxy is a highly adhesive product that provides chemical resistance and is 100% solids. It can be sprayed with ultrahigh build, between 1/16 and 1/4 inches per pass conveniently from a plural-component heated spray rig.

Result: This project was completed on time, and all parties involved were satisfied with the results. The protection will enhance the life of this infrastructure and has brought it back to like-new condition. It allowed for an efficient installation time while also providing quality, durability and strength for years to come. **877-463-7699; www.epoxytec.com**



COMPOSITE COVERS CONTRIBUTE TO WATERTIGHT SYSTEM

PROBLEM:

Fulton County (Georgia) Public Works recently began a major sewer rehabilitation initiative that was highlighted on Fulton Today TV news. Roy Barnes, deputy director of Public Works,



explains that the utility was renewing the manholes with fiberglass inserts while sealing the manhole chimney with watertight HDPE Ladtech grade rings, and it sought composite manhole covers.

SOLUTION:

Composite covers from **Composite Access Products (CAP)** were specified to achieve the first watertight system in the state of Georgia. "The CAP composite manhole cover and frame make a more tightly mated assembly because composites remove the corrosion that fuses covers to frames," says Chad Nunnery, president of CAP. "Also, because the compression-molded composites have one mold for every cover and frame, the CAP system eliminates the higher part-to-part variation inherent in a different sand cast for each iron cover and each frame." The noncorrosive, close-fit CAP cover is gasketed and bolted down, and the cover with frame assembly has been shown to hold 20 inches of water submerged with 0.00 gpm infiltration.

Result: "The major benefit is we are now producing watertight manholes that can even be submerged," Barnes says. **844-344-2271; www.justcapthat.com**

MONITORING SYSTEM PROVIDES FLOODING DATA

PROBLEM:

The city of Green Bay, Wisconsin, sought a solution to get real-time visibility of several manhole locations as it grappled with the need for an estimated \$150 million in sewer/stormwater infrastructure repairs and upgrades. The city especially wanted a better picture of when and where water infiltrates the system during rain events, but it also became clear that it needed more information about dynamic level changes due to infiltration from rivers.

SOLUTION:

Green Bay deployed **SmartCover Systems** to monitor the East River and Fox River and gain visibility about how upstream flow and river level changes impact downstream flooding in the sewer and stormwater collections systems. The East River monitoring uses a configuration in which the unit is hung below the Mason

Street bridge to monitor the water level below. During rainfall events, the unit identifies river level changes. At one point, the East River rose to just 7 inches below the bridge.

Result: By monitoring the rapid rise and fall of local rivers, Green Bay was able to correlate river level changes with stormwater infiltration into the collections system. The ability to aggregate and analyze data from the SmartCover system is helping the city more clearly understand the dynamic relationship between upstream flows and downstream infiltration impacts, prepare for water surges, improve resource allocation and prevent spills. **760-291-1980; www.smartcoversystems.com**





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MANHOLE REPAIR COMPLETED USING GRADE ADJUSTMENT SYSTEM

PROBLEM:

In early 2010, a manhole had been identified as needing repair by the Narragansett Bay Commission in Providence, Rhode Island. The issue was inflow through a deteriorated brick-and-mortar chimney that had caused pavement failure around the manhole frame. The manhole was directly in the wheel path of all vehicles, and due to the volume of traffic in both directions, a quick and easy, but long-term repair was needed.

SOLUTION:

PRO-RING, a lightweight manhole grade adjustment system made from expanded polypropylene from **Cretex Specialty Products** was selected for this repair. Its high-strength, lightweight plastic makes it a suitable material to replace traditional construction methods using masonry materials. This system is fast, safe and cost effective, with one worker being able to complete an entire adjustment in just minutes. On the day of the repair, crews and traffic control arrived and were set up by 7:30 a.m. The pavement was saw-cut, and the manhole was excavated and ready for reconstruction by about 8:50 a.m. The installation of the PRO-RING started at approximately 9 a.m., with some repair of the brick manhole using a high early strength repair mortar and then installing the adjustment rings and manhole frame casting. The installation was



completed by 9:20 a.m., and the excavation was backfilled, compacted and prepared for the asphalt patch.

Result: Since the installation over nine years ago, this site has been subjected to an estimated 200 million traffic impacts, and annual inspections show no leakage or negative effect on the PRO-RING system and surrounding pavement repair. **800-345-3764; www.cretexseals.com I&I**

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CAST YOUR VOTE IN THE CONTRACTORS' CHOICE AWARDS

Municipal Sewer & Water magazine is announcing the **Contractors' Choice Awards**, where you, our readers, can cast votes for your favorite equipment in a variety of categories.

CONTRACTORS' CHOICE AWARDS INCLUDE THE FOLLOWING CATEGORIES:

Flow Control
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Manhole Rehab
Nozzles - High Pressure
Pipeline Rehabilitation/Lining
Stormwater Collection
Vacuum Trucks/Trailers

Voting only takes a minute, and you're allowed one vote per device, per person in each category. You aren't required to vote in every category to participate, so even if there's only one piece of equipment you can't live without, give that company the recognition it deserves by casting your vote. Just click on the bubble next to companies' names and click the "Vote" button at the bottom of the form to confirm your choices.

Go to mswmag.com/contractors-choice/vote

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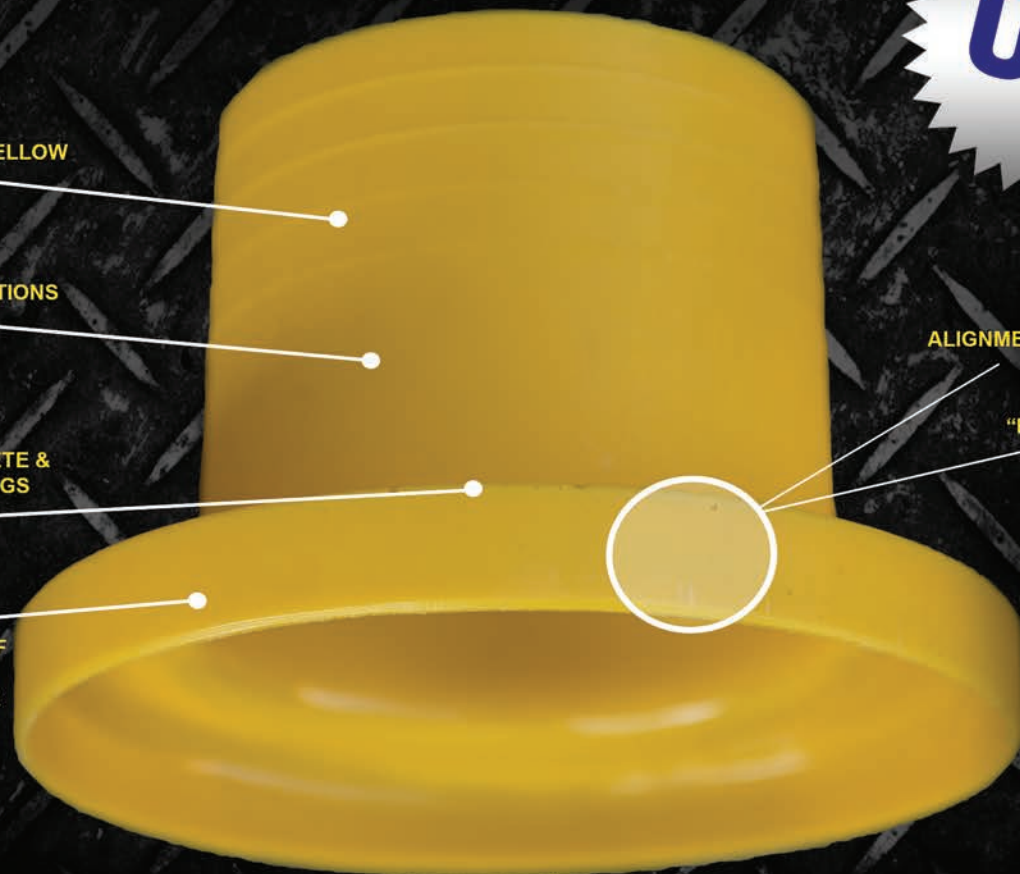
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