

# I&I

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WATER



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# Finding the Smoking Gun

**Detective work leads to a major infiltration source in Stonington, Connecticut**

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**A BETTER FIX:**

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Summer 2022

# I&I

INFLOW & INFILTRATION  
SOLUTIONS AND EQUIPMENT

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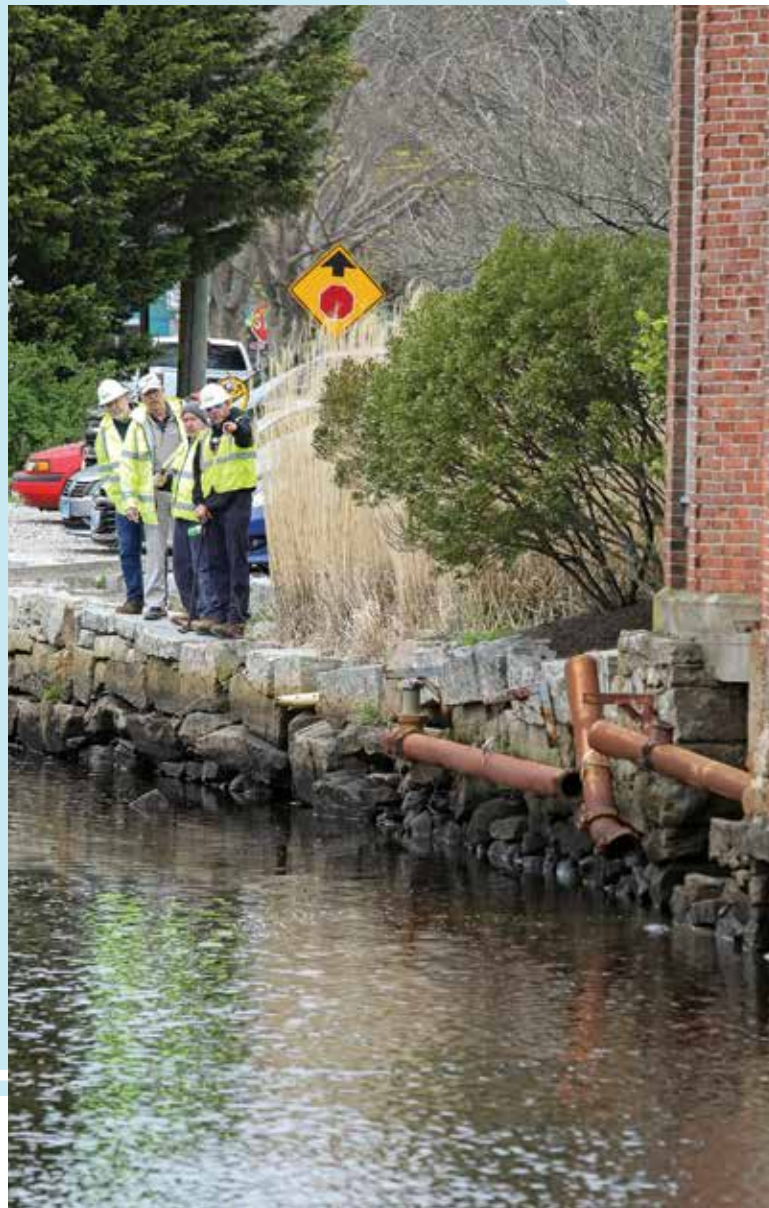
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### Finding the Smoking Gun

Detective work leads to a major infiltration source in Stonington, Connecticut.

By Giles Lambertson

COVER PHOTO: Reviewing plans are, from left, Josh Mello, maintenance technician, Veolia; Mike Spring, project manager, Veolia; Doug Nettleton, director of the Water Pollution Control Authority of Stonington, Connecticut; and James Falconieri, WPCA board member. (Photography by Joe Vericker)



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Jim Koshuta

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# DISRUPTING YOUR INDUSTRY

Change is hard, but the small-business owners unafraid to try something new will weather tough times and emerge as leaders in the field

By Shelley Armato

Everyone has the potential to be an industry leader. These leaders are the ones who transform the world — who disrupt their industry and launch massive and positive change.

The challenge is that too many people are comfortable and complacent with where they are. They've settled into the pattern of reacting to disruptions rather than causing them. Think about your own industry and how it's changed over the years. Who initiated the biggest changes? Who were the disruptors? Were they the people who sat on the sidelines? Or the ones who took bold action?

Contrary to popular belief, having access to large amounts of money isn't what makes someone a disruptor. Money alone isn't what makes change happen. In reality, tenacity and courage are all you need. So stop blaming others or outside circumstances for limiting your ability to enact change. By using the internal resources you already have, you can take action today.

Here are the five keys that will help shift your mindset so you can be the disruptor others react to.

## 1. GET COMFORTABLE WITH CHANGE.

Disruption is all about change. Any company that survives long-term has changed over the years. Whether they added new products or services, catered to a different market or totally reinvented themselves, they had the courage to morph in some way.

Unfortunately, many people get stuck in the vision of what their company was in the past rather than what it could be in the future. This mindset forces them to always be reactive to the disruptions others make — they are never the disruptors themselves because they are too tied to the past. To transform your industry, you have to be future-oriented and ready to make a change at a moment's notice. If you're not nimble, you'll never be the leader. Remember that everything is different today than it was just a few years ago, and that has to include you and your company.

## 2. LOOK FOR THE COMMON CHALLENGES IN YOUR INDUSTRY.

If you want to be an industry disruptor, you need to always be looking to solve challenges — at work as well as at home. In other words, problem solving must become a way of life, not just something you do when times are tough. Look around and ask yourself, "What can I do differently and better?" Realize that if you think something is challenging or in need of change, chances are that others think that too. Ask your customers and employees what changes they wish would transpire. Then really listen to their answers. Insight leads to change.

## 3. RESEARCH EVERYTHING.

To find the problems and the solutions, you need to know what's going on in your industry at all times. Research solutions that others have tried to

introduce. Sometimes disruption isn't about reinventing the wheel; it's about making the existing solutions better. Often, even a tenth of a degree of improvement can make massive progress. Additionally, do research for your emotional wellness, because when you're emotionally healthy, you can take on anything. Broaden your research to encompass all aspects of yourself, your business and your industry.



Shelley Armato

## 4. BE RESILIENT IN YOUR ABILITY TO SOLVE PROBLEMS.

Being a disruptor means being resilient. To build your resilience, refrain from asking disempowering questions like "How am I going to do this?" A better question is "Why am I going to do this?" "Why" leads to "when," and then "when" becomes "how." With your "why" and "when" already mapped out, the "how" becomes much easier and you're more apt to take that first step. Along the way, you'll run into roadblocks and rejection. That's OK. Learn from setbacks and harness your resilience to bounce back and keep going.

## 5. FIND THE EAGLES IN YOUR LIFE.

People in your life can either lift you up or pull you down. We all have people in our life who love hearing our problems and then telling us all the things we shouldn't do. But if you let these people dictate your decisions,

**Look around and ask yourself, "What can I do differently and better?" Realize that if you think something is challenging or in need of change, chances are that others think that too.**

you'll never be a disruptor. Instead, you have to find the eagles. During storms, eagles soar higher because they know the crosswinds will help them gain altitude. In other words, during challenges they rise.

Those are the kind of people you want in your inner circle. Realize that the eagles in your life don't have to be your friends. They can be coaches or mentors you hire or only see in a professional capacity. Ultimately, their goal is to help you soar higher, not encourage you to cower when things get tough. When you rely on your eagles for support and advice, you can see problems in a new light and come up with solutions that will transform your world.

## GET READY FOR CHANGE

Regardless of your past successes or failures, you can initiate massive industry change. So why settle for always reacting to the disruptions that others enact? Have the courage to take action. Be the disruptor that leads your industry to new heights — and your company to even greater success.



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- CPP product attributes and application procedures
- Tips and tricks to outbid the competition
- How the Tnemec/Epoxytec team plan to grow your market with specifications
- How to get a return on your investment





PROJECT  
SHOWCASE

# Finding the Smoking Gun

Detective work leads to a major infiltration source in Stonington, Connecticut

STORY Giles Lambertson | PHOTOS Joe Vericker



Looking over survey plans are, from left, Josh Mello, maintenance technician, Veolia; Eric Kessler, Sr., maintenance technician, Veolia; Douglas Nettleton, WPCA director; James Falconieri, WPCA board member; and Mike Spring, project manager, Veolia.



**T**he Water Pollution Control Authority of Stonington, Connecticut, seems adept at meeting challenges. And it has to be, because the challenges keep coming.

Stonington dates from the mid-1600s when competing English interests vied for New England coastal communities including Stonington. The wastewater problems WPCA wrestles with don't go back that far. It just seems like it some days.

For six and a half years, Doug Nettleton has been the point man on battling inflow and infiltration issues. Among many other duties as executive director, he directs the efforts to find and fix leaks in the system to win grants for upgrading treatment plants and raising manholes, and to persuade property owners to own up to illicit sump pump dumping of water into the system.

The system's maintenance and repair work is contracted to Veolia Group, an international consortium that recently purchased and took over the work from SUEZ Group, another international ecology firm. Besides Veolia's 10 contracted employees, the wastewater staff numbers two: Nettleton and a billing administrative assistant. The director says wryly that so far he hasn't been asked to point a hole with his finger.

### AGING PIPE JOINTS

One of the looming issues for the wastewater system is that its underground infrastructure is getting old. It dates for the most part from the 1960s and '70s. While that compares favorably with yet-older pipe in the ground in larger New

England cities (Nettleton terms Stonington's pipe "about mid-age"), reinforced concrete sections in the Stonington system are failing. That is, they aren't always keeping influent on the way to treatment contained, nor are they keeping groundwater from entering the system, which overburdens the workload at the plant.

Nettleton says the fault probably is with joints that have lost their seal. "The pipe itself actually seems to be in pretty good condition." The system's mix of PVC and RCP lines generally is 18-30 inches in diameter with a few 15-inch segments.

The focus of mitigation efforts is in Mystic, a village situated where the Mystic River empties into Long Island Sound. "Mystic is the hotspot," Nettleton says. "Stonington Borough is built out, so Mystic is where all the development is taking place." Hence, the need for a well-functioning wastewater system.

Though the WPCA's work includes Stonington Borough, Mystic and a second village, Pawcatuck, it is within the less than four square miles of Mystic where the authority is trying to get a handle on I&I. "We have enough work in Mystic to keep us busy."

### DISCOVERING A MAJOR CULPRIT

A big step in reducing flow into the Mystic pipes and plant occurred last fall when a major inlet was discovered in an industrial area of the village. An old and unused pipe was discovered that had been funneling river water into the sewer system. One might think that finding such an

OPPOSITE: Maintenance technicians from Veolia, along with members of the Water Pollution Control Authority of Stonington, Connecticut, point out the location of an abandoned 6-inch sewer pipe that had been allowing significant infiltration.





WPCA Director Doug Nettleton says it took real detective work to analyze flow data, determine that sewer infiltration corresponded with high tides and then locate a broken 6-inch pipe which was allowing between 30,000 and 100,000 mgd of Mystic River water into the system.

**“When you are doing I&I work, you always are looking for low-hanging fruit. That pipe was ours.”**

Doug Nettleton

“When you are doing I&I work, you always are looking for low-hanging fruit. That pipe was ours,” says Nettleton.

Authority engineers still are trying to determine just how much inflow was occurring at the site. Estimates are between 30,000 and 100,000 mgd. Whatever the gallonage, eliminating it gave the authority a big win. Inflow to the Mystic plant is down 30% from a year earlier.

#### NEW CONNECTION MORATORIUM

The reduced incursion of river water was one reason the authority has partly rolled back a moratorium on new hookups to the sewer system. It had self-imposed the limit on hookups in 2019 before state or federal officials did, because the flow to the Mystic plant was sometimes exceeding its capacity. “I saw what was happening and had to do something about it.”

The authority board last fall was able to add 50,000 gallons a day back to the maximum allowable flow and, in January, added 40,000 gallons more. “The moratorium was necessary, but it’s hurting the local economy and construction developments,” Nettleton says. New apartment developments, expansion of a health care facility and a hotel/restaurant in a tourist area were beneficiaries of the regulatory easing. A major industry in the area also is expanding and the higher flow limits will help with development of new housing for the employees.

#### SUMP PUMP AMNESTY

Another ongoing I&I issue is water entering the sewer system illicitly from residential basement sump pumping. Last year, Nettleton made “a stab in the dark” and offered amnesty to any property owner who would cooperate with the authority by having their basements inspected and illegal connections to the sewer discontinued, with some compensation given. No fines, no penalties.

The response was meager. Fourteen hundred letters were mailed and 280 were returned. Just 30% of respondents were found to be connected to the system. “Only honest property owners replied,” the director says, adding that the deal was a one-time thing. “We are working with the information we did get. Now, CDM Engineers will be doing some smoke testing of the system.”

Depending on where the smoke leads investigators, the situation is likely to become dicey. “If we start discovering a lot of working sump pumps connected to the main, someone in leadership is going to have to start making

## STONINGTON (CONNECTICUT) WATER POLLUTION CONTROL AUTHORITY

#### SERVICE AREA:

Stonington Borough, Mystic and Pawcatuck

#### WASTEWATER ACCOUNTS:

4,500

#### WASTEWATER TREATMENT:

Three plants operated by Veolia Group

#### WASTEWATER VOLUME:

2.7 mgd dry-weather design flow, January average flow 1.02 mgd

#### SEWER INFRASTRUCTURE:

54 miles of pipe, 17 lift stations, 1,397 manholes

#### SEWER EMPLOYEES:

10 Veolia Group staff members

#### WEBSITE:

[www.stonington-ct.gov/water-pollution-control-authority](http://www.stonington-ct.gov/water-pollution-control-authority)

interloper would have been a simple matter of looking. Wrong. It took some real detective work. “I never would have found it just looking around,” says the director.

“We had a contract with Wright Pierce Engineers to connect the Mystic treatment plant with the borough plant to divert some water from Mystic. In connection with that, we were doing flow studies with CDM Engineers and it was noticed during flow monitoring that the flow was higher than we thought it should be in one area.”

Nettleton and a WPCA board member James Falconieri analyzed the data. Falconieri, who spent his career working for National Water Main, recently joined the volunteer board and has been a big help in the I&I investigations. They determined that the flow seemed to coincide with tidal ups and downs. They decided to walk the area in question and check flows there.



some decisions. It is all very political because you can't just cut people off from the sewer, leaving them with a flooded basement."

So, what is the sump pump inflow solution? "I'm not sure there are positive solutions for every property owner," says Nettleton. "Mystic is a crowded community where some houses are almost on top of each other and don't have a storm sewer to discharge into, and sometimes you don't want such discharge anyway. You can put a tank in the ground for the pumps to discharge into, but some yards aren't big enough to do that. You can't pump the water over onto a neighbor's property or pump it into the street. It's a big problem."

## SEEKING OTHER SOLUTIONS

To stem I&I, Nettleton does not expect to find another large pipe channeling water into the system. That would be too easy. He has his eye on a large-diameter interceptor pipe that runs along Highway 27. "We think we can capture another 150,000 gallons a day if we can seal it up. We're working on it." It's located in a tourist area, so scheduling the repair work is tricky.

"We wouldn't want to be doing that in the middle of summer," he says. "That's a main artery for summer traffic going to Mystic where all the restaurants and shops are. We don't want to be digging around and lining pipe then."

Paying for such mitigation work is the other consideration. The director has applied for grants for lining and grout work on identified sections of pipe. Also in need of funding is the raising of many of the system's 1,397 manholes. They were covered over during paving jobs and uncovering them will give the authority access for I&I studies.

An even larger expenditure looms.

If reducing the I&I work isn't accomplished, replacement of the Mystic treatment plant will be necessary. That will mean acquisition of property because the present plant site isn't large enough to accommodate an expanded facility. In a crowded community, says Nettleton, "finding a site becomes very hard."

So, here's where the community is today: With the exception of finding the forgotten pipe that was admitting river water, the WPCA hasn't fixed anything yet. It has gotten a good start on identifying its I&I challenges, but most of the actual mitigation work remains to be done.

Nettleton acknowledges as much. "Except for the pipe, which we were lucky to find, we haven't reduced anything. We have just studied the problem. We're still in a study mode and trying to get our ducks in a row."

The director is grateful that his board is highly skilled, very professional and very supportive of his efforts to meet the challenges facing the system. He says community support for his decision-making, including enacting of a moratorium, is strongest in the business community. "Contractors are very thankful that we are on this now so they eventually can move forward on projects that will create jobs. We get a lot of support from businesses."

Citizens in general are less aware. Nettleton says the average person doesn't grasp the necessity of stemming I&I, the level of treatment needed, and the regulations with which a system must comply. "I've been in this business a long time and most people really don't care about the sewer pipes they are driving over as long as the pipes don't fail while they are driving over them."

So, the work continues. Nettleton and the WPCA board have a five-year plan to find and fix the faults that are overloading the system's treatment plants. However, the director won't be around to see the plan bear fruit. The 66-year-old career wastewater executive — who began his career on Block Island, Rhode Island, in 1986 and has worked both as a system consultant and directly for municipalities — retired in May. **I&I**

**"I've been in this business a long time, and most people really don't care about the sewer pipes they are driving over as long as the pipes don't fail while they are driving over them."**

Doug Nettleton



Infiltration to the Mystic wastewater treatment plant is down 30% from the previous year since Nettleton and Falconieri located and plugged this abandoned pipe.

## A TRIPLE BURDEN

The Stonington, Connecticut, Water Pollution Control Authority has a problem that is unique in New England. It is not the system's inflow and infiltration problems, which many other wastewater systems also battle. Nor is the struggle to maintain aging pipe and eliminate sump pump connections at all unusual.

It is the system's three treatment plants that distinguish the Stonington situation from others in the region. "To have three treatment plants in one system is very unusual. Nowhere else in New England will you find it, I believe," says Doug Nettleton, the authority's executive director. "Some have two. Some pump to other cities. I don't believe any others have three plants."

It sounds like an embarrassment of riches for an urban system. Three facilities to handle a community's wastewater! Bring it on! We can handle everything you can flush and pour down the drain! The reality, however, is less euphoric.

While the Stonington plants are small — their total capacity is in the neighborhood of 2.7 mgd — they are in constant demand, working long hours accepting, treating and discharging effluent. Consequently, the cumulative cost of operating the three units is a burden to the community.

Electricity consumption is high, and was bumped up further when the facilities began to disinfect with ultraviolet light systems instead of chlorine. "And though the plants are small, each

one has all the permit requirements that a large plant has, and all the expenses. It's very hard on the budget."

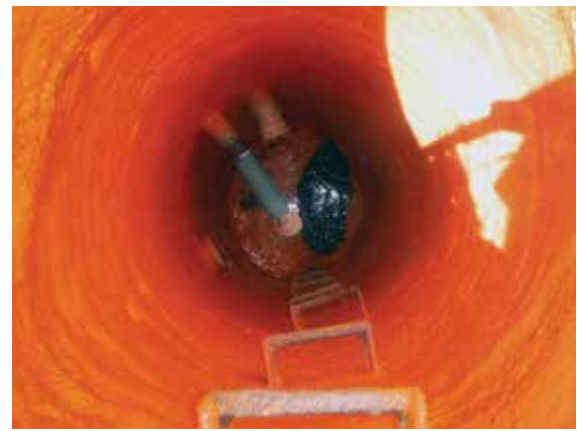
The facilities are located in Stonington Borough, and one in each of the villages of Mystic and Pawcatuck. Some development is occurring in each jurisdiction, though the bulk of it currently is in Mystic. The areas being built out are too far apart to be served by a single plant.

So, the system is stuck for now with three treatment centers. "The community has looked into this problem for many, many years," says Nettleton. "We would like to get it down to one or two facilities, but that is getting harder and harder to do."





Water ran against the bricks of this manhole, which is more than 80 years old, causing it to lose mortar and some of its bricks. Infiltration from a broken stormwater pipe nearby then made its way into the sanitary sewer system.



Rehabilitation of the manhole saw the use of OBIC 1306 polyurethane foam and OBIC 1000 polyurea coating.

# WHAT LIES BENEATH

## Hidden I&I sets a major sinkhole event into action

By Suzan Chin-Taylor

On an early winter morning in Parkersburg, West Virginia, collection system operators faced a major catastrophe when a garbage truck fell into a sinkhole adjacent to a manhole. Quick thinking and trenchless technology saved the day to return the area to service quickly, limiting the impact to local community businesses while protecting nearby buried utilities.

An older storm drain located on a hill by the local community hospital which drains to the Ohio River ran parallel to a manhole structure on a busy mixed use area street. Over the years, the storm drainpipe had deteriorated from the outside, and all its collected water was running up against the bricks of the 80-plus-year-old manhole structure. This resulted in a slow but steady degradation of the structure, causing mortar to erode and its bricks to fall out of its sides down into the sewer mains, which allowed backfill around the manhole to enter the sewer system.

Although the town had been performing annual preventive maintenance and CCTV inspection, the inflow and infiltration from the storm drain and structural issues were hidden, as assessments were typically conducted during dry weather conditions.

### LIMITING COMMUNITY DISRUPTION

The sinkhole surrounding the manhole structure, sewer mainline and storm drainline were situated in a busy thoroughfare, and there were numerous buried utilities adjacent. The community impact and risks were high for performing a dig-and-replace, so utilizing trenchless technology, if feasible, was Parkersburg's best option. The city called Advanced Rehabilitation Technologies (ART) of Bryan, Ohio, to look at the site and determine if it was a candidate for trenchless rehabilitation with the fast-curing manhole lining technologies they offered.

"Because I&I can be quite common in manholes, it would've been nearly impossible for the city to determine how long it took for the grout holding the bricks and the erosion in the manhole to take place," says Colton Shoemaker, project manager for ART. "The pressure from the I&I from the storm drain could have been ongoing for decades unseen, and then suddenly the situation turned ugly real fast. Even with a regular inspection program, if there wasn't any I&I present they could see visually with their cameras,

something like this was just a hidden issue waiting to happen, and unfortunately for them it was just the luck of the draw."

ART determined that a trenchless solution was feasible using a variety of products from the OBIC product line to reinstate the manhole's structural integrity while not disturbing nearby utilities and limiting the amount of community disruption.

### REHABBING THE MANHOLE

City crews had done what they could to stabilize the surrounding area using plywood to hold back what backfill was remaining around the manhole to prevent any additional loss of bricks, backfill and structural integrity. They cleared around the area to create an easy deployment environment for the ART crews to begin prep work. Once the clearing was finished, ART was confident that the project could be completed within a few days.

The key to the project success would be in the preparation of the manhole structure, which was 16 feet deep and 4 feet in diameter. The first step was to make sure that no additional excess debris got into the lines feeding the manhole. Bricks that had come loose were reset in place and mortared

**"The pressure from the I&I from the storm drain could have been ongoing for decades unseen, and then suddenly the situation turned ugly real fast."**

Colton Shoemaker

in with hydraulic cement. This was followed by the application of a combination of four different hydrophilic and/or hydrophobic grouts from OBIC via injection to seal any infiltration on the side walls and bottom areas of the structure.

Once all water ingress was resolved, the structure needed to be cleaned. A 4,000 psi pressure wash of the whole structure was performed, and afterward, drying with a torpedo heater was completed. The structure's surface





A garbage truck fell into a sinkhole next to a manhole that had eroded and deteriorated due to infiltration from a broken stormwater drainpipe nearby.



**“A small change can really help a city save money and reduce the burden at its treatment plant, not to mention avoid stressful events like this.”**

Colton Shoemaker

inch rebar was called for. After all these initial steps were complete, the structure was ready for the application of the lining, which would be executed in three stages.

The first stage used OBIC 1000, a fast-curing polyurea coating with an elongation of 400% that could shift with traffic loading and withstand the freeze-thaw cycles common in the region. This was spray-applied at approximately 50 mils thick over the entire structure’s interior. The second stage of the lining saw the application of OBIC 1306, a high-density polyurethane foam that adds structural integrity to the manhole and fills in any spots with missing or reduced mortar. This created a smooth profile for the third and final stage, which was a spray application of another layer of OBIC 1000 at 50 mils.

The layers fully bond to the structure, sealing and anchoring it to become monolithic. In total, an average of 500 mils of material were applied to the manhole walls and bench, adding significant structural integrity.

After the manhole was fully repaired, city crews returned to perform backfilling around the manhole structure and repave the road, returning everything on the roadway back to service.

#### ATTENTION TO SYSTEM HEALTH

Such a severe emergency has sparked more awareness for the city regarding inspection of its manholes, drainage lines and anything else that can impact collection system integrity. Anomalies such as unusual wear and tear due to excess debris entering a lift station are great indicators that something serious could be occurring upstream. Sanitary sewer overflows in a

needed to be dry before spray-application of the lining could begin. Because it had been compromised, ART felt that to really secure the bottom floor of the manhole, reinforcing the weaker areas with 3/8-



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particular area could also be seen as clear warning signs of potential structural integrity loss that could be impossible to pinpoint during routine CCTV inspection.

“This emergency did create a lot of awareness in the importance of maintenance such as decreasing infiltration,” says Shoemaker. “We’ve recently been able to reduce infiltration for a community up to 33% just by manhole lining alone. A small change can really help a city save money and reduce the burden at its treatment plant, not to mention avoid stressful events like this.”

To prevent future problems, Parkersburg decided that a spot repair in the storm drain would be installed as a temporary fix and a follow-up CIPP lining would be performed to mitigate future water ingress to any structures along the system flow. **I&I**

# HONING IN ON I&I

## Cost-effective sensor helps utilities narrow down infiltration sources

By Bob Donnelly

There are millions of miles of sewer pipelines in the United States that are long overdue for remediation, as many cities and municipalities experience overflows during major rain events. The challenges associated with dealing with these toxic overflows are enormous, costing billions of dollars per year.

Historically, many of these wastewater overflow problems have been dealt with after the fact due to a lack of technology generating early warnings for elevated wastewater levels and blockages in municipal wastewater systems.

It has been estimated that 80% of inflow and infiltration in any given municipal wastewater system can be traced to only 20% of its collection pipelines, but without a reliable way to monitor the flow of wastewater to identify potential blockages, many municipalities have been spending their scarce budgets on cleaning their entire collection systems.

Many different techniques have been deployed to alert operators to blockages and elevated wastewater levels, beginning with flowmeters, cameras and sewer-crawling robots. Major engineering organizations have been developing new sensing technologies to locate I&I problems as our increasingly digital world evolves. Combinations of flowmeters, pressure sensors and a variety of rain gauges have been deployed to monitor wastewater flows during



The iTracker sensor (Eastech Flow Controls) weighs 1.9 pounds, requires no confined-space entry and is easily suspended under manholes, according to the manufacturer.

weather events. Modeling software has also been developed to integrate with the evolution of artificial intelligence, cloud computing and the Internet of Things, as global water crises escalate.

However, as digital water technologies continue to evolve, the ability to easily and cost-effectively determine the causes of wastewater overflows can remain elusive for some municipalities.

**As digital water technologies continue to evolve, the ability to easily and cost-effectively determine the causes of wastewater overflows can remain elusive for some municipalities.**

### COST-EFFECTIVE MONITORING

There is a solution in the form of a new sensing technology device called the iTracker, made by Eastech Flow Controls. Easily installed and suspended under manholes, the sensing technology can scan a length of wastewater piping and generate data rich analytics, alerts and sophisticated reports for municipal wastewater engineers on the wastewater flow activity in the piping where they are deployed. iTrackers have been able to locate I&I problems in just a few days that municipal wastewater engineers have been trying to find for years. These unique sensing devices can pinpoint I&I problems down to adjacent manholes.

By coupling low-cost sensors with wireless connectivity and powerful analytics, the iTracker makes it possible to deliver reliable solutions for the efficient operation of a wastewater collection network. The sensor weighs 1.9 pounds, requires no confined-space entry for installation and is powered by dual lithium batteries. It has an integrated data logger and is equipped for both Wi-Fi and cellular data connectivity.

Due to the ability to easily redeploy iTrackers throughout the entire municipal wastewater piping system, critical data can be generated in real time and represents a proactive solution to the costly I&I problem that many municipalities have historically reacted to after the fact.

### CASE STUDY

A 22-mile stretch of sewer in Jefferson County, Alabama, known as the Turkey Creek basin, was recently selected to undergo a six-month pilot project using 14 iTracker sensors.

An engineering team from Hazen and Sawyer worked with the county on the basin, which was selected because it contributed the greatest amount of I&I in the county's sewer system.

In the first phase of the project, the 14 iTracker sensors were installed in strategic locations along the 22-mile Turkey Creek basin. On average, it took 20 to 30 minutes to locate each manhole and 15 minutes to install each sensor. The entire installation process was completed in fewer than 10 hours.

Data collection and initial review of the iTrackers comprised the second phase of the project. About five weeks after the installation and after a few rain events, data was collected from each monitored site via smartphone using Wi-Fi connectivity. That data was imported into the iTracking analytical software program to determine the area responsible for the bulk of the I&I. The program displayed a bar graph that detailed rainfall-derived



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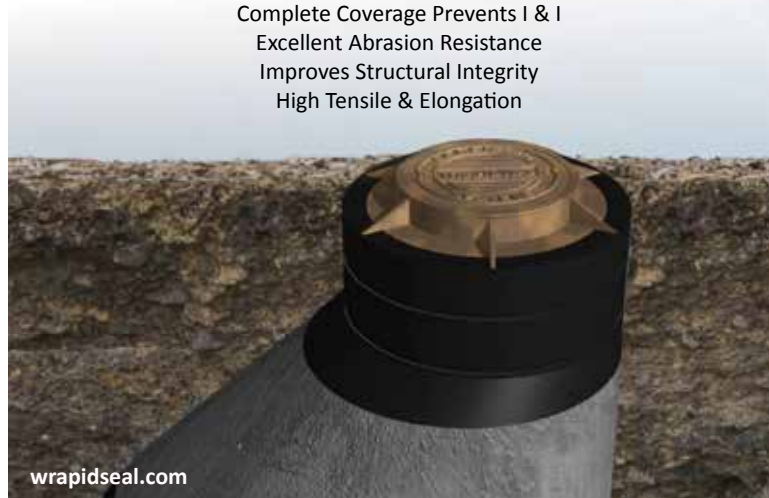


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inflow and infiltration (RDII), groundwater, base and total I&I for each monitored site. At that point, it was determined that mini-basin 7004-002 was responsible for the highest volumes of RDII.

In order to further isolate the source of I&I entering the system, 11 iTrackers were strategically relocated upstream of the mini-basin in question. It was quickly determined that an area directly upstream consisting of only four manholes was responsible for contributing the majority of the RDII. Furthermore, evidence of major infiltration was discovered along a micro-

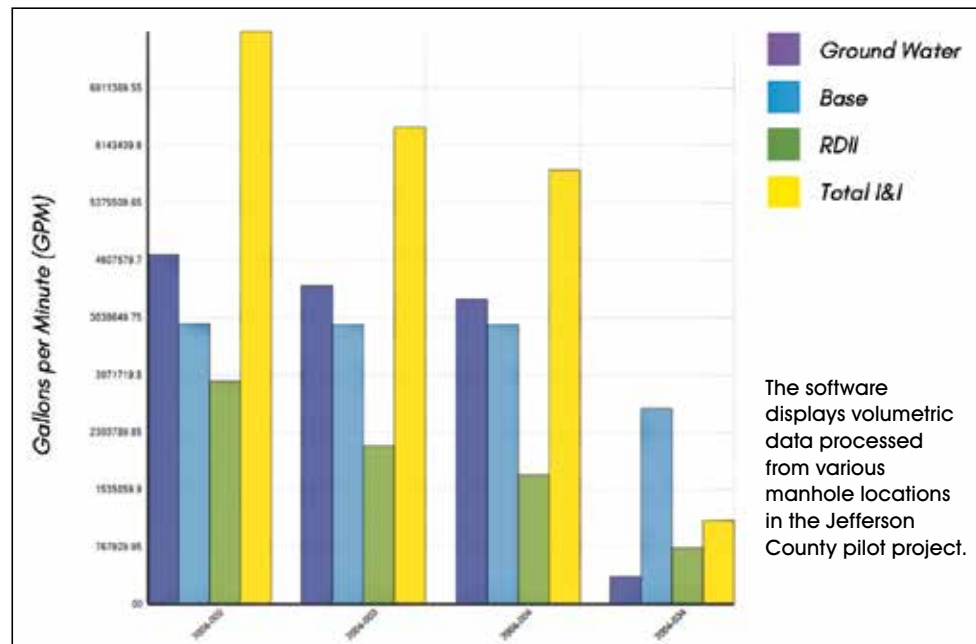
basin with the majority entering between two adjacent manholes. Camera crews then determined that the large volumes of I&I were due to faulty laterals between the manholes.

In practice, the project — which was slated for a six-month time period — was completed in just over three months with a total of only 48 man-hours of labor.

As weather events begin, municipal wastewater engineers utilizing iTrackers can be alerted to where an overflow situation will materialize and deal with it proactively before environmental disasters occur. For more information and videos, visit [www.smartwastewater.com](http://www.smartwastewater.com).

#### ABOUT THE AUTHOR

Bob Donnelly is the vice president of business development for Eastech Flow Controls. **I&I**



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# A SPEEDY CURE FOR INFILTRATION

User-friendly pipe lining system allows for better quality control while reducing cure time and manpower

By Ken Wysocky

**W**hen Pipe Restoration Solutions tackles a pipe lining project, speed is of utmost importance.

“We do a lot of work at hospitals and health care, industrial and food-manufacturing facilities, where it’s critically important to minimize shutdown times,” says Frank Ruco, a project manager at the Sarasota, Florida-based company. “We need to get in and out of these facilities as quickly as possible.”

To accomplish this, the company invested approximately \$56,000 about a year ago in a NuCure pipe lining system from NuFlow Technologies. Designed to rehab pipes 3 to 6 inches in diameter, the system features two primary technologies — a cold-cure resin and a “light rope” — that significantly reduce liner curing times, he says.

“It used to take three to five hours for liners to cure at ambient temperatures,” Ruco explains. “But with the NuCure system, the cure time is about 10 minutes. That allows us to get into places, do the work that needs to be done and get our customers back into service quickly, with minimal disruption to their operations.”

Moreover, the cold-cure system isn’t affected by high or low ambient temperatures, so there’s no need to adjust the resin mixture or the curing schedule for varying environmental conditions.

## NO RUSH

Furthermore, after liners are wetted out, there’s usually a limited “pot life” — the amount of working time installers have to get the liner in place before the resin starts to set up and becomes unmanageable.

But with the NuCure system, there’s virtually unrestricted pot life. That’s because curing doesn’t start until the light rope inside it is activated; this allows for better quality control, Ruco says.

“When you’re using a two-part epoxy to wet-out the liner, you’re always rushing around, trying to beat the clock. But with the NuCure system, installers can work calmly and deliberately because until you turn on those ultraviolet LED lights, no curing occurs.

“That gives our crew plenty of time to be sure the liner is exactly where it needs to be before it starts to cure.”

Another bonus: Instead of sending out a four-worker crew to a job site to ensure the liner can be installed within the limited working time, Pipe Restoration Solutions can deploy just two workers. That allows the company to bid on jobs more competitively and save customers money through reduced labor costs.

## USER-FRIENDLY SYSTEM

Here’s a quick, simplified summary of how the NuCure system works: After the liner is wetted out (either ahead of time or on the job site), it’s either pushed or pulled into the host pipe, utilizing various pull/push points — clean-outs, manholes, vent stacks — to maneuver it into place.

Then the crew uses an air compressor to inflate a bladder inside the liner, which forces the liner to conform to the walls of the host pipe. After that, the light rope is illuminated and the resins start to cure. After the curing process is complete, the bladder is extracted from the pipe.

A plastic sheath around the light rope prevents it from adhering to the liner during the curing process. An internal timer and control system automatically deactivates the lights when curing is complete, at which time the light rope is removed, leaving behind a newly lined pipe, Ruco says.

Another benefit: The liner can withstand higher temperatures than some other liners, he says.

“No other liner we’ve ever used could tolerate high temperatures. So that opened up a new market for us because we now can bid on jobs we couldn’t bid on before.”

## BEATING THE HEAT

This temperature tolerance came in handy last year at an Ohio brewery. Because of the extreme temperature fluctuations in brewing processes, about 600 feet of 6-inch-diameter PVC pipes had developed cracks and was failing. About 10 lateral wye fittings also were affected, Ruco says.

The work was performed during timed shutdowns, so there was little margin for error.

“It took us about six 12-hour days to complete the job. It would’ve taken us two to three weeks if we were using other types of liners.

“I would say that on average, we can do pipe lining jobs about 50% faster.” NuFlow also has developed various liners specifically designed to cover fittings at branch connections (wyes, tees and so forth). Those liners get



Designed to rehab 3- to 6-inch pipes, the NuCure system features two primary technologies — a cold-cure resin and a light rope — that significantly reduce liner curing times.



Curing doesn’t begin until the light train inside the liner is activated, which allows for more time to assure a quality installation.

PHOTOS COURTESY OF NUFLOW TECHNOLOGIES



**“The bottom line is we’re doing two or three jobs in the same time that it used to take us to do one job. And getting in and out of jobs faster also gives us a bidding advantage.”**

Frank Rucco

installed first, then the mainline liner is installed in sections that meet against the front and the back sides of the fitting liners; that eliminates the need for reinstating the mainline and provides full protection for the fittings, Rucco says.

“This system worked great at the brewery because the liner was compatible with high temperatures and the network of pipes with failed fittings was so intricate.”

#### **GREAT ROI**

Rucco says the NuCure system, along with a \$15,000 companion NuCure system designed to line pipes as small as 2 inches in diameter, has been an excellent investment.

“It paid for itself pretty quickly, primarily through reduced labor costs,” he says. “And the risk factor on jobs dropped substantially because we have more control over the curing process.”

“The bottom line is we’re doing two or three jobs in the same time that it used to take us to do one job. And getting in and out of jobs faster also gives us a bidding advantage.”

“In the end, we’re capturing more revenue. It’s been a game-changing technology for us.” **I&I**



The NuCure pipe lining system from NuFlow Technologies isn’t affected by high or low ambient temperatures, so there’s no need to adjust the resin mixture or the curing schedule for varying environmental conditions — curing doesn’t start until the light rope is activated.

**“Like we say in the sewer,  
‘time and tide wait for no man.’”**

— Ed Norton, *The Honeymooners*

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By Craig Mandli

## JOINING FORCES AND UTILIZING NEW EQUIPMENT TO MINIMIZE I&I

### PROBLEM:

In 2012, Pennsylvania's Department of Environmental Protection imposed a consent order and agreement on the Montgomery and Muncy boroughs. The municipalities' aging infrastructure was plagued by I&I, and the wastewater plants in both communities were struggling. With expensive decisions on the line, the DEP encouraged the communities to adopt a regional approach for managing their collection systems.

### SOLUTION:

The boroughs joined two other townships to create the West Branch Regional Authority. Along with building a new, shared wastewater plant, the authority created a preventive maintenance plan that included cleaning and inspecting its lines to get a better understanding of the rehab and repair needs. Among the plan's main goals were to prolong its infrastructure's lifespan and to stay ahead of major repairs. To bolster inspection efforts, the authority purchased a **ROVVER X inspection crawler** and a **Verisight Pro+ push camera** from **Envirosight**, as well as several vac trucks for jetting and cleaning purposes.

**Result:** Today, the authority successfully manages 61 miles of mostly gravity sewer lines, as well as 12 lift stations and several force mains that move wastewater to the centralized plant. With the new assessment gear, the authority got a closer look at pipe condition and could more easily identify and treat sources of I&I. "The ROVVER X has been a great piece of equipment for us," says the authority's deputy executive director, John Lynch. "It's allowed us to really see what's going on and make more informed decisions."

866-936-8476; [www.envirosight.com](http://www.envirosight.com)



## MANHOLE RISERS A FIT FOR COASTAL COMMUNITY

### PROBLEM:

Ocean Springs, population 17,500, is a town on Mississippi's Gulf Coast. The 42 members of Ocean Springs' Public Works Department maintain 186 miles of roadway along with 7,200 manholes. They sought a reliable way to bring manholes to grade easily during repaving projects.

### SOLUTION:

For about 30 years, the department has relied on adjustable manhole risers to raise manholes to grade after new paving. The **American Highway Products Pivoted Turnbuckle Manhole Riser** is a ring of galvanized steel featuring a turnbuckle link used to expand or contract the riser as needed for insertion into manhole rims. The adjustable risers are available in fine size gradations to match manhole diameter and paving lifts precisely.

**Result:** The risers save money and many hours of labor. At-grade risers are gentle on 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; and they don't set high, so vehicle tires don't jar the lid and rim continually. Ocean Springs has been ordering and installing about 60 adjustable risers annually for a few decades, and it plans to continue indefinitely.

888-272-2397; [www.ahp1.com](http://www.ahp1.com)



## FOAM KEEPS ROOTS OUT OF SEWER NETWORK

### PROBLEM:

North Bend, Oregon, is surrounded on three sides by Coos Bay and the temperate climate that makes it a very green and lush place, with an abundance of trees and hedges. That means that city of North Bend collection foreman Joe Vos has a real problem keeping roots from clogging the sewer network he maintains. "We've never been able to narrow it down to, say, Douglas Fir or spruce or hedges," he says. "We just know that roots used to be a real problem in our system."



### SOLUTION:

They apply **RootX Root Control** in-house utilizing existing crews and equipment. RootX is easy to apply and is effective mainly because it's designed to foam on contact with water, which raises the root-killing active ingredient to the top of sewer pipes, where 90% of root intrusion occurs. The foam is also formulated to strip away grease and grime, which allows the active ingredient to penetrate roots, killing them and stunting future growth. This is more effective than simply jetting or cutting roots, because cut roots grow back aggressively and will soon clog pipes.

**Result:** After that initial heavy treatment protocol, RootX use dropped dramatically. The strategy then was simply to foam every line clogged with roots. It worked well. "We had a list of clogged lines, and treated nearly all of them, and honestly it worked well from the beginning," says Vos. "In less than four years, there wasn't a single clogged line left, and we could CCTV all of them."

800-844-4974; [www.rootx.com](http://www.rootx.com)

## LIFT STATION UPDATES IMPROVE COMMUNICATION RELIABILITY FOR SANITARY DISTRICT

### PROBLEM:

The Iowa Great Lakes Sanitary District needed to replace and update its operations. They wanted a prime contractor to retrofit existing lift stations with new Allen-Bradley Program Logic Controllers, replace its existing collections system and SCADA systems and move from radio to Ethernet communication.

### SOLUTION:

**PRIMEX** retrofitted 49 different lift stations across the district with Allen-Bradley CompactLogix **PLCs**. The company also removed and replaced the PLCs and I/O cards at the plant's main SCADA control panel with an Allen-Bradley ControlLogix PLC. PRIMEX facilitated combining the separate wastewater plant and lift station WonderWare software programs into one common WonderWare System Platform software

### FEATURED PRODUCT

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package, installing related hardware as indicated in the project specifications. In addition, it switched the communication style from radio to Ethernet to improve the reliability of the district.

**Result:** The process was highly interactive throughout, leading to a strong relationship with the client. The communication upgrade from radio to Ethernet represented a large piece of what made this project successful for the district and PRIMEX.

844-477-4639; [www.primexcontrols.com](http://www.primexcontrols.com)

(continued)



## FLUSHED WIPES PLAGUE HIGH-RISE UNTIL PUMP SYSTEM SAVES THE DAY

### PROBLEM:

A 23-story, 320-unit high-rise residence building with a grocery store and restaurant in Austin, Texas, experienced frequent pump clogs, including six faults in two months. The primary culprit: not so “flushable” wipes. The building management team needed a solution. Despite multiple notifications to the building occupants, the team had no control over what was being flushed, and clogs persisted while pump service charges piled up.

### SOLUTION:

Installing an **OverWatch Direct In-Line pump system** from **Industrial Flow Solutions** saved the day by eliminating the wet well entirely. Now, wipes, fats, oils and grease are no longer a problem because influent is lifted directly from the gravity invert and they don’t have the opportunity to separate and solidify. Fibrous materials are contained in solution and ejected from the system before solidifying. Since the influent is also contained, it never becomes atmospheric, which eliminates odors and dangerous gases. The system also prevents grease buildup on basin walls that can cause leaching into the adjacent soil or groundwater.

**Result:** This technology not only eliminates the wet well, but also eliminates clogs, odors, gases and maintenance. The building management team is saving time and money with this installation.

860-631-3618; [www.flowsolutions.com](http://www.flowsolutions.com)

## CONTRACTOR USES PNEUMATIC PIPE PLUGS TO MEET EXTREMELY HIGH HEAD PRESSURES

### PROBLEM:

As part of a project that lasted a year and a half, The Metropolitan Water Reclamation District of Greater Chicago performed structure rehabilitation and pipelining along 175th Street and Ridgeland Avenue in the Chicago suburb of Tinley Park. The project’s objective was to update the infrastructure and prevent further deterioration of existing pipes and structures. Instead of digging up and replacing the old line, Insituform Technologies inserted a cured-in-place lining inside 14,051 feet of 60-inch sewer pipe. A Tinley Park-based subcontractor, Airy’s Inc., supported the installation of the cured-in-place lining. Airy’s role as the subcontractor was to plug the sewer lines and bypass the entire 14,000 feet of sewer line so Insituform Technologies could get into the line and safely put the cured-in-place liner in the pipe.

### SOLUTION:

Airy’s used large bypass **pipe plugs** manufactured by **Cherne Industries** to stop and redirect wastewater flow into the bypass system. The subcontractor used Muni-Ball pipe plugs to meet extremely high head pressures and safely plug the lines, bypassing 14,000 feet of 60-inch sewer line.

**Result:** With the use of pneumatic pipe plugs, the contractors did not have to enter the sewer to plug the pipe. For ultimate safety, Airy’s “double-plugged” the sewer, says Airy’s project manager Tom Land. The plug performance proved excellent, even in extreme rain events that truly tested the durability of the plugs. “These plugs had extremely large flows through them and were able to meet extremely high head pressures,” says Land.

800-843-7584; [www.cherneind.com](http://www.cherneind.com)







## LASTING SOLUTIONS FOR MUNICIPAL CORROSION ISSUES

### PROBLEM:

In eastern Pennsylvania, a municipal sewerage authority was tasked with finding a solution and correcting issues with concrete tankage and a screen channel within their treatment facility that was experiencing cracking and spalling issues, resulting in severe deterioration. The interior and exterior of two tanks, channels and screen channels — totaling over 1,500 square feet — were affected by biogenic corrosion.

### SOLUTION:

Corrosion Technology Systems (CTS) was solicited to provide an economical and long-term solution for the complete rehabilitation of the deteriorated concrete. The system would be required to protect the concrete from further damage and also protect further I&I. CTS brought in the general contractor/applicator Heisey Mechanical to spray apply over 1/2 inch of **Sauereisen RestoKrete Substrate Resurfacer F-121** to the exterior of the tanks to restore the concrete back to its original size and to add additional protection against I&I. Next, **Epoxy Filler Compound 209HB** was used to fill voids and imperfections on the interior of the tanks to restore the surfaces. Finally, Heisey's crew applied 125 mils of **SewerGard 210X Epoxy** in two coats for complete corrosion protection in both tanks and channels.

**Result:** With a completely restored substrate and an epoxy lining in the tanks and channels, this municipality was able to return to service with peace of mind knowing the restoration project will protect their assets from further damage and water infiltration, all while adding several more serviceable years.

412-963-0303; [www.sauereisen.com](http://www.sauereisen.com)

## REHABILITATION SOLUTION FOR A SEVERELY DETERIORATED MANHOLE

### PROBLEM:

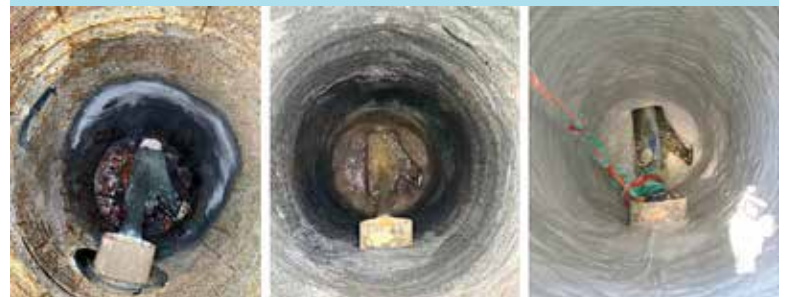
Hydrogen sulfide gases caused by sanitary sewer water and excessive inflow and infiltration were the culprits of the massive deterioration of a Montville, Connecticut, manhole. "In the summer of 2021, the Water Pollution Control Authority was faced with an impending manhole failure," says Derek Albertson, superintendent of the wastewater treatment facility. "The concrete manhole chimney and main body were on the verge of collapse."

### SOLUTION:

Contractors Savy & Sons responded to this perplexing situation. "This manhole was among some of the worst we have seen," says Gino Padewski, Savy and Sons sales and service representative. As an Epoxytec certified applicator with extensive experience in the field of manhole rehabilitation, the Savy team was able to recommend rehab using **Epoxytec's CPP Sprayliner** as an alternative to replacement of the infrastructure. CPP Sprayliner is designed specifically for highly aggressive enclosed, immersive environments like this manhole. It is a two-component, 100% solids structural epoxy that has high strength with great acid resistance. In conjunction with Epoxytec's epoxy-modified mortar, Mortartec Ceramico, used for resurfacing and repairs, the CPP Sprayliner would provide the rehabilitation and lining necessary for the extent of this deterioration.

**Result:** "The cured-in-place lining for repair, along with the injection of void filling/support material, made the manhole bulletproof," says Albertson. The project was completed in six days from start to finish. Epoxytec's CPP Sprayliner extended the life of this infrastructure and enabled what was initially considered an unsalvageable manhole to be rehabilitated.

877-463-7699; [www.epoxytec.com](http://www.epoxytec.com)



(continued)

## MANEUVERABLE PLUMBING CAMERA USED TO PINPOINT LEAK IN HOTEL POOL

### PROBLEM:

A chain hotel on the Caribbean island of Barbados was trying to find a leak in its freshwater pool, which was allowing saltwater to get in. However, the hotel didn't want to shut down the pool operation for very long, and as freshwater is in short supply in Barbados, the issue stood to cost tens of thousands of dollars for the owners. Finding the problematic spot was complicated because the hotel didn't have a precise piping scheme.

### SOLUTION:

The **MiniFlex plumbing inspection camera** from **Medit** successfully navigated multiple bends and visually located the point of the leak. This system features a patented flexible neck between the camera head and the push cable which allows it to navigate multiple 90-degree bends in 1.5-inch PVC piping or a P-trap in 1.25-inch PVC pipe. Thanks to the built-in transmitting sonde, they were able to pinpoint the location above ground, and know where to access it.



**Result:** This issue was resolved quickly and cost-effectively.  
800-239-9934; [www.fiberscope.net](http://www.fiberscope.net) **I&I**

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Which types of sewer, storm & water repair, maintenance & inspection do you perform monthly?

- ☐ Jetting   ☐ Manhole Rehabilitation   ☐ Treatment   ☐ Pipeline Rehabilitation & Relining  
☐ TV Inspection   ☐ Repair/Replace Excavating   ☐ Vacuum Truck Service

What is the approximate population of the area in which you provide service?

- ☐ 0-10,000   ☐ 10,001-50,000   ☐ 50,001-100,000  
☐ 100,001-200,000   ☐ 200,001-500,000   ☐ 500,001+

How many vehicles do you currently have in service?

- ☐ 1-5   ☐ 6-10   ☐ 11-15   ☐ 16-20   ☐ 21+

What is your annual equipment budget?

- ☐ \$0-\$50K   ☐ \$50K-\$100K   ☐ \$100K-\$200K   ☐ \$200K-\$300K  
☐ \$300K-\$400K   ☐ \$400K-\$500K   ☐ \$500K +

If municipal, what percentage of your sewer and/or water work is done by private contractor?

- ☐ None   ☐ 1-20%   ☐ 21-40%   ☐ 41-60%   ☐ 61-80%   ☐ 80%+

\*U.S., Canada and Mexico only

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# MANHOLE INFILTRATION SOLUTIONS



## FLEX SEAL UTILITY SEALANT®

An aromatic urethane rubber noted for extreme toughness, elongation, abrasion, resistance, acidic resistance and longevity.



## AQUA SEAL®

A dual component hydrophobic polyurethane water stop system designed to stop high infiltration in precast or brick lined structures.



## GATOR WRAP®

Forms a continuous rubber seal on a manhole joint which prevents water and soil from infiltrating through the manhole, catch basin or concrete pipe joint.



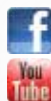
## INFI-SHIELD® UNI-BAND

An inexpensive and permanent method of externally sealing the grade adjustment ring area of a manhole or catch basin.



## MANHOLE INSERT

Stop the unwanted inflow of rainwater through manhole covers.



Sealing Systems, Inc.  
800-478-2054  
[www.ssisealingsystems.com](http://www.ssisealingsystems.com)