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March 2012

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EXPO ISSUE

Randy Mather  
Wastewater collection  
program manager  
Olathe, Kan.

# PROBLEM SOLVER

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Proactive approach helps Olathe collection  
manager keep system running smoothly





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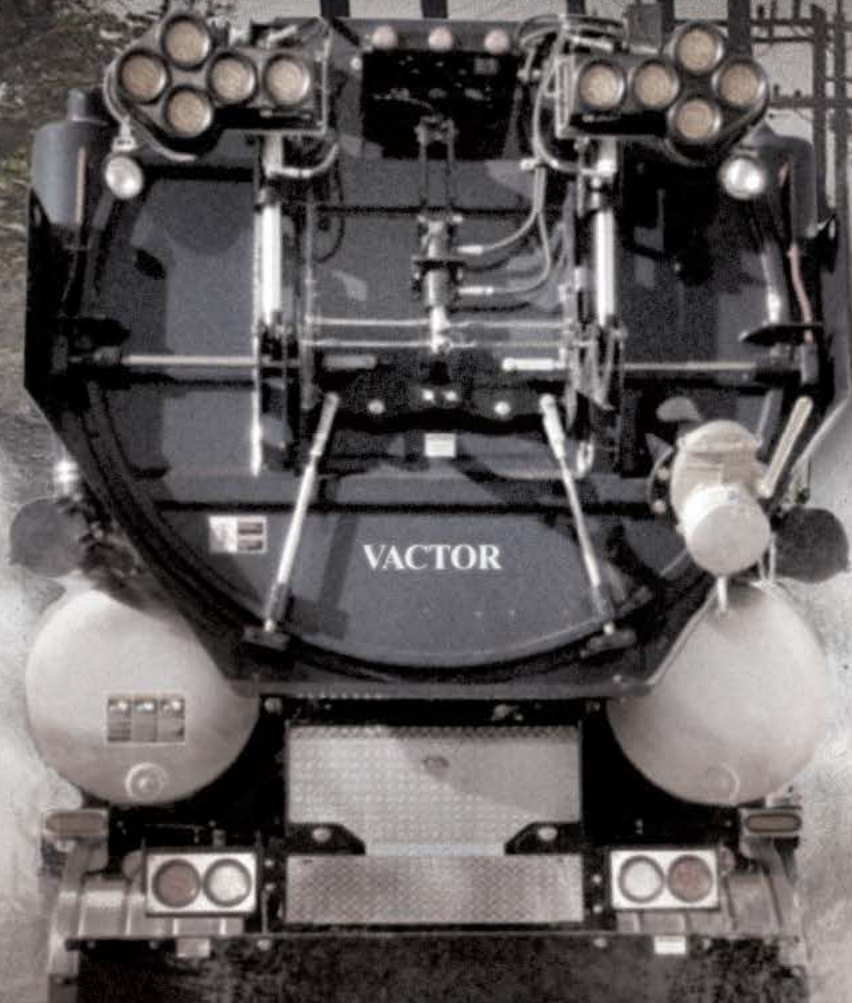


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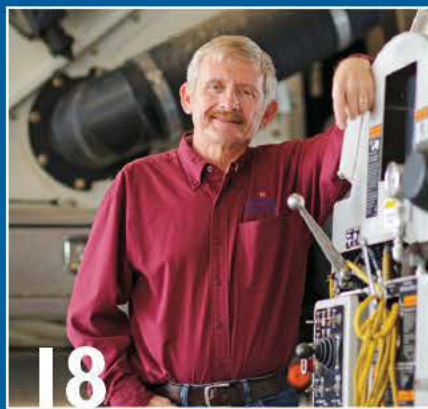
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2012 PUMPER & CLEANER ENVIRONMENTAL EXPO INTERNATIONAL ISSUE



## COVER:

Randy Mather, wastewater collection program manager in Olathe, Kan., takes pride in finding better ways to maintain and operate the city's wastewater collection system. The city averaged fewer than five backups per year over the last decade and made it through all of 2010 without a single backup. (Photography by Steve Puppe)



## COMING IN APRIL 2012

Product Focus: Manholes and Catch Basins/  
Pumper & Cleaner Expo Recap

- ◆ Sewer: Fast-track stimulus projects in Guelph, Ont.
- ◆ Sewer: Manhole and pipe rehab in Greenwood, S.C.
- ◆ Better Mousetraps: Monoform manhole rehabilitation in Waupaca, Wis.
- ◆ Human Side: Volunteerism at Louisville (Ky.) Water Company
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FOR SANITARY, STORM AND WATER SYSTEM MAINTENANCE PROFESSIONALS

Published monthly by:



1720 Maple Lake Dam Rd.,  
PO Box 220, Three Lakes WI 54562

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**EDITORIAL CORRESPONDENCE:** Send to Editor, Municipal Sewer & Water, P.O. Box 220, Three Lakes, WI, 54562 or email editor@mswmag.com.

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**CIRCULATION:** 2011 average circulation was 38,931 copies per month (U.S. and international distribution).



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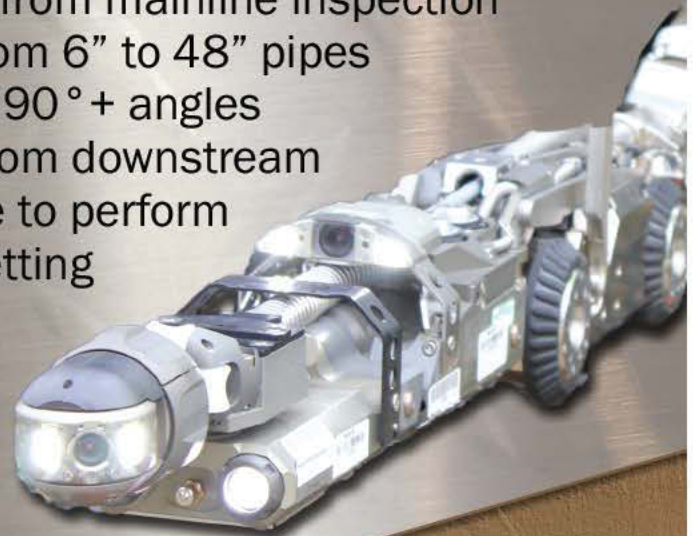
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# BETTER WITH AGE? NOT LIKELY.

A new ASCE report spells out in dollars and cents terms why our nation must make up the shortfall of investment in water and sewer infrastructure

**T**here's a scene in the old Tom Hanks/Shelley Long movie, "The Money Pit" that relates to the status of America's infrastructure.

The Hanks character has called a plumber to fix the piping of the stately but decrepit home he and his wife have bought. The plumber gives an estimate (outrageous) without so much as going into the basement. Hanks asks if the plumber is even going to look at the pipes. The crusty old tradesman replies, "I looked at them five years ago. Do you figure they've improved with age?"

It turns out that as a nation we are treating our plumbing — our water and sewer infrastructure — as if it's going to get better (or at least not worse) over time without adequate investment.

## New alarms sounding

The American Society of Civil Engineers has been harping on this issue for years with its *Report Card for America's Infrastructure*, last issued in 2009. Now the ASCE is out with a new report, *Failure to Act: The economic impact of current investment trends in water and wastewater treatment infrastructure*.

Everyone who is sworn to care for and protect this infrastructure should read at least this report's executive summary, available at [www.asce.org/failuretoact](http://www.asce.org/failuretoact). The picture it paints is no prettier than the Report Card, which consistently showed near-failing grades almost across the board. Some highlights of the new report:

- In this age where politicians claim to care about jobs, jobs, jobs, the nation stands to lose almost 700,000 jobs if the shortfall in infrastructure spending isn't corrected.

- By 2020, that shortfall will reach \$84 billion for water infrastructure alone.
- If we do not invest, then by 2020, unreliable water infrastructure will cost families \$59 billion and businesses \$147 billion.

The report, completed by the Economic Development Research Group (EDR) with Downstream Strategies, is the first study of its kind to link the condition of America's water infrastructure to economic performance.

"We've all seen the impact aging water and wastewater infrastructure has on our daily lives," says Steven Landau of EDR, lead author.

**"From broken water mains to boil-water alerts, failing to invest in this vital part of our country's infrastructure has clear economic consequences. The longer we wait to make needed repairs and upgrades, the more acute these problems become and the higher the costs."**

Steven Landau

"From broken water mains to boil-water alerts, failing to invest in this vital part of our country's infrastructure has clear economic consequences. The longer we wait to make needed repairs and upgrades, the more acute these problems become and the higher the costs."

## How it costs

Exactly how do the authors of this report determine the cost of doing nothing or too little? Well, start with assessments from the U.S. EPA. The agency estimated the cost to maintain and upgrade drinking water and wastewater systems across the nation in 2010 at \$91 billion, but only \$36 billion was being funded, leaving a gap of \$55 billion.

The study found that investment needs will



## FROM THE EDITOR

Ted J. Rulseh

keep escalating as systems age and that if current trends persist, the required investment will hit \$126 billion by 2020, and the funding gap will reach \$84 billion. By 2040, the systems will need \$195 billion of investment and the gap will reach \$144 billion, unless current funding trends change.

Now, how does that translate to costs on families and businesses? The report says that doing nothing will cause water shortages, increase rates, force the purchase of equipment to conserve or recycle water, and increase reliance on individual wells and septic systems.

It also says medical costs will rise because of more waterborne illnesses caused by unreliable water delivery and wastewater treatment services.

The report also notes that doing nothing means more pipes will leak, new facilities needed to meet more stringent environmental goals will be delayed, system operation

and maintenance will become more expensive, and waters will be polluted.

## What to do

So, what should municipal or utility managers do about this report besides shake their heads in frustration? Get out and tell the story. Let local elected leaders know the risks of inaction. If you can't "move the needle" at the national level, maybe you can deliver a dose of inspiration to spur progress locally. ♦

Comments on this column or about any article in this publication may be directed to editor Ted J. Rulseh, 877/953-3301; [editor@mswmag.com](mailto:editor@mswmag.com).



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# ALL ON THE SAME PAGE

California's Western Municipal Water District is leveraging an enterprise software license agreement to bring efficiencies to all aspects of operations

By Peter Kenter

**T**he Western Municipal Water District is a complex entity that provides water on a wholesale and retail basis to customers in Riverside County, Calif.

With a diverse range of projects on its plate, the district has leveraged Esri's small utility enterprise license agreement (ELA) to help bring geographic information system (GIS) mapping tech-

nology to a range of projects, including identification of new water sources, underground leak monitoring, leak reporting, preventive maintenance programs and customer fee calculation.

The district lies about 50 miles east of Los Angeles and serves about one million residential consumers through eight wholesale customers, including smaller water districts. It also directly serves 24,000 residential and retail cus-

**"Having access to these GIS products across the district is making everyone more efficient, allowing us to access software that we might not have otherwise used and giving us the flexibility to have more users of more GIS products in multiple locations."**

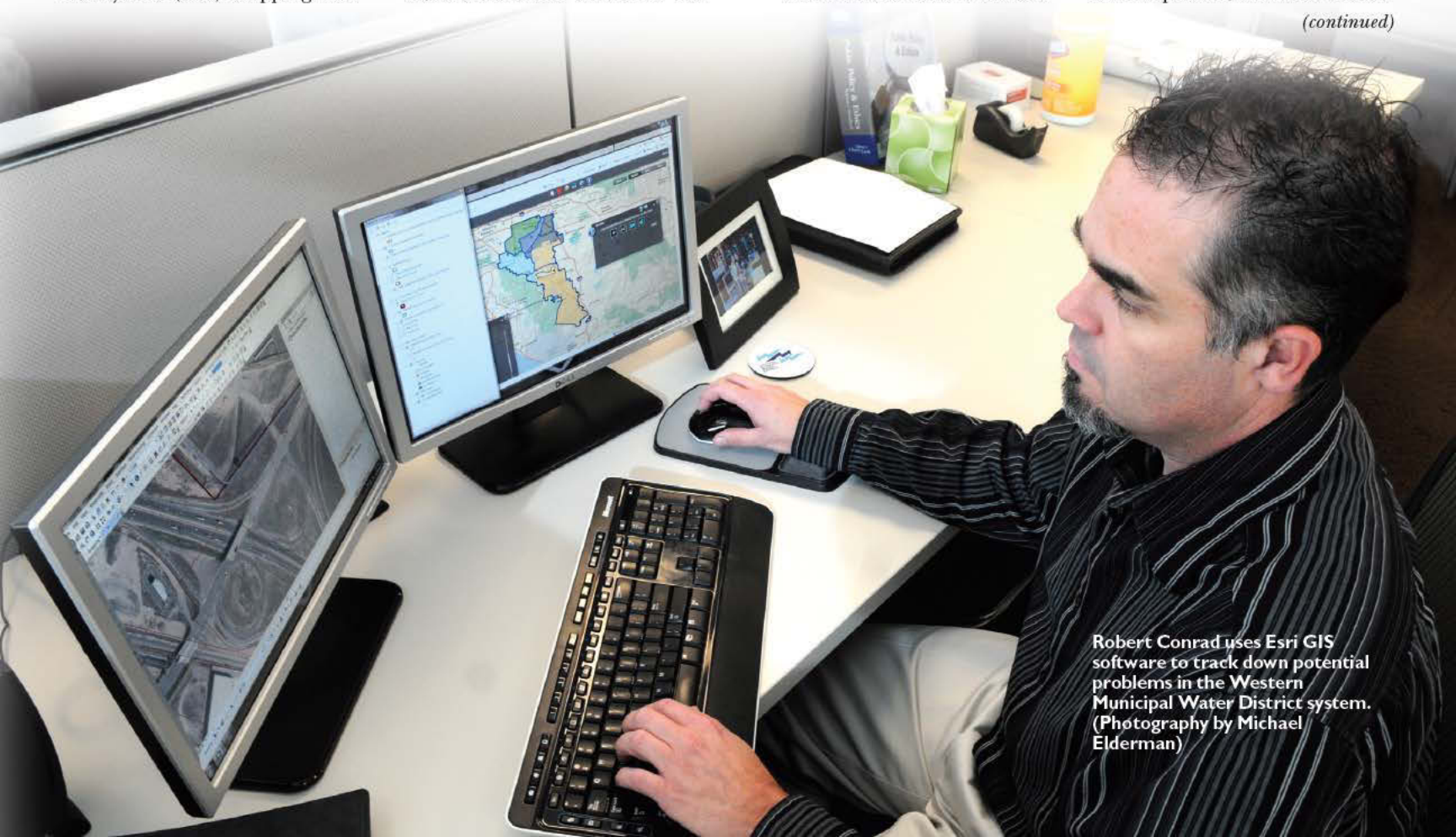
Greg Duecker

tomers, primarily in the communities of Riverside, Murrieta and Rainbow Canyon.

Water comes from a number

of sources, including the Metropolitan Water District of Southern California via the Colorado River Aqueduct, Northern Califor-

*(continued)*



Robert Conrad uses Esri GIS software to track down potential problems in the Western Municipal Water District system. (Photography by Michael Elderman)









**Bob Frosheiser, operations technician IV, marks pipe locations for USA DigAlert with a Vivax-Metrotech 810 locator.**

nia via the California Aqueduct, and the San Bernardino basin. The district also operates several groundwater wells in its Murrieta Division.

Western is responsible for the engineering, infrastructure, management and strategic governance of the distribution system. Originally established to serve primarily agricultural interests, the district is responsible for transmission lines and pumping stations designed to reach its wholesale customers, but operates municipal sewer and water mains only for its 24,000 residential customers.

In July 2010, the district signed on to the Esri Small Utility ELA program, open to utilities with 100,000 or fewer meters or connections. Under the ELA, utilities receive unlimited access to Esri's core ArcGIS platform, including ArcInfo, ArcEditor, ArcView, ArcGIS Extensions, ArcGIS for Server, ArcIMS, and ArcGIS Engine Runtime Deployments. The agreement also provides maintenance and support for products, staff training, and Esri data models.

### Improving efficiency

"One thing that's really important to me is that the ELA fits into our philosophy of being more efficient, conserving everything from water to our own department resources," says Greg Duecker, the district's director of information technology. "Having access to these GIS products across the district is making everyone more efficient,



**Senior operations technicians Chuck Hunt, left, and Todd Fielding use a laptop and Trimble GPS unit to gather coordinates for the location of pipes or valves. The antenna gathers data from different satellites and gives the operator the coordinates.**

allowing us to access software that we might not have otherwise used and giving us the flexibility to have more users of more GIS products in multiple locations."

The district had used some Esri software before activating the license but committed when the cost of the individual products crept up toward the price of an ELA.

"Originally we would track infrastructure on a board with push

## DEVELOPING NEW SOURCES

The Western Municipal Water District collaborated with the Eastern Municipal Water District to conduct a Feasibility Analysis of Additional Groundwater Production for the March Air Reserve Base in California, investigating additional sources of groundwater that would also assist the base in lowering the regional water table in the vicinity of its operations.

"This was a water resources engineering problem that really benefited from GIS applications to determine if the area had water development potential," says Dr. Fakhri Manghi, a project manager with the Western district.

The GIS database, compiled by contracted firm MWH Global, combined aerial photos, computer assisted drawings (CAD), files of base features and boundaries, roads, groundwater data, bedrock maps, limits of contaminated soil, topology and existing infrastructure maps, including water and wastewater treatment plants, lift stations, pump stations, reservoirs and water mains. Four potential well locations were identified using the GIS database and groundwater modeling.

Locations were identified by minimizing the required pipeline lengths, greatest thickness of potential aquifer material, and known contaminant plumes in the area. These locations were then entered into a regional groundwater model to assess the impacts to the area and provide an estimate of maximum groundwater production potential. The results from the modeling were then imported into the GIS project for presentation.

"We were able to develop general cost estimates for going forward with the wells if we decided to do that," says Manghi. "The cost of new municipal well construction in areas north and east of the base is expected to range between \$1.8 million to \$3.6 million, subject to the final well depth, requirements for wellhead treatment, land purchase costs, and pipeline length required to connect a new well to the local distribution system. The GIS was instrumental in helping determine the feasibility of additional groundwater production in the area."



**PROFILE:**  
Western Municipal  
Water District,  
Riverside County, Calif.

**ESTABLISHED:**  
1954

**POPULATION SERVED:**  
888,000

**AREA SERVED:**  
527 square miles

**EMPLOYEES:**  
125

**INFRASTRUCTURE:**  
600 miles of water mains

**ANNUAL BUDGET:**  
\$138 million (operating  
and capital 2011-12)

**WEBSITE:**  
[www.wmwd.com](http://www.wmwd.com)

pins, which were translations of handwritten reports," says Patty Diaz, application specialist III with the district. "On our original AutoCAD maps, we weren't always able to tell what was a pipeline and what wasn't. We took all the reports and put them into spreadsheets. We also took several thousand drawings and imported them directly into our GIS database. We're now all on the same page, and we can see all of the pipelines and anything else in our water system."

(continued)



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**LEFT:** The team includes, from left, Chuck Hunt, senior operations technician II; Bob Frosheiser, operations technician IV; and Todd Fielding, senior operations technician II. Markings on the ground indicate WMWD has 8-inch pipe buried at this location. **BELOW:** Frosheiser works with the hydraulic automatic valve turning machine from Pacific Tek. The machine exercises the valves and counts the turns.



### Pipeline plans modified

The GIS software suite has made a concrete difference in such projects as the 2320 Reach 1 Pipeline, also called the Hillside Pipeline project. The project involved replacement of 8,000 feet of 40-year-old 14-inch single-feed iron pipeline, which delivers water to the southern part of the district and serves about 5,500 customers. Hydraulically, the existing pipeline severely restricts movement of water into the south area, leading to operational inefficiencies at the Hillside Pump Station.

"It's a section of very high-pressure pipeline that feeds a remote and sparsely populated area," says Derek Kawaii, principal engineer with the Western district. "It is rugged terrain with slopes approaching 1:1 and a pipeline that goes

through solid granite, so we needed to seriously consider the method we would use to replace this line."

Considering the complexity of replacement, district engineers considered the possibility of a water supply interruption during construction. What was unclear was the number of customers who might be affected. Eyeball estimates based on traditional map data suggested very few would be inconvenienced.

"We used our GIS database and ran the software to determine what would happen if there would

be a line break and which valves would need to be turned off to fix it if the problem lasted for a few days," says Kawaii. "When we ran the data, we found out that the failure of that line would lead to a cascade of failures with other lines that feed off the pressure provided by that line and would have put 3,000 homes out of service. That led to a decision to put in a temporary line while we installed the new one."

In preparation for the operation, Robert Conrad, application specialist III/GIS, used the GIS to pull the addresses of every homeowner in the pressure zone who might be affected by an outage.

require contractors to provide GIS data for pipelines, valves, hydrants and other features. "When the contractor submits his redlines, our inspector goes through and verifies all of the nodes indicated," says Sergio Felix, construction management supervisor. "When we deal with a leak or shutdown of any kind, that's the data we rely on to protect our system and the surrounding property."

GIS applications have also been used to develop a master schedule for wastewater system maintenance. "We inventoried every foot of the collections system, broke down everything that went into the collections system and treat-

**"We inventoried every foot of the collections system, broke down everything that went into the collections system and treatment plants, and moved from a paper-based system to a computerized master schedule."**

**Stephen Schultz**

The district then sent notices to all of them, explaining that they might experience low pressure during the operation but would never be without water.

"This project is a case where the use of the software suite definitely modified both our planning and approach to construction," says Kawaii.

### Construction auditing

All new construction programs

ment plants, and moved from a paper-based system to a computerized master schedule," says deputy operations manager Stephen Schultz. "We've now got a two-year maintenance schedule that we can achieve by cleaning 19,000 feet of line a month."

The department is looking to buy a CCTV system so that line maintenance operations can add the new video data to the GIS database. "Typically, CCTV should



**“A lot of our staff are hungry for more and better tools. They don’t want so much for us to show them what to do, but for us to help them to do things better.”**

Greg Duecker

audit cleaning and maintenance, but the collection system is only 10 to 15 years old,” says Schultz. “And we don’t have a lot of restaurant or motel rows that typically cause blockages. However, CCTV will definitely be part of our future.”

Schultz likes the ability to customize maps using the current software suite. “We can use anything from satellite imagery to Google Maps and Google Street View as the background for our data, depending on what we need,” he says. His department is creating an emergency location map for all pumping and lift stations, creating GPS coordinates for emergency first responders.

The GIS is also being used in the district’s redistricting operation, an administrative requirement that follows publication of the U.S. Census. “We have five divisions within the boundaries of the district, each with its own director,” says Conrad. “However, some divisions grew faster than others. We’re required to use the census data to re-draw the boundaries so that each division has the same number of customers. GIS is helping us to do that.”

#### Billing accuracy

GIS software is even used to develop accurate billing for customers. “We can now take into consideration the geographic area where the customer and meter are located, the different pumping costs across the topography, the different water rate structures in different parts of a district, and the meter fee, and the application begins to generate a quote,” says Duecker. “It’s pretty elegant.”

The ELA also allows the district to upgrade to the latest versions of GIS software, increasing functionality on the fly. “By opening up the entire Esri catalog, we now have the ability to build a disaster recovery replication site, including replicating both the software and our GIS data, using licensing we didn’t previously have,” says Duecker. “That site could act as an emergency operations center during any major catastrophe.”

The district also uses the software as a jumping-off point to create even more specific software applications. Nobel Systems of San Bernardino, which is contracted to translate AutoCAD and mylars to GIS data, provided a special viewer for non-GIS staff to access GIS data more easily. It also developed a valve shut-off application that shows exactly which valves need to be closed under multiple scenarios.

The GIS department also develops its own applications, including specialty viewers that quickly access the desired GIS data for more experienced users. The department is working on developing preventive maintenance applications, asset management applications, and a computerized work management system. “A lot of our staff are hungry for more and better tools,” says Duecker. “They don’t want so much for us to show them what to do, but for us to help them to do things better.” ♦

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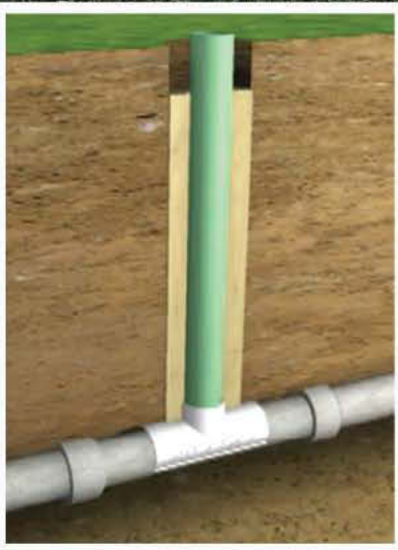




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## FOCUS: OPERATOR

# PROBLEM SOLVER

Former electrician Randy Mather brings a can-do attitude and a customer-service mindset to the wastewater collection program in Olathe, Kan.

By Erik Gunn

**R**andy Mather once had a journeyman's card that said he was an electrician. His job title now is wastewater collection program manager in Olathe, Kan.

But Mather (pronounced MAY-thur) has a different way of describing his work: He's a problem-solver. It has been that way throughout his career in public works — a career that's taken him from maintenance technician at the city's wastewater treatment plant, through stints in design and reha-

our system to help our employees who deal with those systems seven days a week, so they don't have as many problems they have to work on around the clock to fix."

And so it is today, now that he oversees the city's wastewater collection operation. City residents depend on the system to operate cleanly, efficiently, and economically. When trouble occurs, Mather says, "Solving their problems gives me some gratification."

In September 2011, Mather was inducted into the Kansas Golden Manhole Society, an honor

**"You won't find a more dedicated public servant than Randy in his efforts to provide quality customer service and protect the environment."**

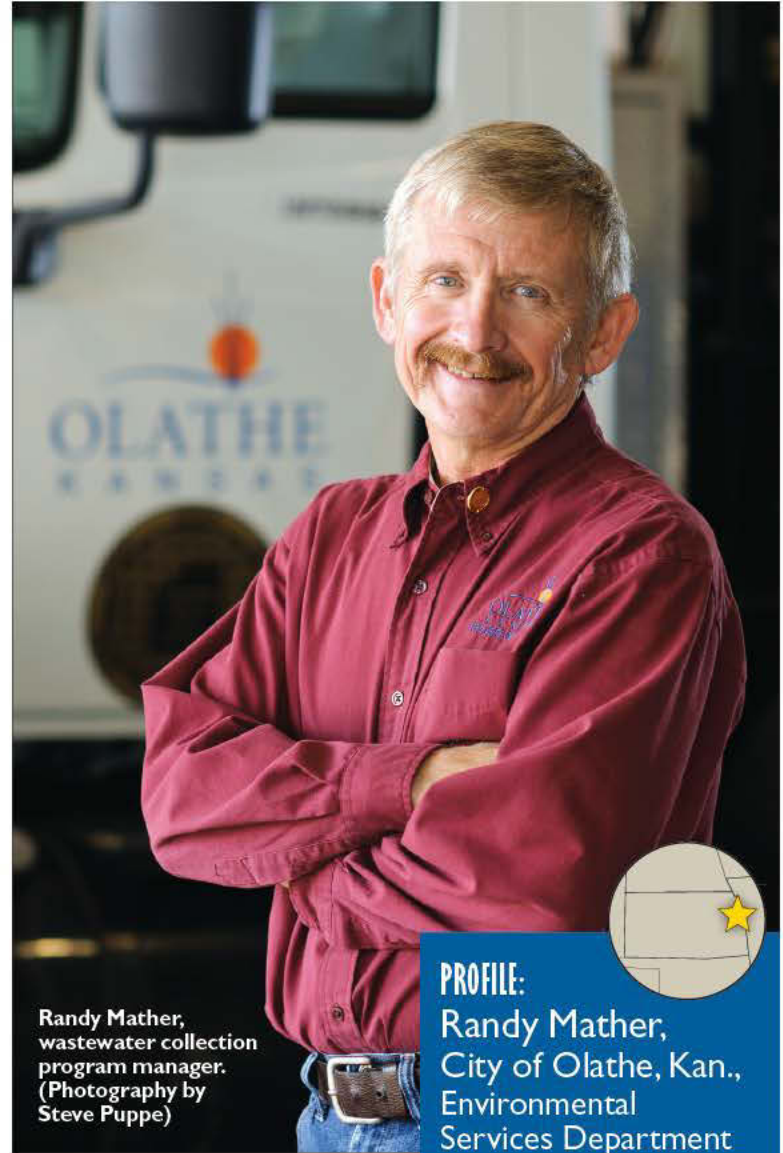
Dave Bries

bilitation of streets and stormwater systems for the city, and a job as project manager for water distribution and wastewater collection system design and rehabilitation.

"When I was doing streets and storms, it was to give better roadways to the public and solve their drainage problems," Mather says. "When I was doing the water and sewer rehab, it was to help alleviate disruptions in our public service and to have better lines in

conferred by the Kansas Water Environment Association (KWEA), in recognition of his long history of service to Olathe.

"You won't find a more dedicated public servant than Randy in his efforts to provide quality customer service and protect the environment," says his boss, Dave Bries, utilities maintenance superintendent for Olathe. "He has not only energy, but a vision, and he leads his staff to accomplish that vision."



Randy Mather, wastewater collection program manager. (Photography by Steve Puppe)

### PROFILE:

Randy Mather, City of Olathe, Kan., Environmental Services Department

### POSITION:

Wastewater collection program manager

### EXPERIENCE:

21 years with Olathe

### EDUCATION:

Associate degree, engineering at Johnson County Community College

### MEMBERSHIPS:

Water Environment Federation, Kansas Water Environment Association (Collections Committee)

### CERTIFICATIONS:

Class IV wastewater collection, Class IV wastewater treatment

### AWARDS:

Kansas Golden Manhole Society, Kansas Water Environment Association

### GOALS:

Continue building a strong team that delivers excellent public service

## Model operation

Olathe is an outer-ring southwest suburb of Kansas City, Kan. Its wastewater collection system consists of 455 miles of line with 22 lift stations (Smith & Loveless) covering a 40-square-mile area. It serves about 90,000 of the city's 125,000 residents (the rest are served by Johnson County Wastewater).

Keeping that system up is hard work. "Anything that has to do with infrastructure is an ongoing battle," Mather says. "As we age, so do the pipes in our system. Things do happen."

But Olathe's operation has long been recognized as a model. The collection system has won statewide recognition from the KWEA as the best in its size category for eight of the last 10 years. "The only reason we weren't in the running those other two years is the state of Kansas only lets you win it three times in a row," Mather says.

The operation has an ethic of





From left, Vincent Wolfe, Ryan Hughey, Shane Banks, Jason Killion and Jesse Sare use the Vector 2100 to hydroexcavate a manhole for grade adjustment and repairs.

## OPEN TO EXPERIMENTS



Mike Richardson uses the OutPost camera system from EnviroSight to give video confirmation and assistance to the crew doing probe grouting. This system is also used for daily CCTV inspections of sanitary sewer lines.

### Long journey

Mather is hundreds of miles from where he started, and light-years away from where he imagined he might be when he entered the workforce. He grew up in western Kansas, graduating from high school in the mid-1970s. After becoming an electrician, he worked in commercial and industrial construction in his hometown for some 15 years.

But hard times in farming, the area's backbone, rippled throughout the rest of the economy. "I was starting to starve to death," Mather says. So in 1990 he moved his family east to Olathe in search of municipal work and its stability. There, he took a job with the city's wastewater treatment plant as a maintenance technician.

He was always restless, though, looking for new opportunities and challenges. "My wife always called me a wandering soul," Mather says. "I get bored with stuff." Not content to just do electrical repairs, he learned how to run the treatment plant and moved up to plant

The City of Olathe has fostered a culture that encourages its employees to get training and try new ways of approaching things, says Dave Bries, utilities maintenance superintendent.

"I try to challenge people in a good way," says Bries. "I try to set goals and expectations that get people to think outside the box. Just because it's the way we've always done it doesn't mean that's going to be the right way."

Randy Mather, wastewater collection program manager, says that openness has helped support him in seeking training and reaching out to other communities to share strategies and techniques. Municipal workers, Bries notes, have an advantage over private-sector personnel when it comes to sharing information.

"When engineering consultants and vendors do a presentation, they're going to hold back some of the key ingredients so another consultant can't come in and mimic what they're doing," he says. "As a utility we don't have that conflict. We can come out there and tell the whole story. We share it, and as an industry we become better."

Giving people room to try new things also means giving them room to fail, Bries adds. Looking at his own career, "If every time I was about to make a mistake, somebody would step on my toes and say, 'No you can't do that,' I don't know that I would be in the position I'm in now, nor would I have learned a lot of things that I learned through those mistakes."



Dave Bries, utilities maintenance superintendent

continuous improvement. The current focus, says Bries, is reducing inflow and infiltration (I&I). In the late 1980s and early 1990s, Olathe took what Bries calls a "shot-in-the-arm" approach, fixing immediate problems.

"We're trying to develop a sustainable program, where we can invest in that infrastructure and continue to support the maintenance and repairs, so it's not something that every 10 or 15 years we have to go to the governing body and justify the funding and the plan," says Bries. In a consultant's annual survey that asks residents in communities around the country about their satisfaction with public services, "For the last seven or eight years we have always had the top position in the Kansas City metro area," Bries adds.

operator. Then he became a project inspector. Along the way, he earned an associate degree in engineering at Johnson County Community College and went to work as an engineering technician

in the Olathe streets and storm-water department.

In 2002, when the city's public works operations were reorganized, Mather moved over to water distribution and wastewater col-



lection operations. In 2008, he was named manager for the wastewater collection program. While he may have been lured by the stability of working for the city, that wasn't his sole reward. Increasingly, he found satisfaction in "trying to provide a better service for the community."

That, and always looking for ways to make things better. "I like trying new innovations, showcasing them, and networking with other cities to develop better practices," Mather says.

### Backup-free year

Within a few years after taking his current position, Mather led the wastewater collection department to a goal it had set years before: to get through an entire year with no sewer backups.

"We had set that goal a number of years ago, before Randy was promoted into that position," says Bries. "He carried on that goal, and we accomplished it in 2010."

To be sure, the city was already close, logging fewer than five backups a year in the last decade, Bries says. The secret was a strong, pro-

**"We try to be very customer-service oriented. And most people appreciate your responding quickly. They are thankful and appreciate that you're out here trying to solve their problems so they don't happen again."**

Randy Mather

active maintenance program that includes regular inspection of lines, crunching inspection data to identify lines at risk for backups, and cleaning and repairing them promptly.

Mather is modest about the milestone: "That goal couldn't have been accomplished without the staff that work with and for me, and the pride and ownership they have in the entire system." He credits the cleaning program to Bries and to his own predecessor as wastewater manager, Rusty Shadoin. Since he has been on the job, the city has embarked on a program of identifying and

removing roots that work their way into the sewer lines.

With his electrician's background, Mather also led a new approach to lift station breakdowns in stormy weather. The city had been relying on generators in a few locations to kick in if the power went out, but that was expensive and didn't directly address the more common problem of stations simply being overwhelmed during storms.

Mather directed the installation of a permanent backup pump on site at one lift station. "That pump has saved the day about five times since we put it in," he says. In addition, at the other 21 lift stations, the city has installed Bauer connections along with permanent suction tubing and floats that allow the quick attachment of portable supplemental pumps. It allows a much faster startup of backup pumping in emergencies, and it's a lot cheaper and more effective than relying solely on backup generators, Mather says.

"Dave calls it our plug-and-play emergency response," Mather says. The solution was chosen for a presentation at a Water Environment Federation technology conference.

Mather also serves on the Collection Systems Committee of the KWEA, promoting training for municipal sewer workers across the state and the employees of private contractors who work with them. And he has been active in helping Olathe and other Kansas City metro communities implement a protocol to standardize measurement and rating systems for TV inspections under the NASSCO Manhole Assessment and Certification Program (MACP) and Pipeline Assessment and Certification Program (PACP).

### Leading by example

With 15 people reporting to him, Mather has more management responsibilities than ever before in his career. He calls his approach "a combination of leading by example, trying to put the people in the right environments, and watching and listening." And he is quick to praise the people who work for his department.

"The majority have a pretty good work ethic and a great pride in the work they do and how it

James Haynes and Tony Leighton do routine maintenance on one of Olathe's 18 Smith & Loveless lift stations. The collections system has 22 lift stations total.



From left, Denton Lewis, Ira Speer and Chris Dankenbring use Prime Resins' Prime Flex Hydro Gel SX to seal leaking joints in a sanitary sewer line buried about four feet deep.

affects the citizens and the system," he says. "A lot of them don't really take much teaching. They've all got a pretty good handle on how they do their job, what needs to be done."

For those employees, managing basically consists of building teamwork and helping them plan for greater efficiency. "And then with the other ones, I'm trying to build that pride and trying to grow them as employees," Mather says. "Quite honestly, my ultimate goal would be to have everybody working under me able to do my job."

Bries recalls an incident in 2009 when a lift station broke down on Christmas Eve. Mather didn't simply delegate the repairs to the crew on duty. "He was out there throughout the night, working side by side with the crews to

get that problem fixed, so that everybody could enjoy their Christmas," Bries says. The same thing happened when a sewer line failed on the eve of a July 4 holiday and many in the crew had plans. Mather stayed with the crew and helped as a new 400-foot service line was put in place.

"I don't expect my guys to do anything that I wouldn't do," Mather says. It's an attitude that may have surprised some of the folks working for him. Not long after he took over running the wastewater collection department, he stopped by one day to see if he could lend a hand to a crew fixing a valve on a force main. Some newer workers warned, "You're going to get dirty."

"It kind of cracked me up," Mather says. "They didn't really know me that well. I looked at





The Olathe team includes, from left, Randy Mather, Mike Richardson, Dustin Grimes, Ira Speer, Jesse Sare, Chris Dankenbring, Jason Killion, Ryan Hughey, James Haynes, Vincent Wolfe, Tony Leighton, Denton Lewis, Tom Bowland, Shane Banks and Dave Bries.

**WATCH THEM IN ACTION**  
 To learn more about the City of Olathe, view the video at [www.mswmag.com](http://www.mswmag.com).

them and said, 'If that's what it takes, that's what it takes.'"

**Pointing the way**

Mather credits his boss for pointing him in the right direction and for setting an example of his own when it comes to management and encouraging innovation. One way the two are alike, Bries says, is that both know they can count on the people working for them.

"Our success is a direct result of the success and the effort of everybody who works for us," Bries says. "As managers, we can't be successful without their participation, without their dedication and their commitment."

And paying attention to quality service pays off in customer satisfaction. Mather found that out firsthand in what turned out to be a pleasant surprise. "I was skeptical when I went into wastewater collections about how people would react when they had sewer backups and disruption in their service," he says.

His earlier jobs had shown him that people don't like having to go without street access or water or sewer service because of

repairs. Yet the emphasis the city puts on quickly helping residents when trouble erupts has made a definite positive impact. "We take great pride in responding to citizens," Mather says. "We try to be very customer-service oriented. And most people appreciate your responding quickly. They don't get real nasty like I thought they would."

"They are thankful and appreciate that you're out here trying to solve their problems so they don't happen again." ♦

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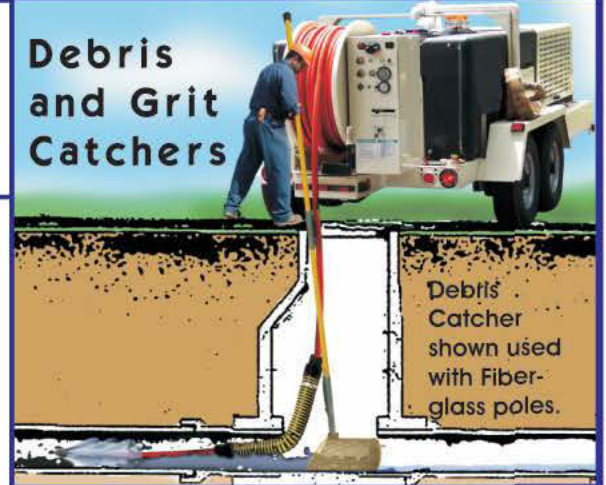
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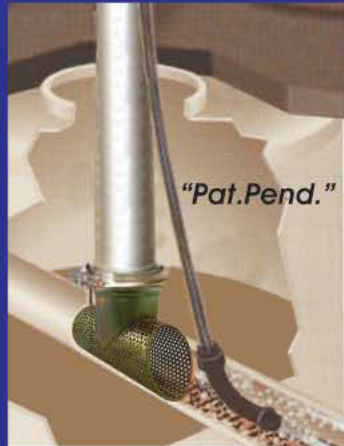


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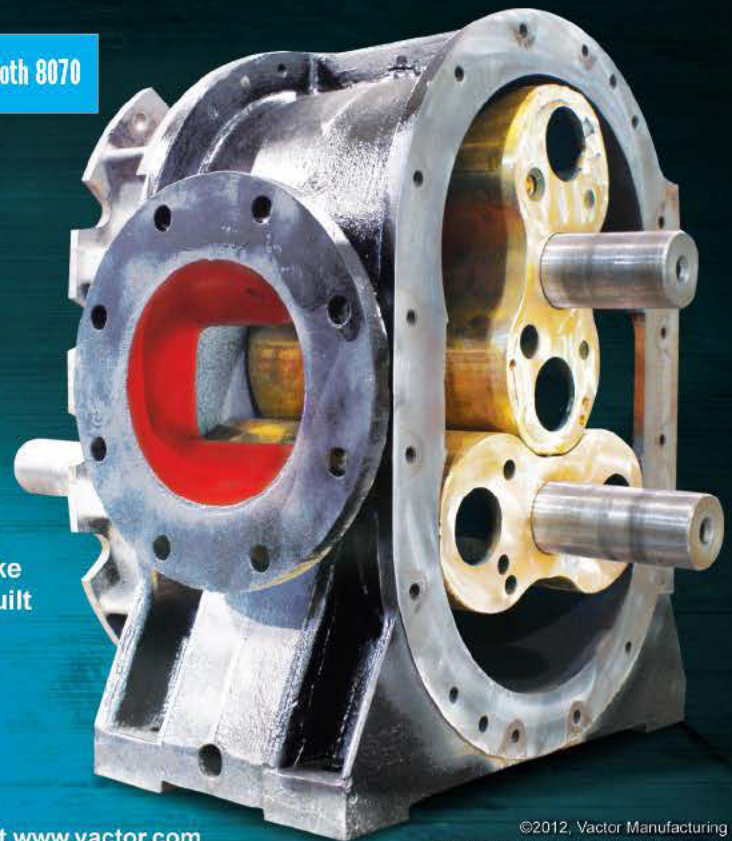
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# MAKING THE SALE

A Georgia city implements marketing and branding tactics like those used by top sales professionals to gain public support for a stormwater utility

By *Scottie Dayton*



**H**igh-powered sales strategies enabled Brant Keller, Public Works and Utilities director, in Griffin, Ga., to sell a stormwater utility to city commissioners and residents when no one appreciated the need for it.

The 23,500 city residents had lived with flooded streets and neighborhoods for so long that they accepted them as a way of life. They saw no value in a new agency that would mean another municipal fee.

Keller reverted to basic salesmanship tactics. Through storyboards and a marketing campaign, he illustrated the advantages of a stormwater utility. To brand the campaign, he hired a media relations firm to design a logo. Keller then went door-to-door and office-to-office to sell his vision and solicit support. He also petitioned U.S. EPA officials for help in persuading the Georgia Environmental Protection Division (GEPD) to support stormwater utilities.

The campaign worked so well that when the city passed the stormwater utility ordinance in 1998, only three residents attended the meeting and none objected. The utility, the first of its kind in the state, has earned numerous awards, including the 2010 Stormwater Program of the Year and the 2009 Public Education Program of the Year, both from the Georgia Association of Water Professionals.

### Stormwater trilogy

The city, founded in 1843, sits on the Continental Divide, 35 miles south of Atlanta. Runoff flows south through a conveyance system built from the 1940s to the 1960s, when much of the 14-square-mile service area was agri-

**A technician for the City of Griffin takes a sample of stormwater that has passed through one of the city's modified Delaware sand filters. (Photography by Collin Chappelle)**

cultural. With no maintenance program, the 101 miles of pipes and more than 6,000 man-made attributes filled with sediment and debris. Water backed up and then sheet-flowed over properties.

When Keller was hired in 1992 as Public Works director, he had been a college professor, a motivational speaker, and the Public Works director of Peachtree City, Ga. He had lived in Florida for six years and was familiar with stormwater utilities. Keller also had run a \$40 million window and door business in the mid-1980s. As a highly successful commission salesman, he knew he could help persuade others to accept a stormwater utility that would create a revenue stream dedicated to flood control.

According to Keller, a stormwater utility is formed from a tril-

### PROFILE:

## City of Griffin, Ga., Stormwater Department



**FOUNDED:**  
1998

**POPULATION:**  
23,500

**SERVICE AREA:**  
14 square miles

**EMPLOYEES:**  
15

**ANNUAL RAINFALL:**  
51 inches

**INFRASTRUCTURE:**  
101 miles of piping, 49 miles of open channels, 6 drainage basins, 171 sub-basins, 342 outfalls, 6,032 man-made attributes

**OPERATING BUDGET:**  
\$2.1 million (stormwater and flood control)

**WEBSITE:**  
[www.griffinstorm.com](http://www.griffinstorm.com)

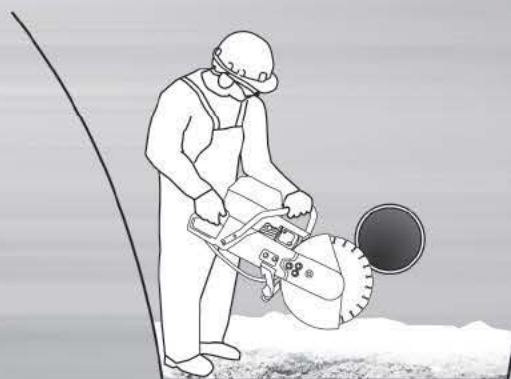
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A technician heads downstream for a stormwater sample. One of the city's modified Delaware sand filters is in the foreground.

ogy. The first element is someone on staff who is passionate about the cause and willing to spend time researching and formulating it. That person should be a problem fixer and should have stable community relationships. The second element is elected officials to champion the cause. The third element is finding community figures who understand the value of the program and getting them involved.

### Marketing and branding

As the city's stormwater champion, Keller set about gathering facts. "Successful salespeople always present enough facts for buyers to make intelligent decisions," he says. He went out in downpours, photographed flooded areas, and created storyboards. Public Works kept call

logs for historical purposes, and Keller isolated the flooding calls to associate firsthand accounts with the photos.

With evidence in hand, Keller showed the storyboards to mayor Doug Hollberg and the assistant city administrator. When they wondered how the city would tackle the problems, Keller took them to a conference of the Florida Association of Stormwater Utilities (now the Florida Stormwater Association), where presenters explained what stormwater utilities could do. They saw the value and became champions.

"Top salesmen have key people to help develop programs, so we began looking for ours," says Keller. The city put out a request for proposals to develop a stormwater utility and selected Hector

## PROUDEST ACHIEVEMENTS

Griffin Public Works director Brant Keller is proud of the partnerships he has established in the community around stormwater management. One example is the stormwater unit Keller developed for schools. In exchange for teaching it, he gave the schools a 50 percent credit on their stormwater utility bills.

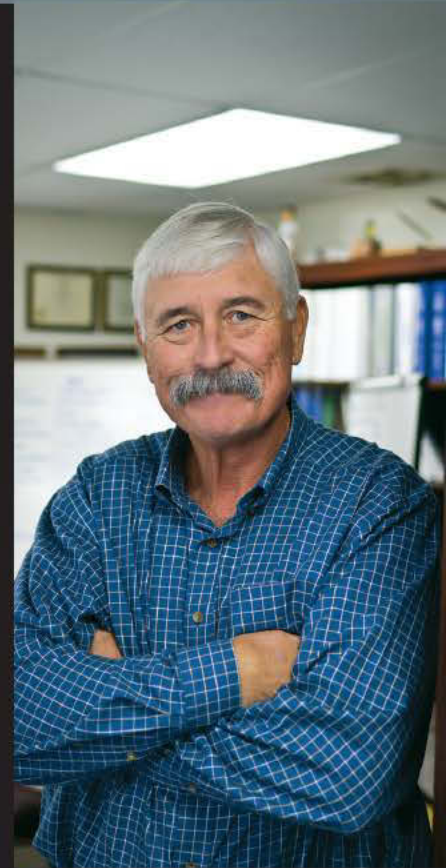
In 2008, the utility fee credit paid for one paraprofessional to teach 30 hours per week of water and environmental issues to fifth and sixth graders. The county Parks and Recreation Department joined in and built a nature area for field studies.

Keller formed the Georgia Association of Stormwater Management Agencies. Then he and other members helped the Atlanta Regional Commission environmental planning section write the state stormwater design manual. "It focused on new construction, but the reason pollutants are in streams is because of existing infrastructure," he says. "The manual's third edition addresses retrofits to clean up the water and says nothing about new construction."

In 2000, Griffin and two other cities received \$1.2 million in federal grants to test the effectiveness of commercial stormwater technologies. Griffin and three other cities also took part in a fecal coliform and *E. coli* study.

"We were some of the first people in the world to explore fluorometry, using ultraviolet light to detect laundry detergent whiteners in stormwater samples to confirm that the fecal coliform were from humans," says Keller. The study also verified that some bacteria survive dormant in streambeds during cold weather, then reanimate as soil temperatures rise.

In 2003, Griffin was one of a few cities using aerial infrared technology to find compromises in the stormwater conveyance system. Flights occurred at night in January and February when leaking warm water appeared as bright areas against the cold ground. "It wasn't as great a maintenance tool as I thought it would be," says Keller. "Infrared isn't discriminating enough, and we had too many false hits."



Dr. Brant Keller, Ph.D., director of the Griffin Public Works Department, in his office in downtown Griffin, Ga.

Cyre of Water Resources Associates in Kirkland, Wash. Cyre teamed up with Ogden Environmental to engineer the capital improvements.

Keller hired a media relations firm to design a stormwater utility logo and shoot a six-minute public service announcement on the bene-





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fits of stormwater utilities.

"Hector taught me to address the hard questions and never hide from the truth," says Keller. "He said to think of a marketing campaign as if it were a debate. You must understand your opponent's position before you can argue successfully against it."

### Best foot forward

At first, most people opposed the stormwater utility fee. Cyre and the media relations firm coached Keller until he could answer objections concisely and explain the program's benefits to residents. He gave 120 stormwater presentations over 18 months to community groups and promoted the cause on local radio and TV programs.

When letters to the editor opposed the utility, Keller called the authors and asked to visit them. After listening to their concerns — a basic sales skill — and explaining his position, the vast majority understood why the utility was necessary.

During initial meetings with the seven city commissioners, Keller read body language to spot those

with open minds. He looked for a relaxed posture with hands resting on the table, good eye contact, corners of the mouth turned upward or head nodding in agreement, and anyone taking notes or leaning toward him.

He then took receptive commissioners into the field to see the challenges and explained in detail during multiple one-on-one meetings what a stormwater utility would

**"Successful salespeople always present enough facts for buyers to make intelligent decisions."**

Brant Keller

accomplish. "Many people in sales fail because they never ask for the order," he says. "At the appropriate time, I would ask that individual to help me orchestrate the other officials and push this through. When he agreed, I'd close with, 'What do I have to do to make you look good and make this happen?' That's how we began our relationships."

### Engaging leaders

To sway the business commu-

nity, Keller looked at the top 100 firms and those with the largest impervious surfaces, then scheduled appointments with the CEO, plant manager or owner. A hospital was high on his list. Its executive director also was the committee chairman for Goals for Griffin, a city and county group. He opposed the stormwater utility and Keller needed his help to sway smaller accounts.

To establish common ground — a salesmanship rule — Keller went to the chairman's office when streets were topping over from a heavy rain. He then used another rule of salesmanship and painted a mental picture with the director in it.

"The hospital is on the north side and our emergency medical services are four miles away on the south side," says Keller. "One main corridor the ambulances used flooded five to eight times

per year due to undersized culverts, and there are two schools on that route."

Keller painted a verbal picture of a fully loaded school bus involved in a major accident and emergency vehicles having to detour eight miles around the flooded corridor to reach the scene. He also emphasized the potential for staff and visitors traveling to the hospital to have an accident, then asked if the director could see the relationship between flooding and the goals of a stormwater utility. He did.

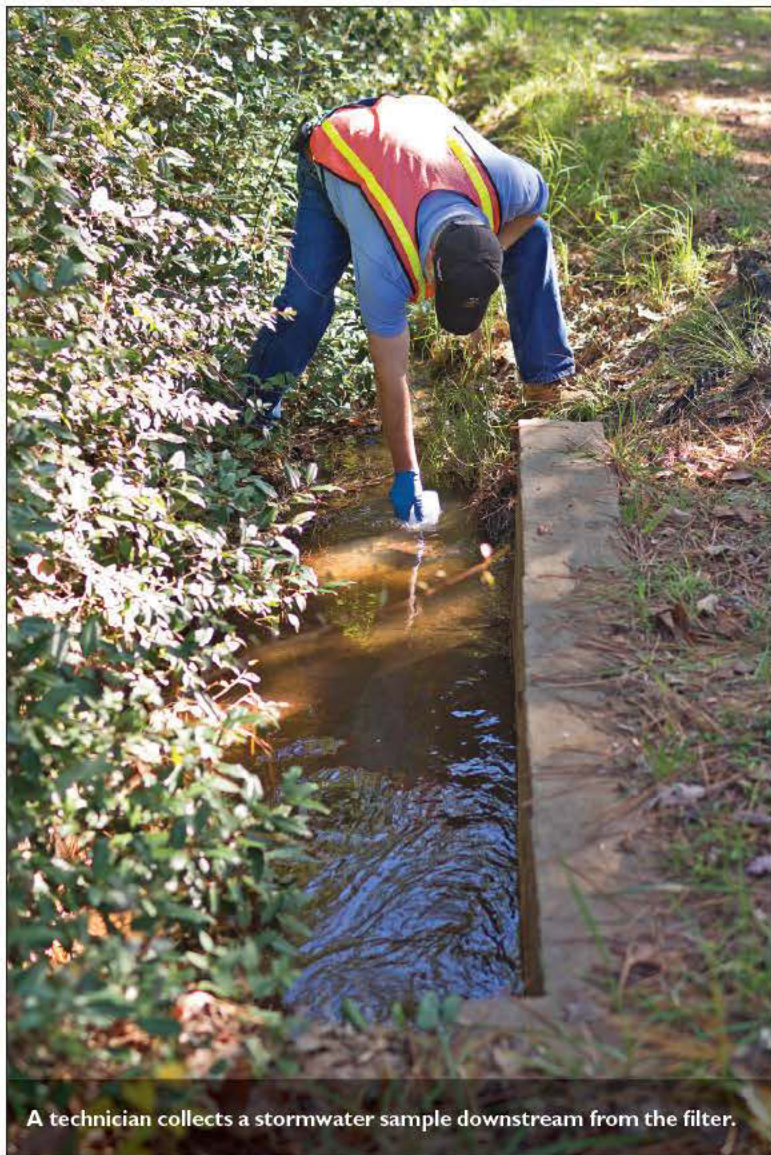
After Keller asked for the sale, he closed it with, "If your ambulances can't reach the hospital due to flooded roads, what are we accomplishing as far as Goals for Griffin?"

The director became a supporter. "Don't say another word after asking the closing question," Keller advises. "Any more will taint the argument."

### Point of view

Another community figure Keller needed was Nigel Thompson, general manager of a manufacturing company that was the





A technician collects a stormwater sample downstream from the filter.

city's largest stormwater contributor. Keller met with him numerous times.

"I always establish trust by acknowledging the other person's concerns," says Keller. "I then appeal to that person's intelligence — another basic sales rule. In this case, I explained that if he understood what we wanted to accomplish, he would be able to speak intelligently for or against it. It's important never to argue. Selling is not the ability to win an argument. It is the ability to earn agreement."

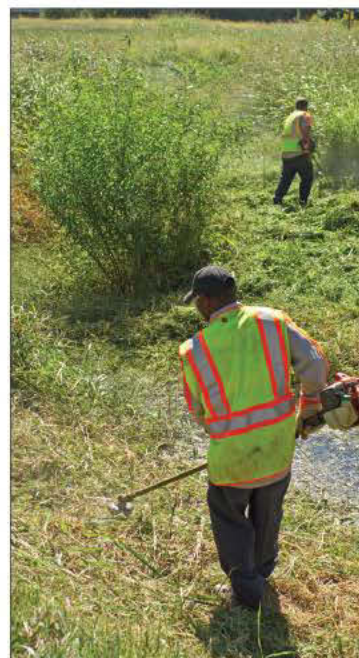
Keller earned Thompson's agreement by personalizing the issue. He asked how productive employees would be if they arrived at work soaked because their vehicles had flooded. He asked Thompson to consider how his employees' quality of life would be affected if they had an accident on a flooded

street while driving to work. "If they are concerned about the stormwater fee cutting into their bottom line, redirect that concern to the cost of lost man-hours and production," says Keller.

### Funding maintenance

Before Keller could get funding for capital improvements, he also had to sell the idea of a stormwater utility to the GEPD, since that agency and the Georgia Environmental Finance Authority administered the State Revolving Loan Fund. He flew to Washington, D.C., and worked with U.S. EPA Region 4 staff to persuade GEPD to support the utility. The educational process took two-and-a-half years, but Keller received his loan.

Such collaborative efforts enabled Griffin to receive six Clean Water Act Section 319 federal grants of \$3 to \$4 million each for



Day laborers use trimmers to clear an overgrown drainage ditch in Griffin. The city's stormwater department is responsible for the maintenance of several large roadside drainage systems.

ond-level areas twice per year, and those least likely to overflow, once a year. They also inspect all the project detention ponds for floatables and vegetation. Depending on size, they inspect proprietary best management practices on commercial properties once or twice per year.

The team cleans the wetland mitigation ponds once cooler weather returns and snakes and insects are less active. "We also harvest invasive black willow to prevent it from forcing out the

**"The day we sent out the first stormwater bill, I had a project going in each district. That's another marketing imperative: show value, show value, show value."**

Brant Keller

stormwater research. With dedicated revenue streams, the city was eligible for funds from the Federal Emergency Management Agency (FEMA). The city received \$750,000 in FEMA money to resolve the main corridor flooding problem. It also received funds from the state Department of Transportation to mitigate pollutants on highways.

When the revolving loan fund money arrived, Keller bought a 1999 Vactor 2100 combination sewer cleaner with 12-cubic-yard debris body, 1,500-gallon freshwater tank, centrifugal compressor pulling 8,000 cfm, and 80 gpm/2,500 psi water pump. The rest of the money went toward construction.

"The day we sent out the first stormwater bill, I had a project going in each district," Keller says. "For \$2.95 per month, homeowners saw us cleaning catch basins and replacing metal hooded grates and frames to keep runoff from eroding their properties and flooding their driveways. That's another marketing imperative: show value, show value, show value."

### Regular attention

Today, two technicians inspect and clean hot spots quarterly, sec-

wetland plants that clean up the water," says Keller.

Keller earned his Ph.D. in engineering management and wrote his dissertation on establishing the first stormwater utility in the state. He concluded that the nation would have 400 to 2,000 stormwater utilities by 2012.

His conclusion was accurate: Georgia alone has some 50 stormwater utilities. "Other cities followed us because we did the correct thing," says Keller. "That's a significant accomplishment and a benefit for our community." ♦



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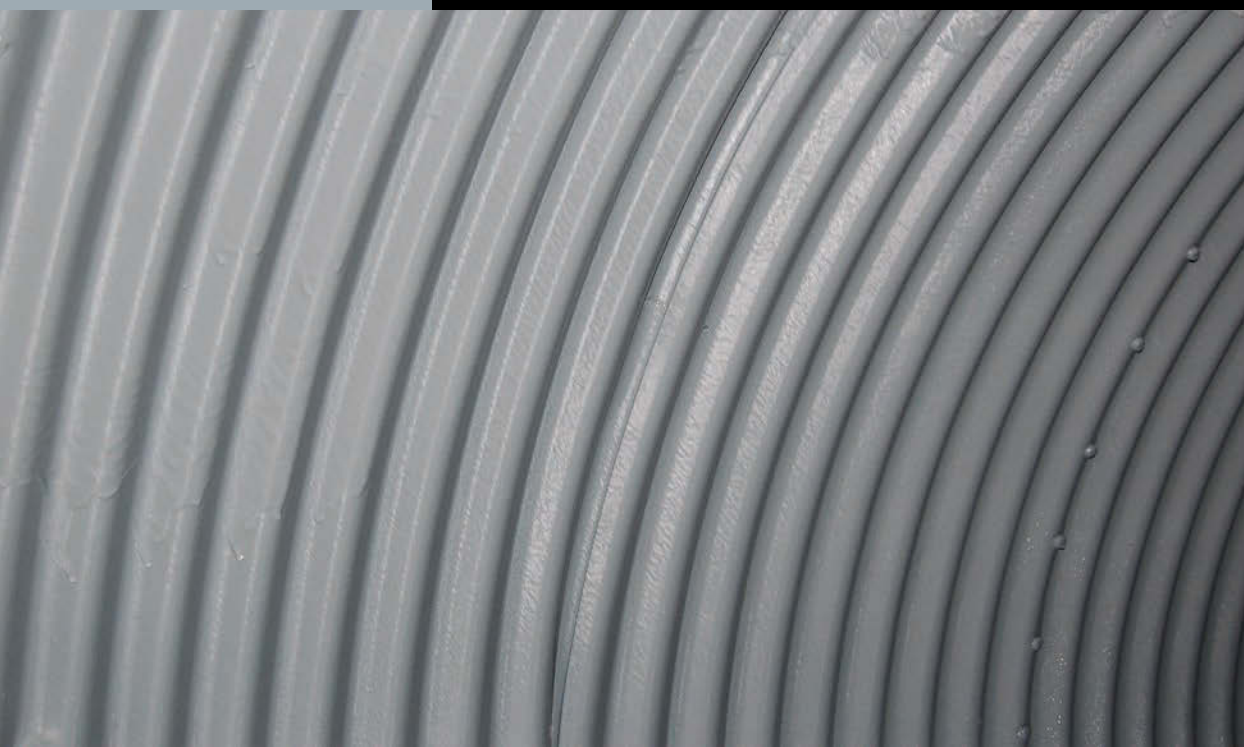
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PolySpray SS-100 polyurea lines the inside of the rehabilitated culvert, providing excellent corrosion and abrasion resistance. (Photos courtesy of HydraTech Engineered Products)

# QUICK FIX

A semi-structural polyurea coating helps an Ohio city repair a culvert in a high-traffic business district without disruptive excavation

By *Ted J. Rulseh*

**“At first I was skeptical that a spray-on liquid material could provide the durability and structural integrity of either sliplining or replacement. The final product has proven to be a tough, resilient technology, exceeding my expectations.”**

Eric Smith

For city leaders in Englewood, Ohio, rehabilitating a deteriorating culvert during an economic downturn could have been a costly proposition.

The 347-foot-long, 112- by 75-inch corrugated metal culvert on State Route 48, next to the Interstate 70 intersection, was deteriorating at the invert. Its galvanized metal bottom had eroded and corroded significantly.

The culvert ran under a commercial business area with average daily traffic of 26,000 vehicles. If nothing were done, ground stability around the culvert would be compromised, possibly leading to sink holes and traffic disruption. A dig-and-replace solution would have disrupted traffic and disrupted businesses already fighting against a struggling economy.

During a cost assessment in 2009, consulting engineer Ken Griffiths of Griffiths-Vanden Bosch & Associates in Englewood proposed a way to repair rather than replace the pipe. D.A. Van Dam & Associates worked with him to develop a complete solution.

Ultimately, the city chose PolySpray SS-100 from HydraTech Engineered Products to repair the pipe and prevent further deterioration without disrupting traffic, businesses or residents. The environmentally friendly coating was sprayed inside the pipe, rehabilitating the culvert so that water would not erode the surrounding soil.

### Patching the invert

E.B. Miller Contracting in Norwood, Ohio, did the work. The company, certified in the applica-



**Initial inspection of the culvert revealed severe corrosion and structural failure.**

tion of the PolySpray product, has served the area for 70 years. The project began in July 2011 and was completed in September, despite some unanticipated challenges created by groundwater.



To complete the repair, the contractor first bypassed the water flow through the culvert using a 4-inch automated pump system. Bypassing ran continuously for the duration of the job. Workers then removed the original tar lining from the culvert with a 40,000 psi waterjet.

The pipe bottom proved to be in unusable shape from groundwater damage, so the team decided to re-establish the entire invert by completely re-patching it. They prepared all surfaces using a garnet abrasive.

Next, workers repaired the corroded and damaged invert using welded wire concrete reinforcing mesh attached to the base material from the 5 o'clock to the 7 o'clock position. They poured Class C concrete over the entire length of the culvert, three to four inches thick.

The PolySpray product was applied with Graco heated plural component spraying equipment at 9-mm thick from the 4 o'clock to 8 o'clock position, and 5-mm thick for the remaining surfaces.

### Capacity protected

The coating created a sound repair without reducing the pipe's hydraulic capacity and without any excavation. The material is a rapid-setting, semi-structural polyurea monolithic coating that provides moderate structural support to the host structure and resists incidental chemical exposure. It is designed for 30- to 120-inch pipes and can be applied in thicknesses from 0.25 inch to greater than 2 inches in a single pass.

The oval shape of the culvert made other rehabilitation methods, such as sliplining, impractical, notes HydraTech founder Peter Blais, P.E. The liner "gave the city a cost-effective, infrastructure-saving solution that could help them meet their timeline and budget requirements, without additional disruptions to the surrounding business community or traffic flow."

The material provided a liner around the circumference of the culvert, prevented erosion of soil at the invert, and maintained soil support around the culvert itself.



Proper personal protective equipment is vital to employee safety during PolySpray application.

Englewood city manager Eric Smith observes, "At first I was skeptical that a spray-on liquid material could provide the durability and structural integrity of either sliplining or replacement. The final product has proven to be a tough, resilient technology, exceeding my expectations."

Engineer Griffiths adds, "The use of PolySpray SS-100 gave the city an excellent, cost-effective solution to repairing the deteriorating culvert. We are pleased with the outcome of the project and the work performed by E.B. Miller Contracting." ♦

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# A BETTER WAY TO MODEL

A new approach to predicting wet-weather sanitary sewer flows incorporates antecedent moisture information and actual long-term rainfall data

By Robert Czachorski, P.E., and Rhonda Harris, P.E.

Imagine you are building your dream house on a lake. To protect your investment from flooding, you hire an engineer to tell you how high up the bank to build your home and design the sea wall.

He determines which design wave height to use to protect your home, then takes that wave height and superimposes it on the record high lake level, just to be safe. When you see the results, you are surprised at how high and how expensive your sea wall must be. You are also unhappy at how high the home is above the water, hurting your view and your investment.

Wouldn't it be nice if your engineer could tell you the chances of maximum wave height and maximum lake level happening simultaneously, or happening at all? If the chances are slim, is it worth the extra money to prevent flooding at this high elevation?

A similar scenario exists with the design of wet-weather upgrades in sewer systems. Peak wet-weather flows in sewers depend on both the magnitude of the rainfall and how wet the soil conditions are during the rain event.

While the response to rainfall is studied extensively, the effects of the antecedent moisture (AM) conditions are often ignored or oversimpli-

fied. This can lead to playing it safe by superimposing a very large design rainfall onto a very wet AM condition to model design peak flows. This results in planning upgrades that are very costly, for flows that will occur very rarely.

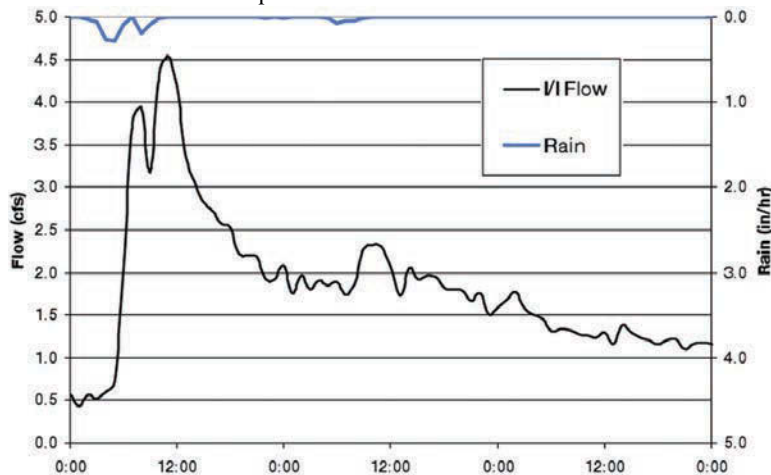
Now there is good news. An engineer *can* tell you the statistical chances of your design capacity being exceeded. Advanced technology that can accurately describe and predict the effects of AM conditions, combined with a frequency analysis of peak flows, reduces design uncertainty. This leads to higher confidence in the results and often significantly lower capital improvement costs.

## Different responses

As seasons change or as rain falls on a sewershed, the inflow and infiltration (I&I) entering the collection system can vary greatly. The water table will rise in spring, and the moisture content of the spongelike soils will increase as rains fall, then dry between events. You can easily see this pattern by reviewing flow monitoring data collected for the same sewershed during different times of year (Figure 1).

### Spring Storm

- 1.24 inches rain
- I&I Volume = 398,000 cubic feet
- Capture % = 8.8%



### Summer Storm

- 2.33 inches rain
- I&I Volume = 72,000 cubic feet
- Capture % = 0.9%

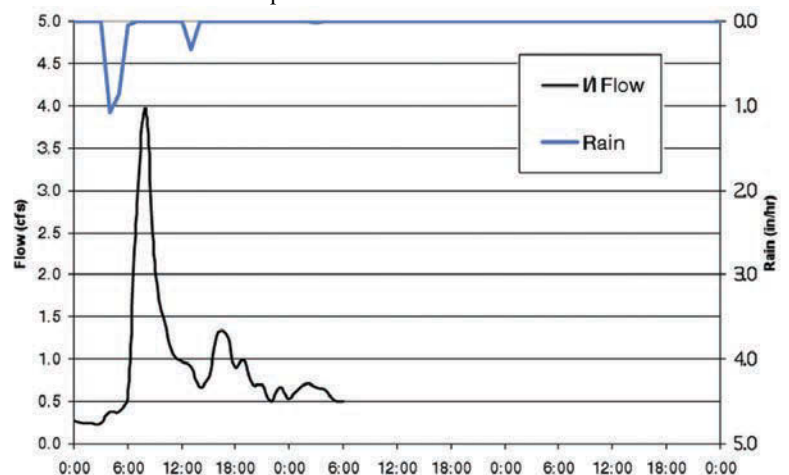
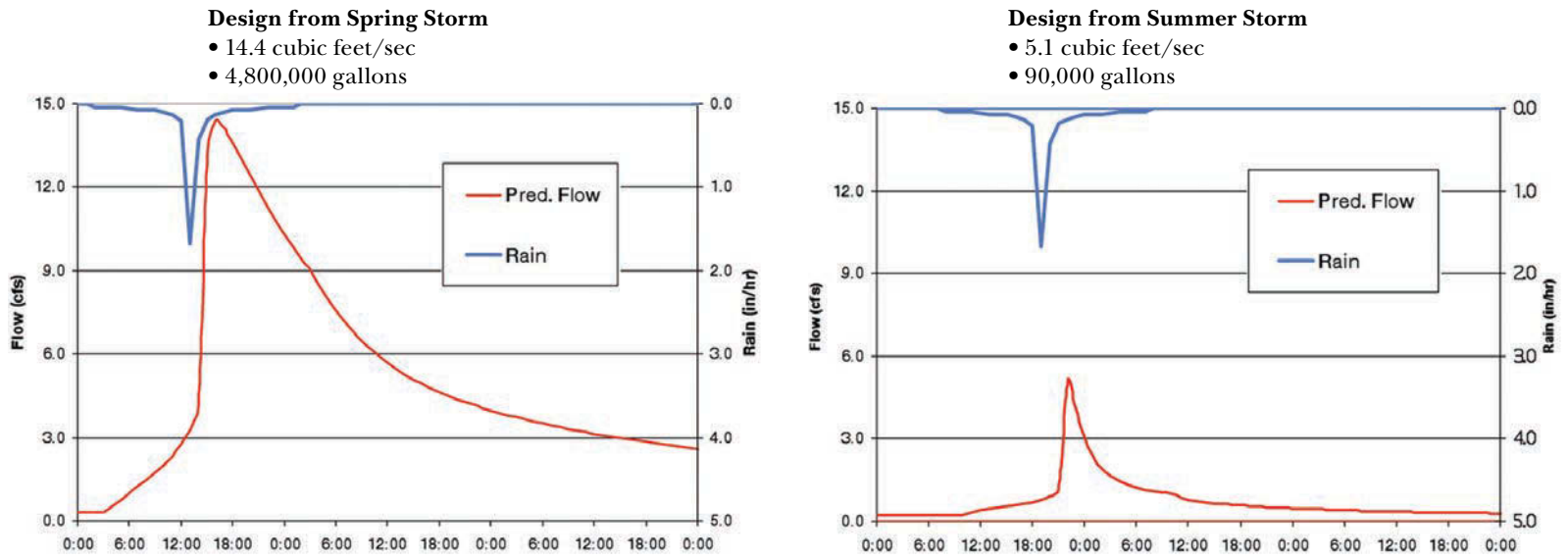


Figure 1 – Spring and Summer Storms – Event Comparison

The I&I response of the spring storm was much larger than that of the summer storm, despite the fact that the summer rain event was much larger.

GRAPHICS COURTESY OF I3D TECHNOLOGIES





**Figure 2 – Spring and Summer Storms: Design Storm Comparison**

The modeled response for the same design rain event can vary greatly depending on the wetness condition to which the model is calibrated.

Due to the relative wetness of the soil, the spring rain was not absorbed by the porous soil, as it was for the summertime event, since in spring the pores were already filled with groundwater and rainfall. The water has nowhere to go except through the cracks and leaking joints of the collection system.

**Advanced technology that can accurately describe and predict the effects of AM conditions, combined with a frequency analysis of peak flows, reduces design uncertainty. This leads to higher confidence in the results and often significantly lower capital improvement costs.**

times higher than that of the summer storm design, and the volume generated is more than 53 times higher. There are two flaws with using this design storm approach.

**Different answers**

Standard modeling procedures involve calibrating an I&I model to actual storm events and using the resulting model to simulate a design storm. This generates very different answers depending on which storm is used for calibration (Figure 2). Assume the design event is a 10-year, 24-hour storm, and we are concerned with volume above 3 cubic feet per second to design a storage tank.

The peak flow generated by the spring storm design is almost three

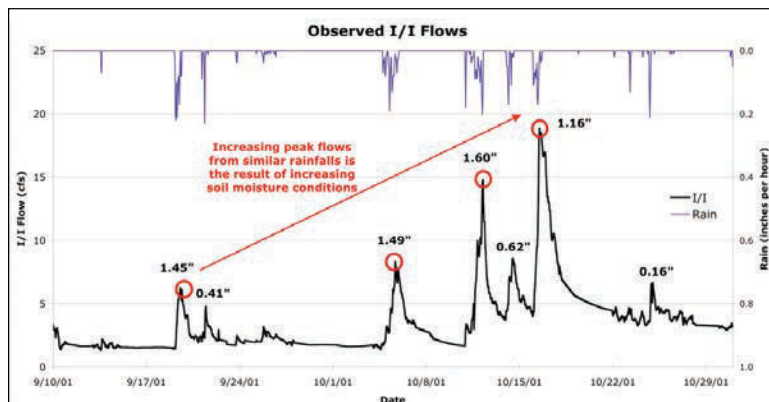
First, as shown by this example, it does not account for varying

AM conditions. Second, a design storm is a fictitious event that may or may not represent the wet-weather behavior of the collection system. It is better to understand the impacts of AM, as well as the wet-weather behavior of the system using actual long-term data instead of a fictitious event that may never really occur.

**Constantly varying AM**

Figure 3 demonstrates the impact of AM effects on several back-to-back storms. Note that while the rain volumes and intensities are similar, the flow response gets larger and larger with subsequent events. This increase in flow response is due not only to an increase in the base groundwater flow but also to an increase in rainfall-dependent I&I.

The wetness conditions are constantly changing. To simulate this properly, a model must be able to change continuously, as well. Understanding these AM effects is critical for understanding wet-weather flows and designing system upgrades.



**Figure 3 – Preceding Rainfall Effects on AM**

The effects of back-to-back storms on AM are shown in this flow data.

**Increasing accuracy**

A new modeling technique resolves these challenges by using a widely accepted system identification theory from the aerospace industry. Unlike standard models used for hydrologic evaluation, the model is specifically tailored for each sewershed, contains a simplified set of modeling parameters, and accurately predicts the amount of AM within the sewershed by simulating a continuously varying capture coefficient.

Figure 4 depicts the workings of the AM model, generated using H2OMetrics software from i3D Technologies. Wetness conditions are tracked in the Sewershed Moisture Retention block. The model continuously adjusts the inflow, infiltration and groundwater hydrographs based



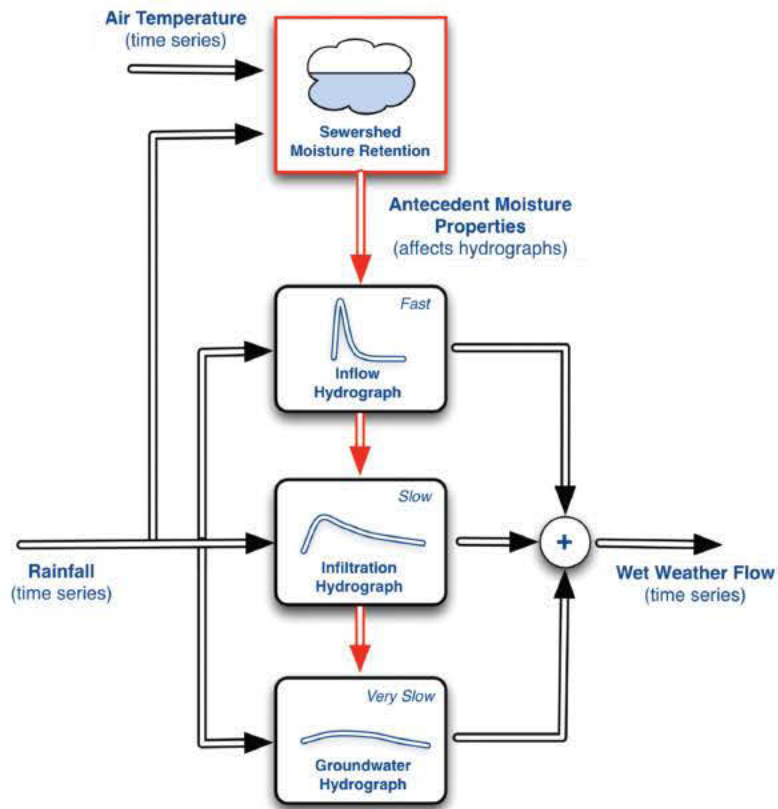


Figure 4 – AM Model Structure

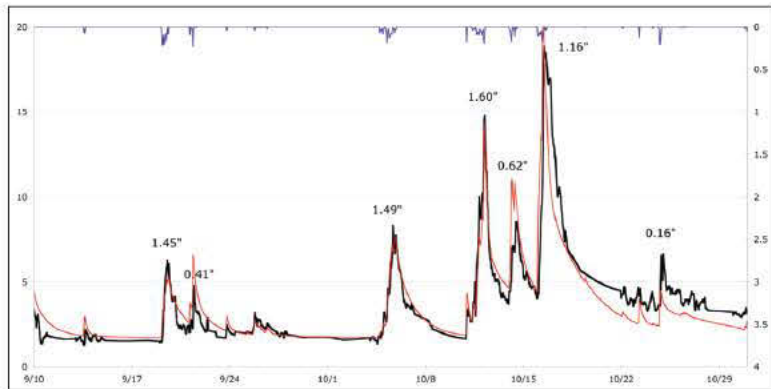


Figure 5 – AM Model Fit

This figure shows AM model performance (red line) compared to the observed I/I flow (black line). The model has knowledge of the increasing wetness conditions from preceding storms and can accurately predict subsequent events on wetter conditions. (AM model performance derived from the H2OMetrics model from i3D Technologies.)

on this wetness. This results in a more accurate prediction of system flows, as shown in Figure 5.

**Frequency-based design**

Rather than using a fictitious design storm approach, industry trends have moved toward a statistical frequency analysis, based on actual long-

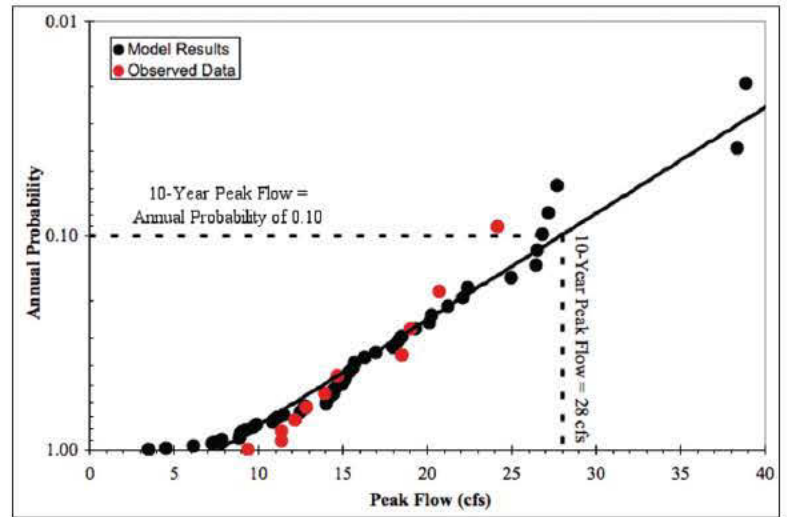


Figure 6 – Frequency Analysis

This plot shows the results of the frequency analysis for existing peak flows. Using the results of the long-term simulation, the annual frequency of any flow rate can be determined from such a plot.

term data. A frequency analysis is developed by routing a long period of rainfall and temperature data through the AM model and then performing a statistical analysis on the resulting model output. Long-term flow monitoring data is not required.

This accurately represents the system flow response because it incorporates the statistical variations of both rainfall from the long-term record and antecedent moisture variations from the AM model. An example of a frequency analysis is shown in Figure 6.

This approach eliminates the problem of over-estimating flow by having to select a design rainfall event for a singular wetness condition. Because frequency analysis performs statistics on the entire range of storm events included in the long-term record, one single design storm does not have to be selected.

The engineer can now share with the decision-makers the real relationship between risks and costs. This gives decision-makers a strong basis for selecting which costs and risks they are willing to accept. It contrasts with traditional techniques in which the modeler alone incorporates the risk decisions into the model calibration by selecting specific wetness conditions.

**More confidence, less cost**

Standard, accepted hydrologic modeling techniques do not effectively account for the effects of AM. This inaccuracy can lead to using overly conservative modeling practices to account for the uncertainty. Using new modeling techniques along with a frequency-based design approach reduces model uncertainty, leading to higher confidence in results and significantly lower capital improvement costs. ♦

**About the Authors**

Robert Czachorski, P.E., is co-founder of i3D Technologies, a modeling and analytics software company based in Ann Arbor, Mich. ([www.H2OMetrics.com](http://www.H2OMetrics.com)). Rhonda Harris, P.E., is director of engineering services for the Columbus, Ohio, office of Orchard, Hiltz & McCliment ([www.ohm-advisors.com](http://www.ohm-advisors.com)).





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# SIMPLE AND DURABLE

The ML-3 magnetic locators from SubSurface Instruments prove easy to operate and accurate in finding ferrous metal objects

By Luke Laggis

Accurate locating of underground utilities is critical for municipal and utility work crews. Failure to pinpoint buried lines can carry heavy costs from the extra time and expense of having to relocate, to the cost of repairing utilities damaged by digging in the wrong place.

Magnetic locators are a common tool in field crews' kits. These relatively simple instruments have one primary purpose — to detect ferrous metal. The ML-3 magnetic locators from SubSurface Instruments are designed to simplify locating and to withstand challenging conditions in the field.

Scott Rauhen, SubSurface Instruments sales manager, demonstrated both the short and long versions of the ML-3 on a 20-degree F December day in Ladysmith, Wis. The snow cover had no impact on the unit, which accurately detected water shutoff valves along a quiet residential street.

## Walk-around

The ML-3 looks different from most magnetic locators in that the typical electronics and display box is absent. All components in the ML-3 are inside the cylindrical aircraft-grade aluminum body, about the same diameter as an empty paper towel roll.

The 40-inch ML-3S weighs 1.8 pounds, and the 55-inch ML-3L weighs 2.8 pounds. The impetus for the locator's design came from the U.S. military, for which low weight and durability are key factors. The extra length of the ML-3L allows military users to make wider sweeps when searching for improvised explosive devices and unexploded ordnance.

Most users won't notice a difference in the performance of the long and short versions, according to Rauhen.

"A majority of what any utility or any surveyor is usually looking for is in the top three feet," he said.

SubSurface Instruments sales manager Scott Rauhen scans for a water shut-off valve on a residential street in Ladysmith, Wis., during a demonstration of the company's new ML-3 magnetic locator in December. (Photography by Luke Laggis)



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www.ssilocators.com

**LOCATION OF DEMO:**  
Ladysmith, Wis.

**DEMONSTRATED BY:**  
Scott Rauhen, sales manager,  
SubSurface Instruments

**LIST PRICES:**  
ML-3S locator, \$915;  
ML-3L locator, \$940

In fact, he noted, most of what they look for is probably within two feet of the surface.

The controls on the ML-3 are simple and intuitive. A small keypad just below the rubberized handle includes controls for Power, Gain Up and Gain Down, and a Zero button used to adjust the unit for magnetic anomalies such as a magnetic gradient in the soil. The speaker is positioned between the keypad and the LCD display.

Each push of the Gain buttons changes the unit's sensitivity up or down one increment at a time, with eight possible settings. A microprocessor remembers the

Gain setting when the device is turned off and returns to that setting when it is powered back on.

The small LCD display fills with bars indicating the strength of the detected signal and indicates polarity with a "+" or "-" sign at the



The ML-3 magnetic locator is available in 40- and 55-inch versions. Both come with a soft carrying case. An aluminum hard case is also available.





The new ML-3 magnetic locator from SubSurface Instruments was originally designed for the military, a client for whom durability is key. Sales manager Scott Rauhen drove over the instrument repeatedly during a demonstration in December to prove that it can take a beating and still function properly.

top. The display also provides a low-battery indicator. While the display does not show the gain setting, it is simple to turn the gain all the way down and start over from there if it's necessary to determine the exact setting.

The units run on three standard 9-volt batteries with a life of about 60 hours. The sensors, which are digitally tuned for optimum accuracy and consistency, operate at 16.5 kHz and can perform in temperatures from 140 to -13 degrees F.

The bright-yellow locator comes with a seven-year warranty and includes a soft case with carrying straps and a pocket for the manual and extra batteries. An aluminum hard case is also available.

### Operation

Using the ML-3 is much like using any other magnetic locator. The operator walks slowly, sweeping the locator back and forth. Audio signals indicate the presence of ferrous metal and get stronger as the locator gets closer to the target.

Rauen started by powering the unit on. He zeroed it in and turned the gain all the way down to get to a known starting point. From there, he turned the gain back up several notches and started scan-

ning along the sidewalk and street edge for a shutoff valve near a fire hydrant.

The locator's indicating signal quickly became audible as it detected ferrous metal. Rauen slowed down

**“You can hear it very clearly under water, so you could snorkel with it and there’s no question that you can tell when you come across something that’s metallic under water.”**

**Scott Rauhen**

at that point. With the target roughly located, he turned the gain back down and made slow and careful sweeps with the wand, paying close attention to the signal, which grew louder as he homed in and pinpointed the valve.

From there, the demonstration moved out into the street, where a fresh layer of snow and ice concealed the locations of additional shutoffs. Rauen made slow passes with the locator around a bend in the road. As the audible signal gained strength, he again slowed and made very deliberate sweeps with the wand until he had an approximate location of the target.

With the target location narrowed considerably, Rauen demonstrated the unit's pinpoint locating capabilities. First, he lowered the gain setting to the lowest level that

could still detect the target. Then, he raised his hand and loosened his grip, allowing the unit to swing down from its normal sweeping position.

With the locator perpendicular to the ground, he moved it back and forth in an X pattern over the target, shifting its position until the peak signal response came from the center of the X, where the shutoff sat beneath the snow.

The ice-covered edges of the nearby Flambeau River prevented a demonstration of the ML-3's underwater capabilities, but Rauen explained that the unit has been extensively and successfully tested under water.

“You can hear it very clearly under water, so you could snorkel with it and there’s no question that you can tell when you come across something that’s metallic under water,” Rauen said, noting that a diver took the ML-3 down more than 200 feet in Lake Michigan, where tests of the instrument



The keypad on the ML-3 includes controls for Power, Gain Up and Gain Down, and a Zero button that adjusts the unit for magnetic anomalies such as a magnetic gradient in the soil. The speaker is positioned between the keypad and the LCD display.

siveness made it easy for a novice to home in on hidden shutoff valves.

It would be convenient to have the gain setting visible on the display, although it was simple enough to turn it all the way down and readjust from that point.

### Manufacturer comments

“We wanted a unit that was going to be as durable as possible, and by coming up with this design, we were able to waterproof it as well,” Rauen said. “That eliminates one of the major problems anyone could have with a magnetic locator, which is getting water into the electronics.”

The digitally tuned sensors add sensitivity and consistency, Rauen added. Digital tuning ensures that both sensors are tuned identically and are the same from one unit to the next, so that operators can expect consistent results.

“This unit will find objects, depending on their size, up to 12 feet deep,” Rauen said. ♦



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# STANDING TALLER

A city and its union reach a compromise that supports training and certification, giving wastewater employees more stature and the utility more work flexibility

By Ken Wysocky

Outdated job classifications and training requirements work like an anchor on efficiency — something municipalities can't afford when pressed to do more with less. Wastewater officials in Marietta, Ohio, developed a solution: Work with union officials to reclassify certain employees and increase workplace flexibility, and motivate workers to become state-certified technicians.

Wastewater department officials worked out an agreement about two years ago with Teamsters Union Local 637 that changed the job title of wastewater tappers to wastewater service technicians, allowing them to work both in the wastewater plant and in the collection system, says Steve Elliott, wastewater superintendent.

## Changing times

During earlier decades, as the city and sewer system grew rapidly, new sewer taps kept tappers busy fulfilling their job descriptions. But when growth slowed, so did demand for sewer taps. At the same time, as the treatment plant aged, it needed more maintenance personnel.

So Elliott approached the union with a proposal: Change the tapper positions to a new job description with a wider range of responsibilities. "As time went on, the tapper job description became antiquated," Elliott says. "We wanted to update the position and allow ourselves more flexibility."

The department also wanted a

new requirement for the position: mandatory state certification in wastewater. But like the job-title change, the training and certification required union approval. "We wanted to increase professionalism by requiring certification for the new position," Elliott says. "We wanted them certified within three years, or transferred to another job that did not require certification."

Agency looks more favorably on a certified workforce. "Regulatory agencies like certification," he says. "The more certified operators you have, the more confident they feel about your operation."

## Compromise was key

Union officials were not opposed to training or certification; they just didn't want them to be man-

**We invite readers** to offer ideas for this regular column, designed to help municipal and utility managers deal with day-to-day people issues like motivation, team building, recognition and interpersonal relationships. Feel free to share your secrets for building and maintaining a cohesive, productive team. Or ask a question about a specific issue on which you would like advice. Call editor Ted Rulseh at 877/953-3301, or email [editor@mswmag.com](mailto:editor@mswmag.com).



Steve Elliott

**“Certification gives them a better attitude — they just act more professional. They’re like teenagers who get their driver’s license. They stand a little taller. It improves their outlook and their sense of self-worth.”**

Steve Elliott

## Source of pride

"Certification creates a more professional attitude and more employee pride," Elliott adds. "And the training course to pass the certification test is a good way to break in new employees." Elliott also believed training and certification would help the utility fight "brain drain." The workforce is getting older, and when people retire, he prefers to fill openings from within.

"If, for example, a foreman retires and an employee wants to move up and take his place, it would require a Class II certification," Elliott says. "But you need a Class I certification before you can get a Class II. So certification would help prepare folks for advancement — put the carrot out there."

There's another good reason to have certified employees: The state Environmental Protection

datory. Eventually, the sides compromised. The city relaxed its stance on mandatory certification, and the union agreed that employees in the new position should at least pass the certification-training course within two years.

In addition, employees must pay the up-front \$550 training-course fee, which the city reimburses upon successful completion.

Then the union leaders went one step farther and made another proposal: Give the new certified employees a 30-cents-an-hour pay raise if they pass the certification exam. They also suggested that employees pay the nominal fee for taking the exam, which the city would reimburse if the employee passed. The compromise allowed the union to sidestep the mandatory certification, yet still provide a strong incentive for employees to get certified, Elliott says.

"As long as we didn't lose any members in the deal, and nobody lost any work time, we were all for it," says John Sheriff, union secretary/treasurer. "We just felt that if certification makes an employee more valuable, it should be reflected in their pay. And with the city paying for the training, it was a win-win situation."

Elliott observes, "It was frustrating at times, but in the end, everyone was happy. The bottom line is we wanted to work with them and they wanted to work with us. The new requirement gives employees more job security, because trained employees are more likely to keep their jobs. The city gets better-trained employees who have more pride and professionalism."

## Professionalism matters

One of the newly classified employees has already passed both



the training course and the certification exam, and another is about to start the training classes. And there has been a ripple effect: More employees in lower-level jobs are talking about certification. "Certification gives them a better attitude — they just act more professional," Elliott says. "They're like teenagers who get their driver's license. They stand a little taller. It improves their outlook and their sense of self-worth. In the past, if we had a problem, they'd figure it out and fix it. Now when they find a problem, they ask what caused it and try to determine what's going on down the line. They're more inquisitive and interested in problem-solving."

The bottom line, Elliott says, is

that in this age of tight budgets, unions and management need to work together. Organizations that provide more opportunities for education, training and certification build more stability and make people more employable — a state certification allows them to work in any plant in Ohio.

"This is just our first step — we may come up with other steps later," he says. "It's imperative to step back and look at things and come up with ways to increase efficiency. You have to do that to survive in the 21st century. People fear change, but at this point, it's necessary. You can't keep doing what you've been doing, or you keep getting what you've been getting." ♦

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# POPULAR PROGRAM EXPANDS

Inspector Training and Certification Program (ITCP) extends its reach to include manhole inspection and renovation and pipe bursting

By Ted DeBoda, P.E.

**N**ASSCO's Inspector Training and Certification Program (ITCP) is a training standard and certification program that provides comprehensive education and tools for professionals who need a better understanding of the inspection of trenchless pipeline renewal technologies.

The training greatly benefits field construction professionals, including consulting engineers who oversee inspection services, municipal engineers who inspect their projects, and construction inspectors who are onsite inspecting proj-

ects. For the past few years, ITCP has focused on the cured-in-place pipe (CIPP) process, with course subjects that include:

- Identifying pipe defects and how they affect CIPP installation
- An overview of CIPP technology
- Field installation of CIPP
- Writing and understanding performance specs
- Pipeline renewal technologies and their applications

Following the success of the CIPP course, and at the request of many industry partners and NASSCO members, we are adding two new course topics available in spring: Manhole Rehabilitation and Pipe Bursting.

### Manhole rehabilitation

More and more, manholes are

found to be a significant source of inflow and infiltration (I&I). Industry reports indicate that as much as 30 percent of infiltration is caused by manholes that have developed cracks or fractures. This critical source of I&I can be the starting point in the evaluation of any sewer system: the results often provide insight into the overall performance and health of the collection system. The ITCP training for manholes will cover:

- Manhole inspector responsibilities
- Manhole components and defects
- Manhole renovation technologies
- Field renovation of manholes
- Performance specifications

### Pipe bursting

Pipe bursting is identified by the Engineering Research Development Center (ERDC) as an area of trenchless technology with priority needs for guidance devel-

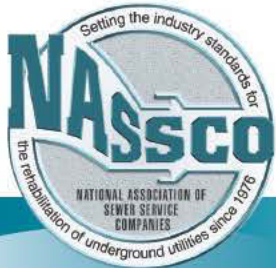
**Following the success of the CIPP course, and at the request of many industry partners and NASSCO members, we are adding two new course topics available in spring.**

opment. The ITCP training program focusing on pipe bursting will include:

- Existing pipe defects and how they affect installation of a new pipe using the pipe bursting methods
- Overview of pipe bursting technology
- Field installation of replacement pipe using pipe bursting technology
- Writing and understanding performance specifications for pipe bursting

Attendees who complete the ITCP will receive a comprehensive course manual for future reference, continuing education units (CEUs) and, upon passing the ITCP examination, a certificate of completion. Attendees also receive the Trenchless Assessment Guide for Rehabilitation (TAG-R) computer program, an interactive software that evaluates alternative rehabilitation methods. To learn more about ITCP and to sign up for a class, visit [www.nassco.org](http://www.nassco.org) or call 410/486-3500. ♦

Ted DeBoda is executive director of NASSCO. He can be reached at [director@nassco.org](mailto:director@nassco.org). NASSCO is located at 11521 Cronridge Drive, Suite J, Owings Mills, MD 21117



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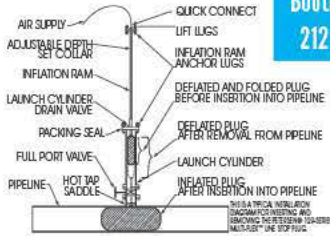




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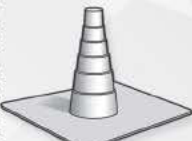


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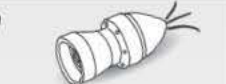
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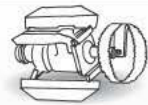
**Radial Bullet**  
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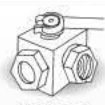
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# Product Spotlight

## One-Piece Nozzles Enhance Performance and Safety

By Ed Wodalski

One-piece nozzles from USB-Sewer Equipment Corp. are neither bonded nor screwed together; the technology enhances strength and reduces chances of failure under pressure for greater safety and optimum performance.

The nozzles' Advanced, Optimized 3D Hydro Mechanics, located in the lower part of the chamber, eliminate pressure in the upper portion of the nozzle and prevent explosion in a sewer line or manhole.

"Everybody is looking for performance, efficiency, hydrodynamics or fluid mechanics, but I'm sure no one has thought about safety," says Reinhart Laimer, company president, who came up with the one-piece concept after studying failures in the field and consulting with contractors and municipal customers. "Based on countless demonstrations and seminars, I came to the conclusion that safety is as important as efficiency."

That doesn't mean performance is compromised. Water coming from a pressurized hose is first divided by a cone piece and directly guided into the fully deburred channels and the ceramic nozzle inserts by means of five axial CNC precision-machining.

"Our inserts do not require winglets or flow-straighteners to get an outstanding jet because of the hydromechanics in and out of the chamber," Laimer says. The result is a highly efficient jet pattern.

The one-piece nozzles include the Flying Nozzle 3D small, Cleaning Nozzle 3D small, FJ Penetrator Nozzle 3D, and Antiblaster Nozzle 3D, all made of tempered stainless steel. With ceramic inserts, they can be used with recycled water and withstand up to 8,000 psi.

The Flying Nozzle 3D, for removing sand and silt from long sewer lines, has 7-degree rear jet incidence and offers 1/2- to 1 1/4-inch threaded hose connections with outputs from 12 gpm to 120 gpm. Made for cleaning 4- to 12-inch lines, it has six or eight ceramic inserts and weighs 1 to 11.5 pounds.

The Cleaning Nozzle 3D, preventive maintenance, has rear inserts at 15 and 25 degrees jet incidence, enabling it to move material toward the manhole while continuing to clean and propel up the pipeline. Available in a 10-jet version, it can remove sand, mud, silt, crust and grease. It delivers 12 gpm to 120 gpm. Ceramic nozzle inserts range from seven to 11. The nozzle cleans 4- to 15-inch pipes and weighs 1 to 6 pounds.

The FJ Penetrator navigates over pipe offsets and removes blockages and obstructions. With 15- and 25-degree rear jet incidence and zero- and 15-degree front jet incidence, it delivers 18 gpm with a 1/2-inch hose connection or 80 gpm with a 1-inch connection. It has 10 or 12 ceramic inserts. The nozzle cleans 4- to 15-inch pipes and weighs 0.5 to 4 pounds.

The Antiblaster nozzle with nine ceramic inserts (one forward and eight rear) is used in shallow sewer lines and lines close to homes to prevent blowing toilets. Made for cleaning 6- to 12-inch pipes, the 4-pound nozzle has a 37-degree rear jet incidence that delivers 30 gpm with a 3/4-inch hose connection and 80 gpm with a 1-inch connection. 770/984-8880; [www.usbsec.com/nozzles](http://www.usbsec.com/nozzles).



One-piece nozzles from USB-Sewer Equipment Corp.



### CULTEC Inc. 900HD Stormwater Chamber

The Recharger 900HD detention/retention stormwater chamber from

CULTEC Inc. has a bare chamber storage

capacity of 123.34 cubic feet and minimum installed storage of 190.73 cubic feet per unit. Units measure 9.25 feet long, 78 inches wide and 48 inches tall and have a side portal internal manifold and can accept up to a 24-inch-diameter pipe into the endwall to manage greater flows. 800/428-5832; [www.cultec.com](http://www.cultec.com).

### Xylem Godwin NC Series Portable Pumps

Godwin NC Series portable pumps featuring non-clog Flygt N-technology from Xylem Inc. are made for sewage and bypass pumping. Designed to allow stringy solids to pass, the 3-, 4- and 6-inch pumps are available



for rent or purchase. Models NC80, NC100 and NC150 are capable of flows up to 1,750 gpm and available with diesel engine or electric motor on a highway trailer or skid base. Quiet enclosures for use in residential areas are available. 704/409-9700; [www.xyleminc.com](http://www.xyleminc.com).

### Radiodetection GatorCam Inspection System

The GatorCam4 pushrod video inspection system from Radiodetection features USB flash drive connectivity with 1- and 2-inch high-resolution cameras. Designed to travel through bends and traps, the system has a waterproof controller that records digital video or images with a single key press, displaying them on an 8-inch TFT screen. Users can zoom, pan and rotate images during recording and playback to focus on problem areas. Still pictures can be taken at any time. 877/247-3797; [www.radiodetection.com](http://www.radiodetection.com).





## JTM Products Pipe Lubricant

Phoenix 27-XL pipe lubricant from JTM Products Inc. is made for pipes, gaskets and all types of pipelines. The lubricant is certified by NSF/ANSI to meet Standard 61-G for potable water supply systems. It has a temperature range of -10 degrees to 150 degrees F and can be applied to wet and dry surfaces. The lubricant is nonhazardous, contains no petroleum and will not support bacteria or impart taste, colors or odor to water in pipelines flushed in accordance with recommended AWWA procedures. 800/229-6744; [www.jtmproductsinc.net](http://www.jtmproductsinc.net).



## Tommy Gate Medium-Duty Railgate

The 3,000-pound capacity, high-cycle railgate for stake and van bodies from Tommy Gate is designed for numerous daily lifting cycles. Features include machined steel rollers, dual-

sealed ball bearings, hardened-steel pulleys and composite bushings. Other features include safety trip bar, self-close and auto-open cam arm, 12-inch platform taper and three-light, incandescent light kit. 800/543-8428; [www.tommygate.com](http://www.tommygate.com).

## Thomas & Betts PVC Conduit Repair System

The Carlon PVC conduit repair system from Thomas & Betts Corp. includes couplings, adapters, reamers and plugs. Repairs are completed by cutting off the broken conduit, reaming the inner diameter and inserting a coupler or adapter. The system is available in sizes from 1/2 inch through 2 inches. The nonmetallic couplings will not rust or corrode. The repair system is UL and c-UL listed. Fittings are in accordance with the NEC and Section 352.6. 800/816-7809; [www.tnb.com](http://www.tnb.com).



## Formadrain Open Time Epoxy Resin

The two-month shelf life epoxy resin from Formadrain Inc. features Durapox technology that remains in a pre-cured state for eight weeks until steam is applied during the installation process. Fully cured in 60 minutes, the epoxy contains no styrene-based polyester resins. 888/337-6764; [www.formadrain.com](http://www.formadrain.com).

## Presto Lifts Hand Pallet Trucks

Rol-Lift hand pallet trucks from Presto Lifts Inc. have a lift capacity of 4,500 to 6,500 pounds and fork length from 48 to 72 inches. Standard and heavy-duty models are available in 20.5- and 27-inch widths. 800/343-9322; [www.prestolifts.com](http://www.prestolifts.com).



## Powerblanket Multi-Duty Heating Blanket

The multi-duty heating blanket from Powerblanket can thaw frozen ground (up to 24 inches deep) and protect construction materials and machinery from freezing. Featuring GreenHeat technology, the blanket uniformly distributes an insulated barrier of heat while consuming low levels of energy. Blankets range in size from 2-by-2 feet to 11-by-23 feet. Custom sizes available. Standard blankets are rated to -10 degrees F, while Arctic blankets are rated to -40 degrees F. 877/398-7407; [www.powerblanket.com](http://www.powerblanket.com).



## Super Products Durasucker Vacuum Truck

The Durasucker liquid vacuum truck from Super Products is DOT/ASME

approved for use in industrial and environmental cleanups. The truck has a 3,200-gallon capacity and is designed for removing and transporting liquids, sludge and semi-solid waste. The 72-inch carbon steel tank has a maximum working pressure of 35 psig internal and 15 psig external (full vacuum). 800/837-9711; [www.superproductsllc.com](http://www.superproductsllc.com).

(continued)

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## PRODUCT NEWS

### Barrier Systems SandMaster Flood Control Attachment

The SandMaster flood control sandbag filler from Barrier Systems LLC attaches to a skid-steer, front-end loader bucket or excavator. Model 26 (front-end loader) or 26E (excavator) can fill 6,250 sandbags in eight hours, while model 20 (skid-steer) can fill 4,800 sandbags in eight hours. The attachment works with both polypropylene and biodegradable burlap bags. 530/412-2260; [www.barriersystemsllc.com](http://www.barriersystemsllc.com).

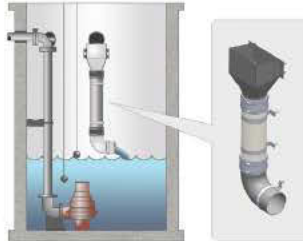


### McElroy Side-Bend Tester

The guided side-bend tester from McElroy enables an operator to perform a bend-back test on polyethylene pipes with 1 to 7 inches of wall thickness. The testing method places the entire wall thickness into tension, giving assurance to the ductility of joints. No external power is required. The tester weighs less than 30 pounds. Saw, planer and calipers needed to complete testing. 918/836-8611; [www.mcelroy.com/fusion](http://www.mcelroy.com/fusion).

### GP HydraFlow Drop Boxes

Standard and Space Saver drop boxes from GP HydraFlow LLC are available for 8- to 24-inch outlets with custom sizes available. Configured to discharge wastewater along the interior wall of the lift station, the drop boxes move solids, while reducing their tendency to separate from the water and collect at the surface. Built with T304 stainless steel, the boxes fit any lift station or manhole. 317/403-2700; [www.gphydraflow.com](http://www.gphydraflow.com).



### Tideflex CheckMate Inline Check Valve

The CheckMate inline check valve from Tideflex Technologies, a division of Red Valve Company Inc., is designed for odor mitigation in outfalls, stormwater, CSO and SSO applications. The all-rubber unibody design prevents sewer odors from backing up, while allowing water to discharge. Valves are available in 4- to 72-inch sizes. Made from 100 percent fabric and elastomer, the valves have no mechanical components to catch debris, corrode or fail. 412/279-0044; [www.tideflex.com](http://www.tideflex.com).

### Bredel SPX100D Hose Pump

The SPX100D hose pump from Bredel is made for challenging sludge applications. Using no valves, seals or rotors in the product stream, the pump can run dry and handle high grit or air-entrained sludge. The pump delivers flows up to 400 gpm, discharge pressure of 232 psi and operating speeds up to 30 rpm continuous use and 38 rpm intermittent use. 800/282-8823; [www.wmpg.com](http://www.wmpg.com).





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## LEARNING OPPORTUNITIES

### APWA

The American Public Works Association has these audio/Web courses:

- March 15 – Using Performance Measurements to Cope with Layoffs
- March 29 – Case Studies on Building Support for Flood Protection Projects
- April 3 – Clients and Consultants: How to Work Together for the Best Possible Project

Visit [www.apwa.net](http://www.apwa.net).

### ASCE

The American Society of Civil Engineers has these courses:

- March 8-9 – NPDES Stormwater Permit Compliance, Atlanta, Ga.
- March 8-9 – Pumping Systems Design for Civil Engineers, San Antonio, Texas
- March 15-16 – Stormwater Treatment Using Detention Ponds and Commercial Devices, Las Vegas
- March 20 – Sustainable Sites Stormwater Design and Water Efficiency Points for LEED Projects, online

Visit [www.asce.org](http://www.asce.org).

### AWWA

The American Water Works Association has a Financial Management: Cost of Service Rate-Making Seminar March 19-21 in Portland, Ore. Visit [www.awwa.org](http://www.awwa.org).

### Wisconsin

The Department of Natural Resources has these courses:

## CALENDAR

### Feb. 27-March 1

Pumper & Cleaner Environmental Expo International, Indiana Convention Center, Indianapolis. Call 866/933-2653 or visit [www.pumpershow.com](http://www.pumpershow.com).

### Feb. 27-March 1

American Water Works Association Membrane Technology Conference & Exposition, Glendale, Ariz. Visit [www.awwa.org](http://www.awwa.org).

### Feb. 27-March 2

Rural Water Association of Utah Annual Conference, St. George, Utah. Visit [www.rwau.net](http://www.rwau.net).

### Feb. 28-March 1

Delaware Rural Water Association Annual Conference, Harrington. Visit [www.drwa.org](http://www.drwa.org).

### March 12-16

National Utility Contractors Association Annual Convention, Fort Worth, Texas. Call 703/358-9300 or visit [www.nuca.com](http://www.nuca.com).

### March 26-28

American Water Resources Association Spring Specialty Conference, Sheraton New Orleans Hotel. Visit [www.awra.org](http://www.awra.org).

### April 29-May 2

American Public Works Association 2012 North American Snow Conference, Frontier Airlines Center, Milwaukee, Wis. Visit [www.apwa.net](http://www.apwa.net).

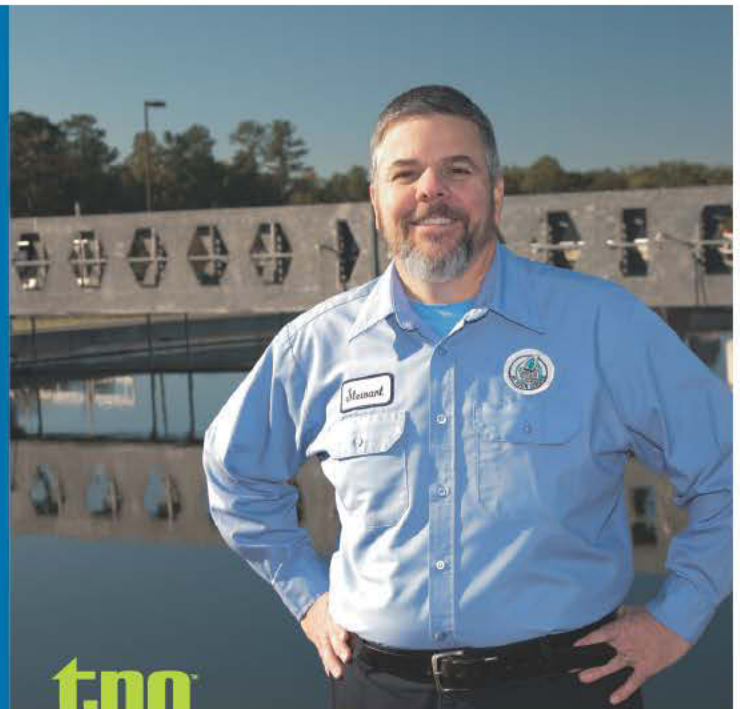
- March 1 – IT/Security, Madison
  - March 8 – Utility Management Training, TBA
  - March 22 – Treatment Operations Seminar, Oak Creek
- Visit [www.dnr.state.wi.us](http://www.dnr.state.wi.us). ♦

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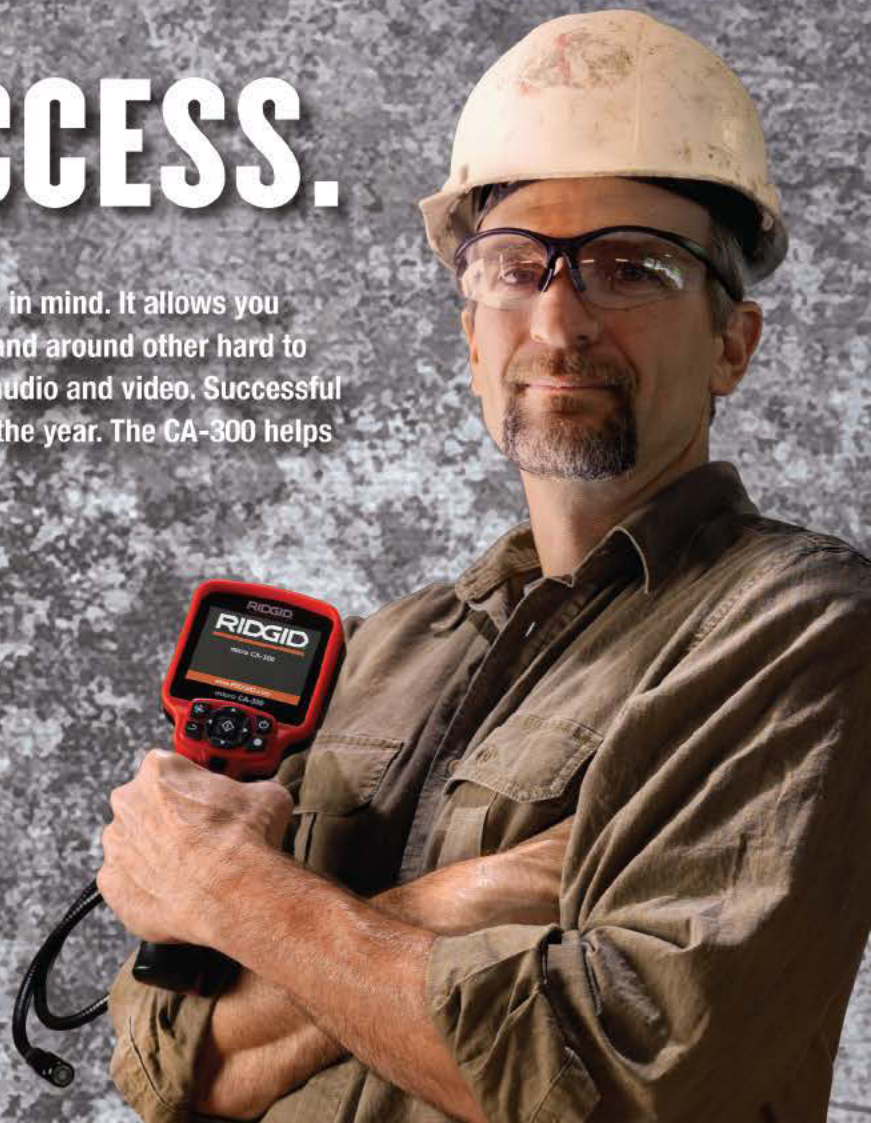


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