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April 2015

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# BACK TO NATURE

Tom Molinari  
for the Cambridge  
Department of Public Works  
in Cambridge, Massachusetts

The Cambridge Department  
of Public Works is counting  
on an engineered wetland  
to help reduce CSOs

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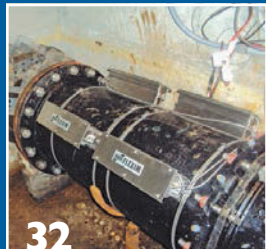
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# INSIDE:

## MANHOLE EQUIPMENT & REHABILITATION



### ON THE COVER:

Tom Molinari of consulting and engineering firm Kleinfelder takes a site survey for the Cambridge Department of Public Works Sewer Separation Project. The City has been working on separating its combined sewer system since the 1990s. (Photography by Ed Collier)



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- ◆ WATER: Tarrant Regional Water District, North Texas

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# BRINGING THE BEST TO YOU

The 2015 WWETT Show brought the water and wastewater industry's best people, equipment, education and technology together

I hope you were able to attend this year's Water & Wastewater Equipment, Treatment & Transport Show. If you didn't, you missed a great opportunity.

This year's show drew one of the largest crowds in the show's history. Attendance was up 10.4 percent over last year to 9,474, and the number of exhibiting companies was up 12.9 percent to 597, an all-time record.

But it wasn't just one of the biggest shows we've ever put on; it was also the best, starting with Education Day. Attendance was up and classrooms were standing room only for some sessions. The *Nozzles, Nozzles, Nozzles* class, taught by Duane Johnson of Affordable Pipeline Services, was jam-packed Monday afternoon. People were holding the doors open and listening from outside.

The attention paid to that class, and a conversation I had with one of the other presenters, brought home an important point: No matter how much technology advances and no matter how savvy some industry veterans become through their years of experience, there are still new things to



## FROM THE EDITOR

Luke Laggis

learn about some of the most basic services you provide, and there is a constant influx of new people who are seeking this knowledge in order to do their jobs effectively and progress within the industry.

In a more general sense, it also reinforced something I've said before in this space: It's the overall education — the networking, connections, classes and conversations — that make the show so valuable. As one exhibitor told me, this is the event. Everything and everyone is here, and if you want to grow in this industry you need to be here.

New equipment can help you do your job more effectively and effi-

**As one exhibitor told me, this is the event. Everything and everyone is here, and if you want to grow in this industry you need to be here.**

ciently, but you can't learn anything from a piece of iron. That's not to say the displays of tools, trucks and equipment aren't an impressive and valuable part of the show — they are the show — but it's the people you meet, the conversations, the advice and the knowledge in that building that can transform your utility. And it's hard to walk out of the Indiana Convention Center when it's over without feeling like you're part of something important, progressive and respected.

In recent years, the show has also taken on a more international feel, with exhibitors from 14 countries and attendees from 52, including every continent except Antarctica. And there's more for the municipal market than ever before. The name change is a reflection of that. It opens up the show to more people, more technology and more ideas, all of which benefit you.

The name change also marked our 35th anniversary, and all attendees and exhibitors were entered for a chance to win a tricked-out Chevy truck to help commemorate the event. Max Silva of Warren Environmental was the lucky winner. Silva opted for \$35,000 cash instead of the truck so he could pay off his student loans, which was fitting in many ways since education is such a huge component of what we do.

The 2015 WWETT Show is certainly one Silva and many others will never forget. If you weren't able to attend, now is the time to put next year's show on your calendar. And be aware we're shifting the days so it'll be easier to attend.

The 2016 WWETT Show will be held Wednesday, Feb. 17 through Saturday, Feb. 20 at the Indiana Convention Center in Indianapolis. We plan to make it even better, with more of everything you need to make your utility stronger.

It was a pleasure meeting so many of you in Indy, and I hope more of you will be able to make it next year.

Enjoy this month's issue. ♦

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## LOSS PREVENTION

### Clamp Down on Manhole Cover Theft

Thieves have become increasingly brazen and gone to creative extremes when it comes to heisting manhole covers and sewer grates from city streets. Not only is it costly to replace the stolen goods, it creates a serious hazard for passersby. So what is a utility to do when its covers go missing? We offer five solutions to help combat the problem. [mswmag.com/featured](http://mswmag.com/featured)

## OVERHEARD ONLINE

“The healthier an operator is, the better chance his body will have of fighting off a serious disease. Another key is increasing awareness of the threats in the waste industry and openly discussing the preventive measures. You cannot be macho about procedures.”

— *Wastewater and Disease: How Can You Stay Safe?*  
[mswmag.com/featured](http://mswmag.com/featured)



## EAR TO THE GROUND

### A Closer Look at Acoustic Pipe Inspection

Increase efficiency by learning more about acoustic pipe inspection technology as a means to assess line integrity. In the second part of our series on API, we examine proper pre-deployment planning, the logistics of insertion, and the need coordinate with your operations department. [mswmag.com/featured](http://mswmag.com/featured)

## 2015 WWETT SHOW

### By the Numbers ...

This year marked the 35th anniversary of the Water & Wastewater Equipment, Treatment & Transport Show. By all accounts, it was among the most successful shows yet, and we have the numbers to prove it. From record Indy attendance to the number of beer kegs consumed, here's a look at the highlights from the 2015 WWETT Show. [mswmag.com/featured](http://mswmag.com/featured)



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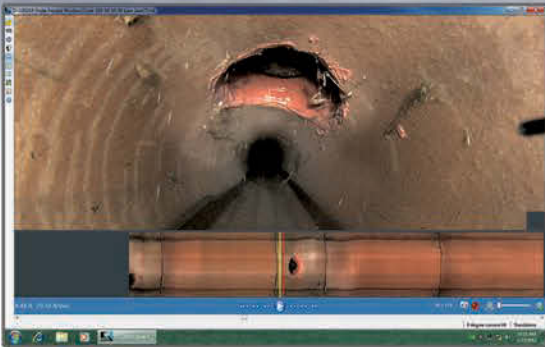
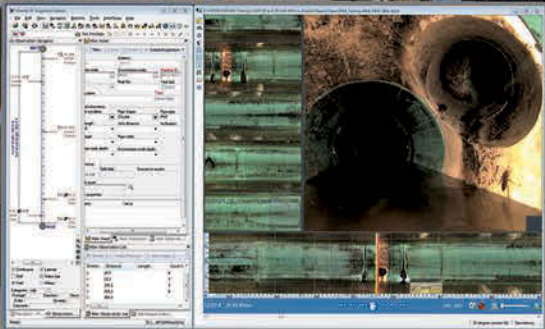
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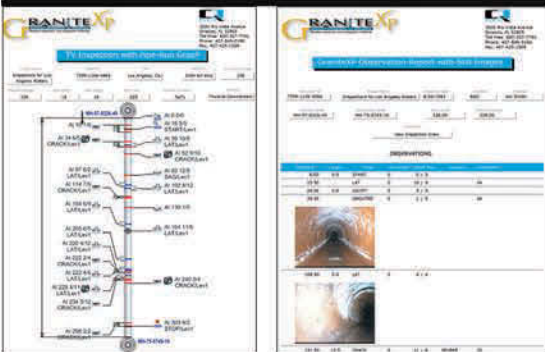


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A walking path and hand-planted native vegetation surround the large forebay at the Alewife Reservation Stormwater Wetland in Cambridge, Massachusetts. (Photography by Ed Collier)



# BACK TO NATURE

The Cambridge Department of Public Works is counting on an engineered wetland to help reduce CSOs

By Peter Kenter

As the home of Harvard and the Massachusetts Institute of Technology, the City of Cambridge, Massachusetts, has never been short on big ideas. The Cambridge Department of Public Works (CDPW) is currently basking in the success of its own big idea — the establishment of the Alewife Reservation Stormwater Wetland to help control combined sewer overflows.

Much of the early history of Cambridge was driven by economic development, often in direct competition with the City of Boston to the south. Lowlands were raised, marshes and swamps were drained and the population expanded. The city's first sewers were built in the 1850s in a typical combined system design. As with many other cities, the control of CSOs has currently become an envi-

ronmental and civic priority.

The city of 110,000 people is served by the Massachusetts Water Resources Authority (MWRA), a state agency providing wholesale water and sewer services to 2.5 million people in 61 metropolitan communities around Boston.

The CDPW provides a host of services, including sewer maintenance, stormwater management, engineering, parks, street and sidewalk maintenance, and urban forestry. The Cambridge Water Department is a separate municipally owned and operated water utility.

## Fighting CSOs

“We are a very old city, and much of our original infrastructure was designed and built as a combined system,” says Catherine Woodbury,

engineering project coordinator with the CDPW. “While the city is making strides to reduce CSOs, the extreme costs of separating the systems often

exceed the immediate benefits.”

The MRWA has operated under an enforcement action by the U.S. Environmental Protection Agency



Michael Smith, left, resident engineer for MWH, and Bruno Cardarelli, a representative from consulting firm Kleinfelder, talk about the next phases of construction on the Cambridge Department of Public Works Sewer Separation Project.





**“When the city was developing, swamps were often filled in to control mosquitoes or to level the land. Other wetlands were filled with invasive, low-quality plant species. The Alewife Brook was channelized.”**

**— Catherine Woodbury**

**Construction on the Sewer Separation Project continues throughout the winter in Cambridge. Above left: Catherine Woodbury, engineering project coordinator for the Cambridge Department of Public Works at the Alewife Reservation Stormwater Wetland. Left: A mix of sand and a small amount of cement is used as fill and compaction material around a new sewer pipe.**



one owned by the MWRA, six by Cambridge and one by the neighboring City of Somerville.

“We’ve already made significant progress on reducing CSOs to both these waterways,” Woodbury says. “Since 1988, we’ve reduced CSO discharges to the Charles River by 98 percent, and since 1987, we’ve reduced discharges to the Alewife Brook by almost half. We began a series of sewer separation projects in the 1990s and the system is now 40 percent separated.”

### **A century system**

Parts of the wastewater and stormwater system date back more than a century. The stormwater system is primarily made of concrete pipe as large as 72 inches in diameter. The oldest sewer pipes are made of clay. Outside crews are contracted to perform new construction with reinforced concrete pipe generally used for larger installations and PVC used for smaller diameters.

Combined system manholes are being isolated and replaced, with additional piping installed to allow for manhole relocation. Common trench installations, in which sewer

and stormwater pipes were placed in the same excavation, are also being reversed.

“The sewer line would be located at the bottom of the trench and a separation plate would be installed to isolate the two systems,” Woodbury says. “However, over time the plates were damaged or removed. During rain events and with damaged pipes, some of these trenches would function as a combined system.”

Effective pipe and infrastructure maintenance also form an important role in CSO control. The CDPW’s Sewer Division inspects and clears obstructed sewer lines, cleans catch basins, repairs broken lines, and inspects and approves private connections to the public system.

The department owns a Vactor combo unit and splits cleaning duties between in-house crews and outside contractors.

“The flatness of our topography means that some of the pipes going out to water bodies are subject to backflow from the rivers,” Woodbury says. “Keeping pipes clean of sediment is always a challenge.”

Closed-circuit television inspections are carried out by contract with



## **PROFILE:** Cambridge (Mass.) Department of Public Works

**YEAR UTILITY ESTABLISHED:**  
1852 (first city sewer system)

**CUSTOMERS SERVED:**  
100,000

**AREA SERVED:**  
7.13 square miles

**DEPARTMENT STAFF:**  
213

**INFRASTRUCTURE:**  
115 miles of separated sanitary sewer mains, 78 miles of separated stormwater mains, 43 miles of combined sewer mains, 190 miles of water mains

**ANNUAL DEPARTMENT OPERATING BUDGET:**  
\$32.9 million (2014)

**ASSOCIATIONS:**  
American Public Works Association, American Society of Civil Engineers, ASHRAE, Water Environment Federation

**WEBSITE:**  
[www.cambridgema.gov/theworks](http://www.cambridgema.gov/theworks)

since 1985 as a result of a remedial framework established during the Boston Harbor Case, which focused on wastewater pollution of Boston Harbor and its tributaries. To date, MWRA has completed 29 of 35 area projects under the resulting CSO Control Plan and has begun construction on an additional four projects.

Projects directly affecting Cambridge have included eliminating CSO outfall points, expansion of sewer pipe volume and sewage diversion.

The city operates under a National Pollutant Discharge Elimination System permit under the Clean Water Act. There are seven permitted CSOs on the Charles River — two owned by the MWRA and five by Cambridge. There are eight permitted CSOs on the Alewife Brook —





**The Cambridge DPW staff includes (seated, from left) Wendy Robinson, Chris Neil, Jane Demoulas and Hussein Musa; Back: City engineer Katherine Watkins, Ruth Mackiewicz, James Wilcox, Catherine Woodbury, Diane Stokes, Kelly Dunn, Mary Legere, Melissa Miguel, Eric Josephson, Kara Falise, Lenny Russell, Deputy Commissioner John Nardone, Brian McLane, Ellen Katz and Commissioner Owen O’Riordan.**

outside suppliers.

The department also expends significant effort educating the public about proper connections to the city’s sewer system, while identifying and isolating illegal connections.

### Engineering a wetland

However, the city’s most novel approach to reducing CSOs has been the creation of the Alewife Reservation Stormwater Wetland, an engineered marsh.

“When the city was developing, swamps were often filled in to control mosquitoes or to level the land,” Woodbury says. “Other wetlands were filled with invasive, low-quality plant species. The Alewife Brook was channelized.”

The engineered wetland project began with the creation of the city’s first hydraulic stormwater model, completed by engineering firm MWH using Innowyze InfoWorks software. The analysis identified the potential for a 3.5-acre detention pond to be located in the Alewife Brook Reservation conservation area. The caveat: The reservation is a state park managed by the Massachusetts Department of

Conservation and Recreation.

“The only way to implement the plan was to create a detention pond and place detention equipment on state lands,” Woodbury says. “We had to approach the state from the position that the plan was an enhancement of the reservation and the wetlands.”

The CDPW worked closely with the state to create a design that supported the conservation area’s master plan. A detention pond constructed in the form of a wetland would be enhanced by the planting of original native plant species and the addition of walking paths through the new wetland.

“We also had to demonstrate that the design of the detention pond wouldn’t increase the peak flow downstream along the Alewife Brook,” Woodbury says.

### Upstream controls

A series of passive stormwater management devices, such as flaps and throttles, were located upstream to regulate water levels. The upstream pipelines also feature catch basins by BMP Supplies Inc., flushing systems, and sump manholes to

capture grit and floatables.

The wetland border provides stormwater storage via a 6-foot earthen berm designed to retain a 10-year storm event.

The wetland itself was designed



as a multistage ecological filter. In the first stage, fine sediment settles in an articulated concrete block forebay where it’s later trucked out for disposal. Stormwater then slowly passes through a vegetated swale before entering the main basin.

The city partnered with consultants and engineers to plan the placement of 120,000 plugs of wetland species and 400 upland trees and shrubs.

### Polishing the effluent

“The wetland is designed to take advantage of its topography to force the water to take the longest route through the system,” says Woodbury.

## PUBLIC UTILITIES, 19TH CENTURY STYLE

Public archives often contain information that demonstrates just how far public sanitation and our understanding of the natural environment have progressed.

*The Report of the Special Committee on the Water Supply of the City*, presented to the City of Cambridge, Massachusetts, in December 1879, outlines the conditions under which improvements to the design and extent of the sewage system were recommended:

“At the present time Alewife Brook is simply an open sewer, discharging its filth into the lower Mystic Basin and contaminating the atmosphere through its entire length with offensive and deleterious gases, and the subsoil with its sewage.”

The report goes on to identify sources of pollution, including a sewage pipe that empties directly into the Alewife Brook and “... discharges very objectionable material into the brook, consisting not only of large amounts of human excreta, but also the refuse from two slaughter-houses, one of which is situated in Cambridge and the other in Somerville. The brook at this point is stained red with blood from these establishments.”





**Lenny DaSilva of Bartlett Construction uses a roller to aid in material compaction after replacing a section of sewer line.**

“The vegetation not only acts as a sponge to slow the water down, it also naturally treats and removes biological nutrients and other pollutants. They polish the water to the point that it can be released to the Little River and downstream to the Alewife Brook.”

The facility began accepting water in April 2013 and was opened to the public in October

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Another report, *The Cambridge Of Eighteen Hundred And Ninety-Six*, edited by Arthur Gilman, underscores the perception of marshes and swamps as enemies of progress, creating physical barriers between citizens:

“Perhaps, as has already been suggested, the ‘accent’ which nature placed upon this division was the chief cause of the unfortunate sectional feeling which then prevailed and influenced all municipal action. Marshes and woodlands ‘interposed, made enemies of those who else like kindred drops would mingle into one.’”

Wetlands of the day were routinely drained, filled or dissected by channels.

“Today’s understanding of natural drainage patterns and their associated ecology has underlined the importance of wetlands in naturally filtering and purifying water,” says Catherine Woodbury, engineering project coordinator with the Cambridge Department of Public Works. “We’ve moved forward by learning from nature.”

of that year.

The \$26 million project has not only earned the accolades of park users and educators, it earned a 2014 National Recognition Award from the American Council of Engineering Companies and a 2014 Environmental Project of the Year award from the American Public Works Association.

“Right now, we’re waiting for the vegetation to establish itself, but we’re on the way to developing a very healthy ecosystem including snapping turtles, muskrats, deer, swans and geese,” says Woodbury. “Once we achieve a healthy base flow, the wetland will be capable of accepting the full complement of water from upstream, perhaps by the end of 2015.” ♦



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# LEARNING THE ROPES

Mentoring programs offer a low-cost, low-risk solution to disengaged employees and high turnover

By *Ken Wysocky*

Here's an interesting factoid to chew on: According to a recent survey conducted by the Corporate Executive Board, 25 percent of companies in the United States run peer-mentoring programs — a dramatic upward leap from just 5 percent before the 2007 recession hit.

Is your organization among the other 75 percent? If so, it's missing out on one of the most effective ways — and least expensive methods — to increase employee engagement and satisfaction, reduce turnover and accelerate the leadership-readiness of high-potential employees. Moreover, a good mentoring program serves as an effective, must-have recruiting tool, says Horace McCormick, the program director for executive development at the University of North Carolina Kenan-Flagler Business School.

"Mentoring is not only inexpensive, it also achieves higher-quality results than more formal learning experiences," notes McCormick, who compiled 15 years of executive human resources and talent-management experience at global 200 organizations. "Mentoring is more sustainable than formal learning events because you're making a cultural shift in how you want to develop people."

Why are mentoring programs mounting a comeback? Part of it stems from the financial hardships encountered by companies and organizations during the recession. Employee training and development programs usually are the first victims of organizational budget cuts, and mentoring provides a natural substitute for revenue-strapped companies that still want to develop employees, McCormick notes.

Another factor: the surge of millennials, or Gen-Yers, entering the labor market. Unlike the employee demographic cohorts that preceded them, millennials crave the kind of workplace culture that mentoring produces. "They don't want a traditional boss-employee relationship," McCormick points out. "They want something more ... and mentoring provides the framework for how they want to communicate and learn."

## Faster employee acclimation

In addition, the days of employees staying with a company long enough to earn the proverbial gold watch at retirement are long gone. So if most employ-

ees' tenures will be ephemeral at best, why not acclimate them as quickly as possible and increase the odds of them staying longer, as well as maximize their productivity? Mentoring programs can help achieve those goals.

"Employers need to get as much out of employees as they can," McCormick says. "And to do so, they have to find ways to bring them up to speed faster. If you don't do that, they're not going to stay very long, and they won't be very productive while they're employed, either."

"Employees make up their minds quickly. Generally within the first six months, they know if they want to stay with an organization," he adds. "If I had to bring someone along in a hurry and maximize their impact on an organization, I would make sure I had the right mentor in place to connect them to the right knowledge and the right people. Most new employees struggle to figure out how things work in an organization — how they can be successful. And mentoring bridges that gap."

Most employees enjoy mentoring programs because they help them learn more. That's valuable because learning is energizing and engaging, and energized and engaged employees are less likely to brush up their resumes and contact headhunters. And if someone doesn't like to learn, well, that's useful knowledge, too. "No organization should want to keep employees who don't like to learn," McCormick says.


## Different options available

Mentoring programs vary widely. One-on-one mentoring usually involves a senior manager serving as a role model to a junior employee, focusing on specific skills the mentee wants to hone. E-mentoring uses social media platforms to more effectively reach widely dispersed workforces.

In reverse mentoring, the mentee is an older employee who perhaps needs help with learning new technologies that younger employees already fully grasp. With group mentoring, a mentor offers guidance to multiple mentees. Then there's peer mentoring, in which employees with similar interests meet periodically to serve as mutual sounding boards and exchange experiences and ideas.

In some instances, an organization might use a combination of different

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**"Mentoring is not only inexpensive, it also achieves higher-quality results than more formal learning experiences. Mentoring is more sustainable than formal learning events because you're making a cultural shift in how you want to develop people."**

— Horace McCormick



mentoring approaches. Another may opt for one type of program that's best suited to its goals and culture. For example, in an engineering environment, a more structured and traditional form of mentoring might be more appropriate, while a sales workforce that's spread out geographically may be better suited for group or e-mentoring.

"E-mentoring works great with millennials," McCormick adds. "They like to have mentoring on demand, sort of like movies on Netflix. To select the right mentoring approach, you have to understand your organization's culture and how people behave in your culture."

### Tie to strategic goals

But no matter what approach is taken, the mentoring programs must align with an organization's strategic goals. "Mentoring programs will die off after time if there's no strategic imperative," he observes. Moreover, the purpose of the mentoring should be articulated clearly and evaluated and measured periodically. In addition, mentoring relationships should not last more than a year, he suggests.

Another thing to consider: Mentoring is not the same thing as coaching. What's the difference? There are gray areas that overlap a bit, McCormick concedes. But in general, employee coaching is short-term in nature and centers more on solving specific challenges that are behavioral- or performance-related. In addition, it's often performed by external consultants.

Mentoring, on the other hand, is an internal, long-term endeavor that's broader in scope; it focuses more on giving advice, connecting employees with the right resources and helping them to better understand an organization and its culture.

Like stormwater and sewage, it's best to avoid mixing up the two. "I wouldn't encourage anyone to use mentoring to help someone who's struggling performance-wise, for example," McCormick says.

One key to a successful mentoring program: A one-day workshop in which someone who's trained in mentoring explains what mentoring is and isn't, clearly specifies the program's objectives, and engages participants in some role-playing "before turning them loose on one another," McCormick says.

### Pockets of resistance

It's always possible that some managers will resist implementation of mentoring programs. They may trot out old tropes like there's not enough time or that mentoring is just a bunch of touchy-feely New Age-ish hogwash aimed at placating spoiled millennials. Nonsense, says McCormick.

"You need to explain that you're not asking them for more time, you're just asking them to develop a better relationship with employees — a mentoring relationship," he says. "In other words, you expect your managers to talk to their people and find out how to make them feel more connected to the organization. If people say they don't have time, you've selected the wrong mentor or the wrong mentee."

Other dissenters will claim that it's too difficult to assess the return on any investment in mentoring programs. McCormick disagrees, noting that not everything can be documented in terms of numbers, financial or otherwise.

"But with mentoring, you'll eventually see the results every day," he says. "You'll see people connecting with your organization and choosing to stay."

And by any measure, those are priceless commodities these days. ♦

*To learn more about mentoring and how to establish a successful program, visit <http://execdev.kenan-flagler.unc.edu/how-to-build-a-successful-mentoring-program-1> and download a mentoring white paper written by Horace McCormick.*



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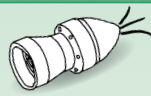
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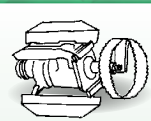
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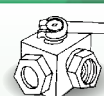
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# NEW BRAUNFELS BRINGS IT IN-HOUSE

Texas utility's reliability-centered operations and maintenance program develops efficiency and self-sufficiency

By *Jim Force*

**T**рино Pedraza and his New Braunfels Utilities operations and maintenance team are the right people, in the right place, at the right time.

Focused on proactive maintenance, they provide cost-effective services for the rapidly growing City of New Braunfels, located between San Antonio and Austin, addressing problems in the city's distribution and collections systems before they occur and performing nearly all the tasks themselves.

Pedraza, operations and maintenance division manager, came to New Braunfels Utilities (NBU) five years ago from San Antonio, where he and his staff had built a predictive main-

tenance program from the ground up. "When I came here, we were functioning like everyone else," he says. "If something broke, we fixed it."

"Now," he says, "I have 50 people and we do 100 percent maintenance [on the city's water, wastewater and plant electrical systems]. We're developing our reliability-centered maintenance program in stages. We use analysis to not only predict breaks and other problems, but actually control them. Each year we're getting better and more reliable."

They're also saving the city money. By lining sewer pipe, cutting laterals, repairing manholes and detecting water leaks themselves, they've shown significant savings as

opposed to hiring contractors on a fee-for-project basis. In some cases, they've purchased their own equipment or rented it if that is the cheaper option. An extensive training program enables the NBU team to be good at what they do.

The program has turned more than a few heads. In 2011, *Uptime* magazine honored the utility with its award for "best lubrication and maintenance."

## **New Braunfels' system**

Ten years ago, the population of New Braunfels was about 44,000. Today, it's 63,000 and is expected to break 100,000 in just a few more years. To provide water and wastewa-

ter service to this growing population of residents, businesses and institutions, New Braunfels Utilities maintains a water distribution system nearly 500 miles long and a sewer system of approximately 400 miles.

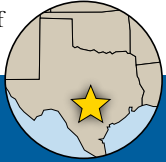
Drinking water is drawn from both surface and groundwater sources in the area. Wastewater is treated at three treatment plants with most of the treated water discharged to the Guadalupe River. A portion is recycled for irrigation use, and the community is building a new water reclamation plant to recycle more water in the face of worsening drought conditions.

Approximately 50 percent of the sewer system is PVC, but the



remainder includes clay, concrete and ductile iron. Pipe size ranges from 4- to 48-inch.

NBU collections maintenance crews use an OmniEye 360 single conductor system (RS Technical Services) to televise the sewer system, and clean it using a Camel 1599-T combination sewer and basin cleaner (Super Products) and a pair of



**PROFILE:**  
City of New Braunfels (Texas)  
Utilities Department,  
Water, Sewer  
Division

**DATE ESTABLISHED:**  
1942

**POPULATION SERVED:**  
Approximately 63,000

**AREA SERVED:**  
Guadalupe and Comal counties, 20 miles north of San Antonio, 35 miles south of Austin, Texas

**CONNECTIONS:**  
Over 29,000 water connections and 23,000 sewer connections

**WATER/WASTEWATER INFRASTRUCTURE:**  
497 miles of water pipe fed from 3 sources of water, approximately 400 miles of sewer pipe, ranging from 4 inches to 48 inches in diameter, and 7,000 manholes. Wastewater treated at North Khueler, South Khueler and Gruene wastewater treatment plants, discharged to Guadalupe River, with some for recycle. New McKenzie Water Reclamation Plant under construction.

**EMPLOYEES:**  
233

**ANNUAL OPERATING BUDGET:**  
\$100 million

**WEBSITE:**  
www.nbutexas.com

Factor 2100 combination units. The team proactively views and cleans 225,000 linear feet a year, which translates to covering the entire 400-mile long system about every 10 years.

Pedraza says in prior years, the utility would only clean sewer lines reactively — if there was a problem. Now, equipped with a SL-RAT (Sewer Line Rapid Assessment Tool) from InfoSense, the utility develops data that indicates where the blockages are. Today, NBU has a team cleaning about 10 percent of the system each year, but it's not just cleaning for cleaning's sake. "The cleaning is devoted to the areas that need it," Pedraza says.

The SL-RAT features a transmitter that provides active acoustic transmission through the pipe and a receiver that listens and interprets the acoustical signal. It is highly portable and can provide a sewer line blockage assessment in less than three minutes.

When NBU looked at the tool and the price, they contacted the company and worked out a monthly rental for the unit. "The owner of the company worked with us and taught us how to use it," Pedraza says. "We inspected 20,000 feet of pipe per day and finished the project after inspecting 1.2 million feet [nearly two-thirds of the sewer system] in four months, and transferred all the data to our GIS system.

"We can now see and address areas that are not on the cleaning schedule but may be on the verge of overflowing. As we do corrective work, it overlays on top of our GIS to show the issue corrected while maintaining the original data. It's made us much more efficient."

### Lining

As in most other U.S. cities, portions of the New Braunfels sewer system are old, dating to the early part of the last century. "We dismantled a hydrant the other day and it was installed in 1907," says Pedraza. Other sections are damaged.



New Braunfels Utilities O&M Division employees (from left) Javier Nieto, Dakota Cielencki and Douglas Clifton help maneuver hydraulic shoring into a trench as the crew works to replace a broken sewer pipe.



New Braunfels Utilities O&M Division senior PDM technician T.J. Wiley wears an arc/flash protective suit to demonstrate an infrared thermography scan of a pump station's switch gear.

NBU has been lining sections of sewer themselves using Perma-Liner's Top Gun manhole-to-manhole system. In the system, a compressor feeds constant air to inflate the liner, which is steam cured in one to three hours depending on pipe length and weather temperature. In addition, the utility uses Perma-Liner's Lateral Liner and Pull-In-Place system

for point repairs.

The NBU crew got into lining with the same type of ingenuity that led to renting the acoustical assessment equipment.

"We caught a break," Pedraza says, explaining that a potential disaster turned into a golden opportunity for his team. "We had hired a lining contractor to fix a damaged





The New Braunfels Utilities O&M Division sewer collections team includes (from left) Lorenzo Herrera, Dakota Cielencki, Alex Alvarado, Robert Oliva, Douglas Clifton, Eric Torres, Javier Nieto, Eddie Ybarra, Alex Rosales, Brent Crocker, Josh Timmerman and David Lagunas.

section of sewer, and we had that ‘Aha moment,’ realizing this was something we could do ourselves.”

When sewer lines in a canyon were about to collapse, the utility decided to take a shot at it.

Of course, it wasn’t that easy.

“They [lining companies] wouldn’t sell to us,” Pedraza explains, suggesting that contractors were unwilling, possibly because they may have sold equipment to other utili-

ties only to end up with a botched job, or they weren’t confident in the abilities of municipal crews.

“But we were thinking that if we had the equipment and the materials, man, we could do this job,” Pedraza says. “So we teamed up with our utility engineering department and wrote our own RFP, soliciting bids for lining equipment.

“Instead, some suppliers offered discounts off conventional service con-

tracts, but Perma-Liner responded, and when we looked at their system and saw it in action, we decided to purchase the necessary equipment.”

By NBU’s calculations, the utility basically broke even versus the cost of letting the contract out to a lining company, but it now owns the equipment – a 20-foot trailer, a main-line system for 6- to 15-inch pipe and an epoxy wet-out bench.

“Perma-Liner worked side by side with us,” Pedraza adds. “We created how-to videos to share the lining knowledge with the full staff.”

To date, using the newly purchased equipment, NBU has successfully lined about 45,000 linear feet of sewer line. The focus is on damaged or aging infrastructure, or lines under streets or roads the city is getting ready to pave over. “Instead of waiting, we have opted to go ahead and reline it to eliminate future cutting of a newly completed road,” Pedraza says.

He estimates the utility has saved more than 50 percent of the cost of using open-cut methods to replace failing sewer lines and 40 percent of the cost of using outside contractors.

“There are some cases where open-cut makes sense – in areas where there are no roads or other utilities,” he says, but lining is the preferred solution in more congested areas of the city.

Once the lining is complete, NBU cuts new lateral connections from the inside of the pipe – again, avoiding the hassle, inconvenience and mess of excavations. The crew

uses a Bowman robotic drill/saw/grinder/buffer, controlled via coaxial cable. “We send in the reinstatement cutter with a camera and then cut the laterals back open from the inside instead of cutting the street,” Pedraza explains.

### Manholes

The 7,000 manholes in New Braunfels aren’t escaping attention, either. The utility’s proactive maintenance group is busy gathering data on all manholes and rehabilitating those in need of repair – once again using in-house expertise.

In the process, they’ve developed new construction specifications based on what they’ve learned in the exercise.

“We’re opening every one and gathering information on attributes, populating drop-down boxes,” says Pedraza. The assets are color-coded into the utility’s GIS system by condition.

“The first one we looked at was completely corroded away and it was only 2 years old ... crazy,” he says.

With outside repair costs at around \$300 a vertical foot to reline the brick manholes, NBU once again looked inside and realized the Perma-Liner system they owned could be used on manholes.

“We found that the actual brick was resistant to corrosion but the grout or mortar in between the bricks corroded readily,” Pedraza says. The Perma-Liner system cost around \$140 to \$160 a vertical foot for brick, and the liner bonded securely to the voids in between the bricks, forming a tight mechanical seal.

On monolithic concrete manholes, NBU has found it cheaper to outsource the lining contract to companies using cementitious and/or epoxy coatings to seal damaged surfaces.

Currently, the utility uses both in-house and outsourced methods.

### Training the team

New Braunfels Utilities has gone the extra mile to train its staff,

## A COMPREHENSIVE APPROACH TO TRAINING

At New Braunfels Utilities, it’s not “on-the-job” training, it’s “on-the-jobs” training.

“When we bring in a new employee,” says Trino Pedraza, operations and maintenance division manager, “that person does not work directly with his boss until the end of the training period.”

For the first 10 weeks of their tenure with the utility, rookies learn about the other departments and tasks. For the first month, Pedraza says a new person might report to a sewer supervisor, gaining experience with cameras and the combo trucks.

Then the new hire moves over to the water side, working with a water supervisor. Finally, the employee does a stint in customer service, handling customer issues, doing taps and installing meters.

“Each month,” Pedraza explains, “crew leaders and shift supervisors sit down with the new employee and review his or her work – this is what we like about you, this is what you need to do better in order to be successful here.”

At the end of the training period, the new employee works with his assigned crew leader and undergoes a final evaluation. “The new employee sees the entire system before he steps into his job,” Pedraza says. “It gives an employee a sense of the whole system. They mix with people. They get hands-on experience, see different types of work.

“They’re no longer like a green horn who doesn’t know what a pipe wrench is.”



upgrade its skills and give them recognition they deserve.

"We expect our technicians to gain national and international certification in such areas as vibration analysis, airborne and structural ultrasound, maintenance and lubrication," Pedraza says. "We have sent our supervisors to high-dollar training."

The utility emphasizes cross-training, rotating jobs with different crews, and they work hard on knowledge transfer. "We have people who just know where things are in the system," Pedraza says. "We want to capture a lot of this information and get it into our records management system. We have lots of standard operating procedures and pictures."

Effective organization is another key.

The 50 people reporting to the operations and maintenance division include the predictive maintenance team, with a supervisor and eight technicians. The sewer division consists of another supervisor and 13 technicians. That division is mirrored on the water side by a water supervisor and 12 technicians. Finally, the customer service group includes a supervisor and 11 support employees.

Within the sewer division, Pedraza says, "Everybody has to do everything. Our maintenance planner and construction foreman sit down twice a week and generate work orders and assign different employees to different jobs. Our guys are now using tablets in the field. They keep getting better."

Pedraza says that in the past, oil and gas booms around New Braunfels have cost the utility as much as 50 percent of its staff. More recently, however, the utility has taken steps to retain and empower its employees.

"Our CEO has really invested in our employees, putting in place a market match and providing a competitive salary range at all levels within the operations group," Pedraza says. "Since we started doing that, turnover has all but disappeared."

And it's more than compensation. "We focus on people and creating a great environment for them to work in," he says. "I'm not a micromanager. We empower people – they have our permission to make mistakes as long as they can logically speak to it.

"No matter how much you pay people, it will never be enough [to compete with the private sector]. We focus on creating a positive environ-

ment, we focus on training, we lift each other up.

"Our people love working here because the atmosphere they came from was or may have been harsh. You'll see people laughing and joking and then getting out there and getting to work.

"We are all about treating people right. It's a pretty cool and fun place to work." ♦

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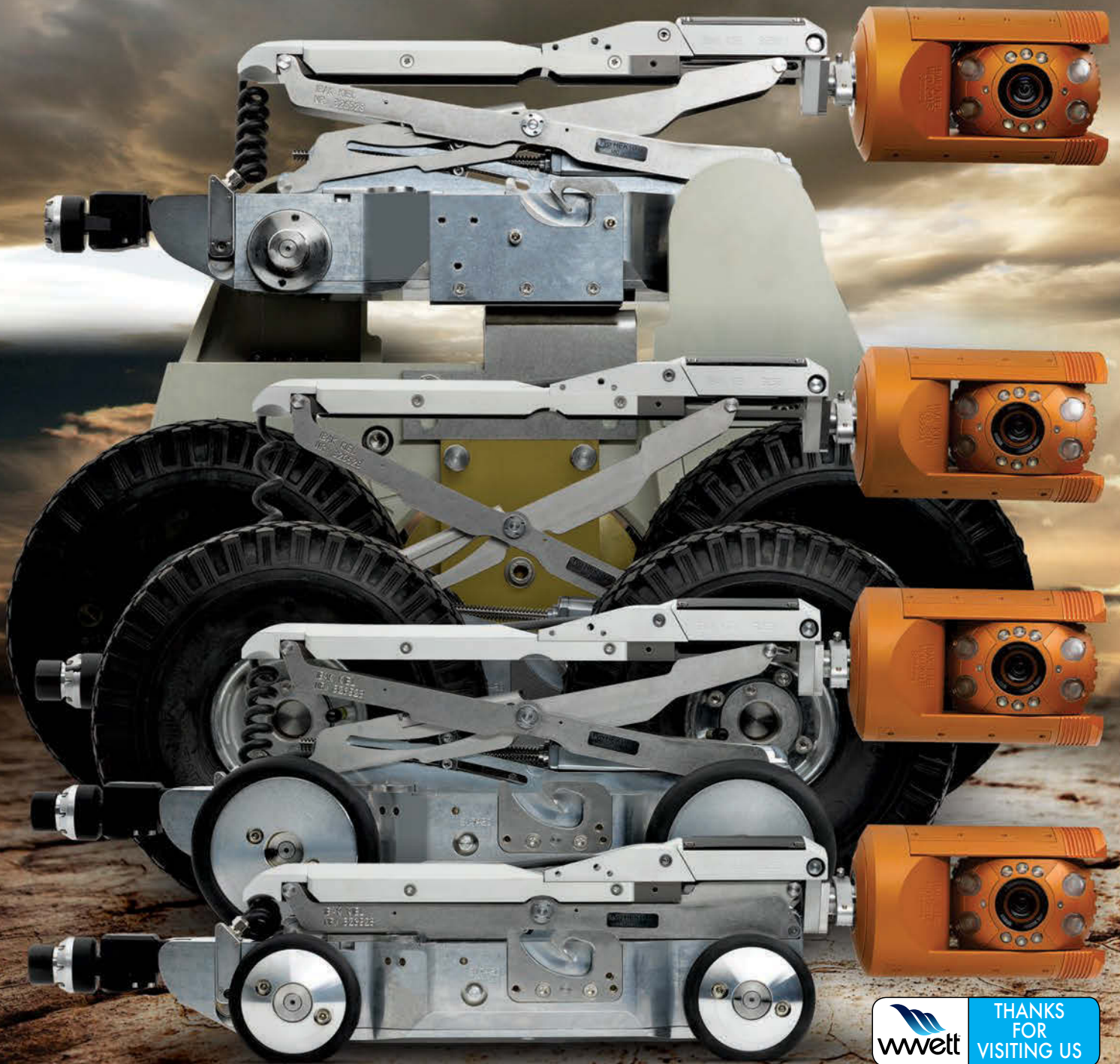


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# ULTRASONIC SOLUTION

Metering problems on a large distribution main lead water company to seek a new solution

By Jack Sine

The Aquarion Water Company recently discovered it had a flow measurement problem with a large customer.

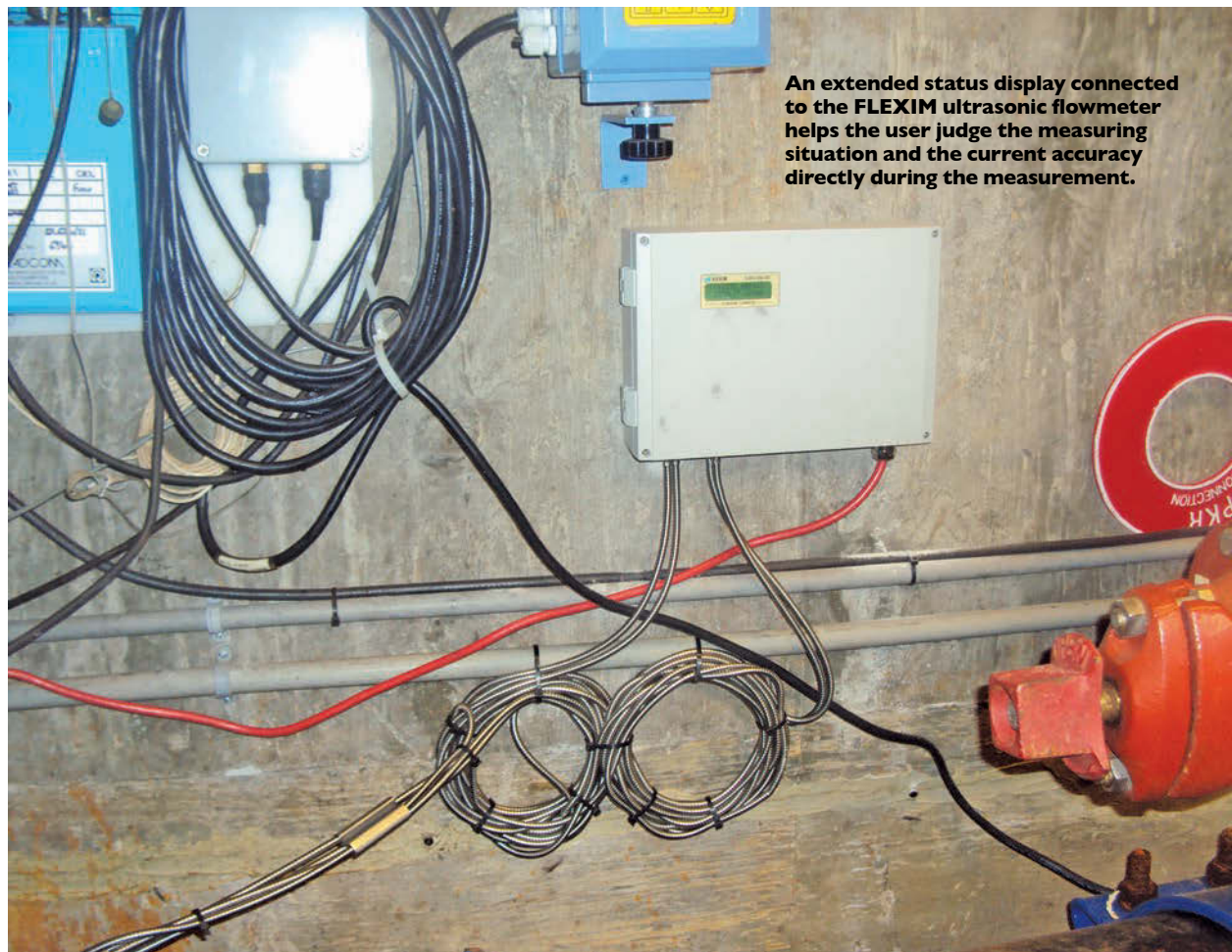
Aquarion, the largest investor-owned water utility in the Northeast, serves 49 cities and towns throughout Connecticut's Fairfield, New Haven, Hartford, Litchfield, Middlesex and New London counties, drawing water from a series of reservoirs and wells. But its measurement problem was not with its home or business customers.

"We also wholesale water to United Water over the border in New York state," says John Schultz, senior operations specialist for Aquarion. "We send them about 4 million gallons a day and they in turn supply the drinking water for Port Chester, Rye, and Rye Brook, New York. We used to measure that volume with a turbine meter and bill them accordingly. Last year during our annual check of the meter, we found it was reading high. We want to be accurate and keep the folks at United happy, so we set out to repair or replace it. Easier said than done."

The manufacturer of the meter had ceased to make meters for any pipe over 10 inches in diameter. The pipe Aquarion used to supply United is 14 inches.

"And we couldn't find replacement parts, either," Schultz says. "We tried other reputable manufacturers, but the story was the same — all had ceased to make meters for larger-diameter pipe. So it was clear that we would have to find another solution."

Schultz eliminated most metering options because they intruded into



An extended status display connected to the FLEXIM ultrasonic flowmeter helps the user judge the measuring situation and the current accuracy directly during the measurement.

the water flow and/or because they didn't accurately measure low flow.

"A key consideration for intrusive meters like venturis is that we have very little headloss available," Schultz says. "It's only about 45 psi at the transfer site. I don't want any headloss at all. I also wanted to be sure we could measure lower flows accurately. Venturis and other technologies weren't considered because they were very costly to install, they require a lot of maintenance and they are not as precise at low flows as we wanted. So we were looking at nonintrusive meters and that narrowed the field to full-bore



mag and ultrasonic meters.”

### Mag meter problems

There were three problems with the full-bore mag meter. First, most manufacturers don't recommend their meters for pipes over 12 inches in diameter because the meters for larger pipes require a crane and a crew of installers, and that means added expense. Second, it does not read flow rates below 0.3 feet per second. The ultrasonic Schultz was looking at could read flow rates as low as 0.03 feet per second. But the third problem sealed the deal for ultrasonic.

“There was no standard from the American Water Works Association [AWWA] for full-bore mag meters and there was one for ultrasonic,”

Schultz says. “We definitely wanted to go with AWWA standards.

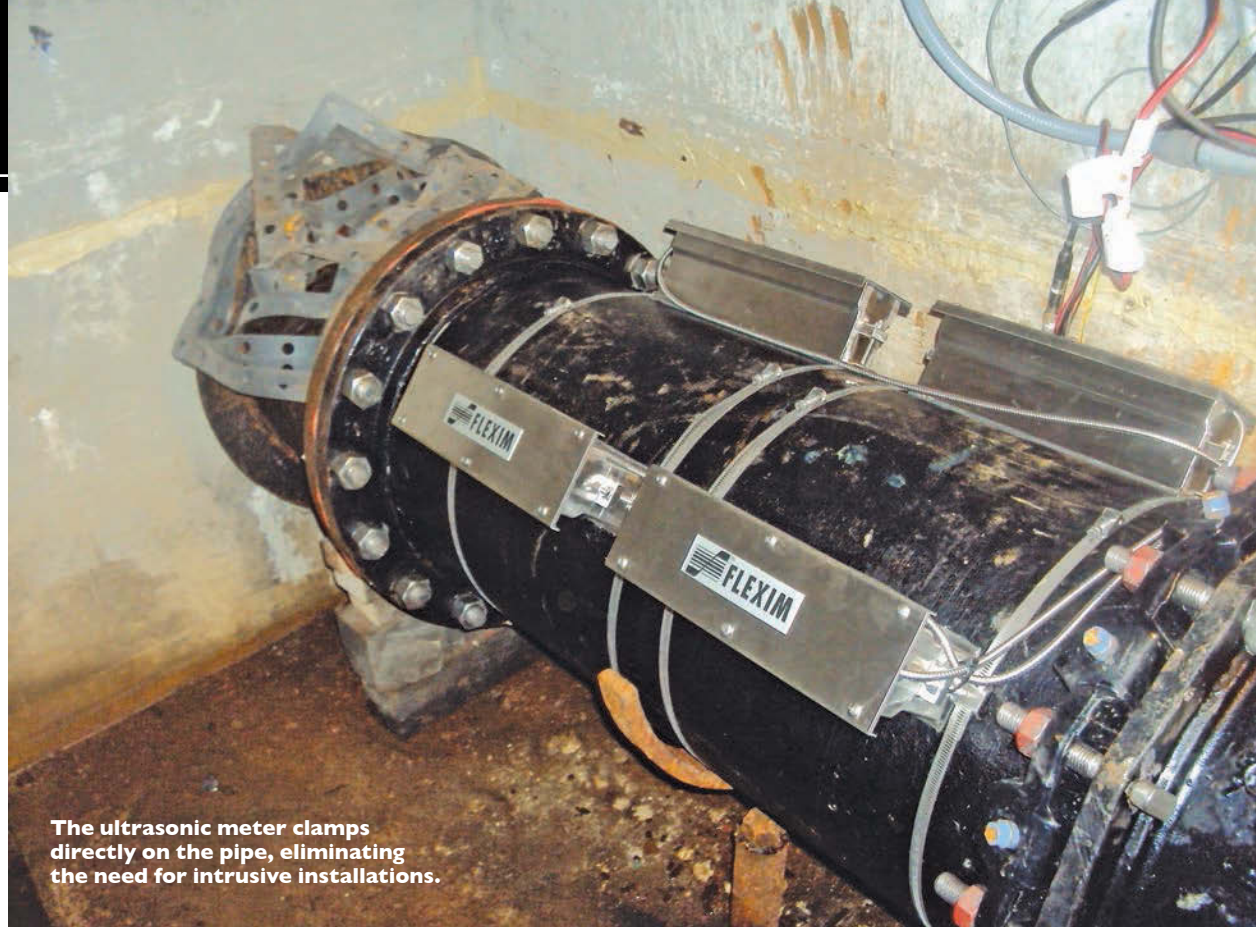
“The ultrasonic I decided to go with was from FLEXIM AMERICAS. I have a good deal of experience with ultrasonic flowmeters. Most aren't robust enough for my applications. I put these things in pits and they have to be able to stand up to their environment.”

The FLEXIM meter adheres to AWWA 750-10, notes Lin Abraham, the FLEXIM field service engineer who performed the installation for Aquarion. “We also meet the American Society of Mechanical Engineers standard ASME MFC 5M that governs the use of ultrasonic flowmeters in closed conduits and provides a National Institute of Standards and Technology traceable certificate of the calibration of the meter's transducers. We're the only ultrasonic flowmeter manufacturer who can say that.”

### How ultrasonic metering works

“One of the major benefits of ultrasonic flowmeters is that, unlike traditional meters, they contain no moving parts and do not need frequent calibration and maintenance,” explains John Van Nostrand, FLEXIM AMERICA's southern regional manager. “Measurements are made using the transit time difference method. It exploits the fact that the transmission speed of an ultrasonic signal depends on the flow velocity of the carrier medium. An ultrasonic signal moves slower against the flow direction of the medium and faster when it is in the flow direction.

“For the measurement, two ultrasonic pulses are sent through the medium, one in the flow direction and the second against it. The meter's transducers work alternately as transmitter and receiver. The transit time of the signal sent in the flow direction is shorter than that of the signal sent against the flow. The meter measures the transit time difference and calculates the average flow velocity. Since the ultrasound signals propagate in



**The ultrasonic meter clamps directly on the pipe, eliminating the need for intrusive installations.**

**“Last year during our annual check of the meter, we found it was reading high. We want to be accurate and keep the folks at United happy, so we set out to repair or replace it. Easier said than done.”**

— John Schultz

solids, the meter can be mounted directly onto the exterior of the pipe non-invasively. And the transducer paste problem was solved by FLEXIM engineers who developed solid mounting pads that don't need replacing and conform to the shape of the pipe.

“The amount of straight run that is usually required to obtain best accuracy is 10 to 5 upstream/downstream diameters,” Van Nostrand says. “So a 10-inch pipe needs 150 inches or 12.5 feet of straight pipe. We find that we can squeeze this down to 5 diameters upstream and still maintain the meter accuracy with multi-beam meters.”

Aquarion installed an ADM 7407 Dual Beam volume flowmeter. It simply clamps onto the exterior of the pipe. The meter was installed with the K Transducer, which is often used in water and wastewater utility applications. The K Transducer is low frequency and delivers a strong signal through ductile iron. The FLEXIM meter can measure low-velocity flow rates as low as 0.03 feet per second, which is 10 times lower than the electromagnetic flowmeter.

“It is nonintrusive and does not require cleaning or maintenance,” Schultz says. “It does not come into contact with the water, so it has no wear and tear. Unlike other ultrasonic flowmeters, FLEXIM uses a patented permanent coupling pad, so there is no need to take the sensors off the pipe to reapply ultrasonic couplant. With the old turbine meters no longer available, the industry is looking for alternatives. I believe I have found one that is much better than what we were used to.” ♦

### About the Author

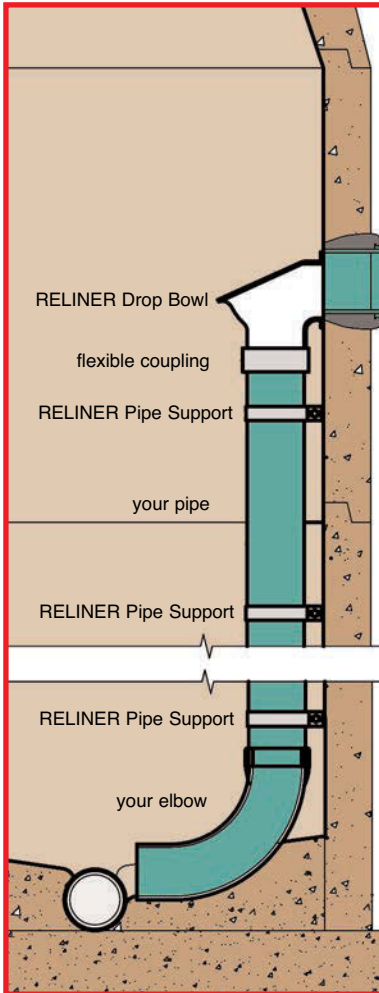
Jack Sine is a freelance writer specializing in environmental issues and the chemical, power and HVACR industries.



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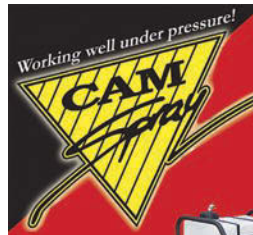
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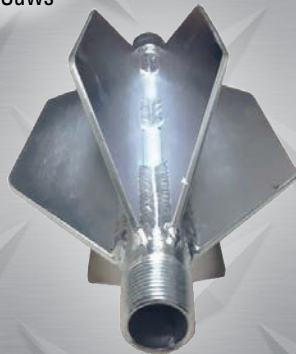
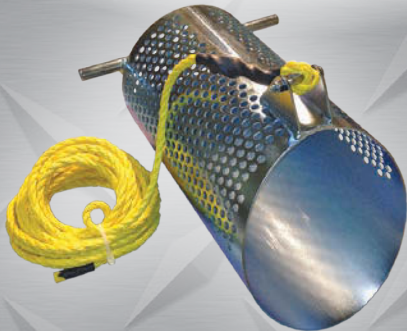
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# SEWER HISTORY ON DISPLAY

Exhibit fosters deeper interest and understanding of the industry and NASSCO's mission

By *Ted DeBoda, P.E.*

For nearly 20 years, Jon C. Schadweiler, the historian of the Arizona Water Association, has researched and collected materials related to the history of sewage conveyance systems. As part of NASSCO's objective to educate and inform, we have recently taken ownership of this impressive exhibit and are excited to share this wealth of information with the trenchless industry.

NASSCO became involved with the Sewer History Exhibit in 2003 when it became part of the RehabZone Exhibit, a no-sell, educational area at UCT. Since then it has been an integral part of the RehabZone and continues to receive rave reviews from attendees.

Our hope in exposing as much of the trenchless industry as possible to the Sewer History Exhibit is to foster deep interest and growing understanding in the work we do. The exhibit covers the era from approximately 3500 B.C. to the 1930s, and some of the artifacts on display are very primitive.

NASSCO's mission to ensure the continued acceptance and growth of trenchless technologies is supported by the Sewer History Exhibit as it builds awareness and pride in how far our technology has advanced over the years. We need to understand and honor our history to know where we are going in the future. The exhibit arouses curiosity and constantly draws crowds from all sectors of the water and sewer industry. Even some seasoned professionals in this industry are not aware of the early materials and methods

used to evaluate, repair and rehabilitate underground pipes, some of which are still in service today.

In February, NASSCO partnered with COLE Publishing to bring the exhibit to the 2015 WWETT Show in Indianapolis, where nearly 10,000 attendees had the opportunity to view this impressive collection of artifacts. In May, NASSCO's Sewer History Exhibit will be on display at the New Jersey Water Environment Association's Centennial Anniversary, scheduled for May 11-15 at Bally's in Atlantic City, New Jersey. The exhibit will complement the association's celebration of training and education while honoring the wastewater profession.

We are just now beginning to identify other appropriate venues for the Sewer History Exhibit. An exhibit of this size requires a significant investment in terms of appropriate storage, transport, setup and takedown. We are looking to NASSCO members to provide annual sponsorships to support sending the exhibit to various events throughout the year to maximize its educational benefit to the industry. Without you, this would not be possible. We hope to continually add to the library of intellectual properties and welcome contributions of information and materials. We also hope to update the way in which it is presented to make it more user-friendly and interactive.

To learn more about bringing NASSCO's Sewer History Exhibit to your event, please email [info@nassco.org](mailto:info@nassco.org) or call 410/442-7473. ♦

NASSCO (National Association of Sewer Service Companies) is located at 2470 Longstone Lane, Suite M, Marriottsville, MD 21104; 410/442-7473; [www.nassco.org](http://www.nassco.org)

**Even some seasoned professionals in this industry are not aware of the early materials and methods used to evaluate, repair and rehabilitate underground pipes, some of which are still in service today.**

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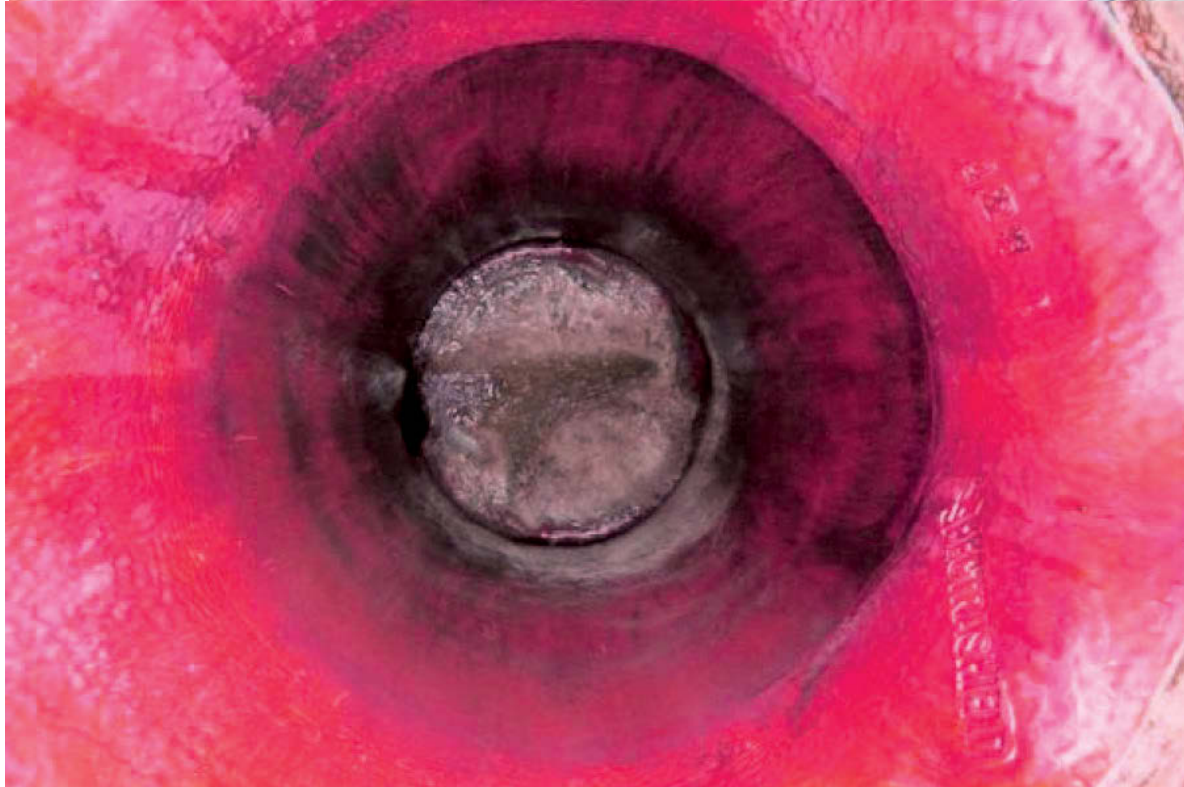




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The upgraded lines in the St. Cloud Department of Public Utilities' main office aeration tunnel, completed in the spring of 2014, can handle 17.9 million gallons of wastewater per day. (Photography by Brad Stauffer)



# SLIPLINING AWAY

St. Cloud significantly reduces I&I over the course of a five-year rehabilitation program utilizing sliplining and CIPP

By Dan Heim

The City of St. Cloud Department of Public Utilities got a wakeup call seven years ago.

"It all started with a very bad day back in 2008," recalls Patrick Shea, director of Public Services. "We had a 6-foot main, installed in 1987, that totally collapsed. So we decided it might be a good idea to take a look at the rest of our pipes."

Two other major interceptors had also collapsed in 2002 and 2006, but those failures involved old brick manholes that were already overdue for rehab. It was the collapse of the 21-year-old concrete main that really scared utility officials.

Most of the failures were due to excess retention times over their wide-spread system, especially at locations where steep drops created turbulence. Those conditions are conducive to growth of bacteria that lead to the production of sulfuric acid, which corrodes concrete pipes and manholes.

The Department of Public Utilities immediately launched an extensive inspection program. Utilizing outside contractors, they televised the entire system, feeding data and images into their GIS database. What they found was not good news. Much of their reinforced con-

**"The choice of sliplining was based primarily on traffic and depth. Some of those pipes ran under buildings at depths down to 25 feet. With the requirement for bypasses when doing CIPP, sliplining was just more cost-effective."**

– Tim Hewett

crete pipe was showing significant signs of corrosion.

## Phase IV details

Phase I was started in 2009, Phase II and III in 2010. This work used standard CIPP to rehabilitate the more accessible lines. Phase IV, started in 2011 and completed in 2014, used sliplining instead of CIPP.

Those Phase IV pipes were the deepest, running under roads and buildings. Trenching would have caused significant disruptions.

"The choice of sliplining was based primarily on traffic and depth," says infrastructure services supervisor Tim Hewett. "Some of those pipes ran under buildings at depths down to 25 feet. With the requirement for

(continued)



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“We’ve been working seriously on our I&I for close to 15 years, and the one thing we’ve really learned is the importance of inspection. And that’s not just the pipes — that includes the work done by contractors.”

— Tim Hewett



Above: Public Services Director Patrick Shea electronically monitors the St. Cloud Wastewater Treatment Facility’s operations from its control room. Left: Industrial electronics technician Jacob Ethen examines the treatment plant’s central processing panel in the aeration system motor control operations room.

bypasses when doing CIPP, sliplining was just more cost-effective.”

Necessarily, sliplining reduces the cross-section available for flow, but with the pipe they used, capacity was actually increased. Flow had been around 1.2 to 1.7 fps, not quite fast enough to keep the solids moving all the time. The resultant high retention times increased the risk of corrosion. With the new pipe, flow rates are closer to the optimal 2.0 to 3.0 fps. That increase in capacity may seem counterintuitive, until you consider the fluid mechanics involved.

### Special pipe

SCDPU chose a slip pipe made by HOBAS Pipe USA. That pipe is centrifugally cast, fiberglass reinforced, polymer mortar. The prod-

uct is strong and light with uniform surfaces and high stiffness. It’s also inherently corrosion-resistant, with a design service life of up to 100 years or more. Wall thickness is only about 3/4 inches. But it was the extreme smoothness of the inside surface that caused the increase in capacity.

Smoothness of pipe interiors is measured by a number known as the Manning’s coefficient. It’s applicable to nonpressurized gravity-flow pipes and is a way to model the friction experienced by flowing fluids. Lower numbers are smoother, meaning less friction and faster flow. The HOBAS pipe comes in at 0.009, which is comparable to smooth brass.

By comparison, new concrete pipes rate around 0.011, but with significant corrosion can run as high as 0.020. Brick can go as high as 0.025.

“When we had good weather conditions we were able to push that

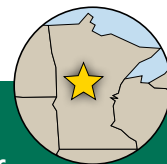
pipe pretty quickly,” says Tracy Hodel, assistant director of Public Utilities. “Once, when we were on a roll, we pushed 25,000 feet in a single day. You don’t have all that wait time like with CIPP.”

Slip-pipe insertion was accomplished by a special machine, one of only two in the country: the Ackerman Hydraulic Pushing Machine. It was leased by their contractor for the job and has the capacity for long pushes, far exceeding that of a typical backhoe.

### On other fronts

The pipe rehab involved during Phase I through IV kept SCDPU busy for close to six years. The majority of that work was contracted out, but there’s always something else that needs tending. In St. Cloud, a lot of that work comes from old infrastructure.

(continued)



### PROFILE:

The City of St. Cloud (Minn.) – Department of Public Utilities

#### SERVICE AREA:

90 square miles

#### CUSTOMERS:

24,000 residential, 3,800 commercial

#### POPULATION DENSITY:

1,643 per square mile

#### INFRASTRUCTURE:

Distribution: 300.24 miles of 6- to 30-inch mains, most ductile iron; 4,577 main-line control valves; 3,257 hydrants (2,669 with gate valves) SEWER: 290.43 miles of 10- to 72-inch mains, most old concrete sliplined with CCFRPM; 8.2 miles of up to 72-inch force mains feeding lift stations; dual force main using 30- and 42-inch pipes with CIP lining; 5,621 man-holes; 34 lift stations

#### EQUIPMENT:

3 International semi-tractors, 5,500-gallon trailers (Tilton, Nova, Engle), Caterpillar loader, Houle pump (GEA Farm Technologies) on a Caterpillar frame, 2 Case International Quad Tracs, 2 Nuhn 6,500-gallon biosolids applicators, 2 John Deere tractors, fleet of 8 assorted utility vehicles

#### ANNUAL BUDGET:

\$10.8 million sewer, \$22 million department total

#### EMPLOYEES:

52

#### AVERAGE RAINFALL:

28 inches per year

#### SOIL TYPE:

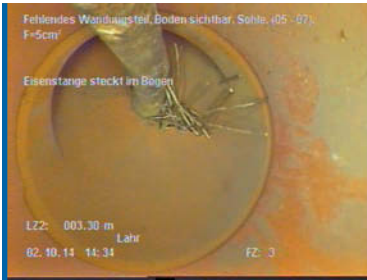
Noncorrosive sedimentary, highly variable water table, 90- to 110-foot elevation change over service area

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**Above: The St. Cloud Public Services leadership team includes (from left) David Mendel, water treatment services manager; David Wire, wastewater services manager; Tim Hewett, infrastructure services supervisor; Patrick Shea, public services director; Lisa Vollbrecht, assistant utilities director; Tracy Hodel, assistant public utilities director; Chris Plautz, wastewater services supervisor; and Shane Lund, utilities water quality coordinator.**

Inflow and infiltration was mainly from bad pipes, less so from manholes. But with 5,621 manholes in the system, the older ones made of brick, I&I and corrosion issues had to be addressed.

“We used spin-cast mortar to add strength to those old manholes,” Hewett says. “Then we applied an epoxy topcoat for corrosion resistance. That needs to be done on a

properly prepared surface, to the right number of mils, or you won’t get a good seal against I&I. So there was a fair amount of prep involved.”

Freeze depth in winter shuts down all but necessary pipe work. By late winter, freeze depth averages 6 feet. Winter 2013 brought a 9-foot freeze depth. When you do have to trench in frozen ground, it involves an up-charge by the contractor.



Freezing causes more urgent issues on the delivery side, with frozen and burst service lines and the occasional shallow main.

SCDPU’s 34 lift stations are hold-

ing up well. About half of them were installed between 1998 and present. A few have needed upgrades and a few more are in the queue for work, but they haven’t caused nearly as

## THE ST. CLOUD WASTEWATER TREATMENT FACILITY

Before 1956, sewage from the City of St. Cloud was not treated. All wastewater from homes and businesses was discharged directly to the Mississippi River. Combined systems were common at that time for most communities along the Mississippi.

“That’s the year we first split our system,” notes Patrick Shea, director of Public Services. “We built our first treatment plant back then, right near the river, but that plant was retired when we built our new facility.”

The St. Cloud Wastewater Treatment Facility was put into service in 1976. St. Cloud owns and operates the facility, but treatment costs are shared by adjacent cities including St. Augusta, St. Joseph, Sartell, Sauk Rapids and Waite Park, who lease capacity on the interceptors. The facility is designed to treat a maximum load of 17.9 mgd, but typically sees only around 10.5 mgd, the average load generated by a population of over 120,000 people.

The WWTF is located in south St. Cloud. Its load includes 24,000 residential and 3,800 commercial customers. It’s rated as an advanced wastewater treatment plant based on several integral components and

processes, including:

- Initial bar screening and grit removal filters
- Split processing streams for sludge and liquids
- Thickening and digesting of sludge, with biosolids analysis
- Land application of biosolids after inspection and holding
- UV treatment of liquids before discharge into the river

The facility’s biosolids process won EMS awards in 2013 and 2014. Raw sludge moves to a gravity belt thickener, then to anaerobic digesters where it’s heated and held for 15 days. After that, it goes to storage for lab analysis. If it passes those tests, it’s held for further dehydration and eventual land application.

There’s not much call for this product when the ground is frozen, so the WWTF has enough on-site storage capacity to hold that output until it can be used in the field. The biosolid waste is rich in phosphates and nitrates and makes an excellent fertilizer.

Commercial facilities that could contribute wastes requiring tertiary treatment are required to apply for a “significant industrial user” permit. “We have 26 permits in place at present,” says infrastructure services supervisor Tim Hewett. “All maintain excellent compliance to EPA pretreatment standards. Those 26 customers contribute only about 5 percent of our loading but have a proportionally greater potential for significant problems.”





Public utilities service operator Joe Kachtinske attaches a vacuum tube to the boom of an Aquatech jet/vac truck while Keith Ruprecht stands at the truck's control panel.

says. "And that's not just the pipes — that includes the work done by contractors. There've been a couple of instances where we went in after the job, found faulty work and needed the contractors to do it over again."

The utility now brings in NASSCO certified inspectors to vet all the outside work, especially with manhole rehabilitations. In a few cases, SCDPU has had to bring the contractor back mul-

multiple times to make it right. Investing in good inspections just makes sense, Hewett notes.

"Good inspections are important, and that's also true for our preventive maintenance program," Hewett says. "We like to stay on top of our system and anticipate future problems. We look 10, 15, 30 years ahead to be sure we're ready." ♦

many problems as the RCP. "Overall, the pumps and other components have really held up," Hewett says. "Many have already exceeded their expected lifetimes and are still within specs. You can thank maintenance for that."

### Lessons learned

SCDPU's most recent effort focused on completion of their three-year Phase IV sliplining project, but they've had other work with unique challenges. Over the years, there's been some major experience gained and some lessons learned.

"We've been working seriously on our I&I for close to 15 years, and the one thing we've really learned is the importance of inspection," Hewett

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# MANHOLE EQUIPMENT AND REHABILITATION

By Craig Mandli

The rehabilitation rather than replacement of leaky manholes can save municipalities time and money. These application tools, grouts, coatings, epoxies, sealants and components can help aid rehabilitation projects.

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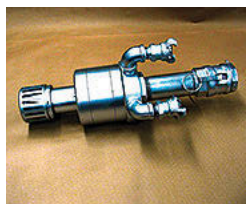
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800/356-9023; www.parsonenvironmental.com.



### RFI Construction Products Model 360

The **Model 360** hand-held, high-speed, air-powered spinning nozzle from **RFI Construction Products** is used to apply fine-grain mortars, grouts and epoxies to circular surfaces. It has the capacity to line 4- to 96-inch-diameter pipe, manholes, storage

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## COATINGS

### Rhino Linings Rhino Extreme



**Rhino Extreme** from **Rhino Linings** is based on polyurea chemistry so it can be applied in less-than-ideal conditions, including damp, low-temperature or high-humidity environments. It provides waterproofing, abrasion, impact, chemical and corrosion resistance. It can be applied up to an unlimited thickness and cures quickly. It is available in 2-1 or 1-1 ratio formulation, and also includes two Class I fire-rated formulas, 11-50 FR and 11-70 FR, and one formula for application over geotextiles, 11-50 GT. It should be applied by a trained applicator using high-pressure, plural spray equipment. **800/422-2603; www.rhinoliningsindustrial.com.**



## EPOXIES

### Epoxytec Mortartec Ceramico



**Mortartec Ceramico** epoxy-modified mortar from **Epoxytec** blends epoxy technology with hardened ceramics and fibers to produce a smooth mortar application with a hard-sealed surface once cured. This chemical-resistant mortar rids outgassing up to 95 percent, allows for same-day recoat and epoxy topcoat three hours after applied, has high epoxy-assisted adhesion, and no need for further preparation after cure. It has ultra-thin film capability as low as 1/16 inch safely, up to 1 inch per pass. **877/463-7699; www.epoxytec.com.**

### Infrastructure Repair Systems Infragard



**Infragard** concrete and manhole rehabilitation products from **Infrastructure Repair Systems** come in two trowel-on applications. **ChimCoat** is a flexible two-part epoxy coating formulated to expand and contract with acute temperature changes, ideal for the chimney portion of manholes or any concrete surface. **Top Coat** is a two-part epoxy coating designed for strength and bonding for patching and repairing concrete structures or manholes below the freeze/thaw-line. Both will seal and stop infiltration or exfiltration with bonding strength and chemical resistance, and can be applied to damp or dry surfaces. They are easy to use; just mix and trowel, as no heavy equipment is needed. **877/327-4216; www.irs.net.**

### International Paint Enviroline 222



**Enviroline 222** 100 percent solid hybrid epoxy novolac from **International Paint** can be trowel or spray applied on precast concrete or brick structures from 20 to 100 mils DFT in a single coat application onto dry or damp vertical and overhead concrete surfaces. It demonstrates excellent adhesion, strength and durability and is chemically resistant to acids, alkalis, hydrogen sulfide and other corrosive products. It meets all state VOC regulations and is safe to use. Application of a penetrating epoxy primer/sealer is often recommended to improve adhesion to brick and concrete surfaces. It cures in eight hours at 77 degrees F, creating a monolithic, easy-to-clean, ceramic-like finish that speeds flow of sewage through the pipe. **440/234-2900; www.international-pc.com/northamerica.**

### Quadex Composite System



The **Composite System** of a 1- to 3-inch structural cementitious underlayment followed by an epoxy topcoat from **Quadex** protects and renews deteriorated manholes and larger structures in corrosive environments. Certified applicators apply Portland, calcium aluminate or geopolymer cements to restore structural integrity and permanently stop infiltration and corrosion. In severe corrosion environments, **Structure Guard** 100 percent solids epoxy is applied to new structures or as a topcoat to cementitious underlayments on rehabilitation projects. Interfit lateral connection seal for lined mains prevents infiltration and root intrusion at the most critical connection and first joint of the lateral. **870/688-7100; www.quadexonline.com.**

### Sherwin-Williams Dura-Plate 6100

**Dura-Plate 6100** high-build, high-physical-strength epoxy lining for man-



holes and other severe wastewater and sewer collection applications from **Sherwin-Williams** is suitable for use on ductile iron pipe, steel and concrete substrates. It offers a dry time of 30 minutes to touch and return to total immersion service in 12 hours. This speed decreases the potential pinholes in the applied film due to outgassing, ensuring monolithic film coverage to increase service life. It is applied using plural component equipment. **800/524-5979; www.sherwin-williams.com.**

## LIDS

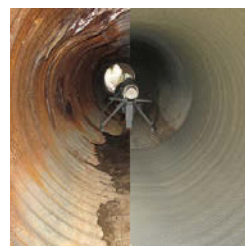
### McGard FiberShield



The **FiberShield** locking manhole cover from **McGard** is constructed of a durable, fiber-reinforced polymer material with multiple security points, making it lightweight and easy to handle and transport. It eliminates the lifting and dropping injuries caused by heavy, cast iron manhole covers. Weighing 80 percent less than cast iron, it exceeds an H-20 traffic rating. It is installed in seconds and removed without bending over. It requires a McGard key to operate and has no scrap value. **888/888-9192; www.manholelocks.com.**

## MANHOLE LINERS

### AP/M PERMAFORM CentriPipe



**CentriPipe** centrifugally cast concrete pipe lining from **AP/M PERMAFORM** provides trenchless, structural spin-cast lining of culverts using PL-8000 specialty mortar. This process provides waterproofing, sealing, structural reinforcement and corrosion protection. It maximizes the pipe interior for capacity and flows while providing a fully structural pipe within a pipe. **800/662-6465; www.centripipe.com.**

### Perma-Liner Industries CIPMH



The **Perma-Liner** trenchless **CIPMH** (cured-in-place manhole liner) one-size liner provides all the benefits of CIPP. It is simple to install and completely renews a manhole in a couple of hours. It requires no digging, resulting in minimal disruption to the public. It is made to fit all manholes, including barrel sections, eccentric and concentric cones constructed of brick and mortar, precast or block. The liner for chimney or full-depth manholes eliminates infiltration and inflow through manhole walls. This universal-sized liner is engineered to resist freeze-thaw cycles and create a watertight, corrosion-resistant structural lining. **866/336-2568; www.perma-liner.com.**

### Raven Lining Systems Raven 760



**Raven 760** high-performance polymer concrete (HPPC) from **Raven Lining Systems** is designed as a stand-alone resurfacing product used to repair voids, spalls or exposed aggregate up to 1/4-inch thick per application. The self-priming product may be used as an underlayment to reduce out-gassing for applications of various topcoats. It can be efficiently sprayed or troweled to reha-

(continued)



bilitate substrates, providing a suitable surface for the application of a polymer topcoat. It is supplied in a self-contained, premeasured easy-to-use kit and can be topcoated three hours after application (at 72 degrees F) with an extended 14-day recoat window. **800/324-2810; www.ravenlining.com.**

## MANHOLE PARTS AND COMPONENTS

### Cherne Industries Clean-Out Gripper Plugs



**Clean-Out Gripper Plugs** from **Cherne Industries** seal damaged threads. The plugs are made with glass-reinforced ABS plastic and include a natural rubber threaded O-ring for a positive seal. NPT sizes are available, including hard-to-find 3 1/2-inch. **800/843-7584; www.cherneind.com.**

### Containment Solutions fiberglass manholes



Noncorrosive fiberglass manholes, wet wells and rehabilitation manholes from **Containment Solutions** are built watertight. They are designed as single structural units and are able to withstand H-20 traffic loads. Products are available for all types of water, wastewater and green building applications. **877/274-8265; www.containmentsolutions.com.**

### Infratech Infrastructure Technologies MONOFORM



**MONOFORM** from **Infratech Infrastructure Technologies** is an ABS interior manhole-forming system that allows the pouring of new concrete walls and bases for complete rehabilitation of existing manhole structures. The new structure is designed to exceed H-20 traffic-loading requirements. Restoration is completed without traffic detours, external sewage bypassing or disruption to adjacent utilities. Custom forms are available for larger structures, such as lift station rehab or retrofit. The company offers rehabilitation as a service with its own crews or can provide the forming system to be used by others. On-site training is available. **763/428-6488; www.infratechonline.com.**

### Lansas Products SMART-BOX



The **SMART-BOX Complete Manhole Vacuum Test Kit** from **Lansas Products** includes a 38-inch flat plate manhole vacuum test head that works on openings from 14 to 34 inches, a SUPER-VAC venturi vacuum generator, two 8-by 12-inch multisize back plugs, and two 20-foot standard inflation kits with gauge assembly, all in a durable, lockable black plastic storage case. It provides everything needed to perform simple vacuum testing on manholes to find leaks, except an air compressor that generates at least 80 cfm. **800/452-4902; www.lansas.com.**

### MK Diamond Parabola Saw



The **Parabola Saw** from **MK Diamond** reduces the cutting time to less than seven minutes by using a spherical cutting blade that prevents misalignment and improves cutting speed. The spherical shape also reduces vibration during cutting and prevents loss of tension when cutting tight circles.

With its circular cutting ability, cross cutting is eliminated. The spherical shape makes for simple removal of the cut area. The spherical cutting blade and adjustable arms allow the cutter to be set to cut 47- or 59-inch diameters up to 6 inches deep. These blades have super-hard inserts at fixed inter-

vals into peripheral that prevent undercutting and blade deterioration. A 5-gallon water canister eliminates the need for a continuous water source. In addition to manhole leveling, the saw can be used for traffic loop and decorative concrete scoring. It easily transitions between circular and straight-line cutting. **800/421-5830; www.mkdiamond.com.**

### NozzTeq Manhole Cleaner Series



The **Manhole Cleaner Series** from **NozzTeq** combines a cleaning nozzle with a safety cage that encloses a nozzle-tipped spinning propeller that scours manhole chimneys with jetting power of up to 5,000 psi. The safety cage serves two functions: It positions the spinning nozzles a few inches away from the manhole interior for maximum cleaning effectiveness, and keeps the spinning arms and nozzles away from debris and hard concrete walls. The cage and propeller are both made of durable, maintenance-free stainless steel. Just lower the unit into the manhole and withdraw. The unit comes in seven sizes. **866/620-5915; www.nozzteq.com.**

### RELINER/Duran Manhole Channel Repair System



The **Manhole Channel Repair System** from **RELINER/Duran** is a molded fiberglass flume combined with a PVX pipe section used to rehabilitate inverts without flow interruption. The field-installed modular components bolt together with minimal tools, are adaptable to a wide range of field conditions and manhole sizes, and are compatible with all current field manhole-lining systems. The full-depth-lined channels are high flow and easy to clean and maintain. Standard 8- and 12-inch-deep channel sections fit through a 24-inch manhole frame and will accommodate 6- through 12-inch pipes. Larger sizes are available. They can be used in new construction. **800/508-6001; www.reliner.com.**

### USB – Sewer Equipment Corporation Alphajet



The **Alphajet** cleaning nozzle from **USB – Sewer Equipment Corporation** cleans grease, sludge and crusts from lift stations and manholes prior to rehabilitations. It is actuated by water coming from the pressurized hose of the jetter truck. Four driving nozzles cause 360-degree controlled rotation in a horizontal plane, eliminating the need to cover the manhole. The horizontal rotation only allows for observation of the cleaning progress. The body requires no lubrication or replacement of internal mechanical parts within the first 12 months of operation. Driving nozzles can be extended to accommodate various sizes of manholes/lift stations. **866/408-2814 www.usbsec.com.**

## SEALANTS

### Sealing Systems Flex-Seal Utility Sealant



**Flex-Seal Utility Sealant** from **Sealing Systems** is a plural component aromatic urethane with 800 percent elongation and a tensile strength of 3,200 psi. It is designed to prevent inflow/infiltration and provide corrosion protection at the grade adjustment ring section or joint section. It will pass a vacuum test according to ASTM standards. The internal seal is manually applied using



a paintbrush, and the kit is designed to cover 12 vertical inches on a 27-inch-diameter manhole. **800/478-2054; www.ssisealingsystems.com.**

## SAFETY EQUIPMENT

### H2 Technical Rescue Equipment MPR100



The **MPR100** manhole protection ring from **H2 Technical Rescue Equipment** protects lines from the rough edges of manholes by simply dropping it into the manhole prior to any equipment. It is produced in a highly visible safety orange to help identify the site and the open manhole, reducing potential hazards. It provides a full 360-degree area of edge protection. **517/204-2121; www.h2tr.com.**

### LIFTPLAQ



The **LIFTPLAQ** tool allows telecom manhole covers and road stoppers to be removed in a safe manner. The mechanical assembly is fitted with a powerful magnet, connecting firmly to covers and road plates. It is ideal for personnel working on dry and wet networks and can be fitted with extensions to suit large manhole covers. The ergonomic design allows workers to lift covers with their backs straight and knees bent. There is no contact between the operator's hands and the cover. The unit is easy to move and requires minimal storage space. **786/486-3197; www.liftplaq.us.**

### LockDown-XP



The **LockDown-XP** manhole safety and security system prevents unauthorized entry to underground vaults and infrastructure while protecting against accidental falls into manholes. Constructed from 12-gauge stainless steel, the device provides a barrier under a standard manhole cover that will stay in place if stood upon by a pedestrian or driven over by a vehicle. It is locked in place via a combination of a steel ledger bar fastened underneath the device via a stainless steel, threaded rod and locked above with a stainless steel puck lock that comes standard with a Van Lock removable core lock. Its flat face with hardened steel deters drills, dent-pullers and picking devices while the key helps prevent unauthorized duplication. **678/750-4872; www.lockdowninc.com.**

### Logiball Model D Sewer Plugs



Multisize **Model D** sewer plugs from **Logiball** enable flows to be controlled, creating a dry environment for manhole rehabilitation projects. Plugs are available with flow-through capabilities for demanding situations. The plugs are commonly used in flow-diversion applications and reduce the cost of the jobs in many cases, as bypass pumping can be avoided. **800/246-5988; www.logiball.com.**

### Milwaukee Rubber Products Gas Alert Micro Clip



The **Gas Alert Micro Clip** from **Milwaukee Rubber Products** provides protection from atmospheric gas hazards. It offers visual compliance at a glance with the flashing green IntelliFlash. Easy one-button operation reduces training time and lets workers focus on the job at hand. For simple, cost-effective management of records, calibration and bump testing, it is compatible with the MicroDock II automatic test and calibration system and

Fleet Manager II software. Its continuous LCD shows real-time gas concentrations while its compact and lightweight design makes it comfortable to wear. It is water-resistant with a built-in concussion-proof boot and multi-language support. It is powered by a rechargeable lithium polymer battery. **800/325-3730; www.milwaukeeerubber.com.**

### Rock Mills Enterprises The Lifter



The **Lifter** from **Rock Mills Enterprises** safely and efficiently removes manhole covers and drainage grates with the push of a button. It mounts into a standard 2-inch trailer hitch receiver and is powered by the vehicle battery. A roadway camera and dash-mounted monitor positions it directly over the cover, which can be removed via remote control. With an optional swing arm, the cover can be swung away from the opening and replaced after work is completed without moving the vehicle. **712/451-6550; www.rockmillsent.com.**

### RS Technical Services Investigator



The self-contained, portable **Investigator** inspection camera from **RS Technical Services** is powered by a 12-volt rechargeable battery for inspection of vertical assets such as manholes, access shafts, conduits and similar structures 4 inches and larger in diameter up to a depth of 21 feet. The unit is fully submersible to a depth of 5 feet and has a 10X optical and 4X digital zoom. The camera has dual high-intensity white LED lights and a digital video recorder. Mainline system video interface and data capture capability are available. **800/767-1974; www.rstechserv.com.**

### Southland Tool Saf-T-Guide Roller



The **Saf-T-Guide Roller** from **Southland Tool** keeps contaminated sewer water from splashing up from the manhole. It is made of aluminum and incorporates clear, removable Lexan side plates that protect the operator from spray and mist. The plates are 3/8-inch thick with rubber trim around the edge that won't come off. The center roller is made of durable nylon. The end lift plate allows the operator to insert hose with any size nozzle. Units are available for 24- or 36-inch manholes. **714/632-8198; www.southlandtool.com.**

### Whirlygig System



The **Whirlygig** riser/collar installation system is size accurate and enables risers and collars to be installed in minutes. Simply place a form on the manhole cone, trim the form to grade with a radial arm trimmer, place the manhole ring, check accuracy and pour redi-mix. Cast-in-place on site, the system streamlines installation into a process that works every time and produces a sturdy installation. **800/307-4263; www.wgig.us.** ♦

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Flexible connectors provide watertight seal on stormwater system

**Problem:**

A July 2009 stormwater project on Delaware Creek in Toledo, Ohio, required a watertight seal between the pipe and concrete manhole.

**Solution:**

**A-LOK PREMIUM** flexible pipe-to-manhole connectors were chosen to speed up the installation. The 42-inch RCP from Independent Concrete Pipe had a large OD of 51.25 inches. Fortunately the connectors can be used with pipe ranging in size from 12 to 90 inches in diameter.

**RESULT:**

The extra flexibility of the liquid-filled connector made the installation of the pipe by contractor E.F.Zeiler simple and quick, requiring minimum force. **800/822-2565; www.a-lok.com.**



Rubber manhole risers remedy adjustment issues

**Problem:**

In spring 2003, pavement conditions on Seneca and Green streets in Ithaca, New York, were deteriorating rapidly from 9,000 vehicles passing daily, requiring constant pothole attention. The work was not in the local NYSDOT Residencies yearly plan, and state funding was not available. An agreement was made to mill out the worst areas of pavement, repair base sections and pave the travel lanes. However, many utility covers would be significantly lower than the new street surface following the pavement overlay.

**Solution:**

The city used recycled rubber **Top Hat** utility cover risers from **Abart Industries**. A two-man crew mechanically fastened 28 Top Hat manhole risers to the utility covers just prior to paving of the streets.

**RESULT:**

The DPW has received many compliments on the now smooth pavement and ride transition over the installed Top Hat utility cover risers. **315/730-2588; www.tophatrisers.com.**



Risers help bring more than 300 manholes up to grade

**Problem:**

State Highway 183, from Eules to Dallas/Fort Worth, Texas, underwent a major reconstruction in 2014 totaling \$1.6 billion. An unexpected grade change was required to correct drainage issues. "It was a surprise — the road was raised up to 4 inches after utility manholes had been installed," says Jonathan White, operations manager at Cheyenne Construction, a concrete subcontractor for the project. That meant that 300 to 400 manholes needed to be uncovered and raised to grade.

**Solution:**

Cheyenne Construction found a manhole raising solution that cut costs and time, and proved to be durable and more than acceptable to lead contractor Bluebonnet Contractors and the Texas Department of Transportation. "Manhole risers from **American Highway Products** almost right away appeared to be the right method for us," White says. "We hadn't used them before, but they directly addressed our need, had a good reputation and certainly seemed to be fast to install and cost-effective."

**RESULT:**

The company installed 556 risers. "It was very convenient, and we were able to match grade at every manhole," says White. "They all worked perfectly." All of the manholes are now set, and some have been in place and bearing traffic for several months. There have been no failures. "They're heavy-duty ribbed steel," White says. "They're not going anywhere." **888/272-2397; www.ahp1.com.**

Lightweight plastic manhole grade ring speeds up adjustment process

**Problem:**

The Jay (Maine) Sewer Department was experiencing deteriorating masonry





grade adjustments on manholes in their sewer collections system. They were looking for something that would be faster and easier to install while also making the repair last longer than traditional methods and materials.

#### **Solution:**

The department selected the **PRO-RING** manhole grade adjustment system from **Cretex Specialty Products**. It is made from expanded polypropylene, a lightweight, high-strength plastic. It is acceptable for heavy traffic applications meeting AASHTO M-306, HS-25 loading, and is watertight when installed using the recommended adhesive/sealant. The department had used this system on three separate sewer manholes to raise the frame and cover to grade, and found it to be very easy to install. It makes it much easier to get the frame to the desired grade because of the variety of available thicknesses and tapered rings. Reconstruction time for a typical manhole now takes approximately one hour.

#### **RESULT:**

The department not only accomplishes the work in less time, they expect the PRO-RING to outlast cement blocks/bricks/mortar since it isn't affected by sewer gases or by the salt and/or calcium used by the highway crews for ice control. **800/345-3764; www.cretexseals.com.**



#### Tape system used to protect new valves

#### **Problem:**

The City of Sault Ste. Marie, Ontario, was involved in the replacement of a number of sections of water main throughout the city's water distribution system. This work involved the installation of several large-diameter valves along various sections of the main. The city's Waterworks Engineering Department wanted to make sure that these newly installed valves

were well protected from corrosion.

#### **Solution:**

They specified the **Denso Petrolatum Tape System** to protect the valves. The valves and accompanying pipe sections were coated with Denso Paste, profiled with Denso Profiling Mastic and then wrapped with Denso LT Tape above grade. Then the assemblies were lowered down and connected in the trench. The tape can be applied to cold, wet surfaces; is easy to apply in arctic temperatures; is ready for immediate service after application; and can be used for above- and below-ground projects.

#### **RESULT:**

The city is confident that this long-term approach to corrosion prevention using the system will protect the valves and pipe sections for many years. **888/821-2300; www.densona.com.**



#### Cutting system used to quickly rebuild manhole frames

#### **Problem:**

Harber Company in Las Vegas bid on a manhole frame adjustment project on the Strip that required work to be completed in one day between 2 and 10 a.m. This required a quick cutting and removal of the existing structures, as well as a quick and accurate rebuild.

#### **Solution:**

The company used the **Mr. Manhole** system to speed the operation. The cutter operates on a skid-steer and allows the operator to remove the manhole frame from the road quickly with minimal labor. The system allows a quick rebuild using a plastic liner and a poured-in-place concrete ring.

#### **RESULT:**

The company adjusted five manholes in the intersection of Las Vegas Boulevard and Flamingo Avenue in one night. The cutter was used to remove all five manholes in one hour. The newly adjusted frames were concreted in by 5 a.m. The fast-setting concrete allowed traffic back on the street by 9:30 a.m. **419/741-9075; www.mrmanhole.com.**

#### Chemical grout used for manhole rehabilitation project

#### **Problem:**

During a street replacement project, the City of Annandale, Minnesota, Public Works Department encountered infiltration and inflow from 17 leaking manholes. They had been leaking for over 25 years at a rate of 20 to 30 gpm.





### **Solution:**

The construction superintendent, Randy Berggren II of Key Contracting of Fargo, North Dakota, suggested Prime Resins chemical grouts. He was advised to use **Prime-Flex 920** instead of Hydro Gel SX. It also has a high expansion rate, enabling it to fill any voids created by the high volume of water flowing behind the walls of the manhole. The hydrostatic pressure was high. "It was a bad one down there. The water literally pushed the drill out of my hands and into the wall on the other side," says Berggren. He injected the leaking joints of each manhole, requiring roughly 50 gallons of Prime-Flex 920.

### **RESULT:**

After checking back a few days later, only two low-volume remedial leaks were treated with Hydro Gel SX before the manholes were sprayed with a protective epoxy lining. **800/321-7212; www.primeresins.com.**



## Grout stops multiple inflow-and-infiltration points

### **Problem:**

Central Ohio Wastewater Services began uncovering I&I problems in the Village of Ashley, Ohio. It discovered 17 manholes, ranging from 16 to 26 feet deep next to a creek. These manholes were located in a low-lying area and identified as a major culprit of peak flows at the wastewater treatment plant. Traditional replacement would have cost \$300,000.

### **Solution:**

After learning about the challenge, **Source One Environmental** sug-

gested **HyperFlex** grout with a unique delivery method to inject the single component, hydrophobic polyurethane into the substrates. HyperFlex is ideal for this type of repair, in which the primary source of infiltration is unknown. A low-pressure paint sprayer was fabricated to inject the product at higher pressures out of 5-gallon jugs, enabling the appropriate volume of product to be injected behind the substrate. HyperFlex's viscosity reacts similar to syrup, so injecting it under pressure changes the chemical makeup of the product and the reaction happens faster, ensuring little to no wash-out during installation.

### **RESULT:**

The village has spent approximately \$13,500 to rehabilitate the 17 manholes, compared to the \$300,000 replacement cost. Central Ohio Wastewater Services will continue to utilize the product as other infiltration points are discovered. **810/412-4740; www.s1eonline.com.**



## Manhole resurfacing utilized in sensitive environmental area

### **Problem:**

The Moraine Park Campground, the only year-round campground in the Rocky Mountain National Park, was experiencing severe infiltration issues in its sanitary system, especially during the spring snow melt. The system consists of 2,346 lineal feet of 6-inch gravity pipe and 11 manholes in an environmentally sensitive area 8,160 feet above sea level. Park officials knew the system needed to be repaired but were worried that the rehab process could lead to significant park closures.

### **Solution:**

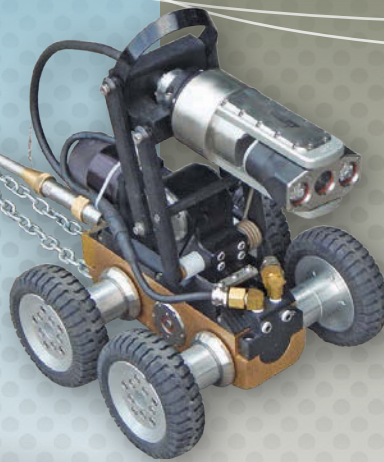
The National Park Service tabbed Advanced Solutions Group for the job. Given the time sensitivity around the project and the extreme conditions the system has to withstand, Advanced employed Fold In Place PVC for the sewer lines and **SpectraShield** for the manhole rehab. SpectraShield's trenchless rehab proved ideal since it can be used to resurface a typical manhole in less than an hour.

### **RESULT:**

Due to the fast and easy application, the campground's manhole rehab was completed in two days and is guaranteed infiltration-free for 10 years. **904/704-9786; www.spectrashield.com. ♦**



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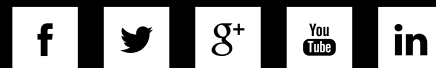
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# Product Spotlight

Inspection system captures video and sound in active pipelines

By Ed Wodalski

The LDS1000 long distance CCTV inspection and leak detection platform, part of a suite of inspection tools offered by JD7, is designed for internal investigation of live pipelines with a minimum flow of about 0.98 fps.

The inspection service system features a 1.4-inch diameter by 6-inch long tri-sensor head with high-resolution digital camera, focused lighting, 240 kHz hydrophone and 512 Hz sonde for mapping and leak detection.

“It’s providing three different functions inside the pipe,” says Mark Ames, regional manager for JD7. “The way it works is typically we pull off a fire hydrant and put a sealed launch tube on top of the spool and open the valve up to the hydrant. A parachute deploys on the front of the cable and pulls the camera system, sonde and hydrophone through the line.”

The inspection head (about 12 ounces) can be inserted through air valves, tappings or pressure fittings with an internal diameter of 2 inches for inspecting 3- to 12-inch lines. Larger lines can be inspected, but visual quality decreases. Although the standard launch of the system is through a hydrant spool, other access points just need an isolation valve and a place to bolt on the launch tube.

“The HD camera is able to see any problems or issues inside the pipe,”



Ames says. “We’re able to track the system and locate any leaks up to 3,000 feet. Most of the time you really don’t know what the inside of the pipe looks like. You only see it when it fails. There can be sections of pipe with issues that you aren’t aware of, including debris and tuberculation in the line or failure points.”

The sensor head has a wide-angle optic, fixed-focus (PAL system) with 3 Lux illumination at F1.2. A chlorination disinfection system prevents contamination of the water supply. The inspection system can operate in temperatures from 23 to 104 degrees F.

“One of the other things that make the LDS1000 unique is its buoyant tether that transmits the data,” Ames says. “The only thing the parachute needs to move forward is the weight of the camera.”

Sound and video are transmitted to a control truck with mechanized reel, TV monitors, video and acoustical analysis software.

“We can input into the control box how quickly the cable goes out and how quickly it can be pulled back in so it can measure the feet per second or feet per minute,” he says. “It might be possible to do two launches a day, which would be 6,000 feet, or over a mile, depending on the job site conditions.” 858/242-1640; [www.jd7us.com](http://www.jd7us.com).



PowerPrime SiteMax



Iota OneBox

## PowerPrime centrifugal pump

The skid- or trailer-mounted SiteMax centrifugal pump from PowerPrime Pumps has a Kubota engine and 88.5-gallon fuel tank for 65 hours of continuous runtime. Features include a venturi or vacuum priming system that enables it to prime and re-prime in less than 20 seconds and on long suction lengths (100 feet). Other features include standard sound attenuation of 69 decibels at 23 feet and high-density polyethylene canopy for quiet operation and protection against tampering and vandalism. 661/399-9058; [www.powerprime.com](http://www.powerprime.com).

## E/One Sewer Systems remote pump control

The Iota OneBox telemetry system from E/One Sewer Systems delivers remote control and monitoring of individual grinder pumps from a desktop computer or smartphone. The system integrates into a SCADA network to provide data on tank storage capacities, power failures, blockages and faults. 518/579-3068; [www.eone.com](http://www.eone.com).





**Electric Eel Model C Combo**



**FCS Pegasus-Plus**



**BJM Pumps SKG**



**McElroy Acrobat 160**



**Honda WMP 20X Pump**



**Larson Electronics 104740**



**Asahi/America Poly-pro DC Pipe**

## Electric Eel dual-cable sectional drain cleaner

The Model C dual-cable sectional drain cleaner from Electric Eel Mfg. cleans tough blockages, including tree roots, in 3- to 10-inch-diameter sewer lines. The drain cleaner delivers up to 200 feet of 1 1/4-inch self-feeding, dual cable in 8- or 10-foot sections. **800/833-1212; [www.electriceel.com](http://www.electriceel.com).**

## Fluid Conservation Systems pressure controller

The electronic controller for pressure-reducing valves from HWM (available through Fluid Conservation Systems) provides detailed multi-port PRV control without a flowmeter, either by flow or by time, together with intelligent closed-loop control. The controller permits immediate control of pressure within a distribution network and automatically adapts to network changes and events by analyzing data from up to three critical points. **800/531-5465; [www.fluidconservation.com](http://www.fluidconservation.com).**

## BJM solids-handling submersible pumps

SKG Series submersible, solids-handling pumps from BJM Pumps feature a dual shredding system for 2, 3 and 5 hp pumps. The pumps can shred a variety of municipal and industrial wastewater solids, including flushable wipes. All shredding elements are made of hardened 440C stainless steel with a Rockwell hardness of 55C plus. **860/399-5937; [www.bjmpumps.com](http://www.bjmpumps.com).**

## McElroy low-force fusion machine

The Acrobat 160 low-force fusion machine from McElroy Manufacturing is designed for 63 mm to 160 mm polypropylene pipe. The machine can be configured from four to three jaws without tools. The narrow jaws allow fusions for flanges to outlet branches of tees and most fittings. Features include a hydraulic power unit and inserts for common butt-fused polypropylene pipe sizes and data logger to document key parameters. The facer and heater can be loaded from the top or bottom in the three-jaw configuration. **918/836-8611; [www.mcelroy.com/fusion](http://www.mcelroy.com/fusion).**

## Honda Power portable water pumps

WT Series portable water pumps from the Honda Power Equipment Group are designed for dewatering construction sites as well as removing water contaminated with leaves, debris, stones and other waste materials. The WDP diaphragm pump moves wastewater containing up to 2.4-inch solids. It has a 118 cc GX 120 OHV commercial-grade engine and can discharge 80 gpm. Features include 3-inch suction and discharge ports, spring-loaded connecting rod, rock channel and oil alert. **678/339-2600; [www.powerequipment.honda.com](http://www.powerequipment.honda.com).**

## Larson 50-foot pneumatic light mast

The LM-50-5S-TLR-16X400L TL-LED, trailer-mounted, fold-over, seven-stage light mast from Larson Electronics features hydraulic ram upright assist, air-powered pneumatic mast and high-output LED light fixtures. The entire assembly is mounted on a 21-foot by 8-foot tandem-axle trailer. The light plant extends to 50 feet and collapses to 13.5 feet. The 16 light heads are wet suitable and produce 52,000 lumens at 400 watts each. **800/369-6671; [www.magnalight.com](http://www.magnalight.com).**

## Asahi/America double-wall piping

Poly-Flo co-extruded double-containment piping system from Asahi/America is available in black PE and euro gray PP-R for applications where thermal expansion and contraction are present. The complete piping system includes pressure fittings, drainage fittings and machined fittings. The SDR-designed system operates up to 150 psi at 68 degrees F and is available in 1- by 1-1/2-inch, 2- by 3-inch and 4- by 6-inch sizes. **800/343-3618; [www.asahi-america.com](http://www.asahi-america.com).**

*(continued)*





**Hannay 6000**

## Hannay heavy-duty 6000 Series hose reels

Heavy-duty 6000 Series hose reels from Hannay Reels are designed for spray, waterblasting and sewer cleaning applications. Manual reels include crank rewind with pinion brake. Power reels feature gear-driven crank rewind or chain and sprocket drive. Bronze or aluminum swivel joint and stainless steel hub assembly and riser are available. **877/467-3357; [www.hannay.com](http://www.hannay.com).**



**Vermeer D100x140**

## Vermeer Tier 4 horizontal directional drill

The D100x140 Navigator horizontal directional drill from Vermeer features a 275 hp Tier 4 Final Cat diesel engine, 100,000 pounds of thrust/pullback, 14,000 ft-lbs of rotational torque and rotational speed of 203 rpm. The drill is available with the InSite asset management system, DigiTrak Aura display and 15- or 20-foot rod options. **641/628-3141; [www.vermeer.com](http://www.vermeer.com).**

## TT Technologies constant-tension winches

Grundwinch 3-, 5- and 10-ton hydrostatic constant-tension winches from TT Technologies are designed for the variable conditions in below-grade work, including pipe bursting, cable pulling, sliplining, pipe pulling and swage lining. Constant tension senses and automatically takes up any cable slack. All models feature protective cable storage and are available with air-cooled diesel or gasoline engine and adjustable boom system. **800/533-2078; [www.tttechnologies.com](http://www.tttechnologies.com).**



**TT Technologies  
3-ton Grundwinch**

## Conjet hydrodemolition surface prep robot

The hydrodemolition surface preparation robot from Conjet AB/National Hydro uses high-pressure water to remove damaged concrete. It cleans rebar and leaves a roughed surface for the adhesion of new concrete. The 363 robot with standard arm is 11 feet, 2 inches long and 7 feet, 7 inches tall. It has a wheel width of 5 feet, 10 inches to 8 feet, 2 inches. Weighing 4,410 pounds, it has a removal width of 6 feet, 7 inches. **517/223-0915; [www.conjet.com](http://www.conjet.com).**



**Conjet Robot**

## Spire Metering vortex flowmeter

The 602VF vortex flowmeter distributed by Spire Metering Technology is designed for accurate, low-maintenance flow measurement in gas, steam and liquid applications. **888/738-0188; [www.spiremt.com](http://www.spiremt.com).**

## Snap-On heavy-duty diagnostic system

The Pro-Link heavy-duty diagnostic system from Snap-On Industrial Brands is designed for light diesel to Class 8 commercial trucks. Features include the ability to read and clear fault codes, access trip data to monitor vehicle and driver performance, create health reports and view live data to verify performance. The diagnostic system has an 8.5-inch glass color touch screen that automatically adjusts brightness for indoor and outdoor use. Other features include 8-foot cable, solid state drive to store data and software updates, carrying case, battery pack and 120-volt AC power adapter. **800/446-7404; [www.snaponindustrialbrands.com](http://www.snaponindustrialbrands.com).**



**Snap-On Pro-Link**

## Buckhorn pipeline pressure test pump

The TPS80D pipeline pressure test pump from Buckhorn Pumps is designed to produce a flow rate of 500 gpm and 350 feet of head down to 40 gpm at a discharge pressure of 0 to 3,000 psi (hydrostatic test). The pump package includes a Cat C4.4TA or Perkins 1104D-E44TA engine, MCM 250 4 by 5 by 14 centrifugal pump, FMC Technologies/Bean L114 triplex pressure pump, and FMC Technologies positive sealing check valve and auxiliary piping. **254/965-2555; [www.buckhornpumps.com](http://www.buckhornpumps.com).** ♦



**Buckhorn Pumps TPS80D**



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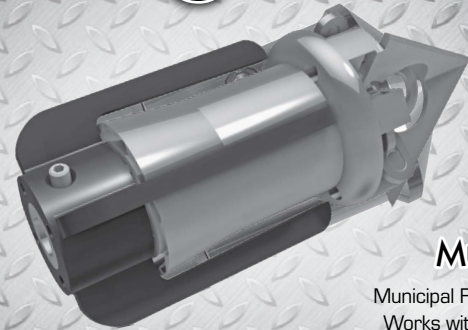
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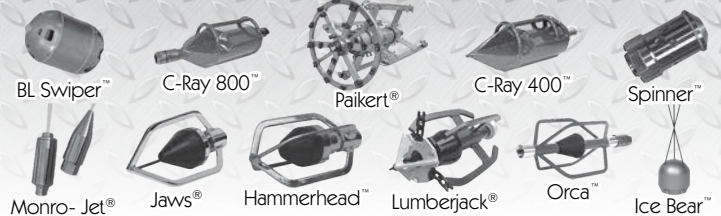
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## Sioux Corp.'s pressure washers receive certification

Sioux Corp.'s electric-motor-driven, industrial cold-water pressure washer received third-party certification by ETL to UL and CSA safety standards. The washers meet UL 1776 and CSA C22.2 #68 safety regulations and the requirements of OSHA regulation 1910.399. Nonexplosive electric-motor-driven models meet UL508A and CSA C22.2 #14-10 requirements.

## APWA certifies fleet professionals

The American Public Works Association (APWA) presented the certified fleet professional (CPFP) credential to John Cady, Palm Bay, Florida; Don Christenson, Wonder Lake, Illinois; Steven L. Mangold, Wilmington, California; and Joel K. Senical, Riverview, Florida.

## Hanson Pipe & Precast names vice president

Hanson Pipe & Precast named Cory R. Mayo vice president of operations. He succeeds Greg Minter who retired after 33 years.

## Nu Flow relocates Houston office

Nu Flow relocated its Houston regional office to 499 West 38th St. The new site is four times larger than the previous office and warehouse.

## HammerHead names UK distributor

HammerHead named Mammoth Equipment of Cambridgeshire, England, its distributor for trenchless equipment in the U.K. and Ireland.

## Electric Eel offers instructional video

The Ace and Ace 2 pipeline inspection camera systems instruction video is available on the Electric Eel Mfg. website, [www.electriceel.com/ecam\\_ace-ace2\\_instructionalvideo.htm](http://www.electriceel.com/ecam_ace-ace2_instructionalvideo.htm).

## InduSoft receives automation software award

InduSoft received the *Automation Inside* 2014 Readers' Choice Award for its Web Studio in the Best Automation Software category. InduSoft was selected from among 26 automation products based on reader votes.

## MaxLite's Puck Lamp certified for Energy Star luminaries

MaxLite's LED Puck Lamp earned placement on the Energy Star Sub-component Database. The GU24-base light source is rated for use in fully enclosed luminaries and damp locations.

## Legacy Equipment names general manager

Legacy Equipment Co. hired John Webster as general manager. Legacy rents hydroexcavators, industrial vacuum trucks, sewer cleaning trucks and other specialized equipment.

## Hi-Vac launches industrial division website

Hi-Vac Corp. launched new websites for its Hi-Vac and UltraVac brands. Product sections are divided between stationary and portable units and include specifications, literature, photos and videos. An aftermarket services portal provides quotes for repairs and/or rebuilds.

## ONICON acquires Greyline Instruments

ONICON, a Harbour Group company, acquired Greyline Instruments. Greyline designs and manufactures ultrasonic flowmeters and level sensors that utilize Doppler, transit time and area velocity technologies.

## Mathey Dearman names factory representative

Mathey Dearman named Rizzo & Associates, managed by Marc Rizzo, as a factory representative for Arizona, California, Hawaii and Nevada.

## Klein Tools receives brand award

Klein Tools was named Best Hand Tool Brand for 2014 by *Tools in Action* readers. Klein was chosen from among 17 brands. ♦



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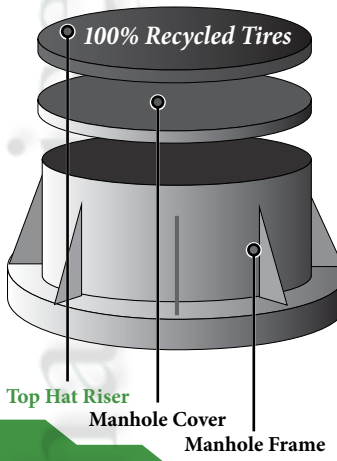
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## PEOPLE/AWARDS

The **Tennessee Stormwater Association**, in partnership with the Department of Environment and Conservation, the Tennessee Valley Authority and the Tennessee Department of Transportation, awarded \$103,080 to five local governments to fund green infrastructure and low-impact development projects beginning in spring 2015. The recipients were the cities of **Chattanooga, Ducktown, Lewisburg, Johnson City and Memphis.**

Stormwater technician **Willie Jones** was honored by Valdosta (Ga.) Mayor John Gayle and city engineer Pat Collins as the January 2015 Employee of the Month. Recently, while driving home from work, Jones observed a woman and three young children beside a broken-down vehicle. Being a mechanic by trade, Jones stopped to assist the citizens and quickly determined that the vehicle had a failed water pump. When he learned that the family had limited resources to have the vehicle repaired, Jones volunteered to fix the vehicle — which took nearly six hours to complete.

**Valerie Gray** was named executive director of City Public Works for Corpus Christi, Texas.

**Gary Brinkworth** received a Certificate of Recognition from New Albany (Ind.) Mayor Jeff Gahan for his service on the New Albany Sewer Board and Stormwater Board.

**John Moden**, the city engineer and director of the Engineering and Stormwater Department for Palm Coast, Florida, retired in February 2015. He played a major role in developing and maintaining Palm Coast's infrastructure and managing the city's stormwater system over the past 37 years.

**Axel Bishop**, co-founder of Design Concepts, a community and landscape architecture firm based in Colorado, joined the Society of Fellows, the highest recognition within the landscape architecture industry. Bishop is recognized as an innovator in, and advocator for, sustainable landscapes, multiuse stormwater management and learning landscapes. His accomplishments include redesign of regional stormwater and drainage systems as naturalized, recreational amenities.

The **Town of Cloverdale** received a \$500,000 grant from the Indiana Office of Community and Rural Affairs. The grant will be used to address stormwater drainage issues.

The **Fresno Metropolitan Flood Control District Board of Directors** awarded annual clean stormwater grants to six local environmental education projects and 20 fifth-grade classes for field trips to the San Joaquin River. The largest grants, which totaled \$2,000, went to the Academy for Civic and Entrepreneurial Leadership, the Center for Advanced Research and Technology, the San Joaquin River Parkway and Conservation Trust, and Yokomi Elementary Schools.

**Greg Klucharich** was hired as the sustainability coordinator for Whitpain Township (Pa.).

## LEARNING OPPORTUNITIES

### American Water Works Association

The AWWA is offering a Financial Management Seminar on April 20-22 in Atlanta. Visit [www.awwa.org](http://www.awwa.org).

## Wisconsin

The University of Wisconsin Department of Engineering-Professional Development is offering an Advanced Modeling Using HEC-RAS P750 Seminar on April 13-14 in Madison. Visit <http://epdweb.engr.wisc.edu>. ♦

## CALENDAR

### March 30-April 1

American Water Resources Association Spring Conference: Water for Urban Areas, Los Angeles Airport Hilton, Los Angeles. Visit [www.awra.org](http://www.awra.org).

### April 12-15

American Public Works Association North American Snow Conference, DeVos Place, Grand Rapids, Michigan. Visit [www.apwa.net](http://www.apwa.net).

### April 19-22

Collection Systems 2015: Collection Systems Taking Center Stage — Seize the Opportunity, Cincinnati. Visit [www.wef.org](http://www.wef.org).

### May 6-8

2015 Ohio Stormwater Association Conference, Sandusky, Ohio. Visit [www.ohio-stormcon.com](http://www.ohio-stormcon.com).

### June 7-10

American Water Works Association Annual Conference and Exposition, Anaheim, California. Call 303/347-6181 or visit [www.awwa.org](http://www.awwa.org).

### July 26-29

American Society of Agricultural and Biological Engineers International Conference, New Orleans. Visit [www.asabe.org](http://www.asabe.org).

### Aug. 2-6

StormCon North American Surface Water Quality Conference & Expo, Austin, Texas. Visit [www.stormcon.com](http://www.stormcon.com).

### Aug. 17-19

Smart H2O Summit 2015: Sustainable Water Solutions, San Francisco. Visit [www.smarth2osummit.com](http://www.smarth2osummit.com).

### Aug. 18-20

National Association of Flood and Stormwater Management Agencies Annual Meeting, Jackson Hole, Wyoming. Visit [www.nafsm.org](http://www.nafsm.org).

### Aug. 30-Sept. 2

American Public Works Association International Public Works Congress and Exposition, Phoenix Convention Center, Phoenix. Visit [www.apwa.net](http://www.apwa.net).

### Sept. 28-30

National Rural Water Association WaterPro Conference, Oklahoma City. Visit [www.nrwa.org](http://www.nrwa.org).

### Oct. 11-14

American Society of Civil Engineers 2015 Convention, New York City. Visit [www.asce.org](http://www.asce.org).

### Oct. 12-16

American Water Works Association 2015 Water Infrastructure Conference and Exposition, Bethesda, Maryland. Visit [www.awwa.org](http://www.awwa.org).

### Nov. 16-19

American Water Resources Association Annual Conference, Grand Hyatt Denver, Denver. Visit [www.awra.org](http://www.awra.org).

**Municipal Sewer & Water** invites your national, state or local association to post notices and news items in this column. Send contributions to [editor@mswmag.com](mailto:editor@mswmag.com).

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