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Brent Ellison
Assistant Director of Utilities
Liberty, Missouri

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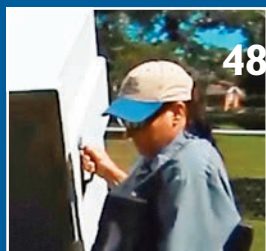
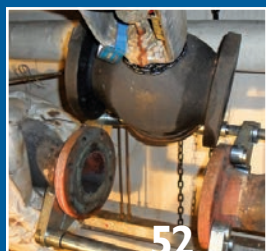
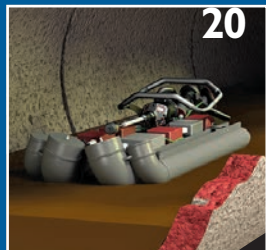
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ON THE COVER: Assistant director of utilities Brent Ellison and the Liberty (Missouri) Civil Utilities have improved efficiency by establishing an in-house construction division capable of handling most water and wastewater projects. (Photography by Denny Medley)



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MUNICIPAL SEWER & WATER

FOR SANITARY, STORM AND WATER
SYSTEM MAINTENANCE PROFESSIONALS

Published monthly by:

 COLE publishing

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



www.mswmag.com

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In U.S. or Canada call toll free 800-257-7222

Elsewhere call 715-546-3346

Email: info@mswmag.com / Fax: 715-546-3786

Office hours Mon.-Fri., 7:30 a.m.-5 p.m. CST

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

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CIRCULATION: 2017 average circulation was 37,681 copies per month (U.S. and international distribution).



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FROM THE EDITOR

Luke Laggis

Liquid. Gas. Solid. Water takes multiple forms. Its solid form is what's on my mind because, well, it's still winter in Wisconsin.

I was ice fishing one Saturday back in early March. For the uninitiated, we from the far north, mostly out of a lack of other worthwhile entertainment in the dead of winter, drill holes on frozen lakes and fish through the ice. For me, more than anything, it's motivation to get out of the house and hang out with friends when the natural tendency would be to stay comfortably within the warm and friendly confines of my home.

I fish on a flowage system on the Wisconsin River, created by a dam originally built in the 1800s to support the logging and paper industries. The Wisconsin River was long known as the hardest working river in America due to the vast industry it supported, and while some of those paper mills have since closed, many still loom large over the river and all who use it.



PHOTO BY CORY DELLENBACH

Boom Lake, Wisconsin River Flowage, Rhinelander, Wisconsin.

Some of those mills may have gone, but their legacy has not.

The flowage where I catch embarrassingly small northern pike in even more embarrassingly small numbers is right above the dam where the river's industrial legacy really begins. Its dark, tannin-stained water is relatively common for the area and isn't an indication of poor water quality. In fact, the water downstream is much cleaner than it was three or four decades ago.

On the flowage, it's not industrial byproducts that taint the water. Yard fertilizers, boats, and the trash people throw overboard — or leave on the ice in winter — are among the biggest pollutants. It's disheartening because those are the easiest things to control on an individual level.

It's nothing to take a drive across the ice (we do that up here, too) and see beer cans, empty plastic bottles, wrappers, potato chip bags, broken lids from Styrofoam minnow buckets and just about any other type of trash blowing in the cold winter wind. As utility operators, that's certainly nothing you can fully control. But, you have a platform to educate the public on the water cycle and its importance to every aspect of life.

Water quality affects us all in ways that aren't always top of mind, especially for those outside the industry. The water we swim in, the water that supports industry, the water that keeps our gardens growing — it's also the water we drink. Protecting those resources is everyone's responsibility, but you are the true stewards. Most will never understand the significance of what you do, but I hope you'll take every opportunity to educate the public and help turn casual bystanders into champions of our water resources.

The Earth isn't making any more water. What we have is what we have. Anything you can do to educate the public about the significance of treating our waterways with the care and respect they deserve can go a long way in preserving those resources for future generations.

Enjoy this month's issue. ♦

Comments on this column or about any article in this publication may be directed to editor Luke Laggis, 800-257-7222; editor@mswmag.com.

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SECOND LIFE

Old Toilets Turn Into Green Infrastructure

New York City has replaced thousands of old toilets throughout its school system with high-efficiency ones as part of an effort to reduce in-city water consumption. But instead of simply being thrown away, the old toilets are seeing a second life — being turned into crushed porcelain and getting incorporated into various green infrastructure projects, including rain gardens. mswmag.com/featured



SUPERIOR SNIFFER

British Utility Deploys Cocker Spaniel as Leak Detection Tool

We've written before about utilities experimenting with dogs' superior sense of smell as a leak detection tool. United Utilities, which serves about 3 million homes and 200,000 businesses in northwest England, is the latest utility to give it a try. United Utilities is assessing how well a cocker spaniel named Snipe can pinpoint water leaks in rural areas where they are harder to detect. Learn more about how Snipe was trained for this role in this online exclusive. mswmag.com/featured

OVERHEARD ONLINE

“It offers a new way to collect data to gauge the extent of opioid abuse in a community — rather than the number of overdoses — and puts the information in the hands of those who can provide pathways to recovery.”

— *Town Fighting Drug Epidemic Through Its Collections System*
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WATER LOSS

California Law Improves Utilities' Water Loss Monitoring

Prompted in part by the recent years-long drought, a new law went into effect toward the end of 2017 in California that requires the state's water utilities to more carefully monitor and annually report their water loss data. In this online exclusive, a representative from a water utility data management company discusses the ramifications of the law.

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READY TO RESPOND

Earl Stewman and his crew battle Alaska's elements to maintain public safety and keep their city's fire hydrants in working order

By Jack Powell

Earl Stewman is on a mission: Make sure the fire hydrants in Anchorage, Alaska, work when they're needed — all 7,400 of them.

It's a tall order, especially when the snow flies. Alaskan temperatures dip to 25 below zero, and an eight-member crew covers a 125-square-mile territory in a city of 290,000.

Fortunately, Stewman, an 11-year veteran of the Anchorage Water & Wastewater Utility is up to the challenge. In fact, he has built a solid career in the Operations and Maintenance Division, becoming systems maintenance foreman (hydrant operations) in 2014

“You have to coordinate with a lot of people to repair, excavate, and replace the hydrants, and that’s what my crew and I are committed to doing. The award reflects a lot of hard work by a lot of great people.”

Earl Stewman

and winning the 2016 Large Water System Maintenance/Operations Person of the Year award from the Alaska Water Wastewater Management Association.

An association news release about the award described Stewman as “a reserved gentlemen, respected by his crew and customers at AWWU alike. He takes his responsibilities and those of his crew very seriously. He has made it his personal mission to ensure the Anchorage hydrants are serviceable and provide sufficient pressure for public safety. Since taking over the hydrant crew two years ago, he has reduced the number of out-of-service hydrants from 166 to 80, with 50 of

those being private hydrants.”

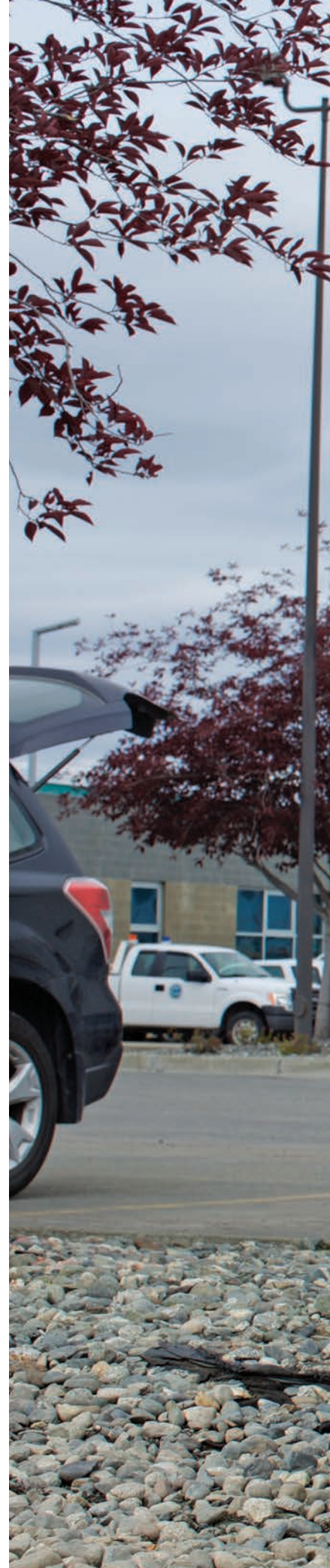
Stewman, a utilityman III, works with Distribution Operations to maintain water quality through flushing programs, the Engineering Department on construction of new hydrants, and Customer Service on providing hydrants of adequate size to accommodate contractors for street cleaning, landscaping and contract maintenance.

Legacy knowledge

“I was surprised to win the award,” Stewman says. “My goal has always been to do a good job of maintaining the 7,400 hydrants in the greater Anchorage area. To me, that meant getting the number of out-of-service hydrants down to less than 1 percent. You have to coordinate with a lot of people to repair, excavate, and replace the hydrants, and that’s what my crew and I are committed to doing. The award reflects a lot of hard work by a lot of great people.”

The award represents a major milestone in a career that saw Stewman follow his father to AWWU, Alaska’s largest water and wastewater utility with 52,000 commercial, residential and military water customers. He joined the ranks of 260 utility employees a decade after his father retired, bringing what hydrant crew member Marshall Kennon calls “legacy knowledge of operations and customer service.” Kennon adds, “You can’t grow up in the household of a utility worker without some of those smarts rubbing off.”

A five-year utility employee, Kennon services 820 hydrants in a territory that stretches from midtown 6 miles north to the Anchorage International Airport. “Earl knows a lot about hydrants and shares it with us, which is priceless. Often you can’t tell if a hydrant needs





Systems maintenance foreman Earl Stewman of the Anchorage Water and Wastewater Utility opens the valve on one of 7,400 fire hydrants he's responsible for maintaining across a 125-square-mile service area. (Photography by Brian Adams)



PROFILE:

Earl Stewman,
Anchorage (Alaska) Water
& Wastewater Utility

POSITION:

Systems Maintenance Foreman

EXPERIENCE:

11 years with the city

DUTIES:

Oversee maintenance of 7,400 fire hydrants

EDUCATION:

Graduate of East Anchorage High School

CERTIFICATIONS:

Utilityman III, Water Distribution 2 and Wastewater Collections 2

GOALS:

Finish his career with AWWU

“Earl is one of the most professional bosses I’ve ever worked for. He lets you use your skills and encourages you to self-learn, but he’s always there to answer your questions.”

Christopher Blastick

repair because it may look OK, so you have to know what to look for and what to test for to make sure it’s working, and then move on.”

Before joining the utility, Anchorage native Stewman did a variety of construction, maintenance and retail jobs. That included a 10-year stint with his then-wife running a general store in Crooked Creek, a remote village (population 105) about 300 miles west of Anchorage, accessible only by small plane or barge. He calls that “a real Alaskan experience, where temperatures could reach 60 below zero. I did a lot of hunting and fishing. We sold groceries, four-wheelers, snowplows and just about anything else customers needed, and we lived

in an apartment above the store.”

Back in Anchorage, a friend saw an ad for positions with the AWWU. He and Stewman applied and got jobs. Stewman was determined to learn all aspects of the business. In time, he earned Water Distribution 2 and Wastewater Collections 2 certifications

and made it a practice to study utility operations. AWWU operates the 35 mgd Eklutna Water Treatment Facility, the 24 mgd Ship Creek Water Treatment Facility, numerous wells, and three wastewater treatment plants.

Making the rounds

AWWU’s unique cross-training work culture facilitated his learning. The 90-member Operations and Maintenance Division has four crews: line cleaning, manhole/valve, excavation and hydrants. Employees make their way around each crew over three- or four-year periods, so they become well-versed and ready to respond to any situation.

While Stewman’s first job was cleaning waterlines, he rotated around the job circuit and ended up on the hydrant crew, long before he thought about becoming foreman. “I realized all the work involved in maintaining these thousands of hydrants,” he says. “Plus, I reasoned that my boss, Eric Braendel, would retire in a few years. That’s why I decided to focus my energy on hydrants, so I could eventually move up, which is exactly what happened.”

Today, Stewman’s crew is responsible for all hydrant repairs and maintenance, funded under a \$1 million budget provided by the Anchorage Fire Department. His maintenance crews work four 10-hour days that overlap Monday through Friday. Upon arriving at 6:30 a.m., Stewman meets with the team and hands out assignments for the day. Then he takes calls about broken hydrants and other issues, handles work orders, and lets the Fire Department know which hydrants are out of service — an all too common issue.

(continued)



Earl Stewman tests the pressure on a fire hydrant. The success of Anchorage’s hydrant program has earned the utility an A1 insurance rating.



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THE HOLLOW SOUND OF SAFE HYDRANTS

Throughout the year, Earl Stewman's hydrant crew performs a hands-on process of tapping fire hydrants to make sure they ring hollow — a sound that's music to their ears.

"We usually slap the hydrant's large steamer nozzle with our hand to see if we get a deep hollow sound, which would indicate that the hydrant barrel has little to no water left in it," Stewman says. "The guys call that 'bunging.' If we hear a dense or sloshing sound, we know there's water in there, most likely from a leak. Water in the hydrant will freeze and cause the hydrant to break and be out of service, something nobody wants, so we have to take action."

If they find water in a hydrant, they immediately remove the bonnet

(cap), pump it out, check the bonnet assembly and valves for leaks, and make any needed repairs. Winter poses more challenges because of the hard ground. Crews must clear snow from the hydrant, dig a 6-foot-diameter trench around it and get to work, draining water and defrosting the bonnets and other parts. Bunging can take a couple of hours if problems are found, but typically, it's a fast slap-and-listen process.

Stewman's busy crew does bunging on all of Anchorage's 7,400 hydrants six to nine times per year, mostly in winter, to make sure the Fire Department can access the hydrants under any conditions. Most of the summer work involves a variety of hydrant repairs.

Each member of Stewman's crew is responsible for about 900 hydrants. Stewman says, "Keeping the hydrants in working order is especially important. In 2016, we seem to have had more apartment and house fires than I've seen in several previous years, so having water to fight them is vital."

Challenging weather

Given all the snow and ice Anchorage gets in winter, drivers sometimes lose control and hit the hydrants. The hydrants, supplied by American Valve & Hydrant and Mueller, are designed to break cleanly and leave the waterlines undisturbed so that water is not wasted.

Sometimes, snowplows strike the hydrants. In other cases of extremely cold weather, groundwater can seep into a hydrant at the base; then freeze; expand; and damage valves, rings, rods or other internal parts.

When those incidents happen, crew members shut the hydrant down and file an excavation request so they can repair it. With lines running 10 to 12 feet below the frozen ground (and the deepest being 23 feet down), the task can be daunting, yet Stewman remains undeterred.

"Earl is a good foreman — reliable and one of my go-to guys who I can always count on," says Tim Forbus, superintendent of the Operations and Maintenance Division, who supervises 22 employees, including three foremen. "He can make a decision and stick to it without caving in to peer pressure. That's essential to making things run well. His crew likes working for him because he's so straightforward. They know exactly what he's thinking. And he lets them do their jobs without micromanaging."

Beyond his strong management style, Stewman's focus on hydrants has made a big difference. Forbus notes that the city had many out-of-service hydrants, both public and privately owned. Since Stewman took over the hydrant crew, the number of such hydrants has fallen steadily to about 1 percent of the total.

Stewman's work for the Anchorage Water and Wastewater Utility earned him the 2016 Large Water System Maintenance/Operations Person of the Year award from the Alaska Water Wastewater Management Association.

“His crew likes working for him because he’s so straightforward. They know exactly what he’s thinking. And he lets them do their jobs without micromanaging.”

Tim Forbus

The private side

Utility workers typically shovel out private hydrants and do some routine maintenance, but the owners — auto body shops, small manufacturers, or big companies like BP or Conoco — are responsible for major repairs. Many of these hydrants are out of service because the owner could not or did not spend money: up to \$3,000 for repairs and up to \$15,000 for replacement. Stewman had a better idea.

“We had plenty of standard parts we weren’t using, so Earl came to me and said, ‘Let’s use them to fix these private hydrants,’” Forbus recalls. “And that’s just what we did. We took them apart, replaced leaking rings and such, so now they’re available if the Fire Department needs them. Because of the success of our hydrant program, we’ve earned an AI insurance rating — the highest there is. That saves us money on our premiums. It’s a real tribute to the job Earl and his crew do and one of the main reasons I nominated him for the Person of the Year award.”

Hydrant crew member Christopher Blastick is equally high on Stewman: “Earl is one of the most professional bosses I’ve ever worked for. He lets you use your skills and encourages you to self-learn, but he’s always there to answer your questions.”

For Blastick, such support is crucial. He has serviced about 2,900 hydrants in his three years working for Stewman, covering three territories. Stewman even helped him put on a presentation about hydrants for the 2016 AWWMA conference. Blastick demonstrated how the crew checks hydrants’ health by tapping them to detect any water inside that could freeze and crack the hydrant. If that happens, crews open the hydrant, pump out the water and repair any leaks. That can be time-consuming, but it’s essential for preventing widespread damage from extreme cold.

Hydrants, bees get personal care

Although Stewman appreciates the recognition, he much prefers the day-to-day work with his crew, which he calls “the best in the utility,” and the nonstop opportunities to learn new techniques and technologies. An avid outdoorsman, he likes hunting, fishing and four-wheeling. At present, his passion is beekeeping: He has run seven hives and gives most of the honey to co-workers.

Growing up, he had a neighbor who kept a beehive and let him sample the honey. Thirty

years and a lot of research later, Stewman finally got his own hives, which he treats like the hydrants he services — with plenty of care. Before winter, he feeds the bees well, wraps the hives with polyurethane insulation and provides a moisture box to get them through

the winter.

As for the future, Stewman plans to spend the rest of his career with the AWWU. “We have a great work environment, great leaders and an excellent team. Because people move from

crew to crew, they don’t get stale or burned out. The Fire Department is good to work with, and I really get satisfaction knowing that we’re making a contribution to keeping Anchorage residents safe.” ♦

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NEW SIGHT FOR OLD PIPES

A combined approach to sewer inspection yields better assessment and significant savings

By Mazen Kawasmi, P.E., and Jessica Brown, P.E.



In the first four years after implementing its Interceptor Condition Assessment Program, the Fort Worth Water Department prevented an estimated 59 sanitary sewer overflows and saved \$3.6 million to \$6.6 million.

For more than a decade, Fort Worth, Texas, has been recognized as the fastest-growing metropolitan area in the nation, resulting in a great deal of resources being dedicated toward building new wastewater infrastructure to accommodate the rapidly expanding population. At the same time, the Fort Worth Water Department recognized the importance of serving and maintaining the existing infrastruc-

One of the most useful pieces of data to be collected from the inspection is the pipe wall thickness, as this information helps determine the condition of the pipe and its anticipated life span.

ture of its wastewater collections system, which consists of more than 262 miles of large-diameter sewer lines 24 inches in diameter and greater. The cost for the city to clean these lines for inspection is \$2 million, which can be a strain on limited resources.

In an effort to find a more efficient, cost-effective, and accurate way to determine the condition of these vital sewer interceptors and develop recommendations for a long-term capital improvement plan, the city initiated an ICAP. It began in October 2010 and is currently planned to have a duration of eight years. The ICAP project team is using results from the 2012 Wastewater Collection System Master Plan, as well as input from the field operations group to prioritize sewer interceptors for inspection under the ICAP.

A better picture

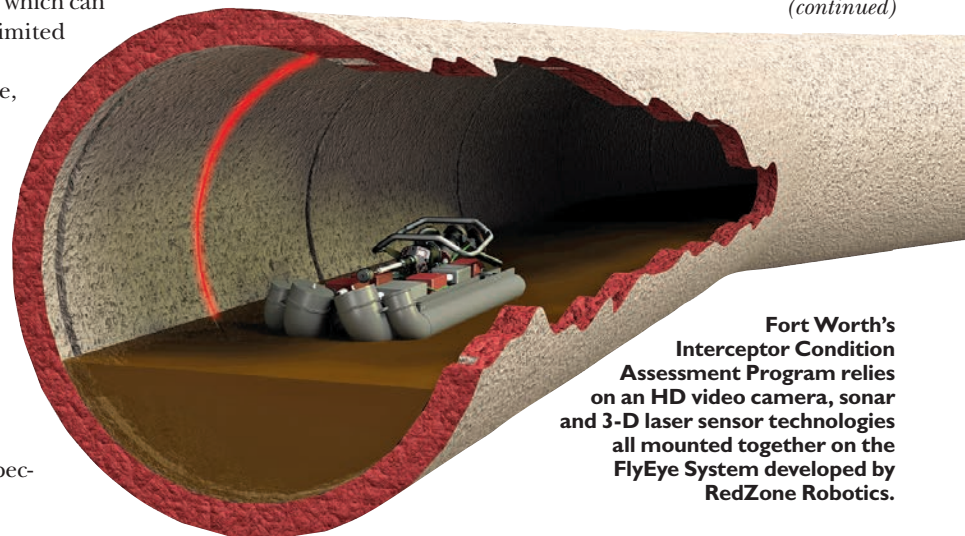
The first step of ICAP is the pre-engineering inspec-

tion process to create a map of the infrastructure. During this stage, the team walks the lines in the field and conducts thorough research to better understand the infrastructure, such as the size and composition of lines and locations of manholes.

Once a map is created, the field condition assessment can begin. This process involves the deployment of three types of technology: high-definition TV inspection, sonar inspection and 3-D laser inspection.

- **HD TV inspection** is the most advanced method for capturing video images. Once the HD TV inspection data is collected, it can be viewed using conventional digital video viewing software.
- **Sonar inspection** is used to inspect the pipe below the water level flow line. The device sends a sonar signal and measures the time required for the signal to return. The technology then creates an image of the pipe below the water surface and identifies accumulation of debris, deformation due to deflection in the pipe, breaks or other defects. As the sonar travels along

(continued)



Fort Worth's Interceptor Condition Assessment Program relies on an HD video camera, sonar and 3-D laser sensor technologies all mounted together on the FlyEye System developed by RedZone Robotics.

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the pipe, the data points are aggregated to create a 3-D model of the debris and pipe surface below the flow line.

- **3-D laser inspection** uses laser technology to create a 3-D model of the pipe wall above the water flow line. Similar to the sonar technology used below the water flow line, the laser sends a rotating beam of light around the pipe surface and measures the amount of time required for the light to bounce back. Using thousands of data slices along the length of the pipe, a 3-D model of the pipe wall is created.

In the case of Fort Worth, the HD video camera, sonar and 3-D laser sensor technologies are all mounted together on the FlyEye System developed by RedZone Robotics. The rig is then pulled through the pipe segment on a pontoon float to collect data.

Once retrieved, the data is shared with the technology manufacturer to develop a 3-D model of the entire pipe length. Combined with the HD video, the result is a high-resolution visual picture of the pipe and a 3-D model of the pipe that is used for detailed condition analysis.

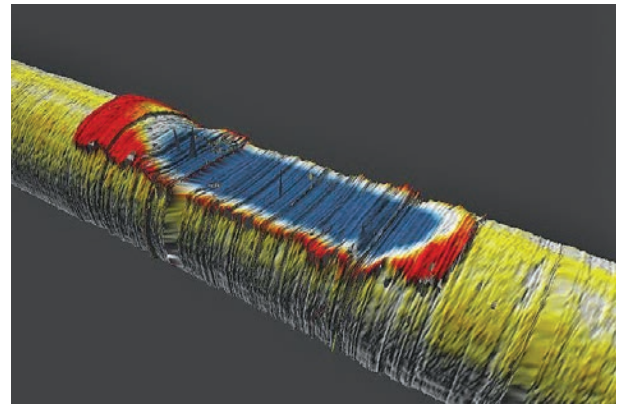
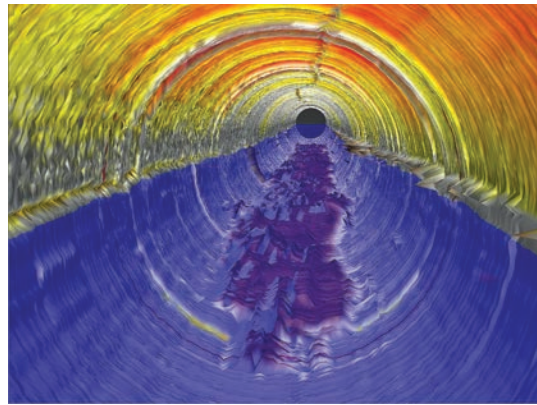
Testing thickness

One of the most useful pieces of data to be collected from the inspection is the pipe wall thickness, as this information helps determine the condition of the pipe and its anticipated life span. Pipe specification data establishes the original interior diameter of each pipe segment, which can be compared to inspection data measuring the amount of wall thickness loss. The difference between the inspected inside wall location and the original inside wall location is used to calculate the inspected wall loss.

The inspected wall loss or remaining wall thickness is used to assign pipe segment condition scores, which are referred to as Remaining Useful Life scores. These scores fall into one of five categories. The ICAP project team used the following condition scoring system for reinforced concrete pipe segments:

- **Score 1:** Material loss of 0 to 0.5 inches from original inside wall. Estimated Remaining Useful Life is 36 to 50 years.
- **Score 2:** Material loss of 0.5 inches to interior face of first row of reinforcement steel. Estimated Remaining Useful Life is 21 to 35 years.
- **Score 3:** Material loss from interior face of first row of reinforcement steel to half the distance to interior face of the second row of reinforcement steel. Estimated Remaining Useful Life is 11 to 20 years.
- **Score 4:** Material loss from half the distance to the interior face of the second row of reinforcement steel to the interior face of the second row of reinforcement steel. Estimated Remaining Useful Life is 3 to 10 years.
- **Score 5:** Interior face of second row of reinforcement steel to outer pipe wall surface. Estimated Remaining Useful Life is less than 2 years.

Pipe segments scoring a five are considered to be in imminent failure and are in



Two components of ICAP, laser and sonar inspection, create 3-D models of the pipe above and below the waterline respectively. The models can then be combined for a more complete picture.

need of emergency rehabilitation. Pipe segments scoring a four should be included in the next available design and construction projects release.

In addition to assigning a Remaining Useful Life score to each segment, the sonar inspection data enables Fort Worth to more effectively clean its pipes by focusing just on the portions of the interceptors that require cleaning. In the past, they would clean the entire interceptor due to the lack of available data. Utilizing the ICAP inspection data to limit cleaning to just the segments requiring attention has already saved the city \$4.5 million in large-diameter cleaning cost to date.

Reaping benefits

The city of Fort Worth and the project team's approach to wastewater system condition assessment achieved multiple benefits and provided a sustainable business process to inspect, score, and monitor critical major wastewater interceptors. In the first three years, Fort Worth was able to inspect 49 percent of the large-diameter lines.

The benefits of ICAP can be summarized into three areas:

- 1. Reduced capital improvements:** The capital improvement plan was estimated to be reduced as a result of the ICAP by two primary means. The first was the ability to restore capacity through focused detailed cleaning and removal of large debris in multiple interceptors. The city's InfoWorks CS hydraulic model (Innovyze) was reanalyzed in locations where significant debris was identified and removed from the wastewater interceptors to determine if CIP improvements can be deferred or downsized in the future. The second was the replacement of portions of sewer interceptor instead of the entire interceptor.
- 2. Reduced reactive maintenance and cleaning costs:** Prior to the creation of the ICAP, the Fort Worth Water Department utilized the industry standards of "clean to inspect" to determine pipe condition and restore capacity. Cleaning under ICAP using the clean-to-inspect method was projected to cost \$1.7 million. Utilizing the sonar data developed from the ICAP results, the Fort Worth Water Department was able to "inspect to clean" at a significant cost savings. Cleaning cost utilizing the inspect-to-clean method totaled under \$400,000, which represents an approximate savings of \$1.3 million over the traditional method. It is estimated that the ICAP methodology will result in a savings of \$15.2 million in cleaning cost over the eight-

(continued)





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The ability to limit interceptor cleaning to just the segments that are in need of service has saved the city \$4.5 million in cleaning costs to date while the ability to determine the Remaining Useful Life of the pipes enables the city to better plan for its short-term and long-term capital improvement budgets.

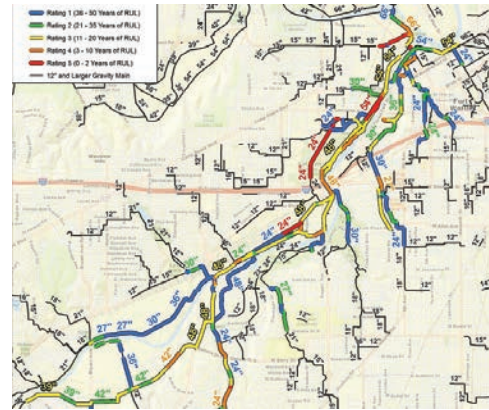
year program.

3. Enhanced understanding and knowledge of asset status and life cycle: The ICAP field assessment findings linked backed to the city's CMMS program, GIS, and hydraulic model, providing enhanced asset understanding to enable the city to prioritize replacement projects more effectively. ICAP field assessment findings provided the needed information to the engineering user group during development reviews and annual budget planning on business

case justification for renewal/replacement projects. Remaining pipe wall thickness can now be monitored, allowing the city to get the most value out of its assets before replacing them.

Big savings

ICAP has replaced traditional practices and provides more accurate pipe condition assessments, leading to fewer overflows, identification of potential failures before they occur, reduced rainwater inflow and infiltration, maintenance schedules addressing critical needs first, and reduced impact from maintenance-related construction.



Inspected wall loss and remaining wall thickness are used to assign pipe segment condition scores, which are referred to as Remaining Useful Life scores. The scores can then be used to prioritize actions.

During the first four years of the eight-year program, the benefits are already paying off. The ability to limit interceptor cleaning to just the segments that are in need of service has saved the city \$4.5 million in cleaning costs to date while the ability to determine the Remaining Useful Life of the pipes enables the city to better plan for its short-term and long-term capital improvement budgets.

As the process continues over the next four years, Fort Worth will gain an even better understanding of the condition of its wastewater system and will be able to focus its resources to sections where it will have the most impact. ♦

Mazen Kawasmi, P.E., is an associate at Freese and Nichols, and Jessica Brown, P.E., is the firm's vice president.

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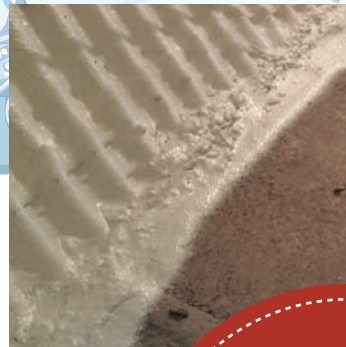
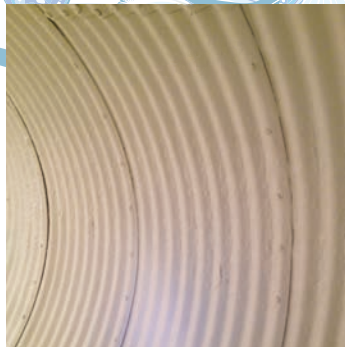
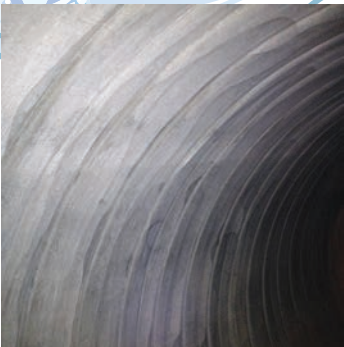
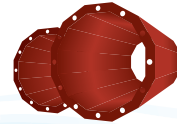
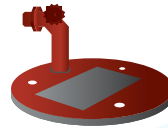
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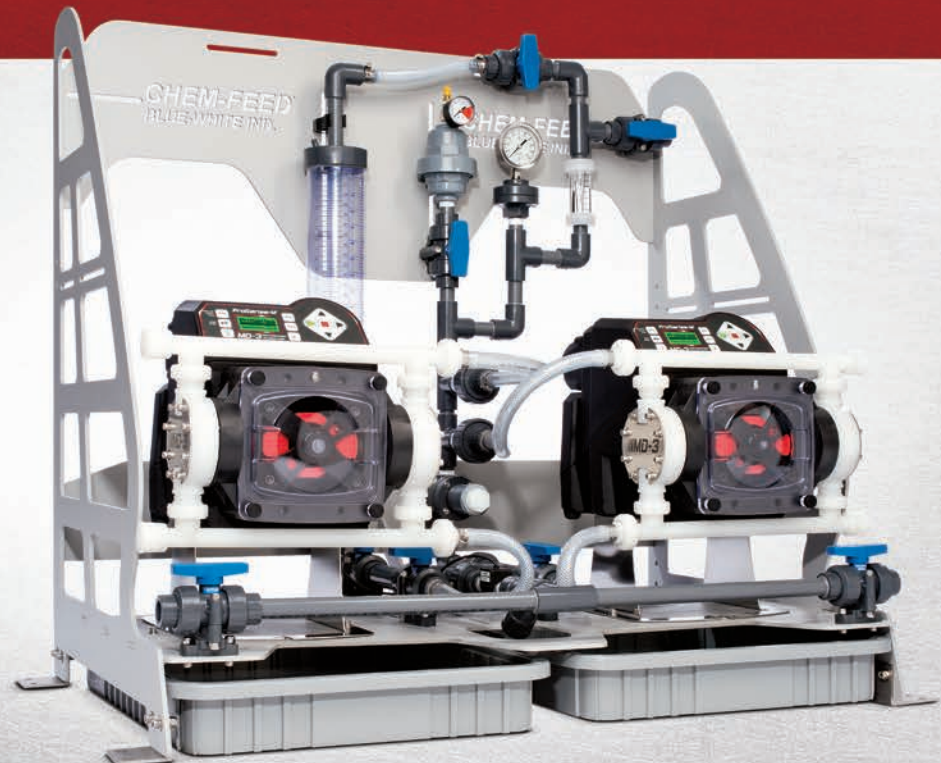
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SET A STRATEGY FOR RECOGNITION

Effective and strategic employee-recognition programs bolster engagement, reduce turnover and drive better behavior and performance

By Ken Wysocky

If your utility doesn't already have an employee-recognition program, it's a good idea to start one. And if it already does, perhaps now is a good time to evaluate and determine if it's accomplishing what it should: align with your utility's mission and values and drive employee performance.

That advice comes from employee-recognition guru Debra Corey, the global head of employee engagement at Reward Gateway (www.rewardgateway.com). The firm develops technology platforms for things such as employee communication, recognition and well-being programs.

"Over the years, I've seen too many employee-recognition programs that aren't strategic enough and don't align closely enough with a com-

"If you think about it, a manager will see you do some things. But people who work with you day in and day out see a lot more of what you do."

Debra Corey

pany's mission, purpose and values," says Corey, who's the author of *Build*

It: The Rebel Playbook for World-Class Employee Engagement (written with Glenn Elliott). "Companies that are getting it are moving toward being true business partners (with employees) and driving business performance through human resources programs, including reward and recognition."

"Recognition needs to be strategic ... aimed at motivating the type of behaviors you're trying to encourage so that your business can succeed," she adds.

Hard-core doubters should take note of the documented benefits of recognition programs, which have been detailed in studies performed over the years. For example, data collected by Bersin by Deloitte, a global research-based consulting firm, shows that employee engagement is 14 percent higher at companies with effective recognition programs, compared to those with no programs.

In a study performed by Reward Gateway, 54 percent of respondents said they'd rather work for an organization with a recognition-oriented culture than one where they'd get a higher salary increase, but no recognition. In addition, another Bersin study indicates that companies with effective recognition programs can reduce employee turnover by about 30 percent, she says.

Developing a sound strategy

Too many recognition programs miss the mark because they're not strategic. As an example, Corey cites a program at one company she worked with that rewarded top salespeople with cash bonuses. Only one problem: It backfired. "The company needed those sales people to collaborate with each other and work as a team," she explains. "But by giving them bonuses, everyone was working for themselves — not for the company."

Then there are the organizations that proudly recognize nothing more than employee tenure. In fact, another recent Bersin study estimates that companies spend a whopping \$46 billion a year on recognition rewards, and 87 percent of them focus on years of service. Corey is not a fan. "Service awards are nice, but if my husband told me he loved me only every five years, I'd probably leave him," she says.

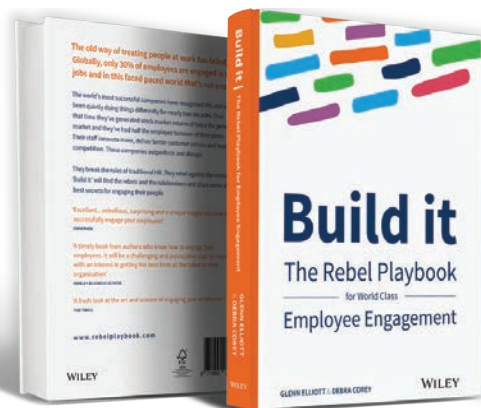
So what's the alternative? Corey advocates what's called continuous, peer-to-peer recognition, in which employees have access to digital technology that allows them — not just managers — to send out digital pats on the back to colleagues. Social media platforms and other technologies provide effective channels for raising the visibility of these digital recognitions, she says.

Reward Gateway, for instance, developed a recognition program called MORE (Moments of Recognition Everyday) that drives employees to embrace its eight core values: love your job, be human, work hard, own it, push the boundaries, delight your customers, speak up and think global. They all emanate from

the company's mission statement: to make the world a better place to work.

Peer-to-peer recognition is a core component. Using the company's intranet platform for instance, employees can send out digital e-cards. Known internally as "high-fives," the cards qualify as "continuous" because they can be sent at any time; they recognize things like positive attitude, volunteering, proposing a new idea or demonstrating Reward Gateway values. "If someone helps me out with something, I can quickly send them an e-card," Corey explains. "We use them for our clients, too."

"Everyone has access to them," she continues. "You just go to the company's intranet website, choose a digital card and click on it, then click on the name of the person you want to send it to. You can even send one to multiple people at the same time. The e-cards also get posted on a social recognition wall (on the intranet), similar to Facebook or Instagram, where other employees can add comments." Furthermore, for those keeping score, employees can see on the intranet site which employees have received the most rewards.



We invite readers to offer ideas for this regular column, designed to help municipal and utility managers deal with day-to-day people issues like motivation, team building, recognition and interpersonal relationships. Feel free to share your secrets for building and maintaining a cohesive, productive team. Or ask a question about a specific issue on which you would like advice. Call editor Luke Laggis at 800-257-7222, or email editor@mswmag.com.

Timely rewards

Continuous recognition works because it's given "in the moment," which makes it more effective, she notes. Employees can even send them from their cell phones. "It's better when you can send recognition right away, before you forget about it," Corey says. "Technology is making it really easy to give continuous recognition. It doesn't cost anything, and it takes just a minute."

Peer-to-peer recognition trumps having only managers provide recognition because it casts the reward net so much further. "If you think about it, a manager will see you do some things," Corey points out. "But people who work with you day in and day out see a lot more of what you do."

Of course, moderation is critical; there can be such a thing as too much recognition — a flood of digital high-fives that dilutes the value of the sentiment. That's why it's important to train employees and emphasize that recognition must be meaningful in order to be effective, she emphasizes.

The MORE program offers three other levels of recognition. The next step up is called "you rock" awards, in which employees can send colleagues gifts that cost up to about \$15 — think a box of chocolates, movie tickets or a bottle of wine. Behavior examples include constructively responding to change or sharing knowledge that helps others grow professionally. To avoid busting the budget, employees are limited to sending only 10 of these awards a year.

The third level of recognition, known as "game-changers," are awarded only by managers. They offer slightly larger rewards, such as dinner for two, and recognize behaviors such as completing stretch goals, succeeding under pressure, or committing extra time to support a team member outside their day-to-day role. At the top of the company's recognition pyramid stands LAA recognition, an acronym for Leadership Amazing Award. Employees are eligible if they go above and beyond to live the company's corporate values; examples include thinking bigger than themselves and tackling challenges significantly above their usual responsibilities.

The why and the what

The hardest part of developing an effective recognition program is deciding why people should be recognized — what strategic goals and values should serve as the criteria — and what they should receive for that recognition. She says a good benchmark for budgeting for recognition rewards is 1 percent of a company's payroll. Moreover, the level of gift should be appropriate, and the reason for the reward and the gifts employees receive should be reviewed periodically to be sure they remain aligned with corporate goals and values, she says.

"At our company, we're not financially driven at all," Corey says, noting that rewards don't have to be expensive to be effective. "We don't want something big — it's not our culture to, say, give a \$500 reward for recognition. I'm not saying that's right or wrong, but we just prefer smaller rewards (that are more attainable)."

"When we rolled out the program, it was my wish that everyone in the company gets a you rock award ... that everyone thinks about what they can do to go above and beyond to get recognized," she adds. Moreover, larger rewards also can backfire because they can create envy among unrewarded employees who may feel strongly that they deserve recognition, too, she notes.

In the end, a good, transparent recognition program creates a level playing field for all employees to be recognized for their good work. And using social media to publicize it maximizes exposure for the company's best performers, which in turn can motivate others to emulate those optimum, value-driven behaviors. As Corey points out, "It lets all employees see what good looks like." ♦



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 AMT Pump Company See ad page 50	AMT Pump Company 400 Spring St., Royersford, PA 19468 Phone: 610-948-3800 • Fax: 610-948-5300 Email: sales@amtpump.com Website: www.amtpump.com	YES	YES	YES	YES	YES				YES		YES	YES	YES				YES	YES				
 Blue-White Industries, Ltd. See ad page 25	Blue-White Industries 5300 Business Dr., Huntington Beach, CA 92649 Phone: 714-893-8529 • Fax: 714-894-9492 Email: sales@blue-white.com Website: www.blue-white.com					YES																	
 Boerger, LLC	2860 Water Tower Pl., Chanhassen, MN 55317 Phone: 612-435-7300 • Fax: 612-435-7301 Email: america@boerger.com Website: www.boerger.com		YES		YES					YES		YES						YES					
 GLOBAL PUMP	Global Pump 10162 E Coldwater Rd., Davison, MI 48423 Toll Free: 866-360-7867 • Phone: 810-653-4828 Fax: 810-658-0632 Email: sales@globalpump.com Website: www.globalpump.com	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
 GORMAN-RUPP PUMPS See ad page 33	Gorman-Rupp Company 600 S. Airport Rd., Mansfield, OH 44903 Phone: 419-755-1011 • Fax: 419-755-1251 Email: grsales@gormanrupp.com Website: www.GRpumps.com	YES	YES	YES		YES	YES	YES	YES	YES	YES	YES	YES					YES	YES	YES			
 Komline-Sanderson	Komline-Sanderson 12 Holland Ave., Peapack, NJ 07977 Toll Free: 800-225-5457 • Phone: 908-234-1000 Fax: 908-234-9487 Email: info@komline.com Website: www.komline.com		YES		YES					YES													
 Moro USA, Inc.	PO Box 424, Union, MO 83084 Toll Free: 800-383-6304 • Phone: 412-787-8400 Fax: 412-787-8444 Email: sales@morousa.com www.morousa.com				YES		YES	YES	YES					YES					YES				
 PRIMEX	PRIMEX PO Box 1708, Detroit Lakes, MN 56501 Toll Free: 844-477-4639 • Phone: 888-342-5753 Fax: 218-847-4617 Email: info@primexcontrols.com Website: www.primexcontrols.com						YES															Pump Control Panels	
 ProMinent	ProMinent Fluid Controls, Inc. 1136 Industry Dr., Pittsburgh, PA 15275 Phone: 412-787-2484 • Fax: 412-787-0704 Email: prominent-us@prominent.com Website: www.prominent.us				YES	YES																	
See ad page 32	RELINER/Duran Inc. 9 Matthews Dr. A1/A2, East Haddam, CT 06423 Toll Free: 800-508-6001 • Fax: 877-434-3197 Email: info@reliner.com Website: www.reliner.com																	YES					

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 Smith & Loveless Inc.	Smith & Loveless, Inc. 14040 Santa Fe Trail Dr., Lenexa, KS 66215 Toll Free: 800-898-9122 • Phone: 913-888-5201 Fax: 913-888-2173 Email: answers@smithandloveless.com Website: www.smithandloveless.com	YES							YES	YES	YES	YES					YES						
 SULZER	Sulzer Pumps Solutions Inc. 140 Pond View Dr., Meriden, CT 06450 Toll Free: 800-525-7790 • Phone: 203-238-2700 Fax: 203-238-0738 Email: info.abs.usa@sulzer.com Website: www.sulzer.com	YES	YES	YES	YES	YES			YES		YES		YES				YES		YES				
	Vacuum Sales, Inc. 51 Stone Rd., Lindenwold, NJ 08021 Toll Free: 800-547-7790 • Phone: 856-627-7790 Fax: 856-627-3044 Email: parts@vacuumsalesinc.com Website: www.vacuumsalesinc.com				YES	YES	YES	YES						YES		YES	YES	YES					
 Vaughan	Vaughan Company, Inc. 364 Monte-Elma Rd., Montesano, WA 98563 Toll Free: 888-249-2467 • Phone: 360-249-4042 Fax: 360-249-6155 Email: info@chopperpumps.com Website: www.chopperpumps.com	YES	YES	YES	YES					YES	YES	YES					YES						
	Vertiflo Pump Company 7807 Redsky Dr., Cincinnati, OH 45249 Phone: 513-530-0888 • Fax: 513-530-0893 Email: sales@vertiflopump.com Website: www.vertiflopump.com	YES	YES	YES	YES			YES		YES	YES	YES				YES	YES	YES					
 WASTECORP Pumps	Wastecorp Pumps PO Box 70, Grand Island, NY 14072 Toll Free: 888-829-2783 • Phone: 201-445-2882 Fax: 888-888-3320 Email: info@wastecorp.com Website: www.wastecorp.com	YES	YES	YES	YES		YES	YES		YES		YES	YES				YES						
 WATER CANNON See ad page 57	Water Cannon Inc. 4300 W Lake Mary Blvd., # 1010-424 Lake Mary, FL 32746 Toll Free: 800-333-9274 • Fax: 888-928-9274 Email: sales@watercannon.com Website: www.watercannon.com				YES			YES					YES				YES	YES					
 wilo [®] See ad page 15	Wilo USA 9550 W Higgins Rd. Ste. 300, Rosemont, IL 60018 Toll Free: 888-945-6872 • Fax: 888-945-6873 Email: info@wilo-usa.com Website: www.wilo-usa.com	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES			YES		YES				
	Zoeller Engineered Products 3649 Cane Run Rd., Louisville, KY 40211 Toll Free: 800-928-7867 • Phone: 502-778-2731 Fax: 502-774-3624 Website: www.zoellerengineered.com	YES		YES	YES			YES					YES	YES									



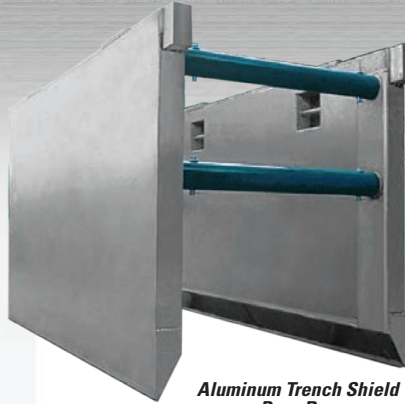
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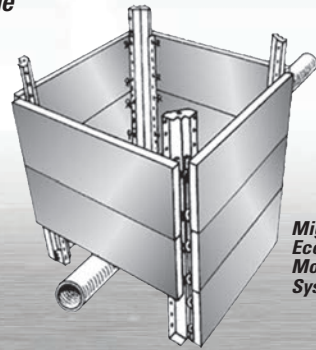
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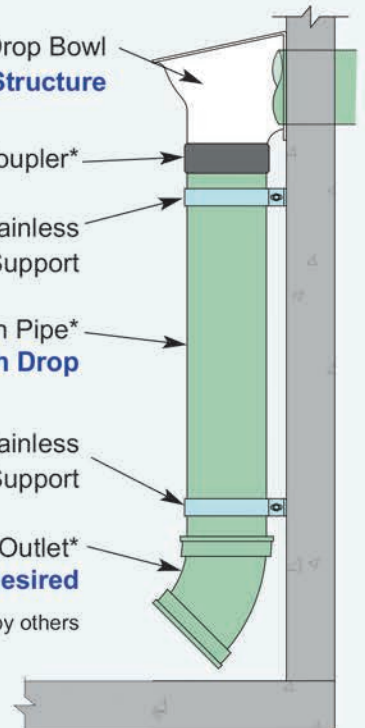
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BRINGING BUSINESS IN-HOUSE

City buys out private contracting operation and establishes its own turnkey construction division

By Jared Raney

To remain proactive and spur their master improvement plan, the city of Liberty, Missouri, found a novel method to simplify rehab and construction.

The city approached Kelson and Kenneth Kerns about the possibility of buying the assets of the long-standing family construction business their father started in the 1970s. As part of the deal, the Kerns brothers would join Liberty as full-time employees, taking management positions overseeing the construction division. The timing was perfect.

“They approached us about buying our equipment — pipelaying equipment, shoring, and everything needed to start construction for the city of Liberty — and we sold all of it to the city,” says Kelson, who heads the wastewater end of the construction division. “Then we became employees of the city of Liberty.”

A difficult choice

The decision to sell the family business wasn't easy, but the small company had done work for the city for years and joining the Liberty utilities department turned out to be an ideal scenario for the Kerns brothers.

In the early 2000s, Liberty began work on master plans for their water and wastewater systems. When the utilities department was separated from Public Works in 2011, management had the idea of adding a construction division for water and wastewater projects.

They approached the Kerns and made them an offer in fall 2011.

“It was kind of the right timing for both of us because the construction industry at that time was just very competitive,” Kelson says.

(continued)

Collections worker Willis Johnson of the Liberty (Missouri) Utilities Division lowers an Envirosight Rover camera into a manhole during a sewer inspection. (Photography by Denny Medley)



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Collections worker Gary Harter operates a camera from the control room of Liberty's inspection van during a sewer main inspection.



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Liberty, Missouri, Utilities
Construction Division

POPULATION:
30,614 in 2016

ESTABLISHED:
City incorporated in 1829,
utilities department — 2011,
construction division — 2012

EMPLOYEES:
23 in utilities division, four in
construction

WEBSITE:
www.libertymissouri.gov

“It’s great actually — just having an extra set of hands if we need help, or even on bigger projects, if we go help them. It gives our guys a little more experience too on some other stuff that they normally wouldn’t be exposed to.”

Jason Thomas

The Kerns say that their parents were considering retiring from the business at that time anyway, and it provided a future for them to continue working in the industry without the stress of keeping the business afloat.

“This made it easier for their transition to retirement,” Kelson says. “And then we have something to do, as far as a career in construction.”

With a specialty in underground construction, the business had done many projects for Liberty over the years.

“In all the years that I’ve been here, they were always our go-to guys in case of emergency,” says Brent Ellison, longtime Liberty employee and current assistant director for utilities, operations, and construction. “We worked hand in hand with them, even though they really didn’t work per se under the city’s control.”

Nonetheless, a series of misfortunes dominated the 2000s for the Kerns. A tornado destroyed much of their facilities and equipment in 2003, which they were still recovering from when the 2008 recession compounded their troubles.

“It was hard to get back up, recover from that,” says Kenneth, water construction manager for Liberty. “That made a double-whammy on the

business, so when the city approached us about coming to work for them and starting the construction division, we jumped at it.”

Under the city’s employment, they were even able to build a nice new office in their old facility, now owned by the city. After the space was ready, the division started simply, with just the brothers and a single laborer, doing rehab work and smaller projects within the master plan.

“There’s peace of mind knowing you’re going to have work. When you’re in the private sector, you depend on bidding jobs and getting them. And we’ve got security as far as having work to do and having a retirement plan,” Kenneth says. “Less stress, definitely.”

Adjusting on the fly

If there were any doubts among other city departments as to the need for an internal construction division, they were quickly quelled.

“We immediately started going to work. We had one major project actually start in the spring: several thousand feet of waterline we put outside of town in an area that didn’t have city water,” Kelson says. “That was our first project right out of the gate.”

Liberty was settled early in the 1800s and became the county seat in 1822, even though it wasn’t incorporated until 1829. Much of the city still uses its original underground systems and actually has honorary membership to the Cast Iron Pipe Century Club, meaning a significant amount of pipe is at least 100 years old.



Gary Harter moves a Prowler easement machine from 3T Equipment across the shop floor.

“Liberty’s a pretty old town and has some issues,” says Jason Thomas, collections division manager. “We try to walk a line of maintenance without breaking any of the pipe further, and then we’ve also experienced a little bit of growth, so there’s a fair amount of new pipe in town too, but we still deal with pipes that are a hundred years old.”

The combination of maintenance, rehabilitation and new construction keeps the Kerns and their new division busy.

“We kind of hit the ground running here that spring, and it’s grown since then,” Kenneth says. “We haven’t stopped working on different projects that the city comes up with: sewer projects, water

(continued)



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“I’ve got a spreadsheet going on this, where we’ve saved quite a sum of money — three-quarters of a million dollars over the past five or six years — on doing this in-house.”

Kelson Kerns



Distribution manager Ken Kerns works in the trench while Collections manager Kelson Kerns operates the Volvo Trackhoe during a waterline replacement project.

projects. ... We don't have a loss for work.”

Some large projects are still contracted out, but having the construction division available for both rehab and smaller capital improvements is faster, generally cheaper, and frees up other city resources to focus on projects that will go to bid.

“Having them in-house allows us to schedule jobs a lot sooner and a lot more cost-effectively,” Thomas says.

Help flows both ways, too, as Thomas and his collections crews can step in with a hydroexcavator or other assistance when necessary.

“It's great actually — just having an extra set of hands if we need help, or even on bigger projects, if we go help them,” Thomas says. “It gives our guys a little more experience too on some other stuff that they normally wouldn't be exposed to.”

Proof is in the projects

A job that started as a simple point repair project exemplifies the benefit of a staff construction crew. The sewer line in question collapsed and ended in a full line replacement, from manhole to manhole.

The Kerns were on the job immediately, instead of the city having to wait potentially days or weeks to begin the repair.

“Just to have them on staff to come out and start working on that right away — instead of having to solicit bids and go who knows how long before we could get it worked on — I'd say easily weeks, saving time. And then some of the other jobs, I mean, it could be months,” Thomas says. “When you hire out a company, you have to get an engineering firm and then go through a lot of other hoops that we don't have to go through.”

An upcoming job this spring is another great example: “If you had to get a contractor, you'd probably have to have an engineer, and with the bidding process, it'd be a year or so before this

(continued)

The full staff of the Liberty (Missouri) Utilities Division at the main Utilities Center building.



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would get done," Kenneth says. "I think we can get it done this spring and be back on the road to the next job."

In addition to saving time, the construction division saves money on a number of factors — most notably the fact that profits aren't an issue.

"It's more cost-effective. You don't have to pay prevailing wage, of course we don't charge a profit, when we do our jobs, it's materials and our labor," Kelson says. "I've got a spreadsheet going on this, where we've saved quite a sum of money — three-quarters of a million dollars over the past five or six years — on doing this in-house."

Benefits for all

The problems Liberty faces are common to many small cities around the country — aging infrastructure and providing for growth at the same time, with close competition between lack of funds and lack of manpower.

An entire construction division may seem out of reach for many municipalities, but this town, at least, makes it look pretty easy.

"Personally, for me, I'm pretty happy here," Kenneth says. "The city's been good to us. It's satisfying to know that we're saving the city money every time we go out and work."

It has worked out on both ends, helping the city to maintain a progressive work schedule with water and wastewater systems and keeping a pair

of experienced managers thriving in the industry.

"Now that we have them on, it has definitely been a godsend," Thomas says. ♦

AVOID THE BIDDING WARS

Bidding projects can often be a mixed bag for utilities: Sure, it generally encourages competitive pricing, but it takes time and comes with a lot of hoops to jump through, often including multiple subcontractors and significant organizational efforts.

However, the city of Liberty has found a way to avoid that hassle by creating a construction division within their utility. While not unheard of, Liberty took a creative approach to their construction division.

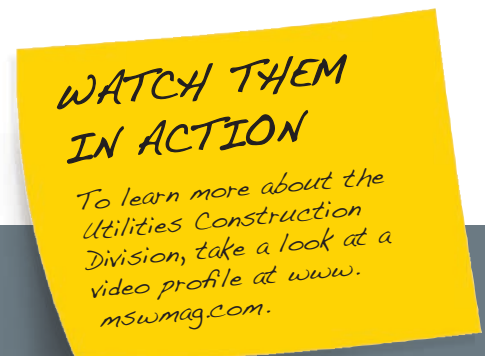
Starting a new division is no simple endeavor, but by essentially folding a longtime contractor into the city, purchasing assets, and hiring on the former owners as managers, the division found its feet quickly.

"Actually it was very smooth. I was very surprised," says Brent Ellison, assistant director of utilities, operations, and construction for Liberty. "I think that was due to the fact that we had worked with and beside them on numerous occasions in the past."

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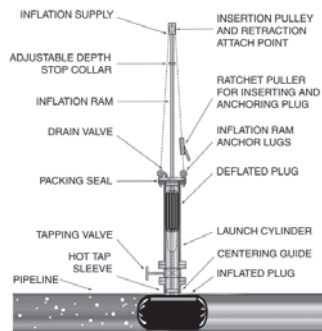
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BETTER TECHNOLOGY CHOICES

New-generation Trenchless Assessment Guide for Rehabilitation database management system to provide decision support for trenchless technologies

By Sheila Joy

The Trenchless Assessment Guide for Rehabilitation, or TAG-R, is a fully automated, web-based decision support tool for the selection of trenchless technology methods based on a project's unique needs and characteristics.

NASSCO, in partnership with other industry leaders, will soon release the updated TAG-R tool to provide even more comprehensive data designed to help contractors, system owners and engineers identify the best trenchless solutions for specific project criteria. Updates to the TAG-R 3.0 program — expected for full release this fall — will include:

- A new stand-alone application of TAG-R using the Microsoft Access database management system. This format will allow the import of the Pipeline Assessment Certification Program and Lateral Assessment Certification Program exchange databases and utilize the data for identifying appropriate technologies.
- The capability to import multiple line segments from a PACP/LACP database, including the PACP condition grading system, in a quick, seamless manner.

- The ability for external information not readily available from PACP data (but required to match up rehabilitation solutions with a particular pipe) to be manually entered or populated electronically.
- A comprehensive database for rehabilitation technologies, including reports explaining each technology, application, and other relevant information.
- Updated existing product/process databases, as well as new products and processes for the following classifications: gravity sewers, storm sewers, drainlines and culverts, and building service laterals.
- A printable report output, and a data export feature.

Future releases will include Manhole Assessment Certification Program data, as well as a risk analysis or social cost calculator. The new-generation TAG-R 3.0 tool, available in the coming months, will be available at www.nassco.org. ♦

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 Includes: PACP, MACP, LACP
 Trainer: Paul Booth
 704-681-3989 or woodsdeenv@gmail.com

May 15
Hartford, CT
 Includes: LACP, PACP, MACP
 Trainer: Laurie Perkins
 888-621-8156 or laurie.perkins@wright-pierce.com

May 15
Asheville, NC
 Includes: PACP, MACP, LACP
 Trainer: Jim Harris Jr.
 615-254-6002 or jim.harrisjr@jacobs.com

May 15
Bolton, Ontario
 Includes: PACP, MACP, LACP
 Trainer: Brandon Conley
 248-349-0904 or pacp@dohenycompanies.com

May 22
Birmingham, AL
 Includes: PACP, MACP, LACP
 Trainer: Paul Booth
 704-681-3989 or woodsdeenv@gmail.com

May 22
La Porte, TX
 Includes: LACP, PACP, MACP
 Trainer info: Brandon Conley
 248-349-0904 or pacp@dohenycompanies.com

May 23
Stafford Springs, CT
 Includes: PACP, MACP, LACP
 Trainer: Justin deMello
 978-482-7884 or jdemello@woodardcurran.com

May 29
Honolulu, HI
 Includes: LACP, PACP, MACP
 Trainer: Marilyn Shepard
 916-899-8961 or mshpard1@hotmail.com

ITCP TRAINING (CIPP and Manhole)

May 17
Denver, CO
 Includes: ITCP - CIPP
 Trainer: Rocky Capehart
 916-834-2712 or rcapehart01@comcast.net

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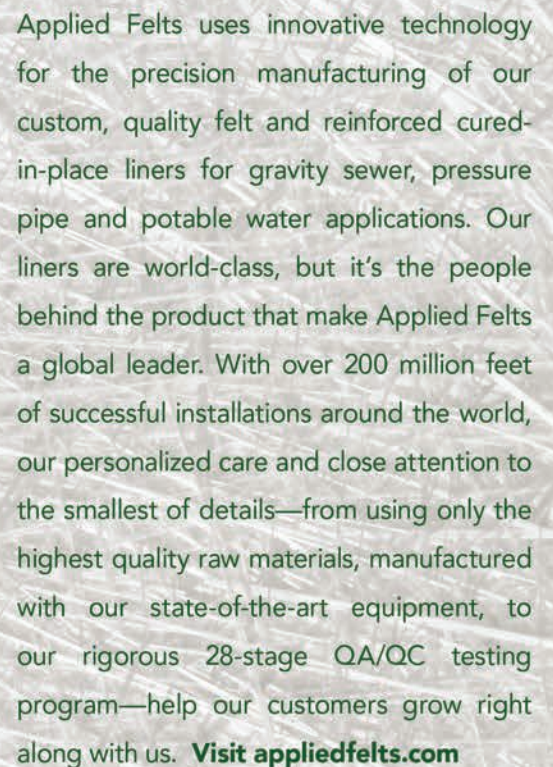
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PUMPS, LIFT STATIONS AND CONVEYANCE

By Craig Mandli



PSL 5.0 Hybrid Pump Station Level Controller



ReliaSource Modular Above-Ground Lift Station



HIVENT



KwikSwitch



Manhole Invert Channel Systems

Control Panel

Greyline Instruments PSL 5.0 Hybrid Pump Station Level Controller

The **PSL 5.0 Hybrid Pump Station Level Controller** from **Greyline Instruments** is ideal for pump stations, lift stations, wet wells and tank level control. It has a noncontacting ultrasonic level sensor with a 32-foot measurement range, LCD display for real-time level reading and relay status, six independently programmable relay outputs, and a 4-20mA input for a redundant level sensor. The simple menu system and built-in keypad makes configuring the measurement range, relay setpoints, and pump alternation sequences easy. The LCD display offers diagnostic information like relay/pump runtimes. When ultrasonic level signal is lost because of grease, foam, or vapors in the tank, the redundant pressure sensor takes over so that level measurement and pump control is never lost. Ultrasonic level measurement automatically recovers when the tank conditions have improved. **888-473-9546; www.greyline.com.**

Lift Stations/Accessories

Gorman-Rupp ReliaSource Modular Above-Ground Lift Station

The **ReliaSource Modular Above-Ground Lift Station** from **Gorman-Rupp** provides a larger solution to accommodate additional components and more complex controls. It includes genuine Gorman-Rupp pumps, controls, and enclosure, and it arrives fully assembled and tested to operating conditions. Every unit is backed by a worldwide network of factory-trained distributors and full parts service. **419-755-1011; www.grpumps.com.**

H2S Control HIVENT

The **HIVENT** from **H2S Control** is a passive vapor phase odor control unit that easily attaches to a lift station vent. It uses **HISCENT**, a safe blend of all-natural essential oils to neutralize odors emitted from the vent. When the lift station pumps are off and the wet well level is rising, the odorous air passes through and is neutralized before being discharged into the environment. When the lift station pumps are running and the wet well level is dropping, clean air is drawn through and into the wet well along with **HISCENT** neutralizing odors within. It treats the air twice using no water or electricity, only the natural flow of air through the unit. It is made of corrosion-resistant aluminum, requires no maintenance, and uses just two to three gallons of **HISCENT** per year. **407-628-1880; www.h2scontrol.com.**

PRIMEX KwikSwitch

The **KwikSwitch** quick-release float switch connection system from **PRIMEX** improves reliability and reduces installation and float switch replacement time. It is designed to be installed directly in a wet well. The four-port manifold easily connects one to four float switches for level control applications, and its color-coded wiring pairs and corresponding colored caps make installation and maintenance easy. It is rated for temporary submersion, and its dual-seal design provides improved protection against water ingress and corrosive gases typically found in sewage lift stations. It includes a single manifold multiconductor direct burial rated cable and stainless steel mounting bracket for the manifold. Sealing plugs for unused ports and mechanically activated float switches are available. It is CSA certified. **844-477-4639; www.primexcontrols.com.**

RELINER/Duran Manhole Invert Channel System

Manhole Invert Channel Systems from **RELINER/Duran** include molded fiberglass flumes with smooth sewer pipe interfaces that are used



AV|GATED Sensor



ProSeries-M M-3



BLUEline Rotary Lobe Pump



Concertor



STS Series

to rehabilitate inverts without flow interruption and are also used for new construction. The field-installed modular components bolt together inside the manhole and serve as the form for a new concrete bench, eliminating the inconsistencies associated with field-formed concrete channels. The full depth lined channels are high-flow and easy to clean and maintain. Standard 8- and 12-inch depth channel sections fit through a 24-inch manhole frame and will accommodate 6- through 12-inch pipes. Larger sizes are available. **800-508-6001; www.reliner.com.**

Meter

AV|GATED Sensor

The **AV|GATED** sensor combines accurate velocity technologies for wastewater flow measurement. Ultrasonic depth and gated velocity measurements deliver accuracy. The rugged and reliable sensor is constructed with a tough, polycarbonate housing built to handle the urban sewer environment. It is designed with the field technician in mind, coming in safety orange for high visibility on site and a 35-foot cable to easily accommodate most manhole installations. **800-633-7246; www.adsenv.com.**

Pumps

Blue-White Industries ProSeries-M M-3

The ProSeries-M M-3 peristaltic metering pump from Blue-White Industries has feed rates from 0.0002 to 33.3 gph, with pressure ratings to 125 psi. It comes with a heavy-duty multichannel pump tube, and a Tube Failure Detection System that senses tube failure caused by conductive chemicals. The pump will automatically shut down until the problem is resolved. It also includes a brushless DC motor and a revolution count display and alarm. It is NEMA 4X (IP66), NSF Standard 61, CE and ETL listed. **714-893-8529; www.blue-white.com.**

Boerger BLUEline Rotary Lobe Pump

The **Boerger BLUEline Rotary Lobe Pump** is a self-priming, valveless, positive displacement pump used to convey viscous and abrasive materials. There are 21 pump models in six series with pulsation-free operation, fully reversible rotation, dry-run capabilities and flow rates up to 7,500 gpm. They are stable and wear-resistant with a maintenance-in-place design that allows for all wetted parts to be easily replaced through the front cover without the removal of pipe or drive systems, according to the maker. **612-435-7300; www.boerger.com.**

Flygt - a Xylem Brand Concertor

The **Concertor** smart, interconnected wastewater-pumping system from **Flygt - a Xylem Brand** senses the operating conditions of its environment, adapts its performance in real time, and provides feedback to pumping station operators. It offers energy savings of up to 70 percent compared to a conventional pumping system; it also reduces inventory by up to 80 percent due to flexible performance. Clog-free pumping operation and clean wet wells can save up to 80 percent in vacuum cleaning costs, according to the maker. Its compact design reduces cabinet size by up to 50 percent. It offers a wide performance field to choose the right operating point, making performance fine-tuning simple. **855-995-4261; www.xylem.com.**

Franklin Electric STS Series

The 9-inch **STS Series** submersible turbine pump from **Franklin Electric** has a premium glass-lined bowl for maximum efficiency and abrasion resistance, and the application flexibility provided by the dual discharge option for either a 6- or 8-inch drop pipe. Each pump features ductile iron motor brackets, ductile iron discharges, cast 304 stainless steel impellers, spiral cutlass rubber intermediate bowl bearings, and copper bismuth bronze discharge and motor bracket bearings. The profile upthrust adjustment bolt provides protection, while the bronze motor bracket bearing is protected with a stainless steel sand collar. **260-824-2900; www.franklinwater.com.**

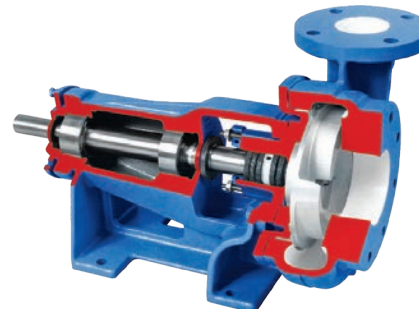
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Wipes Ready



EZstrip



Pump 1400



Vortex Mover Pumps

JWC Environmental Wipes Ready technology

Wipes Ready technology from **JWC Environmental** was created for Muffin Monster and Channel Monster products to eliminate nondispersible material from producing clogs in wastewater systems. It shreds wipes and rags in two directions, leaving behind pieces small enough that they will not reweave into rag balls. The small pieces left behind will remain in suspension, preventing pumps from clogging and allowing systems to run efficiently. Features include 17-tooth cutters, Delta-P side rails, 1/2-inch perforated drums and optimized cut control. **800-331-2277; www.jwce.com.**

NOV EZstrip

The **EZstrip** maintain-in-place progressing cavity pump from **NOV** has quick and safe removal of the full drivetrain including rotor, stator, shaft, rod and seal in minutes without electrical disconnection. The access covers provide 360-degree access to the coupling rod and drive shaft for easy inspection. With its smooth-profile positive torque split coupling rod, maintenance and assembly times are reduced. The tie-bar-free design allows the EZstator clamps to lock the stator securely in place, further reducing stator removal time by over 50 percent and improving safety of common maintenance operations. In addition, the fixed support foot and stator clamp assembly further aids rotor and stator removal. It is available in cast iron or stainless steel with a choice of rotor and stator materials to suit individual applications. **832-424-7300; www.nov.com.**

Vertiflo Pump I400

The **Vertiflo Pump 1400** horizontal end suction pump has a heavy-duty cast-iron frame that incorporates integrally cast support and ribbed mounting feet, which assure a solid, dependable pump installation and operation. One frame fits all pump sizes. The frame has a back pullout design that allows for easy inspection or service/maintenance without disturbing the piping to the pump. It offers ease of maintenance with external impeller adjustment. Its semiopen impeller design accommodates passage of solids or fines. All impellers have balance holes near the hub, which reduce thrust

load and pressure in the packing or seal area. Wiping vanes reduce axial loading and prevent dirt from entering the sealing area. Packing or various mechanical seal arrangements are available. It is offered in cast iron, 316 stainless steel fitted, all 316 stainless steel, or CD4MCu. Capacities range up to 3,600 gpm, with heads of 275 feet and temperatures of 250 degrees F. **513-530-0888; www.vertiflo.com.**

Weil Pump Vortex Mover Pump

Vortex Mover Pumps from **Weil Pump** are designed to effectively pump “no-flush” polyester wipes, such as baby wipes, handy wipes, shopping cart wipes, barrier cloths and washcloths. Thanks to the design of the clog-free zone, they solve the ever-common problem created by these troublesome towels flushed into the wastewater system, which often ball up and clog many grinder and solids handling pumps. The rugged cast-iron submersible mover pumps offer 1,750 and 3,450 rpm double-seal submersible motors and are available in 2-, 3- and 4-inch discharge. They are delivered as either floor-mounted or quick-removal configurations. **262-377-1399; www.weilpump.com.**



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Cleaning system eliminates biomass, increases productivity

Problem:

Shane Donoghue, a wastewater facilities manager in a large Australian city, saw accumulation of FOG and biomass up to 4 feet deep in a month in a lift station. This required tens of thousands of dollars in maintenance, including weekly to biweekly vacuum truck services and confined-space entry to clean the well by hand. "Sometimes the FOG would build so thick, it was too great of a load for a single truck, and they would have to come back again," Donoghue says.



Solution:

Donoghue purchased the EP-1300 conditioning and cleaning system from Anue Water Technologies to relieve the department's operations budget. The unit operates by recycling a small amount of discharged flow to create ongoing surface agitation that prevents FOG buildup and promotes aerobic activity.

RESULT:

The installation immediately reduced maintenance checkups from weekly to monthly, and the lift station no longer required continuous vacuuming. "Our need for confined-space entry was just about eliminated," Donoghue says. When considering the reduction in labor costs, vacuum truck cleaning, and tipping fees, a single unit saved \$15,000 in the first year and nearly \$22,000 in the second year. The change in cleaning routines reduced maintenance costs by nearly 50 percent. **760-727-2683; www.anuewater.com.**

Packaged pump system used in switch to sodium hypochlorite

Problem:

The city of Camden, Tennessee, was in the midst of a project to change its disinfection system from chlorine gas to sodium hypochlorite. The city needed a metering pump system that could fit in a limited space.



Solution:

The city selected two Flowrox Packaged Pump Systems that incorporated two pumps each. Flowrox pumps were ideal because the peristaltic pumps don't vacuum degas on warm summer days. Also, the pumps are ideal for suction lift duties. The systems were equipped with manifold blocks, safety relief valves, gauges, and shut-off valves and have an integral tube leak detector. The base the pumps sit on also performs as spill containment for mishaps and can be equipped with safety drains and even alarms.

RESULT:

The plug-and-play systems have performed as advertised. **888-356-9797; www.flowrox.com.**

Control valve key to sludge removal at hydroelectric plant

Problem:

The Guadalupe Hydroelectric plant operates three turbines that require cooling. The cooling system collects water from a holding tank that has screens to filter fine sand particles. The sand is decanted in the bottom of the tank and can get up to 8 inches high in a period of six months. This gradually decreases the efficiency of the cooling system, resulting in an average 26-hour suspension of plant operations to deploy 10 people to drain, remove sludge and refill the tank.



Solution:

A sludge removal system was designed using a network of high-pressure sprinklers on the bottom of the tank to stir the sludge and then discharge the muddy water through a submersible pump. In order for this design to work, it was imperative that the pressurized water to the sprinklers was regulated to flow at a constant 2,377.50 gpm. A Singer Valve 10-inch 206-2SC-MV - Class 300 control valve was chosen because it combines precise flow control with flowmetering to ensure that the flow is adjusted to supply water at stable pressure.

RESULT:

The sludge removal has changed from a manual cleaning to an automatic six-hour process, and it has decreased generator maintenance as the water quality in the cooling system has significantly improved. "By regulating the flow with Singer's control valve in our new sludge extraction system, we have reduced our maintenance costs and reduced interruption of power generation," says Carlos Ospina, operations director for the plant. **888-764-7858; www.singervalve.com.**

Rural collections system simplifies lift station maintenance with above-ground systems

Problem:

The city of Perryville, Missouri, employs a small staff to manage its lift station network, which is spread over many miles due to its rural nature. Typical submersible-type lift stations are burdensome due to their unreliable performance, time-consuming confined-space entry and frequent pump replacements. The result was high labor and parts costs and frequent downtimes. "With submersible pumps,



(continued)

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when you pull those, you tend to end up breaking other components in the lift station and having more down time,” says Linda Chappius, maintenance technician.

Solution:

Today, the city operates six above-ground Wet Well Mounted Pump Stations from Smith & Loveless. These systems feature all pumps, valves and controls housed above ground-level and outside of the confined-space wet well. “You don’t have to be in the wastewater and dealing with all the hazardous situations,” Chappius says.

RESULT:

Chappius safely and conveniently inspects each of the stations daily without the extra requirements associated with confined-space entry. This has helped the city achieve continuity of maintenance and simplify its regular maintenance program for pump stations. As a result, the city has received superior longevity from the systems. The first station the city installed in 1995 is still in operation today, more than two decades later. “It’s been a tremendously good lift station,” Chappius says. “For where it’s located and what it goes through for day-to-day use, it’s an excellent piece of equipment.” **800-898-9122; www.smithandloveless.com.**

Pump helps municipality prepare for imminent hurricane season

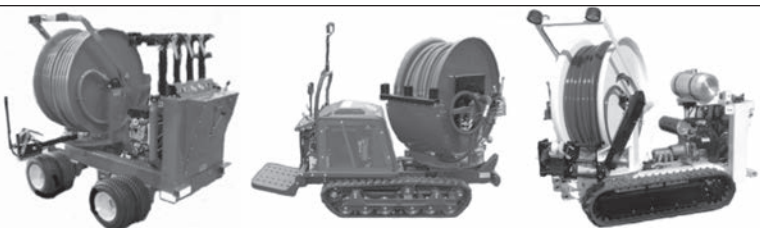
Problem:

Until recently, a Florida municipality frequently encountered significant increases in wastewater flow at their treatment plant due to surface and groundwater entering the collections system during major rain events. The plant could not safely discharge the disinfected wastewater fast enough, resulting in the discharge of over 200 million gallons of untreated wastewater into a major public waterway.



Solution:

The general contractor quickly implemented the first phase of the munic-



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ipality’s action plan by drilling an 800-foot injection well. It was designed to accept the maximum permitted flow of 22 mgd of treated wastewater. The well was estimated to have a hydrostatic pressure of 105 psi. The massive flow rate at such high pressure presented a unique challenge. The general contractor and the municipality asked Thompson Pump to design, manufacture, and deliver four 12-inch, high-pressure, diesel-driven pumps. In addition to the high flows and pressures required, each required 315 hp, sound attenuation to 74 dBA at 23 feet, and Final Tier 4 emission-compliant diesel engines.

RESULT:

After the pumps arrived on site, high-pressure discharge piping was constructed and suction piping installed. The pumps were ready for testing several weeks after delivery. Each achieved full prime in less than 45 seconds, due to the company’s oil-less vacuum technology. With all pumps operating at 1,600 rpm, they were able to achieve a flow rate of 15,277 gpm. During Hurricane Irma, the plant effectively treated and stored all wastewater coming into the plant, with no reports of wastewater spill. **800-767-7310; www.thompsonpump.com.**

Submersible chopper pump stands strong through tropical storm

Problem:

The main lift station serving the wastewater treatment plant in Morgan’s Point, Texas, continually experienced problems with its three standard nonclog pumps. The pumps frequently clogged when rainfall totals reached or exceeded 2 inches — with shop rags, pieces of lumber, plastic bottles, gloves, and wet wipes all commonly clogging the pumps when the standard demand increased. Over a 7-year period, these issues required the city to spend around \$100,000 to maintain and service the three pumps.



Solution:

The city approved a Vaughan SE-Series Submersible Chopper Pump, along with a complete guide rail system to solve the frequent clogging problem.

RESULT:

Since the Vaughan pumps were installed in late July 2016, the city has experienced over 100 inches of rainfall with no plugging incidents or other issues. During Hurricane Harvey in 2017, the pumps ran continuously for 72 hours with no plugging incidents and no problems while pumping over 2.5 million gallons of unscreened sewage through the lift station. “I just wish we had purchased these pumps years ago to eliminate the maintenance headaches we endured and the costs we incurred keeping our previous pumps in operation,” says Brian Schneider, city administrator for Morgan’s Point. “If the former pumps were still installed, all of the residents would have had sewage in their homes.” **888-249-2467; www.chopperpumps.com. ♦**

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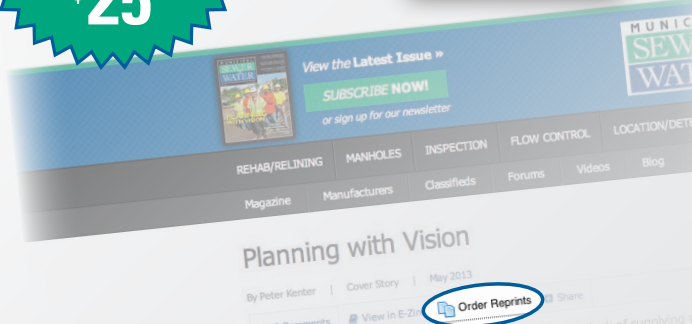
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Product Spotlight

An easier way to replace flanged valves

By Craig Mandli

Replacing flanged valves can be complicated and time-consuming, not to mention dangerous. Well, the Valve-Out Tool from Specialty Maintenance Products is designed to eliminate those problems.

The bolt hole-specific valve spreader eliminates the need for come-alongs, trackhoes, wire rope, chains, hammers, and wedges when attempting to replace flanged valves and meters. When you turn the jack-bolt, the plates cantilever back, binding the bolt-hole pins in the bolt holes, pulling the outside flanges back, and spreading the flanges up to 1/2 inch. The tool requires no gap and is also ideal for changing gaskets.

“There is really nothing else comparable to the Valve-Out Tool on the market,” says Mark Goodman, company president. “It is designed to be simple to maintain and easy to use.”

The Valve-Out Tool safely pulls the outside flanges back, allowing the maintenance technician to easily remove and replace old valves and meters. It can be used flange to flange as a zero-gap flange spreader for gasket replacement, with the included spacer bars for flanged valve removal. It is ideal for replacing butterfly valves and meters as well.

“There are typically multiple types of valves in the water and wastewater industry where this tool is ideal,” Goodman says. “After time, these valves



wear out and need to be replaced. This tool makes that possible.”

In addition, Specialty Maintenance Products’ Valve-Out Tool valve spreader allows for safe and easy removal of control valves, bypass valves, expansion joints, spools, rupture disks, regulators, orifice plates and meters. Kits include flange-spreading plates to service traditional flange sizes, plus interchangeable bolt-hole pins and spacer parts, including two 1 3/4-inch caps, two 1 3/4-inch cups, four 2-inch spacers, and two 4-inch spacers. Spacer parts total 11 1/2 inches per side of the flange. The tool comes in two hard-shelled carrying cases with custom foam inserts. Extra spacer bars are also available for valves or meters wider than 14 inches. According to Goodman, the tool solves a problem that has plagued sewer maintenance workers for decades.

“Once these guys see how this tool works and the time it can save them, they never want to go back,” he says. “When you take time and safety into account, it genuinely pays for itself after only a couple uses.” **713-667-4402; www.smptools.com.**



Frac Tanks from Geneva Equipment

Assess and treat effluent water quality with ease to ensure compliance with federal, state and local discharge regulations. As municipalities continue to replace outdated septic and combined sewer systems, the controlled

flow of raw water and wastewater into water treatment facilities is critical for the preservation of potable water. The 21,000-gallon flat-top frac tank is the perfect solution, acting as a temporary holding tank and allowing for a controlled and variable flow to the treatment system. For larger projects, external manifolds with hammerlock fittings allow for the linking of multiple tanks, with each tank having a 3-inch fill line for the smooth transfer of liquids. Geneva Equipment has thousands of five-point inspection and EPA-complaint frac tanks available nationwide. Contact Eli and ask for delivery to your door. **855-201-2181; www.genevaequipment.com.**

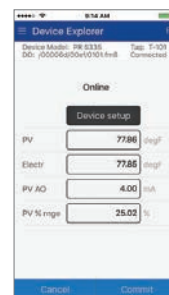
Vector 2100i combination sewer cleaner



Vector Manufacturing’s 2100i is a new combination sewer cleaner, and a successor to the 2100 Plus. It has the IntuiTouch one-touch control system that maximizes operator efficiency. Inside the cab is a 7-inch screen with backlit tactile buttons

and one-touch control for quick startup and engagement. Outside the cab, there’s a single control panel with a 7-inch touch screen featuring at-a-glance data and glove-friendly buttons. The new articulating controls adjust to the desired location for optimal placement. The RDB1015 Rapid Deployment Boom telescopes to 10 feet and extends the debris hose down 15 feet.

800-627-3171; www.vector.com.



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Envirosight Quickview airHD+ sewer assessment camera

The Quickview airHD+ zoom assessment camera from Envirosight has wireless tablet-based control, HD video, remote height and tilt adjustment, and hands-free operation. It also offers enhanced Wi-Fi, cloud connectivity and a laser range finder accessory that measures the exact distance to observations. Measurement of approximate distances can also be done with focus-based measurement. Current Quickview owners can upgrade software for free to obtain the cloud connectivity and focus-based measurement capabilities. **866-936-8476; www.envirosight.com.**

Vac-Con Titan Class combination machine



The Titan Class truck-mounted, dual-engine combination machine from Vac-Con features enhanced twin cyclonic separators, one located on each side of the truck, for optimal efficiency and filtration. The Aeroboost three-stage fan balances airflow, resulting in less turbulence and more power. The water system features 1 1/4-inch plumbing and ball valves. Upgraded hydrostatic and auxiliary drive systems that operate the vacuum and water functions lower noise emissions and reduce overall fuel consumption without sacrificing power. **904-284-4200; www.vac-con.com.**

Trimble T10 mapping and asset management tablet



Trimble's T10 tablet is a rugged, high-performance device for mapping and asset management applications. It allows for collection and processing of data in the field, eliminating the need for a separate laptop and speeding time-to-results by enabling deliverables to be produced while out on the job. The tablet has a large, 10.1-inch display that reads in bright daylight,

and its IP-65 platform meets military-grade specifications for shock, drop and vibration resistance. It supports Trimble field and office software workflows, including Unity, and Telogers for Windows and other third-party Windows 10 software. **585-742-3000; www.trimblewater.com.**

Mueller Water Products Jones Triton fire hydrant



The Jones Triton J-4048 dome top wet barrel fire hydrant from Mueller Water Products gives access to an auxiliary port at the top of the hydrant that allows it to be used for other purposes, such as construction water access and installation of pressure sensors. In the event of an emergency, the horizontal hydrant nozzles remain fully accessible to the fire department or utility, even if the dome port is being



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used. The dome top feature is also available as an option with the J-4065 model. **800-523-8618; www.joneswaterproducts.com.**



Gorman-Rupp ValuPrime line of centrifugal pumps

ValuPrime priming-assisted, centrifugal pumps from Gorman-Rupp are ideally suited for dewatering needs and are based on the Prime Aire and Prime Aire Plus lines. The pumps come in 4-by-4-inch and 6-by-6-inch sizes, flows to 1,520 gpm, a total dynamic head to 150 feet, and solids handling capabilities up to 3 inches. **419-755-1011; www.grpumps.com.**

Water Cannon Inc. - MWBE pressure washers



Pressure washers from Water Cannon Inc. - MWBE feature a recirculation module that cools the water while the trigger gun is closed. The triplex ceramic plunger pump is designed for both commercial and professional daily use. To protect wear parts, it includes an overheat safety valve that will open and close automatically to allow the recirculating higher-temperature water to be released, allowing cool water to replace it. **800-333-9274; www.watercannon.com.** ♦

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EDUCATION

RoyCEU.com: We provide continuing education courses for water, wastewater and water distribution system operators. Log onto www.royceu.com and see our approved states and courses. Call 386-574-4307 for details. (OBM)

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Milliken Infrastructure Solutions' Concrete Cloth Installation Guide meets international standards

ASTM International announced that it has accepted a new Standard Guide for Site Preparation, Layout, Installation, and Hydration of Geosynthetic Cementitious Composite Mats. The new guide, ASTM D8173-18, covers GCCM materials including Concrete Cloth GCCM by Milliken Infrastructure Solutions.

Trimble partners with Aquarius Spectrum

Trimble announced it has entered into a relationship with Aquarius Spectrum to distribute a branded version of Aquarius Spectrum's wireless leak detection and monitoring solutions for water utilities throughout the U.S. The collaboration will extend Trimble's portfolio of smart water management sensors and software solutions to address the growing challenges associated with aging water infrastructure, leakage and nonrevenue water loss.

Geophysical Survey Systems Inc. (GSSI) announces launch of new website

GSSI announced it launched its newly redesigned website. It features a helpful and easy-to-use product configurator, quick access to the training class calendar, and all the latest news and updates, including the most recent case studies and videos. ♦

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PEOPLE/AWARDS

Kari Gerwin was named the director of water quality planning for the Toledo (Ohio) Metropolitan Area Council of Governments. She succeeds Kurt Erichsen, who has retired. Gerwin has been with the council since 2012 as a water quality planner, which included managing the stormwater coalition.

The **Beckley (West Virginia) Sanitary Board** received a National Environmental Achievement Award from the National Association of Clean Water Agencies. The honor is for its Ewart Avenue Stormwater iPond, a stormwater mitigation project that uses technology to reduce flooding.

The **Lake George Association** received a \$15,000 grant from the Lake Champlain Basin Program to fund projects in the town of Lake George, New York, that capture and treat stormwater. This will help reduce the flow into the lake of rain runoff that contains pollution, nutrients and sediment.

The **city of Norman, Oklahoma**, was honored as a Clean Community by the Oklahoma Department of Environmental Quality and Keep Oklahoma Beautiful. The city received the highest award level — Level 1: Scissortail Flycatcher. Stormwater efforts were among the reasons the city received the honor.

The city of Roanoke (Virginia) Stormwater Division and the Roanoke Arts Commission chose five artists to enhance six stormwater drains as part of an environmental education program. The artists include **Ned Savage, Brian Counihan, Gerry Hubert, Tyla Maiden, and Aleks Bratic** and his mother, **Kim Bratic**.

Sioux City's Promenade Improvement Project received the Renovated Civic Project award from the group 1,000 Friends of Iowa. The Fourth Street project beautifies the area while reducing stormwater runoff.

Kenton C. Ward, Hamilton County surveyor, received the President's Award from the Indiana Association for Floodplain and Stormwater Management.

LEARNING OPPORTUNITIES

Kansas

The American Water Works Association is offering an Effective Utility Management seminar on May 7-8 in Kansas City, Kansas. Visit www.awwa.org.

Virginia

The American Society of Civil Engineers is offering a Young Member Leadership Symposium on Aug. 3-5 in Reston, Virginia. Visit www.asce.org.

Online

The American Public Works Association is offering a Levering GIS for Public Works web presentation on June 21. Visit www.apwa.net. ♦

CALENDAR

May 6-9

American Public Works Association North American Snow Conference, Indianapolis. Visit www.apwa.net.

May 22-24

National Utility Contractors Association Washington Summit, Holiday Inn Capitol, Washington, D.C. Visit www.nuca.com.

June 3-7

American Society of Civil Engineers World Environmental and Water Resources Congress, Hyatt Regency Minneapolis. Visit www.asce.org.

June 11-14

AWWA Annual Conference & Exposition, Mandalay Bay Convention Center, Las Vegas. Visit www.awwa.org.

July 9-11

American Water Resources Association Summer Specialty Conference: Managing Transboundary Groundwater, Worthington Renaissance Fort Worth Hotel, Fort Worth, Texas. Visit www.awra.org.

July 10-12

National Association of Flood and Stormwater Management Agencies Annual Meeting, hotel TBA, Santa Fe, New Mexico. Visit www.nafmsa.org.

July 29-Aug. 1

American Society of Agricultural and Biological Engineers Annual International Meeting, Cobo Center, Detroit. Visit www.asabe.org.

Aug. 12-16

StormCon, Hyatt Regency Denver at Colorado Convention Center, Denver. Visit www.stormcon.com.

Aug. 26-29

American Public Works Association Public Works Expo: PWX, Kansas City Convention Center, Kansas City, Missouri. Visit www.apwa.net.

Sept. 17-19

National Rural Water Association WaterPro Conference, Fort Worth, Texas. Visit www.nrwa.org.

Oct. 12-15

American Society of Civil Engineers 2018 Convention, Hyatt Regency Denver at Colorado Convention Center. Visit www.asce.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.



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