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SECURING THE FUTURE

Santa Margarita takes a long-term approach to diversifying source water, meeting the needs of its customers

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Don Bunts
Deputy General Manager
Santa Margarita Water District
Santa Margarita, California

PRODUCT FOCUS:
PIPELINE REHABILITATION AND RELINING

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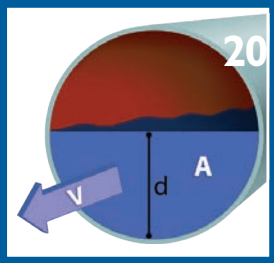
PIPELINE REHABILITATION AND RELINING
WWETT PRE-SHOW ISSUE, UCT SHOW ISSUE

ON THE COVER: Santa Margarita (California) Water District Deputy General Manager Don Bunts and his team are investing heavily in securing new water sources and ensuring an adequate supply for the future. (Photography by Jayme Burrows)



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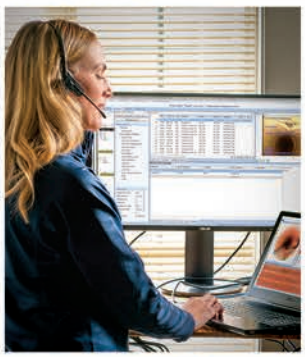

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Luke Laggis

Luke Laggis

TAKING THE CALL

Sometimes listening to your customers and assuring them you have their interests at heart goes a long way

I got a call the other day from a woman in Milwaukee. She had sewer issues. She needed someone to talk to.

Municipal Sewer & Water is an industry publication; it is written for operators, technicians, superintendents, engineers and the like. It's not a magazine for homeowners, but my caller had been online and came across some of our content and reached out for help.

She was having issues with water seeping into her basement, along with the lateral line backing up. The city's records for her house showed two lines running to the house, although she only had one sewer connection. That line did, however, tie in with the neighbor's line. She had a contractor come and inspect the lateral all the way out to the street. Even though it was backing up, it was not obstructed.

She also had the seepage issue. She'd hired a contractor to come in and put a drainage system around the house, but it wasn't working at all. Water was pooling around it. Worse, it was still getting into the basement. She'd suffered a significant amount of property damage. Her house smelled. When she called professionals for help, she either got no answers or more problems. Neighbors offered a variety of theories, but here she was calling me.

She knew I wasn't going to make the four-hour drive to Milwaukee, but she wanted someone to talk to, someone with nothing to sell and no stake in the situation who might offer some insight. I was quick to point out that I have no plumbing, excavation or sewer repair training.

All my knowledge has come from you. I've talked to countless water and wastewater operators, sewer cleaners and rehabilitation specialists. I've listened to your stories, I've read case studies and I've done everything I can do to give myself a solid understanding of your work and the problems you face.

I'm not here to tell you how to do anything. You're the professionals in the field. But I am here to take your stories and share them with your peers, to help you learn from each other's successes. In the process, I've learned quite a bit myself.

Nonetheless, I couldn't give this woman technical advice. I couldn't do any physical work for her. But I could point out that if she had a contractor come in to install a system that hasn't worked from day one, she had every right to get them back on site to rectify the situation.

As for the backup issues, I suggested a couple avenues to track down answers and wished her good luck.

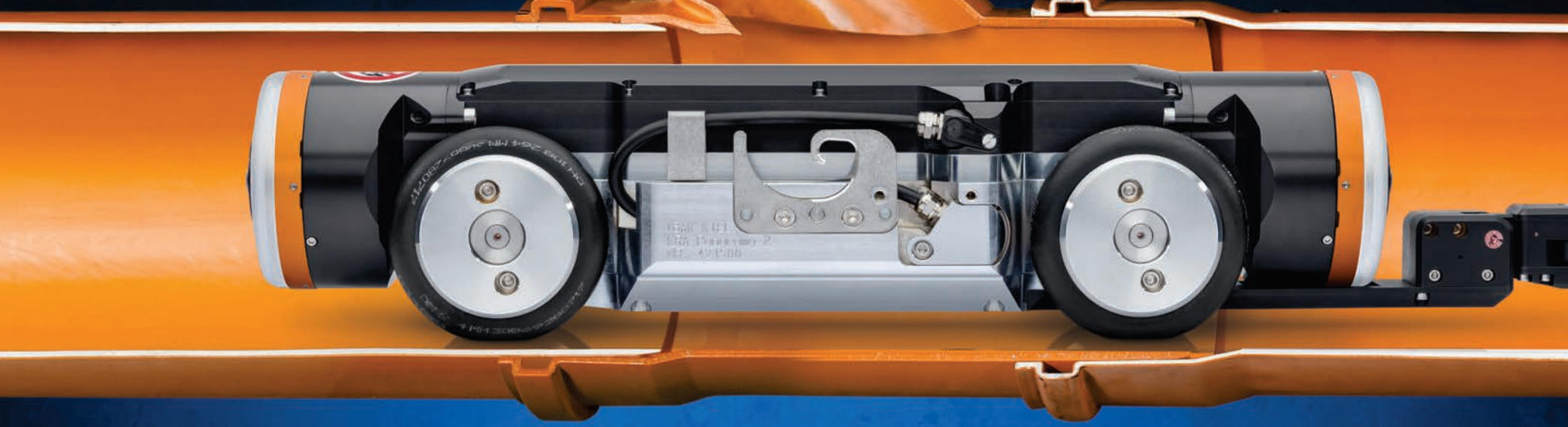
We were on the phone for quite a while and she obviously felt better and more confident in her course of action by the time we were done. She just needed someone to talk through it with her.

That goes a long way. Even when you can't immediately solve your customers' problems, you can still address their concerns and show them you have their best interests at heart. That's really what matters most to people, and you always have that ability.

Here's to treating your customers right.

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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UNCONVENTIONAL SOLUTIONS

Leak-Detection Dogs

Officials at Central Arkansas Water in Little Rock recently hired North America's first leak-detection canine, and they say she's doing a great job so far. A black lab mix named Vessel is helping the utility find surfacing and nonsurfacing leaks within its distribution system. Vessel was specially trained to find water leaks by alerting to chlorine gas. **mswmag.com/featured**

LIMITED WATER SUPPLY

High-Priority Pipeline

Facing concerns about how a limited water supply would affect its ability to fight fires, a community in Madison, Wisconsin, undertook a major project to build a 5-mile transmission main. It's the city's biggest pipeline project in over 20 years, and officials say it's nearly complete after 10 years of work. **mswmag.com/featured**

STUDYING A FATBERG

Educating Customers

A recent sewer blockage in Macomb County, Michigan, offered a rare opportunity to delve into the origins and characteristics of fatbergs. This particular fatberg extended over 100 feet long, weighed about 19 tons and threatened raw sewage discharge into local rivers. Now, parts of the fatberg are on display to educate the public about flushable wipes and FOG accumulation. **mswmag.com/featured**

OVERHEARD ONLINE

"Problems happen when shortcuts become ingrained in working culture. They become internalized."

— ***In Hydroexcavation Work, These Bad Habits Could Kill You***
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SECURING THE FUTURE

Santa Margarita takes a long-term approach to diversifying source water, meeting the needs of its customers

By Giles Lambertson

Rubber dams. Public-private partnerships. These and other ideas are flowing freely at the Santa Margarita Water District headquarters as officials work to meet the challenge of providing abundant and reliably sourced water for the district's Southern California customers.

The district is situated south of Los Angeles and serves parts of Mission Viejo, Rancho Santa Margarita and several other small communities. Its boundaries angle down across a large bloc of unincorporated Orange County before stopping short of the Pacific coast. In all, some 160,000 customers depend on the district for their water. Their dependency has district officials methodically working to ensure the water will be there for them in the years ahead.

"We import all of our potable water," says Don Bunts, deputy general manager. "We're looking at building some local reliability and sustainability in the event something severs our two sources of imported water."

The two sources are provided through the Metropolitan Water District of Southern California — Northern California and the Colorado River. To augment that distant supply, the district is developing local sources including the San Juan watershed. The watershed underlies the district's boundaries and contains two usually dry creek beds that each year channel some 7 billion gallons of watershed runoff into the Pacific Ocean.

"We already are capturing some of the urban runoff in the creeks, but we are going to increase the value of that water," Bunts says. What he calls "a perfect storm" of circumstances brought home to district administration and board members the need for additional water sources. Climate change concern coincided with one of the periodic droughts that visit the semiarid region, driving the price of imported water to $1,100 an acre-foot, thereby draw-

(continued)

The 18,500-square-foot Rancho Santa Margarita Water District property features California-friendly landscaping that is being upgraded as an example for local property owners. (Photography by Jayme Burrows)

Khoa Nguyen (left) and Chris Ingram log levels of neutralizing chemicals at the Santa Margarita Water District's Mission Viejo facility.

ing more attention from water officials.

"Some of this planning was coming together before, but the drought drove it to the forefront of people's consciousness," Bunts says. Local studies were initiated to determine how to develop more local and sustainable water sources and — no surprise — the San Juan watershed popped up as a partial solution.

Inflatable dams

Three years' environmental impact statements were necessary to satisfy regulatory agencies and skeptics that the project was environmentally benign. Specifically, concern about disturbing the life cycle of steelhead trout was raised, reflecting ongoing efforts to reestablish the species, which hasn't been seen in years, according to Bunts. The project was certified OK in July.

"It worked out very well," he says. "When we started the project, we reached out to some environmental groups and received input on some things we hadn't really thought about."

The $120 million project will capture runoff and help recharge the local underground aquifer. A key component of the effort will be the deployment of three inflatable dams. The 5/8-inch-thick rubber tubes are 7 feet high and 125 feet long. Each tube will rest on a concrete foundation inside a small berm of soil and will be covered with an aesthetically pleasing soft material. The tubes are designed to slow and back up runoff so the water can soak into the ground and the underlying aquifer, from which it can be drawn later.

The tube solution sounds pretty impermanent as infrastructure goes, but that's by design. While the tubes can be inflated in 45 minutes, they can be deflated in half that time or quicker. This is important because in the event of a threatening storm, air will be released from the tubes so that the ensuing rush of stormwater can flow downstream and into the ocean rather than spread rapidly and flood the local area.

One of the district's initiatives is enhancing the collection, storage and treatment of wastewater for reuse.

Finding balance

The payoff of this investment by the district is, of course, water. Construction between now and 2030 will follow a three-phase schedule with water accrual occurring at the completion of each stage. In 18 to 24 months, anywhere from 700 acre-feet per year to twice that much will begin to be added to the aquifer. By the

(continued)

"A city putting money into a district water project — that's a first."

Don Bunts

PROFILE: Santa Margarita Water Department

CUSTOMERS:
160,000; 56,000 drinking water connections

AVERAGE ANNUAL WATER DEMAND:
6.5 billion gallons

SERVICE AREA:
97 square miles

STORAGE:
34 drinking water reservoirs with capacity of 340 million gallons, 10 recycled water reservoirs with capacity of 1.5 billion gallons

INFRASTRUCTURE:
600-plus miles of drinking water pipelines, 600-plus miles of wastewater pipelines, 130-plus miles of recycled water pipelines

WASTEWATER TREATMENT FACILITIES:
3 plants with capacity of 9 mgd

NUMBER OF EMPLOYEES:
150

WEBSITE:
www.smwd.com

Santa Margarita Water District Deputy General Manager Don Bunts

"I hedge my bets by saying desalination is a possible ultimate solution, depending upon where it is. It works in San Diego, and it may work for other places."

Don Bunts

time the last phase is completed, the district will be accumulating about 8,000 acre-feet per year, enough water to sustain 50,000 families.

"The board strategy is that, instead of having 100% of potable water imported, we will source 30% to 50% of potable water from local supplies," Bunts says. "That's about what indoor use is, which means if we run into an emergency, we can turn off landscaping water and locally provide all the water we need to sustain life."

The district's approach is to look at the entire portfolio of responsibilities and find balance in sourcing and handling water. "We don't want to hang our hat on just one thing," he says, before switching metaphors to add, "We don't want to put all our eggs in one basket."

The Santa Margarita district is investing $123 million to construct a new reservoir in Trampas Canyon for the containment of recycled water.

The district is in the midst of a $120 million project designed to capture runoff from the San Juan Watershed and help recharge the local underground aquifer. A key component of the effort will be deployment of three inflatable dams.

Consequently, additional water sourcing is only part of the story in the Santa Margarita Water District. Steady development of recycled water capacity is another. The more water can be reused, the more it can supplant potable water use, thereby preserving the drinkable water for drinking. Some $3 million to $7 million per year has been budgeted by the district for enhancing the collection, storage and treatment of wastewater for reuse.

Fully gulpable

The Association of California Water Agencies this year awarded the district its Clair A. Hill Agency Award for Excellence. The agency cited the district's unprecedented partnership with the city of Mission Viejo and the privately held Lake Mission Viejo Association to fast-track, finance and build an advanced water treatment facility in a mere eight months. The new facility's water is pumped into Lake Mission Viejo — the first swimming and recreational lake in California to be refilled with recycled water.

Using the purified effluent to top off the 125-acre lake ends 40 years' dumping drinkable water into the lake and will annually save 114 million gallons of potable water. The association came to the district seeking possible solutions after the state complained about its long-standing practice of using drinking water.

"The lake is on their city emblem, and they saw a danger of water shortage in the community," Bunts says. "They put up the money for the additional treatment plant. A city putting money into a district water project — that's a first."

He adds that association management also "did the heavy lifting" of reassuring the public about putting treated wastewater into a recreational lake. "The water in the lake is fully 'gulpable,' as far as that goes," Bunts says, referring to inadvertent swallowing of lake water by swimmers and boaters. "I probably wouldn't recommend a steady diet of it."

Which brings up the possibility of treating wastewater to a point where it is fully drinkable. "We do have plans for that. I'm not sure we will ever have to go direct, and I'm not sure the public is quite there yet. Actually, we feel you could drink this water that has received advanced treatment, with the addition of some other disinfectants."

UNCOVERING THE POSSIBILITIES

The thinking at Santa Margarita (California) Water District is that 55 years of existence makes it old enough to have established itself and young enough to still be capable of imaginative thinking. Don Bunts, deputy general manager, credits a forward-looking board for this progressive mindset.

"We are a relatively new district in the general scheme of things, so we can see things with fresh eyes," he says. "We have people here who think outside the box, and they aren't ridiculed for it. Their thoughts are incorporated into the conceptualizing phase and kicked around the room for a couple hours, or months, or years until their ideas become feasible. The board has given us that latitude."

He cites the district's participation in a Cadiz Valley water project as an example of thinking "way outside the box." An aquifer under the valley's Mojave Desert floor tests out at 50-75,000 acre-feet per year so the city signed on to buy 5,000 acre-feet per year once the project comes to fruition. That may not be anytime soon. "An environmental study was done and the project certified, but it has become a political project now," he says.

Reaching out to tap a desert aquifer, keeping lines of communication open with agencies involved in desalination projects, damming dry creek beds for their runoff potential — not a stone is being left unturned in the district's search for local water. Bunts says the various initiatives encourage him to believe the district will deliver the promised water in the future.

"I think we are on the right path," he says. "The bar keeps being raised because of external drivers, but we are addressing issues as they arise. We are not boxing ourselves into a corner. Our board has taken a proactive approach. They do not want to just sit and talk about the issues. They are encouraging innovation and challenging staff to come up with solutions."

Consequently, Bunts believes the district and its customers have a viable future.

"We are ahead of the curve. If we have a water emergency tomorrow, we might have difficulty addressing it, but in a couple of years, I think we are going to be in pretty good shape. I don't think most Southern California districts can say that."

> **"They have a tremendous amount of pride in what we are doing here to make things better and to do it smarter and faster and cheaper."**
>
> **Don Bunts**

Khoa Nguyen, Chris Ingram and Mihn Nguyen (from left) in front of the large brine tanks at the district's Mission Viejo facility.

For now, the district is content to dump treated water into storage ponds and aquifers for additional purification later. To that end, the Santa Margarita district is investing $123 million in constructing another reservoir for containment of recycled water. A Trampas Canyon facility will be an enlarged version of a dam built on the site some 40 years ago for a sand-cleaning operation. The property is already permitted for a reservoir, so the district is simply tearing down the old dam and building one with doubled holding capacity.

Long-term economics

A new round of homebuilding triggered the Trampas Canyon facility; and future demographic and population trends continue to put pressure on existing water supplies. Yet another district response to growth is the search for local suppliers of groundwater in neighboring communities such as San Bernardino and Riverside. And it has signed memos of understanding with some adjacent water agencies that are exploring the feasibility of ocean desalination projects. After all, billions and billions of gallons of water — albeit salty — are splashing ashore just a few miles away.

"I hedge my bets by saying desalination is a possible ultimate solution, depending upon where it is," Bunts says. "It works in San Diego, and it may work for other places."

The technology involved pushes seawater through membranes to filter out the salt, but it is an energy-intensive process and, hence, an expensive one. As the technology improves and the cost of the process comes down a bit, it will become more attractive. Bunts notes that the cost differential between imported water and desalinated water continues to shrink.

Water rates have been rising for some time — the typical customer with a 3/4-inch meter pays $23.05 a month — and the district works to convey to its customers just why that is. "We try to take the approach that we are in this for the long haul," Bunts says. "We are going to need water forever. We are trying to do things that are the most economical for the long term."

While public support has been demonstrated, Bunts says educating customers about costs and water conservation is a constant need. He credits district personnel, from administrators to people in the field, for the organization's positive and progressive culture in the face of all these challenges.

"They have a tremendous amount of pride in what we are doing here to make things better and to do it smarter and faster and cheaper. Top to bottom, we have the people here who can do that." ✦

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.

BOOST YOUR CAREER

Climbing the ladder of success is much easier if you establish sound strategies for guidance

By Ken Wysocky

At times, careers can be a lot like locating sewer lines — you never know where they might lead. Some are straightforward, while others take unexpected paths to their final destinations.

But either way, there are things you can do to keep things on track, says Thomas Harris, an employee training and development consultant and owner of The Exceptional Skills. In that vein, here are 10 recommendations that just might help your career progress instead of stagnate.

1. Realize what's important. Many times careers falter because employees spend too much time doing things that seem important but really aren't all that critical. And sometimes it's the fault of managers who don't make it clear where priorities should lie.

This often results in what's known as the 80/20 rule, or the Pareto Principle, where 80% of your job activities achieve only 20% of your results. It should be the other way around, Harris notes.

"A lot of things may seem urgent at the moment, but in the big picture, they're not really all that important," he explains. "That's why it's critical to talk to your boss and ensure you're focusing on the things you should be, which will push your career forward. If you know your priorities, you can make better judgments every day and focus on that 20% of activities that generate 80% of your results."

> **"A lot of things may seem urgent at the moment, but in the big picture, they're not really all that important."**
>
> Thomas Harris

2. Do the important things. This corollary to the point above may seem like advice from Captain Obvious. But truth be told, it's easy to get distracted in today's workplace with its never-ending barrage of emails, phone calls, meetings and impromptu visits from colleagues.

The solution? Plan ahead. "Some people don't like planning because it hurts spontaneity," Harris says. "But it actually helps create time for spontaneity. Work from the most important things down to the least important."

Also consider turning off your phone or email notifications, or only look at email at specific times. "The better you can organize your time and focus on the important tasks, the more you'll get done," he observes. "And periodically take short breaks that keep you refreshed and focused. Studies show that the most productive employees take more short breaks than unproductive employees."

3. Take responsibility. When a project goes south or a promotion goes to a colleague instead of you, it's easy to go into victim mode. But by constantly casting blame externally, you get stuck where you are because you're not learning from the experience and getting better, Harris says.

"So if you want to move forward, you have to take personal responsibility for your career," he advises. "Careers depend on choices we make. While we can't control what happens to us, we can choose how we respond." So if you get passed over for a promotion, for example, find out why and strengthen those areas where you need improvement. Managers are impressed by employees who ask those questions — display the right mentality and attitude, he notes.

4. Know where you want to go. It's not uncommon to lose sight of the big-picture goals we need to progress in life and in careers. In short, you can't get where you want to go if you don't know where you want to go.

"You can always change directions," Harris notes. "But you always need something to aim for. Otherwise you end up just doing random things that don't move you ahead." As such, it's crucial to understand your company's goals, which in turn can help you formulate smaller goals that mesh well with those larger goals.

5. Keep educating yourself. Many people think learning ends after college. Those same people are less likely to advance their careers, especially in today's fast-paced world where technology is constantly racing ahead. "If you're not growing yourself — always learning new trends — you're going to fall behind," Harris says. "If you keep learning, you stay ahead of the game."

Keep in mind that the average chief executive officer reads a book a week; it keeps them sharp and provides them with fresh perspectives. So if you want to keep moving forward, read books, take online tutorials, attend seminars and listen to podcasts that contain useful career information. And network like crazy with people who are where you want to be, Harris adds.

"It's said that from 9 a.m. to 5 p.m. is your job, but from 5-9 p.m. makes your career," he notes. "So listen to an educational podcast instead of watching TV."

6. Don't take feedback personally. Too often we attach too much of our sense of self-worth to our jobs and careers. When that happens, we view feedback as an attack on our character rather than advice about how to get better.

To get around this behavior, it helps to adopt a growth mindset instead of a fixed mindset. In the latter, we're more apt to react negatively to feedback. "We think, This is the way I am — I can't change," he explains. "Then we're less likely to take on challenges because we're always afraid of failing or feeling deficient."

A growth mindset allows us to embrace feedback as a way to learn and grow. That's crucial because if we don't accept feedback graciously, people are less likely to provide it going forward, he says.

7. Just say no. Employees usually are reluctant to say no to requests for help because they fear appearing unhelpful. But every time you agree to take on a new task, keep in mind that you're also saying no to something else. Moreover, it's not your responsibility to rescue colleagues, Harris points out.

"Time is limited, so you have to be wise about what you say yes to," he says. "People are afraid people will be mad at them for saying no. But in fact, most people will actually respect that. It's better to say no than to say yes and do a poor job — or even worse yet, don't get the job done at all."

But when you do say no, it's critical to provide context about why you're unable to take anything else on at the moment. And if it's your boss making the request, be sure to ask for help in prioritizing which of your assigned tasks are more important; managers must fully understand all the demands weighing on your time, he suggests.

> **"Careers depend on choices we make. While we can't control what happens to us, we can choose how we respond."**
>
> Thomas Harris

8. Seek out opposing viewpoints. Because our brains are hard-wired for confirmation bias, we often look for people who believe what we believe. That, in turn, can lead us to look only at things that confirm the decisions we want to make while ignoring the negatives. The result? Bad decision-making, Harris points out.

"If we seek out people who disagree with us, we can make better decisions," he says. "Alternate viewpoints can reveal holes in proposals or decisions."

9. Spend time with the right people. Author and motivational speaker Jim Rohn once observed that we all are the average of the five people with whom we spend the most time. In other words, we become more like the people with whom we hang out. "So spend time with successful people and observe what they do, not negative people who always complain about things," Harris recommends. "Observe successful people's behaviors and attitudes … spend time with people you want to be like."

10. Create structure for good decision-making. Many of us are prone to making decisions on the fly — doing what feels good at the moment. When hiring people, for instance, you might be impressed by certain things that actually aren't even important to the job for which they're under consideration. As such, it's critical to have objective criteria and structure in place to keep us on the right track, Harris says.

"Without structure, it's easy to find something we like and base decisions on it," he explains. "We say, 'That sounds good. Let's do it.' But it's better to figure out ahead of time what's most important and follow that structure. Sound criteria helps you make sound decisions." ✦

THE LURE OF LEVEL-ONLY METERS

There are many variables at play when measuring I&I, and a lone measurement doesn't always tell the tale

By Jay Boyd and Paul Mitchell

Inflow and infiltration in the wastewater collections system draws a utility's attention. It's an ongoing threat for sanitary sewer overflows and has a substantial cost once it is received at the wastewater plant. As one senior plant operator puts it, "I don't like paying to process rainwater."

By far the most accepted technique to locate and quantify I&I is the flow study. The preferred tools for these studies are area-velocity monitors. To acquire data, these monitors measure water depth in a pipe and its velocity to derive flow. While monitor manufacturers employ a range of specific technologies, A/V monitors generally share capabilities to measure flows with one or more sensors, communicate data from the remote location, capture and/or store data, and provide an output for user viewing and assessment.

The cost of monitors, including installation, can be expensive for utilities with limited budgets and technical resources. Yet these utilities are sometimes under pressure through regulatory agencies or have cost pressures due to excessive flows. As a result, some utilities look toward less-expensive means for assessing I&I sources and have embraced the use of level-only monitors. These monitors measure depth only and use software-driven formulas to calculate flow.

At a fraction of the cost of A/V monitors, they promise a quick and easy way to evaluate I&I entering the collections system. Under ideal conditions, they may be capable of providing flow data, but sanitary sewers don't always present ideal conditions. To better understand this, it's important to look at flow basics and review the variables that influence the ability to provide "quick and easy" I&I evaluations.

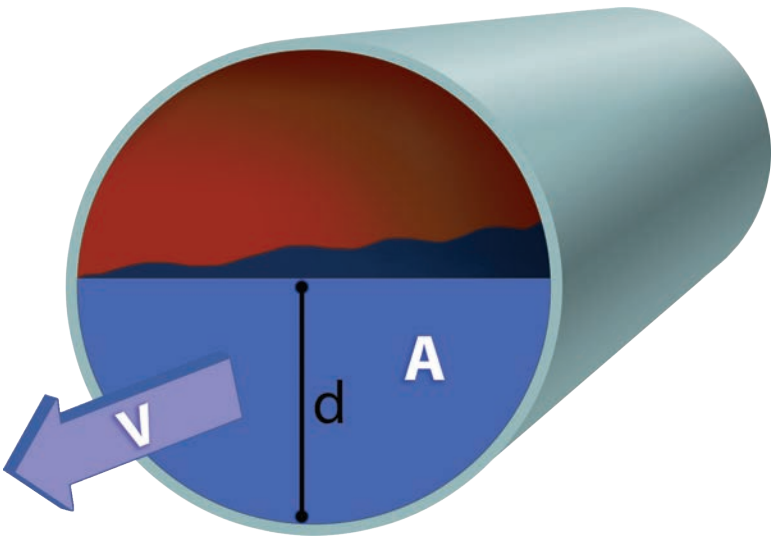


Diagram 1

Flow basics

It is essential to understand collections system flow in order to determine capacity and the effects of I&I for operational performance and asset planning.

The well-known flow formula is Q = VA, where Q is flow, V is velocity and A is the cross-sectional area of the pipe (see Diagram 1). Flow is derived and typically measured using A/V monitors. Now well established, they provide accurate, repeatable measurements.

Those engaged in collections system flow measurement rely on A/V or flow monitors to conduct their work. Even small collections systems can have thousands of pipe segments and manholes. It would be more favorable to have numerous flow monitors distributed throughout the collections system, but it may be cost prohibitive. Thus, concurrent measurement of many sites can be limited by budget.

Another way

Over the past few years level-only monitors have offered the promise of providing collections system flow data but at a fraction of the cost of A/V monitors. These monitors measure the distance from the sensor to the water below and then calculate water level in the pipe for a given pipe diameter (see Diagram 2).

Level-only monitors do not measure velocity. So, if we are to solve the simple flow equation of Q = VA, we have to account for velocity.

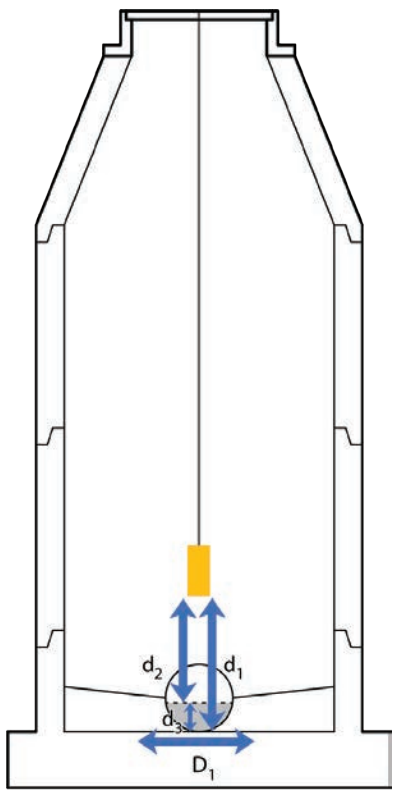
Using Manning's equation below, it is theoretically possible to determine velocity (v) as shown:

$$v = \frac{1.486}{n} R^{2/3} S^{1/2}$$

Where factor n is the Manning coefficient (boundary resistance), R is hydraulic radius (of the pipe) and S is slope (of the grade).

We must therefore know these three factors above to successfully arrive at velocity. To do this, we must determine:

- ❑ Pipe material for the Manning coefficient, (n)



$d_1 - d_2 = d_3$

Diagram 2

- ❑ The hydraulic radius (R) from the level measurements, pipe shape and pipe diameter
- ❑ The slope of the grade

Once these factors are accounted for, software is typically used to derive flow (Q). Provided that level-only monitors and software can be used to derive flow, there are some advantages to be realized, as outlined below:

Cost. Level-only monitors typically cost 35% to 60% less than A/V monitors. Thus, users can either measure I&I for less cost or, alternately, deploy more monitors for the same expense. The latter case increases the number of monitoring locations.

Installation. Generally, level-only monitors are easier and faster to install and uninstall. Consequently, they can be more easily moved to a new location if desired.

Level-only advantages seem compelling and even seductive at first glance, but there are other factors at play.

Yet, there are numerous factors that can influence level changes and mask the actual flow conditions when using level-only monitors.

Messy equation

As expected, there are some significant challenges with using level-only monitors for calculating flow. The essential goal is to acquire good-quality measurement data that is accurate and repeatable. Without this, poor-quality, spurious data will lead to erroneous conclusions about flow, I&I sources or system capacity.

As stated previously, level-only monitors do not measure velocity but instead derive it as shown above.

Looking at the velocity formula, S, R and n are the values that must be determined to complete the equation. These values must be accurate otherwise the calculation will be inaccurate. To test potential accuracy, let's take a look at each value.

- Slope. Often, slope can be obtained from the design drawings. We must then assume that the intended slope noted in the drawing perfectly matches the actual as-built slope.

Experience clearly shows this is a poor assumption, as construction practices do not replicate design to high degrees of accuracy. In addition, segment-to-segment slopes (including the segment leading into the manhole) can be an order of magnitude different from the manhole-to-manhole average slope. Furthermore, the slope in the manhole itself is rarely the same as the assumed slope of piping.

Post-construction, we must also assume that nothing has influenced or changed the pipe slope. For example, we must assume that there is no settling or upheaval. In practice, this is another poor assumption. Therefore, from design to construction and from construction to the current state of the pipe, we see two instances of potential error in calculating slope off drawings. At best, the slope value will be an estimate, and even that can be an order of magnitude off.

- Hydraulic radius. When acquiring a radius of a pipe, several assumptions are made:

- ❑ That the pipe geometry is round
- ❑ That the diameter of the invert trough is dimensionally uniform
- ❑ That the invert and the influent and effluent pipe diameters are uniform

Invert geometry and uniformity are not well controlled in construction. All it takes is a random inspection of a dozen or so manholes to show that invert dimensions are not well controlled, nor do they have to be in order to be functional. Therefore, the poor control of geometry and dimensionality are sources of error.

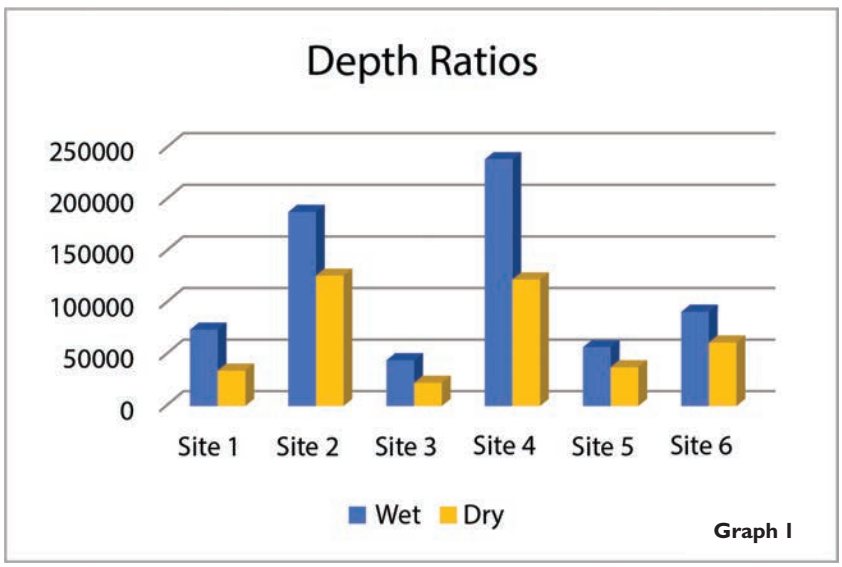
Of special note, any manhole invert with a junction by design has differential radii and cannot be measured with level only.

- Manning's coefficient. Manning's coefficient of roughness can be thought of as the resistance to flow on the pipe surfaces. The roughness coefficient can be referenced using published tables based on pipe material. These tables provide the n value in the velocity equation. For example, a concrete pipe is listed as n = 0.015, a vitrified clay pipe is listed as n = 0.013, etc. While useful as a starting point, these values cannot account for actual pipe condition. The roughness tables provide a value range to account for this, but the reality is that judging pipe roughness coefficient is difficult at best. Therefore, the n value is an estimate. Potential error is again introduced.

- Uniform flow. Manning's equation always assumes there is "smooth, uniform flow." That's rarely true in a sewer. Considering such conditions as backwater, drawdown, wavy/choppy flow or transitional slope-change, the equation will be wrong. Transitional flows from such conditions, directional change, obstructions, pipe curves and offsets will violate the Manning's uniform flow assumptions. Backwater may be the most egregious issue where level is rising but actual flow is not changing.

- Sediment and wetted area. The final step in computing flow is to multiply estimated velocity (v) by wetted area (A) of flow. If sediment is present, this will render the assumed area erroneous. In some cases, this can add massive error to the computation. It is often difficult or impossible to determine the presence of sediment from a topside view only. Even if an attempt is made to account for sediment in the flow cross sections, it is typically not uniformly distributed and causes excessive error regardless.

In summary, Manning's equation has the potential for providing acceptable results, but accuracy is dependent on a wide range of variables. Slope, hydraulic radius, Manning's coefficient of roughness, the assumption of smooth uniform flow, and wetted area all have error potential, and some significantly so. When these variables are combined into a single equation, error is multiplied significantly and accuracy is severely compromised. Even an estimate would have to be called into question for its value of use.



Graph 1

False positives

Despite error from variables as described previously, it can be argued that level-only monitors provide useful comparative information. Specifically, while the actual flow values may be inaccurate, level-only measurement can reveal differences for wet- versus dry-weather flows. Intuitively,

one would expect that wet weather will produce higher levels at a given site than dry weather as illustrated in Graph 1.

Yet, there are numerous factors that can influence level changes and mask the actual flow conditions when using level-only monitors.

During a rain event, flow would appear to increase substantially based on rising level values. This appears to be the case where water levels rise concurrent with a rain event. Yet level change (depth) could be a result of a developing downstream blockage where dry-weather sediment buildup — not rain derived I&I — caused a backup.

In another example, flow appears to increase due to rain, but a downstream FOG blockage was developing at the pipe crown. Measured levels (depth) in the pipe increased due to the blockage. In both cases, these blockages and the corresponding level rise would be interpreted as RDII. If we depended on level-only measurement, this could have led to a conclusion that the area was a source of I&I — leading to expensive action, possibly rehabilitation or replacement. Instead, a good cleaning of blockages would show that these locations only contributed minor increases of I&I during rainfall.

In another instance, a large jump in level indicates that flow has significantly increased. Yet, the A/V meter data shows a much smaller increase of flow. It could be a backwater condition that just looks like an I&I issue.

It is hard to imagine that even 20% error is acceptable when millions of capital dollars are at risk.

False negatives

In a recent study in Washington state, level-only monitors were compared to A/V monitors, assessing their ability to identify and quantify I&I. Co-located monitors provided level data and flow data change at several locations. Hydrographs revealed a distinct pattern where the A/V monitors measured substantial flow increases, while the level-only monitors showed minor change, indicating a false negative.

In one case, two hydrographs representing depth-only measurement and flow did not correlate. Instead, the depth-only measurements showed a lower depth change, while the flow hydrograph value doubled. Therefore, if level-only monitors were used to determine I&I, the event would have been completely missed and the utility might conclude that this site had no issues.

In another example of poor level-flow correlation, the level-only monitor recorded a 1.0-inch level change in response to a 1.5-inch rainfall. Using Manning's equation, we would calculate that this was 2.8x average flow. Yet, the A/V monitor measured 14x average flow. The level-only monitor registered a minor level change and might be ignored by the utility.

These examples illustrate how level-only monitors do not reflect actual conditions of flow. The reason is that in all cases, there was a significant increase in velocity that accounted for the corresponding increases in flow. The level-only monitors missed the velocity change altogether. Therefore, without direct velocity measurement of the A/V monitors, the flow change can be hidden from level-only monitors. Consequently, substantial I&I sources would not be detected, and these sites would be ignored for future corrective action.

Conclusions

Level-only monitors are useful for several collections system applications including SSO mitigation, optimizing cleaning schedules using real-time site feedback, reporting combined sewer overflow activation, and even backup alarming at wastewater pump stations.

Yet, level-only monitors' attempt to measure flow and detect I&I by incorporating algorithms (any assumptive flow based on depth) for the flow calculation rely on multiple poorly controlled variables. Thus, they are a significant source of error. As presented, level-only monitors can indicate false positives from blockages and backwater and false negatives in the case of undetected velocity changes.

It's been argued that some error is acceptable and level-only monitors can get close. But how do we define "close"? If we study 10 sites and miss I&I on 50% of them, is that close? If we only miss I&I on 20% of the segments, is that acceptable?

Rehabilitation costs can easily be in the six- to seven-figure range. That being the case, it is hard to imagine that even 20% error is acceptable when millions of capital dollars are at risk. Further, if an investment is made in the wrong sections due to error, there is no return on investment whatsoever. The low-cost and seemingly easy-to-use level-only monitors can be seductive, but accompanying this is substantial potential for error and wasted resources.

By contrast, an investment in A/V monitors that measure and compute actual flow rates will provide consistent, reliable data. In the final analysis, A/V monitors give users assurance and confidence in the results that, in turn, drive informed capital decisions and substantial returns. ✦

Bonner Springs chief plant operator Laura Munro checks pump operation at pumping station No. 2. (Photography by Denny Medley)

SMALL BUT MIGHTY

Kansas utility rings up awards for collections system excellence despite a small staff

By Jim Force

PROFILE:
Bonner Springs (Kansas) Wastewater Department

CURRENT PLANT BUILT:
1987

NUMBER OF CUSTOMERS SERVED:
7,800

AREA SERVED:
City of Bonner Springs

COLLECTIONS SYSTEM:
52 miles of gravity sewers and force mains, nine pump stations, 725 manholes

STAFF:
Laura Munro, chief plant operator; Steve Garcia, collections specialist, Chuck Staples, municipal utility director

WEBSITE:
www.bonnersprings.org

The Bonner Springs, Kansas, wastewater collections and treatment department knows how to maximize its resources.

And they do it well enough that the Kansas Water Environment Association recognized it in 2018 as Collection System of the Year for systems with under 250 miles of sewer. It's an honor the utility also achieved in 2012, 2013, 2014, 2016 and 2017. Almost a clean sweep.

"I attribute that to just being consistent," says Laura Munro, chief plant operator, who has been with the city for 17 years. "We keep a schedule, TV and clean so many feet (of sewers) per year, and maintain our lift stations. It's everything we do compared to other cities of our size. Part of the reason is the city has allowed us the money to take care of our infrastructure.

(continued)

Laura Munro, Steve Garcia and municipal utilities Director Chuck Staples (from left) review budget plans at the wastewater treatment plant.

"We're a good team," she adds. "We help each other, absolutely."

The team is small: Munro and Steve Garcia, collections specialist, supervised by Chuck Staples, municipal utilities director. A third operations position remains open, and the utility is seeking applicants.

Staples says the Bonner Springs utility posts job openings on websites, works with the county employment office and stays in communication with the Kansas Rural Water Association. And of course, they sometimes borrow people from other city departments to get the job done.

The city

Bonner Springs, with a population of 7,800, is located in the Kansas City metropolitan area. The sewer system consists of 47 miles of gravity lines, 5 miles of force mains, nine lift stations, 725 manholes and 17 lamp holes.

The gravity flow system features 8- to 24-inch-diameter clay, ductile iron and PVC pipe. Force mains are ductile iron and PVC, ranging in diameter from 6 to 10 inches. Certain sections have elevation issues due to shallow bedrock.

Since Bonner Springs has a small crew, some issues need to be contracted to keep the collections system operation at peak performance. In choosing a contractor, whether for sanitary sewer repairs, controls or electrical work, the choice comes down to their dependability, attention to detail and who has the equipment to do the job, Staples says. "The last thing we want to do is waste taxpayers' money by having to call out another contractor to redo someone's work."

Garcia has been with the utility for six years and was promoted to collections specialist in 2019. "We use a 2000 Vactor combination truck for cleaning and flushing the system," he explains. "Recently, we purchased a small Vactor trailer that we use for hydroexcavating small lines without having to tear up the whole area."

Bonner Springs inspects the sewer system using a small pole camera. "If we spot problems, we can call in one of our contractors with camera crews," Garcia says. "They can come in and TV and clean the lines."

> **"We're a good team. We help each other, absolutely."**
>
> **Laura Munro**

Garcia says he and Munro, with the help of staff from the water plant as needed, often do point repairs themselves. "We've done manhole cones and covers. If we have to, we can hand-dig to raise the manhole, pull the metal casing and set the new ring ourselves.

"We can also do some of the smaller spot repairs," he adds, drilling holes and using quick dry cement to deal with small inflow and infiltration issues or other cracks and holes. If larger repairs are required, especially on deeper lines, they call in outside help from a local contractor.

Lining

In cases where sewer lines need full rehabilitation, Bonner Springs contracts with companies for CIPP lining. "It saves us a lot of money," Garcia says.

Munro and Garcia both appreciate the city's system of backup generators to keep lift station pumps operating in case of power outages.

The two do all the preventive maintenance procedures in-house and perform the smaller maintenance and repair projects, taking care of leaking seals, monitoring and repairing impellers, and making sure the pumping curves are correct.

In a cost-saving move, Munro and Garcia often use the city's crane truck to pull larger submersible and dry pumps in order to perform maintenance and repairs themselves. "We can pull up to 3,200 pounds," Garcia says.

Work on the larger pumps situated in a deep dry pit are farmed out to local contractors capable of doing the job.

Roots can be another issue, exacerbated by creeks that flow through the city. In areas that are difficult to access, Bonner Springs uses a contractor for chemical root control.

Grinders

In some sections of the city, especially flat areas where gravity flow isn't possible, grinder pumps move wastewater from individual homes to the sewer system. These areas are served by a low-pressure sewer line, maintained by the city. The city has responsibility for maintaining the grinder pumps installed before 2008.

"We have about 201 grinder pumps we are responsible for," Garcia says. "We're trying to discourage them on future construction projects, but with some housing developments, it's about the only thing they can do."

Like other wastewater utilities, Bonner Springs has to deal with wipes and other nonflushable items. "They flush into the grinder systems and get into our force mains," Garcia says. "Our biggest problem is with what people put into the system."

(continued)

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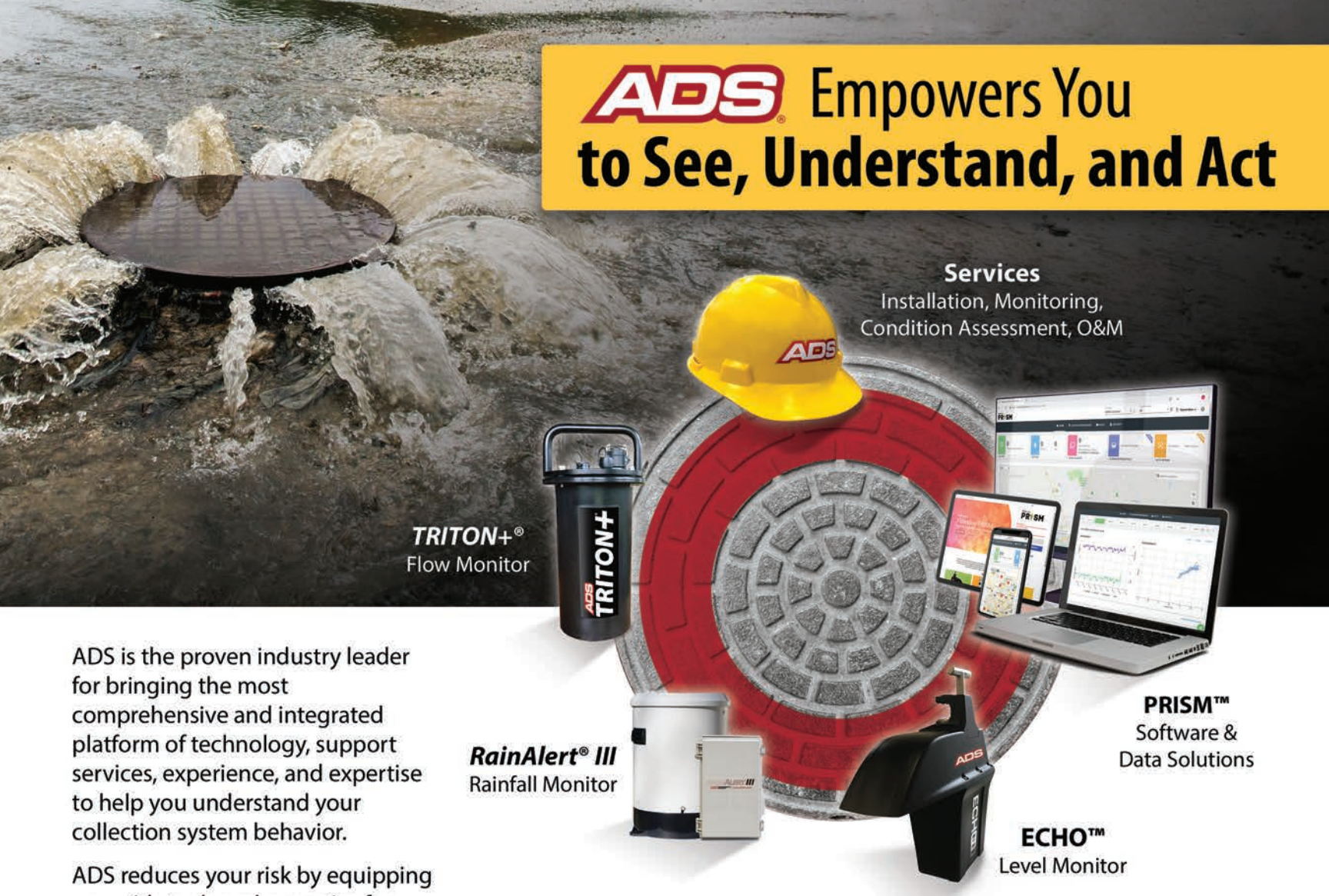

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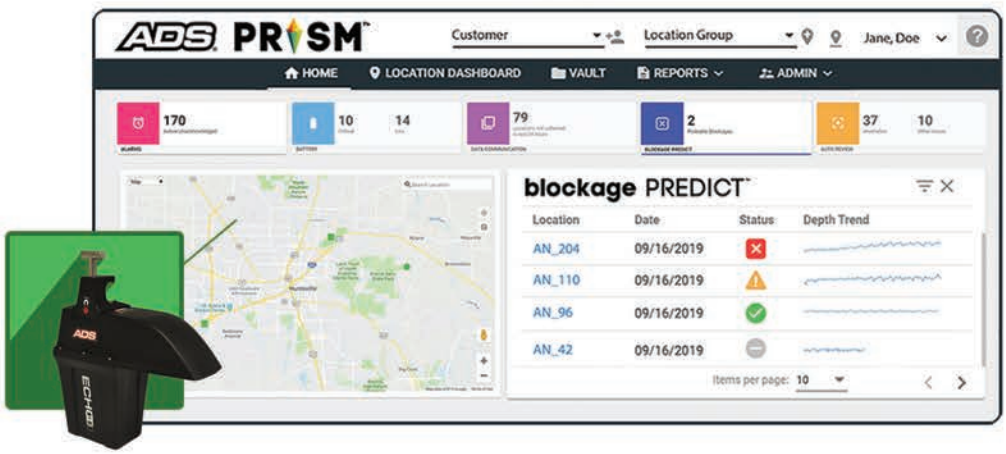

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"Our biggest problem is with what people put into the system."

Steve Garcia

The city's website advises citizens against flushing "disposable" or "septic safe" items, warning that manufacturers' advertising is not always accurate.

FOG

The city also maintains an effective fats, oils and grease control program.

"We annually inspect grease traps," Garcia says. "We open them up to see if they're cleaned, and we send inspection sheets to industries and schools to verify cleaning practices. Our restaurants and other establishments are pretty good about (complying with the ordinance)."

The Kansas Water Environment Association award also complimented Bonner Springs on its safety and training programs. The collections and treatment team work with the others in the city's Public Works Department to conduct monthly safety meetings.

"We're very good about safety," Garcia says. "We have all the required equipment. We suit up for all our operations. We have a good record on confined spaces."

The Bonner Springs team includes (from left) municipal utilities Director Chuck Staples, technicians Chris Johnson and Marlin Crawford, supervisor Steve Garcia, chief plant operator Laura Munro and technician Jerry Wisthoff.

Munro points out that a current collections project involves raising a 40-foot-deep dry lift station and installing submersible pumps. That way, repairs won't have to be made at such a great depth in the future — a move that will enhance safety.

That's the kind of commonsense, one-step-at-a-time approach that has made Bonner Springs both an industry award winner and an effective public utility.

"It's all about preplanning, knowing what you're going to do, maintenance, and keeping your machines running well," Garcia says. "Last summer we jetted a mainline on a busy street. We

Bonner Springs wastewater collections department supervisor Steve Garcia verifies operation of the Aero-Mod TRITAN belt filter press at the wastewater treatment plant.

PROPER TREATMENT

The Bonner Springs (Kansas) Wastewater Treatment plant has undergone a number of improvements and expansions over the years, with the current oxidation ditch configuration dating to the mid-'90s.

The plant is designed for 1.5 mgd and is currently handing between 0.5 and 0.08 mgd, using half of the available treatment train. It includes a headworks channel with a grinder that was installed in 2015. The Infilco Degremont UV light Aquaray 40 disinfection system (SUEZ Water Technologies & Solutions) was installed in 1999.

Treated effluent is discharged to the Kansas River.

Laura Munro, chief operator, says the plant's permit calls for nutrient monitoring only, with limits for TSS and BOD. The on-site lab also tests for pH on a monthly basis.

Munro says future projects include installing variable-frequency drives and improving dissolved oxygen control. Currently, Bonner Springs controls DO by manually raising or lowering the weir on the oxidation ditch. Automatic controls will provide easier and more accurate DO measurements and fine tuning.

Waste sludge is dewatered on a small Aero-Mod belt press, with biosolids hauled to the local landfill in city trucks.

"We're very good about safety. We have all the required equipment. We suit up for all our operations. We have a good record on confined spaces."

Steve Garcia

coordinated with traffic and the street department, used cones and arrow boards, notified the businesses we might affect, and let people know what sounds they might be hearing that day.

"Don't mess around," he says. "Get the work done correctly, and get out of everybody's way." ✦

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GEARING UP FOR GAINEY RANCH

NASSCO's 2020 Annual Conference set to bring trenchless professionals together

By Sheila Joy

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

Sheila Joy is executive director of NASSCO. She can be reached at director@nassco.org.

NASSCO is busy preparing for its 2020 Annual Conference, scheduled for April 22-24 in Scottsdale, Arizona. Marking the association's 44th year, the event — to be held at the beautiful Hyatt Regency at Gainey Ranch — will kick off with a golf tournament and welcome reception on Wednesday, April 22.

On Thursday, members will come together for an official membership meeting to discuss NASSCO business, get updates on technical advancements and elect new members to NASSCO's board of directors. That afternoon, NASSCO will host The Exchange — an educational event where members and invited guests can earn continuing education units or professional development hours for participating. Topics to be covered include health and safety, with a special focus on job site emissions from the cured-in-place process. The agenda also includes updates on the latest from Washington, D.C., and NASSCO's ongoing commitment to help secure funding for underground infrastructure, along with a business track designed to encourage owners and managers to think differently about the people they employ.

Friday will kick off with a detailed update on each of NASSCO's committee accomplishments. Presented by the individual committee chairs and co-chairs, the committee members will then break off for face-to-face meetings to wrap up unfinished business and set new goals for the coming year. After a day of hard work, on Friday night attendees will come together to celebrate the new board of directors and recognize individuals for their contributions to NASSCO (and to our industry) at NASSCO's annual awards banquet.

If you are not yet a NASSCO member, please visit www.nassco.org/join and sign up today as we continue to set standards for the assessment, maintenance and rehabilitation of underground infrastructure through education, industry resources and advocacy. If you are already a NASSCO member and wish to attend our Annual Conference, please visit www.nassco.org/events today. ✦

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rasiddiqi@gmail.com

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Trainer: Gerry Muenchmeyer
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gerry@muenchmeyerassoc.com

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Trainer: Brandon Conley
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brandonconleypacp@gmail.com

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Trainer: Sammy Maestas
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Trainer: Tim Back
513-253-8461
timbacktwo@gmail.com

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Trainer: Tim Back
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timbacktwo@gmail.com

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574-201-7704
brandonconleypacp@gmail.com

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Trainer: Gerald Boman
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gwboman@yahoo.com

January 28
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Trainer: Marilyn Shepard
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mshepard1@hotmail.com

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Trainer: Brandon Conley
574-201-7704
brandonconleypacp@gmail.com

January 28
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Trainer: Jerry Weimer
513-659-5008
jerryweimerconsulting@gmail.com

February 4
Taylor, MI
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Trainer: Gerry Muenchmeyer
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gerry@muenchmeyerassoc.com

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Trainer: Marilyn Shepard
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THREAT IN THE CANYON

Major rehab project saves failing sewer main and overcomes environmental concerns without excavation

By Giles Lambertson

San Diego's Rose Canyon trunk sewer rehabilitation project had to strike a delicate balance between construction solutions and environmental preservation.

Innumerable joints in a sewer main lost their integrity, threatening leakage from miles of pipe beneath a scenic canyon in Southern California. The joints needed to be repaired without tearing up the canyon floor and disturbing riparian habitat.

The San Diego office of GHD, a multinational professional services firm, engineered and oversaw the rehabilitation project. Its oversight involved decisions that delicately balanced construction solutions and environmental preservation. In the end, it all worked out, but not in a purely linear fashion.

Initial failure

The Rose Canyon trunk sewer line, constructed in 1996, is a reinforced concrete structure with a PVC liner. To create the continuous pipe structure, 20-foot-long sections of 54- and 60-inch pipe were joined end to end with the interior liners fused using weld strips applied with heat and pressure. It was the discovery downstream of remnants of the weld strips that flagged the joints' failing condition. Subsequent visual inspection by city of San Diego officials revealed general failure, with many of the welded strips loosening and, in some cases, becoming detached entirely.

Such seal failure was not unheard of, according to Casey Raines, the Rose Canyon project manager for GHD. Early generations of the welded seal product didn't always work unless they were meticulously installed. "From our experience and in talking with others, when these weld strips were introduced, failure was kind of a chronic issue. It appears the Rose Canyon contractor didn't have the proper experience."

By the same token, San Diego officials inspecting the installation also lacked experience with the product in 1996 and were unable to distinguish a sound application of the strips from a faulty one. "The city pretty quickly started seeing weld strip materials downstream and in manholes. It was like 'Uh-oh … '"

The failure of the seals produced a threat of leakage and structural damage. The bad seals exposed the concrete pipe to corrosive hydrogen sulfide, which produces sulfuric acid and can corrode concrete and

(continued)

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"It all became very complicated and expensive."

Casey Raines

steel, thus turning a drip into a stream of escaping effluent.

This threat was distressing because Rose Canyon is not an insignificant feature in the region's terrain. The canyon is a miniature valley with sloping sides covered by native grasses. Rose Creek runs through its bottom in the shade of oak and sycamore trees. Public and private properties are contained by the canyon walls, and the trunk line runs adjacent to the creek and the creek's federally protected wetlands.

Measured approach

A significant sewage spill in Rose Canyon would be consequential. On the other hand, such a threat was not imminent, so in 2014 the city and GHD began systematically planning a fix. Studies, field surveys and assessments were undertaken to determine the temporary and long-term impact of the rehab work. The process took three years.

"There were a lot of changes during the design stage of the project, and a lot of permitting was involved, including with a railroad company," Raines says about the long run-up to actual rehab work. GHD carefully weighed the results of the various studies and prior maintenance agreements with the railroad and with highway and street departments.

In a subsequent presentation to the North American Society for Trenchless Technology, Raines and her boss, GHD project manager Greg Watanabe, remarked that the project was "important to the trenchless industry because it not only used an innovative approach to repair the failing large-diameter sewer that had been recently constructed, but the rehabilitation and bypass design that was developed considered the environment and the community and ultimately determined the best way to minimize their impacts."

Thus stated, the comprehensive process comes across as a neat, straightforward series of coordinated decisions leading to a cost-effective, efficient fix. In reality, getting from point A to point B also involved sashaying between points B and C and occasional retreats to point A.

For example, the construction of a temporary 42-inch-diameter bypass pipeline was envisioned to divert sewage flow during repair of 500 feet of 54-inch-diameter pipe upstream from a juncture structure.

Several trailer-mounted, engine-driven pumps were to be installed to divert flow from that section of the sewer main into an aboveground bypass line, with rehab work ensuing for an estimated three months. The presenters called the bypass solution a "notable" engineering feature of the project.

You know what they say about the best laid plans of mice and engineers: The bypass never happened. Raines says, "Shortly after the contract was awarded and the bypass plan was being developed, the Public Utilities section of the city told us they had changed the operation of an upstream pump station. It changed the flow and would require a larger bypass than planned."

The practical implications were that GHD had to return to square one on rehabbing that section. It was no longer

(continued)

Top to bottom: Rehabilitation became necessary after PVC lining weld strips at the joints of the original line failed.

Contractors worked in task-specific crews, here cutting out and removing the failing PVC weld strips.

A crew member uses mortar to repair concrete and smooth the surface of a joint.

Crew members stage repair seals and bands to be lowered into the pipe through manholes.

PROFILE:
San Diego Public Utilities

SERVICE AREA:
450 square miles

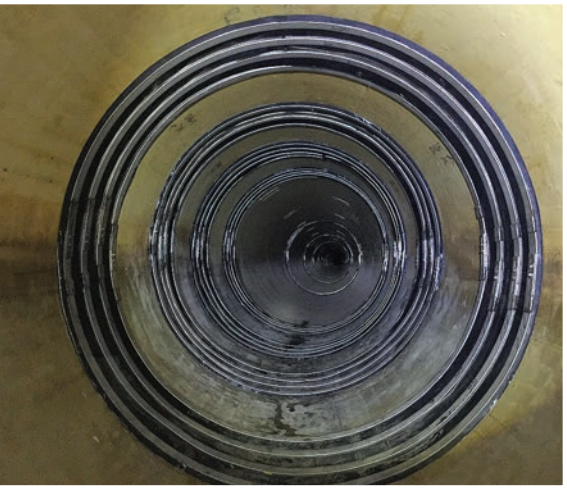
CUSTOMERS:
2.3 million

INFRASTRUCTURE:
3,000 miles of wastewater lines in city

WASTEWATER VOLUME:
100 mgd flowing to 3 wastewater treatment plants

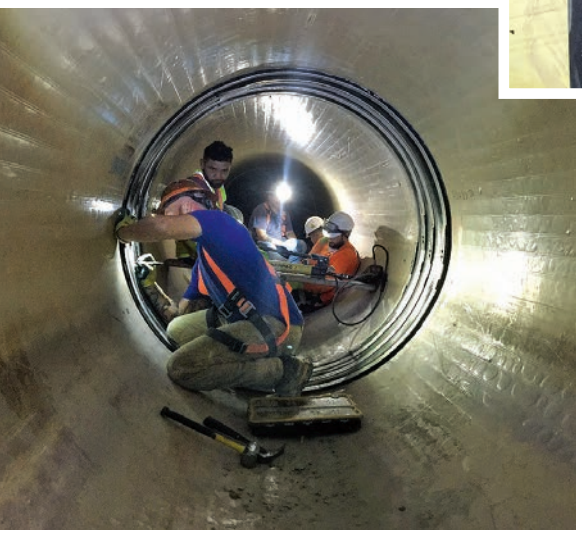
SEWER AND WATER EMPLOYEES:
1,100

WEBSITE:
www.sandiego.gov/public-utilities



A view looking down the pipe showing Cretex HydraTite Internal Joint Seals installed at each joint requiring repair.

Four stainless steel retaining bands were required on the double-wide seals used on the worst joints.



Each joint was air-tested to ensure it was watertight.

feasible to use a manhole as a collection point for the bypass. Instead, excavation would be required along with a wet well. "It all became very complicated and expensive," Raines says. "It was not worth the money for such a short segment." Stop logs were employed exclusively to regulate flow and allow rehab work in that segment of pipe.

Sealing the deal

Coming together on a solution also proved problematic. Raines and her GHD colleagues recommended that a full-on cured-in-place liner be inserted in the pipe, giving the sewer main a brand-new seamless interior. "Our original design recommendation assumed all the joints had failed," Raines says, noting that the presumed condition of the pipe was a worst-case scenario predicated on "pretty old information." To be on the safe side, the full relining was proposed.

City officials didn't embrace the idea. The CIPP recommendation was, according to Raines, cheaper on a per-linear-foot basis, but more expensive overall. The city preferred something less costly on the assumption that the failure of joints wasn't general enough to warrant an entire relining.

"Other factors weighed heavier for the city," Raines says. "Cost was one, and the other was the impact on the surface. We were going to have to excavate to insert the liner rather than just use the manholes. A lot of the city's concern was about restoration of the area after the job was completed. Those items of concern weighed heavier in their evaluation."

Consequently, the contractor that was awarded the job — the San Diego office of Abhe & Svoboda — proceeded to rehab each individual joint using an internal mechanical seal. The selected repair method came from Cretex Specialty Products. The Cretex HydraTite internal joint seal is comprised of a rubber sleeve of varying widths and stainless steel expansion bands. Together they create a watertight compressed seal. Abhe & Svoboda is a certified installer of Cretex HydraTite internal seals.

> **"A lot of the city's concern was about restoration of the area after the job was completed. Those items of concern weighed heavier in their evaluation."**
>
> **Casey Raines**

The project addressed slightly fewer than 1,200 joints, each one categorized as to its condition — poor, bad or severe. The latter were divided further according to the type of Cretex seal to be employed, with more damaged joints requiring wider seals. The four widths were classified as standard, extra-wide, double-wide and the double-wide sleeve, which is made up of multiple interlocked seals. They varied from 11 inches wide to 58 inches. By far, the double-wide solution was the most employed, which testifies to the severity of the general joint failure.

Raines describes the installed seals as "fairly low profile," yet they obviously are not as smooth as the surface of a continuous CIPP liner. It follows that over time some debris collection may occur at the joints, but the product has a long, proven history in a variety of pipe repair applications.

Safe completion

The repair work was undertaken by the contractor during dry-weather seasons to

MASTERING THE PROCESS

Systematically repairing more than a thousand leaking joints in 54- and 60-inch pipe was no small feat. The sheer number of joints spread over 4.5 miles was somewhat daunting to anticipate, and the logistics of moving people and materials in and out of a temporarily emptied pipe added to the challenge.

It all came together for a crew from Abhe & Svoboda, a full-service restoration contractor, which was assigned the job of removing hundreds of PVC weld strips from joints and replacing them with mechanical internal seals. Fewer than a dozen employees were involved in the rehab job, but they were utilized in what Casey Raines termed "an assembly line." Raines was project engineer on the job for GHD, a multinational professional services firm.

Rather than swarm all over a joint to repair it, two-person Abhe & Svoboda teams worked on an individual joint in sequence, each team completing an assigned task before making way for a successor team. They all utilized hand tools for their work. Those who needed air or water for a task were supplied via hoses run into the pipe from manholes.

"The first two-man crew cleaned the area around the joint, and a second crew assessed damage and measured to determine what seal would be used," Raines says. A third crew

avoid the possibility of work crews producing environmental damage to the canyon floor during rainfalls. This meant that work was limited to an April-to-October window. Crews began work in April 2018, a full year after the winning bid was awarded. They pulled out in October of that year and returned in April 2019, finishing in August.

Laborers in the pipe were protected against fumes by small blowers that kept the air moving. Each crew member wore a sensor to warn of excess exposure to hydrogen sulfide, carbon dioxide and other sewage gases. All the sensors were monitored via Bluetooth for further safety against a sudden spike in fume content. No crew safety incidents were reported.

Ultimately, the completed project was more expensive than anticipated. The winning bid by Abhe & Svoboda came in at just under $7 million, but design changes and other unanticipated charges ran up the bill for the 4.5-mile project to more than $8 million. ✦

The rehab team uses a hydraulic tool to expand the retaining bands and compress the rubber seal against the pipe wall.

FEATURED PRODUCTS FROM:

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removed the damaged PVC weld strip from the joint. A follow-up team repaired any damaged concrete and leveled the area around the joint with mortar to ensure a tight seal. An epoxy was applied to the edges of the joint area.

"Then a team would enter the pipe, bringing down the rubber and stainless steel components. It would install the seal, hydraulically expand the retaining bands, lock them in place and do an air test to ensure it was installed properly." A final team with cameras then would enter the pipe and document the completed work.

The tedious but coordinated labor in San Diego's Rose Canyon proceeded steadily, and crews grew more productive as they progressed. Raines says, "They did about eight joints a day at first, but the contractor was able to complete almost 14 a day on average as the work continued."

When the work began, 1,110 joints were assumed to need fixing. That estimate was based on the standard 20-foot length of a segment of the sewer main. But the pipe was curved in some places, meaning joints were closer together where shorter segments of pipe were employed, so the final count was closer to 1,200.

PIPELINE REHABILITATION AND RELINING

By Craig Mandli

CURED-IN-PLACE PIPE

Emagineered Solutions THE SHOOTER

THE SHOOTER from **Emagineered Solutions** is a continuous air-inversion machine for CIPP. Two fast and reliable models are available: the mobile SHOOTER 12 for 6- to 12-inch pipe, with built-in lubrication system and knife gate for after the tail passes, and the trailer-mounted SHOOTER 24 for 15- to 24-inch lines. An optional conversion kit for the SHOOTER 12 inverts 15-inch liners, and one for the SHOOTER 24 inverts 6- to 12-inch liners. A water-cure flange is also available. The new lubrication system includes an oil overspray guard that keeps operators dry. The fully adjustable, structurally reinforced lip seals are robust and available in 4 through 24 inches. **541-504-0416; www.theshootercipp.com.**

Granite Inliner CIPP

Inliner CIPP and glass-reinforced Inliner STX UV-cured liners from **Granite Inliner** are used to rehabilitate a broad range of gravity and pressure pipeline systems. The liners are used by municipalities and manufacturing-based industrial facilities to renew storm, waste and process sewer piping that have been damaged by corrosion and/or structural deterioration. CIPP allows for the renewal of damaged underground pipes without excavation. The products combine an engineered lining tube with a thermosetting resin and are cured by water, air or UV light. The technology can renew pipes from 4 to 120 inches in diameter, including those with bends, diameter changes or noncircular geometries. It can be installed via direct inversion or pull-in-place methods in contiguous segments of several thousand feet by accessing existing manhole structures. **812-865-3232; www.granite-inliner.com.**

HammerHead Trenchless WT212-3D

The **WT212-3D** wet-out table from **HammerHead Trenchless** has a three-drive roller system and no-shim gap control that combine to deliver highly accurate and uniform resin saturation for quality CIPP installations. The latest CIPP curing methods, such as LED curing, require consistency in resin depth and saturation. The three-drive design of the unit powers rollers to reduce liner wrinkling. The smooth, automated operation delivers uniform wet-outs time after time. In addition, a quick-locking gap mechanism allows users to calibrate gaps between 5 and 15 mm, with more precision than shim-calibrated designs, to eliminate thickness variations in resin. **800-331-6653; www.hammerheadtrenchless.com.**

Pipeline Renewal Technologies SpeedyLight+

SpeedyLight+ from **Pipeline Renewal Technologies** is an LED-based UV solution for CIPP that cures at speeds ranging from 0.66 to 3.3 feet per minute. Because it's compatible with felt (as well as invertible glass fiber), it can cure 90-degree bends in lines as small as 4 inches, as well as other challenging geometries like transitions and verticals. Free of styrene and amines (and the associated odor), UV-based cure technologies raise fewer objections from the public and a crew. The single-part vinyl ester resin requires no mixing and elim-

Emagineered Solutions THE SHOOTER

Granite Inliner CIPP

HammerHead Trenchless WT212-3D

Pipeline Renewal Technologies SpeedyLight+

inates shelf life and working time challenges. It uses LED lamps to cure, drawing half the power of traditional UV technology while providing a more powerful cure. The integrated camera lets operators monitor the curing process in real time for optimal quality control. The highly portable design allows for access from even the most remote sites, curing up to 328 feet of liner in pipe 4 to 12 inches. **866-936-8476; www.pipelinert.com.**

PIPE BURSTING TOOLS

Pow-R Mole Trenchless Solutions PD-33M

The **PD-33M** pipe bursting machine from **Pow-R Mole Trenchless Solutions** is designed to replace existing underground pipes 2 to 6 inches in diameter. Its nonslip, cylinder-activated jaws prevent cable damage while providing 60,000 pounds of pulling force. It offers a cost-effective alternative to opencut excavation, reducing customer disruption and increasing company profits. The process replaces the existing pipe with a fused HDPE pipe, which eliminates all joints, and allows the operator to pull through bends such as 45-degree fittings. This system is modular and can be easily disassembled and reassembled for manhole and basement applications. With a compact design and very small footprint of only 20 by 20 inches, this unit can be used in tight locations. **800-344-6653; www.powrmole.com.**

Spartan Tool UnderTaker

With 30 tons of lateral pulling force, the **UnderTaker** pipe bursting system from **Spartan Tool** employs a hydraulically powered cylinder that pulls a bursting head through the existing line while simultaneously replacing it with seamless, high-flow, code-approved HDPE pipe. With a small hole at each end of the run, the user can pull pipe from the building to the main, accommodate bends in the pipe, increase diameter and lay new line at a rate of up to 5 feet per minute. The system allows replacement of 2- to 6-inch pipe with up to three 45-degree bends in the pipe. It can also upsize from 4- to 6-inch pipes. When assembled, the unit weighs 210 pounds, but it disassembles into four separate components for easy transport, with no part weighing more than 70 pounds. **800-435-3866; www.spartantool.com.**

PIPE CUTTERS

RIDGID 286 Soil Pipe Cutter

The **RIDGID 286 Soil Pipe Cutter** is designed for accurate, single-stroke cutting of soil pipes up to 6 inches. Its articulating outward-facing hooks simplify connecting cast iron and clay pipe, while the handles can easily be adjusted and set for repeated cuts. Long handles and a built-in cutting mechanism also provide the mechanical advantage to minimize cutting effort and enhance ergonomics. Chain extenders can be added to cut up to an 8-inch soil pipe (up to 15-inch if you are cutting clay pipe only). **800-769-7743; www.ridgid.com.**

Sewer Robotics USA SR-SERIES HA125

The **Sewer Robotics USA SR-SERIES HA125** is a powerful, self-propelled, lateral reinstatement cutter that fits relined 6-inch pipes easily. The robot's durable body is only 4 inches in diameter and made out of stainless steel. The cutter motor delivers 5.4 hp while its design allows for a long lifetime and easy refurbishment in five minutes in the field. The 8-inch ram lift and 90-degree pivoting of the cutter are both actuated by hydropneumatic cylinders to combine the best of both worlds with precisely controlled and very strong movements without complicated hydraulics going through the robot. It offers camera visibility, a lens cleaner, and precise and operator-friendly controls. The robot is compatible with other water jet cutting and UV patching modules, and it comes as a mobile kit or vehicle installed. **717-658-4532; www.sewerrobotics.com.**

Wachs Utility Products Trav-L-Cutter

The **Trav-L-Cutter** from **Wachs Utility Products** is a portable pipe cutter with the capacity to cut 6- to 72-inch pipe with additional chain sections. It is available in hydraulic or pneumatic power and is capable of being mounted horizontally or vertically on the pipe. It cuts and bevels steel, cast iron and ductile iron with a carbide blade, and PVC with a high-speed steel blade. It requires a minimal clearance of 12 to 15 inches radial and 20 inches axial. The chain drive system maintains continuous out-of-round compensation while providing positive drive under all conditions for accurate cuts. By

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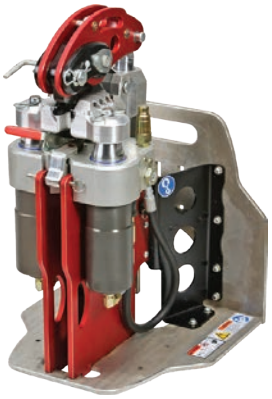
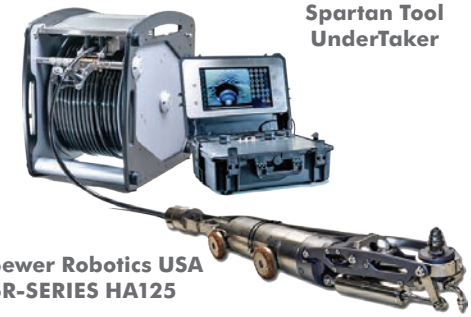
Pow-R Mole Trenchless Solutions PD-33M

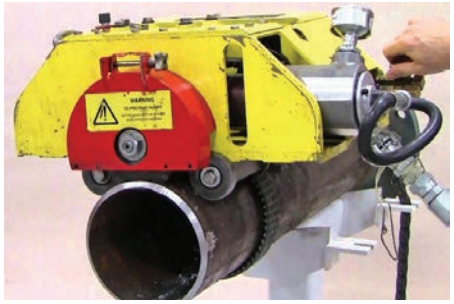


Spartan Tool UnderTaker



Sewer Robotics USA SR-SERIES HA125

RIDGID 286 Soil Pipe Cutter



Wachs Utility Products Trav-L-Cutter

using an optional guide track and special guide track wheels, accuracy of 0.005 inches can be maintained in the field. **815-943-4785; www.turnvalves.com.**

PIPE LINING

Applied Felts hybrid liners

Applied Felts hybrid liners combine fiberglass reinforcement with traditional felt liner material to provide strong, robust liners. These hybrid liners perform and install in the same manner as nonreinforced liners with the benefit of reduced thickness, delivering significant resin savings and ensuring a close fit and faster install. AquaCure RP, PS and PW fiberglass-reinforced liners provide strong physical and mechanical properties that meet or exceed ASTM and NSF 61 testing standards. The company's traditional felt liners come in a variety of coating options for polyurethane, polypropylene or polyethylene. **276-656-1904; www.appliedfelts.com.**

Avanti International AV-100

AV-100 from **Avanti International** is a chemically reactive gel that has similar viscosity to water. It can permeate anywhere water can travel and has adjustable cure times from five seconds to more than 10 hours. It can be used to rehabilitate and sustain sanitary collections systems by eliminating infiltration in manholes, sewer mainlines, joints, laterals, and before and after various forms of CIPP lining. After lining, the chemical grout can be used to reinstate laterals. It creates an effective, long-lasting water barrier while providing soil stabilization. **800-877-2570; www.avantigrout.com.**

Cretex Specialty Products HydraTite

HydraTite internal joint seal from **Cretex Specialty Products** is a mechanical, trenchless remediation for leaking pipe joints. It consists of a rubber seal that spans the joint and is held in place by stainless steel retaining bands on either side of the joint. The retaining bands are hydraulically expanded and locked in place using a wedge lock design, which forms an airtight seal around the joint, eliminating all possibilities of infiltration or exfiltration. These seals can be custom-fitted into irregular-shaped conduits and may be used as end seals on CIPP projects. The system is a recognized method of joint repair by American Water Works Association Manual M28 and has been widely accepted and approved by engineers, municipalities and Departments of Transportation. It has a 50-year design life, does not require excavation and has a low profile that ensures minimal flow loss. **800-345-3764; www.cretexseals.com.**

CUES Easy Grout

The **CUES Easy Grout** system offers a computerized graphical user interface that intuitively leads the user through the grouting process. The software includes help files, tool tip descriptions and recommended settings to assist operators throughout the grouting process. Since the system has been designed to consolidate all the valves and electrical controls into a single instrumentation cabinet, it can be mounted in any location, therefore saving space. **800-327-7791; www.cuesinc.com.**

MaxLiner USA Max FLEX 4D

The **Max FLEX 4D** from **MaxLiner USA** provides ease of inversion and a close fit in 4- to 6-inch transitions (while maintaining a thickness of 3 mm), and its specifically designed stitched seam is capable of negotiating bends up to 90 degrees with minimal wrinkling. It is a nonwoven needle-punched polyethylene felt liner with an impermeable polyurethane coating. **877-426-5948; www.maxlinerusa.com.**

Neopoxy NPR-5305 One-Step Kit

The single package, 1.5- or 3-gallon **NPR-5305 One-Step Kit** from **Neopoxy** makes epoxy protective lining an easy, one-step mixing process. Both components are in a single container that allows the applicator to simply mix the product with a mixing blade until a nice, smooth color is evident. The product can then be moved to a vertical or horizontal surface to be lined and can be smoothed with a plastic spatula. It doesn't require expensive spray equipment, is environmentally safe, requires no measuring and is easy to use. The 3-gallon kit covers 35 square feet at 125 mils. It can be used to

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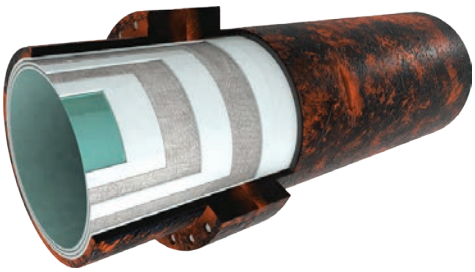
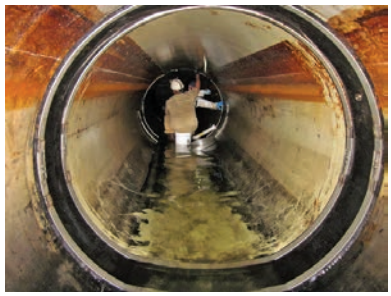


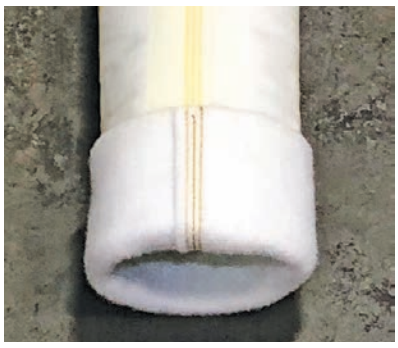
Applied Felts hybrid liners

Avanti International AV-100



Cretex Specialty Products HydraTite

CUES Easy Grout



MaxLiner USA Max FLEX 4D

Neopoxy NPR-5305 One-Step Kit

fill and protect cracks, joints and exposed aggregates and also to perform CIPP repair, CIPP end seal, and manhole and pipe lining. **510-782-1290; www.neopoxy.us.**

Perma-Liner Industries vertical connection lining system

Perma-Liner Industries' vertical connection pipe lining system offers a way to approach and repair vertical pipelines in residential and commercial markets, making the process easier in less time. The system cures in one hour using a compact, electric steamer or vacuum pump. The system offers uniform thickness throughout. The host pipe does not need to be dry prior to installation, which lessens the installation and cure time. The materials come in kit form, eliminating measuring and waste, and an experienced crew can easily install five or more per day. **866-336-2568; www.perma-liner.com.**

Petersen Products Multi-Flex Packer

The **Multi-Flex Packer** from **Petersen Products** is available for steam, hot water and ambient cure, with or without a Flow-Thru By-Pass, and it is flexible and light weight for easier installation to speed point repair projects. Flexibility allows it to navigate through manholes and confined spaces. It is available for air, water or steam application of lining. Configurations can be provided for most relining requirements. Almost any length and diameter is available. It deflates to a small, flexible size for easy insertion. It may be customized to meet a customer's specific requirements. Standard packers utilize nylon-reinforced EPDM covers, with other materials also available. It has a pressure range of 10 to 25 psig. **800-926-1926; www.petersenproducts.com.**

Sauereisen SewerGard Glaze No. 210G

SewerGard Glaze No. 210G from **Sauereisen** is a protective coating specifically formulated for the municipal wastewater industry, providing longevity where either a topcoat or economical, stand-alone lining is required to protect wastewater infrastructure. It is a two-component, chemically resistant, 100% solids epoxy that adds an extra layer of protection against microbiologically induced corrosion. Applications range from manholes, wet wells and lift stations within the collections system to tankage, structural steel and secondary containment at treatment plants. Rolling, spincasting or spraying the material facilitates a rapid rate of application. A thickness of 20 mils works well for the preventive maintenance of collections systems and treatment plants. **412-963-0303; www.sauereisen.com.**

Trelleborg Pipe Seals Type A

Type A silicate resin from **Trelleborg Pipe Seals** is suitable for patch repair. The "A" stands for accelerator, based on the high amounts of catalyst that have been added to this custom-formulated resin system. Catalysts activate the components of the resin, making them more susceptible to react with the hardener. The resin can be combined with other Trelleborg silicate resins, such as Type S and W (summer and winter) in the Northern Hemisphere. It increases the speed of the polymerization without jeopardizing the mechanical properties of the cured liner. It also enables customers to adapt the composition of the resin mixture to the ambient temperature. By supplementing this resin with Type A resin, the curing time can become faster. **800-626-2180; www.trelleborg.com/pipe-seals.**

Warrior Trenchless Solutions Thermoform

Thermoform from **Warrior Trenchless Solutions** is a PVC-alloy structural pipe lining system designed for the trenchless rehabilitation of failing sewer and culvert pipes. It is an environmentally friendly, styrene-free thermoplastic. There are no harmful emissions, and it does not rely on any chemical reaction during installation. Factory-controlled production with rigorous material testing ensures a consistent quality product that conforms to and exceeds the expected standards. The material is highly flexible, allowing it to expand and fit tightly to the host pipe, including changes in shape and dimensions. It is produced in sizes ranging from 4 to 36 inches in diameter, and the wall thickness can be varied according to the application. All installers must be accredited and audited to ensure the highest-quality work possible. **716-601-7760; www.thermoformliner.com.** ✦

Perma-Liner Industries vertical connection lining system

Petersen Products Multi-Flex Packer

Trelleborg Pipe Seals Type A

Sauereisen SewerGard Glaze No. 210G

Warrior Trenchless Solutions Thermoform SpeedyLight+

PIPELINE REHABILITATION AND RELINING *By Craig Mandli*

CentriPipe saves large culverts under high-traffic roadway

Problem:

Aware of aging and deteriorating infrastructure, the city of Aurora, Colorado, contracted with Wilson & Co., Engineering & Architects to conduct a comprehensive condition assessment of their corrugated metal pipe stormwater infrastructure and assess various rehabilitation methods based on a set of specific criteria with regard to hydraulic capacity, load capacity and impact on the environment and traveling public. Two 96-inch corrugated metal pipe culverts under a major arterial roadway at the intersection of Louisiana Avenue and Biscay Street were found to be severely deteriorated and deemed to be in imminent danger of failure.

Solution:

Ace Pipe Cleaning, a certified applicator of **CentriPipe** from **AP/M Permaform,** began the rehabilitation process with cleaning, invert repair, void grouting, stormflow diversion and sandbagging to ensure any large storm runoff wouldn't flood the nearby neighborhood. They then applied the fine-aggregate cementitious CentriPipe liner in 1/2-inch passes to attain the engineered design thickness.

RESULT:

CentriPipe proved to be a viable and cost-effective rehabilitation method for the large-diameter corrugated metal pipe. The minimal footprint enabled it to be installed without disrupting traffic. **800-662-6465; www.centripipe.com.**

Robotic water jetter effectively removes failed liner

Problem:

A relining contractor in Empfingen, Germany, lined a 16-inch clay pipe with a 5 mm fiberglass liner with 1 million psi flexural modulus and it failed. Subsequently, they relined it with an undersized 5 mm fiberglass liner, which then failed too. The municipality now had to remove 10 mm of failed 16-inch liner 200 feet long.

Solution:

I.S.T. North America was in the process of developing a robotic water jet cutter designed to work effectively in these sorts of situations. For this application, they decided to use a two-beam model. The robot provides up

to 43,000 psi of water cutting power. They determined that only 26,000 psi at a flow rate of 6.8 gpm was needed to pierce the fiberglass and rip it apart while preventing damage to the host pipe. After the first day of training, they chose a cutting style of three-piece cross sections and removed the long strips with a jet truck.

RESULT:

It took only three days to fully remove the 200-foot section of double-lined 16-inch fiberglass liner. **212-419-0069; www.ist-na.com.**

Inversion system allows for pipe relining without excavation

Problem:

Columbia College in Missouri had 8-inch clay pipe with hairline fractures and root intrusions at the joints. The major concern was that this issue ran under a very nice courtyard with special glass drainage and fancy landscaping that they did not want to tear up. It had been a very expensive drainage system so tearing out 310 feet would have been a mess and very costly.

Solution:

Pipe Lining Supply used a manhole access point 18 feet underground to reach the problem. They used the **Quik-Shot Inversion System** with an 8-inch by 3 mm felt liner and Quik-Pox resin to reline 310 feet under the courtyard. The Quik-Roller Calibration Table helped get the exact right amount of Quik-Pox resin, while two Quik-Heaters helped provide the correct temperature.

RESULT:

After inspection with the camera, all of the fractures were repaired. There were no more roots, with no digging at all, and the project was done in one day. **888-354-6464; www.pipeliningsupply.com.**

Municipality finds solution to fill gap between lining on manholes

Problem:

After relining many of its old and deteriorating manholes, a Georgia municipality needed a solution to fill a 3- to 5-inch gap between the new liners and the manholes.

Solution:

Precision Fill from **Prime Resins** was chosen to fill this space due to its high expansion rate, the fact that it is hydro-insensitive and because its slower set time allows for a more consistent pour and prevents void pockets from forming. The project included several manholes, and each one used between 8 and 12 gallons of material. Recommended uses for Precision Fill include undersealing and stabilizing concrete slabs, compaction grouting of soils, stabilizing soils and filling voids behind pipes, walls, manholes and other structures.

RESULT:

The process of lining and filling the annular space cost roughly a third less than tear-out and replacement. **800-321-7212; www.primeresins.com.** ✦

Product Spotlight

Water recycling system keeps workers on the job

By Craig Mandli

Combination machines that use recycled water aren't just a novelty anymore. The high-end units on today's market offer similar specs to nonrecycling jet/vacs while enabling the user to stay on the job all day instead of leaving the job site to refill the water tank. Of course, the water conservation capability of these units continues to be perhaps their strongest selling point.

The greatest technical challenge to effective water recycling systems is the complete removal of abrasive sediments from the water. Wiedemann, in partnership with GapVax, found the solution with the Recycle JetVac.

"More than 40 years of refining went into this unit to develop the best technology and design on the market," says Zack Shustrick, the project engineer for the joint program. "The wet-only system physically cleans the water by removing all abrasive particles through a combination of centrifugal separation and sedimentation. There are no filters and therefore no blockages on the unit."

The water recycling system is built around three main components: a self-cleaning backflush mesh, cyclones for centrifugal cleaning action and progressive sedimentation chambers inside the water tank. The key to the water recycling system design is that it keeps the workload of all these components in balance. In fact, the system cleans more water than the pump can discharge. According to Shustrick, the unit offers similar power to the company's mainstream combo units.

"It can clean lines from 4 to 60 inches in diameter, both sanitary and storm lines," he says. "This unit can also clean lift stations over 40 feet deep without adding vacuum tubes. It can also handle potholing."

Because it offers continuous operation, the Recycle JetVac drastically reduces water consumption while increasing productivity. By using existing wastewater for the initial fill, the operator can arrive on site empty and work in subzero temperatures. Push-button operation of jetting hoses, vacuum system and suction hoses speeds setup and reduces strain on operators.

"Municipalities and contractors alike love it because they can work continuously without interruption with minor changes to their everyday routine," Shustrick says. "The amount of time it takes to stop, tear down, get water, go back to the job, set up and start working again is all eliminated." **888-442-7829; www.gapvax.com.**

Flomatic AIS-Compliant Automatic Control Valves

Flomatic AIS-Compliant Automatic Control Valves

Flomatic Automatic Control Valves are designed for use with various types of pressure and electric controls to provide the desired control of pressure or flow for a variety of water system applications. Flomatic pilot-operated control valves are built in compliance with AWWA C530 standards. NSF/ANSI 61 approved, fusion-bonded, epoxy-coated ductile iron globe or angle style bodies are available standard in full- or reduced-port configuration. Valves are fitted with various pilot control systems to control conditions in pressurized pipeline systems. Flomatic Automatic Control Valves are in full compliance with the American Iron & Steel provisions for affected Federal/State Revolving Fund projects, as all iron and steel products are 100% produced in the U.S. Available in sizes 1 1/4 through 36 inches and covered with a three-year warranty, Flomatic Automatic Control Valves are manufactured under a certified ISO 9001:2015 and ISO 14001:2015 quality and environmental system programs. **518-761-9797; www.flomatic.com.**

Subsite Electronics UtiliGuard 2 locating system

General Pipe Cleaners/General Wire Spring Snake-Oil Plus

Insight Vision Cameras IV2 inspection camera system

VMAC DTM70 PTO air compressor for Ram trucks

VANAIR integrated separator tank

McElroy In-Ditch 1600 fusion machine

MasterHaul PowerLoader system

Subsite Electronics UtiliGuard 2 locating system

The UtiliGuard 2 locating system from Subsite Electronics is a new multi-frequency utility locator based on the UtiliGuard system. It uses automatic integrated data capture to provide information that can be used to prove or track performance, compare with benchmarks and provide actionable outcomes to help increase quality, reduce cable strikes and increase productivity. Available in standard and advanced models, an integrated GPS positioning improves accuracy and reporting. An all-new user interface features simplified graphics that are easier and quicker to interpret. It also offers a 5- or 12-watt transmitter that drives signals farther down large, direct-buried utilities. The system also provides both the horizontal and vertical distance to the utility to make accurate locates of obstructed utilities. **800-846-2713; www.subsite.com.**

General Pipe Cleaners Snake-Oil Plus

Snake-Oil Plus from General Pipe Cleaners/General Wire Spring offers enhanced protection of drain cleaning cables and machines and can extend the life of your other equipment. It features the same rust-inhibiting properties and lemon scent of original Snake-Oil. The nontoxic, eco-friendly, biodegradable formula also creates virtually nonstick surfaces, keeping mud and debris from sticking to cables, drums and machines, extending equipment life. Its rust inhibitor cuts through moisture, replacing it with a rust-resistant coating, and its deodorizer keeps drain cleaning tools smelling fresh and clean. Snake-Oil Plus is available in either quart or gallon sizes. **800-245-6200; www.drainbrain.com.**

Insight Vision Cameras IV2 inspection camera system

The IV2 inspection camera system tablet from Insight Vision Cameras has a 10.1-inch, daylight-readable tablet screen. The unit can be powered with either AC, DC or a Milwaukee Tool M18 battery. The system performs on-demand recording and snapshots and has an on-screen distance counter. It has a self-leveling color camera head with modular design and an always-on, built-in 512 Hz sonde. The tablet rotates to any angle and offers one-touch recording to USB. **800-488-8177; www.insightvisioncameras.com.**

VMAC DTM70 PTO air compressor for Ram trucks

VMAC's direct-transmission mounted PTO air compressor for 2019 Ram trucks is smaller and lighter than traditional PTO air compressors. The DTM70 produces up to 70 cfm at 100 psi (175 psi max) and weighs only 150 pounds. It doesn't take up any space on the vehicle deck. The DTM70 can power a 1-inch impact wrench, 60-pound pavement breaker and other small- to medium-size tools with high air demand. The DTM70 is available for the 2019 Ram 3500 through 5500 chassis cab trucks with the 6.7-liter Cummins diesel engine. The truck must have a PTO prep package with a right-side PTO option. **800-738-8622; www.vmacair.com.**

VANAIR integrated separator tank

VANAIR integrated separator tank features integrated manifolds containing a minimum pressure valve, thermo-valve, thermistors, transducers, pressure regulators, oil filter, ultrasonic oil-level sensors, and optional cold-weather oil heater. It also features SAE O-ring and JIC connections, virtually eliminating leak points associated with conventional galvanized pipe fitting designs. The tank is shipped fully assembled and ready for final mounting, reducing installation time. It also features a redesigned coalescing element with 50% greater surface media, doubling the design life up to 6,000 hours. **800-526-8817; www.vanair.com.**

McElroy In-Ditch 1600 fusion machine

The In-Ditch 1600 large-diameter fusion machine from McElroy is designed for fusing pipe up to 65 inches in outside diameter in challenging, close-quarter working environments. It has a compact, two-jaw carriage and a top-loading heater and facer for added flexibility. The machine is capable of fusing onto as little as 15 inches of exposed pipe with minimal excavation required. Multiple lifting points, a carriage spreader bar and skidded carriage provide ease of mobility and fit within a small envelope. A roll cage helps protect the carriage and hydraulics as they are lowered into the ditch. **918-836-8611; www.mcelroy.com.**

MasterHaul PowerLoader system

The PowerLoader by MasterHaul allows any person or autonomous truck to load and unload cargo automatically. It can be used on pickups, cargo vans, service and contractor bodies. In addition, its significantly larger carrying capacity can lead to not needing a utility trailer to tow products that do not fit on a liftgate, such as large power equipment, construction materials and pallets. The system can use different attachments called Application Decks to offer other options, including portable storage and contractor bins. **831-425-0800; www.masterhaul.com.** ✦

SmartCover Systems expands headquarters in California

On Nov. 1, SmartCover Systems hosted a private celebration of its new U.S. headquarters, marking growth and expansion across North America. The facility is located in Escondido, California. SmartCover Systems serves more than 400 wastewater utilities with nearly 5,000 installations across North America. The company has multiple locations, including offices in Texas, Pennsylvania, South Carolina and Canada.

Waterline Renewal Technologies participates at WEFTEC

Waterline Renewal Technologies participated at the Water Environment Federation's Technical Exhibition and Conference in Chicago. Throughout the exhibition, WRT and its core brands — AP/M Permaform, CentriPipe, ConShield Technologies, LMK Technologies and Perma-Liner Industries — used live presentations to showcase the innovative trenchless technology of its core brands while also highlighting case studies and new products.

CUES opens new service center in Oregon

CUES announced the grand opening of its new, larger sales and service center in Estacada, Oregon, just outside of Portland. The factory-certified center will provide CUES customers with direct access to all levels of customer service, loaner equipment support and new equipment sales. The new location features over 6,000 square feet of offices, inventory, shop and service space.

Under Pressure Systems names business development director


Steve Johns

Stephen Johns has been appointed the director of business development at Under Pressure Systems. In addition to leading the sales and marketing teams, his primary focus will be expanding the market share into the high-pressure industrial industries. Before joining the company, Johns worked as the director of sales and business development for CRP Industrial and for Nudraulix, where he supported multiple product lines. He has a mechanical engineering degree from Auburn University.

Reed adds Lessner as regional manager for Midwest


Shannon Lessner

Reed welcomed Shannon Lessner as its new regional manager for the Midwest markets. She will serve key accounts, work with manufacturers' reps and focus on developing new business. Before joining Reed, Lessner worked at Werner, Spectrum Brands, and Fiskars and Gerber. She brings a background in strong customer partnerships, rep agency management, plus strategic vision to drive successful sales and marketing programs with the Reed distributor network.

NASSCO announces new technical advisory council

With the transition of Lynn Osborn, NASSCO technical director, into his new role as president of the American Society of Civil Engineers' Utility Engineering and Surveying Institute, NASSCO has formed a technical advisory council. Announced at NASSCO's semiannual membership meeting in September, the council comprises five industry leaders, all representing different backgrounds and areas of expertise. The members are Christopher Garrett, P.E., vice president of Brown and Caldwell; Chris Macey, P.E., America's practice leader for condition assessment and rehabilitation at AECOM Canada; Osborn, P.E., owner of LEO Consulting; Kaleel Rahaim, currently pursuing a master's degree in civil engineering; and Jerry Weimer, owner of Jerry Weimer Consulting. ✦

Vote Now!

Cast Your Vote in the Contractors' Choice Awards

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

Contractors' Choice Awards Include The Following Categories:

- Flow Control
- Hydro Excavation Equipment
- I&I Prevention
- Inspection-Mainline
- Jet/Vac Combo Units
- Locators
- Manhole Rehab
- Nozzles - High Pressure
- Pipeline Rehabilitation/Lining
- Stormwater Collection
- Vacuum Trucks/Trailers

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

Go to mswmag.com/contractors-choice/vote

Winners will be announced Feb. 17-20 at the 2020 WWETT Show.

MUNICIPAL SEWER & WATER

PEOPLE/AWARDS

Barbara Dunn was hired as a stormwater technician for the city of Seminole (Florida).

Keith Lanfear was hired as Public Works superintendent for the village of Lake George (New York). He replaces Dave Harrington, who retired after 26 years as a village employee.

Kevin Gray was hired as director of Public Works and Engineering for the village of Carpentersville (Illinois). He replaces Bob Cole, who retired after more than three decades as a village employee.

The **city of Warsaw** was honored by the Indiana Association for Floodplain and Stormwater Management for its Beyer Brady Trail Stormwater Quality Project.

The **Detroit Biodiversity Network,** a student-led, sustainability-focused organization at Wayne State University, received a 2019 Ford College Community Challenge award from the Ford Motor Co. Fund to carry out and expand its Sustainable Landscape Collaborative program in partnership with community-based nonprofit organization Detroit Future City. The $25,000 award will support greenhouse upgrades and the training of Wayne State students from diverse backgrounds as Detroit Biodiversity Network Fellows, gaining expertise in native plant propagation, sustainable landscape practices and green stormwater infrastructure design and management.

The townships of **East Mahoning** and **Burrell** (Pennsylvania) received Project of the Year honors from the Indiana County Conversation District for excellence in their use of grant funds to control stormwater drainage and at the same time preserving their transportation system and natural waterways.

The **Albany Park Stormwater Diversion Tunnel** in the city of Chicago received first-place honors from the Construction Management Association of America in the category of Environmental Project with a Construction Value Greater Than $50 Million. The construction manager was WSP USA for the city of Chicago Department of Transportation.

The **city of Tulsa** (Oklahoma) received the Ronald D. Flanagan Platinum Project Award from the Oklahoma Floodplain Managers Association for its stormwater management program that helped save lives and property during the 2019 Arkansas River flood event. ✦

CALENDAR

Jan. 14-16
South Dakota Association of Rural Water Systems Conference, Ramkota Hotel, Pierre, South Dakota. Visit www.sdarws.com.

Feb. 17-20
Water & Wastewater Equipment, Treatment & Transport Show, Indiana Convention Center, Indianapolis. Visit www.wwettshow.com.

Feb. 18-20
Illinois Rural Water Association Conference, Holiday Inn, Effingham, Illinois. Visit www.ilrwa.org.

Feb. 25-28
Utility Management Conference, presented by the Water Environment Federation and American Water Works Association, Hyatt Regency Orange County, Garden Grove, California. Visit www.awwa.org.

March 23-26
American Water Resources Association Geospatial Water Technology Conference, DoubleTree by Hilton, Austin, Texas. Visit www.awra.org.

March 29-April 1
American Water Works Association Sustainable Water Management Conference, Hyatt Regency, Minneapolis. Visit www.awwa.org.

April 14-17
Center for Watershed Protection National Watershed and Stormwater Conference, Renaissance Austin Hotel, Austin, Texas. Visit www.cwp.org.

May 17-21
World Environmental & Water Resources Congress, presented by the Environmental & Water Resources Institute of the American Society of Civil Engineers, Green Valley Ranch Resort, Spa and Casino hotel, Henderson, Nevada. Visit www.ewricongress.org.

May 19-22
American Public Works Association North American Snow Conference, Salt Palace Convention Center, Salt Lake City. Visit www.apwa.net.

July 12-15
American Society of Agricultural and Biological Engineers Annual International Meeting, CHI Health Center, Omaha, Nebraska. Visit www.asabe.org.

Aug. 9-12
American Society of Civil Engineers Pipelines Conference 2020, San Antonio (site TBA). Visit www.asce.org.

Aug. 18-22
StormCon, Hyatt Regency, Atlanta. Visit www.stormcon.com.

Sept. 14-16
National Rural Water Association WaterPro Conference, Phoenix (site TBA). Visit www.nrwa.org.

Nov. 9-12
American Water Resources Association Annual Conference, Embassy Suites by Hilton Orlando Lake Buena Vista South, Kissimmee, Florida. Visit www.awra.org.

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

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- Uncover the most effective treatment processes through educational insights, innovative techniques and groundbreaking tools
- Learn best practices for sustaining and growing your business so it can continue to serve your customers for generations to come

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POSITIONS AVAILABLE

GapVax, Inc., a nationally recognized manufacturing business, is seeking a talented, highly motivated individual to fill a full-time Sales Position in the Midwest (Iowa based preferred) region. GapVax is the leading manufacturer of industrial and municipal vacuum units and hydroexcavation units in the United States. We provide the most reliable, comprehensive, and efficient mobile vacuum units in the industrial and municipal markets. Specifications of the position are listed on our website, www.gapvax.com, click on the Now Hiring link in the left hand column. Send resumes to or betty@gapvax.com or 575 Central Avenue, Johnstown, PA 15902. (MBM)

SERVICE/REPAIR

Dynamic Repairs - Inspection Camera Repairs: 48 hour turn-around time. General Wire, Ratech, RIDGID, Electric Eel Mfg., Gator Cams, Insight Vision, Vision Intruders. Quality service on all brands. **Rental equipment available.** For more info call Jack at 973-478-0893. Lodi, New Jersey. www.dynamicrepairs.biz (MBM)

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