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Gary Taylor
Superintendent of
Water Distribution
El Dorado, Kansas

DOING DOUBLE DUTY

Cross-trained employees boost Kansas utility's efficiency and reduce costs

PAGE 24

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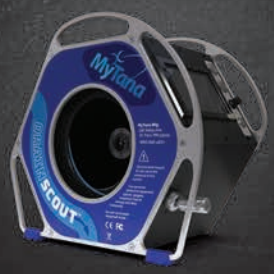

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CONTENTS

PIPELINE INSPECTION,
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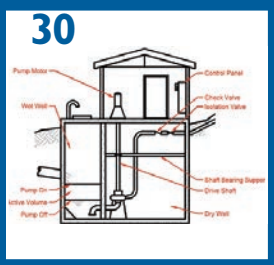
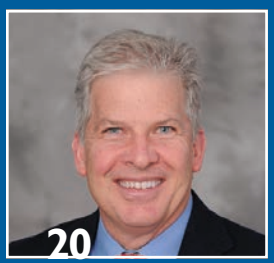
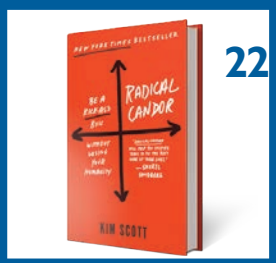
ON THE COVER: Superintendent Gary Taylor has built a skilled and efficient team of cross-trained employees at the El Dorado (Kansas) Water Distribution & Sewer Maintenance Division. (Photography by Denny Medley)







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Luke Laggis

Luke Laggis

GET A LEG UP

Chasing leaks will wear you out, but it'll never get you ahead

It rained last night. It started in the evening, light at first, but then picked up to a steady shower that increased in intensity after dark. It was the first time this summer I'd laid in bed with the windows open and just listened to it rain.

Over the course of the night, the storm woke me a few times. It was steady throughout the night, but only occasionally did it rise up enough to jar my eyes open. Each time, I caught the distinctly separate sound of heavy drops plopping into the plastic bin I'd placed in the eve of the attic above my bed. I'd listen for a minute and feel a flash of dread before falling back asleep.

A couple weeks earlier a large branch snapped off a birch tree right outside the bedroom window. It dented the metal roof and messed up a vent stack. Water had been getting in there ever since, but I didn't notice right away.

Eventually, the steady beat of rain on the roof gave way to birds announcing the arrival of daylight, and I listened as the breeze shook the last of the rain out of the trees. As the day dried out, my concern over the ongoing leak dissipated. My contractor has been assuring me for the past couple weeks that he'll be over in a day or two.

If I left that leak alone, the water would eventually get into the second floor and find a way down to the main level. It would cause significant damage. It's the same for the leaks in your systems.

"It's so important to be proactive, creative and efficient and to stay on top of new technology."

I'm mostly lucky. Insurance is covering the repairs and the plastic bin is working for now. But you don't have the luxury of sitting back and waiting for someone to come and fix your system when it breaks. You don't have the option of putting a bucket under your pipes when they leak. You have to address them.

I could have been proactive about the tree that fell. A few years earlier a larger birch came down in a storm and smashed in the gable end of my roof. I thought at the time that it might be a good idea to take down the one on the side of my house too, but I didn't. I can't control the winds, but I could have taken the tree out of the equation. The inaction came back to bite me.

Have you ever waited to replace a pipe you knew was on the brink of failing because there wasn't money in the budget, only to see its inevitable failure become an even more costly emergency repair? If you don't have the money or the means, sometimes that's all you can do. Even if there isn't money in the budget for line replacement or rehabilitation, there's always money when a waterline bursts and opens a sinkhole in the middle of town. But that's not a path toward system improvement. It's a path toward bigger failures and higher price tags.

That's why it's so important to be proactive, creative and efficient and to stay on top of new technology. You need every advantage you can get, because you don't have nearly enough allies pushing for bigger sewer and water budgets.

Providing ideas, examples and industry insight that can help you do your jobs better is our whole mission. A new feature we're launching this month, Supply Side, is aimed at doing just that. I hope you find it beneficial.

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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TRADE SECRETS

How to Handle Root Cutting

Root cutting jobs are tricky, and you need a variety of cutting tools to tackle the toughest jobs. In this online exclusive article, a pipe tools expert shares the best tools and techniques for handling jobs that require root cutting. He recommends waterjet saws and cutters as a first line of offense.

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SOIL CHALLENGES

Getting Accurate Locations

Soil type plays a big role in a utility worker's ability to accurately locate underground utilities in advance of an excavation job. If conditions aren't optimal, some techniques can prove useless for locations. This online article offers an overview of basic soil types and the best approaches to take when locating utilities in them.

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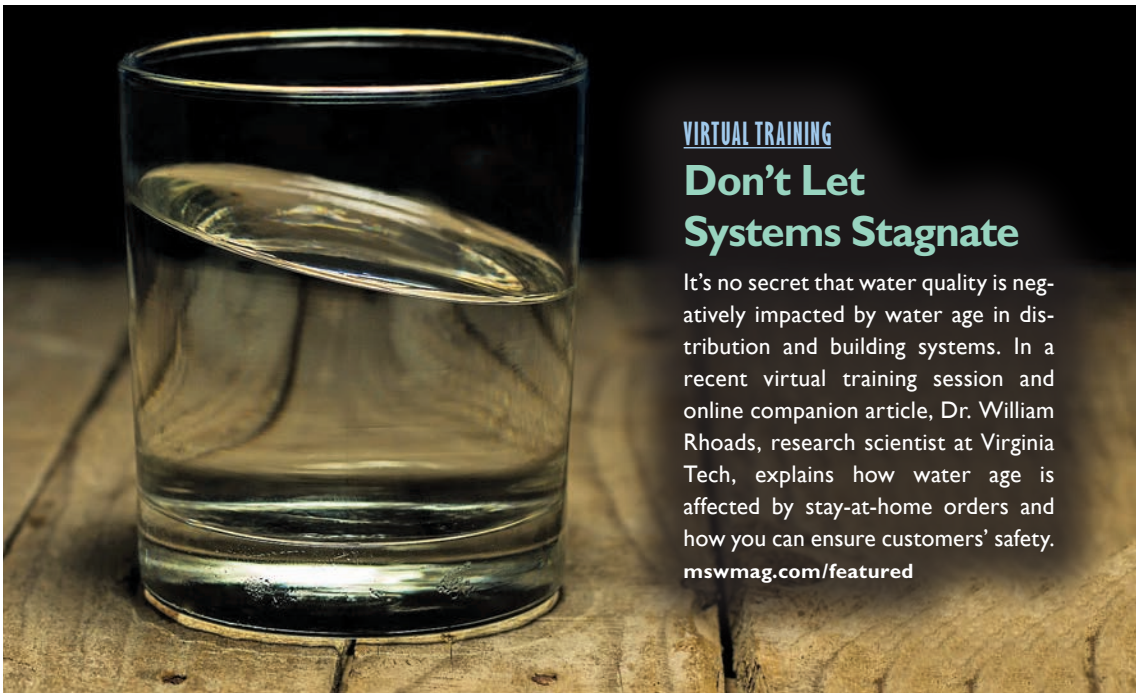

VIRTUAL TRAINING

Don't Let Systems Stagnate

It's no secret that water quality is negatively impacted by water age in distribution and building systems. In a recent virtual training session and online companion article, Dr. William Rhoads, research scientist at Virginia Tech, explains how water age is affected by stay-at-home orders and how you can ensure customers' safety.

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2010 — BEST OF THE DECADE — 2019

Editor's note: We're digging through the archives and sharing our most popular stories from the past decade. This story originally ran in the June 2017 issue of *Municipal Sewer & Water* and has been viewed more times than any other profile on MSWmag.com.

UTILITY OF THE FUTURE

Miami-Dade's master plan encompasses hundreds of improvement projects with a focus on building resilience

By Jim Force

Some utilities struggle to meet the conditions of a consent decree. Others use it as a baseline. The Miami-Dade (Florida) Water and Sewer Department took the $1.6 billion in improvements outlined in its consent decree and added nearly $12 billion in utilitywide upgrades.

Equipped with a comprehensive master plan, the utility is already into year four of its $13.5 billion capital improvement program — one of the largest among U.S. water and wastewater utilities. Some 775 projects, representing $1.1 billion in department assets, have been completed. Another 861 are in the planning or construction phase. They range from sewer line and waterline rehabilitation and replacement and enhanced monitoring and data systems integration, to improved energy efficiency and treatment plant upgrades and expansion — from one end of the service area to the other.

"The challenge for water utilities is resilience," says Hardeep Anand, deputy director for the utility's capital improvement program. "How can we give our customers the comfort that we will be resilient enough to be able to bounce back in the face of a disaster or a disrupting event — large or small — in the future?" he asks. That means being able to overcome climate change — including rising sea levels — replace aging infrastructure, address the threat of cybersecurity, comply with new regulations and still meet the demands of economic growth and an expanding population.

For its planning and foresight, the utility was one of 61 utilities recognized as **Utilities of the Future** at the Water Environment Federation's annual conference last year.

Miami-Dade earned the award again in 2017.

Miami-Dade Water and Sewer Department Capital Improvement Program Deputy Director Hardeep Anand

"The challenge for water utilities is resilience."

Hardeep Anand

Sprawling district

Serving 2.3 million people, plus thousands of daily visitors, and covering 400 square miles, the department is the largest water and wastewater utility in the Southeastern U.S. Its water system draws water from the Biscayne aquifer and treats it at three large regional treatment plants and five smaller plants, plus a new reverse osmosis water treatment plant. Together, these facilities provide an average of 314 million gallons of high-quality water per day via a distribution system of more than 8,000 miles. The system includes more than 126,000 valves and 38,000 hydrants.

Three wastewater treatment plants process an average of 308 million gallons of wastewater per day, collected through a 6,300-mile system of mains and laterals. There are 1,047 sewer pump stations, two ocean outfalls and 21 deep injection wells. About 13 mgd of treated wastewater is currently reused.

The department employs more than 2,800 people and has an annual operating budget of approximately $400 million.

Critical data

Miami-Dade County, the U.S. Environmental Protection Agency and the Florida Department of Environmental Protection entered a consent decree for improvements to the wastewater collections and treatment system in June 2013. But while the decree has mandated a number of projects throughout the county, the utility had been working on improvements in the years prior to the agreement as part of its comprehensive master plan and capital improvement program.

The planning of the program, stretching more than 15 years, depends in large part on data along with operations and maintenance principles contained in its capacity, management, operation and maintenance plan, according to Anand.

"Data is one of our biggest challenges," he says. "We need to be able to integrate data from various sources and analyze it through the lens of utility resiliency and efficiencies in order to become a smart utility for both the present and the future."

New SCADA technology w ill be key. Anand says the department's SCADA plan is only about 20% complete. For now, he says, "We look at data the best we can. The goal is for more SCADA to be deployed so that incrementally we become a smarter utility."

Anand envisions wider use of dashboarding as the department progresses. "Dashboarding is somewhat new to utilities, though it is common in other industries like marketing and banking," he says. "We need the same concept here so we can see big data, run the analytics and make smart decisions related to predictive maintenance as we build dynamic and adaptive capital improvement plans."

The quality of the data is also important. "We can't make decisions based on corrupt data," Anand believes. "Data governance and integrity becomes critical."

Data should not only be assembled, it must be communicated, he explains. "It's critical that when internal divisions of the utility sit around the table, they are able to discuss global utility data, which is consistent rather than from their own roles and perspectives." For the team to work, the barriers of data and traditional information silos will need to be overcome, he says.

Likewise, the information needs to be disseminated down to all 2,800 department employees. "At the end of the day, our workforce, our designers and our consulting workforce all need to know our road map."

The role of CMOM

CMOM is proving to be another useful tool as the utility moves toward making its assets and services more resilient in the future.

A product of the consent decree, the CMOM sets forth several performance parameters that the department must meet in its wastewater collection and treatment programs.

"It's required us to focus on specific things: not just the consent decree requirements — which amount to $1.6 billion in improvements — but the utilitywide aspect," Anand says. "It's a strategic plan ensuring that we consistently deploy asset management, capital planning, and repairs and maintenance across the entire utility."

Typically, CMOM programs help utilities optimize the use of human

PROFILE: Miami-Dade (Florida) Water and Sewer Department

FOUNDED:
1972

AREA SERVED:
Miami-Dade County, including unincorporated areas

CUSTOMER ACCOUNTS:
450,000

ANNUAL BUDGET:
Approximately $400 million

STAFF:
2,800 employees

DIRECTOR:
Lester Sola

WEBSITE:
www.miamidade.gov/water

A crew digs a trench for a new 48-inch force main, part of a $13.5 billion Capital Improvement Program that helped the Miami-Dade Water and Sewer Department earn Utility of the Future honors from the Water Environment Federation. (Photography by Rob Herrera)

PUMP STATION IMPROVEMENTS TAKE SHAPE

A crew member levels off fresh concrete on the foundation of a new pump station under construction near the Miami-Dade Water and Sewer Department building.

Pump stations are the heartbeat of the sewer system. When they wear out or are overwhelmed, they need to be replaced or repaired.

That's the job of Rolando Roque and the team in charge of the Pump Station Improvement Program, or PSIP, at Miami-Dade (Florida) Water and Sewer Department.

Roque, senior professional engineer, says the program began two years ago and is expected to take seven years. More than 100 pump stations are involved, as well as several older gravity-flow sewer lines where inflow and infiltration from the area's shallow water table is increasing pumping volume. In those cases, the piping needs to be repaired or replaced.

The PSIP was one of the requirements of the consent decree Miami-Dade signed in 2014, and it is expected to cost about $200 million.

Roque explains that the utility's system has 1,000-plus pump stations. Many are in neighborhoods that have added considerable population since they were constructed — high-rise apartment buildings and condominiums have replaced single-family dwellings. Higher capacities are required. Other stations are simply old and contain equipment that is difficult to replace.

"The consent decree established certain standards we are following to meet regulatory compliance requirements at all of our pump stations," Roque says.

"We look at our pump stations holistically," he adds. In some cases, a station will need newer or larger-capacity pumps. In other situations, a new dry well/wet well combination may need to be installed to handle higher capacity. The utility uses Flygt - a Xylem Brand, ABS (Sulzer Pumps Solutions), Homa Pump Technology and KSB submersible pumps.

The department uses closed circuit TV monitoring and quantitative analysis to identify defective piping. Nighttime flows are closely monitored to detect I&I. Most pipes are repaired by relining, usually with the CIPP method; where pipes require complete replacement, the utility uses opencut methods.

Roque says the PSIP has updated about 40 pump stations to date, and the design work for the entire project is 80% complete. The department employs a number of different design consultants; construction work is awarded to smaller, local contractors.

Public outreach is important, as the PSIP affects stations that often are close to houses and streets. Roque says the department has an outreach group that meets with affected citizens and explains the projects, which generally take six months from excavation to completion.

When done, Roque says the results are worth it. "We want to leave an area in better shape than it was."

"At the end of the day, our workforce, our designers and our consulting workforce all need to know our road map."

Hardeep Anand

and material resources by shifting maintenance activities from reactive to proactive. In the case of the Water and Sewer Department, the utility is building predictive maintenance into its normal operations. "Emergencies will happen, but we want to become predictive, not reactive … know what's coming and plan for it," Anand says. "Good data becomes the basis for all decision-making behind the scenes, and it allows better capital improvement planning."

Pipe projects

Many of the hundreds of projects the utility is working on involve sewer lines and water mains. The department has thousands of miles of water pipes and sewer lines; many are old or undersized and in need of repair or replacement. In other cases, new lines are being extended to newly developed parts of the district.

Anand points to a number of showcase projects:

- Kendall Boulevard to Southwest 104th Street, where a 12-inch wastewater line is being installed without disruption to traffic or the neighborhoods. The project is expected to take five months. The areas around construction will be restored at the end of the project.
- Renewal of a large waterline traveling down Southwest 152nd Street, parallel to Zoo Miami.
- A 5,300-foot force main replacement under Norris Cut between Fisher Island and Virginia Key. The pipeline required a 10-foot-diameter tunnel. The line also required opencut replacement of 2,700 feet of 60-inch-diameter pipe in the wastewater treatment plant and directional drilling 1,000 feet of 10-inch-diameter pipe.

Anand says the new lines both impact and improve the daily lives of customers. "In older neighborhoods, many of our lines pass under front yards and **backyards."**

In 2018 and 2019, Miami-Dade relocated water service lines from residences' backyards to the front of those properties in the South Miami Heights community.

To avoid community disruption, the utility often turns to sliplining. Juan Bedoya, chief of Wastewater Collection and Transmission, points to a 3.7-mile sewer relining project along Southwest Seventh Street. There, the wire wrap in a 54-inch prestressed concrete pressure pipe had badly deteriorated, causing pipe failures. Rather than use opencut methods to replace the line, the department turned to sliplining with HDPE. Bedoya says HDPE is preferred because its smooth surface results in minimum capacity reductions. Plus, he says sliplining with HDPE is cost-effective on a life cycle basis. "From an environmental and public standpoint, sliplining with HDPE is the way to go," he says.

Ric-Man Construction is doing the sliplining work.

A significant portion of the department's large-diameter pipelines are prestressed concrete cylinder pipe, and Bedoya says the entire PCCP system is being examined using the PipeDiver tool from Pure Technologies. The device travels through the lines, using electromagnetic waves to identify and locate broken prestressed wire wraps, which are the main indication of potential problems.

Anand notes that predictive maintenance enables the department to replace pipes before they fail and cause property damage.

"It's a maximization of existing infrastructure and enhancement in operational resilience."

(continued)

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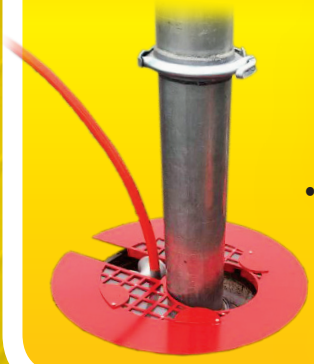

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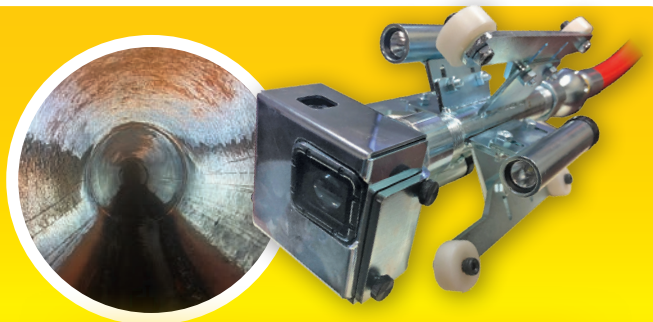

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Crew members prep a section of pipe for installation. The new 48-inch force main is part of the North Miami Avenue Betterment Project.

"Good data becomes the basis for all decision-making behind the scenes, and it allows better capital improvement planning."

Hardeep Anand

Ocean outfalls

In 2008, the Florida Legislature and governor approved a new law requiring all wastewater utilities in southeast Florida using ocean outfalls to reduce nutrient discharges by 2018 and cease using the outfalls by 2025. The law also required utilities to reuse 60% of the treated effluent ocean discharges.

The utility explored a number of options and decided to construct a new 100 mgd West District Wastewater Treatment Plant in the western portion of the county while reducing flows —including storm surges — to its three existing wastewater treatment facilities. "By moving water from east to west, we will be reducing stress on existing pump stations," Anand says.

The nutrient reduction goal will be met through the use of **new deep injection wells** at the North, Central and West district plants, and a new industrial injection well at the Central plant. The reuse requirements of the Ocean Outfall Program are being evaluated further to identify the most feasible compliance strategies.

In April 2019, Miami-Dade signed a $100 million low-interest loan agreement to fund a significant portion of the cost to construct 14 new injection wells at three wastewater treatment plants.

Water system

New projects are shoring up the department's leak detection system to reduce water losses, and they're also installing state-of-the-art advanced metering and a fiber optic emergency response system.

- **Leak detection.** The utility has piloted its new leak detection technology on a 109-mile section of its transmission and distribution system in a densely populated area. The results have been outstanding, Anand says. In the first four months of the pilot test, the system identified 50 leaks, the repair of which saved 459 million gallons of water and produced a significant savings in nonrevenue water. For its work, the department received a 2016 National Association of Counties Achievement Award in water loss management.
- **Advanced metering infrastructure.** The department is preparing to deploy an AMI system throughout its 450,000 accounts. The move is expected to improve customer service and customer engagement with their water utility. Plus, the new system will conserve water and foster more efficiency among its users while generating meaningful data for the department to use in future planning.
- **Acoustic emergency response.** This technology will provide real-time monitoring of the wire strands in vulnerable PCPP pipe and other high-risk assets. Using fiber optics, the system will enable the utility to spot potential breaks and address them before emergencies develop.

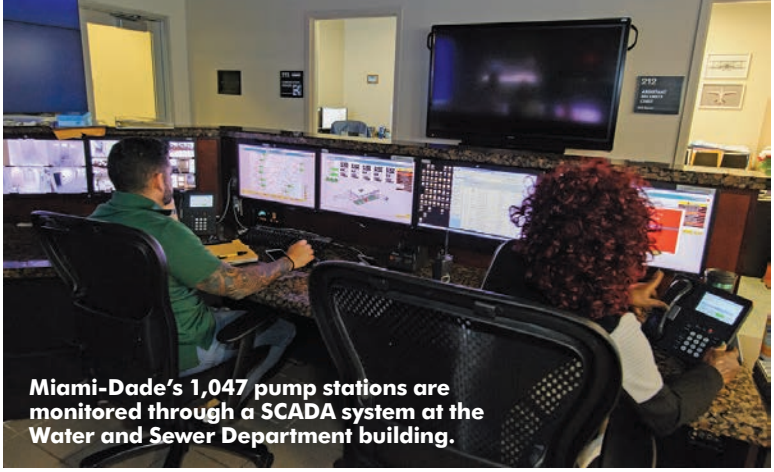
Energy efficiency

The utility is Florida Power & Light's single largest customer in South Florida. In an effort to reduce its carbon footprint while reaping cost savings, the department is strategically pursuing opportunities to reduce energy usage.

The department's Utility Resiliency Plan aims to incorporate energy-efficient measures in technical design standards and capital projects, which will reduce energy costs, as well as the carbon footprint of its water and wastewater treatment plants.

To achieve its goals, the utility has partnered with the U.S. Department of Energy on a Wastewater Infrastructure Accelerator program focused on resource recovery and a pathway toward a sustainable infrastructure of the future. "The partnership will enable us to tap into ongoing technical assistance from the U.S. DOE and Oak Ridge National Laboratory to perform energy assessments and identify opportunities for incorporating energy-efficiency measures within the utility," explains Lester Sola, Water and Sewer Department director.

(continued)



Miami-Dade's 1,047 pump stations are monitored through a SCADA system at the Water and Sewer Department building.

In June 2020, Miami-Dade signed a $326 million loan agreement through the EPA's Water Infrastructure Finance and Innovation Act to help fund wastewater treatment plant electrical distribution building upgrades.

By adopting innovative and best-practice approaches in data management, technologies and **financing for infrastructure improvements**, the utility will seek to improve the energy efficiency of its wastewater treatment facilities by at least 30%. Miami-Dade was one of the few utilities nationwide taking part in the inaugural partnership at the White House in May 2016.

Energy audits will help identify areas where efficiencies are to be leveraged, and capital improvement projects will be undertaken to realize those efficiencies. A recent example of the utility's commitment to energy efficiency is the 8 MW cogeneration facility at the South District Wastewater Treatment Plant. This project takes methane gas from the treatment plant digesters and an adjacent municipal landfill and produces electricity and heat, which are used to operate the facility.

The future

While Anand and others at Miami-Dade brim with confidence and enthusiasm as they push ahead with their master plan and capital improvement program, they recognize the challenges. "The next few years will be very challenging as we develop the framework to be a utility of the future," he says.

The plan includes water, wastewater, climate adaptation and integration of technologies. It requires planning and compliance; coordination among utilities; program and construction management for pipeline and pump station projects; design and construction of new wellfields and a new 20 mgd wastewater treatment plant; and, not to mention, an engaged and skilled workforce, best practices, economic growth and operations optimization.

In January 2018, Miami-Dade received the Resilient Utility Coalition's Resilient Utility of the Year award.

At the same time, the department has become the founding utility in the **Resilient Utility Coalition** — a strategic partnership formed between utilities in four South Florida counties and professional organizations to advance utility infrastructure resiliency efforts and help members deal with new challenges, especially the effects of climate change. "The coalition aims to enhance the usefulness of climate science by developing joint adaptation strategies and improving water management decision-making in the face of climate uncertainty," Anand says.

Currently, the coalition plans to develop a regional resiliency scorecard, conduct quarterly roundtable meetings, develop "tech talks" for training and education, and publish materials for community outreach.

In the long term, the RUC recommends utilities have a resiliency plan, prioritize investment based on the plan, implement energy efficiency and achieve economic sustainability and affordability for ratepayers while engaging employees and reaching out to the community and other partners.

"The collaboration, platform and framework fostered by RUC's members will be vital to the continuous successful delivery of services to our customers," Anand says.

"We're doing the right thing; we're thinking ahead," he continues. "How can we avoid a catastrophic failure if we don't plan for it? It's the path to a smart utility and a resilient utility." ✦

AWARD HONORS PROACTIVE APPROACH

The Miami-Dade (Florida) Water and Sewer Department was one of 61 water and wastewater utilities across the U.S., Canada and Denmark to be named a Utility of the Future at the 2016 Water Environment Federation annual conference in New Orleans.

The program — sponsored by WEF, the Water Environment & Reuse Foundation, and the National Association of Clean Water Agencies, with input from the U.S. Environmental Protection Agency — is designed to guide and honor utilities of all sizes for smart, efficient operations. Utilities are encouraged to recover resources and become more sustainable and resilient. Specifically, the program rewards water reuse, watershed stewardship, beneficial biosolids reuse, community engagement, energy efficiency, and recovery of nutrients and other materials.

The selection committee, consisting of peer utility leaders, evaluated utilities based on their ability to demonstrate comprehensive engagement in their selected activity areas in a meaningful and vigorous manner.

"Being acknowledged as a Utility of the Future is a meaningful recognition for us," says Lester Sola, Water and Sewer Department director, in a press release. "We continually strive to address the resiliency needs of the region by developing proactive approaches to providing services and upgrading our infrastructure to meet current and future demands."

Eileen O'Neill, WEF executive director, added, "We are excited about this new opportunity to recognize the achievements of small, medium and large forward-thinking utilities that are providing sustainable, efficient and value-added service to communities nationwide."

More information about the program can be obtained from the websites of any of the sponsoring organizations, some of which conduct webinars about the program and have application forms for the next round of awards.

ANSWERS FOR WASTEWATER UTILITIES

ADS integrates remote sensing, cloud-based data processing and technical services to predict and prevent system failures

By Luke Laggis

The wastewater business is all about managing flow. As you know, that task is often more difficult than it sounds, but ADS provides utilities with both the equipment and the expertise to predict and prevent system failures.

Hal Kimbrough, the general manager of ADS, recently spoke with *Municipal Sewer & Water* about the company and its mission to help wastewater utilities better manage their systems and stay in compliance.

MSW: Tell me a little bit about ADS' history and how it fits under the IDEX umbrella.

Kimbrough: ADS was formed as American Digital Systems in 1975 by NASA scientist Peter Petroff. ADS introduced the first flow monitor designed specifically for open channel wastewater in response to the passage of the National Pollutant Discharge Elimination System in 1972. ADS was purchased by IDEX in January 2008. They fit in IDEX's Fluid and Metering Technologies segment, which is focused on highly engineered solutions for the movement of high-value fluids.

MSW: What types of needs do you address for municipal utilities?

Kimbrough: The mission of ADS is to provide the easiest and most affordable answers to when, where and how collections systems will fail in time to prevent harm. Because the most common failure modes are loss of capacity due to blockage and due to infiltration and inflow, finding and quantifying their impact are our specialties.

MSW: How do the equipment manufacturing and service sides of your business work together?

Kimbrough: We discover the answers to when, where and how collections systems will fail through an integrated system of remote sensing, cloud-based data processing and technical services. ADS has developed intellectual property in all three of these components. This is an important source of differentiation, as almost all other participants in our industry are either exclusive equipment suppliers or exclusive service companies. The advantage we gain from this integration is applications expertise that spans everything from intrinsic safety design in our monitors to in-depth knowledge of how hydraulic phenomenon in sewers appear in ultrasonic signal patterns that can be recognized by machine learning algorithms.

"The ability to share data with third-party applications such as GIS and SCADA in near-real-time is a breakthrough."

Hal Kimbrough

MSW: What's the most common problem you see your municipal customers facing?

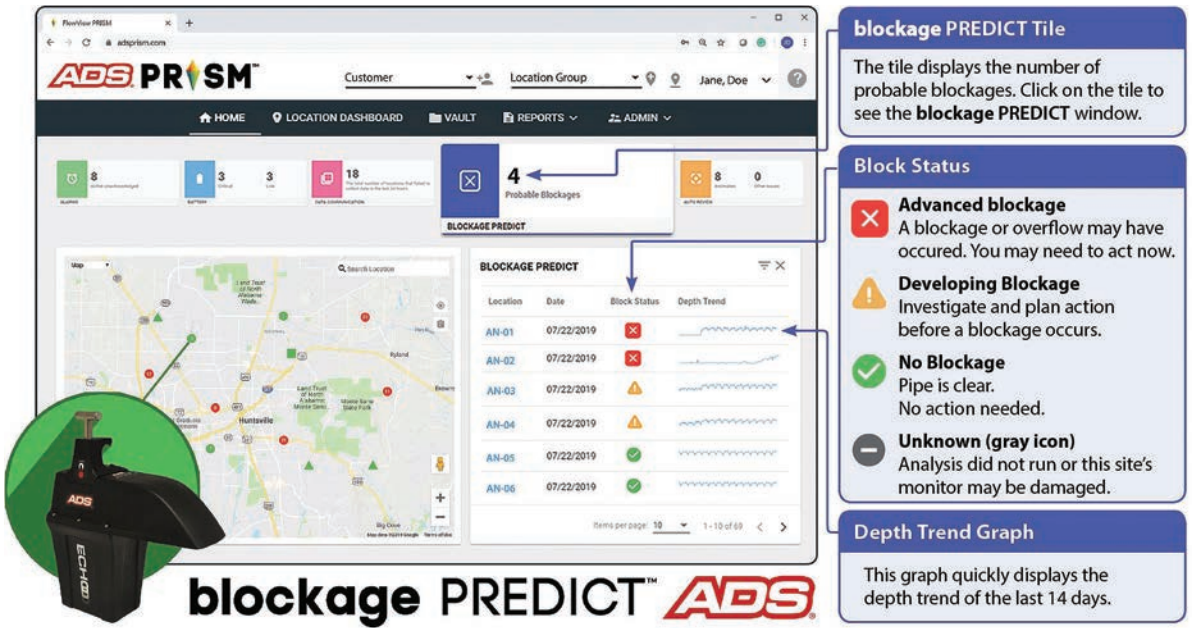
Kimbrough: The most common problems are how to efficiently direct pipe cleaning operations and how to restore conveyance capacity lost to wet weather and I&I. In the absence of data regarding when, where and how these capacity problems develop, systemwide strategies are adopted that often apply remedies where there are no problems.

MSW: How has flow monitoring advanced?

Kimbrough: Flow monitoring technology has benefitted from advancements in wireless communications, low-powered electronics and improved ultrasonic sensing. Our latest flow monitors require significantly less maintenance than prior generations, with improved consistency in the data. Beyond the hardware, the software advances around flow monitoring have been more substantial. The ability to share data with third-party applications such as GIS and SCADA in near real time is a breakthrough. And we are just seeing the tip of the iceberg of the new sources of value that machine learning will bring. For ADS, blockage PREDICT is just the first in a long road map of analytical apps that will help utilities manage capacity risks in their collections systems.

MSW: Proactive maintenance is obviously more efficient than reactive emergency cleaning and repair. Is that the idea behind blockage PREDICT?

Kimbrough: Not only is reactive cleaning inefficient, it is ineffective because it occurs after the collections system has failed in its primary mis-



sion of containing pollutants. On the opposite end of the spectrum is high-frequency preventive cleaning, which can be effective but highly inefficient. We routinely discover that high-frequency cleaning activities are performed on clean pipes. High-frequency cleaning also subjects aging pipe material to high-pressure jetting, which reduces the structural life of pipes. Blockage PREDICT provides early warning of the loss of capacity due to blockage in time to clean pipes under routine maintenance schedules at the time that is neither too early nor too late.

"We routinely discover that high-frequency cleaning activities are performed on clean pipes."

Hal Kimbrough

***MSW:* What mistakes do you see utilities make in their monitoring efforts?**

Kimbrough: I think wastewater utilities are underappreciated for the great job they do in keeping very old collections systems in working condition. There are a few areas where monitoring could be made more effective. First is the recognition that hydraulic model results are not suitable replacements for actual measurements. We think modeling and monitoring should operate in combination. Another common problem is that monitoring data is used to draw conclusions for which it has insufficient statistical power to support. A good example of this is post-rehabilitation monitoring where an insufficient, few number of storms are used to estimate before-and-after I&I volumes.

***MSW:* What differentiates your flow monitoring solutions from the competition?**

Kimbrough: Our differentiation is the integration of sensing, software and technical services mentioned earlier. Sewer flow monitoring is not yet to the "set it and forget it" point like a water meter. We want to get it there someday. But until then, a specific expertise is required that is best gained by experience. This is where we have tried to be different in our 45 years of doing this.

***MSW:* How does the suite of ADS products and services work together to provide solutions for utilities?**

Kimbrough: I'll give the short answer. ADS hardware and software are designed foremost to meet the needs of the most demanding power users in the world, our own service teams. We have a rigorous process that transforms an acoustic pulse from a sensor in a sewer to the answers to critical questions of when, where and how sewer operators should intervene to prevent a pollution event. Our products and services are built on the blueprint of that process. We have been told that this design philosophy makes our monitoring systems complex. This is a valid complaint. Powerful systems have traditionally been more complex. But this is changing with the advent of software architectures that can hide complexity from the user. This was a major emphasis of our new PRISM software platform and our latest sensor, the ECHO.

***MSW:* What's new for ADS in 2020, and what's on the horizon?**

Kimbrough: We just introduced our new AV|GATED sensor, which senses changing velocity profiles in order to measure average velocity, even in shallow water. We are working on the next generation of our surface velocity sensor, which is a nonsubmerged sensor that requires minimal maintenance. We will also be rolling out a series of new modules for our PRISM data platform. Our industry-leading SLiiCER tool set for I&I analysis has been totally rewritten for PRISM. Also, a suite of data editing tools that replaces our legacy Profile software will be introduced. Both have entered beta testing and are to be released in the third quarter of 2020. Our blockage PREDICT app has been retrained with more than a million monitor days of classified data. The horizon? Expect new analytical apps to be added to PRISM, and expect hardware that is easier than ever to deploy in greater density.

***MSW:* Anything else you'd like to add?**

Kimbrough: I would like to address the COVID-19 pandemic and how it is influencing our planning. We have been in discussions with laboratories and researchers who are on the leading edge of wastewater-based epidemiology on the potential for detecting viral concentrations in wastewater. We are sponsoring a pilot project with a major customer in the Western U.S., in partnership with a leading wastewater-based epidemiology firm. Our concept is that flow data analyzed in conjunction with laboratory data can provide more value than laboratory tests alone in both isolating high-risk areas and for continuous monitoring for future outbreaks. We are optimistic that we can play a part in helping our customers confront the pandemic with a very unique service. ✦

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.

MAKING A CASE FOR CANDOR

The truth may hurt, but when delivered with compassion, everyone benefits

By Ken Wysocky

Most people are told at an early age that if they have nothing nice to say, they should say nothing at all. But managers who adhere to this advice run the risk of deflating employee morale and increasing turnover — and in worst-case scenarios, perhaps even getting fired.

Here's the thing: When managers don't candidly give employees the critical intel they need to improve, they essentially send a message that underperformance is OK. That then places an unfair burden on high-performing employees who must pick up the slack. That, in turn, can lead to resentment and low morale, poor team results and higher turnover as star employees get tired of the charade and bolt for the door.

As such, compassionate, but candid criticism is crucial. Bestselling author and executive coach Kim Scott has a name for it: radical candor.

"It's a simple idea: Care personally, while at the same time, challenge directly," says Scott, the author of bestselling *Radical Candor: Be a Kick-Ass Boss Without Losing Your Humanity* and the co-founder of consulting firm Radical Candor. "It's like delivering love and truth at the same time.

"Very often we think there's a dichotomy between the two, but I believe that's wrong," she continues. "If you truly care about someone, you also must challenge them — tell them when they make a mistake."

> **"If you truly care about someone, you also must challenge them — tell them when they make a mistake."**
>
> **Kim Scott**

Scott got a firsthand lesson in the value of candor while working for Google. After she made an important presentation to senior management, her boss told Scott that while she had done a good job, she also said "um" quite a bit and her boss offered to hire a speech coach to cure the problem.

After Scott brushed off the suggestion twice, her boss upped the ante by making the point more bluntly. "She told me that when I say 'um' all the time, it makes me sound stupid," Scott recalls. "And in retrospect, it was the kindest thing she could've said to me because she wasn't exaggerating. I was saying 'um' about every third word."

That incident got Scott thinking about why her boss was able to be so honest. It also raised another question: Why had no one ever told her this before?

"It was like I'd been walking through life with a giant hunk of spinach between my teeth and no one had ever told me," she says.

It's all about context

That raises a crucial point about radical candor: It only works when employees know their manager cares about them. Without that key ingredient, praise sounds insincere and criticism falls under a category Scott calls "obnoxious aggression."

The converse to that is when managers care about employees but can't deliver bad news for fear of hurting their feelings. Scott calls this "ruinous empathy."

But when managers can combine both caring about and challenging employees, they've entered the radical candor zone.

So if managers realize they fall more under the obnoxious aggression umbrella, how do they do an about-face without making their direct reports leery about the sudden transformation? Start by first taking criticism, rather than dishing it out, Scott suggests.

"If you solicit feedback and respond well to it, they see that you view feedback as a gift," she explains. "And going forward, they'll now understand the spirit in which you offer them feedback."

When managers ask for feedback, it's important to ask questions that can't be answered with simple "yes" or "no" answers. For example, managers might start by asking direct reports what managers could do to make working together easier.

Moreover, when it comes to having those difficult conversations, it's important to first give praise for what employees do well. "This isn't a complicated process," Scott notes. "After you start soliciting feedback and giving praise, you're in a better frame of mind, the employees are in a better frame of mind and it becomes easier to offer criticism."

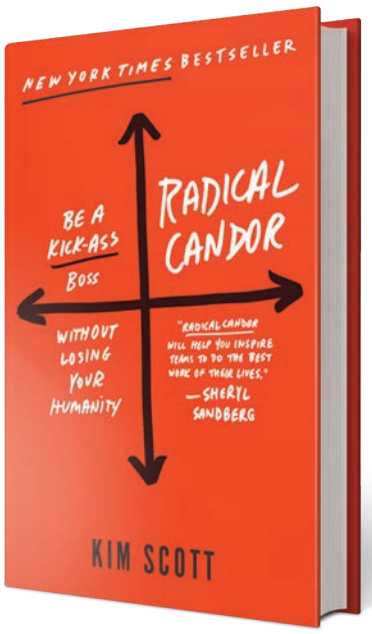
Two-way street

Radical candor also requires two-way dialogue, not a monologue. In short, managers should be mindful of the fact that they're not the sole arbiters of good or bad performance. Instead, they should emphasize that they're not passing judgement, just sharing a point of view, she recommends.

"It's better to say, 'Here's what I see, and I'm curious to understand what you see,'" Scott suggests. "You don't want to sound like you have a pipeline to God, where you know what's true and what isn't. You're simply trying to find a better answer together.

"Like I said before, radical candor is a gift, either because you're right and you're giving an employee a chance to correct what's wrong or you're wrong and you can fix your own thinking," she explains. "But this should be more about listening than talking … be humble."

Listening carefully also helps managers determine how the conversation is going. "Gauge how things are landing and then adjust," Scott says. "Radical candor doesn't get measured at the speaker's mouth, but at the listener's ear.



"It was like I'd been walking through life with a giant hunk of spinach between my teeth and no one had ever told me."

Kim Scott

"If the employee starts to get upset, move up on the caring dimension," she advises. "But if they're not hearing you, it's time to move up on the challenge dimension." (Just as Scott's boss did when Scott needed, um, a bit more candor.)

Spinach in the teeth

What about managers who try hard but find themselves still mired in ruinous-empathy mode? Scott says they should take heart in one fact: Most of the time, it's never as bad as they think it's going to be.

In most cases, when criticism is constructively dispensed, employees are grateful to know about the metaphorical spinach stuck in their teeth. And if a manager doesn't tell them but someone else does, it erodes trust. Why? Because the employee then wonders why the manager never said anything.

"One out of 10 times you might have a radical-candor train wreck," she asserts. "But nine times out of 10, there's a huge reward — it's how you build trust and relationships."

Scott doesn't sugarcoat how difficult it can be to learn the fine art of candor. She says that from her extensive experience, it's "seriously hard" for everyone from new managers to chief executive officers.

"We're social animals," she explains. "For most of human evolution, if you offended people and got thrown out of your tribe, you were dead. So we don't like to take social risks."

On the other hand, practicing radical candor is just like anything else: The more you do it, the better you get.

"It gets easier as you build relationships and people know you have their backs," she observes. "It's hardest when you're just starting a relationship, but that's when it's most critically important, too.

"It's paradoxical because people think they need to wait (on criticism) and be silent in order to build trust," she continues. "But silence doesn't build trust. Communication builds trust. Silence may feel safer, but it's not." ✦

DOING DOUBLE DUTY

Cross-trained employees boost Kansas utility's efficiency and reduce costs

By Ken Wysocky

The El Dorado (Kansas) Water Distribution & Sewer Maintenance division prizes efficiency. And one of the primary ways the small utility achieves that is through cross-trained employees, who allow it to accomplish more with less — and save money in the process.

"We've always done it that way," says Gary Taylor, superintendent of water distribution and sewer collection for the division, part of the city's Public Utilities Department. "Our eight employees know how to flush sewers, as well as fix water main breaks.

"We get a lot more calls for sewer service than water service," he continues. "So if we didn't have cross-trained employees, the guys who do sewers would be out all the time, while the guys who do water wouldn't be very busy. And the sewer guys wouldn't get much time to spend with families.

"We only have eight guys in the field, so it makes us much more efficient if all of them can handle both water and sewer calls."

In addition, an internal operating policy mandates that the division must respond to calls for service within 20 minutes. And most emergency sewer calls come in after normal working hours and on weekends, Taylor notes.

"With cross-trained employees, we only need two people on call instead of paying four people to be on call (two for sewer calls and two for water calls)," he explains. One two-man crew is on call 24/7 for one week at a time on a rotating basis.

Two employees at the division are meter readers who check and read every meter in the city each month and change out meters when necessary.

"We always push to do things as efficiently as possible," notes Kurt Bookout, director of Public Utilities.

The El Dorado (Kansas) water distribution team includes (from left) Chase Halton, equipment operator Brent Peck, Superintendent Gary Taylor, administrative assistant Michelle Linson and equipment operator Chad Schlesner. (Photography by Denny Medley)

El Dorado Lake is an 8,400-acre manmade reservoir on the Walnut River built for flood control and to supply the city's water.

Great water quality

Located roughly 30 miles northeast of Wichita in southeastern Kansas, El Dorado has about 13,000 residents and is the county seat of Butler County. The utilities provide water for about 35,000 city and county residents and sewer service for about 16,000 customers.

Drinking water comes from the 8,400-acre El Dorado Lake, a manmade reservoir created by damming the Walnut River. The Army Corps of Engineers finished the project, aimed at providing flood control and drinking water, in 1981.

The El Dorado Water Distribution & Sewer Maintenance Division's many awards grace the entrance to the wastewater treatment plant.

> **"We only have eight guys in the field, so it makes us much more efficient if all of them can handle both water and sewer calls."**
>
> **Gary Taylor**

The watershed that drains into the lake is predominantly a native tallgrass prairie; as such, water quality is excellent because there's less nutrient runoff from cropland, Bookout explains.

"We're one of the few lakes in Kansas that has had no problem with algae blooms," he says. "Our water quality is exceptional. We've won two annual awards from the American Water Works Association for the best-tasting water in Kansas. Excellent quality of water at the source translates into great finish water at the tap."

The water system includes 129 miles of distribution mains (primarily made from cast iron), 2,919 water main valves, 692 fire hydrants and 5,171 water meters. On the sewer side, the system encompasses 93 miles of collections lines (mainly clay tile pipes), 1,872 manholes and 11 lift stations.

Equipped for maintenance

The division handles most water and sewer maintenance in-house. Contractors are usually hired for major projects, but division employees recently completed the installation of two new manholes and 200 feet of gravity-fed sewer mains to serve new customers.

To inspect sewer lines, crews rely on an Envirosight ROVVER RA200 paired with a portable and compact Oupost system. It's mounted on a Gator all-terrain vehicle, made by John Deere, which helps crews access remote manholes.

To clean sewer lines and lift stations, the division invested in a Vac-Con V311LHA combination sewer truck with an 11-cubic-yard debris tank, 1,300-gallon water tank and three-stage blower.

Powered by compressed natural gas, the vacuum truck includes a hydroexcavation package used primarily to expose underground utility and fiber optic lines during spot repairs on pipelines or while installing new service lines to homes and businesses.

"Hydroexcavating is a lot quicker and a lot safer," Taylor explains. "Plus, it can save money, too. If you hit one of those fiber optic lines, it gets expensive pretty fast."

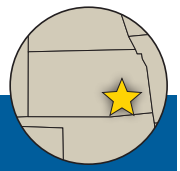
The truck is also equipped with a system made by Vaporooter (a division of Douglas Products) that disperses a chemical foam in sewer lines that kills tree roots. A nozzle cleans the line on the first pass, then fills the sewer line completely with foam as the nozzle is retrieved.

"We Vaporoot about one-third of the sewer lines annually on a rotating basis," Taylor says. "The foam chemical leaves a residual layer inside the pipes, so we try not to flush sewers unless they're actually blocked. If we keep the roots out, they stay pretty clean."

As a result, the city's scheduled cleaning for sewer lines focuses only on known problem areas, which get flushed on a quarterly basis.

Older infrastructure

Aging waterlines and sewer lines pose a continuous challenge for the division. Most of the city's sewer pipes are 80 to 100 years old, and some are even 125 years old. And most of the



PROFILE: El Dorado (Kansas) Water Distribution & Sewer Maintenance Division

EMPLOYEES: 8

CUSTOMERS:
35,000 (water) 16,000 (sewer)

WATER INFRASTRUCTURE:
129 miles of distribution mains, 2,919 water main valves, 692 fire hydrants and 5,171 water meters

SEWER INFRASTRUCTURE:
93 miles of collections lines, 1,872 manholes and 11 lift stations

CAPITAL IMPROVEMENT BUDGET:
$200,000 and $300,000 annually

WEBSITE:
www.eldoks.com

Water Distribution Superintendent Gary Taylor, Supervisor Jason Patty and Director Kurt Bookout (from left) near the effluent pond at the El Dorado wastewater treatment plant.

"Our philosophy is to invest as much in infrastructure as we can to stay ahead of the deterioration."

Kurt Bookout

city's water mains were laid between 1905 and 1955, Bookout says.

"We're like most cities across the U.S. with old systems," he explains. "We're always trying to stay ahead of the rate of deterioration of old underground infrastructure. That's a constant battle, so our philosophy is to invest as much in infrastructure as we can to stay ahead of the deterioration."

The division annually updates a five-year capital improvement plan that prioritizes projects based on infrastructure condition and need. The budget is between $200,000 and $300,000 a year, Bookout says.

One major project occurred in 2009 after a study identified bottlenecks in the sewer system that were slowing down the movement of wastewater from the north side of El Dorado to the treatment plant on the south side. Improvements included boring under the Walnut River to install a new 8-inch-diameter force main, rebuilding the city's largest lift station by replacing existing pumps with three variable-frequency drive pumps made by USEMCO (Universal Sanitary Equipment Mfg. Co.), installing new larger interceptors north of the lift station, and manhole rehabilitation. A $500,000 Community Development Block Grant from the state of Kansas helped fund the $1.3 million project.

In 2010, the division also upgraded a lift station that serves the El Dorado Correctional Facility and the Butler County jail. A contractor installed two new variable-frequency drive pumps, also made by USEMCO, and a Duperon FlexRake, a screening system that filters out trash and debris. The total cost was $424,000.

"That lift station serves a maximum-security state penitentiary and the Butler County jail, and we were removing about 125 pounds of compacted debris from it every week," Taylor explains. "Inmates flush all kinds of stuff down the toilets, from sheets and pillowcases to jumpsuits — everything."

Ongoing system upgrades

In 2016, the division upgraded undersized residential sewer lines in the southeast portion of the city, which were only 6 inches in diameter compared to 8 inches in the rest of the city. Part of the town was destroyed by a tornado in 1958, and Bookout surmises that for unknown reasons, contractors installed 6-inch pipes in those areas, which is too small for inspection cameras to get past offsets.

The $1.2 million pipe bursting project, funded partially with a state grant and performed by Nowak Construction, included replacing roughly 6,731 feet of pipe with 8-inch-diameter PVC lines in about a 6-square-block area. In addition, the company lined 386 feet of pipe.

PROGRAMS SHOWCASE CAREER OPPORTUNITIES

Like many water and sewer utilities, the El Dorado (Kansas) Water Distribution & Sewer Maintenance division has a hard time attracting and retaining employees. But the city's Public Utilities Department is taking a proactive approach to the problem with an outreach program aimed at high school students.

The primary component is a program called Work in Water, originally funded by a grant from the U.S. Environmental Protection Agency through Wichita State University's Environmental Finance Center. The program's goal is to introduce mainly high school juniors to jobs in the water and wastewater fields before they make major school and career decisions, says Kurt Bookout, director of Public Utilities.

"We work with high school science, chemistry and biology teachers — anyone who can identify students with both interest and aptitude," Bookout says. "They identify, say, 40 students who spend a day with us — half of it in a classroom to learn about water and wastewater treatment and the other half touring our drinking water treatment plant and our wastewater treatment plant and its adjoining constructed wetlands."

At the end of the program, the division offers one student a nine-week-long summer internship that pays $11 an hour. The intern spends four weeks working on the water side and four weeks on the wastewater side, he explains.

After that, the intern is required to do a capstone project that includes making a presentation about what they learned during the internship; the presentation is made at an annual water and wastewater conference in Kansas that's sponsored by the AWWA and the Kansas Water Environment Association.

So far, there's been only one paid intern in three years (the program skipped one year, and the COVID-19 pandemic canceled this summer's position), and that intern has not been hired for a full-time job in the division. But it's still valuable to bring water and wastewater careers to young students' attention, Bookout notes.

"We expose a lot of kids to the fact that every city has to have water and wastewater people," he says. "And these careers are widely available across the U.S."

On the potable side, the division in 2010 and 2011 added a booster pump station, creating a new pressure zone on the west side of the city. In addition, a new generator and four variable-frequency pumps built by Pentair - Fairbanks Nijhuis were installed in the water treatment plant. The total of these projects was around $2.5 million.

The division owns a Vermeer D6x6 horizontal directional drilling machine, primarily used to install new 2-inch-diameter PVC waterlines that replace corroded cast iron lines. The machine allows crews to shoot new lines from a water main on one side of a street to houses on the other side of the street by going under the roadway.

"We've abandoned about 4 miles of old undersized and unreliable cast iron lines in the last eight years and replaced them with PVC pipes," Bookout notes. "It has cut down on a lot of water leaks."

Emphasis on training

While not immune to employee turnover, the division emphasizes training and membership in professional organizations as a way to retain workers in an industry in which they're difficult to find.

"A lot of young people these days want to make big money right off the bat," Taylor notes. "And it's dirty work performed in both very hot and very cold weather. You're not sitting in an air conditioned office behind a nice desk.

"Providing employees with training helps them feel like they have a career, not just a job."

Bookout also points out that the continued training makes crew members more knowledgeable. "They develop a sense of pride in their career choice and get a chance to meet and network with others in their field — learn the tricks of the trade. We've received eight awards from the Kansas Water Environment Association for the best wastewater plant of the year during the last 13 years because our guys are very well trained and professional." (Utilities are barred from applying for the award every third year.)

As an example, employees are encouraged to attend annual conferences held by groups such as the Kansas Water Environment Association, the Kansas Rural Water Association, the Kansas Water Office (which sponsors the annual Governor's Water Conference) and the University of Kansas (which hosts an annual Environmental Engineering Conference). The conferences include numerous opportunities to attend classes and seminars that provide valuable continuing education and certifications for technicians, Bookout says.

"There's also a fantastic state-of-the-art training facility in McPherson that's operated by Kansas Municipal Utilities, a statewide organization of municipal-owned utilities," he adds. "We do as much training as we can, but we plan to do more."

Budget constraints

Looking ahead, the division doesn't have many large projects lined up due to budget limitations. One exception is a $2 million plan to line about 60,000 feet of sewer lines and 10,000 feet of larger interceptor lines.

The lines currently aren't creating problems. But they're among the deepest-laid sewer pipes in the city — some as deep as 25 feet. As such, it makes more sense to be proactive and fix them while they're still structurally sound, he explains.

> **"Inmates flush all kinds of stuff down the toilets, from sheets and pillowcases to jumpsuits — everything."**
>
> **Gary Taylor**

"Since they're so deep, it would be harder — and more expensive — to wait until there's a problem to do a repair versus lining them while the pipes are still intact," he points out. "We prefer to be proactive rather than reactive. When something is that old, you're living on borrowed time."

Funding for capital improvements is a constant struggle for the utility. The need to replace aging infrastructure conflicts directly with residents' preference for low water and sewer rates. To get around that resistance, the division is starting to use social media to inform the general public about the need for more funding for infrastructure improvements.

"We're always trying to hold down rates," Bookout says. "But we're probably not being blunt enough about the need for reinvestments in infrastructure."

Bookout's own combined water and sewer bill, which also includes a fee for refuse collection, is between $50 and $60 a month. By comparison, he says his cable television bill is three times that and his cellphone service costs four times that much.

"The water and sewer bill is the smallest one I pay each month, yet it's the most essential service," he says. "The problem is that people have gotten so used to paying so little for water and sewer that they get upset when you raise rates a little.

"They don't understand that in some cases, the infrastructure they're using was bought and paid for by their great-great-great-grandparents and has a finite life span. And we're now reaching the end of that life span.

"And the generation that's now using that infrastructure has to pay to replace it, and they don't want to spend the money — until it fails. It's a struggle to make people understand." ✦

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STRONG AND STEADY IN 2020

NASSCO committees are making great progress on initiatives despite challenges

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.

In the early days of the COVID-19 restrictions, NASSCO's board of directors made the solid decision to cancel the association's Annual Conference in Scottsdale, Arizona, and to pause the planning of other industry events, including NASSCO's Motor City Exchange and Crescent City Exchange events tentatively scheduled for this fall.

Board members were also determined to stay "Strong and Steady in 2020" by agreeing to extend their terms for one more year. Following suit, the majority of NASSCO committee chairs and co-chairs also agreed to extend their appointments to continue focused leadership, minimize disruptions and keep their various industry goals on course. Using technology to its fullest, NASSCO held its annual membership meeting via Zoom in April and broadcast a second webinar on the impressive NASSCO committee accomplishments in June.

The three pillars of NASSCO — all designed to build awareness of aging underground infrastructure — are education, technical resources and advocacy. NASSCO's 2019 committee accomplishments aligned with these three areas in many ways including the Government Relations Committee's first-ever NASSCO Capitol Hill Fly-In; the Infrastructure Condition Assessment Committee elevating the need to address pressure pipe in PACP coding; the Lateral Committee's huge win when IAPMO granted NASSCO petitions to amend Uniform Plumbing Code 715.3 to protect CIPP and other trenchless technologies; the Pipe Rehab Committee's oversight of the Trenchless Technology Center at Louisiana Tech University's final report on CIPP emission safety; and so much more. To learn about all NASSCO committee accomplishments in 2019, visit www.nassco.org/get-involved/join-a-committee.

Without skipping a beat, NASSCO committees are running full steam ahead this summer with new goals including, among many others, the Grouting Committee's research on grouting materials, the release of PACP version 7.0.4, the Health & Safety Committee's update of CIPP Specification Guidelines (based on the Trenchless Technology Center's research findings), and the development of a number of new technical resources to objectively help guide our industry.

By remaining Strong and Steady in 2020, NASSCO is gaining momentum and is more productive than ever before. If you are a current NASSCO member, get involved by joining one of our dynamic committees. If you are not yet a member, join us in setting standards for the assessment, maintenance and rehabilitation of underground infrastructure and ensuring the continued acceptance and growth of trenchless technologies.

Visit www.nassco.org/join to learn more. ✦

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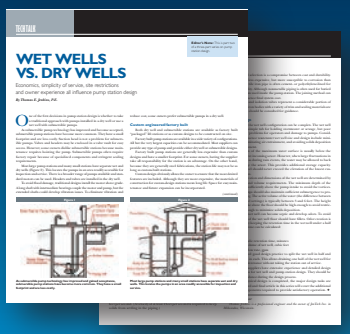


Editor's note: We're digging through the archives and sharing our most popular stories. This story originally ran in the July 2016 issue of *Municipal Sewer & Water* and has since been viewed more times than any other story on MSWmag.com.

TECH TALK

WET WELLS VS. DRY WELLS

Economics, simplicity of service, site restrictions and owner experience all influence pump station design

By Thomas E. Jenkins

One of the first decisions in pump station design is whether to take a traditional approach with pumps installed in a dry well or use a wet well with submersible pumps.

As submersible pump technology has improved and been accepted, submersible pump stations have become more common. They have a small footprint and are less costly. Suction head is not a problem for submersible pumps. Valves and headers may be enclosed in a valve vault for easy access. However, some owners dislike submersible stations because maintenance requires hoisting the pump. Submersible pumps often require factory repair because of specialized components and stringent sealing requirements.

To eliminate vibration and reduce cost, some owners prefer submersible pumps in a dry well.

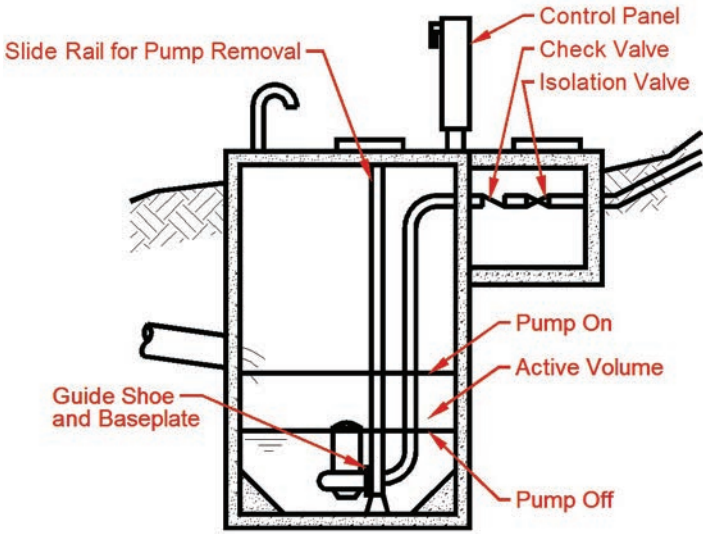
Most large pump stations and many small stations have separate wet and dry wells (Figure 2). This locates the pumps in an area readily accessible for inspection and service. There is a broader range of pumps available and standard motors can be used. Headers and valves are installed in the dry well.

To avoid flood damage, traditional designs install the motor above grade. A long shaft with intermediate bearings couple the motor and pump, but the extended shafts could develop vibration issues. To eliminate vibration and reduce cost, some owners prefer submersible pumps in a dry well.

Custom engineered/factory built

Both dry well and submersible stations are available as factory-built "packaged" lift stations or as custom designs to be constructed on site.

Figure 1



Factory-built pump stations are available in a wide variety of configurations. All but the very largest capacities can be accommodated. Most suppliers can provide any type of pump and offer either dry well or submersible designs.

Factory-built pump stations are generally less expensive than custom designs and have a smaller footprint. For some owners, having the supplier take all responsibility for the station is an advantage. On the other hand, because they are generally steel fabrications, the station life

Custom design obviously allows the owner to ensure the most desired features are included.

may not be as long as custom-built stations.

Custom design obviously allows the owner to ensure the most desired features are included. Although they are more expensive, the materials of construction for custom-designed stations mean long life. Space for easy maintenance and future expansion can be incorporated.

Pump selection

Deciding between submersible or dry well pumps is just the beginning of the pump selection process. The categories and varieties of centrifugal pumps can seem endless. Some types are designed to solve very specific problems, and others are designed for broad application. The options include:

Solids handling dry well and submersible pumps can pass a sphere up to the specified size and are specified for wastewater service

- Grinder pumps and vortex impellers
- Self-priming pumps if flooded suction is not feasible
- Double suction pumps, used for large-capacity clean-water applications
- Stuffing box or mechanical seals
- Horizontal or vertical shafts
- Single or double volute
- Close-coupled or extended drive shaft

Selecting the number of pumps and the size (capacity) of each depends on optimizing many factors. Life cycle cost, which includes power and maintenance expense along with initial cost, is used to guide the selection process. If the pump head is primarily static and the electric billing is for energy only, then a few constant-speed pumps may be best. If the energy cost includes time of day and demand charges, then variable-speed pumping may be best. If the difference between current capacity and peak or future capacity is large, then using several pumps may be cost-effective. The impact of variations in flow on downstream stations or treatment processes should also be considered.

The recommended time between successive starts for constant-speed pumps should be more than five minutes and less than 30 minutes. Small pumps and pumps equipped with soft starts or variable-frequency drives can operate at the lower end of this range, but large pumps should cycle less frequently. The time between successive starts of a pump can be estimated:

$$t_s = \frac{29.9 \bullet V_{ww}}{q_p}$$

t_s = time between successive pump starts, minutes

V_{ww} = active volume of wet well, cubic feet

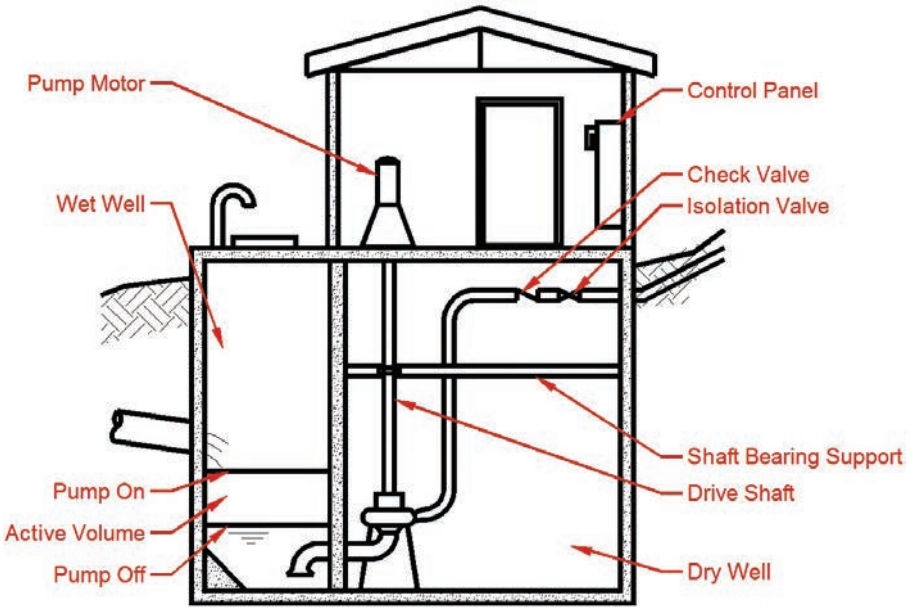
q_p = pump capacity, gpm

It should be noted that not all pumps in a station need to be the same size. There are maintenance advantages to having all pumps identical, but these are usually less significant than energy considerations. Installing different diameter impellers in each pump is another possibility. This allows for future capacity increase without jeopardizing current performance.

Piping systems

Getting the wastewater from the pump discharge to the conveyance system requires piping and related components inside the pump station. There are two principal considerations in the design of the piping system: size and material.

Figure 2



Sizing involves an economic trade-off. Larger pipe means higher capital cost. This is offset by reduced energy cost because of lower friction losses. Cost increases directly with diameter, and friction decreases with the diameter to the fifth power. By calculating life cycle cost, the optimum pipe size can be determined. Water velocities should be between 2 and 8 feet per second. (A velocity of at least 2 fps is required to keep solids from settling in the piping.)

Pipe material selection is a compromise between cost and durability. Steel is typically less expensive, but more susceptible to corrosion than ductile iron. Ductile iron pipe is often cement- or polyethylene-lined for improved durability. Although nonmetallic piping is often used for buried service, it is seldom used inside the pump station. The joining method can substantially influence final system cost.

Check valves and isolation valves represent a considerable portion of piping cost. Cast iron bodies with a variety of trim and sealing materials are typical. Suppliers should be consulted for guidance.

Wet well design

Determining the wet well configuration can be complex. The wet well may seem like a simple tub for holding stormwater or sewage, but poor design can cause problems for operators and damage to pumps. Considerations that influence wastewater wet well size and design include minimizing odors, eliminating air entrainment, and avoiding solids deposition and scum entrapment.

The elevation of the maximum water surface is usually below the invert of the lowest incoming sewer. However, when large fluctuations in flow occur such as during rain events, the water may be allowed to back up and surcharge the sewer. This provides additional storage capacity. Obviously the level should never exceed the elevation of the lowest customer connection.

The floor elevation and dimensions of the wet well are determined by site constraints and volume requirements. The minimum depth of the water should be sufficiently above the pump intake to avoid the vortices. Submersible pumps should also maintain sufficient submergence to provide motor cooling. The active volume of the water (the difference between high and low level settings) is typically between 3 and 6 feet. The height of the pump intake above the floor should be high enough to avoid restrictions but low enough to minimize solids deposition.

The wet well may seem like a simple tub for holding stormwater or sewage, but poor design can cause problems for operators and damage to pumps.

Solids in the wet well can become septic and develop odors. To avoid this, the corners of the wet well floor should have fillets. Odor creation is also minimized by keeping the retention time in the wet well under a half hour. Retention time can be calculated:

$$HRT = \frac{7.48 \bullet V_{ww}}{q_i}$$

HRT = hydraulic retention time, minutes

V_{ww} = active volume of wet well, cubic feet

q_i = influent flow rate, gpm

It is considered good design practice to split the wet well in half and have pump inlets in each. This allows draining one half of the wet well for cleaning and maintenance without taking the station out of service.

Many pump suppliers have extensive experience and detailed design recommendations for wet well and pump station design. They should be consulted for guidance during the design process.

Once the physical design is completed, the major design tasks are finished. The third and final article in this series will cover the additional systems and components required to provide satisfactory operation. ✦

Thomas E. Jenkins is a professional engineer and the owner of JenTech Inc. in Milwaukee.

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PIPELINE INSPECTION, SURVEYING AND MAPPING

By Craig Mandli

ASSET MANAGEMENT

1. RIDGID A-Frame Fault Locator

The **RIDGID A-Frame Fault Locator** finds the location of ground faults in direct-buried insulated wire up to 2 megohms. It can find faults up to 3 miles away from the transmitter and up to 20 feet below the ground, depending on the conditions. It has a durable, lightweight, powder-coated frame and weatherproof membrane buttons. It provides a reference readout to aid in fault location. It is composed of two elements: the FT-103 transmitter and the FR-30 A-frame receiver. The transmitter operates at 797 Hz – "dFF" displayed and has an output power of up to 3 watts with low, medium and high settings. The FT-103 transmitter connects to an insulated conductor to establish a current flow. The current travels to the ground and back to the ground stake via an insulation fault. The FR-30 receiver detects the current flow and gives audio and visual directions to locate faults. **800-769-7743; www.ridgid.com.**

2. Vivax-Metrotech vLoc3 RTK-Pro

The **vLoc3 RTK-Pro** receiver from **Vivax-Metrotech** includes real-time kinematic GNSS accuracy. Using the internal cellular module with 4G LTE capabilities, the operator has the ability to connect to a NTRIP RTK caster that provides RTCM 3 corrections. By using these corrections, the operator can collect both utility location data along with the geographical location of the utility with survey-grade accuracy. It is designed for all operator levels, using user-friendly and intuitive locate screens. Operators simply confirm the utility data with the press of a button and align the electronic spirit level to store the data. All field data is sent to the cloud and retained in the receiver's onboard storage for review and exporting to external mapping programs. The user-configurable receiver contains eight passive locate modes, fault find mode and a range of configurable frequencies from 16 Hz to 200 kHz. **800-446-3392; www.vivax-metrotech.com.**

CRAWLER CAMERAS

3. Aries Industries Mobile Pathfinder System

The **Mobile Pathfinder System** from **Aries Industries** is a lightweight, portable system for accurately inspecting mainlines that are 6 inches or larger. It includes a powerful transporter, camera and lightweight reel operated by an all-in-one remote control. The transporter comes with a variety of wheel sizes and is equipped with a rear-viewing camera and an adjustable electric lift to keep the mainline camera centered in a range of pipe sizes. It features Aries' unique WiperCam pan-and-tilt camera featuring an in-the-pipe cleaning system and field-replaceable wipers. The high-resolution mainline camera has a 300-degree viewing angle and LED lighting system to capture pipe details and ensure accurate assessments. The lightweight reel has 1,000 feet of low-friction, multiconductor cable, making the system fully portable. **800-234-7205; www.ariesindustries.com.**

4. CPI Products / Cavallero Plastics URS1

URS1 universal roller skids from **CPI Products / Cavallero Plastics** are designed to protect a wide variety of push cameras and enable them to safely go farther down the pipe. A durable plastic enclosure around the camera body with wheels enables the cameras to move smoothly down the pipe, around corners and over seams from 6- to 12-inch pipes. Movable arms expand and contract to center the camera and jump over debris and seams, negotiate elbows, and maneuver around bends. A waterproof LED light kit

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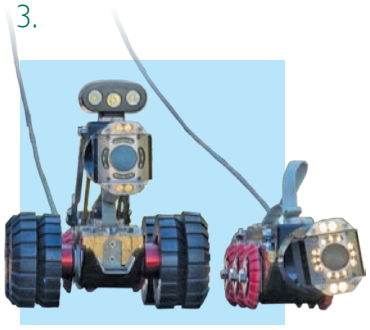

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is available to improve the camera image, and a large wheel kit enables it to be centered in pipes up to 14 inches in diameter. Cameras up to 2 inches fit inside, with the Enzo adapter available for camera heads up to 2.5 inches. **413-443-0925; www.cplasproducts.com.**

5. Forbest Products FB215

The **FB215** crawler inspection camera from **Forbest Products** offers a 360-/180-degree pan-and-tilt waterproof color camera. The waterproof crawler comes with three types of wheels on the six-wheel drive and double motors that can turn left or right with a creeping speed of 20 to 66 feet per minute. It is suitable for 6- to 16-inch pipe, and the waterproof high-resolution color camera head's focus can be adjusted with the high-brightness LED lights. It carries 500 feet of cable and includes a reel with a meter counter and universal wheels with braking function. The heavy-duty waterproof control box includes a 10-inch LCD color screen with USB and built-in SD card to record photos and videos. Typing and editing is available. Two joysticks enable convenient operation of the crawler and pan-and-tilt function. An upgraded version includes an ascending or descending function for the camera head in the pipe. **877-369-1199; www.forbestusa.net.**

6. RapidView IBAK North America PANORAMO

The **PANORAMO** method from **RapidView IBAK North America** changes current processes into data collection in the field and data analysis back in the office. At the core of the system are the wide-angle (185-degree) twin digital cameras, found on both the front and rear of the system. As it moves through the pipeline, the two cameras simultaneously capture still images in 4K resolution. To achieve such high resolution and allow it to be displayed and stored, a gigabit Ethernet standard is being used for the transmission of images and other data. This allows a data transmission rate of up to a gigabit per second. **800-656-4225; www.rapidview.com.**

7. Ratech Electronics Mini Crawler PNT

The **Ratech Electronics Mini Crawler PNT** is a self-propelled, four-wheel-drive multiconductor camera transporter. The 12 super-bright LEDs with variable intensity light the way through 5- to 30-inch-diameter pipes. Using the full 360-degree-rotation pan-and-tilt camera, users will be able to see defects and obstructions more closely and in more detail. This same camera head is interchangeable with the head on the company's push camera system. The power and controls to operate the crawler are in a handy remote control device. It comes with a manual lift and built-in 512 Hz sonde for locating purposes. **800-461-9200; www.ratech-electronics.com.**

8. Subsite Electronics lateral and mainline inspection system

The lateral and mainline inspection system from **Subsite Electronics** is a fully integrated single-conductor technology lateral launch system and performs mainline and lateral pipeline inspections simultaneously. This second-generation system uses picture-in-picture or dual video monitors and can inspect mainlines up to 500 feet in length and laterals of up to 200 feet. It can be used to inspect mainlines from 6 to 24 inches and lateral lines from 4 to 8 inches in diameter. It has a 40-1 zoom, pan-and-rotate mainline camera with auto iris and autofocus, a color rear-view camera, tilt connector for easy deployment, and a high-resolution RodStar lateral camera. It offers a dual video monitor view format that lets the user view the mainline and lateral simultaneously. The six-wheel-drive tractor has three forward speeds, reverse and freewheel. **800-846-2713; www.subsite.com.**

9. TruGrit Traction Steel Track Assembly

Steel Track Assemblies from **TruGrit Traction** are designed to solve traction issues in slippery or greasy pipes. They not only use a softer rubber that provides better grip on slippery surfaces, they also have carbide-gritted steel cleats for additional traction. The steel cleats are placed in an orientation that allows for at least three of them to touch the pipe at once, serving to optimize the performance of camera transporters in varying pipe types and conditions. The carbide-tipped steel cleats on the tracks also prolong the life of the rubber cleats, as less pressure is being put on the rubber cleats during inspections. The assemblies can be manufactured for any tracked crawler or tractor currently on the market, no matter the age. The tracks can easily navigate through greasy pipe, where wheels can be slowed or stopped. Tracks are also useful for smoother video in corrugated steel or HDPE pipe. **407-900-1091; www.trugrittraction.com.**

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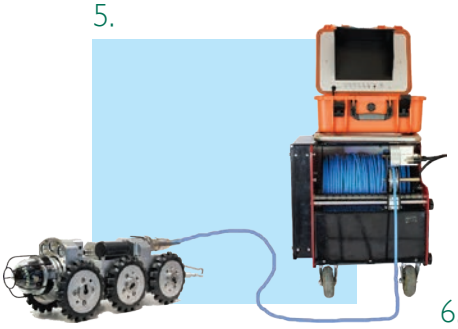

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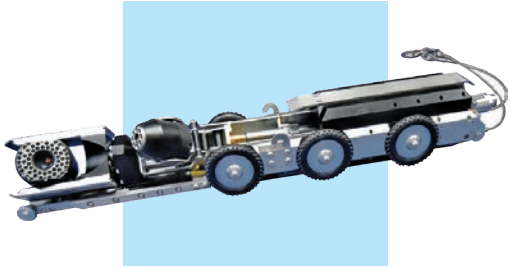


INSPECTION VEHICLE

10. CUES CCTV inspection vehicles

CUES offers custom truck-, van-, ATV- or trailer-mounted systems for TV inspection, condition assessment and rehabilitation needs. Made to withstand the most severe conditions and ergonomically designed for comfort and efficiency, vehicle-mounted systems can include TV inspection equipment for sanitary and stormwater lines, laser and sonar pipe profiling systems, mainline joint and lateral sealing, and lateral reinstatement cutters for the relining industry. Equipment can be ergonomically mounted to inspect 6- through 200-inch mainlines and 3- through 8-inch lateral services. The truck interior can be customized, with cabinets, equipment and mounting configuration, to fit unique requirements. Truck- and trailer-mounted grout rehabilitation systems are available for mainline, manhole and lateral joint sealing and can be equipped with the latest CCTV equipment and decision support software for television inspection with documented condition assessment. **800-327-7791; www.cuesinc.com.**

MAINLINE TV CAMERA SYSTEMS

11. Electric Eel eCAM Ace 2 SL

The **eCAM Ace 2 SL** from **Electric Eel** includes a battery cradle installed on the hub of the reel that accepts a Milwaukee Tool M18 or equivalent battery. This allows for operation in remote locations or anywhere electricity is not available. The camera can run for six to seven hours on battery power. It also includes 6-inch wheels built into the frame for easy transportation of the unit. **800-833-1212; www.electriceel.com.**

12. Envirosight Jetscan 2.0

Jetscan 2.0 from **Envirosight** is wireless, capable of streaming high-definition video footage straight to a tablet upon removal from a manhole. The footage can be imported wirelessly or via a USB connection. It provides an inexpensive solution to assess pipe condition and cleaning success, eliminating repeated callouts and wasted resources. The second generation provides new features for greater ease of use and efficiency, such as tool-free sleds of varying sizes for simple deployment in a variety of line sizes, wireless charging and an app-based tablet interface that makes it easy to view and annotate footage and upload to WinCan Web. **866-936-8476; www.envirosight.com.**

13. EPL Solutions Gvision

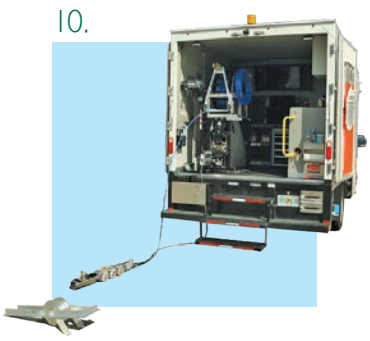
The **Gvision** camera system from **EPL Solutions** offers a rugged, compact solution for inspecting pipelines 3 to 12 inches in diameter. Available with 200 to 400 feet of pushrod, the reel has a stiff, yet flexible fiberglass cable that is optimized for farther pushes through turns and bends. The color camera is self-leveling and includes a powerful, convenient, always-on 512 Hz transmitter for quick and precise area determination. The antiglare LCD monitor delivers a clear, crisp picture even in direct sunlight. To record video inspections, connect a USB storage device or Apple mobile device directly into the USB port. The DVR outputs HD-quality videos, which can be stored and shared from a mobile device. **714-453-9760; www.epls-usa.com.**

14. General Pipe Cleaners Gen-Eye USB

The **Gen-Eye USB** video inspection system from **General Pipe Cleaners** records videos and photos on USB flash drives. The command module has a USB port to store up to 128 GB of video or still images; a 10.5-inch LCD color monitor for crisp, clear pictures; a full-size, waterproof keyboard for on-screen titling, footage counter, date and time stamp, and voice-over microphone. All are safely contained in a heavy-duty Pelican case that weighs 12 pounds. Three models are offered: the Gen-Eye USB; the USB-W with Wi-Fi to record inspections on your smartphone or tablet; and the USB-P premium inspection system that includes all the features of the USB, plus a sunlight-readable screen and a four-hour battery for remote operation, as well as the Wi-Fi transmitter. **800-245-6200; www.drainbrain.com.**

15. Insight Vision Cameras IV2

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.**



16. MyTana PGR400

MyTana's PGR400 push camera has the range and rigidity to inspect long laterals and small mains, with the choice of 325 or 400 feet of pushrod for use in lines 4 to 12 inches in diameter. The reel has a brake with adjustable drag to help manage the pushrod as the technician works. A self-leveling camera head with adjustable LED illumination delivers crisp video footage and includes a built-in 512 Hz sonde. The control box mounts securely on a full swivel bracket to position the 12-inch daylight-readable monitor for best viewing. All-digital recording lets the user save footage to internal storage or USB flash drive. Operators can also stream video wirelessly to multiple devices. The rugged frame has balanced weight and antiskid feet for easy maneuvering. A skid and camera guides for the camera head help jump offsets and navigate bends. **800-328-8170; www.mytana.com.**

17. Pearpoint (USA) P540c

The **Pearpoint (USA) P540c** offers an intuitive graphical user interface with built-in user manual, a full-size QWERTY keyboard and a choice of six different languages at launch. Context-sensitive, ATM-style buttons on both sides of the display provide access to the easy-to-use menus while an additional seven buttons offer direct control of the most-used functions. It has the capability to use the newly designed command module with any reel system. This will provide contractors the flexibility of having multiple rods for different uses while only needing one command module. **800-688-8094; www.pearpoint.com.**

SOFTWARE

18. FOG BMP

FOG BMP is a fats, oils and grease management software used by municipalities to create or enhance their municipal FOG programs. Cleaning record submissions, FOG inspections, sewer overflow logs, and kitchen staff training allow municipalities to operate a smooth organized FOG program. The application uses a tile-based dashboard and is easily navigable. Using the program can help save significant time and resources, while ensuring full compliance with environmental regulations within the particular jurisdiction. **855-364-2671; www.fogbmp.com.**

19. InfoSense SL-DOG

The **SL-DOG** (Sewer Line Data OrGanizer) from **InfoSense** is a secure, cloud-based web portal that complements the SL-RAT (Sewer Line Rapid Assessment Tool). SL-RAT allows users to inspect 10,000 to 20,000 feet of sewer lines a day. With so much data generated each day, the SL-DOG allows users to manage and export valuable acoustic inspection data. Acoustic scores are archived for future access, allowing users to improve asset management with historical data, as their program matures. Use the web portal to view acoustic scores, add notes or edit a measurement's GPS coordinates. Download the free mobile app to add notes in the field while conducting acoustic tests. Create reports and visualize their inspection data by exporting to industry standard programs such as ArcGIS, PDF, Excel or Google Earth. **877-747-3245; www.infosense.com.**

20. WinCan software

Maintaining sewers starts with understanding sewer condition, and **WinCan** makes it easy to collect detailed, standards-compliant inspection data. It identifies trends, pinpoints hot spots, prioritizes maintenance and lets the user forecast budgets. It can integrate with the GIS mapping systems and includes its own mapping tools for increased capabilities. It is compatible with all brands of sewer inspection technology, including crawlers, zoom cameras and push cameras, as well as all major applications of side-scanning, laser profiling, manhole scanning and other emerging technologies. It also integrates with multiple municipal asset management applications. Its modular design allows the user to expand capabilities as needs evolve. Add-on modules support emerging technologies like side scanning, laser, sonar and 3D visualization. **877-626-8386; www.wincan.com.** ✦

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Product Spotlight

Tackle multiple jobs with a single machine

By Tim Dobbins

Combination equipment has found a place in the industry by offering a "one tool does all" advantage. Trailer units like the HotJet II Vac'nJet by HotJet USA allow workers to show up on a job site with a single machine that can tackle nearly any vacuum, jetting or cleaning job.

"This unit truly has multiple applications all wrapped into one machine. It can pothole, vacuum, hydroexcavate, drain/sewer clean and power wash," says Chester Axley, sales manager for HotJet USA.

The unit is powered by a 25 hp Kohler motor pushing 10 gpm at 4,000 psi. The vacuum is capable of 650 cfm at 16.5 inches Hg. The HotJet II can run on both hot and cold water and can cleans lines from 2 to 12 inches in diameter. Using the hot-water feature provides an advantage when using as a power washer for cleaning out waste drums, trucks and other equipment.

"A huge feature of this unit that sets it apart from other comparable machines is that we have two separate power plants all combined on one compact trailer," Axley says. "This enables the operator to run either the vacuum or the jetter/hydroexcavator independently or operate them together depending on job site needs."

The HotJet II is the result of more than 20 years of product development both in the field and at the factory. The unit includes a super-heavy-duty, 14,000-pound-capacity trailer available in two sizes, a 500-gallon spoils tank, 190-gallon water tank with filter system, 12-gallon antifreeze system, multiple hoses for vacuum and pressure washing, a Colt 3-ton hydraulic dump and premium Gardner Denver belt-driven vac system.

"Our vacuum systems have been in development with Gardner Denver for nearly a decade," Axley says. "We have opted to keep this system simple with very little electronic controls."

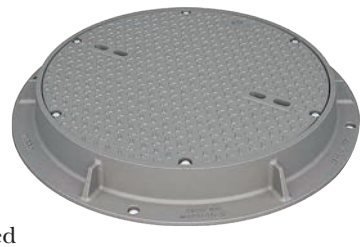
Upgrade options in water tank size, hoses and engine size are also available to fit customers' individual needs. The HotJet II is already used by more than 2,500 customers worldwide.

"For the smaller cities, counties and contractors who don't have a $300,000 to $500,000 budget for a large vacuum truck, this unit is an exceptional value," Axley says.

Feedback from customers indicates that the compact size is extremely practical for tight areas, and it's also convenient that operators do not need a commercial driver's license to operate.

Ron Wallace of PdM Professionals in Utah says, "Being able to jet and hydroclean with the jetter all on one machine really gives us an advantage over competitors." **800-213-3272; www.hotjetusa.com.**

EJ DUOSEAL access assembly watertight cover and frame



EJ's DUOSEAL access assembly is a manhole cover and frame designed to prevent discharge, protect against inflow and suppress odors. It is ideal for flood-prone areas or to prevent unwanted fluids from overflowing due to a surcharge in the system. The bolted, dual-gasket design creates a watertight barrier to contain manhole structures and prevent inflow or overflow. The heavy-duty assembly has been tested to EJ Watertight Level 8, meaning it can withstand 51.45 psi, or approximately 118 feet of water on top of the manhole assembly. The DUOSEAL has a ductile iron cover and gray iron frame. It features stainless steel bolting, closed pick bars and dual 3/8-inch-diameter neoprene O-rings, and it is available in a 30-inch clear opening with 4 1/2-inch frame height. **800-874-4100; www.ejco.com.**

Hayward Flow Control PVDF solenoid valve ranges

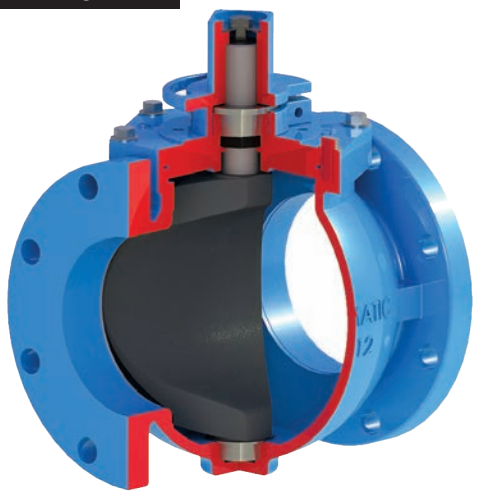
Hayward Flow Control continues its expansion of PVDF flow control products with the addition of Natural PVDF to its SV Series solenoid valves range. Available in sizes 1/2-inch DN15 through 1-inch DN25 with true union end connections, the SV Series in PVDF is the ideal choice for extremely corrosive, high-temperature or sensitive medias. The valves are a continuous-duty-rated normally closed/fail-closed valve that allows ease of service and long-term performance. FPM seals are standard, with EPDM optional. Maximum service temperature is 240 degrees F, and end connections available include socket fusion or threaded per ANSI or DIN/EN standards. **888-429-4635; www.haywardflowcontrol.com.**

SPECIAL REPORT

CUES GraniteNet WebInspect inspection app

GraniteNet WebInspect from CUES is a browser-based inspection app designed to perform inspections and collect information about municipal assets, such as manholes (including MACP v7 Level 1), hydrants, lift stations, grease traps, light poles, signage and more. It performs and tracks tasks such as valve turning, smoke tests, brush cutting and snow plowing. Collect GPS points, water quality samples and flow tests, and assess sewer backups. Virtually any type of asset assessment or task can be quickly deployed using WebInspect, with or without your existing GIS maps. There's no software to install on any user devices to use GraniteNet WebInspect. All that's needed is an internet connection and virtually any device with a browser, such as a mobile phone or a tablet. **800-327-7791; www.cuesinc.com.**

SPECIAL REPORT



Flomatic Valves Flo-E-Centric plug valves

Flomatic Valves' Series 5400 Flo-E-Centric plug valves are energy-efficient, round-port, eccentric, quarter-turn plug valves designed in compliance with AWWA C517 in a fusion-bonded epoxy-coated ductile iron body. Designed with a 98% nickel-welded seat for long service life, Flomatic's plug valves are used in a variety of applications where slurries, solids or grit are present. Flomatic's plug valves are available in a variety of configurations: bare stem, 2-inch AWWA operating nut, buried service gear, gearbox and actuator. The valves are certified lead-free NSF/ANSI 372 and have V-type packing. **800-833-2040; www.flomatic.com.**

FEBCO MasterSeries valves

The FEBCO, a Watts brand, MasterSeries valves are available from 4 to 10 inches in N- and Z-pattern configurations and are designed with the same lay length as other manufacturers' valves for easy retrofits. In addition to being ready for drop-in replacement, the FEBCO MasterSeries models have all the advanced features of the existing MasterSeries products, making them a value-added replacement for an existing competitor valve. The valves have advanced ArmorTek coating technology to mitigate corrosion of internals, modular investment cast stainless steel checks and captured springs for easy service. **978-688-1811; www.watts.com.**

SmartCover Systems mobile app

SmartCover Systems' mobile app easily allows access to sewer status on the go. It complements the SmartCover software and is free to use. The app is available from either the Apple Store or Google Play, and updates are automatic. Features include satellite map, advisories, alerts and alarms. **760-291-1980; www.smartcoversystems.com.**

Mueller Water Products Hydro-Guard industrial flushing system

Mueller Water Products' Hydro-Guard industrial flushing is designed for small-diameter waterlines where water-quality conditions, water age or excessive temperatures require water to be turned over frequently. The flush schedule of the system is managed by a Bluetooth controller that is powered by a single 9-volt battery. For more advanced system monitoring and management, the Hydro-Guard can be upgraded to include S.M.A.R.T. water-quality monitoring, an upgrade that triggers flush events when preset levels of chlorine, temperature, pH, turbidity, flow and/or pressure are detected. It can be installed either indoors or outdoors. The Hydro-Guard system comes with a 3/4-inch stainless steel Singer control valve and NSF 372 certified water-quality sampling point. **800-423-1323; www.muellerwaterproducts.com.**

Gradall Industries Discovery Series hydraulic excavator models

Gradall Industries has introduced two new Discovery Series hydraulic excavator models, the D172 and D174, that are bigger, more muscular and more productive than the previous D152 and D154 models. The new models benefit from a 36% increase in horsepower, as well as greater torque to increase travel speed, hill-climbing capability and overall productivity. Both new models have Freightliner undercarriages. The D172 has two-wheel drive, while the D174 is a four-wheel-drive machine. Both feature a Gradall upperstructure and a telescoping, full-tilting boom, able to rotate attachments 220 degrees. The low-profile boom design also allows the Discovery Series models to work productively under bridges and in tunnels. **330-339-2211; www.gradall.com.** ✦

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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 hydro-excavation 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)

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Boss Industries names new director of engineering

Richard Miltenberger

Todd Hudson, president of Boss Industries, announced Richard Miltenberger as the company's new director of engineering. Miltenberger's resume includes an extensive list of rotary screw manufacturers, and he worked at Boss Industries in its early years.

McElroy University offers new online fusion training

For a limited time, training is available from the fusion experts at McElroy University through a new online learning series. The university has taken all of its online, self-paced learning modules and created three bundles available for a limited time at a special price. The three bundles are polyethylene, polypropylene and DataLogger. The training is also ideal for sales reps, engineers and municipal leaders who are interested in learning more about the fusion process.

Victaulic names Bucher as president

Rick Bucher

Victaulic announced Rick Bucher has been appointed to the position of president and chief operating officer. He will continue reporting to John Malloy, who has served as chairman, president and CEO for the past 16 years. Malloy will remain chairman and CEO.

Badger Meter awarded recertification for ISMS

Badger Meter announced it was again awarded ISO 27001 recertification and successfully conducted a Service Organization Control 2 Type 2 examination of its information security management system. Since 2015, Badger Meter has completed an annual ISO 27001 certification and SOC 2 Type 2 examination, demonstrating a commitment to minimizing potential information security threats and ensuring trust with its customers.

Wilo USA announces plans for new headquarters and production site

Wilo USA, a subsidiary of Wilo SE, announced the investment of a new 250,000-square-foot headquarters and production facility in Cedarburg, Wisconsin. A developer's agreement with the city of Cedarburg was approved on May 11, with construction scheduled to begin in fall 2020. The new headquarters will bring the combined operations of Wilo USA, Weil Pump, Scot Pump and Wilo Machine to a single production site.

Elastec celebrates 30th anniversary

Elastec celebrates its 30th anniversary in 2020. The company was founded in 1990 with the invention of the two-drum oil skimmer. The product set the foundation for the company to grow into one of the world's largest manufacturers of environmental response equipment. The company now has more than 120 employees with three locations in Illinois and one in Florida. Recently, Elastec branched out to focus on waterway trash and debris, plastic pollution and municipal waste disposal systems. The company also provides vacuum systems, baffles and turbidity curtains, power units, pumps, boats and more. ✦

WORTH NOTING

PEOPLE/AWARDS

Grover Fugate retired as executive director of Rhode Island's Coastal Resources Management Council. In 1986, he became the agency's first director. **Jeffrey Willis,** the deputy director, is serving as the acting director.

Chuck Pavlos retired as the town of Orange Park (Florida) Public Works director after serving in that capacity for nine years.

Gannett Fleming (based in Pennsylvania) received five National Recognition Awards from the American Council of Engineering Companies. Included were a pair of stormwater-related projects: the Buckeye Lake Dam Improvements project (in Ohio) and Pikes Creek Dam Rehabilitation project (in Pennsylvania). ✦

CALENDAR

Aug. 3-5
Florida Rural Water Association Annual Conference, Hilton Daytona Beach, Daytona Beach, Florida. Visit www.frwa.net.

Aug. 8-12
American Society of Civil Engineers Pipelines Conference, to be held virtually. Visit www.asce.org.

Aug. 10-13
National Association of Flood and Stormwater Management Agencies Annual Meeting, Stein Eriksen Lodge Deer Valley, Park City, Utah. Visit www.nafsma.org.

Aug. 17-19
StormCon, Washington State Convention Center, Seattle. Visit www.stormcon.com.

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

Oct. 3-7
Water Environment Federation Technical Exhibition and Conference, Morial Convention Center, New Orleans. Visit www.weftec.org.

Oct. 20-22
New Jersey Water Association Management and Technical Conference, Golden Nugget Hotel, Atlantic City, New Jersey. Visit www.njwater.org.

Oct. 28-31
American Society of Civil Engineers Annual Convention, Disneyland Hotel, Anaheim, California. Visit www.asce.org.

Nov. 9-12
American Water Resources Association Annual Conference, to be held virtually. Visit www.awra.org.

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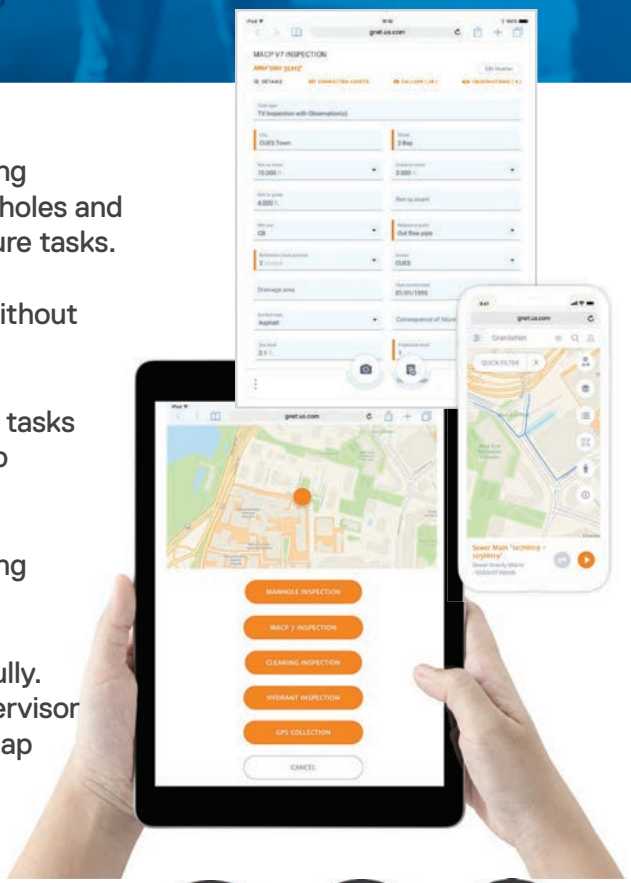

- GraniteNet WebInspect is a browser-based app for collecting inspection information about municipal assets such as Manholes and Hydrants, and performing Cleaning, Jetting, and GPS capture tasks.
- Run the new GraniteNet WebInspect browser-based app without installing any additional software!
- Streamline your operations with simple-to-use, map-driven tasks that can be completed using virtually any device with a web browser.
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