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July 2014
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Heidi Lansdowne, Principal Engineer Bend, Ore.

OVER THE RIVER AND THROUGH THE WOODS...

Pipeline project aims to replace 10 miles of water transmission mains

PAGE 26

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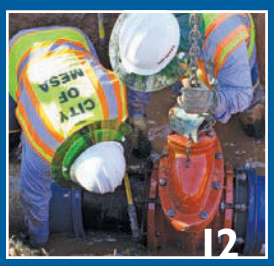

ON THE COVER:
Heidi Lansdowne, principal engineer and project manager with the City of Bend Public Works Department, oversees work on the Bridge Creek pipeline replacement project along Skyliners Road in Bend, Ore. (Photography by Joe Kline)

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EMBRACING THE FUTURE

New tools and technology complement sound operating strategies

FROM THE EDITOR

Luke Laggis

Technology plays a big role in the operations and maintenance of our water and wastewater systems. That's no surprise to the people putting these new tools to work, but the ways in which new technology is used – or bypassed – is very different in utilities across the country.

Middlebury, Vt., profiled in this month's issue of *MSW*, provides an interesting look at the dichotomy between the capabilities of new technology and the value of time-tested methods.

The wastewater utility broke new technological ground with the largest ice pigging project of its kind last year. A 12,000-foot force main was obstructed, and traditional pigging presented challenges and potential problems. So the utility turned to a newer technology, pushed it further than it had been pushed before, and ended up with an economical solution.

Yet even as it charts new territory, the staff still trusts in some older methods many utilities are turning away from. While most utilities look at paper maps of their systems with a growing level of scorn, Middlebury still believes in putting paper maps in the hands of its technicians. The utility is working toward mapping all sewer and water assets in its GIS, but Superintendent Bob Wells says with smaller utilities, plain paper maps can still be the most efficient way to access data.

Directly across the country, the water utility in Bend, Ore., relies heavily on GIS data to plan and prioritize its work.

The system is 100 percent GIS mapped, with data fed into the city's hydraulic modeling system using INFOR, its asset management program. Traditional hydraulic modeling looks at sewer and water operations as static systems. Using sophisticated software, the city has found that comparing hydraulic systems to living organisms provides better modeling and a basis for sound financial planning. The software uses genetic algorithm technology and treats each system component like a strand of DNA. It then finds the most efficient pathways to meet the requirements of the system.

While traditional hydraulic models result in a series of solutions for which engineers must develop a range of costs, Bend's software system runs potential scenarios and immediately provides capital costs associated with any solution, along with life cycle costs of those solutions. The results add up to big savings.

The third profile in this month's issue focuses on the Mesa (Ariz.) Water Resources Department (MWRD). Mesa has used technology to greatly improve its overall efficiency. Treatment plant upgrades, high-efficiency pumps, a SCADA system, CIPP and pipe bursting have all helped push the utility forward.

The MWRD is focused on continuing to improve performance and not just with new technology. One of the ways it does so is through a very traditional means, setting performance metrics. The metrics set very clear goals. Everyone knows what they are, and everyone is held accountable through monthly performance reports.

The MWRD's results speak for themselves. The utility earned the Gold Award for Exceptional Utility Performance from the Association of Metropolitan Water Agencies in 2013.

All three of these utilities are using new technology to their advantage, but these stories also show the value of some basic, time-honored operating principles. There is no single right answer for every problem, and you need to be open to whatever solution – new or old – will get the job done.

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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June 5, 2014

Cobra Technologies
Mr. Alan Grant, CEO
4806 Wright Drive Bldg. C
Smyrna, GA 30082

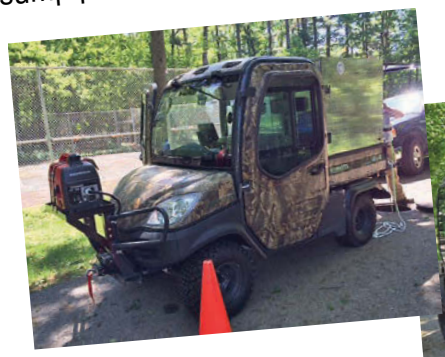
Re: Cobra Camera Start-up

This week we took delivery on our new Kubota mounted Cobra Sewer Camera, and wanted to complement you and Cobra Technologies on the quality of not only the equipment, but of the start-up process. Will Hunt (field tech) and Letty Eberly (software support) were patient, thorough and extremely knowledgeable, making sure it all worked and more importantly, that we understood the process. There was never a moment when they were not fully involved on our behalf to make it all work smoothly – and in conjunction with our ESRI software. Although it took several days, it all came together very well and in fact, exceeded our expectations.

As a small utility agency, this was our first camera "truck" and we greatly appreciate the time spent pre-order, during the construction of the truck, and especially the delivery and start-up procedure. On our first trial run we easily did 1000 feet, the video was perfect (and in-sync with ESRI), and we found two "illegal" sump pumps discharging into the public sewer.

Many thanks again.

Respectfully;



Rich Pierson, Director
Gull Lake Sewer + Water Authority

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WAR ON FOG

Fighting an Age-Old Battle

Everyone is trying to reach the goal of a FOG-free sewer line, but there is no single solution that can handle every FOG problem. Learn more about some of the approaches to controlling fats, oils and grease in the country's sewer lines and treatment plants, including source control, additives and mechanical solutions.

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STORMWATER INSPIRATION

Where Art Means Infrastructure

In Springfield, Mo., decorative storm drains and manhole covers educate the public, highlight infrastructure and help satisfy MS4 permit regulations. Learn more about Storm Water Reveal — an innovative program that has paired 38 artists with storm drains throughout the city — and find out why the city created decorative manhole covers for its stormwater system.

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LAKE ERIE TROUBLES

It's a Blue-Green Algae World

Along the shores of Lake Erie, summer comes in shades of blue and green as thick algae mats begin their seasonal takeover. Could green infrastructure solve the lake's algae woes? Learn how municipalities are using millions of EPA dollars to control runoff, protect the lake and reduce blue-green algae.

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OVERHEARD ONLINE

"Rather than subcontracting pipe bursting work this season, perhaps it's time to invest in the necessary equipment and train your municipal workers to do the specialty jobs."

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CHANGE IN CULTURE

Mesa moves past reactive thinking and shifts focus to efficiency, infrastructure investment and a healthy future

By Jim Force

City of Mesa Water Resources Director Dan Cleavenger (right) looks on as a crew replaces a 12-inch water valve along a residential street in Mesa. (Photography by Mark Henle)

Rapidly growing urban development. Sharp increases in the demand for freshwater. It's a double whammy that most municipalities would just as soon avoid.

But not Mesa, Ariz. The Mesa Water Resources Department (MWRD) has not only accepted these challenges, but is succeeding — to the point that the utility received a coveted Gold Award for Exceptional Utility Performance from the Association of Metropolitan Water Agencies (AMWA) at its annual meeting last fall. With responsibilities for both drinking water and wastewater, Mesa was honored for its record of recycling, cost control, infrastructure integrity and performance metrics.

MWRD Director Dan Cleavenger attributes the success to a change in culture.

"We're proactive in how we go about the issue of aging infrastructure," he says. "Through the use of performance metrics [see sidebar], everybody becomes more involved in the decision-making, and everyone is more accountable."

A comprehensive monthly report that incorporates MWRD's metrics and promotes openness and inclusion reinforces inter-staff communication. Issued electronically, the report follows a template and includes charts and graphs that track the utility's performance. "We post it at the end of every month, and everybody can see what everyone else is doing," Cleavenger says.

He says the approach results in a more transparent operation. "We're especially open and honest with what our spending is and what our needs are," he says. "In return, our city

PROFILE: Mesa (Ariz.) Water Resources Department

FOUNDED:
1913

POPULATION SERVED:
500,000

AREA SERVED:
170 square miles

CUSTOMER CONNECTIONS:
52,633 water connections; 121,000 wastewater connections.

WASTEWATER INFRASTRUCTURE:
3 water reclamation plants (42 mgd, total); 1,600 miles of sewers

WATER INFRASTRUCTURE:
1 owned water treatment plant, 1 shared plant (162 mgd total); 223 miles of water mains; 310 million gallons of storage

MANAGEMENT:
Dan Cleavenger, director; Carlos Padilla, assistant director; Alisha Solano, deputy director of water enterprise services; Jake West, deputy director of water distribution and wastewater collections; Keith DeVore, program manager; Arif Rahman, chief engineer

EMPLOYEES:
251

ANNUAL OPERATING BUDGET:
Total: $134.6 million ($72.2 million – Water Program; $62.4 million – Wastewater Program)

WEBSITE:
www.mesaaz.gov/water

council has been very supportive."

The utility

Located just southeast of Phoenix, Mesa has a population of nearly 500,000 — making it the third largest city in Arizona, and 38th largest in the United States. The MWRD serves customers in a 170-square-mile area, and has been providing drinking water, and treatment and recycling wastewater for over 100 years.

The utility owns and operates the Brown Road water treatment plant, capacity 72 million gallons per day, which treats Colorado River water from the Central Arizona Project. A second treatment facility – the Val Vista plant – is jointly managed by Mesa along with the City of Phoenix, and treats water from the Salt River Project. Capacity is 220 mgd, with Phoenix using about 130 mgd.

"We're proactive in how we go about the issue of aging infrastructure. Through the use of performance metrics, everybody becomes more involved in the decision-making, and everyone is more accountable."

– Dan Cleavenger

Treatment processes at both plants are similar.

In late summer and fall, the plants use powdered activated carbon to remove taste and odor caused by decomposition of organic matter in the raw water source. Chlorine dioxide – generated on site – is used for both pre- and post-treatment disinfection.

Alum addition promotes flocculation and sedimentation in a ballasted Actiflo process (Veolia Water). Clear water then passes through multimedia filters of sand and anthracite; filtered backwash water is returned to the raw water supply.

The product water is fluoridated before being pumped to storage reservoirs and then by gravity or pumping to customers.

At the Val Vista plant, granular activated carbon is used to control disinfection byproducts.

Wastewater returns through a 1,600-mile sewer system to a series of three water reclamation plants, two owned outright by Mesa, and the third shared with the communities of Queen Creek and Gilbert.

The Northwest Water Reclamation Plant has a capacity of 18 mgd, and uses screening and grinding, primary sedimentation, biological treatment and nutrient removal, final filtration and disinfection. The effluent is discharged to two recharge sites and the Salt River, which also recharges the aquifer.

The Southeast Water Reclamation Plant is designed to handle up to 8 mgd, using a process flow similar to the Northwest plant. Treated water is used for golf course irrigation, pond replenishment and agricultural irrigation.

The jointly-owned Greenfield Water Reclamation Plant is designed for 16 mgd, and is an expansion of a former lift station. Treated water is pumped directly to the Town of Gilbert's recharge facilities and to the Gila River Indian Community through an intergovernmental agreement for beneficial reuse in agriculture. Mesa is also part-owner of the 91st Avenue Wastewater Treatment Plant with the cities of Phoenix, Scottsdale, Glendale and Tempe. 91st Avenue delivers reclaimed water to the Palo Verde Nuclear Generating Station.

Biosolids from the reclamation plants are digested, thickened and dewatered by centrifuges. Cake is land-applied throughout the area.

Saving money for ratepayers

The Gold Award from the AMWA made specific mention of two accomplishments by the MWRD – per capita operating costs that are 30 percent lower than the national average, and a pipe break and leakage rate that is 90 percent below the average.

How do they do that?

Like all water and wastewater treatment facilities, Mesa's systems consume a lot of electricity, so the emphasis has been on reducing energy use and cost wherever possible.

The department's SCADA system is a big help, monitoring and controlling pump stations, and man-

SOURCE WATER PORTFOLIO

Three main water sources help the Mesa Water Resources Department support a vibrant population base, recreational facilities and industrial economy.

First, Colorado River water is delivered to the city via the Central Arizona Project (CAP). CAP is designed to import about 1.5 million acre-feet of Colorado River water to the counties of Pima, Pinal and Maricopa, where Mesa is located.

The city's website explains, "Because CAP water is the first water to be cut during times of shortage in the Colorado River, Mesa has proactively stored, or recharged, large volumes of Colorado River water underground in aquifers under Mesa. During times of drought, this water can be pumped from local wells, thus mitigating the impact of drought and climate."

Secondly, Mesa has rights to water from the Salt and Verde rivers. The Verde is a tributary to the Salt which flows into a reservoir known as Roosevelt Lake, located northeast of the Phoenix metro area. Mesa draws water from the lake through the Salt River Project canal.

Finally, Mesa withdraws groundwater from the Navajo Aquifer, which the city also recharges with reclaimed water. Mesa has physical and legal access to more than 1.2 million acre-feet of groundwater and, to date, has recharged nearly 500,000 acre-feet of surface water or effluent underground.

The website reports that since Mesa has participated in nearly every water rights settlement in the state, has built the infrastructure necessary to depend on both surface and groundwater, and has ensured an appropriately sized contingency fund for its water utilities, the city's water supplies are "physically, legally and financially secure."

Adam Farrow (left) and Jose Cabral of the Mesa Water Resources Department install a new valve (U.S. Pipe) on 12-inch water line.

A DASHBOARD THAT MEANS BUSINESS

Performance metrics are more than just important sounding words at the Mesa Water Resources Department. The metrics – there are four of them – jump out at employees from their computer dashboards:

- Reuse at least 90 percent of all reclaimed water supplies
- Maintain the number of sanitary sewer overflows at less than 16 per year
- Respond to customer turn-on/turn-off utility service requests within established timeframes
- Keep total water system losses under 10 percent

"We worked with our city Management, Performance & Accountability division to find the best metrics," says MWRD Program Manager Keith DeVore. "We benchmark against other cities, and against ourselves. Our metrics are reviewed monthly by our managers. They have to report on how they are meeting their goals."

The metrics are specific to Mesa, and help the utility meet its challenge of furnishing water and wastewater services to a growing community in a water-scarce part of the country.

The reclaimed water gauge represents the percent of reclaimed water supplies being used beneficially – for non-potable irrigation, or aquifer recharge. It is the goal of MRWD to reuse at least 90 percent of all water that is reclaimed.

For a wastewater system the size of Mesa, the national benchmark from the American Water Works Association establishes an annual total of 16 SSOs per year. Having a goal of less than that commits the MWRD to provide an effective cleaning and pretreatment program.

The goal of 100 percent completion of service starts and stops represents Mesa's response rate to customer requests for next-day service. "No matter if the department has 3,000 or 5,000 requests in a single month, it is imperative that customer demand to turn-on/turn-off service is met 100 percent of the time within established time frames," the policy states.

Finally, Mesa works hard to keep system losses under 10 percent – an important measurement in the arid Southwest. During 2013, losses averaged right around 4 percent.

aging the water distribution system and storage reservoirs for energy savings. "We try to run equipment at off-peak hours as much as possible," says MWRD Assistant Director Carlos Padilla. "We're getting better and better at it."

Efficient pumping is a major goal. Padilla says the MWRD is constantly monitoring pump performance at its well sites, pump stations and distribution system. Older models are replaced with high-efficiency pumps whenever and wherever necessary. For instance, at three of Mesa's largest pump stations, higher efficiency pumps resulted in electrical cost savings of 15 percent.

Energy consumption is also on the radar screen at the treatment plants. Padilla points out that at one of the reclamation plants, digester methane gas is captured and used as fuel for cogeneration. "We generate enough gas to power one of the process buildings, and also to heat the digesters," he says. The savings average $5,500 per month.

For dewatering, Mesa uses centrifuges – large consumers of energy – so the staff now operates the centrifuges during off-peak hours. "We try to shave as much high-peak energy use as possible," says Padilla. At the Greenfield Water Reclamation Plant, operating the dewatering centrifuges during off-peak periods has resulted in electrical cost savings of 55 percent.

Other energy saving modifications include replacing coarse bubble aeration with fine bubble in the aeration basins at the water reclamation plants, and a shift from single stage to high-speed blowers. The changes have saved from 50 to 70 percent in energy consumption. In the ultraviolet light disinfection process, a move from medium-pressure bulbs to low-pressure, high-energy bulbs has resulted in operational cost savings of 30 to 40 percent, notes Arif Rahman, deputy engineer.

Repairing the pipes

Mesa is among the U.S. cities and utilities taking the matter of aging infrastructure into their own hands. According to Jake West, deputy director of distribution and collections, the investment in new infrastructure is paying off.

"We try to run equipment at off-peak hours as much as possible. We're getting better and better at it."

– Carlos Padilla

"We've invested money in more reliable pipe," he says of MWRD's sterling record of reducing pipe breaks and leaks. "We're doing a better job on leaks."

Communications and transparency again have been the key to the progress. Cleavenger says the utility has participated in strategic infrastructure planning with the Mesa

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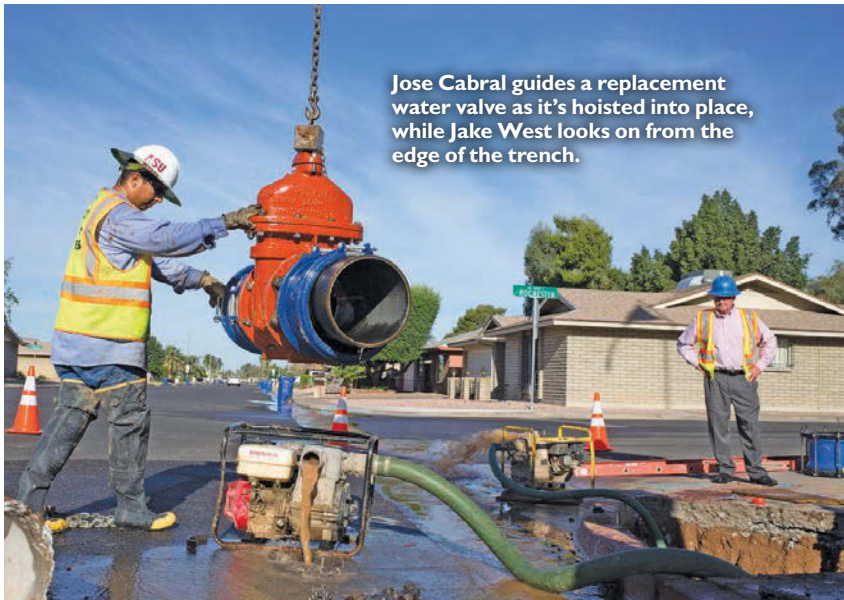

Jose Cabral guides a replacement water valve as it's hoisted into place, while Jake West looks on from the edge of the trench.

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Ric Chavez (left) and Mike Dautherty replace an emergency pump in the primary sludge station at the Greenfield Water Reclamation Plant in Gilbert, Ariz.

Robert Pearce checks the UV ballasts at the Greenfield Water Reclamation Plant.

City Council. "We looked at our mains, and earmarked all that were 30 years old or older."

Based on that analysis, he says, MWRD was able to start on a cycle of replacement.

"We've been tracking water main breaks and leaks since 1999, and have developed a good database that identifies the year the pipes were installed and the type of pipe, as well as the break characteristics in certain sections," West says. "Then we prioritize and replace as needed as we go forward."

Water and wastewater piping underneath heavily traveled roads and intersections gets special attention in the analysis. "If a freeway or interchange is being built and we have identified a future need in our master plan, we insert sleeves under the roadway rather than have to dig it up in the future," West says. He adds that his team works closely with the city's transportation department to identify older pipelines under roads ticketed for future improvement, programming the pipes for replacement as part of the road work.

Mesa uses pipe relining in some sections. "We started using the technology a couple of years ago," West says. "We had a 30-inch interceptor collapse, so we did 5 miles of CIPP."

The MWRD uses other rehab methods like sliplining and pipe bursting to do spot repairs throughout the system and at intersections where pipe conditions lend themselves to the use of such technology. Mesa's largest relining project to date consists of sliplining approximately 2,400 feet of HPDE liner inside an existing 42-inch prestressed concrete cylinder pipe feeding a 10 mgd reservoir.

Still, West says, leaks and breaks can't be entirely eliminated. Mesa uses about 400 Permalogger acoustic leak detectors and conducts leak surveys, patrolling the system regularly with a part-time employee who follows up on "hits" and files a service order. "We want to get to the leaks before they get to the surface," West says.

On the sewer side, West and his team have developed a comprehensive protocol that has helped them meet – and beat – the goal of no more than 16 SSOs per year.

"Our five-year plan is to clean 20 percent of the system – 320 miles – every year," West says. Mesa uses four combination jet/vac units (Vactor and Camel by Super Products) and one CCTV truck. The utility contracts some of the larger pipe work out to the local firm of Pro-Pipe. "We're getting there," West says. "We're pretty close to our annual average."

West notes that, over the last few years, the number of systemwide SSOs has averaged about eight per year – a credit to the cleaning and inspection plan, but also to close cooperation between the collections crew and Mesa's industrial pretreatment program. "When we have an issue with heavy concentrations of grease or fats, we work with the IPT [Industrial Pretreatment] group and get our FOG [fats, oils and grease] brochure out to the people involved," West says. "We stop by to talk with them."

The future

Mesa continues to grow. Already larger than U.S. central cities like Atlanta, Pittsburgh and Minneapolis, Mesa is experiencing rapid industrial development in its southeast sector — fueled by new and expanding high tech and digital businesses.

More infrastructure will be necessary.

"We have huge needs there," Cleavenger says of the southeast part of his service area. "We're building a high tech corridor. We've just had an Apple plant move in and other big names are coming our way."

Cleavenger envisions at least one new water treatment plant and a major expansion of one of the water reclamation plants – an estimated total investment of some $500 million in the next four to five years. He says the city will probably be looking at membrane bioreactor technology as part of the reclamation plant expansion.

"We need to get ourselves in shape and be ready for the necessary infrastructure," he says as a sort of personal reminder as well as a departmental challenge.

But he quickly adds, "We've done the things in the past that have allowed us to get to where we are. We have a solid foundation to build upon." ✦

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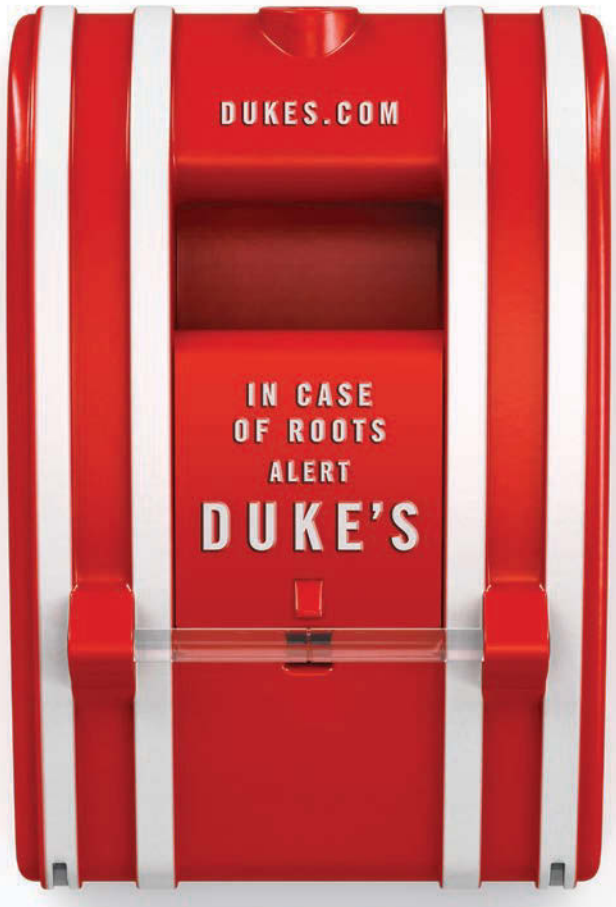

We invite readers to offer ideas for this regular column, designed to help municipal and utility managers deal with day-to-day people issues like motivation, team building, recognition and interpersonal relationships. Feel free to share your secrets for building and maintaining a cohesive, productive 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.

UPON FURTHER REVIEW …

There are better ways to gauge employee performance and success than archaic annual evaluations

By Ken Wysocky

The annual employee performance review is as ingrained in corporate culture as coffee breaks and weekly department meetings. But some observers see a big difference between job appraisals and those other corporate mainstays: the latter actually have some value.

A radical viewpoint? Perhaps. But when all is said and done, there's little in the way of academic research that proves traditional performance appraisals do what they're intended to do, says Ron Baker, the founder of the VeraSage Institute, a think tank devoted to educating business professionals (www.verasage.com). Yet studies show that 97 percent of American companies and organizations still use them as an evaluation tool that determines important things such as pay raises, career paths and promotions.

"Performance reviews are nothing more than a paper-shuffling ritual," Baker asserts. "They're about as effective as baking cookies and using a smoke alarm as a timer … they're just a conversation about past history."

To back up his assessment, Baker points to a thought-provoking book, *Abolishing Performance Appraisals: Why They Backfire and What to Do Instead*, by Tom Coens and Mary Jenkins. The authors scoured 50 years' worth of academic studies of performance appraisals and found little compelling empirical evidence that they actually improve employee performance, Baker notes.

A major flaw is the structure of annual reviews. Initially designed by clinical and abnormal psychologists, reviews subsequently focus on employees' weaknesses.

"Any National Football League coach knows that in order to succeed, you must play to peoples' strengths," Baker points out. "But performance reviews by design focus on weakness, which is why they're so humiliating and inhumane. Organizations stick with them because their human resources departments are like the KGB – they like to have dossiers on people. That gives them control and power."

"Performance reviews are nothing more than a paper-shuffling ritual. They're about as effective as baking cookies and using a smoke alarm as a timer … they're just a conversation about past history."

– Ron Baker

Moreover, there's little truth to the theory that performance reviews protect organizations against legal action from fired employees. Author Coens, who's a labor lawyer, says appraisals offer no protection in court, Baker adds.

"In fact, an annual performance appraisal often can hang companies – hoist them on their own petards," he says. "They actually offer minimal protection. I'm not against documenting the performance of underperforming employees for termination, but you don't have to go through this annual agony because you're going to fire a very small percentage of your employees every year."

So what should companies use to replace annual reviews? Baker suggests three different processes: key predictive indicators, a manager's letter or after-action reviews. Here is a brief run-down of each technique:

• **Using key predictive indicators** to evaluate employees is more effective because it relies on a manager's judgment as opposed to rating employees' performance on, say, a one-size-fits-all numerical scale (a three for meeting expectations, a four for exceeding expectations, and so forth). This is much more effective in analyzing the performance of so-called knowledge workers, Baker says.

"The big difference between knowledge workers and others is that knowledge workers own the means of production in their heads – people such as lawyers, accountants and architects," he explains. "The World Bank estimates that in the developed world, 80 percent of wealth resides in human capital – the stuff between our ears, not in oil under the ground or natural resources or real estate. It's all about mind power and a lot of organizations haven't come to grips with that."

With knowledge workers, effectiveness is much more important than efficiency (how many rivets a worker can produce per hour, for instance). As such, knowledge workers' performance should be defined by a new paradigm that looks at things that predict their future performance – key factors that are relevant and pertinent to their jobs and the organization's strategic goals.

Examples could include feedback from customers; interpersonal skills; ability to listen and communicate; how well they get ideas across, delegate work, persuade others and deal with change; their willingness to take risks and innovate; and so forth.

"All of these skills are really critical in today's work environment," Baker notes. "But most can't be measured. It's a judgment. And having managers make judgments scares organizations.

"The best analogy is that these factors determine which employees have the best bedside manners," he adds. "That runs counter to HR people, who would rather be precisely wrong [using traditional review techniques] than approximately right."

• **The manager's letter** is a concept developed by renowned management guru Peter Drucker. Here's how it works: A supervisor meets with each of his or her employees twice a year. The first thing the employee does is define the supervisor's objectives, then his or hers. This includes determining what performance standards might apply, how they can be measured, what must be done to attain them, how the organization helps and hampers the employee from achieving them and what resources are needed (more training, an assistant, etc.).

"Then the boss and the employee both sign it and it becomes a cove-

nant that's reviewed twice a year and updated," Baker explains. "Everything is tied to an organization's strategy. It's entirely focused on the future, which is why it's so brilliant.

"Some people think I'm suggesting chaos, but this is hardly chaos," he adds. "It requires more work and thought than mindlessly filling in a box on a performance appraisal."

• **The after-action review** is a concept developed by the United States Army. It's designed to help organizations and employees learn from mistakes, Baker says.

"In organizations, you sometimes don't know the guy down the hall is about to do what you're doing, so there's a lot of reinventing the wheel," Baker says. "Obtaining that tacit, sticky knowledge is where you really learn. The Army figured out that when a platoon goes out to build a bridge, they learn all kinds of things that aren't in the bridge-building manual."

When a project like building the aforementioned bridge is completed, everyone up and down the ranks does an after-action review that focuses on just four questions:

1. What was expected – what were the objectives?
2. What actually happened? (This is what the Army calls the "ground truth," Baker notes.)
3. Why was there a gap between the two? And what are the positives and negatives about that gap?
4. How can we do better next time?

"The after-action review is a great tool because it's not a blame game," Baker explains. "In fact, it's a learning tool, so everyone in on it, from privates to colonels, goes over how it can be improved. Then, when the next platoon builds a bridge, they'll know the tricks of the trade."

Baker warns that anyone interested in changing how an organization does performance reviews is likely in for resistance, noting that human resource departments typically are not catalysts for change. But by championing the issue and effecting change, you just might make annual performance appraisals worthwhile – or at the very least, more valuable than coffee breaks and weekly department meetings. ✦

COLD WAR

Small town puts ice pigging technology to the test on an ailing force main and brings home honors

By Peter Kenter

When the Town of Middlebury, Vt., faced a significant reduction in capacity of a critical sewer force main, it gambled – and won – on the use of a novel cleaning technology. Ice pigging restored original pipe capacity, increased system efficiency and reduced the potential for combined sewer overflows.

Middlebury is a town of fewer than 9,000 people, located about 50 miles southwest of the state capital Montpelier. Its sewer system is relatively young; most of it was constructed in 1960.

Gravity sewer pipes are made of a variety of materials, including clay and PVC between 6 and 24 inches in diameter. Most new installations employ PVC. The town's force main is made of both ductile iron and PVC.

"Overall the pipes are in fair condition," says Bob Wells, treatment plant superintendent for the Town of Middlebury. "We do a lot of repair work in-house and we keep a stock of critical items so that our downtime is minimal if something fails."

In-house equipment includes a rodder, a hoist truck and a loader. The town has also contracted such technologies as directional drilling to replace a sagging pipe in 2013, and has previously used sliplining on a problem force main.

Sewer rodding is routinely conducted in-house, while an outside company is contracted yearly to perform a solid week of sewer line cleaning.

"When you think you've seen everything that people will put into the sewer, there always seems to be something that tops the last item," Wells says.

Flow monitors detect leaks

System leaks are detected by monitoring pump hours against rain events, adjusted for the season. In addition, two flow monitors are employed as needed in areas of suspected infiltration.

"Last year, we hired an engineer to assist in nighttime flow monitoring," Wells says. "Several spots have proven to be prone to infiltration and each is put onto a capital improvement list that will be addressed as funds become available."

One procedure that has been paying off incrementally is the town's policy for buildings either going up for sale or being refinanced.

"We inspect the property for any type of illegal hookup to the sewer system," Wells says. "Items like sump pumps discharging into the sanitary system can put a lot of groundwater into the sewer when there may be an alternative that would be beneficial not only to the land owner but also to our system."

In 2000, a new wastewater treatment plant was constructed, replacing the old plant. Wastewater is pumped to the plant through a force main via the Middlebury Main Pump Station. The plant employs sequential batch reactors and ultraviolet disinfection. Solids are sent to two sludge holding tanks and then to two 1.5-meter Komline-Sanderson presses. The solids are heat pasteurized and applied to agricultural land as Class A biosolids. Treated effluent is released to Otter Creek, which passes through town on the way to Lake Champlain.

PROFILE:
Public Works Department, Middlebury, Vt.

YEAR UTILITY ESTABLISHED: 1960

CUSTOMERS SERVED: 8,000

AREA SERVED: 39.2 square miles

DEPARTMENT STAFF: 5 employees

INFRASTRUCTURE: 45 miles of sewer lines

ANNUAL DEPARTMENT OPERATING BUDGET: $2.5 million

ASSOCIATIONS: Green Mountain Water Environmental Association, North East Biosolids and Residuals Association

WEBSITE: www.townofmiddlebury.org

Opposite page: Treatment Plant Superintendent Bob Wells works to unclog a blocked sewer. (Photography by Oliver Parini).
Right: The ice slurry mixture acts as both a solid and a liquid. The consistency is very similar to a convenience store slushy. Below right: The delivery/insertion truck brings the ice slurry to the insertion point and pumps it into the force main.

Sewage treatment is also provided for adjacent sections of the neighboring town of Weybridge.

Reduced pump capacity risks CSOs

Like many communities, Middlebury continues to meet the challenge of controlling CSOs during wet weather. While the overflows often represent small volumes, they're taken seriously. The most recent concern involved reduced pumping capacity at the main pump station, which conveys wastewater through 12,000 feet of 16- and 18-inch ductile iron and PVC force main to the wastewater treatment facility.

"In force main ice pigging you can't really put a bucket at the end of the pipe to see what you've cleared. The real test is to determine if we get an increased flow rate in the pipe at the same pump horsepower — and we were definitely seeing that during the first two applications."

– Wayne Elliott

The pumps were originally designed to discharge wastewater at a rate of 6.2 million gallons per day, but pumping rates decreased over time. During some wet-weather conditions, the pump station could not keep up with incoming flows, and sewage was discharged to Otter Creek.

"Everything checked out fine, from pumps to air release valves, so we realized the problem was obstruction in the force main," says Wells. "Regardless of the type of work we were going to do on the force main, the State of Vermont's CSO policy required us to construct a larger wet well to hold any additional volume of wastewater while the work was to be done."

Middlebury contracted Aldrich + Elliott, PC, an engineering firm located in Essex Junction, Vt., to assist with the design of the pipe remediation job.

"The traditional method of getting the force main back to original condition would be through the use of a mechanical pig," says Wayne Elliott, vice president, Aldrich + Elliott. "However, solid poly pigging was ruled out due to size changes, 90-degree bends, wyes, and a lack of insert or retrieval stations. With a force main 12,000 feet long you would also need to shut off the pumps for quite a while. If the pig became stuck, it would take even longer. Most of the guys who traditionally do this sort of work wanted nothing to do with this project."

The ice pigging alternative

Both the town and the engineering firm were previously aware of the offerings of Utility Service Group (USG), an Atlanta-based company that holds the rights to ice pigging for sewer and water applications in North America. The technology employs saltwater ice slurry, which is injected into the pipe, scouring the interior like a glacier and absorbing impurities as it passes through. In European projects and a few test runs in the U.S., the technology has proven effective at clearing sewers of sediment, sand, debris, sludge, and fats, oils and grease.

Ice slurry is pumped into the force main inside of an existing air release manhole. (Photo contributed by Middlebury Public Works Department)

After receiving approval from the Public Works Committee and the town's selectboard, USG was contracted to pig the force main.

"While sewer ice pigging has been used on force mains, it had never been attempted on a line this long anywhere in the world, so we made the town an offer – if they didn't see noticeable improvement after the first few segments had been treated, we would pack up and they wouldn't owe us a cent," says Paul

TO GIS OR NOT TO GIS

Middlebury, Vt., has been working toward mapping its water and sewer assets using GIS. However, sometimes plain paper maps can be the most efficient way to quickly access data, says Bob Wells, treatment plant superintendent with the Town of Middlebury Public Works Department.

"We still rely on paper copies of our system maps for quick reference," he says. "My personal feeling is that in larger systems GIS mapping is fine, but in smaller communities paper is the way to go."

Another benefit of paper copies is that any notes and corrections made on maps are instantly accessible to the entire department.

"Sometimes it seems like it takes forever for suggested corrections to make their way to the GIS mapping system," Wells says. "We continue to work on updating both the paper and GIS maps, but the 'clean' paper copy in our office is the one that we tend to grab first."

The sample on the left shows influent filled with materials removed by the ice pig. The sample on the right shows the normal influent. (Photo contributed by Middlebury Public works Department)

The ice-making rig produces the ice slurry by cooling and mixing a combination of water and salt to the perfect consistency. (Photo contributed by Middlebury Public works Department)

Treloar, ice pigging project manager with USG.

USG's ice pigging rig consists of a brine tank and chiller that cools a 4.7 percent brine solution to between 22 and 26 degrees. An operator controls the chilling process, which may require as many as 36 hours before the slurry is ready for injection. Unlike a mechanical pig, the ice pig is driven by the existing pressure inside the force main.

samples will show impurities that gradually clear up as the process is completed.

"In force main ice pigging you can't really put a bucket at the end of the pipe to see what you've cleared," says Elliott. "The real test is to determine if we get an increased flow rate in the pipe at the same pump horsepower – and we were definitely seeing that during the first two applications."

"While sewer ice pigging has been used on force mains, it had never been attempted on a line this long anywhere in the world, so we made the town an offer — if they didn't see noticeable improvement after the first few segments had been treated, we would pack up and they wouldn't owe us a cent."

– Paul Treloar

"The job needed to be divided up so that we could insert the ice from our 10-ton delivery rig to scour a certain length of pipe before it melts," says Treloar. "We were able to break the job down into nine sections, with air valves to be used as ice insertion points."

Wells and his crew assisted USG with confined-space entries and tapped the force main in two additional places to provide optimal injection points.

Elliott notes that the temperature of the wastewater is critical to effective ice pigging.

"In this case, we found that Middlebury's wastewater is warmer during the early morning hours, so we found it made sense to delay the procedure a few hours each day," he says.

In water main ice pigging, water

Pump capacity increased

The entire force main was scoured over a period of about 10 days, with pumping efficiency improvement following most applications.

After USG completed the procedure, pump capacity increased by more than 640,000 gallons per day, returning the system to its original specifications.

"Ice pigging has a place in the market as another tool in the toolbox for line cleaning applications," Wells says. "Assess the job to be done to see if traditional or ice pigging is more appropriate for you. Ice pigging certainly worked best for us with this particular job."

The project was recognized by the American Council of Engineering Companies of Vermont with a 2014 Award of Excellence presented to Aldrich + Elliott in association with the Town of Middlebury and USG. ✦

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Members of the Middlebury Public Works Department include (from left) laboratory technician Bill Malloy, operator Dean Rheaume, Treatment Plant Superintendent Bob Wells and operator Paul Lengyel.

INDUSTRIAL CAPACITY

New continuous-duty vacuum pump from Moro USA is well suited to heavy workloads

By Craig Mandli

PHOTO BY CRAIG MANDLI

Matt Gibbs, western territory sales manager for Moro USA, explains several features of the company's new PM3000 vacuum pump to an attendee at the 2014 Pumper & Cleaner Environmental Expo International.

High performance and longevity ratings, low operating costs and continuous vacuum are all highlights of the new PM3000 Storm vacuum pump, unveiled by Moro USA at the 2014 Pumper & Cleaner Environmental Expo International.

The PM3000 Storm is an addition to the company's Storm series of liquid-cooled models capable of pumping nonvolatile liquids and sludge from long distances, providing a solution for heavy-duty industrial applications with a suggested tank capacity of 3,000 to 9,000 gallons. It is capable of 29 psi and features a 4-inch flange connection.

"It's rated at 1,000 cfm free air, and was designed to appeal to vacuum truck operators who work in the industrial sector, including oil and gas utilities, municipal utilities and hydroexcavation," says Dave Flagg, company president. "It is also a pump that will appeal to municipalities that operate trucks continuously. It's not your typical truck-mounted vacuum pump."

Like all of Moro's liquid-cooled vacuum pumps, the PM3000 Storm includes an integrated check valve, change-over valve, automatic oiling system, industrial-duty bearings, Viton seals and state-of-the-art high-flow-rate asbestos-free spark-proof vanes. It incorporates a cantered rotor that promotes less air slippage with six Kevlar, heat-resistant vanes that improve performance and recovery time.

"This isn't the largest vacuum pump model we've made," Flagg says, noting the company's other vacuum pump models are designed for tanks ranging from 1,000 to 9,000 gallons. "This design provides a higher cfm rating at 24 Hg continuous [28 Hg maximum], which is really the top end when you need deep vacuum and high flow, such as when hydroexcavating."

A cantered rotor and Kevlar vanes allow the pump to generate 29 psi. In addition, the efficient design means the pump doesn't need to spin as fast (1,200 rpm), which also increases longevity and reduces heat, noise and oil consumption, Flagg says. "This unit is built to run 24/7 and last."

The self-contained closed-loop oiling system injects oil into the pump's housing, lubricating the vanes and industrial-grade bearings. The integrated four-way valve allows it to work under both vacuum and pressure, boosting longevity in applications where the pump works at high pressure for long periods, Flagg says. In addition, its onboard liquid cooling system incorporates a forced circulation external water pump and cooling circuit "burp" points that are manually operated to remove all air pockets from the cooling circuit. The new systems were in the research, development and testing phase for roughly five years before being introduced to the marketplace, according to Flagg.

"The response has been terrific," says Flagg. "We took orders for several units from our dealers right at the Expo."

As for the company's plans for the 2015 Water & Wastewater Equipment, Treatment & Transport Show (WWETT), the new name for the Pumper and Cleaner Expo, Flagg says Moro USA is working with all industry segments promoting its products.

"Our goal is always to have something new ready to bring to the Expo, and I know our research and development team has some projects that we're very excited about," he says. "We're already looking forward to next year." **800/383-6304; www.morousa.com.** ✦

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OVER THE RIVER AND THROUGH THE WOODS ...

Bend, Ore.'s, Bridge Creek pipeline project aims to replace 10 miles of water transmission mains passing through the Deschutes National Forest

By Peter Kenter

The City of Bend, Ore., is currently in the middle of the Bridge Creek pipeline project – literally. After months of legal challenges, the city's Engineering & Infrastructure Planning Department has begun work on the central 8-mile section of a 10-mile, $24 million pipeline project designed to transport mountain water downhill from Bridge Creek in the west through the Deschutes National Forest.

Bend is located roughly in the center of Oregon and its population is approaching 80,000, an increase of almost 50 percent in a little more than a decade. The water project will replace critical end-of-life infrastructure that dates back 90 years.

The original water supply was privately delivered and derived from the Deschutes River. However, by the 1920s state authorities declared the source unfit for human consumption due to the effect of the local lumber industry.

The city purchased the system in 1924 and settled on a new, high-quality water source – Bridge Creek. A new pipeline would convey water downhill by gravity.

"The initial system became operational in 1926 and consisted of two storage facilities and a 12-inch pipeline close to 14 miles in length, because it was a lot farther into town than today," says Tom Hickmann, director of the Engineering & Infrastructure Planning Department. "The town grew and a second 12-inch line was constructed in 1955."

In 1968, the city purchased two surface wells from logging companies and invested in newly-developed deep well technology to access the area's robust aquifer 800 feet below. While Bridge Creek provided year-round water, the wells supplemented that source during summer. The city currently operates 23 wells.

Early efforts unsuccessful

"By 1982, the Bridge Creek pipeline had deteriorated and there was an effort to upgrade the mains with 24-inch ductile iron, but nobody thought about

Heidi Lansdowne, principal engineer and project manager in the Public Works Department for the City of Bend, poses for a portrait at the worksite of the Bridge Creek pipeline replacement project along Skyliners Road in Bend, Ore. (Photos by Joe Kline)

PROFILE:
Engineering & Infrastructure Planning, Bend, Ore.

YEAR UTILITY ESTABLISHED: 1973

CUSTOMERS SERVED: 24,000 water connections

AREA SERVED: Approximately 25 square miles

DEPARTMENT STAFF: 140 employees

INFRASTRUCTURE: 430 miles of water distribution mains; 480 miles of sewer lines

ANNUAL DEPARTMENT OPERATING BUDGET: Water, $14 million; Sewer, $15.5 million

ASSOCIATIONS: American Water Works Association, Water Environment Federation, American Public Works Association, National Association of Clean Water Agencies, American Society of Civil Engineers

WEBSITE: www.bend.or.us/index.aspx?page=140

"The current system also operates at full flow 24/7. The new system will allow us to control flow, to only take water when we need it."

– Heidi Lansdowne

the hydraulic grade lines," says Hickmann. "With the best of intentions, they replaced a few sticks near the head of the system instead of at the bottom and, when demand was low, the system overflowed and would have become a geyser if they had continued. At that point, there was no political will to spend more money on it."

When the Environmental Protection Agency's Long Term 2 Enhanced Surface Water Treatment Rule was adopted in 2006, the city took a fresh look at its water sources and infrastructure.

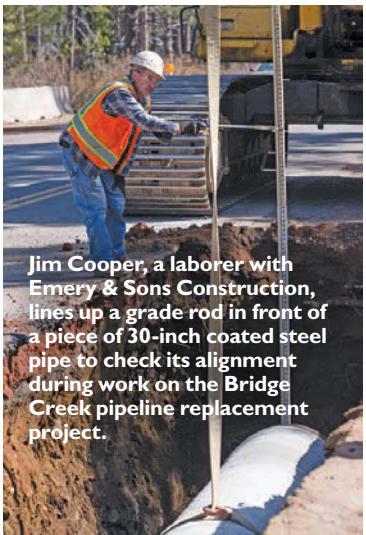
"The situation with the Bridge Creek pipeline was serious and we began the process of securing a quality year-round water supply for the city," says Hickmann.

While the Bridge Creek pipeline approached the end of its life, the rest of Bend's water system, built largely during the 1950s and 1960s, remained robust. The system is about 80 percent ductile iron, ranging from 2 to 36 inches in diameter, with the majority of lines measuring 8 inches. Two private water systems operate within the city.

Pipe breakages are minimal, usually the result of improper backfilling and truck loading on the few cast-iron and galvanized lines that are in the system.

One exception is a formerly private water system condemned and assumed by the city in 2002.

"It's thin-walled PVC with glued joints," says Hickmann. "It's very difficult to maintain and run. We're trying to fix it incrementally, and we've had some interest in selling that system back to a private owner."



Jim Cooper, a laborer with Emery & Sons Construction, lines up a grade rod in front of a piece of 30-inch coated steel pipe to check its alignment during work on the Bridge Creek pipeline replacement project.

The system is 100 percent GIS mapped, with data fed into the city's hydraulic modeling system using INFOR, its asset management program. Leak monitoring is achieved through the use of an automated meter information system.

An in-house department performs repair and maintenance on both sewer and water systems on jobs valued less than $120,000. That includes shortline repairs of about 100 feet. At the utility's disposal are two vans outfitted with CUES CCTV equipment and five Vactor 2100 hydroexcavators and combination sewer cleaning trucks.

Replacement favored

"Given all of the information on the water system, and our wells, we used Optimatics software [see sidebar] to determine the most cost-effective course of action to secure the city's water supply," Hickmann says. "The analysis favored replacement of the Bridge Creek lines."

Heidi Lansdowne, principal engineer and project manager on the Bridge Creek project for the City of Bend, describes the system as elegantly simple.

"There's a small diversion structure on Bridge Creek, with a caretaker's house and intake structure built in 1926 that's still there," she says. "There are screens to filter out twigs and leaves and the water travels by gravity through 1,000 feet of elevation to a water treatment reservoir basin."

Hard evidence of the pipeline's advanced age has included sections of asphalt lining shed from the original steel pipe and found in system reservoirs.

"Also, some of the easements were not well-maintained so we have trees growing over and around the original pipes," says Lansdowne.

Clockwise from top left: Emery & Sons Construction workers Ted Barghini, Eloy Solis and Dalton Rembolz direct a hose to fill a grout diaper inside a shoring box; Neil Miotke, an operator with Emery & Sons, uses a trackhoe to place and compact crushed rock around a new piece of pipe; Scott Little, a steel pipeline inspector with Murray, Smith & Associates, uses an iPad to check project notes while on site at the Bridge Creek pipeline replacement project on Skyliners Road in Bend.

The system's new design includes improved screening at the pipe intake, including protection for aquatic species.

"The current system also oper-

IT'S ALIVE: COMPARING HYDRAULIC SYSTEMS TO LIVING ORGANISMS

Traditional hydraulic modeling looks at sewer and water operations as static systems. Using sophisticated software, the City of Bend, Ore., has found that comparing hydraulic systems to living organisms provides better modeling and a basis for sound financial planning.

"We were working on a new master plan for the water system in 2005, when we were introduced to new software that used genetic algorithms to model hydraulic systems," says Tom Hickmann, director of Engineering & Infrastructure Planning with the City of Bend.

The city employed Optimatics software that uses genetic algorithm technology and treats each system component like a strand of DNA. It then finds the most efficient pathways to meet the requirements of the system.

"Traditional hydraulic models result in a series of preferred solutions for which engineers develop a range of costs," says Hickmann. "Using this system, the software runs through a million different scenarios to immediately provide not only capital costs associated with any solution, but also life cycle costs of those solutions in addition to flagging work which can be deferred. The software also exposes our own biases. For example, if I typically avoid specifying sewer lift stations at any costs, the software may provide evidence that proves me wrong."

A trackhoe with a pinwheel attachment compacts and buries crushed rock around a piece of newly-installed pipe.

ates at full flow 24/7," says Lansdowne. "The new system will allow us to control flow, to only take water when we need it."

A U.S. Forest Service environmental assessment (EA) limits the city's water withdrawals to match what is currently withdrawn. The EA will also require extensive monitoring of stream flows, temperature and fisheries in Tumalo Creek, into which Bridge Creek flows.

The replacement pipe will have a nominal diameter of 30 inches and be constructed of three materials with different wall thicknesses, with the thickest located at the bottom of the system where hydraulic head is greatest.

"Over a distance of 10 miles, optimizing the pipe materials and wall thicknesses saved us considerably on pipe cost," says Lansdowne.

The top 2 miles will specify high-density polyethylene (HDPE) and a short section of ductile iron pipe, while the lower 8 miles will be built using spiral welded steel pipe with cement mortar coating and lining.

Lawsuit delays construction

The city was ready to begin construction in 2012, with HDPE pipe already delivered to the site. However, a lawsuit brought by Central Oregon LandWatch and WaterWatch of Oregon delayed the project's start, charging that the new system would harm the ecosystem of Tumalo Creek.

The initial design also offered a small hydroelectric facility that would dampen the hydraulic head near the treatment plant and provide electricity to the grid. Court challenges by the same groups also put that feature on hold.

However, U.S. District Judge Ann Aiken has given the city the go-ahead to install 8 miles of pipe in the paved Skyliners Road through the Deschutes National Forest, after the U.S. Forest Service (USFS) issued a permit for that portion of the project.

"The Forest Service received federal highway funding to reconstruct Skyliners Road, and this section of pipe – Phase 1 – runs entirely underneath it," says Lansdowne. "We can complete Phase 1 of the project and save ratepayer dollars by coordinating the road repair from the pipeline and road reconstruction of both projects."

The forest project requires significant environmental covenants during construction.

"The USFS Special Use permit to allow our construction requires us to protect wildlife ranging from raptors and owls to bats and bumble bees," says Lansdowne. "Work began in March 2014 and if all goes well, we should be finished with this phase of construction by March 2015."

While construction of the upper and lower segments of the pipe can only commence following the conclusion of the lawsuit, the city has calculated that moving forward on any section of the project is in the community's best interest.

"The new screening system is not only better for the wildlife at Bridge and Tumalo creeks, but the project provides us with much-needed flow control that will help to maintain water levels in the creek," says Hickmann. "We're also eliminating the possibility of a rupture along the original pipe. We believe that completing this project is best not only for the citizens of Bend, but for the environment." ✦

SOFTWARE NETS SAVINGS

Running the Optimatics algorithm in 2008, the department was presented with water system power conservation options that saved the city $320,000 annually.

Bend is currently updating its sewer collection system master plan, which was previously completed in 2007. The city appointed 18 members of the public to work with staff and engineering consultants to update the plan, allowing the public to guide critical inputs to the model.

"We allowed them to introduce their own preferences, but then allowed them to see the impact of those choices using the Optimatics software," says Hickmann. "Some of them had a strong environmental perspective and wanted the city to establish satellite natural sewage treatment systems. When they saw that the approach wasn't economically feasible, they provided their own argument for why it wouldn't work when they went to speak to their constituents."

Ultimately, the sewer master plan adopted by the city will generate an estimated $20 million to $40 million in savings over 20 years.

Hickmann notes that successfully employing the software requires the use of a consultant who understands its limitations and benefits.

"The software works best at analyzing large, complex systems," he says. "When there are more alternative solutions to consider, it really shines."

Members of the crew working on the Bridge Creek pipeline replacement project in Bend.

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PROTECTING YOUR PIPES

Geofoam can be effective in mitigating the effects of shifting, settling and seismic activity on infrastructure

By Terry Meier

A member of the Brian Head Public Works team, in Brian Head, Utah, works on repairs to a severed truss sewer pipe. The new ductile iron replacement pipe is on the left.

Sinkholes. Massive discharges of untreated wastewater. The consequences of pipeline ruptures and breaks can be disastrous.

Sewer and water pipelines are vulnerable to faulting, seismic activity and other ground movements, but ongoing research is showing EPS geofoam to be a material with great potential for protecting them.

Steven Bartlett, associate professor of civil engineering at the University of Utah, and his team have been examining geofoam's mitigating effects on pipeline damage due to seismic faulting since 2007. "If an earthquake occurs, pipelines are one of the most important items to protect," Bartlett says. "For example, if a gas pipeline ruptures and ignites, you essentially have a large blowtorch, which can be catastrophic."

Geofoam weighs roughly 1/100th the weight of soil. The goal of a geofoam cover system on top of a buried pipeline is to reduce the lateral, longitudinal and vertical forces induced on the pipe as the surrounding ground undergoes deformation. The properties of geofoam have distinct advantages that lead to improved pipeline performance during large ground deformation.

There are two main advantages that geofoam has over traditional earth cover materials. First is geofoam's low mass density, which reduces the vertical and horizontal stresses on buried utilities and compressive soils. This reduction in loading and deformation will likely improve the performance of a pipeline during and after a major seismic event along the fault area.

The second advantage of geofoam is its use as a compressible inclusion for systems undergoing static, monotonic and dynamic loadings. Geofoam is somewhat compressible, and controlled compression can be used to reduce earth pressure against buried structures as well as deformation induced by structural loadings.

Bartlett's team confirmed the loadings that cause compression may include static and dynamic lateral earth pressure swells, frost heave pressures, settlements of support soils, faulting, liquefaction, landslides and traffic loads.

A solution in Utah

In December 2013, Bartlett's research on EPS geofoam was put to use in the repair of a severed sewer pipe in Brian Head, Utah. This was the second time the sewer line had been severed due to the dewatering of a deep sandy layer beneath the pipe, which resulted in significant consolidation, settlement, deep cracks and fissures.

"We expect the foam will reduce the weight on top of the pipe sufficiently to slow or stop the settlement. A camera will be sent down the pipe intermittently to determine the status of the pipe by looking for indications of movement."

– Tom Gurr

(continued)

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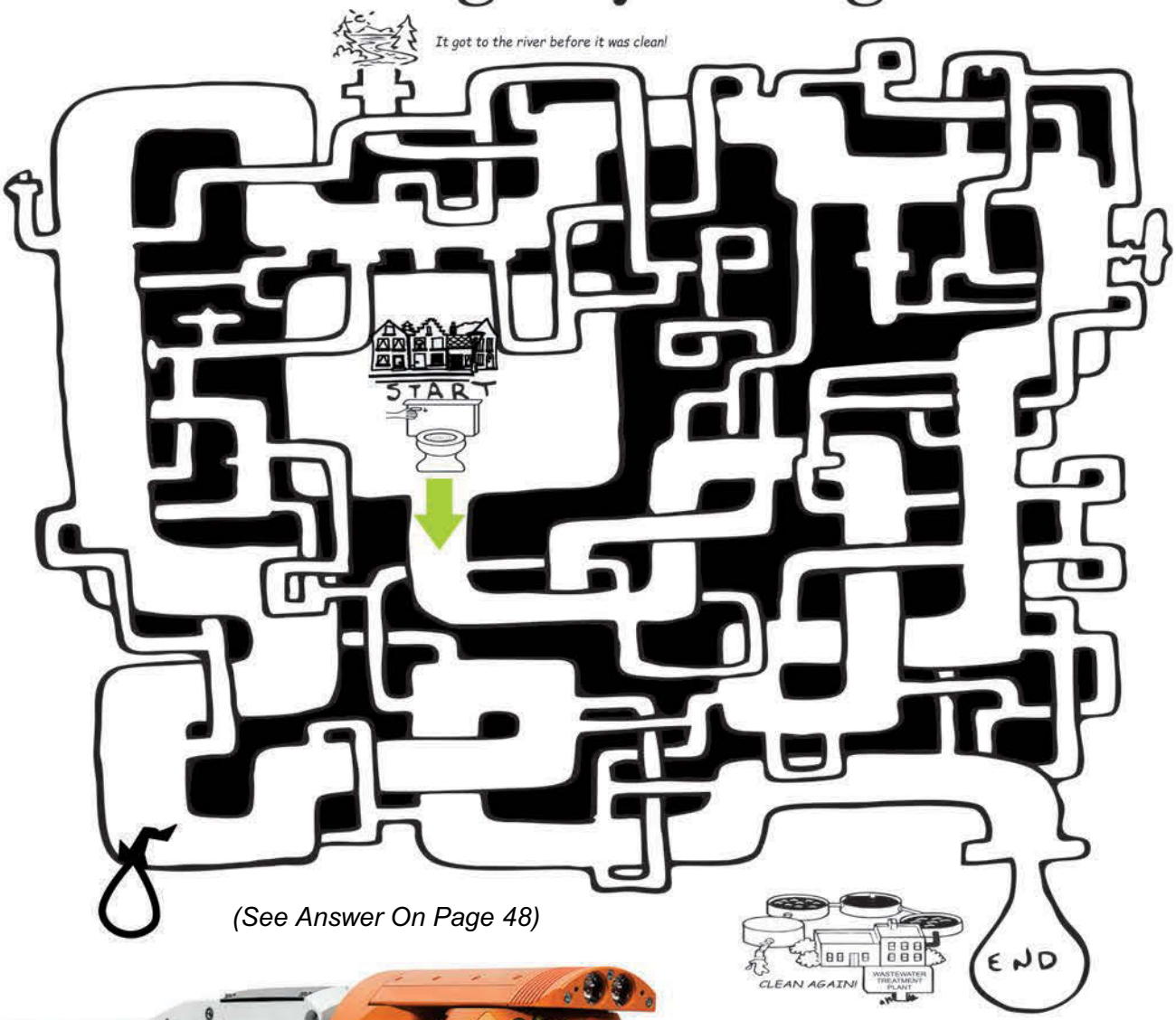

(See Answer On Page 48)

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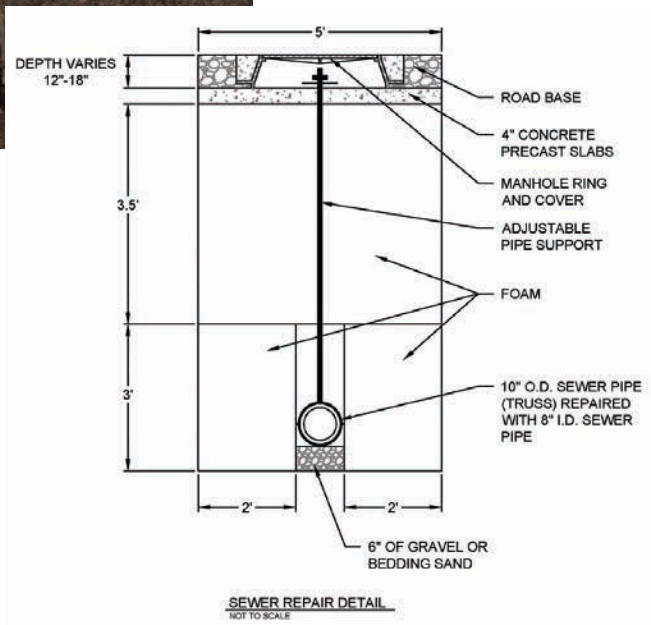
Geofoam provides a 24-inch verticle air gap above the new sewer line, which allows it to be adjusted vertically from the surface. A total of 7 feet of geofoam was used to reduce the weight of the backfill.

During the first repair, 10 inches of settlement and 6 inches of lateral movement were noted. Tom Stratton, Brian Head Public Works director, and his crew devised a plan to repair the damaged pipeline. After consulting with Bartlett and engineers Chet Hovey, P.E., of Advance Environmental Engineering, and Joel Myers, P.E., of Gem Engineering, the team concurred that geofoam should be incorporated into the repair in order to reduce settlement issues and protect the pipeline from future damage by allowing it to be adjusted vertically from the surface.

The old truss sewer pipe was severed about 3 feet downstream from a previous break, but the team never lost flow. "We didn't lose one drop of sewage during repair," says Tom Gurr, a supervisor with Brian Head Public Works. "At about 20 or 30 feet downstream from the break, the old sewer line had settled 18 inches at the lowest spot. We had to build up the bottom of the trench with road base and compact it to get the pipe and flow line back to their original depth."



An 8-inch sewer ball was used in the upstream manhole to stop flow during connection of the new pipe, which took about 40 minutes. Connections were done with stainless steel split repair couplers. The upstream sewer pipe and manholes provided enough storage that bypass pumping was not necessary. When the sewer ball was removed, flow was restored through the new pipe with no leaks.

The team then turned its attention to the installation of the geofoam blocks. The trench was checked for grade one more time as the first layer of geofoam blocks was installed. The second layer of geofoam was attached to the first layer of blocks using adhesive. This created a 24-inch air gap or "doghouse" above the new pipe. "This gap allows the pipe to be adjusted vertically from the surface using the pipe supports and threaded rods with nuts," Gurr explains.

Backfilling and compaction were done carefully in small increments on both sides of the foam blocks so as not to make them shift out of place. Four-inch precast concrete sections were placed on top of the foam.

Solid results

"With everything installed, the total system has a depth of 7 feet," Gurr says. "We installed a lifting ring about 10 feet downstream from where the break was. This involved a steel ring placed around the new pipe, connected to an 8-foot piece of all-thread and secured with a washer and nut. A ring and lid were placed on top of the precast concrete, allowing access to the nut and washer which are used to adjust the elevation of the pipe. We hope the all-thread, bolt, nut and washer will serve as an indicator of possible foam settlement, or help to suspend the pipe if earth settles below the pipe more than below the foam.

The new ductile iron pipe with locking gaskets is shown above the old abandoned line.

"We expect the foam will reduce the weight on top of the pipe sufficiently to slow or stop the settlement," Gurr continues. "A camera will be sent down the pipe intermittently to determine the status of the pipe by looking for indications of movement. Ten days after the repair was completed, no noticeable settling had occurred in the repaired area [approximately 80 feet of new pipe with 40 feet of foam block covering the worst section of settlement] except for one 3-foot-long crack, about one-half inch wide, just outside the repair area. This crack showed up about seven days after the repair was completed. Prior to this repair, cracking and settling had been much worse, requiring road and driveway repairs and fill over the sewer line area about every three days." ✦

Terry Meier is ACH Foam Technologies' expanded polystyrene representative, specializing in geofoam. He can be contacted via email at tmeier@achfoam.com.

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

KEEP OUR COUNTRY STRONG

Support for healthy infrastructure funding will build economic and community health

By Ted DeBoda, P.E.

NASSCO's mission to ensure the continued acceptance and growth of trenchless technologies can only be met when there are appropriate municipal funding mechanisms. If we continue to neglect our buried infrastructure through a lack of funding, it will be more expensive to sustain.

For the same reasons that we perform scheduled maintenance on our cars, we need to maintain our buried infrastructure now or prepare to spend more in the future. Our money is best spent when water and sewer providers can assess, maintain and rehabilitate underground infrastructure when it is most cost-effective to do so, which means sooner rather than later.

NASSCO aggressively partakes in many initiatives to support sewer and water providers in getting the funding they need. One of those ways is our involvement in the Clean Water Council (CWC). The CWC is comprised of national and state organizations representing underground construction contractors, design professionals, manufacturers, suppliers, labor unions and industry leaders committed to ensuring a high quality of life through sound environmental infrastructure.

CWC members work together to support legislation such as the Sustainable Water Infrastructure Investment Act of 2014, which would lift the volume cap on Private Activity Bonds (PAB) for water and wastewater projects. The existing volume cap restricts the use of PABs for water and wastewater infrastructure. These bonds use private capital instead of public debt and provide lower cost financing, which can translate to lower costs for the customer. This legislation can harness $50 billion in private capital investment for water infrastructure projects, creating and supporting 1,425,000 jobs.

NASSCO also supports other municipal funding mechanisms, including the Water Infrastructure Finance and Innovation Authority (WIFIA), a five-year, $250 million program that accesses funds from the U.S. Treasury at long-term Treasury rates. These funds are used to provide low-interest loans, loan guarantees and other support for infrastructure projects, while loan repayment goes back into the Treasury.

WIFIA focuses on very large projects (over $20 million) so it supplements, but does not replace, State Revolving Funds (SRF). During a recent Congressional Fly-In, we asked our representatives to support no decrease in SRF loans, to keep tax-free municipal bonds tax free, and to provide other funding mechanisms for water and sewer providers, enabling them to maintain their systems and continue to provide these essential services.

As a nation and as a united industry, we need to remind our representatives in Washington to invest our tax dollars wisely. They need to know that these necessary funding mechanisms can help boost the economy by creating jobs and stimulating direct and indirect demand for goods and services. Most important, they need to be reminded that their support for buried infrastructure will ultimately save money over the long-term and help make this country stronger. ✦

Ted DeBoda is executive director of NASSCO. He can be reached at director@nassco.org.

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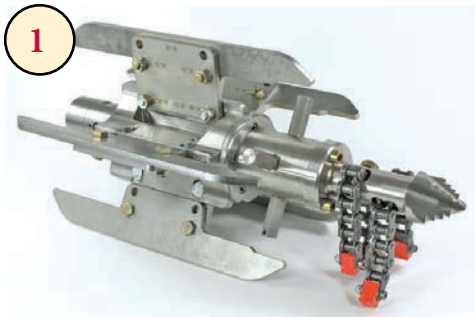
If you are interested in having a class at your facility or in your area, contact Gerry Muenchmeyer at 252-626-9930 or gerry@muenchmeyerassoc.com

NASSCO PRO TRAINING

CHEMICAL AND MECHANICAL ROOT CONTROL

By Craig Mandli

Chemicals can be an effective remedy for root infiltration in sewer lines, but cutters, nozzles, cable machines and jetters are often needed for severe blockages. Manufacturers offer a wide variety of tools for cutting out and cleaning problem roots. Here are some of the latest offerings.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Root Cutters

1. High-speed cutter

The **Supernova** high-speed, high-torque cutter from **KEG Technologies** quickly removes roots in sewer or storm lines from 6 to 48 inches. It has a heavy-duty one-piece stainless steel body and fin assembly; two heavy-duty roller chains; replaceable jet inserts sized for the equipment's gpm, psi and hose length; stainless steel skids and sizing plates; and minimal maintenance with no required lubrication. It is adjustable from 6 to 16 inches, with optional expansion kits to 48 inches, and can achieve operating flow rates from 60 to 180 gpm and working pressures from 1,700 to 3,000 psi. It can clear other obstacles in the line like concrete, grease, tuberculation or protruding laterals while eliminating root problems. **866/595-0515; www.kegtechnologies.net.**

2. Compact pneumatic cutter

The **Pneumatic Micro-Cutter** from **Nu Flow Technologies** can be used to clean and remove pipe debris, calcite and roots from the inside of a variety of pipes, including steel, cast iron and Orangeburg. The system rotates at approximately 2,000 rpm in 1 1/2-inch and larger pipes in lengths up to 100 feet, and will negotiate turns of 90 degrees in pipes down to 2 inches in diameter. It runs at 40 cfm and allows for multiple cutting heads. It is available in an electric/light-duty model, and can also be used for reinstating. **800/834-9597; www.nuflowtech.com.**

3. Hydraulic motor root cutter

The **Model 468 Root Cutter** from **Spartan Tool** uses the flow from a hydrojetter to propel it down sewer lines to attack root intrusions and blockages. Its case-hardened saw blades combine with a high-rpm hydraulic motor to rip, tear and shred roots. It comes with an impact-resistant toolbox with quick-change skids to center the unit in 4-, 6-, 8- and 10-inch sewer lines. These circular tri-blades are sized to stay just under the pipe's interior diameter and to attack roots, ensuring a clear pipe when the job is complete. It operates on 1/2-, 3/4- or 1-inch hose at flows between 10 and 15 gpm and pressures between 800 and 2,000 psi. **800/435-3866; www.spartantool.com.**

4. Chain root cutters

Turbo chain cutters from **USB - Sewer Equipment Corporation** are made of tempered stainless steel and offer continuously adjustable guide skids. The chain retainer is driven by a high-performance turbine to remove roots, grease and mineral deposits from 4- to 48-inch sewer lines. With an optimized 3-D hydromechanics design in conjunction with ceramic nozzle inserts, the cutters use recycled or clean water. They can also be used as barrel cutters with diamond bits for smooth removal of protruding laterals. Heavy mineral deposits can also be removed with carbide bits attached to the specialized chain. **866/408-2814; www.usbsec.com.**

Root Chemicals

5. Root herbicide

Razorooter II root-control herbicide from **Duke's Root Control** leads to extended pipe life, reduced SSO occurrences and maximized asset value. It contains the active ingredient diquat dibromide, a product of Sewer Sciences Inc. It is registered with the U.S. Environmental Protection Agency. The company can customize a root-control program that integrates capacity, management operations and maintenance into each municipality's O&M plan. If a root-related stoppage occurs within two to three years after treatment, they will re-treat the line. **800/447-6687; www.dukes.com.**

6. Latex root control solution

Environmentally-safe **Root Control** from **Lenzyme/Trap-Cleer** can be used in drainlines and in drainfield lines to eliminate root blockages. One application treats up to 100 feet of 4-inch line with a latex

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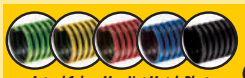

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formula that stays in the line for a long period of time. The solution is slow to foam, allowing for even application. It will not kill trees or bushes. **800/223-3083; www.lenzyme.com.**

7. Foaming root control

Oblitiroot, a foaming sewer line root control product from **Olvidium,** has been formulated to use the maximum amount of the active ingredient dichlobenil currently allowed by the U.S. Environmental Protection Agency. It comes in two pouches which, when combined, create a sticky foam with a latex base that can be applied through the clean-out or in the toilet bowl. The latex makes it stick to pipes and roots, which causes the dichlobenil vapor to remain in the line longer to kill roots. **855/782-4531; www.olvidium.com.**

8. Root intrusion formula

Registered with the U.S. Environmental Protection Agency, **RootX** can be used by sewer departments to enhance their pipe maintenance programs and by drain cleaners as an effective tool and profitable add-on service. The foaming action lifts the root-killing active ingredient to the top of the pipe where 90 percent of intrusion occurs. It also sticks to the top of the pipe and roots to keep blockages caused by root regrowth from occurring for up to 12 months. **800/844-4974; www.rootx.com.**

9. Root-killing formula

The **Vaporooter** scientific formula destroys roots on contact and inhibits regrowth for years to maintain free-flowing lines at a fraction of the cost of cutting roots. It uses a combination of metam sodium and dichlobenil to create a one-two punch on roots. Metam sodium penetrates root cells, destroying roots on contact, while dichlobenil bonds to pipe walls, joints and cracks, preventing new root growth from blocking pipes for years. **800/841-1444; www.vaporooter.com.**

Cutting Nozzles

10. Towable jetter nozzle

The **Cnt-r-KUT "TOW HOOK"** towable jetter nozzle from **Arthur Products** allows for pressurized water to be applied by the integration of a towing nozzle that can be pulled through the line. The technician can also pull a line from point "A" to point "B" if required. It is flexible enough to conform to damaged or deformed lines and can easily be trimmed in the field to fit virtually any line from 2 to 8 inches in diameter by attaching a 3/8- or 1/2-inch NPT hose to one end. It is available in standard and mini sizes. **800/322-0510; www.arthurproducts.com.**

11. Low-maintenance cutting nozzle

Root Rat cutting nozzles from **Chempure Products** are used with jetters from 11 hp to large truck-mounted models. Manufactured of hardened stainless steel, they come with a toolbox with two interchangeable rotors – one with cables and the other with chains. The combination kit includes extra chain, cable and bearings. They need no repair or rebuilding other than bearing replacement, which can be completed in less than two minutes with minimal parts. **800/288-7873; www.chempure.com.**

12. Video nozzle

Deployed on any 3/4- or 1 1/2-inch jetter hose, the **JetScan HD** video nozzle from **Envirosight** allows cleaning crews to determine what tools and setup to use, identify blockages during emergency call-outs, and document the outcome of cleaning operations. It captures valuable HD video footage from underground that can be viewed immediately afterward on a tablet. As it advances down pipe 8 to 24 inches in diameter, it records 720p HD video in MPEG format to an onboard SD memory card. Immediately afterward, the card can be removed and video viewed on an iPad or other SD-compatible device. Twin high-output LED lamps ensure bright, vivid footage. It lasts four hours on rechargeable lithium-ion batteries and stores up to eight hours of video. **866/936-8476; www.envirosight.com.**

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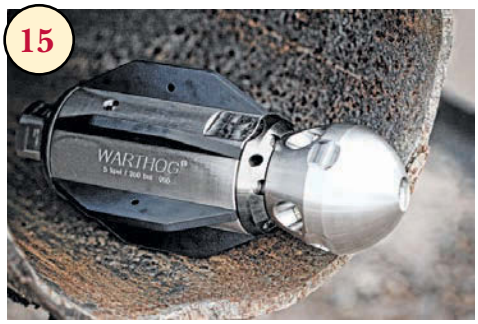

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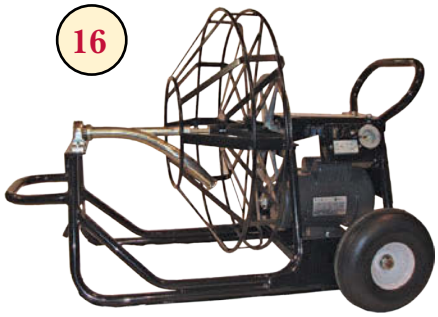

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13. Turbine nozzle

With operating flows as low as 13 gpm at 2,000 psi, the **Golden Jet 10.125TR** turbine nozzle from **Enz USA** maintains high torque for effective pipe cleaning in lines ranging from 5 to 12 inches. Because of its sealed bearings, this nozzle can be operated with both clean and recycled water while being relatively maintenance free. It is a powerful root remover and can be used to remove grease, solids, mineral deposits, concrete and grout. The kit provides a selection of pre-cut chains, skids and two head styles. **877/369-8721; www.enzusainc.com.**

14. Low-torque cutting nozzle

Lumberjack low-torque, variable-speed, multipurpose cutting nozzles from **NozzTeq** are powered by common sewer jetting or combination trucks. The cutting chains rotate at speeds of 10,000 to 50,000 rpm, depending on pressure and flow rate. The cutter is designed to cut roots, clear out concrete, tuberculation, grease, protruding laterals and other obstructions. Low torque means it won't get stuck, harm host pipe or spin off the hose end. They have sealed, grease-lubricated bearings, and are water-cooled so they don't need daily maintenance. The cutter drive shaft and turbine are made of hardened steel, and the supply tube is made of stainless steel. Six models clear pipes from 3 up to 48 inches. The kit includes the turbine, water supply tube, chain plate/pull plate, tow ring, cutting blade, sleds, five sets of chain per sled size, propelling nozzle with jets and adapter, spanner wrench, hand tools and tool box. **866/620-5915; www.nozzteq.com.**

15. Sewer cleaning tool

The **WGR Warthog Magnum** sewer tool from **StoneAge** has a redesigned speed control and long-lasting carbide nozzles to generate high-quality controlled jets for blasting through roots and debris. High-pressure seals effectively handle dirty and recycled water. It has a hardened steel centralizer with individually replaceable fins that can be changed as wear occurs without opening the tool body. The body design is streamlined to improve forward and reverse movements through congested pipes, and the flush style head protects the front shaft seals for longer fluid life. **866/795-1586; www.sewernozzles.com.**

Cable Machines

16. Mainline drain cleaning machine

The **TorqueMasterTM750** mainline drain cleaning machine from **Coast Manufacturing** has a double-welded, powder-coated tubular steel frame and an easy-start 3/4 hp dual-capacitor motor. The main shaft drive is fabricated from stress-proof steel, with sealed ball bearings on the shaft and drive arm bearings that never need lubrication. It has a straightforward pulley drive system, 10-inch-diameter solid polyurethane tires, extra-wide rear handle for stability in the upright position, and quick and easy one-man reel changeover. **800/541-7015; www.coastmanufacturing.com.**

17. Sectional drain cables

Sectional drain cables from **Draincables Direct** are available for almost every brand of machine on the market. Sizes include 5/8-, 7/8- and the larger 1 1/4-inch-diameter cables, along with several choices of inner cables and various lengths with the right fittings to match specific machines. **800/421-4580; www.draincables.com.**

18. Compact drain cleaning machine

The **DM138** drain machine from **Duracable Manufacturing** cleans lines from 1 1/4 to 3 inches. It has a continuously welded frame, heavy-duty front bearing mount and self-aligning head bearing to ensure proper reel placement, quick reel change and longer lifespan. Designed for residential sink, shower and bathtub drains, it has a heavy-duty, 20-amp switch and revolving arm. Powered by a 1/4 hp motor that operates at 230 rpm, the machine weighs 22.5 pounds with a 7.75-pound, 14-inch

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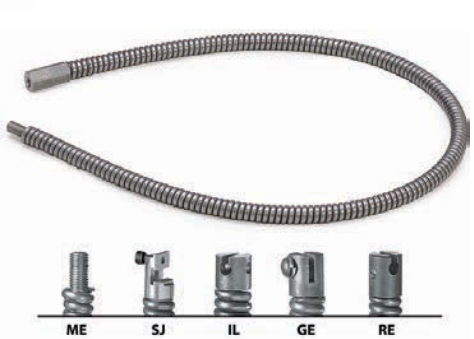

reel. The reel is made of a polyethylene material that will not rust or dent, and it is easily drained with plugs located on the back of the reel. It can be operated upright or horizontal, and has non-marring rubber pads to protect the floor. **877/244-0556; www.duracable.com.**

19. Sectional drain and sewer cleaning machine

The **Model C** cable sectional drain cleaner from **Electric Eel** runs up to 200 feet of 1 1/4-inch self-feeding dual cable in 8- or 10-foot sections that require no handling when rotating. One operator can effectively clean 3- to 10-inch-diameter lines at distances up to 200 feet. A heavy-duty 1/2 hp motor comes standard, with 3/4 and 1 hp motors available. A custom-designed gearbox ensures parts availability. A heavy-duty, safety clutch keeps cable and tool breakage to a minimum and provides overload protection. A fold-down handle allows for easy transportation, storage and use in crawl spaces. It also has a carry handle for balance and easy transport. **800/833-1212; www.electriceel.com.**

20. Heavy-duty drain cleaning machine

The **Model GO 68HD** heavy-duty electric drain cleaning machine from **Gorlitz Sewer & Drain** is available in two different versions, either with an open steel reel or enclosed polyethylene drum, and can be outfitted with an optional power feeder. The standard configuration is 150 feet of 11/16-inch hollow-core cable, which should reach most blockages with a single reel. The unit weighs 185 pounds, and a loading ramp and electric winch can be added to any vehicle to make transportation quick and simple. It is designed to clean pipes from 3 to 8 inches in diameter. **562/944-3060; www.gorlitz.com.**

21. Blockage-cleaning cable machine

The **400** cable machine from **Ken-Way Corporation** is designed for cleaning 3- to 10-inch lines of blockages ranging from roots to grease. It is equipped with an air switch-activated 1/2 hp motor and a three-speed pulley that allows speed adjustment depending upon length of cable and the obstruction being encountered. Two 8-inch wheels, along with a set of stair climbers, aid in handling and maneuverability. It is available with an optional power feed, or as a manual feed unit. Cables of 5/8-, 11/16- and 3/4-inch-diameter are available in either hollow core or inner core in various lengths. A set of six heavy-duty root cutting blades, along with a retriever tool and flexible cable leader come standard. **800/533-0551; www.ken-way.com.**

22. Flexible leader cable

The **LE151 Super Flex** leader cable from **MyTana Mfg. Company** is a flexible cable used for leading main cables down a sewer or drainline with twists, turns, elbows, offsets, sweeps and other irregularities. Many contractors keep several leaders available for use in special situations. For instance, leaders with a slight bend 8 to 10 inches from the end can help force a single blade to the outside of the pipe. The leader is suitable for 3/4-inch cable, and is available with a choice of fittings to attach to existing cables and blades. Other sizes of leader cables are also available. **800/328-8170; www.mytana.com.**

23. Lateral cutter and drain cleaner

The **Maxi Miller** lateral cutter and two-step drain cleaning system from **Picote Solutions** features a range of 75 feet, which can be expanded another 32 feet with a connector. Its Servo motor allows an efficient removal of hard materials from 3- to 10-inch drains and sewers with stainless steel grinding chains. It also powers Picote's Smart Cutter and Twister lateral cutters, enabling a quick reinstatement of connections. The motor features an adjusted torque limiter and shaft protection. Its aluminum frame has powder-coating frame protection, a two-way moving system, and stair glides to ease up or down stairs. **219/440-1404; www.picotesolutions.com.**

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24. Drain cleaning machine

The **R600** drain cleaning machine from **ROTHENBERGER USA** is designed for pipes 3/4 to 6 inches in diameter in residential, commercial and industrial applications. It has a center-lock cable clutch system for safe and powerful transmission to the cable. The reinforced guide hose sheathing comes with a precision quick coupling for safe, kink-free cable feed that also helps prevent dirt from getting inside the machine. The lockable drive lever allows for a secure lengthening or shortening of cable, and serves as a handle. It comes with a die-cast aluminum frame, fiberglass-reinforced side panels and an optional tripod. **800/545-7698; www.rothenberger-usa.com.**

25. Flexible drain cleaner

The **Flexi-Cleaner** from **Southland Tool Mfg.** comes equipped with a Briggs & Stratton or Honda engine and features a steel frame and four wheels for easy tracking (pnuematic tires are available). It comes with instant reverse transmission and an automatic chuck to grip the cable. Its close-coiled, left-hand-wound rods are 1-inch-diameter and 25 feet long. They are easily coupled together for cleaning runs up to 600 feet. Once the rod and tool are started in the drain, the unit is wheeled forward or pulled back, which pushes or pulls the rod in or out of the line. **714/632-8198; www.southlandtool.com.**

Jetters/Jetter Components

26. Jetter/pressure washer combo unit

The **Performance** line of trailer-mounted jetter/pressure washer combo units from **Amazing Machinery** is designed for easy trailering, and the large water supply tank allows technicians to jet anywhere. A rear-mounted 12-volt electric jetter hose reel and SS rear stack mounted manual pressure washer and garden hose reels provide ample hose space. They come standard with 300 feet of jetter hose, two nozzles and a complete set of washdown accessories. The triplex ceramic plunger pump provides pressures up to 4,000 psi and flow rates up to 15 gpm. **800/504-7435; www.amazingmachinery.com.**

27. Trailer jetter

The **E Series** trailer jetter from **American Jetter** offers protection from the elements in a compact enclosed package, with water flows from 7 to 40 gpm up to 5,000 psi. Up to 80 hp of power is provided by a Kohler diesel or gas engine using the dual engine option. It offers a standard 200- to 330-gallon water supply tank depending on model. Optional auxiliary feed allows for a towing vehicle to carry a larger supply tank, enabling higher flows and longer run times. Low water shut-off prevents pump damage. Standard hose reel speed control allows for precise cleaning in both directions. The wireless remote option provides water ON/OFF, engine shutdown and hose reel control. **866/944-3569; www.americanjetter.com.**

28. Suitcase jetter

The **Crap Shooter** sewer jetter from **BullFrog Industries** weighs less than 25 pounds and offers 1,500 psi running off a 15-amp circuit without losing any water pressure. A 50-foot high-pressure hose with quick connect attaches to the unit, and two heavy-duty nozzles are designed to enhance performance. Designed to handle up to 3-inch pipes, two different faucet adapters make the unit versatile. All fixtures and hoses can handle up to 120-degree water temperatures. A heavy-duty case with carry handle encases the entire unit. **303/338-0805; www.bullfrogind.com.**

29. Skid-mounted jetter

The **RCJ Series** skid-mounted jetter from **Cam Spray** is offered in flows and pressures of 8 gpm at 3,500 psi and 7 gpm at 4,000 psi. It features a three-plunger industrial pump with pulse feature powered by a 688 cc Honda engine. It comes with 200 feet of jetter hose that can also be used to supply

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THE NEW HIGHER STANDARD IN JET VAC MACHINES

Vacall's new High Dump option allows the debris tank to raise 76" above ground level and shift 21" beyond the bumper – an industry best accomplished with remote control. You get productive, no-spill debris dumping into on-site roll-offs or municipal dewatering containers. AllJetVac combination sewer cleaners and AllExcavate models also feature high performance jetting and vacuum with just one engine – a "Green That Works" advantage that slashes fuel consumption, emissions and service requirements. For details and a demo, visit our web site to find your nearest authorized dealer.

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an optional portable reel cart available with 200 or 300 feet of jet hose. It is equipped with a 35-gallon buffer water tank with float control, powder-coated heavy tube frame, washdown gun and four-nozzle set. It easily mounts in the side door of a cargo van, on a truck bed or inside a service truck. **800/648-5011; www.camspray.com.**

30. Water jet drain cleaning machine

The **JM-3080 Jet-Set** water jet drain cleaning machine from **General Pipe Cleaners** can clear grease stoppages, sand, sludge and ice clogs. It generates 3,000 psi at 8 gpm, and Vibra-pulse on demand helps the hose slide easily down long runs and around tight bends. A 20 hp Honda engine with electric start and 2-to-1 gear-reducer drives the pump, while a 12-gallon buffer tank protects the jet if the water supply can't match the pump demand. **800/245-6200; www.drainbrain.com.**

31. Sewer jetter pump

The **HDP-196** sewer jetter pump series from **Hammelmann Corp.** is suited for dirty water applications, offering flows up to 160 gpm and pressures of 3,200 psi. It has a compact design with optimum space utilization and an integral reduction gear. Options include horizontal or vertical models, a reversible pump head, a central or side-suction connection, discharge connections on both sides, left- or right-hand drive shaft, and operation at any angle. It has high-grade solid ceramic plungers, wear-resistant valve seats, low-flow velocity over suction and discharge valves, packing seal sets within rust-resistant stainless steel sleeves, a slow plunger speed, an industrial drive end designed for continuous duty, a pressurized oil lubrication system, and clockwise or counterclockwise rotation. Maintenance is possible without removal of suction and pressure lines. **800/783-4935; www.hammelmann.com.**

32. Truck-mounted hydrojetter

The **O'Brien 7000-T** hydrojetter from **Hi-Vac Corporation** includes all of the features of the O'Brien 7000 series trailer jetter but is designed for true truck-mounted applications. It has flow ranges of 18 to 65 gpm and pressure capabilities of 2,000 to 4,000 psi. **800/638-1901; www.obrienmfg.com.**

33. Convertible water jet unit

The **125 Series** convertible water jet unit from **NLB Corp.** converts in about 20 minutes to any of eight operating pressures, from 6,000 to 40,000 psi. A wide range of flows (4.4 to 32.5 gpm) provides additional operating flexibility. It features a continuous-duty six-cylinder diesel engine (electric models are also available), and is trailer-mounted for transport to job sites, with four-wheel electric brakes, heavy-duty axles and full DOT lighting package. All operating controls, including pressure gauge, rupture disc and bypass valve, are mounted on a separate accessory manifold. **248/624-5555; www.nlbcorp.com.**

34. Jetter with run-dry pump

The **Mongoose Model 254** jetter from **Sewer Equipment Co. of America** has a "run dry" pump that operates at 25 gpm at 4,000 psi, a tubular steel frame, corrosion-resistant pre-painted sub assemblies, updated and user-friendly controls, a strong hose reel and a high-quality diesel engine. **800/323-1604; www.mongoosejetters.com.**

35. Compact jetter

The **SJPE-1500** portable, compact jetter from **Shark Pressure Washers & Jetters** has a detachable hose reel and a retractable handle that accomodates easy loading and unloading into vehicles, and allows for transport around work sites. Its Pulse Technology propels hose through the line and around tight curves to break through clogs. Rated at 1.7 gpm at 1,500 psi, it operates on 115-volt electricity and comes standard with a 35-foot power cord with GFCI. Designed for use in pipes less than 4 inches, it has a roll cage steel chassis, triplex pump and heavy-duty Baldor motor, and fits into tight work spaces with easy one-person operation. It is ETL safety certified. **800/771-1881; www.sharkpw.com.**

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MUNICIPAL SEWER & WATER™

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36. Truck-mounted high-pressure jetter

The **Camel Jet 1600** truck-mounted, high-pressure waterjetting system from **Super Products** utilizes three modular tanks to carry up to 1,600 gallons of water. The tanks are rotationally molded polyethylene with ultraviolet stabilizers. Its Lexan Containment System means users have additional safety protection from hose rupture or high-pressure water. It has a heavy-duty, Triplex continuous-flow water pump to provide up to 80 gpm and pressure up to 2,000 psi. Its single-engine design translates to lower fuel costs. Water pump and drive system options are available, as well as a front- or rear-mounted 180-degree rotating hose reel with a 1,000-foot capacity. **800/837-9711; www.cameleasy.com.**

37. High-pressure water jet machine

Hot Shot high-pressure water jet machines from **Vac-Con** are used for obstructions from sanitary sewer and/or storm drainlines. They have a non-corroding, polyethylene water tank, and can be operated by a single person, with all controls for high-pressure water and the hose reel located at the front of the machine for ease of operation and increased safety. They are available with a 1,000- and 1,600-gallon water tank capacity. Options include variable flow, an articulating hose reel, polyethylene water tank, 30 gpm 3,000 psi water pump system, auxiliary engine or hydrostatic drive, cold-weather recirculation system, side-mounted tool boxes, air purge system, hose footage counter, arrowboard, strobe lights, inspector cam, high-pressure spray bar, hose rewind guide, 600 psi hand gun system with 25 feet of hose and a selection of nozzles. **888/491-5762; www.vac-con.com.**

38. Truck-mounted jetter

The truck-mounted **Vactor Ramjet** from **Vactor Manufacturing** comes equipped with a Jet Rodder water pump. Armed with up to 2,500 gallons of water in a stainless steel tank, it delivers flows of 60 to 100 gpm at 2,000 or 2,500 psi. The water pump is a single-piston, hydraulically-driven, dual-acting pump that delivers a jackhammer-action water flow, breaking through line blockages and scouring caked-on debris from pipe walls. A single operator can quickly drive to each job site to solve line problems and tackle regular line maintenance. It can be configured with either a front- or rear-mounted hose reel. The auto-wind hose guide allows hands-free operation from the control panel for a clean, tight wrap. **800/627-3171; www.vactor.com.**

39. Cart jetter

The **15J41** jetter from **Water Cannon** has a Honda GX 390 engine, flow rates up to 4 gpm, pressure up to 4,200 psi and a 200-foot 3/8-inch jetter hose. It has a stable tilt-back style portable frame with a roll cage, and a pulsation valve for instant pulsation on demand in order to allow the operator to quickly loosen blockages and flush them away. It comes with a ball valve, manually adjustable high-capacity Hosetract hose reel, and four jetter nozzles. **800/333-9274; www.watercannon.com.** ✦

Cutter, camera assist in cleaning root-clogged lateral

Problem:

Ventura County, Calif., contractor From Sinks To Sewers was inspecting a lateral and found a massive volume of roots through its entire 60-foot length. The homeowner mentioned the lateral had always backed up so, for the past 10 years, he'd been snaking it with a 1/2-inch drum machine every four to six months.

Solution:

Using the **RIDGID Root Ranger** at 4.5 gpm and 3,000 psi, the plumber was able to remove all the roots in the clay lateral. Using a **Mini Color SeeSnake** during the jetting process allowed for exact root removal of specific troubled areas and verified the results to the customer.

RESULT:

Dig and replace was often the only option for a root-infested sewer, but the Root Ranger allowed for a controllable measure against root stoppages. A neglected sewer lateral that hadn't been properly cleaned in the past 10 years was given a new start. **800/769-7743; www.ridgid.com.**

Cutter effective on roots in sewer system

Problem:

In the city of Baton Rouge, La., roots are a major problem throughout the sewer system, which historically is the cause of many backups and overflows.

Solution:

The city contracted with Video Industrial Services to clean the collection lines to mitigate its ongoing root intrusion problems using a variety of cleaning methods. One of the tools it utilized was the **906** jet root cutter motor and circular saw blades from **Shamrock Pipe Tools,** which enabled it to clean 6- to 18-inch lines. The unit also supports a variety of other root removal tools such as concave, circular or cable-style cutters so the operator can adjust the tool to fit the cleaning requirements easily.

RESULT:

Since Video Industrial Services began its cleaning and root removal work on the collection system lines, there has been a noticeable reduction in blockages and overflows. **800/633-7696; www.shamrocktools.com.** ✦

Val-Matic completes research facility

Val-Matic completed construction of its 7,000-square-foot research and development facility in Addison, Ill. The plant includes a materials lab for testing elastomers and metals and a flow lab for performing check valve and water flow tests. The facility also includes room for hands-on training.

Hino Trucks names vice president

Hino Trucks named George Daniels senior vice president of sales and customer service. He had served as Hino Trucks' vice president of service operations.

George Daniels

Reed Manufacturing redesigns website

Reed Manufacturing Co.'s redesigned website, www.reedmfgco.com, includes tool training videos, new products, promotions and a distributor locator.

Optronics releases vehicle lighting catalog

Optronics International released its 2014 lighting product catalog. Available for download from the company's website, www.optronicsinc.com, the catalog includes 523 new products.

United Rentals completes National Pump acquisition

United Rentals completed the acquisition of National Pump, including 37 branch facilities in the United States and Canada. The $780 million purchase price included $765 million in cash and approximately $15 million in stock.

AEM, Ditch Witch produce vacuum excavator safety video

Ditch Witch, a member of AEM's (Association of Equipment Manufacturers) Underground Equipment Manufacturers Council (UEMC), collaborated on the production of a vacuum excavator safety video. Available through the AEM Store, the video promotes best practices in the operation of vacuum excavation equipment, as well as how to protect underground utilities from damage.

ESCO sells Aclara Technologies

ESCO Technologies sold Aclara Technologies to an affiliate of Sun Capital Partners for approximately $130 million. Net cash proceeds are estimated to be $130 million after taxes and expenses.

Sauereisen names technical service specialist

Brian Wagner

Sauereisen, manufacturer of corrosion-resistant materials, named Brian Wagner technical service specialist.

NexTraq named TAG Top 40 Innovative Technology Company

NexTraq, a leading GPS fleet and asset tracking company, was named by the Technology Association of Georgia (TAG) as one of its Top 40 Innovative Technology Companies. The award recognizes Georgia-based technology companies for their innovation, financial impact and efforts at spreading awareness of the state's technology initiatives.

SubSurface joins Sprayroq network

SubSurface of Moorhead, Minn., joined the Sprayroq Certified Partner Network and will provide spray-applied polyurethane for infrastructure rehabilitation in Minnesota and the Dakotas.

HOBAS recertified to ISO 9001, 14001

HOBAS Pipe USA was recertified in accordance with ISO 9001 and 14001. The certificates verify the establishment and application of quality (9001) and environmental (14001) management systems for development, production, sales and customer service of centrifugally cast fiberglass-reinforced polymer mortar (CCFRPM) pipes. ✦

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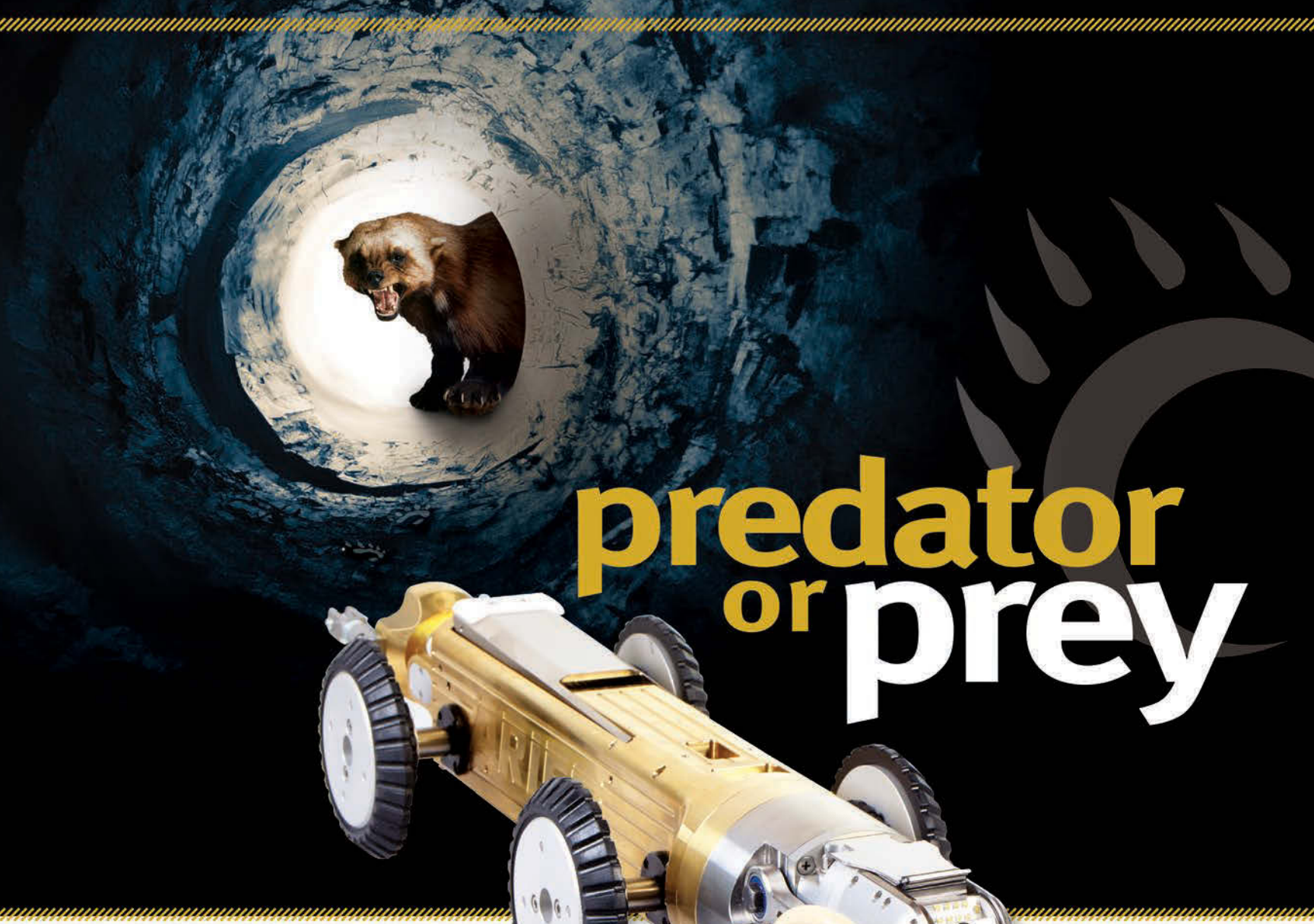
MUNICIPAL SEWER & WATER



Product Spotlight

Combination truck offers cost-saving auxiliary gasoline engine

By Ed Wodalski

The gasoline auxiliary engine option from Vac-Con is designed to be a less expensive, lighter weight and quieter alternative to a Tier 4 diesel engine in a two-engine combination machine. The 6.8 liter Ford V10 water pump engine provides 222 hp at 3,200 rpm and 360 ft-lbs. It delivers from 30 gpm to 120 gpm and up to 3,000 psi, yet weighs less than a comparable diesel engine.

Mike Selby, national service manager for Vac-Con, says the Ford engine was chosen for its emissions compliance with the California Air Resources Board, also known as ARB. "It's really the only supplier at this point with the horsepower range that we required in an emissions-compliant engine for off-road application," he says.

The greatest advantage of the engine over a Tier 4 diesel is cost, according to Selby. "Ever since discussion of the more stringent emissions tiers came through, we partnered with our suppliers and said, 'What options do we have here?" he says. "We know that after-treatment is going to become extremely expensive as each tier is introduced, and we were starting to get a huge price differential between Tier 2 to Tier 3 to Tier 4."

With gasoline engines already being used in the stationary pump and agricultural markets, Vac-Con decided to test it in a combination truck. "We actually had more horsepower with the gasoline engine," he says, at a lower cost than that of a comparable diesel engine.

Other advantages of the gasoline option were lower fuel prices and less weight. "Just from the cast-iron block [in the diesel engine] to the aluminum block, it's probably 200 pounds," Selby says. "And that's a conservative number."

The engine also can be modified to run on less-expensive (approximately 40 percent less than gasoline) and cleaner-burning compressed natural gas (CNG). The modification process to accommodate the auxiliary CNG fuel cell adds approximately 36 inches to the length of the combination vehicle and negates the engine's weight advantage over the diesel version.

Vac-Con's two-engine combination unit with gasoline option is available on 5-, 9-, 11-, 12- and 16-yard models. "About 80 percent of the time, the customer is going to hydrojet, jet or use the hose reel and spool to clean sewer lines, especially in a maintenance practice," Selby says. "You're not going to vacuum every single manhole."

The two-engine system allows the chassis engine to be turned off during jetting operations for added savings. Mounted behind the cab, away from the operator, the auxiliary engine also produces less noise and creates less heat than a system powered entirely by the chassis engine, he says. "Especially if you're in warmer climates." **888/491-5762; www.vac-con.com.**

Smith & Loveless non-clog pump

The S&L Non-Clog Pump from Smith & Loveless has an oversized, stainless steel pump shaft that minimizes overhang for less shaft deflection. Shaft runout is limited to 0.003 inches. The full-diameter back shroud prevents stringy material from winding around the shaft. **800/898-9122; www.smithandloveless.com.**

Grundfos Sewer Chewer grinder

The Sewer Chewer grinder from Grundfos Pumps is designed for wastewater and sludge-handling systems and features a durable ductile iron frame and high-pressure pipe flanged seal. Submersible up to 90 psi, the grinder has a NEMA 4X FRP controller and PLC keypad operator interface. **800/921-7867; http://us.grundfos.com.**

Spire ultrasonic water meter

The Prime Series 280W – Cl ultrasonic water meter from Spire Metering Technology is designed for durability, wide dynamic range (2 to 10 inches) and leakage detection. Features include multi-path technology, no moving parts and bidirectional flow, and is AMR/AMI ready with pulse, M-Bus, Modbus, BACnet or wireless interface. **888/738-0188; www.spiremt.com.**

Blue-White diaphragm metering pump

The Chempro-M diaphragm metering pump from Blue-White Industries is designed for the injection of aggressive and/or viscous chemicals. The non-loss motion pump is powered by a variable-speed DC motor. Features include a Dia-Flex single layer PVDF diaphragm for chemical compatibility and an all PVDF pump head. The LCD with UV protective cover indicates output

in several optional measurements, including mL/mm or gpm. Intelligent electronics permit connection to SCADA systems and other remote controllers. **714/893-8529; www.blue-white.com.**

Franklin Electric submersible pumps

SR Series submersible pumps from Franklin Electric are designed for municipal and industrial applications. Features include fully welded impellers and diffusers. Available in two models, the 6-inch pump delivers flow up to 400 gpm, while the 8-inch pump delivers up to 650 gpm. **866/271-2859; www.franklinwater.com.**

Isuzu 2014, 2015 N-Series diesel models

Isuzu Commercial Truck of America has introduced its lineup of 2014 and 2015 model year N-Series diesels. The 2014 NPR ECO-Max features increased frontal area, enabling non-air-deflector models to handle bodies with inside heights up to 85 inches. The 2015 NPR-HD, NQR and NRR models feature the 4J 3.0 liter, four-cylinder turbo-diesel engine with Denso air conditioning compressor, along with 19.5-inch Bridgestone M895 low rolling resistant tires for improved fuel efficiency. **866/441-9638; www.isuzucv.com.**

Val-Matic QuadroSphere ball valve

The QuadroSphere ball valve from Val-Matic Valve & Manufacturing Corp. features a contoured ball with four recessed surfaces that allow solids to be flushed from the body/ball cavity, preventing them from being trapped around the back of the seat rings and bearings. Recessed surfaces on the ball provide lipped edges for scraping the seats clean to avoid buildup of solids and scale. **630/941-7600; www.valmatic.com.**

Nu Flow portable dust collector

The commercial cyclone and dust collector from Nu Flow Technologies is designed for use during cleaning prior to epoxy barrier coating. The cart-mounted, 1,000 cfm unit has a reinforced steel frame. The filtration purge system allows for filter cleaning between applications. It has two 2-inch connections and one 3-inch inlet connection. The two-piece system locks together and offers easy access to collection drawers and filters. **800/834-9597; www.nuflowtech.com.**

Guardair pneumatic Gun Vac

The pneumatic Flexible Gun Vac from Guardair Corp. has an 18-inch by 1 5/16-inch O.D. tapered flexible metal extension. The tapered vacuum inlet accepts standard 1 1/4-inch vacuum accessories. Designed for industrial cleaning, features include comfort grip, filtration collection bag and dual 1/4-inch FNPT air inlets (bottom and rear). **800/482-7324; www.guardaircorp.com.**

StoneAge rotary shotgun tool

The Barracuda BC-H9-XXLF-TI rotary shotgun tool from StoneAge has a maximum pressure of 40,000 psi and flow range from 1.68 to 3.12 gpm. Designed for hand-held shotgun waterblast cleaning, the 3.2-pound tool is 8.88 inches long, has a 2.45-inch head diameter and a 9/16 HP inlet connection. **866/795-1586; www.stoneagetools.com.**

Condux underground hydraulic puller

The ARS709 hydraulic puller from Condux Tesmec is designed for a range of underground pulling applications, including power transmission and distribution cable installation. Features include 20 tons of pulling force, negative self-acting hydraulic brake, integrated hydraulic dynamometer, hydraulic cooling system and advanced user controls. The pull, speed monitor and recorder provide real-time data on pulling operations. **800/533-2077; www.condux.com.**

MagneGas liquid biomass fuel trailer

The mobile liquid biomass fuel unit from MagneGas Corp. converts liquid waste, including sewage, sludge, agricultural manure and bio-diesel into sterilized water, usable for irrigation, fertilization and hydrogen-based fuel. The process uses MagneGas' Plasma Arc Flow that gasifies the waste. **727/934-3448; www.magnegas.com.** ✦

classifieds

see photos in color at www.mswmag.com

DRAIN/SEWER CLEANING EQUIPMENT

Used and rebuilt cable machines in stock: RIDGID K-7500, K-40, K-60, K-1500, Spartan #1064, #300, #100, Electric Eel model #C machines. The Cable Center: 800-257-7209. (CBM)

EDUCATION

RoyCEU.com: We provide continuing education courses for water, wastewater and water distribution system operators. Log onto www.royceu.com and see our approved states and courses. Call 386-574-4307 for details. (o07)

JET VACS

1998 Vac-Con 3-Stage: Municipality-owned tandem truck. Ready to work with 82k miles. 12 yd., 1,300 gallons of water. Hydraulic pump on rear door. $40,000. 813-267-2968 (C07)

2005 10 yd. PD Vactor mounted on 2004 IH 7500 chassis. DT466 engine and Allison transmission. 1,500-gallon water capacity. 18" blower rated at 4,500cfm. 800' capacity hose reel with new hose and 80gpm @ 2,500psi water pump rating. Approximately 112,000 miles and 10,500 hours. Southern municipal truck. Ready to work. $125,000. Call Todd @ 800-321-6929. (C07)

2008 Camel combo sewer cleaner, 10-yard debris tank, 80gpm, 2,000psi. PD blower, water recycling system. Low miles, low hours. $165,000. Call 813-489-3108 (C07)

1983-2010 Vactor jet-vacs available. Check out our inventory at www.ahequipment.com, email: sales@ahequipment.com or call 800-753-7566 for more. (C11)

POSITIONS AVAILABLE

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

POSITIONS AVAILABLE

Product Demonstrator: Chambersburg, PA CCTV pipe inspection manufacturer currently has an immediate opening for a CCTV pipe inspection equipment product demonstrator & sales representative. Candidate must be an outgoing, energetic and reliable individual who will conduct CCTV pipe inspection equipment demos and represent the company at various industry events. Good communication skills a must. As a demonstrator, you will conduct customer CCTV pipe inspection equipment demonstrations which will include customer follow up and customer training. The candidate will be the East Coast Product Demonstrator with occasional international travel. Prior CCTV pipe inspection, municipal sewer and or municipal sales or industry experience required. Candidate must be prepared to travel up to 50% of their time and be available to fly, or drive to product demo locations and sales events. Minimum requirements for this position are as follows: Valid insurable drivers license and passport required for successful applicant. High school diploma or GED required. Candidate must be able to lift up to 70lbs. Background check required. Submit resume with references to reusa@rauschusa.com (M07)

SHOP MECHANIC: Florida Bearings, a subsidiary of **Kaman Industrial Technologies,** is a 'total solutions' provider of bearings, power transmission, and pump related products with more than 50 years of experience. Florida Bearings has a full-service overhaul shop, the ability to provide turn-key solutions at your company, and offers a complete Predictive Maintenance Program to prevent catastrophic machine failure, reducing downtime and maintenance costs while increasing productivity. **Essential Duties & Responsibilities:** • Must be able to disassemble and reassemble various types of rotating equipment. (Pumps, Centrifugal, Submersible, Vertical, Turbine, Gear Reducers, Electric Motors and blowers.) • Knowledge of tolerances for bearing fit and clearances, motor connections and testing. • Knowledge of operating lifting equipment such as forklifts, hoists and cranes. • Comply with all safety policies, practices, and procedures; report all unsafe activity. • Participate in team efforts to achieve departmental and company goals. Number of Positions: 4 (Hialeah & Orlando) FL **Job Requirements:** • HS diploma or equivalent; • Technical / Vocational training ideal • 2-4 Years' Experience. **APPLY TODAY** www.kamandirect.com - About Us/Careers (keyword) Mechanic, or Fax resume to 305-573-2410. EEO, M/F/D/V, DFWP (M07)

POSITIONS AVAILABLE

MUNICIPAL SALES ENGINEER: Florida Bearings, a subsidiary of **Kaman Industrial Technologies,** is a 'total solutions' provider of bearings, power transmission, and pump related products with more than 50 years of experience. The Municipal Sales Engineer will combine technical knowledge with sales skills to work closely with consulting engineers/owners and municipalities in an assigned sales territory for the planning and designing of projects for equipment in water and wastewater treatment plants. **Job Responsibilities:** • Work with consulting engineers and municipalities in the design/planning stage to position and write favorable product specifications for Florida Bearings/Kaman and our manufacturers. • Enhance and grow municipal business and market share by promoting product features and benefits, presenting value-added services, and handling on-site problems on a timely basis (applications, design improvements, and product recommendations). • Promote all of our products and services to customers in territory and update customers on new products. • Plan and conduct "lunch and learn" seminars for consulting engineers and municipalities. • Develop and maintain effective working relationships with utility contractors, land planners, municipalities, customers, engineers and suppliers. • Maintain productive relationship with customer service associates and project manager through positive team work. Lead by example. Work with support staff to select equipment for our final quotation/bid package. • Attend municipal project pre-bid meetings. • Keep current with information of competitive products, customers' equipment and process. • Assist with equipment startups. • Attend product and selling skills seminars and participate in local industry associations and trade shows. Positions available: (2) Fort Lauderdale & Orlando FL. **Job Qualifications:** Strong background with pumps, blowers, motors, VFD's and controls. Must be comfortable and have experience working with consulting engineers/owners in the design/planning stage to position and write favorable product specifications for Florida Bearings and our manufacturers. Must have a valid driver's license. Must be capable of lifting up to 25 lbs. **Education:** Minimally must have a HS diploma or equivalent. A BS degree in Electrical, Mechanical or Civil Engineering is preferred, but not required. **Experience:** A minimum of 5 years of experience in pumps, blowers, motors, VFD's and controls application in the municipal market. **APPLY TODAY** www.kamandirect.com - About Us/Careers (keyword) Municipal or Fax resume to 305-573-2410. EEO, M/F/D/V, DFWP (M07)

POSITIONS AVAILABLE

East Coast Sales and Product Consultant: CCTV pipe inspection equipment manufacturer accepting applications for experienced underground infrastructure rehabilitation sales and product consultant. The position entails direct technical selling of sewer, water and well rehabilitation products to municipal water and waste water utilities, industrial clients, consulting engineers and contractors. Maximum 30% out of office travel is required. Skills/Experience required is 5 years technical sales experience in related field or 2 years experience and college degree. Public speaking in the form of product presentations and field demonstrations. Candidate will represent product at trade shows and conferences. Must be able to lift 70 lbs. Valid, insurable drivers license and passport required for occasional international travel. Base salary plus commission. Criminal background check required. Drug free, equal opportunity employer. Submit resume and references to reusa@rauschusa.com (C07)

SERVICE/REPAIR

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

TV INSPECTION

CUES K2 SYSTEM: Steerable Compact Pipe Ranger (CPR), OZ3 camera, 1000' gold cable, auto cable reel, CPU, CCU, wireless controllers, six different wheel sets, two different wheel spacer sets, tool and manual. Like new (app. 40 hours) at 20% off list. Call 866-936-8476 or email office@envirosight.com. (MBM)

NEED TRACTION? We make aftermarket more aggressive pads and chain assemblies for all chain-driven camera tractors. Custom, dependable, double-hole fabrication secured to high quality carbon steel chain, or just pads and rivets. Samples upon request. **Pipe Tool Specialties LLC:** 888-390-6794; Fax 888-390-6670; www.yourtractionpads.com or email pts4422@yahoo.com (MBM)

AVALON SERVICES - We buy, sell & service most brands of pipe inspection equipment. Used Pearpoint EXPLOSION PROOF - tractor & pushrod systems in stock. We are certified for EX repair. Contact lou@avalonus.com or call Lou Brents at 713-849-3900 (C07)

PEOPLE/AWARDS

Charles Ferrell, the stormwater maintenance operations supervisor for York County, Va., was honored by the county for reaching a 30-year milestone at his job.

Scott Nobles, Stormwater Division supervisor for the City of Valdosta (Fla.), was named the April 2014 Employee of the Month by the City Council.

The City of Easton (Pa.) received the Green Park Award from the Pennsylvania Department of Conservation and Natural Resources for its work at Sullivan Park. The award recognizes excellence in the public park community in utilizing green and sustainable park practices.

The U.S. Environmental Protection Agency (EPA) announced two Great Lakes Restoration Initiative grants totaling $1.25 million to fund green infrastructure projects in Southeast Michigan to improve water quality in the Great Lakes. **Detroit** and **St. Clair Shores** will use the EPA Great Lakes Restoration Initiative Shoreline Cities grants for green infrastructure projects to prevent stormwater from carrying contamination into the Great Lakes.

Montgomery County's (Md.) Stoney Creek Stormwater Management Pond, a 1.3-acre pond that captures runoff from 204 acres of the Bethesda Central Business District and NIH campus, received the 2014 Engineering Excellence Award from the American Council of Engineering Companies.

The Cambridge, Mass.-based team of **Kleinfelder, MWH Americas and the Bioengineering Group** earned a national recognition award for engineering achievement in the American Council of Engineering Companies' 48th annual Engineering Excellence Awards for the Alewife Stormwater Wetland in Cambridge. The 3.4-acre project is New England's largest stormwater wetland, designed to prevent overflows from combined storm and sanitary sewer systems during heavy rains.

The City of Hudson received a $636,260 Stormwater, Asset Management and Wastewater Program Grant from the Michigan Department of Environmental Quality to video record and map the city's sanitary and stormwater sewer network.

The City of Okoboji received an award at the Iowa Water Conference for its continued leadership and implementation efforts in the installation of green infrastructure practices in the Okoboji watershed.

LEARNING OPPORTUNITIES

American Water Works Association

The AWWA is offering an online summer workshop July 23-25. Visit www.awwa.org.

American Society of Civil Engineers

The ASCE is offering the following courses:

- July 24-25 – Pumping Systems Design for Civil Engineers, Greenwood Village, Colo.
- July 25 – Preparing and Implementing Construction Site Stormwater Pollution Prevention Plans, online
- Aug. 20 – Stream Restoration Bioengineered Retaining Walls for Riverbank Stabilization, online

Visit www.asce.org.

Wisconsin

The University of Wisconsin Department of Engineering-Professional Development is offering the following course in Madison:

- Oct. 20-21 – Using WinSLAMM v. 10.0.1: Meeting Urban Stormwater Management Goals

Visit http://epdweb.engr.wisc.edu.

The Wisconsin Department of Natural Resources is offering the following courses:

- Sept. 17 – Permit-Required Confined-Space Entry, Plover
- Dec. 9 – General Safety, Plover

Visit http://dnr.wi.gov. ✦

CALENDAR

July 13-16
American Society of Agricultural and Biological Engineers Annual International Meeting, Montreal, Quebec. Visit www.asabe.org.

Aug. 3-7
StormCon, Oregon Convention Center, Portland, Ore. Visit www.stormcon.com.

Oct. 6-8
National Rural Water Association WaterPro Conference, Sheraton Seattle, Seattle, Wash. Visit www.waterproconference.org.

Nov. 3-6
American Water Resources Association Annual Conference, Sheraton Premier Hotel, Tysons Corner, Va. Call 540/687-8390 or visit www.awra.org.

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

GapVax continues to build custom equipment and strives to give you top performance, versatility, and reliability. Our Advanced unit is outperforming the competition and we continue to grow and meet customer requests, putting us at the top of our game for manufacturing the best industrial vacuum equipment on the market today!. We started as the little guy helping to clean up Johnstown, PA after a devestating flood. We were there, we know what it takes, which is why we give you ease of use, low-cost maintenance, and an overall great quality piece of equipment.

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