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USHERING IN A NEW ERA

Thousand Oaks tackles the challenges
of modernizing wastewater operations

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John Smallis
Superintendent of Public Works
Thousand Oaks, Calif.

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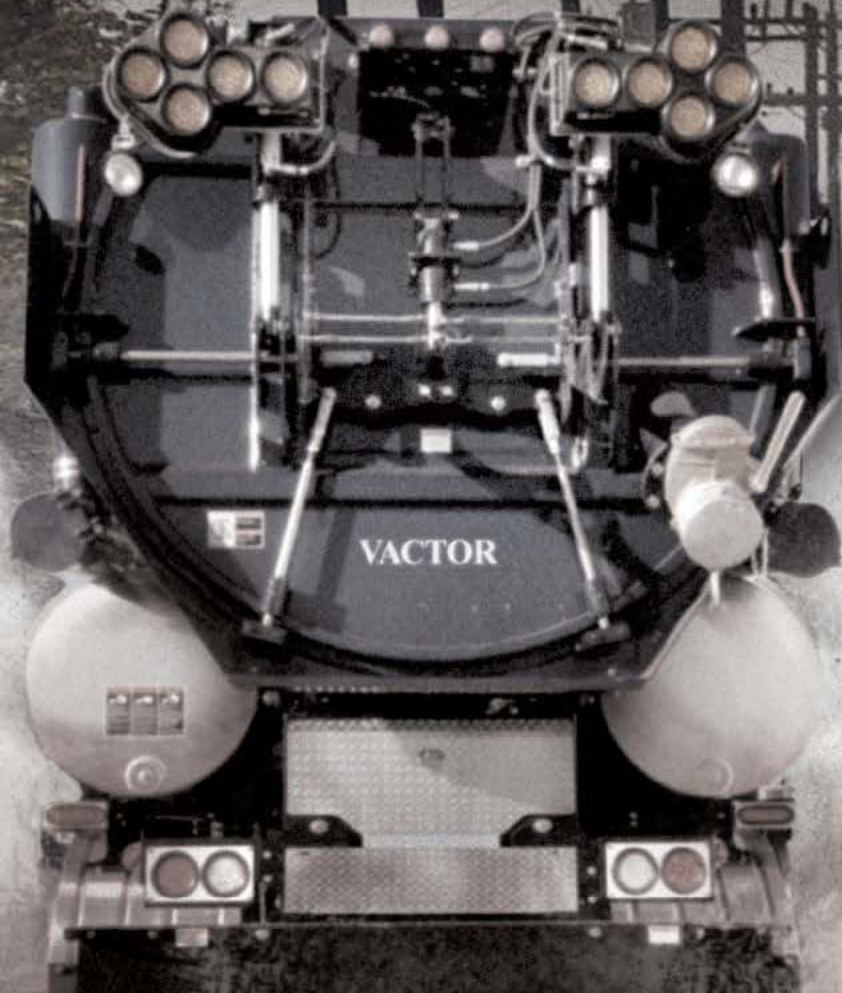
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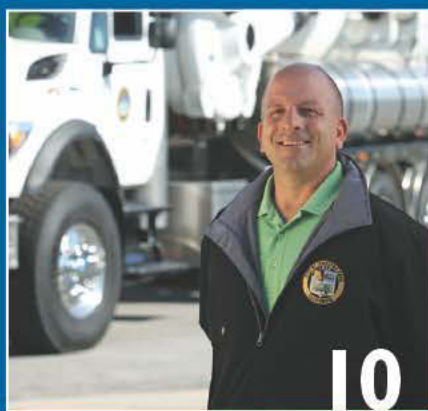
INSIDE:

PIPELINE INSPECTION,
SURVEYING AND MAPPING



ON THE COVER:

John Smallis, superintendent of Public Works for Thousand Oaks, Calif., is a firm believer in evolution. That belief guides the operations of his department, which is constantly striving to develop new and better ways to maintain and improve the city's wastewater collection system. He says long-term vision and commitment from the staff are keys to his department's success. (Photography by Stephen Osman)



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FOR SANITARY, STORM AND WATER SYSTEM MAINTENANCE PROFESSIONALS

Published monthly by:



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

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

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CIRCULATION: 2011 average circulation was 38,931 copies per month (U.S. and international distribution).



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BUILDING ON SUCCESS

Take a cue from the utilities featured in this issue and make your own operations stronger

Life is filled with stories of success and failure. For journalists, life is just plain filled with stories. This issue features my first profile for *MSW*, a story detailing the success of the Stevens Point (Wis.) Wastewater Department in getting up to date on system maintenance and planning for future needs.

The department didn't even have a collections crew before 2008. In four short years the department's four-man crew has made great strides, cleaning the entire 140-mile system of sewer mains while repairing the most troubled areas. They've done all this without the benefit of up-to-date management and mapping software and without a huge stable of equipment. The department's success has been based on good planning and efficient workflow.



FROM THE EDITOR

Luke Laggis

The Thousand Oaks Wastewater Division is also accustomed to success. Public Works superintendent John Smallis and his crew continually strive to improve their system, looking for better solutions to the challenges they face. Root intrusion is one. Rather than continue to cut them by hand as they'd done for years, they sought out a different approach. They eventually turned to a combination of chemical foam and new jetting heads. A process that used to require six or seven passes through the line to remove roots now takes only one pass, and roots have been reduced significantly.

The department has also put a lot of effort into lining manholes and older pipes once they've been cleared of roots, measurably reducing inflow and infiltration. Because the area has pockets of high groundwater, the treatment plant would get a heavy inflow after rainstorms, and it would last a long time — trailing off for more than a month as the groundwater levels slowly subsided. With the improvements the department has

All three of these stories highlight the great work being done by municipal sewer and water departments across the country. Perhaps you can learn from their successes and use their blueprints to make your own communities stronger.

made, initial flow now drops off within days, and the cost has been recovered by reductions in the treatment expense.

This issue holds yet another success story, that of Metro Water Services in Nashville, Tenn. After a massive rainstorm dropped 13.5 inches of rain on the city over two days in 2010, municipal officials were faced with the daunting task of cleaning up the wreckage from massive flooding that saw the Harpeth River peak 15 feet higher than its previous record and left semi trailers piled up below downstream bridges. Metro Water Services was also tasked with taking the necessary steps to ensure that the city would never experience another disaster of this nature.

Significant stormwater infrastructure repairs followed, including replacing culverts, cleaning sediment from stormwater inlets, and redefining ditches. They also developed green sites that incorporate irrigation and graywater harvesting, constructed wetlands, green roofs, bioretention areas, vegetated swales and other features to control stormwater. Several projects within this initiative have won numerous awards, and the city is now much better prepared to handle the next major storm.

All three of these stories highlight the great work being done by municipal sewer and water departments across the country. Perhaps you can learn from their successes and use their blueprints to make your own communities stronger.

Enjoy this month's issue. ♦

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USHERING IN A NEW ERA

Seeking better methods is part of the daily routine for Thousand Oaks Wastewater Division

By Jim Force

“Evolve or Die!” That’s the challenge that drives John Smallis, public works superintendent at Thousand Oaks, Calif. As a result, his city’s wastewater collection system is very much alive and well.

“It’s the headline of an article I have taped to my office wall,”

explains Smallis of the exhortation. “It’s the way we operate. We continue to make improvements in response to the numerous issues that many wastewater collections systems face.


“Changes take time,” he advises, “but when well planned, they result in immediate benefits in the form of reduced labor, improved safety and better system operation.”

A planned city

Thousand Oaks is located in southeastern Ventura County — northwest of the Los Angeles metropolitan area — and is home to 127,000 people. The city was master-planned by a private investment company in the 1950s, incorporated in 1964, and is one of the few communities that has adhered to its master plan throughout its development.

The sewer system consists of 550 miles of pipe and 8,500 manholes. There are no combined sewers, and only two lift stations. Wastewater is conveyed to the tertiary level Hill Canyon Wastewater Treatment Plant, which reclaims and recycles about 10.5 million gallons a day. The collection system is part of the city’s Wastewater Division and is based at the

(continued)



Utilities maintenance worker Joe Maiden lowers the sensor from an MSA gas detector into a manhole prior to deploying a Warthog (StoneAge) cutter. (Photography by Stephen Osman)

“Changes take time, but when well planned, they result in immediate benefits in the form of reduced labor, improved safety and better system operation.”

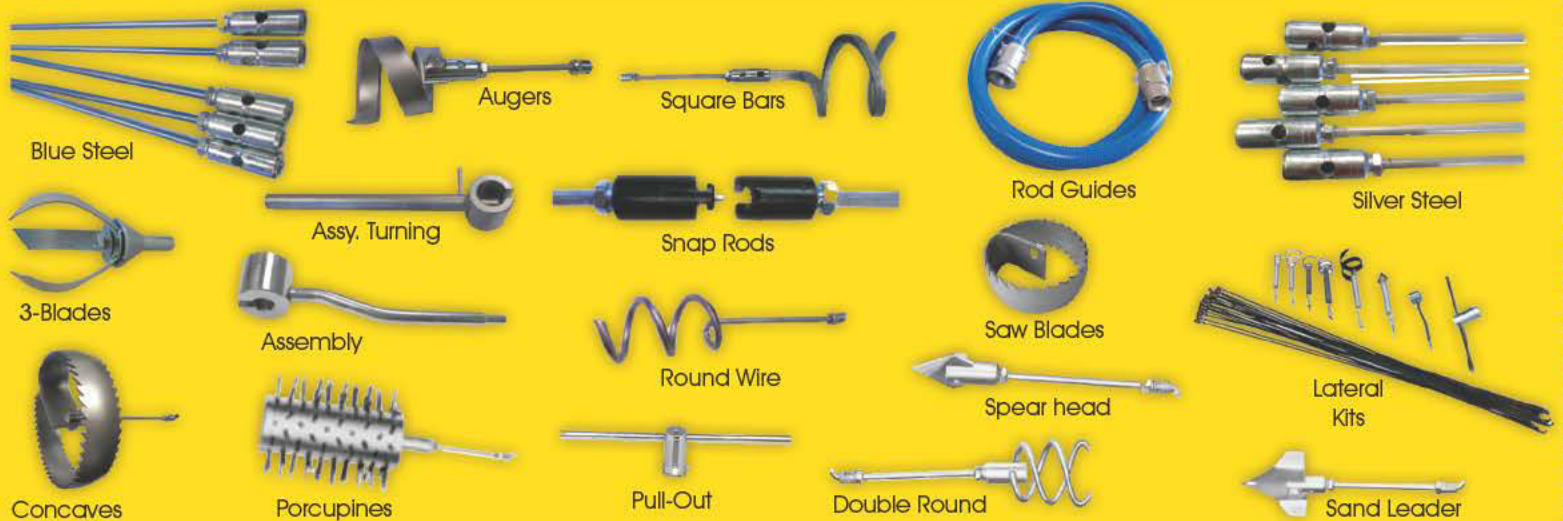
John Smallis

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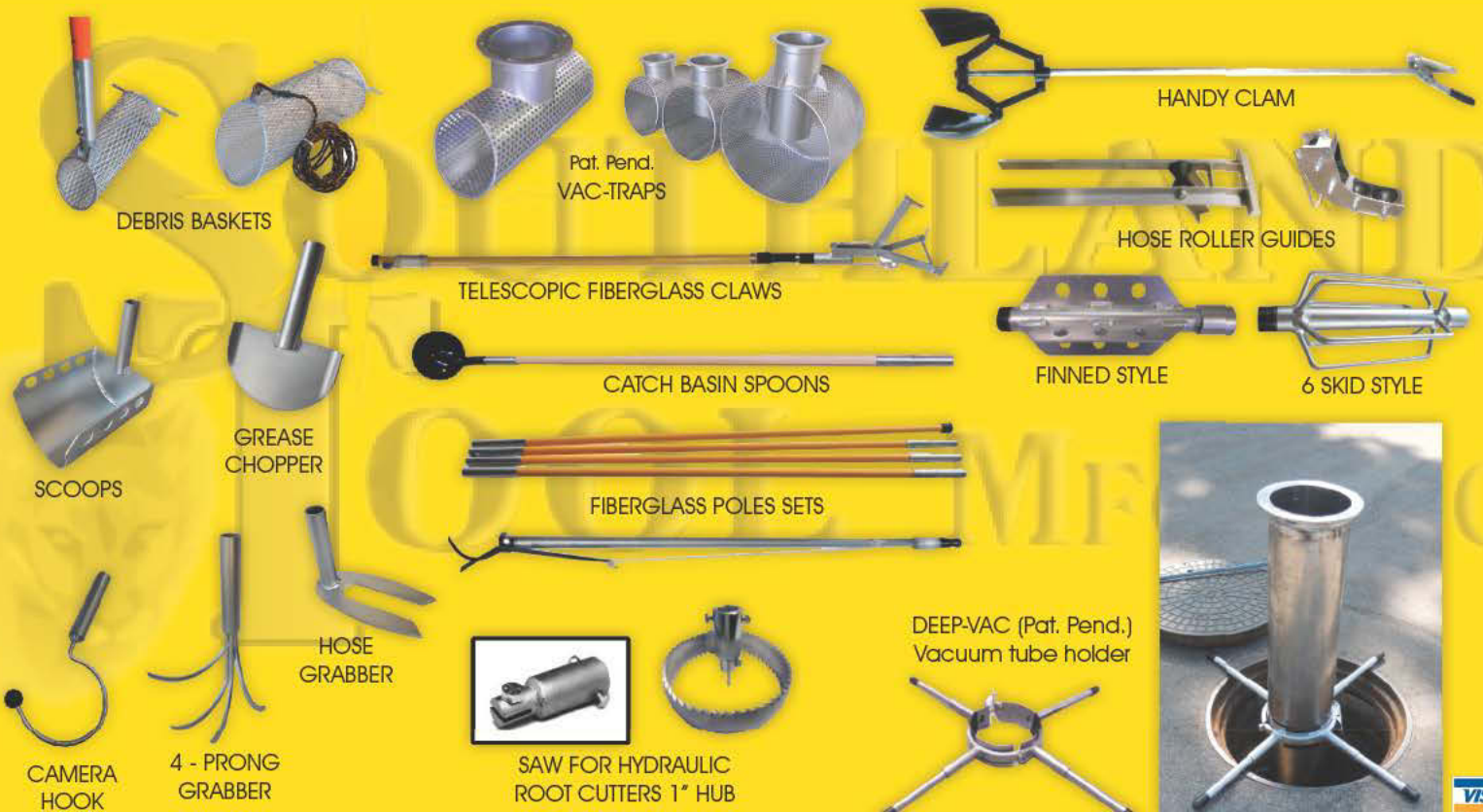
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The Thousand Oaks team includes, from left, Brian Hetherington, senior information technology technician; John Nelson, utilities maintenance supervisor-wastewater division; Jason Vollmer, Sue Underwood, Patrick McCulloch, Edgar Gonzalez, Ryan Zgrabik, Joe Maiden, utilities maintenance worker II; Mike Noblitt, utilities maintenance crew leader; Rudy Murillo, utilities maintenance worker II; Bob Wilson, utilities maintenance crew leader; Jim Mabry, utilities maintenance worker II; and John Smallis, public works superintendent.

PUBLIC WORKS ACCREDITED

The Thousand Oaks Wastewater Division is fully accredited by the American Public Works Association (APWA). The accreditation involves a complete assessment of an organization's methodology, operating procedures, budgeting, safety — virtually every aspect of public works.

"It's a long process," says public works superintendent John Smallis. "There are numerous meetings with the review boards."

But he feels it's well worth the effort.

"It's important to the public," says Smallis. "It shows them that their money is being spent wisely, and that we are doing the best that we can — operating safely and effectively."

Thousand Oaks has also been the recipient of other awards, including the Golden Gate Recognition Award from California OSHA; the Tri County Award for Collections System of the Year by the California Water Environment Association; and most recently as the State Collection System of the Year (Large Systems) from the California WEA.

"Recognition means a lot," says Smallis.

the collections division started chemical foaming its lines and using new jetting heads to clear roots.

"We evaluated the chemical expense, and chose to outsource the foaming," says Smallis. "We use Duke's Root Control, and they guaranteed no roots for three years. We also evaluated the cutting heads we were using," Smallis says.

Root control has become an operating standard as Thousand Oaks goes about relining its older sewer sections using resin-impregnated material.

"We TV the areas where we're having trouble focusing on the

older sections first," says Smallis. "Then we foam those sections before we reline. We did more than 25,000 feet last year."

Smallis says the approach saves time.

"We used to go back six or seven times in one run," he says. "Now, we do one pass and we have no roots. They've been reduced tremendously."

Utilities supervisor John Nelson confirms the choice of cutter heads. In the old days, they used their combination trucks with jetting nozzles for roots, but that required multiple runs. He says

(continued)



PROFILE: City of Thousand Oaks (Calif.) Wastewater Division

INCORPORATED:
1964

SERVICE AREA:
55 square miles

POPULATION SERVED:
127,000 (33,000 customers)

INFRASTRUCTURE:
550 miles of sewers; 8,500 manholes; Hill Canyon Wastewater Treatment Plant

EMPLOYEES:
11 on wastewater collections team

ANNUAL BUDGET:
\$491,000

WEBSITE:
www.toaks.org

Thousand Oaks Municipal Service Center, which houses all public works activities.

Even though the infrastructure is relatively new, Smallis and his team face challenges that are common to collections departments across the U.S.

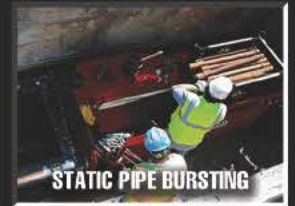
"While we're lucky to have newer systems, we still have a lot of vitrified clay pipe and a lot of brick manholes," he says. "Hydrogen sulfide eats away at these surfaces, just as it does elsewhere."

And, as one might imagine from its name, Thousand Oaks has a plethora of trees and this leads to problems with roots. It's also led to a solution that's representative of the way the Thousand Oaks crew tackles challenges.

"We used to cut roots by hand," explains Smallis. "We'd do as many as 200 manholes in a year, chopping out roots and picking them up and removing them. Then we looked at how we could improve the process."

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A computer in the cab of the Vector truck displays touch screens from iWater (infraMAP software), used to view the maintenance history of the city's network of wastewater pipes.

another cleaning approach was "balling" — using water pressure to push a scouring ball down the line. "It might take us 30 to 45 minutes to do 300 or 400 feet," he says, "and we'd use a lot of water."

The new heads are high-tech, stainless steel with ceramic inserts. Says Nelson, "They last longer, use less water, and cut more efficiently, resulting in more footage cleaned."

"While there are numerous heads available on the market, we would call in vendors and ask if we could demo their specialty nozzles for a couple of weeks before buying them. The staff found the ones they liked best and for a minimal cost, we purchased them (Warthog nozzles from StoneAge, Chain Flail cutters from Shamrock Pipe Tools, Milling Machine cutters from USB – Sewer Equipment Corp.).

"It really depends on your equipment and your system to determine which nozzles are best for your operations," he concludes.

Reduced I&I

A measurable reduction in inflow and infiltration is another important benefit of the new cleaning method.

"Thousand Oaks has pockets of high groundwater," explains Smallis. "When it rained, we would get a heavy inflow to the treatment plant, and it would last a long time — trailing off for more than a month as the groundwater levels slowly subsided."

"The pipeline improvements have had an immediate impact. Our flowmeters are radar based, non-contact (Hach) and show the initial flow quickly dropping off within days, not months."

"That's directly attributable to our sewer and manhole lining. The costs have been more than recovered by reductions in the treatment expense." Thousand Oaks has used National Liner, Insituform and SAK Construction for sewer lining. Zebbron, Sancon, Social Pacific and National Coating & Lining Co. have performed manhole rehabilitation.

Smallis says investment in new flowmeters has also helped. "We're



Jason Vollmer operates an OZIII camera-equipped Compact Pipe Ranger from CUES.

moving to Hach's Flo-dar models," he explains.

IT advances

The most significant change at Thousand Oaks, however, is computerization, and it's completely transformed how the wastewater collections team does business.

"The move really began back in 2002," explains Smallis. "We had a long-tenured work force who were used to doing things on paper. Our goal was to take that activity to the next level — ideally a paperless approach based on best management practices. We needed to get past the paperwork hurdle and move on to computers."

The project really took off in

2006, when Brian Hetherington was hired as a senior IT technician, and was charged with computerizing the division's maintenance management system and developing GIS-based asset management.

At first, Hetherington organized a pilot project that placed laptop computers in two of the division's trucks. An early issue was vibration in the vehicles, but the concept proved workable.

"We started simple," says Hetherington. "We changed work orders from paper to electronic versions in the individual trucks. Next, we leveraged the program into a computerized management and maintenance system (CMMS). It took about a year for us to work out the

SAFETY FIRST

While Thousand Oaks has moved quickly to adopt innovations and improve operations, it hasn't sacrificed the fundamentals of safety.

"We only had \$250 in employee lost-time accidents in the last four years," says public works superintendent John Smallis. "Safety comes from the top," he says, "but it's similar to our advances in technology. You must have employee buy-in and good training procedures." Repetition is another must, he adds.

"You don't have to have a giant budget," he says. "We do lots of things in-house. The city provides continuing training skills."

He says his division performs job safety analyses on every piece of equipment the operators come in contact with. "It takes time, but it's worth it," he says. "The average accident costs \$10,000 — that can take away from your budget. Small investments pay off."

"We have a small staff," he adds. "If someone's not here (because of injury) we don't have extra staff. With a small crew, safety is critical."

bugs, but in 2008-2009 we placed laptops in all our hydro trucks."

As a result, all work orders are decentralized into the trucks, and the CMMS system tracks staff time, labor actions, and costs — an ideal tool for analysis and tracking where the division is spending its time and money.

"We're able to trace visually where we've cleaned," explains Hetherington. "We use touch screens from iWater (infraMAP software). It integrates GIS and our CMMS."

Next steps in Hetherington's plan include using tablets instead of laptops. "We'll have two tablets in each truck — completely decen-

(continued)

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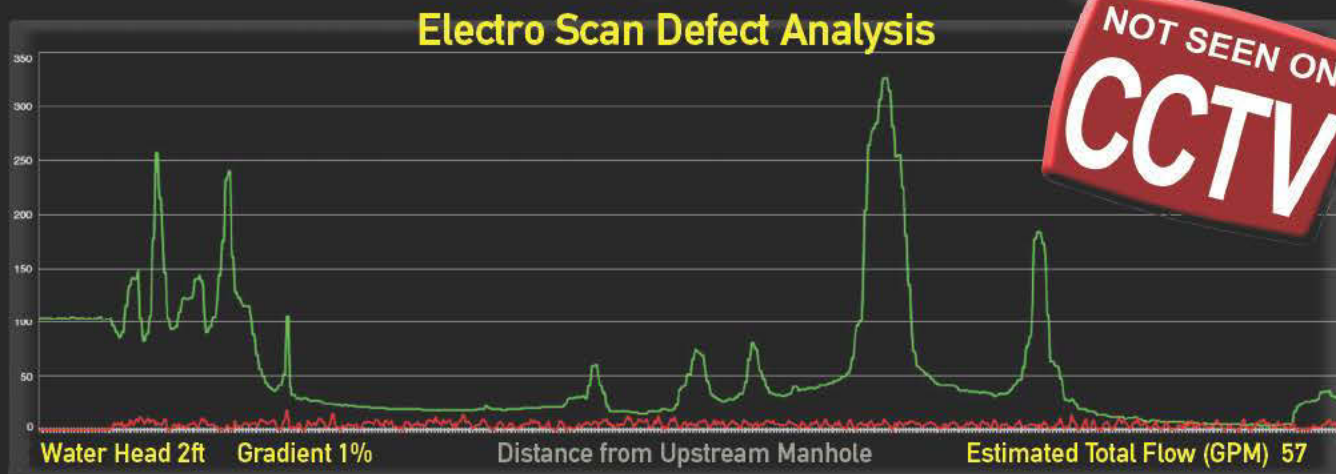
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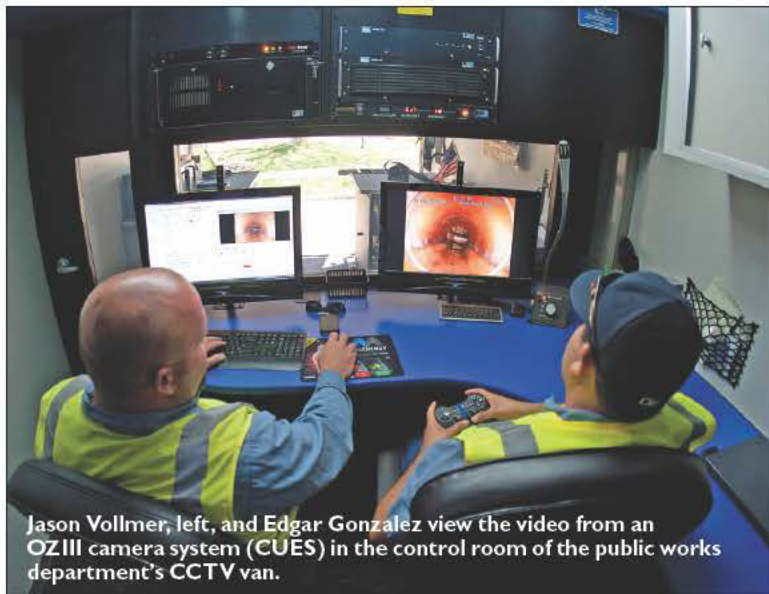
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Jason Vollmer, left, and Edgar Gonzalez view the video from an OZIII camera system (CUES) in the control room of the public works department's CCTV van.

“We used to cut roots by hand. We’d do as many as 200 manholes in a year, chopping out roots and picking them up and removing them. Then we looked at how we could improve the process.”

John Smallis

tralized and wireless, and very user friendly. The last thing an operator needs is a complicated work order system that slows them down. We’ve integrated our GIS with our CMMS program.”

Smallis says there is no book outlining how to undertake this type of technology upgrade. “We learned by going to conferences, talking with others, and communicating with our own staff,” he says. “What you can do depends on the budget available, but you can take small steps, make small improvements.”

The cameras and images used by the Thousand Oaks crew are an example. “We started with Polaroid cameras for our staff inspections in the field,” Smallis recalls, “but now we use digital cameras. We can zoom in, maintain high quality (images) and store them in a terabyte-sized memory that’s large enough to record everything.”

“It’s the next step; we were able to take our staff from by-hand records to all digital in a very short period of time.”

Staff buy-in

As any organization embraces

new technology and leaps ahead it must bring its employees along with it, and that’s not always easy.

“None of this would be possible if it were not for staff buy-in, as well as a solid budget, open management and our continued desire to improve our service,” says Smallis.

“It’s difficult. One group (of employees) comes in with computer skills, but another group has never been exposed to that, except what they learn on the job.”

He says honesty and communications are key.

“You have to make your expectations known right up front,” he says. “Discuss with the group exactly where we want to go. No sugar-coating.”

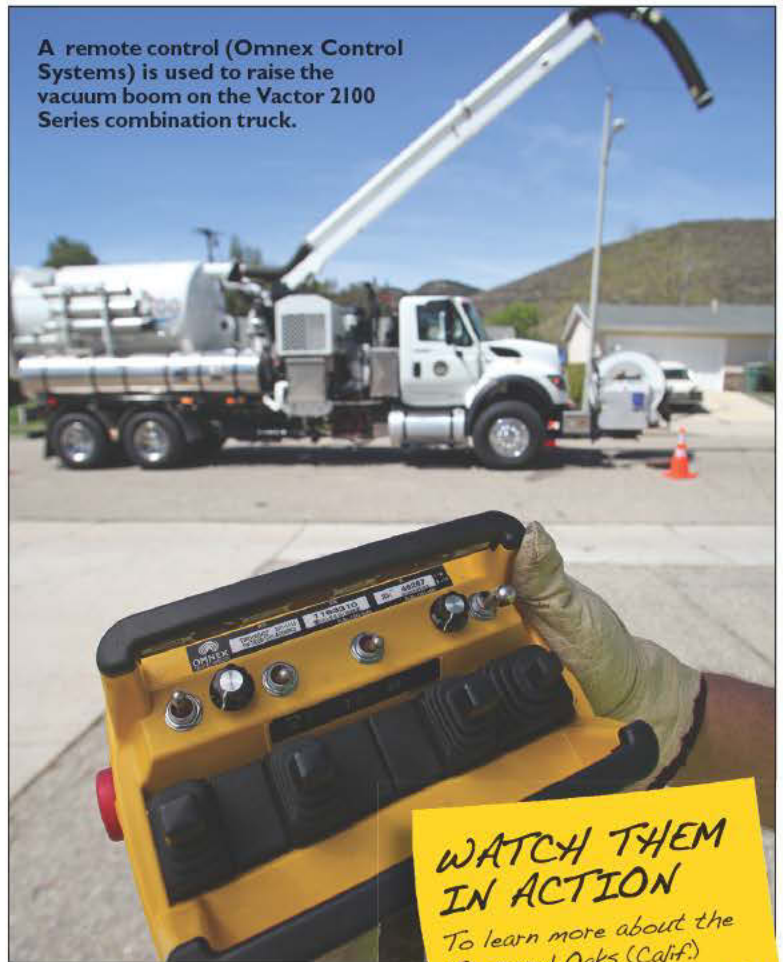
In addition, Smallis advocates achieving small successes and being unafraid to fail.

“It’s easier to move forward with change if you have small successes,” he says. “Once in a while you’re going to fail,” he says. “You need to continue to move forward toward your overall goal.”

“Quick fixes don’t work,” he adds, noting that organizations need long-term vision and commitment from the staff. “We’re lucky to have long-term employees with great knowledge of the systems. That’s a big advantage in our vision for change.”

Smallis and the Thousand Oaks team believe that once created and nourished, the environment for change becomes contagious.

“Ideas start coming in from all over the place,” he says. ♦



A remote control (Omnex Control Systems) is used to raise the vacuum boom on the Vector 2100 Series combination truck.

WATCH THEM IN ACTION
To learn more about the Thousand Oaks (Calif.) Wastewater Division, view the video at www.mswmag.com.

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FOCUS: STORM

AFTER THE RAIN

Nashville implements large-scale plan to combat stormwater control issues with green initiatives

By *Scottie Dayton*

Nashville, Tenn., is recognized as the country music capital of the world, but the city is working hard to garner another title, that of the greenest, most livable city in the Southeast.

A mayoral ordinance directing Metro Water Services and other departments to develop a plan to install green infrastructure within the Stormwater Master Planning District has been a big part of the push. The move dovetails with the city's consent decree with the U.S. EPA to control combined sewer overflows. The capital project, which includes some separation of sanitary and storm sewers and constructing equalization basins, will cost more than \$1 billion over the next 10 years. Green infrastructure is expected to limit some need for sewer separation by reducing the volume of runoff reaching the sewers.

A stormwater user fee, effective July 2009, created a \$14 million revenue stream to manage the four stormwater sections within Metro Water. Their biggest concerns were maintaining drainage in basins that occasionally experienced flash flooding.

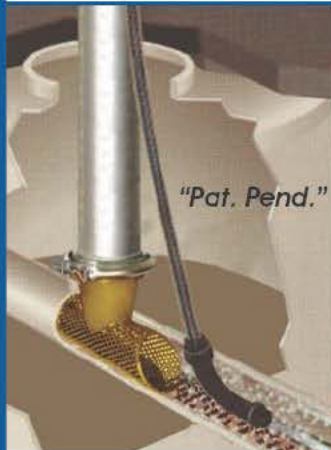
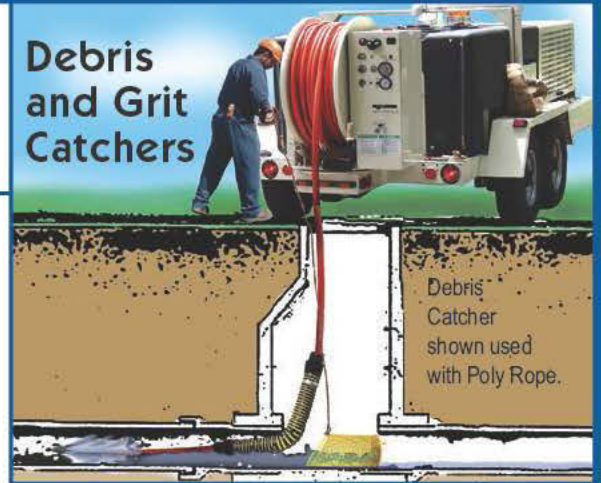
"It was localized with water in some basements," says Roger Lindsey, Stormwater Development Review and Permitting section program manager. "We hadn't had a historic flood in more than 30 years."

The City of Nashville demonstrates its newest permeable pavement parking lot at McKay bookstore. The Nashville Fire Department dumped 10,000 gallons of water on the pavement to demonstrate the permeable nature of the construction materials. Belgard Hardscapes was the contractor. (Photography by Rachel Paul)

(continued)

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MDS
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M730
Steel down hole roller. 4 heavy duty poly rollers. Max-life steel female coupling allows for use of fiberglass pole set.



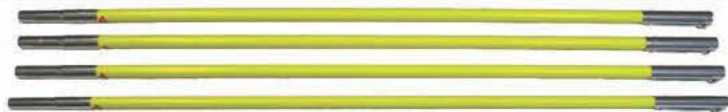
CH-1
Great for cameras or gaffing downstream tools.



MBC-1
Nice 9" round paddle for general use.



MSR-1
Claw Rake. 3 prong rake with 90° bend. Ideal for grabbing roots and debris.



MFPG-24 Quick Connect Fiberglass Poles

Foam filled 24' pole set used with above Tools and Debris Catchers. Each set includes 3 ea. 6' male x female and 1 x 6' end pole.



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Jennifer Higgs, Planning Department GIS director, wrote the code for a computer model for more structured flood forecasting based on the city's GIS mapping program. Higgs and her crew demonstrate the use of the SAFE interactive mapping system. The team includes from left, Kimberly Hayes, Jennifer Knauf, Higgs, and Roger Lindsey.

All that changed on May 1-2, 2010. That Saturday, 6.3 inches of rain fell on Nashville in 24 hours. On Sunday, 7.2 inches fell in 12 hours, making it the wettest day in the city's history. Lindsey and his section faced their greatest challenge, one that would take almost two years to overcome.

Beneficial experience

The Cumberland River winds through downtown Nashville. More than 100 years ago, workers laid 20-foot brick combined sewers in the creeks feeding the river, filled in the creek beds and built over them.

Public Works managed the stormwater division when it formed in 1979. In 2002, the city transferred the responsibilities to Metro Water Services and created the Stormwater Division with four sections totaling 90 people.

"My section is an engineering group involved in reviewing calculations for stormwater drainage and infrastructure like detention basins and water-quality treatment units," says Lindsey.

Almost half the division's employees work in Routine Maintenance cleaning culverts and ditches, reforming ditches, and repairing clogged or eroded infrastructure. The NPDES section is responsible for permit compliance and water-quality sampling. Remedial Maintenance, another engineering group, designs remedial stormwater projects and oversees construction.

"We've been building large concrete equalization basins for more

than 20 years to capture the flow from combined sewers and prevent it from reaching the river," says Lindsey. "After storms, the structures release water to the interceptors and outfalls that feed back to the wastewater treatment plant."



PROFILE:
Metro
Water Services,
Stormwater Division,
Nashville, Tenn.

ESTABLISHED:
2002

TOTAL WATERSHED:
311,212 acres

ANNUAL RAINFALL:
48.5 inches

POPULATION SERVED:
601,000

EMPLOYEES:
93

INFRASTRUCTURE:
832 miles of stormwater conveyance (pipes and culverts), 3,840 miles of open channels, 70 swales, 68 bioretention ponds, 1,662 detention basins, 20 sand filters, 88 catch basin inserts, 931 outfalls

ANNUAL BUDGET:
\$13.3 million (stormwater and flood control)

WEBSITE:
www.nashville.gov/stormwater



An island with greenery is part of the three-block renovation of Deaderick Street.

GREEN STREETS OF NASHVILLE

A three-block renovation of Deaderick Street in Nashville, Tenn., is the first street project in the city and state to incorporate low-impact development features within the public right-of-way. It is the second green street in the Southeast.

"The area is prone to combined sewer overflows," says Roger Lindsey, Stormwater Development Review and Permitting section program manager. "Therefore, the renovations focused on addressing stormwater issues and urban trees."

Local master planning firm Hawkins Partners put a 6-foot median with bioswales down the center of the street. They drained sidewalks into 8-foot-wide rain gardens accented with 102 shade trees in 8-foot-square grates, and used pervious concrete for much of the surface area. Rain gardens or bioswales in pedestrian bulb outlets incorporated existing storm drains retrofitted to serve as overflow only.

Some 4,200 shrubs, perennials, sedges and groundcover plants were added to the street. "More than half the plants are native species that adapt to extreme wet and dry conditions," says Lindsey. "Hawkins estimates the renovation will remove more than 1.2 million gallons of runoff from the sewer system annually."

The project has won numerous awards.

(continued)

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HYDRO EXCAVATOR

The division began a home buyout program 10 years ago in response to repetitive-loss properties along creeks prone to flooding.

“Our experience dealing with the Federal Emergency Management Agency (FEMA) hazard mitigation grant program (HMGP) made an enormous difference after the 2010 flood,” Lindsey says. “We knew how to apply for the funds to purchase properties. Our application packages didn’t come back for review and corrections.”

Prompt federal responses were critical for owners of homes with more than 50 percent flood damage. They had to keep mortgages current

for swift water rescues and dealing with evacuations from institutions. Tractor-trailers swept from industrial parking lots created logjams under downstream bridges, causing the most extreme flooding.”

The Harpeth River peaked 15 feet higher than previous records. Thousands of houses in the Bellevue area not in the floodplain had five to 10 feet of water in them, and few owners had flood insurance.

“By Tuesday or Wednesday, life was back to normal for 90 percent of the city,” says Lindsey. “But if you lived along the river or creeks, your life was turned on end for years to come.”



Stormwater crew member James Madden cleans a culvert, part of the routine maintenance schedule. The crew uses a Vac-Con truck and blasting heads to blow out sand, gravel and debris. Then a large vacuum attachment is used to suck up the debris that was blown from the culvert.

“During the storm, it was difficult to sense the true magnitude of what was happening. Our Emergency Operation Center was responding to calls for swift water rescues and dealing with evacuations from institutions. Tractor-trailers swept from industrial parking lots created logjams under downstream bridges, causing the most extreme flooding.”

Roger Lindsey

while paying to live somewhere else.

“At best, it takes eight to 20 months before they get their money out of the house,” says Lindsey. “Some can’t survive the wait.”

Silver lining

The division has 25 more flood-damaged properties to acquire for a total of 207 lots that are then deeded to the city. Workers have demolished 101 homes, removing any structure indicating human inhabitancy and returning the land to its natural state.

“We’re working with the Parks Department to tie extended stretches of buyout properties into our greenway trail system,” says Lindsey. “Parks also is considering installing picnic pavilions in places, or playgrounds on land adjacent to the floodplain. We’re also working with volunteer organizations to plant community gardens on some properties.”

After the flood receded, trees and vegetation sloughed off the saturated banks of the Cumberland River. Erosion was severe in places and many people lost significant parts of their backyards. A program to plant 20,000 trees is helping restore buffer areas, and to date, half the trees have been planted.

“During the storm, it was difficult to sense the true magnitude of what was happening,” says Lindsey. “Our Emergency Operation Center was responding to calls

Water in motion

After the storm, staff combed the county identifying damage to stormwater infrastructure for FEMA and drivers.

“The flood washed away culverts, then the roads,” says Lindsey. “In one case, a culvert floated out of its installation without the bed collapsing. We immediately barricaded the area.”

Replacing culverts was the most challenging of the stormwater infrastructure repairs. Temporary efforts slowed erosion, then crews returned to replace corrugated culverts with concrete pipe or constructed box culverts. The cast-in-place drainage improvements took months to complete.

As the flood ripped through backyards, it swept away tons of outdoor possessions that snagged 20 feet up in trees or mounded behind the Cheatham Dam 30 miles downstream of Nashville.

“The sea of floating debris defied description,” says Lindsey. “River cleanup organizations are still scheduling weekend excursions to pull material out of trees and brush along the banks.”

The storm happened so quickly that many people had no time to save anything except their lives. Those who chose to repair their homes immediately hauled flood-damaged possessions to the curb.

“It’s a FEMA-reimbursable cleanup,” says Lindsey. “Our Solid



The Nashville Public Square project replaced the Metro Courthouse parking lot with a five-story subterranean garage topped by a 2.25-acre green roof. A 57,000-gallon below-grade tank stores runoff for on-site landscape irrigation. People gather in this park-like setting where concerts are held.



The division began a home buyout program 10 years ago in response to repetitive loss properties along creeks prone to flooding. The homes were torn down and young trees were planted along the flood plain near the creek.

(continued)

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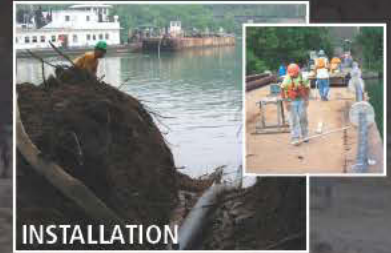
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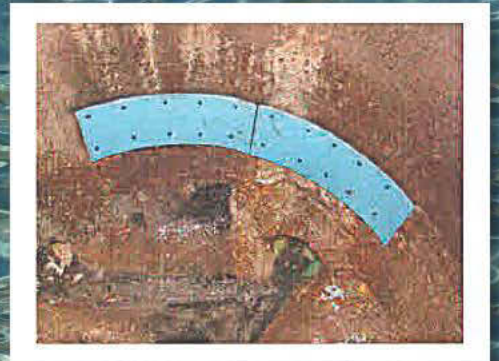
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The Nashville team includes front row, from left, JoAnn Brown, Jennifer Knauf, Kimberly Hayes, Gong-Yu Hsu; second row, Anna Kuoppamaki, Patsy Brown, Maria Debraganca, Roger Lindsey; third row, Paula Kee, Gabi Castillo; back row, Toni Plummer, Marie Morgan, Tom Palko and Stan Robinson.

Waste Department quickly removed mountains of nasty, stinking debris to staging locations in our parks, then to landfills. Putting a city back together again after a flood is a monumental undertaking, made more challenging because we had to fight for every nickel we received from FEMA.”

To control normal flooding, Lindsey’s section pinpointed cleaning silt and sediment from stormwater inlets as the best practice. It was and is a major issue because people in some neighborhoods still rake leaves into the inlets. Workers from Routine Maintenance visit every structure annually and have identified those prone to stoppages.

“When a significant storm is predicted, crews make what they call a ‘rain run’ to the hot spots to remove debris,” says Lindsey.

Routine Maintenance also cleans

or redefines ditches using Gradall equipment, but most brush and debris work is intensive manual labor. They also do some masonry and install culverts with headwalls in rights-of-way.

“We rent more equipment than we purchase because it is economical,” says Lindsey. “More important is that for the last two years, we have spent most stormwater revenue repairing flood-damaged infrastructure instead of building new projects. Now we’re back to where we were before the flood.”

Nashville SAFE

Six months after the disaster, the section created a computer model for more structured flood forecasting. Jennifer Higgs, Planning Department GIS director, wrote the code based on the city’s geographic information system mapping program. Staff worked with

the Corps of Engineers, the U.S. Geological Survey, the National Weather Service and a consultant to develop Nashville SAFE (situational awareness for flooding events).

During emergencies, the operations center launches the interactive tool, which compiles the data from every USGS stream and river gauging station in the Metro area. It projects a map of those stations on the wall. When stations reach a defined action level, they blink.

“The computer monitor has the same image, and holding the mouse cursor over a station brings up the real-time water level,” says Lindsey. As the storm progresses, the map shows inundation levels of roads and bridges, and institutional facilities that should be evacuated.

The center activated the model 11 times in 2011. Every time the team used the tool, they learned from it.

“As Jennifer and I spent long hours watching storm systems, we’d think of fancy new things the model should do,” says Lindsey. “She could always write the code to make it happen.”

Lindsey has presented Nashville SAFE to sister cities and at the Kentucky-Tennessee Water Environment Association Watershed Conference in January 2012.

“People are amazed by what this model does,” he says. “It is probably one of the most sophisticated in the country.”

Green grows the valley

The mayor’s Green Ribbon Committee on Environmental Sustainability is equally progressive. Their efforts to ensure that Nashville is a leader in livability and environmental quality through low-impact development (LID) dovetails perfectly with stormwater and flood control programs.

To date, the city has 50 green sites that incorporate irrigation and graywater harvesting, constructed wetlands, green roofs, bioretention areas, vegetated swales, newly planted trees and permeable pavement. The Pinnacle at Symphony

Place, a 29-story office building, is the first skyscraper in the state to receive LEED Gold certification for its 1-acre green roof terrace garden on top of the parking garage. According to the American Society of Landscape Architects, the roof captures 67 percent of the annual stormwater and harvests it for irrigation.

The Nashville Public Square project replaced the Metro Courthouse parking lot with a five-story subterranean garage topped by a 2.25-acre green roof. A 57,000-gallon below-grade tank stores runoff for on-site landscape irrigation. The project earned the Green Roof Award of Excellence in 2007 from the Green Roofs for Healthy Cities. The 25,000-square-foot McCabe

“Putting a city back together again after a flood is a monumental undertaking, made more challenging because we had to fight for every nickel we received from FEMA.”

Roger Lindsey

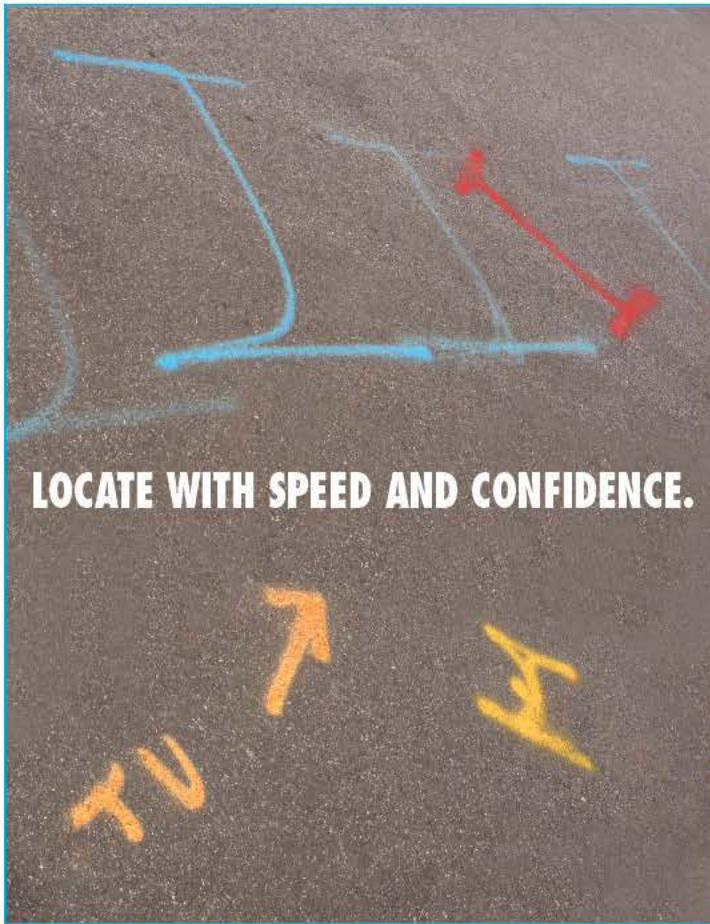
Park Community Center with its green roof, permeable pavement and rain gardens is the city’s first LEED-certified community center.

In 2011, the Natural Resources Defense Council named Nashville one of 14 cities leading the country in using green infrastructure to reduce runoff. The council’s peer-reviewed report, *Rooftops to Rivers II*, contains case studies of how the cities maximized their LID investment. ♦

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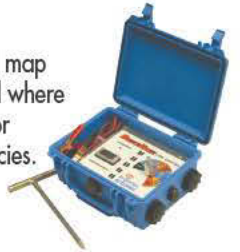
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FOCUS: SEWER

GETTING UP TO SPEED

The Stevens Point Wastewater Department's collections crew includes, from left, Tony Sterling, Mark Zalewski, Dan Woitczak and conveyance system manager Rob Molski. (Photography by Luke Laggis)

Stevens Point collections crew makes up for lost time and a lack of system maintenance

By Luke Laggis

When Rob Molski moved out of the city Engineering Department in Stevens Point, Wis., and became the collections system manager at the end of 2007, the city's sewer system had gone years without adequate maintenance. It didn't take long before the right people, plans and equipment were in place to whip the system's 140 miles of sewer pipe into shape.

There were plenty of immediate tasks at hand, but Molski and his people kept their sights on the utility's long-term goals. They formulated a plan to get a clear picture of the system's condition and set out to clean and televise every inch of pipe.

In the past, the city had hired contractors to televise sewer lines, but they inspected only small sections at a time, and progress was limited.

"We maybe had a budget of \$26,000 per year to use for televising," says Molski. "At 50 cents a foot, it wasn't really getting us there. So we decided we'd buy our own equipment."

There was about a 12-year period where the city's aging collection system received minimal maintenance. Many planned projects were never started due to lack of funds, but budget moves — the city wanted to fund collections work out of the Wastewater Utility — ultimately led to the reorganization of some city positions and the formation of the collections system crew at the Wastewater Department.

"Getting the crew over here and having them working on the system has made a difference, and it took them off the city's budget as state aid started falling off," Molski says.

Before the change, sewer maintenance was divided between the wastewater treatment plant crew and the Streets Department, but other responsibilities often took focus away from the sewer system.

"The guys used to plow snow and fill in where needed. They don't anymore," Molski says. "Time is focused on what it's supposed to be focused on. We have a good crew, good equipment, and our boss is really working with us to get us what we need."

The utility is also moving toward implementing a new GIS that ties in all its inspection data and video.



PROFILE:
City of Stevens Point (Wis.) Wastewater Department

CUSTOMERS SERVED:
Approximately 25,000

INFRASTRUCTURE:
140 miles of sewer mains, 2,621 manholes

ANNUAL BUDGET:
Variable, anywhere from \$25,000 to \$500,000

EMPLOYEES:
4

WEBSITE:
www.stevenspoint.com

(continued)

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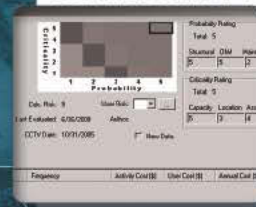
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Dan Woitczak guides the jetter hose from the department's Vector 2100 down a manhole to begin cleaning the sewer main.

Around the city

In 2006, the city purchased its own televising equipment. Molski came on board shortly thereafter, and in 2007 the city really started to dig into inspection and maintenance of its sewer lines.

"In the first three years we cleaned pipes that had never been cleaned before," Molski says. "I can guarantee it because we found concrete on some of the benches in the manholes. They were probably televised when they were first installed, but when the road surface was put on, they put two inches of asphalt on the first year. The second year they raised the castings two inches, cemented the rings, and some of the mortar fell down into the channels. It was still there, like a dam, with the flow going over or around it. There was some nasty stuff backed up behind it."

The department now follows a program where a section of the

system gets cleaned every year. The team just recently completed the first full rotation through the system and is back at the beginning of another cycle.

"Basically every year we clean a third of the city," Molski says. "We have the city divided into three sections — a northern section, a central section and a southern section — and we just work our way through, concentrating on cleaning one of those sections a year. We know where we have bad root problems and we'll cut them every year or if they're really bad, twice a year to prevent backups.

"We start out flushing the dead ends in the winter to get everything moving so we don't have solids rolling up. Then we go back when it starts getting warmer out and cut any roots we find. If it doesn't have roots we'll just jet it. We have a pretty good handle on where roots are, now that we've



Mark Zalewski operates the inspection camera from the control room of the department's Aries televising trailer.

PUTTING TECHNOLOGY TO WORK

Eric Southworth, inspection/GIS technician for the City of Stevens Point's Water and Wastewater Departments, has served as the city's point person on the initiative to upgrade GIS and inspection software.

"We're in the process of working with Ruckert-Mielke out of Milwaukee to convert our old ArcIMS (Esri) program, which is really only used by the Water Department right now," Southworth says.

The system was custom-built in the early 2000s, but it doesn't show any records on the wastewater side and Esri stopped supporting it years ago.

"When I call software support and say I have a problem ... they say 'We stopped supporting that version six or seven years ago.' So you can get a feel for how outdated this system is," Southworth says.

The new ArcGIS server Web application will functionally include all the sewer mains, manholes and laterals, which weren't previously included on any of the city's maps, other than as-builts and construction plans.

"In the future, the GIS is going to be an interface for viewing PipeTech reports," Southworth says. "When you click on a pipe segment, let's say from manhole A to manhole B, it will bring up all the information out of the GIS records, the length, diameter and type of pipe, the date it was last televised or cleaned along with pipe condition — any of the information the guys would give me from the field.

"In the new application we should be able to see as-builts linked to the right-of-ways, TV reports and TV videos from PipeTech linked to each pipe segment. The possibilities are endless for what you can do with the new application and have it all available to anyone out in the field at any time. The future for the departments is centered around mobility. In an economic climate like today, the biggest challenge is coming up with the funding. I see this application as a huge asset to the whole department, not only to the crews out in the field but also the office staff, and hope to have everything up and running by the end of the year."

The Wastewater Department has been working on transitioning to this type of system for a few years, but now it's finally coming to fruition.

"All tasks at hand should run a lot smoother and it's going to be at the fingertips of all the staff, that's the main thing — being out in the field and being able to access all the information instead of having to call or make the trip across town back to the office to research something. Being able to access any information and data about the water and wastewater infrastructure firsthand through the application, from anywhere in the city is priceless," says Southworth.

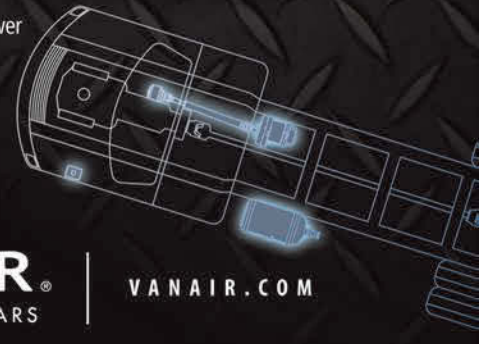
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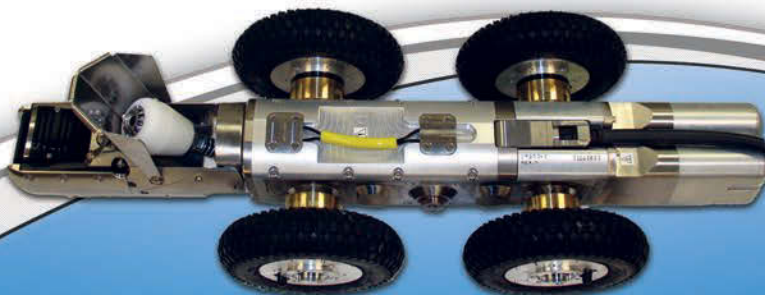
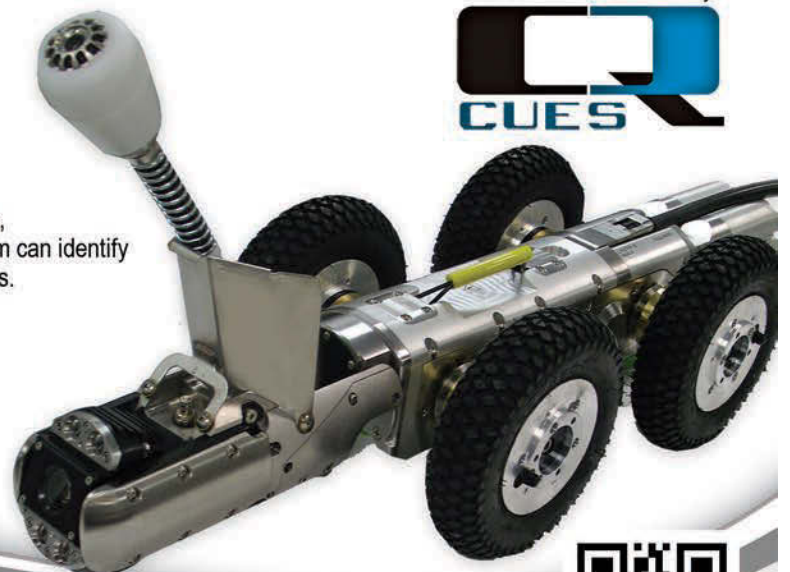
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been through everything. The collections system crew has been here since 2008. They came over in January, so we've gone full-circle through everything on the cleaning."

When the crew flushes pipes, they always monitor the flow from a downstream manhole so they can see what's coming through. If there's a problem, they'll bring in the Vactor truck and cut or clean the line. Once they believe the line is clean, the crew moves on and returns later for camera inspection.

Televising, the other primary focus, has taken a bit more time.



Dan Woitczak lowers the Aries camera and transporter down a manhole before inspecting a section of mainline sewer.

The utility has been making good use of its televising trailer (Aries Industries) and 3000 series tractor and lateral launching tractor. Video is captured with two Aries cameras: a 3000 Badger and a LETS (Lateral Evaluation TV System). The crew primarily uses a Grand Slam nozzle or a Rotor nozzle from USB — Sewer Equipment Corporation. They also use one of two Dredger nozzles for

larger pipe. Molski says the utility doesn't have a lot of equipment, but what it has is versatile and efficient. Inspection is progressing steadily through the system, and the end of the first cycle is now in sight.

"We started televising in 2008 and will finish up this year televising the whole city," Molski says. "We actually did some televising before 2008 but the video wasn't really all that useful because the guys were new at it, so we kind of backed up. In the spring of 2008 we sent a person out to get national certification training (NASSCO PACP) for the video, so everyone's on the same page."

Prioritizing repairs

Cleaning and televising led to some immediate repairs in areas where the pipe was in especially bad shape.

"We went through first, looking at all the existing TV reports and data that we had collected. We then identified where we had pipe that looked like it was going to cave in and did CIPP spot repairs."

After tackling the most urgent repairs, Molski and his crew began looking at pipes with lesser issues and lined them where possible. They also started bringing other pieces of the system up to speed as they encountered problems, and it wasn't uncommon to run into old repairs and other work that was never documented. The crew would occasionally find spots where someone had dug down and made a spot repair on the outside of the pipe, but the pipe still appeared ready to collapse.

"I think the Streets Department in the past would just go and dig it up, bend an old stop sign over the pipe and pour some concrete on it, and no one knew. There was no record of it," Molski says.

While broken and cracked pipe seems to be more common in the older sections of town, not all the old pipes are in bad condition. Surprisingly, Molski says, much of the old vitrified clay pipe is still holding up.

"Some clay is really in remarkable shape," he says. "I think it depends on how it was laid in the first place. Clay laid in clay soil is holding up really well, but if it's in sandier soil, it seems like the clay



Tony Sterling disconnects a hose after flushing an air relief valve on a pressure system in a Stevens Point subdivision.

"If the street is shot and the utilities are questionable, it's a good candidate for a total reconstruction project. If it requires water and storm sewer upgrades and the sanitary is questionable, we'd probably like to go in and rebuild the sewer."

Rob Molski

pipe has more root intrusion."

The system includes 2,621 manholes, which are maintained by the collections system crew, and 14 lift stations, which are maintained by the treatment plant crew with Molski's team doing the cleaning. The department is also responsible for maintenance on approximately four miles of pipe in Park Ridge, a small village of about 500 that is completely surrounded by the City of Stevens Point. The complete system's 140 miles of pipe are comprised of PVC, vitrified clay, reinforced concrete, transite (asbestos concrete),

smooth-lined galvanized pipe, smooth-surfaced corrugated pipe and non-reinforced concrete, much of which is reaching the end of its service life.

"Park Ridge had a lot of that non-reinforced concrete," Molski says. "A force main was dumping into that, and it corroded the pipe to the point where I saw pieces which had collapsed that were only a quarter-inch thick at the crown."

Decisions on whether to repair or replace a specific section of pipe are based on age, condition, and the necessity of road and other utility repairs.

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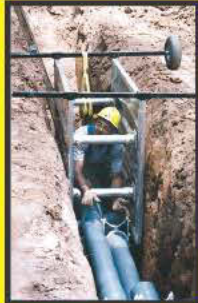
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"If the street is shot and the utilities are questionable, it's a good candidate for a total reconstruction project," Molski says. "If it requires water and storm sewer upgrades and the sanitary is questionable, we'd probably like to go in and rebuild the sewer."

"Being able to access any information and data about the water and wastewater infrastructure firsthand through the application, from anywhere in the city is priceless."

Eric Southworth

To dig or not to dig

"Lining sewer mains is getting popular, but if we're in the street and we're going to be digging, say replacing the water main or storm utilities we would likely replace all of our utilities. Once you take the top off the road you don't know how deep the laterals are. If you start to compact the soil and are working around old pipe, you're probably going to end up back there making a repair because you're going to have a break of some sort."

On total reconstruction projects, the city rebuilds the laterals from the main to the property line, but property owners are responsible for their laterals from the property line to the structure.

Molski notes that the system does have some I&I problems with laterals, but the mains are still the biggest problem. His crew will continue to address the problem with lining and grouting, determining the proper case-by-case solution by assessing the condition of the pipe, the severity of the infiltration, and the cost of repair.

"If it's clay or concrete and it's cracked, we may just be better off putting a liner in it," he says.

The city contracts out all its CIPP lining work because it's more efficient for the small department. They've primarily used felt liners (Liner Products LLC) with either steam or hot water curing. The team tries to combine projects and put out large quantities of pipe lining for bids to get better rates.

"You get a pretty good price when you do it that way," Molski says.

The old fashioned way

At present, the collections system crew keeps track of problems on paper. Video inspection reports are printed and placed in large binders organized in alphabetical order by street name. The binders date back to 1981, but 30 years later the shift to a modern record-keeping system is under way.

"Right now we're keeping everything in paper copies as well as digital files with extra copies of the bad areas that get filed separately," says Molski.

Manholes, which are inspected visually from above and with the camera panned up from below, are handled in similar fashion.

"We'll rate the manhole as either good, fair or poor," Molski says. "If the manhole is poor, right now it's being kept on a separate list. We have basically a legal pad with the manholes that need attention."

"Eventually when we get the GIS application up and running, everything will be logged into that, and we should be able to do queries." The project has been in the works for four years but funding was only recently approved. "Some of the software we had was no longer supported," Molski says. "So we had to cough up some money and Ruckert-Mielke is starting to work on a map for us."

The city is using PipeTech Software that will link to the GIS so that specific issues can be queried in that system.

The department has laptops in most of its trucks and will install one in its new Vactor 2100 this year. Once the new system is in place, it will streamline procedures for the crew, especially on emergency calls. A crew that needs to cut into a line will be able to bring up the video for that segment of pipe right in the truck and know the situation, rather than operating blindly or having to go back into the office to look at paper reports and printed still frames from inspection videos.

"A lot of the information will be right at our fingertips," Molski says.

Dedicated crew

The City of Stevens Point collections system has come a long

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way in the four years since the collections crew in the department was established. The crew has taken a system with a history of deferred maintenance and quickly brought it up to speed. With the planned inclusion of the stormwater crew in 2013 and technology upgrades that are in the works, it's clear the systems will continue to improve and will serve the city well in the future.

Molski says the path to the Promised Land has been pretty straightforward, especially with a focused crew and the support of city officials.

"With our up-to-date TV reports, we have a great handle on the system's current and future needs," Molski says. "When your televising information is 30 years old, what good is it, really?" ♦



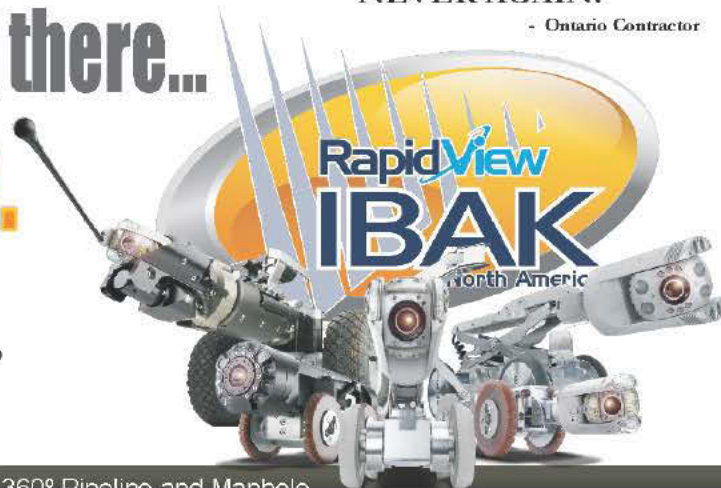
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ON THE BEAM

Vermeer AXIS guided boring system provides a precision alternative to horizontal directional drilling

By Erik Gunn

Contractors and utilities are constantly on the lookout for alternative technologies that can help them avoid the expense and disruption of open-trench digging to repair or replace underground sewer or waterlines.

If the task is simply to repair and strengthen existing pipes, a number of pipelining technologies offer trenchless solutions. When the pipe itself must be replaced or a new line must be installed where none

existed previously, trenchless alternatives are much more challenging.

Vermeer Corp. of Pella, Iowa, recently introduced one approach: the laser-targeted underground AXIS guided boring system.

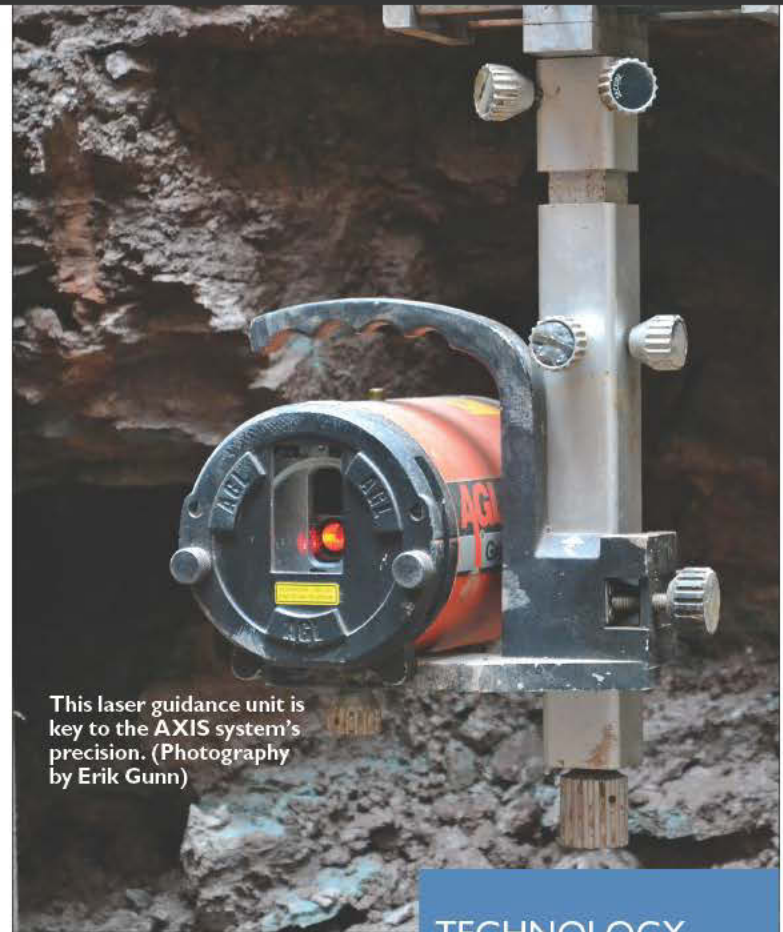
Vermeer, which also manufactures horizontal directional drilling machinery, offers the AXIS system as an alternative to HDD where precision is critical, such as when setting the grade for a gravity-fed sewer line.

A sewer line boring and installation project in the Canadian community of Oakville, Ontario, provided an opportunity in early April 2012 to see the AXIS system operating in the field.

Oakville is about 30 miles southwest of Toronto on the northern shore of Lake Ontario. The project was conducted under the direct supervision of James Vis, a foreman with Avertex Utility Solutions Inc.

Ryan Linde of Avertex was the operator for the AXIS system. Bo Howell, an engineering technician from Vermeer's plant in Pella, was on hand to advise Linde and the Avertex crew.

Avertex, based in Orangeville, Ontario, was contracted for the project by the Regional Municipality of Halton, Ontario, which is



This laser guidance unit is key to the AXIS system's precision. (Photography by Erik Gunn)

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responsible for utilities such as water and wastewater. Avertex owns one of just two AXIS systems in use in all of Canada.

The Oakville project entailed the installation of a new gravity-fed sewer line in a residential neighborhood. The old line was powered by a pump station at its starting point, explained Vis. The AXIS system was used to avoid disrupting the neighborhood, with its numerous mature trees, with an open-trench project.

When complete, the line was to run from the dead end of Timber Lane, the location of the original pumping station, along two blocks of Seneca Drive to West River Street, where it was to connect with an existing sewer line. In all, about 1,640 feet of line was installed using the AXIS system.

Walk-around

The AXIS system consists of a drill rack operated from inside an underground pit and a power sup-

ply that is set up on the ground above the pit.

When a pipeline is installed using the AXIS system, the process is typically completed in 300- to 400-foot increments. For each increment, a pit is dug at the starting point and at the ending point of the run. The drill rack is set up and operated from the first pit and



A closer look at the auger boring into the underground rock.



Workers maneuver a casing — still in the crane's claws — into place on the rack as it's lowered into the pit.



The TV camera, positioned behind the drill head, allows the operator to see the target.

bores through the dirt to the second pit. As the bore is completed, a manhole is typically constructed at each pit, and the rest of the pit is then filled in.

The heart of the AXIS system is a hydraulic-powered thrust and pullback carriage assembly and gear box that pushes the drill casing forward and turns a cutter bit at the end of the drill head that bites into the underground soil. The rack is seated on a leveling frame. The assembly altogether is 11 feet 2 inches long, 3 feet 9 inches wide and 5 feet high.

The thrust/pullback mechanism drives a 13.5-inch-diameter drill head mounted on a 2-meter (about 6.5 feet) drill casing unit into the soil.

As the head goes deeper into the soil, additional 2-meter drill casing units are inserted behind the lead unit to extend the system's reach. Different drill bits are available depending on the nature of the medium, such as rock or clay, through which the hole is being bored.

A laser unit provides precision guidance for the system to maintain exact grade. The laser unit is securely mounted at the rear of the pit, opposite where the bore is to be made. A camera in the drill head allows the operator to see right in front of the drill as it is operated, aligning a target with the laser to ensure a straight, steady bore.

The cylindrical drill casing units include a central shaft that turns inside the unit, turning the drill bit at the front. An external channel accommodates cable from the camera and its lighting at the front of the auger so that the casing units maintain a smooth, cylindrical external profile.

The casing units also include two internal channels. The upper channel is for air to move forward through the shaft to the front so that debris can be vacuumed out of the way and pulled back through the lower channel.

The air in the upper channel also keeps it cool, which is necessary to keep the laser beam on target, said Howell. Heat can bend the laser off target, he explained.

The laser is directed at a target positioned inside the lead cylinder on the backside of the drill head so the operator can maintain a straight shot. The beam shines through the upper channel.

Vermeer also sells a vacuum system to remove the debris from the boring project. Avertex, however, removes debris using a combination vacuum truck from the contractor's fleet.

The superstructure of the rack unit includes a space where the operator can be positioned under the Falling Object Protective System. The operator controls the system from a console mounted inside a portable case the size of a small toolbox; the console is attached via cables and then unhooked at the end of each working session. The control console includes simple buttons and a joystick-type control for the drill and the thrust/pullback mechanism as well as a television screen for the camera.

Power for the system comes from a 140 hp diesel motor situ-

ated aboveground, adjacent to the operating pit. The motor is encased in a moveable, windowless, shed-like sea container measuring 8 feet long, 8 feet high, and 6.5 feet wide.

Operation

The observation took place over a day and a half on the last stretch of the new line, a 311-foot run.

In advance of the boring done on April 3 and April 4, a crew from Avertex had dug a rectangular pit 10 by 20 feet in perimeter and 23 feet below the street at the intersection of Timber Lane and Seneca Drive. A second pit was dug where the run was to end at the dead end of Timber Lane. That end of the run is the highest point in the line and the starting point for sewage flow.

The AXIS system was installed in several steps. First, the laser guidance equipment was positioned precisely based on surveyor's readings. The laser then was programmed using its own controller — a device about the size of a TV remote — for the exact grade of the bore and secured on a horizontal wooden beam erected along



The tri-cone bit (above) is used to cut through rock. Partway through the project, a bit was attached for digging through clay (below).





The auger mechanism on the rack is the mechanical heart of the system. The hydraulically powered motor drives the shaft forward and rotates the cutting bit inside the drill head. Operator Ryan Linde monitors the progress of the drill (above and left).



the rear wall of the pit behind where the boring unit was to be set up. Maintaining a secure position for the laser is essential to ensure consistent accuracy. Once set up, work crews must be careful not to bump it out of alignment, Vis and Howell explained.

Because the endpoint was to be the highest point in the gravity-fed line, the AXIS laser was set to bore at a consistent 0.6 percent grade upward.

After securing the guidance laser, the Avertex crew lowered the leveling frame into the pit and positioned it to be consistent with the laser beam. Once the frame was set, the rack was lowered onto it and secured; then hydraulic hoses to power the motors on the rack, the vacuum hose for debris, and electric cables were all attached.

A tri-cone bit was used for rock. This consists of three toothed, slightly spherical, intermeshed components that constantly revolve to cut out the rock. The tri-cone bit was attached to the lead drill casing unit.

The hydraulic motor provided power both to the revolving drill head components and to push the

entire shaft forward. Only the cutter bit itself rotates or revolves during operation. The drill head to which the bit is attached and the cylindrical casings that extend the shaft do not.

With Linde operating the machine, the drill head cut into the rock as the gearbox pushed it forward.

The gearbox pulled back at intervals of 6.5 feet, leaving the drill head and shaft in the earth. A crane operator lowered the next drill casing into the pit, where crew members placed it on the rack behind the previous casing. Crew members aligned male and female connections between the two casings and latched the new casing to the previous one. Cable was then tucked into the external channel on the new casing, and the casing unit was numbered in sequence to keep track of the progress of the shot.

Linde used the console to send the drill casing forward into the earth another 2 meters, then again drew back the gearbox so that another casing could be inserted.

The process was repeated over several hours, during which the machine made steady progress into the earth, drilling about halfway to the final endpoint.

After the unit had punched through the rock, it entered a heavy clay soil that required an alternative boring bit. The shaft was removed, casing by casing, so that the tri-cone bit could be removed and the replacement bit installed. Then the lead casing with the drill head and bit was returned to the hole and again the shaft extended, casing by casing, into the ground.

User's comments

To avoid disrupting traffic in the residential neighborhood where the project was taking place, and to avoid damage to numerous mature trees in the immediate area, avoiding open trench work was a critical consideration, Vis said. The depth of the line — 30 feet at its deepest point — was another consideration. "To dig a trench safely 30



The controls on the unit are very simple.

feet deep is tough," he said.

And horizontal directional drilling, he said, would not have enabled the degree of precision in the angle of the grade that the gravity-fed sewer line required.

The laser guidance feature has proved to be extraordinarily accurate and efficient, Vis noted. Once the laser is programmed to the precise grade required, he said, "You can maintain that grade the whole duration of the shot."

Machine operator Ryan Linde says the AXIS system takes some getting used to, because the drill has to be "steered" to keep the target centered in the laser beam, instead of the more intuitive approach of moving the beam to match a target.

"If you've run other drills before, it's completely different," he said. "But once you've been shown how to use it, it's pretty straightforward."

Linde said the machine is very easy to control, with a joystick for steering and two levers, one for thrusting forward and one for rotation of the drill bit.

When the AXIS system is used for a line that will require multiple increments, it's typical to use the pit at the end of a run as the starting point and installation site for the mechanism for the next run. But it doesn't have to be done that way.

Vis explained that on the Oakville project, the crew saved time by boring up grade in one direction, and down grade in the other, from the same pit. That reduced set-up time.

Manufacturer's comments

Vermeer engineering technician Bo Howell explained that the steer-

ing shell on the unit is a precise 13.5 inches in diameter. When boring a hole, maintaining that maximum diameter allows the operator to make precise adjustments as needed to maintain a consistent grade without deviation.

When wider diameter bores are required, the line is reamed out to the wider size as the unit is pulled back after the bore. The pipe is pulled in and additional debris removed during the same pullback operation, he said.

The Oakville project was to conclude with punching through the pit at the end, then pulling back new piping using the same machine.

Because of the soft clay soil in the ground where the shot was made, however, the crew ran into some unexpected problems that were unrelated to the AXIS system itself.

Late in the day on April 3, clay from the drill obscured the lens of the closed circuit camera. After

several unsuccessful attempts to wash the clay off, the shaft had to be withdrawn so that the camera could be cleaned.

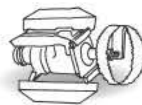
With that, the crew then opted to start the shot over with a fresh bore, which Howell and Vis explained was necessary to preserve the integrity of the sewer line shaft. Too many repeated bores into the same hole would weaken the earth surrounding the line and risk compromising the precise grade that the gravity-fed sewer required, Howell explained.

Vis said that was the first major hiccup in the project, and one reflective of the challenging soil conditions on the site and not any kind of problem with the AXIS system.

He noted that until the final shot, the entire project had required boring through the red shale that is most common in the area, and no problems had occurred. ♦

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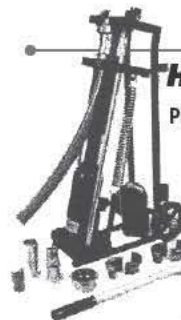
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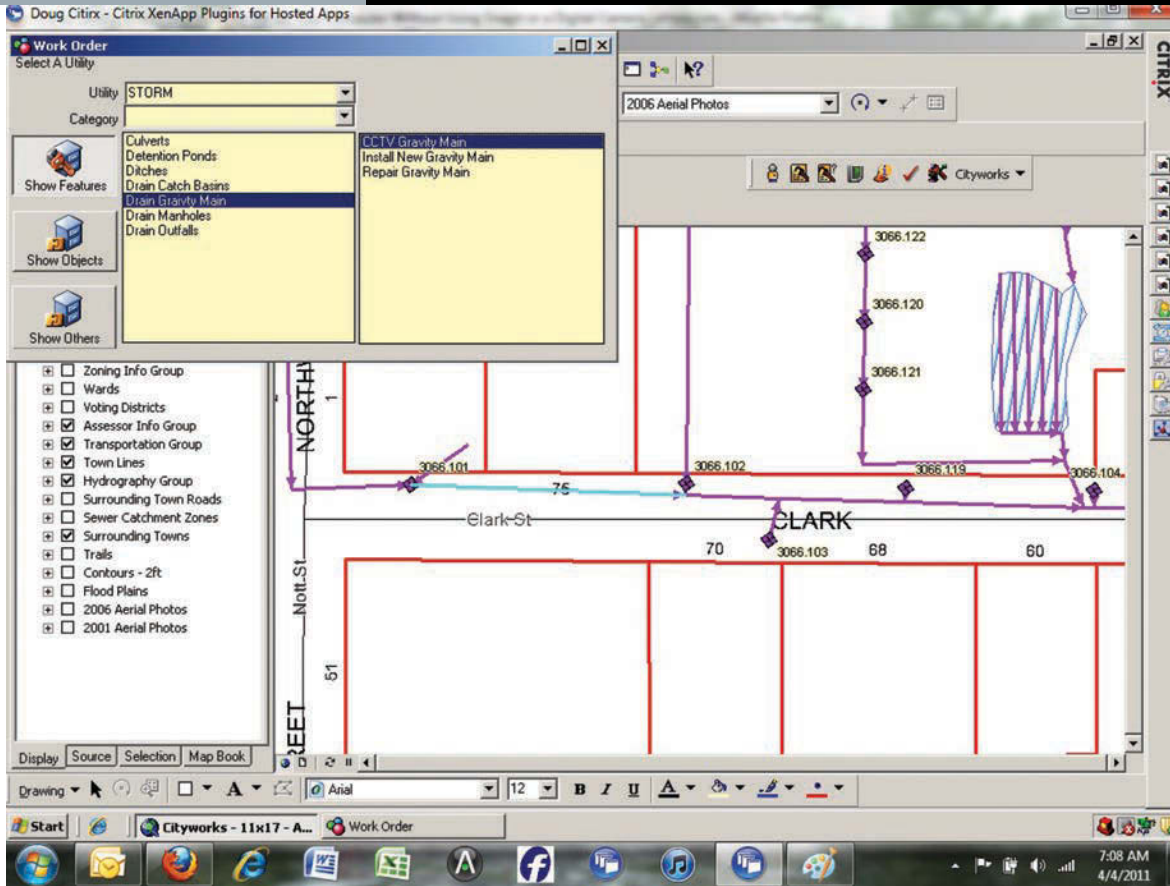
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City of Saco (Maine) Public Works Department

The user selects an asset in the GIS and attaches it to a work order in this Cityworks screenshot. (Photos courtesy of Saco Public Works Department)

FROM DRAWERS TO THE DESKTOP

City of Saco consolidates data and improves customer service with new asset management system

By *Scottie Dayton*

“Improved communication is one of the biggest advantages of the program. When calls come in, we don’t lose track of them anymore. That’s huge for us. The other big advantage is having all the asset data in one place and a mouse click away.”

Doug Howard

The City of Saco (Maine) Public Works Department recorded maintenance on its sewer and stormwater systems on sheets of paper and index cards. Management stored the information in file cabinets by street, and the city has 300 of them.

“Every street has its own folder, and anything that happens, from pothole to sewer repairs, is stored in it,” says Doug Howard, the environmental utilities supervisor. “Finding something meant fumbling through each bit of paper.”

In 2006, management tackled the problem of how to make work more efficient. They wanted a system that the department and the wastewater treatment plant could use. A solution fell into their hands when Howard discovered a Cityworks asset management software package from Azteca Systems on the computers.

“A previous manager had bought the program, but failed to administer it,” says Howard. “As soon as I looked at it, I knew this was exactly what we needed.”

Azteca updated the account and

the software, which became the central piece of the department’s customer communication plan.

“Cityworks helps us provide better service by communicating customer concerns to our workforce and their solutions to residents,” says Howard. “It was instrumental in organizing our workflow, and now the data is in one easy-to-access location.”

Tailored templates

Saco is Maine’s tenth largest city, with a population of 18,500. The 45-member Public Works Depart-

ment takes care of 69 miles of sanitary sewers, 30 lift stations, 1,750 manholes, 56 miles of storm sewers and 1,800 catch basins. Howard, collection system foreman Joe Cooper, and collection system operator Mike Cash maintain the sanitary and storm sewers.

In the not-so-good old days, the department kept track of schedules for cleaning sewer and storm-water pipes by printing big maps, hanging them on walls or storing them in drawers, and highlighting streets as work progressed.

“We clean 10 hot spots monthly, another six quarterly, and the rest are on a five-year rotation,” says Howard.

The city used a form for cleaning catch basins that gave just a street address. Basins are often across the street from each other, but if no property was associated with one of them, the cleaning operator listed them as street address A and B. “I knew the technician cleaned both basins, but I didn’t know on which side of the street they were,” says Howard.

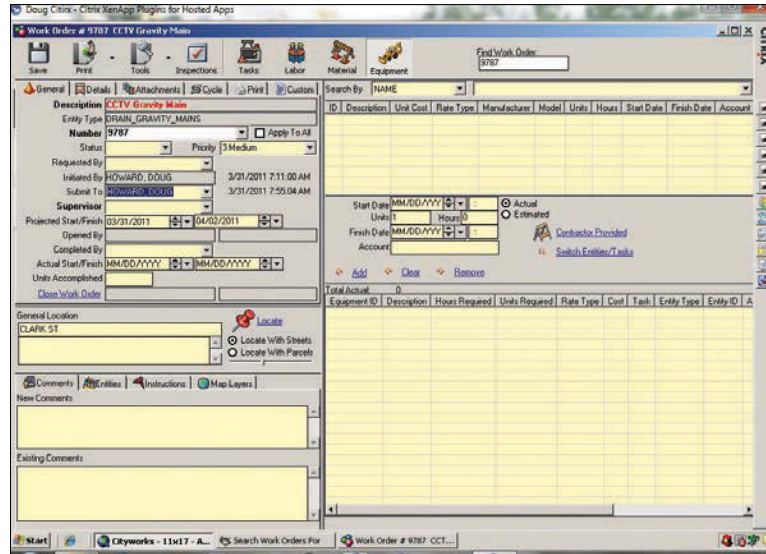
Howard created some preliminary work orders and service requests in Cityworks, then showed them to upper management. Mike Bolduc, director of Public Works, agreed with Howard’s evaluation of the system and tasked him with initiating it. He began by training the three foremen in the department.

“Field technicians don’t always have a work order in hand, but the foreman does,” says Howard. “They can tailor work order templates to the job, guaranteeing that they bring back the kind of information we need in the database.”

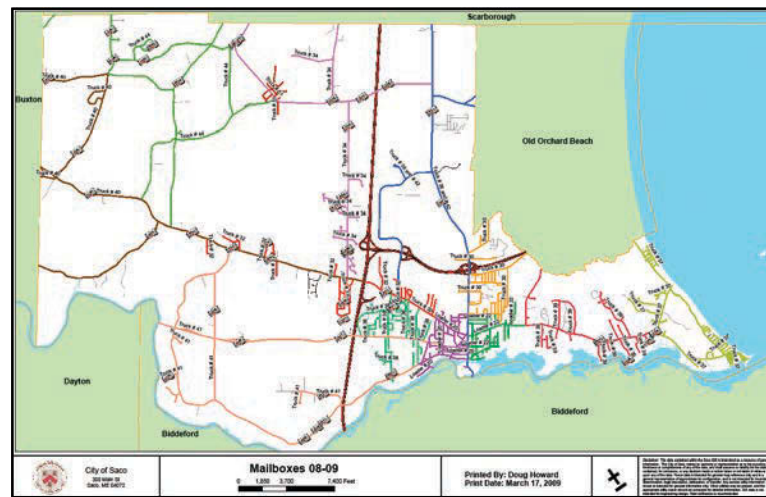
The department now has 15 people trained on Cityworks, including Cash and utilities inspection operator Andrew Whitaker. The sewer division has a laptop computer that Cash and Whitaker share to do updates. As technicians become better trained on the software, they also will do updates in the field.

Communication advantages

Years ago, customer complaints and concerns were written on a



Cityworks displays a work order to televise a sewer line.



In this Cityworks screen view, service requests are geocoded in the creation of an event layer for mailboxes that were damaged by snowplows. Streets are color coded by plow routes.

notepad, and the page was handed to somebody who occasionally misplaced it or forgot what needed to be done. “We didn’t have many unhappy residents, but they did call to ask what was going on because they hadn’t heard from us,” says Howard. “Now we have a much faster response time and informed customers.”

Customer calls are logged in Cityworks as service requests, which can generate work orders if needed. Howard set up the service request template to collect the caller’s contact information. The program emails

the phone message to the proper manager and sends a confirmation email to the caller.

“If customers don’t provide email addresses, our policy is to call them within 48 hours to acknowledge their request and tell them our schedule for attending to it,” says Howard. Once the service request or work order is closed out, Cityworks emails the resident stating that the work is completed.

“Improved communication is one of the biggest advantages of the program,” says Howard. “When calls come in, we don’t lose track

of them anymore. That’s huge for us. The other big advantage is having all the asset data in one place just a mouse click away.”

Looking ahead

The city has mapped 95 percent of its assets using Esri ArcGIS software and is working this year on inputting updates into Cityworks. The remaining 5 percent of the assets are incorrectly mapped or known but unmapped.

“We send staff and interns with a Trimble backpack GPS unit to map assets still not in GIS,” says Howard. “If our field technicians find an incorrectly mapped asset, they tell the foreman, and he redlines it on the work order.”

The department also plans to expand Cityworks beyond managing sanitary and storm sewers. Howard is creating a template to track snowstorms, including how much sand and salt was used, who worked the storm, and how many hours they worked.

“It will give us history on how much it costs to run a snowstorm,” says Howard. “We’ll begin doing that this winter. We’re creating similar templates for major weather events that could become emergencies. It will help make FEMA reporting easier.”

The department also created work orders to track the maintenance history of street signs, traffic lights, sidewalk repair, and solid waste and recycling complaints. Key components of the city’s asset management program were presented at the 2008 Maine Rural Water Association conference and used as a 2007 case study by the U.S. EPA. In 2010, the city received the Asset Management Excellence Award from the New England Water Environment Association. ♦

WINNING AT OFFICE POLITICS

Understanding workplace relationships will help you manage the bigger picture

By Ken Wysocky

Anyone who says they sidestep office politics is essentially a liar — or in denial.

“Avoiding office politics is like trying to avoid air,” says Marie McIntyre, a nationally known management consultant and the author of *Secrets to Winning at Office Politics: How to Achieve Your Goals and Increase Your Influence at Work*. “If you have more than two people at work, you’ll have politics in one form or another. The key is to manage relationships in ways that let you get your job done and achieve your career goals at the same time.”

In theory, that should be easy. Just follow what McIntyre calls the Golden Rule of Office Politics: Never do anything that would harm the business where you work or other people.

Reality is a much different animal, however. For a myriad of complex reasons, common sense often goes out the window when it comes to workplace relationships, and that’s true for both managers and their direct reports. From turf battles to personality conflicts, McIntyre has seen it all over the years.

“Too many times, people forget to put that filter between their brain and their mouth,” she notes. “They have a purely emotional reaction to something and do or say something completely inappropriate ... anyone who thinks it’s good to be completely honest (with

opinions or feelings) at work is stupid. You need to be in adult, professional mode at all times, and keep the bigger picture in mind.

“There’s no mileage to be gained in having bad relationships at work,” she continues. “You never know who’s assistance you’re going to need down the road, who may influence a decision that affects you — a promotion, for instance — or who might even be your boss one day.”

Aside from potentially deep-sixing your career, venomous work politics also create larger, negative ripple effects within organizations. While it’s difficult to quantify, McIntyre notes that political jousting and game-playing deters collaboration, wastes time and energy, increases employee turnover and boosts the odds of missing business opportunities.

So how do you go about diffusing all these political landmines and ensuring your career path isn’t headed for a steep cliff with no guardrails? McIntyre suggests following these six tips to become a more politically savvy employee:

1. Get on board with your boss. Unless you have an invaluable or irreplaceable skill, or are the nephew of the person who owns the business where you work, it’s time to face an irrefutable fact: Your boss has way more leverage than you do. As such, waging a battle against him or her makes about as much sense as a kickstand on a vacuum truck.

“Unless they’re doing something illegal or unethical, you must adapt to your boss’s leadership style,” McIntyre says. “I’d say that 95 percent of the time, if you go to war with a boss, you’re going to lose. You don’t get to pick your boss ... and too many people fail to realize that an important part of your job is managing that relation-

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.

who has that power — and recognize when it shifts.

“One of the most common flash-points for any employee is when a new manager or chief executive officer steps in,” she points out. “When that power shifts, people often fail to realize they need to build new relationships. Expectations are going to change and you

“Too many times, people forget to put that filter between their brain and their mouth. They have a purely emotional reaction to something and do or say something completely inappropriate ... anyone who thinks it’s good to be completely honest (with opinions or feelings) at work is stupid.”

Marie McIntyre

ship with your boss. You must learn to manage up.”

2. Be a 360-degree player. You have relationships in all directions at work — a boss above you and peers all around you. Some people get along well with co-workers but are oppositional to authority. Others suck up well to management but get in squabbles with co-workers. But a good 360-degree team player builds relationships in all directions, McIntyre says.

3. Understand the power map. Organizations rely on hierarchies because they need people to make decisions to get things done. To be politically savvy, you need to know

need to find out what they are. This is especially true if your new manager comes from outside the organization, because they know nothing about you, and all your leverage is gone.”

Employees who face new expectations or management styles must be flexible and realize that just because things are different doesn’t mean they’re wrong — unless it’s illegal or unethical. “If it’s too uncomfortable for your style or personality, maybe it’s time to get a new job, because you’re not going to change the organizational culture,” she adds.

4. Be your own best promoter. Most people don’t want to talk them-

selves up for fear it will sound like bragging. Get over it — but be subtle, McIntyre suggests.

“Self-promotion doesn’t mean bragging, it means looking for opportunities to let people know what you do,” she notes. As an example, she cites a client who was frustrated about a three-year wait to get her position reclassified, due to extra responsibilities she’d assumed. When asked to pinpoint the last time she’d reminded someone that her additional responsibilities warranted a reclassification, her reply flooded McIntyre: Three years ago.

“I told her she needed to go in with documentation about all her new responsibilities and talk about all the things she does that now go above and beyond her original classification,” she recalls. “Some people think that if they just wait, someone will reward them appropriately ... but most of us are way more aware than management of what we do.”

How does one go about subtly promoting themselves without looking like the resident Eddie Haskell suck-up? If your manager doesn’t request regular feedback from you about your job, McIntyre suggests you offer to provide a monthly summary of your activities.

“Only a moronic manager would say no to that proposal,” she says.

Employees also should look for opportunities in casual conversations to mention activities and accomplishments. The bottom line: If you’re waiting around for someone to notice what you’re doing, you’re being way too quiet, she warns.

5. Connect with the power people. Whether you want to attend a conference, tackle a special project or get a promotion, someone higher up than your immediate manager will likely make the ultimate decision. As such, the more familiar you are to the people who have the power to affect your career, the more likely those decisions will fall in your favor.

That means maximizing what may be limited opportunities to

chat with higher-ups at, say, a Christmas party or a company picnic, or when you unexpectedly bump into them in a break room.

“Higher-level people often feel uncomfortable with employees, so it helps if you have a question to ask, or something to share about what’s going on in your end of the business,” McIntyre says. “Or mention a new business trend.”

6. Commit to the business. It’s almost axiomatic that people who are higher up in the corporate food chain — and who can affect your career — also are jazzed about your company’s business. So if you want to impress those people, you must be able to talk adroitly about the business, McIntyre says.

“You need to be as interested in the business as they are, so pay attention to trends in and read publications about your industry,” she suggests. “You should be conversant about the environment in which your company operates. And if you’re in a business you really don’t give a flip about, maybe you’re in the wrong business.”

In short, if you want a promotion, a transfer to a different job or a good performance review, you need to play politics, whether you want to or not.

“Even if you want nothing more from a job than a more pleasant environment in which to spend eight hours a day, you need to manage relationships,” McIntyre concludes.

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THE EDUCATION STANDARD

High-level instruction makes Pipeline Assessment Certification Program successful

By Ted DeBoda, P.E.

In the April issue of *MSW I* discussed the importance of planning the evolution of the Pipeline Assessment Certification Program (PACP) to maintain the standard's value while keeping the data relevant and meeting the needs brought about by new technologies. Another important component of the success of this standard is the PACP users' initial certification training.

Over the past two years, NASSCO has taken a closer look at the quality of our more than 140 trainers and made a significant effort to ensure these PACP trainers are prepared to provide quality training and have adequate, practical experience with CCTV so they can answer a wide spectrum of questions from students. This starts when individuals who are either certifying initially to become trainers, or recertifying to maintain their trainer

status, submit an application and resume. The PACP Trainer Board reviews each application and resume, and either approves or denies the application based on experience with coding, teaching experience, use of PACP to develop project deliverables, and other areas. Not all applicants are approved.

Trainers who are approved by the board are required to take an online PACP examination and code a video. After successfully completing the exam (with a higher score than required by PACP users) and accurately coding a pipe segment video, they may then attend a PACP trainer class.

The purpose of the PACP trainer class is not to learn PACP, but rather to confirm that the potential trainer can train the PACP class in accordance with the approved syllabus. During these classes, which are conducted by PACP master

trainers, potential trainers are expected to teach PACP to their peers and one or more master trainer; answer questions using personal experience; and meet the time demands of training on all the material. Only after they have met all of these challenges can they become PACP trainers.

This sounds like a lot for PACP trainers to go through, and perhaps it is. However, those trainers and potential trainers with years of experience using PACP data, experience working in CCTV trucks and creating deliverables with the data generally have few problems successfully completing all the steps. The classroom time actually presents opportunities to explore the limitations of PACP and look for improvements.

When new PACP training opportunities arise, NASSCO has been using webinars to review information with PACP trainers. Webinars

are a very efficient way to provide a great deal of information at minimal cost to recipients. When MACP and LACP were added to the manual, many trainers took part in a 90-minute webinar to review the new materials with trainers. With the addition of the one-day PACP recertification class, NASSCO will

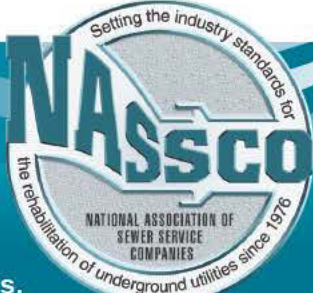
When new PACP training opportunities arise, NASSCO has been using webinars to review information with PACP trainers. Webinars are a very efficient way to provide a great deal of information at minimal cost to recipients.

conduct similar webinars to introduce the new training materials to the trainers.

As NASSCO was creating the new material used in the one-day recertification class, it became apparent that much of the material could replace material in the two-day PACP class. We hope to get these improvements, which follow the book better than the previous training materials, out to all trainers in the near future.

NASSCO, and particularly the experienced, dedicated PACP trainers, have been working hard to continue setting industry standards for the assessment and rehabilitation of underground pipelines and to assure the continued acceptance and growth of trenchless technologies. If you would like to get involved in the myriad of opportunities that NASSCO offers, please feel free to contact us and discuss how you can participate. ♦

Ted DeBoda is executive director of NASSCO. He can be reached at director@nassco.org. NASSCO is located at 11521 Cronridge Drive, Suite J, Owings Mills, MD 21117.




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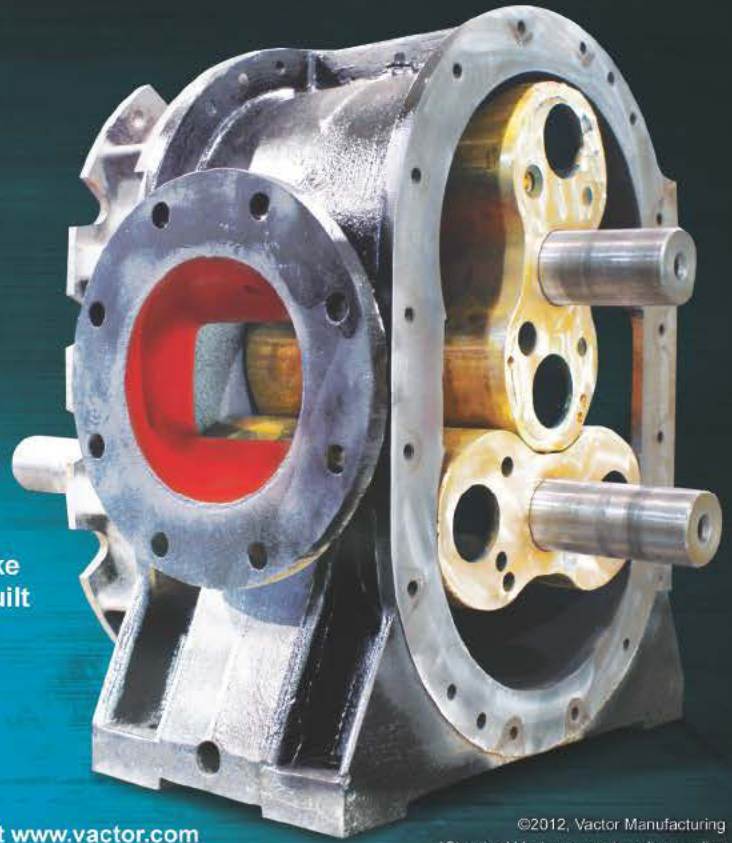
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By Briana Jones

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An impact-resistant polycarbonate light ring cover adds protection. The system provides 512 Hz sonde and features a detachable 8.4-inch LCD monitor with AR film for optimal viewing in sunlight, all housed in a weatherproof hard case with a protective acrylic, anti-glare monitor shield. An easy navigation menu allows transfer of MPEG recording files to a personal computer or laptop with USB ports. A two-hour NiMH battery with built-in charger and power display is included, along with an on-screen footage counter. The system comes standard with 200 feet of Kevlar braided 1/2-inch-diameter pushrod. It includes powder-coated steel tube-and-bar construction with a secure-locking reel brake. The camera rolls on 8-inch wheels. **800/833-1212; www.electriceel.com.**

Camera carriage

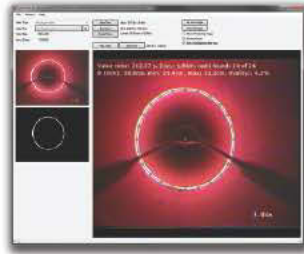
The **bolt-on carriage** for **Envirosight's ROVER X** raises the crawler, expands its wheelbase and gives it ground clearance. The carriage attaches in seconds and accepts all ROVER wheels, as well as two pneumatic wheel options. When used in tandem with the system's remote camera lift accessory, the carriage gives the camera an overall inspection capability of 6 to 72 inches, plus the ability for centered viewing in most common pipe sizes 24 inches and larger.



The carriage elevates the crawler 4.4 inches or more with pneumatic wheels. It lengthens the crawler's wheelbase 75 percent, widens it 150 percent, and offers 7 3/4 inches of ground clearance. The camera's ultra-powerful motors and efficient gear train allow it to still pivot in place and easily pull the full length of its 1,000-foot cable. The carriage is available with two large pneumatic wheel sets. One style measures 10.4 inches in diameter by 3.8 inches wide and has knobby tread suited for deep silt and debris. The other style measures 8.4 inches in diameter by 2.2 inches wide and has less aggressive tread. **866/936-8476; www.envirosight.com.**

Laser module

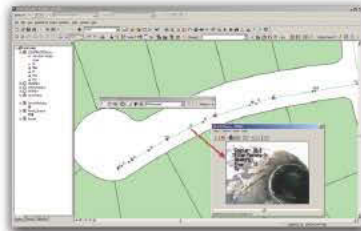
The **WinCan** laser module from **Pipeline Analytics** captures geometric information to verify proper pipe installation, plan relining projects, determine remaining pipe life, monitor erosion/corrosion and analyze partial collapses. It accepts standard and HD video and links collected data to the asset being inspected for easy recall from a section view or GIS entity. The module works with most laser profiling hardware, capturing data in one of three modes.



In parallel laser mode, a properly equipped camera aims its parallel lasers perpendicular to a pipe wall, then rotates 360 degrees. Video is analyzed to determine pipe diameter and deformation at that location. In ring mode, a laser ring pattern is extracted frame by frame from crawler video to trend a pipe's diameter and deformation over its full length. This data is readily converted to a solid model, ovality graph or color plot. In scanning mode, a ring pattern is interpolated from the laser dots cast by a properly equipped side-scan camera. The readings are trended frame to frame, yielding diameter and deformation data that can be converted to a solid model, ovality graph or color plot. 877/626-8386; www.pipelineanalytics.com.

GIS mapping

The **GIS** module from **PipeLogix** allows users to create a map of assets from existing survey work. Once the GPS coordinates are added to the survey data with the "Get GPS" tool, users can export new or existing pipes to update or create a map. The tool can be used to import the coordinates from a GPS unit that is connected to a computer, or information can be manually entered by copying and pasting from other forms.



The system makes exporting pipeline inspection survey conditions and displaying them on maps with correlated exact footage easy. Users choose the condition export needed (shape file, personal geodatabase, enterprise geodatabase, and file geodatabase are all supported), map the fields and export. Once added to the ArcMap and using the toolbar, users can select the condition and open the video file to view it. 866/299-3150; www.pipelogix.com.

GIS software

Cityworks is a suite of GIS-centric enterprise software solutions designed for public and private agencies that manage capital assets, permits, licensing and land-related activities. Built on Esri's ArcGIS technology, the software uses the geodatabase as the authoritative land and asset data repository. It is certified by the National Association of GIS-Centric Software.

With an easy-to-use and customizable user interface, agencies can respond to customer needs, schedule and track maintenance operations, issue permits and business licenses, and manage property issues. In the field, office or warehouse, the software streamlines operations throughout the enterprise. Based on open standards, intuitive reporting tools provide easy access to the data. 801/523-2751; www.cityworks.com.

Laser push camera

The **MiniLite** pan-and-tilt push camera with laser measurement from **RapidView IBAK North America** is a pipe inspection system that allows users to inspect, record and measure the internal dimensions of small pipelines. Users can accurately capture diameter measurements with one touch using the **ORION** zoom camera during normal inspection operations. The system consists of a replaceable coiler cartridge, portable command console and one of several choices of cameras. The unit includes a high-visibility 10.4-inch monitor and a full QWERTY keyboard. Inspections can be recorded on a built-in MPEG digital video recorder on SD and SDHC memory cards. The system is available in 100- and 130-foot lengths. 800/656-4225; www.rapidview.com.



Versatile camera system

The **SeeSnake Max rM200** camera system from **RIDGID** is an inspection system for lines up to 200 feet in length and 1.5 to 6 inches in diameter. The unit combines portability and versatility. Features include improved reel mechanics for easy passage through tight turns, an ultra-compact camera capable of providing optimal lighting, and an upgraded 200-foot cable, which provides high-quality abrasion resistance and allows users to push further with less effort.



The inspection system is compatible with the company's full line of SeeSnake monitors, including the CS10 and CS1000 digital recording monitors. The unit comes with an integrated transport system to make it easily portable. Users can carry the reel with the included shoulder strap or use the integrated wheel system. 800/769-7743; www.ridgid.com.

Compact inspection

The **CUBE** from **RS Technical Services** is a compact, all-inclusive mainline system that offers all the inspection capabilities found in vehicle-mounted systems. It provides portability and transport flexibility and is well suited for easement work or for users needing a full mainline system in a free-standing, highly mobile format.



Housed in quarter-inch, powder-coated, glare-resistant aluminum, the system has forklift access in the front and rear along with stainless steel lift and tie-down hooks for easy handling and storage. The system is designed to fit on an ATV or in the bed of a pickup truck. It can be configured to operate any of the company's mainline cameras and transporters with up to 1,500 feet of cable for inspections in lines 6 inches and larger in diameter. Everything is self-contained, including an onboard generator, two 500-pound capacity storage drawers and a front-access 9-gallon pressurized washdown system. An optional rack mount or laptop computer with a choice of data collection software is available. 800/767-1974; www.rstechserv.com.

(continued)

Versatile camera

The **Wohler VIS 340** is a versatile inspection camera set that comes in a self-contained carrying case. Users can analyze defects in water pipes and inspect flue-gas lines, chimneys, air-conditioning lines, heating lines, ducts, welding seams, gaskets and manholes. The miniature, waterproof camera head is equipped with 360-degree pan and 180-degree tilt technology and a bright LED light, providing an all-encompassing view of dark spaces. The system includes a TFT color monitor and can negotiate 90-degree bends. The digital distance measurement feature pinpoints the exact location of trouble spots. Users can record, save and replay inspections for customers. **978/750-9876; www.wohlerusa.com.**



Mapping module

Lucity Sewer is a solution for maintaining and improving wastewater collection systems. It offers the data needed to prioritize system rehabilitation and analyze inflow/infiltration removal. The program tracks regulatory information, including sanitary sewer overflows (SSOs). The module tracks data, including location, date discovered, estimated volume of release, emergency response and notification, and generates the appropriate documentation for reporting. The FOG module addresses specific sewer environmental compliance needs, helping users track and analyze inspection and pump schedules, traps, storage and disposal, and industrial pretreatment.

The program provides several inspection modules to house various inspection results, while also supporting NASSCO standards. Users can track PACP/LACP/MACP data and condition ratings, record rehab recommendations, and identify any other necessary work. The modules interface with industry-standard CCTV inspection data collection systems for importing pipeline inspection information for inventory updates and condition assessment. The system also interfaces with SCADA systems for monitoring pumping readings to trigger appropriate preventive maintenance activities. All tools integrate with Esri ArcGIS. **800/492-2468; www.lucity.com.**

Steerable tractor

The **Pathfinder XL** tractor from **Aries Industries** has a 6-wheel steerable drive system that allows it to drive over obstructions and offset joints. Tires range from the standard 3 3/8-inch for lined 8-inch pipe to 10-inch tires with bolt-on gear-reduction side plates for 36-inch and larger pipes. The tractor can be converted to tread-track drive.

With remote operated camera lift in the down position, the unit can navigate 8-inch lined pipe. With 9 inches of lift, the operator can center the camera in the pipe or raise the camera above the waterline. Additional features include a tip-up connector with integral rear-viewing camera and LED lights, sealed and pressurized electronics cavities, on-screen diagnostics, brushless DC drive motors with temperature sensors, and permanently lubricated drive gears. The tractor has a built-in 512 Hz sonde beacon, and optional auxiliary lights can illuminate large-diameter pipes. **800/234-7205; www.ariesindustries.com.**



Portable inspection

The **Pan n' Tilt** push camera from **Ratech Electronics** is a portable inspection system for pipes and drains as small as 3 inches in diameter. Users can choose the type of camera to use with the push system: black and white, color, self-leveling, micro, or pan n' tilt. The camera can be retrofitted to the company's existing systems or as a stand-alone unit. It rotates 330 degrees vertically and 220 degrees horizontally. The cost-efficient unit is adaptable to the company's Jet Cam.

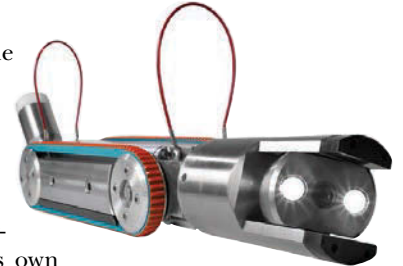
Combining the camera with the company's control unit, such as the Elite SD, gives recording capability using SD/USB drive and allows MPEG video capture and JPEG image capture. Also included is an on-screen display overlay system providing electronic distance counter, time, date and eight pages of memory for listing problems and displaying of company information. Standard 200-foot gel-rod cable is included. **800/461-9200; www.ratech-electronics.com.**



Steerable crawler

The **Model 636S** 6-inch steerable crawler from **TV Ferret** is based on a one-piece monotube stainless steel o-ring sealed structure for a streamlined, submersible design to inspect pipes up to 36 inches. The crawler has full differential steering, allowing it to rotate about its own axis. It has a stainless steel articulating cable receptor to alleviate stress on the main cable and is designed for quick, easy connection without tools.

Reinforced urethane tracks are a one-piece continuous loop. The solid paddle tracks obtain maximum traction in difficult conditions and do not bind in loose grit. A modular lift wheel system attaches to the outside of the crawler without removal of the tracks. The pan-and-tilt camera head contains a high-resolution camera. The ultrabright LEDs can fully illuminate a 12-foot pipe. Options include a 512 Hz locating sonde, rear-viewing backup camera, internal pressure monitor, pan/tilt/zoom camera, and abrasive high-traction lift wheels. **518/399-2211; www.tvferret.com.**



Modular inspection camera

The **vCam** inspection system from **Vivax-Metrotech** includes a control module with an 8-inch color LCD, dual-frequency transmitting sonde, digital recording to an internal hard drive or SD card, full function keyboard, internal microphone, AC/DC power, rechargeable batteries, USB interface, RCA jacks for video and audio, distance counter, and camera LED brightness control. The modular design makes it field-serviceable. A range of reels allows for inspection of diameters from 3 to 12 inches and distances from 60 to 400 feet. The reels are fitted with field-serviceable camera terminations as standard equipment. **800/446-3392; www.vxmt.com.** ♦



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Monitoring catches utility theft

Problem

Pasco County Utilities in New Port Richey, Fla., has numerous electronic flowmeters that customers occasionally turned off before running their water or sewer pumps.

Solution

To obtain legal proof of customer tampering, the agency used a **dataTaker DT821 industrial data logger from CAS Dataloggers**. Workers placed an external port inside a portable Pelican case, added a through-the-case port, inserted the data logger, and chained the case to a concrete pole adjacent to a meter. The data logger's universal inputs connect to various sensors, while USB stick support makes data collection fast and easy. Data is downloaded in an unalterable binary format.



RESULT

"We found out the real usage in suspect cases by measuring the water and sewage flow and comparing them with the digital outputs measuring the dry contacts on the pumps," says electronic technician Clifford Farris. "The documentation is instrumental in proving our case, as the binary file qualifies it a legal digital copy." 800/956-4437; www.dataloggerinc.com.

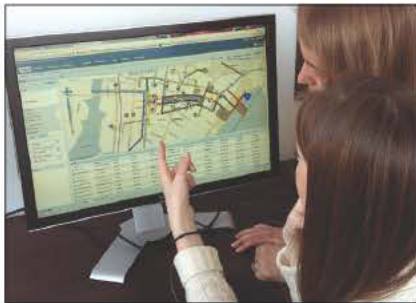
Web solutions stretch city budgets

Problem

The Northern Kentucky Area Planning Commission had a paper-driven, time-consuming process for coordinating projects. There was potential for conflict when the City of Covington, Ky., planned to pave three streets in the same area where the Northern Kentucky Water District had scheduled water main projects.

Solution

The Commission purchased the **Envista Enterprise Right-of-Way Coordination Platform**. The cloud-based solution brought together municipalities, water and sanitation utilities, and fiscal courts from two counties, enabling stakeholders to manage multiple projects simultaneously and avoid conflicts.



RESULT

Covington identified the overlap in projects and worked with the water district to incorporate resurfacing into its projects, saving the municipality \$18,000. "Envista had an immediate effect on our productivity and efficiency," says assistant city engineer Mike Yeager.

"Covington and utility companies can now coordinate and prioritize projects based upon each other's needs and budgets." 978/232-6300; www.envista.com.

Logger supports motor on/off measurements

Problem

Upper Allen (Pa.) Township officials wanted to gather motor run times on pump stations and equipment at wastewater treatment plants to help them choose new technologies and processes to reduce energy usage and nutrient flow.

Solution

Auditors attached **HOBO U9 data loggers from Onset Computer Corp.** as close to the motor coils as possible. Mounting options included a magnet, hook-and-loop tape, and 3/8-inch double-sided tape. An internal A/C magnetic field sensor monitored motor on-and-off conditions, recording up to 43,000 state changes. A direct USB computer interface launched the monitors and uploaded data. Filters included percent and seconds of high- and low-run times, total state changes, and total on-to-off and off-to-on cycles.



RESULT

After four weeks, the data was uploaded, then extrapolated for a year to see how many kilowatt hours each motor used. 800/564-4377; www.onsetcomp.com.

Electromagnetic assessments help city

Problem

The failure of a 48-inch pre-stressed concrete transmission main opened a hole across three traffic lanes and disrupted water service to 80,000 people in Ottawa, Ontario. The utility needed a condition assessment program to monitor the line and avoid future service interruptions.

Solution

The city, Pure Technologies, and Robinson Consultants of Kanata developed a plan that put the pipeline back in service in months. Following a visual inspection of the main, **Pure Technologies technicians launched PureRobotics**, a modular electromagnetic inspection robot on a tracked vehicle tethered by a fiber optic cable. The pan-tilt-zoom closed circuit television system produced high-definition digital video footage that was used to analyze the line.



RESULT

The sensors found 41 out of 865 inspected pipes needing rehabilitation. 855/280-7873; www.puretechltd.com. ♦

Carboline's Reactamine 760 receives FDA approval

Reactamine 760, an elastomeric polyurethane hybrid lining from Carboline Co., has received FDA approval for direct dry food contact in addition to its UL certification for potable water service.

Parkson names Turpin vice president

Parkson Corp. named Mark Turpin vice president of strategic marketing and business development. Turpin joined the company in 2007 and most recently served as vice president and general manager of aftermarket products and services.

Synagro appoints Zimmer president, CEO

Synagro Technologies Inc. appointed Eric Zimmer president and chief executive officer. Zimmer has 22 years experience in the environmental services industry. He joined the company in 2011 as executive vice president of Synagro's services division and succeeds Bill Massa who resigned in October.

Super Products adds regional sales managers

Super Products LLC expanded its field support team with the addition of industrial sales managers Mike Drott and Russ Coaliron. Drott will represent the Midwest market and Coaliron will manage the Gulf South Region.



Mike Drott



Russ Coaliron

SCAA appoints Gallagher to board

The Spill Control Association of America (SCAA) named C.I. Agent Solutions representative Michael Gallagher to its board of directors.

AP/M names Southeast regional manager

AP/M PERMAFORM named Keith Morrison Southeast regional manager. He has 15 years of sales experience with seven focused on civil engineering projects.

Vac-Con hosts annual dealer meeting

Vac-Con Inc. hosted its 24th annual dealer meeting in March. Municipal Maintenance Equipment of California was recognized as the top dealer for 2011.



Recognized as the 2011 Vac-Con Dealer of the Year from MME were, from left, Darrell LeSage, Mark Protine, Dave Aznar, Tray Hall III, Julie Posner, Bob Egli, Frank Wheeler, Helen Wheeler, Todd Masley, Ron Paproski, Tim Powers and Terry Pellecchia.

Electric Eel offers tool selection guide

Electric Eel Mfg. Co. Inc. offers a cable and tool selection guide for Mainline Tools on its website, www.electriceel.com.

Sprayroq adds business development manager

Sprayroq Inc. named Kenny Orr Midwest business development manager. He has 20 years of sales experience, including the past five as a Sprayroq representative.

Coxreels releases catalog

Coxreels released its latest 56-page catalog, featuring new models and specialty product lines. A PDF version of the catalog is available at www.coxreels.com.



RIDGID Reputation Roadshow in full gear

The nine-month RIDGID Reputation Roadshow will make 54 stops across 27 states and four Canadian provinces before concluding in September. Each stop will feature inspection products, utility locators, drain maintenance and pressing technology. A schedule is available at www.ridgid.com/roadshow.

Ditch Witch presents service, Chestnut awards

The Charles Machine Works Inc., manufacturer of Ditch Witch underground construction equipment, presented the Superior Service and Support Excellence Award for 2011 to Kelly Clark, and the Harold Chestnut Award to Jimmy Creecy, parts manager of Witch Equipment Co. The Chestnut award is presented annually to the parts marketing manager who best exemplifies the enthusiasm, dedication and creativity that Harold Chestnut brought to his profession for 30 years. ♦

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Product Spotlight

Valve maintenance trailer includes vacuum, jetter

By Ed Wodalski



PT13-LR trailer from Pacific Tek

The PT13-LR long reach valve operation and maintenance trailer from Pacific Tek combines valve exercising and maintenance in a towable trailer.

“The trailer keeps you from having to dedicate a vehicle,” says Dan Skorcz, president. Systems also can be mounted on flatbed trucks.

The exerciser’s extendable arms can reach out 13 feet to operate valves in the street, median or off the road. The single-axle trailer measures 10 feet from hitch to taillight, while the double-axle model measures 16 feet long.

The smaller unit can be used in confined spaces, residential neighborhoods and alleys.

Both units have a vacuum system for cleaning out valve and meter boxes and a high-pressure waterjet

for potholing to locate lines or valves. Five vacuum tank capacities (66-, 100-, 150-, 220- and 250-gallon) are available. The 66-, 100-, 150- and 220-gallon units have fixed-angle tanks, while the 250-gallon unit can be hydraulically tilted and has a full-diameter opening. The 66- and 100-gallon tanks also have a 3-inch hose connection, while the larger tanks have a 4-inch hose connection.

A single 20 or 25 hp Kohler gasoline engine powers the Roots vacuum blower and water pump. The jetter delivers up to 3,000 psi at 4 gpm.

The electronic torque meter is adjustable from 0 to 800 ft-lbs. The electronic counter records 1/10 of a turn for data accuracy.

The basic system features a data logger, similar to an Excel spreadsheet, that automatically captures the number of turns it took to close the valve and the amount of torque. Users can manually enter such information as valve identification number, condition of the valve box or location hints, such as distance from a fire hydrant. Information can be downloaded at the end of the day.

The advanced unit includes a Spatial Wave GIS infrastructure management system (Field Mapper) that communicates with the valve operating machine.

“You have your entire piping system, every valve and pump station on the screen,” Skorcz says. “You can track the vehicle as it moves through town to exercise the valve. It can also do calculations on fire flow ... and line isolation trace. If you have a broken water main, it’ll calculate which valves need to be closed to isolate the area, and which customers might be affected by the shutdown. You also can do a wireless transfer from your field computer to the home office.”

The exerciser’s chain-drive aluminum head is capable of 1,200 ft-lbs but is rated at 800, Skorcz says. “The thing that is going to give way when we exceed 800 pounds is not the power head — it’s the aluminum valve key. It’ll twist like a barber pole once you get over 1,000 ft-lbs. We also have a universal socket that will break at the joint at about 1,200 ft-lbs.”

Maintenance primarily involves lubricating the exerciser’s articulating joints. The hydraulic system also has a suction strainer and return line filter. A gauge indicates when the filters need changing. 800/884-5551; www.pacific-tek.com.

Reed deburr, chamfer tool

The DEB1 deburr and chamfer tool from Reed Manufacturing Co. creates a smooth, chamfered pipe end so solvent spreads evenly as the pipe is joined. The tool is made for deburring 1/2-, 3/4- and 1-inch PVC, CPVC, ABS, PP and PE pipe calibrated in iron pipe size and copper tube size. The tool has a knurled grip for slip resistance and sharpenable blade. 800/666-3691; www.reedmfgco.com.



PipeLogix 6.4.5 pipe survey software

Version 6.4.5 of the pipe survey software suite from PipeLogix Inc. includes the redesign of the recording and playback forms in the DVS module. The change enables users to take a photo during a survey and add it with one click during live recording and from video

playbacks. Audio devices are no longer needed for DVS to work on most computers. A program option allows the setting of DVS to autoplay. The enhanced GIS module enables the width of the highlight in the ArcMap toolbar to be set so pipes are easier to view and locate on maps. 866/299-3150; www.pipelogix.com.

Wacker Neuson trench roller

RT series (22-inch-wide RT 56-SC-2 and 32-inch-wide RT 82-SC-2) trench rollers from Wacker Neuson have lifetime lubricated drive gears and maintenance-free exciter gears and bearings. The infrared remote control system features line-of-sight control for operator safety. If the operator cannot see the machine or should the operator come within three feet of the roller’s front or rear sensing eye with the control box, the unit will stop moving and vibrating. The 16-channel control system enables the operator to select an unused channel for job site safety. 800/770-0957; www.wackerneuson.com.



Royal Building SDR 26 sewer fittings

Molded, heavy-duty solvent weld SDR 26 sewer fittings from Royal Building Products are made to withstand pressure from compacting soil during and after installation. Fittings are available in sizes from 4 to 8 inches in diameter and more than 100 patterns and configurations. 800/232-0888; www.royalbuildingproducts.com/plastic-trends.



Carboline Polyclad 975 epoxy coating

Polyclad 975 100-percent solids epoxy pipeline coating from Carboline is made to protect buried steel and ductile iron pipeline exteriors, girth welds or tie-ins. The coating can be applied by spray (plural airless or dual cartridge), while companion product Polyclad 975 H can be hand applied by brush or roller. The coating is compatible with FBE, coal tar, tape systems and cathodic protection. 800/848-4645; www.carboline.com.

Dust Control evaporator

The DriBoss DBE-750 evaporator from Dust Control Technology features a water fracturing design driven by a 25 hp industrial-grade motor. Engineered to eliminate wastewater quickly and cost-effectively, even without large evaporation ponds, the 7.5 hp submersible pump is attached to a frame that floats on polyethylene pontoons filled with closed-cell urethane foam. The evaporator can pass particles up to 3/16 inch without clogging or fouling nozzles, reducing the need for pre-filtering or cleaning dirty elements. 800/707-2204; www.driboss.com.



NLB 125 convertible waterjet

The 125 Series convertible waterjet pump from NLB Corp. includes ultra-high pressures. All models can be converted in about 20 minutes to any of eight operating pressures, from 6,000 psi to 40,000 psi using NLB's conversion kit. Flow ranges from 4.4 to 32.5 gpm with choice of 125 hp or 145 hp engines. 800/441-5059; www.nlbcorp.com.

Hach Biogas Titration Manager

The Biogas Titration Manager from Hach Co., designed for monitoring biogas production, features three pre-programmed methods and has seven free spots for more user-defined methods, such as acidity, chloride and hardness. The system provides real-time on-site analysis, dedicated FOS/TAC application package and a library of biogas methods. 800/227-4224; www.hach.com.

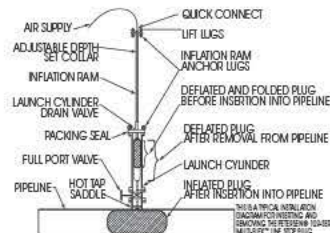


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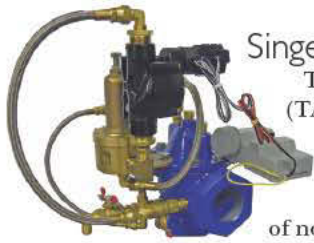
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Municipal Sewer & Water magazine is written solely for professionals who install, inspect, maintain and rehabilitate sewer, water and stormwater infrastructures.



Singer Valve purging system

The Total Automatic Purging System (TAPS) from Singer Valve Inc. is designed to flush tough pipes and improve water quality without compromising fire pressure while ensuring minimal loss of non-revenue water. The system uses an automatic control valve and battery-operated timer to control the time, length and pressure required to flush a distribution system. 604/594-5404; www.singervalve.com.

Honda collegiate team generator kits

The College Skinit Kit cover from Honda Power Equipment Group is available in six team designs for the EU2000i Super Quiet Series of generators. The kit consists of a thin, flexible generator cover, imprinted with official team logos and graphics from a choice of 29 college football teams, with the choke, check oil and on/off label integrated into the design. The skins do not interfere with the safety warning or serial number label, and are easy to apply and remove, leaving no residue. 678/339-2600; www.powerequipment.honda.com.



Jenny GT-Series air compressors

The GT-Series of electric-powered, two-stage air compressors from Jenny Products feature high-pressure output in 8-, 15-, 17- and 30-gallon tank models. All compressors produce 15.5 cfm at 100 psi or 15.2 cfm at 175 psi and are driven by commercial-grade, 5 hp motors that operate from a 230-volt, single-phase source. 814/445-3400; www.steamjenny.com.

ABB AquaProbe insertion flowmeter



The AquaProbe insertion electromagnetic flowmeter from ABB Inc. is designed to work with both WaterMaster and AquaMaster 3 transmitters and features a choice of power options, including main, battery and renewable, which can draw power from a solar or wind source. The probe is fully submersible and has no moving parts. 800/829-6001; www.abb.us/instrumentation.



General Pipe Cleaners Vista inspection system

The Gen-Eye Vista video inspection system from General Pipe Cleaners includes both DVD recorder and SD card reader for troubleshooting 3- to 10-inch lines with a full-size reel or 2- to 4-inch lines with a mini reel. Video or still images can be simultaneously recorded on both devices. An optional USB port is available. Features include built-in rechargeable battery for up to four hours of operation, 8-inch color LCD monitor, full keyboard, on-screen distance counter, built-in voice over, date and time stamp, LED dimmer control, camera test port and AC and DC power cords. The system includes a padded, 24-pound case that can stand alone or be mounted on a reel. 800/245-6200; www.drainbrain.com.



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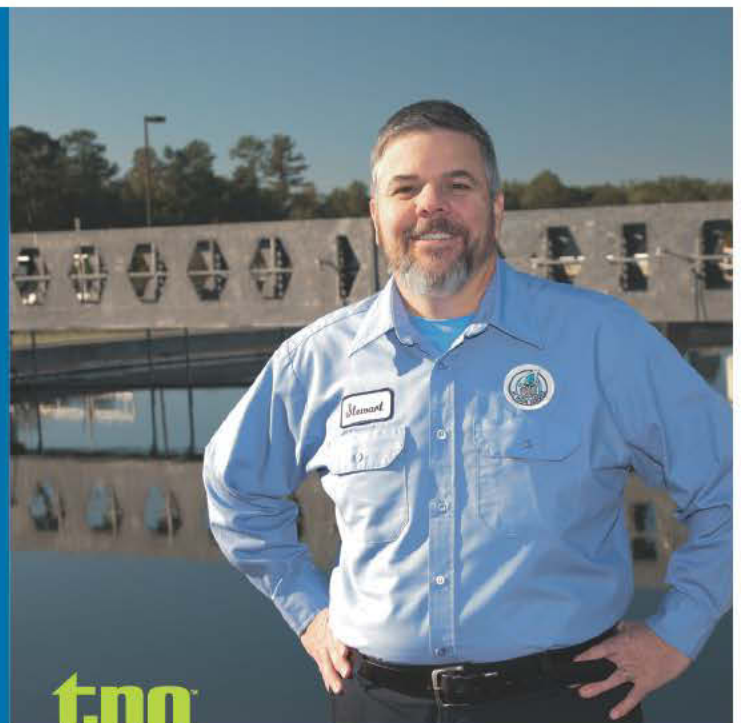
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WORTH NOTING

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

PEOPLE/AWARDS

The **Hopkinsville Surface and Stormwater Utility** received the Kentucky League of Cities Enterprise City Award for the construction of the Woodmont Basin System to reduce flooding in that area.

Howard LaFever, a member of the American Public Works Association, was named chairman of the Board of Directors for the Institute for Sustainable Infrastructure.

LEARNING OPPORTUNITIES

American Society of Civil Engineers

The ASCE has these courses:

- July 5 – Sustainable Stormwater Hydrology: Concepts to Reduce Hydrologic Footprint, webinar
- July 19 – Engineered Rainwater Collection and Case Studies for Sustainable Water Management, webinar
- Aug. 1 – Stormwater BMPs: What Works, What Doesn't and What About Maintenance, webinar
- Aug. 14 – Cold-Weather Stormwater BMPs That Work, webinar
- Sept. 27-28 – Stormwater Treatment Using Detention Ponds and Commercial Devices, Chicago

Visit www.asce.org.

American Water Works Association

The AWWA has these courses:

- Aug. 22-24 – Customer Service Certificate Program Seminar, Bloomington, Minn.

CALENDAR

July 18-20

Water Environment Federation Stormwater Symposium 2012, Sheraton Baltimore City Center, Baltimore, Md. Visit www.wef.org.

July 29-August 1

American Society of Agricultural and Biological Engineers Annual International Conference, Dallas, Texas. Visit www.asabe.org.

August 7-9

ISA Water/Wastewater and Automatic Controls Symposium, Orlando, Fla. Visit www.isawwsymposium.com.

August 13-16

National Association of Flood and

Stormwater Management Agencies Annual Conference, Coeur d'Alene, Idaho. Call 202/289-8625 or visit www.nafma.org.

August 19-23

StormCon: North American Surface Water Quality Conference and Exposition, Sheraton Downtown Hotel, Denver, Colo. Visit www.stormcon.com.

August 26-29

American Public Works Association Congress: The Best Show in Public Works, Anaheim Convention Center, Anaheim, Calif. Call 816/595-5241 or visit www.apwa.net.

- Sept. 9-12 – Distribution Systems Symposium, St. Louis, Mo.
- Sept. 9-12 – Emergency Preparedness, St. Louis, Mo.
- Sept. 19-21 – Financial Management: Cost of Service Rate-Making Seminar, Orlando, Fla. Visit www.awwa.org.

Wisconsin

The Wisconsin Department of Natural Resources has these courses:

- July 26 – Northwood Collection System Seminar, Marshfield
- July 27 – Regional Utility Management Training, Plover
- Sept. 13 – Utility Management Training, Dodgeville

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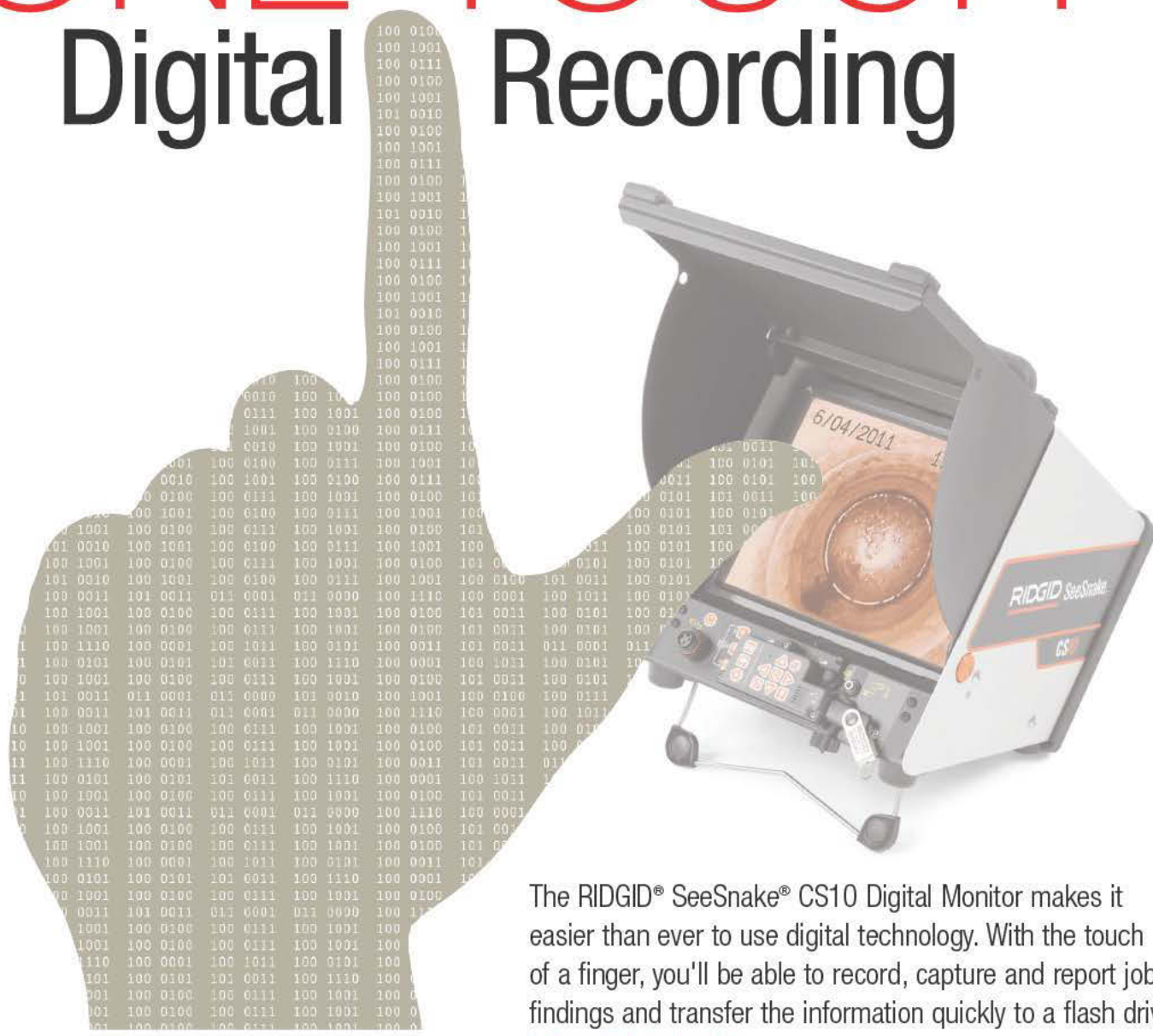


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