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FOR SANITARY, STORM AND WATER SYSTEM MAINTENANCE PROFESSIONALS

July 2010

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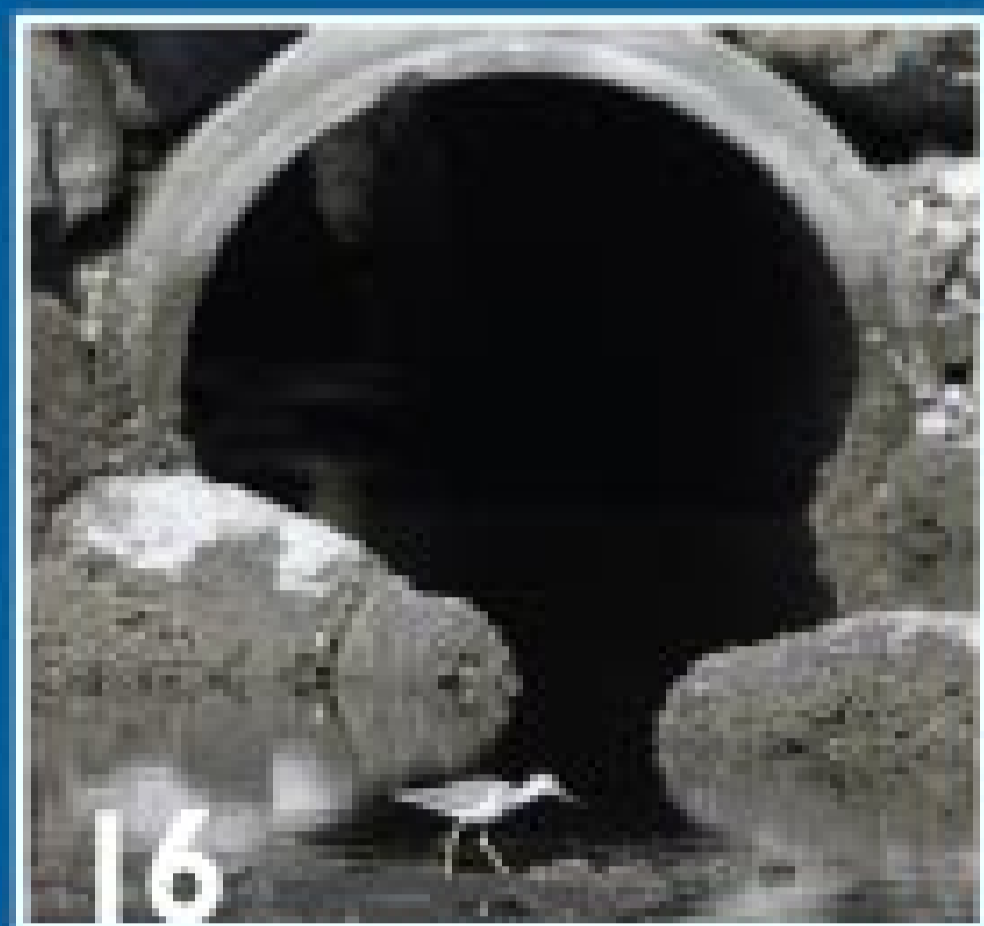
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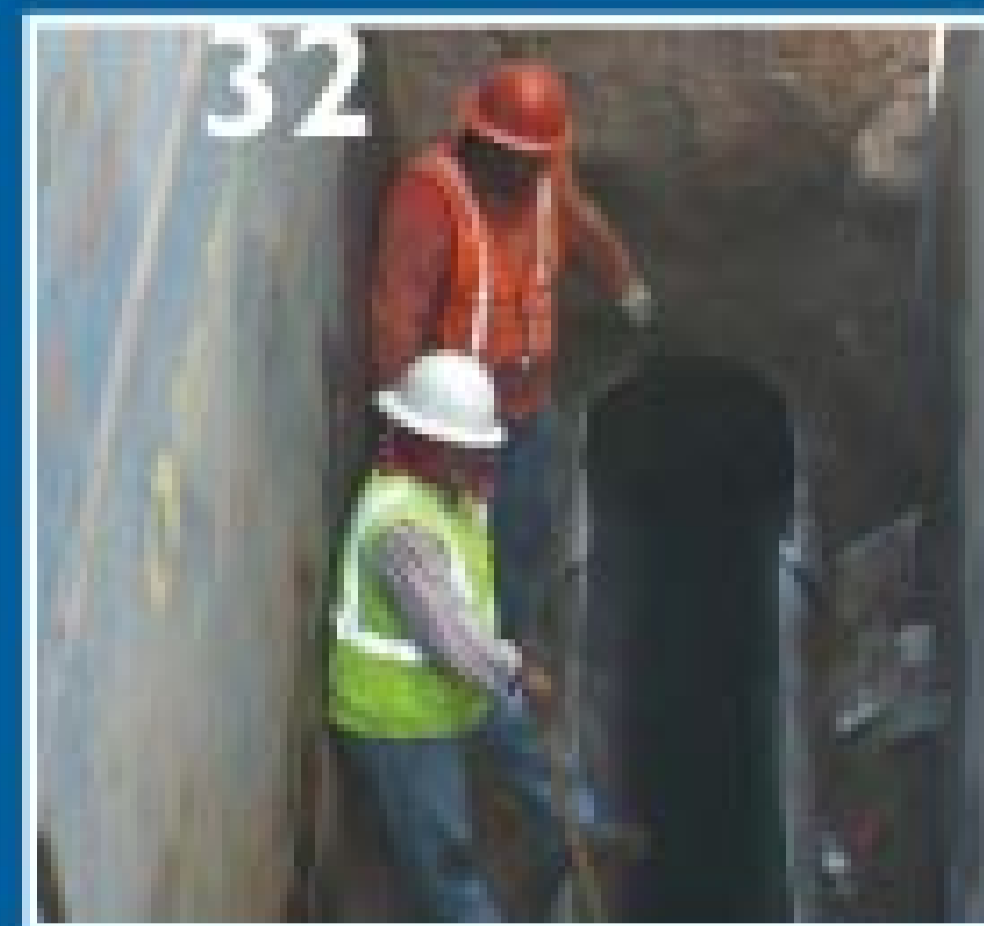
*When compared to Vactor 2100 model. Source: Federal Signal engineering department. Fuel savings assumptions: 3 gallons/hour saved in combination mode (4" orifice at vacuum, 80 gpm @ 2500 psi), 1,500 hours per year at \$3.00/gallon.

INSIDE:

PIPE BURSTING/ HORIZONTAL DIRECTIONAL DRILLING



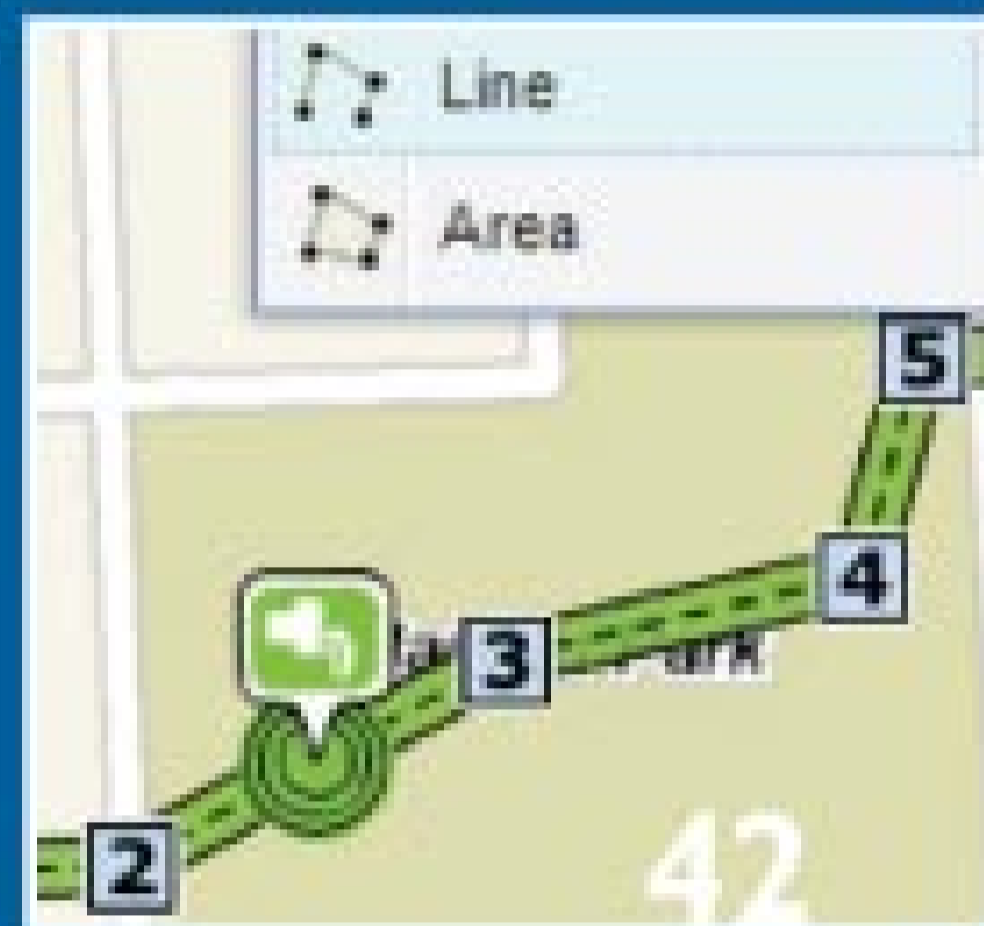
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COVER:

The Vallejo (Calif.) Sanitation and Flood Control District makes pipe bursting a key component of its I&I control program. A district work crew is shown on the site of a bursting job. (Photography by Shawn Miller)



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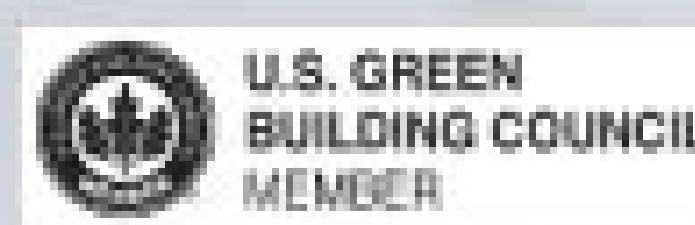


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MUNICIPAL SEWER & WATER

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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 e-mail editor@mswwmag.com.

REPRINTS AND BACK ISSUES: Visit www.mswwmag.com for options and pricing. To order reprints, call Jeff Lane at 800-257-7222 (715-546-3346) or e-mail jeff@colepublishing.com. To order back issues, call Nicole at 800-257-7222 (715-546-3346) or e-mail nicole@colepublishing.com.

CIRCULATION: 2009 average circulation was 36,282 copies per month (U.S. and international distribution).

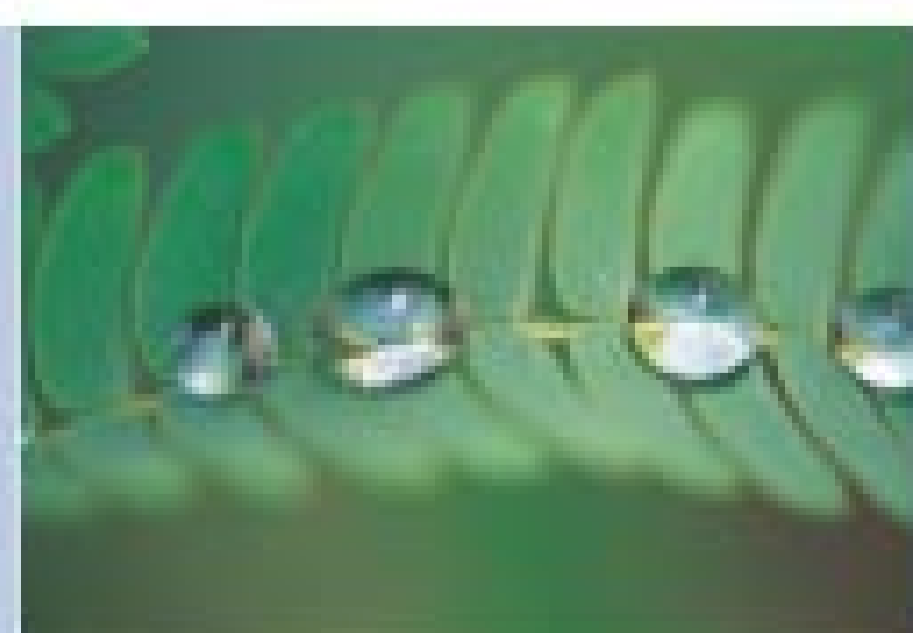


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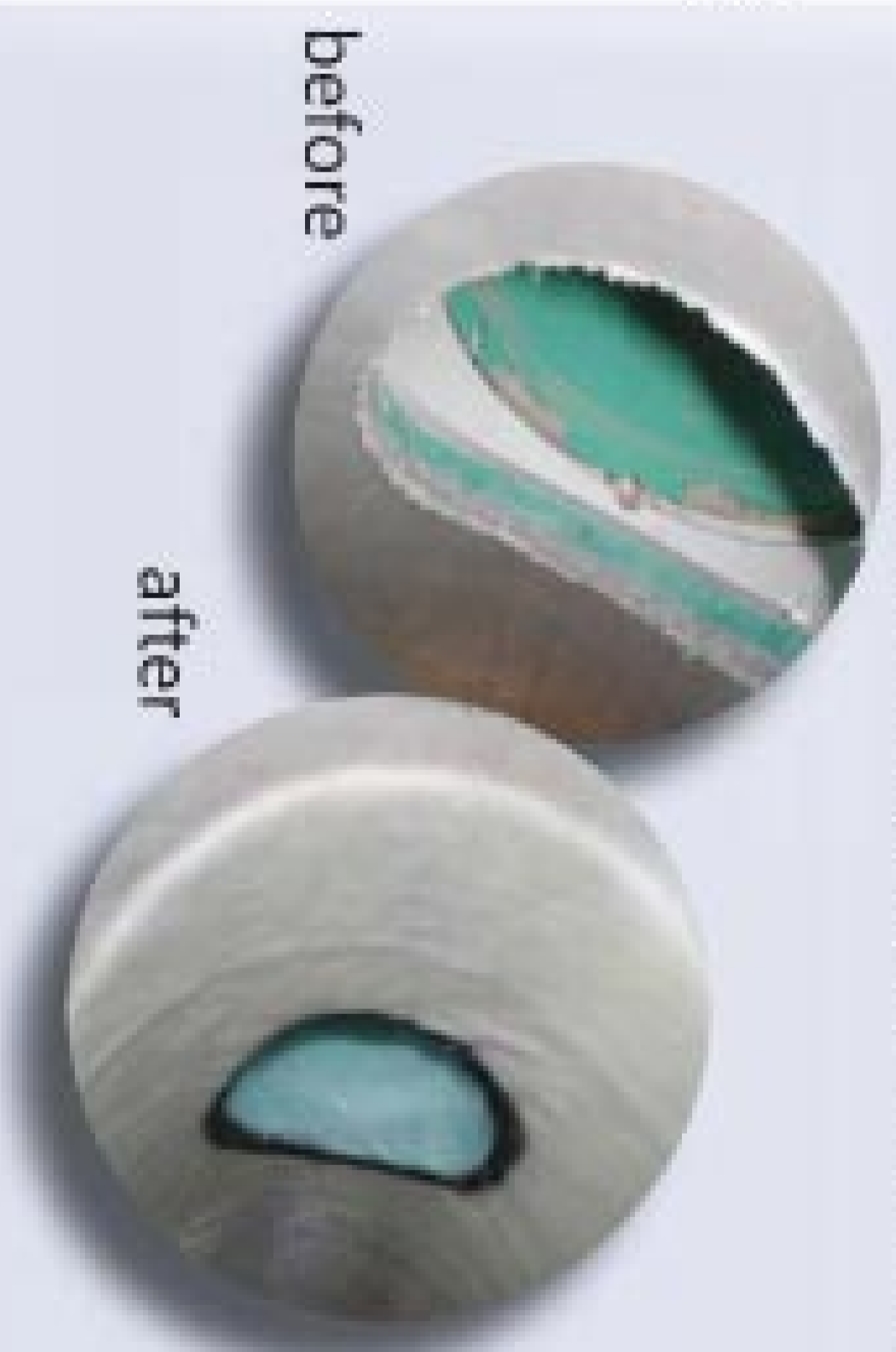


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THE LESSON OF THE CARP

The Great Lakes States' battle against an invasive and destructive fish provides a metaphor for the growing fiscal crisis facing our country

In Wisconsin where I live, we naturally treasure Lake Michigan. That lake and all the Great Lakes now face the threat of Asian carp invading by way of the Illinois River and the Chicago Sanitary and Ship Canal. Scientists and state and federal government officials have known about the carp for years. Each year, they move farther upstream toward Lake Michigan. Everyone knows they need to be stopped, because if they get into the lake, they could multiply rapidly, disrupt the food chain with their voracious eating, and destroy a multi-billion-dollar fishing industry, not to mention the entire Great Lakes ecosystem.

To keep the carp out of the lakes, the U.S. Army Corps of Engineers, the U.S. EPA, the State of Illinois, the International Joint Commission, the Great Lakes Fishery Commission and the U.S. Fish and Wildlife Service are working together to install and maintain a permanent electric barrier.

But there's a problem: Various interests are fighting. Where are we going to get the money? What about this barrier's effect on commercial shipping? What about the safety of boaters? Dispute follows dispute. Delay follows delay. And each year the carp move farther upstream.

And if in the end the carp make it into Lake Michigan, we will all have to look at ourselves and say: We saw this coming. Why didn't we stop it? How could we have been so incredibly stupid?

Of fish and budgets

So it is with our governments — federal, state and local. For the sake of simplicity, let's stick with federal for now. Argue all the partisan politics all you want — a few facts are beyond dispute.

The economic recession put people out of work and drastically reduced tax revenue to the treasury. We borrowed vast amounts of money to

To get out of this, we first have to accept that it won't be easy. Somewhere along the line, in government and in our personal lives, we got the idea that we can have things without paying for them. That idea must leave our heads permanently. If we're going to spend a dollar, we have to raise a dollar somehow.

bail out banks, other financial institutions and car companies. We borrowed more vast amounts to stimulate the economy and get people back to work. We did all this at a time when the federal budget deficit and the national debt were already at frightening levels.

Blame whichever political party you want — we have what we have. And what we have is a national debt of \$12.6 trillion, growing every second. And a federal budget deficit for this year alone of \$1.4 trillion. We can't comprehend numbers that size, but we can comprehend these:



FROM THE EDITOR

Ted J. Rulseh

The national debt per citizen is now \$41,000, and the national debt per taxpayer is \$115,000.

If that isn't scary enough, go to www.usdebtclock.org. There you will see all these figures, not as static numbers but changing (that is, increasing) in real time. It is surreal. It is dizzying to watch.

What to do now?

No sane person thinks we can continue to accumulate debt at this pace. A revitalized economy will help turn the tide, but even if that happened today, we would still be in a very deep hole. At \$12.6 trillion, that's a lot of digging.

To get out of this, we first have to accept that it won't be easy. Somewhere along the line, in government and in our personal lives, we got the idea that we can have things without paying for them. That idea must leave our heads permanently. If we're going to spend a dollar, we have to raise a dollar somehow.

Second, we have to make up our minds to get it done. Plans will need to be brought forward. No plan that makes sense will be without pain. Collectively, through our elected representatives, we will need to weigh the alternatives and act. Otherwise, the problem will only keep getting worse.

Who knows what manner of financial calamity awaits us and our children and grandchildren if as a country we don't take action? And if the worst happens, we'll know the anguish of looking back and saying we could have stopped it.

We'll have to say to ourselves: We were standing on the railroad tracks. We heard and saw the train coming from miles away. Yet we just stood there and never even bothered to step aside. How could we have been so incredibly stupid?

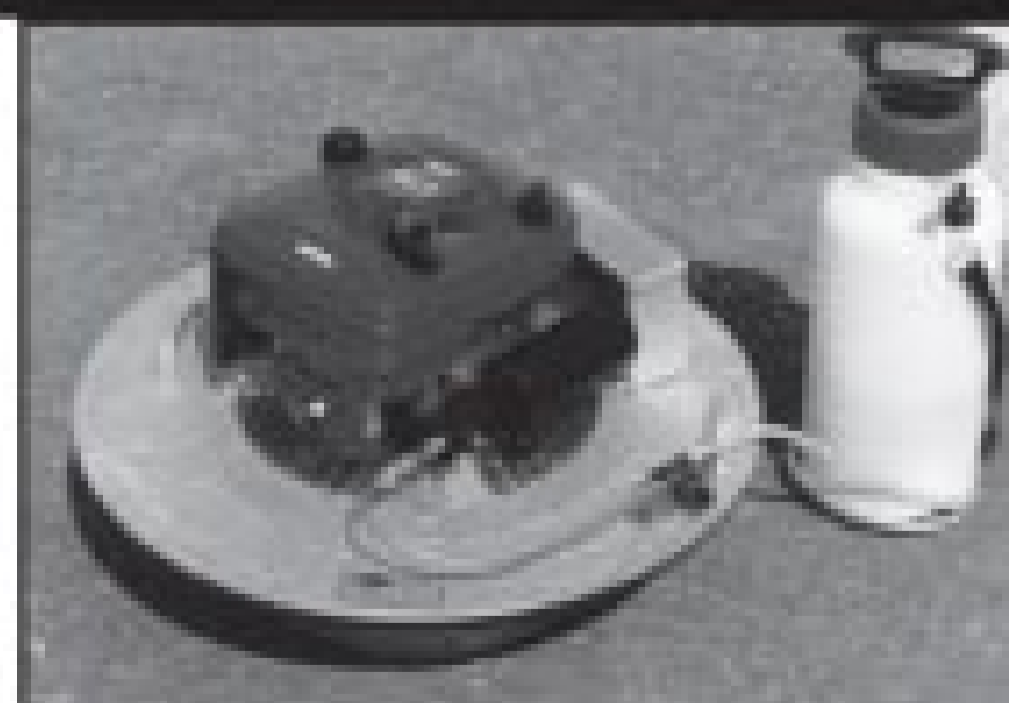
This has to matter to everyone in government at every level. Which means it has to matter to everyone, period, because in our democratic society, the government is us. It's time to get serious and fix this problem. ♦

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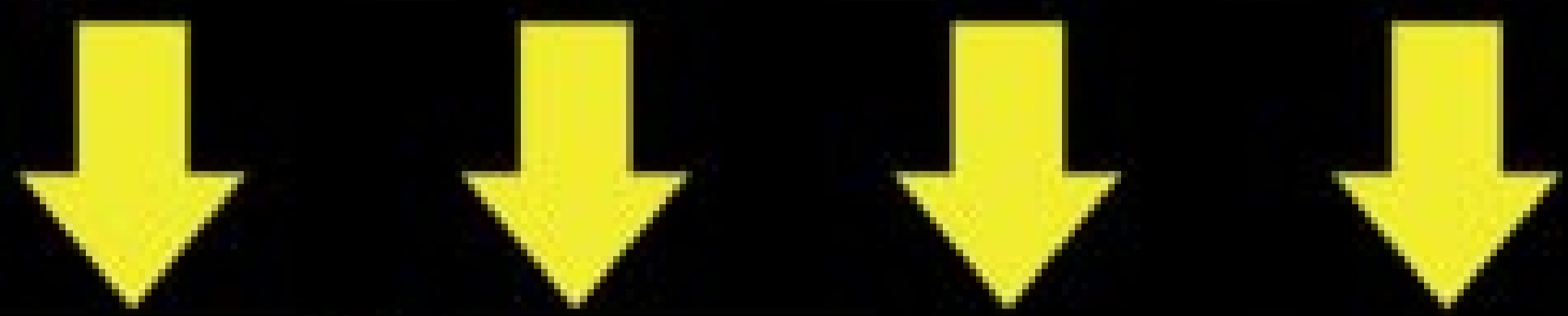
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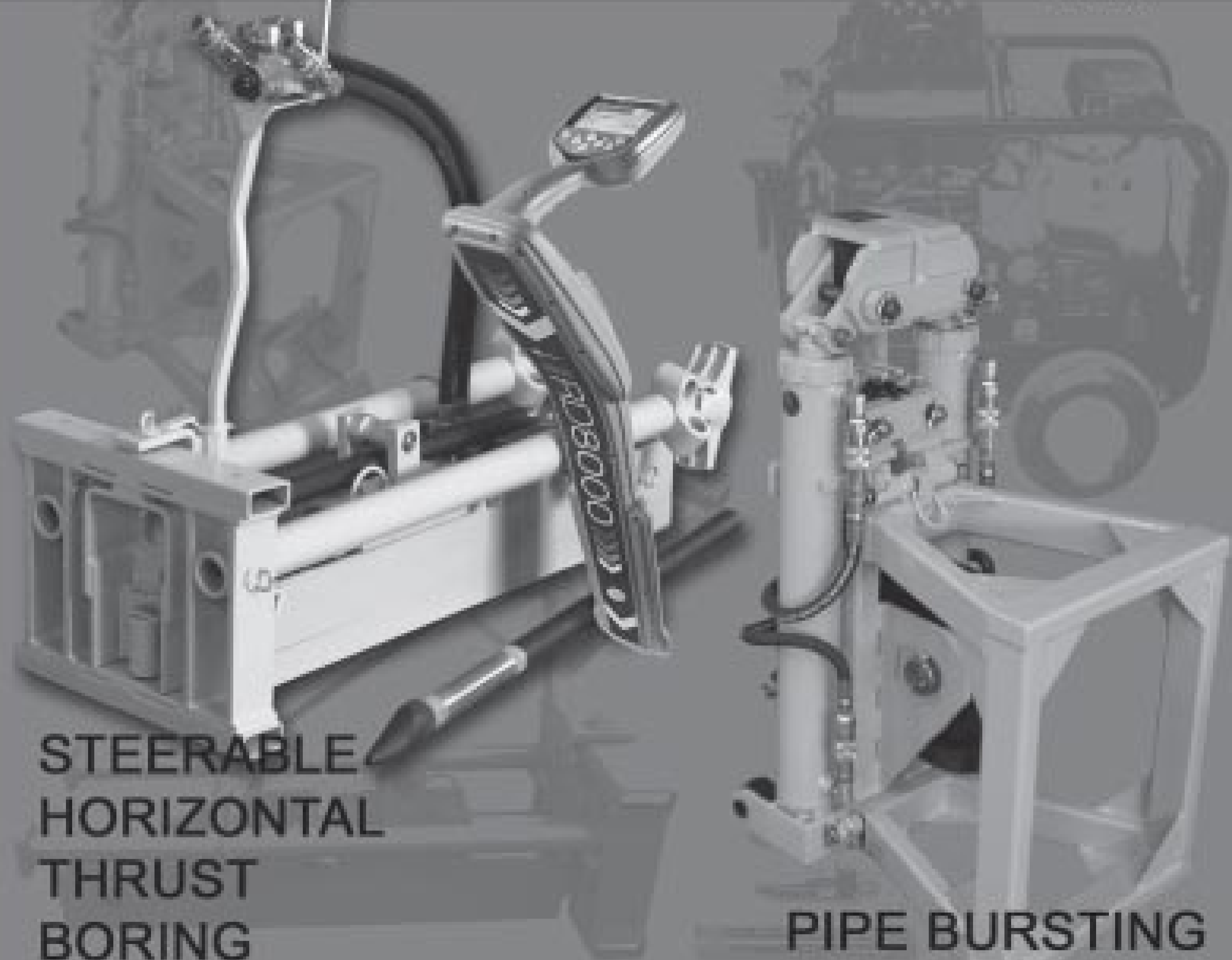
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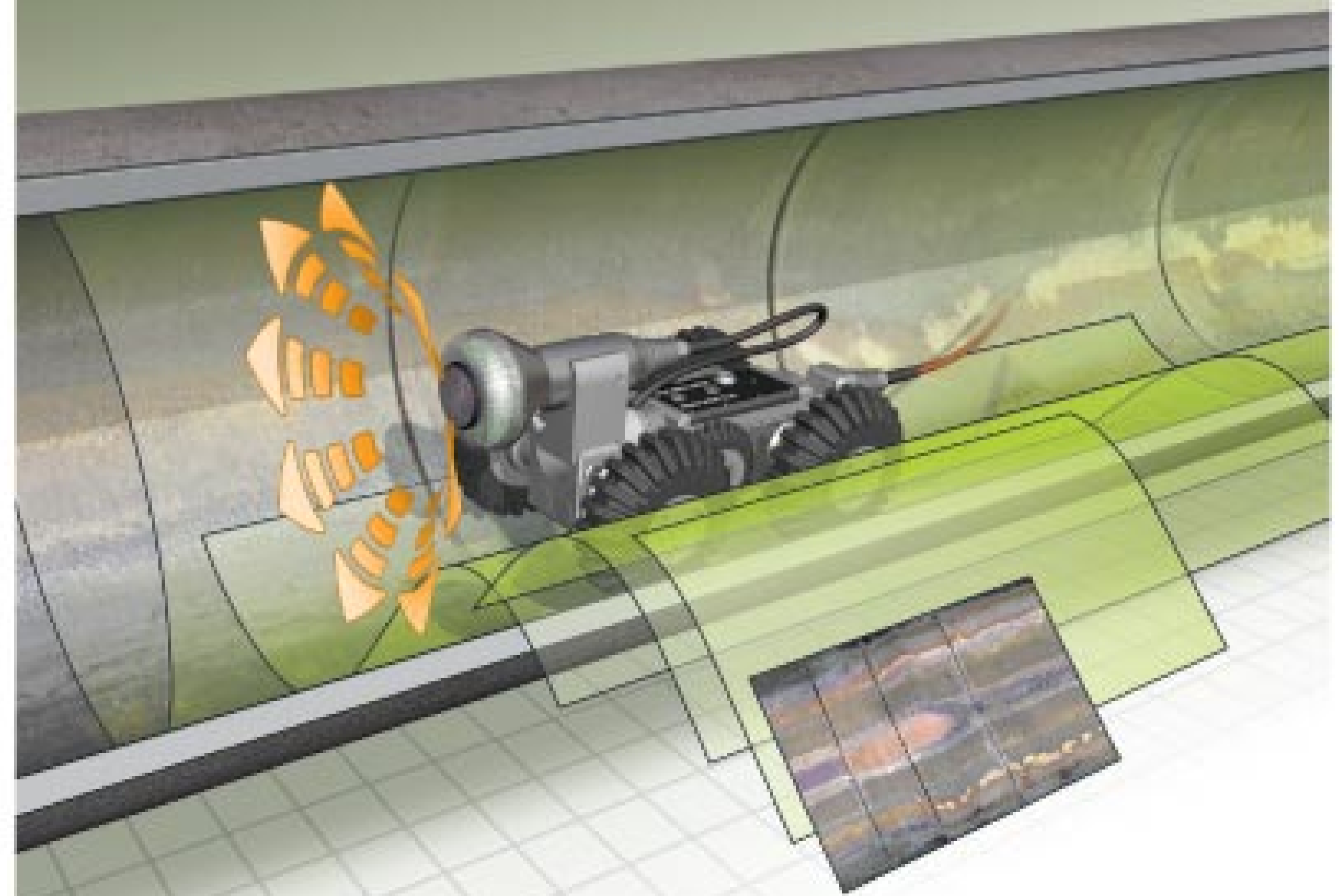
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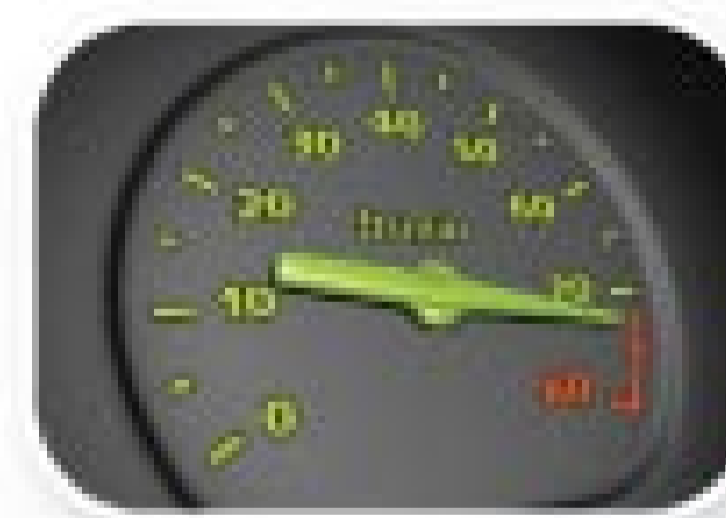
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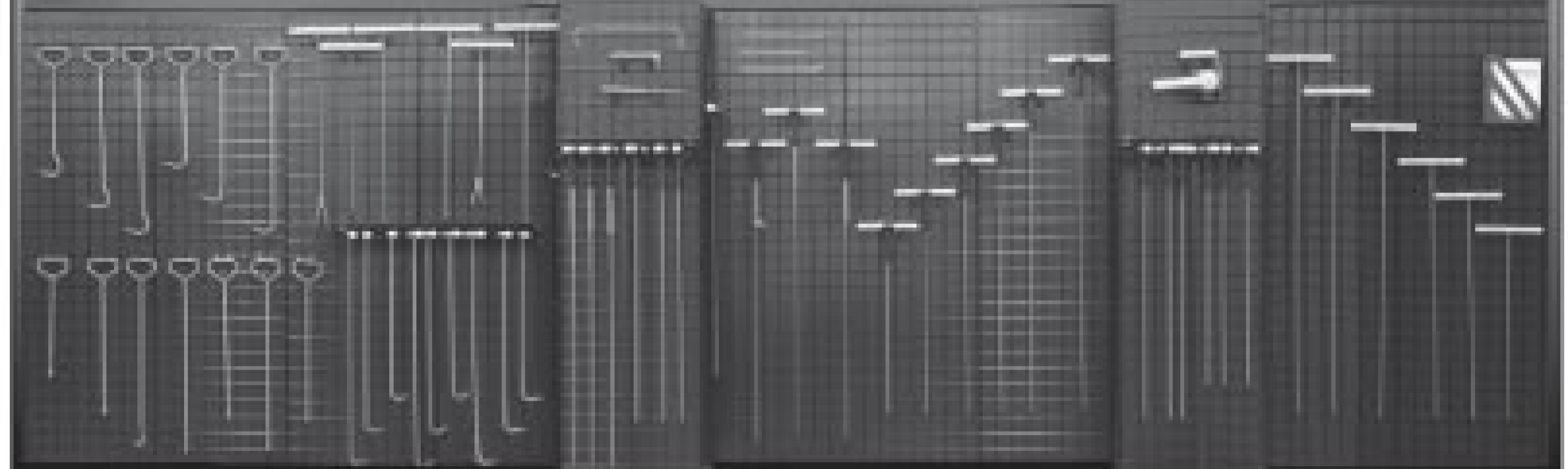
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Water from Clear Creek flows under a roadway and into Dyes Inlet bay during low tide. On high tide, Dyes Inlet actually pushes saltwater up into the stream. (Photography by Jesse Beals)

FOCUS: STORM

MAKING IT VISIBLE

Stormwater programs in Kitsap County, Wash., aim to show local residents how proper management improves water quality and environmental health

By *Scottie Dayton*

Everyone in Kitsap County, Wash., lives in some watershed that drains to Puget Sound. Because the 393-square-mile area looks pristine, the county's Surface and Stormwater Management Program (SSMP) team found it difficult to convince residents that there were water-quality challenges.

Consequently, the team developed approaches with visual and physical benefits. "If people can swim in our waters, eat the shellfish, and watch salmon returning to our streams, then they have

hard evidence that our individual actions, combined with those of our neighbors, can affect our watershed's health and that of Puget Sound," says Theresa Thurlow, senior program manager of SSMP in Port Orchard, Wash.

Through initiatives such as benthic macroinvertebrate biological monitoring, salmon habitat assessment, identification of outfalls in urban and commercial-industrial developments, education and outreach, and commercial property inspections, the county program achieved its goals, while attaining state and national recognition.

Powerful partnerships

From its inception, the county's SSMP gained notice for innovative approaches. One strategy was to

form partnerships with sister agencies. "After identifying potential solutions for impaired waterways, we looked for entities with the expertise to execute the programs,"

says Thurlow. "We then offered to sponsor them if those agencies partnered with us." For example, the county sponsors the Pollution Identification and Correction (PIC) program, but the Health District runs it because it wants beaches and waterways kept open and shellfish beds kept healthy. The county-funded agricultural waterways impact program is executed by the Conservation District because it prevents soil erosion and preserves farmland. The county also sponsors its Stream Team and shoreline watershed assessment programs through the Department of Community Development.

The county created the PIC program after the state Department of Health (DoH) began classifying shellfish beds as prohibited because of bacteria and other contaminants. Teams sampled monitoring stations in waterways with high fecal coliforms numbers, then traced the pollution back to homeowners with failed onsite systems.

"Sixty percent of properties, from rural residences to shoreline

PROFILE:

Surface and Stormwater Management Program, Kitsap County, Wash.

FOUNDED:
1993

POPULATION:
240,000

SERVICE AREA:
393 square miles

EMPLOYEES:
26

ANNUAL RAINFALL:
40 inches

INFRASTRUCTURE:
229 miles of stormwater pipes;
11,000 catchment basins

OPERATING BUDGET:
\$6 million (water quality
and flood control)

WEB SITE:
www.kitsapgov.com

"Our inspectors inspect catch basins, vaults, and detention ponds, then explain to owners what should be done if the facility isn't functioning as designed. With almost 100 percent compliance, water quality is improving."

Theresa Thurlow

homes, have onsite systems," says Thurlow. "The county is surrounded by water because it is on Kitsap Peninsula, which juts into Puget Sound."

Eric Werden, stormwater inspector 2, checks a Bioswell drainage system for sediment accumulation around the outlet pipe at Harrison Hospital in Silverdale, Wash.

Success story

The crown jewel of the PIC program is the Yukon Harbor Watershed Restoration Project, a cooperative effort of the Health and Conservation Districts with money from a grant and matching SSMP utility fee funds.

Yukon Harbor, an older residential area in the Colvos Passage/Yukon Harbor watershed, has ample public beach access and shellfish beds. The DoH had closed the beds years before the project began. Watershed monitoring showed fecal coliforms, coming mainly from onsite systems, as a prime pollutant. Failed systems and poor farming practices also compromised salmon habitats.

From May 2003 to August 2006, SSMP members surveyed 378 parcels and found 51 failed onsite systems, 15 suspected failures and 16 nonconforming systems. "This was the highest of failure rates for PIC projects," says Thurlow. "Systems failed because of age, poor soils, proximity to surface waters, high water table and tidal effects."

Repairs ranged from replacement of broken pipes to complex alternative technologies designed around lot limitations. Service contracts were required on 31 systems. The Health District's educational campaign taught homeowners how to operate and maintain their systems, identify conditions that could cause premature failure, reduce nutrient contamination and manage animal waste.

The Conservation District's efforts to improve livestock and pasture management and implement best management practices reduced the number of high-priority agricultural sites in the watershed from 22 to four. In autumn 2008, the DoH reclassified 900 acres as approved for shellfish harvesting. "That's a major success story for water quality," says Thurlow.

Floodplain restoration

The Clear Creek Floodplain Restoration Project illustrates how the SSMP upgrades infrastructures. Flooding in Silverdale, a commer-



The Kitsap Conservation District driveway is set up with permeable paving, an alternative to concrete or asphalt. The driveway is made up of 432 ecologically friendly squares made of 100 percent recycled material.

cial-urban area, caused property damage and blocked the main doors of a fire station.

Studies identified the flood mechanisms. The stormwater pipes were too small to convey heavy runoff to Clear Creek. During large storms, the creek overflowed. Flood elevations in the creek caused runoff in stormwater pipes to back up into a bowling alley and

Liz Bear uses a Mutt Mitts trash can. Silverdale Beach Hotel teamed up with Kitsap County and the Kitsap County Health District to help clean up the Clear Creek Trail along Dyes Inlet. Each station has plastic bags and a trash can.



BAG IT!

Dogs in Kitsap County, Wash., produce 11 tons of excrement per day. A respondent survey by the county's Surface and Stormwater Management Program (SSMP) found that 34 percent of dog owners who walked their pets did not pick up after them, and 50 percent reported removing piles from their yards once a week or less.

To emphasize the scale of the problem and spread the message to bag the poop, the SSMP education and outreach team collaborated with teachers at a local elementary school to conduct a survey. Second and third graders went into a nearby park to count dog waste as part of their science curriculum. They conducted six counts. The first three were done before the county installed Mutt Mitt (plastic bag) dispensers and erected signs reminding owners to clean up after their pets.

"We provided the children with clipboards, pencils and metal flag markers," says Theresa Thurlow, senior program manager of SSMP. "They marked each pile with a flag, measured its size, and recorded where it was on the park trail." The highest count was 114 piles in October 2008, and the lowest was 31 in January 2009.

After the signs and dispensers were up for two months, the students took three more counts. The high and low numbers were 43 and 22. "The Health District funds the Mutt Mitt kits, and we issue them to interested groups," says Thurlow. "Groups must sign a contract that they will maintain the dispenser and change the bags." In 2008, 13 groups adopted dispensers. By the second quarter of 2009, SSMP issued 62 Mutt Mitts.

adjacent properties.

"Silverdale was built on a filled-in marshy area," says Thurlow. "Our plan to restore the marsh added more than 66,600 cubic feet of floodplain storage."

The county excavated 7,400 cubic yards of fill, then removed a concrete box culvert to restore the stream's capacity and improve habitat. Workers built a concrete footbridge for hikers to cross the creek and used 600 cubic yards of excavated material for boardwalk approaches and landscape berms.

Not all SSMP projects involve restoration. One problematic program was establishing a consolidated spill response hotline. Mindy Fohn, water quality program manager, led the effort. "We partnered with all the unincorporated communities, the Department of Emergency Management, the Department of Roads and Traffic, and other entities," she says. "Because our hotline was developed to correspond with Kitsap One, the county's information line, we partnered with Public Works Information Systems, which handles that."

The biggest challenge was to make people understand that the



program to recognize business owners for maintaining their stormwater systems. "It's a public thank you that dovetails with our Clean Water Partner awards," says Thurlow. "Green is a large movement here, so the awards have a commercial value in the community."

Influencing behavior

The SSMP team includes elementary and high schools in its education programs. "We want to

Dyes Inlet is home to a number of birds that can be viewed while walking along the five-mile Clear Creek Trail in Silverdale, Wash.



Levi Stuart, a volunteer at the Kitsap Conservation District office, walks past a rock garden. All the rain water from the building's gutters is directed to the rock garden, where it is filtered through the rocks and percolates back into the soil.

hotline was for reporting spills and illegal dumping, not responding to them. "We educated our staff, city staffs and the people manning the hotline," says Fohn. "We also designed a flow chart listing situations, specifying which district had jurisdiction, and telling whom to call."

"This is not an enforcement action. The hotline is so that we know what is going into the waterways. The Health District investigates illegal dumping and is the enforcement arm."

Property inspection

The SSMP program maintains the county's stormwater infrastructure, which includes 229 miles of stormwater pipes; 11,000 catchment basins; 600 detention ponds; 133 biofiltration swales; 255 oil-water separators; and 319 manhole control structures.

Workers clean the catch basins yearly, dewatering the debris at a county facility. They also inspect the pipes based on location, age and signs of failure.

Maintenance of the 600 stormwater ponds includes annual inspec-

tions, cutting back cattails, expanding the capacity of some ponds and dredging. Workers replace the dredged material with engineered soil to help increase infiltration.

The program keeps expanding. The Commercial Property Inspection Program ensures that private stormwater systems on commercial sites are maintained properly. Funding comes from a utility fee based on impervious surface area and other factors.

"Our inspectors inspect catch basins, vaults, and detention ponds, then explain to owners what should be done if the facility isn't functioning as designed," says Fohn. "With almost 100 percent compliance, water quality is improving."

The inspector program is working so well that she is expanding it. "We want inspectors to look for potential sources of pollution that may enter the stormwater system, offer free technical assistance on controlling the sources, and instruct owners on how to manage hazardous wastes at their sites," says Fohn.

The county also is developing a

reach children while they are still young enough to influence behavior changes," says Thurlow. One such influential program is Salmon in the Classroom.

Elementary students tend salmon eggs, donated by the Suquamish Tribe, each January. The Central Kitsap Kiwanis Club donates the aquariums, food and educational materials. The eggs hatch in three to four months. When the fry are large enough, children take them to Clear Creek. Besides releasing the fish, the students learn about salmon habitat, plant trees, test water quality and examine stream invertebrates.

Another program, EnviroScape, demonstrates the cumulative effects of people's behaviors by using different colors in water to simulate pollutants. "At first, the water in the tank is clear, but the cumulative effect of all this separate pollution is ugly brown water," says Thurlow. "That's what makes non-point pollution such a challenge — it involves everyone. This model helps youngsters understand it."

The county also partnered with




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high school seniors to get a grant to study what is in runoff from group car washes. “We helped them develop the budget and protocol, decide how to take samples, and determine what to do as a scientific approach,” says Thurlow. The study is ongoing.

Stream Team

The Stream Team, administered via the Department of Community Natural Resources Division, involves the public in monitoring and restoration. Individuals or groups adopt their local stream, then provide information to SSMP through biological and physical monitoring. Volunteers are trained in county-sponsored workshops.

The East Kitsap Nearshore Salmon Habitat Assessment is an example of Stream Team work. Two teams, walking the 156 miles of East Kitsap shoreline, collected data on GPS units and digital cameras, and in notebooks. Volunteers traversed barnacle-covered cobble to knee-deep mud looking at sediment, vegetation, armoring, over-water structures, bank height and outfalls.

This baseline study provided scores for each section of shoreline. The scores were used to identify and set priorities for restoration and conservation projects that would best support salmon recovery.

The Stream Team also collects data for outfalls (6 inches or larger), ditches, swales, stream mouths and large seeps. Outfall data includes a photograph, longitude-latitude, physical description and visual observations. If sufficient flow is present, team members sample for bacteria, nutrients, oil, detergent, glycol, turbidity, pH, conductivity and temperature.

“When tests show a potential problem, we initiate an investigation,” says Thurlow. “Occasionally, we refer cases to the Health District for further assessment.”

Through multi-agency efforts, the SSMP program is protecting water quality and reducing flooding. Residents are seeing hard evidence in reduced backups, open beaches, and a resurgent commercial shellfish industry. And in the fall, salmon again battle up cool, clean streams to spawn. ♦



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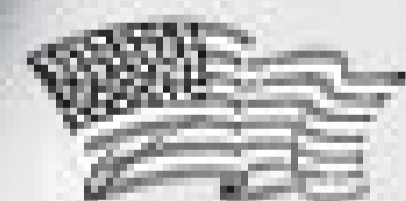
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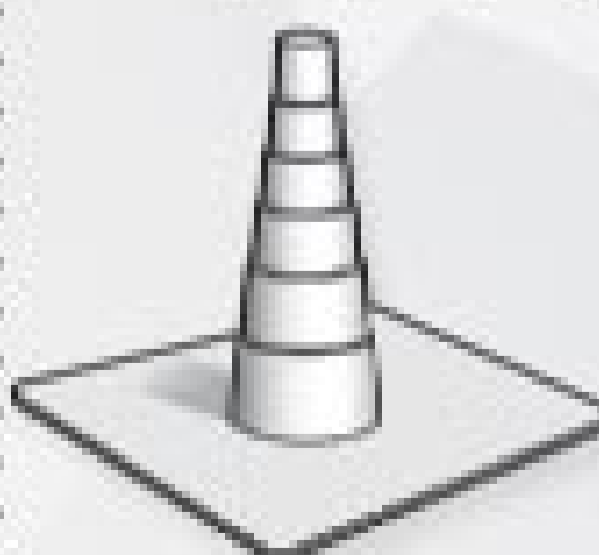
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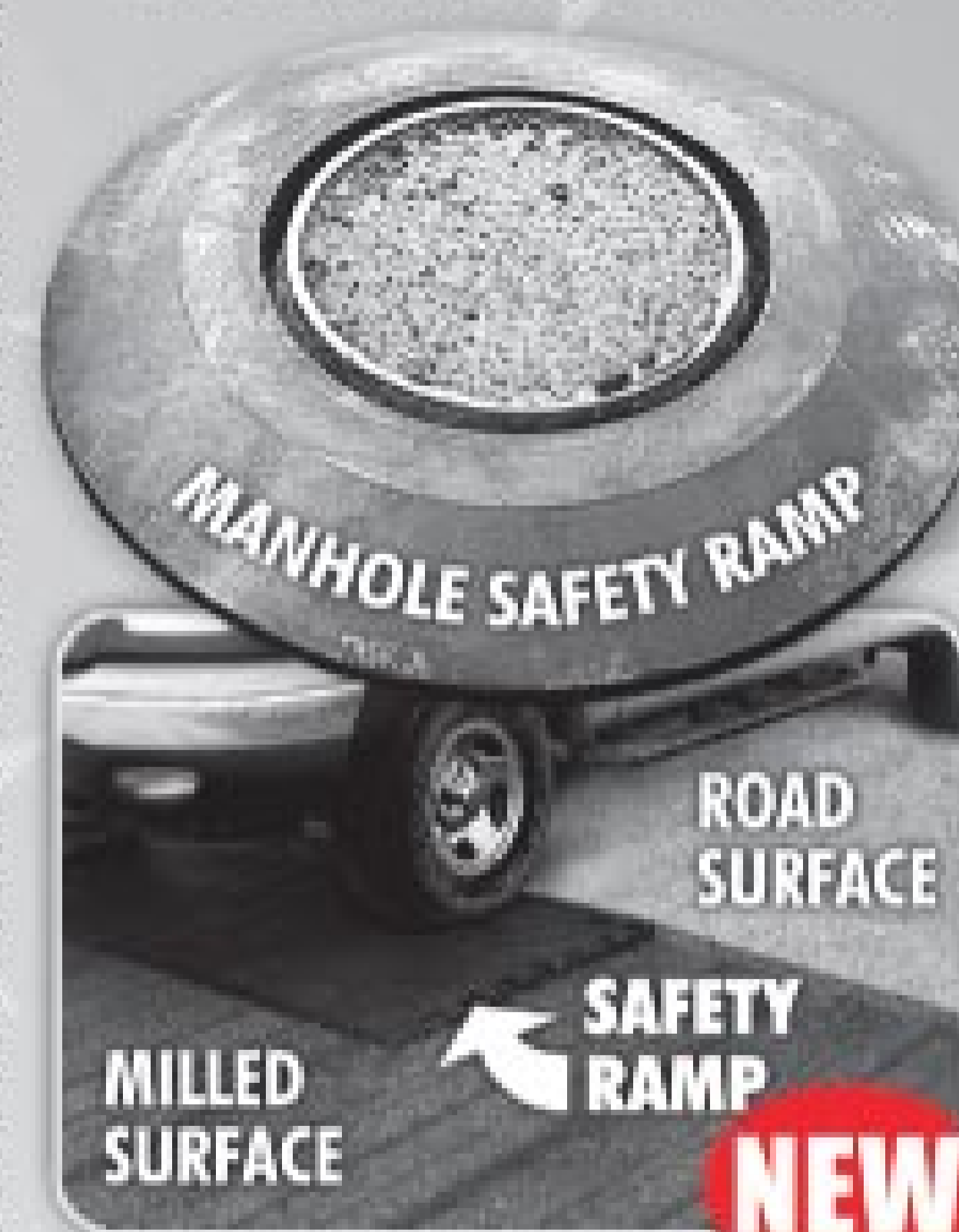


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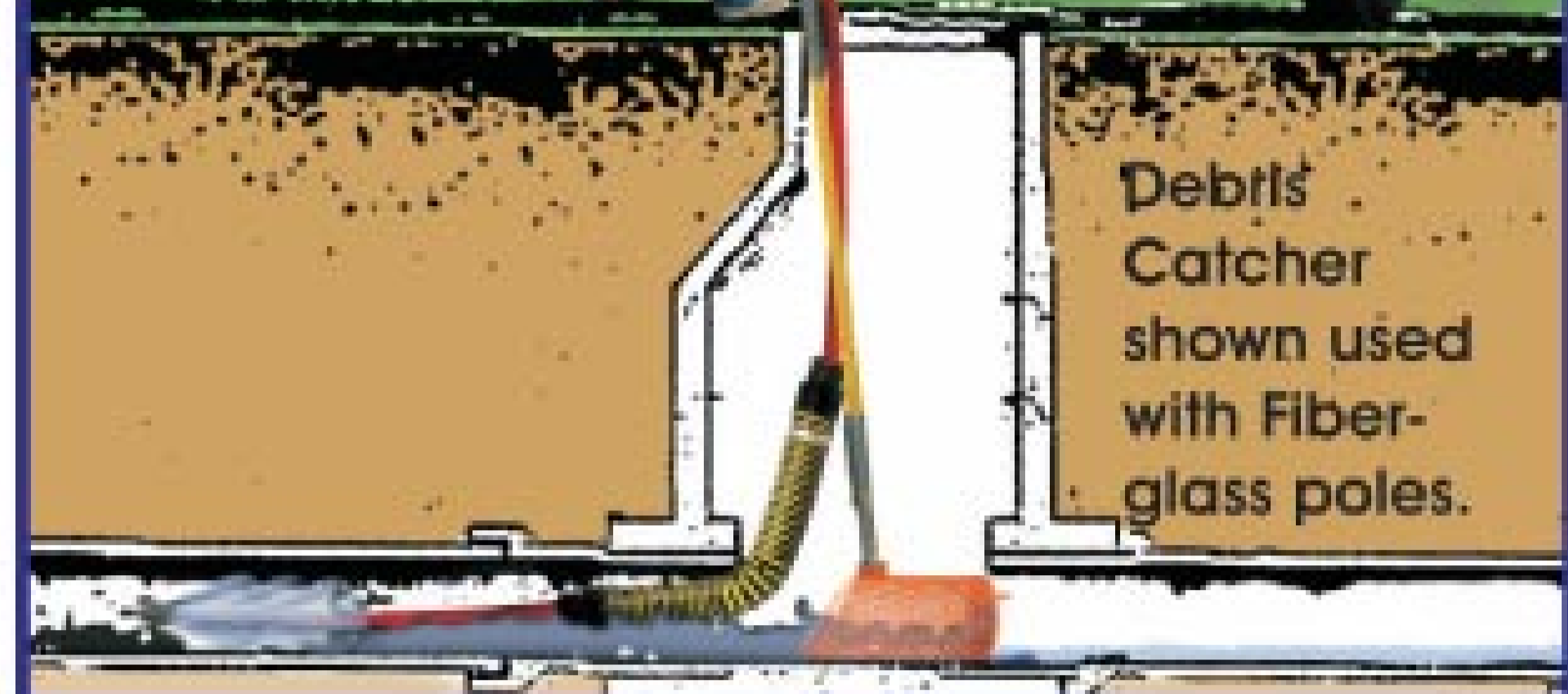
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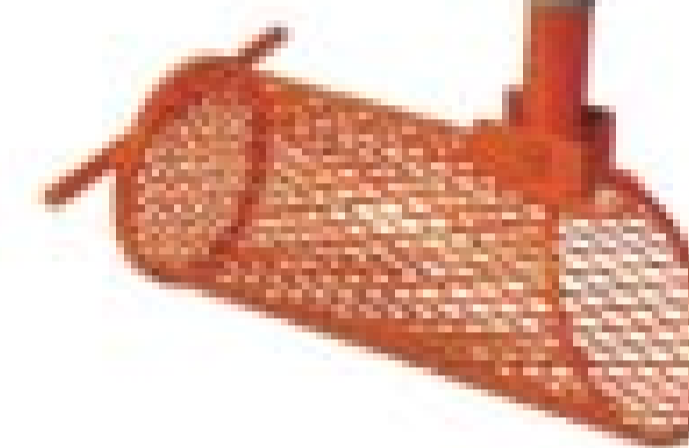


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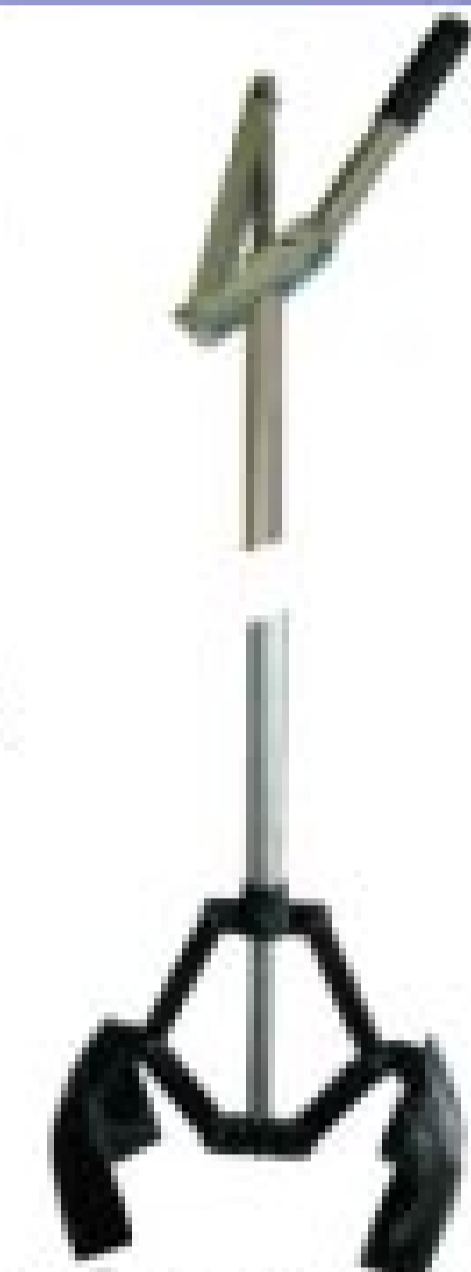
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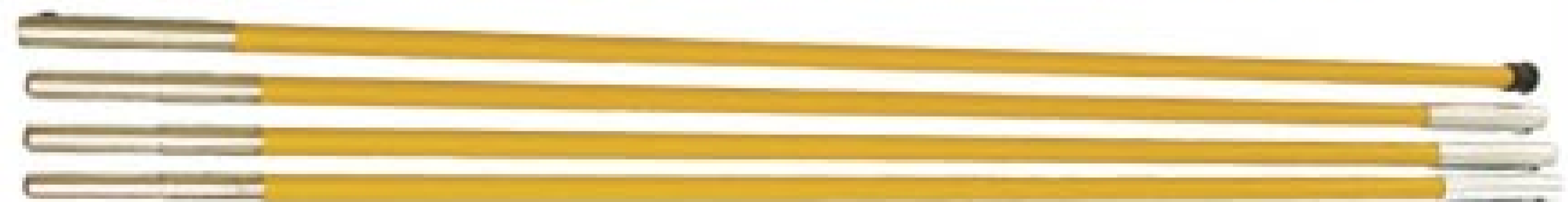


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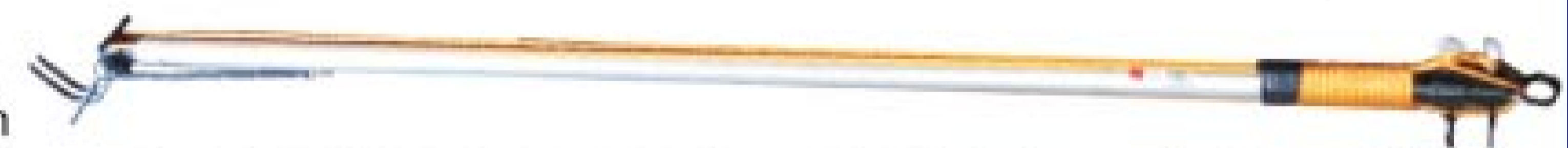
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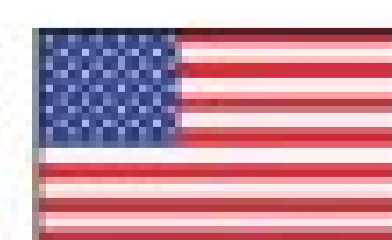
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FOCUS: SEWER

GETTING TOUGH ON I&I

The Vallejo Sanitation and Flood Control District uses pipe bursting as a key technology in an aggressive program to tighten its sewers

By *Scottie Dayton*

Hheavy rains were overwhelming the Vallejo (Calif.) Sanitation and Flood Control District sewers and bypass systems, sending untreated sewage into San Francisco Bay during the largest storms and leaving the district vulnerable to a third-party lawsuit.

The district spent \$60 million on improvements that included upsizing interceptors, rehabilitating laterals and reducing inflow and infiltration (I&I). It also built a 3-million-gallon storage tank at the largest pump station and a 9-million-gallon storage basin at the Ryder Street wastewater treatment plant.

The capital improvement projects reduced sanitary sewer overflows (SSO) from 333 in 2000 to 45 in 2009. Average dry-weather flows decreased from 12 mgd to 9.3 mgd. The collection system achievements helped the district earn a 2007 Silver Peak Performance Award and a 2008 Gold Peak Performance Award from the National

Association of Clean Water Agencies (NACWA) for permit compliance.

Roots and I&I

The district, one of only three such independent state agencies, maintains 413 miles of 4- to 60-inch sanitary sewers comprising clay, concrete, PVC and HDPE pipe, and more than 100 miles of 4- to 6-inch laterals. The agency provides sewer and flood control services for the city of Vallejo, Mare

“Developers gave no thought to preventive maintenance when they built these communities. They ran laterals and mains through backyards and up hillsides, making many inaccessible.”

Andy Jannings

Island, Sky Valley and unincorporated parts of Solano County.

“We’re unique in that we are responsible for the lower laterals; those running from the property line or public right-of-way to the sewer,” says field operations superintendent Andy Jannings. “Home-



Collection systems technician/equipment operator Don White and collection systems technician Justin Keating assemble the pipe bursting system from TRIC Tools. (Photography by Shawn Miller)



PROFILE:

Vallejo (Calif.)
Sanitation and Flood
Control District

FOUNDED:
1952

POPULATION SERVED:
120,000

AREA SERVED:
26 square miles

WASTEWATER FLOW:
9.3 mgd average dry weather

EMPLOYEES:
28 (field operations group)

INFRASTRUCTURE:
413 miles of sewer; 10,715
manholes; 28 lift stations

ANNUAL BUDGET:
\$27 million

WEB SITE:
www.vsfcd.com

owners are responsible for the upper laterals, those running from our jurisdiction back to the house. In the case of easements, we take responsibility for the last five feet of pipe, provided it has a cleanout.”

As the mainline improvements continued, the field operations group reported significant I&I and root intrusion coming from clay laterals in the older areas of town, and especially those in easements. “Developers gave no thought to

preventive maintenance when they built these communities,” says Jannings. “They ran laterals and mains through backyards and up hillsides, making many inaccessible.”

In 2003, the district began evaluating trenchless technologies. “Contractors rehabilitated several

thousand feet using pipe bursting, cured-in-place pipe liner, and spiral wound,” says Jannings. In several



Collection systems technician Jose Herrera operates the power rodder from OK Champion Corp.

PIGGYBACK BIDDING

When the Vallejo Sanitation and Flood Control District wants to purchase equipment, field operations superintendent Andy Jannings searches for cities that have done the bid work for him.

"Being a public agency, all purchases go out to bid," he says. "We talk to other municipalities or a particular manufacturer to find out if people are going out to bid for equipment that may be in the style or type we want to purchase."

If the specifications are identical, the manufacturer usually agrees to sell the equipment for the open public low bid price. "It shortens the process and saves us a lot of money because we don't have to put it all together," says Jannings.

neighborhoods, they rehabilitated mains and laterals on one side of an imaginary boundary line and left the opposite side untouched to measure I&I reduction by comparison. In another part of town, they rehabilitated only the laterals to see if that approach would be more cost effective.

"We learned that if the lateral wasn't replaced, we had root intrusion in the newly lined mains," says Jannings. "Furthermore, if the seal between the main and lateral liners wasn't perfect, roots traveled along the annular space between the liner and host pipe, causing deformities in the liner and, in some cases, even breaking it."

The pipe-bursting contractor,

however, used tees at the main-lateral junctions or saddle-fused the connections, and they were tight. At the same time, the 6-inch mains were upsized to the 8-inch industry standard, and that was the pivotal factor in Jannings' decision to purchase a 30-ton pipe-bursting system from TRIC Tools Inc.

Multiple advantages

"We had done everything open-cut until then, so excavating two holes and not an entire street made a lot more sense," says Jannings. "Before long, the real push became to pipe-burst laterals. A three-man crew excavates entrance and pull pits at the main and behind the sidewalk at the district cleanout.

The project blocks only one lane of traffic. It's completed by the end of the day, and it puts an end to root intrusion. The lines basically become maintenance-free once they're rehabilitated."

In a one-off situation, the crew once used the ram to slip-line 1,800 feet of 6-inch SDR 21 HDPE pipe into an 8-inch, multi-use line with some S-curves. "Just a few live connections remained on the upstream end, enabling us to rehab it with smaller diameter pipe," says Jannings. The men strung out more than 1,200 feet of pipe for the longest of the two pulls, which went straight through the manholes.

Carollo Engineers in Walnut Creek, Calif., developed the lateral replacement master plan using flow monitoring and modeling to handle a five-year return-rate storm. The program's most successful element, however, was the engineers' willingness to work closely with field crews.

"Our guys tell their supervisors why things need to be fixed and where," says Jannings. "Then the four supervisors work in unison with the engineers to come up with the best solution. Incorporating input from the field crews has produced far better results than what



Field operations superintendent Andy Jannings.

we've had in the past, and it saves a lot of time."

The district has a unique program for upper laterals. After inspecting the completed project, the district originally reimbursed property owners at close to 100 percent of installation cost. Today, because those costs have increased, reimbursement is closer to 80 percent. If customers do not want to replace the lateral, the district reimburses them for installing a cleanout.

"It's sort of a Catch-22 for us," says Jannings. "Without a cleanout, homeowners own the lateral all the way to the main. Those laterals aren't in our system, so we have no idea how many more are out there or how far along we are in our replacement program."

As soon as a cleanout is installed

Collection systems technician Denis Crockett cleans a catch basin as collection systems technician Tom Riedl operates the the Vac-Con 1300 combination truck.



Collection systems technician Scott Ransford prepares a Model 1065 cable machine from Spartan Tool to cut a root located by a camera crew.

“Our guys tell their supervisors why things need to be fixed and where. Then the four supervisors work in unison with the engineers to come up with the best solution. Incorporating input from the field crews has produced far better results than what we’ve had in the past, and it saves a lot of time.”

Andy Jannings

on the district side of the line, the district takes responsibility for the lower lateral. In 2008, contractors replaced 31 lower laterals totaling 855 feet and installed 147 cleanouts. In 2009, they replaced 37 lower laterals totaling 1,500 feet and installed 209 cleanouts.

Protecting the contractor

The district has an in-house inspector and three engineers who

monitor all the work as it is happening to ensure that it is done to specifications. “Doing the inspections ourselves protects the contractors from themselves,” says Jannings. “If we alert them to a developing situation right away, they can correct it at minimal cost.”

One district engineer handles most of the rehabilitation work and meets with contractors to resolve issues. Jannings often receives calls to send someone from his department to provide the maintenance viewpoint. The major issue is always whether doing the repair will cost less than maintenance in perpetuity.

Jannings’ crews use two CUES Inc. camera vehicles to inspect the HDPE pipe. Otherwise, contractors must inspect with a district OCTV technician witnessing. “People are busy and may not review those tapes for a week or two,” says Jannings. “By then, the contractor has demobilized. With somebody in the van to point out problems, the repairs can be done promptly and won’t cost as much.”

In 2009, the district agreed to



Members of the Vallejo Sanitation and Flood Control District team include, from left: Guy Harris, Mike Sisson, Tom Riedl, Scott Ransford, Brian Burket, Ken Taylor, Shorty Miller, Jose Herrera, Justin Keating, Gary Meeker, Jay Frazelle, Shannon Boyt, Don White, Jim Gianulias, Denis Crockett, Tyler Armitage and Paul Moore.

televisé all sewer mains by August 2011. Some lines were probably inspected 15 or more years ago, but the records have disappeared. “We don’t know the exact number of old pipes in the system,” says Jannings.

“I spent more than 10 years doing TV work. Back then, we turned in the information and didn’t keep the records.” Today, the district uses Infor Public Sector/Hansen Technologies infrastructure management software to store preventive maintenance work orders, inspections and other information.

Maintaining the flow

The district’s pipe-cleaning program includes jetting, pigging or rodding siphons twice a month to remove the solids that collect on the bottom. The district has two jet trucks: an HV high-pressure unit from SRECO-Flexible and an 800-H unit from Sewer Equipment Co. of America. It also has a truck-mounted continuous rodder from OK Champion Corp.

The staff sometimes uses a Vac-Con 350 LHA-1000 combination sewer cleaner with hydroexcavator package because the water

“If the jetter operator brings back pipe or something abnormal, he calls the TV crew to televise the line.

A jet machine can check many more segments than a CCTV truck set up on one spot spending time inspecting a perfectly good line.”

Andy Jannings

tank enables them to jet more lines on one fill up. The truck also has a 5-cubic-yard debris body, 8,000 cfm three-stage fan, and 50 gpm/3,000 psi water system.

Another part of the district's preventive maintenance agenda is the jet investigation program, which involves running a jet nozzle up older lines every two years. “If the operator brings back pipe or something abnormal, he calls the TV crew to televise the line,” says Jannings. “A jet machine can check many more segments than a CCTV truck set up in one spot spending time inspecting a perfectly good line.”

Maintenance also includes \$100,000 per year for chemical root treatment in the lower laterals and mains. Vaporooter treated about 600 laterals this year. For the previous five years, Duke's Root Control had won the bid. Jannings is comparing results to see which chemical works better. Vaporooter uses a combination of metham sodium and dichlobenil, while Duke's uses Razorooter II, a diquat-based herbicide.

Counting benefits

Looking back, Jannings is gratified with the results of the I&I program. “We have spent \$60 million

eliminating overflow conditions, which involved a tremendous amount of work,” says Jannings.

“To achieve the results we needed in the shortest time, we went to the option of conveying and storing, and increasing the interceptor sizes to drain the upper reaches of the system. Now we are fixing those things on the top end to make the system tight. The decrease in our average dry-weather flow is a simple indicator that all the new pipe is tightening the system and reducing I&I.”

The district's greatest challenge is to come as close as possible to eliminating blockages and overflows. The group will incorporate best management practices in its preventive maintenance program, continue an aggressive chemical root control program, perform a comprehensive and continuous condition assessment of the system, and rehabilitate or replace lines that cannot be effectively maintained.

“It's easy to overlook the linchpin in all of this, and that is the effort everyone makes to function as a cohesive group,” says Jannings. “My obligation is to provide the best equipment and training available so we are ready for the challenges ahead.” ■

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INTELLIGENT PLANNING

The Mesa Water Resources Department optimizes its inspection and rehab program with innovative software that makes it feasible to predict what might break next

By Dan Heim

Software that can detect and filter e-mail spam incorporates a library of known spam characteristics, learns from user input and recognizes patterns. It works well.

The City of Mesa, Ariz., has found that the same process can be applied to infrastructure maintenance. In theory, if software can learn to predict spam, it can learn to predict infrastructure failures. This is the reasoning behind the

city's Sewer Cataloging, Retrieval and Prioritization System (SCRAPS).

The Water Resources Department incorporated SCRAPS to help optimize its system rehabilitation and maintenance program. The results to date have been stunning. Hebi Li, the civil engineer in charge of integrating SCRAPS with Water Resources planning, observes, "There have been no surprises since we started using SCRAPS. In fact, we've come to trust the program's judgment when setting up our

rehab and inspection schedule."

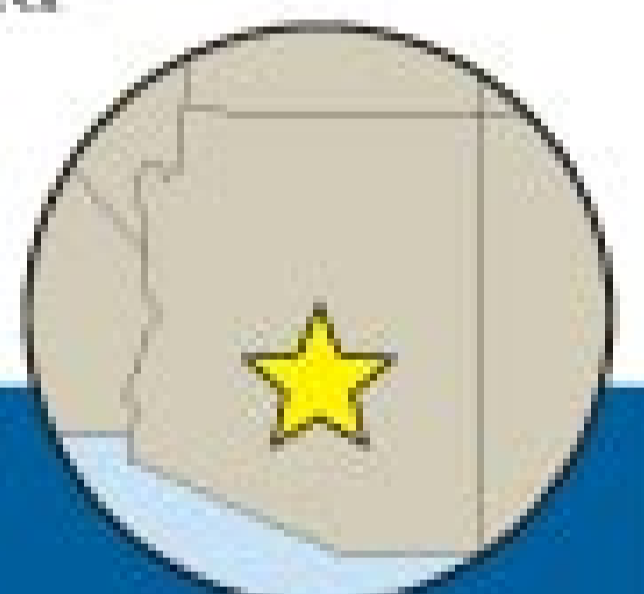
SCRAPS automatically sets maintenance schedule priorities based on the likelihood of a problem, the damage that problem could cause and the resources required to prevent it. It takes the guesswork out of planning and recommends the most effective allocation of department resources.

Predictive tool

Mesa's relatively young sewer system includes 1,632 miles of

sewer pipe, 17 lift stations, 19 sulfide control stations, five metering stations and 29 flow diversion structures. Its four wastewater treatment plants process 35 mgd on average.

The city began using SCRAPS in 2009. The software was developed under contract to the Water Environment Research Foundation by the Brown and Caldwell environmental engineering and consulting firm and the University of



PROFILE:
City of Mesa, Ariz.,
Water Resources
Department

SERVICE AREA:
169 square miles

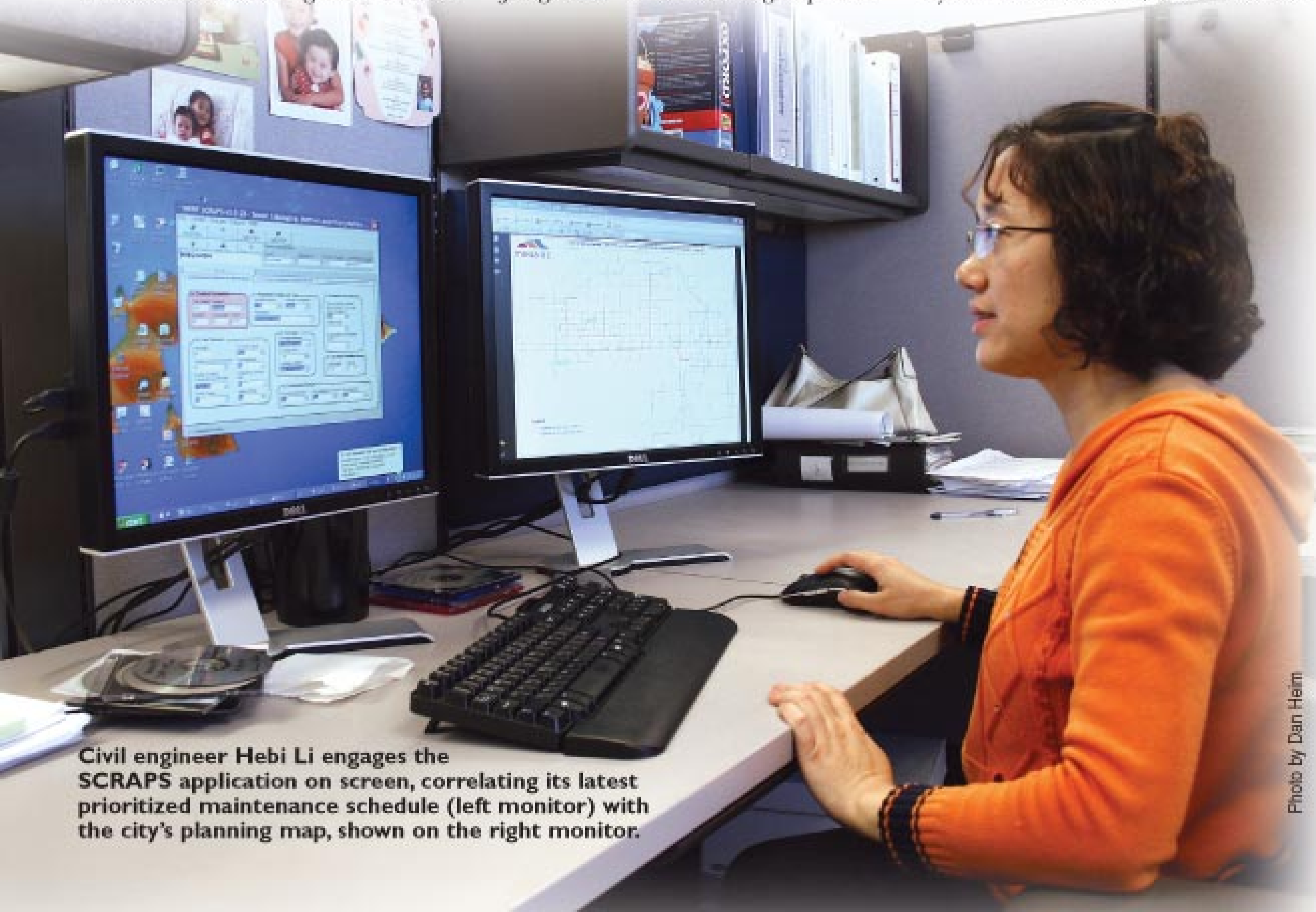
POPULATION:
464,000

INFRASTRUCTURE:
1,632 miles of sewer pipe,
17 lift stations

ANNUAL BUDGET:
\$20 million operations,
\$17.5 million capital

EMPLOYEES:
65

WEB SITE:
www.mesaaz.gov/water



Civil engineer Hebi Li engages the SCRAPS application on screen, correlating its latest prioritized maintenance schedule (left monitor) with the city's planning map, shown on the right monitor.

Photo by Dan Heim



Workers from Achen-Gardner Engineering use slip lining for a trenchless pipe rehabilitation job. Achen-Gardner is a general contractor specializing in wet utility, roadway, and highway construction.

Washington. It was officially launched in 2001.

The Microsoft Windows-based software is of the genre often called expert systems (see sidebar). The internal model it builds allows it to make statistically sound predictions about where things might next go wrong within a sewer system infrastructure.

Once it assimilated Mesa's geographic information system (GIS) and started interacting with the staff, it quickly learned to predict the most likely system failures, and that's

Upper right: The SCRAPS input screen where basic attributes such as pipe age, diameter, slope, and other relevant data are entered. Lower right: The SCRAPS input screen where the user can input information about the environment in which the pipe is located.

where the city focuses its dollars.

When SCRAPS is launched, the user is presented with a series of three input screens requesting data. Those are:

- **General and historical information:** Includes typical GIS data, such as pipe material, dimensions, slope and age.
- **Previous inspection or improvements:** Records the pipe's current rehabilitation and condition status.
- **Pipe environment characteristics:** Includes pipe depth, type of soil, proximity to bodies of water and street resurfacing costs.

Each screen prompts the user for the appropriate data. Much of it can be assimilated directly from the existing GIS, but that requires proper formatting of the attributes. "It takes a little setup time, and maybe some global editing in the GIS, but then SCRAPS just pulls it all in," notes Bill Fick, senior civil engineer.

WERF SCRAPS v2.0.23 - Sewer Cataloging, Retrieval and Prioritization ...

File Utilities Evaluate Reports Help

First Pipe Previous Pipe Next Pipe Last Pipe

Apply Defaults Add Data Remove Data

Pipeline Identification

Basin* Alternate ID Upstream Facility* Downstream Facility*

MN24494 Case Studies SC404 MH22776

Results

1. General and Historical Information 2. Previous Inspection or Improvements 3. Pipe Environment Characteristics

1a. Required Information

Year Installed* Material*
2000 Concrete

Diameter* Invert Depth* Slope*
36 12 0.007

1c. Wastewater Volume and Type

Hydraulic Demand Sanitary or Combined?
2700 Sanitary

Redundancy
No Previous Available

1d. Overflows and Releases

Has an overflow or release been observed? If so, what was the frequency?
None

Overflow type?
A wet weather or dry weather event?

1f. Calculated Variables

Cover Depth Velocity
7-10' 5.5-10.0

1b. Line Structure

Line length Structural Support
40 Drive

Turbulence inducing structure? Frost Protection
None 1F

Number of Lateral Connections per 100 feet? Designed for pressure flow?
2-3 per 100' 1F

Exterior Coating Interior Coating
1F 1F

1d. Surcharge

Surcharge frequency
1 Line per 5 year

Surcharge head
< 10'

Surcharge modeled?
Based on Surcharge

1g. Construction History

Poor Joint Construction Poor Installation Practices? Poor Materials?
None None None

(*) = Required Information

WERF SCRAPS v2.0.23 - Sewer Cataloging, Retrieval and Prioritization ...

File Utilities Evaluate Reports Help

First Pipe Previous Pipe Next Pipe Last Pipe

Apply Defaults Add Data Remove Data

Pipeline Identification

Basin* Alternate ID Upstream Facility* Downstream Facility*

MN24494 Case Studies SC404 MH22776

Results

1. General and Historical Information 2. Previous Inspection or Improvements 3. Pipe Environment Characteristics

3a. Ground - Based

Neighboring Utilities Groundwater
Underground Groundwater

Soil Classification Defective water mains
None None

Soil Type Acidic Total Influence
None None

Hazardous Materials in Soil Cathodic Protection
None None

Depth of Freeze Galvanic Factor
None None

Slope Hazard
None

3b. Ground - Surface

Trees above the line? Tunnel
None None

Resurfacing costs Street Sanding
None None

Access Steeps Drainage Access
None None

Subsidence Heavy Surface Load
None None

3d. Wastewater

Dissolved Oxygen Industrial Contribution to temperature
None None

Max 3 Month Temp Utility Corrosion Treatment
None None

Int'l BOD Contribution Industrial Contribution to acidity of wastewater
None None

Known H2S Upstream
None

3c. Location

Near businesses or critical services?
None

Near a habitat or water body?
None

Near homes, schools
None

Traffic
None

(*) = Required Information

EXPERT SYSTEMS IN ACTION

The City of Mesa's SCRAPS program makes use of a computing technique called an expert system — a computer program that embodies the combined knowledge and wisdom of recognized masters in the field.

Many examples of expert systems are already in use. Here is an example based on auto mechanics. When interacting with the system, the user, whether a mechanic or a do-it-yourselfer, will be led through a branching series of questions and answers that ideally ends at a solution. The dialog might go something like this:

- My car won't start.
- Does it make any sounds like it's trying to start?
- No.
- Do the lights on the dashboard come on when you turn the key?
- Yes.
- How many days ago did it last start properly?
- And so on.

The expert system attempts to narrow the possibilities by the kind of questions asked. The process is called Bayesian filtering, and was developed by the mathematician Rev. Thomas Bayes in the 18th century.

E-mail spam filters use a similar process to learn to sort real e-mails from

spam. They learn when you tell them "that was not spam" or "that was spam." Over time, they become quite accurate at assigning a spam value based on the words in an e-mail.

The SCRAPS program learns, too, but does so during the initial input phase when it is first synched to the city's infrastructure. For example, it will ask questions about the environment around the pipe, proximity to bodies of water, interruption of vehicle traffic, whether there are trees above the line, and what the resurfacing costs would be.

This information typically is not found already incorporated into a GIS. It must be added for SCRAPS to work at its highest level of predictive fidelity. "After SCRAPS has absorbed what it can from the GIS, you must spend some time entering this additional data," says Hebi Li, civil engineer with the city. "Only then can SCRAPS make the kind of prioritization decisions it was designed to do."

SCRAPS continues to learn based on updates to the database, continuously modifying its recommended prioritizations as it goes. So as city experts interact with SCRAPS, in a sense it gains from their knowledge as well. And the more SCRAPS knows about the sewer system, the better its predictions.

Data output

After crunching all the numbers, and consulting its expert system algorithms, SCRAPS displays its prioritization summary. This is the payoff for all the setup and data entry. With reference to individual pipe numbers, the software lists every pipe in its database, starting at the top with what it has judged to be the highest-priority job, whether repair, rehabilitation or inspection.

The first column on this output report (Need to Inspect) really calls the shots. The Need to Inspect

“I’ve been amazed by the lack of surprises. We open up the pipe at the top of the list, and sure enough, it’s a good thing we did.”

Bill Fick

is a number from 100 (do it yesterday) to zero (no problems expected). It effectively sets priorities for work based on a combined assessment (other columns) of the probability of failure, consequences of failure, and structural, operational and material considerations.

Mesa Water Resources has generated a five-year plan for pipe rehabilitation and inspection based on the priorities assigned by SCRAPS. The city is just now completing its cycle of inspections for year 1, and it’s working. “I’ve been amazed by the lack of surprises,” says Fick. “We open up the pipe at the top of the list, and sure enough, it’s a good thing we did.”

Upper right: The SCRAPS input screen where the user can record the results of previous inspections and observed pipe condition. Lower right: SCRAPS displays a list, cataloged by pipe number, showing the “need to inspect” from highest priority to lowest. Other columns show values for the parameters on which the decision is based.

About 8 percent of the pipes have been in the ground for more than 50 years. The rest of the collection system has been in place for 40 years (16 percent), 30 years (39 percent), 20 years (63 percent) and 10 years (22 percent). That boom in piping 20 years ago corresponds to Mesa’s transition from a largely agricultural area to a residential and commercial metropolis — it is now the 38th largest city in the country.

Making compensation

SCRAPS was designed to be used in any location, but some locations have unique environments that lie a little too far from the mean design parameters. “The internal weighting factors that assign relative importance to things like pipe material or slope are not user adjustable,” Li observes. “They’re averages. Sometimes we find ourselves questioning these weightings. It would be nice to set them ourselves.”

Fick adds, “So what we find ourselves doing, when we input the database, is mentally compensating for these weighting factors. We adjust up or down based on how we know these weighting factors operate. I’d like to have more control over that.”

Pipe Num	Need To Inspect	Probability	sequenced	Structural	Operational	Material
MN17049	92.91	94.7	99.5	85.6	93.8	13.5
MN16479	92.91	94.7	99.5	85.6	93.8	13.5
MN11593	92.41	94.7	99	84.6	93.8	13.5
MN11786	92.41	94.7	99	84.6	93.8	13.6
MN11609	92.41	94.7	99	84.6	93.8	13.5
MN11605	92.41	94.7	99	84.6	93.8	13.5
MN11592	92.41	94.7	99	84.6	93.8	13.5
MN11793	92.41	94.7	99	84.6	93.8	13.6
MN11794	92.41	94.7	99	84.6	93.8	13.6
MN11798	92.41	94.7	99	84.6	93.8	13.6
MN11802	92.41	94.7	99	84.6	93.8	13.6
MN11804	92.41	94.7	99	84.6	93.8	13.6
MN17657	92.41	94.7	99	84.6	93.8	13.5
MN17658	92.41	94.7	99	84.6	93.8	13.5
MN11801	92.41	94.7	99	84.6	93.8	13.6
MN17659	92.41	94.7	99	84.6	93.8	13.5
MN1578	91.5	94.1	99	89.5	84.7	28.2
MN2257	91.5	94.1	99	89.5	84.7	28.2
MN1444	91.01	94.7	98.1	85.6	93.8	13.5
MN2272	91	94.1	98.5	89.5	84.7	28.2
MN31198	91	94.1	98.5	89.5	84.7	28.2
MN16474	90.61	94.7	96.6	85.6	93.8	13.5
MN2012	90.5	92.6	97.6	90	81.8	38.7
MN6368	90.5	92.6	98.5	84	85.3	30.8
MN6820	90.5	92.6	98.5	84	85.3	30.8
MN1189	90	91.6	98.5	88	84.7	13.5



Decisions on which pipes to rehabilitate first, by methods including slip lining, are made with the support of the SCRAPS software application.

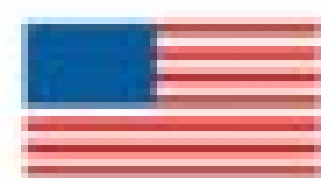
For example, attributes such as pipe depth and freeze depth are internally correlated, and the correlation is averaged for use throughout the country. But in central Arizona, where freezing is not an issue, that correlation is higher than it needs to be.

Another attribute is the extent and likely duration of traffic disruption, should excavation be required. In a city with high population density and narrow two-lane streets, this is indeed an important consideration. But in Mesa, with its large open spaces and relatively low population density, and many of its lines under four-lane streets, that factor gets too high of a weighting.

High confidence

Still, both Li and Fick have confidence in the software, as evidenced by their commitment to a five-year plan based on its prioritization schedule. They may revise that schedule as new inspection data is entered and SCRAPS continues to learn and revises its prioritization schedule.

Water Resources farms out all work on pipes 15 inches and larger. The work is generally done by Achen-Gardner Engineering LLC, a general contractor specializing in wet utility, roadway and highway construction. Smaller pipes are handled in-house. “We find that this provides a good balance between operational and capital expenses,” Li says.



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The department fields three in-house-built jet-vacuum cleaning trucks, one camera van, and one easement machine for working on off-road rights-of-way. The camera van carries with it an OZII camera and Granite XP software from CUES Inc.

The city's nominal inspection cycle is set for 10 years, or about 162 miles of pipe each year. SCRAPS has already identified where to inspect for the next five years of that cycle. As more data is acquired, it will do the same for the final five years.

"Typically you would start with the oldest pipe and work your way up based solely on age," Li says. "But what SCRAPS has shown us is that it's not always the oldest pipe you need to throw your resources at."

Fick adds, "Sometimes a newer pipe gets flagged for inspection based on factors other than age, and when we go take a look, we'll find that, sure enough, we've got root intrusion or a corrosion problem."

The next act

Water Resources is working along a similar track with lift sta-

tions, sulfide control stations, metering stations and flow diversion structures. Here the department is using another Brown and Caldwell program, Asset Management Planning System (AMPS).

"AMPS identifies replacement and refurbishment activities and associated costs to ensure the asset attains its expected useful life," Li says. It's a work in progress, as crews are still gathering data from field inspections for input to AMPS.

But once done, the software will provide crucial guidance for long-term capital improvement budget planning. Working in concert with SCRAPS, effective and efficient resource allocation is the result. Having an "expert" in the house 24/7 is a powerful tool. ♦

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Manhole rehabilitation

BENEFIT:
Effective sealing against I&I

USER:
Wastewater Collection Division,
Miami-Dade (Fla.) Water
and Sewer Department

MANUFACTURER:
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A manhole is shown before and after lining with the epoxy coating system. (Photos courtesy Wastewater Collection Division, Miami-Dade Water and Sewer Department)

PLUGGING THE GAPS

An epoxy coating system helps a Florida sewer department cut off I&I from manholes and drive down sanitary sewer overflows

By Scottie Dayton

A 1992 consent order from the U.S. EPA to reduce sanitary sewer overflows started the Wastewater Collection Division of the Miami-Dade (Fla.) Water and Sewer Department on its formal I&I program.

Precast concrete manholes corroded by sulfuric acid were the primary contributors. Crews repaired them using grout and Type 2 cement. Meanwhile, operators at the South District Wastewater Treatment Plant were successfully

combating concrete and metal corrosion with Uroflex semi-structural (flexible) urethane-modified epoxy coating from Epoxytec.

Because the product was in the county system and easy to buy, Rod Lovett, Wastewater Collection Division chief, tried it. "Every material we use is tested, so we selected a pilot manhole and observed the coating over 12 months," says Lovett. "It still looked good after a year, and we adopted it as an approved product." He reports

that manholes treated with the coating 10 years ago still have no signs of corrosion.

55 and counting

More than 6,000 miles of sewer lines traverse the division's 360-square-mile service area. The 6- to 72-inch gravity collection lines are 75 percent vitrified clay pipe. The 4- to 102-inch pressure lines are mostly ductile iron, although the larger pipes are prestressed or reinforced concrete. More than

one-quarter of the system was built in the early 1950s, and there are more than 80,000 manholes.

To inspect the entire sewer system and comply with the consent order, the city increased its fleet to 16 vans outfitted with equipment from CUES Inc. As part of the order, the division adopted a volume sewer customer ordinance that required a certain number of inspections per year.

"Those inspections generate the sewer work we do that year," says Lovett. "For example, we have 3,000 manhole repairs scheduled for 2010. That's repairs, not manholes. Each structure could have two or three different problems."

Clean and roll

The county has 11 cross-trained repair crews in different locations. Manhole rehabilitations are grouped by area to minimize travel. A crew with a Model 4025-600 truck-mounted pressure cleaner from US Jetting LLC precedes the repair trucks. The men prepare the surfaces, jetting at 4,000 psi/25 gpm down to bare concrete or substrate.

Confined-space entry pullover suits and equipment provide adequate protection for the worker applying the Epoxytec CPP (concrete polymer paste) or epoxy coating. "They sometimes need respirators, but that's to meet OSHA requirements," says Lovett. "In shallow manholes, the men wear just dust masks."

The CPP, applied with a trowel to fill voids or restore the manhole to its original contour, dries in 30 minutes. The manhole walls do not have to be dry before the CPP is applied. "Having moisture-tolerant products is very important because of the damp environment in sewers," says Lovett.

The Uroflex coating, applied with a paint roller, adheres to the concrete substrate even if moisture is present. It dries in 30 minutes. A three-man crew can rehabilitate an average manhole in four to five hours.

Manholes are rehabilitated on

an as-needed basis, since not all experience severe enough corrosion to warrant it. While the coating can be sprayed on, the division finds rollers just as effective and more budget-friendly.

"One of the things we like about these products is that they don't require special or proprietary equipment to apply," says Lovett. "Anybody can do it after a brief training session. In fact, if you know how to put in cement products, you probably can install the filler paste and coating."

Locating sources

Infiltration determines when the department conducts sanitary

sewer evaluation surveys. To locate infiltration sources, they meter all the basins — collection systems flowing to a particular pump station — and inspect basins with flows of 5,000 or more gallons per inch-diameter-mile every 10 years.

"We convert all the different pipe sizes to inch-diameter-miles for comparison, then look at the gallons in our night flow metering for each diameter mile," says Lovett. Basins with less than 5,000 gallons per inch-diameter-mile are rarely surveyed. The department's goal is to inspect 1.5 million feet of sewer pipe per year and include some of these overlooked basins.

The I&I program has reduced

"One of the things we like about these products is that they don't require special or proprietary equipment to apply. Anybody can do it after a brief training session. In fact, if you know how to put in cement products, you probably can install the filler paste and coating."

Rod Lovett

SSOs to small, low-volume (5- to 100-gallon) overflows, mainly due to blockages in the gravity mains. "We think the paste and epoxy coating are working," says Lovett. "The materials are moisture-tolerant, bond well and are easy to use. Our repair crews simply load the containers into the trucks and gear up for confined-space entry." ♦

Confined-space entry gear protects a worker from contacting the concrete polymer paste as he trowels it into voids and restores the manhole to its original contour.



The concrete polymer paste restores manholes by filling voids. This manhole is ready for coating.

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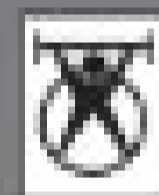
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Envista displays projects graphically on an easy-to-read map. All users need is Internet access to see project locations, types and dates, and project conflicts. (Screenshots courtesy of Envista)



CONFLICT AVOIDANCE

Envista application helps multiple infrastructure owners coordinate activities and complete projects cost-effectively, free of interference

By Gil Longwell

To operate efficiently, owners of subsurface utilities and surface infrastructure need to avoid conflicts during construction and repairs. Coordination between water, sewer and street departments, and electric, gas and telecommunications companies, can be challenging.

Envista, an online software tool from Envista Corporation, enables these entities to coordinate project

interact with the software and with each other via the Internet. Typical subscribers include municipalities with multiple public works or streets departments, and water, sewer, electric and other utility providers.

Chris Ciriello, P.E., a water and wastewater applications engineer with Envista, and Martha Bednarz, director of marketing, demonstrated the application online. Internet access and a Web browser are the

system through an intuitive interface that combines a GPS-like map, a spreadsheet and an assortment of data-display filters. These are the anchor components on every Envista screen. Regardless of location, each client's data is housed in Envista's redundant, secure servers.

The map, prominently centered on the computer screen, is a geographic interface. The subscriber's entire service area is in the system, but only a small portion is displayed at any time. The map is navigable with zoom in/out controls and a click-and-drag feature.

Several reconfigured screens focus users' attention on any of several conditions or relationships that the software automatically identifies. These screens are labeled Projects, Incidents, Conflicts, Moratoriums, Opportunities, Permits and Events. There is also a mailbox screen by which subscribers can communicate with each other.

Much of the map-depicted information also appears in a text format in the spreadsheet or in a pop-up window. As with the map,

TECHNOLOGY TEST DRIVE

EQUIPMENT:
Envista software

SUPPLIER:
Envista Corporation

LOCATION OF DEMO:
Via Internet

DEMONSTRATED BY:
Chris Ciriello, P.E., water and wastewater applications engineer, and Martha Bednarz, director of marketing

LIST PRICE:
One-year subscription:
\$7,500 for a municipality with 25,000 to 50,000 population;
\$15,000 for a utility with 10,000 to 50,000 customers

WEB SITE:
www.envista.com

Envista, an online software tool from Envista Corporation, enables these entities to coordinate project schedules and work zone locations effectively. It presents multiple projects simultaneously in an attention-focusing, visually pleasing manner.

schedules and work zone locations effectively. It presents multiple projects simultaneously in an attention-focusing, visually pleasing manner. By preventing conflicts, users save money and time.

The product is available only by subscription in a software-as-service (SAS) format — subscribers

only requirements for accessing the Envista Web site and using the software. Envista launched the service in May 2008 and has clients in about 30 geographic areas across the United States and Canada.

Walk-around

Envista users interact with the

only a portion of the database is displayed at any time.

Because each line segment and explicit work site on the map is connected to a discrete spreadsheet line, clicking on a map feature immediately positions the corresponding spreadsheet entry or record at the top of the list. This dual presentation helps users locate or visualize the project on a map and, without cursor or mouse moves, read key project data. Additional data is a mouse-click away.

Screens organize and depict project data in a variety of ways to enable different users to consider project interactions from different

perspectives. Each screen is a kind of electronic “heads up” for all subscribers. Each is a focused tool designed to help avoid or resolve an issue that may affect two or more subscribers’ activities.

A Conflict, for example, occurs when two subscribers’ activities are scheduled in the same or nearby spots at the same time. The Conflict can be avoided by changing project schedules. Envista finds the conflicts and points them out to all conflicted subscribers. Presenting future events so that conflicts can be avoided is the primary purpose of the application.

Opportunities are planned activities that are electronically flagged and called to the attention of all users. Street paving is an opportunity if other subscribers complete their same-location work before the paving begins and so avoid tearing up a newly paved street by making underground repairs first.

An Incident may be a utility line strike during a directional boring project or the appearance of a sinkhole. Incident notification enables all affected subscribers to see the problem and coordinate responses in real time.

Moratoriums are set in place for freshly paved streets and may last for five to ten years. These are flexible prohibitions, and when excavation is essential, it can be permitted.

The Event screen is a planning tool usually used for non-utility activities. Marathons, demonstrations, parades and festivals all represent events for which public safety staff and supporting resources may need to be deployed or redeployed.

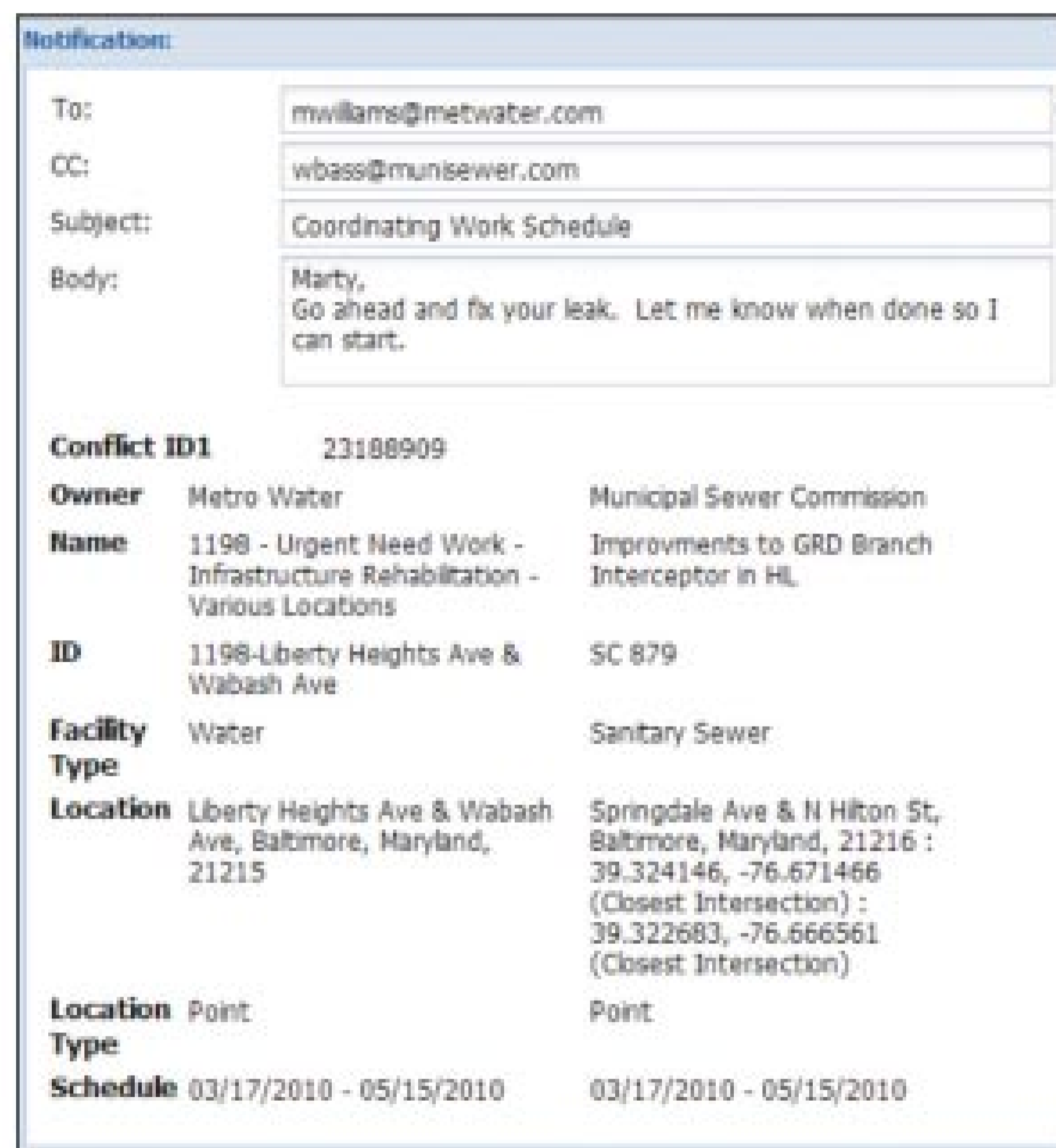
Recognition of issues and opportunities is only the first stage in interagency coordination. Without communication to coordinate strategies and resolve issues, the act of resolution itself can generate new issues. Each project entered in the system has project sponsor contact information embedded. A mouse-click on a conflict site on the map opens an overlay window displaying details of the conflict.



Projects are color-coded by facility type: for example, blue for water, dark green for sanitary sewer, gray for roadway projects.



Envista software automatically identifies conflicting projects to facilitate resolution. To review a project, the user clicks on it to view more detailed information.

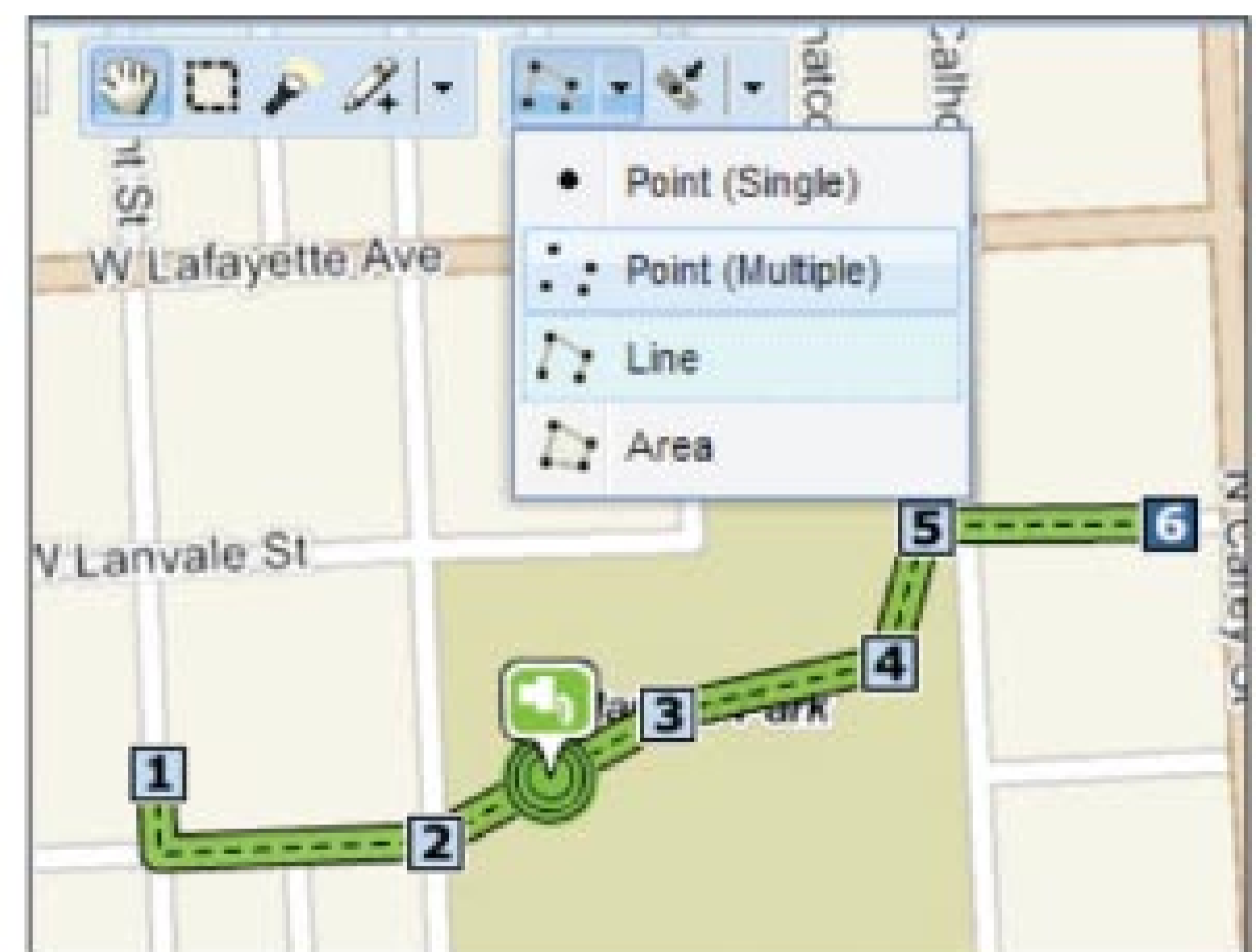


To contact another infrastructure owner about a conflicting project in Envista, users click Notify, and an e-mail with project details is automatically generated. The sender can add his or her own message. The software tracks all e-mails generated.

From this window, an e-mail writing window can be opened. E-mail traveling within the Envista platform is archived and retrievable.

Operation

Ciriello began the demonstration with an overview of the Project screen. Clicking the cursor on a street segment presented in bold blue, symbolizing a water pipeline project, he opened an overlay window that identified the project’s owner, anticipated start and end dates, and more. Simultaneously, the text for that project automatically appeared in the spreadsheet’s top line position.



Drawing tools enable users to add projects by simply drawing them on the map. Here, a storm sewer project crossing a park is being added. Users can add a single point, multiple points, a line, or an area. The program enables all types of users to map projects.

He then reviewed the complete array of data accessible about the project. “Standard One-Call utility colors visually link a project to its sponsor,” he noted.

Next, Ciriello clicked open a suite of drawing tools and entered a new project directly on the map. As he entered data, street names, nearest intersection and other fixed locations, area affected, and other information automatically populated the spreadsheet.

Users are prompted to enter nonspatial data into the application to fully detail each new project. This includes start and stop dates, a project name, and sponsor-

related information. Because the spatial components of all data entered into the spreadsheet are automatically transferred to and appear on the map, no cartographic skills are required.

Moving the cursor to the left side of the screen, Ciriello explained how displayed map data can be filtered by date, location or project type. “For example, if you want to look at projects scheduled in a particular month, the calendar filter is used to narrow the displayed information,” he said. “Similar searching or filtering capabilities enable searches at or near specific intersections, addresses or utilities.”

Subscriber data can be entered to the system using simple import commands. Data from a wide range of spreadsheet, database and project management applications can



Facility Types in Envista conform to industry-standard colors for One-Call systems. For example, orange is communications, red is electricity, yellow is gas.

be imported quickly. Project modifications can be added through the browser interface or by subsequent imports. "Each subscriber can control the information available to other subscribers," Ciriello said. "The site is password protected, and it is generally not made accessible to the public."

The system is intended to find conflicts and enable resolution. Demonstrating how the software facilitates communication between subscribers, Ciriello clicked open the e-mail function by first identifying a conflict on the map, then selecting the Conflict Information window. From there he activated the Notification Window, and a pre-formatted e-mail template appeared.

The template presented the conflict identification number and the nature of the conflict. The conflicting subscribers were also identified, and the e-mail was pre-



In its latest version, the software enables users to map unplanned and emergency incidents, such as water main breaks. As a Web-based solution, multiple city departments — utilities, public works, traffic, police — can quickly share information and actions on a map.

"The application enables simultaneous information exchange, visualization of the data, identification of real conflicts, and conflict resolution that reaches all subscribers, not just those experiencing conflicts."

Martha Bednarz

addressed to reach the appropriate utilities' project contact persons.

Observer comments

Envista screens are user-friendly, engaging and deceptively low-key. Without fanfare, they enable collaboration that inspires a quiet "wow" when the full benefits are realized.

As a work zone conflict avoidance tool, the software protects surface infrastructure from excavation after paving. As a project-planning tool, it enables subsurface utility owners to reduce work conflicts and collaborate for cost-saving, sequential operations.

As a real-time incident management tool, it lets emergency responders, police and utility owners respond to anticipated and unanticipated incidents. As an event-planning tool, Envista allows limited human and support assists to be pre-positioned and redeployed efficiently.

Manufacturer comments

Bednarz describes Envista as a centralized collaboration application. "The application enables simultaneous information exchange, visualization of the data, identifica-

tion of real conflicts, and conflict resolution that reaches all subscribers, not just those experiencing conflicts," she observes.

"Usually, the owner of the largest infrastructure system is the entity that first subscribes to the service. This is because they have the most to lose as the result of conflicts. They also have the most to gain from conflict avoidance."

Ciriello notes that behind the scenes, Envista is powered by Oracle software that incorporates NAVTEQ digital mapping and ESRI GIS tools. A municipal subscriber's subscription fee is based on total population, while a utility company's fee is based on its number of customers. ♦

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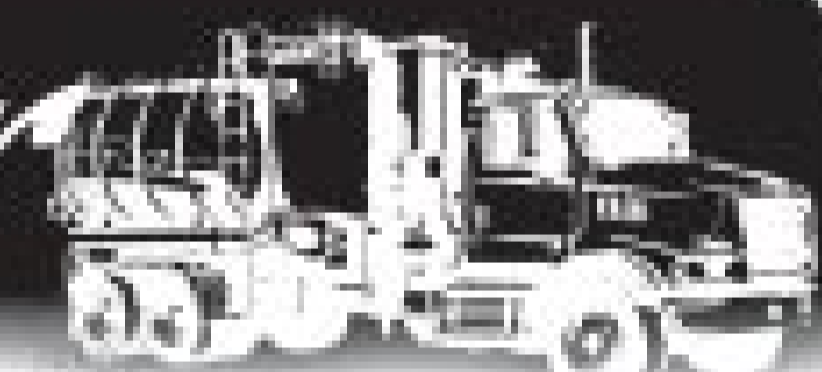


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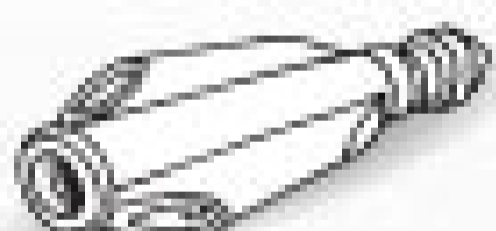
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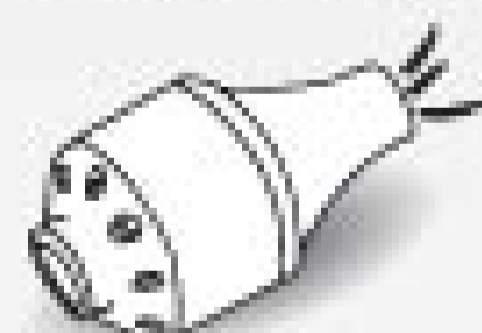
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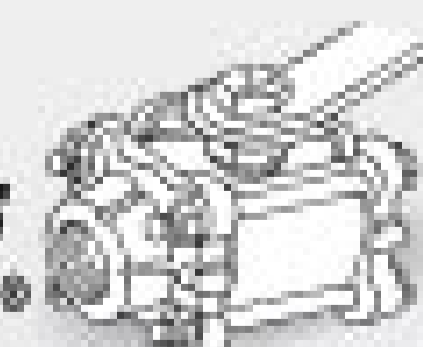


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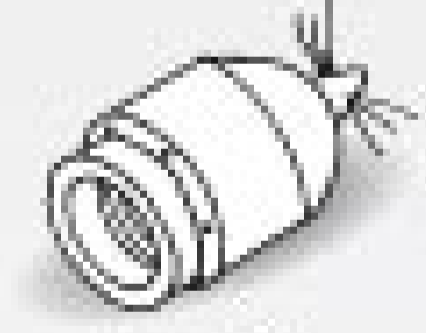
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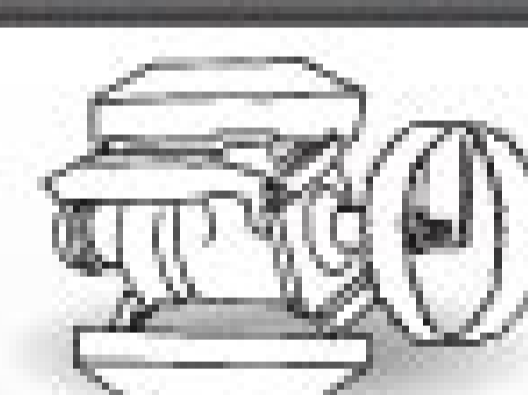
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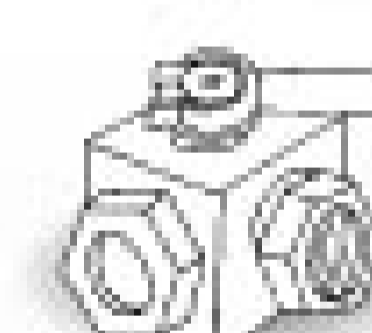
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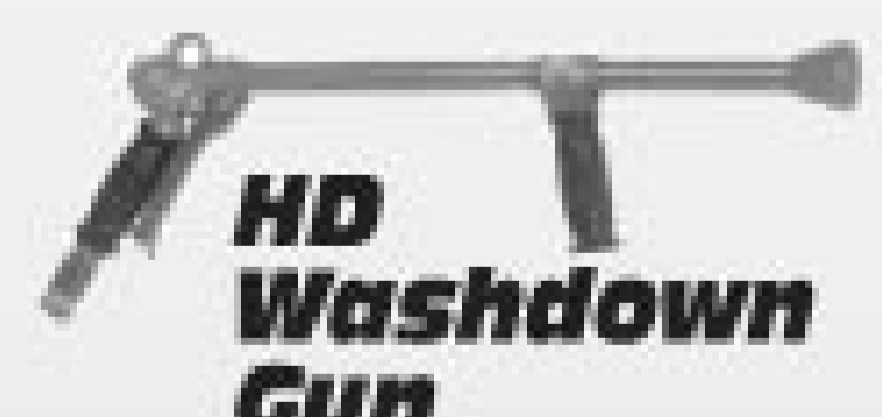
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BUILDING FIRST-STRINGERS

Facing multiple retirements, senior managers at the Charleston (S.C.) Water System are grooming future leaders with an intense development program

By Ken Wysocky

Bench depth is just as valuable to business organizations as it is to sports teams. Just ask the senior management at the Charleston (S.C.) Water System.

The management team saw several years ago that they had a silent problem: a lack of qualified people to replace older workers headed toward retirement. “We faced the loss of about one-third of our employees to retirement within five years,” says Jim Meeks, assistant director of human resources. “So we started benchmarking ourselves against other utilities. We found that many organizations develop succession plans, and

tion’s strategic plan.

But first, management had to identify critical positions and the core competencies that went with them. “Basically, if you touch water, you’re in a critical position,” Meeks says. About one-third of employees qualified as critical. Next, a workforce development team identified employees who might be leaving for retirement, promotion or other reasons. “We found out that we’d better get busy,” Meeks says.

Leadership 101

The utility then set up a three-year leadership-training program, starting with 30 employees. To save time and money, professors from

Meeks says. “It emphasizes to employees that they need to exhibit the competencies they were taught. It makes sure they meet those expectations for all three years of the program.” The check-off sheets also helps senior management buy into the program, since they provide a mechanism for accountability.

In the second year, employees focus on continuous improvement concepts such as problem-solving, root-cause analysis, asset management and operating enhancements. The class splits into groups that pick a particular problem facing the utility (equipment downtime, for example), then solve it by applying concepts learned in the class.

“It’s sort of a final exam where they can execute what they’re taught, then make a presentation about it,” Meeks says.

The third year exposes employees to criteria used in the Malcolm Baldrige National Quality Award program. They learn about budgeting and finance, safety, empowerment, change management, transformational leadership and presentation skills.

Seeking accountability

As part of the program, employees are asked at performance reviews to name two jobs they would like to hold within three to five years. Supervisors then use the list of core competencies devel-

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 Ted Rulseh at 800/257-7222, or e-mail editor@mswmag.com.

oped for critical positions to determine what training people need to prepare for their career path.

“Now supervisors can target training toward the skill sets that those critical jobs require,” Meeks says. “This systematically ties everything together.”

No employee is guaranteed the job he or she wants, but the training ensures that if they do get it, they will be well prepared. Meeks emphasizes that the training is broad enough to apply to more than one specific job.

Along with developing a career track, employees are required to set SMART goals — specific, measurable, attainable, relevant, timely — that supervisors use to measure performance. “Accountability is key,” Meeks notes. “The SMART goals comprise up to 40 percent of an employee’s job appraisal. Each goal must be tied to the organization’s mission, vision, strategic plan or company incentive.

“As a result, when employees are out there working on pipes, they realize how that fits into the big picture. They need to live and breathe it. The better job they do on the front end of setting goals and determining how they’re measured, the easier it is to talk later about their performance during job reviews.”

Employee buy-in

At first, the program had its

“We faced the loss of about one-third of our employees to retirement within five years. So we started benchmarking ourselves against other utilities. We found that many organizations develop succession plans, and that’s as far as they get — there’s no execution.”

Jim Meeks

that’s as far as they get — there’s no execution.”

Determined to do better, the utility developed a comprehensive talent management program to improve employees’ leadership skills and better qualify them for higher positions. The program also aimed to make employees more accountable by tying performance reviews and salary increases to verifiable goals that mesh with the organiza-

local colleges taught the classes on site. Each student spends 68 to 80 hours a year in classes.

The first year focuses on leadership fundamentals such as diversity, ethics and decision-making. To reinforce the training, each participant receives a competency check-off sheet that later counts toward 10 percent of the performance evaluation.

“The check-off sheet follows you after you complete the classes,”

skeptics. Meeks thought it might begin and end with just the initial 30 participants. But in its fourth year, the program attracted another 30 employees, and now even non-supervisory employees express interest in attending.

A key to the program's success is measurable results from employee goal-setting. For instance, since 2006, the utility recorded a 3 percent drop in water lost during delivery from the treatment plant to homes, businesses and hydrants.

"But the biggest thing is inflow and infiltration on the wastewater side," Meeks says. "From 2006 to 2008, we saw an 8.8 mgd decrease in I&I. That means less strain on our equipment, a better and more consistent process, and less need for capital investments in more infrastructure."

Another key is flexibility. The

curriculum changes with the results of annual needs assessments that include input from senior management and line managers. This ensures that training is applicable to new emerging issues. "For example, our continuous improvement classes now include statistical process control because our plant managers determined there's a need," Meeks says.

Make it happen

A little determination never hurts, either. "A lot of good plans sit on a shelf," Meeks notes. "We decided we weren't going to fail. We were going to live it. It's a struggle at times to keep it a priority. But senior leadership sees how attendees' behavior has changed, and they love the accountability aspect." Not to mention the luxury of a deeper bench. ♦



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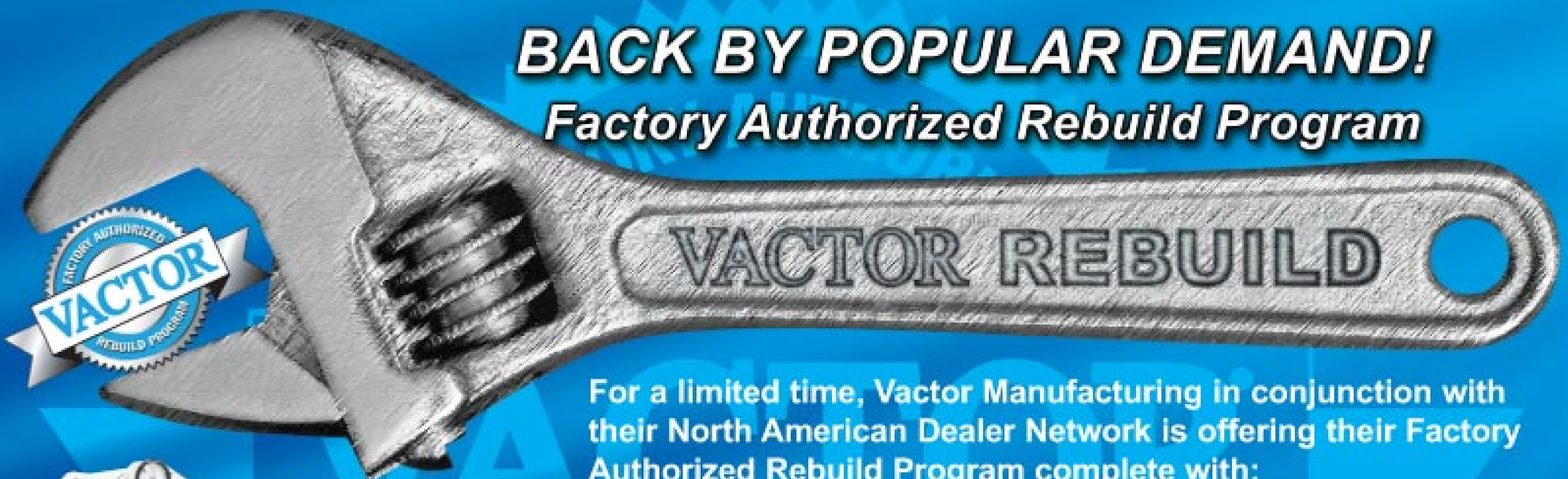
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PULLING AND DRILLING

Manufacturers present innovations in pipe bursting and horizontal directional drilling for trenchless repair

By Benjamin Wideman

Pipe bursting and horizontal directional drilling are important items in any municipality's trenchless repair tool kit. Here is a look at some of the more recent innovations in systems, tools and accessories from industry manufacturers.

Difficult soils

The **Model PD-6 directional thrust boring machine from Pow-R Mole** is designed to install new pipe or cable through virgin ground and also may be used for pipe bursting. The device operates from a pit 56 inches long and has a thrust force of 84,822 pounds at 3,000 psi. The maximum push rate is 7 fpm. The



device is designed for use in difficult soil conditions under roads or in areas that cannot be dug. The dry-bore system does not require drilling fluids. It uses a digital transmitter in a housing at the front of the rod string. 800/344-6653; www.warriorworldwide.com.

Travels under obstructions

An all-new generation of **Hole-Hog piercing tools from Allied Construction Products** provide underground pipe or service replacement in construction and installation work. The tools travel under obstructions such as roads, driveways, parking lots, runways and foundations without disturbing surfaces and landscaping. When impassible conditions are encountered, the tool is easily reversed with a quarter-turn reverse mechanism. The tools make holes from 1 7/8 to 6 inches in diameter. With 18 parts including only one moving part, maintenance costs are minimal. 216/431-2600; www.alliedcp.com.



Adjusts to conditions

The **D20x22 Series II Navigator horizontal directional drill from Vermeer Corporation** is powered by an 83 hp Kubota diesel engine and provides 2,200 foot-pounds of torque for turning cutting tools and pulling large backreamers. The standard AutoDrill feature allows operators to pre-set rotation, thrust and pullback pressure. Then the drill adjusts to the conditions it encounters during the bore.

The Rock Adaptable Terrain Tool (RATT) system lets operators drill and steer through many soil conditions without specialized machines. Fingertip controls are mounted on two joysticks within the ergonomically designed operator's station. 888/837-6337; www.vermeer.com.



40,000-pound thrust

The **EarthPro DD-4045** from **Astec Industries Inc.** delivers a 40,000-pound thrust/pullback and 4,500 foot-pounds of rotary torque. It has a two-speed carriage and a Cummins QSB4.5 turbocharged Tier 3 Stage IIIA diesel engine that produces 156 hp. A multi-function color LCD display provides a clear view of the drill's performance and functions. Dual joystick control and cruise control are standard. **800/527-6020; www.astecunderground.com.**



Heavy duty

TA-30 and TA-40 pipe bursting systems from **Pipe Genie Mfg.** are designed for tough jobs. The TA-30 can pull up to 6-inch pipe through any soil conditions. It comes standard with a 9 hp hydraulic power supply and two chain carts containing 100 feet of 5/8-inch chain to pull high-density polyethylene pipe.



The TA-40 pipe pulling unit handles a wide variety of general jobs and can pull 4- to 6-inch pipe in any soil conditions. It includes a 9 hp hydraulic power supply and three chain carts containing 5/8-inch chain. **877/411-7473; www.pipegenie.com.**

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Size and power

The **M50 bursting system** from **TRIC Tools Inc.** provides a combination of size and power for easements and other tight spots where bigger equipment won't fit. The device is strong enough to burst 8-inch mainlines, yet portable enough to set up by hand. It can operate from a backhoe or a dedicated high-flow hydraulic pump.

The unit's pulling force is 48 tons at 5,000 psi. Piston area is 19.24 square inches. The suggested flow rate is 10 to 20 gpm. The puller weight is 135 pounds, the 12-inch pulley base is 95 pounds, and the 24-inch resistance plate is 50 pounds. **888/883-8742; www.trictools.com. ♦**



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SO MUCH TO SAY

It is gratifying to see the pipeline rehabilitation industry moving forward and a new generation of leaders emerging

By Irvin Gemora

Every month I've been grateful for these 500 words to say what's on my mind and educate the readers of *Municipal Sewer & Water* on the key issues facing NASSCO, the organization dedicated to the rehabilitation of underground utilities.

I've spoken with many people, and it's always nice to hear that folks are reading what I write — or want to listen to what I have to say. Many people tell me they like this column because it gives them a nice variety of information.

During the last two years, I've covered many topics: consent decrees, inspector training, negative selling, public education and much more. I've also covered key highlights of our organization. Members and nonmembers like the quick read this column provides. We have so much happening at NASSCO that it can be a challenge to cover

with the highlights in this space, but once again I'll do my best.

The year is off to a great start with new president Brad Dutruch, who is focused on moving many in-development NASSCO projects to completion. Some exciting highlights of what's ahead include:

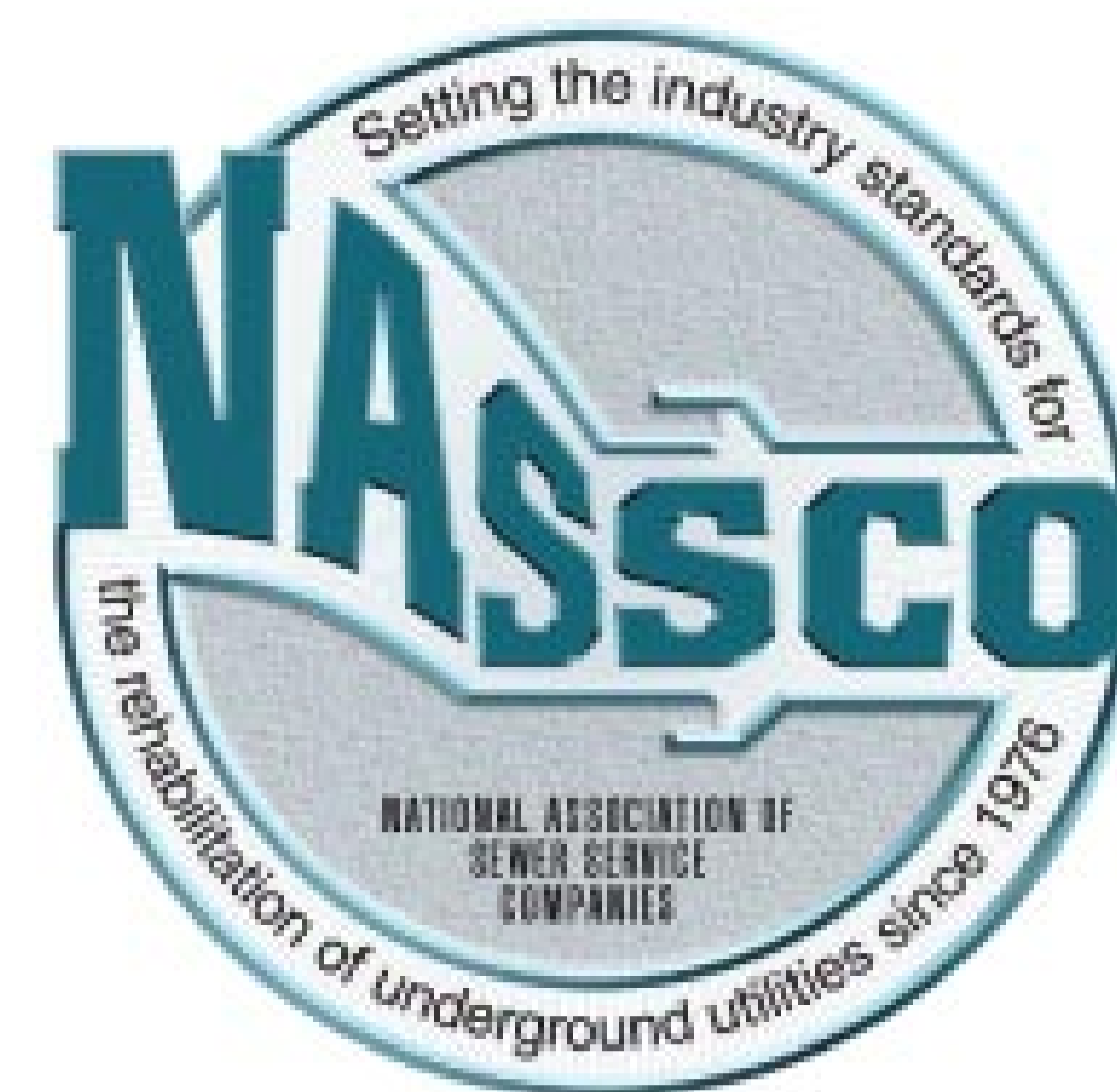
- Launch of the Lateral Assessment and Certification Program (LACP) Web site training and local area testing.
- New version of the Manhole Assessment and Certification Program (MACP).
- Pipeline Assessment and Certification Program (PACP) advanced inspection.
- Jetter Awareness Video — designed for use in hiring operators and in marketing efforts. It effectively displays the use of combination jet/vacuum trucks and the best ways to clean sanitary and storm sewer lines.

- Updated Smoke Testing Performance Specification.
- Updated Pipe Bursting Performance Specification.

I announced my plans for retirement last fall, setting my departure date to follow the NASSCO Annual Meeting in February. Since I made this announcement and an accompanying call for my replacement, I've been honored to receive great feedback throughout the industry. I'm also pleased to see such a strong pool of candidates in an industry that was once so small.

It's only natural when you've been in the industry as long as I have to look at the sea of faces, at industry events and professional activities, and see the tremendous growth and the new generation being positioned for leadership.

Growth in any industry is directly related to those who contribute and help sustain it. One example is the Jeffery D. Ralston



Scholarship Award. This scholarship is given annually by NASSCO to college students who are working in the industry. This year, the board of directors voted to add two additional \$1,000 scholarships. Funds for the scholarships come directly from NASSCO members' donations and fundraising efforts.

Our organization is truly moving forward in a positive way, building leaders and investing in our industry.

Our organization is truly moving forward in a positive way, building leaders and investing in our industry. I want to remind all readers to get involved in our organization, mentor your younger colleagues, and support programs that will help us maintain quality work and quality people. You will find these efforts truly rewarding.

I've been so pleased to serve the industry that I entered 23 years ago. I can't think of another opportunity where I would have gained such knowledge and insight. To be able to serve as executive director and give back to the industry has been a gift. During the coming months, I will keep you updated on key topics affecting our industry and what NASSCO is doing. As always, I love hearing from readers. Feel free to contact me. I look forward to hearing from you. ♦

Irvin Gemora is executive director of NASSCO. He can be reached at director@nassco.org. The NASSCO headquarters is at 11521 Cronridge Dr., Suite J, Owings Mills, MD 21117.


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LISTINGS

Chicago-Area Biosolids, Land Application, Dredging and Industrial Services Business. Established in 1985, owner is retiring. Reputable business includes real estate servicing the entire Chicagoland area with sludge and biosolids disposal and treatment services. Real estate and shop included with sale valued at \$750,000, business grosses in excess of \$3 million annually, \$6.3 million in equipment and assets including several TerraGators, Vac Trailers, dump trailers, loaders and much more. **\$4,900,000.** Huge potential, good profit and priced right. Non-Disclosure Agreement required, all P&L statements, list of assets, and financials available to qualified buyers.

Allentown, Pennsylvania Area Sewer Business. Specializing in collection systems, video inspection, jetting, municipal work. Includes CUES TV & grout truck, Sewer Equipment Corporation jetter truck, Vactor 2100, RIDGID camera, confined space equipment and more! Good revenue history. Great opportunity to expand or start your own business. Current owner wants to retire. **\$330,000.**

Massachusetts Sewer & Drain Franchise For Sale. Confidential listing. Non Disclosure Agreement required. Turn-key business, good revenue. **Asking \$165,000.**

Dallas/Fort Worth Texas Area Sewer/Rehab Business For Sale. Drain Cleaning, TV inspection, Pipeline & Manhole Rehab/Relining, Municipal Cleaning and Maintenance business for sale. Excellent opportunity to expand or start your own business. Good revenue history and priced to sell. Includes all equipment to get started. **Asking \$150,000.**

Northern Minnesota Septic & Drain Cleaning Business For Sale. Established in 1965, owner is retiring. 3,500 customers including some contracted. Well-established name for 45+ years. Real estate available for additional fee that adjoins municipal dump site. Hunt, fish, snowmobile right out your back door. **Affordably priced at \$50,000.**

Texas Septic and Sewer Business. Grossing in excess of \$1,000,000 annually. Includes 2007 2500 gallon septic truck, 1995 2500 gallon septic truck, 2007 and 2008 Chevy service trucks, portable restrooms and more. 430 contracted customers. **\$799,000.**

Green Bay, Wisconsin Area Septic & Drain Business. Solid and steady revenue history and nearly 20 years established. Excellent opportunity to expand or start your own business. Includes very well-maintained 3,800 gallon septic service truck, fully outfitted 2002 Chevy drain service van, drain & sewer equipment, all office equipment and computers, 2,700+ customer list, and more - a true turn-key or easy expansion opportunity. Very meticulously maintained equipment all kept inside a heated shop. Current owner is retiring. Large shop and real estate is also available if desired at additional cost. **Asking \$249,000.**

North Carolina Septic Business. Grossing in excess of \$125,000 annually. Includes 2,000 gallon service truck, backhoe, jetters and more. **\$110,000.**

New Jersey VIP Restroom/Portable Toilet Business. Servicing Metro Philadelphia and Southwest New Jersey with VIP restroom trailers and portables. Many late model assets including 2 nice service trucks, 1 back-up service truck, pick-up truck, 4 VIP restroom trailers, nearly 300 restrooms, sinks, holding tanks, slide-in unit, 2 forklifts, and more. Assets worth over \$300,000 - priced to sell at **\$399,000.**

Badger Meter Purchases Cox Instruments, Flow Dynamics

Badger Meter Inc. of Milwaukee, Wis., has purchased Cox Instruments LLC of Scottsdale, Ariz., and its subsidiary companies Flow Dynamics Inc. and Exact Flow, suppliers of precision and industrial flow measurement instrumentation. The acquisition combines the resources of the three flow measurement companies into a wholly-owned subsidiary of Badger Meter Inc. named Cox Flow Measurement Inc., which will continue to be based in Scottsdale, along with its management team.

Ottumwa, Iowa, Receives EPA Grant for Sewer Project

The U.S. Environmental Protection Agency has awarded the City of Ottumwa, Iowa, \$291,000 for ongoing construction of a multi-phased combined sewer separation project. The purpose of the project is to eliminate combined sewer overflows and basement backups for residents on the south side of the Des Moines River in Ottumwa. The area has recorded more than 500 basement backups over a 10-year period. The project also will reduce the amount of phosphorus entering Oxbow Lake, which has been identified as impaired by algae, turbidity and chlordanes.

Jamko Receives PACP Certification

Jamko has received the Pipeline Assessment and Certification Program (PACP) certification from the National Association of Sewer Service Companies. NASSCO develops standards and best practices for the rehabilitation of underground pipelines and is the North American standard for sewer defect identification and assessment, providing standardization and consistency to the methods in which sewer pipe conditions are evaluated and TV inspection results are managed. ♦

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PEOPLE / AWARDS

The **Village of Frankfort** received the 2010 Stormwater Award from the Illinois Association for Floodplain and Stormwater Management.

Ernie Faucett, the National Director from Arkansas on the National Rural Water Association Board of Directors from 1977 to 2007, died April 7, 2010.

The National Rural Water Association announced the following recipients of the NRWA Scholarships: **Randi Anklam, Hannah Ardoin, Matthew Buhmann, Kevin Culpepper, Jordan DeMoss, Alaina Gammil, Jaston Herndon, Tanner McClellen, Hailey Murphy, Laurel Murphy, Arissa O'Connell, James Sault, Wendy Strathman, Mackenzie Unruh, Danielle White, Chauncy Wiggins, Alexis Williams, Tyler Williquette, Micah Wilson, Catherine Woodworth.**

LEARNING OPPORTUNITIES

AWWA

The American Water Works Association is offering these courses:

- July 14 – Introduction to Laboratory Automation (Management Version), Providence, R.I.
- July 15 – Lab Automation for IT Professionals, Providence, R.I.
- July 28-30 – Summer Workshop, Denver
- Aug. 25 – Public Outreach Planning

Visit www.awwa.org.

Kansas

The Kansas Water Environment Association is offering these courses:

- July 13 – Safety, Liberal
- July 20 – Special Environmental Topics, Dodge City
- July 22 – Ethics, Dodge City

Visit www.kweca.net. ♦

CALENDAR

July 20-23

National Association of Clean Water Agencies Summer Conference, Fairmont San Francisco, Calif. Visit www.nacwa.org.

July 29-31

International Conference on Sustainable Water Environment, University of Delaware, Newark, Del. Visit www.udel.edu/conferences.

Aug. 1-5

StormCon, JW Marriott, San Antonio, Texas. Visit www.stormcon.com.

Aug. 7-10

American Society of Agricultural and Biological Engineers International Conference, Louisville, Ky. Visit www.asabe.org.

Aug. 15-18

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

Aug. 15-18

Biofilm Reactor Technology Conference, Portland Marriott, Portland, Ore. Call 703/684-2441 or visit www.wef.org.

Aug. 23-27

National Association of Flood & Stormwater Management Agencies Annual Conference, Hotel Del Coronado, San Diego, Calif. Visit www.nafsm.org.

Aug. 30-Sept. 1

American Water Resources Association Summer Specialty Conference, Gran Melia, Puerto Rico. Visit www.awra.org.



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Product Spotlight

Self-Propelled Robotic Cutting Tool Offers High Versatility

By Ken Wysocky

The water-powered HydroCut self-propelled robotic cutter from Envirosight LLC uses high-pressure water to power a cutting head that clears roots from drain lines, mills offsets, removes grout flashing, reinstates laterals after lining and performs other tasks in 6- to 32-inch pipes.

"High-pressurized water generates much higher torque and speed," says Jake Wells, marketing manager. "As a result, it doesn't leave rough edges. There's no need for a second pass to perform brushing." A 7.3 hp turbine motor spins the cutting head at 30,000 rpm. The cutter can completely mill away the liner from a service connection.

The motor is water-cooled to prevent overheating, increasing reliability. The cutter also is designed with minimal wear parts for dependability, and its diamond-impregnated, hardened-steel cutting bits last up to 100 hours.

"There's no need to change bits in the middle of a line, which improves productivity," Wells says. "Feedback from contractors tells us the unit can triple productivity because it cuts faster and cleaner, it's quick and easy to deploy, and there's no stopping to change bits."

The unit is self-propelled, eliminating winching from a secondary access point. "This allows the machine to drive into position, then creep backward or forward to fine-tune the cutting head's location," Wells says. "The cutting arm also swings up and down and pivots."

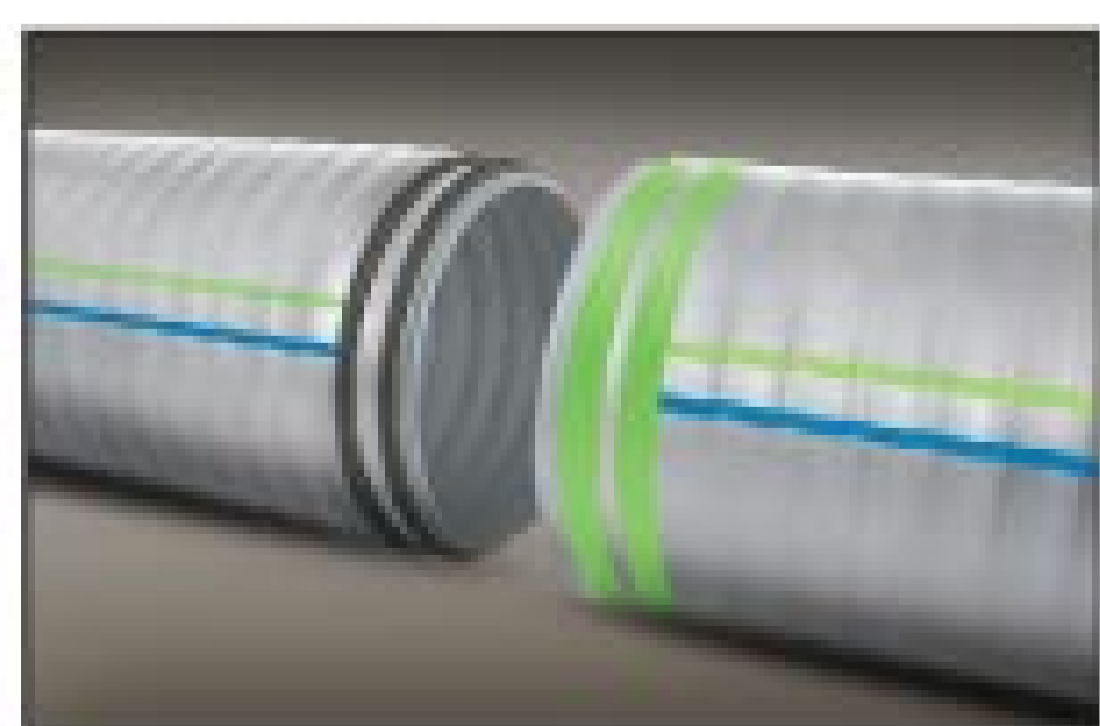
Twin onboard cameras eliminate auxiliary inspection crawler during cutting, and rinse nozzles clean cutting debris off the lenses with the push of a button. "You don't need a waterjetter to clear out debris in order to see what you're doing," Wells says. **For information: 866/936-8476 or www.envirosight.com.**



HydroCut from Envirosight LLC

General Pipe Offers Metro-Rooter

The Metro-Rooter root-cutting machine from General Pipe Cleaners can clear up to 75 feet with 5/8-inch Flexicore wire rope center cable (100 feet with 1/2-inch cable) and handle roots and other tough stoppages in 3- through 6-inch lines. The compact unit features a fold-down handle, truck-loading wheel and lightweight frame on 10-inch heavy-duty wheels. An optional stair climbing package is available. **800/245-6200; www.drainbrain.com.**



ADS Offers SaniTite HP

SaniTite HP pipe from Advanced Drainage Systems Inc. meets requirements for ASTM Standards F2736 and F2761. Designed for sanitary sewer truck lines and storm sewer applications, the pipe is made of polypropylene resin. Its triple-wall construction provides a smooth interior and exterior wall, supported by a corrugated structural core. A complete line of fittings, taps and manhole connections are available. **800/733-7473; www.ads-pipe.com.**

Greyline Introduces Stingray Portable Flow Logger

The Stingray portable open channel flow logger from Greyline Instruments Inc. is designed for area-velocity flow surveys in sewers, open pipes and channels, municipal stormwater, combined effluent, raw sewage, irrigation water and stream flow. The unit uses a submerged ultrasonic sensor to measure both velocity and level in the channel. No calibration is required. Powered by Alkaline D-cell batteries, it can operate up to four years. Electronics are housed in a watertight IP67 enclosure and rated for operation from -4 degrees to 140 degrees F. Enclosed Greyline Logger software can retrieve and display logged data by RS232 or modem connection. The software calculates flow for round, rectangular, trapezoid and egg-shaped channels, as well as flumes and weirs. **888/473-9546; www.greyline.com.**



Top Hand Introduces 15 mil Latex Gloves

Disposable 15 mil latex gloves from Top Hand Safety are 12 inches long, extra strong and suited for a variety of uses. **800/282-1007; www.tophandglove.com.**

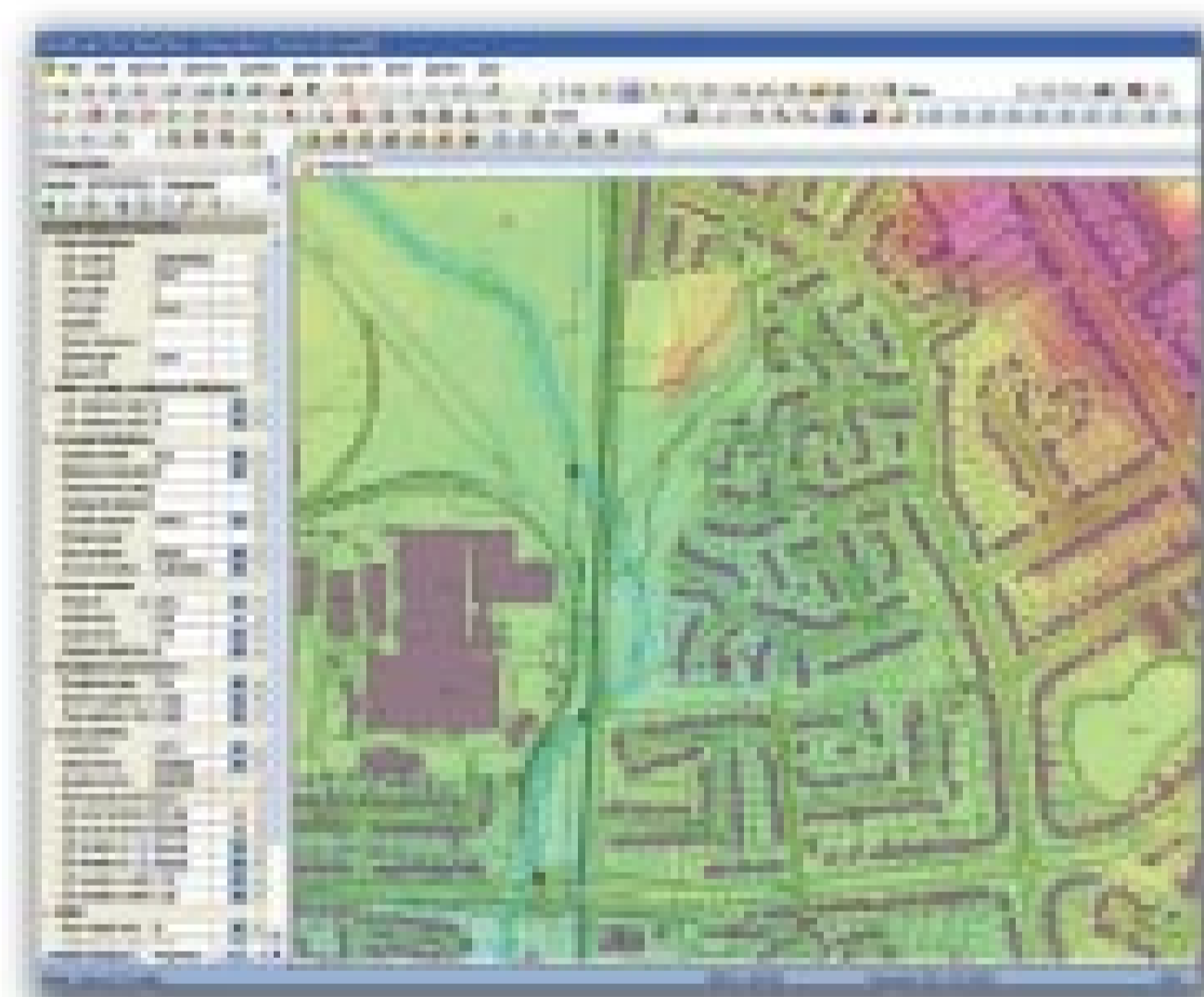


RIDGID Launches SeeSnake microReel

The SeeSnake microReel L100 and L100C inspection systems from RIDGID are designed for 1 1/2- to 4-inch lateral lines that exit the building and connect to septic or sewer lines as well as roof stacks. The 10.3-pound unit features a 100-foot cable and 25-mm camera head. It can be used with all SeeSnake monitor and recording options, as well as microExplorer. **440/329-4422;** www.ridgidconnect.com.

RapidView Introduces PANORAMO 150

The PANORAMO 150 pipeline inspection system from RapidView IBAK North America provides the same data as the larger PANORAMO pipeline and PANORAMO SI manhole inspection systems for 6- through 12-inch diameter pipes. **800/656-4225;** www.rapidview.com.



MWH Soft Releases InfoWorks Modeling

InfoWorks ICM integrated modeling software for aboveground and belowground drainage systems from MWH Soft offers 1D and 2D simulation of man-made drainage, open channels, rivers and floodplains. The resulting model contains

common hydrology and can include both catchment and floodplain data. **626/568-6868;** www.mwhsoft.com.

Electric Eel Introduces Camera Inspection System

The EelCam EC-8SD camera inspection system from Electric Eel features a digital recorder that records inspection video onto a secure digital flash card. The control unit is housed in a compact and rugged carry case that weighs 10.4 pounds and includes controls for microphone, lights, camera test port and secondary video and audio outs. Date, distance and time are displayed on the screen. A keyboard for adding text is included. A 1.3-inch diameter camera with 512 sonde is standard, along with 200 feet of premium Gel Rod push cable. The camera can be upgraded to a color self-leveling unit. **800/833-1212;** www.electriceel.com.

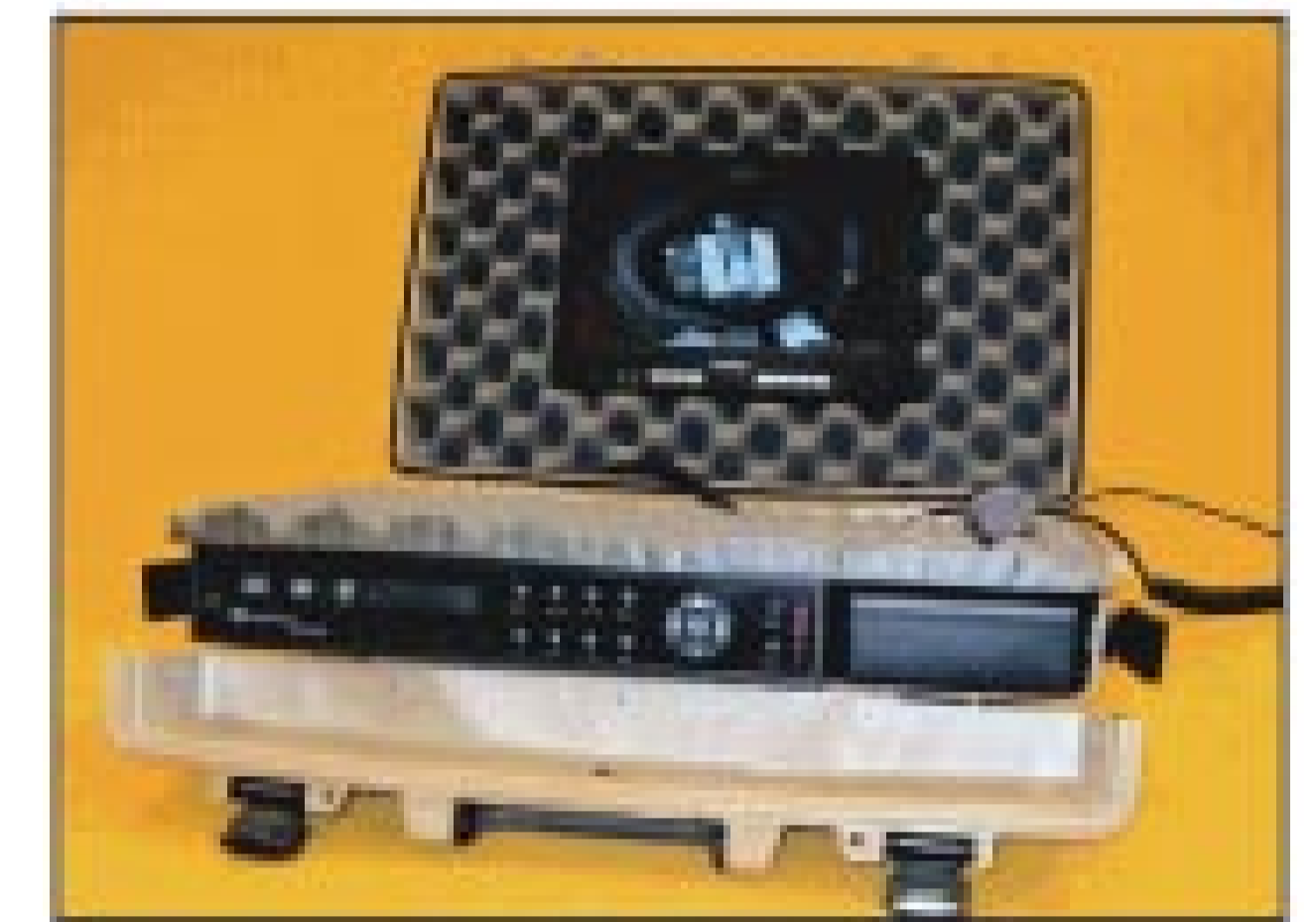


Green Monster Coatings Offers Spray-On Liner

The Green Monster Liner from GML Coatings LLC can be spray-applied on properly prepared concrete and metal surfaces at 1/8-inch thickness. The liner can be used for concrete restoration, coatings for manholes, lift stations, tanks and other wastewater applications. **941/377-8555;** www.greenmonsterliner.com.

Scooter Introduces Attache Family of Monitors

The Attache 3 monitor from Scooter Video Inspection Systems features a 250-gigabyte hard drive, DVD and USB flash drive burner with time and date stamp, as well as microphone for voice-over narration and 20-foot coil cord interface to the coiler. Scooter also offers the Attache 2 with 2-gigabyte DVR that records to a 2-gigabyte SD card and Attache 1 when no recording is required. All models come with a 10-inch, color LCD monitor. **800/772-6165;** www.tvinspection.com.



FCI Offers MT91 Gas Flowmeter

The MT91 multipurpose gas mass flowmeter from Fluid Components International is designed for gas flow measurement in large diameter pipes, stacks and ducts. The multipoint system is capable of averaging up to 16 sensing points placed strategically across the stack's cross-sectional area. Dual 4-20 mA analog outputs of flow rate and temperature and dual DPDT relays are standard outputs for user interface with DCS, PLC, SCADA, controllers or other recording devices. **800/854-1993;** www.fluidcomponents.com. ♦

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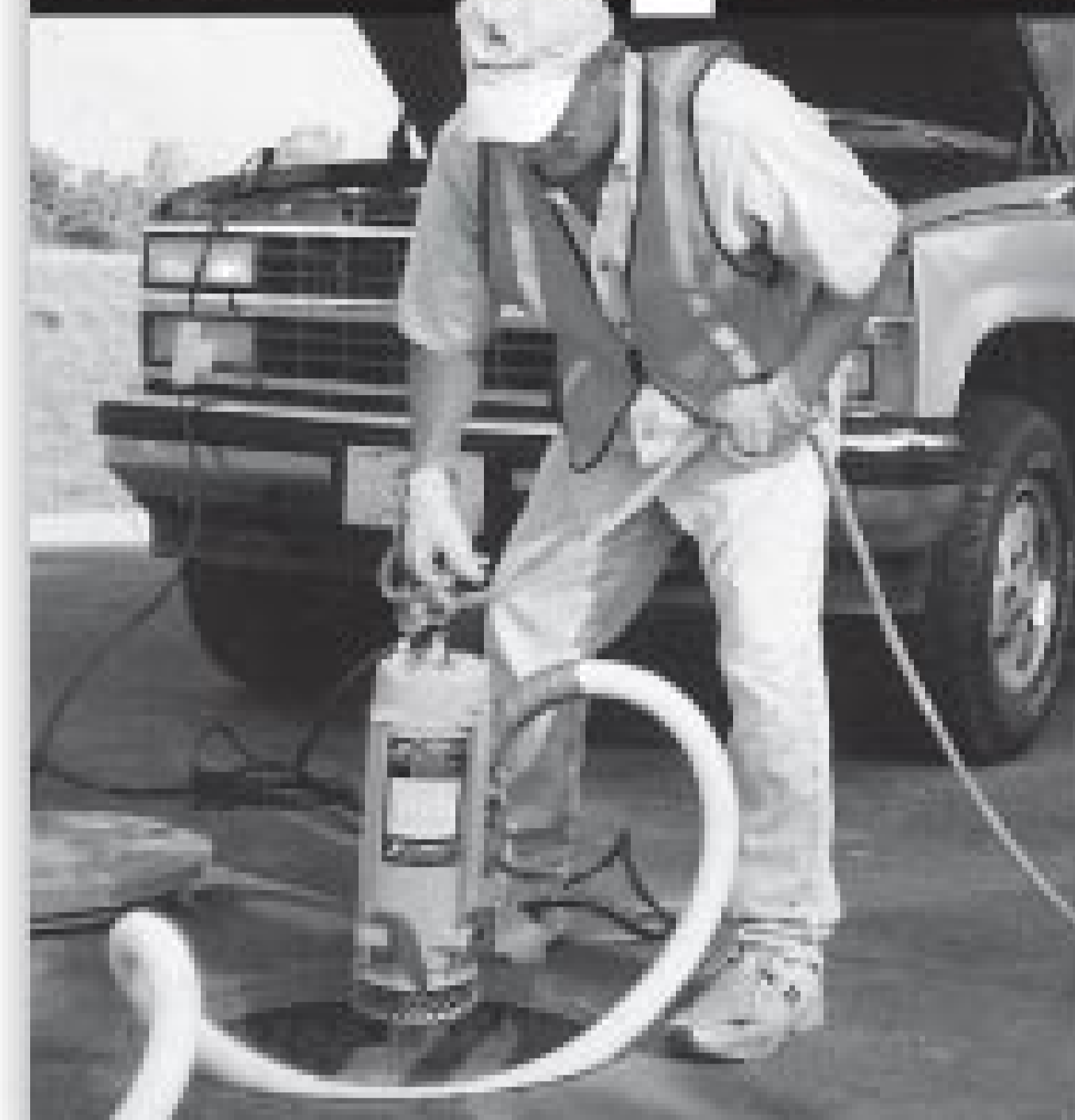
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1996 International 9200 Dumping Keith Huber Truck: Detroit 60 series @ 330 hp, Spicer 10-spd., (00) Keith Huber body w/4,396 hrs., 3,249 gal. cap., air ride, new 22.5 recaps, disc wheels, new paint, hazardous placarded.\$69,500
715-546-2680 MBM



1999 IH Vac Truck with Guzzler Liquid Ring Ace: Includes hose. Purch. 8/09 with liquid ring pump, vac module, baghouse and cyclone filtration.\$133,000
877-207-2774
or 602-531-0942 M7



1994 Ford L8000 Dumping Presvac Truck: Cummins 8.3L @ 250 hp., 9-spd., 1994 Presvac tank, 3,300 gal. cap., 20' manway, 4" suction, Fruitland pump, Hendrickson RT susp., 22.5 tires, spoke wheels, hazardous placarded. NEW PAINT.\$29,500
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1998 IH Vac Truck with Guzzler Liquid Ring Ace: Includes hose. Purch. 8/09 with liquid ring pump, vac module, baghouse and cyclone filtration.\$122,000
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or 602-531-0942 M7



2007 SECA TGV-2600: 3-yd. debris body, 40 gpm @ 2000 psi Tri-plex pump, 188 hp Cat engine, recirculation system, 1400 cfm blower, hydraulic dump & rear door, hydrostatic drive, 4" catch basin tube & rotating boom. (Stk. 1647)
Call Joe 312-706-9678 ☐



IME PB8 Sand Clean-up Vacuum Trailer: 1,000 gallons, full rear door with dump, Pierson liquid-cooled pump @ 370 cfm, boom, overall nice condition for age.\$17,500
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1997 Camel MCB on a 1997 GMC C8500: 10-yd. debris body, 500 gal. water tank, hyd. extendable boom, catch basin gun with reel, Cat 3116 250 hp diesel, tandem axle, 18,000 mi./5,800 hrs. (Stk. 1659)
Call Joe 312-706-9678 ☐



2000 International 2000 Vector 2100: In great running condition, 2674 6 x 4, 147,641 miles, 10,546 hours, DCDL, hydraulic pump, blower, will paint if owner desires.\$59,500
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Cleaner Pumper

TRUCK STOP

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Please print ad legibly with correct punctuation and PHONE NUMBER. Don't forget to send photo!

RATE \$125 PER AD, PER MONTH, PER PUBLICATION WITH A 30 WORD MAXIMUM – **PLEASE NOTE:** You can only advertise **ONE TRUCK** for sale per ad.

DEADLINES MSW: 1ST OF THE MONTH • CLEANER: 1ST OF THE MONTH • PUMPER: 10TH OF THE MONTH – For example: July 1st would be the deadline for August MSW.

ADVANCE PAYMENT NO BILLING FOR TRUCK STOP ADS. Payment must be received in **ADVANCE** before publishing in Cleaner, Pumper or MSW.

Enclosed is \$ _____ for _____ ad(s) to run _____ month(s) in

CLEANER MSW PUMPER ALL 3 PUBLICATIONS (Triple dollar amount)

Company Name _____

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COLE Publishing Inc., P.O. Box 220, Three Lakes, WI 54562
(Make check/money order payable to: COLE Publishing Inc.)

• **ONLINE** ad form at: www.mswmag.com; www.pumper.com;
www.cleaner.com

• **FAX** this completed form to: **715.546.3786** and **E-MAIL** photo to:
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Vac-Con's larger capacity hydrostatic pumps allow the system to perform at a much lower RPM which means quieter operation, a healthy benefit for operators and community residents around the world.



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Because of the efficiency of our hydrostatic drive systems, Vac-Con machines use less fuel, which means lower cost...and less exhaust.

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Vac-Con is proud to be a leader in the worldwide environmental industry.

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