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June 2010

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# HOME COOKING

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with in-house  
pipe inspection  
and cleaning

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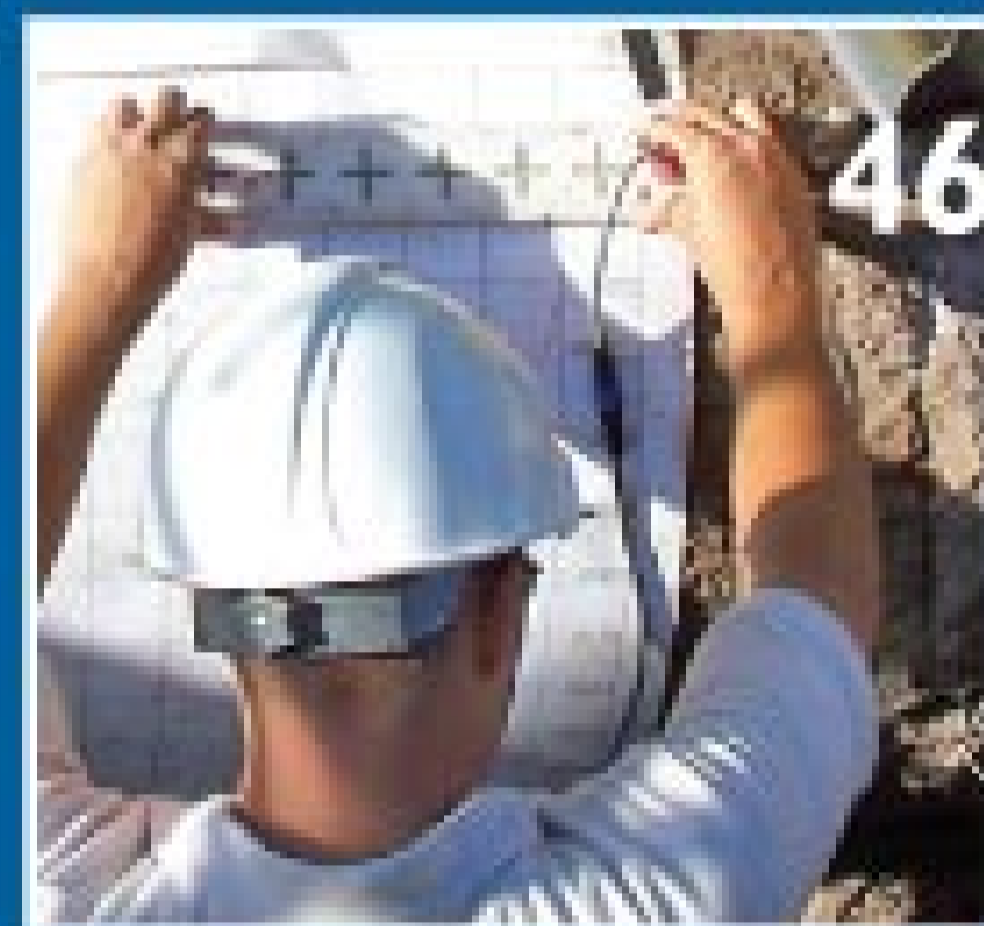
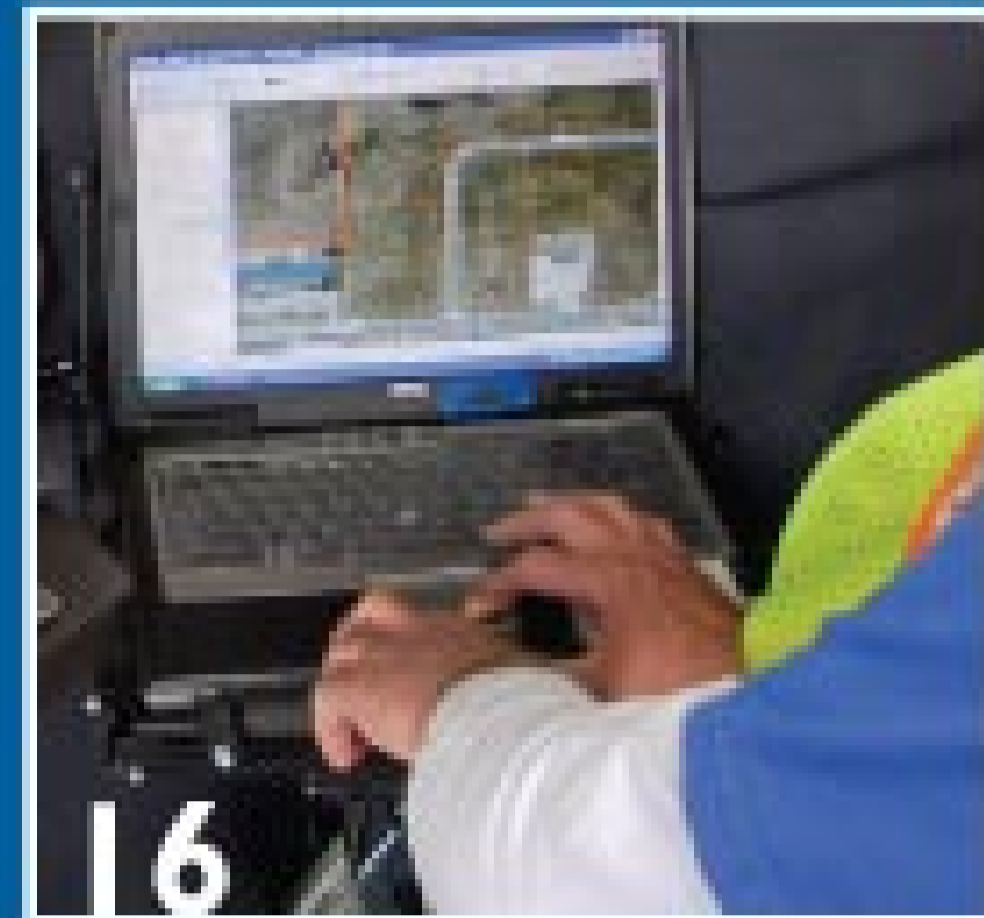
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\*When compared to Vactor 2100 model. Source: Federal Signal engineering department. Fuel savings assumptions: 3 gallons/hour saved in combination mode (4" orifice at vacuum, 80 gpm @ 2500 psi), 1,500 hours per year at \$3.00/gallon.

# INSIDE:

## PIPELINE INSPECTION, SURVEYING AND MAPPING



### COVER:

The city of Ames, Iowa, is moving toward a do-it-yourself approach to sewer line cleaning and inspection. The reasons? More flexibility, better customer service, and lower cost. Here, technician Chris Miller flushes a hydrant as part of the city's water distribution maintenance program. (Photography by George Ensley)



## COMING IN JULY 2010

### Special Issue: Pipe Bursting/Horizontal Directional Drilling

- ◆ Sewer: I&I control at Vallejo Sanitation and Flood Control District
- ◆ Sewer: Setting inspection priorities in Mesa, Ariz.
- ◆ Storm: Public outreach in Kitsap County, Wash.
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JUNE 2010

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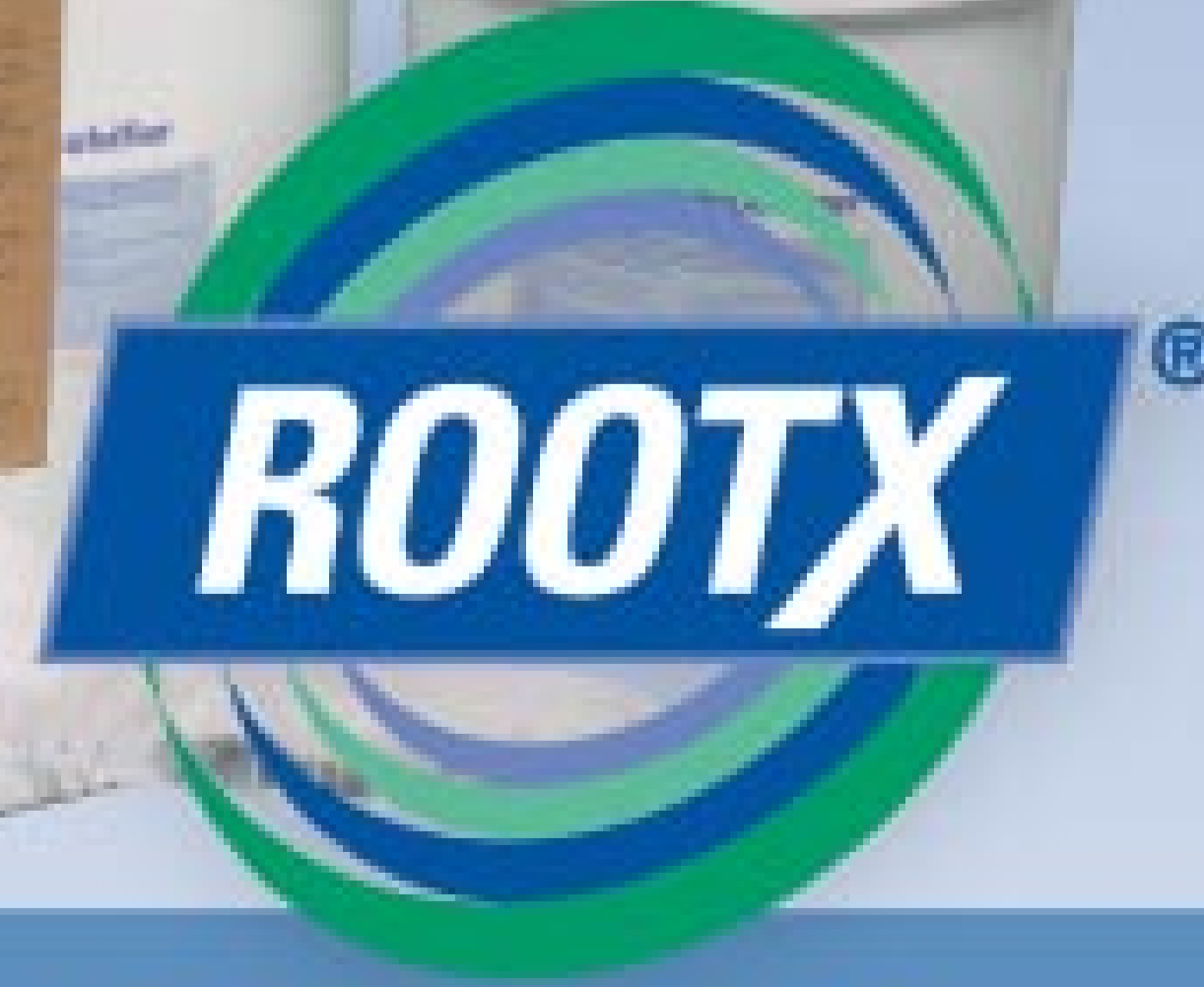
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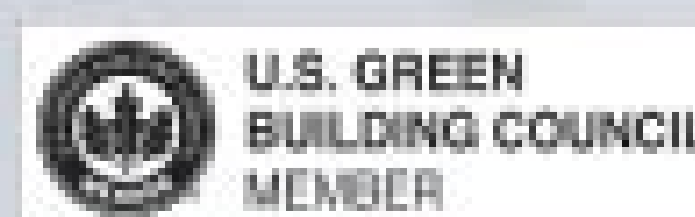
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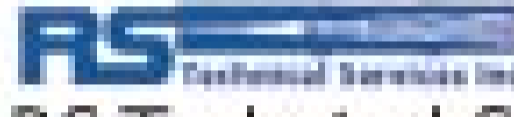




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## MUNICIPAL SEWER & WATER

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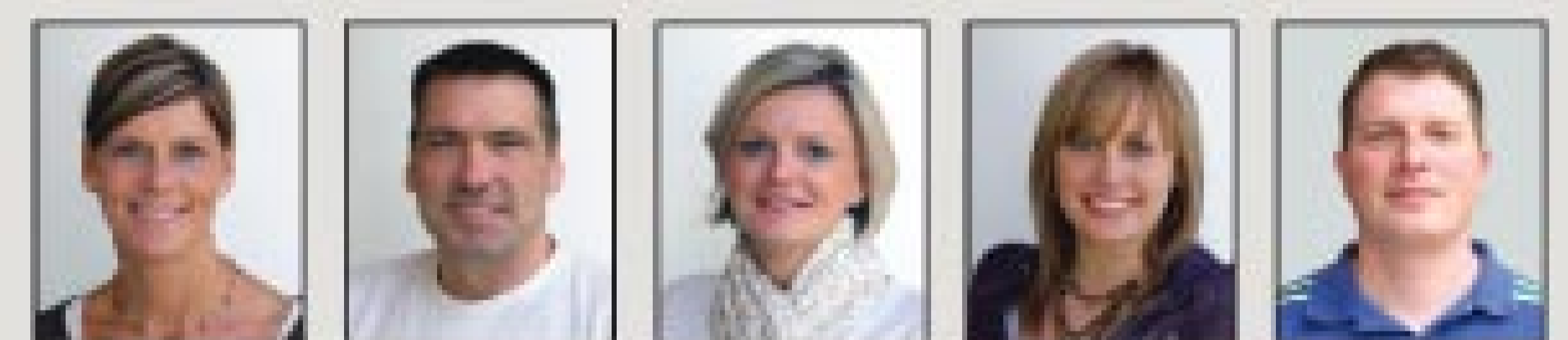
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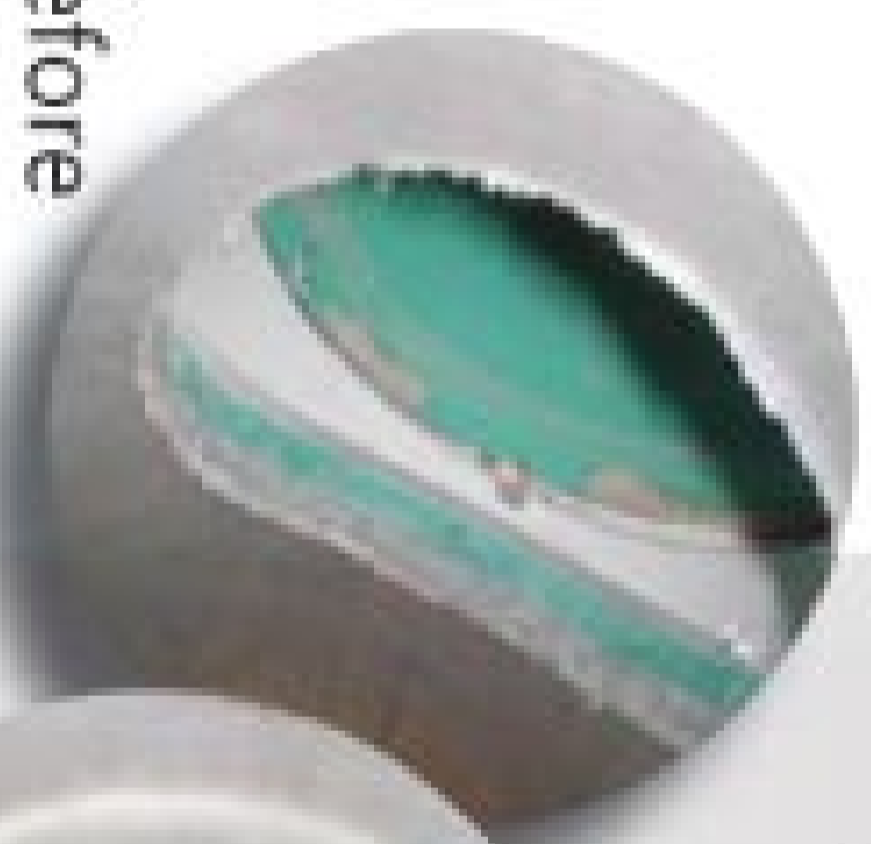
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# WHAT WOULD MOTHER SAY?

The official report card says that America's critical infrastructure gets near-failing grades. Maybe the remedy is easier than we think.

**I** can still remember the look on my mother's face as she walked from the car to the house after fall parent-teacher conferences when I was in fourth grade.

For some reason my siblings and I had not done so well on our first-quarter report cards that year, and mom was on the warpath. It wasn't as if we were flunking. We'd just earned a few more Bs and Cs than mom was used to seeing. Just imagine if our report cards had contained no grade higher than a C-plus and a lot of Ds and D-minuses.

Well, that's exactly the assessment given to our nation's roads, bridges, airports and other facilities in the American Society of Civil Engineers' latest Report Card for America's Infrastructure (2009). Of significance to readers of *Municipal Sewer & Water*, the drinking water and wastewater systems both earned D-minus grades.

## Growing accustomed?

Perhaps one reason these reports pass quietly is that for years they have shown basically the same thing. Everybody knows our infrastructure is in horrible shape and will take hundreds of billions — if not trillions — of dollars to renew. Everyone also “knows” that we “can't afford it.” But consider these excerpts from the ASCE Report Card:

- “America's drinking water systems face an annual shortfall of at least \$11 billion to replace aging facilities...and to comply with existing and future federal water regulations. This does not account for growth in the demand for drinking water over the next 20 years. Leaking pipes lose an estimated seven billion gallons of clean drinking water a day.”
- “Aging systems discharge billions of gallons of untreated wastewater into U.S. surface waters each year. The EPA estimates that the nation must invest \$390 billion over the next 20 years to update or replace existing systems and build new ones to meet increasing demand.”

It's hard to put it more starkly than that. The

federal economic stimulus program directed some billions toward water and sewer systems, but not nearly enough to make a big dent, and the program is temporary. When those dollars are spent, what then?

## Not keeping pace

Evidence shows pretty clearly that for years, charges for water and sewer have not kept pace with cities' or utilities' real costs of operation.

Therefore, the U.S. EPA now advocates what it calls full-cost pricing for water and wastewater. A Web site (<http://www.epa.gov/waterinfrastructure/fullcostpricing.html>) spells it out this way: “When measured as a percentage of household income, the U.S. pays less for water/wastewater bills than other developed countries. Because of this, the public has been led to believe that water is readily available and cheap.

“We need to fundamentally shift thinking in this area to meet our essential infrastructure needs. Pricing that recovers the costs of building, operating and maintaining a system is absolutely essential to achieving sustainability. Drinking water and wastewater utilities must be able to price water to reflect the full costs of treatment and delivery.”

## Paying the piper

The message seems to be that we should be on a true pay-as-you-go system: Include the cost of regular upkeep and rehab in the price of the service, and keep the work up to date, so that the infrastructure is never allowed to deteriorate. Anyone care to argue with that premise?

A key objective of full-cost pricing is to encourage the responsible use of the resource. “Prices signal value to consumers and help determine whether consumers use water efficiently,” the EPA notes. “If prices are too low, consumers will use too much water ... Full-cost pricing is usually interpreted to mean factoring all costs — past and future, operations, maintenance and capital costs — into prices.”



## FROM THE EDITOR

Ted J. Rulseh

Full-cost pricing initiatives can include innovative rate structures designed to encourage conservation. Examples in the water business might include:

- Increasing block rates, which raise per-unit prices as usage increases.
- Time-of-day pricing, which charges more during peak-demand periods.
- Surcharges imposed on excessive water use.
- Seasonal rates, where prices rise and fall according to water demands and weather patterns (water would typically cost more in summer).

The net result of a full-cost pricing scheme would be to charge enough to cover all costs, while giving users some control over how much

**The net result of a full-cost pricing scheme would be to charge enough to cover all costs, while giving users some control over how much they pay through market-based signals, incentives and penalties. It seems like a sound approach.**

they pay through market-based signals, incentives and penalties. It seems like a sound approach.

## The real cost

There's one more thing to remember: It is just possible that investing too little in infrastructure upkeep has been costing us all along. For example, what is the cost of an effective water main maintenance and rehab program, versus the cost of massive repairs and damage to streets and private property from a major water main break?

What is the cost of sound sewer maintenance, versus the cost of treating vast amounts of clear-water I&I, and of spilling raw sewage into our lakes and rivers?

Perhaps this concept of full-cost pricing, if we adopt it wholeheartedly, is a way to get serious about fixing what ails our water and sewer infrastructure. And maybe in time that will lead to an ASCE report card that would make a mother proud. ♦

# ARE YOU EXERCISING YOUR VALVES PROPERLY?

**MAYBE**

## THE OTHER GUYS

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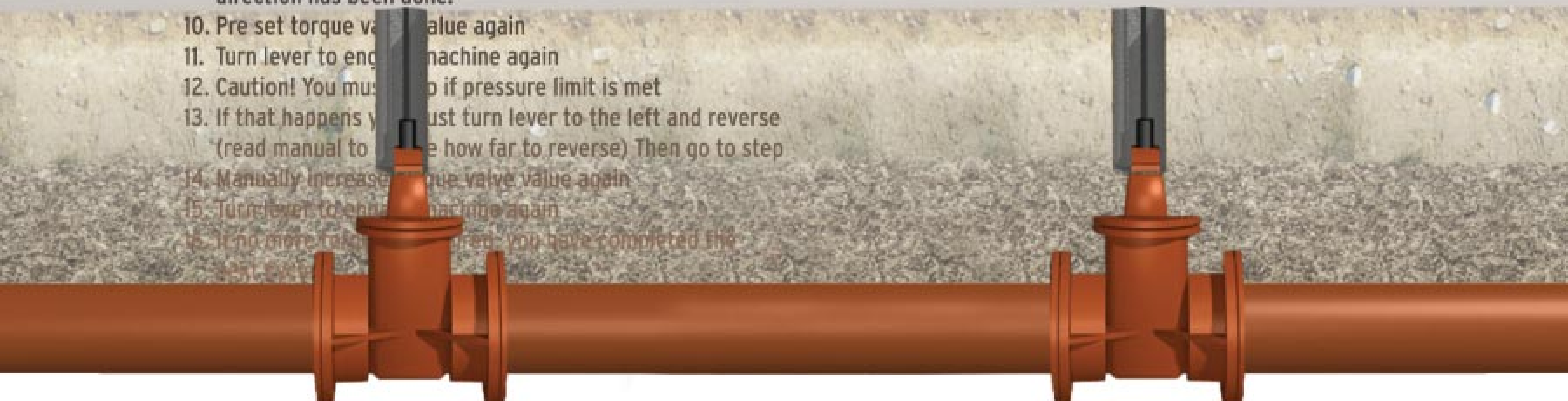
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  2. Turn lever to engage machine
  3. Caution! You must stop if pressure limit is met
  4. If that happens you must turn lever and reverse (read manual to decide how far to reverse) Then go to step 5
  5. Manually increase torque valve value
  6. Turn lever to engage machine
  7. If no more torque is required, you have completed the first cycle
  8. If more torque is required, reset the torque valve value and repeat above.
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10. Pre set torque valve value again
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13. If that happens you must turn lever to the left and reverse (read manual to decide how far to reverse) Then go to step 14
14. Manually increase torque valve value again
15. Turn lever to engage machine again
16. If no more torque is required, you have completed the



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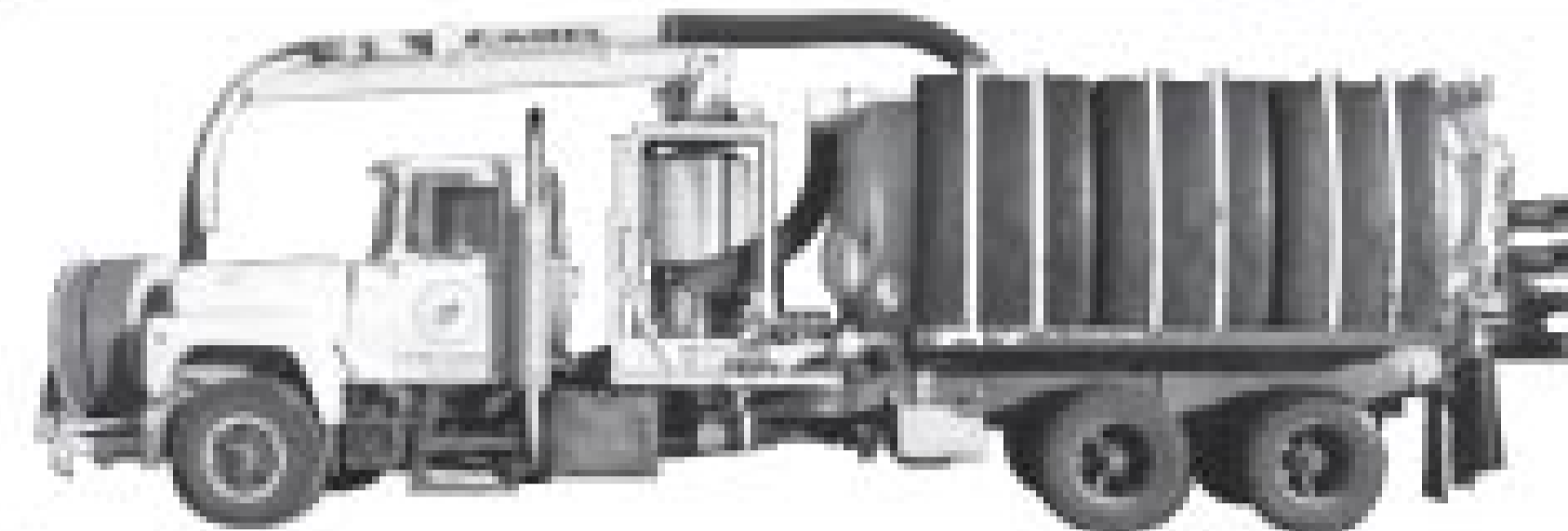
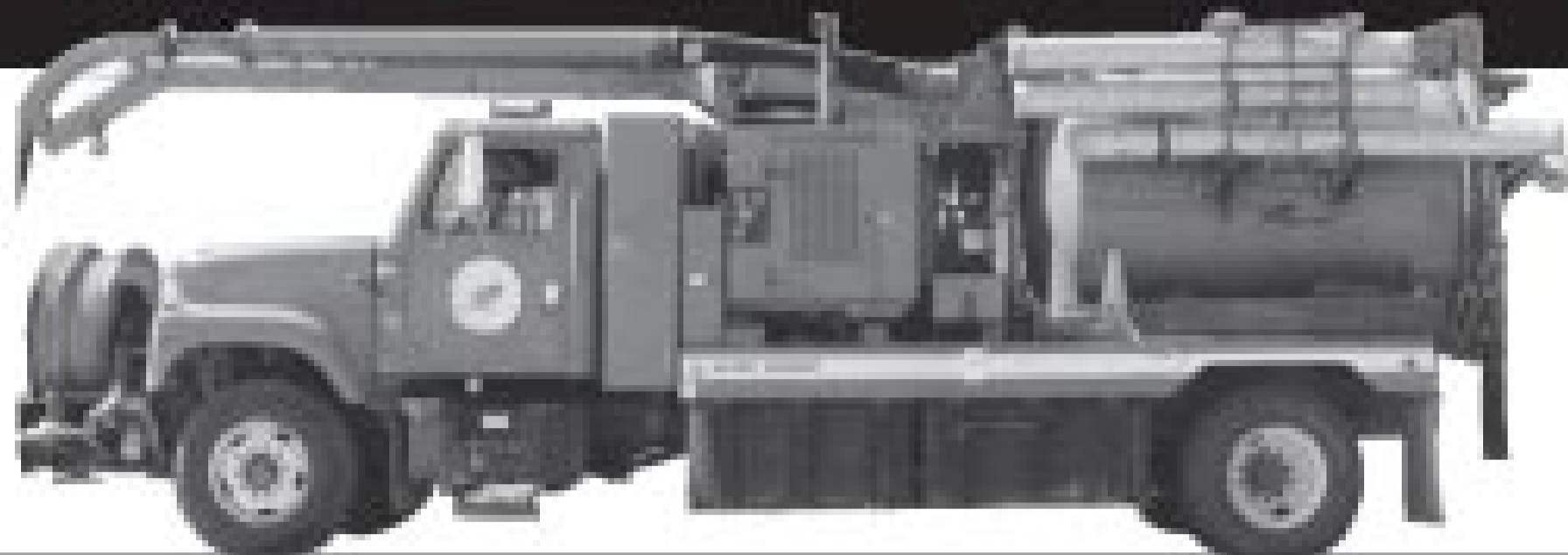


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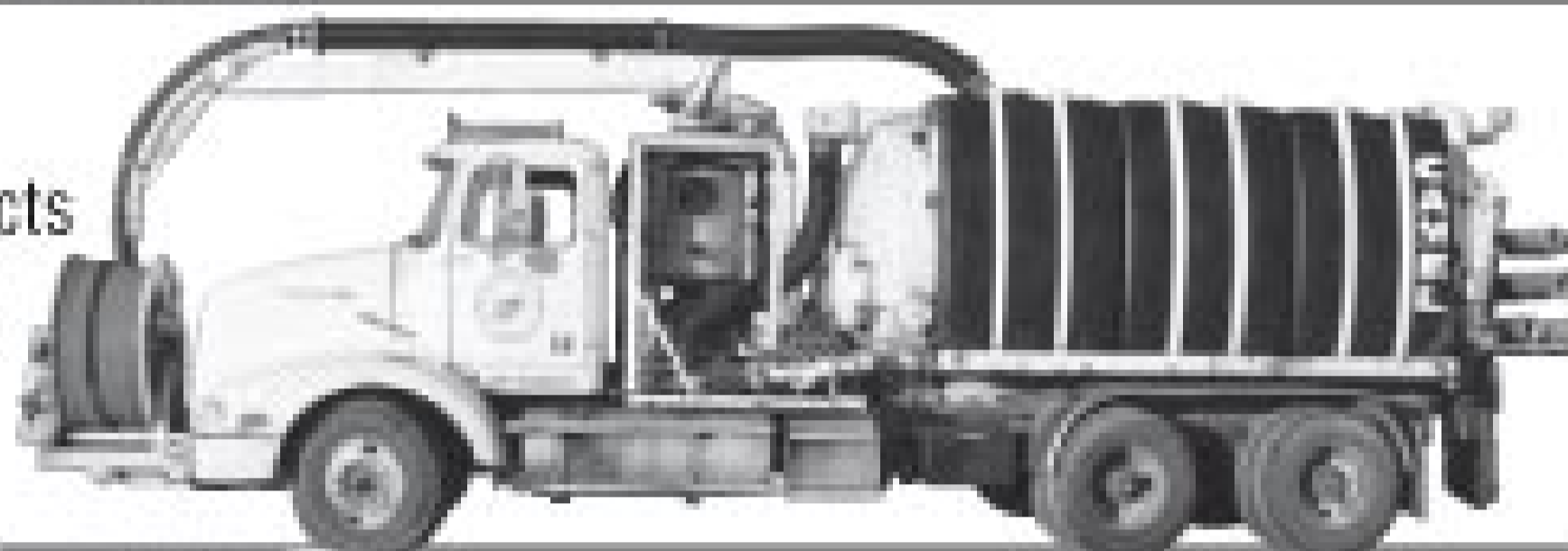
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w/1986 Mack:** 80 gpm @ 2000 psi,  
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**1993 Ford LNT 8000 Vector  
Combination:** 80 gpm @ 2000 psi,  
1,500 gal. alum. tank, 1" x 600' hose,  
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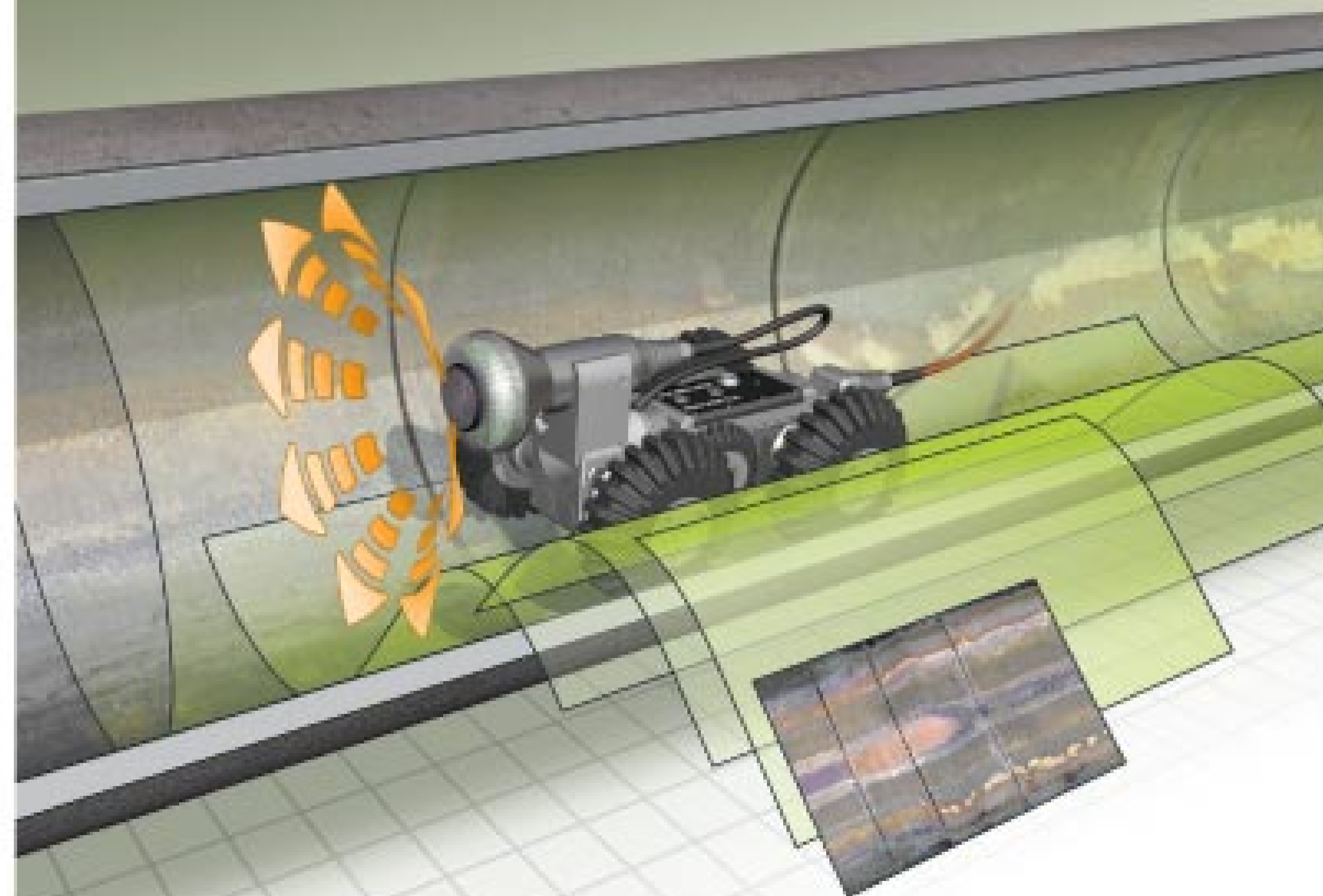
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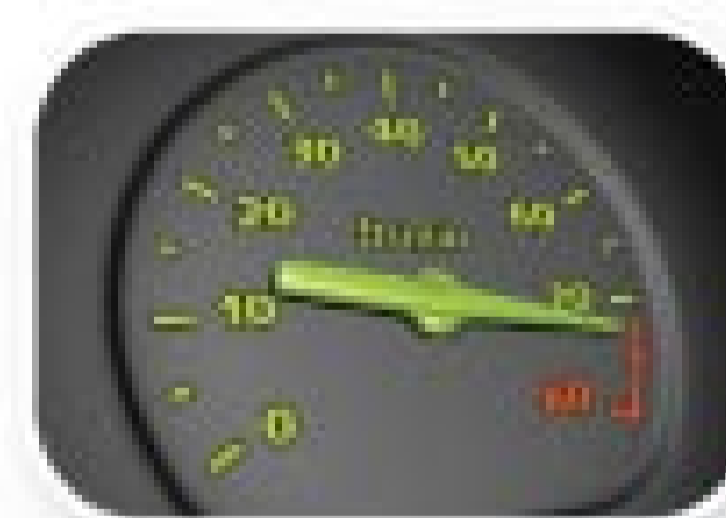


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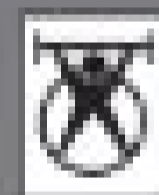
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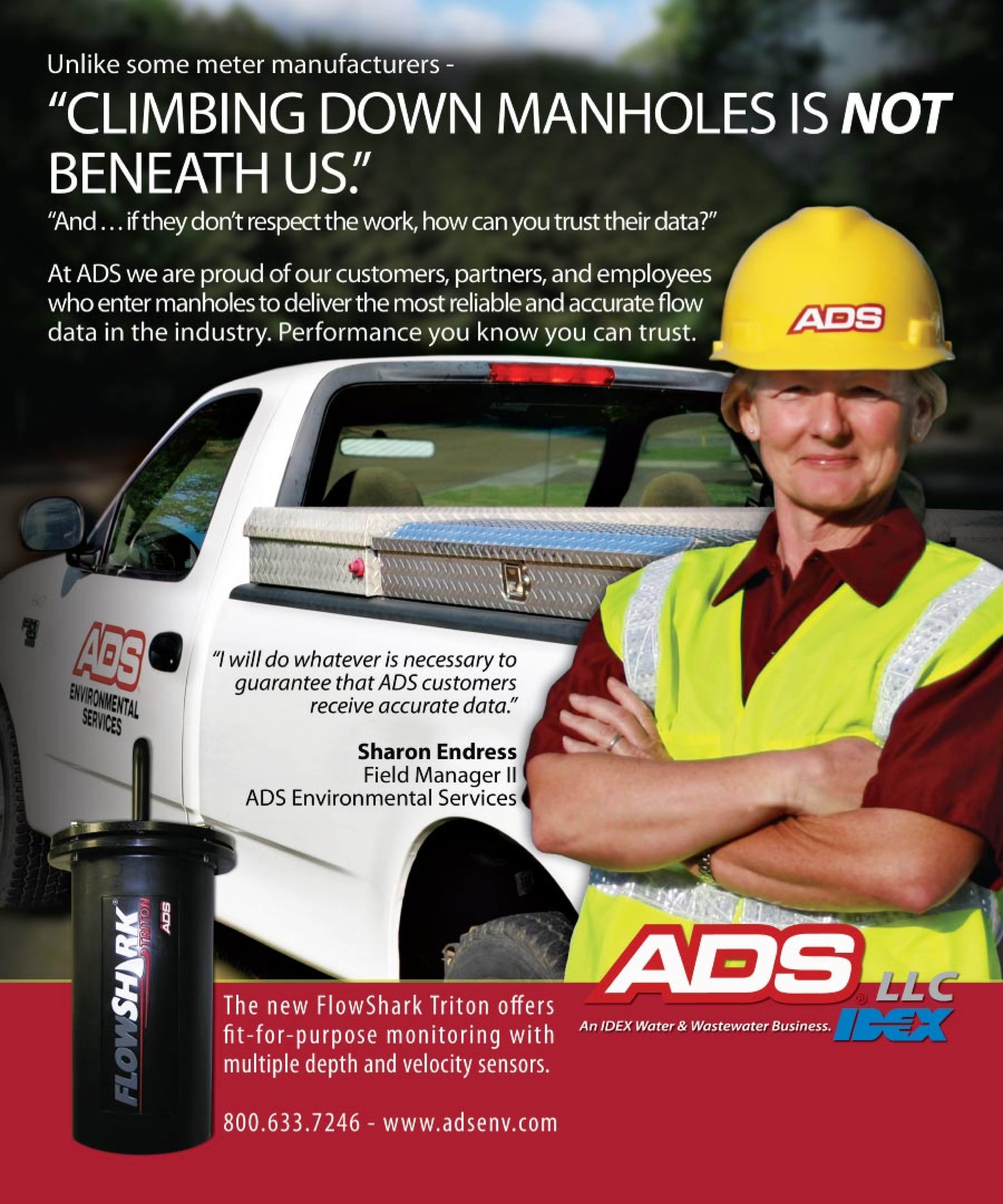
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## FOCUS: SEWER

# HOME COOKING

The City of Ames succeeds with an in-house pipe inspection program and looks to put its own crews to work on sewer cleaning, as well

By Erik Gunn

**T**he city of Ames, Iowa, is moving steadily toward a DIY approach in sewer line cleaning and inspection. As in: Do it yourself.

Several years ago, Ames began doing more of its sewer inspection in-house. Now the community is on the verge of bringing line cleaning inside, too. The reason? More flexibility, better customer service and lower cost, says Dale Weber, utility maintenance supervisor for the Department of Public Works.

"We put a lot of priority on service to our customers," Weber says. "By assigning our employees to do the work, and getting them the tools and support they need, we believed we could do a better job with service and really get more work done."

So far it's working out with inspection: The department has already moved up to its second generation of TV equipment. But the real proof may be in the coming year, when the city buys its first combination truck and begins assigning its own crews to clean the system.

### College town

Ames has a population of about 51,000, and students at Iowa State University account for about half of that. The city is responsible for 211 miles of sanitary sewers from 8 to 66 inches, as well as nearly 4,000 manholes.

The city bought a used inspection camera in the 1990s, before Weber joined the department. It wasn't very dependable, and the city bought its first new camera 10 years ago. Since then, public works has steadily ramped up its inspection and cleaning routines.

"We're getting more aggressive with the televised inspection, going from where we were just looking at blockages or backups and trying to determine the cause," says Weber. By expanding routine inspection, the city hopes to catch problems sooner.

Inspection needs run the gamut: detecting the source of backups when they occur, checking pipes in new developments, and assessing the condition of sanitary and storm sewers in advance of street construction, so that if an area will be torn up for new pavement, dete-

Maintenance worker Rob White (on Terex boom truck) and senior heavy equipment operator Owen Hunter load a fire hydrant for installation. (Photography by Ensley-Photo.com)

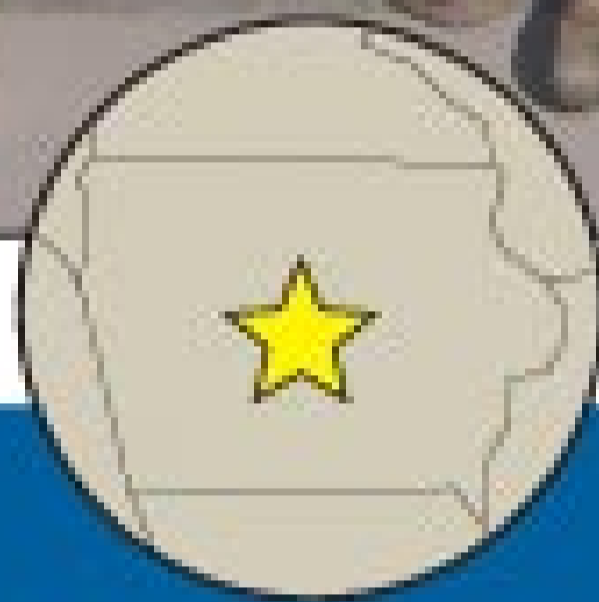






Members of the City of Ames utility maintenance team include, from left, senior heavy equipment operator Owen Hunter; maintenance worker Brian Hurd; utility maintenance supervisor Dale Weber; maintenance worker Chris Miller; utility maintenance foreman Tom Weese and maintenance worker Rob White.

Weber oversees a maintenance program that relies increasingly on in-house resources.



#### PROFILE:

City of Ames, Iowa,  
Department of  
Public Works

**POPULATION SERVED:**  
51,000

**SEWER INFRASTRUCTURE:**  
211 miles of mains

**WATER INFRASTRUCTURE:**  
245 miles of mains

**EMPLOYEES:**  
10

**ANNUAL BUDGET:**  
\$1.4 million (wastewater  
collection, water distribution,  
utility locating)

**WEB SITE:**  
[www.cityofames.org](http://www.cityofames.org)

**“We want to get it to the point where we have video and inspection point data all linked together, so that our engineering department also has access to it. The more history we can put at their fingertips, the better.”**

Dale Weber

turer, and it needed repairs that led to downtime.

Ames chose the Pathfinder PE3300 camera from Aries Industries Inc. for 6- to 24-inch pipes. It has 360-degree viewing rotation, zoom and a backup camera. “It just seemed user-friendly and lightweight,” Weber notes.

The camera travels on a steerable TR3300 tractor with wheels for maneuvering around objects in the line. Zoom capability allows the camera to collect information 70 feet or even farther away.

The city kept the 2000 Ford step van inspection unit it had used with the previous camera. Aries retrofitted the van for the new camera and crawler and installed a new cable reel.

Other upgrades are coming. City workers still log inspections with a pencil-and-paper system, but they plan to move to a software package purchased through Aries in the new fiscal year. The ultimate goal is to link the records that software creates with the city’s ESRI GIS mapping system, which has

riorated sewers can be repaired or replaced at the same time.

“Some of that is being contracted out,” says Weber. “But we are shifting to doing more of the inspecting in-house.”

#### New camera

By 2008, the city was ready to upgrade. The older camera was no longer supported by its manufac-

## DOUBLE DUTY

For the city of Ames, Dale Weber wears two hats. As utility maintenance supervisor for the Department of Public Works, he oversees sewer maintenance. But he’s also in charge of the water lines. The Ames water system has 245 miles of lines and 2,600 hydrants. Altogether, Weber says, “We’ve got somewhere around 6,000 valves in the distribution system.”

The city deals with about 34 water main breaks a year on average, and Weber says that’s improving as Ames focuses increasingly on preventive maintenance. “We’ve put a lot of priority on water distribution to locating valves and exercising valves so that we know if they work or don’t work,” he says. “Then we try to get bad valves replaced on a preventive maintenance basis rather than in an emergency.”

There has been an ongoing effort to map the system and to use slower times to move or replace valves that were broken or located in hard-to-reach spots before an emergency occurs. The city has also looked for ways to make water main work more efficient, especially by improving coordination with outside utility locating companies.

“We’ve got a tight system,” says Weber. “It’s been constructed well, inspected well and maintained well.” He’s modest, though, about his own contributions to that: “I am following some good managers we had in the past.”

been in place for about a decade.

"We want to get it to the point where we have video and inspection point data all linked together, so that our engineering department also has access to it," Weber says. "The more history we can put at everyone's fingertips, the better." Once the software is in place, Weber hopes to meet the city's goal of inspecting 10 percent or more of its lines a year.

### Multiple issues

As in any system, Ames' sewer problems run the gamut. The causes of backups, blockages and leaks include tree roots, grease clogs, problems from taps and utility crossbores. City inspectors are finding that what at first appears to be a tree root piercing a line might in fact be a gas line or an electrical conduit.

"It seems that with horizontal direction boring, we keep finding more and more stuff that has

**"Probably 75 percent of what we do is responding to the latest emergency.**

**So what you have planned, versus how things actually unfold, can be drastically different."**

Dale Weber

been bored through the sanitary system and is creating problems," Weber says.

Inflow and infiltration (I&I) is a concern, and leaking manholes are one culprit. "The ones that seem to cause the most problems are the ones that are out of the way, along the two streams here that cut through town," Weber says. "We're trying to target the manholes in the floodplain first. We're trying everything from replacing manhole castings to raising buried manholes so they're accessible, so we can do maintenance and inspection on them."

So far, an intensive inspection project has covered through about half the manholes. Workers use a standard checklist, noting the type of casting, whether the manhole lid has holes, and whether the structure is brick or concrete. They also identify any defects where pipes enter the manholes.

"We suspect a lot of these are being flooded during heavy rains," Weber says. "In the floodplain, we're trying to change to bolt-down manhole lids and castings, so we don't have a hazard. The biggest fears are of flooding that lifts manhole covers as water fills the sewer lines, and the risk of injury or worse to workers or members of the public."

### Cleaning routines

Over the years, the city has taken various approaches to structuring its cleaning



Maintenance worker Brian Hurd and colleagues perform in-house line inspections that are helping the City of Ames improve customer service and save money.

routine. Ames used to use certain major roads and streams as dividing lines in choosing where to clean. Now it divides the work by focusing on each of 16 drainage basins, so that all lines that drain into a larger trunk line get cleaned at once.

The current cleaning routine calls for covering 20 percent of the system each year, so that the entire system is covered in five years. But Weber hopes to shorten that cycle once the city acquires its combination truck.

City officials believe that moving the cleaning in-house will save money and improve service. Today, the city has only a jetter that can flush debris down lines. "We have no way of physically removing it," Weber says. "With contract cleaning, we've been spending almost \$100,000 a year. And we've got a city employee with that contractor most all of the time."

To simply assign a two-person crew to the city's own truck wouldn't cost much more in labor, he says. "By the time we go through a five-year contract,

we could pay for the truck and the maintenance on it."

Better yet, doing the work in-house should enable the city to be more nimble. That's especially important when it comes to cleaning lines near the streams, one of the city's higher priorities. "You've got two times a year when you can get in there — when the ground is frozen, or when it's extremely dry in the summer," Weber says.

But coordinating with contractors and ensuring their availability at those times can be challenging. By assigning its own crews, the city can respond immediately. "Probably 75 percent of what we do is responding to the latest emergency," says Weber. "So what you have planned, versus how things actually unfold, can be drastically different."

Weber hopes the do-it-yourself approach will serve the city well — through lower costs, faster response, more predictable scheduling and better service to city residents. ♦



**An Aries Pathfinder camera is a key component of the city's newly retrofitted inspection van.**

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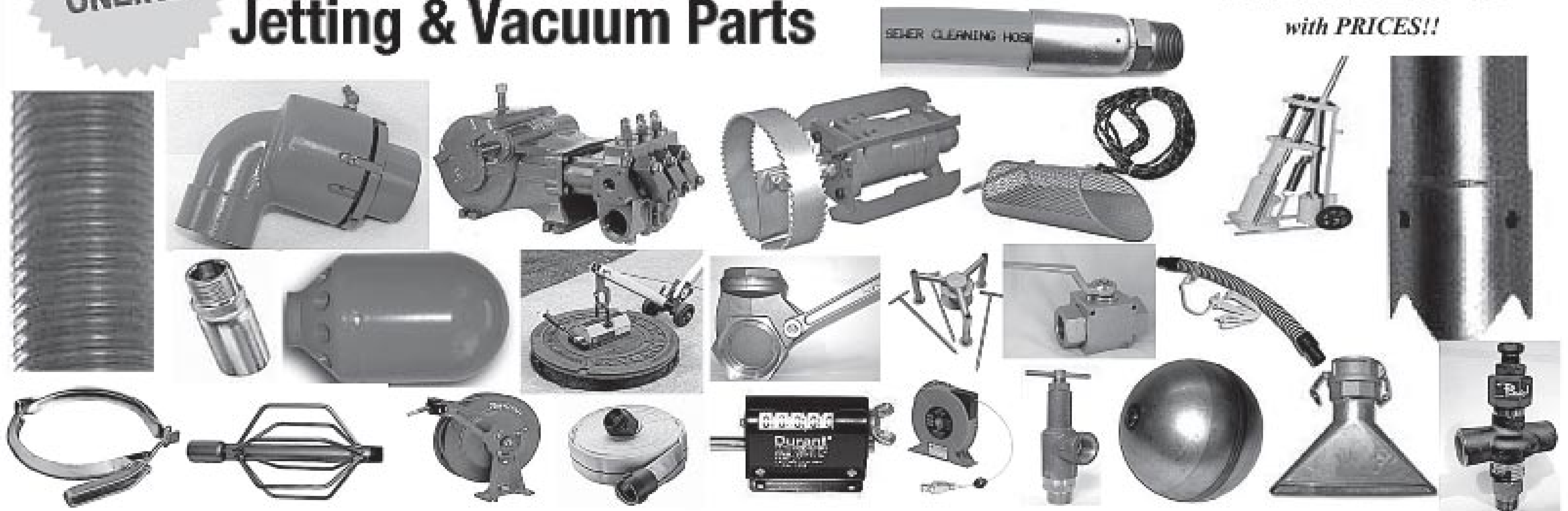


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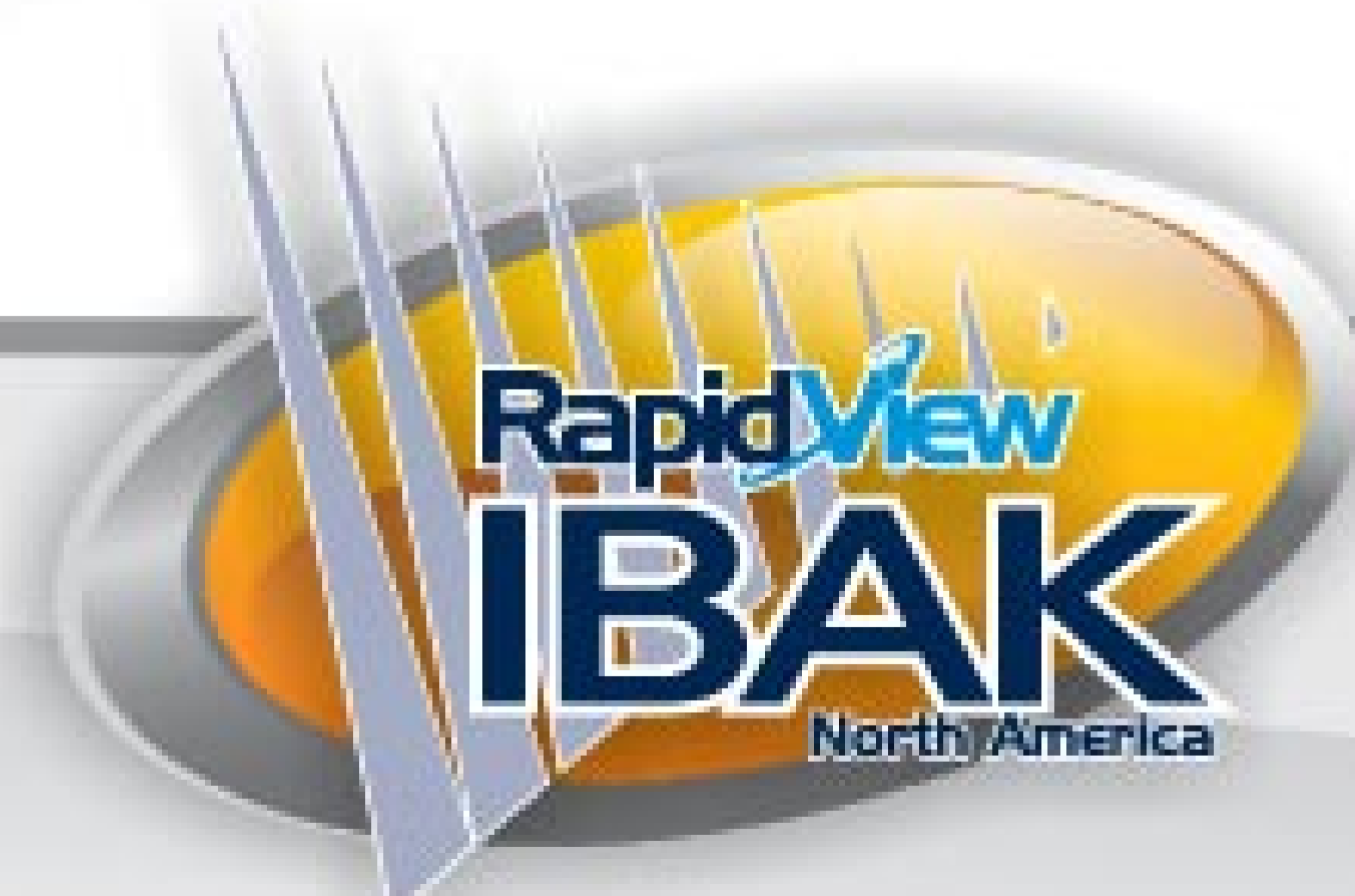
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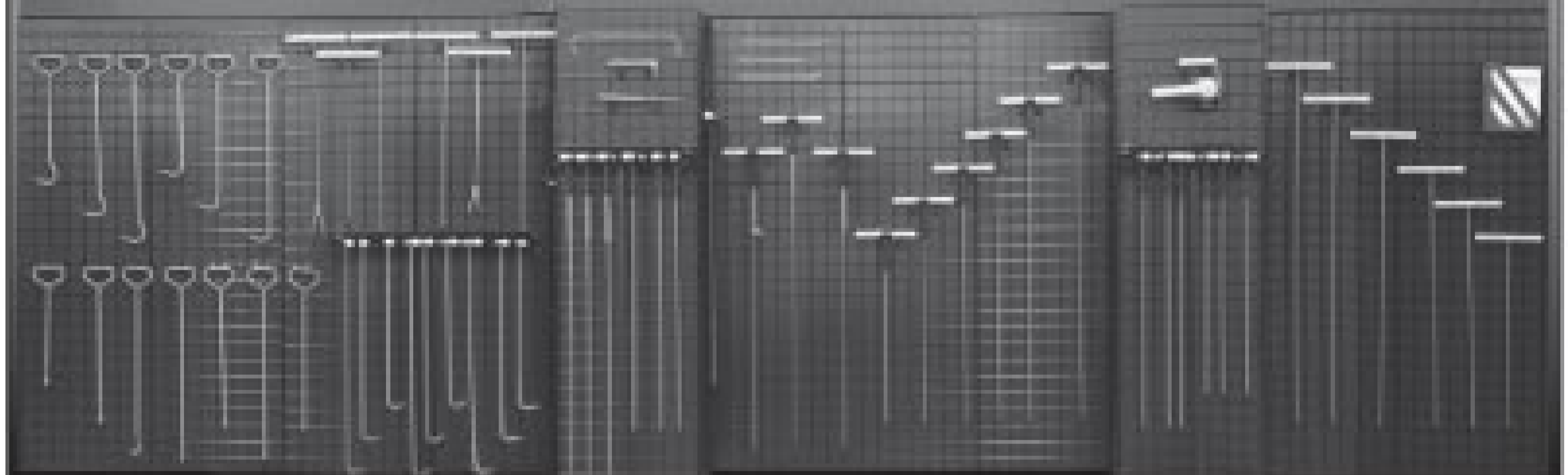


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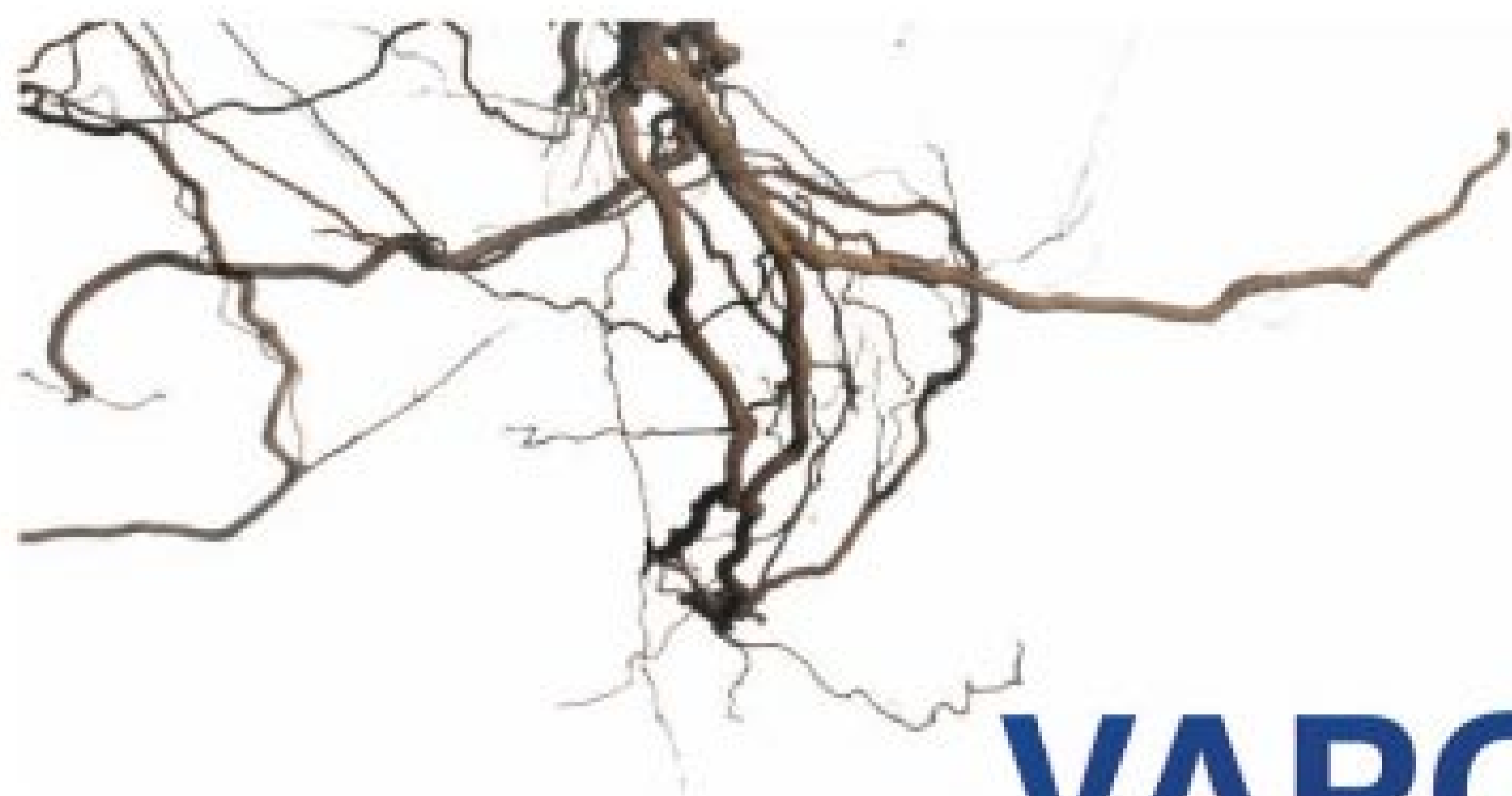
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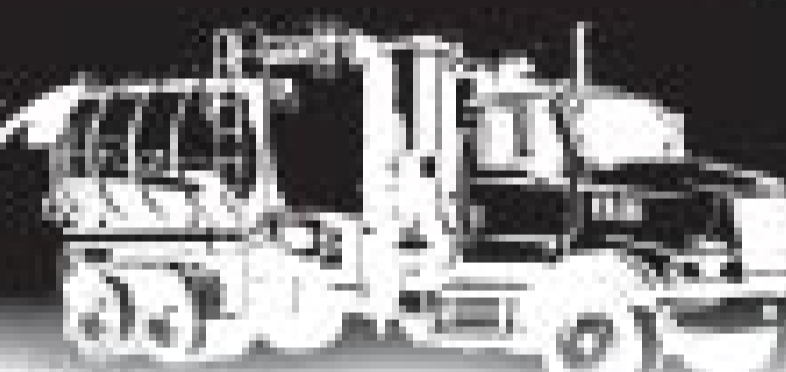


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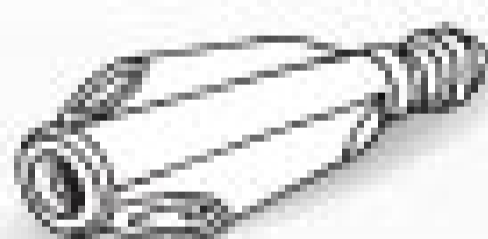
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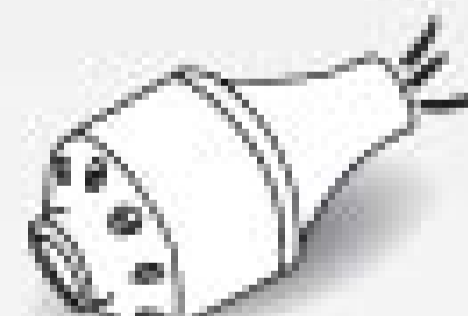
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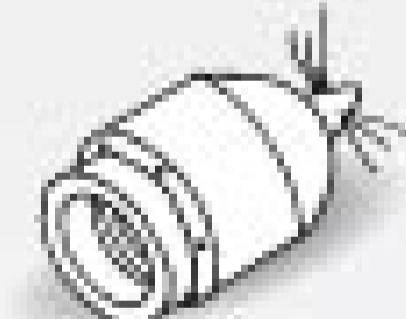
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# MADE TO ORDER

Two cities improve infrastructure management with software packages that enable high flexibility and customization to suit specific needs

By Suzan Marie Chin and Mary Shafer

**D**ublin, Ohio, and Lee's Summit, Mo., are two very different cities — the latter more than twice as large. Yet both apply the same basic technologies to inspect and manage their critical underground infrastructure.

Dublin, a northwest suburb of Columbus with 41,000 population, installed its sewer system in 1974. It includes some 220 miles of gravity line, of which 38 percent is clay tile

and the rest concrete trunk and plastic. The Streets and Utilities division deals mostly with sewers, but also does some basic stormwater conduit cleaning and inspection. All wastewater is treated at a regional facility in Columbus.

Lee's Summit, population 93,000, has 518 miles of sewer pipe, 80 percent of it 8-inch lines. About 128 miles are vitrified clay pipe significantly older than 50 years. A private sewerage district

plant treats the wastewater.

To meet their specific management requirements, both communities apply three data collection and management software packages:

- Cityworks asset management software (Azteca Systems Inc.)
- The ArcGIS geodatabase package (ESRI)
- Flexidata pipe inspection and survey software (PipeLogix Inc.)

## Dublin: Setting goals

Dublin has had an official pipeline inspection program since 1990. "We started off with one cleaner and one TV truck," recalls William Grubaugh, Streets and Utilities operations administrator. In the last two years, with the acquisition of new equipment, "We started a rotation and have mapped out a goal of cleaning and televising all of our sanitary sewer lines every six years," he says.

In 2001, the city bought its first custom inspection truck (Pearpoint Inc.), which included flexidata software. "That gave us our first real opportunity to collect very good data about our sewer system, and then help us with databases and using that information in other areas of the city."

The city holds a full flexidata office license for managing project creation and copying completed inspections up to a master database on the city's network. The city



Video and pictures are exported from flexidata survey software to Cityworks, where they can be displayed from the inspection form.

also has a Light and DVS license for the inspection truck, a full license for managing manhole inspections, two mobile manhole licenses in the Engineering Department, and a full office license and mobile license for the GIS Department to use in engineering.

## Data standards

For pipe jetting and cleaning, the city uses a Vactor 2100 Series PD low-axle combination truck and a 2001 Clean Earth SafeJet unit (Vacall Industries), each with a 1,500-gallon water tank. The inspection fleet consists of the original primary camera truck with mounted camera system, plus a Pearpoint Transportable Mainline

### PROFILE:

## Streets and Utilities Division, City of Dublin, Ohio

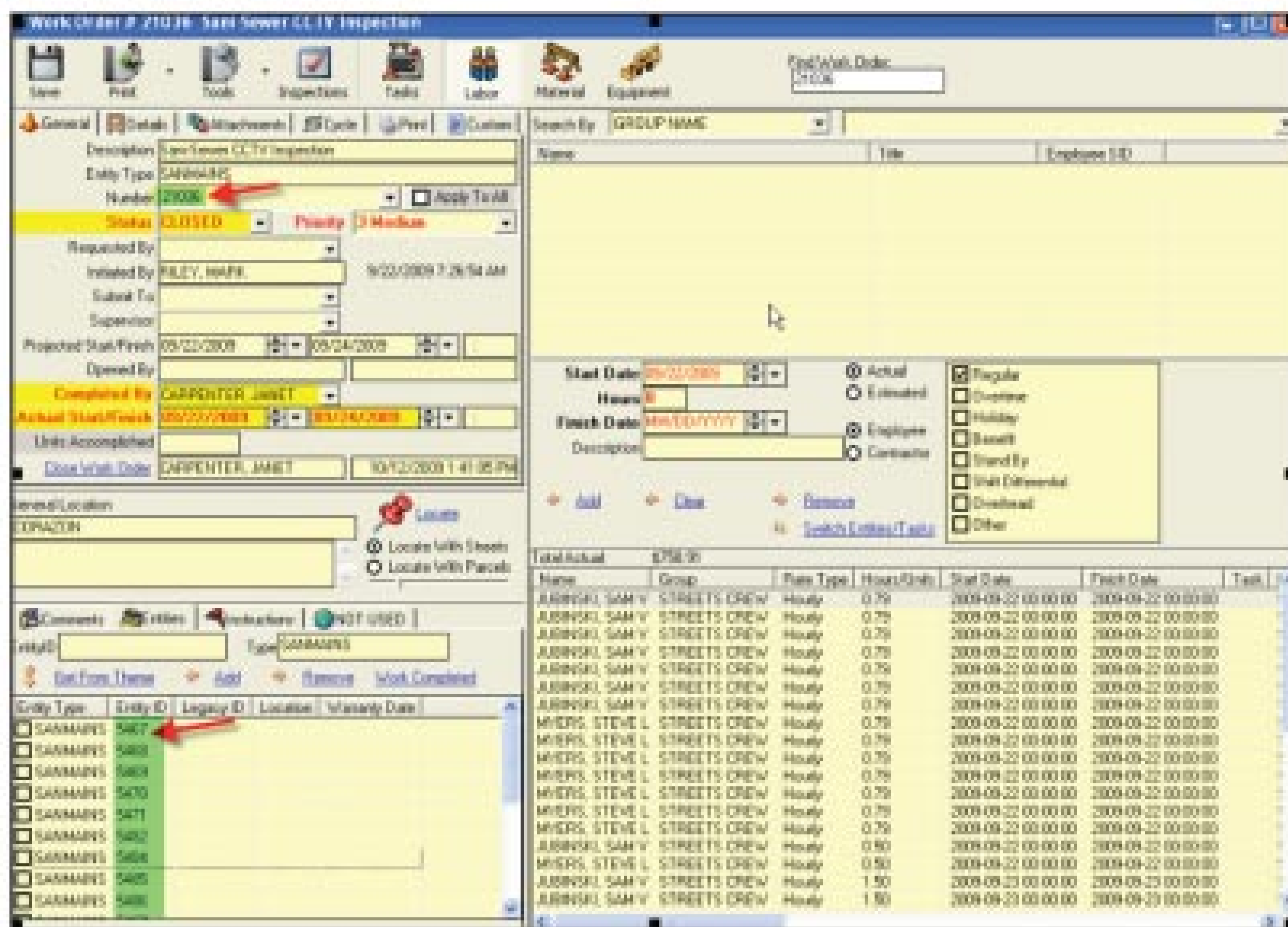


FOUNDED:	1810
POPULATION SERVED:	41,000
AREA SERVED:	24.5 square miles
EMPLOYEES:	8 sanitary sewer, 3 stormwater/engineering
INFRASTRUCTURE:	220 miles of sewer mains
OPERATIONS BUDGET:	\$2.3 million
WEB SITE:	www.dublin.oh.us

## Water Utilities, City of Lee's Summit, Mo.



FOUNDED:	1868
POPULATION SERVED:	93,000
AREA SERVED:	60 square miles
EMPLOYEES:	11 wastewater collection, 6 office, 6 pump stations
INFRASTRUCTURE:	518 miles of sewer mains, 12,000 manholes, 12 lift/pump stations
OPERATIONS BUDGET:	\$1 million (collection system maintenance)
WEB SITE:	www.cityofls.net/Utilities.aspx



The Cityworks Work Order identifies the pipes scheduled for inspection by Entity ID. The inspection information is imported into flexidata survey software to be completed.

Inspection System that can go into remote areas. This setup includes a model P320 portable controller with hose reel, and a Series 400 pan-and-tilt camera and tractor.

In the beginning, the city used flexidata software in a stand-alone environment, recalls Maria Renzetti, IT Department project manager. "As they progressed and started to want more information, and to share information easily about the health of our sewer infrastructure, we found that we needed a better way to store the inspection data. We worked with PipeLogix to expand our flexidata use so we can now store that information in a database on our network."

This eliminates data loss, since all data is backed up regularly. Other departments, such as engineering or the Services Department's Sewer Team, can also access the database from their desks. "We can share it without burning CDs or DVDs or some other media," says Renzetti. "So we now have storage for our database that can be maintained and grow with us."

NASSCO Pipeline Assessment and Certification Program (PACP) and Manhole Assessment and Certification (MACP) defect coding guides data formatting, and city employees and contractors alike use those standards.

Dublin contracts for about half its inspection work. "Our lining contracts require the contractor to inspect and clean the sewer line, do the rehabilitation, and then

re-inspect to ensure that the product was installed properly," says Grubaugh. "So while they're working independently, they're also gathering data, and they use our standards."

#### Accessible data integration

Even powerful inspection data and GIS programs have limited value unless they can be referenced by an enterprise-wide asset management tool. Dublin chose Cityworks for its ability to work seamlessly with the city's GIS solution. It integrates with ArcGIS and flexidata via portals that reveal their data within its screens for quick reference.

The Cityworks package serves as a central, single-source data repository that any user can log into and update in real time: multi-location synchronization is not necessary. That means everyone is on the same virtual page, looking at the same current data, as a basis for scheduling maintenance, allocating resources and budgeting.

"We have a sanitary main feature class or layer of GIS data," says GIS administrator Brandon Brown. "That is referenced in Cityworks, so when any work order or anything done by our staff chooses those exact assets from a map, we know where each pipe is, its unique characteristics, and its maintenance history."

"Flexidata has a pipe table, which keeps track of information about each pipe and uses it to ref-

The inspector on the Lee's Summit video truck has two monitors: one to watch video and one to enter pipe conditions into flexidata survey software. Equipment operator Kenny Moore controls the camera and records observations. (Photo courtesy of Lee's Summit)



## THE BROAD VIEW

IT and GIS staff members with the City of Dublin believe a municipality choosing asset management technology must consider the full scope of a project: who might use the data and how, now and in the future.

GIS administrator Brandon Brown cites the need to find a common basis for the data. "Whether or not you have GIS, you should have some record of asset history that is used across all the systems, so you don't have competing viewpoints on what a certain pipe is or what it may be made of," Brown says.

"If you have GIS data, you may need to do some work to get it in a format that you can use properly with your systems. You need to think holistically about it, so that it's not just pipe attributes that the engineers want to know about, but it's also some of the attributes of interest to the utility side, or to the sewer crews."

Maria Renzetti, IT Department project manager, adds, "It's important to keep everyone involved in the process from start to finish. This way, they understand not just their piece of the puzzle, but how their piece affects the rest of the puzzle. We have a more useful solution in the long run because we made sure we understood the data needs of different departments."

erence the survey and any videos. So a user would choose a pipe or set of pipes in Cityworks and create a work order. This order tracks the history of how much time we're spending doing this work.

"Then an import process from flexidata grabs that work order and brings over any information that's

applicable about the pipe, like size and type, and puts it into flexidata. The surveys become tied to it at that point." Cityworks tracks the amount of staff time applied to those tasks, along with hourly rates.

#### Seeing is believing

Renzetti says the system makes

it easy to select assets. "By using GIS, you have a visual reference, so that you can choose the section of pipe or specific manhole you want to work on," she says.

The visual aspect of ArcGIS and the way it interfaces with the Cityworks display makes the city more efficient in scheduling. "Because we can input work we would like to get done through Cityworks GIS, and because we can visually see what we anticipate doing in any given year, we can build our workload around that," Grubaugh says.

"It has helped us tremendously. We do the work, bring the field data from flexidata into Cityworks, and then we know which work is left to do. We have so many miles of sewers, and we could easily duplicate work if we didn't have this visual system."

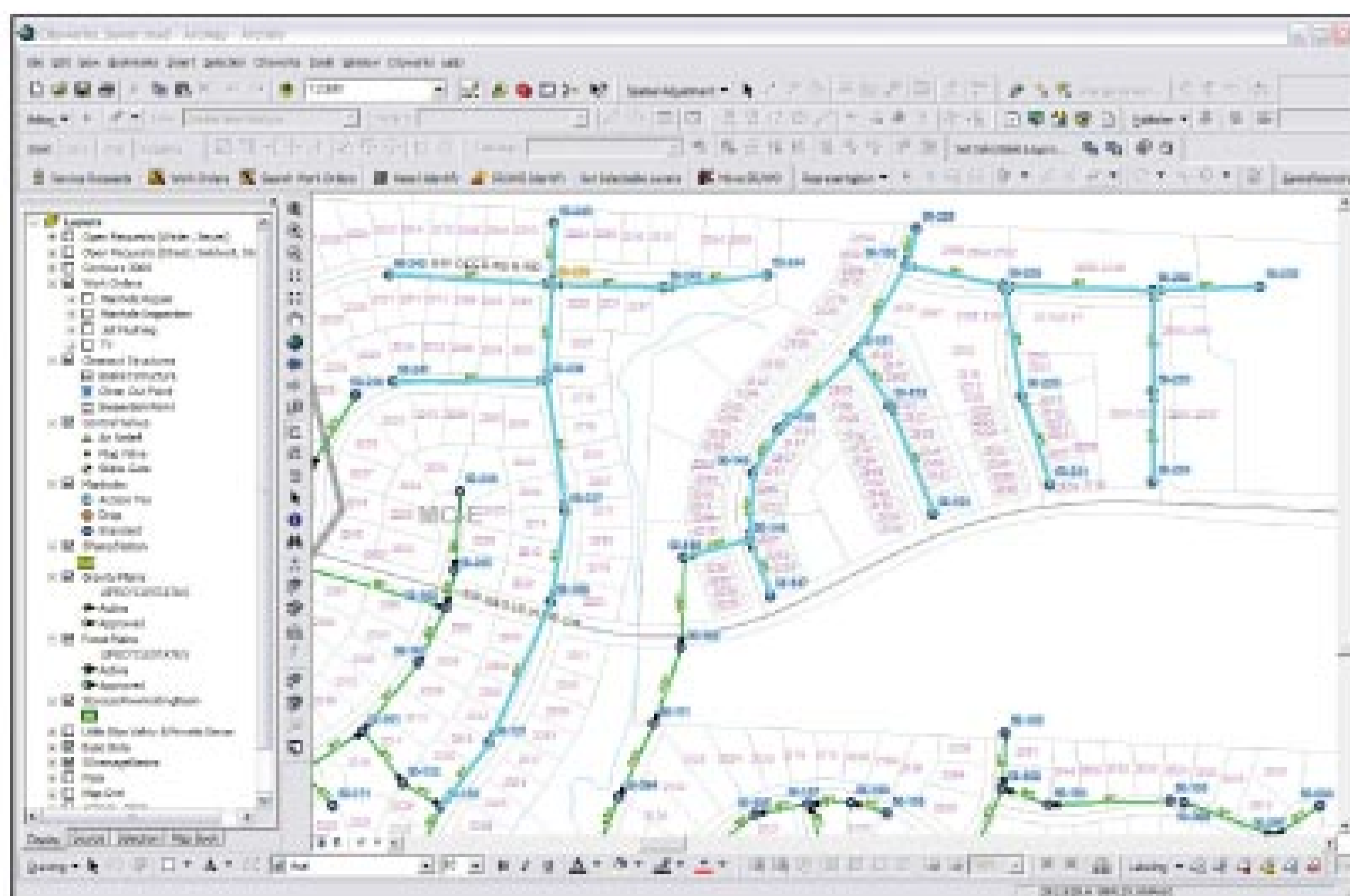
For ease of reference and logical crew deployment, he divides the city into sewersheds and assigns work along those lines. Pipes are

a crew can easily walk away from what they're doing, then come back and pick up where they left off.

The program also documents the crews' response to emergency or cleaning calls, "so we have something we can report back to residents," Grubaugh says. "When we clean the line, if they have a back-up, we would know the last time we were there, what we found at the time, how many times that particular resident or sewer line has had issues."

"The data we're collecting and running through Cityworks to track equipment, labor costs, dates and times of service and what we've found, as well as point-of-contact information — who we spoke to, what the discussions were, and what resulted from our communication — are all vital to us. It helps us build a history with each resident and each asset in the city."

Renzetti adds, "Having a place to indicate the types of calls we're getting from a resident, and then



Cityworks adds tools to ArcGIS so that the user can create or view work orders for selected pipes on the map.

color-coded by year of service. "That makes it easy to see where we need to be working, based on whether it's a sewershed, or a project from another division, or if we need to look at pipes in a newly constructed neighborhood. It helps us plan our work to meet the goals we've established."

### Keeping things moving

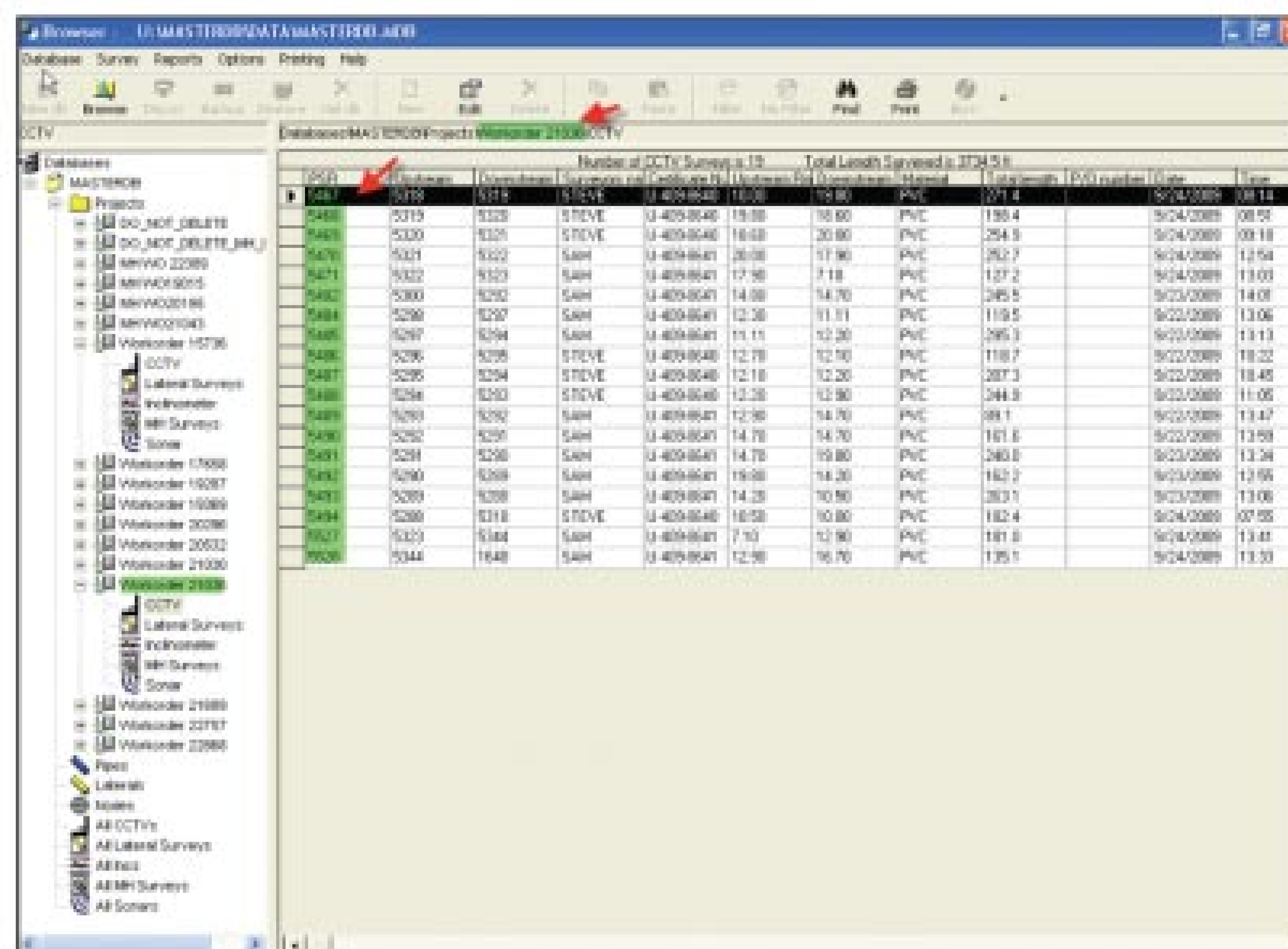
Emergency situations don't throw a wrench in the works any more. With the visual work record,

being able to track the history of a call to resolution, was a big consideration.

"We were also looking for ease of use for our end users who have to input these work orders and select the asset — something that didn't take a lot of time and just made a lot more sense to those doing the work."

### Lee's Summit: Bigger picture

Lee's Summit took an enterprise stance in its recent review of



Work Order 21036 has been imported into flexidata software and the survey is started for the inspector. The Entity ID is imported into the PSR field as shown in this list, which links the survey back to Cityworks.

asset management processes. A current inflow and infiltration (I&I) study has concluded that 60 percent of the system's I&I comes from private sources. Because the city does not maintain laterals, it hired a contractor to do the study and access the laterals from the homes.

The city runs ArcGIS Desktop with data housed in an SDE database on an SQL Server in the office. It also runs Cityworks to manage assets, and adopted flexidata when it came coupled with the inspection rigs.

The cities have two inspection and two cleaning trucks, all with two-man crews. Both run automated systems with mounted reel cameras on P420 tractors (Pearpoint Inc.). Goals are to clean a total of 8,000 feet of line per day and inspect at least 10 percent of that.

"We're reviewing that, because I think we have the potential to cover a lot more," says Ryan Ratcliff, water operations and wastewater supervisor. "I think most days we well exceed that already, so we're developing what we believe the standard should be. Right now, our jetting cycle is every four years. Our TV program is tied to that, so it would be about 12 to 16 years before we televised 100 percent of our system."

Inspection crews enter survey data into flexidata, running the DVS module with Light Reporting on two truck licenses and the GIS

module under the office's full management license. They format using proprietary codes.

### Overcoming limitations

The crews don't port their inspection data to the Cityworks software. "Cityworks, coupled with our GIS manages our inspection systems and associated program costs," says Kelly Phipps, senior GIS analyst. "Ryan will create a work order in Cityworks of what infrastructure needs to be televised. We import that work order into flexidata through its built-in process. It pulls that asset's information across from Cityworks, which is originally from our GIS."

"That survey is put on an external hard drive for the inspectors to use in the truck. They upload the TV data onto it as they work. Then we pull that information back into the office and load it into our sewer data 'vault' on a file server in flexidata format. Our current goal is just to allow people to access the inspection information, instead of replicating it in the Cityworks system."

Over two decades, the city has built a detailed GIS database. "In the recent past, we've gone through a significant cleanup of all our sewer and water infrastructure," says Phipps. "GIS gives you the ability to do a lot more, when you have that spatial component associated with it. For instance, using GIS and Cityworks gives you the ability to

review work history throughout the recent past and see where your high-priority issues are. Where do you have continuing problems? Where do we need to focus, maybe, on jetting more?"

For 15 to 20 years, the city had been recording inspection data to VHS tapes, CDs and DVDs. "The only time that you could use that information was when somebody asked for it, and you had to go retrieve it," says Ratcliff. "So there was no analysis being done on it. In the last year, we looked at how we could change our CCTV and flexi-data software implementation to make the data more accessible. So we purchased that file server."

Now, with the data available on the network, the Engineering Department, in a separate location, can easily access and review it.

#### Further integration

Now the team is looking at how to load the backlog of old video data. "Is it worth it to load that into our vault and then analyze it?" says Ratcliff. "Or is it better just moving forward with what we're capturing on a daily basis? That's a decision we're going to make here shortly."

Phipps and Ratcliff are researching how they can tie the GIS and flexidata databases more closely together to allow wider usage of the information. For instance, they get many requests for pre- and post-new-construction video inspections. They're likely to consider the functionality available through Cityworks.

"The program is extremely flexible," Phipps says. "You don't have to take a canned approach and try to fit that to your business process. You can look at your busi-

ness process and adapt it to that."

Ratcliff already uses the program to schedule preventive maintenance, capital improvements and point repairs and consults the data when making decisions on emergency jobs.

The most immediate goal is getting easy access to comprehensive inspection data that will clearly show the condition of the sewer infrastructure. In line with that, he wants inspection operators to record as many observations as possible. "You want to make sure everybody is grading the problems they encounter," he says. "As much information as you can collect, that's what makes the process worth the time and money we put into it." ♦

#### MORE INFO:

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[www.esri.com](http://www.esri.com)

**Pearpoint Inc.**  
800/688-8094  
[www.radiodetection.com](http://www.radiodetection.com)

**PipeLogix Inc.**  
866/299-3150  
[www.flexi-data.com](http://www.flexi-data.com)

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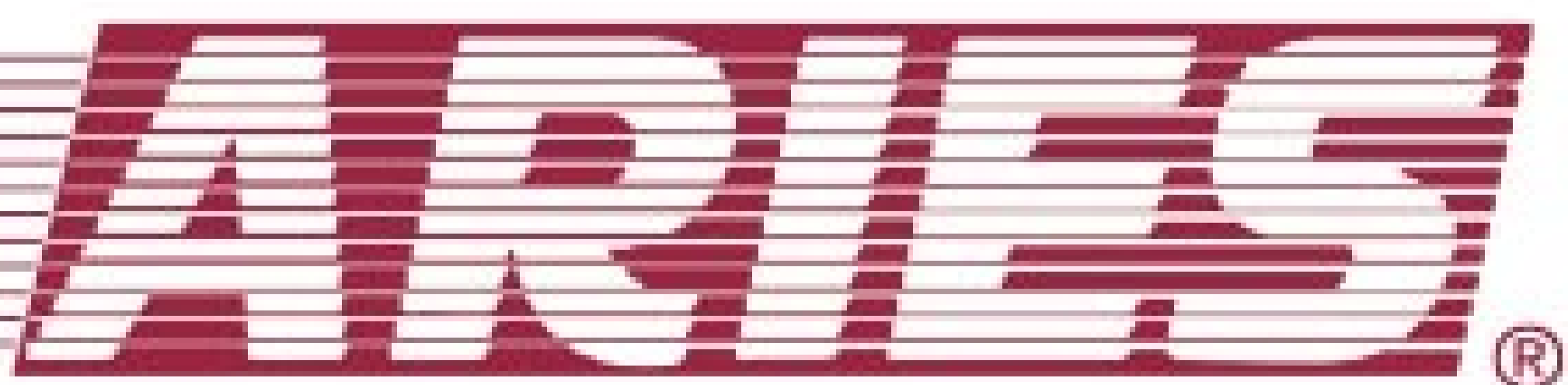


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# GETTING CONTROL

The Water Services Department in Kansas City deploys more than 300 green stormwater initiatives in a citywide effort to help curtail CSOs

By *Scottie Dayton*



**A**n ambitious pilot project using green solutions in Kansas City, Mo., is believed to be the largest of its kind for combined sewer overflow control undertaken in the United States and overseen by a Federal consent decree.

The Middle Blue River Basin Green Solutions Pilot Project encompasses more than 300 green solutions within 100 urban acres. It represents one component of the city's commitment to use green solutions to control runoff as part of the Overflow Control Plan submitted to the U.S. EPA and the Missouri Department of Natural Resources in January 2009.

Major water-quality studies by the United States Geological Survey (USGS) and work with eight basin engineers have paved the way for the city's Water Services Department and the program management team from Burns & McDonnell, headquartered in Kansas City. Terry Leeds, overflow control program manager and stormwater utility manager, has led the city efforts since July 2005.

The department kicked off its first CSO control design in September 2009. The two-pronged attack involved rehabilitating 3.5 miles of combined sewer within the pilot area, and constructing green solutions in an initiative expected to take two years.

## Getting there

According to a 2008 report from the Black & Veatch Corp. engineering, consulting and construction firm, the city has made great progress in stormwater management and natural resource protec-

**Equipment operator II Terry "TWI" Wilson (left) and engineer technician Amir Kenner prepare a robotic crawler from Envirosight LLC for an inspection by pressurizing it with carbon dioxide to make it submersible and impervious to water. (Photography by Michael McClure)**



**A combined water outfall in Kansas City includes a brick weir that retains sewage. During heavy rains when capacity is reached, runoff topples over the wall and spills into the Brush Creek watershed.**

tion. Efforts began in 1996, when the USGS studied small urban streams in the combined sewer area to define water quality based on bacteria levels.

During rain events, research showed that 40 percent of the bacteria came from human waste, 30 percent from animal waste, and 30 percent from other pollutants. "We learned that CSOs were only one part of the problem," says Leeds. "Just separating our combined service sewers wasn't going to do it. To really improve water quality, we needed a watershed management plan."

The combined sewer area has 90 structures that contain some of the sewage and prevent it from reaching streams during low flows. From 2006 to 2008, Water Services investigated the condition of the 75-year-old combined sewer system in the pilot project area to discover what really was under the ground.

"The pipes range from clay tile to rock structures and some concrete sewers," says Leeds. "Diameters vary from 8 to 48 inches to irregu-



**“We learned that CSOs were only one part of the problem. Just separating our combined service sewers wasn’t going to do it. To really improve water quality, we needed a watershed management plan.”**

**Terry Leeds**

lar-shaped box culverts.” Most lines under the streets were in decent condition. Crews found the worst degradation — collapsed pipe and infiltration and root intrusion at joints — where the clay tile traversed backyards.

“We’re replacing some of the pipe in those areas,” says Leeds. “We’ll also line the pipes under the streets as a precaution. After the green solutions are installed, we don’t want to dig them up to fix leaking sewers.”

Besides televising lines, crews did smoke tests, inspected manholes, installed flowmeters, and created survey data on the infrastructure, including the location of sidewalks and curbs. “We have a GIS, but it’s based on old, hand-drawn maps that were digitized,”



**PROFILE:**  
**Water Services Department, Kansas City, Mo.**

**FOUNDED:**  
1847

**CUSTOMERS SERVED:**  
151,600

**SERVICE AREA:**  
318 square miles

**EMPLOYEES:**  
900

**ANNUAL RAINFALL:**  
37 inches

**INFRASTRUCTURE:**  
2,800 miles of sanitary sewers; 35,000 catch basins; 5 detention ponds; 162 diversion structures; 90 combined sewer outfalls; 65,615 manholes

**OPERATING BUDGET:**  
\$10 million stormwater,  
\$80 million wastewater,  
\$90 million water

**WEB SITE:**  
[www.kcmo.org](http://www.kcmo.org)

says Leeds. “Their accuracy isn’t always the greatest.

“A couple of manholes in the project area were never dug up because they are in backyards. This year, we will rehabilitate most of the abandoned systems and reroute some of the retrofit. We also will line or rehabilitate most of the laterals up to the property line.”

### Modeling the future

The basin engineers and Burns & McDonnell modeled the combined sewer system, showing the water sources and volumes. They then developed an overflow control plan that will reduce CSOs from more than three dozen to about half a dozen per year in the project area.

“It’s too expensive to separate all the combined sewers in the city, so we developed different overflow limits for each area,” says Leeds. “The cost of controlling overflows in the combined sewer area is \$1.4 billion.”

Running parallel to the overflow control program is the KC-One Project, the city’s stormwater management plan. Water Services identified 35 watersheds within Kansas City, then developed master plans for them. KC-One combines those plans into one comprehensive plan. The cost is \$2.1 billion for 750 stormwater projects, mostly driven by the need to correct undersized pipes.

A 1 percent sales tax funds most of the city’s capital projects. Stormwater maintenance and engineering is funded by a stormwater fee of 50 cents per 500 square feet of runoff surface. The average fee for residential property is \$3 per month.

“Our stormwater fee brings in \$10 million per year,” says Leeds. “That’s not enough to maintain what we have. If we’re going to provide consistent funding for stormwater projects, we’ll need more dollars.

“Some models indicate that we’ll need \$10 per month from res-



**Project leaders Francis Reddy, senior registered engineer (left), and Terry Leeds, stormwater utility manager, in the naturally lit atrium in the Kansas City Water Department building.**

**A rain garden on the east side of the Water Department building is dormant but ready to bloom with spring weather.**



## TEST DRIVES

The Water Services Department of Kansas City is engaged in an unprecedented program to use more than 300 green solutions within a 100-acre site. To help city employees become better salespeople when talking to the public about green solutions, Terry Leeds, overflow control program manager, and associates constructed a 30- by 50-foot rain garden alongside the Water Services headquarters.

“It was a good employee event, and everyone had an opportunity to help plant different types of native vegetation,” says Leeds. “So far, the buffalo grasses and prairie sedges seem to be working the best.” At first, the employees weeded the garden, but now a contractor does it.

Water Services also worked with the local bus agency to use green solutions as part of its new rapid bus line. “They are installing bump-outs — curbs extending into the street — along the route, and planting rain gardens in them,” says Leeds. Besides the environmental benefit, bump-outs shorten the distance across the six lanes for pedestrians and make drivers slow down by narrowing the street.

idential properties. That will make homeowners scream, but it also will be an incentive for them to do something to reduce the fee, such as using rain gardens or rain barrels.”

In 2005, Water Services and various city and county executives begin the 10,000 Rain Gardens community outreach program. KC-One managed it for the first year, then gave it to the city’s Overflow

**“Over time, we hope to create an appetite and appreciation for green solutions that will motivate property owners to adopt rain gardens, disconnect downspouts and use rain barrels, or build rain gardens on their sites.”**

**Terry Leeds**

Control Plan. The program provided homeowner-based information and professional-level training and certification, bringing the enormity of the stormwater challenge down

to a personal scale.

“We never knew how many residents built rain gardens or installed rain barrels,” says Leeds. “However, the program raised people’s awareness about the impact stormwater runoff has on the environment. Before the program, most citizens thought of stormwater as a flooding issue. Now, they understand the water-quality aspect, too.”

### Flood control

Another component of KC-One identifies flood-control projects. Water Services has worked with the U.S. Army Corps of Engineers for more than 20 years to deepen and widen channels and to build levies and concrete flood walls. This work will probably continue for another 15 or 20 years.

A major boon to flood control is a stream setback ordinance that took effect in February 2010. It prohibits further development in floodplains. To deal with the more than 1,000 existing structures in those areas, KC-One recommends a voluntary buyout, but provides no funding.



Engineer technician Amir Kenner observes a line inspection from the department’s TV truck.

“We’re analyzing three avenues, all under long-range planning,” says Leeds. “First, owners would sell the property to the city, and we would tear down the structures. Second, owners would be able to live there as long as they pleased, but they could sell only to the city. Third, we would build a levy or flood wall to protect the property if the owner’s investment were substantial and the cost-benefit ratio were high enough.”

While there are hundreds of privately maintained stormwater detention ponds, only five belong to the city. However, when the pilot project area is completed, the city will own more than 300 green solutions involving rain gardens, bioretention swales, infiltration galleries, permeable pavement and street trees.

### Power of trees

Trees have many benefits, says Mark Govea, landscape architect with the city. The leaves, roots and bark sequester carbon and hold and absorb substantial amounts of stormwater. “The pilot project area already has many street trees, but we’re filling in the gaps by planting more,” he says. “We’re working with the city Forestry Department on what types of trees to plant.”

The annual leaf drop raises the possibility of clogging the green additions. “We don’t know what it will take to maintain these structures or the cost,” says Leeds. “We’re analyzing whether we should maintain them or create networks to do the work.”

The city now collects brush and vegetation in spring and fall. Homeowners may put out 30 biodegradable bags or take the material to composting sites. “We want to

encourage people to build compost piles in their yards,” says Francis Reddy, senior registered engineer with the city. “However, compost piles have some stigma attached to them because they can attract undesirable wildlife.”

Another concern is how salting streets in winter will affect the green solutions. “Time will tell which plants are more salt resistant,” says Reddy. “We can overcome this issue. We just want to do it correctly.”

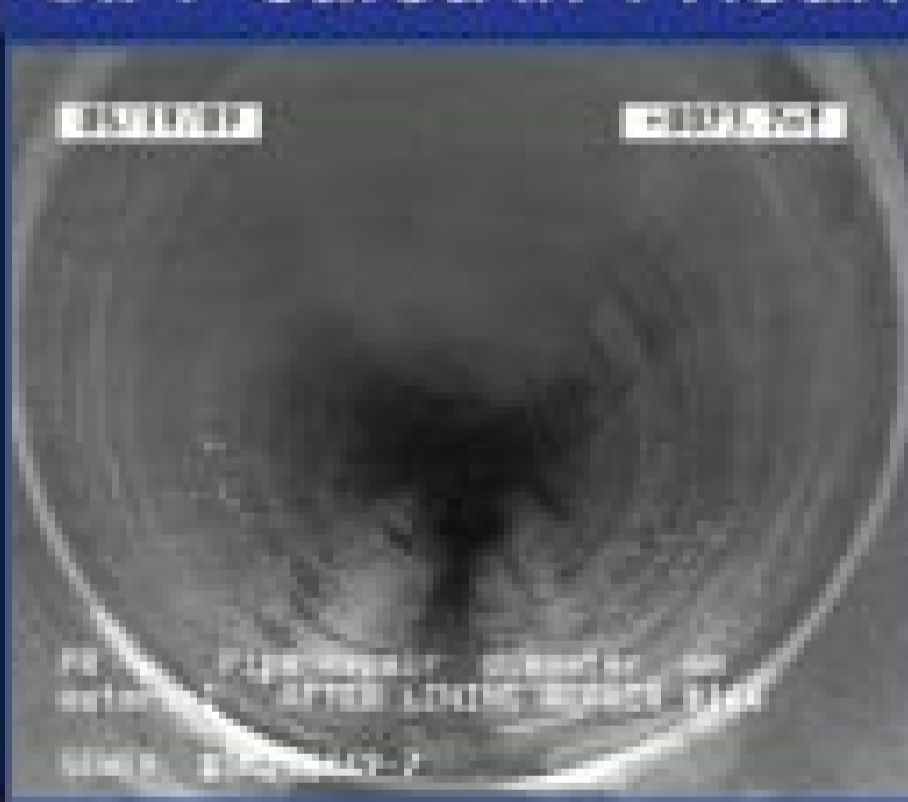
Rain gardens in the pilot project are slated for public right-of-ways and easements. While Water Services will maintain them in those areas, Leeds hopes that responsibility will eventually shift to property owners in other parts of the city.

“For green solutions to really work, you need a lot of them,” says Leeds. “The city has far more private property than public. Over time, we hope to create an appetite and appreciation for green solutions that will motivate property owners to adopt rain gardens, disconnect downspouts and use rain barrels, or build rain gardens on their sites.”

After the pilot project is completed in winter 2011, the city will work with the EPA Office of Research and Development to monitor the program’s effectiveness in reducing stormwater runoff. The information will guide the design of future green solutions in Kansas City. ♦

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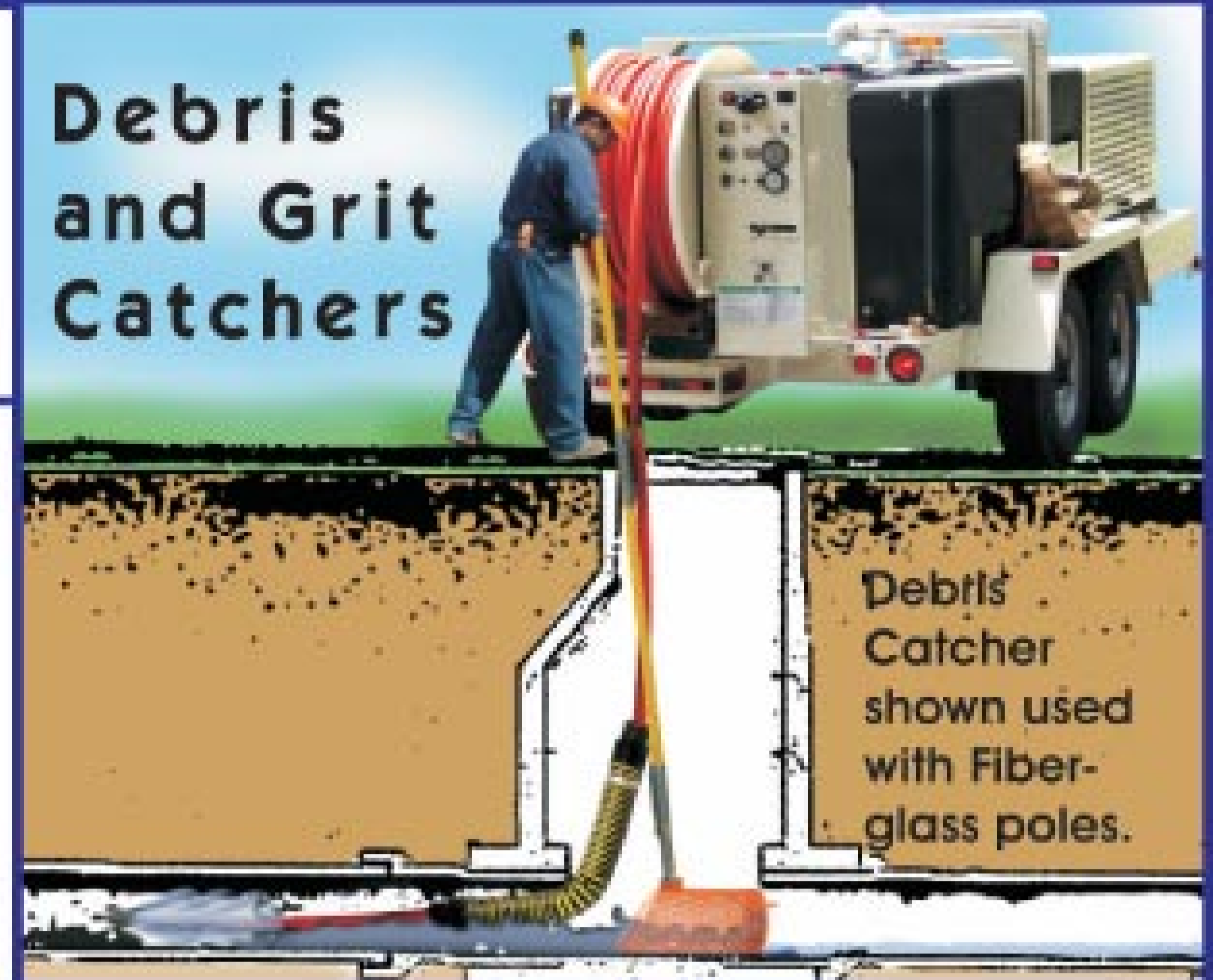
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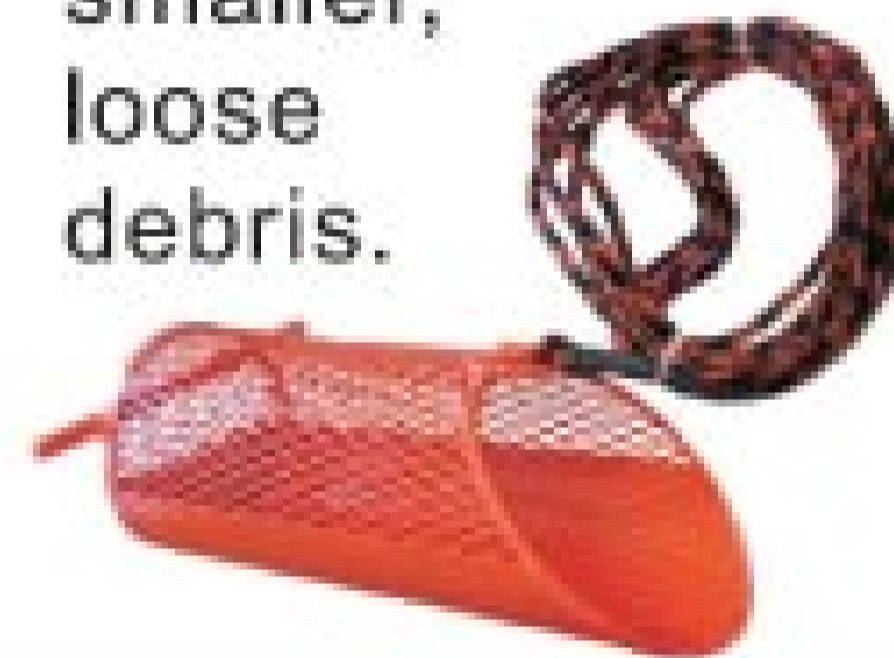
Comes with 22' of Poly Rope. Available from 6" to 24".



Debris Catcher for use with Poles

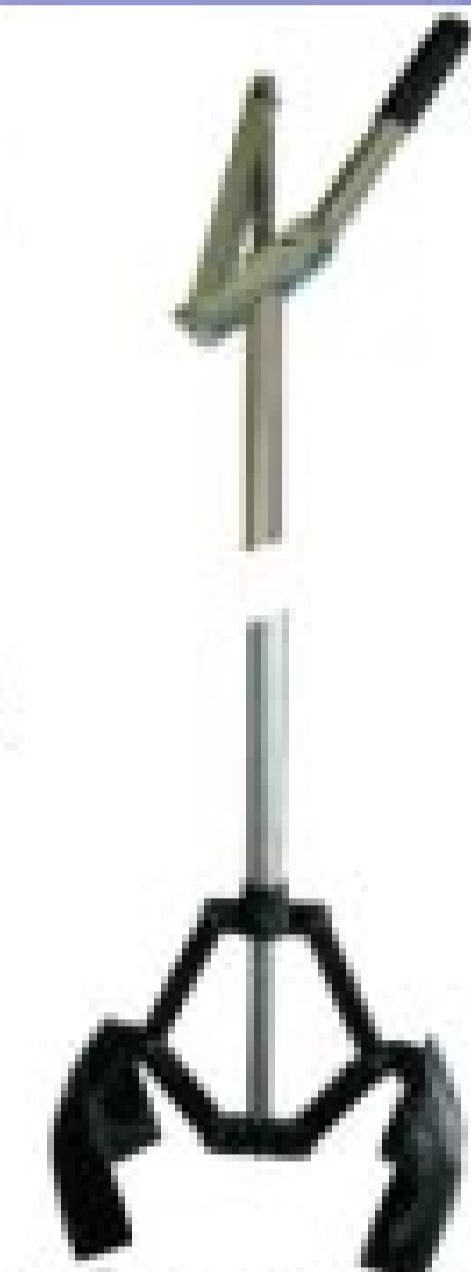
### Grit Catchers

Stops finer grit, black sand and smaller, loose debris.



Debris and Grit Catchers both can be used with Fiberglass Poles. Provides for positive action of positioning, raising and/or lowering these catchers in manholes.

Grit Catcher for use with Poles



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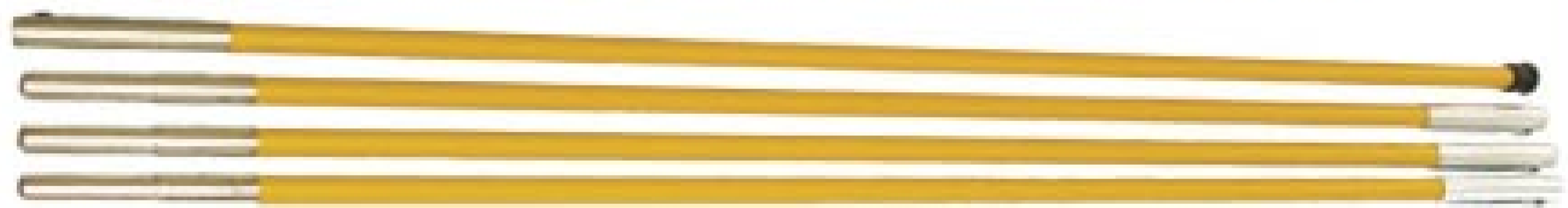


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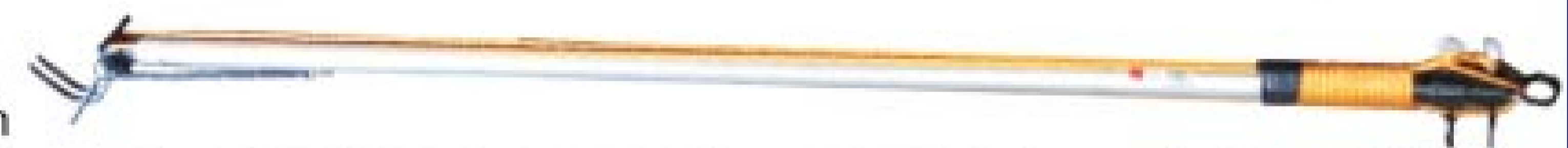
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**SPIR STAR Opens Mexico Repair Center, Launches Web Site**

SPiR STAR has named Comuniv S.A. de C.V., Tampico, Tamaulipas, Mexico, as an authorized hose repair center. It offers flex lance repair and stocks new assemblies, fittings and valves. SPiR STAR also launched a valve Web site, [www.spirstarvalves.com](http://www.spirstarvalves.com). The site displays NPT, medium-pressure and high-pressure needle valves, ball valves and check valves with working pressures to 60,000 psi.

**Hydraulic Institute Recognizes Atchia**

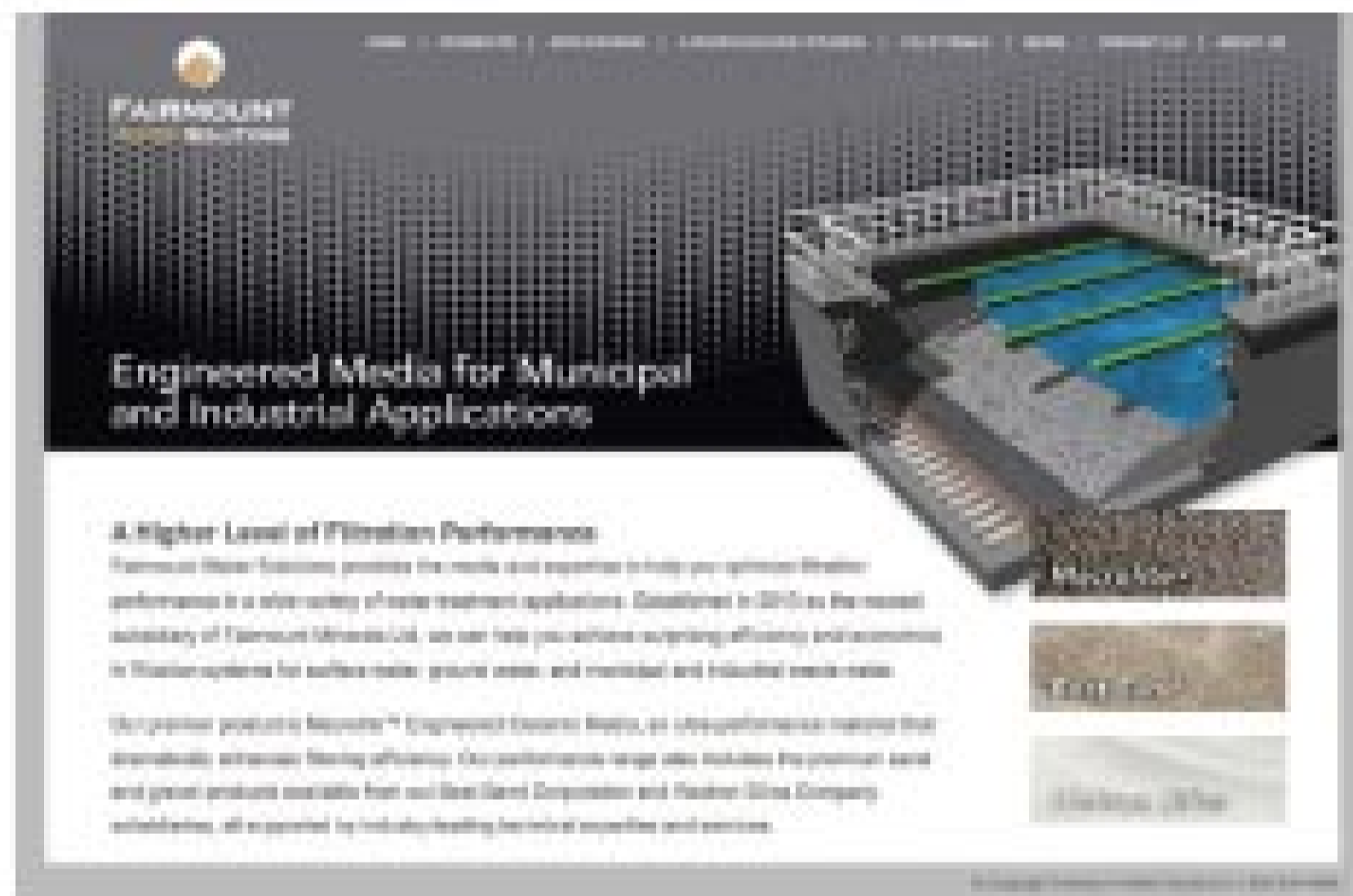
Julian Atchia, new product development manager for SJE-Rhombus, was recognized by the Hydraulic Institute for his contributions to writing the ANSI/HI standard 9.6.4-2009 (vibration measurements and allowable values for rotodynamic pumps).



Julian Atchia (right), new product development manager for SJE-Rhombus.

**Fairmount Launches Water Treatment Web Site**

Fairmount Water Solutions' new Web site, [www.fmwater.com](http://www.fmwater.com), includes company information on municipal water and wastewater treatment solutions. ♦



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# FOLLOW THE BOUNCING BALL

A combination of technologies, including a SmartBall acoustic leak detection device, provide condition assessments for a Maryland district

By *Scottie Dayton*

Finding leaks in water transmission mains before they become safety hazards is an ongoing challenge for the Washington Suburban Sanitary Commission in Laurel, Md. In 2009, the district repaired 1,847 water main breaks and leaks in Prince George's and Montgomery counties, the second-highest calendar year total in the past quarter-century.

But the real problem children in the agency's 5,500 miles of water

lines are 350 miles of 50- to 70-year-old prestressed concrete cylinder pipe (PCCP). The concrete core, steel cylinder, high-strength steel prestressing wires and mortar coating are highly sensitive to corrosion.

Consequently, the commission has inspected all 59 miles of 54- to 96-inch mains multiple times. Investigations have advanced from visual inspection and sounding to sonic/ultrasonic measures and electromagnetic assessments.

"If you depend on just visual to



The P-Wave electromagnetic inspection system pinpoints breaks in high-strength steel prestressing wires. (Photos courtesy of Pure Technologies Ltd.)

look for leaks, you'll miss a lot," says chief engineer Gary Gumm. "We learned that lesson after we knew we had a leak, but couldn't locate it until we used electronic equipment. Then we had to really search for it visually to repair it. After that, we added electronic leak detection technology to our repertoire, and we use it before dewatering the pipe."

However, some electronic leak detection equipment is tethered, often requiring excavation to create

entry points. When Pure Technologies Ltd. in Columbia, Md., introduced the untethered SmartBall, an acoustic leak detection device, the commission embraced it and the P-Wave electromagnetic inspection system.

### With the flow

SmartBall, introduced in 2007, is a sensor-filled aluminum core surrounded by a protective foam shell. Requiring only an insertion and extraction location, the device



The SmartBall is a sensor-filled aluminum core surrounded by a protective foam shell. When deployed in 10-inch or larger pipes, various internal sensors pinpoint leaks as small as 0.1 gpm.

**“If you depend on just visual to look for leaks, you’ll miss a lot. We learned that lesson after we knew we had a leak, but couldn’t locate it until we used electronic equipment.”**

**Gary Gumm**

is deployed in 10-inch or larger pipes, then rolls with the flow. Various internal sensors pinpoint leaks as small as 0.1 gpm. The ball travels up to 15 hours before reaching memory capacity and depleting its rechargeable battery. An accelerometer determines leak locations, as do acoustic pulses emitted by the ball. Receivers are attached to pipe appurtenances. The collected data is graphically represented in a position versus time profile.

Additional instrumentation calculates temperature and identifies valves, outlets and other metallic features. Once the ball is retrieved, the data is downloaded and analyzed for acoustic anomalies. The technology can be used with most pipe materials, including steel, ductile iron and PVC.

As part of a comprehensive PCCP inspection and management program, the commission contracts with Pure Technologies to conduct leak detection surveys. Before launching the ball, the agency closes sideline valves that could divert the device. “We try to turn the pipeline into a river and shoot for flows of 1.5 to 2 feet per second,” says Gumm. “Pure sets a net at the extraction port to catch the ball.”

#### Wave of the future

To inspect the prestressing wires, the pipe is dewatered, and a worker then pushes a cart with the P-Wave technology through the line, generating a magnetic signature of each pipe section. Broken wires alter the magnetic signal, creating an anomalous reading on the cart’s onboard computer. The readings are analyzed to pinpoint the breaks and estimate the total number of broken wires.

The commission takes transmission mains out of service in lengths of 6 to 18 miles. “That’s the size of our program for a year,” says Gumm. “We get away with this because these mains generally don’t have feeders to homes and busi-

nesses, and we have just enough redundancy. Locating and quantifying the extent of breaks gives us the pipe’s baseline condition. Monitoring it from that point on allows us to decide when to act.”

Thus far, Pure has inspected 27 miles of pipe 48 inches and larger, subsequently installing SoundPrint, an acoustic fiber optic cable that identifies active wire breaks in pipe sections and establishes a rate of deterioration.

A data acquisition unit transmits light through the cable, which is disturbed by the pressure wave created when a wire breaks. A second optical fiber determines the location of each event. Once data analysts at Pure confirm a wire break, they e-mail a PCCP management group within the commission.

“By June 30, 2013, Pure should have inspected and left cable in our entire 48- to 96-inch pipe, a

distance of 77 miles,” says Gumm. “This year, we’re halfway through inspecting 13.3 miles of 54-, 60- and 66-inch pipe. A contractor will repair or replace the distressed areas.”

Contractors will either excavate and replace highly deteriorated sections of PCCP or repair them using external tendons (a wrap that squeezes and holds the concrete in place) or internal carbon-fiber-reinforced composite. “By using a combination of the latest technologies, it’s far more likely that we will identify the potential for big water main breaks in time to react before lines fail,” says Gumm. ♦

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# FILLING THE PIPELINE

In many cases, the best way to find high-quality CCTV inspection operators is to identify people with the right personal attributes and train them yourself

By Jim Aanderud

Filling a CCTV inspection operator's position can be a real challenge. It's not as if you can call the local labor pool and have one sent over. It is a specialized job with relatively few positions and almost no one already in the pipeline of available talent.

The easiest way to fill an immediate vacancy is to find an experienced operator, but that may not be the best way to go. The experience and training operators have received at other companies or agencies may be inadequate. Bad habits acquired elsewhere can be difficult to change and may be incompatible with your program. Unfortunately, by the time these weaknesses surface, it may be too late.

As a contractor, I have found myself in dire need of an inspection operator on several occasions. Out of frantic need, I have hired the first operator to come along. This has rarely worked out. My next option has been to train someone quickly and put him or her into the operator chair as soon as possible. This, too, can have negative consequences.

## Training from scratch

So, how do municipal managers keep from being put in this position? How can you anticipate your needs? What typically works best

is simple: plan ahead. By being proactive, you can make sure there is always a quality trainee being prepared to fill future needs.

The best way to find ideal CCTV operators is to grow them from scratch, before you actually need them. By doing it this way, you have time to find the attributes in a candidate that are most favorable for you and your organization. By always keeping at least one trainee in the pipeline, you have the assurance that you are covered for any future contingencies without a huge ongoing training cost.

The single most important step is to hire the right person by using a thorough screening process. There are three skills sets to consider:

**Innate skills.** These are attributes a person is born with: personal IQ, aptitude, leadership and organizational abilities. A person with these attributes most likely can learn and perform the job adequately.

**Learned skills.** These are skills people have developed through schooling or other means. The most important is computer knowledge. Trainees must have a solid understanding of file management, word processors and spreadsheets. Learning these skills on the job is not practical. Mastering the required computer skills takes a long time and should never be done on the clock. Other learned



Al Nila, senior CCTV inspection operator at Innerline Engineering, watches as inspection operator Allen Souza learns to how to conduct pipeline inspections. (Photos courtesy of Innerline Engineering)

skills include mechanical and electrical knowledge.

**Trained skills.** These are the skills you will teach candidates to develop them into top-notch operators. It is important that trainees are teachable. They must be able to learn how to operate the software, troubleshoot the equipment and become certified in NASSCO/PACP as soon as possible.

## A training plan

After screening candidates carefully, you can start training. One of

**After screening candidates carefully, you can start training. One of the worst things you can do to trainees is rush them into the operator chair. Once they are operating, they become so focused on the inspections themselves that they are unable to take in the other functions around them.**

the worst things you can do to trainees is rush them into the operator chair. Once they are operating, they become so focused on the inspections themselves that they are unable to take in the other functions around them.

Therefore, time trainees spend in a support role on the back of the truck is very valuable. This is where trainees can follow the inspection process on the rear monitor while observing the mechanical func-

tions of the equipment. From there, they can observe the inspection environments, and understand the reactions from traffic, pedestrians and even children. Valuable lessons like these can be missed if trainees are not allowed to learn from the outside in.

A comprehensive training program is critical. You need to assess each person's readiness and the issues their training needs to address. More than once I have sent new employees to NASSCO/PACP training prematurely, with

poor results. When trainees with insufficient exposure to the industry are thrown into a training class with completely new terminology and information, their retention levels are low.

Conversely, if they have had time to take in the industry and have been exposed to the terminologies before taking the class, their retention rates are much higher. Begin by exposing trainees to the industry as a whole. There



Al Nila points out the proper equipment maintenance procedures to Innerline Engineering colleagues (from left) Chris Stutzman, CCTV inspection trainee; and Jeremy Hartoog and Allen Souza, CCTV inspection operators.

are wonderful online resources that will give them valuable information. There are Web sites dedicated to the history of pipe, current rehabilitation practices and many more valuable topics.

Help trainees understand the big picture. Talk about why pipelines are inspected, what the information represents and how it is used. Discuss the data that is collected and why its accuracy is so important.

Take the time to instill in them the value of the position. Explain the importance of collection systems to our civilization and survival. Make clear that our infrastructure has far surpassed its design life and that CCTV operators sit on the forefront of its rehabilitation. Impart to them the importance of the task.

Remember that it is far easier to teach someone the right way the first time. Take full advantage of a new employee's attention and eagerness to learn. Spend more than enough time with them to make sure they grasp everything that is important.

### Handling equipment

Don't forget to teach trainees the value of equipment. An operator who misuses or abuses equipment can cost you thousands of dollars and cause numerous lost days. Be sure to instill the importance of caring for equipment and maintaining it properly. Help

them understand the potential costs of damaged equipment in time lost on the job and delays waiting for replacement parts.

By all means, teach trainees how to carry out an effective preventive maintenance program. Instruct them how to perform minor repairs. Let them leisurely practice configuring different equipment setups. Allow them to become intimately familiar with each piece of equipment before they ever work on a job site. If an equipment maintenance class is available in your area, have them attend it.

Remember that there is no magic timetable for training. Each employee learns at a different pace. The point is to give trainees enough time to absorb the environment around them before they are too busy to learn it properly. This is not rocket science, but it may be overwhelming to trainees at first.

### The next step

When a trainee is ready, it's time to expose him or her to the operator's chair. A good start is to let them run a line or two each day under the lead operator's supervision. This hands-on experience will help them understand the process and will elevate their knowledge absorption rate.

During this process, set time aside for trainees to play with the software without an actual inspection taking place. Let them fill out

headers, enter observations and print out reports. Let them go through all the menus and functions to gain a thorough understanding of the systems involved.

Develop a written aptitude test to assess each trainee's knowledge and retention. Include technical

information, maintenance issues, equipment configuration, traffic control and general industry knowledge. Incorporate some role-playing scenarios that will help them begin the critical-thinking challenges they will encounter in the field.

When you're satisfied with a trainee's progress, schedule a NASSCO/ PACP class. Let the trainee page through a PACP notebook to begin the familiarization process.

### Keep the pipeline full

By following these procedures, you will be assured of having a qualified CCTV inspection operator making his or her way through your trainee pipeline at all times. When the need presents itself, you will be able to seamlessly meld a new operator into your inspection program without ever missing a beat. ♦

### About the Author

Jim Aanderud is owner of Innerline Engineering, a video pipeline inspection company based in Corona, Calif.

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Managers will soon face a new generation of workers who require more hands-on attention and more development to build needed skills

By Ken Wysocky

In almost any organization, managers wear many hats: supervisor, mentor, disciplinarian, motivator, decision-maker, conflict resolver and more. But in the public sector, which will soon need to hire unprecedented numbers of younger, entry-level employees, they'll need to add a new one: surrogate parent.

That's the assessment of Terese Corey Blanck, an employee development consultant who focuses on helping organizations learn how to attract, retain and manage so-called Generation Y employees (also called Echo Boomers). They are the 75 million or so workers age 18 to 30.

After interviewing thousands of Generation Y college graduates during her career, Corey Blanck concludes that this generation is largely bereft of the decision-making and conflict-resolution skills that came as standard equipment with most Baby Boomers. It's much more than a generation gap, says Corey Blanck, CEO and president of CTC Consultants, based in Minneapolis, Minn.

## Umbilical cords

Instead, she points to overly protective parents who not only paved the way for their children but went out and built the road, too. And then striped it, put up guardrails, posted traffic signs and handed out GPS units.

"I remember when I got

dropped off on my first day at college," she recalls. "During that first week, I navigated everything myself. I didn't ask my parents for any help making decisions. Now, parents set up their loft beds, buy their books and then talk to their kids' professors. And after they leave, they're still attached by umbilical cords called cell phones and text messaging.

"As a result, most members of this generation aren't really adults yet. They haven't had the experiences or developed decision-making skills because their parents have been so involved and had them so programmed. In a way, they've delayed growing up. Their hearts are in the right place, but they just don't have enough life experiences. They're still navigating toward adulthood. They don't know how to fail — and build their skill sets in doing so."

There are aberrations, Corey Blanck notes. She estimates that 10 to 20 percent of Gen Yers have enough moxie to thrive as entry-level employees. But there aren't enough of them to fill the job openings, which means it's very likely that some maturity-challenged workers will soon be working near you.

## Making it work

So what's a manager to do? First of all, managers might want to temper expectations. Corey Blanck has heard many Gen Y horror sto-

ries: employees who balk at menial tasks, or who ask if it's okay to come in late on certain days to accommodate their social lives. Many find it difficult advancing to the next level because they don't want to hurt the feelings of people they now supervise who used to be their peers.

"Managers will need to push them out of the self-absorbed mode — make them make decisions based on the greater good of the organization," she says.

Supervisors also must become much more hands-on, developmental managers. Gone are the days when managers could hand off projects to employees with minimal direction and assume they

**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](mailto:editor@mswmag.com).

and figure out where they are in terms of cognitive competencies and emotional development. Then they need to talk candidly to employees about their deficiencies.

"Managers will need to sit down with these employees and discuss specific experiences they want them to navigate," Corey Blanck says. "Whether they fail or succeed isn't even the point. It's all about learning through new challenges and experiences. If you never fail, you never truly know who you are."

Gen Yers also demand more dialogue and communication. Managers will have to continually benchmark and assess their development, and patiently correct mis-

**"Managers need to get to know employees in a more personal way. Instead of solving a problem for them, managers will have to walk them through their thoughts and discuss what kinds of resources are available."**

Terese Corey Blanck

would figure it out on their own and get things done.

"Managers need to get to know employees in a more personal way," Corey Blanck says. "Instead of solving a problem for them, managers will have to walk them through their thoughts and discuss what kinds of resources are available."

Managers should also work closely with their human resources departments to perform developmental assessments of Gen Yers

takes. "The more you do something and get corrected, the more efficient your brain becomes at executing the task," Corey Blanck says. "You want them to practice these new skills on a frequent basis. Part of this is about developing an identity."

## Touch base often

In addition, managers will likely find they need to check in more often with Gen Y employees, rather

than relying on a weekly staff meeting. They'll also need to tailor their management styles.

"Get rid of the half-hour weekly staff meeting and coach these employees," Corey Blanck suggests. "It doesn't need to take more time. You just spread it out over the course of a week. And you need to get to know people well. Some will respond better to e-mail, while others will prefer face-to-face contact. You have to ask them often if they need help and give them specific times you'll be available if they need help later on."

Corey Blanck urges managers not to look at this as handholding. Managers always have some star employees and some who need help and development — and some need it more than others. Gen Yers are no different.

In many ways, managers will be

forced to do the work that family, neighbors and society, and even neighborhood games and contests, did in generations past: Help children mature into adults, learn how to manage conflict and develop assessment skills.

"It's a daunting challenge, but we have no choice," Corey Blanck says. "Managers need to look at these employees differently and start developing them differently. They can get help by using other employees who are further along. They'll know who those employees are."

Who knows? If you properly and patiently coach and develop this new breed of employees, you might be able eventually to slip back into normal management mode, and wear one less hat along the way. ♦

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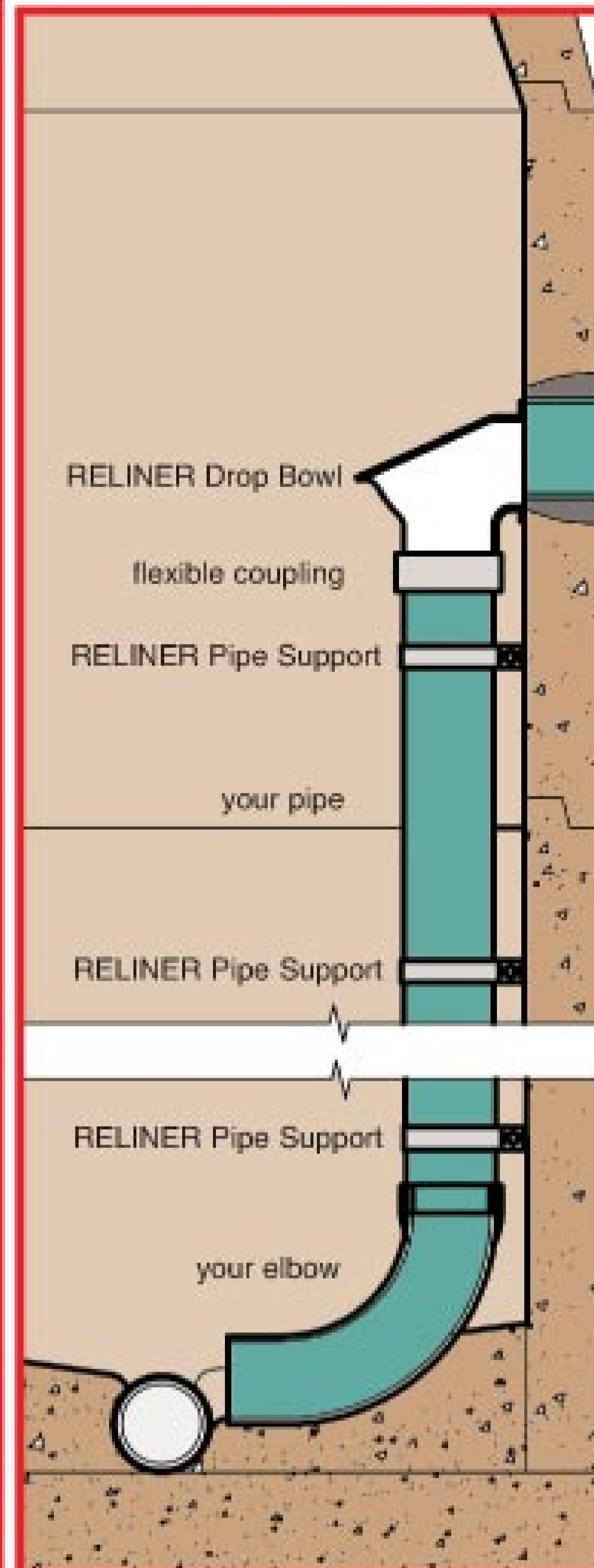
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# INSIDE INFORMATION

BEM technology helps utilities gather data on condition and life expectancy in pressurized pipes as part of a risk-based, predictive approach to rehabilitation

By Ted J. Rulseh

It's relatively easy to assess the condition of gravity sewer pipes — just run a crawler camera through the line and record the defects.

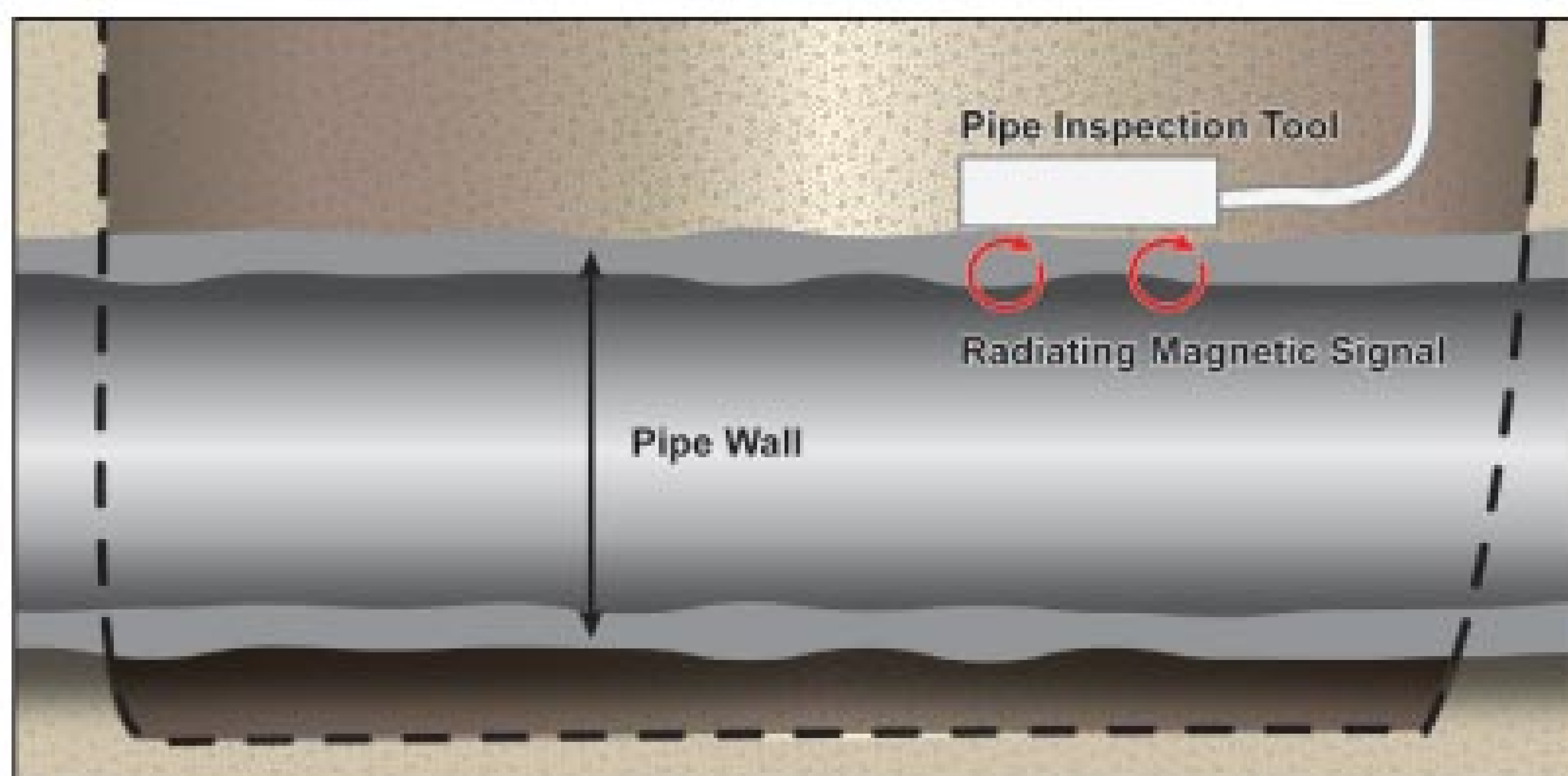
Condition assessment is much harder in pressurized pipes like water lines and sewer force mains: taking these pipes out of service for inspection is highly disruptive, not to mention expensive.

Historically, cities and utilities have relied on predictive deterioration modeling to decide when to rehabilitate or replace pressure piping. Here, computer software is

used to analyze pipe material and age curves, taking into account other factors such as soil conditions and break history. That method has often proven inaccurate.

Today, new technologies enable managers to get accurate “snapshots” of the actual condition of metal pressurized pipes — and therefore estimate remaining service life — by taking measurements from the pipe exterior.

One such technology is the Broadband Electromagnetic (BEM) eddy current system from InfraMetrix LLC of Tampa, Fla. The



The BEM antennas induce an electric current in the pipe wall material. Sensors then measure the amplitude and time of current decay.



BEM technology uses a series of antennas in a configuration that looks like a foot-long ruler, 2 inches wide. A technician wraps the pipe with grid paper marked in 2-inch squares and, using that grid as a guide, takes measurements around the entire pipe circumference. (Photos and graphics courtesy of InfraMetrix LLC)

system gives users an investigative tool that enables quick-turnaround sampling of pipe condition at a relatively low cost.

BEM produces a complete profile of a section of metal pipe, allowing users to gauge the metal thickness and check for conditions such as fractures or graphitization. Scans are performed while the pipe is in full operation.

BEM is not an all-in-one solution for condition assessment. Rather, it is designed to be a valuable part of an investigative program under a sound, risk-based approach to pressure pipe repair and replacement.

InfraMetrix president and founder William Di Tullio and project manager Robert Kerry demonstrated the technology on March 10 by way of a Web conference. As part of it, they shared results from an actual BEM inspection at a water authority in Florida.

## TECHNOLOGY TEST DRIVE

**TECHNOLOGY:**  
Broadband Electromagnetic (BEM) eddy current system

**PROVIDER:**  
InfraMetrix LLC, Tampa, Fla.

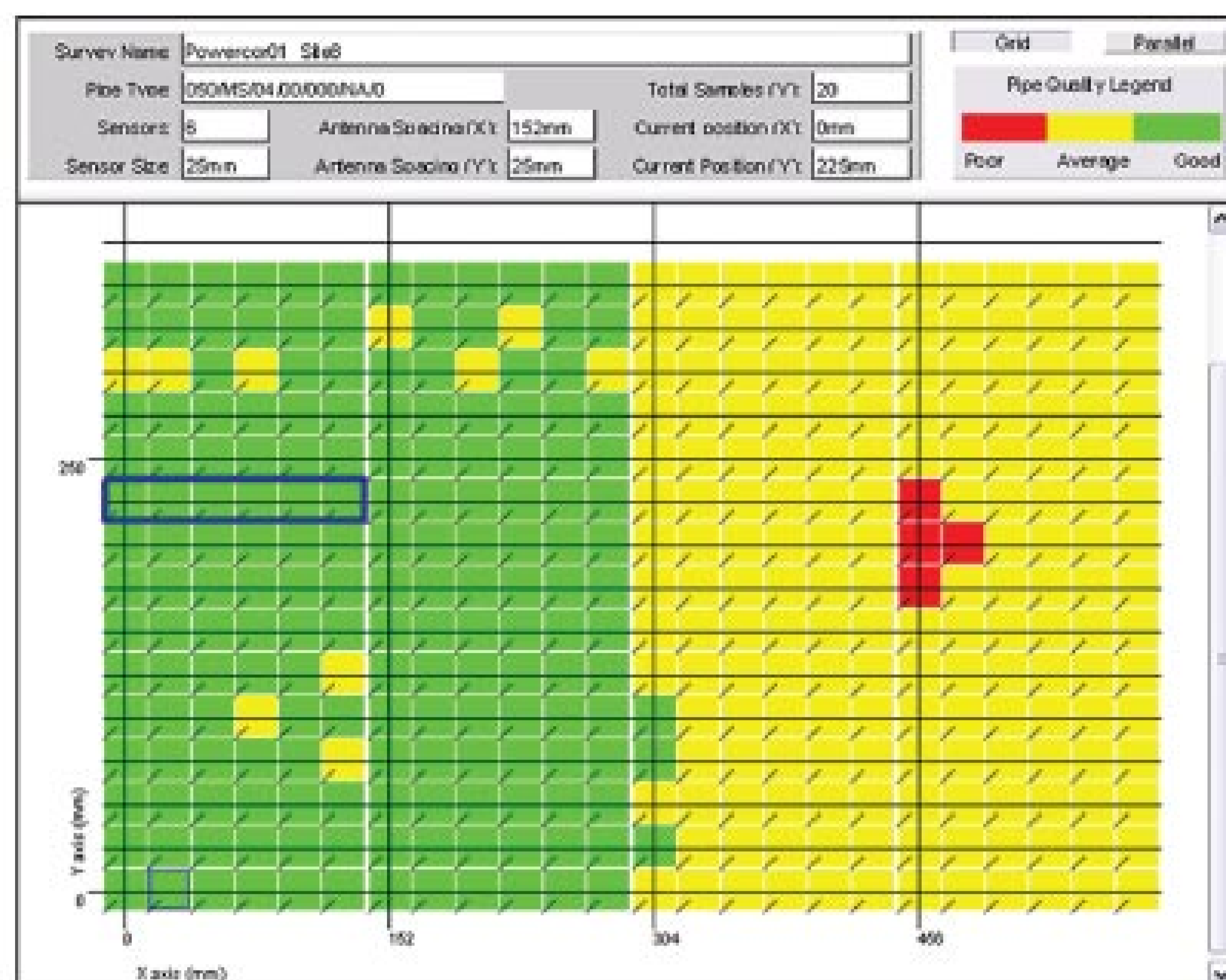
**LOCATION OF DEMO:**  
Via Internet and telephone

**DEMONSTRATED BY:**  
Robert Kerry, project manager; and William Di Tullio, president

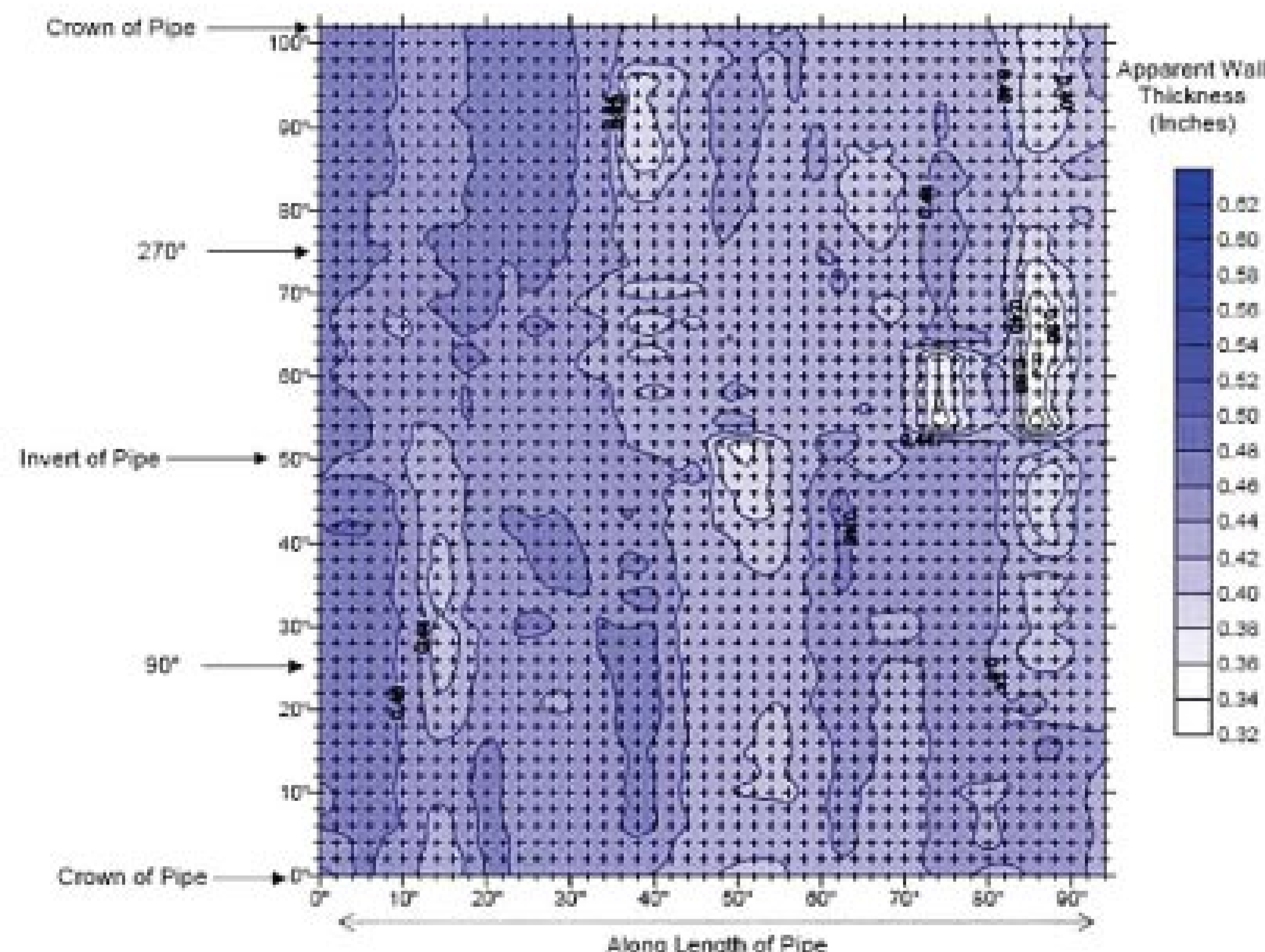
### Walk-around

BEM technology uses a series of six antennas in a configuration that looks like a foot-long ruler, 2 inches wide. Each antenna is 2 inches square and contains a coil of wire. In a typical investigation, a section of the pipe to be studied — typically about 6 feet long — is fully exposed by excavation. The antenna device is then used to take readings around the circumference.

First, a technician wraps the pipe with grid paper marked in 2-inch squares. The technician begins taking measurements by laying the antenna assembly along the crown of the pipe. An electric



**Figure 1.** Colors on a computer display generated in the field indicate the severity of erosion in pipe wall thickness: green where the pipe is within 10 percent of its original thickness, yellow where the thickness has decreased by 10 to 30 percent, and red where the thickness has decreased by more than 30 percent.



**Figure 2.** The final computer analysis of pipe wall condition in essence provides a contour map of pipe thickness.

current is introduced to the antennas, in turn inducing a current in the metallic pipe.

The current is then shut off, and the antennas measure the amplitude and time of decay in the current in the pipe. The process takes about 5 seconds. Based on the measured data and the type of pipe material

(previously entered), software calculates the pipe thickness.

The technician continues measuring around the entire pipe at 2-inch increments, using the grid paper as a guide. Once that is done, the technician moves 1 foot horizontally and repeats the procedure. While the pipe section is

scanned, a display (Figure 1) continuously updates on the technician's laptop computer roughly indicating the pipe's condition.

The display shows green where the pipe is within 10 percent of its original thickness, yellow where the thickness has decreased by 10 to 30 percent, and red where the thickness has decreased by more than 30 percent.

Later, a more detailed data analysis yields what is essentially a topographic map of the pipe, showing the thickness at all points in the section studied. A BEM investigation typically looks at segments of pipe about 1,500 feet apart.

The BEM antennas can scan through coatings, linings or insulation up to 2 inches thick — direct metal contact is not necessary, nor is special cleaning of the pipe surface. The antennas are minimally affected by background electromagnetic noise, such as from nearby electric cables. The frequency can be modified to suit the pipe material or excavation conditions. The technology can detect loss of metal thickness as small as one millimeter. The antennas are water resistant, enabling their use in wet trenches as well as during wet weather.

### Operation

Kerry and Di Tullio demonstrated the technology using data from an analysis performed for the Toho Water Authority in Kissimmee, Fla.

The authority, as part of an overall sewer system evaluation, tested BEM as a non-destructive way of assessing the condition of its wastewater force mains without taking them out of service. Managers chose to analyze two ductile iron force mains that carry a significant share of the sewage flow: a 30-inch line 11,700 feet long, and 20-inch line 6,000 feet long.

The excavations for BEM analysis — four on the 30-inch line and two on the 20-inch line — exposed 6 feet of pipe. "Because this was a demonstration, they

were looking to keep costs down and get an idea of what the technology could do," says Kerry. "There would have been more test pits if this had been a more comprehensive investigation."

Both force mains were about 20 years old and had no external corrosion protection or internal protection. Both had typical sand bedding support, 4 to 5 feet of cover, and operating pressures less than 50 psi.

**BEM produces a complete profile of a section of metal pipe, allowing users to gauge the metal thickness and check for conditions such as fractures or graphitization. Scans are performed while the pipe is in full operation.**

Using the grid method, InfraMetrix technicians took a total of nearly 2,500 individual measurements, each covering an area 2 inches square, on each 6-foot section of 30-inch force main. The investigation revealed an average thickness of 0.44 inch, a maximum of 0.48 inch, and a minimum of 0.33 inch in this pipe, which was 0.5 inch thick when new. The topographic profiles (Figure 2) showed the greatest thinning in the haunch areas (roughly 5 o'clock and 7 o'clock).

By determining the remaining wall thickness and knowing the pipe's age, InfraMetrix was able to calculate the annual rate of wall loss and the time remaining at the current rate of loss (19 to 55 years) before the pipes reached the end of their design life according to American Water Works Association standards. The company was also able to estimate the life to failure (32 to 82 years).

BEM investigation concluded that there had been no significant deterioration of the pipe inverts. Pipe wall loss was related to inter-

nal corrosion. The average wall loss during the pipes' 20 years of life had been 14 to 30 percent, and the average rate of loss was 0.0042 to 0.010 inch per year — not considered excessive for the application.

The InfraMetrix team concluded that the water authority should perform a detailed criticality analysis of its force mains, identifying those that are the most critical and conducting in-depth investigations to assess their condition.

**“If you test the worst spots and the pipe still looks OK, you have good confidence the rest of the pipe is OK, too. But if you test the worst places and confirm that the pipe is deteriorated, you know you have to make decisions on a course of action.”**

**Robert Kerry**

#### Observer comments

Technologies like BEM enable cities and utilities to gather accurate data on pipe thickness at affordable cost. Before such techniques existed, the only reliable way to determine pipe wall thickness and estimate rates of erosion was to perform destructive testing, cutting a section (coupon) out of the pipe and measuring it. Naturally, that meant taking the pipe out of



**A technician observes a laptop computer display showing pipe wall information while the pipe is being scanned with BEM technology.**

service and repairing the pipe before restarting flow.

The process of measuring with BEM is labor-intensive, and this would limit the technology to checking critical pipes at wide intervals, ideally at carefully selected locations where pipe wear would be likely to occur.

The technology appears to be a useful tool for assessing the condition of metallic pressurized pipe when used in the context of a complete assessment program.

#### Manufacturer comments

Kerry notes that while gravity sewers of VCP, concrete or PVC pipe may last 100 years and remain in good condition, pressurized pipes have shorter service lives. Sewer force mains, in particular,

may have service lives of only 25 to 50 years because they are subject to a variety of stresses, including pressure differentials, pressure surges and the corrosive nature of wastewater.

InfraMetrix advocates using BEM technology in a program that starts with a criticality analysis. Such an analysis first determines which pressurized pipes are the most critical based on the consequences of failure: effect on the environment, commerce and public health and safety; cost of lost service; cost of repair; and others.

With a list of the most critical pipelines in hand, the next step is to consider the probability of failure, based on the existence of potential life-reducing factors. BEM can be used to analyze the points on those lines that appear the most potentially vulnerable to wear. Those include:

- High spots in the pipe or changes in horizontal direction — areas where the pipe may be subject to scouring.
- Locations with corrosive soils.
- Sites with fluctuating groundwater or saltwater.
- Areas with minimal cover and thus little protection for the pipe.
- Pipe sections near “live loads” such as railroad tracks or busy highways.

- Sites where other metallic pipes are nearby and galvanic corrosion may occur.

“If you test the worst spots and the pipe still looks OK, you have good confidence the rest of the pipe is OK, too,” says Kerry. “But if you test the worst places and confirm that the pipe is deteriorated, you know you have to make decisions on a course of action.

“If you’re making decisions based solely on pipe base material and age, you could be replacing a 50-year-old pipe that is actually still in good condition when another pipe somewhere else that in theory should last another 20 years is just about to fail. In other words, you could end up spending money to fix the wrong pipes.

“With BEM, you get a much better working knowledge of the condition of your metal pipes, and you get a basis on which to estimate remaining life. You can have much more confidence in your decisions and a more factual justification for capital budgeting.”

InfraMetrix is also applying the BEM technology to assess the risk of failure of other metal assets. “The same diagnostic, evaluation and prioritization procedures that we use for pipelines can also be applied to other ferrous components such as hydro-pneumatic and water storage tanks, buried vaults and light poles to help prevent costly failures that may affect public health and safety,” Di Tullio says.

“The economic constraints facing utility agencies make it necessary to encourage the development of new inspection and rehabilitation technologies and to be more open to using them. Innovations may provide solutions to the sustainability of our assets for the next generation of citizens.” ♦

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# JUST ONE!

This summer, commit yourself to take one affirmative step toward educating the public and government officials about the importance of water infrastructure

By Irvin Gemora

**H**ats off to all those who take the time to write, speak and educate lawmakers and the public on important issues that affect our industry and our nation's public health.

Challenges such as lack of appropriate funding and low public awareness aren't going away any time soon, but I strongly believe each one of us can make a difference in a most positive way. While I've talked about this issue in the past, I now invite readers to take action to really make a difference.

On March 14, 2010, an article appeared in *The New York Times*: "Saving U.S. Water Systems Can Be Costly." I wrote a letter to the editor on behalf of NASSCO commending the newspaper for shed-

ding light on the importance of helping to educate the public on our out-of-sight/out-of-mind challenges. We need to educate our public that health is threatened when failures in our systems occur — sewer and water infrastructure is a necessity, not a want.

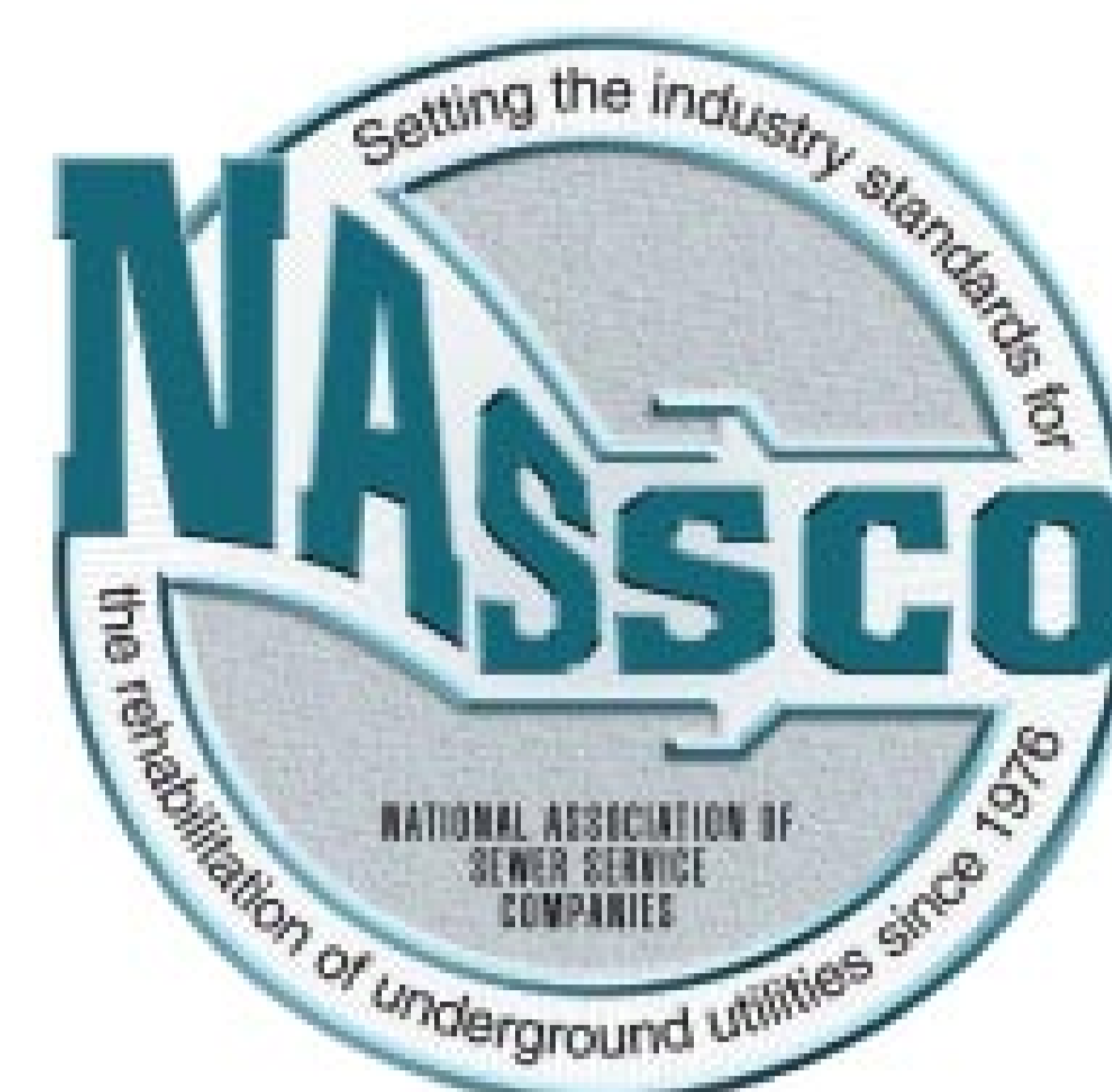
### Bend their ears

I knew the odds of getting my letter printed were slim since they receive thousands of letters and only print a handful, but that didn't discourage me. In fact, I know these letters help give editors and reporters a pulse on key issues. If an editor receives an overwhelming number of letters in response to an article, that often makes him or her look more closely at the issue and often leads to additional articles.

In addition to the press, we need to bend the ears of lawmakers so that they fully understand how vital our industry's issues are to the nation's health. Writing a letter to your elected officials is fairly simple and easy.

One good source of advice for writing letters to legislators can be found online at <https://writerep.house.gov/writerep/welcome.shtml>. The more local you can make your issue, the more your voice will be heard.

Writing is one way to be heard, but not the only way. It's also important to speak about our issues, to network, and to educate yourself and others. Organizations such as NASSCO give us a platform to network, train and become credentialed, educated professionals who can serve the industry better.



This year, NASSCO launched its Just One! membership drive, focusing on how every one of us can make a small contribution to help the entire organization. It's the "rising tides lifts all boats" philosophy, and I've seen it work many times.

### Take one step

I'm expanding this Just One! philosophy as an industry call to action. I invite readers to commit to Just One! activity this summer to help educate key publics outside our industry. Here are a few sample activities that you can do:

- Write a letter-to-the-editor in response to articles on pipe bursts, flooding or some other problem related to infrastructure.
- Network with community and state water and environmental organizations.
- Write a letter to your local- or state-elected officials.
- Participate in a local environmental day or festival.
- Speak at a local community college.
- Take part in educational days at local schools.

Over the next three months, I want you to write to me and let me know what you did. I will gladly write a follow-up on what readers are doing to help spread the word about our industry and the need for ongoing support and funding. Thank you for participating. I look forward to hearing from you. E-mail me at [director@nassco.org](mailto:director@nassco.org). ♦

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



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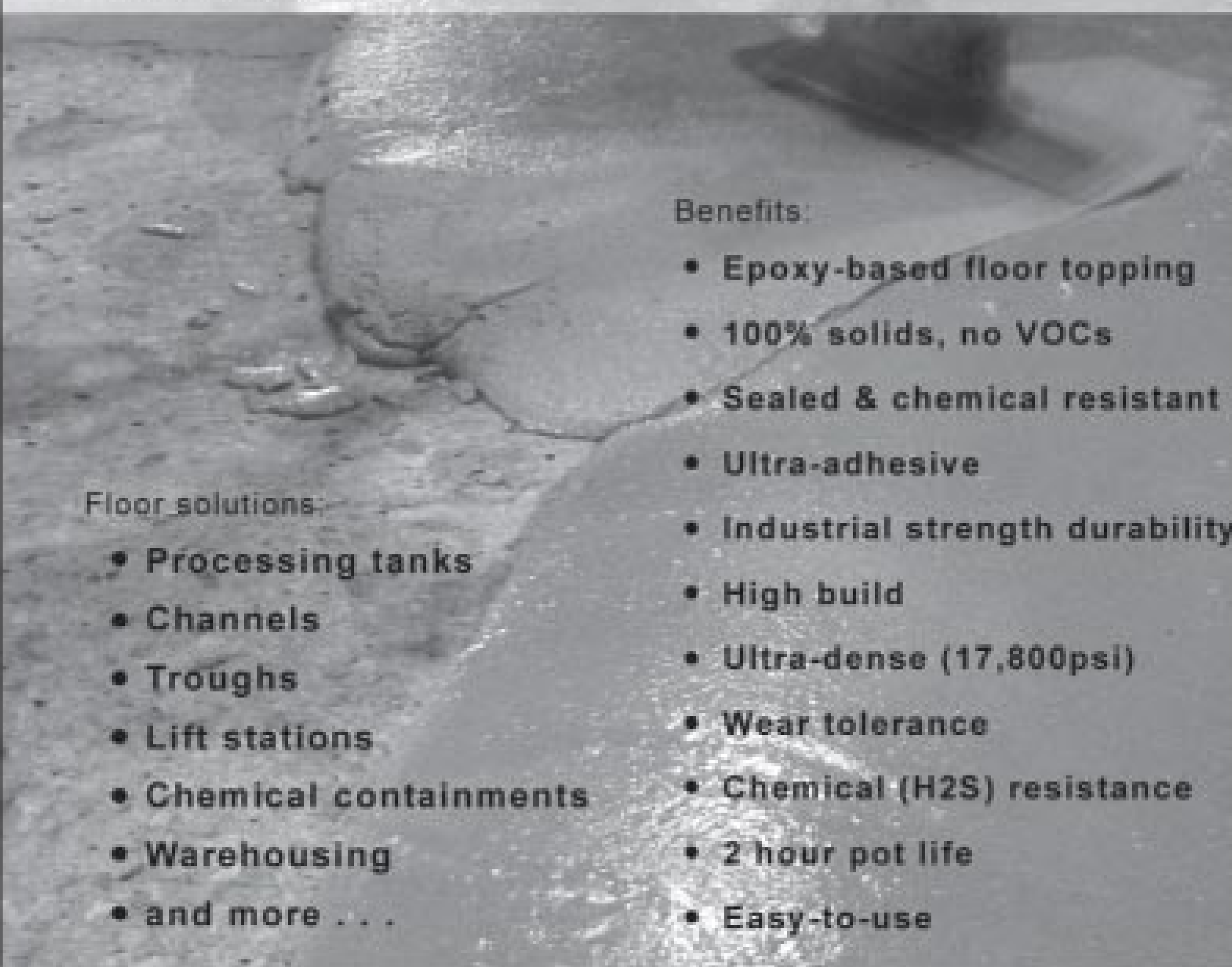
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## PEOPLE / AWARDS

**Greenhorne & O'Mara Inc.** received a Top Storm Water Project Award from Storm Water Solutions.

**Allison Cowles** of Pennsylvania and **Carrie Hemeyer** of South Dakota each received Palmer Endowment Scholarships from the National Rural Water Association.

The **Hamilton (Ill.) Water Department** received the Water Plant of the Year Award from the Illinois Rural Water Association.

The **Sioux Rural Water System** in South Dakota received the Great American Water Taste Test Award from the National Rural Water Association.

The **American Society of Agricultural and Biological Engineers** has elected new officers: Sonia Maassel Jacobsen, president-elect; Larry Hoover, Sherry Hunt, Keith Tinsey and Chad Yagow, board of trustees.

The **Water Environment Research Foundation** named Catherine Gerali, Stephen Maguin, and Brian Wheeler to the board of directors.

- June 29 – Ethics, Dodge City
  - July 13 – Safety, Liberal
  - July 20 – Special Environmental Topics, Dodge City
  - July 22 – Ethics, Dodge City
- Visit [www.kwea.net](http://www.kwea.net).

## Pennsylvania

The Western Pennsylvania Water Pollution Control Association is offering a Collection System Workshop on June 25 in Elizabeth. Visit [www.wppwca.org](http://www.wppwca.org). ♦

## CALENDAR

### June 6-9

Membrane Applications 2010, Hilton Anaheim, Calif. Call 703/684-2441 or visit [www.wef.org](http://www.wef.org).

### June 8-10

Sustainability in Public Works Conference, Hilton Minneapolis, Minn. Call 612/376-1000 or visit [www.apwa.net](http://www.apwa.net).

### June 9-10

Water Resources Research Center Annual Conference, University of Arizona, Tucson. Visit [www.ag.arizona.edu/azwater](http://www.ag.arizona.edu/azwater).

### June 9-11

Florida Stormwater Association Annual Conference, Sanibel Harbour Marriott, Ft. Myers. Visit [www.florida-stormwater.org](http://www.florida-stormwater.org).

### June 10-11

Ohio Stormwater Conference, Kalahari Resort, Sandusky. Visit [www.ohioswa.com](http://www.ohioswa.com).

### June 13-16

Collection Systems 2010, Phoenix (Ariz.) Convention Center. Call 703/684-2441 or visit [www.wef.org](http://www.wef.org).

### June 13-16

Pennsylvania Water Environment Association Annual Conference & Exhibition, Penn State Conference Center Hotel, State College. Call 570/549-2204 or visit [www.pwea.org](http://www.pwea.org).

### June 13-17

International Drainage Symposium "Sustainable Biosystems through Engineering," Quebec City, Que. Visit [www.asabe.org](http://www.asabe.org).

### June 15-18

Canadian Water Resources Association National Conference, Vancouver, B.C. Visit [www.cwra.org](http://www.cwra.org).

### June 20-23

American Society of Agricultural and Biological Engineers Annual International Meeting, David L. Lawrence Convention Center, Pittsburgh, Pa. Visit [www.asabe.org](http://www.asabe.org).

### June 20-24

ACE10 – American Water Works Association Annual Conference and Expo, McCormick Place, Chicago, Ill. Call 303/347-6132 or visit [www.awwa.org](http://www.awwa.org).

### July 20-23

National Association of Clean Water Agencies Summer Conference, Fairmont San Francisco, Calif. Visit [www.nacwa.org](http://www.nacwa.org).

### July 29-31

International Conference on Sustainable Water Environment, University of Delaware, Newark. Visit <http://www.udel.edu/conferences>.

## LEARNING OPPORTUNITIES

### APWA

The American Public Works Association is offering these audio/webcasts:

- June 3 – A New Vision for Public Works Management
  - June 9 – Stormwater Manager Certification Study Guide Part 1
  - June 16 – Stormwater Manager Certification Study Guide Part 2
  - June 23 – Stormwater Manager Certification Study Guide Part 3
- Visit [www.apwa.net](http://www.apwa.net).

### AWWA

The American Water Works Association is offering these courses:

- June 23 – Introduction to Laboratory Automation (Management Version), Waltham, Mass.
  - June 24 – Lab Automation for IT Professionals, Waltham, Mass.
  - 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
- Visit [www.awwa.org](http://www.awwa.org).

### Kansas

The Kansas Water Environment Association is offering these courses:

- June 8 – Environmental Ethics, Kinsley
- June 15 – Small Water Systems, Dodge City
- June 22 – Plant Safety, Garden City



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Big Blue Bio Block, 5-lb	MS-49828	<del>99.95</del>	89.96
Big Blue Bio Block, 10-lb	MS-49829	<del>199.95</del>	179.96
Big Blue Bio Block, 30-lb	MS-49831	<del>309.95</del>	359.96
Formula 52, 1-Gal Jug	MS-64702	<del>38.95</del>	33.26
Formula 52, 5-Gal Jug	MS-64703	<del>176.95</del>	159.26

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# Product Spotlight

## Combination Trailer Allows Simultaneous Jetting and Vacuuming

By Ken Wysocky

The JVLT combination trailer from Hi-Vac Corp./O'Brien Manufacturing increases sewer-cleaning productivity with all-hydraulic controls and simultaneous jetter/vacuum capability.

"This next-generation unit is all hydraulically operated now, from the boom rotation to the hose articulator to the door locks," says Ehrin Amrine, sales coordinator. "It's more user friendly, which increases productivity. Remote-control operation makes it a lot quicker than walking back and forth to the machine."

The unit carries a 500-gallon debris tank with a 45-degree dump angle and a top-opening rear door for safety and ease of access. The positive-displacement blower runs at 800 cfm and produces vacuum up to 15 inches Hg. The waterjetter operates at 3,500 psi/18 gpm. The blower and jetter can be operated independently or together.

"You can actually vacuum out debris as you're jetting," Amrine says. "By the time you're finished jetting, you're finished with the job. Over the course of a year, that's a significant productivity increase."

The unit, 22 feet long and 96 inches wide, has stainless steel water tanks with a total of 325 gallons capacity and a 2 1/2-inch water fill hook-up. It comes with 400 feet of 1/2-inch jetting hose. "That allows contractors and municipalities to do smaller jobs that they normally couldn't do with a vacuum truck," Amrine says.

A 75 hp water-cooled diesel engine runs the blower and the water pump, which means half as much maintenance as a unit with an independent engine for each. This also saves on fuel consumption. The boom, operated with pendant control, offers 360-degree rotation, and the hydraulic reel articulates 180 degrees.

Safety features include automatic high-temperature, low-oil and low-water shutdowns. The gross vehicle weight of the dual-axle trailer is 12,000 pounds. **For information: 800/638-1901 or [www.hi-vac.com](http://www.hi-vac.com).**



JVLT combination trailer from Hi-Vac Corp./O'Brien Manufacturing



### American Highway Products Offers Flex-O-Ring

The Flex-O-Ring rubber adjusting ring from American Highway Products Ltd. is installed under the utility casting on new construction or the rehab of existing utilities. The ring replaces pre-cast concrete

donuts or brick and mortar. Made of solid rubber, the ring provides a watertight seal, eliminates noise and vibration and is not affected by freeze-thaw cycles. **888/272-2397; [www.ahp1.com](http://www.ahp1.com).**

### CUES Introduces Powered Camera Lift

The remote-control CRP Power Lift from CUES is designed for use in 18-inch diameter pipe and slides in and out of the transporter cradle for quick and easy assembly. It features pre-wired connections for an optional rear-viewing camera and/or external lights. The electric lift enables the operator to manipulate the height of the camera while televising to remotely compensate for water, sediment or a sag in the line. The lift can be powered up or down and will return to the down position in the event of power loss. **800/327-7791; [www.cuesinc.com](http://www.cuesinc.com).**



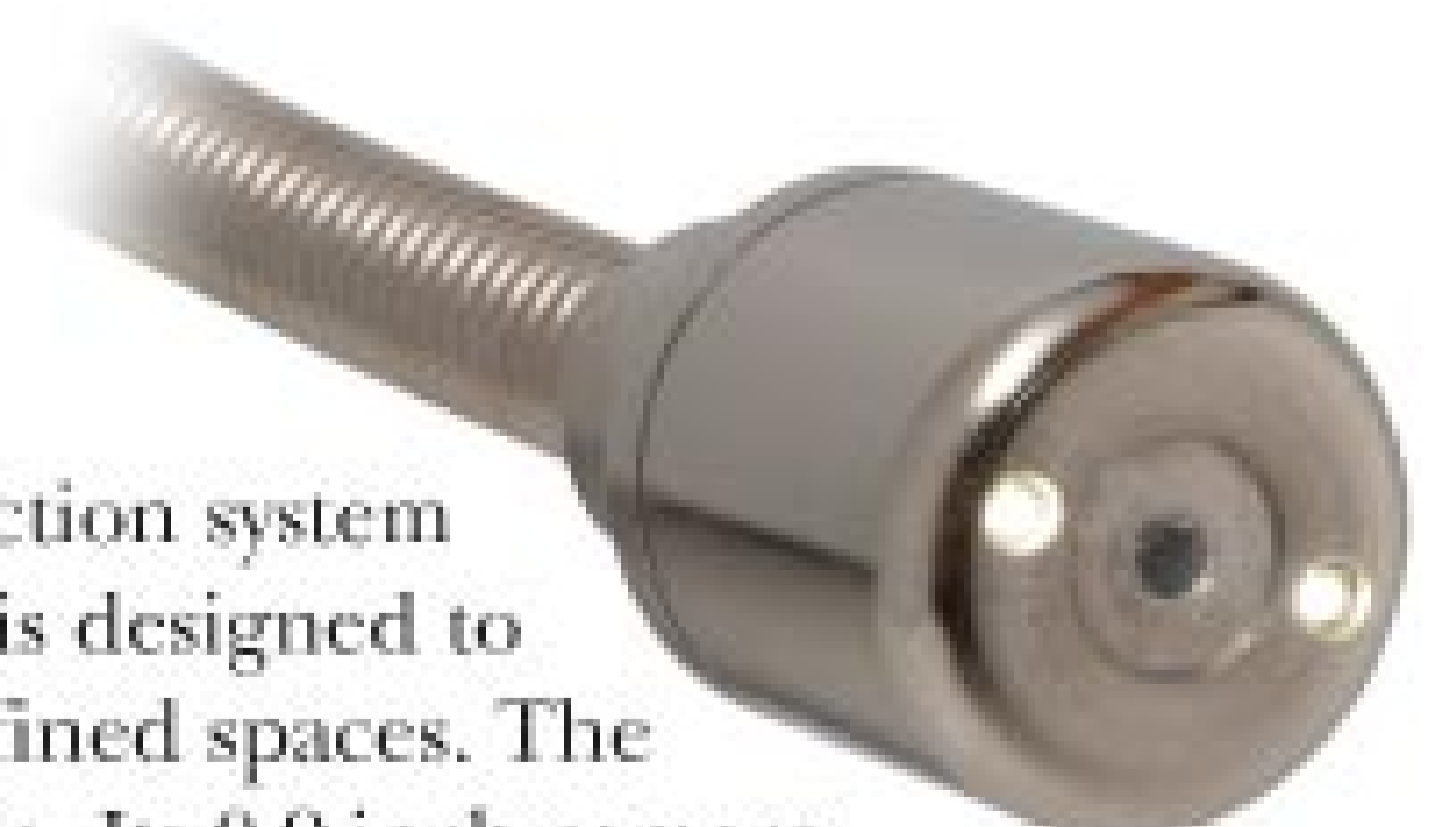
### StoneAge Introduces Warthog WV-1/4

The Warthog WV-1/4 cleaning nozzle from StoneAge Inc. is designed to cut roots, clear grease, ice blockages and remove hard mineral deposits in 2- to 4-inch lines. The nozzle features a maintenance-free design, eliminating

the need to replace seals. It has a maximum pressure of 4,000 psi, operating pressure of 2,000 to 4,000 psi and flow of 3-8 gpm. The 2-inch nozzle measures 1.3 inches in diameter and weighs 0.45 pounds. **866/795-1586; [www.stoneagetools.com](http://www.stoneagetools.com).**

### Jamko Introduces INVU Inspection System

The INVU remote portable inspection system from Jamko Technical Solutions Inc. is designed to inspect multiple angle pipes and confined spaces. The unit comes with 25 feet of spring cable. Its 0.9-inch camera head is made for inspecting pipes 1 inch or greater, including drain lines, house laterals, septic lines, vent stacks and other confined spaces. **315/871-4420; [www.jamkosolutions.com](http://www.jamkosolutions.com).**



## Sewer Equipment Co. Offers 7500 Cable Machine

The model 7500 cable machine from Sewer Equipment Co. of America has 350 feet of 1 1/4-inch stress-relieved cable coiled from 0.312 oil-tempered steel rods. Powered by a 13 hp gasoline engine with throttle control and 5-inch diameter double pulley and centrifugal clutch, the unit has a 12-volt electric start. The trailer frame is made from 3-inch channel iron with 14-gauge steel bottom supported by a 1 1/2-ton type axle with leaf springs, adjustable legs and retractable stand, mud guard and drum cover. The unit has a multi-speed, totally enclosed transmission with forward, reverse and neutral. A safety hand brake stops reel and cable rotation. The 7500 B uses 1-inch cable. **800/323-1604; www.sewerequisite.com.**



## WIKA Offers Liquid Level Transmitter

The Tronic LS-10 submersible liquid level transmitter from WIKA is designed for stormwater and water flow monitoring as well as level measurement in water and wastewater treatment plants, wells, holding tanks and rivers. The unit is rated IP 68 for permanent submersion, ranges from 50INWC to 400 psi, delivers a 4-20 mA 2-wire output signal (others available) and features a cable that can support 220 pounds of strain. Other options include Hastelloy case and lightning protection. **888/945-2872; www.wika.us.**

## Moyno Offers 2000 HS Sludge System

The 2000 HS system from Moyno Inc. is designed for dewatered sludge transfer in municipal wastewater treatment. It features an integral hopper with twin-screen auger feeder and G4 progressing cavity pump that handles semi-dry, high solids and dewatered municipal sludge to over 50 percent solids. The unit features a non-pulsing flow for lower operating pressures. Other features include industry standard VFD controls, closed piping system and Ultra-Drive gear joint drive train system. **937/438-3434; www.moyno.com.**



## Superior Signals Introduces LED Work Lights

The Illuminator SY2L and SY4L Series LED work lights from Superior Signals feature a bright white flood beam pattern with 60-degree viewing angle and polycarbonate lens. The lights are shock resistant, reverse polarity protected, spike protected and have stainless steel mounting hardware. Mounting options include pedestal, pendant and lateral RH or LH with stud swivel and wire leads. They are CE certified and have an IP66 rating. The SY2L is an oval two-LED unit providing 310 lumens of light. The SY4L is a four-LED, 450-lumen unit available in round or square configurations. **800/447-3693; www.superiorsignals.com.**



## Linko Offers FOG Tracker Web-Based System

The FOG Tracker Internet-based system from Linko Data Systems is designed to manage the amount of fats, oils and grease in grease traps, reducing the chance for sewer system overflows. The system provides feedback on grease traps that have been pumped and those requiring attention. **877/546-5699; www.fogtracker.com.**



## Electric Eel Offers Auto Cable Feed Cleaners

Four models of auto cable feed drain-cleaning machines from Electric Eel Mfg. Co. Inc. are designed to retrieve cable with the push of a lever. Model

D-5 cleans 3- to 10-inch diameter lines up to 100 feet. It features a quick-remove continuous auto cable feeder and drum. Model Z5-P-AF cleans 1 1/4- to 3-inch lines up to 100 feet. It runs 1/2-inch galvanized aircraft wire inner core cable. Model E-P-AF cleans 1 1/4- to 3-inch lines up to 75 feet. It has an inner drum that eliminates cable buckling. Model CT cleans 1- to 2 1/2-inch lines up to 50 feet and features a variable-speed motor. **800/833-1212; www.electriceel.com.**

## Super Products Introduces Camel Jet 1600

The Camel Jet 1600 truck-mounted, high-pressure waterjetting system from Super Products is designed to keep municipal sewers, sanitary and storm sewer lines, laterals and drainage lines clean and free flowing. An alternative to a combination sewer-cleaning unit, the system features three modular, polyethylene water tanks and 1,600-gallon capacity. The unit has a triplex continuous flow water pump, delivering up to 80 gpm and 2,000 psi as well as optional front- or rear-mounted 180-degree rotating hose reel with 1,000-foot capacity. **800/837-9711; www.superproductscorp.com.**



## Bilco Offers LadderUP in Safety Yellow

The LadderUP safety post from The Bilco Co. is available in safety yellow. The powder-coat finish provides greater visibility than the original black design. The extension device for fixed ladders provides workers with safe entrance and egress from roof hatches, manholes or floor, vault and sidewalk doors. The spring-balanced unit features tubular construction and permanently mounts on the top two rungs of any fixed ladder. A release level enables the attachment to be lowered to a retracted position. Models also are available in galvanized steel, aluminum, stainless steel and can be custom ordered in the original black finish. **203/934-6363; www.bilco.com.**





### IPS Introduces Test-Tite Pressure Relief Plug

The Test-Tite pressure relief pneumatic test plug from IPS Corp. features an internal-pressure safety relief valve that reduces the risk of exceeding the proper inflation pressure, reducing the potential for damage to plugs and drain, waste and vent systems. The relieved pressure exhausts

through the top of the plug. It is designed for testing or temporarily blocking plumbing DWV systems and can be used in place of standard pneumatic test plugs. It features no moving parts, five center sealing rings and one-piece injection-molded construction. Additional features include a crimped ferrule that activates the relief valve. **800/888-8312; www.ipscorp.com.**

### MWH Soft Releases InfoSWMM 2D Stormwater Mapping Program

InfoSWMM 2D hydrodynamic stormwater and overland flow modeling software from MWH Soft enables engineers to model aboveground urban and rural flooding. Combined with one-dimensional hydraulic and water quality sewer systems analysis within ESRI's ArcGIS, the software provides a single geospatial environment for building and analyzing comprehensive 2D models that simulate urban stormwater, sanitary sewers,

river flooding and pollutant transport. The model can perform single event or long-term (continuous) rainfall runoff simulations accounting for runoff quantity and predict runoff quality, including buildup and washoff of pollutants from primarily urban watersheds. **626/568-6868; www.mwhsoft.com.**

### McElroy Offers Hydraulic Clamping Retrofit Kit

Hydraulic Clamping retrofit kits for the 500 line of fusion machines from McElroy include a manifold block that controls the two fixed-jaw cylinders and two moveable jaws.

Designed to increase speed and productivity by replacing manual clamping with hydraulic power, the kits can be installed at local distributors or ordered preinstalled on new machines. **918/836-8611; www.mcelroy.com.**



### Anue Introduces Automating Lift Station Cleanout

The EP-1115 automating sewer lift station cleanout system from Anue Water Technologies re-circulates

wastewater to break up fats, oils, grease and bio-film buildup. The process also increases dissolved oxygen up to 800 percent. Solids are homogenized, increasing the surface area, allowing for even dispersal. The interrelated actions promote pretreatment in the lift station. The unit is installed by either tapping an existing discharge main or by using Anue's dedicated grinder pump option. **760/476-9090; www.anuewater.com.**

### Rohmac Introduces Robotic Culvert Cleaners

The SL 436 and MT 3234 radio remote-controlled Microtraxx culvert cleaners from Rohmac Inc. are designed to safely clean culverts, eliminating the need for confined-space entry. The SL 436 fits 48-inch box or 60-inch round culverts. It measures 42 inches wide, 42 inches high and is

120 inches long. The unit has a 1,550-pound lifting capacity and 1/3-cubic-yard bucket capacity. It weighs 5,600 pounds, has a ground pressure of 7.5 psi loaded and drawbar pull of 4,700 pounds. Powered by a 30 hp diesel engine it has a



360-degree swing rotation and QDS system for attachments. The MT 3234 is designed for 36-inch box or 48-inch round culverts. It measures 32 inches high, 34 inches wide and 134 inches long. The unit has a lifting capacity of 1,500 pounds and bucket capacity of 1/4 cubic yards. It weighs 4,600 pounds, has a ground pressure of 5.5 psi loaded and drawbar pull of 3,700 pounds. Powered by a 26.1 hp diesel engine, it has a low tram speed of 55 feet per minute and high speed of 110 feet per minute.

**304/259-2201; www.rohmac.com. ♦**

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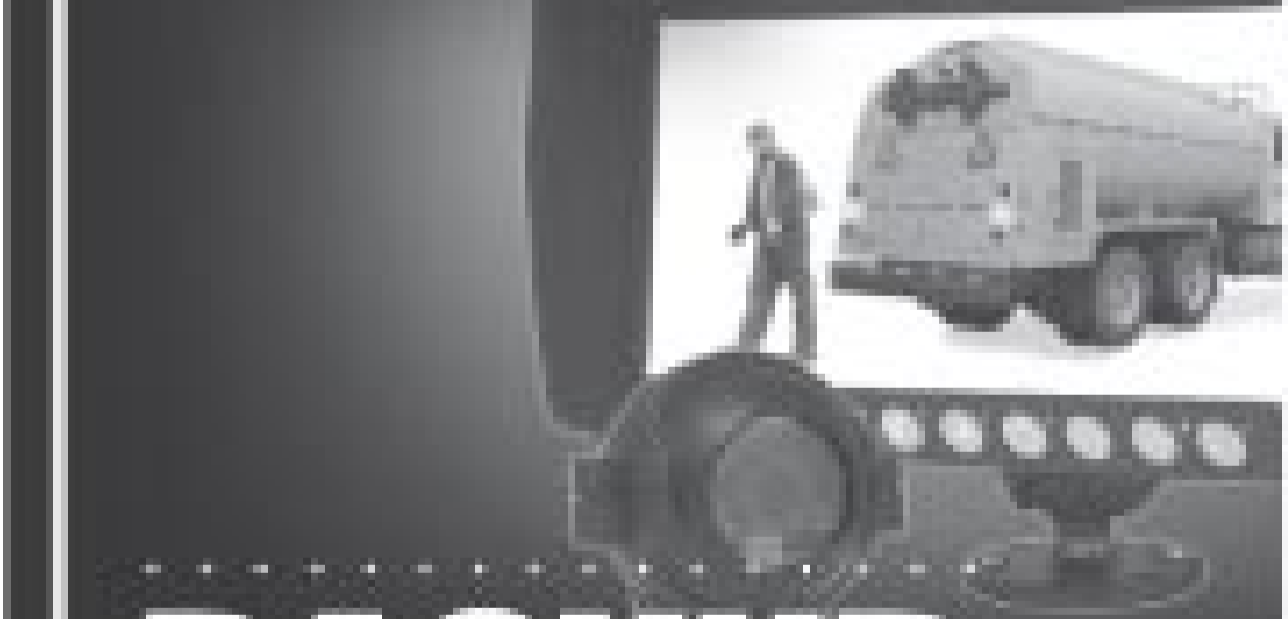
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**Northern California/Reno, Nevada Area Portable Restroom Service Business for Sale.** Owner is motivated and inventory alone is worth the asking price. Includes 100+ restrooms, sinks, ADA units, holding tanks, 2 service trucks and a delivery trailer. Annual revenue in excess of \$100K each of the past 4 years. List of existing customers and contracts included. Owner is willing to train if needed. **Asking \$75,000 - REDUCED TO \$55,000.** E-mail [jeffb@colepublishing.com](mailto:jeffb@colepublishing.com) or call 800-257-7222 and ask for Jeff Bruss for more details. **A B2 Business Brokerage Listing.** (M6)

Very successful established Midwest based full service Trenchless Sewer Company with municipal and industrial experience and contacts available for acquisition. Serious confidential inquiries only. Please respond to P.O. Box 154283, Irving, TX 75015-4283 or email: [cippcompany@yahoo.com](mailto:cippcompany@yahoo.com). (CM6)

## BUSINESSES

**Looking to sell your portable restroom business?** We have buyers looking in the following areas: Florida, California, Virginia, Iowa, Kentucky, New York, Pennsylvania and more! Must have gross revenue in excess of \$250,000 in most cases. E-mail [jeffb@colepublishing.com](mailto:jeffb@colepublishing.com) or call 800-257-7222 and ask for Jeff Bruss for more details. **A B2 Business Brokerage Listing.** (MBM)

**Green Bay Wisconsin Area Septic & Drain Business For Sale.** 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. **Offered at \$249,000.** E-mail [jeffb@colepublishing.com](mailto:jeffb@colepublishing.com), visit [www.Btwo.biz](http://www.Btwo.biz) or call 800-257-7222 and ask for Jeff Bruss for more details. **A B2 Business Brokerage Listing.** (MBM)

**ARIZONA BUSINESS WANTED:** Qualified buyer looking to purchase existing industrial/municipal cleaning and inspection business in the Phoenix area. Will consider other areas in Arizona as well. If you are looking to sell, please call Jeff at 800-257-7222. (M6)

**Houston Texas Area Septic & Drain Business For Sale.** Grossing nearly \$300,000 annually and showing growth. Established commercial clients and customer list. Includes all equipment to operate, a turn-key business. Huge potential, owner is motivated and moving on - **asking \$140,000.** E-mail [jeffb@colepublishing.com](mailto:jeffb@colepublishing.com) or call 800-257-7222 and ask for Jeff Bruss for more details. **A B2 Business Brokerage Listing.** (MBM)

## BUSINESSES

**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. **Offered at \$150,000.** E-mail [jeffb@colepublishing.com](mailto:jeffb@colepublishing.com), visit [www.Btwo.biz](http://www.Btwo.biz) or call 800-257-7222 and ask for Jeff Bruss for more details. **A B2 Business Brokerage Listing.** (MBM)

**Well-Established and Profitable Texas Septic, Sewer & Installation Business For Sale.** Grossing in excess of \$1,000,000 annually, customer list of nearly 2,000 accounts and 430 contracted customers. Includes nice late model equipment, most are 2007, 2008 model years. Real estate with rental income can be purchased separately if interested. **Asking \$799,000.** E-mail [jeffb@colepublishing.com](mailto:jeffb@colepublishing.com) or call 800-257-7222 and ask for Jeff Bruss for more details. **A B2 Business Brokerage Listing.** (MBM)

**North Carolina Septic and Installation Business for Sale.** Showing good growth over the past 3 years. Includes all equipment to operate, extensive customer list, and owner is willing to train if necessary. **Asking \$110,000.** E-mail [jeffb@colepublishing.com](mailto:jeffb@colepublishing.com) or call 800-257-7222 and ask for Jeff Bruss for more details. **A B2 Business Brokerage Listing.** (MBM)

## BUSINESS OPPORTUNITIES

**Looking to buy a business** in the liquid waste, portable sanitation, or sewer & drain industries? Call B2 Business Brokers powered by Municipal Sewer & Water at 800-257-7222 and we can add you to our VIP buyer list. No obligation, no fees, no pressure. (MBM)

## BUSINESS OPPORTUNITIES

**Looking to sell your business?** We can effectively market your business to more than 60,000 potential buyers in the liquid waste, portable sanitation, and sewer & drain industries, as well as your local markets, the Internet and other venues. No upfront fees — you don't pay unless your business sells. To learn more about brokering your business through B2 Business Brokers powered by Municipal Sewer & Water, call 800-257-7222. (MBM)

## DRAIN/SEWER CLEANING EQUIP.

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**Xtreme Flow Cold Jetter - New!** Model # CJ85-3600TU, tandem axle trailer, 35 HP Vanguard, 8.5 gpm @ 3,600 psi, 325 gal. water tank, 300' hose, General pump. List \$19,995. **Sale only \$14,995. Fully loaded!** 800-624-8186; [www.hotjetusa.com](http://www.hotjetusa.com). (MBM)

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2006 GMC TC6500 cab and chassis with Pipe Hunter trunk mounted jetting unit, 3000 psi @ 50 gpm with a 1,000 US gal. water tank, rear mounted hose reel with JET EYE camera system. **6,800 original miles, new new. \$129,000 sale price. (Retail for \$210,000)** (Stock #13234V) **www.VacuumSalesInc.com, (888) VAC-UNIT (822-8648).** (M6)

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**2004 SECA Jet Vac 747 on Ford F650:** 40 gpm @ 2000 psi, variable speed control, remote pendant, retrieve pay-out switch, master fill hose handgun w/25' hose, level wind up/down, tiger tail, fin skid extension, manual clutch. (Stk. 1531)

Call Joe 312-706-9678 C6



**2000 Vactor 2100, International DT530:** Allison auto, 120K miles, 6800 hrs., inframe at 113K. Blower rebuilt 5000 hrs. 3600 cfm, 80 gpm pump. Ex-city truck.

.....\$115,000  
208-888-9191 C6



**US Jetting Trailer Jet Model 4018300TRL:** Hatz diesel engine, US Jetting rodder pump, 500 gal. water, telescopic hose reel, 300' new sewer hose, 18 gpm @ 4000 psi, (2) tool boxes, only 342 hours on unit. (Stk. 1617)

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**2005 CCTV Dodge Sprinter Diesel:** Pearpoint inspection vehicle. 29,300 miles. Small AND Large tractors, elevator, Flexi-Data, pan/tilt, color, new 1,250' cable, plus original 800' cable. Onan generator. RARE!!!!

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**1997 Vactor 2100 on 1998 Int'l 2554:** 10-yd. debris, 1,000 gal. water, single stage, 60 gpm @ 2000 psi, domed rear door, debris body flush out, cold weather recirc., tele/rotating hose reel, joystick boom control, auto. trans., 18k fr/23k rr. (Stk. 1618)

Call Joe 312-706-9678 C6



**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 C6



**1996 IHC Vac-Con 312:** 3-stage blower, 12-yd. debris body, 1300 gal. water, 3176 CAT, Allison, 46 rears, JD diesel upper, municipal truck, 109K miles, 1758 rear hours.

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Cues TV/Cutter Trailer: 2007 Evolution package, with or without camera, cutter or compressor. Call or go to our web site for photos and specs. [www.mccannsunderground.com](http://www.mccannsunderground.com). Financing available. Kelly 608-279-2299. (MBM)

## PRESSURE WASHERS

New Commercial Grade Trailer Special - Single axle, hot water trailer unit, 18 HP Vanguard, 5.0 gpm @ 3,000 psi, with 200 gal. water tank, General pump. List \$11,995. **Sale only \$8,995. Fully loaded! Ready to clean!** 800-624-8186; [www.powerlineindustries.com](http://www.powerlineindustries.com). (MBM)

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## SEPTIC TRUCKS

2010 Peterbilt 340 with a Presvac 3600 gal. (US), aluminum vacuum tank unit and Masport pump package. (Stock #8807V) [www.VacuumSalesInc.com](http://www.VacuumSalesInc.com), (888) VAC-UNIT (822-8648). (M6)

## SERVICE/REPAIR

**Sewer Cam Reel, Camera and Locator Repair:** 48-hr. turn-around time. General Wire, Ratch, Ridgid, Pearpoint, Electric Eel, Gator Cams, Insight Vision, Vision Intruders. Quality service on all brands. For more info. give Jack a call. Dynamic Cable Repairs, Lodi, NJ 07644. 973-478-0893. (MBM)

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## TV INSPECTION

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**COMPLETE ENVIROSIGHT SYSTEM:** 2 Steerable crawlers 400 & 600, auto cable reel, watertight Outpost box, text overlay, pan and tilt lens, (one w/optical zoom valued at \$25K), dual joystick, extra wheel setups for sewer/drain pipe, seasonal use. Orig. owner downsizing. Turn-key ready. Optional equipment - large 225/900 crawler, 10X zoom pan/tilt camera, computer w/Wincan overlay software. Located in Northeast. 508-726-0813. (CM6)

**New Cyclops TV System,** mounted in 2001 1/2-ton Ford van. P&T camera, transporter, 1,000' cable, powered cable reel, on-screen footage & data, DVD. Factory warranty. \$52,800. Call Bill @ 830-249-9756. (M6)

## VACUUM LOADERS

2008 Demo Internationals 7600 with a Guzzler Ace XXS4118TS wet/dry industrial vacuum loaders, 18-yd. debris body, dump-type, carbon steel vacuum tanks. **Demo/Rental unit.** (Stock #'s 4400V & 4401V) [www.VacuumSalesInc.com](http://www.VacuumSalesInc.com), (888) VAC-UNIT (822-8648). (M6)

1999 International with a Guzzler Ace 27' HG wet/dry industrial vacuum tank loader. **Demo/Rental unit.** (Stock #7390) [www.VacuumSalesInc.com](http://www.VacuumSalesInc.com), (888) VAC-UNIT (822-8648). (M6)

2009 used Sterling LT9500 triaxle with new Presvac, Powervac 3800, 3,250 gallon (US) DOT, wet/dry industrial vacuum tank loader. **ONLY 500 miles since new.** (Stock 4735C) [www.VacuumSalesInc.com](http://www.VacuumSalesInc.com), (888) VAC-UNIT (822-8648). (M6)

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