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March 2010

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BATTLE OF THE BLOCKAGE

Cedar Rapids campaigns
against backups with a
sound maintenance plan

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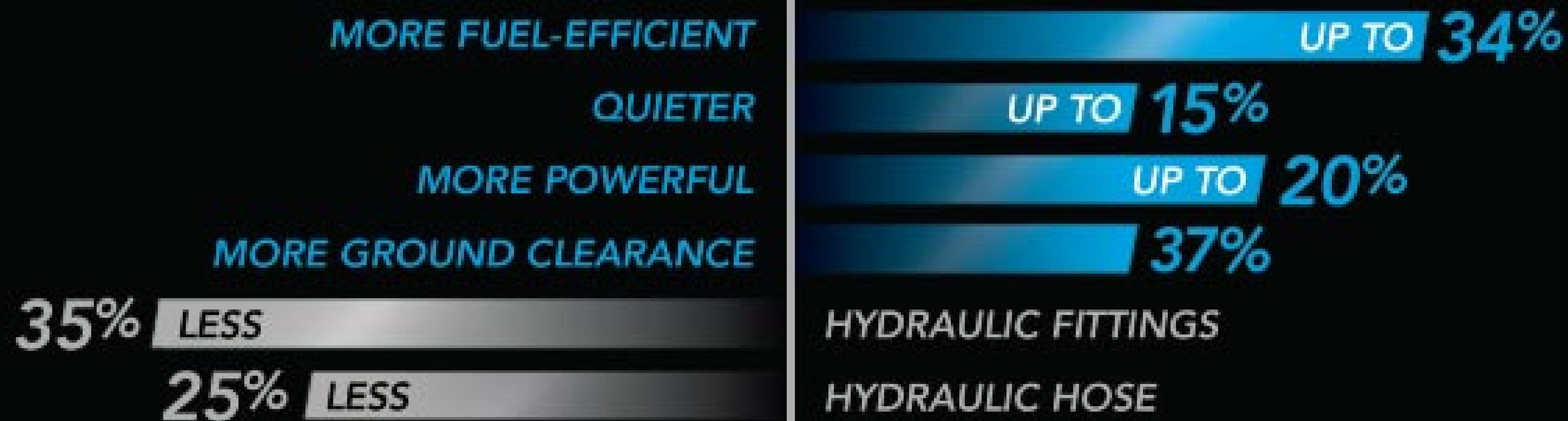


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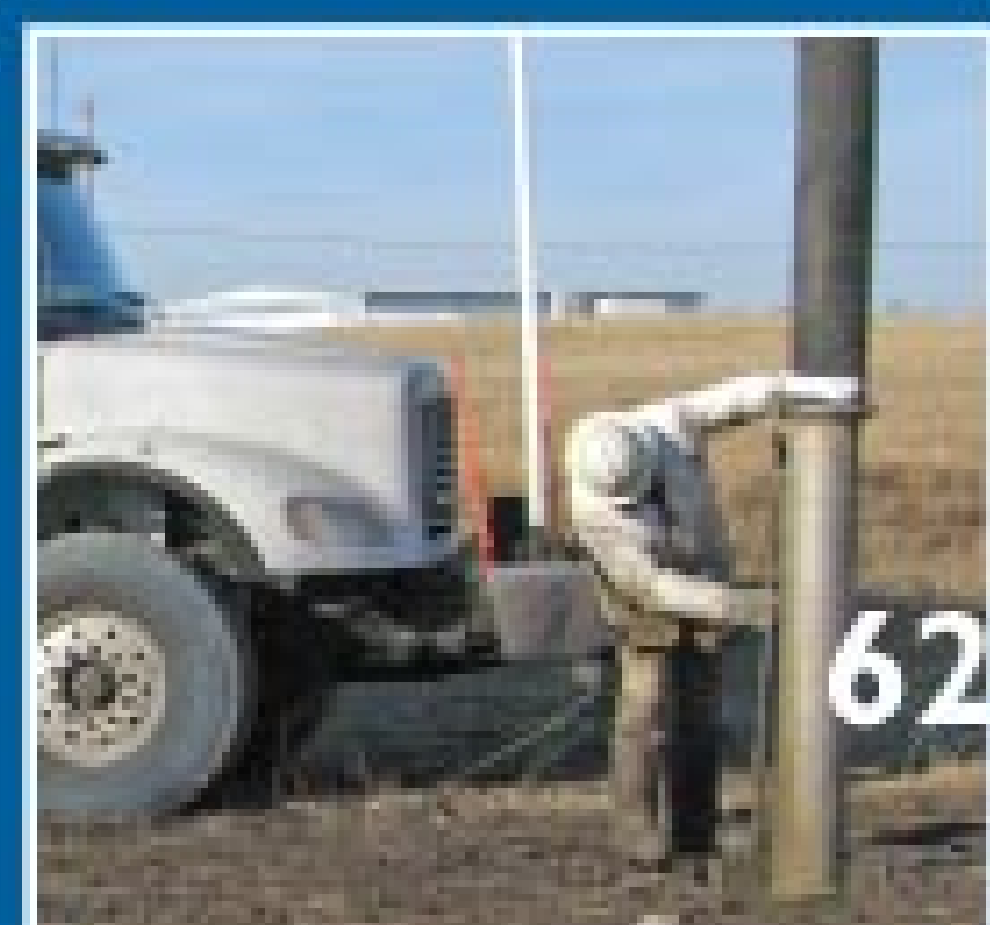
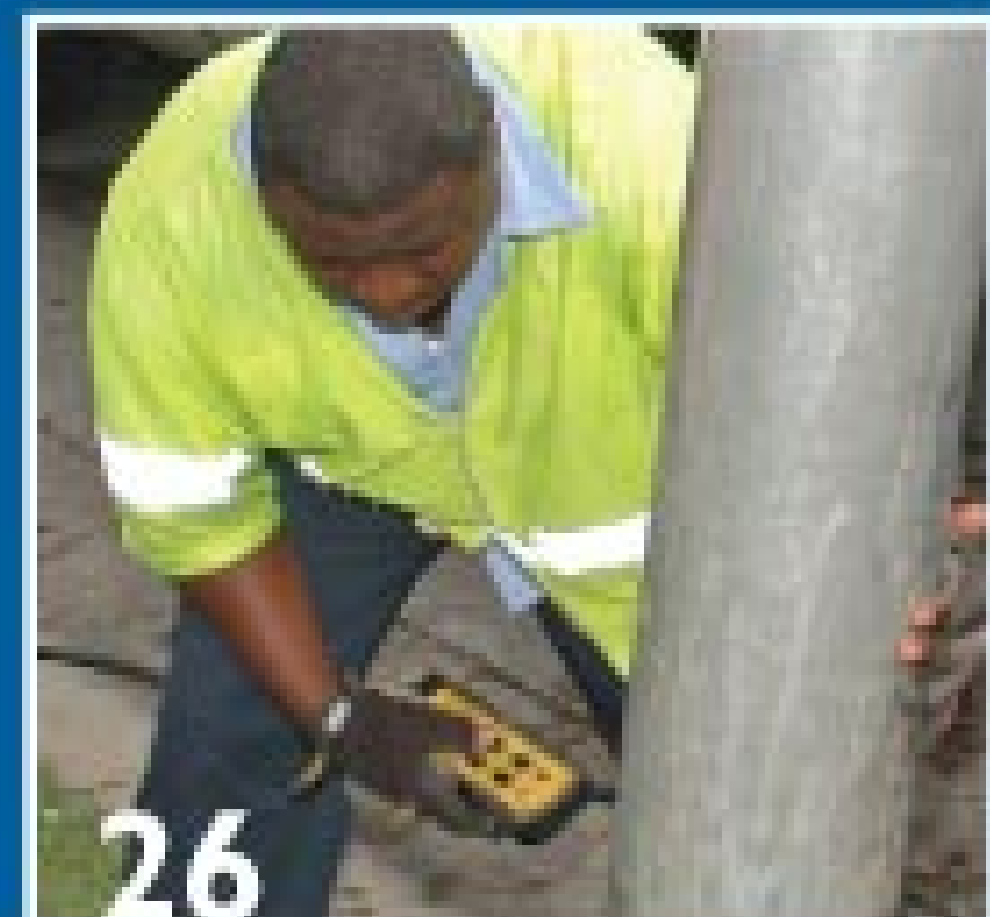
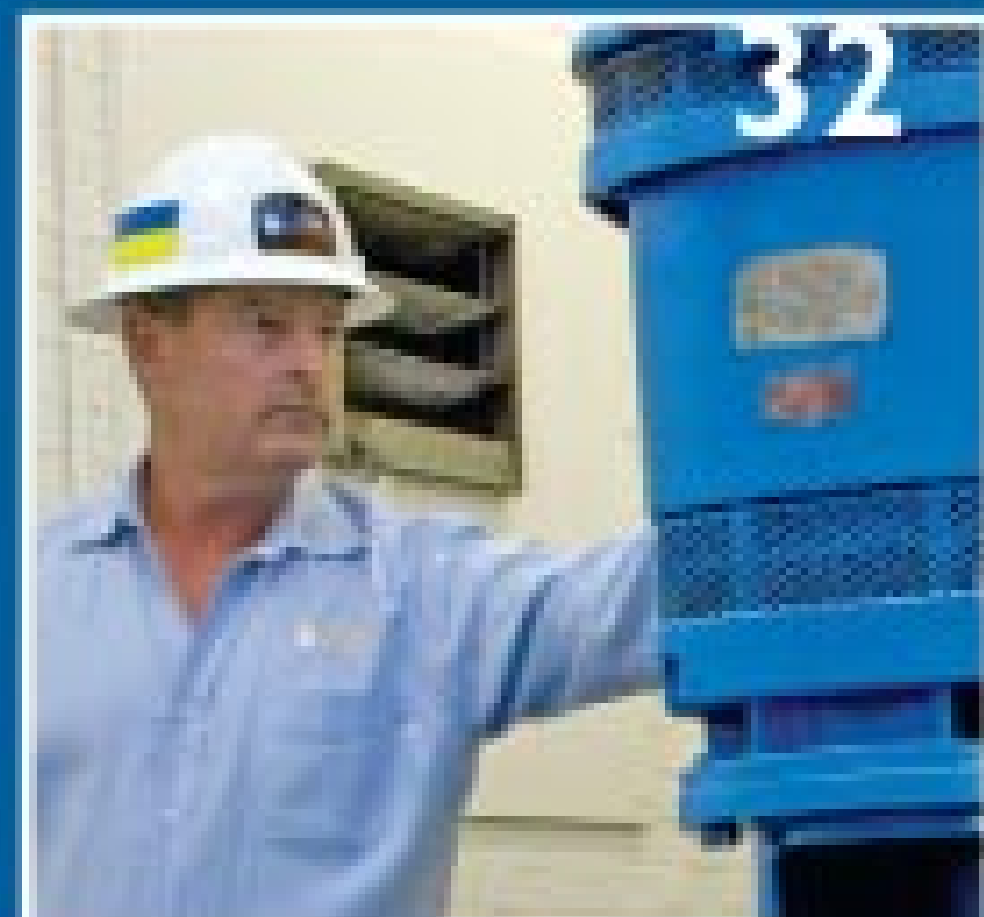
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*When compared to Vactor 2100 model. Source: Federal Signal engineering department. Fuel savings assumptions: 3 gallons/hour saved in combination mode (4" orifice at vacuum, 80 gpm @ 2500 psi), 1,500 hours per year at \$3.00/gallon.

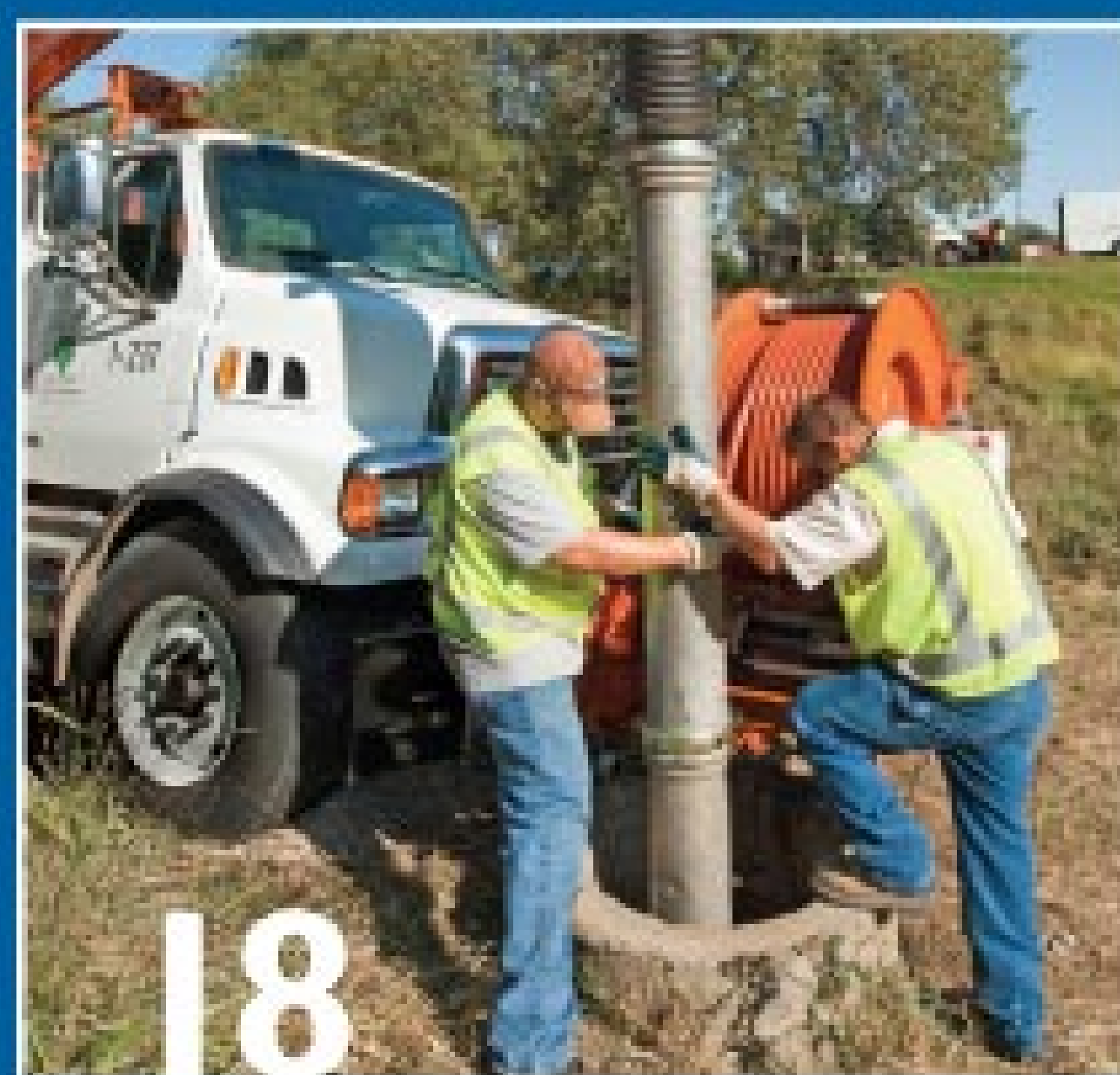
INSIDE:

2010 PUMPER & CLEANER ENVIRONMENTAL EXPO INTERNATIONAL ISSUE



COVER:

A fleet of Camel sewer and catch basin cleaners from Super Products LLC helps the City of Cedar Rapids, Iowa, stay ahead of sewer blockages. Here, technicians Chris Maher (left) and Dallas Hyke clean a 12-inch sanitary sewer with a Camel unit. A second truck (background) pumps water to them on the off-road, rough-terrain site. (Photography by Mark Tade)



COMING IN APRIL 2010

Special Issue: Pipe Lining/Relining

- ◆ Sewer: Aggressive rehabilitation in New Castle County, Del.
- ◆ Water: Major main rehabilitation project in Victoria, B.C.
- ◆ Storm: Progressive management in Dane County, Wis.
- ◆ Human Side: Resolving and preventing workplace conflicts

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Armed with a targeted preventive maintenance plan, the Cedar Rapids Sewer Maintenance Division campaigns against sanitary sewer backups.

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The City of Tallahassee combines innovative facilities with public education to help keep area lakes clear of runoff pollution.

By Scottie Dayton

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Marietta Water has earned repeated First Place awards for excellence in quality and service, using ordinary tactics, executed with great finesse.

By Dan Heim

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The Solo robotic inspection system from RedZone Robotics helps communities achieve substantial increases in productivity in the field phase of studies.

By Gil Longwell

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Centrifugal chopper pumps in a major lift station put an end to frequent plugging that drove up costs and threatened SSOs.

By Scottie Dayton

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There is greater recognition today of something water utilities have always known: Saving water saves energy. And by the way, saving energy also saves water.

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Here are 10 tips that can help managers conduct effective interviews and zero in on the candidate best suited for the job.

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The industry should have no tolerance for contractors who represent their people as PACP certified when they are not.

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MARCH 2010

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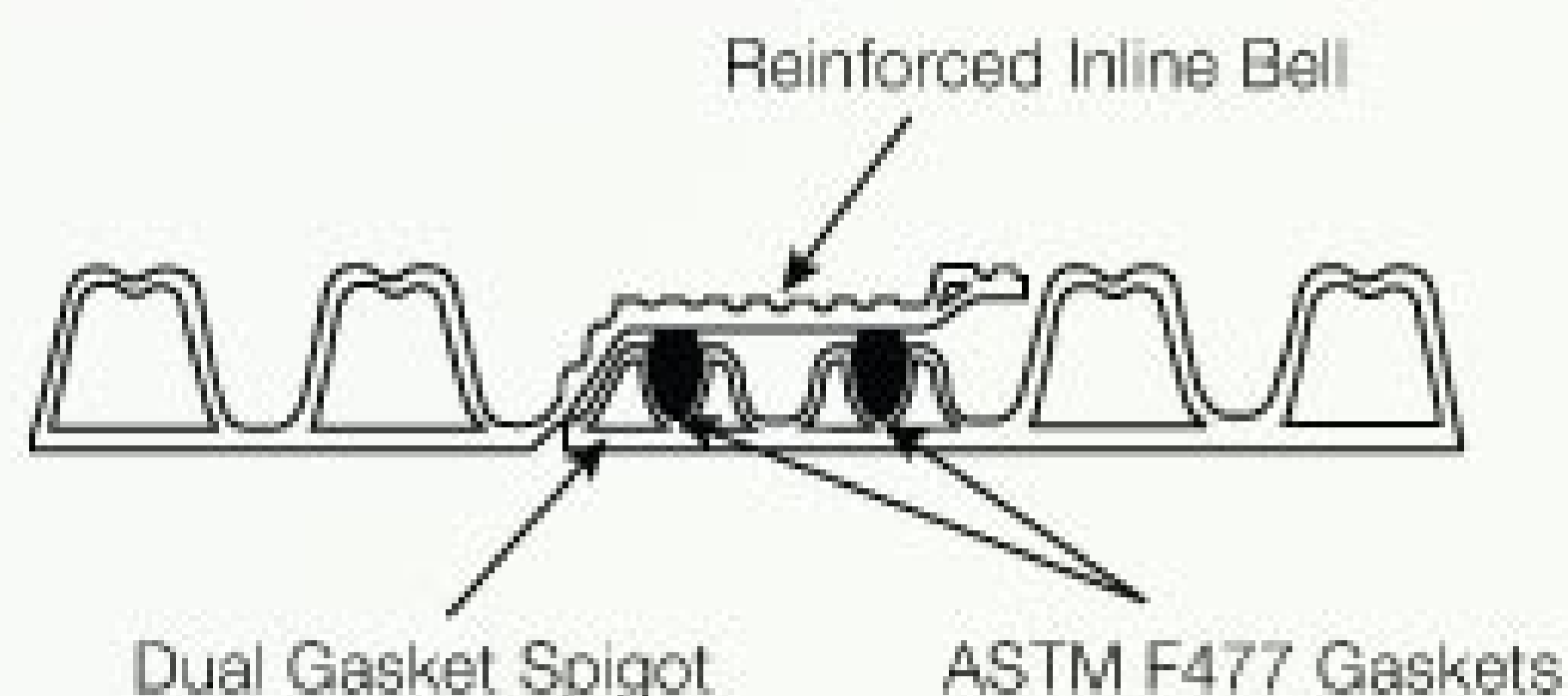
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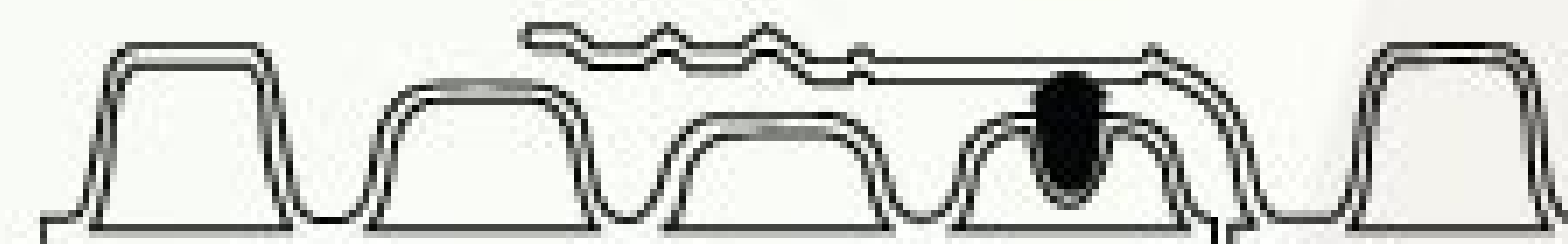
- Features a heavy integral bell and dual gasket spigot.
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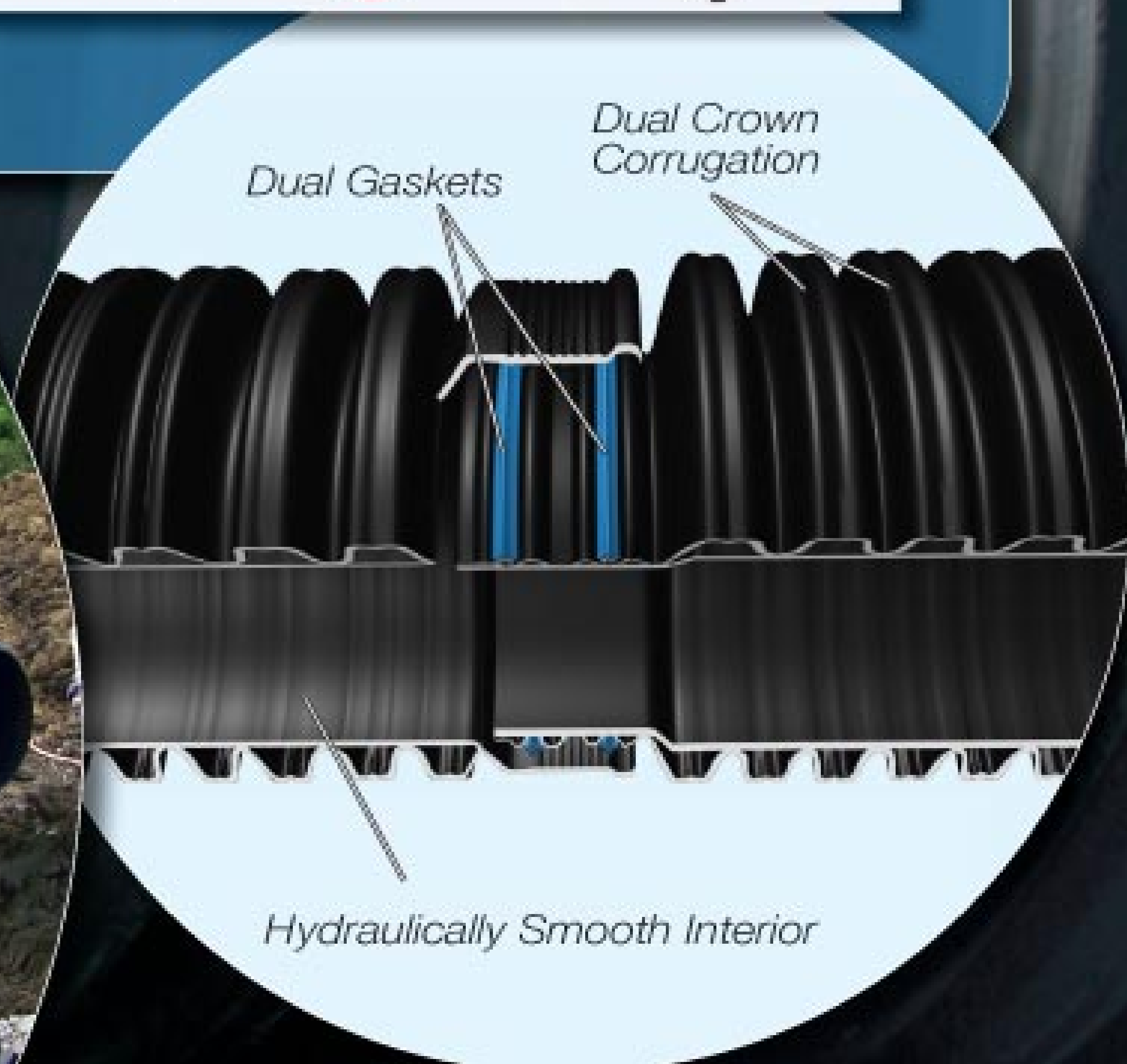
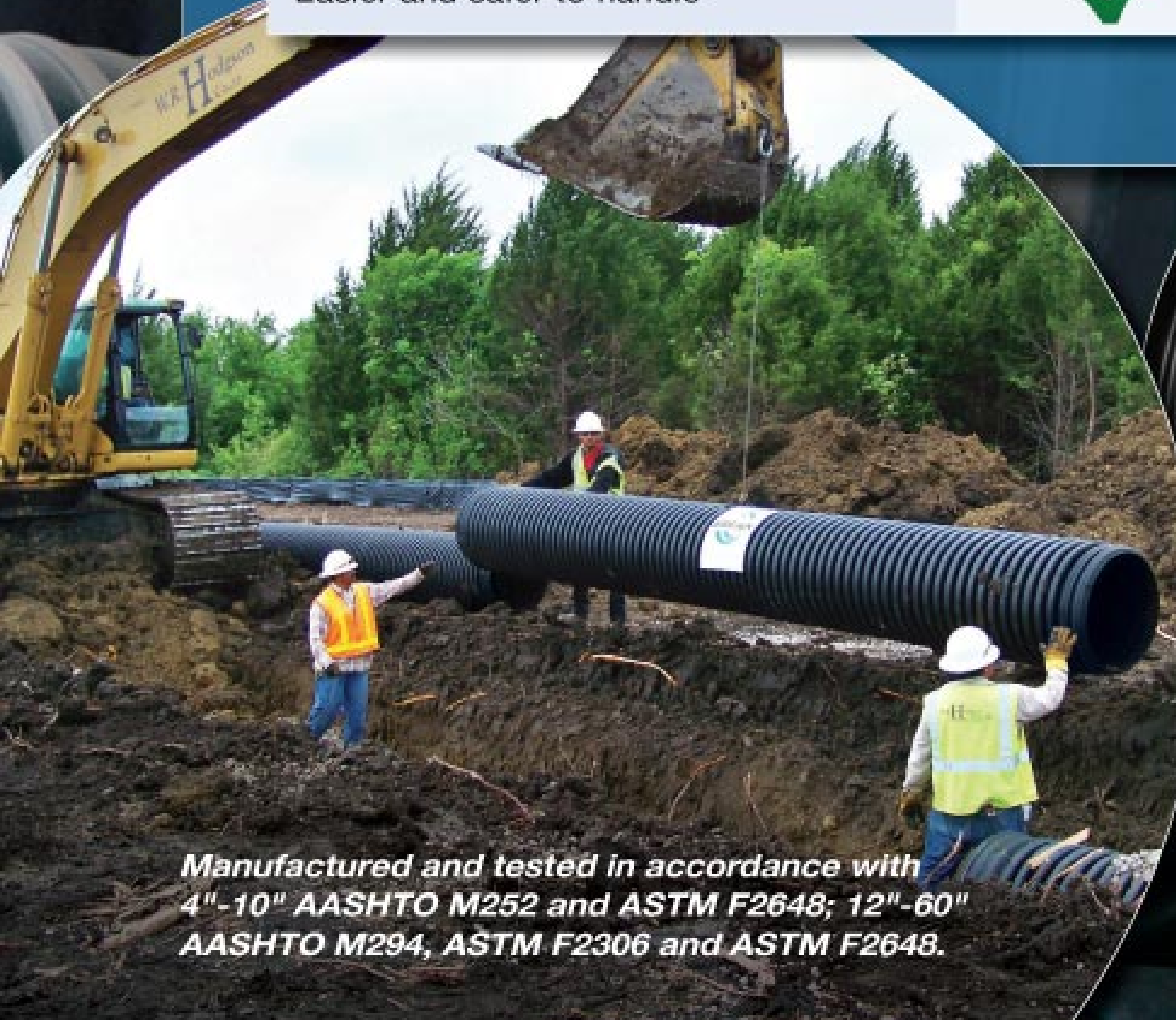
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Easier and safer to handle	✓	∅	✓



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IT WORKS BOTH WAYS

There is greater recognition today of something water utilities have always known: Saving water saves energy. And by the way, saving energy also saves water.

When it comes to running a water utility, saving water and saving energy mean pretty much the same thing. When water is wasted, so is the energy it took to pull the water from the source, treat it, and pump it up the water tower.

Other sectors — industrial, commercial, residential — are coming to that realization. And they're seeing that it works the other way, too: Saving energy saves water. It's a concept called the energy-water nexus. Sandia National Laboratories, on its Web site, says it this way:

"Energy production requires a reliable, abundant, and predictable source of water, a resource that is already in short supply throughout much of the U.S. and the world. The electricity industry is second only to agriculture as the largest user of water in the United States. Electricity production from fossil fuels and nuclear energy requires 190,000 million gallons of water per day, accounting for 39 percent of all freshwater withdrawals in the nation, with 71 percent of that going to fossil-fuel electricity generation alone.

"Coal, the most abundant fossil fuel, currently accounts for 52 percent of U.S. electricity generation, and each kWh generated from coal requires withdrawal of 25 gallons of water. That means U.S. citizens may indirectly depend upon as much water turning on the lights and running appliances as they directly use taking showers and watering lawns."

Saving resources

Seeing the connection between water and energy automatically makes it more important to conserve both. We literally can't have one without the other. Our nation has been serious for some time about conserving energy, and rising prices in recent years have added a sense of urgency.

On the other hand, many of us — especially in water-rich areas like the Great Lakes region

where I live — have tended to think of water as cheap and abundant. Increasingly, it is neither. It's one thing to read about water shortages in the Southwest and, more recently, the Southeast. It's another to see, as I did a few years ago, the Rio Grande River reduced to a water-filled ditch from all the withdrawals along its course.

The need to conserve water has not escaped notice. That's why we see all sorts of innovations in water reclamation, especially in drier areas of the nation. But the connection between water and energy is a newer realization, and it applies very directly to water and its treatment and distribution.

Maximum utility

The Water and Energy Technology Team (WETT) at Lawrence Berkeley National Labora-

"Electricity and water are at the heart of the U.S. economy and way of life. National defense, food production, human health, manufacturing, recreation, tourism, and the daily functioning of households all rely on a clean and affordable supply of one or both of them."

Sandia National Laboratories

tory says it clearly. "When water is used only once, then treated and discharged to the environment, for instance, through an ocean outfall as is still the practice in most coastal cities worldwide, the result is minimal resource utility, minimal resource recovery, and maximum compounded energy use.

"When water is reclaimed through advanced wastewater treatment and is then reused to offset the use of potable water for non-potable purposes such as irrigation and fire protection, water's utility is increased. Moreover, the per-unit volume energy intensity associated with water collection, potable treatment, and distribution followed by wastewater collection, treatment, and reuse is decreased.



FROM THE EDITOR

Ted J. Rulseh

"In short, water reclamation and recycling save water and energy, while single-pass water use wastes water and energy. Matching water quality with its intended use achieves the greatest water and energy utility and efficiency, thereby minimizing depletion of these scarce resources. By offsetting the demand for new water resources, water reclamation and recycling reduce water consumption and the energy used in providing potable water."

Fixing the pipes

The WETT might have added that the connection between water and energy makes it all the more important to fix the underground infrastructure that carries water and wastewater.

What is more wasteful, after all, than treating and pumping water, only to have it trickle out of the pipes and into the ground? What could be more wasteful than letting clear stormwater flow into sewer pipes, get dirty, and require treatment?

The energy-water nexus should give even more impetus to the need to invest money, equipment, and staff ingenuity in improving the underground infrastructure. In every facet of the water and wastewater sectors, we need to treat water and energy like the invaluable treasures they are. Here are the folks at Sandia National Labs again: "Electricity and water are at the heart of the U.S. economy and way of life. National defense, food production, human health, manufacturing, recreation, tourism, and the daily functioning of households all rely on a clean and affordable supply of one or both of them. Understanding the complex relationship between water and electricity and developing technologies to keep that relationship healthy is an important key to a sustainable and secure future for the United States." ♦

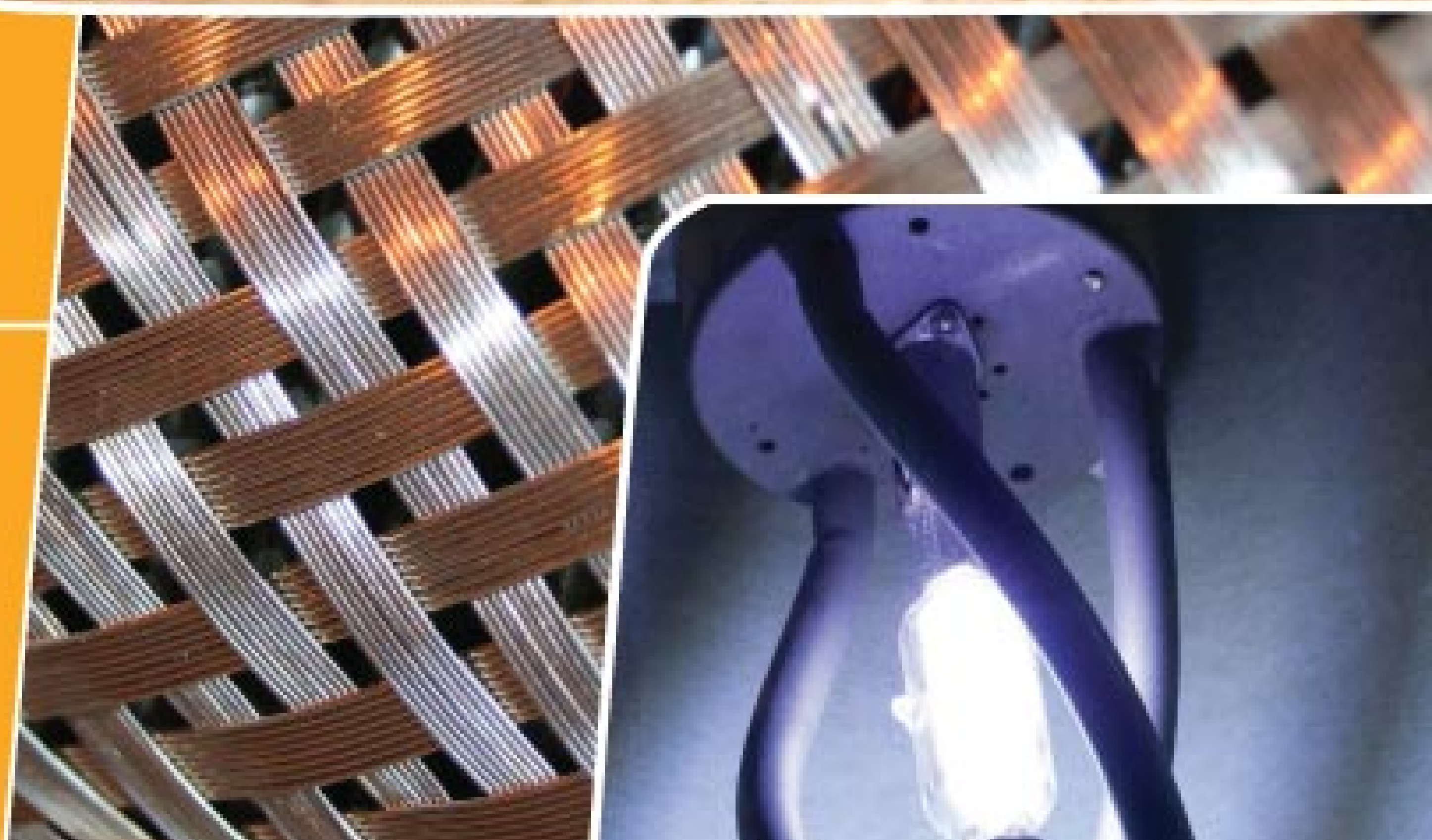
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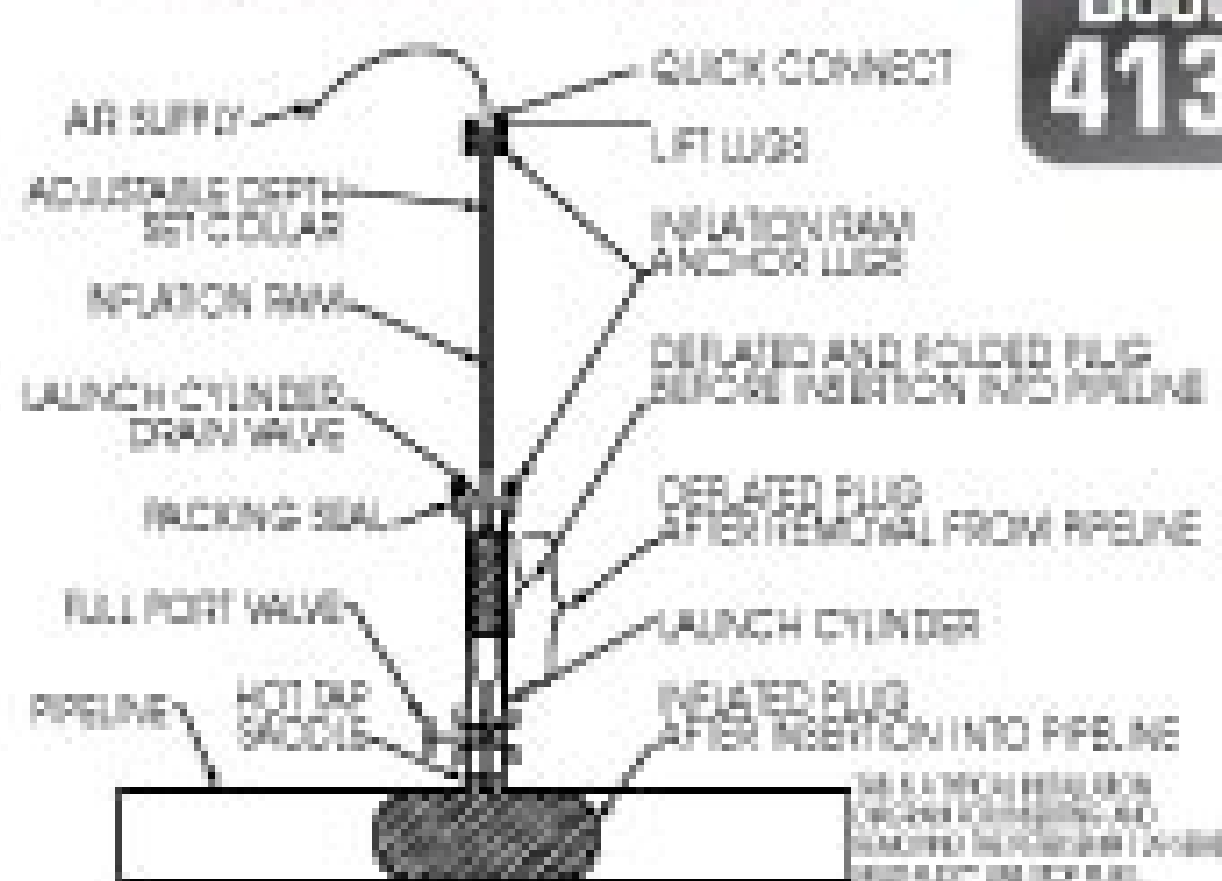
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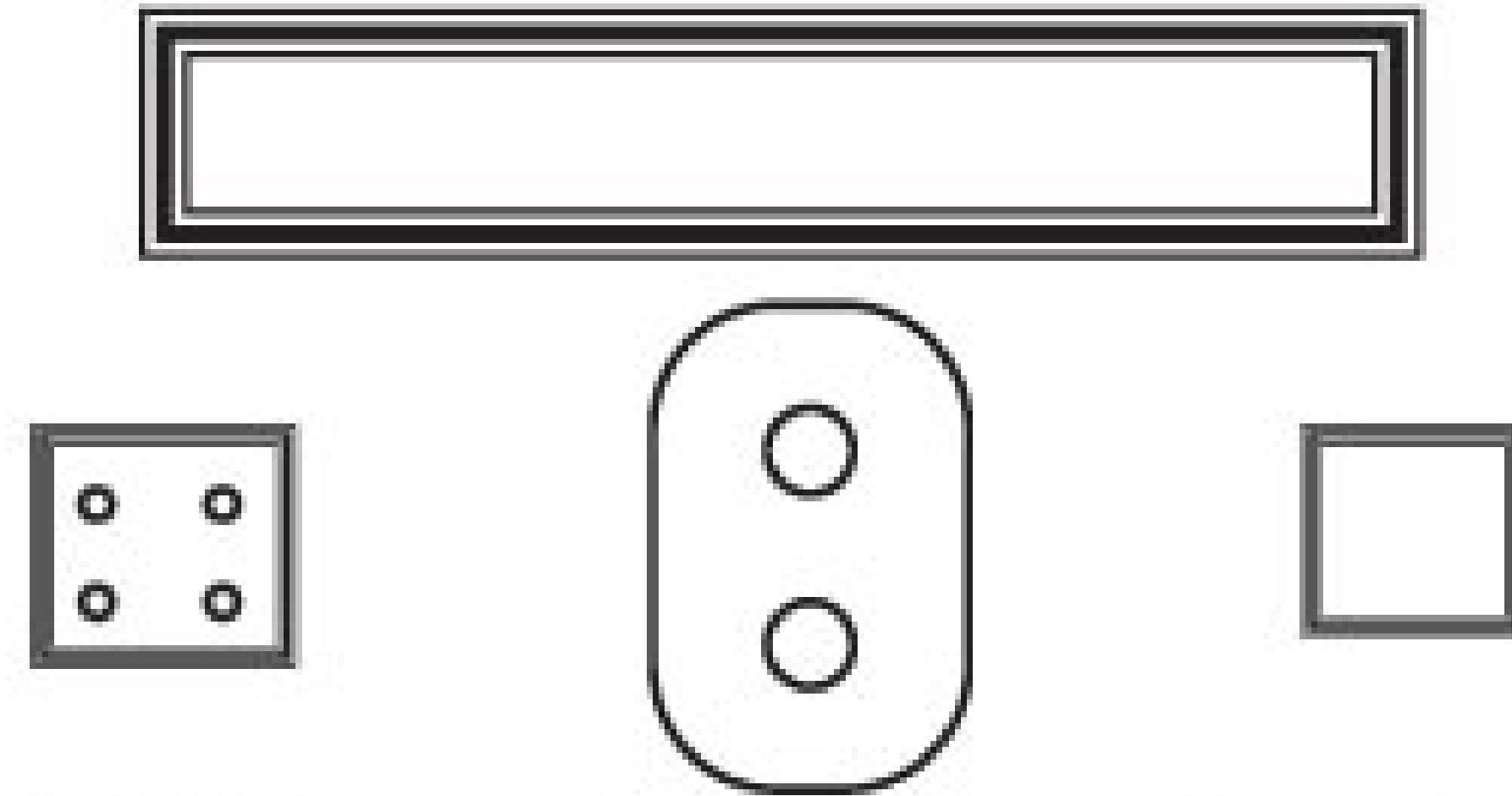


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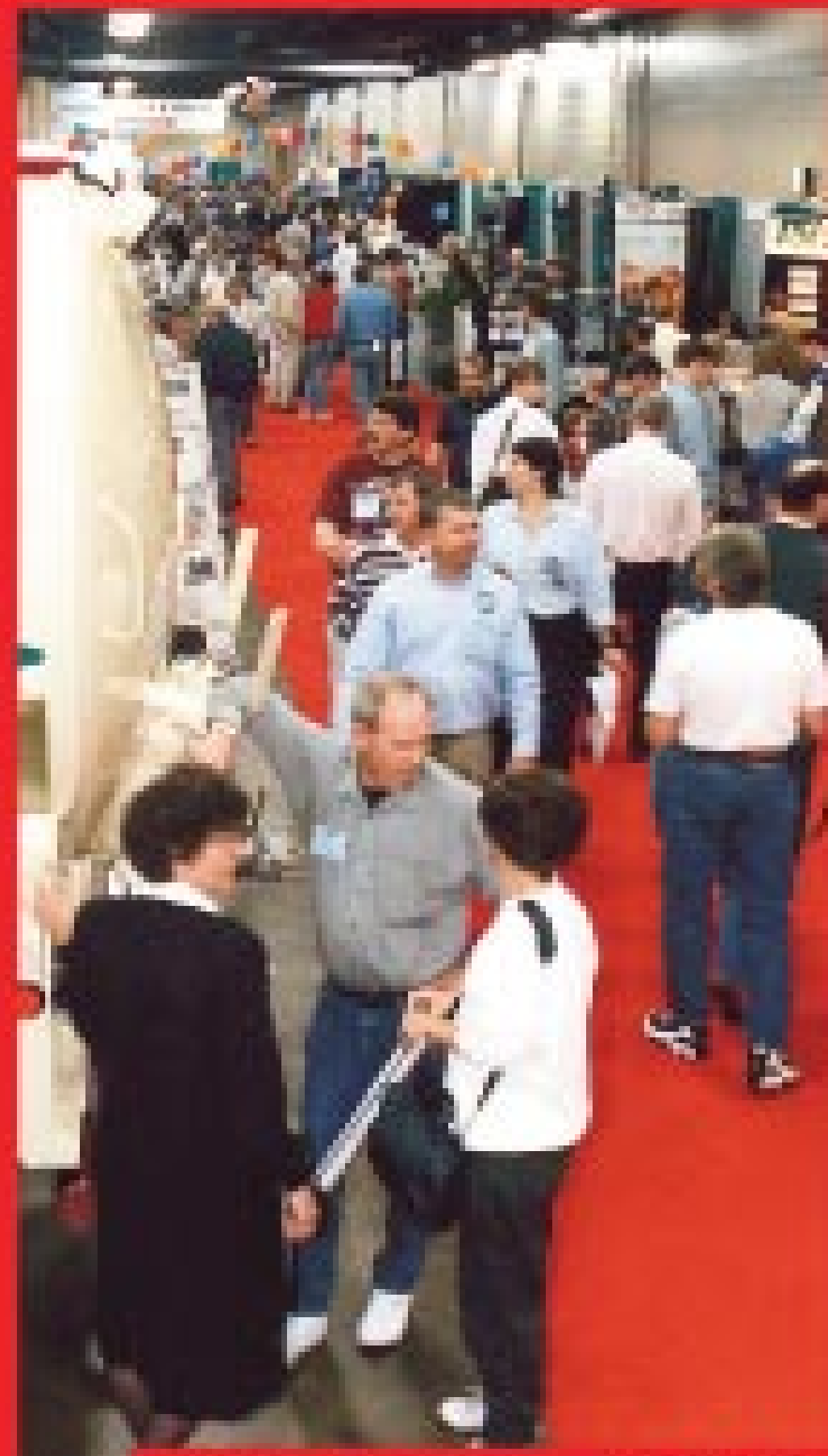


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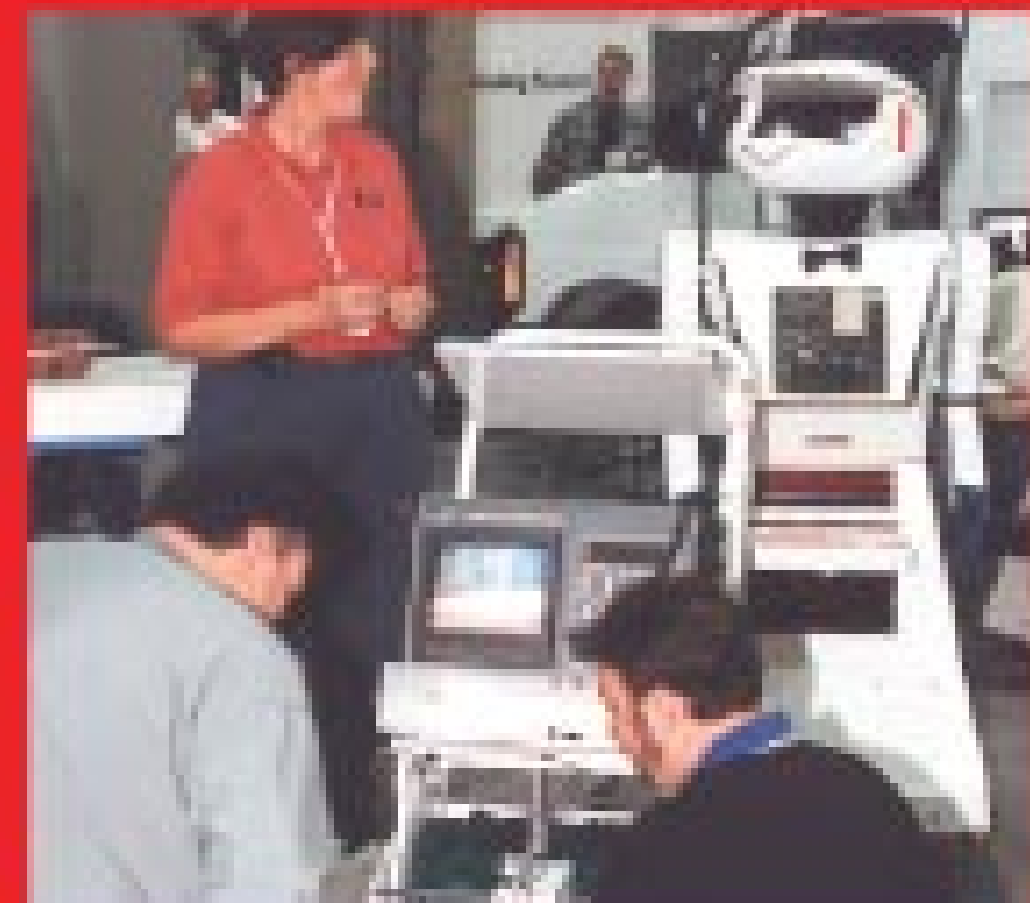


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Nashville, 1996



Nashville, 1994



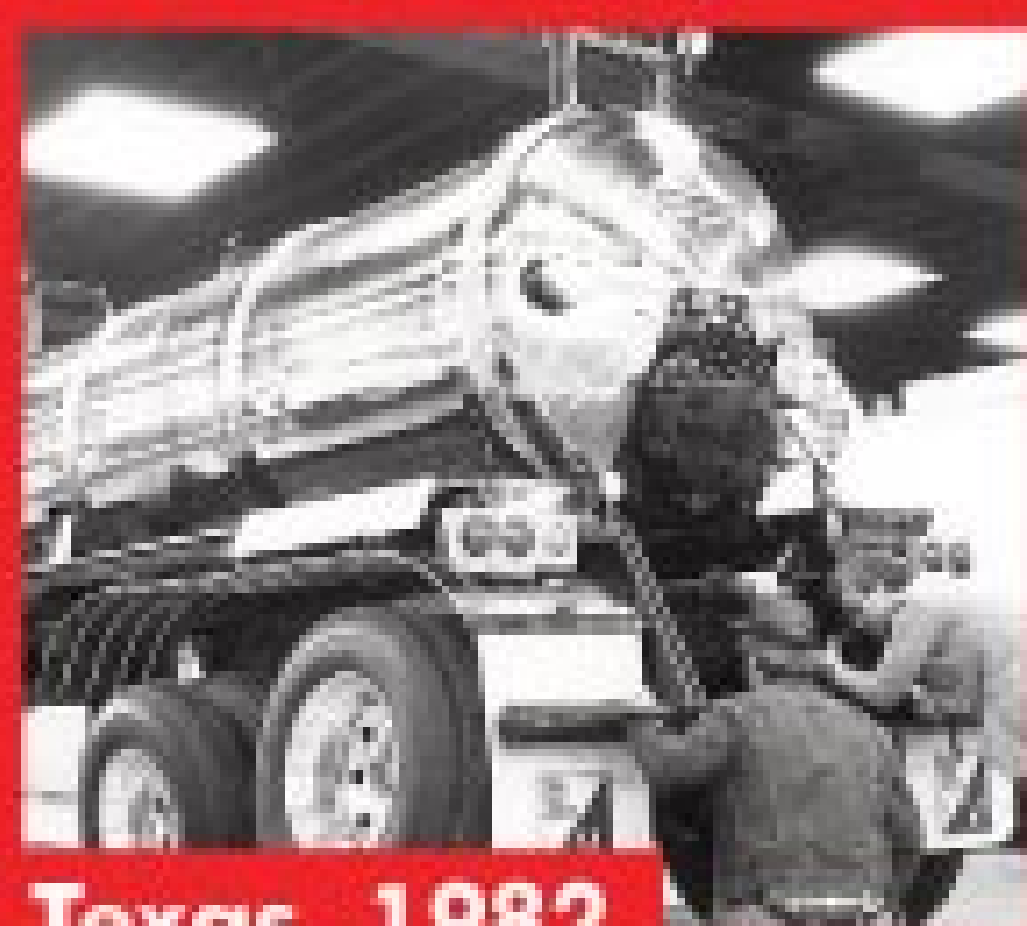
CELEBRATING

30 years

1981-2010



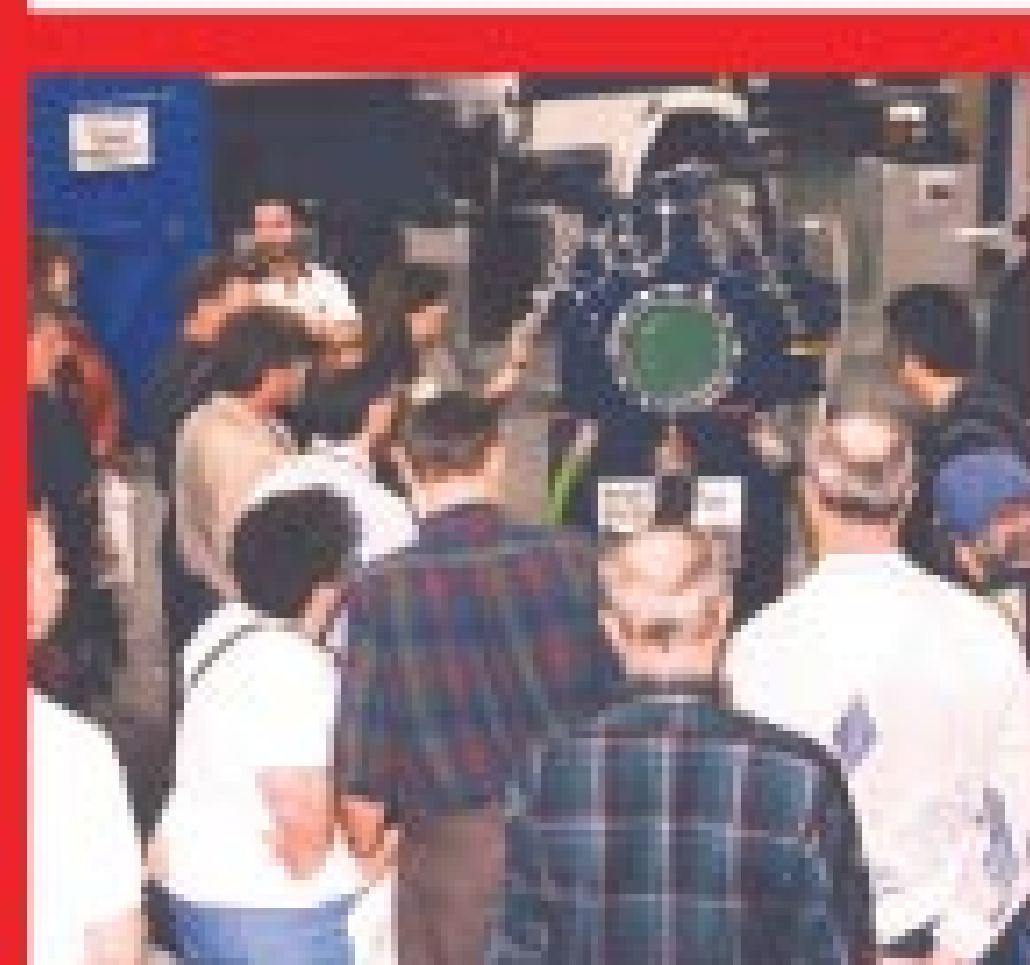
First Show in Nashville, 1981



Texas, 1982



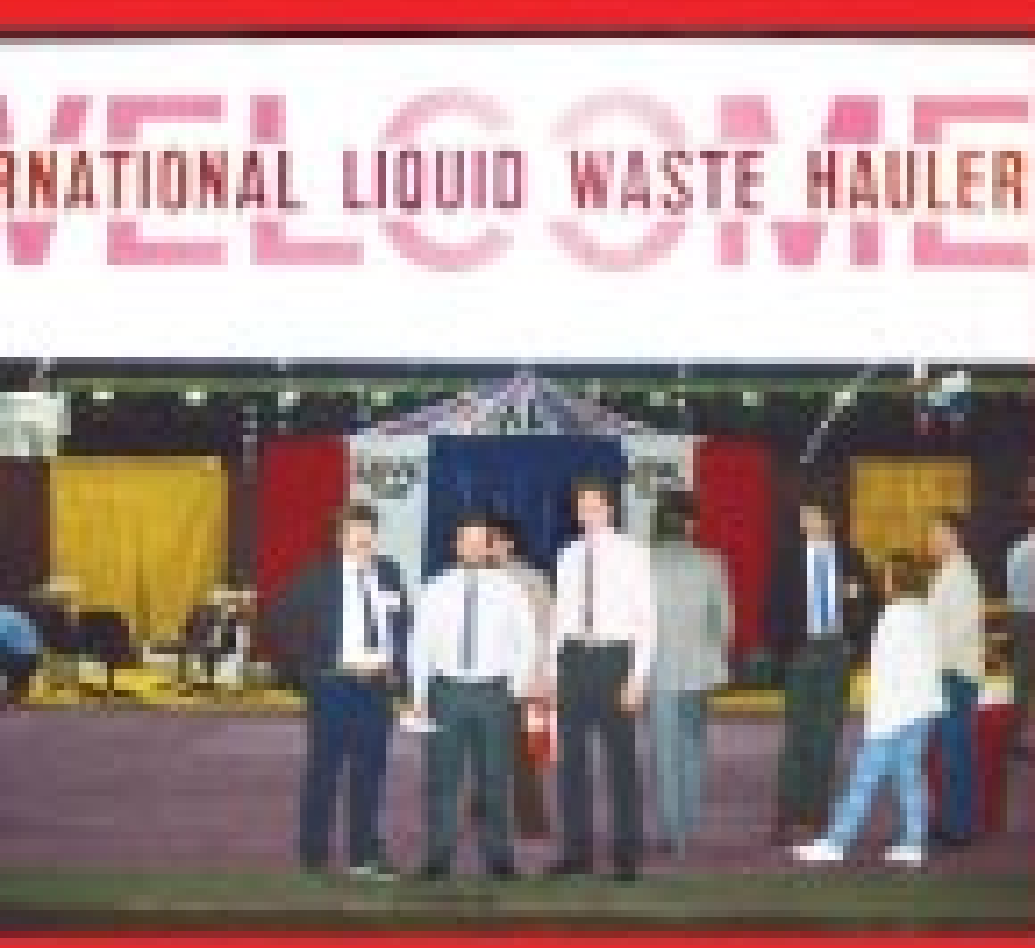
Nashville, 1985



Nashville, 2004



Superdome in New Orleans, 1987



Mississippi, 1983

► Call 1-866-933-2653 for information about the 2010 Expo!



Louisville, 2009

SCHEDULE OF EVENTS

WEDNESDAY

February 24, 2010

- Education Day - All Day - No Exhibits
- More than 40 Educational Sessions
- Networking: 5 - 7 p.m.

THURSDAY

February 25, 2010

- Certified Onsite Installer Course
- Educational Seminars: 8 a.m. - 12 noon
- Exhibits Open: 9 a.m. - 5 p.m.
- Women in the Industry Seminar: 9 a.m. - 12 noon
- Women's Wine & Cheese: 2 - 4 p.m.
- Industry Appreciation & Networking Party: 5 p.m. - 25¢ Tap Beer and Other Refreshments

FRIDAY

February 26, 2010

- Educational Seminars: 8 a.m. - 12 noon
- Exhibits Open: 9 a.m. - 5 p.m.

SATURDAY

February 27, 2010

- Exhibits Open: 9 a.m. - 3 p.m.
- Saturday Evening Jam: 5 p.m. - Phil Vassar & Sawyer Brown



THURSDAY NIGHT

INDUSTRY APPRECIATION PARTY

FEBRUARY 25TH, 2010

5 p.m. at the COLE Pub



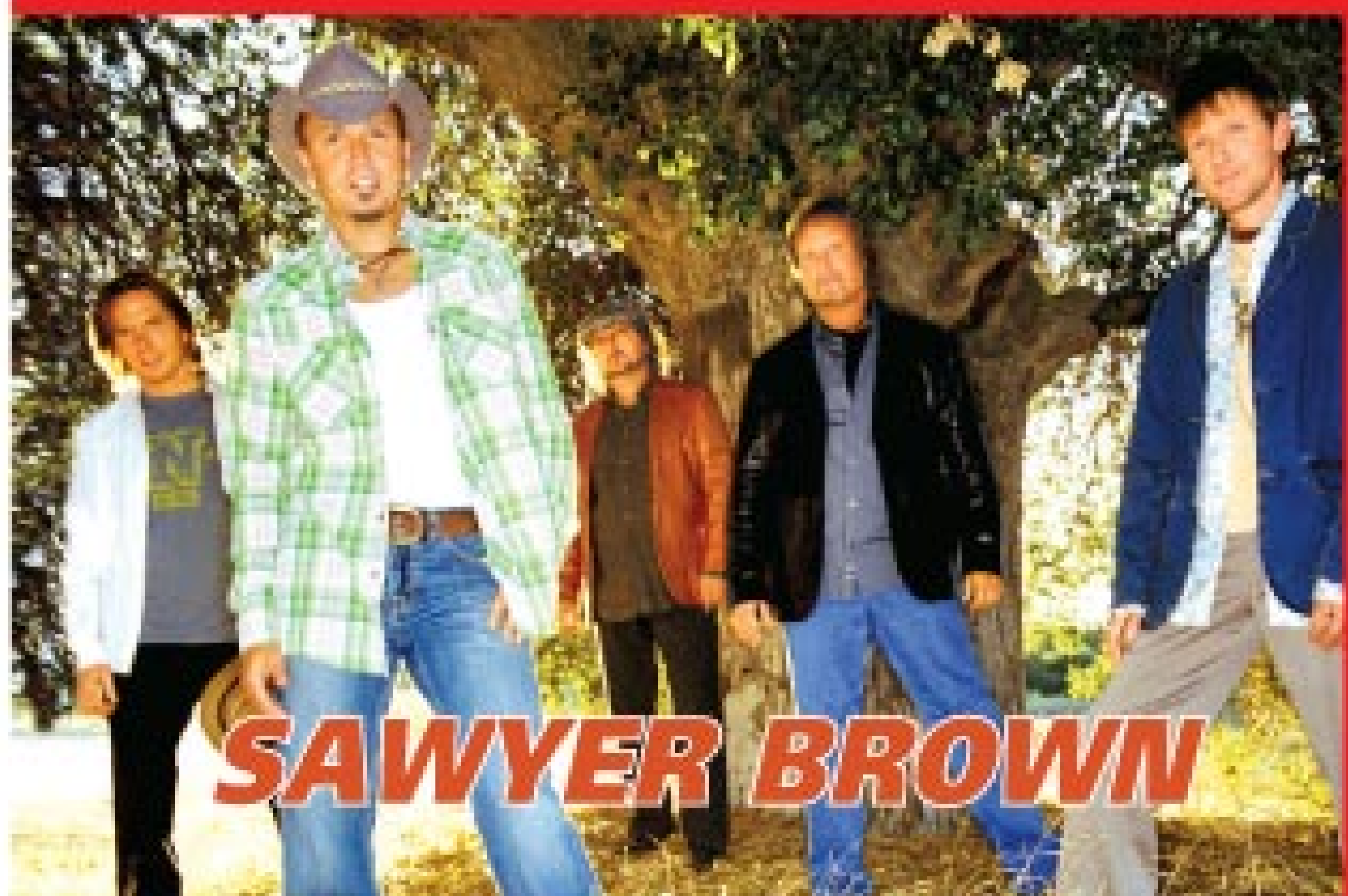
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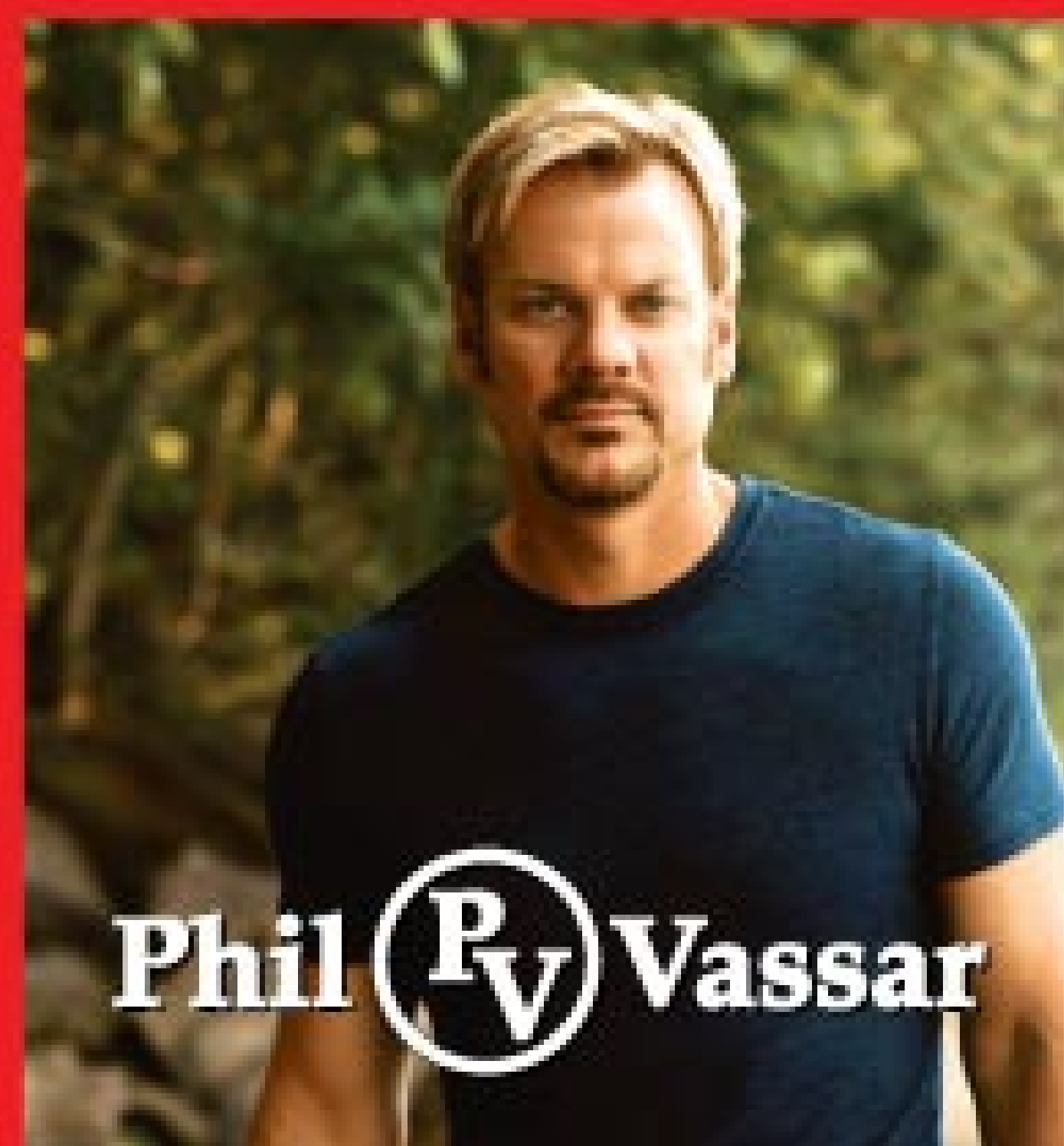
SATURDAY

FEBRUARY 27, 2010

5 p.m. approximate




SAWYER BROWN



Phil  Vassar

► Exhibits open at 9 a.m. on Thursday!



A Pearpoint pan-and-tilt digital video camera in a clay pipe storm sewer in Cedar Rapids. Thirty-one members of the Sewer Maintenance Division operate and maintain the sanitary and storm sewer systems. (Photography by Mark Tade)

FOCUS: SEWER

BATTLE OF THE BLOCKAGE

Armed with a targeted preventive maintenance plan, the Cedar Rapids Sewer Maintenance Division campaigns against sanitary sewer backups

By Barb Cooper

The City of Cedar Rapids has reduced sanitary sewer backups by more than 80 percent — proof that its aggressive war on blockages is working.

The Sewer Maintenance Division's key weapons against blockages include a comprehensive preventive maintenance program (PMP) and a targeted capital improvement program (CIP) to upgrade the infrastructure.

Cedar Rapids has a population of 125,000, but it has a large industrial base. The wastewater flow is 30 mgd, more typical of a city of 1.2 million. For years, the city took a reactive approach to blockages, which occurred at the rate of 500 to 700 per year.

No longer willing to accept the service interruptions and high costs and risks of blockages, the city implemented a mandatory grease trap program in 1994. As county and building inspection teams enforced those rules, backups dropped to 120 by 2003.

"In that year, we implemented our PMP and CIP and reduced sewer blockages by 60 percent in three years," says Public Works maintenance manager Craig Hanson, P.E. "These programs have also helped decrease the average flow of wastewater to our treatment plant by almost 15 percent and peak flow by 25 percent.

"We accomplished this by combining several tools and technologies. Our PMP uses geospatial technologies, work order management, and CCTV pipe inspection to provide us with accurate information on the location and condition of our sanitary sewer pipes. Our CIP involves rehabilitation of more than 25,000 feet of line with cured-in-place liner and replacement of over 5,000 feet each year."

Building a database

The Cedar Rapids sanitary sewer system serves a population of about 155,000, including residents of Marion, Hiawatha and Robins, part of Fairfax, and a small portion of Linn County. The 31 members

of the Sewer Maintenance Division operate and maintain the sanitary and storm sewer systems. The city maintains more than 650 miles of sanitary sewer pipes in sizes from 6 to 96 inches with an average age of 53 years. The Water Pollution Control Department takes care of the system's six lift stations.

"Although the system is simple, it takes careful review and coordination to ensure that more than 1,300 annual preventive maintenance actions are completed and documented," Hanson says.

In fighting any battle, it is critical to know the geography and history of the battlefield. In Cedar Rapids, a geographic information system (GIS) supplies the geography, and a work order management system provides the history.

In 2004, the Sewer Maintenance Division performed a thorough review of the previous three-year period to locate sites of backups and document past cleaning efforts. The team then inspected each location to identify specific pipe defects. This helped them



PROFILE:

Cedar Rapids, Iowa,
Sewer Maintenance
Division

FOUNDED:
1890s

POPULATION SERVED:
155,000

SERVICE AREA:
82 square miles

EMPLOYEES:
31

INFRASTRUCTURE:
650 miles of sanitary sewer,
14,300 manholes, 6 lift stations

ANNUAL BUDGET:
\$9 million (storm and sanitary
sewer operations)

WEB SITE:
[www.cedar-rapids.org/sewer/
collection.asp](http://www.cedar-rapids.org/sewer/collection.asp)

build a database of nearly 1,000 locations. Since then, crews regularly review work orders from inspections and blockage responses

SURPRISE ASSAULT

On June 13, 2008, nature launched a surprise attack on Cedar Rapids. In a historic flood, the Cedar River crested at 31.12 feet, more than 11 feet above the previous record and 19 feet above flood stage.

The Sewer Maintenance Division's Preventive Maintenance Plan (PMP) and key debris removal equipment expedited the recovery. The plan helped the division mobilize quickly and direct most of its resources to the flood zone.

Since crews were used to working off of work orders, they were able to respond efficiently. The division lost its public works building and worked out of the parking lots, but because the trucks carried laptop computers loaded with the GIS and all of the sewer maps, underground locates continued.

"With the flooding of 60 to 65 miles of sewer line, with 20 pipe segments per mile, we relied on the Camel sewer and catch basin cleaners to meet our debris removal challenges," says Public Works maintenance manager Craig Hanson, P.E.

"One of our Camel units has a 16-cubic-yard debris tank, and it was a tremendous productivity booster. Although we also used another Camel with a 10-cubic-yard tank, the extra six cubic yards meant a 60 percent increase in productivity with a crew of two. Since we were experiencing lines that were 80 to 90 percent filled with debris, in some cases we were literally taking a full truckload out of a single 300-foot segment.

"Since the Camel can be connected to a fire hydrant to refill the water tank as we were jet vacuuming, we were able to work on a single pipe until it was completely clean without going off site. The trucks withstood the demanding work conditions without any breakdowns, and because they are front-reel trucks, the operators had better access to the equipment with the added safety of working out of traffic."

Since the sewers had been inspected under the PMP, the city had documentation of the pipes' pre-flood condition. "Unless you have proof of the initial condition of your pipes, it is difficult to prove that any damage was caused by the flood," Hanson says. "We were able to prove that our pipes were clean and that the debris in our system came from the flood. As a result, the cleaning of 65 miles of pipe is FEMA eligible.

"In addition to the evidence televising provided, FEMA was impressed with our PMP's comprehensive documentation, and that we can show our trends and maintenance and how many miles we clean every year. The fact that we had Capacity, Management, Operations and Maintenance (CMOM) documentation, which is required by the EPA for our NPDES permit, and a written standard operating procedure for our sanitary and storm sewers, further demonstrated our proactive commitment to sewer management."

the GIS to provide a method to call up each pipe segment and look at its history."

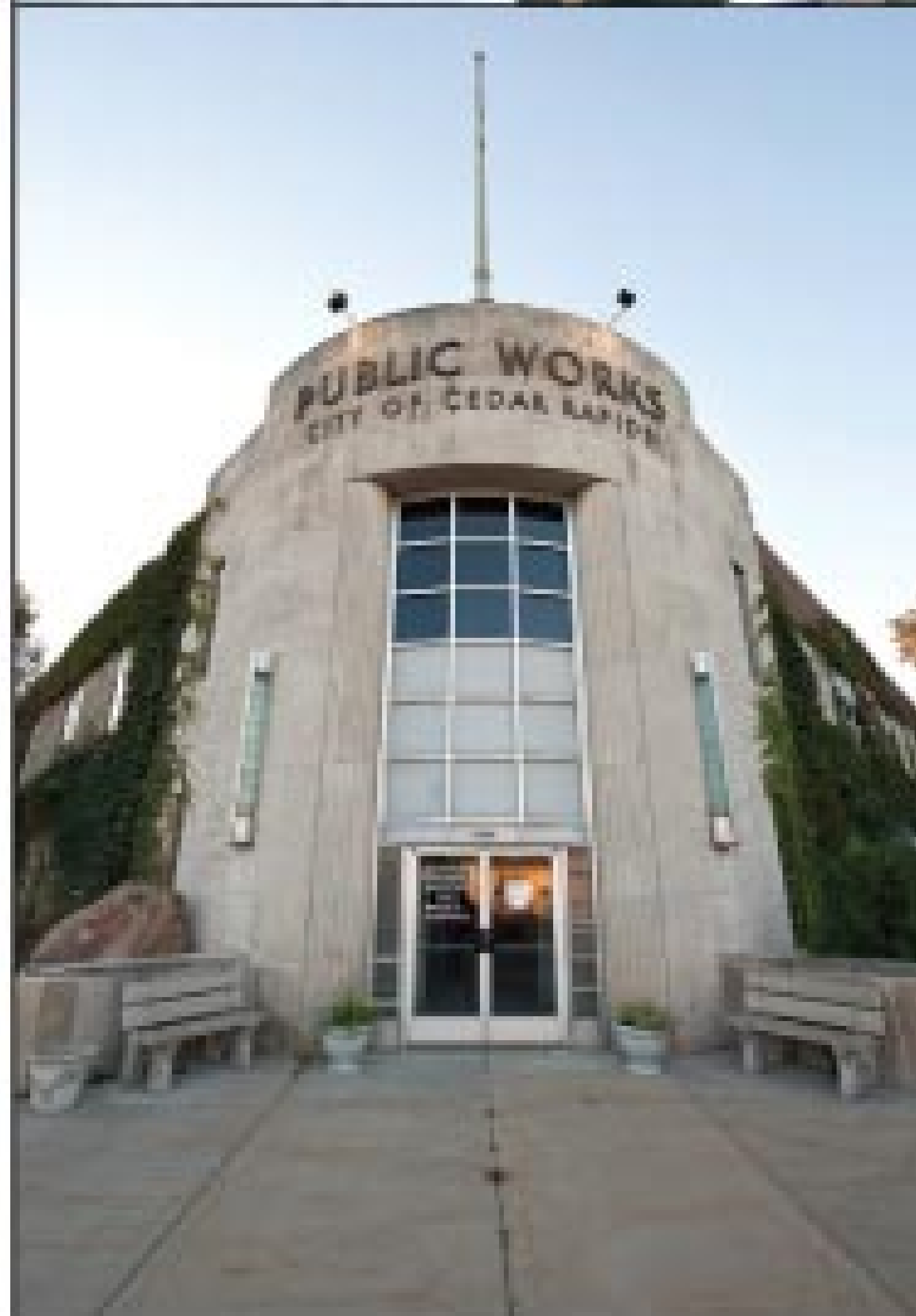
The city's inspection program is a systematic and proactive effort to document pipe conditions. GIS information on pipe diameter and age helps the staff target areas with older and smaller pipes that are

more likely to have blockages. The work order management system helps identify problem areas based on customer requests.

Most televising simply verifies that pipes are functioning properly. Where televising finds problems such as roots, grease, or debris, the lines are cleaned using four Camel



Above: Maintenance manager Craig Hanson (right) with sewer superintendent Mike Kuntz (standing) and Rory Smith, grounds maintenance supervisor, discuss mowing and maintenance of stormwater basins. Left: The Public Works building in Cedar Rapids, six blocks from the Cedar River, was inundated by a flood in 2008.



such as elevations, diameter, material, and project number. Data for existing sewers is field verified using GPS and, if necessary, revised in the GIS.

Work order management

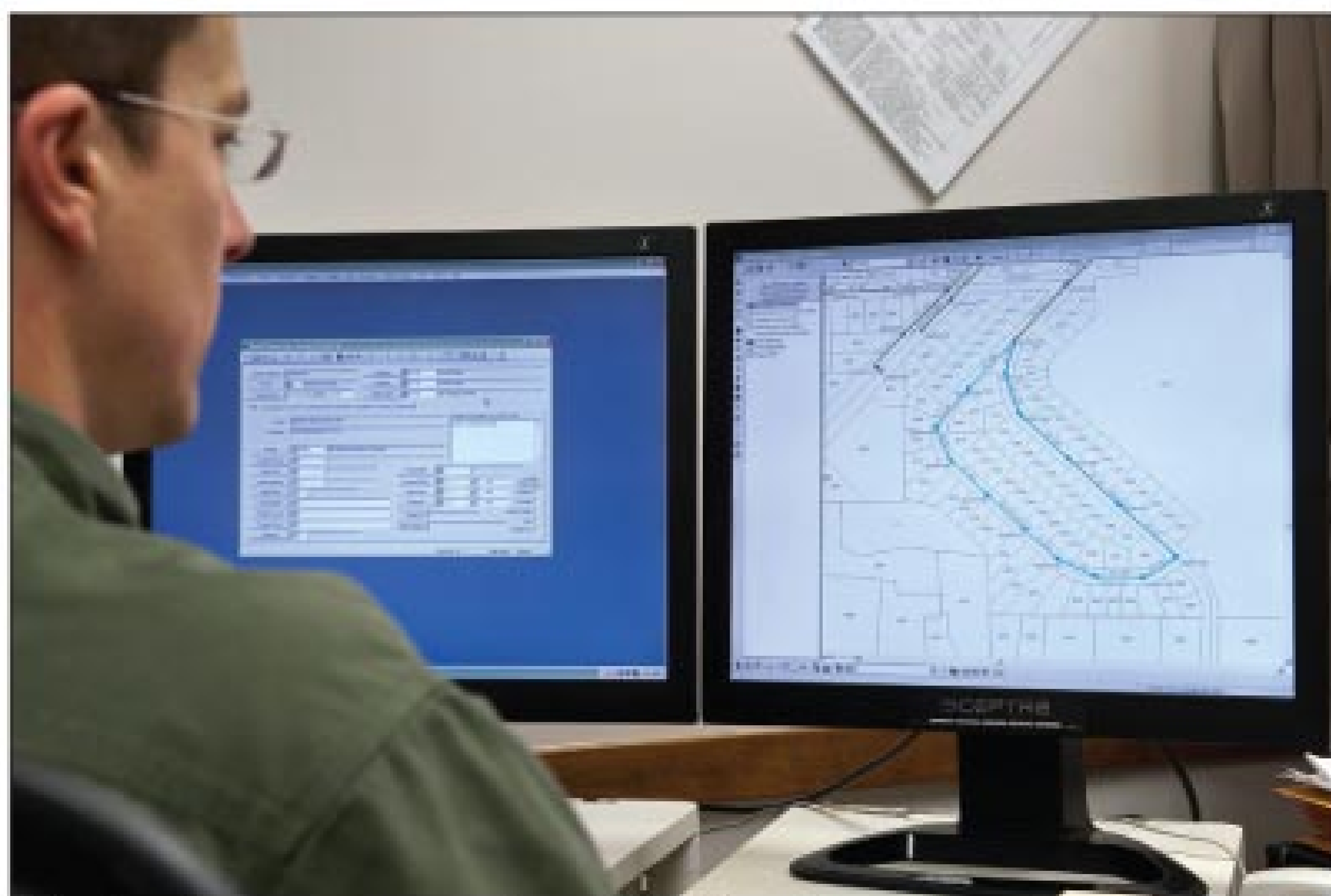
"The work order management system we use was developed by GBA Master Series Inc. and allows us to track, manage, and analyze the work performed on our sewer pipes," Hanson says. "We can categorize and summarize this work based on cause (such as roots or grease), tasks (inspecting or cleaning), personnel, and equipment. All staff time is tracked in the work order system to provide cost-of-service data.

"One of the keys to our work order management system is that we record work data by each pipe segment, as opposed to an address or a general street location. The work data can then be linked to

and enter more information into the database. That has added 300 more locations.

The GIS provides an inventory of pipes and structures. Global positioning systems (GPS) are used for accurate field-data collection and condition analysis. The GIS was developed 10 years ago using ESRI shape files, and the staff has refined it over the last five years into a robust enterprise Geodatabase.

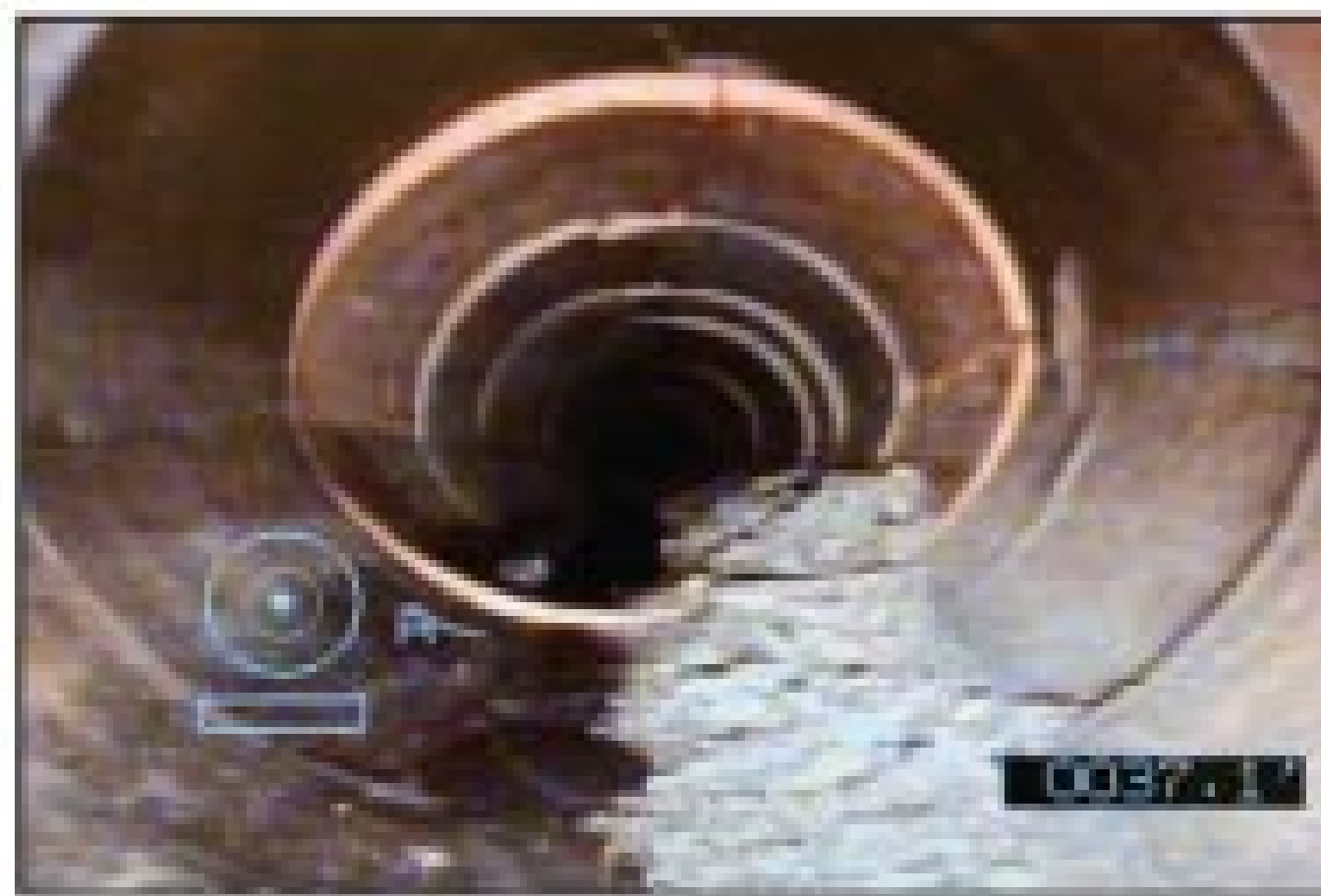
The city began using a Sokkia survey-grade GPS for data collection in 2002, and also uses recreational-grade and GIS-grade GPS units for locating and other data-collection tasks. New sewers are located with GPS and entered into the GIS along with attribute data,



Infrastructure management specialist Steve Cooper creates a work order for a crew using the city's geographic information system (GIS). A map and corresponding database are displayed on the computer monitors.

“Our PMP uses geospatial technologies, work order management, and CCTV pipe inspection to provide us with accurate information on the location and condition of our sanitary sewer pipes. Our CIP involves rehabilitation of more than 25,000 feet of line with cured-in-place liner and replacement of over 5,000 feet each year.”

Craig Hanson, P.E.



Digital video images of the interior of a debris-filled sewer. CCTV inspection is an important part of the city's sewer maintenance program.

sewer and catch basin cleaners from Super Products LLC, three with 11-cubic-yard debris bodies and one with a 16-cubic-yard tank. Once cleaned, the pipes are then added to the preventive maintenance database.

Depending on the problem and its severity, routine maintenance work orders are created to revisit those pipes every three to 24 months for cleaning. Where televising identifies significant problems, such as severe recurring roots or broken pipes, those pipes are added to the database of pipes to be lined or replaced.

In addition, the city inspects sewers in new developments before accepting the maintenance bond

to verify that pipes are installed to city standards and are functioning properly. To inspect interceptor sewers (60 to 90 inches), city crew members use a QuickView XR pole camera (Envirosight LLC) with zoom capability to look down the lines and assess general conditions, such as debris and corrosion. More detailed interceptor inspections are contracted as needed.

The televising program is supported by four vehicles. Two vans have Pearpoint Inc. cameras and tractors, which provide detailed inspection. Two combination jetting and camera trucks, one from Super Products and one from PipeHunter, are used for quick verification of pipe conditions.

Capital improvement

The city also aggressively targets repairs to lines that need more than cleaning. Sewers with severe structural defects, such as collapsed or broken pipes, are given priority, and city construction crews often repair them immediately. Pipes with less serious structural defects or with severe recurring root intrusion are added to the CIP database for future work. Pipes with the most severe root

Dallas Hyke (foreground) and Chris Maher operate a Camel sewer and catch basin cleaner from Super Products LLC.



problems are typically lined in the next fiscal year.

In addition to reducing blockages, the lining and pipe replacement program reduces infiltration and inflow.

“Since we track our work based on staff hours and by pipe segment, we can use this data to see outcomes and show historic trends as well as determine future financial needs,” Hanson says. “Historically, we can show that our productivity is increasing by querying the total linear feet of pipe cleaned and televised over given periods of time.

“We can also show service increases and cost savings through the reduction of sewer blockages. For the future, we can analyze the historic data to help us determine what pipes will need attention and estimate the cost to do the work. Additionally, we can use this data to analyze comparisons. Currently, the City of Cedar Rapids experiences only 25 percent of the sewer blockages seen by an average city of similar size.

“Although the individual tasks that make up our PMP had been performed for several years, 2003

was the first year that they were all put together into a dedicated and definable system. Since then, we have experienced tremendous improvement in service level and productivity.”

It just goes to show what happens when you go to war with the right people, the right equipment, and a well-designed plan of attack. ♦

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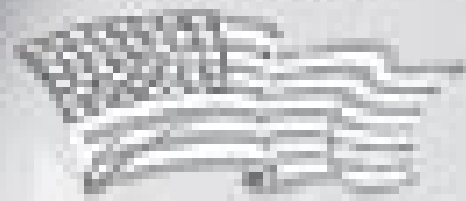
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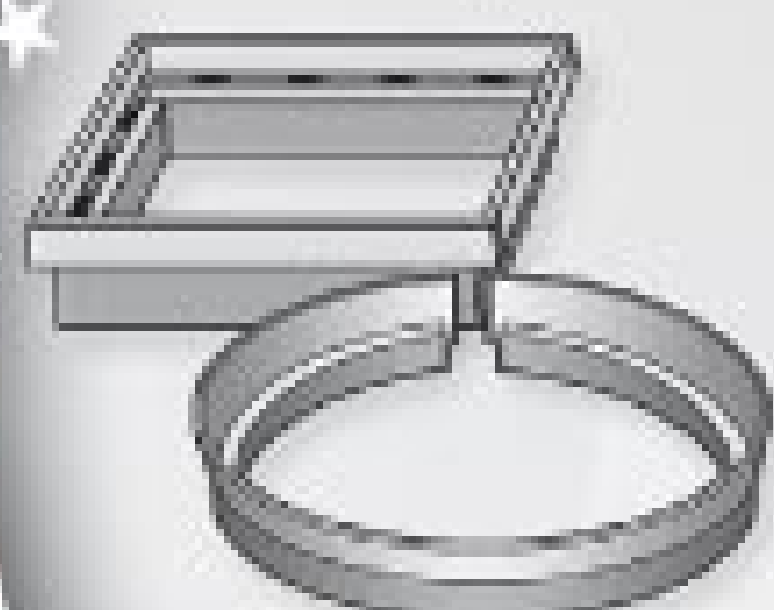
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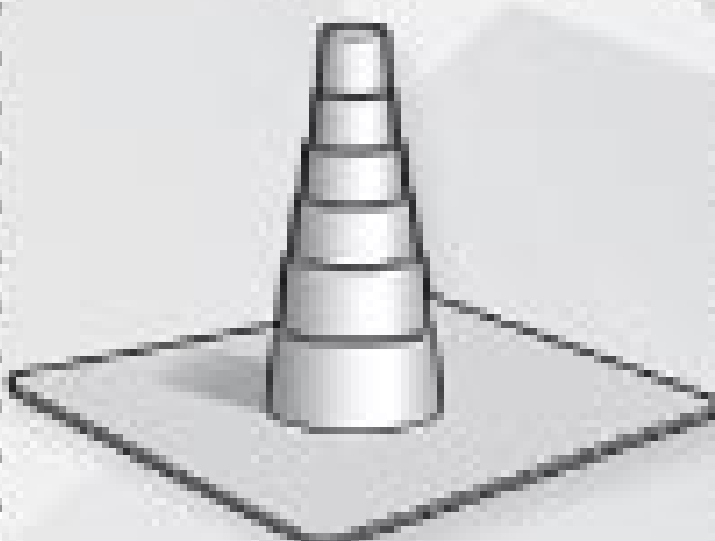
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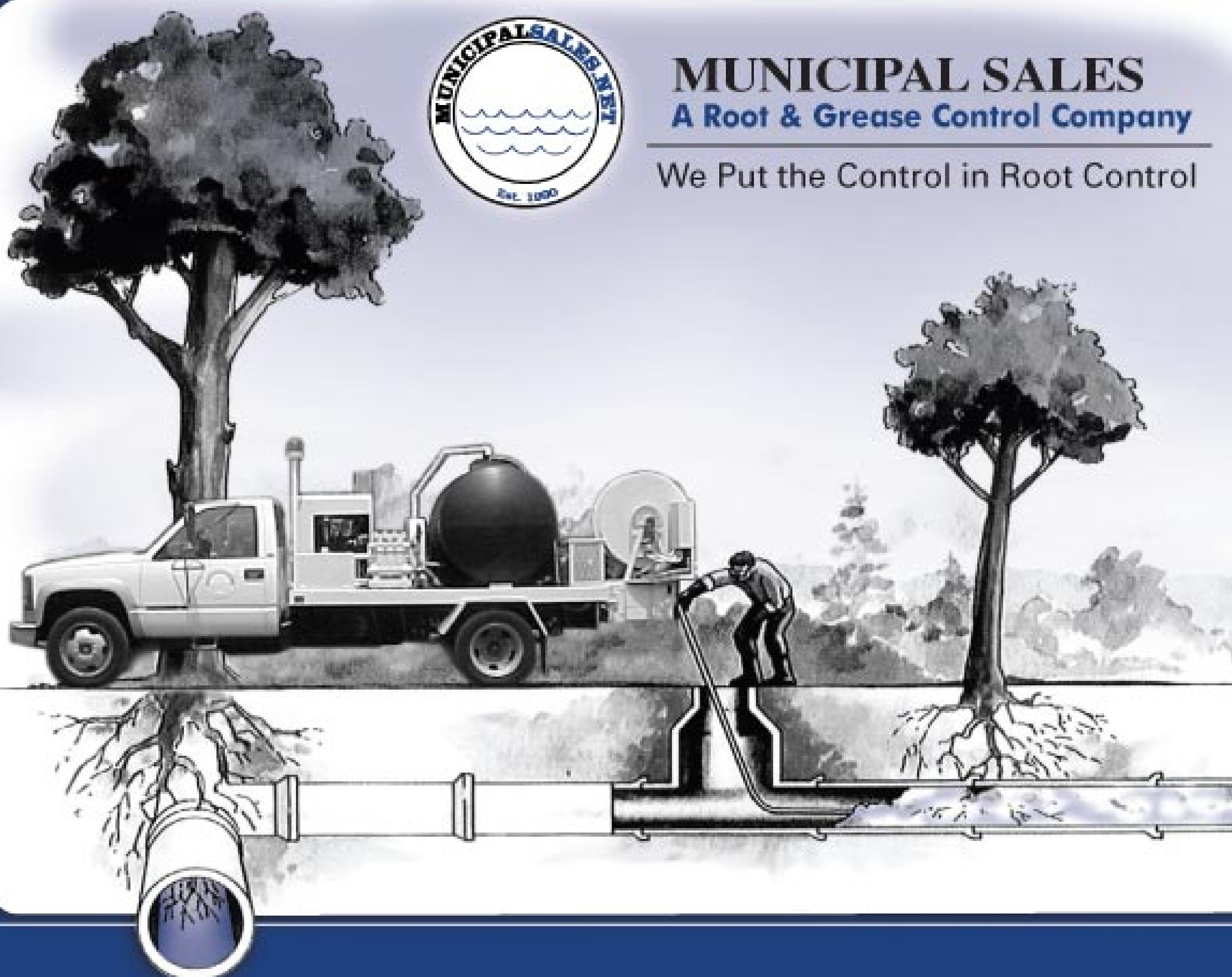
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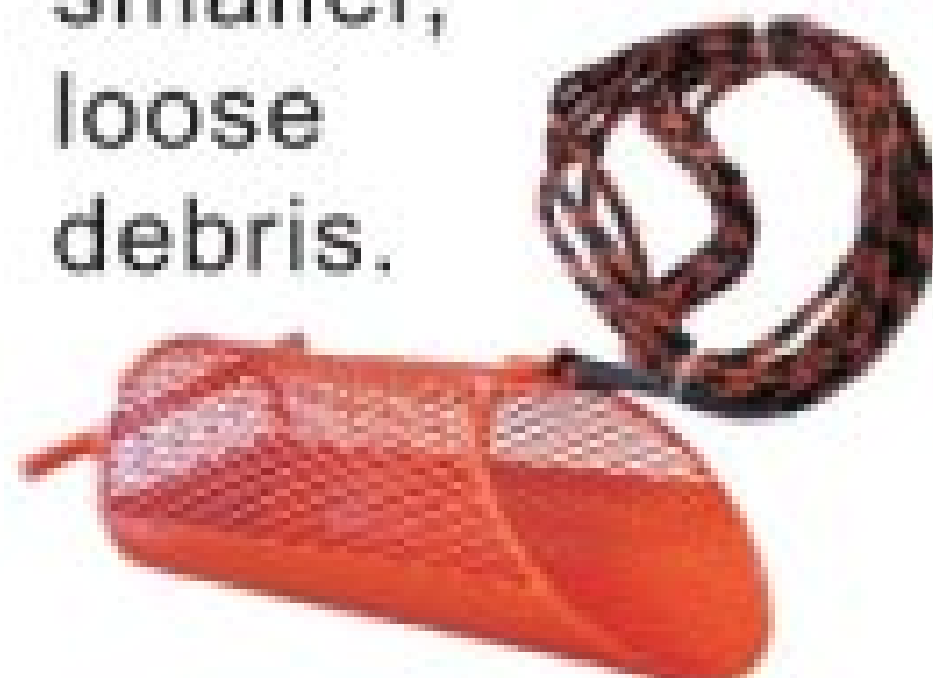
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Grit Catchers

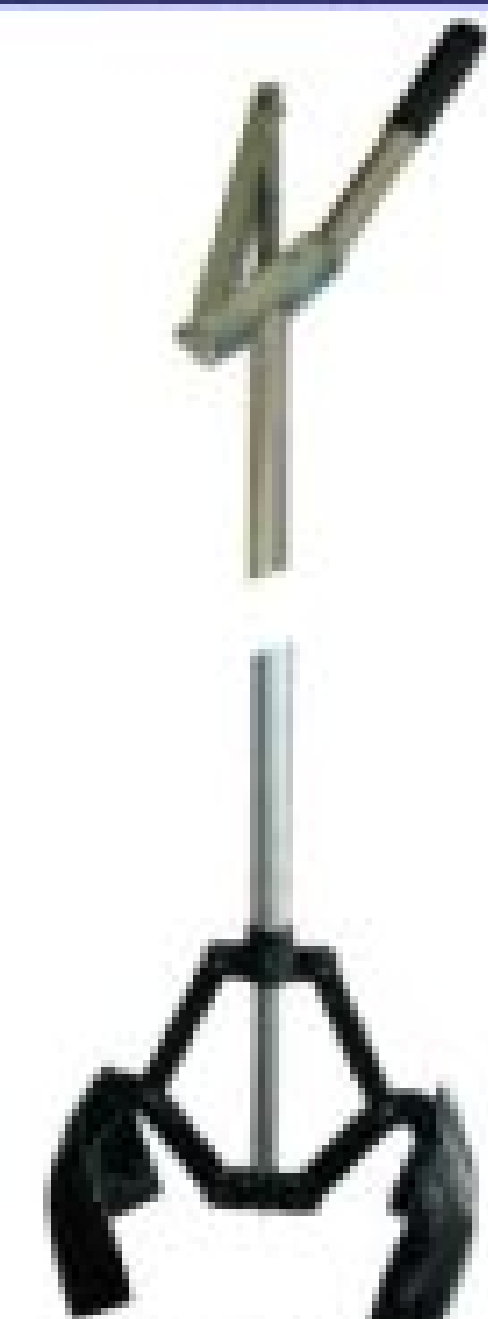
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Debris Catcher for use with Poles

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Grit Catcher for use with Poles



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Grease Log Chopper. Blade



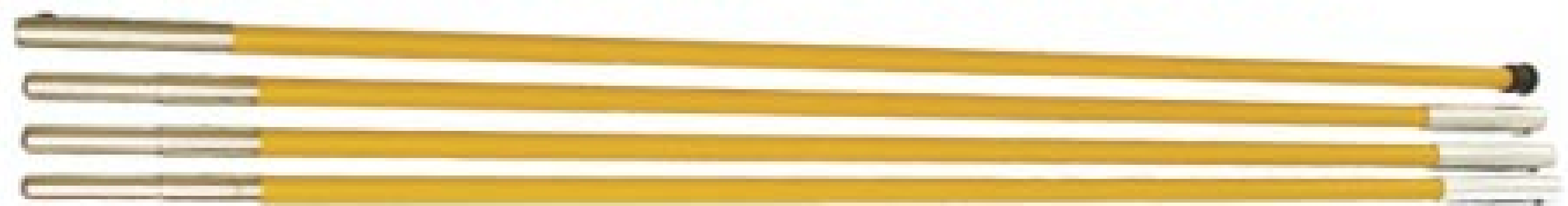
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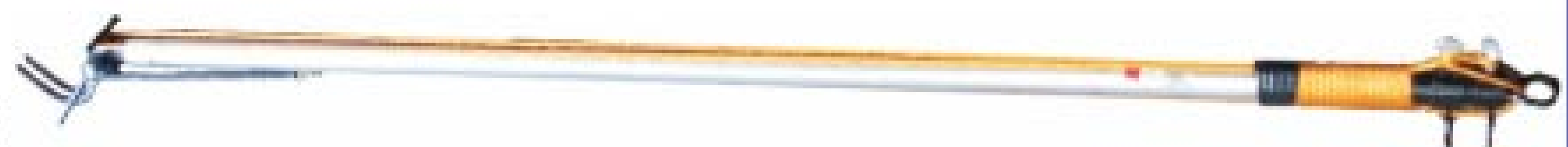


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MBC-1
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CLEAN WATER ON TAPP

The City of Tallahassee combines innovative facilities with public education to help keep area lakes clear of runoff pollution

By *Scottie Dayton*

John Cox approaches stormwater problems the same way they were created: little by little. As grant manager for the Think About Personal Pollution (TAPP) campaign in the city of Tallahassee (Fla.) Stormwater Management Group,

Cox focuses on the low-hanging fruit, while leading his team in efforts ranging from public awareness programs to action-oriented projects that homeowners embrace with enthusiasm.

Cox is part of a progressive program in a community where residents are concerned about stormwater

quality and how it affects area lakes. The city was first in the state to adopt a stormwater utility or user-fee approach to stormwater management.

The procedures and processes the stormwater group developed, such as pioneering the equivalent residential units (ERU) concept,

became a template now promoted by the U.S. EPA and the Florida Department of Environmental Protection. Over the last decade, the community has continued to support the program through one of the highest stormwater fees in the state.

The comprehensive program includes water-quality and flood-control



City of Tallahassee employees Sean McCalla, public works service worker; Clint Tyler, equipment operator III; Larry Ivory, public works service worker; and James Moore, equipment operator III, use a Vactor truck to clean a leaking storm sewer pipe in the ground. (Photography by Lance Oliver)



PROFILE:
Stormwater Management Group, City of Tallahassee, Fla.

POPULATION SERVED:
200,000

AREA:
110 square miles

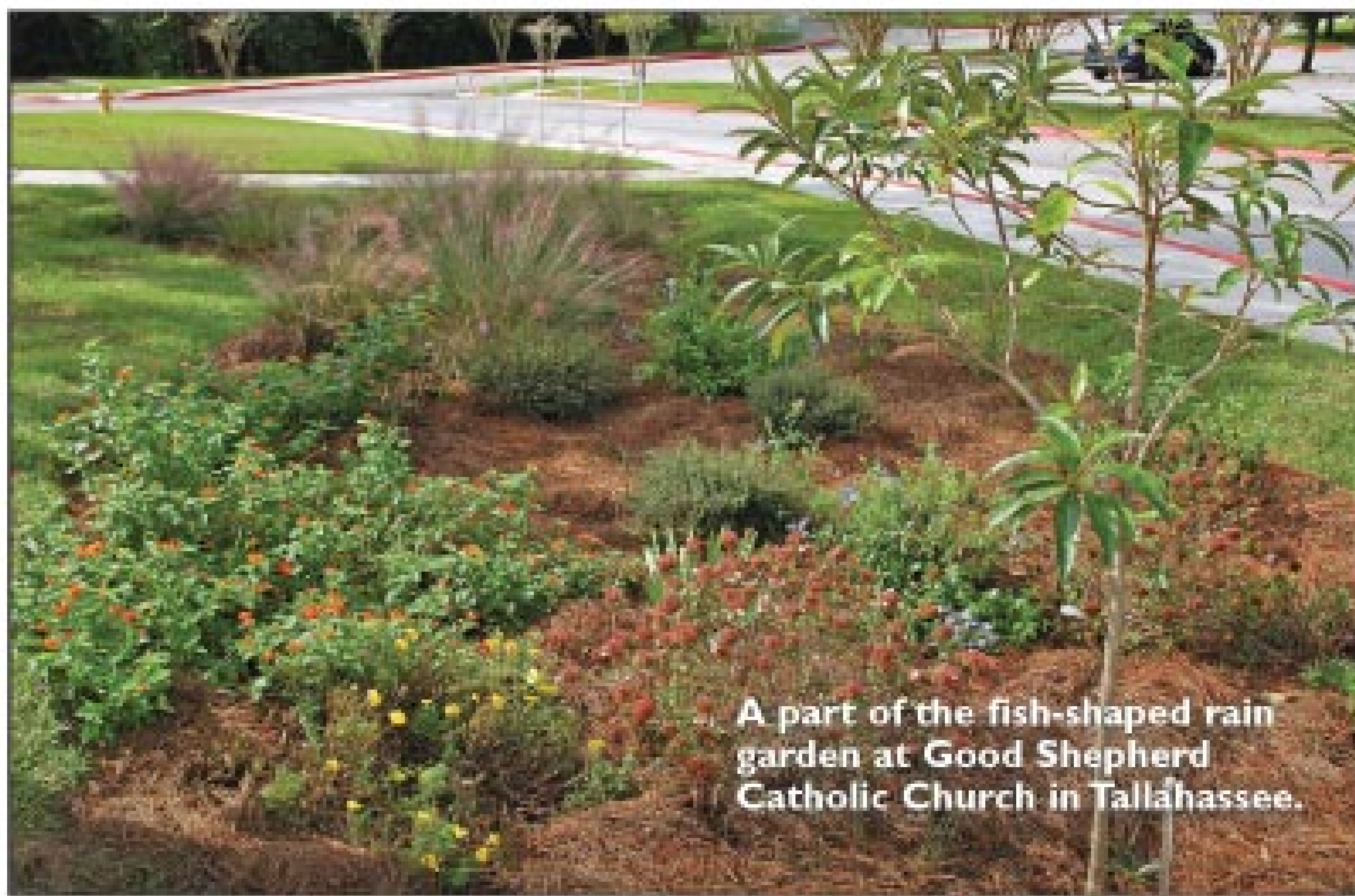
EMPLOYEES:
20

ANNUAL RAINFALL:
66 inches

INFRASTRUCTURE:
350 stormwater detention ponds with sand filters

OPERATING BUDGET:
\$11.9 million (stormwater and flood control)

WEB SITE:
www.tappwater.org



A part of the fish-shaped rain garden at Good Shepherd Catholic Church in Tallahassee.

GOOD SHEPHERD

Rain gardens are among the most successful elements of the TAPP (Think About Personal Pollution) Campaign in the City of Tallahassee Stormwater Management Group. "Residents continually say that they knew stormwater runoff was a problem, and they wanted us to tell them what they can do about it," says John Cox, program manager.



Good Shepherd rain garden plan. (Photo courtesy of John Cox)

Literature developed by the TAPP team explains how to build rain gardens without using heavy equipment. A Section 319 Nonpoint Source Management Program Implementation grant from the U.S. EPA helps pay for the plants, mulch, and compost when residents install rain gardens.

"We take before-and-after pictures and annually check the gardens to make sure homeowners haven't plowed them up," says Cox. "We use them as demonstration projects illustrating what individuals can accomplish."

Perhaps the stormwater group's most unique rain garden prevents runoff from the roof of Good Shepherd Catholic Church from eroding the front lawn. Fred Lorenzo, Ph.D. in landscape design and management, and Yun Cao, landscape architect, designed the garden in the shape of a fish, the symbol of Christ.

The fish appears to be swimming upstream toward the sanctuary. Pink Muhly Grass in the tail gives the illusion of motion, and a fringe tree represents the eye. The day after the parishioners completed the garden, a downpour put it to the test. The garden slowed the flow, capturing the rainwater from the roof.

projects. The TAPP campaign introduced an outreach component, educating homeowners on how small changes in their habits and yard-care practices can reduce water pollution. In 2008, the Florida Stormwater Association honored Tallahassee with its Outstanding Achievement Award.

Turn on the TAPP

In 2003, the Ochlockonee River, Soil, and Water Conservation District began the TAPP program as a public-private partnership. Three years later, management responsibility shifted to the city. The TAPP team combined outreach with an award-winning media



John Cox, grant manager for the Think About Personal Pollution (TAPP) campaign, in front of a typical TAPP information stand, one of many around the Tallahassee area.

campaign of 30-second public service announcements about nonpoint personal pollution.

"At the time, nobody was thinking about how using too much fertilizer affects water quality, or how soil erosion from lawns and construction sites clogs waterways with silt," says Cox. "The team's first goal was to make citizens aware of the most common personal pollution sources."

The campaign adopted the motto: "Every drop you lose, nature finds." It urged residents to slow the flow by using simple methods to reduce pollution. In time, public service announcements, publications such as the *TAPP Guide to a Water-Friendly Yard*, and other outreach manuals became part of the Florida's stormwater toolbox.

One of the most successful spots, using the TAPP duck, aired all over the state. As a cha-cha plays, a yellow rubber duck (representing pollution) floats in runoff down a driveway. He is joined by more and more ducks as they bob down a street. An aerial shot of the neighborhood then shows all the streets bright yellow with ducks.

Close collaboration

The public service announcements are a collaboration between the stormwater management group and the TAPP team. From 2004 to 2007, the campaign focused on

creating an awareness of the problem. In 2008, more action-oriented messages encouraged changes in people's habits to help protect water quality in the area's three major lakes, whose watersheds

"At the time, nobody was thinking about how using too much fertilizer affects water quality, or how soil erosion from lawns and construction sites clogs waterways with silt. The team's first goal was to make citizens aware of the most common personal pollution sources."

John Cox

comprise most of Tallahassee.

"Our latest announcement reminds pet owners to clean up after their dogs," says Cox. "That's a difficult topic to put on film without offending someone's sensibilities, so we went with suggestive imagery."

The 30-second clip shows a man dispensing chocolate soft-serve ice cream, a potter forming a cone of brown clay, a chef grinding meat into sausage casings, a wife heaping chocolate whipping cream



Workers install an advanced drainage system at the City Hall Renaissance Building.

Retrofits

The stormwater group's most challenging retrofit is also one of the only regional stormwater treatment facilities in north Florida, and the only one in Tallahassee.

Florida State University (FSU), surrounded by the city, had very little land near its campus for an expansion. FSU officials offered to donate 20 acres on the campus periphery if the city would build the required stormwater facility. The stormwater group saw more low-hanging fruit.

"We built Lake Elberta to treat 400 acres," says Cox. "About 200 acres are reserve capacity for new development." The facility, now a park, also provides enhanced treatment for the heavily developed area upstream.

Much of the city's conveyance system involves open drainage ditches dug primarily for mosquito control years ago. Besides cleaning and reshaping the ditches, swales,



Lake Ella was the first stormwater treatment lake constructed in Tallahassee.

Lake Ella, a 12-acre stormwater facility in a 150-acre watershed. The alum flocculates suspended solids and nutrients such as phosphorus, sequestering them on the bottom of the lake.

When it rains, sensors in the storm sewers detect a rise in water levels, activating pumps that inject the alum. "Alum really enhances and quickens sedimentation," says Cox. "Lake Ella was the first such stormwater facility built in Florida, and it remains our most popular lake. While it provides a significant amount of stormwater treatment, all visitors see is blue water."

The stormwater group is considering upgrades to Weems Pond, a 14-acre lake on an 11,000-acre watershed, using the same technology. During rainstorms, water flows too quickly through the system, affecting treatment performance. "We're going to install alum injection units and see how much improvement we get," says Cox.

Lake Ella and Weems Pond are examples of picking the low-hanging fruit — facilities with characteristics that can be upgraded to enhance performance without acquiring land. Stormwater managers arrived at the concept after a detailed analysis projected a cost of \$800 million to retrofit stormwater facilities in just 70 percent of the city's 110 square miles. "We knew no one would adopt that idea," says Cox.

"Alum really enhances and quickens sedimentation. Lake Ella was the first such stormwater facility built in Florida, and it remains our most popular lake. While it provides a significant amount of stormwater treatment, all visitors see is blue water."

John Cox

on cake, and a SWAT team member smearing brown camouflage grease on his face. The message to pick up the poop is delivered over the aria "La donna è mobile" from Verdi's *Rigoletto*.

"We know people are watching because the spots generate a lot of heat," says Cox. "Within 24 hours after airing this one, we began receiving positive and negative feedback. Our goal to get people talking was successful."

Cox estimates that Tallahassee dogs generate 20 tons of excrement per day. "If one-half inch of rain delivers 10 percent of that waste to our storm drains, it

increases our permitted bacterial level of 400 units per 100 ml three-fold," he says. "And this is only one source contributing coliforms. We have many others."

Duck magnets

The city has 350 stormwater management facilities (detention ponds), operated and maintained by the Streets and Drainage Department. Most were built by private contractors, but all attract ducks and other wildlife.

To keep the water quality good despite the nutrient influx, stormwater staff members inject alum into storm sewers discharging into

and major canals, the Streets and Drainage Department repairs damaged drainage structures, dredges and stabilizes outfall ditches and ponds, and controls weed and brush growth. Crews mow stormwater facilities at least twice a year and perform major maintenance as needed.

"We're also one of few Florida cities to inspect stormwater facilities in new residential areas," says Cox. "Public and private facilities require operation permits and must be inspected every three years."

The ERU funds these activities. At \$7.29, the fee brings in \$1.7 million annually per dollar of rate charged. It is in its fourth year, and the rate will increase to \$7.95 by October 2010. An ERU represents a single-family dwelling with an average 1,990 square feet of impervious area. Residential customers are charged one ERU per month.

Doing their part

The city uses the fees to fund capital improvement projects and

announcements in the media have the desired effect, Cox sees public attention shifting to the Internet. The TAPP Web site attracts 1,500 visitors a month, and half are interested in rain barrels and rain gardens. In response, upgrades are planned that will make the site more interactive and informative. "We're also on Facebook, and some messages have found their way onto YouTube," says Cox.

In spring 2011, the site will add Web automated human interaction



The structure at center left is the major stormwater input to Abbiegail Pond, a wet detention facility in the headwaters of Lake Jackson. The structure includes substantial hardware for trash and debris collection to help maintain the pond's appearance. (Photo courtesy of John Cox)

its share of the TAPP grant program. Cox is quick to drive home the message to residents that the stormwater group can continue building costly facilities, but that a lower-cost alternative is for them to do their part by reducing the pollution load so fewer structures are needed.

One source of such pollution, and another key element in the TAPP campaign, is lawn fertilizer. Native clays are rich in phosphorus, and sheet erosion over denuded ground is the primary culprit for conveying that element to the lakes.

TAPP messages urge homeowners to test their soil before fertilizing, and to look for the zero P on bags of fertilizer if the soil has sufficient phosphorus. The city went one step further, adopting a fertilizer ordinance requiring commercial and institutional applicators to be licensed.

While the public service

from Wahi Media in Tallahassee. The video-based platform communicates TAPP messages by simulating human conversation. With each interaction, the program learns about the viewer, tailoring messages based on replies to questions. At the same time, it stores the responses in real time for the team to analyze.

Whether it's a banner at sporting events, information booths at community activities, workshops, or flyers mailed in utility bills, Tallahassee residents are learning to reduce stormwater pollution loads bit by bit by Thinking About Personal Pollution. ♦

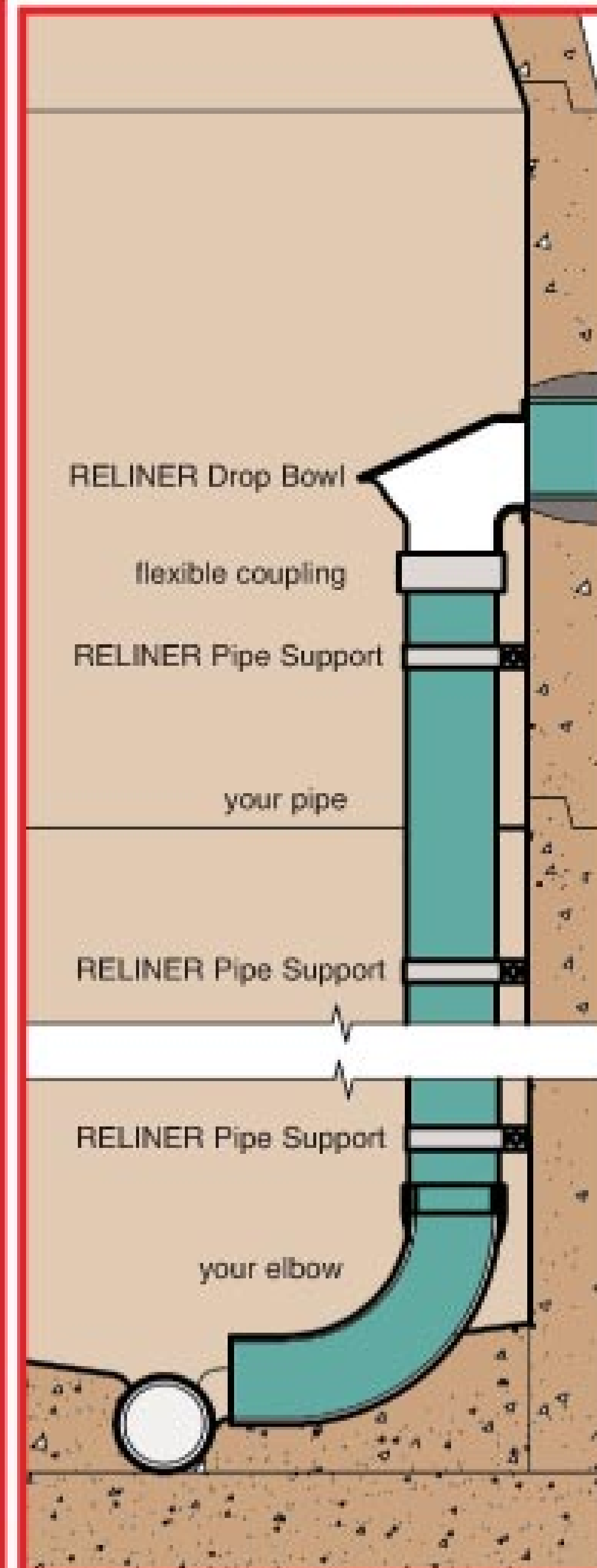
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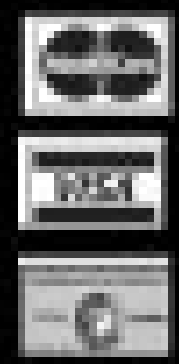
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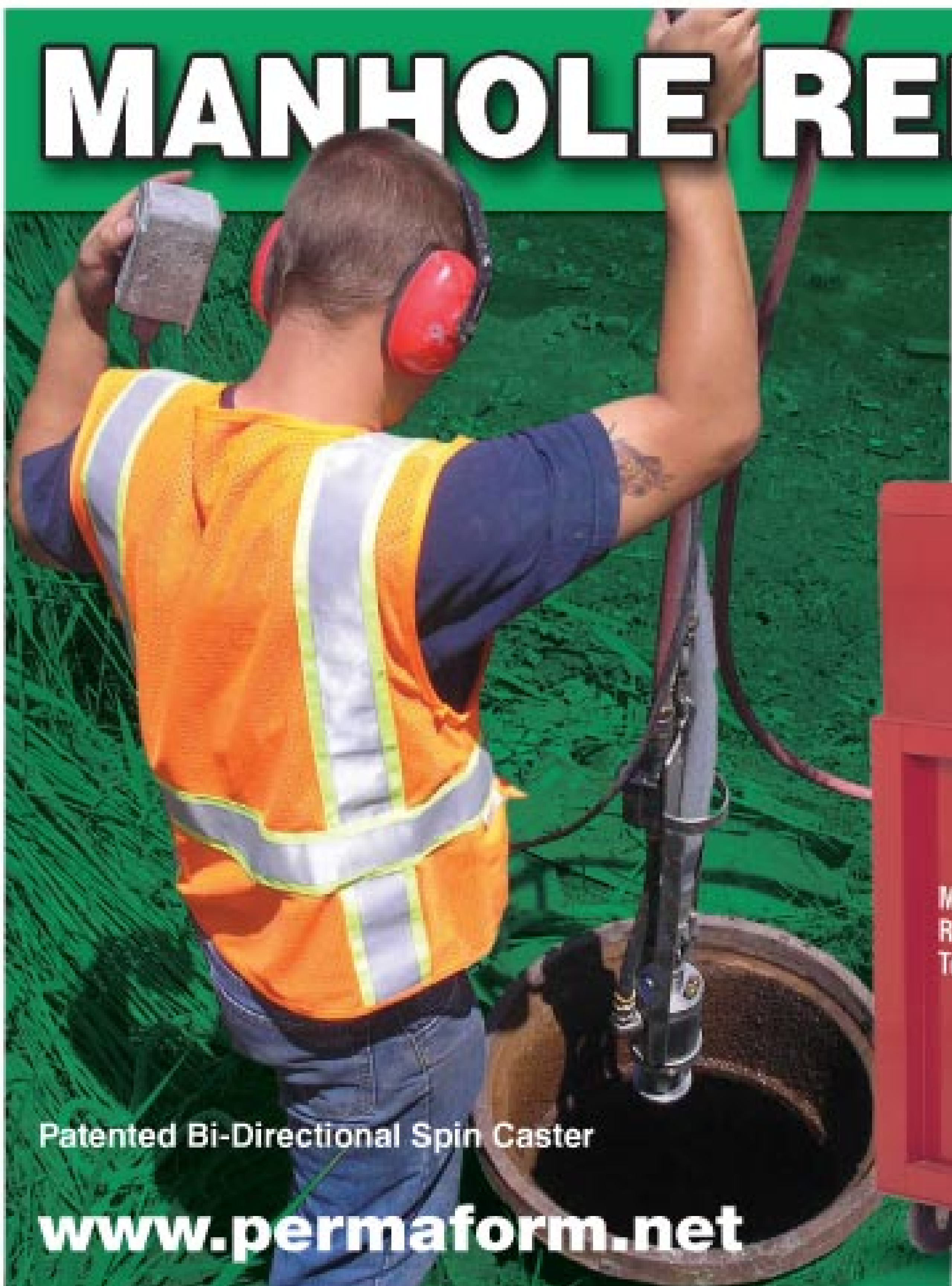
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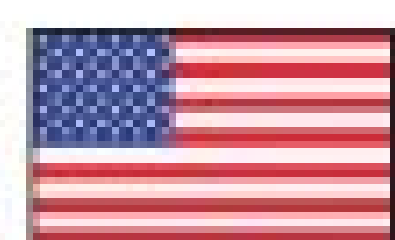
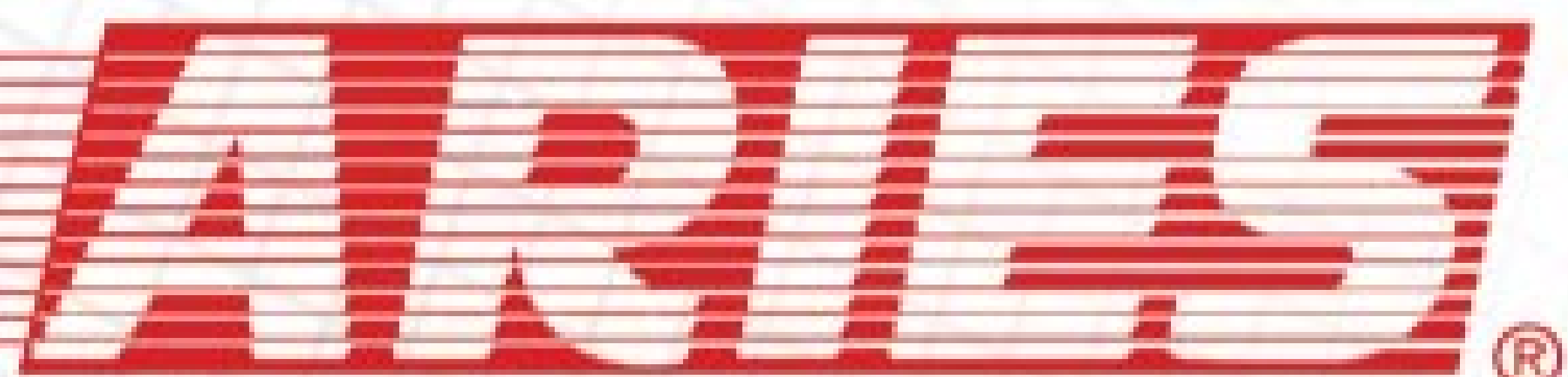


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SIMPLE THINGS DONE RIGHT

Marietta Water has earned repeated First Place awards for excellence in quality and service, using ordinary tactics, executed with great finesse

By Dan Heim

The Georgia Association of Water Professionals (GAWP) gives two major awards every year: Water Distribution System of the Year, and Wastewater Collection System of the Year.

Marietta Water won the former in 2001, 2005, and 2007, and the latter in 2008. Bob Snelson, water and sewer director, notes, "The inspectors that do these evaluations are experts in the industry, and to have them select us as best of the best is a tribute to the hard work our staff puts out each day to provide high-quality and reliable service to our customers."

The awards are made in three categories based on number of customers: under 10,000; 10,000 to 50,000 (Marietta's category); and over 50,000. There are 14 cities in Marietta's category. "Typically, only six to eight cities will subject themselves to the GAWP inspections," says water and sewer superintendent

James Wells. "So we are most definitely in competition with the best of the best."

System details

Marietta Water is responsible for drinking water distribution and wastewater treatment. Stormwater is handled by a separate department. The distribution division serves 25 square miles with 18,000 meters and a population of 67,000,

"Typically, only six to eight cities will subject themselves to the GAWP inspections. So we are most definitely in competition with the best of the best."

James Wells

overseeing 330 miles of distribution pipe, a mix of ductile iron, cast iron, concrete and PVC.

Forty percent of that pipe is less than 20 years old, 35 percent is 20 to 40 years old, 20 percent is 40 to 60 years old, and only 5 percent is older than 60 years. An inspec-



Water and sewer superintendent James Wells takes readings from a distribution pump station. Marietta Water has found success by sticking to the basics of sound water system maintenance. (Photography by Harris Hatcher)

tion program is scheduled to cover about 20 percent of the system each year.

Elevations in Georgia range from sea level to 4,787 feet at Brasstown Baldy. Within the Marietta service area, elevations range from 1,000 to 1,346 feet. Service pressure requirements are met with a combination of two elevated storage tanks and three pumping stations.

All water for distribution is pur-

chased from the Cobb County Marietta Water Authority, which draws from Lake Allatoona and the Chattahoochee River. The area has experienced drought since around 2000, but these two bodies of water have been able to meet Marietta's system demand of 8 mgd.

PROFILE:

Marietta Water,
Marietta, Ga.

WATER SERVICE:
Urban and suburban
Marietta, Ga.

SERVICE AREA:
25 square miles

POPULATION:
67,000

EMPLOYEES:
30

INFRASTRUCTURE:
330 miles of water mains,
3 pump stations, 2 elevated
storage tanks, 18,000 meters

EQUIPMENT:
7 service trucks, directional
drilling machine, 2 backhoes,
2 mini-excavators, payloader,
tandem dump truck,
leak-detection equipment

ANNUAL BUDGET:
\$3 million capital, \$2.1 million
operations (distribution)

WEB SITE:
[www.mariettaga.gov/
departments/utilities](http://www.mariettaga.gov/departments/utilities)



Josh Townsend and Mark Crutcher jet a sewer line in preparation for inspection with a crawler-mounted camera.

H2Opportunity

Typically, water industry professionals quietly do their jobs in the background and help keep the clean water flowing. The Georgia Association of Water Professionals (GAWP) felt it was time to bring the profession into the limelight, create some focus on the industry, and attract much-needed new talent.

The GAWP outreach program, H2Opportunity, (subtitled "Career Paths for Water Protection from GED to Ph.D.") is designed to do just that: It gives students in Georgia a renewed sense of water issues in the state and highlights the benefits of a job in the water industry.

Engineers go to high schools and colleges with the aim of attracting the best and brightest into the field, explaining the importance of the work and the current career opportunities. The positive aspects of a career in the water industry most noted are:

- Job availability.
- Employment stability.
- Health care and retirement benefits.
- Personal sense of meaningful public service.

In addition, the visiting engineers talk about personal insights, including what attracted them to the industry, the kind of training that best prepared them, how they got their first job, thoughts about current water issues, and what keeps them in the business.

GAWP has also created a blog to support H2Opportunities. It solicits members' thoughts and ideas, articles, and industry-related experiences. Links to videos relevant to the industry are featured, along with links to other media online and in print.

Judging from the visitor count (nearly 6 million as of late 2009), the blog is highly successful in attracting readers. Visit <http://h2opportunities.blogspot.com>.

Routine maintenance includes the usual repairs to water main leaks, breaks, and other reactive work orders, which generate an average of 3,400 work orders each year. Scheduled activities include exercising valves and inspection of tank and pump stations. Water mains are routinely flushed to ensure water quality. Further, all 18,000 meters are inspected at set intervals and repaired or replaced as needed. Meter maintenance and repair is critical to reducing unbilled water.

Conservation efforts

One thing GAWP considers in its evaluation is water conservation — both belowground leaks and aboveground waste. Marietta Water has a strong education and enforcement program and uses a staggered lawn irrigation schedule: Even and odd street addresses are keyed to specific days of the week.

Blatant waste, such as water gushing out of a broken sprinkler head, a hose left running, or water running off the property into the street, brings a written warning.



Brian Bickers observes a sewer line from an inspection van console.

The second offense brings a \$100 fine, third offense a \$500 fine, and fourth offense a \$500 fine and service shut-off.

"In the first year of enforcement, some 900 warnings were sent out, with only a single case escalating to a \$500 fine," says Tim Marshall, environmental compliance coordinator. "These days, public compliance is excellent, thanks to our outreach and education programs."

Snelson adds, "Our meter readers recognize excessive con-

sumption when they see it, and flag that home for a follow-up visit by an inspector. If it's an internal leak, we help them find it and there's no fine involved. If it's waste, they get a written warning and a follow-up inspection to ensure compliance."

During all of 2008, only a few written warnings were issued. People increasingly understand the need for conservation. In addition to the "stick" of fines, there are plenty of "carrots" available on the Marietta Water Web site to help reduce water consumption. They include:

- Rebates for installing low-flush toilets,
- Instructions for constructing rain barrels,
- Free household water-use audits,
- Xeriscaping strategies,
- Tips for saving water in every room of the house, as well as the yard and pool.

Each year Marietta holds a Clean Water Week with the support of local media, focusing on educational outreach to schools,



Members of the Marietta Water team show some of the agency's awards for excellence. From left are Lee Neal, meter maintenance supervisor; Troy Huebner, distribution supervisor; Stephen Johnson, maintenance and repair foreman; Bob Snelson, water and sewer director; James Wells, water and sewer superintendent; Levander Hines, meter service worker; Ernest Bartholomew, pump station maintenance foreman; and Brian Bickers, collections supervisor.



Maintenance and repair foreman David Sharp; system operator 2 Danny Ferrell; and distribution supervisor Troy Huebner use Vermeer equipment to perform valve exercising and hydrant flushing.

community groups, and customers. Overall these conservation efforts resulted in a 2 percent drop in consumption during the drought.

Infrastructure upgrades

GAWP also looks at the distribution system itself, including inspection cycles, infrastructure condition and upgrades, pumping efficiency, and maintenance and repair equipment. This is yet another

area where Marietta excels.

The Capital Improvements page on Marietta Water's Web site lists recent and near-future projects. Diligent coordination with other utilities ensures the roads are dug up only once for water-system repairs. That saves money and time and makes for happy customers.

Although GAWP conducts no customer surveys, Marietta does,

and it makes the results available to the GAWP inspectors. Troy Huebner, water distribution supervisor, proudly notes, "We get good marks on those surveys. We are strongly oriented to customer service, and our people have been consistently rated as friendly, helpful, and dependable. We actually get unsolicited letters from satisfied customers."

Marshall adds, "We really try to be community-based in our approach. When we get a call about a water leak, or a report of blatant waste, we're on it in less than 24 hours, often in just a few hours. Our response time is something we're justifiably proud of."

And it seems the federal government is satisfied, too. Last year Marietta Water received a President's Volunteer Service Award from the President's Council on Service and Civic Participation. The award recognizes Marietta's volunteer service, including work by department personnel with schools, parks, and environmental groups.

Workforce stability

"The people on our staff are really top-notch," says Snelson. "On the management side, we've got about 50 man-years of experi-

"I have to say, this group of young women and men at Marietta Water are some of the best that I have ever had the privilege to work with. They deserve the accolades. We wouldn't be getting these awards without them."

Bob Snelson

ence on this job. The newest guy has been with us for eight years, the oldest for 25 years.

"And our men in the field, our operators, really know their job and how to best use our equipment assets. They are required to get full certification within one year of hire. Even with typical turnover rates, at any given time, about 85 percent are certified. We put a lot of focus on having the best people out there doing the real work.

"I am a Lieutenant Colonel in the Marine Corps with over 20 years service, retired from active duty in 1988. I have to say, this group of young women and men at Marietta Water are some of the best that I have ever had the privi-

lege to work with. They deserve the accolades. We wouldn't be getting these awards without them."

Certification is provided by the Georgia Board of Examiners for both water and wastewater operators. Ten years ago, Marietta partnered with Chattahoochee Technical College, which has its main campus in Marietta, to provide a 10-week training course before the certification exam. The course is structured around a field-study training program developed at California State University in Sacramento.

But that's not all. In an effort to attract more people into the business, GAWP has initiated the "H2Opportunity" program (see sidebar). Marietta Water's own Kim Holland led the initiative as the committee chair for the GAWP. Engineers go to local high schools and colleges aiming to attract the best and brightest into the field, explaining the importance of the work, career opportunities, and the personal satisfaction that public service brings. Because of Marietta's extensive participation, GAWP cited that program specifi-

cally in presenting the most recent System of the Year award.

Where to from here?

With the winning record already on the books, it may seem there's little room for improvement at Marietta Water. Says Wells, "It's not like we're doing anything fundamentally different than other cities. We're just doing it extremely well, and we all have a real sense of pride in our accomplishments. Our people are both talented and motivated."

The GAWP awards are structured so that no city can win the same award two years in a row. With a win for Wastewater Collection System of the Year in 2008, Wells decided to apply for neither in 2009. Instead, Marietta Water will go for wins in both categories (water and wastewater) for 2010. ♦

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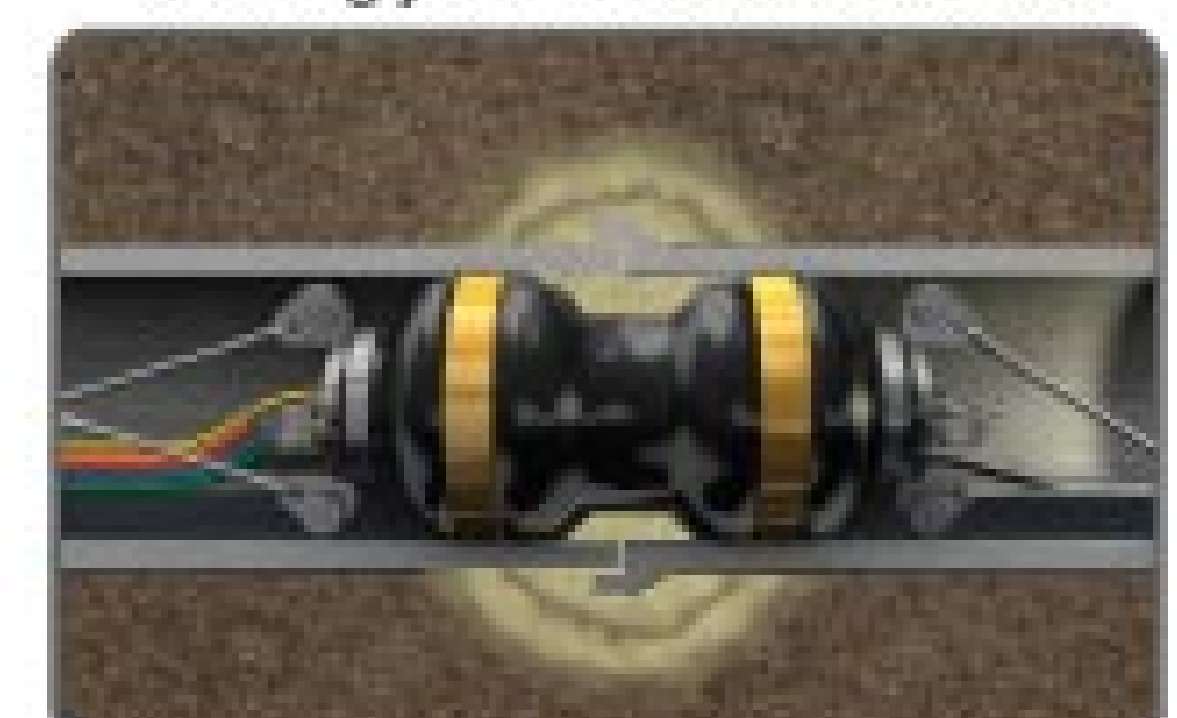


Grout curtain stops infiltration

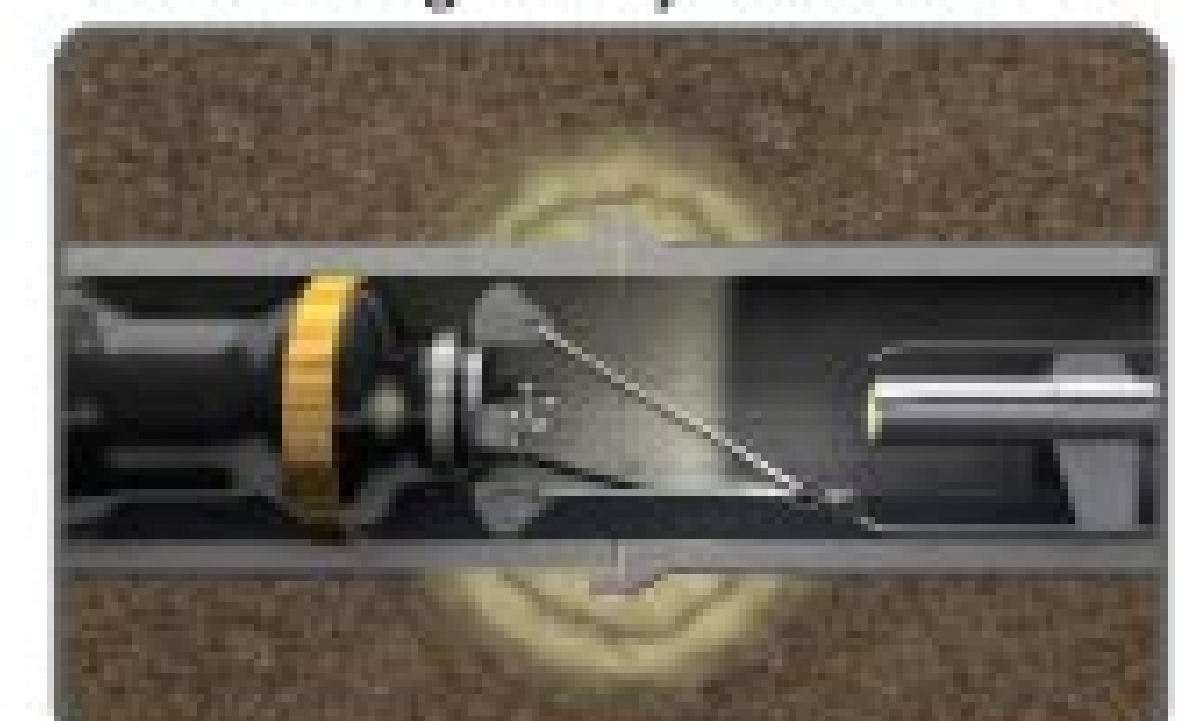
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INSPECTION BY ROBOT

The Solo robotic inspection system from RedZone Robotics helps communities achieve substantial increases in productivity in the field phase of studies

By Gil Longwell

Contractors and municipalities are constantly alert for ways to make the process of inspecting underground pipes less time- and labor-intensive, especially in the field.

That explains the interest in side-scanning devices that quickly record panoramic images of the entire pipe circumference for later review in an office setting. That technology greatly reduces data-gathering time in the field.

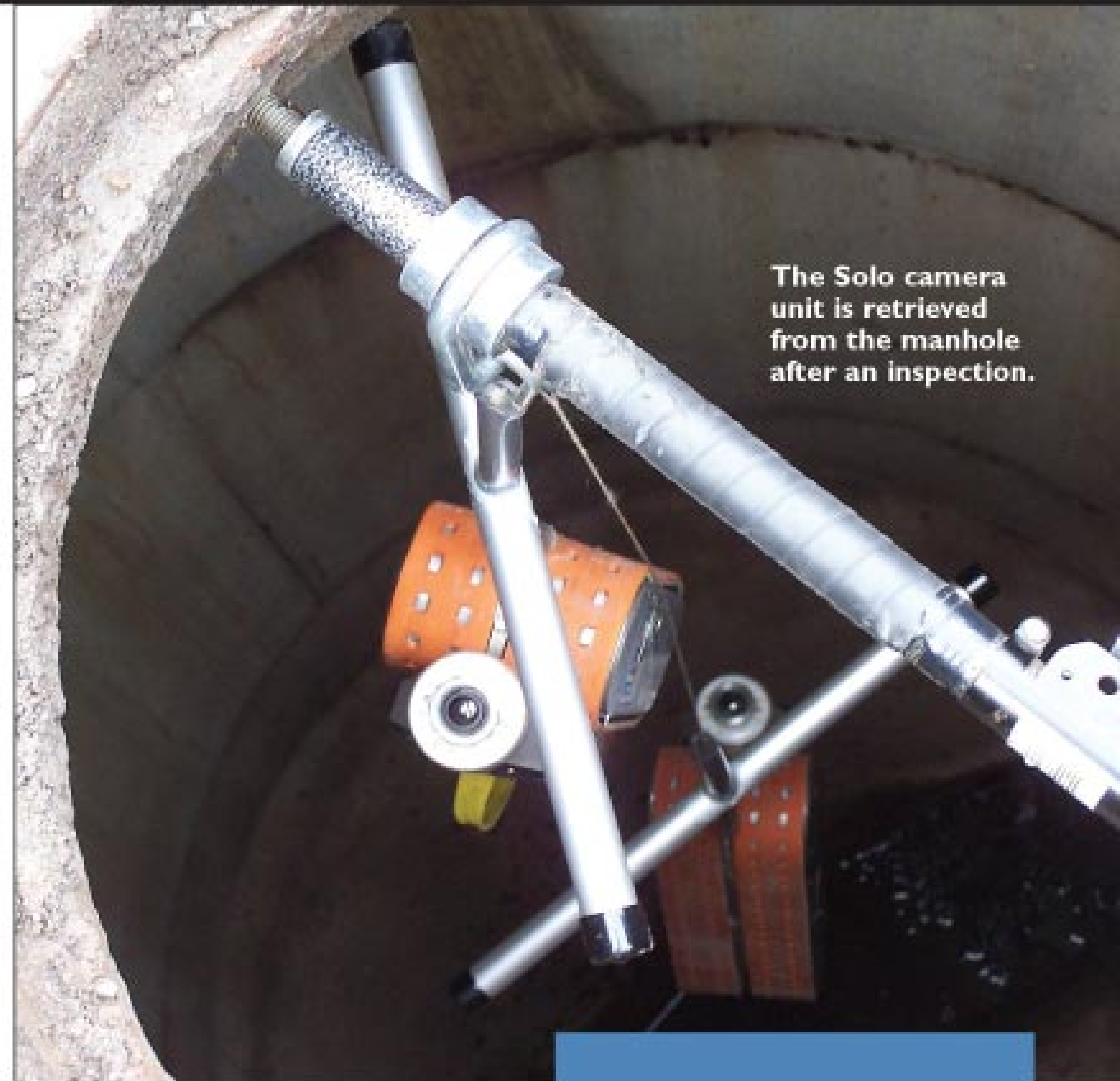


A technician tightens the hanger bar inside the entry manhole. The robotic crawler is tethered to this bar.

The Solo robotic pipe inspection system from RedZone Robotics Inc. has a similar benefit. The system includes a fully autonomous robotic crawler, camera platform, image capture, and data-storage device. Available only as a leased unit, it eliminates capital investment in inspection equipment and the need for highly trained field inspection technicians and dedicated, specialized support vehicles.

Because the lease includes data archiving, interpretation, comprehensive condition reports and access to interactive online asset management tools, owners of even small infrastructure networks can get the benefit of top-of-the-line inspection and analysis technology.

The Solo system enables a single, modestly trained field technician to investigate and document multiple runs of 8- to 12-inch pipe simultaneously. The only limit to the number of simultaneous investigations is the number of camera units on hand and the technician's agility at sequential deployments and retrievals. The manufacturer says a technician typically can keep four units busy.



The Solo camera unit is retrieved from the manhole after an inspection.

RedZone Robotics personnel demonstrated the technology in the City of Pittsburgh, Pa. On hand were project manager Chris Atwood, marketing director Phil Johns, Solo technician Doug Soxman, reporting technician Jennifer Costello, and lead reporting technician Martin Breit.

Walk-around

The Solo unit, with or without attached cameras, appears symmetrical. Prominent on both ends of the cameras are LED light arrays that encircle the lenses, which in turn are protected by a transparent, field-replaceable plastic bubble. Cameras have a 360-degree field of view.

On close observation, the aft end is distinguishable by a back plate, from which emerges a small-diameter, Kevlar-like cord with its end tied in a loop. The cord is part of the control mechanism. Other points of asymmetry are the green start button, a data port, and the product nameplate, all on only one side. Data capture is totally symmetrical: As the device moves forward, it captures images from

TECHNOLOGY TEST DRIVE

EQUIPMENT:

Solo autonomous inspection robot and ICOM3 software

MANUFACTURER:

RedZone Robotics Inc.

LOCATION OF DEMO:

Pittsburgh, Pa.

DEMONSTRATED BY:

Chris Atwood, project manager; Phil Johns, marketing director; Doug Soxman, Solo technician; Jennifer Costello, reporting technician; and Martin Breit, lead reporting technician, all with RedZone Robotics

PRICE:

Leases are negotiated based on length of use, number of units needed, and other factors

fore- and aft-facing cameras.

The most noticeable and colorful components are the pair of 2-inch-wide orange treads that resemble those of a military tank. One component of conventional inspection camera-crawler platforms is missing: There is no control or



Left, a data overlay on the control screen shows basic information about the pipe being inspected. Right, an image from inside a pipe shows a plugged lateral.



umbilical cable. From the moment the operator deploys the crawler and starts a traverse until he retrieves it, there is no direct human interaction. Deployment requires three other devices:

- A traditional telescoping deployment pole with hook, used to place the crawler into the flow channel in the manhole.
- A telescoping, compression-secured hanger bar installed at the top of the insertion manhole (the short cord is clipped to this bar).
- An armored laptop computer with WiFi communications capabilities that transmits location and pipe information to the crawler and is used to send it on its way.

Protected in the pressurized crawler body are rechargeable batteries, an onboard computer, and sensors that keep the crawler centered in the pipe's channel and let it discern when it emerges from the pipe at the next manhole. Hidden in the back of the body, a reel maintains slight tension on the cord as part of the condition-sensing system.

At the end of a day's field deployment, at a jobsite trailer, workshop or the user's office, battery chargers and a redundant mass data-storage unit known as the Vault support the robot's work. The Vault automatically downloads the day's collected data and image files from up to eight robots using Ethernet cable connections.

A palm-sized hard drive is used

to transport the data from the Vault to the RedZone Robotics offices in Pittsburgh. Data is sent by UPS or similar service on a weekly basis. Resident in RedZone headquarters are an array of data-storage devices and a computer system that enables highly trained reporting technicians to perform condition assessments and manage users' information.

The system provides 16 GB of onboard data-storage capacity,

The Solo system enables a single, modestly trained field technician to investigate and document multiple runs of 8- to 12-inch pipe simultaneously. The only limit to the number of simultaneous investigations is the number of camera units on hand and the technician's agility at sequential deployments and retrievals.



enough for about 10,000 linear feet of inspections. Battery life in the crawler is adequate for two typical 400- to 500-foot traverses. Traverse speed is up to 30 feet per minute.

Operation

The equipment package demonstrated included four Solo robots, vault, extra batteries, a battery charging system and all related hardware. It also included the armored laptop, data analysis and reporting, and limited use of ICOM3 survey software.

The first part of the demonstration took place next to the RedZone office in the Lawrenceville neighborhood of Pittsburgh, in an 8-inch sewer pipe owned by Pittsburgh Sewer and Water. Soxman and Johns demonstrated the system in the field.

In the office, Costello and Breit demonstrated image interpretation and report preparation using NASSCO PACP standards. Atwood



An armored tablet computer with WiFi capability transmits location and pipe information to the crawler and is used to send the unit on its way.

was present throughout, detailing the continuity that bridges individual tasks.

For the field demonstration, traffic cones were positioned around the SUV deployment vehicle parked beside the entry manhole. (In routine use, because the manhole would be open for only a short time, state Department of Transportation Work Zone Traffic Control regulations would not require "work zone" signage.)

With cones in place and the manhole cover removed, Soxman positioned the telescoping hanger bar at the top of the manhole, just below the lid-supporting lip, so that the lid could be replaced without disturbing the hanger bar. The tension-secured bar is a firm reference point (benchmark), from which the Solo unit measures its surroundings and interprets its situation.

Before insertion of the crawler, the end of the cord is slipped through a lightweight anti-chafing guide (tiger tail). The end is then secured to the hanger bar using an aluminum snap clip. The crawler is then lowered using the hook.

After a lights check to verify that the unit was properly responding to inputs from the laptop, Soxman sent it on its way. Additional robots could be deployed in each of any other pipes that enter or leave the same manhole. After all units are deployed, the manhole cover is

replaced, and the operator moves on to the next manhole.

When it began to emerge from the pipe and enter the next manhole, the robot sensed the absence of a confining pipe, continued for a few feet, and stopped. This allowed the cameras to capture images of the manhole chimney.

After validating the sensor information three times, the device returned to the insertion manhole. This same sensing capability prevents it from falling into the abyss of a wet well. The robot would also return to the insertion manhole if it had met an obstacle that prevented forward movement.

When the crawler returned to the insertion manhole, the treads disengaged, and using the cord, it hoisted itself to a point just below the hanger bar, where it waited for retrieval, which required the same limited traffic safety as for insertion.

Before and after each traverse, to assure that all of the systems

Solo units are placed into a docking station for download of the data collected.



and sanitation issues — important because the field technician typically replaces the rechargeable batteries after two traverses.

The RedZone headquarters in Pittsburgh is both a data-interpretation facility and an engineering lab. When the portable storage device arrived at the office, it was

standards. Although the report writer perceived a movie-like display as the robot moved through the pipe, the images were actually a series of still photos stitched together by an automated movie-making software tool. The images enabled the technician to view panned, tilted and zoomed views through a full 360-degree field of view.

The report writer inserted electronic bookmarks into the data stream whenever he noted a defect, lateral connection or other feature. These allow future viewers to move from issue to issue without fast-forwarding. Each bookmark contains condition data saved to a database file.

Databases from multiple traverses are aggregated, enabling systemwide insights and planning. The file can be searched for defects of a specific type. This feature also enables tabular data presentation. In a similar manner, a start-to-finish, issue-by-issue report can be generated.

After the report was completed, a technician ran it through a quality assurance-quality control process. The electronic database and visual data file of each pipe segment were then burned to a DVD. Large data files may be saved to a small transportable hard drive. The storage device and hard-copy reports then can be mailed to the client.

With the data in hand, clients can use RedZone's ICOM3 online asset management software. Infra-

structure owners can plan maintenance and management programs, estimate materials needs, create project budgets, set work priorities, and do for themselves tasks usually reserved for engineers. Draft plans can be reviewed and verified by the owner's in-house engineer or sent to a consultant.

Observer comments

Deployment vehicles can be parked near, but need not be directly next to, the insertion manhole. On busy streets, the absence of a parked vehicle at the manhole could reduce operator safety, but this could be overcome with a safety flagger.

As long as the technician can carry the 22-pound Solo unit to the manhole, the pipes entering the manhole can be inspected. Considering the nature of the work environment, cleanup and disinfection for worker safety are essential. This becomes a greater concern when a client uses a personal SUV or van as the deployment vehicle.

Manufacturer comments

"We have never had to dig up a Solo," says Johns. Atwood adds, "There is no feeling like dropping four robots, eating lunch and retrieving complete inspection data on 1,200 feet of pipe."

The unit is pressurized to prevent liquid intrusion. Its external components are resistant to high- and low-pH environments. "On average, clients are inspecting 3,000 to 5,000 linear feet of sewer per day," says Atwood. "Operators experienced in traditional CCTV inspection can increase their productivity 300 to 400 percent."

Johns observes, "The lease package provides everything an infrastructure owner needs except a deployment vehicle and traffic safety cones." ♦

"There is no feeling like dropping four robots, eating lunch and retrieving complete inspection data on 1,200 feet of pipe."

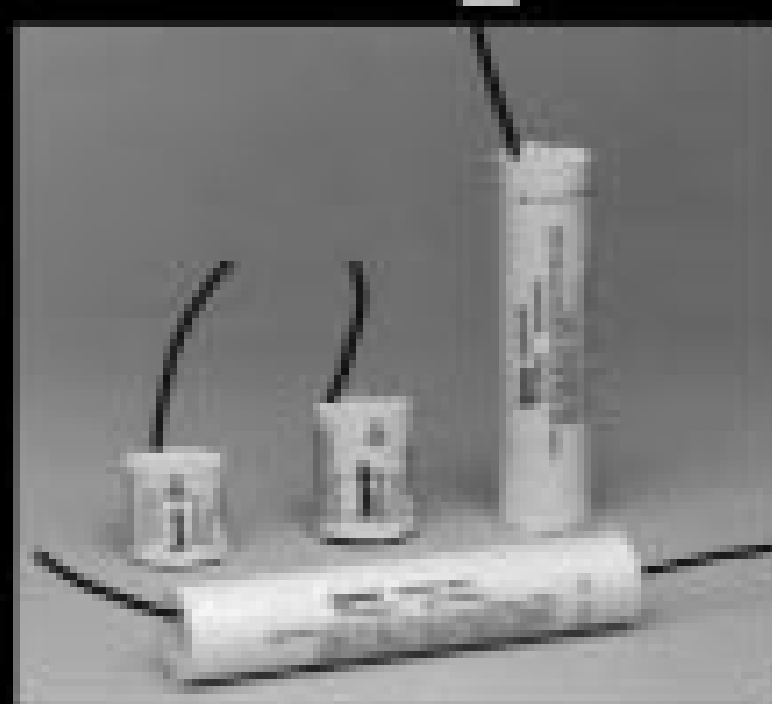
Chris Atwood

were performing as intended, the technician used the laptop and reviewed the camera views and captured images. After retrieval, the robot was cleaned using a garden-type sprayer supplied with the package. RedZone also specifies a degreaser. This addresses health

taken to the main data download and storage facility, where redundant copies were archived.

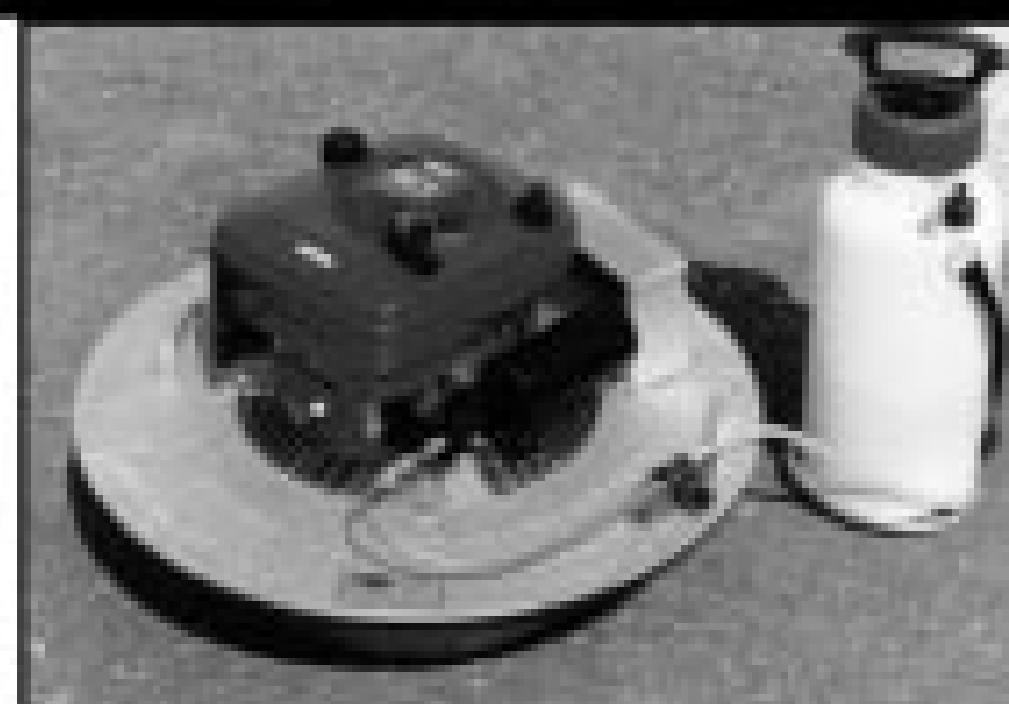
Once stored, a report technician reviewed the collected images, adding condition notes using NASSCO's Pipeline Assessment and Certification program (PACP)

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DEVOURING TROUBLE

Centrifugal chopper pumps in a major lift station put an end to frequent plugging that drove up costs and threatened SSOs

By *Scottie Dayton*

The Jefferson Street Pump Station in Centralia, Wash., handles one-third of the city's sewage from six other pump stations and a 24-inch interceptor line. The average flow is 350,000 gpd. In 2002, lead wastewater collection technician Greg Boone began noticing disposable wipe products in the waste stream. "When Jefferson backs up, it's a large area, so we take immediate action even if one pump clogs," he says.

Routine weekly maintenance involved two technicians entering the dry well and visually inspecting the twin 10-year-old submersible pumps. At first, the men had one plug per week. Then it became twice a week — often after hours. It took them two hours to pull and clear the pump. By 2007, the crew amassed more than 40 overtime instances besides the clogs that occurred during work hours.

"I remember saying grace at Thanksgiving one year when the phone rang," says Boone. "Plugging had become a nightmare, creating a lot of extra maintenance and overtime expense."

Working with PumpTech Inc., a pump distributor in Rochester, Wash., Boone found a cost-effective, reliable solution with a centrifugal chopper pump. The successful installation protects the environment by keeping sewage in the pipes until it reaches the wastewater treatment plant.

Ragging problems

Boone, who was the city's pump technician at the time, first consid-

"I remember saying grace at Thanksgiving one year when the phone rang. Plugging had become a nightmare, creating a lot of extra maintenance and overtime expense."

Greg Boone

ered changing out the impellers on the dry-pit submersible pumps. "The pumps worked great, but they just couldn't handle the disposable wipes," he says. "However, nobody I called could guarantee that their vortex impellers would end the ragging problem, and often the efficiency was wrong. The variables to these pumps

drove me wild."

Then Boone recalled a demonstration he had seen seven years ago when Vaughan Company Inc. visited the station with a trailer-mounted chopper pump. The representative threw in ropes and towels, but they didn't plug the pump. "Ragging wasn't a big problem at the time, and we didn't switch over because the chopper pumps were more expensive," says Boone. "But now, given all the over-

time the city was paying, the pumps seemed cost effective."

Boone called Mike Hoskison at PumpTech, who offered to take him, his three technicians, and department manager to the Vaughan factory for a chopper pump demonstration. "They had one horizontal dry well pump in a tank and dumped in nylon ropes, T-



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MANUFACTURER:
Vaughan Company Inc.,
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WEB SITE:
www.chopperpumps.com

Shown with the chopper pump from Vaughan Company are Greg Fischer, wastewater electrician for the Chehalis Public Works Department (left), and Greg Boone, lead wastewater collection technician.

shirts, rags, a box of wipes, small chunks of wood — even a frozen turkey," says Boone. "I kept expecting the pump to plug, but it didn't. That put a whole new light on what I needed to correct the problem."

Unlike grinders

The city ordered two Vaughan model PE4P6CS-088 vertical pedestal chopper pumps with 15-hp/1,760-rpm motors. They are specified for 640 gpm at 41 feet of total dynamic head (TDH).

The term "chopper pump" is often used generically to describe any type or brand of chopper pump, cutter pump, grinder, or comminutor. However, the Vaughan centrifugal chopper pumps have a cartridge-style mechanical seal that reduces problems associated with wrapping or abrasion. Stray solids trapped in the mechanical seal area are shredded and removed by the impeller vanes turning against the upper cutter.

The sharpened impeller blades turning across the cutter bar chop solids in a smooth, slicing effect. A cutter nut at the pump inlet cuts stringy materials that wrap around

the shaft. The conditioned slurry passes through the pump and conveyance system without plugging.

The city hired PumpTech to change out the pumps at the Jefferson Street station. The new ones, which use a flushless cartridge mechanical seal to simplify installation, were up and running in two days. "The increase in horsepower requires a little more electricity, but paying slightly higher electrical bills is preferable to SSOs," says Boone. Centralia has 75 miles of sewer line and more than 1,000 manholes.

More replacements

Boone, who maintains the city's 25 lift stations, replaced the two aging pumps at the larger Borst Park Pump Station in November

2009. PumpTech installed Vaughan model PE6W8CS-094 vertical dry chopper pumps with 30-hp/1,750-rpm motors. They are specified for 1,100 gpm at 58 feet of TDH.

Previously, Boone's crew installed a Vaughan model SE4L-075 submersible chopper pump on a rail system with 10-hp/1,755-rpm motor at the Reynolds Pump Station. This pump is specified for 370 gpm at 46 feet of TDH. None of the pumps have clogged despite an increase in wipes. ♦

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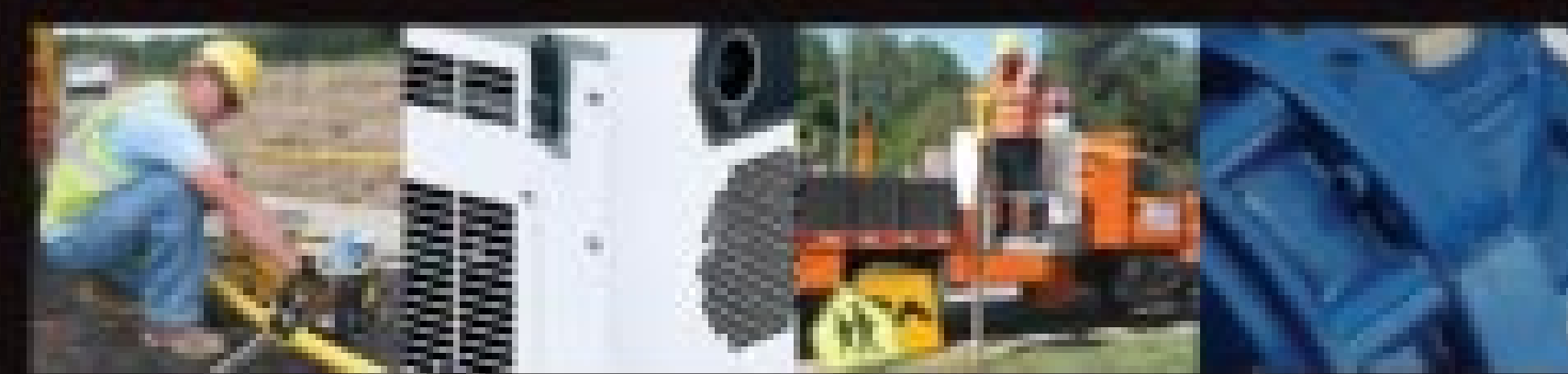
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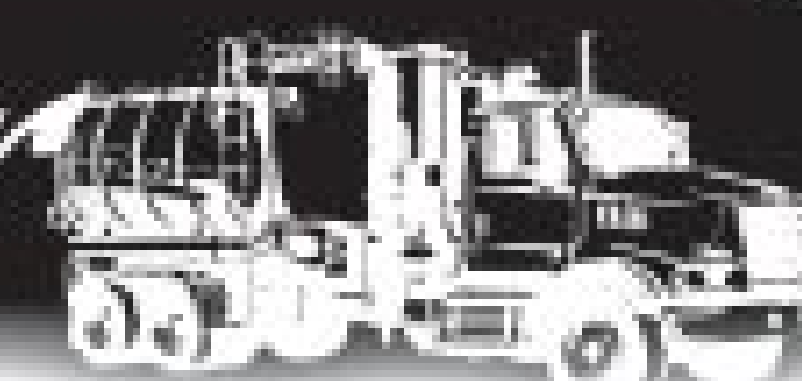


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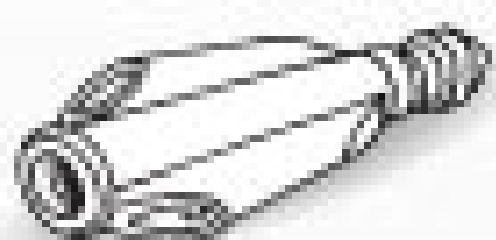
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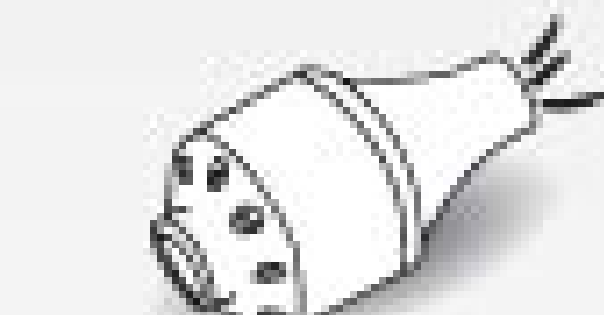
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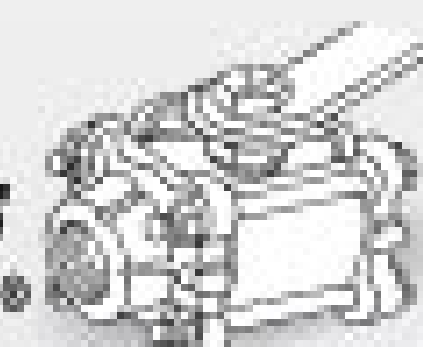


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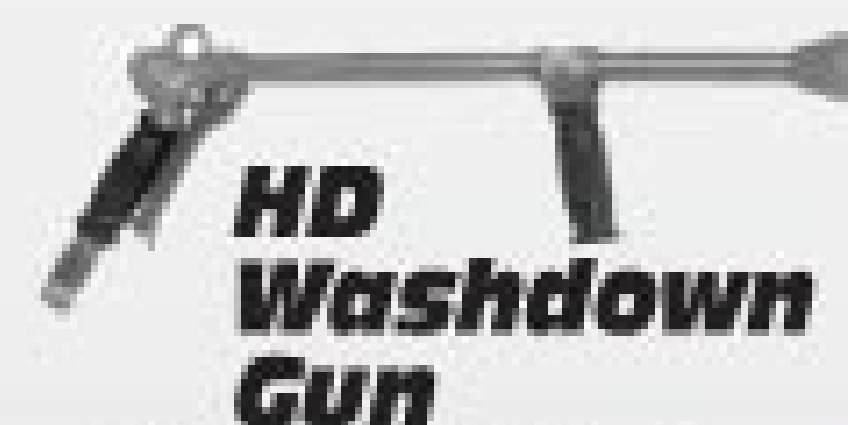


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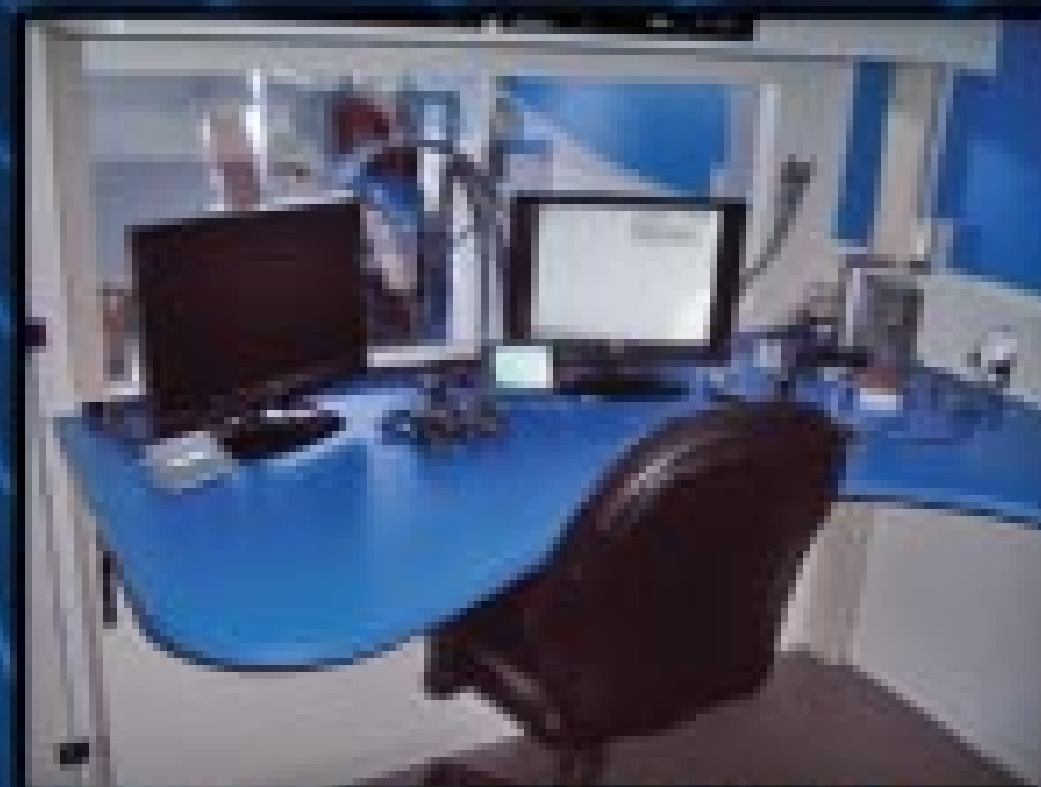


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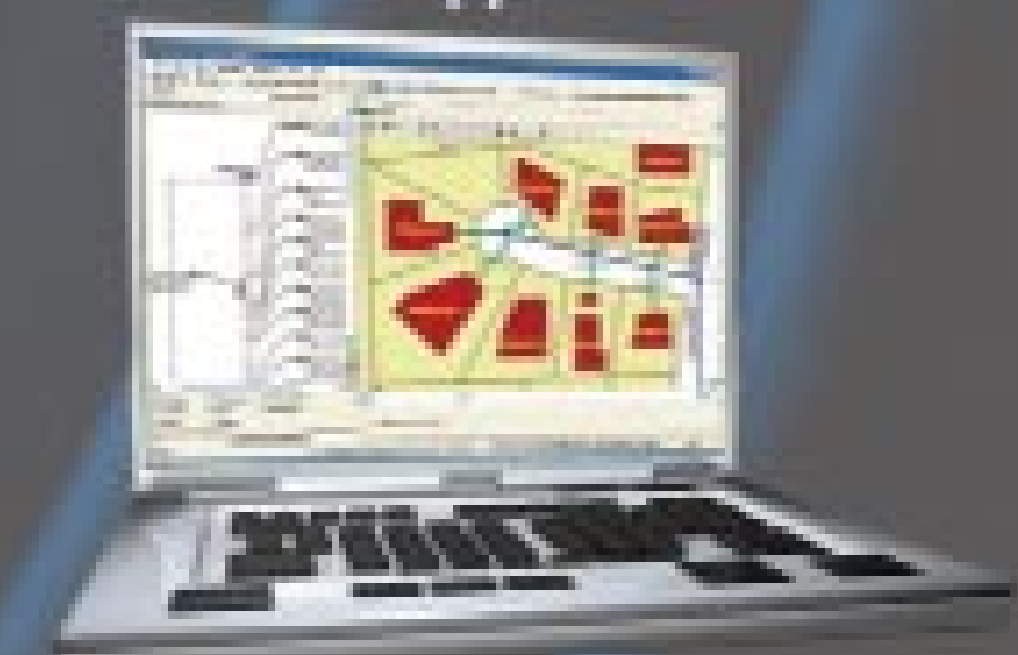
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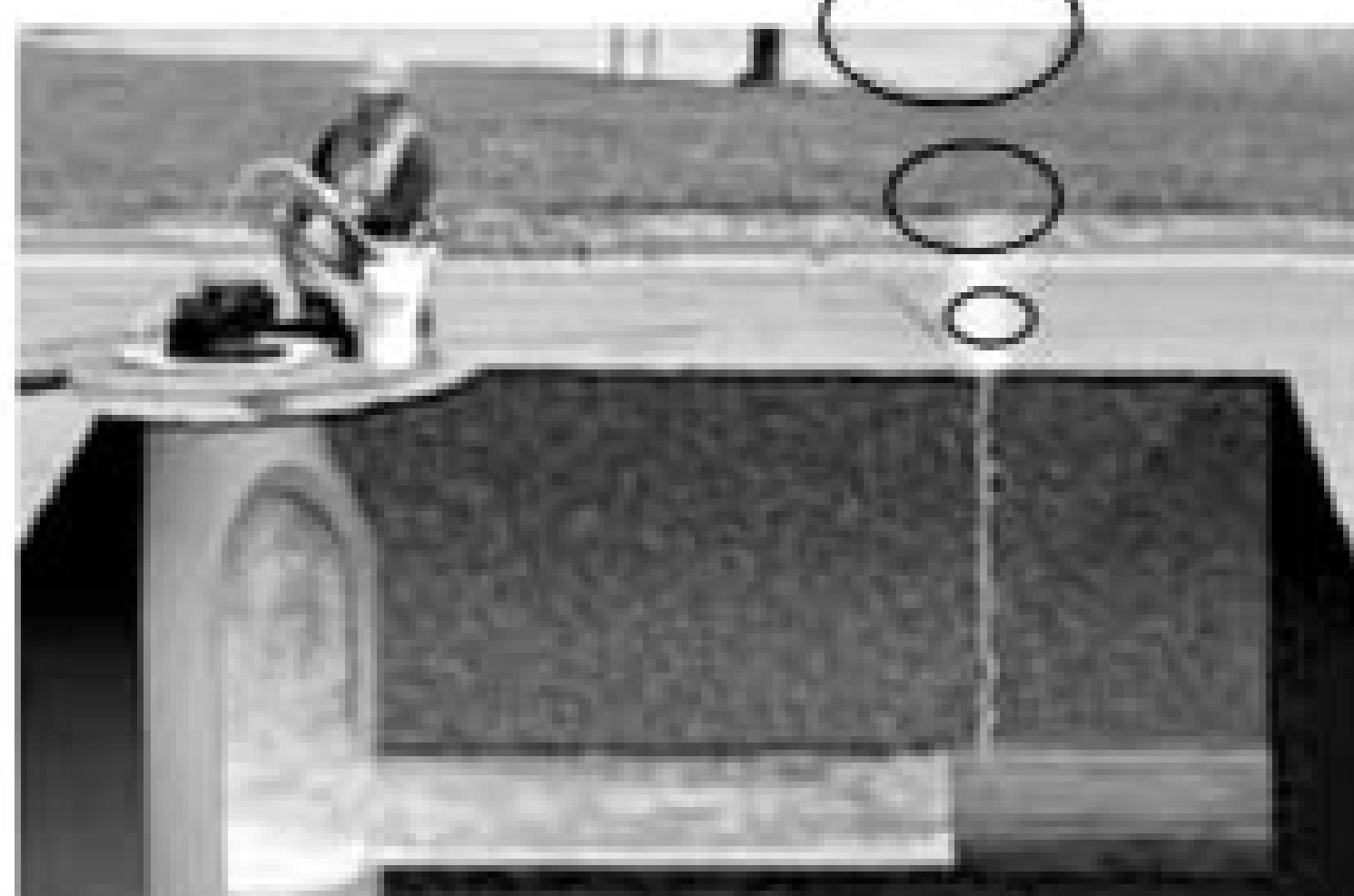


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GETTING PAST THE FEAR

Here are 10 tips that can help managers conduct effective interviews and zero in on the candidate best suited for the job

By Ken Wysocky

During a typical job interview, there are two tough places to be: behind the desk and in front of it. Behind it, the hiring manager wonders what to ask next after the interviewee stops talking. In front of it, the interviewee is squirming.

"It's like the blind leading the blind," says Martin Yate, a professional development consultant, motivational speaker and author of *Hiring the Best: A Manager's Guide to Effective Interviewing*. "All the manager wants to do is hire someone and get back to work."

Much fear of the process results from employees who were promoted to managerial positions without being trained in the fine art of interviewing. The result? Bad hires. "Except in organizations where there's more management training, many people are promoted simply because they do a super job as non-managers," Yate says. "It's sort of a mystical right — they're ordained as managers."

"The big problem with this is that one of the first tenets of management is to get work done by others. And if you don't hire the right person, you can never hope to manage effectively." So what's a manager to do? Here are 10 recommendations:

1. Forget about the legal job description. Too often, managers are forced to rely on a job description on which they never had input, and that may have been heavily scrutinized and rewritten by legal counsel to avoid lawsuits.

The result is often a "specifically vague document, full of weasel

words, that comes down very firmly on the fence," Yate says. Instead, managers should develop their own "internal" job description that hones in on what the person will actually do.

2. Embrace the recruiters. To avoid wasting time on fruitless interviews with poor job candidates, work closely with the human resources recruiter to develop ads that directly reflect the "internal" job description. "Recognize that human resources has a lot of value in writing job postings or advertisements," Yate says. "They should recruit people with specific strengths to deal with problems A, B and C."

3. Get out the highlighters. Before you read resumes, get out two markers. Use one color to highlight candidates' strengths and the other to highlight weaknesses. This helps you explain to the HR recruiter why a candidate was suitable or unsuitable and serves as a quick reminder of important points about each candidate. "It'll save you a lot of time if you don't have to re-read all those resumes," Yate says.

4. Hit the phone. Do telephone interviews first. "Very few in-person interviews last less than 30 minutes, and usually after 10 minutes, you know you wouldn't hire the person on a bet," Yate says. "The telephone interview is a much-underrated tool in terms of saving time. You go from hello to the first question in about 45 seconds. You can interview at least twice as many people, so you're buying time to do your real job."

5. Gauge suitability. Make sure the candidate can do the job, instead

of projecting onto people the values you hope to find. "You want someone who understands how to do a specific job — someone who speaks the language and has a frame of reference for how things are done in your field."

6. Avoid previous mistakes. Take cues from the behavior profiles of people who were successful and unsuccessful hires and use them to screen job candidates. "Recall who was the best person and why," Yate says. "Maybe he or she was a good listener, had strong analytical skills, was patient and could establish rapport with people at various levels inside the organization. Learn from your mistakes."

"One of the first tenets of management is to get work done by others. And if you don't hire the right person, you can never hope to manage effectively."

Martin Yate

7. Don't get snowed. "When you start to see the faint aura of a halo around the candidate's head, beware," Yate warns. "Ask the person to tell you about projects that didn't go quite as well as the successful ones." If someone shows signs of discomfort, be doubly careful.

8. Be a good listener. "Interviewers should live by the 80/20 rule: Ask questions 20 percent of the time and listen 80 percent of the time," Yate says.

9. Ask the right questions. Ask open-ended questions that elicit more than yes and no answers. "Ask them to tell you about the time they had to solve a particular problem," Yate suggests. "Talk

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.

about a specific experience. If you can determine how they behaved in the past, it's a good predictor of how they'll behave in the future." To develop questions, think about the problems the candidate will face daily. "We're all hired to be problem solvers within our areas of responsibility," Yate says. "If you know where the problem areas lie for a job, you'll be able to ask questions about it."

10. Network with peers. Yate suggests managers join at least two professional organizations: one for management in general and one for the field in which they work.

This helps them become better recruiters. "If you become connected to your profession, and attend conferences, you'll be more knowledgeable, and you'll meet and know more people," he says. "It's much better to fill a position with someone you've met, or through someone you've met who knows someone else."

Aside from hiring great employees, there's another benefit to becoming a better interviewer: Listening and communication skills are valuable in more areas than just interviewing. To learn more about Martin Yate, visit www.martinyate.com. ♦

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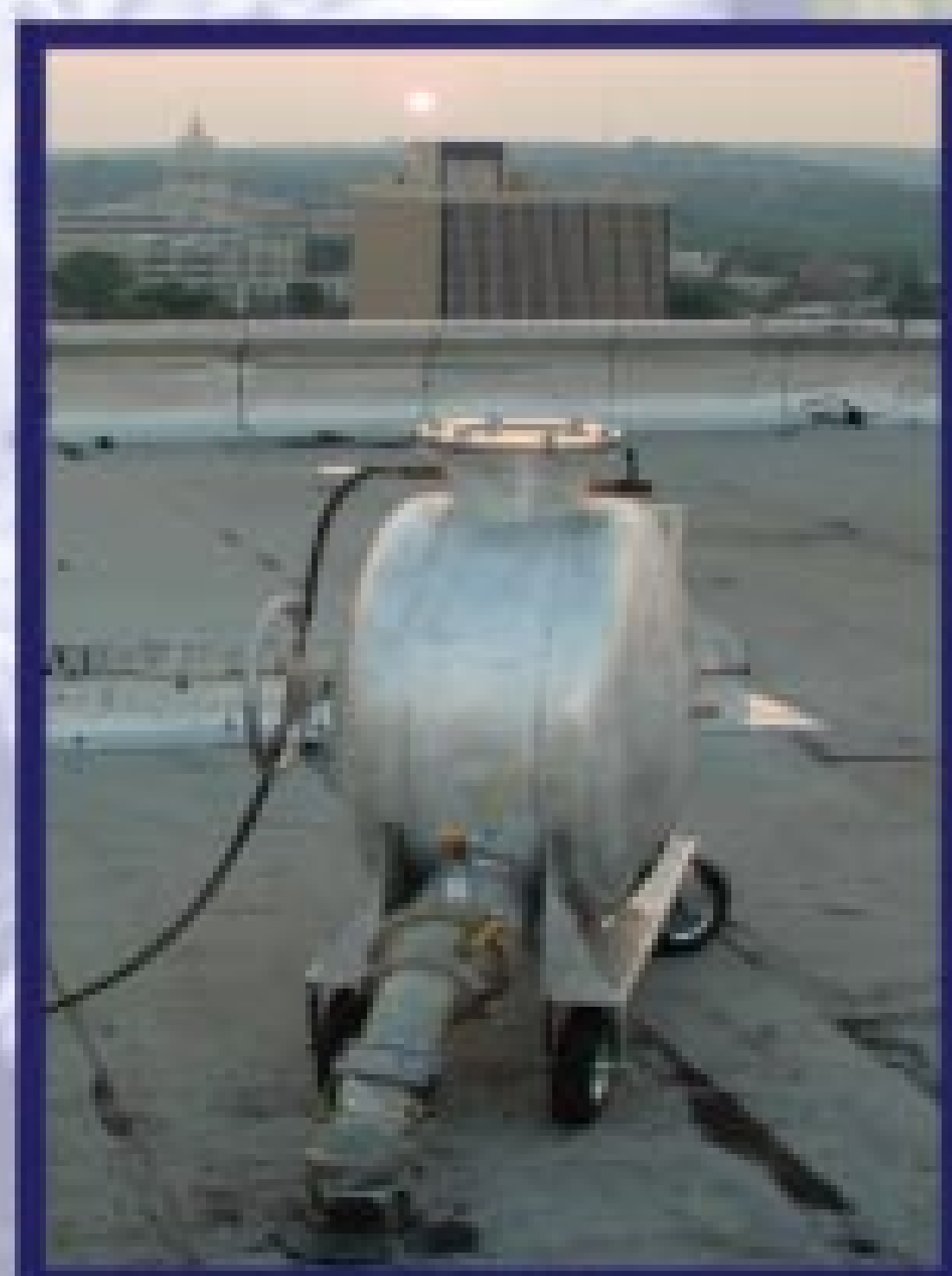


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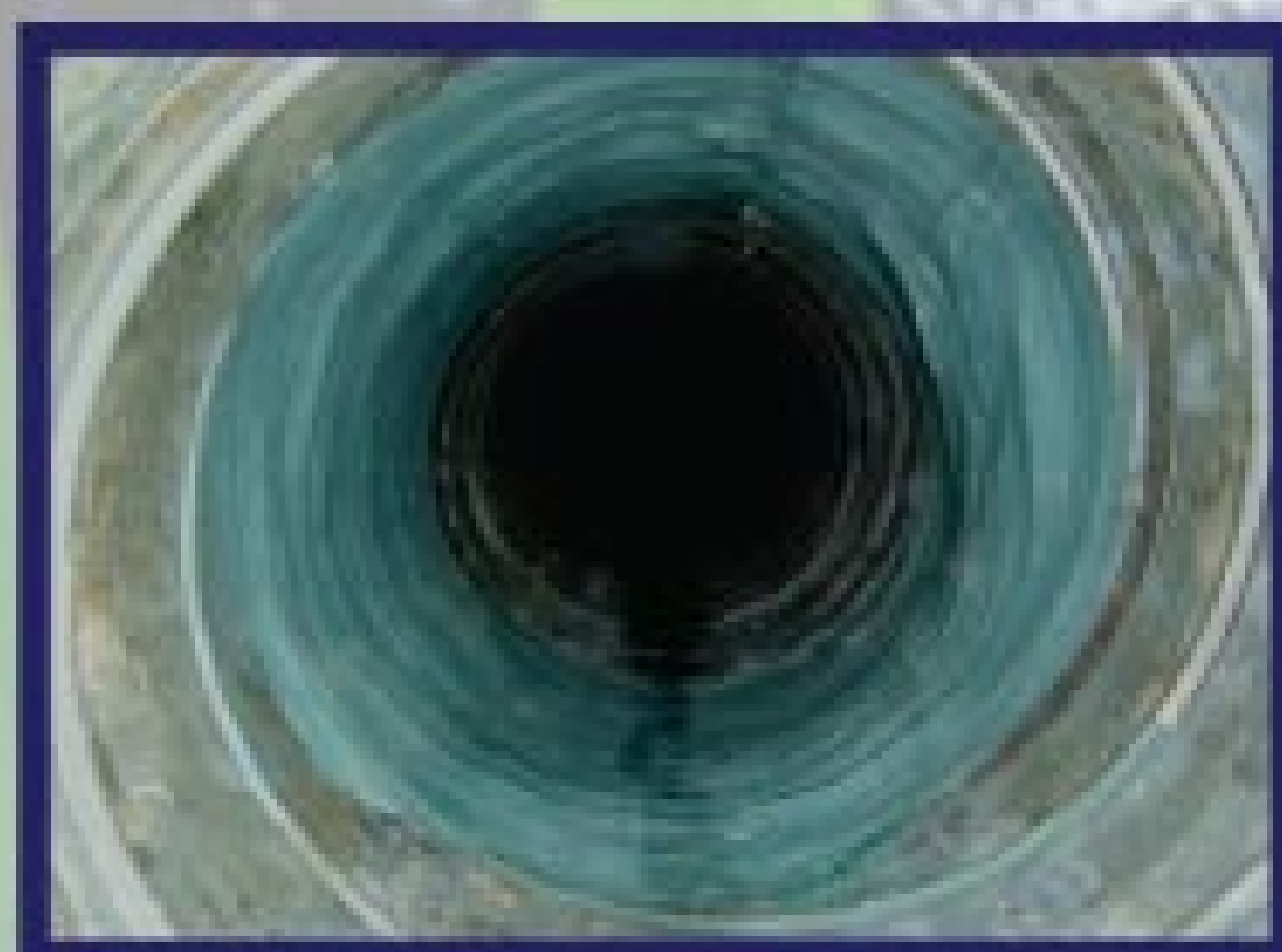


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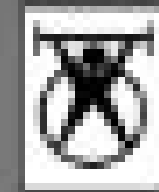
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STOP PACP ABUSE

The industry should have no tolerance for contractors who represent their people as PACP certified when they are not

By Irvin Gemora

A few bad apples often spoil the barrel, and that's exactly why I'm sending out this industry call to action to protect the NASSCO Pipeline Assessment Certification Program (PACP), the North American standard for pipeline defect coding.

These bad apples are typically contractors who bid a PACP-trained person for a rehabilitation project, but then, when the project actually begins, replace the person originally presented with someone who lacks PACP certification.

This switcheroo ultimately gives the contractor more money for the job but puts the project at risk. It's abuse of PACP certification. As an industry, we have a common goal to improve the quality of rehabilitation projects to ensure long-lasting pipelines, a vital com-

ponent of the public sewer system. NASSCO, the leader in setting standards, developed PACP nearly a decade ago as a result of the need for a consistent method to identify and code pipeline defects. PACP benefits everyone involved in trenchless technology.

For example, engineers can tap into a vast amount of data on pipe conditions, enabling analysis of the infrastructure to be based on reliable facts. Municipalities can easily identify problem areas that can be fixed by relatively inexpensive measures. And contractors and suppliers can reduce the uncertainty of bidding by providing consistent and reliable condition reports.

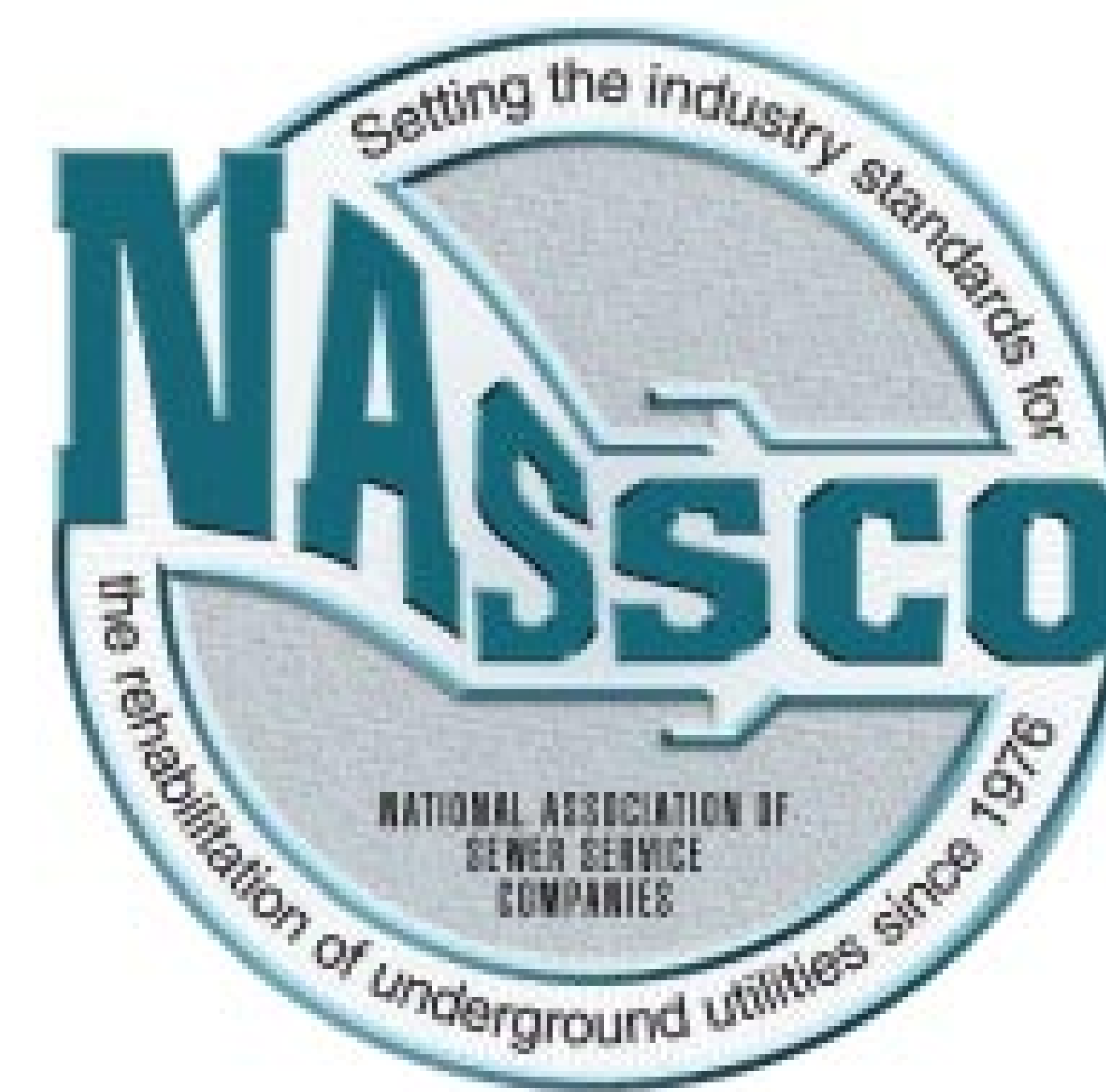
Today, about 10,000 people nationwide are PACP certified, and that number will greatly increase as PACP continues its strong track

record. Municipalities have an obligation to ensure the success of their rehabilitation projects. I urge municipalities and others to always verify PACP certification before a rehabilitation project begins.

Verifying PACP certification is easy: Visit www.NASSCO.org and click Training and Education, PACP. Next, click the link titled "Search for certified users and trainers." Everyone who is PACP certified is listed in alphabetical order.

If you have any questions, contact NASSCO headquarters at 410/486-3500. Keep in mind that PACP compliant is not the same as PACP certified, and that even CCTV operators with many years of experience are not certified PACP operators unless they attend the PACP classes and pass the required test.

Software vendors must be com-



pliant with the latest 4.4 version. A list of certified vendors can also be found on the NASSCO Web site. The investment in PACP training can pay for itself within one rehabilitation project. That's because the cost and risk of not being certified is significant. Classes are scheduled throughout the year, and PACP user certifications do not expire — individuals receive updates as the program evolves.

Obtaining PACP certification is not simply about taking a class and passing an exam. It is meant to be respected and presented solely for the person who earned it. As I discover unethical practices, I will swiftly terminate the abuser's certification.

I do hear of such violations from time to time from unhappy employees, ex-employees, and some cities that have checked the facts. Our industry has come too far and worked too hard to let a few ruin what PACP represents. If you allow someone to use your PACP Certification number, you will lose your certification and will have given away your hard-earned credential.

I urge our entire industry to pull together to end this PACP abuse. We've come a long way, creating standards that provide the foundation for our industry's success now and for future growth. There is nothing I won't do to protect that. Please join me in upholding and respecting PACP. ♦

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


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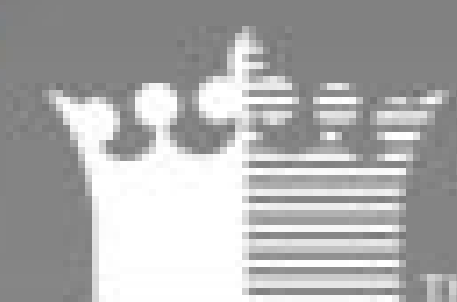
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The American Water Resources Association announced these award recipients:

- **Dustin Garrick**, University of Arizona; **Katharine Jacobs**, Arizona Water Institute; and **Gregg Garfin**, University of Arizona, William R. Boggess Award.
- **Michael E. Campana**, Oregon State University, Icko Iben Award.
- **Pacific Institute for Studies in Development, Environment and Security**, Sandor C. Csallany Institutional Award for Exemplary Contributions to Water Resource Management.
- **Faye Anderson**, U.S. Department of Agriculture, President's Award for Outstanding Service.
- **University of Wisconsin-Stevens Point**, Outstanding Student Chapter Award.
- **Alaska State Section**, Outstanding State Section Award.

LEARNING OPPORTUNITIES

American Water Works Association

AWWA announced the publication of a new edition of The Water Dictionary, a desk reference providing definitions for more than 15,000 water- and wastewater-related words and phrases. It is available online at www.awwa.org/bookstore.

CALENDAR

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Pretreatment, Pollution Prevention and Stormwater Conference 2010, Long Beach, Calif. Visit www.cwea.org.

March 7-10

Cities of the Future 2010, Boston Marriott Cambridge, Boston, Mass. Visit www.wef.org.

March 29-31

2010 American Water Resources Association Spring Specialty Conference: GIS & Water Resources VI, Rosen Shingle Creek Hotel, Orlando, Fla. Visit www.awra.org.

April 11-14

American Water Works Association Sustainable Water Sources Conference, Albuquerque (N.M.) Convention Center. Visit www.awwa.org.

Kansas Water Environment Association

The KWEA is offering these courses:

- March 2 – Applied Math for Operators, Hays
 - March 4-5 – Water Treatment, Phillipsburg
 - March 9 – Basics of Water Operations, WaKeeney
 - March 9-12 – Cross Connection Control and Backflow Prevention, Kansas City
 - March 10-11 – Treatment, Fort Scott
 - March 25 – Small Water Systems, Kinsley
 - April 6-7 – Distribution, Russell or Hays
 - April 13 – Safety, Kinsley
 - April 13-14 – Cross Connection Control and Backflow Prevention, Wichita
 - April 15-16 – Cross Connection Control and Backflow Prevention, Wichita
 - April 21-22 – Utilities Management, Fort Scott
- Visit www.kwea.net.

Wisconsin Department of Natural Resources

The Wisconsin DNR has these courses:

- March 9-11 – Water Supply, Sun Prairie
- March 16-18 – Water Supply, Sun Prairie
- March 30-31 – Water Supply, Fond du Lac
- April 13-14 – Iron, Zeolite & VOC, NWTC-Green Bay
- April 14 – Distribution Seminar, Green Bay
- April 14 – System Operations O&M, Ashland
- April 15 – Distribution Seminar, Wisconsin Dells
- April 15 – System Operations O&M, River Falls
- April 20-22 – Surface Water, FVTC-Appleton

Visit www.dnr.state.wi.us/org/es/science/opcert/training.htm. ♦

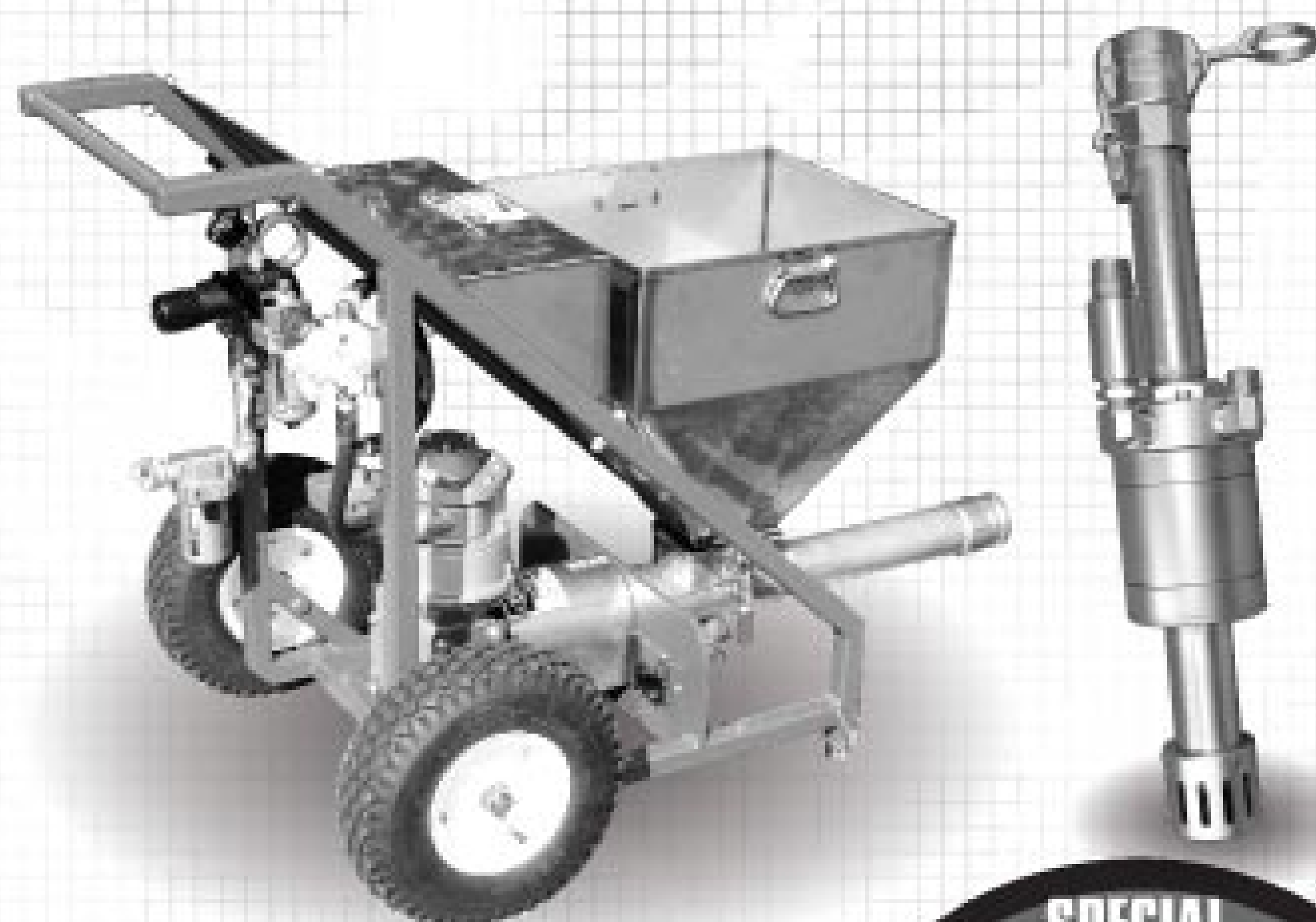
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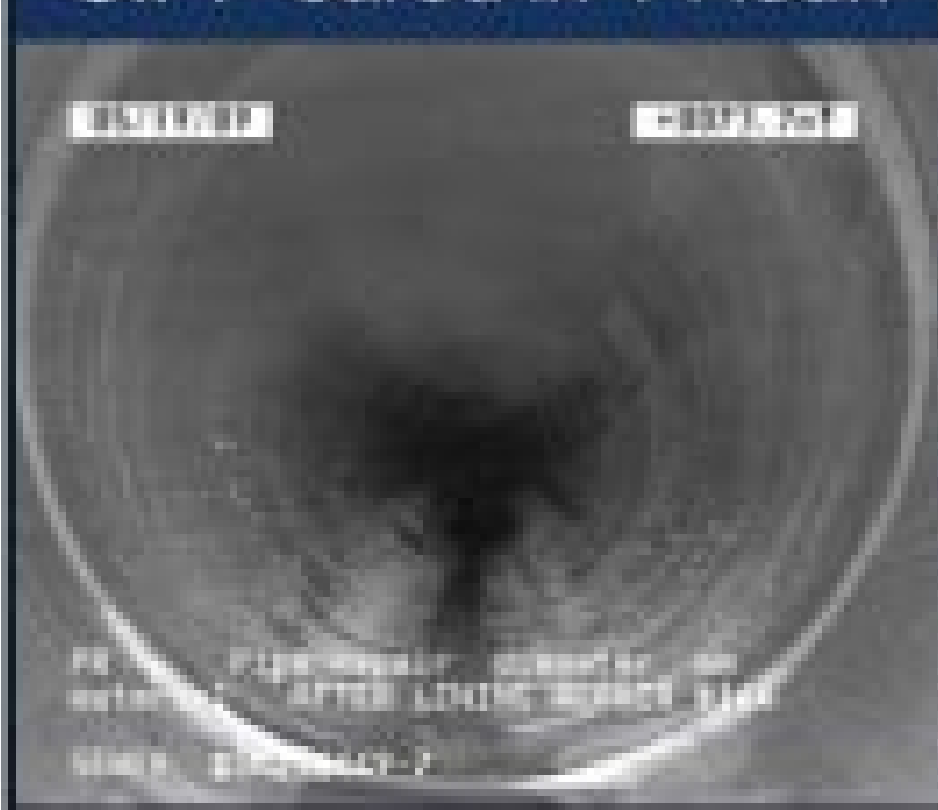
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Product Spotlight

Truck-mounted Digging System Operates Continuously

By Ted J. Rulseh

Hydroexcavation enables damage-free digging around buried utilities, but traditionally, productivity has been limited by the periodic need to empty vacuumed soil slurry from the debris tank and refill the freshwater tank.

Non Stop Hydro Excavating of Red Deer, Alberta, has developed a Hydro Excavator Separator (HES) that can excavate continuously without the cost and delays of dumping and water refilling. The truck-mounted system separates water from the excavated material, rendering it dry enough to use as backfill. It also recycles the water, returning it clean enough to reuse in the unit's high-pressure pump for jetting.

The system also can load the dewatered material onto a standby gravel truck or container, or drop it directly onto the ground. All these operations can go on without stopping the excavation procedure.

Solids separation and water recycling take place in a continuous process. Soil slurry is vacuumed into an air-lock mechanism that continuously removes the slurry out of the vacuuming process. The slurry flows into a separating process where water and soil are separated.

The HES includes a complete package of hydroexcavating, dewatering, and water-recycling systems. The system components include a suction boom, and a cyclone to separate air from the loosened soil and water.

Vibrating screens on a shaker body collect solids, and a fixed conveyor deposits them onto a swing conveyor. That conveyor deposits the solids debris in a holding tank, into a standby truck, or onto the ground. A 10-gallon catch basin receives fluid and fines that pass through the vibrating screens. From there, a pump delivers the water and fines to a centrifuge, which separates solids from the water.

A working water tank receives water from the centrifuge. Dirty water at the bottom of the working tank drains into a catch basin and recirculates to the centrifuge for further cleaning. **For information: 403/346-0996; www.nonstophydroexcavating.com.**



Hydro Excavator Separator (HES) from Non Stop Hydro Excavating

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General Offers Gen-Eye POD, Mini-POD Inspection Systems

The Gen-Eye POD and Mini-POD video inspection systems from General Pipe Cleaners combine camera, reel and monitor in one package. Both units have a 5.6-inch LCD monitor protected by a padded case. The full-size Gen-Eye POD has a self-leveling camera and 200 feet of Gel-Rod for 3- to 10-inch drain lines. The Mini-POD carries 125 feet or 175 feet of pushrod and camera small enough for 2- and 4-inch lines. A video-out connection enables the user to record on an external device. **800/245-6200; www.drainbrain.com; Expo booth 3147.**



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ground and steel manhole covers to receivers located in control cabinets. Signals can be transmitted via wireless or wired connection to a programmable logic controller or SCADA system. The portable unit is powered by six AA-sized batteries and features a small external antenna. It can send both analog and discrete signals, enabling both water levels and high-low set point to be monitored. Components include a wireless transmitter and battery pack. Downloadable software permits transmission signal mapping and control of the transmit schedules. **800/849-9343; www.weidmuller.com.**

American Highway Products Offers Manhole Safety Ramp

The Manhole Safety Ramp from American Highway Products Ltd. is designed to fit over raised manholes or manhole risers during road construction projects. Made of 100 percent recycled rubber, the ramp is available in 10-, 26-, 28- and 31-inch I.D. sizes. Providing a smooth transition from the original surface to the manhole lid, the ramp protects vehicles, equipment and the manhole. **888/272-2397; www.ahpl.com.**



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Weidmuller Introduces Wireless Manhole Monitoring

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The wireless manhole monitoring system from Weidmuller is designed to monitor underground sewer levels to prevent sewage overflow. Installed in the manhole, the system sends signals through the

RIDGID Introduces SeeSnake Digital Adaptor

The SeeSnake digital adaptor for the microExplorer inspection camera from RIDGID enables users to digitally connect to existing SeeSnake camera inspection systems. The adaptor can be used on any video-out enabled monitor, including SeeSnake VHS or DVD monitors. **800/769-7743; www.ridgid.com; Expo booth 7115.**



Greyline Introduces Portable Ultrasonic Flow Meter

The Portaflow PT500 Transit Time flowmeter from Greyline Instruments Inc. is designed for clean liquids, oils and most chemicals. Made for troubleshooting, spot checks and balancing flow, the meters feature strap-on sensors that mount on the outside of plastic or metal pipes. Ultrasonic signals are injected through the pipe between the two sensors. The meter works on any pipe diameter from 0.51 to 78 inches. The meter includes a backlit graphics display, 4-20 mA output, data-logger, RS232 and USB outputs, Quick Start calibration menu and the ability to store calibration for up to 20 different sites. The meter operates 16 hours on internal battery and recharges overnight. **888/473-9546; www.greyline.com.**



Sprayroq Offers Bio-Based Coating

Bio-based Green SG#1 corrosion coating for wastewater collection and treatment systems from Sprayroq Inc. is an elasto-meric, spray-applied polyurethane with 70 percent "B" content bio-based material. The product has been accepted for inclusion in the U.S. Department of Agriculture's BioPreferred program. It is NSF61 certified and approved for use in a potable water environment. **205/957-0020; www.sprayroq.com; Expo booth 6035.**

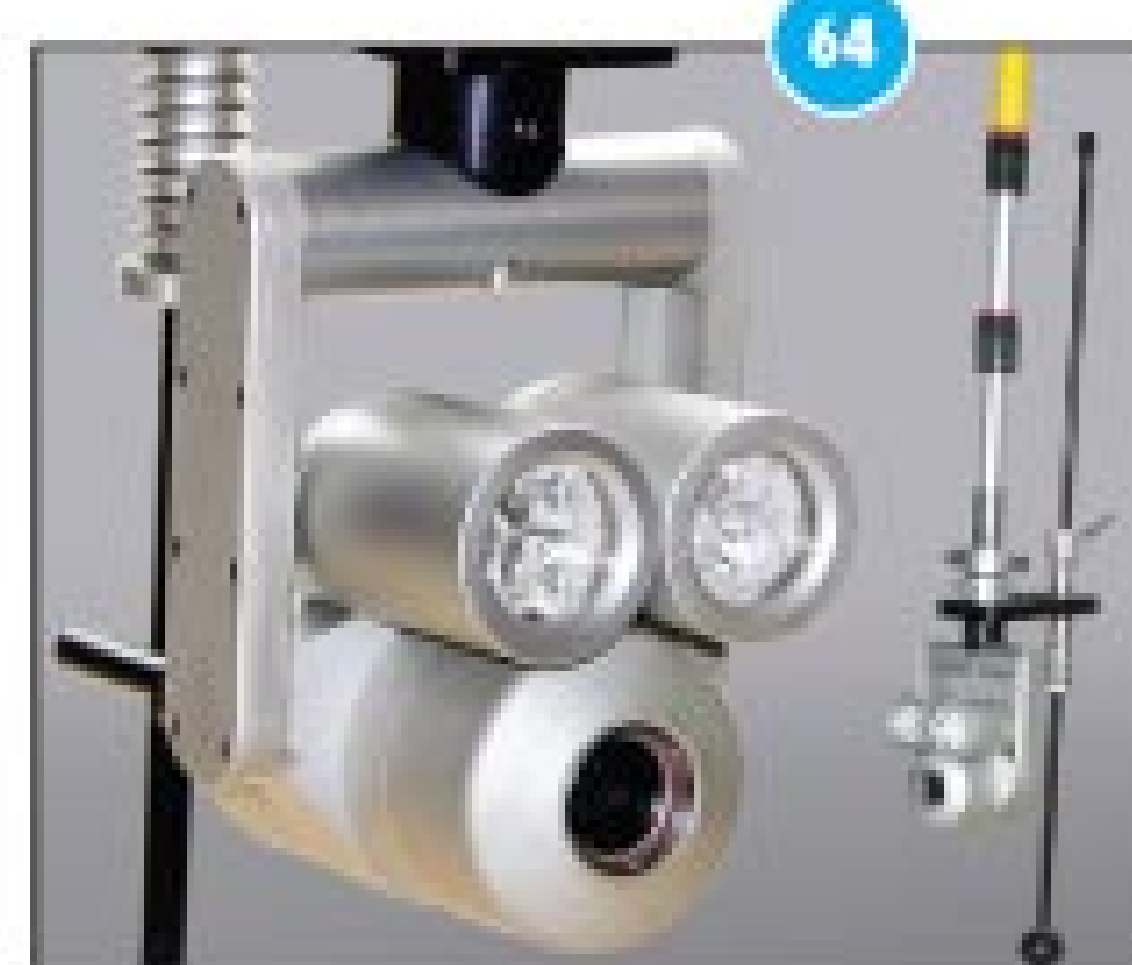
Under Pressure Introduces Road Stripe Removal Tool

The Road Stripe Removal Tool from Under Pressure Systems Inc. has 10 jet spray bars with vacuum recovery port and hydraulic-driven gear box. The 11-inch canister features a free-floating swivel design with three 6- by 2-inch caster wheels, a maximum pressure rating of 60,000 psi at 7 gpm and a maximum operating rate of 4,500 rpm. Custom spray bar designs are available. **330/602-4466; www.underpressuresystems.com.**



UEMSI Introduces ProCam DVR Inspection System

The compact ProCam DVR inspection system from U-Tech Environmental Manufacturing Supply Inc. uses an SD card to record data and has a built-in hard drive with USB port. The system, weighing less than 20 pounds, has a 10.4-inch LCD color monitor and DVR player/recorder in a heavy-duty case. It operates on both 110 VAC and 12 VDC, with two rechargeable battery packs available. The system includes multi-conductor video push cable and CM-1 color camera head measuring 1.4 inches in diameter and 2 inches long. The self-leveling Pro Eye color camera is available. **800/666-0766; www.uemsi.com; Expo booth 8145.**



Cobra Technologies Introduces FastView Zoom Camera

The Cobra FastView telescopic zoom camera from Cobra Technologies is a portable, rugged, lightweight, easy-to-use video inspection system ideal for quick evaluation and inspection of manholes, pipes, and areas where human entry is impractical or impossible. Quickly and safely evaluate access point conditions and surrounding areas. Designed for single-user operation, the FastView functions as a stand-alone unit or with any CCTV system. Videos and images are easily transferred to the office for your database or GIS system. Features include Cobra lighting system with Luxeon lights, 432:1 zoom for detailed viewing at hundreds of feet away, pole mounted, extendable to 24 feet, up to 38 feet optional. **800/443-3761; www.cobratec.com; Expo booth 7057.**

MWH Soft Releases Version 10.5 of InfoWorks, InfoNet, FloodWorks

Version 10.5 of InfoWorks, InfoNet and FloodWorks is available from MWH Soft. InfoWorks CS enables engineers and planners to produce hydraulic modeling of a complete urban collection system network, including trunk sewers and complex pipe connections and ancillary structures, while InfoWorks SD enables users to model stormwater flows through a complex environment with a diversity of underground and overland structures. InfoNet is a purpose-built asset and data management system for water distribution, wastewater collection, and stormwater networks. FloodWorks focuses on real-time simulation and forecasting of future hydrological and hydraulic conditions in stormwater and drainage systems. **626/568-6868; www.mwhsoft.com.**

(continued)

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**Max-Life Designs
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The Vac-Trap debris catcher from Max-Life Manufacturing Corp. connects to the end of a vacuum suction tube and rests at the bottom of the manhole. The trap fills with debris as water flows downstream. Once full, the debris can be vacuumed up. 888/873-6295; www.flexmax.com; Expo booth 22.

**BW Technologies Offers
Quattro Gas Monitor**

The GasAlertQuattro gas monitor from BW Technologies by Honeywell and distributed by Milwaukee Rubber Products Inc. features IntelliFlash, a green LED that continuously flashes to let safety managers know their crew is safe. Other features include a durable exterior with reinforced bumpers and integral concussion-proof boot. 800/325-3730; www.gasalertquattro.com; Expo booths 3209, 6147. ♦



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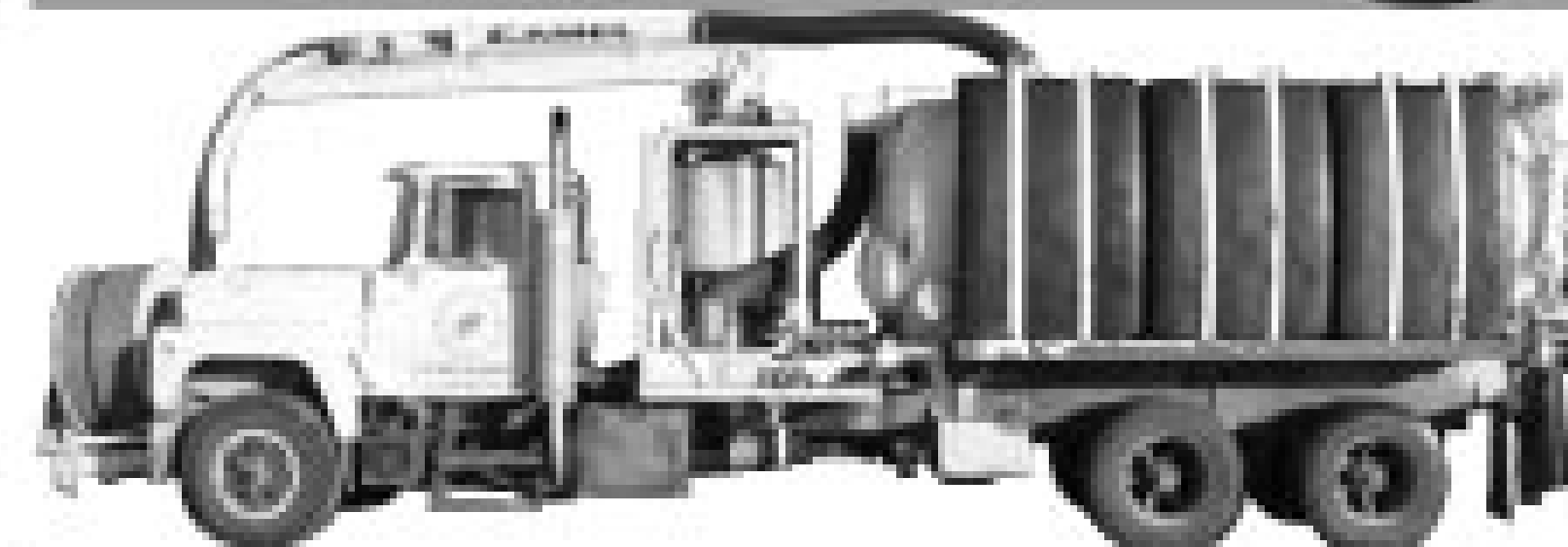
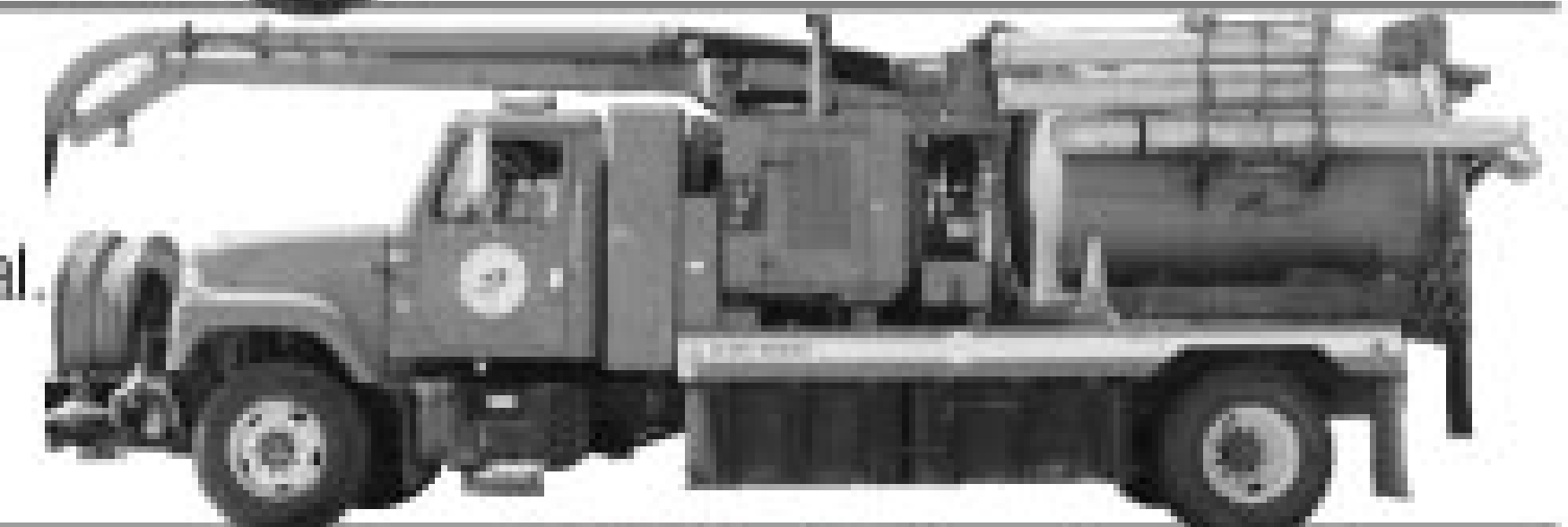
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Combination Cleaner:** 69,700
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ucts Camel, 16-yd. debris, Hicks
blower, 1500 gallon water, 65@2000
psi Myers pump. \$40,000 OBO

**1992 Western Star Combo
Truck:** 280 hp, 1995 Super Products
Camel, 16-yd. debris, 6-24 blower,
1500 gallon water, 65@2000 psi
Myers pump. \$60,000 OBO



**1991 Camel Combination Cleaner
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1,500 gal. poly tank, 1" x 600' hose,
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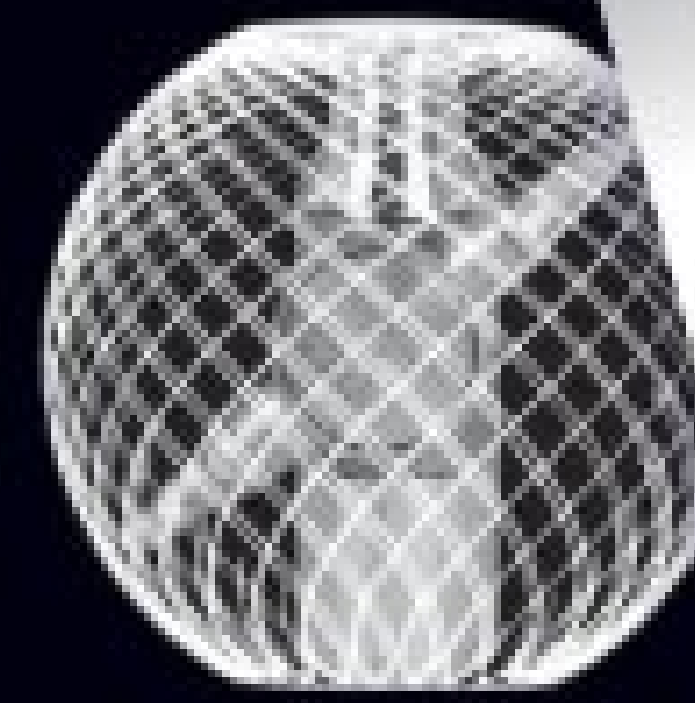
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