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April 2008

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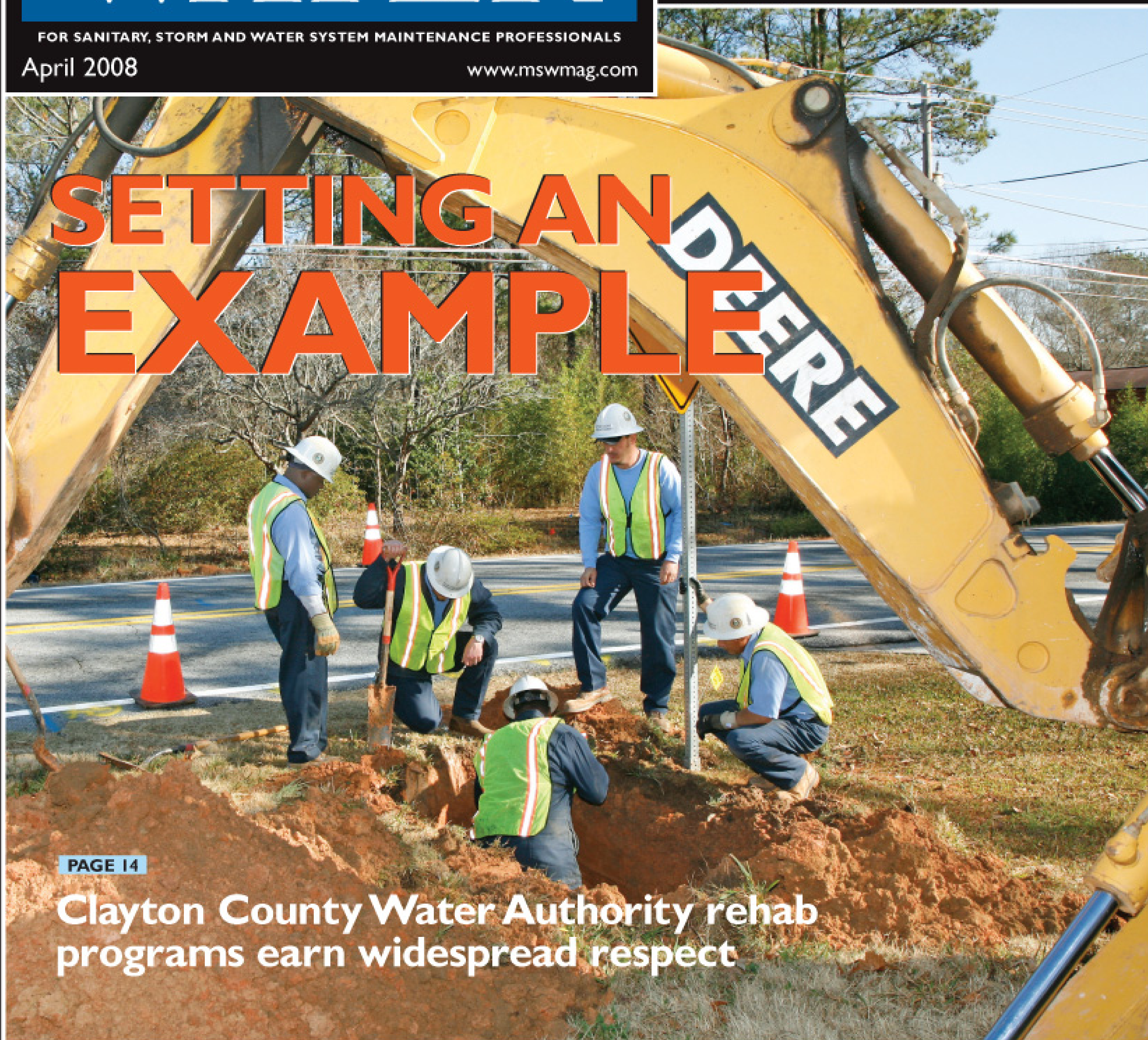
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SETTING AN EXAMPLE

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Clayton County Water Authority rehab
programs earn widespread respect



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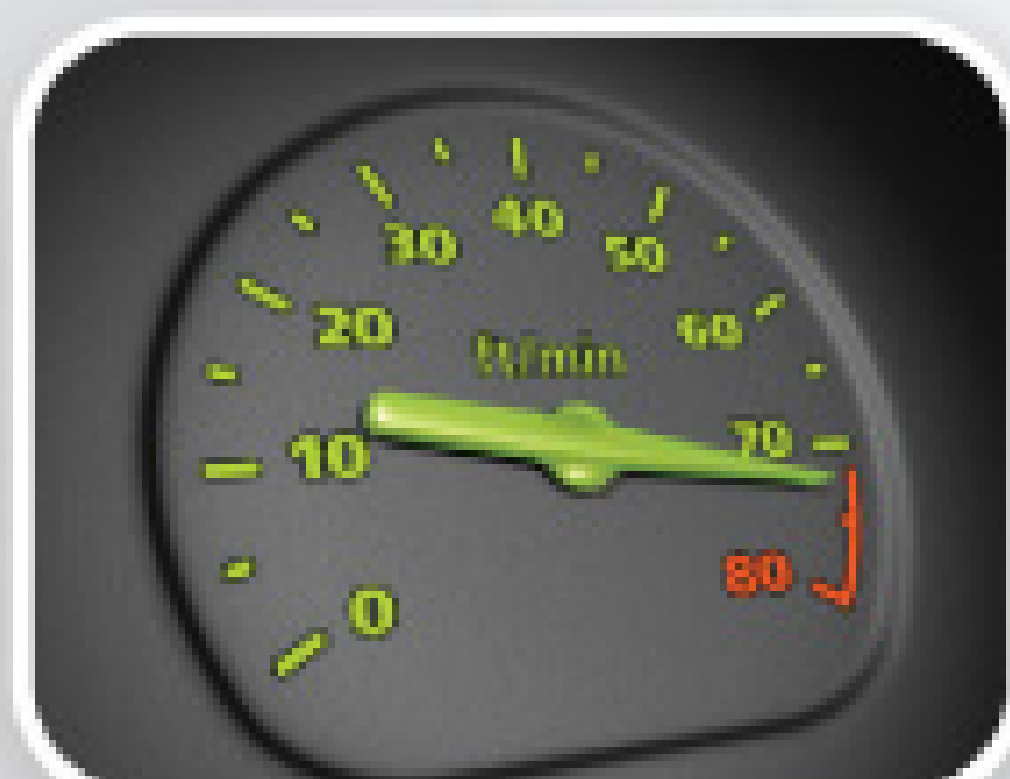
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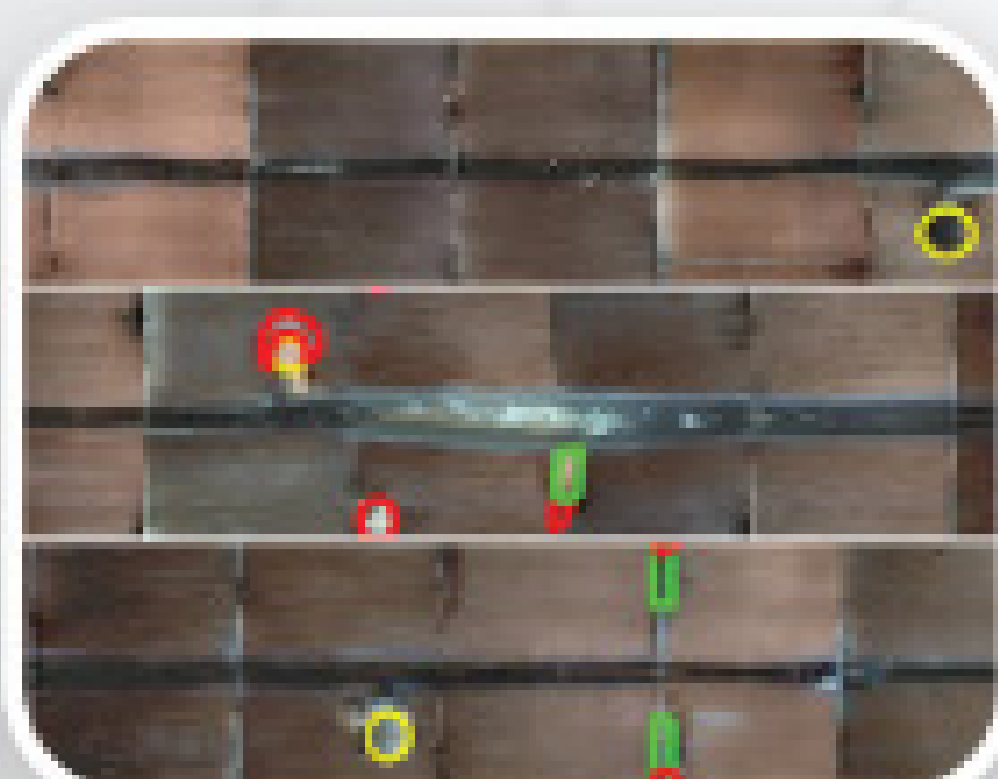
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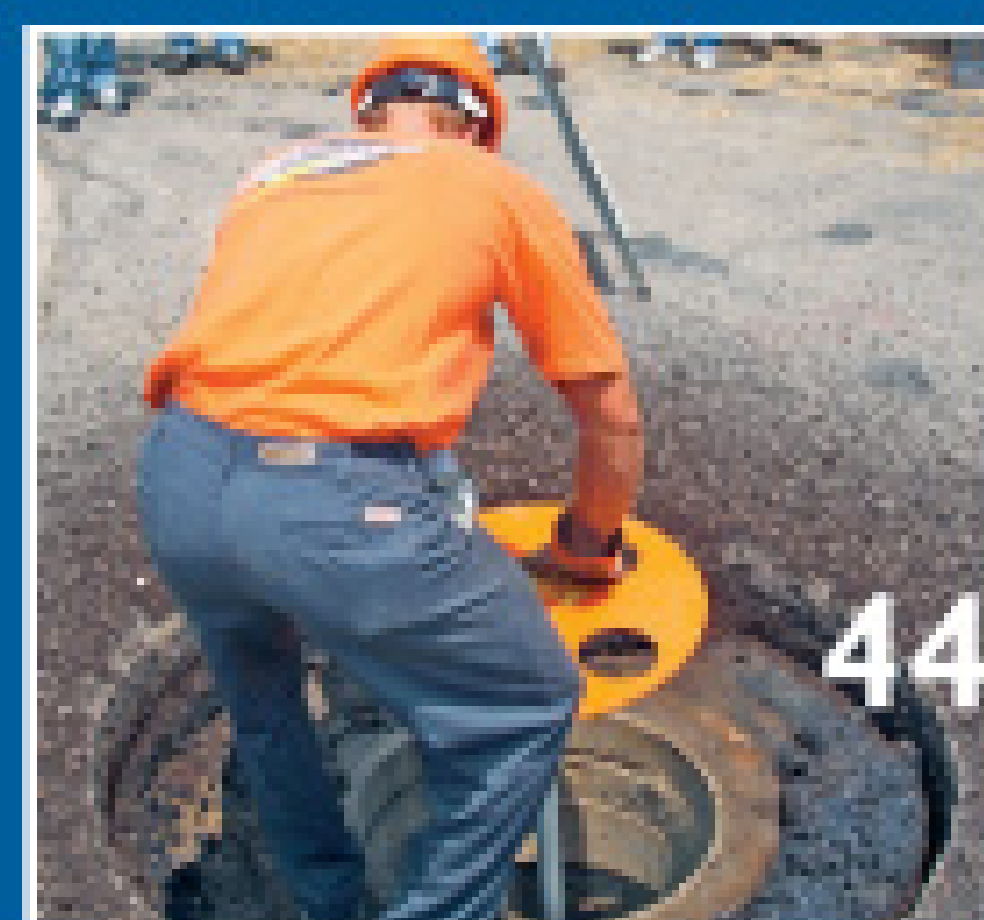
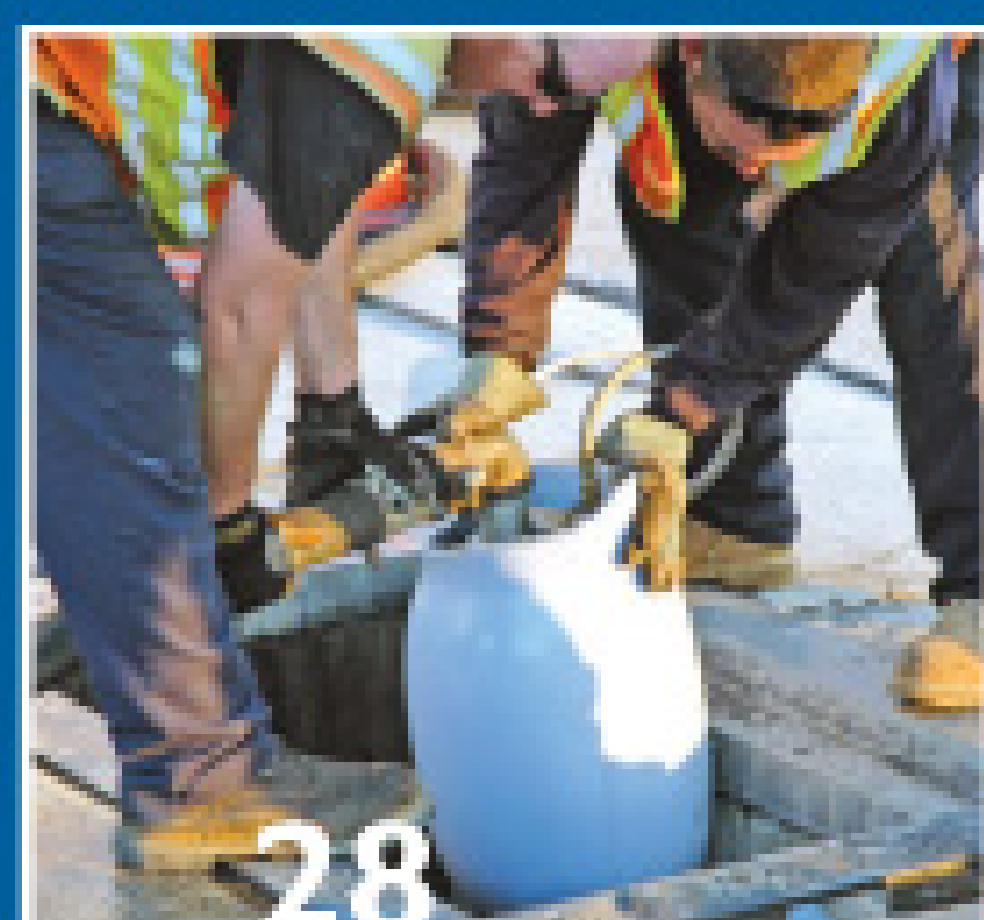
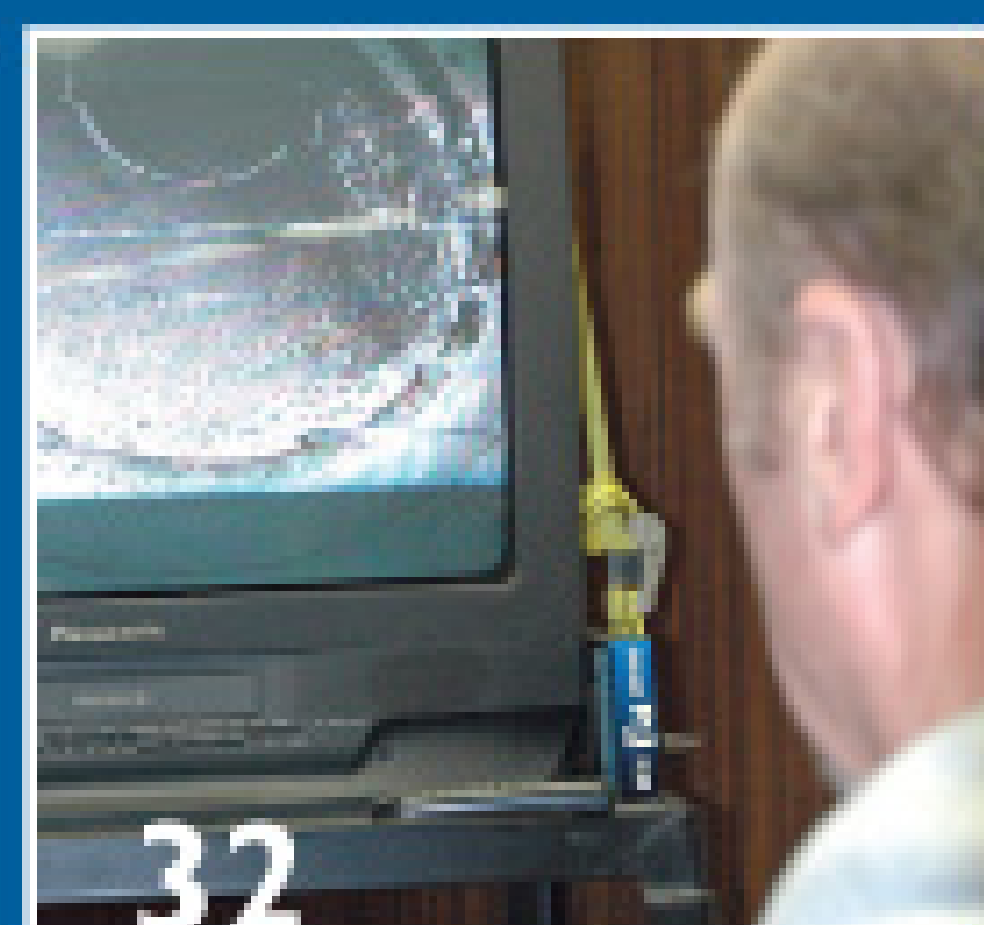
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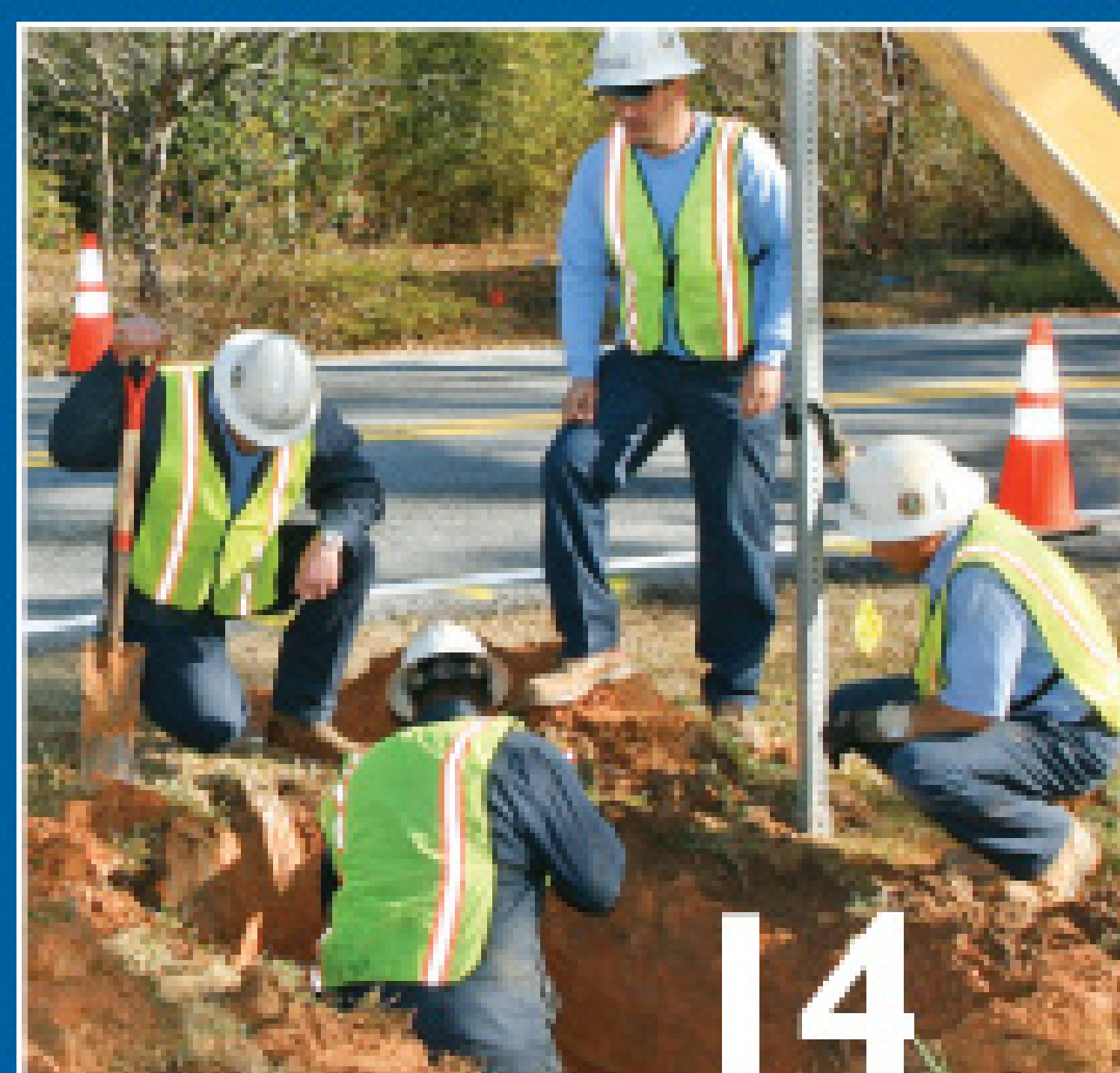
INSIDE:

PIPE LINING / RELINING



COVER:

The Clayton County Water Authority has earned widespread recognition for its pipe lining, pipe replacement, and leak detection programs. The leak detection and repair program alone returns \$4 for every dollar invested. (Photography by Harris Hatcher)



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Special Issue: Flow Control and Monitoring/Dewatering/Treatment

- ◆ Sewer: Treating CSOs in Saco, Maine
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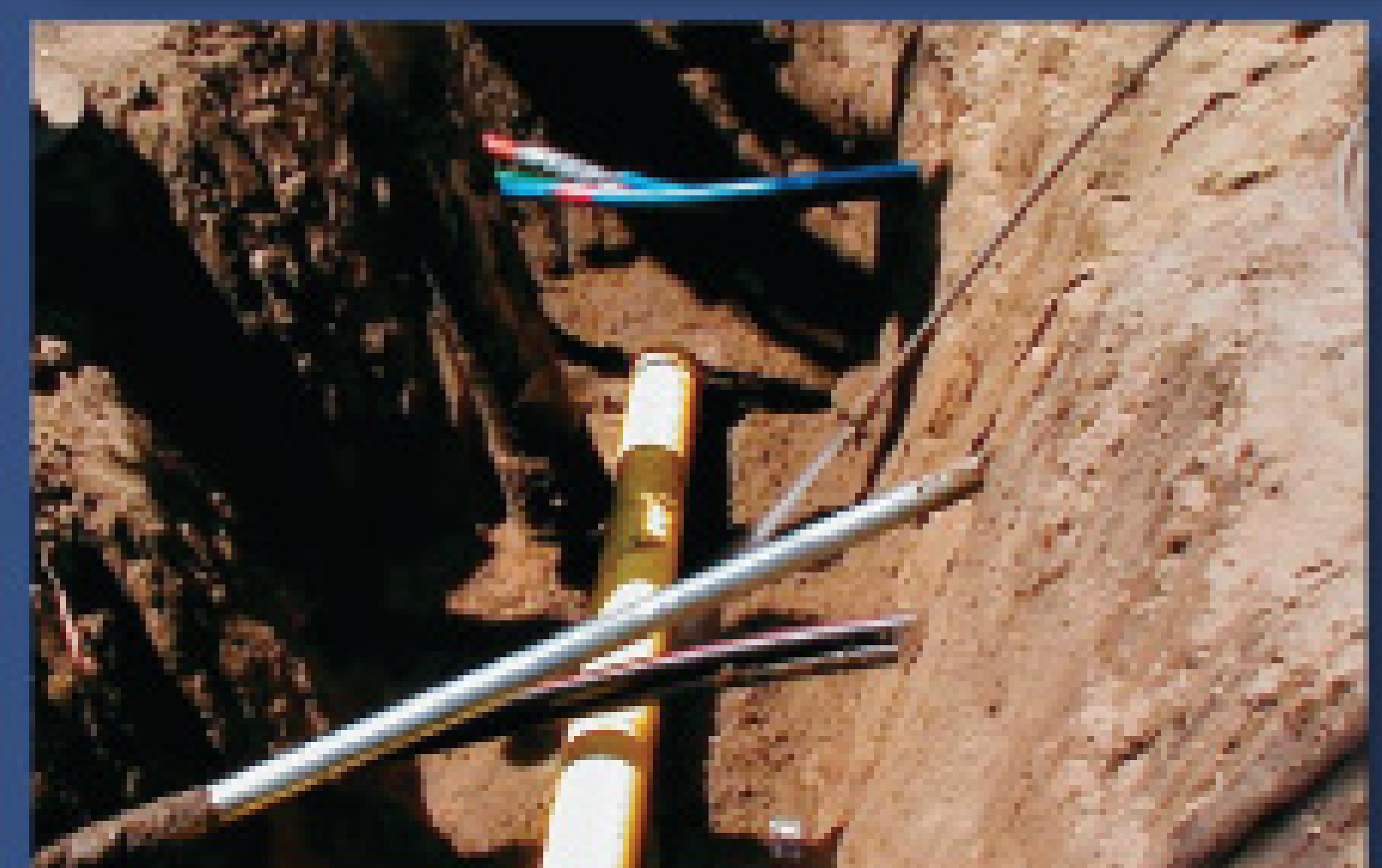
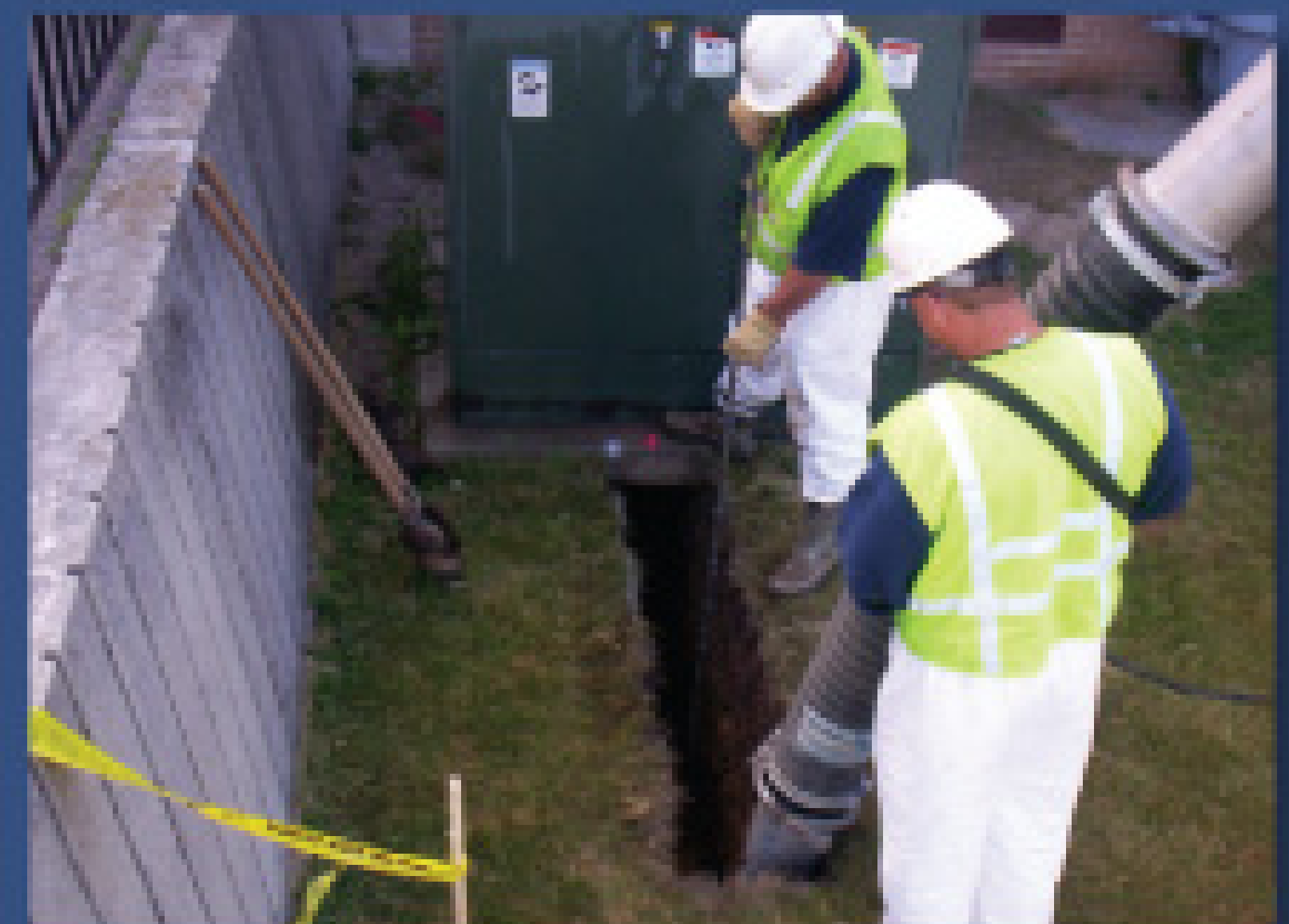
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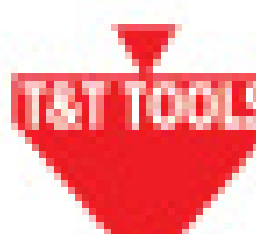
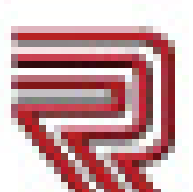


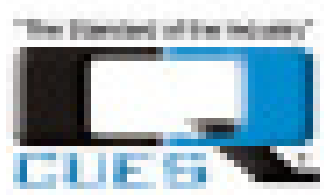











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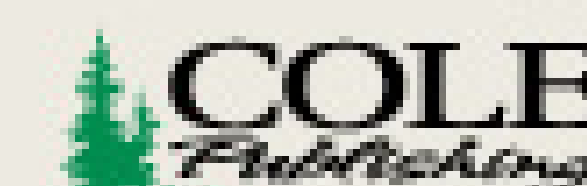
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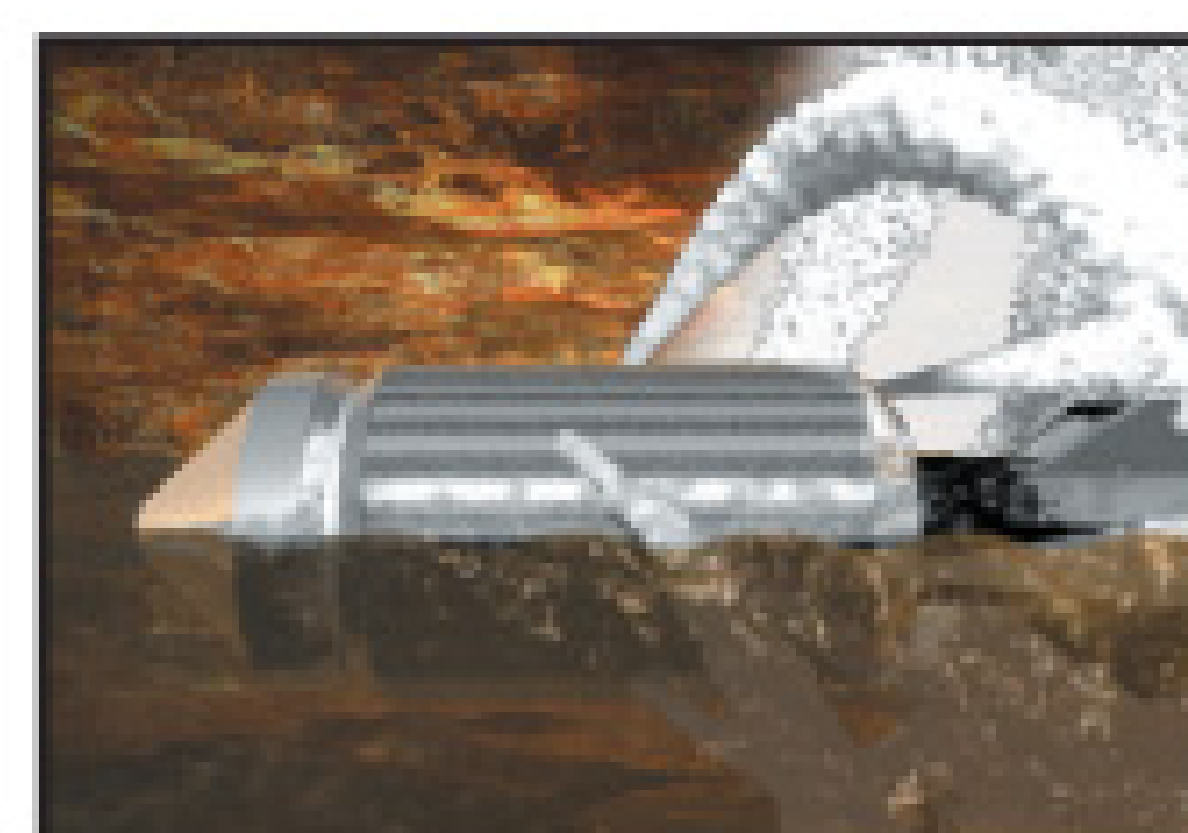


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As hard as saving energy may be, it's even harder coming to grips with the need to conserve something as seemingly limitless as water

In my newspaper reporting days I once saw a sign in a town hall that compared the price of water to beverages like milk, beer, soda pop, and orange juice. Water, the sign said, cost "four gallons for one cent — delivered."

The point was to tell residents that water was a bargain and the water utility was doing a great job. But in a way it was also telling people that water was not necessarily to be valued or respected — it was essentially free.

Look at the situation today. The Southeastern U.S. is parched. The Southwest has been that way for a long time (on a trip a few years ago, I was astonished to cross a bridge over the Rio Grande and see only a pathetic trickle). A candidate for president talked last year about tapping the Great Lakes to supply New Mexico.

Unequal distribution

There's no doubt: Some regions have plenty of water, while others do not. Spreading water around is not logistically easy, nor is it environmentally sound. And yet, perhaps even those of us who live in areas of abundance (such as the

Great Lakes basin) should learn to respect and treasure water as much as those who have to water their golf courses with recycled sewage.

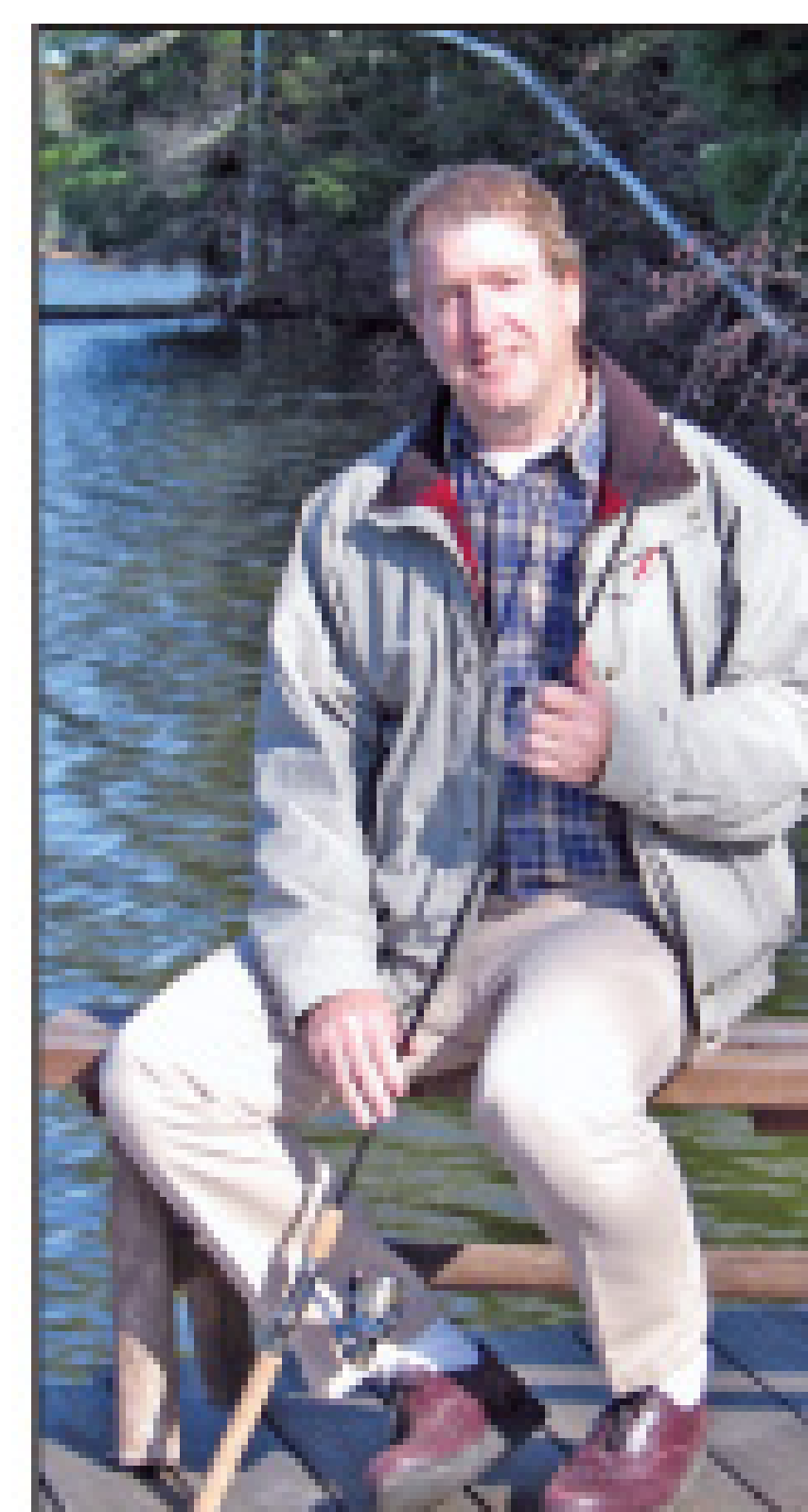
Municipal agencies, especially in water-scarce areas, are doing the job. Leak detection and water conservation programs have become standard currency among water utilities. (This issue of *Municipal Sewer & Water* highlights such initiatives in Iowa City, Iowa). But maybe it's time for more homeowners — no matter where — to start taking water as seriously as their utilities do.

In the end, solutions to water scarcity are going to take some measure of empathy, some political compromises, and yes, some expense. All of that comes easier when people come to the resource with a similar degree of respect.

Think of it. Home heating fuel and electricity for cooling have become quite expensive, yet most of our homes are not nearly as energy efficient as they could be. What, then, of water? It's still extremely cheap (at least in many communities). It takes a major event, such as a large and long-lasting leak, to cause a spike in a typical water bill. So why would people bother to conserve?

Without thought

Where I live, in a city on Lake Michigan, water is both cheap and abundant. We run a pipe out into the lake, bring the water in, use it, and send it back. I have never seen anything resembling an emergency water restriction, like a ban



FROM THE EDITOR

Ted J. Rulseh

on car washing or limits on lawn sprinkling.

My wife, and the kids (until they grew up and moved on), were quite profligate with water at times, letting the tap run while doing dishes, taking long showers, running the hose carelessly when gardening. It annoyed my conservative nature, but I let it go, partly for the sake of domestic harmony, and partly because I couldn't make much of a case that it was "costing us a fortune."

In truth, it's not as if we "use water up" by pouring it into the sink and running it down the drain. It just goes back to the lake. What we conserve by breaking bad habits is mainly the energy to run pumps and the dollars to treat water and sewage. Still, I can't help thinking it would be healthy for all of us in water-rich areas to treat water with the kind of respect those in dry areas give it.

Is that a little bit like being frugal with food for the sake of the "starving people in China?" Maybe, but in the end, solutions to water scarcity are going to take some measure of empathy, some political compromises, and yes, some expense. All of that comes easier when people come to the resource with a similar degree of respect.

A new town hall sign?

It's hard to preach conservation when a resource costs, in the grand scheme, next to nothing. It would be foolish in too many ways to count to inflate the price of it artificially in order to encourage wiser use.

Maybe a better sign for our town and city halls would be a map of the United States — or the world — colorized to show the areas where water is truly scarce. Some of us may have water, some may not, but we're all in this together. ♦

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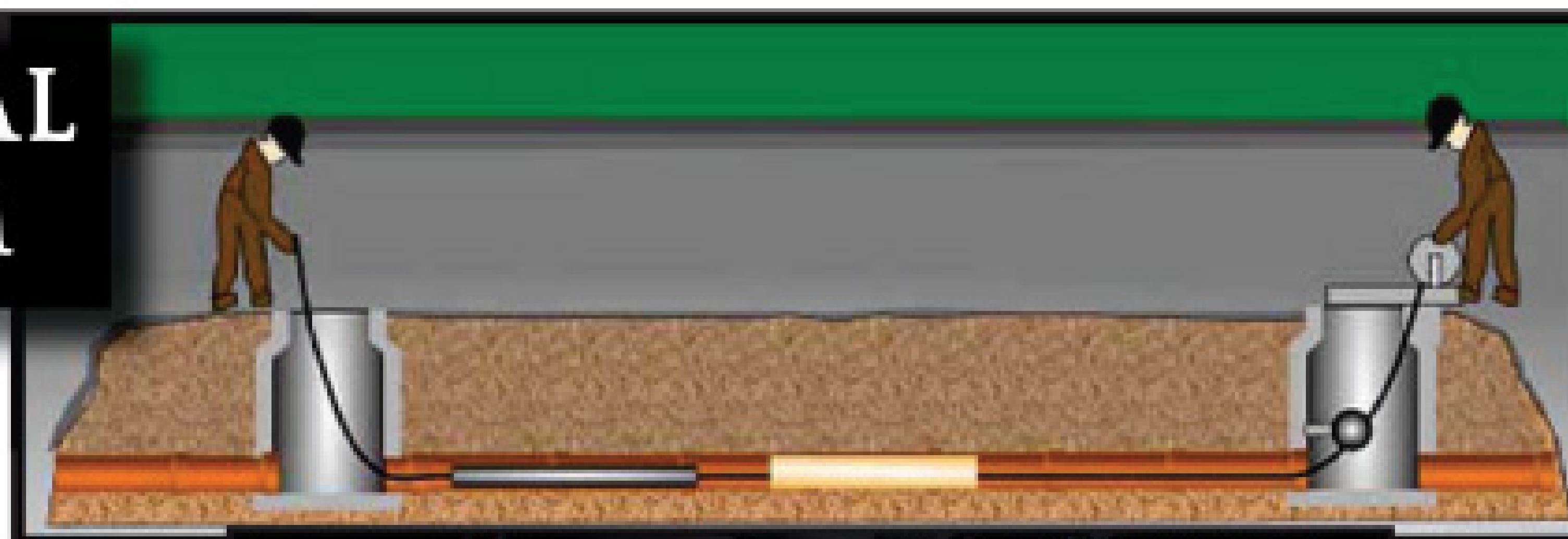
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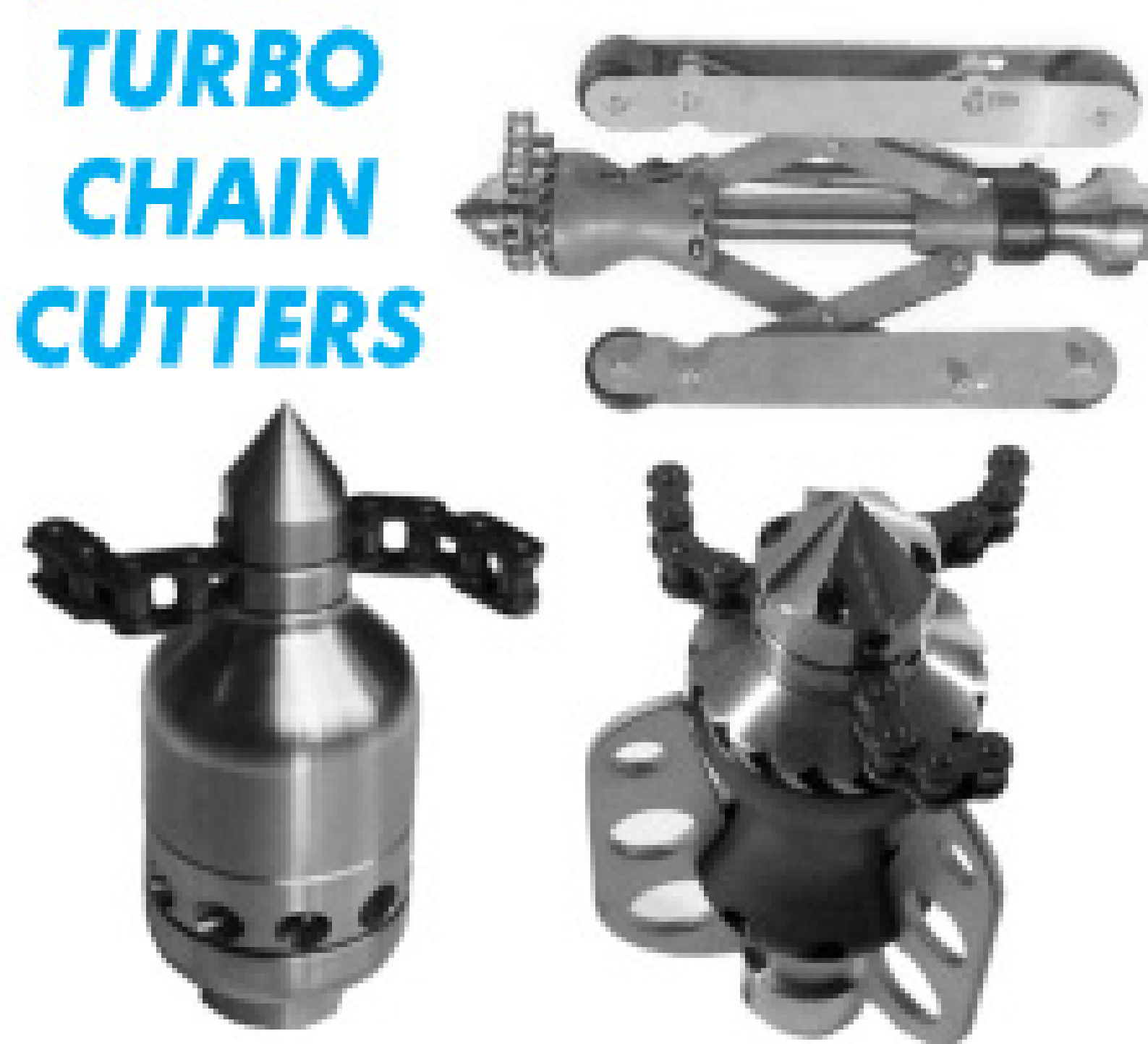
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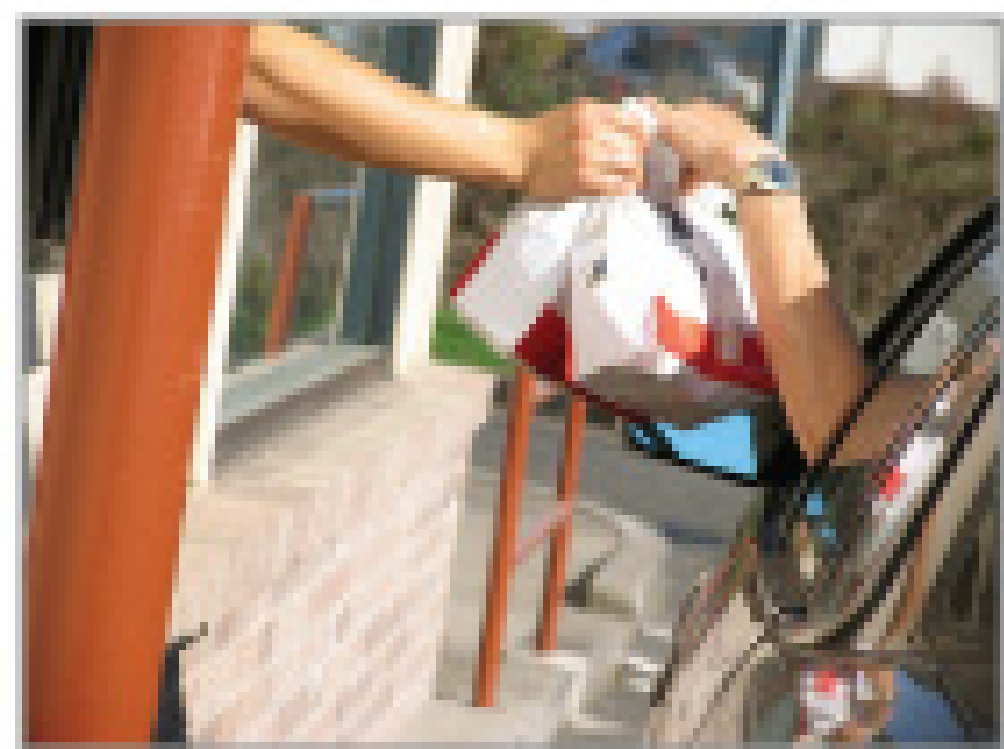
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SETTING AN EXAMPLE

Clayton County Water Authority's pipe lining, pipe replacement and leak detection programs serve as a model for other Georgia water utilities

By Suzan Marie Chin

"If you don't set goals and have a 10-year plan and strategy, you're just treading water. Budgets are great. But numbers aren't enough. You have to set goals."

So says Herbert Etheridge, manager of maintenance and construction for the Clayton County Water Authority (CCWA), based in Morrow, Ga. With the purchase of the Jonesboro and Forest Park municipal systems within its boundaries in 1994, Clayton County became one of the nation's largest agencies responsible for all water mains, sewer mains and storm

drains within county boundaries.

The acquisition of these two systems, the oldest in the county, brought numerous maintenance issues along with potential revenues. Maintenance and management of a water distribution and wastewater and stormwater collection system of this magnitude takes a strategy.

Clayton County has carefully chosen its plan of attack. Its programs include a trenchless pipe cleaning and lining program that saves substantial dollars and limits the disruption caused by open-trench line repair; a comprehensive replacement program for old

and troublesome galvanized steel mains and service lines, and a leak detection program that returns \$4 in water savings for every dollar invested. The approach is so successful that the county has won numerous industry awards and has become a model for other agencies.

Rehabilitate and save

When CCWA took over for the Jonesboro and Forest Park water systems, managers knew they faced aging lines that couldn't be ignored for long. The bulk of both systems had been built before 1950 and contained numerous unlined cast-iron mains, many heavily tuberculated.

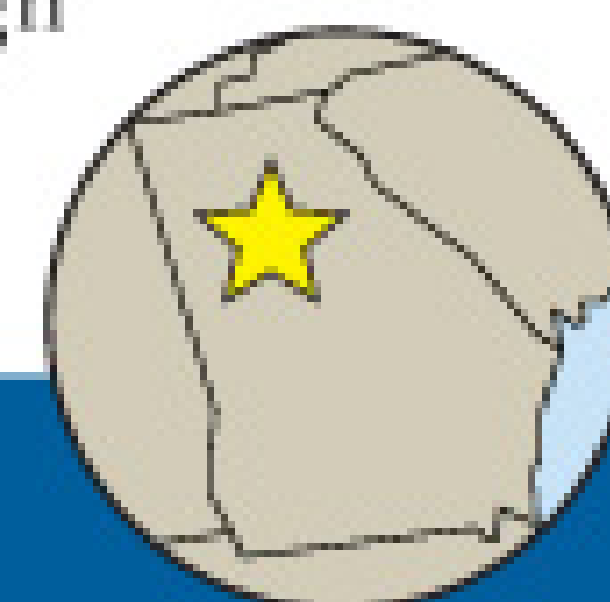
When CCWA crews needed to change the flow direction for fire protection, hydrant maintenance flushing, or emergency pumping, the mineral buildup would dislodge and discolor the water. Sometimes taste was affected. Although it was safe to drink, customers did not find the water pleasing. The authority also found that the buildup could affect flow and pressure.

At a program conducted by the Georgia Association of Water Professionals, Etheridge observed other distribution systems throughout the state that were being considered for the annual Distribution System of the Year award. During a stop in Macon, Ga., he saw a contractor cleaning and relining mains.

CCWA had a number of mains in need of rehabilitation, or of replacement at costs averaging \$55

per foot, including restoration costs. After seeing the cleaning and lining process, Etheridge found that it would work for Clayton County. Better still, it would cost roughly \$18 per foot and would limit disruption to customers. There was little doubt about how to proceed.

The cleaning and lining process starts with a thorough scraping of the pipe. Contractor J. Fletcher Creamer & Son Inc. uses a proprietary, self-built cleaning device made of spring-loaded steel. The unit consists of a series of heads with bolted-on blades that is winched or hydraulically pushed through the line.



PROFILE:

**Clayton County Water Authority,
Morrow, Ga.**

CUSTOMERS:
250,000

INFRASTRUCTURE:
1,446 miles of water mains

EMPLOYEES:
108

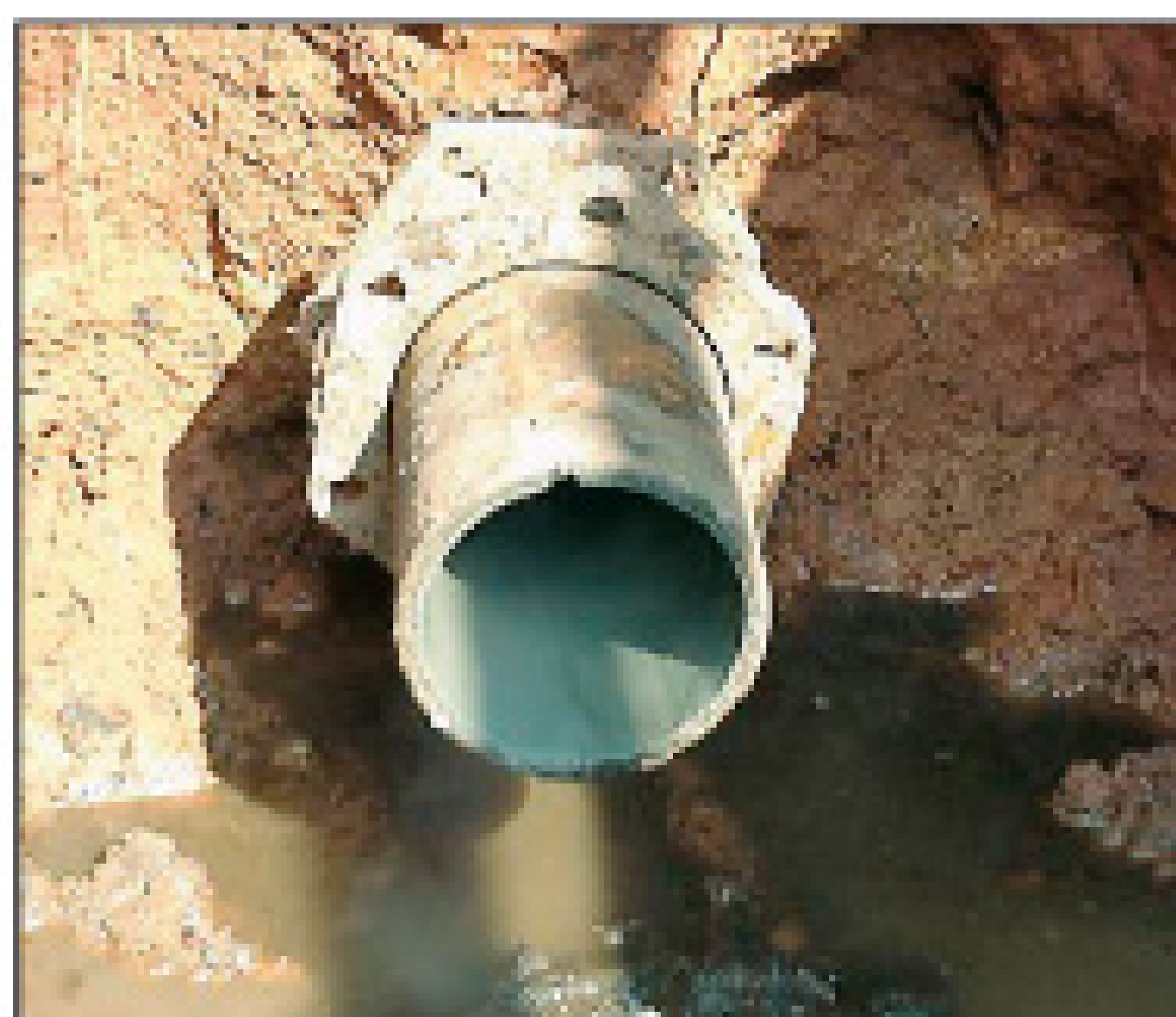
ANNUAL BUDGET:
\$11.5 million (water only)

WEB SITE:
www.ccwa1.com

Two workers retrieve the centrifugal water pipe lining machine and troweling device used in Clayton County Water Authority's cleaning and lining operations. (Photos courtesy of Clayton County Water Authority)



Cleaning and lining is a minimally disruptive process when compared to replacing pipes with open-cut methods. (Photo by Harris Hatcher)



Top photo: A sample of a 50-year-old tuberculated 6-inch, cast-iron pipe. **Lower photo:** A similar water main after cleaning and lining.

While the scraper proceeds, water is introduced behind it to flush the debris and ease the device's movement. The cleaning crew can determine by sight when the line is thoroughly clean and ready for lining.

"At the beginning of the process, the water coming from the exit point is as black as crude oil," says Cliff Padgett, area manager for the contractor. "We continue the scraping process until we see completely clear water running out. In most cases, our scraper

does the job in one pass."

After the main is clean, a very dense Type II Portland cement mortar made of equal parts of sand and cement is applied. The mortar blend is a formula chosen for its particular sand gradation and pumpability. The mortar is pumped in and applied using another piece of self-designed equipment.

"Although there are some off-the-shelf tools for cleaning and lining, we have found through experience that the items we build ourselves give us better results for this type of work than anything currently available on the market," says Padgett. The cleaning and lining process for an average city block can be completed within one day after the preparation work of establishing temporary services for area property owners.

Most of the 58,000 feet of pipe OCWA has cleaned and lined is 6- to 8-inch mains. The process has brought multiple benefits. "A pipe that should be 6 inches often has only a 3- or 4-inch opening because of the buildup," Etheridge says.

"The cleaning and lining process not only addresses the discol-

DROUGHT? WHAT DROUGHT?

Constructed treatment wetlands have helped Clayton County remain somewhat drought-proof during one of the worst dry spells in the past 50 years. During the early 1980s, the Clayton County Water Authority began reusing treated wastewater through land application (spray irrigation) for reservoir re-charge.

In 2004, the agency began converting the land-application system to constructed wetlands, which provide more capacity on less land and are more cost-effective. Highly treated effluent from the authority reclamation facility is pumped to a splitter box, from which it is distributed to the wetland sites.

As it flows by gravity through the cells, plants take up the nutrients and provide additional treatment. The clean water is discharged to the county's two reservoirs in what is called indirect potable reuse.

Wastewater reuse is critical because every stream in the county begins in the county. The Flint River, the main water source, starts as a spring under Atlanta International Airport in the northern part of the county.

"Because of our limited sources, we have to really protect the raw water we have here," says Herbert Etheridge, manager of maintenance and construction. "Every little stream and bit of water captured counts."

The county's average water usage is 25 to 26 mgd. The wetlands significantly offset that need. "We're putting 10 mgd back into our reservoirs through the wetlands right now," Etheridge says. "Because of this, we weren't affected by the drought like other counties in the South."

Work has begun on an expansion of the wetland treatment capacity. When complete in 2010, capacity will be 17.53 mgd.

oration caused by the buildup but also increases our available flow for firefighting by 350 to 900 gallons per minute and pumps up our pressure from 30 psi to 45 psi. We haven't needed to upsize, as this process gives us back the full diameter function of our pipes."

Replacing small lines

The CCWA system also includes 2-inch galvanized mains dating as far back as 1955, primarily in smaller streets and cul-de-sacs. Each such line serves eight to 10 homes. The galvanized pipes are a maintenance issue because of leaks and diminished flow.

"The big difference between the cast-iron and galvanized steel mains is rust," Etheridge says. "Like cast iron, steel will accumulate the mineral buildup, but it will also degrade through from the outside from rust, and so it will develop leaks."

Here, cleaning and relining is not an option, and an estimated 200,000 feet of steel pipe needs replacing. Always proactive, CCWA has already replaced 45,000 feet with lined cast-iron pipe and will replace the balance in the next 10 to 12 years.

Another problem is with the system's galvanized steel service lines. Here, issues are most common when a main is located on the east side of a road with meters on the west. The longer pipes have vulnerable connection points, which can give way, causing surface leaks.

To address these lines, the authority 16 years ago began replacing all galvanized steel service lines with copper in entire subdivisions. To date, almost 95 percent of such lines have been replaced, and service calls and street flooding have been reduced.

Detecting water losses

In 2000, nearly 20 percent of the authority's water was unaccounted for. At the time, the American Water Works Association (AWWA) acceptable standard was 15 percent loss for an average size system. To correct the problem, CCWA launched a mobile leak detection program and a permanent leak detection program.

For its first step, the authority purchased digital leak detection equipment from Flow Metrix Inc.

"If all of the leaks we have found to date had gone one more year, we would have lost 4.6 billion gallons of water at a production cost of \$3.2 million. For the \$800,000 we've spent over the last seven years on this program, we've recovered more than \$3 million."

Herbert Etheridge



Above, a crew member from J. Fletcher Creamer & Son Inc. cleans the lining machine and trowel device. Upper right, a look up a tuberculated water main. Lower right, the steel scraper used to remove tuberculation during the cleaning process.



and hired one foreman and two technicians to use it. Each day the crew goes to work, aiming eventually to evaluate and track the entire distribution system.

The Flow Metrix Inc. system collects digital information that can be downloaded into system maps in the ArcView GIS from ESRI and a Cityworks work order system from Azteca Systems Inc.

With this program, CCWA finds leaks before they surface. An AWWA study has shown that without a proactive detection program, the average leak may persist for as long as two years before it becomes visible on the surface. When CCWA discovers a leak, it is measured and immediately repaired. Since the start of the leak detection program, the crew has been through the entire system twice and has found 360 leaks that were not surfacing.

"When we measure a leak, we assume it would have leaked one more year before it was discovered or surfaced, which is conservative based on the AWWA report," Etheridge says. "If all of the leaks we have found to date had gone one more year, we would have lost

4.6 billion gallons of water at a production cost of \$3.2 million. For the \$800,000 we've spent over the last seven years on this program, we've recovered more than \$3 million. We save \$4 for every dollar we invest, which isn't a bad return."

The second phase for capturing lost water is the installation of a permanent leak detection system from Flow Metrix that attaches to water meters. The devices will be placed in specified sections of the system at roughly 500-foot intervals. As the meters are read, they will also analyze and pinpoint leaks. The data will be downloaded daily into the Cityworks work order system so that repairs can be scheduled. CCWA has procured 10,000 leak detectors for 2008 installation and plans to add more each year until the entire system is equipped.

To date, the leak detection initiatives have helped CCWA reduce its lost water to 12 percent. The goal is to reduce it to 10 percent or less. This work has gained the

attention of the Metro North Georgia Water Planning District, which uses the Clayton County program as a model for other agencies.

"As a requirement for licensing renewal, water distribution companies are now required to establish a leak detection program," Etheridge says. "So the first call those folks make is to us to come by here and see how we set up our program and how we run it daily."

Setting an example

Strategic planning and progressive rehabilitation, replacement and leak detection programs have earned CCWA the Georgia Association of Water Professionals highest honor, Water Distribution System of the Year for Large Systems, in 2003, 2005 and 2007.

The authority might have won the award more often if not for a rule that says the winner must "sit out" for the next year. "Everyone that wants to win the award knows what they're shooting for; they want to be better than we are," says Etheridge. "It's a nice position to be in, but it does put a little pressure on you when you're in the running."

Planning and strategy have been keys in CCWA's management of its massive system but Etheridge is quick to point out that nothing happens without the employees, management team and board of directors. "Our success, more than anything comes from our teamwork," he says.

"Our board and management team doesn't just come to the office and simply vote on what we ask for. They are involved. They look at programs, go to conferences, and visit with our crews in the field. This gives them the confidence in us that we need to operate successfully." ♦

MORE INFO:

- 256 Azteca Systems Inc.**
801/523-2751
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ESTUARIAL EXCELLENCE

The Buzzards Bay National Estuary Program (BBNEP) in Massachusetts helps communities safeguard the environmental quality of an essential resource.

By Dan Heim

An estuary is an area where a river meets and mixes with the sea, and is influenced by changing tides, temperatures and salinity.

To Bernadette Taber and her colleagues at Buzzards Bay National Estuary Program (BBNEP), it's more simply defined as the battleground on which her agency succeeds or

fails. And it hasn't failed yet.

Taber, stormwater specialist, has overseen the distribution of grants to help area communities with a variety of water quality programs since 1985. On "extended loan" from the USDA Natural Resources Conservation Service, she is one of five specialists who make up the program. "It's a tight group with a sharp focus, and that

really helps us get things done," Taber says. "The newest member of our team has been here for 13 years, so we do know how to work together."

Their mission is to protect the environmental quality of Buzzards Bay and its watershed — no small task with 17 municipalities, seven major rivers, and over 350 miles of coastline under their watch. John

Rockwell, wetlands specialist, adds, "We've had full cooperation from the stakeholders. Private citizens, town councils, corporations, the fishing industry; they all truly care about the quality of the bay."

Organizational intricacies

The BBNEP acts as an advisory arm of the Massachusetts Office of Coastal Zone Management (MCZM). With offices in Wareham, Mass., on the north end of the bay, the staff is in



PROFILE:
Buzzards Bay
National Estuary
Program,
Wareham, Mass.

SERVICE AREA:
Buzzard Bay Watershed
(430 square miles)

ANNUAL PRECIPITATION:
45 inches average

POPULATION:
260,000 in 17 municipalities

EMPLOYEES: 5

OPERATING BUDGET:
\$450,000 (50 percent EPA,
50 percent local matching)

WEB SITE:
www.buzzardsbay.org

Jennifer Longley

In the one-time whaling port of New Bedford, Mass., a combined sewer overflow mitigation project will help keep sewage out of Buzzards Bay. The project design was funded by the Buzzards Bay National Estuary Program (BBNEP). Here, city workers Mike Supczak (left) and Felix Fernandez search for a water line from the street to a house.





Jennifer Longley

Bernadette Taber, a BBNEP stormwater specialist, talks to Jesse Velez, foreman and equipment operator for a combined sewer overflow project in New Bedford.

continuous contact with entities throughout the 430-square-mile bay watershed. “It’s a huge area,” notes Taber, “but the sense of shared mission among stakeholders helps us meet our mutual goals.”

Those goals are spelled out in the Comprehensive Conservation Management Plan (CCMP), which identifies four environmental priorities:

- Fecal coliform contamination, especially via stormwater discharge.
- Nitrogen loading and resultant eutrophication of coastal embayments.
- Toxic contamination in the ecosystem and in seafood.
- Habitat loss (especially wetlands) within the bay and its watershed.

To meet these ambitious goals, the BBNEP works with stakeholders to suggest solutions (best management practices, or BMPs) and provide resources. An essential part of their work is a municipal grant program. Using U.S. EPA or state funds, often matched or exceeded by local agencies, the BBNEP disburses mini-grants of up to \$25,000 for individual water quality and habitat protection and restoration projects.

“The grant system is push-pull, with some projects created within the BBNEP, and others applied for by outside agencies,” Taber observes. In a typical year, BBNEP provides mini-grants totaling about \$100,000,

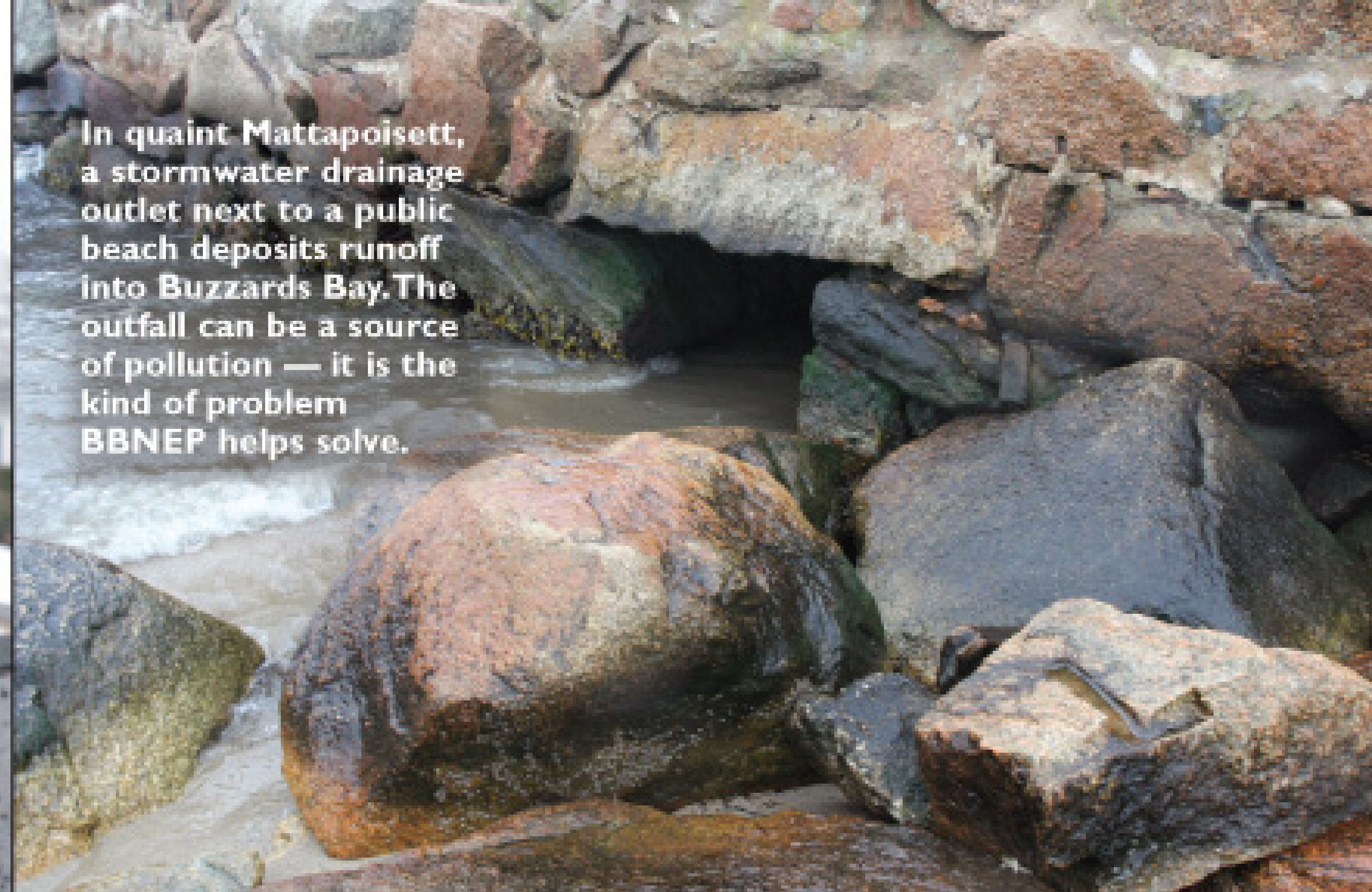
working with municipalities and their partners throughout the watershed.

The balance of the \$450,000 budget funds on-staff specialists who provide technical assistance to municipalities. Those specialists design and review projects, write proposals, draft local laws and regulations, write planning documents, prepare maps, coordinate between agencies, and serve as a clearinghouse for information.

Stormwater solutions

One of the earlier grant programs helped all 17 watershed municipalities make the move to GIS mapping of stormwater infrastructure. The entire watershed is almost fully mapped and modeled. To facilitate the sharing of data, the BBNEP uses the ever-popular ArcGIS software, from Environmental Systems Research Institute (ESRI).

The Storm Drain Atlas is a byproduct of the mapping effort. Available online, this comprehensive GIS database of storm drain locations and specifications facilitates planning for maintenance, rehabilitation, and remediation. Notes Rockwell, “Stormwater quality was a huge issue, since what goes



In quaint Mattapoisett, a stormwater drainage outlet next to a public beach deposits runoff into Buzzards Bay. The outfall can be a source of pollution — it is the kind of problem BBNEP helps solve.

Jennifer Longley

GEOLOGICAL DETAILS

Buzzards Bay was formed during the last ice age, about 15,000 years ago. Before that, the bay was periodically submerged as glaciers advanced and retreated and ocean levels rose and fell. The southeast side of the bay is formed from the glacier’s terminal moraine and so has a relatively smooth shoreline with sand and gravel soils.

The northwest side, with its numerous bays and inlets, was formed during the glacier’s retreat to the north. Many of these bays and inlets are now sheltered from the ocean by barrier spits. Here the soils are more silt-dominated with poor infiltration.

Rivers within the watershed are slow, meandering streams near their headwaters, and for most of their freshwater length. Near the coast, the action of the tides rapidly widens the channels as the rivers transition from freshwater stream to tidal estuary.

Tidal currents and wind are the dominant circulation forces in Buzzards Bay. The Elizabeth Islands protect the bay from the heaviest waves but still allow excellent water circulation. Complete tidal mixing is estimated to occur every 10 days.

Water temperatures in the bay range from 72 degrees F in summer to 28 degrees F in winter. The shallowness of the bay, combined with wave mixing and turbulent tidal flow, prevents strong thermal stratification, so the bay is well mixed for most of the year.

Salinity has a small annual range and gradually increases offshore. Only a few large streams bring freshwater into the bay, so salinity offshore is essentially the same as in the estuaries. Overall, the bay is tidally dominated and well mixed.

“When we first started talking about these issues, way back in the 1980s, everyone was worried about government regulation intruding on private property rights. But after we explained the issue to them, and it came to a vote, it went like 250 to 4. People care about this water and are willing to do what it takes.”

John Rockwell

down the drains ultimately ends up in the bay.”

The atlas also identifies the presence of road cuts and their associated drainage. Many roads in Buzzards Bay are built with “country drainage,” and before the environment was an issue. Carelessly planned cuts cause significant runoff problems that bring pollution into the bay.

BBNEP is working with several communities to address stormwater issues, focusing on improving the status of shellfish beds. Problems with bacterial contamination, primarily from wild and domestic animal waste, frequently close these beds, and have shut down a few permanently.

Two of the most recent stormwater projects are in the towns of Westport and Marion. In Marion, the waterbody of concern is Sippican Harbor, where the shellfish status ranges from permanently closed to conditional closures to open. The site conditions within Marion, especially along the coastal fringe, make the remediation of stormwater outfalls challenging.

Low permeability and high groundwater levels (a mere two to four feet below the surface in some areas), plus tidal backflow, dictated the use of custom-built biofilters in an area known as Island Wharf. Biofilters, also known as bio-retention facilities or rain gardens, consist of a volume of porous soil covered by a thin layer of mulch. A stand of grasses, shrubs, and small trees is established to allow evapotranspiration, maintain soil porosity, encourage biological activity, and promote the uptake of some pollutants.

At Island Wharf, the existing soil had to be removed and replaced. Four separate biofilters were built, all strategically located between the town and the bay. The size and number of biofilters were dictated by the area drained (7.5 acres in this case). Several difficulties were encountered during excavation in this high-use area, not the least of which was the discovery of old infrastructure, some of it not yet in the GIS.

The final phase involved regrading and/or crowning drainage areas to ensure that they feed the biofilters. In addition, pre-treatment filters were installed along some roads to mitigate loading from win-

ter road sand. On BBNEP’s recommendation, Marion chose a proprietary pre-filter called Downstream Defender by Hydro International of Clevedon, U.K. Like most passive, mechanical pre-filters, it efficiently extracts both floating debris and that which sinks.

The plant cover on the biofilters was well established after only

tion focuses on the headwaters of the east branch of the river, in an area called the Head of Westport.

On the east side of the Head, one stormwater discharge has been re-routed through a constructed wetland on land owned by the town. Issues at the site were high groundwater, pipe outfall elevations, and tidal floods. Several

The results of these efforts to treat and manage stormwater are evident. For example, closures of shellfish harvesting areas peaked in 1990 and have steadily declined since. “There’s a lot of other fishing here too,” says Taber, “but shellfish are a good indicator of the general health of the bay.”

Nixing nitrogen

Nitrogen loading is also on the BBNEP priorities list. Nitrates and ammonia enter the system primarily from human waste disposal and fertilizer use, causing what is termed coastal eutrophication. Algae love nitrogen and respond by growing rapidly like any well-fed plant. This excessive algal growth smothers animals, shades seagrasses, reduces the oxygen content of the water (bad for fish and mollusks),



Stormwater retention basins (above, under construction), and constructed wetland (right) are valuable tools for the BBNEP stormwater program.



two growing seasons. The pre-filters, of course, begin working immediately. Analysis of discharge water quality shows both are working as designed. Regular inspection and monitoring will ensure their continued efficacy.

Still at work

The Town of Marion is continuing with remediation under its overall sewer and water improvement program. As part of this project, the town expects to use tree boxes to treat stormwater pollutants. In addition to site conditions similar to those at Island Wharf, there is limited space for treatment at the site. The tree boxes will be placed within the road layout and along private property. The design of this project is being funded through the BBNEP mini-grants program.

The other stormwater site is in the Town of Westport, along the west edge of Buzzards Bay. Drainage from Westport and several other communities flows into the Westport River. Here, stormwater remedia-

partnerships helped get the project in the ground — local organizations and boards were the driving force. State and federal agencies provided the planning assistance and construction funding.

The remaining discharges are on the west side of the river. The project there is in its early planning stages; the contributing drainage is much larger and involves runoff from a local school. Options discussed include biofilters, grass swales, green roofs, and use of stormwater to irrigate recreational fields. Once planning is complete and the alternatives selected, the town will proceed with the design, funded through BBNEP mini-grants.

increases water opacity, and generally destabilizes the ecosystem.

Most homes in the watershed still use septic systems, often the largest source of nitrogen. In the 1990s, the BBNEP helped enact new regulations that required inspection of these systems at the time of home sales, but even these new septic systems do not remove nitrogen. Only through sewerage, or the use of new types of nitrogen-removing septic systems will progress be made.

Even then, remediation on this pollution source will take years because of the slow travel time of contaminants in groundwater, so it could take decades to improve the eutrophic conditions in some estu-

aries. Fortunately, the bay itself enjoys good tidal mixing, so that if this form of pollution can be reduced, the bays can quickly recover.

No discharge zone

Toxic contamination is the BBNEP's third priority. Work is still being done at the infamous New Bedford Superfund site. Contaminated sediments have been removed and PCB levels are dropping. The program has also been involved with assessing the impacts of the 2003 oil spill in Buzzards Bay. BBNEP is not directly involved with the cleanup but acts as a local clearinghouse for information on project status and progress.

"It's a huge area, but the sense of shared mission among stakeholders helps us meet our mutual goals."

Bernadette Taber

Buzzards Bay is also designated by the EPA as a "no discharge zone." For commercial and recreational boaters, this means no dumping of sanitary waste from marine toilets. Boat pump-outs are widely available and more are being added. "Our harbor masters do a good job of enforcing this," says Taber. "It's really not a large problem anymore."

Some 12,000 boats use the bay during the peak summer season, but they add little to the environmental load. Boaters recognize the value of clean water. Bilge socks (oil-absorbent sacks) help capture motor oil that has leaked into bilge water compartments. Notes Rockwell, "We helped the towns get a grant to buy a bilge sock for every boat in the bay. This reduced oil leaking into the bay."

Wetlands preservation

BBNEP's final priority is wetland preservation. Early projects focused on restoring wetlands damaged by development and making sure new development had minimal impact. Current efforts also include working with local environmental groups, encouraging enforcement of existing laws, and educational programs on wetland ecology.

Massachusetts has lost 40 to 50 percent of its original freshwater

and saltwater wetlands since colonial times. State law, in the form of the Wetlands Protection Act and Wetlands Restriction Program, has been immensely successful in stemming these losses.

Still, the law allows areas of wetland up to 5,000 square feet to be altered or filled for a number of reasons, although these permitted losses must be offset by the construction of new wetlands. Not surprisingly, because wetland replication is not always successful, and because of smaller unpermitted and illegal wetland filling, incremental wetland losses continue.

BBNEP is working with cities and towns to enact effective local wetland bylaws to provide another layer of protection above and beyond what the state mandates as a minimum standard. Other efforts by towns to mitigate the effects of increased boat traffic, non-point-source pollution, and nitrogen loading are complementing these wetlands protection efforts.

Making a difference

BBNEP helps document trends in water quality, and Taber expects that to continue. The change of attitude within the community in response to the degradation of the bay, and the benefits observed from these restoration projects, is incontrovertible and perhaps a more significant outcome of the program's efforts. Notes Rockwell, "When we first started talking about these issues, way back in the 1980s, everyone was worried about government regulation intruding on private property rights. But after we explained the issue to them, and it came to a vote, it went like 250 to 4. People care about this water and are willing to do what it takes."

Taber adds, "Our web site is a great resource too, and an important part of our outreach program. It has a real impact in shaping public opinion on these environmental issues." The site is the creation of Joe Costa, PH.D., BBNEP executive director.

It's the nature of government in New England to have a town committee for just about everything. The public interest was there, but inter-committee communication was severely lacking. Says Taber, "When it comes to a specific issue,

After more than two decade as a BBNEP stormwater specialist, Bernadette Taber knows almost every mile of Buzzards Bay coastline. Here, Taber and regional planner Sarah Williams review a map at the BBNEP offices in Wareham, Mass.



Jennifer Longley

MORE INFO:

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348 Hydro International
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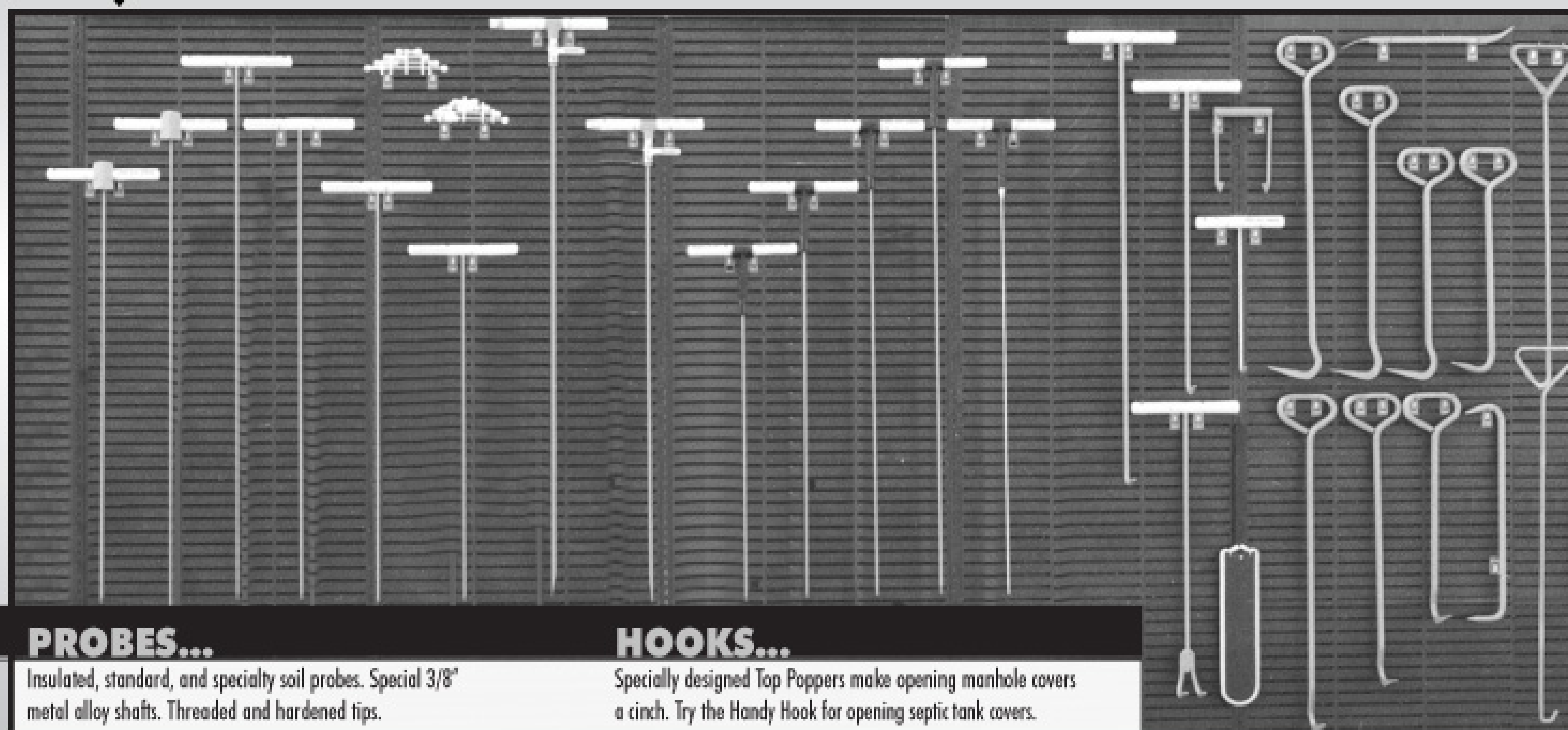
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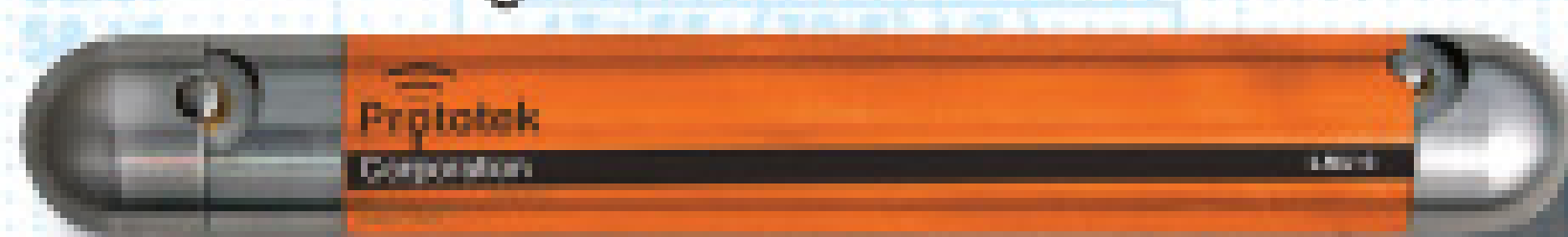
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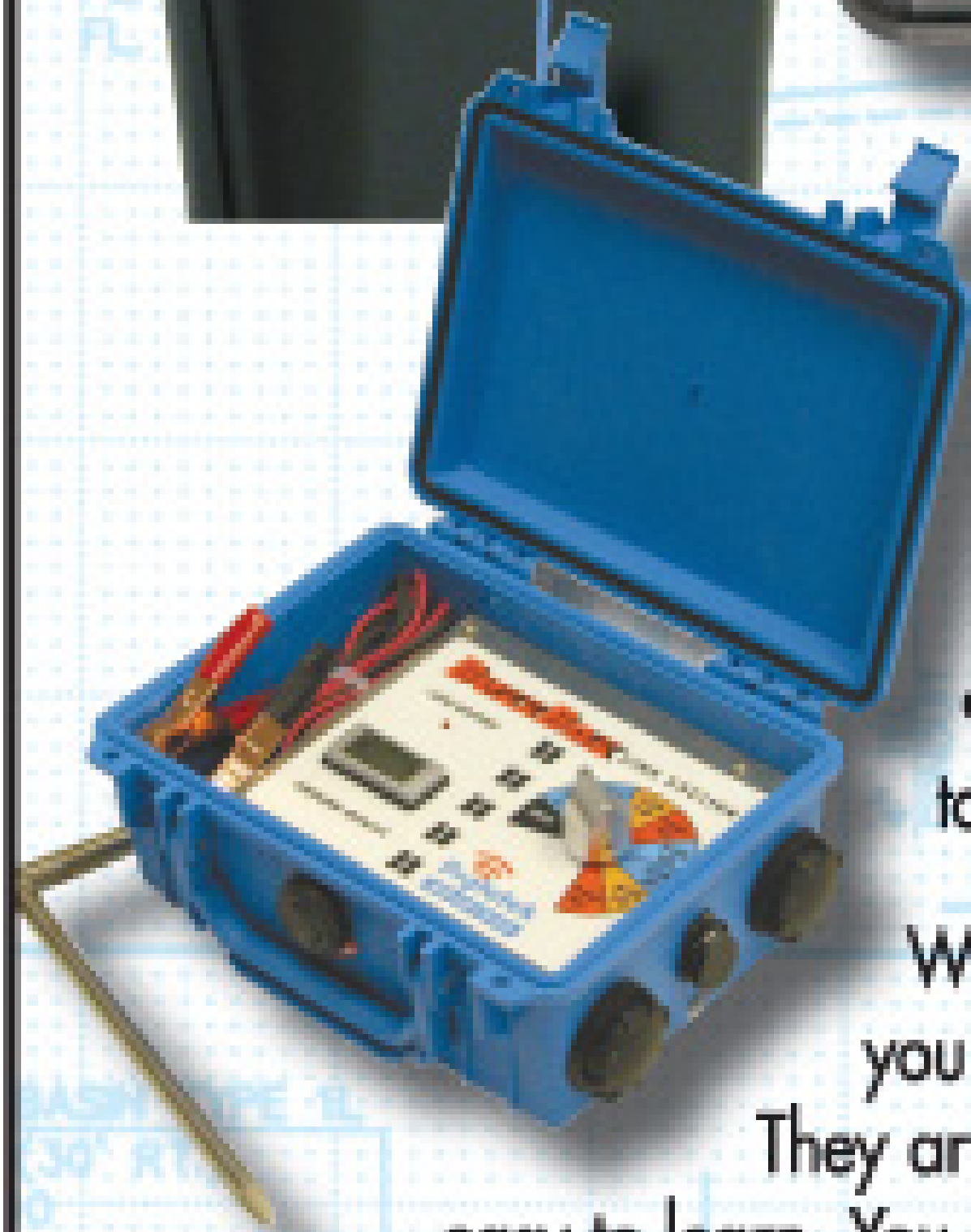
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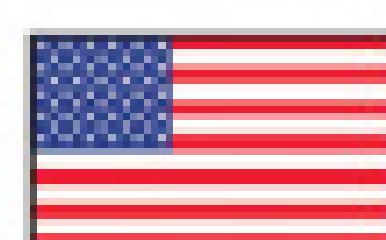
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ULTRA SOLUTION

A thermoforming PVC alloy pipe enables a Florida utility to reline a culvert scheduled for open-cut repair, save money and reduce disruption

By Scottie Dayton

“Ultraliner lined the complete culvert and made a substantial improvement. Before the repair, I had a skeleton of a corrugated metal pipe that was showing me ribs. The demo proved the product’s worth to our department.”

Rick Carper

Point repair crews from the Atlantic Beach (Fla.) Public Works Department had made several repairs to the road and inlets at either end of a 50-foot-long elliptical culvert in a residential area. The department was concerned that the culvert could collapse with the next big rainstorm.

The city had obtained a quote from its point repair contractor for replacing the 45-year-old, 18- by 29-inch elliptical metal pipe culvert by open-cutting the road, but public works director Rick Carper wanted to test a trenchless solution.

Steve Bagby of S Bagby and Company in Jacksonville Beach put

Carper in touch with Gary Pender, vice president of Engineered Lining Systems Inc. (ELS) in Jacksonville. Bagby had seen the results ELS achieved relining storm drains using a custom PVC alloy fold-and-form piping system manufactured by Ultraliner Inc. in Oxford, Ala. Carper invited Pender to demonstrate the process on the damaged culvert.

Master mold

A public works crew cleaned the line, and the ELS team inspected it. “The culvert was heavily corroded with breached joints,” says Pender. “There were several places three to four feet long and inches wide

where corrugated pipe was missing.”

ELS engineers determined that a 24-inch Ultraliner with a standard 3/4-inch thick wall would work. The factory-produced liner arrived folded like an “H” lying on its side and wrapped around a wooden spool. A boom lifted the spool into a hotbox where steam from a boiler truck at 280 degrees heated the material until it was pliable enough to be pulled.

The head of the liner was tapered, and two opposing holes were then drilled 12 inches in from the edge. “We fed a chain through the holes, hooked it to a 3/8-inch cable, and inserted the liner through a brick catch basin,”



The downstream end of the 18-inch-tall by 29-inch-wide corrugated pipe is shown before repair.



A winch has pulled the folded liner through the culvert. The upstream end protrudes beyond the brick catch basin so that a sewer plug can be inserted.



The factory-produced Ultraliner material arrived folded like an "H" and wrapped around a wooden spool.

says Pender. The 30-ton hydraulic winch across the street pulled the liner through the culvert in less than 90 seconds.

A flow-through sewer plug from Plug-It Products sealed the upstream end, allowing a hose to introduce steam that heated the alloy and prevented post-installation longitudinal shrinkage. Once the downstream end was plugged, the team increased the boiler pressure to 18 psi to inflate the liner.

Letting off steam

Once the liner formed to the pipe, the pressure was reduced to 12 psi to hold it in place as an after-cooler blew in 80-degree air. "We monitor the temperature at the exhaust end," says Pender. "Once it drops below 100 degrees, we turn off the pressure because the liner is hard enough not to collapse. The process is very fast."

Depending on the diameter and length of the pipe, liners cure in one to two-and-a-half hours. If a mistake occurs, the liner can be reheated, extracted, and reinserted.

Engineers, project managers, and designers from Atlantic Beach and Jacksonville Beach public works departments observed the demonstration. "Ultraliner lined the complete culvert and made a substantial improvement," says Carper. "Before the repair, I had a skeleton of a corrugated metal pipe that was showing me ribs. The demo proved the product's worth to our department." ♦

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FOCUS: SEWER

DOUBLE BARREL

Slip-lining and CIPP lining enable a central Wisconsin city to choose the most cost-effective sewer rehabilitation technology to suit each situation

By Jim Force

Under the right conditions, the City of Wausau, Wis., uses slip-lining as an alternative to cured-in-place pipe (CIPP) lining to rehabilitate aging sewer lines. It's a double-barreled approach that lets this northern city slice the cost of specific sewer replacements in half.

"Obviously, slip-lining isn't feasible for every sewer in the system," explains Joe Gehin, director of public works and utilities. "But where we are able to use it, we've found that we can save money."

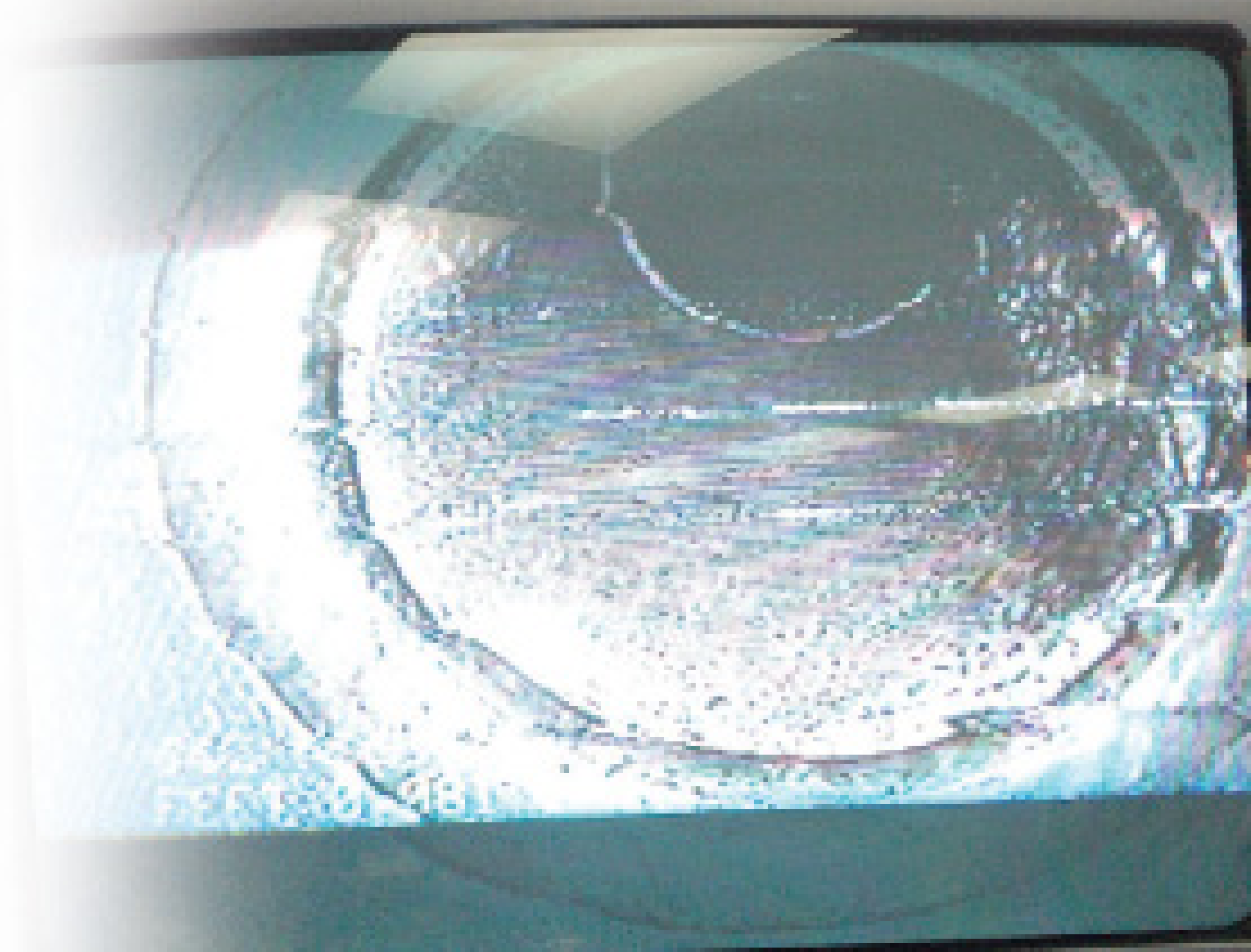
Slip-lining uses high density polyethylene (HDPE) pipe, which the city purchases at about \$3 per foot. A thermal bonding process

joins the 40-foot lengths together, and the liner pipe is then pushed into the existing sewer. Even including installation costs, Gehin calculates the procedure costs about 50 percent less than CIPP, although he says the cost for cured-in-place technology has been coming down as well.

Following a pattern

Wausau has about 250 miles of sanitary sewer and 200 miles of storm sewer, 99 percent separated. Some of the pipes are old enough to have been constructed of hand-laid brick. The sewer rehabilitation program follows a regular pattern: The city rebuilds streets using a pavement management program, which rates streets according to their condition, and then recommends reconstruction projects to the city's Capital Improvement and Street Maintenance committee.

As a street is targeted for reconstruction, the sewer department inspects the lines beneath using a pan-and-tilt CCTV system from Aries Industries Inc. If the line needs replacement, Gehin's department takes advantage of the street reconstruction to accomplish both jobs at once, using a single contractor, and avoiding extra excavation.



Gus Strehlo, wastewater superintendent for the City of Wausau, reviews VHS tapes of sewer lines that have been inspected and are targeted for lining. (Photography by Ed Wodalski)

"Coordination between street and sewer rehabilitation is really a key to success," says Gehin. "We have one contractor and one point of responsibility. It's essentially a single, all-inclusive project." The department also replaces sewers in case of pipe collapses or other emergencies.

Years of experience

Wausau has been using the dual approach to sewer replacement for about 20 years. In 2007, the city rehabilitated about 2,500 feet of sewer with slip-lining, and more than 20,000 feet with CIPP. The city bids out both types of jobs.

For CIPP lining, the city uses Insituform Technologies Inc., based in Chesterfield, Mo., and Visu-Sewer Clean & Seal Inc., based in Pewaukee, Wis. According to city records, costs for CIPP have ranged from \$22 a foot for 8-inch pipe to \$32 a foot for 12-inch pipe.

For slip-lining, the city secures



PROFILE:

City of Wausau, Wis.,
Public Works
and Utilities

FOUNDED:
1861

POPULATION:
39,000

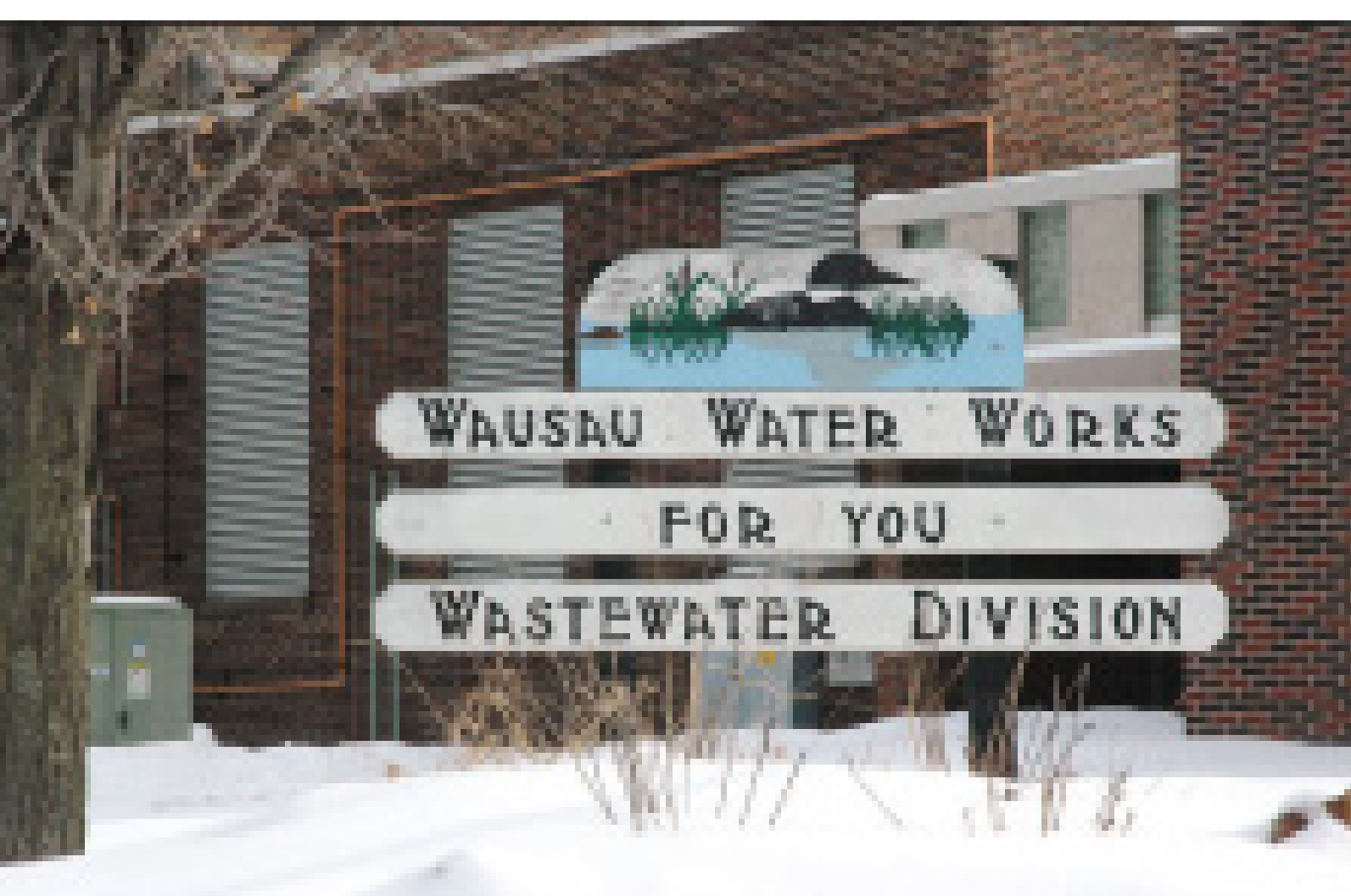
METERED CUSTOMERS:
15,000

INFRASTRUCTURE:
250 miles of sanitary sewers,
200 miles of storm sewers

EMPLOYEES:
31 (water and sewer
department)

ANNUAL BUDGET:
\$8.5 million

WEB SITE:
www.ci.wausau.wi.us



The outside of the city water and sewer department, which has 31 employees who serve 15,000 customers.

proposals from several area manufacturers and provides much of the labor itself, working with the street contractor when sewer replacement accompanies street rebuilding. Gehin estimates that the all-in cost for slip-lining can run as low as \$6.50 per foot for the smaller diameters, and up to \$10 per foot for larger diameters. Aside from cost, several other factors affect the decision to slip-line or use CIPP:

- Depth of sewer to be rehabilitated
- Changes in grade or direction of sewer to be rehabilitated
- Size of the host pipe
- Condition of laterals

If the line needing replacement is deep underground, or on a steep grade, the city will likely choose CIPP, explains Gus Strehlo, wastewater superintendent. That's because CIPP liners are flexible enough to be inserted through manholes, whereas slip-lining requires an excavated trench for insertion. If the host pipe makes abrupt changes in direction or grade, flexible CIPP lining is better suited to the twists and turns.

Size does matter

Wausau has found CIPP to be the better choice as well, if the existing pipe is 8 inches in diameter or smaller. "If the host pipe is 8 inches or less in diameter, we'll use CIPP because it's not practical

to slip-line sewers that small," says Strehlo. "We tried with a 7.25-inch liner pipe once but it's not something we'd do again."

The condition of existing sewer laterals can also be a factor. With CIPP, a robotic cutter makes holes in the liner to connect with existing laterals, while slip-lining requires an excavation at each lateral connection. However, explains Strehlo, if the city plans to replace existing laterals, as well as the

sewer line, then slip-lining makes sense because the excavations must be made anyway.

When the conditions are favorable, and when the failing sewer line qualifies for slip-lining, Wausau has developed a reliable program for installation. First, the city purchases the pipe and has it delivered to the site. A thermal fusing machine ties the lengths together. City workers cut slits in the leading end of the pipe and

push the end sections together to form a point, or cone, that is secured with a bolt. The cone aids in the insertion of the liner into the host pipe. The crews can also use bentonite lubricant to pro-

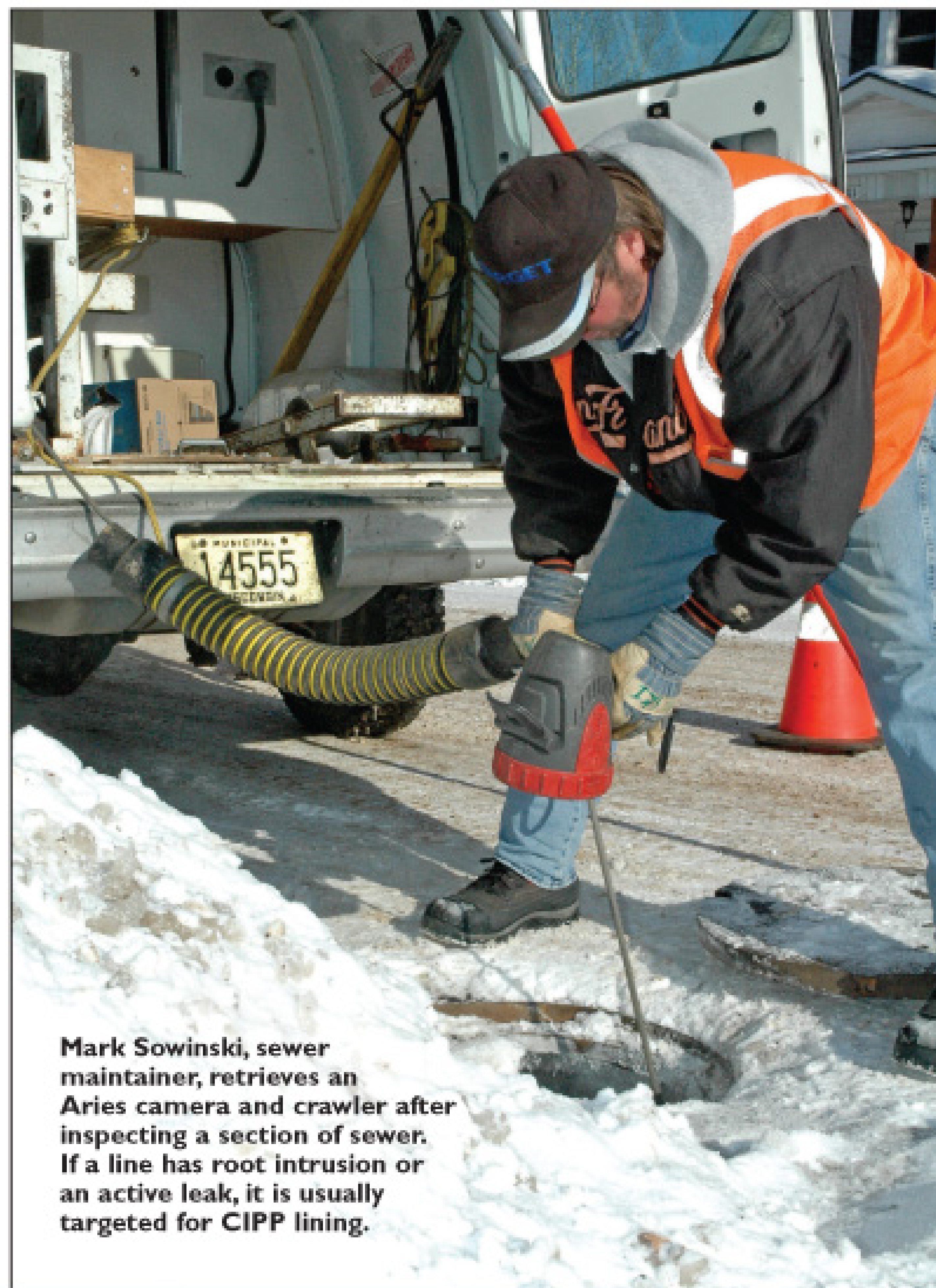
CIPP CHOICES

When Wausau chooses CIPP over slip-lining for sewer rehabilitation, the city bids out the work. A number of contractors are available, but most recently the city has hired Insituform Technologies Inc. of Chesterfield, Mo., and Visu-Sewer Clean & Seal Inc. of Pewaukee, Wis.

Visu-Sewer uses a non-woven, needled, polyester felt lining system, saturated with a thermosetting resin. The liners can be installed from manhole-to-manhole. Once the liner is inverted or winched into place, it is expanded against the host pipe wall, and resin in the liner is forced into cracks and joints to form a mechanical lock. Heat then activates the resins and causes them to cure into a new structural pipe.

Insituform employs a sewn tube liner consisting of one or more layers of absorbent, non-woven felt. The outside layer of the tube is coated with an impermeable, flexible membrane that contains the resin and allows the resin impregnation process to be monitored. The resin is a corrosion-resistant polyester or vinyl ester.

The tube can be inverted with air or water, or pulled into place. Either hot water under hydrostatic pressure or steam activates the resins and cures the tube.



Mark Sowinski, sewer maintainer, retrieves an Aries camera and crawler after inspecting a section of sewer. If a line has root intrusion or an active leak, it is usually targeted for CIPP lining.

“Obviously, slip-lining isn’t feasible for every sewer in the system. But where we are able to use it, we’ve found that we can save money.”

Joe Gehin

PAVEMENT MANAGEMENT

To identify streets needing reconstruction — as well as which sewers are candidates for rehabilitation — the City of Wausau uses a pavement management system developed and copyrighted by the Transportation Information Center of the University of Wisconsin-Madison, as part of the nationwide Local Technical Assistance Program. The system is called PASER (Pavement Surface Evaluation and Rating).

The city inspects its road surfaces annually, looking for deterioration caused by weather, age or traffic. According to the PASER system, this deterioration falls into four main categories: surface defects, surface deformation,

cracks, and patches and potholes.

Photographs in the PASER manual depict varying degrees of deterioration for each category. The manual describes the levels of deterioration and recommends appropriate maintenance or repair procedures.

“The state requires all communities to submit their road ratings every two years,” says Wausau project manager Brad Marquardt. “The majority of them use the PASER system. It’s very useful. It gives us a benchmark to measure the condition of our road surfaces and establish priorities.”

mote the slipping action.

The HDPE pipe is not as flexible as CIPP, so the crew excavates a small entry trench to provide access to the host pipe, or to a manhole if the insertion will begin there.

Push, not pull

Wausau crews push the liner pipe into the host pipe, rather than pulling it. "We feel that pulling the pipe could elongate it or stretch it out of shape," Strehlo says. Crews use a backhoe with a sling attached to the bucket. With the pipe positioned in the sling, the bucket arm extends, pushing 10 to 12 feet of pipe at a time



Joe Gehin, director of public works and utilities, points to sections of sewer that have been cleaned and inspected. The city is transferring the maps to a digital database, although full-size wall maps let crews see at a glance what needs to be done that day.

"Coordination between street and sewer rehabilitation is really a key to success. We have one contractor and one point of responsibility. It's essentially a single, all-inclusive project."

Joe Gehin

Matt Baker, sewer maintainer, observes the condition of a sewer line, infiltrated with roots, and notes the position of a leak.



Gus Strehlo sorts through HDPE pipe remnants in which crews have cut slits. Bolts hold the sections together, forming a point. Fused to sections of new pipe, the cones aid in the insertion of the slip-liner into the host pipe.

to put too small a liner into a host pipe. "The liner pipe needs to stay on the floor of the existing sewer," says Strehlo, "so if there's a large space around the liner, you're better off to fill that space with mud so the liner won't float.

"We've found that if the host pipe has I&I, that could float the liner pipe and interrupt the gradient. One solution is to weigh the liner down with mudding; another is to cut holes to drain the water out of the host pipe."

Flow rate through the sewer is important, too. "We're actually downsizing the sewer diameter by about one inch," says Strehlo. While the smoother, more uniform surface of the liner pipe can actually increase hydraulic capacity, the smaller diameter could impede flow in the case of extremely high volumes.

In either slip-lining or CIPP, the walls of the host pipe need to be smooth and sound, and pipe offsets need to be as clean as possible.

Gehin and Strehlo are confident that with experience, and with resolution of key issues like groundwater infiltration, slip-lining provides a city with a cost-effective tool for rehabilitation of aging sewer lines. ♦

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into place. Workers have pushed lengths of 300 to 600 feet of liner pipe using this method.

The HDPE pipe slides easily, and since it is in sections, it can be installed manhole-to-manhole. Once the liner pipe is in place, city crews grout the new pipe to the old to form a seamless connection, and connect the laterals with saddles and banding.

After installing a large amount of slip-lining over the years as it has, Wausau has learned valuable lessons. Besides avoiding small-diameter pipe, it's important not

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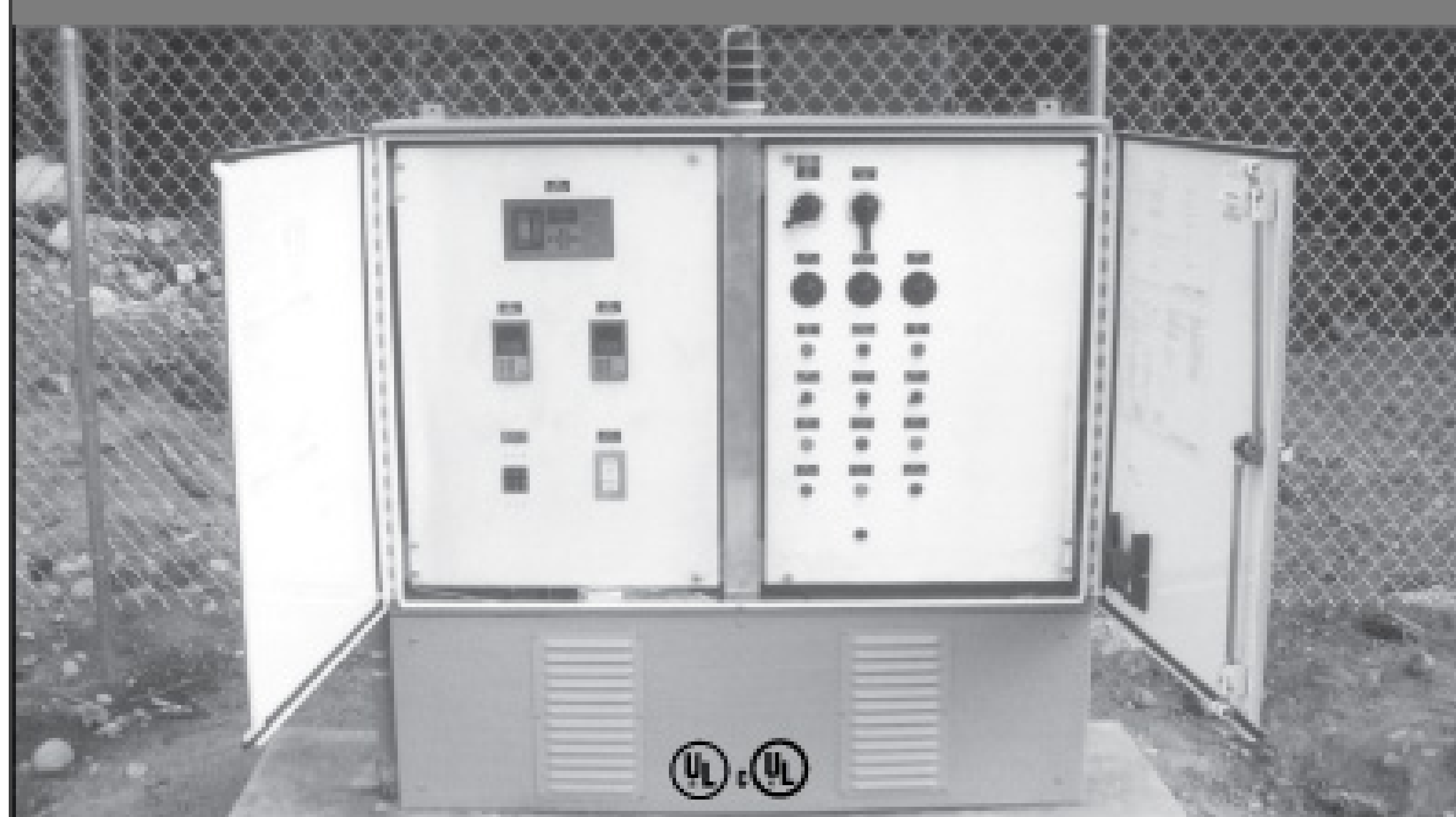
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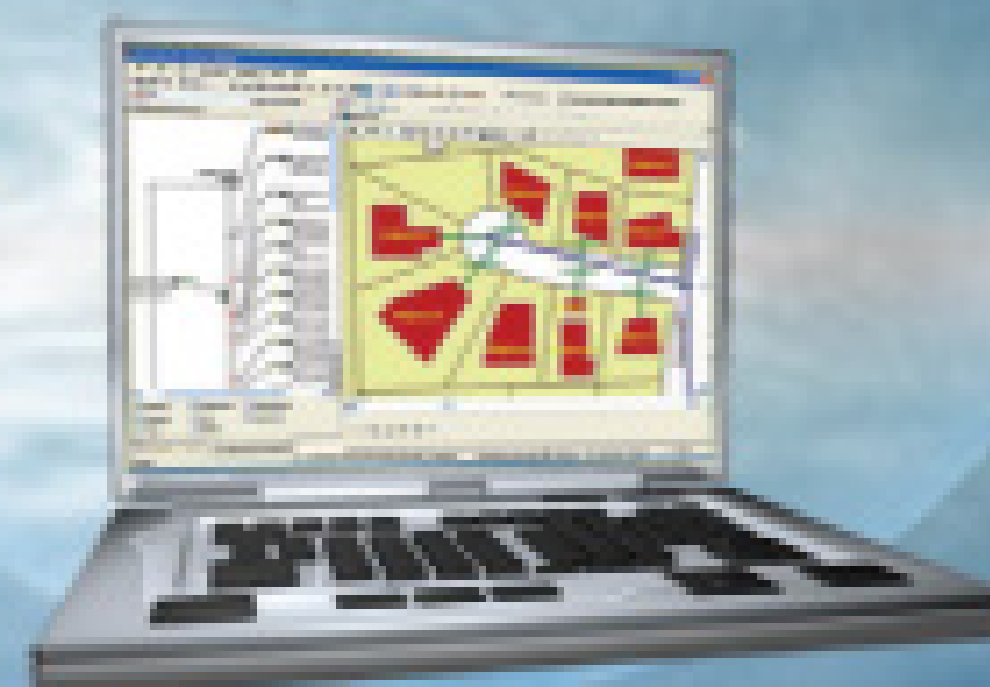
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“DIDJA HEAR THE ONE ABOUT ...”

Workplace humor is invaluable, but also fraught with risk. Here's how to make your team members laugh, without giving offense or putting your job at risk.

By Ken Wysocky

Humor in today's workplace isn't always a laughing matter. In fact, the jokes that used to make you a hero around the office or in the field just might earn you a disciplinary hearing — or even a pink slip.

“The demographics in the workforce have changed dramatically,” observes John Okamoto, the chief administrative officer for the Port of Seattle. “There are more

women, more people of color, and more sensitivity toward gender and sexual orientation than there was, say, 10 years ago.

“Furthermore, if you look at the overall

No humor allowed?

There's more to consider than just employees' hurt feelings and offended sensibilities. In today's litigious society, jokes that are perceived as harassment or discrimination can result in costly legal action. “You could be on the hook for huge financial penalties,” Okamoto observes. “It hurts your organization not only on the work side, but on the pocketbook side, too.”

Okamoto's background makes him knowledgeable about the issue. During a public-sector career that spans more than 30 years, he has worked in human resources, public affairs, and labor and government relations. Along the way, he's had plenty of experience with humor, good and bad. As a third-generation Japanese-American, he knows full well the sting inflicted

tor's office? Not at all.

“I'm not promoting a sterile work environment,” Okamoto says. “If anything, I enjoy humor in the workplace. It's what makes coming to work fun. Appropriate humor can reduce stress and pressure and help a team work more productively by breaking the ice and working through interpersonal issues.”

Scientific research backs up his assertions. Studies show that humor in everyday work life can reduce absenteeism and employee turnover. Furthermore, laughter actually increases the production of endorphins, the so-called “happiness hormones,” stimulates the immune system, and reduces stress hormones.

Often in his career, Okamoto has seen truth in the adage that “laughter is the best medicine.” Labor negotiations are a case in point. “When tempers start to flare, a well-placed joke can calm people down and get things back on track,” he notes.

“But there's always the risk of humor backfiring. I've used humor in some negotiations where others didn't feel I was taking things seriously enough. I may have started out too early with humor, and it set back the discussions. Timing is everything. You have to get a good read on the situation.”

Things to Consider

Before employees take a stab at

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.

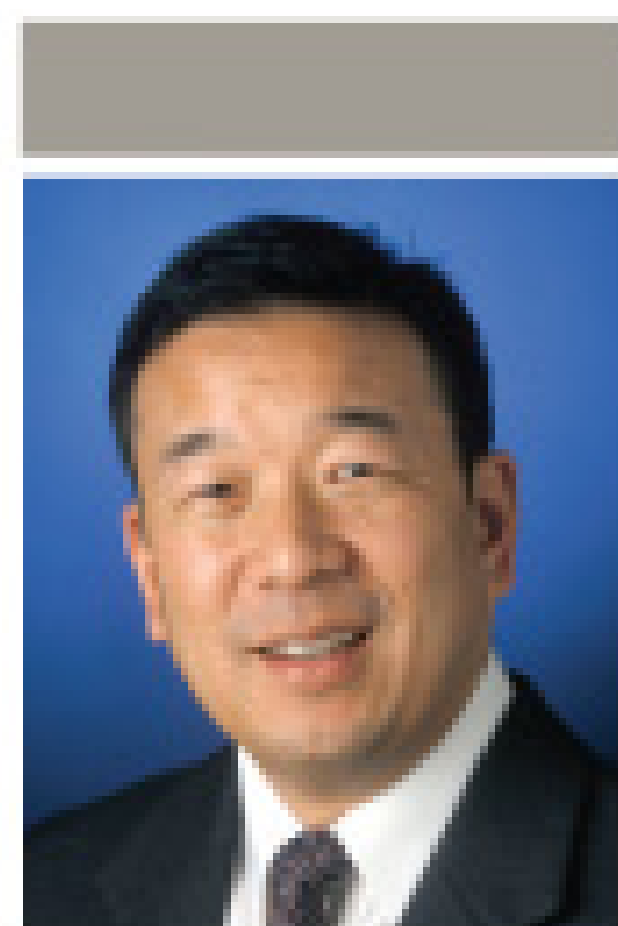
being funny, they should consider three things. First of all, weigh whether the joke is derogatory to someone's race, nationality, gender, religion, age, disability or sexual orientation. All these are protected classes under federal law, Okamoto notes.

Second, if humor goes awry, good intentions are no defense. “The person telling a joke usually doesn't intend it to be offensive,” Okamoto notes. “But it's not about intent. It's about how the joke is perceived. From my experience, that's something many people don't understand.”

Finally, employees should know the person or audience well enough to realize what they might find offensive. “Everyone takes humor differently,” Okamoto says. “If you don't know someone very well, you need to be much more cautious.”

Does that mean if you know someone won't be offended by an ethnic joke, you can feel free to tell it? Not really. “The legal arena would say no,” Okamoto observes. “If you tell a joke that's offensive, and it gets repeated, it can still create a hostile work environment.”

For example, an employee of Polish descent might feel comfortable telling a “Polack joke” to fellow Poles in the department. But if telling that joke makes those fellow employees feel like it's OK to tell it again, this time with people of various ethnic heritages



John Okamoto

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John Okamoto

demographic trends, employers are fighting hard to attract and retain good employees. If you want to create an attractive workplace, you've got to be sensitive to those issues.”

by ethnic jokes.

So what's the solution? A mirthless workplace where employees tiptoe on eggshells, afraid that even the most innocuous joke will land them in the personnel direc-

present, it could spell big trouble.

Moreover, most employees, and many employers, don't realize that the same rules that govern humor in the workplace itself also apply at offsite organization functions, such as department picnics, holiday parties and celebrations.

Self-humor is safest

"Some companies believe that if the event is held offsite, and it's not during work hours, that there's no exposure legally," Okamoto explains. "But case law says there is." He cites a conference where the host organization hired impersonators of Rat Pack stars such as Dean Martin and Sammy Davis Jr. They proceeded to tell late-1950s and early-1960s ethnic, religious and racial jokes that offended some attendees.

The safest joke around, and sometimes the most effective, is anything that makes fun of yourself. "With the title I have and the organizational role I play, employees often feel intimidated around me," Okamoto says. "But if I can present myself in a humorous light, it gives people permission to view me as a human being, not just a suit."

In some situations, spontaneous humor can be a huge risk, but reap big rewards. Okamoto recalls his first day on a new job when a group of African-American employees gathered in his office to demand changes to what they

viewed as unfair hiring, training and promotion practices — a smoldering issue that Okamoto knew nothing about.

"I felt very defensive because I didn't know the background of the situation," he says. "The leader of the group cited example after example of discrimination, and he said the only way to get ahead in the organization was to sleep with your boss."

"Things escalated further, and the leader then asked me what I was going to do about things. I was stunned at their anger and frustration, and felt I was really being put on the spot. So without thinking, I said, 'One thing I can assure you is I'll never sleep with you.' After a moment of total silence, everyone started laughing hysterically."

"It was a huge risk, said without any thought. If there would have been a gay employee present who thought I was making fun of homosexuals, it could have really erupted into something major. But after the joke, we had a very good discussion about how we'd work together to remedy the situation. It was very constructive; the humor brought things down to a collegiate and collaborative level."

You might not be so lucky with your next punch line. So think twice the next time you try to be funny around the workplace. But also remember that humor in good taste can be the spice of work life. ■



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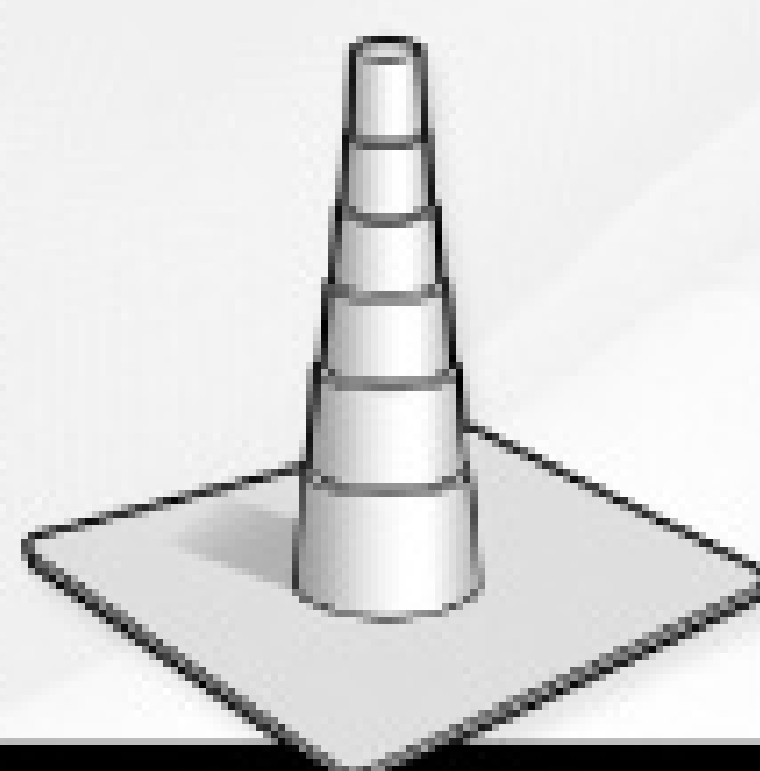


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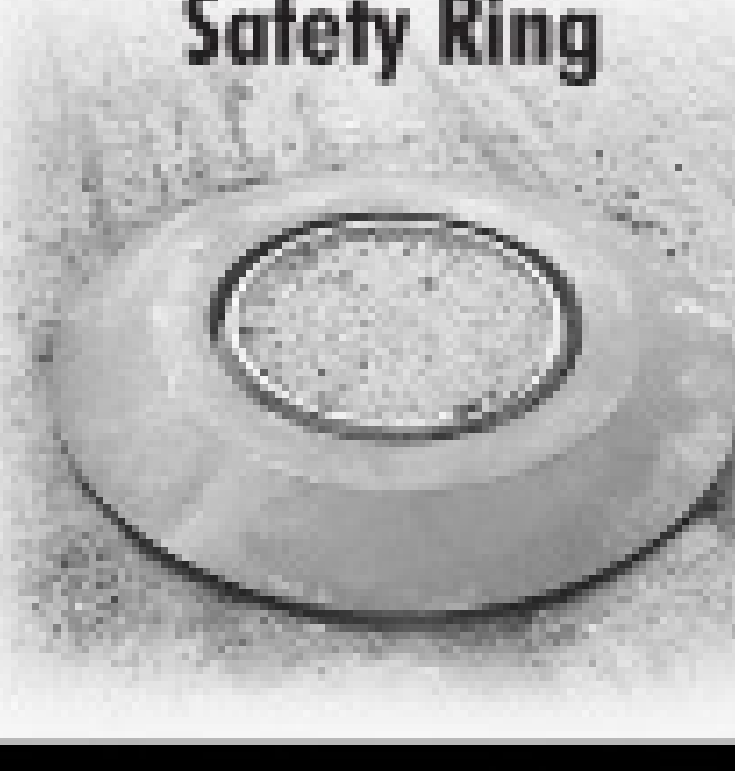
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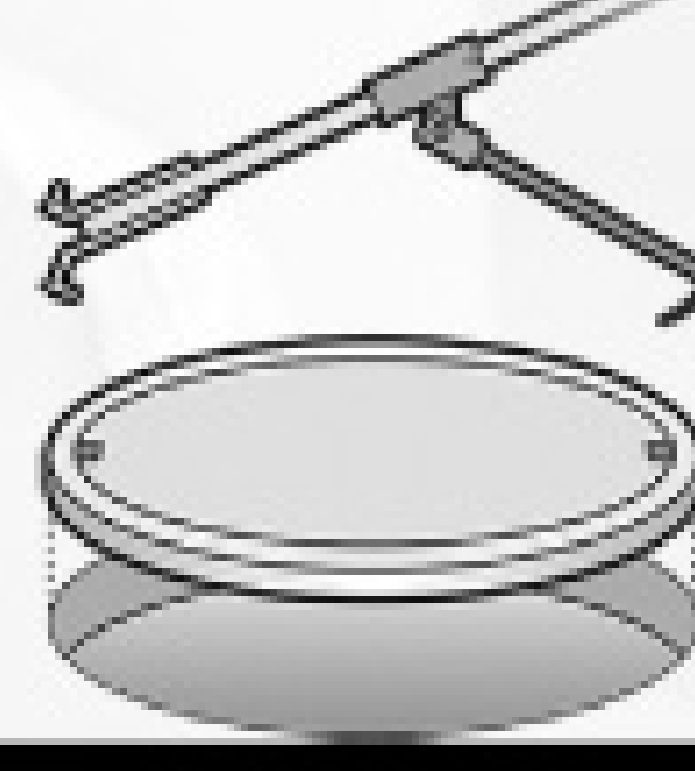
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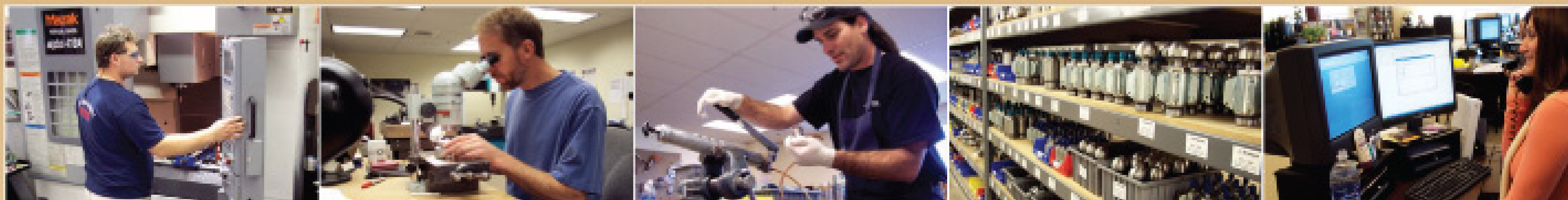
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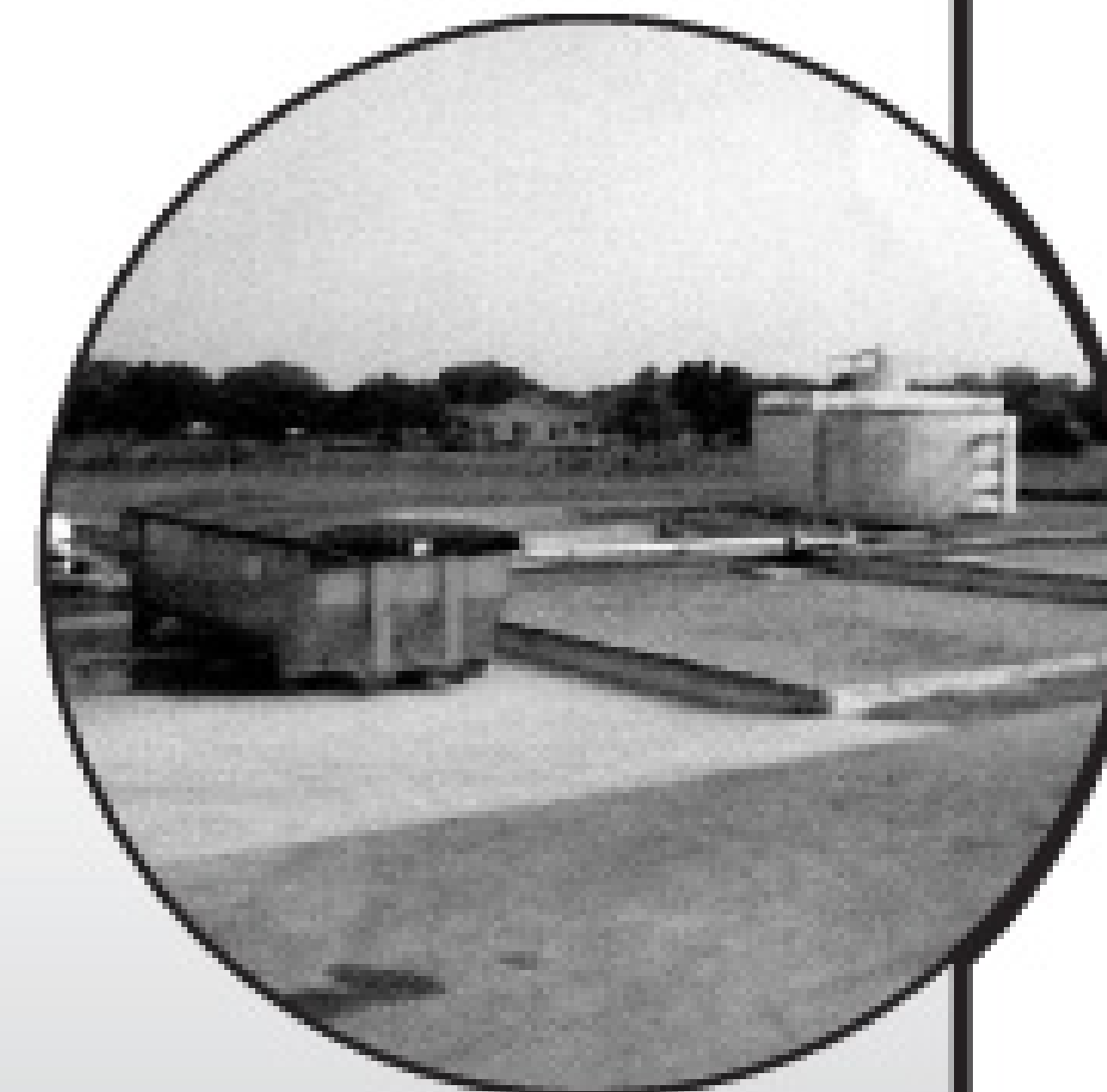
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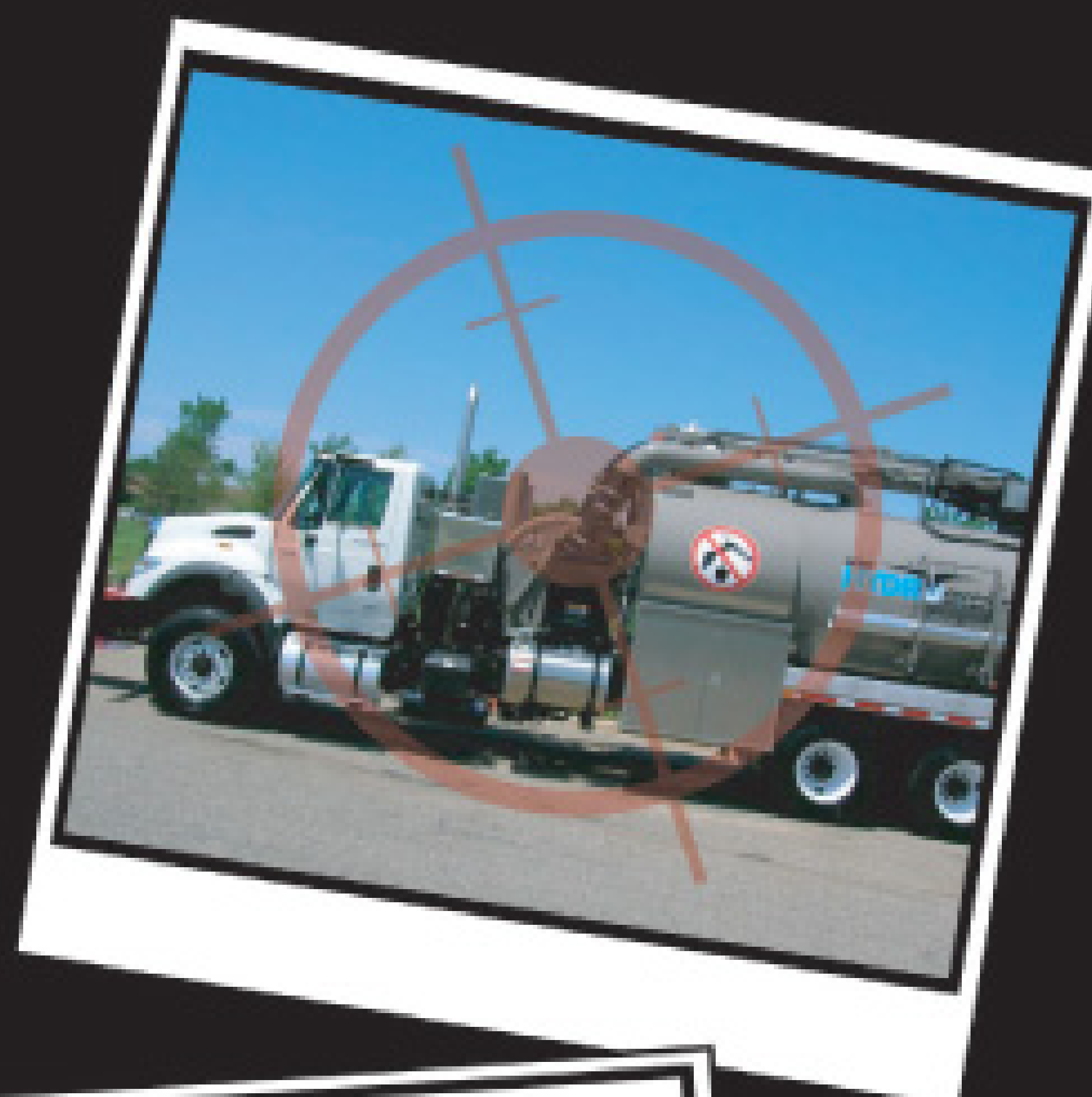
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CUTTING THROUGH COMPLEXITY

The Mr. Manhole system enables machine-powered manhole repair that seals effectively and leaves behind a smooth road surface

By Erik Gunn

Manhole repair can be complex and time-consuming. Many manholes develop leaks in the chimney area, which is subject to wear from the stress of traffic and from freezing and thawing.

In repairing these manholes, crews face the challenges of sealing or otherwise repairing the chimney and resetting the manhole casting itself in a way that both excludes clear-water infiltration and leaves a smooth road surface. Poorly leveled manholes can cause

problems for motorists driving over them.

Traditional repairs require crews equipped with jackhammers or saws to break up the roadway surrounding the manhole, re-level the manhole frame, and then refinish the roadway. The process typically takes several hours.

Mike Crites, a foundation contractor who operates Crites Excavating Inc. in Lima, Ohio, devised the Mr. Manhole repair system, manufactured and sold by a separate company, Critex LLC. The system includes a circular cutting device to remove the manhole frame and the surrounding asphalt, and additional components to complete the repair. The cutting unit is operated from a skid-steer loader's auger drive.

Tony Crites and Galen Troyer of Critex demonstrated the Mr. Manhole system at the World of Training underground utility construction show in Manteno, Ill., on June 26. The show took place at Planet Underground, a cityscape training venue in Manteno.

Walk-around

The principal tools in the Mr. Manhole system are the circular cutter/extractor and a ring saw.



The Mr. Manhole cutting device is shown attached to the skid-steer. Turning at about 70 rpm, the cutter digs into the asphalt. (photography by Erik Gunn)



Before the cutting begins, a "speed plate" is installed inside the manhole rim. This plate will enable the skid-steer operator to remove the manhole and the surrounding asphalt when the cutting is finished.

TECHNOLOGY TEST DRIVE

EQUIPMENT:
Mr. Manhole repair system

MANUFACTURER:
Critex LLC
419/229-3015
www.mrmanhole.com

LOCATION OF DEMO:
World of Training construction show, Manteno, Ill.

DEMONSTRATED BY:
Tony Crites and Galen Troyer of Critex

LIST PRICE:
\$41,000 as demonstrated

The 800-pound cutter consists of two 44-inch-diameter disks. Four adjustable arms extend outward from between the disks. Cutting blades extend vertically from the adjustable arms. Each blade has four teeth, which can be replaced when damaged or worn. They are positioned so that when the cutter spins, it cuts in a circular path.

The adjustable arms allow the cutter to be set to varying diameters, normally 50 to 60 inches. The cutter unit surrounds a shaft. The upper portion of the shaft ends in a hex-shaped female socket that fits snugly onto the hex-shaped shaft of a skid loader's onboard hydraulic auger drive, to which it is attached with a 5/8-inch pin. The lower portion of the shaft extends and serves as a pilot. At the shaft's tip are two small flanges.

The ring saw consists of a cast metal ring along with attached calibration tools and a small gasoline- or battery-powered saw for cutting PVC sewer liner used in



The operator lifts the circular segment of asphalt surrounding the manhole ring and moves it out of the way of the manhole area.

the manhole repair process.

Accessory tools include a metal speed plate. At the center of the speed plate is a circular keyhole with two opposing slots to match the flanged bottom of the pilot shaft. The speed plate is clamped inside the manhole frame at the beginning of the repair. Additional accessories include a lifting bracket with an attached magnet used to carry manhole covers and frames, and a trailer stand for transporting

the cutter/extractor.

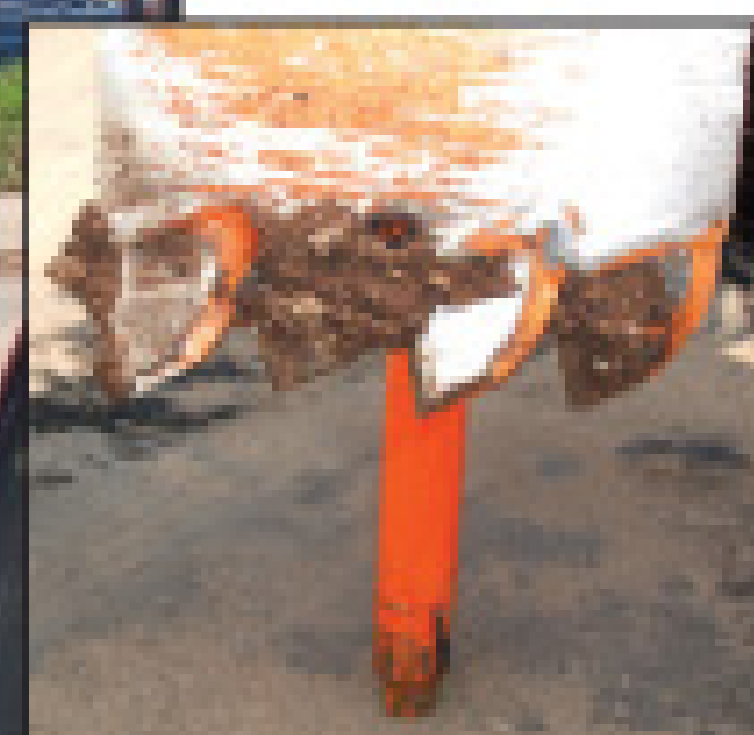
The system demonstrated was the Mr. Manhole municipal/contractor package, which includes the cutter, ring saw, accessories, a software package for use in working up specifications for each job, and material kits to repair 80 manholes.

Operation

When the demonstration began, Crites and Troyer had attached



Upper photo, a close-up of the bottom of the cutter's pilot shaft, showing two opposing flanges. Below, a close-up of the teeth on the cutter.



the cutter/extractor to a Caterpillar A26B auger drive, installed on a Cat 287B skid loader. In normal

ered the cutter into place, threading the pilot shaft and its flanges through the slotted keyhole in the speed plate.

With the auger drive turning at about 70 rpm, he lowered the cutter to the asphalt. The cutter teeth sawed out a circular section of roadway centered on the manhole. It took less than 10 minutes to cut through about 10 inches of asphalt.

With the cutting complete, Troyer used the skid loader con-

“What we’ve got is something with no joint. It won’t let water in and it won’t let gas at the concrete from the inside. Then we encapsulate the whole thing in concrete. The objective is to make sure every repair is a high quality repair that lasts.”

Mike Crites

use, the cutter/extractor is hauled on a trailer, resting on its metal stand, and the cutter is attached to the auger drive for the first job of the day. Assuming that several jobs are all scheduled in the immediate vicinity, the cutter remains attached to the skid loader for the day as the machine is driven from job to job.

Crites and Troyer removed a manhole cover and clamped the speed plate in place inside the manhole frame. Troyer then maneuvered the loader with cutter attached over to the manhole. Using the loader’s controls, he low-

trols to turn the shaft so that the flanges were transverse to the slots on the speed plate’s keyhole. He then raised the cutter/extractor, and the circular section of roadway and the manhole came with it, dangling by the speed plate hole from the cutter’s pilot shaft.

Troyer maneuvered the removed section of roadway to a spot about 15 feet from the manhole and lowered it. After again turning the shaft so that the flanges were

After the PVC liner is adhered to the manhole, a special tool is used to determine where the liner should be cut so that the metal manhole ring will be level with the street surface after repair. A battery-powered saw is used to cut the liner at the right point.

Tony Crites installs a temporary debris prevention system that blocks the pipe below the manhole throat from debris caused by the removal process.





The ring is carried using a special tool and lowered onto the PVC liner. Then the manhole lid is put back in place.

aligned with the speed plate keyhole, he raised the cutter, leaving behind the removed section of roadway and the manhole frame.

Crites then installed a temporary debris barrier that is part of the system. With the barrier in place, he shoveled debris away from the manhole chimney. Crites and Troyer broke up the concrete chimney using hand shovels and a Bobcat mini-excavator, then used hand shovels and a broom to finish sweeping debris from the hole in the asphalt left by the cutter. Crites also used the excavator to break remaining asphalt away from the

removed manhole frame, until it was clean and able to be reinstalled.

Once the concrete manhole chimney had been removed, Crites used a hammer drill to prepare what was now the top of the structure below the road surface. He then took a piece of PVC sewer liner that had been rough-cut to fit the installation and applied white, urethane adhesive to one edge. He placed the adhesive-coated edge of the liner on top of the manhole opening and applied a water-activated sealant strip around the bottom seam where the liner met the manhole throat.

Crites and Troyer then placed the 100-pound metal ring-saw tool over the manhole opening. They used a caliper to measure the exact depth of the cast iron manhole frame, and used that measurement to adjust the length of the arm to which a small saw was attached on the ring-saw tool.

With the ring saw, they cut off the top of the liner at a height below the road surface that would allow the manhole frame and lid, once reattached, to be level with the road surface. Once the liner was cut to the proper height, Crites applied adhesive to its upper edge.

Using a special bracket (part of the system), Crites and Troyer carried the manhole frame back to the hole and placed it on the upper edge of the PVC, then put the manhole lid in place. Troyer double-checked the level of the lid.

Then a cement mixer standing by moved into place to pour aggregate into the opening surrounding the newly installed liner and the re-installed frame and lid. Two rings of epoxy-coated reinforcing bar were lowered into the wet cement, and a vibrator was used to drive the cement into the nooks and crannies beneath the manhole frame to eliminate air pockets.

When the concrete was finished and smoothed off, the men applied a black colorant to the surface of the new concrete collar so that it matched the asphalt. A temporary polyethylene cover protected the concrete as it cured. From beginning to end, the repair took less than one hour.

Observer comments

The Mr. Manhole system worked with speed and precision. In function, the cutter resembled the common hole saw found in many home craftsmen's toolboxes, except that its adjustable design allows the operator to use just one cutter in many situations rather than a series of fixed-diameter rings. The system requires no water or other lubrication for cut-

ting. Dry cutting eliminates the need to contain runoff.

Manufacturer comments

Since its initial development less than a year ago the system has already gone through evolution. For example, the speed plate that holds the ring to the cutter/extractor device replaces a different assembly.

In addition to the cutter's standard configuration up to 50 inches across, Critex can custom configure the device to a diameter up to 6 feet, reports Critex president Mike Crites. The system has uses besides manhole repairs. For example, "It can be used for utility companies to penetrate the street for repairs," Crites says.

Critex supplies materials kits that include urethane sealant, rebar rings, PVC sewer pipe insert liner, black sealant, and black colorant for the road surface. Materials kits include enough for 20 manholes. The company also supplies a software package that can develop specifications for repair projects. The replaceable cutter blades are rated to last for 100 to 200 uses.

Noting that hydrogen sulfide sewer gas is a common cause of sewer leaks because it erodes concrete, Crites says that the PVC liner between the manhole throat and the frame makes for a superior repair.

"We're guaranteeing it not to leak, and we're not having to put a chimney seal in it in," he says. "What we've got is something with no joint. It won't let water in and it won't let gas at the concrete from the inside. Then we encapsulate the whole thing in concrete. The objective is to make sure every repair is a high quality repair that lasts." ♦

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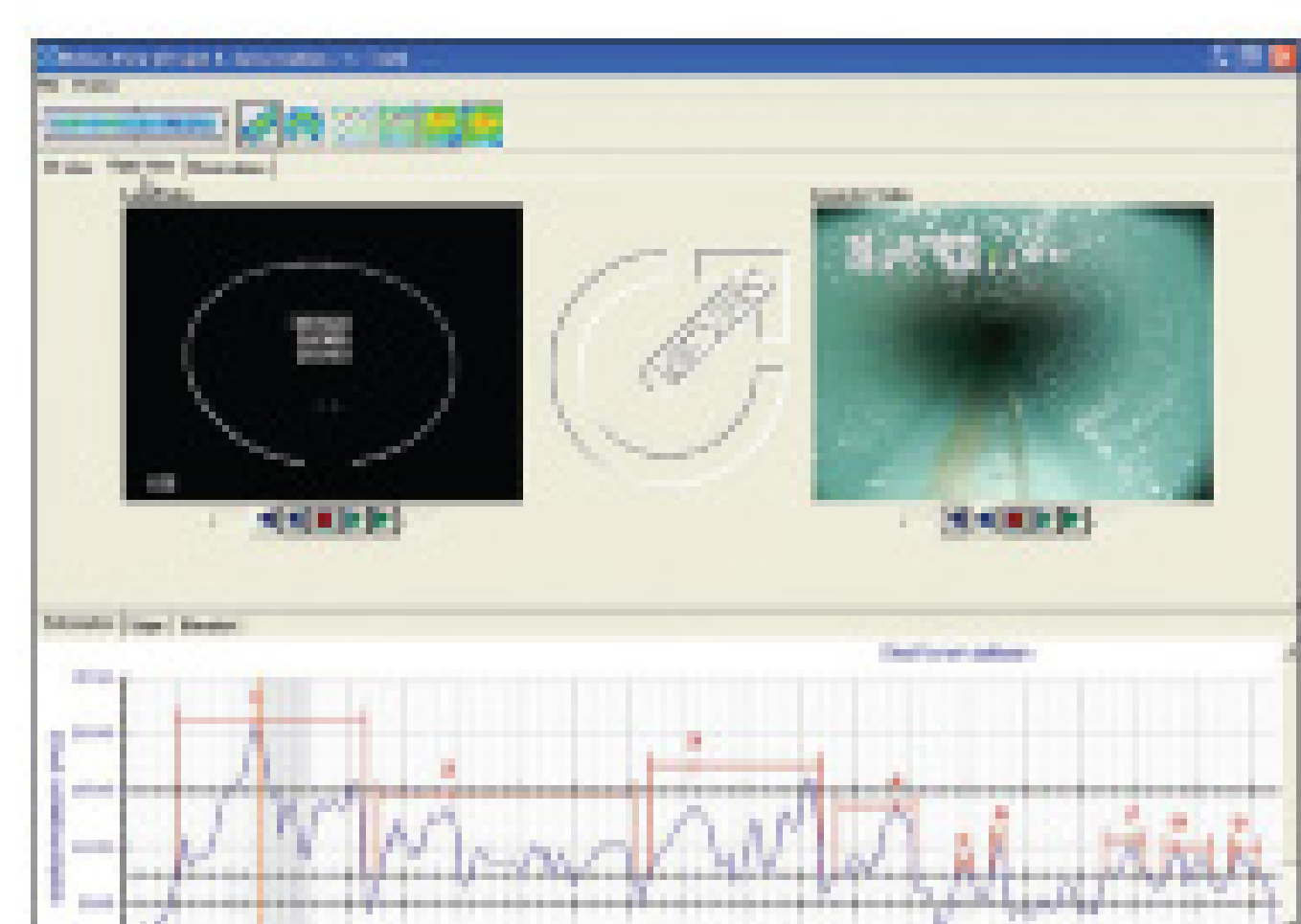
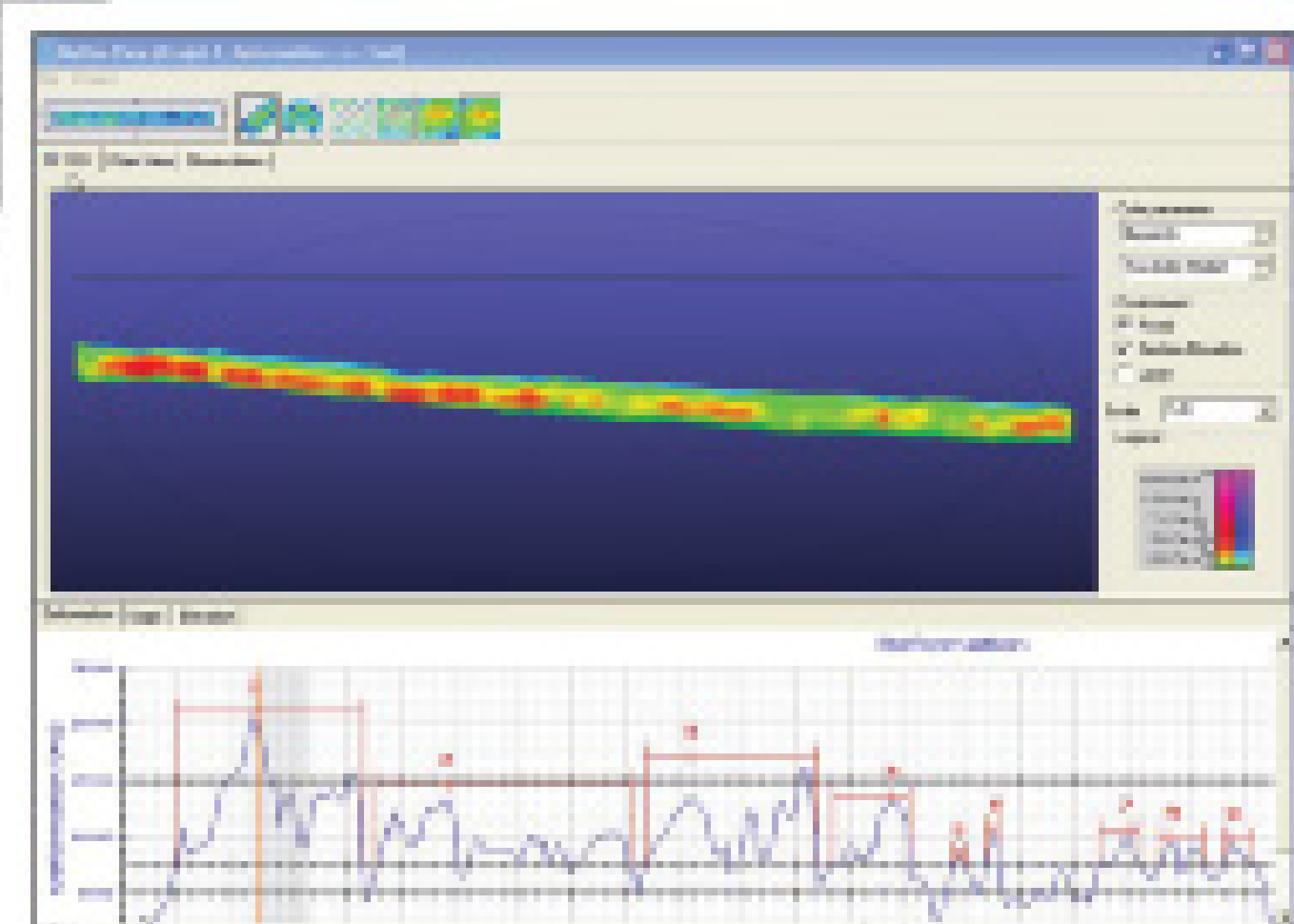
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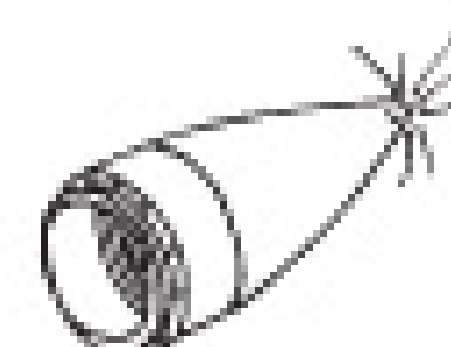
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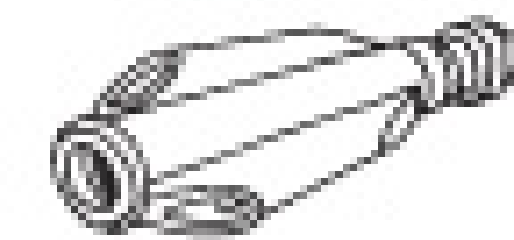
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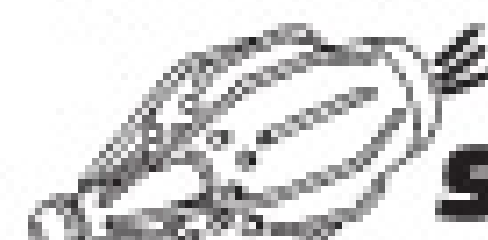
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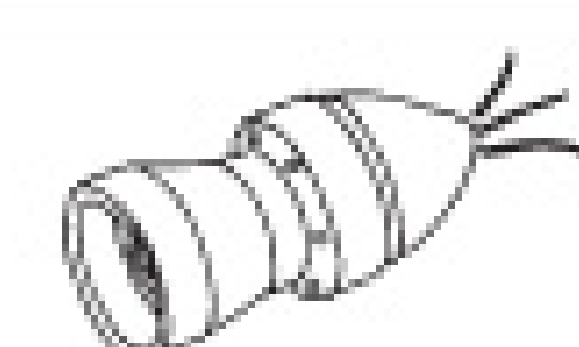
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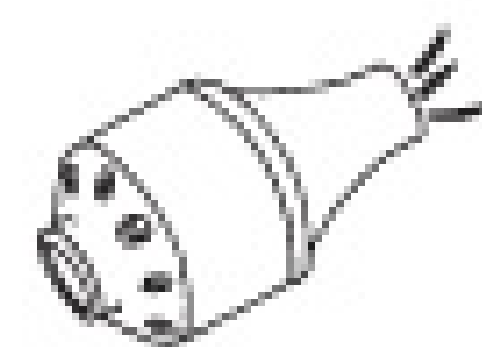
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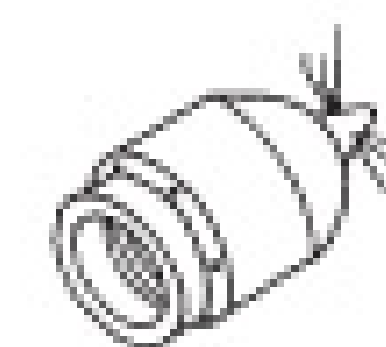


Aluminum Sand

| | |
|------------|----------|
| 3/4"-24° | \$125.00 |
| 1"-17°/24° | \$138.00 |
| 1"-24° | \$125.00 |

Stainless Steel Nozzles

| | |
|------|---------|
| 1/8" | \$26.00 |
| 1/4" | \$28.00 |
| 3/8" | \$34.00 |
| 1/2" | \$48.00 |
| 3/4" | \$52.00 |
| 1" | \$92.00 |

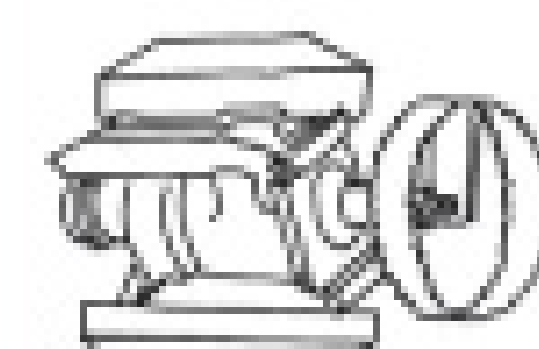


Steel Sand

1"-12°\$59.00

NEW Storm/Culvert Floor Cleaner Nozzles

MANY OTHER STYLES, SHAPES & SIZES AVAILABLE



Root Cutter Assemblies

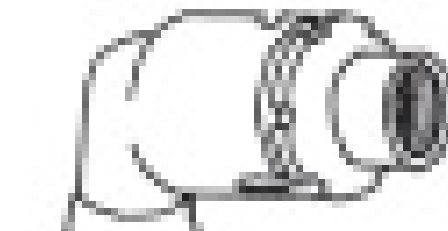
| | |
|---|----------|
| Skid Mounted | |
| w/flat blades | \$815.00 |
| w/concave blades | \$850.00 |
| w/spiral blades | \$850.00 |
| Donut Mounted | |
| w/flat blades | \$790.00 |
| w/concave blades | \$835.00 |
| w/spiral blades | \$835.00 |
| Lateral Mounted | |
| w/flat blades | \$762.00 |
| w/concave blades | \$825.00 |
| Assemblies come with one ea. of 6, 8, 10 and 12" blades, saw blades, hub, skids, etc. | |

Sewer Hose Guides

TigerTail™ Style

| | |
|----------|---------|
| 3" x 36" | \$42.00 |
| 2" x 36" | \$34.00 |

with 24' rope



Swivel Joints

T-M® Style

| | |
|---------------------------|----------|
| 90° or Straight, 6000 psi | |
| 3/4" & 1" | \$169.00 |
| 1-1/4" | \$174.00 |
| 1-1/2" | \$432.00 |
| 2" | \$547.00 |



Clamps

Power Clamps

8"\$11.00

3"-6" available

King Clamps

8"\$24.00

4"-6" available

Bandlock® Clamps

8"\$18.00

3"-6" available

Quick Clamps

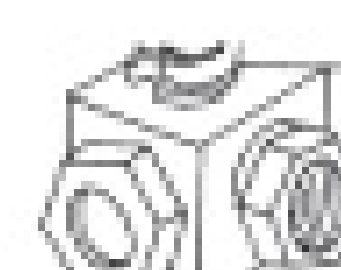
8"\$21.00

3"-6" available



Ball Valves

| | |
|--|----------|
| Dyna Quip® Style, Stainless Steel, 3000 psi | |
| 1" | \$145.00 |
| 1-1/4" | \$190.00 |



Hycon® Valves

2 & 3-way Ball Valves

| | |
|-----------------|----------|
| 5000 psi | |
| 1/2" 2-way | \$65.00 |
| 3/4" 2-way | \$89.00 |
| 1" 2-way | \$119.00 |
| 1-1/4" 2-way | \$226.00 |
| 4500 psi | |
| 3/8" 3-way | \$115.00 |
| 1/2" 3-way | \$160.00 |
| 3/4" 3-way | \$180.00 |
| 1" 3-way | \$190.00 |
| 1-1/4" 3-way | \$440.00 |



Saw Blades

4"-18"

NEW Chain Root Cutters
4"-48", All Stainless Steel, No Lubrication



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- Saved weight
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- Theft elimination



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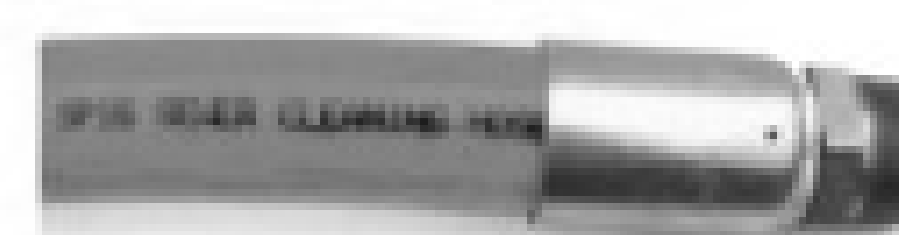
The V3 Multi-Drive System delivers versatile functionality and reliability with three power sources with one PTO. VANAIR innovating the industry... again. For more information contact:

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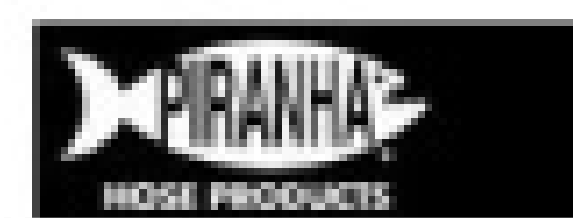


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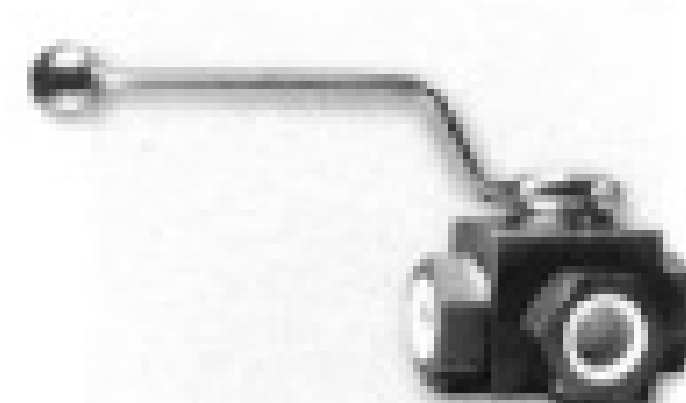
268



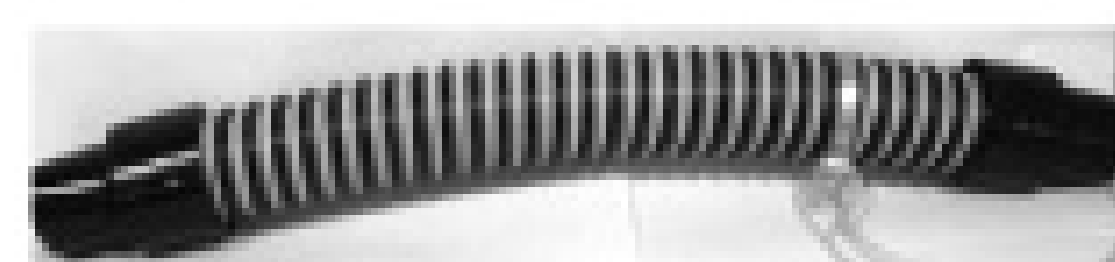
Jetter Hose



Hydraulic Swage
Die Sets & Pusher
\$925.00



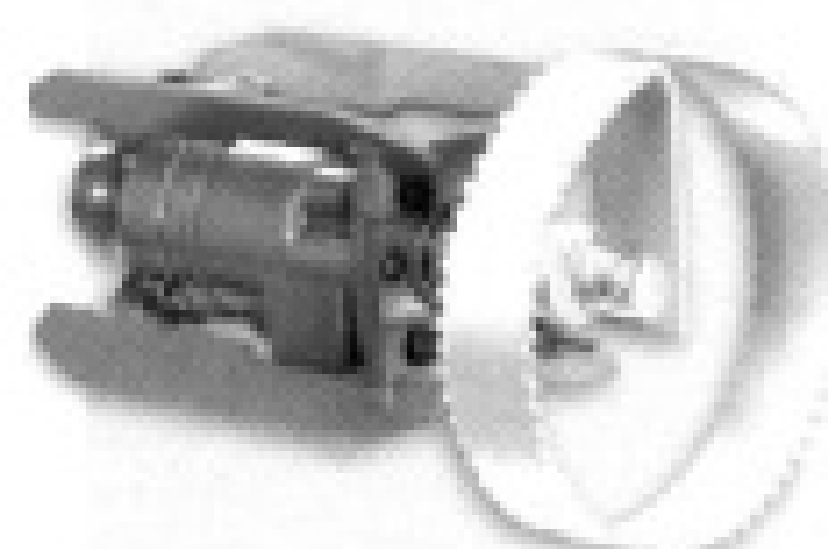
High Pressure
Valves
3/4", 1", 1-1/4"
2 Way Ball Valve
3 Way Ball Valve



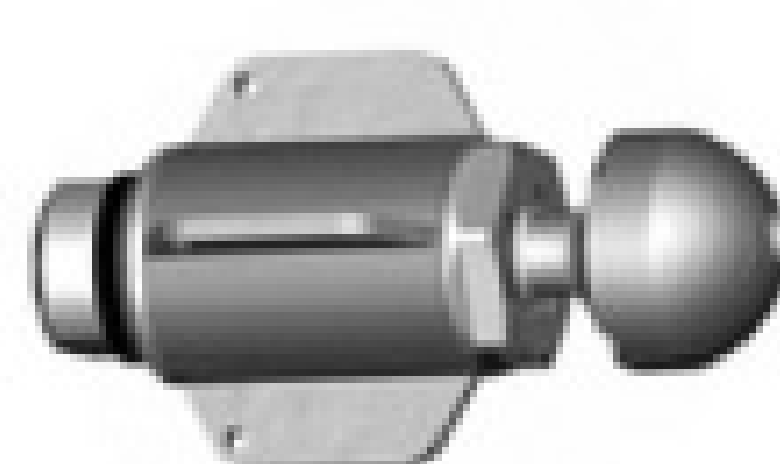
Tiger Tails



Hose Reel
Swivels
3/4", 1", 1 1/2"



Root Cutters



Warthog
Rotating Nozzles



Chain Cutters



Catch Basin
Flange * Crown



Aluminum Tube



Aluminum Tube
Aqua-Latch Couplers



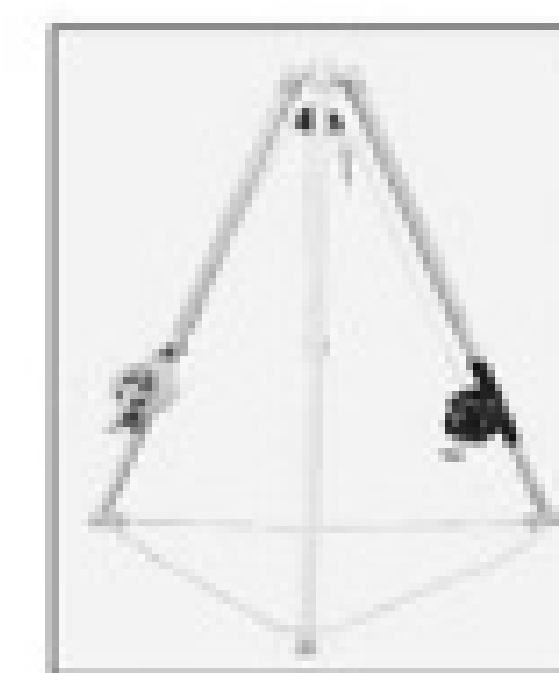
Tube Handle
Easy Clamp Onto
Outside of Tube



Pipe Plugs



Hydrant Hose

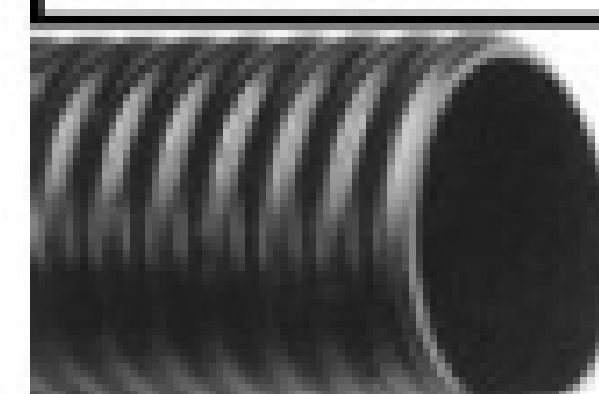


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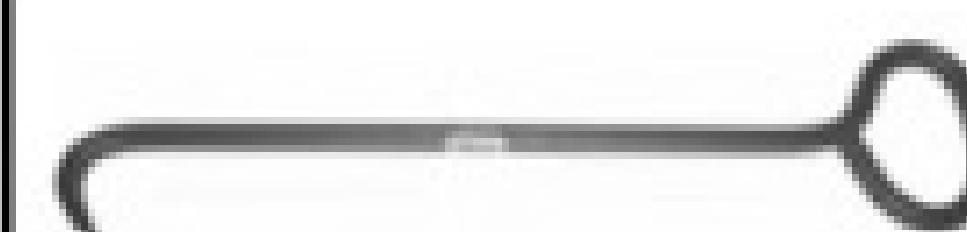
Kanaflex®
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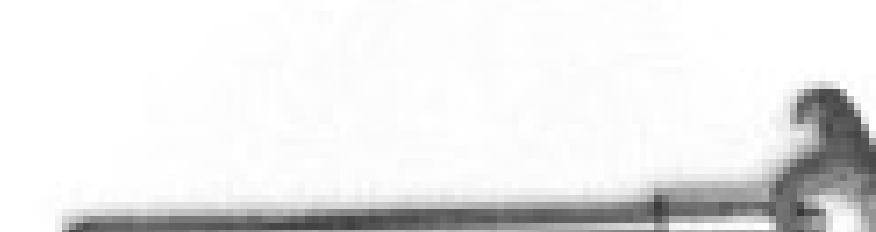
Lever Valves
Brass



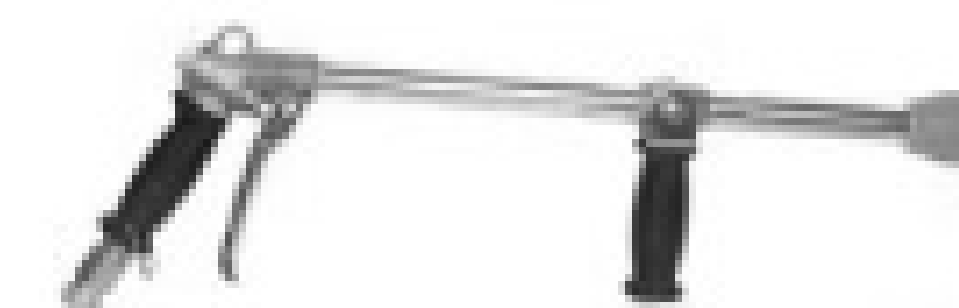
Piston Valve
Brass
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6" Flange \$199.00



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Product Spotlight

Stormwater Filter Accommodates Shallow Installations

By Ken Wysocky

Kleerstream chamber from Katchall Stormwater Filtration Systems LLC

Installing large, vertical vault stormwater filtration devices in relatively flat terrain with minimal elevation fall has always been difficult.

When faced with that problem in a large, mixed-use development in Southern California, Katchall Stormwater Filtration Systems LLC used a Jensen Precast vault and developed the Kleerstream antimicrobial filtration chamber, a shallow-draft, reinforced concrete unit that requires less excavation, accommodates minimal elevation differences, and eliminates bacteria and viruses under flowing stormwater conditions.

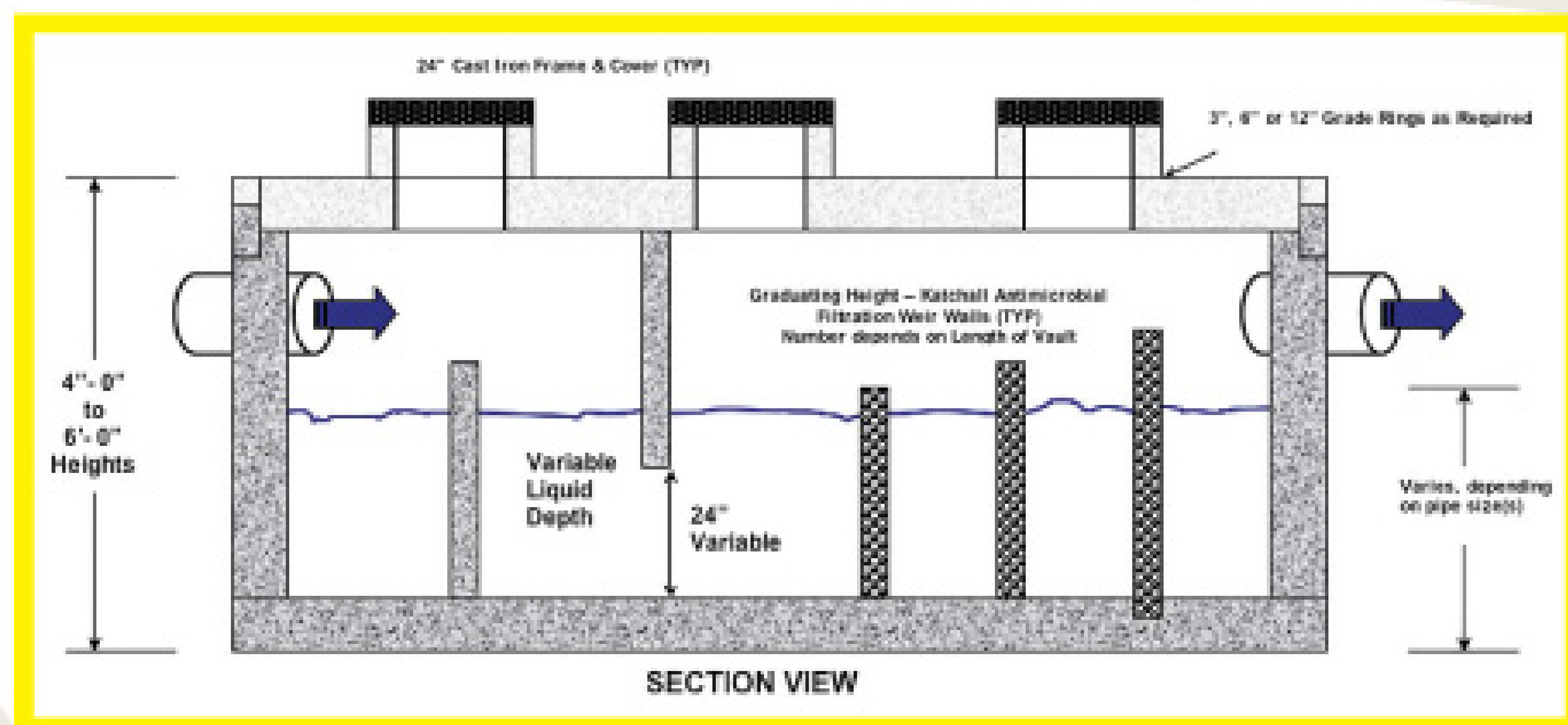
"In a conventional filtration device, the inlet and outlet pipe elevations are usually at least two to three feet apart," notes Kip Searcy, CEO. "With the Kleerstream unit, the elevations can be as little as 12 inches between the pipes, so you're no longer faced with how to get a site to drain properly if each unit requires a 2- to 3-foot drop in pipe elevations. We took the same basic principles being used for vertical devices and made them function in a horizontal plane."

The self-contained structures use two-stage filtration. First, hydrodynamic separation removes solids larger than 100 microns. Then the stormwater passes through a series of antimicrobial filtration weir walls that remove suspended solids, hydrocarbons, nutrients, and heavy metals to less than 50-micron levels, and kill 99.99 percent of bacteria and viruses with less than one-second contact time.

There are seven H-20-rated chambers, each able to accommodate several different pipe diameters. The smallest unit (Model 120) is 4 1/2-feet-wide by 6 1/2 feet long by 4 feet deep with a 35-square-foot footprint. It filters up to 3,410 gpm, and retains about 1.5 cubic yards of solid waste material.

"You can literally place this unit only one foot under a street and hook it up to the storm drainage conveyance pipes," Searcy says. "The bottom of the vault is only five feet below the street surface — that's huge in terms of minimizing the cost of excavations and disposal of waste products."

The largest (Model 200) is 8-feet-wide by 40-feet-long by 6-feet-deep and has a 340-square-foot footprint. It filters up to 55,000 gpm. "Every unobstructed square foot of antimicrobial filtration media can filter 180 gpm," Searcy says. The chambers work as inline filtration systems or as off-line (first flush) systems, and can handle flows even during 25- to 50-year storms. **For information:** 866/528-2425; www.katchall.net.



Clear Computing Launches Centralized Reporting

Clear Computing has added centralized financial reporting for external divisions to its Total

Activity Control operations management system. The new feature enables users to access and run individual or combined reports, wherever they are located. Reports can be viewed, e-mailed or exported into Excel.

For more information: 888/332-5327; www.clearcomputing.com.

QuickView Introduces Accessory Package

Envirosight LLC has added an extended targeting leg, pole extensions and an updated display/recorder to its QuickView zoom inspection camera system. The adjustable carbon-filter targeting leg attachment enables users to inspect



drop lines, while the 6-foot pole extension can add 6-18 feet of depth, enabling the camera to inspect manholes as deep as 48 feet. The camera's 7-inch color LCD video display provides nine times the pixel resolution of its previous 4-inch screen and has been updated to support high definition. The memory card capacity also has been increased. **For more information:** 866/936-8476; www.envirosight.com.



Water Cannon Designs Undercarriage Attachment

The Mud Cannon undercarriage cleaner from Water Cannon attaches to a pressure washer hose and requires only 5 1/2 inches of clearance. Featuring a stainless-steel Mosmatic swivel and spray bar, the spinning 4-nozzle rotating assembly cleans an approximately 24-inch area. The unit has a telescoping handle and can withstand temperatures up to 195 degrees F, as well as almost any type of liquid chemical or acid solution. **For more information:** 800/333-9274; www.watercannon.com.

Ditch Witch Releases 250R/T Locating System 174

The 250R/T locating system from Ditch Witch is designed to locate and avoid buried telephone, CATV, power, gas and water lines. The unit features a 250T transmitter and 250R receiver. It offers intuitive controls, an easy-to-read display and depth estimation up to 15 feet. Tones are derived from the actual signals radiating from pipes or cables. The display is backlit and reinforced with a scratch-resistant coating for optimal visibility day or night. **For more information: 800/654-6481; www.ditchwitch.com.** ♦

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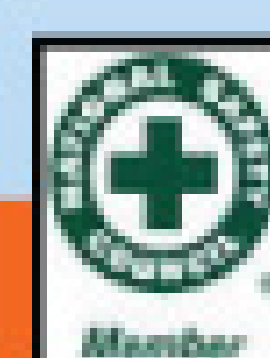
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- ▶ Hose Guide (pictured in green)
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INDUSTRY NEWS

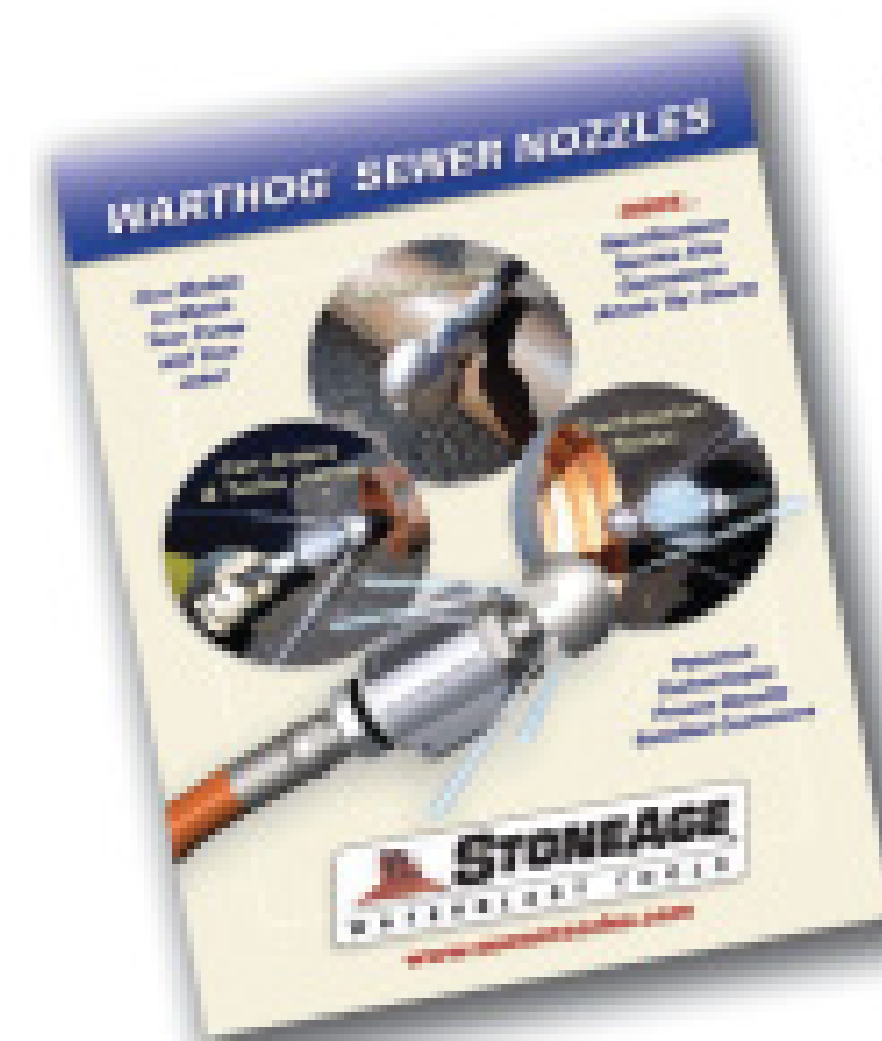
APRIL 2008

Earth Tool Promotes Metcalf to CEO

Brian Metcalf has been promoted to chief executive officer for Earth Tool Co., manufacturer of HammerHead products. Metcalf had been vice president of international sales and business development. He holds a degree in accounting from Drake University.



Brian Metcalf



StoneAge Releases Warthog Catalog

The 16-page Warthog catalog from StoneAge Inc. is available in PDF format at www.stoneage-tools.com/infocenter/index.html. The catalog includes jetting charts, tool breakdowns with each part identified, service kit components and available accessories.

Inuktum Services Named Business of the Year

Inuktum Services Ltd. has been named Vancouver Island's Technology Business of the Year by the *Business Examiner*. The pipe inspection technology company also was a finalist for Manufacturer of the Year. ♦

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A NEW LOOK

NASSCO opts for an updated identity and a new web site to support its leadership role in trenchless technology training and education

By Irv Gemora

NASSCO has taken two more steps befitting an organization dedicated to setting the standards for the rehabilitation of underground utilities.

A new web site and visual identity, introduced at the Underground Construction Technology International Conference and Exhibition last January in Atlanta, will strengthen NASSCO's presence in the trenchless industry.

We are practicing what we preach. We are committed to setting standards throughout our industry. We're doing that now

with our communications to current and prospective members. A web site that is appealing and easy to navigate and a fresh look to our communications support the kind of professionalism we promote.

To sharpen our communications, NASSCO has hired New Phase Marketing Inc., a strategic marketing communications agency in Reston, Va., to conduct research, identify NASSCO's unique brand, and bring that brand message to life through new advertising, interactive communications, public relations, and marketing support.

The new web site (www.nassco.org)

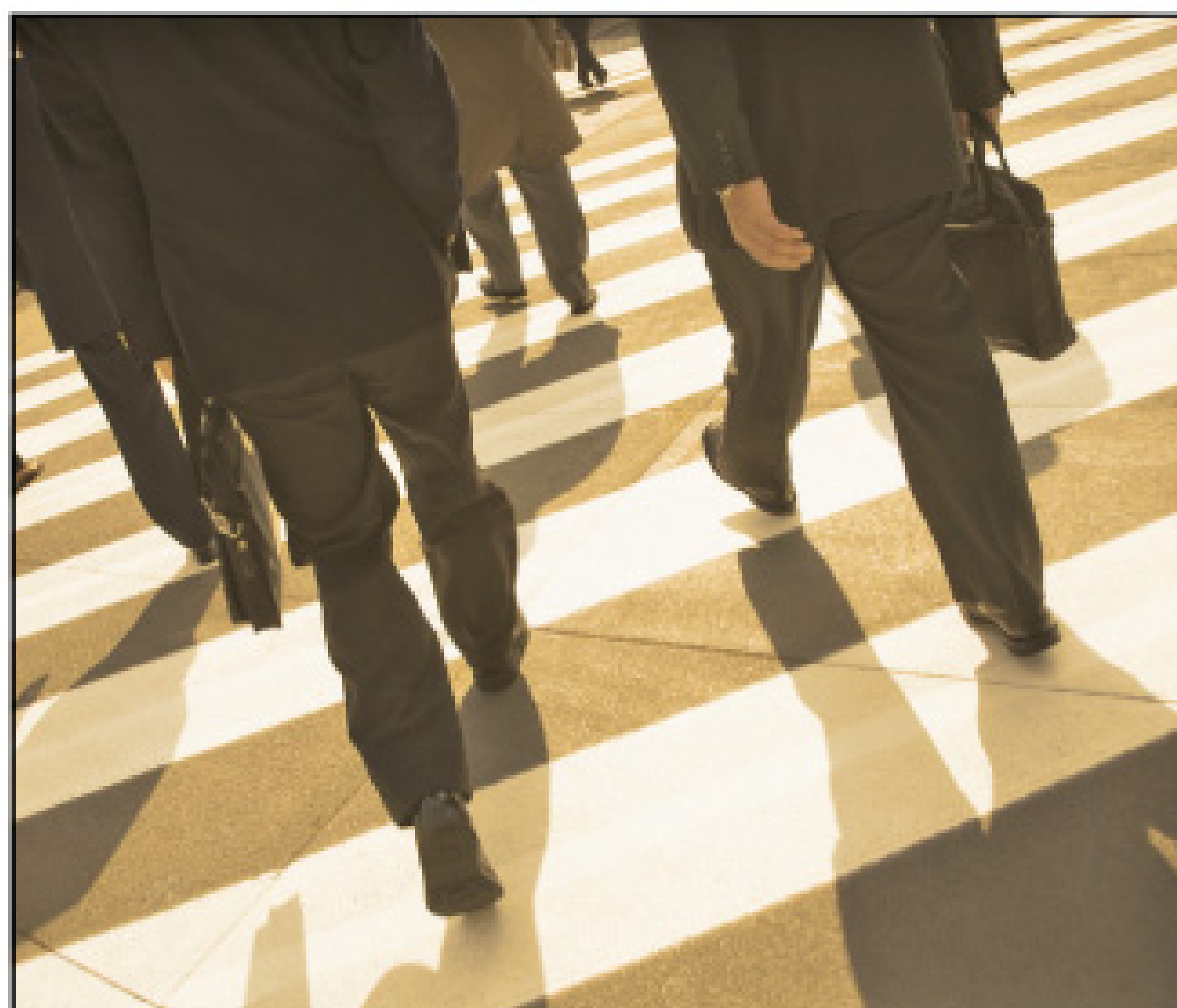
has a menu that makes it easier for members and visitors to find what they need. It also includes free downloadable specifications. Among the new features is an interactive Meet a New NASSCO Member section. Here, visitors can access profiles in which members share information about themselves and their companies and explain why they joined our organization.

This is a good way for people in the industry to gain insights about the value of NASSCO membership from people who actually enjoy those benefits as part of their daily work life.



All of us at NASSCO encourage industry professionals to visit the web site and see how it embodies the way our association is changing and building for the future. ♦

Irv Gemora is executive director of NASSCO. He can be reached at director@nassco.org.



JOIN THE UNDERGROUND

Until now, NASSCO, Inc. has been a well kept secret - but all of that is changing. Through our continued dedication to training programs, education, and networking among sewer service professionals, the secret is out: To compete in this marketplace, you need to have access to NASSCO's growing list of training, education and assessment tools, including the soon-to-be released Inspector Training Certification Program (ITCP) and the Trenchless Assessment Guide to Rehabilitation (TAG-R). Become a part of the movement and join NASSCO, the industry's leading association, today.

For information on member benefits, training programs, and to complete an application online, visit our Website at www.nassco.org or call us at 1.410.486.3500.



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2003 Sreco jetter. Model HP4030 TR/L/P. 300 gallon tank. Gas engine. 28 gpm, 4000 psi. 500' hose. Flexi-cam and VCR monitor. Low hours. Ready to use. Will email more info & pictures. \$23,000. 860-793-4293 ext. 1003. (P3CM4)

New PipeHunter Model 38T44 jetting unit, trailer mounted, w/335 Poly water tank, 4,000 psi @ 25 gpm, 600' of hose and attachments. **In stock!!!** (Stock #13317) **www.VacuumSalesInc.com, (888) VAC-UNIT (822-8648).** (M4)

JETTERS-TRUCK

2006 Chevy C5500 with a Pipe Hunter with a Jet Eye camera and vacuum system. (Stock #13234) **www.VacuumSalesInc.com, (888) VAC-UNIT (822-8648).** (M4)

JET VACS

2003 Sterling LT7501 with a Vac-Con Model VPD4216LHA / 1300 combination vacuum-jetter unit. (Stock #4648C) **www.VacuumSalesInc.com, (888) VAC-UNIT (822-8648).** (M4)

1998 Vac-Con 2-stage combination cleaner, single axle, 9-yd debris body, International chassis w/62K miles, 65@2000 water pump, 1000 gallon poly tanks, front 600' extension hose reel, 6' boom extension, 1700 hrs. on auxiliary diesel engine, many extras, very good machine, city owned. \$73K OBO. Call Mark @ 515-681-6321. (C5)

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1985 Camel, single axle Ford 8000, Meyers pump, 80 GPM, 2,000 PSI. Price \$17,000. Call 503-969-9557 or 503-682-2723. (C4)

JET VACS

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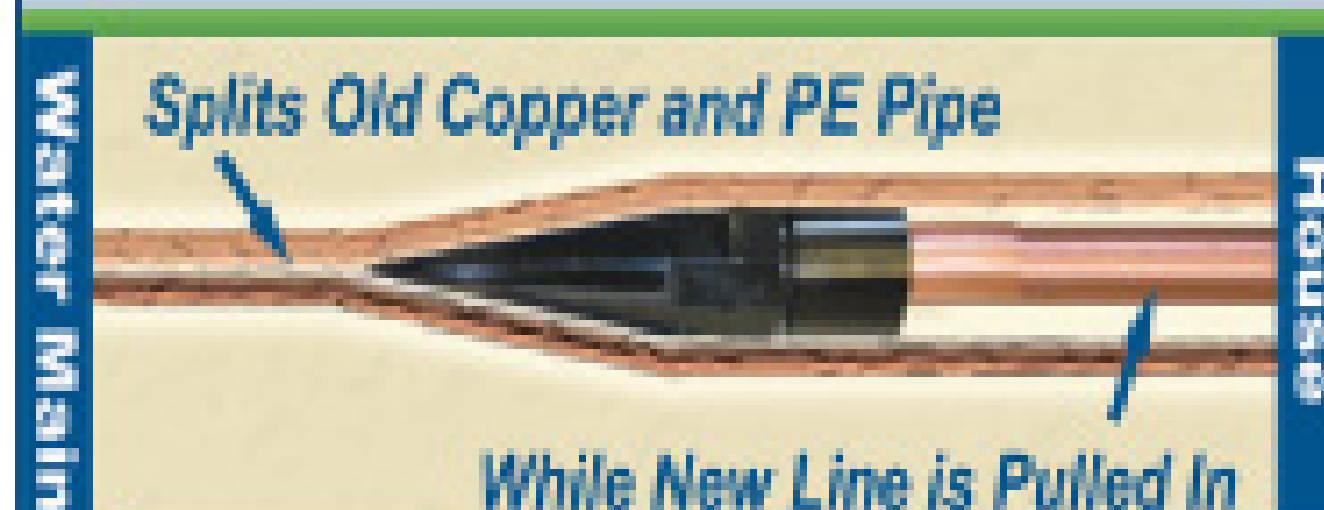
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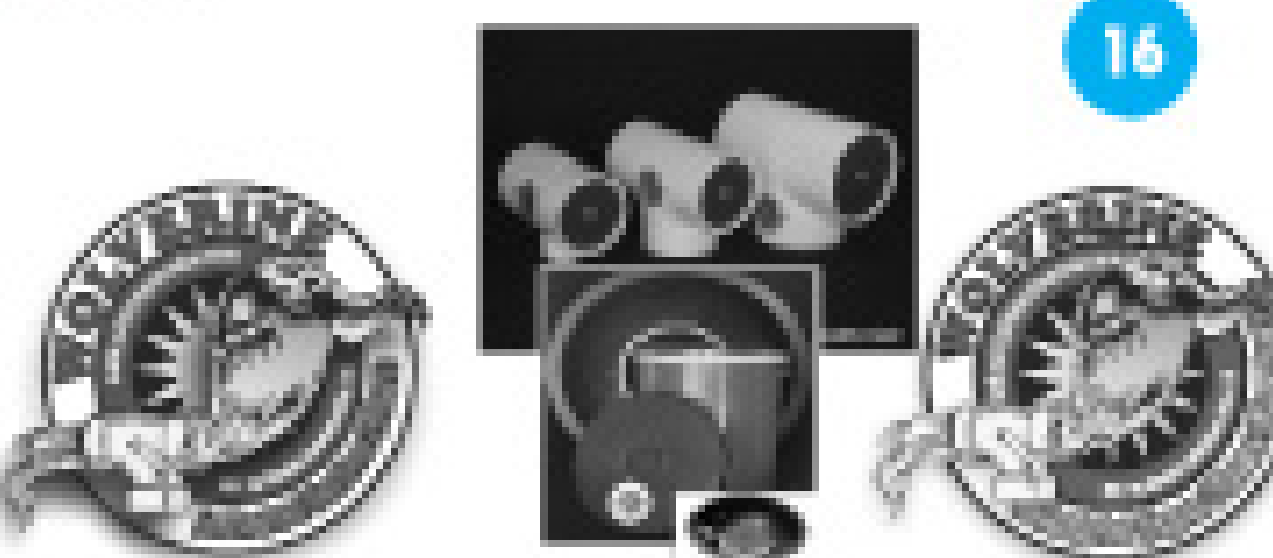
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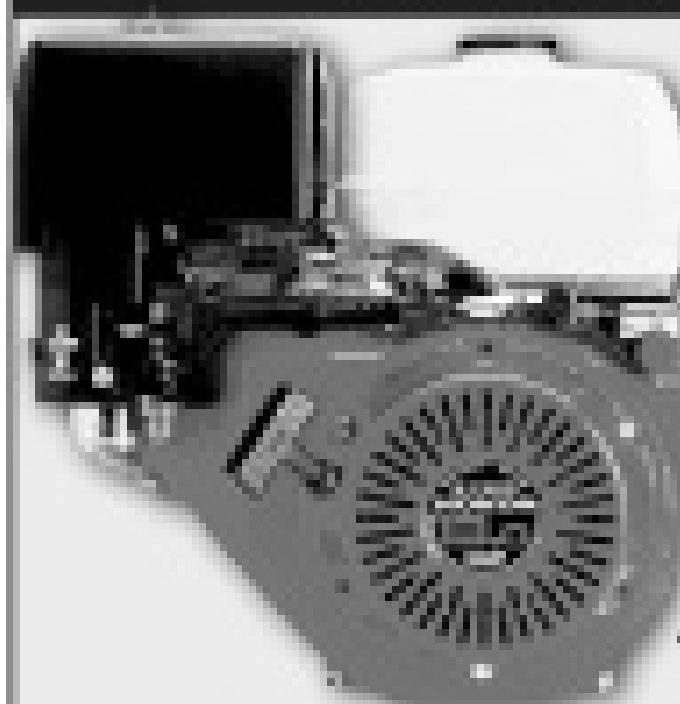
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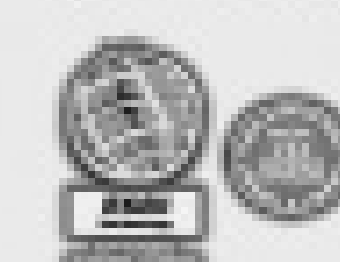
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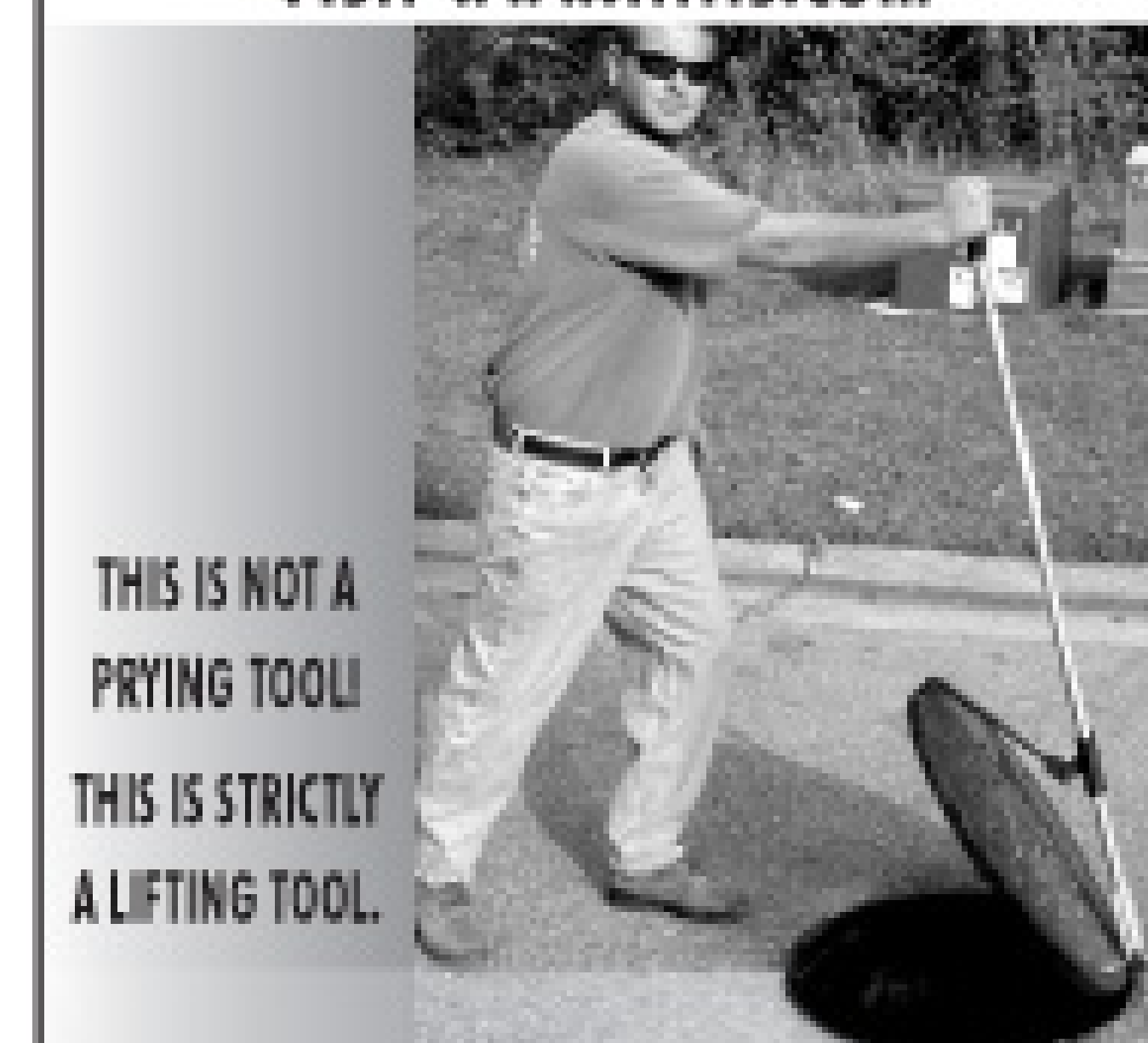


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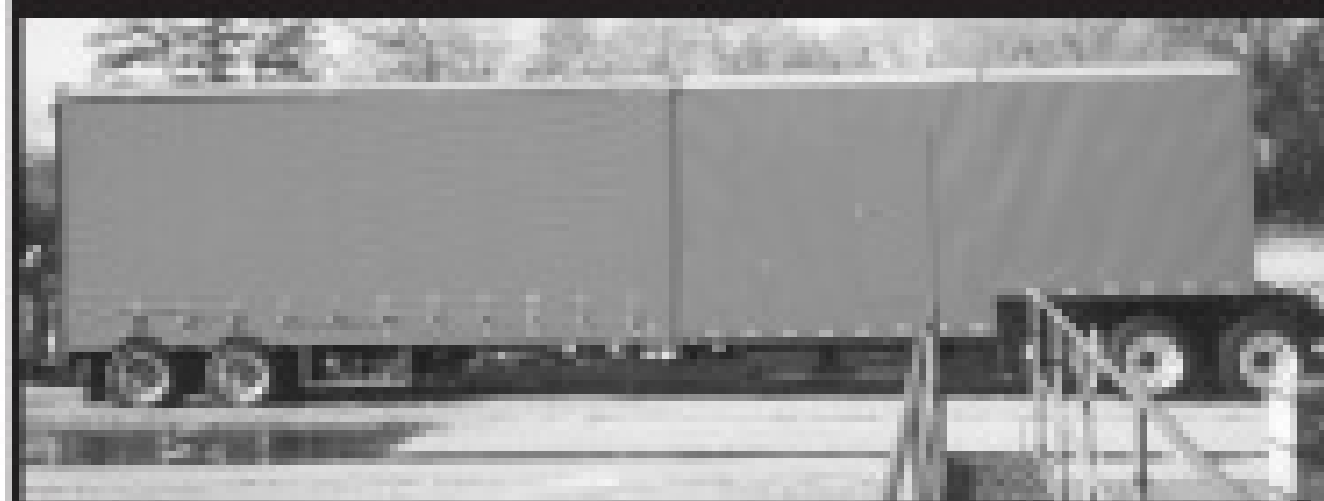
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DELAYING DECAY

Here's an overview of ways in which corrosive sulfuric acid proliferates in your wastewater collection system — and some things you can do about it

By Joseph A. Nuciforo Jr.

The turbulent spots in your wastewater collection system are directly linked to the rate at which your system will decay and the amount of money you will have to spend on rehabilitation. That is because turbulence plays a role in generating hydrogen sulfide (H_2S) — a precursor of sulfuric acid that can slowly destroy concrete pipes.

Corrosion is caused by the displacement of oxygen (O_2), the oxidation of sulfur, and the creation of sulfuric acid, both atmospherically and biologically. You can take affirmative steps to reduce corrosion by reducing H_2S formation.

Effects of turbulence

In an abstract, *Air water transfer of hydrogen sulfide: an approach for*

*application in sewer networks*¹ the authors have studied the effects of turbulence in wastewater and concluded that the level of turbulence and the pH of the water directly affect the amount of H_2S released into the atmosphere.

This means that septic water at lower pH will cause more H_2S release than normal. On lift station force main discharge lines and flat, slow-moving trunk lines, this is especially prevalent. Rough manhole inverts, uneven pipeline bottoms, debris in pipes, and unrestrained internal drops in manholes are also large sources of H_2S .

As H_2S levels rise, oxygen is displaced. This causes the perfect atmosphere for the growth of anaerobic bacteria. The common perception is that the H_2S actually

attacks concrete. In part that is true, but H_2S still needs scum from anaerobic bacteria to do so.

In an article titled, *A Brief Primer on Microorganisms*,² the author describes a sticky substance, polysaccharide, secreted by anaerobic bacteria, that traps H_2S as the bacteria grow. At this point, the H_2S needs an oxidizer to turn into sulfuric acid. This is supplied by fermentation of biomaterial in the manhole in the form of nitrogen dioxide (NO_2). This is one way that sulfuric acid is produced in sewers, but it is very slow.

Role of bugs

Another more rapid way of producing sulfuric acid in sewer atmospheres is through direct sulfur-oxidizing bacteria, *Thiobacillus*. This bacterium thrives in H_2S -rich environments and is the key to sewer system deterioration.

In an article, *The Importance of Hydrogen Sulfide, Thiosulfate, and Methylmercaptan for the Growth of Thiobacilli during Simulation of Concrete Corrosion*,³ the author studied the effects of three corrosives: H_2S , thiosulfate (S_2O_3), and methylmercaptan (CH_3SH). The concrete test specimens were subjected to *Thiobacillus* bacteria, then to the three corrosives.

In the nine- to 12-month period that the specimens were exposed to a continuous atmosphere of the three corrosives, those subjected to H_2S deteriorated severely. This was due to the action of the sulfur-oxidizing *Thiobacillus* and its ability to create sulfuric acid. This finding directly correlates to the effect of sulfur-oxidizing bacteria in sewer systems with high H_2S levels and the presence of sulfuric acid.

Taking concrete measures

All the information provided in these reports falls in line with 20 years of observation during a career in wastewater system reha-

bilitation. These facts indicate three basic ways in which to combat corrosion in sewer systems:

1. Reduce turbulence by building internal drops in manholes to lessen aeration of sewage and lower the release of H_2S , releasing force main discharges into or under flow levels on gravity sewer trunks, repairing offsets in sewer pipes, and smoothing manhole inverts to produce an even transition for flows through the manhole.

2. Minimize bacteria breeding grounds by jet-cleaning debris from sewer lines, removing deteriorated concrete from manhole walls by high-pressure water wash-down, and having combination truck/jetter crews use heavily chlorinated water when washing manholes and jetting lines.

3. Lining pipelines with acid-resistant cured-in-place liners, using bacteria-reducing underlayments to rebuild manholes, and using acid-proof trowel-down coatings to line manholes.

Joseph A. Nuciforo Jr. is manhole rehabilitation supervisor with J.P.C.I. Services, a manufacturer of manhole and sewer pipe rehabilitation products in Mesa, Ariz. He can be reached at jnuciforo@jpciservices.com. ♦

¹Yongsiri, C., Vollertsen, J., Rasmussen, M., Hvitved-Jacobsen, T.: *Air-water transfer of hydrogen sulfide: an approach for application in sewer networks*; Water Environment Research, 2004; Vol.76 No.1, p. 81-88.

²Owens, Sam R., *A Brief Primer on Microorganisms*; Ethanol Producer Magazine, November 2006.

³Sand, Wolfgang; *Importance of Hydrogen Sulfide, Thiosulfate, and Methylmercaptan for Growth of Thiobacilli during Simulation of Concrete Corrosion*; Applied and Environmental Microbiology, July 1987, p. 1645-1648, ©1987, American Society for Microbiology.

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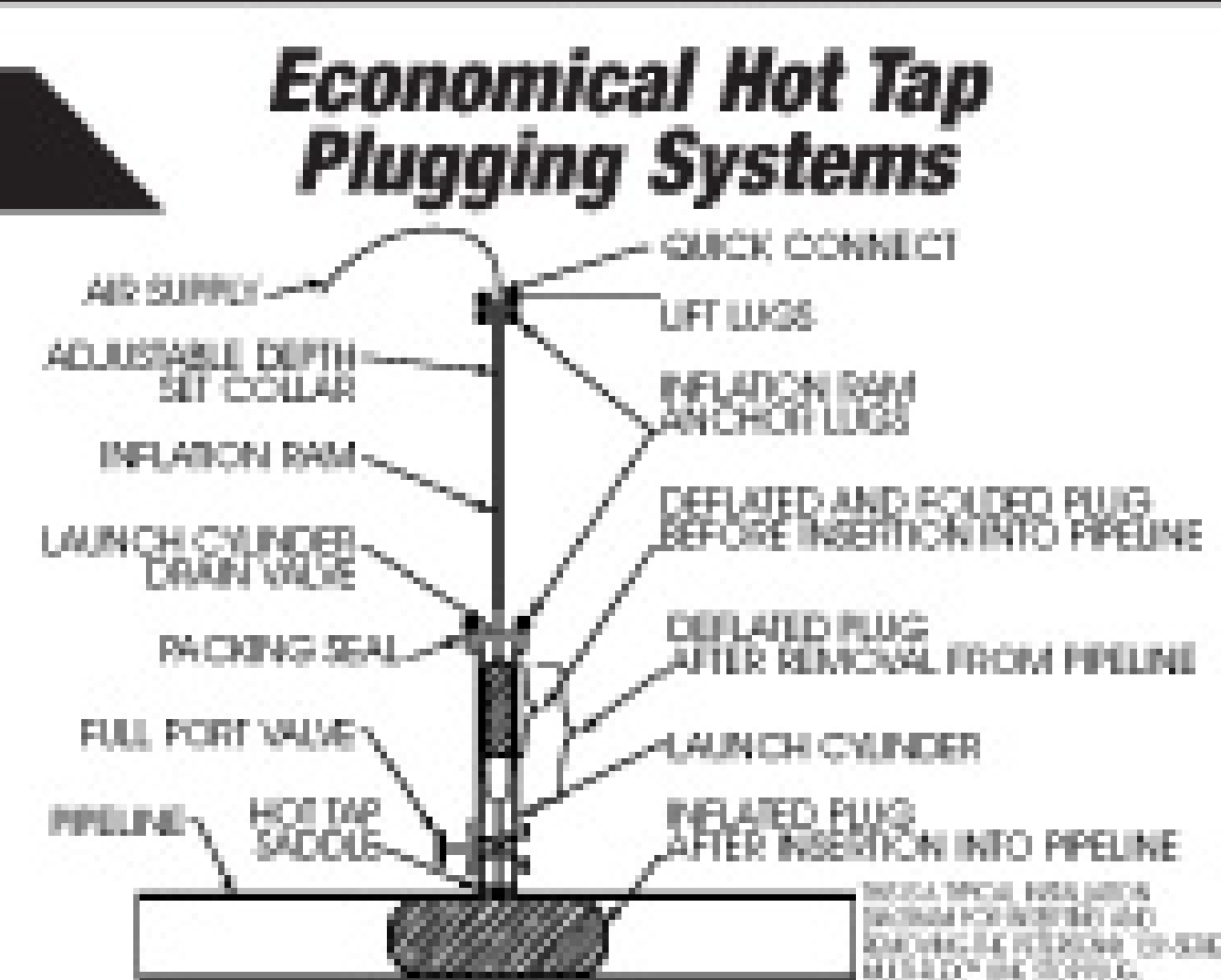
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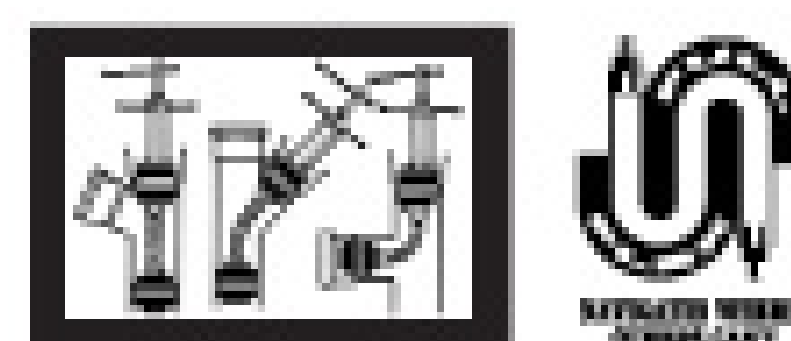


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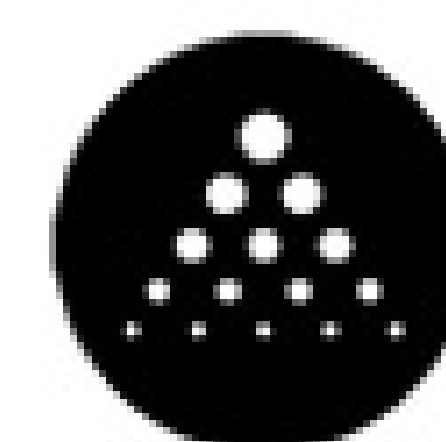


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Collection Systems Conference

The Water Environment Federation is sponsoring *Collection Systems: Regional Planning for Compliance — The Future with Multi-Jurisdictional Organizations* on May 18-21 at the David L. Lawrence Convention Center in Pittsburgh, Pa. Topics include regional system management, flow monitoring and sewer system analysis, sanitary and combined sewer overflow control, private property I/I, green systems solutions, computer modeling of wet weather conditions, and collection systems in the Pittsburgh area.

Besides 12 technical sessions, participants can attend a workshop on Satellite Utilities and the Regional POTW: Developing 21st Century Relationships, and tour the Nine Mile Run Aquatic Ecosystem Restoration and Allegheny County Sanitary Authority treatment facility, while earning up to six continuing education units, 12.75 professional development hours, and 6.75 contact hours. An evening cruise sails the Monongahela, Allegheny and Ohio Rivers. Call 800/666-0206 or visit www.wef.org.

Contractors raise concerns on budget

According to the Associated General Contractors of America (AGC), the proposed \$3.1 trillion budget for fiscal year 2009 would shrink domestic spending and reduce infrastructure funding by 2.9 percent below 2007 levels.

Stephen E. Sandherr, chief executive officer of AGC, notes that over the last year, nonresidential construction employment has declined 2.1 percent, translating into 21,000 lost jobs. Nationwide, however, the Labor Department reports that 1.25 million non-farm payroll jobs were created in 2007.

Based on 2008 enacted levels, the 2009 budget proposes \$39.4 billion (\$1.8 billion less) for the Federal Aid Highways Program (FAHP), \$175 million (\$200 million less) for the Transit Security Grant Program, and \$2.8 billion (\$750 million less) for the Airport Improvement Program capital grants, says AGC.

The U.S. Department of Transportation, however, reports that the administration's budget includes an obligation limitation of \$39.4 billion for the FAHP. It is the final installment of the \$286.4 billion in highway, transit, and safety program funding agreed upon in the last surface transportation re-authorization act.

The administration proposes \$4.4 billion for the U.S. Army Corps of Engineers Civil Works program, \$800 million less than in 2008. The AGC says that the budget proposes a \$134 million reduction in the Clean Water State Revolving Loan Fund.

However, EPA Administrator Stephen L. Johnson says, "The EPA's proposed 2009 budget meets the president's commitment for funding State Revolving Fund grants with a request of \$555.5 million for clean water grants and \$842.2 million for drinking water grants."

National Water Quality Monitoring Conference

The National Water Quality Monitoring Council Conference, "Monitoring: Key to Understanding Our Waters," is May 18-22 at the Atlantic City (N.J.) Convention Center. The conference will feature successes from an array of river basins and coastal waters, including overviews of the three pilot studies selected for the National Water Quality Monitoring Network for U.S. Coastal Water and their Tributaries, and plans for the network's future. Conference themes are:

- Connecting and Integrating Data About Hydrologic Resources
- Collecting, Assessing and Interpreting Data: New Technologies and Analytical Methods
- Describing the Sustainability and Condition of Water Resources

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

- Understanding Water Quality Stressors
- Exploring Federal, State, and Local Monitoring Needs
- Enhancing State, Regional, and Local Monitoring Programs
- Addressing Multi-Jurisdictional and International Monitoring Issues
- Improving Communication through Innovative Outreach

E-mail Lara Hughes at Monitoring2008@wef.org or visit <http://acwi.gov/monitoring>.

LEARNING OPPORTUNITIES

Sewage Biohazards

The National Utility Contractors Association has a Toolbox Talk on *Health Hazards of Working with Sewage* for employees involved in sewer inspection and maintenance work. It covers basic hygiene and what personal protective equipment to wear to avoid contracting serious illnesses. The handout is available to members at www.nuca.com or call 800/662-6822.

Trenchless Technology Courses

The North American Society for Trenchless Technology has the following classes:

- April 27-May 2 – No-Dig Conference & Exhibition, Grapevine
 - April 27 – An Introduction to Trenchless Technology, Grapevine
 - April 30-May 1 – New Installation Methods Good Practices, Grapevine
 - April 30-May 1 – HDD Good Practices Guidelines, Grapevine
- Visit www.nastt.org.

UW-Madison Engineering Course

The University of Wisconsin-Madison Department of Engineering Professional Development is offering the following CEU, LU, PDH classes. They are at the Madison campus unless indicated otherwise:

- March 31-April 4 – Cross-Connection Control and Backflow Prevention (J117)
- April 7-8 – Municipal Engineering Fundamentals for Non-Engineers (J491)
- April 14-15 – Mastering the Fundamentals of Culvert Hydraulic Design (J759)
- April 17-18 – Drainage Engineering Fundamentals for Non-Engineers (J762)
- April 24-25 – Soil Engineering for Non-Soils Engineers and Technicians (J718), Philadelphia, Pa.
- April 28-29 – Pumping Equipment and Systems: Selecting, Operating, Maintaining, and Troubleshooting (J660)
- April 30-May 2 – Preventing Deficiencies in Design and Construction of Water and Wastewater Projects (J797)
- April 30-May 2 – Watershed Modeling Using the New HEC-HMS (J490)
- May 8-9 – Preparing an Effective Municipal Capital Improvements Plan (J488)
- June 11-13 – Designing Wastewater Pumping Systems and Lift Stations (J796)

Call 608/262-2061 or visit http://epdweb.engr.wisc.edu/course_categories.lasso.

American Public Works Association

APWA has these courses as classroom workshops or as audio/Web-based broadcasts:

- April 9-10 – Symposium on Climate Change: Public Works Role, Strategy, and Impact, Tempe, Ariz.

CALENDAR

April 6-8

Water Security Congress, sponsored by the American Water Works Association, Cincinnati, Ohio. Call Dana Trujillo at 303/347-6240 or visit www.awwa.org.

April 27-May 2

North American Society for Trenchless Technology No-Dig Show, Gaylord Texan Resort and Convention Center, Dallas, Texas. Call 330/467-7588 or visit www.nodigshow.org.

May 4-7

National Clean Water Policy Forum, Renaissance Mayflower Hotel, Washington, D. C. Call 202/833-2672 or visit www.nacwa.org.

May 18-21

Collection Systems, sponsored by the Water Environment Federation, David L. Lawrence Convention Center, Pittsburgh, Pa. Call 800/666-0206 or visit www.wef.org.

May 18-22

National Water Quality Monitoring Conference, sponsored by the National Water Quality Monitoring Council, Atlantic City Convention Center, N.J. E-mail Monitoring2008@wef.org or visit www.wef.org.

May 19-21

New England Interstate Water Pollution Control Commission Annual Nonpoint Source Pollution Conference, Mystic Marriott Hotel and Spa, Groton, Conn. Call Laura Chan at 978/323-7929 or visit www.neiwpcc.org.

May 31-June 5

American Industrial Hygiene Conference and Expo for Occupational and Environmental Health and Safety, Minneapolis Convention Center, Minn. Call 703/849-8888 or visit www.aiha.org.

June 1-3

International Water Association-Water Environment Federation Wastewater Treatment Modeling Seminar, Château Mont-Sainte-Anne, Qué. Call Bruce Johnson at 720/286-5373 or visit www.modeleau.org/WWTmod2008.

June 8-12

American Water Works Association Annual Conference and Exhibition, Georgia World Congress Center, Atlanta. Call 800/926-7337 or visit www.awwa.org.

June 22-25

National Environmental Health Association Educational Conference and Exhibition, Tucson, Ariz. Call 303/756-9090 or visit www.neha.org.

July 15-18

National Association of Clean Water Agencies Summer Conference and Meeting, Hilton Hotel, Anchorage, Alaska. Call 202/833-2672 or visit www.nacwa.org.

Aug. 3-7

StormCon North American Surface Water Quality Conference and Exposition, Orlando World Center Marriott, Fla. Call 805/682-1300, ext: 129 or visit www.stormcon.com.

Aug. 17-20

American Public Works Association Congress: The Best Show in Public Works, Morial Convention Center, New Orleans, La. Call 800/848-2792 or visit www.apwa.net.

Sept. 21-24

Distribution Systems Symposium and Exposition for Distribution, Engineering and Plant Operations Professionals, Austin, Texas. Call Tricia Loughead at 800/926-7337 or visit www.awwa.org.

- April 17 – Innovative Funding – Getting to the End of the Rainbow (Web).
- May 7-9 – Public Fleet Management Workshop, Grimsby, Ont.
- May 15 – Delta Force Readiness! Developing Tomorrow's Elite Corps of Public Works Leaders (Web).
- June 12 – Developing a Successful Fleet Replacement Program (Web).
- June 26 – Municipal Stormwater Self-Audit: A How-To Guide (Web). Call Carrie Merker at 816/472-6100, ext: 5213 or visit www.apwa.net.

American Water Works Association

The organization has a "Financial Management: Cost of Service Rate-Making" CEU/PDH seminar on April 16-18 in Boston, Mass. Call 800/926-7337 or visit www.awwa.org.

North Carolina

The state university at Raleigh is offering these courses:

- April 2 – Sediment & Erosion Control: Latest Information with Hands-On Demonstrations
- April 22-24 – Land Application/Residuals Operators Training
- May 5-8 – Spray Irrigation Systems Operators Training
- June 25 – Soil Survey in the 21st Century
- June 18 – Location, Navigation and Data Collection Using Global Positioning

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cation renewal credits. Some are approved by ME DHS for Drinking Water Operator (DWO) certification.

- May 8 – PVC Valves, Connections & Joining, Boothbay (DWO)
 - May 20 – Pump Station Retrofits & Troubleshooting, Bangor (DWO)
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