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OCTOBER 2015

## EYE ON THE PRIZE

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SPECIALTY SHOP AROUND PIPE REHABILITATION **PAGE 20**

### MONEY MACHINES

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**A**

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**B**

### Null Point Icon—

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**C**

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**D**

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### ON THE COVER:

Bernie Tessier used his decades of drain cleaning industry experience to open New England Pipe Restoration in 2012. In a brief three years, the company has become the go-to contractor for commercial and residential CIPP work in its service area. (Photography by Dustin Marshall)

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Luke Laggis  
editor@cleaner.com

# Talking About the Industry

Good stories and good discussion provide perspective and insight that can help you improve your business

By Luke Laggis

I'm always trying to think of new ways to deliver content that helps you and your businesses.

There's a story in this month's issue about a CIPP project at the historic federal building and U.S. District Courthouse in Sioux City, Iowa. It doesn't really fit the profile of a Tough Job feature, but it demonstrates a good CIPP project, how the equipment works, and why it was the perfect solution in this instance.

I sometimes get locked into looking for stories to fill specific slots in *Cleaner*: contractor profiles, Tough Jobs, Tech Perspectives, etc. Sometimes it's good to just step back and recognize good content, whether it fits one of those clearly defined slots or is simply a story that can provide a little insight into a process or service you may not have adopted yet. That's the case here.

You're all familiar on some level with CIPP pipe rehabilitation, but the Sioux City story provides a good background and overview of some of the capabilities, as well as a specific look at how it was used to avoid major expense and disruption on a sensitive project.

I hope you find the story helpful. If not, feel free to let me know. I always like getting calls and emails from readers. It lets me know that we're connecting with you. Sometimes it lets me know we're missing the mark. Either way, you're the people in the field, using the tools and doing the work, so your perspective is extremely valuable to me.

To further that exchange, we recently relaunched our discussion board at *Cleaner.com*. It's a forum for you to discuss the issues that matter to you. It's another way for us to engage each other, to discuss the stories in *Cleaner* as well as your problems and successes in the field.

It's going to take a little while to build up a robust library of questions and in-depth discussion, but we want this forum to be a resource for you. Just like our content is aimed at bringing you new perspectives and insights, the forum is a place for you to connect with your peers and get their thoughts and perspectives on the issues you're facing. It could be anything from tricks for maintaining your jetter, to technical insight for planning a pipe bursting job, or tips for boosting your profitability.

You'll find the recent *Cleaner* Forum posts right on the *Cleaner* homepage. Create a user name and join the discussion, or find the answer to your own question.

I hope you check it out and use it as a resource.  
Enjoy this month's issue. **c**

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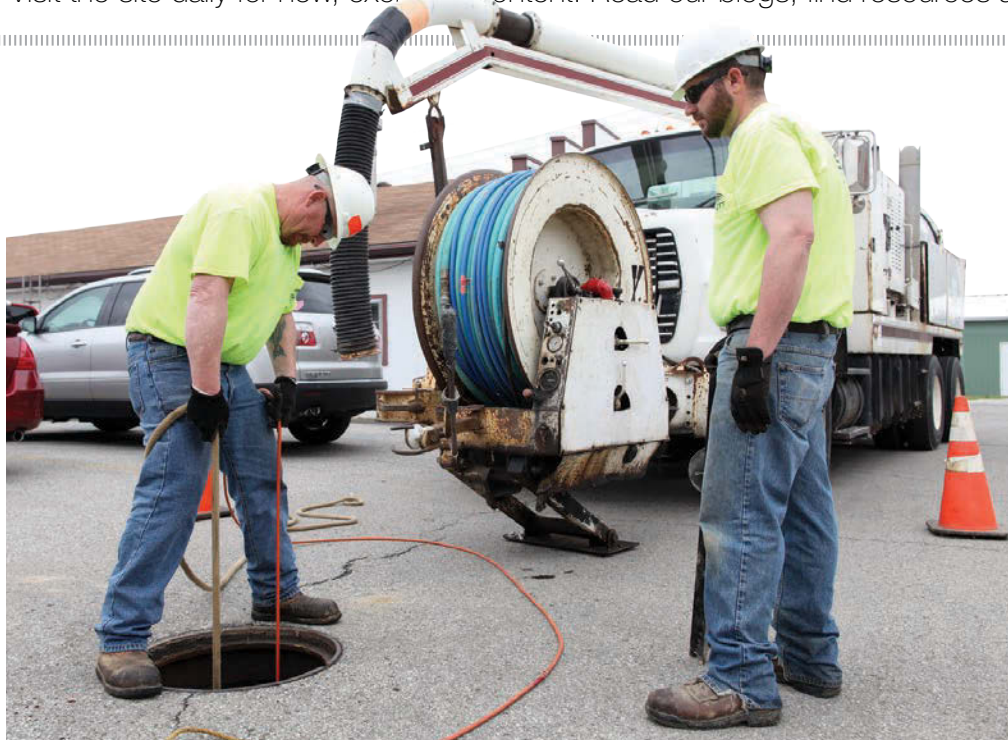
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# EYE ON THE PRIZE



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AFTER 25 YEARS IN THE DRAIN CLEANING INDUSTRY, BERNIE TESSIER DECIDED TO USE HIS EXPERIENCE AND REPUTATION TO BUILD HIS OWN COMPANY.

In 1990, Tessier started American Rooter in Lunenburg, Massachusetts, a pipe cleaning company with a varied list of services. He sold the company in 2008, and after a brief stint working for another firm, Tessier realized he wanted to go back out on his own and focus entirely on relining.

In a brief three years, New England Pipe Restoration has become the go-to contractor for commercial and residential CIPP work in its service area.

As specialists, Tessier and his crew are typically booked up to six weeks in advance.

“Since we entered the marketplace, we have been doing more lining than our competitors. We are building on our reputation

and have worked on some of the most significant projects in Massachusetts and neighboring states,” Tessier says.

Relining is particularly popular in large cities such as Boston where sewer laterals often run under sidewalks and roads, making it very difficult to dig and replace lines.

“There is a lot of concrete,” he says.

Tessier says his team typically works with cast iron and clay pipe, which are both candidates for CIPP. Although residential makes up most of NEPR’s work, commercial and health care projects are gaining momentum. Residential lines can run from 20 to 60 feet, but commercial projects are another situation entirely and can often take 10 times longer than residential jobs.

BY MARIAN BOND

PHOTOGRAPHY BY DUSTIN MARSHALL





Frank Machonis (left) and Matt Leger of New England Pipe Restoration watch the Gvision monitor (EPL Solutions) during a pre-lining inspection.



profile

**NEW ENGLAND PIPE RESTORATION INC.,**  
LUNENBURG, MASSACHUSETTS,



SERVING MASSACHUSETTS AND ALL OF NEW ENGLAND

**OWNER:** Bernie Tessier

**ESTABLISHED:** 2012

**SERVICES:** CIPP for sewer lines and chiller lines, lining steam condensate lines, CCTV, jetting, drain cleaning

**EMPLOYEES:** 4

**WEBSITE:** [www.NEPipe.com](http://www.NEPipe.com)

“Commercial work is looked at as a dollars-and-cents decision, while residential work is a more emotional conclusion for the homeowner,” Tessier says. “A residential job might run \$6,000 to \$7,000. A commercial project can total much higher — we have an upcoming project that will be \$65,000. We recently had a major job that ran \$45,500, but in the long run we saved the client \$200,000.”

Tessier points out that although lining is widely accepted and fairly well-understood, traditional solutions are still recommended in some instances, typically at jobs with few obstacles such as driveways, walkways, trees or roads. If a customer is on a large property and digging isn’t a problem, customers can save a lot of money. However, some customers refuse to dig up their pristine lawns.

<< **LEFT:** Bernie Tessier gets a bucket of Perma-Lateral Lining Resin out of the trailer to set up the wet-out process.

>> **RIGHT:** The New England Pipe Restoration team includes (from left) Matt Leger, owner Bernie Tessier and Frank Machonis.

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**ABOVE:** Bernie Tessier (right) helps move a liner into position as Frank Machonis begins the wet-out process.

**>> RIGHT:** Matt Leger moves CIPP lining equipment out of the New England Pipe Restoration work trailer to set up for a lateral lining job.

“For a situation where a customer prefers an open dig, I will recommend an excavator for the job if I know and trust that operator. Otherwise I will suggest (the homeowner) call the local jurisdiction to get a list of contractors to do the job.”

“Since we entered the marketplace, we have been doing more lining than our competitors. We are building on our reputation and have worked on some of the most significant projects in Massachusetts and neighboring states.”

Bernie Tessier

## MENU SPECIALS

As a specialty firm focused on pipe rehabilitation, NEPR lines sewer laterals, roof drains, sewer vents and restaurant grease lines as well as commercial air conditioner chiller lines. Additionally, the company lines steam condensate pipes, which provide heat in many university and commercial buildings.

When lining chiller lines, NEPR is often in commercial buildings with aging pipes. Those pipes can develop leaks and exhibit a heavy oxidation scale buildup, which narrows the line. When the scale buildup breaks down it can block the pump strainer and cause the pump’s electrical system to overheat, which triggers electrical breakers to shut off.

Tessier says his team continues to perfect the process of lining steam condensate lines — an important specialty for customers. He says that although lining works for condensate lines, NEPR cannot line steam supply



lines because they expand, and the liner does not. The temperature for supply lines is also too high, whereas temperatures in condensate lines are much cooler.

One of the company’s chiller line rehabilitation jobs saved a major hospital \$200,000 by avoiding conventional replacement. NEPR had to work with a 200-lineal-foot 8-inch line that ran 80 feet horizontally and 120 feet vertically. The building had been totally renovated except for the 8-inch chiller line, which would have been costly to replace conventionally. NEPR had already lined some of the hospital’s sewer lines in an earlier project.

“They realized the chiller line had a very heavy scale buildup when they attempted to put the air conditioning system online. The scale started to



break up, causing the strainer for the system to block up. They then contacted NEPR, and we met with their engineers to discuss the possibility of lining their chiller line.

“We explained our process and gave them a product sheet that we would use for the chiller line. We estimated it would take five to six days to complete the work. The most difficult part of the lining operation is the descaling of the 8-inch pipe. Our Picote cutter was very effective in the descaling, which took three and a half days. The lining took two and a half days. To replace the line conventionally, it would have taken an estimated three to four weeks and cost them more than \$200,000 — much more than our proposed cost.”

In June 2015, another project at a large university presented different challenges. A rotted-out cast iron sewer pipe was failing, and a brand-new floor would have to be dug up if the pipe couldn't be rehabilitated. The mainline also had a large number of branch lines tied in at various points, and all would have to be reinstated.

“For us to reinstate those connecting lines, we needed two types of reinstating cutters,” Tessier says. “We used our Picote reinstator and a second one specially built for our use. The university did not want the disruption of jackhammers, and there was the matter of the new flooring. Relining was the solution for this difficult job.”

## CONNECTING

Maintaining a good relationship with large commercial clients is not much different than working with an individual client, Tessier says.

“My business practice is to be up-front and honest with the client, and to keep them well-informed on what's going on and what to expect during

“My business practice is to be up-front and honest with the client, and to keep them well-informed on what's going on and what to expect during our lining operations. It's very important for clients to feel comfortable that NEPR is a well-trained crew.”

Bernie Tessier

## EQUIPPED FOR ANYTHING

New England Pipe Restoration of Lunenburg, Massachusetts, provides specialized pipe rehabilitation services across a broad service area, and the crew always has to be properly equipped for the task at hand.

NEPR hits the road with a 2012 Ford F-350 utility box van that carries all the tools needed for lining work. Pre- and post-inspection calls for cameras, and the crew has three at their disposal: a VeriSite Pro camera from Envirosight, a RIDGID SeeSnake Plus Color Self-Leveling camera with a 200-foot reel, and a Gvision Series 2000 from EPL Solutions Inc.

Their Perma-Liner lateral lining system is pulled behind the box van in a fully equipped trailer. Tessier says they use Perma-Liner equipment and materials in about 90 percent of their sewer lining projects.

NEPR also uses a 2012 Harben jetter (4,000 psi/16 gpm) mounted in a heated, enclosed trailer, along with various nozzles and cutting heads. RIDGID Navi-Track and General Pipe Cleaners Gen-Eye locators help pinpoint underground pipes and other utilities.

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our lining operations,” he says. “It’s very important for clients to feel comfortable that NEPR is a well-trained crew. We want them to feel at ease that we will solve their problem.”

Part of putting customers at ease is having skilled and courteous professionals on staff, but those people aren’t always easy to find.

“We want to make sure any candidate understands that we do not bring in outside help for our lining process, and I need an employee to understand that it’s not a normal 8 a.m. to 5 p.m. work period,” Tessier says.

“Sometimes a technician will start work at 6 a.m. and stay on the job until a project is at a stage where they can step away, which means it could be a 12-hour day. Our technicians need to know that some of our jobs will require them to stay away from home and sleep in a hotel for four to five days at a time, that they will not return home at the end of each day. Otherwise, I cannot hire that person.

“I want a technician who has some basic plumbing knowledge with drainage systems. I have found that auto mechanics are great candidates for this type of work. Auto mechanics have a sense of how things work and for the most part can easily understand our lining process.”

**“My style is not to act as an owner or boss. We all work together and all opinions count.”**

**Bernie Tessier**

Tessier says his small crew of four must coordinate personal plans when leaving for a job, as the job must be a priority.

“I enjoy a good working relationship with the crew,” he says. “I feel it is very positive. Although I’m not with them on all the jobs, I’m there for a good part of the work. My style is not to act as an owner or boss. We all work together and all opinions count.”

He says NEPR works as a subcontractor for some companies, which is a positive for them and the customer.

“We do around \$250,000 yearly with contractors that don’t offer lining,” he says.

### EXPERIENCE PAYS

After 25 years in the industry, Tessier says his experience troubleshooting drainage systems has paved the way for NEPR.

“Frequently on commercial jobs we need to figure out how to build a bypass for the sewer system so the client can continue to operate,” he says. “When a bypass system is needed to line a commercial property, no one system can do all that is required. The job of NEPR is to scope out the work



Matt Leger (left) operates a Perma-Liner Perma-Lateral inversion unit while Frank Machonis helps feed the liner into the pipe.

that is needed and then figure out how to build a bypass system so the client can continue to function.”

It’s that type of experience that separates NEPR from the competition. Dedication to the craft and to customers has also played a big role.

“Even though we are doing work that is all scheduled, my phone is always on and anyone can get to me 24/7,” Tessier says. “I think that is very important as I always enjoy working with people, whether on the phone or in person. I want people to feel comfortable and to realize I know the lining business very well. All of my work is guaranteed, and if there is ever an issue that we caused, we will take care of it at no charge.”

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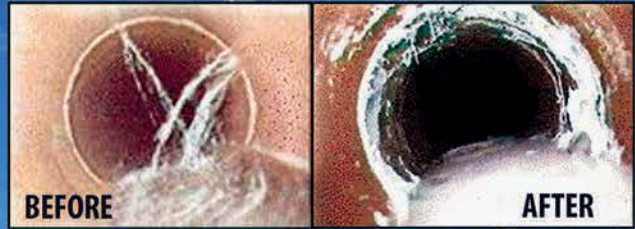
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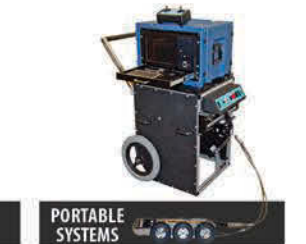
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# Beast of Burden

Camel combination vac truck gives Idaho contractor the power to carry out tough cleaning projects

By Ken Wysocky

In some countries, camels are known as “ships of the desert” for their ability to carry goods and people through tough, arid terrain. In Idaho, Jon McManus calls his Camel – a Camel 200 combination vac truck (Super Products LLC), to be exact – something else altogether: a productivity- and profitability-enhancing beast of burden.

“We run into the most challenging situations you can imagine when we clean irrigation pipes in high-desert country,” says McManus, the manager of the hydrojetting department of Sweet’s Services, based in Shoshone. In business for more than 70 years, Sweet’s technicians pump septic tanks and do excavation and trenchless pipe rehabilitation work, along with providing sewer and drain cleaning services throughout Idaho.

“Many of the irrigation pipes we clean aren’t laid to grade,” he explains. “As long as Point A is higher than Point B, the installers don’t much care if the pipes are level in between.”

That creates plenty of opportunities for clogs in lower spots. And to make the work a little more interesting, the pipes are typically located in remote areas. Many times, the only way to access them is via tall risers that stand from 4 to 10 feet tall; think of them as manholes that rise above ground level.



The mid-mounted reel on the Camel 200 combo unit helps Sweet’s Services in Shoshone, Idaho, clean irrigation pipes that aren’t laid to grade and are often accessible only through 4- to 10-foot risers.

“Without the Camel truck, we would’ve had a much harder time establishing a dependable, profitable hydrojetting department because it would have been hard to jump over the hurdles our market presents.”

Jon McManus

But the Camel is well-suited for handling the risers because of a hose reel that’s mid-mounted on the truck, behind the cab. Because of that location, the jetting hose runs along the vacuum-hose boom all the way to the front of the truck, where the higher elevation allows technicians to just drop it down into the risers. Without that elevation, workers would have to put up ladders or use mechanical devices to get high enough to manually wrestle the hose up and over the rim of the riser, then keep feeding in hose as well as pull it back during jetting, McManus points out.

“Wherever you put the boom, your jetter hose is there, too,” he says. “We just put the boom over the riser and start jetting the line right from there. It saves us from dealing with a lot of problems. ... Believe me, the hose doesn’t pull back easy without that boom. It would be very hard on our workers without it. And the rim of that riser can shred even our Tiger Tails (made by

**money machines**

- OWNER:** Sweet’s Services, Shoshone, Idaho
- MACHINE:** Camel 200 combination vacuum truck, made by Super Products LLC
- FUNCTION:** Specialty pipeline cleaning
- FEATURES:** 1997 GMC TopKick chassis; PD blower made by Roots Systems Ltd.; Myers water pump (a brand owned by Pentair Ltd.) that generates 2,000 psi at 65 gpm; 6-cubic-yard debris tank; 1,000-gallon water tank; Allison transmission; 275 hp Cat diesel engine

Flexaust, a Schauenburg company).” In addition, the hose-on-boom feature allows Sweet’s to send out one to two fewer men per job, manpower that can be allocated more productively elsewhere.

The Camel features a 1997 GMC TopKick chassis, equipped with a 275 hp Cat diesel engine and an Allison transmission; a 6-cubic-yard debris tank; a Myers water pump (a brand owned by Pentair Ltd.) that generates pressure of 2,000 psi and flow of 65 gpm; a 3,600 cfm PD blower from Roots Systems Ltd; and a 1,000-gallon water tank. “The blower does a great job,” McManus says. “The boom and pipe are 6 inches in diameter, which provides more vacuum power than an 8-inch-diameter boom and pipe. We can run hose 150 feet away from the truck to suck up sand and it still works great.”

McManus also praises the truck’s simple-to-operate PTO system. “We

literally flip one switch (a master hydraulic switch) in the cab, then go out front and flip one switch to turn on the water and another switch to turn on the vacuum. It's a huge time-saver. It's so simple to operate that I could tell my kid how to operate it over the phone."

The Camel has also proven itself as a durable truck despite the rugged environments in which it works, with minimal downtime. And when repairs are needed, McManus points out that parts are easy to obtain because he's not limited to acquiring them from just a third-party distributor. "I can buy a Roots blower or a Myers pump from many sources. I love the flexibility and options that gives us," he notes.

Moreover, when Super Products upgrades a part or system on its trucks, the company makes retrofit kits available for older models. "For example, I was having a problem with the latches on the rear gate," McManus points out. "When Super Products fixed the problem, I bought a retrofit kit for a new-style gate with different latches."

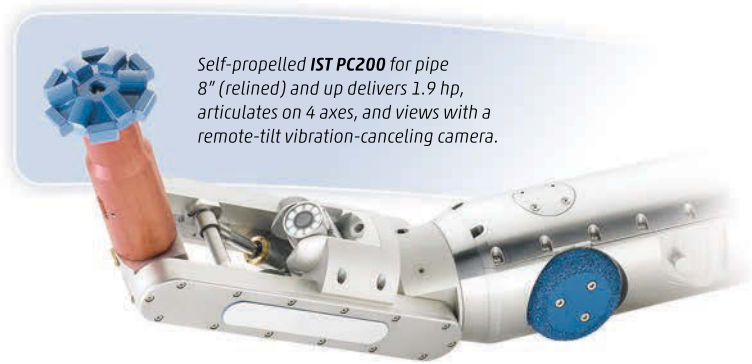
McManus considers the Camel one of Sweet's most valuable machines. "Without the Camel truck, we would've had a much harder time establishing a dependable, profitable hydrojetting department because it would have been hard to jump over the hurdles our market presents. With that mid-mount hose reel, the Camel makes jobs that could be a pain in the butt really easy. The truck has paid for itself many, many times over.

"Even when the truck gets older, we'll never retire it, just for that reason," he continues. "We'll keep Old Faithful around because it can so easily do what other trucks can't do.

"For our specialty jobs, there's no question that this is the truck we use." **C**

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# Landmark Decision for CIPP

Historic district courthouse ‘upholds’ CIPP as its most feasible, permanent drainpipe solution

By Joe Bradfield

**N**early a century of heavy stormwater flow had eroded the drainage system at the historic federal building and U.S. District Courthouse in Sioux City, Iowa. The cost of replacement wasn’t feasible, so operations staff needed another solution.

Roof water runoff from the building is directed by a drainpipe network to enclosed-wall risers. Each precipitation event for the past 90 years has delivered the equivalent of a half city block’s rainfall down the pipes in a 70-foot freefall. While scale and rust had taken their toll on the entire drainage system, one of the risers tasked with redirecting each torrent to the city’s storm sewer system had finally worn through at its lower 90-degree fitting. It required urgent repair to prevent interior water damage from the coming season’s spring rains.

Had it been just an old building, one remedy might have been to open the walls, replace the pipes and restore the walls. But this three-story Depression-era landmark is listed in the National Register of Historic Places. Building-restoration costs eliminated full replacement as an option.

Sioux City’s Morningside Plumbing had been contracted for a number of projects in the building over the years, including drainpipe repairs, so the contractor knew just how critical its condition was becoming. Owner Mark Corbin recommended lining the pipes, which would provide a long-term solution.

## COURT OF APPEAL

A Sioux City newspaper’s coverage of the building’s 1933 dedication headlined it, “Uncle Sam’s Gift to the City.” Created to serve as the Sioux City U.S. Courthouse and post office, it was designed to inspire public confidence during the most severe economic downturn the industrialized world has ever known. Its bold, powerful exterior is created from light gray limestone and ashlar masonry atop a 5-foot-high granite base. Its fortress-like façade protects its blend of stripped classical and art deco styles.

In 1984, the U.S. General Services Administration (GSA) acquired the building from the U.S. Postal Service, which needed more room. The building currently houses federal courts as well as offices for several federal agencies.

Erik Peterson, a GSA facilities operation specialist, needed to limit costly restoration: “Just to get at the first 15 feet of pipe would have consumed a third of the total project funding in



Equipment is lifted to the roof of the historic federal building and U.S. District Courthouse in Sioux City, Iowa, for a stormwater drainage system rehabilitation project.

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demolition and repaving of a 20-inch hole in the wall to access it.”

Peterson was familiar with CIPP. “I knew of its use for things like lining sewers, of course,” he says. “But I’d never heard of it used for lining pipes that collect rainwater from a roof.”

Corbin told Peterson how CIPP was used to upgrade the enclosed-wall drainage systems of a 30-building VA hospital campus in Montrose, New York. The Sioux City federal building was a similar candidate ideal for CIPP. Morningside Plumbing would just need a week free of winter weather conditions and precipitation. Working from the roof would have no impact on the building’s exterior or interior walls.

HammerHead lateral product representative Cory Steckmann, who had been at the VA hospital job, and lateral application technician Joe Walsh would be on site in person to provide Morningside Plumbing with manufacturer support for this project. Peterson confidently recommended the plan to the building manager.



Members of the Morningside Plumbing crew use a HammerHead Super Hydra Inversion Drum to line a 100-foot run of 8-inch drain pipe at the historic federal building and U.S. District Courthouse in Sioux City, Iowa.

## SUPPORTING EVIDENCE

Steckmann pointed out several major advantages of CIPP rehabilitation, which would form a new pipe within the old and provide a higher flow rate than when the original pipe was new.

CIPP lining smoothes over pipe wall irregularities, holes and cracks with its nonstick surface, right through pipe bends and fittings. Product offerings include a flexible felt liner that will make seamless upsized transitions of one step, such as 4-inch to 6-inch.

The installed liner’s 4-millimeter thickness equates to about a 6 percent reduction in the actual interior diameter of an 8-inch pipe. However, the smoother surface of CIPP improves flow and virtually eliminates the potential for future impediments to flow.

Since the liner does not rust, scale or otherwise corrode, the useful life of a CIPP-rehabilitated pipe exceeds that of pipe materials such as ductile iron and galvanized steel, and can be used to rehabilitate pipes of most any other composition.

## PRETRIAL

Morningside Plumbing inspected the interior of the pipe runs after they were jetted clean and capped off to prevent contamination while the crew waited for a stretch of conducive weather.

Peterson says five or six of the threaded joints had holes in them. Areas where galvanization and metal had been removed to thread the pipe during the 1932 installation were more vulnerable to corrosion than other points in a run. The biggest was the same hole that had made the project urgent: a 3/4- by 2-inch-wide gap in a 90-degree fixture at the bottom of the riser.

Prior to lining through the fittings, Morningside Plumbing’s factory-trained installers applied PipePatch point repair kits from Source One Environmental. Although CIPP typically bridges small holes and fractures without distortion, PipePatch eliminates any potential for bulging during the pressurized setup and cure time.

A 3- by 5-foot section of the roof was removed to form a temporary access with a wood curb and metal cap.

In the boiler room at ground level, the crew removed 3 to 4 feet of the 8-inch riser, replacing it with 8-inch PVC pipe and a clean-out.

## PROCEEDINGS

Morningside Plumbing owns its own HammerHead HydraLiner equipment, including a Super Hydra Inversion Drum and standard Hydra Inversion Drum and wet-out table. They used a crane to hoist these to the rooftop along with a boiler, felt liner, epoxy resin and hardener.

The four-person crew treated three 20-foot runs and one 50-foot run of 6-inch drainpipe first, completing two runs a day. These four drains connect the rooftop grates to a common 100-foot run of 8-inch pipe sloping at 1/4 inch per foot.

Each drain was first uncapped and re-inspected. The crew cut a felt liner to length and ran it through the wet-out table. The wet-out table allowed for precise and consistent distribution of the epoxy resin.

The crew wound the wet-out liner into the Super Hydra Inversion Drum, leaving the end extending outside the drum as they sealed it up. The end was folded and clamped over the inversion nozzle. Placing the nozzle in the drainpipe opening and charging the drum with air pressure to approximately 6 psi forced the lining to invert itself inside the pipe. As the lining spooled out of the drum, its inner resin-impregnated side turned inside out, uniformly mating with the clean pipe surface as it progressed.

The inversion drum was then spooled with a calibration tube, a tubular bladder cut to the same length as the liner. The calibration tube was immediately inverted inside the installed liner.

Unlike an open-ended liner, a calibration tube is sealed. This allows it to hold air, water or steam after the tube’s inversion. Inflating the tube with air, water or steam presses the liner uniformly against the pipe, ensuring a good bond between the pipe and liner and smooth interior surface.

The calibration tube was inverted with a recirculation hose inside that reached nearly to the end of the tube to allow continuous hot water circulation to maintain a uniform 160 degrees throughout the cure period. In this case, Morningside Plumbing left the tube in place overnight, though cure rates for thermally activated installations can be as short as one hour.

Part of the reason for leaving them to cure overnight was an unexpected change in the weather. Temperatures dropped below freezing. Brisk winds at rooftop level created brutal wind chills. Corbin would not have started

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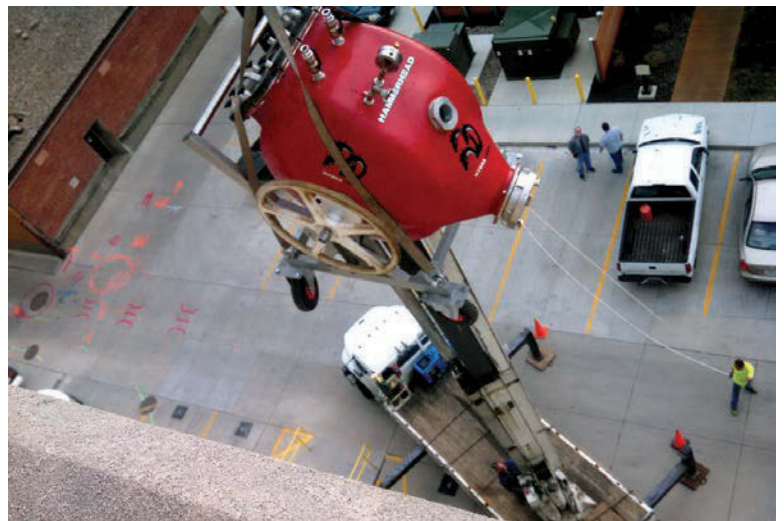


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A crane lifts the HammerHead Super Hydra Inversion Drum onto the roof of the building.

the project in these conditions, but work was already underway. “The cold probably slowed our pace a little, but as long as the equipment didn’t freeze up on us, we could keep working.”

The 100-foot run of 8-inch common drainpipe was accessed from the space beneath the roof. Each CIPP-treated wye where 6-inch pipe joined the 8-inch pipe had to be trimmed and smoothed before inverting the 8-inch liner. After inversion and curing, the intersections between 6-inch and 8-inch CIPP were cut open, trimmed and smoothed using Picote reinstatement and cleaning equipment.

The 8-inch common pipe emptied into an 8-inch enclosed-wall riser descending three stories to the boiler room, angling 70 degrees side-to-side over the run. At the boiler room, the riser turned 90 degrees away from the building through a final 6-foot galvanized lateral, which attached to clay sewer pipe leading to a manhole in the alley. The CIPP project terminated at the end of the galvanized pipe, since other roof drains fed into the clay pipe beyond this transition point.

Once the riser CIPP had cured, all treated pipes were inspected, reconnected and returned to service.

## RESULTS

Peterson’s main objective had been to get the most urgent problems fixed, with as much additional replacement as funding would allow in this first drainpipe remediation project. Morningside Plumbing, however, accomplished more repairs within the project budget than would otherwise have been attempted — finishing two days ahead of schedule in spite of uncooperative weather.

Other than a crane that occupied a couple of parking spaces in the alley while hoisting their equipment to and from the roof, daily activities continued unimpeded and undisturbed throughout the CIPP operation.

The remaining roof drains may be a future lining project. For right now, Peterson wants to share the news of this technique’s benefits with his colleagues in other GSA buildings, who may be facing similar issues. “I think our takeaway here is CIPP’s versatility. We need to be aware of just how many other ways we can use it.” **C**

## ABOUT THE AUTHOR

Joe Bradfield is senior writer for Ellenbecker Communications, an international communications firm specializing in the drilling, mining and construction industries.

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# The Learning CURVE

A CANADIAN FAMILY STEPS INTO THE CLEANING ARENA AND FINDS AN ENTIRELY DIFFERENT WORK ENVIRONMENT AND A NEW SET OF CHALLENGES

BY MARIAN BOND

PHOTOGRAPHY BY ABIGAIL SAXTON

**A** BC Pipe Cleaning Services has served the Vancouver area of British Columbia since 1972. In 1991, Carmelo Intile, who had worked in the construction industry, purchased the company with his daughter, Rosa Hawkes, and sons, George, Joe and Robert. Although sewer cleaning was a new game for the family, the new owners brought a diverse skill set to the company.

“We brought our construction experience with us,” says Hawkes. “My dad and I knew how to estimate and do job costing — things like

**“You can’t send the camera over dirt and rock. That debris gets so high you cannot travel through it. If the grease is too thick, you can’t get through it, so it is simpler for the flush truck to clean before the camera goes through.”**

Rosa Hawkes

that. My brothers had Class 1 driver’s licenses and were able to drive the trucks. But they had to learn how to use the trucks. When we purchased the company, ABC had a vacuum truck, combination truck, straight-flush truck and video van.

“My brothers had to learn how to do grouting and run the video inspection equipment,” continues Hawkes. “That was at a time — actually the beginning of so much new technology — when we were using black and white screens, and a laptop was very expensive at up to \$3,000. In those days, we were still pulling cameras through with a string. Then we advanced to where we attached the camera to skids and pulled it through by hand. Now of course we have the cameras on tracks with wheels. We don’t use string any longer. For us it was all a very steep learning curve.”

After 24 years in the drain cleaning business, the Intile family has indeed learned a few lessons, including things they would have done differently.

“The previous owner had leased everything,” Hawkes says. “We crunched the numbers and found the total cost increased by 30 percent over the sticker price. For smaller items, that was wasting money. Since then, whenever we buy something I talk with our accountant and decide which way is best. Personally, I do not like leasing. When we do lease, the agreement is made to benefit us, and I use a financial company that is responsive to our needs.”

## FOCUS ON OLD AND NEW

Video inspection is the heart of the operation, but before an inspection can take place, sewer pipes must be thoroughly cleaned and flushed.

“The asbestos cement put in in the ’50s still looks pretty good after a thorough cleaning,” Hawkes says. “We have roots ... lots of roots. They



Carmelo Intile and his daughter, Rosa Hawkes, own and operate ABC Pipe Cleaning Services in Surrey, British Columbia.



Devlin Hawkes of ABC Pipe Cleaning Services lowers a CUES Shorty CCTV camera into a manhole for a sewer main inspection in New Westminster, British Columbia.

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are everywhere, and infiltration is a big issue for us. We do not offer relining or pipe bursting. We have done some manhole-to-manhole liners in the past, but now we focus on the short liners. Where there might be a crack or small issue in a 400-foot line, we will do a repair using liners from Formadrain.”

ABC sometimes encounters PVC pipe that has become oval-shaped

and requires re-rounding. PVC loses flexibility when it becomes ovalized, and local code requires contractors to address pipes that are 5 percent or more oval. By re-rounding the pipe, ABC can avoid digging and replacing it. The crew uses tools from Advanced Construction Products and Hurco Technologies that vibrate within the pipe to make it round again. The pipe diameter and specific material dictate which tool will work best.

About 80 percent of ABC Pipe Cleaning Services’ jobs come from municipalities, which include mainlines and laterals that are typically cast iron and clay.

The company usually works as the prime contractor but sometimes serves as a subcontractor, cleaning and televising pipe from 6 inches up. Lateral lines are generally 4- to 6-inch pipe.

ABC inspects newly installed sewer systems for construction companies that deal with compliance requirements. This includes a video inspection upon completion, followed by a 12-month maintenance period. Many contractors want to have the lines televised in the 11th month to verify everything is proper, which protects the contractor.

ABC’s services include cleaning, degreasing and root cutting as well as chlorination of water mains before they go into use.

“We have put our cameras down wells to inspect and down chimneys in

Devlin Hawkes sets up for a sewer main inspection in New Westminster, British Columbia.



apartment complexes when required,” Hawkes says. “And we do smoke testing (using Hurco Technologies products), which I really like. You put the smoke into the manhole and then watch to see where the smoke appears. You will see it coming out of the catch basins, and then you know the sewer line and storm sewer are cross-connected. If it comes out of the roof leader, you know the storm sewer is connected to the sanitary sewer, and all the rain flowing down is going into the gutters and then into the sanitary line. When it does that, the city is treating a lot of extra water, which costs them a lot more money.”

**“We want a candidate to learn the back of the truck and then move into the operator’s chair. This way, he (or she) knows what is going on in the back.”**

Rosa Hawkes

#### STAY THE COURSE

Hawkes says the company does very little residential work, and what it does primarily involves grouting the lines.

“There is usually just one line from the building to the street,” she says. “Not much work there.”

On a typical workday, ABC tackles one or two jobs, with each project running from a half day to two or three days and occasionally a week. Work is typically planned, and the company rarely encounters emergency situations.

“We will have a big flush truck on a job along with the television van, and an air-test truck for pressure testing. This is the same for new pipes. Three trucks on the site.

“Our big trucks are used whenever we video a line because we prefer the lines clean and that is what they do; they are like big pressure washers,” she says. “This way the camera can get from Point A to Point B. It’s just common sense. You can’t send the camera over dirt and rock. That debris gets so high you cannot travel through it. If the grease is too thick, you can’t get through it, so it is simpler for the flush truck to clean before the camera goes through.

“As to the roots, you can drive a camera through even when it looks impossible. The roots are sometimes like a curtain. They will move apart, unless it’s like a big ball. To get rid of the roots, our operators use our nozzles, root cutters, blades and chains. It really depends on the situation.”

The video inspection fleet includes three vans fully outfitted with Pearpoint/SPX camera equipment



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Rosa Hawkes operates a CUES Shorty inspection system from the control room in the TV truck. ABC records, analyzes and delivers inspection videos to clients on site immediately following an inspection.

and a fourth CUES-equipped van with a lateral launch system. ABC also has push cameras from UEMSI and Ratch Electronics.

ABC's two Aquatech B10s (Hi-Vac Corporation) each have three tanks. If only flushing is required, then all three tanks are filled with water. If vacuuming is required, then only the two outer tanks are filled with water and the center tank becomes a debris tank. The hose and reel are at the back of these trucks. The company's 2002 Vactor 2100 features a front-mounted reel. Each truck has either 600 or 800 feet of 1-inch hose. These trucks can all be used for flushing, vacuuming or hydroexcavation.

Several additional support trucks are used for grouting, relining and general service.

#### STAFFING UP

Finding good, qualified technicians is a challenge in the industry, and it's no different for ABC.

"We're all looking for competent people," Hawkes says. "In this job, you work in the sewer and you have to go down the manhole and touch the stuff before you can send the camera down there. That just turns many people off. I find a lot of the young people coming through think they are entitled to big bucks and no work. Their expectations are too much doing too little. I remember one candidate who wanted to know about being a video operator. I told him he knows how to turn the

CONTINUED >>

## CHINA IS JUST A CALL AWAY

People say the Yellow Pages are dead, but they did the trick back in 2000 when ABC Pipe Cleaning Services was contacted to take on a job in Shanghai, China.

ABC is a family-owned company serving the Vancouver, British Columbia, area. When a local engineering firm contacted the Intile family, owners of ABC, looking for a company to provide video inspection in Shanghai, they jumped on it.

"We were able to modify our equipment to go portable," says ABC co-owner Rosa Hawkes. "Our guys built a sturdy wooden box and stuffed it full of equipment, including spare parts, repair tools, manhole hooks — everything we could think of that might be needed.

"I remember the guys fighting to see who would get to go to Shanghai. In the end, it was two of my brothers, Joe and Robert, who were both working in the company at the time.

"It took weeks for customs to clear our equipment. The site was at a commercial company. They were experiencing trouble with blockages in their sewer outside the building. There was no flush truck to clean the pipes, so they recruited help and used rags and a rope to clean the 6-inch pipe, which was about 200 feet long. They used push cameras to televise the line."

She says the project should have only taken one day but it stretched out over four days because the pipe wasn't clean enough to see through.

"Pulling rags through the pipe in virtually 100 percent humidity and over 100-degree weather was tough, and Robert suffered heat stroke twice," Hawkes says. "We were successful and found the problem. A fence post had punctured the sewer line."

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Devlin Hawkes changes the wheels on the camera before a pipe inspection.

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equipment on, and that is about all he would know to begin with. I wouldn't dare let this person alone after a week of instruction. I usually require three to six months training before letting the person go alone.

**“My family, my dad and brothers and I like technology, so when we bought the company we liked learning about the equipment, and as stuff came along we were ready to jump on it.”**

Rosa Hawkes

“I like to start everybody off learning the back end of the truck — how to set the equipment up, put the wheels on and take them off, how to lower the camera down the manhole, how to pull it out, and how to take care of the area. Even learning how to properly pull the roots off the wheels. We want a candidate to learn the back of the truck and then move into the operator's chair. This way, he (or she) knows what is going on in the back.”

She says there are many safety issues. “There are some simple things you have to get across to the guys. For instance, I caution, never smoke over a live manhole. If you take the lid off to put the camera in, you do not want to have a cigarette in your

mouth. Some smokers don't quite get this, but there is a 1 percent chance of a problem, so you just don't do it.”

Having the right attitude and being compatible is also a consideration in the final hiring process.

“There is a lot of detail involved,” she says. “When we hire someone, that person is a paid employee during the training process.”

### JUMPING IN WITH BOTH FEET

“My family, my dad and brothers and I like technology, so when we bought the company we liked learning about the equipment, and as stuff came along we were ready to jump on it,” Hawkes says. “But another part of it was the cities were saying to us, ‘We want this, we want that.’ We had to respond.”

Although Joe and Robert Intile are no longer active in the business, Carmelo Intile, 87, still does air testing, chlorination and estimating. George is a jet/vac and grout truck operator.

Now, 24 years after the family took over ABC Pipe Cleaning Services, the next generation — Scott Intile and Devlin Hawkes — has stepped in, and the future looks bright. **C**





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The background of the entire advertisement is a wide-angle, high-angle photograph of the interior of Lucas Oil Stadium. The stadium is mostly empty, with rows of blue seats visible. The field is in the center, and the stadium's architecture, including the large glass windows and brickwork, is visible in the upper portion of the image. A large, stylized graphic of the stadium's facade is overlaid in the center, containing the event title.

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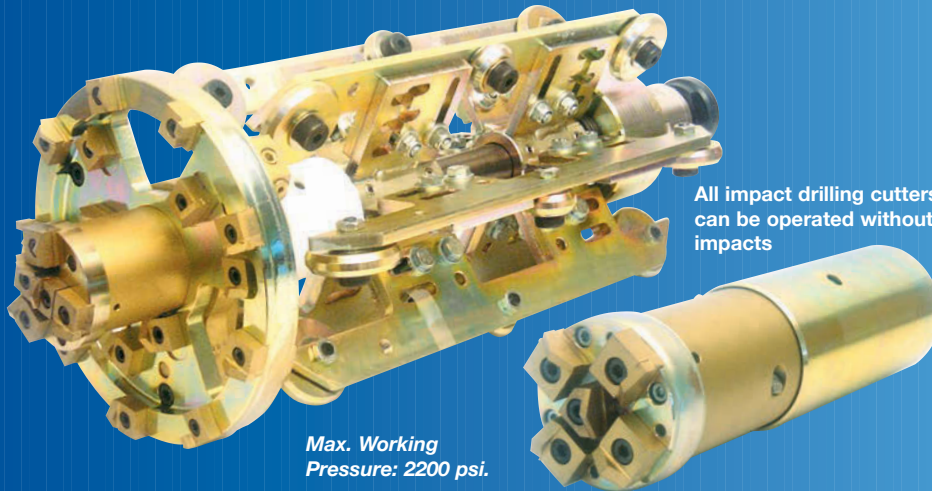
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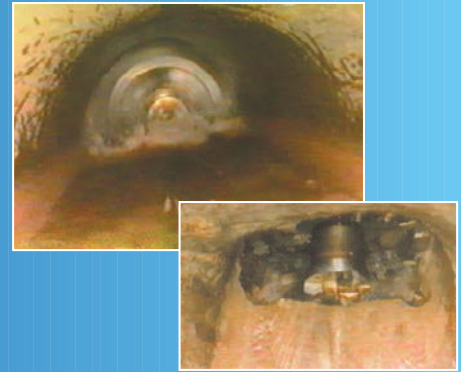
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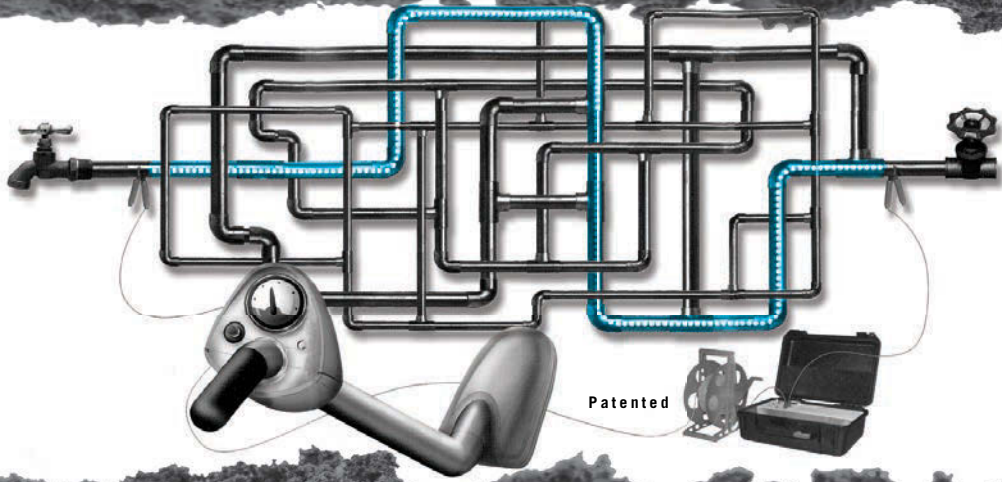


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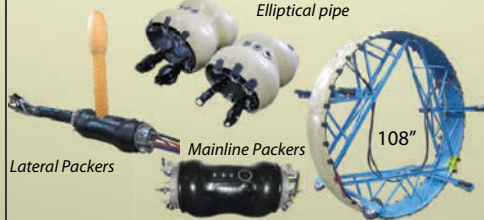
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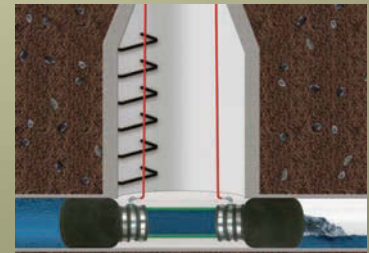
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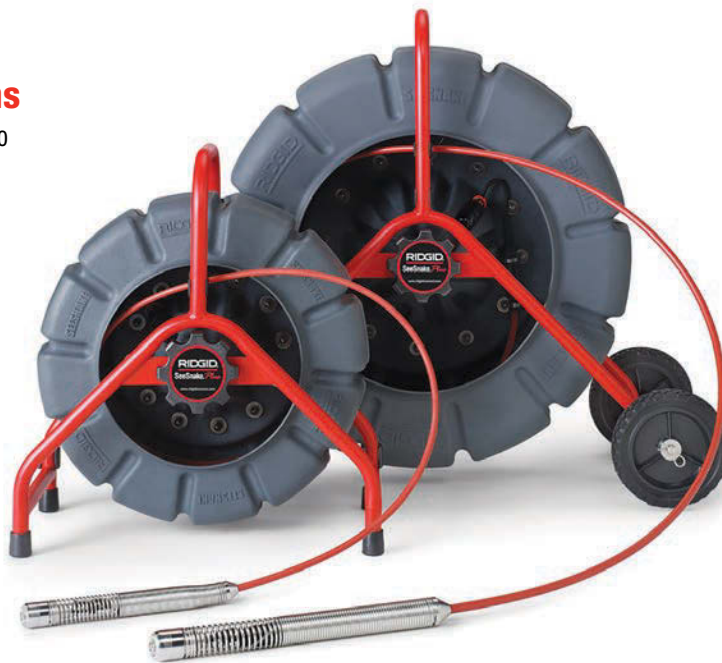
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Erik Gunn is a magazine writer and editor in Racine, Wisconsin.

# Easy as A-B-C?

Take the time to figure out how different health care add-on programs can help you and your employees

By Erik Gunn

**S**o you've made the plunge and decided to offer health benefits to your employees. Or perhaps you've been doing that for a while, but now you're looking at what revisions you might make.

In either situation, you'll have a lot of decisions ahead. One is just which flavor you might pick from the alphabet soup on the health care plan menu: HSAs? HRAs? FSAs?

And if your head's spinning already, read on. What are all these things? And how should you decide whether to include them — and if so, which one?

## DEFINITIONS

Let's take that first question first.

HSAs, HRAs and FSAs are three different ways of answering the same questions when it comes to health benefits.

The questions are: How do you keep benefit costs down? How do you enable employees to get broader coverage? And how do you engage them directly in thinking about how to spend their health care dollar?

Each of these programs is also aimed at helping employees make sure they aren't taxed on the money they spend directly on health care. That's an important benefit. While our annual income tax return allows us to take a tax deduction on our out-of-pocket health care spending, we only get that deduction if we spend at least several hundred dollars.

HSAs, HRAs and FSAs are all ways that enable people to ensure their out-of-pocket medical spending is tax-free from the first penny.

"It helps to hold down the employer's cost (for health benefits) if they can pass some of that cost to the employee," says Julie Stich, director of research for the International Foundation of Employee Benefit Plans, based in Brookfield, Wisconsin. And HSAs, HRAs and FSAs are all ways of making sure employees take part in paying for their health care while at the same time providing a financial cushion.

So what do all those letters stand for?

**Flexible spending accounts (FSAs)** are the oldest of the three. They allow employees to set aside a fixed amount of their pay before taxes into a special account.

To cover a health care expense not already covered by insurance — such as a deductible or a copayment, or expenses for medications and certain other health-related products — the employee taps the FSA. You can see a list of the expenses that qualify for payment through the FSA at the IRS website.

A tricky aspect of FSAs is that if there's money left over in the account at the end of the year, you can't keep it and you can't roll it into the account for next year; it's truly a "use it or lose it" system. To avoid leaving money on the table, employees have to make a careful calculation as to how much money they are likely to spend over the year on those unreimbursed health care costs.

**Health reimbursement arrangements (HRAs)** provide employees with tax-free dollars to cover various medical expenses.

One difference is that HRAs don't use the employee's money — instead, the employer pays money into the HRA on the employee's behalf. The employee can use that money tax-free to cover various expenses that crop up and aren't already covered by the insurance plan.

If money is left in the HRA at the end of the year, it can be rolled over for the next year, Stich says — that's up to the employer. But rolling the money over isn't required; untapped balances can simply revert back to the company.

**Health savings accounts (HSAs)** have much more flexibility than either FSAs or HRAs, but they also come with strings attached of their own.

HSAs are funded mostly by employees through a payroll deduction — although they can get contributions from other sources, including employers.

(Usually. Sometimes people transfer money that has already been taxed into an HSA; in that case, they get the tax benefit in the form of a reduced overall tax bill when they file their tax returns and declare the payment to the HSA.)

A big difference is that, unlike HRAs and FSAs, owners of HSAs get to keep the money from year to year, assuming they have a balance at the end of the year. More on that in a moment.

## WHAT ARE THE DIFFERENCES?

All three kinds of accounts require a health plan in place first, Stich explains. But only HSAs place strict limits on what kind of health plan it must be.



“HSAs need to be put in place in conjunction with a high-deductible health plan,” Stich says. To qualify as an HDHP under the law, the policy must have a deductible of at least \$1,300 for single-individual coverage and \$2,600 for family coverage.

HDHPs are becoming more popular with employers basically because they have much lower insurance premiums. With them HSAs are becoming more popular as well.

An FSA or an HRA is literally under the control of the employer (often delegated to a third-party consultant or institution), while an HSA is under the employee’s control. Employees whose banks or financial institutions offer HSAs can simply take their documents showing that their insurance plan qualifies over to the bank, sign up, and then arrange for automatic deposits to the HSA. The HSA can earn interest like any other investment; accounts can be placed in federally insured bank accounts or in uninsured — but often more profitable — investment accounts.

HSAs also tend to be more popular with employees. According to the Employee Benefit Research Institute, health plans that qualified for HSAs had enrolled about 17 million policyholders and their dependents as of the end of 2014.

Some employers offer employees a choice between an FSA or an HSA, but for many the HSA-eligible insurance plan is the only option anyway.

HSAs have another reason for being popular, though, Stich notes: The account holder can keep the money even after retirement and can keep using it to pay medical expenses that aren’t otherwise covered. Additionally, HSAs that have substantial funds in them can become an additional source of post-retirement income for their account holders — although it’s important to carefully follow the rules about how to convert them to that purpose.

#### GET HELP

For every employer, figuring out which of these options, if any, will be best for your business and your workforce requires the advice of a professional who knows your company inside and out. There are a raft of consultants and other professionals who can advise you on which of these programs will be best suited to your workforce, your business and your business conditions.

But don’t let that intimidate you from delving into the subject. Programs like HSAs, FSAs and HRAs have become a key part of our health insurance calculations, and that’s guaranteed to continue

through the next decade. So take time to immerse yourself in the ABCs of all of these programs so you can become that much better prepared to reward your workers while holding down your health care costs in the years to come. **C**

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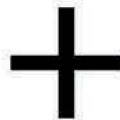
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# Should You Drug Test?

Screening employees for illegal substances has benefits as well as drawbacks

By Judy Kneiszel

**W**hen your name is on the trucks and on the door, you don't want anyone – especially an employee – tarnishing your reputation or damaging your equipment. You do want your employees to be as healthy, happy and productive as possible. These are all reasons a business owner might consider having employees drug tested.

According to a report by the U.S. Department of Health and Human Services, illicit drug users are significantly more likely to skip work, change jobs frequently and take time off for illness or injury than employees who don't use drugs. Screening for substance abusers, especially as part of the hiring process, can boost a company's productivity and retention rates.

Any private employer has the right to drug test employees, and it is required of companies that contract with the federal government. That said, do you require drug testing in your company? Should you? It's not a simple endeavor. There are laws and procedures to follow and, of course, costs involved.

## POTENTIAL BENEFITS

Testing can cost from \$25 to \$75 per employee, so you're probably wondering if it would be worth the expense. Here are some possible benefits:

- Reduced risk of on-the-job injuries
- Fewer employee sick days
- Increased productivity
- Improved quality of service
- Reduced risk of equipment damage
- Reduced chance of theft
- Fewer worker compensation claims
- Reduction in employee turnover
- Being a drug-free company sends a positive message to the public

## POSSIBLE DRAWBACKS

Besides the expense, there could be negatives to implementing a drug-testing program, including:

- Dealing with complicated legal issues. Drug testing regulations vary by state, industry, federal contract status and more. You should consult with an attorney before putting a policy into practice.
- Negative pushback from employees. Employees may resent the lack of trust drug testing implies. Also, if you choose to do random drug testing, individuals who are selected may feel they are being singled out too frequently for drug testing and make a claim of discrimination. Be sure to adopt a truly random selection process.
- Medical marijuana makes things trickier. Forms of medical marijuana are allowed in 23 states and others have pending legislation, but the federal government still classifies marijuana as an illegal Schedule 1



drug. This discrepancy means you must address medical marijuana in your employee drug testing policy. Some employers operating in states that allow medical marijuana usage maintain a zero-tolerance drug-free workplace policy except for those legitimately prescribed marijuana by a doctor for a medical condition. Others choose to allow medical marijuana usage for low-risk jobs but ban it for higher-risk positions, like heavy-equipment operators. As for nonmedical marijuana, while it is legal in two states, it is still considered an illegal substance under federal law.

## PROGRAM IMPLEMENTATION

There are several steps to take if you decide to implement drug testing.

First, decide what type of drug testing you want to do. Options include pre-employment testing, post-accident testing, reasonable cause testing, periodic or scheduled testing, and random testing.

If you are going to make hiring contingent on passing a drug test, it's important to know that you must legally offer the prospective employee a job and have them sign a consent form before you can have them tested. The job offer is then contingent on them passing the drug test. You cannot use drug testing as a way to narrow down a pool of applicants.

If you choose to perform periodic or scheduled testing, it's best to test everyone. Picking and choosing who is tested can look like discrimination and get you in legal trouble.





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Next, you need to find a certified and reputable drug-testing laboratory. Many clinics and hospitals provide this service or can recommend a reliable provider to you. You want to make sure the provider you choose follows consistent procedures for collection and handling to ensure the specimens are not mislabeled, switched or tampered with.

### HAVE A WRITTEN POLICY

After you decide on the type and frequency of testing, you need to decide what drugs you will be testing for. You need to determine the consequences for someone who tests positive or alters a test. Is a positive test grounds for immediate dismissal, or will there be a second-chance program? Will there be an amnesty program for anyone who admits to having a problem before they are chosen for a test?

Before finalizing your company drug policy, make sure you are in compliance with federal and state laws. Then include all the details of your company's drug-testing policy in a written document and distribute it to employees and potential employees. Make it a part of the employee handbook if you have one.

Avoid springing the policy on your employees. Give them at least 30-days notice that a drug-testing program will be implemented so they have time to read the policy and ask questions. All employees should be given an acknowledgement and consent form to sign that proves they received a copy of the policy and have agreed to be tested for the listed drugs at any time during their employment. Be prepared to terminate any employee who refuses to sign the form to underscore that this is a serious policy.

The final step in establishing an employee drug-testing program is to set up a recordkeeping system. Keep results of drug testing confidential by filing this information separately from an employee's other personnel records. c

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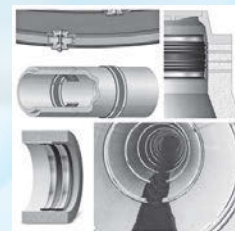
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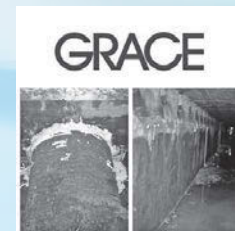
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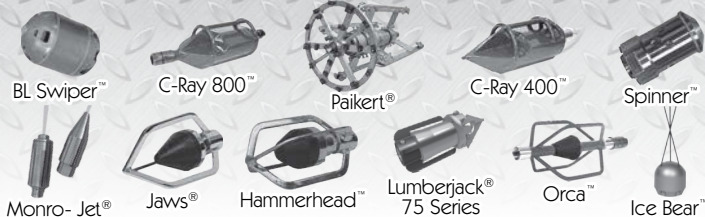


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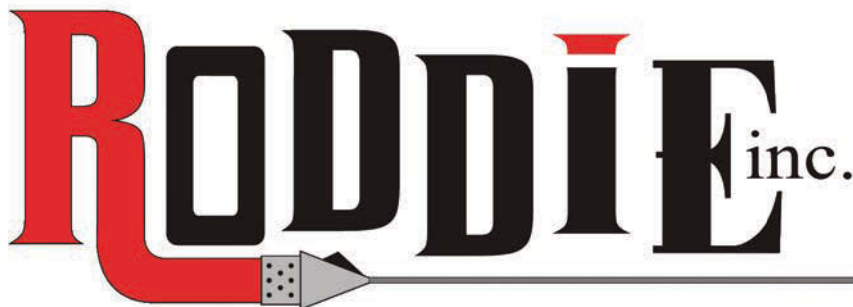
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# A Modular Hydroexcavation Solution

HX-4000 hydroexcavator from LMT can be pre-mounted or attached to chassis of choice

By Ed Wodalski and Craig Mandli

**B**rand-new to the North American market, the HX-4000 hydroexcavator from LMT Inc., in partnership with Smart-Dig of New Zealand, is designed on a rigid sub-frame that can be mounted to a variety of truck chassis. The unit garnered plenty of attention at the 2015 Water & Wastewater Equipment, Treatment & Transport (WWETT) Show.

“The customer gets to choose the chassis they want. We don’t lock them into a particular make or model,” says Mike Fenneman, owner of LMT Inc. “If they have a brand preference or local truck dealer, they can select something — new or used — that they are comfortable with. It is compatible with any 33,000 GVW chassis. A lot of people were pretty excited to see a unit that provides full hydroexcavation functionality on a smaller scale.”

The complete unit on display at WWETT was available on a Freightliner M2 106 day cab with 300 hp Cummins engine and Allison 3000 RDS automatic transmission. It has an auxiliary 83 hp Kubota diesel engine; 1,500 cfm Tuthill 6015 blower with exhaust silencer; 3,000 psi, 7 gpm Udor waterblaster with retractable reel; 50 feet of 3/8-inch hose; and a 6-cubic-yard debris tank with side-mounted level indicator.

Other features include four side-mounted, rotary-molded water tanks totaling 396 gallons. The water filter includes an inline 80-gauge stainless steel strainer with 1-by-50-micron 10-inch pleated cartridge filter. The 2,200 cfm full-flow filtration system is housed in a 0.98-cubic-yard pressure-drop unit and has four washable, PTFE-coated, pleated vacuum discharge filters. Assembled in the U.S. by LMT using New Zealand components, the HX-4000 is one of three models (HX-3000 and HX-5000) offered by Smart-Dig, but the only one currently available in North America.

“These have been extremely popular in New Zealand, and the end users that have had the chance to look at it believe it will be a great fit for the U.S. market,” Fenneman says. “It will be the fourth quarter of 2015 or early 2016 that we’ll have the other models available here.”

The wireless, remote-control telescoping boom rotates 270 degrees horizontally and 25 degrees vertically. It extends to a working range of 31 feet with two floodlights on the end of the boom. The hydraulic rear door with sight glass lifts 90 degrees, while auto-hydraulic-locking adjustable plates ensure an optimal seal. The 5-inch rubber main dig hose has an over-center clamp-lock fitting. A 30-foot-4-inch suction hose provides extended digging access. Safety features include an automatic vacuum release and an internal stainless steel float ball with a seal that shuts off the vacuum when the tank is full, preventing



LMT Inc. owner Mike Fenneman (left) discusses the features of the HX-4000 hydroexcavator with a WWETT Show attendee. The modular unit can be mounted on a variety of chassis. (Photo by Craig Mandli)

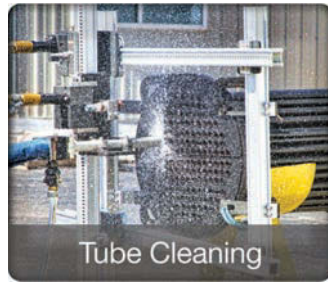
debris or liquid from entering the filtration system. Roller doors on both sides of the unit provide access to the engine, blower, filter unit, silencer and storage area. Accessories include a digging wand and head. Options include a 400,000 Btu AquaBlast, a fuel-oil-fired water heater for cold-weather operation or breaking up hard soil.

Fenneman says he decided to feature the HX-4000 in Indianapolis to help determine where the U.S. market would develop. “Hydroexcavation is obviously a growing market, especially with younger businesses,” he says. “I see this unit as a fit for public utilities and municipalities, and private contractors that perform potholing. In New Zealand, they are being used a lot for running underground fiber-optic cable.”

Fenneman says that the market reaction to the HX-4000 will help the company determine the target market for its modular hydroexcavator line in the coming years.

“They are using the HX-5000 in New Zealand, and that is more of a larger, traditional-sized hydroexcavator that’s still a modular unit,” he says. “We’re excited for the HX-4000, and you’ll be seeing the larger model next year.”  
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- ▶ Economical Method For Compliance
- ▶ Direct Connection To Catalyst Pump
- ▶ Password Protected Control Panel
- ▶ Computer Controlled Processing
- ▶ Digital Recording Of All Processes
- ▶ Continuous Batching Capability

The Automated Catalyst Blending Unit (ACBU-2015) is designed to use Perkadox 26, a flake form of Perkadox 16 used within the cured-in-place pipe lining industry. The blending process raises a resin sample to the melting point of the Perkadox 26 flake allowing the flake to dissolve into solution. The unit then cools the catalyst solution for use in static mixers during the liner wetout process. Perkadox 26 is a Class 3 material, Perkadox 16 is currently listed as a Class 3 material but will become a Class 1 material on January 1, 2016 thus requiring new safety handling & costly storage procedures.

**CIPP**  
Services, LLC.

[WWW.CIPP-SERVICES.COM](http://WWW.CIPP-SERVICES.COM)

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# CIPP Lining Methods and Projects

By Craig Mandli

Cured-in-place pipe (CIPP) lining can be a cost-effective and time-saving solution for renewing aging and deteriorated pipes without major service disruptions. Here are several systems that employ the technology, along with excavation and hydroexcavation equipment to expose entry points. Cutting tools for lateral reinstatements are also included, as is safety equipment.

## EXCAVATION EQUIPMENT

### FORBEST PRODUCTS FB-R2012

The **FB-R2012** 512 Hz wireless digital locator from **Forbest Products** detects buried water pipe, sewer lines and other pipeline. It comes with the FB-T2011 512 Hz sonde transmitter and can be used with a camera head with a built-in 512 Hz sonde transmitter. It comes with two operation modes – NORM and NOISE CONTROL – for different application environments. NOISE CONTROL is chosen where there is interference. A shift button enables sensitivity grade conversion between near and far for locating and pinpointing the location and depth of the transmitter. On-screen status indicates the signal strength of 15 levels and battery volume. The hand-held locator powered with six AA batteries is lightweight with retractable poles and easy to carry. **650/757-4786; www.forbestusa.net.**



Forbest Products

### JOHN DEERE 35G

The **35G** compact excavator from **John Deere** offers a 23 hp Final Tier 4 diesel engine, with auto-idle that slows engine speed when the pilot-control levers are momentarily released for reduced fuel consumption and noise. A new door improves entry and visibility to the left-hand side of the machine. The door design also widens the size of the opening for entering the cab. Within the operator station, a multifunction monitor provides a coolant temperature and fuel gauge, clock, two trip meters, regeneration inhibit, auto shutdown control and machine hours. A third service door provides improved access to the cooling core for cleaning purposes. The cores are also positioned side by side to permit easier access. It can be equipped with an optional, hydraulic, adjustable-angle backfill blade with 25 degrees of adjustment to both the left and right. A



John Deere

standard coupler accommodates a wide variety of available attachments such as hydraulic breakers and augers. Rubber tracks, steel tracks and steel tracks with rubber pads are available. **800/503-3373; www.johndeere.com.**

### VOLVO CONSTRUCTION EQUIPMENT EC140E

The **EC140E** excavator from **Volvo Construction Equipment** has a Tier 4 Final Volvo D4 engine, with a 5 percent increase in engine power and 10 percent improvement in fuel efficiency versus previous models. The hydraulics system, electronic control system and advanced ECO mode have been optimized to match engine power and reduce power losses. The redesigned main control valve and new software builds on the hydraulic control system, improving fuel efficiency and controllability. A boom float function allows pump power for boom lowering to be transferred to other functions, while the auto engine shutdown feature further helps to reduce fuel consumption by automatically switching off the engine after a preset amount of time. **828/650-2000; www.volvo.com/constructionequipment.**



Volvo

## HYDROEXCAVATION

### DITCH WITCH FXT60

The **FXT60** truck vacuum excavator from **Ditch Witch** is available on a Class 6 or 7 single-axle or Class 8 tandem-axle truck. The vacuum excavator is mounted directly to the frame rails, enabling system components to flex independently of the truck. Equipped with a 74 hp Deutz diesel engine, the unit offers 1,027 cfm and a high-pressure water system with a 5.5 gpm, 3,000 psi water pump. Options include a hydraulic boom that extends to 14 feet and choice of tank configurations: 500-gallon spoils with 200-gallon water, or 800-gallon spoils and two 200-gallon saddle-style water tanks. **800/654-6481; www.ditchwitch.com.**



Ditch Witch

### FOREMOST 1600 HYDROVAC

The **Foremost 1600 Hydrovac** has a heated 42-inch van body and is recommended for both urban and industrial applications. It allows for water capacities of 1,600 gallons and has a 13-yard debris body. Vacuum power is supplied by a Robuschi RB-DV125 blower. The Cat 3560 wash pump and 740,000 Btu boiler are also used on this model. The boom is rear-mounted, 8 inches in diameter, fully rotational and controlled by an Omnex wireless controller, which also controls the vehicle rpm and wash and vacuum functions. All off-loading functions can be performed via the remote and are performed via a sloped debris floor design and wash-out system. The dump door is 48 by 58 inches, providing a large area to allow for tank cleaning. An optional 4-inch Hydratech off-loading pump system is available, which allows for pumping off in a contained manner when discharging liquid loads. A complete winterization package is standard. **403/295-5800; www.foremost.ca.**



Foremost



## GAPVAX HV-55

The HV-55 hydroexcavator from GapVax has a 12.5-cubic-yard debris body and water tanks from 400 to 1,400 gallons. It comes with a positive displacement blower rated at 5,250 cfm and 28 inches Hg. The filtration design includes five cyclones that prolong the life of the filter bags and eliminate the threat of material entering the vacuum pump. The full-opening tailgate is field-adjustable and has four fail-safe, individually adjustable locks that ensure a complete seal. Options include interior polymer coating, cold-weather package, sludge pump, wireless remotes, washdown system and stainless steel body. 888/442-7829; [www.gapvax.com](http://www.gapvax.com).



GapVax

## HBD/THERMOID TRANSPORTER OIL FIELD VACUUM HOSE

Thermoid Transporter Oil Field Vacuum Hose from HBD/Thermoid is a lightweight, flexible rubber suction and discharge hose that can handle abrasive slurries and is oil-resistant. It has multiple uses, including the transfer of crude oil, brine water, drilling mud and diluted solutions of hydrochloric acids/diesel fuels. It is made of a fuel- and oil-resistant NBR/SBR-blended compound that meets all RMA IP-2, Class B oil-resistance requirements. Its multiple synthetic textile cords and a dual wire helix enable it to maintain a constant working pressure of 150 psi. It is rated at full vacuum and works in minus 30 to 180 degree F temperatures. It comes in various ID sizes and standard packaging of 100-foot lengths. 800/543-8070; [www.hbdthermoid.com](http://www.hbdthermoid.com).



HBD/Thermoid

## HURCO TECHNOLOGIES VAC 250 AND 500

VAC 250 and 500 units from Hurco Technologies are a portable solution for potholing and exposing buried utilities. They use a Gardner Denver 14 Hg PD vacuum pump and a Giant 4,000 psi, 4.2 gpm high-pressure water pump. The pitched-angle tank eliminates mechanically complicated lift and dump systems for faster and more efficient debris unloading. The 97-gallon water tank sits under the debris tank, balancing the load over the center of the axle, resulting in little change on tongue weight and ensuring a safe towing configuration. All units can be configured to meet specific needs, including auxiliary hydraulics and water heaters. All are powder-coat painted. 800/888-1436; [www.hurcotech.com](http://www.hurcotech.com).



Hurco Technologies

## HYDRA-FLEX RIPS AW ROTATING HYDRO-EXCAVATION NOZZLE

The Ripsaw Rotating Hydro-Excavation Nozzle from Hydra-Flex blasts a zero-degree straight water stream at up to 3,200 psi while rotating at a high speed to provide an 18-degree cone of coverage. Its optimized stream quality results in greater impingement, allowing the operator to use a smaller nozzle size while getting the same impact as nozzles with higher gpm flow rates. These heavy-duty, high-impact nozzles are constructed with stainless steel housings and tungsten carbide wear surfaces to withstand harsh environments and provide long life. Non-conductive urethane coating on the nozzle body protects the user and



Hydra-Flex

sensitive underground assets. Repair kits are available for extended life and low overall operating costs. 952/808-3640; [www.hydraflexinc.com](http://www.hydraflexinc.com).

## INTEGRATED CHASSIS SOLUTIONS SKY-VAC SV-120-2

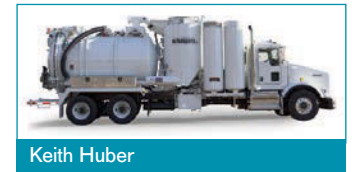
The SKY-VAC SV-120-2 hydrovac from Integrated Chassis Solutions has a hydrovac excavation package including a blower, filter housing, silencers, cyclone, boiler and pump, along with the water tank and boom all on one chassis. A vacuum box acts as the debris tank that can be emptied and replaced, all while the unit stays positioned and remains working. The boom can reach 126 feet vertically, 84 feet downward and 118 feet horizontally, with 370 degrees of rotation. It can excavate over an acre without having to reposition. The extended-reach vacuum extraction system addresses the issues of accessibility in the excavation and extraction industries. 970/475-6256; [www.ics-vac.com](http://www.ics-vac.com).



Integrated Chassis Solutions

## KEITH HUBER KNIGHT PD

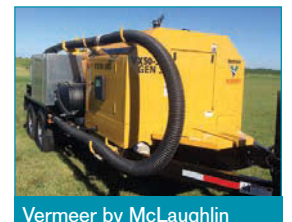
The Knight PD air-mover from Keith Huber is capable of 6,100 cfm and incorporates deep vacuum with the ability to pressure off-load. The Huber Master Control allows the operator to switch easily from wet to dry product with no downtime. Its wet/dry diverter valve filtration, deep vacuum loading and high air conveyance are designed to help move sludges and dry product. 800/334-8237; [www.keithhuber.com](http://www.keithhuber.com).



Keith Huber

## VERMEER BY MCLAUGHLIN VX50-500

The Vermeer VX50-500 vacuum excavator for utility potholing from McLaughlin has a no-hassle hose configuration and a Kubota Tier 4 Final engine with a common fuel rail system. The no-hassle hose allows contractors to hang the suction hose on the side of the machine when moving between job sites, instead of coiling or disconnecting it, increasing productivity and reducing operator fatigue. It has aluminum blower and water belt tensioners that keep consistent pressure on the belt, extending its life and making it easier to service. It comes with a cam-over rear door, three-stage cyclonic filtration system and in-tank washdown system. 800/435-9341; [www.mclaughlinunderground.com](http://www.mclaughlinunderground.com).



Vermeer by McLaughlin

## NOZZTEQ MONRO-JET

MONRO-JET nozzles, distributed by NozzTeq, enable the user to combine the power of a solid stream pencil jet with the large coverage of a fan jet. Its circular waterjet motion generates tremendous power at modest gpm rates, allowing the user to move faster whether hydroexcavating, surface cleaning or cleaning sewer lines. They can be used to surface clean concrete, steel, castings and large surface areas, including line removal from runways. They can be modified for internal pipe cleaning of sewers and pipes of all types. Their orbital design operates at pressures as high as 36,250 psi. 866/620-5915; [www.nozzteq.com](http://www.nozzteq.com).



NozzTeq

## PETROFIELD INDUSTRIES TORNADO HYDROVACS F4 SLOPE

The **Tornado Hydrovacs F4 Slope** hydroexcavator from **Petrofield Industries** holds 13 cubic yards of mud and more than 2,100 gallons of freshwater. It includes a water boiler and a 3,600 to 6,300 cfm positive displacement vacuum blower to pull spoils to the tank via a boom. The boom has a 342-degree rotation and a 26-foot reach. All critical components are housed in an insulated and heated aluminum van body. Its mud sweep empties the tank without hoisting, which eliminates the dangers of dumping on uneven ground and around overhead power lines. **877/340-8141; www.tornadotrucks.com.**



Petrofield Industries

## RAMVAC BY SEWER EQUIPMENT HX-3

The **HX-3** truck-mounted hydroexcavator from **Ramvac by Sewer Equipment** has a 3-cubic-yard debris body, a 0 to 10 gpm at 2,500 psi water system all in a temperature-controlled enclosure, a compact footprint, NEMA-rated electrical system, debris blow-off system and a fully hydraulic power train. A parts and service network is available 24/7. **877/735-4640; www.ram-vac.com.**



Ramvac by Sewer Equipment

## RING-O-MATIC 550 HICFM VACEX HYDROEXCAVATOR

The **Ring-O-Matic 550 HiCFM VacEx Hydroexcavator** comes standard with a 50 hp CAT diesel engine and a 1,000-cubic-foot-per-minute Gardner Denver positive displacement blower. The Cyclo-Jet two-in-one pothole excavator attachment can safely dig a 3-foot hole in 30 seconds, making it useful for contractors looking to locate underground utilities quickly and safely. Equipment is available mounted on vacuum trailers, vacuum trucks and skids. **800/544-2518; www.ring-o-matic.com.**



Ring-O-Matic

## STONEAGE HYDRO-X LANCE ASSEMBLY

The **Hydro-X Lance Assembly** from **StoneAge** is a hydroexcavation jetting tool that can be used to locate utilities and precisely excavate an area with high-pressure water. Jetted with a single replaceable OC1H 1/4 NPT carbide nozzle, this 60-inch lance with a 1/2 NPT male connection gives extra reach for digging deep, focused holes. The assembly includes a guard and collar system to protect the nozzle. **866/795-1586; www.stoneagetools.com.**



StoneAge

## SUPER PRODUCTS MUD DOG 1200

The **Mud Dog 1200** 12-yard hydroexcavator from **Super Products** has a rear-mounted boom capable of a 19- to 27-foot reach, 335-degree rotation and a 45-degree upward and 25-degree downward pivot allowing operators to access a larger work area and dig deeper without halting operations to reposition the truck. It has easy-to-use ejector plate unloading technology, and its tilt unloading ensures liquids in the debris tank



Super Products

are cleared quickly and efficiently even when unloading in an upslope/nose-down position. The optional Acculevel load sensor system enables precise debris level measurement. **800/837-9711; www.superproductsllc.com.**

## USB - SEWER EQUIPMENT CORPORATION HYDRO-EXCAVATION NOZZLE

The oscillating **Hydro-Excavation Nozzle** from **USB - Sewer Equipment Corporation** uses pressurized water to excavate soil. The oscillation is the result of high-performance ceramic balls, and the internal parts are protected by a high-density plastic cover. **866/408-2814; www.usbsec.com.**



USB

## VAC-CON X-CAVATOR

The easy-to-operate **X-Cavator** from **Vac-Con** comes with a hydrostatic drive that uses the chassis engine to eliminate the need for PTO, clutch and gearbox operation. It offers water systems up to 4,000 psi and a mobile wireless remote control enabling the operator to work the chassis engine rpm, boom, automatic vacuum breaker, dump controls and hydraulic door locks from up to a half-mile away. The boom rotates up to 270 degrees. **855/336-2962; www.vac-con.com.**



Vac-Con

## VACALL ALLJETVAC

**AllJetVac** combination sewer cleaners from **Vacall** are powered by a single chassis engine, cutting fuel consumption and harmful emissions, and reducing routine maintenance downtime. A strong positive displacement blower system enables jetting and vacuum power. The oval-shaped debris body has cylindrical sides for extra strength and efficient material dumping. Water tanks, fabricated from high-quality aluminum, are mounted high on the chassis away from road debris. Optional galvanized debris bodies and water tanks are available. An intelligent SmartFlow CAN-bus control system has a programmable LCD display that monitors engine, water flow and vacuum performance while allowing for precise boom and reel movements. **800/382-8302; www.vacallindustries.com.**



Vacall

## VACTOR MANUFACTURING HXX HYDROEXCAVATOR

The **HXX HydroExcavator** from **Vactor Manufacturing** comes with a Robuschi blower option that's rated for 6,176 cfm and 28 inches Hg. It has a 3,000 psi variable water multi-flow pump with DigRight technology that allows the operator to select a maximum water pressure limit to prevent the pressure from exceeding site or industry requirements. The technology includes a user-selectable maximum water pressure setting that controls the water pump's maximum water pressure output, preventing wear and tear on check valves, unloader valves and relief valves by avoiding bypassing water. The system has three default selectable pressure limitations based on industry best practices for digging around underground utilities – 1,500, 2,500 and 3,000 psi – with the option to deactivate the feature. **800/627-3171; www.vactor.com.**



Vactor Manufacturing

## REINSTATEMENT CUTTERS

### CUES TV/CUTTER INSPECTION TRUCK

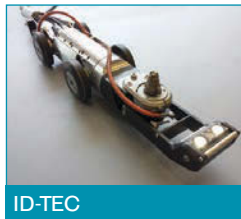
Made to withstand severe conditions and ergonomically designed for comfort and efficiency, **CUES** truck-mounted systems can include TV inspection equipment for sewer/storm/potable waterlines, mainline joint or lateral sealing, and lateral reinstatement cutters for the relining industry. Custom TV/cutter inspection trucks are available with Schwalm self-propelled cutters for 6- to 12-inch lines or 8- to 24-inch lines, or CUES Kangaroo Cutters, which include full capabilities for reinstating lateral services, removal of protruding taps, brush-finishing existing cuts, and pre- and post-TV inspection. **800/327-7791; www.cuesinc.com.**



CUES

### ID-TEC SEWER REHABILITATION-SERIES

The 8 hp **HA165** lateral reinstatement equipment from **ID-TEC** is locked to the base robot by its twist-and-lock mechanism, and can be used in 7- to 12-inch relined pipelines. The cutting equipment has a 3.5-inch vertical stroke with 240N lifting force. Two high-power LEDs and a color camera, all front placed and protected by sapphire lenses, rotate infinitely and provide vision at the cutting operations and while driving. The water-driven piston motor is powerful and efficient. For heavy and hard to reach operations, HA195 grinding, milling and cutting equipment can be used with its 7-inch stroke and front-placed cutting motor. **503/504-8474; www.sr-series.com.**



ID-TEC

### MYTANA MFG. COMPANY HSC1

The **HSC1** high-speed cutter from **MyTana Mfg. Company** offers high-speed, low-torque power for reinstatement, descaling, cutting, over-shoot cleanup, collapsed liner removal and root cutting. Various tools are provided, and safety features include an air-actuated foot switch with guard, GFI protection and a design that has a telescoping handle and is easy to maneuver. The machine is lightweight and operates at 1,750 rpm. It is suitable for 2- to 6-inch pipes and offers a 70-foot range with a lightweight flex shaft. **800/328-8170; www.mytana.com.**



MyTana Mfg.

### TRY TEK TRYDENT 80

The **Trydent 80** small-pipe cutting system from **TRY TEK Machine Works** allows reinstatement of interior or exterior relined pipes from 3 to 6 inches in diameter. Operators can access pipe systems through clean-out ports or rooftop vent pipes. Buildings where tenants or operations cannot be disturbed are ideal prospects. It can be used to reinstate an entire vertical waste pipe from a single access point. Its small, powerful cutting head can maneuver around 90- and 45-degree elbows and navigate multiple bends and turns. Its reach extends up to 100 feet and its narrow 23-inch width enables easy access through doorways. It can be used to reinstate lateral waste pipes connected to the sewer main at ground or basement level. **717/428-1477; www.trytek.com.**



TRY TEK

## RELINING AND REHABILITATION SYSTEMS

### APPLIED FELTS AQUACURE

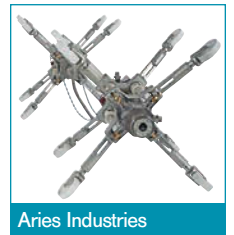
**AquaCure** RP CIPP liner from **Applied Felts** combines fiberglass reinforcement with a felt liner design and construction specially designed for pressure sewer pipes and other non-potable water applications. AquaCure PW is suited for potable water applications and designed to incorporate quality liners with an NSF-certified system. The liners' 28-stage testing system is done in one location. **276/656-1904; www.appliedfelts.com.**



Applied Felts

### ARIES INDUSTRIES ANACONDA UV CURING SYSTEM

The **Anaconda UV Curing System** from **Aries Industries** provides consistent lining installation with CCTV video inspection before and during curing. This rehabilitation method uses a light train that emits ultraviolet light as it is pulled through the flexible, resin-impregnated liner. The light cures and hardens the liner, forming a tight-fitting, joint-free pipe. A computer controls the speed, temperature and pressure in the inflated liner, all of which are carefully monitored during curing. A camera inspects the pipeline before and during curing, allowing any sags and wrinkles in the liner to be corrected. With no need to invert the liner, UV curing requires less equipment and smaller crews. A portable unit is available for lining pipe diameters of 6 to 12 inches, and a vehicle-mounted system provides a professional platform for lining pipe 6 to 48 inches. **800/234-7205; www.ariesindustries.com.**



Aries Industries

### AVANTI INTERNATIONAL AV-100 ACRYLAMIDE

**AV-100 Acrylamide** from **Avanti International** is an ultra-low-viscosity, chemically reactive gel that has a similar viscosity to water. It can permeate anywhere water can travel and has adjustable cure times from five seconds to more than 10 hours. It is used to rehabilitate and sustain sanitary collections systems by eliminating infiltration in manholes, sewer mainlines, joints, laterals, and before and after various forms of CIPP lining. By eliminating infiltration before lining pipes, maximum performance and an infiltration-free environment is achieved. It creates an effective, long-lasting water barrier while providing soil stabilization. **800/877-2570; www.avantigrout.com.**



Avanti International

### CITADEL TECHNOLOGIES SLS-30

**SLS-30** coating from **Citadel Technologies** can be tailored to customers' specific needs. For industrial and aqueous service where strength and corrosion resistance are critical, it provides a structural, cured-in-place lining and a chemical protective barrier in one quick application. It can be applied to both old and new bricks, concrete, and steel at a thickness of 40 mils to over 275 mils. It is a two-component, 100 percent solids, and no VOC epoxy system. It can be used for waste collections systems, sewers, lift stations, waste



Citadel Technologies

treatment facilities, new construction, cooling waterlines, slurry tanks, vaults, rehabilitation and manholes. 918/584-2220; [www.cittech.com](http://www.cittech.com).

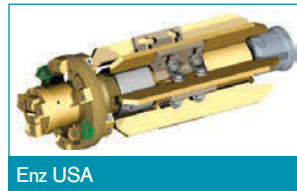
### EASY-LINER EASY GLASS TUBE

The **Easy Glass Tube** woven fiberglass tube from **Easy-Liner** is used for trenchless spot repairs of old and/or defective pipes. The material is used as an alternative to flat sheets of fiberglass used for sectional point repairs. It may also be used for no-dig lining of 2-inch-diameter pipes using a long-length packer. It is available in 160-foot rolls. 888/639-7717; [www.easy-liner.com](http://www.easy-liner.com).



### ENZ USA GOLDEN JET IMPACT DRILLING CUTTERS

**Golden Jet Impact Drilling Cutters** from **Enz USA** can be used to remove stubborn deposits like concrete, injection cement, as well as calcareous and mineral deposits. It can cut out dropped liners and prep for a reline job. It can be used for pipe diameters from 4 to 24 inches. It comes with tungsten carbide and/or diamond-tipped teeth, and works with a percussion system of 600 to 3,000 impulses per minute, and up to 12 tons of impact force. It can be operated without impacts by means of a simple mechanical changeover. 877/369-8721; [www.enzusainc.com](http://www.enzusainc.com).



### FLOW-LINER SYSTEMS REMOTE AIR MONITORING SYSTEM (RAMS)

The **Remote Air Monitoring System (RAMS)** from **Flow-Liner Systems** alerts the installer when the air pressure changes in the liner during the curing process. Installers will no longer have to worry if the liner is holding pressure overnight or while away from the project site. It is easy to operate with real-time ability to view the gauges remotely via a smartphone wherever service is available. The system is self-contained in a lightweight, water-resistant case, and has a backup power supply, audible alarms on site, and remote alerts sent via the smartphone app. It requires the use of a smartphone and Wi-Fi hot spot. 800/348-0020; [www.flow-liner.com](http://www.flow-liner.com).



### LOGIBALL BLADDERS

Bladders from **Logiball** are available for 3- up to 36-inch pipe in lengths up to 25 feet. All bladder sleeves are factory replaceable. Bladders have flow-through capabilities on 6 inches and up, with a quick turnaround time. Bendy models are available for 4- and 6-inch lines. A pushrod option (slide-in and out) is available with 3-, 4- and 6-inch sleeve installers. 800/246-5988; [www.logiball.com](http://www.logiball.com).



### LMK TECHNOLOGIES T-LINER

The **T-Liner** one-piece homogenous main and lateral CIPP connection liner from **LMK Technologies** is ASTM F2561 compliant. It has a uniform wall thickness and incorporates compressible lining material at the upstream and downstream ends, creating a smooth, tapered transition to the host pipe. Both the mainline and lateral sections are formed as a structural cylinder that

renews 18 inches and 360 degrees of the mainline and extends up the lateral pipe as one continuous lining. When combined with Insignia compression gasket-sealing technology, it provides a verifiable non-leaking system. These compression gaskets are embedded between the host pipe and the liner, and are compatible with all pipe types, including polyethylene. A permanent lateral identification indicia is placed on the mainline lining, which includes the building address and other information regarding the raw materials and other pertinent manufacturing details. 815/433-1275; [www.lmktechnologies.com](http://www.lmktechnologies.com).



### MAXLINER USA SUPERFLEX

**SuperFlex** single-layer CIPP liner from **MaxLiner USA** is PU laminate coated, stitched and bonded to polyester felt. Extremely flexible in bends, the versatile liner is offered in diameters of 2 to 8 inches, with a thickness of 4.5 mm. Using inversion installation, it is used with MaxPox resin and hardener from the MaxLiner system, and will go around bends with minimal wrinkling. 877/426-5948; [www.maxlinerusa.com](http://www.maxlinerusa.com).



### PARSON ENVIRONMENTAL PRODUCTS PRO50 STARTER

The **Pro50 Starter** manhole rehabilitation system from **Parson Environmental Products** has been upgraded to include a 2 hp motor and faster paddle speed. The lightweight and portable unit has a larger drum diameter and a greater batch output than the previous model. Other notable changes include improved handles and wheels for easier movement. 800/356-9023; [www.parsonenvironmental.com](http://www.parsonenvironmental.com).



### PERMA-LINER INDUSTRIES VAC-A-TEE

The **Vac-A-Tee** from **Perma-Liner Industries** allows access to the lateral pipe for cleaning, inspection and lateral lining through a clean-out. It can also be used to establish a new service connection at the mainline pipe. It is compatible with all pipe types such as clay, cast iron, concrete, PVC and HDPE, and is available in diameters from 4 to 24 inches. The unit is homeowner-friendly, with minimal disruption and restoration; utility-friendly, eliminating the hazard of digging up water and gas lines; environmentally friendly, saving trees and landscaping; and installer-friendly, requiring no large equipment or shoring. 866/336-2568; [www.perma-liner.com](http://www.perma-liner.com).



### PICOTE SOLUTIONS TWISTER

The **Twister** family from **Picote Solutions** allows businesses to quickly, affordably and safely reinstate lined connections in 2- to 8-inch PVC, cast iron and clay pipes. It opens T and Y branches with ease, and navigates multiple bends and diameter changes accurately, without damage to the original pipe. The concept has been developed for larger 8-inch pipes, and Mini Twisters offer installers the same benefits in small 2- and 3-inch pipes. The Twister Express, for 4- and 6-inch



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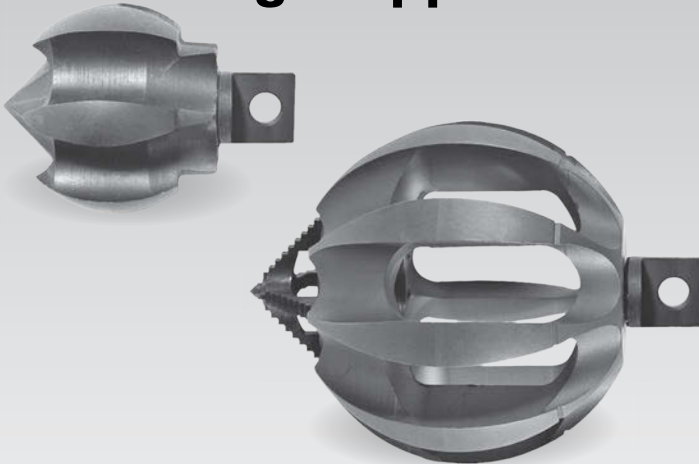
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## NEW Gen-Eye Hot Spot™ Pipe Locator



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- Total field antenna array – Allows you locate from any direction.
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**General J-2900**  
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**Mini-Rooter XP™**  
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pipe, focuses on safety as well as speed. The Twister Liner Remover for 4- and 6-inch pipe has dual front bushes, a heavy-duty 3 mm front metal panel, and a flat front drill head that provides efficiency for removing collapsed liner. All products are powered by multiuse Millers (Mini, Midi or Maxi). **219/440-1404; www.picotesolutions.com.**

### PIPE LINING SUPPLY AUTOMATED SYSTEM

**Pipe Lining Supply** is making lateral lining automated by combining the Quik Shot lateral lining inversion unit with a calibration roller and vacuum system. This allows CIPP lining material to be saturated with resin in a single pass through the calibration and directly into the ground through the Quik Shot. Combining the components moves the material through the process like a production line in a factory and saves labor and time. A side benefit gives the contractor the ability to do longer installations due to the reduced time it takes, allowing them to work with larger batches of mixed resin that have a limited work time before they expire. **888/354-6464; www.pipeliningssupply.com.**



Pipe Lining Supply

### PIPELINE RENEWAL TECHNOLOGIES VERICURE

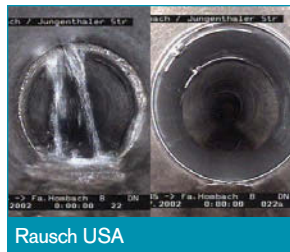
The **VeriCure** system from **Pipeline Renewal Technologies** monitors cure temperature continuously along the full length of a CIPP liner during installation. This information helps ensure storm and sewer lines are rehabilitated to specification and perform as intended. Designed to distinguish even small thermal variances, the system measures average temperature in successive 1.5-foot zones. It indicates exactly when the liner cure goes exothermic and when cure and cooldown are complete. This means no wasting fuel and crew time overcooking the liner, and no risk of failure due to undercooked midpoints. **866/936-8476; www.pipelinet.com.**



Pipeline Renewal Tech.

### RAUSCH USA QUICKLOCK POINT REPAIR

**QuickLock Point Repair** from **Rausch USA** is a permanent no-dig trenchless pipeline rehabilitation installation with a 316L stainless steel sleeve encased in an EPDM rubber gasket mechanically compressed against the inner pipe wall and permanently locked in place by two locking gear mechanisms. No chemicals or resins are used, so there is no cure time. It meets ASTM Standard F3110-14 and is NSF61 certified for use in potable water. Applications include repairing leaking or offset joints, fixing cracks and holes, preventing root intrusion, and closing unused laterals in pipes from 6 to 32 inches. It augments the structural strength of the pipe, withstanding and passing internal pressure tests. Since there are no chemicals involved, it can be installed with flow. **717/709-1005; www.repipetech.com.**



Rausch USA

### RAVEN LINING SYSTEMS RAVEN 405

**Raven 405** from **Raven Lining Systems** is an epoxy coating that can be used for corrosion, I&I protection, erosion and rehabilitation in the wastewater industry. It is eco-friendly, 100 percent solids, and zero VOCs. It provides adhesion and corrosion protection, with a network of certified applicators available to apply it. **800/324-2810; www.ravenlining.com.**



Raven Lining Systems

### RFI CONSTRUCTION PRODUCTS MODEL 360

The **Model 360** hand-held, high-speed, air-powered spinning nozzle from **RFI Construction Products** is used to apply fine-grain mortars, grouts and epoxies to circular surfaces. It has the capacity to line 4- to 96-inch-diameter pipe, manholes, storage tanks and pipe fittings. Linings can range from 1/8 to 1 inch. Coatings go on with a controlled wall thickness, and the operator stays above ground to spray. **631/752-8899; www.rficonstructionproducts.com.**



RFI Construction Products

### RHINO LININGS SYSTEMS RHINO EXTREME

**Rhino Extreme** from **Rhino Linings Systems** is based on polyurea chemistry so it can be applied in less-than-ideal conditions, including damp, low-temperature or high-humidity environments. It provides waterproofing, and abrasion, impact, chemical and corrosion resistance. It can be applied up to an unlimited thickness and cures quickly. It is available in 2-to-1 or 1-to-1 ratio formulations, and includes two Class I fire-rated formulas, 11-50 FR and 11-70 FR, and one formula for application over geotextiles, 11-50 GT. It should be applied by a trained applicator using high-pressure plural spray equipment. **800/422-2603; www.rhino linings industrial.com.**



Rhino Linings Systems

### SAUEREISEN SEWERGARD NO. 210X

**SewerGard No. 210X** from **Sauereisen** exhibits compressive strength exceeding 15,000 psi and elongation of 12.9 percent. It is used as a stand-alone, high-strength lining that enables high build capabilities, while providing a chemical-resistant barrier for concrete, masonry, brick and steel substrates. As a 100 percent solids epoxy polymer, it protects infrastructure including manholes, lift stations, tankage, structural steel and secondary containment. Installation is easily completed using airless spray equipment, plural component spray equipment, or it can be hand-applied via roller. **412/963-0303; www.sauereisen.com.**



Sauereisen

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The **Infi-Shield** external seal from **Sealing Systems** prevents erosion and infiltration in manholes or catch basins. The one-piece molded seal is made from EPDM rubber and has a reinforced, preformed L-shaped corner. It is bonded with nonhardening butyl mastic and will pass a vacuum test. It installs easily in minutes without special tools. 800/478-2054; [www.ssisealingsystems.com](http://www.ssisealingsystems.com).



Sealing Systems

## SAFETY EQUIPMENT

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**HAND-E-GLOVE** protective lotion from **CAIG Laboratories** essentially creates an invisible glove, protecting and shielding hands from dirt, grease, chemicals and harsh contaminants. It moisturizes skin, is non-greasy and does not impair grip. Simply apply the lotion and hands are protected. It has antistatic properties. 858/486-8388; [www.caig.com](http://www.caig.com).



CAIG Laboratories

### SOUTHLAND TOOL SAFETY SHUTTER VACUUM NOZZLE

The **Safety Shutter Vacuum Nozzle** from **Southland Tool** puts the vacuum control into the hands of the operator at the end of the hose. It is designed to instantly release vacuum with the push of a lever. A detachable tripod design lets it stand on its own, granting hands-free operation. The shutter design allows the operator to regulate airflow as needed. It is designed for 4- and 6-inch flex hose. 714/632-8198; [www.southlandtool.com](http://www.southlandtool.com).



Southland Tool

### SVE PORTABLE ROADWAY SYSTEMS SHOR-MAT

**SHOR-MAT** easy-handling and durable shore sheeting from **SVE Portable Roadway Systems** is just 5/8-inch thick and weighs 100 pounds. It is designed from high-performance polymers with structural grid, but it flexes enough to follow trench wall contour. It comes in 4- by 8-foot by 5/8-inch size, and is available with a matte finish on both sides. The light-colored product is not affected by chemicals, temperature or water. It will not rot or splinter, delivering safe and efficient trench protection. Every shoring sheet comes with hand cutouts on four sides that can be used with lifting straps. 800/762-8267; [www.shor-mat.com](http://www.shor-mat.com).



SVE Portable Roadway

### TST SWEDEN AB ULTRA VEST

**Ultra** cooling vests from **TST Sweden AB** are available with either 17 or 21 **TEMPTECH** elements that absorb heat. They are made of a fast-drying polypropylene fabric that can transfer up to 40 times more moisture than standard polyester. High elasticity provides comfort and a snug fit against the body, increasing moisture wicking. Adjustable elastics at the sides help create a tight, excellent fit, while side extensions make the vest further adaptable to various body types. Permanent **TermoFresh** antibacterial treatment keeps them odor-free. They are recommended for use tight to the body, with a functional T-shirt between and a covering garment on top. They suit both men and women. [www.tst-sweden.com](http://www.tst-sweden.com).



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US Jetting

# WHAT'S TRENDING FOR CIPP?

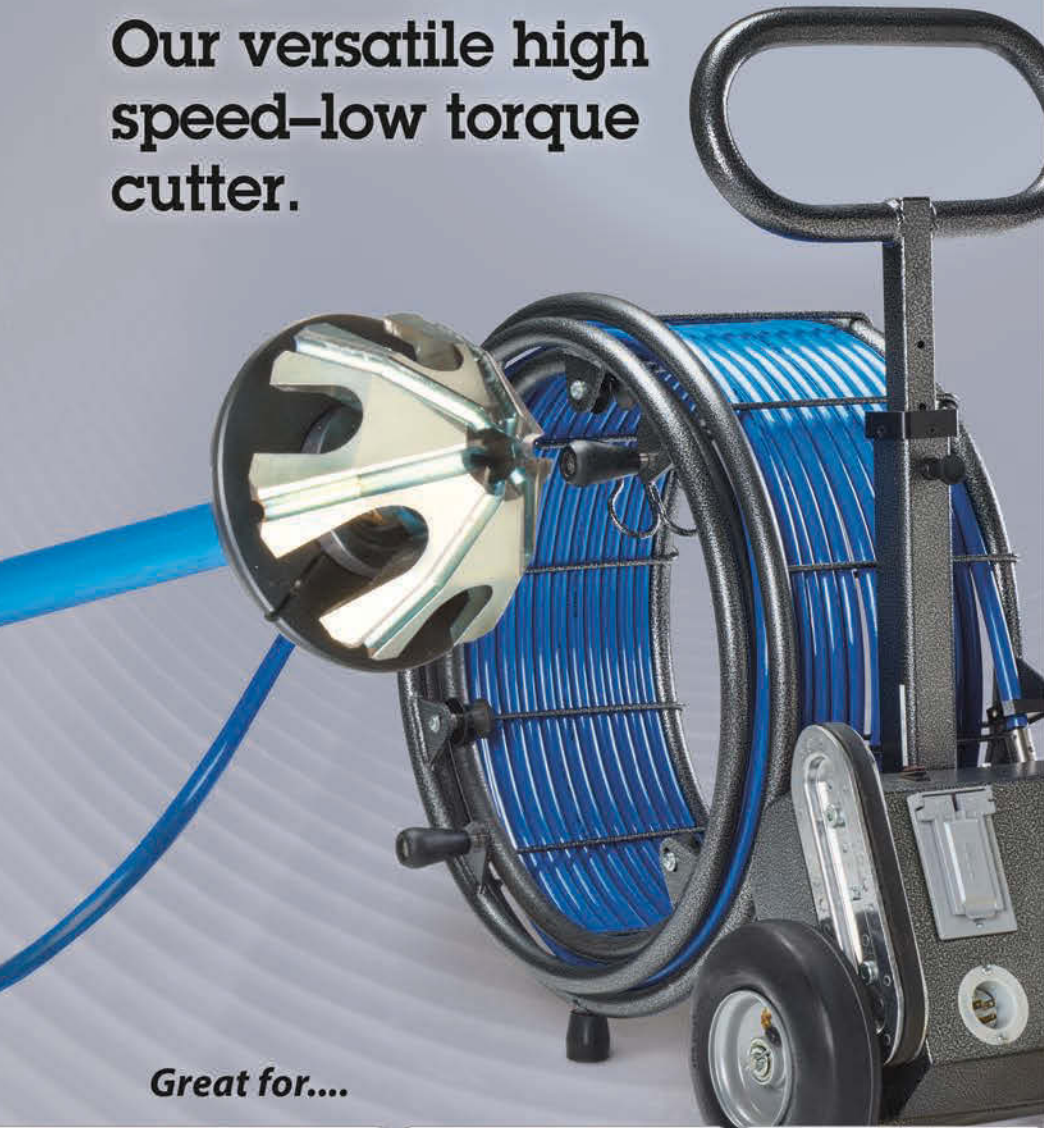
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# CIPP Lining Methods and Projects

By Craig Mandli

## Large culvert rehabilitation project saves money and maintains traffic flow

### PROBLEM

An annual inspection in Grottoes, Virginia, uncovered serious problems with the town's stormwater system. A large set of elliptical CMP culverts did not pass inspection. There was severe corrosion and individual sections were failing and misaligned. The town's consultants recommended replacement. Complicating the issue, the failing pipes were four parallel culverts that were all quite large — 70 by 44 inches — running directly underneath Dogwood Avenue, one of Grottoes' two main thoroughfares.



### SOLUTION

The town initially obtained cost estimates for replacing the culverts. The price was high and the plan called for significant and lengthy traffic disruptions. Fortunately, Grottoes Town Manager Jeff Nicely had seen a process called **CentriPipe** at a Rural Water Association conference and thought it could be useful in this situation. The process is based on spincasting technology developed by **AP/M Permaform**. The spincaster is pulled back through failing pipes while spraying strong, highly adhesive, fiber-reinforced cementitious grout onto the pipe in thin layers. As the layers build up, they form a new, structurally sound concrete pipe within the old pipe. Sewer flow capacity is minimally affected and no annular space is left between the old and new pipes.

### RESULT

CentriPipe provided a trenchless solution, was 15 percent less expensive than digging up the old sewers and replacing them, and saved the town incalculable but significant benefits by eliminating the hassles of disrupted traffic. The new culverts are smooth, seamless, watertight and structurally strong, with a long-projected service life. **800/662-6465; www.centripipe.com.**

## CIPP renews lateral, spares landmark bridge

### PROBLEM

The century-old wastewater lateral between the street and the motherhouse of the Dominican Sisters of Peace in Oxford, Michigan, was well past its life expectancy. Continued treatments for backups due to root intrusion in the lateral's widening joints were becoming too much for the antiquated pipe to bear.

### SOLUTION

The Waterworks, a residential and industrial plumbing firm based in Columbus, Ohio, proposed rehabilitating the lateral with cured-in-place pipe, which would create a durable, impervious pipe with improved flow. They could make the repair in a single shift at a fraction of the cost of open-cut replacement, which had been ruled out for a number of reasons including the need to preserve a historic deck-arch bridge. Source One Environmental of Davison, Michigan, **HammerHead Trenchless Equipment's** distributor of HydraLiner CIPP tools and consumables, provided a **Super Hydra Inversion Drum**, electric wet-out table and lining trailer for the installation, as well as a water boiler. The CIPP consumables consisted of a felt liner, extended cure resin and extended cure hardener. During the inversion process, compressed air forced the resin-impregnated lining from a pressurized inversion drum into the existing pipe. Inversion took only 30 minutes to complete. The crew then inverted an inflation tube inside the felt. Using heated water to activate the resin's hardener also created hydraulic pressure that forced the lining smoothly and firmly against the sides of the pipe throughout the cure, which took just two and a half hours.



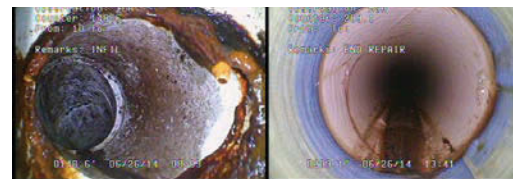
### RESULT

Post-installation video proved the liner held its shape, even bridging past fractures and joints, leaving no deformities. The new 8-inch CIPP rehabilitation has added at least 50 years to the lateral's service life and ended any need to deal with root intrusion and backups until at least 2064. **800/331-6653; www.hammerheadtrenchless.com.**

## Point repair system used to restore defective truss pipe

### PROBLEM

Mid Mo Environmental of Jefferson City, Missouri, was cleaning and televising an 8-inch reinforced truss pipe for Callaway County and found it needed repairs for three defects — a lateral crack, an abandoned tap and a bad joint — all within a 6-foot-2-inch span, causing severe I&T issues. As with many of these lines, it was under a street and buried more than 10 feet deep.



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## SOLUTION

Shawn York, owner and certified installer of the **Infrastructure Trenchless Point Repair System** from **Infrastructure Repair Systems Inc.**, made the decision to restore the three defective areas with a single 7-foot infrastructure point repair liner. Since the damaged area was within 24 feet of the manhole, he devised a 3/4-inch PVC pushrod and pushed the flow-through carrier wrapped with the resin-soaked 7-foot structural fiberglass and felt liner into position to cover all three damaged areas.

## RESULT

Mid Mo's use of the trenchless single 7-foot repair to cover all three damaged areas saved Callaway County thousands of dollars. Digging and replacing could have taken weeks, and three individual point repairs would have taken one to two days. With the IRSI single point repair there was no disruption of service to customers or the environment. This successful permanent repair was completed in less than three hours. **877/327-4216; www.irsi.net.**

## Manhole adjusting rings save time, increase safety

### PROBLEM

The City of Prescott, Wisconsin, had issues with concrete manhole rings failing after just a few years of being in service.



### SOLUTION

"I heard of the many successes that **LADTECH** was having in other cities across the country," says Hank Zwart, the city's director of public works. "I changed my specification to allow for LADTECH HDPE adjusting rings to be used in our city." The riser rings can be installed in minutes. They nest together and include a 2 percent slope ring and a 1/4-inch spacer ring for a precision fit. They're made of high-density, lightweight recycled polyethylene, meet AASHTO's HS-25 axle-loading spec, and are impervious to hydrogen sulfide corrosion that destroys concrete. "They weigh only 6 pounds, compared to the 85-pound concrete rings, making them safe to handle and reducing on the job injuries and eliminating the need for heavy equipment," says Zwart.

## RESULT

Zwart says he expects the rings to be a long-term solution. **877/235-7464; www.ladtech.com.**

## Pipe rehabilitation liners keep facility open during installation

### PROBLEM

Shortly after the Rebound Mental Health facility in Lancaster, South Carolina, opened in January 2014 in a pre-owned building, the original cast iron pipes from 1988 located under slab quickly began to corrode and deteriorate with the sudden increase in usage. The 4- and 6-inch cast iron pipes became prone to constant sewer backups, which required the original contractor to come out each week to jet them. They suggested digging up the floors and replacing all the sewer pipes, which would have required closing the facility for several weeks.

## SOLUTION

The customer needed a less intrusive solution that wouldn't involve digging up the slab or closing the facility. Carolina Pipe Repair proposed to install **Nu Drain** small-diameter CIPP liners from **Nu Flow** in all the 4- and 6-inch building drains. Several days were spent removing the years of corrosion and buildup throughout the mainlines. In total, over 500 feet of sewer pipe was relined, including five individual runs of 4-inch pipe and 120 feet of a 6-inch drain. Pipes in the commercial kitchen were also relined without interrupting the continual 15-hour-a-day operation.



## RESULT

The facility stayed fully operational throughout the pipe rehabilitation process, and Carolina Pipe Repair didn't cause any destruction to the site. **905/433-5510; www.nuflowtechnologies.com.**

## Inflatable point repair packers solve cured-in-place pipe ailments



### PROBLEM

Lametti & Sons was working on an interceptor rehabilitation project in southwest Minneapolis when an issue arose. Very cold soil on a 14,000-foot rehabilitation caused a soft spot near the middle of a run. "It only happens a dozen or so times a year, but when it does we're in danger of losing the whole lining," says Project Manager Ross Larson. These soft spots are places where the lining loses stiffness or adhesion, and sags away from the original pipe. Fixing the individual weak spots without compromising or replacing the entire lining is a major challenge.

### SOLUTION

Lametti & Sons used an inflatable point repair packer from **Petersen Products** to fix the failing liner. "We call them steam plugs," Larson says. "We inserted a 10-inch plug into the liner and pushed it along until it was centered at the soft spot. Then we inflated it with the same steam truck that we used to cure the liner." When filled with steam, the reusable packers press out against the lining, returning it to round, and apply heat and pressure where it's needed to recook the lining in place.

## RESULT

"If we didn't have these, we'd have to improvise something and it wouldn't be as good," Larson says. "Because we don't have to cut out sections or reline, the steam plugs save us thousands every time we use them." **800/827-5275; www.petersenproducts.com.**

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## Lateral lining system used to rehab collapsed sewer line

### PROBLEM

A warehouse facility in San Diego, which houses three businesses, had a 4-inch common sewer drain buried under the floor that was collapsing. One section had collapsed, and the solution offered by other contractors was continued cleaning of the remaining 960 feet of pipe while digging up the 140 feet of collapsed pipe.



### SOLUTION

The owner asked Brink Services to look at the situation and see if they could solve the problem and keep the warehouse up and running. The bottom of the cast iron pipe was gone the entire length of the 1,100 feet of pipe, but aside from the collapsed section, it was still round. The biggest problem was the access points, or more specifically, the lack thereof. The shortest line segment was 70 feet, then 289, 141, 140, 220 and 240 feet. Brink Services determined they could employ the **Quik Shot** lateral lining inversion system from **Quik-Lining Systems** to make the long lengths between pits, with a 240-foot blind installation at the end. Epoxy resin was chosen to eliminate toxic fumes, along with a 60-minute resin hardener to expedite the project.

### RESULT

The project was completed with no hiccups, on budget and faster than anticipated. The warehouse was able to continue operations uninterrupted. 605/695-6778; [www.quiklining.com](http://www.quiklining.com).

## Camera rescued, rehabilitation lining installed under railroad crossing

### PROBLEM

A contractor hired by the Pima County Regional Wastewater Reclamation Department in Tucson, Arizona, was inspecting a 12-inch DIP sanitary sewer line under a Union Pacific Railroad crossing, and their CCTV camera was stuck in a section of the pipe that was partially deteriorated. The county asked all three of their JOC contractors to offer their best plan for getting the camera out. Achen-Gardner Construction's plan was chosen and work began immediately.



### SOLUTION

Achen-Gardner Construction sent a camera down the line and used a rodding machine with a hook attachment to extract the stuck camera and associated cables. Crews then video inspected both sides of the deteriorated section to determine the line was clear of debris and could be lined. Crews successfully lined the entire 385 feet of 12-inch pipe using **Reline America's ALPHA-LINER** in one of the busiest industrial intersections in Pima County. The team coordinated with Union Pacific Railroad and Tucson Electric Power, which has a large facility next to the job site, to perform this work quickly and safely. The team worked 24/7 to complete the work before Christmas.

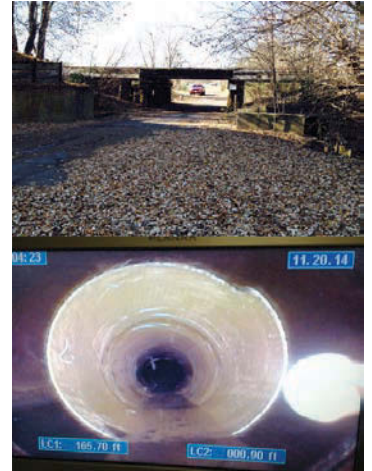
### RESULT

After the new year, crews returned and completed a second shot of the line per Pima County's request. This was done due to the extremely poor condition of the original host pipe and to provide additional protection to accommodate railroad standards. The lining system has performed as advertised. 866/998-0808; [www.relineamerica.com](http://www.relineamerica.com).

## Point repair leads to significant cost and time savings

### PROBLEM

In Mayfield, Kentucky, a 10-inch vitrified clay pipe was missing a 4-foot section, causing heavy, continuous I&I. A small, concrete bridge with an 18-inch storm drain crossing the sewer line sat above the pipe. Traditional dig-and-replace methods would have forced the city to bypass both sewer lines, completely rebuild the bridge and close the road, with estimated costs between \$25,000 and \$30,000.



### SOLUTION

The city, hoping to avoid a long and expensive excavation, turned to **Source One Environmental** to provide a trenchless repair solution for the missing pipe. The company used the **PipePatch** point repair system and installed two 10- by 48-inch repairs. The repairs overlapped by 1 foot, allowing the team to utilize the existing solid pipe to re-establish structural strength and prevent further damage.

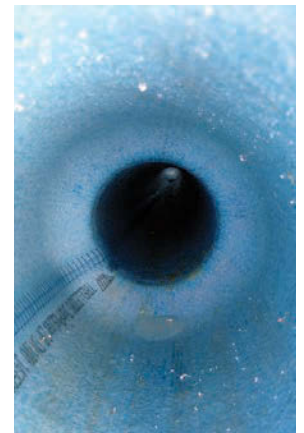
### RESULT

The trenchless system restored all structural integrity to the damaged pipe. It created a pipe within a pipe, as the fully cured resin and fiberglass formed a structural barrier between the pipe interior and the exterior environment. The original inside diameter of the pipe was only affected by 1/8 inch. The entire installation process took five hours, three people and a fraction of the estimated cost. 877/450-3701; [www.s1eonline.com](http://www.s1eonline.com).

## Lining system used to rehabilitate failing iron sewer pipe

### PROBLEM

The owners of the Pine Grove Resort in northern Wisconsin needed to reline a deteriorated cast iron sewer pipe under concrete flooring without digging up the floor. The sewer is approximately 70 feet long and 5 to 6 inches in diameter. Heavy tuberculation made rehabilitation a challenge.



### SOLUTION

Great Lakes TV Seal, in cooperation with **Trelleborg Pipe Seals Milford**, delivered one of its no-dig CIPP solutions using the **DrainPlusLiner 2.0** and **EPROPOX**



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## RESULT

The trenchless pipeline and sewer rehabilitation methods were a practical and economical alternative to complete replacement. Major construction and disruption to the hotel was avoided, and business wasn't affected. 800/626-2180; [www.trelleborg.com/pipe-seals](http://www.trelleborg.com/pipe-seals).



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# You're Not Really 'OSHA-Exempt'

Even if your business is exempt from certain reporting requirements, it's not exempt from safety regulations

By Doug Day

It's not complicated. If you have employees, you are subject to OSHA regulations.

"Oftentimes you see people who think they are exempt. There is really no exemption from OSHA," says one agency official, a compliance assistance specialist in Wisconsin. "For OSHA to have coverage, all you need is an employer-employee relationship."

If you had 10 or fewer employees in the previous calendar year, you are exempt from OSHA injury and illness recordkeeping — the OSHA 300 log. However, the size exemption still requires those employers to report specific incidents to OSHA. Low-risk businesses may also be exempt from recordkeeping, but that wouldn't apply to those in the onsite wastewater industry. (Check your state regulations if you are covered by an OSHA-approved state plan or Public Sector Enforcement in your state.)

OSHA reporting requirements apply to all employers, a regulation that was updated on Jan. 1, 2015. In the past, all employers under federal OSHA jurisdiction were required to report work-related fatalities and the hospitalization of three or more employees. The standard was updated to include:

- Fatalities (report within eight hours)
- Inpatient hospitalization of one or more employees (report within 24 hours)
- Amputations (report within 24 hours)
- Loss of an eye (report within 24 hours)

(Report to 800/321-6742 or your nearest OSHA area office during business hours.)

If you experience a workplace accident, the agency official says you may see an OSHA inspector, depending on the severity of that accident. They could also show up for an inspection based on an employee complaint or even media reports. "We sometimes get referrals from police and fire departments," he

adds. "The local district attorney's office investigates industrial accidents and they also make referrals to us."

Generally, an OSHA Serious Violation carries a base fine of \$7,000. Smaller companies, up to 25 employees, get a 60 percent reduction in penalty, and a sliding scale includes smaller reductions for those with up to 250 employees. Having a safety and health program can also reduce a fine up to 25 percent. However, you may also face a number of citations out of one incident. "It's pretty expensive to have a serious injury or fatality. It can be devastating, especially for a small company."

## RISK-FREE HELP AVAILABLE

OSHA's On-Site Consultation Program is free for all small- and medium-sized businesses. It made 27,000 visits covering 1.25 million workers in 2014, helping companies identify workplace hazards, providing advice on complying with OSHA standards and helping with the establishment of injury and illness prevention programs.

"Any report they generate is confidential," says the OSHA official. "They have a variety of sample safety programs they can share and can teach you how to develop your own."

The information is not shared with OSHA. However, if the consultant finds something OSHA would consider a serious hazard, the employer would be responsible for correcting it within a specific time frame. Failing that, the situation would be reported to the local OSHA office for follow-up, though it doesn't happen very often.

OSHA also has an online Quick Start guide that will help identify applicable OSHA requirements. Onsite wastewater is categorized under Electric Gas and Sanitation Service. On the data and statistics page of OSHA's website, you can also search inspection reports by SIC code (4952 or NAICS 221320 for onsite wastewater).

A safe workplace is everyone's responsibility, and OSHA says an effective health and safety program can save \$4 to \$6 for every dollar invested. **C**

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## PRODUCT SPOTLIGHT

### Midsized hydroexcavator delivers high vacuum for heavy slurries, faster loading

By Ed Wodalski

The midsized, truck-mounted X-6 hydroexcavator from Hi-Vac Corp. has a 6-cubic-yard debris tank and carries 570 gallons of freshwater with an optional 1,000-gallon capacity.

“There are a lot of hydroexcavators out there that are either very, very big or very, very small trailer-mounted vacuum systems with small capacities,” says Dan Coley, president, Hi-Vac. “There aren’t a lot of midsized hydroexcavation machines, and that’s what the X-6 is. It’s a midsized unit.”

The adjustable triplex water pump delivers up to 3,000 psi and is set independently of the blower speed. The vacuum system ranges from 2,600 cfm at 27 inches Hg to 3,400 cfm at 16 inches Hg.

“The advantages you get with a high-vacuum system, 27 inches, is when you’re vacuuming heavy sludges, slurries or liquids or you’re vacuuming over a long distance, that high vacuum and very good cfm airflow allows you to vacuum in more difficult situations,” he says. “It allows you to load faster. Sometimes when you’re hydroexcavating, the material you’re hydroexcavating is very, very thick and heavy. That’s when you need to rely on your inches of mercury or vacuum to help load.”

The hydroexcavator, with 6-inch hose, can expose any type or size of underground utility and is especially suited for residential areas



with limited work space.

“The volume of material you’re vacuuming does not require a larger debris box,” Coley says. “If you’re potholing or daylighting, it’s appropriately sized. The 6-cubic-yard debris body is all you’re going to need.”

The X-6 can be mounted on any brand of appropriately-sized single- or tandem-axle truck. The water pump and vacuum system are driven by a split-shaft transfer case. There is no auxiliary engine.

“The X-6 is primarily for utility excavations where the depth and distance are very close to the truck and the volume of material you’re digging does not exceed the 6-cubic-yard debris body that you have on the rig,” he says.

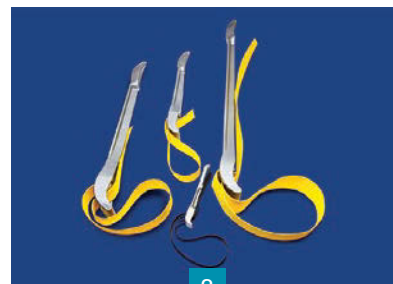
Options include a 320-degree, top-mounted rotating boom and water heater for cold weather and hard soil excavation. The water pump and blower can be shrouded. 800/752-2400; [www.x-vac.com](http://www.x-vac.com).



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#### 1 GENERAL PIPE CLEANERS VIDEO INSPECTION, LOCATION SYSTEM

The Gen-Eye SDP premium video inspection and location system from General Pipe Cleaners features a 10.4-inch LCD sunlight-readable screen, a four-hour rechargeable battery and a Wi-Fi transmitter along with the full-size camera system. The integral SD recorder captures video or still images and can store 32 GB of data on one card. 800/245-6200; [www.drainbrain.com](http://www.drainbrain.com).

#### 2 RIDGID TELESCOPING BASIN WRENCH

The telescoping basin wrench from RIDGID extends up to 17 inches. It has a heavy-duty jaw with a rust-resistant spring and travel limiter for a tight grip and long life span. A light illuminates dark work spaces and automatically shuts off after five minutes of inactivity to preserve battery life.

A removable T-handle pivots 180 degrees for easy access to tight under-sink spaces and provides the option to use a standard 3/8-inch ratchet or breaker bar for additional leverage. 800/769-7743; [www.ridgid.com](http://www.ridgid.com).

#### 3 LOWELL ALUMINUM STRAP WRENCHES

Aluminum strap wrenches from Lowell Corp. are designed for use in industrial, construction, water and high-line utility work, as well as in-home applications. The tools make it possible to turn any shape without scratching, denting or crushing. Four new models have 6- to 24-inch handles with strap lengths from 17 to 54 inches with custom lengths available. Capacities range from 2 to 12 inches with torque limits from 20 to 330 ft-lbs. 800/456-9355; [www.lowellcorp.com](http://www.lowellcorp.com).

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## 4 WACHS VALVE IDENTIFICATION SYSTEM

The Valve ID from E.H. Wachs is designed to identify and delineate valves based on size, function, pressure boundaries or direction of closure. The one-size-fits-all application ensures the correct valves are being cycled and the direction of closure is never in doubt. **866/392-1060; www.turnvalves.com.**

## 5 ACLARA THROUGH-THE-LID ANTENNA

The through-the-lid antenna from Aclara reaches 100 percent of meters in pits and vaults while providing high read rates. Designed for installing communications modules in meter pits and vaults, the unit enables utilities to reuse existing metal lids or replace them with lids that radio frequency signals can penetrate. The antenna installs through an industry-standard-sized hole drilled in the pit-lid and attaches to the Aclara STAR network meter transmission unit and meter. **800/297-2728; www.aclaratech.com.**

## 6 FRANKLIN ELECTRIC HIGH-HEAD GRINDER PUMPS

The single- or three-phase FPS IGPH Series of high-head grinder pumps from Franklin Electric are designed for the demands of higher-head conditions found in low-pressure sewage transfer applications. Available in automatic or manual, the pumps are powered by a 2 hp, 3,450 rpm motor that delivers 414,000 cuts per minute and has two non-clogging impeller stages for pumping sewage slurries with a shut-off head of 200 feet. **800/701-7894; www.franklinengineered.com.**

## 7 ELECTRIC EEL ELECTRIC, GAS JETTERS

Eel-Jet EJ1500 electric and EJ3000 gas jetters from Electric Eel Mfg. Co. are designed to clean 1 1/2- through 8-inch drainlines. The EJ1500 electric jetter cleans 1 1/2- through 4-inch-diameter lines and delivers 1,500 psi and 1.7 gpm. It has a 1.5 hp motor, duplex pump with pulsation

and a reel that holds 150 feet of 1/4-inch hose. The pump/motor assembly removes in seconds for added portability. The EJ3000 gas jetter cleans up to 300 feet of 2- through 8-inch-diameter lines. It delivers 3,000 psi and 4.7 gpm and is powered by a 13 hp overhead valve engine. **800/833-1212; www.electriceel.com.**

## 8 GENERAL PUMP HIGH-TORQUE CLUTCH ASSEMBLY

The electromagnetic mobile clutch assembly from General Pump features a 9 3/4-inch, two-groove pulley that receives both "A" (4L) and "B" (5L) belts. A one-piece, solid-forged rotor eliminates the chance of parts separation and maximizes torque. The pulley is made from zinc-coated steel. **888/474-5487; www.generalpump.com.**

## 9 HIPPO AUXILIARY POWER UNITS FOR TRUCKS

Power Pack, Power Plant and Hurricane auxiliary power units from HIPPO Multipower Systems are designed for the work and service truck market. The base model Power Pack delivers electric/welding power and compressed air simultaneously. The diesel-powered Power Plant produces hydraulic, compressed air, electric and welding power. The Hurricane delivers the power and flexibility of the Power Plant plus 100 cfm at 100 psi of compressed air. **800/844-0624; multipower.us.**

## 10 KENCO CONCRETE BARRIER LIFTER

The Barrier Lift from KENCO hooks with a sling and shackle to any type or model of machine with lifting capabilities. Handles on both sides allow personnel to safely guide the lifter into position. The lifter automatically grabs as it's lowered onto the wall and won't release until the wall has been firmly set into place. Pad angles swivel to match the slope of the wall to be lifted. Lifting capacities range from 1,500 to 40,000 pounds. Options include self-aligning guides. **800/653-6069; www.kenco.com.**

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## 11 TRELLEBORG INTEGRATED CONCRETE PIPE SEAL

The Forsheda 165 integrated concrete pipe seal from Trelleborg Pipe Seals Milford features a soft rubber slurry lip (50 International Rubber Hardness Degrees) for flexibility. Forming parts are made from 70 IRHD rubber for stability and grip. 800/626-2180; [www.trelleborg.com](http://www.trelleborg.com).



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## 12 PEERLESS REVERSING SWITCHES, MODULES

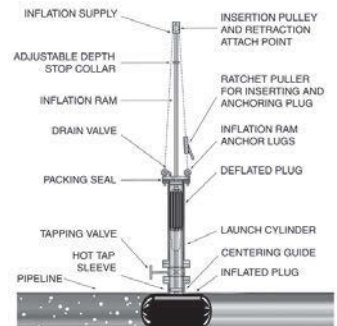
Switches and relays for work trucks and heavy-duty vehicles are available from Peerless Electronics, including 40-amp reversing rocker switches from CW Industries, forward and reversing relay modules, and a 12-volt motor reversing intermittent duty DPDT vehicle solenoids from the Cole Hersee division of Littelfuse, and Cole Hersee's three-position, 10-amp rotary switch that replaces toggle or rocker switches. 800/285-2121; [www.peerlesselectronics.com](http://www.peerlesselectronics.com). c

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**APS holds groundbreaking, forms rental company**

Advanced Pressure Systems held a groundbreaking for the 35,000-foot expansion of its administrative offices and distribution center in Tomball, Texas, site of the company's primary manufacturing facility. Work is scheduled for completion this fall. The manufacturer of high-pressure waterblasting equipment also formed a rental company featuring StoneAge tools.

**WJTA-IMCA launches conference/expo website**

The WaterJet Technology Association-Industrial & Municipal Cleaning Association launched [www.wjtaimcaexpo.com](http://www.wjtaimcaexpo.com), a dedicated website for the 2015 WJTA-IMCA Conference and Expo, Nov. 2-4, in New Orleans. The site features the show schedule, exhibitors and hotel information.

**Draincables names sales representative**

Draincables Direct of Ohio named Glenn Corbett sales representative for the New York City area. Draincables Direct manufactures and supplies sewer and drain cleaning cables.

**Dwyer Group acquires Service Brands International**

The Dwyer Group acquired Service Brands International of Ann Arbor, Michigan, a multi-concept franchise system that includes Molly Maid, Mr. Handyman and ProTect Painters, with combined sales of \$283 million. The acquisition represents the largest in the history of the Dwyer Group, which has more than 2,100 franchisees across all brands.

**Pure Technologies names vice president**

Pure Technologies named Randall Moore vice president of market development North America. He will focus on developing network optimization programs with utilities across North America and increase the company's role on industry committees for the American Water Works Association.

**One Biotechnology receives Safer Choice award**

One Biotechnology, a subsidiary of Osprey Biotechnics, was named a 2015 Safer Choice Partner of the Year award winner for achievement in the design, manufacture and promotion of products that are safer for families, workplaces, communities and the environment.

**Hi-Vac Corp. names Coley president**

Hi-Vac Corp. named Daniel J. Coley company president. He will be responsible for new product and channel development for Hi-Vac's product lines, including Aquatech, X-Vac, UltraVac, Hi-Vac and O'Brien.



Daniel J. Coley

**American Water acquires Keystone Clearwater Solutions**

American Water acquired Keystone Clearwater Solutions of Hershey, Pennsylvania, from Rex Energy Corp. for \$130 million. Keystone provides water-related services to the oil and gas industry, primarily in the Appalachian region of Pennsylvania, Ohio and West Virginia.

**Cityworks CEO finalist for entrepreneur award**

Brian Haslam, president and CEO of Cityworks, was a finalist in the technology category for EY's Utah Regional Entrepreneur of the Year award.

**American Water names vice presidents**

American Water Works Company named Martin Uezen vice president of business development and Greg Panagos vice president of investor relations. He succeeds Edward Vallejo, who was named American Water's vice president of financial, strategy, planning and decision support.

**Spartan Tool names Canadian distributor**

Spartan Tool named Joe Johnson Equipment as the company's exclusive distributor in Canada. JJE is one of North America's leading providers of infrastructure maintenance and inspection equipment.

**Vermeer breaks ground on technology hub**

Vermeer Corp. and the Iowa State University Research Park broke ground on the Vermeer Applied Technology Hub, 2710 South Loop Drive, Pella, Iowa. The facility will enable students and faculty from Iowa State and other schools to work collaboratively on technology advancements for Vermeer industrial and agricultural equipment. Vermeer will initially occupy about 23,000 feet of the 35,880-square-foot facility, which will be built, owned and operated by ISU RP. The facility is scheduled for completion in May 2016.

**Avanti International names vice president**

Avanti International named Frank Aguilar vice president of operations and integrator of Avanti's business endeavors. He will oversee day-to-day operations for all departments.



Frank Aguilar

**Subsite Electronics launches website**

Subsite Electronics, a Charles Machine Works company, launched a mobile-friendly website, [www.subsite.com](http://www.subsite.com). The site includes product information and a Ditch Witch dealer locator. **c**

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2004 Sterling Camel Hydrovac: Automatic, 10-wheeler, 46,651 miles. 80gpm, 400' of 1" hose, mid-mount reel, 1,500-gallon water, excavation wand. One owner. Sacramento, CA. \$60,000. Carroll 916-747-3819 (C11)

For Sale: MyTana push inspection camera. Used three times. Must sell! \$2,000. Call me at 904-824-8585. (C10)

2006 Sterling Camel Hydrovac: Automatic, 10-wheeler, 41,289 miles. 80gpm, 600' of new 1" hose, new water tank, 1,500 gallons. Front reel, hose press, excavation wand. One owner. Sacramento, CA. \$135,000. Carroll 916-747-3819 (C11)

Used and rebuilt cable machines in stock: RIDGID K-7500, K-40, K-60, K-1500, Spartan #1064, #300, #100, Electric Eel model #C machines. The Cable Center: 800-257-7209. (CBM)

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2008 Hammerhead Lightning bursting tool with power pack, 4" and 6" heads, new cable. Recently rebuilt. Compact size, WORKS GREAT. Asking \$15,000. 503-849-2339 [tyler@prodrainpdx.com](mailto:tyler@prodrainpdx.com) (C10)

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## HYDROEXCAVATING EQUIPMENT



**Vector 2100 Series** on a 2001 Sterling L9500. New engine @ 15,550 hours. CAT C12 435hp, rebuilt RoadRanger 10-speed transmission. Vector 2112 combo unit w/17,983 hours. New 12-yard debris tank, (replaced Feb. 2014) 1,500-gallon H2O tank, 2,500psi @ 100gpm. Water pump rebuilt Feb. 2014. 37cfm @ 28" Roots 1016 blower. Cold weather package. Please call Melinda at

**970-653-8588, CO** C11

## JETTERS-TRAILER

2000 John Bean Trailer Jet: 35gpm @ 2,000psi. 400-gallon tank, 400' new hose. \$11,000 OBO. 231-325-0052 or 734-365-4035. (CBM)

Shamrock Pipe Tool 1995 Trailer Jetter Model SPT-325 Wisconsin 35hp. Myers pump 18gpm @ 2,000psi. 325-gallon poly tank. Reel capacity 800' of 1/2" hose. \$1,000 FIRM. Orange Beach, AL. Call 251-974-5630 (C10)



**Xtreme Flow Trailer Jetter Hot/Cold!** Model# HJ2TA8536, tandem axle trailer, 35 hp Vanguard 10 gpm @ 3,850 psi, 325-gallon water tank, 300' hose, General Pump. List \$36,995. On sale for \$32,995. Fully loaded!

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[www.hotjetusa.com](http://www.hotjetusa.com) CBM

2008 GMC PipeHunter: John Deere rear engine, 700-gallon poly water tank, 3/4" jet hose, Giant pump. Ken's Truck & Equipment: [www.khtrucks.com](http://www.khtrucks.com) 972-938-1905 or 214-632-5277 (CBM)

2008 Ford PipeHunter: 7844TMV. 1/2" hose. Giant jet pump 14.2gpm @ 4,000psi. Tuthill blower, 1/2-yd. debris tank. John Deere rear engine. 294 hrs. Ken's Truck & Equipment: [www.khtrucks.com](http://www.khtrucks.com) 972-938-1905 or 214-632-5277 (CBM)

## JETTERS-TRUCK



**1992 GMC Topkick / Sewer Equip Co.** jet truck. 202k miles, 6.6L CAT, 31k on engine, Myers pump, 1" hose. Located in Kearney, NE. .... \$9,950

**Call 308-237-6651, NE** C10  
[lewis@midlandscontracting.com](mailto:lewis@midlandscontracting.com)



**1993 GMC 1-ton Jetter:** 35gpm FMC pump, 3/4" hose, 500-gallon plastic tank. Excellent cold-weather machine. .... \$14,500 OBO  
Other jet trucks and trailers available.

**608-835-7767, WI** CBM

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**1999 International 4700** jet truck: 4x2, 190hp T444E, AT 545, 1,600-gallon capacity, 2,000psi, 120gpm. 134hp 6-cylinder auxiliary engine, articulating hose reel, two side-mounted tool boxes. .... \$7,500 OBO

**406-447-5050, MT** C11

## JET VACS



**2005 Vac-Con** VPD4211LHA/1300 on International 7400 with DT466 engine, Allison auto transmission, 87,300 miles. Deutz 138hp rear engine, long telescopic boom, hydrostatic drive, articulating 600' x 1" hose reel. 1,300-gallon water tanks, 11-yard debris tank, 80gpm @ 2,000psi and Roots 827PD blower. \$90,000 OBO

**Mark 708-475-7100, IL** CBM



**2002 Aquatech B52:** 5-yd/2,000 gallons, PD blower, 80gpm pump. GMC chassis, tandem axle, CAT 275hp. Easily convertible to B-10 (10-yd/1,000 gallons). Ex-municipal, Excellent condition.

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**856-599-4838, PA** C10

1991 Volvo Camel 200: Tandem axle. Great condition. Ready for work. \$25,000. Green Bay, WI. 920-655-7302 or 920-866-9109. (CBM)

1997 Vac-Con jet vac with 3-stage fan blower, 65gpm @ 2,000psi water pump. CAT auxiliary engine, front articulating hose reel, 11-yard debris tank, telescopic boom. Unit mounted on tandem-axle International chassis. Auto. transmission. 20,963 miles on chassis. Well maintained. Asking \$43,000. Contact Dave @ 262-951-8979 (C11)

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## JET VACS

2007 Mack Guzzler: Damaged, rear unit new in 2011. Ingersoll Rand Air Solutions Hibon model SIAV 8702 blower. Ken's Truck & Equipment: [www.khtrucks.com](http://www.khtrucks.com) 972-938-1905 or 214-632-5277 (CBM)

2004 Vactor 2100 PD sewer cleaner mounted on Volvo chassis. 1,300-gallon freshwater, 12-cubic-yard debris tank. \$150,000. 757-421-3502 (C10)

2009 Sterling Vac-Con: VPD3616LHAEN S\N: 09085083. 3,975 main engine hours. Bean jetting pump. Roots 824 RCS blower, 16-yard debris tank. New aluminum extension tubes. Hydraulic-driven jetter pump. Ken's Truck & Equipment: [www.khtrucks.com](http://www.khtrucks.com) 972-938-1905 or 214-632-5277 (CBM)

2014 GapVax MC Series 1510, Peterbilt 348, 8,600 miles, 1,500-gallon water capacity, 10-cubic-yard debris body. 80gpm @ 2,500psi water pump, 18" Roots vacuum pump. Wireless remote, 800 ft. of 1" hose capacity reel. Contact Matt 618-566-3003 for pictures and pricing. (C10)

Ford L85 Vactor jet truck: New motor, 53,293 miles, 80 gpm, 1,000-gallon capacity. Good, clean truck. Contact [k.coker17@gmail.com](mailto:k.coker17@gmail.com). (C12)

2007 Vactor 2115, International 7600, 43,300 miles, 7,350 engine hours. 1,500-gallon water capacity, 15-cubic-yard debris body, 600 ft. of 1" hose reel capacity. Hydro-ex kit, 18" Roots blower- 4,400cfm, 80gpm @ 2,500psi water pump - fresh rebuild, 3" debris pump off. Contact Matt at 618-566-3003. (C10)

2002 Sterling LT7501 Vac-Con Model V390LHA combination sewer cleaning truck: Freshly painted white. CAT 3126 - 275hp engine, 3-stage fan, 1,000-gallon water tanks, pump off option available. 10' telescopic boom. FMC water pump - 65gpm @ 3,000psi. Articulating hose reel with 600 feet of new 1" hose. 84,316 miles. Located in Orange, CA. \$79,900. Contact Craig: 714-639-8352. Additional details at [www.empireequip.com](http://www.empireequip.com) (CBM)

1998 Volvo GapVax: Stk# 2301, VIN# 4VHJCB JF8WN857157. Stainless steel tank, N-14 Cummins, 9-speed Fuller transmission, Roots 27" blower. Ken's Truck & Equipment: [www.khtrucks.com](http://www.khtrucks.com) 972-938-1905 or 214-632-5277 (CBM)

2006 International Vactor 2112\15: 9,300 hours, S\N: 05-07V-9443, Vactor jet pump 80gpm @ 2,000psi. 600' 1" new hose. 800' hose reel capacity. Pump-off system. Ken's Truck & Equipment: [www.khtrucks.com](http://www.khtrucks.com) 972-938-1905 or 214-632-5277 (CBM)

2002 International Guzzler: 54,000 miles, 10-speed, 27" Roots blower. Stainless steel tank. Stk# 2300. Ken's Truck & Equipment: [www.khtrucks.com](http://www.khtrucks.com) 972-938-1905 or 214-632-5277 (CBM)

Vac-Con V390LHA combination unit with Roots 827 blower, 1999 International Model 2554 cab and chassis. (Stock #3918C) **www.VacuumSalesInc.com, (888) VAC-UNIT (822-8648).** (CBM)

2006 Volvo cab & chassis with a Vactor 2110 combination vacuum loader and high-pressure sewer cleaning system. (Stock #3483C) **www.VacuumSalesInc.com (888) VAC-UNIT (822-8648)** (CBM)

Vac-Con industrial machine mounted on a pre-owned 2006 Sterling cab and chassis. (Stock #8593C) **www.VacuumSalesInc.com (888) VAC-UNIT (822-8648)** (CBM)

Pre-owned Super Products jetting unit mounted on a 1995 GMC Kodiak Cab and chassis (Stock# 5620V) **www.VacuumSalesInc.com (888) VAC-UNIT (822-8648)** (CBM)

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## POSITIONS AVAILABLE

Tampa Bay, FL based sewer rehab company looking for a CIPP senior technician utilizing the Perma-Liner small diameter inversion rehabilitation system. The ideal candidate will have 3+ years of selling the work and then doing the work. CDL is preferred but not necessary; but, applicants must have a valid driver's license and be willing to travel within central Florida. Lodging and per diem are provided when working out of town. Must be able to pass drug and background checks. Highly competitive pay based on experience. This is a great opportunity for the right person to join our rapidly growing company as an integral member. To apply, please fax your work history or resume to 941-722-3447 or by email to [graecastle@gmail.com](mailto:graecastle@gmail.com). (C11)

Tampa Bay, FL based sewer rehab company looking for an experienced CCTV operator. The ideal candidate will have 3+ years of selling the work and then doing the work. CDL is preferred but not necessary; but, applicants must have a valid driver's license and be willing to travel within central Florida. Lodging and per diem are provided when working out of town. Must be able to pass drug and background checks. Highly competitive pay based on experience. This is a great opportunity for the right person to join our rapidly growing company as an integral member. To apply, please fax your work history or resume to 941-722-3447 or by email to [graecastle@gmail.com](mailto:graecastle@gmail.com). (C11)

Looking for experienced Vactor, CCTV and manhole rehab operators. Also looking for experienced concrete spincasters. Southeast Georgia company. Job requires overnight travel. Send resume to [ken@lowsewer.com](mailto:ken@lowsewer.com) or call 706-825-6913 or 706-825-3497. (C10)

Seeking full-time salesperson with 3-5 years experience in trenchless technology. This position requires a goal-oriented individual who is willing to travel and has excellent communication skills. Send resume to [liner@masterliner.com](mailto:liner@masterliner.com). (C10)

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## PUMPS

Honda model WP40X, 8 hp, 4" with hoses. Honda 4 hp, 2" pump with hoses. The Cable Center: 800-257-7209. (CBM)

NEW Myers DP80-20 left-hand drive — \$12,250 + freight. Cloverleaf Tool Co. 941-739-0707; [sales@cloverleaftool.com](mailto:sales@cloverleaftool.com) (C10)

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## TOOLS

RIDGID model #300 with stand, RIDGID tri-stand vises, RP 330 ProPress kit. The Cable Center: 800-257-7209. (CBM)

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**1999 Ford E450** Hi-Cube CUES TV truck Reduced!! \$25,000 OBO. If interested, please call for more info and photos.

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**2004 UEMSI Main Line TV System,** track transporter, 1,000' reel, pan/tilt camera, computer & software, trailer with a/c, generator & air compressor. \$29,950

334-693-9507, AL C10

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1998 Ford Box Van with V10 motor, 2004 Aries CCTV equipment w/air reel. POSM operating w/2 pan & tilt cameras, tractor, cutters. I also have equipment to outfit another van pcu, reel, controls, etc. All equipment in working order. Contact [k.coker17@gmail.com](mailto:k.coker17@gmail.com) (C12)

2004 Ford E250 TV Van: POSM computer, H&A, air compressor, beacons & arrow board. RST Omni III camera & tractor. New tractor motor. Mini camera reel with color camera. \$50,000. Carroll 916-747-3819 (C11)

2004 CUES Chevy Express. Datacap 4.0, OZII camera, Ultra Shorty transporter, 1,400' multiconductor cable, Honda EV60/10 generator, Evolution interior, Minipush 20/20, Sonde locator. \$50,000 OBO. 503-849-2581 (C10)

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