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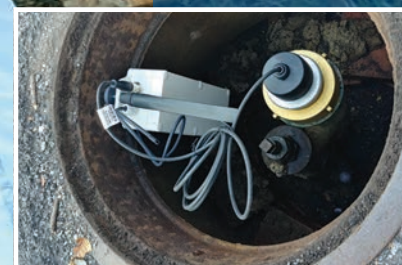


The Theory of Positivity

Culture of optimism is key to Connecticut company's success

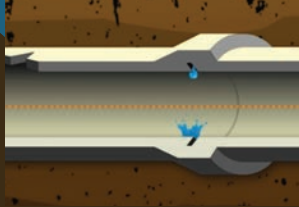
Page 6

**PROJECT
SHOWCASE:**
It takes
a village
Page 12

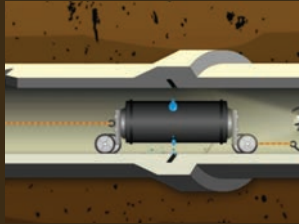


CASE STUDIES
Page 18

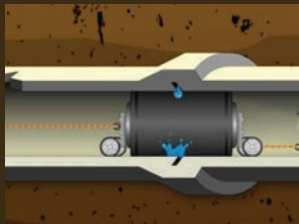
QUICK 5-STEP PROCESS



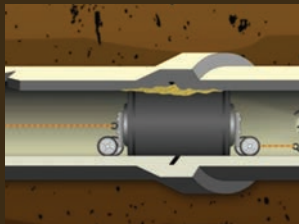
1 CCTV locates defect in pipe



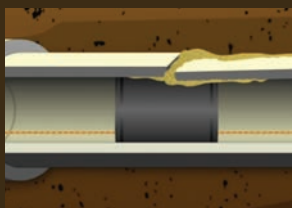
2 Packer and repair sleeve pulled into place



3 Packer inflated and sleeve installed

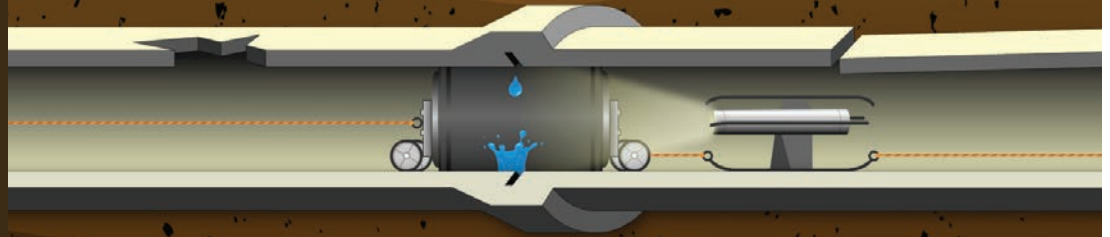


4 Packer deflated while grout fills void



5 CUES LOCK mechanical sleeve permanently installed

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BEST PRACTICES | 16 How to Manage Rising Equipment Costs

Six tips from an industry expert can help you decide whether to rent or own.

By Association of Equipment
Manufacturers

Case Studies | 18

By Craig Mandli

NEXT ISSUE:
Spring 2021

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6 | COVER STORY The Theory of Positivity

Optimistic attitudes allow infrastructure restoration company to work well under pressure.

By Ken Wysocky

COVER PHOTO: Pipe lining technician Adam Casale (left) and Savy & Sons co-owner Travis Savy roll out and measure a felt fiberglass liner and calibration tube. (Photography by Joe Vericker)



12 It Takes a Village

A sewer district's integrated approach aims to alleviate overflows in its member communities.

By Traci Browne



BEST PRACTICES | 22 Seeing I&I

How to establish an advanced flow monitoring program.

By Tim Dobbins

A BETTER FIX | 24 A Sure Cure

A pipe lining newcomer completes four lateral lining jobs in one day with a new product that allows liners to cure unattended.

By Ken Wysocky

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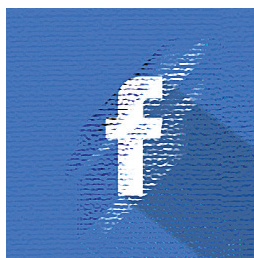
Composite Access Products (CAP)	3	LADTECH, Inc.	5
Cretex Specialty Products	17	Rainstopper	23
CUES, Inc.	2	Sealing Systems, Inc.	11
		Strike Products	Back Cover

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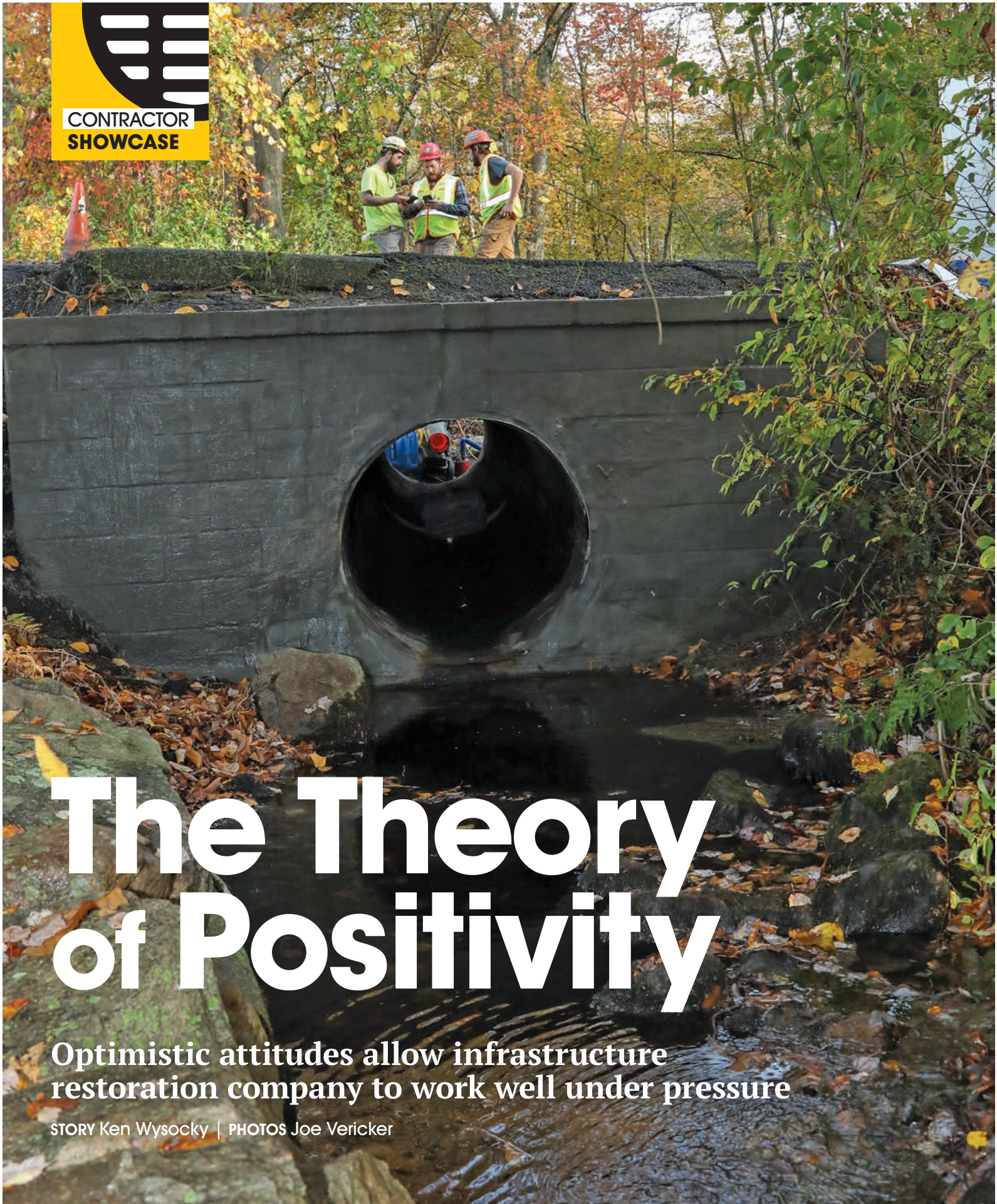
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The Theory of Positivity

Optimistic attitudes allow infrastructure restoration company to work well under pressure

STORY Ken Wysocky | PHOTOS Joe Vericker

From left, Ralph Savy, Gordon Sime and Dillon Fournier discuss details of an epoxy rehabilitation of a culvert in Ledyard, Connecticut.



A deteriorating chlorine contact chamber in a wastewater treatment plant, a broken large-diameter sanitary sewer mainline, a rusting pump deep inside a dam and a failing wooden water tower don't appear to have a lot in common.

However, they do for Savy & Sons, an infrastructure-restoration company that has leveraged decades of experience and know-how and advanced technology — plus a relentlessly positive, can-do company culture — to resolve these challenging problems and many others since 2008.

“If you want the best in the industry, you hire us,” says Travis Savy, a third-generation co-owner of the family company along with his brother, Ralph Savy III. “We’re professionals and we hold ourselves to a higher standard.”

What's the secret sauce that transformed the Connecticut-based company from primarily a masonry-repair outfit into a full-service business that does waterproofing, epoxy coating, pipe lining, media-blasting, and water and wastewater infrastructure rehabilitation? A big part of the recipe is a great work environment that helps employees reach their full potential, Savy says.

“We help them become more than they ever thought possible because there's no ceiling here. We need those kind of people to be the kind of company we are.”

From performance bonuses to weekly meetings where employees discuss assigned motivational books and videos, the company strives to retain employees and help them unlock their potential.

“It's all about building a certain culture,” Savy says. “For the last three years or so, we've invested significant time, money and effort into hiring and retaining people. We're not looking for anyone less than great.”

Savy candidly concedes it all might sound a little hokey to some people, especially for employees in a construction-related company. “We absolutely go against the grain,” he says.

And what if employees don't like this approach? “They're no longer with us,” he says matter-of-factly. “For a majority of people, it's not a good fit. But you're either in or you're in the way. We're not looking to drag a donkey up a hill.”

COMPANY BUILT BRICK BY BRICK

Based in Amston, Savy & Sons started out as Ralph Savy Sr. & Sons Masonry, founded by the brothers' grandfather, Ralph Savy Sr., in 1972. The brothers assumed ownership after their father, Ralph Savy Jr., died in 2007.

The duo rebranded the company as Savy & Sons in 2018. Marketing efforts to drive that new brand awareness include social media (including Facebook, LinkedIn, YouTube and Instagram),

FACING PAGE: In order to take on the epoxy rehab project, a Savy & Sons crew first had to divert a stream around the culvert to dry the pipe and prep it for coating.

“For the last three years or so, we’ve invested significant time, money and effort into hiring and retaining people. We’re not looking for anyone less than great.”

Travis Savy

From left, co-owner Ralph Savy, supervisor Dillon Fournier and waterproofing technician Tyler Smith use a DeWalt Tool construction heater in a stream bed to dry pipe and prepare it for epoxy coating by Epoxytec.

“We’re doing better than ever,” he says. “We take a lot of pride in upholding and improving the value of the company’s name.”

EQUIPMENT INVESTMENTS

That decision to provide multiple services required considerable investments in equipment and systems. “We need to be able to provide whatever our customers need,” Savy says.

To prepare pipelines for lining or coating, the company owns a truck-mounted water jetter built by Jetters Northwest and one self-fabricated trailer-mounted jetter.

The company also has invested in a Brute portable cart-mounted jetter (4,000 psi at 12 gpm), manufactured by Jetters Northwest; drain cleaning and milling machines from Picote Solutions and GI Industries; a portable vacuum unit from GI Industries; and two mainline-inspection crawler cameras from CUES.

For lining pipes, the company primarily uses a system built by Perma-Liner Industries. The business also owns a custom-built spraying rig manufactured by Spray-Quip with a Graco dual-piston pump, used to apply epoxy coatings, along with an EcoQuip media-blasting unit built by Graco and powered by a Sullivan-Palatek air compressor.

For epoxy-coating projects, the company prefers products made by Epoxytec.

EMERGENCY SERVICE

Savy & Sons often gets calls for tough emergency jobs. That was the case in August 2020 when a 42-inch-diameter concrete sanitary sewer line — laid in 1966 and corroded by sulfuric acid — broke in New Haven, Connecticut.

As a result, before city officials installed an emergency bypass, about 2.1 million gallons of raw sewage spilled onto city streets and into the nearby Mill River, which flows into Long Island Sound. The line reportedly carries an average of 3 mgd.

To repair the 100-foot-long section of damaged pipe, Savy crews worked for 20 hours straight. While employees jetted the line to loosen and collect debris, a subcontractor used a vacuum truck to remove it from the line, says Ralph Savy.

The crew then applied an industrial-grade, high-density, cementitious mortar product called Mortartec Silicate, made by Epoxytec.

“We spray-applied the product from ½ to 4 inches thick,” he says. “You can hang it in ‘lifts’ up to 2 inches thick, otherwise it sags. Then you wait about 15 minutes before applying the second pass in the areas with bigger chunks of concrete missing.”

SAVY & SONS Amston, Connecticut

FOUNDED:
1972

OWNERS:
Travis and Ralph Savy III

EMPLOYEES:
13

SPECIALTIES:
Waterproofing, water/wastewater infrastructure rehab, epoxy coating and pipe lining

SERVICE AREA:
New England region

WEBSITE:
www.savyandsons.com

radio advertising, email blasts and vinyl wraps on service vehicles, he says.

The company also partners with municipalities, engineering firms, general contractors, property management and water and wastewater management companies. Savy & Sons also attends trade shows and belongs to water and wastewater associations.

Statistics show that third-generation-owned companies are more prone to fail than to succeed. But the Savy brothers apparently didn’t get the memo. And ironically enough, a major catalyst for the company’s growth was the great economic recession that hit in 2008 and 2009, Savy says.

“We were doing a lot of construction-related masonry and waterproofing at the time. But when the recession hit, we had to pull back, be resourceful and think about what we needed to do to keep working.

“We decided that restoring municipal infrastructure was where we wanted to be, so we dove in harder,” he says. “In the end, we decided to envelop that space so we could be a one-stop shop for customers.”

The strategy has worked well, Savy says, pointing to an estimated tenfold increase in gross revenue since 2008.

“It was a really bad situation that we had to take care of quickly with a fast-curing product to get the bypass pumps offline,” he adds. “This was affecting probably tens of thousands of homes and businesses.”

PUMP REHAB REQUIRED

Another incident that exemplifies the company’s versatility involved rehabilitating a rusting pump inside the 400-foot-long Charles River Dam in Boston. The dam provides flood-protection for the Charles River basin via six large, critically important “bell” pumps (so named because of their shape), which help control the river’s water level by pumping excess volume in the basin into the city’s harbor.

When the dam was built nearly 50 years ago, the pumps were coated inside and out with a thick layer of coal tar to protect them from corrosion. But on one of the giant pumps — which are about 35 feet tall and roughly 30 feet in diameter — that coating was failing due to corrosion from salt and other elements, Ralph Savy says.

The pump is more or less built into the dam, making it nearly impossible to remove for rehabilitation. So Savy & Sons got the call to media-blast the coal tar down to an extremely high industry standard called a “near-white metal” level before applying a new protective coating.

“It was the middle of winter, so we had to heat the area with massive space heaters, as well as use a giant dehumidifier,” he says. “The water level



Savy & Sons team members dispatched for a CIPP lining job in Storrs, Connecticut, include, from left, field technician Jonathan Sartori, camera/robotics technician Ryan Spalla, company co-owner Travis Savy, pipe lining technician Adam Casale and sales and service representative Gino Padewski.

was 38 feet above where we were working, so they installed stoplogs to prevent water from coming down into the pump.”

First the four-man crew had to rebuild parts of the degraded pump with an industrial-grade, ceramic-filled and epoxy-based metal-filler product made by Belzona International. Then they vapor-blasted the pump with garnet media, using the EcoQuip media-blasting unit, he says.

A subcontractor with a vacuum truck collected the debris.

The last step involved coating the pump with an immersion-grade, high-performance, two-part epoxy coating, also made by Belzona.

MOTIVATIONAL LEADERSHIP, DEVOTED EMPLOYEES

As Travis Savy learned the ropes of masonry and waterproofing while working for his father, Ralph Savy Jr., the owner of Ralph Savy Sr. & Sons Masonry, he often found himself frustrated with the bad attitudes that seem to pervade construction job sites.

“In our view, the construction industry is filled with negativity,” he says. “The prevailing attitude seems to be, ‘It’s not my job, so you’re on your own.’ As human beings, it drove us into the ground.”

So when their father died in 2007 and the two brothers took ownership, they renamed the company Savy & Sons and vowed to not do business as usual any longer. Instead, the brothers embraced the concepts espoused by Grant Cardone, a well-known author, motivational speaker and sales trainer.

“We owe all of our growth and success to him,” says Savy.

In essence, Cardone posits that regardless of a situation, people can make a simple decision to either be positive or negative.

Savy concedes that others may laugh and snicker when they hear about the company’s emphasis on positivity in such a tough industry.

But he doesn’t care because the company’s success speaks volumes about the approach.

“We create our own culture by choice and find people who want to join and make us, and themselves, even better,” he says. “When we come on job sites, we’re a breath of fresh air. People tell me they’ve never seen so much positivity.”

“It was the complete opposite a few years ago, but we made a decision to not be that way anymore.”

To reinforce the positive ideals, the company holds two 15-minute meetings a week from 5:45 to 6 a.m. called Money Mastery Mondays and Freedom Fridays. For the former, all employees discuss a motivational or educational video sent to them the prior Friday.

At the Friday meetings, employees discuss a chapter in a self-help or personal-development book they’re assigned to read during the week. All of Cardone’s books have already been covered; other titles include *MAXOUT Your Life* by motivational guru Ed Mylett and *Leadershift* by leadership consultant John C. Maxwell.

In addition, every morning from 6 to 6:15 a.m., field technicians attend a Savy Success

meeting to share successes from the day before — no negativity allowed, Savy says.

How do employees react to all this? “They love it,” he says. “Sure, it’s different at first because they’ve never had to read a book for a construction job before. But it gets them out of their comfort zones and keeps them goal-oriented.”

“And I’ve had employees’ spouses tell me that they (Savy employees) now are completely different people at home,” he adds. “It’s been phenomenal.”

To help ensure positivity, as well as attract and retain employees, the company sometimes pays cash bonuses when they finish jobs ahead of schedule. Employees also are eligible to earn commissions if they sell a job.

In addition, if a project that’s expected to take 12 hours takes only 10, for example, the employees still get paid for 12 hours, provided no corners are cut and jobs are performed to company standards.

“It’s the same deal if it’s a weeklong job and they finish in four days,” Savy says. “We don’t want to penalize them for doing a great job and finishing early, nor do we want them to milk the clock.”



A crew from Savy & Sons prepares for a CIPP lining project in Storrs, Connecticut. The company primarily uses a lining system built by Perma-Liner Industries.

But the company embraces unusual challenges, as well.

“We love to solve severe problems for people by providing solutions that, in a lot of cases, they didn’t even know existed,” Travis Savy says.

Take the nearly 100-year-old wooden water tower that provides potable water to campers at historic Camp Kinder Ring in Hopewell Junction, New York. The tower’s wooden

“We love to solve severe problems for people by providing solutions that, in a lot of cases, they didn’t even know existed.”

Travis Savy

walls were failing and replacing it would’ve cost up to \$500,000, a significant cost for the owners, who

“The total coverage inside and outside the pump was about 4,000 square feet,” Ralph Savy says. “That may not sound like a ton, but let me tell you, when you’re inside a dam working on a project like that, it feels absolutely massive. It took two months to complete the job.”

WORKING UNDER PRESSURE

In another under-the-gun project in July 2019, the company was asked to rehabilitate a badly deteriorating concrete chlorine contact chamber at a wastewater treatment plant in New Haven, Connecticut. Finishing the eight-day job quickly was critical in order to minimize plant downtime, Travis Savy notes.

“We had to use a 135-foot boom lift to get the hoses up and over into the tank,” he says. “We also had to set up scaffolding because the tank was about 25 feet deep.”

The tank was divided into two sections. The company used pumps to divert wastewater flow from one half into the other one in order to keep one half dry during the rehab process, then reversed the process to work on the second half, he says.

“If it rained, we were in trouble because the flow would increase and overflow into the half of the tank where we were working,” says Travis Savy. As it turned out, it did rain during the first phase of the project, which forced the crew to start over and reprep the half of the tank on which they were working.

“At that point, the customer didn’t expect us to meet the deadline. But we worked over the Memorial Day holiday weekend and finished the project on time.”

The job entailed rehabbing about 24,000 square feet of concrete. The eight-man crew cut out or jackhammered any failing concrete and repaired those areas with two Epoxytec products — one an industrial-grade cementitious mortar and the other an epoxy-modified mortar. Then they spray-applied a 125-millimeter-thick coating of a moisture-insensitive, chemical-resistant, reinforced epoxy product, also made by Epoxytec, he says.

WATER-TIGHT SOLUTIONS

Savy & Sons handles a lot of conventional projects, too, such as lining municipal sewer lines or coating manholes to stop inflow and infiltration.

opened the children’s summer camp back in 1927.

But Savy & Sons rehabbed the tank for significantly less money and with just three months of downtime, he says.

After waterjetting the interior of the tank and vacuuming up the debris, workers used trowels and putty knives to fill gaps and voids in the tank’s wooden walls with an eco-friendly epoxy paste made by Epoxytec. Then they applied a 125 mm thick, water-tight coating of another Epoxytec product, a fiber-reinforced polymer epoxy that’s compatible with potable water, he says.

Projects like these burnish the company’s reputation and help it move toward its long-term goal: To be known as a company that’s not afraid to take on the most challenging jobs, Travis Savy says.

“We want to keep building our brand as a company that does superior work — fills that niche for tackling the toughest and highest-profile jobs. And if anyone can do it, it’s our guys.” **I&I**

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It Takes a Village

A sewer district's integrated approach aims to alleviate overflows in its member communities

STORY Traci Browne | PHOTOS Courtesy of The MDC

On your average sunny day in West Hartford, Connecticut, approximately 8 million gallons of water flows through the sanitary sewer system on its way to the state's largest treatment plant — The Metropolitan District's (The MDC) Hartford Treatment Plant.

It wasn't unusual for The MDC — a nonprofit municipal corporation serving eight member communities — to see as much as 69 million gallons flow through that one system during a rain event. So, yes, inflow and infiltration were a very significant problem for both The MDC and the communities it serves.

That situation was compounded by Hartford's 150-year-old combined sewer system and the 100-year-old sanitary systems of the surrounding towns that The MDC inherited when established in 1929. The unfortunate result was approximately 1 billion gallons of untreated wastewater that overflowed annually into area streams and waterways along with basement backups experienced by property owners.

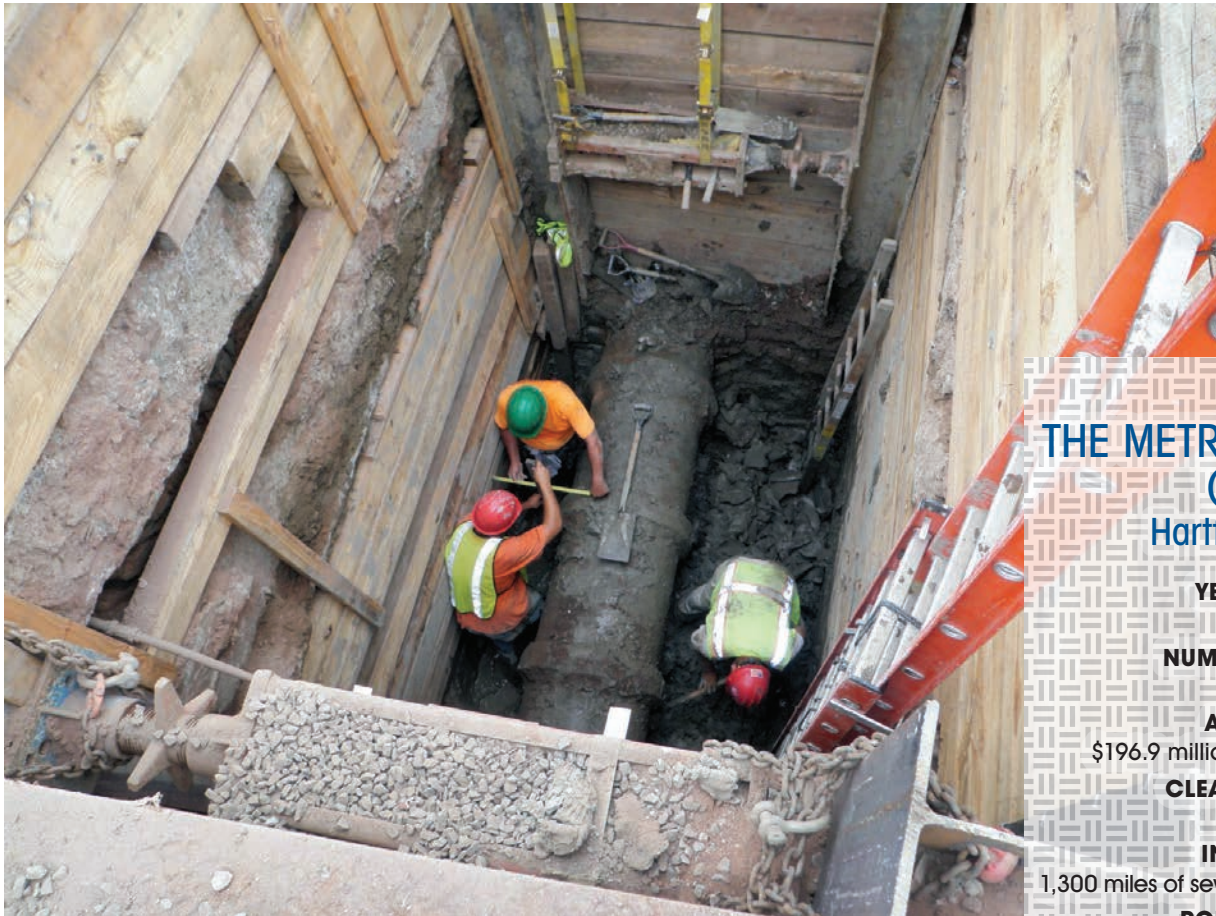
Those overflows caught the U.S. Environmental Protection Agency's attention, along with the Connecticut Department of Energy and Environmental Protection. In 2006, a federal consent decree and a state consent order were issued, calling for the complete elimination of SSOs in Wethersfield, Rocky Hill, Windsor, West Hartford and Newington. Also included in the consent decrees were necessary actions to be taken by The MDC and individual property owners to reduce inflow and infiltration of water into the sewer systems.

The MDC hired construction and engineering firm CDM Smith as program management consultant and Smith immediately started with a Sanitary Sewer Evaluation Study to identify areas with high amounts of I&I. This study included flow metering, flow isolation, smoke testing, CCTV and building inspections. Identified were sewers in need of rehabilitation and replacement and areas to target private inflow removal, both of which often require coordination with the individual towns The MDC serves.

“We have a whole department that’s dedicated to outreach, and we try to go into the neighborhoods and have meetings with people before we do projects.”

Susan Negrelli

One major initiative of the Clean Water Project is expanding the capacity of the Hartford Water Pollution Control Facility (pictured) and the Rocky Hill Water Pollution Control Facility. The expansions will result in fewer CSOs into the Connecticut River.



Crews work on a sewer separation project blocks away from downtown Hartford. The original pipes for the city's combined sewer system were designed for a population much smaller than today.

THE METROPOLITAN DISTRICT (THE MDC) Hartford, Connecticut

YEAR ESTABLISHED:
1929

NUMBER OF EMPLOYEES:
450

ANNUAL BUDGET:
\$196.9 million total / \$94.8 million sewer

CLEAN WATER PROJECT:
\$2.5 billion

INFRASTRUCTURE:
1,300 miles of sewer main in the collections system

POPULATION SERVED:
400,000 people served via 100,000 customer accounts



Susan Negrelli, director of engineering at The MDC, says her favorite part of the Clean Water Project is the massive South Hartford Conveyance and Storage Tunnel. The tunnel is four miles long, 200 feet deep and has an 18-foot diameter.



During a sewer separation project in Hartford, workers add a second pipe in the street to serve as a sanitary sewer.

THE CLEAN WATER PROJECT

To address all the problems uncovered in the study and outlined in the consent decrees, The Metropolitan District created a comprehensive plan titled the Clean Water Project.

Five components comprise the Clean Water Project:

- Eliminating both inflow from private property and infiltration via cracked or broken pipes and laterals, faulty connections, and deteriorated manholes.
- The separation of Hartford's combined sewer system.
- Construction of two storage tunnels (see sidebar).
- Installation of a mile-long, five-foot-diameter interceptor pipe. (This project won The MDC the National 2011 Public Works Project of the Year for the first-time use of curved micro-tunneling technology in the United States.)
- Critical upgrades to The MDC's Hartford Treatment Plant

Phase I of the CWP first tackled the infiltration in The Metropolitan District's system. Susan Negrelli, director of engineering at The MDC, explains that they immediately went after the quick fixes and easy wins with CIPP. By lining the mainline sewers and rehabilitating manholes, they were able to eliminate 10% of I&I. Another 20%-30% would be eliminated by lining laterals. The MDC has lined about 17% of its system with steam cured-in-place lining systems to date.

The more challenging piece of the puzzle to address in Phase I was the private property inflow sources. Sump pumps and foundation drains connecting directly into the sanitary sewer service are common in areas with older houses. This is where The MDC's outreach team was deployed for full effect.

“We have a whole department that’s dedicated to outreach, and we try to go into the neighborhoods and have meetings with people before we do projects.”

On the streets those projects are taking place, The MDC educates homeowners with a direct connection into the sanitary sewer on the need to install new laterals or perform foundation drain retrofits. In areas where private property fixes are critical, The MDC will coordinate the work, and in some cases, even pay for it.

FUNDING REMAINS A STRUGGLE

The MDC estimates that this private property work reduces I&I by an additional 20%, bringing the total reduction to 50%. And therein lies the problem.

“We’re 15 years in, and we’ve spent a lot of money on our project, and we’ve already eliminated half our overflows,” says Negrelli.

With the Clean Water Project, The MDC committed to spending just over \$2 billion to control combined sewer overflows, and in some cases eliminating them. So far, it has spent about \$1.8 billion, and yet it’s just halfway toward its goal. And sewer overflows are not the only issue needing to be fixed to meet the EPA’s consent decree.

As far as paying for this aggressive renewal, The MDC actively pursues funding through the State Clean Water Fund grants and loans, and from the issuance and sale of bonds by The MDC.

Negrelli says they’re lucky because the state of Connecticut has been very generous with its clean water funds.

Unfortunately for The MDC’s ratepayers, they must help pay back the debt that The MDC incurs. The Metropolitan District collects its sewer fees through an ad valorem system. However, The MDC also supplies water service to its customers, and it now includes a Clean Water Project fee based on their water usage. Currently, that fee is higher than the water rate property owners pay.

“It’s getting very difficult to keep raising that Clean Water Project charge every year. We can’t maintain this pace of spending that we’re doing right now,” says Negrelli.

AN INTEGRATED PLAN

For that very reason, The MDC went back to CTDEEP and said it needed to create an integrated plan that would fix the myriad of problems with more holistic solutions, and they would need more time to do it.

The extensive list of projects required for The MDC to meet its objectives creates competing needs and priorities. To assess each project’s relative priority, The MDC created a set of common scoring criteria to determine the

“It’s getting very difficult to keep raising that Clean Water Project charge every year. We can’t maintain this pace of spending that we’re doing right now.”

Susan Negrelli

importance of each project and benefit relative to one another. Projects that achieved the goal of overflow reduction and system rehabilitation ranked higher on its prioritization list.

The MDC submitted the integrated plan to CTDEEP in December of 2018 and is awaiting final approval.

“They’re working with us, we haven’t gotten approval yet, but I think they understand what’s going on,” says Negrelli.

But The MDC is not alone in convincing CTDEEP to give them an extension. The MDC is showing up at neighborhood meetings and town council meetings asking for help, and its efforts are bearing fruit.

“We received eight letters of support, and some towns submitted a proclamation supporting our integrated plan,” says Negrelli.

The Metropolitan District is a nonprofit municipal corporation chartered

ENGINEERING OPPORTUNITY OF A LIFETIME



Susan Negrelli

For Susan Negrelli, director of engineering at The MDC, her favorite part of the Clean Water Project is the South Hartford Conveyance and Storage Tunnel. The tunnel is the largest component of the Metropolitan District’s Clean Water Project with a \$500 million price tag.

“It’s not every day an engineer gets to be involved with a project like this. (The SHCST) is bigger than the dams that we built a hundred years ago,” says Negrelli.

The MDC contracted with Kenny/Obayashi, a joint venture of Granite Construction subsidiaries Kenny Construction and Obayashi Corp., which purchased the German boring machine used for the tunnel project.

The SHCST is a four-mile-long, 200-foot-deep, 18-foot diameter, deep-rock tunnel that will convey and temporarily store excess wastewater and stormwater from portions of South Hartford, along with sanitary sewer overflows from West Hartford and Newington. The corridor of the tunnel will also extend from West Hartford to the Hartford Water Pollution Control Facility.

The tunnel includes a 38-foot-diameter launch shaft, a 33-foot-diameter retrieval shaft and 74-foot-diameter pump station excavation shaft, drop shafts, adits, de-aeration chambers, and odor control at potential release points.

The MDC enlisted the help of students at Hartford’s Environmental Sciences Magnet School in the naming of the tunnel boring machine in keeping with tradition. That tradition says that the TBM cannot begin work until it’s been named, typically after a woman, to bring good luck to the project. This particular school was chosen because the tunnel will run right underneath the students.

The MDC conducted an essay contest, and the winning name for the TBM was Iris, which comes from the Greek word for “rainbow” and from the Greek goddess who personified the rainbow.

The author of the winning essay wrote that the tunnel would allow everyone to enjoy the rainbow, which appears after the storm.

So far, Iris has brought plenty of good luck and fortune. For Negrelli and her crew, it’s a once in a lifetime engineering project. For The MDC, the tunnel is on schedule and is about halfway complete. It is expected to be fully operational by 2023.

by the Connecticut General Assembly in 1929 to provide potable water and sewerage services on a regional basis.

In addition to water and sewer services, MDC also provides GIS mapping and household hazardous waste collection to eight member municipalities. Drinking water is also provided to portions of four nearby nonmember towns. **I&I**

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HOW TO MANAGE RISING EQUIPMENT COSTS

Six tips from an industry expert can help you decide whether to rent or own

By Association of Equipment Manufacturers

A major challenge facing companies in today's construction industry is dealing with rising equipment and rental costs. One key component to this is knowing whether to buy a piece of equipment or rent it, says Gregg Christensen, recently retired vice president of the national accounts at United Rentals. Founded in 1997, the company is the largest equipment rental company in the world.

"If there is a consistent level of equipment utilization, based on future projections of workload that can be counted on — the sweet spot of utilization, purchasing is the way to go," he says. "If there is a roller coaster of utilization, you're probably better off renting. Renting enables a company to augment its owned fleet with rental equipment to help smooth out workload peaks and valleys."

Sometimes though, the buy-or-rent decision boils down to whether a fleet has what it needs, when and where it's needed. A further consideration, adds Christensen, is whether a company has the appropriate staffing and transportation infrastructure in place to maintain, repair and transport its fleet of equipment. Staffing can be a challenge unto itself because of the construction labor shortage and lack of labor growth that continues to plague the construction industry.



Determining whether to rent or buy equipment like this Vermeer D23x30 S3 horizontal directional drill can be a hugely impactful decision for a business owner.

PLANNING FOR PROJECT NEEDS

"It has been my experience that in general, construction businesses are poor planners when it comes to equipment and a need for rentals," says Christensen. "At United Rentals, we try to be proactive to make sure we understand a company's equipment scheduling and the possible need for last minute rentals. Especially for larger jobs, we work with job site staff to try and get an idea of ebbs and tides in their project scheduling and staffing so we can have equipment available when appropriate."

Another way to reduce equipment and rental costs, he adds, is to appropriately service and maintain all equipment to ensure that it continues to function efficiently and properly. Equipment malfunction and failure can be costly due to equipment downtime, repair expenses, idle labor and project delays, all of which have a direct impact on construction costs.

Christensen says equipment cost reductions are also available through the use of a comprehensive telematics solution — which provides up-to-the-minute visibility into equipment health and activity — and predictive analytics.

Basically, predictive analytics uses several monitoring methods to establish regular trends and then predict the future path of those trends. With such insight, equipment owners can shift from a reactive repair-after-failure approach to a proactive repair-before-failure tactic. The end result, he says, is more efficient operations and increased fleet availability.

Christensen notes that United Rentals employs predictive analytics around major component wear-outs and failures, plus has developed effective preventive maintenance schedules. This helps avoid or reduce breakdowns, along with the expense and loss of productivity related to them.

"Renting enables a company to augment its owned fleet with rental equipment to help smooth out workload peaks and valleys."

Gregg Christensen

PRACTICAL TIPS FOR MANAGING COSTS

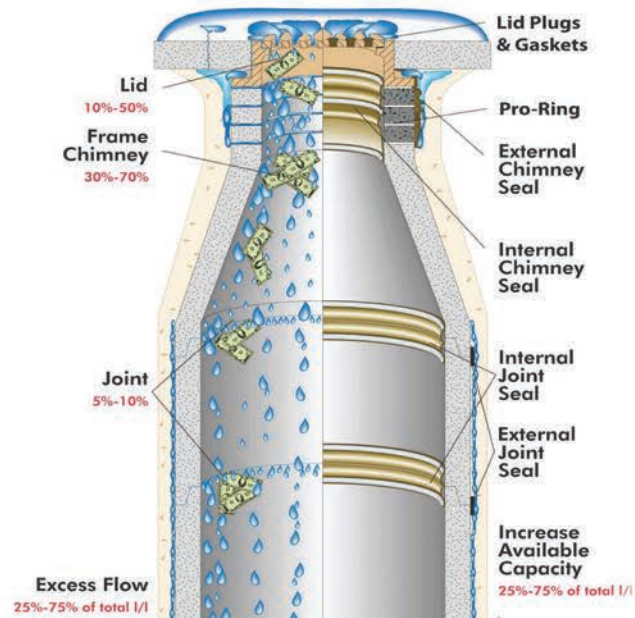
To help manage rising equipment and rental costs, Christensen offers some advice:

- 1 Utilization** – First and foremost, determine your project equipment utilization over 18 to 24 months. If a piece of equipment is going to be used over a certain percentage month in and month out, it typically stands to reason that the piece of equipment should be purchased.
- 2 Equipment** – Determine if you have the staff and infrastructure available to service and transport equipment.

HOW MUCH IS I&I IN YOUR MANHOLE COSTING YOU?

> Problems

- Leaking Lid
- Leaking Frame & Chimney
- Structure loss in Chimney
- Leaking Barrel Joints
- Leaking Pipe Joints



> Solutions

- Internal Chimney Seals
- External Chimney Seals
- PRO-RING
- Internal Joint Seals
- External Joint Wrap
- HydraTite Pipe Joint Seals
- Lid Plugs
- Inflow dishes
- Lid gaskets



Phone: 800-345-3764
E-mail: info@cretexseals.com
www.cretexseals.com



A hydraulic-powered Grundoburst 800G model rented from TT Technologies pulls the head through a sewer line. Some municipalities and contractors benefit from renting pipe-bursting equipment to keep costs down while pursuing I&I work.

3 Geographic footprint – Take into account the geographic footprint for where you might need other equipment because it is very expensive to transport construction equipment from place to place.

4 Scope and versatility – Think about the scope of a project, the specialty aspects of a piece of equipment and how to enhance the flexibility of equipment with attachments.

5 Data collection – Employ technology to track as much information from equipment as possible and learn how to leverage the data collected to boost efficiency, productivity and uptime, plus help stay on track and on budget.

6 Working capital – Consider whether you are better off using a line-item expense for rental on your profit and loss statement versus tying up a lot of working capital in assets that you may or may not keep using on a consistent and regular basis. If you have limited capital, where do you want to tie it up?

ABOUT THE AUTHOR

AEM is the North American-based international trade group representing off-road equipment manufacturers and suppliers, with more than 950 companies and 200-plus product lines in the agriculture and construction-related sectors worldwide. AEM has an ownership stake in and manages several world-class exhibitions, including CONEXPO-CON/AGG. **I&I**

By Craig Mandli



ACOUSTIC SENSORS DETECT LEAKS IN WATER NETWORK

PROBLEM:

A2A Ciclo Idrico (a company of the A2A Group) operates more than 1,800 miles of iron water pipes in Italy. As part of its intensive efforts to increase their efficiency, it has looked for advanced technologies that will enable it to reduce its water loss and energy costs.

SOLUTION:

The company initiated a **leak detection pilot** with **Aquarius Spectrum** which was carried out in Brescia City. Based on GIS data, 39 acoustic correlating sensors have been installed to cover around 9 miles of pipes. The pilot site was closed to Brescia's football stadium, and despite heavy traffic disruptions due to an important match, within two days all sensors were installed and activated. The sensors combined with cloud-based analysis software, and unique algorithms enable tracing and accurately locating hidden leaks.

Result: During the first week, 10 hidden leaks were found. One of them was a huge leak that had surfaced to the ground within a few hours from its time of detection. The next step was verification and pinpointing of POI raised by the AQS-SYS fixed monitoring system, so it used Aquarius' smartphone-based mobile leak detection equipment — iQuarius. In total, 20 leaks have been verified and fixed in just a few months. Thanks to the successful pilot, the Italian utility has purchased 235 AQS acoustic sensors that will allow it to continue monitoring the current area and to expand to additional areas.

www.aqs-systems.com

WHEN COVID WEIGHS DOWN COLLECTIONS SYSTEMS, PREDICTIVE TECHNOLOGY LIGHTENS THE LOAD

PROBLEM:

Initially, the COVID-19 pandemic brought well-publicized shortages of toilet paper and created a high demand for wipes, masks and latex gloves. These sewer-unfriendly items unfortunately found their way into conveyance systems, forming blockages and fouling pumps. Maintenance staffs were challenged to apply their limited resources, like hotspot cleaning, as they lacked the means to see a developing blockage in real-time.

SOLUTION:

To address this, 82 utilities across the U.S. took advantage of a technology from **ADS Environmental Services**. Using existing flow and/or level monitoring networks, they joined a pro bono program that added machine-learning-based, predictive software to detect developing blockages in very early stages. The software identified and prioritized locations based on urgency, providing up to a week's worth of advanced notice. Thus, they were able to target limited maintenance resources and mitigate sanitary sewer overflow threats. This program prevented a total of 80 SSOs from May through October.

Result: Some of these utilities went further and hypothesized that this predictive technology could be used to reduce scheduled cleaning where they were often cleaning clean pipes. Three studies tested this hypothesis. Cleaning high frequency sites was performed only as the software indicated. Reductions of 80%, 86% and 94% were achieved with no SSOs. The pandemic has shown that predictive, machine-learning software is creating new opportunities for SSO prevention and substantial maintenance efficiency increases.

800-633-7246; www.adsenv.com

BLOCKAGE PREDICT

Location	Date	Status	Depth Trend
3853-66	09/17/2019	⚠️	
3549-74	09/17/2019	✅	
3551-78	09/17/2019	✅	
3749-62	09/17/2019	✅	

DEVICE SEALS LEAK WITHOUT REPIPING

PROBLEM:

A shopping plaza in California noticed an increase in its water bill. After some investigating, maintenance crews were able to pinpoint the cause of the issue being a leak located in a 3/4-inch line running below hardwood flooring. The leak was losing 1.4 gpm.

SOLUTION:

The **Aquapea** from **Internal Pipe Technologies** was chosen as the preferred solution to seal the leak. Crews used an external pump to boost the unusually low city water pressure. The device was launched into the system to seal the leak. It traveled through the line and was drawn to the leak's location by the flow of the escaping water.

Result: In this situation, it took approximately 45 seconds for the Aquapea to find and seal the leak. The shopping plaza now has a 0.0 gpm leak reading.

325-788-1139; www.internalpipeotech.com



FEATURED PRODUCT

PREVENT COSTLY SSOs WITH SUPERIOR SMOKE'S TESTING PRODUCTS

For over 60 years, **Superior Smoke's testing technique** continues to be

used with great success by thousands of municipalities in all 50 states, and around the

world. Hundreds of millions of feet of sanitary sewer mains have been effectively tested using Superior Smoke products, eliminating countless faults and costly

SSOs. A fast and cost-effective method to find all sources of surface inflow to sanitary sewers, smoke candles find problems quickly and cost-effectively. Superior's classic smoke candles provide a highly visible smoke to find more faults at a longer distance. Superior Smoke's fluid systems feature a stainless steel injector to maximize dry smoke output, producing a higher quality, liquid-based smoke.

800-945-8378; www.superiorsignal.com/ll



CATCH BASIN RISERS VALUABLE COMMODITY FOR CONTRACTOR

PROBLEM:

J.C. Lee Construction & Supply was founded in 1977 and is based in Petrolia, Pennsylvania, and specializes in drainage subcontracting on highway projects, with more than 95% of its work for the Pennsylvania Department of Transportation. The big line items on its contracts are usually the installation of underground drainage pipes and large culverts, but there are plenty of details like catch basins to take care of too. Getting these details right is often the key to a high quality, profitable project.

SOLUTION:

Catch basin risers are used when inlet grates need to be raised to the final elevation of new paving. Rather than excavating the old rim and installing new grade rings — which can take hours and exposes crews to pinch and strain injuries — precisely sized **American Highway Products risers** are simply placed into the original rim, where they are tapped into place to provide a new, at-grade rim for the original inlet grate. Because they have a long history of use and are made of sturdy U.S. steel, the Pennsylvania DOT (and most DOTs) approve them for all projects. Even while exposed, they are strong enough to support heavy truck traffic and can stay in place during construction and milling.



Result: In all the years the company has used them, J.C. Lee has never seen an American Highway Products riser fail. So fairly often, the final appearance and performance of the inlet is actually improved by the use of a riser, since no edges are exposed. "I'm able to order riser height in 1/4-inch size increments starting at 3/4 inch, and dimensionally in 1/16-inch increments, in every dimension," says Andrew Lawrence, a civil engineer with J.C. Lee. "I really don't know what we'd do without them."

888-272-2397; www.ahp1.com

(continued)

DATA HELPS CITY TACKLE RAINWATER OVERFLOW ISSUE

PROBLEM:

Dublin, Ohio, contracts with Columbus for drinking and wastewater. In the early 1990s, Dublin found that it was buying 2 to 3 mgd from Columbus, yet when it rained, the city was pumping over 10 mgd. That increase created overflows at its pump station, resulting in significant property damage in homes in two sensitive areas.

SOLUTION:

The city turned to **Hach Flow's Data Delivery Services**. DDS is an efficient flow monitoring service where, for a fixed monthly fee, Hach Flow provides all the equipment, resources and support the city needs to acquire real-time flow data. With DDS, the city was able to see how rainfall affects its sanitary sewers and employ a more proactive bypass pumping plan. DDS level alarms provide it with real-time text message alerts when the sewer is being affected by the rainfall.

Result: “[With DDS] we get reliable, dependable and real-time data either on our computer or as text messages on my phone,” says Bill Graubaugh, operations administrator. “We have responded in every instance before sustaining any property damage. The elimination of cleanup costs alone, not to mention the bad publicity, is worth every penny. With DDS I have instant access to data and alerts. I know immediately when something goes awry. It is very clear to me that this is the way to go. I have nothing but praise for this system.”

800-227-4224; www.hach.com



ELECTRODE LEAK LOCATION HELPS FLORIDA UTILITY IDENTIFY INFILTRATION

PROBLEM:

After spending decades and millions of dollars rehabilitating sewer pipes across its service area, a large coastal Florida utility realized its legacy pipe inspection program was failing to reduce excessive and unwanted infiltration.

SOLUTION:

The utility engaged **Electro Scan** to perform a **Focused Electrode Leak Location** pipe inspection program, comparing equal lengths of 50-year-old unlined vitrified clay pipe, newly lined cured-in-place pipe, and 15-year-old CIPP liners to evaluate its efficacy to support improved rehabilitation strategies.

Result: Remarkably, the 50-year-old unlined VCP performance for controlling I&I was 2.5 times greater than the newly rehabilitated CIPP liners. This single finding resulted in an immediate priority to inspect all remaining VCP to identify which pipes do and do not require further attention at this time. The cost avoidance benefit of this alone will exceed several million dollars. A side-by-side comparison was also performed between FELL and legacy CCTV inspection results. By stark contrast, FELL documented 1,188 individual infiltration defects, compared to just 34 defects identified by CCTV inspection. More importantly, FELL inspection found 74% of customer taps were defective, compared to only 3% seen using CCTV inspection.

800-975-6149; www.electroscan.com

TOWN FINDS EASY SOLUTION FOR ROOT INTRUSION ISSUES

PROBLEM:

The town of Brandon, Vermont, dealt with continuing root intrusion issues in an 8-inch gravity sewer that originated on Pearl Street, and runs along Maple Street. The route has a couple of Crimson King Maple trees that the town considers aesthetically valuable, but have large and far-reaching root structures belowground.



SOLUTION:

RootX is deposited in the manhole at the end of the line on Pearl Street along with about 20 gallons of water. “We treat the line without having to spend about half an hour with the rodding machine and/or 15 minutes with the flusher machine dragged behind the truck,” says Town of Brandon Chief Operator Steve Cijka. “We have 12 river crossings and many are not in a spot to drive a truck up to with a flushing machine, but we can always carry a 40-pound box of RootX to the manhole to treat the line where our machinery cannot reach.”

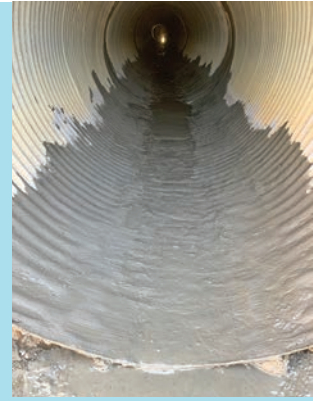
Result: “There are only two of us on the crew to maintain six pump stations, 22 miles of sewer line, and a 700,000 gpd design extended aeration wastewater plant,” says Cijka. “Being I am 61 and my assistant is 55, we strive to work smarter not harder. The town manager has allowed us to buy a small pallet of RootX at a time to treat a substantial area, so in approximately 4.5 years we would have treated the whole system once.”

800-844-4974; www.rootx.com

LINING USED TO KEEP STORM PIPE FROM COLLAPSING

PROBLEM:

The city of Carmel, Indiana, was in a dire situation when a rusted water pipe ruptured, creating a massive sinkhole in the road at a major intersection. Fortunately, officers arrived at the scene and were able to secure the area surrounding the 12- by 18-foot hole before any accidents occurred. The storm pipe was removed and replaced, but the city was faced with another obstacle: There was another 220 linear feet of storm pipe between the replaced section and a drainage lake that could collapse at any time.



SOLUTION:

Removing the remaining pipe was not a practical option due to the location of utilities in the area. Conco Spray Solutions provided the city with an alternative solution: a structural liner that would hold infiltration back and provide a long-term structural solution with a 50-year design life. Time was of the essence, so after the lake was pumped down, the pipe was dried and cleaned to remove debris. The Conco Spray team pressure washed the pipe surface at 5,000 psi. Mortar was used to repair rusted voids in the invert. As voids were filled, more leaks became evident, so chemical grout was utilized. The ASTM F1216 formula was calculated using a fully deteriorated pipe for a 50-plus-year design life. **Sprayroq's SprayWall lining** was applied at a thickness of approximately 630 mils.

Result: By providing a quick application and not removing the existing structure, Conco Spray Solutions minimized the disruption of traffic flow and preserved the natural landscape.

205-957-0020; www.sprayroq.com

SPINCASTERS REDUCE MANHOLE REPAIR TIME BY 50%

PROBLEM:

Manhole rehabilitation in southern Texas is not for the faint of heart. Thousands of manholes and an aged sewer system create complexities beyond a typical rehab project, including infiltration concerns and even structural collapses, all while navigating inside confined spaces.

SOLUTION:

For National Works and its fleet of **HyFlex Slinger spincasters** and 30GM pump and mixer systems, manhole rehabilitation is just another day at the office. Chris Olmstead, operations manager at National Works, and his team put HyFlex equipment in the forefront of planning to meet timeline and productivity goals. The spincaster applies a specialty cementitious lining called SewperCoat to manholes with lim-

ited entry time, increasing efficiency through repetition while eliminating errors found with traditional manual application methods. Approximately 50% of the work gets completed before a contractor enters the manhole for hand finishing/troweling. Olmstead and his team map out subproject areas when managing geographically expansive projects, using a fabricated system for manholes grouped in a close proximity. For remote locations, portability and the small footprint of the Slinger and 30GM allow equipment to be within a couple hundred feet of the manhole to pump material to that distance, which isn't possible with other equipment. This process ensures evenly spread materials, elimination of confined space issues, and improved safety.



Result: National Works is receiving high job performance ratings and crew satisfaction with the HyFlex Slinger and 30GM equipment. Project time is significantly reduced. Consistency and safety factors are greatly improved. Utilizing a fleet of high-quality equipment ensures that all projects stay on track.

866-849-6246; www.hyflexcorp.com **I&I**



There are numerous sensor technologies available that serve different applications in flow monitoring programs. Depending on the goals of your program, more than one sensor style may be required.

SEEING I&I

How to establish an advanced flow monitoring program

By Tim Dobbins

As sanitary sewer overflows become less tolerated by state and federal agencies, more utilities are turning to advanced flow monitoring programs to predict, record and monitor inflow and infiltration.

Monitoring flow through a system wasn't always as simple and efficient as it can be today. In the past, recording was performed by collections personnel out in the field, or even through residents reporting overflows. Through that method of recording, it was very common to see the end result of the problem and not necessarily the leading cause of the issue.

Technological advancements in flow monitoring allow users to rely on sensors and recording equipment to automatically read and document flow depth and flow rate to determine if I&I issues are occurring within a system. The data gathered is useful in designing a rehabilitation plan to correct the issues at their specific locations. Once the rehabilitation has been completed, the monitoring data is also valuable as a follow-up measure to depict the success of the improvements made.

Through utilization of technological flow monitoring programs, it is much easier to keep eyes on your system in multiple areas at all times. In many cases, they help determine what is causing a problem or notify personnel that a problem is developing before it becomes a costly or detrimental issue.

STARTING A PROGRAM

Setting up a proper flow monitoring program isn't as easy as just plugging in a sensor and waiting. It takes well-designed monitoring technologies and careful planning and preparation.

"Step number one is to understand what you want to get out of a system like that," says Kevin Enfinger, product manager for ADS Environmental Sciences. "Then it's important to understand the layout of your system. Where do these things need to be deployed is often a big question."

Using your objective with an understanding of the layout of your system, it's much easier to develop a plan and figure out how many monitors are needed and the potential places to set them up.

"Sometimes locations are at odds with their purpose. For example, where you might locate monitors in ideal places for a hydraulic model to be most successful may not be the same places you would locate them for an I&I study," says Enfinger.

"I think of sensors in terms of tools in a toolbox. You may need several tools or a combination of tools to get a job done."

Kevin Enfinger

Picking a location where a monitor or sensor is likely to succeed is crucial to getting the most accurate results. A lot of high-level planning for monitoring studies is done initially at the map level, usually through GIS information, but sometimes choosing the best location with only a map is difficult.

"Once you actually go out to install and deploy these devices, you have to put some expertise on the ground — people who are familiar with installing these devices," Enfinger says. "They may find the desired location

for one reason or another doesn't have the right conditions to be monitored successfully."

There are a lot of factors that can lead to placing the sensor in a location different from what was chosen at the map level. Perhaps the manhole is in the middle of a busy street, or it may be difficult to divert traffic to service at that particular location, or it ends up being in an area that has confined spaces or other limitations affecting safety.

The variability in locations available to utilities for sensor placement — and the number of unforeseen restrictions — means that one sensor does not fit all applications.

SENSOR OPTIONS

Various sensor technologies are available for different applications. Depending on the goals of a program, more than one sensor style may be needed to perform the task, so it boils down to understanding the objective before purchasing and placing.

"It's important to understand the layout of your system. Where do these things need to be deployed is often a big question."

Kevin Enfinger

Different sensor technologies have different strengths and weaknesses and are built for different applications or variations in placement, according to Enfinger. "I think of sensors in terms of tools in a toolbox. You may need several tools or a combination of tools to get a job done."

For example, the type and location of a sensor will differ depending on the size of the pipe where the sensor is to be placed. Some sensors will also have tradeoffs in accuracy versus cost or ease of use, and when selecting technology for I&I, accuracy matters.

Inflow sensors mount to the bottom of a pipe and gather information as the fluid flows over them, providing the most accurate velocity reading, but they do require technician entry for installation and can be corrupted by debris over time.

Downward-looking sensors are also mounted inside the pipe at the top, using a beam to bounce off the surface of the fluid to measure velocity and depth. The top-mounting location makes it less likely to gather debris, but these sensors tend to be more costly, and they still require technician entry for installation and may not be as accurate for velocity readings.

As far as maintenance goes, most times if the sensors are installed properly and in good locations, they will run for a long time without intervention, with battery life being the limiting factor. However, there are certain situations when the sensor needs to be placed in a position that is not ideal.

"Probably the most common area we see that causes problems would be in a site with slower velocities that are prone to silt or sediment buildup," says Enfinger. There may be situations when sensors need to be placed in those areas to achieve the desired monitoring objective, and in those situations, it should be noted that the equipment may need more maintenance than the others.

ORGANIZING THE DATA

One of the biggest improvements to flow monitoring technologies is the way we are able to collect, assemble and share the data. In the past, Enfinger says he's seen many cases where people were overwhelmed by the sheer amount of data points collected from a group of flow monitors. The number of different data sets they are collecting and the frequency at which they are taking the measurements can equate to what seems like an infinite amount of data over the span of the study. A proper way to sift through the information is critical.

"We have found in recent years that cloud-based technology allows us to put data in one place at people's use very easily," he says. "Another thing



these modern applications allow is to interface more easily with other applications."

Applications like webhooks allow data to be pushed from one system to another and can be used in alarm instances. For example, an alarm signifying infiltration or changes in flow can be pushed instantaneously to a SCADA system to where an operator can see it.

These software advancements also open the door to displaying collected data in a way that is easier to consume. "The brain processes large amounts of data quite easily in graph form," Enfinger says. "There are two types of graphs we rely heavily on in the flow monitoring world — a hydrograph and a scatter graph."

A hydrograph displays depth, flow velocity, flow rate and similar data points over time. These allow viewers to easily see what is coming down a pipe and when. A scatter graph in flow monitoring specifically plots depth versus velocity. Displaying the data in these straightforward graphs can be useful when presenting the data to the public in an effort to illustrate how effective renovations were, or to show potential problem sites where funding is needed.

WHY IT MATTERS

Closely monitoring flow in a system is a critical step in identifying, predicting and eliminating I&I, helping to prevent sanitary sewer overflows. By compiling data in an organized way and having the resources to interpret it, utilities are able to prevent water quality problems, protect public health from back-ups in homes and reduce the release of untreated flow into natural waterways.

The knowledge gained from data gathered helps reduce I&I before the design and construction of wastewater treatment upgrades, identifying where I&I exists and allowing communities to make informed decisions about how best to tackle the problem. **I&I**



“We had to think out of the box to do four in one day. We also had to get past the mental hurdle, sort of like breaking the four-minute-mile barrier.”

Ken Beyer

Russell Joe, Brian Dacey and Johan Lindholm prepare to shoot a liner through a calibration tube that keeps it from expanding.

A SURE CURE

A pipe lining newcomer completes four lateral lining jobs in one day with a new product that allows liners to cure unattended

By Ken Wysocky

Lining one or two sewer laterals in a day would be considered great production by anyone’s standards in the trenchless pipe rehab industry. Doing four lining projects in one day — performed by a company that’s never even lined a pipe before, no less — sounds almost impossible.

But that’s exactly what Russell “Russ” Joe, the owner of Quality Sewer & Drain Cleaning in Danvers, Massachusetts, accomplished last July in Boston. With a strong assist from Ken Beyer, owner of Clog Squad in Hamilton, Michigan, Joe and his employee, Brian Dacey, lined approximately 225 feet of failing clay and cast iron sewer laterals at four different homes.

The total time to do all four linings was about eight hours, including travel time between job sites. Gross revenue for the projects was around \$35,000.

“In just one day, we basically made back the money I invested in the lining equipment,” says Joe, who established his company in 2016 and works

primarily on the north side of metropolitan Boston. “My philosophy is that scared money doesn’t make money,” he adds, noting that taking calculated risks on new technology is essential to growth.

And for any doubters, Joe streamed parts of all four jobs live on Instagram. He estimates that thousands of contractors watched it live; eventually, the videos received more than 15,000 views on Instagram and another 3,000 views on Facebook.

“It was a pretty big to-do to shoot four liners in one day, especially on our first go-around,” Joe says. “I thought it was pretty amazing. It shows what can be done if you’re willing to learn.”

A CURING INNOVATION

Initially, no one intended to line four pipes in one day. But the more Beyer thought about it, the more he thought it might be possible. The reason for his

optimism was a new device he'd developed called a curing cap, which essentially allows contractors to leave job sites and let liners cure unattended.

"I was headed out to Boston for a week to train Russ," says Beyer, whose company also sells drain cleaning equipment and trenchless pipe rehab systems. He also runs a Clog Squad Academy for pipe lining training. "He had five lining jobs already lined up fairly close to each other, and I had just come up with the curing cap, so it seemed like doing four of those jobs in one day just might be doable."

Joe admits he was a bit skeptical at first. "I definitely was a little nervous, too," he says. "I didn't think there was any way we could do four in one day. But we banged them out."

It helped that the jobs were close together and that any required excavation was done the day before. But the real key to success was the curing cap technology, Beyer says.

"As soon as the 'shot' is completed, the cap goes on where the pipe terminates," he explains. "Then we just put hot water into the cal tube (a bladder that keeps the liner tight against the walls of the host pipe) and hook up an air compressor to regulate the pressure and be sure it doesn't drop. That frees you up to leave and go on to the next job and the next job."

Without the cap, the liner would have to remain hooked up to the inverter, with hot water circulating through the inverter into the liner, which would require continuous monitoring. In addition, doing multiple jobs in one day would require a water heater, an inverter, an air compressor and other items on each job site. That would make doing multiple jobs a day an expensive proposition, he says.

DYNAMIC DUO

To line the pipes, Joe used a Sactools inversion drum, which Beyer helped develop for the U.S. market in conjunction with Sacpro AB, a Swedish company that makes pipe lining systems. He used liners made by Sacpro (Clog Squad is the U.S. distributor for Sacpro) and MaxLiner USA.

The crew also used resins made by Trelleborg Pipe Seals. The resins can be heat-cured in about 1 1/2 hours by either hot air or hot water. But they can stay pliable for up to 12 hours before heat is applied. "That takes away that time bomb ticking on you," Beyer says.

Joe and Dacey did the work, supervised by Beyer and Johan Lindholm, the owner of Scandinavian Relining in Finland. Lindholm does pipe lining training for the academy.

"We had to think out of the box to do four in one day," Beyer says. "We also had to get past the mental hurdle, sort of like breaking the four-minute-mile barrier."

"If you deviate from the process and try to cut corners, you only create problems for yourself."

Patience is a virtue when it comes to pipe lining."

Russell "Russ" Joe

"We were there just to instruct and provide guidance. Russ and Brian did all the work. For them to do that many linings on their first time doing it was pretty unbelievable. Russ is amazing."

"It was hands-on training, not just us standing by and watching," Joe adds. "We couldn't possibly have done this without Ken and Johan. They're a huge inspiration to us and awesome mentors."

FULL DAY'S WORK

The four projects were similar in scope, with each one requiring at least one excavation pit. All the laterals suffered from cracks and some had root intrusions. But all were structurally sound and good candidates for lining, Beyer says.

The first shot started at about 8:25 a.m. on July 29, a 93 degree F day in Boston. It involved lining about 70 feet of 6-inch-diameter clay pipe, Beyer says. Because the home had no basement or clean-out, a pit had been dug down to the pipe, several feet away from the house. Joe shot a MaxLiner liner from that pit out to the mainline. The total time for job one was about two hours.

After a 15-minute drive, work began on the second job — a 37-foot-long stretch of 4-inch clay and cast iron pipe that Joe lined with a Target liner. Like the first job, there was no basement or clean-out available, so he had to dig a pit in the yard. He shot the liner from there to an entry in the home's slab foundation. The job was finished by 11:45 a.m., Beyer says.

The third job was another 15-minute drive away and centered on a 73-foot-long section of 4-inch cast iron line that transitioned to a 6-inch clay pipe.

(continued)



Each one of the four pipe lining projects the crew completed required at least one excavation pit.

Johan Lindholm teaches Quality Sewer & Drain Cleaning owner Russell Joe (right) and his employee Brian Dacey how to attach the liner to the nozzle of the Sactools inversion drum.

This time a clean-out was available in the home's basement, so the crew shot a Target liner from inside the home's basement. That job ended around 1:45 p.m., he says.

The last job was about 15 minutes away. For this project, Joe used a 45-foot-long Target liner to rehab a 6-inch clay pipe that transitioned down to a 4-inch cast iron pipe. The shot started at about 2 p.m. and ended at about 3 p.m. The crew used a clean-out in the home's basement to shoot the liner from inside the house, Beyer says.

The last step involved going back to each job site and inspecting the liners, which they finished at exactly 4:58 p.m., Beyer says. "We wanted to finish by 5 p.m., and we just made it."

ALL ABOUT THE PROCESS

The process at all four jobs was similar: inspect the pipe with a camera system made by CustomEyes Cameras, mill them out with a Clog Dog milling machine manufactured by Clog Squad, jet the line with a Soldier trailer-mounted water jetter (3,000 psi at 12 gpm) built by Spartan Tool, reinspect the line, take measurements with the camera, build and wet-out the liners, and shoot the liners.

"Before shooting the liners, we also tested all the equipment to make sure everything was 100% operational," Joe says. "It all went pretty smoothly. There were a few hiccups here and there, but that's to be expected with lining pipes."

The hardest part was following all the instructions and adhering to exactly the same process every time, Joe says.

"If you deviate from the process and try to cut corners, you only create problems for yourself," he says. "Patience is a virtue when it comes to pipe lining."



Beyer's takeaway from the day is: Don't let conventional beliefs limit expectations. "Don't box yourself in by thinking you can only do one liner a day," he says.

For anyone thinking about getting into pipe lining, Joe suggests going into it 100% committed. It's a big capital cost upfront, but the payback is quick, he points out.

"We've shot 1,028 feet of liners since then. We now feel very comfortable with the process and love doing it. Sure, things can go wrong. ... But it works if you stick to the method, be patient and don't cut corners." **I&I**

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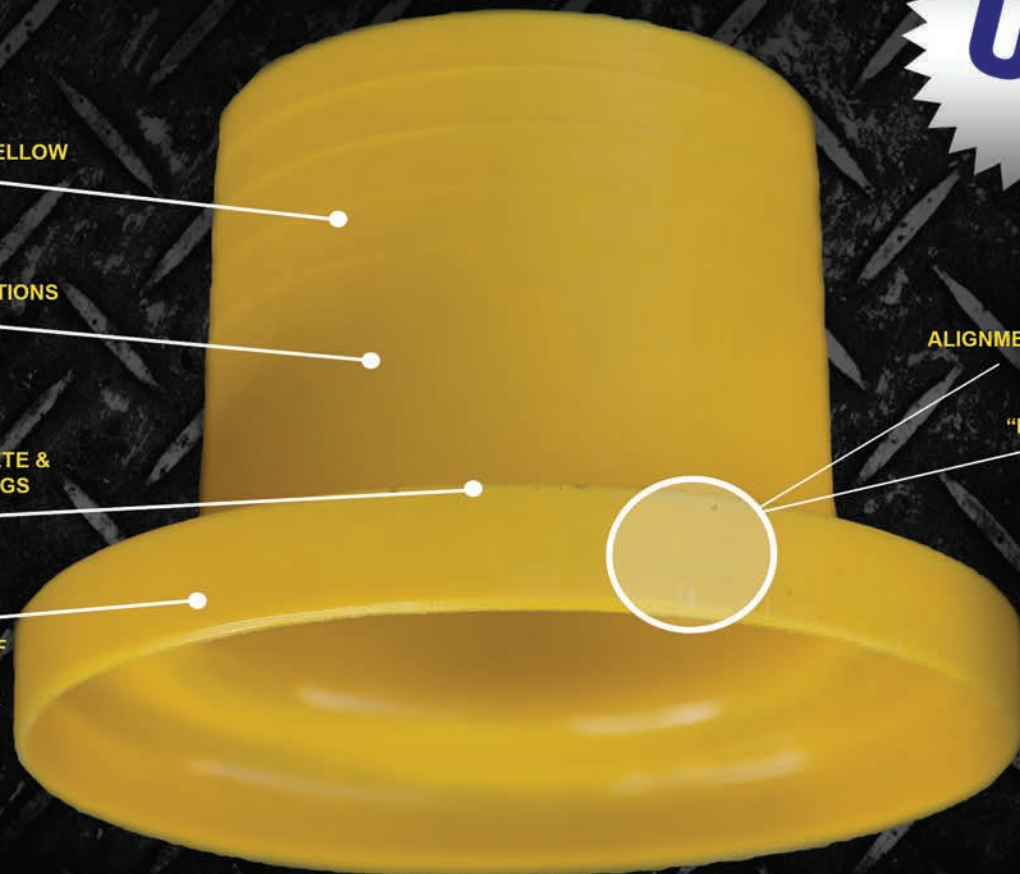
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