Trenchless Technologies

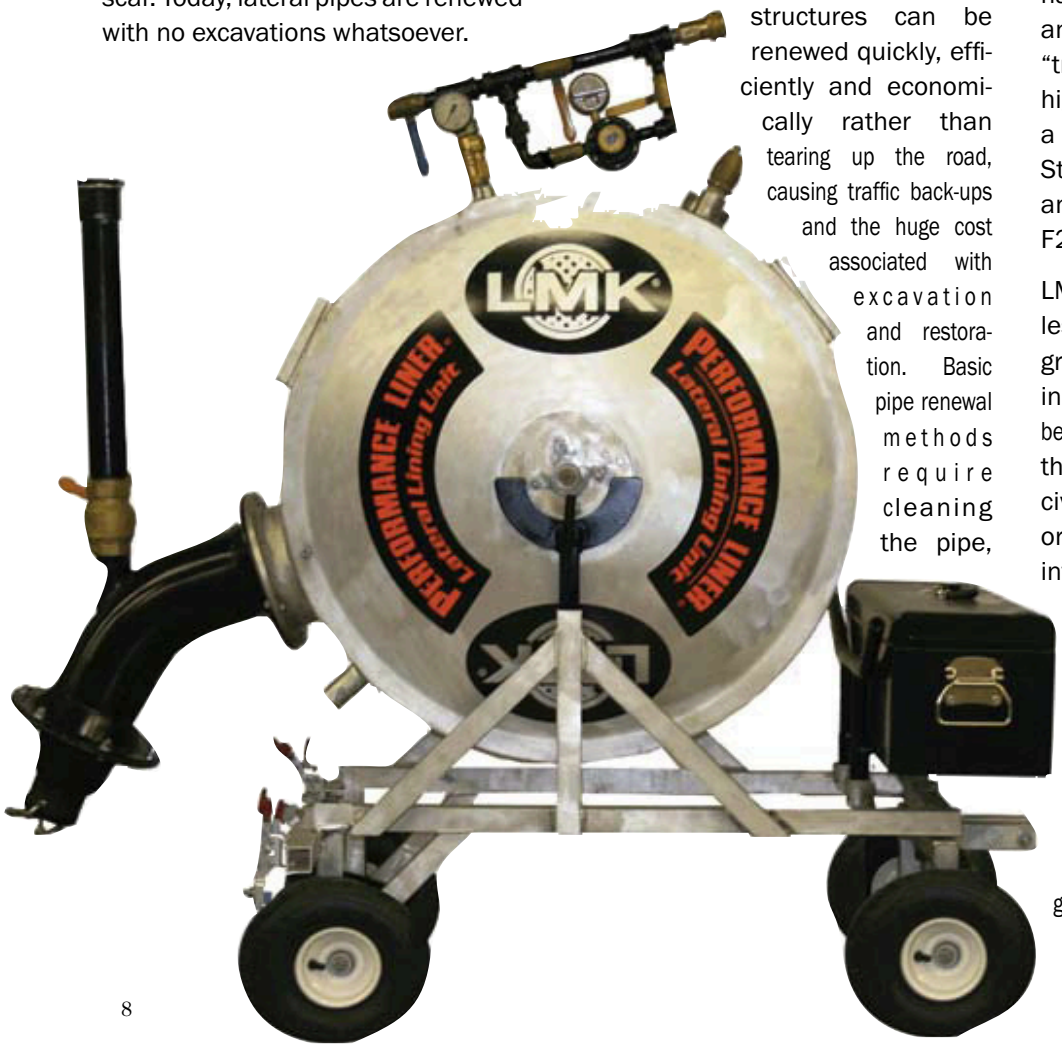
Quicker, Cleaner Greener and Cheaper Ways to Get the Job Done

By Kristina Breese
LMK Enterprises, Inc.

The words surgical and precision often appear in articles and marketing material promoting trenchless technology, and for good reason. Advances in sewer repair techniques have resulted in procedures that are less invasive, more cost-effective, allow for a quicker return to everyday activities, and don't leave behind a big, ugly scar. Today, lateral pipes are renewed with no excavations whatsoever.

When Rick Gage, national sales director for LMK Enterprises, describes how his company's trenchless lining systems are applied, it sounds a lot like outpatient surgery.

"Let's say you had a broken pipe under a four-lane highway, you might be concerned about the pipe collapsing. With our patented rehabilitation methods, pipes and similar structures can be renewed quickly, efficiently and economically rather than tearing up the road, causing traffic back-ups and the huge cost associated with excavation and restoration. Basic pipe renewal methods require cleaning the pipe, video inspection to document the condition of the pipe for proper structural design and achieving the least disruptive installation procedures. Then a tubular liner is saturated with a curable resin, inserted into the pipe and cured. You're basically in and out in two or three hours with no digging and no restoration. These rehabilitation technologies have catapulted the civil engineering and construction industry into the "trenchless" arena of advanced and highly technical design formulas with a minimum service life of 50-years. Standard practices for installation and materials are found in ASTM F2561-06 and F2599-06.



LMK is on the leading edge of trenchless technology. Instead of opening great swaths of earth, as is done in open-cut projects, they're operating beneath the surface, without disturbing the environment above. For some civil engineers, no-dig construction or rehabilitation of underground infrastructure may be an unfamiliar option. LMK and its network of licensed installers that specialize in trenchless technology are more than willing to help educate the uninitiated.

"We're doing research and development every day;" Gage said. "If anyone would like to take a day and get an education, our doors are open."

The North American Society of Trenchless Technology (NASTT) defines trenchless technology as a "family of methods, materials, and equipment capable of being used for the installation of new, or replacement, or rehabilitation of existing, underground infrastructure with minimal disruption to surface traffic, business, and other activities."

Rehabilitation today includes municipal sewer mains, sewer laterals, manholes, wet wells, water main, water service lines, natural gas mains and gas service lines. A variety of unique installation methods, equipment and materials are utilized for rehabilitation of America's subterranean infrastructure. A few of the most common installation practices include sliplining, cured-in-place pipe (CIPP), cementicous linings, epoxy coatings and pipe bursting. These techniques offer alternatives to traditional open-cut methods for replacing or repairing buried pipelines and similar structures.

Trenchless technology isn't new According to the NASTT, there *is* evidence that early Romans used trenchless techniques in early sewer systems. In the United States, documented uses of pipe-jacking date back to the 1890's. But it's only within the last 20 to 25 years that the technology has advanced and been accepted to the point where it is a practical alternative on many projects in the United States. In some areas of the country, its use is so prevalent that the open-cut method is referred to as 19th century technology.

The City of Jacksonville, NC is implementing a long-term sanitary sewer collection system rehabilitation program and was looking for cost effective solutions that minimized disturbance to roadways, private property, and sidewalks. In an effort to understand the available options for trenchless rehabilitation, the City retained Malcolm Pirnie, Inc to provide design and construction administration services for their rehabilitation program. Together, the City and Malcolm Pirnie evaluated and selected the trenchless technologies that would best meet program objectives.

In 2006, the City awarded its first trenchless technology based rehabilitation project to Insituform® Technologies, Inc. a pioneer in the cured-in-place piping Industry. The multi-million dollar project consisted of manhole rehabilitation, cured-in-place pipeline and lateral lining.

The lateral lining portion of the work included renewing some 188 lateral connections to the City's collection system. "The condition of the laterals were in desperate need of repair with "break-in" tap connections, laterals protruding into the main, mis-aligned joints, and abandoned sewer laterals that were never capped" says Wally

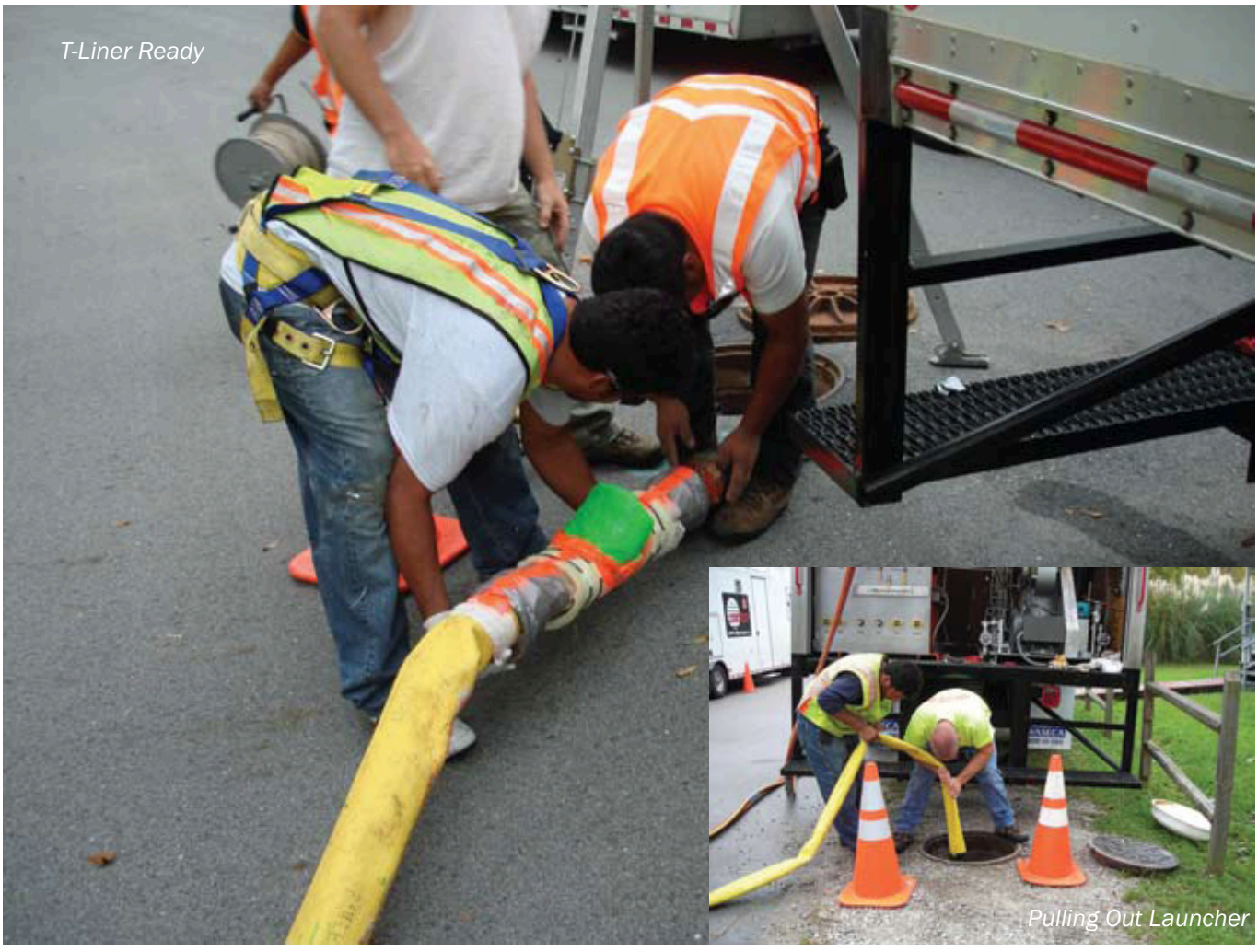
Hansen, Capital Project Manager with the City of Jacksonville. These types of defects also allow extraneous amounts of ground water to infiltrate into the collection system.

The North Carolina based contracting company "United Pipe Renewal" was sub-contracted to complete the lateral renewal work on the sewer rehabilitation project. The goal was to structurally renew the lateral pipes and eliminate infiltration from the system. "The connection point between the lateral and main pipes are normally the biggest challenge as they can be the weakest point in the collection system" says Todd Williams Malcom Pirnie Project Engineer. The contract specified LMK's T-Liner® process for renewing the entire WYE or TEE connection and the lateral pipe simultaneously by using a one-piece main and lateral cured-in-place pipe. The main pipe was lined first, the service connection was re-instated by a robotic cutter and then the laterals were renewed.

The lateral liner was inserted through the main pipe, robotically positioned at the reinstated lateral tap and inserted into the lateral pipe by air inverting the liner. Once the liner was in-place, steam was introduced into the liner to cure the thermo-set resin producing a new pipe in less than an hour.

T-Liner® is engineered and constructed as a one-piece homogeneous main and lateral CIPP lining. A one-piece main/Lateral lining means there is no overlapping of two separate liners and the T-Liner® has a uniform wall thickness over the entire length of the lining. Both the upstream and downstream ends of the liner incorporate an engineered taper providing a smooth transition to the host pipe. The cured main and lateral pipe is constructed in a cylindrical shape making it a true structural stand alone pipe and LMK's T-Liner® materials and installation practices conform to ASTM F2561-06. The main portion of the T-Liner® covers 16-inches of the main fitting and includes four hydrophilic O-rings to create a seal to the new CIPP that is verifiably non-leaking. The lateral portion can be as far as 200-feet in a one-piece continuous lining.

Other challenges included varying pipe diameters ranging from 3.75" to 4" and 6-inch due to a variety of the host pipe materials including VCP, transite, orangeburg and PVC. "You never know what you are going to run



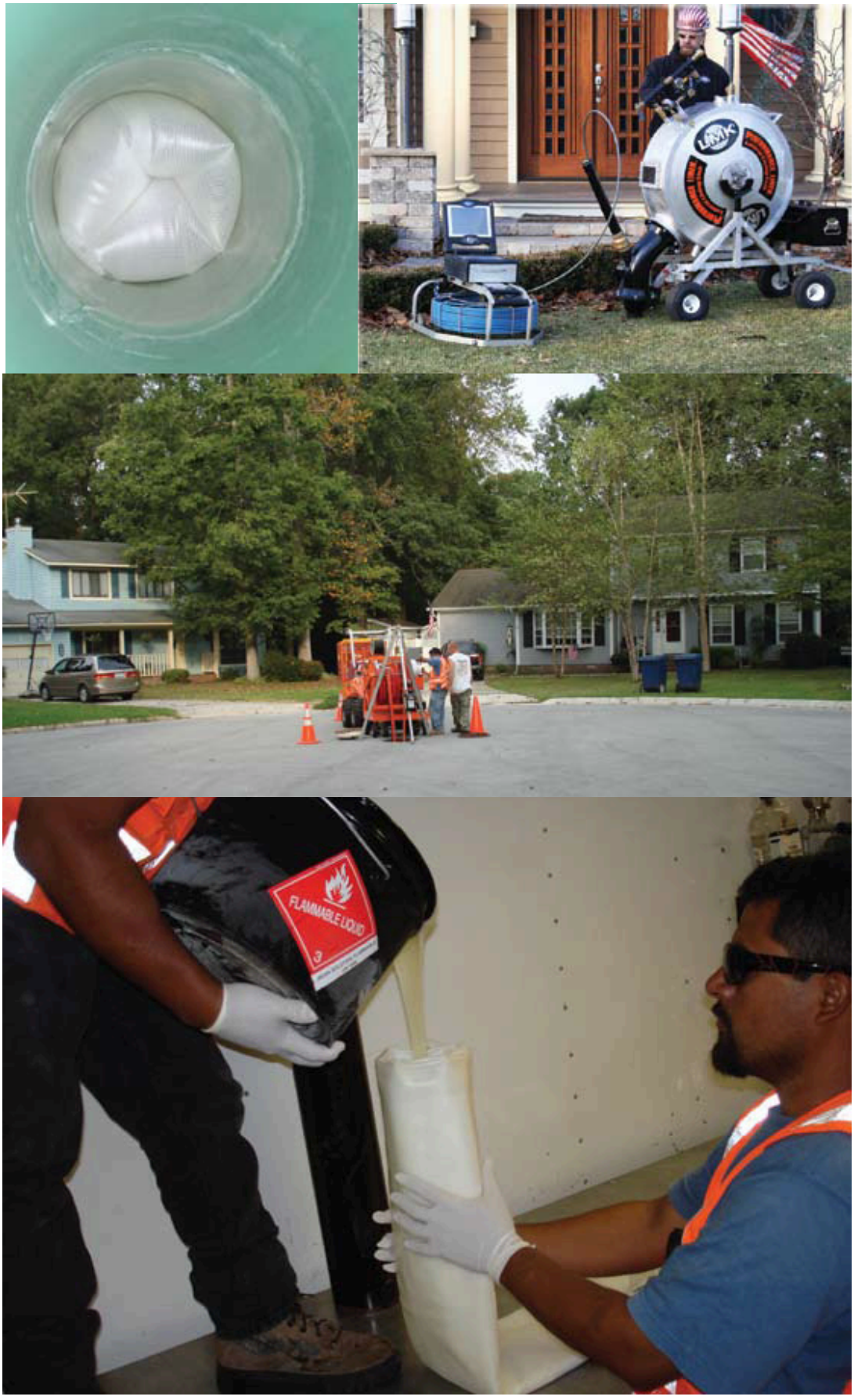
T-Liner Ready

Pulling Out Launcher

into underground" said Mike Czipar, President of United Pipe Renewal, Inc. I recall one instance where we actually found what we believed to be electrical conduit used for part of the sewer. Another location we found a broken water service laid right next to the sewer lateral and water was pouring into the pipe at the main connection. No one knows how long the pipe had been leaking into the sewer but it is estimated that over one million gallons of fresh water annually was running directly into the collection system from this one lateral connection." United Pipe Renewal informed the water department of the leak, the water department fixed the water service and United Pipe Renewal renewed the lateral.

The construction crew for renewing the laterals consisted of 5 to 6 technicians, a mobile resin impregnation trailer and a steam generating truck. An average of four laterals a day were completely renewed. "It was truly a collective effort and cooperative effort among the engineers, the city and our crew" says Mike Czipar, President of United Pipe Renewal.

The finished product is a structural one piece joint less, seamless new lateral pipe connected to the main pipe. By utilizing this technology, home-owners experienced very little disruption, no extensive landscaping or street restoration was necessary and the city achieved the reduction in flow as designed and anticipated.



Clockwise from top left: Best bladder removed; Clint launcher; The Reel in Suburbia; Impregnating Liner in Trailer View

Design Leader and Senior Project Engineer Todd Williams, from Malcolm Pirnie was asked why he chose Cured in Place lateral lining over conventional dig and replace methods for this project. "We were interested in speed and minimizing disturbance. Unhappy home-owner complaints are just simply something no City wants to deal with, and we have many lateral connections that are in streets. If you dig every lateral, you will need to perform a lot of re-paving to return the street to the pre-construction condition. Also if you are working in recently paved state roadways, there are moratoriums on excavated activities."

United Pipe Renewal is a subsidiary of the Iowa Company United Contractors, Inc. United Contractors has been striving to deliver innovative, cost-effective and time-efficient finished work since 1959. The Newly formed United Pipe Renewal focuses on cured in-place pipe (CIPP) lateral rehabilitation. Through the use of the innovative, trenchless system, United Pipe Renewal is able to improve the production and effectiveness of the municipality's wastewater treatment plant.

"It was truly a collective effort among the engineers, the City and United Pipe Renewal, Inc. There was a cooperative spirit. The key to this project's success is organization, understanding the goals and focusing on the goals," Says Mike Czipar, President of United Pipe Renewal, Inc. on the overall success of the job.

With challenges met and expectations exceeded, the City of Jacksonville and Malcolm Pirnie were very satisfied with the job United Pipe Renewal, Inc. performed. We asked Todd Williams of Malcolm Pirnie from his professional experience if he would recommend LMK's T-liner® to other clients and he replied "I would definitely recommend this process to my clients. LMK provides great customer service and supports their products 100%. When the Contractor ran into installation problems, LMK stood right along side of them to troubleshoot and develop procedures to minimize future problems. LMK is a stand up group of people who stand behind their products. I welcome the opportunity to work with LMK and their licensed installers in the future. ●