



Leavenworth Water Department Utilizes Trenchless Technology for Waterline Replacement

This photo shows the pulling end of the pipe bursting process with equipment in the pit. The backhoe operator is lifting a section of the Quicklock rod that has been pulled through. Workers will continue to remove the rods as they are pulled through.

The city of Leavenworth is the oldest city in Kansas and it has some of the oldest cast iron water lines from when the municipal water system was created in 1882. These water lines are still in use today, some of which date back to the time of the civil war. Today, there are about 180 miles of water mains and transmission lines in the city. Nearly half of it needs to be replaced.

The Leavenworth Water Department provides potable water to the citizens of Leavenworth, the Federal Penitentiary, the Veterans Administration medical facility, two community hospitals, and seven neighboring water districts, including the city of Lansing. The total population served by the Leavenworth

Water Department is about 50,000. The Water Department also provides potable water to Fort Leavenworth and the Kansas Correctional Facility whenever emergencies occur. Therefore, water service provided by the Leavenworth Water Department must be reliable with adequate pressure at all times for fire-fighting and other municipal uses.

The Water Department owns, operates, and maintains two water treatment plants, high-service pumps, a booster pumping station, a five million-gallon water storage reservoir, and a complex network of water transmission, distribution, and service lines that range in size from ¾-inch up to 24 inches in diameter. Over time, many of the old cast iron water lines

have deteriorated and need to be replaced. The old water pipes are buried along paved streets lined with large, mature elm and oak trees. Other utilities including natural gas, telephone, storm and sanitary sewers, and cable TV lines are buried next to or cross over and under the water lines. The old water pipes also lie beneath streets in front of downtown businesses and government buildings. In both situations, replacing the old water mains by open-cut trenching is difficult, costly, disruptive to local businesses, and potentially damaging to streets, sidewalks, and mature landscaping. The Water Department has replaced several thousand feet of water mains by horizontal directional drilling, but often directional drilling

damages private sewer laterals and driveways. Connecting the new pipe installed by horizontal directional drilling with the existing pipe that remains in the ground can be difficult depending upon the site conditions.

Line replacement by pipe bursting

In May 2012, the Water Department determined that it needed to replace about 1,100 feet of deteriorated 12-inch diameter ductile iron water transmission line with 12-inch diameter fusible polyvinyl chloride (PVC) water line. The transmission line conveys potable water from the Water Department's South Water Treatment Plant to the Lansing Wastewater Treatment Plant, Lansing Correctional Facility, and a neighboring rural water district. The transmission line is buried beneath the west side of Kansas Highway 5; there was no space to excavate a large trench, stockpile soil material, and maintain two-way traffic flow on the highway.

Most of the new PVC pipe was installed by mechanically bursting the old pipe and pulling the new pipe behind the bursting head in its place. A 1250G TT Technologies, Inc. Grundoburst static pipe bursting system was used to install the new transmission line. TT Technologies, Inc. provided on-site training and oversight while Water Department staff operated the equipment and performed the pipe fusing. The project was successfully completed on time, under budget, and with minimal traffic-flow impact.



These three photos show the pipe bursting sequence:

Photo left, shows the Grundoburst Quicklock rod pulling a cutter head into the existing 12-inch ductile iron pipe.

Lower left, photo shows the next part in line which is the expander head. The expander head separates the pipe so the replacement pipe can be pulled through.

Photo below, shows the replacement PVC pipe being pulled through.



PVC pipe is being pulled through along with tracer wire.

We've been serving Kansas Rural Water Districts since water was invented.

785.539.4687
Schwab-Eaton.com
Manhattan | Wichita | Beloit

Community Planning
Construction Support
Parks, Recreation, & Tracks
Site Design & Development
Storm Water Management
Topographic & Boundary Surveys
Transportation
Water and Waste Water

Civil Engineers • Land Surveyors • Landscape Architects

PROVIDING
RESPONSIBLE
SOLUTIONS
FOR YOUR
WATER
NEEDS

WELL SERVICES

Water Supply Systems
Hydrogeological Services
Well Drilling & Rehabilitation
Pump Repair & Maintenance

WELL INSPECTIONS

WATER TREATMENT



WATER · MINERAL · ENERGY

316.264.5365

www.layne.com

Office Locations

Kansas City, KS
Wichita, KS
Omaha, NE
Kearney, NE
Oklahoma City, OK
St. Louis, MO



These four photos show the pipe fusing sequence: Top left photo shows an employee in the process of evening up the pipe ends with a facing tool. Note the facing tool in the next photo, top right. Next photo lower left, an employee has picked up the hot iron which will be inserted between the pipe ends, heating it sufficiently to form a bead. The last photo, lower right, shows the two pipe ends fused together.

Shawnee Street replacement

In late November 2012, the Water Department began a project to replace 2,440 feet of deteriorated 6-inch cast iron water main with larger 8-inch high-density polyethylene (HDPE) pipe beneath Shawnee Street between Esplanade and 6th Street and beneath Esplanade Street from Shawnee Street to Delaware Street in downtown Leavenworth. The 6-inch water main was installed in 1882 before the streets were paved with bricks and decades later by asphalt. About 475 feet of new HDPE was successfully pulled through the old cast iron pipe beneath the intersection of Shawnee and 4th Street (aka State Highway 7) and beneath Shawnee Street between the 4th and 5th Streets (directly in front of City Hall). This took place during a two-week period in late November and early

December with no damage to streets or nearby gas, fiber-optic, and sewer lines. Most of the available time was spent in planning and site preparation, while the actual pipe bursting step consumed only about three hours for the entire reach. An 800G TT Technologies, Inc. Grundoburst static pipe bursting system was used by Water Department staff to install the new water main. The Water Department staff also performed the necessary HDPE pipe fusing. All businesses were kept in water during the project using 2-inch diameter yellow mine pipe connected to a fire hydrant and flexible service connections connected to the water meters.

Pipe bursting eliminated the need to place a sleeve beneath State Highway 7. It allowed the new pipe to be placed exactly where old pipe was located,

which made connecting the new to the old remaining pipe much easier while saving time. This also minimized necessary changes to the Water Department's infrastructure mapping system.

The Shawnee Street project will be completed soon as weather conditions improve. In the future, the Water Department plans to replace about 5,000 feet of old cast iron water main each year by pipe bursting. Pipe bursting may save the Water Department millions of dollars in future replacement costs over open-cut trenching and horizontal directional drilling.

Trenchless technology

Pipe bursting has become a popular type of trenchless technology in use today. One only needs to surf the Internet to find any number of municipalities and utilities that have employed this technology. In virtually every case, the reasons given are similar to those noted earlier in this article. For example, in comparison to open-cut pipe replacement, systems utilizing pipe bursting find the process is less costly, less disruptive to residents in heavy traffic areas, and allows nearly continued water service to customers. All of these advantages obviously are solid reasons why pipe bursting has become such a popular method of pipeline replacement, especially in downtown areas. In fact, John Kaufman, Manager of the Leavenworth Water Department, commented that while there is a definite cost benefit, it was also important to him to not cause a lengthy disruption of service to residents and businesses. Service to customers was shut down only long enough to tap and reconnect the service. He was pleased also that street repair and patching was held to a minimum. KRWA recognizes the expert contributions John provided in preparing this article.



Two cuts were made on the downtown project on Shawnee Street with undisturbed street between the cuts. Note the 2-inch yellow mine pipe used to continue service to customers during the main line replacement procedure.

Annual KRWA Conference and Exhibition

The 46th KRWA annual conference will again be held in Wichita during the last week of March. There are eight preconference sessions scheduled on Tuesday, March 26 and 48 concurrent sessions on Wednesday and Thursday, March 27 and 28. You can find a complete schedule of sessions in this issue. Readers are also encouraged to attend the array of training sessions which are a very important part (probably the most important part) of the conference.

In addition, "EXPO Hall" offers numerous opportunities to visit with various exhibitors as well as allowing people to network with their peers. It's a great conference. I hope to see you there.

Bert Zerr is currently a consultant with KRWA. He has been with KRWA since 2005. Prior to that, Bert was a District Engineer with the KDHE in the Salina District Office for 32 years.





WaterWise Enterprises

PROVIDING QUALITY WATER TREATMENT SOLUTIONS THROUGHOUT THE MIDWEST



Featuring Aqua Mag® line of phosphates

WaterWise Enterprises offers a full line of chemical treatment agents for potable, waste and swimming pool water.

- ⇒ Technical support on chemical sales
- ⇒ Laboratory testing available
- ⇒ Stenner and Liquid Metronic pump repair
- ⇒ On-site delivery with liftgate service
- ⇒ Pumping and product transfer capabilities

WaterWise Enterprises, LLC Phone: **(316) 729-6994**
 1931 S. 119th Street West Toll Free: **(866) 883-1427**
 Wichita, KS 67235-1821
www.waterwiseenterprises.com

Diane Patton dpatton@waterwiseenterprises.com