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Double-Diameter Upsizing With Pipe Reaming

Salina, KS, a city known as “The Best Place In Kansas To Raise Your Kids,” is in part managed by Utility Services personnel tasked with guarding the city treasury to help continue this style of community life. That led to the city exploring the various replacement methods and procedures to replace an aging 12-inch, vitrified clay pipe (VCP) gravity sewer with a 24-inch pipe line for needed increased capacity.

Design, plans and specifications were developed by Martha Tasker, Salina director of utilities, and Steve Palmer, utility engineer. The project was advertised in early November 2009, and bid on Dec. 8. The Notice to Proceed was dated Dec. 31 with work scheduled to begin Feb. 1, 2010. Due to inclement weather, work began on Feb. 15.

The existing line lay beneath a predominantly concrete street located near an old channel of the Smokey Hill River at a depth averaging more than 20 feet. With soil conditions being silt and sand, open cutting presented the likelihood of replacing the entire street, a disruptive situation at best. As an alternative, consideration was given to a trenchless process. The only process available to upsize and obtain the desired 400 percent increase in capacity and double the pipe diameter was through use of the Inne-Ream pipe reaming system.

Pipe reaming

The pipe reaming process, an assemblage of the power and versatility of a horizontal directional drill and a modified backreamer, is the basis for the pipe reaming process. Procedurally simple, the drill is situated at one end of the replacement section, and then a drill rod is extended through the existing pipe and connected to the reamer. The unit, supplying high rotation speed and pull back

force, cuts and pulverizes the existing pipe into small pieces as the reamer progresses. Drilling fluid, flowing from the pump on the drilling unit through the drill stem and numerous ports in the reamer, mixes with the ground pipe particles and together flow through the existing pipe to a collection point where it is picked up by a vacuum truck for disposal. As the reamer progresses, grinding up the existing pipe, the replacement pipe connected to the rear of the reamer is simultaneously pulled into place.

The project consisted of 160 linear feet of 24-inch PVC to be installed by open-cut because of a PI in the line and its location, 1,480 feet of 24-inch DIPS HDPE SDR 17 to be installed by pipe reaming, rehabilitation of three manholes and replacement of two manholes on the continuous line with three manholes removed and replaced away from the primary work site.

Nowak Construction Co. Inc., Goddard, KS, was the prime contractor who installed both the reamed and open-cut sections. Manhole replacement was sub-contracted to Stevens Contractors Inc., Salina, and the manhole rehabilitation sub-contracted to Mayer Specialty Services LLC, Goddard, KS. The city of Salina provided the by-pass pumping system for the duration of the project.

Insufficient “stringing” room necessitated fusing the pipe into three sections, each fused into approximately 500-foot lengths that were then pulled into place.

Complications

Considered to be a single pull, continuous installation, the Ditch Witch 7020 HDD drill rig performed as expected, installing at the rate of 50-feet per hour, with pullback and torque pressures kept to the moderate range.



Top left: Unusual but effective drill location.
Top right: Insertion pit.
Above: Jeremy Wills, driller (left) and Jim Heiman,
Left: Steve Palmer, utilities engineer.

At 3 a.m. on a very cold and blustery night, a swivel broke, bringing the project to a halt with about 700-feet in place. The crew cut the concrete paving, excavated and shored down to the reamer, replaced the swivel and restarted the installation after a weary 12 hours, resuming at essentially the previous rate of installation to a point approximately 100 feet from completion where pull back and torque pressures rose dramatically until completion.

The reason for the high pressures became evident with a look at the retrieved reamer: the front 6 to 8-inches of the cutting face was destroyed. Having retrieved a large block of concrete at a service connection containing two-inch steel pipe, perhaps used for reinforcement, is a reminder that regardless of the cause of reamer damage, there will always be problems that will hit your equipment – and wallet.

While recognizing that double diameter upsizing is never easy, the result was a satisfactory and cost-effective installation.

FOR MORE INFORMATION:

- InneReam Pipe Replacement System,**
 (316) 794-8898, www.pipereaming.com
- Nowak Construction Co. Inc.,**
 (316) 794-8898, www.nowakconstruction.com
- Mayer Specialty Services LLC,**
 (316) 794-1165, www.mayerllc.com