Trenchless Innovation Keeps It Green In Takoma Park

by A.R.Tenbusch

Takoma Park, MD, lies within suburban Washington D.C., and is serviced by the Washington Suburban Sanitary Commission (WSSC). WSSC is one of the country's 10 largest water and wastewater utilities. WSSC maintains 5,292 miles of water main and 5,132 miles of sanitary sewer main in order to serve a population of approximately 1.6 million people within a 1,000 square mile area.

WSSC services an area with its share of wastewater collection problems. WSSC has entered into an agreement with the Environmental Protection Agency (EPA) and various conservation groups as a result of a lawsuit filed by the U.S. Department of Justice regarding overflows in WSSC's wastewater collection system. The agreement consists of a comprehensive 12-year plan to significantly minimize and eliminate, where possible, sewage overflows. This agreement covers $350 million in improvements to WSSC's wastewater collection system.

Video inspection is used to determine the condition of existing wastewater lines and identify needed repairs. Routine inspection identified a 170-foot segment in need of repair in Takoma Park. Inspection showed severe cracks and root intrusion present in the old line.

The replacement of the line was submitted for bids as a pipebursting job. Taylor Utilities of Capital Heights, MD, was awarded the contract. Taylor Utilities opted instead for the Tenbusch Insertion Method (TIM) as an innovative solution for trenchless pipe replacement.

Job conditions

The line segment identified for repair consisted of approximately 170-feet of existing 8-inch clay pipe located in a heavily wooded easement between two houses in a residential area of Takoma Park. The replacement section was conveniently located between two manholes - starting at an upstream manhole located near the road, continuing through the easement and terminating at the downstream manhole located near a neighborhood park and creek.

Excavation of the line was unacceptable due to the proximity of the line to existing structures and dense mature vegetation. However, line replacement required two access points - one for an insertion pit and the other for a receiving pit. Excavation near the 15-foot deep upstream manhole was objectionable and it was determined that this manhole would be used as the receiving pit. Figure 1 shows the location of the upstream manhole relative to the property line the easement follows.

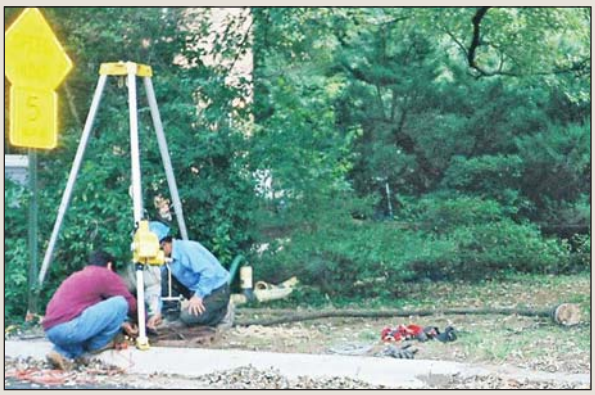

Figure 1

Men working at the location of the upstream manhole used as the receiving pit. The easement runs along the heavily wooded property line near the manhole.

A modest sized insertion pit needed to be excavated near the termination point of the replacement section, located at the downstream manhole. This presented a problem due to the proximity of a large tree. In order to save the tree, the downstream manhole could not be removed to accommodate the insertion pit, and a region just downstream of the manhole was excavated instead.

With the insertion pit located downstream, the manhole itself became an obstruction to the work. A novel solution to the problem was decided - a sleeve was mortared into the downstream manhole allowing the pipe replacement to go through the manhole. The insertion pit was located directly above the outfall coming from the manhole. Thus, replacement through the sleeve not only saved both the tree and manhole, but also allowed bypass pumping into the manhole to continue throughout the installation. Figure 2 presents a diagram showing the excavated insertion pit, manhole and mortared sleeve. Figure 3 presents an alternate view into the insertion pit looking upstream.

Site staging at the insertion pit was difficult. The only access to the work area was a road through the neighborhood park. The insertion pit was close to a creek that ran through the park and it was necessary to stage equipment on steel plates set on rocks in the creek. Pipe was staged off the back of a truck where it was unloaded piece by piece as needed.

Method, material

Job conditions demanded a trenchless pipe replacement solution that could address the tough job conditions and constraints. Taylor Utilities chose TIM as they believed it was well suited to the job and demanding conditions for several reasons.

TIM is different from other pipe replacement methods because it jacks (pushes) new pipe in place of the existing deteriorated pipe. Unlike other trenchless methods, TIM utilizes the column strength of segmented jacking pipe. Lead equipment positioned ahead of the new pipe penetrates, fractures, and expands the old pipe making room for the new pipe to be jacked into place. TIM can install through collapsed sewers and the lead equipment has a straightening effect on the final line.

TIM installs rigid pipe. The TIM installation process requires both a strong and rigid replacement pipe and does not work with flexible or weak materials. The stringent

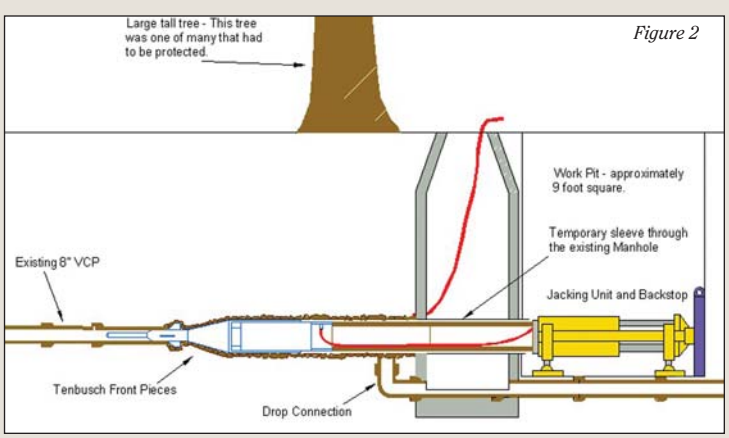

Figure 2

Diagram showing trenchless pipe replacement through a mortared sleeve in the manhole.

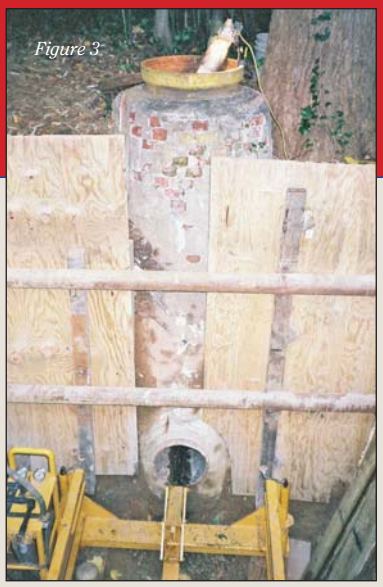
Figure 3

Figure 4

Left: *Picture looking upstream into the insertion pit. Both the tree and the existing manhole remained undisturbed during the installation.* ***Right:*** *Post inspection video – looking downstream 5 ft within the line. Daylight is visible through the "gun-barrel" straight line.*

structural requirements of the TIM System ensure a long-lived, structurally superior, end product.

The 8-inch clay line was replaced with 8-inch Denlok vitrified clay jacking pipe manufactured by American owned Can Clay Corporation, of Cannellton, IN. Denlok pipe carries a 100-year warrantee. This particular size Denlok jacking pipe had a 200 ton axial load capacity, which was well in excess of that used during installation.

Results

Once the insertion pit was excavated and the equipment was set in place, the contractor began installation of the new line. Installation was fast. The 170 linear foot line segment was replaced within approximately four hours.

Post inspection video showed amazing results. The camera traversed the new line from the upstream manhole to the downstream manhole. Daylight was visible through the entire line. The replacement line was straight and true. Figure 4 shows the post inspection at 5 feet within the line, looking downstream.

Conclusion

Wastewater utilities in this country are facing problems with sewage overflows and decay of infrastructure. The rate of infrastructure decay is greater than the rate of repair for many utilities, and there is a great need for further advances in wastewater rehabilitation technology.

Demanding job conditions and constraints are the rule rather than the exception when dealing with the rehabilitation of an existing sewer line. Job conditions such as proximity to structures and mature vegetation generally preclude excavation. In areas with prolonged urban growth, site access is difficult if not impossible.

This paper has presented on account of the trenchless pipe replacement of a segment of sanitary sewer line in Takoma Park, MD. Although the tough job conditions were typical, the line replacement was unique in method and material. The contractor, Taylor Utilities, chose the Tenbusch Insertion Method (TIM) for installation of Denlok vitrified clay jacking pipe.

TIM proved to be well suited to this job for several reasons:

- Ability to install high column strength rigid pipe;
- Limited access requirements (small insertion and receiving pits);
- Entire job-site staged from small area without leaving a permanent footprint;
- Innovative installation through sleeve in downstream manhole allowed for continuous bypass pumping; and
- Installation was fast at approximately a foot per minute.

In addition, one of the most significant benefits of the TIM System was the straightening effect of the TIM lead equipment. Final inspection showed a "gun-barrel" straight line replacement.

FOR MORE INFORMATION:

Rigid pipe replacement system:
Tenbusch Insertion Method,
(972) 221-2304, tenbusch.com

Clay pipe:
Can Clay Corporation,
(812) 547-3461, canclay.com