New Technology For An Old Community

In the 1930s, the United States was in the throws of a terrible economic depression. The Federal Government, in its desire to help, experimented with many new concepts.

Greenbelt, MD, was the first of three planned communities from the Depression era. These planned communities were thought to be leading edge designs with wide green areas and a cooperative ownership program. The Resettlement Administration and its Suburban Division helped with funding - in part to provide jobs. The project succeeded in two ways: the administration provided much needed work relief, and the workers built a comfortable, vibrant place to call home. The residents today are proud of the special amenities that are unique to this original planned community.

In the 1930s, the builders of Greenbelt faced limitations. Funds were limited. Skilled labor was not always available. The men were only allowed to work a maximum of 88 hours per month. Because of these limits, the original sewer design was modified to save on depth and footage. The sewer mains were constructed in close proximity to the structures with manholes within five feet of the front door entrances. This also reduced length of the laterals. These modifications saved money during the hard times of the depression.

Modern challenges

The sewer design that solved the problems of the 1930s present engineering challenges today. The existing eight-inch line had numerous breaks, root intrusions and sags. In order to repair or replace the existing line, Washington Suburban Sanitary Commission (WSSC) had to consider:

- Digging a trench within five feet of a structure;
- The vibration of compaction efforts in backfilling and compacting an open ditch;
- Logistics of carrying out open cut construction, i.e. handling spoil and importing bedding; and
- Surface improvements, including private plantings, patios, sidewalks and trees.

The high level of community pride coupled with the historical significance of the area dictated that whatever was going to be done to replace the old sewer had to be low impact and cost effective.

Corman Construction of Columbia, MD, offered a new trenchless solution to WSSC that has advantages over existing technologies. The solution employed the use of the patented Tenbusch Insertion Method (TIM) together with vitrified clay jacking pipe. The new method allows for the trenchless replacement of the existing pipe size on size or upsizing without percussion or long pits.

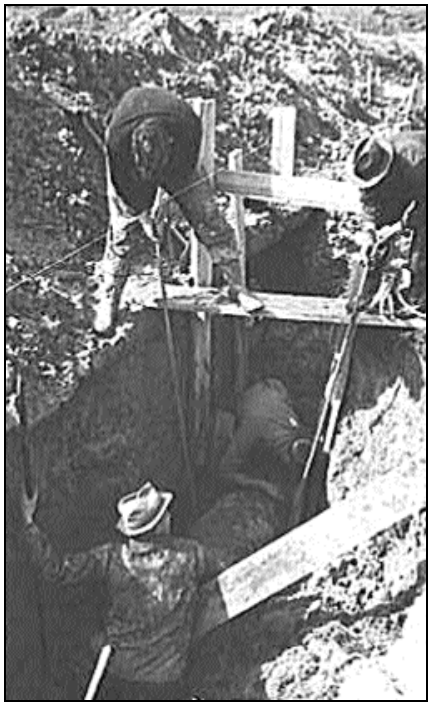
Another joint of pipe is readied. This pit is only 9-feet square.

The condition of the existing manhole necessitated a small receiving pit. The Tenbusch System allowed for the replacement of the existing line in close proximity to the existing structure without the risks associated with percussion methods or open cut construction.

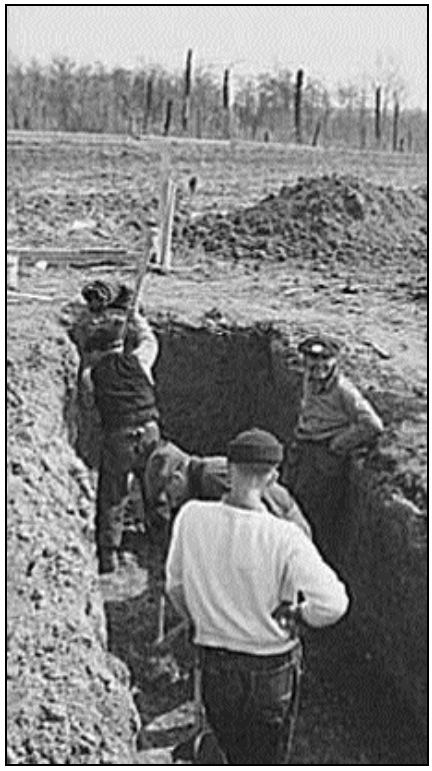
The lack of vibration reduced the potential for settlement to the homes. The short pits and the segmented pipe resulted in minimal impact to the 60-year-old trees, sidewalks and homes.

Other advantages proved apparent as the project progressed. The short pits required minimal excavation and the segmented jacking pipe required no fusing together of long pipe strings and the resulting blockage of traffic. The use of this trenchless technique also saved hauling approximately 44 truck loads of material into and out of the neighborhood, lessening traffic congestion on area streets and freeways that would have resulted from traditional open cut replacement. The logistics of stockpiling and loading those trucks would have impacted the neighborhood in terms of parking as well as noise.

The Tenbusch System is often used without a receiving pit by receiving directly into a manhole. But because of the small diameter and the condition of the brick manholes, Corman elected to excavate small receiving pits adjacent to the existing manholes. The use of bypass pumping kept all services functioning during the replacement phase.



Thanks to the Library of Congress these few photos of the original construction of the sewer system in Greenbelt MD are available. Here we see four men laying a new section of pipe



Here we see a sewer ditch being excavated by hand.

The process

A small insertion pit was constructed and the new pipe was pushed in both directions from the insertion pit. Pushing through manholes is possible if the alignment is straight.

After the insertion pit had been constructed, the jacking system and thrust block were installed in the pit. Once the jacking system had been aligned and its position fixed in place, the lead pieces were inserted into the existing pipe. Those pieces of equipment include the lead, cracker, cone expander, front hydraulic cylinder and sleeve and the pipe adapter. The jacks were extended and the lead pieces were advanced into the existing pipe, cracking and compacting the pipe fragments radially outward. In this manner, space was made for the new segmented pipeline which was being pushed in from the insertion pit.

As each pipe segment was installed, the jacks were retracted and a new pipe segment was lowered onto the jacking frame. Each pipe segment has two flexible hoses, which were connected to those in the previous pipe segment. One hose supplies hydraulic fluid to the front hydraulic cylinder. The second hose supplies lubricant, which was ejected at the pipe adapter into the annular space.

As the work progressed, the new eight-inch VCP jacking pipes were installed behind the lead assembly at an average rate of one-foot per minute.

The system provides lubricant at the leading end of the new pipe column to reduce friction and fill annular voids. When high resistance develops, the cracking and expanding force from the main jacking frame is enhanced by activating the front jack and advancing the lead train assembly forward without moving the new pipe column. This allows for the full application of force to the lead train without loss due to friction along the pipe string.

Difficult areas, such as concreted lateral repairs, can be easily expanded as a result of the lead train advancing independently of the pipe column.

Rigid pipe

The VCP Denlok jacking pipe on this project was provided by Can Clay Corporation. The pipe was selected due to its high jacking strength rating of 201 tons, its long-term corrosion resistance and economical costs.

The lead assembly or "lead train" becomes a single rigid structure that can span sags in the old line. This ability is enhanced by the use of rigid pipes, when pushed in a longitudinal manner with high force, act in rigid manner over several pipe lengths. The rigidity of the lead train also allows for installations into sewers where the old line is completely collapsed, a situation sometimes difficult for other systems.

This new technology, using the latest in rigid jacking pipe, successfully straightened the dips and the offset joints encountered and the line was replaced with a new pipe with a design life in excess of 100 years. After its success in the Greenbelt, the WSSC has elected to continue use of the TIM System on new projects in 2001.