

# Sewer Project On The Upper Mississippi River Poses Challenges

by Maretta Tubb • Managing Editor

**V**isu-Sewer Clean & Seal Inc. of Pewaukee, WI, is well known for the trenchless construction and rehabilitation of sewer systems, and the company's project portfolio reflects a number of interesting jobs.

Few jobs, however, pose as many challenges as a recent project for the City of Muscatine Public Works Department in Muscatine, IA. Ray Childs, city engineer for the City of Muscatine, said the aim of the recent project was to rehabilitate approximately 4,000 feet of the aging Mad Creek interceptor and place cementitious mortar liners inside 14 existing manholes to prevent H<sub>2</sub>S gases from eating away at the concrete structures.

Over the course of the project, crews completing the interceptor work relied on the National Liner Cured In Place Pipe (CIPP) method to rehabilitate 3,800 feet of large diameter 24- and 27-inch pipe and 183 feet of eight-inch diameter clay pipe.

## High water test

Childs said that within two weeks of the CIPP installation the new liner system was put to the test. When the interceptor was originally constructed, he explained, "oakum was used as a pipe joint sealing material. Over the years, this material had failed, resulting in seepage problems every time the Mississippi River rose even two feet above normal."

Childs recalled that high water conditions just two weeks after the installation put 13 feet of water pressure against the newly lined pipes. "Nevertheless," he said, "the seepage was totally eliminated."

Visu-Sewer Project Manager Dan Stoffel said one of the reasons the CIPP method was selected for this project is that the interceptor is located inside the dike system that protects Muscatine from the Mississippi River. Piping making up the system runs along Mad Creek from Washington Street to a lift station just one-half block from the river.

In describing the CIPP process, Stoffel noted that the liner was made up of a non-woven, needled, polyester felt which is saturated with a thermosetting resin. Water pressure is used to invert the resin impregnated felt into the host pipe through a manhole. Once installed, it extends from one manhole to another.

The curing process is initiated when a boiler pump system is activated to heat and re-circulate the water inside the felt liner. Next, the heated water is displaced with cool water, causing a chemical reaction in the thermosetting resin that works to create a solid pipe between the two manholes.

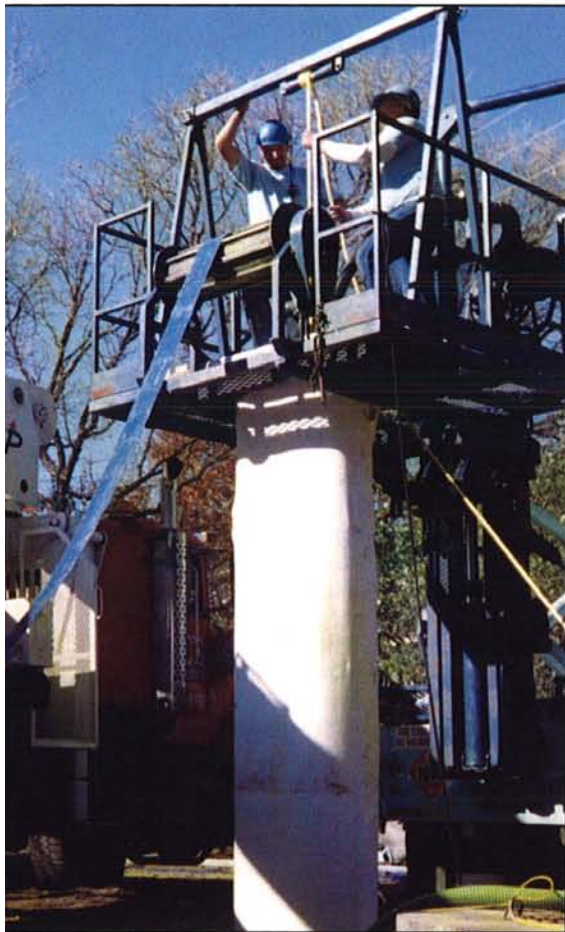
## Inspection

In describing early jobsite activities, Stoffel said that since the first step was to determine the condition of the pipe in place, a televising crew was mobilized to



View of a National Liner Cured In Place Pipe (CIPP) before being inverted into the host pipe.





*The inversion process, accomplished with a head of water, is relatively simple. On this project, inversion lengths ranged from 20 to 600 linear feet.*



Muscataine several weeks in advance of construction crews. The televising crew used an Aries internal viewing camera that travels through the line on a crawler system to inspect the lines.

"Since the camera stayed well above the flow inside the lines, they were able to get some good pictures of the existing pipe and determine its condition," he said. "Our finding indicated significant structural cracks and infiltration problems throughout the system. The lines were also found to be extremely dirty, which resulted in Visu-Sewer contracting with Philips/Ace Alwastes of Indiana to bucket out and properly dispose of the debris."

The Visu-Sewer spokesman said Philips/Ace Alwastes' crews removed several hundred tons of debris from the lines. The debris removed contained broken tile that appeared to have been inside the lines since its construction over 50 years ago, along with a significant amount of gravel and rock.

"To give you some idea of the condition of the lines," he said, "the bucket portion of the job, which was conducted from various manhole locations, required approximately six months to complete."

In addition to bucketing out and removing debris from inside the lines, each section was flushed out using a high-pressure water jetting and vacuum system. Following the cleaning, the waste and water was removed and placed into watertight containers for proper disposal.

When the line was clean, the upstream lines were plugged and two rented eight-inch bypass pumps, furnished by Baker Tank and Pump Supply of Frankfort, IL, were used to divert the 600 to 800-gpm flows in the segment of the line to be inverted.

### CIPP installation

In describing CIPP activities, Stoffel said 14 inversions were required to insert 3,803 feet of liner into the 24- and 27-inch diameter lines. The inversion length ranged from 20 linear feet to 600 linear feet.

"On this project, we were running 12-hour shifts, with each crew made up of four men," Stoffel said. "The crews started at 7 a.m., setting up the inversion column. Within about two and one-half hours they were ready to begin the inversion process. Once the inversion began it required an

additional two and one-half hours to turn the bag into the line between the respective manholes. With that accomplished, the pumps were hooked up to circulate the water inside the line. Next, the boiler was activated to heat the water to 180 degrees C to cure the thermal resin. Once the water was heated and held at the required temperature to afford proper curing, cold water was introduced to cool the line and allow the resin to set.

"After the liner cooled to about 75 to 80 degrees C, the water was released. At that point, the lateral lines were reopened with a remote-controlled, robotics cutter and the lateral services re-established, allowing crews to move on to the next pipe segment to be lined."

Stoffel says crews started the CIPP process at the top end of the job, on Washington Street, which is the furthest point from the river and worked their way downstream.

Given the high water table and wet soil conditions crews encountered, Stoffel is pleased with the progress achieved during the CIPP phase of the project. Project evaluation figures indicated that crews averaged spending about 24 hours lining a 600-foot segment of line.

### Manhole rehabilitation

As to other work on the project, this will primarily involve manhole rehabilitation. Stoffel said, "When we completed the lining portion of the project, which ran from August through November 2000, the weather was too cold to begin the manhole rehabilitation. At that time, a decision was made to wait until spring to begin this work. However, when spring came around, flooding along the Mississippi occurred, which has made it necessary for us to wait for the ground to dry up."

When weather permits, crews will use a high pressure washing system to scour the wall of the manholes to make sure they are free of debris and grease. Once that is accomplished, a fi-inch layer of cementitious mortar will be spray-applied to the inside wall of the manholes. Shortly after the initial application, the coating will be smoothed out and allowed to cure for four to five hours before a second fi-inch application is made.

Stoffel says the cured one-inch thick covering will work to effectively stop inflow, infiltration and exfiltration.

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