

Relining Aging Brick Sewer Pipes

On any given day, the streets of Portland, OR's Hollywood business district bustle with heavy traffic, people, big intersections and the energy of any popular city. That's why when the city of Portland discovered it needed to rehabilitate 3,000 feet of sewer pipe on Sandy Boulevard – one of the largest and busiest streets – significant effort was made in the planning phase to minimize disruption.

Long before many who today walk on these busy streets were born, the city's network of sewer pipes was established. Portland has more than 2,000 miles of pipe, some dating back to 1864 when many pipes were made of bricks. The limited lifespan and age of the pipes was showing through cracks, voids and other defects. Ongoing video and on-site inspections to monitor the pipes enabled the city to identify and evaluate the deterioration and proactively fix problems.

"It's always preferable to work on a planned project to fix a pipe sinkhole or collapse rather than an emergency situation such as a raw sewage spill on the street

above," said Bob Cynkar, community outreach representative for the city of Portland Bureau of Environmental Services.

The decision to rehabilitate the majority of the 94-year old brick sewer pipes in the Hollywood district was made after routine inspections showed widespread cracks, holes, and in some cases, bricks falling out. Additionally, the city was planning a comprehensive street improvement project that included resurfacing, concrete work and changes to intersections.

"We were concerned about the conditions of the pipe upon routine inspections and we also wanted to get in and out of there before the city started its street project," said Cynkar.

With the budget at the forefront, Portland explored various options for rehabilitating the sewer pipes with the least amount of disturbance to the street above. Open trench excavation was ruled out because of the impact to the business district, working around other pipes, such as cable, water and gas, and the need to complete the job on a fast timetable. Given its proven success and speedy implementation, the CIPP (cured-

in-place pipe) process was chosen. CIPP effectively relines the original pipe to create a new pipe within the existing pipe without digging. This trenchless method is popular for both residential and commercial applications because it's fast, proven effective and causes minimal disruption.

The \$5.4 million project dubbed, "Hollywood Relief and Reconstruction Project" was awarded to general contractor RCI Parsons of Portland, OR, who sub-contracted the CIPP portion of the job to Salem, OR-based Mi-

chels Pipe Services, a certified installer of the Premier-Pipe USA Cured-In-Place Pipelining Process for Sewer Mains.

"We've had a lot of great experience with CIPP and were excited about this project because it presented some interesting challenges," said Ron Smisek, project manager, Michels Pipe Services.

Overcoming challenges

A significant challenge was working in a densely populated commercial area which included four lanes of traffic and six freeway ramps. In addition to the hectic daytime activity, the area is equally busy at night with evening-goers visiting restaurants, movies and other favorite nighttime spots. As a result, attention to detail during the planning phases of this project was vital. Silent generators and compact installation equipment was used to reduce disruptions on the street.

"The CIPP process was really the best choice for this busy area," said Nate Rodriguez, project superintendent at Michels. "This process enabled us to avoid digging up the road and really impacting traffic and areas businesses."

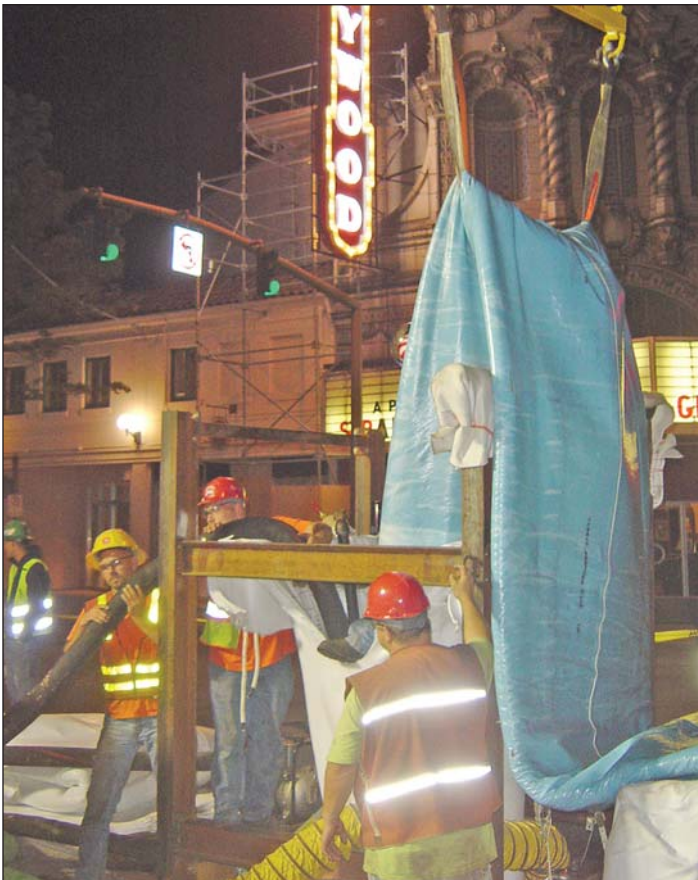
Another difficulty was relining a 43 by 45 inch brick pipe that was elliptical-shaped instead of circular. This uniquely-shaped pipe made it difficult to establish the bypass. After the first failed bypass, RCI Parsons decided to build a temporary weir to keep water away from the job site and ensure the success of the bypass. An 18-inch gap was left at the top of the pipe to effectively handle water overflow.

"When they built this pipe in the old days, it was probably easier to lay the brick like an arched doorway where the top of the pipe is round and the bottom part is concave, like a basket handle," said Smisek.

"Fortunately the materials we used for the project were custom-made with exact specifications, enabling us to overcome this challenge."

The materials included felt liners supplied by Applied Felts, a leading felt liner manufacturer and a pioneer of the CIPP rehabilitation process. Applied Felts provides ISO-9002 certified, custom-designed liners to meet clients' exact specifications, which for this project meant five, 600-foot liners, each weighing 80,000 pounds. The liner measured 42 by 45 inches by 34.5mm.

Before the liner could be installed, new manholes were created to accommodate the large liner. Five 96-inch manholes were built specifically to insert the liner into the existing pipe to create the like-new pipe.



Process

The pipes were lined by Michels Pipe Services using the Premier-Pipe water inversion method for CIPP rehabilitation. The basic process begins by taking the lead end of the Applied Felts resin-saturated liner and turning it inside out for a predetermined length and clamping it to a collar over the manhole. Water is then introduced into the turned back section creating a head, which causes the lining to continue turning inside out along the defective pipe. The constant addition of water maintains the inversion head, inverting the liner and ensuring it is held firmly against the host pipe. When the installation is complete, the water in the liner is circulated through a mobile hot water boiler to gradually raise the water temperature to achieve a controlled cure of the resin. Once the cure is complete, the end of the newly formed pipe is cut and trimmed.

Prior to relining the pipe, the team conducted patchwork, such as fixing voids and filling in bricks, as noted by video and onsite inspections. While the team was conduct-

ing these preparations, the wet-out process was started and completed in the evening.

Due to the large liner size and limited space (only one traffic lane) at the job site, the actual wet-out process was conducted at Michels' facilities in Salem. A 33-ton crane was used to pull the liner into a 15-yard dumpster that was set on a low-boy. The first wet-out took 16-18 hours with succeeding liners completed in less time. A special roller was built to accommodate the large liners and transport the liners on the low boy to the job site.

The crew began the install process by using a crane to pick-up 5 to 12 feet of the inverted liner and slowly place it into the existing pipe using the water inversion technique. The installation took anywhere from five to 8 hours per liner.

One 600-foot liner was repaired and relined each week enabling the CIPP portion of the project to be completed in just six weeks.

The entire project took six months and also included rehabilitating most of the collector sewer, about 40 square blocks, which feeds into the 3,000 feet of pipe.

"This was a true success story in how to rehabilitate an old sewer line while simultaneously keeping an incredibly busy commercial area fully operational," said Jim Mortell, president of Premier-Pipe USA.

"We wanted to rehabilitate our sewer in some cost-effective way that would give us a good result and we did that," said Cynkar. "Lining pipe is attractive when you don't want to tear up the street, railroad or freeway. As more and more of the world is developed, you not only see more infrastructure on the surface, but underground so it's harder to dig a hole without causing problems."

FOR MORE INFORMATION:

Felt liners:

Applied Felts, (203) 426-5948,
appliedfelts.com

Contractors:

Michels Pipe Services, (503) 364-1199,
michels.us

RCI Parsons, (503) 287-5742

CIPP system:

Premier-Pipe USA, (952) 944-8093,
premierpipeusa.com