

FOCUS: SEWER

LIGHTING THE WAY

A proactive approach to infrastructure renewal in Dover, Del., includes a lining project on 3,345 feet of pipe under a main thoroughfare

By Erik Gunn

About four years ago, the city of Dover, Del., stepped up efforts to control sewer system inflow and infiltration and keep its buried infrastructure in general good repair.

The city's water and wastewater operation and the electrical department were combined under a Public Utilities Department with specific budget line items for improving the water distribution and wastewater collection systems.

That meant instituting life cycle planning and more preventive maintenance on the 185 miles of sewer line, about 30 miles of which are force mains. Now the city has an active investigation program on its sewer mains, along with scheduled replacement or lining

of pipes. "You just need to face reality that pipes are going to need repairs or upgrades on a regular basis," observes Sharon Duca, water and wastewater manager.

A key component of the program was the lining of a critical sewer main last July. There, for the first time, the city used a liner cured by ultraviolet (UV) light. The Division Street project required extensive planning, and hot summer weather added to the challenge, but in the end, the liner passed the test. "The UV-cured liner is really going to be the best bet for the long-term benefit of our city," says Duca.

Proactive approach

Dover, capital of Delaware, is about an hour south of Wilmington, the state's largest city, and across Delaware Bay from southern New Jersey. The city is on land flat enough to test carpenters' levels. As in many communities, grease buildup in sewers is a chronic problem, along with root intrusion and I&I.

The liner from Pacific Multilining with the black cover cut to expose the liner. Once the cover is removed, sunlight or any other UV light source starts the curing process.



The Lanzo Lining Services and Advance Underground Inspections crews pull a 24-inch liner with project superintendent Steve Carbeck (red hat), who was on hand 24/7 with all operations. (Photos courtesy of Pacific Multilining)



PROFILE:
City of Dover, Del.,
Wastewater Division

FOUNDED:
1683

POPULATION:
36,000

AREA SERVED:
40 square miles

INFRASTRUCTURE:
185 miles of sewer mains

ANNUAL BUDGET:
\$5.535 million (operations)

WEBSITE:
[www.cityofdover.com/
Public-Utilities](http://www.cityofdover.com/Public-Utilities)

The region's sandy soil means that the groundwater table can change significantly almost overnight. That can also affect I&I studies. "When we're doing our inspections, we might not find any active I&I, but if we have heavy rains, a few days later it might be an issue," says Duca.

The new maintenance routine includes inspections that started with interceptors and proceeded into scheduled investigations of the city's 42 sewer basins. Each year, city crews trained on video equipment to inspect designated basins, which Duca selects based on discrepancies in sewer flow. Sudden spikes in flow provide tip-offs to areas where I&I is the worst. "We also have a smoke-testing program in those basins to

look for illicit connections," Duca says. "We're trying to keep moving forward and keep our sewers in good repair."





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Fred Tingberg Jr.

Project superintendent Steve Carbeck checks out the light train to make sure all the parts are ready for another curing session.

HOT-WEATHER ADVANTAGE

As the City of Dover undertook the lining of the Division Street sewer main in July 2011, crews realized a key advantage to UV-cured resin in the liner. Temperatures ran high during the 10-day project. “We had heat indexes up to 110 a couple of days,” says Scott Fowler, public utilities operations/construction manager for the city.

With steam-cured resin, premature exposure to heat could have triggered the curing process, but that wasn’t an issue with the UV-cured liner. Both kinds of liner are best kept chilled until use; they are typically shipped in refrigerated vehicles. Indeed, to be safe, the contractor, Lanzo Lining of Deerfield Beach, Fla., kept the liner tubes at 60 degrees in a refrigerated trailer inside a warehouse.

But keeping liners cool until they are applied is even more critical for the steam-cured material. “If I would have had a steam-cured liner sitting outside for 20 minutes or half an hour in a box in 105 degree heat, it would cure early,” says Rod Loewen, sales and marketing manager for Pacific Multilining, the North American manufacturer and distributor of MultiLiner.

The UV-cured liner has greater tolerance for temperatures, although it’s still better to keep it cool, and also out of direct sunlight, which of course includes UV rays. Says Loewen: “If the liner sees sunlight, it’s cooked.”

From the inspection results, the city analyzes which sites should take priority for capital improvements, including lining of man-holes or sewer pipes. “The plan is to address four basins a year or the equivalent, depending on the size of the basin,” Duca says.

It will take some time before the whole system is finished. “We would be lucky if we hit 5 percent of the system a year in a capital project,” Duca says. The city tries to make sure all the problems at an inspection site are identified and targeted for repairs.

Ten-day project

The Division Street lining job was the second and most intense phase of a two-part, \$1.77 million project. Part one, carried out in May, was the Northwest Interceptor project, which involved lining 536 feet of 12-inch pipe, 300 feet of 18-inch pipe, and 957 feet of 24-inch pipe in 12 other sewer mains throughout the city, says Scott Fowler, public utilities operations/construction manager for the city.

The Division Street project called for lining the sewer under a 12-block, 4,000-foot stretch of one

of the city’s main arteries, which is also a state highway. That part of the project covered 360 feet of 15-inch main, 1,435 feet of 24-inch main, and 1,560 feet of 30-inch main. Work began at midnight on July 8, and ended at 7 a.m. on July 19.

It was by far the largest project the city took on since it revitalized its maintenance program and was Dover’s first lining project in more than a decade. It was also the city’s first use of UV-cured liner.

“Our staff spent about a year researching the various technologies that were available,” Duca says. “We also considered the overall magnitude of what we were facing citywide.” The preferred solution had to be economical and durable. Cost-benefit analysis and a close look at structural integrity were the principal criteria in making a selection.

The city chose Lanzo Lining Services of Deerfield Beach, Fla., as its contractor, and that company’s proposal called for MultiLiner from Pacific Multilining, the North American manufacturer and distributor for the product. “We felt it was the best product because of its structural integrity,” Duca says.

Made to order

MultiLiner is a pull-in fiberglass liner impregnated with a polyester resin, says Rod Loewen, sales and marketing manager for Pacific Multilining. Originally available with a steam-cured resin, the liner now comes in a UV-cured-resin version.

Because it doesn’t require a steam generator, the UV-cured liner uses less bulky equipment for installation. The process has become widely used for pipe lin-

ing in Europe. The liners are made to order based on detailed measurements provided by the end user. At the factory the liners are impregnated with resin, a thickening agent and, for the UV-cured version, a photo-initiator chemical. At the job site, the liner is pulled into place using a Kevlar string.

Once the liner is in place, a clear polyethylene bladder inside is inflated with air to conform it to the pipe interior. That takes 20

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minutes to half an hour for each length of liner.

The UV light instrument sent through to cure the resin has a built-in camera on the front end — a big advantage because it allows crews to check the inside of the liner before curing it and remedy any flaws they may find.

Visual inspection

“You’ve got to ensure that not only is the tube inflated properly, but it’s pressed tightly up against the host pipe before you cure,” says Fred Tingberg Jr., manager of business development for Lanzo Lining. “You’re watching the entire process. You have the opportunity to stop, roll back, add more air pressure, pull the bag taut — whatever it takes just before the cure. That’s a big plus.”

The camera also helped confirm the location of laterals that

would have to be reinstated. That kind of immediate visual inspection while lining wouldn’t be feasible with steam-cured liners, notes Loewen: “It would be like coming out of a hot shower and putting your glasses on.”

Tingberg said the project was the first he had done using the MultiLiner UV product, although he has worked with other UV liners. Compared to steam-cured, “It’s more labor-intensive as far as the setup,” he says. “But the cure proceeds more quickly.”

The Dover project was planned to continue around the clock over 10 days to minimize traffic disruption from the necessary detour. Lanzo employed three crews. Because of the heavy flow the lines normally carried, extensive bypassing was required, says Fowler.

Upstream from the project, a pump station discharges into an



At the end of the mile-long bypass system, a crew member checks the pressure and releases a small amount of air so that the bypass system flows with ease.

interceptor that at the same time receives flow from the local flow basin. The pump station had ample power to drive flow through the bypass, a 12-inch pipeline that ran along the top of the street, for the first half of the project, says Tingberg. When the bypass was set up for the second half, additional pumps were used. At two cross streets that had to remain open during the work, ramps were constructed to carry traffic right over the bypass pipeline.

Despite the size of the job, “It really went pretty smoothly,” Fowler says. “There were no major hiccups along the way.”

Long-term benefit

Duca says the Division Street project stands out for its size and provided a good opportunity to try

out the UV-cured liner. “I don’t expect that we’ll have projects of this magnitude on a regular basis,” she says. “But I do expect to have projects using this technology on a regular basis.”

And with Dover’s new emphasis on consistent rehabilitation, she expects more projects of many kinds in the future. “Our overall management philosophy now is that we have to take care of our infrastructure appropriately,” Duca concludes. “Things don’t last forever.” ♦

MORE INFO:

Pacific Multiliner, Inc.
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