

A Rude Surprise That Turned Out Surprisingly Well: Rockland NY Sewer District Innovates in a Hurry to Make Critical Repair

by Angus W. Stocking, L.S.



Top half of interceptor, completely rotted out and held in place by root masses

A routine five-year inspection of a 36” reinforced concrete pipe (RCP) sewer interceptor in Rockland County (NY) Sewer District No. 1 revealed a rude surprise for Engineer IV Martin Dolphin P.E.—CCTV showed that the top half of the interceptor, which had been in good shape just five years previously, was almost completely rotted out by microbiologically-induced corrosion (MIC). Even the reinforcing rebar was gone in 20-30 foot stretches of the 750 lf sewer and the only factor preventing complete collapse appeared to be solid root masses that held soil in place.

It was a shock, but not completely unexpected. Rockland has been implementing an aggressive I&I reduction plan for several years that has reduced excess flows to their sewer plant by almost 50%. This is a good thing of course, but reduced flows in this sewer may have allowed greater accumulations of organic matter, fostering growth of *Thiobacillus* bacteria and the consequent

production of hydrogen sulfide and concrete-destroying sulphuric acid. Ironically, in this critical sewer, Rockland Sewer District No. 1 may have been a victim of their own success. “It is now taking more time for waste to get to the plant, and that may be causing more of this type of corrosion,” Dolphin says. “In the past we were more used to seeing cracks and other deformations affect our network, but now we are seeing more corrosion caused by hydrogen sulfide accumulation.”

And it *is* a critical sewer; the 36-inch interceptor is just a mile upstream of the region’s wastewater treatment plant and

most of the District’s network feeds into it—a failure here would affect hundreds of homes and businesses. So a rehabilitation was definitely needed, and due to the extent of the corrosion it had to be structurally sound. This ruled out CIPP, and would ordinarily have been addressed with trenching and new pipe, despite the cost and inconvenience. But another confounding factor seemed to rule out trench-and-replace. “This interceptor runs parallel to a railroad track, within the railway easement, and also crosses under two roadways,” Dolphin explains. “That meant permitting issues for trenching could push back



Interceptor site running parallel to railroad tracks and underneath two roadways

rehabilitation for months, and we really needed to get this fixed as soon as possible.”

So Dolphin—who is, incidentally, the New York State Society of Professional Engineers’ 2015 P.E. in Government Engineer of the Year—went looking for a new solution. And with the help of contractors Ace Pipe and National Water Main Cleaning, and vendor AP/M Permaform, he found it. “I am really happy with the way the contractors and the material manufacturer stayed with this project and helped us find a rehabilitation method that worked in our unique circumstances,” Dolphin says. “We ended up with a monolithic lining system that is continuous from manhole to manhole, and is also completely structural and resistant to microbiological corrosion.”

What National Water Main Cleaning recommended was a centrifugally cast concrete pipe (CCCP) process known as CentriPipe, from AP/M Permaform, that is routinely employed by their sister company, Ace Pipe, for structural, trenchless repair of sewer mains. The process inserts a spincaster into large diameter (30-144 inches) pipe and withdraws it at precisely controlled speeds while spraying thin, smooth layers of high strength cementitious grout. The layers adhere tightly to the original substrate and to each other, essentially casting a new concrete pipe within the old sewer that is structurally sound, watertight, and thin enough so that effect on pipe capacity is minimal. In this case, the fine aggregate concrete liner (PL-8000 from AP/M Permaform) was mixed with Con^{mic}Shield[®], an additive that makes concrete intrinsically and permanently resistant to the formation of Thiobacillus bacteria... and no bacteria means no microbiologically-induced

corrosion.

One Difficult Challenge

CentriPipe looked like a good fit for the Rockland sewer rehabilitation, with one exception. Since the CentriPipe spincaster sprays even layers, it requires a reasonably intact substrate to work with—small voids and gaps can be patched (and sometimes new inverts are poured to facilitate smooth withdrawal) but the Rockland interceptor’s long stretches of collapsed pipe and exposed earth presented a major challenge. Contractors had to figure out a way to provide a substrate that didn’t require days of troweling that would negate the cost and efficiency gains of the trenchless CentriPipe process.

National Water Main Cleaning’s Executive Vice President James Lounsbery, in consultation with engineers at AP/M Permaform, proposed an innovative solution—so innovative, in fact, that it

appears to have been first used on the Rockland project and may have a substantial impact on future rehabilitations of this type. “The crown of the pipe was completely gone, ruling out most repair methods, and was even a challenge for CentriPipe,” Lounsbery explains. “So stabilizing the pipe cavity—from

‘10:00’ to ‘2:00’, basically—to the point where we could spray cement was our biggest concern. After multiple conversations with the sewer district and AP/M Permaform—and keeping in mind that collapse was possible and time was of the essence—we came up with a game plan that relied on sheet steel inserts that worked out surprisingly well!”

Working with a local fabricator, Lounsbery made long tubes of sheet steel, with lengths customized to the voids shown on CCTV, which were rolled up and banded to a tight 24-inch diameter. These were inserted from



Custom sheet steel inserts to be inserted into failing interceptor

manholes and pulled to the areas of exposed soil. Once the tubes were in place, the constricting bands were cut so the rolls of steel could expand to the full 36-inch pipe diameter, and secured in place with rivets and masonry anchors. And voilà—a fully stable pipe substrate was created at low cost, in just five



Manhole entry for rehab installation



Spin-casting onto sheet steel inserts for fully structural rehabilitation of interceptor

days on site.

This accomplished, the actual CentriPipe rehabilitation was almost routine. Dewatering was accomplished with a temporary

diversion to a parallel sewer and, working from manhole to manhole, an inch-and-a-half thick concrete pipe was cast in three half-inch passes. “This was actually conservative,” Lounsbery

says. “The engineered design called for a one-inch pipe, and we decided to exceed that to eliminate any possibility of collapse, and for peace of mind.” Less than two weeks was spent on actual CentriPipe application—layer application is fast, and since PL-8,000 cures quickly, layers can be applied on successive days. This time also included soil compaction and backfilling from above, after CCCP work was completed.

Dolphin did have one lingering concern. “I was worried that the cementitious material used would slag off or slump,” he says.

“Especially in the areas where the smooth steel inserts were placed.” But PL-8,000 is designed to be highly adhesive and adhere well to most substrates, including CMP and HDPE. In the event, no slumping was observed. “We’ve always been impressed by the ‘tackiness’ of this product. Even layer application was assured with visual inspections, depth gauges, and monitoring the amount of material mixed per lineal foot of pipe cast. “It worked out here, volume wise, to about one bag per lineal foot of half-inch layer,” Lounsbery explains. “So by counting the bags used on a run—300 bags for 300 feet, say—we had a good quick measure of thickness applied.”

Safety, of course, was also a concern, as it is on all confined space projects—concerns were magnified here by the known presence of corrosive gases. Work also proceeded from upstream manholes, all operators were trained for confined space and equipped with gas sensors, soil stability was monitored, pipes were flushed before entry, and ventilation provided.

All in all, after the ‘rude surprise’ revealed by CCTV, the Rockland sewer interceptor was repaired quickly, safely, and cost-effectively, and the completed project is structurally sound and permanently corrosion-resistant. It was the first use ever of the CentriPipe process in Rockland Sewer District No. 1 (and the first use *anywhere* of the sheet steel insert innovation) but it surely won’t be the last—Dolphin is already rewriting the district’s specifications to include CCCP. “We are very happy with this repair,” he says. “And also very happy with the cooperation and innovation that made it possible.”

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Fully rehabilitated interceptor