The city of Martinsville, Virginia, has long been known for an economy built on tobacco, textiles, and furniture manufacturing. In recent years, with its legacy industries in decline, the city has strategically positioned itself for next-generation technology and manufacturing sectors. Set along the state’s southern border with North Carolina, Martinsville is also known for its recreational areas, including the trout-filled Smith River, a state scenic river and popular local waterway for fishing and boating.

The city’s 6.2-mile interceptor sewer, which runs adjacent to the Smith River, is the major collector for the city’s sanitary sewer system and also collects the majority of wastewater from the Henry County Public Service Authority. Constructed in 1963, the interceptor consists of 36-inch and 42-inch corrugated metal and reinforced concrete pipe. The line had been heavily used to serve the city’s industries for decades and, after more than 50 years of use, was showing signs of both severe corrosion and structural defects.

Mitigating Risk: Protecting the Community

The Martinsville Water Resources Department contracted with Dewberry to perform a condition assessment using multisensory technology, including CCTV, laser, and ultrasonic profiling. The assessment revealed severe defects, including the heavy corrosion, excess pipe ovality, and numerous inflow and infiltration manhole and line defects. Dewberry’s team identified segments of pipe that were as much as 80 percent collapsed, a potential threat to the viability of local industries as well as the environmental integrity of the Smith River—not only a recreational destination but a source of drinking water for the region as well.

Recognizing the high risks associated with the discovered collapse, Dewberry immediately provided assistance in mitigation planning. This effort led to the installation of an emergency pump bypass line, establishment of a pump staging area, and the execution of an agreement with an emergency pump provider. Additionally, a comprehensive Preliminary Engineering Report was prepared compliant with key funding agency requirements. The report included the results of the condition assessment, an evaluation of rehabilitation alternatives, work prioritization, and rehabilitation costs estimates.

While the report was being finalized, Dewberry initiated design for the repair of the 80 percent collapse, which was located along an unstable, steep embankment at the edge of the Smith River. Before an excavation of the existing sewer could be made, a 35-foot soil nail wall had to be constructed. The retaining wall was also necessary to protect a major gas line and upgradient roadway and railroad.

With full replacement of the interceptor estimated at an untenable $40 to $50 million, the City of Martinsville asked Dewberry to pursue funding options as well as creative design and delivery methods to mitigate the costs and address the most critically needed repairs. The firm was able to secure a zero percent interest loan from the Virginia Department of Environmental Quality (DEQ) and grant funds, including a $1 million grant from the U.S. Department of Commerce Economic Development Administration (EDA).

Creative Contract Sequencing

Dewberry devised an innovative, multiple-contract approach for the complex project that enabled contractors to select rehabilitation methods for repair or lining of the corrugated metal pipe. The multi-phase delivery, separated into four construction contracts, proved effective, maintaining the sequencing of critical phases of work while allowing
contractors to employ their strengths and competitively bid the work. The phases consisted of:

• Contract I: Emergency replacement of 750 linear feet of collapsed corrugated metal pipe with highly complex site conditions, including the steep slope along the Smith River
• Contract II: Installation of 5,200 linear feet of parallel gravity sewer
• Contract III: Alternative selection of sewer rehabilitation methods, including replacing in place, cured-in-place pipe liner (CIPP), or parallel sewer installation. Where possible, multiple rehabilitation methods were identified from which contractors could select based on their respective strengths and capabilities.
• Contract IV: Repair the collapsed sewer and CIPP lining on an industrial site

The first three contracts were funded through the Virginia DEQ’s Revolving Loan Fund while the fourth contract was primarily funded by the EDA grant. “If we expect to achieve cost-effective, creative solutions in our designs, we as design engineers must do a better job of mining the combined talents of contractors who are being asked to perform the work,” says Scott Ehrhardt, PE, a senior associate with Dewberry. “The Martinsville project is a perfect example of how we can effectively access the collective talents and creativity of contractors who are accustomed to bidding rehabilitation projects, thereby ensuring we are delivering the best solutions for our clients.”

An Affordable Rehabilitation
The city was able to complete the ambitious amount of repairs in 2.5 years. Challenges included historical rainfall events, significant infiltration, heavy sediment and debris deposits within the existing interceptor, bypass system malfunctions, unmarked utilities, vandalism, fire and freezing of the bypass system, and unstable slopes and river embankments. Despite these obstacles, the construction was completed for less than $17 million, and as a result of the overall cost savings, the city’s Water Resources Department has been able to address additional targeted deficiencies within the system, including further CCTV inspections, flood damage repairs, and critical sewer repairs utilizing CIPP.

The project serves as an example of a successful and affordable rehabilitation of a large-diameter sewer line for a rural community working with a limited budget. “Major deficiencies in the Smith River Interceptor posted significant risk to both the public and the environment,” says Mike Kahle, director of water resources for the City of Martinsville. “Dewberry’s approach and expertise was critical to the success we experienced in the rehabilitation of this major interceptor.”

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