

Slipline Safeguard

By Stephen C. Cooper

Culvert reclamation project saves time and money, keeps traffic moving

The Delaware Department of Transportation (DelDOT) found a way to keep nearly 16,000 vehicles a day streaming on a major highway while saving more than \$850,000 and months of construction time when it repaired a crumbling culvert in early 2007.

Instead of replacing the reinforced concrete pipe (RCP), DelDOT decided to insert a 100-ft run of 60-in.-diameter high-density polyethylene (HDPE) corrugated pipe from Advanced Drainage Systems (ADS). Strong and lightweight, the ADS N-12 watertight (WT) HDPE pipe can also be sliplined. This method eliminated the need to rip up and replace the original pipe, and it reduced the planned five-month project down to two weeks, avoiding interruption of the 15,831-vehicles-per-day flow on the four-lane State Road 48, called Lancaster Pike.

“When the Delaware DOT came to us to develop an alternative engineering

plan that would reduce costs while keeping traffic flowing and meet cost savings and American Association of State Highway and Transportation Officials (AASHTO) specification goals, we knew that the N-12 WT pipe would be the product to use,” said Tom Harbert, P.E., ADS regional engineer for the area.

Project Planning

Originally built in 1970, the culvert carries Chestnut Run Creek water flow under Lancaster Pike, a busy highway in the northern part of Delaware.

“With ADS N-12 WT pipe, the DelDOT did not have to plan for a costly and time-consuming construction site,” Harbert said. “Many, if not most, of the daily commuters driving on Lancaster Pike did not know what was happening beneath them for the two days it took to reline this pipe. But if they did, they would be thankful for the months of

detours that the Delaware DOT saved them from by repairing this culvert in this innovative manner.”

According to state records, the RCP was in poor condition due to severe spalling of the concrete, causing accelerated corrosion of the exposed reinforcing steel. The DelDOT inspection also concluded that the spalling and delamination of the concrete bottom pointed to more degeneration in the future.

ADS N-12 WT was selected because of a design that includes a smooth interior and corrugated exterior, a WT joint and exceptional hydraulics and strength. With an integral built-in bell and factory-installed gasket, the pipe requires no extra couplers to install. The joint meets or exceeds the ASTM D 3212 lab test and the ASTM F 2487 WT field test, which helps fill an essential role in meeting new, stricter U.S. Environmental Protection Agency guidelines.

The pipe meets or exceeds the requirements of the AASHTO M 294 materials specification and can be specified for culverts, cross drains, storm sewers and other types of new and rehab projects. Recently, the Federal Highway Administration changed the national construction and maintenance regulation to expand the use of alternative types of pipe on federal-aid highway projects, increasing competition and expanding the opportunity for economical and labor-saving products to be used.

Named for its Manning’s “n” rating of 0.012, the ADS N-12 pipe was designed in 1987 specifically for culverts, storm sewers, highways, airports and other civil design construction and has been used in these applications ever since. The product used



With the help of a backhoe, a four-man crew joined and slipped new pipe sections into place.

for this project includes a pressure-tested coupler that provides a WT connection, meeting a full 10.8 psi in accordance with ASTM D3212.

Repair Work

According to Harbert, damage to the concrete pipe was not limited to the bottom. "Concrete will wick water. There was considerable exposure of the reinforcing steel on the walls as well," he said. "Typically you find damage around the entire circumference of this type of pipe because concrete naturally absorbs water, and that was the problem in this culvert."

To complete the repair, five 20-ft-long sections of the pipe were joined and slipped into place using a four-man crew and a backhoe. The integral bell and spigot enabled each section of pipe to be easily popped together, forming a WT seal. A slurry consisting of fly ash, cement and water was pumped in to fill the void between the worn-out 72-in. RCP pipe and the new 60-in. HDPE pipe. The slurry easily filled any voids so that if the RCP did eventually totally crumble, the integrity of the structure would be maintained.

"It's always satisfying to be able to offer a simple, time-efficient and cost-effective solution to the customer, and in this case we were able to easily achieve all three of those objectives," Harbert said. **[SWS]**

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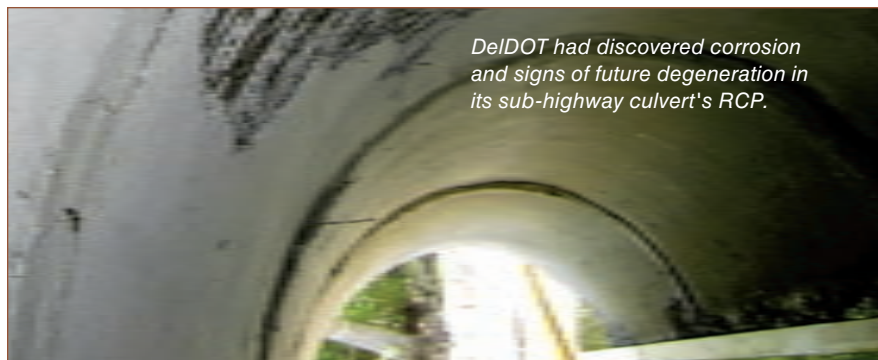
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DeIDOT had discovered corrosion and signs of future degeneration in its sub-highway culvert's RCP.

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