

**NORTHERN CONCRETE PIPE**



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## **Failed HDPE System Increases Cost of Simple Storm Sewer Improvements**



A simple resurfacing and storm sewer improvements to an industrial park street crossing over the Red Cedar River in the Village of Fowlerville, Michigan required connection to an HDPE flood control system that had been installed in 2001. The system consisted of seven parallel 60-inch diameter HDPE culverts under the road that serviced the industrial park and approximately 1,250 trucks and other vehicles, daily. The culverts were designed to accommodate floodwaters in the event that the new bridge built in the same year did not have sufficient end area capacity during large storm events. Floodwaters would top the river banks and spill into a floodplain area upstream of the elevated roadway alignment, rise to the invert of the HDPE culverts, relieve the upstream flooding, and protect the integrity of the new bridge. The culverts were installed in an embankment condition to meet the elevation of the bridge deck and normal water level of the creek.

The storm sewer improvements included a precast structure over the westerly most 60-inch HDPE culvert. Wolverine Engineers and Surveyors, Inc. designed a 108-inch diameter manhole with a 42-inch diameter tap that would accommodate a

new 42-inch diameter reinforced concrete pipeline carrying stormwater from the industrial park. A representative of Northern Concrete Pipe, Inc. (NCP), producer of the concrete pipe and proposed precast concrete manhole, inspected the HDPE culvert that would be fitted with the proposed manhole. What he discovered confirmed Wolverine's findings about the condition of the pipe. This would prove very alarming for the village of 3,000 residents and local businesses.

The westerly most HDPE culvert had deflected nearly 20%. It was considered a failed culvert that could not be used for the planned modification. After inspection of the entire HDPE flood control system it was determined that all seven culverts showed imminent failure characteristics. The village had no option other than to expand the project to include replacement of the flood control system.

The manufacturer of the HDPE conduit suggested that the failed product be replaced with a contemporary type not available in 2001. The failed HDPE type had only been sold for 3 years.





Village management elected to specify RCP in lieu of HDPE in an expanded “remove and replace” project.

NCP provided an estimate to replace the seven 80-foot HDPE culverts with 60-inch diameter RCP. Despite competitive pricing from NCP, and the underground contractor, replacement of the culverts would cost the Village of Fowlerville nearly \$250,000. NCP teamed with Wolverine to save the village almost \$4,000 in value engineering. This was accomplished by precasting a 42-inch diameter horizontal Tee, in lieu of a 108-inch inside diameter manhole, and manufacturing a 48-inch diameter Manhole Tee into the same pipe. Thoughtful consideration of the problem coupled with the goal of installing a robust product that would be appropriate for the application kept the roadway from being closed indefinitely. The underground contractor, C & D Hughes, Inc., completed the culvert replacement in 2 weeks.

When we think of updating aging infrastructure we generally envision failing bridges and culverts that have reached the end of their service life. The challenge for municipalities is that flexible and rigid pipeline systems cannot be installed the same

way, and their inherent structural characteristics are as different as their physical appearance. If HDPE systems are selected, they must be installed very carefully, and post installation mandrel tested to lessen the likelihood of premature failure, according to many standards and the manufacturer’s own installation recommendations.

