

## Corrugated HDPE Pipe in Railroad Applications

**T**esting has been completed in Pueblo, CO, for the use of corrugated HDPE pipe in shallow cover railroad applications. The test, conducted by the Transportation Technology Center, Inc. (TTCI) for the Plastic Pipe Institute (PPI) at the Facility for Accelerated Service Testing (FAST) involved 157-ton rail cars used to study the 48-in. HDPE pipe.

The methodology of the project included repeatedly running a train consisting of four locomotives with 80, 315,000-lb rail cars over the HDPE pipe with just four ft of cover from the top of the pipe to the bottom of the rail. In addition to the dynamic performance evaluation, the long-term impact of heavy, static loads on the pipe was assessed by parking the cars with one set of wheels on the track directly over the same pipe for six weeks. The corrugated HDPE pipe used in the test was manufactured by Advanced Drainage Systems, Inc. ([www.ads-pipe.com](http://www.ads-pipe.com)).

The pipes were instrumented to allow data collection during train operations. Transducers were installed at various locations on the pipes to measure pipe

wall strains and lateral, vertical, diagonal, and circumferential deflections. Strains and deflections were measured when the pipes were in place before the trenches were backfilled, after backfill, during normal operations at FAST after accumulating one million gross tons (MGT) of heavy axle load (HAL) traffic, and after accumulating 96 MGT of HAL traffic. Also, the pipes were monitored visually and with a video camera.

"The instrumented pipes performed perfectly after 96 million gross tons of heavy axle loading, with measured strains and deflections well below the material limits," stated Michael Plumier, director of engineering for the PPI's Corrugated Plastic Pipe Division. "The maximum measured combined deflection from construction and dynamic loading was less than 1.5 percent and the maximum deflection due to dynamic loads alone was 0.14 percent. The maximum measured tensile strains were negligible, and the maximum measured compressive strains were less than one percent. Operators noted that the track ride quality was acceptable, and no track geometry maintenance was required at the conclusion of the test."

FAST operates as a test bed for railroad track and components, and for rail



*After 96 million gross tons of heavy axle loading, the pipe performed perfectly.*

vehicles and components. The Federal Railroad Administration, the Association of American Railroads, and individual railroads and railroad suppliers (through in-kind contributions) have cooperatively funded the operations at FAST and its test programs. The program has focused on increased axle loads and their implications for track components, maintenance practices, and interaction of vehicles and track since 1988 when the nominal axle load of the train at FAST was increased from 33 tons to 39 tons. About 120 MGT of HAL traffic accumulate each year at FAST. Testing at FAST allows for safe controlled testing of components without incurring the risk of in-service evaluations.

The PPI ([www.plasticpipe.org](http://www.plasticpipe.org)) is a non-profit organization founded in 1950 that is the major trade association representing all segments of the plastic piping industry. PPI is dedicated to expanding awareness about plastic pipe systems and promoting plastics as the material of choice for pipe applications. It is the premier technical, engineering, and industry knowledge resource that publishes data for use in development and design of plastic pipe systems. Additionally, PPI collaborates with industry organizations that set standards for manufacturing practices and installation methods. To access the complete study, go to [www.plasticpipe.org/drainage/ads-technical.html](http://www.plasticpipe.org/drainage/ads-technical.html).



*Eighty 315,000-lb rail cars plus four locomotives were repeatedly run over the HDPE pipe with just four ft of cover from the top of the pipe to the bottom of the rail.*

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