

FORT WAYNE IMPLEMENTS 100-YEAR WATER MAIN REPLACEMENT PROGRAM

PE 4710 HDPE Pipe Selected to Solve Breaks and Leaks

By: Plastics Pipe Institute (PPI)

Faced with an aging water delivery system that has experienced an average of 398 main breaks per year during the last ten years, the Fort Wayne Water Utility has embarked upon a total pipe replacement program to improve reliability and customer satisfaction. Averaging nine miles being replaced a year, contractors hired by City Utilities primarily use horizontal directional drilling (HDD) to replace legacy mains with high-density polyethylene (HDPE) pipe. The initiative is supported by water rates, not taxes or other funding options.

“Fort Wayne, like many other Midwestern cities, grew rapidly into the 1960’s,” said Andrew Schipper, P.E., water engineering manager for Fort Wayne City Utilities. “Unfortunately the piping materials installed between 1940 and 1960 contained less metal and employed newer manufacturing techniques that have not stood the test of time or corrosion. These pipe materials are now responsible for the majority of main breaks in our system. About ten years ago, cast iron mains comprised nearly 70 percent of our distribution system. Today, when we include ductile iron and other metallic pipes, about 70 percent of our 1,400 miles of water main remain subject to corrosion. Therefore, Fort Wayne has a long-term need to replace water mains. We involved rate payers, obtained their support, and implemented a water main replacement program.”

Fort Wayne is fortunate to have an extensive electronic record of nearly 11,000 main breaks dating back to 1974. “We have leveraged this information to prioritize which mains to replace first. We are able to look at mains with poor break history over the past 43 years as well as

mains that are breaking now. Using this prioritization methodology to drive the main replacement program resulted in only 314 main breaks in 2016,” Schipper observed.

The pipe used in the main replacement program is now entirely HDPE PE 4710, DR 11 with HDPE fittings. Before the decision to use HDPE pipe exclusively, Schipper and his department ran pilot



HDD used to install six-inch diameter water main from 500 foot reels. City crews have become skilled with electrofusion

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projects with other types of pipe including Fusible PVC® and Certa-Lok® PVC pressure pipe.

According to the Plastics Pipe Institute, Inc. (PPI), the major North American trade association representing all segments of the plastics pipe industry, PE 4710 is the highest performance classification of HDPE piping material for water applications. “PE 4710 HDPE pipe is tough, durable and flexible, meeting AWWA C906 and ASTM F714 standards,” stated Camille George Rubeiz, P. E., F. ASCE, senior director of engineering for the Municipal and Industrial Division of PPI.

“PE 4710 compounds offer an excellent level of performance. This means PE 4710 HDPE pipe can be used with increased flow capacities plus increased resistance to surge pressure, fatigue and slow crack growth. The ANSI/AWWA C906-15 standard includes PE 4710 for sizes up to 65 inches and recognizes the increased durability and reliability of HDPE pressure pipe used in water systems.”

“Just about all the replacement projects we have done are installed with directional drilling techniques,” explained Landon Geiger, project manager for a number of main replacement projects for Fort Wayne. “We’ve continued to evaluate different HDPE installation methods such as pipe bursting. Due to the right-of-way layout in Fort Wayne we can generally find an alignment for a new main. Therefore, main replacement has been more economical than bursting an existing pipe. I would like to try it but haven’t yet had a situation where a new main alignment is cost prohibitive.”

“The contractors here are knowledgeable about drilling in Fort

Wayne and they tend to know what’s underground. Fort Wayne has some pretty stiff clay that is usually good for drilling. Once contractors get their mud mixes just right, we’ve actually had to slow down the drilling operation so the crews making service reconnections can catch up. This is a good problem to have,” said Geiger.

On a number of multi-mile HDPE pipe replacement projects, six-inch diameter water main has been installed from reels on which 500 feet of pipe is coiled. Installation is done by local contractors who can also do the fusing of the pipe sections along with the in-house crew. There are typically five to six people on a crew with work continuing throughout the year, except in severely cold weather.

Fort Wayne has transitioned from using ductile iron fittings to using HDPE fittings on main replacement projects. “Historically we’ve used ductile iron fittings with HDPE pipe for hydrant assemblies and for other connections,” explained Geiger. “We started comparing the cost to use HDPE from the hydrant all the way back to our cut-in at the existing cast iron main. We were pleasantly surprised to see that the price for HDPE was much more competitive than the ductile. On one replacement project, we allowed the contractor to bid both materials. The result was that using the HDPE fittings on this particular \$2 million project saved \$33,000. HDPE fittings are a win-win for us. They give us a longer lasting design without joints subject to corrosion as well as being cost effective for rate payers.”

During the past three years, the Fort Wayne water utility has invested just under \$16 million in eleven projects that have replaced a total of nearly 30 miles of

main. The investment represents all costs assigned to the projects including design, construction, construction management, and inspection, along with maintenance labor provided by City Utilities employees and parts from in-house inventory. As part of the main replacement projects 3,124 private services were replaced. There are a total of 101,000 services in the Fort Wayne system.

“Working closely with contractors on main replacement projects has helped City Utilities’ maintenance department become skilled with fusion and our crews are now able to electrofuse saddles and couplings, and perform hot taps on HDPE,” Geiger observed. “We have a number of hot tapping machines and our maintenance staff is quite skilled at making hot taps. The contractors will excavate the hole and our maintenance staff will insert the tapping saddle, mount the valve, attach the machine, drill it, and be in and out in just a few hours.”

According to Schipper, “HDPE provides many benefits for us including being a leak-free system without joints. Plus HDPE has the longest design life of any pipe material available. It’s corrosion free, the material is durable and tough, and because the system is installed with HDD it is completely restrained.” †

ABOUT PPI:



The Plastics Pipe Institute, Inc. (PPI) is the major North American trade association representing all segments of the plastic pipe industry and is dedicated to promoting plastic as the materials of choice for pipe and conduit applications. PPI is the premier technical, engineering and industry knowledge resource publishing data for use in the development and design of plastic pipe and conduit systems. Additionally, PPI collaborates with industry organizations that set standards for manufacturing practices and installation methods. For additional information, go to the Plastics Pipe Institute’s website at: www.plasticpipe.org.