

New Innovations in Water Distribution System Piping

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Traditionally, water line construction has involved PVC or Ductile Iron pipe and these pipes are typically laid by direct bury in a trench and joined together with a gasketed bell and spigot. Depending upon the application, these joints, as well as, bends and tees are restrained by concrete thrust blocks or mechanical restraining joints. When the need arises to cross a road, rail road, creek, or some other obstacle, the usual method would be horizontal directional drilling or jack and boring. Horizontal directional drilling uses a bore machine that bores under and then pulls the pipe back through the bore hole under the obstacle. HDPE piping has been the usual material for this application in the past. After the HDPE pipe is pulled-in, fittings must be fused to the material in order to join the HDPE to the PVC or Ductile Iron main. The jack and bore method works by jacking and boring a casing large enough to handle the carrier pipe and spacers under the obstacle. The casing is usually steel and the carrier pipe is most often restrained joint Ductile Iron Pipe.

In the past few years, Fusible PVC has been introduced into the market. The Fusible PVC C-900 and C-905 provides a method of installing a continuous, restrained joint, gasket-free PVC pipe to be used in trenchless and direct burial applications for various water and sewer projects. The Fusible PVC piping is fused together in the field and can be laid by direct burial or horizontal drilling. In the horizontal drilling application, continuous pull-ins of over 5,000 LF have been accomplished. The Fusible PVC C-900 is available in 4" to 12" diameter while the Fusible PVC C-905 is available in 14" to 36" diameter.

Recently EMC Engineering Services, Inc. surveyed, designed, and monitored construction of a water main extension project along SR 21 in Effingham County for the City of Springfield. This project involved approximately 22,000 LF of 16" diameter PVC water main and was completed by Tyson Utilities Construction, Inc. at the end of 2009 with a construction total of \$1.6 million dollars. At three locations on this project, horizontal directional drilling was selected as the method to cross a total of 900 LF of creek or wetland areas. Using the installation method, permitting with the US Army Corps of Engineers and /or Georgia EPD was not required because there were no impacts to wetlands or stream buffers. Additionally, this method saved money on permitting and clearing costs since the areas were not required to be cleared with horizontal drilling. Conventional HDPE pipe was bid with the newer Fusible PVC being bid as an alternate.

The cost between the two different materials was negligible and Fusible PVC was selected due to several advantages. First, 16" Fusible PVC has the same inside diameter as regular PVC piping used for the main and allows us to maintain the flow and pressure characteristics of the 16" PVC main. A 20% larger diameter HDPE pipe would be needed to match the inside diameter of the 16" PVC main line (See Figure 1). Second, readily available standard water line fittings can be used to repair or connect to the Fusible PVC line. This allows the City of Springfield's public works department to connect to or repair the line with familiar materials and methods. HDPE requires special fused fittings for connection or repairs, which could cause costly water service outages while waiting for repair.

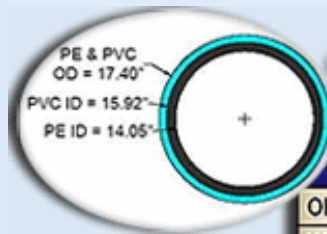


FIGURE 1.
PIPE MATERIAL COMPARISON

16" Pipe	16" PVC DR 25	16" PE DR 11	% PVC Advantage
OD (Inches)	17.4	17.4	-
Wall Thickness (Inches)	0.69	1.68	141%
ID (Inches)	15.92	14.05	12%
Flow Area (Inches ²)	199.06	155.04	22%
Pressure Rating (PSI)	165	160	3%
Weight (lbs. / ft.)	24.88	34.29	38%

In summary, the selection of Fusible PVC provided a better alternative to the older HDPE pipe used in horizontal directional drilling for this project. The construction using the new product went quickly without problems and the line is in use today. The new technology of Fusible PVC is something that is being used more often and is becoming widely accepted. The benefits to your project should be evaluated to see if this product can be utilized on future projects.