Indianapolis Water Company's Successful Transition to HDPE

Indianapolis, IN

In 1992, Indianapolis Water Company (IWC) began hunting for a piping material and method to install new water mains in established residential areas. The utility's primary objective was to reduce the restoration costs associated with conventional trenching methods.

"We are a private municipality," says Earl Anderson, IWC's Director of Purchasing. "If we have an opportunity to save our company money, we must take advantage of it, just like any other business would do."

Ultimately, IWC decided high-density polyethylene pipe (HDPE) from ISCO Industries, Inc., installed via directional drilling technology, offered the best solution to its pipe restoration needs.

"The Indianapolis Water Company is truly a pioneer among its peers," says Jimmy Kirchdorfer, CEO, ISCO Industries, Inc. "Their personnel constantly searches for better, more cost-effective solutions for their operation."

Introducing a new piping material is a tremendous undertaking for a municipality, Kirchdorfer acknowledges. "The water company is making a huge commitment," he says. It means new design considerations and installation procedures, as well as new fittings, tapping equipment, valves, fusion equipment, etc.

Kirchdorfer makes available whatever ISCO resources are required to ensure the success of each project. To help navigate the transition in Indianapolis, ISCO led a partnering effort within the team, including representatives fromI-WC, the Polyethylene Pipe manufacturer and McElroy Manufacturing, the fusion equipment manufacturer.

The Search for Alternatives

IWC chose directional drilling because the process would cause minimal disturbance to surrounding neighborhoods, thus minimizing low restoration costs for sidewalks, lawns, easements, and other impacted structures. Rather than dig a network of trenches throughout the project site, directional drilling can take place without inconveniencing residents, disrupting their routines, or otherwise impacting yards and other structures.

Most piping materials lack the physical properties to accommodate the rigors of directional drilling. However, the flexibility of HDPE and the strong joints created by the pipeline fusion process make it ideal for the task. This directional drilling project marked the beginning of IWC's successful application of with HDPE pipe.

HDPE & Water Service

HDPE pipe has been in use since the early 1950s. During the '70s and '80s, municipal gas utilities drove the demand for HDPE. But for the last several years, Indianapolis Water and others in the potable water industry were attracted to the benefits of HDPE pipe for their applications.

In 1978, the American Water Works Association (AWWA) approved HDPE pipe for water service; back then, the maximum diameter tubing was just 3 inches. In June 1990, AWWA developed the first edition of AWWA Standard C906-90 for 4-inch through 63-inch HDPE pipe and fittings designed for water distribution. The new standard opened the way for innovative applications and for water suppliers to realize the economic and performance advantages of the synthetic material.

Other Applications in Indianapolis

Convinced of HDPE's suitability – thanks to the success of the initial directional drilling project, IWC gradually increased its usage of HDPE pipe.

Cul-de-sacs

As the number of new housing developments

increased in the Indianapolis metropolitan area, IWC faced the challenges of installing water mains around cul-de-sacs.

The rigid 6-inch PVC pipe IWC had used for years required numerous elbow fittings to fit curves, and this rigidity created stress on the joints. Moreover, installing the PVC pipe required open trenching as well as setting a shoring box at every location of a bend or hydrant. A typical cul-de-sac included four to five bends, plus a hydrant at the end of the main to provide a flushing point.

Thanks to HDPE's high flexibility, one fused length of pipe can be wrapped around the outside of the cul-de-sac. The fire hydrant is placed at the entrance to the cul-de-sac, and a smaller diameter pipe beyond the hydrant can be used to wrap the cul-de-sac and deliver water for residential use.

Indianapolis Water now uses 3-inch HDPE to wrap cul-de-sacs, starting from a 6-inch x 3-inch reducer at the hydrant. The application also features:

- HDPE's smooth interior surface gives it a high flow factor that does not degrade over time.
- HDPE is a ductile, flexible material which can be bent safely on a radius as small as 25 times the diameter of the pipe.
- Seasonal cycles of distortion will not cold-work the pipe to fatigue. It will not crack or break as easily as PVC pipe installed in similar environments.
- HDPE is chemically inert and resists corrosion from substances in the soil or the water.

Stream Crossings

In addition to cul-de-sacs in residential areas, IWC routinely contends with stream crossings in its service area.

"Stream crossings pose one of the least desirable situations for a contractor," says Jeff Peters, a Design Engineer with IWC. "These crossings are usually extremely difficult to open excavate." In turn, the level of difficulty typically decreases production and increases costs to build these crossings, he says. Environmental considerations present yet another concern, since the State of Indiana does not allow open excavation of a stream during the fish spawning season.

HDPE pipe, installed using horizontal directional drilling technology, offers an ideal solution to all of these concerns, Peters says.

Main Replacements

As IWC achieved good results, additional opportunities for the new pipe material continue to surface. The water company had experienced numerous corrosion and electrolysis problems with existing ductile iron pipe (DIP) lines. Some pipes failed after less than 10 years in the ground. Wrapping the DIP with polyethylene film had only made the problem worse. The "holidays" in the wrapping from construction rigors and tapping intensified the failures at these points.

The cost to replace corroded mains is one of the most capital-intensive undertakings any water utility faces, according to IWC's Peters. Fortunately, HDPE offers a comprehensive solution for IWC's situation. The utility runs a temporary polyethylene main aboveground to maintain service to customers. Once this temporary main is in service, they transfer existing services to it and remove the temporary aboveground HDPE pipe.

"The ability to run a temporary line greatly reduces the impact of main replacements on our customers," says Peters. "Above all, we are a service-oriented company."

Meeting the Demands of Growth

IWC has experienced tremendous growth in its business, receiving numerous contracts to provide water to outlying communities, including Pittsboro and McCordsville. This growth required large diameter pipe – and lots of it. The utility selected HDPE for the projects because long lengths of water line could readily be fused together aboveground in relatively open areas (less populated areas meant there would be relatively few other utility lines to cross). "It's a pretty easy process," Peters says.

In all, IWC has installed more than 30 miles of 20-inch and larger HDPE. One project alone included 7,500 feet of 36-inch pipe.

IWC's Piping Material of Choice

Clearly, HDPE is IWC's material of choice for many reasons, including its physical properties and ease of construction:

- The heat-fusion process is superior to joining

processes used for other materials. During heat-fusion, the ends of two prepared sections of pipe are heated to approximately 425° F. The molten ends are pushed together under pressure for a short period of time. This fusion process results in a "zero-leak-rate" system.

- The joints are strong. With all other piping materials, the joints are the weakest points in the system. In contrast, HDPE pipe joints – which are stronger than the pipe itself – do not require bolts, gaskets, adhesives, or any other "foreign" material. The pipe is simply melted and "welded" together. It's as if the pipe is manufactured at the job site into one long piece without any joints.
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On-Going Team Effort

Like any new material, when HDPE was introduced to IWC, the introduction was accompanied by its share of challenges and questions. "Being the 'first' at something means there are no paths to follow," says IWC's Anderson. "There were virtually no industry standards. In a sense, we were creating a new standard of excellence."

Since the beginning of the first directional drilling installation, the project team has continued to meet monthly to discuss status, problems and solutions, training, upcoming projects, and more. "By having all four parties in one room, we could address the immediate problems and deal proactively with anticipated problems," says Kirchdorfer. "Frankly, we probably learned as much from everyone else as they did from us."

"Our approach to working with customers is much more than simply showing up and saying, 'We sell better pipe,'" says Kirchdorfer. "Superior product is only one piece of the picture. What the customer needs is a complete system." The partnering process brings together all the expertise into one room – for the HDPE pipe, fusion equipment, fittings, installation procedures, all of it. This approach benefits the customer because it really focuses on providing solutions."

As a result of IWC's first HDPE project, many new fittings and associated equipment have been designed and fabricated from polyethylene. Not only have IWC and its water service customers benefited from the introduction of HDPE pipe, the utility has opened the door for other municipalities to realize the cost savings for years to come.