

The Municipal Pipeline

IPEX Responds to Customer Need Developing 30" Fusible™ PVC Pipe to Protect New Riverside Community from Flooding

Established in 2010 through the adoption of the Keswick Neighbourhood Structure Plan (NSP), Keswick on the River is a new community in southwest Edmonton, Alberta. Bounded by the North Saskatchewan River to the west and the Windemere Golf and Country club to the north, the 200-acre neighbourhood is named for a quaint town in northwest England and features more than 1,500 homes that offer old world English architecture designed to look and feel like a country village. Future residents of Keswick on the River will enjoy riverside living, playgrounds, a nature trail system and easy access to Edmonton.

As with much of Edmonton's storm systems that collect surface water into underground pipes and conveys it to either surface watercourse, lakes, ravines or the river, the development of Keswick required a system to drain surface water and prevent flooding.

The land includes three interconnected ponds each surrounded by beautiful parkland. While the wetlands were designed with ecologist and biologists to recreate the natural system of a river valley, they will also be functional. The ponds will collect and

clean rain water and return it to the river through an innovative storm outfall system. Designed for 100-year flood protection, the system conveys the storm water through an underground trenchless system along the southern edge of the golf course and into the North Saskatchewan River. This required more than

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Jordan Rice

Project Manager for Raywalt Construction Co. Ltd

500 meters of careful horizontal directional drilling (HDD) that dropped 32 meters to the river bank and a pipe large enough and reliable enough to handle the volume with the inherent flexibility to accommodate a compound bend during the pull. Thankfully, Fusible Brute™ PVC pipe from IPEX was up to the task.

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Fusible Brute PCV pipe ends and fusion machinery are sheltered during the installation

Benefits of Fusible PVC Pipes



- ✓ 30 inches in Diameter
- ✓ Corrosion Resistant
- ✓ Curves Along the Center of the Pipe
- ✓ Long Continuous Trenchless Application
- ✓ Easy Installation and Handling

Delivering a Larger, Better Alternative

To handle maximum storm water flow, the underground pipe installed at Keswick had to be 750 millimeters (30 inches) in diameter. Many municipalities have historically used traditional HDPE (high-density polyethylene) pipe in these trenchless applications, but PVC is the material of choice for the city of Edmonton due to its pull force and other advantages. The other alternative was to use steel pipe, which is difficult to handle and can corrode over time, so they would have had to make do with HDPE.

Offering several benefits over HDPE and steel, PVC has grown steadily in popularity as the material of choice for storm water systems throughout North America. One of the leading PVC pipes on the market, CIOD (cast-iron outside diameter) Fusible Brute PVC pipe from IPEX enables fully restrained joints with a tensile strength equal to that of the pipe. By combining the mechanical properties of PVC with an innovative patented butt fusion process, Fusible PVC pipe is capable of being installed in long continuous trenchless applications like the Keswick storm outfall

system. PVC's reduced wall thickness also requires less material and yields better flow than the alternatives.

"With steel pipe, there can be no curves along the center line of the pipe. It's also much heavier and it can rust over time. Because this system was going into the river, we needed an environmentally-friendly option—the pipe had to be corrosion resistant to avoid causing any contamination of the water," explains Jordan Rice, project manager for Raywalt Construction Co. Ltd., the general contractor for the project. "We knew that we wanted to use PVC and the Fusible Brute product from IPEX, but it was not available in the larger 30-inch diameter that the system required."

During the preliminary design stages of the project, Raywalt Construction met with IPEX to analyze options and determine if it was possible for the Fusible Brute pipe to be manufactured in a 750 mm (30 in) diameter. IPEX engineers quickly got to work developing a larger pipe specifically for the Keswick project.

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diameter Fusible Brute pipe to ensure solid joints, tensile strength and a system that would perform as needed," said Rice. "Thankfully they were able to deliver."

For the storm water outfall at Keswick, Raywalt ultimately needed a total of 512 meters of the large-diameter CIOD Fusible Brute PVC pipe (DR25). Because the system was gravity fed, dropping 32 meters over its length to the river bank, no specific pressure rating was required. The Fusible Brute PVC pipe also meets CSA B137.3, AWWA C900, AWWA C905, NSF-61, NQ 3660-950 and ASTM cell classification 12354.

For the Keswick project, the use of Fusible PVC allowed for easy connections via simple standard fittings and material consistency across the entire system. The CIOD Fusible PVC pipe will also be easier to maintain over the life of the system because all the accessories are readily available, and its gasket-free joints and excellent abrasion and scratch-resistant properties ensure long-term reliability.

Solving a Challenging, Unique Installation

The Fusible Brute PVC pipe is available in 12.2-meter (40 foot) lengths. To create longer pipe lengths for the installation, the patent-pending fusion process for the Fusible Brute PVC incorporates a proprietary PVC formulation and a unique combination of heat, pressure and time, using slightly modified standard industry fusion machines. The fusion process is carried out by trained and qualified individuals to ensure consistent, reliable fusion that creates piping systems of unparalleled strength.

Clean Harbors Directional Boring Services Ltd. was subcontracted by Raywalt Construction for the fusion and installation of the Fusible Brute system at Keswick. As one of the first companies licensed in Canada to carry out the fusion process, Clean Harbors has grown from having

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one qualified technician to six. Qualifying a technician involves a two to three-day training course with IPEX experts, which results in technicians being qualified to fuse pipes up to 400mm (16in) diameter Fusible Brute and Fusible Series. With time and a certain amount of joints fused in the field and inspections, technicians can then be trained to fuse up to 600mm (24-inch) diameter pipe. The new 30-inch Fusible Brute pipe used for Keswick required yet more time in the field and joints fused.

"IPEX is always very flexible and ready to provide us with training that works with our schedule," said Matt Porter, operations area manager with Clean Harbors. "We were already qualified to fuse 24-inch Fusible Brute. Through additional three-day training with several fusion joints and inspections, and the fact that we've been installing this pipe for quite some time, IPEX licensed Roger Zwaan, our fusion technician, to fuse the 30-inch pipe. In fact, Roger is currently the only fusion technician in Canada qualified to fuse 30" Fusible Brute."

Fusion time with Fusible Brute PVC is comparable to other thermoplastic materials. Fusion also can be performed under any temperature, as long as the pipe ends are maintained at a temperature above 4°C and both the pipe ends and fusion machinery are sheltered from the elements. Temperature was not a concern for the Keswick project, which began in the warmer weather of June 2013.

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"I ended up fusing about 40 joints for this project, completing about five joints a day. The warmer weather meant more cooling time for the joints, but it was a lot easier than needing to bring in shelter and heat," said Roger Zwaan, the fusion technician with Clean Harbors Direction Boring. "Because the directional boring process was taking place later, I did about 300 meters in June and then came back and finished up the remaining joints about a week before the pull date in September."

According to Zwaan, the fusion process for the Fusible Brute pipe does require more technical expertise and focus, but when it comes to the alternative HDPE or steel pipe, there is no comparison. "If you have the right tools and the right mindset, Fusible Brute is solid stuff to work with. It's rigid enough to not flex while handling, but great for boring due to its higher pull strength. The alternatives are not as corrosion resistant, and steel pipe is old school—the installation and trucking costs would greatly increase," he said. "The technical support I've received from IPEX has been great, and being the only qualified fusion technician in Canada for the larger Fusible Brute pipe has been a big boost to my career."

Due to the need to drop 32 vertical meters to the outfall at the river bank and to ensure limited disturbance to the adjacent golf course, the Keswick storm water system was specified a trenchless application using HDD methods. HDD offers several key benefits, including faster installation, ability to place pipe under natural and man-made obstacles and a greener more environmentally-friendly approach. Because HDD eliminates the need to excavate a trench, repair costs to the surrounding natural environment surrounding installation were limited.

The vertical drop, river bank, soil and larger pipe diameter proved to be a challenge for Clean Harbors Directional Boring. Fortunately, the full-strength butt fusion joints of the Fusible Brute PVC pipe offered Clean Harbor crews a greater pull force rating than they would have had with HDPE. A greater pull force offers safer installation in tough conditions for HDD trenchless applications.

"We had to bring out our biggest drill and consolidate crews to make sure we have enough people to operate the equipment. It took a bit longer than anticipated

because we encountered some harder soil conditions like coal that were not indicated on the original survey report," said Porter. "The higher pull strength of the Fusible Brute pipe certainly came in handy. We were able to fully use our equipment's pulling ability and pull the pipe harder without risk of pulling apart joints or damaging the pipe."

Unlike typical HDD installations that form an arc underground from surface to surface, the vertical drop to the river bank also required a unique approach. "We had to build a berm on the river bank to create a flat area for our equipment and then drill upwards towards the surface," said Porter. "This was a unique installation and presented the challenge of the drilling fluids flowing back towards the machinery, which can build up."



Standing By to Reliably Protect

The new storm water system at Keswick on the River was the first project in Canada to use the largest ever Fusible Brute PVC pipe from IPEX. Through IPEX engineering expertise, training and technical support, the system is now installed and ready to protect the community from the heaviest rainfall possible.

In late September at a grand opening complete with a jazz band, cocktails and culinary delights, the doors to eight incredible show homes at Keswick on the River opened for potential home buyers. Whether future residents purchase a single family, town home, duplex or one of the exclusive \$1 million estate houses, they can rest assured that the Fusible Brute pipe from IPEX resting underground will reliably carry storm water away from the community for many decades to come.

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