Municipal Case Study

City of Salmon Arm – Fusible™ PVC Slip Line Project

Slip-lined solution saves iron pipe system corroding after just 27 years

IPEX FUSIBLE™

Product: Fusible™ PVC pipe

Size and Length of Pipe: 500mm (20") x 13.7m DR18

Joining Method: Butt fusion

Contractor: Capital Works Supervisor

Municipality: City of Salmon Arm, British Columbia

THE CHALLENGE

The clay soil on the foreshore of Shuswap Lake in Salmon Arm, BC is incredibly corrosive. Due to its corrosiveness, the existing ductile iron water works had multiple failures which put the entire piping system in jeopardy.

The pipe, which is also the primary water trunk main for the City of Salmon Arm, had experienced multiple failures in recent years, where corrosion had blown baseball-sized holes out of the iron piping. The city couldn't afford to leave the ductile iron pipe in service and risk another failure.

Work on the muddy lake bank couldn't take place in the summer for several reasons. Firstly, there is limited access to the original pipe system given its placement below the high water mark of Shuswap Lake in the summer months. Secondly, as a popular destination in lake country, the population of Salmon Arm increases during tourist season, creating an increase in water demand.

The pipe replacement needed to be done in the winter months, when the water level and water demand was low, so workers could more easily access the pipeline and divert the mainline water through smaller, local pipelines while work was being done

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THE SOLUTION

Given the extent of the corrosion from the soil, it was clear a non-metallic or plastic pipe solution was needed.

Slip lining was the preferred installation method for this project (to avoid a full-blown excavation of the existing iron pipe system), the pipe had to be fusible as well, which meant using either a Polyvinyl Chloride (PVC) or High Density Polyethylene (HDPE) product.

Given HDPE is a softer material, it would require a thicker pipe wall to handle the internal water pressure. The HDPE pipe needed for this project would require a 4" larger outer diameter, and therefore wouldn't have fit in the host pipe. A fusible PVC pipe was the only solution.

Project contractors Ironman Directional Drilling were familiar with IPEX's line of fusible PVC piping, and had used it successfully on local projects in other municipalities across British Columbia.

The city of Salmon Arm selected IPEX's 500mm (20 inch) x 13.7m DR18 Fusible PVC pipe for this project. Though familiar with IPEX products, it was the first time the team had used a pipe this large. It was also the first time IPEX had used a fusible pipe of this diameter in British Columbia as well.

> "Overall, the project was a great success, the flow losses were negligible and the pipeline has been operating without any problems since installation in Nov 2020. Environmental impacts were minimal with the need to excavate only access points on each end of the project site."

Tim Perepolkin
Capital Works Supervisor,
City of Salmon Arm

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> Its smooth interior surface minimizes energy consumption for pumping due to reduced frictional forces. Its corrosion resistance enables long-term durability. Studies confirm PVC pipe's longevity to be in excess of 100 years, which means that it has to be replaced less often, resulting in additional environmental impact reductions.

Given that this was a new product for the team, IPEX provided on-site training to familiarize the installers with this larger PVC piping system.

Unlike bell and spigot piping that require mechanical, metallic restraints at the joints, F-PVC provides a fully non-metallic one continuous length of piping. Using butt fusion to join the pipe systems (instead of metallic restraints) resulted in seamless, non-metallic, leak-free joints.

THE RESULTS

The major benefit of the 20" fusible PVC pipe was that it could be slip-lined or pulled through the existing 24" ductile iron pipework, eliminating the need to replace the original pipe, which would have been disruptive, expensive and time-consuming.

Had a full excavation of the pipe been needed, it would have been incredibly challenging to fit and set up the machinery in such a tight space around the lakebank, not to mention the considerable environmental impact it would have had on such an ecologically sensitive area.

Fusing PVC requires the material to be brought up to a certain temperature to fuse the pipes together, and it takes a bit longer to do this in cold weather. The team used a tent structure during the fusing process to protect the pipework from the cold temperatures, which hovered near zero.

Where fusible PVC pipe really shines is with its ease of use and resistance to corrosion. In this instance, existing ductile iron piping began to see failures in just 27 years, whereas IPEX's plastic piping is expected to last up to 100 years or more, which is now considered the engineering standard for the design life of such a product.

A PVC solution eliminates many of these negative environmental impacts. In fact, according to the Environmental Product Declaration from the PVC Piping Association, PVC pipe is designed to minimize environmental impacts.

This was certainly the case with Salmon Arm. As the PVC pipe easily slip-lined into existing piping, a full excavation wasn't needed, greatly reducing the impact on the local environment. IPEX's PVC piping is also sourced just 800km from Salmon Arm, in Edmonton, Alberta, further reducing the carbon footprint related to transportation. And most importantly, the new pipe installed on the shores of Shuswap Lake will likely last as long as the city needs it.

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