



# SOLENO

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**DEVELOPER**  
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FOR MASTERING STORM WATER

## REHABILITATION OF CULVERT WITH KRAH HIGH-DENSITY POLYETHYLENE (HDPE) PIPE

### A cost-effective Solution for Culvert Restoration in the Niagara Region

Culverts play a vital role in maintaining connectivity, ensuring public safety, and managing water flow beneath roadways, railways, and other infrastructure. Over the years, these structures have deteriorated due to freeze-thaw cycles, heavy use, and the corrosive effects of deicing salts, compromising their structural integrity and functionality.

Signs of wear and structural compromise had become evident in the existing concrete culverts within the Niagara region. Issues such as loose joints, loss of strength, corrosion and rebar exposure necessitated attention to ensure the continued functionality and structural integrity of these essential infrastructure elements.

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## THE CONTEXT

The Niagara Region, in collaboration with Devron Ltd and CRL Campbell, faced a significant challenge involving damaged concrete culverts. The objective was to find a solution to restore the structural integrity, while maintaining the capacity for water flow under the roads.

The decision between rehabilitation and replacement hinged on factors such as the extent of damage, site conditions, and feasibility. In particular, replacing culverts under roads with heavy traffic or with major embankments presents significant challenges related to costs and traffic control. The partnership with Soleno aimed to find an effective and efficient solution for this critical infrastructure issue.

## THE SOLUTION

To meet the project's requirements, Soleno's technical service recommended a high-density polyethylene (HDPE) pipe: the Krah pipe, with smooth interior and exterior walls. This pipe made it possible to rehabilitate the 2 existing culverts with a waterproof, economical and large diameter relining.

Two Krah pipes with an inside diameter of 800 mm and an outside diameter of 902 mm, were selected. The combined length of the installed pipes was 65 meters. The decision to use Krah pipes was based on their functionality, life cycle costs, and environmental impact considerations.

## THE BENEFITS

The use of Krah pipes as culvert linings provided a range of benefits, including structural rehabilitation and enhanced flow capacity due to the smooth interior surface. These pipes also offered corrosion resistance, reduced maintenance costs, and a lightweight design. Additionally, Krah pipes featured a double gasket design, facilitating quick and efficient installation compared to threaded ends. Notably, 65 meters of Krah pipes were installed in just one day without disrupting traffic flow, thanks to a unique design and installation sequence.

Niagara's culvert rehabilitation with Krah HDPE pipes proved to be a cost-effective and highly efficient solution for addressing structural deterioration. This approach enhanced the culvert's durability and hydraulic performance while significantly reducing maintenance costs and minimizing traffic disruptions. This case study demonstrates the successful strategy of employing Krah pipes to extend the lifespan of critical infrastructure, ensuring public safety and the continuous flow of water beneath roads.



## SYSTEM SUSTAINABILITY

A rehabilitation of culvert made of high-density polyethylene (HDPE), a lightweight, high-performance, and durable material, ensures a perfect system seal. Furthermore, HDPE is resistant to corrosion, abrasion, de-icing salts, and vibrations, guaranteeing the sustainability of infrastructure. Its cost-effectiveness and reduced environmental footprint make it a superior choice over concrete or steel.



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# REHABILITATION PROCESS OF CULVERT WITH KRAH HIGH-DENSITY POLYETHYLENE (HDPE) PIPE

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