



# Buffalo Creek

<b>OWNER</b>	British Columbia Ministry of Transportation and Infrastructure
<b>DESIGNER</b>	DWB Consulting Services Ltd.
<b>CONTRACTOR</b>	Belvedere Place Contracting Ltd.
<b>LOCATION</b>	Arras, BC

During the summer of 2011, a 3,000mm circular pipe was washed out six kilometres west of Highway 52 on the 206 Road at Buffalo Creek during the historic flooding that hit the British Columbia Peace Region. The British Columbia Ministry of Transportation was tasked with replacing a washed out drainage culvert and ensuring it would have sufficient hydraulic capacity for future floods.

## Application:

A new drainage structure was required to replace the washed out culvert. In order to deliver the project in a speedy and cost-effective manner, the government tendered the project as a Design-Build. DWB Consulting, with Armtec's support, prepared a preliminary package for a steel pile supported 6,500mm span x 3,681mm rise Bridge-Plate arch with Armtec's Wire Mesh Wall system. Belvedere Contracting was the successful bidder on the project.

## The Challenge:

Due to the site's weak foundation soil, the B.C. Ministry of Transportation required that any arch solution have pile supported foundations. The adjoining wall system design also needed to factor in the potential for settlement. Work began in early November 2012, making cold weather construction inevitable. As with all soil structures that require compaction, the backfilling of the structure and retaining wall system could not contain any frozen material.



## TECHNICAL DETAILS

Bridge-Plate Arch  
Span: 6,500mm  
Rise: 3,681mm  
Wire Mesh Wall System

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### The Solution:

A Bridge-Plate arch with wire mesh MSE wall system was selected for the project. To accommodate for the weak foundation soil, DWB Consulting designed an economical steel pile with an HP shape structural steel element as a pile cap. Armtec recommended the use of a gasket to separate the black steel footing cap and the galvanized components of the Bridge-Plate arch since the mixing of dissimilar metals can often lead to accelerated corrosion.

The issue of frozen backfill material was addressed at Armtec's preconstruction meeting with the contractor, design engineer, and owner so that all parties knew how to proceed. The geotechnical engineer provided backfilling instructions which included removal of any backfill material that had frozen during the night, the use of heaters to warm the backfill and close site monitoring.

Armtec's MSE Wire Mesh Wall system was selected using Tencate's Miragrid XT polyester geogrid. This high-strength woven geotextile provided additional soil reinforcement to prevent settlement of weak foundation soils. The rock faced welded wire mesh wall facing was a cost-effective solution suited to the steep site geometry. Both products were listed on the B.C. Ministry of Transportation and Infrastructure recognized products list.

Construction was halted near the end of November as temperatures dropped between  $-18^{\circ}\text{C}$  and  $-25^{\circ}\text{C}$ . During this time the settlement of the approach embankments exceeded the predicted amount. Since the arch design included pile foundations and was fixed, negative soil arching that had not been included in the original design resulted in additional loading on the arch. When construction restarted in the spring, Armtec verified that the arch design was still valid even with the additional loading. The Armtec Wire Mesh MSE wall system and geogrid reinforcement were also designed to exceed actual ground settlement.

The project was successfully completed in July 2013, re-establishing safe road access while preserving the aquatic habitat in the creek.

**Find out how Bridge-Plate can be used on your next project.**

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