



# Highway 417/Mississippi River Twin Bridges Geotechnical Investigation and Design

## Geographical location

Near Arnprior, in the Regional Municipality of Ottawa Carleton, Ottawa valley, Ontario

## When it began or was completed

Investigation and design report completed in 1995; design completed in-house in 1999; twin bridges were open in 2004.

## Why a Canadian geotechnical achievement?

The Ottawa valley is known for its sensitive Champlain Sea clay and the highest seismic zone in Ontario. For this project, seismic isolation was used for the first time in Ontario.

The subsurface consists of approximately 45 m of soft to firm compressible clay underlain by glacial till and limestone bedrock. A 200 m wide wetland exists immediately east of the Mississippi River, within which thick clay deposits are overlain by up to 4 m of peat and organic floodplain deposits.

A combination of foundation engineering solutions were applied to ensure the performance of the bridge foundations and to control the stability and settlement of the approach embankments. Over 17 km of piles were driven to bedrock to support the bridge foundations. To reduce embankment fill heights and settlement, and to minimize environmental effects, the bridge was lengthened to six spans. A palletized blast furnace slag lightweight fill was used for the embankments. Wick drains, in combination with a 2 m surcharge, accelerated embankment settlement from a predicted 15-20 years to 7 months.

To construct the pier foundations in the sensitive wetlands, and to erect the superstructure, a temporary access road was built. Geogrid and geotextiles were used to float the road over the wetlands. This road successfully supported heavy pile driving equipment and steel erection cranes on material on which one typically cannot stand without sinking.

## Submitted by

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## Key Reference

Ontario Ministry of Transportation. 1995. **Foundation investigation and design report for Mississippi EBL & WBL River bridges, Hwy 417, Arnprior, Ontario.** Ontario Ministry of Transportation.

## Photographs



Twin Mississippi River bridges carrying Highway 417 over the Mississippi River and the adjacent wetland.



Foundation construction in wetlands.