

CCE Awards 2023

Crescent Lake Causeway in the City of Portage la Prairie

Project Overview

The City of Portage la Prairie needed to replace Island Park Bridge. Constructed in 1929, the 220 m long timber bridge had deteriorated significantly and was load restricted. A temporary causeway with a pedestrian walkway accommodated traffic unable to use the bridge. AECOM explored replacement options and ultimately designed and oversaw the construction of a three-lane causeway with an Active Transportation Pathway and three arched culverts. The Crescent Lake Causeway provides safe, reliable transportation infrastructure.





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1. Innovation

The City of Portage la Prairie (the City), needed to replace the Island Park Bridge. Constructed in 1929, the 220 m long bridge had timber piles, pile caps, and stringers, with a timber deck, asphalt overlay, and timber posts with a steel guardrail. Due to its condition, the bridge was load-restricted and heavier vehicles were required to use the temporary single lane causeway located west of the bridge. The south end of the causeway encroached on private land. A deteriorated cantilevered pedestrian walkway on the bridge was removed and replaced with a walkway on the temporary causeway. People who previously used boats and snowmobiles to cross under the bridge were prevented from doing so due to the temporary causeway and associated small diameter culvert.

AECOM's involvement in replacing this deteriorated structure began in 2015 when we were engaged by the City of Portage la Prairie to prepare the conceptual design of the Island Park Bridge replacement. The conceptual design included gathering feedback from the City, multiple stakeholders, and the public through various discussions, stakeholder meetings, and a public open house. Three possible alternatives were considered feasible during the conceptual design, including: a new two-lane bridge; a three-lane causeway with a short span bridge or three large culverts; and a three-lane causeway on an alternate alignment with Tupper St. The recommended replacement option was a new three-lane causeway with a short span bridge or three culverts large enough to provide clearance for recreational users of Crescent Lake.

Ultimately, the constructed design was a low level three lane causeway with three arched culverts. The middle arch can accommodate boaters at low water levels, while pedestrian crossings including ramps and signage were implemented for boaters who need to portage and snowmobilers who need to cross the causeway. The accommodation of kayakers, canoeists, and snowmobilers through the site is unique. The design features that allow these groups continued access to Crescent Lake maintains use of a key local recreational asset.

During construction the temporary causeway was used as a detour for access to the island. This decreased the overall cost of detours.

As part of the design two new roundabouts, which were the first of their kind in the City, were designed at each end of the causeway to allow for better traffic and pedestrian flow.



3D Model, Crescent Lake looking West



South roundabout construction

2. Complexity

The primary complexity around this project is the selection and design of the preferred option. A three-lane low-level (lower clearance) causeway option was selected due to a significant cost savings as there was a reduction on the anticipated settlement/consolidation and other geotechnical challenges caused by the increase in fill material and very poor underlying soils. A reduction in the number of lanes did not have the same magnitude of financial impact, and it also did not provide the required improvements to roadway traffic.

The option that was designed and tendered was the three-lane low-level option with three pipe culverts. The circular pipes would have required a substantial excavation below lakebed to accommodate the large diameter culverts. Due to geotechnical challenges with piping and base heave in the soft soils, the cofferdam (designed by the Contractor) was a substantial portion of the awarded construction cost.

Due to the high throwaway cost for the cofferdam, AECOM, in discussion with the City, modified the design during construction to include arched culverts and a piled foundation. This reduced the excavation depth, eliminated the steel sheetpile cofferdam (replaced with a shallower clay cofferdam) and to shift the cost from the temporary sheetpile cofferdam to the permanent piled structure. The piled foundation was required beneath the shallow footings of the arch culvert footings due to frost heave and the concentrated loads on the poor underlying soils.

The slope stability and consolidation analysis were key geotechnical tasks that contributed significantly to the success of the work.



Culvert and retaining wall construction

3. Social and/or Economic Benefits

The new causeway provides improved access for all modes of transportation, including roadways designed to accommodate heavy truck traffic. Removing the old structure and temporary causeway eliminated the need for a detour and makes the traffic flow more efficient through the area. With the removal of the temporary structure, there is no longer an encroachment on to private property.

Improved aesthetics also benefit the community and encourage people to use the Active Transportation Pathways. The main north/south Active Transportation Pathway (ATP) connects existing multi-use pathways and sidewalks along Crescent Road to the sidewalks and trails on Island Park. The location of the north/south ATP has been moved away from the roundabout and crossing locations to encourage pedestrians travelling north/south to stay west of the roundabouts. This also reduces jaywalking and disruption to

traffic flow at the roundabouts. The crossings also accommodate boaters portaging in the summer and snowmobiler and cross-country skiers in winter.

The area is further designed for active modes as there are regular rest stops along the pathway with benches spaced significantly less than the maximum 400 m apart. The lighting was selected to be functional, provide pedestrian and vehicle safety, to be unintrusive to nearby residents, and to enhance the landscape features and visual appeal of the new facility at night.

Selecting the low-level causeway allowed the transportation infrastructure to be constructed in a cost-efficient manner, the existing temporary causeway reduced detour costs, and the landscaping including durable hard surface materials will reduce ongoing maintenance costs.



Causeway open to traffic, November 2021, looking West

4. Environmental Benefits

The Environmental Act Proposal (EAP) produced by AECOM considered the climate, air quality, physical environment, terrestrial flora and fauna, fish and fish habitat, protected species, socio-economic and cultural environment, public engagement, environmental effects and mitigation measures, and other construction impacts. The new three-lane low-level crossing, combined with removal of the temporary causeway restored the capacity of the water crossing and increased the aesthetic value of the area. The installation of three culverts also allowed for improved passage of water and fish, and the increased footprint of the causeway had negligible impacts on fish habitat.

Mitigation measures implemented during construction meant that there were negligible impacts to the environment during construction. The new causeway provided a long-term solution to transportation

infrastructure to Island Park Island, and relieved traffic congestion in the area during community events. Furthermore, realignment of one of the roundabouts meant that a mature stand of trees was not impacted.

Our landscape architecture design incorporates a diversity of plant material using a broad mix of tree and shrub species hardy to the prairie region, such as: Ashes, Elms and Lindens, Dogwood, Lilacs, Cranberries and Elders. Some of the landscaping was also modified during construction due to feedback from some of the local residents, and so that views would not be diminished.

Environmental impacts were mitigated during construction, and the environment benefits from the re-establishment of the waterflow as well as planting region appropriate trees and shrubs.



Bridging structure looking West

5. Meeting Client's Needs

The client's key goals were to construct a new causeway that could accommodate all forms of transportation from heavy trucks, cars, active modes and accommodating access to Crescent Lake for boater and snowmobilers. The end result addresses the key items raised during the stakeholder and public engagement process. Pedestrian safety was addressed with the creation of a separate active transportation pathway that ties into other regional paths. Pedestrian crossings are limited at the roundabouts on either end of the causeway to keep people away from traffic as much as possible.

The need for improved traffic flow and allowance for truck movements are provided by roundabouts designed to accommodate large vehicles.

An evaluation of the design options led to the selection of a low-level causeway as the most cost-effective option. The landscaping and design of the structure means it fits into the area and provides a good public space with paved pathways, clear lighting and rest areas.

Finally, the culverts in the bridge portion of the causeway address the need to maintain water flow and quality.

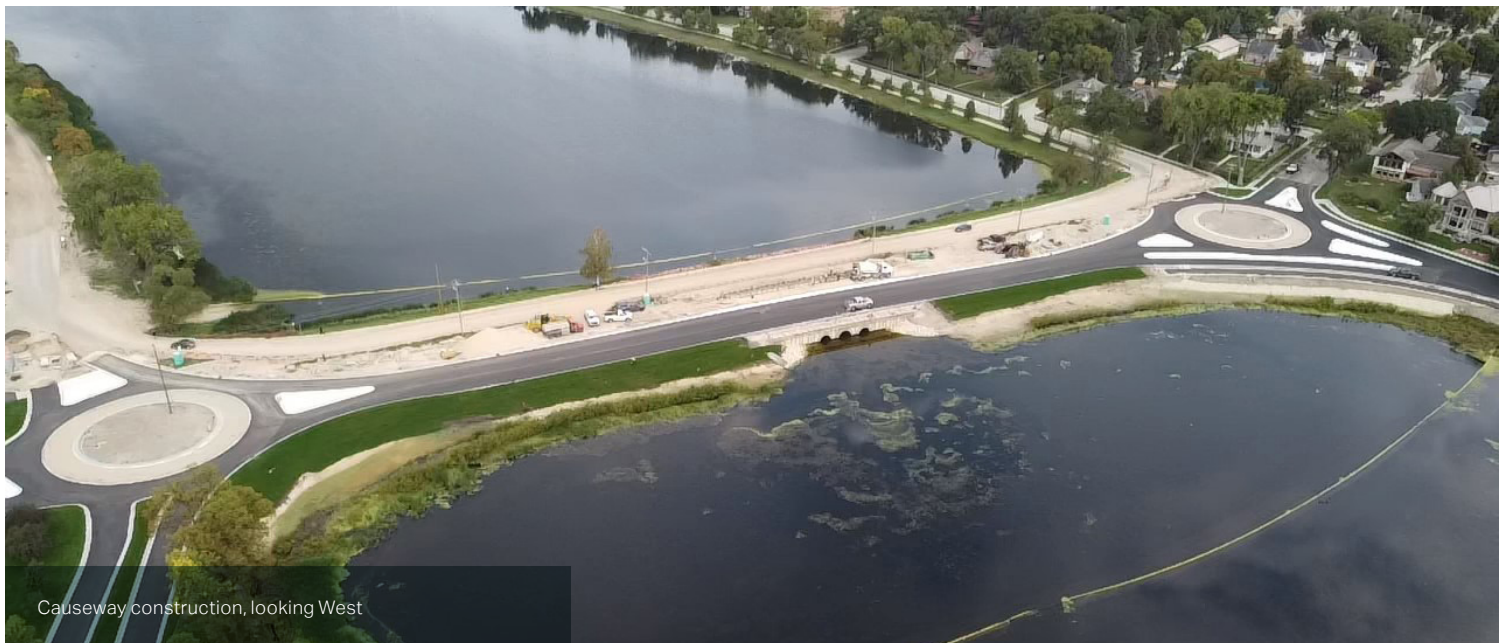
In replacing a load restricted timber bridge with a three-lane causeway with a wide path for active transportation and accommodation for snowmobilers and cross-country skiers, residents of Portage la Prairie have multiple reliable ways of navigating this area.



Causeway grand opening



3D Model, Crescent Lake, looking West



Causeway construction, looking West



Causeway open to traffic, November 2021, looking West

About AECOM

AECOM is the world's trusted infrastructure consulting firm, delivering professional services throughout the project lifecycle – from advisory, planning, design and engineering to program and construction management. On projects spanning transportation, buildings, water, new energy and the environment, our public- and private-sector clients trust us to solve their most complex challenges. Our teams are driven by a common purpose to deliver a better world through our unrivaled technical and digital expertise, a culture of equity, diversity and inclusion, and a commitment to environmental, social and governance priorities. AECOM is a *Fortune 500* firm and its Professional Services business had revenue of \$13.1 billion in fiscal year 2022. See how we are delivering sustainable legacies for generations to come at [aecom.com](https://www.aecom.com) and [@AECOM](https://www.aecom.com).