



## Development of the St Croix River Extradosed Bridge Form

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### Summary

The new St Croix River Bridge in Minnesota is a critical new piece of infrastructure required to replace the existing functionally obsolete Stillwater Lift Bridge which was constructed in 1931. The form of the bridge was developed over a long exhaustive process required to address stakeholder issues with the environmentally sensitive site. The paper describes the process for the development of the project, including the basis for the selection of the extradosed bridge form, and the aesthetic theme and features developed and incorporated into the design to address the stakeholder concerns.

**Keywords:** Extradosed bridge, cable stays, bridge aesthetics, post-tensioning, precast segmental.

### 1. Introduction

The St Croix River Bridge currently under construction in the USA will be the largest extradosed bridge constructed to date in North America and one of the longest in the world when complete in 2016. The extradosed bridge is part of a landmark crossing of the St Croix River near Stillwater in Minnesota. The Lower St Croix River was designated as a Wild and Scenic River in 1972 to be preserved for possessing outstandingly remarkable scenic, recreational, fish and wildlife, and cultural values. As a result of the challenging environmental and visual quality issues raised by stakeholders, the bridge project has been in development for more than 30 years.



*Fig 1: Existing Stillwater Lift Bridge*

The Stillwater Bridge over the lower St Croix River has been an important link between Minnesota and Wisconsin since it was first opened in 1876. The bridge was originally a timber toll bridge with a pontoon section that could be swung open to let vessels and log rafts past. The original timber bridge was under constant repair until it was replaced in 1931 by the existing steel lift span shown in Fig 1.

The approach roads to the existing bridge on the Wisconsin side of the crossing are steep and unsafe in winter conditions. The structure lacks pedestrian or bicycle access, carries only two lanes of traffic and congestion backs up onto the nearby main streets of Stillwater when the lift span is opened. The bridge also regularly closes when flood water over tops the bridge deck thereby limiting emergency access across the river.

All of these shortcomings spurred discussion of a new bridge crossing of the St Croix at Stillwater starting in the 1970's. The context in which this bridge and its adjoining roadways sit has turned out to be a significant factor in the development of the final solution for the new crossing.