

## Design of a Remarkable Bascule Bridge Over an Historical Canal

### Benoit CUSSON

Bridge Designer

WSP

Montréal, Québec, Canada  
[benoit.cusson@wsp.com](mailto:benoit.cusson@wsp.com)

Benoit holds a Master's degree in structures and has seven years of experience in bridge design and evaluation. He has a great interest in special designs relying on innovative materials.



### Tony MAILHOT

Sr Bridge Practice Lead

WSP

Montréal, Québec, Canada  
[tony.mailhot@wsp.com](mailto:tony.mailhot@wsp.com)

Tony holds a Master's degree in structures and has 25 years of experience in bridge design and construction. His main interests are in design of complex, movable and signature bridges.



Contact: [tony.mailhot@wsp.com](mailto:tony.mailhot@wsp.com)

## 1 Abstract

The Gouin bascule bridge is a 1,300 tons gigantic steel structure that allows pleasure boats to enter the Chambly Canal National Historic Site and provides access over the Richelieu river for vehicles, cyclists and pedestrians. As part of a project to revitalize and modernize the city centre, the architectural concept of the movable bridge will provide a landmark to this highly touristic site. There are only few examples in the world of such movable bridges with a large suspended counterweight. The challenges of the project include strict architectural criteria, fabrication and alignment of over 800 mm in diameter pins, the assembly on-site of remarkably large bridge parts and the precise balancing of the bridge.

When designing this structure, WSP made sure to consider the non-redundant aspect of some parts of the structure. Details regarding the design of the stays supporting the entire upper structure and the hydraulic cylinders initiating the rotation are described in this paper. The planning of the works in the middle of the critical infrastructures and services surrounding the bridge is explained. Since no interruption of the navigation on the canal was allowed during construction, some special considerations had to be taken with regards to the works at the foundation units.

**Keywords:** bridge, movable, bascule, stays, cables, isostatic, counterweight, services, canal

## 2 Introduction

Located 40 minutes South of Montréal in Canada, the Gouin bascule bridge is one of the largest of its type in the world. It was designed in 2014 and 2015 by WSP to replace the centenary existing bridge that had reached the end of its lifecycle. The bridge crosses the Chambly Canal National Historic Site, where 16 civil engineering structures allow pleasure boats to travel from the Champlain Lake (U.S.A.) to the St-Lawrence River (Canada). The greatest feature of this structure is probably its 320 tons

counterweight suspended 20 meters above ground level. It creates the required tension in the stays to relieve the lower hydraulics cylinders as they rotate the entire structure. As the bridge reaches its maximum 70° degrees rotation, the upper arms fade behind the sleek top arrows of the architectural piles, creating a signature look.

A previous paper from the authors made a general overview of the project [1]. It described how the preliminary studies lead the client to retain this type of structure. References and comparisons were made to the movable Bridge #9, designed by WSP in 2009, which inspired the Gouin Bridge. The

<https://doi.org/10.2749/newyork.2019.1635>

Distributed by Structurae