



Canadian Consulting Engineering Awards 2015

NBSL, Montréal | NBSL Business Case and PPP Procurement Readiness
Category B: Transportation
April 2015

ARUP



Online Submission Confirmation Receipt



© Her Majesty the Queen in Right of Canada (2014)

Contents

Entry Forms

Full Project Description

A Project Information...	1
B Project Outline...	3
75 Word Summary...	3
Project Highlights Innovation ...	5
Project Highlights Complexity ...	7
Project Highlights Social and Economic Benefits...	8
Project Highlights Environmental Impact...	9
Project Highlights Meeting the Client's Needs...	10



© Her Majesty the Queen in Right of Canada (2014)

Entry Consent Forms

Full Project Description

A | Project Information

Project Name	NBSL Business Case and PPP Procurement Readiness
Details of the Project:	The New Bridge for the St. Lawrence (NBSL) corridor project is one of the largest infrastructure projects in North America. The bridge design solution presented meets the client’s desire of replacing the existing bridge with an impressive landmark bridge while respecting a very aggressive schedule.
Project Location	Montréal, Québec, Canada
Project Size	Arup’s consulting fees: 15M\$ Total project cost: \$3B-\$5B 8.5km of highway replacement, including the existing 3.4km Champlain and 495m Île de Soeurs Bridge
Completion Year	2014
Entering Firm	Arup
Role	Engineering consultant for preparing the Definition Design and the Technical Requirements for the NBSL Project
Project Leaders	Project Manager – Douglas Balmer, Associate Principal, Arup Project Director – Dan Saville, Principal, Arup
Contact Names	Doug Balmer Associate Principal +1 514 448 6694 douglas.balmer@arup.com Diana Lubniewski Marketing Coordinator +1 514 908 6119



Rendering of the new bridge to replace the Champlain Bridge

Full Project Description

B | Project Summary

75 Word Summary

Given that the existing Champlain Bridge has fallen under significant disrepair, Infrastructure Canada announced its replacement with a new bridge (the “NBSL”) by end of 2018. Arup was appointed to write the technical requirements for incorporation into the RFP within an unusually short timeframe for a project of this magnitude.

The solution proposed by Arup meets the client’s desire of replacing the existing bridge and improving the road safety with an impressive landmark bridge.



Image of Champlain Bridge

Project Highlights | Innovation

Innovation

One of the main technical challenges Arup had to overcome was to develop the preliminary design and the aesthetic of the new Bridge in order to meet the client and external stakeholder's requirements. While some wanted a more classical "architectural competition", the client did not have the luxury of the timescales required for such an event. However, describing aesthetic requirements within the procurement documentation in a manner that contractors can actually use is challenging.

Arup advised Infrastructure Canada that the most effective means of ensuring a high-quality design was to develop both reference and definition designs, which were prepared in parallel with the development of the technical requirements and tender documents. These designs serve two separate, but complementary, functions by:

- Helping the owner and its consultant team understand the project's technical requirements and prepare cost and schedule estimates (through the reference design)
- Clarifying the owner's intentions in terms of aesthetics to the bidders, ensuring that technical and visual dimensions of the design are considered

simultaneously, and providing a plan for safeguarding architectural integrity through the final stages of the project (through the definition design)

Although it is reasonably common to prepare a reference design, clients do not typically focus much effort on it as they know that the final design will almost certainly be very different. In the case of the NBSL, the reference design was provided as an interpretation of the technical requirements and an example of how the project could be built. Thus, the bidders were able to save significant time in elaborating their proposal because the reference design integrates all the constraints included in the technical requirements. Arup has then used the reference design to prepare a definition design, which includes a set of drawings showing the requirements for configuration, geometry, and form for the final bridge.

Through this proposed approach, the quality of the reference design has allowed the bidders to elaborate their technical proposal within a very limited timeframe for a \$3B-\$5B project. Also, the definition design has been elaborated in order to determine the external aesthetic of the NBSL while still allowing flexibility in term of material and methods of construction.



Rendering of NBSL - View from Mont Royal

Project Highlights | Complexity

Complexity

Construction over the Seaway

One of the main challenges facing the delivery of the NBSL is construction of the main bridge span. There is a need to mitigate the identified risks to the satisfaction of the St-Lawrence Seaway Management Corporation (SLSMC) in order for construction to proceed during the shipping season.

Arup has advised Infrastructure Canada on the required approval processes for integrating the SLSMC requirements while still allowing construction activities during the operating season.

Coordinating with JCCBI

JCCBI is the Crown Corporation currently in charge of operating and maintaining the existing Champlain Bridge corridor. With the existing Champlain Bridge approaching the end of its useful life, JCCBI must continue with its

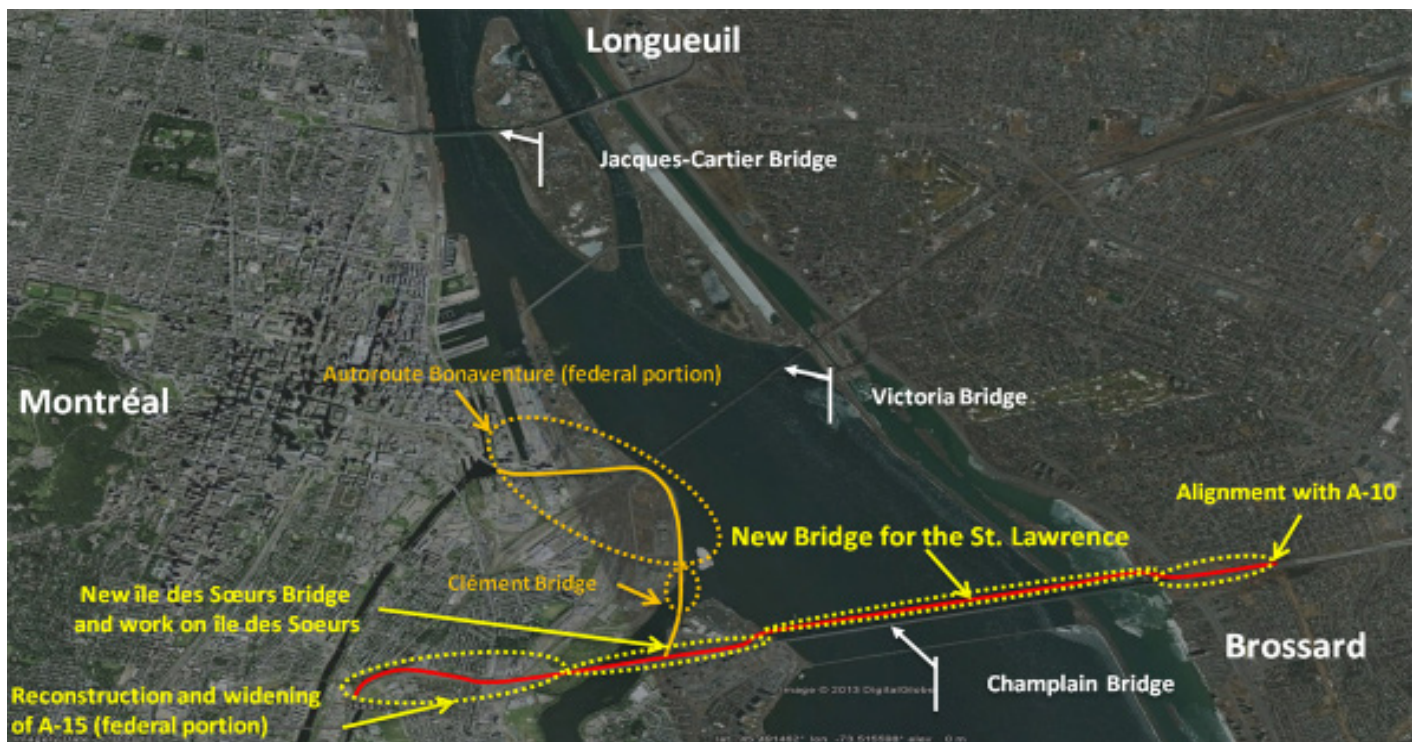
essential maintenance program until 2018, while at the same time enabling the construction of the new Bridge.

Arup has advised Infrastructure Canada on design requirements that will optimize the construction of the new Bridge within a constrained space to enable JCCBI to carry on with its maintenance requirements.

Interface with Turcot Project

The NBSL project interfaces with another major reconstruction project being built at the same time. With these two projects being central to the fluidity of traffic within the Montreal area, there is an obvious need to coordinate the various traffic detours which will occur.

Arup has advised Canada on technical requirements for traffic management which will optimize traffic fluidity, as well as a governance framework in order to coordinate traffic within the project with adjacent areas.



Aerial project overview showing the new bridge along-side the Champlain bridge

Project Highlights | Social and Economic Benefits

Social and Economic Benefits

With nearly 58 million crossings per year, the Champlain Bridge is one of the busiest bridges in Canada and is also part of a major Canada-United States trade corridor. In addition, the bridge also facilitates the transit of close to \$20B of trade every year. Through our involvement in the NBSL project, we are promoting economic growth by:

- Strengthening Canada's continental gateway and improving system connectivity to promote the continuous and safe flow of both people and goods
- Creating jobs and enhancing the local, provincial and national GDP

The technical requirements we have developed will also provide value for money to Canadians by using a PPP contract to provide high quality, 125-year minimum design-life structure, which optimizes the life cycle costs and risk transfer to the private sector. We have also helped develop, shape and realize Canada's objectives for the NBSL project to foster sustainable development and urban integration, through careful consideration of social and environmental issues, including protecting the natural environment, creating an iconic gateway to Montreal and promoting sustainable transportation via a dedicated transit corridor and accessible multi-use paths.



NBSL Bridge design - Lookout point

Project Highlights | Environmental Impact

Environmental Impacts

Arup's contribution to the NBSL project will improve both the existing situation of the NBSL corridor, once re-built, and also minimize the environmental disturbance during construction. Specific requirements have been introduced in order to limit the permanent and temporary encroachment within the river, to maintain fish migration channel and spawning areas. Strict monitoring requirements for dust and noise will be mandatory during construction. The reference design produced by Arup ensures that the Canal de l'Aqueduc, a critical infrastructure for supplying water in Montreal, will be protected from any spillage during construction.

Arup has helped Infrastructure Canada to engage the public and answer their concerns by producing

3D-animation and renderings of the new corridor. Those deliverables have helped explain how the project will improve the built environment in a sustainable way. Arup has applied a holistic framework in designing the new infrastructure in order to improve the quality of life of the resident and urban integration.

Arup also provided technical support to Infrastructure Canada during various open house sessions. These sessions allowed federal officials involved in the environmental assessment process to meet and engage with the public, and also allowed members of the public to provide comments on the proposals. The comments received have been taken into account by Infrastructure Canada and, where appropriate, incorporated within the technical requirements of the project.



Image of the existing Champlain Bridge

©Arup

Project Highlights | Meeting the Client's Needs

Meeting the Client's Needs

Our client, Infrastructure Canada, had specific expectations in terms of meeting the schedule for delivery of the RFP documentation to the bidders. Those objectives were driven by the condition of the existing Champlain Bridge and the need to move traffic onto the new bridge as soon as possible in order to ensure public safety, and to reduce the risk of disruption caused by lane closures. Despite this very aggressive schedule, the quality of both the reference and definition designs were of paramount importance, given the status of the Champlain Bridge. Pressure from public opinion towards Infrastructure Canada was highly dependent upon Arup's capability to provide the correct design.

Arup has succeeded in this task by following a rigorous methodology to developing the technical requirements for the multiple disciplines that are needed for this project. A detailed schedule was produced, monitored and updated weekly, both internally and with the client, to ensure compliance to deliverables, and adjustments were agreed with the client. The end result was the on-time delivery of both the reference and definition designs and all RFP documentation within Arup's mandate, in accordance with the client's accelerated schedule.

"... Arup has delivered its expertise and services with integrity, and has worked tirelessly with our team to deliver a design that has fulfilled all of the project objectives in a timely manner. Our project schedule was, and remains extremely aggressive and Arup has been instrumental in allowing us to achieve every milestone to date."

Marc Brazeau, Infrastructure Canada, Director General - NBSL project