



Durability Features of the Vimy Memorial Bridge

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Abstract

The Vimy Memorial Bridge is a new structure crossing the Rideau River in Ottawa, Canada. The Rideau River at the bridge location is part of the Rideau Canal System, a recognized National Historic Site in Canada and a UNESCO World Heritage Site. An overhead structure, comprised of steel tubular triple arches, that spans the entire waterway with a 125m main span, exceeded the imposed design requirements and resulted in an iconic gateway structure. The bridge design incorporated several durability features to achieve the 100-year design life and to minimize future works to the bridge at this nationally significant site.

Keywords: bridge; arch; durability; sustainability; tubular sections; hangers; closed box girders.

1 Introduction

The Vimy Memorial Bridge is a unique structure located in Canada’s national capital, Ottawa. It is on a major east-west arterial that clear spans the Rideau River and Rideau Canal, a recognised UNESCO World Heritage Site in Canada, and connects two urban communities in the south of the city (Figure 1). The bridge is comprised of three triple-chord space-truss true arches supporting a concrete deck on a steel grillage using hangers. The bridge carries four lanes of traffic and a cyclist lane in each direction within the three arches, and a segregated sidewalk on the outside of each of the exterior arches.

The bridge was designed to satisfy the disparate functional and the many mandatory heritage, environmental, and aesthetic requirements relevant to this important cultural and heritage location. The functional design requirements set by the City of Ottawa involved spanning an 80m-wide waterway, while accommodating a 45m-wide by 6,7m-high navigation envelope, providing a 3,0m clear height above a pathway on the west

side and carrying as a minimum a 40,6m-wide bridge deck cross-section comprised of eight lanes of traffic, including six through and turning lanes, and two dedicated bus rapid transit lanes, two bicycle lanes, and two pedestrian walkways. The aesthetic design guidelines included requirements for a distinctive new bridge in a natural setting that was: pleasing to the eye from a distance and up close, by day and night; exhibits an appropriate landmark quality that responds to the significance of the Rideau Canal and is harmonious with its picturesque natural setting; responds to the history of engineering innovation and evolution of high quality bridge design on the Rideau Canal, yet is an expression of its own time; creates a safe, enjoyable, and memorable experience for users, both on the bridge and under the bridge; and maximizes transparency and openness. Furthermore, the structure had to be sustainable to minimize the total cost of ownership over a 100-year life cycle. Achieving this required a combination of durable materials selection, proper detailing, a design for ease of maintenance, and stringent quality control, which will be discussed in this paper.