

The logo for QUATTRO, featuring the word in white uppercase letters on a black background. The letter 'Q' is stylized with a red swoosh underneath it.

QUATTRO

The title of the project, 'ARTHUR-SAUVE BRIDGE', written in white uppercase letters on a red background.

ARTHUR-SAUVE
BRIDGE

The year of the project, 'PROJECT 2008', written in white uppercase letters on a red background.

PROJECT 2008



ARTHUR-SAUVÉ BRIDGE: QUATTRO DELIVERS

CONTEXT

Date: September 2008

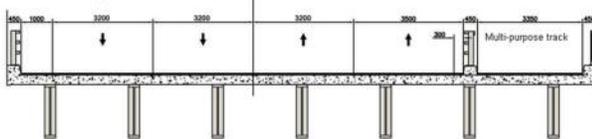
City: Saint-Eustache, Quebec

Originally built between 1947 and 1948, the Arthur Sauvé Bridge allows route 148 to cross over the Mille Iles River, joining Saint-Eustache and Laval. The bridge was opened to traffic on December 21st 1948. Fifty years later, 24 000 vehicles are crossing this bridge daily. It is under the jurisdiction of the Ministry of Transportation of Quebec.

The bridge, closed to overloaded vehicles, was subject of minor repairs in 2005. It has now reached the end of its useful life. The ministry of Transportation of Quebec has recommended its reconstruction for 2008. Plans and technical specifications were elaborated in 2007 and work will be performed between 2008 and 2010.

Re-construction will occur in 3 different phases: pillars will be enlarged and the bridge abutments will be rebuilt. A portion of the deck will also be widening to allow the layout of a multipurpose track. The existing bridge deck will be rebuilt and during summer 2010 the protection railings and final layer of pavement will be done.

PROPOSED CONFIGURATION
(Laval to St-Eustache)



MANDATE

The municipalities of Laval and Saint-Eustache have agreed to replace the existing conventional lighting by a functional decorative luminaire offering an enhanced architectural aspect. The intent is to create a distinctive signature with the lighting system taking advantage of the functionality and the look, two features that will improve safety to the bridge users.

The antique look of the PRO650S luminaire from Quattro, a strongly shaped hexagonal lantern, couple to the slenderness of the fluted pole makes us realize that yesterday and tomorrow are not so far. Like the Arthur Sauvé Bridge the luminaire integrates this element of cohesion between the simplicity of the past and the modernity of the new technologies. The Huntington style aluminum pole with its cast decorative base and the scrolled console gives the assembly a nostalgic touch blending it harmoniously with its environment.

Integrating an element of the past, this luminaire will shine a contemporary light, with renewed power well adapted to the vocation of the bridge.

CHALLENGE

The main purpose of roadway lighting is to achieve a level of lighting that will assist the motorists and pedestrians in distinguishing with certainty roadway details such as raised curbs, horizontal bends and obstacles.

- Roadway lighting is an operative tool that provides both economic and social benefits to the public including;
- Reducing night time accidents;
- Facilitating traffic flow;
- Promoting commercial activity downtown, Mixed Use Centers, and Village main streets by the general public;
- Encouraging night time use of public & private facilities such as libraries, community centers, entertainment facilities and commercial areas;
- Assisting in crime prevention and police enforcement.

The Ministry of Transportations of Quebec required that the lighting design meet recognized national and international practices in street lighting, namely the ANSI/IESNA RP-8-00 Roadway lighting handbook and the CTA design guide.

The illumination levels required for a Collector with a Medium Roadway and Nighttime Pedestrian Conflict classification is given in the following table:

Recommended Illumination Level			
From IESNA, RP-8-00			
Luminance		Illuminance	
Minimum Maintend Average Values	Uniformity Ratio	Minimum Maintend Average Values	Uniformity Ratio
Lux	Avg / min	Cand / m ²	Moy / min
13	3,0	0,9	3,0
Max Veilling Luminance	30%	Uniformity max / min	5,0

SOLUTION

To achieve this ambitious task and meet the required illumination levels with economically reasonable and safe pole spacing, Quattro proposed to incorporate into its PRO650S, a cut off optical system composed of its hydro formed OCB reflector with a type III distribution. Using a 150W HPS horizontal lamp, this system offers superior photometric performances. Not just minimizing the light pollution as defined by the Dark Sky association, this optical system offers a better visual comfort, and a reduction of the spill and dazzling that can cause accidents.

Calculation results on the bridge deck			
East direction			
Luminance		Illuminance	
Minimum Maintend Average Values	Uniformity Ratio	Minimum Maintend Average Values	Uniformity Ratio
Lux	Avg / min	Cand / m ²	Moy / min
15,8	3,3	1,06	2,1
Max Veilling Luminance	28%	Uniformity max / min	4,2

RESULTS

Quattro then proposed to install 34 staggered luminaires spaced 38 meters to cover the bridge span which is 625 meters long by 18.8 meters wide. Two decorative luminaires were added on the Saint-Eustache approach.

Structural calculations were also performed to confirm that the poles were capable of withstanding the wind and ice loads as defined by the Ministry standards.

Also, the luminaires had to conform to the MTQ standard no.8301 art. 3.5. regulating vibration test. Therefore the PRO650S was tested against impact and vibration in accordance to the PSEL-01 procedure for bridge installation.

The objective of the tests is to evaluate the capability of the equipment to sustain solicitations that are likely to occur during its useful life for a standard bridge application. A 100 000 cycles, vibration test was then performed in all axes (x,y,z) at the resonant frequencies of the unit under test. The acceleration for a bridge luminaire is 3.0g. The unit was also tested for impact at 10g for 20 ms in the same tree axis, in both directions (positive and negative). A total of 6 impact tests were performed on each tested units.

Following all those tests, the unit has to be in a working condition and under X rays testing not show any crack or damage to the shell or the tenon. All hardware and ancillary components must be in place and show no damage. As well, gaskets, hinges or clips must not show any sign of wear and cracking.

Results for each sample under the described tests:

Sample CRIQ n°	Test Axis	Test performed	Results
E02446 (modifications A)	Longitudinal Y	Long-life test, 100 000 cycles at resonance on light fixture at 3g	Compliant Undamaged
E02446 (modifications A)	Longitudinal Y	Shock test at 10 g 20 ms	Compliant Undamaged
E02444 (modifications A)	Transverse X	Long-life test, 100 000 cycles at resonance on light fixture at 3g	Compliant Undamaged
E02444 (modifications A)	Transverse X	Shock test at 10 g 20 ms	Compliant Undamaged
E02446 (modifications A)	Vertical Z	Long-life test, 100 000 cycles at resonance on light fixture at 3g	Compliant Undamaged
E02446 (modifications A)	Vertical Z	Shock test at 10 g 20 ms	Compliant Undamaged

Quattro's PRO650S light fixture passed all the tests in each of the three perpendicular axes therefore demonstrating its compliance with the referenced standard.



In conclusion, the luminaire tested, Quattro's PRO650S in this case, did not show any signs of damage in terms of physical integrity pursuant the endurance test. The luminaire remained intact and the service tray remained adequately closed without any of its parts coming loose.

Thanks to judicious planning and smart engineering plus an adequate usage of the pole, bracket and luminaire the lighting design of the bridge will offer a comfortable and safe night environment for motorists and pedestrians.



QUATTRO REALISES REMARKABLE PROJECTS

Quattro is a Quebec based company located in Longueuil. It specialises in manufacturing decorative and functional light structures for municipal lighting. Whether you are an architect, an urbanist, an engineer or a building contractor, Quattro will know how to help you throughout your project. You will benefit from the aesthetics, the assembling simplicity and the performance of our high quality energy efficient lighting solutions, as well as from the courteous service and the efficient partnership of a professional team.

For Quattro, developing and managing lighting projects implies and involves knowledge of the environment and of the people, technology, materials, manufacturing and architecture. All in order to ensure a safe, comfortable and attractive urban atmosphere. We will turn your idea into a remarkable project.

 QUATTRO

Remarkably brilliant

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