

Case Study – Arthur Sauvé Bridge (St-Eustache, QC, Canada)

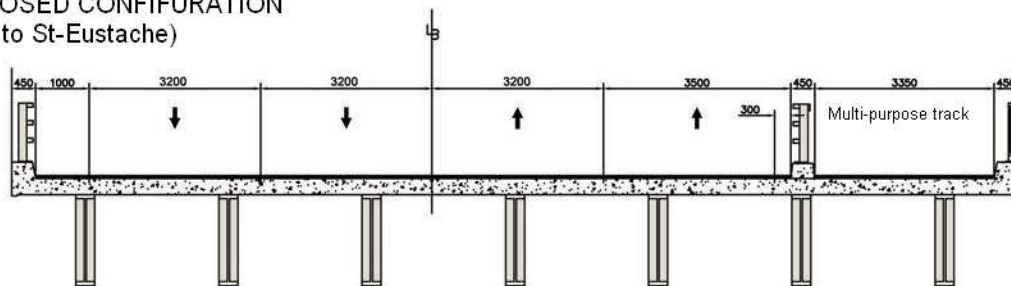
Reconstruction of Arthur Sauvé Bridge

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. Filthy 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 widened 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)



** from Transport Québec

A functional and decorative lighting for the Arthur Sauvé Bridge

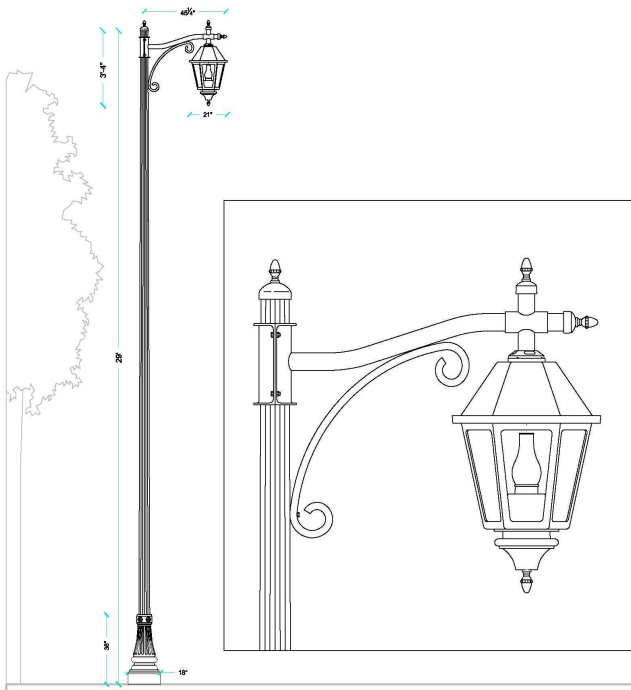
The municipalities of Laval and Saint-Eustache have agreed to replace the existing conventional lighting by a functional decorative luminaire offering an enhanced architectural aspect. The intent is to create a distinctive signature with the lighting system taking advantage of the functionality and the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

The antique look of the PRO-600 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.

PROJECT # 2496 TYPE: QTY: 36
 cat# PRO600-OCB3-GPC-150HPS/MOG-TT2/240-BKTX-QSP506
 cat# QM403-1A-BKTX-QSP507
 cat# QSP505-29-BKTX



Proj. #:	QSP505	Projet:	St-Eustache MTQ 0401-08-0201 Pont Arthur Sauvé	 www.quattrolighting.com
Scale/Ech:	1=60			
Designer:	VSL	Description: LUMINAIRE, CONSOLE & FUT		
Date:	24 SEPTEMBRE 2008	PRESENTATION		

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, and
- 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	Uniformity Ratio	Minimum Maintend	Uniformity Ratio
Average Values		Average Values	
Lux	Avg/min	Cand / m²	AVG/Min
13	3,0	0.9	3,0
Max Veiling Luminance	30%	Uniformity max/min	5,0

To achieve this ambitious task and meet the required illumination levels with an economically reasonable and safe pole spacing, Quattro proposed to incorporate into its PRO600, 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	Uniformity Ratio	Minimum Maintend	Uniformity Ratio
Average Values		Average Values	
Lux	Avg/min	Cand / m²	AVG/Min
15,8	3,3	1,06	2,1
Max Veiling Luminance	28%	Uniformity max/min	4,2

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 where 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 luminaries had to conform to the MTQ standard no.8301 art. 3.5. regulating vibration test. Therefore the PRO600 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, negative). A total of 6 impact tests were performed on each tested units.

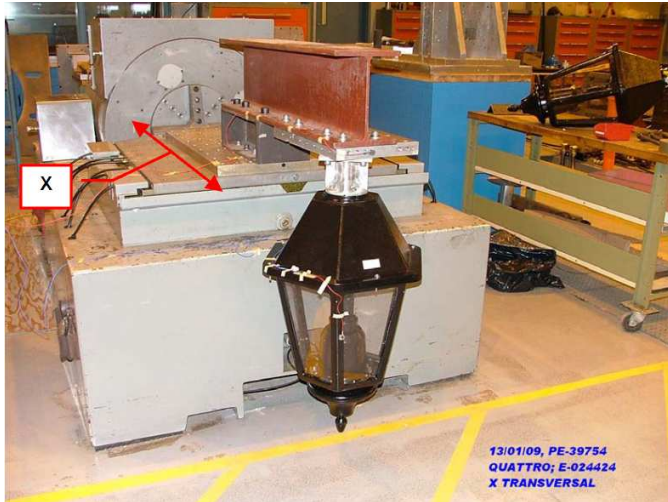
Following all those tests, the unit has to be in a working condition and under X rays testing not show any crack or damage to the shell or the tenon. All hardware and ancillary components must be in place and show no damage. As well, gaskets, hinges or clips must not show any sign of wear and tare.

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 PRO600 light fixture passed all the tests in each of the three perpendicular axes therefore demonstrating its compliance with the referenced standard.

Undamaged: the luminaire tested 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.



Vibration test on the Longitudinal X axis



Vibration test on the Vertical Z axis

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 LIGHTING inc.

Quattro lighting specializes in the manufacturing of decorative and functional urban luminaire. Our mission is to develop, manufacture and sell to North American user such as city, county, state, province or real estate promoter efficient decorative luminaire. We offer standard products as well as customized ones developed in an efficient and courteous partnership with the clients.

We offer at competitive pricing quality product adapted to your needs driven the following values:

- Esthetics
- Ease of maintenance
- Optical performance
- Flexibility

With an eye on the future Quattro's team has client satisfaction as its primary objective.

Whatever the complexity or scope of your lighting project Quattro's will do it's outmost to meet your needs, specifications and schedule.

Product's specifications :

Pole: QSP505-29-BKTX: Pole made from an ASTM A595 one piece tapered fluted (16 FF) shaft with a base diameter of 7.6in, a top diameter of 3.4in; 29ft long with a 0.123in wall (11Ga) welded onto the base plate. The base plate is made from ASTM A36 11in square x 0.88in thick with slotted holed allowing bolt circles from 10.25 to 12.5in for 1in anchor bolts. Pole is equipped with a vibration damper, a 3 x 5in reinforced hand hole at 18.5in from the base plate and a second reinforced access of 2 x 4in at 64in from the base plate.

Decorative base cover model QSP506TB7.188OD : Two piece clamshell decorative Huntington style base cover, made from A356 aluminum, mechanically assembled. Diameter of 18 in, height of 36in for a 7in pole diameter.

Arm model QM403-QA-BKTX-QSP507 : Made from 2in steel sc.80 pipe (2.375 x 0.218in) bent and welded to the clamp which is mechanically assemble to the pole. The caps and the scroll are made of A356 aluminum and mechanically assembled to the arm.

Luminaire model PRO600-OCB3-GPC-150HPS/MOG-TT2-240-BKTX-QSP506 : The luminaire PRO-600 is from Quattro's Provincial Series and has the following characteristics:

- 1) **Hood:** Made from a one-piece hexagonal A356 cast aluminum tapered hood with an integrated hinge facilitating the access to the electrical components with 3 captive screws; the luminaire is mechanically assembled to the bracket with four 3/8"-16 NC stainless steel bolts.
- 2) **Cage:** Made from a one-piece A356 aluminum tapered hexagonal cage, mounted with a self adjusting gasket and an integrated hinge and 3 captive screws. . The lamp and removable ballast assembly are accessible by means of the tool-free QUAD-TURN locking system. A self adjusting gasket is seals the optical chamber.
- 3) **Lenses:** Six clear polycarbonate lenses mechanically assembled to the cage.
- 4) **Lampe:** 150W HPS, 240 volts ED23.5, mogul socket. Maintenance information and luminaire codification are located on the cone.
- 5) **Optical system:** (OCB3F) IES type III. Multiple segment hydro formed aluminum reflector, anodized with a minimum of 86% reflectivity, mechanically assembled to the luminaire. Comes with a 4 KV socket.
- 6) **Ballast:** High power factor of 90%. Lamp starting capacity -40°F (-40°C) degrees. Assembled on a unitized removable tray with quick disconnect plug.

- 7) **Wiring/hardware:** Wiring type TEW 14-7, with a minimum of 12 inches of exceeding wire. All connections are with quick disconnect plugs. All hardware is made of stainless steel.
- 8) **Finish:** Pole and bracket are hot dipped galvanized with a minimum zinc layer of 600 gr/sqr m. according to CAN/CSA-G164-M. Powder coat paint is applied with an electrostatic process to obtain a black textured finish (4 mils/100microns) (BKTX).

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