

A Landmark of Light

By: Krystle Murphy



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The new Samuel De Champlain Bridge glistens with 13.6 million lumens

Stretching 2.1 miles across the Saint Lawrence River to connect the Island of Montreal and the South Shore suburbs, is the Samuel De Champlain Bridge. One of the busiest pieces of infrastructure in North America, it welcomes more than 40 million crossings every year. Delivered in partnership by Infrastructure Canada and Signature sur le Saint-Laurent and designed by engineering firm T.Y. Lin International and Donald MacDonald Architects, the bridge fully opened to traffic in July 2019 to replace its 57-year-old predecessor. At 200' wide, the Samuel De Champlain Bridge is the widest cable-stayed bridge in the world using two planes of cables. Beyond an engineering marvel, it's become a symbol for the thriving city of Montreal. Lighting played a huge role in adding to its prestige.

"Infrastructure Canada's goal was to have something that was a real landmark," said Kenneth Douglas, Principal at Horton Lees Brogden Lighting Design (HLB). "They're replacing a bridge that had a steel cantilever truss main span and big concrete girder approach spans that were highly deteriorated and visually unpleasing with something that is quite cutting edge – both from an architectural standpoint and engineering standpoint. They wanted something that was really going to have a presence."

HLB Lighting took on the task of lighting design for the bridge, working closely with the engineering team for over five years. The lighting system features 7,606 Lumenpulse luminaires to create a continuous ribbon of light along the structure's entire length and up the inner faces of the cable stay tower.

CLOSE-UP: LIGHTING

“They were very specific with us—they didn’t want a lot of movement,” Douglas says. “There is movement on the bridge, but it is paced at a relatively slow pace. There are color changes, there are chases, there are things that move. But it’s not vibrating at night. We wanted it to be very elegant.”

Because the bridge has been designed for a 125-year life span, it was critical to select lighting technology that was sustainable and low-maintenance. The Lumenbeam luminaires are made of architectural-grade materials and have lifetimes of up to 250,000 hours. To ensure their dependability, these fixtures are IP66-rated (resistant against dust and water) and meet the 3G ANSI C136.31 vibration standard for bridge applications.

The system covers four miles, two miles per side, with 7,606 fixtures and 22,818 control parameters, or 45 universes of control parameters across 189 different universes. The project consumes 380,000W. Also featured are 20 hardened (-40C) network switches and four redundant fiber rings..

The ETC Mosaic dynamic controller is programmed with preset lighting scenes, which are primarily based around Canadian and Québec holidays, like Québec Flag Day and Canada Day.

“We were able to do a lot of work offline with visualization tools so we could define fade times, patterns, and pattern speeds before we were full scale on the site,” says Stephen Call, supervisor of project management, Barbizon

Lighting Company, systems integrator for the project.

“That pre-programming and visualization saved us a lot of time on-site so we could spend that time on dialing in exactly what the designers were looking for. The first night we were out testing on the bridge, we did a chase from one end to the other, testing to see if our network was solid, basically a ping-pong. It looked amazing across the two-mile span and reflecting off the water.”

One of the biggest challenges was the weather requirements. Ritec and Antaira provided the industrial-grade network switches to stand up to the cold Montréal winters. All of the span-mounted components are rated to -40° Celsius.

In addition to the dynamic lighting scenes, Barbizon was asked to provide the option for the bridge operator to select static colors of their choosing for special events to be displayed on the bridge. The team built pages on the remote touch screen located a mile away in the traffic control center, so the bridge operator could select individual colors for the tower and the span fixtures from the millions of colors that the Lumenpulse fixtures provide.

“One thing we did push for on this project was a remote connection for programming and maintenance,” Call says. “The bridge operator has a dedicated link for us to be able to log in securely and update programming as needed. This has been a massive help over the last year so that we could continue to service the bridge from New York City while not being able to travel.”

A big concern was how the bridge would impact bird



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migration. HLB Lighting developed a "migratory birds" scene that was specifically designed not to affect the migration patterns in the area during that part of the year. Integration with a weather station on the bridge helps to modify the aesthetic lighting under certain weather conditions.

In addition, the team was concerned about making sure as much light as possible stayed on the structure.

"We did several extensive light pollution studies," says Elizabeth Johnson, senior associate at HLB. "We ended up with the perfect balance of light on the structure, lessening the environmental impact. Part of what helped us achieve this balance was using linear spread lenses on the inner face of the tower. We worked with the Lumenpulse team, both on-site and during mock-ups, to make sure light stayed where it needed to be."

Barbizon continues to make updates and changes remotely for various holidays and events. In March 2020, at the beginning of the COVID-19 pandemic, in an address to the nation, Prime Minister Justin Trudeau asked buildings and infrastructure to light up in a rainbow to show hope and support for essential workers.

"During our time on-site up in Montréal, I had been using the rainbow as one of my test patterns, both to make sure all the colors were working and that all the fix-

tures were receiving a good data stream," says Sam Updike, programmer for Barbizon. "The bridge team remembered this and immediately got in touch with us. I was able to log into the processors from New York City, and that evening, after Canada's prime minister requested their country light up in rainbows, the Samuel De Champlain Bridge was able to fulfill his request."

Since the original installation, the team has added a dynamic effect for Black History Month, International Francophonie Day, and winter holidays.

"From our perspective, what we're doing is trying really hard to create a landmark and create something that the community is proud of," Douglas says. "We spend a lot of time doing community work and community outreach and understanding the place. When you see them using it for something like the emergency with COVID, and they're communicating their point of view, that's what we're really after." 📶

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