



VIEW OF THE SAMUEL DE CHAMPLAIN BRIDGE CORRIDOR. ©Firefighter Montreal/Shutterstock.com

CANADA

ENVISION[®]: SAMUEL
DE CHAMPLAIN BRIDGE
CORRIDOR PROJECT,
CANADA



The Sustainable Infrastructure Tool Navigator

is an online platform that connects infrastructure practitioners with over 100+ relevant tools that can assist them in evaluating and making decisions at various phases of the infrastructure life cycle. This case study demonstrates the use of a tool in a country context, to better understand the process involved as well as good practices, challenges and lessons learned.

ENVISION® RATING SYSTEM FROM THE INSTITUTE FOR SUSTAINABLE INFRASTRUCTURE

Envision® (<https://sustainableinfrastructure.org/envision/use-environment/>) is a flexible framework of criteria and performance objectives developed and managed by the Institute for Sustainable Infrastructure (ISI) whose purpose is to aid decision-makers and help project teams identify sustainable approaches during the planning, design and construction of civil infrastructure projects. The Envision® framework consists of several components which serve different purposes, including (1) The Envision® Guidance Manual, which contains the written framework; (2) The Envision® Pre-Assessment Checklist, which can be applied in early phases and used to prepare later sustainability assessments; (3)

the Envision® Online Scoresheet, which can be used to carry out a detailed online self-assessment; (4) the Envision® Verification, which provides for an independent third-party project review process; (5) the Envision® Awards, which offer recognition for qualifying verified projects, and (6) The Envision® Sustainability Professional Credential (ENV SP), an expert training designed to educate and qualify professionals in Envision® use.

Envision® measures the sustainability of infrastructure projects across 64 criteria organized into five categories. Using the Envision® Verification, stakeholders receive a third-party evaluation of their projects' sustainability. Under the Envision® Awards, projects that have completed the Envision® Verification receive a sustainability award depending on their sustainability performance (there are four levels: Verified, Silver, Gold and Platinum).

1. BACKGROUND

With more than four million inhabitants, the Montreal metropolitan region is the most populous administrative region in Quebec province. This region includes the city of Montreal, the second-most populous city in Canada. Montreal connects with the city of Brossard on the South Shore through the Samuel De Champlain Bridge Corridor. The bridge is located over the Saint Lawrence River, which is more than three kilometres wide, and over the Saint Lawrence seaway – a major waterway that connects the Atlantic Ocean with the Great Lakes. Over 200 million tons of cargo travel on the waterway annually (Infrastructure Canada 2022).

The Samuel De Champlain Bridge Corridor Project is one of the largest transportation infrastructure projects in North America, and it is vital to the economic growth of Quebec and Canada. It is one of the busiest crossings in Canada, with more than 50 million vehicle trips per year. Due to its unique location, Montreal's economy is directly tied to the Samuel De Champlain Bridge, allowing for Canada-US trade worth about Can\$20 billion a year (Infrastructure Canada 2022).

After more than 50 years of operation, the old Champlain Bridge presented serious corrosion damage, mainly caused by the use of de-icing salts over the years and the lack of an adequate drainage system in the original design. In addition, the volume of traffic was much higher than designed for, contributing to accelerated degradation. Maintenance work became increasingly expensive and insufficient over the years. In light of these challenges, the new Samuel De Champlain Bridge Corridor Project was announced in 2011, aimed at improving long-term safety while meeting the evolving traffic demands in the region. Construction began in 2015 (Infrastructure Canada 2022).

2. THE SAMUEL DE CHAMPLAIN BRIDGE CORRIDOR PROJECT

The Samuel De Champlain Bridge Corridor Project (henceforth referred to as the Project) is delivered through a Public-Private Partnership (PPP). The PPP comprises Infrastructure Canada (INFC), a federal department acting as the public partner, and the Signature on the Saint-Lawrence (SSL) consortium (DB with SNC-Lavalin, Dragados, Flatiron and EBC)

as the private partner which is responsible for design, construction, financing, operations, maintenance and rehabilitation of the Project for the next 30 years. The Project includes three components: a new 3.4-kilometre bridge span, which connects Nun's Island (in the Verdun borough) to Brossard on the South Shore; the replacement of the existing 470-metre Île-des-Soeurs/Nun's Island Bridge span; and highway redevelopment work along the A-15 and A-10 in Montreal and Brossard, respectively. The total corridor length is eight kilometres (Institute for Sustainable Infrastructure 2018).

Construction took 42 months. All roadwork, including the final connections between existing highways and the new bridge, was completed in late 2019. The total cost for the design and construction of the new bridge, highway approaches and access roads was \$2.15 billion. The Project has been designed with a focus on sustainable development, with an estimated useful life of 125 years and a suite of measures to reduce the environmental, social and economic footprint during construction and operation (Institute for Sustainable Infrastructure 2018; Global Infrastructure Hub 2022).

Besides following the contractual and legal obligations and requirements contained in the PPP agreement between SSL and INFC, to achieve the basic Envision® sustainability award, the project had to go beyond the contractual requirements. SSL pursued the Platinum level – the highest sustainability award granted by Envision®. To reach the Envision® Platinum level, a project must demonstrate that it delivers a range of environmental, social, and economic benefits to local and affected communities, the natural environment and the project itself. Infrastructure resilience and a robust maintenance plan are also requirements. Based on the pre-feasibility studies conducted, the project team recognized that numerous good practices that could be incorporated in the projects by INFC were aligned with sustainability practices and would increase the sustainability project score. However, additional work was needed to achieve the Platinum level score. This included capturing and monitoring all project initiatives in a standardized fashion.

3. THE APPLICATION OF ENVISION®, AND PERFORMANCE OF THE NEW SAMUEL DE CHAMPLAIN BRIDGE CORRIDOR PROJECT

The Envision® framework was used to assess the project in the initial stages carried out by INFC and during its design by SSL, and to identify opportunities to enhance the project's "sustainability footprint". The Envision® framework is divided into five distinct categories and considers all phases of a project, from planning to decommission: i) **Quality of Life** – the potential social effects that an infrastructure project has on the surrounding communities, ii) **Leadership** – the governance structures to be put in place to ensure implementation of sustainability in the long term; iii) **Resource Allocation** – initiatives that reduce and optimize resource use; iv) **Natural World** – the environmental impacts and incorporated mitigation strategies; and v) **Climate and Resilience** – strategies to reduce emissions and long term climate change adaptation. Each of these five categories is divided into different indicators, called credits. The Envision® methodology includes 64 credits, and based on the practices implemented by the project in each of those credits a higher or lower score can be achieved. For instance, in the **RA 1.2 Used Recycled Material** credit, a project using 5% reused or recycled materials would achieve 4 points, but a project using at least 50% reused or recycled materials would achieve 16 points. A similar analysis is performed with each of the credits of the methodology. The total score of all applicable credits will define the level of sustainability or award¹ achieved by the project. In order to achieve any of these awards, a third-party verification process is conducted, whereby the project team self-reports the project points, and a third-party Envision® verifier (authorized by the Institute for Sustainable Infrastructure), reviews and approves the final score for the project (Institute for Sustainable Infrastructure 2018).

The New Samuel De Champlain Bridge Corridor earned 67% of the total available points. The Project far exceeds the 50% performance required for the highest award. Receiving the Envision® Platinum Award in 2018, the Project became the first Envision®-recognized Project in the province of Quebec, the fourth in Canada overall, and the second bridge project to earn an Envision® award in North America (Government of Canada 2022).

¹ There are four verification award levels in Envision®. To receive recognition, projects must achieve a minimum percentage of the total applicable Envision® points. These are: verified (20%), silver (30%), gold (40%) and platinum (50%).



FIGURE 1: ENVISION® CREDIT LIST.

Source: Envision® Sustainable Infrastructure Framework (V3). Pag. 18 and 19 ²

The Project included a team of environmental professionals from SNC-Lavalin, responsible for ensuring compliance with the environmental obligations and requirements. This team also collaborated with design and construction teams to ensure environmental obligations were considered during project design. This collaboration also helped identify the most effective environmental solutions when determining construction methods. The environmental team included 25 staff at the project's peak, including two members certified as Envision® Sustainability Professionals (ENV-SP) ³ who were responsible for the Envision® strategy and documentation. However, some of the documentation required by Envision® had already been required for the earlier project development phase, making it more complex to determine the level of effort explicitly necessary for project certification.

4. RESULTS

The Project created positive impacts like providing a reliable bridge corridor between South Shore and Montreal, providing public transit options and a multi-

use path for pedestrians and cyclists. In addition, it created employment for over 1,600 workers in the Montreal region: about 50% of the total cost for design and construction was dedicated to regional, national and international subcontractors and suppliers, which generated sizable economic opportunities in the region.

Applying the Envision® rating system and pursuing the Envision® Platinum Award helped the project proponents manage some of the technical, engineering and organizational challenges. For instance, to achieve points for some of the Envision® credits, such as LD1.2 Foster Collaboration & Teamwork, required comprehensive coordination across teams, which had a positive effect across other aspects of the project. Achieving credits for risk management and resilience also required the SSL team to ensure the resilience of the Project components, which included designs that are adapted to climate change and a monitoring and management plan tailored to the project's complexity (Institute for Sustainable Infrastructure 2018).

² This project applied V2 of the Envision® Framework for verification. V3 was launched in 2018, and currently is the one implemented for all projects seeking to be verified. This figure represents the V3 List of Credits.

³ Envision® Sustainability Professionals (ENV-SP) is the denomination used for professionals who have gone through the Envision® expert training online course and exam. ENV-SP are qualified to apply the Envision® methodology to a real-world project. Being an ENV-SP is a requirement for taking part in the sustainability certification of a project, guaranteeing the highest quality in the application of the tool.

Applying the Envision® framework throughout the Project helped generate positive results, including:

- **Enhanced urban space, mobility and active transportation.** Promoting mobility and connectivity in the project region is one of the key considerations incorporated from the Envision® process. In this case, the project improved accessibility and mobility by adding two additional lanes dedicated to public transit and a multi-use path for pedestrians and cyclists. Design requirements for winter maintenance of the multi-use path was incorporated since the initial project operation did not address the unique challenges of the winter period. Because of this proactive consideration, the later announcement that the multi-use path would be open year-round did not generate added complications.
- **Stakeholder and host community engagement.** Community participation in the decision-making process is addressed in the “Quality of Life” and “Leadership” credit categories, and was a key consideration for the project team. Interaction and dialogue with stakeholders and the host community have been crucial for the Project’s success, from the beginning of the planning stage until the construction phase. This dialogue will continue during operation. Some of the good practices during the construction include: a communication plan grounded in transparency, active social media presence, a website with current construction data (traffic, noise, air quality, etc.), public information sessions, and a good neighbourly relations committee.
- **Greenhouse Gas (GHG) compensation for construction activities.** According to the Envision® definition of sustainable infrastructure, a project cannot be sustainable if it does not comprehensively address the climate and GHG emissions impacts generated by the project. In an effort to reduce project emissions in alignment with Envision® requirements, the Samuel De Champlain Bridge project compensated for an estimate of 60,600 tons of GHG emissions for construction activities. This is one of the first compensation initiatives for this type of project by the government of Canada.
- **Management Plans during construction.** As required by the Envision® Leadership category, it is key that the project defines and implements a management plan that allows for the integration of sustainability strategies in the long term. The Project’s Environmental Management System included an Air Quality Management Plan. The Management Plan required a survey at the start of each new activity and in the event of non-

compliance, activity ceased and mitigation measures were immediately implemented before work continued. Also because of Envision®, the Environmental Management System has been expanded to include more sustainability elements, which also reduce the risks associated with public complaints and climate change events. Sustainability training and awareness activities have been put in place, which has made it possible to better capture the needs of the teams and stakeholders and thus to consider them in the design and construction process.

- **Wildlife protection and restoration.** In alignment with Envision®’s Natural World category, all sensitive habitats were mapped, and the Environmental team developed mitigation measures. Specific mitigation and compensation measures were developed for fish habitats, including water quality control for activities in or near the water and the location of drainage outside of sensitive aquatic habitats. As identified in Envision®’s “Minimize Light Pollution” credit, the Project also includes design specifications to reduce light pollution, limit glare close to existing urban areas, and reduce the intensity and colour of lighting to limit impacts on migratory birds.
- **Innovation as a means for improvement.** Innovative solutions were also integrated into the Samuel De Champlain Bridge Project and were awarded Envision® innovation credits. To avoid disrupting maritime travel, a new construction method for the cable-stayed bridge section was used. The project team and the cable-stay system supplier (DSI) reduced the risk of accumulated ice from the bridge cable-stay system falling onto the bridge below. This would save the corridor from accident-related costs and traffic disruption linked to winter maintenance (Institute for Sustainable Infrastructure 2018; Dubé 2022).

5. LESSONS LEARNED

Applying the Envision® framework has helped plan, design and build the Project with the necessary flexibility, adaptability and resilience to meet community and stakeholder needs despite changing operating conditions. According to the project team’s reflections, the application of Envision® requires a learning curve and good communication between teams. Project team members learned how to use Envision® for the first time, prepared the sustainability strategy within the Envision® framework, and implemented different initiatives and documents of the Envision® methodology between 2015 and 2018. This three-year period included the certification of team

members as Envision® Sustainability Professionals (ENV-SP), and allowed the team to gain proficiency and comfort with the Envision® application.

The team representatives encourage future Envision® users to dedicate unique teams – one to focus on environmental management and sustainability and another to focus on community and communication. They also recommend a Sustainability lead staffer, and staff with previous Envision® experience, if possible. Key recommendations include embedding Envision® indicators and criteria as early as possible in project planning, enabling ENV-SPs to guide the process, sharing and explaining documentation requirements to the project team, and training key personnel to become ENV-SP certified (Dubé 2022).

6. REPLICABILITY

Envision® is applicable across the world and has already been successfully applied to more than 120 infrastructure projects (collectively worth more

than US\$106 billion in infrastructure development) throughout the United States of America, Canada, and countries in Europe. Los Angeles, New York City, Miami, Dallas, Denver, St. Petersburg (Florida), Vancouver and Montreal are a few of the cities whose authorities have used Envision® to deliver better roads, public transportation projects, airports, renewable energy facilities, water/wastewater projects and other civil infrastructure. The Envision® Manual is also translated into French and Spanish.

As of 2022, more than 200 cities, towns, countries, public agencies and academic institutions recognize or use Envision® to guide infrastructure development, while more than 250 private sector companies and industry associations embrace Envision® solutions and actively collaborate with the Institute for Sustainable Infrastructure (ISI) and their clients to implement Envision® (Institute for Sustainable Infrastructure 2022).

KEY INSIGHTS



- > Using Envision® had a great effect on mobilizing the team around a common goal. This helped the project strengthen its social and environmental performance and proved that the company and the project really care about sustainability.
- > Having a project verified by an independent third-party institution such as the Institute for Sustainable Infrastructure (ISI) positively impacts the project, both internally and externally, and helps to support project commitments.
- > The application of the Envision® rating system helped strengthen the collaboration between teams and encouraged the adoption of innovative sustainability solutions to overcome significant problems, challenges and/or limitations. This approach helped the team secure additional points for the integration of innovative practices.

FEEDBACK

“The application of the Envision® rating system requires a learning curve. Finding a champion or mentor that can help you with the application of the tool could be very useful. Envision® creates a common goal for the project team; this can make a difference to develop real initiatives that contribute to a sustainable project”.

Hélène Dubé, ENV-SP
Envision® Lead of the Samuel De Champlain Bridge Corridor Project

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