Concession A25

Transports Québec

Kiewit PARSONS
Concepteur-Constructeur A-25

TAC Environmental Achievement Award Submission

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Traffic flow between the northern suburbs and the Montreal Metropolitan area is a key issue in many respects. Solutions currently under development include enhancing public transit service and upgrading the current roadway.

The project involves building a 7.2 km four-lane section between Highway 440 in Laval and Henri-Bourassa Boulevard in Montreal. This includes the construction of a six-lane bridge across Rivière des Prairies. The bridge will be equipped with a free-flow electronic toll collection system, in other words, payment is made automatically and users are not required to stop at a toll-booth. The project, carried out by Concession A25 S.E.C. (CA25) in partnership with the *Ministère des transports du Québec* (MTQ), is the first project run as part of a public-private partnership (PPP) in Quebec. Kiewit-Parsons (KP) is responsible for design and construction.

The purpose of this PPP-driven project is clearly to ensure a rapid road-transport alternative—a new service that will benefit users, communities, investors and partners—while complying with the most current sustainable-development standards which call for balanced economic, environmental and social aspects.

In the planning phase before the partnership agreement was signed, the project followed standard practices in Quebec which include an impact study and public consultation by the *Bureau d'audiences publiques en environnement* (BAPE). Following this process, the *Quebec Ministère du Développement durable, de l'Environnement et des Parcs* (MDDEP) issued an order setting out 33 conditions. In this PPP-driven project, a number of the obligations established in the order were transferred to the private partner. This new approach to managing design and construction in this type of project required that all of the parties, including the MTQ, CA25 and KP, develop various and innovative management approaches. The MDDEP also adapted its management of the environmental permit issuing process.

All of the solutions presented are administered as part of an environmental management system ISO 14001-certified within nine months as set out in the partnership agreement between the MTQ and CA25, and based on KP's existing environmental management system. Certification shows that the company has clearly identified the major environmental impacts of the project and that it manages them in a manner consistent with all of the requirements. Frequent audits (internal/external) validate the proper operation of the system and compliance with all of the requirements. Within KP, an "environment" unit (two to three individuals, depending on the season) ,which reports directly to the project manager, audits the enforcement of mitigation measures and prepares the required daily reports.

1 Environmental protection and improvement

Six components contributed to protecting and/or improving the environment as part of this project.

1.1 Fish habitats

The order imposed a number of conditions: a moratorium on work in the river during fish breeding season (April 1 to August 1); limitations on permanent and temporary loss of fish

habitats; compensation for residual losses and duration of temporary losses; and, protection of downstream islands by maintaining identical water levels and minimizing sediment on the shorelines.

To build the bridge, a temporary stone pier was built in Montreal and a barge dock was built in Laval following strict specifications (granulometry) to minimize the creation of sediment in the water when the stones are immersed. A sediment shield was maintained around the work site in the water during construction, and removed only in winter owing to ice. It will also be used during excavation for the pier to minimize the amount of sediment released into the river.

Loss of fish habitat in the area occupied by the pier was minimized through the design and by adding a portal crane which requires little space compared to others. Following a hydraulics and sediment analysis, a temporary bridge was added in the middle of the pier maintaining water flow and feed to the islands and limiting drifting sediment.

Finally, all temporary and permanent losses of fish habitat (including the culverts on the Laval streams) were compensated using a ratio of 1:5; as a result, the project contributed to the quality and number of fish habitats.

1.2 Management of work site and highway discharge

The order places special emphasis on managing the quality of the water discharged from the construction site into the Rivière Des Prairies and various waterways of Laval or the Ruisseau de Montigny. The purpose of the order is clear: comply with the regulatory limitations established by the City of Montreal.

In Montreal, to manage discharge from the highway during use, a stilling pond collects the highway run-off in combination with a Stormceptor system that collects sediment, oil and grease. The pond that existed before the project was not combined with this system. Retention ponds will be created in Laval and also combined with the Stormceptor system. These ponds will improve the quality of water discharged compared to its quality before the project.

Discharge will be monitored in the early years to validate the proper operation of the system. Moreover, the stilling pool will be developed in such a way that the cycling path runs over it, providing an enjoyable space for cyclists and pedestrians—another KP added value.

During construction, measures were taken as part of an erosion and sediment control plan:

- Site water was treated through the permanent systems—the stilling ponds and Stormceptor system— installed in the initial phases, providing a better alternative than traditional measures.
- Various traditional mitigation measures, such as filter berms, standalone or multiple stilling ponds, sediment fences, and filter bags, where used on the site.
- All points of discharge in the natural environment were visually monitored on a daily basis, or as often as possible, to ensure the quality of effluents discharged by the site. Where quality was deemed insufficient, the environmental coordinator took immediate measures and verified effectiveness. This level of monitoring is more stringent than average in this type of construction.

Samples were sent on a monthly basis or as needed to an external laboratory in Montreal or Laval to ensure compliance with all of the parameters of the City of Montreal's municipal by-laws on water quality.

1.3 Soil management and protection of the Ruisseau de Montigny ecoterritory

In order to reuse as much excavated soil as possible (approximately 1.5 million m^3), dunes were developed in Montreal and Laval. In Laval, these dunes were created along the roadway and will be redeveloped to ensure consistency with the landscape surrounding the highway, thus fulfilling the requirements of the order on this point.

Although the order did not contain any specific recycling conditions, KP worked with the cities, CA25 and the MTQ to reuse materials as much as possible in order to minimize the environmental impact of waste from the project.

In Montreal, dunes were created in the Ruisseau De Montigny ecoterritory with the approval of the City of Montreal which will use them to improve the cycling and pedestrian trails along the Ruisseau. Consequently, we were able to comply with the order on protecting this sensitive area and redeveloping the highway corridor. In the future, the municipality will build two bridges across Perras and Duplessis Boulevards to facilitate passage for cyclists and pedestrians throughout the ecoterritory.

These dunes have very significantly decreased the volume of soil to be sent to landfills. They also contributed to reusing very lightly contaminated soil (type AB), greatly reducing the greenhouse gases emitted by the trucks used to cart this soil off site. This KP initiative generated a meaningful gain for the project's environmental health.

1.4 Project noise levels

Under the partnership agreement, we are required to comply with the usual noise limitations of 55 DBA, 24 hours a day. To fulfil this requirement, permanent noise barriers—concrete walls or soil mounds—will be erected. As a result, noise levels in the areas surrounding the project will improve slightly or remain the same as before the project. We will, therefore, have improved or maintained the levels of noise that reach those most highly affected, the neighbours.

1.5 New public transit link

The project was designed by the MTQ, further to public hearings by the BAPE, with a lane reserved for public transit at each bridge access point (Montreal and Laval side). A new public transit link will therefore be created for Laval residents travelling to Montreal, with potentially rapid access to the Metro's Green Line. This is consistent with the Quebec government's policy enhancing public transit in order to limit automobile traffic.

1.6 New cycling and pedestrian link

The bridge was designed with a multi-purpose lane, as imposed by the order, which allows pedestrians and cyclists to cross the bridge safely. The Laval and Montreal cycling trails connect directly to this lane in a safe manner, thus encouraging this mode of transportation. In

addition, following public consultations held to incorporate the input provided by the cities of Montreal and Laval, KP added a lookout deck on the bridge to give users, pedestrians and cyclists, a rest area with a view of the river and the islands downstream.

2 Innovation to overcome environmental challenges

The project's environmental innovations came in response to the environmental challenges that arose in both design and construction.

2.1 Sturgeon habitat

Under the MDDEP's order, the design and construction of the bridge must not affect the sturgeon habitat. In response, KP designed an innovative two-part bridge: one 280-metre stay-cable component and one traditional nine-pillar section. During construction, and in order to comply with this condition, barges were used and secured with cables outside of the habitat. A passage was marked out to ensure the flow of pleasure boat circulation.

2.2 Wetland protection

Under the order, we were responsible for protecting existing wetlands and compensating for any destroyed wetlands. On the Laval side, a number of wetlands were located in the middle of the highway area. Some were completely or partially backfilled. In total, approximately 4,670 m^2 were lost; the MTQ offset this loss by rehabilitating and protecting more than 350,000 m^2 of natural land, including 11,040 m^2 of wetlands, in a conservation area.

The largest expanse of wetlands was preserved and protected throughout the work by imposing a minimum 15-metre protected area, except where the structure ran overhead. The technical challenge was addressed in an innovative manner by installing girders, spanning 63 metres ,on each shoreline using two cranes.

The drainage from the bridge will be treated on each shore through recently introduced bioretention basins, which are effective for treating road salt over the long term.

2.3 Management of environmental permits

All work performed as part of this project was covered in a permit issued by the MDDEP based on the 33 conditions set out in the order. KP decided to segment the permit to follow the work schedule by maintaining a good-quality description of the work and mitigation measures for each type of activity. For example, deforestation activities were carried out under a permit issued at the outset of the work, and landscaping development was permitted only two years later.

This innovative approach allowed for better management of permit issue lead times based on construction activities and promoted quality MDDEP reviews by giving them enough time to verify and validate requests. Consequently, more than 12 permits were obtained from the MDDEP over the course of the project, in addition to authorization from Fisheries and Oceans Canada (DFO) and Transport Canada, and permits from the City of Montreal.

With regard to variances during the course of work, permanent contact was maintained with MDDEP and DFO officials to discuss and request amendments as needed, thus anticipating potential issues.

Inspectors from the various departments and the City of Montreal made regular site visits (more than once per month overall) and worked closely with us to improve the project's final environmental results.

2.4 Environmental management by activity

Before being carried out, each activity is described in writing as part of an implementation plan that includes an environmental analysis of the work. This implementation plan was developed by the engineers and approved by the environmental coordinator who ensures that the activity complies with all of the conditions. The plan is then read and signed by all workers before beginning work. The environmental coordinator then checks that the plan is carefully followed during his site visits and takes corrective measures as needed. Such implementation plans that incorporate environmental conditions reflect the innovative management of potential issues and call for professional verification of each activity's rollout, rather than establishing initial mitigation measures for the duration of the work.

2.5 Hazardous spill management

Hydraulic oil spills are a recurring risk on construction sites given the amount of equipment used. We adhere to a strict equipment maintenance program, and we implement, communicate and test an emergency response plan for prompt reaction to spills to minimize their impact. Most of the equipment used in the water or near sensitive environments use biodegradable hydraulic oil (95% biodegradable in 21 days) which limits the potential impact of spills in sensitive areas. Nonetheless, any spill involving this type of oil is treated like any other spill.

3 Financial impact

3.1 General

The A25 project and its public-private partnership arrangement provides strict controls and very clear shared objectives for all partners: compliance with budget, compliance with schedules, and quality of work. These objectives are set to fulfill the primary goal which is to provide a new quality service to area road users. Environmental issues were assigned the same importance in project management as other issues, and environmental challenges were managed in a manner consistent with the project overall. Challenges were overcome without additional budget or scheduling constraints, making a major contribution to the project's potential for success and cost-effectiveness.

3.2 Contaminated soil

With the MDDEP's approval, a contaminated soil management plan helped to define the possibilities for reusing lightly contaminated soil (below criterion B—usable for the construction of family homes). Accordingly, more than 500,000 m^3 of AB contaminated soil were reused as part of the project, both in Montreal and Laval. From a financial perspective, this was a very

good solution, as it helped reduce cartage and associated fuel consumption. Under the initial plan, this soil would have been sent to landfills, considerably increasing disposal costs.

Under the partnership agreement, the MTQ assumes the costs of contaminated soils in excess of the minimum paid by KP. Using this management approach, project costs were reduced for both KP and the MTQ, demonstrating sound environmental risk-sharing operations in PPP-driven projects.

The more heavily contaminated soil was excavated following a stringent volume verification program to limit quantities and to reuse as much soil as possible, thus reducing the final financial and environmental impacts.

3.3 Building materials

Building materials were reused on the construction site.

- The rock produced by blasting was crushed on site and reused in the road structure.
- The concrete and asphalt destroyed was also reused in the construction of the new roads.
- Usage of framing lumber was maximized through reuse in various operations before being recycled.
- Steel, concrete and wood were recycled or reused by various suppliers.

Waste management and recycling helped to reduce the costs of new materials and to protect the environment. We were able to minimize direct and indirect costs in the administrative management of purchasing and material transport.

4 General applicability

At this very advanced stage of the project, the most significant environmental issues that arose in both the design and construction phases were successfully managed and addressed. The main impacts associated with this type of project arose in the roadway design phase and in the first two years of construction where the natural environment was relatively intact and needed to be modified. The final phases of the project do not involve any extensions and cover mainly areas subject to control and monitoring measures with no major issues. The final major operation involving the environment will be managing the temporary pier in the fall of 2010. We do not anticipate any issues or complications with this operation.

The successful management of environmental issues in this project, necessary to consolidate roadways in the northern sector of the Montreal area and promote better traffic flow, contributed to the success of the project overall. Each partner's contribution and KP's role as partner responsible for design and construction helped complete the A25 link on schedule and on budget. Careful planning, reflected in the project definition, consultation phases, design and monitoring during construction, fostered acceptance of the project among the communities affected and provided an appropriate response to every challenge, particularly environmental management. All of the stakeholders involved played their roles as part of management approach that was new to all of the partners.

A project of this magnitude called for a solid and stringent environmental management system in order to minimize its impact on the natural surroundings. The PPP agreement introduced new

complexities by reassigning areas of responsibility between the prime contractor which is usually the MTQ and the designer-builder (KP). Moreover, no final plans or specifications on the approach were issued upon signing the agreement, making this arrangement unique. Environmental management was adapted to a project in the design stage and building stage simultaneously. Innovative planning, monitoring and oversight solutions were developed, opening the door to new ways of working in Quebec.

This type of extensive project was new to Quebec. The A25 project is the first to use the public-private partnership approach. Risk management, responsibility-sharing and achieving objectives rather than means are all new concepts for the stakeholders in this case. Both the private partners and the *Ministère des Transports* had to be innovative in their management approach to ensure the success of the project.

Shared objectives in terms of schedules, budgets, quality of work and consideration for environmental issues helped ensure that the numerous aspects of the project's critical path were handled appropriately.

The partnership was guided by a well-defined partnership agreement and a partnership committee created for project oversight. The environmental issues were the focus of the government order (33 conditions) that resulted from public consultations and the report of the *Bureau des audiences publiques en environnement* (BAPE).

The management approach, partners' dedication, innovations and adjustments made by the design and construction manager helped produce a major infrastructure project for the northern part of Montreal that is well on its way to opening in 2011 as planned.

The environmentally responsible and respectful management of this extensive roadwork project prompted us to make this TAC Environmental Achievement Award submission together.