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Turcot Interchange Project Management

Canadian Consulting Engineer Awards 2021



The consortium formed by AECOM and Tetra Tech acted as the owner's engineer in major Turcot interchange project for the last 12 years as part of an integrated team with the Ministry of Transport for the reconstruction of interchanges, sections of motorways, railways and municipal links. A combination of alternative and traditional delivery methods made possible the implementation and integration of this project in an urban setting, while maintaining active the busiest road sector in Canada.

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PROJECT NAME Reconstruction of Turcot Interchange and Railways

FIRM NAMES: AECOM and Tetra Tech QI inc. (Consortium Gestion AECOM-BPR)

CLIENT: Ministère des Transports du Québec



One of three signature bridges included Turcot Interchange project (© MTQ, photo : Édith Martin) CCE Awards 2021

Complexity

The Turcot Interchange had reached the end of its service life. Its rebuilding was an opportunity to modernize this key junction, rethink its place within the urban fabric and reclassify the land on which the previously decommissioned railyard was located.

Much more extensive than the interchange itself, the Turcot Project consists of rebuilding four interchanges and three highway sections (15, 20 and 720), moving the transcontinental railway and adding new municipal connections in anticipation of future development and to improve the existing infrastructure. The project location spans a dense and diverse metropolitan area of 3 to 7 km. With a budget of \$3.67 billion, it is the largest highway construction project in Quebec history.

The project team coordinated among the multiple stakeholders whose interests sometimes differed, to achieve consensus on proposed project elements. These stakeholders included the cities of Montreal West and Westmount, five boroughs of the City of Montreal and other organizations including CN, CP, RTM - Réseau de transport métropolitain, STM – Société de transport de Montréal and Parks Canada.

To begin in a timely manner, a strategy based on two project delivery models was adopted. The integrated project team established a work breakdown where 35 simultaneous work packages would be delivered under a traditional project delivery model and one other major contract would deliver another portion of the project under a design-build model. Undertaken simultaneously, these required extensive planning and coordination to effectively deliver the broad scope of work. Separate and dedicated teams were setup to manage the two models to avoid any schedule delays and consequently the resulting nuisances.

Railroad displacement, which is under federal jurisdiction, in addition to the managing two separate project delivery models added to the complexity of standards, access sharing and uninterrupted functionality.

In collaboration with MTQ, the consortium drafted technical requirements, which were used to reach the objectives of uninterrupted road and rail travel and to leave room for creativity through a request for contractor bids.

The main challenges consisted of rebuilding the infrastructure in constrained spaces below or near the existing infrastructure where over 300,000 vehicles travel daily, while limiting closures in order to avoid excess traffic in neighbouring areas.









Meeting client needs

From the beginning of the project, the management consortium formed by AECOM and Tetra Tech worked as an integrated team with the MTQ's resources to develop the project. The Turcot Interchange project will create lasting positive impacts to the surrounding areas in terms of land use, public and active transportation, the environment, road geometry, bridges and structures, drainage and public services. The consortium benefited from the expertise it acquired in previous projects to define the best-case scenario for future generations with the MTQ.

In 2020, commissioning of the infrastructure marked the 12th year of the consortium's involvement, testifying to the Ministry's continued satisfaction.

The consortium participated in the development of the objectives of the project's charter, which aim to maintain functionality, limit impacts on the community, promote urban integration, improve public transit and ensure mobility during the works, while respecting the established budget and schedule.

The consortium designed and implemented custom monitoring and control tools to meet the requirements of the accountability report of the Directive on the management of major public infrastructure projects, inspired by project management best practices.

The Ministry wanted to make Turcot a flagship project in terms of project management and environmental approaches, which the consortium upheld by implementing processes that led to this success.

Project management of the turcot interchange represents more than:

- 280 Contracts
- 9,200 Plans
- **2,150** Items in review procedures
 - **320** Presentations

- Hundreds of meetings with partners and citizens

Environmental benefits

To reduce the negative impacts on traffic and mobility, several measures to promote public transit were implemented including reserved lanes in the local network, express bus lines, and the relocation of a bus terminal and a commuter train station. The integrated team collaborated on these measures and monitored their impact on mobility. The team also helped develop multiple communications to keep nearby communities informed on the progress of the works and to promote use of alternative transportation modes.

The consortium prepared the contaminated land restoration plans for approval by the Ministry of Environment. These plans included using soils from other regional construction sites to limit the amount of borrowed native raw materials; reusing contaminated soils on the site under certain conditions; and revalorizing compressible soils, which are typically unfit for construction in landscaping projects and the 2.7-km green strip, thus improving the ecoterritory of the Saint-Jacques escarpment.

The project requirements also included a target to reuse or recycle 80% of the materials remaining after the dismantling of existing buildings and structures. This was achieved by incorporating these materials into the new earthworks.

The consortium analyzed the environmental impacts of the works and proposed approaches to reduce them.

3.3 km of noise barriers to improve the noise environment in the residential sector (© MTQ, photo : Édith) Martin)





10 km of reserved lanes and improvement of public transport in the region (© MTQ, photo : Édith Martin)













The consortium promoted the adoption of dynamic management methods for the sector's drainage waters in order to optimize retaining structures and rejected flows in urban systems.

In 2013, the consortium established a team to monitor environmental quality and track environmental impacts such as noise, dust and vibrations on the neighbouring communities. This monitoring took place 24 hours per day, seven days per week.

In addition to the audit program, which assures the Ministry that the works are up to standard, the consortium developed durability criteria, which consist of measuring the condition of the structures in the warranty period to extrapolate their lifespans.



Innovation

The Ministry had set the objective of making Turcot its first carbonneutral project. The consortium made this commitment a reality through numerous elements within the design-build contract and the development of a methodology to calculate the Greenhouse gases (GHG) emitted by construction activities, the transportation of materials to and from construction sites, and the off-site elimination of waste.

Technical requirements on the project included the reduction of GHG through the use of hybrid vehicles on the construction site, compensation in the form of carbon credit purchases and the planting of trees inside and outside of the project's boundaries. The consortium also conducted studies that led to a decrease in heat islands by quantifying the impact of the increased greenery of areas compared to the conventional final coverage method in infrastructure projects.

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Social and/or environmental benefits

The consortium recommended a series of measures to integrate the infrastructure into neighbourhoods, including the incorporation of architectural elements into the works and the design of three signature bridges. Active transportation solutions were prioritized and addressed with enhanced safety measures such as extending the scope of overpasses to widen sidewalks and the addition of 8.1 km of bike paths which created new connections between neighbourhoods.

The environmental quality team made use of the data available from temporary noise monitoring stations and recommended adjustments as needed during construction. The location of the noise monitoring stations changed to follow the progress of the works. Four air quality monitoring stations, which are innovative in the field of environmental construction site monitoring, were also established. At the end of the works, one station will remain operational under the City of Montreal's monitoring network.

The integrated team implemented follow-up measures to address the psychosocial and economic impacts related to the land acquisitions. Depending on these results, assistance programs may be developed.

Efforts were made to rebuild structures away from nearby residential communities and a 3 km noise barrier was installed to improve the quality of life for the residents in the nearby neighbourhoods.

Furthermore, the integrated team analyzed the new construction processes proposed and recommended changes to the integration approach of the infrastructure into the urban environment.





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8.1 km of cycle paths to develop active transport between neighborhoods (© MTQ, photo : Édith Martin)

About AECOM

AECOM is the world's premier infrastructure consulting firm, delivering professional services throughout the project lifecycle – from planning, design and engineering to program and construction management. We partner with our clients in the public and private sectors to solve their most complex challenges and build legacies for generations to come. On projects spanning transportation, buildings, water, governments, energy and the environment, our teams are driven by a common purpose to deliver a better world. AECOM is a Fortune 500 firm and its Professional Services business had revenue of approximately \$13.6 billion in fiscal year 2019. See how we deliver what others can only imagine at aecom.com and @AECOM.

About Tetra Tech

Tetra Tech is a leading provider of consulting and engineering services worldwide. We are a diverse company, including individuals with expertise in science, research, engineering, construction, and information technology. Our strength is in collectively offering integrated services – delivering the best solutions to meet our clients' needs. With almost 50 years of experience, we have unique capabilities in water, environmental, energy, infrastructure, and mining and industrial sectors to support global commercial and government clients. With more than 20,000 associates worldwide, including 3,500 in Canada, Tetra Tech provides clear solutions to complex problems.