YPT International Awards – Project of the Year

TRANS-CANADA HIGHWAY TWINNING

in Yoho National Park, BC

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Project Title
Trans-Canada Highway Twinning

Location of Project
Yoho National Park, BC, Canada

Category of Entry
Project of the Year

Project Owner
Parks Canada Agency

YPT Chapter
YPT Vancouver BC
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1. DESCRIPTION

BACKGROUND

The Canadian Rocky Mountain Parks are a UNESCO World Heritage Site, and a geological and environmental masterpiece. The Trans-Canada Highway (TCH) is the only major road allowed through the protected area. The TCH, completed in 1962, is Canada’s national highway. It serves as a link to all Canadians and is the primary east-west route for inter-provincial trade and travel from coast to coast. It is a major access route into Canada’s Rocky Mountain parks and connects the rest of the nation with one of Canada’s most important ports on the Pacific Coast: Port Metro Vancouver, the gateway to Asia-Pacific markets. Due to its importance as a transportation corridor and the increasing traffic demand on the highway, there has been substantial need over the years in upgrading the TCH from its original two-lane form to a four-lane divided highway (“twinning”).

THE PROJECT

Located within the Yoho National Park and managed by the Parks Canada Agency, the 6km section in this project was challenging for both roadway users and for the construction of a twinned highway. The existing highway often shared the narrow ecologically sensitive valley bottoms with the CP Railway which severely restricted the usable roadway corridor. Steep unstable mountain slopes, deeply eroded ravines, and river and railway crossings often required the construction of large structures such as retaining walls or bridges. Compounding the challenge, the TCH follows alignments originally pioneered by mule trains of the early

1. The Trans-Canada Highway in Yoho National Park is one of the last un-twinced sections of highway.

2. Looking over the highway on a cold morning. Temperatures are well below freezing by mid-September and ground typically only thaws around late June.
explorers, with no consideration for present-day vehicles, speeds, and safety standards, nor for impacts on wildlife and the environment.

The highway has frequent closures of 24 hours or more due to accidents, avalanches, rock slides, and/or extreme weather events. During the summer months, the addition of tourist traffic causes the highway traffic volumes to more than triple, making the route too congested for commercial trucker traffic.

In addition, there are frequent wildlife-vehicle collisions, which are not only dangerous (and potentially fatal) for the motorists, they are costly for the public. One wildlife-vehicle collision could have the following economic impact:

- $10,000 - $100,000 in wildlife loss
- $500 for carcass removal
- $1.3M in the event of motorist fatality
- $100,000 per hour in network closure

McElhanney provided comprehensive services to upgrade 6km of highway to a four-lane divided standard, while improving the alignment, safety, and amenities. Our services included engineering design, aerial LiDAR, orthophoto mapping, ground surveys, landscaping design, and construction management.

McElhanney’s design carefully took into consideration the environmentally sensitive vegetation and strategically located structures to minimize their impact on rare plants.

McElhanney designed longitudinal fencing and wildlife crossings to facilitate wildlife travel across the four-lane highway. Similar projects adjacent to the area have shown an 80% reduction in collision rates as well as enabling wildlife to migrate to different parts of the parks in their search for feeding and breeding habitat. Furthermore, the wildlife crossing route allows tourists an increased opportunity for wildlife viewing.
Some of the other challenges McElhanney overcame in this project included:

Narrow Corridor: McElhanney used retaining walls, tightened roadway sections, and strategic widening locations to avoid the challenging geographic constraints so that the design’s footprint was safely contained within these features. No additional right-of-way was necessary as a result of McElhanney’s forward-thinking design.

Safeguarding habitat: McElhanney included contractor schedule restrictions so that the work would be completed before the bird nesting period, illustrating our commitment to embrace the environmental sensitivity of this project.

Early clearing contract: McElhanney tendered an advance clearing and grubbing contract during the winter to use project time effectively and allow the area to be ready for the construction season in the spring, avoiding the bird nesting window.

Local Materials: As the nearest material and equipment centres were 100km away, sourcing material or equipment from these centres would have increased the project’s cost significantly because of haulage and would have enlarged the project’s carbon footprint. McElhanney sourced material from ‘Wapta Cut’, a large 50m high embankment, to improve the horizontal alignment as well as source local material. Establishing a local borrow site also meant that McElhanney adhered to Parks Canada’s mandate to minimize the introduction of foreign material into national parks.

These solutions resulted in additional capacity for the steady trend of tourists and enhanced protection of the parks. This project is a testament to providing a comprehensive solution that meets transportation and motorist safety requirements, and wildlife safety and habitat connectivity needs.
2. IMPACTS TO THE TRANSPORTATION SYSTEM

The benefits of the project are:

- improvements to the transportation infrastructure,
- increased goods movement, and
- environmental factors.

Transportation Infrastructure Improvements | The project has improved the highway’s transportation capacity, roadway safety, passing opportunities, and intersections. The safety and road reliability have also improved through the introduction of a divided median, infrastructure adaptations to climate change, and expanded rock-fall ditches.

Increased Goods Movement | All of these upgrades have aided in an incremental reduction in the traffic bottlenecks on Canada’s primary trucking corridor through decreased travel times, delays, and vehicle operating costs. In addition, the commercial vehicle brake check and chain-off areas were improved with an innovative off-grid lighting system, expanded storage lanes, improved signage, and new restroom facilities. This provides capacity for Canada’s growing inter-provincial trade and export trade markets.

Environmental Benefits | The safer highway has led to a decrease in vehicle collision fatalities, injuries and property damage costs. The reduced travel times will reduce air contaminant and greenhouse gas emissions. Lastly, the fencing and wildlife crossing structures will reduce animal population fragmentation as well as the wildlife killed by motor vehicles.

All of these benefits ultimately impact the users: the trucking community with improved winter reliability and a reduction in travel delays, the local wildlife with protected highway crossings, the environment with reduced GHG emissions, and the local road users who have a safer and more reliable highway.
3. CONTRIBUTIONS OF YOUNG PROFESSIONALS

Over 20 of McElhanney’s Young Professionals was needed to successfully implement this four-year project. The YPs contributed in all stages of the project, from design to inspection to contract administration, many taking on leadership roles throughout the project’s life.

Joey Chiu and Nick Guaran, both EITs when the project started and Professional Engineers (P.Eng.) by the end, were involved in the design and led the team on the contract documents, including drawings, specifications, and cost estimates. They used 3D modelling software to develop the road corridor and design the wildlife underpasses, landscaping on the wildlife overpass, laning and geometrics, and the traffic signage. Joey also helped coordinate the sub-consultants and transitioned into the project manager role halfway through the project.

Jimmy Howells, EIT, and Ben Ticknor, P.Eng., provided the day-to-day construction supervision and quality assurance on the roadway and the wildlife overpass structure, respectively. They ensured conformance with project specifications and field fit designs where necessary. They monitored and approved the monthly quantities, led construction meetings, completed field reviews and surveys, and tracked daily activities, ensuring that all traffic, safety, quality, and environmental requirements were met.

Mathias Tait, EIT, processed and conducted quality assurance on all survey data, as-builts, and layouts and utilized VBA coding to standardize the monthly quantity tracking. Allen Pan, EIT, controlled cash flow, budget, scope changes, and progress payments. He was the gatekeeper of documents and coordinated communication between the client, consultant, and contractors.
4. ADDITIONAL INFORMATION

The wildlife overpass structure from this project was featured on numerous Canadian television news stations as well as the Discovery Channel and in local newspapers (see links and attachment). In addition, Parks Canada presented at the Canadian Society for Civil Engineering seminar (February 2019) and Joey Chiu presented at the Society of Chinese Canadian Transportation Professionals technical seminar (October 2018).

McElhanney has been heavily involved in the Young Professionals in Transportation group’s Vancouver Chapter with members often attending trivia nights, ‘Cards against Urbanity’ pub socials, and the highly anticipated annual Meet-the-Managers event. McElhanney’s senior leadership have also been supportive, often sponsoring events or sending managers every year to meet and network with fellow young professionals.

10. McElhanney’s Vancouver Branch Manager giving a speech at a YPT Meet-the-Managers mixer.

11. Joey Chiu, 2nd from the right, networking at a YPT event.
5. ATTACHMENTS


- “Yoho National Park Overpass” Discovery Canada, 1 September 2017, https://www.youtube.com/watch?v=f47fpRPSsqY

