



TAC Technical Excellence Awards –

Road Safety Engineering Award

Submitted by:



McElhanney

Prepared for:



Transportation Association of Canada

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1. Realized or anticipated benefits

1.1 Project introduction

The \$3.3B Port Mann Highway 1 (PMH1) Improvement Project was one of the largest design-build transportation infrastructure projects in Canada's history, featuring a new 10-lane long-span bridge (the widest in the world at the time), 37km of highway widening, 17 highway interchanges, and numerous safety and access improvements. As part of the Gateway Program, the PMH1 project was initiated to respond to traffic congestion in Metro Vancouver and has affected five municipalities (see the attached map in [APPENDIX A](#)).

In collaboration with owner Transportation Investment Corporation (TI Corp)/BC Ministry of Transportation and Infrastructure (MoTI) and design-builder Kiewit Flatiron General Partnership, McElhanney continuously developed comprehensive detour plans in real time for the entire route and the connecting roadways (over 350 detours) to ensure safe, free-flowing, high-speed traffic movement along the busy corridor (with more than 200,000 Average Annual Daily Traffic). The project lasted over 5 years and was officially opened by the Minister of Transportation and Infrastructure, Todd Stone, in September 2015.

1.2 Magnitude of the project's safety impact

Despite the fact that detours can often introduce confusion, the Highway 1 corridor saw decreased collision rates during construction, as per ICBC stats included in [TABLE 1](#).

McElhanney's team introduced many innovations (discussed further in [SECTION 2.1](#) and also in the Vancouver Sun article in [APPENDIX A](#)) to increase safety. The team carried out careful planning to ensure that detour designs were clear and logical, with detailed signage and pavement markings, all under a 24-hour construction schedule with constantly changing deliverables. Due to the complexity of the project and the fast pace of construction, the contractor frequently needed to make schedule and methodology changes at short notice; throughout the construction period McElhanney's design team and the project communications team were able to respond immediately with new and modified detour designs. Under these circumstances, increased unsafe conditions might normally be expected; however McElhanney's team consistently delivered drawings that passed road safety audits. These audits were led by Dr. John Morrall, the world-renowned road safety expert, who is quoted as saying that McElhanney's detour work exhibited excellence in planning, design, and implementation.

The team installed screened fences on top of concrete roadside barriers to prevent curious drivers from checking out construction activity as they passed, thereby preventing distractions.

Winner of the ITE Award

» This project won Project of the Year by the Institute of Transportation Engineers, Greater Vancouver Chapter, November 2012, while the project was still ongoing.

McElhanney was invited to present on the detour design at the following conferences:

- » Transportation Association of Canada TAC, October 2012
- » Design-Build Institute of America, March 2015
- » International Symposium on Highway Geometric Design (ISGHD), June 2015
- » Transportation Research Board of the National Academies, January 2016

The project’s safety measures received many accolades, especially from the client, TI Corp. Garry Dawson, Vice-President of Technical Services, said,

“[McElhanney] provided innovative temporary traffic management designs in order to accommodate complex construction staging, while respecting the importance of maintaining traffic operations and safety for both the public and construction workers. [McElhanney] was well trusted by the Owner’s and the Contractor’s teams, bringing their knowledge and experience to effectively bridge any gaps between constructability needs and traffic impacts.

“As a testament to how effective traffic was managed during the multi-year construction period, TI Corp’s Communications team received relatively few public complaints and reports of incidents in comparison to the vast scale of construction work under complex traffic conditions. This project success is strong reflection of the top quality engineering services and traffic management expertise provided by [McElhanney].” The full letter of reference is attached in [APPENDIX A](#).

Reduction in the frequency & severity of collisions

The detour designs were so successful that collision rates actually decreased during construction (see [TABLE 1](#)), according to ICBC reports. The extremely congested Coquitlam section of the highway saw a 14% decrease in collisions over the 5-year period, despite continuous construction of road widenings, overpasses, on/off ramps, and related paving, striping, and detours.

“Crash numbers have actually declined the last two years,” said Adam Grossman, Senior Media Relations Advisor with ICBC. *“We’re obviously pleased to see the downward trend.”* This outcome affirms the ultimate cost-effectiveness of designing engineered detours with TAC standard geometries, signs and pavement markings, safety barriers, delineators, and electronic message boards to direct traffic efficiently past construction zones.

To respond quickly to contractor changes and adjust designs to meet road safety standards quickly, McElhanney maintained an engineering team at an on-site office for over three years. Our team was co-located with the owner (TI Corp) and builder (Kiewit Flatiron) allowing our team to communicate on a continuous basis and to monitor the performance of detour designs on-site and in real time. This meant they could provide ongoing adjustments to increase safety on site and reduce collision rates.

Table 1: ICBC Numbers

| Corridor crashes per year on Highway 1 between United Boulevard and 152nd Street | |
|--|-----|
| 2007* | 473 |
| 2008* | 450 |
| 2009* | 483 |
| 2010** | 439 |
| 2011** | 417 |

**Prior to construction of detours*

***Detours in place*



Reliability of safety performance results

With an average annual daily traffic of over 200,000 vehicles, monitoring and maintaining safe travel was of utmost importance for the detour engineering team.

Dr. John Morrall, PEng, PMH1 Road Safety Auditor Team Leader, long-time member of many of TAC's standing and project committees as well as the recipient of four Chairman's Awards and the Award for Service to TAC, has expressed how thorough the detour engineering team was in designing safe, efficient detours. In his reference letter in **APPENDIX A** he writes:

“Some work zones were extremely complex in terms of traffic operations, requiring hundreds of signs and traffic control devices such as drums, delineators, flexi-sticks, PCMS, and road pavement markings. McElhanney’s team accepted RSA mitigation suggestions with a short turnaround time and were proactive in suggesting enhancements. The ability to accommodate traffic while swiftly addressing RSA measures through the work zones is a testimony to the quality of the planning, design, and implementation of the engineering detour team.”

1.3. Sustainability

The PMH1 project was delivered to the highest environmental standards. This meant leaving no habitats affected, and when possible, enhancing them and improving an area's long-term function. The team scheduled construction to avoid environmentally sensitive periods such as bird nesting and fish migration, and took measures to protect areas during active construction including slope stabilization.

McElhanney's detour engineering team made every effort to avoid impacting environmentally sensitive zones within the project boundaries by installing siltation fences, steepening slopes, retaining slopes, and by minimizing the temporary roadwork footprint.

Further, the detour designs contributed directly to the sustainability of the project by maintaining high-speed, free-flow traffic that consequentially reduced vehicle emissions from idling vehicles.

Economic sustainability

As part of the Gateway Program, the PMH1 project promoted economic growth within Metro Vancouver due to improved movement of people and goods. The project saw the addition of new truck ramps connecting Highway 1 and the Pacific Reach commercial/industrial area of Coquitlam, easing the transportation of commercial goods.

Additionally, the PMH1 project created an estimated 8,000 jobs throughout the construction phase. Although detours are temporary measures, having limited future economic value on their own, they not only maintained economic activities by ensuring continued traffic flow during construction, but they also enabled the uninterrupted completion of the main PMH1 project and the advancement of the overall Gateway Program. These initiatives will create opportunities for future environmental sustainability and economic development.



Social sustainability

The PMH1 project will have a significant impact on the quality of life for regular users of Highway 1. Travel times are expected to decrease by up to 30%, which could save commuters up to an hour each way. McElhanney's comprehensive detour designs enabled this major project to take place seamlessly, with minimal impact on end users. Unlike traditional projects, free-flow traffic was maintained during all aspects of construction, which limited disruption and delays.

The PMH1 project has been high profile in nature, as it has directly impacted five municipalities. Highway 1 is part of the Trans-Canada Highway, the major transportation corridor connecting Canada's east and west coasts. It serves as a gateway and has a significant effect on commercial and tourist activity.

2. Degree of innovation

As this project occurred on an integral part of the Trans-Canada Highway network, the impact and successes had national significance.

2.1 Project innovations

Detour design is a very complex sub-specialty of transportation engineering, with no textbook answers to the issues and challenges presented. As such, the design team developed the standards as they went along, including the ramps leading to the building and staging sites.

The team custom-designed each detour to accelerate construction, avoid throw-away construction, eliminate motorist confusion, and enhance safety. Additionally, the detour engineering team was located on-site throughout the project, enabling it to observe and learn from each detour design in operation and apply new lessons learned as necessary.

The team developed several project innovations, described in more detail below:

- Customized use of temporary raised pavement markers
- Development of a standard for temporary freeway construction access
- Left-turn on/off ramps
- Custom signage
- Screen fencing above concrete safety barriers to eliminate distractions for drivers curious about the construction

McElhanney's detour engineering team, including experts in geometric design, construction staging, traffic engineering, and road safety auditors, spent over 80,000 hours (the equivalent of one individual's 40-year career) designing more than 350 detours, representing over 700 lane kilometres, 6,000 traffic signs, and 5,000 engineering design drawings.

Each detour required unique alignment and geometric design, traffic analysis, drainage design, signage, pavement markings, and environmental mitigation.

In many cases, innovative solutions were required to achieve the project objectives, either by developing new applications or by improving on existing standards and guidelines, often for the first time in BC.

Customized use of temporary raised pavement markers

A significant number of detour alignments were planned for the ultimate design surface, requiring temporary pavement markings on the final lift of pavement. Removal of traditional painted pavement markings (lane lines) would have left undesirable pavement scarring and a ghosting effect on the final top lift of pavement.

McElhanney researched the use of temporary raised pavement markers and reflective tape to develop a standard for use on the PMH1 project. The team undertook a pilot project on an approximate 1km test section. The safety audit team concluded that the use of raised pavement markers would enhance guidance for motorists in the absence of paint lines. The method was advanced by developing arrows, high occupancy vehicle symbols, and gore standards using temporary raised pavement markers.

Development of a standard for temporary freeway construction access

With construction taking place in the median and shoulder areas of Highway 1, several temporary accesses were needed to expedite construction activities without impeding freeway traffic operation.

Slow-moving construction vehicles required safe entry to and exit from the high-speed corridor, without the need for freeway lane closures, while discouraging access to general purpose traffic. With no existing design standards or guidelines for freeway construction accesses, McElhanney developed a standard that can now be applied nation-wide to future projects with similar requirements.

Worker safety within work sites off high-speed, general purpose lanes, as well as construction vehicle entry to and from these sites, is an example of a significant safety element McElhanney solved through innovative engineering. A strategy was developed by McElhanney whereby a work zone entry deceleration lane was built off the highway with a complementary “slow down” lane inside the zone. A solid paint line fronting the deceleration lane was then used along with special signage to prevent general traffic accidentally entering the work site and injuring workers. Similarly, acceleration lanes were built alongside the highway so exiting traffic could merge safely into the adjacent high speed traffic at the posted speed.

Left-turn on/off ramps

The team determined that left-turn on/off ramps on Trans-Canada Highway 1 at the 152nd Street Interchange would eliminate the need for a temporary overpass structure and corresponding construction stages, saving the project millions of dollars. Although left-turn on/off ramps have been used on freeways in the United States, all were permanent applications, and no literature existed on temporary usage. The process would require temporarily re-educating motorists, which could have adverse safety implications. MoTI had previously been reluctant to deviate from its policy of only right-turn on/off ramps, citing potential traffic operation and safety concerns.

McElhanney’s team researched the use of left-turn on/off ramps in other jurisdictions and applied the findings to the proposed condition for the 152nd Street Interchange. The team then proceeded with the left-turn design, ensuring significant public notification, and the configuration was found to operate successfully. Ultimately, McElhanney’s design serves as a baseline approach that can be applied to future left-turn on/off ramp treatments in the province, saving time and effort.

Custom signage

The team erected custom signage at either end of the project site to alert motorists that their GPS information might not be reliable through the corridor, as many motorists operate on “autopilot”, paying little attention to their daily commute until a change occurs. This meant that for the start of the project, motorists were often looking for a left turn that they had become accustomed to using. To resolve confusion, McElhanney’s team needed to monitor motorist misunderstanding closely – sending out inspectors to monitor traffic queues.

2.2. Communication & promotional activities

Throughout the PMH1 project, communication was key. Major traffic pattern changes at several high-volume sections such as the Gagliardi Interchange loop, Cape Horn, and 152nd Street needed to be communicated regularly to the public in order to reduce traffic backlogs and increase traveller awareness.

Edmund Lee of RF Binnie & Associates (formerly TI Corp's Deputy Project Director) has said that traffic management was critical to the success of the project, and the communications techniques employed throughout construction should be used in other big infrastructure projects.

The project’s communications team used traditional communication tools, such as news releases and a well-developed and updated project website. More social modes of communication including Twitter, in order to communicate closures and changes. More immediate, changeable message signs (CMS) were used as well to increase clarity for motorists and communicate on-site necessary detouring through the corridor.

3. Transferability to other Canadian communities & organizations

Although this project took over 5 years and covered 37km, each detour was unique. Lessons learned in a particularly congested accident-prone section using extensive detours on this Highway 1 upgrade could be used as a precedent elsewhere in Canada under similar circumstances. Traffic safety design is not unique; it is how an engineering team develops a three-dimensional solution to a problem by safety-oriented design, anticipating motorist reactions and mobility. This documentation and philosophy can certainly be transferred to other transportation designers and safety auditors.

3.1 Benefits to the transportation community across Canada

Over the course of this project, many innovations were introduced, some more successfully than others. This meant that the detour design process evolved and improved accordingly. These lessons learned are applicable to detour designs for any congested, high-volume freeway, and may even prove useful for non-detour highway designs, particularly when unusual conditions prevail.

As part of the Trans-Canada Highway, the PMH1 project needed to meet the more stringent national standards (TAC), while maintaining appropriate highway speeds of 80km/h. This meant the application of some creative and, on occasion, uncustomary detour techniques, including the left-hand exit ramp (see SECTION 2.1). This innovation, not generally encouraged in BC, may now be applied with less hesitation Canada-wide to similar highway detouring projects.

3.2 Contributing to the national road safety vision

Canada's Road Safety Strategy report, "Towards Zero: Ambitious Road Safety Targets and the Safe System Approach," includes the vision of being a world leader in road safety, with the safest roads in the world. The countries that perform the best have fatality rates of around 5-7 fatalities per 100,000kms.

The PMH1 project directly contributes to the realization of this vision, though introducing unexpected detours in frequently commuted corridors along high-speed routes can often times increase confusion and collision rates, McElhanney's intelligent detour designs contributed to a decreased collision rate in 2011.

3.3 Likelihood of other jurisdictions accepting & implementing a similar project

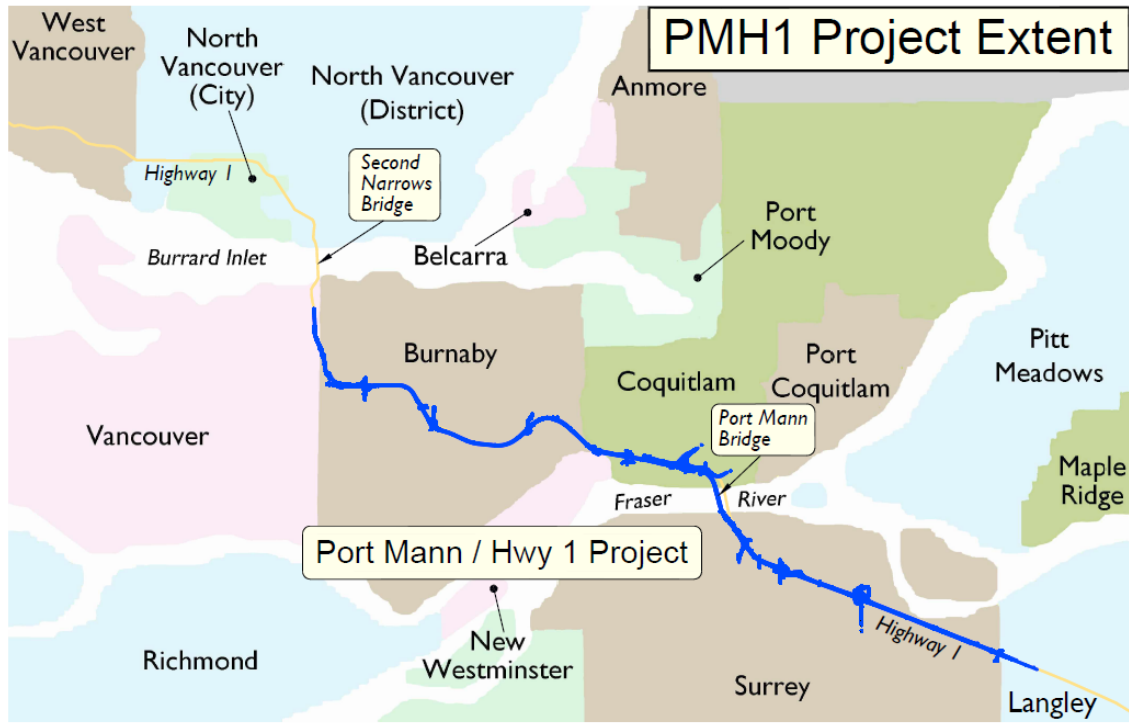
The PMH1 detour designs can have national application along the Trans-Canada Highway, should jurisdictions look to upgrade further sections, or on other four-lane freeways in a restricted right-of-way that is increased to eight lanes. The detour innovations can be useful for any highway upgrade within Canada that necessitates high-speed detours.

As this project included 17 interchanges that required major municipal arterial upgrades, it required acceptance and approval from 5 municipal jurisdictions – no small feat. However, all municipalities expressed their satisfaction with the detour design approach, which may provide testament that this project's designs could be implemented similarly in a comparable project.

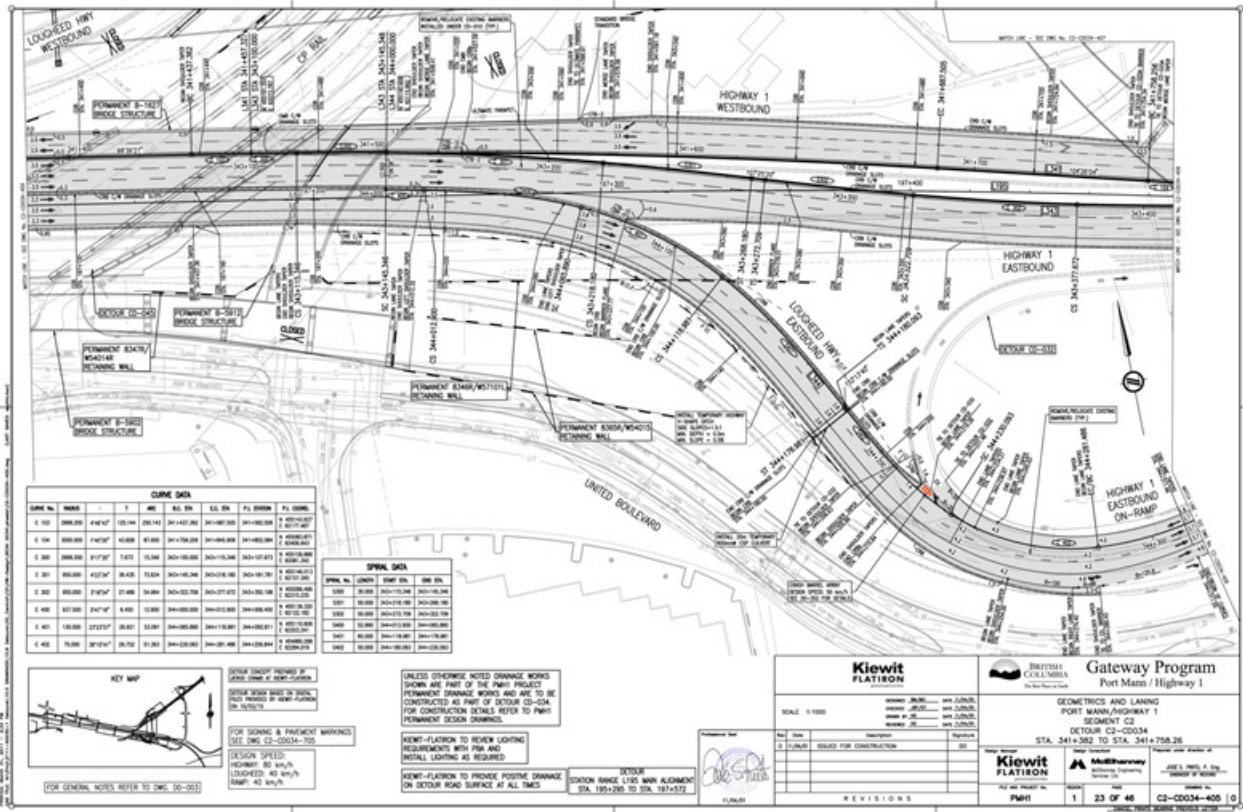
The Honourable Todd Stone, BC Minister of Transportation and Infrastructure, expressed his satisfaction with the project during the project opening in September of 2015 (a link to the full project opening speech can be found in [APPENDIX A](#)):

"[The PMH1 project] alleviated the single largest congestion bottleneck, not just across the Lower Mainland or British Columbia, but indeed, across Western Canada. I find it particularly exciting and ground-breaking that not only was this the largest transportation project in our history, but it was also a project that was done while the traffic continued to flow through the active construction site. It's one thing to build a project like the South Fraser Perimeter Road, which was a net new project, but it's quite something different to have a project of this size, with this volume of traffic moving through it while construction is taking place. [The project team did] everything that you could to minimize disruptions and delays for the travelling public and to ensure, above all else, that safety was always first and foremost in [their] minds."

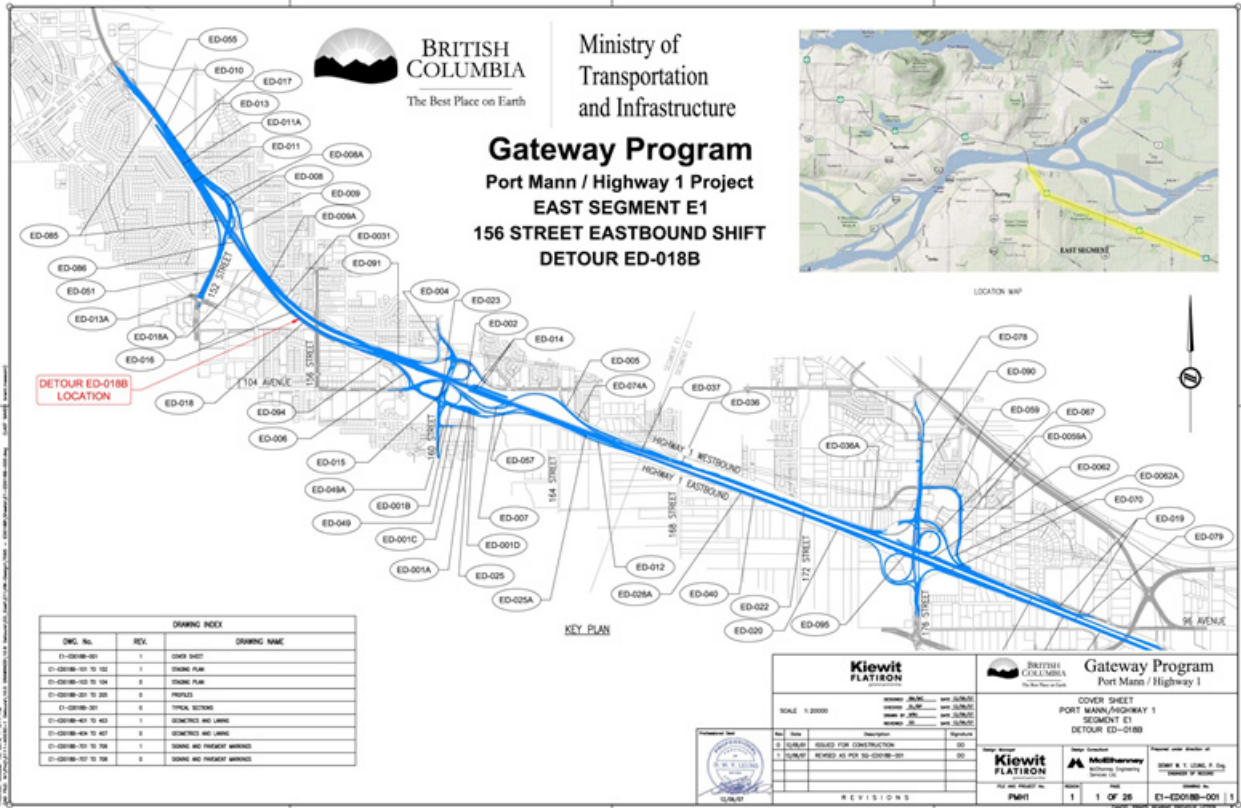
Appendix A – Project photos/diagrams



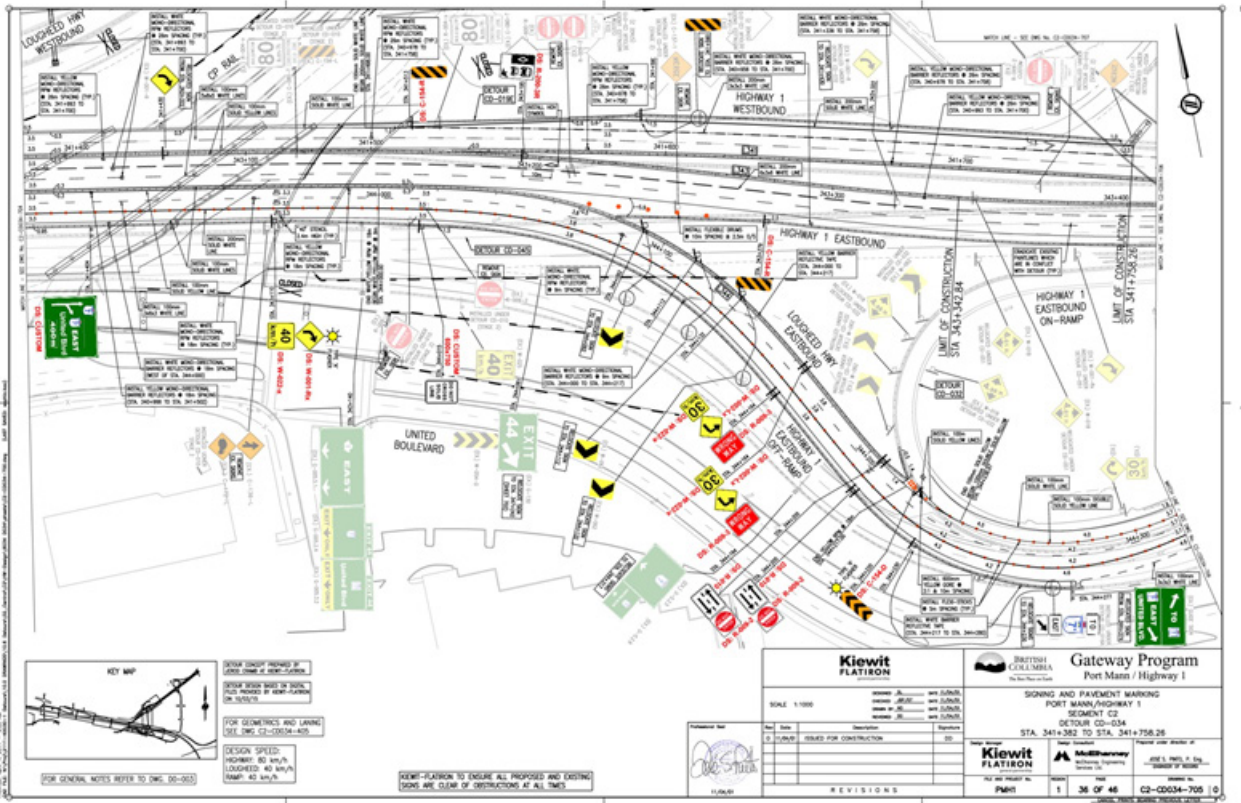
The PMH1 project extended over 37km, including 17 interchanges and a new 10-lane bridge through 5 municipalities.



Detour design drawings from the PMH1 project.



Detour design of the east segment of the project.



Detour design drawings including signage.

CBC player

RAW: Port Mann Bridge complete
CBC News Vancouver at 6

September 17, 2015 | 01:55

Todd Stone: "drivers saving time"

CBC Port Mann Bridge Completion video featuring Minister of Transportation and Infrastructure the Honourable Todd Stone. (www.cbc.ca/player/play/2675745091)



The project team signs the completed sign for the PMH1 project.

Job 1: Keeping traffic moving, safely

McElhanney Engineering Services broke new ground for their industry designing the constantly shifting detours needed during the Port Mann Bridge/Highway 1 reconstruction project

BY EVAN DUGGAN, SPECIAL TO THE SUN NOVEMBER 28, 2014



The Port Mann Bridge, as seen from north Surrey.

Photograph by: Ric Ernst, PNG

VANCOUVER — Engineers Dave Dulay and Jose Pinto both run their hands through their retreating hairlines and laugh when asked about the challenges of making sure traffic kept moving during the Port Mann Bridge/Highway 1 reconstruction project.

The pair were part of a team that won industry accolades for the design of the complex, myriad, constantly shifting detours the work required.

“I lost most of my hair when I was at the site,” said Dulay, the detour project manager for McElhanney Engineering Services. “He’s not the only one,” said Pinto, who worked as McElhanney’s engineer of record and handled the traffic flow design at the site.

As he relaxes in a restaurant in East Vancouver, Dulay recalls the project as one of the most complicated he’s worked on in his 24-year career — and that includes other big projects such as the Golden Ears Bridge, Sea to Sky Highway, and Cassiar Tunnel detour.

The \$3.3-billion Port Mann/Hwy. 1 project was the largest transportation infrastructure undertaking in B.C.’s history.

For its part, starting in 2009, McElhanney invested 80,000 person-hours into designing and monitoring the Port Mann detour network after their firm was selected by the province's Transportation Investment Corporation. The Kiewit/Flatiron General Partnership, the main construction contractor, was in charge of bringing McElhanney's designs to life.

If all of the detour roads built during the project were aligned into one lane, it would extend more than 700 kilometres, Dulay said, adding that they produced more than 300 individual detour plans over a 35-kilometre section of the corridor, based off of more than 5,000 individual drawings.

"We consider ourselves experts on this kind of geometric design and engineering," Dulay said. "We took this as a challenge."

Their highly scrutinized engineering work on the detour project recognized in 2012 as Project of the Year by the Greater Vancouver chapter of the Institute of Transportation Engineers.

And it armed Dulay, Pinto and others in their field with new techniques and insight on how to handle such mega-projects in the future.

"The number 1 thing is public safety," Dulay said. "You've got to keep the traffic moving at 80 (km/h) but you need the room for construction."

More than 120,000 vehicles travel the corridor every day and the requirement was to keep that traffic moving.

But there was another set of traffic, too, slow-moving construction machinery. It needed access to and from the narrow building and staging sites in the median, without mixing with the higher-speed non-construction traffic, Dulay said. "The contractors needed access for the trucks, or their own vehicles, or protection of their people going in and out."

There were no industry standards for such construction networks, so McElhanney essentially developed the standards as they went along, including a series of dedicated ramps leading to the building and staging sites.

While it was assumed that the complex network of detours would increase the number of accidents, figures suggest collision rates dropped over the duration of the detour project.

Another challenge turned into a new tool.

Pinto said they were painting pavement lines and then removing them, which was leaving traces on sections of the permanent road. "You don't want to open the highway with a ghosting effect," he said. So they introduced customized raised pavement markers that could be laid down and pulled up without leaving any trace.

They also had to protect motorists from their own technology, Pinto said.

"We were finding that a lot of drivers were on autopilot — they have GPS. They always look for the point where the GPS says, this is the exit point, rather than watching for it." So, they erected signs at either end of the project to warn people not rely on their GPS amid changing traffic patterns.

Communication was key, Pinto said, pointing to a major traffic pattern changes at several high-volume sections such as the Gaglardi Interchange loop, Cape Horn, and 152nd Street.

“People don’t really pay attention, so for the first few days when people arrived, there they were looking for a left turn that they usually took, not realizing that it [had become] a right turn,” he said. “A lot of confusion, a lot of backups for a few days, and we had to send out people to monitor the queues.”

Having young engineers at the site became a great asset and a good way to transfer knowledge for future mega-projects, Dulay said. “We had people of a younger generation there, who were coming out of university, in their 20s,” he said, “They were able to learn all this stuff, just being at the site. They would design something and then they will go see what it looks like.”

Edmund Lee of RF Binnie & Associates represented the province and TI Corp on the detour project, monitoring and assessing the design and construction process.

Lee, whose firm often bids in competition with McElhanney, said the communication protocol throughout the Port Mann detour is something that should be pulled into other big infrastructure projects.

He said traffic management was critical to the success of the project. “One of the key lessons was having a communications department,” he said.

“I think they did a pretty good job,” Lee said, highlighting the use of news releases, social media and a thorough project website to communicate closures, changes and alerts.

Lee said McElhanney’s team wasn’t afraid of going against conventions. At the 152nd Street interchange, the designers introduced a temporary left-hand ramp entrance to eliminate the need for a temporary overpass. The move saved millions of dollars and was designed without any existing information on similar strategies.

“It was unique,” Lee said. “Normally on modern freeways, general purpose traffic is always on the right,” he said. “You enter or exit on right.”

He said the designers made it clear why it had to be done and then did a good job directing motorists on the new traffic pattern. “It went relatively seamlessly.”

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**Port Mann/Hwy 1-Temporary Traffic Accommodation (TTA) Road Safety Audits (RSA):
A Testimony to Excellence by John Morrall; P.Eng. RSA Team Leader**

This is a brief overview of my experience as the Road Safety Auditor Team Leader for the Port Mann/Hwy 1 Project.

During the course of the 37 km project 2007-2015 there were over 300 major detours planned, and designed by McElhanney Engineering Services. Detour implementation was undertaken by the Kiewit/Flatiron General Partnership. Many detours were subject to a RSA at the design and pre-opening stage as well as an In-Service Operational Safety Review. A condition of the project was that all lanes had to be operational, often with a posted speed of 80 km/h except when workers were present on/near live lanes. Traffic volumes for the course of the project varied from 150,000-200,000 AADT with up to 15% heavy trucks at times. Safety issues and suggested mitigation measures were readily adopted by the TTA Team Leader Dave Dulay: EngL, Division Manager, Design-Build/P3, McElhanney Engineering Services Ltd. It is noted that some work zones were extremely complex in terms of traffic operations requiring hundreds of signs and traffic control devices such as Drums, delineators, flexi-sticks, PCMS and RPMs. I note that Dave and his Team at McElhanney accepted RSA mitigation suggestions with a short turnaround time and were proactive in suggesting enhancements. A testimony to the quality of TTA setups was that ICBC reported fewer MVC during the construction period than prior to work commencing. In summary considering the scope of the project in my opinion the safety record of the work zones at the same time accommodating traffic are a testimony to the quality of the planning, design and implementation of the TTA.

John Morrall has had a long association with the Transportation Association of Canada dating back to 1966. He is currently a member of the TAC Geometric Design Guide Standing Committee GDGSC; GDG Revisions and Additions Committee; and Road Safety Standing Committee (RSSC). He is a senior reviewer for the GDG update and was a member of the steering committee for the 1999 TAC GDG. He has been Chair of a number of TAC project committees and most recently “Best Practices for the Implementation of Shoulder and Centreline Rumble Strips” (2001) and “Synthesis of Practices for the Implementation of Centrelines Rumble Strips” (2005). For his service on these and other technical committees he has received four Chairman’s Awards and an Award for Service to TAC. In 1974 he received the Canadian Good Roads Association (now TAC) Presidents Medal for the Best Technical paper; and the same award again in 1985 from the Roads and Transportation Association of Canada (RTAC now TAC). In 1993 he received the C.W. Gilchrist Award for the Best Technical paper.

John Morrall
February 2, 2016

To whom it may concern:

The following is a testimonial on behalf of TI Corp (Owner) regarding the temporary traffic management services provided by McElhanney Engineering Services Ltd (MESL) on the Port Mann/Highway 1 (PMH1) Improvement Project.

One of the key success factors for completion of the PMH1 Project was the management of traffic through more than 5 years of active construction. From the Owner's perspective, maintaining worker and public safety go hand in hand with the important task of minimizing inconvenience to the motoring public. In addition, it was important to ensure the project was completed on time, to a high quality and meeting all required standards.

MESL provided the highest quality Engineering services through innovative temporary traffic management designs in order to accommodate complex construction staging, while respecting the importance of maintaining traffic operations and safety for both the motoring public and construction workers. MESL was well trusted by the Owner's and the Contractor's teams, bringing their knowledge and experience to effectively 'bridge' any gaps between constructability needs and traffic impacts. As MESL's Traffic Team Leader, Dave Dulay worked tirelessly with TI Corp and Contractor staff, and in so doing was able to foster a strong level of tri-party cooperation between the Owner, Contractor and Designer throughout the duration of project construction.

Due to its complex construction requirements and the critical need to maintain a traffic on an important Provincial Highway, the PMH1 Project included some of the most comprehensive traffic management specifications and requirements in the history of the BC Ministry of Transportation. As a testament to how effective traffic was managed during the multi-year construction period, TI Corp's Communications team received relatively few public complaints and reports of incidents in comparison to the vast scale of construction work under complex traffic conditions. This project success is strong reflection of the top quality Engineering services and traffic management expertise provided by MESL.

Regards,

Garry Dawson,
Senior Project Advisor
Vice-President/Technical Services
Transportation Investment Corporation