

Tank Hill Emergency Restoration

2023 Canadian Consulting Engineering Awards

Project summary

After severe storms hit in November 2021, AECOM provided emergency assistance to the British Columbia Ministry of Transportation and Infrastructure to reinstate the Trans-Canada Highway at the Tank Hill underpass where road and rail infrastructure was destroyed near the Village of Lytton.

AECOM quickly and safely mobilized a team that worked round-the-clock in the coldest weather to hit the region in years. What would typically take months was successfully completed in eight weeks and the road reopened on January 14, 2022.



Innovation

A storm that blew through south-western British Columbia on November 14 and 15, 2021 dropped a month's worth of rain in just 48 hours. These fierce rains created extreme flooding and mudslides that caused catastrophic destruction and road closures throughout the region.

Among the extensive damage was the complete washout of a 100-metre stretch on the Trans-Canada Highway at the Tank Hill underpass that destroyed existing road and Canadian Pacific (CP) rail infrastructure. A portion of the roadway had collapsed and much of the rail bridge fill east of the bridge had been completely washed away. The bridge however stayed in place on what remained of the exposed and battered piles.

Following the storm, on Saturday November 20, AECOM was called on to provide emergency assistance to help reinstate the washed-out grade of the highway and to design an interim road and at-grade railroad crossing to replace the unsalvageable grade separation structure. That day, AECOM began assembling its team and by the following morning design work had begun. By Monday, AECOM staff

were on site and in just a short time, a diverse AECOM team of more than 70 specialists from 10 different offices was hard at work on repairing this vital road link between Vancouver and the rest of Canada.

The following Tuesday morning, the team presented to the BC Ministry of Transportation and Infrastructure two design options, complete with plan and profile, ready for their review.

By this time AECOM staff were on-site supporting the reconstruction and working collaboratively with multiple contractors. Our team was focussed on developing an interim alignment to produce a functional highway and new at-grade railway crossing. Work included highway geometrics design, geotechnical engineering, hydrology analysis and drainage updates, traffic engineering including railway pre-emption timing for new highway signals, riverbank protection design, and engineering services during construction.

In 2022, the Tank Hill Emergency Restoration project was the recipient of an ACEC-BC Award of Excellence as well as the prestigious Lieutenant Governor's Award.



Project complexity

To meet the unusual demands of this project, AECOM mobilized a team of specialists and senior staff from across western Canada. This talented team had the specific skills needed to respond to on-site issues as they occurred to reinstate the corridor as quickly and as safely as possible.

As prime consultant, we coordinated a team of seven subconsultants as the project evolved from emergency response to design and then to construction. While work progressed, project challenges continued to emerge including complex drainage and hydrology requirements, as well as the need to manage surrounding grade instabilities during construction. Access to the Tank Hill site was also compromised by other nearby washouts, creating an additional complication for the AECOM to contend with.

Streamlined processes and emergency response guidelines were implemented to facilitate immediate review and resolution of issues as they were identified. Staff worked on-site in 24-hour shifts, seven days per week through rain and snow, amid the coldest weather conditions to hit British Columbia in many years. Work that would have typically taken several months was executed in just eight weeks, including over the Christmas break.

Hydrotechnical and climate specialists were brought in from Quebec and Manitoba to support our staff in British Columbia. Our team also included project managers, field staff, geotechnical and rock mechanics, road engineers, rail bridge engineers and other rail specialists from the local region as well as from Alberta, Saskatchewan, and Quebec.

Social and economic benefits

With the complete destruction of the roadway and railway infrastructure on the Trans-Canada Highway at the Tank Hill underpass, local travel in neighbouring communities and the movement of goods and services in the area became extremely challenging, if

not impossible. Quickly reinstating this portion of the highway and railroad crossing were critical to the local economy and to the well-being of its residents and workers.

The Tank Hill washout was only one of many that sliced through the Trans-Canada Highway, effectively isolating some local communities from normal economic and emergency services at the larger local hub of Kamloops BC. These same local communities had been stricken by wildfires only months earlier – the Town of Lytton was virtually wiped out by wildfire in 2021 and suffered again in the of summer 2022.

AECOM's swift and effective reaction to the situation, and its ability to quickly assemble and mobilize a team of specialists with the required expertise enabled the rapid response that was needed to get the emergency road and railway repairs underway and promptly restore connectivity between communities. With its depth of resources and broad service offering, AECOM's cross-country staff worked in round-the-clock shifts until construction was underway.

Environmental benefits

As part of AECOM's design, the team incorporated sustainability and climate resilience elements to avoid potential issues or recurrence of similar devastation in future storms and other extreme weather events. The recent forest fires and floods in this area had changed the canyon's existing hydraulic flows and capacities which directly impacted the run-off at Tank Hill. Enhancements were made to expand the culvert and hydraulic emergency capacity to better manage these new predicted flows.

The team also added a catchment system to prevent debris and other material from flowing down the mountain and blocking the new and existing culverts. This new catchment was shotcreted to prevent rocks and trees from impeding water flow and avoid any build up that could potentially cause another wash out of the roadway and railway tracks. AECOM's team recommended a water level monitoring system for this catchment basin, which was implemented by CP Rail under a separate contract.

Meeting client needs

AECOM's ability to quickly assemble the right team enabled an immediate response to the catastrophic destruction caused by the storm. The team worked diligently around the clock to complete in just eight weeks work that would have typically taken months.

As previously mentioned, AECOM's work on the Tank Hill Emergency Restoration project was the recipient of an ACEC-BC Award of Excellence as well as the prestigious Lieutenant Governor's Award, further demonstrating the merits of this project and the quality work delivered to our clients.

This portion of the Trans-Canada Highway opened on January 14 and in an accompanying news release upon the reopening, Rob Fleming, Minister of Transportation and Infrastructure said:

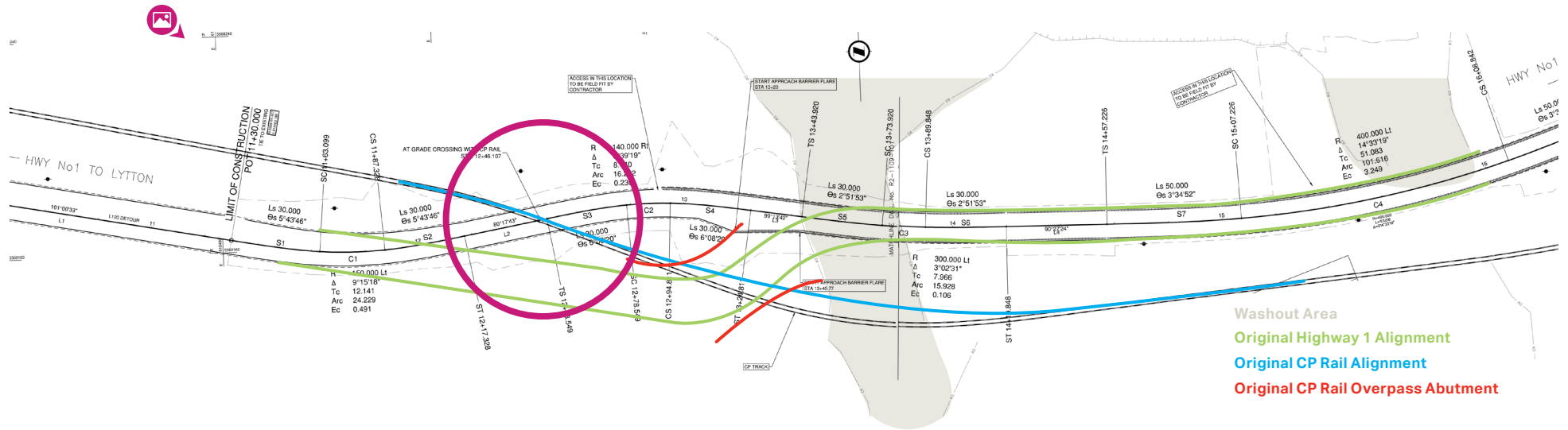
"We all owe a huge debt of gratitude to all of the crews and staff who have put in long hours to make the repairs necessary to reopen Highway 1 through the Fraser Canyon.

The construction and engineering accomplishments to get people and goods moving again after the highway sustained such heavy damage are nothing short of remarkable."



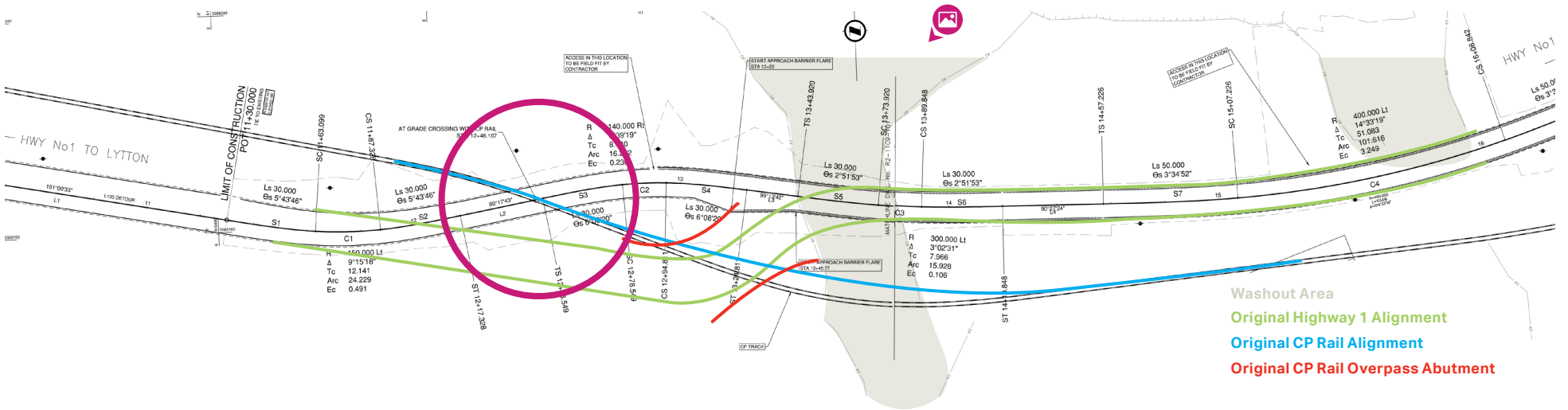
Tank Hill Emergency Restoration

Looking eastward before and after



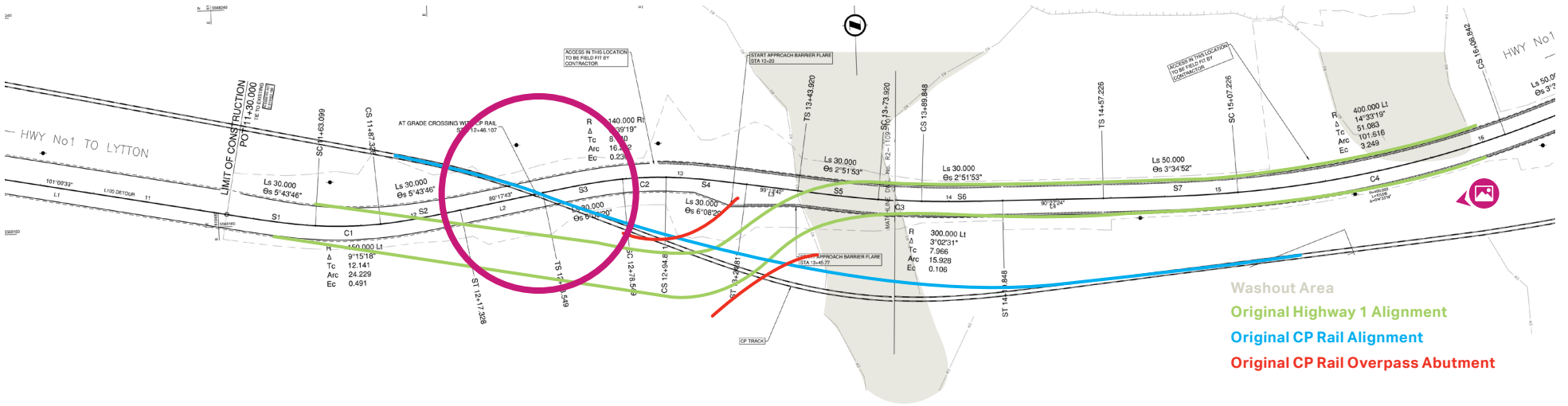
Tank Hill Emergency Restoration

Contrast of washed out and remediated areas



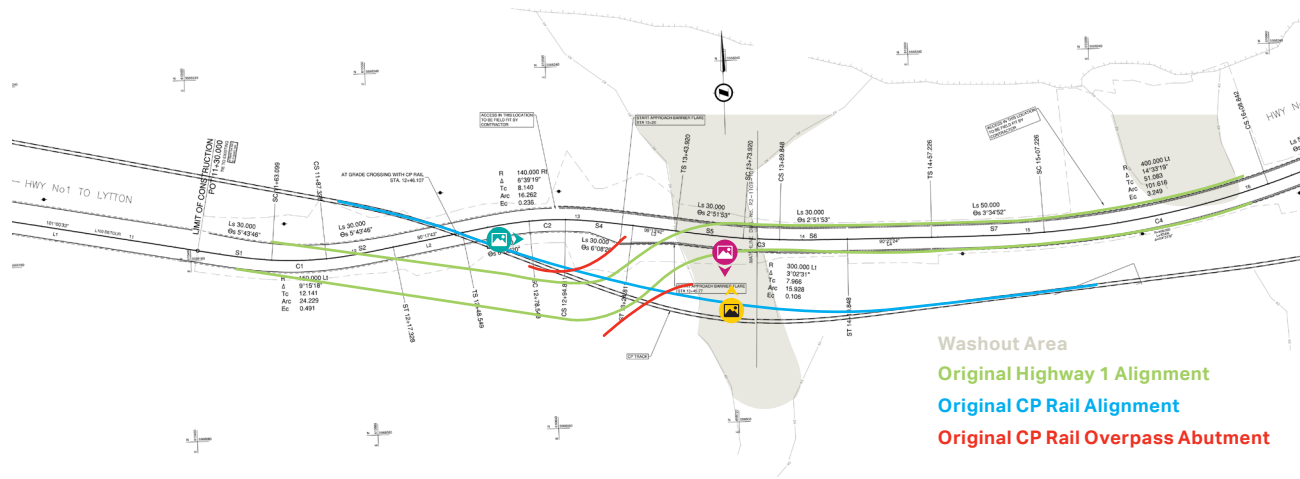
Tank Hill Emergency Restoration

Rapid reconstruction



Tank Hill Emergency Restoration

24/7 and all season work



Work continued 24 hours per day during harsh winter weather to keep production moving.

Road paving, which seldom ever occurs in the winter took place on January 10-12.



Nov 14-15/21

A major storm dropped a month's worth of rain in just 48 hours, creating extreme flooding and mudslides that caused catastrophic destruction and road closures throughout the region. Among the extensive damage was the complete wash out of a 100-metre stretch on the Trans-Canada Highway at the Tank Hill underpass that destroyed existing road and Canadian Pacific rail infrastructure.



Nov 20/21

AECOM is called upon to provide emergency assistance to help reinstate the washed-out grade of the highway and to design an interim road and at-grade railroad crossing to replace the unsalvageable structure.



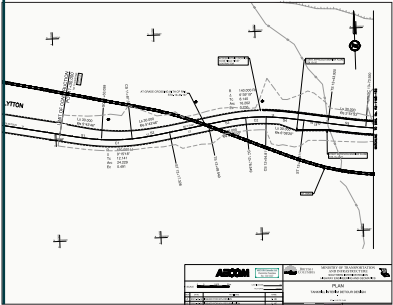
Nov 22/21

AECOM staff are on site. A diverse team of more than 70 specialists from 10 different offices was hard at work on repairing this vital road link between Vancouver and the rest of Canada.



Nov 23/21

The AECOM team attends its first meeting with the BC Ministry of Transportation and Infrastructure with two design options ready for their review.



Nov 24/21

AECOM is on-site in 24-hour shifts, seven days per week through rain and snow, amid the coldest weather conditions to hit British Columbia in many years.



The team is working collaboratively with multiple contractors and stays focussed on developing an interim alignment to produce a functional highway and new at-grade railway crossing.

Work progresses, project challenges continue to emerge — complex drainage and hydrology requirements, and surrounding grade instabilities create difficult conditions.

Jan 14 /22

The Trans-Canada Highway successfully opens.



Work that would have typically taken several months was executed in just eight weeks.

The Town of Lytton now has more direct access to the City of Kamloops and other nearby communities.

“We all owe a huge debt of gratitude to all of the crews and staff who have put in long hours to make the repairs necessary to reopen Highway 1 through the Fraser Canyon. The construction and engineering accomplishments to get people and goods moving again after the highway sustained such heavy damage are nothing short of remarkable.”

Rob Fleming,
Minister of Transportation and Infrastructure