About the TTN Analysis Study

The Transportation Trade Network (TTN) Initiative is a province-wide undertaking focused on identifying and addressing infrastructure issues and gaps along key road and rail trade corridors. These corridors enable the movement of goods through British Columbia’s primary marine terminals in Vancouver and Prince Rupert. The goal of this initiative is to ensure an efficient and effective transportation trade network in British Columbia that supports the province’s critical role in international trade, especially as the demand for various commodities shipped through the province is anticipated to grow in the coming years.

The first step of the TTN Initiative was the Transportation Trade Network Analysis Study which was led by the Ministry of Transportation and Infrastructure (MoTI). The TTN Analysis Study employed a systematic process to identify issues and develop, refine, and evaluate a series of infrastructure improvement options designed to maintain the competitiveness of the province’s road and rail-based trade corridors.

The objectives that guided the TTN Analysis Study were:
- Improving the capacity, reliability, efficiency, safety, and connectivity of British Columbia’s transportation trade network;
- Addressing key issues in the network as well as for communities impacted by trade growth (including community liveability and environmental impacts);
- Working collaboratively to plan a strong economic future for British Columbia and Canada.

The geographic scope of the TTN Analysis Study encompasses the Province of British Columbia except the Lower Mainland, Vancouver Island, and Haida Gwaii. The study area was organized into two key trade corridors as depicted graphically on the next page:
- The Northern Corridor, which runs east-west (and north-south on ancillary routes) across northern British Columbia to the Port of Prince Rupert. This port is connected to the rest of Canada by a Class I railway as well as the provincial highway system; and
- The Southern Corridor, which runs east-west (and north-south on ancillary routes) across southern British Columbia to the Port of Vancouver. This port is connected to the rest of Canada by two Class I railways as well as the provincial highway system. The Metro Vancouver area was not part of the study scope, as that area was the subject of previous planning work.

The TTN Analysis Study provides a basis to support the planning, partnering, funding, and development of potential transportation programs and projects as part of future steps. Externally relevant drivers, including funding opportunities provided through the Transport Canada National Trade Corridors Fund, were therefore also considered in the study process. This document summarizes the TTN Analysis Study findings which will enable opportunities for collaboration for study partners to address some of the many issues identified along the key trade corridor within the province. Following the completion of the TTN Analysis Study, it is anticipated that study partners will work together to prioritize and further develop critical improvements in consideration of the complete picture of infrastructure needs for the overall transportation trade network.

The TTN Analysis Study also supports the province’s commitments to build a strong, sustainable, innovative economy that works for everyone, create well-paying jobs in every corner of the province, implementing true, lasting reconciliation with Indigenous peoples in British Columbia, and reducing pollution and protecting our environment.
The Study Process

The TTN Initiative is envisioned as a three step process: the TTN Analysis Study, Partnership Opportunities, and Project / Program Implementation. The TTN Analysis Study, which represents the first step of the TTN Initiative, was conducted between the fall of 2016 and the winter of 2018. The subsequent steps of the TTN Initiative will build upon the findings of the TTN Analysis Study and will continue from 2019 onward.

A graphical representation of the TTN Initiative, shown on the following page, briefly describes the multiple phases forming the TTN Analysis Study process as well as the proposed activities comprising the future Partnership Opportunities and Project / Program Implementation steps.
The Trade Traffic Volume Forecast Phase involved the validation and reconciliation of ten year growth forecasts for twelve major commodities that move through the Port of Vancouver and the Port of Prince Rupert to form a base case freight volume forecast. Development of a high and low growth forecast were also conducted to frame the potential growth in commodities over the next ten years.

The Issue Identification Phase involved the identification of deficiencies and issues along the major road and rail corridors throughout the province. The identification process was based on both technical analysis, input from key stakeholders, and findings from previous studies. The issues, subsequently validated and screened for significance to international trade, were then subjected to a prioritization process to identify a subset of issue locations to carry forward for option development.

The Option Development Phase consisted of generating mitigation options for each of the identified issue locations. The mitigation options were then refined based on feedback obtained through a wide-ranging engagement process and further screened as to whether they would be retained for further evaluation.

The Option Evaluation Phase involved a comprehensive multiple account evaluation of the mitigation options at each issue location that were retained through the screening process. The evaluations were refined based on feedback obtained through an additional round of engagement and one or more of the evaluated options were identified for further development.

The Reporting Phase involved the preparation of this document to summarize the entire TTN Analysis Study.
Engagement

Engagement with stakeholders and Indigenous groups was a key element of the TTN Analysis Study. An overview of the process and extent of the engagement with these groups is provided below.

STAKEHOLDER ENGAGEMENT

The TTN Analysis Study sought input from a broad range of stakeholders. To facilitate input and collaboration, a stakeholder engagement approach was developed to identify which stakeholders were best-positioned to provide certain types of input at each phase of the study. MoTI Regional and District offices, the Vancouver Fraser Port Authority, the Prince Rupert Port Authority, CN, CP, the Province of Alberta, the Province of Saskatchewan, Transport Canada, and fourteen municipal and regional governments were engaged as stakeholders at varying levels of participation and based on varying levels of interest throughout the phases of the TTN Analysis Study as described in the subsequent sections.

Key study partners were engaged through all phases, at a strategic and technical level, including representatives from the two port authorities, the two rail companies, and Transport Canada. Transport Canada and the Vancouver Fraser Port Authority in particular were study funding partners.

As part of the trade traffic volume forecasting phase, port authority, railway and federal stakeholders contributed to scenario definitions, provided data, and commented on the validity of the forecasts. Both formal and informal meetings and discussions were held to gain input and feedback and reach a consensus on three trade traffic volume forecast scenarios to support the issue identification phase.

During the issue identification phase, key study partners provided input on the issues identified, highlighted other issues and assisted with the prioritization for option development. Other stakeholders besides the key study partners were also involved to review and validate the list of locations prioritized for option development. Some municipal governments were involved at the issue identification stage through their capacity as a road authority in high trade impact areas.

In the option development and evaluation phases, stakeholder engagement was conducted to review options and obtain feedback for further refinement. Port authorities, railways and municipalities were engaged when their interests and responsibilities were relevant to the location. The received feedback, combined with the input received through the Indigenous engagement process, was used to both update the options as well as the accompanying technical analysis. In the final round of engagement, stakeholders were asked to provide comments on the refined options as well as the preliminary option evaluation results as input into the final option evaluation process.

INDIGENOUS ENGAGEMENT

The Ministry study team and consultants initiated Indigenous engagement in the options development phase by issuing a letter to Indigenous groups whose traditional territory overlaps with at least one identified issue location. Indigenous groups were invited to meet to receive more information on the study and provide input on issue locations, conceptual options, safety considerations, and other considerations as they desired. A total of 90 Indigenous groups were contacted about the study and many decided to participate through a conference call, requesting written materials, providing written comments, providing study input in an initial meeting, and/or providing input in a more detailed follow-up meeting. Out of the 90 Indigenous groups initially contacted, 65 Indigenous groups chose to provide input in person, by phone or in the form of written materials. Indigenous engagement on options spanned options development and evaluation.

Through increased partnerships and collaboration with Indigenous communities, the Ministry is committed to creating true and lasting reconciliation resulting in strengthened and meaningful relationships between the Province of British Columbia and First Nations' governments. The Ministry will continue to engage with Indigenous groups on potential concerns and opportunities. As the Ministry moves into the next phases of the TTN Initiative, there will be opportunities to further develop the potential projects in consideration of Indigenous input, and work with each Indigenous group on their requested level and preferred process for engagement.
AN ONGOING PROCESS

As extensive as the engagement process was, there are many steps between the TTN Analysis Study and potential project implementation. Public engagement and Indigenous consultation were not part of the scope of the Analysis Study, and therefore the input received to date cannot be interpreted as approval or disapproval of any particular mitigation option. Considerations for further engagement and initiation of consultation activities are identified in the next steps.

The scope of engagement with Indigenous groups is highlighted in Figure 2, with each marker showing the location of a group that was engaged through either in-person meetings as well as by phone or in the form of written materials. Although the marker denotes the location of the administrative office of each engaged group, groups were in fact engaged for all mitigation options identified as being within their traditional territories. In some cases, engagement was undertaken with tribal councils representing multiple different Indigenous groups.

Figure 2: Scope of Engagement with Indigenous Groups
Growth in International Trade

Demand for international trade and the shipment of various commodities through the Port of Prince Rupert and the Port of Vancouver are anticipated to exhibit strong growth over the next decade. The TTN Analysis Study developed a 10-year cumulative scenario-based trade traffic volume forecast. In conjunction with background traffic, this trade traffic volume forecast represented a fundamental element of the technical analysis underlying the issues identification phase. The forecast approach is shown in Figure 3, which outlines how the study team worked with the study partners to understand cumulative growth, current trends and key economic drivers that would lead to growth in the demand for commodity movements through British Columbia ports.

If improvements are not implemented in a timely and strategic manner across the western trade corridors, including the road and rail networks in British Columbia, there could be significant foregone economic opportunity. Forecasted growth in commodities may not materialize either though delayed production or diversion along currently less competitive transportation trade networks such as through one or more United States west coast ports.

The resultant aggregate anticipated growth in demand for commodity movements through the two ports is shown in Figure 4. The growth in commodities handled by the Port of Vancouver and the Port of Prince Rupert were forecasted to increase by approximately 34% and 95% respectively over the period between 2015 and 2026, with corresponding and significant increases on the railway and highway networks in both the Northern and Southern Corridor.
Issue Identification

A systematic process, summarized in the simplified graphic in Figure 5, was undertaken to identify transportation-related issues along the road and rail trade corridors in British Columbia. The issues identified as part of the TTN Analysis Study encompassed a wide range of different concerns and constraints, and therefore for the purposes of the TTN Analysis Study, nine specific issue types of transportation-related issues were considered: highway capacity; traffic operations such as excessive intersection delays; road safety; highway reliability; oversize / overweight vehicle constraints; road / rail interface issues which affect roadway operations; road / rail interface issues which affect rail operations; road / rail interface issues related to safety; and other community liveability issues such as noise impacts and severance.

As a first step in the process, issues were initially identified through one of three sources:

- **Technical Analysis**: This component involved the assessment of the major railway and provincial highway networks, with the former focusing primarily on locations of road / rail interface (i.e. at-grade rail crossings). The technical analysis was supported by the truck and train volumes developed through the trade traffic volume forecasting exercise, as well as data relating to population, traffic volumes, collision history, highway closures, bridge clearances, and the Transport Canada Canadian Rail Operating Rules;

- **Stakeholder Engagement-Identified Issues**: This component encompassed the highway and railway network issues identified by study partners and other agencies, as well as select municipal and regional governments that act as road authorities within their respective jurisdictions; and

- **Reports and Studies**: This component involved a review of previously developed information and reports relating to the highway and railway corridors included in the scope of the TTN Analysis Study. Issues identified in the previous assessments, other than those that were specifically known to have already had a mitigation measure implemented, were incorporated as issues in the TTN Analysis Study.

The issue identification process identified over 800 issues throughout the rail and road based transportation networks within the province. This preliminary set of issues was subsequently screened down to only those issues that reflected the primary objective of the TTN Analysis Study; namely gateway-significant issues that related to road or rail based commodity movements through the two major west coast ports. The approximately 300 gateway-significant issues resulting from the screening process were then consolidated into issue locations that could feature multiple overlapping or adjacent related issues. A prioritization process was subsequently undertaken that considered several issue characteristics including type, severity, urgency, and magnitude of trade volumes as well as a comparative analysis to MoTI priorities. The initial prioritized issue location list included a total of 32 issue locations.

Through further engagement with the study partners and stakeholders, this initial list was further reduced as several issues were found to be addressed independently by other agencies or were deemed to not be of a pressing matter in the 10 year planning horizon of the TTN Analysis Study. Of the initial list, 20 select issue locations warranted mitigation option development under the TTN Analysis Study.
Determining the Mitigation Opportunities

At each of the 20 issue locations on the prioritized list, several activities were conducted in parallel to determine the appropriate mitigation measures or options. In some cases, previous or ongoing reports and studies that addressed some of the same issues identified in the TTN Analysis Study were referenced with respect to advancing applicable findings as potential mitigation options. Simultaneously, several other mitigation options were generated anew to address the remaining identified issues.

At each issue location, mitigation options were generated to address a specific issue, with each of these mitigation options representing alternatives to one another. However, as many issue locations involved more than one specific issue due to the issue consolidation step previously noted, other generated mitigation options may be complementary to one another. In these instances, more than one potential solution would eventually be identified at an issue location, although each addressing different underlying issues.

The preliminary set of mitigation options was reviewed through an engagement process with stakeholders (such as municipal and regional governments, port authorities, and railways) and Indigenous groups. As an outcome of the feedback received through this engagement process, several mitigation options were refined, several new mitigation options were developed, and some mitigation options removed from further consideration.

A mitigation option screening process was subsequently undertaken to reduce the set of potential mitigation options in order to manage the effort of the comprehensive and detailed option evaluation activity. The screening process considered the asset owners and potential beneficiaries, potential impacts, anticipated cost range based on high level design, and applicability in terms of addressing the stated issue(s). Typically, three to four mitigation options were shortlisted for further detailed evaluation.

The detailed option evaluation activity was undertaken using a multiple account evaluation framework applicable for transportation planning studies, with several criteria added to specifically reflect the multi-modal goods movement mandate of the TTN Analysis Study. The multiple account evaluation framework used to assess the mitigation options is summarized in Figure 6. Preliminary results from the option evaluation activity were reviewed through further engagement with stakeholders and Indigenous groups, resulting in several refinements to the shortlisted options and evaluation criteria scoring to address specific considerations. Considerations identified by Indigenous groups are both embedded in many of the criteria as well as specifically included in the Socio-Community Account. The option evaluation for each issue location was subsequently finalized with one or more mitigation options identified to be carried forward for further development.
As described previously, through the TTN Analysis Study process, a number of issue locations were identified and prioritized, several mitigation options were developed, and a detailed and comprehensive option evaluation process was undertaken. The outcome of these key study activities, with one or more mitigation options being identified for further development at each of the issue locations – is presented in the list overleaf and shown geographically in Figure 7. Where more than one issue was consolidated at a single issue location, multiple complementary mitigation options were identified for further development as reflected in the list.

In addition to the TTN Analysis Study mitigation options, a number of other similar opportunities and initiatives have been identified through engagement with the study partners and stakeholders. These other opportunities and initiatives, also shown in Figure 7, include proposed projects, ongoing studies, and future plans being advanced by other agencies that will also improve the efficiency and effectiveness of the transportation trade network in order to support the anticipated growth in commodities shipped through the two major ports of Prince Rupert and Vancouver.

Examples of these other initiatives and opportunities include the various rail network improvements under the Greater Vancouver Gateway (GVG) 2030 program in the Lower Mainland, the Port of Prince Rupert / CN Collaborative Rail Master Planning at the Zanardi Bridge, Highway 1 – Kamloops to Alberta Border four laning, Highway 16 – Vanderhoof to Telkwa passing lane improvements, and various rail fluidity initiatives under development by both CN and CP.
Further initiatives that are being advanced independent of the TTN Analysis Study and which directly address some of the initial priority issues identified as part of the TTN Analysis Study include the following examples:

- City of Chilliwack – a city led rail grade-separation study to identify the location and timing of a future overpass of the CN railway corridor.
- City of Quesnel – MoTI transportation planning study that identified several corridor improvements along Highway 97 in the downtown area to address safety and traffic operations concerns.
- City of Salmon Arm - Ross Street Underpass project and closure of the at-grade rail crossing at Marine Park Drive.

### NORTHERN CORRIDOR

1. **Prince Rupert Port Connector Road**
   - Truck-only road connection on the west side of Kaien Island to connect Fairview Container Terminal to Ridley Island Road.

2. **Port Edward North Pacific Cannery Pedestrian Overpass**
   - Pedestrian overpass to the north of the existing at-grade rail crossing to access the North Pacific Cannery.

3. **Highway 16 Train Detection and Warning System at Car Wash Rock**
   - Automated detection system and dynamic warning signage to alert motorists to oncoming train on a highway segment with a narrow cross-section.

4. **Terrace Kenney Street Overpass**
   - Overpass at Kenney Street at-grade rail crossing, and westward extension of Park Avenue to Kalum Lake Road.

5. **Smithers Scotia Street Overpass**
   - Overpass at Scotia Street, new road connections, pedestrian overpass at Railway Avenue, and closure of the existing Slack Road and Railway Avenue at-grade rail crossings.

6. **Prince George West Rail Approach Otway Road Realignment**
   - Realignment of Otway Road to south side of the railway corridor, and closure of the two Otway Road at-grade rail crossings and one private crossing.

7. **Terrace Highway 16 Commercial Vehicle Inspection Station Relocation**
   - Relocation of the commercial vehicle inspection station to a new site further east on Highway 16, and implementation of a weigh-in-motion system.

8. **Telkwa Alder Street - Birch Street Overpass**
   - Implementation of overpass across railway corridor and retention of the existing at-grade rail crossing at Coalmine Road.

9. **Vanderhoof Burrard Avenue Railway Crossing Information System**
   - Dynamic signage system to detect approaching trains and direct motorists to Recreation Avenue Overpass instead of Burrard Street at-grade rail crossing.

10. **Vanderhoof Burrard Avenue and Silversmith Avenue Whistle Cessation**
    - At-grade rail crossing and railway corridor safety upgrades in order to enable cessation of train whistling.

### SOUTHERN CORRIDOR

11. **Highway 1 No. 3 Road Westbound On-Ramp Extension**
    - Extension of the on-ramp to provide more room for vehicles to merge, and address road safety and reliability considerations.

12. **Highway 1 Horizontal Curve Delineation Upgrades**
    - Safety upgrades to address road safety and reliability considerations.

13. **Highway 1 Flood Hope Road Interchange Ramp Reconfiguration**
    - Realignment of the westbound on-ramp to provide more room for vehicles to merge, and address road safety and reliability considerations.

14. **Highway 1 Guide Signage Upgrades (Exit 170 and Exit 146)**
    - Signage to provide improved guidance to motorists, and address road safety and reliability considerations.

15. **Highway 5 Automated Highway Closure System**
    - Remotely activated lane control and gate system to close the highway in the event of an incident, and divert traffic to alternative routes.

16. **Kamloops Brocklehurst Neighbourhood Lethbridge Avenue Overpass**
    - Extension of Lethbridge Avenue and an overpass across the railway corridor to connect to Ord Road. Closure of the Singh Street and McLean Street at-grade rail crossings.

17. **Kamloops Brocklehurst Neighbourhood Ord Road Overpass**
    - Overpass to replace the Ord Road (east) at-grade rail crossing.

18. **Kamloops Rayleigh Neighbourhood Devick Road Underpass**
    - Road extension and underpass beneath the railway corridor and Highway 5 and closure of the Puett Ranch Road and Mattoch-McKeague at-grade rail crossings.

19. **Kamloops Mission Flats Road Overpass**
    - Overpass to replace Mission Flats Road at-grade rail crossing.

20. **Kamloops Downtown At-Grade Rail Crossings**
    - Mitigation option deferred at this location. To be addressed as part of a future study or municipal initiative.

21. **Kamloops Valleyview Neighbourhood River Road Crossing Closure**
    - Closure of the north leg of the Highway 1 / River Road intersection and adjacent at-grade rail crossing, as well as provision of new pedestrian underpass.

22. **Kamloops Valleyview Neighbourhood Highway 1 / Vicars Road Intersection Improvements**
    - Turn lane storage bay extensions and laning improvements to mitigate impacts of train movements at adjacent at-grade rail crossing.

23. **Ashcroft Highway 97C Underpass**
    - Underpass to replace Highway 97C at-grade rail crossing and closure of the Mesa Vista Court at-grade rail crossing.

24. **Highway 97 – Highway Profile Lowering at CN Hixon Rail Underpass**
    - Lowering of Highway 97 underneath bridge structure to provide additional vertical clearance for overweight cargo.

25. **Highway 97 Realignment and New Bellos Rail Underpass**
    - Four-laning of highway corridor on a new alignment to provide consistent design speed, passing opportunities, and increased vertical clearance for overweight cargo at the underpass structure.
Mitigation Opportunities

#1 - PRINCE RUPERT PORT CONNECTOR ROAD

Issue(s) Resolved: Growing volumes of container trucks travelling along Highway 16 through the centre of Prince Rupert, as these trucks move between the Fairview Container Terminal and the various logistics facilities accessed via Highway 16. Impacts related to road capacity, traffic operations, road safety, and other community liveability concerns result from these truck movements through town.

Option Description: This option is an independent initiative led by the Prince Rupert Port Authority and consists of a new approximately five kilometre two-lane roadway running south from the Fairview Container Terminal and connecting to Ridley Island Road just north of the Canadian Border Services Agency container examination facility. All container truck traffic travelling to and from the Fairview Container Terminal would be redirected from Highway 16 within downtown Prince Rupert to this new access route. The option would be compatible with track expansion adjacent to the existing Kaien siding.

Cost Range: $100 M - $145 M

Additional Mitigation Option Considerations: The Prince Rupert Port Authority has indicated their intention to proceed with the implementation of the connector road, which would remove container trucks from the centre of town, thereby addressing the identified issues. However, even without the presence of container trucks on Highway 16, there is still an opportunity to improve road safety along the highway corridor in the downtown area, particularly for pedestrians. Additionally, regardless of the connector road, implementation of the Wantage Road extension would leverage additional trade-supporting industrial land development opportunities within Prince Rupert.

#2 - PORT EDWARD NORTH PACIFIC CANNERY PEDESTRIAN OVERPASS

Issue(s) Resolved: The North Pacific Cannery museum is currently accessed by an at-grade rail crossing of the CN railway corridor. During train movements, visitor and employee access to and from the cannery is severed. Additionally, the presence of a public at-grade rail crossing creates the need for train whistling at this crossing.

Option Description: A pedestrian overpass would be implemented to the west of the existing crossing, in order to avoid creating visual impacts to the historic cannery structure. The northern approach to the overpass would tie into the existing parking lot, while the southern approach would tie into the existing cannery boardwalk located to the west of the museum. The overpass would provide an alternative route in and out of the cannery site during train movements.

Cost Range: $6 M - $16 M

Please note that these are preliminary cost estimates based on high level design. They should not be used for capital planning processes.
#3 - HIGHWAY 16 TRAIN DETECTION AND WARNING SYSTEM AT CAR WASH ROCK

**Issue(s) Resolved:** The Car Wash Rock area of Highway 16 features a narrow road cross-section, and minimal setbacks between the namesake rock face on one side of the highway and the CN railway corridor on the other side. There is a tendency for westbound vehicles to shy away from the rock wall face while eastbound vehicles shy away from passing trains. If vehicles (and trucks in particular) in both directions shy towards the centre of the road simultaneously, this can create an increased risk of collisions.

**Option Description:** This option would implement an electronic advisory system in the Car Wash Rock area that would alert motorists to approaching trains and encourage drivers to use additional caution when passing through the area due to the narrow road cross-section and lack of setback between the roadway and the adjacent CN railway corridor.

**Cost Range:** $0.7 M - $1.8 M

**Additional Mitigation Option Considerations:** Independent of the TTN Analysis Study, the MoTI is also implementing a remote detonation system for avalanche control at the nearby Mile 35 area. In the future, both the Car Wash Rock and Mile 35 areas along Highway 16 could potentially be subject to a more comprehensive series of initiatives to fully address safety and reliability considerations associated with the narrow roadway cross-section and winter weather conditions.

#4 – TERRACE KENNEY STREET OVERPASS

**Issue(s) Resolved:** Operational flexibility on the railway corridor through Terrace has the potential to be encumbered by the two public at-grade rail crossings at Kenney Street and Frank Street. During train events, the two public at-grade rail crossings can create impacts in terms of traffic delays and queuing, community severance, and road safety.

**Option Description:** This option would provide an overpass across the CN railway corridor as well as Highway 16. The northern approach would tie into Lazelle Avenue, therefore Greig Avenue would no longer connect to Kenney Street and would be realigned through a vacant lot to connect to Highway 16 as an unsignalized T-intersection. To support east-west connectivity, the western end of Park Avenue would be extended to the west to tie into Kalum Lake Road.

**Cost Range:** $29 M - $59 M

**Additional Mitigation Option Considerations:** It is acknowledged that the City of Terrace Transportation Master Plan identifies an overpass at the Braun Street / Kalum Lake Road corridor as potentially providing a greater increase in north-south community connectivity across the railway corridor, although this finding assumes that the Kenney Street at-grade rail crossing would remain open even if the overpass at Braun Street is implemented. Additional collaboration with the City of Terrace to refine the mitigation option is therefore likely if a grade-separation solution is to be considered for further development.
#5 – SMITHERS SCOTIA STREET OVERPASS

**Issue(s) Resolved:** The two at-grade rail crossings along the CN railway corridor at Railway Avenue and Slack Road on the west approach to the Smithers Rail Yard can create impacts in relation to traffic delays and community severance, train whistling noise, and have the potential to encumber the flexibility of railway operations.

**Option Description:** Scotia Street would be extended westward by approximately one kilometre to connect to Muir Road, including an overpass across the CN railway corridor. Muir Road would also be extended by approximately one kilometre to connect to Zobnick Road. A walking and cycling overpass would be provided in the vicinity of the existing Railway Avenue at-grade rail crossing, and both the Railway Avenue at-grade rail crossing as well as the Slack Road at-grade rail crossing would be closed.

**Cost Range:** $22 M - $43 M

**Additional Mitigation Option Considerations:** Stakeholder feedback noted an interest in providing a road connection from the Slack Road area to the Lake Kathlyn area. Such a connection could provide residents of the Lake Kathlyn area with a more reliable route to Smithers (via the Scotia Street Overpass), and also eliminate the need for residents in the Slack Road area travelling to / from the west to double-back to the proposed Scotia Street Overpass. It is anticipated that this opportunity may be explored further in the future, either as part of the mitigation option or later, after implementation.

Please note that these are preliminary cost estimates based on high level design. They should not be used for capital planning processes.
#5 – SMITHERS TATLOW ROAD CONNECTOR

**Issue(s) Resolved:** The at-grade rail crossing of the CN railway corridor at Tatlow Road on the east approach to the Smithers Rail Yard can create impacts in relation to community severance, and has the potential to encumber the flexibility of railway operations.

**Option Description:** This option would provide an approximately two kilometre roadway that would connect Tatlow Road to Whistler Road. The new roadway would follow an alignment best suited to the existing topography in an approximately northwest-southeast alignment. With the connector in place, traffic will be able to bypass the Tatlow Road at-grade rail crossing by rerouting to Whistler Road and use the Dahlie Road overpass to cross the CN railway corridor, thereby enabling the closure of the Tatlow Road at-grade rail crossing.

**Cost Range:** $6 M - $14 M

Please note that these are preliminary cost estimates based on high level design. They should not be used for capital planning processes.
#6 – PRINCE GEORGE WEST RAIL APPROACH

MIWORTH ROAD OVERPASS

**Issue(s) Resolved:** Operational flexibility on the west approach to the CN Prince George West Rail Yard has the potential to be encumbered by five public at-grade rail crossings along Miworth Road (two crossings), Otway Road (two crossings), and Wilson Park (one crossing). During train events, the northern at-grade rail crossing along Miworth Road to the west of Prince George can also sever access for both residents and emergency response vehicles for trips to and from Prince George.

**Option Description:** The northern Miworth Road at-grade rail crossing would be grade-separated from the CN railway corridor via an overpass that follows the existing roadway alignment. The cross-section of the overpass would consist of two lanes with shoulders and a sidewalk connection. The southern Miworth Road at-grade rail crossing would also be closed.

**Cost Range:** $8 M - $19 M

#6 – PRINCE GEORGE WEST RAIL APPROACH

OTWAY ROAD REALIGNMENT

**Issue(s) Resolved:** Operational flexibility on the west approach to the CN Prince George West Rail Yard has the potential to be encumbered by five public at-grade rail crossings along Miworth Road (two crossings), Otway Road (two crossings), and Wilson Park (one crossing). During train events, the two public at-grade rail crossings of Otway Road, as well as an adjacent private crossing, can also sever access for residents, recreational trips to the Caledonia Nordic Ski Club, and emergency response vehicles.

**Option Description:** Otway Road would be realigned such that the entirety of the roadway would be located on the south side of the CN railway corridor, while avoiding interference with the ski and hiking trails of the Caledonia Nordic Ski Club. The roadway cross-section would include a boulevard trail on the south side of the roadway. The segment of Otway Road to the north of the railway corridor would be decommissioned and the two Otway Road at-grade rail crossings, as well as the private crossing to the east, would be closed.

**Cost Range:** $16 M - $39 M

**Additional Mitigation Option Considerations:** This mitigation option assumes that it is feasible to acquire all properties on the north side of the railway corridor, and therefore eliminate the need for the at-grade rail crossings to access this area. However, if property acquisition is not feasible, then an overpass structure may need to be constructed instead to maintain access to these properties.

Please note that these are preliminary cost estimates based on high level design. They should not be used for capital planning processes.
#6 – PRINCE GEORGE WEST RAIL APPROACH
WILSON PARK OVERPASS

Issue(s) Resolved: Operational flexibility on the west approach to the CN Prince George West Rail Yard has the potential to be encumbered by five public at-grade rail crossings along Miworth Road (two crossings), Otway Road (two crossings), and Wilson Park (one crossing). During train events, the at-grade rail crossing of the CN railway corridor at the Wilson Park access in Prince George can sever access to the park for both recreational users as well as municipal service vehicles monitoring the city’s water wells.

Option Description: The Wilson Park at-grade rail crossing would be closed, and a new pedestrian, cyclist and service vehicle overpass would be implemented to the southeast of the Wilson Park access at-grade rail crossing. To facilitate continued regional access to the park, a new parking lot accessed from Ospika Boulevard would be constructed adjacent to the overpass structure.

Cost Range: $7 M - $16 M

Please note that these are preliminary cost estimates based on high level design. They should not be used for capital planning processes.


#7 – TERRACE HIGHWAY 16 COMMERCIAL VEHICLE INSPECTION STATION

**Issue(s) Resolved:** The existing Commercial Vehicle Inspection Station in Terrace has been in operation since 1964. The existing station is located immediately adjacent to the intersection of Highway 16 and Highway 37. The intersection has reached its operational capacity and is being upgraded to a multi-lane roundabout. The accesses to the Commercial Vehicle Inspection Station are too close to the intersection to operate safely once the proposed roundabout is completed. Therefore, the Commercial Vehicle Inspection Station will need to be closed and relocated.

**Option Description:** A new Commercial Vehicle Inspection Station would be implemented approximately three kilometres to the east of the existing station, at the intersection of Highway 16 with Novotny Road. The design concept incorporates best practice for Inspection Station design in North America and utilizes advanced technologies such as Weigh-in-Motion and Tire Anomaly & Classification systems to maximize the efficiency of commercial vehicle inspection and regulation compliance monitoring.

**Cost Range:** $16 M - $22 M

#8 – TELKWA ALDER STREET - BIRCH STREET OVERPASS

**Option Description:** This option involves the construction of a new rail overpass located to the southeast of the existing Coalmine Road at-grade rail crossing. In this option, Coalmine Road between the Bulkley River and the CN railway corridor would be realigned to follow Alder Street to the east. The realigned roadway would rise until reaching sufficient height to cross over the rail corridor and connect to Birch Street via a T-intersection. The approach on the southern side of the railway corridor would be shorter due to the existing grade differences between the corridor and Birch Street. The road cross-section on both Birch Street and Alder Street would be upgraded to include standard lane widths and shoulders. The Coalmine Road at-grade rail crossing would remain open, making the overpass an alternative route for passenger vehicles, trucks, and emergency services for cases when train crossing events block the at-grade rail crossing.

**Additional Mitigation Option Considerations:** The mitigation option being considered for further development needs to include a related condition study of the existing Coalmine Road Bridge across the Bulkley River. Through subsequent investigations where it may be determined that the river bridge has an extended lifespan, then proceeding with the above mitigation option would likely remain the preferred choice and at a much later point in time, the bridge over the Bulkley River would be replaced with a new two-lane span. However, if it is determined that the bridge over the Bulkley River must be replaced in the shorter-term, then a combined bridge structure that spans both the river and the railway corridor in the vicinity of the existing at-grade rail crossing should be pursued as the mitigation option being considered for further development.

**Cost Range:** $10 M - $23 M

Please note that these are preliminary cost estimates based on high level design. They should not be used for capital planning processes.
**#9 – VANDERHOOF BURRARD AVENUE RAILWAY CROSSING INFORMATION SYSTEM**

**Issue(s) Resolved:** Train movements through the Burrard Avenue and Silversmith Avenue at-grade rail crossings of the CN railway corridor within Vanderhoof can create delays and queue formation, particularly at the Burrard Avenue crossing. The Recreation Avenue Overpass maintains connectivity across the railway corridor during train occupancy events, however the Burrard Avenue at-grade rail crossing features much higher traffic volumes due to its more central location within Vanderhoof.

**Option Description:** This option is intended to minimize traffic delays at the Burrard Avenue at-grade rail crossing when a train crosses at this location. A Railway Crossing Information System (RCIS) would advise road users of approaching trains and would direct them to use the existing overpass on Recreation Avenue instead. A total of six dynamic message signs would be installed to alert drivers intending to use Burrard Avenue to instead use the Recreation Avenue Overpass to avoid train-related delays at the Burrard Street at-grade rail crossing. No signage is proposed for the Silversmith Avenue at-grade rail crossing, as traffic volumes at this location are lower and the detour distance to the existing overpass is greater, resulting in limited benefits at this crossing compared to the Burrard Avenue at-grade rail crossing.

**Cost Range:** $2.2 M - $5.3 M

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**#9 – VANDERHOOF BURRARD AVENUE AND SILVERSMITH AVENUE WHISTLE CESSATION**

**Issue(s) Resolved:** All trains passing through the Burrard Avenue and Silversmith Avenue at-grade rail crossings are required to whistle in advance of the crossings. As these two at-grade rail crossings are located adjacent to the main residential and commercial area of Vanderhoof, train whistling creates a noise impact for residents and businesses in the community.

**Option Description:** This option would implement whistle cessation agreements at the Burrard Avenue and Silversmith Avenue at-grade rail crossings. An assessment of the two at-grade rail crossings would be conducted to confirm the scope of work required to enable whistle cessation. A corridor-wide assessment of safety considerations associated with trespassing may also be required, as there is evidence of a pedestrian shortcut across the railway tracks from Church Avenue to Fraser Avenue, located one block west of Burrard Avenue.

**Cost Range:** $0.3 M - $0.7 M

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Please note that these are preliminary cost estimates based on high level design. They should not be used for capital planning processes.
#10 – HIGHWAY 16 PROFILE LOWERING AT HIGHWAY 5 TÊTE JAUNE CACHE BRIDGE

**Issue(s) Resolved:** At the junction of Highway 16 and Highway 5, the Tête Jaune Cache Bridge structure on Highway 5 that spans both the Fraser River and Highway 16 has a vertical clearance of 4.92 metres. This vertical clearance affects eastbound vehicles on Highway 16 and vehicles travelling northbound on Highway 5 to westbound on Highway 16. As a minimum clearance of 5.0 metres is required for overheight vehicle permit pre-approvals, the limited height clearance impacts the movement of overheight cargo, particularly for cargo being transported east along Highway 16 from Prince Rupert to Alberta.

**Option Description:** The eastbound lane of Highway 16 would be lowered by 0.45 metres to provide a clearance of 5.35 metres underneath the Highway 5 Tête Jaune Cache Bridge structure. To accommodate the change in road elevation, approximately 60 metres of highway would require reprofiling. An earthwork berm would be provided on the south side of Highway 16 where the road is being lowered in order to mitigate the incremental risk of flooding from the Fraser River. In addition, to reduce the likelihood of northbound vehicles on Highway 5 impacting the rock wall in off-road left collisions, the existing roadside barrier for the westbound direction of Highway 16 would be extended at each end by approximately 390 metres.

**Cost Range:** $1.2 M - $2.8 M

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#10 – HIGHWAY 16 ROBSON SWIFT CREEK MOBILE WEIGH SCALE

**Issue(s) Resolved:** The Robson Weigh Scale located east of the Highway 5 Tête Jaune Cache Bridge has limited storage space for trucks. Additionally, although the scale is oriented primarily for use by eastbound vehicles, it is also used by westbound vehicles. Sightlines are limited for westbound vehicles departing the scale.

**Option Description:** This option includes a new westbound-oriented weigh scale at Swift Creek, located approximately 10 kilometres to the east of the existing Robson Weigh Scale. The Swift Creek facility would include a pull-out area as well as an in-ground scale. Additionally, the station would incorporate weigh-in-motion, automatic vehicle location, and automatic vehicle identification technology and operate as part of the British Columbia Weigh2GoBC (W2G) program. This program allows commercial vehicles enrolled in the program to be identified and weighed at highway speeds in advance of the existing inspection station and if in compliance, allows them to bypass the station.

**Cost Range:** $4 M - $11 M

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Please note that these are preliminary cost estimates based on high level design. They should not be used for capital planning processes.
#11 – HIGHWAY 1 NO. 3 ROAD WESTBOUND ON-RAMP EXTENSION

**Issue(s)Resolved:** Highway 1 in the vicinity of the No. 3 Road Interchange has been identified as a collision-prone segment of the highway. The westbound on-ramp at this interchange has a short merge section, which can create a potential for collisions between merging vehicles and through vehicles on the highway. These safety impacts can also affect the reliability of the highway.

**Option Description:** This option would extend the existing westbound on-ramp merge section from 85 metres to 150 metres, and provide an improved 90 metre taper. The merge section extension and the taper would provide additional distance and time for motorists to merge with highway traffic, thereby reducing the potential for traffic collisions.

**Cost Range:** $0.3 M - $0.7 M

Please note that these are preliminary cost estimates based on high level design. They should not be used for capital planning processes.

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#11 – HIGHWAY 1 HORIZONTAL CURVE DELINEATION UPGRADES

**Issue(s) Resolved:** The Highway 1 segment in the vicinity of the Vedder Canal Bridge and the S-curve east of the Annis Road Interchange has been identified as collision-prone. Also, the highway segment in the vicinity of Annis Road features combined horizontal and vertical curvatures with no spiral transitions. The horizontal curvature at these locations can create the potential for off-road and rear-end collisions between vehicles. These safety impacts can also affect the reliability of the highway.

**Option Description:** Delineation markings could be enhanced with a more durable and reflective road marking product, while the curve warning signing could be upgraded by making use of solar powered LED outlining lights to provide improved guidance to motorists as they approach the curves.

**Cost Range:** $0.1 M - $0.4 M
#12 – HIGHWAY 1 FLOOD HOPE ROAD INTERCHANGE RAMP RECONFIGURATION

**Issue(s) Resolved:** The Highway 1 segment in the vicinity of the western Flood Hope Road Interchange has been identified as collision-prone. The westbound on-ramp at this interchange is short and also features a sharp horizontal curve that vehicles (especially trucks) must pass through at slow speeds. These slow speeds and slower acceleration distance combined to create a speed differential with through traffic on the highway which represents a safety concern.

**Option Description:** To reduce the speed differential, this option would convert the westbound ramps of the western Flood Hope Road Interchange to a diamond configuration. The change in the westbound on-ramp location would provide approximately 180 metres of additional length for the acceleration lane, with a downhill grade that would assist in truck acceleration.

**Cost Range:** $3.5 M - $8.8 M

#12 – HIGHWAY 1 GUIDE SIGNAGE UPGRADES (EXIT 170 AND EXIT 146)

**Issue(s) Resolved:** At Exit 170, to continue eastbound on Highway 1 at Hope, motorists must exit the highway and proceed through the community of Hope. This requirement may be confusing for drivers unexperienced with the area, and could cause motorists to continue onto Highway 3 without realizing that Highway 1 is discontinuous, or cause motorists to perform abrupt lane changes near the exit particularly as the advanced guide signs are limited in size and height. At Exit 146, the eastbound off-ramp exit to Herrling Island Road is located on the left-hand side of Highway 1, as opposed to the more typical right-hand side. Furthermore, that the exit is a left-hand exit only becomes apparent at the beginning of the exit ramp. Although the exit has a low vehicle volume and provides approximately 500 metres of parallel lane to change lanes, drivers who pass or use this exit for the first time have no knowledge of the fact that the ramp is located on the left, as neither of the two guide signs, located one kilometre and two kilometres from the exit, note that the exit is a left-hand exit. Therefore, first time or unaware users may perform abrupt lane changes from the right lane to the left in order to avoid missing their exit. Additionally, due to the presence of a contractor site near the interchange, there could be a higher volume of exiting vehicles that are heavy trucks which would need to merge with the left lane before the off-ramp.

**Option Description:** At Exit 170, larger and taller guide signs could be implemented approximately 600 and 1,200 metres upstream of the exit. These signs could be on high-mounting or cantilever poles and feature overhead lighting. At Exit 146, additional information could be added to the one-kilometre guide sign to inform drivers to the fact that the Herrling Island Road Exit is located on the left-hand side to mitigate abrupt lane changes at the exit, and to alert motorists in the left lane of the potential for exiting trucks merging into the left lane.

**Cost Range:** $0.1 M - $0.4 M

Please note that these are preliminary cost estimates based on high level design. They should not be used for capital planning processes.
#13 – HIGHWAY 5 AUTOMATED HIGHWAY CLOSURE SYSTEM

**Issue(s) Resolved:** Incidents such as collisions or severe weather can create a need for Highway 5 to be temporarily closed to traffic. Currently, once a decision has been made to close the highway, approximately two hours is required to implement the closure. This extended implementation duration results in additional vehicles continuing to enter the highway after an incident has already occurred. Vehicle queues can also frustrate incident recovery efforts.

**Option Description:** The automated highway closure system would consist of a series of lane control signals and automated closure gates to rapidly close the highway. The highway closure devices would be installed at the northbound ramps of the Othello Interchange in Hope at the south end of the corridor and at the southbound ramps of the Highway 5 and Highway 5A Interchange in Merritt at the north end of the corridor. Similar device would also be installed along Coldwater Road. This rapid closure system would enable vehicles that would otherwise get stuck on Highway 5 to instead divert to alternative routes, which would in turn reduce the risk of extended vehicle queues creating obstructions to recovery efforts.

**Cost Range:** $8 M - $20 M

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#13 – HIGHWAY 5 ZOPKIOS BRAKE CHECK QUEUE DETECTOR

**Issue(s) Resolved:** During severe weather events when high volumes of trucks are travelling southbound, the limited capacity at the Zopkios Brake Check area can result in trucks queuing back onto the highway in the shoulder lane. The safety issue resulting from the presence of long queues in the shoulder lane is exacerbated as other trucks attempt to bypass the queue and inadvertently block through traffic in the median lane as they wait to merge back into the shoulder lane to access the brake check area. This scenario results in obstructions of both southbound lanes creating additional safety and reliability issues for through traffic and maintenance vehicles.

**Option Description:** The concept under consideration to address this type of occurrence is implementation of a Queue Detection System within the brake check area and along the southbound off-ramp. Dynamic signage would be implemented to alert truck drivers to avoid bypassing the queue. This system is anticipated to address the issue of truck drivers blocking the median lane when queues form in the shoulder lane.

**Cost Range:** $3.2 M - $7.5 M

Please note that these are preliminary cost estimates based on high level design. They should not be used for capital planning processes.
#14 – Kamloops Brocklehurst Neighbourhood Lethbridge Avenue Overpass

**Issue(s) Resolved:** The three at-grade rail crossings along the CN railway corridor at Singh Street, McLean Street, Ord Road (East) in the Brocklehurst neighbourhood of Kamloops can create impacts in relation to traffic delays and community severance, as well as the potential to encumber the flexibility of railway operations. A multi-use pathway is planned along Singh Street, although currently there are no such facilities provided, and people walking and cycling are also delayed by train movements.

**Option Description:** This option would address the Singh Street and McLean Street at-grade rail crossings, but not the Ord Road (East) crossing. Lethbridge Avenue would be extended to cross over Parkcrest Avenue and the railway corridor via a new two-lane overpass structure in order to connect the intersection of Singh Street and Lethbridge Avenue with Ord Road. The extended segment of Lethbridge Avenue would curve around the Brocklehurst Substation (BC Hydro) and continue between the mobile home park and the Singh Bowl playing fields. The existing Singh Street at-grade rail crossing would be closed while the north side of Singh Street would be narrowed and shifted to the east and designated as an access to the parking lot at the playing fields. To accommodate the extension of Lethbridge Avenue, the playing fields would be shifted to the east with a portion of the existing Singh Street right-of-way being repurposed into replacement playing field area. The McLean Street at-grade rail crossing would also be closed.

**Cost Range:** $19 M - $46 M

**Additional Mitigation Option Considerations:** The City of Kamloops has noted that the closure of McLean Street as part of the scope of this option could create community concerns. Additionally, the City noted that alternative grade-separation alignments should be further explored, such as an overpass connection between Ord Road and Halston Avenue in the vicinity of Ollek Street. Additional collaboration with the City of Kamloops to refine the option is therefore likely if a grade separation solution is to be considered for further development.

Please note that these are preliminary cost estimates based on high level design. They should not be used for capital planning processes.
#14 – KAMLOOPS BROCKLEHURST NEIGHBOURHOOD ORD ROAD OVERPASS

**Issue(s) Resolved:** Same as Lethbridge Avenue, except that the Ord Road (East) at-grade rail crossing is not a high traffic volume crossing, however there may be safety-related considerations at this crossing if Ord Road were to be designated as the Dangerous Goods Route for this area of the city.

**Option Description:** This option would address the Ord Road (East) at-grade rail crossing, but not the Singh Street and McLean Street crossings. An overpass would be constructed to cross over the railway corridor as well as Tranquille Road, which parallels the rail corridor. The new two-lane overpass and roadway would connect to Ord Road on the north side of the railway corridor with an upgraded T-intersection. To maintain connectivity between the east-west segment of Tranquille Road and the north-south segment of Tranquille Road, the east-west segment of Tranquille Road would be extended further west to pass underneath the overpass and then loop around to form a new T-intersection.

**Cost Range:** $15 M - $35 M

#15 – KAMLOOPS RAYLEIGH NEIGHBOURHOOD DEVICK ROAD UNDERPASS

**Issue(s) Resolved:** The at-grade rail crossings along the CN railway corridor at Puett Ranch Road and Mattoch McKeague Road are the only two routes providing access to and from the Rayleigh neighbourhood of Kamloops. These at-grade rail crossings can create impacts such as traffic delays, safety-related considerations due to queue spillovers on Highway 5, community severance, and also have the potential to encumber the flexibility of railway operations.

**Option Description:** This option would realign the southern leg of the Cammeray Drive and Puett Ranch Road intersection within the Rayleigh neighbourhood to the east, enabling the road to pass underneath the railway corridor. After passing under the railway corridor, the new access road would connect with Old Highway 5 Road at a new intersection. This new intersection would require Old Highway 5 Road to be lowered approximately four metres from the existing ground level. The new access roadway would then pass underneath Highway 5 and connect to Devick Road. The Puett Ranch Road and Highway 5 intersection would be converted to maintain right-in / right-out movements only, thereby creating a defacto interchange. The existing at-grade rail crossings at Puett Ranch Road and Mattoch-McKeague Road would be closed.

**Cost Range:** $32 M - $67 M

Please note that these are preliminary cost estimates based on high level design. They should not be used for capital planning processes.
#16 – KAMLOOPS MISSION FLATS ROAD OVERPASS  

**Issue(s) Resolved:** The Mission Flats Road at-grade rail crossing along the CP railway corridor creates traffic delays for travel to the adjacent industrial area as well as train whistle noise impacts for nearby residential communities such as those on the north side of the Thompson River. The at-grade rail crossing also has the potential to encumber the flexibility of railway operations.

**Option Description:** A new two-lane overpass would be constructed along Mission Flats Road. The existing at-grade rail crossing would be closed, which would also eliminate the need for train whistling.

**Cost Range:** $18 M–$41 M

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#17 – KAMLOOPS DOWNTOWN AT-GRADE RAIL CROSSINGS  

**Issue(s) Resolved:** The 2nd and 3rd Avenue at-grade rail crossings along the CP railway corridor in downtown Kamloops creates delays for both motorists and pedestrians and have been noted to have safety-related considerations. The at-grade rail crossings also have the potential to encumber the flexibility of railway operations.

**Additional Mitigation Option Considerations:** Due to the complexity of the constraints within the downtown Kamloops area and the desire of the City of Kamloops to first explore the potential relocation of the CP Rail Yards, no mitigation options have been identified to carry forward for further development. It is noted that the mitigation options considered by the TTN Analysis Study would likely be superseded by future studies and or municipal initiatives. Any additional mitigation options that may be explored at this location, beyond the TTN Analysis Study, will therefore need to ensure compatibility with the various urban planning initiatives underway in the downtown Kamloops area while addressing the identified issues related to delays and safety for both pedestrians and traffic.

Please note that these are preliminary cost estimates based on high level design. They should not be used for capital planning processes.
#18 – Kamloops Valleyview Neighbourhood River Road Crossing Closure

**Issue(s) Resolved:** The at-grade rail crossings along the CP railway corridor at either River Road and or Tanager Drive are the only two routes providing access to and from the residential area within the Valleyview neighbourhood of Kamloops. These at-grade rail crossings, and the adjacent signalized intersections with Highway 1, can create impacts in relation to traffic operations and delays, community severance, and also have the potential to encumber the flexibility of railway operations. There are also safety considerations associated with pedestrians crossing Highway 1 and the railway corridor at the River Road intersection to access the South Thompson River.

**Option Description:** This option would involve closing the River Road at-grade rail crossing and consolidating road access to this neighbourhood at Tanager Drive. This access consolidation is similar to the single point of access provided at comparable residential developments on the north side of the rail corridor and Highway 1 (e.g. Nina Place or Pat Road). In order to mitigate the impacts of the at-grade rail crossing closure as well as overall growth in train volumes on pedestrian connectivity, a new, wide, pedestrian underpass would be provided near the existing River Road crossing.

**Cost Range:** $3.1 M - $6.5 M

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#18 – Kamloops Valleyview Neighbourhood Highway 1 / Vicars Road Intersection Improvements

**Issue(s) Resolved:** The Vicars Road at-grade rail crossing along the CP railway corridor can create impacts in relation to traffic delays, safety-related considerations due to queue spillovers along Highway 1, and community severance. During train movements, the Trans Canada Highway East Frontage Road located to the south of the Vicars Road and Highway 1 intersection can experience heavy congestion, which can also create impacts to traffic operations on Highway 1. Additionally, the eastbound left-turn and westbound right-turn lanes can experience queues that can interfere with vehicle deceleration on Highway 1, approaching the intersection.

**Option Description:** This option would involve extending the eastbound left-turn lane and westbound right-turn lane on Highway 1 to increase storage capacity. Additionally, a second northbound lane would be constructed to provide storage capacity for northbound vehicles during rail events. In order to prevent large trucks from interfering with the operations of the eastbound right-turn movement along Highway 1, dynamic message signs would be installed at the eastern, southern, and western legs of the Trans Canada Highway East Frontage Road and Vicars Road intersection to direct heavy vehicles to cross the rail corridor using the left-turn or right-turn lanes of Highway 1.

**Cost Range:** $1.6 M - $3.6 M

Please note that these are preliminary cost estimates based on high level design. They should not be used for capital planning processes.
#19 – ASHCROFT HIGHWAY 97C UNDERPASS

**Issue(s) Resolved:** Within the Village of Ashcroft, the at-grade rail crossings of Highway 97C and Mesa Vista Court along the CP railway corridor have been identified as having impacts in relation to community severance, as well as the potential to encumber the flexibility of railway operations.

**Option Description:** This option would realign Highway 97C to cross underneath the railway corridor near the 2nd Street alignment. The intersection of Highway 97C and Railway Avenue would be lowered in order to continue accommodating all traffic movements. To maintain access to the CP transload facility as well as residential properties on Barnes Road, a new intersection would be constructed to tie into the current Highway 97C alignment which would be repurposed as a frontage road. The existing Highway 97C at-grade rail crossing as well as the Mesa Vista Court / Railway Avenue at-grade rail crossing, would be closed. The new underpass would eliminate train movement-related severance for provincial highway through-traffic, intra-community traffic, and emergency vehicles. The closure of the two at-grade rail crossings would unencumber the railway corridor.

**Cost Range:** $16 M - $33 M

#20 – HIGHWAY 97 REALIGNMENT AND NEW BELLOS RAIL UNDERPASS

**Issue(s) Resolved:** The vertical clearance at the existing Bellos Rail Underpass structure creates a constraint for transport of overheight project cargo. This area was also identified as a collision-prone section of highway, and just north of the overpass, features a sharp horizontal curvature adjacent to a rock wall at the bottom of a vertical grade.

**Option Description:** Option 3 would realign the highway to the east widen the cross-section to four lanes for a distance of approximately 1,300 metres. The re-alignment would provide a new CN Bellos Rail Underpass structure with a minimum vertical clearance of 5.6 metres. The realigned highway would provide a horizontal curvature that is appropriate for a 100 km/h design speed, and eliminate the reduced speed zone at the existing collision prone segment. Widening the highway to four lanes would also provide additional passing opportunities.

**Cost Range:** $16 M - $36 M

Please note that these are preliminary cost estimates based on high level design. They should not be used for capital planning processes.

#20 – HIGHWAY 97 PROFILE LOWERING AT CN HIXON RAIL UNDERPASS

**Issue(s) Resolved:** The vertical clearance at the existing Hixon Rail Underpass structure creates a constraint for transport of overheight project cargo.

**Option Description:** Option 2 would lower the highway profile by a minimum of 0.7 metres through the underpass structure in order to achieve a vertical clearance of 5.6 metres. Approximately 140 metres of the highway would require re-profiling.

**Cost Range:** $1.0 M - $2.3 M
Considerations for Next Steps - Partnership Development and Implementation

Upon the completion of the TTN Analysis Study, action may move towards the Partnership Opportunity step for one or more of these mitigation options or the underlying issues. Activities to be conducted during this next step, which are anticipated to begin in early 2019, include:

- A prioritization process to identify which mitigation options have potential to be implemented in the nearer term, and which mitigation options are likely to be longer-term considerations;
- Continued engagement and commencement of consultation with asset owners, stakeholders, Indigenous groups, and the public when appropriate. It is acknowledged that at several locations, there are outstanding considerations regarding the mitigation options identified for further development that may require further discussion to confirm a preferred approach;
- Ongoing development and refinement of design concepts and cost estimates in response to further technical investigations and risk analysis, as well as further feedback obtained through the ongoing engagement and consultation process;
- Exploration of partnership opportunities for the funding and delivery of the mitigation options identified for further development; and,

- Preparation of business cases to support investment in the mitigation options identified for further development that have the potential to proceed to implementation based on encouraging partnership opportunities and priorities amongst the affected and interested agencies.

These activities may be led by the MoTI, municipalities, railways, port authorities or other project champions. Project champions may choose to work with other partners, which may also include the MoTI, municipalities, railways and port authorities. It should be recognized that this process may take a varying amount of time depending on the prioritization and complexity of the transportation issue being addressed as well as the degree of alignment between the partners. Based on the outcome of all the activities in the Partnership Opportunities step, only then would the mitigation option proceed to the Project or Program Implementation step, which would include a continuing consultation and engagement process in parallel with the initiation of detailed design activities, procurement, and construction.
Considerations for Next Steps - Phasings

At some issue locations, multiple complementary mitigation options were identified for further development. In some cases, these mitigation options are interdependent, and as such, there should be consideration that the potential projects evolving from these mitigation options should be delivered together as project bundles or packages.

In other instances, partners may have different perspectives on phasing which would be considered during the Partnership Opportunities step. For example, MoTI planning and prioritization process considers the provincial road network as a primary focus throughout the province whereas the railway would consider prioritization based on corridor activity, the type of yard, its function and the perceived benefits at the time for the elimination of an at-grade crossing, or a group of at-grade crossings. The phasing considerations are described below with respect to the associated location:

PRINCE GEORGE
Elimination of the at-grade rail crossings along this segment of the railway corridor would unencumber the west approach to CN’s Prince George North Yard. The Wilson Park Overpass, may also serve to facilitate switching activity within the yard. Therefore, possible phasing the options could be:
• Wilson Park Overpass;
• Otway Road Realignment / Miworth Road Overpass.

It would also be possible to implement two or all three mitigation options as a simultaneous package.

SMITHERS
Similar to Prince George, elimination of the at-grade rail crossings along this segment of the rail corridor would unencumber both the western and eastern approaches to the CN Smithers Rail Yard. The two mitigation options identified for further development, namely the Scotia Street Overpass and the Tatlow Road Connector would address the west and east rail approach, respectively.

TERRACE
The rail yard at Terrace serves as a base for rail service to Prince Rupert and Kitimat including traffic classification. Elimination of both the Frank Street and Kenney Street at-grade rail crossings along this segment of the rail corridor would fully unencumber the western approach to the yard. However, only one mitigation option at this issue location, Kenney Street Overpass, was identified for further development. Future consideration will need to be given as to whether the elimination of the Frank Street at-grade rail crossing could be made while maintaining or enhancing road network connectivity within Terrace.

KAMLOOPS
Elimination of the at-grade rail crossings to the east and west of the CN Kamloops Rail Yard and CP Kamloops Rail Yard would unencumber the approaches to both of the rail yards. For prioritization, a consideration for railway support would be to achieve complete unencumbrance for the approach to the yards, with an emphasis on clearing space closest to the yard. For example, the phasing of the mitigation options in the Brocklehurst neighbourhood could consist of first implementing the Lethbridge Avenue Overpass followed by the Ord Road Overpass, either sequentially or as a simultaneously as a single package.
Phasing of options for at-grade rail crossings in different locations should consider that from a community perspective, the closure of at-grade rail crossings in Kamloops is viewed as an extension of operations at the rail yards, and the operations of trains are impactful in themselves to the community. These other at-grade rail crossings are also located in developed urban areas, and any phasing of the potential removal of the at-grade rail crossing will need to ensure compatibility with the various urban planning initiatives being undertaken by the City of Kamloops as well as incorporating input through related public engagement processes.

HIGHWAY 1 BETWEEN ABBOTSFORD AND HOPE

The majority of the mitigation options identified for further development at these two issue locations are smaller-scale measures that aim to reduce the frequency of vehicle collisions, thereby addressing safety and reliability issues. However, one of the mitigation options, Highway 1 Automated Closure System, is intended to address highway traffic management when mud slides or rock falls occur along the segment of Highway 1 between Highway 9 and Highway 3. Complementary to the TTN Analysis Study, the MoTI is also investigating other options including potential mitigation measures to prevent slides along this segment of Highway 1 from interrupting traffic operations. The merits of these various approaches will need to be further investigated as part of subsequent work, beyond the TTN Analysis Study.

HIGHWAY 97 HIXON AND BELLOS UNDERPASSES

The mitigation options identified at both the Hixon and Bellos underpasses would address two vertical clearance constraints that impede the transport of overheight cargo along the Highway 97 corridor. However, transport of such cargo is not possible along this corridor until the vertical clearance at both structures is addressed. Furthermore, for transport of overheight project cargo from port facilities in the Vancouver area to destinations in northern British Columbia, there may be additional vertical clearance constraints along key routes that could also act as an impediment.