

# Staff Report to Council

Engineering

FILE: 11-5460-06/21

REPORT DATE: February 19, 2021      MEETING DATE: March 02, 2021  
TO: Mayor and Council  
FROM: Samantha Maki, Director of Engineering & Operations  
SUBJECT: Traffic Operations Safety Review Report – Harris Rd/McMyn Rd and  
Harris Rd/122 Ave

CHIEF ADMINISTRATIVE OFFICER REVIEW/APPROVAL:



RECOMMENDATION(S): THAT Council:

- A. Receive for information the 'Traffic Operations Safety Review Report – Harris Rd/McMyn Rd and Harris Rd/122 Ave' staff report dated February 19, 2021, and attached Traffic Operations Safety Review prepared by Watt Consulting Group; OR
- B. Other.

## PURPOSE

To provide Council with an overview of the Traffic Operations Safety Review (TOSR) recently completed for McMyn Rd between 191 St and Harris Rd, the intersection of Harris Rd/ 122 Ave, and the implementation plan proposed by staff.

☒ Information Report

☐ Decision Report

☐ Direction Report

## DISCUSSION

### Background:

A Traffic Operations Safety Review was planned as part of 2020 Business Planning to assess the intersection of Harris Rd/ 122 Ave and along McMyn Rd from 191 St to Harris Rd. The Harris Rd/122 Ave intersection was selected due to a recent accident in the area. McMyn Rd was selected due to recent and future development in the area and increase

in active transportation. The TOSR was coordinated in collaboration with ICBC’s Road Improvement Project. A map of the study area is outlined in the figure below.



Figure 1 – Study Area Map

**Analysis:**

Watt Consulting Group completed the TOSR report and identified the following issues at each location:

Area 1: McMyn Rd from 191 St to Harris Rd	Area 2: Harris Rd/122 Ave
<ul style="list-style-type: none"> <li>• NB left and NB/SB collisions at Harris Rd/ McMyn Rd intersection</li> <li>• Wide lanes along McMyn Rd</li> <li>• SB left collisions out of Meadow Vale Shopping Centre onto McMyn Rd and vehicles not coming to a full stop</li> </ul>	<ul style="list-style-type: none"> <li>• Pedestrian collision at north crosswalk and SB collision</li> <li>• Sightlines on 122 Ave</li> <li>• NB vehicles travelling over centreline at 193 St curve and</li> </ul>

<ul style="list-style-type: none"> <li>• Misalignment of intersection at McMyn Rd/ 191 St</li> <li>• Lack of pedestrian crossings</li> </ul>	<ul style="list-style-type: none"> <li>proximity of parked cars and speeding</li> <li>• Driveway spacing</li> </ul>
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There were a number of recommendations provided for the areas, most of which staff support. The recommendations are generally operational in nature and can be completed/prioritized within the annual Active Transportation capital project and the Traffic Calming Implementation capital project. A summary of the recommendations are outlined below.

### **McMyn Rd from 191 St to Harris Rd**

- Pedestrian Leading Interval for east-west pedestrian movements across Harris Rd, which allows pedestrians to enter the crosswalk a few seconds before vehicles are given a green light and helps avoid conflict with left-turning vehicles.
- Signal coordination along the Harris Rd corridor
- Protected northbound left-turn phasing at McMyn Rd, which allows vehicles to make a left-turn without any conflicting pedestrian or vehicle movements.
- Install curb extension at southeast corner of McMyn Rd/191 St intersection, relocate stop bar and install a crosswalk

The estimated cost for design/implementation of these improvements totals approximately \$65,000, excluding the Harris Rd corridor signal coordination. Note that the curb extension and crosswalk at McMyn Rd/191 St has already been designed and tendered as part of the 2020 Active Transportation capital works. This scope was prioritized to improve safety and accommodate a marked pedestrian crossing in the area. Separate from the scope of the TOSR, another marked crossing with curb extensions on McMyn Rd is planned to be implemented near MacLean Park for the same reason. TransLink grants were applied for to help fund both crossings. The pedestrian leading interval is likely to be prioritized in 2022.

Removal of bollards at the Harris Rd/McMyn Rd intersection and modifications to the eastbound left-turn lane on McMyn Rd was also suggested, but neither of these are supported by staff. The concrete bollards at each corner of the intersection help to protect pedestrians from vehicle traffic. The modifications to the east-bound left-turn lane is not considered to have a significant improvement on operation of the intersection and the current use is functioning well, with the exception of a needed loading zone. Eradication of the bike lanes on Harris Rd was also suggested as they no longer meet the width guidelines; however, this requires further review and is not currently recommended by staff. This could be reviewed further prior to future repaving of Harris Rd, which is planned for 2024/2025.

## Harris Rd/122 Ave/122A Ave

- Pedestrian Leading Interval for east-west pedestrian movements across Harris Rd
- 'No left turn' signage at parking lot exit of property at southwest corner of the intersection
- Relocate crosswalk at 122 Ave and 191B St to west side
- Clear foliage along s-curve near the 122/191 B St intersection
- Install a curb extension and potential traffic calming at the corner of 122A Ave/193 St

The estimated cost for the design/implementation of these improvements totals approximately \$58,000. The majority of the total cost accounts for the curb extensions and potential traffic calming, with a cost of approximately \$45,000.

A curb extension was also suggested at the north side of the s-curve near 122 Ave and 191B St; however, this may conflict with cyclists and is not supported by staff. Modifications to the lane markings was suggested just north of the Chevron access point on 122A Ave, but this would have an impact on parking, is seen to have little benefit and is therefore not supported by staff.

Implementation of most of the supported recommendations is likely to occur by the end 2022; however, further review and consultation will be coordinated for the curb extension/traffic calming at the corner of 122A Ave and 193 St.

The TOSR and staff recommendations were also presented to the Active Transportation Advisory Committee. They agreed with staff's recommendations. They suggested further review of the crosswalk placement at 122 Ave/191B St to align with the park entrance and consideration of the existing transit stop. They also advised that visibility and operational impacts on pedestrians/cyclists should be considered in the design of the curb extensions. Lastly, it was suggested that reduction in parking be reviewed at the northwest corner of McMyn Rd/191B St to improve sightlines for drivers exiting the Meadow Vale Shopping Centre, which staff will look into further.

## COUNCIL STRATEGIC PLAN ALIGNMENT

- ☐ Principled Governance   ☐ Balanced Economic Prosperity   ☐ Corporate Excellence  
☒ Community Spirit & Wellbeing   ☒ Transportation & Infrastructure Initiatives  
☐ Not Applicable

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## FINANCIAL IMPLICATIONS

- ☐ None   ☒ Budget Previously Approved   ☐ Referral to Business Planning  
☐ Other

There is an annual Active Transportation capital project with a budget of \$100,000. Each year staff also seek various grant funding through TransLink, ICBC, Ministry of

Transportation and Infrastructure or other avenues to help fund the prioritized projects. The improvements recommended in the report and supported by staff will be prioritized and implemented in 2021 and 2022, as budget allows.

The potential scope of work at the corner of 122A and 193 St would be best suited for the Traffic Calming Implementation capital project, which has a budget of \$50,000 each year.

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## **PUBLIC PARTICIPATION**

☒ Inform    ☒ Consult    ☐ Involve    ☐ Collaborate    ☐ Empower

Comment(s):

As the recommended crossing on McMyn Rd/191 St would affect a small amount of street parking, residents in the nearby area will be informed of the upcoming change. This improvement is necessary for safety reasons and not considered traffic calming; therefore, no engagement is planned.

Further review is required by staff for the recommended curb extension and potential traffic calming measure at the corner of 122A Ave and 193 St. Staff would also collect current volume and speed data to aid the review. Once the review is complete and if recommended by staff, support for the improvements would be canvassed from the surrounding residents prior to any design and/or implementation. This approach aligns with the City's Traffic Calming Policy C029.

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## **KATZIE FIRST NATION CONSIDERATIONS**

Referral    ☐ Yes    ☒ No

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## **SIGN-OFFS**

**Written by:**

**Reviewed by:**

Samantha Maki, Director of Engineering & Operations    Mark Roberts, Chief Administrative Officer

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## **ATTACHMENT:**

- A. Pitt Meadows – Harris Road / McMyn Road & Harris Road / 122 Ave / 122A Ave Traffic Operations Safety Review by Watt Consulting Group, dated December 16, 2020.

## **PITT MEADOWS – HARRIS ROAD / MCMYN ROAD & HARRIS ROAD / 122 AVE / 122A AVE**

### **Traffic Operations Safety Review**

Prepared for: ICBC, City of Pitt Meadows

Prepared by: **Watt Consulting Group**

Our File: 2768.B01

Date: December 16<sup>th</sup>, 2020

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## 1.0 INTRODUCTION

Watt Consulting Group was retained by ICBC and the City of Pitt Meadows to conduct a traffic operations safety review (TOSR) for two areas:

- **AREA 1** – McMyn Road between Harris Road and 191 Street, and the areas to the north and south of the Harris Road / McMyn Road intersection;
- **AREA 2** – 122 / 122A Avenue between 191B Street and 193 Street, and the areas to the north and south of the Harris Road / 122 / 122A Avenue intersection.

This report investigates the roadway characteristics and conditions of the corridor and intersections between in order to assess potential issues that may contribute to collision incidents and severity, as well as the identification of other potential safety issues for all travel modes and vehicle types. Based on this analysis, a number of safety countermeasures are investigated in consideration of their safety improvement attributes, from which a final recommendation is made.

A traffic operations safety review is a structured review of existing road facilities that analyzes collision history, traffic operations, geometric characteristics, and an assessment of human factors, through in-field and analytical reviews. The TOSR is multi-modal in scope, and considers all road users, travel modes and the interactions between users. Based on the review of these categories, several countermeasures are proposed which may lower safety risk, and a recommendation is made regarding countermeasure implementation.

### 1.1 STUDY APPROACH

The TAC *Canadian Guide to In-service Road Safety Reviews* was used as a basis for the study approach. This was complimented with consideration of other relevant guides, such as:

- TAC Geometric Design Guide for Canadian Roads
- TAC Manual of Uniform Traffic Control Guidelines for Canada
- Design specifications from Pitt Meadows

The assessment considered four key areas: collision analysis, operations analysis, geometric analysis, and human factors analysis. Included within these areas were considerations for asset condition / maintenance as related to road safety. The study process included input and direction from ICBC and Pitt Meadows, including meetings, data provision, and feedback at key stages.

## 2.0 STUDY AREA OVERVIEW

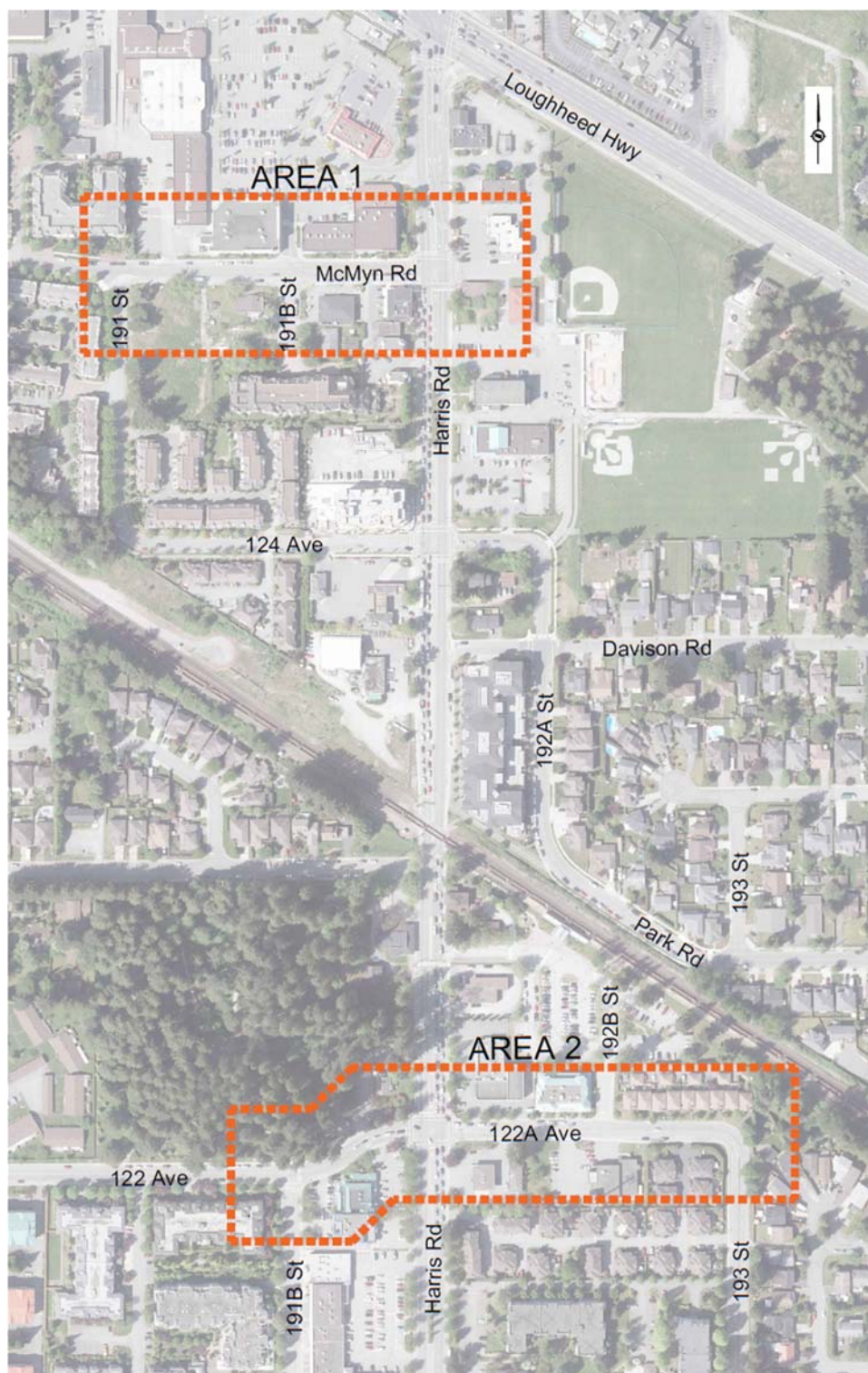
Two distinct study areas on Harris Road were included in this study, as shown in **Figure 1**. Area 1 consists of the McMyn Road corridor between Harris Road and 191 Street. Area 2 consists of the 122 / 122A Avenue corridor between 191B Street and 193 Street.

## 2.1 EXISTING ROAD FUNCTION

Harris Rd is a north-south arterial road in Pitt Meadows. Within the study area it is a four-lane divided road, with commercial and multi-family land uses along its length. It has a daily traffic volume of approximately 19,000 vehicles/day.

The McMyn Road corridor is a two-lane urban local road that is fronted by residential and commercial land-uses within the study area. On-street parking is permitted and is allowed on the south side of McMyn Road east of 191B Street and on both sides of the street west of 191B Street. There is an access to the Meadow Vale Shopping Centre across from 191B Street on McMyn Road, and this access is less than 100m away from the Harris Road / McMyn Road intersection. In terms of traffic volumes, the daily traffic volumes along McMyn Road are approximately 6,500 vehicles per day.

The 122 Ave / 122A corridor is a two-lane urban local road that is fronted mainly by commercial, park and residential land-uses within the study area. On-street parking is permitted on both sides of the street east of Harris Road, and is not permitted between Harris Road and 191B Street which is likely due to the s-curve and proximity to the intersections and accesses along 122 Avenue. There is also a firehall located at the intersection of 122A Avenue / 192B Street, though there is no signal to provide pre-emption likely due to the low volumes along 122A Avenue. In terms of traffic volumes, the daily traffic volumes along 122 Avenue and 122A Avenue are approximately 4,000 and 3,000 vehicles per day, respectively.



**Figure 1: Study Areas**

## 2.2 EXISTING ACTIVE TRANSPORTATION FACILITIES

Harris Road has two bike lanes (northbound / southbound) that begin/end at the south side of the Harris Road / McMyn intersection. There is a 100m gap in the Harris Road bike lanes at the rail crossing. There is no facility to transition cyclists into and out of the bike lanes, and there is no signage indicating that the bike lane starts/ends. The gap between the bike lanes north and south of the rail line crossing are expected to be filled in when the Harris Road underpass is installed as part of the Pitt Meadows Road and Rail Improvements Project.

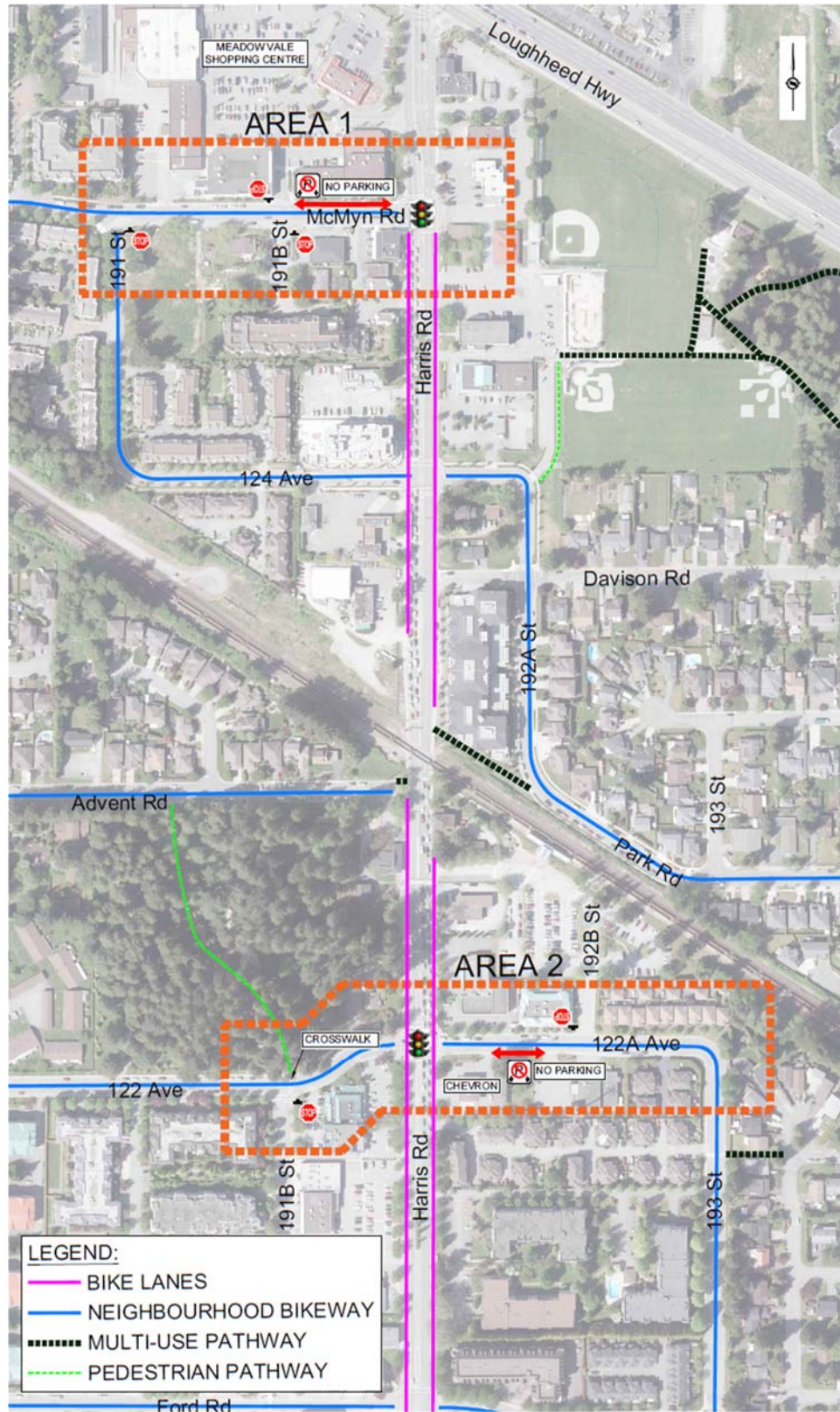
McMyn Road is designated as a neighbourhood bikeway as per the *Pitt Meadows Transportation Master Plan Summary Report (2014)*, however there is no signage or pavement markings indicating that the road is a bikeway.

The 122 / 122A Avenue is designated as bike route and has sharrow stencil markings within the corridor.

There are sidewalks along all roads in the study area corridors.

**Figure 2** shows key study area road characteristics.



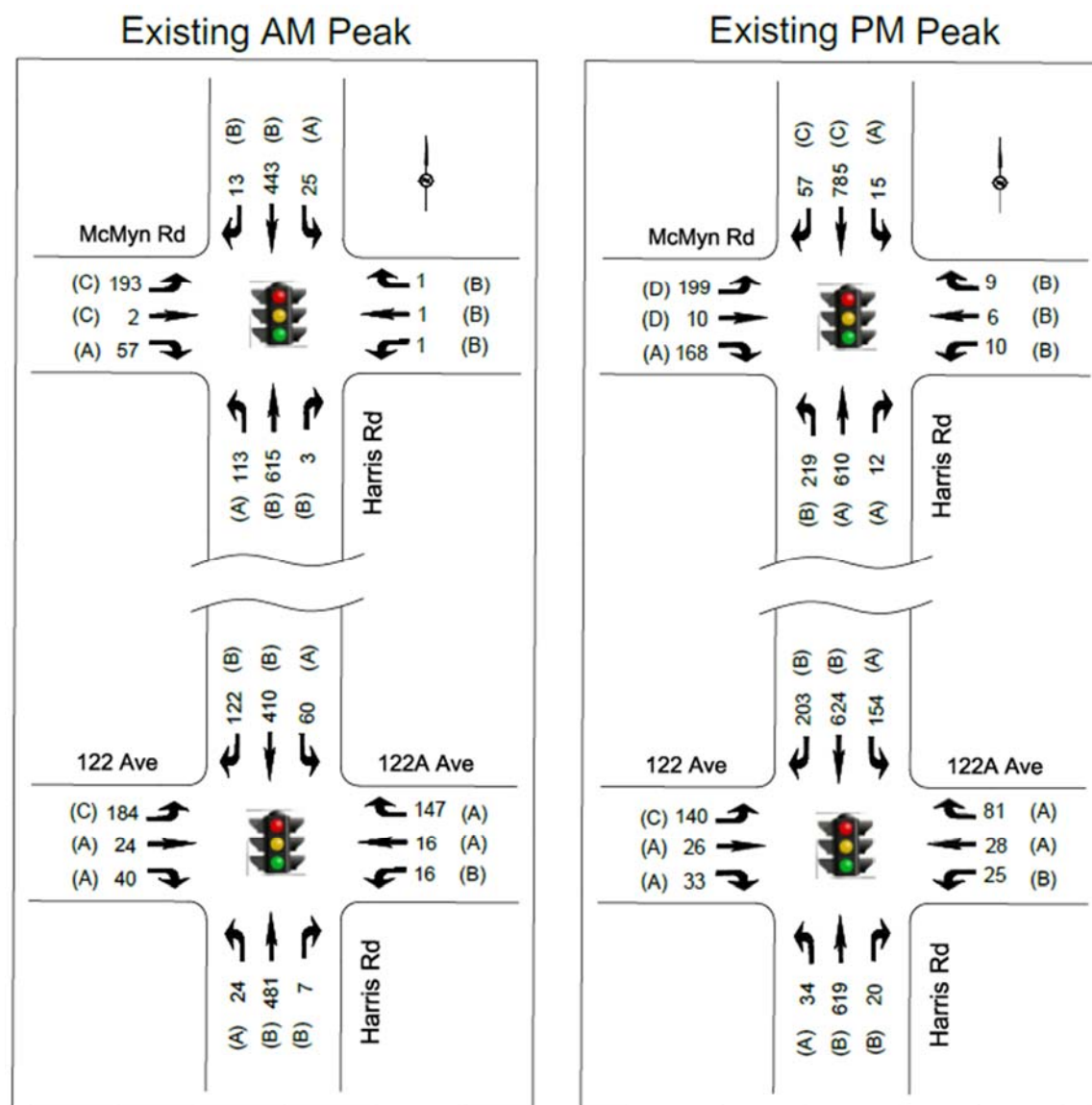


**Figure 2: Study Area Road Network Characteristics**

## 2.3 BACKGROUND TRAFFIC CONDITIONS

Traffic volumes and conditions were reviewed for the corridor at the Harris Rd / McMyn Road and Harris Road / 122 Ave / 122A Avenue intersections.

Counts for Harris Rd intersections were available from the *Harris Road & Kennedy Road & Rail Data Collection Study (January 2020)*. Traffic volumes for AM and PM peak hours, along with levels of service, are shown in **Figure 3**, for the signalized intersection of Harris Rd / McMyn Road and Harris Road / 122 Avenue / 122A Avenue.



**Figure 3: Peak Hour Traffic Volumes and Level of Service**

Traffic operations were analysed using Synchro 9 software, for the AM and PM peak hours, to understand operations and potential contributing safety risk factors. Operationally, both

intersections operate with good peak hour levels of service (generally LOS C or better, except for the eastbound left / through movement at Harris Rd and McMyn Road at LOS D in the PM peak). 95<sup>th</sup> percentile Queues are generally contained within the available storage lengths.

These are general operations, however, and do not factor in impacts due to rail crossing events or due to long queues extending south from Lougheed Highway. Rail crossing queues can extend north through the intersection at Harris Road / McMyn and south to/past Harris Road / 122 / 122A Avenue. These queues can lead to stop-go conditions that create a higher chance for rear-end collisions; however, these queues will be eliminated with the installation of the Harris Road underpass under the rail line (to be completed by 2024).

### 3.0 COLLISION ANALYSIS

ICBC collision data for the study area were obtained via Pitt Meadows, and are based on ICBC-reported collisions, for the 5-year period from 2013 to 2017. The dataset includes a number of collision attributes that can be used to investigate characteristics, possible contributing factors, and trends. **Figure 4** shows the collision diagram for the McMyn Road corridor (Area 1); **Figure 5** shows the collision diagram for the 122 / 122A Avenue corridor.

#### 3.1 KEY COLLISION TRENDS IN STUDY AREA

Key collision locations are summarized below in terms of total collisions in 5 years, the collision frequency (collisions/year), and collision rate (collisions per million entering vehicles (MEV)).

In the study area corridor, the peak locations are:

**Harris Rd / McMyn Road** – 45 collisions (29 casualty, with 3 pedestrian and 1 bike) in 5 years.

- 9.0 collisions/yr (5.8 injury collisions/yr)
- 1.17 collisions/MEV (0.76 injury collisions/MEV)

**Harris Road / 122 / 122A Avenue** – 31 collisions (15 casualty, with 3 pedestrians) in 5 years.

- 6.2 collisions/yr (3.0 injury collisions/yr)
- 0.85 collisions/MEV (0.41 injury collisions/MEV)

**McMyn Road / 191B Street / Meadow Vale Shopping Centre Access** – 8 collisions (3 casualty) in 5 years.

- 1.6 collisions/yr (0.60 injury collisions/yr)
- 0.67 collisions/MEV (0.25 injury collisions/MEV)

**122A Avenue / Chevron Access** – 4 collisions (1 casualty) in 5 years.

- .8 collisions/yr (0.20 injury collisions/yr)
- 0.63 collisions/MEV (0.16 injury collisions/MEV)

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**All other study corridor intersections / accesses – 2 or less in 5 years**

In the study area periphery:

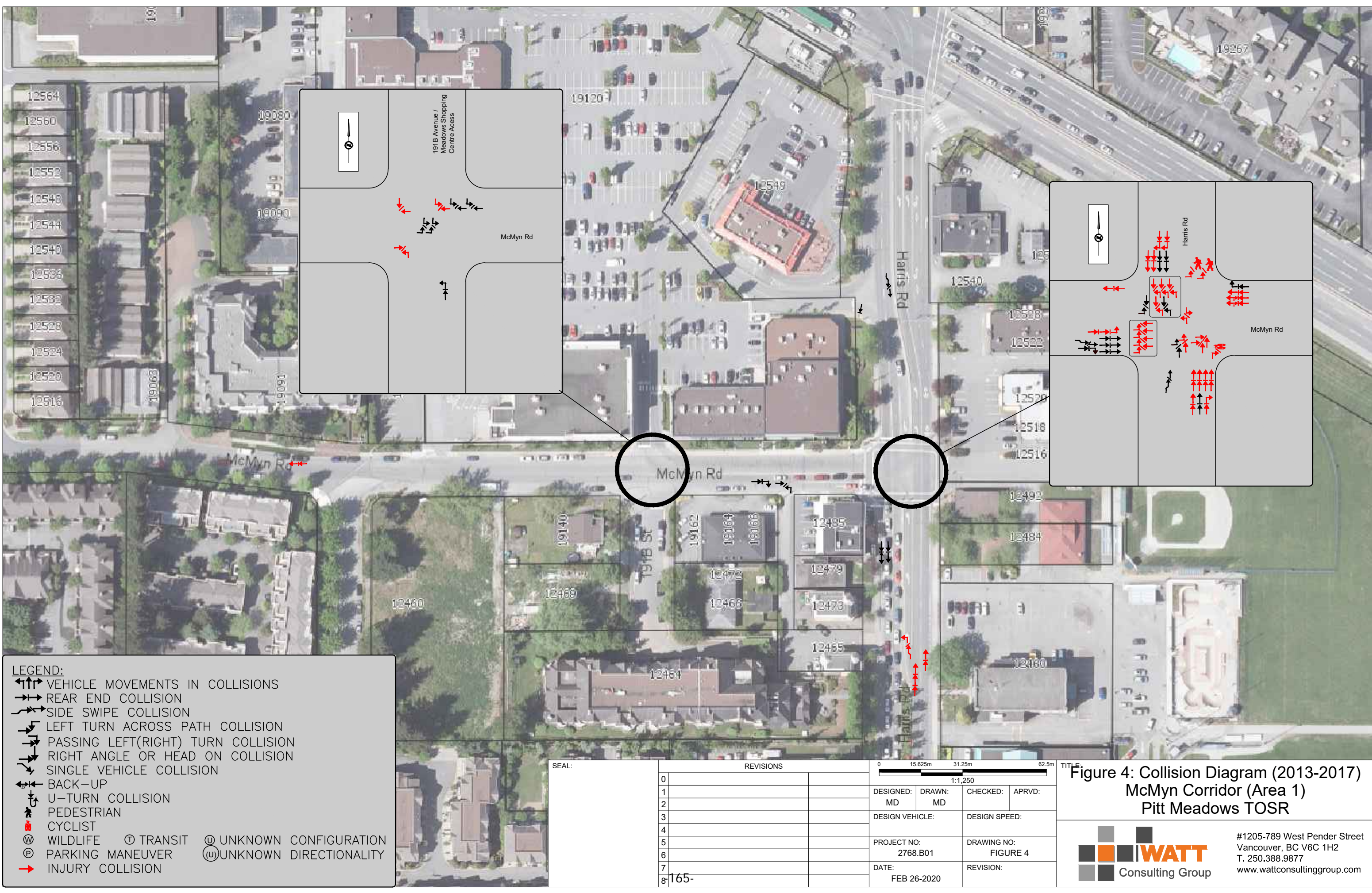
**Rail Crossing** – 7 collisions (4 casualty) in 5 years.

- 1.40 collisions/yr (0.80 injury collisions/yr)
- 0.19 collisions/MEV (0.11 injury collisions/MEV)



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LEGEND:

↔↔↔ VEHICLE MOVEMENTS IN COLLISIONS

↔↔ REAR END COLLISION

↔↔ SIDE SWIPE COLLISION

↔↔ LEFT TURN ACROSS PATH COLLISION

↔↔ PASSING LEFT(RIGHT) TURN COLLISION

↔↔ RIGHT ANGLE OR HEAD ON COLLISION

↔↔ SINGLE VEHICLE COLLISION

↔↔ BACK-UP

↔↔ U-TURN COLLISION

↔↔ PEDESTRIAN

↔↔ CYCLIST

⊙ WILDLIFE   ⊙ TRANSIT   ⊙ UNKNOWN CONFIGURATION

⊙ PARKING MANEUVER   ⊙ UNKNOWN DIRECTIONALITY

→ INJURY COLLISION

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Figure 5: Collision Diagram (2013-2017)  
122/122A Corridor (Area 2)  
Pitt Meadows TOSR

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ICBC's *Road Safety Benchmark Statistics for British Columbia (2017)* provides a set of benchmark road safety metrics based on 2011-2015 collisions which cover a range of intersection types, and provides rates based on the AADT of the major and minor roads at the intersection. See **Table 1** for a comparison of the intersection collision rates with the ICBC provincial rates.

Based on the report, the collision rates for Harris Road / McMyn Road and Harris Road / 122 / 122A Avenue are lower than the provincial average as provided in the report. Traffic volume was not collected for McMyn Road / 191B Street and 122A Avenue / Chevron Access, which makes it difficult to assign a specific ICBC collision rate, therefore a range of collision rates was provided in the table based on a range of potential volumes. It is not clear if the collisions at either intersection are higher than the average, but the potential is there.

**TABLE 1: COMPARISON OF COLLISION RATES WITH ICBC PROVINCIAL RATES**

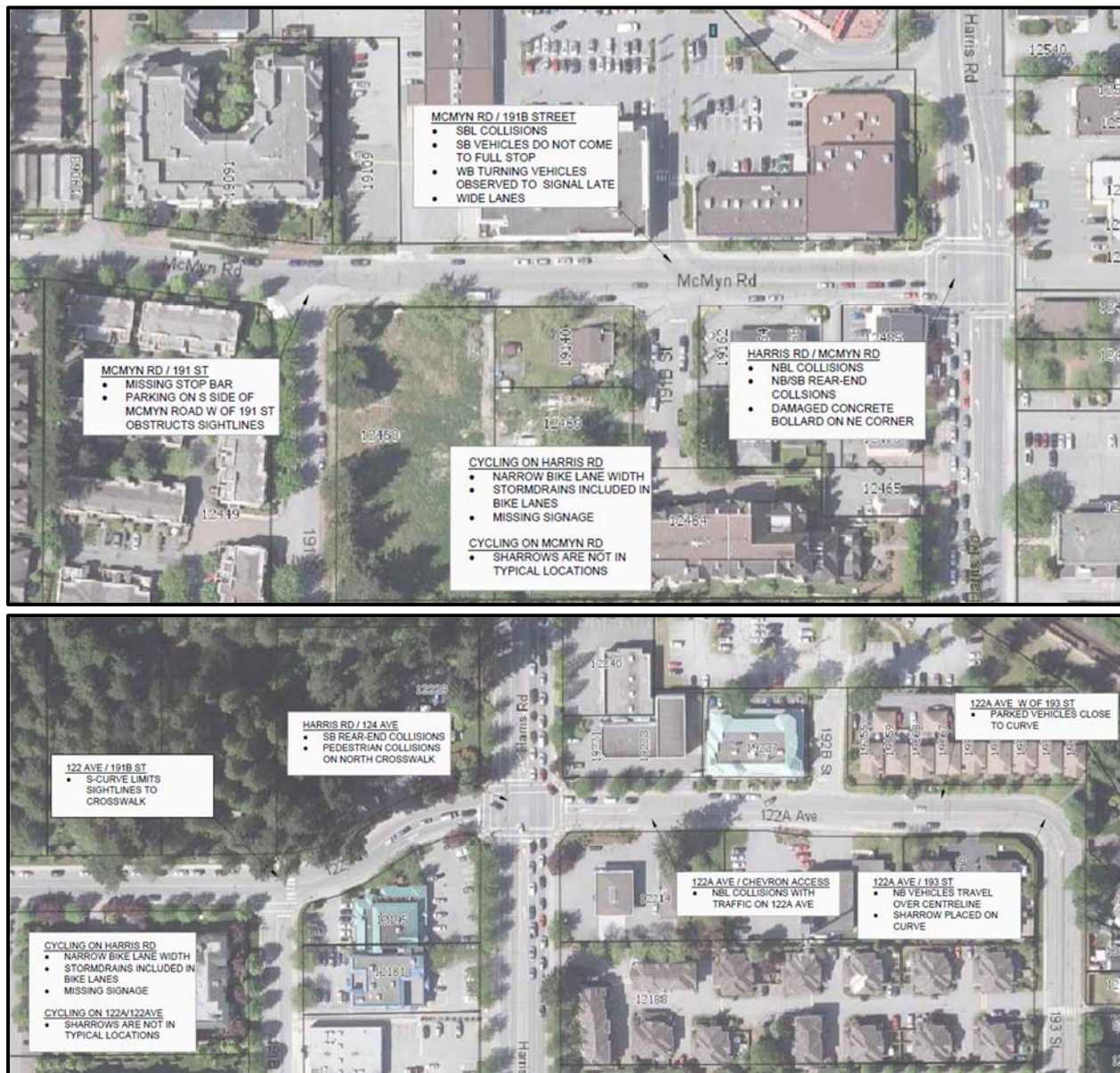
	Intersection Type	ICBC Collision Rate (Collisions/MEV)	Intersection Collision Rate (Collisions/MEV)
Harris Rd / McMyn Road	Four-Leg Signalized Intersection	1.56	1.17
Harris Road / 122 / 122A Avenue	Four-Leg Signalized Intersection	1.21	0.85
McMyn Road / 191B Street / Meadow Vale Shopping Centre Access	Four-leg Unsignalized Intersection	0.54 – 0.82 <sup>a</sup>	0.67
122A Avenue / Chevron Access	Three-leg Unsignalized Intersection	0.40 – 0.80 <sup>a</sup>	0.78

<sup>a</sup> Traffic volumes were not available for these intersection, and a range of potential rates was provided rather than a specific benchmark.

## 4.0 MULTI-MODAL SAFETY ANALYSIS

The operational, geometric, and human factor elements were considered for the corridor and key intersections for all travel modes. Specific locations and issues are assessed below in more detail, with consideration of these issues as appropriate. Operations include capacity conditions, speeds, and signage and markings. The review of geometry included cross sections, pedestrian accommodation (sidewalks and gaps), specific intersections (including sight lines, curb radii, widths, laning etc), driveways, accesses, and grades. Human factors includes a review of elements such as decision points and distances, complex operating environments with other road users, complex visual environment and sight distances, signage/markings and conspicuity, and

adjacent land use and potential distractions from these land uses. **Figure 6** shows the key safety issues in the study area corridor.



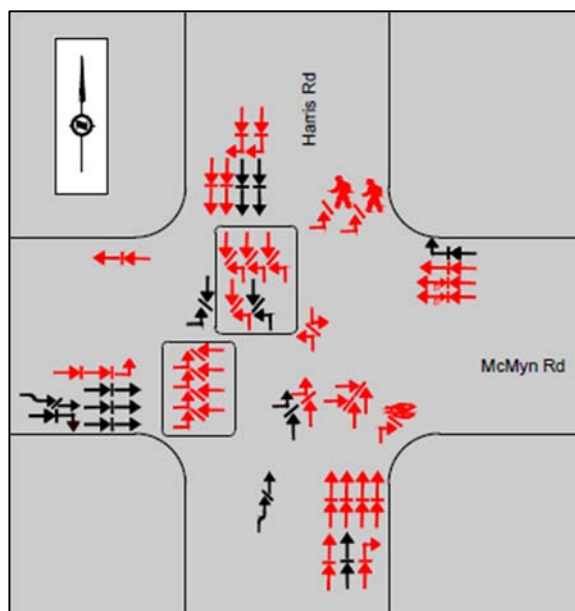
**Figure 6: Key Safety Issues Identified in the Corridor Analysis**

## 4.1 HARRIS RD & MCMYN ROAD

### Collision Profile

At Harris Rd and McMyn Rd, there were, overall, 9.0 collisions/year (5.8 casualty collision/year).

Of note were two eastbound left collisions with pedestrians on the north crosswalk (both casualty). There was also a collision between a northbound vehicle turning right and a cyclist travelling northbound on Harris Road (property damage). The highest frequency for a specific configuration was northbound rear ends, with seven in the dataset. There are also a number of left-turning vehicles conflicting with opposing vehicles (northbound left with southbound, and eastbound-left with westbound) which could be due to a short intergreen time.



Four collisions were attributed to congestion (of which three was attributed to train crossing traffic related congestion).

In terms of temporal characteristics, the PM peak was noted as having an increase in collisions (19 of the 45 in the dataset occurred between 3 and 6PM), followed by the afternoon period (13 collisions between 12 and 3PM). The AM peak period was the third highest period for collisions (7 of the 45 in the dataset occurred between 6 and 9PM). There were no other strong temporal trends. There are more collisions occurring in August (10 of 45 in the dataset), than at any other month of the year. More collisions occurred towards the end of the week (Wednesday – Saturday), however, there were no clear day of week trends.

The pedestrian and cyclist collisions are a notable concern due to the potential severity of these incidents. The pedestrian collisions involved eastbound left-turning vehicles, and the cyclist collision involved a northbound right-turning vehicle. It may be beneficial to provide a pedestrian leading interval (PLI) to provide pedestrians with a head start crossing the intersection and to increase visibility to drivers.

There are a small number of motorists completing the northbound right movement at the intersection (3 in the AM peak hour, and 12 in the PM peak hour), which could suggest that the collision with the cyclist is a “one-off”. Review of collision data prior to 2013 indicates that this type of collision has occurred before at the same location. It may be beneficial to provide bollards to provide more visibility and provide a degree of protection for cyclists. This may not be possible until the bike lane is widened, as it is currently too narrow to accommodate the additional width of the bollards. A RB-37 “Turning Vehicles Yield to Bicycles” sign could be installed to provide more

warning to turning vehicles of cyclists in the bike lane. Other measures to be undertaken could involve marking the conflict area with green paint to provide more visibility.

## Operations

The operational review did not identify any capacity or queuing issues at the intersection for general intersection characteristics. The worst movement in the PM peak hour is the eastbound left / through movement at Harris Rd / McMyn Rd that operates at LOS D. All other movements at the study intersections in the AM and PM peak hour operate at LOS C or better. Storage bay length was adequate for observed and modeled 95<sup>th</sup> percentile queues.

The eastbound left shares the lane with the eastbound through movement, even though the eastbound left volume is higher than the eastbound right. Consideration should be given to designating the laning to a single left-turn lane and a shared through-right lane. This may reduce the eastbound-left turn opposing collisions, as it will be easier to clearly identify which vehicles are going through the intersection, and vehicles movements are turning left.

The existing permitted phases are appropriate for current volumes. Pedestrian walk phases and durations are appropriate for crossing Harris Rd.

Previous field visits, and the collision data, note occasional congestion issues associated with the railway crossing, and Lougheed Highway. Signal coordination may not influence safety during a train crossing, however, it may influence situations where queuing is due to traffic along Lougheed Highway. Within 550m signals (one pedestrian) from McMyn Road to 122 Avenue which may be a contributing factor in the rear-end collisions. Signal coordination would reduce the number of stops and maintain consistent speed for drivers, which would also reduce the number of rear-end collisions<sup>1</sup>.

## Geometry / Human Factors

In general, intersection geometry met (or exceeded) recommended TAC minimums. The exceptions are the following:

- Left turn tapers – deficient for the northbound left turn lane (20m) vs desirable minimum of 24m (at 8:1 ratio)
- Offset left turn lanes – left turn lanes are negatively offset which obstruct sightlines to through

The left-turn tapers were not identified as being a contributing factor in collisions, but the negatively offset left turn lanes may be a contributing factor in the northbound left-turn collisions. Opposing left turn lanes are typically aligned and can sometimes obstruct sightlines to oncoming vehicles. Sightlines can be improved by shifting left-turn lanes to the left to create a positive offset.

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<sup>1</sup> Berg, W., Kaub, A., and Belcamper, B. (1986). Case Study Evaluation of the Safety and Operational Benefits of Traffic Signal Operations. Available online at: <http://onlinepubs.trb.org/Onlinepubs/trr/1986/1057/1057-008.pdf>



As it may not be possible to better align the left-turn lanes, it may be beneficial to determine if the left-turn phase should be fully protected, and not permissive to eliminate the conflict between northbound left turning traffic and southbound through traffic. Restricting the northbound-left (and southbound-left by default) to a protected only phase would result in the northbound-left movement operating at LOS C (previously LOS A) in the AM peak hour, and LOS D (previously LOS B) in the PM peak hour.

There are concrete bollards located at each corner of the intersection to protect pedestrians. This is a typical standard found in the Subdivision and Development Servicing Bylaw No. 2589, 2013, and are designed with wheelchair ramp. The bollards are intended to protect pedestrians; however, the bollards may provide a collision hazard for trucks with a wide turning radius or motorists who turn too tightly. The bollards are concrete and are therefore capable of causing significant damage in the event of a collision. A damaged bollard was identified on a site visit. Standard sidewalk letdowns should inherently provide sufficient guidance and protection at intersection corners for pedestrians. Alternatively, flexible bollards or bollards with break-away bases could be considered to reduce damage in the event of a collision.



Damaged Bollard (NW Corner)

### Mitigation Options

The following countermeasure options are suggested:

- Consider implementing a pedestrian leading interval for the east-west movement of pedestrians crossing Harris Road;
- Change the shared eastbound left and through movement to a dedicated eastbound left lane, and turn the eastbound right turn lane into a shared eastbound through-right lane;
- Implement signal coordination along the Harris Road corridor (including the pedestrian signal) to reduce the number of rear-end collisions due to frequent stopping;

- Consider changing the northbound-left turn phasing from permitted / protected to protected only;
- Remove concrete bollards from the intersection

## 4.2 MCMYN ROAD / 191B STREET

### Collision Profile

At McMyn Road and 191B Street, there were, overall, 1.6 collisions/year (0.67 casualty collision/year).

The highest frequency for a specific configuration was southbound left turn head on collisions with three in the dataset. Notably, six of the eight collisions in the dataset at the intersection involved the southbound movement from the Meadows Vale Shopping Centre.

In terms of temporal characteristics, most of the collisions occurred during the daytime (9AM – 9PM) which coincides with the shopping hours of many stores at the Meadow Vale Shopping Centre. Friday appears to be the day with the most collisions occurring (4 of the 8 in the dataset), though this is not considered a strong temporal trend considering the small number of collisions. There is a temporal trend identified, in that all the collisions occurring take place in the fall / winter (September to January).

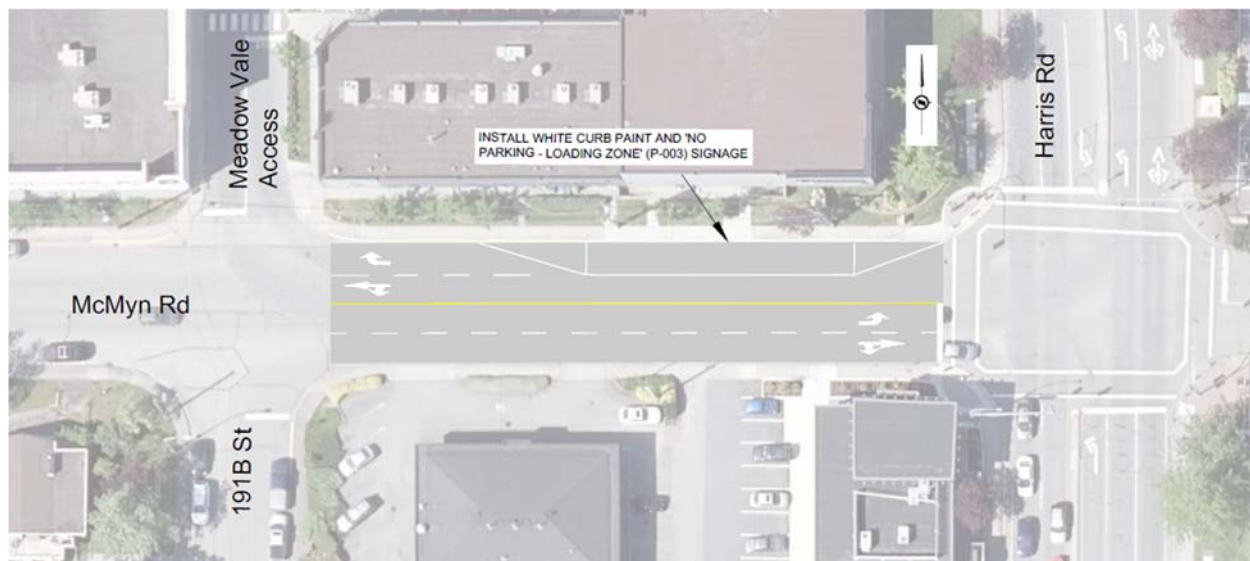
### Operations

Traffic volumes were not available for this intersection, however, observations at the intersection during the site visits indicating that the southbound movement from the driveway is likely to be a major movement at the intersection. An all-way stop was considered, however, it could result in queuing back to the signal. Furthermore, as future development occurs along this corridor, it may be beneficial to continue prioritizing McMyn Road.

### Geometry / Human Factors

The roadway width on McMyn Road from curb to curb is approximately 14m, and the lanes are approximately 7m in width. This is enough space for two vehicles to drive abreast of each other. At the intersection, it was observed that westbound vehicles turning into the driveway are not signaling far in advance to provide notice to drivers exiting Meadow Vale Shopping Centre. Pitt Meadows bylaw staff have observed that commercial trucks will often park on the north side of McMyn Road to unload. Given the excess space, pavement marking can be applied to provide a designated loading area, a westbound right turn lane for vehicles turning into the access, and a shared westbound through-left lane. Similarly, there can be a separate eastbound-left turn lane and a shared eastbound through-right lane designated. This will help to meeting driver expectations, because if motorists are not signalling in advance, the lane that they take will reduce the conflict that is created due to drivers expecting motorists to continue straight due to the late signal. Providing the eastbound laning may require restricting parking 10-15m on the south side of McMyn Road east of the intersection. See **Figure 7** for a concept sketch.

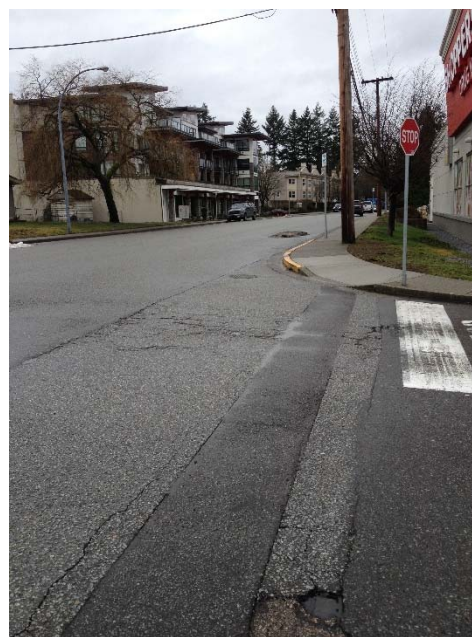




**Figure 7: McMyn Road Re-Laning Concept Sketch**



**Meadow Vale Shopping Centre South Access looking East**



**Meadow Vale Shopping Centre South Access looking West**

### **Mitigation Options**

The following countermeasure options are suggested:

- Provide pavement marking to create a formal loading zone on the north side of McMyn and a westbound left turn lane on McMyn Road into the Meadow Vale Shopping Centre.

### **4.3 MCMYN ROAD / 191 STREET**

#### **Collision Profile**

At McMyn Road / 191 Street, there were no collisions reported at the intersection.

#### **Geometry / Human Factors**

The stop bar for the south approach on 191 Street is currently missing but is present in 2018 ortho-photos; the stop bar should be re-instated unless there is a pavement marking policy that the City has indicating otherwise. It is assumed that the stop bar was removed during construction of the development on the south-east corner of the intersection and will be re-installed pavement repair after construction.

The southeast intersection corner is set further south than the southwest intersection corner. Sightlines from 191 Street looking northwest are partially obstructed by parked vehicles on the south side of McMyn Road. Parking restrictions on the south side of McMyn Road west of 191 Street could be implemented to improve sightlines. TAC recommends a sightline of 95m to the left; however, in order to provide the recommended sight distance, parking would need to be restricted along the south side of McMyn which would result in a loss of approximately 10 on-street parking spaces. Alternatively, installation of a curb extension on the southeast corner would allow the stop sign and stop bar to be moved ahead to improve the sightlines without requiring restricted parking.

#### **Mitigation Options**

The following countermeasure options are suggested:

- Install a curb extension on the southeast corner and move the stop sign / stop bar ahead to improve sightlines.
- Re-instate the stop bar on 191 Street unless City policy states otherwise.



191 Street looking North West



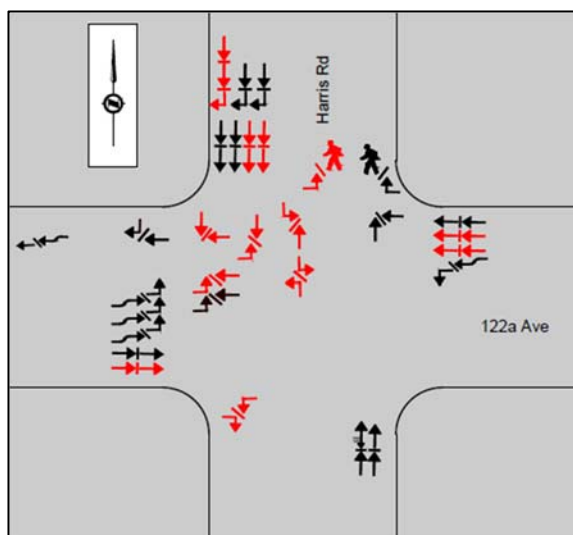
McMyn Road looking East

#### 4.4 HARRIS RD / 122 / 122A AVENUE

##### Collision Profile

At Harris Road / 122 / 122A Avenue, there were 6.2 collisions per year (3.0 casualty collisions per year).

Of note were two collisions with pedestrians on the north crosswalk (both casualty). There were also two additional collisions involving pedestrians (one casualty, the other property damage only) that occurred at the intersection, however, the direction is unknown. In 2019, there was a fatality in the daytime involving a pedestrian on the north crosswalk with a vehicle turning eastbound left from 122<sup>nd</sup> Avenue onto Harris Road.





The highest frequency for a specific configuration was southbound rear ends, with seven in the dataset. Three collisions were attributed to right-turning vehicles stopping for pedestrians in the west crosswalk, and then getting rear-ended by the vehicle behind. The eastbound left turn movement also had a significant number of collisions, with three sideswipe collisions, three 'left turn across path' collisions, and one collision with a pedestrian in the north crosswalk.

In terms of temporal characteristics, the midday peak was noted as having the highest number collisions (8 of the 31 in the dataset occur between 12 and 3PM). This trend was not considered very strong as other peak periods had a similar number of collisions (6 of 31 in dataset between 3 – 6PM and 5 of 31 in the dataset between 6 – 9AM, 9AM -12PM and 6-9PM). There are more collisions occurring in August (10 of 45 in the dataset), than at any other month of the year. More collisions occurred during weekdays (Monday – Friday), however, there were no clear day of week trends.

The pedestrian collisions are a significant concern due to the severity of these incidents, in particular, the recent fatality. Collisions seem to involve both eastbound left vehicles, and westbound left vehicles at the intersection, indicating that better visibility may be needed overall. It may be beneficial to provide a pedestrian leading interval (PLI) to provide pedestrians with a head start crossing the intersection and to increase visibility to drivers.

### **Operations**

The operational review did not identify any capacity or queuing issues at the intersection for general intersection characteristics. All movements at the intersection operate at LOS C or better. Storage bay length was adequate for observed and modeled 95<sup>th</sup> percentile queues.

The existing permitted phases are appropriate for current volumes. Pedestrian walk phases and durations are appropriate for crossing Harris Rd. Similar to the Harris Road / McMyn intersection, there are occasional congestion issues associated with Lougheed Highway and the railway crossing. Signal coordination with the adjacent intersections in the corridor is recommended.

### **Geometry / Human Factors**

In general, intersection geometry met (or exceeded) recommended TAC minimums. The exceptions are the following:

- Left turn tapers – deficient for the northbound/southbound left turn lane (20/19m) vs desirable minimum of 24m (at 8:1 ratio).
- Curve on west approach – “S” curve located on west approach may restrict sightlines to crosswalk
- Driveway spacing – there are driveways near the intersection.

The left-turn tapers are deficient; however, they were not identified as being a contributing factor in collisions. The curve geometry was reviewed, and the curve had an operating speed of

approximately 40km/h, which is 10km/h below the speed limit. Although there is no warning signage for the curve, the curve was not identified as being a contributing factor in collisions at this intersection. There are driveways in close proximity to the intersection on all approaches, however, they do not meet the minimum clearance for accesses at major intersections.

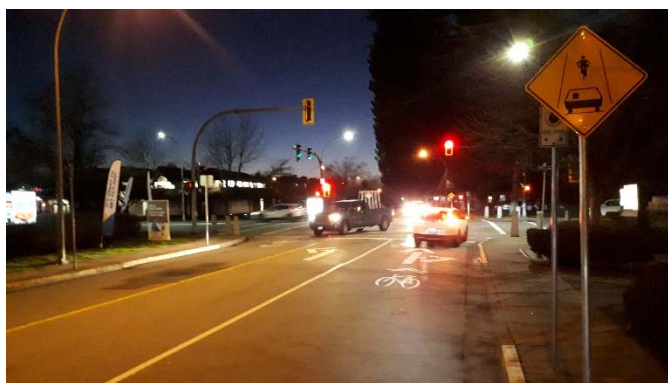
Along 122A / 122 Avenue, a local road, the access must be located 15m in advance of the intersection. The Chevron driveway on the east approach is more than 15m in advance of the intersection, however, the configuration of the access (two-way, no restrictions) has been a contributing factor to collisions and will be discussed in a later section. The access on the west approach is located within 15m of the intersection, and the configuration of the access has been a contributing factor to one left-turn collision with eastbound traffic along 122 Avenue. There should be some consideration given to restricting the access to right-in / right-out only, especially due to its close proximity to the intersection. It should be noted that left-in traffic is already restricted at this time, and there is signage at the driveway indicating this.

The access to the Chevron on the south approach is also located within 15m of the intersection. The configuration of the access has been a contributing factor to one left-turn collision with northbound traffic along Harris Road. This access should be restricted to right-in right-out traffic only.

Concrete bollards are also located at each corner of the intersection. It is also recommended that the bollard be removed.



East approach, close proximity to driveway



West Approach

## Mitigation Options

The following countermeasure options are suggested:

- Consider implementing a pedestrian leading interval for the east-west movement of pedestrians crossing Harris Road;
- Restrict driveway accesses in close proximity to intersection to right-in right-out only (access on west approach, and chevron access on south approach).
- Remove concrete bollards from the intersection

### 4.5 122A AVENUE / CHEVRON ACCESS

#### Collision Profile

At 122A Avenue and the Chevron Access, there were, overall, 0.80 collisions/year (0.20 casualty collision/year).

The highest frequency for a specific configuration was northbound left turn head on collisions with three in the dataset. Notably, all four collisions in the dataset involved the northbound left movement from the Chevron access. There are no strong temporal trends, though three of the four collisions occurred during the peak hours (2 of 4 from 6 – 9AM and 1 of 4 from 3 – 6PM).

#### Operations / Geometry

The access is located 25m east of the intersection. While this access is spaced appropriately according to TAC, vehicles turning left out of Chevron onto 122A Avenue to head west are required to cross two lanes of traffic (one eastbound / one westbound) to get to the westbound through / right lane. The access is also located at the point where westbound traffic is choosing either the left turn lane or the through / right lane.

Restricting the northbound-left movement would eliminate the conflict between northbound left vehicles from the Chevron and east west traffic on 122A Avenue; however, this would require vehicles exiting the Chevron to have to either cross two northbound through lanes on Harris Road to access the northbound left turn onto 122 Avenue or re-route onto 193 Street to head south. An alternative mitigation measure would be to extend the lane markings dividing the westbound lane back to 192B Street, thereby lengthening the separate westbound left turn and through / right turn lanes. This would westbound drivers to choose a lane at an earlier point, which would in turn allow traffic turning left out of the Chevron to judge gaps better by understanding which lane the westbound traffic is in. This option would require the removal of on-street parking on the north side of 122A Avenue west of 192B Street; however there would be no restrictions on turning movements for drivers.

## Mitigation Options

The following countermeasure options are suggested:

- Restrict parking on the north side of 122A Avenue west of 192B Street and extend the separate westbound left and through / right turn lanes back to 192B Street.

- Monitor the left turn movement out of the Chevron access. If collisions do not improve, restrict northbound left turns out of the Chevron by installing R-15-L signage.

#### 4.6 122 AVENUE / 191B STREET

##### **Collision Profile**

There were two collision in the dataset at this intersection (a collision involving a pedestrian on the east crosswalk, and a collision involving a rear-end at the intersection). The collision involving the pedestrian occurred on the east crosswalk when a northbound vehicle was turning right to proceed onto Harris Road. The rear-end collision at the intersection occurred due to the first motorist stopping for a pedestrian in the east crosswalk. This may indicate sightlines may not be sufficient due to the “s” curve.

##### **Geometry / Human Factors**

The “s” curve on the east approach to the intersection is a factor in reduced sightlines to the crosswalk at the intersection. To improve pedestrian visibility, the crosswalk should be moved to the other side of the intersection and a curb extension should be installed on the north side of the intersection that ties into the curve from the east approach. The bus stop on the north side of the intersection would need to be moved east, however, there would be additional protection provided to the bus due to the curb extension. Foliage should be trimmed where possible to provide the best sightlines, there is dense vegetation (Hoffman Park, foliage east of Hoffman Park).

##### **Mitigation Options**

The following countermeasure options are suggested:

- Clear foliage where possible to improve sightlines.
- Move the crosswalk to the west side of the intersection and install curb extensions on the north side of the intersection which tie into the “s” curve.
  - May require moving the existing bus stop to the east.





122 Avenue looking towards 191B Street



East Crosswalk

#### 4.7 122A AVENUE / 193 STREET

##### Collision Profile

At 122A Avenue and 193 Street, there was one collision reported at the intersection which involved a northbound left vehicle on the curve hitting a parked vehicle located too close to the curve. There was also a second parked vehicle hit west of the curve, indicating that vehicles may be placed too close to the curve, or that guidance is required to move motorists away from the parked vehicles. A curb extension could be in place west of the curve to guide motorists away from the parked cars along the north side of 122A Avenue.

##### Operations / Geometry

The curve was measured to have a radius of 15m. According to TAC, this corresponds to a design speed of 20km/h and is appropriately marked by the warning signage placed in advance of the curve. Motorists were observed to drive over the centerline, indicating that they may be driving at higher speeds than the 20km/h advised.

Traffic calming devices could be implemented on the approaches to the curve to reduce traffic speeds. There is already a center median in place on the north approach, however, devices such as speed humps, tables or cushions could assist in reducing speeds even further prior to the curve.

##### Mitigation Options

The following countermeasure options are suggested:

- Provide a curb extension in advance of the parking west of 193<sup>rd</sup> Avenue to provide protection from westbound traffic.



- A cost-effective treatment could be placing delineators to form a curb extension. The delineators also have retroreflective material which may help to improve visibility.
- Consider installing traffic calming devices (speed humps, tables or cushions) on the approach to the curve.



122A Avenue looking South East



193 Street looking North West

## 4.8 CYCLIST ACCOMMODATION

### Collision Profile

One cyclist collision was recorded in the study area, as noted previously at Harris Road and McMyn Road (between a northbound right motorist and northbound through cyclist); see section 4.1 for discussion about this issue.

### Harris Rd Accommodation

South of McMyn Road, Harris Road has very narrow bike lanes that vary between 1.0 to 1.1.m including the gutter pan. This is lower than the minimum recommended width of 1.2m, and preferred minimum of 1.5m as identified by TAC. There are also no bike lane signs and the

markings are inconsistent with current Canadian practice (as well as faded in many areas). The narrow lanes are a particular concern as they may give cyclists the false sense of security of sufficient space, but also give motorists the message that cyclists should ride in that area and not encroach the motorist lane (which cyclists may be compelled to do, given the lack of space and the presence of the gutter pan which serves to push cyclists further out).



Although the bike lanes end at McMyn Road, there is no 'Bike Lane Ends' sign warning northbound cyclists that the lane will end, and the lane line remains solid until the intersection (as opposed to a broken line to indicate the end of the bike lane). Cyclists north of McMyn Road are either forced to take the road, or ride on the sidewalk if they are not comfortable.

Even if the bike lane were to meet standard minimum widths, it would not be considered an all ages and abilities (AAA) facility, as there are large trucks and heavy volumes on Harris Rd.

### **McMyn Road**

McMyn Road is designated as a neighbourhood bikeway in the Pitt Meadows Pedestrian and Cycling Master Plan, and there are sharrows painted on the road west of 191 Street. No cyclist signage or paint markings exist east of 191 Street. However, rather than travel between 191 Street and Harris Road on McMyn Road, it is the expressed desire of City staff to direct cyclists along 191 Street and 124 Avenue to access Harris Road. Bike route signage has been installed on McMyn Road directing cyclists to 191 Street and sharrows have been painted along 191 Street and 124 Avenue. The 'neighbourhood bikeway' designation should therefore be removed from McMyn Road between 191 Street and Harris Road in the master plan as well as on the City of Pitt Meadows Cycling Network and Major Bike Loop maps found on the City website to avoid encouraging cyclists to use this section of McMyn Road.

### **122 / 122A Avenue**

The 122 / 122A Avenue is designated as neighbourhood bikeway. There are bike route signs sharrows stencil markings in place along the corridor.

### **Mitigation Options**

The following countermeasure options are suggested:

- Harris Rd: remove edge / bike lane line and stencils, only install if adequate minimum bike lane facility can be accommodated (would require widening). Option to install Share the Road signage with sharrows markings (shared lane width is appropriate if bike lane line is eradicated)

- McMyn Rd: remove the 'Neighbourhood Bikeway' designation in the Pedestrian and Transportation Master Plan and on City bike route maps at the next opportunity.

#### 4.9 PEDESTRIAN ACCOMMODATION

In general pedestrians are well served in the study area. There have been eight collisions with pedestrians, with all of them occurring at intersections. Most have them been identified and located, however there were three (3) where the location and direction could not be determined. Pedestrian leading intervals have been suggested as a measure to deal with the collisions at the signalized intersections, whereas moving the crosswalk and implementing a curb extension was suggested at an unsignalized location.

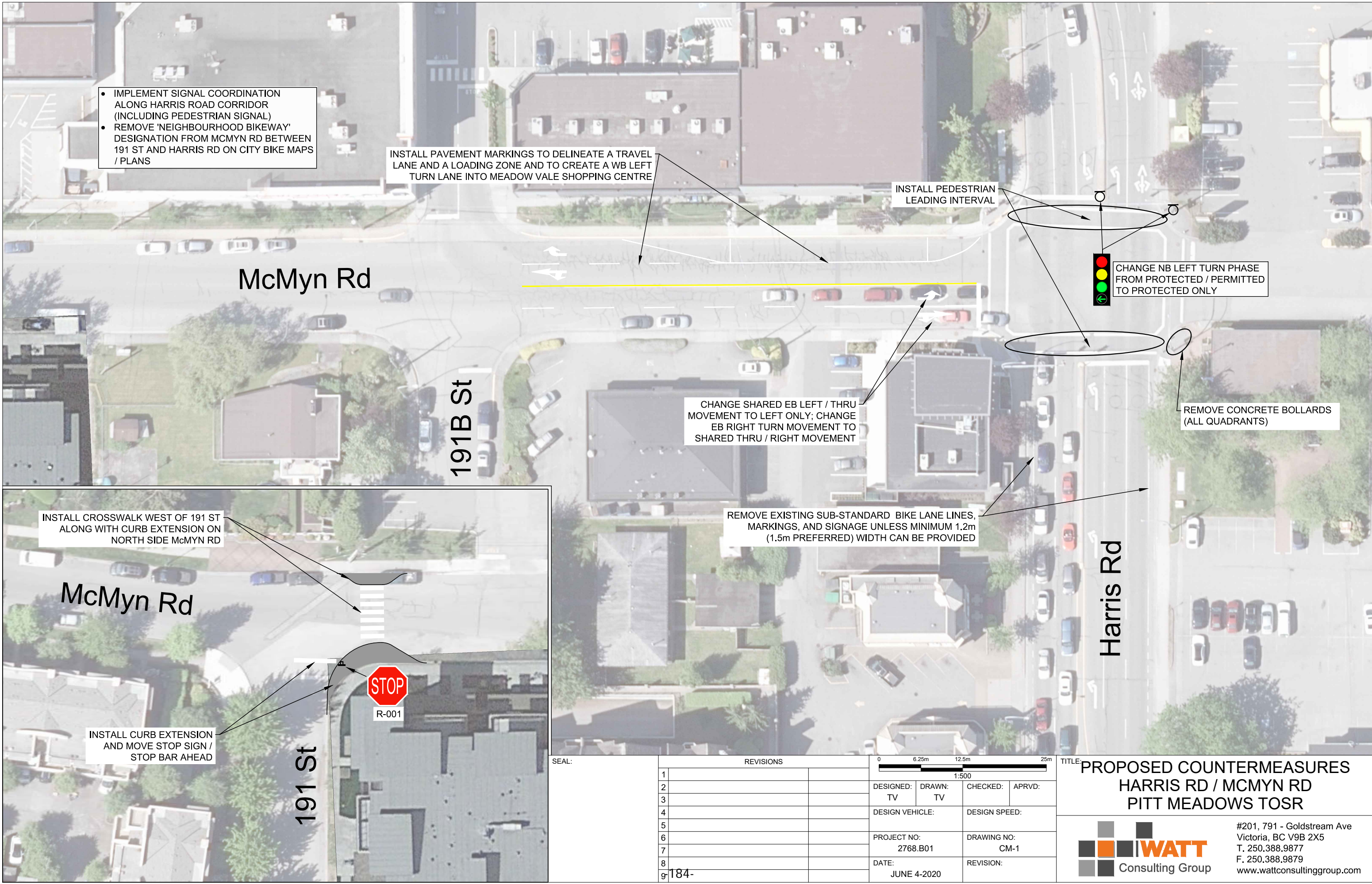
The City has expressed a desire for increasing the pedestrian connectivity between Meadowvale Center and the residential developments on the opposite side of McMyn Road by adding a north/south crosswalk at either 191 Street or 191B Street. Although no pedestrian counts were conducted at either location, based on volumes on McMyn Road at the Harris Road intersection a crosswalk may be warranted if required for pedestrian connectivity (from the *TAC Pedestrian Crossing Control Guide* Decision Support Tool). Placing the crosswalk at 191 Street is preferred over 191B Street due to the proximity of 191B Street to the existing crosswalk at Harris Road. The addition of a curb extension on the southeast corner of McMyn Road / 191 Street (as recommended in Section 4.3) would improve the safety and functionality of a crosswalk on the east side of 191 Street by improving the sightlines between pedestrians and vehicles and reducing the crossing distance. As there is on-street parking on the north side of the road, a curb extension on the north side is required to provide a pedestrian queue area that is visible to motorists. A sketch of the recommended crosswalk placement and configuration is included in **Figure 8**.

#### 5.0 COUNTERMEASURE IDENTIFICATION & EVALUATION

Potential countermeasures for specific locations and issues were noted in the analysis section of the report. Below is a summary of potential countermeasures, separated into those measures that can be evaluated in terms of potential reduction in collision cost, and those that cannot as readily be quantified in terms of collision reductions but may nonetheless be beneficial for improving multi-modal safety on the corridor or at specific locations. **Figures 8 and 9** show the overview of proposed countermeasures for specific locations and the corridor as a whole.



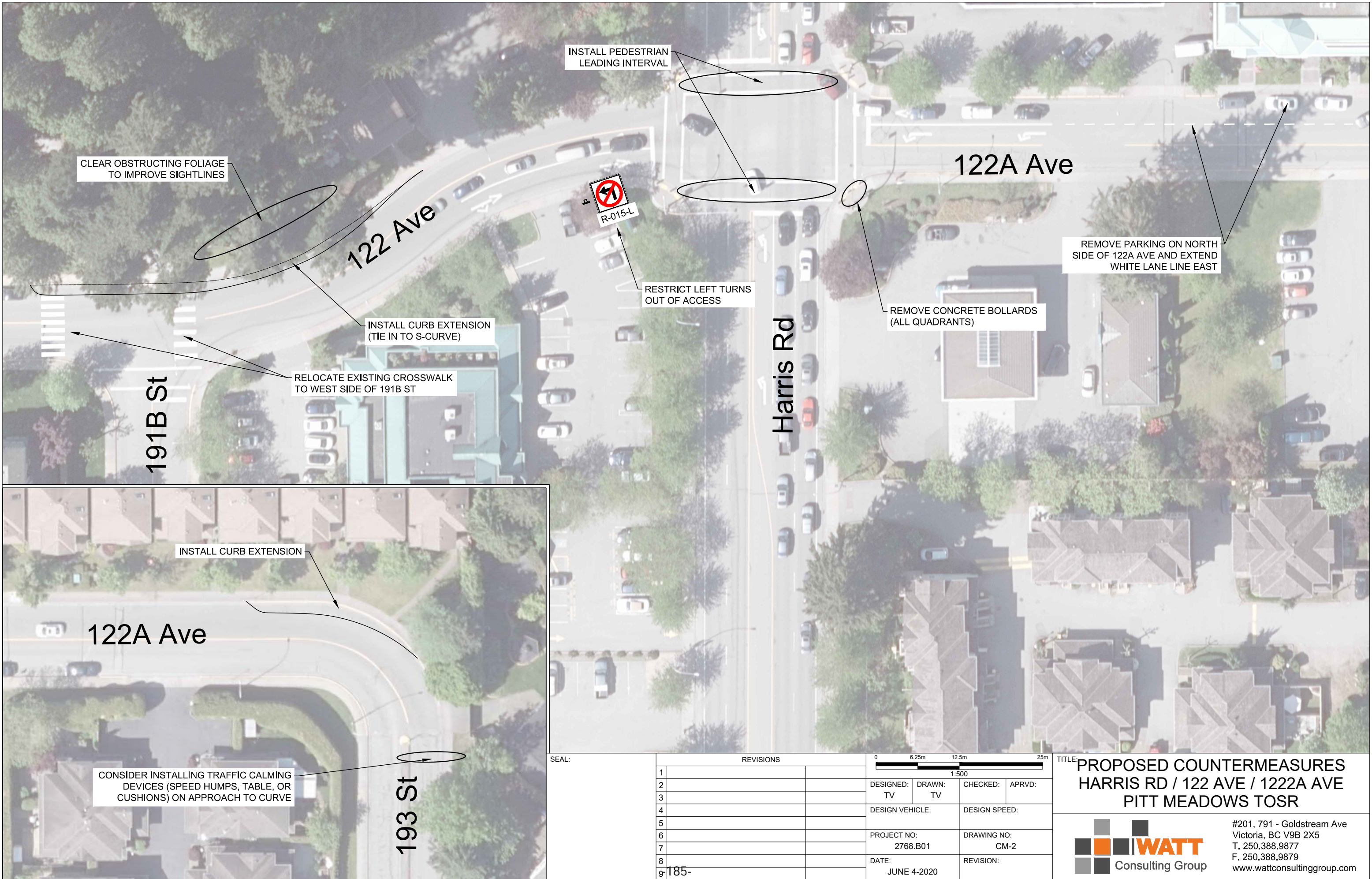
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## 5.1 COUNTERMEASURES FOR COLLISION REDUCTIONS

The following are potential countermeasures that can reduce the frequency and/or severity of collisions, with observed collisions that may be mitigated

- McMyn Rd / Harris Rd – Pedestrian Leading Interval for the east-west pedestrian movements across Harris Rd
- McMyn Rd / Harris Rd – Implement signal coordination along the Harris Rd corridor
- McMyn Rd / Harris Rd – Protected northbound left turn phasing
- McMyn Rd between 191B St and Harris Rd – Pavement markings to delineate eastbound through and right turn lanes
- 122 Ave / 122A Ave / Harris Road – Pedestrian Leading Interval for the east-west pedestrian movements across Harris Road
- 122 Ave / Pitt Meadows Professional Centre Access – ‘No Left Turn’ signage for northbound traffic
- 122 Ave / 191B St – Install curb extension on the north side of 122 Ave at intersection
- 122 Ave / 191B St – Relocate crosswalk to the west side of 191B St
- 122 Ave / 191B St – Clear foliage on curve (NE corner)
- 122A Ave / 193 St – Install curb extension on north side of 122A Ave west of parking area

The following are potential countermeasures that can reduce the frequency and/or severity of motorist collisions but with no observed or directly attributable collisions in the dataset.

- McMyn Rd / 191 St – Install curb extension on south-east corner of intersection and relocate stop sign / stop bar forward to end of curb extension
- 122A Ave / Chevron Access – Extend the separate westbound left and through / right turn lanes back to 192B Street

## 5.2 EVALUATION OF COUNTERMEASURES COLLISION REDUCTIONS AND BENEFIT / COST

Countermeasures were evaluated for their effectiveness and the reduction in collision costs. Collision cost values were determined from ICBC’s values for average cost per collision from the ICBC *2015 Program Evaluation Report Road Improvement Program* report. Severe (Fatal + Injury) collisions are valued at \$33,307 per injury collision and PDO collisions are valued at \$3,029 per collision. Reduction in collision costs for specific collision type reductions are weighted based on the number of PDO and severe collisions.

Collision reductions rates/factors are determined from the following hierarchy of sources:

- a) BC MoTI Collision Modification Factors for British Columbia;
- b) TAC Canadian Guide to In-Service Road Safety Reviews; and
- c) CMF Clearinghouse Website: <http://www.cmfclearinghouse.org/>
- d) MORCOAR Guide (Alberta Road Safety Engineering Toolbox)
- e) Similar countermeasure sourced from a), b), c), or d)

The economic evaluation compares the estimated average reduction in collision cost to the estimated road improvement investment and the estimated countermeasure cost. The estimated road improvement investment amount is based on the service life of the measure (either 2, 5, or 10 years depending on the measure), as follows:

- 2 year service life: cost reduction/year X 1.1;
- Over 2 to 5 year service life: cost reduction/year X 1.5, and
- Over 5 to 10 year service life: cost reduction/year X 1.8.

The high level cost estimates and economic evaluation do not get into details of annual maintenance costs, nor do they include user costs (such as costs associated with travel time and changes in delay for a given measure etc.).

**Table 2** summarizes the countermeasures that were evaluated for potential collision reduction, to establish potential road improvement investment by ICBC for each countermeasure. For the majority of countermeasures, the collision reduction cost/year as well as the amount of potential ICBC investment is less than the cost of the countermeasure, with the following exceptions:

- Harris Rd corridor signal coordination (dependent on whether controller upgrades are required)
- 'No Left Turn' signage at 122 Ave / Pitt Meadows Professional Centre Access

Nonetheless the estimated road improvement investment would offset cost to the municipality of installing some of the measures. Further, many of these measures may also benefit less-quantifiable safety improvements to vulnerable road users.

**Pitt Meadows TOSR - Countermeasure Options and ICBC Road Improvement Economic Assessment**

Countermeasure	Collisions Reduced by type	Target Collisions in 5 year period	Collisions per year		Collision Reduction		Reduction in Collision Cost		Service Life	Estimated RI Amount		Estimated Cost	CMF Source	Additional Notes
			total	injury	Low	High	Low	High		Low	High			
McMyn Rd / Harris Rd - Pedestrian Leading Interval	13% of vehicle / pedestrian collisions	2 Total (2 Injury)	0.4	0.4	0.052	0.052	\$1,732.00	\$1,732.00	5	\$2,598.00	\$2,598.00	\$3,500.00	CMF clearing house	
McMyn Rd / Harris Rd - Implement signal coordination along Harris Rd corridor	15% of intersection collisions	13 total (10 injury)	1.3	1	0.195	0.195	\$5,132.00	\$5,132.00	5	\$7,698.00	\$7,698.00	\$3,500 per signal	BC MoTI - CMFs for BC, Exhibit 6.11 (Signal Coordination)	- Additional \$10,000 per signal for controller upgrade (if required) - RI does not include collision reduction at other Harris Rd intersections as a result of coordination
McMyn Rd / Harris Rd - Protected northbound left turn phasing	99% of angle collisions	5 total (4 injury)	1	0.8	0.99	0.99	\$26,979.00	\$26,979.00	5	\$40,468.50	\$40,468.50	\$10,000.00	CMF clearing house	
McMyn Rd between 191B St and Harris Rd - Narrow westbound lane and delineate WB through and right turn lanes	10% to 45% of all collisions	4 total (2 injury)	0.8	0.4	0.08	0.36	\$1,453.00	\$6,540.00	5	\$2,179.50	\$9,810.00	\$5000 - \$10,000	TAC Canadian Guide to In-service Road Safety Reviews; Table 6.4 (Improve Pavement Marking / Delineation)	
McMyn Rd / 191 St - Curb extension (southeast corner)	30% to 50% of pedestrian collisions	0 total (0 injury)	0	0	0	0	\$0.00	\$0.00		\$0.00	\$0.00	\$10,000.00	TAC Canadian Guide to In-service Road Safety Reviews; Table 6.11 (Provide Curb Extensions)	
122 Ave / 122A Ave / Harris Road - Pedestrian leading interval	13% of vehicle / pedestrian collisions	2 total (1 injury)	0.4	0.2	0.052	0.052	\$945.00	\$945.00	5	\$1,417.50	\$1,417.50	\$3,500.00	CMF clearing house	
122 Ave / Pitt Meadows Professional Centre Access - 'No Left Turn' signage	up to 40% of all collisions	1 total (1 injury)	0.2	0.2	0.08	0.08	\$2,665.00	\$2,665.00	5	\$3,997.50	\$3,997.50	\$1,000.00	TAC Canadian Guide to In-service Road Safety Reviews; Table 6.7 (Restrict Turning Movements)	
122 Ave / 191B St Curve - Clear foliage in NE corner	15 to 50% of sight distance collisions.	1 total (0 injury)	0.2	0	0.03	0.1	\$91.00	\$303.00	5	\$136.50	\$454.50	\$500.00	TAC Canadian Guide to In-service Road Safety Reviews; Table 6.6 (Increase Sight Distance)	
122 Ave / 191B St - Curb extension (north side of 122 Ave)	30% to 50% of pedestrian collisions	1 total (1 injury)	0.2	0.2	0.06	0.1	\$1,998.00	\$3,331.00	5	\$2,997.00	\$4,996.50	\$10,000.00	TAC Canadian Guide to In-service Road Safety Reviews; Table 6.11 (Provide Curb Extensions)	
122 Ave / 191B St Crosswalk - Improve placement	5% of all	1 total (1 injury)	0.2	0.2	0.01	0.01	\$333.00	\$333.00	5	\$499.50	\$499.50	\$5,000.00	BC MoTI - CMFs for BC, Exhibit 8.3 (Improve Sign Conspicuity)	Also benefits pedestrian safety in the crosswalk



### 5.3 ADDITIONAL MEASURES

A number of the countermeasures can benefit multi-modal safety and comfort but are not as readily quantified in terms of benefit / cost financial values. They nonetheless are a consideration and can be considered in a multiple accounts evaluation approach in terms of public health, emissions, built-form / aesthetics, influence on mode choice, and equity of modes. Potential Measures are as follows.

Countermeasure	Purpose	Discussion
<b>Remove Concrete Bollards at 122 Ave / 122A Ave / Harris Rd</b>	Benefit mobility impaired pedestrians, minimize hazard for errant vehicles	Consider replacing concrete bollards with flexible / break-away bollards to reduce damage / injury potential in the event of a collision
<b>Remove Concrete Bollards at McMyn Rd / Harris Rd</b>	Benefit mobility impaired pedestrians, minimize hazard for errant vehicles	Consider replacing concrete bollards with flexible / break-away bollards to reduce damage / injury potential in the event of a collision
<b>Remove Bike Lanes on Harris Rd, install Sharrow markings and Share the Road Signs</b>	Provide a bicycle facility that matches available geometry, to better manage driver and cyclist expectations in this area.	Improves accommodation for confident cyclists but not all ages and abilities. (It is still a recommended measure.)
<b>Bike Route Connections for all ages and abilities</b>	Provide AAA bike connection in the study area, connecting south of rail (including West Coast Express station) to areas north.	Recommendation to ensure the future Harris Rd underpass can accommodate AAA cycling facilities due to limited opportunities for AAA railway crossings
<b>Multi-use Path Parallel to Harris Rd</b>	Provide a multi-use facility to provide a north-south AAA facility for cyclists, and sufficient width to share the space with pedestrians (compared to sidewalk-cycling that currently is observed).	Improves accommodation for cyclists of all ages and abilities, but there are space and ROW limitations (may only be possible in some locations as parcels redevelop), and a potentially high cost of implementation.
<b>Crosswalk across McMyn Road at 191 St</b>	Improve pedestrian connectivity between residences south of McMyn Rd and Meadowvale Center	Recommendation to install marked crosswalk across the east leg of the McMyn Rd / 191 St intersection, including curb extensions on north and south side.

## 6.0 IMPLEMENTATION PLAN

The following implementation plan provides a prioritized list of actions to guide the decision making and application of safety improvement countermeasures. These were assigned to short-term, medium term, and long term action items, based on either level of calculated benefits and costs or other noted benefits.

### Short-term / Immediate Action Items

- Remove / eradicate bike lane lines and stencils on Harris Rd, install sharrows and Share the Road signage
- Restrict parking on the north side of 122A Avenue west of 192B Street and extend the separate westbound left and through / right turn lanes back to 192B Street
- Install 'No Left Turn' signage at 122 Ave / Pitt Meadows Professional Building Access
- Clear obstructing foliage from north side of 122 Ave (on S-curve)
- Install pavement markings on McMyn Rd between 191B St and Harris Rd to delineate the eastbound through and right turn lanes as well as create a formal loading zone on the north side of McMyn Rd
- Install curb extension on the north side of 122 Ave at 191B St
- Relocate existing crosswalk at 122 Ave / 191B St to west side of intersection

### Medium-term Action Items

- Remove concrete bollards at intersection of McMyn Rd / Harris Rd
- Change northbound left turn phase at McMyn Rd / Harris Rd from protected / permitted to protected
- Install pedestrian leading interval at McMyn Rd / Harris Rd for east-west pedestrian movements
- Install curb extension on southeast corner of McMyn Rd / 191 St. Move stop sign / stop bar on southeast corner ahead to end of extension.
- In conjunction with above, install marked crosswalk across east leg of McMyn Rd / 191 St intersections including a curb extension on north side of McMyn Rd
- Remove concrete bollards at intersection of 122 Ave / 122A Ave / Harris Rd
- Install pedestrian leading interval at 122 Ave / 122A Ave / Harris Rd for east-west pedestrian movements
- Remove 'Neighbourhood Bikeway' designation from McMyn Rd between 191 St and Harris Rd on City documents (bike maps, transportation plans, etc)
- Install curb extension on north side of 122A Ave at 193 St

### Long-term Action Items

- Implement signal coordination along the Harris Rd corridor