



McElhanney



Prospect Lake Road Traffic Operations and In- Service Road Safety Review

Final Report

July 10, 2020

Submitted to: District of Saanich.
Prepared by McElhanney Ltd.

Contact

Denny Leung, PEng
Lead Road Safety Engineer
604-424-4860
dleung@mcelhanney.com

Bob Bigelow, PEng
Road Safety Engineer
604-674-6738
bbigelow@mcelhanney.com

Address

Suite 2300 Central City
Tower, 13450 – 102nd
Avenue, Surrey BC Canada
V3T 5X3

Our file: 2243-18131-00



**Your Challenge.
Our Passion.**

Contents

1. Introduction	1
1.1. Background	1
1.2. Work Currently Underway / Recently completed	3
1.3. Scope of Traffic Operations and In-Service Road Safety Review	3
2. Traffic Operations Review	7
2.1. Traffic Volumes	7
2.2. Assessment of Local vs Non-Local Traffic	9
2.3. Traffic operations Analysis	10
3. Collision and Speed Data Review	13
3.1. Collision Analysis	13
3.2. Speed Data Review	19
4. Observations from Site Visits / Corridor Drive Throughs	22
4.1. General Observations	22
4.2. Roadway Geometry	23
4.3. Vulnerable Road Users / Wildlife	24
4.4. Vision Limited – Goward Road	25
4.5. Trevlac Pond North of Calvert Park	26
5. Review of Public Input	27
6. Potential Mitigation Measures	28
6.1. Mitigations for Off-Road / Head-On Collisions	28
6.2. Mitigations to Reduce Vehicle Speeds	28
6.3. Vulnerable Road Users and Wildlife	29
6.4. Additional Mitigation measures	30
7. Recommendations	31
7.1. Projects Currently Underway	31
7.2. Counter Measures and Mitigation Strategy	31
7.3. Summary of Recommended Mitigation Measures	36
7.4. Benefit/Cost Analysis	37
8. Concluding Remarks	41



Figures

Figure 1 – Project Location	2
Figure 2 – 2020 Traffic Volumes	8
Figure 3 – ICBC Claims by Severity (January 2014 through December 2019)	13
Figure 4 – ICBC Claims by Vulnerable Road Users (January 2014 through December 2019).....	14
Figure 5 – ICBC Claims by Month (January 2014 through December 2019)	15
Figure 6 – ICBC Claims by Time of Day (January 2014 through December 2019).....	15
Figure 7 – ICBC Claims by Location (January 2014 through December 2019)	16
Figure 8 – ICBC Claims by Collision Type (January 2014 through December 2019)	17
Figure 9 – Cause of Off-Road Collision Claims (January 2014 through December 2019).....	17
Figure 10 – Saanich Police Violation Tickets by Year (January 2015 to February 2020)	20
Figure 11 – Saanich Police Violation Tickets by Location (January 2015 to February 2020)	21
Figure 12 – Summary of Public Feedback by Type of Concern	27
Figure 13 – Potential Signage at Roadway Curves	28
Figure 14 – Examples of Speed Reader Boards	29
Figure 15 – Cyclist Signage	29
Figure 16 – Wildlife/Deer Signage	29
Figure 17 – Roadside Hazards / Object Markers.....	30
Figure 18 – Concealed Road Sign	30
Figure 19 – Proposed Speed Reduction Zone – South End.....	33
Figure 20 – Proposed Speed Reduction Zone – North End	33
Figure 21 – Skew Angle at Prospect Lake Road / Munn Road	35

Tables

Table 1 – Intersection Level of Service Definitions	11
Table 2 – 2020 Level of Service Results	12
Table 3 – Collision Rate Assessment (Claims from January 2015 through December 2019)	19
Table 4 – Speed Summary Reports.....	20
Table 5 – Summary of Recommended Mitigation Measures.....	37
Table 6 – CMFs for Various Mitigation Measures.....	38
Table 7 – Estimated Collision Frequencies Before and After Implementing Mitigation Measures	39
Table 8 – Average Collision Cost Values (ICBC).....	39
Table 9 – Class D Cost Estimates	40
Table 10 – Financial Performance of Mitigation Measure	40



Photos

Photo 1 – Horizontal and Vertical Curve	23
Photo 2 – Crest Curve into Horizontal Curve.....	23
Photo 3 – Near Miss Incident With Cross-Over Vehicle	23
Photo 4 – Northbound Cyclist Near North End	24
Photo 5 – Northbound Cyclist Near South End.....	24
Photo 6 – Pedestrians Crossing Prospect Lake Road at Meadowbrook Road	24
Photo 7 – Wildlife during the Daytime	25
Photo 8 – Wildlife during the Nighttime	25
Photo 9 – Southbound Prospect Lake Road, South of Goward Road.....	25
Photo 10 – Southbound Prospect Lake Road, Approaching Trevlac Pond	26
Photo 11 – Southbound Prospect Lake Road Near the Pond	26
Photo 12 – Trees / Rock Outcrop North of Goward Road	34

Appendices

- A – BC MoTI 2018 AADT Factors
- B – Prospect Lake Road – Existing and Proposed Signing and Pavement Markings
- C – Summary of Public Input Received



1. Introduction

1.1. BACKGROUND

McElhanney Ltd. (McElhanney) was retained by the District of Saanich (the District) and the Insurance Corporation of BC (ICBC) to conduct a Traffic Operations and In-Service Road Safety Review of the Prospect Lake Road corridor from West Saanich Road to West Burnside Road, as shown in **FIGURE 1**. This review is being undertaken at the request of the District.

Prospect Lake Road is approximately 7.2 km long, the majority of which runs in a north-south orientation. At the northern end, approximately 600 m of the corridor runs east-west before intersecting with West Saanich Road. The corridor is a two-lane roadway with minimal/no shoulders and is designated as a Collector Road within the District's Official Community Plan (OCP) and *2007 Rural Saanich Local Area Plan* (Appendix J to Bylaw 8940, adopted June 10, 2008). Within this plan, Prospect Lake Road is also designated as a Recreation Route / Local Connector cycling facility.

The posted regulatory speed limit along the corridor is 50 km/hr, although 20 and 30 km/hr advisory speeds are included at some locations. There is also a 30 km/hr school zone in front of Prospect Lake Elementary, located to the west of West Saanich Road.

For the most part, the corridor serves as an access point for single family homes within the study area. Prospect Lake Elementary school and several parks are also situated along the corridor. As shown in **FIGURE 1**, Prospect Lake Road is a parallel route to other corridors located to the east, such as Interurban Road, West Saanich Road, and Highway 17 (Patricia Bay Highway). A connection to the Trans Canada Highway to the south is also provided via West Burnside Road.

The following four study intersections have been included as part of this review. Note that roadway classifications are from the District's OCP.

- Prospect Lake Road (Collector) / West Saanich Road (Major) / Sparton Road (Collector),
- Prospect Lake Road (Collector) / Goward Road (Residential),
- Prospect Lake Road (Collector) / Munn Road (Collector), and
- Prospect Lake Road (Collector) / West Burnside Road (Major).



Prospect Lake Road In-Service Safety and Traffic Operations Review

Project Location

FIGURE 1

Not to Scale

1.2. WORK CURRENTLY UNDERWAY / RECENTLY COMPLETED

Several projects are either currently underway or recently completed along Prospect Lake Road. These include:

- Prospect Lake Elementary participated in the District's Active and Safe Routes to School 2017-2018 Program, which included an on-line school travel survey for parents to complete and a neighbourhood walkabout to support the information received.
- LED street lighting was installed along the corridor in 2019.
- A work order was issued by the District in October 2019 to install centreline rumble strips around the curves to the north and south of the Prospect Lake Road / Munn Road intersection (approximately 1,150 m of thick centreline). This will include rumble strip warning signs at each end of the installation.
- Re-configuration of the existing Prospect Lake Road / West Saanich Road / Sparton Road intersection to a signalized intersection and the construction of a pedestrian path from Whitehead Park to Prospect Lake Community Hall – currently in the detailed design phase.
- Design underway for an improved pedestrian facility from Goward Road to West Saanich Road, including the installation of delineator posts on Prospect Lake Road and a speed reader board at the school. In addition, the rock outcrop on the west side of Prospect Lake Road will be removed.
- Preliminary design is underway for the placement of road edge barrier at Trevlac Pond near Calvert Park.

1.3. SCOPE OF TRAFFIC OPERATIONS AND IN-SERVICE ROAD SAFETY REVIEW

The In-Service Road Safety Review portion of this project was conducted based on *The Canadian Guide to In-Service Road Safety Reviews*, developed by the Transportation Association of Canada (TAC), January 2004. The following is a definition of an In-Service Road Safety Review:

An In-Service Road Safety Review is an in-depth engineering study of an existing road using road safety principles with the purpose of identifying cost-effective countermeasures that would improve road safety and operations for all road users.

The Traffic Operations and In-Service Road Safety Review is different from a Road Safety Audit of a design or pre-opening audits of a project. The intent of the review is to assess the existing roadway conditions, traffic volumes, collision history, geometrics, human factors observations and traffic conflicts, and identify mitigations to reduce collision risks.

1.3.1. Review Team

This Traffic Operations and In-Service Road Safety Review was prepared by Denny Leung, PEng, Lead Road Safety Engineer, and Bob Bigelow, PEng, Road Safety Engineer, both from McElhanney's Surrey Branch.



1.3.2. Review Process

Start-Up Meeting and Site Visit

McElhanney's review team met with District Staff and ICBC on March 2, 2020 to discuss the project scope and exchange information relevant to the corridor, such as challenges, issues, and concerns. The review team then conducted site visits of the corridor during the following periods:

- Afternoon / PM peak period – 5:00 PM on March 2, 2020
- Nighttime – 6:30 PM on March 2, 2020
- Morning / AM peak period – 7:30 AM on March 3, 2020
- Mid-day – 11:30 AM on March 3, 2020

The site visits were conducted within a vehicle using a dash-mounted camera to record various aspects of the roadway. This allowed us to ascertain any traffic safety related conditions and see how the existing road network interacts with the current land use, general surroundings, and existing road users (pedestrians, cyclists, and vehicles). Given the current cross-section of Prospect Lake Road, the review team was unable to safely walk and cycle the corridor. However, specific observations were made regarding how vulnerable road users interact with vehicle traffic, including a review of cycling and pedestrian facilities and signage.

The site visits were conducted at various times on the two days such that we were able to cover AM and PM peak periods, non-peak periods (e.g. mid-day), and daytime and nighttime conditions. During the site visits, the review team also pulled over at several locations to observe various aspects of the roadway, including:

- Prospect Lake Road / West Saanich Road / Sparton Road – to observe intersection operations, pedestrian movements to/from the school, and vehicles travelling to/from Mosi's Bakery Café & Gelateria on the north-east corner.
- Prospect Lake Road / Goward Road – to observe sight line constraints and traffic operations.
- Prospect Lake Road / Munn Road – to observe traffic operations at the intersection and vehicles approaching the intersection through the winding roadway segments to the north and south.
- Prospect Lake Road / West Burnside Road – to observe traffic operations at the intersection, including queuing and delays for the southbound approach.

A follow up drive through was conducted by McElhanney on March 12, 2020 where we recorded the corridor using a roof-mounted panoramic camera to help document the existing conditions of the roadway.



Materials that were provided by the District and ICBC for this review include:

1. ICBC claims data from 2014 to 2019
2. Saanich Police car crash data from January 1, 2018 to May 22, 2019
3. Saanich Police violation tickets issued to motorists from 2015 to February 2020
4. Speed summary reports at various locations along the corridor from 2017, 2018, and 2019
5. Historical traffic count information for Prospect Lake Road and the study intersections
6. The District's *2007 Rural Saanich Local Area Plan* (Appendix J to Bylaw 8940, adopted June 10, 2008)
7. Prospect Lake Elementary Active and Safe Routes to School Consultation Summary 2017-2018 Program
8. Corridor map of Prospect Lake Road that was used as part of the public forum process
9. Input received from the public forum process
10. As-built drawings for segments along Prospect Lake Road

Traffic Operations and In-Service Road Safety Review

Based on the information obtained from the District and ICBC, and observations made during the site visit, a Traffic Operations and In-Service Road Safety Review of the existing corridor was conducted. The intent of the review is to assess the existing roadway conditions, traffic volumes, collision history, geometrics, human factors observations and traffic conflicts, and identify mitigations to reduce collision risks. In addition, the scope of the assignment does not cover the review of any existing structural performance of components, such as retaining walls.

Available Design Guidelines used in the review:

1. Transportation Association of Canada (TAC), Geometric Design Guide for Canadian Roads, June 2017.
2. BC Ministry of Transportation and Infrastructure (BC MoTI), BC Supplement to TAC Geometric Design Guide, Third Edition, 2019.
3. BC MoTI, British Columbia Active Transportation Design Guide, 2019 Edition
4. TAC Bikeway Traffic Control Guidelines for Canada, Second Edition, February 2012.
5. BC MoTI, Manual of Standard Traffic Signs & Pavement Markings, September 2000.
6. Manual of Uniform Traffic Control Devices (MUTCD) for Canada, January 2014.

RSA Guidelines:

1. TAC Canadian Guide to In-Service Road Safety Reviews, January 2004.



Other Manuals/Resources:

1. Collision Modification Factors for British Columbia, Prepared for BC MoTI by Tarek Sayed and Paul de Leur, December 2008.
2. Collision Prediction Models for British Columbia, Prepared for BC MoTI by Tarek Sayed and Paul de Leur, December 2008.
3. American Association of State Highway and Transportation Officials (AASHTO), Highway Safety Manual, 1st Edition, 2010.
4. Crash Modification Factors Clearinghouse – <http://www.cmfclearinghouse.org/>
5. 2015 Program Evaluation Report – Road Improvement Program, Prepared for ICBC by Tarek Sayed and Emanuele Sacchi, June 2015.
6. Institute of Transportation Engineers (ITE), Trip Generation Manual, 10th Edition, September 2017



2. Traffic Operations Review

2.1. TRAFFIC VOLUMES

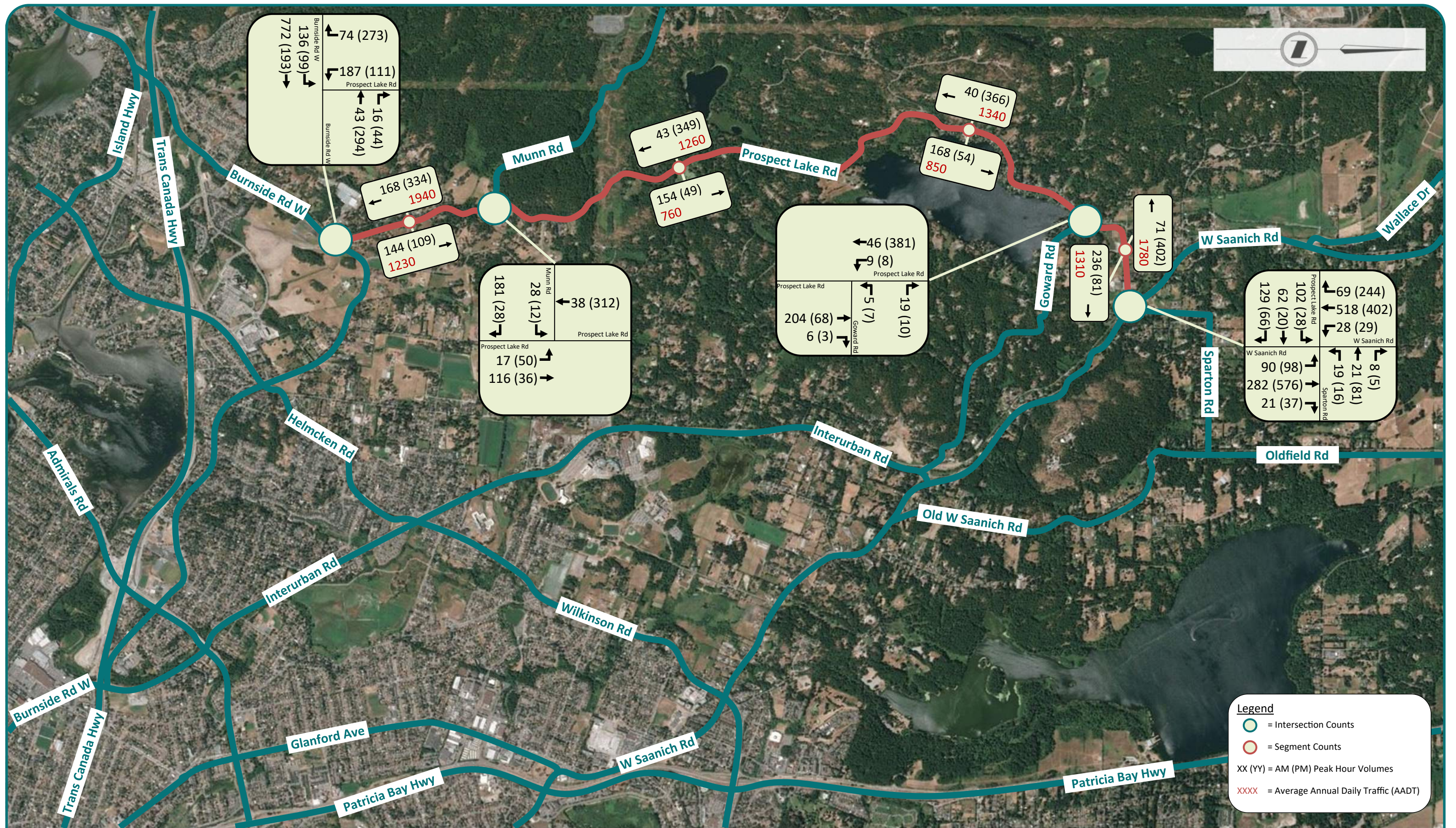
Historical traffic data for Prospect Lake Road was provided by the District, which included the following:

- Peak hour intersection turning movement counts at:
 - Prospect Lake Road / West Saanich Road / Sparton Road – February 22, 2017
 - Prospect Lake Road / Goward Road – March 7, 2018
 - Prospect Lake Road / Munn Road – October 4, 2016
 - Prospect Lake Road / West Burnside Road – October 16, 2019
- Two-way link volume counts at various locations along the corridor
 - 24-hour counts covering mid-week periods (typically Tuesday through Thursday)
 - Counts were conducted in 2011, 2012, and 2018

A review of the historical data near Munn Road suggests that traffic volumes have been growing by more than 5% per year between 2011 and 2018. However, given the limited data at these locations, this growth rate may not be representative of the actual traffic growth that has occurred. BC MoTI has a permanent count station, P-11-5EW, located on West Burnside Road approximately 1.3 km south-west of Prospect Lake Road. A review of this data, which is collected annually, suggests that traffic volumes have been growing by 2.0 to 2.5% per year. As this is likely more representative of the growth that has been occurring on Prospect Lake Road, an annual growth rate of 2.0% was used to project traffic volumes to existing 2020 conditions.

To estimate the annual average daily traffic (AADT) volumes along the study corridor, a 2.0% annual growth rate was applied to the most recent two-way link volumes to estimate the daily traffic in 2020. Each year, BC MoTI develops daily and monthly factors that can be used to convert traffic volumes to AADT (refer to **APPENDIX A**). Day of week factors from 2018 were used to estimate the monthly average daily traffic (MADT) volumes along the corridor. Annual factors were then applied to convert MADT to AADT.

The estimated 2020 AM and PM peak hour and daily traffic volumes for Prospect Lake Road are presented in **FIGURE 2**, which were developed based on the methodology described above. The TAC Geometric Design Guide for Canadian Roads (June 2017) suggests that the typical AADT volumes for rural and urban collector road are less than 5,000 and 8,000 vehicles per day, respectively. Currently, the corridor serves approximately 3,100 vehicles per day, which is within the TAC definition of a collector road.



Prospect Lake Road In-Service Safety and Traffic Operations Review

2020 Traffic Volumes

FIGURE 2

Not to Scale

2.2. ASSESSMENT OF LOCAL VS NON-LOCAL TRAFFIC

Given its location in the surrounding network, there is a perception that Prospect Lake Road is used by non-local traffic. This could occur if congestion and/or construction activities impact travel times on parallel routes, such as Interurban Road and West Saanich Road, or because Prospect Lake Road serves as a more direct connection for people wanting to access Trans Canada Highway to the south/west. In addition, motorists could be using this corridor to access the various recreation areas, wineries, farms, Prospect Lake Elementary, Prospect Lake Community Hall, and Mosi's Bakery Café & Gelateria.

As actual origin-destination data is not available for the traffic currently using the study corridor, it is difficult to make any conclusive statements regarding local vs. non-local traffic. However, we can estimate the amount of residential traffic that could potentially be using the corridor during weekday peak hours and compare that against the actual observed traffic volumes.

Trip generation refers to the process of estimating the amount of vehicular traffic a land use is expected to add to the surrounding roadway system. Trip generation estimates were developed using *Trip Generation, 10th Edition* (September 2017), Institute of Transportation Engineers (ITE). Given that the majority of land use within the study area consists of single-family homes and the assessment is for the AM and PM peak hours (i.e. heavy commuter traffic is expected), ITE Land Use Code 210: Single-Family Detached Housing was selected for this analysis. Although other land uses exist along the corridor (e.g. recreational areas, farms, community hall, light commercial, etc.), it is difficult to understand the origin-destination of the trips generated by these uses without additional data (e.g. origin-destination surveys, travel demand model, etc.). It is assumed that these trips would be a combination of local and non-local users and would likely occur outside of the commuter peak hours that were analyzed as part of this review.

It is estimated that there are approximately 314 residents either living on Prospect Lake Road or one of the dead-end roads that connect to the corridor. The ITE manual suggest that Land Use Code 210 will generate 0.74 and 0.99 vehicle trips during typical weekday AM and PM peak hours, respectively. Based on the number of residents who access the corridor, this equates to approximately 233 vehicles during the AM peak hour and 311 during the PM peak hour.

As shown in **FIGURE 2**, average traffic volumes during the AM peak hour range from 270 to 330 vehicles per hour. Compared to the estimated local traffic of 233 vehicles per hour, approximately 15 to 40% of the traffic currently on Prospect Lake Road during the AM peak hour could be non-local traffic (i.e. 60 to 85% of the traffic is likely local traffic). Similarly, average traffic volumes during the PM peak hour range from 440 to 470 vehicles per hour. Comparing this to the estimated local traffic of 311 vehicles per hour suggests that 35 to 50% of the existing traffic on Prospect Lake Road is non-local traffic (i.e. 50 to 65% is generated by local residents).



It is important to note that there may be additional factors that could influence the amount of non-local traffic using Prospect Lake Road. This includes traffic that is travelling to/from Prospect Lake Elementary. Prospect Lake Road is also a more direct route for vehicles traveling between the north and south/west. However, as discussed in **SECTION 2.1**, the current traffic volumes along Prospect Lake Road (AADT of approximately 3,100) are within the daily volumes expected for a typical collector road.

Note that conducting origin-destination surveys along the corridor or developing a travel demand model would allow for more definitive conclusions to be drawn regarding nature of the traffic on Prospect Lake Road.

2.3. TRAFFIC OPERATIONS ANALYSIS

Traffic operations analysis was conducted at the four study intersections for the existing conditions (i.e. 2020 traffic volumes). The analysis was done for the AM and PM peak periods.

2.3.1. Synchro Analysis Software

Synchro software, version 10, was used to report the level of service (LOS), average delays, volume-to-capacity (v/c) ratios, and 95th percentile queue lengths at each of the study intersections. Synchro is a traffic software used to determine traffic conditions based on volumes, laning, and type of traffic control. Synchro calculates average delays and queue lengths for each movement at an intersection. Average delays are then translated into LOS.

2.3.2. Intersection Level of Service

Operations of roadway facilities are described in terms of Level of Service (LOS), which is a qualitative description of traffic flow based on factors such as speed, travel time, delay, and freedom to manoeuvre. Six service levels are defined, ranging from LOS A (the best operating conditions) to LOS F (the worst operating conditions). LOS E corresponds to “at or near capacity” operations. When volume exceeds capacity, it results in stop-and-go conditions, which is designated as LOS F. The delay thresholds and corresponding LOS are presented in **TABLE 1**. The typical criterion for acceptable operation is LOS D.



Table 1 – Intersection Level of Service Definitions

Level of Service	Delay Criteria		Description
	Signalized	Unsignalized	
A	≤ 10	≤ 10	Represents free flow. Individual users are virtually unaffected by others in the traffic stream. Usually no conflicting traffic
B	> 10 to 20	> 10 to 15	Stable flow, but the presence of other users in the traffic stream begins to be noticeable. Occasionally some delay due to conflicting traffic
C	> 20 to 35	> 15 to 25	Stable flow, but the operation of individual users becomes significantly affected by interactions with others in the traffic stream. Delay is noticeable, but not inconveniencing.
D	> 35 to 55	> 25 to 35	Represents high-density, but stable flow. Delay is noticeable and irritating; increased likelihood of risk taking.
E	> 55 to 80	> 35 to 50	Represents operating conditions at or near the capacity level. Delay approaching tolerance levels; risk taking behaviour is likely.
F	> 80 or v/c ratio > 1	> 50 or v/c ratio > 1	Represents forced or breakdown flow. Delay exceeds tolerance level; high likelihood of risk taking.

2.3.3. Existing Conditions Level of Service Results

A summary of the 2020 AM and PM peak hour intersection results – v/c ratio, delay, LOS, and 95th percentile queue length – can be found in **TABLE 2**.

As the detailed design for the improvements at Prospect Lake Road / West Saanich Road / Sparton Road is currently underway, this intersection was analyzed assuming signalized operation. The signal timing plan for this intersection is also being developed as part of the detailed design work. For the purposes of this review, an optimized signal timing/phasing plan was assumed. The actual traffic operations at this intersection may vary once the timing/phasing plan has been finalized.



Table 2 – 2020 Level of Service Results

		2020 Results – Existing Conditions ¹													
Intersection	Period	Attribute	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Overall
Prospect Lake Road / West Saanich Road / Spartan Road ² (Signalized)	AM	v/c Ratio	0.57	0.54	0.25			0.59	0.43	0.18	0.89	0.15			-
		Delay (s)	33	33	27			48	20	35	43	20			34
		LOS	C	C	C			D	B	C	D	C			C
		95% Queue (m)	40	35	15			40	75	15	165	20			-
	PM	v/c Ratio	0.24	0.39	0.44			0.50	0.63	0.19	0.49	0.38			-
		Delay (s)	33	37	35			43	23	38	23	22			26
		LOS	C	D	D			D	C	D	C	C			C
		95% Queue (m)	20	25	30			35	170	15	90	55			-
Prospect Lake Road / Goward Road (Stop Control)	AM	v/c Ratio	-		0.05	-	0.05	-	0.15	0.01		-			-
		Delay (s)	-		10	-	10	-	0	1		-			1
		LOS	-		B	-	B	-	A	A		-			A
		95% Queue (m)	-		<5	-	<5	-	0	<5		-			-
	PM	v/c Ratio	-		0.04	-	0.04	-	0.05	0.01		-			-
		Delay (s)	-		10	-	10	-	0	1		-			1
		LOS	-		B	-	B	-	A	A		-			A
		95% Queue (m)	-		<5	-	<5	-	0	<5		-			-
Prospect Lake Road / Munn Road (Stop Control)	AM	v/c Ratio	0.27	-	0.27	-			0.01	-	-	0.03		-	
		Delay (s)	10	-	10	-			1	-	-	0		6	
		LOS	B	-	B	-			A	-	-	A		A	
		95% Queue (m)	10	-	10	-			<5	-	-	0		-	
	PM	v/c Ratio	0.09	-	0.09	-			0.06	-	-	0.19		-	
		Delay (s)	11	-	11	-			5	-	-	0		2	
		LOS	B	-	B	-			A	-	-	A		A	
		95% Queue (m)	<5	-	<5	-			<5	-	-	0		-	
Prospect Lake Road / West Burnside Road (Stop Control)	AM	v/c Ratio	0.11	0.55	-	-	0.05	-			1.69	-	1.69	-	
		Delay (s)	8	0	-	-	0	-			>200	-	>200	84	
		LOS	A	A	-	-	A	-			F	-	F	F	
		95% Queue (m)	<5	0	-	-	0	-			175	-	175	-	
	PM	v/c Ratio	0.09	0.12	-	-	0.22	-			0.84	-	0.84	-	
		Delay (s)	8	0	-	-	0	-			39	-	39	16	
		LOS	A	A	-	-	A	-			E	-	E	C	
		95% Queue (m)	<5	0	-	-	0	-			65	-	65	-	

Notes: 1. **BOLD** = traffic volume meets or exceeds capacity.

2. Analyzed as a signalized intersection to match future conditions – detailed design currently underway.

With the planned upgrades at Prospect Lake road / West Saanich Road / Spartan Road, all movements are expected to operate at LOS D or better during both the AM and PM peak hours. Once again, operations for this intersection may vary once detailed design of the signal timing/phasing plan is complete. In addition, traffic operations at Prospect Lake Road / Goward Road and Prospect Lake Road / Munn Road are within acceptable levels with all movements operating at LOS A or B.

The southbound approach at Prospect Lake Road / West Burnside Road operates at LOS F and E during the AM and PM peak hours, respectively. This movement experiences lengthy delays largely due to the high eastbound volumes travelling along West Burnside Road, particularly during the AM peak hour.



3. Collision and Speed Data Review

3.1. COLLISION ANALYSIS

Recent ICBC claims data was provided for Prospect Lake Road from 2014 through 2019. In total, there were 118 claims recorded during this six-year period. Saanich Police also provided information on 32 collisions that they attended along the corridor from January 1, 2018 through May 22, 2019. Additional analysis of the collision data is provided in the sections below.

3.1.1. Collision Trends

A summary of the ICBC claims data by year and severity is presented in **FIGURE 3**. **Note that “casualty” claims represent collisions that involved injuries and/or fatalities while “PDO” represent property damage only claims.** On average, there are approximately 20 claims made per year along Prospect Lake Road.

Additional review of the data by ICBC indicates that there were no fatalities recorded as part of the casualty claims. However, there was news of a fatal collision near Munn Road on September 30, 2019 that involved the death of a motorcyclist. Although unlikely, this fatality may not be included in ICBC’s database due to a claim not being filed yet. Between 2014 and 2018, approximately 26% of all claims involved casualty collisions, on average. In 2019 there was an increase in this proportion with over 50% of the claims resulting in injuries and/or fatalities; however, the reported claims are down by 35% when compared to the claims in 2018.

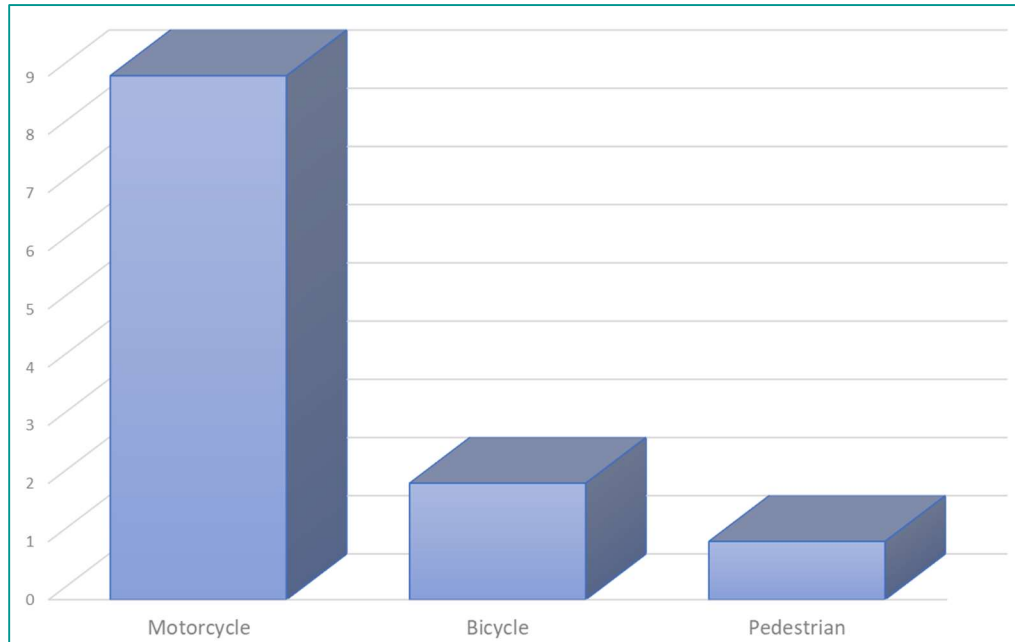
Figure 3 – ICBC Claims by Severity (January 2014 through December 2019)



Note: Casualty claims includes collision resulting in injuries and/or fatalities

FIGURE 4 includes the claims that involved vulnerable road users. It is noted that Prospect Lake Road is a popular route for motorcycles and a designated cycling route. Over the six-year period, there were nine collisions that involved motorcycles and two claims that involved cyclists. However, there could be additional near misses that occurred but were not recorded by ICBC as claims were not made. There was also one collision that involved a pedestrian.

Figure 4 – ICBC Claims by Vulnerable Road Users (January 2014 through December 2019)



Collision trends by month and time of day are presented in **FIGURE 5** and **FIGURE 6**, respectively. Approximately 17% of all claims occurred in May, while 7.5% occurred in March and April combined. All other months were consistent with approximately 8.5% of the claims, on average. It is not clear based on the data why there was a spike in collisions in May, but this could be a result of changing weather patterns. The weather starts to become clearer in May and daylight hours start to increase. This may lead drivers to believe that they can drive faster along the corridor when the actual road conditions may not be suitable for this.

Approximately 25% of claims were made during the PM peak period from 3:01 to 6:00 PM, which was more than 10% higher than the AM peak period (14% occurred between 6:01 to 9:00 AM). This is not a surprise, as the PM peak volumes along Prospect Lake Road are nearly double those during the AM peak period.

Figure 5 – ICBC Claims by Month (January 2014 through December 2019)

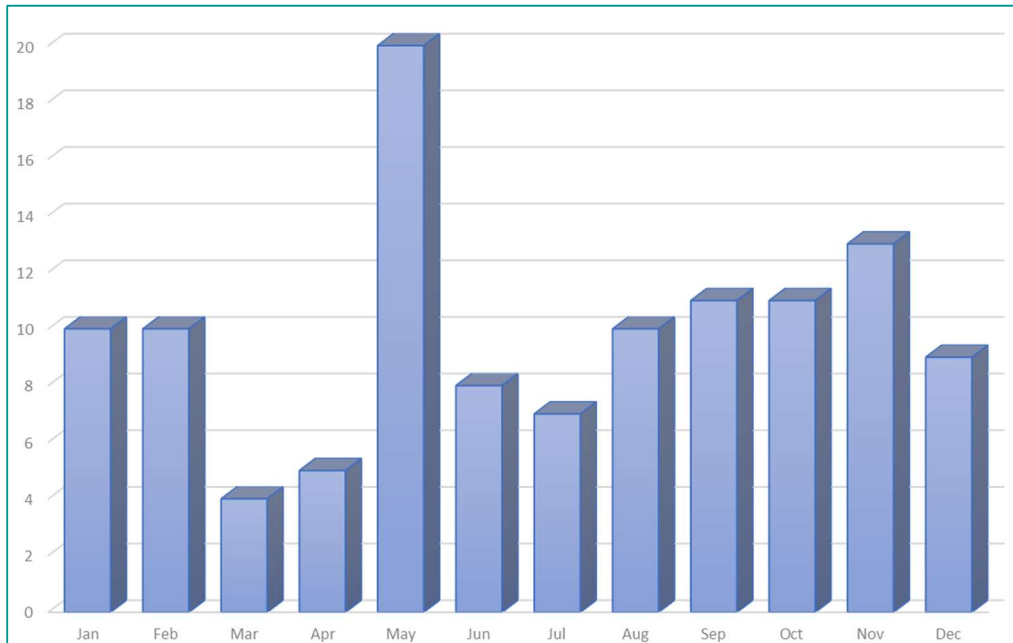
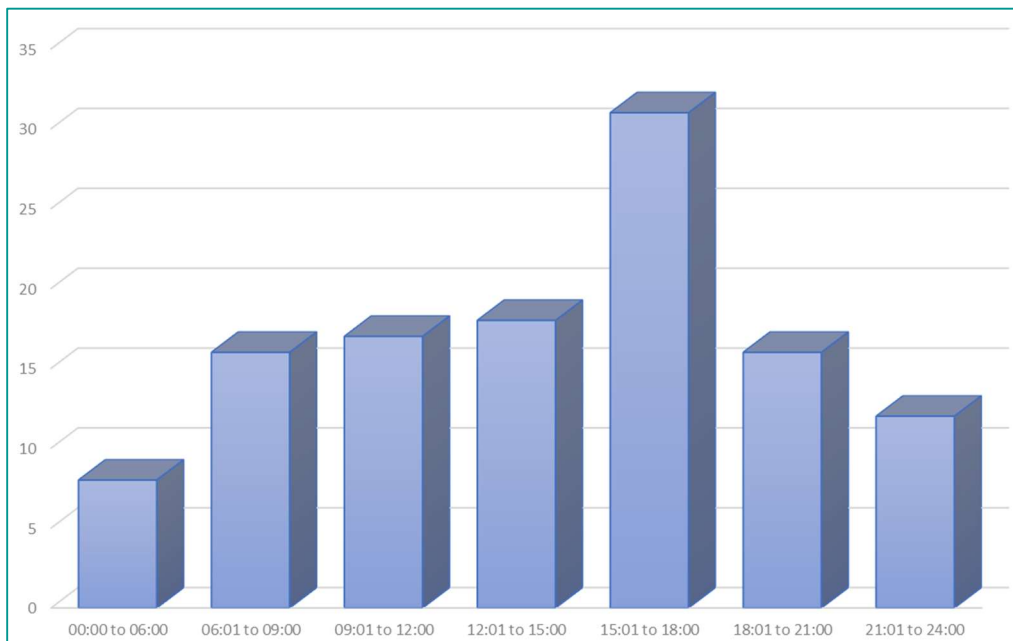


Figure 6 – ICBC Claims by Time of Day (January 2014 through December 2019)

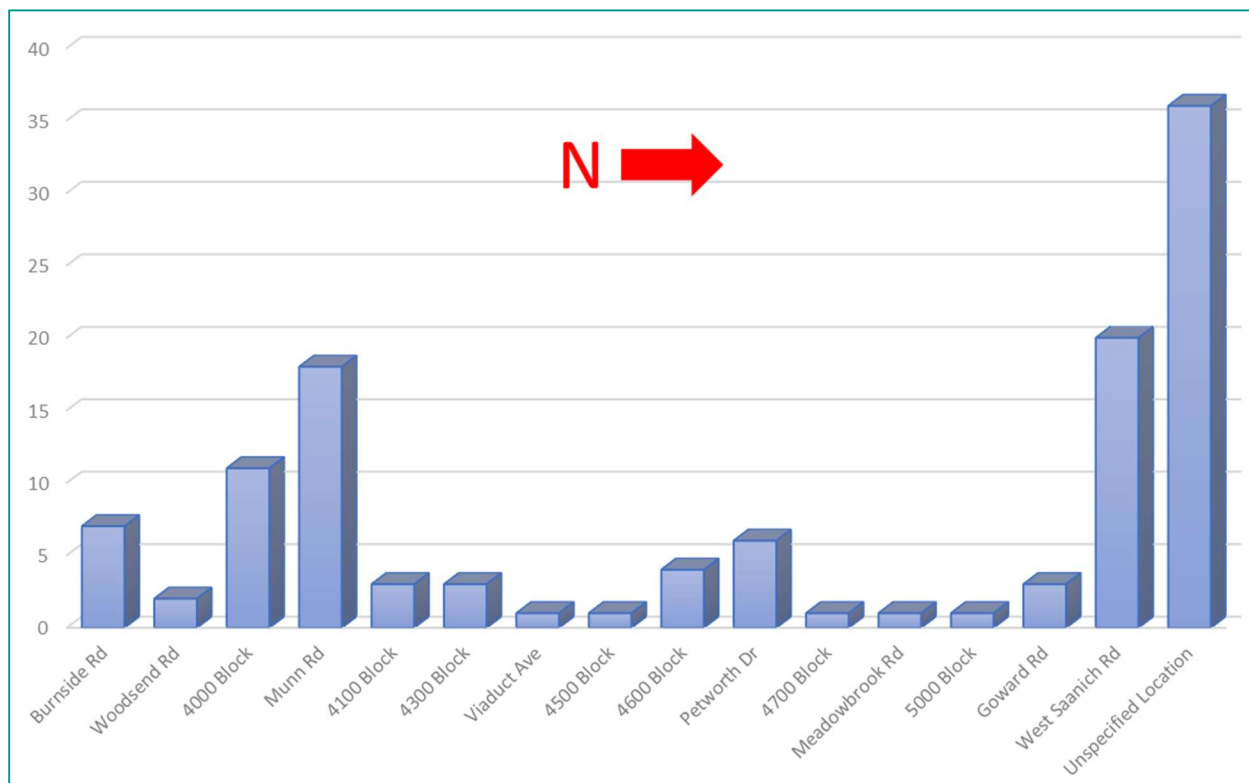


A summary of the claim data by location is presented in **FIGURE 7**. Approximately 50% of the claims were recorded at or near intersections while 20% were recorded along segments of Prospect Lake Road. The remaining 30% of claims had unspecified locations. The majority of claims at intersections occurred at the four study intersections, with the highest occurring at Prospect Lake Road / West Saanich Road / Sparton Road (17% of all claims). Approximately 33% of the claims occurred along a 1.2 km stretch of the corridor in the south between West Burnside Road and Munn Road. The several vertical/horizontal



curves in this area combined with the skew angle of the Prospect Lake Road / Munn Road intersection likely contribute to higher number of collisions along this segment.

Figure 7 – ICBC Claims by Location (January 2014 through December 2019)



Note: The claims assigned to an intersection may have occurred near to, but not at, the intersection

FIGURE 8 presents the claims data for Prospect Lake Road based on the collision type. Almost 50% of all claims were a result of off-road collisions while the second highest collision type was head-on/sideswipe opposite direction (15% of all claims). The narrow cross-section of the roadway combined with winding curvature are likely key contributors to these types of collisions. Intersection related collisions (e.g. rear-end, left-turn cross, etc.) accounted for approximately 17% of the collisions along the corridor. Given that 50% of collisions were recorded at or near intersection (refer to **FIGURE 7**), it is likely that the majority of these collisions occurred approaching or exiting the intersection.

As off-road collisions are a significant occurrence along the corridor, a further breakdown of these types of collisions is provided in **FIGURE 9**. Of the off-road claims that were made, 25% were due to slippery conditions while 17% were a result of evading wildlife or other vehicles. This further suggests that the narrow cross-section of Prospect Lake Road with minimal to no shoulders contributes to these types of collisions. Although the ICBC data is inconclusive, data provided by Saanich Police indicates that excessive speeds and/or driver error likely contribute to off-road collisions.

Figure 8 – ICBC Claims by Collision Type (January 2014 through December 2019)

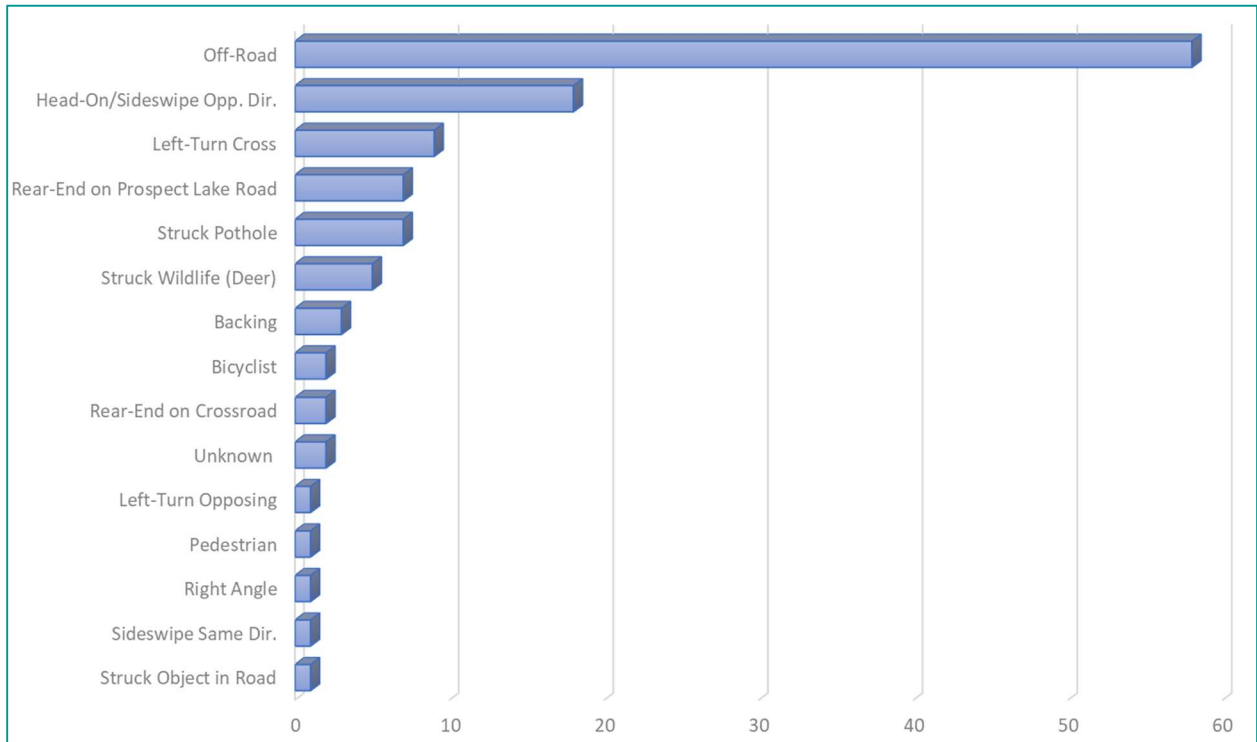
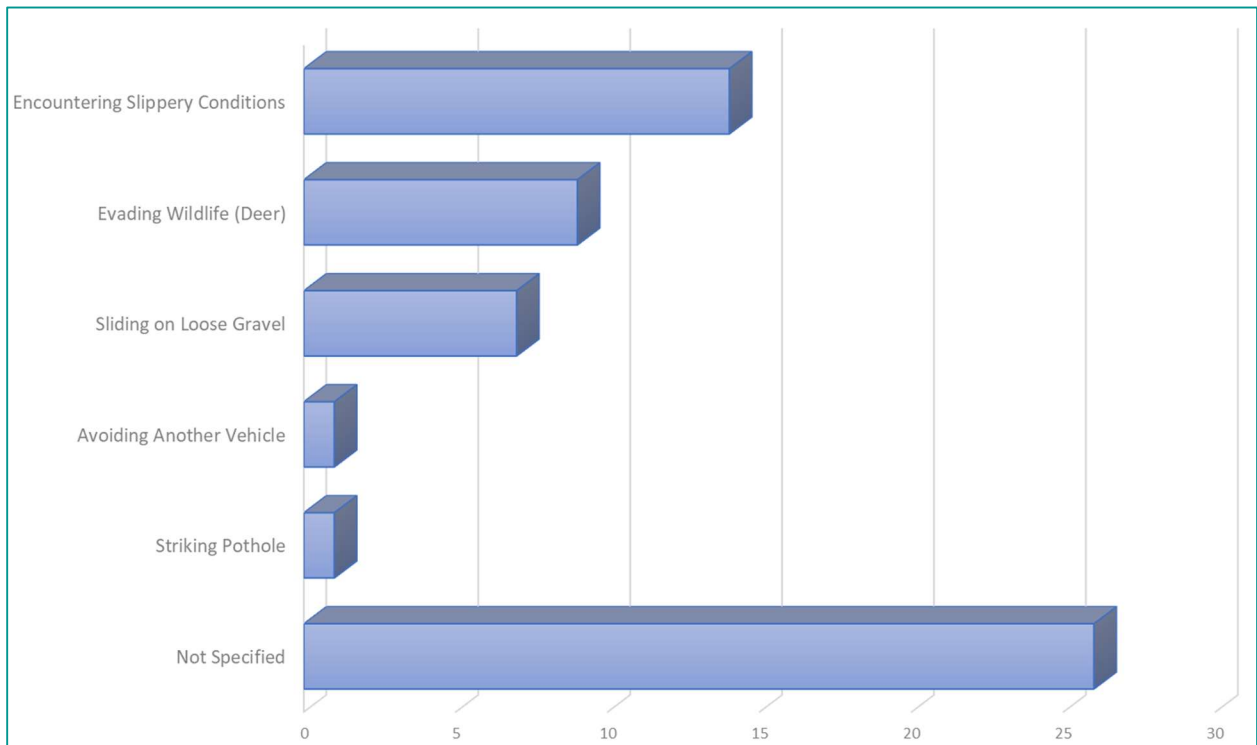


Figure 9 – Cause of Off-Road Collision Claims (January 2014 through December 2019)



3.1.2. Collision Rates

The safety performance measures for the Prospect Lake Road study intersections and segments were compared to average conditions across the corridor. The collision rates are based on the most recent five-year period of claims data (2015 to 2019). The following safety performance measures are the most commonly used to determine the performance of an intersection or roadway:

- **Observed Collision Rate, CR_{obs} :** Defined as the observed collisions per million entering vehicles (MEV) for intersections and collisions per million-vehicle-kilometres (MVKM) for roadway segments. This is calculated for a specific intersection or segment on Prospect Lake Road. The benefit of using the collision rate for each location is that it allows for a comparison to be made between similar sites but with different levels of traffic volumes (or exposure).
- **Average Collision Rate, CR_{avg} :** An average of the collisions rates along Prospect Lake Road. This is calculated separately for collisions that occur at intersections and along roadway segments.
- **Critical Collision Rate, CR_{crit} :** The critical collision rate, which is based on statistical quality control procedures, has been the most widely used statistical technique among highway and roadway agencies to identify collision prone locations. The technique defines a location as collision prone if the observed collision rate (CR_{obs}) exceeds a critical collision rate (CR_{crit}), which is based on the average collision rate (CR_{avg}). The critical collision rate is calculated as follows:

$$CR_{crit} = CR_{avg} + k \sqrt{\frac{CR_{avg}}{m} + \frac{1}{2m}}$$

Where,

CR_{avg} = Average Collision Rate

k is a constant (1.64 for 90% confidence)

m = Million-Vehicle-Kilometres (MVKM) or Million Entering Vehicles (MEV)

An assessment of the collision rates along Prospect Lake Road is provided in **TABLE 3**. Note that in determining the average collision rate for intersections, claims for roadway segments or with an unspecified location were excluded. For the average rate of roadway segments, all collisions that did not occur at controlled intersections along the corridor were included. Collisions at West Burnside Road and West Saanich Road were excluded from this average rate as it is unknown which collisions occurred on Prospect Lake Road versus the intersecting roadway.

Based on the most recent five-year period of collision claims, the majority of intersections and roadways have observed collision rates lower than the critical rates. Only the Prospect Lake Road / Munn Road intersection appears to be collision prone as the observed rate of 4.09 collisions per MEV is greater than the critical rate of 2.01 collisions per MEV. As stated previously, claims that were linked to intersections in ICBC's database could have occurred near to, but not at, the intersection. Therefore, some of the 17 claims that were recorded at Prospect Lake Road / Munn Road could have been on the segment approaching / exiting the intersection. However, the assessment in **TABLE 3** still indicates that there are a higher than expected number of collisions occurring in this area.



Table 3 – Collision Rate Assessment (Claims from January 2015 through December 2019)

Location	Intersection or Segment	No. of Collisions	Collision Frequency (coll./year)	CR _{obs} (coll./MEV or MVKM)	CR _{avg} ^{1,2} (coll./MEV or MVKM)	CR _{crit} (coll./MEV or MVKM)	Collision Prone?
West Burnside Road	Intersection	7	1.4	0.73	1.06	1.65	No
Woodsend Road	Intersection	2	0.4	0.45	1.06	1.98	No
4000 Block	Segment	11	2.2	2.41	3.03	4.47	No
Munn Road	Intersection	17	3.4	4.09	1.06	2.01	Yes
4100 Block	Segment	3	0.6	1.70	3.03	5.46	No
4300 Block	Segment	3	0.6	1.70	3.03	5.46	No
4600 Block	Segment	3	0.6	1.87	3.03	5.59	No
Petworth Drive	Intersection	5	1.0	1.26	1.06	2.03	No
4700 Block	Segment	1	0.2	0.52	3.03	5.34	No
Meadowbrook Road	Intersection	1	0.2	0.24	1.06	2.00	No
5000 Block	Segment	1	0.2	0.41	3.03	5.05	No
Goward Road	Intersection	3	0.6	0.66	1.06	1.96	No
West Saanich Road	Intersection	18	3.6	1.18	1.06	1.52	No

Notes: 1. CR_{avg} for intersections excludes collisions with an “unspecified” location.

2. CR_{avg} for segments excludes collisions recorded at West Burnside Road and West Saanich Road

3.2. SPEED DATA REVIEW

Speed data was provided by the District for the 4100, 5000, and 300 blocks of Prospect Lake Road in 2017, 2018, 2019. A summary of the recorded vehicle travel speeds is presented in **TABLE 4**. Note that the data for the 300 block was collected when Prospect Lake Elementary was in session (i.e. regulatory posted speed of 30 km/hr). In areas outside of the school, average and 85th percentile vehicle speeds are generally within the posted speed limit of 50 km/hr. Near the school, average speeds were slightly higher than the 30 km/hr posted speed while 85th percentile speeds were more than 10 km/hr higher.



Table 4 – Speed Summary Reports

Location	Travel Direction	Date	Average Speed (km/hr)	85th Percentile Speed (km/hr)
4100 Block	SB	November 2017	31.6	36.8
5000 Block	SB	November 2017	42.6	51.6
5000 Block	SB	July 2018	37.2	44.8
300 Block ¹	WB	September 2018	31.7	41.8
300 Block ¹	WB	September 2019	32.7	42.6

Notes: 1. Speeds were recorded while school was in session (i.e. 30 km/hr regulatory speed)

The District also provided information regarding Saanich Police violation tickets that were issued to motorists on Prospect Lake Road from January 2015 to February 2020. Summaries of the violations by year and location are provided in **FIGURE 10** and **FIGURE 11**, respectively. Of the 181 violations that were issued over the five-year period, 80 were issued in 2018 alone. In addition, over 90% of violations were issued in a 1.5 km section of Prospect Lake Road from south of Meadowbrook Road to West Saanich Road. This is likely a result of increased enforcement in the north, particularly around the elementary school, and less opportunities for enforcement in the south (e.g. limited locations where police can pull over to conduct radar enforcement, etc.).

Figure 10 – Saanich Police Violation Tickets by Year (January 2015 to February 2020)

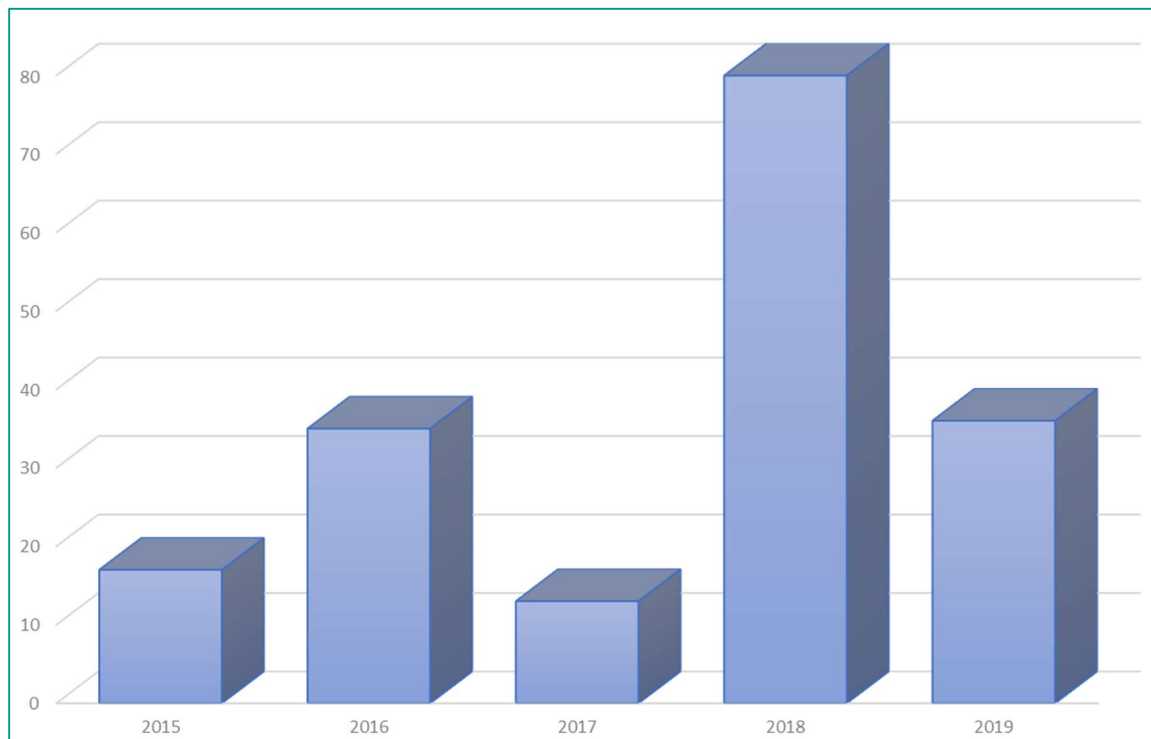
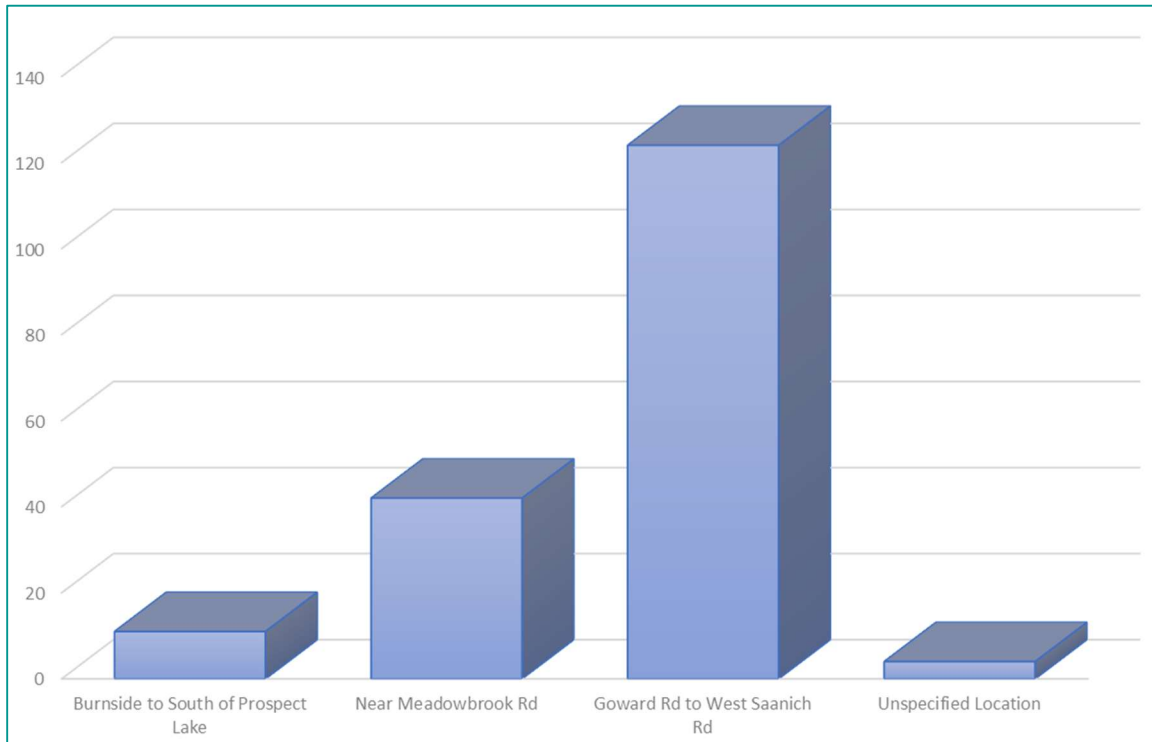


Figure 11 – Saanich Police Violation Tickets by Location (January 2015 to February 2020)



4. Observations from Site Visits / Corridor Drive Throughs

The review team conducted four site visits / corridor drive throughs on March 2 and 3, 2020. These site visits covered the following time periods:

- Morning / AM peak hour (7:30 AM) – to observe the morning commuter peak traffic;
- Mid-day (1:30 AM) – to observe the off-peak period;
- Afternoon / PM peak period (5:00 PM) – to observe the evening commuter peak traffic; and
- Evening (6:30 PM) – to observe roadway conditions during the darker nighttime hours.

The site visits included a review of roadway geometry, signing and pavement markings, access management, vulnerable road user facilities, lighting conditions, and operational issues. The following sections provide summaries of the observations that were made during the site visits / corridor drive throughs.

Based on the drive through observations and dash-cam footage, the review team was able to develop an existing signing and pavement marking plan for Prospect Lake Road using the corridor map that was provided by the District. This plan, which is based on observations only and may not include all signage, is included as **APPENDIX B**.

4.1. GENERAL OBSERVATIONS

Typically, it took the review team 11 minutes to drive the Prospect Lake Corridor from one end to the other. Although significant volumes were observed during the drive throughs (80 to 90 opposing vehicles per 11-minute drive through), capacity constraints never seemed to be an issue. As a result, travel times were consistent for both travel directions during the various periods. In addition, large commercial vehicles (i.e. trucks) were not observed during the drive throughs. There is a truck restriction sign located at the northern end of the corridor for southbound traffic (no trucks greater than 5,500 kg).

The corridor is a narrow and winding road with several horizontal curves combined with crest/sag curves. With the minimal to no shoulder widths, it was difficult for us to travel at the posted speed of 50 km/hr. As we were relatively unfamiliar with the corridor, average travel speeds ranged from 35 to 40 km/hr. On occasion, we tried to keep pace with the vehicles in front of us but found it difficult at times, particularly through more winding sections. Many regular drivers on the corridor are familiar with its geometry, which likely allows them to travel at the posted travel speed.

The geometry of the roadway also limits visibility in several sections. This makes it difficult to see some of the existing roadway signage. Visibility is even more of an issue during the nighttime hours, as there is limited lighting along the corridor. It also appeared as though some of the roadway signage had low reflectivity.

Several residential and park accesses are located along the corridor, with the density increasing towards the northern section of Prospect Lake Road. In addition, several private signs have been placed at various locations along the corridor. This private signage is often placed low to the ground, is difficult to read, and can lead to driver confusion. Private signage contravenes the District's Street and Traffic Bylaw (Bylaw 8382) and should be removed.

4.2. ROADWAY GEOMETRY

As noted previously, there are several horizontal and vertical curves along Prospect Lake Road, often located back to back, as shown in **PHOTO 1** and **PHOTO 2** below. The narrow cross-section of the roadway combined with the curvature and crest can contribute to the occurrence of cross-over incidents. This was experienced during one of the drive throughs when an oncoming vehicle crossed over the centreline and almost struck our vehicle (refer to **PHOTO 3**). Further complicating this incident was a utility pole located near the edge of the roadway on our right, which limited the space that we could safely swerve right in order to avoid the oncoming vehicle, while not hitting the pole.

Photo 1 – Horizontal and Vertical Curve



Photo 2 – Crest Curve into Horizontal Curve



Photo 3 – Near Miss Incident With Cross-Over Vehicle



4.3. VULNERABLE ROAD USERS / WILDLIFE

As mentioned previously, the current cross-section of Prospect Lake Road restricted the review team from walking or cycling the entire corridor. However, specific focus was given to vulnerable road users during the drive throughs, including observations on interactions between them and vehicle traffic. Observations were also made regarding existing pedestrian/cycling facilities and signage.

During the drive throughs, several cyclists were observed to be travelling along Prospect Lake Road. As shown in **PHOTO 4** and **PHOTO 5**, vehicles had to travel single file with the cyclists due to the limited lane/shoulder width of the roadway. This required vehicles to slow down to the same speed as the cyclists. In one instance, a cyclist pulled onto the sidewalk in order to allow the vehicle behind him to safely pass. With the single solid yellow centreline, vehicles are permitted to pass other vehicles/cyclists with extreme caution. However, this could lead to additional safety concerns given the curvilinear road alignment with limited passing sight distance.

Photo 4 – Northbound Cyclist Near North End



Photo 5 – Northbound Cyclist Near South End



During the corridor drive throughs, minimal pedestrian activity was observed. However, pedestrians were seen using the sidewalk along the eastern side of Prospect Lake Road, often north of Prospect Avenue. On one occasion, two pedestrians were observed crossing Prospect Lake Road at Meadowbrook Road (refer to **PHOTO 6**). Although vertical curves are located north and south of this intersection, the approach is relatively straight and sight lines were adequate for us to identify that pedestrians were crossing the road. Community mailboxes are located at this intersection, which likely results in an increase in pedestrian activity in this area.

Photo 6 – Pedestrians Crossing Prospect Lake Road at Meadowbrook Road



Deer were also observed during the site visits, as shown in **PHOTO 7** and **PHOTO 8**. During the nighttime drive through (**PHOTO 8**), we encountered a deer on the side of the road which was difficult to see until it was directly in front of our vehicle.

Photo 7 – Wildlife during the Daytime



Photo 8 – Wildlife during the Nighttime



4.4. VISION LIMITED – GOWARD ROAD

Just south of Goward Road, there is a combined horizontal and vertical curve in the roadway alignment with limited visibility for both drivers travelling on Prospect Lake Road and waiting at the stop bar on Goward Road. **PHOTO 9** shows the curved alignment of the corridor, which includes a 20 km/hr advisory speed sign. Further restricting the visibility at this location are the shrubs and rock outcrop located along the right side of the road edge. It is noted that the District has plans to remove the rock outcrop as part of the improvements currently under design for this section of the corridor.

Photo 9 – Southbound Prospect Lake Road, South of Goward Road



4.5. TREVLAAC POND NORTH OF CALVERT PARK

As southbound vehicles approach Trevlac Pond (north of Calvert Park), orange flexible delineator cones are located along the eastern road edge to indicate the potential hazard (refer to **PHOTO 10**). As you travel further to the south, Prospect Lake Road starts to climb a vertical curve which introduces a steep drop off on the eastern side of the road (refer to **PHOTO 11**). As noted previously, preliminary design is currently underway for the installation of road edge barrier in this location, which would reduce the risk of off-road collisions.

Photo 10 – Southbound Prospect Lake Road, Approaching Trevlac Pond



Photo 11 – Southbound Prospect Lake Road Near the Pond



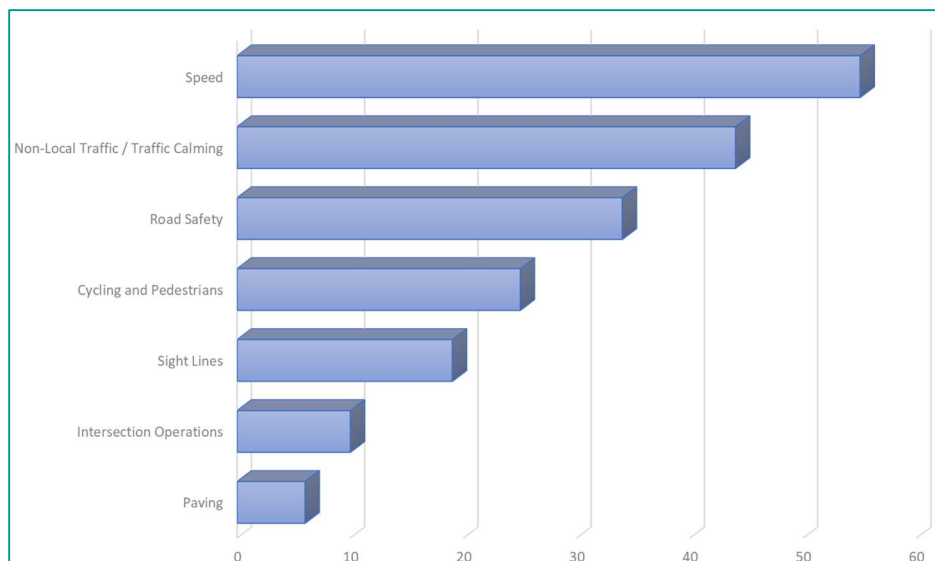
5. Review of Public Input

Parallel to this Traffic Operations and In-Service Road Safety Review of Prospect Lake Road, the District asked residents to provide feedback regarding the corridor and to identify areas of concern. The public forum was posted on the District’s website and feedback was sought through March 30, 2020. In total, 65 email responses were provided to the District by residents, with the following general types of concerns:

- Cycling and Pedestrians – lack of bike lanes and sidewalks, no marked crossings, safety
- Paving – quality of pavement and shoulders, potholes
- Road Safety – turning movements at intersections, parking at Prospect Lake Elementary, narrow roadway, motorists crossing the centreline, few safe passing areas, heavy truck traffic, need for improved signage (hidden road signs near curves in the road) and reflective pavement markers
- Sight Lines – visibility restrictions due to vegetation or hills
- Speed – speeding is a perceived issue, consider reducing posted speed limit
- Non-Local Traffic / Traffic Calming – non-local traffic includes truck traffic, traffic calming measures should be implemented
- Intersection Operations – improvement to intersection controls (signalization, three-way stop)

FIGURE 12 provides a summary of how many times each of the concerns listed above were mentioned within the public feedback that was received. The most common types of concerns were related to vehicle speeds, followed by non-local traffic / traffic calming and road/pedestrian/cyclist safety. A more detailed summary of the feedback received is included as **APPENDIX C**.

Figure 12 – Summary of Public Feedback by Type of Concern



6. Potential Mitigation Measures

The review team identified a number of potential safety observations, design issues or operational issues based on the site visits / corridor drive throughs and information provided by the District, ICBC, and Saanich Police. Based on the findings of this review, we have identified several potential mitigation measures that could be implemented along Prospect Lake Road, which are discussed further in the sections below.

6.1. MITIGATIONS FOR OFF-ROAD / HEAD-ON COLLISIONS

As off-road and head-on/sideswipe opposing direction were shown to be the highest collision types along the corridor, it is important to try and reduce the likelihood of these occurring. This could be done through improving signage at the more significant horizontal curves in the roadway alignment. Signage could include delineator posts, chevron alignment signs, or additional curve warning signs with speed advisory tabs where warranted (refer to **FIGURE 13**). In addition to signage improvements, centreline rumble strips and recessed pavement markers (RPM) could be used to alert drivers when they are crossing over the centre of the roadway.

Figure 13 – Potential Signage at Roadway Curves



6.2. MITIGATIONS TO REDUCE VEHICLE SPEEDS

The speed data that was provided suggests that corridor travel speeds (average and 85th percentile) are generally within the 50 km/hr posted speed limit for Prospect Lake Road. However, in areas with increased pedestrian/cyclist activity and/or higher density of driveway accesses, it might be desirable to reduce speeds in order to improve the safety of the roadway. This can be achieved through reduced posted speed zones, increased enforcement and potentially additional safe pullout locations for police, and the use of speed reader boards in high risk/high speed areas on tangents. Speed reader boards, examples of which are provided in **FIGURE 14**, can be used to tell drivers their current speed and whether or not they are travelling above the posted speed of the roadway. It is noted that speed reader boards are planned at Prospect Lake Elementary as part of the current design project for that section of Prospect Lake Road.

Figure 14 – Examples of Speed Reader Boards



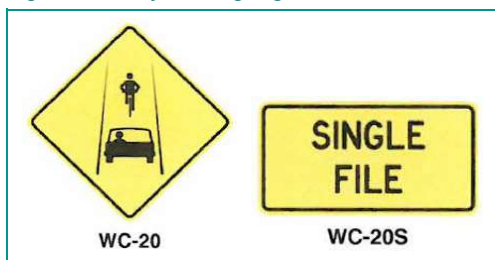
6.3. VULNERABLE ROAD USERS AND WILDLIFE

Although only one pedestrian related collision was recorded in the most recent six years of ICBC claims data, additional near miss incidents could have occurred which would not appear in the database.

Pedestrian activity was observed during the site visits / corridor drive throughs and was identified as an area of concern by residents. Consideration could be given to extending the existing sidewalk network on Prospect Lake Road to areas with high pedestrian activity and/or along key pedestrian desire lines. Note that design is currently underway for a new pedestrian path from Goward Road to West Saanich Road.

As Prospect Lake Road is designated as a cycling route, signage should be installed along the corridor to inform/remind motorists that cyclists may be present. Given the narrow cross-section of the roadway, a single file sign with accompanying tab is most appropriate (refer to **FIGURE 15**).

Figure 15 – Cyclist Signage



The collision analysis also showed that in the past six years, there were eight collisions that involved vehicles striking deer. An additional eight off-road collisions occurred as vehicles tried to avoid deer within the roadway. Wildlife signage (refer to **FIGURE 16**) could be used to help remind drivers that wildlife, particularly deer, may be present along Prospect Lake Road.

Figure 16 – Wildlife/Deer Signage

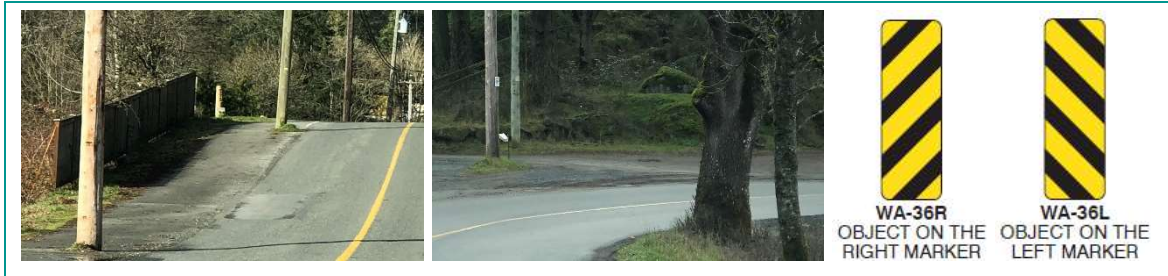


6.4. ADDITIONAL MITIGATION MEASURES

Additional mitigation measures that could be considered for the study corridor include:

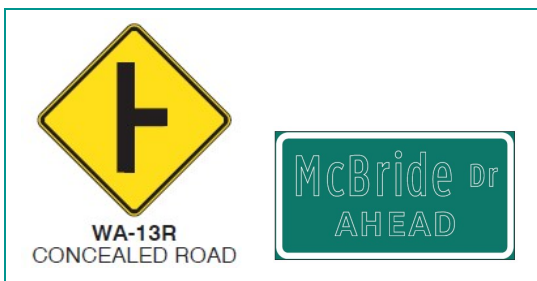
- Object markers can be placed on roadside hazards, such as trees and utility poles (refer to **FIGURE 17**). Since the corridor is generally without shoulders, object markers are recommended where hazards are within 1m from the pavement edge.

Figure 17 – Roadside Hazards / Object Markers



- If feasible, consider removing/relocating large trees and utility poles that are along the road edge
- Improve the reflectivity of existing signage
- Trim bushes / rock outcrops to improve sight lines, particularly through curves in the roadway alignment
- Install additional lighting along the corridor
- Install regulatory speed signs at each end of and within the corridor to remind drivers of the expected speed
- Install intersection ahead signs (refer to **FIGURE 18**) with a street name tab (where appropriate) to warn motorists of hidden roadways, particularly at locations where the alignment of Prospect Lake Road curves in advance of an intersection

Figure 18 – Concealed Road Sign



- Longer-term mitigation measures could include improving traffic operations at Prospect Lake Road / West Burnside Road, installing traffic calming measures to reduce vehicle speeds, and road widening to improve lane/shoulder widths.

7. Recommendations

7.1. PROJECTS CURRENTLY UNDERWAY

As noted previously, there are a number of projects that are currently underway and in various levels of design/procurement.

The signalization of Prospect Lake Road / West Saanich Road / Sparton Road intersection is currently in the detailed design phase. Once the project is complete, traffic operations and safety will be improved at this intersection. This will also address a number of the comments received from the public regarding this intersection. In addition, design is currently underway for a pedestrian facility from Goward Road to West Saanich Road. It is intended that the rock outcrop at Goward Road will also be cut back as part of this work.

A work order has been issued for centreline rumble strips to be installed north and south of Munn Road. This mitigation measure will help to alert drivers as they cross over the centre of the roadway, reducing the likelihood of off-road and head-on/sideswipe opposite direction collisions. Depending on the results of this counter measure, rumble strips could be considered for the rest of the Prospect Lake Road corridor (discussed further in the next section). The objective is to reduce the collision rate of this intersection/location to be non-collision prone.

Preliminary design is underway for the installation of a road edge barrier at Trevlac Pond near Calvert Park. This improvement will reduce the likelihood of vehicles travelling off-road and into the pond or down the steep drop-off. Orange flexible delineator cones are currently located along the road edge to help alert drivers to this hazard and the road curvature. This should be monitored and if the cones are continually being knocked over / removed, more permanent delineators may be required until such time that the barrier is installed.

7.2. COUNTER MEASURES AND MITIGATION STRATEGY

This section provides recommendations on the specific mitigation measures that should be considered for the Prospect Lake Road corridor. Additional mitigations have also been suggested but may require further consideration/study before being implemented.

7.2.1. Roadway Standard

Within the District's *2007 Rural Saanich Local Area Plan* (Appendix J to Bylaw 8940, adopted June 10, 2008), Collector Roads are identified as having 11.0 m pavement width, 20.0 m right-of-way, and 2.5 m shoulders and boulevard. Based on as-built information for the corridor, Prospect Lake Road generally has pavement widths ranging from 5.3 m to 6.1 m, without shoulders. The roadway right-of-way is generally 20.0 m.

Given the nature of Prospect Lake Road with physical constraints, it is likely not feasible to upgrade it to a Collector Road standard. In addition, a roadway with this cross-section would likely have negative impacts on the corridor, such as increased vehicles speeds.

7.2.2. Short-Term Improvements (0-1 Year)

Signage and Pavement Marking Improvements

In the short-term, the existing signing and pavement markings along Prospect Lake Road should be improved. These improvements are considered easier and quicker to implement to address the immediate concerns. A markup of the proposed additions to the signing and pavement markings is provided in **APPENDIX B**, and also discussed below.

All of the existing private signage (e.g. kids at play, wildlife signage, etc.) should be removed as it adds to the driver's workload and can sometimes be distracting. Too many of these signs in one location can add to signage clutter and possibly result in driver's missing the more important roadway signs.

The visibility / reflectivity of existing signs should be reviewed and improved where necessary. This could include cutting back tree branches that are blocking the signs, cleaning signs that may be dirty, or replacing them with signs of standard or higher reflectivity. Additional delineator posts and chevron signs are also recommended as shown in **APPENDIX B**.

The claims data shows that a higher proportion of collisions occur during the month of May (refer to **SECTION 3.1.1**). A targeted public education period during the last week of April and the first week of May could be used to help warn motorists to slow down and drive to the conditions. This could be achieved through setting up portable changeable message signs (PCMS) at both ends of the corridor. Increased enforcement during this time could also be used to supplement this mitigation measure.

Speed Reduction Zone

Although a speed reduction for the entire corridor is not deemed necessary, the District should implement a speed reduction to 30 km/hr from Estelline Road to north of Goward Road, as shown in **FIGURE 19** and **FIGURE 20**. This section of the corridor (approximately 1.5 km in length) has many residential driveways along with two horizontal curves with 20 km/hr advisory speed signs and a park with a 30 km/hr zone near Goward Road. As the posted speed is currently 50 km/hr, except when the 30 km/hr playground zone is in effect, if drivers are unaware of the upcoming horizontal curvature / limited vision, then it might be difficult for them to slow down in time to navigate the roadway safely.

As Saanich Police has issued violation tickets in the northern portion of the corridor over the past few years, it might be difficult to achieve compliance with the reduced speed limit. Therefore, increased enforcement and/or speed reader boards may also be required. It is also noted that this improvement would require an amendment to the District's Street and Traffic Bylaw (Bylaw 8382).



Figure 19 – Proposed Speed Reduction Zone – South End

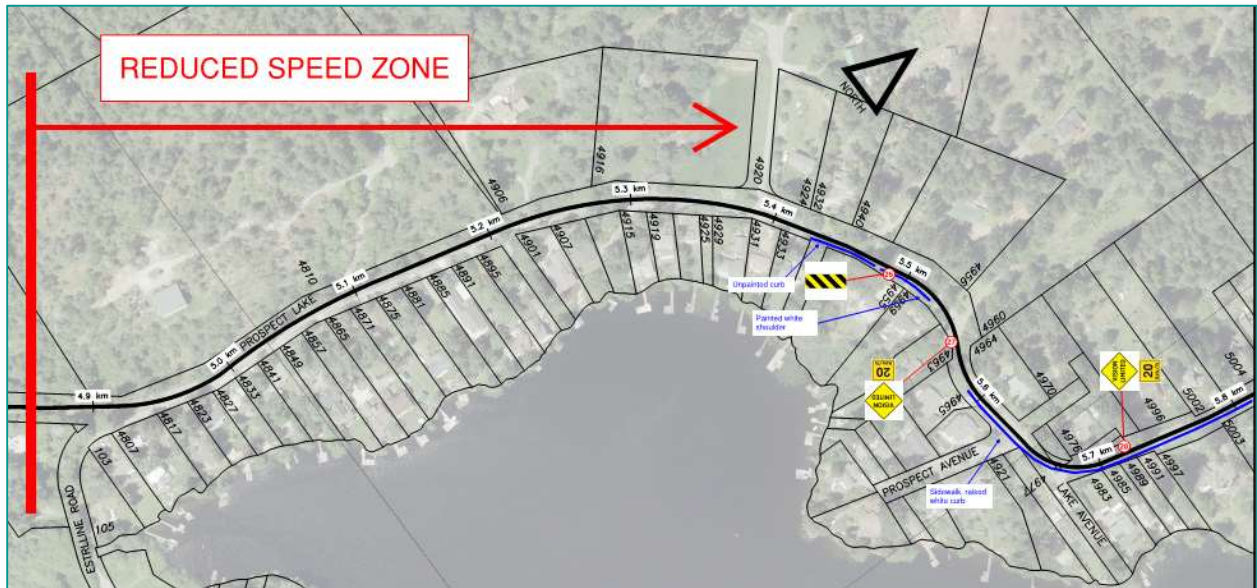
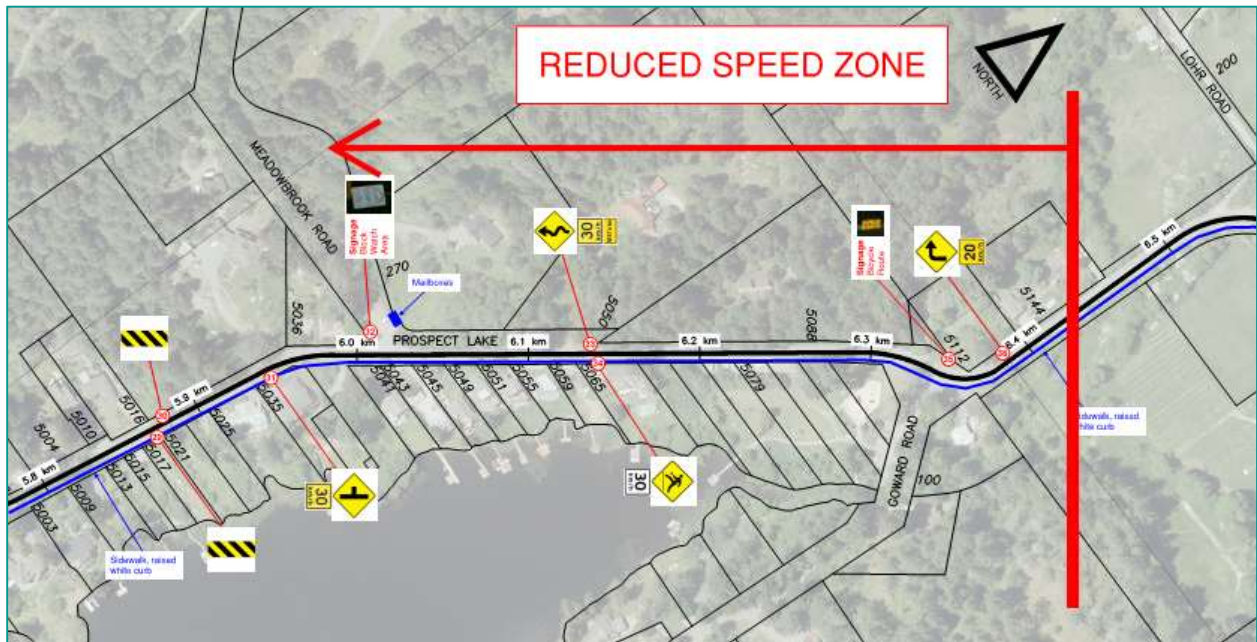


Figure 20 – Proposed Speed Reduction Zone – North End



7.2.3. Medium-Term Improvements (1-5 Years)

Sight Line Improvements

In the medium-term, the District should consider improving sight distance at roadway curves. This would typically include cutting back trees and/or shrubs located close the edge of the roadway. The curve located north of Goward Road is one specific location where this should be done (refer to **PHOTO 12**). This area also includes a rock outcrop, which will be removed as part of the District’s planned improvements for this area.



Photo 12 – Trees / Rock Outcrop North of Goward Road



Centreline Rumble Strips and Reflective Pavement Markings

Centreline rumble strips could be used along the corridor to help alert drivers when they start to crossover into oncoming traffic. As the District is in the process of installing these near Munn Road, it is recommended that a follow up study be conducted afterwards to understand their effectiveness along the corridor (i.e. reduction in off-road or head-on/sideswipe opposite direction collisions). If they are proven to be effective in reducing vehicle collisions, the District should consider implementing them corridor wide.

Another centreline treatment that could be effective is the use of RPMs. By placing these along the centreline, visibility will be improved at nighttime and will help drivers navigate the various curves in the road. These can also be recessed into the pavement to avoid them being removed during snow clearing.

7.2.4. Long-Term Improvements (5+ Years)

After implementing the short- and medium-term mitigation measures, a follow up review should be conducted for the corridor to determine how effective these improvements were at improving safety. At that time, additional mitigation measures may be warranted. The following sections describe some of the long-term improvements that could be considered at that time or warrant further investigation.

Skew Angle at Prospect Lake Road / Munn Road

Munn Road currently intersects Prospect Lake Road at a skew angle of less than 40°, as shown in **FIGURE 21**. This can make it difficult for drivers waiting on Munn Road to judge when it is safe to turn onto Prospect Lake Road, which could be a factor in the high collision rate observed at this location. Improving the skew angle would improve sight lines and reduce the likelihood of collisions at this intersection. After implementing the short- and medium-term improvements, a follow up study should be conducted to determine if further mitigation measures are required at this intersection.

Figure 21 – Skew Angle at Prospect Lake Road / Munn Road



Improvements to Road Geometry

As noted previously, improving Prospect Lake Road to a Collector Road standard may not be practical and would likely result in higher vehicle speeds. However, improving the geometry to allow for a shoulder could be beneficial in a number of circumstances. It would allow for additional space for a vehicle to pull over when they experience a flat tire or other mechanical issues. It would also allow provide additional space for pedestrians and cyclists, thus allowing for some separation between vehicle traffic.

As improvements occur along Prospect Lake Road, the District should consider widening/adding shoulder space along the road edge. A minimum shoulder width of 1.5 m would be needed to fully accommodate cyclists while 2.5 m might be required to allow for vehicles to safety pull over. However, it is noted that this improvement is very complex given the physical constraints/challenges along Prospect Lake Road, such as utility pole and tree locations and a few steep drop-offs. It is estimated that the cost to widen the entire corridor to include a 1.5-2.0 m path on either side of the roadway could be in the range of \$15 to \$30 million (assuming \$2,000 to \$4,000 per metre). This estimate does not take into account the need for retaining walls in steep sections, replacing roadway structures (e.g. bridges or culverts), potential environmental impacts (e.g. road widening near creeks or ponds), or property acquisition.

Traffic Calming

As discussed previously, the existing horizontal and vertical geometry of Prospect Lake Road results in vehicle speeds that are lower than the posted speed in several sections. The inability to travel at the posted speed, or higher, likely deters some non-local traffic from using the corridor. Additional traffic calming measures, such as chicanes, traffic circles, and transverse rumble strips, can be effective measures for reducing vehicle speeds and deterring non-local traffic from using Prospect Lake Road. Careful consideration must be used when selecting traffic calming measures in order to understand and mitigate any negative impacts to the various road users (e.g. vehicles, emergency response, motorcycles, cyclists, and pedestrians).



As summarized in the review of public feedback that was received, traffic calming / non-local traffic was the second highest concern noted by residents. Further data collection, such as origin-destination surveys, could be used to help understand how many non-local vehicles are currently using Prospect Lake Road. This, along with further public consultation, could be used to inform the need for traffic calming along the corridor. However, it should be noted that as Prospect Lake Road is designated as a Collector Road, non-local motorists are expected to use the corridor.

Since Prospect Lake Road has defined entrance and exit points at West Burnside Road and West Saanich Road, traffic calming would likely only be required along a short section of the road and would still be effective. A good location for this type of mitigation would be the section between Estelline Road and Goward Road, particularly if it is used in conjunction with a reduced speed zone (as noted earlier).

Intersection Improvements at Prospect Lake Road / West Burnside Road

The traffic operations analysis for the existing conditions shows that the southbound movement at Prospect Lake Road / West Burnside Road experiences lengthy delays during the AM and PM peak hours. This could be a result of increased traffic on Prospect Lake Road due to non-local traffic and/or increased traffic on West Burnside Road due to unknown issues that occurred while traffic data was being collected (e.g. road closures/construction that caused traffic to divert to West Burnside Road). Once some of the other mitigation measures have been implemented, traffic patterns within the study area may change. A follow up study, including updated traffic counts, would help to inform the need for improvements at this intersection. If traffic operations are found to be unacceptable, the intersection may need to be upgraded to a signal or roundabout control. However, an improved intersection performance may also attract an increased usage of the Prospect Lake Road.

7.3. SUMMARY OF RECOMMENDED MITIGATION MEASURES

A summary of the recommended mitigation measures, including the proposed timing, is provided in **TABLE 5**. Each measure has also been identified as being recommended for implementation or requiring further study. Note that the short-term improvements are detailed in **APPENDIX B**.



Table 5 – Summary of Recommended Mitigation Measures

Mitigation Measure	Timing	Implement or Further Study Required
Remove Existing Private Signage	Short-term (0-1 Year)	Implement
Improve Signage Visibility / Reflectivity	Short-term (0-1 Year)	Implement
Install Additional Signage / Delineator Posts	Short-term (0-1 Year)	Implement
April/May Public Education / Enforcement	Short-term (0-1 Year)	Implement
Reduced Speed Zone	Short-term (0-1 Year)	Implement
Sight Line Improvements	Medium-term (1-5 Years)	Further Study Required
Centreline Rumble Strips	Medium-term (1-5 Years)	Further Study Required
Recessed Pavement Markers (RPM)	Medium-term (1-5 Years)	Implement
Munn Road Skew Angle Improvements	Long-term (5+ Years)	Further Study Required
Improve Road Geometry	Long-term (5+ Years)	Further Study Required
Traffic Calming	Long-term (5+ Years)	Further Study Required
Prospect Lake Road / West Burnside Road Traffic Operations Improvements	Long-term (5+ Years)	Further Study Required

7.4. BENEFIT/COST ANALYSIS

Two financial indicators that are often used to measure the cost effectiveness of road improvements are the net present value (NPV) and benefit/cost (B/C) ratio. The NPV is defined as the present value of the estimated benefits minus the present value of the estimated costs for an improvement:

$$NPV = (PV \text{ of Benefits}) - (PV \text{ of costs})$$

The B/C ratio is defined as the present value of benefits divided by the present value of costs. A B/C ratio of 1.0 indicates that the benefits from the improvement are equal to the associated costs. A B/C ratio of greater than 1.0 indicates a proposed improvement presents a clear financial benefit.

$$B/C = (PV \text{ of Benefits}) / (PV \text{ of costs})$$

To estimate the potential benefits for a specific mitigation measure, collision modification factors (CMFs) are often applied to the expected collision frequency for a location. If the measure is expected to reduce the collision frequency and/or severity, then a net benefit can be achieved. In some cases, the number of collisions may increase but the severity distribution (e.g. number of severe collisions vs PDO) may improve, resulting in an overall benefit.



A summary of CMFs used for this review are provided in **TABLE 6**. Note that CMFs have been provided for all of the mitigation measures that are recommended for implementation at this time. In addition, a CMF has been provided for installing centreline rumble strips along the entire corridor. Once the short-term measures have been implemented, a follow up study should be conducted to determine their effectiveness and if additional mitigation measures (i.e. the medium- and/or long-term measures) are required. The financial performance of these additional measures should be evaluated at that time as well.

Table 6 – CMFs for Various Mitigation Measures

Mitigation Measure	CMF	Target Collisions	Source
Upgrade Signs to Conform to MUTCD	0.95	All	CMFs for BC MoTI (2008)
Install Warning Signage	0.93	All	CMFs for BC MoTI (2008)
Improve Sign Conspicuity / Reflectivity	0.90	Night	CMFs for BC MoTI (2008)
Delineator Posts	0.92	All	CMFs for BC MoTI (2008)
Speed Reader Boards	0.80	All	CMFs for BC MoTI (2008)
Public Education / Enforcement	N/A	N/A	N/A
Reduced Speed Zone ¹	0.74	All	CMF Clearinghouse
Centreline Rumble Strips	0.86	Off-Road Left / Head-On	CMFs for BC MoTI (2008)
Recessed Pavement Markers (RPM)	0.92	Night / Poor Weather	CMFs for BC MoTI (2008)

Notes: 1. A CMF was only available for changing the posted speed from 50 km/hr to 40 km/hr. The proposed improvement is to reduce the speed to 30 km/hr, which could result in a further reduction in collisions.

A summary of the estimated collision frequency before and after implementing the proposed mitigation measures is provided in **TABLE 7**.



Table 7 – Estimated Collision Frequencies Before and After Implementing Mitigation Measures

Mitigation Measure	Severity	Estimated Collision Frequency Before Mitigation (collisions/year)	Estimated Collision Frequency After Mitigation (collisions/year)
Upgrade Signs to Conform to MUTCD	PDO	10.41	9.89
	Severe (Injury + Fatal)	4.76	4.52
Install Warning Signage	PDO	10.41	9.68
	Severe (Injury + Fatal)	4.76	4.42
Improve Sign Conspicuity / Reflectivity	PDO	4.12	3.71
	Severe (Injury + Fatal)	1.88	1.69
Delineator Posts	PDO	10.41	9.58
	Severe (Injury + Fatal)	4.76	4.38
Speed Reader Boards	PDO	10.41	8.33
	Severe (Injury + Fatal)	4.76	3.80
Public Education / Enforcement	N/A	N/A	N/A
Reduced Speed Zone ¹	PDO	2.60	1.93
	Severe (Injury + Fatal)	1.19	0.88
Centreline Rumble Strips	PDO	5.38	4.62
	Severe (Injury + Fatal)	2.46	2.11
Recessed Pavement Markers	PDO	4.12	3.79
	Severe (Injury + Fatal)	1.88	1.73

Notes: 1. A CMF was only available for changing the posted speed from 50 km/hr to 40 km/hr. The proposed improvement is to reduce the speed to 30 km/hr, which could result in a further reduction in collisions.

To estimate the financial benefit of reducing collisions along the corridor, the average collision costs shown in **TABLE 8** were used. These average costs were sourced from ICBC's *2015 Program Evaluation Report – Road Improvement Program*.

Table 8 – Average Collision Cost Values (ICBC)

Collision Severity	Collision Cost
PDO Incidents	\$3,029
Severe (Injury + Fatal) Incidents	\$33,307



Class D estimates (+/- 40%) for the recommended short- and medium-term improvements are provided in **TABLE 9**. Cost estimates account for mobilization/demobilization, traffic control, clearing, grubbing, construction/installation, design (10%), construction administration (5%), and contingency (40%).

Table 9 – Class D Cost Estimates

Mitigation Measure	Cost Estimate
Upgrade Signs to Conform to MUTCD	\$11,000
Install Warning Signage	\$55,000
Improve Sign Conspicuity / Reflectivity	\$11,000
Delineator Posts	\$11,000
Speed Reader Boards	\$60,500
Public Education / Enforcement	N/A
Reduced Speed Zone ¹	\$7,000
Centreline Rumble Strips	\$33,000
Recessed Pavement Markers	\$20,000

For each mitigation measure, the NPV and B/C ratio were estimated over a five-year period using a discount rate of 3%, as shown in **TABLE 10**. All mitigation measures result in positive NPVs and B/C ratios greater than 1.0. A reduced speed zone results in the highest B/C ratio (8.57) while installing delineator posts is the second highest (6.33). Both mitigation measures are relatively low-cost items to implement. Note that the financial performance is based on a five-year lifecycle when the actual benefits would possibly be realized over a much longer period.

Table 10 – Financial Performance of Mitigation Measure

Mitigation Measure	Net Present Value (NPV)	Benefit/Cost Ratio (B/C)
Upgrade Signs to Conform to MUTCD	\$32,500	3.95
Install Warning Signage	\$6,100	1.11
Improve Sign Conspicuity / Reflectivity	\$23,400	3.13
Delineator Posts	\$58,600	6.33
Speed Reader Boards	\$113,700	2.89
Public Education / Enforcement	N/A	N/A
Reduced Speed Zone ¹	\$50,000	8.57
Centreline Rumble Strips	\$30,000	1.91
Recessed Pavement Markers	\$7,8000	1.40

Notes: 1. A CMF was only available for changing the posted speed from 50 km/hr to 40 km/hr. The proposed improvement is to reduce the speed to 30 km/hr, which could result in a higher NPV and B/C ratio.



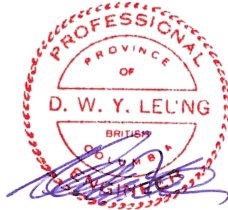
8. Concluding Remarks

The Traffic Operations and In-Service Road Safety Review team has conducted this review to the best of its professional abilities. While every attempt has been made to identify significant safety issues, the District is reminded that no road is immune to the occurrence of collisions. In addition to the road characteristics, there are other factors, such as driver behaviour and adverse weather, which may contribute to a collision and are outside the control of the design team.

The Traffic Operations and In-Service Road Safety Review team has proactively identified a number of potential safety issues related to the current conditions of the Prospect Lake Road corridor and recommended improvement suggestions to reduce the risk of collisions.

It is recommended that the District proceed with the short- and medium-term mitigation measures that have been identified for implementation in **SECTION 7.3**.

Prepared by:



2020-07-10

Denny Leung, PEng
Lead Road Safety Engineer
dleung@mcelhanney.com

Bob Bigelow, PEng
Road Safety Engineer
bbigelow@mcelhanney.com

APPENDIX A – BC MOTI 2018 AADT FACTORS

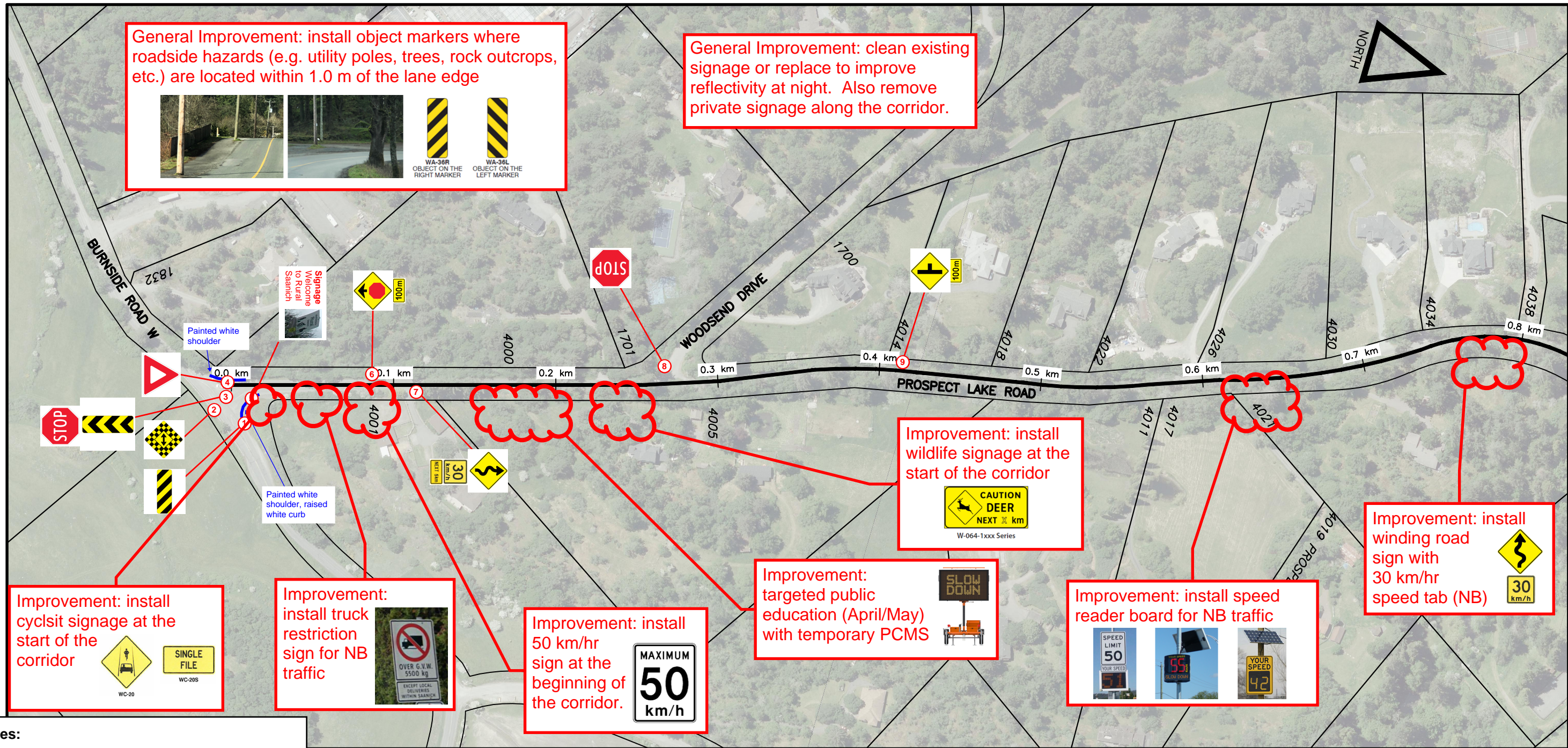
AADT Factors													
2018													
Seasonal Factors													
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	Consistent	1.128	1.099	1.033	0.989	0.956	0.939	0.932	0.937	0.97	0.983	1.026	1.072
	Highly Seasonal	1.765	1.624	1.359	1.203	0.95	0.804	0.591	0.575	0.832	1.129	1.478	1.545
	Seasonal	1.46	1.35	1.179	1.1	0.916	0.846	0.73	0.725	0.855	1.001	1.238	1.361
Daily Factors													
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Consistent	Sunday	1.389	1.364	1.339	1.328	1.253	1.271	1.253	1.251	1.315	1.317	1.344	1.296
	Monday	1.029	1.002	0.976	0.995	1.038	0.981	1.023	1.02	1.037	1.037	1.042	1.005
	Tuesday	0.93	0.922	0.947	0.948	0.949	0.959	0.955	0.949	0.945	0.95	0.945	1.006
	Wednesday	0.919	0.931	0.924	0.944	0.942	0.95	0.945	0.943	0.932	0.951	0.934	0.944
	Thursday	0.92	0.911	0.921	0.921	0.932	0.926	0.923	0.921	0.924	0.92	0.923	0.911
	Friday	0.887	0.916	0.944	0.901	0.903	0.918	0.914	0.913	0.897	0.888	0.883	0.887
	Saturday	1.16	1.177	1.147	1.164	1.137	1.167	1.144	1.161	1.145	1.127	1.142	1.12
Highly Seasonal	Sunday	1.083	1.064	1.038	0.993	1.003	1.01	0.988	0.999	0.983	1.056	1.092	1.003
	Monday	1.001	0.936	1.04	0.962	0.917	1.03	0.981	1.002	0.942	0.969	0.983	1.098
	Tuesday	0.981	1.046	1.072	1.072	1.085	1.105	1.116	1.1	1.061	1.093	1.026	1.255
	Wednesday	1.004	1.062	1.001	1.037	1.097	1.06	1.078	1.08	1.063	1.093	1.034	0.994
	Thursday	0.996	1.014	0.946	0.976	0.989	0.944	0.994	0.997	1.02	0.973	0.98	0.919
	Friday	0.901	0.889	0.898	0.905	0.874	0.865	0.894	0.892	0.942	0.842	0.892	0.853
	Saturday	1.121	1.078	1.072	1.119	1.132	1.064	1.016	0.993	1.033	1.07	1.074	1.024
Seasonal	Sunday	1.246	1.235	1.167	1.127	1.071	1.056	1.026	1.07	1.101	1.181	1.198	1.161
	Monday	1.024	0.98	1.031	1.008	0.988	1.017	1.006	1.001	0.998	1.038	1.024	1.06
	Tuesday	0.949	0.976	0.986	1.005	1.039	1.042	1.032	1.038	1.028	1.008	0.975	1.09
	Wednesday	0.935	0.995	0.946	0.978	1.042	1.016	1.035	1.004	1.031	1.03	0.974	0.944
	Thursday	0.942	0.95	0.951	0.945	0.983	0.964	0.982	1.006	0.977	0.967	0.951	0.908
	Friday	0.884	0.883	0.921	0.895	0.891	0.897	0.911	0.891	0.88	0.838	0.876	0.869
	Saturday	1.184	1.183	1.1	1.125	1.068	1.08	1.059	1.062	1.069	1.064	1.106	1.071

**APPENDIX B – PROSPECT LAKE ROAD
EXISTING AND PROPOSED SIGNING AND
PAVEMENT MARKINGS**

General Improvement: install object markers where roadside hazards (e.g. utility poles, trees, rock outcrops, etc.) are located within 1.0 m of the lane edge



General Improvement: clean existing signage or replace to improve reflectivity at night. Also remove private signage along the corridor.



Improvement: install cyclsit signage at the start of the corridor

Improvement: install truck restriction sign for NB traffic

Improvement: install 50 km/hr sign at the beginning of the corridor.

Improvement: targeted public education (April/May) with temporary PCMS

Improvement: install speed reader board for NB traffic

Improvement: install winding road sign with 30 km/hr speed tab (NB)

Improvement: install wildlife signage at the start of the corridor

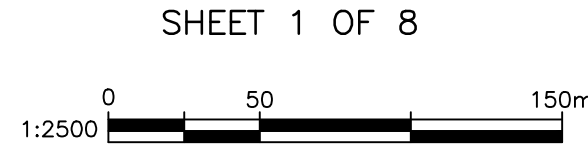
Notes:
 1) Existing and proposed sign locations are approximate. Actual sign locations/placement to be confirmed in the field.
 2) Sign numbers shown are per MUTCD for Canada or BC MOTI Manual of Standard Traffic Signs & Pavement Markings

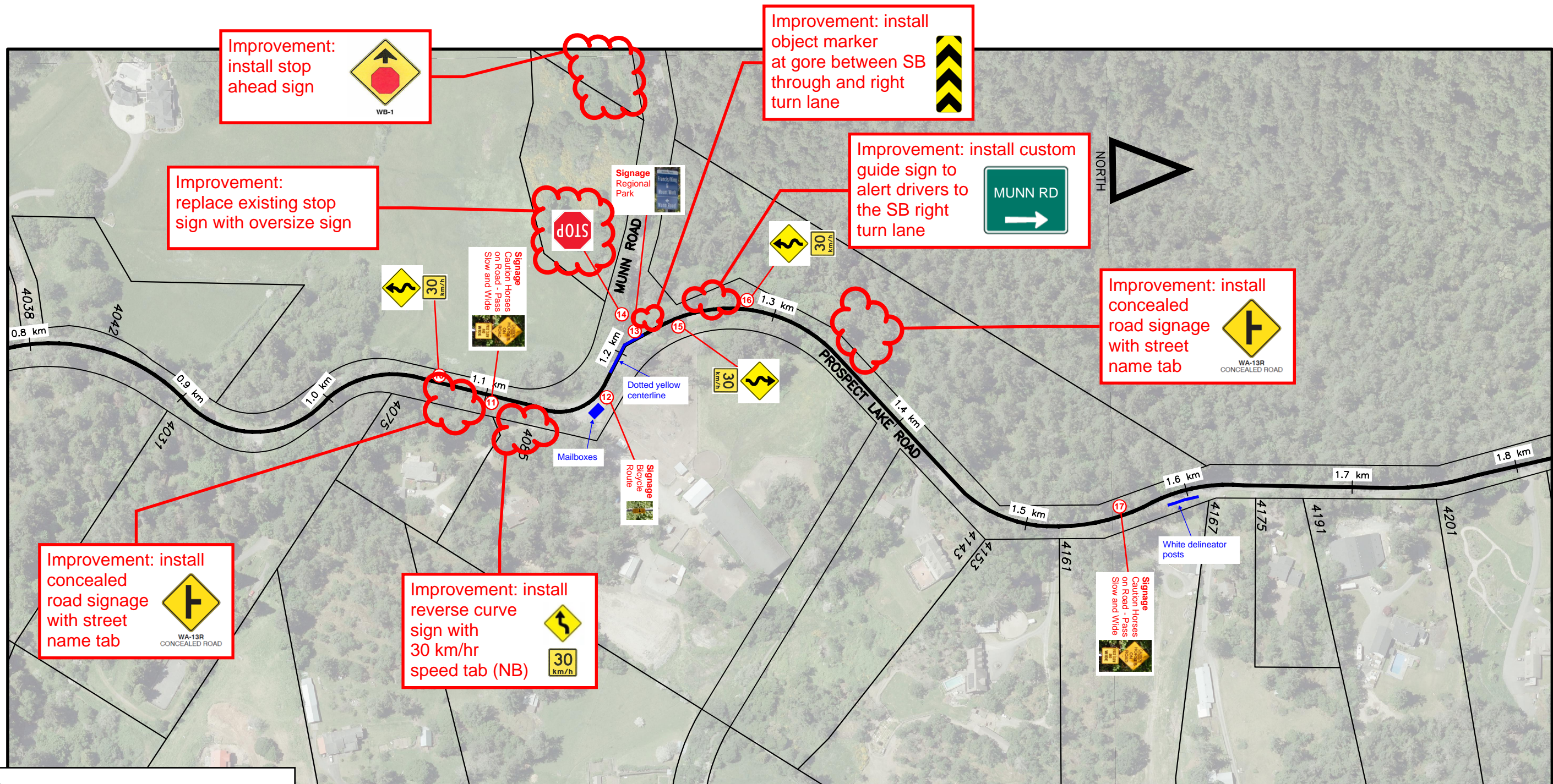
NOT FOR CONSTRUCTION

SHORT-TERM - SIGNING AND PAVEMENT MARKING IMPROVEMENTS
 July 10, 2020



PROSPECT LAKE ROAD - TRAFFIC OPERATIONS AND ROAD SAFETY REVIEW





Notes:

- 1) Existing and proposed sign locations are approximate. Actual sign locations/placement to be confirmed in the field.
- 2) Sign numbers shown are per MUTCD for Canada or BC MOTI Manual of Standard Traffic Signs & Pavement Markings

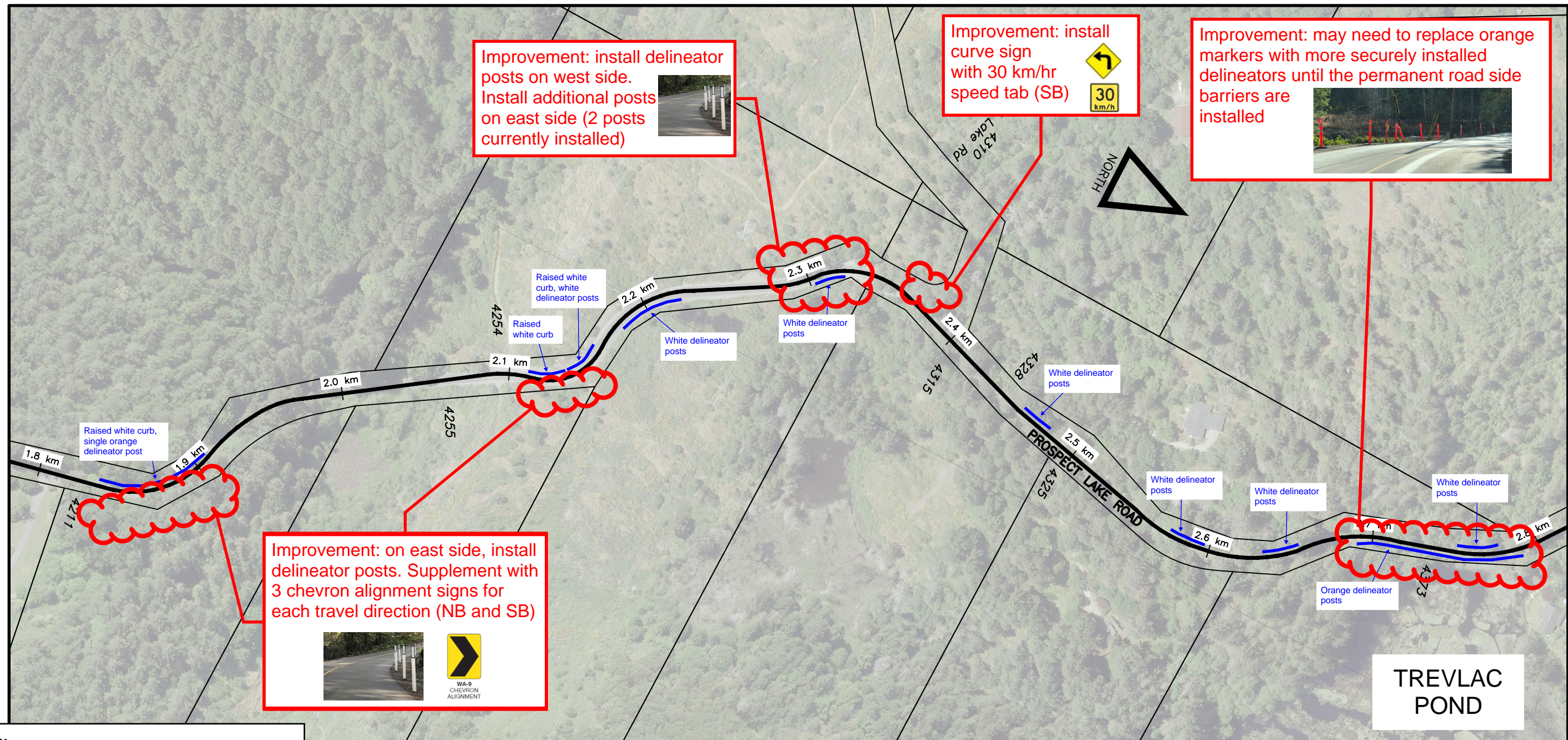
NOT FOR CONSTRUCTION

SHORT-TERM - SIGNING AND PAVEMENT MARKING IMPROVEMENTS
July 10, 2020



PROSPECT LAKE ROAD - TRAFFIC OPERATIONS AND ROAD SAFETY REVIEW





Notes:

1) Existing and proposed sign locations are approximate. Actual sign locations/placement to be confirmed in the field.

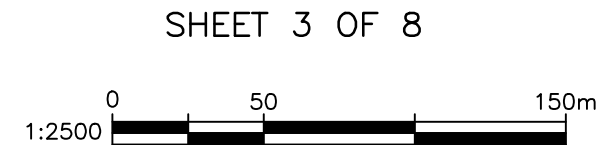
2) Sign numbers shown are per MUTCD for Canada or BC MOTI Manual of Standard Traffic Signs & Pavement Markings

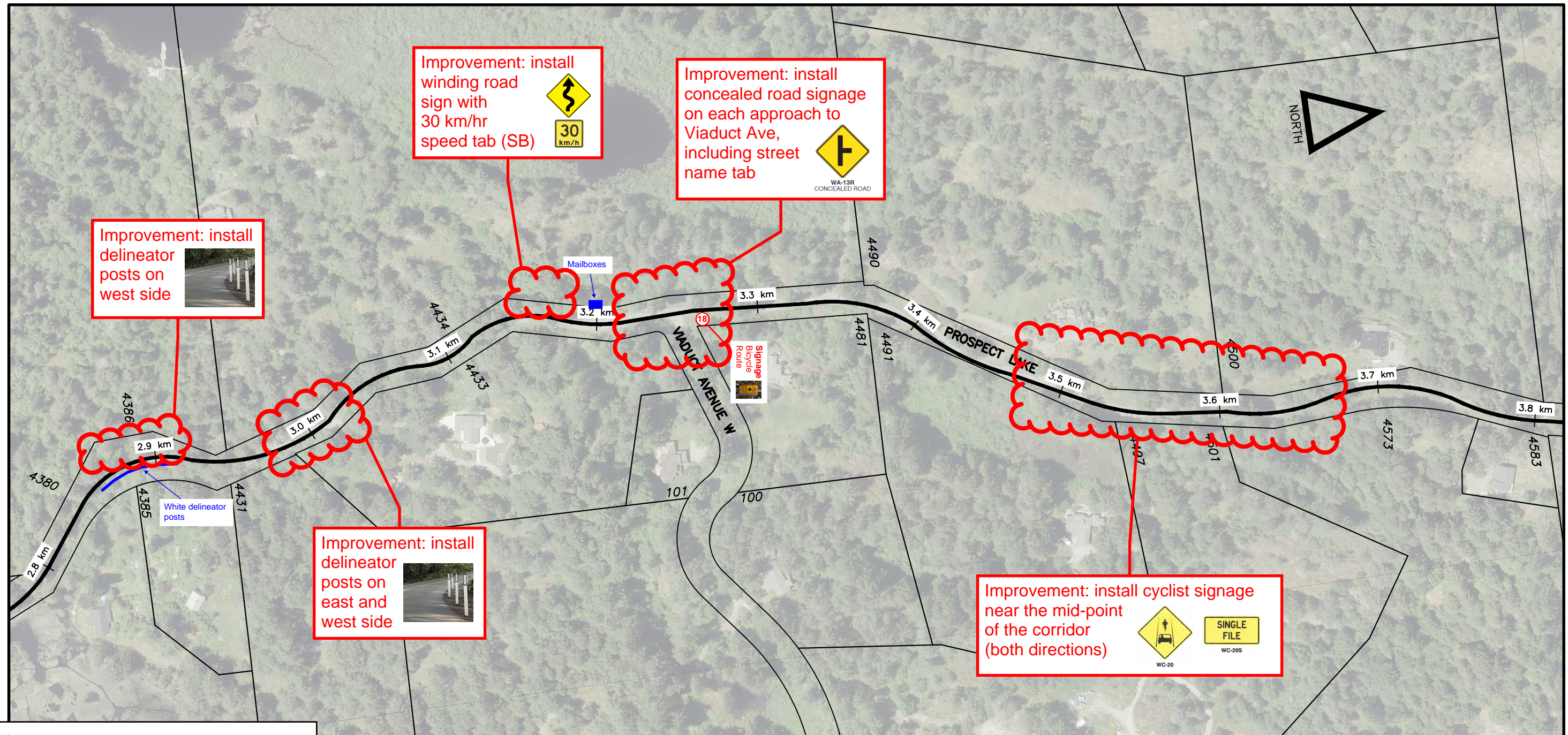
NOT FOR CONSTRUCTION

SHORT-TERM - SIGNING AND PAVEMENT MARKING IMPROVEMENTS
July 10, 2020



PROSPECT LAKE ROAD - TRAFFIC OPERATIONS AND ROAD SAFETY REVIEW





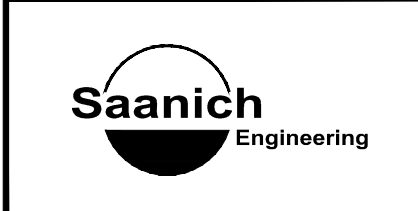
Notes:

1) Existing and proposed sign locations are approximate. Actual sign locations/placement to be confirmed in the field.

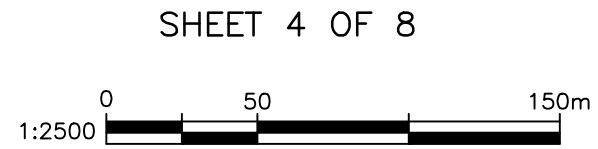
2) Sign numbers shown are per MUTCD for Canada or BC MOTI Manual of Standard Traffic Signs & Pavement Markings

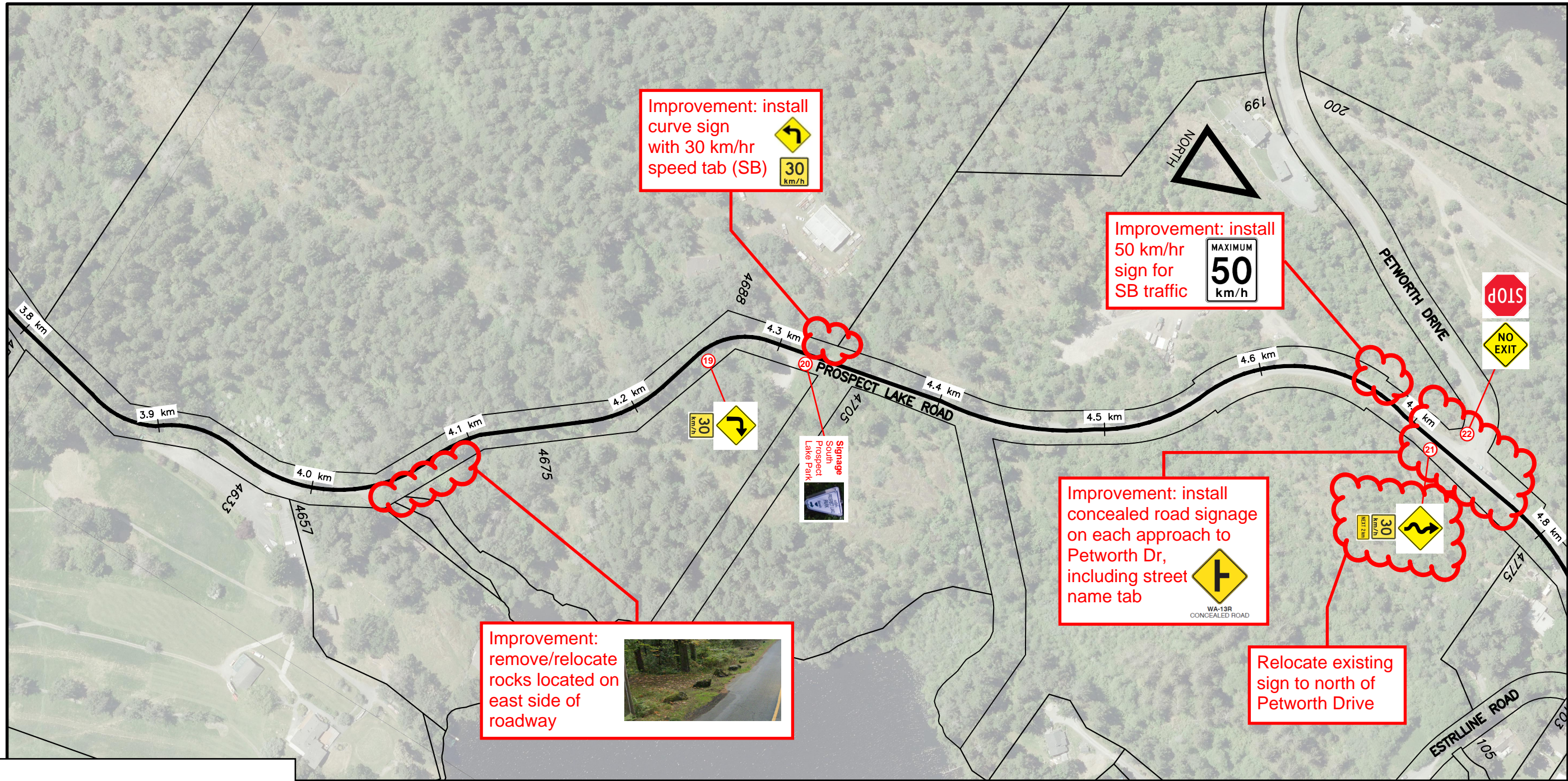
NOT FOR CONSTRUCTION

SHORT-TERM - SIGNING AND PAVEMENT MARKING IMPROVEMENTS
July 10, 2020



PROSPECT LAKE ROAD - TRAFFIC OPERATIONS AND ROAD SAFETY REVIEW





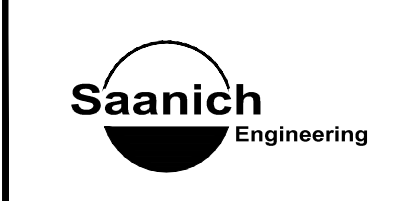
Notes:

1) Existing and proposed sign locations are approximate. Actual sign locations/placement to be confirmed in the field.

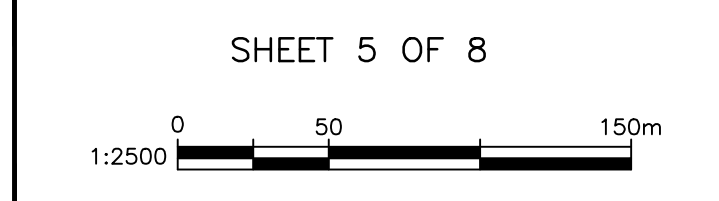
2) Sign numbers shown are per MUTCD for Canada or BC MOTI Manual of Standard Traffic Signs & Pavement Markings

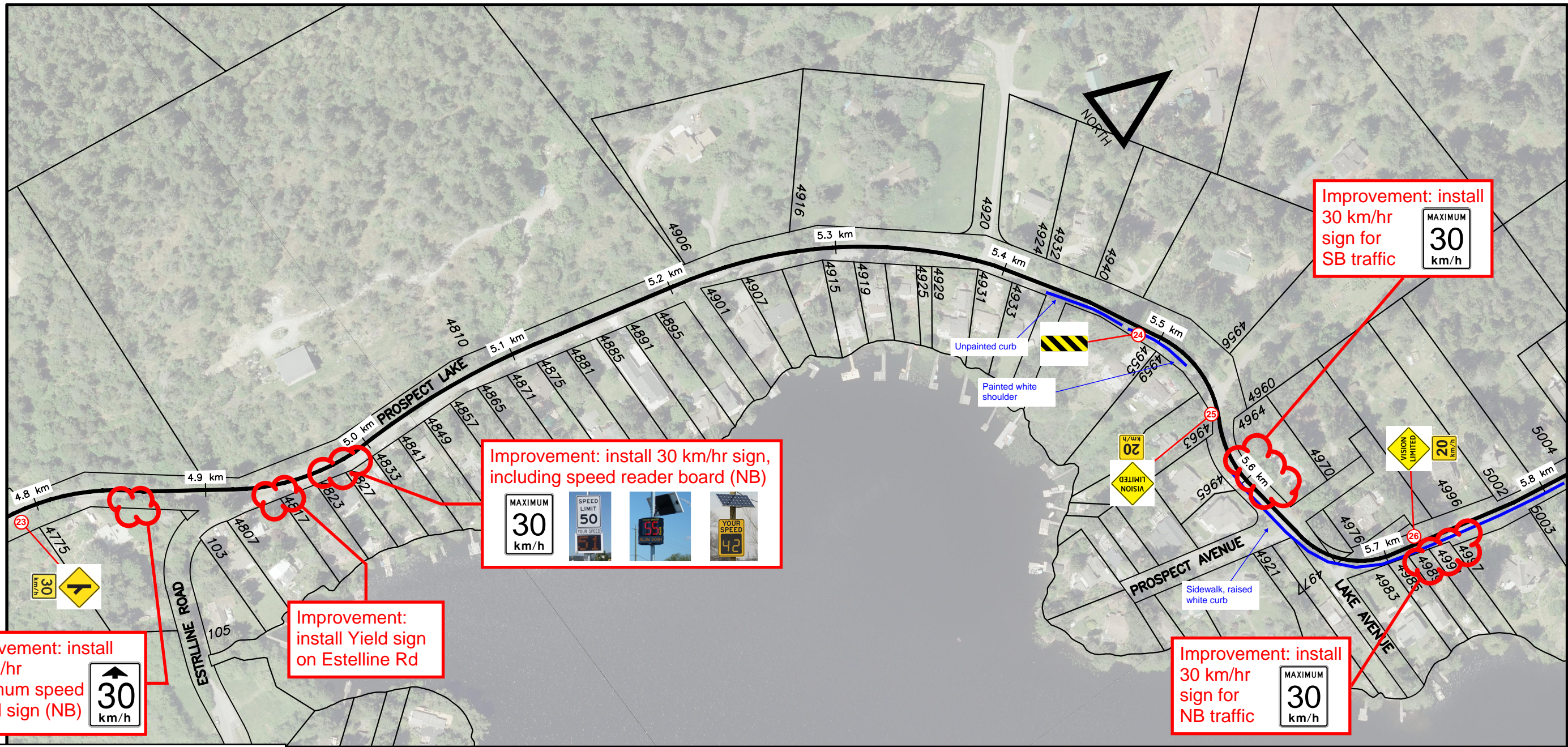
NOT FOR CONSTRUCTION

SHORT-TERM - SIGNING AND PAVEMENT MARKING IMPROVEMENTS
July 10, 2020



PROSPECT LAKE ROAD - TRAFFIC OPERATIONS AND ROAD SAFETY REVIEW





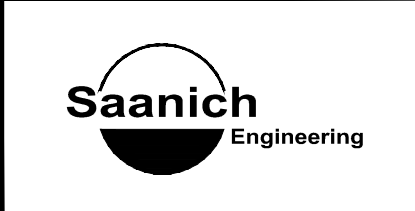
Notes:

1) Existing and proposed sign locations are approximate. Actual sign locations/placement to be confirmed in the field.

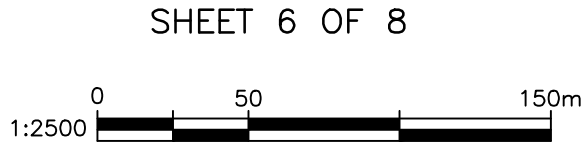
2) Sign numbers shown are per MUTCD for Canada or BC MOTI Manual of Standard Traffic Signs & Pavement Markings

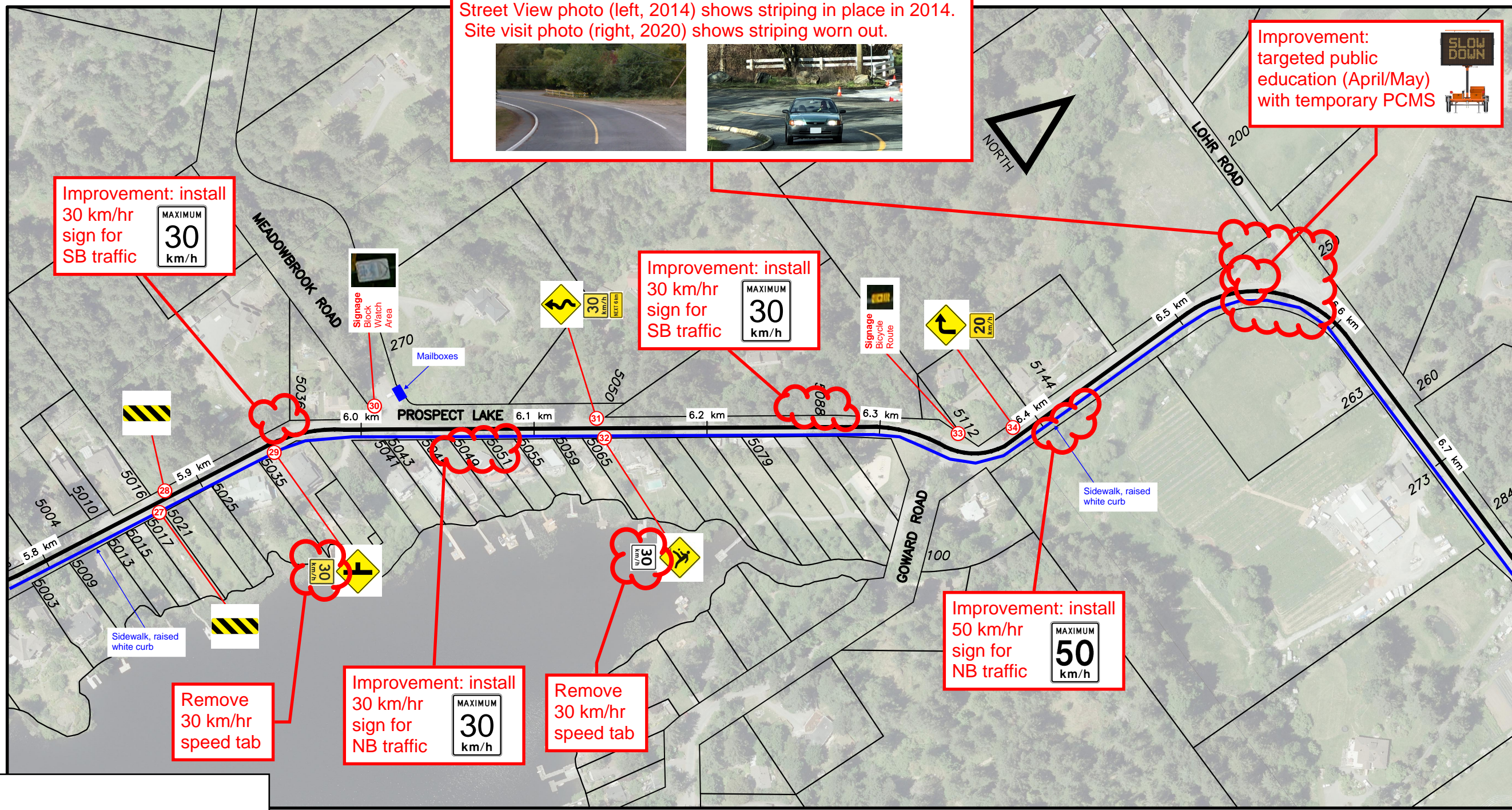
NOT FOR CONSTRUCTION

SHORT-TERM - SIGNING AND PAVEMENT MARKING IMPROVEMENTS
July 10, 2020



PROSPECT LAKE ROAD - TRAFFIC OPERATIONS AND ROAD SAFETY REVIEW





Improvement: replace shoulder striping along curve. Google Street View photo (left, 2014) shows striping in place in 2014. Site visit photo (right, 2020) shows striping worn out.



Improvement: targeted public education (April/May) with temporary PCMS



Improvement: install 30 km/hr sign for SB traffic



Improvement: install 30 km/hr sign for SB traffic



Improvement: install 50 km/hr sign for NB traffic



Improvement: install 30 km/hr sign for NB traffic



Remove 30 km/hr speed tab

Remove 30 km/hr speed tab

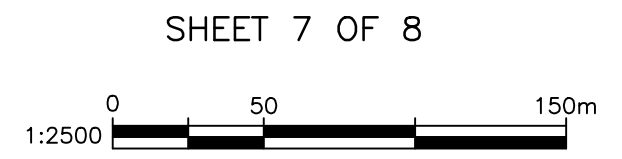
Notes:
 1) Existing and proposed sign locations are approximate. Actual sign locations/placement to be confirmed in the field.
 2) Sign numbers shown are per MUTCD for Canada or BC MOTI Manual of Standard Traffic Signs & Pavement Markings

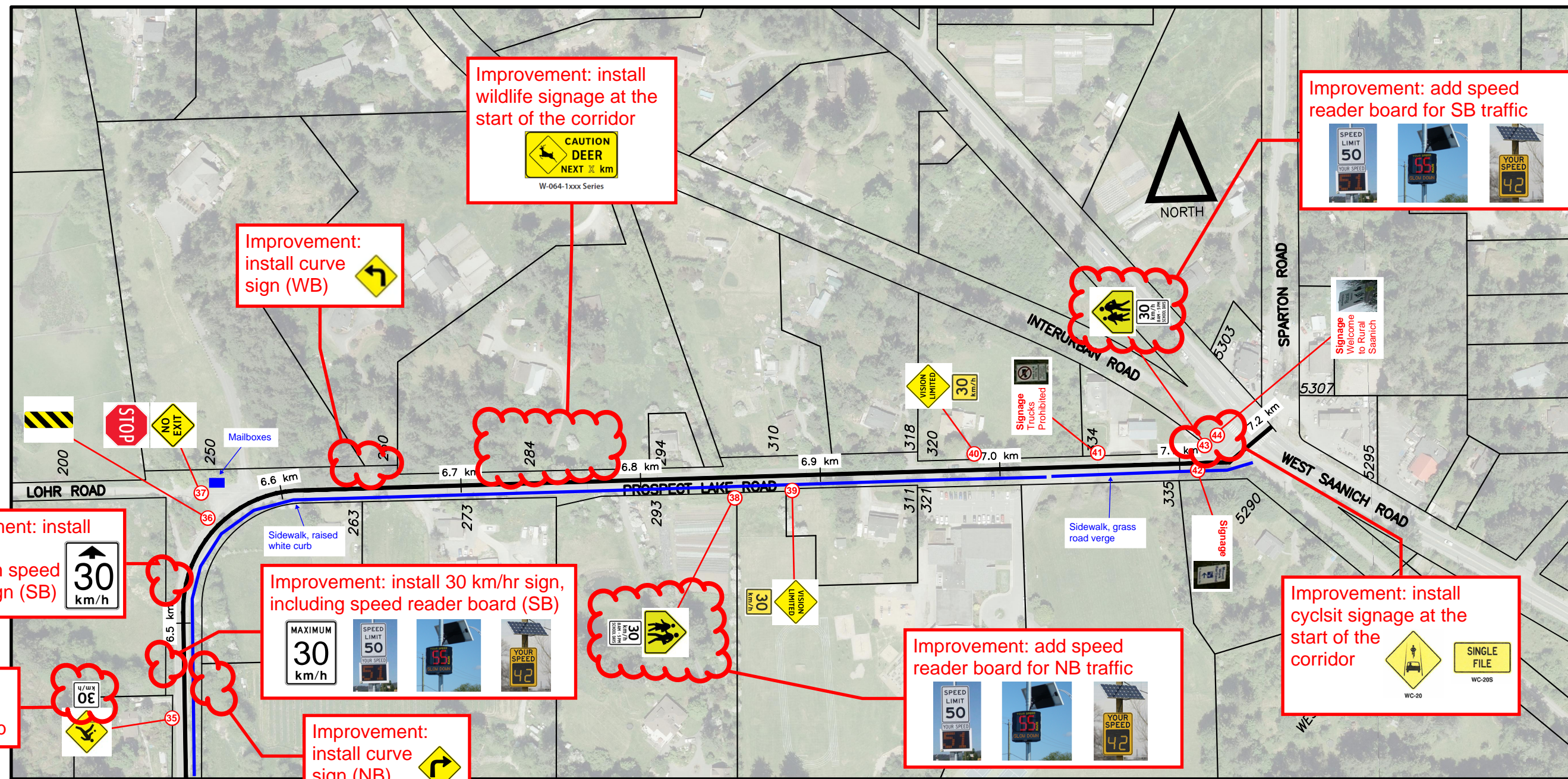
NOT FOR CONSTRUCTION

SHORT-TERM - SIGNING AND PAVEMENT MARKING IMPROVEMENTS
 July 10, 2020




PROSPECT LAKE ROAD - TRAFFIC OPERATIONS AND ROAD SAFETY REVIEW






Improvement: install 30 km/hr maximum speed ahead sign (SB)



Remove 30 km/hr speed tab




Improvement: install curve sign (WB)



Improvement: install wildlife signage at the start of the corridor



Improvement: install 30 km/hr sign, including speed reader board (SB)



Improvement: install curve sign (NB)



Improvement: add speed reader board for NB traffic



Improvement: add speed reader board for SB traffic



Improvement: install cyclsit signage at the start of the corridor

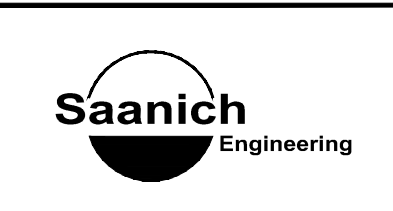


Notes:

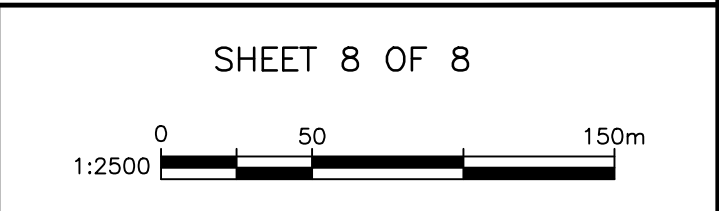
- Existing and proposed sign locations are approximate. Actual sign locations/placement to be confirmed in the field.
- Sign numbers shown are per MUTCD for Canada or BC MOTI Manual of Standard Traffic Signs & Pavement Markings

NOT FOR CONSTRUCTION

SHORT-TERM - SIGNING AND PAVEMENT MARKING IMPROVEMENTS
July 10, 2020



PROSPECT LAKE ROAD - TRAFFIC OPERATIONS AND ROAD SAFETY REVIEW












Prospect Lake Road Signage

<p>1</p> <p>MUTCD: WA-36R</p> <p>MoTI: W-054-R</p>		<p>2</p> <p>MUTCD: WA-8B</p> <p>MoTI: W-016</p>	
<p>3</p> <p>MUTCD: RA-1 WA-36</p> <p>MoTI: R-001 W-054-D</p>		<p>4</p> <p>MUTCD: RA-2</p> <p>MoTI: R-002</p>	
<p>5</p> <p>MUTCD: -</p> <p>MoTI: -</p>		<p>6</p> <p>MUTCD: WB-1 WA-30S</p> <p>MoTI: W-011 -</p>	
<p>7</p> <p>MUTCD: WA-6R WA-7S WA-28S</p> <p>MoTI: W-005-R W-022 -</p>		<p>8</p> <p>MUTCD: RA-1</p> <p>MoTI: R-001</p>	
<p>9</p> <p>MUTCD: WA-13R WA-30S</p> <p>MoTI: W-007-1 -</p>		<p>10</p> <p>MUTCD: WA-6R WA-7S</p> <p>MoTI: W-005-R W-022</p>	

<p>11</p> <p>MUTCD:</p> <p>-</p> <p>-</p> <p>MoTI:</p> <p>-</p> <p>-</p>		<p>12</p> <p>MUTCD:</p> <p>-</p> <p>MoTI:</p> <p>-</p>	
<p>13</p> <p>MUTCD:</p> <p>-</p> <p>MoTI:</p> <p>-</p>		<p>14</p> <p>MUTCD:</p> <p>RA-1</p> <p>MoTI:</p> <p>R-001</p>	
<p>15</p> <p>MUTCD:</p> <p>WA-6R</p> <p>WA-7S</p> <p>MoTI:</p> <p>W-005-R</p> <p>W-022</p>		<p>16</p> <p>MUTCD:</p> <p>WA-6R</p> <p>WA-7S</p> <p>MoTI:</p> <p>W-005-R</p> <p>W-022</p>	
<p>17</p> <p>MUTCD:</p> <p>-</p> <p>-</p> <p>MoTI:</p> <p>-</p> <p>-</p>		<p>18</p> <p>MUTCD:</p> <p>-</p> <p>MoTI:</p> <p>-</p>	
<p>19</p> <p>MUTCD:</p> <p>WA-2R</p> <p>WA-7S</p> <p>MoTI:</p> <p>W-002-R</p> <p>W-022</p>		<p>20</p> <p>MUTCD:</p> <p>-</p> <p>MoTI:</p> <p>-</p>	

<p>21 MUTCD: WA-6L WA-7S WA-28S</p> <p>MoTI: W-005-L W-022 -</p>		<p>22 MUTCD: WC-50</p> <p>MoTI: W-145</p>	
<p>23 MUTCD: WA-12R WA-7S</p> <p>MoTI: - W-022</p>		<p>24 MUTCD: WA-36R</p> <p>MoTI: W-054-R</p>	
<p>25* MUTCD: - WA-7S</p> <p>MoTI: W-125 W-022</p>		<p>26 MUTCD: - WA-7S</p> <p>MoTI: W-125 W-022</p>	
<p>27 MUTCD: WA-36R</p> <p>MoTI: W-054-R</p>		<p>28 MUTCD: WA-36R</p> <p>MoTI: W-054-R</p>	
<p>29 MUTCD: WA-13L WA-30S</p> <p>MoTI: W-007-1 W-022</p>		<p>30 MUTCD: -</p> <p>MoTI: -</p>	

<p>31 MUTCD: WA-6R WA-7S WA-28S</p> <p>MoTI: W-005-R W-022 -</p>			<p>32 MUTCD: WC-3 -</p> <p>MoTI: PS-006 PS-006 tab</p>		
<p>33 MUTCD: -</p> <p>MoTI: -</p>			<p>34 MUTCD: WA-2R WA-7S</p> <p>MoTI: W-002-R W-022</p>		
<p>35 MUTCD: WC-3 -</p> <p>MoTI: PS-006 PS-006 tab</p>			<p>36 MUTCD: WA-36R</p> <p>MoTI: W-054-R</p>		
<p>37 MUTCD: WC-50</p> <p>MoTI: W-145</p>			<p>38 MUTCD: WC-1 -</p> <p>MoTI: PS-001 PS-001 tab</p>		
<p>39 MUTCD: - WA-7S</p> <p>MoTI: W-125 W-022</p>			<p>40 MUTCD: - WA-7S</p> <p>MoTI: W-125 W-022</p>		

<p>41</p> <p>MUTCD: RB-62</p> <p>-</p> <p>MoTI:</p> <p>-</p> <p>-</p>		<p>42*</p> <p>MUTCD:</p> <p>-</p> <p>MoTI:</p> <p>-</p>	
<p>43</p> <p>MUTCD: WC-1</p> <p>-</p> <p>MoTI: PS-001 PS-001 tab</p>		<p>44</p> <p>MUTCD:</p> <p>-</p> <p>MoTI:</p> <p>-</p>	

*Difficult to see in the dark

**APPENDIX C – SUMMARY OF PUBLIC INPUT
RECEIVED**

Summary of Public Input Received

The following are some of the more specific concerns regarding Prospect Lake Road that were identified by the public:

- Prospect Lake Road does not have the capacity to handle the large volumes of traffic associated with non-local traffic – residents would like to deter commuter traffic by lowering speeds and implementing traffic calming measures.
- Posted speed limits are not respected – residents have suggested to reduce the posted speed limit on Prospect Lake Road to 30 or 40 km/hr and either have speed cameras or police enforcement.
- Residents like the rural feel of the road and are therefore against widening or straightening of the road, as this would attract commuter traffic.
- Some residents have expressed discontent with the lack of sidewalks and bike lanes; however, some feel that installing smooth gravel shoulders would be good enough to accommodate pedestrians and cyclists while preserving the rural feel of the road.
- Limit commercial truck traffic on Prospect Lake Road to only allow for essential deliveries.
- Frequent occurrence of motorists crossing the centreline – residents suggested changing solid yellow to double yellow line to prohibit passing.
- Few safe passing areas.
- Many areas with poor sight line visibility due to hills or roadside vegetation.
- Intersection control:
 - Convert Prospect Lake Road / West Burnside Road, Prospect Lake Road / Munn Road and Prospect Lake Road / Goward Road to three-way stop control intersections
 - Signalization needed at Prospect Lake Road / West Saanich Road / Sparton Road
 - The Goward Road stop bar and sign are set too far back
- Insufficient number of parking stalls at Prospect Lake Elementary which forces parents to park on the road
- Improve signage (e.g. hidden road signs) and install reflective pavement markers



Contact

Denny Leung, PEng

604-424-4860

dleung@mcelhanney.com



McElhanney

