



Traffic Control Review Village of Burns Lake

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1 Introduction

1.1 Background

Effective traffic signing and paint markings on roadways are critical to the safe movement of vehicular traffic, cyclists, and pedestrians. These traffic control devices establish the rules of the road in accordance with the Motor Vehicle Act, warn drivers of specific conditions they are approaching, and provide guidance to help travelers find their destinations.

However, the warrants, designs, applications, and strategies of traffic control can change over time. Furthermore, community growth and new development can change traffic volumes and patterns. These can lead to existing traffic control becoming unwarranted, obsolete, or inappropriate. Such inconsistencies may create confusion in road users, render some traffic control more difficult to enforce, and affect road safety.

The Insurance Corporation of British Columbia (ICBC) has initiated a program with BC communities to undertake comprehensive reviews of traffic signs and road markings within those communities. This study was jointly commissioned by ICBC and the Village of Burns Lake to complete a review of the traffic control in Burns Lake, BC.

1.2 Objectives

The objectives of the Burns Lake Traffic Control Review are:

1. To review current principles and recent developments in traffic control standards with Village staff;
2. To learn what policies and practices the Village has adopted for its traffic control;
3. To identify specific locations of concern to be reviewed in the field;
4. To complete a comprehensive field review of existing traffic control to identify potential areas for adjustments to improve road safety; and
5. To develop a field book of traffic signing and road marking standards for use by Village staff.

A concurrent study of the traffic speeds in Burns Lake was completed with the Traffic Control Review. This report was delivered separately.

1.3 Study Area

The study area includes all roads under the jurisdiction of the Village of Burns Lake. Provincial highways within the municipal limits are not directly included in the scope of the study, except for issues that may affect the Village's traffic control.

2 Methodology

The stages of the project were as follows:

1. Meet with the Village of Burns Lake staff on September 26th, 2018. The minutes from this meeting are provided in Appendix A.
2. Complete a comprehensive field review of the existing traffic control in Burns Lake.
3. Evaluate the existing traffic control against national guidelines from the Transportation Association of Canada, and common practices in British Columbia.
4. Address the specific locations of concern identified by the Village, as outlined below:

	Description	Report Section(s)
a.	3 rd Avenue and Carroll Street – existing use of Yield sign	3.2
b.	Hill Street and Carroll Street – existing use of Yield sign + Stop sign	3.1.2
c.	8 th Avenue and Centre Street	3.1.2
d.	Centre Street inconsistency (1 st through 7 th Avenue) – all intersections signed differently	3.1.2
e.	8 th Avenue and Lorne Street – use of Yield sign	3.2
f.	Government Street / 3 rd Avenue / Gilgan Rd (5 Corner) – overall confusion	3.1.2, 4.3

5. Complete a report identifying potential issues with existing traffic control and road safety, and recommending options for improvement. The supporting photographs which accompany this report are geotagged to facilitate locational referencing.
6. Complete a field book for common applications of traffic control for use by Village staff.

3 Traffic Signs

The following sections outline the findings in the review of all traffic signage.

3.1 Stop Signs

Stop signs are used at intersections to establish traffic right-of-way between approaches. In the past, it was common to leave intersections unsigned and uncontrolled. At that time, most drivers understood that the first vehicle to arrive at the intersection has right-of-way. In the event of two vehicles arriving at the intersection at the same time, the vehicle on the right had right-of-way according to the Motor Vehicle Act.

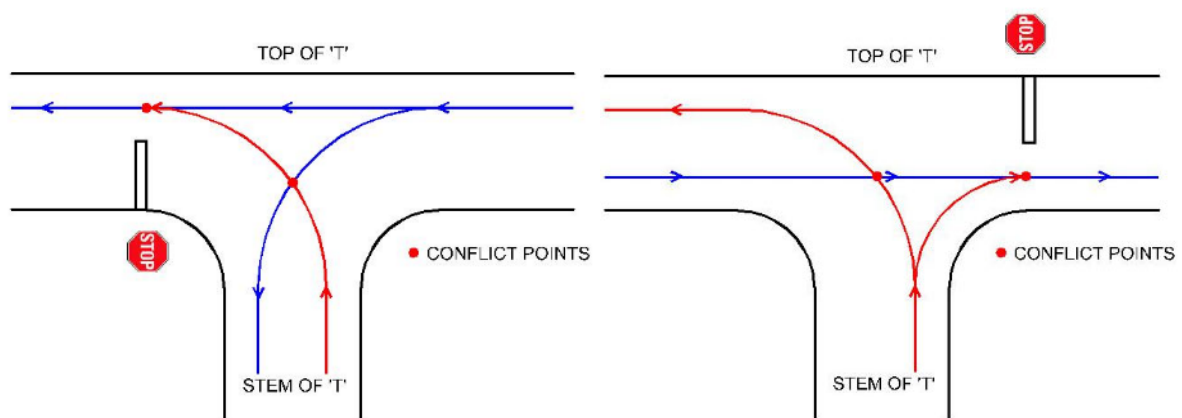


Stop signs are now more widely used at intersections in British Columbia. Therefore, modern drivers tend to assume that if there is no stop sign on their approach to an intersection, the conflicting approach(es) have the stop condition(s).

At four leg intersections, the continuity through the intersection can give drivers on each approach the sense that they are on a continuous through road, while concurrently inviting higher vehicle speeds through the intersection. In addition, limited sight distance due to adjacent structures and foliage can impede a driver's ability to see approaching vehicles on conflicting movements. Stop control at four-leg intersections can dramatically reduce the potential for high-severity collisions.

At "T" intersections, the stop condition is ideally applied to the stem of the "T" (according to the Transportation Association of Canada). This is more intuitive to drivers, and avoids conflicts between free-flow traffic traveling across the top of the "T" and free-flow traffic turning from the stem of the "T" (see Figure 1). Therefore, even stop signs for traffic coming from short cul-de-sacs are recommended, but are considered lower priorities than those on higher class roads.

Figure 1: Traffic Conflicts When Stop Condition is on Top of "T" Intersection



In some locations, a stop condition on the stem of the “T” is not feasible, such as locations with severe grades, or at the frontage road access to a highway. In these cases, both approaches along the top of the “T” intersection can be stopped as an alternative. However, this traffic control may not be as intuitive to drivers.

If the predominant movements through a “T” intersection are turning, the intersection can be redesigned to favour the turning movement (see example, Figure 2) if desired. This involves minor geometric improvements, and the use of curve signing and centreline markings.

Figure 2: Example Upgrade to Give Priority to Turning Movements at a “T” Intersection



For private roads connecting to public streets, the Village can require the developer to install and maintain stop signs where warranted by geometry, traffic volumes, and/or visual cues. If the signs are not installed at the time of development, the Village may opt to pay for these sign installations retroactively. However, the signs should be maintained by the property owners.

Most intersections in Burns Lake are currently controlled with stop signs or other traffic control devices. There were 35 issues identified with stop signs, as outlined below.

3.1.1 New Stop Signs

There were 15 locations where new Stop signage appeared warranted, as outlined below.

Priority	Photo No.	Location	Comments
V. High	75	Nash Rd at Torrika	4 leg intersection with no stop control adjacent to hwy access.
V. High	76	Nash Rd (Ftg Rd) at Woods'n'Water access	4 leg intersection with no stop control adjacent to hwy access.
V. High	80	Frontage Rd at Eagle Automotive hwy access	4 leg intersection with no stop control adjacent to hwy access.
High	79	Frontage Rd at Highway 16 access	T intersection, adjacent to highway
High	88	Williams Drive at Babine Crescent	T Intersection missing stop control
High	90	Lorne Street at Babine Crescent	Four leg intersection, no stop signs on both sides
High	91	Residential Rd (btn Lorne and Centre) at Babine	Four leg intersection, no stop signs on both sides
High	103	10th Ave and Babine Cres	Stop control warranted.
High	107	Eleventh Ave at Centre	Stop sign needed at T intersection
High	149	Centre Street at Hwy 16	Apparent warrant for "Stop Ahead" sign before intersection.
Med	37	Water Street at Francois Lake Dr	Stop sign needed at T intersection on gravel road.
Low	98	Toh St at Witzih	Stop sign needed at T intersection
Low	99	Residential Rd at Sus Ave	Stop sign needed at T intersection
Low	104	Residential Rd at Babine Cres	Stop sign needed at T intersection from small cul-de-sac residential road
Low	109	Residential Rd at 11th Ave	Stop sign needed at T intersection

Figure 3: New Stop Signs Warranted at Four Leg Intersection – Highway Frontage Rd (Photo 80)



3.1.2 Adjustments to Existing Stop Signs

There were six locations where issues with existing stop signs were identified.

Priority	Photo No.	Location	Comments
High	51	Gilgan Road at Government Street	Missing four way tab on Gilgan Rd approach to Government.
High	92	Centre St at Babine Crescent	One of three legs stopped. Stop sign should ideally be on the stem of T intersection.
High	112	Eighth Ave at Centre St	3 of 4 legs stopped. Consider four way stop (if warranted by volumes), or otherwise a two way stop.
High	148	Centre Street at First Ave	3 of 4 legs stopped; Steep hill on south leg. Consider four way stop (if warranted), or otherwise a two way stop.
High	157, 158	Carroll St at Hill St	Two way stop with Yield on third approach. Consider four way stop (if warranted), or otherwise a two way stop.
Med	44	Francois Lake Dr at H16	Stop sign should typically be on the right side of the approach. Also, a Yield condition may be an alternative (MoTI jurisdiction).

Figure 4: Two Stop and One Yield Sign at Four-Leg Intersection – Carroll Street at Hill (Photo 158)



If a new stop sign or an adjustment to existing stop signage is likely to change the existing traffic pattern, drivers and affected stakeholders should be notified accordingly. For example, a recommended procedure for changing the stop condition from one approach to another approach is as follows:

- Consult with the affected stakeholders to explain the rationale, timing and procedure of the change, and confirm there are no unforeseen concerns. This can be done with letters.
- Install stop signs on all approaches, with Traffic Pattern Changed signs approximately 30 to 50 metres in advance of the intersection.
- After approximately one month, remove the Traffic Pattern Changed signs.
- After approximately one more month, remove the stop signs on the approaches which will become free-flow, and restore the Traffic Pattern Changed signs on all approaches.
- After approximately one more month, remove the Traffic Pattern Changed signs.



3.1.3 Stop Signs with Visibility Issues

Despite being placed well, a stop sign's effectiveness can be reduced if it lacks visibility due to age, poor reflectivity, or obstructions. If the visibility of signage can be restored easily, it should be done as soon as possible. However, if there are challenges to achieving the necessary visibility, a Stop Ahead sign may be considered as an alternative. Stop lines (see Section 4.3) may also be used to emphasize a stop condition where issues with compliance have been identified.

The following stop signs have identified issues with visibility. Higher priorities were assigned to locations with higher class roads, and more severe visibility issues.

Priority	Photo No.	Location	Comments
V. High	136	Fourth Ave at Carroll	Sign obscured by trees; visual cues suggest continuous road.
V. High	139	Third Avenue at Centre	Sign obscured by trees; visual cues suggest continuous road.
High	5	Schritt Cres at Roumieu	Sign obscured by bushes/trees. Also defaced.
High	161	Hill Street at Hwy 16	Very faded/old stop sign.
High	163	Telegraph Trail at Hill St	Sign obscured by trees.
Med	106	Privite Dr at Babine Cres	Sign spray painted; defaced.
Low	6	Roumieu Drive at Hwy 16	Defaced/damaged sign.
Low	24	Railway Ave at Francois Lk	Damaged sign
Low	66	Fifth Ave at Government	Stop sign low on post (also potential hazard for pedestrians).
Low	69	High School access road at Government	Sign has sticker; defaced
Low	127	Lorne St at Hwy 16	Damaged sign
Low	137	Fourth Ave at Carroll	Stop sign low on post (also potential hazard for pedestrians).
Low	144	Fourth Ave at Centre	Stop sign low on post (also potential hazard for pedestrians).
Low	153	Second Ave at Centre	Defaced stop sign

Figure 5: Sign Obscured by Trees – Fourth Ave at Carroll Street (Photo 136)



3.2 Yield Signs

Yield signs have historically been used to allow drivers to coast through an intersection unless they see a vehicle on another approach. According to TAC guidelines, Yield signs can be appropriate at intersections with low traffic volumes, a low frequency of collisions, and adequate sight lines. However, Stop signs are generally recommended as a safer alternative to Yield signs due to their clear message.



The following Yield-controlled intersections were identified as recommended candidates for conversion to Stop-control, and/or other adjustments to the Yield condition. Higher priorities were assigned to higher class roads, and at intersections with particular concerns with the sight lines or problematic signage.

Priority	Photo No.	Location	Comments
High	8	Bennett St at Pioneer Way	Insufficient sight distance. Also sign obscured by trees.
High	10	Saunders Dr at Pioneer Way	Insufficient sight distance. Also sign obscured by trees.
High	128	Lorne St at Eighth	Insufficient sight distance at offset T intersection
High	138	Brown Street at Third	Insufficient sight distance
High	154	Carroll Street at Third Ave	Insufficient sight distance; stop sign in opposing direction. If grades are a concern and the traffic volume and network strategy allow, consider stopping the cross street instead.
High	159	Hill St at Carroll St	Yield at intersection with two other stops (see Section 3.1.2)
High	21	Francois Lake Drive	Sign behind pole. Ideally should be stop sign.
Med	7	Glans Dr at Richmond Loop	Insufficient sight distance.
Med	9	Gerow Dr at Pioneer Way	Insufficient sight distance
Med	30	Evenshen Drive at Railway	Insufficient sight distance.
Med	74	Torrika Dr at Nash	Insufficient sight distance.
Med	105	Babine Cres at Williams	Insufficient sight distance.
Med	129	Lorne St at Ninth	Insufficient sight distance
Med	71	High school access road at P lot	Yield sign does not appear warranted by a conflicting movement.
Low	11	Flogan Street at Pioneer Way	Sight distance appears adequate, but stop sign still recommended to be consistent with other intersections.

Figure 6: Obscured Yield Sign with Insufficient Sight Distance – Bennett St at Pioneer (Photo 8)



3.3 Turn Control and Lane Use

Turn Control and Lane Use signs are used to regulate the permitted movements at intersections. Turn Control signs apply to all traffic in all lanes on the approach to an intersection. Lane Use signs apply only to the lane designated.

Three issues were identified with Turn Control signage:

Priority	Photo No.	Location	Comments
High	40	Francois Lake Dr at rail crossing	No Left Turn sign located well before intersection. Also defaced/damaged. Sign should be replaced, and relocated to the intersection on the approach to which it applies. If needed, an advance warning sign (yellow diamond) concerning the turn restriction could be provided at the existing sign location.
High	130	Centre Street at Ninth	Southbound approach should have No Left Turn sign to match No Right Turn in opposing (northbound) direction.
Med	44	Francois Lake Dr at Hwy 16	No U Turn sign should ideally be a No Left Turn sign, since it appears to apply to traffic on Francois Lake Drive. (MoTI jurisdiction)

Figure 7: No Left Turn Sign Warranted Before One Way Street – Centre Street at Ninth (Photo 130)



3.4 Speed

Speed signs are used to indicate the safe speed at which a road can be driven. If the posted speed is too high, safety concerns may result. If the posted speed is too low, it may not be respected by drivers. To be effective and enforceable, the posted speed limits should be consistently applied, reasonable for the conditions, and should clearly delimit the area.



The concurrent speed study conducted at eight locations in Burns Lake showed that there are some issues with speeding on the highway at the west municipal boundary, as well as issues with non-compliance at the 30 km/h School and Playground Zones (see Sections 3.6 and 3.7). Otherwise, the majority of traffic on municipal roads travels well within the posted speed of 50 km/h.

In general, the existing speed signs were well-situated around Burns Lake. The following two issues were identified as concerns.

Priority	Photo No.	Location	Comments
High	33, 36	Tibbets Crescent	20 km/h sign at Isaac Sam Drive (Charlie Cres?), but there is no similar signage for opposing traffic at Railway Avenue to delimit an enforceable speed zone on Tibbets Crescent. Also, the existing southbound speed sign should ideally be on the right side of the road.
High	67, 68	High School P Lot and Lakers Street (access road)	Non-standard 10 km/h sign on stop sign at parking lot exit, and a non-standard 30 km/h speed sign on the left side of the access road for exiting traffic. These should be replaced with standard school signage (see Section 3.6) and/or standard regulatory speed signage consistently applied in both directions to delimit an enforceable zone.

Figure 8: 20 km/h Posted Speed in Southbound Direction Only – Tibbets Crescent (Photo 33)



3.5 Crosswalks

Crosswalks should be placed at locations where warranted by volumes or network requirements, and at appropriate distances from other crosswalks and signals. Otherwise, drivers may become desensitized to the crosswalks and/or grow frustrated at successive stops for pedestrians over short distances. Both conditions may contribute to poor compliance and safety concerns.

There are two types of painted crosswalks generally used in BC:

- Parallel Line Crosswalks, which are typically used at stop conditions (e.g. stop signs, traffic signals) with a pedestrian crossing demand. These crosswalks may be supplemented with stop lines, but do not require signage.
- Zebra Stripe Crosswalks, which are typically used where greater emphasis or visibility is required. The common convention is to use zebra stripe markings on free-flow crosswalks, and supplement the markings with four (4) crosswalk signs (i.e. one sign on each side of each approach, with figures walking toward the roadway). This design makes the crosswalks easier to see on roads with free-flow traffic.



Crosswalk



School Crosswalk

A result of this practice is that many drivers now interpret parallel line crosswalks as an indication of a stop condition, and zebra stripe markings as an indication of free-flow traffic.

There were seven locations identified in Burns Lake with crosswalk issues:

Priority	Photo No.	Location	Comments
High	1	Roumieu Drive, S of Hwy 16	School Crosswalk Ahead signage in place, but no apparent school (or other) crosswalk on the road.
High	49	Gilgan Road at Tweedsmuir Park	Only one sign provided (eastbound), which is partially in the trees. The rest of the crosswalk signage is missing.
High	95	Sus Avenue, N of Centre St	School crosswalk sign on one side only. Zebra paint markings should be white only (for enforceability), and the advance yellow painted "X" markings are no longer used for crosswalks.
High	102	Centre Street at 10th Ave	Multiple crosswalk signs. Signage should be at the crosswalk only, and on both sides of each approach.
High	118	Ninth Ave at Carroll St	Replace zebra markings with parallel lines to reflect stop condition. Crosswalk signs are not warranted at a stop condition, and should be removed.
High	122	Ninth Ave at Marsh	Missing signage at school crosswalk.
Med	42	Francois Lake Drive at Hwy 16	Crosswalk signs missing on left side of each approach.

Figure 9: No Crosswalk After Advance Warning Sign – Roumieu Drive (Photo 1)



Figure 10: Unwarranted Signs/Markings at Stop Condition – 9th Ave at Carroll St (Photo 118)



3.6 School Signs

School Area signs (fluorescent-green pentagons) advise drivers that there is a school in the vicinity, and that they should be aware of the potential for school children on the road. School Zones use the same pentagon sign, but are supplemented with speed reduction tabs (typically 30 km/h), which are in effect from 8:00 AM to 5:00 PM School Days, unless otherwise posted.



The Transportation Association of Canada has developed a warrant system to help determine if and what signs are appropriate for the streets surrounding a given school. The maximum score is 100, with higher scores indicating the need for stricter signing, as indicated below:

TAC Warrant Score	Applicable Signage
0 – 40	No school signage required
41 – 64	School Area
65 – 80	School Area or School Zone
81 – 100	School Zone

To be clear, effective, and enforceable, one school sign is required on every approach to the defined School Zone. If an approach is not signed, a driver may enter the zone without being aware of the school proximity or the reduced speed limit. Redundant school signs within the zone can also create enforceability problems as the Motor Vehicle Act stipulates that a School Zone ends at the school sign in the opposing direction.

The existing School Zones and identified issues are discussed in the following sections. Any proposed changes to the existing school signing should be discussed with the affected schools and the School District.

3.6.1 William Konkin Elementary School

There is an existing 30 km/h School Zone around William Konkin Elementary School. This is supported by the TAC warrant scores, as shown in the table below.

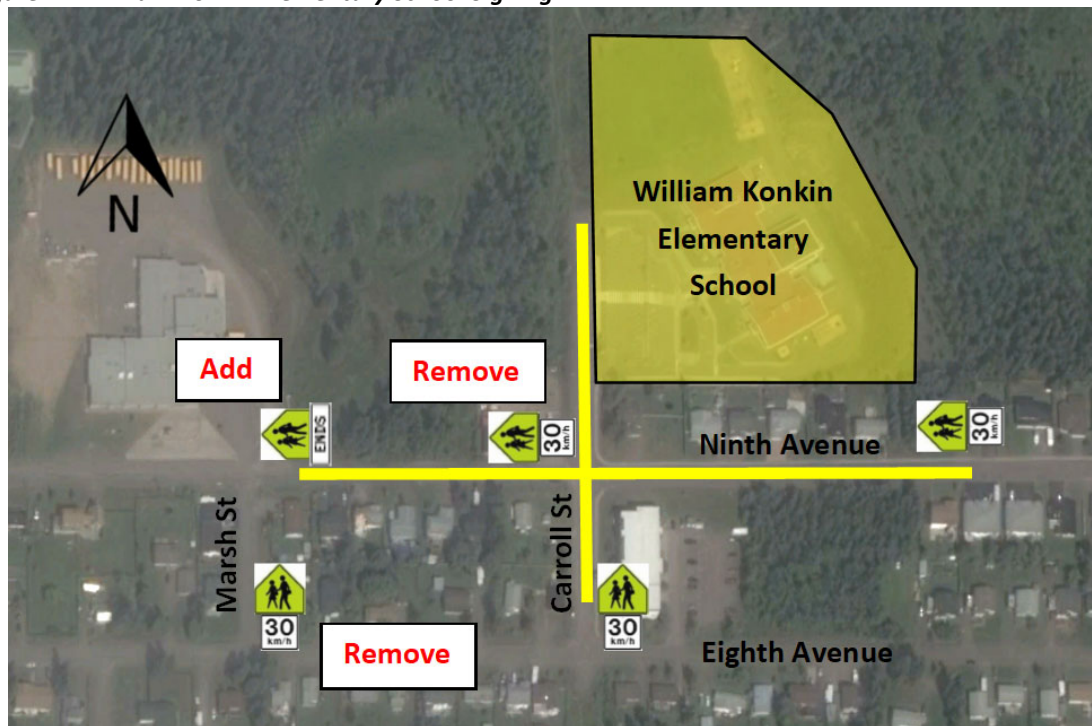
School	Perimeter Street	TAC Score	Photo No.	Comments
William Konkin Elementary School	Carroll St	95	147	Warrants a School Zone.
	Ninth Ave	73	117	Warrants a School Area or Zone.

The following three issues were identified with the existing school signage:

1. The westbound School Zone sign on Ninth Avenue, west of Carroll Street, is redundant since traffic is already in the school zone at this location. This sign can be removed.
2. In the absence of an eastbound School Zone sign on Ninth Avenue (which is unnecessary due to the one-way traffic condition), there is no indication where the School Zone ends. A new School Zone sign with an "ENDS" tab should be installed on Ninth Avenue.
3. The school zone appears to extend further west on Ninth Avenue than necessary, and could be closed east of the Marsh Street intersection. This would require the removal of the school zone sign on Marsh Street.

The changes are illustrated in Figure 11, and are recommended as a Medium priority.

Figure 11: William Konkin Elementary School Signing



3.6.2 Lakes District Secondary School

There were no existing school signs for Lakes District Secondary School, other than School Area signs on Highway 16 in the vicinity. However, the TAC Warrant Score in the table below indicates that either a 30 km/h School Zone or a School Area (i.e. complementing the existing regulatory posted speed; see Section 3.4) is warranted on the roads accessing the school. These should be installed at each entrance to the access roads as a High priority.

School	Perimeter Street	TAC Score	Photo No.	Comments
Lakes District Secondary School	Access Road (Loop Road & Lakers Street)	66	67, 68	Warrants a School Area or School Zone.

Figure 12: No Existing School Signs – Lakers Street (Photo 68)



3.6.3 Woyenne Secondary School

Woyenne Secondary School is located on the northeast corner of Centre Street and Sus Avenue. The school has one School Area sign, which is located for northbound traffic on Centre Street (Figure 13). This is supported by the TAC Warrant Scores in the table below.

School	Perimeter Street	TAC Score	Photo No.	Comments
Woyenne School	Centre Street	41	101	Warrants a School Area.
	Sus Avenue	63	n/a	Warrants a School Area.

Figure 13: Existing School Area Sign – Centre Street (Photo 101)



To fully delimit the School Area, additional school signs should be provided as follows:

- Westbound on Sus Avenue, east of the school perimeter
- Southbound on Centre Street, north of the school perimeter

These should be installed as a High priority.

3.7 Playground Signs

Playground Area signs (yellow diamond) advise drivers that there is a playground in the vicinity, and that they should be aware of the potential for playground activity near the road. Playground Zones use the same yellow sign, but are supplemented with speed reduction tabs (typically 30 km/h, as shown at right), which are in effect from dawn to dusk every day.



As with School Zones, Playground Zones are most effective when they are used only where warranted, are consistently applied, and are placed in close proximity to the playground itself. As well, playground signing must be clearly defined with one sign on each approach. Redundant signs or missing signs render the playground limits ambiguous, and hence unenforceable.

The Transportation Association of Canada has developed a warrant system to help determine if and what signs are appropriate for the streets surrounding a given playground. The maximum score is 100, with higher scores indicating the need for stricter signing, as indicated below:

TAC Warrant Score	Applicable Signage
0 – 40	No playground signage required
41 – 80	Playground Area
81 – 100	Playground Zone

There were three Playgrounds Zones signed in Burns Lake, as outlined and analyzed below.

Playground	Perimeter Road	TAC Score	Priority	Photo Nos.	Comments
Sports Field	Government Street	82	Low	55, 58,	30 km/h Playground Zone warranted. However, signs should be standard yellow, rather than fluorescent yellow (which is reserved for schools).
	Fifth Avenue	n/a	High	65	Add new Playground sign to delimit zone.
Tot Lot	Fourth Avenue	90	High	142, 143	30 km/h Playground Zone warranted. Sign and tab colours non-standard. Also, add new Playground sign in opposing direction.
Tot Lot	Tibbetts Crescent	90	High	28, 34, 35	30 km/h Playground Zone warranted. Existing sign on Charlie Crescent should be relocated to Tibbetts Crescent, and a new sign added for the opposing (NB) traffic. Also add 30 km/h tabs to both signs.

Figure 14: Missing Playground Zone Sign – Fifth Avenue (Photo 65)



Figure 15: Need for Playground Sign Relocation – Charlie Crescent (Photo 28)



3.8 Curve Warnings

Curve warning signs give drivers the necessary information they need about the direction and severity of the alignment they are approaching. This is particularly important on higher speed and higher-class roads, or roads with unclear grade or alignment issues.



There was one location in Burns Lake that appeared to warrant new curve warning signage, as described in the table below.

Priority	Photo No.	Location	Comments
High	3	Roumieu Drive	Sharp curve on steep gravel hill. Advance curve warning signs may be warranted in both directions. The curve warning signs can be complemented with curve chevrons, if desired.

Figure 16: Potential Warrant for Advance Curve Warning Signage – Roumieu Drive (Photo 3)



Before curve warning signs are installed or adjusted, the warrants and design of the signage and advisory speeds should be confirmed based on engineering curve testing (see Section 6).

3.9 Object Markers

Object markers are used to indicate potential roadside hazards. The WA-36R signs (stripes pointing to the top right) indicate a hazard on the right side. The WA-36L signs (stripes pointing to the top left) indicate a hazard on the left side. WA-36 chevrons are used at gore areas. These signs are commonly used at the ends of concrete barriers, or other obstacles within or in close proximity to the roadway.



The following 19 locations appeared to warrant object markers, or adjustments to existing object markers. Higher priorities were assigned to roads with higher functional classifications and higher traffic volumes, hazards exacerbated by road geometry/alignment, and hazards of greater severity and/or proximity to the roadway.

Priority	Photo No.	Location	Comments
High	18	Francois Lake Drive	Concrete barrier. Also consider curve chevrons, or other delineation for barrier across road.
High	31	Railway Avenue at Isaac Sam	Existing object marker has been damaged/removed.
High	38	Railway Avenue, W of Francois Lake Dr	Hydro poles are within paved road area, and should be made more visible with object markers or reflective tape.
High	54	Government Street at Third	Hydro poles are within paved road area, and should be made more visible with object markers or reflective tape.
High	124	Ninth Ave at Marsh	Wrong direction for object marker
High	156	Carroll St at Hill St	Chevron sign is upside down.
Med	13	Pioneer Way at Hwy 35	Left side object marker appears unwarranted as it abuts the inbound oncoming lane. Alternately, a Do Not Enter sign could be used, which would be consistent with other locations.
Med	56	Government Street at culvert	Concrete barrier at culvert.
Med	82	Mulvaney Crescent	Concrete barrier/retaining wall.
Med	84	Babine Lake Rd at Highway 16	Concrete barrier
Med	115	Ninth Ave at Gowan Rd	Concrete Roadside Barrier
Low	12	Pioneer Way at Hwy 35	Old/faded chevron on raised intersection island.
Low	52	Government Street at Third	Concrete barrier
Low	61	Government Street at Gilgan	Yellow concrete barriers
Low	77	Nash Rd (Ftg rd) at Kal Tire	Concrete barrier at hydrant
Low	89	Babine Crescent	Concrete barriers (unconnected/ not really functional)
Low	93	Babine Cres at Centre Street	Concrete barrier
Low	94	Centre Street at Sus	Concrete barrier
Low	108	Lower Lorne St at 11th	Concrete barrier

Figure 17: Object Markers Warranted on Roadside Barrier – Francois Lake Road (Photo 18)



Figure 18: Hydro Poles Need Better Visibility in Road Area – Railway Avenue (Photo 38)



3.10 Checkerboards

Checkerboards are used to indicate the end of the road, or an abrupt change in the road alignment. They provide a critical message to drivers that the road no longer continues straight.



The following three locations appeared to warrant new checkerboards.

Priority	Photo No.	Location	Comments
High	19	Francois Lake Drive (old section)	End of road before highway
High	26	Charlie Crescent at corner	Road Turns checkerboard needed at 90 degree curve
Med	155	First Avenue at end	Rocks and hill at end of road

Figure 19: New Checkerboard Warranted – Francois Lake Drive (old section; Photo 19)



3.11 Other Signing Issues

The following additional traffic signing issues were identified.

Priority	Photo No.	Location	Comments
High	15	Pioneer Way at Hwy 35 (West approach)	Do Not Enter sign has faded to white.
High	17	Francois Lake Drive Lane	Do Not Enter sign has faded to white.
High	39	Francois Lake Dr at rail crossing	Faded/defaced railway crossing sign behind pole.
Med	16	Francois Lake Drive Lane	One way sign should be turned to point in direction of traffic flow. Consider using standard sign (see below)
Low	119	Ninth Ave at Carroll St	Consider using standard One-Way Traffic signs (see below).
Low	123	Ninth Ave at Marsh	
Low	146	Marsh Street at Ninth	
Low	121	Carroll St at William Konkin Elementary School	Consider using standard Two-Way Traffic sign (see below).
Low	160	Hill Street at curve	Hidden Driveway tab should be yellow to reflect a permanent condition.
Low	96	Sus Avenue, N of Centre St	Rough Road Ahead signs used at speed humps, rather than speed hump warning signs (see below). Also, ideally speed humps should include painted triangles.
Low	97	Sus Avenue at Tsa	
Low	100	Centre Street at Sus Ave	
Low	4	Roumieu Drive	Use of Children Playing signs not recommended. The signs can give an erroneous message to residents about the safety of the roadway as a place to play. Furthermore, the signs may create a false sense of security, thereby diverting attention from the importance of educating young pedestrians about road safety. And finally, if permitted, these signs would technically be warranted on every residential street in the community (which would ultimately desensitize drivers). More effective solutions include education and traffic calming.
Low	27	Tibbets Cres at Railway Ave	
Low	32	Isaac Sam Road at Tibbets	

Figure 20: Example Standard Signs

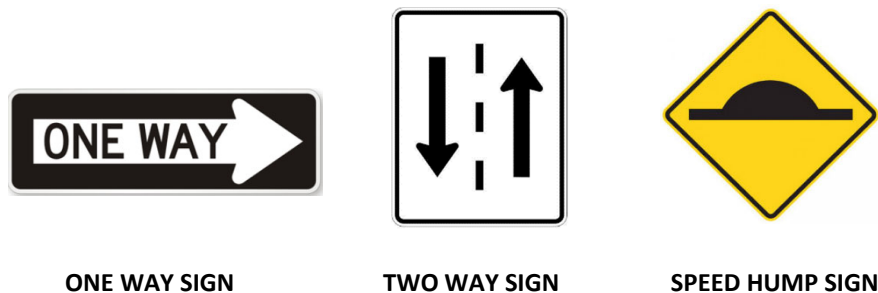


Figure 21: Faded Do Not Enter Sign – Francois Lake Drive Lane (Photo 17)



Figure 22: Orange Hidden Driveway Sign – Hill Street at Curve (Photo 160)



4 Road Markings

4.1 Centrelines

Road centrelines help establish the rules of the road (e.g. regarding passing, turning, etc), and provide guidance to drivers. For these reasons, centrelines are typically warranted on higher class roads with significant traffic volumes. Short sections of centreline may also be beneficial on minor roads to provide guidance around curves, or on approaches to major roads (i.e. in conjunction with stop lines).

The following eight issues with road centrelines were identified.

Priority	Photo No.	Location	Comments
High	20	Francois Lake Drive	Centreline needed to define curve toward highway.
High	50	Gilgan Road at Government Street	Centreline needed to define curve on approach to intersection, and provide guidance around median barrier.
High	110, 111	Eighth Avenue at Babine	Challenging intersection geometry next to highway intersection. Centrelines needed for guidance.
Med	23	Francois Lake Drive	Road is wide, and would benefit from a centerline. May be sufficient width to add shoulder lines as well (see Section 4.2).
Low	25	Pioneer Way (west side)	Potential candidates for centerlines, which may help control traffic speeds.
Low	116	Ninth Avenue	
Low	133	Fifth Avenue	
Low	86	Babine Lake Rd	Centreline could be a single solid line, if desired.

Figure 23: Warrant for New Centreline – Francois Lake Drive at Curve (Photo 20)



4.2 Shoulder Lines

White-solid shoulder lines provide additional guidance to drivers (especially on wider roads, or during limited visibility), and can be beneficial for cycling if adequate width is available (typically 1.2 metres minimum).

Most roads in Burns Lake are too narrow for shoulderlines. As noted in Section 4.1, Francois Lake Drive appears to have sufficient width for shoulderlines. This may require additional study to determine how to best dedicate the available widths between traffic lanes, shoulder/bike lanes, and on-street parking (see Section 6).

Figure 24: Potential for Shoulder Lines – Francois Lake Drive (Photo 23)



4.3 Stop Lines

Stop lines are an effective treatment to enhance the visibility of a stop condition. They are beneficial on the minor road approaches to major roads (e.g. provincial highways, arterials, major collectors), particularly when the visual cues may suggest the road is continuous. In such instances, a short section of centreline should also be painted (see Section 4.1). Stop lines are required at all four-way stops, and can also be used wherever there has been a history of compliance and/or safety issues.

The following intersections appeared to warrant new stop lines for the reasons noted.

Priority	Photo No.	Location	Comments
High	43	Francois Lake Dr, NB approach to railway	Northbound approach to railway crossing should have a stop line to match that on the southbound approach.
High	59	Government Street at Third	Four way stop warrants stop lines on all approaches.
High	131	Centre Street at Fifth	Four way stop warrants stop lines on all approaches.
Med	14	Pioneer Way at Hwy 35	Stop lines are desirable on the approaches to Highway 16 and Highway 35. Ideally (especially with curved approaches), the stop lines should be complemented with short sections of yellow centerline to provide guidance to inbound and outbound traffic.
Med	22	Francois Lake Drive at Hwy 35	
Med	45	Roumieu Dr at Hwy 16	
Med	46	Kerr Road at Hwy 16	
Med	47	Richmond Loop E at Hwy 16	
Med	48	Richmond Loop W at Hwy 16	
Med	57	Government Street at Hwy 16	
Med	62, 140	Third Avenue at Hwy 16	
Med	63, 141	Fourth Ave at Hwy 16	
Med	64, 132	Fifth Ave at Hwy 16	
Med	70	High School access at Hwy 16	
Med	72	N Frontage Rd at Hwy 16	
Med	73	Torikka Dr at Hwy 16	
Med	78	Frontage Rd at Key-Oh Lodge	
Med	81	Mulvaney Cres at highway access (E)	
Med	83	Mulvaney Crescent at Hwy 16 access (W)	
Med	126	Lorne St at Hwy 16	
Med	150	Centre Street at Hwy 16	
Med	151	First Ave at Hwy 16	
Med	152	Second Ave at Hwy 16	
Med	162	Hill Street at Hwy 16	
Low	125	Ninth Ave at Centre Street	If desired, stop lines could also be provided on local road approaches to major collectors in the Village, such as this example on Ninth Avenue, approaching Centre Street.

Figure 25: Stop Lines Warranted at Four Way Stop – Government Street at Third (Photo 59)



4.4 Crosswalks

Recommendations for adjustments to painted crosswalks are outlined with the crosswalk recommendations in Section 3.5.

5 Intersection Issues

5.1 Government Street at Third Avenue

The existing intersection of Government Street at Third Avenue has five approaches, including Third Avenue, Government Street, Gilgan Road, a railway access road, and the access to the parking lot for the post office and other businesses. Some of these approaches have acute approach angles, and all currently have stop conditions. The traffic volumes appear to be generally manageable, which has likely prevented this from being a concern with safety and congestion.

The existing intersection could be upgraded to improve the safety for traffic and pedestrians. This may entail revisions to the laning/geometry, access management, parking management (especially within the functional area of the intersection), and the creation of dedicated space for pedestrian movements.

Another alternative is to design a roundabout, which would more safely accommodate the traffic with relatively short delays. A roundabout would likely require the closure of the the parking lot access to the south in order to reduce the number of approach legs to four. The traffic volumes may not technically warrant a roundabout at this time, but it is a concept that could be planned for the future as traffic volumes increase.

Additional study is required to identify short and long term solutions at this intersection (see Section 6).

Figure 26: Potential Roundabout Concept – Government Street at Third Avenue



5.2 Government Street at Post Office Access

The existing access on Government Street to the area around the post office has a short throat distance (i.e. the distance between the edge of the road and the beginning of the parking lot area, in which traffic is expected to queue). This could create issues with traffic/parking conflicts and guidance, especially under heavy traffic conditions.

With the angle parking configuration adjacent to the access, short islands could be added to each side of the access to increase the throat length, and better define/protect the parking area (see Figure 27).

Figure 27: Short Access Throat – Government Street at Post Office (Photo 60)



6 Further Study

A number of traffic issues cannot be fully resolved within the scope of this high-level review of the traffic control and intersection geometry. In some cases, more detailed traffic analysis, collision analysis, and/or data collection is necessary to determine an effective recommendation. In other cases, the actual problems may be beyond traffic control. These could entail land use planning, network planning, geometric design, stakeholder consultations, or other engineering disciplines (e.g. environmental, geotechnical, hydrological).

Three recommended future studies are outlined below for consideration by the Village:

1. **Curve Testing:** As noted in Section 3.8, the curve on Roumieu Drive is significant, and located on a steep hill. The curve could be tested to confirm the necessary signing and advisory speed tabs. Curve testing involves driving the curves at different speeds using a ball-bank indicator to measure the centrifugal forces. The test results indicate what speeds are appropriate for the curve, and what signing is required.
2. **Road Laning on Francois Lake Drive:** As noted in Sections 4.1 and 4.2, a number of concepts could be developed for discussion with the community about how to dedicate the large width available on Francois Lake Drive. This may include a combination of traffic lanes, shoulders/bike lanes, on-street parking space, and turning lanes.
3. **Government Street at Third Avenue:** As noted in Section 5.1, a geometric design is needed to either improve the existing conventional intersection, or evaluate the the feasibility of a roundabout concept. This study would require detailed survey/base mapping, traffic analysis, the generation and evaluation of feasible short and long term solutions, and a plan for community engagement due to the potential to affect adjacent parking and businesses.

7 Recommendations and Conclusion

Over 160 issues were identified and recorded during the site visit in October 2018. These ranged from minor suggestions and curiosities to more significant concerns. To facilitate the Village's efforts in reviewing, confirming, and responding as required to these issues, they have each been classified by type and priority. Higher priorities were assigned to issues directly affecting traffic safety.

A suggested strategy would be to immediately address the "very high" priorities identified. These are urgent priorities because of the safety concerns from potentially unclear traffic control, and are listed below.

Priority	Photo No.	Location	Comments	Section
V. High	75	Nash Rd at Torrika	4 leg intersection with no stop control adjacent to hwy access.	3.1.1
V. High	76	Nash Rd (Ftg Rd) at Woods'n'Water access	4 leg intersection with no stop control adjacent to hwy access.	3.1.1
V. High	80	Frontage Rd at Eagle Automotive hwy access	4 leg intersection with no stop control adjacent to hwy access.	3.1.1
V. High	136	Fourth Ave at Carroll	Sign obscured by trees; visual cues suggest continuous road.	3.1.3
V. High	139	Third Avenue at Centre	Sign obscured by trees; visual cues suggest continuous road.	3.1.3

The issues ranked as high priorities should be addressed next. These are typically traffic safety issues, but also include simple but important adjustments to the traffic control. The medium priorities can be addressed over time, as these are typically important but less urgent issues. The low priorities can be taken as suggestions for future consideration, especially as traffic control infrastructure is replaced as time and resources permit. The priority levels are summarized in the table below. In all cases, the Town should review and confirm the issues, as there may be local or historic considerations which affect the recommendations.

Priority	Description	Suggested Timing
Very High	Urgent priorities due to safety concerns from potentially unclear traffic control.	Immediate
High	Key traffic safety issues, as well as simple but important adjustments to the traffic control.	As soon as possible
Medium	Typically important but less urgent issues.	As time permits
Low	Suggestions for future consideration.	With next maintenance cycle, or if problems arise.

Once the Village has confirmed their priorities and identified an implementation strategy, they can discuss with ICBC the potential for cost-sharing improvements under the Road Improvement Program (RIP). This program allows ICBC to contribute funds to road safety improvements when an estimated benefit in collision reduction can be demonstrated. The program includes specific initiatives that are directly related to sign and road marking upgrades.

8 Closure

This Traffic Control Review has been completed by McElhanney Consulting Services Ltd. (MCSL) for the Insurance Corporation of British Columbia and the Village of Burns Lake. The study is a high-level review of the existing traffic signage, road markings, traffic signals and intersection geometry under the jurisdiction of the Village of Burns Lake.

The identified issues and the prioritized list of suggested improvements are intended to assist the Village in improving the traffic control and traffic safety in the municipality. The information and data contained herein represent the MCSL's best professional judgment in light of the knowledge and information available at the time of preparation.

McElhanney Consulting Services Ltd. denies any liability whatsoever to other parties who may obtain access to this report for any injury, loss or damage suffered by such parties arising from their use of, or reliance upon, this document or any of its contents without the express written consent of MCSL, the Insurance Corporation of British Columbia, and the Village of Burns Lake.

McELHANNEY CONSULTING SERVICES LTD

Prepared By:



V. Glenn Stanker, PEng, PTOE
Senior Transportation Engineer



Reviewed By:



Lee Peltz, PEng
Engineering Division Manager

Appendix A: Project Meeting Minutes

Time: 9:00 AM
Date: Wednesday, September 26, 2018
Location: Municipal Hall, Village of Burns Lake

Attendees:

Sheryl Worthing, Chief Administrative Officer, Village of Burns Lake
Dale Ross, Director of Public Works, Village of Burns Lake
Rob Krause, Director of Protective Services / Fire Chief, Village of Burns Lake
Susan Meeds, Director of Finance, Village of Burns Lake
Rebecca Billard, Deputy Corporate Officer, Village of Burns Lake
Valerie Anderson, Economic Development Officer, Village of Burns Lake
David Dean, PEng, Road Safety Engineer, Insurance Corporation of BC

Minutes:

Presentation:

1. Dave explained the rationale and methodology of the Traffic Control Review program, and presented the common applications from the Transportation Association of Canada.
2. The Village would like a TAC zone warrant calculation for each school and playground. The Village hopes that this can be done on the highway as well for the high school.
3. The Village chose to use the School Sign + 'END' tab to identify the end of the zones.
4. The Village would like to have stop lines on all roads stopping at 'major' roads (e.g. highways, 8th Avenue, Centre Street).
5. Shoulderlines and Centrelines are not currently used in Burns Lake. However, the Village recently bought a line painter and would like recommendations on which roads to include centre and shoulderlines.
6. ICBC can contribute to the cost of upgrading signs, depending on the number of signs involved. The Village would be responsible for the sign installations and maintenance.

Specific Areas of Concern:

1. 3rd Avenue and Carroll Street – existing use of Yield sign
2. Hill Street and Carroll Street – existing use of Yield sign + Stop sign
3. 8th Avenue and Centre Street
4. Centre Street inconsistency (1st through 7th Avenue) – all intersections signed differently
5. 8th Avenue and Lorne Street – use of Yield sign
6. Government Street / 3rd Avenue / Gilgan Rd (5 Corner) – overall confusion, guidance required on geometrics, paint, signs, and barriers.