



School Safety and Transportation Study

Capilano Elementary School

**District of North Vancouver and North
Vancouver School District 44**





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Contents

Executive Summary 1

1 Introduction..... 2

 1.1 About the study 2

 1.2 Background 2

 1.3 Methodology 2

2 Existing Situation and Problem Description 4

 2.1 About Capilano Elementary School 4

 2.2 Observed Conditions and Issues 8

3 Mitigation Options and Recommendations19

 3.1 Short Term Improvements 19

 3.2 Long Term Improvements 23

4 Conclusions..... 25

Appendices

Appendix A	Crash Data Memo
Appendix B	Signs and Markings Inventory
Appendix C	Concept-level Cost Estimate Assumptions
Appendix D	Safe-Route-To-School Map

Executive Summary

The District of North Vancouver (DNV) and North Vancouver School District 44 (NVSD44) led a school transportation and safety study (study) for Capilano Elementary School, 1230 West 20th Street. This report discusses existing conditions, issues, and mitigation for Capilano Elementary. A summary of recommendations is included in the table below.

Term	Recommendation	Responsibility
On-going	<ul style="list-style-type: none"> • More extensive walking and cycling incentive programs and resources 	NVSD44 and School Administration
	<ul style="list-style-type: none"> • Active parking management at school front 	DNV
	<ul style="list-style-type: none"> • Positive reinforcement of legal use of school drop off/pick up sites 	PAC, School Administration, RCMP
	<ul style="list-style-type: none"> • Work with residents to maintain clear sight distance by addressing overgrown vegetation 	DNV
Short Term	<ul style="list-style-type: none"> • New crosswalks and signage at 20th Street West and Pemberton Avenue (north, west, south, and east legs); and 21st Street West and Pemberton Avenue (west leg). 	DNV
	<ul style="list-style-type: none"> • Expansion of School Zone designation and signage 	DNV
	<ul style="list-style-type: none"> • New raised crossing to school entrance across 20th Street West between Bridgman Avenue and Pemberton Avenue 	DNV
Long Term	<ul style="list-style-type: none"> • New sidewalk on the south side 20th Street West between Bridgman Avenue and Pemberton Avenue: <ul style="list-style-type: none"> ○ Gravel (west half of the block) ○ Concrete (east half of the block) 	DNV
	<ul style="list-style-type: none"> • 20th Street West & Bridgman Avenue – Reduce crossing distances and vehicle speeds and improve visibility with build-outs in one or more locations at intersection 	DNV

This report is the result of extensive comments and feedback from the DNV and preliminary comments from the school’s Parent Advisory Committee (PAC). Recommendations have been identified, refined, and prioritized which are cost-effective and reflect each school’s safety priorities – as supported by both the data and stakeholders.

20th Street West and Pemberton Avenue (north, west, south, and east legs); and 21st Street West and Pemberton Avenue (west leg).

1 Introduction

1.1 About the study

The School Transportation and Safety study for Capilano Elementary School (Capilano) were commissioned as a partnership between the District of North Vancouver (DNV) and the North Vancouver School District 44 (NVSD44) to improve transportation safety around schools.

This study focuses on feasible and cost-effective mitigation that DNV, NVSD44 and the school is capable of implementing in the short and medium/long term. It is not simply a wish list, but rather an attainable plan to improve safety of the school-area environment.

1.2 Background

The objectives and focus of this school report closely align with DNV's transportation policies and Official Community Plan (OCP). All of these background policies strongly support increasing the proportion of trips made by walking, cycling, and transit. Increasing safety and the share of school trips made by foot and bicycle is therefore the basis of all the proposed recommendations.

These reports align with and support higher-level policy and site-specific report documentation:

- District of North Vancouver Official Community Plan (OCP, 2011);
- District of North Vancouver Transportation Plan (2012) – outlines background conditions for growth and associated transportation infrastructure to support;
- North Vancouver Bicycle Master Plan (2012) – identifies several routes fronting schools as future on-street bicycle facilities;
- District of North Vancouver Pedestrian Master Plan (2009, Opus) – identifies walking and sidewalk priority scores for locations relevant to school report areas;
- Parks and Open Space Strategic Plan (2012);
- Safe Routes to Schools reports (2010 and 2011);
- Capilano Main No. 9 – Phase 2 Traffic Management Study (2015, MMM Group);
- Safe Routes Advocates report (from 2013 delegation to Council – from parents group); and
- North Vancouver school travel survey (2013, NVSD44, DNV and City of North Vancouver).

1.3 Methodology

This process proceeded as follows:

1. School stakeholders meeting and school investigations – June 2015
2. Submission of Draft 1 report to DNV – July 2015
3. DNV review of Draft 1 and confirmation of changes for Draft 2 – July-September 2015 -
4. Submission of Draft 2 to DNV– September 2015
5. School stakeholder meeting to review recommendations– December 2015

6. Draft 2 report review by school stakeholders – December 2015-January 2016
7. Submission of Final Report – 2016

The investigations at Capilano included:

- Close liaison with DNV, NVSD44, and school representatives (administration and parents);
- Walkabouts around each school with school and DNV stakeholders to discuss and identify specific safety issues and areas of concern;
- Follow up site visits at each school to perform traffic counts at key intersections and discuss specific areas of concern with stakeholders;
- Observation of student drop-off and parking survey at drop-off and pick-up times;
- Analysis of ICBC crash data and school catchment data to identify crash trends; and
- Record of transportation issues.

2 Existing Situation and Problem Description

2.1 About Capilano Elementary School

2.1.1 Population

Capilano has a population of approximately 470 students, based on 2013-2014 totals. Capilano is an authorized International Baccalaureate (IB) World School and offers the IB Primary Years Program and hosts students from outside the catchment shown in Figure 1.



Figure 1: Capilano Elementary School Location and Catchment Area

2.1.2 Transportation Network

Capilano is located in the Pemberton Heights area of the DNV, on 20th Street West. The surrounding neighbourhood is predominantly a suburban residential community. The school is bordered by four roads: 21st Street West, 20th Street West, Bridgman Avenue and Pemberton Avenue. The local transportation network has some sidewalks, varying street widths, and some landscaping in the right of way.

A local map showing main access points, road hierarchy, and existing pedestrian infrastructure is shown below in Figure 2.



Figure 2: Capilano Elementary School - Existing Situation

2.1.2.1 Access Points

Capilano can be accessed from all four bordering roadways. The main entrance is situated on 20th Street West, where the drop-off/pick-up zone is also located. The property is fenced along the remaining three bordering roads with entrances in the fence to allow students to enter/exit the property.

2.1.2.2 Road Hierarchy

Capilano is located on 20th Street West, a collector road. The other roads that border the property are Bridgman Avenue, Pemberton Avenue and 21st Street West; these are all local roads. The roads in the immediate vicinity of the school are outlined in Figure 2 and are colour coded by their road classification.

Vehicle access into the neighbourhood is from two points: the Capilano Drive and Route 1 East/Keith Road intersection (at the Highway 1 eastbound on ramp) to the northwest and West Keith Road via MacKay Avenue in the southeast. Highway 1 is to the north, McKay Creek to the east, and Barbour Park escarpment to the south and west of the neighbourhood.

2.1.3 Modes of Travel

A survey provided to parents was conducted by the DNV and NVSD44 in 2013. The survey indicated that at Capilano, 52% of parents walk their children to school, 42% drive and 6% reported combining modes or cycling. Results may vary seasonally with weather conditions. The top reason parents reported

driving their children to/from school is because they are from out of the catchment area, and therefore are not within walking distance from their homes.

2.1.3.1 Transit

There are five bus routes within Capilano's catchment. The bus routes are as follows:

- Route 236 – is the closest bus route to the school. It follows Marine Drive to MacKay Avenue up to West 22 Street and through to Capilano Road up to Grouse Mountain and reverses back along the same route. Northbound is called Grouse Mountain and southbound is called Lonsdale Quay. The route is illustrated in Figure 2, based on TransLink's website (http://infomaps.translink.ca/System_Maps/106/NV-Jun%202015.pdf);
- Route 247 – travels from Lionsgate Bridge up Capilano Road to Grouse Mountain/Capilano area and reverse back to Vancouver. Northbound is called either Upper Capilano or Grouse Mountain and southbound is called Vancouver;
- Route 246 – travels along a long route from Lonsdale Quay up to Capilano Heights Region via Westview Drive and to Vancouver via Capilano Road and Lionsgate Bridge and reverses back from Vancouver to Lonsdale Quay. Eastbound direction is called either Highland or Lonsdale Quay and westbound direction is called one of the following; Highland, Marine and Capilano, Marine and Garden or Vancouver;
- Route 242 – services the weekend only. Travels up and down Lonsdale Avenue and/or down Marine Drive within the Capilano catchment. Southbound route travels along Marine Drive and is called Vancouver and northbound route is called Lonsdale Quay; and
- Route 255 – travels most along Marine Drive both east and west bound. The eastbound bus is called either Capilano University – via Lynn Valley or Special and westbound is called either Dundrave – to 25th and Marine or Special.

2.1.3.2 Cycling Facilities and Routes

There are uncovered bicycle racks (space for approximately 10 bicycles) at the front/main entrance to the school. During the June 3rd 2014 site visit, the bicycle racks had space remaining for a number of bicycles.

The streets around the school are local streets. A few cycle routes are located around the school's larger periphery. According to the North Vancouver Bicycle Master Plan, in addition to the existing marked cycle lanes on Capilano Drive and Mackay Avenue, cycling routes are identified in the plan for West 23rd Street and Hope Road to the north and south, respectively.

2.1.3.3 Pedestrian Facilities and Routes

Sidewalks are shown in Figure 2. There are sidewalks on the north side of 20th Street West, between Bridgman Avenue and Pemberton Avenue, along the east side of Bridgman Avenue from Keith Road West to West 22 Street, and on the north side of West 22 Street and the north side of Keith Road West. The sidewalks in front of the school are approximately 1.5 m wide.

The area shown in Figure 2 contains approximately 8,800m of total roadway – or 17,600m of sidewalk demand area. Currently, only 3,500m of sidewalk exists – 20% of local area coverage. In the DNV's Pedestrian Master Plan, sidewalks are identified on 20th Street between Bridgman Avenue and Pemberton Street.

Marked crosswalks are shown in Figure 2. Crosswalks are located at Bridgman Avenue at Keith Road West and crossing Keith Road West, west of Bridgman Avenue. There is a crosswalk at 20th Street West at Bridgman Avenue and at 21st Street West on the east side of Bridgman Avenue.

2.1.4 School Transportation Facilities and Layout

2.1.4.1 Drop-off / Pick-Up

Capilano has a dedicated drop-off and pick-up zone on the north side of 20th Street West between Bridgman Avenue and Pemberton Avenue and along the east side of Bridgman Avenue between 20th Street West and 21st Street West. The total length of drop-off/pick-up zone is approximately 250m; 150m along the school frontage on 20th Street West and 100m along Bridgman Avenue.

While the school has the designated drop-off/pick-up areas along Bridgman Avenue and 20th Street West, drivers were observed to drop-off/pick-up children in no parking/no stopping zones around the school.

2.1.4.2 Signage

The following parking restrictions exist along the frontage of the school block:

- North side of 20th Street West, between Bridgman Avenue and Main Entrance to school property (midblock), Drop Off / Pickup Zone – No Parking 8 AM – 4 PM School Days;
- North side of 20th Street West, between Main Entrance to school property (midblock) and Pemberton Avenue, Drop Off / Pickup Zone – No Parking 8 AM – 4 PM School Days;
- Midblock on 20th Street West, in front of the main entrance – No Stopping zone;
- West side Bridgman Avenue between 20th Street West and 21st Street West – No Stopping 8AM – 4PM School Days; and,
- East side Bridgman Avenue from West 20th Street to point 15m north – No Stopping Anytime.

The general condition of the signage is discussed in greater detail in Section 2.2.2.

2.1.4.3 School Zone

School zone signage, accompanied by a speed hump, is provided in both directions on 20th Street West, 21st Street West and Bridgman Avenue. School zone (30 km/hr) signage is provided on both 20th Street West and 21st Street West. The remaining roadways within the school catchment are 50 km/hr posted speed zones.

2.1.4.4 Traffic Control

Many intersections in the area shown in Figure 2 are three or 4-way stop controlled. Several intersections along West 22 Street and Keith Road West are 2-way stop controlled for the local street.

2.1.5 Collision History

ICBC data shows a relatively small number of crashes reported within several blocks of the school between 2008 and 2013 as shown in Table 1. None of the reported crashes included pedestrians or cyclists. Further crash data for the larger area is provided in Appendix A; the most crashes were reported at intersections along Marine Drive and Capilano Drive.

Table 1 – Collision volume around school (ICBC) 2008-2013

Intersection	# Crashes	Pedestrian Crashes (Yes/No)
Pemberton Avenue and West 22 Street	6	No
Lloyd Avenue and West 22 Street	5	No
Bridgman Avenue and West 22 Street	3	No
Bridgman Avenue and 21 st Street West	1	No
Keith Road West and Pemberton Avenue	1	No
Cortell Street and Lloyd Avenue	1	No

2.1.6 Existing Transportation Demand Management Programs

Transportation Demand Management (TDM) is a strategy of programs and initiatives often used to influence a shift from private automobile use to other modes, or disperse travel from times or routes of peak demand. Capilano has reported implementing initiatives to encourage students and parents to walk or cycle to school. School representatives noted that a proportion of children at the school are currently travelling from out of the catchment area for the IB program.

2.1.7 Traffic Management

Capilano and the PAC have requested parents drive in a clockwise rotation around the school, ensuring that students are dropped off on the school-side of the bordering street and to reduce instances of students crossing midblock.

At the meeting with the school vice principal and parent representatives, the vice principal and parents reported that a parent or staff volunteer often is present at the drop-off area in the morning to help manage traffic in front of the school. The volunteer reminds drivers to observe the No Parking and/or No Stopping signage.

2.2 Observed Conditions and Issues

On Wednesday June 3rd, 2015, DNV led a walkabout with school and parent representatives. NVSD44 staff were invited. The walkabout started inside the school for initial background discussion, strategy session, and marking out the walkabout route, then the group walked around the school and nearby streets. Following this initial meeting, the consultant revisited the school June 9th, 2015 to collect additional quantitative and qualitative data relating to school area conditions at arrival and dismissal times. Observed findings include:





- Vegetation obstruction and encroachment;
- Some sidewalks, crosswalks, and entrances to school property;
- On-street parking along local roads; and
- Non-compliant usage of school drop-off zone and surrounding street network.

2.2.1 Network Observations

2.2.1.1 Vegetation Encroachment

Vegetation and planted landscaping may grow into the public right of way and may obscure visibility of signage and reduce effective sidewalk width. Table 2 highlights some of the issues.



Table 2: Sight Obstructions

Issue	Picture
Vegetation obstructing signage.	
Vegetation reducing sidewalk width – Bridgman Avenue north of 20 th Street West	
Large trees in right of way / boulevard may limit feasibility of a concrete sidewalk – 20 th Street West south side in front of school entrance	
West Keith Road at Bridgman Avenue – visibility may be limited by vegetation	

2.2.1.2 Pedestrian Facilities (Connectivity, Treatments, etc.)

There is a good level of pedestrian permeability within the neighbourhood as demonstrated by short block lengths, laneways, and trail connections. There are some sidewalks on school-area local roads as noted in the previous section. Vegetation may reduce some sidewalks’ width. Sidewalks are generally in good condition with some form of curb drop. Total width of sidewalks averages 1.5m but there are some locations narrowed by vegetation encroachment.

Table 3: Pedestrian Facilities

Issue	Picture
<p>An example of an intersection in school area with open boulevard space – Pemberton Avenue and 20th Street West.</p>	
<p>Location without a sidewalk and vegetation on boulevard – south side of 21st Street West, west of Pemberton Avenue (school side of block).</p>	


Issue	Picture
<p>Sidewalks on east side of Bridgman Avenue; no sidewalks on west side of Bridgman Avenue.</p>	
<p>Marked crosswalk on one side of intersection (east leg); sidewalk on east side of Bridgman Avenue; no sidewalk on west side of Bridgman Avenue – Bridgman Avenue and 21th Street West.</p>	
<p>Sidewalks on north side of West 20th Street in front of school; no sidewalks south side of 20th Street West across from school entrance.</p>	

2.2.1.3 Road and Intersection Design

Most of the local roads in the vicinity of the school are approximately 8m wide and accommodate on-street parking on both sides and two way traffic. West 22 Street, Keith Road West and 20th Street West are 10m wide with on-street parking permitted on both sides of the road and two-way traffic. These widths themselves are consistent with TAC and similar best practices for their respective road hierarchy and context.

The corridor widths are appropriate to retain parking and ensure adequate mobility. Table 4 shows examples of the streets.

Table 4: Road Network Design

Issue	Picture
<p>When parking is full, observers notice cars parking too close to intersections (Street and Traffic Bylaw states no parking within 11 m of street intersections).</p>	

2.2.2 Signage and Markings

2.2.2.1 Signage

The majority of signage in the vicinity of the school are stop signs or for parking restrictions. A complete signage and markings inventory for the school vicinity is shown in Appendix B.

Overall, the condition of signage was fair-to-good and signs were appropriately placed to convey their accompanying restrictions. Some observations include:

- Some signs were obscured by vegetation;
- To reinforce no parking zones, parking restriction (No Parking) signage could be added at some intersections where routine parking was observed; and
- ‘School Zone Crossing’ signage could replace ‘Pedestrian Crossing’ signage where guidelines are met. School crossing signage is intended to make drivers aware that a school is close by and to use extra caution for students playing and crossing in the area. Pedestrian crossing signage is to let drivers know to yield or to stop for pedestrians.

2.2.2.2 Markings

Road markings in the Capilano catchment are applied consistently through the catchment area; some markings may benefit from refreshed paint. More information about road markings can be found in Appendix B.

Yellow painted curbs are found along 20th Street West in front of a fire hydrant on the south side of road and in the no stopping zones on the north side of the road in front of the school main entrance and either side of the teachers' parking lot. The DNV prefers to designate or reinforce No Parking zones with signage instead of yellow painted curbs as signage is more durable in the long term.

The most significant findings with regards to pavement markings are:

- Some stop signs did not have stop lines;
- Some painted crosswalks and stop lines are faded; and
- Many painted stop lines are located within 1.0m of intersecting curb plane and do not provide enough setback for pedestrian desire paths.

2.2.3 Arrival and Dismissal Time – Traffic Conditions

The consultant's survey staff were positioned at four intersections in the Capilano catchment area – Bridgman Avenue at 20th Street West, Bridgman Avenue at 21st Street West, Pemberton Avenue at 20th Street West and Pemberton Avenue at 21st Street West; to observe traffic conditions at the school entrance, verify volumes and to observe driver behaviour. Turning movement counts for vehicles, buses, bicycles, and pedestrians were recorded in those locations at arrival and dismissal times. The weather was sunny and approximately 20 degrees Celsius during the AM and mid-twenties during the PM.

2.2.3.1 Traffic Patterns and Volumes

This section describes each intersection and the volumes for the following intersection movements:

- EBL/EBT/EBR = Eastbound Left Turn/Through/Right Turn;
- WBL/WBT/WBR = Westbound Left Turn/Through/Right Turn;
- NBL/NBT/NBR = Northbound Left Turn/Through/Right Turn; and
- SBL/SBT/SBR = Southbound Left Turn/Through/Right Turn.

Bridgman Avenue at 20th Street West

The Bridgman Avenue at 20th Street West intersection is a skewed, 3-legged intersection. Some motorists undertake illegal U-turn manoeuvres even though there is a ‘No U-turn’ sign at the intersection. Northbound traffic can proceed left, through or right, while southbound traffic can proceed right, through or left and westbound traffic can turn left or right.

The following tables provide a summary of the number of vehicles and pedestrians counted, respectively, by 15 min intervals. A total of three cyclists were observed in the AM period and three in the PM period.

Table 5: Bridgman Avenue at 20th Street West – Vehicles

Time	Movements						Whole Intersection
	WBL	WBR	NBT	NBR	SBL	SBT	
8:00			3	2	2		7
8:15	1	4	2	5	4	2	18
8:30	17	11	12	4	5	4	53
8:45	19	20	6	3	10	2	60
Total	37	35	23	14	21	8	138
14:15		2	1	2	2	1	8
14:30	3	1	5	2	6	3	20
14:45	1	3	4	5	6	5	24
15:00	17	20	4	5	9	2	57
Total	21	26	14	14	23	11	109

Table 6: Bridgman Avenue at 20th Street West – Pedestrians

Time	Movement							Crosswalk from School	Whole Intersection
	WBL	WBR	NBT	NBR	SBL	SBT	Crosswalk to School		
8:00	1						1		2
8:15				4					4
8:30			1	47	4		7		59
8:45	8	2		11		2	5	2	30
Total	9	2	1	62	4	2		2	95
14:15									0
14:30			1	1	4			2	8
14:45	1		1	9	4		9		24
15:00	59	6	3	12	2	4	2	13	101
Total	60	6	5	22	10	4		15	133

Bridgman Avenue at 21st Street West

The Bridgman Avenue at 21st Street West intersection is a 4-legged, all way stop-controlled intersection, with full movement for all approaches.

Bridgman Avenue at 21st Street West intersection had higher volumes of vehicular traffic than the Bridgman Avenue at 20th Street West intersection, and fewer pedestrians.

Table 7: Bridgman Avenue at 21st Street West – Vehicles

Movement													
Time	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Whole Intersection
8:00						5		3		3	2		13
8:15					1	2	1	6		7	6		23
8:30						7	1	10	3	29	9		59
8:45	1	1	2		1	12	1	31	4	15	10	1	79
Total	1	1	2	0	2	26	3	50	7	54	27	1	174
14:15					2	1		2		6	3		14
14:30		1	3			1	2	2		3	4		16
14:45		1	1	1		2		5		21	13		44
15:00	1		1	1		14	1	25	2	7	8	2	62
Total	1	2	5	2	2	18	3	34	2	37	28	2	136

Table 8: Bridgman Avenue at 21st Street West – Pedestrians

Movement													
Time	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Whole Intersection
8:00													0
8:15			2								2		4
8:30			18	3							18		39
8:45			1			1	7	15			8		32
Total	0	0	21	3	0	1	7	15	0	0	28	0	75
14:15													0
14:30								1			3		4
14:45			3					1			14		18
15:00			5		3		3	18			3		32
Total	0	0	8	0	3	0	3	20	0	0	20	0	54

Pemberton Avenue at 20th Street West

The Pemberton Avenue at 20th Street West intersection is a 4-legged, all-way stop controlled intersection. All movements (left, through, right) are allowed for motorists travelling in all directions.

The majority of pedestrians counted during the morning arrival period were children and parents travelling to the school and then parents travelling back from the school. This was reversed in the PM peak.

Table 9: Pemberton Avenue at 20th Street West – Vehicles

Time	Movement														Whole Intersection
	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	NB from Lane	SB to Lane	
8:00	1	1			1		3	3	1						10
8:15			3		1		7	3	1		1	2	1		19
8:30	2	1	2		4		26	7	2		2	6			52
8:45	9	3	6		4		21	2			10	9		1	65
Total	12	5	11	0	10	0	57	15	4	0	13	17	1	1	146
14:15	1		1		2		1	1	1		1	2			10
14:30		2			2		8								12
14:45	2		3	1		2	13	3	2			3		1	30
15:00	3		13	1	4	1	13	3	1		7	4		1	51
Total	6	2	17	2	8	3	35	7	4	0	8	9		2	103

Table 10: Pemberton Avenue at 20th Street West – Pedestrians

Time	Movement														Whole Intersection
	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	NB from Lane	SB to Lane	
8:00											3				3
8:15					9		6	1	1	1	1	1	1	2	23
8:30	2				35		9					6	2		54
8:45	1	3	5	1	14		8		2		3	3	5	2	47
Total	3	3	5	1	58	0	23	1	3	1	7	10	8	4	127
14:15							1								1
14:30							2								2
14:45	2				7		4	1				2		1	17
15:00	28	30	20		1		2	1		1	3	3	2	9	100
Total	30	30	20	0	8	0	9	2	0	1	3	5	2	10	120

Pemberton Avenue at 21st Street West

The Pemberton Avenue at 21st Street West intersection is a 3-legged, all way stop controlled intersection. Eastbound motorists can travel through or turn right at the intersection, westbound motorists can either travel through or turn left at the intersection and northbound motorists have to turn left or right. Tables 11 and 12 show the intersection vehicle and pedestrian volumes, respectively. The intersection experiences a lower volume of vehicular traffic compared to the other three observed intersections but has similar volumes of pedestrians.

Table 11: Pemberton Avenue at 21st Street West – Vehicles

Time	Movement						Whole Intersection
	EBT	EBR	WBL	WBT	NBL	NBR	
8:00			1		4		5
8:15	1	3	2		1	3	10
8:30	5	10		1	1	5	22
8:45	10	14	3	3	4	5	39
Total	16	27	6	4	10	13	76
14:15	3	2	1	1		2	9
14:30	2	1	1				4
14:45	1	7	2	2		5	17
15:00	5	11	1	2	11	4	34
Total	11	21	5	5	11	11	64

Table 12: Pemberton Avenue at 21st Street West – Pedestrians

Time	Movement							Ped From Stairs	Ped to Stairs	Whole Intersection
	EBT	EBR	WBL	WBT	NBL	NBR				
8:00							3		3	
8:15		1		2			3	1	7	
8:30			4	2			20		26	
8:45	12			13	5	1	6	2	39	
Total	12	1	4	17	5	1	32	3	75	
14:15									0	
14:30					1				1	
14:45			2	10			6		18	
15:00	1	4			17		1	26	49	
Total	1	4	2	10	18	0	7	26	68	

2.2.4 Drop-Off/Pick-Up Observations

On Tuesday, June 9th 2015 the consultant went to Capilano to perform a parking occupancy survey and to observe drop-off and pick-up behaviours. On the whole, arrival and dismissal times had different parking and driving behaviour from parents, mostly involving non-compliant usage of all or portions of the drop off zone for medium-term parking. Weather conditions were sunny with temperatures between 20 and 23 degrees Celsius.

2.2.4.1 Drop-off/Arrival

The busiest drop-off period is between 8:35 and 8:45 am. The majority of parking issues were due to non-compliance of parking regulations within the drop off zone; although some vehicles were illegally

parked in the ‘No Stopping’ zones at all approaches of the Pemberton Avenue and 20th Street West intersection and in front of the fire hydrant across from the school entrance. Opus notes that the presence of surveyors in high-visibility vests may have promoted better driving behaviour.

A total of 49 vehicles were observed parking – either legally or illegally – during the AM arrival time (Table 13). The majority of these vehicles parked on the south side of the road which is not the drop-off zone and has no sidewalk.

Table 13: Parking Occupancy – Morning Drop-Off

Time	Zone		Total
	North Side	South Side	
14:30	1	4	5
14:45	2	7	9
15:00	12	9	21
15:15	4	10	14
Total	19	30	49

** Total value does not include the carry over, this is the total number of different vehicles that park.*

There were two different parking patterns observed in the school drop-off zone along the north side of 20th Street West in the AM. Some parents used the drop-off zone appropriately, pulling in and dropping off their children within the ‘No Parking’ zone’s 5-minute standing allowance. Other parents parked for extended periods; some arriving early and staying until the bell rang.

2.2.4.2 Pick-Up/Dismissal

In the PM dismissal time, the entire drop-off zone was occupied with parents parked for non-compliant durations (+5 minutes). There were no observations of short-term pullover and pick-up.



Table 14: Parking Occupancy – Afternoon Pick-Up

Zone	North Side	South Side
Time		
14:30	10	14
14:45	8	11
15:00	19	23
15:15	9	12
Total	46	60

** Total value does not include the carry over, this is the total number of different vehicles that park.*

Figure 3: Stopping in front of No-Stopping Zone

In addition to parents parking in the school drop-off zone, parents were observed parking on the south side of 20th Street West both legally and illegally. There is a section of roadway that is a No-Parking zone due to the presence of a fire hydrant; however parents filled this gap when other areas were not available for parking.

3 Mitigation Options and Recommendations

This section summarizes the improvement options to respond to the high level gaps identified in the previous section. All options are feasible and are accompanied by high-level cost estimates. Short term projects can be implemented quickly whereas long term projects require more substantial planning. Priority projects are indicated with an asterisk.

Table 15: Recommended Improvements

Location	Infrastructure Cost Estimate	Suggested Mitigation	Short / Long Term	Who?
Capilano Elementary	N/A	Expand School Travel Demand and Mode Shift Programs – Section 3.1.1	On-going	Capilano ES NVSD44
Capilano Elementary	N/A	Traffic management around school – Section 3.1.2	On-going	Capilano ES PAC Group RCMP
Around Capilano Elementary*	\$2,000	School Zone expansion upgrade - Section 3.1.3	Short Term	DNV
DNV	N/A	Work with residents to maintain clear sight distance by addressing overgrown vegetation – Section 3.1.4	On-going	DNV
Study Area*	\$15,000	Signage and marking upgrades – Section 3.1.5	Short Term	DNV
20 th Street West and Bridgman Avenue	\$14,000	Intersection upgrades – curb buildout, new crossing – Section 3.2.1	Long Term	DNV
20 th Street West between Bridgman Avenue and Pemberton Avenue*	<u>\$8,400 for gravel section</u> \$40,000 for concrete section	New sidewalk (gravel + concrete) on the south side - Section 3.2.2	Long Term	DNV
	\$5,000	Raised crosswalk from south side of 20 th Street West to school entrance – Section 3.2.2	Short Term	DNV
Sum of Short Term + Priority items	\$22,000			

3.1 Short Term Improvements

All of these projects are relatively low cost either to the DNV or NVSD44 and can be provided in the short term. DNV-related recommendations are eligible under the Capital or Operations budget, with some potential for reimbursement via school-related transportation grants.

3.1.1 Expand School Travel Demand and Mode Shift Programs

Responsibility of: NVSD44 and School Administration

The school and PAC have collaborated on incentive programs to encourage and reward active travel modes to school. This and similar programs could be encouraged and expanded through the following means.

3.1.1.1 Encourage Parent Volunteers

The North Vancouver school travel survey in 2013 conducted by NVSD44 and the two North Vancouver municipalities found that families who attend schools with parent-led traffic safety information campaigns, and that are involved in Travel Smart® programs reported higher satisfaction about conditions for pedestrians and cyclists accessing the school.

One example of a current parent volunteer group is the North Shore Safe Route Advocates (RSA), an independent advocate group of parents. Parent volunteers may organize walking or cycling programs; for example, “Walk Or Wheel” days (Highlands) or “Freedom Fridays” (Canyon Heights) to encourage walking, cycling or other active modes to travel to school. The programs may have incentives, such as a draw for a bike (Canyon Heights) or a scanned QR code tag to electronically tally walking and cycling trips by students and award points (Highlands). Therefore, the study recommends support of these type of parent-led initiatives.

3.1.1.2 Include more Traffic Safety into Curriculum

According to the 2013 school travel survey, traffic safety was listed as a significant contributor to parents’ decisions to drive their children to school. The school can broaden its efforts to expand traffic safety into the background curriculum at the school.

ICBC offers age-appropriate teaching resources for traffic safety free of charge through its *RoadSense Kids* and *SMART Board RoadSense Kids* activities. These materials can be supplemented with individual ICBC and RCMP speakers to demonstrate appropriate behaviour at intersections and when near road traffic. Individual lessons and strategies can assist both children and parents with gaining confidence for walking or cycling to school in all weather conditions.

This can extend to a modal choice curriculum for staff and faculty through TransLink’s *Travel Smart* program, an informational site to assist schools make smarter choices about their travel habits.

3.1.1.3 Drive to Five Program

Drive to Five is an initiative that aims to map out where students travel to and from the school and then designate safe locations along those routes at roughly a five minute walk to or from the school. This provides pick up and drop off away from the front school entrance at arrival and dismissal times. Providing trustworthy and monitored pick up and drop off could eliminate a number of vehicle trips from the front school entrance at arrival and dismissal times. If the school is interested in starting start a Drive to Five program, it is recommended that Capilano undertake a study which includes neighbourhood consultation to determine feasible locations amenable to neighbours which are large enough for vehicle parking and turning movements. Communicating and working with the residents near the proposed locations would be important for the school to do.

3.1.1.4 Walking School Bus

A Walking School Bus is a group of children walking together under the supervision of one or more adults following a prescribed route and schedule. This is an idea for schools to consider to offer a safe,

dependable, and healthy way for children to get to school versus being driven in a car. It can be informally planned when two or three families take turns walking or cycling with their children to school or it might be a more formally developed and organized program with specific stops, specific participants and volunteer Walking School Bus leaders.

Walking School Buses can contribute to reducing vehicle trips to schools, contribute to at least a modicum-recommended daily exercise regime for children, and improve parental involvement in school affairs. This type of program is recommended for younger elementary school students and daycare-attending children as well. This program could be implemented on a volunteer schedule for the school or day care with a number of suitable routes mapped out as required by participants' addresses.

3.1.2 Improved Traffic Management at School

Responsibility of: School Administration, PAC, RCMP

Sustained efforts to manage or control traffic movements in and around school at arrival and dismissal times will reduce risk and the potential for pedestrian/vehicle conflicts.

The existing 'No Parking 8AM-4PM School Days' regulatory signage on 20th Street West is routinely ignored – especially at dismissal times. The signage and regulation exists to ensure adequate turnover and availability of drop off space for parents. DNV Bylaws does periodic enforcement and enforcement is recommended to continue. Continued encouragement of the '1-way' drop off and pick up movements around the school is also recommended.

The options for enforcement and reinforcement range from school communication reminders to active parent volunteer monitoring of parking behaviour to ticketing by RCMP. North Vancouver *Speed Watch* is another resource that the school or parents can request to come to a location to monitor vehicle speeds. It is a program by the RCMP, volunteers and ICBC.

3.1.3 Expand School Zone – Priority

Responsibility of: DNV

The BC Ministry of Transportation and Infrastructure (MoTI) supplement to Transportation Association of Canada (TAC) recommends that school zones not be less than 100m from the property of the school, where warranted. TAC's *School and Playground Areas and Zones: Guidelines for Application and Implementation* (2006) references the *Geometric Design Guide for Canadian Roads* (1999) to note that the actual distance of a school zone should be the safest Sight Stopping Distance (SSD) from the school's property line based on the road's terrain, topography, and design speed. For the flat surfaces on 20th Street West, Bridgman Avenue, 21st Street West, and Pemberton Avenue, the SSD is 60m-65m (see Table 1.2.5.3, *Geometric Design Guide to Canadian Roads*). Based on the minimum length and SSD guidelines for school zones, the existing school zone, with all accompanying signage and regulatory authority, could be considered to extend to:

- 21st Street West and Philip Avenue – signs posted just east of intersection;
- Bridgman Avenue and West Keith Road – signs posted just north of intersection;
- Bridgman Avenue and 22nd Street West – signs posted just south of intersection;
- Pemberton Avenue at service lanes north of West Keith Road/Cortell Street – signs posted just north of service lane intersections;

- 21st Street West between Pemberton Avenue and Lloyd Avenue – signs posted approximately mid-block; and
- 20th Street West between Pemberton Avenue and Lloyd Avenue – signs posted approximately mid-block.

The estimated cost to supply and install new signs is \$175 each. To relocate existing signs, the estimated cost is \$125 each.

3.1.4 Vegetation Maintenance

Responsibility of: DNV

Maintaining sight distance is an important element on streets and at intersections. Landscape vegetation may impede sight distance when it is not properly maintained. In addition, maintaining vegetation is also important so that it does not obscure signage or reduce the effective width of sidewalks. Case-by-case vegetation trimming inquiries can be made to the general DNV engineering email or phone line.

3.1.5 Signage and Markings Enhancements – Priority

Responsibility of: DNV

3.1.5.1 Install New Pedestrian and/or School Crosswalks and Crossing Markings

Crosswalks are normally installed at locations with existing stop control, sidewalks, demonstrated pedestrian demand, and/or along demonstrated pedestrian desire paths as per TAC and BC MoTI guidelines. This investigation proposes new crosswalks at a number of existing intersections around the periphery of the school:

- 20th Street West and Pemberton Avenue – north (school), west (school), south (pedestrian), and east (pedestrian) legs
- 21st Street West and Pemberton Avenue – west leg (pedestrian) at entry and crossing from stairs
- 21st Street West and Bridgman Avenue – south leg (school), north and west legs (pedestrian), and east leg (completed in 2015)

The installation of these new crosswalks will also require existing stop lines be moved back to a minimum 1.5m distance from the nearest crosswalk line. New pedestrian crosswalks also require new accompanying signage at each approach. Table 16 shows the high level costs for signage and marking upgrades.

Table 16: High-level costs – Signage and Marking Upgrades

Signage and Marking Upgrades				
Short Term Improvements	Cost	Unit	Qty	Price
Pavement Markings (Stop Bar)	\$ 175.00	each	8	\$ 1,400.00
Signs (each)	\$ 175.00	each	14	\$ 2,450.00
School Crossing and Signage (each)	\$ 800.00	each	8	\$ 6,400.00
Contingency/Risk/Design	40%			\$ 4,100.00
TOTAL				\$ 14,350.00

3.1.5.2 Standardize Signage as per TAC

This section contains recommendations for parking regulations and school zone-related signage.

- Parking Regulations – consider installing ‘No Stopping’ or ‘No Parking’ signage at intersections where vehicles are observed to frequently park too close to the intersection (Street and Traffic Bylaw states no parking is allowed within 11 m of street intersections). This may help reduce vehicles parking too close to the intersection. Minimum eight signs/poles per 4-way intersection and six signs/poles per ‘T’ intersection.
- School zone-related signage – consider installing ‘School Crosswalk Ahead’ signs (sign number WC-16R/L) signs and ‘School Crosswalk’ signs (sign number RA-3R/L) signs at the locations noted above for new school crosswalks.

3.2 Long Term Improvements

These proposals respond to conditions identified at specific locations.

3.2.1 20th Street West and Bridgman Avenue

Responsibility of: DNV

An option for this intersection addresses different safety issues noted during the investigation, generally reduces crossing distance for the major movement (east leg), and improves visibility and control for through movements on Bridgman Avenue.

The sketch for this option (Figure 4) builds out the southeast corner and ties back to the point of an existing catch basin on the south side of 20th Street West to reduce the crossing distance of the east leg by 1.5m – 2.0m. It improves pedestrian visibility by moving the northbound stop line up away from the service lane to the 20th Street West and removes vegetation from the north-west corner approach at the west service lane.

As this recommendation is at the conceptual level, the location of the northbound stop line needs to be determined when detailed design is completed to account for the location of the east service lane.

Northbound volumes on Bridgman Avenue are low enough to provide adequate gaps for exiting vehicles with negligible delays. High-level concept costs are provided in Table 17.

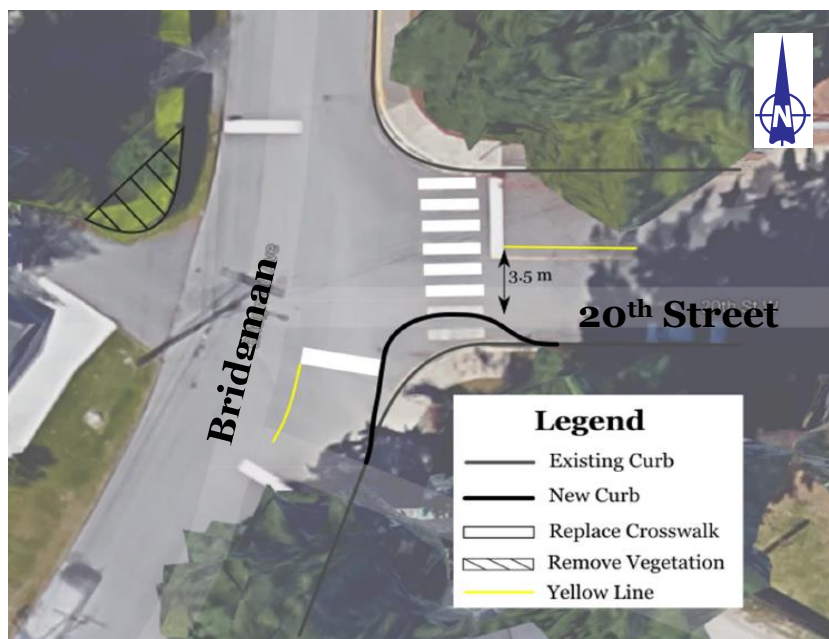


Figure 4: High-level proposal for 20th Street West and Bridgman Avenue

Table 17: High-level costs – 20th Street West and Bridgman Avenue treatments

Bridgeman Ave and 20th St W				
Long Term Improvements	Cost	Unit	Qty	Price
Pavement Markings (Stop Bar)	\$ 175.00	each	1	\$ 175.00
School Crossing and Signage (each)	\$ 800.00	each	1	\$ 800.00
Concrete curbs (m)	\$ 150.00	m	20	\$ 3,000.00
Concrete sidewalk (m)	\$ 250.00	m	10	\$ 2,500.00
Curb Let Downs	\$ 1,200.00	each	1	\$ 1,200.00
Pavement Markings (Longitudinal)	\$ 2.00	m	20	\$ 40.00
Clear Vegetation (m2)	\$ 80.00	m2	25	\$ 2,000.00
Contingency/Risk/Design	40%			\$ 3,900.00
TOTAL				\$ 13,615.00

3.2.2 20th Street West between Bridgman Avenue and Pemberton Avenue – Priority

Responsibility of: DNV

A raised pedestrian crosswalk in front of the school’s entrance on West 20th Street was the school administration and parents group’s primary request for new infrastructure. Of the locations near the school that may benefit from the addition of a sidewalk, the south side of West 20th Street is considered a priority by the school.

Figure 5 shows the approximate location of a raised crosswalk, although the exact location would need to be later determined taking into account driveway locations and drainage. Due to large mature trees in the boulevard along the western half of the south side of 20th Street West, walking on the boulevard could be improved with gravel or other surface material; a concrete sidewalk on the eastern half where there is less vegetation permits construction within the boulevard.



Figure 5: High-level proposal for 20th Street West south side

High-level concept costs are provided in Table 18. Although the total cost is approximately \$55,500, most of this cost is for concrete sidewalk to the east of the new crossing. The school’s stated priority is the raised crosswalk, which can be installed in the short term for an estimated \$5,000.

Table 18: High-level costs – 20th Street West

W 20th Sidewalk				
Long Term Improvements	Cost	Unit	Qty	Price
Concrete sidewalk (m)	\$ 250.00	m	100	\$ 25,000.00
Curb Let Downs	\$ 1,200.00	each	3	\$ 3,600.00
Raised Crosswalk (asphalt)	\$ 5,000.00	each	1	\$ 5,000.00
Gravel Sidewalk (m2)	\$ 40.00	m2	150	\$ 6,000.00
Contingency/Risk/Design	40%			\$ 15,900.00
TOTAL				\$ 55,500.00

The school suggested the idea to make a permanent one-way circulation around the school. This option has been suggested to and considered by DNV over the years, but for several reasons it is not appropriate for this location. A permanent one-way circulation restricts traffic circulation all day besides school peak hours (including summer and non-school days and hours), and it does not necessarily resolve jay-walking issues or safe crossings. The school asks parents to voluntarily drive in a one-way clockwise circulation around the school; this seems to be a good strategy to address the short time of busy school traffic.

4 Conclusions

This report recommends a combination of programming and infrastructure upgrades to improve safety around the school in a manner consistent with the availability of DNV resources. Short term and priority projects for implementation are summarized in Table 19.

Table 19: Short-Term and Priority Projects for Implementation

Proposal	Partners
Greater uptake of school-supported programs (Section 3.1.1)	Capilano ES NVSD44
Traffic management around school to promote quicker turnover, illegal and obstructive parking (Section 3.1.2)	Capilano ES PAC Group RCMP
Work with residents to maintain clear sight distance by addressing overgrown vegetation (Section 3.1.3)	DNV
School Zone expansion upgrade (Section 3.1.4)	DNV
Signage and marking upgrades (Section 3.1.5)	DNV
Raised crosswalk from south side of 20 th Street West to school entrance (Section 3.2.2)	DNV

APPENDIX A
Collision Data Memo



Collision Data

Opus reviewed the collision data provided by ICBC in the immediate vicinity of Capilano. In 6 years of data reviewed (2008-2013), the local, collector roads and laneways had few collisions, averaging 1 or fewer per year. The major arterial roads (Capilano Road and Marine Drive) experienced higher crash averages with an average of 3 – 139 per year. More collisions were at intersections along Marine Drive at Capilano Road and Marine Drive at Pemberton Avenue; several hundred metres to the south of the school.

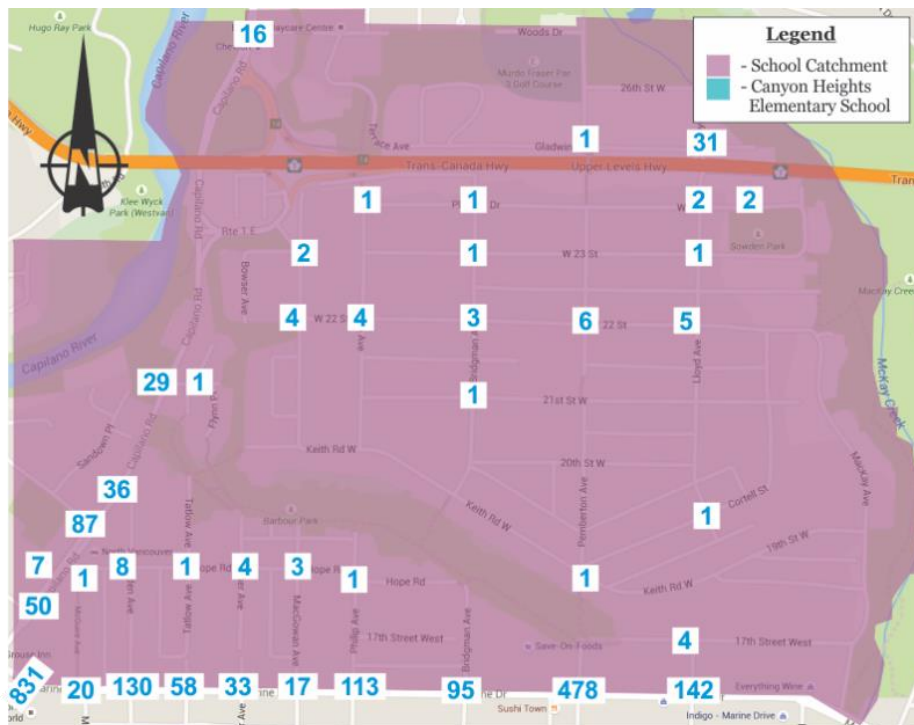


Figure 6: Capilano - Crash Information by Intersection (2008 – 2013)

Of these 22 crash incidents, no crashes involved pedestrians or cyclists. Nine (9) involved clipped vehicle mirrors of parked and moving cars. Five of these were by buses and four were oncoming vehicles. Three crashes each were reported for rear end, hitting parked cars while reversing from a driveway, and failure to yield to a vehicle that had the right of way.

APPENDIX B

Signs and Markings Inventory



Capilano Elementary School Study

A complete signage and markings inventory of the school vicinity is shown here with reference table of respective condition notes below.

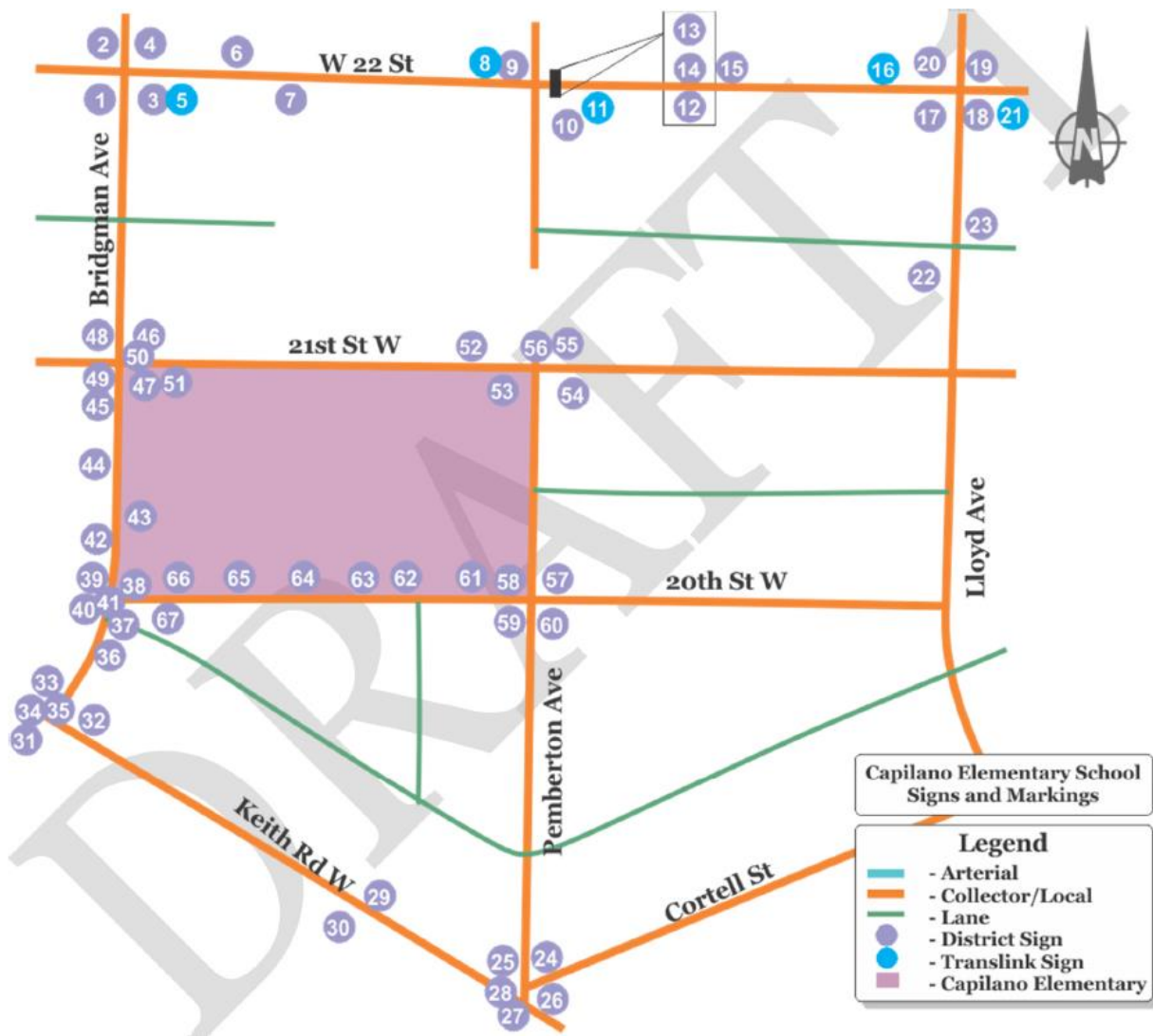


Figure B.1: Capilano Elementary School – Signs and Markings Inventory

Capilano Elementary School Study

Capilano Elementary School - Signs and Markings						
No. On Map	Sign/Pavement Marking Name	TAC Sign Code	BCMoTI Sign Code	Condition	Elaborate on Fair/Poor Condition	Location
1	Stop Sign/4- Way Supplementary Sign/Stop Bar	RA-1	R-001/R-001-Tb	Good/Fair/Good	4-way Sign bent	Bridgman @ 22nd - EB
2	Stop Sign/4- Way Supplementary Sign/Stop Bar	RA-1	R-001/R-001-Tb	Good/Fair/Fair	4-way sign dirty and stop bar faded	Bridgman @ 22nd - SB
3	Stop Sign/4- Way Supplementary Sign/Stop Bar	RA-1	R-001/R-001-Tb	Good/Fair/Good	4-way Sign in poor condition	Bridgman @ 22nd - NB
4	Stop Sign/4- Way Supplementary Sign/Stop Bar	RA-1	R-001/R-001-Tb	Good/Fair/Good	4-way Sign in poor condition	Bridgman @ 22nd - WB
5	Translink Bus Stop	NA	NA	Good		South Side of 22nd, East of Bridgman
6	Stop Ahead	WB-1	W-011	Fair	Faded	North Side of 22nd, East of Bridgman
7	Pedestrian Crossing Warning Sign	WC-2R	PS-002	Good		South Side of 22nd, East of Bridgman
8	Translink Bus Stop	NA	NA	Good	Loose Pole	North Side of 22nd @ Pemberton
9	Stop Sign/Stop Bar	RA-1	R-001	Good		Pemberton @ 22nd - SB
10	Stop Sign	RA-1	R-001	Good	No Stop Bar	Pemberton @ 22nd - NB
11	Translink Bus Stop	NA	NA	Good		South Side of 22nd, East of Pemberton
12	Pedestrian Crossing Warning Sign & Speed Hump Warning Sign	WC-2R & WA-50	W-011 & W-108-2	Good & Good		South Side of 22nd, East of Pemberton
13	Pedestrian Crossing Warning Sign & Speed Hump Warning Sign	WC-2R & WA-51	W-011 & W-108-2	Good & Good		North Side of 22nd, East of Pemberton
14	Crosswalk	NA	NA	Good		East of Pemberton
15	Pedestrian Crossing Warning Sign	WC-2R	PS-002	Good		North Side of 22nd, East of Pemberton
16	Translink Bus Stop	NA	NA	Fair	Loose Pole	North Side of 22nd, East of Pemberton
17	Stop Sign/4- Way Supplementary Sign/Stop Bar	RA-1	R-001/R-001-Tb	Good	Faded Stop Bar	22nd @ Llyod- EB
18	Stop Sign/4- Way Supplementary Sign/Stop Bar	RA-1	R-001/R-001-Tb	Good		22nd @ Llyod- NB
19	Stop Sign/4- Way Supplementary Sign/Stop Bar	RA-1	R-001/R-001-Tb	Good	Faded Stop Bar	22nd @ Llyod-WB
20	Stop Sign/4- Way Supplementary Sign/Stop Bar	RA-1	R-001/R-001-Tb	Good	Faded Stop Bar	22nd @ Llyod- SB
21	Translink Bus Stop	NA	NA	Fair	Faded	South Side of 22nd, East of Lloyd
22	Stop Sign/Stop Bar	RA-1	R-001	Good		Llyod @ 21st - WB
23	Stop Sign	RA-1	R-001	Good	No Stop Bar	Llyod @ 21st - EB
24	Stop Sign/Stop Bar	RA-1	R-001	Good		Cortell @ Pemberton - WB
25	Stop Sign/Stop Bar/3 Way Stop	RA-1	R-001/R-001-Ta	Good	Stop Sign not visible from Cortell, set back from Stop Bar	Pemberton @ Keith - SB
26	Stop Sign/Stop Bar/3 Way Stop	RA-1	R-001/R-001-Ta	Good	Stop Bar Faded	Pemberton @ Keith - WB
27	Stop Sign/Stop Bar/3 Way Stop	RA-1	R-001/R-001-Ta	Good	Stop Bar Faded	Pemberton @ Keith - EB
28	Crosswalk	NA	NA	Poor	Faded	West leg of Keith @ Pemberton
29	Speed Hump Sign	WA-50	W-108-2	Good		West of Pemberton on Keith - North Side
30	Speed Hump Sign	WA-50	W-108-2	Good		West of Pemberton on Keith - South Side
31	Stop Sign/Stop Bar	RA-1	R-001/R-001-Ta	Good	Faded Stop Bar	Bridgman @ Keith - WB
32	Stop Sign/Stop Bar	RA-1	R-001/R-001-Ta	Good	Faded Stop Bar	Bridgman @ Keith - SB
33	Stop Sign/Stop Bar	RA-1	R-001/R-001-Ta	Good		Bridgman @ Keith - EB

Capilano Elementary School Study

Capilano Elementary School - Signs and Markings						
No. On Map	Sign/Pavement Marking Name	TAC Sign Code	BCMoTI Sign Code	Condition	Elaborate on Fair/Poor Condition	Location
34	Crosswalk	NA	NA	Poor	Faded	West leg - Bridgman @ Keith
35	Crosswalk	NA	NA	Poor	Faded	North leg - Bridgman @ Keith
36	School Zone Signage/Reduced Speed (30 km/hr)	NOT TAC	PS-001/PS-001-Ta			West Side of Bridgman
37	Stop Sign/Stop Bar/3 Way Stop	RA-1	R-001/R-001-Ta	Good	Faded Stop Bar	Bridgman @ 20th - NB
38	Stop Sign/Stop Bar/3 Way Stop	RA-1	R-001/R-001-Ta	Good	old 3 way sign, faded Stop bar	Bridgman @ 20th - WB
39	Stop Sign/Stop Bar/3 Way Stop	RA-1	R-001/R-001-Ta	Good	Faded Stop Bar	Bridgman @ 20th - SB
40	No U-turn x2	RB-16	R-019	Good		Bridgman @ 20th
41	Crosswalk	NA	NA	Poor	Faded	Bridgman @ 20th - West Leg
42	No Stopping (specified times)	RB-57	?	Good		East Side of Bridgman
43	No Stopping to Corner	RB-55	P-058	Fair	Fading	West Side of Bridgman
44	No Stopping (specified times)	RB-57	?	Good		East Side of Bridgman
45	No Stopping (specified times)/School Zone Signage/Reduced Speed	RB-57/NOT TAC	?/PS-001/PS-001-Ta	Good		East Side of Bridgman - South of 21st
46	45p Sign/4- Way Supplementary Sign/Stop Bar	RA-1	R-001/R-001-Tb	Good	Stop Bar Faded	21st @ Bridgman - WB
47	Stop Sign/4- Way Supplementary Sign/Stop Bar	RA-1	R-001/R-001-Tb	Good	Stop Bar Faded	21st @ Bridgman - NB
48	Stop Sign/4- Way Supplementary Sign/Stop Bar	RA-1	R-001/R-001-Tb	Good	Stop Bar Faded	21st @ Bridgman - SB
49	Stop Sign/4- Way Supplementary Sign/Stop Bar	RA-1	R-001/R-001-Tb	Good	Stop Bar Faded	21st @ Bridgman - EB
50	Crosswalk	NA	NA	Fair	Faded	21st @ Bridgman - East Leg
51	School Zone Signage/Reduced Speed (30 km/hr)	NOT TAC	PS-001/PS-001-Ta	Good		21st @ Bridgman - South Side of 21st
52	School Zone Signage/Reduced Speed (30 km/hr)	NOT TAC	PS-001/PS-001-Ta	Good		21st @ Pemberton - North Side of 21st
53	Stop Sign/Stop Bar/3 Way Stop	RA-1	R-001/R-001-Ta	Good	Stop Bar Faded	21st @ Pemberton - EB
54	Stop Sign/Stop Bar/3 Way Stop	RA-1	R-001/R-001-Ta	Good	Stop Bar Faded	21st @ Pemberton - NB
55	Stop Sign/Stop Bar/3 Way Stop	RA-1	R-001/R-001-Ta	Good	Stop Bar Faded	21st @ Pemberton - WB
56	Checkerboard Sign	WA-8	W-014	Good		21st @ Pemberton
57	Stop Sign/4- Way Supplementary Sign/Stop Bar	RA-1	R-001/R-001-Tb	Good	Stop Bar Faded	20th @ Pemberton - WB
58	Stop Sign/4- Way Supplementary Sign/Stop Bar	RA-1	R-001/R-001-Tb	Good	Stop Bar Faded	20th @ Pemberton - SB
59	Stop Sign/4- Way Supplementary Sign/Stop Bar	RA-1	R-001/R-001-Tb	Good	Stop Bar Faded	20th @ Pemberton - EB
60	Stop Sign/4- Way Supplementary Sign/Stop Bar	RA-1	R-001/R-001-Tb	Good	Stop Bar Faded	20th @ Pemberton - NB
61	School Zone Signage/Reduced Speed (30 km/hr)	NOT TAC	PS-001/PS-001-Ta	Good		20th @ Pemberton - North Side of 20th
62	No Parking on School Days/Drop off Pick Up Zone	RB-52 / ?	P-008/?	Good		20th - North Side, in front of School
63	No Parking on School Days/Drop off Pick Up Zone/Do Not Stop (to left)	RB-52 / ?	P-008/?	Good		20th- North Side, in front of School
64	No Parking on School Days/Drop off Pick Up Zone/Do Not Stop (to right)	RB-52 / ? / RB-55	P-008/?/P-058	Good		20th - North Side, in front of School
65	No Parking on School Days/Drop off Pick Up Zone	RB-52 / ?	P-008/?	Good		20th - North Side, in front of School
66	No Parking on School Days/Drop off Pick Up Zone	RB-52 / ?	P-008/?	Good		20th - North Side, in front of School
67	School Zone Signage/Reduced Speed (30 km/hr)	NOT TAC	PS-001/PS-001-Ta	Good		20th @ Bridgman - South side of 20th

APPENDIX C

High-level Cost Estimate Assumptions



Assumptions

Landscaping and demolition costs are not included.

Description of Work	Cost	Unit	Source
Temporary Curb Stops (m)	\$25.00	m	https://www.trafficsafetystore.com/parking-blocks/recycled-rubber
Pavement Markings (Stop Bar)	\$175.00	each	http://www.transportation.alberta.ca/Content/docType257/Production/UnitPriceList.pdf
Signs (each)	\$175.00	each	DNV
School Crossing and Signage (each)	\$800.00	each	Assume 15m crosswalks + 2 signs
1. Crosswalk	\$30.00	m	Fineline
2. Crosswalk Signage	\$175.00	each	DNV
Concrete curbs (m)	\$150.00	m	http://www.transportation.alberta.ca/Content/docType257/Production/UnitPriceList.pdf
Concrete sidewalk (m)	\$250.00	m	DNV
Curb Let Downs	\$1,200.00	each	Quote for other project
Pavement Markings (Longitudinal)	\$2.00	m	http://www.transportation.alberta.ca/Content/docType257/Production/UnitPriceList.pdf
Pavement Markings (Gore)	\$1,000.00	each	http://www.transportation.alberta.ca/Content/docType257/Production/UnitPriceList.pdf
Pavement Markings (Median)	\$13.00	m	Fineline
Coloured Paint (Sidewalk/Bike Lane)	\$125.00	m2	Fineline
Move Catchbasin	\$3,000.00	each	Opus File System
Clear Vegetation (m2)	\$80.00	m2	Chesterfield proposal - cost to trim each tree - Assumed 1 m2 = 1 tree
Pavement Markings (arrows)	\$200.00	each	Fineline
Raised Crosswalk (asphalt)	\$5,000.00	each	DNV
Bollards	\$200.00	each	www.reliance-foundry.com/bollard/all-bollards
Gravel Sidewalk (m2)	\$40.00	m2	Duncan Paving Quote for installing sub base
Stairs (m)		m	
Handrail	\$111.00	m	Quote from Simplified Building
Relocate Existing Signs	\$125.00	each	Assume approximately 70-75% of supply and install cost

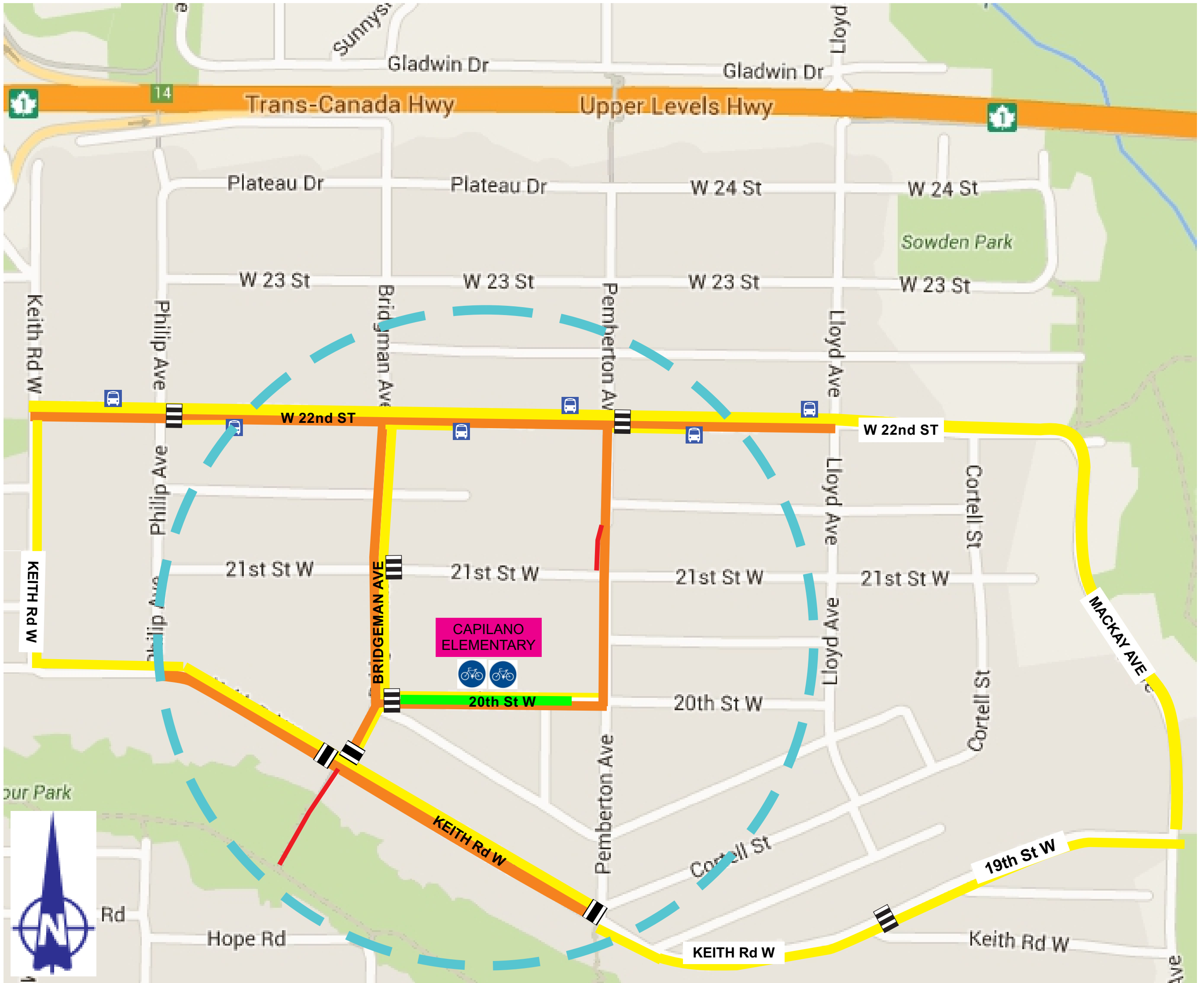
APPENDIX D

Safe-Route-to-School Map





Capilano Elementary School Safe Routes to School Map



Legend - Canyon Heights Elementary School

- | | | |
|----------------------|------------------|----------|
| Best Walking Routes | Drop off/Pick up | Sidewalk |
| 5 Minute Walk Radius | Bus Stop | Trail |
| Pedestrian Crosswalk | Bicycle Parking | |



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