



833 / 835 DUNSMUIR ROAD DEVELOPMENT

Traffic Impact Assessment

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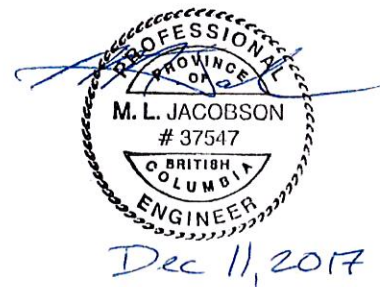


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1.0 INTRODUCTION

Watt Consulting Group was retained by GT Mann Contracting to conduct a traffic impact assessment for the proposed residential development at 833 / 835 Dunsmuir Road in the Township of Esquimalt, BC. An analysis of post-development conditions was undertaken in order to provide a clear view of the impacts at two key intersections on Dunsmuir Road. The proposed site access location (underground parkade ramp) was also reviewed to establish the functionality and safety of the access. Study recommendations and conclusions are to provide safe and efficient movement of vehicular traffic for the proposed development while minimizing the impact to non-site trips.

1.1 STUDY AREA

The development site is located at the south-east corner of Dunsmuir Road / Garrett Place. The study area includes Dunsmuir Road, Esquimalt Road, Head Street, Garrett Place and the site access. There are two key intersections in the study area: Esquimalt Road / Dunsmuir Road and Head Street / Dunsmuir Road. See **Figure 1** for the study area and site location.

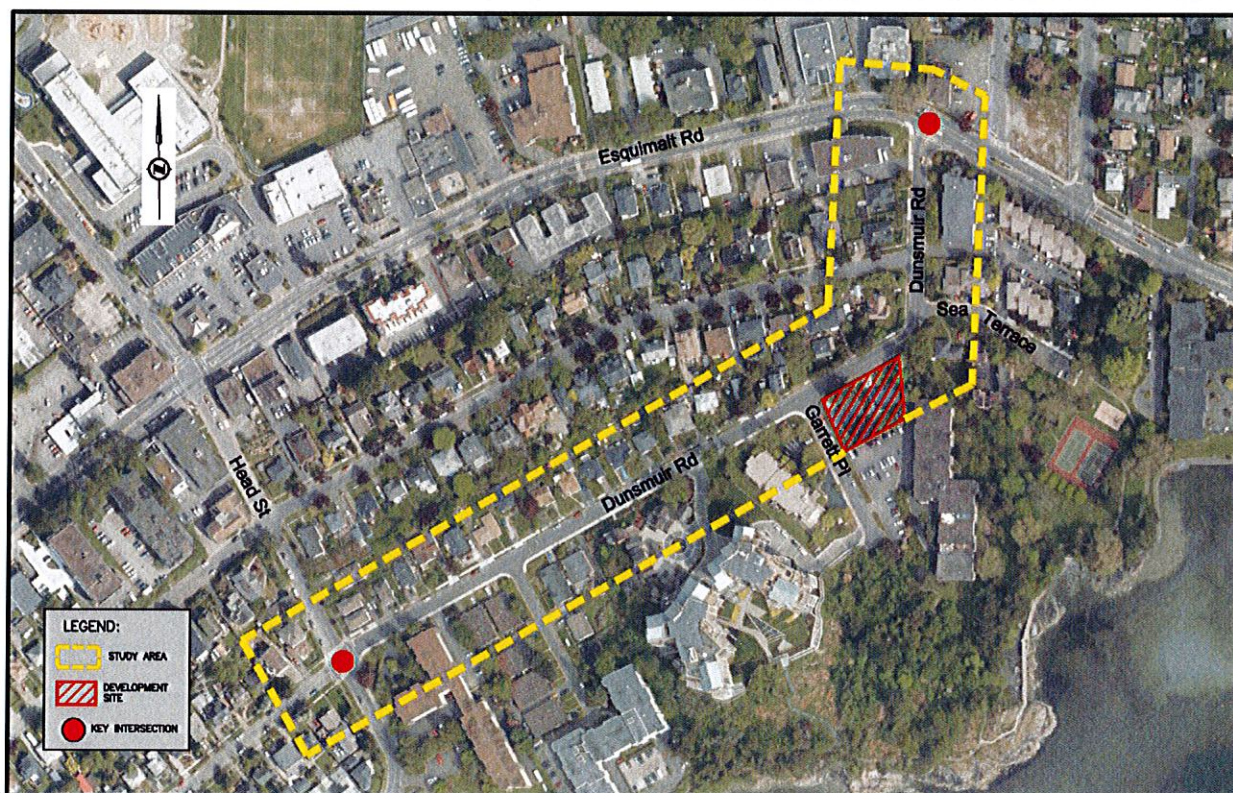


Figure 1: Study Area and Site Location

2.0 EXISTING CONDITIONS

2.1 LAND USE

There are two single family houses on the existing site (two residential lots). The surrounding land use is a mix of single-family and multi-family residential along Dunsmuir Road. To the north is a commercial area along Esquimalt Road.

2.2 ROAD NETWORK

Dunsmuir Road is a residential east-west local road with on-street parking along the north side in the study area. It connects to Esquimalt Road east of the development site. Esquimalt Road is an east-west major road with a three-lane cross section (centre medians or two-way left turn lane) through the town. There are bike lanes on Esquimalt Road for both sides. Head Street is a two-lane collector road running north-south.

At the intersection of Esquimalt Road / Dunsmuir Road, the northbound turn movement is stop control with channelization (right out only). There is a dedicated left turn lane on Esquimalt Road at Dunsmuir Road. A 30 km/h speed limit sign is posted on Esquimalt Road at Dunsmuir Road. Head Street / Dunsmuir Road is stop controlled for Dunsmuir Rd with a zebra crosswalk across each leg of Head Street. On Dunsmuir Road adjacent to the development site, traffic calming measures have been implemented including a speed hump and a crosswalk with curb extensions.

2.3 TRAFFIC COUNT

Turning movement counts were undertaken at the two key intersections (Esquimalt Road / Dunsmuir Road and Head Street / Dunsmuir Road) in the PM peak hour on September 14, 2017. See **Figure 2** for the 2017 existing peak hour traffic volumes. At the two study intersections, 2017 traffic volumes did not increase compared with previous counts (measured in the early 2000s).

2.4 TRAFFIC MODELLING – BACKGROUND INFORMATION

Analysis of the traffic conditions at the intersections within the study area were undertaken using Synchro software (for signalized and stop-controlled intersections).

Synchro / SimTraffic is a two-part traffic modelling software that provides analysis of traffic conditions based on traffic control, geometry, volumes and traffic operations. Synchro software (Synchro 8) is used because of its ability to provide analysis using the Highway Capacity Manual (2010) methodology, while SimTraffic integrates established driver behaviours and characteristics to simulate actual conditions by randomly “seeding” or positioning vehicles travelling throughout the network. These measures of effectiveness include level of service (LOS), delay and 95th percentile queue length.

The type of traffic control are analyzed to determine the level of service and delays. The level of services are broken down into six letter grades with LOS A being excellent operations and LOS F being unstable/failure operations. Level of service C is generally considered to be an acceptable

LOS by most municipalities. Level of service D is generally considered to be on the threshold between acceptable and unacceptable operations. A description of level of service and Synchro is provided in **Appendix A**.

2.5 EXISTING TRAFFIC – RESULTS

Existing traffic conditions were analyzed at the two key intersections within the study. All movements operate a LOS A/B except the northbound right turn movement (stop control: LOS C) from Dunsmuir onto Esquimalt Road in the PM peak hour. See **Figure 2** for the 2017 existing peak hour volumes and levels of service.

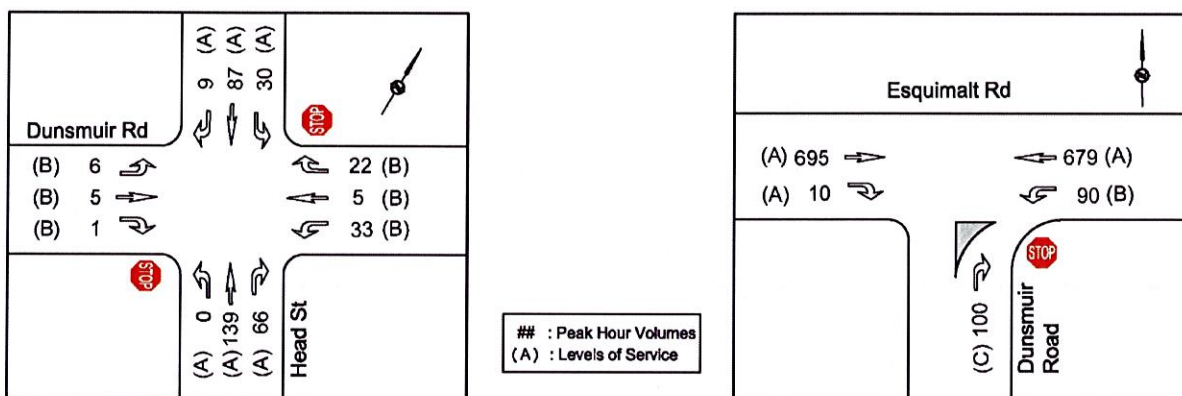


Figure 2: Existing PM Volumes and Levels of Service

3.0 POST DEVELOPMENT CONDITIONS

3.1 PROPOSED LAND USE

The proposed development is a multi-family residential building with a total of 34 multi-family units as of December 11, 2017. At the time of this study commencement 36 units were proposed, and this is the number assessed in this report. Therefore this analysis is a slightly conservative assessment.

3.2 SITE ACCESS

A site access (ramp to underground parkade) is proposed on Dunsmuir Road at a middle point of the development frontage. The proposed access is located just east of the existing speed hump on Dunsmuir Road. See **Figure 3** for the proposed site plan and accesses.

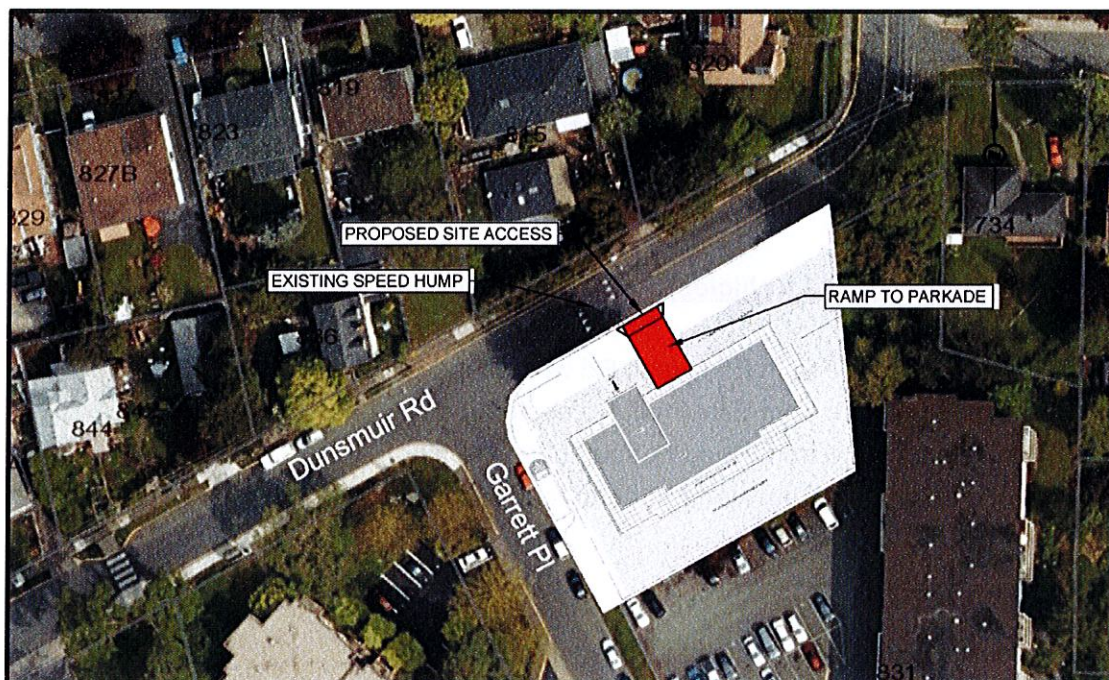


Figure 3: Proposed Site Plan and Access

3.3 TRIP GENERATION

Site trips were estimated using the *ITE Trip Generation Manual (9th Edition)*. The *Trip Generation Manual* provides trip rates for a wide variety of land uses gathered from actual sites across North America over the past 35 years. The site trips were estimated for the PM peak hour which reflects a recurring worst case time period of weekdays.

Table 1 summarizes trip generation for the proposed land use. The proposed land use (multi-family residential) is assumed an apartment building since trip generation (ITE rates) by rental apartments is slightly greater than ownership condominiums. The development will generate 20 new trips in the PM peak hour after the existing trip deduction. A residential development does not generate pass-by trips. The generated site trips are considered all primary trips within the study area.

TABLE 1: PM PEAK HOUR TRIP GENERATION

ITE Code	Land Use	Size	Trip Rate	Total Trips	Trips In	Trips Out
220	Multi-family Residential (Apartment Building)	36 units	0.62 trips/unit	22	14	8
210	Existing Trip Deduction (Single-family)	2 units	1.00 trip/unit	(-2)	(-1)	(-1)
			Net Trips Total	20	13	7

3.4 TRIP ASSIGNMENT

The site trip assignment is based on the existing trip distributions at the study intersections and commuter traffic patterns. The following summarizes directional split percentages of the site trips at the two key intersections within the study area.

Trips In (PM Peak Hour : 13 Vehicles)

- 70% of site trips are from Esquimalt Rd westbound (9 Veh)
- 10% of site trips are from Esquimalt Rd eastbound (1 Veh)
- 10% of site trips are from Head St southbound (1 Veh)
- 10% of site trips are from Head St northbound (2 Veh)

Trips Out (PM Peak Hour : 7 Vehicles)

- 60% of site trips are to Esquimalt Rd eastbound (4 Veh)
- 25% of site trips are to Head St northbound (2 Veh)
- 15% of site trips are to Head St southbound (1 Veh)

See **Figure 4** for the site trip assignment at the access roads.

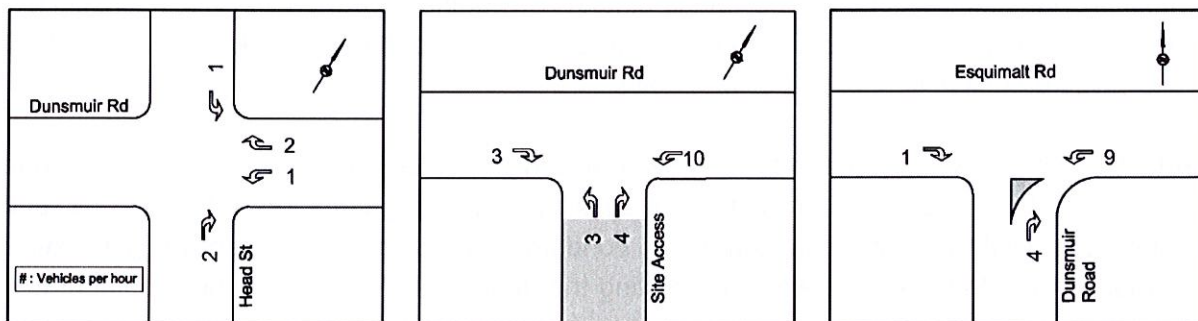


Figure 4: Site Trip Assignment

3.5 POST DEVELOPMENT TRAFFIC ANALYSIS RESULTS - FULL BUILD OUT

Based on the post-development analysis, all movements at the two key study area intersections will operate at the same levels of service as existing with the development and operate at a good LOS (C or better), and the additional average delay will be less than one second in the PM peak hour for all intersection movements.

No queuing issues were found with the development. At the intersection of Esquimalt Road / Dunsmuir Road, the westbound left 95th queue length (18.5m) will be accommodated within the existing storage length (20m). At the proposed site access on Dunsmuir Road, all movements will operate at a LOS A.

Based on the analysis results, the development will not trigger any mitigations measures at any of the study intersections.

Table 2 and **3** summarize delays and queues for 2017 existing and post development at the two study intersections. **Figure 5** summarize post-development volumes and levels of service at the key intersections.

TABLE 2: 2017 PM PEAK CONDITIONS AT ESQUIMALT RD/DUNSMUIR RD

Movement	Existing			Post Development		
	LOS	Delay (s)	95 th Queue (m)	LOS	Delay (s)	95 th Queue (m)
EBTR	A	0	4.7	A	0	4.8
WBL	B	10.0	17.2 (20)	B	10.1	18.5 (20)
WBT	A	0	11.8	A	0	23.2
NBR	C	17.9	21.1	C	18.1	23.5

*Notes: EB & WB = Esquimalt Rd, NB = Dunsmuir Rd; 95th Queues based on SimTraffic results, (##) = existing turn lane length

TABLE 3: 2017 PM PEAK CONDITIONS AT HEAD ST/ DUNSMUIR RD

Movement	Existing			Post Development		
	LOS	Delay (s)	95 th Queue (m)	LOS	Delay (s)	95 th Queue (m)
EB	B	12.7	13.0	B	12.8	12.5
WB	B	13.0	18.9	B	13.0	18.6
NB	A	0	3.1	A	0	3.3
SBL	A	8	11.3	A	8	13.3

*Notes: EB & WB = Dunsmuir Rd, NB & SB = Head St; 95th Queues based on SimTraffic results, (##) = existing turn lane length

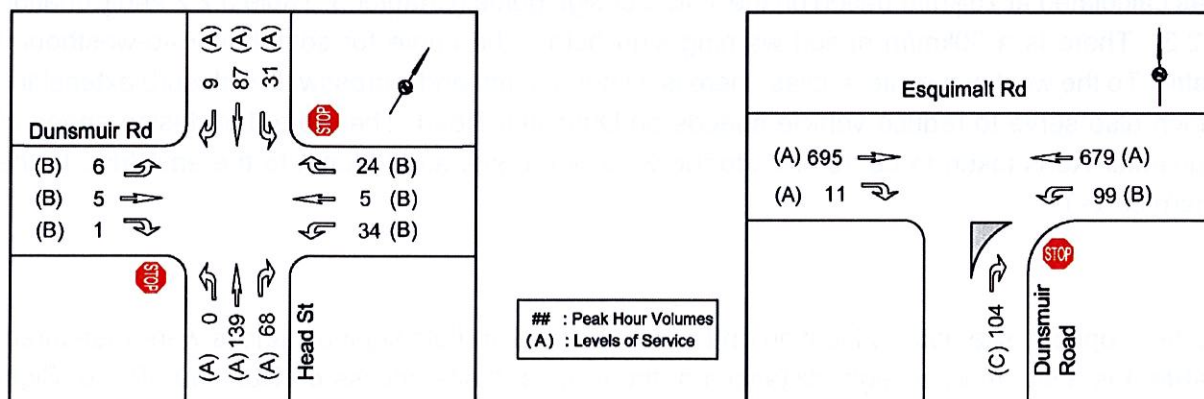


Figure 5: 2017 Post Development PM Volumes and Levels of Service

4.0 SAFETY AND GEOMETRICS

The site access is proposed to intersect Dunsmuir Road. A safety review was undertaken for the proposed site access ramp to the underground parkade based on the Transportation Association of Canada (TAC)'s Geometric Design Guide for Canadian Roads and municipal design standards.

4.1 ACCESS SPACING AND GRADES

The proposed access is located the Dunsmuir Road 20m east of Garrett Place and 25m west from the adjacent driveway (at 831 Dunsmuir Road). The proposed access location exceeds the TAC's suggested minimum corner clearance for multi-family residential driveways of 5m to minor intersections and of 3m between driveways.

The proposed access and ramp design should conform to the municipal engineering specifications. According to the Township's Design and Construction Specifications (R-8: Driveway Grades), the maximum grade of driveway is 15%. Also, the driveway and finished boulevard grade must be at the same elevation at the center of the existing road surface and the minimum level distance is 7.5m for residential roads.

4.2 SIGHT DISTANCE

The provision of adequate sight distance for the exit maneuver from the driveway is one of the most critical elements for safety. The required sight distance is determined in consideration of the design speed of the intersecting roadway and the sight line requirements for approach and departure vehicles.

4.2.1 DESIGN SPEED

Dunsmuir Road is designed with to a lower speed than a typical 50 km/h road based on the existing geometrics of the road. There is a curve section on Dunsmuir Road 40m east of the proposed site access location. The design speed of the road at the curve (curve radius of 16m) was calculated at 26 km/h based on the TAC's design guide (Chapter 3: Table 3.2.2 and Equation 3.2.3). There is a 30km/h speed warning sign before the curve for southbound-to-westbound traffic. To the west of the site access, there is a speed hump and a crosswalk with curb extensions which also serve to reduce vehicle speeds on Dunsmuir Road. Therefore, the design speed of Dunsmuir Rd is taken to be 40 km/h to the west of the site and 26km/h to the east (due to the sharp curve).

4.2.2 SIGHT DISTANCES

At the proposed site access location on Dunsmuir Road, in-field sight distances were measured. **Table 4** is a summary of sight distances at the proposed site access on Dunsmuir Road. Sight distance looking to left (west) exceeds the minimum required turning sight distance (75m). However, sight lines looking to the right (east) are limited due to the road curvature and existing vegetation (boxwood hedge). At the access location, the available sight distance to the east is

54m under existing conditions (over the sidewalk line). This is less than recommended turning sight distance at 30 km/h (of 65m) but meets the minimum turning sight distance for 26 km/h (which is 54m)¹, which is the design speed of the curve. On Dunsmuir Road, sight distances for approaching vehicles also exceed minimum stopping sight distance (50m) for 40 km/h from the west or 35m from the east. Therefore, the proposed site location meets the minimum turning sight distance requirements and exceeds stopping sight distance minimums. The curve warning advisory speed signage, however, is currently posted for higher than the design speed; reducing this advisory speed to 20 km/h would more accurately reflect the condition of the curve and better match sight line conditions for the site access.

TABLE 4: SIGHT DISTANCES AT SITE ACCESS ON DUNSMUIR RD

Sight Line Direction	Required Sight Distance	Measured at Site Access	Sight Distance Met?
Looking Left from Access	75m at 40 km/h	92m	Yes
Looking Right from Access	54m at 26 km/h	54m	Yes
Looking Forward along Dunsmuir – from West	50m (SSD)	90m	Yes
Looking Forward on Dunsmuir – from East	35m (SSD)	54m	Yes

5.0 OTHER MODES

5.1 PEDESTRIANS AND CYCLISTS

There is concrete sidewalk along the north side of Dunsmuir Road and asphalt sidewalk along the development frontage. Concrete sidewalk will be required along the development frontage of Dunsmuir Road.

There are bike lanes along both sides on Esquimalt Road and no bike lanes on Dunsmuir Road. On Dunsmuir Road, it is appropriate for cyclists to share the road with motorists given it is a local road with traffic calming. On site pedestrian/bicycle facilities should adhere to the Township specifications.

5.2 TRANSIT

There are two transit bus routes adjacent to or near the site; one (#25) is on Dunsmuir Road and the other (#15) is on Esquimalt Road. These bus routes connect the Esquimalt town centre to Downtown Victoria or UVic several times per hour on weekdays. The closest bus stop (#25) is on Dunsmuir Road 80m west of the proposed site and a bus stop for the route #15 is on Esquimalt Road within a walking distance (250m) from the development.

¹ Eq. 9.9.1, Pg 67, Chapter 9 – Intersections, TAC Geometric Design Guide for Canadian Roads

6.0 CONCLUSIONS

The following conclusions are made regarding the traffic impact assessment for the proposed 34-unit development at 833/855 Dunsmuir Road. In terms of operational impacts, the proposed development will not impact the two intersections the study area. Esquimalt Road / Dunsmuir Road and Head Street / Dunsmuir Road will operate with the same levels of service and without adverse queues in the post development period. The development does not trigger any traffic capacity mitigation requirements.

The proposed access location meets TAC's access spacing requirements and the access (ramp) should be designed based on the municipal standards. The Dunsmuir Road horizontal curve to the east of the site is constructed with a design speed of 26 km/h, and this represents the design speed to the east of the access location. Turning sight distance is just met looking east, and exceeds minimum requirements looking west. The existing southbound-to-westbound curve warning sign has an advisory speed of 30 km/h. This is higher than the design speed and therefore a consideration is to reduce this advisory speed to 20 km/h to better reflect as-built conditions.

There are sidewalks on both sides of Dunsmuir Road, and a concrete sidewalk will be required along the development frontage on Dunsmuir Road. Cyclists are accommodated on-street, with traffic calming serving to limit vehicle speeds. The area is well served by two BC Transit routes.

7.0 RECOMMENDATIONS

The following measures are recommended:

- The proposed site access (ramp to underground parking) should be designed based on the municipal standards.
- Provide a concrete sidewalk along the development frontage of Dunsmuir Road to municipal standards
- Modify the existing curve warning sign advisory speed for southbound-to-westbound drivers from 30 km/h to 20 km/h to better match the curve design.

APPENDIX A: SYNCHRO BACKGROUND

SYNCHRO MODELLING SOFTWARE DESCRIPTION

The traffic analysis was completed using Synchro and SimTraffic traffic modeling software. Results were measured in delay, level of service (LOS) and 95th percentile queue length. Synchro is based on the Highway Capacity Manual (HCM) methodology. SimTraffic integrates established driver behaviours and characteristics to simulate actual conditions by randomly “seeding” or positioning vehicles travelling throughout the network. The simulation is run five times (five different random seedings of vehicle types, behaviours and arrivals) to obtain statistical significance of the results.

Levels of Service

Traffic operations are typically described in terms of levels of service, which rates the amount of delay per vehicle for each movement and the entire intersection. Levels of service range from LOS A (representing best operations) to LOS E/F (LOS E being poor operations and LOS F being unpredictable/disruptive operations). LOS E/F are generally unacceptable levels of service under normal everyday conditions.

The hierarchy of criteria for grading an intersection or movement not only includes delay times, but also takes into account traffic control type (stop signs or traffic signal). For example, if a vehicle is delayed for 19 seconds at an unsignalized intersection, it is considered to have an average operation, and would therefore be graded as an LOS C. However, at a signalized intersection, a 19 second delay would be considered a good operation and therefore it would be given an LOS B. The table below indicates the range of delay for LOS for signalized and unsignalized intersections.

Table A1: LOS Criteria, by Intersection Traffic Control

Level of Service	Unsignalized Intersection Average Vehicle Delay (sec/veh)	Signalized Intersection Average Vehicle Delay (sec/veh)
A	Less than 10	Less than 10
B	10 to 15	11 to 20
C	15 to 25	20 to 35
D	25 to 35	35 to 55
E	35 to 50	55 to 80
F	More than 50	More than 80

APPENDIX B: 2017 EXISTING CONDITIONS

Intersection

Int Delay, s/veh 1.7

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑		↑	↑		↑
Traffic Vol, veh/h	695	10	90	679	0	100
Future Vol, veh/h	695	10	90	679	0	100
Conflicting Peds, #/hr	0	21	21	0	0	2
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	Stop
Storage Length	-	-	200	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	93	63	78	83	92	93
Heavy Vehicles, %	5	0	2	5	0	3
Mvmt Flow	747	16	115	818	0	108

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	784	0	-	778
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	4.12	-	-	6.23
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	2.218	-	-	3.327
Pot Cap-1 Maneuver	-	-	834	-	0	395
Stage 1	-	-	-	-	0	-
Stage 2	-	-	-	-	0	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	832	-	-	386
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1.2	17.9
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	386	-	-	832	-
HCM Lane V/C Ratio	0.279	-	-	0.139	-
HCM Control Delay (s)	17.9	-	-	10	-
HCM Lane LOS	C	-	-	B	-
HCM 95th %tile Q(veh)	1.1	-	-	0.5	-

Intersection												
Int Delay, s/veh	3.1											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↕			↕			↕			↕		
Traffic Vol, veh/h	6	5	1	33	5	22	0	139	66	30	87	9
Future Vol, veh/h	6	5	1	33	5	22	0	139	66	30	87	9
Conflicting Peds, #/hr	3	0	5	5	0	3	12	0	32	32	0	12
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	50	42	25	75	63	92	92	77	83	75	81	56
Heavy Vehicles, %	0	0	0	6	0	0	0	12	3	3	20	0
Mvmt Flow	12	12	4	44	8	24	0	181	80	40	107	16

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	446	499	132	460	467	255	135	0	0	292	0	0
Stage 1	207	207	-	252	252	-	-	-	-	-	-	-
Stage 2	239	292	-	208	215	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.16	6.5	6.2	4.1	-	-	4.13	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.16	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.16	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.554	4	3.3	2.2	-	-	2.227	-	-
Pot Cap-1 Maneuver	526	476	923	505	496	789	1462	-	-	1264	-	-
Stage 1	800	734	-	743	702	-	-	-	-	-	-	-
Stage 2	769	675	-	785	729	-	-	-	-	-	-	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	483	440	908	463	459	762	1455	-	-	1260	-	-
Mov Cap-2 Maneuver	483	440	-	463	459	-	-	-	-	-	-	-
Stage 1	791	701	-	720	680	-	-	-	-	-	-	-
Stage 2	734	654	-	739	696	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	12.7	13	0	1.9
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1455	-	-	496	528	1260	-	-
HCM Lane V/C Ratio	-	-	-	0.056	0.144	0.032	-	-
HCM Control Delay (s)	0	-	-	12.7	13	8	0	-
HCM Lane LOS	A	-	-	B	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.2	0.5	0.1	-	-

Intersection: 1: Dunsmuir Rd & Esquimalt Rd

Movement	EB	WB	WB	NB
Directions Served	TR	L	T	R
Maximum Queue (m)	9.1	20.3	22.8	26.3
Average Queue (m)	0.5	10.7	1.5	12.5
95th Queue (m)	4.7	17.2	11.8	21.1
Link Distance (m)	243.6		215.2	74.2
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)		20.0		
Storage Blk Time (%)		0	0	
Queuing Penalty (veh)		3	0	

Intersection: 2: Head St & Dunsmuir Rd

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	10.5	24.5	6.4	15.6
Average Queue (m)	5.9	10.8	0.3	3.1
95th Queue (m)	13.0	18.9	3.1	11.3
Link Distance (m)	124.6	307.5	107.1	117.2
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Zone Summary

Zone wide Queuing Penalty: 3

APPENDIX C: 2017 POST DEVELOPMENT CONDITIONS

Intersection

Int Delay, s/veh 1.8




Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑		↑	↑		↑
Traffic Vol, veh/h	695	11	99	679	0	104
Future Vol, veh/h	695	11	99	679	0	104
Conflicting Peds, #/hr	0	21	21	0	0	2
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	Stop
Storage Length	-	-	200	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	93	63	78	83	92	93
Heavy Vehicles, %	5	0	2	5	0	3
Mvmt Flow	747	17	127	818	0	112

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	786	0	-	779
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	4.12	-	-	6.23
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	2.218	-	-	3.327
Pot Cap-1 Maneuver	-	-	833	-	0	394
Stage 1	-	-	-	-	0	-
Stage 2	-	-	-	-	0	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	831	-	-	385
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1.4	18.1
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	385	-	-	831	-
HCM Lane V/C Ratio	0.29	-	-	0.153	-
HCM Control Delay (s)	18.1	-	-	10.1	-
HCM Lane LOS	C	-	-	B	-
HCM 95th %tile Q(veh)	1.2	-	-	0.5	-

Int Delay, s/veh	0.7
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Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	100	3	10	100	3	4
Future Vol, veh/h	100	3	10	100	3	4
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	80	85	92	80	80
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	109	4	12	109	4	5

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	112	0	243	111
Stage 1	-	-	-	-	111	-
Stage 2	-	-	-	-	132	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1478	-	745	942
Stage 1	-	-	-	-	914	-
Stage 2	-	-	-	-	894	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1478	-	738	942
Mov Cap-2 Maneuver	-	-	-	-	738	-
Stage 1	-	-	-	-	914	-
Stage 2	-	-	-	-	886	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.7	9.3
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	842	-	-	1478	-
HCM Lane V/C Ratio	0.01	-	-	0.008	-
HCM Control Delay (s)	9.3	-	-	7.5	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0	-	-	0	-

Intersection: 1: Dunsmuir Rd & Esquimalt Rd

Movement	EB	WB	WB	NB
Directions Served	TR	L	T	R
Maximum Queue (m)	10.6	22.2	45.2	28.9
Average Queue (m)	0.5	11.1	2.4	13.3
95th Queue (m)	4.8	18.5	23.2	23.5
Link Distance (m)	243.6		254.8	74.2
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)		20.0		
Storage Blk Time (%)		1	0	
Queuing Penalty (veh)		8	0	

Intersection: 2: Head St & Dunsmuir Rd

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	9.2	26.1	5.5	18.3
Average Queue (m)	5.2	9.8	0.4	4.1
95th Queue (m)	12.5	18.6	3.3	13.3
Link Distance (m)	124.6	305.6	107.1	117.2
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 10: Site Access & Dunsmuir Rd

Movement	WB	NB
Directions Served	LT	LR
Maximum Queue (m)	7.4	9.2
Average Queue (m)	0.4	2.4
95th Queue (m)	3.3	9.0
Link Distance (m)	67.5	72.5
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 8