



THE MARIN MULTI-FAMILY DEVELOPMENT

Traffic Impact Assessment



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1.0 INTRODUCTION

Watt Consulting Group Ltd. was retained by Boardwalk Rental Communities c/o dHKarchitects to conduct a Traffic Impact Assessment (TIA) for the proposed The Marin multi-family development located at Carlisle Avenue/Lyall Street/Fraser Street in the Esquimalt Town Centre area. The opening day for the development is expected to be in 2024.

This report analyses the existing and post development traffic conditions for both the short and long-term horizons. The report also reviews the site access, as well as pedestrian, cyclist, and transit modes of transportation for the site.

1.1 STUDY AREA

The proposed development site is located at Carlisle Avenue/Lyall Street/Fraser Street in the Township of Esquimalt, BC. The study area includes the site access and the following intersections: Admirals Road/ Esquimalt Road, Esquimalt Road/ Fraser Street, Fraser Street/ Carlisle Avenue, Fraser Street/ Lyall Street, and Admirals/ Lyall Street. See **Figure 1** for the site location. **Figure 2** shows the study intersections and site access.



Figure 1: Site Location

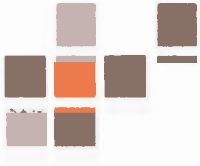


Figure 2: Site Access and Study Intersections

2.0 EXISTING CONDITIONS

2.1 LAND USE

The proposed site is currently twelve detached single-family homes and designated as medium density residential in the OCP. In the surrounding area, there is a mix of land uses including single family residential, multi-family residential, commercial, and institutional.



2.2 ROAD NETWORK

Esquimalt Road is an east/west major road with a 50km/h speed limit. East of the Admirals intersection, the road has a 3-lane cross-section with the centre lane being a two way left turn lane. Bike lanes and sidewalks are provided east of the Admirals intersection. West of the Admirals intersection, the road has a 4-lane cross-section with no bike lanes, but sidewalks on both sides of the road. Esquimalt Road serves as the main route between downtown Victoria and Canadian Forces Base Esquimalt.

Admirals Road is a north/south major road with a 50km/h speed limit. North of the Esquimalt Road intersection the road has a 3-lane cross-section with a two way left turn lane in the centre; south of the intersection the road becomes a two lane cross section. Sidewalk and bike lanes are provided on both sides of the road.

Lyll Street is a 2-lane east/west residential collector with a 50km/h speed limit and parallel parking on either side of the road. Sidewalks are available on both sides of the road. No separate bicycle facilities are provided on Lyall Street.

Fraser Street is a 2-lane north/south, residential collector with a 50km/h speed limit. Sidewalks are available on both sides of the road. No bicycle facilities are provided on Fraser Street.

Carlisle Avenue is a 2-lane east/west, 50km/h local road and parallel parking on the south side of the road. Sidewalks are provided on both sides of the road.

The Esquimalt Road/ Admirals Road signalized intersection that is slated for improvements in the near future. Northbound a left turn lane will be added and southbound the existing left/through will be converted to a dedicated left turn lane and the existing right turn lane will be converted to a shared through/right. Westbound one of the through lanes will be converted to a right lane and eastbound one of the through lanes will be converted to a left turn lane. The intersection will better accommodate cyclists. As part of the re-design of the Esquimalt Road/ Admirals Road signal the

signal phasing will be changed to split phasing for all approached. This means that each direction of traffic will proceed on a green while all other directions are stopped. The Sychro modelling reflects this updated intersection geometry and signal phasing. See **Figure 3** for the proposed changes to the intersection.

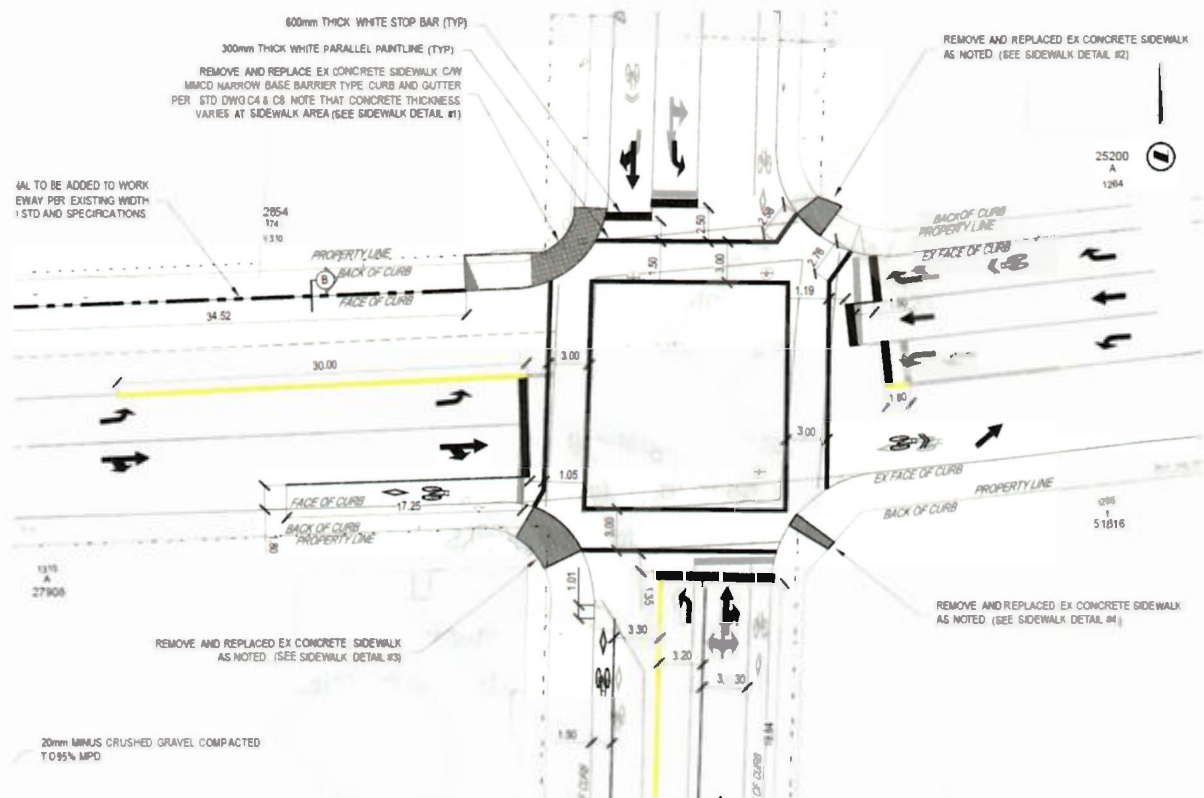
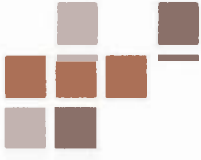


Figure 3: Future Esquimalt Road / Admirals Road Intersection Geometry

Other intersections in the study area have the following traffic control:

- Lyall Street/ Admirals Road – All Way Stop Control;
- Lyall Street/ Fraser Street –All Way Stop Control;
- Fraser Street/ Esquimalt Road – North Stop Control;
- Fraser Street/ Carlisle Avenue – East Stop Control; and
- Fraser Street/ Site Access – East Stop Control.



2.3 TRAFFIC VOLUMES

Traffic counts were undertaken during AM and PM peak hours on March 11, 2021 at the Fraser Street/ Lyall Street and Fraser Street/ Carlisle Avenue intersections. The remaining intersections we counted as part of a city-wide network analysis WATT Consulting conducted in 2018 for the Township. The peak hours occurred between 8:00 - 9:00AM and 4:00- 5:00PM.

At the time of the count, the province of BC was under a provincial health order to have individuals limit contact with others outside of their immediate family (Phase 3 of the restart plan). Travel habits have continued to adjust back to more 'normal levels' as time has progressed; however, the 2021 count volumes were adjusted by a COVID-19 factor. The factor was obtained via comparisons to the permanent MOTI traffic counter located on West Burnside Road, 0.5km East of Route 1, Colwood as this is the nearest counter (8km away). The most recent MOTI traffic data available is December 2020 (during Phase 3 of the restart plan). The December 2020 volume was compared to the December 2019 volumes (pre-COVID pandemic). After adjusting for background traffic growth, a COVID-19 factor of 1.2 (20% increase) has been applied to count volumes collected in 2021 to reflect 'non-COVID conditions'. See **Figure 4** for the 2020 and 2019 traffic volumes from the count station.

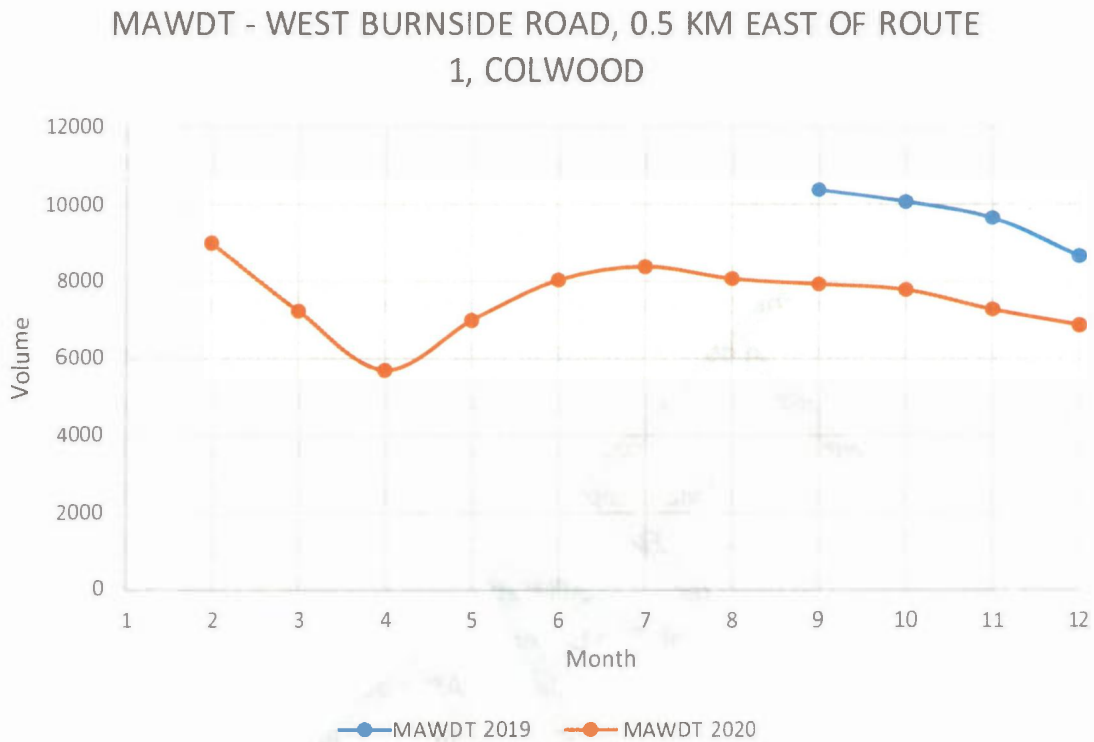


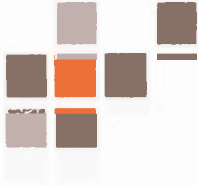
Figure 4: 2020 to 2019 COVID-19 Factor Volume Comparison

A linear background traffic growth rate of 2% has been applied to the counts to adjust them to the opening day and the 10-year horizon. This rate is as per a memorandum by WATT Consulting to the Township of Esquimalt dated April 9, 2018. The memorandum has been included in Appendix B for reference.

2.4 TRAFFIC MODELING –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 10) has been used since it has the 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 (in vehicles, for 7.5m vehicle).

The delays and type of traffic control are used to determine the level of service. The level of services are broken down into six letter grades with LOS A being excellent operations and LOS F being unstable/ failure operations. LOS C is generally considered to be an acceptable LOS by most municipalities. LOS 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 2024 BACKGROUND TRAFFIC CONDITIONS

Background traffic conditions were analyzed at the key intersections within the study area for the opening year of the development (2024). See **Figure 5** and **Table 1** for AM/ PM volume and LOS results.

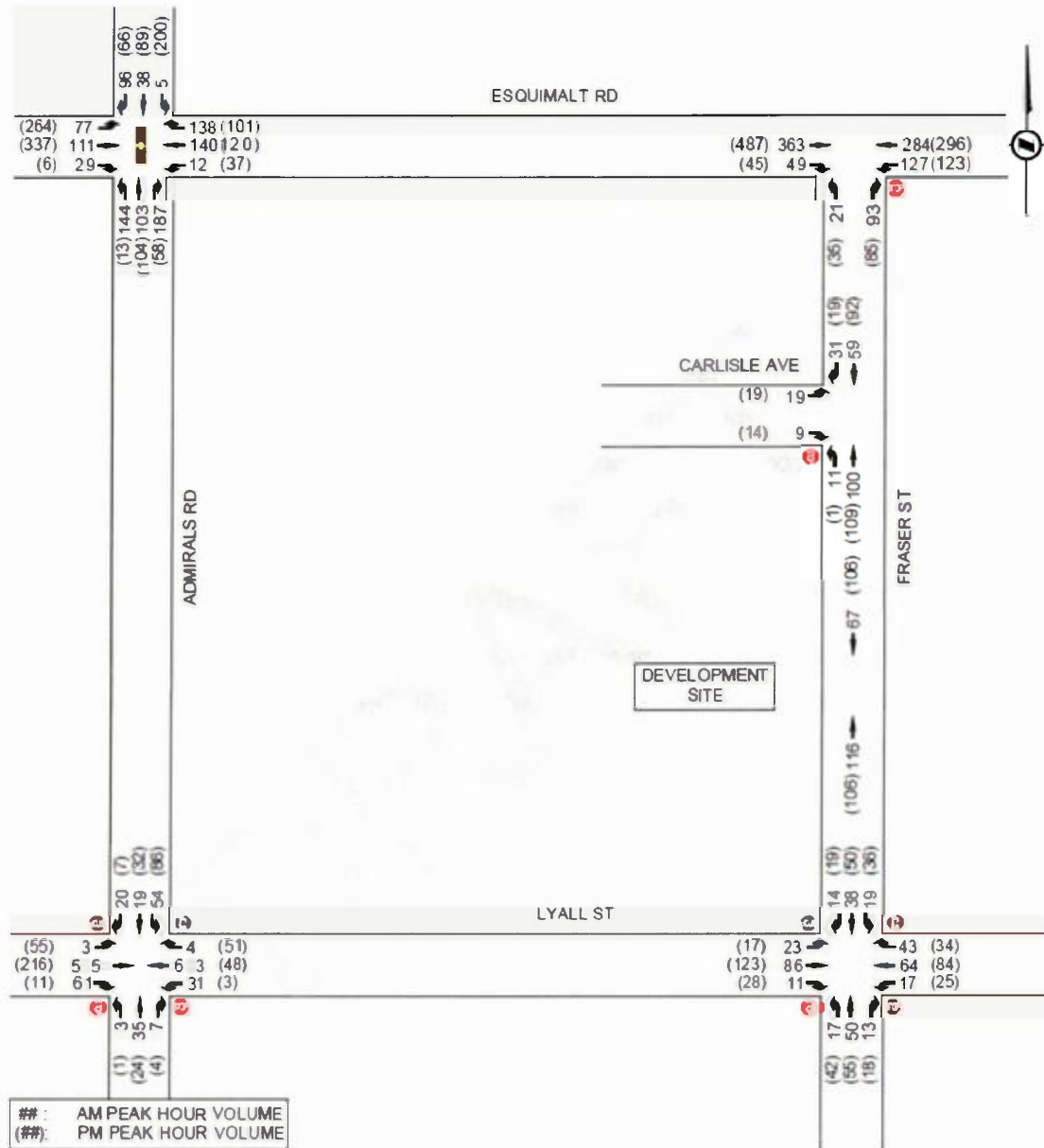


Figure 5: Background 2024 AM / PM Peak Hour Volumes

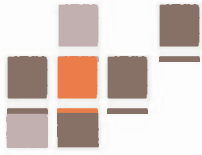


TABLE 1: 2024 BACKGROUND AM / PM PEAK HOUR CONDITIONS

Intersection	Movement	LOS		Delay (s)		95 th Queue (m)		Storage Length (m)
		AM	PM	AM	PM	AM	PM	
Esquimalt Rd / Admirals Rd	EBL	D	F	44	172	23	72	-
	EBT / R	D	E	54	71	37	94	-
	WBL	D	F	41	103	9	24	25
	WBT	D	D	48	46	37	46	-
	WBR	B	B	11	12	23	27	25
	NBL	D	D	41	41	42	19	20
	NBT / R	D	E	47	58	64	49	-
	SBL	D	F	41	300+	6	57	35
	SBT / R	D	D	36	46	30	60	-
Esquimalt Rd / Fraser St	EB	A	A	0	0	6	24	-
	WBL	A	C	10	10	18	21	18
	WBT	A	A	0	0	2	11	-
	NBL	C	C	20	24	9	15	9
	NBR	B	C	15	17	13	13	-
Lyll St / Admirals Rd	EB	A	B	9	13	13	26	-
	WB	A	A	8	9	16	12	-
	NB	A	A	8	9	14	13	-
	SB	A	A	9	10	17	23	-
Lyll St / Fraser St	EB	A	B	9	11	14	17	-
	WB	A	A	9	10	17	17	-
	NB	A	A	9	10	13	15	-
	SB	A	A	9	10	12	15	-
Fraser St / Carlisle Ave	EB	A	A	10	10	11	12	-
	NB	A	A	1	1	3	2	-
	SB	A	A	0	0	0	0	-



Development Access/ Fraser St	EB	-	-	-	-	-	-	-
	WB	-	-	-	-	-	-	-
	SB	-	-	-	-	-	-	-

The 95th percentile queue lengths were averaged from five SimTraffic Simulations.

Overall, all the movements at the intersections operate at an acceptable LOS with the exception of the Esquimalt Road/ Admirals Road intersection in the 2024 background condition. The Esquimalt Road/ Admirals Road movements operates at a LOS D or better in the AM; however, in the PM several movements operate at a LOS E / F. Movements operating at a LOS E include: eastbound through/ right lane, and the northbound through/ right lane. Movements operating at a LOS F include: eastbound left, westbound left, and the southbound left.

With the changes to the Esquimalt Road/ Admirals Road proposed, the southbound left turn lane is proposed to be 35m; however, the 95th percentile queue length for that movement is 57m in the PM. The proposed northbound left turn lane will be 20m; however, the 95th percentile queuing is 42m in the AM peak hour. The westbound left and right turn 95th percentile queues will be at or slightly (2m) over the provided storage in the PM peak hour. Therefore the multiple movements at the intersection will have queues that exceed the left turn storage for one hour per day. It is not known why the split phasing for each approach was chosen for this intersection; however, it may be due to the potential for overlapping left turn truck movements for opposing directions. The split phasing proposed for the intersection is creating the poor operations and queue lengths that exceed the storage.

The Esquimalt Road/ Fraser Street intersection operates at a LOS C or better for the AM and PM peak. The westbound 95th percentile queue is 21m which exceeds the existing storage of 18m by 3m in the PM peak hour and in the AM the queue equals the storage length. However, there is space to storage in the left turn, but it requires vehicles to store over the painted gore area/ taper.



All other study intersections operate at a LOS B or better and have no queueing issues in the 2024 background condition.

3.0 POST DEVELOPMENT

3.1 PROPOSED LANE USE

The proposed land use for the development is two 5-storey multifamily apartment buildings resulting in 210 units. See **Figure 6** for the site plan. It is expected that this development will attract renters from CFB Esquimalt.

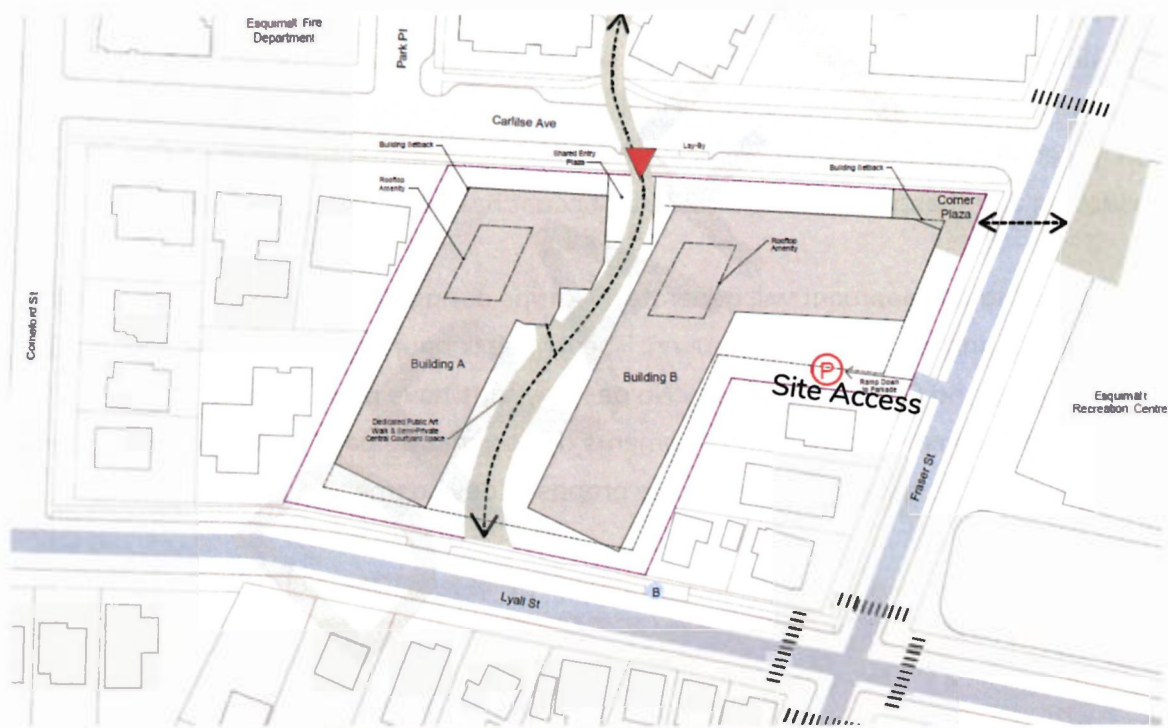


Figure 6: Site Plan and Access Location

3.2 SITE ACCESS

The proposed development has one proposed full movement access point onto Fraser Street approximately 45m south of Carlisle Avenue. In addition to the vehicle access on Fraser Street there are two pedestrian access points on Lyall Street and Carlisle Avenue respectively with a pedestrian pathway through the middle of the site. There will also be a pedestrian access to Building B at the Carlisle Avenue/ Fraser Avenue intersection.



3.3 TRIP GENERATION

Site trips were estimated from the Institute of Transportation Engineers' (ITE) Trip Generation Manual (10th 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 40 years.

The trip generation is based on a prior version of the development concept which had 231 units proposed, whereas the current version has 210 units. This is a reduction of 21 units and results in 10 fewer vehicles in the PM peak hour (6 inbound, 4 outbound). The ten fewer vehicles distributed on the network has no measurable impact on the modelling and therefore the higher 231 unit count has been utilized for the analysis.

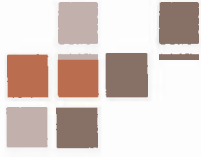
The proposed development will generate 102 trips during the PM peak hour of travel: 62 trips inbound and 40 trips outbound. The AM peak hour results in 84 trips total, 22 trips inbound and 62 trips outbound. No pass-by trips have been assumed for this development since residential developments don't generate pass-by trips. **Tables 2 and 3** summarizes the trip generation for the proposed development.

TABLE 2: PEAK HOUR TRIP GENERATION RATES

ITE Land Use		Weekday AM			Weekday PM		
Code	Description	Rate	In	Out	Rate	In	Out
221	Multi-Family Housing	0.36	26%	74%	0.44	61%	39%

TABLE 3: ESTIMATED DEVELOPMENT TRIPS

Description	Units	Weekday AM			Weekday PM		
		In	Out	Total	In	Out	Total
Multi-family	231	22	62	84	62	40	102



3.4 TRIP ASSIGNMENT

The trip assignment was based on existing trip distributions and local destinations for traffic in the area. The main two destinations are east of the site on Esquimalt Road towards the central business district of Downtown Victoria and west of the site on Lyall Street towards CFB Esquimalt. Admirals Road is the main route to access west shore communities. The trip assignment is shown in **Figure 7** which is based on the following percentages:

- Inbound
 - o From the west (Lyall Street via northbound on Fraser Street) – 20%;
 - o From the north (Admirals Road via eastbound on Esquimalt Road and southbound on Fraser Street) – 10%;
 - o From the east (Esquimalt Road via southbound on Fraser Street) – 60%;
 - o From the east (Lyall Street via northbound on Fraser Street) – 10%.
- Outbound
 - o To the west (Lyall Street via southbound on Fraser Street) – 20%;
 - o To the north (Admirals Road via northbound on Fraser Street and westbound on Esquimalt Road) – 10%;
 - o To the east (Esquimalt Road via northbound on Fraser Street) – 60%;
 - o To the east (Lyall Street via southbound on Fraser Street) – 10%.

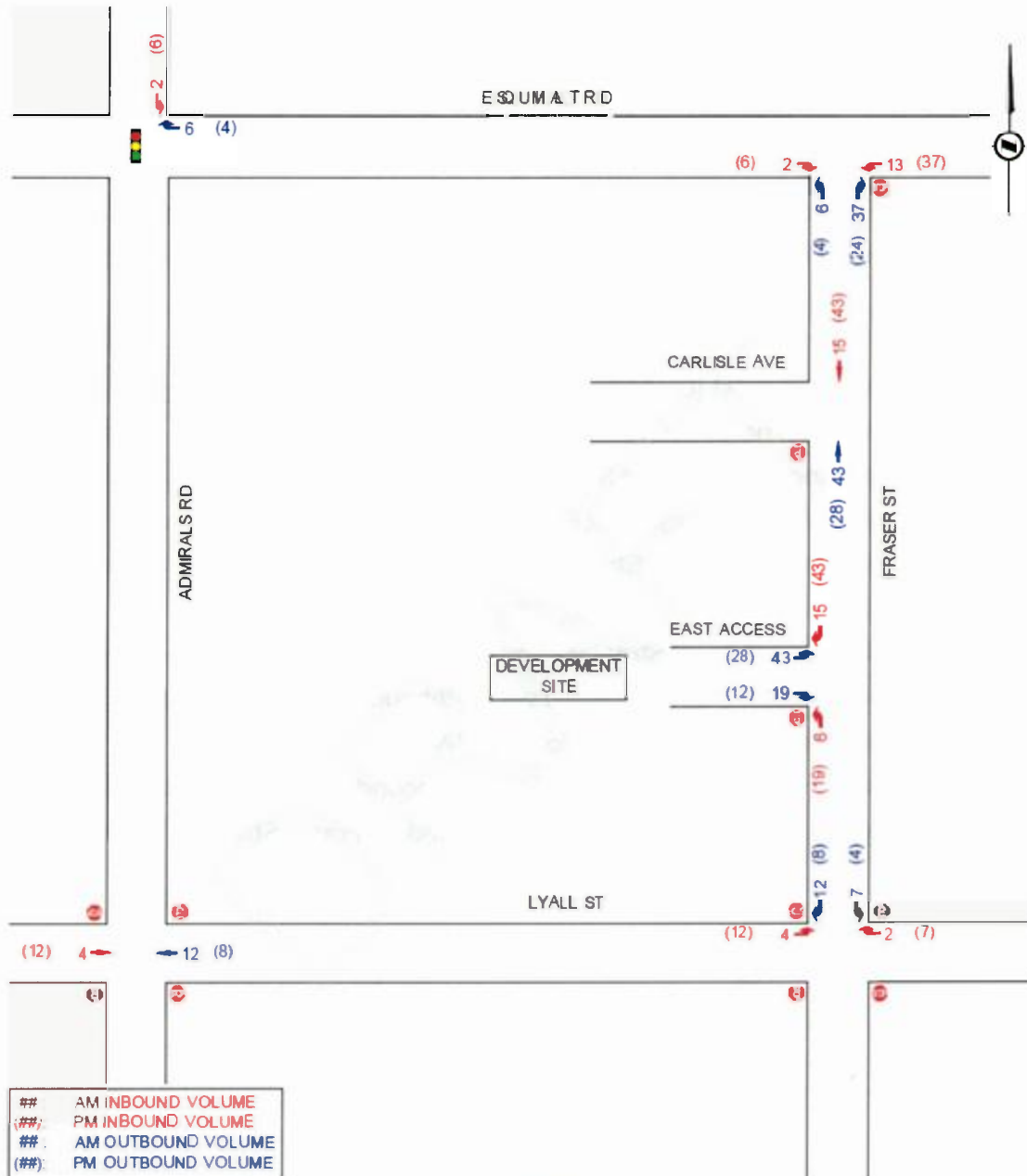
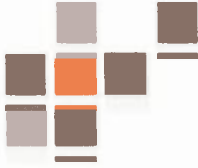


Figure 7: Proposed Development Trip Assignment



3.5 2024 POST DEVELOPMENT ANALYSIS RESULTS

The 2024 post development conditions were analyzed during the AM/ PM peak hour within the study area. See **Figure 8** and **Table 4** for the 2024 post development traffic volumes and conditions during the AM/ PM peak hour.

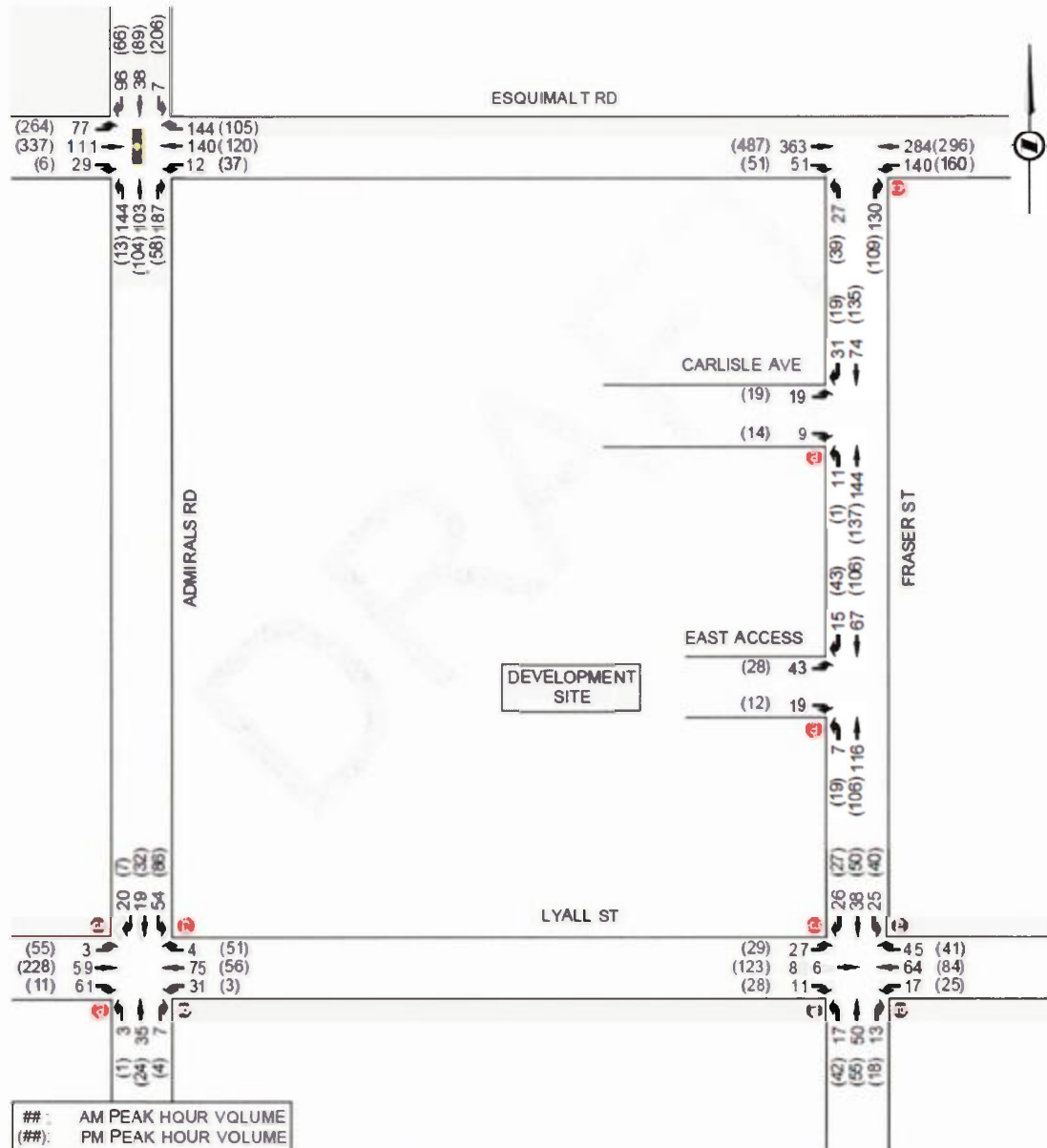
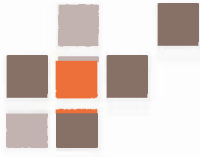


Figure 8: Post Development 2024 AM/ PM Peak Hour Traffic



TABLE 4: 2024 POST DEVELOPMENT AM/ PM POST DEVELOPMENT CONDITIONS

Intersection	Movement	LOS		Delay (s)		95 th Queue (m)		Queue Bay Length (m)
		AM	PM	AM	PM	AM	PM	
Esquimalt Rd / Admirals Rd	EBL	D	F	45	172	25	73	-
	EBT / R	D	E	54	71	40	98	-
	WBL	D	F	41	103	7	25	25
	WBT	D	D	48	46	44	46	-
	WBR	B	B	11	12	32	27	25
	NBL	D	D	41	41	39	14	20
	NBT / R	D	E	47	58	50	51	-
	SBL	D	F	46	300+	8	57	35
	SBT / R	D	D	36	46	31	69	-
Esquimalt Rd / Fraser St	EB	A	A	0	0	5	28	-
	WBL	A	B	10	11	18	23	18
	WBT	A	A	0	0	13	16	-
	NBL	C	D	21	28	10	13	9
	NBR	C	C	16	19	14	14	-
Lyll St / Admirals Rd	EB	A	B	10	14	16	25	-
	WB	A	A	9	9	17	13	-
	NB	A	A	9	9	15	13	-
	SB	A	A	10	10	17	23	-
Lyll St / Fraser St	EB	A	B	9	11	15	17	-
	WB	A	B	9	10	18	19	-
	NB	A	B	9	10	11	15	-
	SB	A	A	9	10	15	16	-
Fraser St / Carlisle Ave	EB	B	B	10	10	12	13	-
	NB	A	A	1	0	3	2	-
	SB	A	A	0	0	0	2	-



Development	EB	B	B	10	11	16	15	-
Access/	WB	A	A	0	1	2	5	-
Fraser St	SB	A	A	0	0	0	0	-

The 95th percentile queue lengths were averaged from multiple SimTraffic Simulations.

The addition of the development traffic does not impact the surrounding network or study intersections. All movements at the intersections operate at the same level as in the 2024 background condition with the exception of the northbound left turn at Esquimalt Road/ Fraser Street which drops from a LOS C (24 sec delay) to LOS D (28 sec delay) in the PM peak hour only. LOS D is acceptable for a minor side street such as Fraser Street. The westbound left turn queue will increase by 2m in the PM peak hour. This movement is exceeding the storage length in the PM with out the development. The additional 2m is minimal.

The access for the development on Fraser Street operates at a LOS B or better during the AM and PM peak. Northbound and southbound both operate at a LOS A. A review of left turn warrants for the site access determined that a separate left turn lane on Fraser Street is not required due to the development.

4.0 LONG TERM CONDITIONS

4.1 2034 BACKGROUND TRAFFIC ANALYSIS RESULTS

The 2034 background traffic conditions were analyzed during the AM/ PM peak hour within the study area. This is ten years after opening day of the proposed development. See **Figure 9** and **Table 5** for the 2034 background traffic conditions during the AM/ PM peak hours.

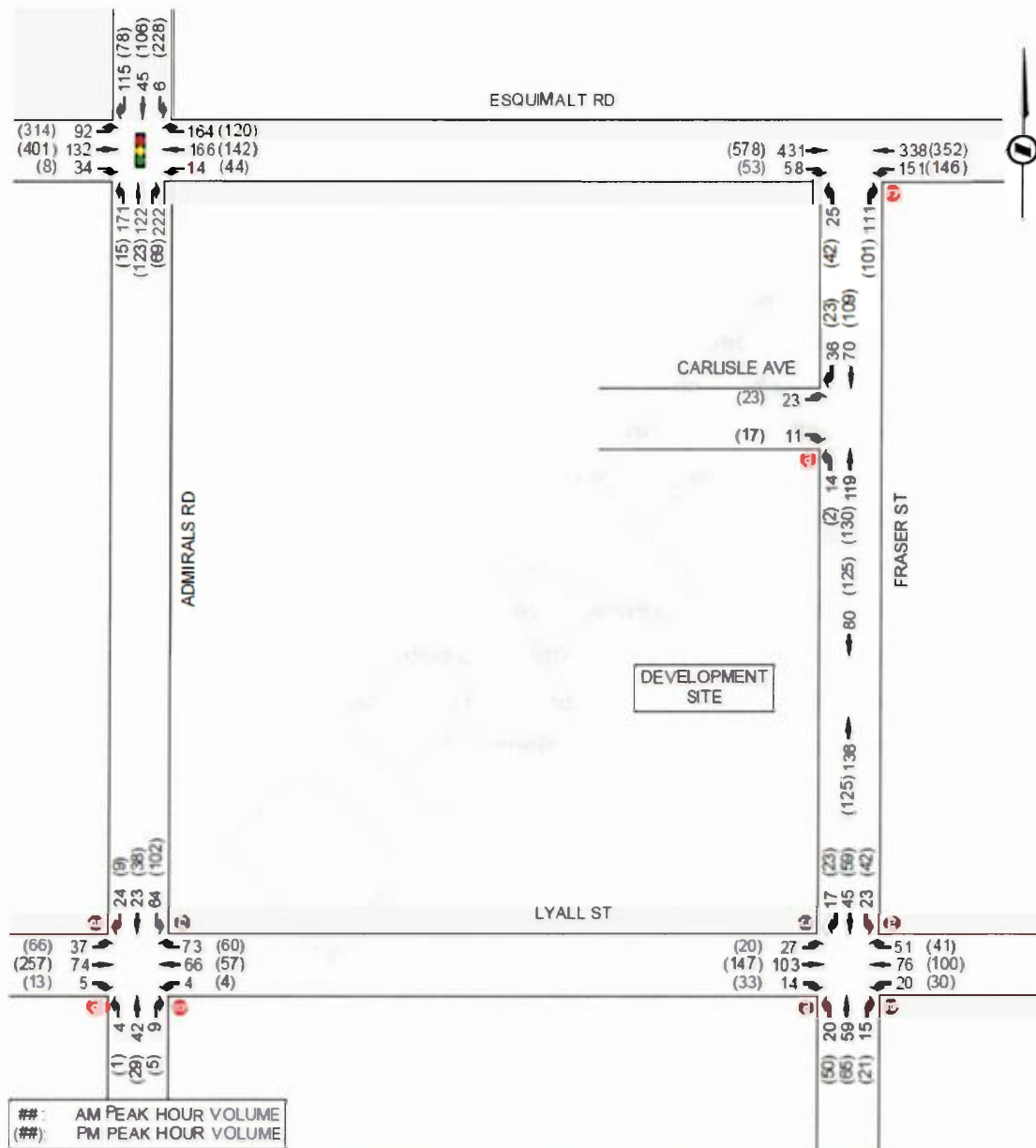


Figure 9: Background 2034 AM/ PM Peak Hour Volumes

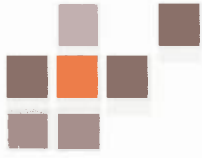


TABLE 5: 2034 BACKGROUND AM/ PM PEAK HOUR CONDITIONS

Intersection	Movement	LOS		Delay (s)		95 th Queue (m)		Queue Bay Length (m)
		AM	PM	AM	PM	AM	PM	
Esquimalt Rd / Admirals Rd	EBL	D	F	51	303	30	83	-
	EBT / R	E	F	71	143	51	113	-
	WBL	D	F	44	144	12	28	25
	WBT	D	D	53	48	48	54	-
	WBR	B	B	10	11	33	37	25
	NBL	E	D	56	41	51	21	20
	NBT/R	F	E	97	66	84	64	-
	SBL	D	F	45	1696	6	59	35
Esquimalt Rd / Fraser St	SBT/R	D	E	43	58	35	86	-
	EB	A	A	0	0	7	34	-
	WBL	C	B	11	11	20	26	18
	WBT	A	A	0	0	4	25	-
	NBL	C	D	25	33	9	15	9
Lyll St / Admirals Rd	NBR	B	C	18	22	15	17	-
	EB	A	C	9	17	16	27	-
	WB	A	A	9	10	17	15	-
	NB	A	A	9	10	15	14	-
Lyll St/ Fraser St	SB	A	A	10	12	17	26	-
	EB	A	B	9	13	15	18	-
	WB	A	B	9	11	17	20	-
	NB	A	B	9	11	13	18	-
Fraser St/ Carlisle Ave	SB	A	B	9	11	13	18	-
	EB	B	B	10	10	12	12	-
	NB	A	A	1	0	5	2	-
	SB	A	A	0	0	0	1	-



Development	EB	-	-	-	-	-	-	-
Access /	WB	-	-	-	-	-	-	-
Fraser St	SB	-	-	-	-	-	-	-

The 95th percentile queue lengths were averaged from multiple SimTraffic Simulations.

The Esquimalt Road/ Admirals Road intersection is anticipated to operate at a LOS E / F in the AM and LOS F during the PM peak with the additional 2% per year traffic and the split phasing operations. In the AM, the eastbound through/ right and northbound left will operate at a LOS E and the northbound through/ right will operate at a LOS F. In the PM the majority of movements will operate at a LOS E/F including the eastbound movements, westbound left, northbound through/right and southbound movements. The westbound left turn queues exceed the provided storage by 3m and the westbound right exceeds the provided storage by 12m in the PM peak hour. The northbound left turn queues exceed the provided storage in the AM (by 31m) and the PM (by 1m). The southbound left queues will exceed the provided storage by 24m in the PM peak hour. The northbound and southbound queues will exceed the storage by three to four vehicles.

Standard phasing provides better long term operations than the proposed split phasing. If the split phasing, at Esquimalt Road/ Admirals Road was removed and modelled with standard phasing with protected/permitted left turns on each approach the intersection LOS would improve from a LOS F to LOS D or better in the AM and PM peak hour. This change in phasing should be reviewed by civil (to check truck movements) and electrical (as wiring changes may be required).

The Esquimalt Road/ Fraser Street intersection operates at a LOS C / D or better for the AM and PM peak. However, the westbound left 95th percentile queues exceed storage by 8m (or approximately 1 vehicle). This may impact westbound through traffic would be stopped behind left turning traffic. Although the existing storage length is 18m there is a total of 30m to the end of the median. Left turning vehicles can be accommodated in the future if vehicles utilize the gore area. If further storage is required after 2034 the median could be adjusted. See **Figure 10** for available storage.



Figure 10: Westbound Left Turn Storage at Esquimalt Road / Fraser Street

All other study intersections operate at a LOS C or better condition.

4.2 2034 POST DEVELOPMENT TRAFFIC CONDITIONS

The 2034 post development traffic conditions were analyzed during the AM / PM peak hour within the study area. See **Figure 11** and **Table 6** for the 2034 post development traffic conditions during the AM/ PM peak hours.

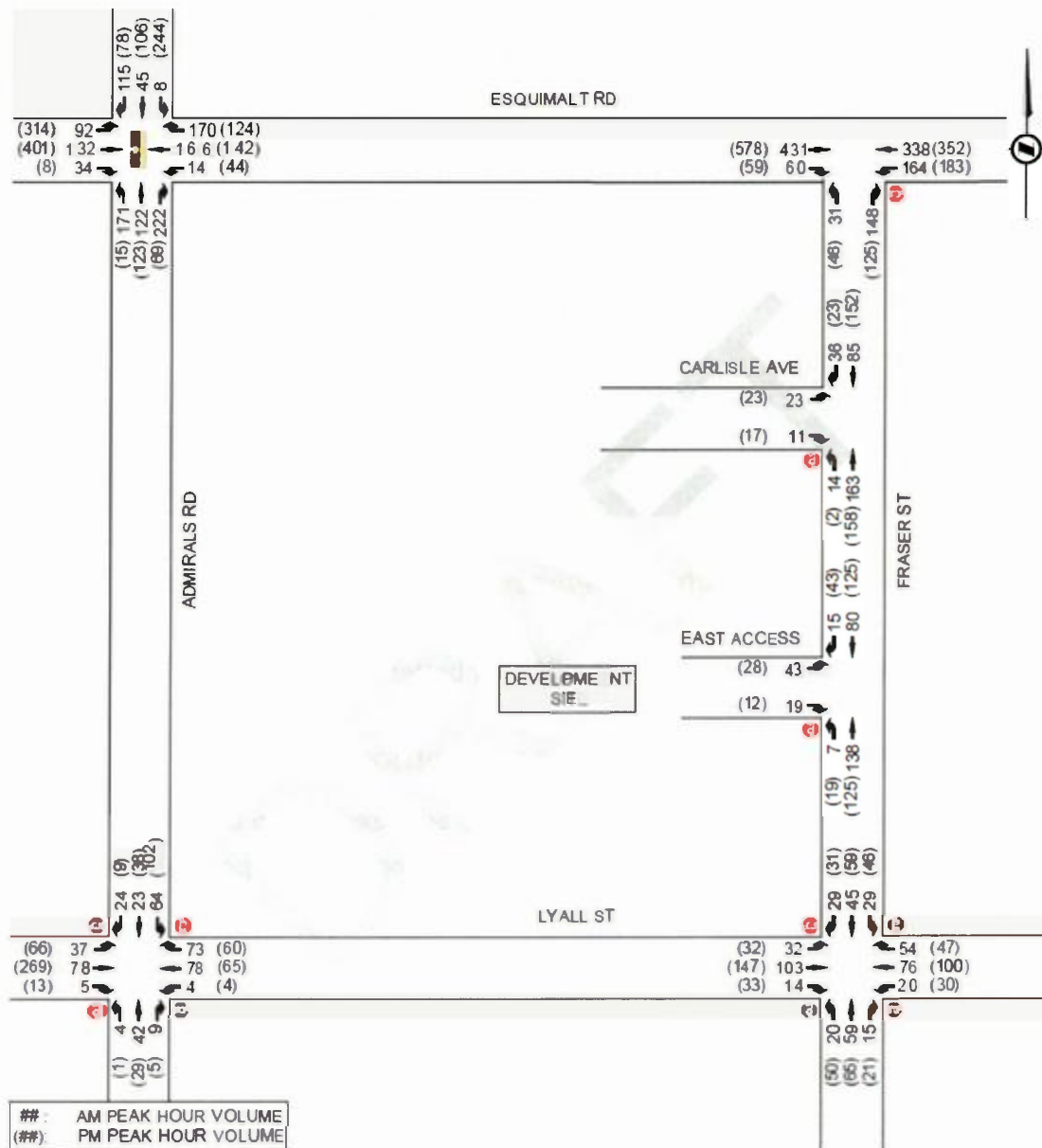


Figure 11: Post Development 2034 AM/ PM Peak Hour Volumes

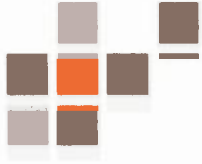


TABLE 6: 2034 POST DEVELOPMENT AM / PM CONDITIONS

Intersection	Movement	LOS		Delay (s)		95 th Queue (m)		Queue Bay Length (m)
		AM	PM	AM	PM	AM	PM	
Esquimalt Rd / Admirals Rd	EBL	D	F	51	286	30	86	-
	EBT/R	E	F	71	133	47	111	-
	WBL	D	F	44	147	15	29	25
	WBT	D	D	53	51	50	57	-
	WBR	B	B	10	12	35	39	25
	NBL	E	D	56	40	52	17	20
	NBT/R	F	E	97	63	72	59	-
	SBL	D	F	51	1790	8	64	35
Esquimalt Rd / Fraser St	SBT/R	D	E	43	56	33	103	-
	EB	A	A	0	0	12	25	-
	WBL	B	B	11	12	22	28	18
	WBT	A	A	0	0	19	43	-
	NBL	D	E	27	41	13	18	9
Lyll St/ Admirals Rd	NBR	C	C	20	24	15	18	-
	EB	A	C	9	19	17	30	-
	WB	A	A	9	10	18	15	-
	NB	A	A	9	10	15	14	-
Lyll St/ Fraser St	SB	A	A	10	12	17	26	-
	EB	A	B	10	13	14	20	-
	WB	A	B	10	11	19	20	-
	NB	A	B	9	11	13	16	-
Fraser St/ Carlisle Ave	SB	A	B	9	11	15	18	-
	EB	B	B	11	11	12	12	-
	NB	A	A	1	0	7	5	-
	SB	A	A	0	0	1	0	-



Development	EB	B	B	8	11	15	14	-
Access /	WB	A	A	0	1	2	5	-
Fraser St	SB	A	A	11	0	0	1	-

The 95th percentile queue lengths were averaged from multiple SimTraffic Simulations.

With the addition of the development traffic in 2034, the LOS for all movements at the study intersections remain the same to the 2034 background condition except for the Esquimalt Road/ Fraser Street intersection for which the LOS decreases slightly in both the AM and PM periods.

The northbound movement at Esquimalt Road/ Fraser Street drops one LOS in both the AM and PM peak hours. In the AM the northbound movements drops to a LOS D (25 to 27 sec delay) and to LOSE (33 to 41 sec delay) in the PM peak. Although the northbound movement drops to an LOS E this is for only one hour in the PM peak hour in 14 years and is expected for a side street onto an arterial roadway. The addition of the development traffic adds an additional 2m to the westbound left turn which already will exceed the provided storage.

4.2.1 ESQUIMALT ROAD/ ADMIRALS ROAD IMPROVEMENTS

As noted in the opening day and long term background conditions the split phasing proposed for Esquimalt Road/ Admirals Road creates poor operations without the development. Removing the split phasing and providing protected-permission left turn phases for each approach with the development traffic will allow the intersection to operate long term at a LOS D or better. **Table 7** outlines the PM peak hour long term post development operations.



TABLE 7: PM PEAK HOUR POST DEVELOPMENT OPERATIONS WITH IMPROVEMENTS

Intersection	Movement	LOS
Esquimalt Rd/ Admirals Rd	EBL	C
	EBT / R	D
	WBL	B
	WBT	D
	WBR	A
	NBL	B
	NBT/R	D
	SBL	D
	SBT / R	C

In order to remove the split phasing geometric/ pavement marking adjustments would need to be implemented to eliminate overlapping left turn truck movements for opposing directions.

5.0 SAFETY AND GEOMETRICS

5.1 SIGHT DISTANCE

The Esquimalt Road/ Fraser Street intersection is approximately 160m north of the access; whereas the Lyall Street/ Fraser Street intersection is 60m south. **Table 8** outlines the sight distances from the proposed access.



TABLE 8: SIGHT DISTANCES AT ACCESS

Access	Movement	Vehicle Speed	Required Sight Distance (m)	Measured Sight Distance (m)	Achieved
Driveway	Right Turn looking left	50 km/h	95	160	Yes
	Left Turn Looking left and looking right	50 km/h	105	60*	No*

*Sight distance is limited by the intersection of Lyall Street/Fraser Street

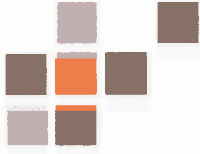
The sight distances for turning right and for turning left, looking to the left are met for a 50km/h road. The sight distance for a left turn, looking to the right is not reached looking right for a 50km/h road due to the Lyall Street/ Fraser Street intersection. Since the Lyall Street/ Fraser Street intersection is an all-way stop all traffic from this intersection, heading north will not be travelling at 50km/h at 60m from the access. It is assumed that vehicles will be at 20 to 25km/h to the south, as well drivers exiting the site will be able to see a vehicle as it leaves the all-way stop. Based on a 25km/h speed the turning sight distance (53m) is met.

Therefore, there are no sight distance issues at the proposed driveway.

6.0 OTHER MODES OF TRANSPORTATION

6.1 PEDESTRIANS

The site is well suited to accommodate pedestrians. The Esquimalt Town Center is immediately north of the site and has sidewalk access to Carlisle Avenue. There is a grocery store and service commercial options within easy walking distance (~250m). The sidewalk network is extensive as all roads surrounding the site have sidewalks on both sides.



6.2 BICYCLES

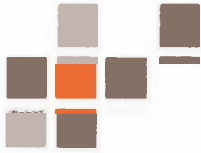
Esquimalt Road and Admirals Road both have bike lanes. Fraser Street is a low volume road without parallel parking and is suitable for cycling as well; although it does not have any bicycle facilities. No further roads in the area are designated as bike routes in the Township's OCP. However, the Township is currently undertaking an Active Transportation Plan which may identify additional future bicycle facilities within the surrounding area. The development is not required to provide any additional bicycle facilities along their frontages at this time.

6.3 TRANSIT

The area is well serviced by transit and bus stops for three routes are available on the adjacent roads. Route 25 – Maplewood/Admirals Walk has bus stops on Lyall Street and Fraser Street within 80m . This route has 40min headways during peak times. Two other routes are available with stops on Esquimalt Road within 150m. Route 15 – Esquimalt/UVic and Route 26 – Dockyard/UVic. Route 15 has 15min headway throughout the day and Route 26 has 20min headways throughout the day. These routes provide easy access to CFB Esquimalt, downtown Victoria, and UVic.

7.0 CONCLUSIONS

On opening day (2024), the proposed development does not add a significant amount of delay for any movement within the study area. All intersections operate at satisfactory LOS, with exception to the Esquimalt Road/ Admirals Road intersection which has poor movements with or without the development on opening day. The planned split phasing at Esquimalt Road/ Admirals Road contributes to these poor movements. It is not known why the split phasing was chosen for this intersection; however, it may be due to the potential for overlapping left turn truck movements for opposing directions. If the signal timing was converted to a more standard phasing with protected/permissive left turns, there would be major improvements at the Esquimalt Road/ Admirals Road intersection. Changes to the phasing at Esquimalt Road/ Admirals Road are not due to the development which has minimal impact on the intersection in the long term.



The westbound left turn 95th queue length at Esquimalt Road / Fraser Street exceeds the marked storage under existing conditions; however, there is space for left turners to store over the painted gore. This queue will grow slightly (2m) with the addition of the development. In the long term, with general growth of traffic on Esquimalt Road, the 95th percentile queue will extend the full 30m between Fraser Street and the centre median. In the long term, not due to the development, this median may need to be adjusted to accommodate the peak hour queues.

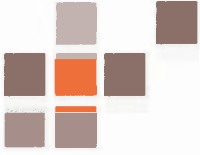
In the 2034 post development scenario, the LOS for all intersections remains the same to the 2034 background condition except for the Esquimalt Road / Fraser Street intersection for which drops an LOS in both the AM and PM periods for the northbound left movement. The PM northbound left will operate at a LOS E; however, the modeled queue length is short at only 18m. The poor operations, for one hour a day in the long term, is due to the high volume of traffic on Esquimalt Rd and the challenges finding a gap in traffic. No mitigation is required as this is a typical condition for side streets on a major arterial roadway. Also motorists have the option to use Admirals Road signal to turn onto Esquimalt Road.

All other intersections operate at an acceptable LOS in the long term. The development's access has appropriate sightlines and operates at a LOS B during the 2034 post development condition.

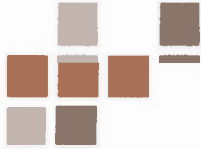
The pedestrian, and transit networks are comprehensive in the surrounding area. The cycling network is under review as part of the Township's Active Transportation Plan being undertaken at this time. The developer shall build pedestrian connections from the development to Fraser Street, Lyall Street, and Carlisle Avenue.

8.0 RECOMMENDATIONS

The Township of Esquimalt should consider not implementing split phasing at Esquimalt Road/ Admirals Road.



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: GROWTH RATE MEMO

MEMORANDUM

To: Will Wieler, ASCT, Engineering Manager
From: Michael Skene, Eng.L., ASCT
Our File#: 2348.B01
Project: Esquimalt Traffic Studies
Date: April 9, 2018
RE: Growth Rate for Horizon Years

1.0 INTRODUCTION

Watt Consulting Group was retained by the Township of Esquimalt to complete a series of traffic studies. This memorandum will propose an average annual growth rate to be used to determine the background traffic growth for the 5-, 10- and 15-year horizon transportation models.

2.0 PROPOSED GROWTH RATE

Link volumes were acquired from the City for several locations in the traffic network. Data was collected at these locations from 1997 – 2016. The link volumes were summed for 2014 and 2016 in the PM peak hour to acquire an average annual growth rate that is based on recent traffic trends. See **Table 1** for the traffic totals.

Table 1: Total Traffic Volume at Each Link

	PM Peak Hour	
	2014	2016
Sum of Traffic Volumes at each Link	51859	54305

Based on the traffic volumes above, an average growth rate of **2.4%** was calculated. Due to variation in traffic activity for the navy base and ship yard, the proposed average annual growth rate for the study network is **2%**.

3.0 CONCLUSION AND RECOMMENDATIONS

The proposed average annual growth rate for the analysis is 2%. This growth rate will be used to calculate background growth at a linear rate of 2% for the 5-, 10- and 15-year horizon transportation models.

Sincerely,

Watt Consulting Group

A handwritten signature in blue ink, appearing to be 'MS', written over a light blue rectangular background.

Michael Skene, Eng.L, AScT

A handwritten signature in black ink, appearing to be 'MD', written over a light blue rectangular background.

Mona Dahir, EIT

