1075 TILLICUM ROAD

Traffic Impact Assessment

PERMIT TO PRACTICE
WATT CONSULTING GROUP LTD.
SIGNATURE Nadine King
DATE 2022-03-24
PERMIT NUMBER 1001432
ENGINEERS & GEOSCIENTISTS
BRITISH COLUMBIA

Kristen Machina, P.Eng.
Transportation Engineer
Author

Andy Kading, P.Eng.
Transportation Engineer
Reviewer

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
A. J. KADING
53693

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Our File No: 3245.B01

WATT VICTORIA
302 – 740 Hillside Ave
Victoria, BC V8T 1Z4
250-388-9877

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1.0 INTRODUCTION

WATT Consulting Group is retained by Abstract Developments to prepare a Traffic Impact Assessment (TIA) for a proposed mixed-use development on the former Gorge Pointe Pub site at 1075 Tillicum Road in Esquimalt BC. The site is bound by Tillicum Road to the west, and residential buildings to the north, south, and east. The site location is illustrated in **Figure 1**.

1.1 The Site Today

The site today is occupied by a one storey commercial building and associated surface parking lot. The previous use on the site (the former Gorge Pointe Pub) closed in December 2021.

1.2 Proposed Development

A Zoning Bylaw Amendment application has been submitted to the Township of Esquimalt to permit the proposed redevelopment of the site. The site is currently zoned C-6A (Licensed Liquor Establishment – Professional Office). It is proposed to re-zone the site to CD (Comprehensive Development). The current development programme incorporates 100 residential units and 120 m^2 of commercial gross floor area (GFA).


GORGE ROAD WEST
SAANICH
ESQUIMALT
SITE
TILLICUM ROAD
CRAIGFLOWER ROAD
PROJECT: V:\Project Files\3245 - Gorge Point Pub Pedestrian Crossing\5 - Design\Figures\TIA\Fig01-SL.dwg

1.3 This Report

This report is provided as part of the Zoning Bylaw Amendment application being submitted to the Township of Esquimalt. It provides the following:

- An overview of the existing and evolving transportation context in the vicinity of the site, including vehicular, pedestrian, cycling, and transit facilities, and area travel characteristics
- An overview of the proposed development programme
- An assessment of the existing traffic activity patterns and volumes in the study area during the weekday afternoon peak period
- A comprehensive review of the vehicular traffic volume changes that may occur in the area in the future with the construction of other area development projects
- An assessment of the trip generation and assignment characteristics of the proposed development
- A traffic signal warrant review at the site driveway
- A review of vehicular traffic operations at intersections in the area under existing and future conditions (i.e. the 2022 and 2032 horizon years), including an assessment of the operational impacts of the proposed development

2.0 TRANSPORTATION CONTEXT

2.1 Road Network

2.1.1 Existing Road Network

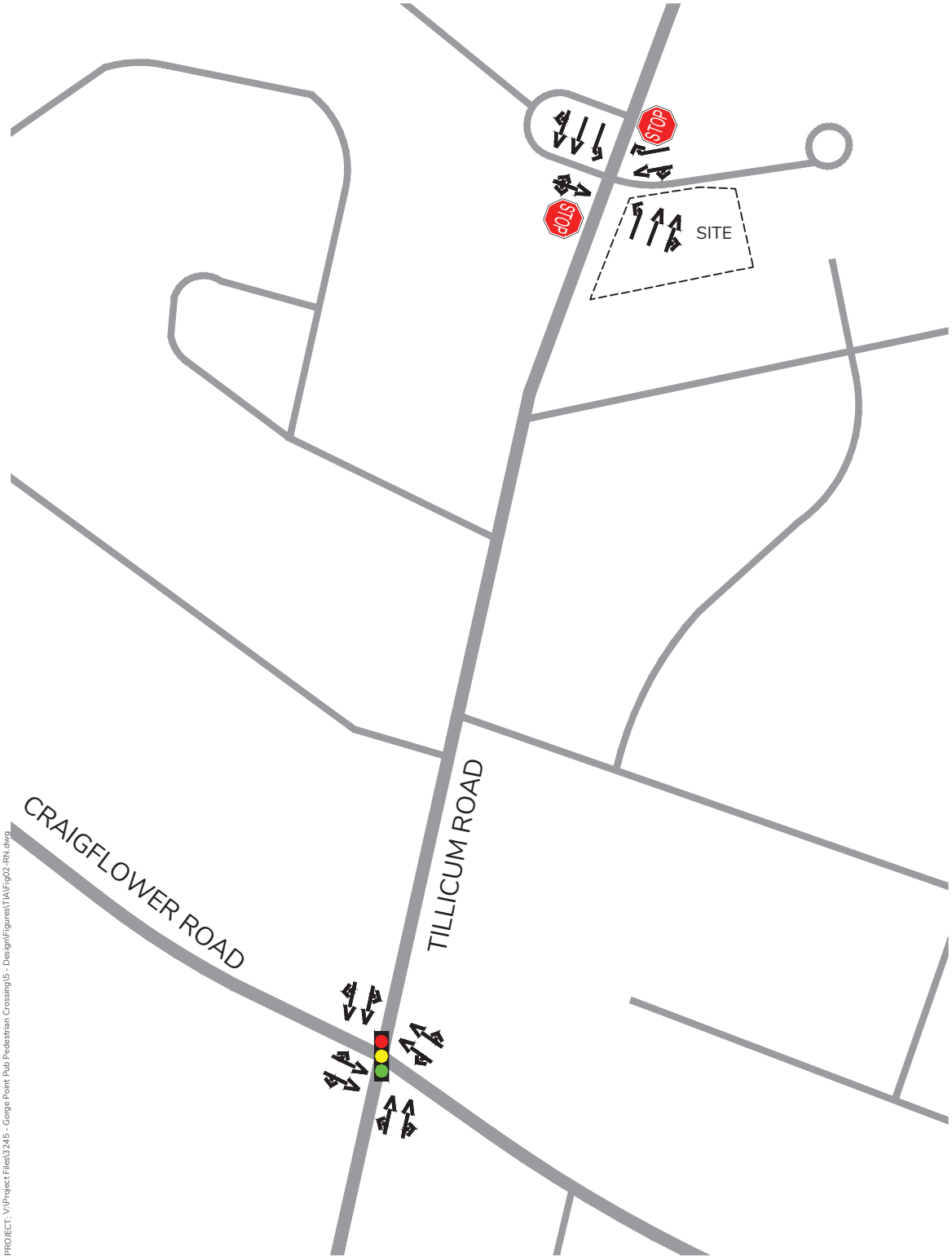
The existing road network, lane configuration and intersection control are illustrated in **Figure 2**.

Tillicum Road is a north-south major road under the jurisdiction of the Township of Esquimalt. It extends between Colville Road in the south and Carey Road in the north. The posted speed limit is 50 km/h. South of the Gorge Bridge, Tillicum Road has a four lane cross section with auxiliary left turn lanes at some intersections. North of the bridge, Tillicum Road has a three lane cross section (two northbound lanes and one southbound lane). The southbound direction has an approximately 130 metre section of on-street bike lane across the Gorge Bridge. On-street parking is not permitted on either side of the road. The Gorge Road West and Craigflower Road intersections are signalized.

Craigflower Road is an east-west major road under the jurisdiction of the Township of Esquimalt. It extends between Russell Street in the east (where it continues as Skinner Street) and Admirals Road in the west (where it continues as Island Highway). The posted speed limit is 40 km/h. Craigflower Road generally has a three lane cross section (i.e. one lane in each direction with a centre left or auxiliary left turn lane on certain sections). Additional through lanes are provided for short segments in the vicinity of Tillicum Road. On-street bike lanes are provided in both the eastbound and westbound directions. On-street parking is generally not permitted on either side of the road. The intersection at Tillicum Road is signalized. Westbound left turn movements are not permitted at this intersection between 4:00 PM and 6:00 PM.

2.1.2 Evolving Road Network

Esquimalt Council approved their Active Transportation (AT) Network Plan in February 2022. Upgrades to the Craigflower Road / Tillicum Road intersection (including cross-ride markings, conflict zone markings, signage, and signal phasing changes) were highlighted as a short term project in the AT plan. Installation of a new traffic signal along Tillicum Road between the Gorge Bridge and Craigflower road was also highlighted as a short term project.



1075 Tillicum Road
Traffic Impact Assessment

Figure 2
Existing Area Road Network

2.2 Transit Network

The area transit network is illustrated in **Figure 3**.

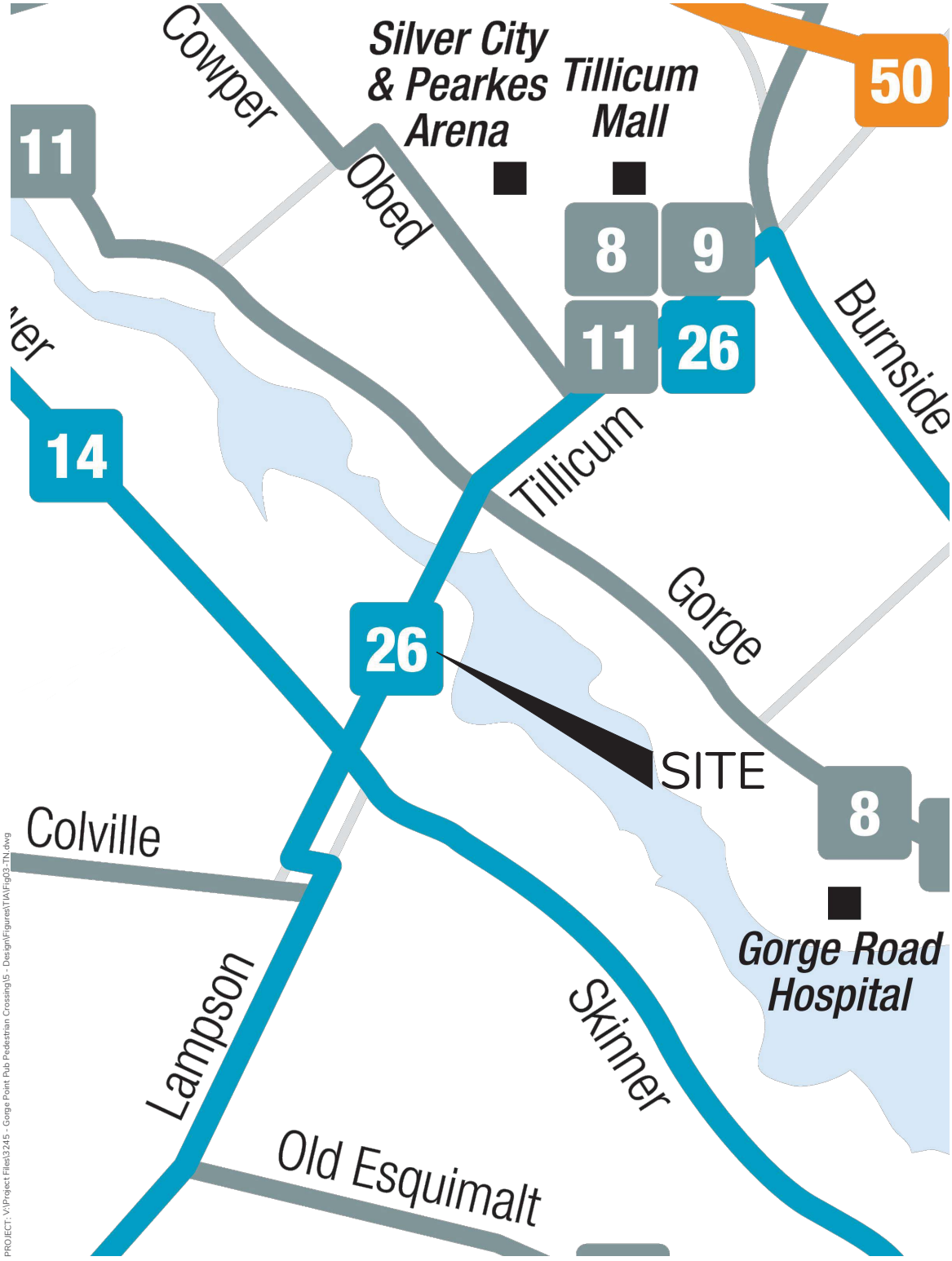
Route 8 – Interurban / Tillicum Centre / Oak Bay operates between Camosun College Interurban Campus and the Oak Bay Marina, passing by Tillicum Mall. The closest stop is approximately 400 metres (i.e. a 5 minute walk) from the site, at Gorge Road West / Tillicum Road. Buses operate at 15 to 45 minute headways on weekdays, and 45 minute headways on weekends. Service only operates between Oak Bay and Tillicum Mall on weekends.

Route 9 – Royal Oak / UVic operates between Royal Oak Exchange and the University of Victoria, passing by Tillicum Mall and Hillside Mall. The closest stop is approximately 400 metres (i.e. a 5 minute walk) from the site, at Gorge Road West / Tillicum Road. This route only operates on weekdays during the day, with 15 minute to 3 hour headways.

Route 11 – Tillicum Centre / UVic operates between Tillicum Mall and the University of Victoria, passing by the Victoria downtown core and the Oak Bay Junction. The closest stop is approximately 400 metres (i.e. a 5 minute walk) from the site, at Gorge Road West / Tillicum Road. Buses generally operate at 15 to 20 minute headways on weekdays and 20 to 40 minute headways on weekends.

Route 14 – Vic General / UVic operates between Victoria General Hospital and the University of Victoria, passing by the Victoria downtown core and the Oak Bay Junction. The closest stop is approximately 450 metres (i.e. a 6 minute walk) from the site, at Craigflower Road / Lampson Street. Buses operate at 15 to 30 minute headways on weekdays, and 20 to 30 minute headways on weekends. Additional weekday peak period trips between UVic and downtown Victoria (i.e. leaving downtown in the morning and leaving UVic in the afternoon) are provided when UVic is in full session.

Route 26 – Dockyard / UVic operates between the University of Victoria and the HMC Dockyard, passing by Uptown. The closest stop is directly adjacent to the site at Tillicum Road / Gorge Bridge. Buses operate at 15 to 30 minute headways seven days a week, with additional peak period trips in both directions when public schools and UVic are in full session.


Cowper
Silver City & Pearkes Arena
Tillicum Mall
50
11
Obed
8
9
11
26
Burnside
14
Tillicum
Gorge
26
SITE
8
Colville
Gorge Road Hospital
Lampson
Skinner
Old Esquimalt
PROJECT: V:\Project Files\3245 - Gorge Point Pub Pedestrian Crossing\5 - Design\Figures\TIA\Fig03-TN.dwg

2.3 Cycling Network

2.3.1 Existing Cycling Network

The existing cycling network in the vicinity of the site is fragmented. On-street bike lanes are provided in both directions on Craigflower Road and Gorge Road, but a section of Gorge Road between Tillicum Road and Harriet Road is designated as a shared street only. Tillicum Road has on-street bike lanes north of Maddock Avenue West / Arena Road, and is designated as a shared street south of Craigflower Road. Tillicum Road also has an approximately 130 metre section of on-street bike lane across the Gorge Bridge, in the southbound direction only. Selkirk Avenue is designated as a shared street.

These cycling facilities provide connections to other high quality cycling facilities in the area, including the E&N Rail Trail, the Lochside Regional Trail, and the Galloping Goose Regional Trail. These trails provide off-street connections across the Township of Esquimalt, and the greater Victoria region as a whole.

2.3.2 Evolving Cycling Network

The 2022 Esquimalt AT plan recommends implementing an additional active transportation connection between the Gorge Bridge and the Craigflower Bridge. The District of Saanich 2018 AT plan identified a potential crossing between Dysart Road and Garthland Road.

Protected bike lanes on Tillicum Road between Colville Road and the Gorge Bridge was identified as a priority cycling corridor project in the Esquimalt AT plan. The intent is to implement the protected cycling facilities as part of a quick-build pilot project to test the functionality of the infrastructure prior to permanent construction. The permanent build-out of the bike facility will remove a vehicle travel lane, elevate the bike lanes up to sidewalk level, and remove the existing handrail on the Gorge Bridge. Conflict markings and intersection treatments are required, and upgrades to the existing traffic signal at Tillicum / Craigflower are warranted. At their March 15th 2022 meeting, Esquimalt council has requested that design of the Tillicum protected bike lanes be completed in 2022, with construction to be completed by 2023.

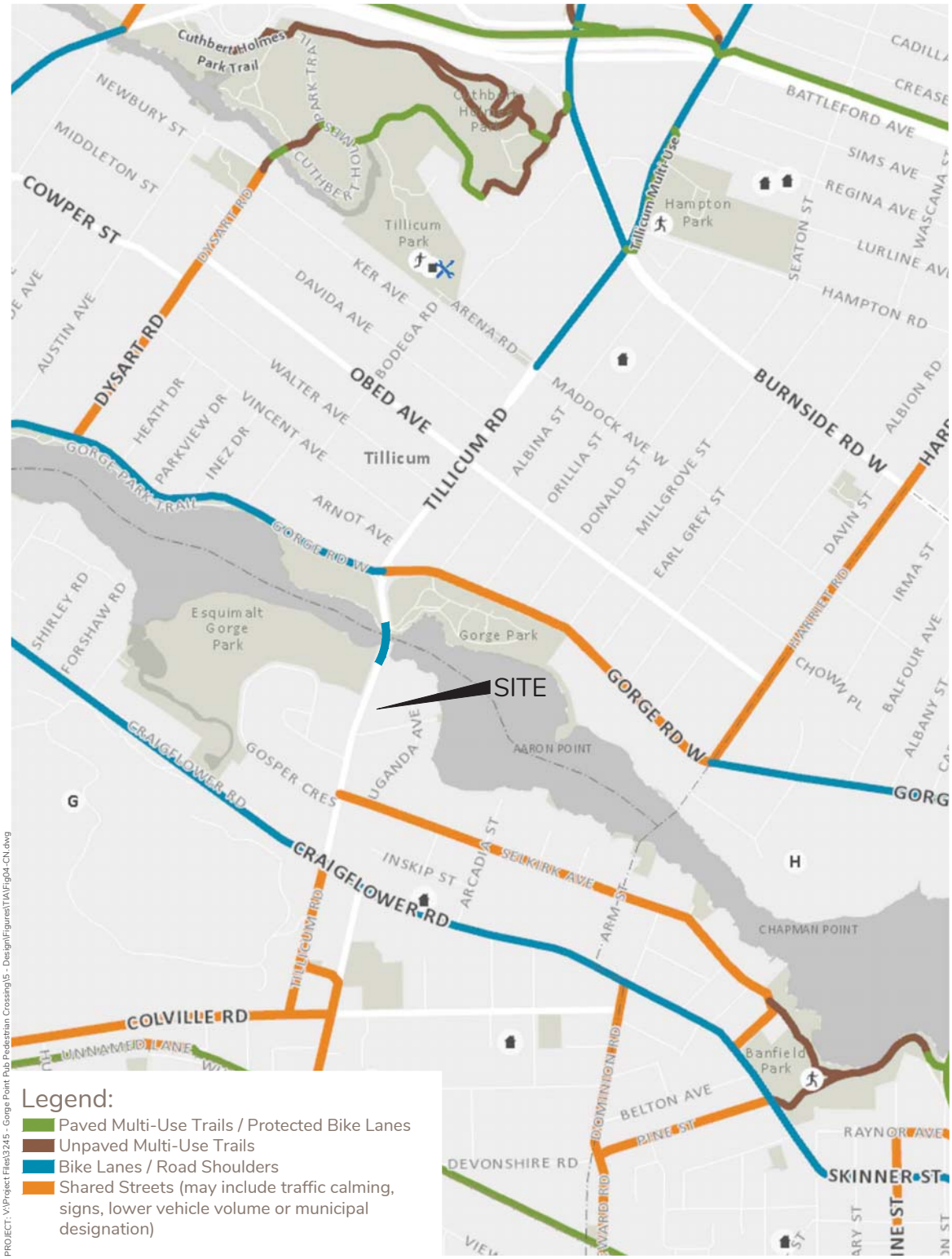
Tillicum Road and Gorge Road are both identified as all ages and abilities (AAA) cycling links in the 2018 Saanich AT plan. Improvements to existing facilities on Gorge Road west of Tillicum Road and new facilities between Tillicum Road and Harriet Road are identified as short term priorities in the implementation plan. At their March 14th 2022 meeting, Saanich council approved the construction of quick-build protected bike lanes on Tillicum Road between Arena Road and the Esquimalt Boundary.

2.4 Pedestrian Environment

The pedestrian environment in the vicinity of the site is generally contiguous and of good quality. Sidewalks are provided on both sides of the road on all major streets in the study area. Some segments of sidewalk in the vicinity of the Tillicum Road / Craigflower Road intersection are of substandard width due to above-ground utility encroachments (i.e. fire hydrants, utility poles).

Sidewalks on the Gorge Bridge are separated from vehicle traffic by handrails, and additional curb-separated pedestrian space on the west side of the bridge was implemented in 2021. A pedestrian underpass at the south end of the Gorge Bridge provides access to Esquimalt Gorge Park for pedestrians on the east side of the road. Several other high quality recreational walking facilities are also in close proximity to the site, including Saanich Gorge Park, the Victoria Canoe and Kayak club, and the Gorge Road walkway.

The pedestrian network in the vicinity of the site provides convenient access to local area transit services and a broad range of commercial and recreational uses in the surrounding neighbourhood.


Cuthbert Holmes Park Trail
NEWBURY ST
MIDDLETON ST
COWPER ST
AUSTIN AVE
DYSART RD
DAVIDA AVE
KER AVE
BODEGA RD
ARENA RD
Tillicum Park
Tillicum Multi-Use
Hampton Park
BATTLEFORD AVE
SIMS AVE
REGINA AVE
LURLINE AVE
SEATON ST
HAMPTON RD
OBED AVE
TILLICUM RD
BURNSIDE RD W
ALBION RD
HEATH DR
PARKVIEW DR
INEZ DR
VINCENT AVE
WALTER AVE
Tillicum
ALBINA ST
MADDOCK AVE W
ORILLIA ST
DONALD ST W
MILLGROVE ST
EARL GREY ST
DAVIN ST
GORGE PARK TRAIL
ARNOT AVE
GORGE RD W
SHIRLEY RD
FORSHAW RD
Esquimalt Gorge Park
Gorge Park
SITE
HARRIET RD
IRMA ST
CHOWN PL
BALFOUR AVE
ALBANY ST
AARON POINT
GORGE RD W
CRAIGFLOWER RD
GOSPER CRES
UGANDA AVE
SELKIRK AVE
ARCADIA ST
INSKIP ST
ARM ST
CHAPMAN POINT
TILLICUM RD
COLVILLE RD
UNNAMED LANE
Banfield Park
BELTON AVE
PINE ST
DOMINION RD
RAYNOR AVE
DEVONSHIRE RD
SKINNER ST
G
H
Legend:
Paved Multi-Use Trails / Protected Bike Lanes
Unpaved Multi-Use Trails
Bike Lanes / Road Shoulders
Shared Streets (may include traffic calming, signs, lower vehicle volume or municipal designation)
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2.5 Area Travel Characteristics

The 2017 *CRD Household Travel Survey* provides information on area travel characteristics for southern Vancouver Island. **Table 1** outlines the existing mode share for the Township of Esquimalt.

Table 1 – Existing Mode Share

Mode	AM Peak	PM Peak
Auto Driver	55%	54%
Auto Passenger	12%	14%
Transit	12%	12%
Bicycle	9%	8%
Walk	10%	11%
Other	2%	1%

Notes:
1. Based on 2017 CRD *Household Travel Survey* for District 12 – Township of Esquimalt
2. Travel mode split calculation based on overall number of trips to, from, and within district.

67 to 68 percent of all trips made to, from, and within Esquimalt are made using a personal vehicle. Trips internal to Esquimalt have a substantially higher walking mode share; 32 and 40 percent during the morning and afternoon peak periods, respectively. 82 percent of all households in Esquimalt have access to at least one vehicle.

3.0 DEVELOPMENT PROGRAMME

The current development proposal consists of a 6-storey mixed-use building containing 100 residential units and 120 m^2 of commercial GFA. The architectural site plan is provided in **Appendix A**.

Table 2 – Development Programme

Site Element	Details	
Residential Units	100 units	
Commercial GFA	120 m^2	
Vehicular Parking Supply	Residential	83 spaces
	Visitor / Commercial	5 spaces
	Car Share	1 space
	Total	89 spaces
Bicycle Parking Supply	Residential	100 spaces
	Visitor / Commercial	10 spaces
	Total	110 spaces
Vehicular Access	Access to the site's surface and underground parking facility is provided from the shared site driveway via Tillicum Road	
Cyclist Access	Visitor and commercial bicycle parking on the ground floor can be accessed directly from the public street network. Residential bicycle parking within the underground parking garage can be accessed via the parking garage ramp or the residential elevators.	
Pedestrian Access	Pedestrian access to the commercial units is provided along Tillicum Road. Pedestrian access to the residential lobby is provided on the north side of the site along the site driveway.	

Notes:

1. Site statistics based on architectural site plans prepared by Urban West Architecture, dated February 8, 2022.

4.0 TRAFFIC VOLUMES

4.1 Traffic Analysis Scenarios and Design Periods

Traffic operations analysis has been undertaken during the weekday morning and afternoon peak periods under the following conditions:

- Existing traffic – traffic activity under current conditions
- Background traffic – traffic activity levels into the future which includes allowances for corridor growth and background development
- Post-development traffic – traffic activity levels into the future with the site redeveloped and projected site generated traffic added to the road network

Traffic operations are discussed in the following sections for these scenarios:

- Existing conditions
- Opening day (2022) background conditions
- Opening day (2022) post-development conditions
- 10 year post-buildout (2032 horizon year) background conditions
- 10 year post-buildout (2032 horizon year) post-development conditions

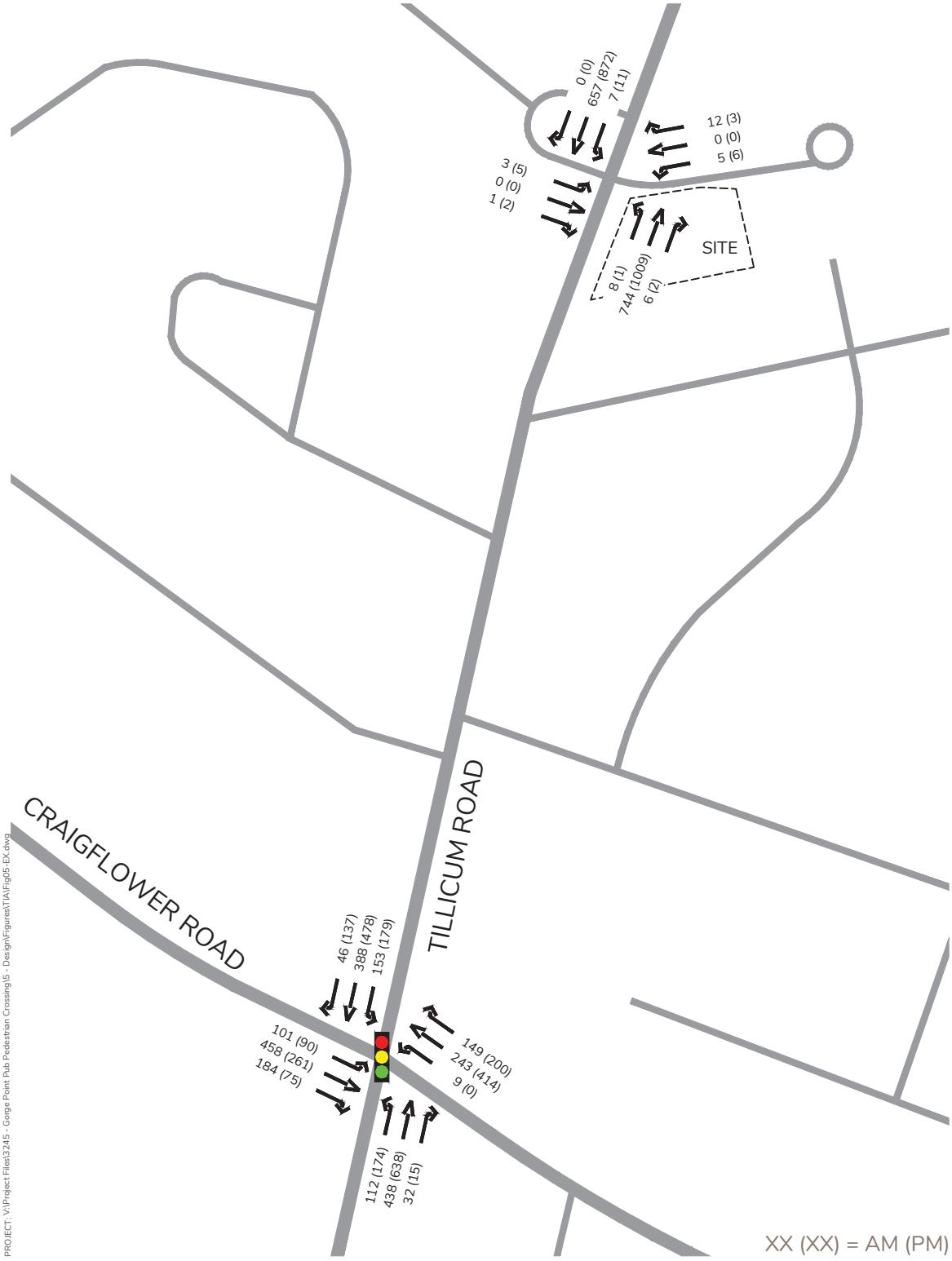
4.2 Existing Traffic

Base existing turning movement volumes were established for intersections within the study area for the weekday morning and afternoon peak periods. Traffic count information adopted as the basis for this study is summarized in **Table 3**.

Table 3 – Existing Traffic Count Information

Intersection	Date of Count	Source
Tillicum Road / Craigflower Road	Wednesday, February 23, 2022	WATT
Tillicum Road / Site Driveway	Wednesday, February 23, 2022	WATT

The existing baseline area traffic volumes for the weekday morning and afternoon peak hour are illustrated in **Figure 5**.


CRAIGFLOWER ROAD
TILLICUM ROAD
SITE
0 (0)
657 (872)
7 (11)
12 (3)
0 (0)
5 (6)
3 (5)
0 (0)
1 (2)
8 (1)
744 (1009)
6 (2)
46 (137)
388 (478)
153 (179)
101 (90)
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184 (75)
149 (200)
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112 (174)
438 (638)
32 (15)
XX (XX) = AM (PM)
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4.3 Background Traffic Volumes

4.3.1 Corridor Growth

Corridor growth on both Tillicum Road and Craigflower Road was forecast using a 1.0% annual linear growth rate applied to the observed volumes from 2022 to the 2032 horizon year.

4.3.2 Background Developments

Allowances were made to account for new traffic generated by other development proposals in proximity to the proposed site that are either under construction, approved, being reviewed, or in which an application is expected to be submitted to the Township in the near future. Three (3) background developments have been considered, comprising approximately 110 residential units. Trip generation and traffic assignments were derived for the three background developments using the methodology in this report. **Table 4** summarizes the background developments considered as part of this study.

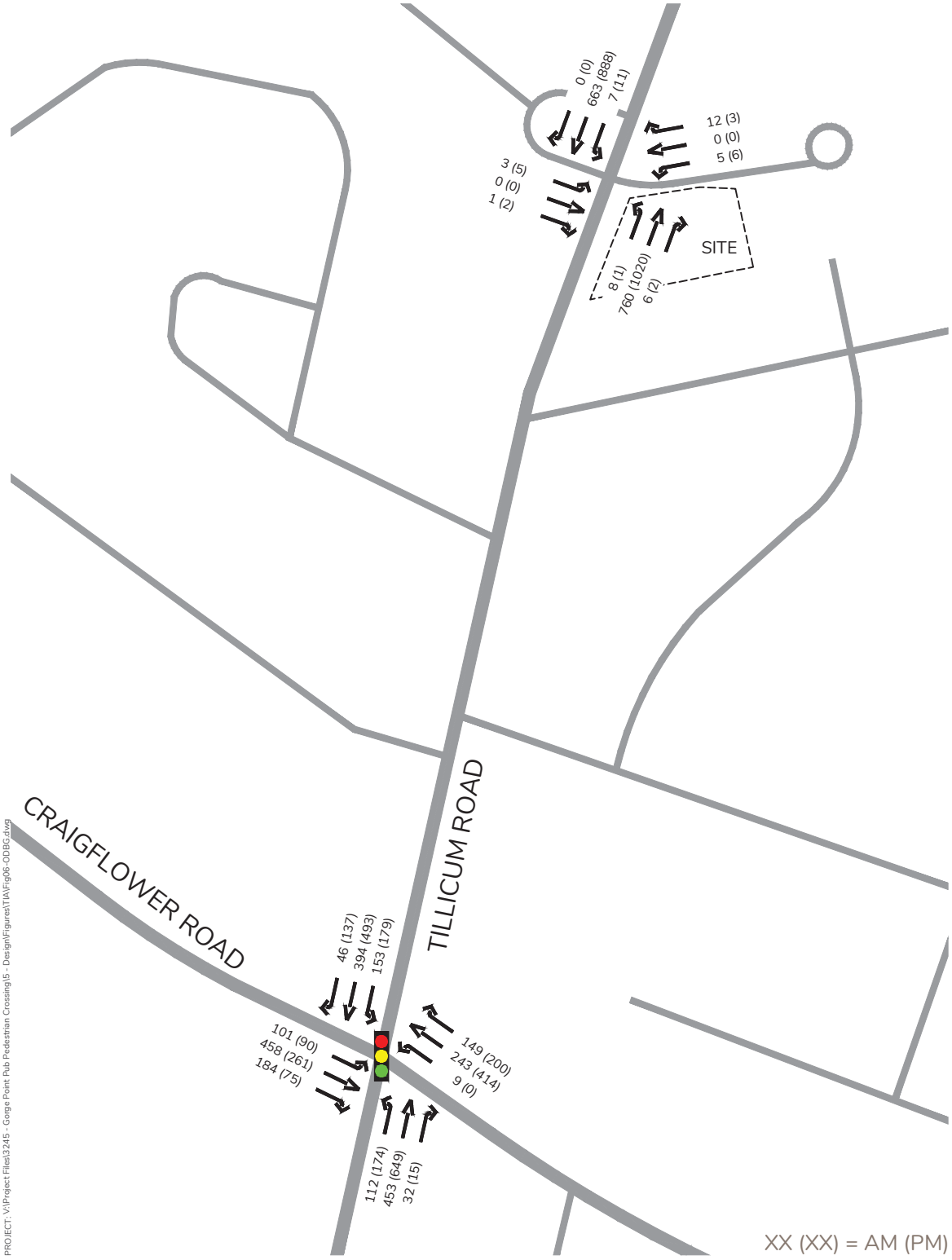
Table 4 – Background Developments

Development Address	Development Statistics	Report Source	Trip Generation / Distribution Source
1078 Tillicum Road	5 townhouse units	N/A	Generated
874 Fleming Street	60 new affordable housing units[1]	N/A	Generated
880 Fleming Street	45 mid-rise residential units	N/A	Generated

Notes:
1. The existing 77 unit building at 874 Fleming is being replaced with a new 137 unit building

4.3.3 Background Traffic Volumes

Background traffic volumes have been established for the weekday morning and afternoon peak periods as the sum of the new background development traffic and corridor growth where applicable. Background traffic volumes for opening day and the 2032 horizon year are illustrated in **Figure 6** and **Figure 7**, respectively.


CRAIGFLOWER ROAD
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5 (6)
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0 (0)
1 (2)
8 (1)
760 (1020)
6 (2)
46 (137)
394 (493)
153 (179)
101 (90)
458 (261)
184 (75)
149 (200)
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9 (0)
112 (174)
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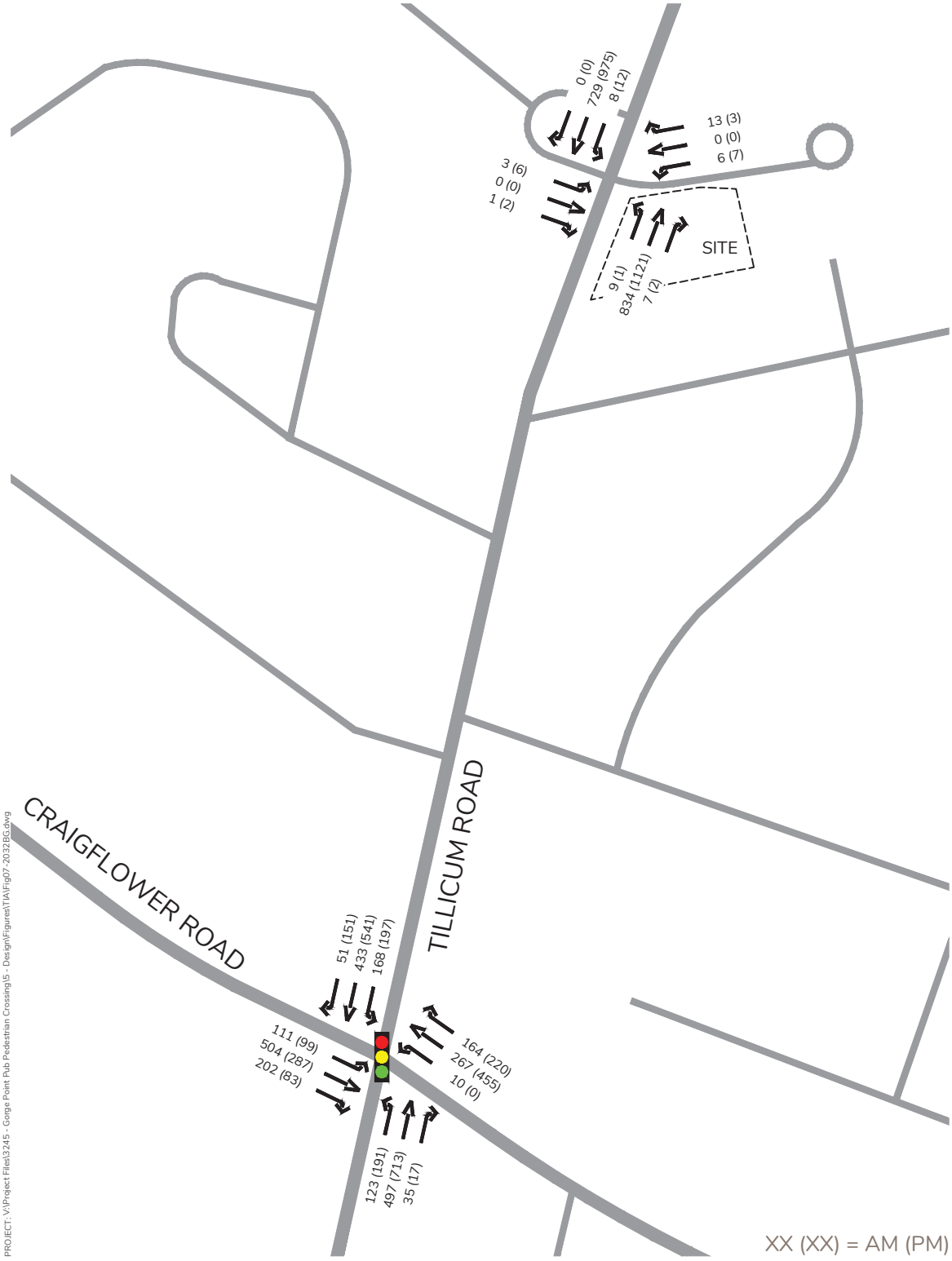
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8 (12)
13 (3)
0 (0)
6 (7)
3 (6)
0 (0)
1 (2)
SITE
9 (1)
834 (1121)
7 (2)
TILLICUM ROAD
CRAIGFLOWER ROAD
51 (151)
433 (541)
168 (197)
111 (99)
504 (287)
202 (83)
164 (220)
267 (455)
10 (0)
123 (191)
497 (713)
35 (17)
PROJECT: V:\Project Files\3245 - Gorge Point Pub Pedestrian Crossing\5 - Design\Figures\TIA\Fig07-2032BG.dwg
XX (XX) = AM (PM)

4.4 Site Traffic Volumes

4.4.1 Existing Site Trip Generation

Given that the existing use on the site closed in September 2021 and traffic counts at the area intersections were undertaken in February 2022, existing trips were not removed with the contemplation of the redevelopment of the site.

4.4.2 New Site Trip Generation

A total of 100 residential units and 120 m^2 (1,292 ft^2) of commercial GFA are currently proposed for the site. The developer has indicated that the two commercial units will likely have a café and a professional office as tenants.

Vehicular trip generation rates for the proposed mixed-use development are generally based on the Institute of Transportation Engineers (ITE) *Trip Generation Manual (11th Edition)*. Given the limited commercial parking provided on the site and the mixed-use nature of the site lending itself towards pedestrian trips, an alternative trip generation rate for the café use was selected based on the *Trip-Generation rates for Urban Infill Land Uses in California* report prepared for the California Department of Transportation (June 2009).

The trip generation forecast is summarized in **Table 5**.

Table 5 – Vehicle Trip Generation Forecast

Use	AM Peak Hour			PM Peak Hour		
	In	Out	Two-Way	In	Out	Two-Way
ITE Trip Generation Manual 11th Edition Rates						
Multifamily Housing (Mid-Rise) (ITE LU 221)[1]	0.09	0.28	0.37	0.24	0.15	0.39
Small Office Building (ITE LU 712)[2]	1.37	0.30	1.67	0.73	1.43	2.16
Coffee Shop[2] (Caltrans)	8.95	8.94	17.89	3.92	3.95	7.85
Vehicular Trip Generation						
Residential (100 units)	9	28	37	24	15	39
Office (755 ft^2)	1	0	1	1	1	2
Café (537 ft2)	5	5	10	2	2	4
Total	**15**	**33**	**48**	**27**	**18**	**45**

Notes:
1. Trip rates are per dwelling unit
2. Trip rates are per 1,000 ft^2 GFA

The proposed development is forecast to generate 48 two-way trips during the weekday morning peak hour and 45 two-way trips during the weekday afternoon peak hour.

4.4.3 Trip Distribution and Assignment

The trip distribution pattern for site-generated traffic was established based on the person-trip OD matrix for the Township of Esquimalt provided in the 2017 CRD *Household Travel Survey*. The distribution of inbound and outbound traffic adopted for the proposed development is outlined in **Table 6**.

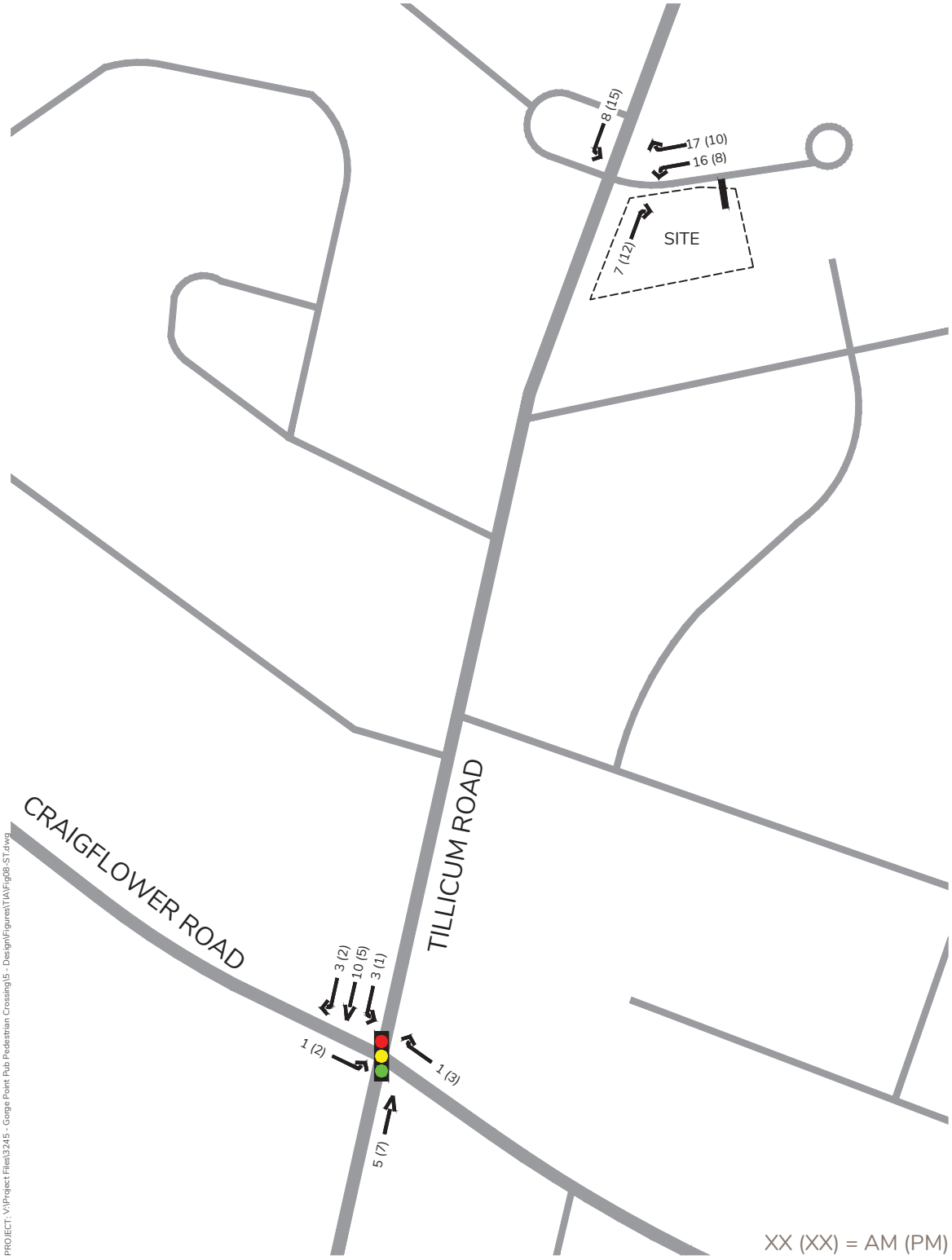
Table 6 – Site Traffic Distribution

Street	Direction	AM	PM
Tillicum Road	North	50%	55%
	South	30%	25%
Craigflower Road	East	10%	10%
	West	10%	10%

The site traffic volumes assigned to the area road network are illustrated in **Figure 8**.

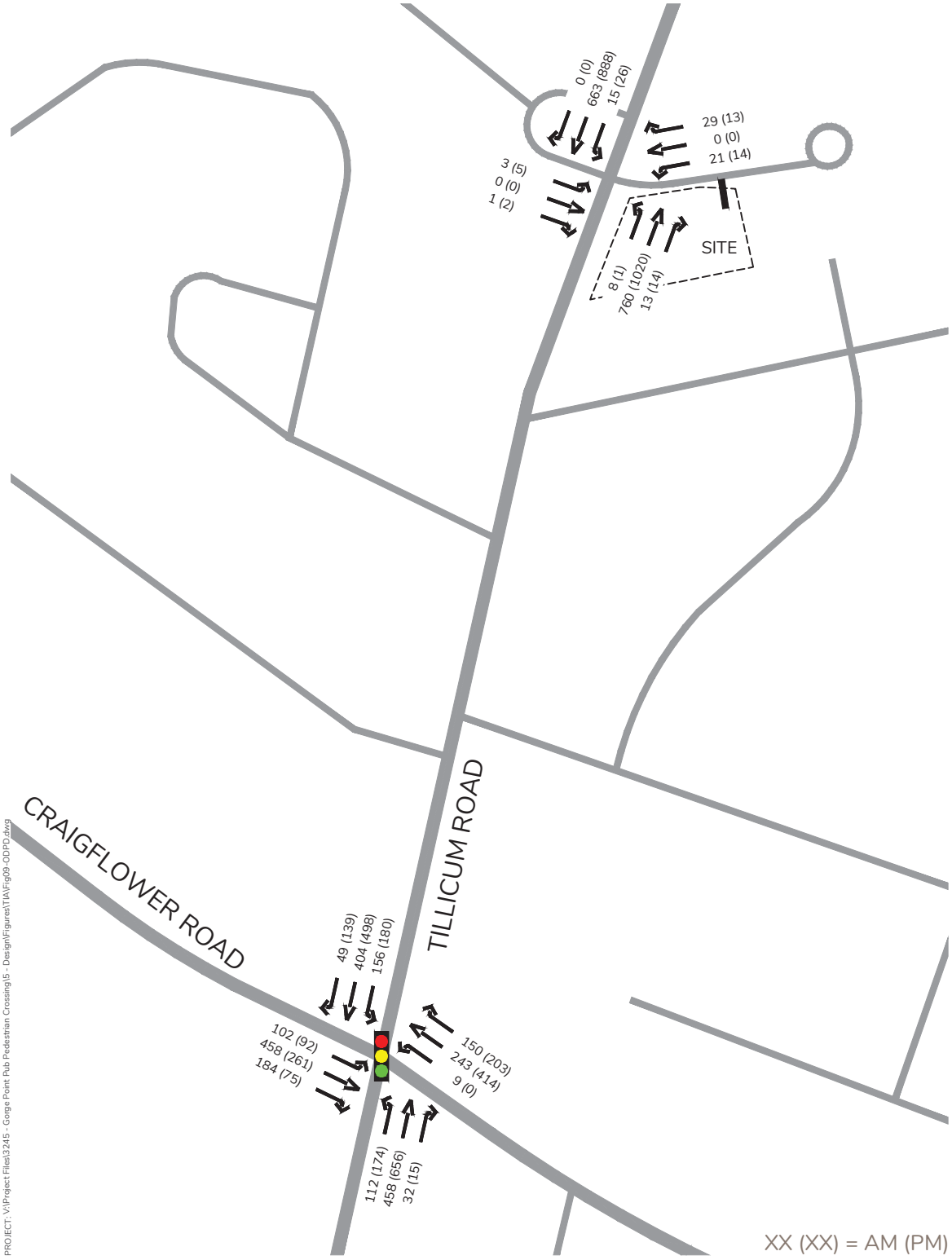
4.5 Post-Development Traffic Volumes

Post-development traffic volumes are established by adding the new site traffic to the existing traffic volumes for opening day, and background traffic volumes for the 2032 horizon year. Post-development traffic volumes for opening day and the 2032 horizon year are illustrated in **Figure 9** and **Figure 10**, respectively.



1075 Tillicum Road
Traffic Impact Assessment

Figure 8
Site Traffic Volumes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102 (92)
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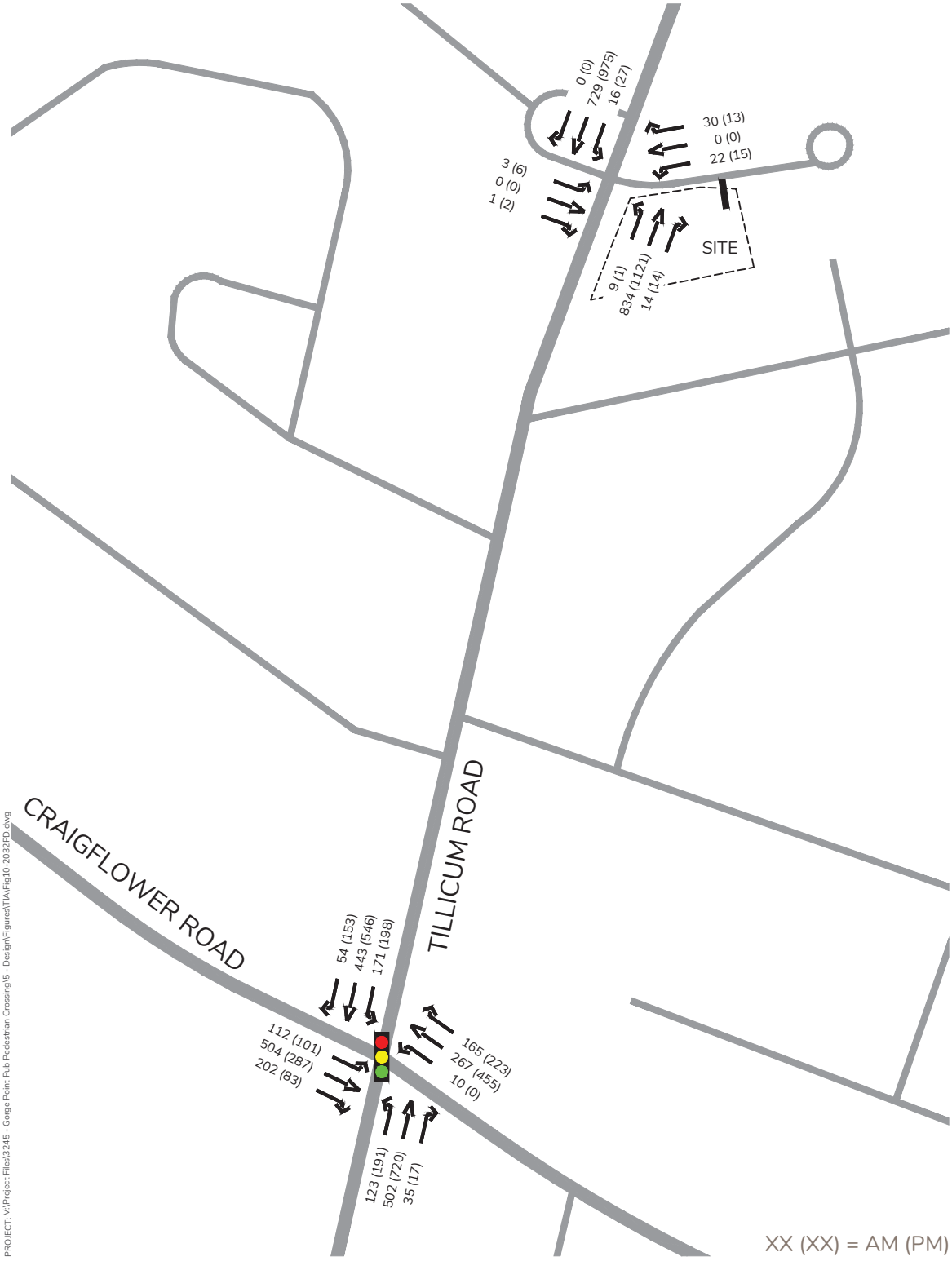


Figure 10
2032 Horizon Year Post-Development Traffic Volumes

5.0 TRAFFIC SIGNAL WARRANT

A traffic signal warrant was conducted to determine if there is a need to install a traffic signal at the intersection of Tillicum Road and the site driveway / Gorge Point Park access. The *Canadian Traffic Signal Warrant Matrix Procedure* was used. This methodology considers several factors when determining the appropriateness of installing a traffic signal at an intersection, including vehicle and pedestrian volumes, roadway characteristics (e.g. lane configuration, speed limit, proportion of heavy vehicles), proximity to adjacent signals, and local factors.

Limited traffic data was collected as part of this study. The average of the two peak hours studied was used in lieu of the six peak hours required by the warrant.

Given that the vehicle volumes on the side streets (i.e. the site driveway and Gorge Point Park access) do not exceed 75 vehicles per hour, a full traffic signal is not warranted at this intersection.

WATT conducted a pedestrian crossing warrant for the site in February 2022, using TAC's *Pedestrian Crossing Control Guide, Third Edition*. The outcome of the pedestrian crossing warrant analysis was unclear, given insufficient data on pedestrian volumes in the area, and ambiguity surrounding the inclusion of the nearby pedestrian underpass under the Gorge Bridge. The road geometry in the vicinity of the site driveway (notably the U-shaped Esquimalt Gorge Park driveway and the channelized right turn lane at the site driveway) pose challenges to locating a pedestrian crossing or a full traffic signal at this intersection.

Given the imminent road diet scheduled for late 2022/2023 on Tillicum Road in front of the site, the implementation of a traffic signal or pedestrian crossing in the vicinity of the site is not recommended at this time. Further study by the Township is recommended.

6.0 TRAFFIC OPERATIONS ANALYSIS

6.1 Methodology

Analysis of the traffic conditions at the study area intersections was undertaken using Synchro version 11. Synchro / SimTraffic is a two-part traffic modelling software that provides analysis of traffic conditions based on *Highway Capacity Manual (2010)* evaluation methodology. A detailed description is provided in **Appendix B**.

6.2 Input and Calibration Parameters

Heavy Vehicle Assumptions

Heavy and medium truck percentages incorporated into the analysis were based on information provided as part of the intersection turning movement counts. Where these values were unavailable, a default value of 2 percent heavy vehicles was assumed.

Signal Timings

Existing signal timing plans were available for the signalized intersection at Tillicum Road / Craigflower Road, and were used for the analysis of existing conditions only. This is discussed further in **Section 6.3**.

Peak Hour Factor

Peak hour factors for each intersection were calculated from the existing turning movement counts. Where these values were unavailable, a default peak hour factor of 0.90 was adopted for all movements.

Lane Configuration

Given the planned road diet approved by Esquimalt council as part of the implementation of the Active Transportation Plan, the lane configuration on Tillicum Road was assumed to be reduced to a three-lane cross section (i.e. one lane in each direction with a centre left turn lane) for both the opening day (i.e. 2022 horizon year) and 2032 horizon year scenarios.

6.3 Tillicum Road / Craigflower Road

The traffic analysis results for the Tillicum Road / Craigflower Road intersection are provided in **Table 7**.

The Tillicum Road / Craigflower Road intersection currently operates under split traffic signal phasing, with the northbound and southbound movements proceeding independently.

The intersection operates adequately under existing conditions. The eastbound and westbound approaches operate at LOS C during both the weekday morning and afternoon peak periods, with delays of 34 seconds or less. The northbound approach operates at LOS E with delays of up to 55 seconds during the weekday afternoon peak period. This approach and the southbound approach operate at LOS D or better at all other times, with delays of up to 51 seconds.

With the existing signal timings, performance deteriorates substantially at this intersection after the implementation of the planned road diet on Tillicum Road, particularly on the northbound and southbound approaches. Under background conditions on opening day, the northbound and southbound approaches operate at LOS F during the weekday afternoon peak hour, with delays of up to 240 seconds on the southbound approach. Performance continues to deteriorate by 2032 post-development, with delays of up to 257 seconds on the southbound approach.

The Township of Esquimalt has committed to the implementation of a protected cycling route on Tillicum Road and the removal of a vehicle travel lane to accomplish the road diet. To maintain acceptable levels of vehicular flow through this intersection after the road diet is implemented, the removal of the split signal phasing is imperative. Upgrades to this intersection are identified as a priority project in the Esquimalt Active Transportation Plan. As part of these upgrades, the Township should consider any necessary geometric changes to the roadway required to remove the split phasing.

Without the split signal phasing, all approaches of the intersection are forecast to operate at LOS C or better during the weekday morning peak period, and LOS D or better during the weekday afternoon peak period.

It should also be noted that the AT Plan improvements to the Tillicum corridor are likely to facilitate a mode shift, which is expected to reduce the number of passenger vehicles, which in-turn will improve the passenger vehicle performance at the intersection. Improved bicycle and pedestrian accommodations are likely needed as part of this shift and should be included as part of the signal changes.

Table 7 – Tillicum Road / Craigflower Road Traffic Operations

Key Movement	Existing			Background			Post Development		
	LOS	Delay (s)	95th % Queue (m)	LOS	Delay (s)	95th % Queue (m)	LOS	Delay (s)	95th % Queue (m)
2022 Horizon Year (Opening Day)									
EBT	C (C)	24.7 (33.4)	68.2 (50.1)	C (D)	21.7 (48.1)	102.1 (65.6)	C (D)	22.4 (48.9)	104.5 (66.4)
EBR	C (C)	21.6 (26.1)	34.3 (11.8)	B (C)	19.3 (27.9)	48.4 (5.9)	B (C)	19.7 (28.0)	48.7 (6.0)
WBLT/TR	C (C)	21.5 (34.0)	36.6 (72.6)	B (D)	19.0 (41.5)	51.0 (90.0)	B (D)	19.4 (41.9)	51.5 (91.1)
NBL	D (E)	51.1 (55.1)	96.1 (130.5)	B (B)	16.7 (13.3)	16.9 (18.3)	B (B)	16.8 (13.4)	16.9 (18.2)
NBTR				C (C)	30.7 (29.9)	137.1 (197.0)	C (C)	30.1 (30.5)	139.0 (200.3)
SBL	D (D)	43.1 (45.2)	79.1 (111.3)	C (B)	24.3 (14.5)	22.4 (23.5)	C (B)	24.7 (14.9)	22.8 (24.9)
SBTR				C (C)	29.5 (22.0)	90.0 (136.2)	C (C)	29.8 (22.3)	93.5 (138.4)
2032 Horizon Year									
EBT	C (C)	24.7 (33.4)	68.2 (50.1)	C (D)	27.9 (42.8)	135.2 (80.0)	C (D)	28.8 (44.4)	136.0 (81.1)
EBR	C (C)	21.6 (26.1)	34.3 (11.8)	C (C)	21.4 (30.0)	45.1 (18.5)	C (C)	21.8 (30.5)	45.1 (18.5)
WBLT/TR	C (C)	21.5 (34.0)	36.6 (72.6)	C (D)	21.9 (40.3)	61.2 (106.1)	C (D)	22.3 (41.2)	61.4 (106.5)
NBL	D (E)	51.1 (55.1)	96.1 (130.5)	B (C)	16.2 (26.5)	17.7 (41.0)	B (C)	16.3 (26.8)	17.7 (41.3)
NBTR				C (D)	29.9 (49.2)	152.6 (259.6)	C (D)	29.4 (49.5)	154.5 (263.2)
SBL	D (D)	43.1 (45.2)	79.1 (111.3)	C (D)	29.2 (41.6)	23.6 (54.7)	C (D)	29.5 (42.3)	23.9 (55.3)
SBTR				C (D)	30.4 (38.7)	101.9 (210.4)	C (D)	30.7 (38.6)	105.2 (217.9)

Notes:
1. XX (XX) = AM (PM)
2. Background and Post Development scenario results do not consider existing split signal phasing

6.4 Tillicum Road / Site Driveway / Esquimalt Gorge Park Access

The traffic analysis results for the Tillicum Road / Site Driveway / Esquimalt Gorge Park Access intersection are provided in **Table 8**.

Table 8 – Tillicum Road / Site Driveway Traffic Operations

Key Movement	Existing			Background			Post Development		
	LOS	Delay (s)	95th % Queue (m)	LOS	Delay (s)	95th % Queue (m)	LOS	Delay (s)	95th % Queue (m)
2022 Horizon Year (Opening Day)									
EBLTR	D (E)	26.0 (42.3)	0.5 (1.6)	E (F)	42.4 (91.7)	0.9 (3.5)	E (F)	45.9 (104.1)	1.0 (3.9)
WBLT	D (F)	33.7 (65.2)	0.9 (2.5)	F (F)	52.4 (131.4)	1.5 (4.7)	F (F)	69.7 (190.4)	8.2 (11.4)
WBR	B (B)	11.4 (12.8)	0.5 (0.1)	C (C)	15.4 (19.8)	0.8 (0.3)	C (C)	16.1 (20.6)	2.2 (1.4)
NBL	A (A)	10.0 (10.0)	0.3 (0.0)	A (B)	9.7 (10.0)	0.3 (0.0)	A (B)	9.7 (10.0)	0.3 (0.0)
SBL	B (B)	10.1 (10.9)	0.3 (0.4)	A (B)	10.0 (11.0)	0.2 (0.4)	B (B)	10.1 (11.2)	0.5 (1.1)
2032 Horizon Year									
EBLTR	D (E)	26.0 (42.3)	0.5 (1.6)	F (F)	53.9 (156.4)	1.2 (6.7)	F (F)	59.3 (183.6)	1.3 (7.4)
WBLT	D (F)	33.7 (65.2)	0.9 (2.5)	F (F)	69.7 (207.0)	2.7 (7.3)	F (F)	100.9 (327.9)	11.3 (15.4)
WBR	B (B)	11.4 (12.8)	0.5 (0.1)	C (C)	16.7 (22.2)	1.0 (0.3)	C (C)	17.5 (23.3)	2.6 (1.6)
NBL	A (A)	10.0 (10.0)	0.3 (0.0)	B (B)	10.1 (10.5)	0.3 (0.0)	B (B)	10.1 (10.5)	0.3 (0.0)
SBL	B (B)	10.1 (10.9)	0.3 (0.4)	B (B)	10.4 (11.6)	0.3 (0.5)	B (B)	10.5 (11.9)	0.6 (1.2)

Notes:

1. XX (XX) = AM (PM)
2. Background and Post Development scenario results assume a road diet cross section

The intersection of Tillicum Road at the site driveway / Esquimalt Gorge Park access operates under side-street stop-control. The site driveway features a channelized right turn lane. The Esquimalt Gorge Park access is a U-shaped driveway with inbound and outbound access permitted from both legs. For the purposes of this analysis, only the southern portion of the driveway was analysed.

Under existing conditions, the intersection performs acceptably during the weekday morning peak period, operating at LOS B or better on all northbound and southbound approaches, and the westbound right turn approach. The eastbound and westbound through/left turn approaches operate at LOS D during the weekday morning peak period with delays of up to 34 seconds. The northbound and southbound approaches continue to operate well in the weekday afternoon peak period, but the eastbound approach deteriorates to a LOS E (42 second delay) and the westbound through/left turn approach deteriorates to a LOS F (65 second delay).

After the implementation of the planned road diet on Tillicum Road, performance on the northbound and southbound approaches continues to be adequate, operating at no less than LOS B through 2032, with delays of 12 seconds or less. The westbound right turn will also operate at LOS C or better, with delays of 23 seconds or less.

Delays to exit the site and park driveways increase substantially with the addition of background traffic and the implementation of the road diet. The eastbound approach deteriorates to LOS E on opening day, and LOS F by 2032, while the westbound through/left turn approach will deteriorate to LOS F by opening day. By 2032, delays of up to 3 minutes are forecasted on the eastbound approach and delays of up to 5 minutes are forecasted on the westbound approach.

While the installation of a traffic signal at this intersection reduces delays on the eastbound and westbound approaches, a traffic signal is not warranted at this intersection due to the relatively small side-street volumes (i.e. less than 75 vehicles during the peak period) as noted in **Section 5.0**. Additionally, Synchro has limited ability to model the behaviour of drivers turning left at intersections where a two-way centre-left turn lane is available; the analysis results do not account for the ability of a driver to turn left across one lane of traffic into the centre left turn lane, and then merge into the appropriate through lane once a gap is available.

Based on the above, the planned road diet and the proposed development provide minimal impact to the public road network at this intersection. Excessive delays exiting the site and park driveways, but due to the limitations of the Synchro model and the limited vehicle volumes exiting the driveways, the actual delays are likely far less severe.

7.0 CONCLUSIONS

The proposed development can be accommodated on the evolving road network as planned in the Esquimalt Active Transportation Plan.

To maintain acceptable levels of vehicular flow through the Tillicum Road / Craigflower Road intersection after the road diet is implemented on Tillicum Road, the removal of the split traffic signal phasing at this intersection is imperative.

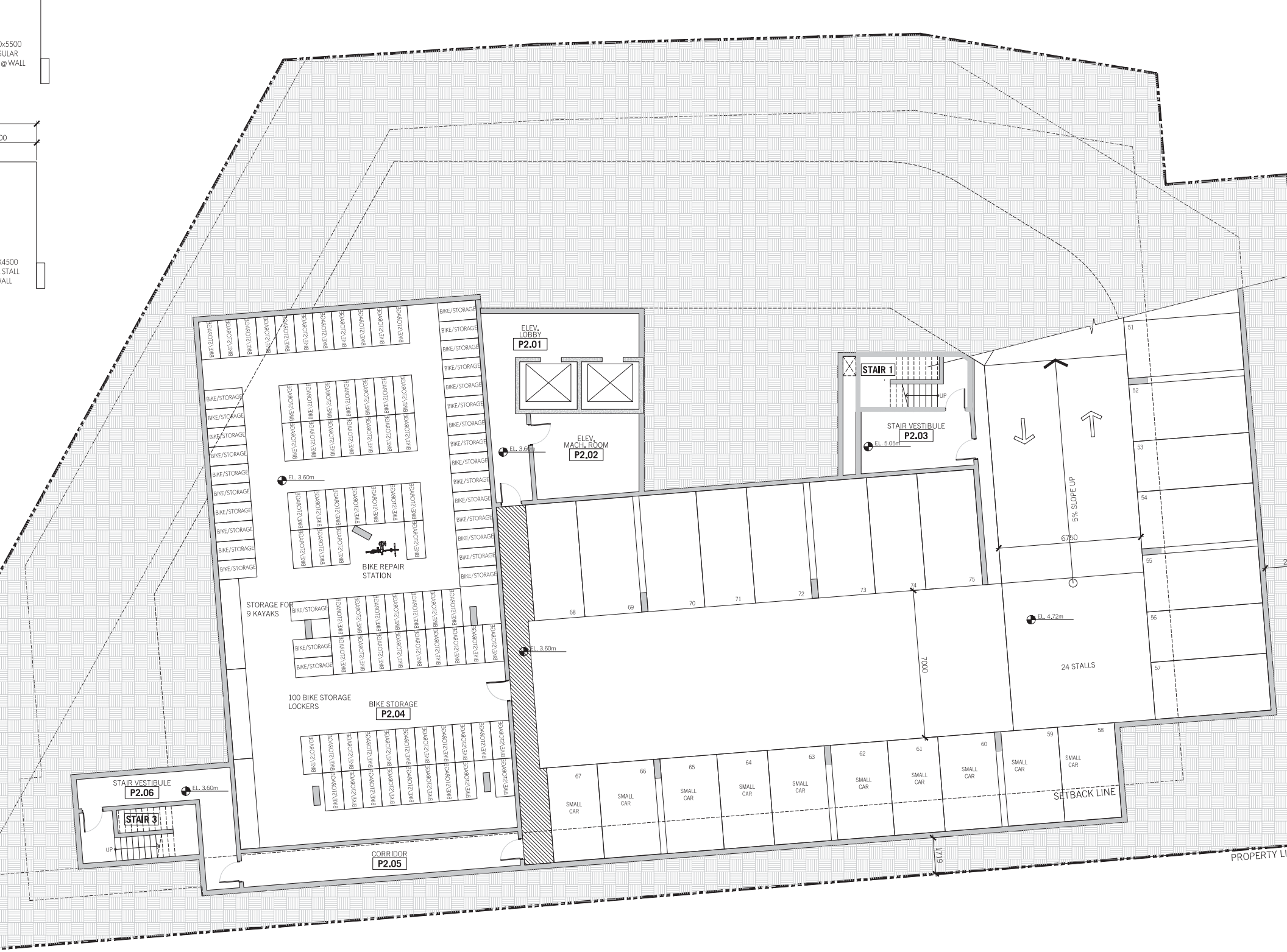
Despite the substantial delays forecasted for the eastbound and westbound approaches at the intersection of Tillicum Road and the site driveway / Esquimalt Gorge Park access, the impacts to the public street network are minor and the forecasted traffic volumes from both the site driveway and park driveway are limited. A dedicated pedestrian crossing or full traffic signal are not currently warranted at this intersection.

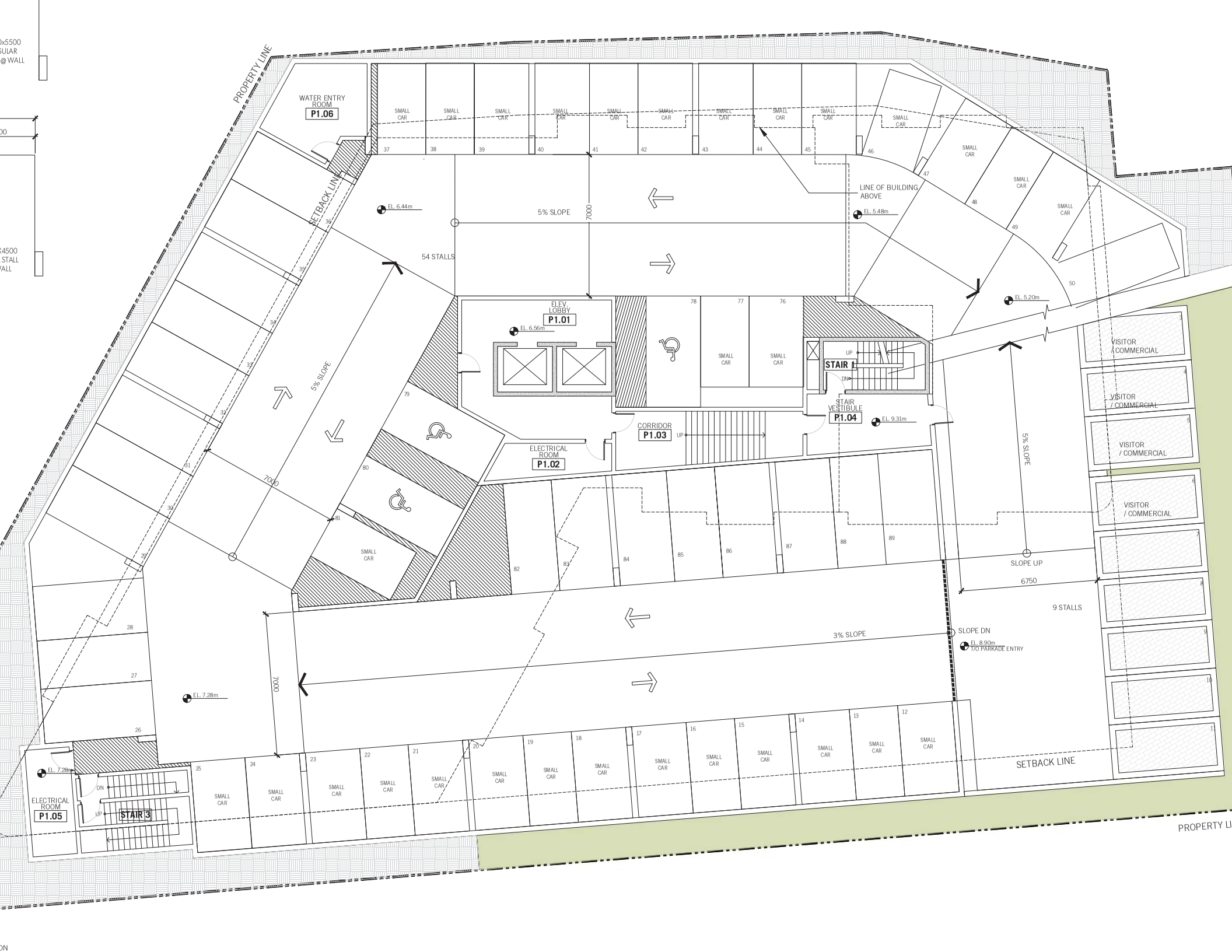
8.0 RECOMMENDATIONS

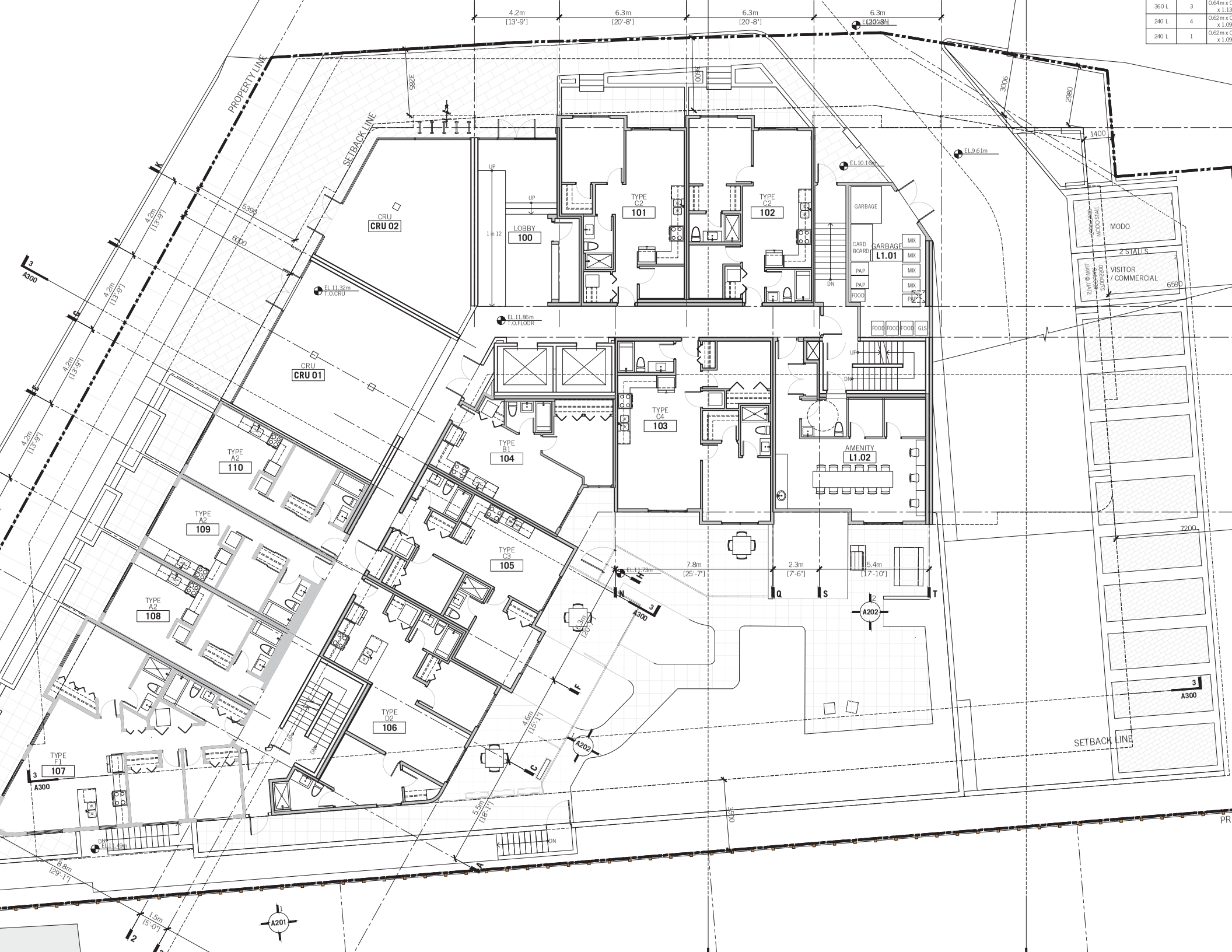
WATT makes the following recommendations:

- The developer of the site should provide the Township of Esquimalt with a cash contribution to be used towards active transportation improvements on Tillicum Road in the vicinity of the site
- The Township of Esquimalt should remove the split traffic signal phasing at the Tillicum Road / Craigflower Road intersection when planned intersection improvements are implemented
- The Township of Esquimalt should include bicycle and pedestrian improvements at the Tillicum Road / Craigflower Road intersection when planned intersection improvements are implemented
- The Township of Esquimalt should monitor pedestrian, cyclist, and vehicle volumes at the intersection of Tillicum Road and the site driveway / Esquimalt Gorge Park access after the implementation of the planned road diet on Tillicum Road. The Township should undertake further study to determine the feasibility of a grade-level pedestrian crossing in the vicinity of the site to improve access for pedestrians crossing Tillicum Road

Appendix A – Site Plan


ELEV. LOBBY
P2.01
ELEV. MACH. ROOM
P2.02
EL. 3.60m
STAIR 1
UP
STAIR VESTIBULE
P2.03
EL. 5.05m
5% SLOPE UP
6750
BIKE REPAIR STATION
STORAGE FOR 9 KAYAKS
100 BIKE STORAGE LOCKERS
BIKE STORAGE
P2.04
EL. 3.60m
7000
EL. 4.72m
24 STALLS
STAIR VESTIBULE
P2.06
EL. 3.60m
STAIR 3
UP
CORRIDOR
P2.05
SMALL CAR
SETBACK LINE
1719
PROPERTY LI


PROPERTY LINE
WATER ENTRY ROOM
P1.06
SETBACK LINE
SMALL CAR
EL. 6.44m
5% SLOPE
7000
54 STALLS
LINE OF BUILDING ABOVE
EL. 5.48m
EL. 5.20m
ELEV. LOBBY
P1.01
EL. 6.56m
STAIR 1
UP
DN
STAIR VESTIBULE
P1.04
EL. 9.31m
CORRIDOR
P1.03
ELECTRICAL ROOM
P1.02
VISITOR / COMMERCIAL
SLOPE UP
6750
9 STALLS
3% SLOPE
SLOPE DN
EL. 8.90m
T/O PARKADE ENTRY
EL. 7.28m
ELECTRICAL ROOM
P1.05
STAIR 3
SETBACK LINE
PROPERTY LI


PROPERTY LINE
SETBACK LINE
CRU
CRU 02
CRU 01
LOBBY
100
TYPE
C2
101
TYPE
C2
102
TYPE
C4
103
TYPE
B1
104
TYPE
C3
105
TYPE
D2
106
TYPE
F1
107
TYPE
A2
108
TYPE
A2
109
TYPE
A2
110
GARBAGE
L1.01
AMENITY
L1.02
MODO
2 STALLS
VISITOR
/ COMMERCIAL
EL.11.32m
T.O.CRU
EL.11.86m
T.O.FLOOR
EL.10.16m
EL.9.61m
EL.11.73m
EL.11.49m
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2.3m
[7'-6"]
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A201
A202
A300

Appendix B – Synchro Background

SYNCHRO MODELLING SOFTWARE DESCRIPTION

The traffic analysis was completed using Synchro and SimTraffic traffic modelling software. Results were measured in delay, level of service (LOS), 95th percentile queue length and volume to capacity ratio. 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 ten times (ten 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. A LOS C or better is considered acceptable operations, while D is considered to be on the threshold between acceptable and unacceptable operations. Highway operations will typically need to operate at LOS C or better for through movements and LOS E or better for other traffic movements with lower order roads.

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 (LOS	Unsignalized Intersection Average Vehicle Delay (sec/veh)	Signalized Intersection Average Vehicle Delay (sec/veh)
A	0 – 10	0 – 10
B	> 10 – 15	> 10 – 15
C	> 15 – 25	> 15 – 25
D	> 25 – 35	> 25 – 35
E	> 35 – 50	> 35 – 50
F	> 50	> 50