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Original Date: December 15th, 2022
Updated Date: January 31st, 2023
L&M Project: 1831-01

City of Prince George
1100 Patricia Blvd.
Prince George, BC, V2L 3V9

Attention: Ms. Imogene Broberg-Hull
Planner 1

Reference: RZ100753 – Queensway Multifamily (2690 Queensway)
Traffic Analysis Letter

Dear Imogene,

On behalf of Atpar Developments, L&M Engineering is pleased to submit this Traffic Impact Study in support of the rezoning application RZ100753. The developer is proposing to rezone the property from C7: Transitional Commercial to RM4: Mid-Rise Residential to accommodate the development of residential apartments. The RM4 zone permits a density of 90 units per hectare which would equates to 55 total dwelling units on the subject property.

Exhibit 1: Proposed Zoning Area

1.0 EXISTING BACKGROUND

Traffic counts were conducted at the Queensway and La Salle Avenue intersection on November 10th, 2022. The counts were conducted on a weekday from 6:30 am – 9:30 am (AM Peak) and 3:00 pm – 6:00 pm (PM Peak). The counts were categorized by vehicle type and the peak hours were determined. The Existing Background traffic volumes are illustrated in Figure 1.

Typically, a seasonal adjustment factor would be applied to the Existing Background volumes to account for the traffic counts being conducted outside of the peak summer months. It was assumed that the majority of the traffic using Queensway during the AM and PM Peaks is commuter traffic and is not significantly impacted by seasonal changes. As a result, no seasonal adjustment was applied.

2.0 PROJECTED BACKGROUND

The Prince George Official Community Plan identifies the following three population growth rate scenarios:

- Low – 0.4%
- Medium – 0.8%
- High – 1.2%

The data from the nearest Ministry of Transportation (MoTI) permanent count station was reviewed. The closest permanent count station that includes commuter traffic is Count Station: P-42NS located at the intersection of Highway 16 and 97 in Prince George. Based on the annual average daily traffic data from 2010 to 2020, Prince George has experienced an annual growth rate of 1.4% To remain consistent with other traffic studies completed in the City of Prince George area, this study uses a projected growth rate of 1.5%. The 2039 Projected Background traffic volumes are shown in Figure 2.

3.0 SITE ACCESS

The subject property directly fronts Queensway, the laneway to the north of the property, and the south end of Inlander Street. The City of Prince George Design Guidelines specify that “driveway crossings onto Arterial roads shall not be permitted when other means of access are available. Where a lot abuts a lane or road of different classification, the driveway shall be located to access the lane or road of lower classification.” Based on this criterion the subject site will be prohibited from accessing Queensway directly. The best location for a driveway access would be at the intersection of the laneway and Inlander Street. Constructing the driveway at

this location will reduce the number of conflict points at the intersection. If the driveway access is not constructed directly in line with Inlander Street, then the driveway should have a minimum corner clearance of 15m from Inlander Street to meet TAC Guidelines.

During preliminary discussions, the City indicated that they support the use of the alleyway for one way (eastbound) access to the site with right turn only movements off of Queensway. The existing paved laneway is approximately 3.6m wide and connects Queensway to the south end of Inlander Street. At this time, there is no signage to indicate that the laneway is one way only. A 'Do Not Enter' sign (R-009) should be installed at the intersection of Inlander Street and the laneway to indicate that westbound traffic on the laneway is prohibited. To prevent left turning access from Queensway onto the alleyway, a "No Left Turn" sign (R-015-L) will be required for vehicles travelling southbound on Queensway.

Exhibit 1: R-009 Sign

Exhibit 2: R-015-L Sign

4.0 DEVELOPMENT TRAFFIC

4.1 Trip Generation

The proposed trip generation for the development site was developed using the Institute of Transportation Engineers (ITE) Trip Generation Manual 10th Edition rates for low rise multifamily housing.

Table 1 – Trip Generation								
Peak Period	**Trip Gen. Variable**	**Projected Trip Gen. Variable Value**	**Fitted Equation/ Average Rate**	**Total Trip Gen.**	**In %**	**Out %**	**In (vph)**	**Out (vph)**
Multifamily Housing – Low Rise (ITE Code: 220)								
AM	Occupied Dwellings	55	Ln(T) = 0.92 Ln(X) - 0.51	24	20	80	5	19
PM			Ln(T) = 0.98 Ln(X) - 0.52	30	65	35	19	11

* *Trip Generation for AM & PM Peaks was calculated using the methods and equations outlined in the ITE Trip Generation Manual (10Th Ed).*

4.2 Trip Distribution

The proposed Trip Distribution for ingress and egress traffic has been developed using the existing intersection percentage splits and engineering judgement for the AM and PM peak hour scenarios. To generate a worst-case analysis scenario, it was assumed that all of the development traffic would utilize the Queensway and La Salle Avenue intersection to access and leave the site. In actuality, northbound vehicles on Queensway will be able to access the site through the laneway to the north of the property.

It was assumed that the traffic split onto Queensway will be fairly even. During the AM peak, it was assumed that slightly more traffic will be heading to the downtown core than toward Highway 97. In the evening the split was assumed to be 50-50. The Trip Distribution volumes are shown in Figure 3.

4.3 Trip Assignment

Based on the trip distribution percentages and utilizing the trip generation volumes illustrated in Table 1, the Trip Assignment volumes can be calculated. The Trip Assignment volumes are shown in Figure 4.

4.4 2024 Opening Day

Adding the Trip Assignment traffic (Figure 4) to the 2024 Existing Background traffic (Figure 1) results in the 2024 Opening Day traffic shown in Figure 5.

4.5 2039 Total Traffic

Adding the Trip Assignment traffic (Figure 4) to the 2039 Projected Background traffic (Figure 2) results in the 2039 Total Traffic shown in Figure 6.

5.0 CAPACITY ANALYSIS

5.1 Method Analysis

To analyze the performance of the study intersections and calculate the capacity and "level of service" (LOS) of each intersection, Synchro Studio Software (Version 11) has been used. This software was developed by Trafficware Ltd. and is based on the methods and procedures in the Highway Capacity Manual. Computer printouts showing the detailed calculation for each movement at each study intersection are provided in Appendix C.

The concept of "Level of Service" is defined as a qualitative measure describing operational conditions within a traffic stream, and their perception by motorists. A level of service definition generally describes these conditions in terms of factors such as speed and travel time, freedom to maneuver, traffic interruptions, comfort and convenience, and safety. The six levels of service are defined in the Highway Capacity Manual as follows:

- **Level of Service A** represents free flow. Individual users are virtually unaffected by the presence of others in the traffic stream. Freedom to select desired speeds and maneuver within the traffic stream is extremely high. The general level of comfort and convenience provided to the motorist is excellent.

- **Level of Service B** is in the range of stable flow, but the presence of other users in the traffic stream begins to be noticeable. Freedom to select desired speeds is relatively unaffected, but there is a slight decline in the freedom to maneuver within the traffic stream from Level of Service A. The level of comfort and convenience provided is somewhat less than at Level of Service A because the presence of others in the traffic stream begins to affect individual behaviour.

- **Level of Service C** is the range of stable flow but marks the beginning of the range of flow in which the operation of individual users becomes significantly affected by interaction with others in the traffic stream. The selection of speed is now affected by the presence of others and maneuvering within the traffic stream requires substantial vigilance on the part of the user. The general level of comfort and convenience declines noticeably at this level.

- **Level of Service D** represents high-density, but stable, traffic flow. Speed and freedom to maneuver are severally restricted, and the driver experiences a

generally poor level of comfort and convenience. Small increases in traffic flow will generally cause operational problems at this level.

- **Level of Service E** represents operating conditions at, or near, the capacity level. All speeds are reduced to a low, but relatively uniform value. Freedom to maneuver within the traffic stream is extremely difficult and is generally accomplished by forcing a vehicle to "give way" to accommodate such maneuvers. Comfort and convenience levels are extremely poor, and driver or pedestrian frustration is generally high. Operations at this level are usually unstable because small increases in flow and minor perturbations within the traffic stream will cause breakdowns.

- **Level of Service F** is used to define forced or breakdown flow. This condition exists wherever the amount of traffic approaching a point exceeds the amount which can traverse the point. Queues form behind such locations. Operations within the queues are characterized by stop-and-go waves, and they are extremely unstable. Vehicles may progress at reasonable speeds for several hundred feet or more and then be required to stop in a cyclic fashion. The Level oPf Service F is used to describe the operating conditions within the queue, as well as the point of the breakdown.

Levels of Service Criteria, as defined by the Highway Capacity Manual, are illustrated in Table 2.

Table 7 – Level of Service Definitions

Level of Service	Impact on Street Traffic	Unsignalized Intersection Delay(s)	Signalized Intersection Delay(s)
A	Little or no delays	0 – 10	0 – 10
B	Minor delays	10 – 15	10 – 20
C	Average delays	15 – 25	20 – 35
D	Long delays	25 – 35	35 – 55
E	Very long delays	35 – 50	55 – 80
F	Undesirable	> 50	> 80

5.2 Queensway & La Salle Avenue

The Queensway/La Salle Avenue intersection is an unsignalized four-way intersection with a stop condition on La Salle Avenue. Queensway is a four-lane arterial road, and La Salle Avenue is a two-lane local road. Both roads have 50km/hr speed limits.

In addition, there is an overhead pedestrian signal on Queensway that is pedestrian actuated. The crosswalk is located on the north leg of the intersection.

Table 3: Queensway & La Salle Avenue Intersection Analysis Summary

	La Salle				Queensway			
Approach	**EB**		**WB**		**NB**		**SB**	
	LOS	**Delay (s)**	**LOS**	**Delay (s)**	**LOS**	**Delay (s)**	**LOS**	**Delay (s)**
AM Peak								
2024 Existing Background	B	13.1	B	14.2	A	0.1	A	0.8
2024 Opening Day	B	13.5	B	14.1	A	0.1	A	1.2
2039 Projected Background	B	14.9	C	16.9	A	0.1	A	0.9
2039 Total Traffic	C	15.5	C	17.0	A	0.1	A	1.2
PM Peak								
2024 Existing Background	B	13.8	B	11.8	A	0.4	A	0.2
2024 Opening Day	B	14.3	B	12.1	A	0.4	A	0.7
2039 Projected Background	C	15.9	B	13.1	A	0.5	A	0.2
2039 Total Traffic	C	16.7	B	13.7	A	0.5	A	0.7

The analysis shows that all intersection movements operate at a LOS C (average delays) or better during all 2024 and 2039 design scenarios.

6.0 AUXILIARY LANES

Auxiliary lanes, as defined by the Transportation Association of Canada (TAC), “serve as storage lanes, deceleration lanes, or a combination of the two.” They can be used to minimize hazards and inconvenience, increase capacity, and promote operating efficiency where vehicles exit or enter the roadway.

6.1 Left Turn Warrants

The southbound left turning movement was plotted on the Harmelink charts to determine if a warrant for a separate left turn lane is required on Queensway. Based on the plots a separate left turn lane is not required during any of the design horizons.

6.2 Right Turn Deceleration Lane Warrants

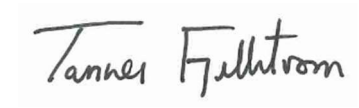
The right turn movement was evaluated to determine if a separate right-turn taper or lane was warranted at the study intersection. In, B.C., the widely accepted method for evaluating right turns is to utilize the "Warrants for Right Turn Treatment," a chart published in the VDOT Access Management Design Standards for Entrances and Intersections manual. Based on the plots a right-turn deceleration lane is not required during any of the design horizons.

7.0 SUMMARY

Based on the analysis, no offsite improvements are required as a result of this development. The development will generate a low traffic volume and will have a negligible effect on the Queensway and La Salle Avenue intersection.

Sincerely,
L&M ENGINEERING LIMITED

Prepared by:



Tanner Fjellstrom, P. Eng.
Associate

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2023-01-31

Reviewed by:

Terry Fjellstrom, P. Eng.
President

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FIG. 1

ATPAR DEVELOPMENT LTD.

2690 QUEENSWAY

PRINCE GEORGE, BC

2024 EXISTING BACKGROUND

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FIG. 2

ATPAR DEVELOPMENT LTD.

2690 QUEENSWAY

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2039 PROJECTED BACKGROUND

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FIG. 3

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FIG. 4

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TRIP ASSIGNMENT

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FIG. 5

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OPENING DAY

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FIG. 6

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TOTAL TRAFFIC

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