1110 Fisher Avenue

Transportation Impact Assessment

[Scoping, Forecasting & Analysis/TIA Strategy Report]

Presented to:

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1.0 INTRODUCTION

The purpose of this *Transportation Impact Assessment (TIA)* report is to investigate the traffic impacts associated with the proposed apartment building located at 1110 Fisher Avenue. This TIA report complied with the City of Ottawa Transportation Impact Assessment Guidelines (June 2017). The screening form assessment indicated that the development does not meet the trip generation trigger but meets the location and safety triggers (Appendix A).

2.0 SCOPING

2.1 EXISTING AND PLANNED CONDITIONS

2.1.1 Proposed Development

Exhibit 2.1 illustrates the proposed apartment building development, which consists of a 62-unit, 9-storey building with 3-levels of underground parking (65 underground stalls: 57 tenant stalls and 8 visitor stalls). The development would be served by a circular driveway along Fisher Avenue (15m from Turnbull School inbound access).

The following provides a brief description of the proposed development:

- **Existing Land Use Permitted**: The existing land is currently zoned as Residential Third Density Zone[1] (R3A [2229]).
- **Relevant Planning Regulations**: The application will be submitted as a zoning amendment application.
- **Estimated Date of Occupancy**: The date of occupancy is unknown at this stage.
- **Planned Phasing of Development**: For the purpose of this traffic study, the site is anticipated to be build-out in a single phase.

1 City of Ottawa Zoning By-law 2008-250

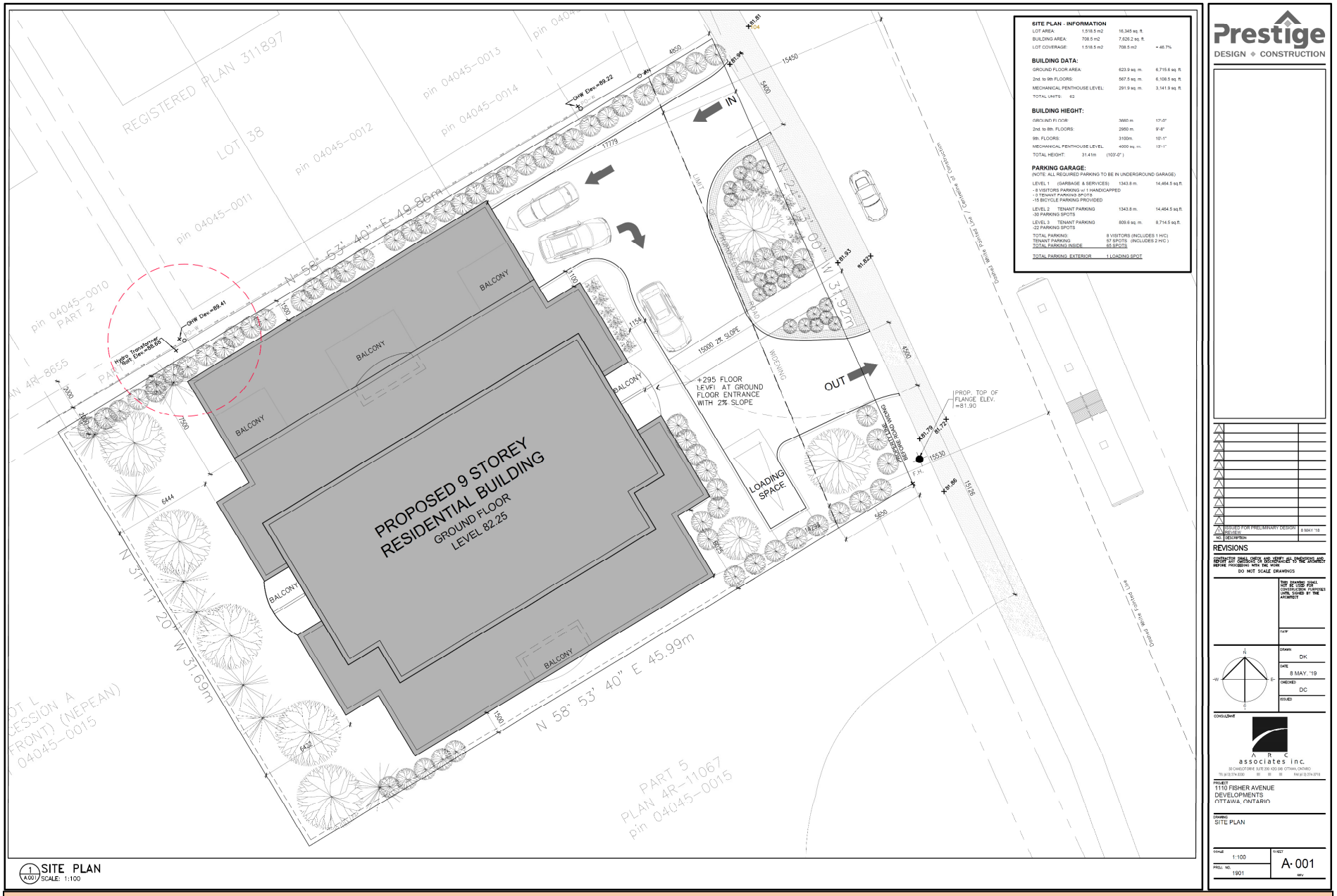


Exhibit 2.1: Proposed Site Plan

2.1.2 Existing Conditions

Study Area Roadways

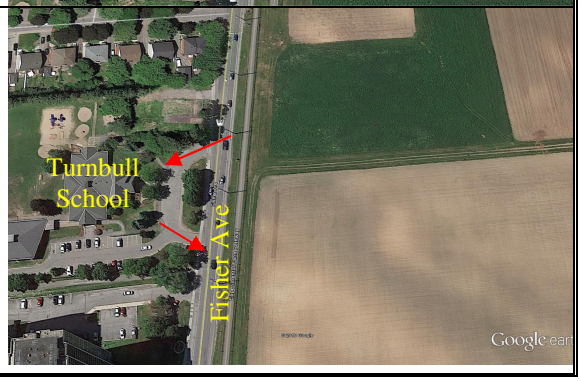
The following provides an overview of the roadways supporting the proposed development:

- *Fisher Avenue* is defined as a north-south arterial roadway that provides for a two-lane cross-section (within the vicinity of the subject site) with a posted speed limit of 50 km/hr. Fisher Avenue flares out to a 4-lane divided cross-section nearest the Baseline Road intersection. A sidewalk is located along the road to the west and the Experimental Farm Pathway runs along the east side between Trent Street and the Windfield Apartments access.
- *Trent Street* is a local two-lane residential roadway where on-street parking is permitted.

Existing Intersections

Table 2.1 below depicts the existing configuration for the study area intersection and accesses.

Table 2.1: Study Area Intersections

Intersections	***Configuration***	***Picture***
Fisher Ave / Trent St	Single lane approach along all direction Dedicated EB-LT along Trent Street Dedicated NB left-turn lane along Fisher Avenue (total length ~120m)	
Fisher Ave / Turnbull School Access	Turnbull School accommodates a circular driveway with an inbound access (located 15 m south from the proposed outbound site access) and an outbound access (43 m south of the inbound access).	

Existing Transit Provisions

OC Transpo's current bus routes in the study area are shown in Exhibit 2.2. In this exhibit, Routes 86 and 89 provide regular service for the study area. There are bus stops in vicinity of the site on either side of Fisher Avenue north and south of Trent Street.

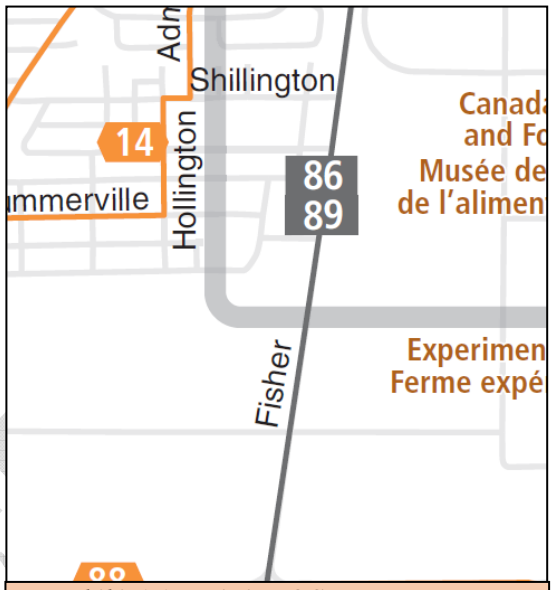


Exhibit 2.2: Existing OC Transpo Routes
(Extract from OC Transpo Dec. 2018 Map)

Existing Cycling Facilities

The City of Ottawa TMP (2013) indicates that Fisher Avenue as a Spine Route. Bike lanes/shoulder lane along Fisher Avenue are provided for the most part to facilitate cyclists. The Experimental Farm Pathway (Major Pathway) also provides an off-road alternative for cyclists.

Existing Pedestrian Facilities

There are sidewalks along the west side of Fisher Avenue with a traffic control signal (Trent Street) north of the proposed site connecting the site to transit stops and recreational opportunities (Experimental Farm Pathway).

Existing Collision Information

Five (5) year (January 1st, 2013 to December 31st, 2017) collision information were reviewed for the study area intersections. The collision information provides the date and time of each collision, the environmental condition at the time of the collision, the type of collision (i.e. angle collision, rear-end), the level of damage involved, vehicle details (truck, passenger vehicle, etc.), vehicle path/maneuver characteristics and the number of pedestrians involved (in the collision).

The following provides a summary of the collisions:

- *Fisher Avenue / Trent Street.*: A total of 8 collisions occurred at this intersection in the past 5 years and 63% (5) of collisions were rear-end collisions. Five resulted in in property damage and three were non-fatal. None of the collisions involved pedestrians.
- *Fisher Avenue Mid-Block (between Trent Street and 220 South of Trent Street)*: A total of 9 collisions occurred at this section of the road intersection in the past 5 years and 56% (5) of collisions were rear-end collisions. Seven resulted in in property damage and two were non-fatal. None of the collisions involved pedestrians.

Existing Traffic Volumes

Recent traffic counts were obtained from the City of Ottawa at the Fisher Avenue / Trent Street intersection (April 4th, 2019 – 6:30am-to-9am & 2:30pm-to-6pm). Exhibit 2.3 illustrates the existing traffic volumes at the intersection, which indicates the dominant direction of traffic is the northbound direction during the morning peak hour. This reverses to the southbound movement during the afternoon peak hour.

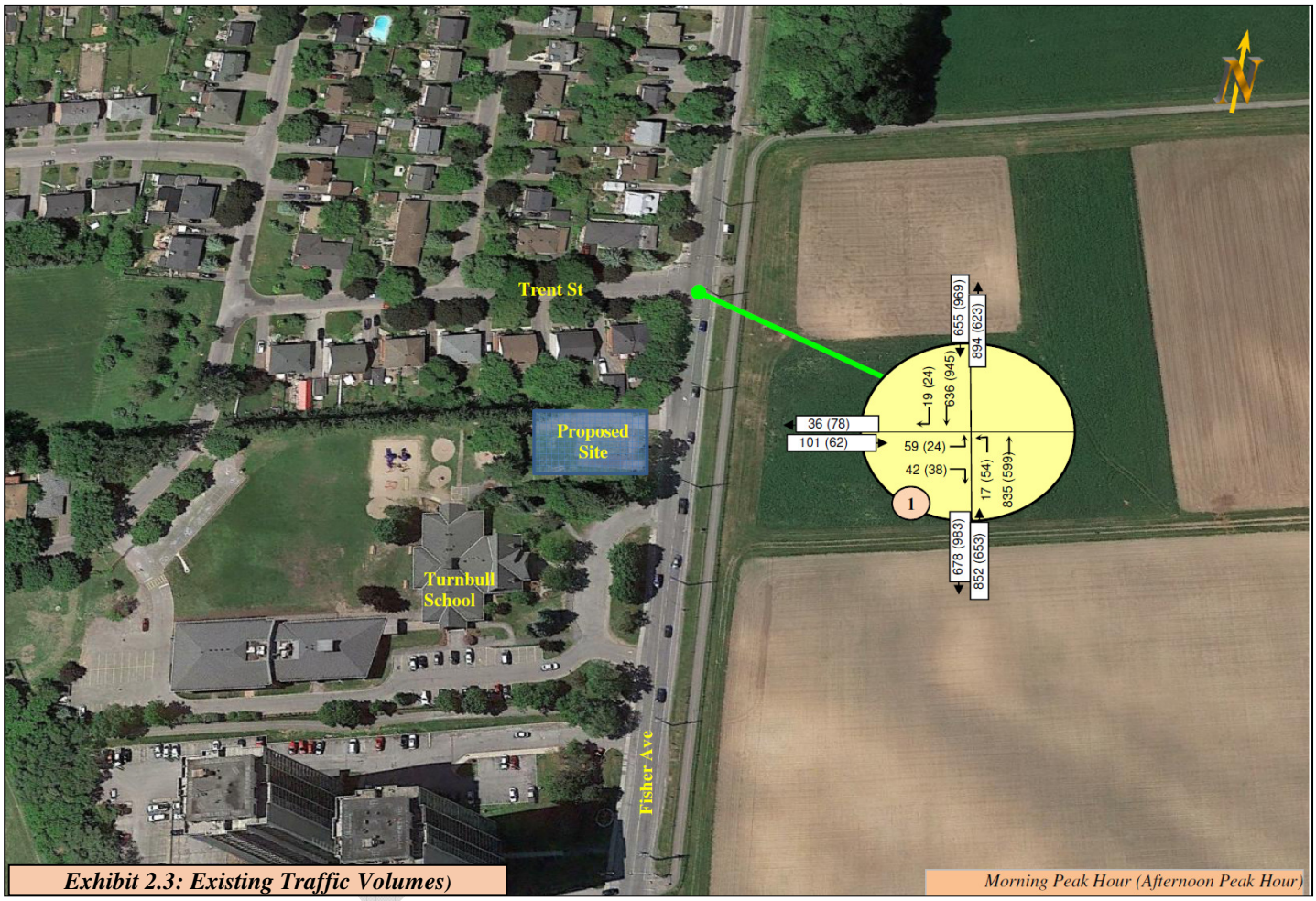


Exhibit 2.3: Existing Traffic Volumes) *Morning Peak Hour (Afternoon Peak Hour)*

2.1.3 Planned Conditions

The Affordable Network in the City of Ottawa TMP (Map 5 Affordable Network) identifies Fisher Avenue as transit priority corridors with isolated measures. This would provide connection to the future Bus Rapid Transit station along Baseline Road and LRT station at Scott Street and Holland Avenue.

Other Adjacent Development Initiatives

A review of other adjacent developments planned within the immediate study area was undertaken on the City of Ottawa's website (development application search) as part of this traffic study. The following summarizes the adjacent developments within the immediate study area:

- ***1132 Fisher Avenue***: The development would consist of 10 2-storey homes fronting Kingston Avenue located behind Turnbull School, north of Experimental Farm and east of Vale Street intersection.
- ***1305 Summerville Avenue***: The development would consist of 3-storey low-rise apartments building that would accommodate 18 units. The development would be located about 700m west of the proposed 1110 Fisher Avenue.
- ***966, 968 and 974 Fisher Avenue***: The development would consist of 2-buildings each accommodating 19 units (total 38 units). This development is located about 530m north of the proposed 1110 Fisher Avenue.

The above developments are anticipated to have negligible traffic impacts along Fisher Avenue fronting the proposed site.

2.2 Study Area and Time Periods

2.2.1 Study Area

The study would analyze the following intersections:

- Fisher Avenue / Trent Street (traffic control signal); and
- Fisher Avenue / Proposed Site Access.

The TIA will also comment on the interaction between Turnbull School accesses and the proposed site access.

Time Periods

The study will analyze two-time periods (morning and afternoon peak hours) of travel demand as they were envisioned to represent the "worst-case" scenario in terms of traffic volumes.

2.2.2 Horizon Years

The traffic study will analyze the build-out horizon year only given the trip generation triggers were not met.

2.3 Exemption Review

Table 2.2 is an extract from the TIA Guidelines (2017) in regards to possible reduction in scope of work of the traffic study. We would request the City to exempt sections 4.1.3, 4.2.2 and 4.5-thru-4.9 (given trip generation triggers are not met - Network Impact Component is not required for this TIA) from the TIA report.

Table 2.2: Extract from TIA Guidelines (2017)

Module	Element	Exemption Considerations	Include Module In TIA
Design Review Component			
4.1 Development Design	**4.1.2 Circulation and Access**	• Only required for site plans	Yes
	4.1.3 New Street Networks	• Only required for plans of subdivision	No
4.2 Parking	**4.2.1 Parking Supply**	• Only required for site plans	Yes
	4.2.2 Spillover Parking	• Only required for site plans where parking supply is 15% below unconstrained demand	No
Network Impact Component			
4.5 Transportation Demand Management	**All elements**	• Not required for site plans expected to have fewer than 60 employees and/or students on location at any given time	No
4.6 Neighbourhood Traffic Management	**4.6.1 Adjacent Neighbourhoods**	• Only required when the development relies on local or collector streets for access and total volumes exceed ATM capacity thresholds	No
4.8 Network Concept		• Only required when proposed development generates more than 200 person-trips during the peak hour in excess of the equivalent volume permitted by established zoning	No

3.0 Forecasting

3.1 Development-Generated Travel Demand

The following sections represents the traffic forecasting methodology.

3.1.1 Trip Generation and Mode Shares

The TRANS Trip Generation Study (2009) was used to determine the site traffic volumes for the proposed development. Table below is an extract from the TRANS Trip Generation Study.

Table 6.3: Recommended Vehicle Trip Generation Rates for Residential Land Uses with Transit Bonus

Recommended Vehicle Trip Generation Rates with Transit Bonus AM and PM Peak Hours									
ITE Land Use Code	Geographic Area / Dwelling Unit Type		Vehicle Trip Rate						
			Core		Urban (Inside the Greenbelt)		Suburban (Outside the Greenbelt)		Rural
			Base Rate	< 600m to Rapid Transit	Base Rate	< 600m to Rapid Transit	Base Rate	< 600m to Rapid Transit	Base Rate
210	Single-detached dwellings	AM	0.40	0.31	0.67	0.50	0.70	0.49	0.62
		PM	0.60	0.33	0.76	0.57	0.90	0.63	0.92
224	Semi-detached dwellings, townhouses, rowhouses	AM	0.34	0.34	0.51	0.50	0.54	0.39	0.62
		PM	0.39	0.38	0.51	0.51	0.71	0.51	0.67
231	Low-rise condominiums (1 or 2 floors)	AM	0.34	0.34	0.50	0.50	0.60	0.60	0.71
		PM	0.29	0.29	0.49	0.49	0.66	0.66	0.72
232	High-rise condominiums (3+ floors)	AM	0.26	0.26	0.38	0.38	0.46	0.46	0.54
		PM	0.20	0.20	0.34	0.34	0.46	0.46	0.50
233	Luxury condominiums	AM	0.31	0.31	0.45	0.45	0.55	0.55	0.65
		PM	0.24	0.24	0.40	0.40	0.55	0.55	0.59
221	Low-rise apartments (2 floors)	AM	0.21	0.21	0.31	0.31	0.37	0.37	0.44
		PM	0.20	0.20	0.34	0.34	0.46	0.46	0.50
223	Mid-rise apartments (3-10 floors)	AM	0.17	0.17	0.24	0.24	0.29	0.29	0.35
		PM	0.16	0.16	0.28	0.28	0.37	0.37	0.41
222	High-rise apartments (10+ floors)	AM	0.17	0.17	0.24	0.24	0.29	0.29	0.35
		PM	0.16	0.16	0.27	0.27	0.36	0.36	0.39

The proposed development falls within the Urban (Inside the Greenbelt) area. The ITE land use code 223 was used to determine the automobile trip generation:

- 62 units x 0.24 = 15 vehicle trips during the AM peak hour; and
- 62 units x 0.28 = 17 vehicle trips during the PM peak hour.

Once the vehicle trip generations were determined, the vehicle trips were converted to persons-trip using the table below (Table 3.13 from 2009 Trans Trip Generation Study).

- *Apartment*: 15 vehicle trips / 0.37 = 41 persons-trip during the morning peak hour and 17 vehicle trips / 0.40 = 43 persons-trip during the afternoon peak hour.

Table 3.13: Mode Shares - (all households with residents not older than 55 years of age)

Reported Mode Shares
All Households with persons 55 years of age or less
AM and PM Peak Hours

Geographic Areas / Dwelling Unit Types		Core Area			Urban Area (Inside the greenbelt)			Suburban (Outside the greenbelt)			Rural *			All Areas		
		Vehicle Trips	Transit Share	Non-Motorised	Vehicle Trips	Transit Share	Non-Motorised	Vehicle Trips	Transit Share	Non-Motorised	Vehicle Trips	Transit Share	Non-Motorised	Vehicle Trips	Transit Share	Non-Motorised
Single - Detached:	AM	35%	20%	33%	51%	26%	11%	55%	25%	9%	60%	27%	4%	54%	25%	10%
	PM	45%	11%	32%	58%	19%	13%	64%	19%	6%	73%	13%	2%	63%	17%	8%
Semi-Detached:	AM	38%	30%	26%	44%	35%	10%	52%	24%	12%	64%	27%	5%	49%	28%	12%
	PM	36%	20%	34%	51%	27%	13%	62%	17%	7%	77%	12%	1%	58%	20%	10%
Row / Townhouse:	AM	33%	22%	40%	45%	34%	10%	55%	27%	8%	73%	15%	3%	49%	30%	11%
	PM	39%	15%	42%	53%	28%	8%	61%	22%	6%	74%	15%	1%	57%	24%	9%
Apartment:	AM	27%	27%	43%	37%	41%	14%	44%	34%	13%	76%	8%	16%	36%	35%	23%
	PM	23%	29%	42%	40%	37%	14%	44%	33%	9%	48%	4%	17%	35%	33%	23%
All Types:	AM	32%	24%	38%	47%	31%	11%	54%	26%	9%	61%	26%	4%	51%	27%	11%
	PM	34%	21%	38%	53%	24%	12%	62%	20%	6%	73%	13%	2%	59%	20%	10%

Note: Percentages do not necessarily sum to 100% as the proportion of automobile passengers have not been tabulated. Vehicle trips reflect the percentage of vehicle drivers.
* - Rural area sample size is extremely low and mode shares are highly influenced by school types where public transportation levels are high during the AM versus the PM peaks.

The 2011 Trans OD Survey Report was reviewed to get an understanding of the existing travel mode shares for the Merivale Area (within the location of the proposed development). Table 3.1 depicts the existing and future travel demand for the study area:

***Table 3.1 Future Travel Mode Share Targets** [Table 5 of the TIA]*

Mode Share	Existing Mode Share		Future Mode Share	Rationale
	AM Peak	PM Peak	AM/PM	
Auto Driver	53%	59%	55%	Auto mode share assumed to be on average similar/close to the existing condition
Auto Passenger	11%	14%	12%	
Transit	26%	19%	25%	For analysis purposes, transit share was assumed to remain close to existing condition. Transit share could increase in future: • Fisher Avenue (transit priority corridor) providing connection to the LRT line / station (3km north of the proposed site). • Fisher Avenue provides connection to the future BRT line/station (1km south of the proposed site)
Walking	2%	3%	3%	
Cycling	3%	3%	3%	
Other	5%	2%	2%	

The future travel mode share split was applied to the proposed development. Table 3.2 below depicts the total trips generated for each mode share. The auto mode was determined to be less than 30 vph during the peak hour of travel demand.

Table 3.2: Site Traffic Volumes by Mode Share

Travel Mode	*Mode Share*	*AM*			*PM*		
		In	*Out*	*Total*	*In*	*Out*	*Total*
Auto Driver	55%	6	17	23	15	9	24
Auto Passenger	12%	1	4	5	3	2	5
Transit	25%	3	7	10	7	4	11
Walking	3%	0	1	1	1	0	1
Cycling	3%	0	1	1	1	0	1
Others	2%	0	1	1	1	0	1
Total Person Trips	100%	10	31	41	28	15	43
Net Auto Trips		***6***	***17***	***23***	***15***	***9***	***28***

Directional split was referenced from ITE 10th Edition, Land Use 221

- AM: 26% In / 74% Out
- PM: 61% In / 39% Out

3.1.2 Trip Distribution & Assignment

The site traffic volumes were distributed according to the existing travel patterns along Fisher Avenue. It was assumed that about 55% of the site traffic volumes would head to/from north and the remaining to/from south along Fisher Avenue. Based on the above rationale, the trips were distributed and assigned on the road network as illustrated in Exhibit 3.1.

3.2 Background Network Travel Demands

This section of the forecasting report outlines the background network travel demand assumptions.

3.2.1 Transportation Network Plans

As noted in Section 2.1.3 of this TIA, the Affordable Network in the City of Ottawa TMP (Map 5 Affordable Network) identifies Fisher Avenue as transit priority corridors with isolated measures. This would provide connection to the future Bus Rapid Transit station along Baseline Road and LRT station at Scott Street and Holland Avenue.

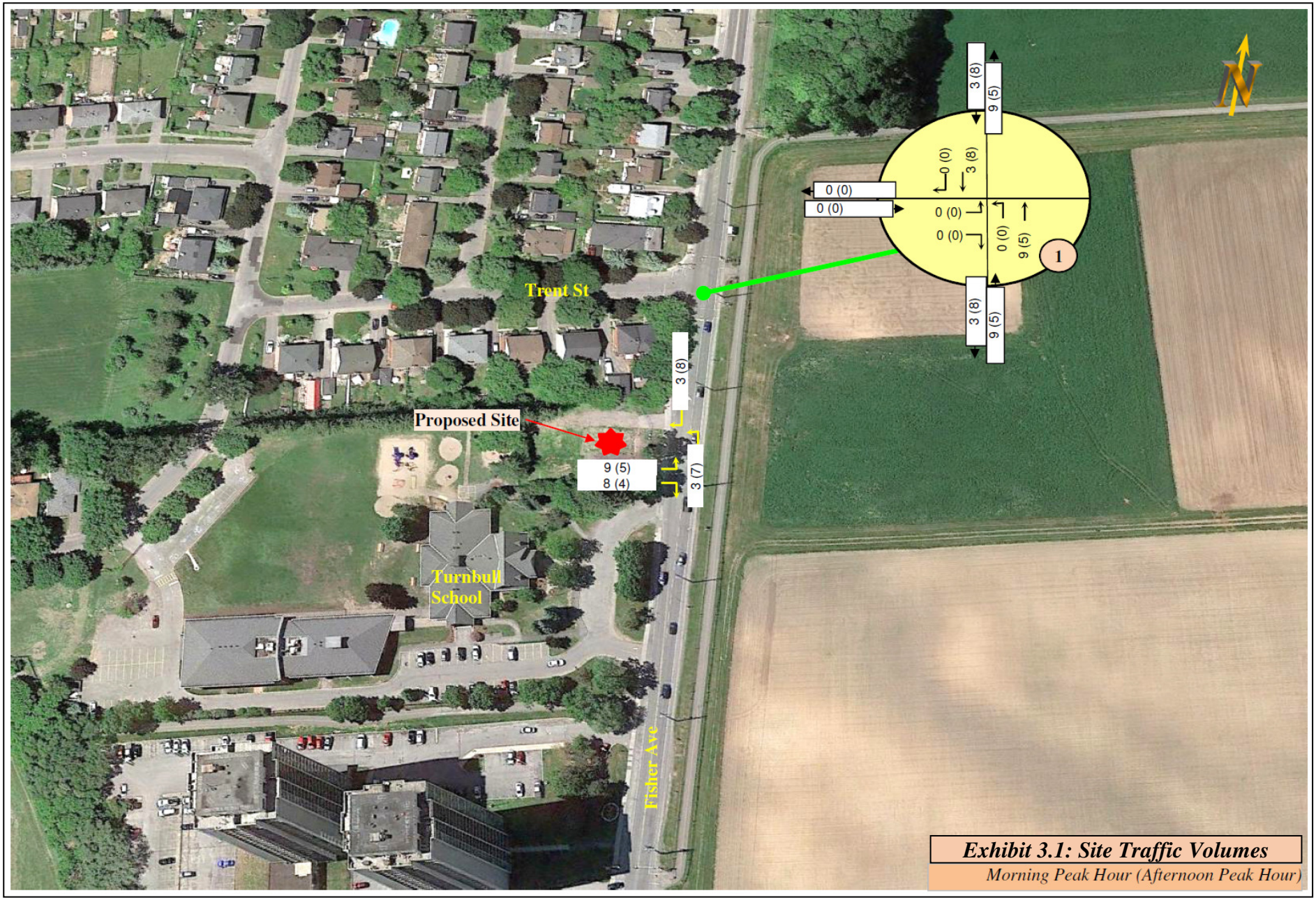


Exhibit 3.1: Site Traffic Volumes

Morning Peak Hour (Afternoon Peak Hour)

3.2.2 General Background Growth

The Transportation Master Plan population growth for the Inner Suburbs was reviewed to determine the general growth within the study area. It was determined that on average the annual growth within the Inner Suburbs is less than 1 percent. To remain conservative, a one percent annual growth was applied along Fisher Avenue through movements. Appendix "C" illustrates the background traffic volumes.

3.2.3 Other Area Development

Section 2.1.3 (Other Adjacent Developments) identifies the new adjacent developments within the study area. These adjacent developments are anticipated to have negligible impact along Fisher Avenue within the vicinity of the proposed site.

3.3 DEMAND RATIONALIZATION

This section rationalizes the assumed future travel demands for the study area to determine if there are any auto capacity limitations of the transportation network. The initial projections (for analysis purposes assumed build-out to be 2021) indicates that the proposed site is anticipated to generate less than 30 vph during the peak hour of travel demand (See Exhibit 3.1). This translates to an average of a single vehicle every two minutes. This is anticipated to result in negligible traffic impacts on the study area intersections and corridors.

4.0 ANALYSIS / TIA STRATEGY

4.1 DEVELOPMENT DESIGN

This section of the report reviews the transportation network elements within the vicinity of the proposed site to ensure they provide efficient access for all users.

4.1.1 Design for Sustainable Modes

The proposed site is located within the urban area (inside the greenbelt area) along Fisher Avenue, which is a transit priority corridor. This would provide connection to the future Bus Rapid Transit station along Baseline Road and LRT station at Scott Street and Holland Avenue. There are bus stops along Fisher Avenue located immediately adjacent and across from the proposed site. Sidewalks are available along Fisher Avenue to facilitate pedestrians to/from the bus stops. A traffic signal control intersection (Trent Street) would facilitate pedestrian crossings from/to the bus stop across from the site.

The proposed development also provides 31 covered and secured bike stalls to further encourage non-auto mode share. There is a major pathway across from the proposed site that provides off-road alternative for cyclists.

4.1.2 Circulation and Access

Loading, short term delivery, emergency vehicle access and garbage pick-ups would be accommodated within the circular internal driveway of the site. Parking for tenants and visitors is provided underground.

4.2 PARKING

4.2.1 Parking Supply

The City of Ottawa Zoning By-Law[2] requires the following parking stalls to be provided for the proposed development:

- *Residential Tenant Parking*: The City's By-law requires a rate of 0.5 stalls-per-unit within the Area "X" (Inner Urban). This translates to a parking requirement of 31 stalls [0.5 x 62 units]. The proposed site provides for a total of 57 tenant stalls, which exceed the City of Ottawa Zoning By-law.
- *Residential Visitor Parking*: The City's By-law requires a rate of 0.1 stalls-per-unit within the Area "X" for visitors. This translates to a parking requirement of 6 stalls [0.1 x 62 units]. The proposed site exceeds the City of Ottawa By-law for visitor parking requirement (8 visitor stalls provided).
- *Residential Bicycle Stalls*: The City's By-law requires a rate of 0.5 stalls-per-unit for Bicycle parking. This translates to a bicycle parking requirement of 31 stalls (0.5 x 62 units) for residents. The proposed site provides for 31 bike stalls, which meets the City's By-law.

4.3 BOUNDARY STREET DESIGN

Mobility: Multi-Modal Level of Service (MMLOS) Analysis

The Multi-Modal Level of Service (MMLOS) guidelines was used to evaluate the segment level of service for all mode of transportation (pedestrians, cyclists, transit, trucks) within the immediate study area. The boundary street Fisher Avenue (which fronts the proposed site) in the vicinity of the site was reviewed as per the segment MMLOS guidelines.

2 Zoning By-Law 2008-250 – Parking, Queuing and Loading Provisions (Sections 100-114)

1) Pedestrian LOS

Fisher Avenue appears to have a 2m wide sidewalk on the west side of corridor in the vicinity of the proposed site. A major pathway also exists east of the corridor with a width of about 3m. This results in a Pedestrian LOS "C[3]".

2) Bicycle LOS

For the most part in the vicinity of the proposed site, bike lanes/shoulder lanes are provided along Fisher Avenue. There is also a major pathway east of the corridor that provides off-road alternative for cyclists. The BLOS varies along this corridor, with major pathway scoring LOS "A" and bike lanes scoring LOS "C[4]".

3) Transit LOS

Fisher Avenue is an arterial roadway that accommodates multiple driveways and accesses serving the surrounding residential developments. Bus routes 86 and 89 provide service along the corridor to the surrounding residents. The TLOS for the roadway segment is difficult to predict in this situation. However, despite multiple driveways and accesses, it should be appreciated that:

- There is no on-street parking along Fisher Avenue in the vicinity of the proposed development; and
- Fisher Avenue is designated as a transit priority corridor that could improve travel times for transit services along this corridor in the future.

Based on the above and the facility type[5], the TLOS can be predicted to be "E" with potential improvement to travel times in the future.

4) Truck LOS

The truck LOS for the segment of the Fisher Avenue was evaluated based on Exhibit 20 of the MMLOS Guidelines. The result indicated that the corridor exhibit TkLOS "C" given the wide pavement width (<= 3.5m).

5) Summary of MMLOS

Table 4.2 depicts the MMLOS for all modes of transportation for the study area corridors and provides a comparison to the target LOS shown in the MMLOS guidelines[6].

3 Multi-Modal Level of Service (MMLOS), Exhibit 4 – PLOS Segment Evaluation Table
4 Multi-Modal Level of Service (MMLOS), Exhibit 11 – BLOS Segment Evaluation Table
5 Multi-Modal Level of Service (MMLOS), Exhibit 15 – TLOS Segment Evaluation Table
6 Multi-Modal Level of Service Guidelines, September 15th, 2015 Exhibit 22, General Urban Area

Table 4.2: Segment MMLOS Summary

Intersections	Pedestrian (PLOS)		Bicycle (BLOS)[1]		Transit (TLOS)[2]		Truck (TkLOS)	
	PLOS	Target	BLOS	Target	TLOS	Target	TkLOS	Target
Fisher Ave	C	C	A/C	C	E	D	C	D

1- Exhibit 22 – Minimum Desirable MMLOS Targets: Target BLOS" C" is based on Spine Route designation. As indicated earlier, the BLOS is "A" with the advent of a major pathway and BLOS "D" assuming bike lanes/shoulder lane.
2- Exhibit 22 – Minimum Desirable MMLOS Targets: Minimum target could be achieved once Transit Priority are implemented.
3- If the smallest sidewalk width is selected, a PLOS "D" is achieved. However, some section would achieve a PLOS "C".

All modes of transportation meet or exceed the target (where available) assuming the General Urban Area except Transit LOS. However, this could be met with implementation of transit priority measures that would potentially reduce travel times along Fisher Avenue.

Road Safety

Existing collision information were reviewed in Section 2.1.2. It was determined that no patterns (a pattern is more than 6 collisions in the same direction and impact type) were identified in the past 5-years.

Sightlines were also reviewed as part of this study along Fisher Avenue. It should be appreciated that Fisher Avenue is:

- characterized, for the most part, as a straight segment road;
- relatively low posted speed (50 km/hr.); and
- accommodates multiple accesses and private approaches.

Therefore, sightlines are not anticipated to be a concern for the proposed site access.

Neighbourhood Traffic Management (NTM)

The proposed site is forecasted to add less than 20 vph in the peak direction of peak hour along the study area roads. This translates on average to a single vehicle every 2-to-3 minutes in the peak direction of peak hour. Therefore, the proposed site traffic volumes are not anticipated to result in significant impact on traffic operation.

4.4 Access Intersection Design

4.4.1 Location and Design of Access

The site proposes a one-way circular driveway (See Exhibit 2.1) that provides access to the underground garage and also for drop-offs/pick-ups. The proposed outbound access would be located approximately 15m north of Turnbull School inbound access. This meets the City of Ottawa Private Approach By-law[7] of 15m requirement. The inbound site access

7 Private Approach By-Law No. 2003-447 Section 25(1)(m)(ii)

would be placed about 35m south of the Trent Street traffic control signal intersection. This also meets the separation requirement between a private approach and an intersection. The distance between the underground parking garage door and the sidewalk is approximately 18m, which provides sufficient throat length[8] storage for cars within the site.

The proposed site also has a frontage of approximately 32m, which meets the number of private approaches permitted[9].

4.4.2 Intersection Control

This is a private access where vehicles would yield to traffic along Fisher Avenue before entering the traffic stream.

4.4.3 Intersection Design and Analysis

Synchro 10™ software was used to analyze the traffic control Trent Street intersection for both morning and afternoon peak hours of travel demand. For the purpose of this analysis, a volume to capacity (v/c) ratio greater than 0.90 was considered unsatisfactory.

Table 4.1: Forecast (Build-out) Intersection Capacity Analysis Results

Intersections		Morning Peak Hour			Afternoon Peak Hour		
		Overall LOS	*Critical Approach*		*Overall LOS*	*Critical Approach*	
			Movement	*LOS, V/C*		*Movement*	*LOS, V/C*
Fisher Ave / Trent St	Existing	A	EB-LT NB-TH	D, 0.30 A, 0.66	A	EB-LT SB-TH	D, 0.14 A, 0.70
	Forecast	A	EB-LT NB-TH	D, 0.30 A, 0.68	A	EB-LT SB-TH	D, 0.14 A, 0.72

The intersection was found to operate at a satisfactory level of service during both peak hours of travel demand assuming existing and forecast build-out conditions. The MMLOS was also evaluated for the Fisher Ave / Trent Street intersection. The results indicated that the pedestrian and Bicycle LOS were found to be "C" and "B" respectively. Appendix "D" illustrates the detailed level of service analysis.

Site Access/Egress Operations

The site generated traffic volumes are anticipated to be low (23 vehicles in the morning and 28 in the afternoon, with no more than 20 vehicles in the peak direction). Therefore, the impact to the supporting roadway network is anticipated to be negligible.

8 *Geometric Design Guide for Canadian Roads – June 2017*, Table 8.9.3 for Apartments less than 100 units fronting an Arterial Road
9 Private Approach By-law No. 2003-447 (20 m to 34 m of frontage, one (1) two-way private approach or two (2) one-way private approaches)

Delays could be experienced by residents wishing to exit left out of the site (the eastbound left-turn) due to the existing high volume of traffic (1,500-to-1,600 vph two-way) along Fisher Avenue. However, it should be noted that:

- this movement is forecast to be low, with only 9 vph in the morning and 5 vph in the afternoon peak hours wishing to complete the EB-LT out of the site. This translates to a single vehicle every 7-to-12 minutes wishing to complete the maneuver; and
- the low posted speed along Fisher Avenue, the courtesy of Fisher Avenue through-traffic, and the close proximity to the Trent Street signalized intersection (i.e. vehicles stopped at the red light) all combine to facilitate the occurrence of sufficient gaps for vehicles wishing to complete the EB-LT maneuver out of the proposed site.

Queue Analysis

A) Interactions between Site Access and Trent Street Signalized intersection

The proximity of the site access to the Trent Street traffic control signal was evaluated (the proposed inbound site access is located 35m south of Trent Street with the outbound access is located 55m south of Trent Street). The northbound (NB) thru queue at the Trent Street/Fisher Avenue intersection was determined to be 120 m in the morning peak hour of travel demand. On occasions the NB thru queue could extend beyond the proposed site access and up the Turnbull School access during the traffic signal "red" north-south phase. However, given the low traffic volumes entering/egressing the site during the peak hour, the probability of occurrence and significant delay to the site traffic volumes is anticipated to be low.

As regards to the NB left-turn queue at the intersection of Trent Street, this is not anticipated to block the access/egress to the proposed site during the traffic signal "red" N-S phase. In addition, the number of vehicles wishing to turn left into the proposed development was determined to be low (3 vehicles in the morning and 7 in the afternoon peak hours).

B) Impacts to Turnbull School

The impacts of the proposed site access on the Turnbull School access was evaluated. It is understood that school buses do not access the site via the Fisher Avenue intersection, but rather use the Kingston Avenue-Chevrier Street access to the west of the school. It should be emphasized that the peak period of demand during the afternoon for the school (latest dismissal at 3:30pm) does not coincide with the peak period of traffic along Fisher Avenue (4:00-to-5:00 pm). Traffic operations were analyzed using a *worst-case* scenario where the peak traffic entering/exiting the school was forced to coincide with the peak period of travel demand on Fisher Avenue. An analysis was undertaken to determine the potential for northbound vehicle

traffic wishing to access the proposed residential development to queue beyond the Turnbull School access.

- The distance between the school inbound access and the proposed residential development inbound access is approximately 35m.
- The potential queue of the northbound left-turn into the development (3 vehicles in the morning and 7 in the afternoon) represents a queue length of a single vehicle. A single vehicle in the northbound direction would require approximately 7m of storage.

The analysis indicates that there is sufficient separation between the Turnbull School access and the proposed site access to assure that the queue into the development will not affect the Turnbull School access.

5.0 SUMMARY OF FINDINGS

The TIA report yields the following findings:

- The proposed site traffic volumes are not anticipated to result in significant impact on traffic operation.
- The proposed access location meets the city's Private Approach By-law.
- Delays could be experienced by residents wishing to exit left out of the site due to the existing high volume of traffic along Fisher Avenue. However, it should be noted that:
  a. this movement is forecast to be low, with only 9 vph in the morning and 5 vph in the afternoon peak hours wishing to complete the EB-LT out of the site. This translates to a single vehicle every 7-to-12 minutes wishing to complete the maneuver; and
  b. the low posted speed along Fisher Avenue, the courtesy of Fisher Avenue through-traffic, and the close proximity to the Trent Street signalized intersection (i.e. vehicles stopped at the red light) all combine to facilitate the occurrence of sufficient gaps for vehicles wishing to complete the EB-LT maneuver out of the proposed site.
- All modes of transportation meet or exceed the target assuming the General Urban Area except Transit LOS. However, this could be met with implementation of transit priority measures that would potentially reduce travel times along Fisher Avenue.
- Queue lengths at the intersection of Trent St / Fisher Ave are not anticipated to adversely impact the operation of the proposed site.

The result indicate that no improvements or modifications are required to the existing transportation infrastructure as a result of the proposed development.

Yours Truly,

Arman Matti

Arman Matti, P. Eng.
Sr. Transportation Engineer

Appendix A

Screening Form

Castleglenn Consultants
Engineers, Project Managers & Planners

2460 Lancaster Road, Suite 200,
Ottawa, Ontario, K1B 4S5
Tel: 613-731-4052

City of Ottawa 2017 TIA Guidelines Screening Form

Mr. Wally Dubyk
Project Manager, City of Ottawa
110 Laurier Avenue West,
Ottawa, ON, K1G 6J9

April 3rd, 2019

Please see below the completed screening form for the proposed apartment development located at 1110 Fisher Avenue.

1. Description of Proposed Development

Municipal Address	1110 Fisher Avenue
Description of Location	Fronts Fisher Avenue south of Trent Street
Land Use Classification	Residential
Development Size (units)	62 units
Development Size (m^2)	NA
Number of Accesses and Locations	A single access from Fisher Ave
Phase of Development	Unknown at this stage
Buildout Year	Unknown

2. Trip Generation Trigger

The development will consist of 70 units consisting of 9 storeys with 3-levels of underground garage.

Land Use Type	Development Size
Apartment Building	62 units

The proposed development size is less than the minimum development threshold size (of 90 units) for apartment developments and therefore, <u>the Trip Generation Trigger is not satisfied.</u>

Table 2: Trip Generation Trigger

Land Use Type	Minimum Development Size
Single-family homes	40 units
Townhomes or apartments	90 units
Office	3,500 m^2
Industrial	5,000 m^2
Fast-food restaurant or coffee shop	100 m^2
Destination retail	1,000 m^2
Gas station or convenience market	75 m^2

Castleglenn Consultants
Engineers, Project Managers & Planners

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Tel: 613-731-4052

3. Location Triggers

	Yes	No
Does the development propose a new driveway to a boundary street that is designated as part of the City's Transit Priority, Rapid Transit or Spine Bicycle Networks?	X	
Is the development in a Design Priority Area (DPA) or Transit-oriented Development (TOD) zone? *		X

**DPA and TOD are identified in the City of Ottawa Official Plan (DPA in Section 2.5.1 and Schedules A and B; TOD in Annex 6). See Chapter 4 for a list of City of Ottawa Planning and Engineering documents that support the completion of TIA).*

Fisher is a transit priority corridor and a spine route. Therefore, the Location Trigger is satisfied.

4. Safety Triggers

	Yes	No
Are posted speed limits on a boundary street are 80 km/hr or greater?		X
Are there any horizontal/vertical curvatures on a boundary street limits sight lines at a proposed driveway?		X
Is the proposed driveway within the area of influence of an adjacent traffic signal or roundabout (i.e. within 300 m of intersection in rural conditions, or within 150 m of intersection in urban/ suburban conditions)?	X	
Is the proposed driveway within auxiliary lanes of an intersection?	X	
Does the proposed driveway make use of an existing median break that serves an existing site?		X
Is there is a documented history of traffic operations or safety concerns on the boundary streets within 500 m of the development?		X[1]
Does the development include a drive-thru facility?		X

1- To best of Castleglenn's Knowledge, we are not aware at this time of traffic operations or safety concerns within the study area. The study will review collision history within the immediate study area (from Trent Street to the next southern signalized intersection at 1140 Fisher Ave) to determine any traffic operation concerns.

The proposed driveway is within the area of influence of an adjacent traffic signal (Trent Street), therefore, the Safety Trigger is satisfied.

2460 Lancaster Road, Suite 200,
Ottawa, Ontario, K1B 4S5
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5. Summary

	Yes	No
Does the development satisfy the Trip Generation Trigger?		X
Does the development satisfy the Location Trigger?	X	
Does the development satisfy the Safety Trigger?	X	

Please review the above screening information and let us know your comments or questions before proceeding to the next step of the TIA (Scoping Report).

Yours Truly,

Arman Matti

Arman Matti, P.Eng.
Sr. Transportation Engineer
Castleglenn Consultants Inc.

Appendix B

TDM Supportive Development Design and Infrastructure Checklist

TDM-Supportive Development Design and Infrastructure Checklist:
Residential Developments (multi-family or condominium)

Legend

REQUIRED	The Official Plan or Zoning By-law provides related guidance that must be followed
BASIC	The measure is generally feasible and effective, and in most cases would benefit the development and its users
BETTER	The measure could maximize support for users of sustainable modes, and optimize development performance

		TDM-supportive design & infrastructure measures: *Residential developments*	Check if completed & add descriptions, explanations or plan/drawing references
	1.	**WALKING & CYCLING: ROUTES**	
	1.1	**Building location & access points**	
BASIC	1.1.1	Locate building close to the street, and do not locate parking areas between the street and building entrances	☒ Building facing Fisher Ave and parking is underground
BASIC	1.1.2	Locate building entrances in order to minimize walking distances to sidewalks and transit stops/stations	☒ Bus stop located in front of the building
BASIC	1.1.3	Locate building doors and windows to ensure visibility of pedestrians from the building, for their security and comfort	☒ Building frontage includes windows
	1.2	**Facilities for walking & cycling**	
REQUIRED	1.2.1	Provide convenient, direct access to stations or major stops along rapid transit routes within 600 metres; minimize walking distances from buildings to rapid transit; provide pedestrian-friendly, weather-protected (where possible) environment between rapid transit accesses and building entrances; ensure quality linkages from sidewalks through building entrances to integrated stops/stations *(see Official Plan policy 4.3.3)*	☒ Bus stop located adjacent to the proposed building
REQUIRED	1.2.2	Provide safe, direct and attractive pedestrian access from public sidewalks to building entrances through such measures as: reducing distances between public sidewalks and major building entrances; providing walkways from public streets to major building entrances; within a site, providing walkways along the front of adjoining buildings, between adjacent buildings, and connecting areas where people may congregate, such as courtyards and transit stops; and providing weather protection through canopies, colonnades, and other design elements wherever possible *(see Official Plan policy 4.3.12)*	☒ Sidewalks available along Fisher Ave; building faces Fisher Ave

TDM-supportive design & infrastructure measures: *Residential developments*			Check if completed & add descriptions, explanations or plan/drawing references
REQUIRED	1.2.3	Provide sidewalks of smooth, well-drained walking surfaces of contrasting materials or treatments to differentiate pedestrian areas from vehicle areas, and provide marked pedestrian crosswalks at intersection sidewalks *(see Official Plan policy 4.3.10)*	☒ Sidewalks availalble along Fisher Ave; traffic control signal north of the site
REQUIRED	1.2.4	Make sidewalks and open space areas easily accessible through features such as gradual grade transition, depressed curbs at street corners and convenient access to extra-wide parking spaces and ramps *(see Official Plan policy 4.3.10)*	☒ Sidewalks available along Fisher Ave
REQUIRED	1.2.5	Include adequately spaced inter-block/street cycling and pedestrian connections to facilitate travel by active transportation. Provide links to the existing or planned network of public sidewalks, multi-use pathways and on-road cycle routes. Where public sidewalks and multi-use pathways intersect with roads, consider providing traffic control devices to give priority to cyclists and pedestrians *(see Official Plan policy 4.3.11)*	☒ Sidewalk west of Fisher Ave; major pathway opposite the proposed site; traffic control signal just north of the proposed site
BASIC	1.2.6	Provide safe, direct and attractive walking routes from building entrances to nearby transit stops	☒ Direct walking route to transit stops via sidewalks
BASIC	1.2.7	Ensure that walking routes to transit stops are secure, visible, lighted, shaded and wind-protected wherever possible	☒ Walking routes have adequate street lights and visibility
BASIC	1.2.8	Design roads used for access or circulation by cyclists using a target operating speed of no more than 30 km/h, or provide a separated cycling facility	☐ NA
	1.3	**Amenities for walking & cycling**	
BASIC	1.3.1	Provide lighting, landscaping and benches along walking and cycling routes between building entrances and streets, sidewalks and trails	☐
BASIC	1.3.2	Provide wayfinding signage for site access (where required, e.g. when multiple buildings or entrances exist) and egress (where warranted, such as when directions to reach transit stops/stations, trails or other common destinations are not obvious)	☐

		TDM-supportive design & infrastructure measures: *Residential developments*	Check if completed & add descriptions, explanations or plan/drawing references
	2.	**WALKING & CYCLING: END-OF-TRIP FACILITIES**	
	2.1	**Bicycle parking**	
REQUIRED	2.1.1	Provide bicycle parking in highly visible and lighted areas, sheltered from the weather wherever possible *(see Official Plan policy 4.3.6)*	☒ Bike stalls provided in secure place (UG garage)
REQUIRED	2.1.2	Provide the number of bicycle parking spaces specified for various land uses in different parts of Ottawa; provide convenient access to main entrances or well-used areas *(see Zoning By-law Section 111)*	☒
REQUIRED	2.1.3	Ensure that bicycle parking spaces and access aisles meet minimum dimensions; that no more than 50% of spaces are vertical spaces; and that parking racks are securely anchored *(see Zoning By-law Section 111)*	☒
BASIC	2.1.4	Provide bicycle parking spaces equivalent to the expected number of resident-owned bicycles, plus the expected peak number of visitor cyclists	☐
	2.2	**Secure bicycle parking**	
REQUIRED	2.2.1	Where more than 50 bicycle parking spaces are provided for a single residential building, locate at least 25% of spaces within a building/structure, a secure area (e.g. supervised parking lot or enclosure) or bicycle lockers *(see Zoning By-law Section 111)*	☒
BETTER	2.2.2	Provide secure bicycle parking spaces equivalent to at least the number of units at condominiums or multi-family residential developments	☐
	2.3	**Bicycle repair station**	
BETTER	2.3.1	Provide a permanent bike repair station, with commonly used tools and an air pump, adjacent to the main bicycle parking area (or secure bicycle parking area, if provided)	☐
	3.	**TRANSIT**	
	3.1	**Customer amenities**	
BASIC	3.1.1	Provide shelters, lighting and benches at any on-site transit stops	☐ No on-site transit stops
BASIC	3.1.2	Where the site abuts an off-site transit stop and insufficient space exists for a transit shelter in the public right-of-way, protect land for a shelter and/or install a shelter	☐
BETTER	3.1.3	Provide a secure and comfortable interior waiting area by integrating any on-site transit stops into the building	☐

	TDM-supportive design & infrastructure measures: *Residential developments*		Check if completed & add descriptions, explanations or plan/drawing references
	4.	**RIDESHARING**	
	4.1	**Pick-up & drop-off facilities**	
BASIC	4.1.1	Provide a designated area for carpool drivers (plus taxis and ride-hailing services) to drop off or pick up passengers without using fire lanes or other no-stopping zones	☐
	5.	**CARSHARING & BIKESHARING**	
	5.1	**Carshare parking spaces**	
BETTER	5.1.1	Provide up to three carshare parking spaces in an R3, R4 or R5 Zone for specified residential uses *(see Zoning By-law Section 94)*	☐
	5.2	**Bikeshare station location**	
BETTER	5.2.1	Provide a designated bikeshare station area near a major building entrance, preferably lighted and sheltered with a direct walkway connection	☐
	6.	**PARKING**	
	6.1	**Number of parking spaces**	
REQUIRED	6.1.1	Do not provide more parking than permitted by zoning, nor less than required by zoning, unless a variance is being applied for	☐
BASIC	6.1.2	Provide parking for long-term and short-term users that is consistent with mode share targets, considering the potential for visitors to use off-site public parking	☐
BASIC	6.1.3	Where a site features more than one use, provide shared parking and reduce the cumulative number of parking spaces accordingly *(see Zoning By-law Section 104)*	☐
BETTER	6.1.4	Reduce the minimum number of parking spaces required by zoning by one space for each 13 square metres of gross floor area provided as shower rooms, change rooms, locker rooms and other facilities for cyclists in conjunction with bicycle parking *(see Zoning By-law Section 111)*	☐
	6.2	**Separate long-term & short-term parking areas**	
BETTER	6.2.1	Provide separate areas for short-term and long-term parking (using signage or physical barriers) to permit access controls and simplify enforcement (i.e. to discourage residents from parking in visitor spaces, and vice versa)	☐

Appendix C

Forecast Traffic Volumes

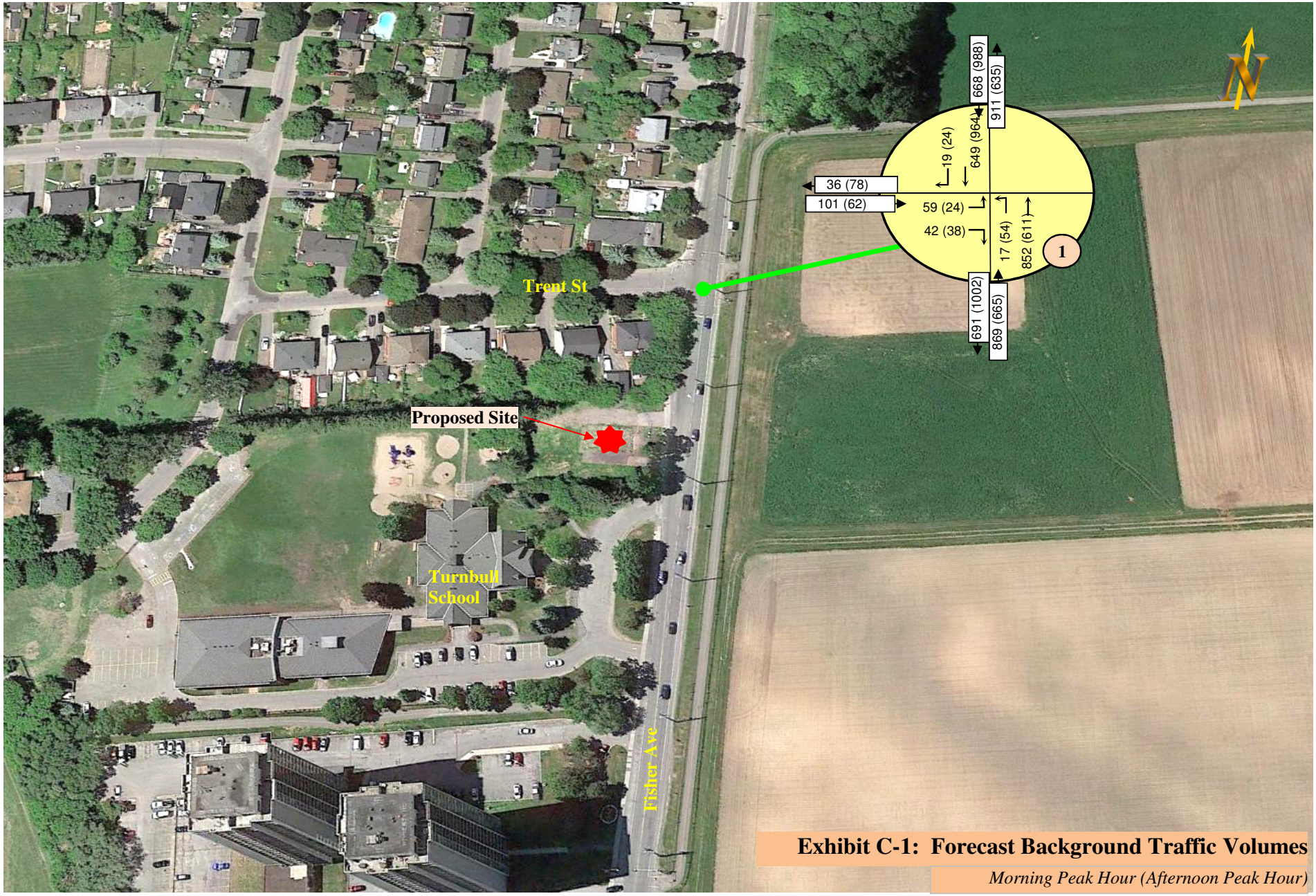


Exhibit C-1: Forecast Background Traffic Volumes

Morning Peak Hour (Afternoon Peak Hour)

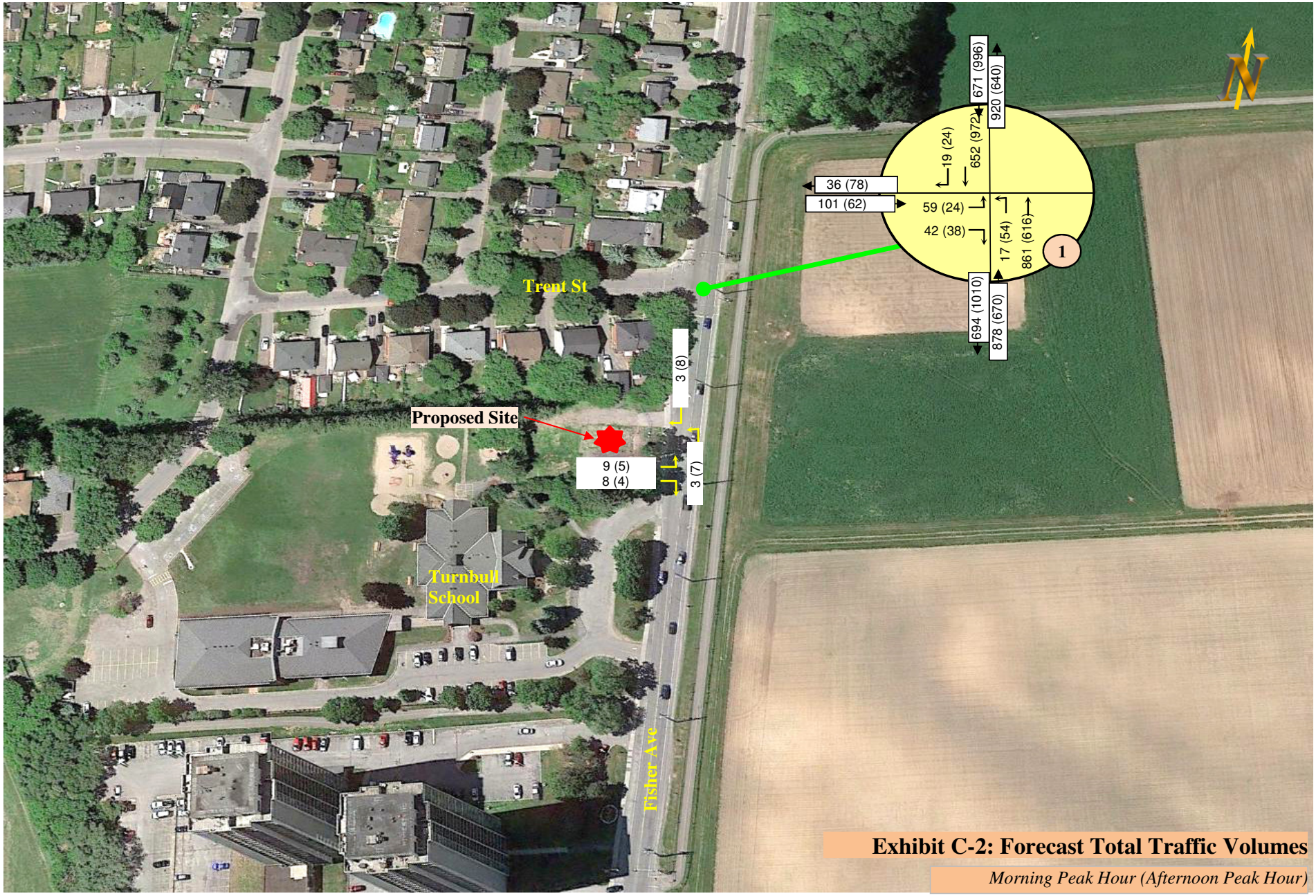
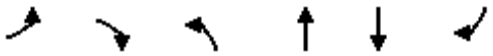


Exhibit C-2: Forecast Total Traffic Volumes

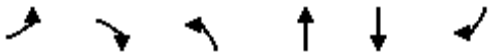
Morning Peak Hour (Afternoon Peak Hour)

Appendix D

Forecast Traffic Analysis



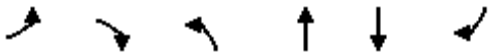
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	59	24	17	835	636	19
Future Volume (vph)	59	24	17	835	636	19
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Storage Length (m)	25.0	0.0	65.0			0.0
Storage Lanes	1	1	1			0
Taper Length (m)	20.0		55.0			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.96	0.98	1.00		1.00	
Frt		0.850			0.996	
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1710	1500	1613	1765	1741	0
Flt Permitted	0.950		0.349			
Satd. Flow (perm)	1649	1467	592	1765	1741	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		26			4	
Link Speed (k/h)	50			50	50	
Link Distance (m)	87.7			186.9	103.5	
Travel Time (s)	6.3			13.5	7.5	
Confl. Peds. (#/hr)	17	1	4			4
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	2%	6%	2%	3%	0%
Adj. Flow (vph)	64	26	18	908	691	21
Shared Lane Traffic (%)						
Lane Group Flow (vph)	64	26	18	908	712	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.07	1.07	1.07	1.07	1.07	1.07
Turning Speed (k/h)	25	15	25			15
Number of Detectors	1	1	1	2	2	
Detector Template	Left	Right	Left	Thru	Thru	
Leading Detector (m)	2.0	2.0	2.0	10.0	10.0	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	
Detector 1 Size(m)	2.0	2.0	2.0	0.6	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(m)				9.4	9.4	
Detector 2 Size(m)				0.6	0.6	
Detector 2 Type				Cl+Ex	Cl+Ex	
Detector 2 Channel						
Detector 2 Extend (s)				0.0	0.0	



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Turn Type	Perm	Perm	Perm	NA	NA	
Protected Phases				2	6	
Permitted Phases	4	4	2			
Detector Phase	4	4	2	2	6	
Switch Phase						
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	
Minimum Split (s)	24.4	24.4	40.7	40.7	40.7	
Total Split (s)	25.0	25.0	55.0	55.0	55.0	
Total Split (%)	31.3%	31.3%	68.8%	68.8%	68.8%	
Maximum Green (s)	19.6	19.6	49.3	49.3	49.3	
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	
All-Red Time (s)	2.1	2.1	2.4	2.4	2.4	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	5.4	5.4	5.7	5.7	5.7	
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None	C-Min	C-Min	C-Min	
Walk Time (s)	7.0	7.0	24.0	24.0	24.0	
Flash Dont Walk (s)	12.0	12.0	10.0	10.0	10.0	
Pedestrian Calls (#/hr)	0	0	0	0	0	
Act Effct Green (s)	10.3	10.3	62.8	62.8	62.8	
Actuated g/C Ratio	0.13	0.13	0.78	0.78	0.78	
v/c Ratio	0.30	0.12	0.04	0.66	0.52	
Control Delay	35.5	13.9	3.4	8.4	6.1	
Queue Delay	0.0	0.0	0.0	0.0	0.0	
Total Delay	35.5	13.9	3.4	8.4	6.1	
LOS	D	B	A	A	A	
Approach Delay	29.2			8.3	6.1	
Approach LOS	C			A	A	

Intersection Summary			
Area Type:	Other		
Cycle Length: 80			
Actuated Cycle Length: 80			
Offset: 9 (11%), Referenced to phase 2:NBTL and 6:SBT, Start of Green			
Natural Cycle: 70			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.66			
Intersection Signal Delay: 8.5		Intersection LOS: A	
Intersection Capacity Utilization 64.2%		ICU Level of Service C	
Analysis Period (min) 15			

Splits and Phases: 3: Fisher Ave & Trent St

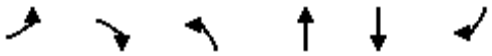


Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	24	38	54	599	945	24
Future Volume (vph)	24	38	54	599	945	24
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Storage Length (m)	25.0	0.0	65.0			0.0
Storage Lanes	1	1	1			0
Taper Length (m)	20.0		55.0			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.95	0.98			1.00	
Frt		0.850			0.997	
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1710	1500	1710	1782	1759	0
Flt Permitted	0.950		0.209			
Satd. Flow (perm)	1630	1463	376	1782	1759	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		41			3	
Link Speed (k/h)	50			50	50	
Link Distance (m)	87.7			186.9	103.5	
Travel Time (s)	6.3			13.5	7.5	
Confl. Peds. (#/hr)	21	2	12			12
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	2%	0%	1%	2%	0%
Adj. Flow (vph)	26	41	59	651	1027	26
Shared Lane Traffic (%)						
Lane Group Flow (vph)	26	41	59	651	1053	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.07	1.07	1.07	1.07	1.07	1.07
Turning Speed (k/h)	25	15	25			15
Number of Detectors	1	1	1	2	2	
Detector Template	Left	Right	Left	Thru	Thru	
Leading Detector (m)	2.0	2.0	2.0	10.0	10.0	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	
Detector 1 Size(m)	2.0	2.0	2.0	0.6	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(m)				9.4	9.4	
Detector 2 Size(m)				0.6	0.6	
Detector 2 Type				Cl+Ex	Cl+Ex	
Detector 2 Channel						
Detector 2 Extend (s)				0.0	0.0	

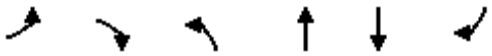
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Turn Type	Perm	Perm	Perm	NA	NA	
Protected Phases				2	6	
Permitted Phases	4	4	2			
Detector Phase	4	4	2	2	6	
Switch Phase						
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	
Minimum Split (s)	24.4	24.4	40.7	40.7	40.7	
Total Split (s)	25.0	25.0	60.0	60.0	60.0	
Total Split (%)	29.4%	29.4%	70.6%	70.6%	70.6%	
Maximum Green (s)	19.6	19.6	54.3	54.3	54.3	
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	
All-Red Time (s)	2.1	2.1	2.4	2.4	2.4	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	5.4	5.4	5.7	5.7	5.7	
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None	C-Min	C-Min	C-Min	
Walk Time (s)	7.0	7.0	24.0	24.0	24.0	
Flash Dont Walk (s)	12.0	12.0	10.0	10.0	10.0	
Pedestrian Calls (#/hr)	0	0	0	0	0	
Act Effct Green (s)	10.0	10.0	72.3	72.3	72.3	
Actuated g/C Ratio	0.12	0.12	0.85	0.85	0.85	
v/c Ratio	0.14	0.20	0.18	0.43	0.70	
Control Delay	35.6	13.9	4.4	4.1	8.4	
Queue Delay	0.0	0.0	0.0	0.0	0.0	
Total Delay	35.6	13.9	4.4	4.1	8.4	
LOS	D	B	A	A	A	
Approach Delay	22.3			4.1	8.4	
Approach LOS	C			A	A	

Intersection Summary			
Area Type:	Other		
Cycle Length: 85			
Actuated Cycle Length: 85			
Offset: 13 (15%), Referenced to phase 2:NBTL and 6:SBT, Start of Green			
Natural Cycle: 90			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.70			
Intersection Signal Delay: 7.3		Intersection LOS: A	
Intersection Capacity Utilization 72.1%		ICU Level of Service C	
Analysis Period (min) 15			

Splits and Phases: 3: Fisher Ave & Trent St



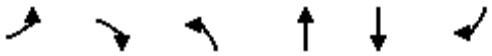
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	59	24	17	861	652	19
Future Volume (vph)	59	24	17	861	652	19
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Storage Length (m)	25.0	0.0	65.0			0.0
Storage Lanes	1	1	1			0
Taper Length (m)	20.0		55.0			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.96	0.98	1.00		1.00	
Frt		0.850			0.996	
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1710	1500	1613	1765	1741	0
Flt Permitted	0.950		0.340			
Satd. Flow (perm)	1649	1467	577	1765	1741	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		26			3	
Link Speed (k/h)	50			50	50	
Link Distance (m)	87.7			136.9	103.5	
Travel Time (s)	6.3			9.9	7.5	
Confl. Peds. (#/hr)	17	1	4			4
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	2%	6%	2%	3%	0%
Adj. Flow (vph)	64	26	18	936	709	21
Shared Lane Traffic (%)						
Lane Group Flow (vph)	64	26	18	936	730	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.07	1.07	1.07	1.07	1.07	1.07
Turning Speed (k/h)	25	15	25			15
Number of Detectors	1	1	1	2	2	
Detector Template	Left	Right	Left	Thru	Thru	
Leading Detector (m)	2.0	2.0	2.0	10.0	10.0	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	
Detector 1 Size(m)	2.0	2.0	2.0	0.6	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(m)				9.4	9.4	
Detector 2 Size(m)				0.6	0.6	
Detector 2 Type				Cl+Ex	Cl+Ex	
Detector 2 Channel						
Detector 2 Extend (s)				0.0	0.0	



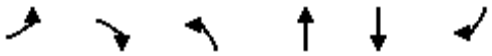
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Turn Type	Perm	Perm	Perm	NA	NA	
Protected Phases				2	6	
Permitted Phases	4	4	2			
Detector Phase	4	4	2	2	6	
Switch Phase						
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	
Minimum Split (s)	24.4	24.4	40.7	40.7	40.7	
Total Split (s)	25.0	25.0	55.0	55.0	55.0	
Total Split (%)	31.3%	31.3%	68.8%	68.8%	68.8%	
Maximum Green (s)	19.6	19.6	49.3	49.3	49.3	
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	
All-Red Time (s)	2.1	2.1	2.4	2.4	2.4	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	5.4	5.4	5.7	5.7	5.7	
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None	C-Min	C-Min	C-Min	
Walk Time (s)	7.0	7.0	24.0	24.0	24.0	
Flash Dont Walk (s)	12.0	12.0	10.0	10.0	10.0	
Pedestrian Calls (#/hr)	0	0	0	0	0	
Act Effct Green (s)	10.3	10.3	62.8	62.8	62.8	
Actuated g/C Ratio	0.13	0.13	0.78	0.78	0.78	
v/c Ratio	0.30	0.12	0.04	0.68	0.53	
Control Delay	35.5	13.9	3.4	8.9	6.3	
Queue Delay	0.0	0.0	0.0	0.0	0.0	
Total Delay	35.5	13.9	3.4	8.9	6.3	
LOS	D	B	A	A	A	
Approach Delay	29.2			8.8	6.3	
Approach LOS	C			A	A	

Intersection Summary			
Area Type:	Other		
Cycle Length: 80			
Actuated Cycle Length: 80			
Offset: 9 (11%), Referenced to phase 2:NBTL and 6:SBT, Start of Green			
Natural Cycle: 75			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.68			
Intersection Signal Delay: 8.8		Intersection LOS: A	
Intersection Capacity Utilization 65.7%		ICU Level of Service C	
Analysis Period (min) 15			

Splits and Phases: 3: Fisher Ave & Trent St



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	24	38	54	616	972	24
Future Volume (vph)	24	38	54	616	972	24
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Storage Length (m)	25.0	0.0	65.0			0.0
Storage Lanes	1	1	1			0
Taper Length (m)	20.0		55.0			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.95	0.98			1.00	
Frt		0.850			0.997	
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1710	1500	1710	1782	1759	0
Flt Permitted	0.950		0.196			
Satd. Flow (perm)	1630	1463	353	1782	1759	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		41			3	
Link Speed (k/h)	50			50	50	
Link Distance (m)	87.7			186.9	103.5	
Travel Time (s)	6.3			13.5	7.5	
Confl. Peds. (#/hr)	21	2	12			12
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	2%	0%	1%	2%	0%
Adj. Flow (vph)	26	41	59	670	1057	26
Shared Lane Traffic (%)						
Lane Group Flow (vph)	26	41	59	670	1083	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.07	1.07	1.07	1.07	1.07	1.07
Turning Speed (k/h)	25	15	25			15
Number of Detectors	1	1	1	2	2	
Detector Template	Left	Right	Left	Thru	Thru	
Leading Detector (m)	2.0	2.0	2.0	10.0	10.0	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	
Detector 1 Size(m)	2.0	2.0	2.0	0.6	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(m)				9.4	9.4	
Detector 2 Size(m)				0.6	0.6	
Detector 2 Type				Cl+Ex	Cl+Ex	
Detector 2 Channel						
Detector 2 Extend (s)				0.0	0.0	



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Turn Type	Perm	Perm	Perm	NA	NA	
Protected Phases				2	6	
Permitted Phases	4	4	2			
Detector Phase	4	4	2	2	6	
Switch Phase						
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	
Minimum Split (s)	24.4	24.4	40.7	40.7	40.7	
Total Split (s)	25.0	25.0	60.0	60.0	60.0	
Total Split (%)	29.4%	29.4%	70.6%	70.6%	70.6%	
Maximum Green (s)	19.6	19.6	54.3	54.3	54.3	
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	
All-Red Time (s)	2.1	2.1	2.4	2.4	2.4	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	5.4	5.4	5.7	5.7	5.7	
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None	C-Min	C-Min	C-Min	
Walk Time (s)	7.0	7.0	24.0	24.0	24.0	
Flash Dont Walk (s)	12.0	12.0	10.0	10.0	10.0	
Pedestrian Calls (#/hr)	0	0	0	0	0	
Act Effct Green (s)	10.0	10.0	72.3	72.3	72.3	
Actuated g/C Ratio	0.12	0.12	0.85	0.85	0.85	
v/c Ratio	0.14	0.20	0.20	0.44	0.72	
Control Delay	35.6	13.9	4.7	4.2	9.2	
Queue Delay	0.0	0.0	0.0	0.0	0.0	
Total Delay	35.6	13.9	4.7	4.2	9.2	
LOS	D	B	A	A	A	
Approach Delay	22.3			4.2	9.2	
Approach LOS	C			A	A	

Intersection Summary			
Area Type:	Other		
Cycle Length: 85			
Actuated Cycle Length: 85			
Offset: 13 (15%), Referenced to phase 2:NBTL and 6:SBT, Start of Green			
Natural Cycle: 90			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.72			
Intersection Signal Delay: 7.7		Intersection LOS: A	
Intersection Capacity Utilization 73.6%		ICU Level of Service D	
Analysis Period (min) 15			

Splits and Phases: 3: Fisher Ave & Trent St

Intersections		Fisher Ave / Trent St			
	Crossing Side	***North***	***South***	***West***	***East***
Pedestrian	Lanes	3 (105)	3 (105)	3 (105)	
	Median	No (-4)	No (-4)	No (-4)	
	Conflicting LT	Permissive (-8)	NA	Permissive (-8)	
	Conflicting RT	No right-turn	Perm/yield control (-5)	Perm/yield control (-5)	
	RTOR	No right-turn	Allowed (-3)	Allowed (-3)	
	Leading Ped Interval	No (-2)	No (-2)	No (-2)	
	Corner Radius	>5m-to-10m (-5)	>5m-to-10m (-5)	>5m-to-10m (-5)	
	Crosswalk Treatment	Standard transverse markings (-7)	Standard transverse markings (-7)	Standard transverse markings (-4)	
	PETSI Score	79 pts	79 pts	74 pts	
	Ped. Exposure to traffic LOS	B	B	C	
	Cycle Length	85 sec	85 sec	85 sec	
	Effective Walk Time	34 sec	34 sec	19 sec	
	Avg Ped Delay	15 sec	15 sec	26 sec	
	Ped Delay LOS	B	B	C	
	LOS	B	B	C	
		C			
	Approach From	***North***	***South***	***West***	***East***
Bicycle	Bike lane arrangment on approach	Mixed Traffic	Mixed Traffic	Mixed Traffic	
	Right-turn lane configuration	No right-turn	No right-turn	Shared	
	Right turning speed				
	Cyclists relative to RT motorists	NA	NA	NA	
	Left turn approach	No lane crossed	No lane crossed	No lane crossed	
	Left-turn Operating speed	>= 50km/h	<=50km/hr	<=50km/hr	
	Left turn cyclists - LOS	B	B	B	
Transit	Avg. Delay	<=10 sec	<=10 sec		
	LOS	B	B		
		B			
Truck	Effective corner radius	10 to 15m		10 to 15m	
	No. of receiving lanes on departure from intersection	1		1	
	LOS	E		E	
		E			