

Traffic Impact Study

Proposed Expansion

Mixed Use Commercial and
Residential Development

1273-1289 London Road, Sarnia



May 19, 2020

Project N° 2029-17

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May 19, 2020

Mr. Mike Berkvens,
Development Manager
The Corporation of The City of Sarnia
255 North Christina Street
PO Box 3018
Sarnia, ON
N7T 7N2

Dear Mr. Berkvens,

Reference: Student Residential Development
1273-1289 London Road, Sarnia,
Traffic Impact Study Report
Project N° 2029-17

Asurza Engineers Ltd. is pleased to submit the enclosed Traffic Report of the proposed Student Residential Development. The study was prepared on behalf of the proponent as part of the documentation required by the City of Sarnia.

Should you have any questions regarding this report, please do not hesitate to contact the undersigned.


Martin Asurza, M.Eng. P.Eng.
Senior Transportation/Traffic Engineer

A circular blue seal for a Licensed Professional Engineer in the Province of Ontario. The seal contains the text 'LICENSED PROFESSIONAL ENGINEER' around the top edge and 'PROVINCE OF ONTARIO' around the bottom edge. In the center, it reads 'M.C. ASURZA AYVAR' and '100128443'. A handwritten signature 'May 19, 2020' is written across the seal.

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Executive Summary

Asurza Engineers Ltd. was retained to undertake a traffic impact study in order to review, assess, and determine any traffic impact the proposed development may generate on the adjacent London Road intersections.

The site is an existing commercial area located at 1273-1289 London Road in the City of Sarnia. The subject site is located within the urban commercial area. The site currently holds restaurants, a coffee shop, a general store and a warehouse.

One of the existing buildings is to be removed and it is proposed the site to include three new nine-storey student resident buildings including a total of 910 bedrooms; one of the building to have some commercial activity on the first floor.

London Road is an east-west five-lane arterial roadways under the jurisdiction of the Lambton County. Commercial concentration is noted on London Road within the study area.

Traffic turning movements for the morning and afternoon peak hour for the study intersections were provided by the County and supplemented with field counts.

Generation of trips were derived from the Trip Generation Manual 10th Edition, published by the Institute of Transportation Engineers (ITE). It was estimated that the proposed expansion will generate a total of 117 new trips for the morning peak hour and 213 new trips for the afternoon peak hour.

In order to maintain an acceptable level of service for the London Road/Unnamed Road intersection, a westbound left turn

protected/permitted phase was introduced in the evaluation for future conditions.

The traffic operation results for the base year 2021 (assumed build-out year) including the new traffic volumes generated by the proposed expansion show very minor changes in control delay in comparison with the background conditions. Individual movements at the intersections show good operation with level of service “C” or better.

The traffic operation results for the horizon year 2026 (five years after build-out year) including the new traffic volumes generated by the proposed expansion show very minor changes in control delay in comparison with the background conditions. Individual movements at the intersections show good operation with level of service “D” or better.

It is recommended to include a westbound left turn protected/permitted phase for the London Road/Unnamed Road intersection; it is also recommended to supply bicycle parking racks within the site to be consistent with the characteristics of the area and the type of residents for this expansion.

With the implementation of the recommended actions, the proposed expansion can take place without significant impact to current conditions.

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1 Introduction

1.1 Overview

Asurza Engineers Ltd. was retained by the proponent to undertake a traffic impact study for the proposed development to be located at 1273-1289 London Road in the City of Sarnia. It is understood the City of Sarnia is the municipal authority to review and approve the traffic study; however, the County of Lambton may also be involved to provide comments since the proposed development is located next to a county road.

1.2 Objectives

The purpose of this study is to determine any traffic impact the proposed development may generate on the adjacent roadways and adjacent intersection as well as to identify the required improvements to maintain acceptable operational levels on the roadways within the study area.

The general scope of this study includes the following key elements:

- Establish baseline traffic conditions for the study area.
- Estimate the traffic growth for future planning horizons.
- Estimate the additional traffic generated by the proposed development.
- Estimate the total future traffic and identify impacts within the study area.
- Identify any operational and/or geometric issues within the study area.
- Provide recommendations to address any deficiencies, if identified.



To achieve these objectives, the traffic study makes use of accepted methodologies and procedures including informational reports, publications from recognized institutions, recommended best practice manuals and municipal guidelines when available. These documents will be noted within the report in the associated topic of discussion.



2 Existing Conditions

2.1 Study Area

The City of Sarnia is located in Southwestern Ontario. It is the largest city on Lake Huron and in Lambton County. The City of Sarnia with a population of 71,594 residents, according to the 2016 Census, is located on the eastern bank of the junction between the Upper and Lower Great Lakes where Lake Huron flows into St. Clair River, which forms the Canada-United States border.

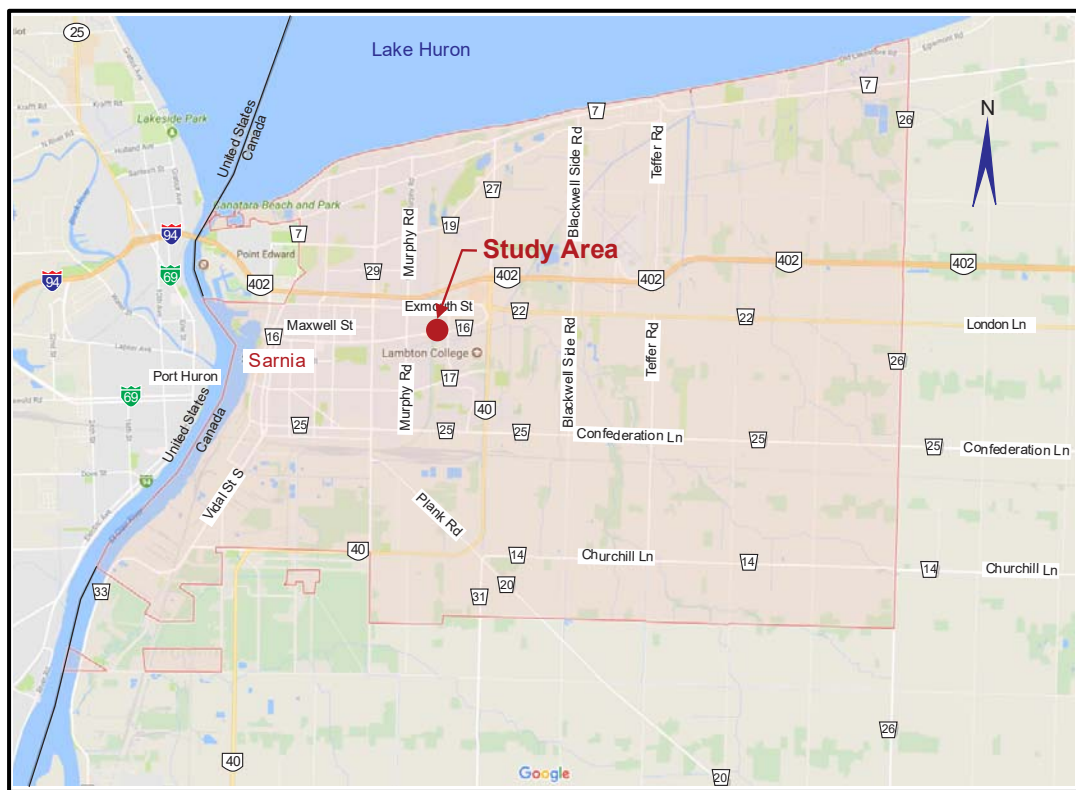


Exhibit 1: Study Area.



2.2 The Site

The subject site is located within the urban area in the City of Sarnia, at 1273-1289 London Road. The site is currently a commercial area that holds restaurants, a coffee shop, a general store and a warehouse.

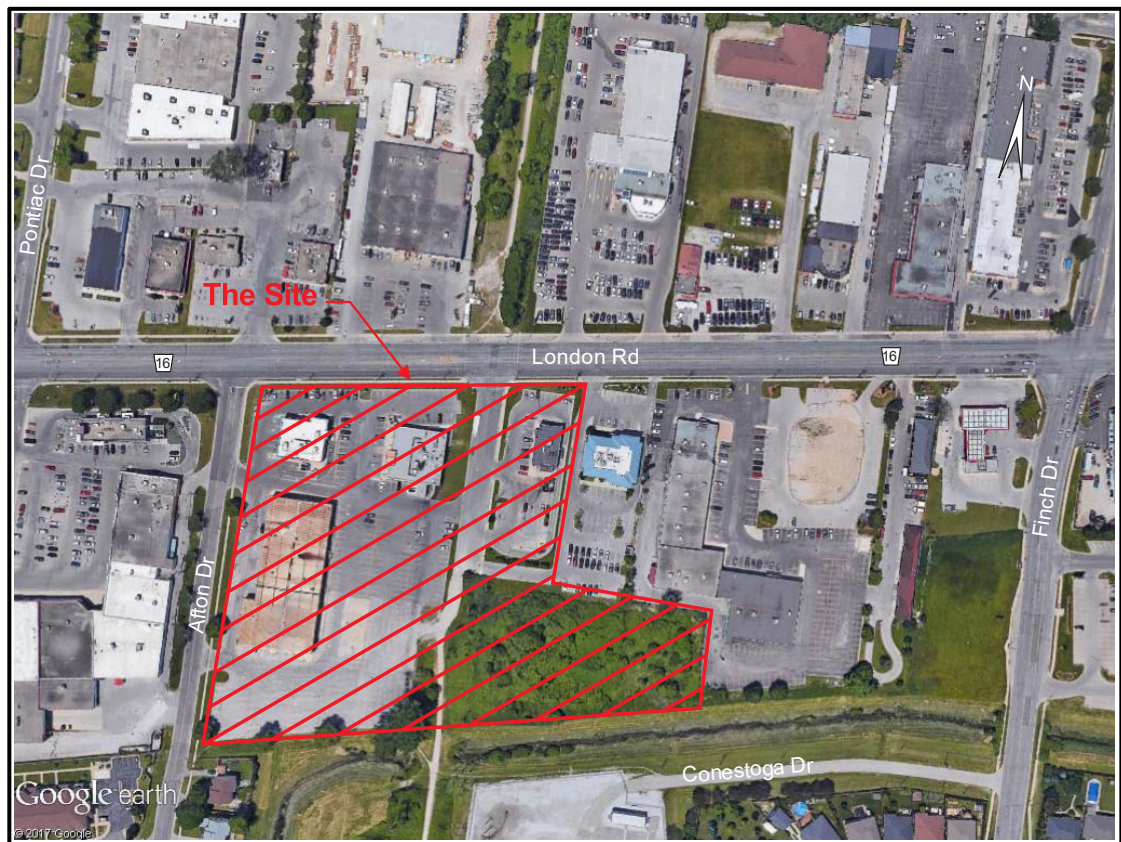


Exhibit 2: The Site.

It is planned the removal of an existing building to include three new nine-storey student resident buildings with a total of 910 bedrooms; one of the buildings to include commercial area on the first floor (9,181 sqf). The site will be extended to provide on-site parking to resident students.

The build-out of the subject development is anticipated to the year 2021.

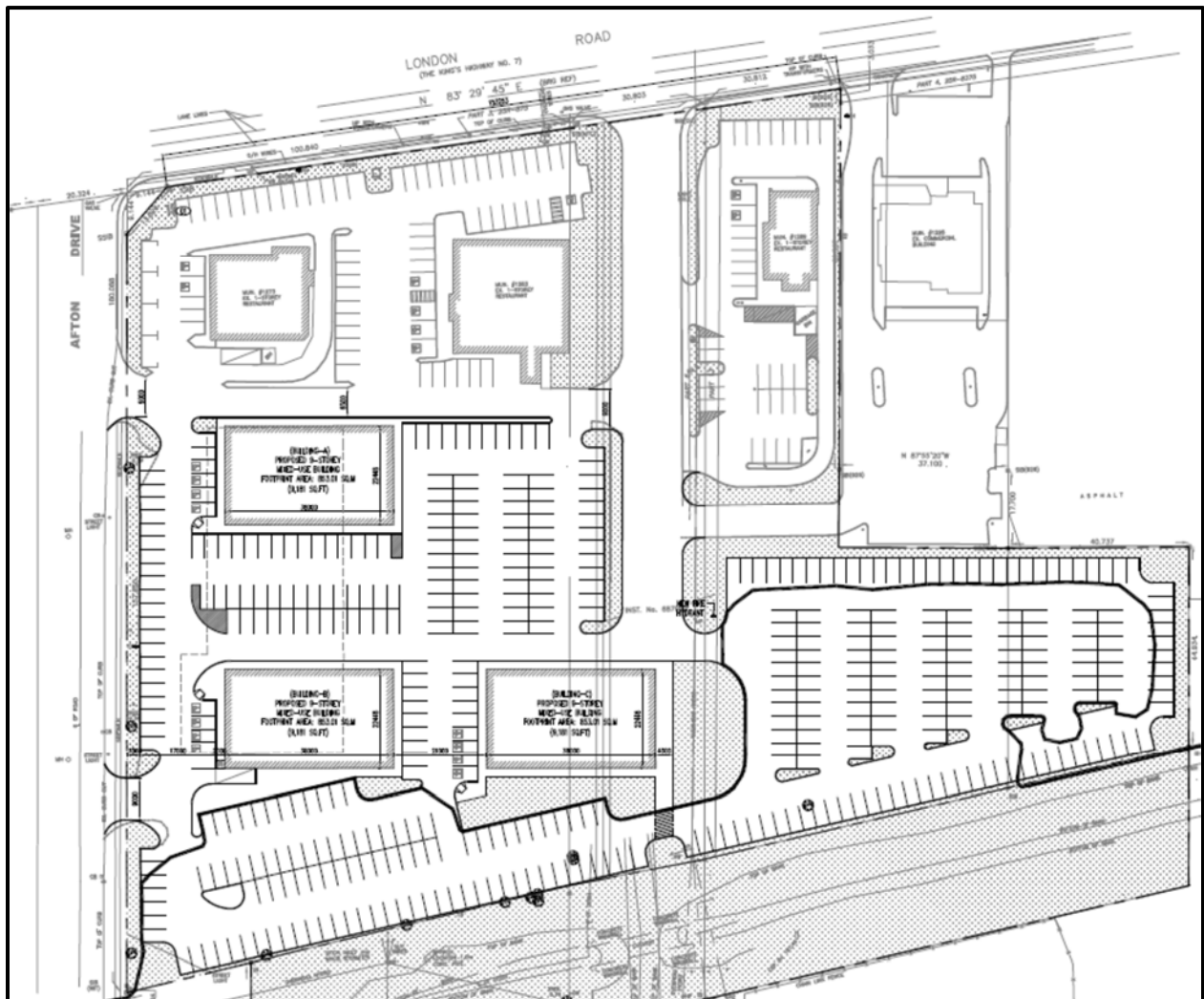


Exhibit 3: Draft Site Plan.

2.3 Roadway Network

As described, the site is located next to the intersection London Road and Afton Drive.

London Rd (County Road 16) is an east-west five-lane arterial roadway (two lanes for each direction and a continuous two-way left turn lane) under the jurisdiction of the County of Lambton. London Road show urban cross-section with sidewalks both sides of the road. The closest traffic signal controlled intersection is the London Rd/Unnamed Rd intersection located



next to the site. This section of London Road within the study area is surrounded by commercial environment including restaurants, banks, gas stations, retail stores, office buildings and a shopping center. London Road has a posted speed limit of 50 km/h within the study area.

Afton Drive is a north-south two-lane collector street which intersects London Road on the west side of the site, approximately 115 metres east of Pontiac Drive intersection. Afton Drive also shows an urban cross section within the study area. Afton Drive Road has a posted speed limit of 40 km/h.

Finch Drive and Lambton Mall Road is a north-south four-lane roadway that intersects London Road forming a four-leg intersection controlled by traffic signals. North of London Road (Lambton Mall Road), the link is surrounded by commercial area; south of London Road (Finch Drive), the link has a residential environment. Finch Drive and Lambton Mall Road do not show a posted speed; therefore, the statutory speed of 50 km/h applies to this road link.

2.4 Traffic Data

Traffic turning movement counts for the intersections within the study area were provided by the County of Lambton; the traffic data are counts for the year 2015 representing a typical morning and afternoon weekday peak hour. Additional field counts were performed in 2017 (April and September) to complete missing traffic information.

According to counts provided, the peak hours were identified as following:

- Morning Peak Hour – 9:00 am to 10:00 am
- Afternoon Peak Hour – 4:00 pm to 5:00 pm

The existing 2019 traffic volumes for a typical morning and afternoon peak hour are shown in the following exhibit:



EXISTING TRAFFIC VOLUMES 2019

AM PEAK HOUR

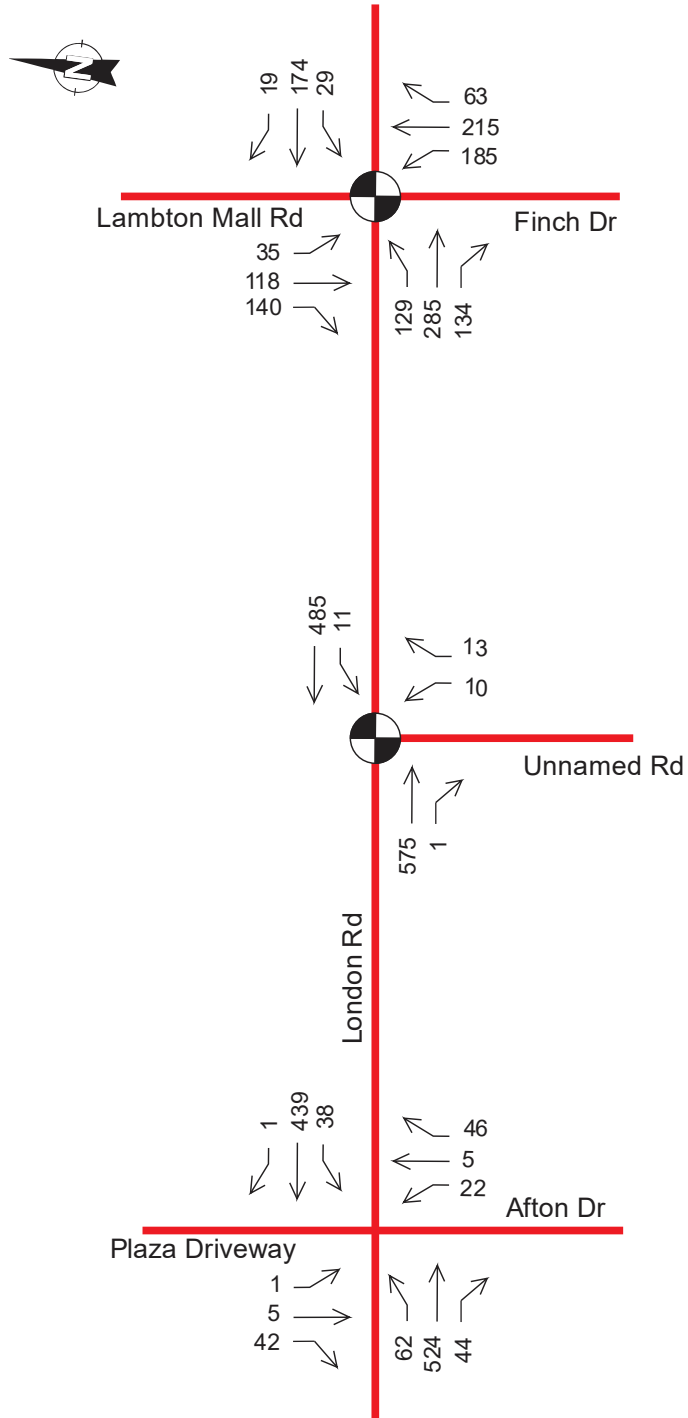


Exhibit 4: Existing AM Traffic Volumes - 2019.



EXISTING TRAFFIC VOLUMES 2019

PM PEAK HOUR

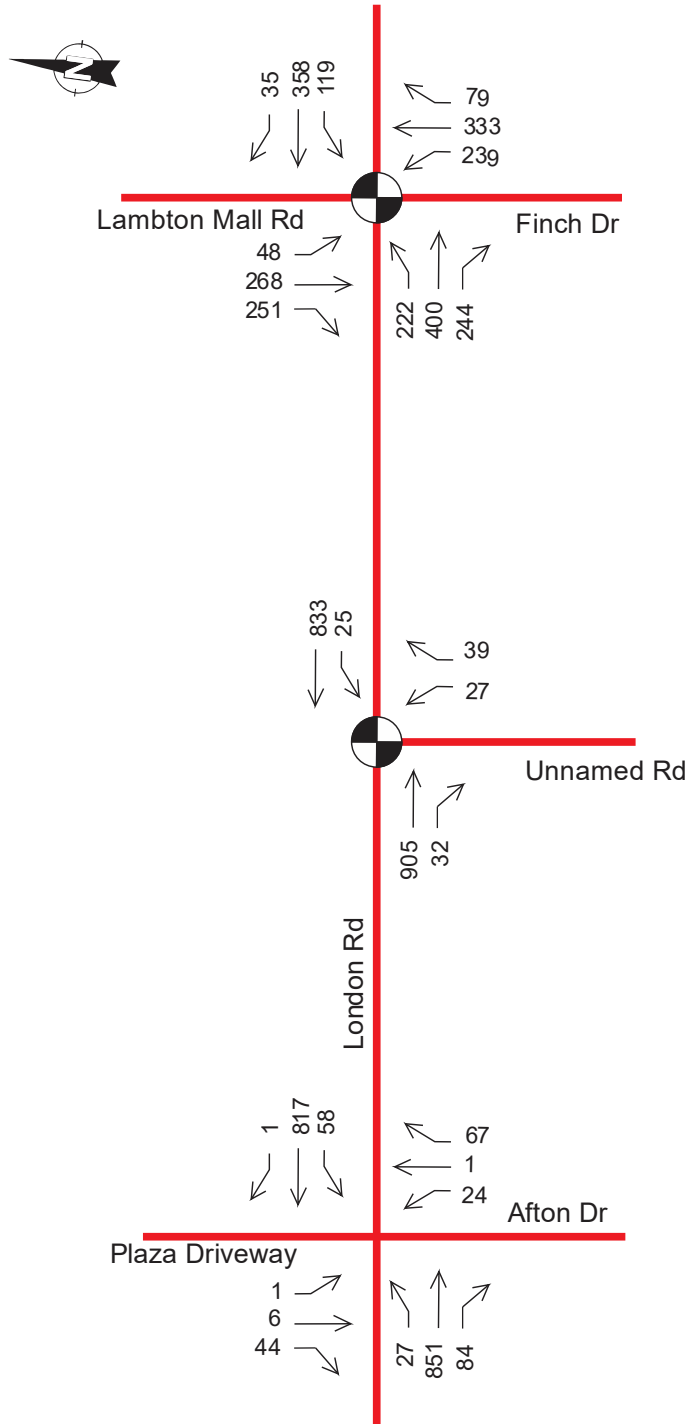


Exhibit 5: Existing PM Traffic Volumes - 2019.



2.5 Existing Traffic Operations

Intersection level of service (LOS) is a recognized method of quantifying the efficiency of traffic flow at intersections. It is based on the delay caused by the control system experienced by individual vehicles executing the various movements. The delay is related to the number of vehicles desiring to make a particular movement, compared to the estimated capacity for that movement.

For two-way stop-controlled intersection, the method assesses the available and critical gaps in the traffic stream, which make it possible for the side road traffic to enter the main street flow. High delays are indicative of insufficient gaps in the approaching traffic flow to allow vehicles from the side street to execute their turning movements.

Table 1 shows the level of service criteria for signalized and stop-controlled intersections. The level of service ranges from the letter 'A' to 'F' where 'A' represents the ideal traffic condition and 'F' represents the extreme congested traffic condition.

LOS	Signalized Intersection Control Delay (sec/veh)	Stop Controlled Intersection Control Delay (sec/veh)
A	0 - 10	0 - 10
B	> 10 - 20	> 10 - 15
C	> 20 - 35	> 15 - 25
D	> 35 - 55	> 25 - 35
E	> 55 - 80	> 35 - 50
F	> 80	> 50

Table 1: Level of Service Definition.

The existing operations for the subject intersections were evaluated using the existing traffic volumes as illustrated in **Exhibit 4** and **Exhibit 5** for the AM and PM peak hours respectively. The current lane configuration and traffic control with existing timings were also included in the analysis for the existing operations. The Synchro software, based on the Highway Capacity



Manual 2000 methodologies (HCM 2000), was used to estimate the existing operations at intersections. Results are summarized in **Table 2** below:

		Capacity Analysis - Existing 2019							
		AM Peak Hour				PM Peak Hour			
		V/C	Delay (s)	Q ₉₅ (m)	LOS	V/C	Delay (s)	Q ₉₅ (m)	LOS
London Rd & Afton Dr (Stop Sign)	EBL	0.06	8.1	1.3	A	0.03	8.9	0.7	A
	EBT	0.22	0.0	0.0	A	0.36	0.0	0.0	A
	EBR	0.14	0.0	0.0	A	0.24	0.0	0.0	A
	WBL	0.01	9.0	1.0	A	0.08	10.3	2.1	B
	WBT	0.19	0.0	0.0	A	0.35	0.0	0.0	A
	WBR	0.09	0.0	0.0	A	0.17	0.0	0.0	A
	NBL	0.08	15.6	20.0	C	0.08	16.7	2.0	C
	NBT	0.08	15.6	20.0	C	0.08	16.7	2.0	C
	NBR	0.06	10.0	1.6	A	0.08	9.5	2.1	A
	SBL	0.00	13.6	0.1	B	0.00	15.3	0.1	C
	SBT	0.06	9.6	1.5	A	0.08	10.7	1.9	B
	SBR	0.06	9.6	1.5	A	0.08	10.7	1.9	B
London Rd & Unnamed Rd (Traffic Signal)	EBT-R	0.55	16.0	35.8	B	0.70	16.7	61.5	B
	WBL	0.05	12.1	3.3	B	0.20	14.5	6.5	B
	WBT	0.46	15.0	29.8	B	0.61	15.3	52.7	B
	NBL	0.01	9.2	2.9	A	0.04	13.7	6.9	B
	NBR	0.02	5.5	2.6	A	0.07	5.7	5.5	A
	Overall	0.55	15.3	-	B	0.70	15.8	-	B
London Rd & Finch Rd (Traffic Signal)	EBL	0.27	15.0	23.5	B	0.53	20.1	44.7	C
	EBT-R	0.37	17.5	39.0	B	0.74	28.9	73.0	C
	WBL	0.09	14.1	7.6	B	0.43	19.9	25.1	B
	WBT-R	0.28	25.1	22.9	C	0.56	31.9	51.0	C
	NBL	0.39	16.6	31.0	B	0.65	23.7	47.2	C
	NBT-R	0.26	18.2	26.4	B	0.37	22.4	46.2	C
	SBL	0.09	13.5	8.0	B	0.14	16.0	11.9	B
	SBT-R	0.35	13.5	18.7	B	0.64	21.6	45.5	C
	Overall	0.39	17.3	-	B	0.74	25.0	-	C

Table 2: Existing Intersection Capacity - 2019.



The intersection analysis considers the following:

- The level of service for each movement.
- The average delay in seconds for each movement.
- The volume to capacity (v/c) ratio for each movement.
- The 95th percentile estimated queue length.

Results show that the intersection is currently operating at acceptable level of service for the different peak hours. Each movement at the intersection shows good operation with level of service “C” or better. Results also show that movements at the intersections have still enough capacity to handle additional traffic.



3 Future Background Traffic

3.1 Future Background Traffic

In order to obtain the background traffic volumes for the base year 2021 (Year of buildout) and for the next five years after build out, growth rates were applied to the existing traffic volumes. Growth rates within the area were assumed to 2.0% which is conservative and representative for most urban areas.

The 2.0% annual growth rate was applied to the 2019 traffic volumes to obtain the base year 2021 and the horizon year 2026 background traffic volumes.

As part of the traffic counts activities, traffic volumes at driveways were also obtained.

The following exhibits show the morning and afternoon peak hours background traffic volumes for the base year 2021 and horizon year 2026. Intersection capacity results for the background volumes are shown in **Table 3** and **Table 4**.



BACKGROUND TRAFFIC VOLUMES 2021

AM PEAK HOUR

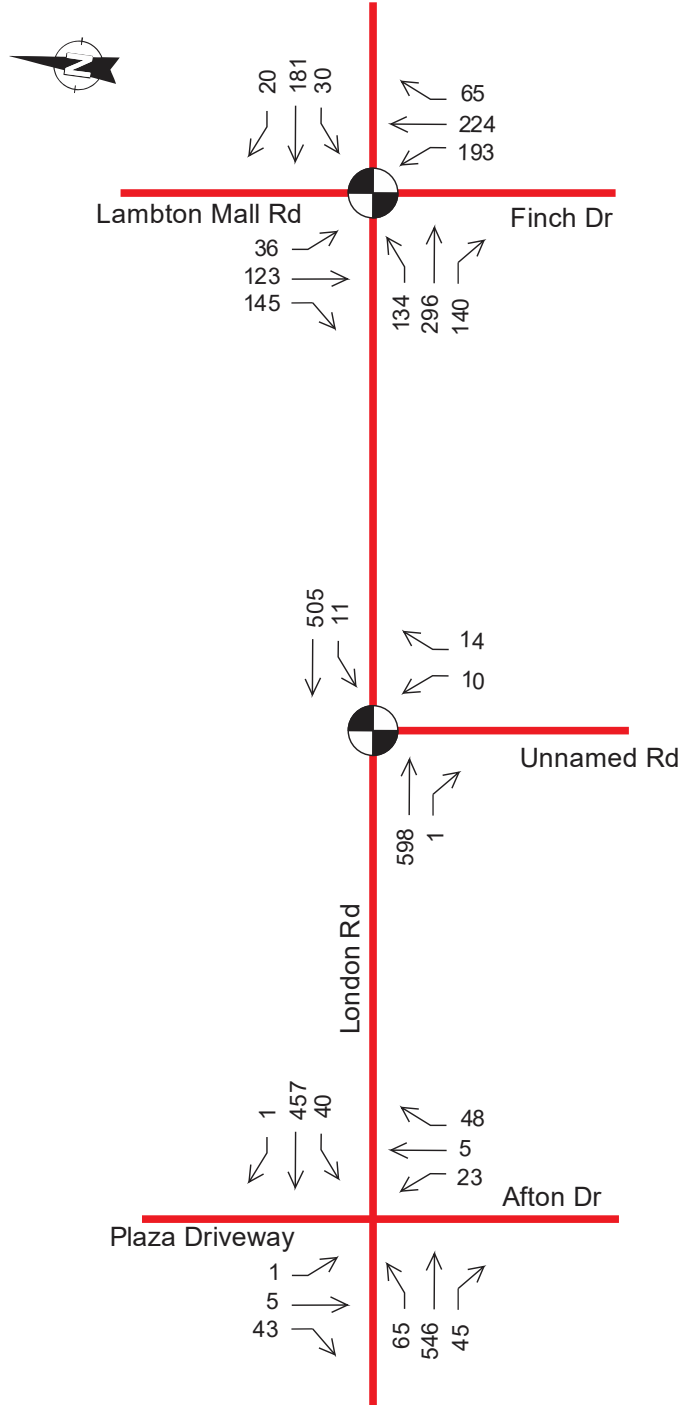


Exhibit 6: AM Background Traffic Volumes - Base Year 2021.



BACKGROUND TRAFFIC VOLUMES 2021
PM PEAK HOUR

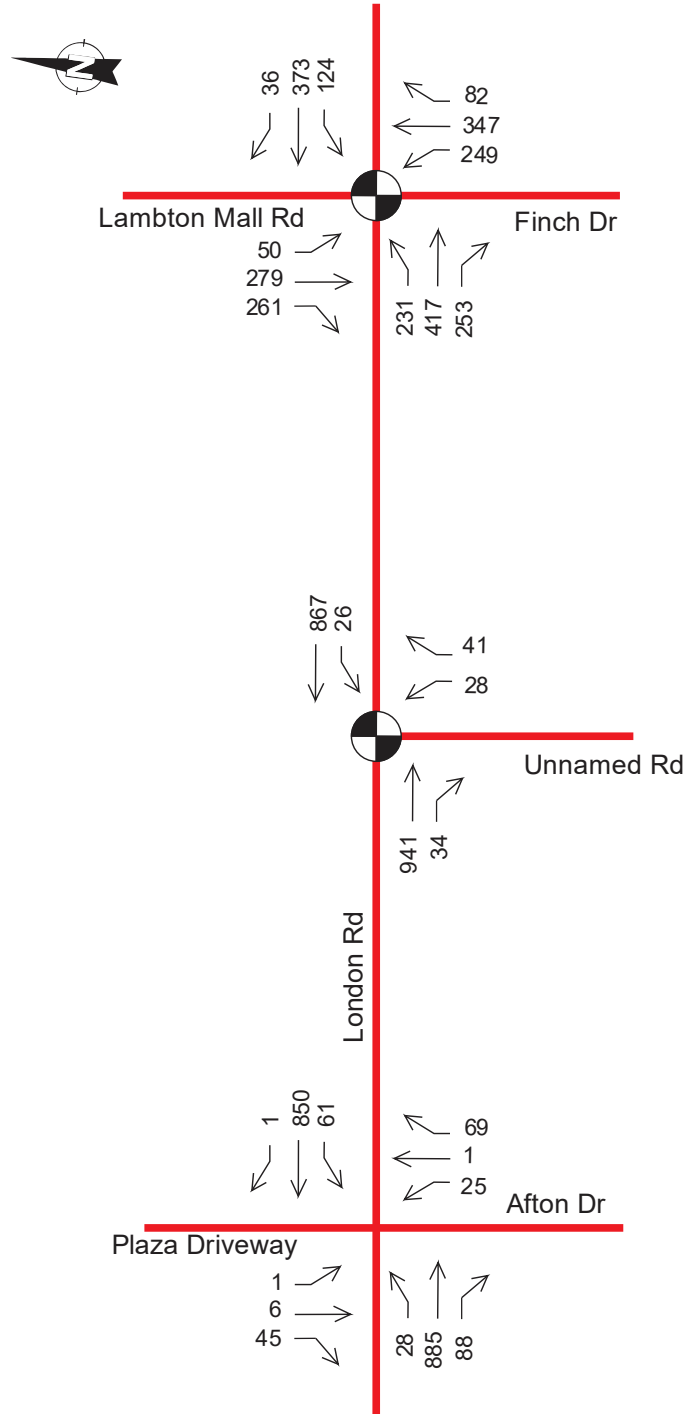


Exhibit 7: PM Background Traffic Volumes - Base Year 2021.



BACKGROUND TRAFFIC VOLUMES 2026

AM PEAK HOUR

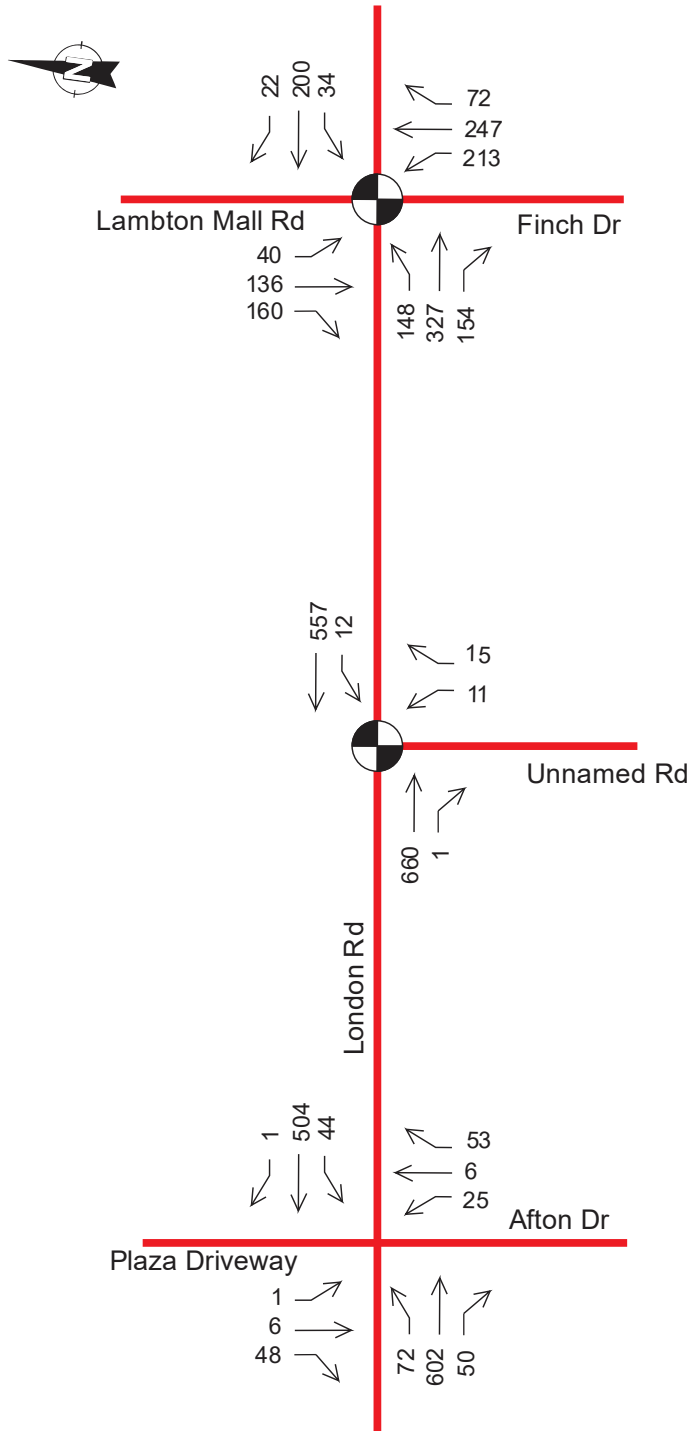


Exhibit 8: AM Background Traffic Volumes - Horizon Year 2026.



BACKGROUND TRAFFIC VOLUMES 2026

PM PEAK HOUR

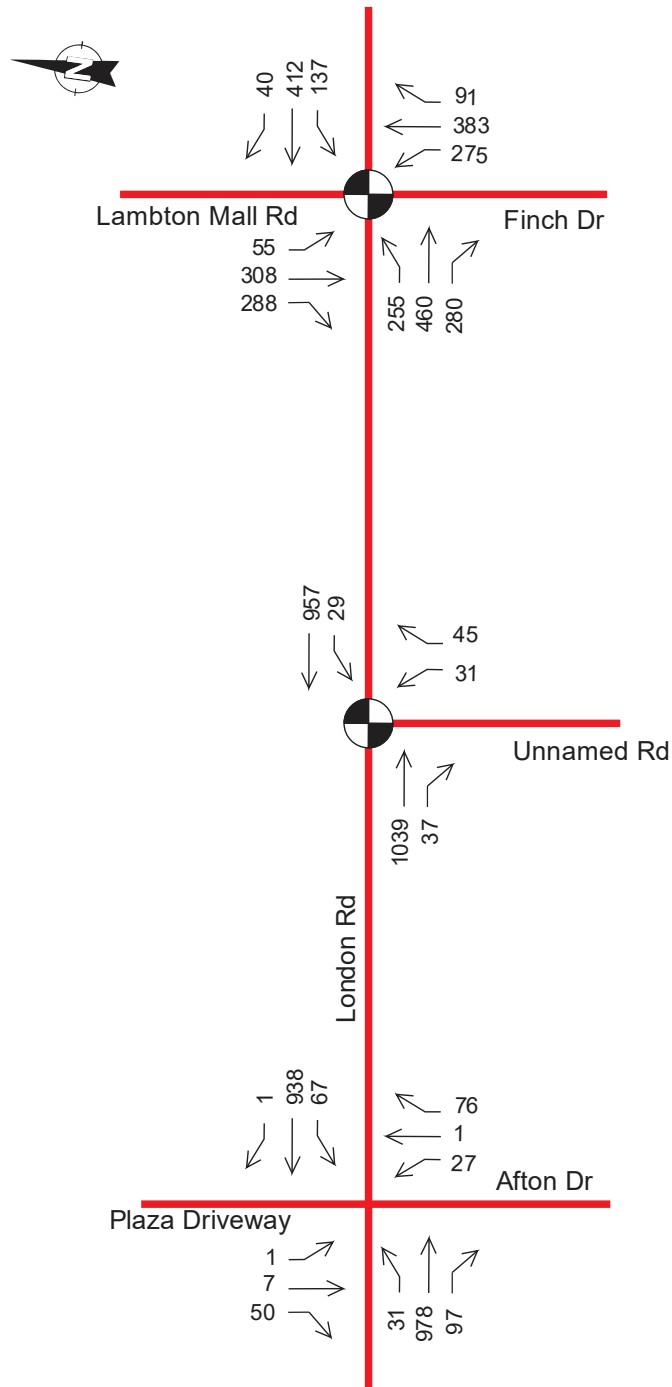


Exhibit 9: PM Background Traffic Volumes - Horizon Year 2026.



		Capacity Analysis - Background Base Year 2021							
		AM Peak Hour				PM Peak Hour			
		V/C	Delay (s)	Q ₉₅ (m)	LOS	V/C	Delay (s)	Q ₉₅ (m)	LOS
London Rd & Afton Dr (Stop Sign)	EBL	0.06	8.2	1.4	A	0.03	9.0	0.8	A
	EBT	0.23	0.0	0.0	A	0.38	0.0	0.0	A
	EBR	0.15	0.0	0.0	A	0.24	0.0	0.0	A
	WBL	0.05	9.1	1.1	A	0.09	10.6	2.3	B
	WBT	0.19	0.0	0.0	A	0.36	0.0	0.0	A
	WBR	0.10	0.0	0.0	A	0.18	0.0	0.0	A
	NBL	0.09	16.2	2.1	C	0.09	17.7	2.3	C
	NBT	0.09	16.2	2.1	C	0.09	17.7	2.3	C
	NBR	0.07	10.1	1.7	B	0.09	9.7	2.2	A
	SBL	0.00	14.0	0.1	B	0.00	15.9	0.1	C
	SBT	0.06	9.7	1.5	A	0.08	10.9	2.1	B
	SBR	0.06	9.7	1.5	A	0.08	10.9	2.1	B
London Rd & Unnamed Rd (Traffic Signal)	EBT-R	0.56	16.1	37.2	B	0.71	16.9	64.8	B
	WBL	0.05	12.0	3.4	B	0.22	15.2	6.8	B
	WBT	0.47	15.0	31.0	B	0.62	15.3	55.5	B
	NBL	0.01	9.4	3.0	A	0.05	14.0	7.0	B
	NBR	0.02	5.5	2.6	A	0.07	5.6	5.6	A
	Overall	0.56	15.4	-	B	0.71	15.9	-	B
London Rd & Finch Rd (Traffic Signal)	EBL	0.29	15.3	24.6	B	0.57	21.3	46.9	C
	EBT-R	0.39	17.9	41.2	B	0.76	30.7	77.7	C
	WBL	0.10	14.3	7.6	B	0.45	20.6	26.2	C
	WBT-R	0.30	25.5	24.1	C	0.58	32.8	53.3	C
	NBL	0.41	15.9	32.6	B	0.68	25.5	49.9	C
	NBT-R	0.26	18.4	27.6	B	0.38	22.7	48.8	C
	SBL	0.10	13.6	8.2	B	0.15	16.2	12.2	B
	SBT-R	0.36	13.7	19.5	B	0.66	22.5	48.6	C
	Overall	0.41	17.6	-	B	0.76	26.1	-	C

Table 3: Background Intersection Capacity – Base Year 2021.



		Capacity Analysis - Background Horizon Year 2026							
		AM Peak Hour				PM Peak Hour			
		V/C	Delay (s)	Q ₉₅ (m)	LOS	V/C	Delay (s)	Q ₉₅ (m)	LOS
London Rd & Afton Dr (Stop Sign)	EBL	0.07	8.3	1.6	A	0.04	9.3	0.9	A
	EBT	0.26	0.0	0.0	A	0.42	0.0	0.0	A
	EBR	0.16	0.0	0.0	A	0.27	0.0	0.0	A
	WBL	0.06	9.4	1.3	A	0.12	11.5	3.0	B
	WBT	0.21	0.0	0.0	A	0.40	0.0	0.0	A
	WBR	0.11	0.0	0.0	A	0.20	0.0	0.0	A
	NBL	0.11	17.8	2.7	C	0.12	20.9	3.0	C
	NBT	0.11	17.8	2.7	C	0.12	20.9	3.0	C
	NBR	0.08	10.4	2.0	B	0.11	10.3	2.8	B
	SBL	0.00	15.0	0.1	C	0.00	17.9	0.1	C
	SBT	0.08	10.0	1.9	B	0.10	11.7	2.6	B
	SBR	0.08	10.0	1.9	B	0.10	11.7	2.6	B
London Rd & Unnamed Rd (Traffic Signal)	EBT-R	0.59	16.3	41.2	B	0.75	17.6	74.5	B
	WBL	0.06	11.8	3.5	B	0.26	17.2	8.2	B
	WBT	0.50	15.0	34.2	B	0.66	15.7	63.1	B
	NBL	0.02	10.4	3.3	B	0.05	14.4	7.7	B
	NBR	0.03	6.0	2.9	A	0.08	6.6	6.5	A
	Overall	0.59	15.5	-	B	0.75	16.5	-	B
London Rd & Finch Rd (Traffic Signal)	EBL	0.32	15.7	26.7	B	0.65	24.8	51.8	C
	EBT-R	0.46	20.5	46.0	C	0.84	35.9	97.7	D
	WBL	0.11	14.5	8.3	B	0.50	22.4	28.7	C
	WBT-R	0.33	26.1	26.2	C	0.62	34.9	59.0	C
	NBL	0.45	16.9	37.5	B	0.79	35.7	75.3	D
	NBT-R	0.29	19.1	31.6	B	0.45	25.3	55.1	C
	SBL	0.11	14.1	9.3	B	0.17	16.8	13.4	B
	SBT-R	0.40	14.2	21.6	B	0.71	25.7	57.3	C
	Overall	0.46	18.8	-	B	0.84	30.1	-	C

Table 4: Background Intersection Capacity – Horizon Year 2026.

4 Proposed Development Traffic Forecasting

4.1 Traffic Impact Study Methodology

The traffic impact analysis was completed in accordance with the methodologies of the Transportation Impact Analysis for Site Developments and Manual of Transportation Engineering Studies, both published by the Institute of Transportation Engineers (ITE).

The analysis also makes use of field data obtained specifically for this study.

4.2 Site Trip Generation

Estimation of trips generated by the proposed development were derived from the Trip Generation Manual, 10th Edition, published by the Institute of Transportation Engineers (ITE). The land uses which most closely describe the proposed expansion are the following:

- Off-Campus Student Apartment (Land Use 225).
- General Office Building (Land Use 710).

The office building is related to the planned 1st floor commercial for Building A; which includes a mixture of tenants such as professional services, insurance companies, investment brokers, banks, loan institutions, restaurants, cafeteria and other service retail facilities.

The table below shows the trip generation rates and the estimated number of trips generated by the proposed expansion.



TRIP GENERATION RATES BY LAND USE								
ITE Code	ITE Land Use	Unit of Measure	AM Peak Hr. of Adj. Street			PM Peak Hr. of Adj. Street		
			Rate	In	Out	Rate	In	Out
225	Off-Campus Student Apartment	Bedrooms	0.16	28%	72%	0.30	52%	48%
710	General Office Building	GFA	0.83	86%	14%	0.87	17%	83%

ESTIMATED NUMBER OF TRIPS BY LAND USE								
ITE Code	ITE Land Use	Total Units	AM Peak Hr. of Adj. Street			PM Peak Hr. of Adj. Street		
			Trips	In	Out	Trips	In	Out
225	Off-Campus Student Apartment (Bldg. A)	280	45	13	32	84	44	40
710	General Office Building (Bldg. A - 1st Floor Commercial)	9.2	8	7	1	8	1	7
225	Off-Campus Student Apartment (Bldg. B)	315	50	14	36	95	49	45
225	Off-Campus Student Apartment (Bldg. C)	315	50	14	36	95	49	45
TOTAL GENERATED TRIPS AT ENTRANCES			153	47	106	281	143	138
Internal Trip Reduction (For Code 225 only)		25%	36	10	26	68	35	33
TOTAL NEW EXTERNAL TRIPS			117	37	80	213	108	105

Table 5: Estimation of Trips Generated by the Proposed Expansion.

Due to the particularity of the residential units to be located within the commercial site, it is recognized that substantial trips will be made not only internally within the plaza but with the different business around without using the public roads. In order to represent this trips, a conservative 25% internal trip reduction was applied to the residential part of the proposed development.

4.3 Trip Distribution/Assignment

Lambton College, located approximately 1.1 km from the proposed student residence, is the main attractor for students; however, given the commercial nature of the study area, there will be other attractors. Thus, it is estimated that 70% of the trip activity will be generated at the London Rd/Unnamed Rd intersection and only 30% of the trip activity at the London Rd/Afton Dr



intersection. The following exhibits show the distribution of trips and also the number of new trips for the morning and afternoon peak hours.

**DISTRIBUTION OF NEW TRIPS
AM & PM PEAK HOUR**

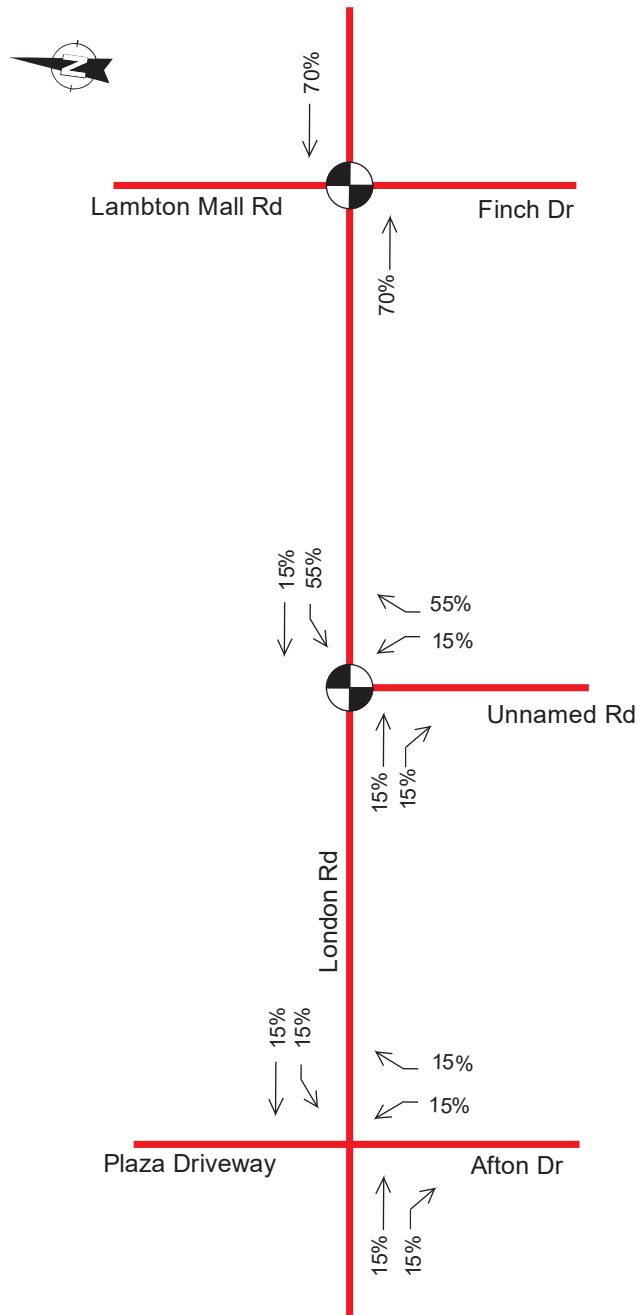


Exhibit 10: Distribution of Trips.



**NEW TRIPS GENERATED BY THE
PROPOSED DEVELOPMENT (AM PEAK HOUR)**

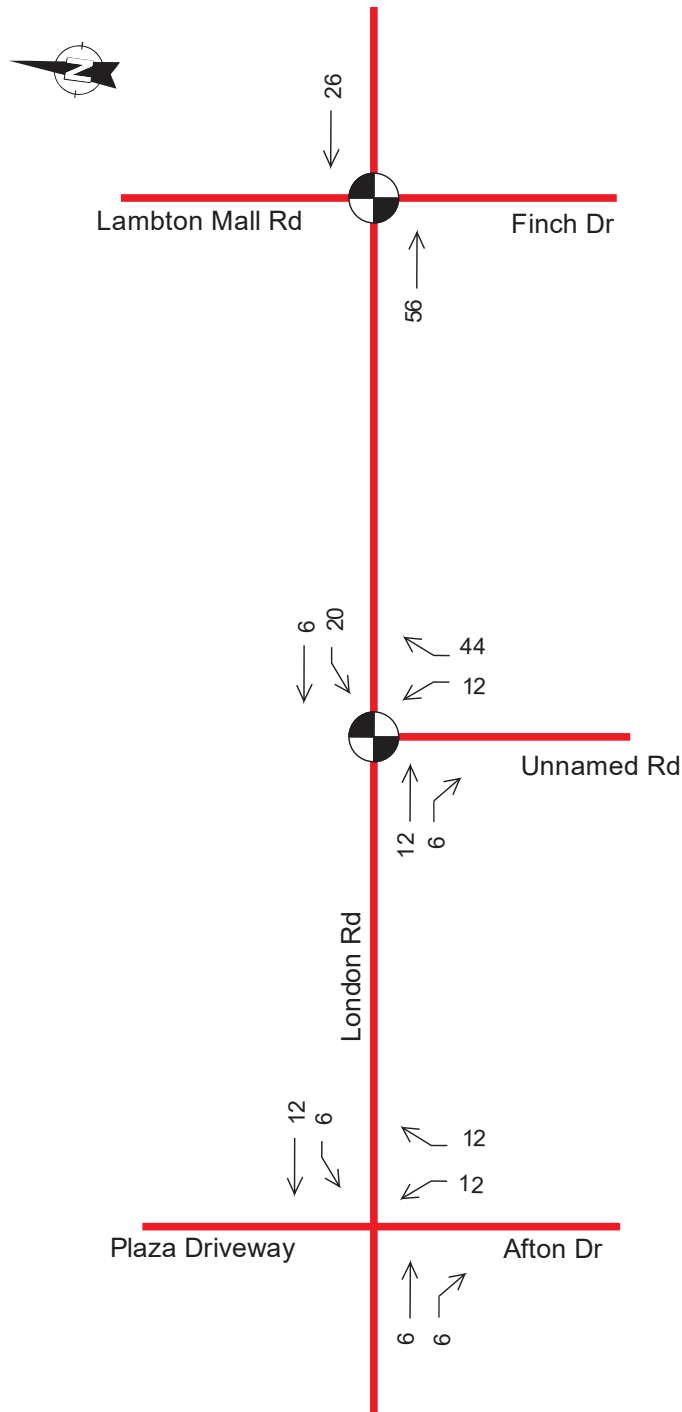


Exhibit 11: Generated New Trips for the AM Peak Hour.



**NEW TRIPS GENERATED BY THE
PROPOSED DEVELOPMENT (PM PEAK HOUR) -**

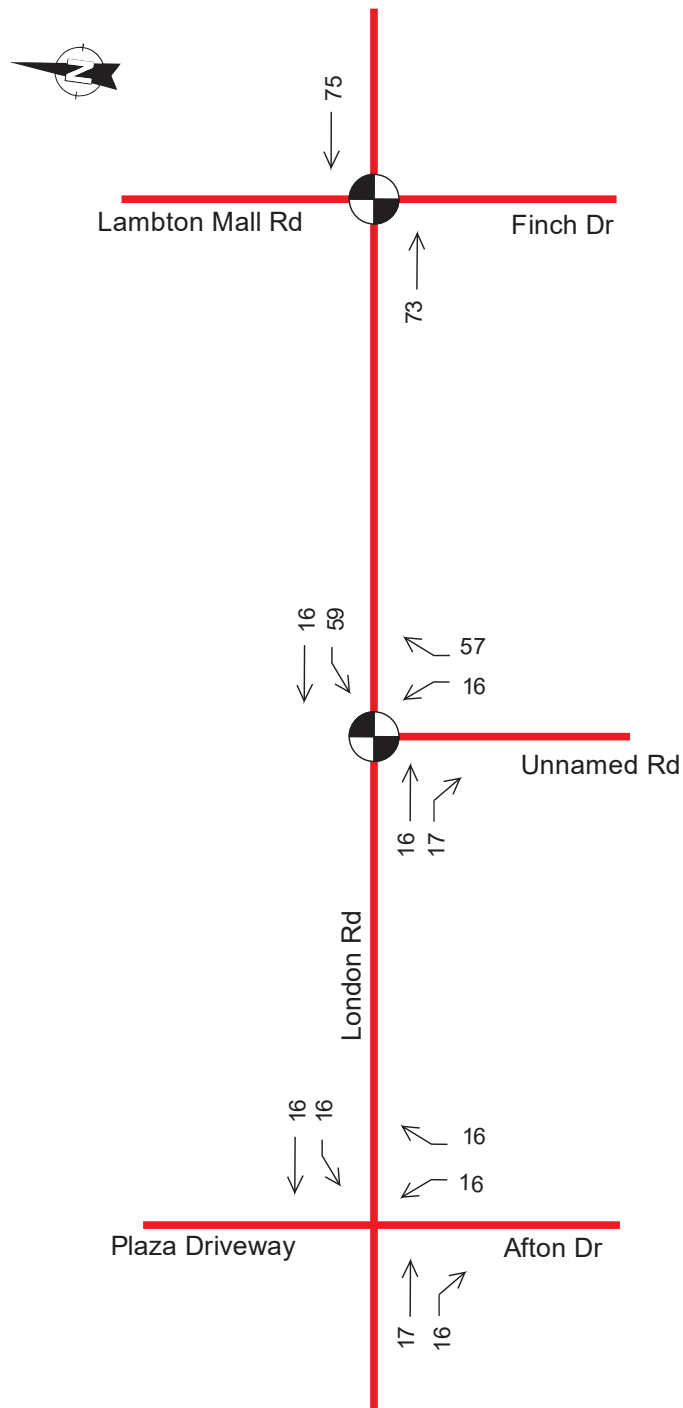


Exhibit 12: Generated New Trips for the PM Peak Hour.



5 Future Traffic Operations

5.1 Future Traffic Volumes

Future total traffic volumes for the base and horizon years are obtained adding the background traffic volumes plus the traffic volumes generated by the proposed development. The background traffic volumes and the total traffic volumes will be the base for comparison to assess any impact for the future years.

5.2 Scenarios

The analysis will review the intersections operations for the base year 2021 and the horizon year 2026. The scenarios to evaluate are the following:

- Morning and afternoon peak hour for the Base year 2021.
- Morning and afternoon peak hour for the Horizon year 2026.

5.3 Total Traffic Volumes for Horizon Years

It is planned the construction of the proposed expansion to be completed by the year 2021 which for this study is considered the base year. The horizon year 2026 is also evaluated that represents the traffic operations after 5 years of the proposed expansion.

The total traffic volumes including the trips generated by the proposed expansion for the years 2021 and 2026 are shown below:



TOTAL TRAFFIC VOLUMES 2021
AM PEAK HOUR

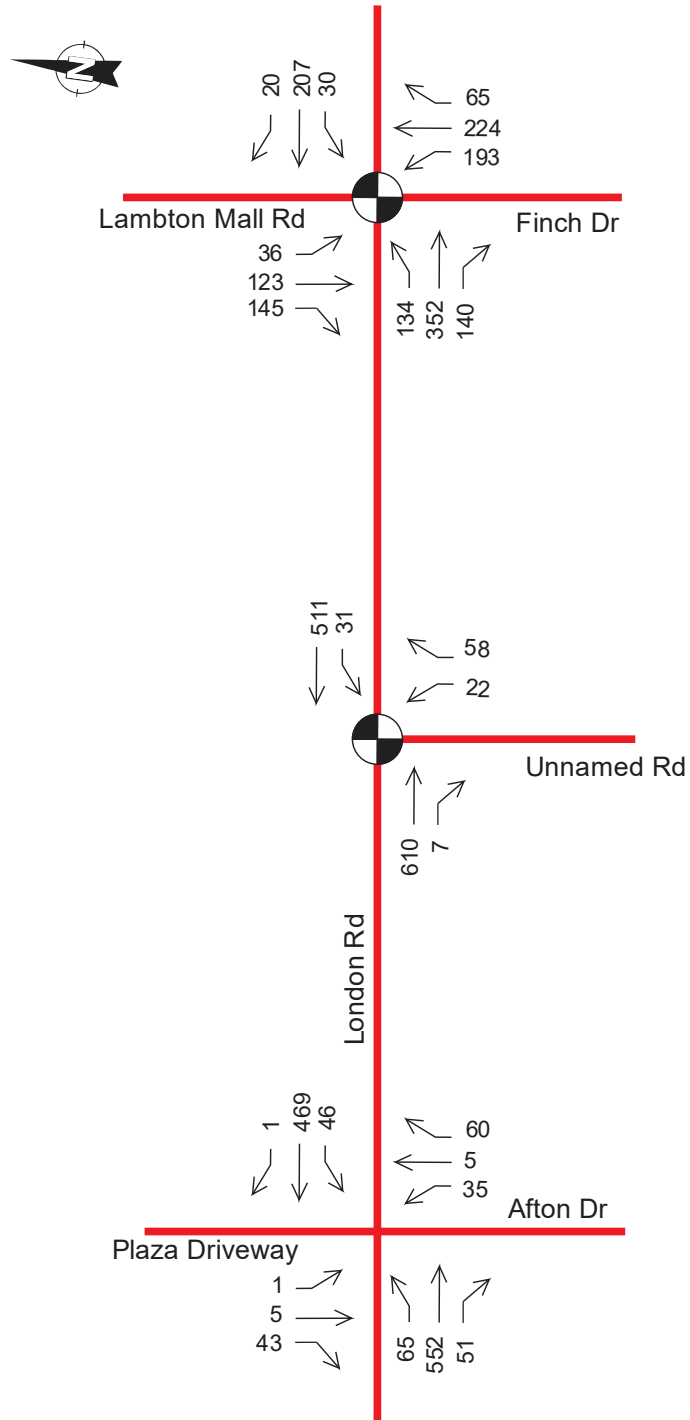


Exhibit 13: AM Peak Hour Total Traffic Volumes - Base Year 2021.



TOTAL TRAFFIC VOLUMES 2021
PM PEAK HOUR

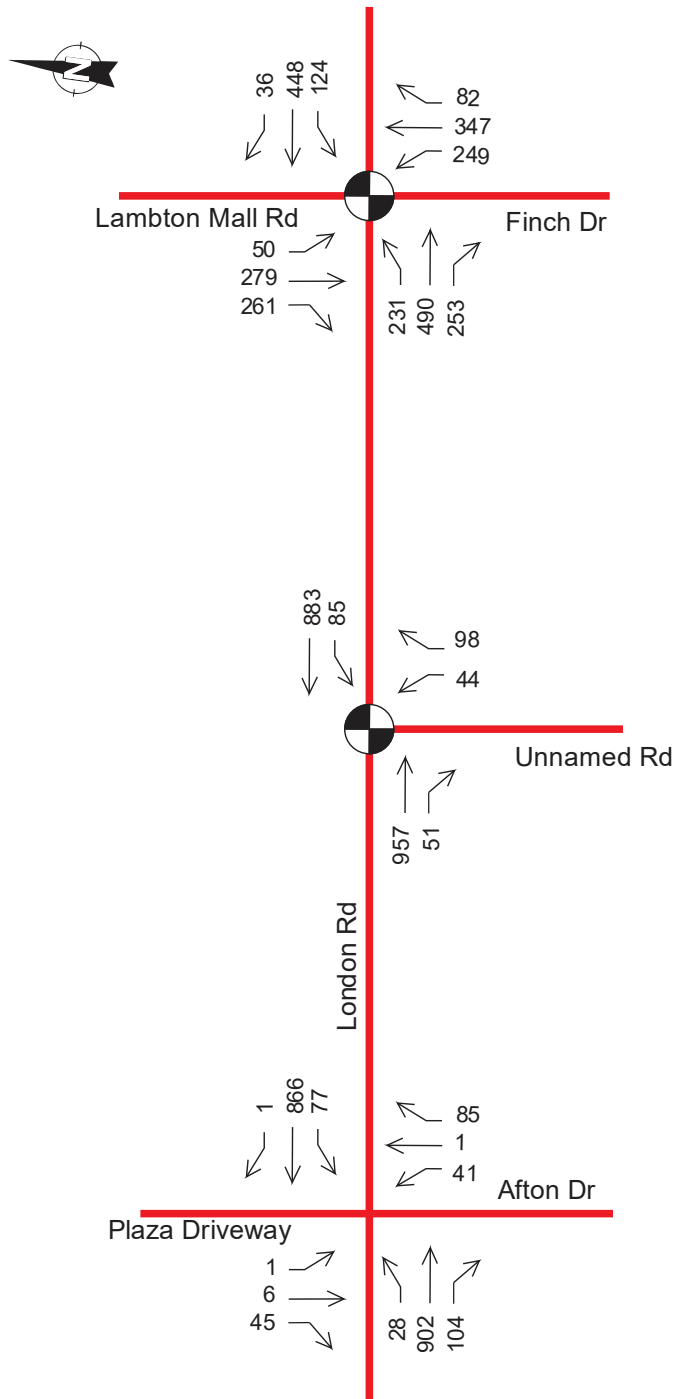


Exhibit 14: PM Peak Hour Total Traffic Volumes - Base Year 2021.



TOTAL TRAFFIC VOLUMES 2026

AM PEAK HOUR

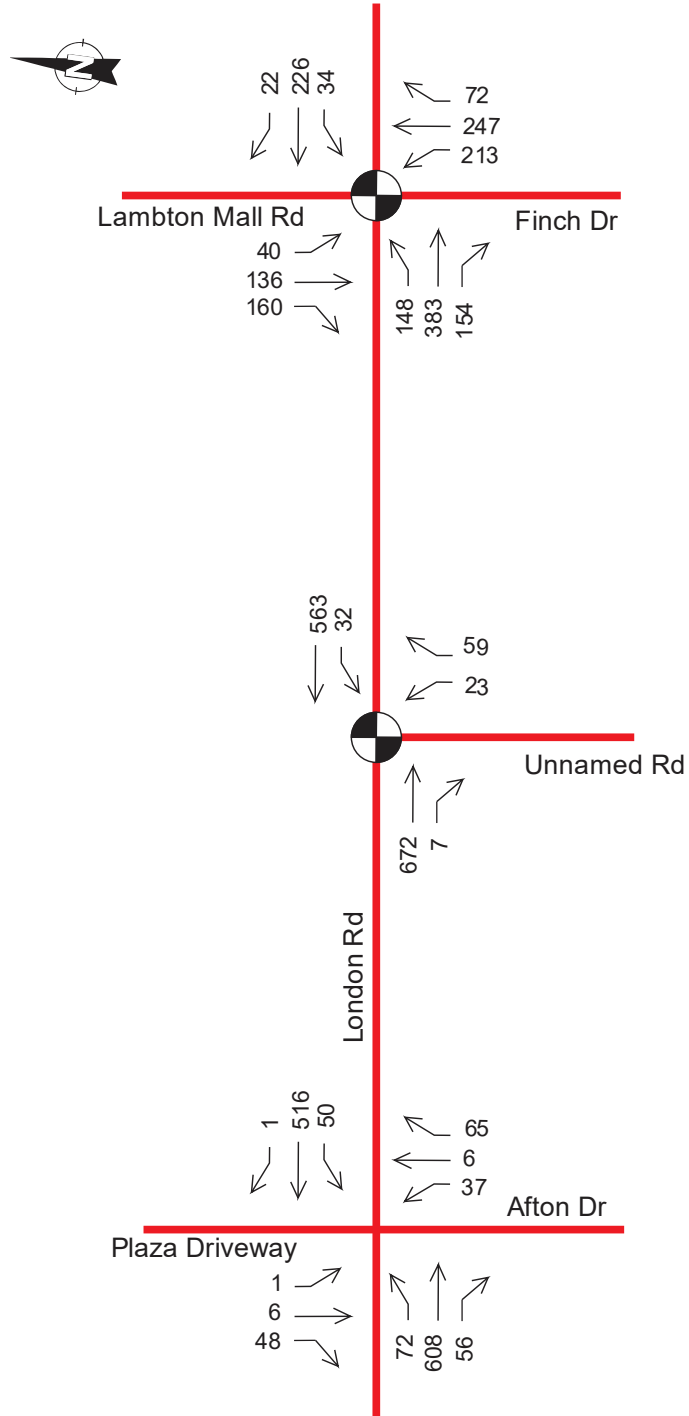


Exhibit 15: AM Peak Hour Total Traffic Volumes - Horizon Year 2026.



TOTAL TRAFFIC VOLUMES 2026
PM PEAK HOUR

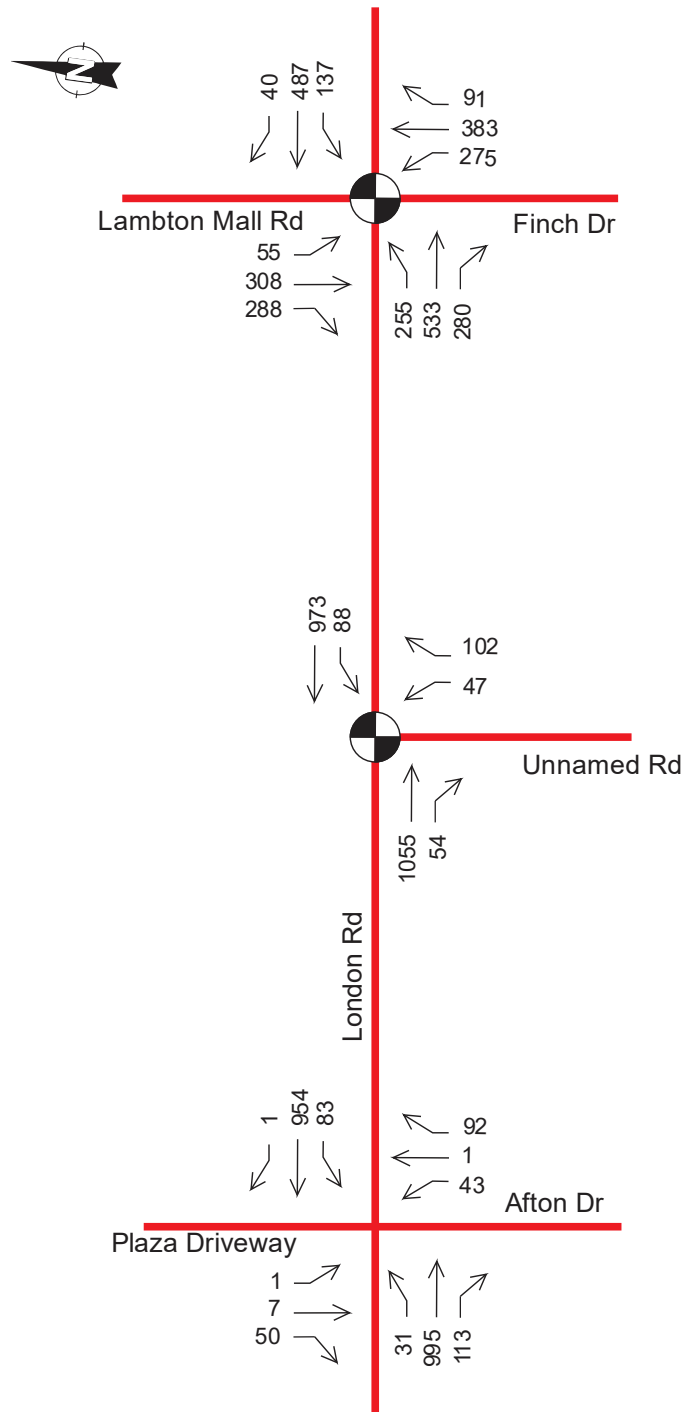


Exhibit 16: PM Peak Hour Total Traffic Volumes - Horizon Year 2026.



5.4 Intersection Capacity and Level of Service

Operations of the intersection were evaluated based on their respective control delay and Level of Service (LOS). The LOS is a recognized method of qualifying the efficiency of traffic flow at intersections. It is based on the delay experienced by individual vehicles executing the various movements.

The LOS conditions on the existing intersection have been assessed using Synchro 7 with HCM 2000 methodologies. The following factors were considered in the assessment:

- Volume to capacity ratios (v/c), which is indicative of how the traffic volume is affecting the existing roadway capacity; a v/c ratio approaching 1 indicates that the full roadway capacity is being used, a v/c ratio greater than 1 indicates that traffic volumes are exceeding the capacity of the roadway.
- The 95th percentile queue lengths provides the possible queue lengths in meters for a given movement. The 95th percentile can be used to assess the estimated queues against the availability turning lane storage.
- Delay (control delay) is measured in seconds and is the main factor to determine the LOS for a specific turning movement in an intersection. High delays are indicative of insufficient gaps in approaching traffic to allow vehicles execute their movements.
- The LOS is determined by the computed or measured control delay for each minor movement. As noted in **Table 1** under the “Existing Traffic Operations” section of this report, the highest possible rating is LOS ‘A’ representing the ideal traffic condition and LOS ‘F’ representing the extreme congested conditions.

The intersections operations were evaluated using the existing lane geometry and traffic control along with the forecasted peak hour traffic. However, the traffic signals for London Rd/Unnamed Rd intersection was modified to include a westbound left turn protected/permitted phase. This phase allows to maintain an acceptable level of service for individual



movements as well as for the overall intersection. Traffic operation results for the base year 2021 including the noted new signal phase is shown in the following table:

		Capacity Analysis - Total Volumes Base Year 2021							
		AM Peak Hour				PM Peak Hour			
		V/C	Delay (s)	Q ₉₅ (m)	LOS	V/C	Delay (s)	Q ₉₅ (m)	LOS
London Rd & Afton Dr (Stop Sign)	EBL	0.06	8.3	1.5	A	0.04	9.3	0.8	A
	EBT	0.24	0.0	0.0	A	0.38	0.0	0.0	A
	EBR	0.15	0.0	0.0	A	0.26	0.0	0.0	A
	WBL	0.05	9.2	1.3	A	0.12	11.0	3.2	B
	WBT	0.20	0.0	0.0	A	0.37	0.0	0.0	A
	WBR	0.10	0.0	0.0	A	0.19	0.0	0.0	A
	NBL	0.13	17.1	3.3	C	0.16	19.9	4.2	C
	NBT	0.13	17.1	3.3	C	0.16	19.9	4.2	C
	NBR	0.09	10.2	2.2	B	0.11	10.0	2.9	A
	SBL	0.00	14.7	0.1	B	0.00	18.6	0.1	C
	SBT	0.07	9.9	1.6	A	0.08	11.0	2.1	B
	SBR	0.07	9.9	1.6	A	0.08	11.0	2.1	B
London Rd & Unnamed Rd (Traffic Signal)	EBT-R	0.57	18.1	48.6	B	0.74	20.9	85.4	C
	WBL	0.09	8.6	5.2	A	0.36	10.6	10.5	B
	WBT	0.40	12.5	29.0	B	0.51	11.5	52.5	B
	NBL	0.03	14.5	6.6	B	0.09	22.0	13.4	C
	NBR	0.11	5.7	7.2	A	0.20	6.4	11.0	A
	Overall	0.57	14.9	-	B	0.74	15.9	-	B
London Rd & Finch Rd (Traffic Signal)	EBL	0.29	15.1	24.4	B	0.60	22.3	46.7	C
	EBT-R	0.43	19.3	48.5	B	0.82	34.9	101.0	C
	WBL	0.10	14.1	7.7	B	0.46	20.8	26.2	C
	WBT-R	0.33	25.7	26.5	C	0.63	33.7	63.6	C
	NBL	0.41	16.3	34.5	B	0.70	27.3	50.6	C
	NBT-R	0.27	18.8	28.8	B	0.39	23.6	49.3	C
	SBL	0.10	14.1	8.7	B	0.15	16.9	12.3	B
	SBT-R	0.37	14.0	20.2	B	0.67	23.4	49.1	C
	Overall	0.43	18.3	-	B	0.82	28.2	-	C

Table 6: Total Volumes Intersection Capacity – Base Year 2021.



Traffic operation results for the horizon year 2026 including the noted new signal phase are shown in the following table:

		Capacity Analysis - Total Volumes Horizon Year 2026							
		AM Peak Hour				PM Peak Hour			
		V/C	Delay (s)	Q ₉₅ (m)	LOS	V/C	Delay (s)	Q ₉₅ (m)	LOS
London Rd & Afton Dr (Stop Sign)	EBL	0.07	8.4	1.7	A	0.04	9.6	1.0	A
	EBT	0.26	0.0	0.0	A	0.42	0.0	0.0	A
	EBR	0.17	0.0	0.0	A	0.28	0.0	0.0	A
	WBL	0.06	9.5	1.5	A	0.15	12.0	3.9	B
	WBT	0.22	0.0	0.0	A	0.41	0.0	0.0	A
	WBR	0.11	0.0	0.0	A	0.20	0.0	0.0	A
	NBL	0.15	19.0	4.1	C	0.20	24.1	5.6	C
	NBT	0.15	19.0	4.1	C	0.20	24.1	5.6	C
	NBR	0.10	10.6	2.5	B	0.13	10.6	3.5	B
	SBL	0.00	15.9	0.1	C	0.00	21.3	0.1	C
	SBT	0.08	10.1	1.9	B	0.11	12.0	2.7	B
SBR	0.08	10.1	1.9	B	0.11	12.0	2.7	B	
London Rd & Unnamed Rd (Traffic Signal)	EBT-R	0.61	18.2	53.7	B	0.78	21.8	98.1	C
	WBL	0.10	8.4	5.3	A	0.39	11.2	10.9	B
	WBT	0.43	12.5	32.0	B	0.55	11.8	59.5	B
	NBL	0.04	15.6	7.2	B	0.10	22.8	14.0	C
	NBR	0.11	6.0	7.5	A	0.21	6.4	11.1	A
	Overall	0.61	15.0	-	B	0.78	16.6	-	B
London Rd & Finch Rd (Traffic Signal)	EBL	0.32	15.6	26.7	B	0.69	26.5	52.0	C
	EBT-R	0.51	22.0	53.7	C	0.88	40.6	120.3	D
	WBL	0.11	14.4	8.3	B	0.52	22.7	28.7	C
	WBT-R	0.36	26.4	29.1	C	0.67	35.8	69.5	D
	NBL	0.46	17.3	38.3	B	0.81	38.1	76.3	D
	NBT-R	0.29	19.4	32.0	B	0.46	26.2	55.1	C
	SBL	0.11	14.4	9.4	B	0.17	17.3	13.4	B
	SBT-R	0.40	14.4	21.9	B	0.73	26.9	57.3	C
	Overall	0.51	19.5	-	B	0.88	32.4	-	C

Table 7: Total Volumes Intersection Capacity – Horizon Year 2026.

The traffic operation results for the base year 2021 including the new traffic volumes generated by the proposed expansion show very minor changes in control delay for all movements in comparison to the background volumes for the base year; the change in control delay are not affecting the level of services for the intersections which remain basically the same for the year 2021; individual movements shows good operation with LOS “C” or better.

The traffic operation results for the horizon year 2026 including the new traffic volumes generated by the proposed expansion show very minor changes in control delay for all movements in comparison to the background conditions for the horizon year 2026; the change in control delay are, in general, not affecting the level of services for the intersections which remain basically the same for the year 2026. Individual movements at the intersections shows good operation with level of service “D” or better.



6 Off-Campus Student Apartment Parking Survey in Oshawa

As part of this study, there was the need to estimate the parking rate for off-campus student apartment; for this purpose, it was selected student apartment buildings in proximity to the Durham College/Ontario Tech University North Oshawa Campus. The surveyed sites are located along Simcoe St. North.

6.1 Existing Road Condition

Simcoe Street North is an important north/south arterial road that carries traffic from and to the core business area. Within the site area, Simcoe Street North is a five-lane urban arterial road with two lanes for the northbound and two lanes for the southbound direction, and a center continuous two-way left turn lane. The posted speed of Simcoe Street North within the study area is 60 km/h.

6.2 Pedestrian, Cyclist and On Street Parking Facility

During our site visit done on February 11 and 12, 2020, it was observed that concrete and asphalt sidewalk exist at both sides of Simcoe Street North. Pedestrian activity is very common in the area given the location of the university/college campus and other businesses like sit-in restaurants, fast food restaurants, coffee shop, gas station/convenience store, bank branch, drug store, etc.



Although no dedicated cyclist facility is provided in the area, some cycling activity was observed and seems to be common in the area.

Facility for on street parking along Simcoe Street North within the study area is not provided. On local roads within the area, parking is restricted from 8:00am to 5:00pm during weekdays unless a residential parking permit is obtained from the City of Oshawa.

6.3 Public Transit

Based on the Durham Region Transit's website, there are a total of 12 routes that serve the area, six (6) routes that operate along Simcoe Street North and six (6) with arrival/departure from the Durham College/Ontario Tech University Campus. Transit routes provide regular, limited or peak hour only services.

6.4 Parking Survey and Previous Study Review

Parking demand study for student residential sites was performed by the engineering company IBI in February 2016. The parking study was provided as part of a study for a proposed off-campus student residential site in proximity to the campus; the following sites were surveyed:

- 2 Taylorwood Rd – 1,600 ft from campus
- 33 Taylorwood Rd – 2,000 ft from campus
- 1805 Simcoe St. N. – 2,700 ft from campus

Given that IBI has the surveys done to capture local characteristics to determine parking rates specific to the area, validation was done by our firm for the three existing sites; results are noted in **Table 8**. The sampling survey was performed on Friday February 14 and Saturday February 15, 2020 to validate the results obtained by IBI and to make sure parking demand is within the range of the survey data. Our sampling in general, obtained results with slightly lower parking demand than those obtained by the IBI parking survey. Given that the IBI survey data represents the worst-case scenario, the 0.20 rate per bedroom is adopted to estimate the parking need for the proposed off-campus student apartment development.



	Friday			Saturday			Max. Demand	No of Beds	Parking Demand Rate
	5:00 PM	5:30 PM	6:00 PM	8:00 AM	8:30 AM	9:00 AM			
2 Taylorwood									
Original Survey	45	44	44	50	48	46	50	371	0.13
Sampling Survey	22	20	21	29	27	25	-		
33 Taylorwood									
Original Survey	12	11	10	8	8	8	12	60	0.20
Sampling Survey	3	4	3	3	3	3	-		
1805 Simcoe									
Original Survey	21	21	21	22	21	20	27	190	0.14
Sampling Survey	17	18	18	23	24	23	-		

Table 8: Parking Survey Sampling vs Original Survey.



7 Conclusions/Recommendations

As discussed throughout the report, it is planned the expansion of the existing commercial site to include three new nine-storey student resident buildings with a total of 910 bedrooms. One of the building to include a commercial area on the first floor.

The traffic impact study takes in consideration the existing conditions (2019) and the future traffic conditions for the base year 2021 and horizon year 2026.

Based on the above statement and the study done for this expansion, the following conclusions were reached:

- Most of the new trips generated by the proposed expansion will be directed to the London Road/Unnamed Rd signalized intersection.
- In order to maintain an acceptable level of service at London Road/Unnamed Rd intersection, a westbound left turn signal phase needs to be introduced.
- With the new signal phase and the added trips generated by the proposed expansion, traffic operations for the base year 2021 show very minor changes in control delay in comparison to the background conditions. Individual movements at intersections show good operation with level of service “C” or better.
- With the new signal phase and the added trips generated by the proposed expansion, traffic operations for the horizon year 2026 show very minor changes in control delay in comparison to the



background conditions. Individual movements at intersections show good operation with level of service “D” or better.

- It was identified that pedestrian activity is very common in the area given the location of the Lambton College campus and other businesses like restaurants, coffee shop, convenience store, banks, shopping malls, etc. The site is also very well served by public transit.

Recommendations:

- It is recommended a westbound left turn protected/permitted phase be introduced in the signal timing for the London Road/Unnamed Road intersection. Phase timings used on this report for this intersection are shown in the appendix.
- It is recommended to supply bicycle parking racks within the site to be consistent with the characteristics of the area and the type of residents for this expansion.
- It is recommended to use a parking rate of 0.20 per bedroom to estimate the required parking spaces for the proposed development.

