URBANTRANS
Engineering Solutions Inc.

Traffic Impact Study (TIS)

Proposed Residential Development

1884 Liverpool Road
City of Pickering, ON

UT-24-146

February 9, 2026

URBANTRANS
Engineering Solutions Inc.

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February 9, 2026

Louisville Homes Ltd
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Attention: Amanda Lazaridis

RE: Traffic Impact Study (TIS)
Proposed Residential Development
1884 Liverpool Road, Pickering, ON, L1V 1W5
Reference No.: UT-24-146

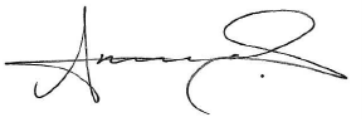
UrbanTrans Engineering Solutions Inc. was retained by Louisville Homes Ltd. (the "Client") to complete a Traffic Impact Study in support of a site plan application. The proposed residential development is located north of Glenanna Road, west of Liverpool Road, municipally known as 1884 Liverpool Road, City of Pickering.

The subject property is currently occupied by a single dwelling unit. The proposed development, as detailed in the plans prepared by Micacchi Architecture Inc., envisions the construction of 51 residential units with a total Gross Floor Area (GFA) of approximately 3,207.1 square metres. Construction is expected to commence in 2026, with full build-out anticipated by 2027. Vehicular access will be provided via a full-movement driveway on Glenanna Road, accommodating a total of 56 parking spaces.

This report concludes the proposed residential development will have minimal traffic impacts to the immediate roadways and nearby intersections. It is understood that the City of Pickering is the Municipal authority to review and approve the Traffic Impact Study for the proposed development. The Study is in accordance with the municipalities Traffic Impact Study (TIS) Guidelines as well as the Terms of Reference comments received in a timely manner from the City Staff (see **Appendix A**).

We thank you for the opportunity to undertake this study. We trust the enclosed comply with your requirements. Should you have any questions, please do not hesitate to contact the undersigned.

Kind Regards,
UrbanTrans Engineering Solutions Inc.



Signature Engineer's Seal

Annosan Srikantha, P.Eng.
President

DISCLAIMER

This document entitled '1884 Liverpool Road – Traffic Impact Study' or named part thereof (the "project") was prepared by UrbanTrans Engineering Solutions Inc. ("UrbanTrans") for the account of Louisville Homes Ltd. (the "Client"). This document is confidential and prepared solely for approval and commenting municipalities and their agencies in their review and approval of this project. The materials in this report reflect best judgement based on the information available at the time the document was issued. Any reliance on this document by any third party is strictly prohibited and UrbanTrans accepts no responsibility for damages, if any, suffered by any third party by reason of decisions made or actions based on this document.

RECORD OF REVISIONS

Revision	Date	Identification	Description
0	February 9, 2026	Final Report	Final Submission

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1.0 INTRODUCTION

1.1 Background

UrbanTrans Engineering Solutions Inc. was retained by Louisville Homes Ltd. (the "Client") to complete a Traffic Impact Study in support of a site plan application for the proposed residential development.

1.2 Objective

The study will assess the following components:

- Evaluate potential impacts of traffic changes prompted by the proposed development on municipal roadways and identify any infrastructure enhancements or mitigation measures warranted to ensure the road network will operate acceptably and safely upon completion of the proposed development.
- Determine whether the proposed vehicle supply can sufficiently accommodate the peak parking demands of the proposed development and conform to the City's Zoning By-law requirements.
- Determine whether the proposed vehicle supply can sufficiently accommodate the peak parking demands of the proposed development and conform to the City's Zoning By-law requirements.
- Review 5 years (2020-2025) collision history at intersection of Glenanna Road/Glendale Drive, Glenanna Road/Liverpool Road, and Glenanna Road between Liverpool Road and Glendale Drive.

1.3 Development Proposal

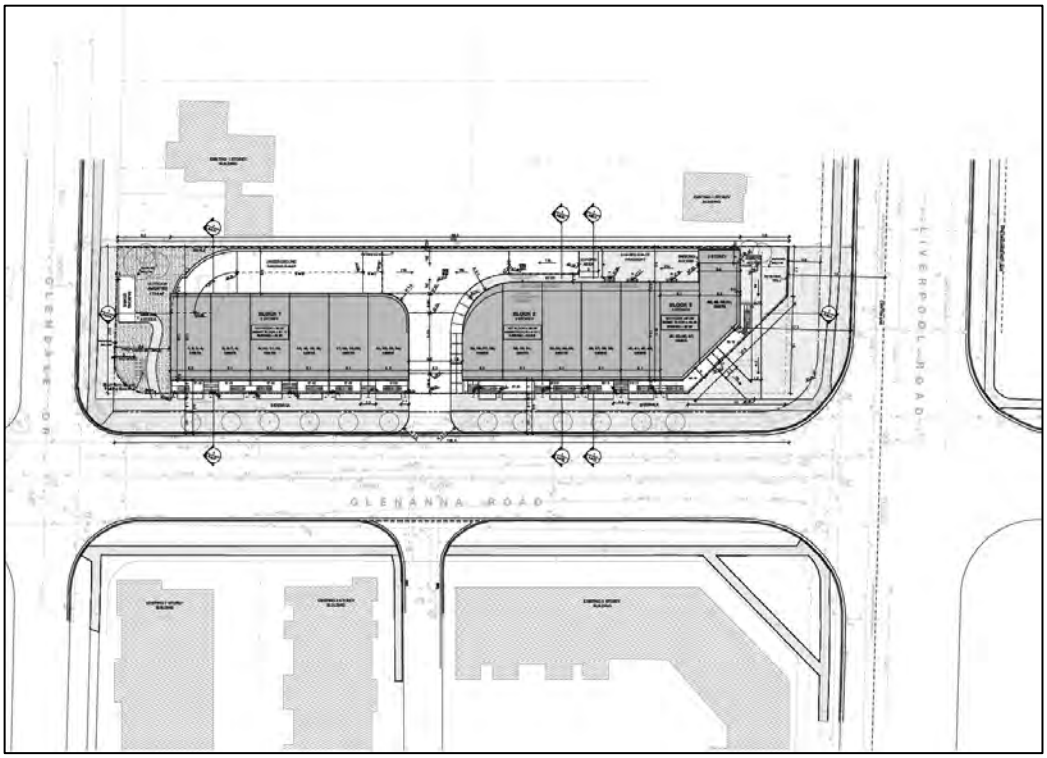
The subject property is currently occupied by a single dwelling unit. The proposed development, as detailed in the plans prepared by Micacchi Architecture Inc., envisions the construction of 51 residential units with a total Gross Floor Area (GFA) of approximately 3,207.1 square metres. Construction is expected to commence in 2026, with full build-out anticipated by 2027. Vehicular access will be provided via a full-movement driveway on Glenanna Road, accommodating a total of 56 parking spaces.

The location of the proposed development is illustrated in **Figure 1**. The proposed site plan is illustrated in **Figure 2; Appendix B** also provides a larger scale version of the proposed site plan.

Figure 1: Site Location

Source: Google Maps

Figure 2: Proposed Site Plan



Source: Micacchi Architecture.

2.0 EXISTING CONDITIONS

This section documents the transportation network in the study area in 2025, including existing roadways, transit services, active transportation network, traffic control measures, and intersection performances.

2.1 Road Network

To provide clarity throughout this report, Glenanna Road has been given an east-west orientation, while Glendale Drive and Liverpool Road are given a north-south orientation. On this basis, the characteristics of the roads and intersections within the vicinity of the subject site are described below:

- **Glenanna Road** operates as an east-west collector road under the jurisdiction of the City of Pickering. It operates as a 2-lane cross-section with bike lanes on both sides of the road from Kingston Road to Dixie Road. The stretch of Glenanna Road fronting the subject site does not have bike lane on the south side. It maintains a posted speed limit of 40km/hr.
- **Glendale Drive** operates as a north-south collector road under jurisdiction of the City of Pickering. It operates as a 2-lane cross-section. It maintains a posted speed limit of 40km/hr.
- **Liverpool Road** operates as a north-south collector road under jurisdiction of the City of Pickering. It operates as a 2-lane cross-section. It maintains a posted speed limit of 50km/hr.

2.2 Transit Network

The proposed subject site is situated within an area that is currently serviced by the local bus routes. Bus stops are located within a walkable distance of 80m from the subject site. There are other transit routes that operate at the intersection of Liverpool Road at Kingston Road which is located 450m (10min walk) from the subject site. The existing transit services in the vicinity of the subject site are illustrated in **Table 1**.

Table 1: Area Transit Context

Bus Route	Route Description	Frequency
Durham Region Transit 121	The 121 bus eastbound/westbound has 36 stops operating between Pickering Parkway Terminal and Pickering Station.	30 minutes
Durham Region Transit 112	The 112 bus northbound/southbound has 31 stops operating between Pickering Parkway Terminal and Belcourt Street at Burkholder Drive.	60 minutes
Durham Region Transit 118	The 118 bus northbound/southbound has 17 stops operating between Pickering Parkway Terminal and Belcourt Street at Burkholder Drive.	30 minutes
Durham Region Transit 900 PULSE	The 900 bus eastbound/westbound has 59 stops operating between Bond Street East at Ritson Road North and Ian Centennial Cricle.	9 minutes

Table 1: Area Transit Context (Cont'd)

Bus Route	Route Description	Frequency
Durham Region Transit 920	The 920 bus eastbound/westbound has 66 stops operating between Scarborough Center Station and Durham College North Campus.	25-30 minutes
Durham Region Transit 921	The 921 bus eastbound/westbound has 31 stops operating between Scarborough Center Station and Durham College North Campus.	10-20 minutes
Durham Region Transit N1	The N1 bus eastbound/westbound has 82 stops operating between Centennial Circle and Harmony Road North at Conlin Road East.	30 minutes

Figure 3: Durham Region Transit Map

Source: DRT System Map

2.3 Active Transportation Network

Active transportation network involves human-powered forms of travel with walking and cycling being the most dominant and can be combined with other modes such as public transit.

2.3.1 Sidewalk Network

Sidewalks are present on both sides of Glenanna Road and Liverpool Road, and only on the east side of Glendale Drive, providing fundamental pedestrian connectivity. While specific measurements are not provided, the sidewalks appear to be of standard width, likely ranging from 1.2 to 1.5 meters.

2.3.2 Bicycle Network

Painted bicycle lanes are provided along both sides of Glenanna Road, extending from approximately 60 metres west of Kingston Road to Dixie Road. The segment of Glenanna Road adjacent to the subject property does not include a painted lane on the south side, as this area accommodates an eastbound right-turn lane at the intersection of Glenanna Road and Liverpool Road. Although specific measurements are unavailable, the painted bicycle lanes appear to be of a standard width of approximately 1.5 metres.

2.4 Traffic Data

Based on discussion and acceptance from City Staff (see **Appendix A**), the study will review and evaluate the following intersections in the vicinity of the subject site:

- Glenanna Road and Liverpool Road (Signalized)
- Glenanna Road and Proposed Site Access/Private Driveway (Unsignalized)
- Glenanna Road and Glendale Drive (Unsignalized)

The existing traffic volumes at the abovementioned study area intersections were undertaken by Spectrum Traffic Data Inc. on Thursday, September 25, 2025, during the morning (7:00 AM to 10:00 AM) and afternoon (4:00 PM to 7:00 PM) peak hour periods.

Observed traffic volumes in the year 2025 are shown in **Figure 4**. The detailed traffic data and signal timing plans are provided for reference in **Appendix C**.

2.5 Base Year (2025) Traffic Operations

To assess the existing traffic conditions, UrbanTrans utilized window-based computer software Synchro Version 11 which incorporates the Highway Capacity Manual 2000 methodology (HCM 2000), to undertake capacity analysis (i.e., level of services, volume to capacity ratios, delays, queues, etc.) at the study area intersections during weekday AM and PM peak hour periods for the signalized and unsignalized intersections.

The detailed results of the analysis for base year (2025) existing traffic conditions are provided in **Appendix D** and summarized in **Table 2**.

Table 2: Base Year (2025) Traffic Peak Hour Level of Service Analysis

Intersection	Weekday AM Peak Hour					Weekday PM Peak Hour			
	Movement	Control Delay (s)	95th Queue (m)	V/C	LOS	Control Delay (s)	95th Queue (m)	V/C	LOS
Glenanna Road and Liverpool Road (Signalized)	OVERALL	14.6	-	0.68	B	16.5	-	0.67	B
	EBL	41.0	16.6	0.27	D	38.0	18.5	0.32	D
	EBT	47.5	42.6	0.56	D	46.3	60.9	0.67	D
	EBR	10.2	19.6	0.57	B	16.0	28.2	0.49	B
	WBL	61.6	34.3	0.68	E	41.5	19.4	0.38	D
	WBTR	28.3	30.4	0.48	C	36.8	48.3	0.57	D
	NBL	6.1	17.4	0.22	A	11.1	50.6	0.45	B
	NBTR	4.3	17.8	0.16	A	6.6	38.0	0.28	A
	SBL	5.0	7.6	0.08	A	7.9	13.6	0.16	A
	SBTR	4.7	26.2	0.22	A	6.4	25.4	0.18	A
Glenanna Road and Site Access (Unsignalized)	EBTLR	0.0	0.0	<0.01	A	0.0	0.0	<0.01	A
	WBTLR	0.0	0.0	<0.01	A	0.0	0.0	<0.01	A
	NBTLR	0.0	0.0	<0.01	A	0.0	0.0	<0.01	A
	SBTLR	0.0	0.0	<0.01	A	0.0	0.0	<0.01	A
Glenanna Road and Glendale Drive (Unsignalized)	EBTLR	0.2	0.2	0.01	A	0.2	0.1	0.01	A
	WBTLR	2.0	1.0	0.04	A	0.7	0.5	0.02	A
	NBTLR	16.6	10.9	0.33	C	19.4	13.6	0.39	C
	SBTLR	16.3	3.0	0.12	C	21.0	2.4	0.10	C

Glenanna Road and Liverpool Road (Signalized)

The intersection capacity analysis indicates that under existing conditions, the signalized intersection is expected to operate at acceptable levels of service based on overall intersection levels of service, v/c ratios and delay with no critical movements identified.

Glenanna Road and Site Access (Unsignalized)

The intersection capacity analysis indicates that under existing conditions, the unsignalized intersection is expected to operate at acceptable levels of service based on overall intersection levels of service, v/c ratios and delay with no critical movements identified.

Glenanna Road and Glendale Drive (Unsignalized)

The intersection capacity analysis indicates that under existing conditions, the unsignalized intersection is expected to operate at acceptable levels of service based on overall intersection levels of service, v/c ratios and delay with no critical movements identified.

3.0 FUTURE BACKGROUND CONDITIONS

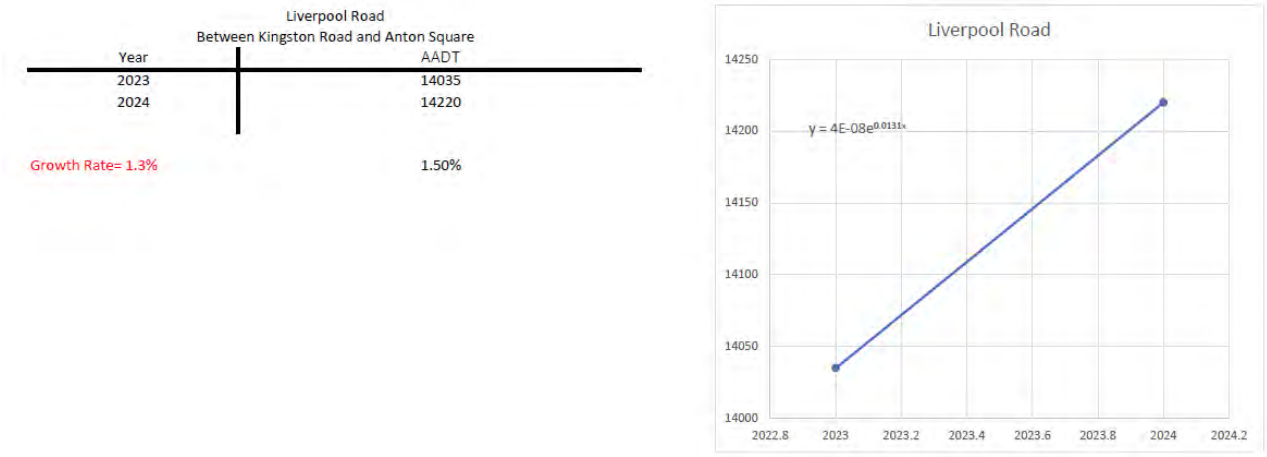
3.1 Horizon Years

City staff noted that the Traffic Impact Study (TIS) must clearly identify the anticipated construction start year and full build-out year. While the submitted Terms of Reference (TOR) referenced a five-year post-build-out horizon to 2030—implying completion in 2025—the proposed development is now expected to reach full build-out in 2027. Accordingly, UrbanTrans has assessed 2032 as the five-year post-build-out horizon year.

3.2 Growth Rate

The Average Annual Daily Traffic (AADT) data was obtained from Durham Region to calculate the growth rates along Liverpool Road. The calculated growth rate (1.5%) along Liverpool Road is detailed in **Figure 5.**

Figure 5: Growth Rate Calculations



Liverpool Road
Between Kingston Road and Anton Square

Year	AADT
2023	14035
2024	14220
Growth Rate= 1.3%	1.50%

For a conservative approach, UrbanTrans also applied an estimated growth rate of 1.5% along Glendale Drive and Glenanna Road.

3.3 Future (2032) Background Developments

In addition to general corridor traffic growth, specific allowances have also been made to account for traffic generated by other area developments in the vicinity of the site that are either undergoing the approval process or under construction at the time of this study.

Following discussions with City Staff, UrbanTrans incorporated traffic from the following background developments into the Traffic Operations Analysis:

- 1095 Kingston Road
- 1105 and 1163 Kingston Road
- 1300-1360 Kingston Road
- 1355 Kingston Road
- 1786-1790 Liverpool Road
- Pickering Town Centre Block 1
- Pickering Town Centre Block 4

Table 3: Future Background Developments

Site Address	Proposed Development Information
1095 Kingston Road	35 storeys apartment buildings with total of 1429 dwelling units.
1105 and 1163 Kingston Road	17 to 35 storeys apartment buildings with total of 5238 dwelling units.
1300 – 1360 Kingston Road	15 to 25 storeys apartment buildings for mixed use purpose.
1355 Kingston Road	40 to 55 storeys apartment buildings for mixed use purpose with 500 dwelling units.
1786 – 1790 Liverpool Road	48 storeys apartment building for mixed use with 594 dwelling units.
Pickering Town Center Block 1	40 to 45 storeys apartment buildings with 974 dwelling units.
Pickering Town Center Block 4	55 storeys apartment building for nixed use with approximately 650 dwelling units.

3.4 Future (2032) Background Traffic Operations

To assess the future background traffic conditions, UrbanTrans utilized window-based computer software Synchro Version 11 which incorporates the Highway Capacity Manual 2000 methodology (HCM 2000), to undertake capacity analysis (i.e., level of services, volume to capacity ratios, delays, queues, etc.) at the study area intersections during weekday AM and PM peak hour periods for the signalized and unsignalized intersections.

The estimated Future (2032) Background traffic volumes are illustrated in **Figure 6**. The detailed results of the analysis are provided in **Appendix E** and summarized in **Table 6**.

Table 4: Future (2032) Background Traffic Operations

Intersection	Weekday AM Peak Hour					Weekday PM Peak Hour			
	Movement	Control Delay (s)	95th Queue (m)	V/C	LOS	Control Delay (s)	95th Queue (m)	V/C	LOS
Glenanna Road and Liverpool Road (Signalized)	OVERALL	16.8	-	0.77	B	18.5	-	0.72	B
	EBL	31.7	16.5	0.23	C	34.8	19.9	0.33	C
	EBT	34.5	44.4	0.44	C	42.2	72.3	0.69	D
	EBR	20.3	49.5	0.70	C	19.7	43.2	0.59	B
	WBL	55.0	51.2	0.77	E	46.1	27.7	0.55	D
	WBTR	25.4	39.6	0.48	C	34.3	57.0	0.59	C
	NBL	14.6	42.4	0.48	B	23.5	105.9	0.72	C
	NBTR	7.4	35.5	0.26	A	8.5	53.8	0.39	A
	SBL	8.5	11.7	0.13	A	11.1	19.2	0.27	B
	SBTR	8.3	50.1	0.34	A	8.1	38.7	0.28	A
Glenanna Road and Site Access (Unsignalized)	EBTLR	0.0	0.0	<0.01	A	0.0	0.0	<0.01	A
	WBTLR	0.0	0.0	<0.01	A	0.0	0.0	<0.01	A
	NBTLR	0.0	0.0	<0.01	A	0.0	0.0	<0.01	A
	SBTLR	0.0	0.0	<0.01	A	0.0	0.0	<0.01	A
Glenanna Road and Glendale Drive (Unsignalized)	EBTLR	0.2	0.2	0.01	A	0.2	0.2	0.01	A
	WBTLR	2.1	1.5	0.06	A	0.9	0.7	0.03	A
	NBTLR	26.2	21.7	0.52	D	32.7	27.5	0.60	D
	SBTLR	23.3	5.5	0.20	C	33.6	5.0	0.19	D

Glenanna Road and Liverpool Road (Signalized)

The intersection capacity analysis indicates that under future (2032) background conditions, the signalized intersection is expected to operate at acceptable levels of service based on overall intersection levels of service, v/c ratios and delay with no critical movements identified.

Glenanna Road and Site Access (Unsignalized)

The intersection capacity analysis indicates that under future (2032) background conditions, the unsignalized intersection is expected to operate at acceptable levels of service based on overall intersection levels of service, v/c ratios and delay with no critical movements identified.

Glenanna Road and Glendale Drive (Unsignalized)

The intersection capacity analysis indicates that under future (2032) background conditions, the unsignalized intersection is expected to operate at acceptable levels of service based on overall intersection levels of service, v/c ratios and delay with no critical movements identified.

4.0 SITE GENERATED TRAFFIC VOLUMES

4.1 Trip Generation

The subject lands are currently occupied by an existing dwelling unit. The proposed development plan, as detailed in the plans prepared by Micacchi Architecture Inc., envisions the construction of 51 residential units with a total Gross Floor Area (GFA) of approximately 3,207.1 square metres. Construction is expected to commence in 2026, with full build-out anticipated by 2027. Vehicular access will be provided via a full-movement driveway on Glenanna Road, accommodating a total of 56 parking spaces.

The number of vehicular trips generated by the proposed development is estimated using the information contained in the ITE Trip Generation Manual (11th Edition) published by the Institute of Transportation Engineers (ITE). For the purpose of this assessment, the ITE Land Use Codes (LUC) 220 "Residential – Low Rise". Since R^2>0.75, fitted curve rates have been utilized for the proposed development provided in **Appendix F**.

Table 5 summarizes the trip generation volumes for the proposed residential development during the weekday AM and PM.

Table 5: Site Traffic Trip Generation

Land Use (Magnitude)		Weekday AM Peak Hour			Weekday PM Peak Hour		
		In	Out	Total	In	Out	Total
Residential (51 Dwelling Units)	New Trip	9	30	39	27	15	42
TOTAL NEW TRIPS		9	30	39	27	15	42

Based on the trip generation calculations, the residential development is estimated to generate a total 39 two-way trips (9 inbound and 30 outbound) during the weekday morning peak hour and 42 two-way trips (27 inbound and 15 outbound) during the afternoon peak hour.

The traffic volumes for the proposed development site were allocated in accordance with the current travel patterns. The distribution of trips to the study area intersections is illustrated in **Figure 7.**

5.0 FUTURE TOTAL CONDTIONS

The future (2032) total traffic volumes are the sum of the future (2032) background traffic volumes plus the proposed site generated traffic volumes.

To assess the future total traffic conditions for signalized and stop-controlled intersections, UrbanTrans utilized window-based computer software Synchro Version 11 which incorporates the Highway Capacity Manual 2000 methodology (HCM 2000), to undertake capacity analysis (i.e., level of services, volume to capacity ratios, delays, queues, etc.) at study area intersections during weekday AM and PM peak hour periods for the signalized and unsignalized intersections.

The estimated Future (2032) Total traffic volumes are illustrated in **Figure 8**. The detailed results of the analysis are provided in **Appendix G** and summarized in **Table 6**.

Table 6: Future (2032) Total Traffic Peak Hour Level of Service Analysis

Intersection	Weekday AM Peak Hour					Weekday PM Peak Hour			
	Movement	Control Delay (s)	95th Queue (m)	V/C	LOS	Control Delay (s)	95th Queue (m)	V/C	LOS
Glenanna Road and Liverpool Road (Signalized)	OVERALL	17.3	-	0.78	B	19.5	-	0.74	B
	EBL	31.8	17.0	0.24	C	36.3	19.9	0.35	D
	EBT	34.7	46.0	0.45	C	44.0	71.1	0.70	D
	EBR	21.7	53.0	0.72	C	19.7	42.3	0.60	B
	WBL	56.5	51.7	0.78	E	48.9	27.3	0.57	D
	WBTR	25.3	39.6	0.47	C	36.0	57.2	0.60	D
	NBL	14.9	43.0	0.48	B	25.7	115.7	0.74	C
	NBTR	7.4	35.5	0.26	A	8.8	57.1	0.38	A
	SBL	8.5	11.7	0.13	A	11.5	20.4	0.27	B
	SBTR	8.4	50.1	0.34	A	8.4	41.1	0.27	A
Glenanna Road and Site Access (Unsignalized)	EBTLR	0.2	0.2	0.01	A	0.3	0.2	0.01	A
	WBTLR	0.0	0.0	<0.01	A	0.0	0.0	<0.01	A
	NBTLR	0.0	0.0	<0.01	A	0.0	0.0	0.62	A
	SBTLR	17.2	2.5	<0.01	C	25.1	2.0	0.08	D
Glenanna Road and Glendale Drive (Unsignalized)	EBTLR	0.2	0.2	0.01	A	0.2	0.2	0.01	A
	WBTLR	2.2	1.5	0.06	A	0.9	0.7	0.03	A
	NBTLR	27.2	22.6	0.53	D	33.9	28.5	0.61	D
	SBTLR	24.3	5.9	0.21	C	34.6	5.2	0.19	D

Glenanna Road and Liverpool Road (Signalized)

The intersection capacity analysis indicates that under the future total (2032) conditions, the signalized intersection is expected to operate at acceptable levels of service based on overall intersection levels of service, v/c ratios and delay with no critical movements identified.

Glenanna Road and Site Access (Unsignalized)

The intersection capacity analysis indicates that under the future total (2032) conditions, the unsignalized intersection is expected to operate at acceptable levels of service based on overall intersection levels of service, v/c ratios and delay with no critical movements identified.

Glenanna Road and Glendale Drive (Unsignalized)

The intersection capacity analysis indicates that under the future total (2032) conditions, the unsignalized intersection is expected to operate at acceptable levels of service based on overall intersection levels of service, v/c ratios and delay with no critical movements identified.

6.0 TRANSPORTATION IMPACT ASSESSMENT

6.1 Site Access

A full-movement vehicular is proposed via Glenanna Road.

6.2 On-site Circulation

AutoTURN software was used to generate vehicular turning templates to confirm and demonstrate the accessibility for typical 5.6m long passenger vehicle (P TAC-2017), PCU vehicles and Waste Collection Vehicles.

Figure 9 to **Figure 12** illustrate the turning movement templates for passenger vehicles and PCU and Waste Collection vehicles. The analysis demonstrates that a passenger vehicle and loading trucks can maneuver within the designated route with no conflicts.

6.3 Signage and Pavement Marking Plan

As previously mentioned, a full movement vehicular entrance is proposed to serve the development. Internally, a T-intersection driveway layout is provided, with the east leg accommodating access to the loading area and the west leg providing access to the underground parking ramp parking spaces.

In accordance with the Ontario Traffic Manuel (OTM) Book 5, we recommend appropriate internal signages and pavement marking signs and are illustrated in **Figure 13**. A truck warning system will be provided when there is a truck presence at the loading docks, the warning system will flash to notify motorists that garbage/loading trucks are in operation. Furthermore, pavement markings with arrow signages are provided to separate ingress from egress vehicular movement. Based on the recommended signages and pedestrian sidewalk within the subject site, it is our opinion the site will operate safely and efficiently for both motorists and pedestrian connectivity.

7.0 PARKING REQUIREMENT

7.1 City of Pickering Consolidated Zoning By-law 8149/24

The City of Pickering Consolidated Zoning By-law 8149/24 establishes minimum parking requirements that differ between lands designated as "City Centre Zones and those in "All Other Zones" within the municipality. The subject property is not technically within a City Centre Zone; however, it is located approximately 200 meters (about a 4-minute walk) from the nearest City Centre boundary, placing it in very close proximity to this higher-order, transit-supportive area. **Table 7** shows the required parking rate for stacked townhouse developments within "City Center Zones".

Table 7: City of Pickering By-law 8149/24 - Vehicle Parking Requirement (City Center Zones)

Land Use	Dwelling Units	Parking Rates	Parking Requirement	Parking Provided	Difference
Residential Use	51	1.25 spaces per unit	64	48	-16
		0.15 visitor spaces per unit	8	8	0
		TOTAL	**72**	**56**	**-16**

Note: Where the calculation of the required parking spaces results in a number containing a fraction, fractions of less than 0.5 shall be rounded down to the nearest whole number and fractions equal to or greater than 0.5 shall be rounded up to the nearest whole number.

Based on the City of Pickering Consolidated Zoning By-law 8149/24, a proposed residential development within "City Center Zones" is required to provide 64 parking spaces for tenants and 8 parking spaces for visitors. The proposed development provides 48 parking spaces for tenants and 8 parking spaces for visitors, thereby having a deficit of 16 tenant parking spaces.

The site is situated approximately 200 meters (a 4-minute walk) from the City Centre Zone and about 1.5 kilometers (a 20-minute walk) from Pickering GO Station. Given this proximity to both the City Centre Zone and a major transit hub, UrbanTans' recommends reduced parking rates to be adopted for the proposed development, as detailed in the subsequent section.

7.2 Recommended Parking Rates for The Proposed Development

As previously mentioned, the proposed development includes a total of 56 parking spaces, consisting of 48 for tenants and 8 for visitors. Discussions with the owner indicate that a future leasing and parking management plan will allocate a maximum of 48 parking spaces to tenants on a 'first come, first served' basis, with priority given to larger units. Consequently, the remaining 16 rental units will include a 'no parking space' clause in their lease agreements. Based on our review, on-street parking spots are located throughout the Glendale Drive during off-peak times, overnight, and/or weekends. These parking spots are all located within 150m (around 1 to 2 minute walk) of the proposed development.

With the abundant parking supply, future residents are likely to continue making single-occupant vehicle trips to and from the subject site. This travel behavior is inconsistent with the

excellent transit service provided by DRT Route 121, which is located within an easily walkable distance of less than 100 meters from the site. Furthermore, The City of Pickering Integrated Transportation Master Plan indicate the need to reduce parking requirements for developments in proximity to higher-order transit and requiring minimum bike parking standards.

On this basis, UrbanTrans' recommends that parking management is the most effective Transportation Demand Management measure and incentive to reduce the numbers of single-occupant vehicular trips to and from the proposed development. For these reasons, UrbanTrans recommends parking rate of 0.94 spaces/dwelling unit for tenants and maintain visitors parking at 0.15 spaces/dwelling unit.

Table 8: Recommended Parking Rate for the Proposed Development

Land Use	Dwelling Units	Recommended Parking Rates	Parking Requirement	Parking Provided	Difference
Residential Use	51	0.94 spaces per unit	48	48	-
		0.15 visitor spaces per unit	8	8	-
		TOTAL	**56**	**56**	**0**

Note: Where the calculation of the required parking spaces results in a number containing a fraction, fractions of less than 0.5 shall be rounded down to the nearest whole number and fractions equal to or greater than 0.5 shall be rounded up to the nearest whole number.

Based on the recommended parking rate, the proposed residential development is required to provide 48 parking spaces for tenants and 8 parking spaces for visitors which aligns with number of parking spaces provided by the proposed development.

7.3 Proxy Parking Studies Within Durham Region

UrbanTrans reviewed a number of development proposals listed on The City of Pickering web portal. **Table 9** below summarizes the results from proxy parking studies.

Table 9: Proxy Parking Studies Results

Address	Dwelling Units	Recommended Parking Rates	Distance From The Subject Property
1215 Bayly Street	169	0.80 spaces per unit + 0.12 visitor spaces per unit (Approved)	1.4 Km (5 min Drive)
1235 Bayly Street	235	0.86 spaces per unit + 0.12 visitor spaces per unit (Approved)	1.4 Km (5 min Drive)
1210 Radom Street	179	0.89 spaces per unit + 0.17 visitor spaces per unit (Approved)	1.6 Km (5 min Drive)

As presented in **Table 9**, the proxy sites selected for the parking study are located within a 1.6-kilometre radius (approximately a five-minute drive) of the subject site. These developments were identified based on their comparable land use types, urban context, and proximity. The approved tenant parking supply rates for these reference developments range between 0.80 and

0.89 spaces per dwelling unit. This range is lower than the recommended parking rate of 0.94 spaces per dwelling unit proposed for the subject development, indicating that the proposed rate provides a slightly higher level of parking provision relative to recent comparable projects in the surrounding area.

8.0 COLLISION ANALYSIS

Based on consultation with the City of Pickering, a collision analysis was conducted for the intersections and midblock in vicinity of the proposed development and subject site. Collision data from 2020 to 2025, summarized by intersection and by segment for all collision types, was provided by the Durham Region.

A review of the collision data showed a total of 34 collisions over this 5-year period, 10 (29%) of which resulted in a non-fatal injury. This averages to 7 collisions per year within the study area. There were no fatalities, and no collisions involving pedestrians were recorded within the 5-year period. There was one (1) non-fatal injury collision involving cyclist at Glenanna Road and Liverpool Road intersection.

Out of the 34 total collisions recorded within the study area, 1 (3%) occurred on the Glenanna Road between Liverpool Road and Glendale Drive, 17 (50%) occurred at Glenanna Road and Liverpool Road intersection, and 16 (47%) occurred at Glenanna Road and Glendale Drive intersection.

Table 10: Five Years Collision History (2020 – 2025)

Midblock/Intersection	Collision Type	Severity	Environment
Glenanna Road between Liverpool Road and Glendale Drive	Turning Movement - 1	P.D. Only - 1	Clear - 1
Glenanna Road and Liverpool Road	Turning Movement – 7 Rear End – 4 Angle – 3 Sideswipe – 2 SMV Other - 1	P.D. Only – 13 Non-Fatal Injury - 4	Clear – 12 Rain – 1 Snow - 4
Glenanna Road and Glendale Drive	Turning Movement – 1 Angle – 15	P.D. Only – 10 Non-Fatal Injury - 6	Clear – 14 Rain – 1 Snow - 1

UrbanTrans reviewed the collision diagrams provided by the Durham Region. Human error was identified as the primary factor in all collisions over the past five years, specifically including failures to stop and running red lights. Based on this analysis, UrbanTrans does not recommend any changes or modifications to the existing roadway design and infrastructure.

9.0 CONCLUSION

The following section provides a brief overview of the study findings and our assessment of the transportation related aspects of the proposed development.

Development Proposal

The subject property is currently occupied by a single dwelling unit. The proposed development, as detailed in the plans prepared by Micacchi Architecture Inc., envisions the construction of 51 residential units with a total Gross Floor Area (GFA) of approximately 3,207.1 square metres. Construction is expected to commence in 2026, with full build-out anticipated by 2027. Vehicular access will be provided via a full-movement driveway on Glenanna Road, accommodating a total of 56 parking spaces.

Active Transportation Network

Sidewalks are present on both sides of Glenanna Road and Liverpool Road, and only on the east side of Glendale Drive, providing fundamental pedestrian connectivity. While specific measurements are not provided, the sidewalks appear to be of standard width, likely ranging from 1.2 to 1.5 meters.

Painted bicycle lanes are provided along both sides of Glenanna Road, extending from approximately 60 metres west of Kingston Road to Dixie Road. The segment of Glenanna Road adjacent to the subject property does not include a painted lane on the south side, as this area accommodates an eastbound right-turn lane at the intersection of Glenanna Road and Liverpool Road. Although specific measurements are unavailable, the painted bicycle lanes appear to be of a standard width of approximately 1.5 metres.

Base (2025) Year Traffic Operation

Glenanna Road and Liverpool Road (Signalized)

The intersection capacity analysis indicates that under existing conditions, the signalized intersection is expected to operate at acceptable levels of service based on overall intersection levels of service, v/c ratios and delay with no critical movements identified.

Glenanna Road and Site Access (Unsignalized)

The intersection capacity analysis indicates that under existing conditions, the unsignalized intersection is expected to operate at acceptable levels of service based on overall intersection levels of service, v/c ratios and delay with no critical movements identified.

Glenanna Road and Glendale Drive (Unsignalized)

The intersection capacity analysis indicates that under existing conditions, the unsignalized intersection is expected to operate at acceptable levels of service based on overall intersection levels of service, v/c ratios and delay with no critical movements identified.

Future (2032) Background Traffic Operation

Glenanna Road and Liverpool Road (Signalized)

The intersection capacity analysis indicates that under future (2032) background conditions, the signalized intersection is expected to operate at acceptable levels of service based on overall intersection levels of service, v/c ratios and delay with no critical movements identified.

Glenanna Road and Site Access (Unsignalized)

The intersection capacity analysis indicates that under future (2032) background conditions, the unsignalized intersection is expected to operate at acceptable levels of service based on overall intersection levels of service, v/c ratios and delay with no critical movements identified.

Glenanna Road and Glendale Drive (Unsignalized)

The intersection capacity analysis indicates that under future (2032) background conditions, the unsignalized intersection is expected to operate at acceptable levels of service based on overall intersection levels of service, v/c ratios and delay with no critical movements identified.

Site Generated Traffic Volumes

Based on the trip generation calculations, the residential development is estimated to generate a total 39 two-way trips (9 inbound and 30 outbound) during the weekday morning peak hour and 42 two-way trips (27 inbound and 15 outbound) during the afternoon peak hour.

Future (2032) Total Traffic Operation

Glenanna Road and Liverpool Road (Signalized)

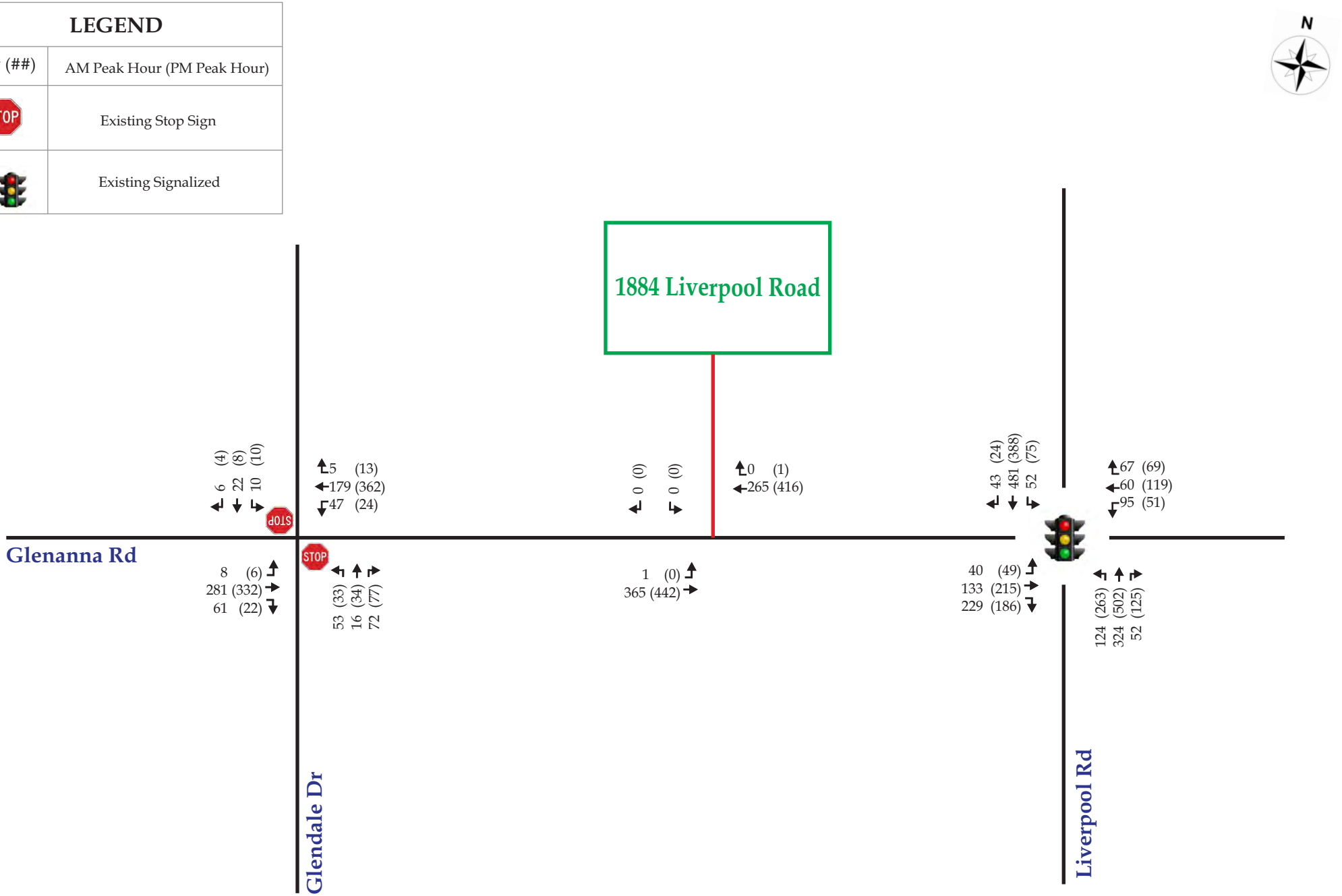
The intersection capacity analysis indicates that under the future total (2032) conditions, the signalized intersection is expected to operate at acceptable levels of service based on overall intersection levels of service, v/c ratios and delay with no critical movements identified.

Glenanna Road and Site Access (Unsignalized)

The intersection capacity analysis indicates that under the future total (2032) conditions, the unsignalized intersection is expected to operate at acceptable levels of service based on overall intersection levels of service, v/c ratios and delay with no critical movements identified.

Glenanna Road and Glendale Drive (Unsignalized)

The intersection capacity analysis indicates that under the future total (2032) conditions, the unsignalized intersection is expected to operate at acceptable levels of service based on overall intersection levels of service, v/c ratios and delay with no critical movements identified.



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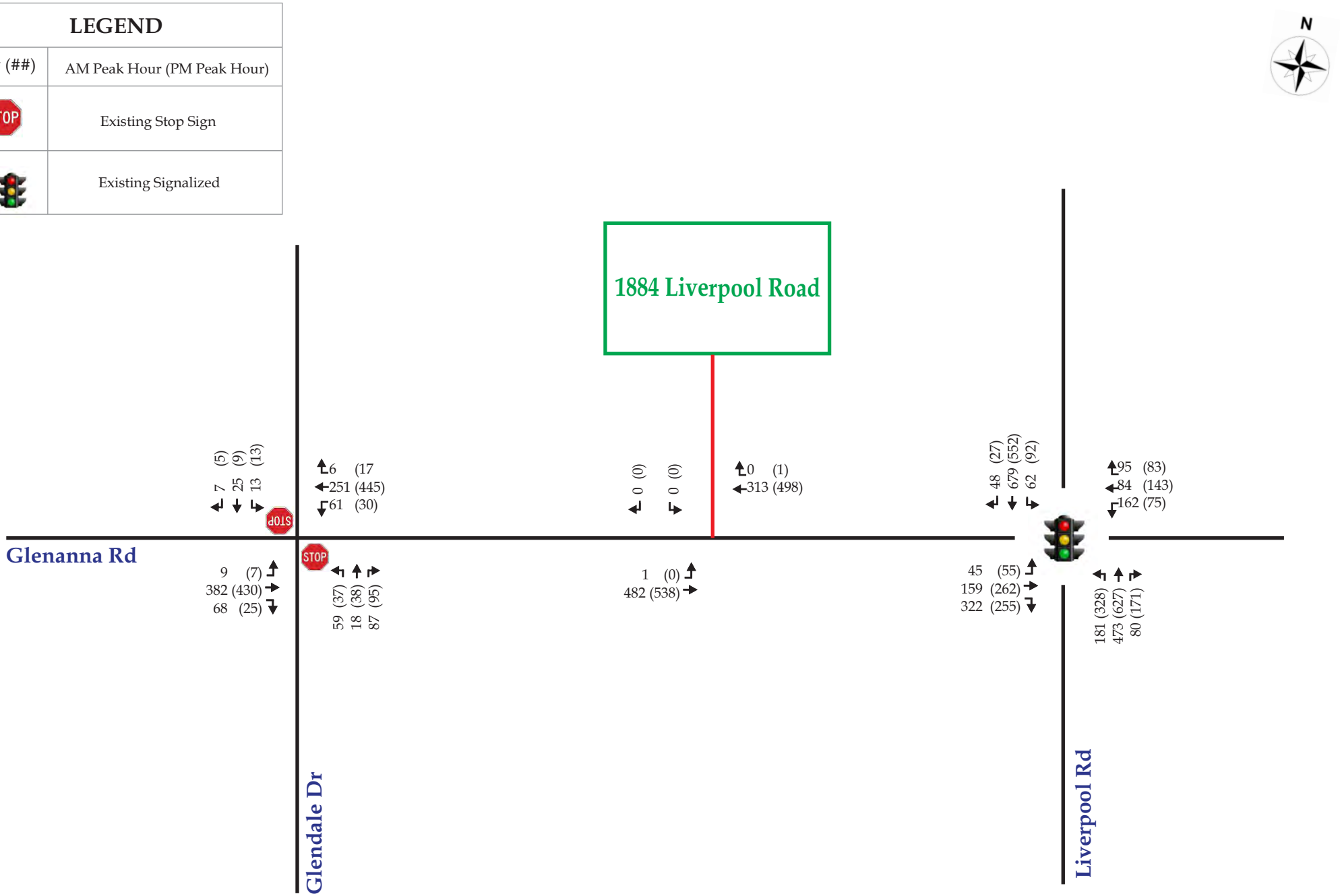
1884 Liverpool Road, Pickering, ON
Project No. UT-24-146
February, 2026

Figure 4 - Based Year (2025) Traffic Volumes



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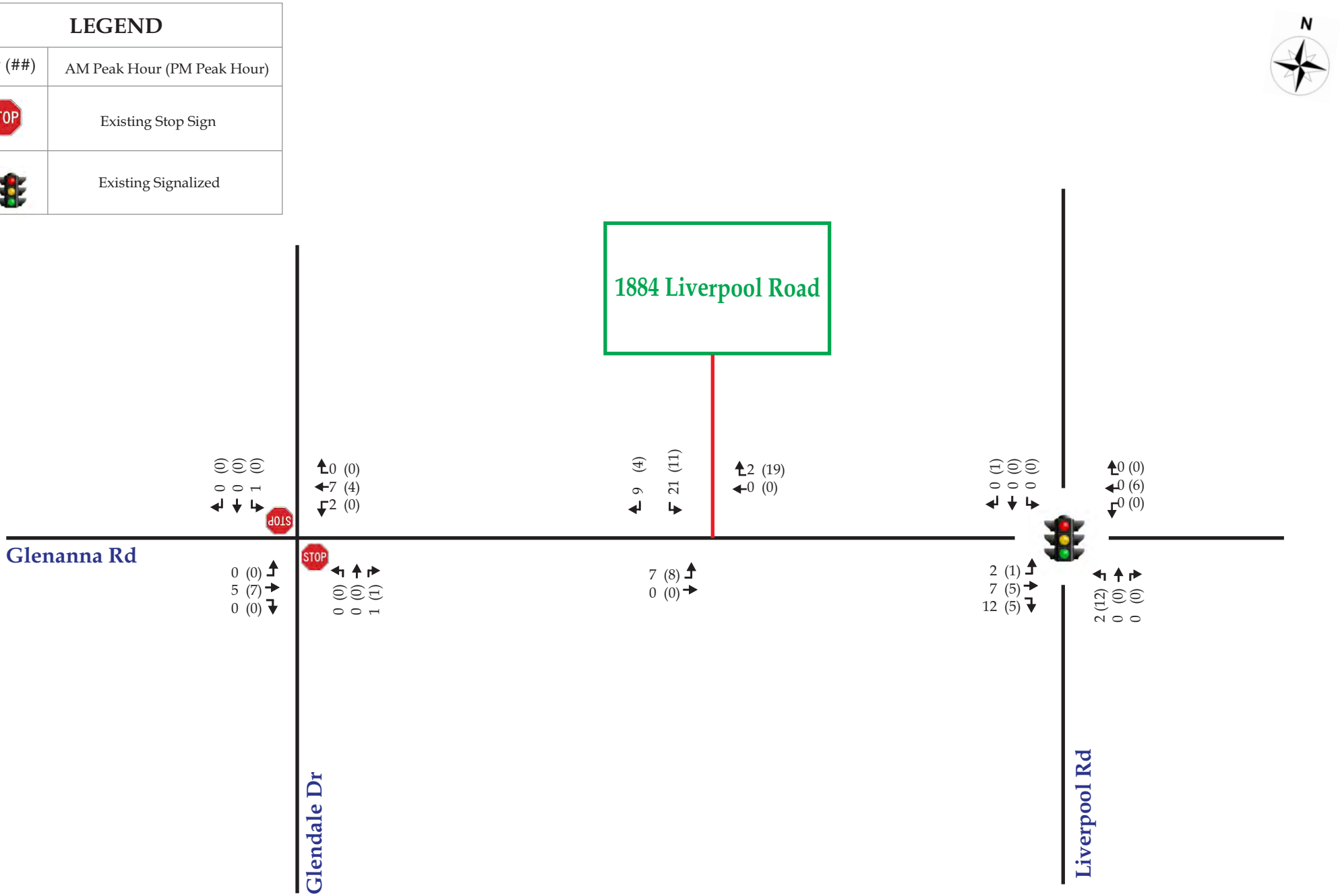
1884 Liverpool Road, Pickering, ON
Project No. UT-24-146
February, 2026

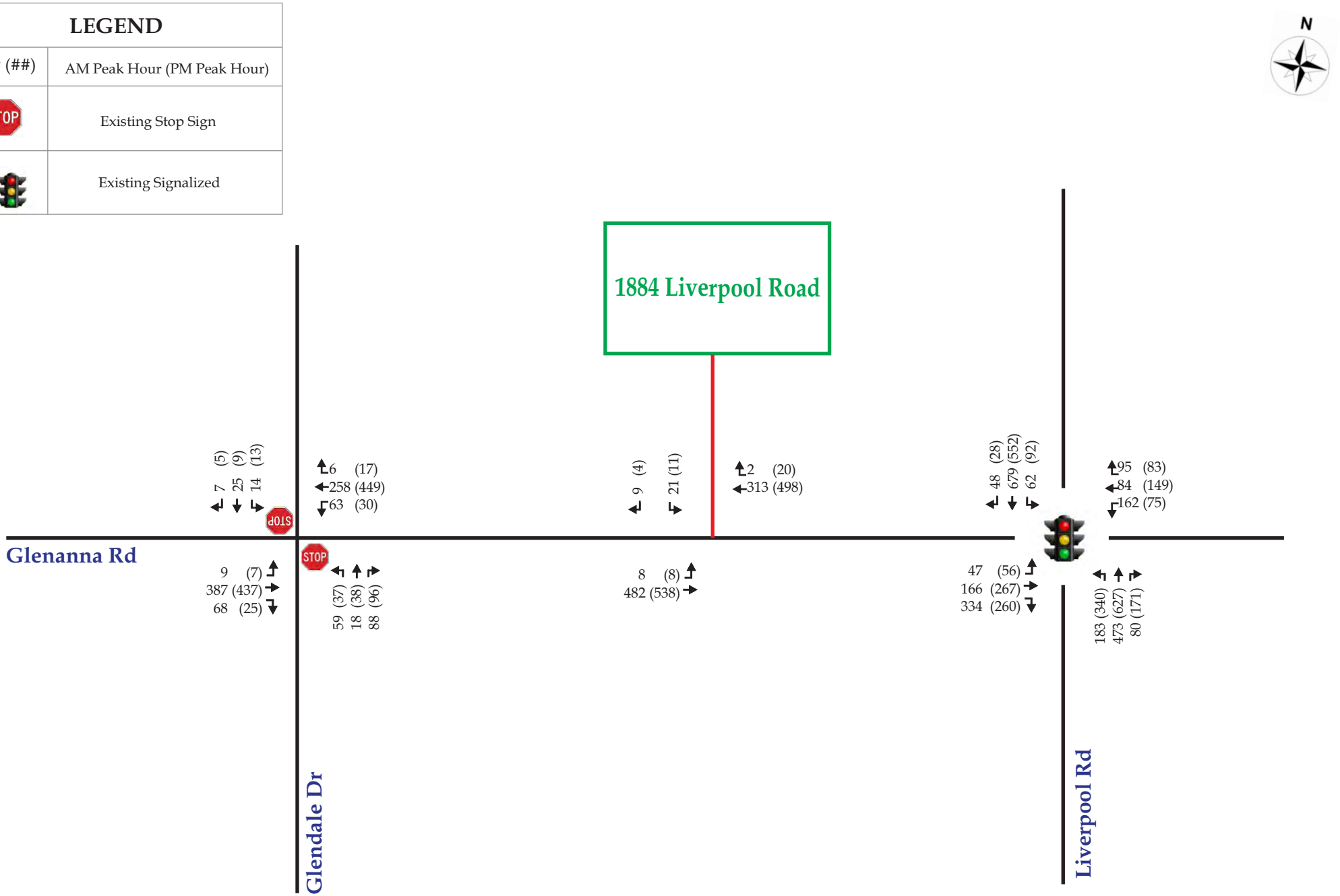
Figure 6 - Future (2032) Background Total



URBANTRANS Engineering Solutions Inc.

1884 Liverpool Road, Pickering, ON
Project No. UT-24-146
February, 2026

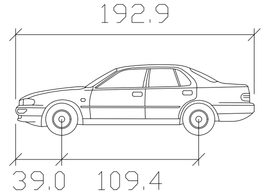
Figure 7 - Site Traffic Distribution



URBANTRANS Engineering Solutions Inc.

1884 Liverpool Road, Pickering, ON
Project No. UT-24-146
February, 2026

Figure 8 - Future (2032) Total Traffic Volumes



PCU (Average)

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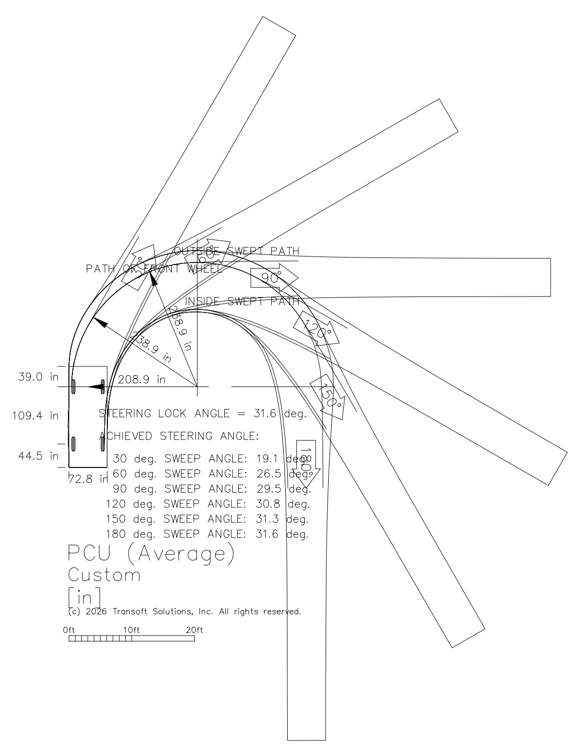
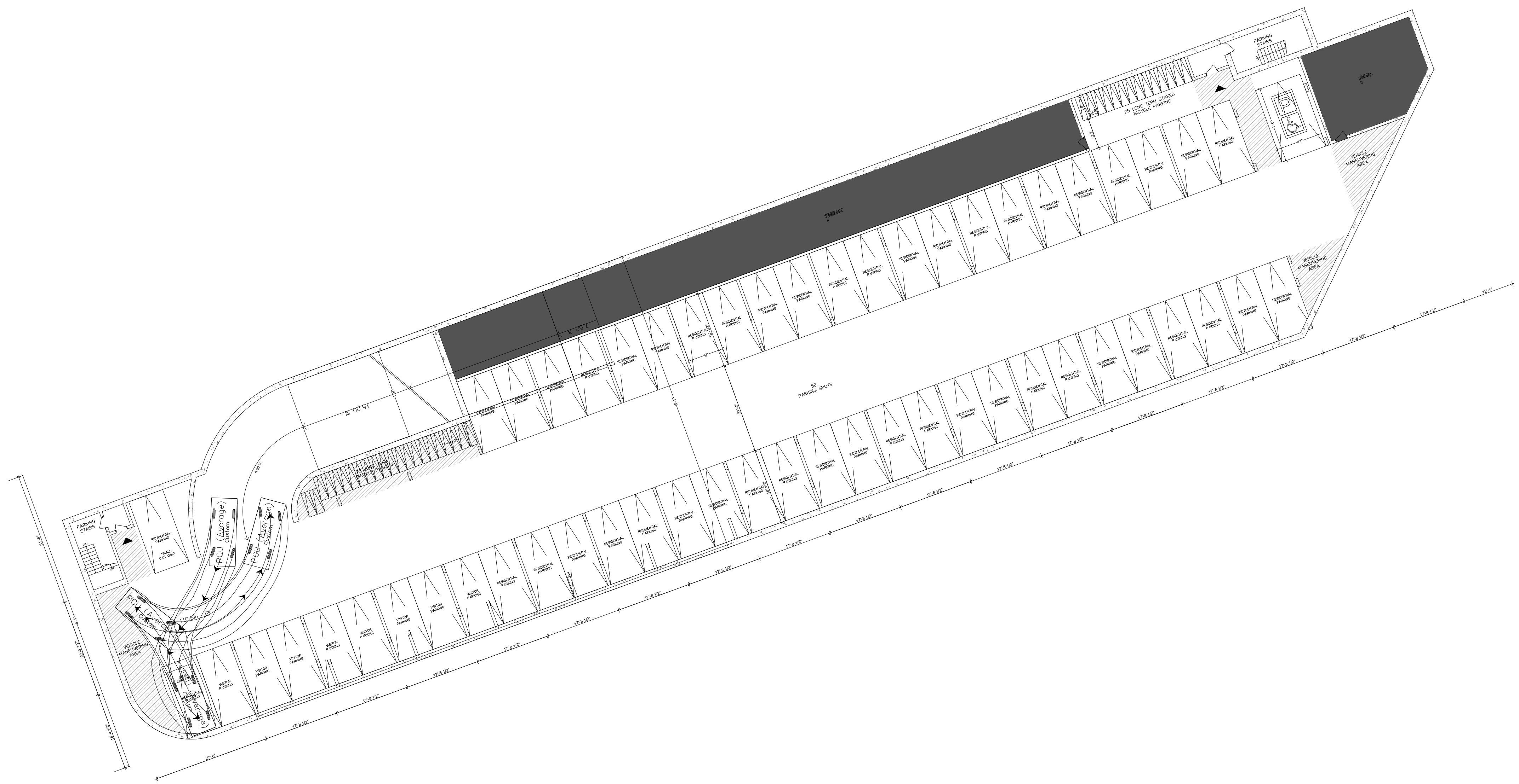
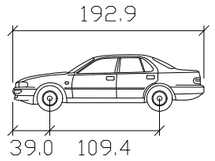
Width	: 72.8
Track	: 63.0
Lock to Lock Time	: 3.0
Steering Angle	: 31.6





URBANTRANS Engineering Solutions Inc.	Project Name: Proposed Residential Development 1884 Liverpool Road, City of Pickering, Ontario

Drawing Title:	AutoTURN Analysis PCU Average		
Drawing No.:	Figure 9	Date:	February 6, 2026
Project No.:	UT-24-146	Drawn By:	AS
Scale:	NTS	Notes:	



PCU (Average)

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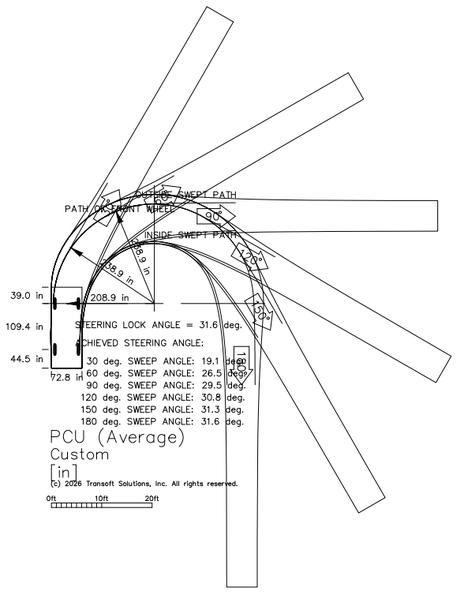
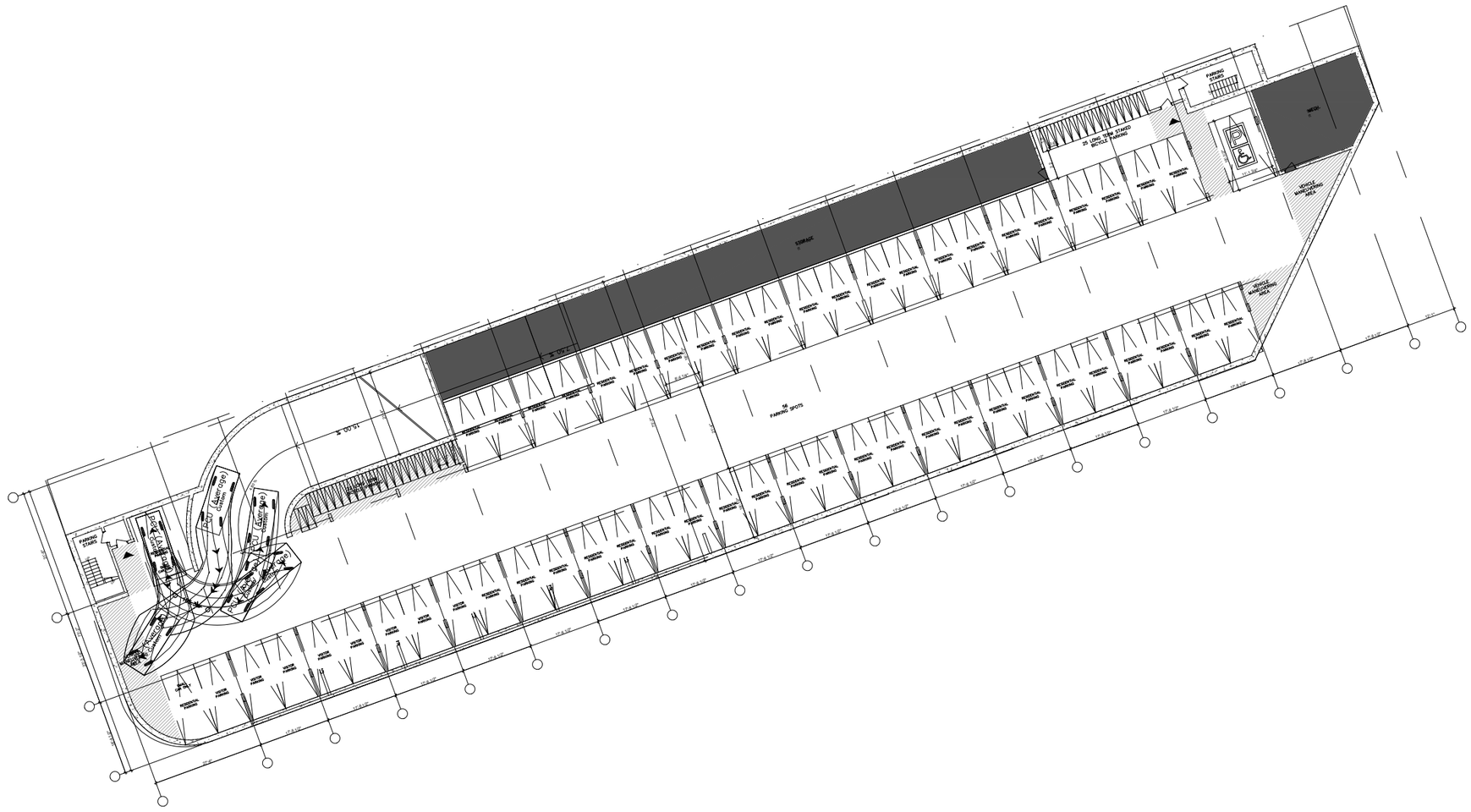
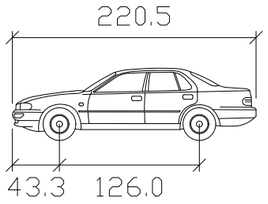
Width	: 72.8
Track	: 63.0
Lock to Lock Time	: 3.0
Steering Angle	: 31.6



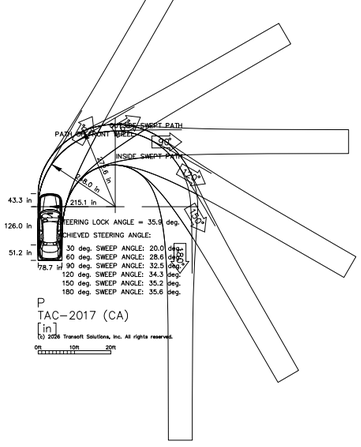


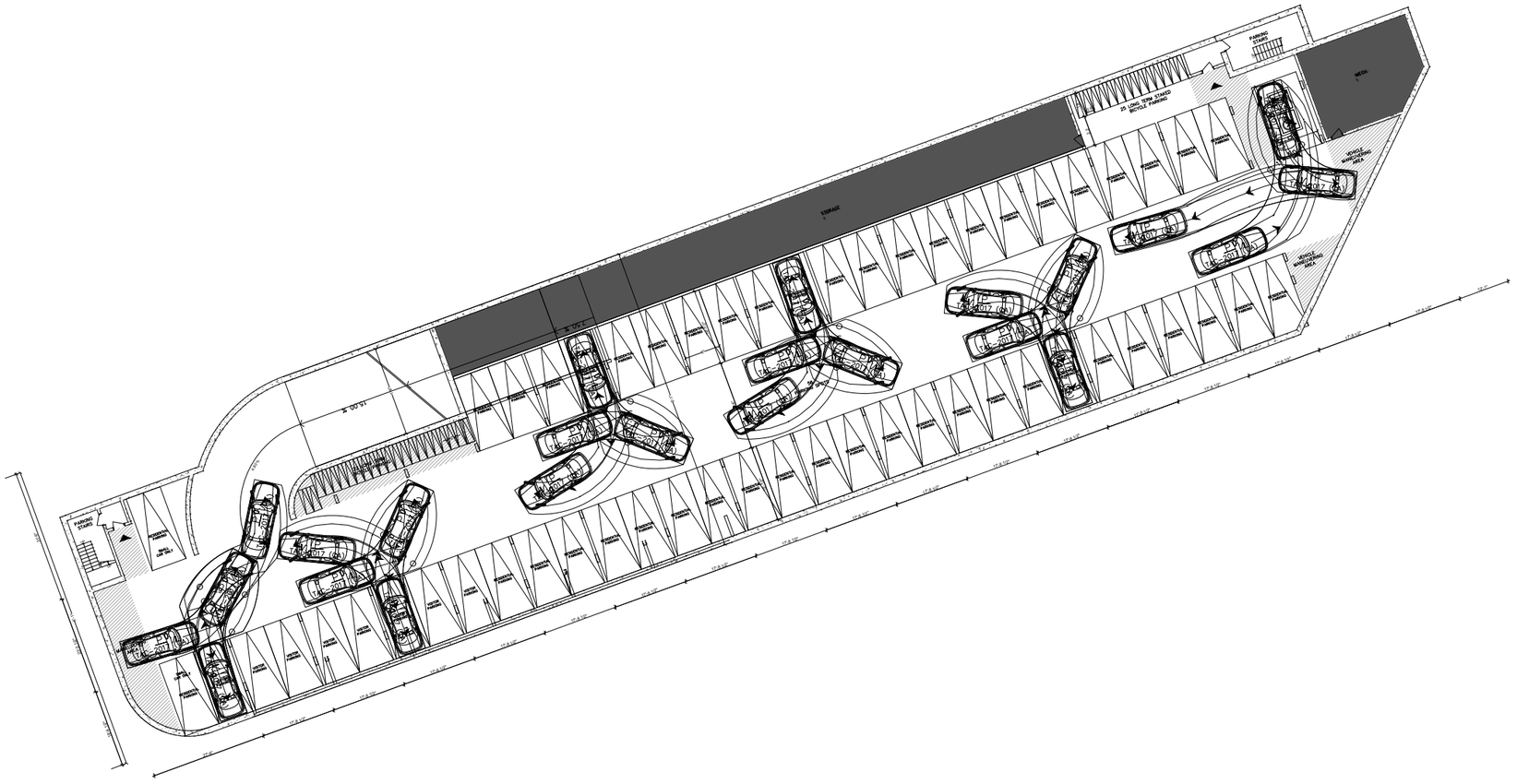
Project Name: Proposed Residential Development 1884 Liverpool Road, City of Pickering, Ontario			
Drawing Title:	AutoTURN Analysis PCU Average		
Drawing No.:	Figure 10	Date:	February 6, 2026
Project No.:	UT-24-146	Drawn By:	AS
Scale:	NTS	Notes:	



P

	inches
Width	: 78.7
Track	: 78.7
Lock to Lock Time	: 6.0
Steering Angle	: 35.9



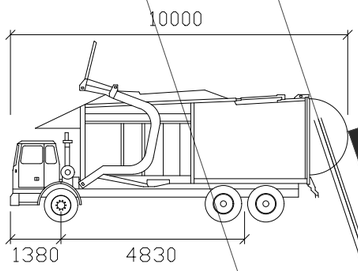


URBANTRANS Engineering Solutions Inc.

Project Name:

Proposed Residential Development
1884 Liverpool Road, City of Pickering, Ontario

Drawing Title:	AutoTURN Analysis Passenger Vehicle (P-TAC 2017)		
Drawing No.:	Figure 11	Date:	February 6, 2026
Project No.:	UT-24-146	Drawn By:	AS
Scale:	NTS	Notes:	

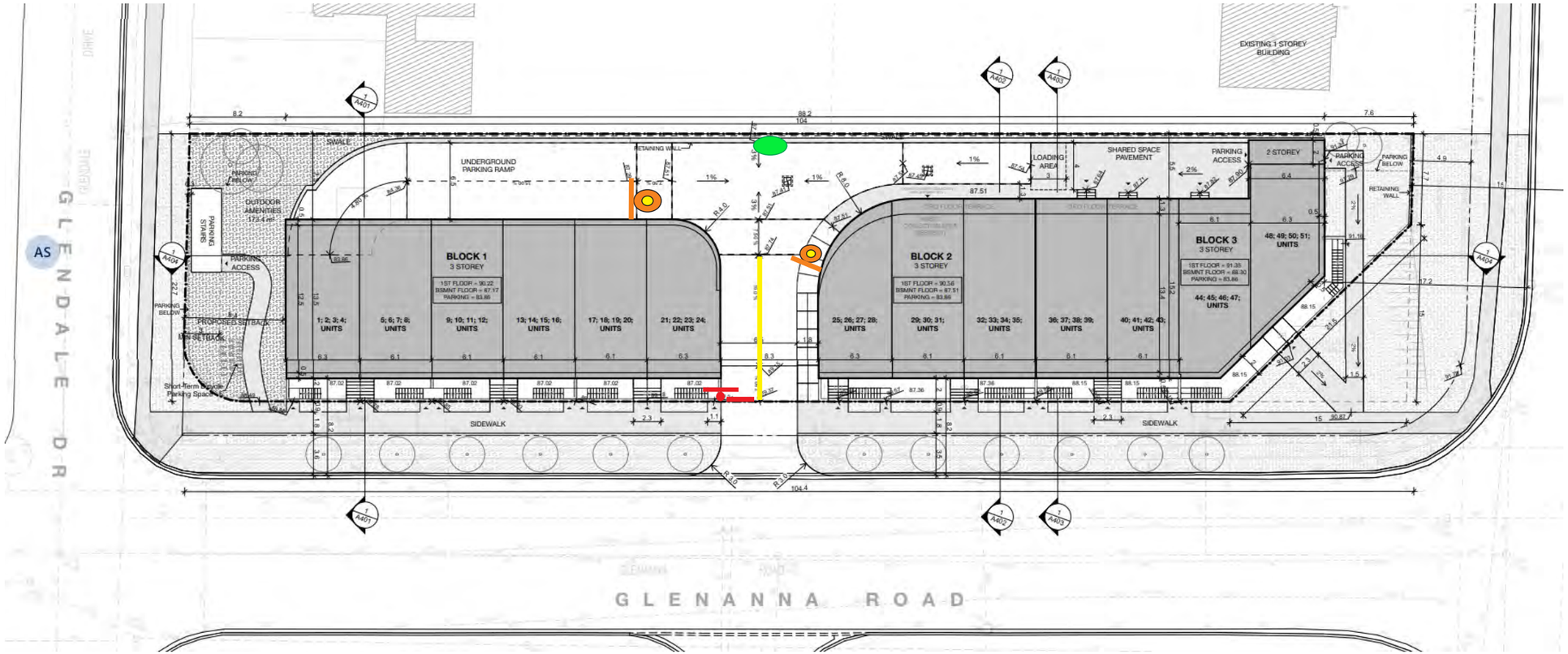


Region of Durham Front Loader

	mm
Width	: 2770
Track	: 2500
Lock to Lock Time	6.0
Steering Angle	: 24.8

Project Name:	Proposed Residential Development 1884 Liverpool Road, City of Pickering, Ontario
Drawing Title:	AutoTURN Analysis Region of Durham Front Loader
Drawing No.:	Figure 12
Date:	February 6, 2026
Project No.:	UT-24-146
Drawn By:	AS
Scale:	NTS
Notes:	

LEGEND	
SYMBOL	DESCRIPTION
	STOP Sign (Ra-1)
	Convex Mirror
	Flashing Beacon
	TRUCK LOADING IN PROGRESS
	STOP BAR (Solid White Retro-Reflective Line between 30cm and 60
	Solid Yellow Line Pavement Marking
	Solid White Line Pavement Marking



URBANTRANS Engineering Solutions Inc.	Project Name: PROPOSED RESIDENTIAL DEVELOPMENT 1884 Liverpool Road, Pickering, ON	Drawing Title:	Signage and Pavement Marking Plan
		Drawing No.: Figure 13	Date: February 11, 2026
		Project No.: UT-24-146	Drawn By: AS
		Scale: NTS	Notes:

Appendix A
Terms Of Reference

URBANTRANS
Engineering Solutions Inc.
UrbanTrans Engineering Solutions Inc.
9275 Markham Road, Suite 146
Markham ON L6E 0H9
Tel: 437-236-7085
annosan@uteng.ca

TERMS OF REFERENCE

To: Nadeem Zahoor, Transportation Engineer, City of Pickering

From: Annosan Srikantha, President, UrbanTrans Engineering Solutions Inc.

Date: June 6, 2025

Re: Terms of Reference for Traffic Impact Study – Proposed Residential Development – 1884 Liverpool Road, City of Pickering

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These Terms of Reference below are to serve as a general guideline to present the purpose, structure and scope of the work to be undertaken for the preparation of the Traffic Impact Study (TIS) in support of a Site Plan Application. The proposed development is located north of Glenanna Road, west of Liverpool Road, municipally known as 1884 Liverpool Road, City of Pickering.

The subject lands are currently occupied by an existing dwelling unit. The proposed development plan, as outlined in Micacchi Architecture Inc., aim to create 47 units with the residential Gross Floor Area of 3,285.6 square meters. A full-movement vehicular entrance is proposed on Glenanna Road, which will include a total of 56 parking spaces.

Introduction

The report introduction will include full description of the proposed development, but not limited to:

- Municipal Address
- Existing and proposed land uses, access locations and operations
- Total building size and parking/loading supply
- Anticipated date of occupancy
- Development operations (i.e. hours of operation and employee/staff totals)

Existing Traffic and Active Transportation Conditions

The existing traffic analysis for the development includes the following, but not limited to:

- Review the existing conditions of the surrounding area, including road network (i.e., traffic data, lane configuration and turning restrictions), active transportation and/or transit network and assessment.
- Turning movement counts will be collected during weekday AM (7am-10am) and weekday PM (4pm-7pm) peak periods at the following study area intersections:
    - Glenanna Road and Liverpool Road (Signalized)
    - Glenanna Road and Proposed Site Access/Private Driveway (Unsignalized)
    - Glenanna Road and Glendale Drive (Unsignalized)
- The traffic data obtained will utilize window-based computer software (Synchro Version 11) to undertake capacity analysis (i.e. level of services, volume to capacity ratios, delays, queues, etc.) at the study area intersections during weekday peak hour periods for signalized and unsignalized intersections.
- Document the results of all level-of-services analysis, including overall delay, control delay per vehicle, vehicle queues, and volume/capacity ratios for each intersection and critical lane group or critical movements in appendix to the TIS.

Future Background Traffic and Transit Assessment

The future background traffic analysis for the development includes the following, but not limited to:

- Review the future background traffic volumes surrounding the subject property that consist of:
    - Background traffic growth provided from City Staff will be applied to through traffic movements within the study area intersections and applied to horizon study year (2030).
    - Traffic generated by background developments in the vicinity of the subject site approved or in the approval process occurring within the horizon year of this development.
- Transportation network improvements and transit considerations will be examined.
- A five-year (2030) horizon after the entire building process of the proposed development will be carried out for assessment purposes.
- Document the results of all level-of-services analysis, including overall delay, control delay per vehicle, vehicle queues, and volume/capacity ratios for each intersection and critical lane group or critical movements in appendix to the TIS.
- Operational deficiencies due to future forecasted traffic volumes will be identified and alleviative measures will be proposed and documented in the final report.

Trip Generation and Distribution

The trip generation and distribution analysis will include:

- Apply trip generation rates from the ITE Trip Generation Manual (11th Edition) and similar development applications/first principal analysis in the area to the subject site to determine site traffic and newly added trips on the surrounding network.
- The Transportation Tomorrow Survey (TTS) data will be reviewed to forecast the trips generated by the proposed development and trip distributions.

Future Total Traffic Assessment

The future total traffic volume analysis for the development includes the following, but not limited to:

- The Future total traffic assessment comprises of future background traffic volumes plus site generated traffic volumes.
- Document the results of all level-of-services analysis, including overall delay, control delay per vehicle, vehicle queues, and volume/capacity ratios for each intersection and critical lane group or critical movements in appendix to the TIS.
- Review the proposed site accesses from a safety and operational feasibility perspective.
- Potential operational shortcomings as a result of the proposed development site traffic will be identified and alleviative measures will be proposed and documented in the report
- Identify vehicle queuing that exceeds the available storage and requirement for turn lanes as necessary.
- Access consideration and recommendations necessary to fulfill the study requirements will be detailed.

Parking Assessment

- Describe parking and loading facilities proposed in conjunction with the proposed development.
- Determine whether the proposed vehicle, bicycle and loading supply can sufficiently accommodate the peak parking demand/requirement of the proposed development and meets the City's Zoning By-law requirements.
- A recommended minimum parking rate for proposed land uses, based on best practices and shared parking rationale will be provided (if applicable).

Site Access & On-site Circulation Review

- Undertake AutoTURN Analysis as part of the functionality of the site plan by simulating vehicle swept path on the proposed site plan to confirm adequate space requirements are provided for passenger cars, waste collection, fire/emergency, and delivery trucks (where applicable).

- Appropriate signage and pavement marking plans will be recommended in accordance with the Ontario Traffic Manual (OTM).
- Analyze the gap, queue, and delay study at the site entrance, east of Major MacKenzie Drive West.

A Traffic Impact Study (TIS) report will be compiled and produced in final report form for submission to the City summarizing the findings and recommendations with supporting documentation (i.e. summaries of data collection, assumptions related to traffic operations, computer outputs of level of service calculations, and other technical data).

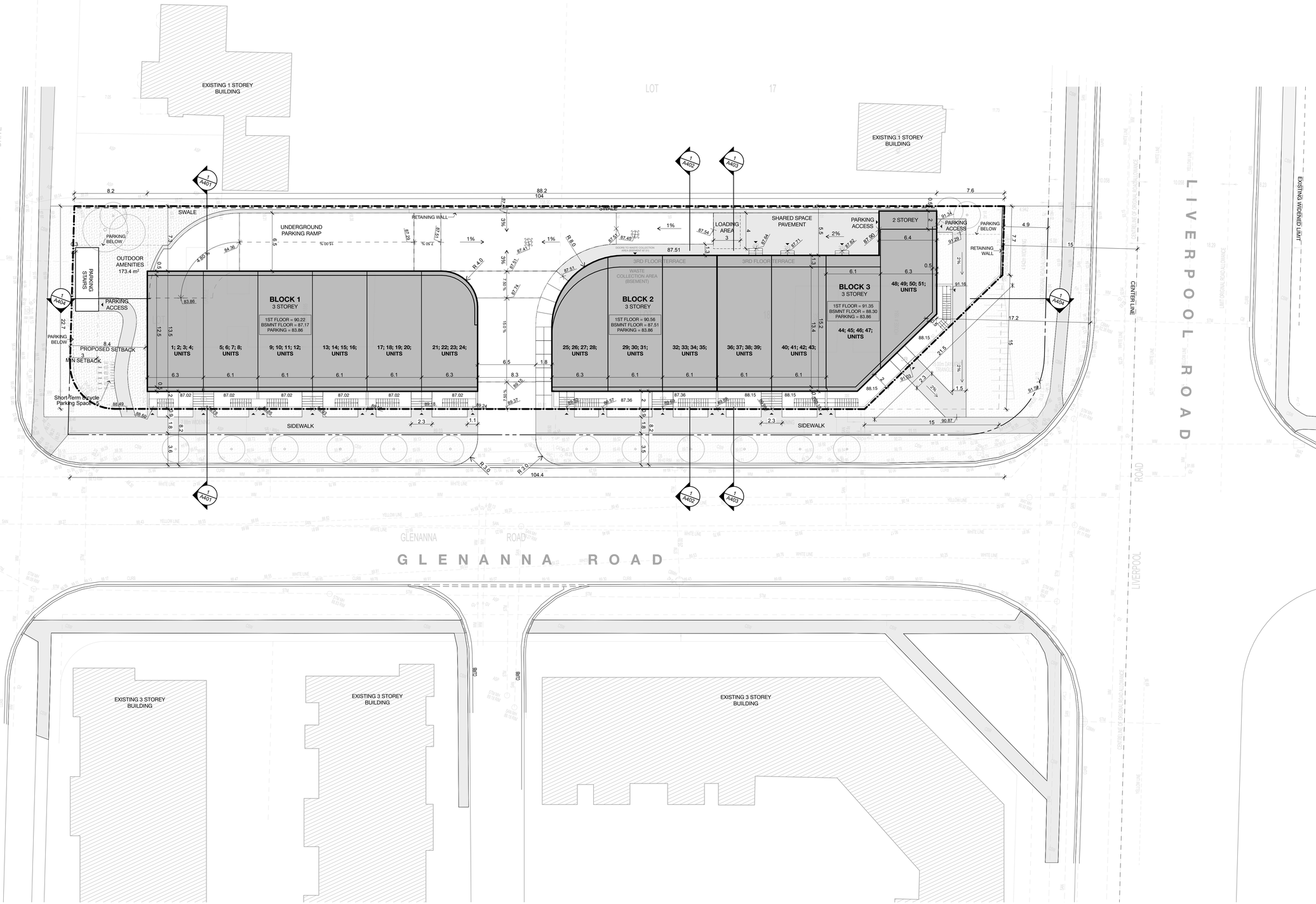
We appreciate the opportunity to submit this Terms of Reference and look forward to working with you on this study application. Should you have any questions or would like to discuss any matter in greater detail, please do not hesitate to contact me at 437-236-7085. We courteously await your instructions to advance.

Kind Regards,
UrbanTrans Engineering Solutions Inc.

Annosan Srikantha, P.Eng.
President

Appendix B
Proposed Site Plan

Mark	Date	Description
01	2024-04-26	Issued for Massing Study Review
02	2025-05-15	Issued for Zoning Review
03	2025-10-07	Re-Issued for Zoning Review
04	Work in Progress	Re-Issued for Zoning Review



MICACCHI

Micacchi Architecture Inc.
212 - 160 Pears Ave, Toronto ,Ontario, M5R 3P8
647-725-7799 | general@micacchi.ca

job title
1884 Liverpool Rd

client
withheld

sheet title
Site Plan

issue date
Friday, January 30, 2026

scale
1:200

job number
2400-04

A006

Appendix C
Traffic Data and Signal Timing Plan

Spectrum

Turning Movement Count
Location Name: GLENANNA RD & LIVERPOOL RD
Date: Thu, Sep 25, 2025 Deployment Lead: Rey Fernandez

Urban Trans Engineering Solutions Inc
146 9275 MARKHAM ROAD
MARKHAM ONTARIO, L6E 0H9
CANADA

Turning Movement Count (1 . GLENANNA RD & LIVERPOOL RD)

Start Time	N Approach LIVERPOOL RD						E Approach GLENANNA RD						S Approach LIVERPOOL RD						W Approach GLENANNA RD						Int. Total (15 min)	Int. Total (1 hr)
	Right N:W	Thru N:S	Left N:E	UTurn N:N	Peds N:	Approach Total	Right E:N	Thru E:W	Left E:S	UTurn E:E	Peds E:	Approach Total	Right S:E	Thru S:N	Left S:W	UTurn S:S	Peds S:	Approach Total	Right W:S	Thru W:E	Left W:N	UTurn W:W	Peds W:	Approach Total		
2025-09-25 07:00:00	7	91	6	0	0	104	5	4	14	0	0	23	10	54	15	0	2	79	38	7	6	0	0	51	257	
2025-09-25 07:15:00	7	82	3	0	0	92	15	6	31	0	0	52	5	81	18	0	1	104	43	16	7	0	2	66	314	
2025-09-25 07:30:00	7	122	12	0	0	141	21	10	26	0	2	57	11	77	19	0	1	107	51	16	27	0	1	94	399	
2025-09-25 07:45:00	24	122	17	0	0	163	12	20	26	0	1	58	12	80	30	0	3	122	38	32	20	0	1	90	433	1403
2025-09-25 08:00:00	25	147	25	0	1	197	7	19	24	0	1	50	14	57	37	0	2	108	42	17	4	0	1	63	418	1564
2025-09-25 08:15:00	12	122	9	0	0	143	8	12	18	0	0	38	12	77	30	1	1	120	48	31	12	0	0	91	392	1642
2025-09-25 08:30:00	10	115	14	0	1	139	20	14	27	0	0	61	5	72	31	0	0	108	61	38	11	0	0	110	418	1661
2025-09-25 08:45:00	12	109	17	0	1	138	24	17	25	0	0	66	15	84	42	0	3	141	67	33	10	0	0	110	455	1683
2025-09-25 09:00:00	9	135	12	0	1	156	15	17	25	0	5	57	20	91	21	0	1	132	53	31	7	0	1	91	436	1701
2025-09-25 09:15:00	17	114	20	0	1	151	11	12	14	0	2	37	14	91	29	0	1	134	40	22	5	0	0	67	389	1698
2025-09-25 09:30:00	6	92	23	0	1	121	9	15	14	0	4	38	11	53	17	0	0	81	45	20	10	0	0	75	315	1595
2025-09-25 09:45:00	5	63	21	0	2	89	7	7	13	1	1	28	7	40	23	0	1	70	26	29	5	0	1	60	247	1387
BREAK																										
2025-09-25 16:00:00	6	81	14	0	2	101	13	28	9	0	4	50	27	113	52	0	5	192	39	36	3	0	1	78	421	
2025-09-25 16:15:00	4	72	9	0	1	85	16	23	13	0	1	52	19	90	55	0	6	164	58	48	9	0	2	115	416	
2025-09-25 16:30:00	7	76	12	0	2	95	25	35	12	0	4	72	27	109	51	0	3	187	42	36	8	0	1	86	440	
2025-09-25 16:45:00	4	82	17	0	3	103	15	32	5	0	2	52	21	110	54	0	3	185	46	52	15	0	0	113	453	1730
2025-09-25 17:00:00	3	92	17	0	4	112	17	35	15	0	0	67	27	140	57	0	3	224	58	51	13	0	3	122	525	1834
2025-09-25 17:15:00	5	103	21	0	1	129	15	24	9	0	5	48	36	148	69	0	2	253	40	51	13	0	1	104	534	1952
2025-09-25 17:30:00	6	78	17	0	1	101	16	27	7	0	2	50	34	117	60	0	0	211	43	47	13	0	0	103	465	1977
2025-09-25 17:45:00	10	115	20	0	4	145	21	33	20	0	3	74	28	97	77	0	3	202	45	66	10	0	0	121	542	2066
2025-09-25 18:00:00	5	89	10	0	4	104	18	30	15	0	5	63	29	139	43	0	2	211	49	35	9	0	4	93	471	2012
2025-09-25 18:15:00	5	92	16	0	4	113	11	23	16	0	6	50	28	131	56	0	7	215	42	28	11	0	2	81	459	1937
2025-09-25 18:30:00	8	68	14	0	2	90	16	28	10	0	3	54	29	98	64	0	3	191	42	26	2	0	1	70	405	1877
2025-09-25 18:45:00	5	73	15	0	9	93	19	27	12	0	10	58	26	108	46	0	7	180	38	39	8	0	1	85	416	1751
Grand Total	209	2335	362	0	45	2906	356	498	400	1	61	1255	467	2257	996	1	60	3721	1094	807	238	0	23	2139	**10021**	-
Approach%	7.2%	80.4%	12.5%	0%		-	28.4%	39.7%	31.9%	0.1%		-	12.6%	60.7%	26.8%	0%		-	51.1%	37.7%	11.1%	0%		-	-	-
Totals %	2.1%	23.3%	3.6%	0%		29%	3.6%	5%	4%	0%		12.5%	4.7%	22.5%	9.9%	0%		37.1%	10.9%	8.1%	2.4%	0%		21.3%	-	-
Heavy	6	24	17	0		-	4	3	3	0		-	5	31	18	0		-	1	29	4	0		-	-	-
Heavy %	2.9%	1%	4.7%	0%		-	1.1%	0.6%	0.8%	0%		-	1.1%	1.4%	1.8%	0%		-	0.1%	3.6%	1.7%	0%		-	-	-
Bicycles	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	-	-
Bicycle %	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	-	-

Urban Trans Engineering Solutions Inc
146 9275 MARKHAM ROAD
MARKHAM ONTARIO, L6E 0H9
CANADA

Peak Hour: 08:15 AM - 09:15 AM Weather: Moderate Rain (18 °C)

Start Time	N Approach LIVERPOOL RD						E Approach GLENANNA RD						S Approach LIVERPOOL RD						W Approach GLENANNA RD						Int. Total (15 min)
	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	
2025-09-25 08:15:00	12	122	9	0	0	143	8	12	18	0	0	38	12	77	30	1	1	120	48	31	12	0	0	91	392
2025-09-25 08:30:00	10	115	14	0	1	139	20	14	27	0	0	61	5	72	31	0	0	108	61	38	11	0	0	110	418
2025-09-25 08:45:00	12	109	17	0	1	138	24	17	25	0	0	66	15	84	42	0	3	141	67	33	10	0	0	110	455
2025-09-25 09:00:00	9	135	12	0	1	156	15	17	25	0	5	57	20	91	21	0	1	132	53	31	7	0	1	91	436
Grand Total	43	481	52	0	3	576	67	60	95	0	5	222	52	324	124	1	5	501	229	133	40	0	1	402	**1701**
Approach%	7.5%	83.5%	9%	0%		-	30.2%	27%	42.8%	0%		-	10.4%	64.7%	24.8%	0.2%		-	57%	33.1%	10%	0%		-	**-**
Totals %	2.5%	28.3%	3.1%	0%		33.9%	3.9%	3.5%	5.6%	0%		13.1%	3.1%	19%	7.3%	0.1%		29.5%	13.5%	7.8%	2.4%	0%		23.6%	**-**
PHF	0.9	0.89	0.76	0		0.92	0.7	0.88	0.88	0		0.84	0.65	0.89	0.74	0.25		0.89	0.85	0.88	0.83	0		0.91	0.93
Heavy	4	3	2	0		9	3	0	1	0		4	0	3	2	0		5	0	11	2	0		13	31
Heavy %	9.3%	0.6%	3.8%	0%		1.6%	4.5%	0%	1.1%	0%		1.8%	0%	0.9%	1.6%	0%		1%	0%	8.3%	5%	0%		3.2%	1.8%
Lights	39	478	50	0		567	64	60	94	0		218	52	321	122	1		496	227	122	38	0		387	1668
Lights %	90.7%	99.4%	96.2%	0%		98.4%	95.5%	100%	98.9%	0%		98.2%	100%	99.1%	98.4%	100%		99%	99.1%	91.7%	95%	0%		96.3%	98.1%
Single-Unit Trucks	0	1	0	0		1	0	0	0	0		0	0	0	0	0		0	0	0	0	0		0	1
Single-Unit Trucks %	0%	0.2%	0%	0%		0.2%	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	0.1%
Buses	4	1	2	0		7	3	0	1	0		4	0	3	2	0		5	0	9	2	0		11	27
Buses %	9.3%	0.2%	3.8%	0%		1.2%	4.5%	0%	1.1%	0%		1.8%	0%	0.9%	1.6%	0%		1%	0%	6.8%	5%	0%		2.7%	1.6%
Articulated Trucks	0	1	0	0		1	0	0	0	0		0	0	0	0	0		0	0	2	0	0		2	3
Articulated Trucks %	0%	0.2%	0%	0%		0.2%	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	0%	1.5%	0%	0%		0.5%	0.2%
Bicycles on Road	0	0	0	0		0	0	0	0	0		0	0	0	0	0		0	2	0	0	0		2	2
Bicycles on Road %	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	0.9%	0%	0%	0%		0.5%	0.1%
Pedestrians	-	-	-	-	3	-	-	-	-	-	5	-	-	-	-	-	5	-	-	-	-	-	1	-	**-**
Pedestrians%	-	-	-	-	21.4%		-	-	-	-	35.7%		-	-	-	-	35.7%		-	-	-	-	7.1%		**-**
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	**-**
Bicycles on Crosswalk%	-	-	-	-	0%		-	-	-	-	0%		-	-	-	-	0%		-	-	-	-	0%		**-**

Spectrum

Turning Movement Count
Location Name: GLENANNA RD & LIVERPOOL RD
Date: Thu, Sep 25, 2025 Deployment Lead: Rey Fernandez

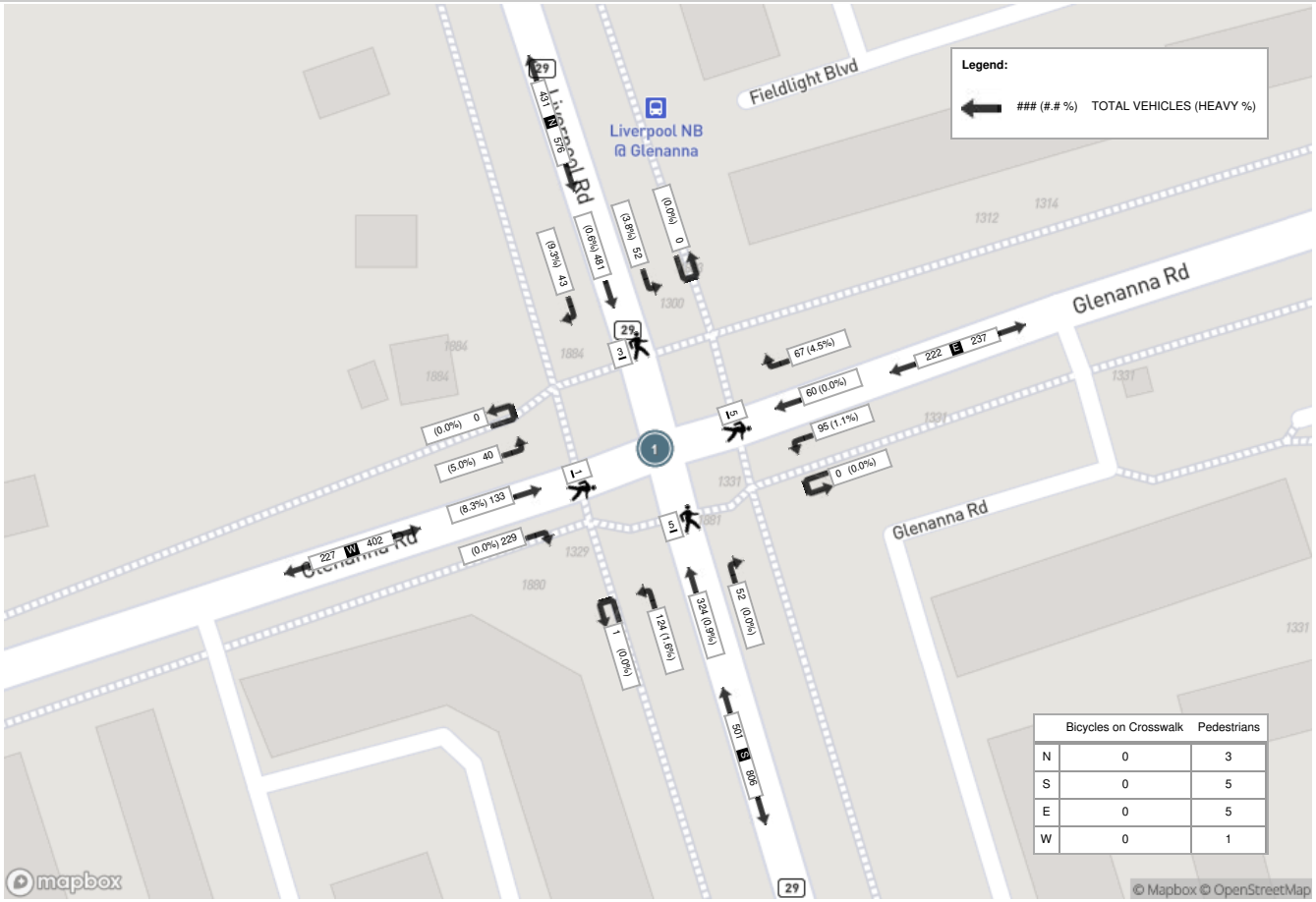
Urban Trans Engineering Solutions Inc
146 9275 MARKHAM ROAD
MARKHAM ONTARIO, L6E 0H9
CANADA

Peak Hour: 05:00 PM - 06:00 PM **Weather: Mist (19 °C)**

Start Time	N Approach LIVERPOOL RD						E Approach GLENANNA RD						S Approach LIVERPOOL RD						W Approach GLENANNA RD						Int. Total (15 min)
	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	
2025-09-25 17:00:00	3	92	17	0	4	112	17	35	15	0	0	67	27	140	57	0	3	224	58	51	13	0	3	122	525
2025-09-25 17:15:00	5	103	21	0	1	129	15	24	9	0	5	48	36	148	69	0	2	253	40	51	13	0	1	104	534
2025-09-25 17:30:00	6	78	17	0	1	101	16	27	7	0	2	50	34	117	60	0	0	211	43	47	13	0	0	103	465
2025-09-25 17:45:00	10	115	20	0	4	145	21	33	20	0	3	74	28	97	77	0	3	202	45	66	10	0	0	121	542
Grand Total	24	388	75	0	10	487	69	119	51	0	10	239	125	502	263	0	8	890	186	215	49	0	4	450	**2066**
Approach%	4.9%	79.7%	15.4%	0%		-	28.9%	49.8%	21.3%	0%		-	14%	56.4%	29.6%	0%		-	41.3%	47.8%	10.9%	0%		-	**-**
Totals %	1.2%	18.8%	3.6%	0%		23.6%	3.3%	5.8%	2.5%	0%		11.6%	6.1%	24.3%	12.7%	0%		43.1%	9%	10.4%	2.4%	0%		21.8%	**-**
PHF	0.6	0.84	0.89	0		0.84	0.82	0.85	0.64	0		0.81	0.87	0.85	0.85	0		0.88	0.8	0.81	0.94	0		0.92	0.95
Heavy	0	2	2	0		4	0	0	0	0		0	1	2	2	0		5	0	3	0	0		3	12
Heavy %	0%	0.5%	2.7%	0%		0.8%	0%	0%	0%	0%		0%	0.8%	0.4%	0.8%	0%		0.6%	0%	1.4%	0%	0%		0.7%	0.6%
Lights	24	386	73	0		483	69	119	51	0		239	124	500	261	0		885	186	212	49	0		447	2054
Lights %	100%	99.5%	97.3%	0%		99.2%	100%	100%	100%	0%		100%	99.2%	99.6%	99.2%	0%		99.4%	100%	98.6%	100%	0%		99.3%	99.4%
Single-Unit Trucks	0	1	0	0		1	0	0	0	0		0	1	0	0	0		1	0	1	0	0		1	3
Single-Unit Trucks %	0%	0.3%	0%	0%		0.2%	0%	0%	0%	0%		0%	0.8%	0%	0%	0%		0.1%	0%	0.5%	0%	0%		0.2%	0.1%
Buses	0	1	2	0		3	0	0	0	0		0	0	2	2	0		4	0	2	0	0		2	9
Buses %	0%	0.3%	2.7%	0%		0.6%	0%	0%	0%	0%		0%	0%	0.4%	0.8%	0%		0.4%	0%	0.9%	0%	0%		0.4%	0.4%
Articulated Trucks	0	0	0	0		0	0	0	0	0		0	0	0	0	0		0	0	0	0	0		0	0
Articulated Trucks %	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	0%
Bicycles on Road	0	0	0	0		0	0	0	0	0		0	0	0	0	0		0	0	0	0	0		0	0
Bicycles on Road %	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	0%
Pedestrians	-	-	-	-	10	-	-	-	-	-	10	-	-	-	-	-	8	-	-	-	-	-	4	-	**-**
Pedestrians%	-	-	-	-	31.3%		-	-	-	-	31.3%		-	-	-	-	25%		-	-	-	-	12.5%		**-**
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	**-**
Bicycles on Crosswalk%	-	-	-	-	0%		-	-	-	-	0%		-	-	-	-	0%		-	-	-	-	0%		**-**

Urban Trans Engineering Solutions Inc
146 9275 MARKHAM ROAD
MARKHAM ONTARIO, L6E 0H9
CANADA

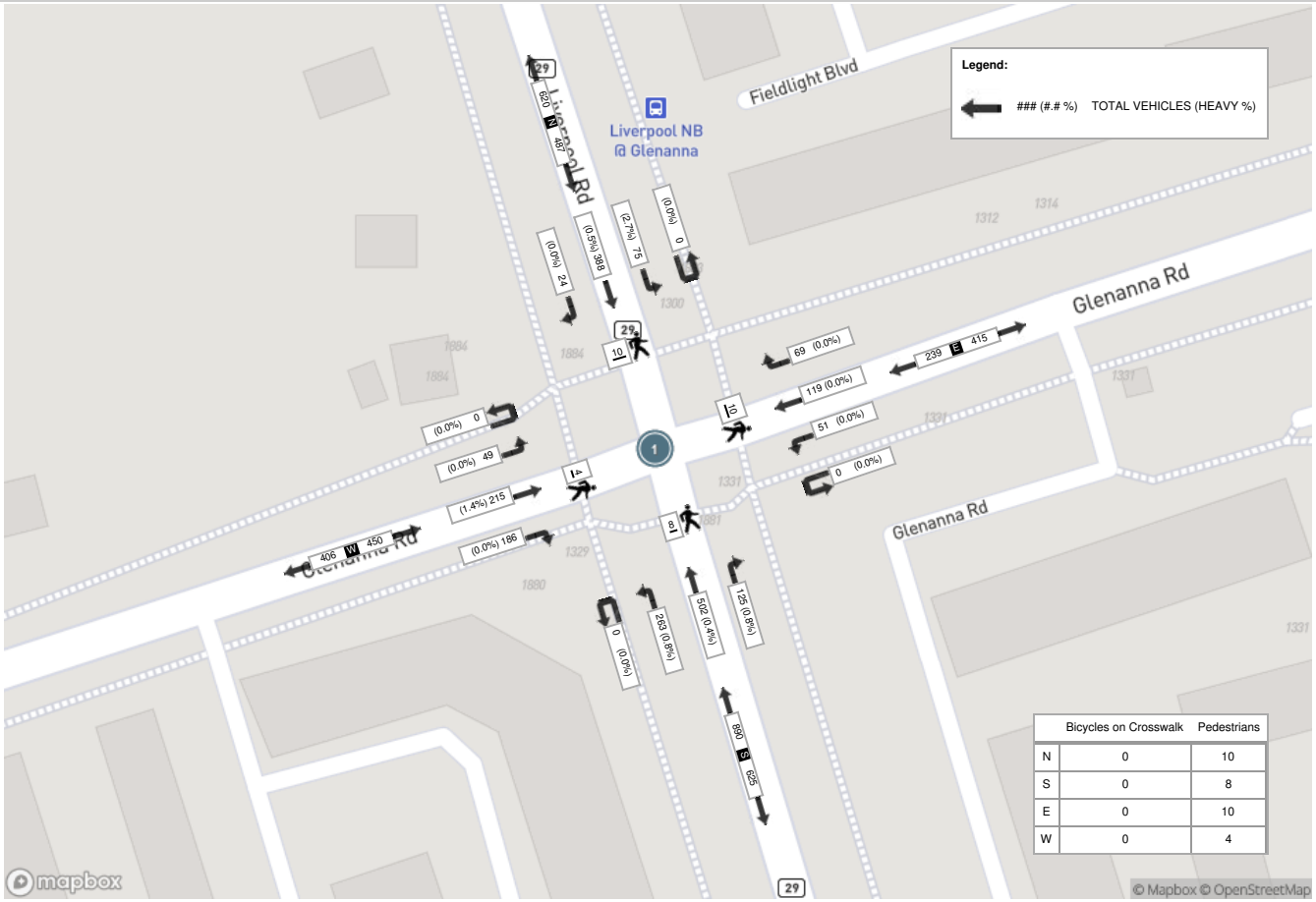
Peak Hour: 08:15 AM - 09:15 AM **Weather: Moderate Rain (18 °C)**



	Bicycles on Crosswalk	Pedestrians
N	0	3
S	0	5
E	0	5
W	0	1

Urban Trans Engineering Solutions Inc
146 9275 MARKHAM ROAD
MARKHAM ONTARIO, L6E 0H9
CANADA

Peak Hour: 05:00 PM - 06:00 PM **Weather: Mist (19 °C)**



	Bicycles on Crosswalk	Pedestrians
N	0	10
S	0	8
E	0	10
W	0	4

Spectrum

Turning Movement Count
Location Name: GLENANNA RD & GLENDALE DR
Date: Thu, Sep 25, 2025 Deployment Lead: Rey Fernandez

Urban Trans Engineering Solutions Inc
146 9275 MARKHAM ROAD
MARKHAM ONTARIO, L6E 0H9
CANADA

Turning Movement Count (3 . GLENANNA RD & GLENDALE DR)

Start Time	N Approach GLENDALE DR						E Approach GLENANNA RD						S Approach GLENDALE DR						W Approach GLENANNA RD						Int. Total (15 min)	Int. Total (1 hr)
	Right N:W	Thru N:S	Left N:E	UTurn N:N	Peds N:	Approach Total	Right E:N	Thru E:W	Left E:S	UTurn E:E	Peds E:	Approach Total	Right S:E	Thru S:N	Left S:W	UTurn S:S	Peds S:	Approach Total	Right W:S	Thru W:E	Left W:N	UTurn W:W	Peds W:	Approach Total		
2025-09-25 07:00:00	1	4	1	0	0	6	2	19	6	0	0	27	8	2	3	0	0	13	9	39	2	0	0	50	96	
2025-09-25 07:15:00	0	4	1	0	1	5	0	25	8	0	1	33	10	4	8	0	1	22	7	53	2	0	0	62	122	
2025-09-25 07:30:00	1	5	2	0	0	8	1	27	7	0	0	35	14	10	6	0	0	30	15	69	5	0	0	89	162	
2025-09-25 07:45:00	0	7	1	0	0	8	2	64	13	0	1	79	20	10	5	0	0	35	12	65	2	0	0	79	201	581
2025-09-25 08:00:00	1	5	1	0	0	7	0	60	21	0	1	81	11	7	14	0	0	32	8	46	0	0	0	54	174	659
2025-09-25 08:15:00	1	6	2	0	0	9	0	41	15	0	0	56	17	5	11	0	0	33	10	69	3	0	0	82	180	717
2025-09-25 08:30:00	2	7	1	0	3	10	2	46	10	0	0	58	14	2	18	0	0	34	15	73	1	0	0	89	191	746
2025-09-25 08:45:00	3	1	5	0	2	9	1	58	11	0	1	70	15	5	9	0	1	29	22	81	3	0	0	106	214	759
2025-09-25 09:00:00	0	8	2	0	1	10	2	34	11	0	0	47	26	4	15	0	0	45	14	58	1	0	0	73	175	760
2025-09-25 09:15:00	0	4	3	0	1	7	2	48	9	1	0	60	17	5	11	0	2	33	10	48	1	0	0	59	159	739
2025-09-25 09:30:00	0	8	3	0	0	11	1	28	9	0	0	38	14	5	8	0	1	27	9	55	2	0	0	66	142	690
2025-09-25 09:45:00	1	6	1	0	0	8	1	28	6	0	0	35	16	1	6	0	0	23	5	38	0	0	0	43	109	585
BREAK																										
2025-09-25 16:00:00	1	4	2	0	1	7	1	92	2	0	0	95	13	5	4	0	2	22	3	61	4	0	0	68	192	
2025-09-25 16:15:00	0	3	0	0	2	3	2	73	4	0	1	79	29	7	5	0	0	41	5	83	1	0	0	89	212	
2025-09-25 16:30:00	1	3	1	0	0	5	1	94	3	0	0	98	12	5	5	0	2	22	1	77	0	0	0	78	203	
2025-09-25 16:45:00	3	3	3	0	2	9	1	83	6	0	0	90	15	4	8	0	1	27	6	90	1	0	0	97	223	830
2025-09-25 17:00:00	1	2	2	0	2	5	1	95	5	0	0	101	24	14	9	0	4	47	5	86	2	0	0	93	246	884
2025-09-25 17:15:00	0	1	5	0	2	6	5	87	7	0	0	99	22	9	10	0	0	41	6	70	0	0	0	76	222	894
2025-09-25 17:30:00	2	3	2	0	2	7	4	81	4	0	0	89	11	3	11	0	2	25	3	78	3	0	0	84	205	896
2025-09-25 17:45:00	1	2	1	0	5	4	3	99	8	0	0	110	20	8	3	0	2	31	8	98	1	0	0	107	252	925
2025-09-25 18:00:00	1	2	4	0	3	7	2	75	6	0	1	83	9	7	11	0	3	27	5	73	0	0	0	78	195	874
2025-09-25 18:15:00	0	1	3	0	2	4	3	82	5	0	1	90	17	8	7	0	4	32	3	53	1	0	0	57	183	835
2025-09-25 18:30:00	0	2	3	0	3	5	1	99	7	0	0	107	10	5	4	0	2	19	4	65	2	0	0	71	202	832
2025-09-25 18:45:00	1	0	3	0	7	4	2	72	6	0	0	80	12	3	8	0	1	23	7	62	2	0	1	71	178	758
Grand Total	21	91	52	0	39	164	40	1510	189	1	7	1740	376	138	199	0	28	713	192	1590	39	0	1	1821	**4438**	-
Approach%	12.8%	55.5%	31.7%	0%		-	2.3%	86.8%	10.9%	0.1%		-	52.7%	19.4%	27.9%	0%		-	10.5%	87.3%	2.1%	0%		-	-	-
Totals %	0.5%	2.1%	1.2%	0%		3.7%	0.9%	34%	4.3%	0%		39.2%	8.5%	3.1%	4.5%	0%		16.1%	4.3%	35.8%	0.9%	0%		41%	-	-
Heavy	0	0	2	0		-	1	28	0	0		-	6	0	2	0		-	2	27	0	0		-	-	-
Heavy %	0%	0%	3.8%	0%		-	2.5%	1.9%	0%	0%		-	1.6%	0%	1%	0%		-	1%	1.7%	0%	0%		-	-	-
Bicycles	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	-	-
Bicycle %	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	-	-

Spectrum

Turning Movement Count
Location Name: GLENANNA RD & GLENDALE DR
Date: Thu, Sep 25, 2025 Deployment Lead: Rey Fernandez

Urban Trans Engineering Solutions Inc
146 9275 MARKHAM ROAD
MARKHAM ONTARIO, L6E 0H9
CANADA

Peak Hour: 08:15 AM - 09:15 AM Weather: Moderate Rain (18 °C)

Start Time	N Approach GLENDALE DR						E Approach GLENANNA RD						S Approach GLENDALE DR						W Approach GLENANNA RD						Int. Total (15 min)
	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	
2025-09-25 08:15:00	1	6	2	0	0	9	0	41	15	0	0	56	17	5	11	0	0	33	10	69	3	0	0	82	180
2025-09-25 08:30:00	2	7	1	0	3	10	2	46	10	0	0	58	14	2	18	0	0	34	15	73	1	0	0	89	191
2025-09-25 08:45:00	3	1	5	0	2	9	1	58	11	0	1	70	15	5	9	0	1	29	22	81	3	0	0	106	214
2025-09-25 09:00:00	0	8	2	0	1	10	2	34	11	0	0	47	26	4	15	0	0	45	14	58	1	0	0	73	175
Grand Total	6	22	10	0	6	38	5	179	47	0	1	231	72	16	53	0	1	141	61	281	8	0	0	350	**760**
Approach%	15.8%	57.9%	26.3%	0%		-	2.2%	77.5%	20.3%	0%		-	51.1%	11.3%	37.6%	0%		-	17.4%	80.3%	2.3%	0%		-	**-**
Totals %	0.8%	2.9%	1.3%	0%		5%	0.7%	23.6%	6.2%	0%		30.4%	9.5%	2.1%	7%	0%		18.6%	8%	37%	1.1%	0%		46.1%	**-**
PHF	0.5	0.69	0.5	0		0.95	0.63	0.77	0.78	0		0.83	0.69	0.8	0.74	0		0.78	0.69	0.87	0.67	0		0.83	0.89
Heavy	0	0	2	0		2	0	7	0	0		7	3	0	1	0		4	0	8	0	0		8	21
Heavy %	0%	0%	20%	0%		5.3%	0%	3.9%	0%	0%		3%	4.2%	0%	1.9%	0%		2.8%	0%	2.8%	0%	0%		2.3%	2.8%
Lights	6	22	8	0		36	5	172	47	0		224	69	16	52	0		137	61	272	8	0		341	738
Lights %	100%	100%	80%	0%		94.7%	100%	96.1%	100%	0%		97%	95.8%	100%	98.1%	0%		97.2%	100%	96.8%	100%	0%		97.4%	97.1%
Single-Unit Trucks	0	0	0	0		0	0	2	0	0		2	0	0	0	0		0	0	0	0	0		0	2
Single-Unit Trucks %	0%	0%	0%	0%		0%	0%	1.1%	0%	0%		0.9%	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	0.3%
Buses	0	0	0	0		0	0	5	0	0		5	3	0	1	0		4	0	8	0	0		8	17
Buses %	0%	0%	0%	0%		0%	0%	2.8%	0%	0%		2.2%	4.2%	0%	1.9%	0%		2.8%	0%	2.8%	0%	0%		2.3%	2.2%
Articulated Trucks	0	0	2	0		2	0	0	0	0		0	0	0	0	0		0	0	0	0	0		0	2
Articulated Trucks %	0%	0%	20%	0%		5.3%	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	0.3%
Bicycles on Road	0	0	0	0		0	0	0	0	0		0	0	0	0	0		0	0	1	0	0		1	1
Bicycles on Road %	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	0%	0.4%	0%	0%		0.3%	0.1%
Pedestrians	-	-	-	-	6	-	-	-	-	-	1	-	-	-	-	-	0	-	-	-	-	-	0	-	**-**
Pedestrians%	-	-	-	-	75%		-	-	-	-	12.5%		-	-	-	-	0%		-	-	-	-	0%		**-**
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	1	-	-	-	-	-	0	-	**-**
Bicycles on Crosswalk%	-	-	-	-	0%		-	-	-	-	0%		-	-	-	-	12.5%		-	-	-	-	0%		**-**

Spectrum

Turning Movement Count
Location Name: GLENANNA RD & GLENDALE DR
Date: Thu, Sep 25, 2025 Deployment Lead: Rey Fernandez

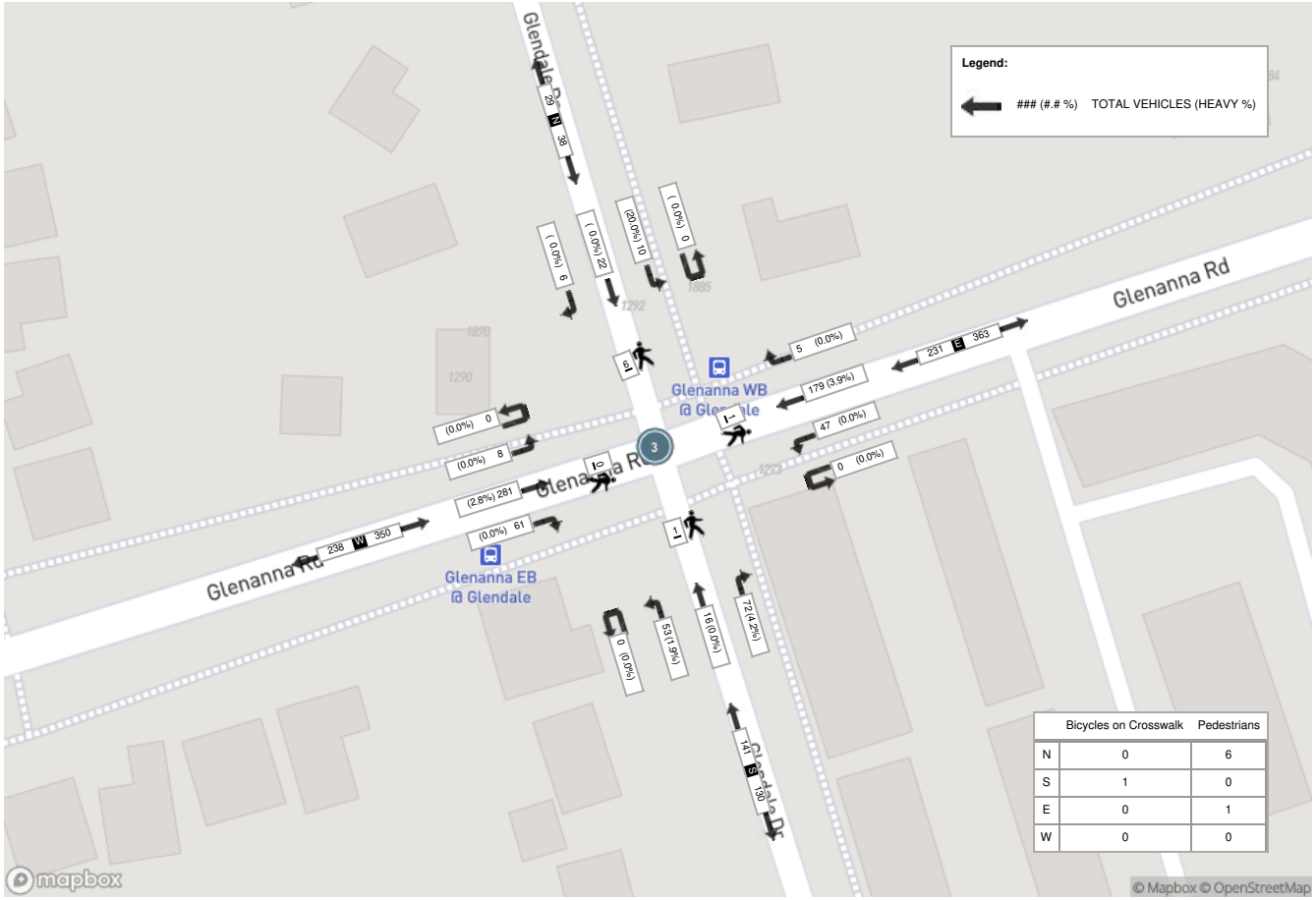
Urban Trans Engineering Solutions Inc
146 9275 MARKHAM ROAD
MARKHAM ONTARIO, L6E 0H9
CANADA

Peak Hour: 05:00 PM - 06:00 PM **Weather: Mist (19 °C)**

Start Time	N Approach GLENDALE DR						E Approach GLENANNA RD						S Approach GLENDALE DR						W Approach GLENANNA RD						Int. Total (15 min)
	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	
2025-09-25 17:00:00	1	2	2	0	2	5	1	95	5	0	0	101	24	14	9	0	4	47	5	86	2	0	0	93	246
2025-09-25 17:15:00	0	1	5	0	2	6	5	87	7	0	0	99	22	9	10	0	0	41	6	70	0	0	0	76	222
2025-09-25 17:30:00	2	3	2	0	2	7	4	81	4	0	0	89	11	3	11	0	2	25	3	78	3	0	0	84	205
2025-09-25 17:45:00	1	2	1	0	5	4	3	99	8	0	0	110	20	8	3	0	2	31	8	98	1	0	0	107	252
Grand Total	4	8	10	0	11	22	13	362	24	0	0	399	77	34	33	0	8	144	22	332	6	0	0	360	**925**
Approach%	18.2%	36.4%	45.5%	0%		-	3.3%	90.7%	6%	0%		-	53.5%	23.6%	22.9%	0%		-	6.1%	92.2%	1.7%	0%		-	**-**
Totals %	0.4%	0.9%	1.1%	0%		2.4%	1.4%	39.1%	2.6%	0%		43.1%	8.3%	3.7%	3.6%	0%		15.6%	2.4%	35.9%	0.6%	0%		38.9%	**-**
PHF	0.5	0.67	0.5	0		0.79	0.65	0.91	0.75	0		0.91	0.8	0.61	0.75	0		0.77	0.69	0.85	0.5	0		0.84	0.92
Heavy	0	0	0	0		0	0	2	0	0		2	0	0	0	0		0	0	2	0	0		2	4
Heavy %	0%	0%	0%	0%		0%	0%	0.6%	0%	0%		0.5%	0%	0%	0%	0%		0%	0%	0.6%	0%	0%		0.6%	0.4%
Lights	4	8	10	0		22	12	360	24	0		396	77	34	31	0		142	22	330	6	0		358	918
Lights %	100%	100%	100%	0%		100%	92.3%	99.4%	100%	0%		99.2%	100%	100%	93.9%	0%		98.6%	100%	99.4%	100%	0%		99.4%	99.2%
Single-Unit Trucks	0	0	0	0		0	0	0	0	0		0	0	0	0	0		0	0	0	0	0		0	0
Single-Unit Trucks %	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	0%
Buses	0	0	0	0		0	0	2	0	0		2	0	0	0	0		0	0	2	0	0		2	4
Buses %	0%	0%	0%	0%		0%	0%	0.6%	0%	0%		0.5%	0%	0%	0%	0%		0%	0%	0.6%	0%	0%		0.6%	0.4%
Articulated Trucks	0	0	0	0		0	0	0	0	0		0	0	0	0	0		0	0	0	0	0		0	0
Articulated Trucks %	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	0%
Bicycles on Road	0	0	0	0		0	1	0	0	0		1	0	0	2	0		2	0	0	0	0		0	3
Bicycles on Road %	0%	0%	0%	0%		0%	7.7%	0%	0%	0%		0.3%	0%	0%	6.1%	0%		1.4%	0%	0%	0%	0%		0%	0.3%
Pedestrians	-	-	-	-	11	-	-	-	-	-	0	-	-	-	-	-	8	-	-	-	-	-	0	-	**-**
Pedestrians%	-	-	-	-	57.9%		-	-	-	-	0%		-	-	-	-	42.1%		-	-	-	-	0%		**-**
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	**-**
Bicycles on Crosswalk%	-	-	-	-	0%		-	-	-	-	0%		-	-	-	-	0%		-	-	-	-	0%		**-**

Urban Trans Engineering Solutions Inc
146 9275 MARKHAM ROAD
MARKHAM ONTARIO, L6E 0H9
CANADA

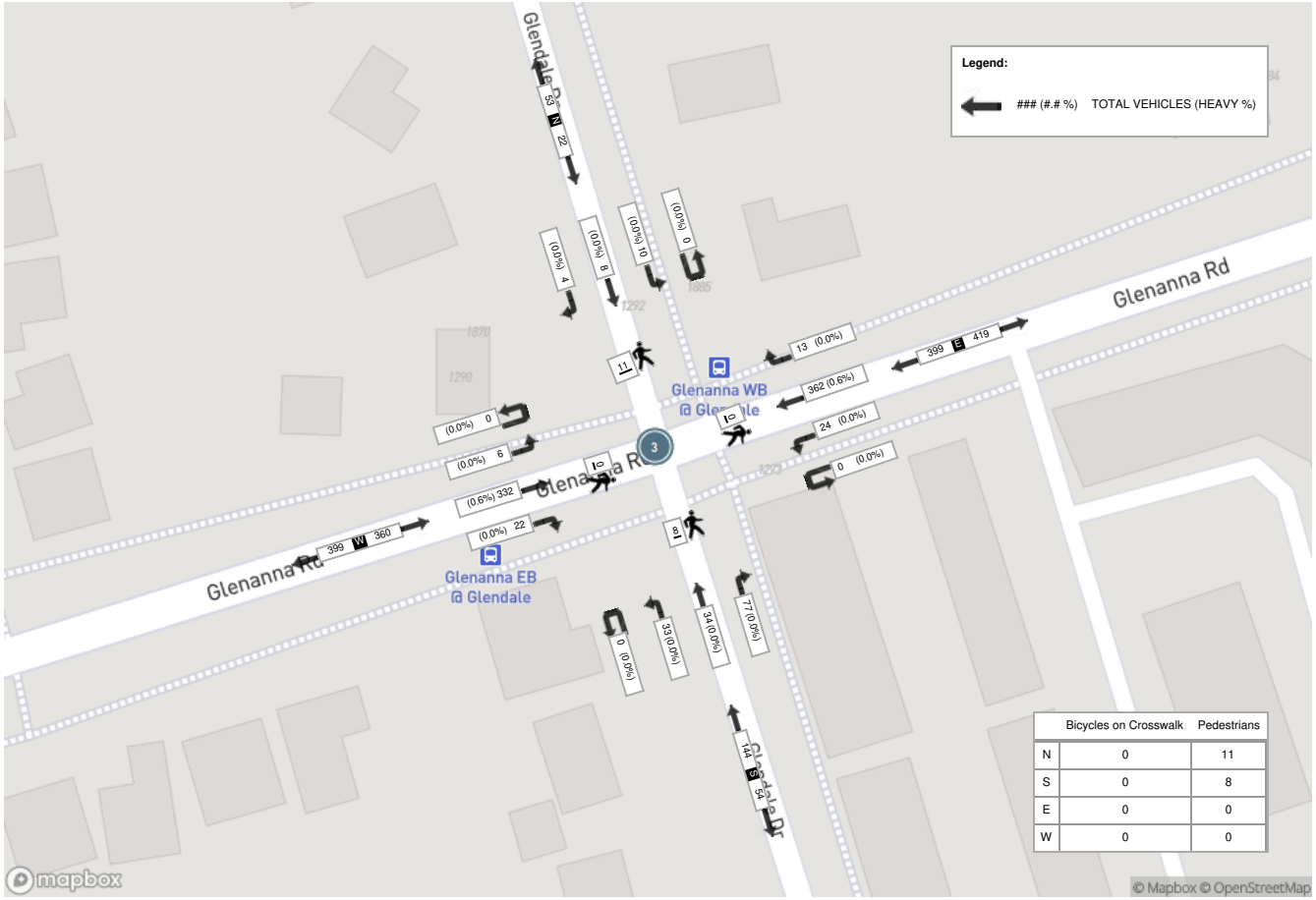
Peak Hour: 08:15 AM - 09:15 AM **Weather: Moderate Rain (18 °C)**



	Bicycles on Crosswalk	Pedestrians
N	0	6
S	1	0
E	0	1
W	0	0

Urban Trans Engineering Solutions Inc
146 9275 MARKHAM ROAD
MARKHAM ONTARIO, L6E 0H9
CANADA

Peak Hour: 05:00 PM - 06:00 PM **Weather: Mist (19 °C)**



	Bicycles on Crosswalk	Pedestrians
N	0	11
S	0	8
E	0	0
W	0	0

Urban Trans Engineering Solutions Inc
146 9275 MARKHAM ROAD
MARKHAM ONTARIO, L6E 0H9
CANADA

Turning Movement Count (2 . GLENANNA RD & 1884 LIVERPOOL RD (PROPOSED SITE ACCESS))

Start Time	N Approach 1884 LIVERPOOL RD (PROPOSED SITE ACCESS)					E Approach GLENANNA RD					W Approach GLENANNA RD					Int. Total (15 min)	Int. Total (1 hr)
	Right N:W	Left N:E	UTurn N:N	Peds N:	Approach Total	Right E:N	Thru E:W	UTurn E:E	Peds E:	Approach Total	Thru W:E	Left W:N	UTurn W:W	Peds W:	Approach Total		
2025-09-25 07:00:00	0	0	0	1	0	0	26	0	0	26	51	0	0	0	51	77	
2025-09-25 07:15:00	0	0	0	0	0	0	31	0	0	31	70	0	0	0	70	101	
2025-09-25 07:30:00	0	0	0	0	0	0	33	0	0	33	93	0	0	0	93	126	
2025-09-25 07:45:00	0	0	0	1	0	0	82	0	0	82	91	0	0	0	91	173	477
2025-09-25 08:00:00	0	0	0	0	0	0	83	0	0	83	64	0	0	0	64	147	547
2025-09-25 08:15:00	0	0	0	0	0	0	56	1	0	57	89	0	0	0	89	146	592
2025-09-25 08:30:00	0	0	0	1	0	0	56	0	0	56	101	0	0	0	101	157	623
2025-09-25 08:45:00	1	0	0	0	1	0	70	0	0	70	111	1	0	0	112	183	633
2025-09-25 09:00:00	0	0	0	1	0	0	49	0	0	49	91	0	0	0	91	140	626
2025-09-25 09:15:00	0	0	0	1	0	0	59	0	0	59	70	0	0	0	70	129	609
2025-09-25 09:30:00	0	0	0	0	0	0	39	0	0	39	73	0	0	0	73	112	564
2025-09-25 09:45:00	0	0	0	0	0	0	35	0	0	35	59	0	0	0	59	94	475
BREAK																	
2025-09-25 16:00:00	0	0	0	3	0	0	94	0	0	94	79	0	0	0	79	173	
2025-09-25 16:15:00	0	0	0	2	0	0	82	0	0	82	119	0	0	0	119	201	
2025-09-25 16:30:00	0	0	0	3	0	0	98	0	0	98	89	0	0	0	89	187	
2025-09-25 16:45:00	0	0	0	3	0	0	93	0	0	93	112	0	0	0	112	205	766
2025-09-25 17:00:00	0	0	0	2	0	0	107	0	0	107	124	0	0	0	124	231	824
2025-09-25 17:15:00	0	0	0	1	0	0	103	0	0	103	100	0	0	0	100	203	826
2025-09-25 17:30:00	0	0	0	1	0	0	93	0	0	93	95	0	0	0	95	188	827
2025-09-25 17:45:00	0	0	0	4	0	1	113	0	0	114	123	0	0	0	123	237	859
2025-09-25 18:00:00	0	0	0	5	0	0	83	0	0	83	94	0	0	0	94	177	805
2025-09-25 18:15:00	0	0	0	2	0	0	93	0	0	93	73	0	0	0	73	166	768
2025-09-25 18:30:00	0	0	0	2	0	0	103	0	0	103	77	0	0	0	77	180	760
2025-09-25 18:45:00	0	0	0	6	0	0	83	0	0	83	83	0	0	1	83	166	689
Grand Total	1	0	0	39	1	1	1764	1	0	1766	2131	1	0	1	2132	**3899**	-
Approach%	100%	0%	0%		-	0.1%	99.9%	0.1%		-	100%	0%	0%		-	**-**	-
Totals %	0%	0%	0%		0%	0%	45.2%	0%		45.3%	54.7%	0%	0%		54.7%	**-**	-
Heavy	0	0	0		-	0	32	0		-	39	0	0		-	**-**	-
Heavy %	0%	0%	0%		-	0%	1.8%	0%		-	1.8%	0%	0%		-	**-**	-
Bicycles	-	-	-		-	-	-	-		-	-	-	-		-	**-**	-
Bicycle %	-	-	-		-	-	-	-		-	-	-	-		-	**-**	-

Urban Trans Engineering Solutions Inc
146 9275 MARKHAM ROAD
MARKHAM ONTARIO, L6E 0H9
CANADA

Peak Hour: 08:00 AM - 09:00 AM Weather: Moderate Rain (18 °C)

Start Time	N Approach 1884 LIVERPOOL RD (PROPOSED SITE ACCESS)					E Approach GLENANNA RD					W Approach GLENANNA RD					Int. Total (15 min)
	Right	Left	UTurn	Peds	Approach Total	Right	Thru	UTurn	Peds	Approach Total	Thru	Left	UTurn	Peds	Approach Total	
2025-09-25 08:00:00	0	0	0	0	0	0	83	0	0	83	64	0	0	0	64	147
2025-09-25 08:15:00	0	0	0	0	0	0	56	1	0	57	89	0	0	0	89	146
2025-09-25 08:30:00	0	0	0	1	0	0	56	0	0	56	101	0	0	0	101	157
2025-09-25 08:45:00	1	0	0	0	1	0	70	0	0	70	111	1	0	0	112	183
Grand Total	1	0	0	1	1	0	265	1	0	266	365	1	0	0	366	**633**
Approach%	100%	0%	0%		-	0%	99.6%	0.4%		-	99.7%	0.3%	0%		-	**-**
Totals %	0.2%	0%	0%		0.2%	0%	41.9%	0.2%		42%	57.7%	0.2%	0%		57.8%	**-**
PHF	0.25	0	0		0.25	0	0.8	0.25		0.8	0.82	0.25	0		0.82	0.86
Heavy	0	0	0		0	0	8	0		8	12	0	0		12	20
Heavy %	0%	0%	0%		0%	0%	3%	0%		3%	3.3%	0%	0%		3.3%	3.2%
Lights	1	0	0		1	0	257	1		258	353	1	0		354	613
Lights %	100%	0%	0%		100%	0%	97%	100%		97%	96.7%	100%	0%		96.7%	96.8%
Single-Unit Trucks	0	0	0		0	0	2	0		2	1	0	0		1	3
Single-Unit Trucks %	0%	0%	0%		0%	0%	0.8%	0%		0.8%	0.3%	0%	0%		0.3%	0.5%
Buses	0	0	0		0	0	6	0		6	9	0	0		9	15
Buses %	0%	0%	0%		0%	0%	2.3%	0%		2.3%	2.5%	0%	0%		2.5%	2.4%
Articulated Trucks	0	0	0		0	0	0	0		0	2	0	0		2	2
Articulated Trucks %	0%	0%	0%		0%	0%	0%	0%		0%	0.5%	0%	0%		0.5%	0.3%
Bicycles on Road	0	0	0		0	0	0	0		0	0	0	0		0	0
Bicycles on Road %	0%	0%	0%		0%	0%	0%	0%		0%	0%	0%	0%		0%	0%
Pedestrians	-	-	-	1	-	-	-	-	0	-	-	-	-	0	-	**-**
Pedestrians%	-	-	-	100%		-	-	-	0%		-	-	-	0%		**-**
Bicycles on Crosswalk	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	**-**
Bicycles on Crosswalk%	-	-	-	0%		-	-	-	0%		-	-	-	0%		**-**

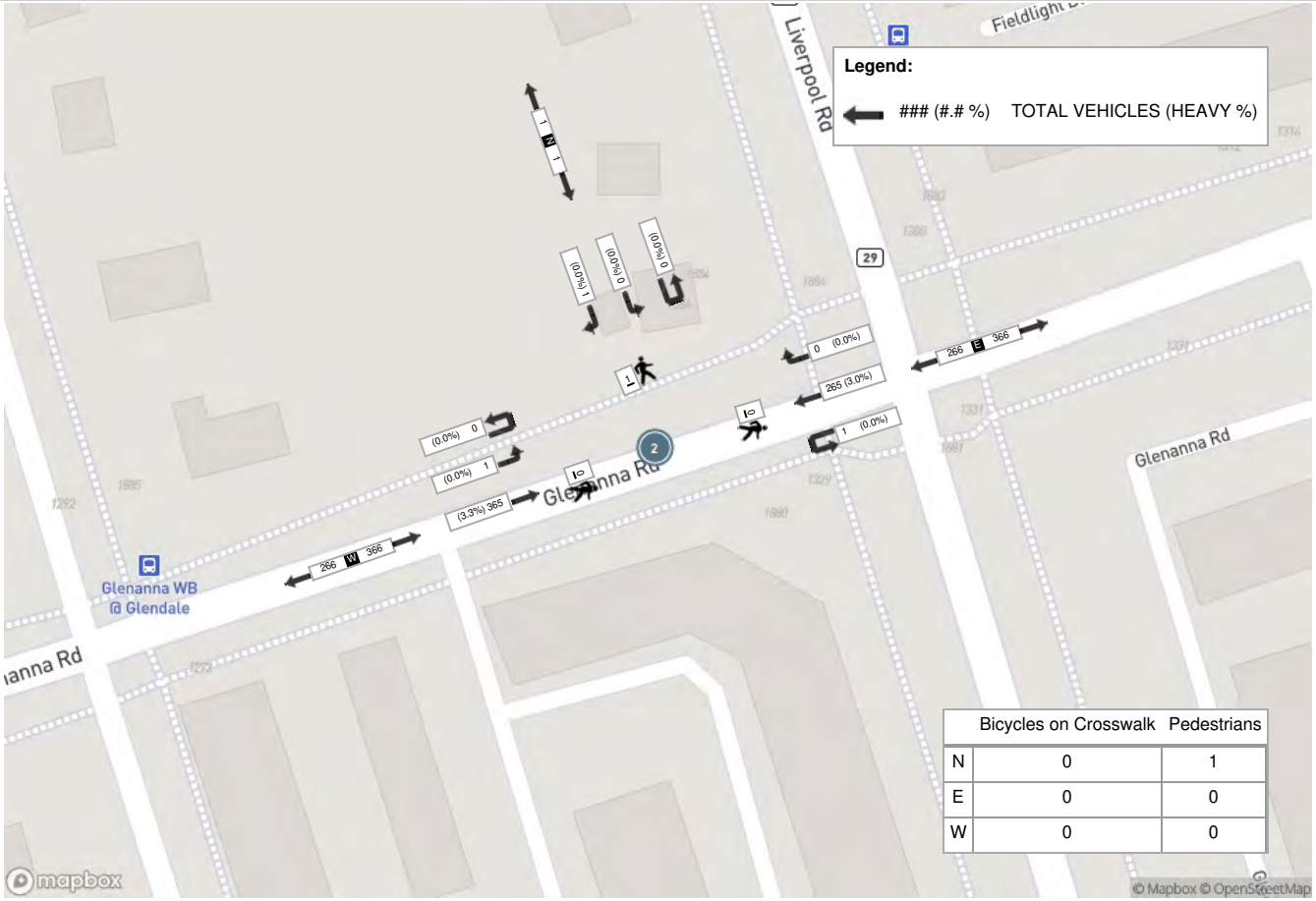
Urban Trans Engineering Solutions Inc
146 9275 MARKHAM ROAD
MARKHAM ONTARIO, L6E 0H9
CANADA

Peak Hour: 05:00 PM - 06:00 PM Weather: Mist (19 °C)

Start Time	N Approach 1884 LIVERPOOL RD (PROPOSED SITE ACCESS)					E Approach GLENANNA RD					W Approach GLENANNA RD					Int. Total (15 min)
	Right	Left	UTurn	Peds	Approach Total	Right	Thru	UTurn	Peds	Approach Total	Thru	Left	UTurn	Peds	Approach Total	
2025-09-25 17:00:00	0	0	0	2	0	0	107	0	0	107	124	0	0	0	124	231
2025-09-25 17:15:00	0	0	0	1	0	0	103	0	0	103	100	0	0	0	100	203
2025-09-25 17:30:00	0	0	0	1	0	0	93	0	0	93	95	0	0	0	95	188
2025-09-25 17:45:00	0	0	0	4	0	1	113	0	0	114	123	0	0	0	123	237
Grand Total	0	0	0	8	0	1	416	0	0	417	442	0	0	0	442	**859**
Approach%	0%	0%	0%		-	0.2%	99.8%	0%		-	100%	0%	0%		-	**-**
Totals %	0%	0%	0%		0%	0.1%	48.4%	0%		48.5%	51.5%	0%	0%		51.5%	**-**
PHF	0	0	0		0	0.25	0.92	0		0.91	0.89	0	0		0.89	0.91
Heavy	0	0	0		0	0	2	0		2	3	0	0		3	5
Heavy %	0%	0%	0%		0%	0%	0.5%	0%		0.5%	0.7%	0%	0%		0.7%	0.6%
Lights	0	0	0		0	1	413	0		414	439	0	0		439	853
Lights %	0%	0%	0%		0%	100%	99.3%	0%		99.3%	99.3%	0%	0%		99.3%	99.3%
Single-Unit Trucks	0	0	0		0	0	0	0		0	1	0	0		1	1
Single-Unit Trucks %	0%	0%	0%		0%	0%	0%	0%		0%	0.2%	0%	0%		0.2%	0.1%
Buses	0	0	0		0	0	2	0		2	2	0	0		2	4
Buses %	0%	0%	0%		0%	0%	0.5%	0%		0.5%	0.5%	0%	0%		0.5%	0.5%
Articulated Trucks	0	0	0		0	0	0	0		0	0	0	0		0	0
Articulated Trucks %	0%	0%	0%		0%	0%	0%	0%		0%	0%	0%	0%		0%	0%
Bicycles on Road	0	0	0		0	0	1	0		1	0	0	0		0	1
Bicycles on Road %	0%	0%	0%		0%	0%	0.2%	0%		0.2%	0%	0%	0%		0%	0.1%
Pedestrians	-	-	-	7	-	-	-	-	0	-	-	-	-	0	-	**-**
Pedestrians%	-	-	-	87.5%		-	-	-	0%		-	-	-	0%		**-**
Bicycles on Crosswalk	-	-	-	1	-	-	-	-	0	-	-	-	-	0	-	**-**
Bicycles on Crosswalk%	-	-	-	12.5%		-	-	-	0%		-	-	-	0%		**-**

Urban Trans Engineering Solutions Inc
146 9275 MARKHAM ROAD
MARKHAM ONTARIO, L6E 0H9
CANADA

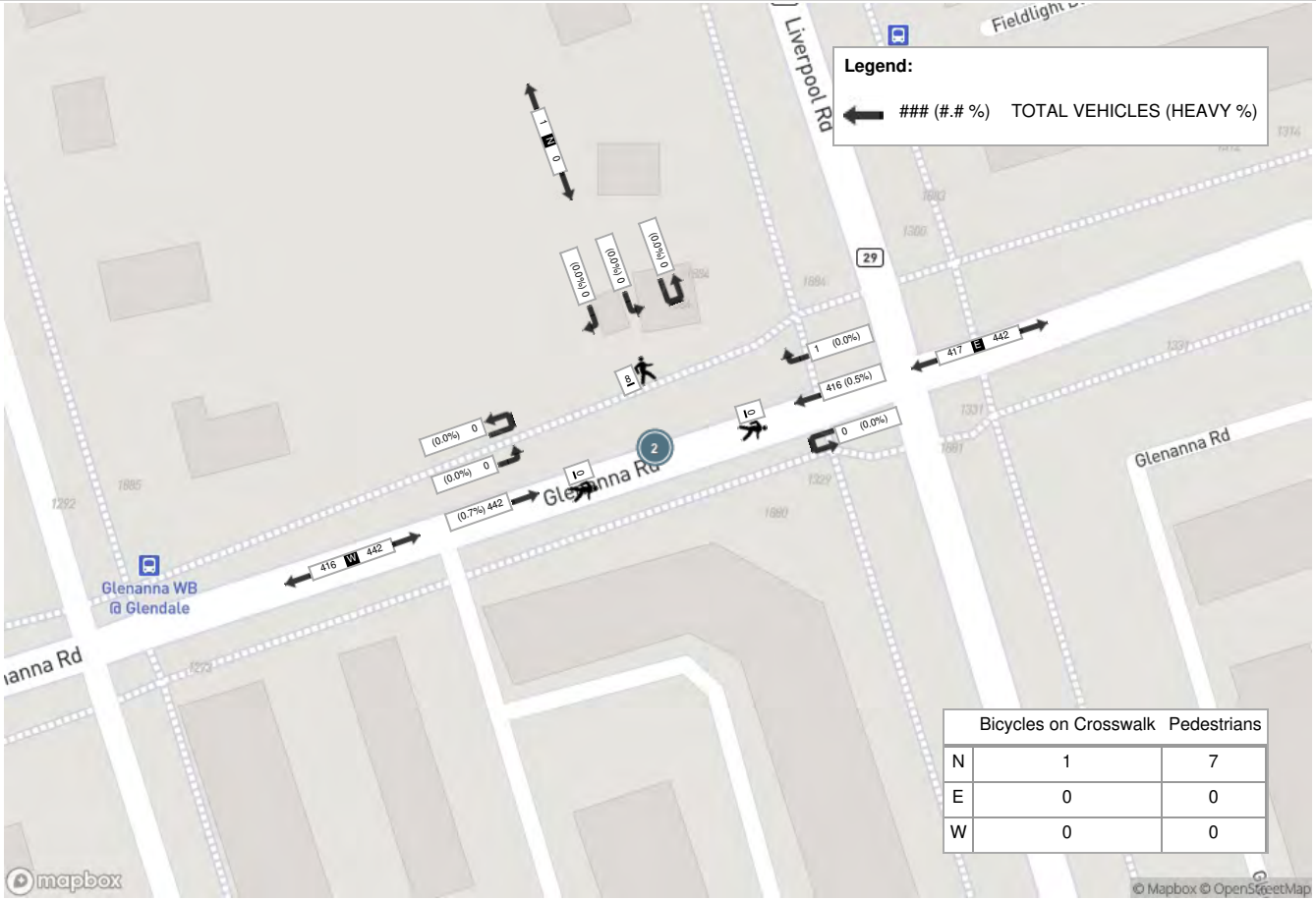
Peak Hour: 08:00 AM - 09:00 AM Weather: Moderate Rain (18 °C)



	Bicycles on Crosswalk	Pedestrians
N	0	1
E	0	0
W	0	0

Urban Trans Engineering Solutions Inc
146 9275 MARKHAM ROAD
MARKHAM ONTARIO, L6E 0H9
CANADA

Peak Hour: 05:00 PM - 06:00 PM Weather: Mist (19 °C)



	Bicycles on Crosswalk	Pedestrians
N	1	7
E	0	0
W	0	0

INTERSECTION SIGNAL TIMING REPORT

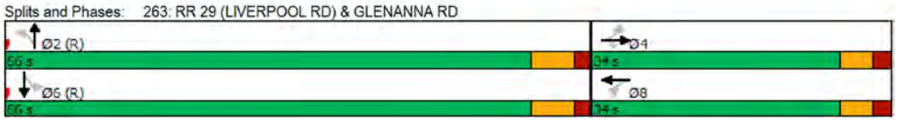
Location	Liverpool Rd. (RR 29) and Glenanna Dr.				
Date	10-02-2025	**C&E No.**	82420678	**Prepared by**	Jaydn Chin
Prepared for	UrbanTrans				

AM Peak (6:00-9:00)

10-03-2025

Phase Number	2	4	6	8
Movement	NBTL	EBTL	SBTL	WBTL
Lead/Lag				
Lead-Lag Optimize				
Recall Mode	C-Max	None	C-Max	None
Maximum Split (s)	66	34	66	34
Maximum Split (%)	66.0%	34.0%	66.0%	34.0%
Minimum Split (s)	32.8	32.9	32.8	32.9
Yellow Time (s)	4.9	3.7	4.9	3.7
All-Red Time (s)	1.9	2.2	1.9	2.2
Minimum Initial (s)	20	8	20	8
Vehicle Extension (s)	0.2	3	0.2	3
Minimum Gap (s)	3	3	3	3
Time Before Reduce (s)	0	0	0	0
Time To Reduce (s)	0	0	0	0
Walk Time (s)	7	7	7	7
Flash Dont Walk (s)	19	20	19	20
Intersection Summary				
Cycle Length			100	
Control Type		Actuated-Coordinated		
Natural Cycle			70	
Offset: 99 (99%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green				

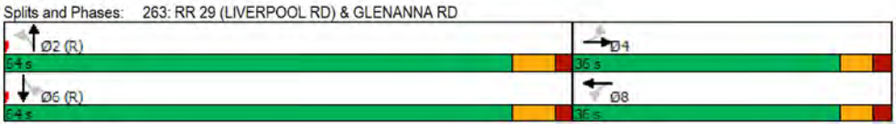
Splits and Phases: 263: RR 29 (LIVERPOOL RD) & GLENANNA RD



PM Peak (14:30-19:00)

Phase Number	2	4	6	8
Movement	NBTL	EBTL	SBTL	WBTL
Lead/Lag				
Lead-Lag Optimize				
Recall Mode	C-Max	None	C-Max	None
Maximum Split (s)	64	36	64	36
Maximum Split (%)	64.0%	36.0%	64.0%	36.0%
Minimum Split (s)	32.8	32.9	32.8	32.9
Yellow Time (s)	4.9	3.7	4.9	3.7
All-Red Time (s)	1.9	2.2	1.9	2.2
Minimum Initial (s)	20	8	20	8
Vehicle Extension (s)	0.2	3	0.2	3
Minimum Gap (s)	3	3	3	3
Time Before Reduce (s)	0	0	0	0
Time To Reduce (s)	0	0	0	0
Walk Time (s)	7	7	7	7
Flash Dont Walk (s)	19	20	19	20
Intersection Summary				
Cycle Length			100	
Control Type		Actuated-Coordinated		
Natural Cycle			70	
Offset: 28 (28%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green				

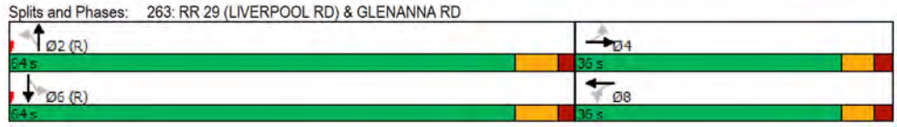
Splits and Phases: 263: RR 29 (LIVERPOOL RD) & GLENANNA RD



Weekend Peak (8:00-21:00)

Phase Number	2	4	6	8
Movement	NBTL	EBTL	SBTL	WBTL
Lead/Lag				
Lead-Lag Optimize				
Recall Mode	C-Max	None	C-Max	None
Maximum Split (s)	64	36	64	36
Maximum Split (%)	64.0%	36.0%	64.0%	36.0%
Minimum Split (s)	32.8	32.9	32.8	32.9
Yellow Time (s)	4.9	3.7	4.9	3.7
All-Red Time (s)	1.9	2.2	1.9	2.2
Minimum Initial (s)	20	8	20	8
Vehicle Extension (s)	0.2	3	0.2	3
Minimum Gap (s)	3	3	3	3
Time Before Reduce (s)	0	0	0	0
Time To Reduce (s)	0	0	0	0
Walk Time (s)	7	7	7	7
Flash Dont Walk (s)	19	20	19	20
Intersection Summary				
Cycle Length			100	
Control Type		Actuated-Coordinated		
Natural Cycle			70	
Offset: 56 (56%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green				

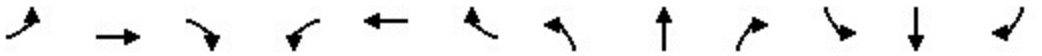
Splits and Phases: 263: RR 29 (LIVERPOOL RD) & GLENANNA RD



**Please note a concerted effort has been made to ensure the accuracy and completeness of the data provided, however, inadvertent errors or omissions can still occur. Please bring any errors or omissions to the Region's attention.*

Appendix D
Base Year (2025) Level of Service Calculations

9: Liverpool Road & Glenanna Road



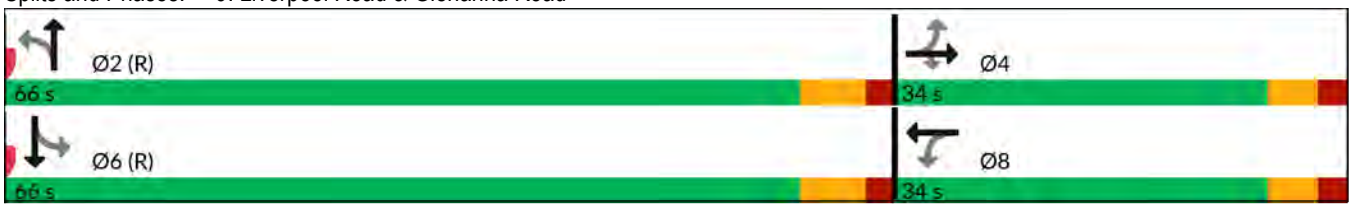
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	40	133	229	95	60	67	124	324	52	52	481	43
Future Volume (vph)	40	133	229	95	60	67	124	324	52	52	481	43
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	19.2		15.8	24.4		0.0	24.7		0.0	46.6		0.0
Storage Lanes	1		1	1		0	1		0	1		0
Taper Length (m)	7.6			7.6			7.6			7.6		
Satd. Flow (prot)	1789	1883	1601	1789	1735	0	1789	3503	0	1789	3536	0
Flt Permitted	0.608			0.585			0.438			0.512		
Satd. Flow (perm)	1145	1883	1601	1102	1735	0	825	3503	0	964	3536	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			249		56			32			16	
Link Speed (k/h)		40			40			50			50	
Link Distance (m)		76.9			58.7			51.8			56.5	
Travel Time (s)		6.9			5.3			3.7			4.1	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	43	145	249	103	138	0	135	409	0	57	570	0
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2			6		
Detector Phase	4	4	4	8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	8.0	8.0	8.0	8.0	8.0		20.0	20.0		20.0	20.0	
Minimum Split (s)	32.9	32.9	32.9	32.9	32.9		32.8	32.8		32.8	32.8	
Total Split (s)	34.0	34.0	34.0	34.0	34.0		66.0	66.0		66.0	66.0	
Total Split (%)	34.0%	34.0%	34.0%	34.0%	34.0%		66.0%	66.0%		66.0%	66.0%	
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7		4.9	4.9		4.9	4.9	
All-Red Time (s)	2.2	2.2	2.2	2.2	2.2		1.9	1.9		1.9	1.9	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.9	5.9	5.9	5.9	5.9		6.8	6.8		6.8	6.8	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None	None	None	None		C-Max	C-Max		C-Max	C-Max	
Act Effct Green (s)	13.8	13.8	13.8	13.8	13.8		73.5	73.5		73.5	73.5	
Actuated g/C Ratio	0.14	0.14	0.14	0.14	0.14		0.74	0.74		0.74	0.74	
v/c Ratio	0.27	0.56	0.57	0.68	0.48		0.22	0.16		0.08	0.22	
Control Delay (s/veh)	41.0	47.5	10.2	61.6	28.3		6.1	4.3		5.0	4.7	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay (s/veh)	41.0	47.5	10.2	61.6	28.3		6.1	4.3		5.0	4.7	

9: Liverpool Road & Glenanna Road

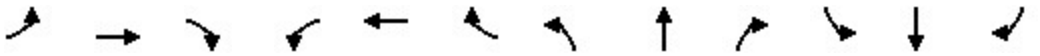
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	D	D	B	E	C		A	A		A	A	
Approach Delay (s/veh)		25.6			42.5			4.7			4.8	
Approach LOS		C			D			A			A	
Queue Length 50th (m)	7.6	26.6	0.0	19.2	14.6		7.0	9.6		2.6	15.0	
Queue Length 95th (m)	16.6	42.6	19.6	34.3	30.4		17.4	17.8		7.6	26.2	
Internal Link Dist (m)		52.9			34.7			27.8			32.5	
Turn Bay Length (m)	19.2		15.8	24.4			24.7			46.6		
Base Capacity (vph)	321	529	628	309	527		606	2581		708	2601	
Starvation Cap Reductn	0	0	0	0	0		0	0		0	0	
Spillback Cap Reductn	0	0	0	0	0		0	0		0	0	
Storage Cap Reductn	0	0	0	0	0		0	0		0	0	
Reduced v/c Ratio	0.13	0.27	0.40	0.33	0.26		0.22	0.16		0.08	0.22	

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green			
Natural Cycle: 70			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.68			
Intersection Signal Delay (s/veh): 14.6		Intersection LOS: B	
Intersection Capacity Utilization 68.4%		ICU Level of Service C	
Analysis Period (min) 15			

Splits and Phases: 9: Liverpool Road & Glenanna Road



6: 1299 Glenanna Road/1884 Liverpool Road & Glenanna Road

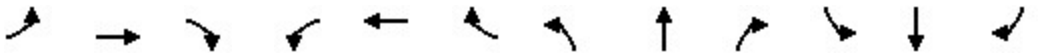


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	1	365	0	0	265	0	0	0	0	0	0	0
Future Volume (Veh/h)	1	365	0	0	265	0	0	0	0	0	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	397	0	0	288	0	0	0	0	0	0	0
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)					77							
pX, platoon unblocked	1.00						1.00	1.00		1.00	1.00	1.00
vC, conflicting volume	288			397			687	687	397	687	687	288
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	284			397			684	684	397	684	684	284
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	100	100	100	100	100
cM capacity (veh/h)	1274			1162			361	369	652	361	369	752

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	398	288	0	0
Volume Left	1	0	0	0
Volume Right	0	0	0	0
cSH	1274	1162	1700	1700
Volume to Capacity	0.00	0.00	0.00	0.00
Queue Length 95th (m)	0.0	0.0	0.0	0.0
Control Delay (s/veh)	0.0	0.0	0.0	0.0
Lane LOS	A		A	A
Approach Delay (s/veh)	0.0	0.0	0.0	0.0
Approach LOS			A	A

Intersection Summary				
Average Delay	0.0			
Intersection Capacity Utilization	23.3%	ICU Level of Service	A	
Analysis Period (min)	15			

3: Glendale Drive & Glenanna Road

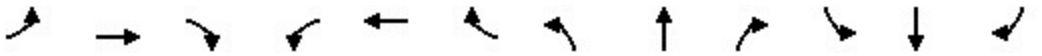


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	8	281	61	47	179	5	53	16	72	10	22	6
Future Volume (Veh/h)	8	281	61	47	179	5	53	16	72	10	22	6
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	9	305	66	51	195	5	58	17	78	11	24	7
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)					135							
pX, platoon unblocked												
vC, conflicting volume	200			371			675	658	338	742	689	198
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	200			371			675	658	338	742	689	198
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			96			83	95	89	96	93	99
cM capacity (veh/h)	1372			1188			333	365	704	274	351	844

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	380	251	153	42
Volume Left	9	51	58	11
Volume Right	66	5	78	7
cSH	1372	1188	462	359
Volume to Capacity	0.01	0.04	0.33	0.12
Queue Length 95th (m)	0.2	1.0	10.9	3.0
Control Delay (s/veh)	0.2	2.0	16.6	16.3
Lane LOS	A	A	C	C
Approach Delay (s/veh)	0.2	2.0	16.6	16.3
Approach LOS			C	C

Intersection Summary				
Average Delay	4.6			
Intersection Capacity Utilization	53.9%	ICU Level of Service	A	
Analysis Period (min)	15			

9: Liverpool Road & Glenanna Road



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	49	215	186	51	119	69	263	502	125	75	388	24
Future Volume (vph)	49	215	186	51	119	69	263	502	125	75	388	24
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	19.2		15.8	24.4		0.0	24.7		0.0	46.6		0.0
Storage Lanes	1		1	1		0	1		0	1		0
Taper Length (m)	7.6			7.6			7.6			7.6		
Satd. Flow (prot)	1789	1883	1601	1789	1780	0	1789	3471	0	1789	3546	0
Flt Permitted	0.479			0.408			0.493			0.386		
Satd. Flow (perm)	902	1883	1601	768	1780	0	929	3471	0	727	3546	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			137		30			51			10	
Link Speed (k/h)		40			40			50			50	
Link Distance (m)		76.9			58.7			51.8			56.5	
Travel Time (s)		6.9			5.3			3.7			4.1	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	53	234	202	55	204	0	286	682	0	82	448	0
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2			6		
Detector Phase	4	4	4	8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	8.0	8.0	8.0	8.0	8.0		20.0	20.0		20.0	20.0	
Minimum Split (s)	32.9	32.9	32.9	32.9	32.9		32.8	32.8		32.8	32.8	
Total Split (s)	36.0	36.0	36.0	36.0	36.0		64.0	64.0		64.0	64.0	
Total Split (%)	36.0%	36.0%	36.0%	36.0%	36.0%		64.0%	64.0%		64.0%	64.0%	
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7		4.9	4.9		4.9	4.9	
All-Red Time (s)	2.2	2.2	2.2	2.2	2.2		1.9	1.9		1.9	1.9	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.9	5.9	5.9	5.9	5.9		6.8	6.8		6.8	6.8	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None	None	None	None		C-Max	C-Max		C-Max	C-Max	
Act Effct Green (s)	18.7	18.7	18.7	18.7	18.7		68.6	68.6		68.6	68.6	
Actuated g/C Ratio	0.19	0.19	0.19	0.19	0.19		0.69	0.69		0.69	0.69	
v/c Ratio	0.32	0.67	0.49	0.38	0.57		0.45	0.28		0.16	0.18	
Control Delay (s/veh)	38.0	46.3	16.0	41.5	36.8		11.1	6.6		7.9	6.4	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay (s/veh)	38.0	46.3	16.0	41.5	36.8		11.1	6.6		7.9	6.4	

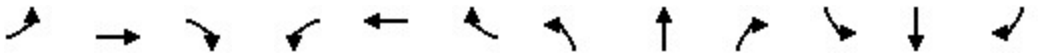
9: Liverpool Road & Glenanna Road

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	D	D	B	D	D		B	A		A	A	
Approach Delay (s/veh)		32.9			37.8			7.9			6.6	
Approach LOS		C			D			A			A	
Queue Length 50th (m)	9.0	42.6	10.8	9.4	30.8		22.1	21.6		5.0	14.1	
Queue Length 95th (m)	18.5	60.9	28.2	19.4	48.3		50.6	38.0		13.6	25.4	
Internal Link Dist (m)		52.9			34.7			27.8			32.5	
Turn Bay Length (m)	19.2		15.8	24.4			24.7			46.6		
Base Capacity (vph)	271	566	577	231	556		637	2397		499	2436	
Starvation Cap Reductn	0	0	0	0	0		0	0		0	0	
Spillback Cap Reductn	0	0	0	0	0		0	0		0	0	
Storage Cap Reductn	0	0	0	0	0		0	0		0	0	
Reduced v/c Ratio	0.20	0.41	0.35	0.24	0.37		0.45	0.28		0.16	0.18	

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green			
Natural Cycle: 70			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.67			
Intersection Signal Delay (s/veh): 16.5		Intersection LOS: B	
Intersection Capacity Utilization 73.7%		ICU Level of Service D	
Analysis Period (min) 15			

Splits and Phases: 9: Liverpool Road & Glenanna Road

6: 1299 Glenanna Road/1884 Liverpool Road & Glenanna Road

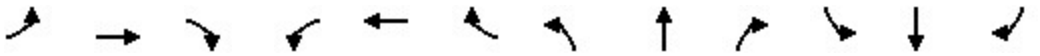


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	442	0	0	416	1	0	0	0	0	0	0
Future Volume (Veh/h)	0	442	0	0	416	1	0	0	0	0	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	480	0	0	452	1	0	0	0	0	0	0
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)					77							
pX, platoon unblocked	0.89						0.89	0.89		0.89	0.89	0.89
vC, conflicting volume	453			480			933	933	480	933	933	453
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	324			480			862	863	480	862	862	323
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	100	100	100	100	100
cM capacity (veh/h)	1100			1082			245	260	586	245	260	639

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	480	453	0	0
Volume Left	0	0	0	0
Volume Right	0	1	0	0
cSH	1100	1082	1700	1700
Volume to Capacity	0.00	0.00	0.00	0.00
Queue Length 95th (m)	0.0	0.0	0.0	0.0
Control Delay (s/veh)	0.0	0.0	0.0	0.0
Lane LOS			A	A
Approach Delay (s/veh)	0.0	0.0	0.0	0.0
Approach LOS			A	A

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	26.6%	ICU Level of Service	A
Analysis Period (min)	15		

3: Glendale Drive & Glenanna Road



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	6	332	22	24	362	13	33	34	77	10	8	4
Future Volume (Veh/h)	6	332	22	24	362	13	33	34	77	10	8	4
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	7	361	24	26	393	14	36	37	84	11	9	4
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)					135							
pX, platoon unblocked	0.96						0.96	0.96		0.96	0.96	0.96
vC, conflicting volume	407			385			848	846	373	942	851	400
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	360			385			820	818	373	918	823	353
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			98			87	87	88	94	97	99
cM capacity (veh/h)	1149			1173			268	289	673	187	287	662

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	392	433	157	24
Volume Left	7	26	36	11
Volume Right	24	14	84	4
cSH	1149	1173	406	250
Volume to Capacity	0.01	0.02	0.39	0.10
Queue Length 95th (m)	0.1	0.5	13.6	2.4
Control Delay (s/veh)	0.2	0.7	19.4	21.0
Lane LOS	A	A	C	C
Approach Delay (s/veh)	0.2	0.7	19.4	21.0
Approach LOS			C	C

Intersection Summary				
Average Delay	3.9			
Intersection Capacity Utilization	49.0%	ICU Level of Service	A	
Analysis Period (min)	15			

Appendix E

Future (2032) Background Level of Service Calculations

9: Liverpool Road & Glenanna Road

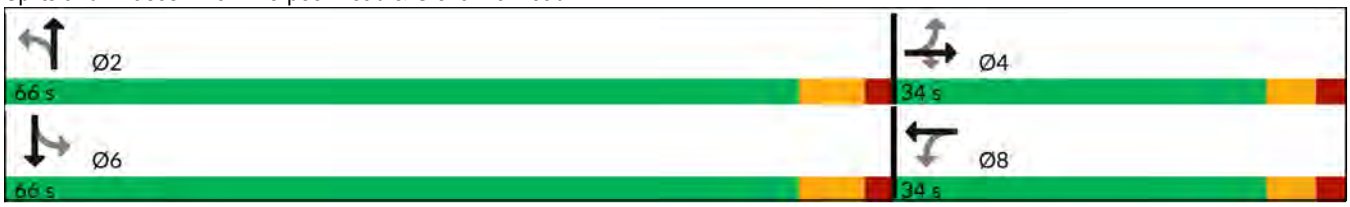
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	45	159	322	162	84	95	181	473	80	62	679	48
Future Volume (vph)	45	159	322	162	84	95	181	473	80	62	679	48
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	19.2		15.8	24.4		0.0	24.7		0.0	46.6		0.0
Storage Lanes	1		1	1		0	1		0	1		0
Taper Length (m)	7.6			7.6			7.6			7.6		
Satd. Flow (prot)	1789	1883	1601	1789	1733	0	1789	3500	0	1789	3543	0
Flt Permitted	0.541			0.587			0.337			0.425		
Satd. Flow (perm)	1019	1883	1601	1106	1733	0	635	3500	0	800	3543	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			214		57			34			13	
Link Speed (k/h)		40			40			50			50	
Link Distance (m)		76.9			58.7			51.8			56.5	
Travel Time (s)		6.9			5.3			3.7			4.1	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	49	173	350	176	194	0	197	601	0	67	790	0
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2			6		
Detector Phase	4	4	4	8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	8.0	8.0	8.0	8.0	8.0		20.0	20.0		20.0	20.0	
Minimum Split (s)	32.9	32.9	32.9	32.9	32.9		32.8	32.8		32.8	32.8	
Total Split (s)	34.0	34.0	34.0	34.0	34.0		66.0	66.0		66.0	66.0	
Total Split (%)	34.0%	34.0%	34.0%	34.0%	34.0%		66.0%	66.0%		66.0%	66.0%	
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7		4.9	4.9		4.9	4.9	
All-Red Time (s)	2.2	2.2	2.2	2.2	2.2		1.9	1.9		1.9	1.9	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.9	5.9	5.9	5.9	5.9		6.8	6.8		6.8	6.8	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None	None	None	None		Max	Max		Max	Max	
Act Effct Green (s)	19.1	19.1	19.1	19.1	19.1		59.5	59.5		59.5	59.5	
Actuated g/C Ratio	0.21	0.21	0.21	0.21	0.21		0.65	0.65		0.65	0.65	
v/c Ratio	0.23	0.44	0.70	0.77	0.48		0.48	0.26		0.13	0.34	
Control Delay (s/veh)	31.7	34.5	20.3	55.0	25.4		14.6	7.4		8.5	8.3	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay (s/veh)	31.7	34.5	20.3	55.0	25.4		14.6	7.4		8.5	8.3	

9: Liverpool Road & Glenanna Road

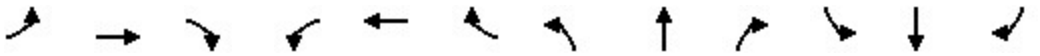
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	C	C	C	E	C		B	A		A	A	
Approach Delay (s/veh)		25.6			39.5			9.2			8.3	
Approach LOS		C			D			A			A	
Queue Length 50th (m)	7.2	26.5	20.8	29.1	20.7		15.5	19.3		4.0	28.4	
Queue Length 95th (m)	16.5	44.4	49.5	51.2	39.6		42.4	35.5		11.7	50.1	
Internal Link Dist (m)		52.9			34.7			27.8			32.5	
Turn Bay Length (m)	19.2		15.8	24.4			24.7			46.6		
Base Capacity (vph)	315	582	642	341	575		413	2292		521	2312	
Starvation Cap Reductn	0	0	0	0	0		0	0		0	0	
Spillback Cap Reductn	0	0	0	0	0		0	0		0	0	
Storage Cap Reductn	0	0	0	0	0		0	0		0	0	
Reduced v/c Ratio	0.16	0.30	0.55	0.52	0.34		0.48	0.26		0.13	0.34	

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 91.3			
Natural Cycle: 70			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.77			
Intersection Signal Delay (s/veh): 16.8		Intersection LOS: B	
Intersection Capacity Utilization 75.5%		ICU Level of Service D	
Analysis Period (min) 15			

Splits and Phases: 9: Liverpool Road & Glenanna Road



6: 1299 Glenanna Road/1884 Liverpool Road & Glenanna Road

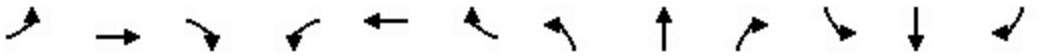


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	1	482	0	0	313	0	0	0	0	0	0	0
Future Volume (Veh/h)	1	482	0	0	313	0	0	0	0	0	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	524	0	0	340	0	0	0	0	0	0	0
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)					77							
pX, platoon unblocked	0.97						0.97	0.97		0.97	0.97	0.97
vC, conflicting volume	340			524			866	866	524	866	866	340
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	301			524			845	845	524	845	845	301
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	100	100	100	100	100
cM capacity (veh/h)	1219			1043			273	290	553	273	290	715

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	525	340	0	0
Volume Left	1	0	0	0
Volume Right	0	0	0	0
cSH	1219	1043	1700	1700
Volume to Capacity	0.00	0.00	0.00	0.00
Queue Length 95th (m)	0.0	0.0	0.0	0.0
Control Delay (s/veh)	0.0	0.0	0.0	0.0
Lane LOS	A		A	A
Approach Delay (s/veh)	0.0	0.0	0.0	0.0
Approach LOS			A	A

Intersection Summary				
Average Delay	0.0			
Intersection Capacity Utilization	29.5%	ICU Level of Service	A	
Analysis Period (min)	15			

3: Glendale Drive & Glenanna Road

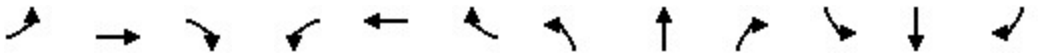


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	9	382	68	61	251	6	59	18	87	13	25	7
Future Volume (Veh/h)	9	382	68	61	251	6	59	18	87	13	25	7
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	10	415	74	66	273	7	64	20	95	14	27	8
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)					135							
pX, platoon unblocked	0.99						0.99	0.99		0.99	0.99	0.99
vC, conflicting volume	280			489			902	884	452	986	918	277
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	263			489			893	875	452	978	909	259
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			94			71	92	84	92	89	99
cM capacity (veh/h)	1283			1074			223	264	608	171	252	769

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	499	346	179	49
Volume Left	10	66	64	14
Volume Right	74	7	95	8
cSH	1283	1074	345	246
Volume to Capacity	0.01	0.06	0.52	0.20
Queue Length 95th (m)	0.2	1.5	21.7	5.5
Control Delay (s/veh)	0.2	2.1	26.2	23.3
Lane LOS	A	A	D	C
Approach Delay (s/veh)	0.2	2.1	26.2	23.3
Approach LOS			D	C

Intersection Summary				
Average Delay	6.2			
Intersection Capacity Utilization	65.5%	ICU Level of Service	C	
Analysis Period (min)	15			

3: Glendale Drive & Glenanna Road



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	7	430	25	30	445	17	37	38	95	13	9	5
Future Volume (Veh/h)	7	430	25	30	445	17	37	38	95	13	9	5
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	8	467	27	33	484	18	40	41	103	14	10	5
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)					135							
pX, platoon unblocked	0.89						0.89	0.89		0.89	0.89	0.89
vC, conflicting volume	502			494			1066	1065	481	1179	1069	493
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	380			494			1013	1011	481	1140	1017	370
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			97			78	80	82	87	95	99
cM capacity (veh/h)	1050			1070			180	205	585	108	204	602

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	502	535	184	29
Volume Left	8	33	40	14
Volume Right	27	18	103	5
cSH	1050	1070	308	155
Volume to Capacity	0.01	0.03	0.60	0.19
Queue Length 95th (m)	0.2	0.7	27.5	5.0
Control Delay (s/veh)	0.2	0.9	32.7	33.6
Lane LOS	A	A	D	D
Approach Delay (s/veh)	0.2	0.9	32.7	33.6
Approach LOS			D	D

Intersection Summary			
Average Delay	6.1		
Intersection Capacity Utilization	58.9%	ICU Level of Service	B
Analysis Period (min)	15		

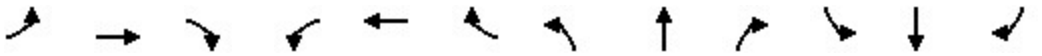
6: 1299 Glenanna Road/1884 Liverpool Road & Glenanna Road

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	538	0	0	498	1	0	0	0	0	0	0
Future Volume (Veh/h)	0	538	0	0	498	1	0	0	0	0	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	585	0	0	541	1	0	0	0	0	0	0
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)					77							
pX, platoon unblocked	0.84						0.84	0.84		0.84	0.84	0.84
vC, conflicting volume	542			585			1127	1127	585	1127	1127	542
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	363			585			1057	1057	585	1057	1057	362
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	100	100	100	100	100
cM capacity (veh/h)	1007			990			171	189	511	171	190	575

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	585	542	0	0
Volume Left	0	0	0	0
Volume Right	0	1	0	0
cSH	1007	990	1700	1700
Volume to Capacity	0.00	0.00	0.00	0.00
Queue Length 95th (m)	0.0	0.0	0.0	0.0
Control Delay (s/veh)	0.0	0.0	0.0	0.0
Lane LOS			A	A
Approach Delay (s/veh)	0.0	0.0	0.0	0.0
Approach LOS			A	A

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	31.6%	ICU Level of Service	A
Analysis Period (min)	15		

9: Liverpool Road & Glenanna Road



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	55	262	255	75	143	83	328	627	171	92	552	27
Future Volume (vph)	55	262	255	75	143	83	328	627	171	92	552	27
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	19.2		15.8	24.4		0.0	24.7		0.0	46.6		0.0
Storage Lanes	1		1	1		0	1		0	1		0
Taper Length (m)	7.6			7.6			7.6			7.6		
Satd. Flow (prot)	1789	1883	1601	1789	1780	0	1789	3464	0	1789	3553	0
Flt Permitted	0.443			0.363			0.409			0.303		
Satd. Flow (perm)	834	1883	1601	684	1780	0	770	3464	0	571	3553	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			150		29			61			8	
Link Speed (k/h)		40			40			50			50	
Link Distance (m)		76.9			58.7			51.8			56.5	
Travel Time (s)		6.9			5.3			3.7			4.1	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	60	285	277	82	245	0	357	868	0	100	629	0
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2			6		
Detector Phase	4	4	4	8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	8.0	8.0	8.0	8.0	8.0		20.0	20.0		20.0	20.0	
Minimum Split (s)	32.9	32.9	32.9	32.9	32.9		32.8	32.8		32.8	32.8	
Total Split (s)	34.0	34.0	34.0	34.0	34.0		66.0	66.0		66.0	66.0	
Total Split (%)	34.0%	34.0%	34.0%	34.0%	34.0%		66.0%	66.0%		66.0%	66.0%	
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7		4.9	4.9		4.9	4.9	
All-Red Time (s)	2.2	2.2	2.2	2.2	2.2		1.9	1.9		1.9	1.9	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.9	5.9	5.9	5.9	5.9		6.8	6.8		6.8	6.8	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None	None	None	None		Max	Max		Max	Max	
Act Effct Green (s)	20.2	20.2	20.2	20.2	20.2		59.4	59.4		59.4	59.4	
Actuated g/C Ratio	0.22	0.22	0.22	0.22	0.22		0.64	0.64		0.64	0.64	
v/c Ratio	0.33	0.69	0.59	0.55	0.59		0.72	0.39		0.27	0.28	
Control Delay (s/veh)	34.8	42.2	19.7	46.1	34.3		23.5	8.5		11.1	8.1	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay (s/veh)	34.8	42.2	19.7	46.1	34.3		23.5	8.5		11.1	8.1	

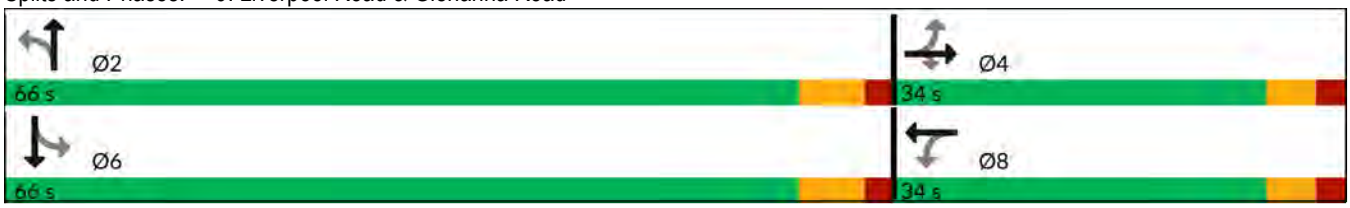
9: Liverpool Road & Glenanna Road

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	C	D	B	D	C		C	A		B	A	
Approach Delay (s/veh)		31.5			37.2			12.9			8.5	
Approach LOS		C			D			B			A	
Queue Length 50th (m)	9.0	46.7	19.2	13.0	34.4		38.6	32.2		7.0	22.8	
Queue Length 95th (m)	19.9	72.3	43.2	27.7	57.0		#105.9	53.8		19.2	38.7	
Internal Link Dist (m)		52.9			34.7			27.8			32.5	
Turn Bay Length (m)	19.2		15.8	24.4			24.7			46.6		
Base Capacity (vph)	254	574	593	208	563		495	2249		367	2287	
Starvation Cap Reductn	0	0	0	0	0		0	0		0	0	
Spillback Cap Reductn	0	0	0	0	0		0	0		0	0	
Storage Cap Reductn	0	0	0	0	0		0	0		0	0	
Reduced v/c Ratio	0.24	0.50	0.47	0.39	0.44		0.72	0.39		0.27	0.28	

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 92.4			
Natural Cycle: 90			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.72			
Intersection Signal Delay (s/veh): 18.5		Intersection LOS: B	
Intersection Capacity Utilization 81.1%		ICU Level of Service D	
Analysis Period (min) 15			

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 9: Liverpool Road & Glenanna Road



Appendix F
ITE Trip Generation

Query | Filter

DATA SOURCE:
Trip Generation Manual, 11th Ed
New data edition is available. Upgrade now.

SEARCH BY LAND USE CODE:
220

LAND USE GROUP:
(200-299) Residential

LAND USE :
220 - Multifamily Housing (Low-Rise)

LAND USE SUBCATEGORY:
Not Close to Rail Transit

SETTING/LOCATION:
General Urban/Suburban

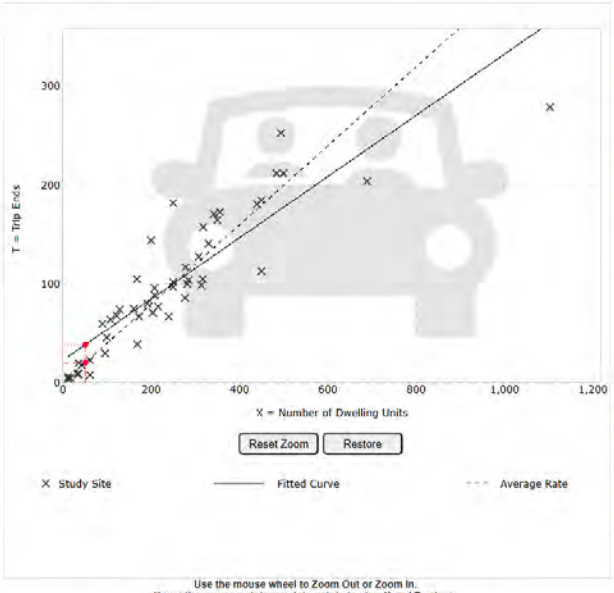
INDEPENDENT VARIABLE (IV):
Dwelling Units

TIME PERIOD:
Weekday, Peak Hour of Adjacent Stre

TRIP TYPE:
Vehicle

ENTER IV VALUE TO CALCULATE TRIPS:
51 Calculate

Data Plot and Equation



Use the mouse wheel to Zoom Out or Zoom In.
Hover the mouse pointer on data points to view X and T values.

DATA STATISTICS

Land Use:
Multifamily Housing (Low-Rise) - Not Close to Rail Transit (220) Click for Description and Data Plots

Independent Variable:
Dwelling Units

Time Period:
Weekday
Peak Hour of Adjacent Street Traffic
One Hour Between 7 and 9 a.m.

Setting/Location:
General Urban/Suburban

Trip Type:
Vehicle

Number of Studies:
49

Avg. Num. of Dwelling Units:
249

Average Rate:
0.40

Range of Rates:
0.13 - 0.73

Standard Deviation:
0.12

Fitted Curve Equation:
T = 0.31(X) + 22.85

R^2:
0.79

Directional Distribution:
24% entering, 76% exiting

Calculated Trip Ends:
Average Rate: 20 (Total), 5 (Entry), 15 (Exit)
Fitted Curve: 39 (Total), 9 (Entry), 30 (Exit)

Query | Filter

DATA SOURCE:
Trip Generation Manual, 11th Ed
New data edition is available. Upgrade now.

SEARCH BY LAND USE CODE:
220

LAND USE GROUP:
(200-299) Residential

LAND USE :
220 - Multifamily Housing (Low-Rise)

LAND USE SUBCATEGORY:
Not Close to Rail Transit

SETTING/LOCATION:
General Urban/Suburban

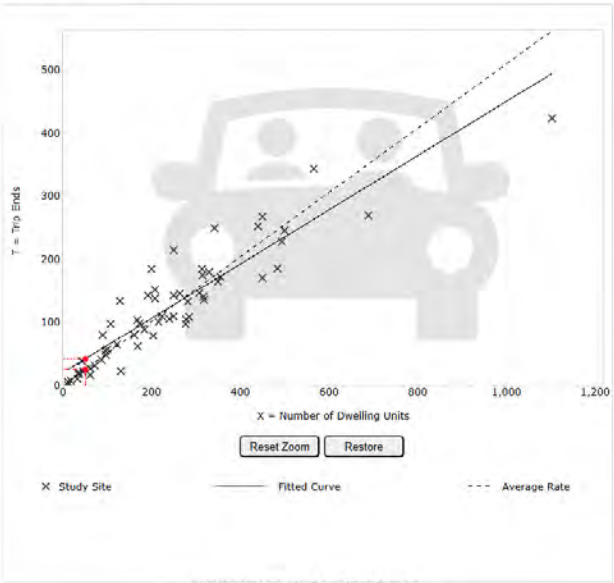
INDEPENDENT VARIABLE (IV):
Dwelling Units

TIME PERIOD:
Weekday, Peak Hour of Adjacent Stre

TRIP TYPE:
Vehicle

ENTER IV VALUE TO CALCULATE TRIPS:
51 Calculate

Data Plot and Equation



Use the mouse wheel to Zoom Out or Zoom In.
Hover the mouse pointer on data points to view X and T values.

DATA STATISTICS

Land Use:
Multifamily Housing (Low-Rise) - Not Close to Rail Transit (220) Click for Description and Data Plots

Independent Variable:
Dwelling Units

Time Period:
Weekday
Peak Hour of Adjacent Street Traffic
One Hour Between 4 and 6 p.m.

Setting/Location:
General Urban/Suburban

Trip Type:
Vehicle

Number of Studies:
59

Avg. Num. of Dwelling Units:
241

Average Rate:
0.51

Range of Rates:
0.08 - 1.04

Standard Deviation:
0.15

Fitted Curve Equation:
T = 0.43(X) + 20.55

R^2:
0.84

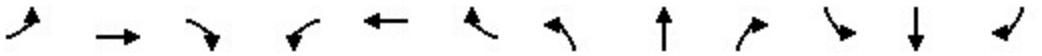
Directional Distribution:
63% entering, 37% exiting

Calculated Trip Ends:
Average Rate: 26 (Total), 16 (Entry), 10 (Exit)
Fitted Curve: 42 (Total), 27 (Entry), 15 (Exit)

Appendix G

Future (2032) Total Level of Service Calculations

9: Liverpool Road & Glenanna Road



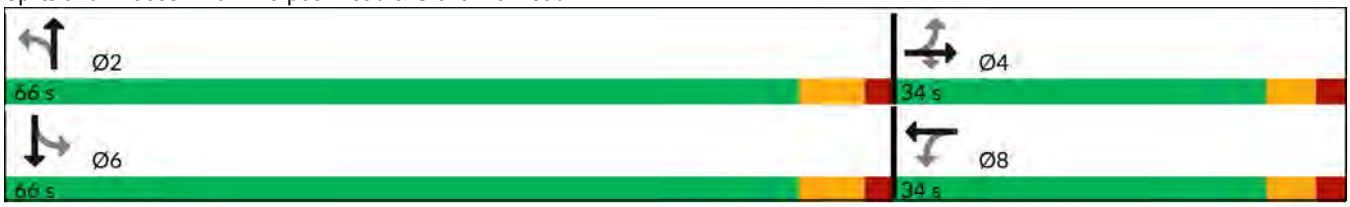
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	47	166	334	162	84	95	183	473	80	62	679	48
Future Volume (vph)	47	166	334	162	84	95	183	473	80	62	679	48
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	19.2		15.8	24.4		0.0	24.7		0.0	46.6		0.0
Storage Lanes	1		1	1		0	1		0	1		0
Taper Length (m)	7.6			7.6			7.6			7.6		
Satd. Flow (prot)	1789	1883	1601	1789	1733	0	1789	3500	0	1789	3543	0
Flt Permitted	0.543			0.573			0.336			0.425		
Satd. Flow (perm)	1023	1883	1601	1079	1733	0	633	3500	0	800	3543	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			214		57			34			13	
Link Speed (k/h)		40			40			50			50	
Link Distance (m)		76.9			58.7			51.8			56.5	
Travel Time (s)		6.9			5.3			3.7			4.1	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	51	180	363	176	194	0	199	601	0	67	790	0
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2			6		
Detector Phase	4	4	4	8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	8.0	8.0	8.0	8.0	8.0		20.0	20.0		20.0	20.0	
Minimum Split (s)	32.9	32.9	32.9	32.9	32.9		32.8	32.8		32.8	32.8	
Total Split (s)	34.0	34.0	34.0	34.0	34.0		66.0	66.0		66.0	66.0	
Total Split (%)	34.0%	34.0%	34.0%	34.0%	34.0%		66.0%	66.0%		66.0%	66.0%	
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7		4.9	4.9		4.9	4.9	
All-Red Time (s)	2.2	2.2	2.2	2.2	2.2		1.9	1.9		1.9	1.9	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.9	5.9	5.9	5.9	5.9		6.8	6.8		6.8	6.8	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None	None	None	None		Max	Max		Max	Max	
Act Effct Green (s)	19.3	19.3	19.3	19.3	19.3		59.5	59.5		59.5	59.5	
Actuated g/C Ratio	0.21	0.21	0.21	0.21	0.21		0.65	0.65		0.65	0.65	
v/c Ratio	0.24	0.45	0.72	0.78	0.47		0.48	0.26		0.13	0.34	
Control Delay (s/veh)	31.8	34.7	21.7	56.5	25.3		14.9	7.4		8.5	8.4	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay (s/veh)	31.8	34.7	21.7	56.5	25.3		14.9	7.4		8.5	8.4	

9: Liverpool Road & Glenanna Road

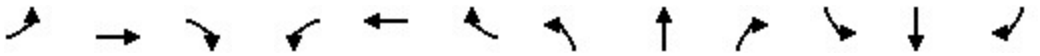
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	C	C	C	E	C		B	A		A	A	
Approach Delay (s/veh)		26.5			40.2			9.3			8.4	
Approach LOS		C			D			A			A	
Queue Length 50th (m)	7.5	27.7	23.4	29.3	20.7		15.9	19.5		4.0	28.7	
Queue Length 95th (m)	17.0	46.0	53.0	51.7	39.6		43.0	35.5		11.7	50.1	
Internal Link Dist (m)		52.9			34.7			27.8			32.5	
Turn Bay Length (m)	19.2		15.8	24.4			24.7			46.6		
Base Capacity (vph)	315	581	641	332	574		411	2286		519	2307	
Starvation Cap Reductn	0	0	0	0	0		0	0		0	0	
Spillback Cap Reductn	0	0	0	0	0		0	0		0	0	
Storage Cap Reductn	0	0	0	0	0		0	0		0	0	
Reduced v/c Ratio	0.16	0.31	0.57	0.53	0.34		0.48	0.26		0.13	0.34	

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 91.5			
Natural Cycle: 70			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.78			
Intersection Signal Delay (s/veh): 17.3		Intersection LOS: B	
Intersection Capacity Utilization 75.8%		ICU Level of Service D	
Analysis Period (min) 15			

Splits and Phases: 9: Liverpool Road & Glenanna Road



6: 1299 Glenanna Road/1884 Liverpool Road & Glenanna Road

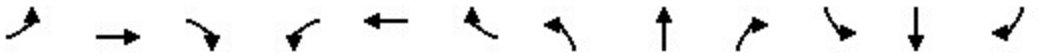


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	8	482	0	0	313	2	0	0	0	21	0	9
Future Volume (Veh/h)	8	482	0	0	313	2	0	0	0	21	0	9
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	9	524	0	0	340	2	0	0	0	23	0	10
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)					77							
pX, platoon unblocked	0.97						0.97	0.97		0.97	0.97	0.97
vC, conflicting volume	342			524			893	884	524	883	883	341
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	302			524			872	863	524	861	861	301
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			100			100	100	100	91	100	99
cM capacity (veh/h)	1217			1043			257	281	553	265	281	714

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	533	342	0	33
Volume Left	9	0	0	23
Volume Right	0	2	0	10
cSH	1217	1043	1700	327
Volume to Capacity	0.01	0.00	0.00	0.10
Queue Length 95th (m)	0.2	0.0	0.0	2.5
Control Delay (s/veh)	0.2	0.0	0.0	17.2
Lane LOS	A		A	C
Approach Delay (s/veh)	0.2	0.0	0.0	17.2
Approach LOS			A	C

Intersection Summary				
Average Delay	0.8			
Intersection Capacity Utilization	41.8%	ICU Level of Service	A	
Analysis Period (min)	15			

3: Glendale Drive & Glenanna Road

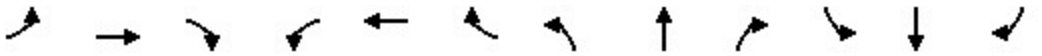


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	9	387	68	63	258	6	59	18	88	14	25	7
Future Volume (Veh/h)	9	387	68	63	258	6	59	18	88	14	25	7
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	10	421	74	68	280	7	64	20	96	15	27	8
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)					135							
pX, platoon unblocked	0.99						0.99	0.99		0.99	0.99	0.99
vC, conflicting volume	287			495			919	901	458	1004	935	284
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	269			495			910	892	458	996	926	265
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			94			70	92	84	91	89	99
cM capacity (veh/h)	1276			1069			216	257	603	165	246	762

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	505	355	180	50
Volume Left	10	68	64	15
Volume Right	74	7	96	8
cSH	1276	1069	337	236
Volume to Capacity	0.01	0.06	0.53	0.21
Queue Length 95th (m)	0.2	1.5	22.6	5.9
Control Delay (s/veh)	0.2	2.2	27.2	24.3
Lane LOS	A	A	D	C
Approach Delay (s/veh)	0.2	2.2	27.2	24.3
Approach LOS			D	C

Intersection Summary				
Average Delay	6.4			
Intersection Capacity Utilization	65.9%	ICU Level of Service	C	
Analysis Period (min)	15			

9: Liverpool Road & Glenanna Road



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	56	267	260	75	149	83	340	627	171	92	552	28
Future Volume (vph)	56	267	260	75	149	83	340	627	171	92	552	28
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	19.2		15.8	24.4		0.0	24.7		0.0	46.6		0.0
Storage Lanes	1		1	1		0	1		0	1		0
Taper Length (m)	7.6			7.6			7.6			7.6		
Satd. Flow (prot)	1789	1883	1601	1789	1782	0	1789	3464	0	1789	3553	0
Flt Permitted	0.419			0.345			0.406			0.301		
Satd. Flow (perm)	789	1883	1601	650	1782	0	765	3464	0	567	3553	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			155		29			58			8	
Link Speed (k/h)		40			40			50			50	
Link Distance (m)		76.9			58.7			51.8			56.5	
Travel Time (s)		6.9			5.3			3.7			4.1	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	61	290	283	82	252	0	370	868	0	100	630	0
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2			6		
Detector Phase	4	4	4	8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	8.0	8.0	8.0	8.0	8.0		20.0	20.0		20.0	20.0	
Minimum Split (s)	32.9	32.9	32.9	32.9	32.9		32.8	32.8		32.8	32.8	
Total Split (s)	36.0	36.0	36.0	36.0	36.0		64.0	64.0		64.0	64.0	
Total Split (%)	36.0%	36.0%	36.0%	36.0%	36.0%		64.0%	64.0%		64.0%	64.0%	
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7		4.9	4.9		4.9	4.9	
All-Red Time (s)	2.2	2.2	2.2	2.2	2.2		1.9	1.9		1.9	1.9	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.9	5.9	5.9	5.9	5.9		6.8	6.8		6.8	6.8	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None	None	None	None		C-Max	C-Max		C-Max	C-Max	
Act Effct Green (s)	22.2	22.2	22.2	22.2	22.2		65.1	65.1		65.1	65.1	
Actuated g/C Ratio	0.22	0.22	0.22	0.22	0.22		0.65	0.65		0.65	0.65	
v/c Ratio	0.35	0.70	0.60	0.57	0.60		0.74	0.38		0.27	0.27	
Control Delay (s/veh)	36.3	44.0	19.7	48.9	36.0		25.7	8.8		11.5	8.4	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay (s/veh)	36.3	44.0	19.7	48.9	36.0		25.7	8.8		11.5	8.4	

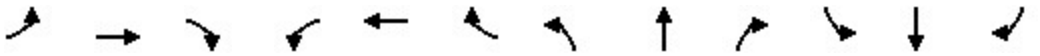
9: Liverpool Road & Glenanna Road

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	D	D	B	D	D		C	A		B	A	
Approach Delay (s/veh)		32.4			39.2			13.9			8.9	
Approach LOS		C			D			B			A	
Queue Length 50th (m)	10.0	51.8	21.1	14.2	38.8		44.1	34.4		7.5	24.3	
Queue Length 95th (m)	19.9	71.1	42.3	27.3	57.2		#115.7	57.1		20.4	41.1	
Internal Link Dist (m)		52.9			34.7			27.8			32.5	
Turn Bay Length (m)	19.2		15.8	24.4			24.7			46.6		
Base Capacity (vph)	237	566	590	195	556		498	2276		369	2316	
Starvation Cap Reductn	0	0	0	0	0		0	0		0	0	
Spillback Cap Reductn	0	0	0	0	0		0	0		0	0	
Storage Cap Reductn	0	0	0	0	0		0	0		0	0	
Reduced v/c Ratio	0.26	0.51	0.48	0.42	0.45		0.74	0.38		0.27	0.27	

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green			
Natural Cycle: 90			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.74			
Intersection Signal Delay (s/veh): 19.5		Intersection LOS: B	
Intersection Capacity Utilization 81.3%		ICU Level of Service D	
Analysis Period (min) 15			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			

Splits and Phases: 9: Liverpool Road & Glenanna Road

6: 1299 Glenanna Road/1884 Liverpool Road & Glenanna Road

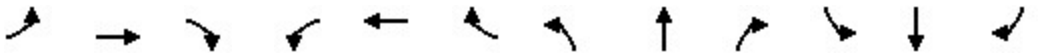


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	8	538	0	0	498	20	0	0	0	11	0	4
Future Volume (Veh/h)	8	538	0	0	498	20	0	0	0	11	0	4
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	9	585	0	0	541	22	0	0	0	12	0	4
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)					77							
pX, platoon unblocked	0.83						0.83	0.83		0.83	0.83	0.83
vC, conflicting volume	563			585			1159	1166	585	1155	1155	552
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	369			585			1088	1097	585	1083	1083	356
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			100			100	100	100	93	100	99
cM capacity (veh/h)	985			990			158	175	511	160	178	570

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	594	563	0	16
Volume Left	9	0	0	12
Volume Right	0	22	0	4
cSH	985	990	1700	195
Volume to Capacity	0.01	0.00	0.62	0.08
Queue Length 95th (m)	0.2	0.0	0.0	2.0
Control Delay (s/veh)	0.3	0.0	0.0	25.1
Lane LOS	A		A	D
Approach Delay (s/veh)	0.3	0.0	0.0	25.1
Approach LOS			A	D

Intersection Summary				
Average Delay	0.5			
Intersection Capacity Utilization	44.7%	ICU Level of Service	A	
Analysis Period (min)	15			

3: Glendale Drive & Glenanna Road



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	7	437	25	30	449	17	37	38	96	13	9	5
Future Volume (Veh/h)	7	437	25	30	449	17	37	38	96	13	9	5
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	8	475	27	33	488	18	40	41	104	14	10	5
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)					135							
pX, platoon unblocked	0.89						0.89	0.89		0.89	0.89	0.89
vC, conflicting volume	506			502			1078	1077	489	1192	1081	497
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	382			502			1025	1024	489	1153	1029	372
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			97			77	80	82	87	95	99
cM capacity (veh/h)	1046			1062			176	201	579	104	200	599

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	510	539	185	29
Volume Left	8	33	40	14
Volume Right	27	18	104	5
cSH	1046	1062	303	150
Volume to Capacity	0.01	0.03	0.61	0.19
Queue Length 95th (m)	0.2	0.7	28.5	5.2
Control Delay (s/veh)	0.2	0.9	33.9	34.6
Lane LOS	A	A	D	D
Approach Delay (s/veh)	0.2	0.9	33.9	34.6
Approach LOS			D	D

Intersection Summary				
Average Delay	6.2			
Intersection Capacity Utilization	59.2%	ICU Level of Service	B	
Analysis Period (min)	15			