



January 2nd, 2023

JDE Project 20067

Ministry of Transportation

West Operations, Highway Corridor Management Section

659 Exeter Road

London, ON N6E 1L3

Attn: Jessica Pegelo

**RE: Loon Call, Markdale – Traffic Impact Study (County File # 42T-2021-08)
2nd Submission Addendum Letter**

JD Northcote Engineering Inc. [JD Engineering] is pleased to provide the following addendum letter in support of the proposed residential development in the Municipality of Grey Highlands [Municipality].

The following list summarizes how we have addressed each of MTO's 2nd submission comments as included in the email composed by Jessica Pegelo on January 25th, 2023 [MTO Email]. We have included a copy of the MTO Email in this addendum letter for your reference.

MTO Comments	
Comment	Action Taken
<i>The proposed development will include one full movement access roadway onto Highway 10 [North Access] and include the extension of Margaret Elizabeth Avenue [South Access] and Stan Baker Boulevard [East Access] into the subject site. The East Access will be constructed as part of Phase 1 of the proposed development. The North Access and South Access will be constructed after the completion of Phase 1 and 2 (96 units) of the proposed development.</i>	No action required.
<i>MTO agrees that assuming there is no occupancy in other area developments, the construction of an auxiliary southbound left-turn lane will be required prior to occupancy of the 97th unit of the proposed development.</i>	No action required.
<i>The TIS identifies the construction of an auxiliary southbound left turn lane with a 25 metre storage length, 70 metre parallel length and 115 metre taper length. However, MTO require the construction of</i>	Acknowledged. The recommended taper length for the southbound left turn lane has been revised to 160 metres. The change in taper length does not impact the operational results of the TIS.



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<i>auxiliary southbound left turn lane with a 25 metre storage length, 70 metre parallel length and a 160 metre taper. Please submit a revised TIS with the required taper length.</i>	
--	--

We trust you will find this submission acceptable. Should you have any questions or concerns or require any additional information in this regard, please contact the undersigned.

Yours truly,
JD Northcote Engineering Inc.



John Northcote, P.Eng.
President

Jacob Losole

To: John Northcote
Subject: RE: Markdale - Turn Lane

From: Pegelo, Jessica (MTO) <Jessica.Pegelo@ontario.ca>
Sent: January-25-23 2:54 PM
To: John Northcote <john.northcote@jdengineering.ca>
Cc: Angus Knowles <angus@lcdg.ca>; Scott Taylor <Scott.Taylor@grey.ca>; Matt Rapke <rapkem@greyhighlands.ca>
Subject: RE: GH1 Call Conference: +1 416.874.8100; Code – 3336458#

Good afternoon,

MTO has reviewed the updated TIS and have the following comments:

- The proposed development will include one full movement access roadway onto Highway 10 [North Access] and include the extension of Margaret Elizabeth Avenue [South Access] and Stan Baker Boulevard [East Access] into the subject site. The East Access will be constructed as part of Phase 1 of the proposed development. The North Access and South Access will be constructed after the completion of Phase 1 and 2 (96 units) of the proposed development.
- MTO agrees that assuming there is no occupancy in other area developments, the construction of an auxiliary southbound left-turn lane will be required prior to occupancy of the 97th unit of the proposed development.
- The TIS identifies the construction of an auxiliary southbound left turn lane with a 25 metre storage length, 70 metre parallel length and 115 metre taper length. However, MTO require the construction of auxiliary southbound left turn lane with a 25 metre storage length, 70 metre parallel length and a 160 metre taper. Please submit a revised TIS with the required taper length.

For future reference, please find attached MTO's Developer Driven Highway Improvement (DDHI) Design and Construction Guidelines. Please review and if there are any questions, please let me know.

Kind Regards,

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Loon Call Markdale

Municipality of Grey Highlands

Traffic Impact Study for LC Development Group Inc.

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Final Report

Project Number:
JDE – 20067

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Legal Notification

This report was prepared by **JD Northcote Engineering Inc.** for the account of **LC Development Group Inc.**

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Executive Summary

This report summarizes the traffic impact study prepared for the proposed development municipally known as 775309 Highway 10, located in the northeast corner of the community of Markdale, on the north side of Highway 10 in the Municipality of Grey Highlands [Municipality], County of Grey [County]. The report assesses the impact of traffic related to the development on the adjacent roadway and provides recommendations to accommodate this traffic in a safe and efficient manner.

The proposed development, as illustrated in **Appendix A**, is anticipated to approximately include the following:

- 156 townhouses; and
- 313 single family detached houses.

Phases 1 and 2 of the proposed development are anticipated to include +/- 96 residential lots with the following approximate unit breakdown:

- 24 townhouses; and
- 72 single family detached houses.

The proposed development is anticipated to include one full movement access roadway onto Highway 10 [North Access] and include the extension of Margaret Elizabeth Avenue [South Access] and Stan Baker Boulevard [East Access] into the subject site. The East Access will be constructed as part of Phase 1 of the proposed development. The North Access and South Access will be constructed after the completion of Phase 1 and 2 of the proposed development.

The scope of this analysis includes a review of the following intersections:

- Fairway Heights / Margaret Elizabeth Avenue (Functional review);
- Fairway Heights & Commercial Driveway / Toronto Street; and
- North Access / Highway 10.

Conclusions

1. The proposed development is expected to generate a total of 281 AM and 378 PM peak hour trips with Phase 1 and 2 of the proposed development is expected to generate a total of 65 AM and 85 PM peak hour trips.
2. Detailed turning movement traffic and pedestrian counts for the Toronto Street / Fairway Heights & Commercial Driveway intersection were commissioned by JD Engineering. Detailed turning movement traffic and pedestrian counts for the Toronto Street / Main Street intersection we also obtained from the Municipality.
3. An intersection operation analysis was completed at the study area intersections, using the existing (2022) and background (2025, 2030 and 2035) traffic volumes, with the adjacent development traffic and without the proposed development traffic if the proposed development did not proceed. This enabled a review of existing and future traffic deficiencies that would be present without the influence of the proposed development. No geometric lane improvements or traffic signal improvements are recommended within the study area.
4. An estimate of the amount of traffic that would be generated by the proposed development was prepared and assigned to the study area streets and intersections.
5. An intersection operation analysis was completed under total (2025, 2030 and 2035) traffic volumes with the proposed development operational at the study area intersections. The

following geometric lane improvements or traffic signal improvements are recommended within the study area to accommodate the proposed development.

North Access / Highway 10

- Construction of an auxiliary southbound left turn lane with a 25 metre storage length, 70 metre parallel length and 115 metre taper length

Highway 10

- It is recommended that the necessary speed change review be undertaken to facilitate the extension of the Toronto Street 50 km/hr speed limit to 100 metres north of the North Access
 - In the event that MTO staff recommend a reduction in the posted speed limit on Highway 10 at the North Access, it is recommended that the storage, parallel and taper length for the southbound left turn lane on Highway 10 at the North Access are also revised, corresponding with the new speed limit.
6. It is recommended the Municipality explore constructing a two-way-left-turn lane [TWLTL] on Toronto Street within the community of Markdale.
 7. The North Access will operate efficiently as a full-movement access, with one-way stop control for the westbound movements. A single eastbound and westbound lane at the North Access roadway will provide the necessary capacity to service the proposed development together with the Margaret Elizabeth Avenue and Stan Baker Boulevard extensions.
 8. The sight distance available for the North Access meets the minimum stopping and intersection sight distance requirements.
 9. The North Access is not required to be constructed as a part of Phase 1 and 2 of the proposed development. The North Access will be required with the occupancy of the first unit of Phase 3 of the proposed development.
 10. In summary, the proposed development will not cause any operational issues and will not add a notable delay or congestion to the local roadway network.

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1 Introduction

1.1 Background

LC Development Group Inc. [The Developer] is proposing to develop the property municipally known as 775309 Highway 10, located in the northeast corner of the community of Markdale, on the north side of Highway 10 in the Municipality of Grey Highlands [Municipality], County of Grey [County].

The proposed development, as illustrated in **Appendix A**, is anticipated to include the following:

- 156 townhouses; and
- 313 single family detached houses.

Phases 1 and 2 of the proposed development is anticipated to include 24 townhouse units and 72 single-detached units. Build-out of Phase 1 and 2 is anticipated to be constructed by the 2025 horizon year. The remaining ultimate development is anticipated to be constructed by the 2030 horizon year.

The proposed development is anticipated to include one full movement access roadway onto Highway 10 [North Access] and include the extension of Margaret Elizabeth Avenue [South Access] and Stan Baker Boulevard [East Access] into the subject site. The East Access will be constructed as part of Phase 1 of the proposed development. The North Access and South Access will be constructed after the completion of Phase 1 and 2 of the proposed development.

The Developer has retained **JD Northcote Engineering Inc.** [JD Engineering] to prepare this traffic impact study in support of the proposed development.

1.2 Study Area

Figure 1 shows the location of the proposed development and study area intersections, in relation to the surrounding area. The Concept Plan by Pinestone Engineering Ltd. is provided in **Appendix A**.

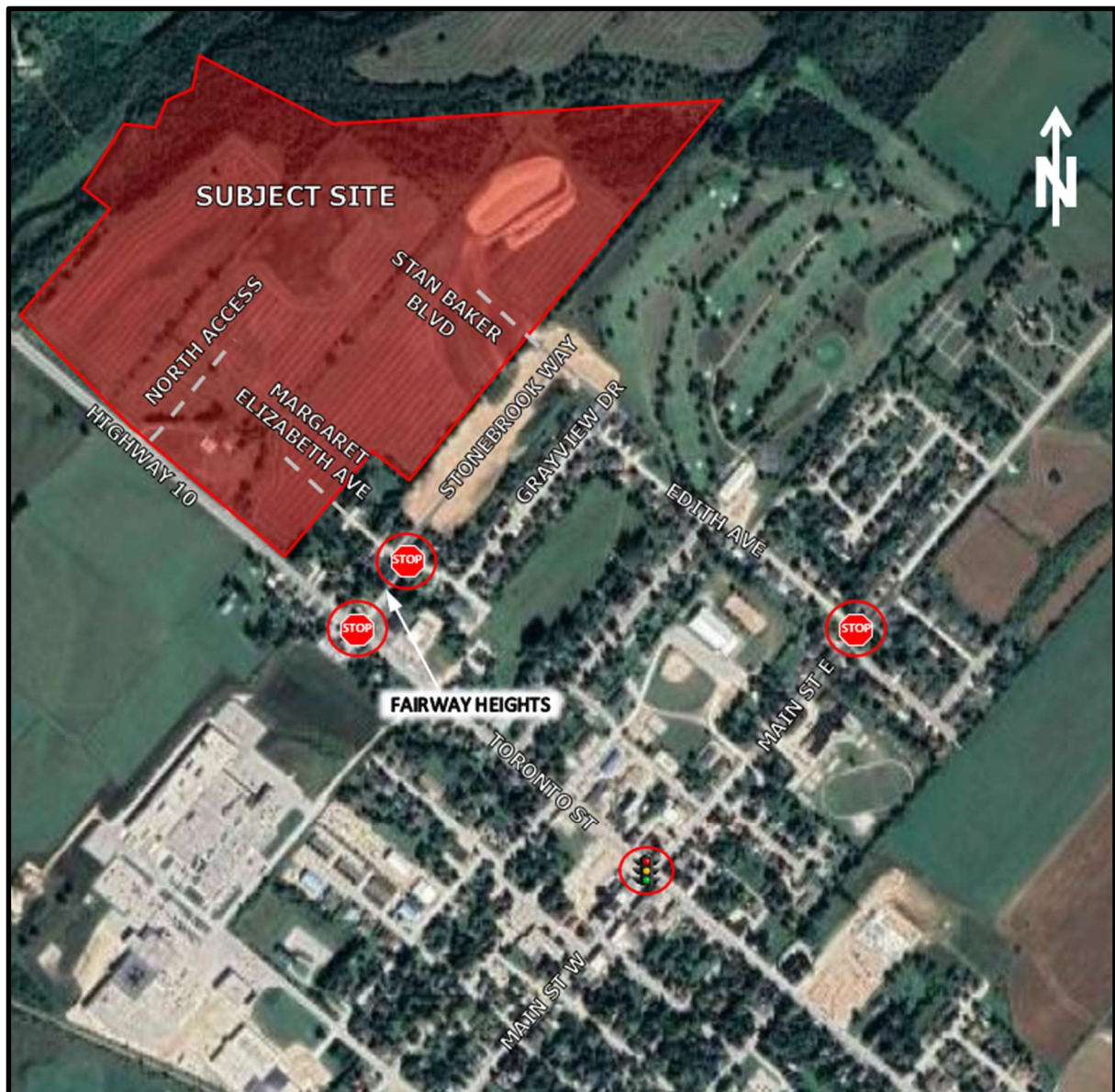
The proposed development is bound by Highway 10 to the south, a golf course and residential lands to the east, undeveloped lands to the north and a river and undeveloped lands to the west.

The following intersections will be analysed as part of the study:

- Fairway Heights / Margaret Elizabeth Avenue (Functional review);
- Fairway Heights & Commercial Driveway / Toronto Street; and
- North Access / Highway 10.

In addition to the above noted intersections analyzed, it is noted that traffic generated by the proposed development has also been assigned to the Main Street / Edith Street intersection.

Figure 1 – Proposed Site Location and Study Area



1.3 Study Scope and Objectives

The purpose of this study is to identify the potential impacts to traffic flow at the site access and on the surrounding roadway network. The study analysis includes the following tasks:

- Consult with the Municipality, County and Ontario Ministry of Transportation [MTO] to address any traffic-related issues or concerns they have with the proposed development;
- Determine existing traffic volumes and circulation patterns;
- Review traffic impact studies for the proposed adjacent developments within the study area;
- Estimate future traffic volumes if the proposed development was not constructed, including the impact of additional proposed developments in the area;

- Complete level-of-service [LOS] analysis of horizon year (without the proposed development) traffic conditions and identify operational deficiencies;
- Estimate the amount of traffic that would be generated by the proposed development and assign to the roadway network;
- Complete LOS analysis of horizon year (with the proposed development) traffic conditions and identify additional operational deficiencies;
- Identify improvement options to address operational deficiencies; and
- Document findings and recommendations in a final report.

1.4 Horizon Year and Analysis Periods

Traffic scenarios for the existing year (2022), Phase 1 & 2 build-out horizon year (2025), 5-year horizon (2030) and 10-year horizon (2035) were selected for analysis of traffic operations in the study area. The weekday morning [AM] and weekday afternoon [PM] peak hours have been selected as the analysis periods for this study.

2 Information Gathering

2.1 Street and Intersection Characteristics

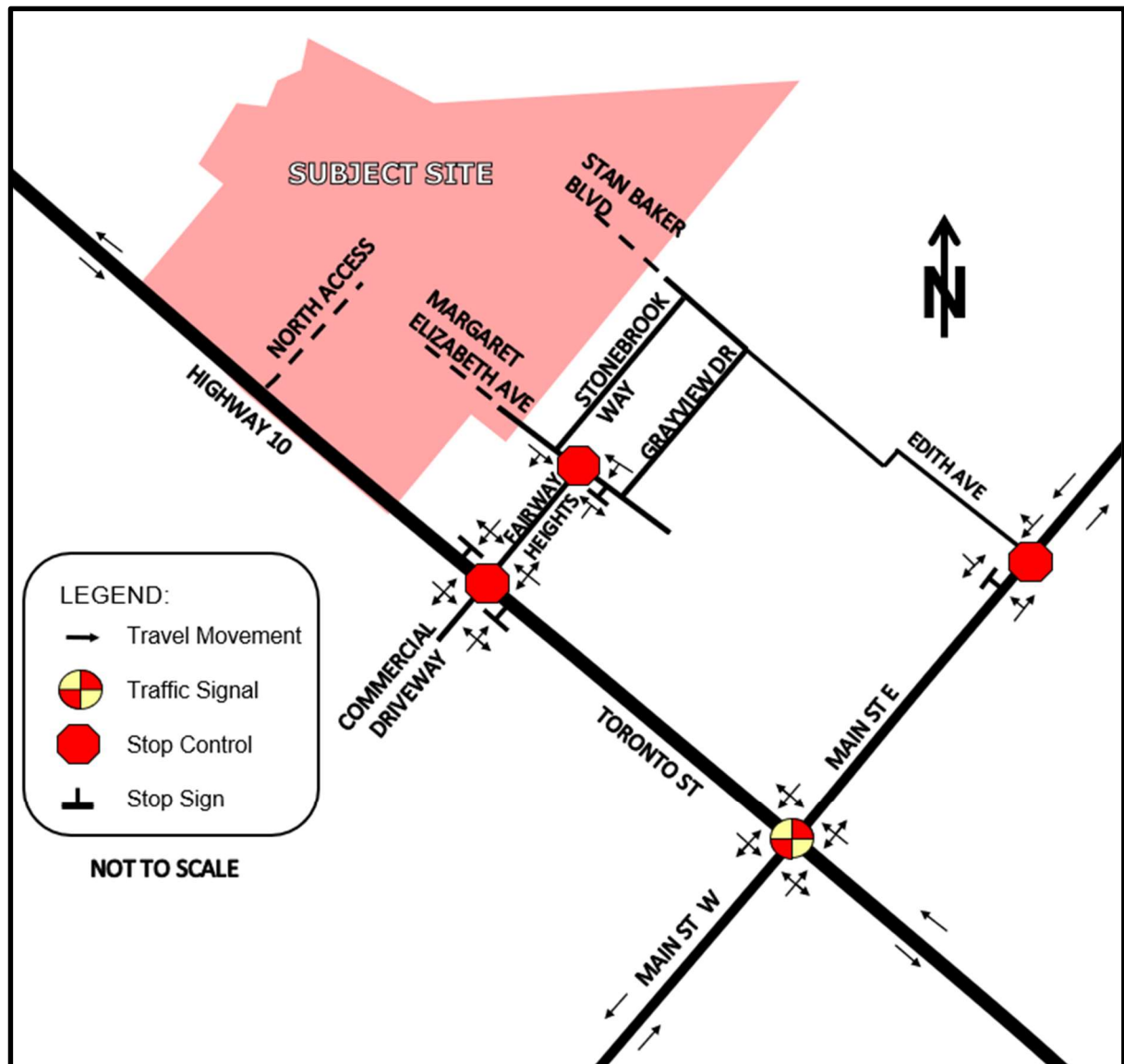
Highway 10 (Toronto Street) is a two lane-lane 2B arterial highway. Within the study area, Highway 10 has an urban and rural cross-section south and north of the southeast corner of the subject site, respectively. Highway 10 has a sidewalk on both sides of the road south of Fairway Heights, generally has an asphalt shoulder on both sides of the road between the southeast corner of the subject site and Fairway Heights, and generally has a gravel shoulder on both sides of the road, north of the southeast corner of the subject site, within the study area. Highway 10 has a posted speed limit of 80 km/hr and is under the jurisdiction of the MTO 100 metres north of the southeast corner of the subject site and has a posted speed limit of 50 km/hr and is under the jurisdiction of the Municipality (via a connecting link agreement) south of 100 metres north of the southeast corner of the subject site within the study area.

Fairway Heights is a two-lane local road with an urban cross-section and a sidewalk on the east side of the road. Fairway Heights has an assumed (unposted) speed limit of 50km/h and is under the jurisdiction of the Municipality.

Margaret Elizabeth Avenue is a two-lane local road with a rural cross-section and no sidewalks. Margaret Elizabeth Avenue has an assumed (unposted) speed limit of 50km/h and is under the jurisdiction of the Municipality.

The existing lane configuration within the study area is illustrated in **Figure 2**.

Figure 2 – Existing Lane Configuration within Study Area



2.2 Local Transportation Infrastructure Improvements

Based on a review of MTO's highways program webpage, there are no planned infrastructure improvements within the study area.

2.3 Transit Access

The County's transit service provider, GRT, provides one bus route within the study area. The No. 1 (Owen Sound to Dundalk) bus route provides service on Highway 10 within the study area.

The No. 1 bus route operates between 06:45 – 20:59 on weekdays with service three times a day for each of the northbound and southbound directions. The closest bus stops to the proposed development for the No. 1 bus route are located at 206 Toronto Street.

2.4 Other Developments within the Study Area

Based on our discussions with Municipal staff, there are four adjacent developments nearby the study area that will impact the traffic generation rates, specifically:

- Centre Point South Residential;
- Markdale Hospital;
- 105 Toronto Street; and
- Stonebrook Residential.

For the purposes of this study, it has been assumed that all traffic generated by the adjacent developments within the study area will be new traffic and would not be in the study area if the developments were not constructed.

2.4.1 Centre Point South Residential

The Centre Point South Residential development is located in the southeast quadrant of the community of Markdale and is anticipated to include 293 single-family detached residential units and 100 townhouse units. It is anticipated that the Centre Point South Residential Development will be fully occupied by the 2026 horizon year.

Traffic generated by the Centre Point South Residential development has been estimated based on the November 2017 Centre Point South Residential traffic impact study by Tatham Engineering Limited [Centre Point TIS] (excerpts provided in **Appendix B**).

Figure 3 illustrates the Centre Point South Residential development traffic within the study area.

2.4.2 Markdale Hospital

The proposed Markdale Hospital is located in the southwest quadrant of Toronto Street / Uplands Drive intersection and is anticipated to include 39,000 sq.ft. ground floor hospital space and a partially completed basement with support and nutrition services, staff facilities and storage. It is anticipated that the proposed Markdale Hospital will be fully occupied by the 2025 horizon year.

Traffic generated by the proposed Markdale Hospital has been estimated based on the June 2018 Markdale Hospital traffic impact study by Paradigm Transportation Solutions Limited [Hospital TIS] (excerpts provided in **Appendix B**).

Figure 4 illustrates the proposed Markdale Hospital traffic within the study area.

2.4.3 105 Toronto Street

The proposed 105 Toronto Street development is located in the southeast corner of the Toronto Street South / Victoria Street intersection and is anticipated to include a 33,415 sq.ft. supermarket and 3,690 sq.ft. additional commercial space. It is anticipated that the proposed 105 Toronto Street development will be fully occupied by the 2025 horizon year.

Traffic generated by the proposed 105 Toronto Street development has been estimated based on the December 2016 105 Toronto Street traffic impact study by Paradigm Transportation Solutions Limited [105 Toronto TIS] (excerpts provided in **Appendix B**).

Figure 5 illustrates the proposed 105 Toronto Street development traffic within the study area.

2.4.4 Stonebrook Residential

The Stonebrook Residential development is located just east of the subject site, north of Toronto Street and is anticipated to include a total of 133 townhouse units. It is anticipated that the Stonebrook Residential development will be fully occupied by the 2025 horizon year.

Traffic generation for the Stonebrook Residential development has been calculated based on the data provided in the Institute of Transportation Engineers [ITE] *Trip Generation Manual* (10th Edition) [ITE Trip Generation Manual]. The following ITE land uses have been applied to estimate the traffic from the Stonebrook Residential Development:

- ITE land use 220 (Multifamily Housing (Low-Rise)) – General Urban / Suburban Setting.

The estimated trip generation of the Stonebrook Residential development is illustrated below in **Table 1**.

Table 1 – Estimated Traffic Generation – Stonebrook Residential development

Land Use	Size	AM Peak Hour			PM Peak Hour		
		IN	OUT	TOTAL	IN	OUT	TOTAL
Multifamily Housing (Low-Rise) ITE Land Use: 220	133 units ¹	17	56	73	55	33	88

The distribution of traffic for the Stonebrook Residential development is based on the distribution of the existing traffic volumes illustrated in Table 9, Section 4.2

Using the traffic distribution pattern noted above, the traffic assignment for the Stonebrook Residential development within the study area was calculated for the AM and PM peak hour and is illustrated in **Figure 6**.

¹ Trip generation for the Stonebrook Residential development utilized a previous iteration of the ITE Trip Generation Manual, yielding higher values. In order to remain conservative no change has been applied.

Figure 3 – Centre Point South Residential Development Traffic Volumes within Study Area

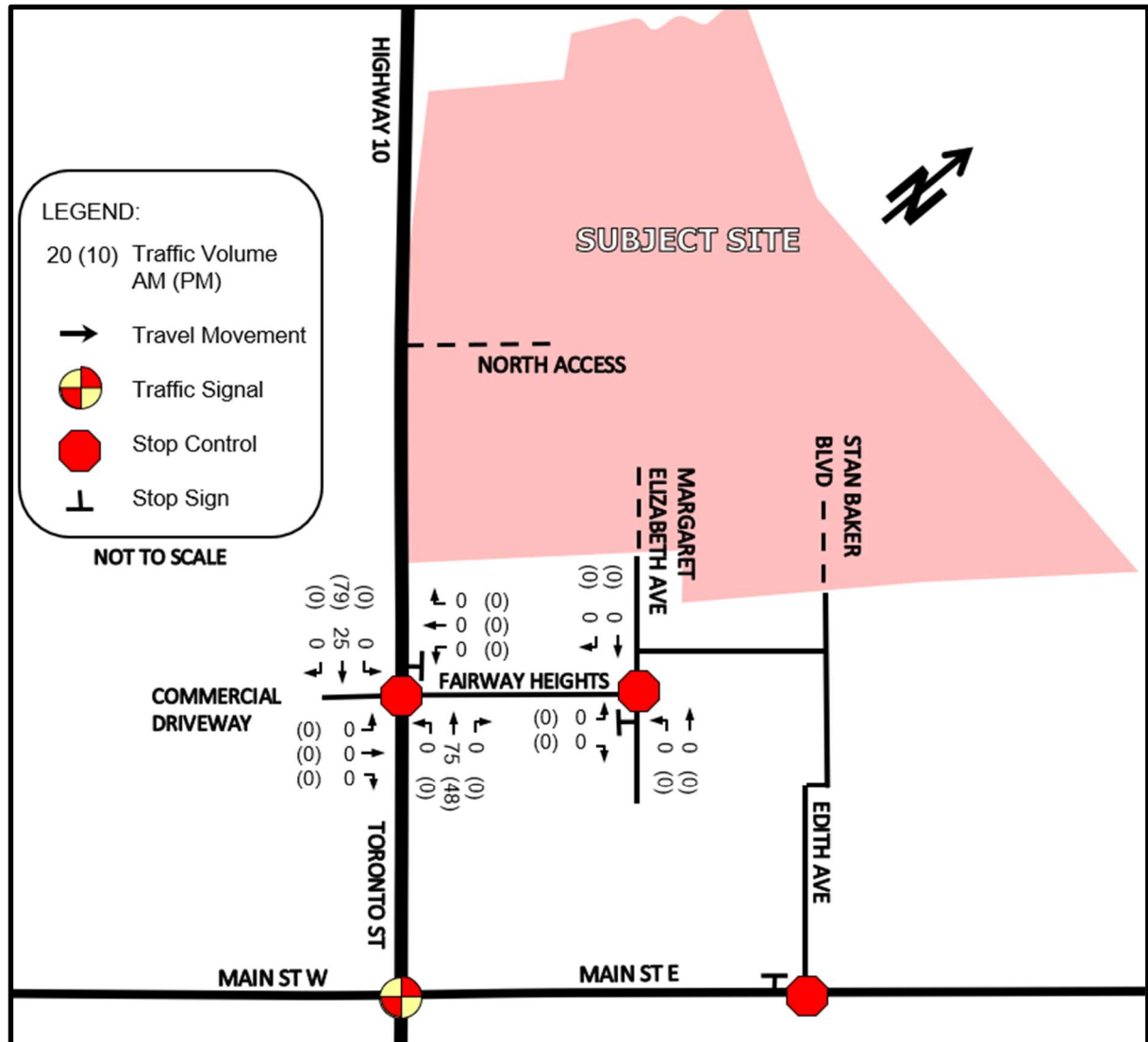


Figure 4 – Markdale Hospital Development Traffic Volumes within Study Area

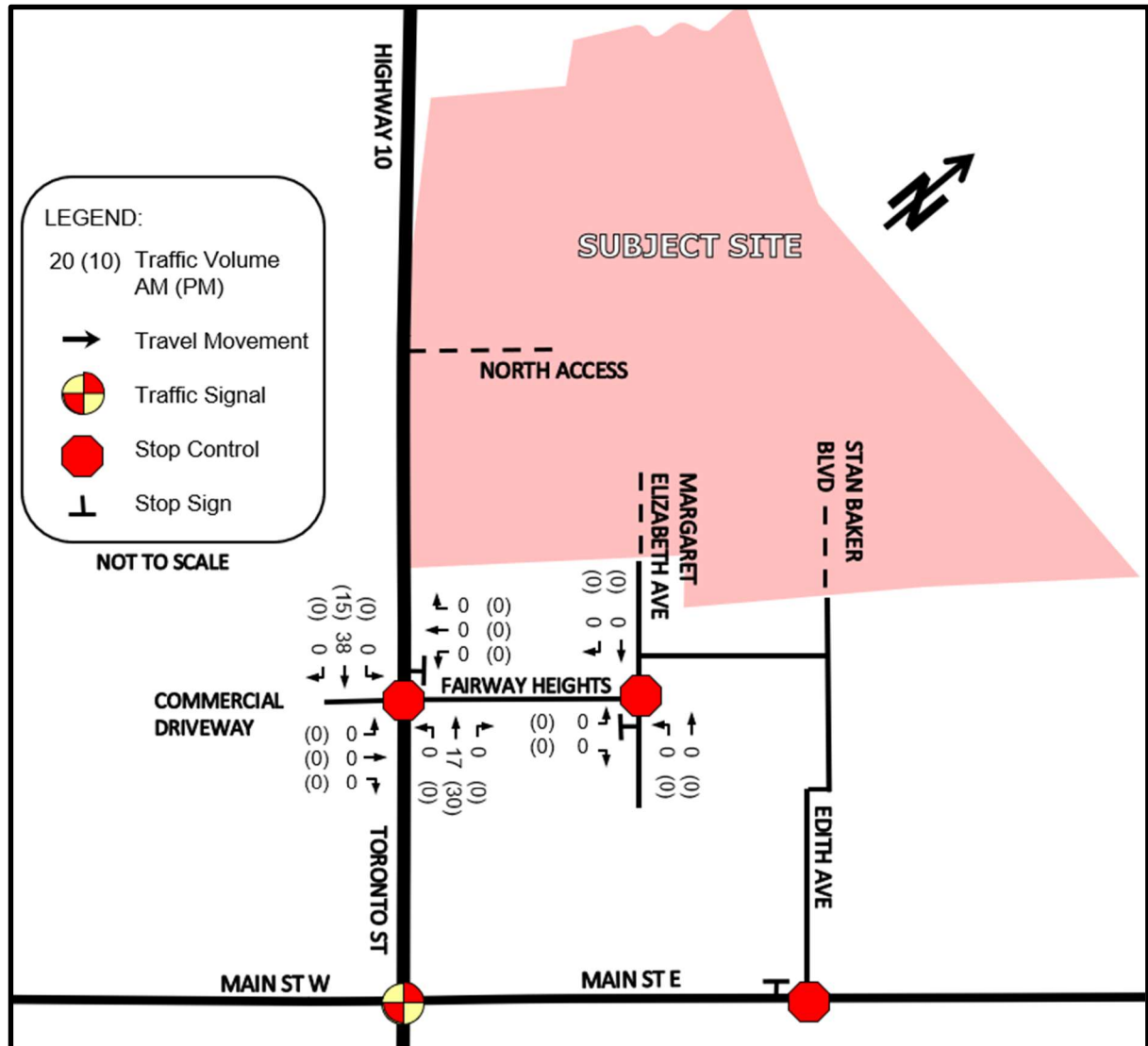


Figure 5 – 105 Toronto Street Development Traffic Volumes within Study Area

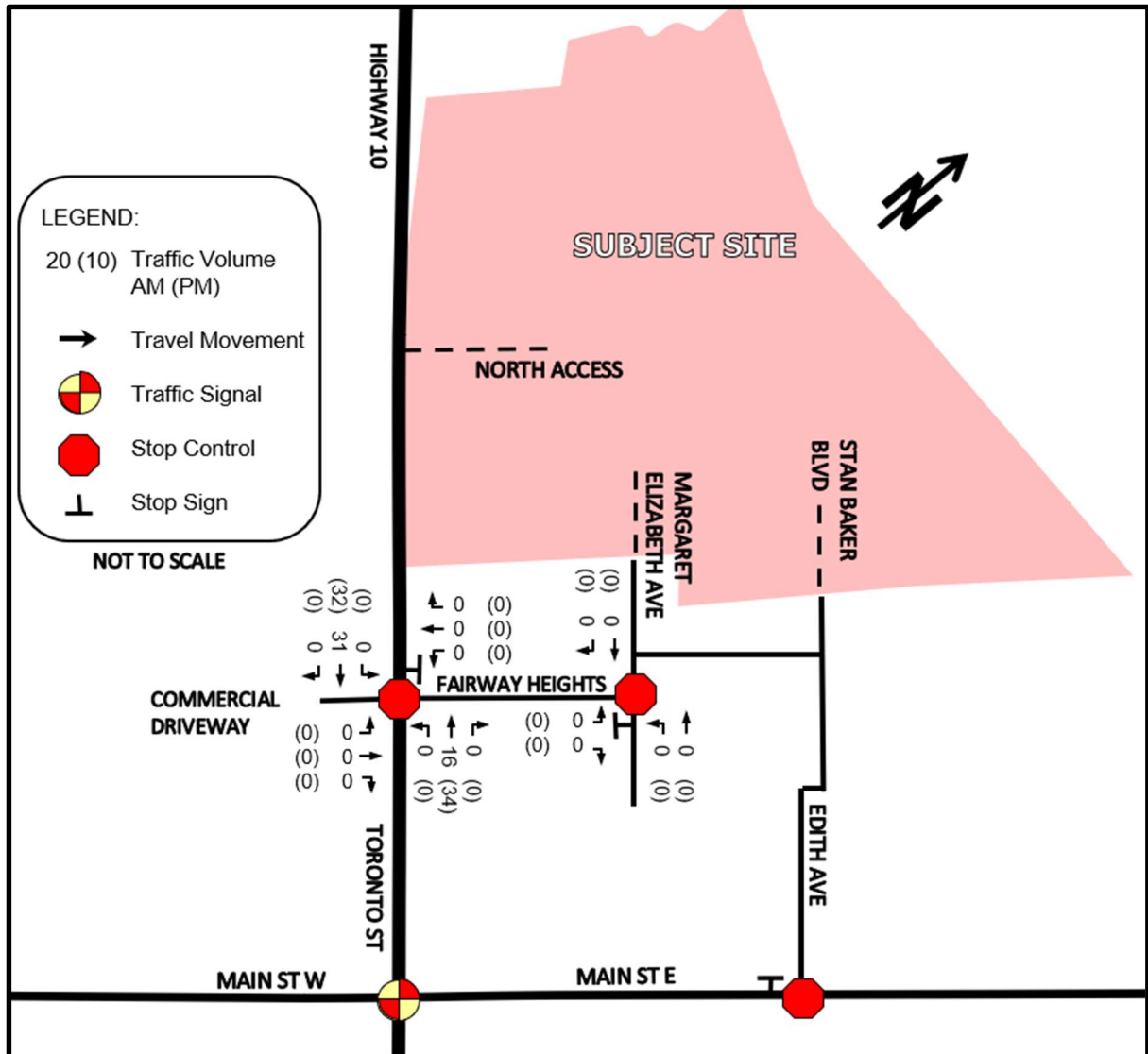
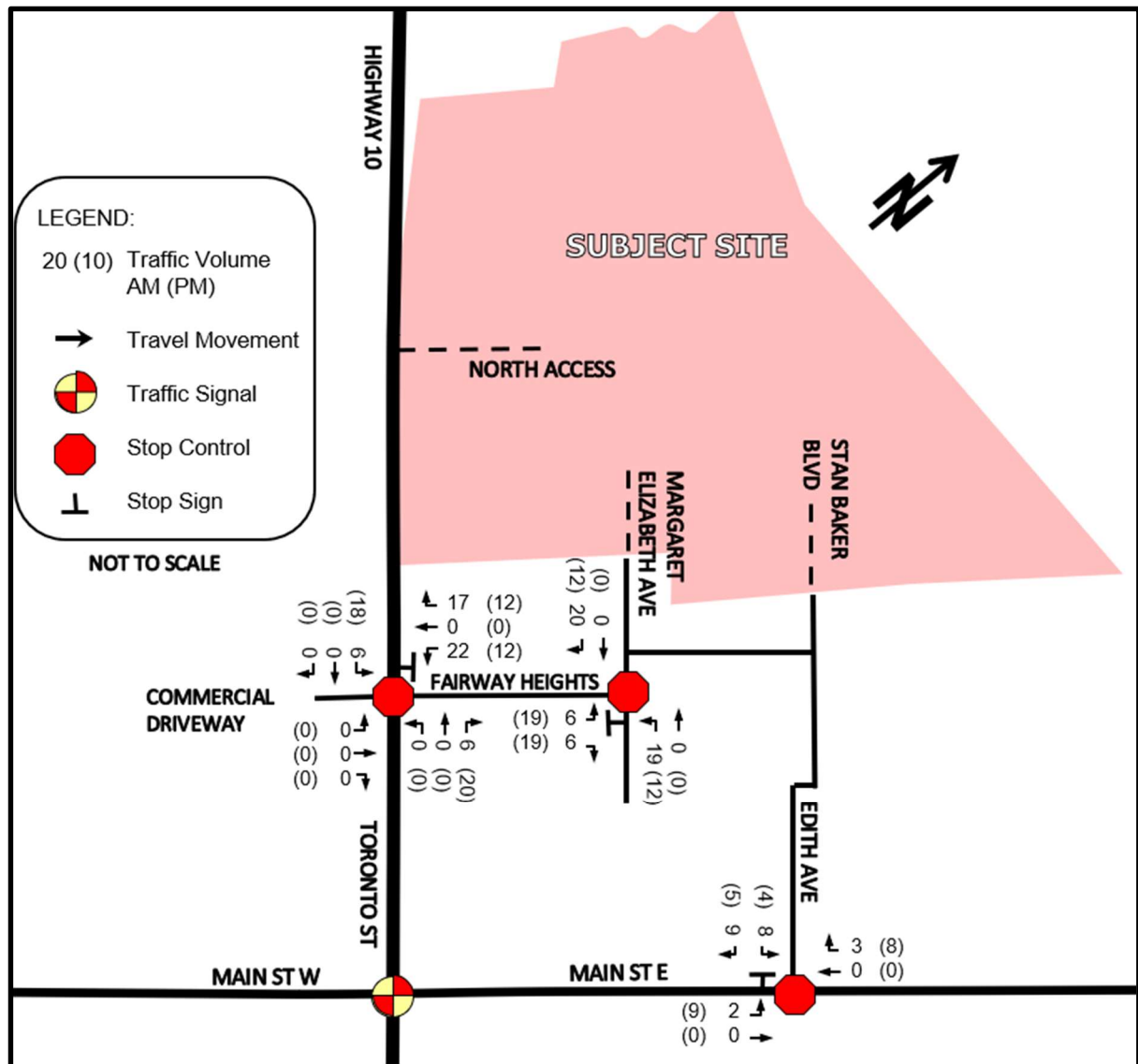


Figure 6 – Stonebrook Residential Development Traffic Volumes within Study Area



2.5 Background Growth Rate

Based on MTO historical Average Annual Daily Traffic [AADT] and Summer Average Daily Traffic [SADT] data, a general background traffic growth rate of 2.0% per year has been selected for Toronto Street within the study area. No background growth rate has been utilized for Fairway Heights and Margaret Elizabeth Avenue as these roads only service the local area.

2.6 Traffic Counts

Detailed turning movement traffic and pedestrian counts for the Toronto Street / Fairway Heights & Commercial Driveway and Toronto Street / Main Street intersections were commissioned by JD Engineering. Detailed turning movement traffic and pedestrian counts for the Toronto Street / Main Street intersection we also obtained from the Municipality.

Table 2 summarizes the traffic count data collection information.

Table 2 – Traffic Count Data

Intersection (E-W Street / N-S Street)	Count Date	AM Peak Hour	PM Peak Hour	Source
Fairway Heights & Commercial Driveway / Toronto Street	Thursday, November 17, 2022	08:00 – 09:00	16:15 – 17:15	JD Eng.*
Main Street / Toronto Street	Wednesday, October 5, 2016	08:15 – 09:15	16:30 – 17:30	Municipality

*Traffic counts were completed by Accu-Traffic Inc. on behalf of JD Engineering.

Detailed traffic count data can be found in **Appendix C**. It is noted that the timing of the November 2022 traffic counts occurred after the lifting of the public health restrictions related to the COVID-19 pandemic. Consequently, the traffic counts reflect typical traffic operations.

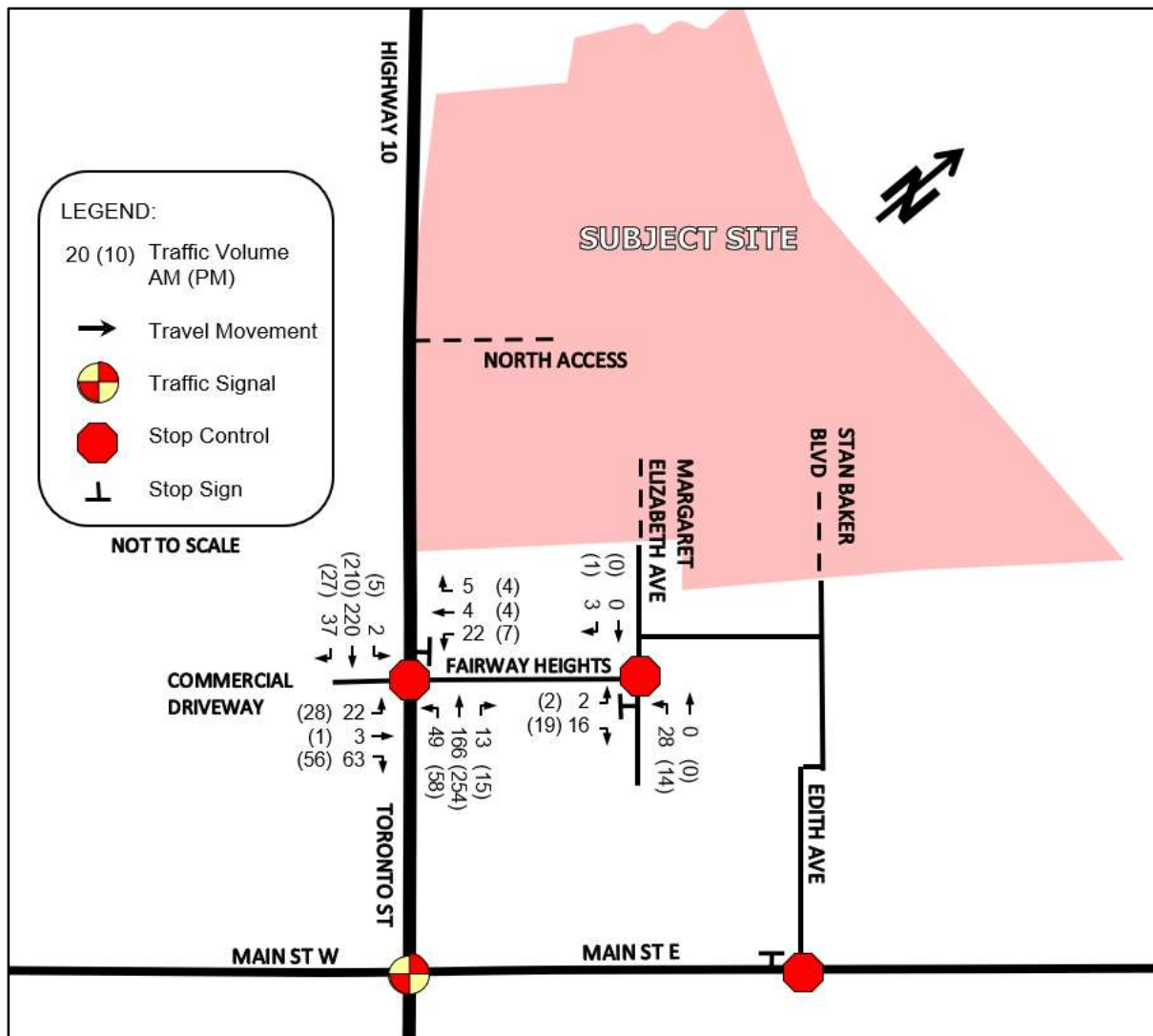
Heavy vehicle percentages from the traffic count data have also been included in the Synchro analysis.

Traffic volumes at the Margaret Elizabeth Avenue / Fairway Heights intersection were calculated by taking the traffic volumes at the east leg of the Toronto Street / Fairway Heights & Commercial Driveway intersection and assigning them through the Margaret Elizabeth Avenue / Fairway Heights intersection based on the number of residential units on either side of the intersection.

Traffic volumes at the Main Street / Toronto Street intersection were utilized to derive the existing travel distribution patterns in the study area, further discussed in Section 4.2.

Figure 7 illustrates the existing (2022) AM and PM peak hour traffic volumes within the study area.

Figure 7 – Existing (2022) Traffic Volumes



2.7 Horizon Year Traffic Volumes

In addition to the adjacent development traffic volumes discussed in Section 2.4, the background traffic growth rates discussed in Section 2.5 have been applied to the existing traffic volumes to estimate the background (2025, 2030 and 2035) horizon year traffic volumes.

Figures 8 through 10 illustrate the background (2025, 2030 and 2035) horizon year AM and PM peak hour traffic volumes in the study area.

Figure 8 – Background (2025) Traffic Volumes

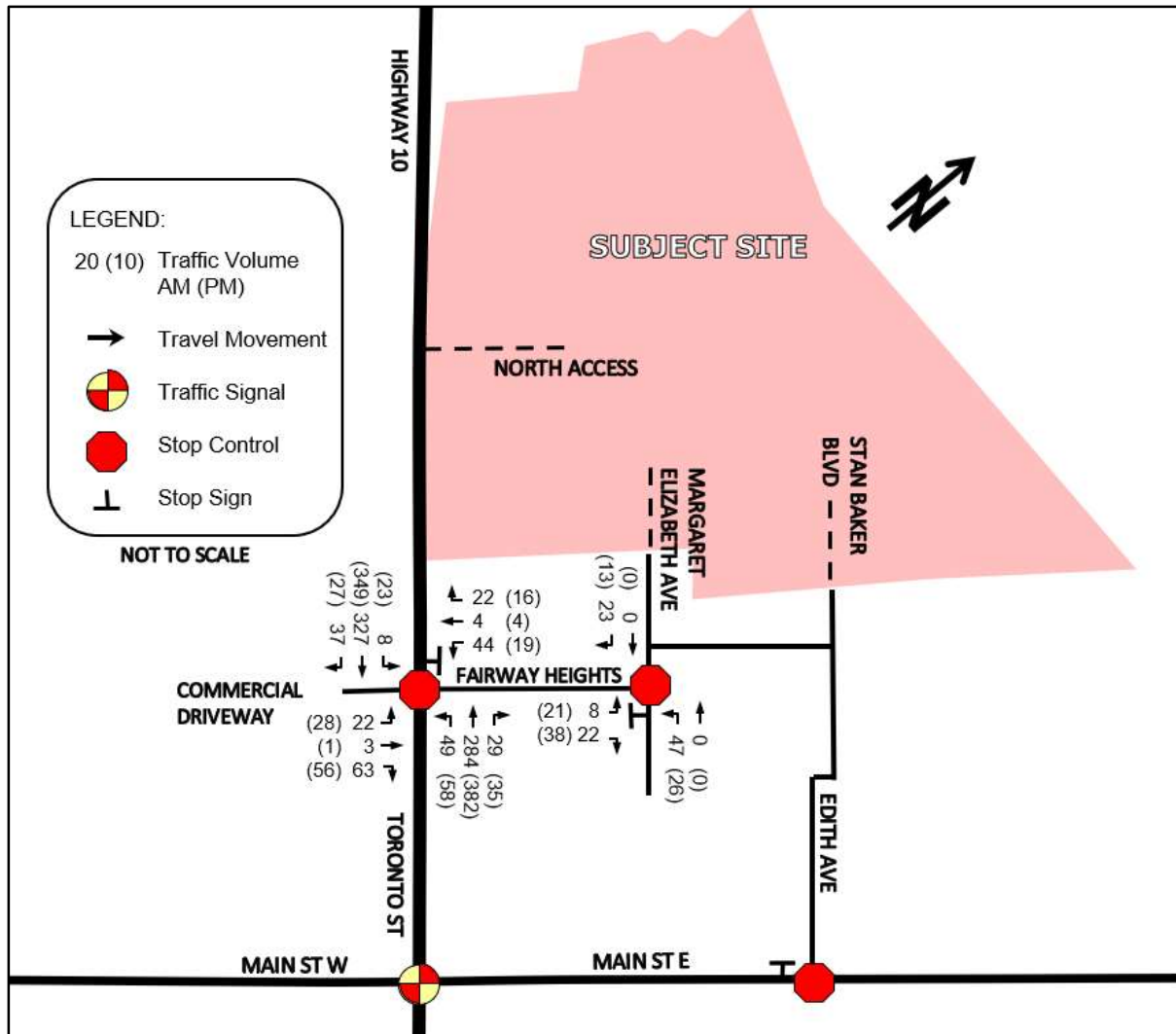


Figure 9 – Background (2030) Traffic Volumes

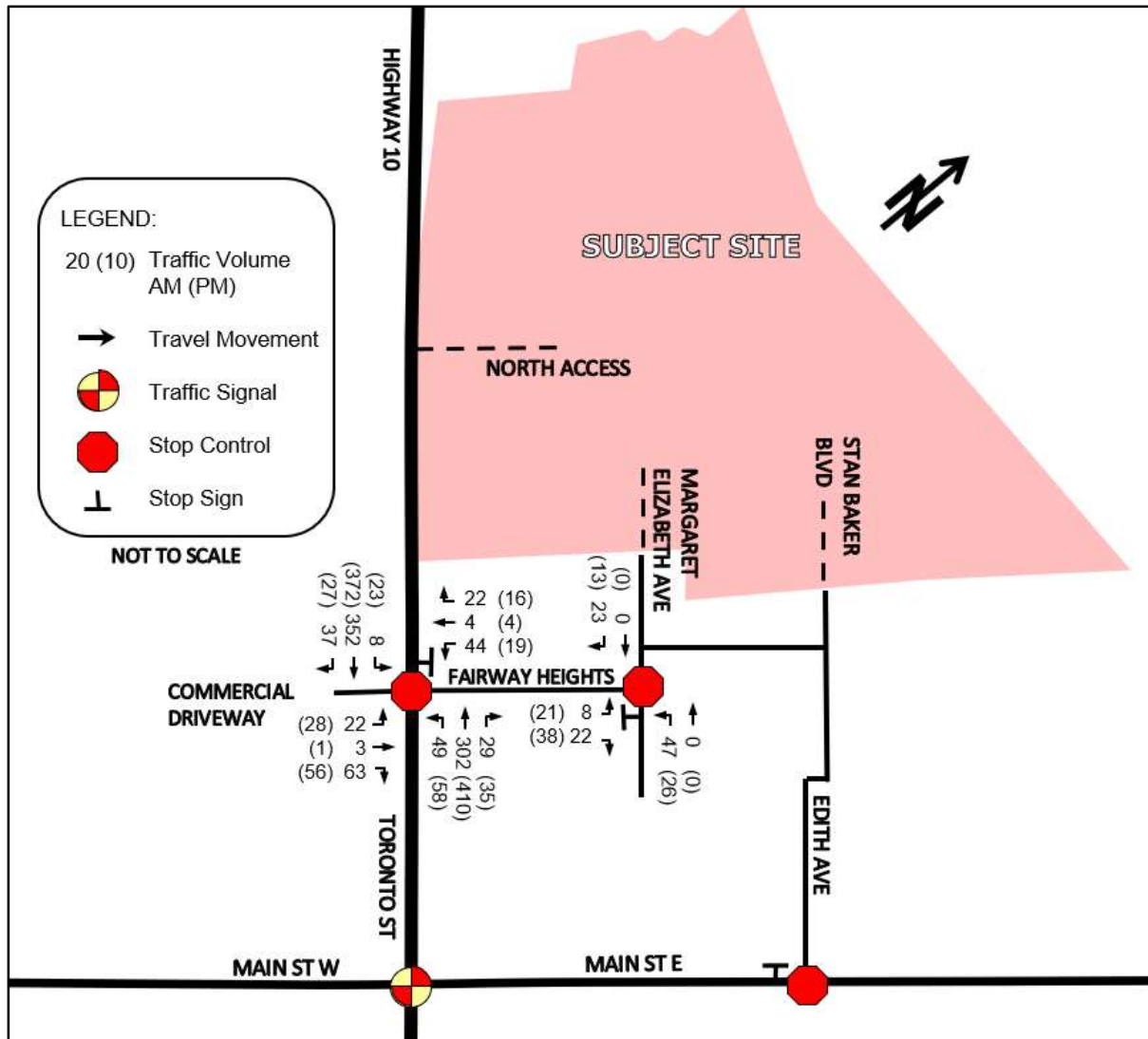
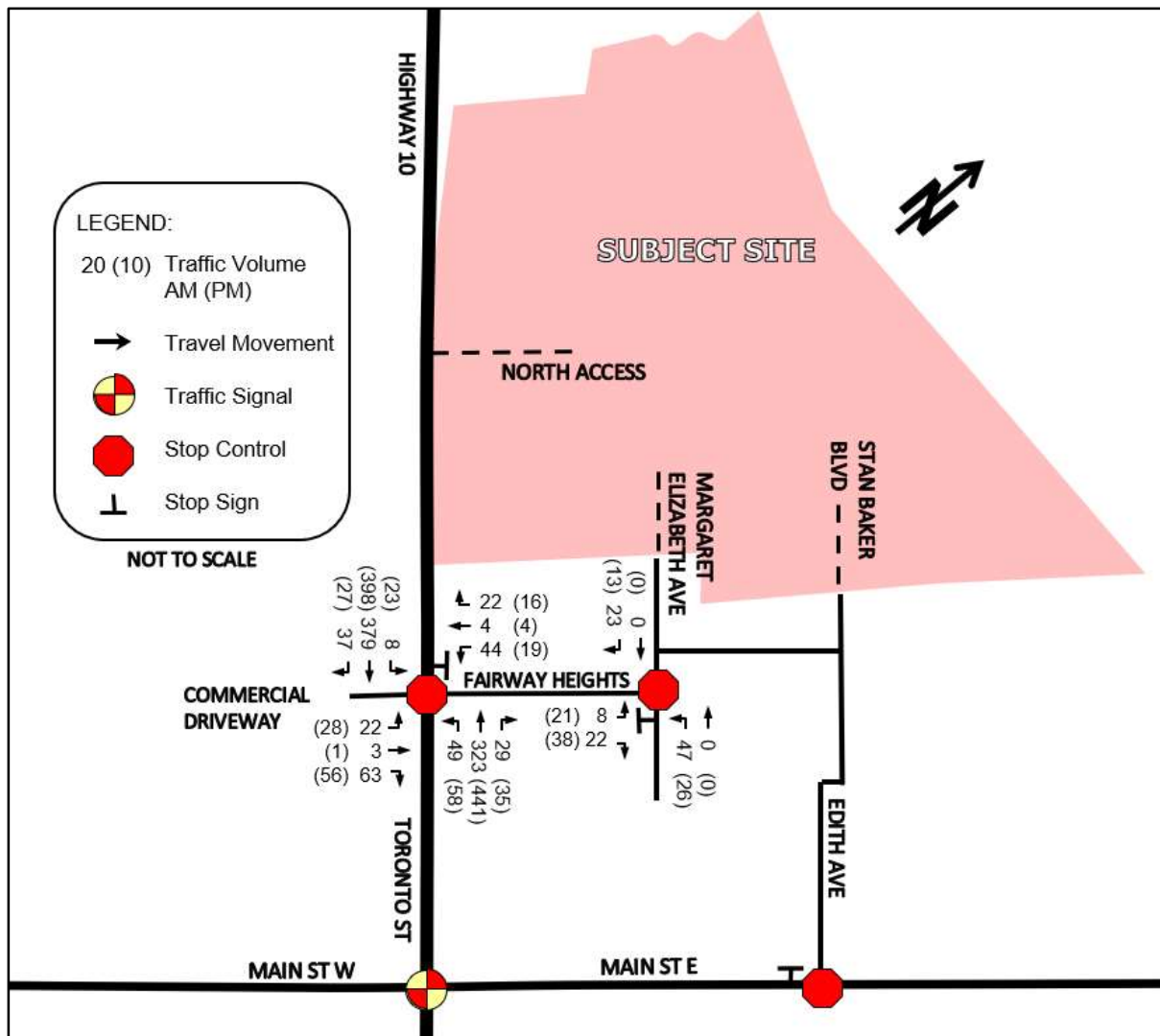


Figure 10 – Background (2035) Traffic Volumes



3 Intersection Operation without Proposed Development

3.1 Introduction

Existing year operational conditions were established to determine how the street network within the study area is currently functioning without the proposed development. This provides a base case scenario to compare with future development scenarios. Traffic operations within the study area were evaluated using the 2022 traffic volumes with the existing road configuration and traffic control. The intersection performance was measured using the traffic analysis software, Synchro 11, a deterministic model that employs Highway Capacity Manual and Intersection Capacity Utilization methodologies for analyzing intersection operations. These procedures are accepted by provincial and municipal agencies throughout North America.

Synchro 11 enables the study area to be graphically defined in terms of streets and intersections, along with their geometric and traffic control characteristics. The user is able to evaluate both signalized and unsignalized intersections in relation to each other, thus not only providing level of service for the individual intersections, but also enabling an assessment of the impact the various intersections in a network have on each other in terms of spacing, traffic congestion, delay, and queuing.

3.2 Intersection Capacity Analysis Criteria

Individual turning movements with a volume-to-capacity [V/C] ratio of 0.85 or greater are considered to be critical movements and have been highlighted in the LOS tables.

The intersection operations were also evaluated in terms of the LOS. LOS is a common measure of the quality of performance at an intersection and is defined in terms of vehicular delay. This delay includes deceleration delay, queue move-up time, stopped delay, and acceleration delay. LOS is expressed on a scale of A through F, where LOS A represents very little delay (i.e. less than 10 seconds per vehicle) and LOS F represents very high delay (i.e. greater than 50 seconds per vehicle for a stop sign controlled intersection and greater than 80 seconds per vehicle for a signalized intersection).

The LOS criteria for signalized and stop sign controlled intersections are shown in **Table 3**. A description of traffic performance characteristics is included for each LOS.

Table 3 – Level of Service Criteria for Intersections

LOS	LOS Description	Control Delay (seconds per vehicle)	
		Signalized Intersections	Stop Controlled Intersections
A	Very low delay; most vehicles do not stop (Excellent)	less than 10.0	less than 10.0
B	Higher delay; more vehicles stop (Very Good)	between 10.0 and 20.0	between 10.0 and 15.0
C	Higher level of congestion; number of vehicles stopping is significant, although many still pass through intersection without stopping (Good)	between 20.0 and 35.0	between 15.0 and 25.0
D	Congestion becomes noticeable; vehicles must sometimes wait through more than one red light; many vehicles stop (Satisfactory)	between 35.0 and 55.0	between 25.0 and 35.0
E	Vehicles must often wait through more than one red light; considered by many agencies to be the limit of acceptable delay	between 55.0 and 80.0	between 35.0 and 50.0
F	This level is considered to be unacceptable to most drivers; occurs when arrival flow rates exceed the capacity of the intersection (Unacceptable)	greater than 80.0	greater than 50.0

3.3 Existing (2022) Intersection Operation

The results of the LOS analysis under existing traffic volumes during the AM and PM peak hour can be found below in **Table 4**. Existing intersection geometry and traffic control have been utilized for this scenario. Detailed output of the Synchro analysis can be found in **Appendix D**.

Table 4 – Existing (2022) LOS

Location (E-W Street / N-S Street)	AM Peak Hour			PM Peak Hour		
	V/C	Delay (s)	LOS	V/C	Delay (s)	LOS
Commercial Driveway & Fairway Heights / Toronto Street (unsignalized)	-	3.4	A	-	3.0	A
EB	0.17	12.4	B	0.19	13.5	B
WB	0.10	16.2	C	0.05	15.8	C

The results of the LOS analysis indicate that the Commercial Driveway & Fairway Heights / Toronto Street intersection is operating within the typical design limits noted in Section 3.2.

An analysis was completed for left turn movements at the Commercial Driveway & Fairway Heights / Toronto Street intersection based on the criteria outlined in Appendix 9A of the Ontario Ministry of Transportation Design Supplement for TAC Geometric Design Guide for Canadian Roads June 2017 [MTO DS]. According to the above-noted criteria a left turn lane is not warranted (results are provided in **Appendix G**).

A review of the need for an auxiliary right turn lane at the unsignalized study area intersections was completed as part of our analysis. The results of the Synchro analysis indicate that there is excess capacity for all movements; consequently, an auxiliary right turn lane is not recommended.

Based on the Ontario Traffic Manual Book 12 *Signal Justification*, traffic signals are not warranted at the unsignalized study area intersections (results are provided in **Appendix H**).

No infrastructure improvements are recommended within the study area.

3.4 Background (2025) Intersection Operation

The results of the LOS analysis under background (2025) traffic volumes during the AM and PM peak hour can be found below in **Table 5**. Existing intersection geometry and traffic control have been utilized for this scenario. Detailed output of the Synchro analysis can be found in **Appendix E**.

Table 5 – Background (2025) LOS

Location (E-W Street / N-S Street)	AM Peak Hour			PM Peak Hour		
	V/C	Delay (s)	LOS	V/C	Delay (s)	LOS
Commercial Driveway & Fairway Heights / Toronto Street (unsignalized)	-	4.2	B	-	3.8	B
EB	0.23	15.9	C	0.29	20.3	C
WB	0.30	25.1	D	0.20	25.3	D

The results of the LOS analysis indicate that the Commercial Driveway & Fairway Heights / Toronto Street intersection is operating within the typical design limits noted in Section 3.2.

An analysis was completed for left turn movements at the Commercial Driveway & Fairway Heights / Toronto Street intersection based on the criteria outlined in Appendix 9A of the MTO DS. According to the above-noted criteria a left turn lane is warranted in the northbound direction of the intersection

(results are provided in **Appendix G**). The need for left turn lanes along Toronto Street is discussed further in Section 5.3.

A review of the need for an auxiliary right turn lane at the unsignalized study area intersections was completed as part of our analysis. The results of the Synchro analysis indicate that there is excess capacity for all movements; consequently, an auxiliary right turn lane is not recommended.

Based on the Ontario Traffic Manual Book 12 *Signal Justification*, traffic signals are not warranted at the unsignalized study area intersections (results are provided in **Appendix H**).

No infrastructure improvements are recommended within the study area.

3.5 Background (2030) Intersection Operation

The results of the LOS analysis under background (2030) traffic volumes during the AM and PM peak hour can be found below in **Table 6**. Existing intersection geometry and traffic control have been utilized for this scenario. Detailed output of the Synchro analysis can be found in **Appendix E**.

Table 6 – Background (2030) LOS

Location (E-W Street / N-S Street)	AM Peak Hour			PM Peak Hour		
	V/C	Delay (s)	LOS	V/C	Delay (s)	LOS
Commercial Driveway & Fairway Heights / Toronto Street (unsignalized)	-	4.3	B	-	3.9	B
EB	0.25	16.8	C	0.31	22.0	C
WB	0.33	27.4	D	0.22	27.7	D

The results of the LOS analysis indicate that the Commercial Driveway & Fairway Heights / Toronto Street intersection is operating within the typical design limits noted in Section 3.2.

An analysis was completed for left turn movements at the Commercial Driveway & Fairway Heights / Toronto Street intersection based on the criteria outlined in Appendix 9A of the MTO DS. According to the above-noted criteria, a left turn lane is warranted in the northbound and southbound directions of the intersection (results are provided in **Appendix G**). The need for left turn lanes along Toronto Street is discussed further in Section 5.3.

A review of the need for an auxiliary right turn lane at the unsignalized study area intersections was completed as part of our analysis. The results of the Synchro analysis indicate that there is excess capacity for all movements; consequently, an auxiliary right turn lane is not recommended.

Based on the Ontario Traffic Manual Book 12 *Signal Justification*, traffic signals are not warranted at the unsignalized study area intersections (results are provided in **Appendix H**).

No infrastructure improvements are recommended within the study area.

3.6 Background (2035) Intersection Operation

The results of the LOS analysis under background (2035) traffic volumes during the AM and PM peak hour can be found below in **Table 7**. Existing intersection geometry and traffic control have been utilized for this scenario. Detailed output of the Synchro analysis can be found in **Appendix E**.

Table 7 – Background (2035) LOS

Location (E-W Street / N-S Street)	AM Peak Hour			PM Peak Hour		
	V/C	Delay (s)	LOS	V/C	Delay (s)	LOS
Commercial Driveway & Fairway Heights / Toronto Street (unsignalized)	-	4.4	B	-	4.0	B
EB	0.26	17.8	C	0.34	24.2	C
WB	0.35	30.4	D	0.24	30.7	D

The results of the LOS analysis indicate that the Commercial Driveway & Fairway Heights / Toronto Street intersection is operating within the typical design limits noted in Section 3.2.

An analysis was completed for left turn movements at the Commercial Driveway & Fairway Heights / Toronto Street intersection based on the criteria outlined in Appendix 9A of the MTO DS. According to the above-noted criteria a left turn lane is warranted in the northbound and southbound directions of the intersection (results are provided in **Appendix G**). The need for left turn lanes along Toronto Street is discussed further in Section 5.3.

A review of the need for an auxiliary right turn lane at the unsignalized study area intersections was completed as part of our analysis. The results of the Synchro analysis indicate that there is excess capacity for all movements; consequently, an auxiliary right turn lane is not recommended.

Based on the Ontario Traffic Manual Book 12 *Signal Justification*, traffic signals are not warranted at the unsignalized study area intersections (results are provided in **Appendix H**).

No infrastructure improvements are recommended within the study area.

4 Proposed Development Traffic Generation and Assignment

4.1 Traffic Generation

The traffic generation for the proposed development has been based on the ITE Trip Generation Manual. The following ITE land uses have been applied to estimate the traffic from the proposed development:

- ITE land use 210 (Single-Family Detached Housing) – General Urban / Suburban Setting; and
- ITE land use 220 (Multifamily Housing (Low-Rise)) – General Urban / Suburban Setting.

The estimated trip generation of Phase 1 and 2 of the proposed development and the ultimate development is illustrated below in **Table 8** through **Table 10**. The AM and PM peak traffic generation for the proposed development is not expected to exactly align with the AM and PM peak hour in the traffic counts; consequently, we have applied the peak hour of adjacent street traffic values provided in the ITE Trip Generation Manual.

Table 8 – ITE Traffic Generation Trip Rates & Fitted Curve Equations (Subject Site)

Land Use	Trip Basis	AM Peak Hour			PM Peak Hour		
		IN	OUT	TOTAL	IN	OUT	TOTAL
Single-Family Detached ITE Land Use: 210	equation (units)	$\ln(T) = 0.91 \ln(X) + 0.12$			$\ln(T) = 0.94 \ln(X) + 0.27$		
	distribution	26%	74%	100%	74%	26%	100%
Multifamily Housing (Low-Rise) ITE Land Use: 220	rate (units)	0.10	0.30	0.40	0.32	0.19	0.51
Multifamily Housing (Low-Rise) ITE Land Use: 220	equation (units)	$T = 0.31 (X) + 22.85$			$T = 0.43 (X) + 20.55$		
	distribution	24%	76%	100%	63%	37%	100%

Table 9 – Estimated Traffic Generation of Proposed Development (Phase 1 & 2)

Land Use	Size	AM Peak Hour			PM Peak Hour		
		IN	OUT	TOTAL	IN	OUT	TOTAL
Single-Family Detached Housing ITE Land Use: 210	72 units	14	41	55	46	27	73
Multifamily Housing (Low-Rise) ITE Land Use: 220	24 units ²	2	8	10	7	5	12
TOTAL TRIP GENERATION		16	49	65	53	32	85

Table 10 – Estimated Traffic Generation of Proposed Development (Ultimate)

Land Use	Size	AM Peak Hour			PM Peak Hour		
		IN	OUT	TOTAL	IN	OUT	TOTAL
Single-Family Detached Housing ITE Land Use: 210	313 units	54	156	210	183	107	290
Multifamily Housing (Low-Rise) ITE Land Use: 220	156 units	17	54	71	55	33	88
TOTAL TRIP GENERATION		71	210	281	238	140	378

No transportation modal split has been applied to the above-noted traffic generation calculation.

4.2 Traffic Assignment

For the purposes of this study, it has been assumed that all traffic generated by the proposed development will be new traffic and would not be in the study area if the development was not constructed.

In Section 4.1, the anticipated percentage of new traffic entering and exiting during the peak hour was established. The distribution of traffic entering at each access location is based on our review of the internal road network, in conjunction with the external traffic distribution.

The distribution of traffic for the proposed development is based on the distribution of the existing traffic volumes within the study area. **Table 9** illustrates the calculation of the distribution of ingress and egress traffic for the proposed development.

² For values less than 100 units, the average trip rate provides the most accurate trip generations results for the ITE 220 Land Use Code. Consequently, the average trip rate has been applied to the 24 units within Phase 1 & 2.

Table 11 – Proposed Development Traffic Distribution

Travel Direction (to / from)	AM Peak Hour		PM Peak Hour	
	Ingress	Egress	Ingress	Egress
East via Main Street	16%	15%	15%	13%
West via Main Street	21%	16%	19%	22%
North via Toronto Street	38%	30%	32%	35%
South via Toronto Street	25%	39%	34%	30%
TOTAL	100%	100%	100%	100%

Using the traffic distributions pattern noted above, the traffic assignment for Phase 1 and 2 of the proposed development and the ultimate development was calculated for the AM and PM peak hour and are illustrated in **Figures 11** and **12**.

4.3 Total Horizon Year Traffic Volumes with the Proposed Development

For the total (2025) horizon year traffic volumes, the Phase 1 and 2 proposed development traffic was added to the background (2025) traffic volumes. For the total (2030 and 2035) horizon year traffic volumes, the ultimate development traffic was added to the background (2030 and 2035) traffic volumes. The resulting total (2025, 2030 and 2035) horizon year traffic volumes for the AM and PM peak hour are illustrated in **Figures 13** through **15**.

Figure 11 – Proposed Development Traffic Assignment – Phase 1 & 2

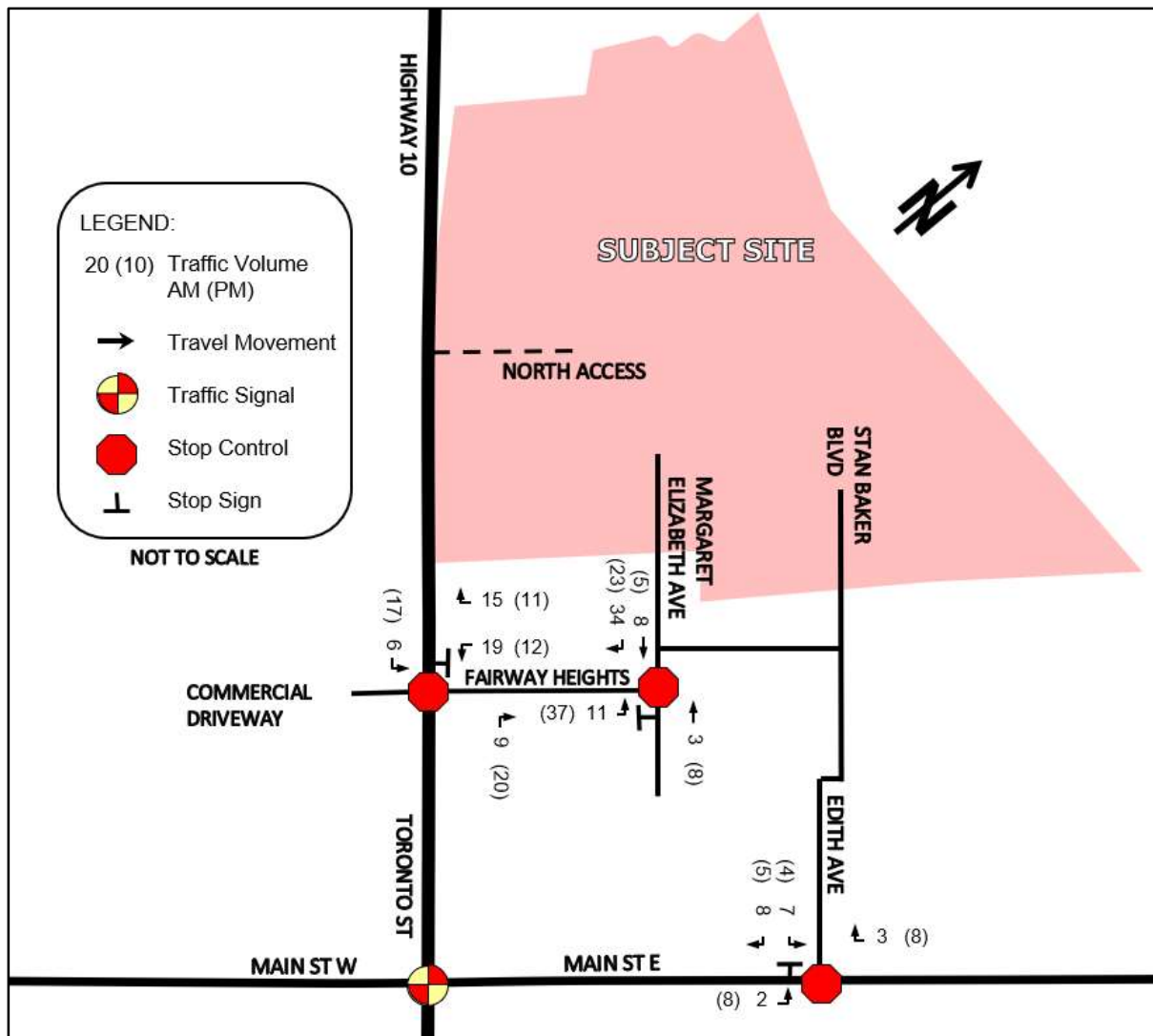


Figure 12 – Proposed Development Traffic Assignment – Ultimate Development

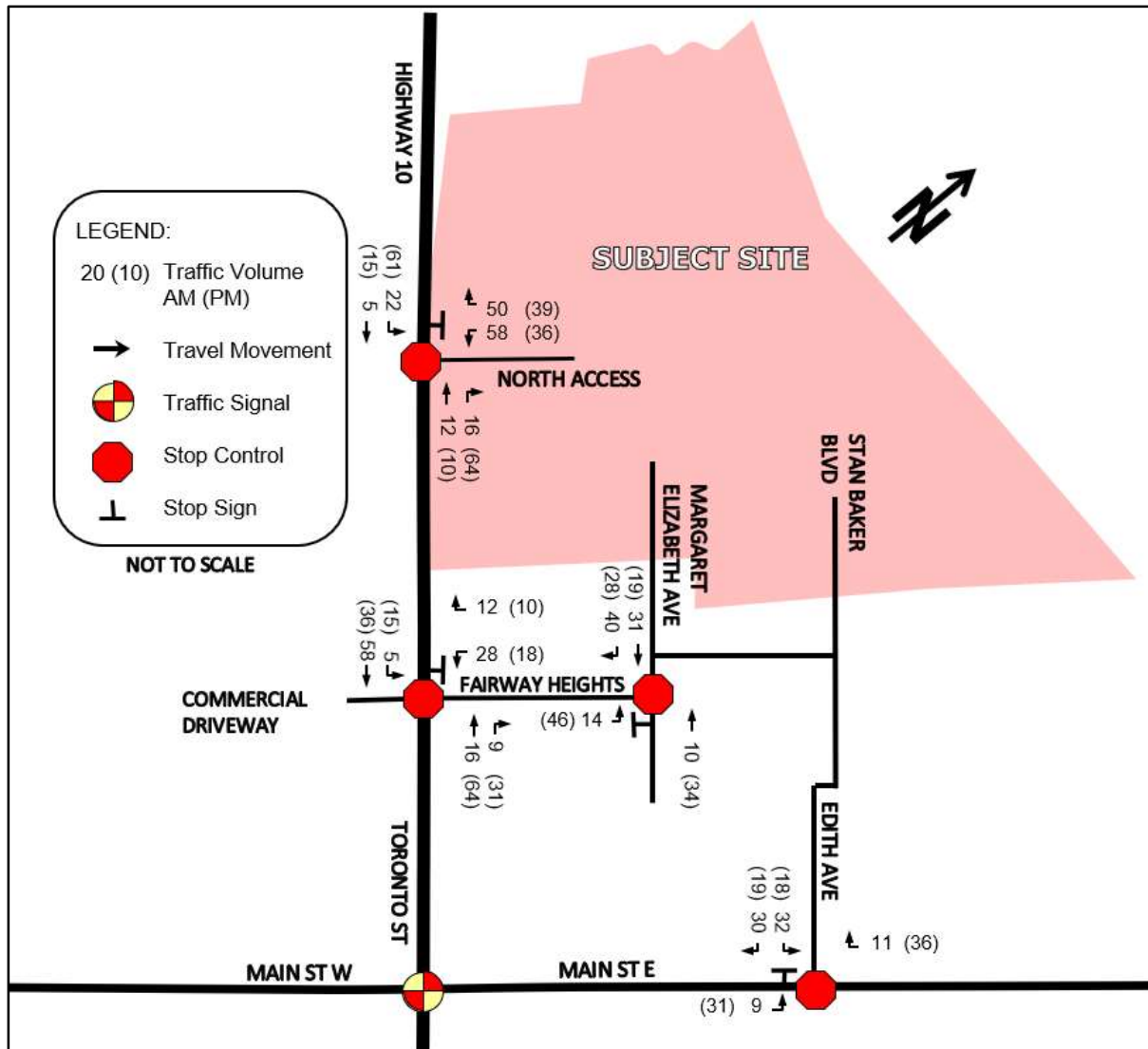


Figure 13 – Total (2025) Traffic Volumes

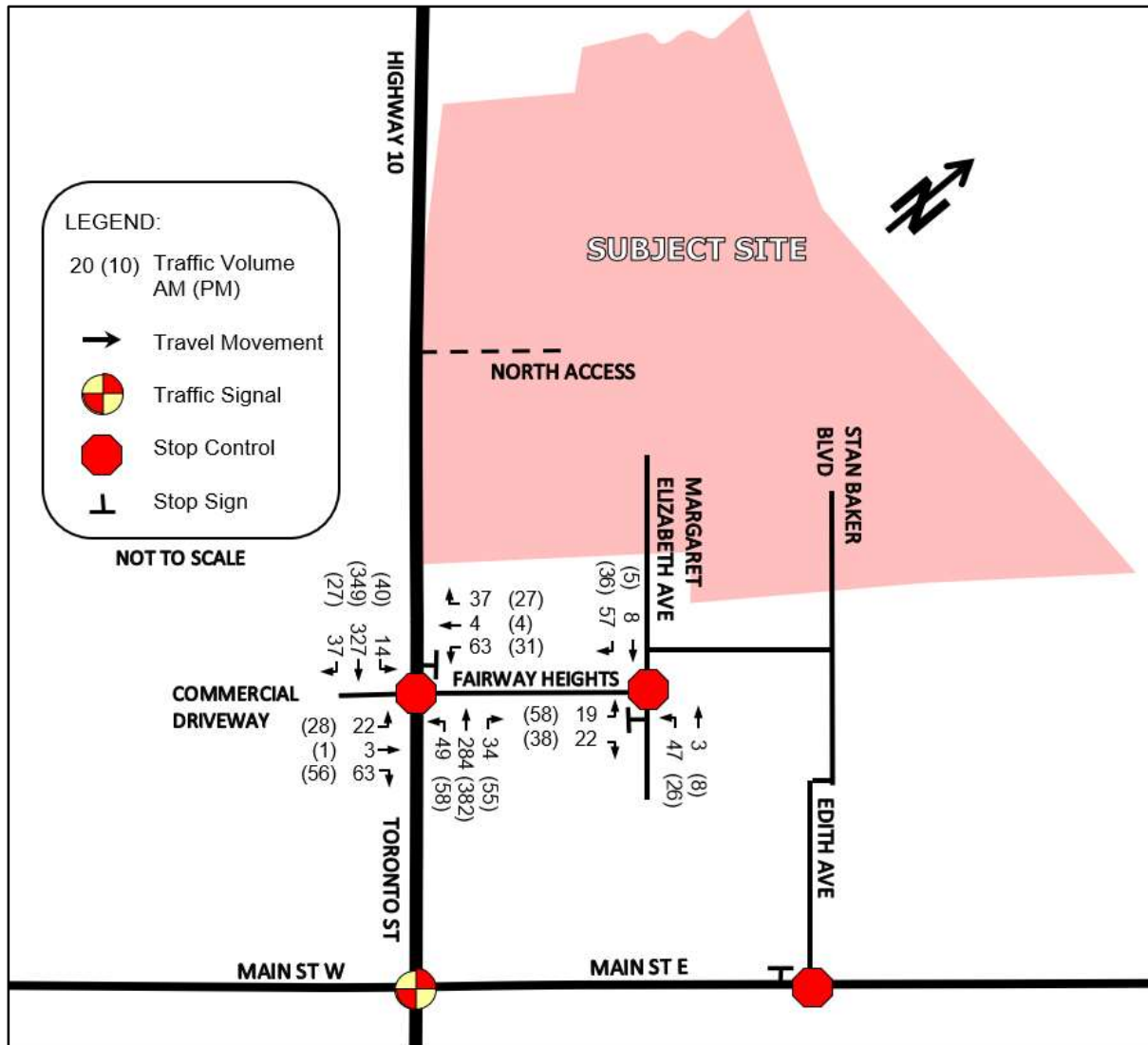


Figure 14 – Total (2030) Traffic Volumes

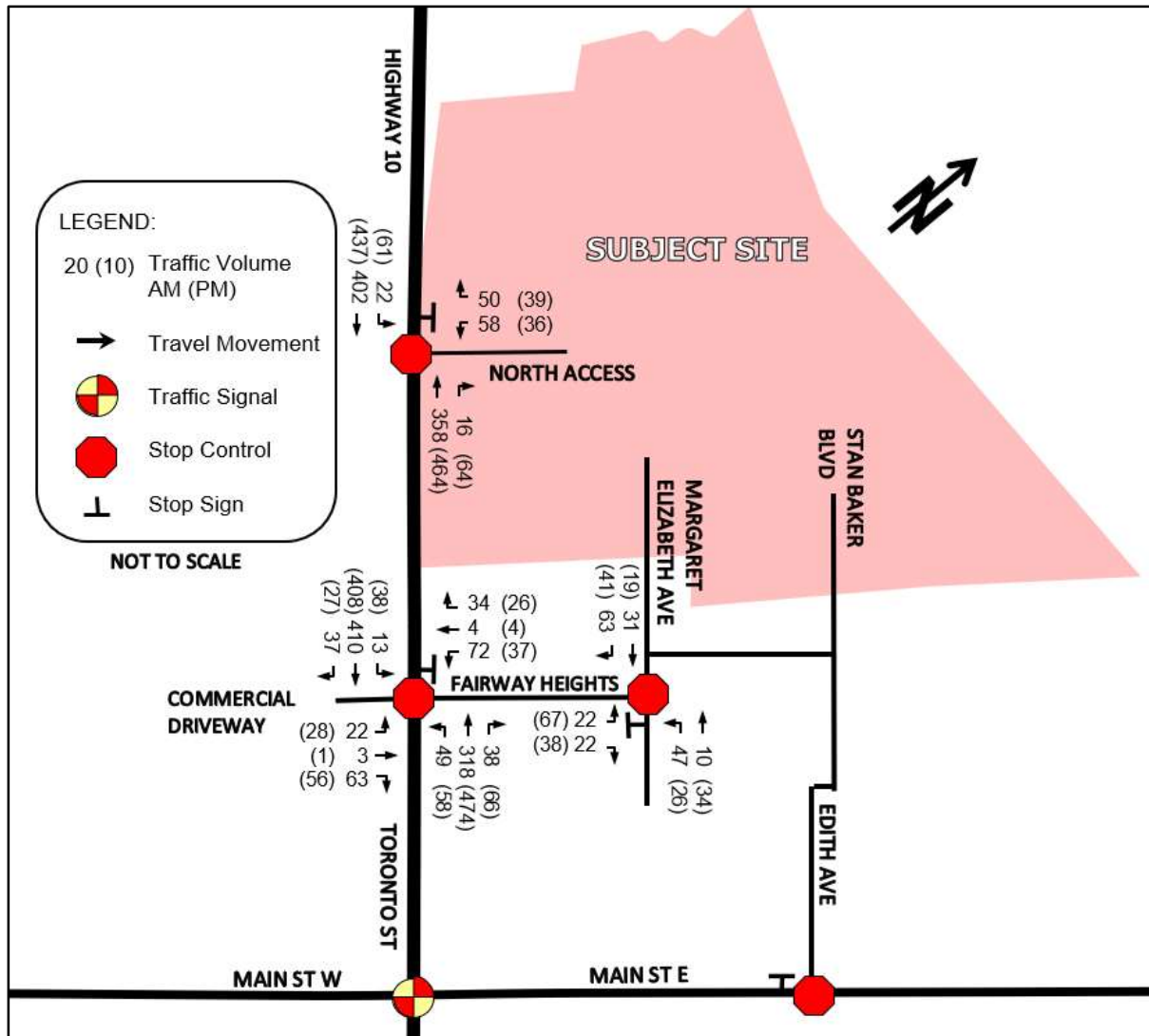
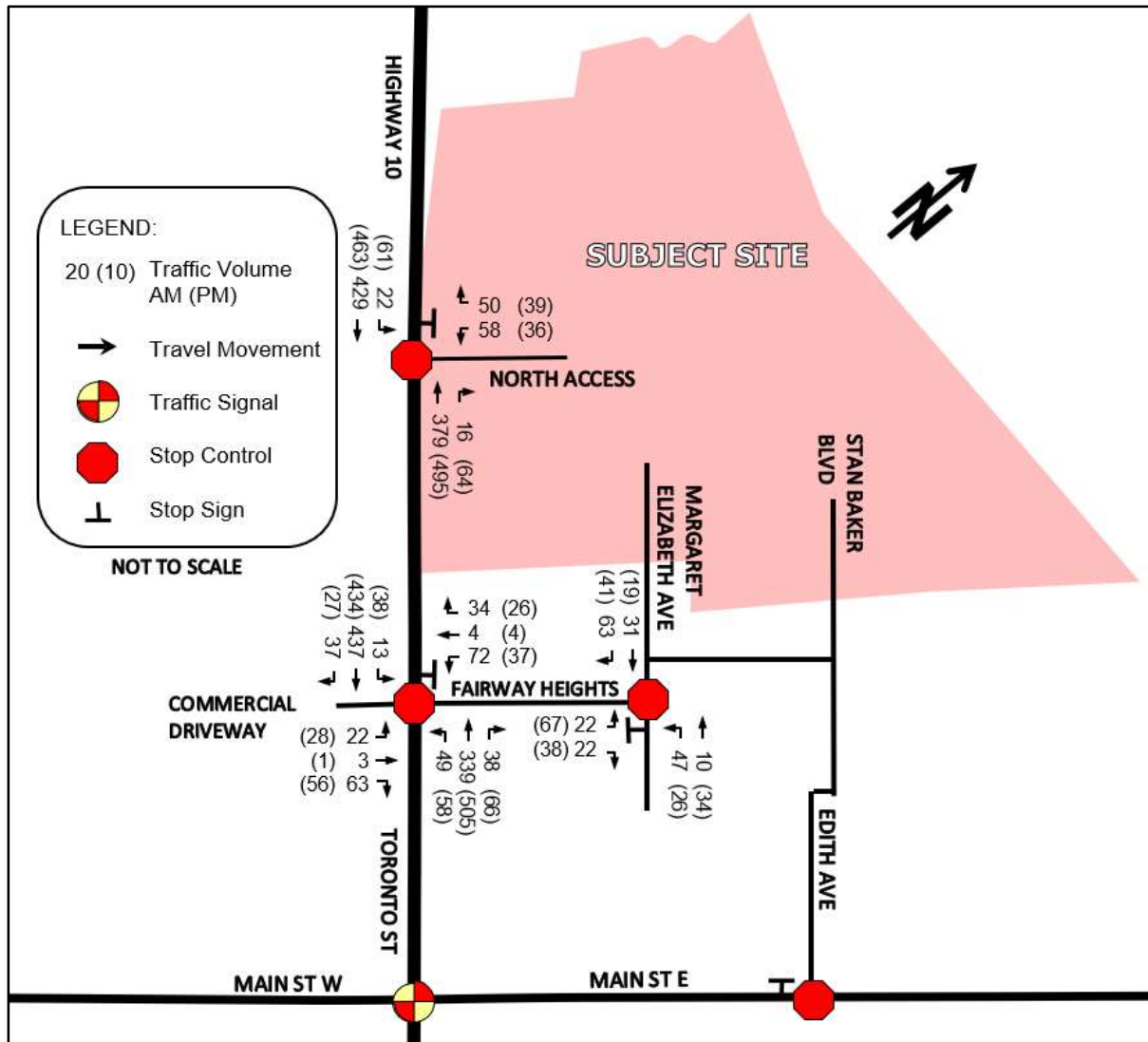


Figure 15 – Total (2035) Traffic Volumes



5 Intersection Operation with Proposed Development

5.1 Total (2025) Intersection Operation

The results of the LOS analysis under total (2025) traffic volumes during the AM and PM peak hour can be found below in **Table 12**. Existing intersection geometry and traffic control have been utilized for this scenario. Detailed output of the Synchro analysis can be found in **Appendix F**.

Table 12 – Total (2025) LOS

Location (E-W Street / N-S Street)	AM Peak Hour			PM Peak Hour		
	V/C	Delay (s)	LOS	V/C	Delay (s)	LOS
Commercial Driveway & Fairway Heights / Toronto Street (unsignalized)	-	5.8	B	-	4.8	A
EB	0.24	16.6	C	0.32	22.4	C
WB	0.46	30.6	D	0.34	30.6	D

The results of the LOS analysis indicate that the Commercial Driveway & Fairway Heights / Toronto Street intersection is operating within the typical design limits noted in Section 3.2.

An analysis was completed for left turn movements at the Commercial Driveway & Fairway Heights / Toronto Street intersection based on the criteria outlined in Appendix 9A of the MTO DS. According to the above-noted criteria a left turn lane is warranted in the northbound and southbound directions of the intersection (results are provided in **Appendix G**). The need for left turn lanes along Toronto Street is discussed further in Section 5.3.

A review of the need for an auxiliary right turn lane at the unsignalized study area intersections was completed as part of our analysis. The results of the Synchro analysis indicate that there is excess capacity for all movements; consequently, an auxiliary right turn lane is not recommended.

Based on the Ontario Traffic Manual Book 12 *Signal Justification*, traffic signals are not warranted at the unsignalized study area intersections (results are provided in **Appendix H**).

No infrastructure improvements are recommended within the study area.

5.2 Total (2030) Intersection Operation

The results of the LOS analysis under total (2030) traffic volumes during the AM and PM peak hour can be found below in **Table 13**. Existing intersection geometry and traffic control have been utilized for this scenario with the exception of below left turn lane recommendation.

Based on the criteria outlined in Appendix 9A of the MTO DS, an auxiliary southbound left turn lane is recommended at the North Access / Highway 10 intersection with a 25 metre storage length, 70 metre parallel length and 115 metre taper length (results are provided in **Appendix G**).

Detailed output of the Synchro analysis can be found in **Appendix F**.

Table 13 – Total (2030) LOS

Location (E-W Street / N-S Street)	AM Peak Hour			PM Peak Hour		
	V/C	Delay (s)	LOS	V/C	Delay (s)	LOS
Commercial Driveway & Fairway Heights / Toronto Street (unsignalized)	-	7.6	B	-	6.1	A
EB	0.29	19.6	C	0.40	29.7	D
WB	0.63	49.9	E	0.51	51.1	F
North Access / Highway 10 (unsignalized)	-	2.5	A	-	2.1	A
WB	0.32	18.9	C	0.31	23.6	C

The results of the LOS analysis indicate that the control delay for the westbound direction at the Commercial Driveway & Fairway Heights / Toronto Street intersection will operate outside the typical design limits noted in Section 3.2 during the PM peak hour; however, no improvements are recommended as the delay is only marginally outside design limits.

An analysis was completed for left turn movements at the Commercial Driveway & Fairway Heights / Toronto Street intersection based on the criteria outlined in Appendix 9A of the MTO DS. According to the above-noted criteria a left turn lane is warranted in the northbound and southbound directions of the intersection (results are provided in **Appendix G**). The need for left turn lanes along Toronto Street is discussed further in Section 5.3.

A review of the need for an auxiliary right turn lane at the unsignalized study area intersections was completed as part of our analysis. The results of the Synchro analysis indicate that there is excess capacity for all movements; consequently, an auxiliary right turn lane is not recommended.

Based on the Ontario Traffic Manual Book 12 *Signal Justification*, traffic signals are not warranted at the unsignalized study area intersections (results are provided in **Appendix H**).

No additional infrastructure improvements are recommended within the study area.

5.3 Total (2035) Intersection Operation

The results of the LOS analysis under total (2035) traffic volumes during the AM and PM peak hour can be found below in **Table 14**. Existing intersection geometry and traffic control have been utilized for this scenario with the exception of the left turn lane recommendation noted in Section 5.2. Detailed output of the Synchro analysis can be found in **Appendix F**.

Table 14 – Total (2035) LOS

Location (E-W Street / N-S Street)	AM Peak Hour			PM Peak Hour		
	V/C	Delay (s)	LOS	V/C	Delay (s)	LOS
Commercial Driveway & Fairway Heights / Toronto Street (unsignalized)	-	8.4	C	-	6.7	B
EB	0.31	21.0	C	0.44	33.6	D
WB	0.69	60.2	F	0.56	60.7	F
North Access / Highway 10 (unsignalized)	-	2.5	A	-	2.1	A
WB	0.34	20.2	C	0.33	25.8	D

The results of the LOS analysis indicate that the control delay for the westbound direction at the Commercial Driveway & Fairway Heights / Toronto Street intersection will operate outside the typical design limits noted in Section 3.2 during the AM and PM peak hours. However, no improvements are recommended as the delay is only marginally outside design limits. It is further noted that as the control delay for westbound movements on Fairway Heights increases, motorists choose to reroute and utilize the North Access until satisfactory operations are observed. Based on our review and in recognition of the excess capacity noted in Table 11, the North Access can accommodate the additional vehicles with while maintaining satisfactory operations.

An analysis was completed for left turn movements at the Commercial Driveway & Fairway Heights / Toronto Street intersection based on the criteria outlined in Appendix 9A of the MTO DS. According to the above-noted criteria a left turn lane is warranted in the northbound and southbound directions of the intersection (results are provided in **Appendix G**). The need for left turn lanes along Toronto Street is discussed further in Section 5.3.

A review of the need for an auxiliary right turn lane at the unsignalized study area intersections was completed as part of our analysis. The results of the Synchro analysis indicate that there is excess capacity for all movements; consequently, an auxiliary right turn lane is not recommended.

Based on the Ontario Traffic Manual Book 12 *Signal Justification*, traffic signals are not warranted at the unsignalized study area intersections (results are provided in **Appendix H**).

No additional infrastructure improvements are recommended within the study area.

5.4 Two Way Left Turn Lane on Toronto Street

A left turn lane is warranted at the Commercial Driveway & Fairway Heights / Toronto Street intersection in the northbound direction during the background (2025) scenario and in the southbound direction in the background (2030) scenario based on the criteria outlined in Appendix 9A of the MTO DS. With the increasing volume of traffic on Toronto Street, it is anticipated that a left turn lane will be warranted for multiple roads and access driveways along Toronto Street. Consequently, it is recommended that the Municipality explore widening Toronto Street to include a two-way-left-turn lane [TWLTL] within the community of Markdale.

A TWLTL will also have the added benefit of reducing the control delay for left turn vehicles from local roads and developments onto Toronto Street.

5.5 Margaret Elizabeth Avenue / Fairway Heights Traffic Impact Review

The volume of traffic approaching the Margaret Elizabeth Avenue / Fairway Heights intersection in each direction is less than 125 vehicles during the critical total (2035) scenario. This volume of traffic can be conveyed by an unsignalized T-intersection with a high level of service and significant excess capacity. The existing configuration of the Margaret Elizabeth Avenue / Fairway Heights intersection can safely and efficiently accommodate the anticipated traffic for the total (2035) scenario. No additional improvements are recommended at this intersection.

5.6 Speed Limit on Highway 10

Highway 10 has a posted speed limit of 80 km/hr north of 100 metres north of the southeast corner of the subject site and Toronto Street has a posted speed limit of 50 km/hr south of 100 metres north of the southeast corner of the subject site. The proposed location for the North Access is within the 80 km/hr zone. It is recommended that the 50 km/hr speed limit is extended to 100 metres north of the

North Access to provide reduced speeds for vehicles turning to/from the residential North Access and to reflect the residential nature of the adjacent lands.

It is our understanding that in order to make this adjustment, a speed change review must be completed by MTO staff. It is recommended that this review be undertaken to facilitate this change. Nevertheless, this report has considered the critical case, using higher speed limit of 80 km/hr.

In the event that MTO staff recommend a reduction in the posted speed limit on Highway 10 at the North Access, it is recommended that the storage, parallel and taper length for the southbound left turn lane on Highway 10 at the North Access are also revised, corresponding with the new speed limit.

5.7 Timing of North Access Construction

Based on the intersection operation analysis in Section 5.1, the North Access is not required to be constructed as a part of Phase 1 and 2 of the proposed development. The North Access will be required with the occupancy of the first unit of Phase 3 of the proposed development. As previously noted, it is recommended that a southbound left turn lane be constructed at the North Access, prior to the occupancy of Phase 3.

5.8 Toronto Street / Main Street Traffic Operations

General concerns have been raised with regards to traffic operations on Toronto Street and Main Street, in the commercial core of the village, south of the subject site. JD Engineering prepared an addendum letter dated July 12th, 2022, to comment on the concerns and review transportation options.

It is our recommendation that the Municipality complete a comprehensive review of the traffic operations and identify transportation objectives in the above-noted area, in order to determine the preferred approach that will align with the community's vision for the operation and function for the area. Based on our preliminary review, it is anticipated that the following transportation options would be included:

- Maintain the existing street parking and lane configuration;
- Adjust vehicle lanes and street parking to increase sidewalk area to allow for street patios;
- Relocate some or all of the existing street parking and create enhanced pedestrian and active transportation infrastructure;
- Relocate some or all of the existing street parking and create additional vehicle lanes; or
- Widen the existing road surface to maintain the existing street parking and expand the vehicle lanes.

The approach selected will have a significant impact on the atmosphere and operation within the commercial core of the village, consequently, it is our recommendation that the Municipality complete a comprehensive review including consultation with local residents and stakeholders to ensure the transportation alternative selected aligns with the vision for the area.

5.9 Active Transportation Review

There are no cycling routes within the study area; however, "The Grey County CP Trail" runs generally parallel to Highway 10 on the west end of the community of Markdale within the study area. Cyclists from the subject site would be required to share the existing road network with all other users within the community of Markdale.

The proposed development will include a sidewalk along all internal roads, to provide pedestrian connectivity and connect into existing and future sidewalk infrastructure adjacent to the subject site.

5.10 Sight Distance Review

A review of the available sight distance for the proposed site access roadway was completed as part of this analysis.

The sight distance north and south of the North Access at Highway 10 (greater than 300 metres) is greater than the minimum stopping and intersection sight distance requirements as identified in the Transportation Association of Canada *Design Guide for Canadian Roads* (2017) [TAC Guidelines] for a design speed of 100km/h (185 metres and 210 metres).

There are no issues with the sight distance for the proposed site access roadway.

5.11 Site Access

The North Access at Highway 10 will operate efficiently as a full-movement access, with one-way stop control for the westbound movements. A southbound left turn lane with a 25 metre storage length, 70 metre parallel length and 115 metre taper length is recommended on Highway 10 at the North Access. A single eastbound and westbound lane at the North Access at Highway 10 will provide the necessary capacity to service the proposed development.

6 Summary

LC Development Group Inc. retained **JD Engineering** to prepare this traffic impact study in support of the proposed development of a property municipally known as 775309 Highway 10 in the Municipality of Grey Highlands [Municipality], County of Grey [County]. The proposed Site Plan is shown in **Appendix A**. This chapter summarizes the conclusions and recommendations from the study.

1. The proposed development is expected to generate a total of 281 AM and 378PM peak hour trips with Phase 1 and 2 of the proposed development is expected to generate a total of 65 AM and 85 PM peak hour trips.
2. Detailed turning movement traffic and pedestrian counts for the Toronto Street / Fairway Heights & Commercial Driveway intersection were commissioned by JD Engineering. Detailed turning movement traffic and pedestrian counts for the Toronto Street / Main Street intersection we also obtained from the Municipality.
3. An intersection operation analysis was completed at the study area intersections, using the existing (2022) and background (2025, 2030 and 2035) traffic volumes, with the adjacent development traffic and without the proposed development traffic, if the proposed development did not proceed. This enabled a review of existing and future traffic deficiencies that would be present without the influence of the proposed development. No geometric lane improvements or traffic signal improvements are recommended within the study area.
4. An estimate of the amount of traffic that would be generated by the proposed development was prepared and assigned to the study area streets and intersections.
5. An intersection operation analysis was completed under total (2025, 2030 and 2035) traffic volumes with the proposed development operational at the study area intersections. The following geometric lane improvements or traffic signal improvements are recommended within the study area to accommodate the proposed development.

North Access / Highway 10

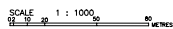
- Construction of an auxiliary southbound left turn lane with a 25 metre storage length, 70 metre parallel length and 115 metre taper length

Highway 10

- It is recommended that the necessary speed change review be undertaken to facilitate the extension of the Toronto Street 50 km/hr speed limit to 100 metres north of the North Access
 - In the event that MTO staff recommend a reduction in the posted speed limit on Highway 10 at the North Access, it is recommended that the storage, parallel and taper length for the southbound left turn lane on Highway 10 at the North Access are also revised, corresponding with the new speed limit.
6. It is recommended the Municipality explore constructing a two-way-left-turn lane [TWLTL] on Toronto Street within the community of Markdale.
 7. The North Access will operate efficiently as a full-movement access, with one-way stop control for the westbound movements. A single eastbound and westbound lane at the North Access roadway will provide the necessary capacity to service the proposed development together with the Margaret Elizabeth Avenue and Stan Baker Boulevard extensions.
 8. The sight distance available for the North Access meets the minimum stopping and intersection sight distance requirements.
 9. The North Access is not required to be constructed as a part of Phase 1 and 2 of the proposed development. The North Access will be required with the occupancy of the first unit of Phase 3 of the proposed development.
 10. In summary, the proposed development will not cause any operational issues and will not add a notable delay or congestion to the local roadway network.

Appendix A – Site Plan

DRAFT PLAN OF SUBDIVISION OF
PART OF LOTS 95, 96 & 97
CONCESSION 1 N.E.T.S.R.
GEOGRAPHIC TOWNSHIP OF ARTEMESIA
MUNICIPALITY OF GREY HIGHLANDS
COUNTY OF GREY

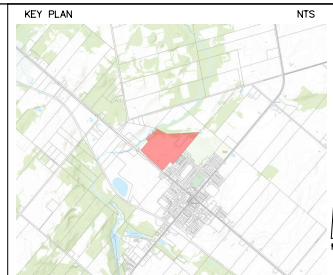


METRIC
DISTANCES AND COORDINATES SHOWN ON THIS PLAN ARE
IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING
BY 3.28

PLAN CONTENTS

PLAN CONTENTS

- SECTION 51(7) OF THE PLANNING ACT
- A. BOUNDARY CERTIFICATION IS SET OUT BELOW
 - B. LOCATION OF HIGHWAY IS SHOWN HEREON
 - C. AS SHOWN HEREON
 - D. THE PURPOSE OF THE PROPOSED LOTS IS RESIDENTIAL
 - E. THE USE OF ADJOINING LANDS IS SHOWN HEREON
 - F. LAYOUT AND DIMENSIONS OF PROPOSED LOTS ARE SHOWN HEREON
 - G. EXISTING STRUCTURES ARE SHOWN HEREON
 - H. MUNICIPAL WATER
 - I. SOIL IS SANDY LOAM AND CLAY
 - J. CONTOURS ARE SHOWN HEREON
 - K. MUNICIPAL SERVICES - WATER & SEWER
 - L. NO EXISTING EASEMENTS & RIGHTS OF WAY



SURVEYOR'S CERTIFICATE

I HEREBY CERTIFY THAT THE BOUNDARIES OF THE LAND IN THE SUBDIVISION (SHOWN IN HEAVY OUTLINE) AND THEIR RELATIONSHIP TO THE ADJACENT LANDS ARE CORRECTLY SHOWN ON THIS PLAN.

MARCH 8, 2022
DATED

C. D. BUNKER
ONTARIO LAND SURVEYOR

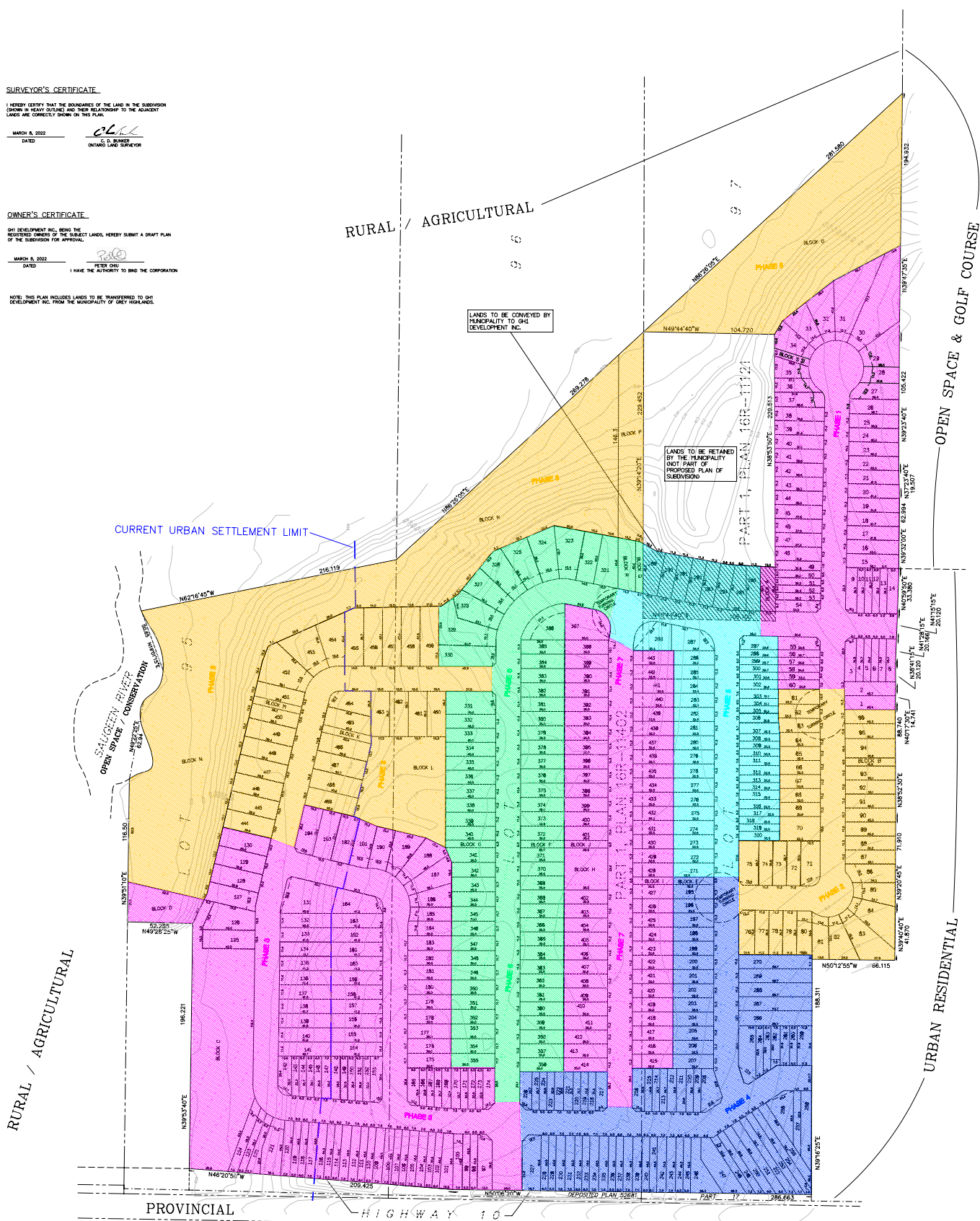
OWNER'S CERTIFICATE

GHI DEVELOPMENT INC., BEING THE REGISTERED OWNERS OF THE SUBJECT LANDS, HEREBY SUBMIT A DRAFT PLAN OF THE SUBDIVISION FOR APPROVAL.

MARCH 8, 2022
DATED

PETER CHU
I HAVE THE AUTHORITY TO BIND THE CORPORATION

NOTE: THIS PLAN INCLUDES LANDS TO BE TRANSFERRED TO GH1 DEVELOPMENT INC. FROM THE MUNICIPALITY OF GREY HIGHLANDS.



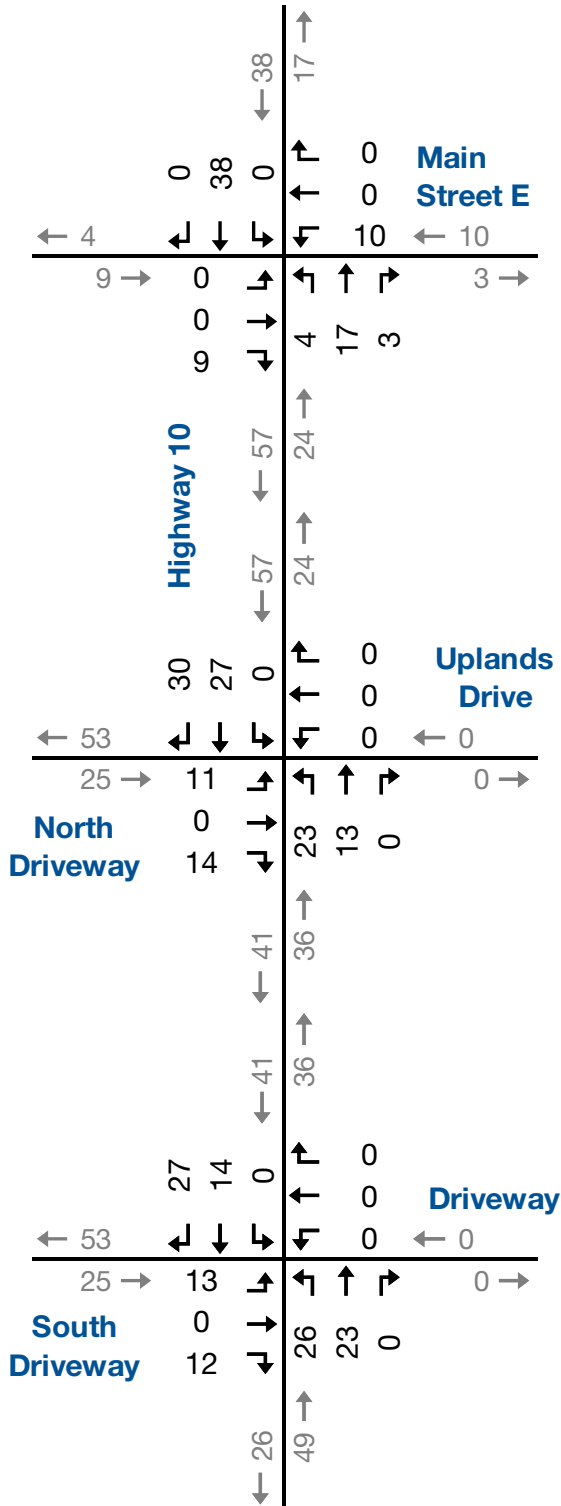
MARCH 8, 2022

OPEN SPACE / RURAL

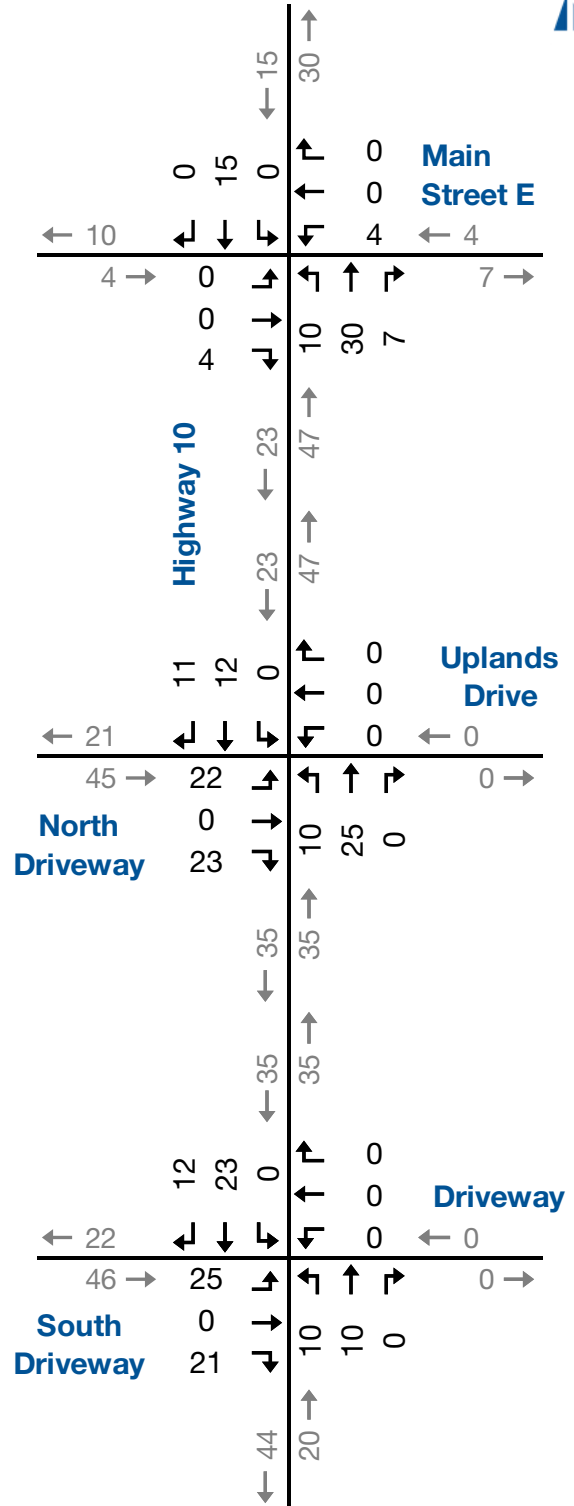
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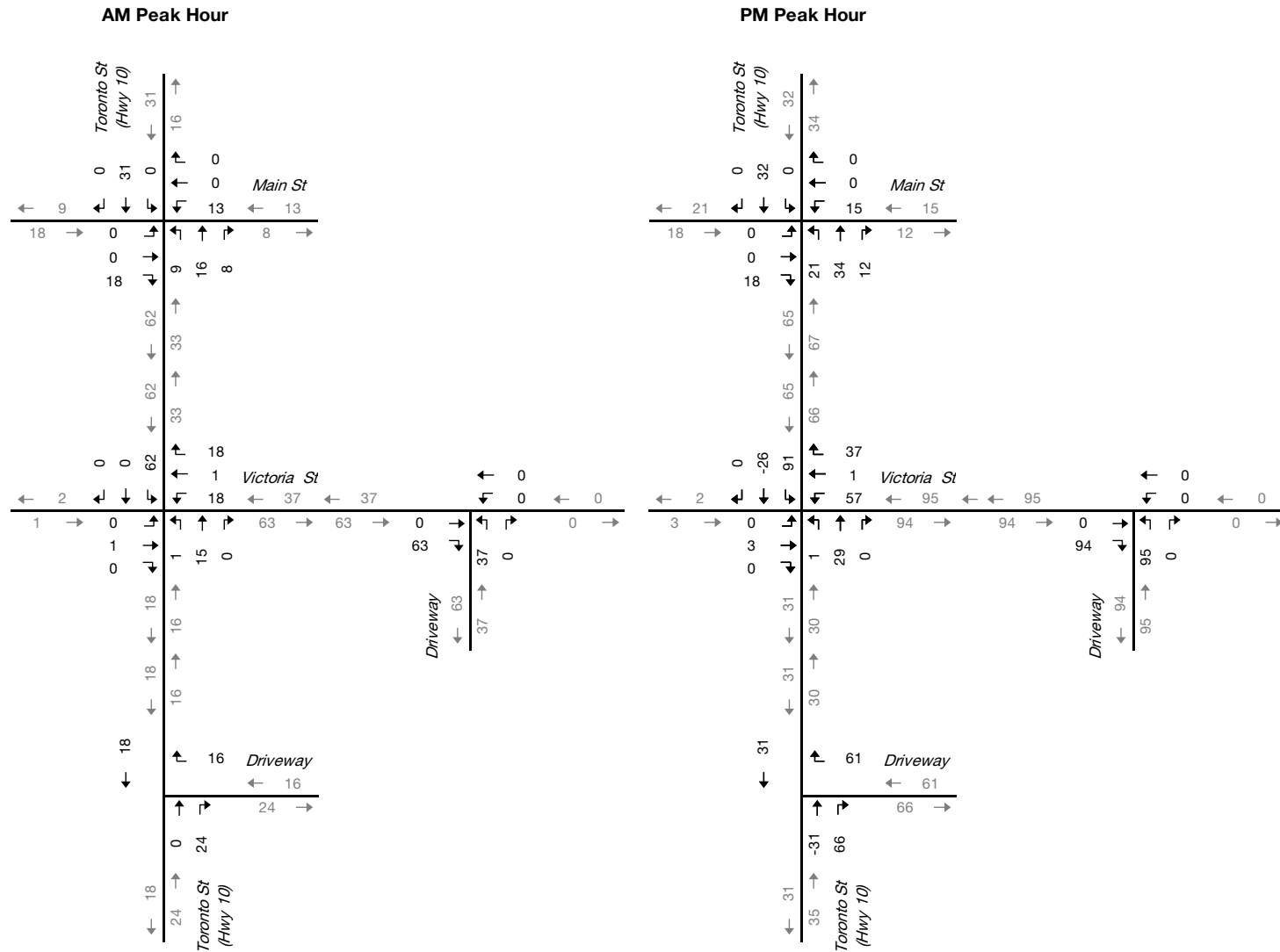
Appendix B – Adjacent Development Excerpts

AM Peak Hour



PM Peak Hour





Appendix C – Traffic Count Data

Morning Peak Diagram		Specified Period From: 7:00:00 To: 9:00:00	One Hour Peak From: 8:00:00 To: 9:00:00
Municipality: Markdale Site #: 2222000001 Intersection: HWY 10 & Fairway Heights TFR File #: 1 Count date: 17-Nov-22		Weather conditions: Person counted: Person prepared: Person checked:	
** Non-Signalized Intersection **		Major Road: HWY 10 runs N/S	

North Leg Total: 452 North Entering: 259 North Peds: 0 Peds Cross:	<table style="width: 100%; border-collapse: collapse;"> <tr><td>Heavys</td><td>2</td><td>21</td><td>0</td><td>23</td></tr> <tr><td>Trucks</td><td>2</td><td>7</td><td>0</td><td>9</td></tr> <tr><td>Cars</td><td>33</td><td>192</td><td>2</td><td>227</td></tr> <tr><td>Totals</td><td>37</td><td>220</td><td>2</td><td></td></tr> </table>	Heavys	2	21	0	23	Trucks	2	7	0	9	Cars	33	192	2	227	Totals	37	220	2		<table style="width: 100%; border-collapse: collapse;"> <tr><td>Heavys</td><td>19</td></tr> <tr><td>Trucks</td><td>8</td></tr> <tr><td>Cars</td><td>166</td></tr> <tr><td>Totals</td><td>193</td></tr> </table>	Heavys	19	Trucks	8	Cars	166	Totals	193	East Leg Total: 49 East Entering: 31 East Peds: 1 Peds Cross:
Heavys	2	21	0	23																											
Trucks	2	7	0	9																											
Cars	33	192	2	227																											
Totals	37	220	2																												
Heavys	19																														
Trucks	8																														
Cars	166																														
Totals	193																														

Heavys	Trucks	Cars	Totals
3	2	85	90

Commercial driveway

Heavys	Trucks	Cars	Totals
1	0	21	22
0	0	3	3
2	2	59	63
3	2	83	

HWY 10

HWY 10

Cars	Trucks	Heavys	Totals
5	0	0	5
4	0	0	4
20	0	2	22
29	0	2	

Fairway Heights

Cars	Trucks	Heavys	Totals
17	0	1	18

Peds Cross: West Peds: 1 West Entering: 88 West Leg Total: 178	<table style="width: 100%; border-collapse: collapse;"> <tr><td>Cars</td><td>271</td></tr> <tr><td>Trucks</td><td>9</td></tr> <tr><td>Heavys</td><td>25</td></tr> <tr><td>Totals</td><td>305</td></tr> </table>	Cars	271	Trucks	9	Heavys	25	Totals	305	<table style="width: 100%; border-collapse: collapse;"> <tr><td>Cars</td><td>48</td><td>140</td><td>12</td><td>200</td></tr> <tr><td>Trucks</td><td>0</td><td>8</td><td>0</td><td>8</td></tr> <tr><td>Heavys</td><td>1</td><td>18</td><td>1</td><td>20</td></tr> <tr><td>Totals</td><td>49</td><td>166</td><td>13</td><td></td></tr> </table>	Cars	48	140	12	200	Trucks	0	8	0	8	Heavys	1	18	1	20	Totals	49	166	13		Peds Cross: South Peds: 1 South Entering: 228 South Leg Total: 533
Cars	271																														
Trucks	9																														
Heavys	25																														
Totals	305																														
Cars	48	140	12	200																											
Trucks	0	8	0	8																											
Heavys	1	18	1	20																											
Totals	49	166	13																												

Comments

<h2 style="margin: 0;">Mid-day Peak Diagram</h2>		Specified Period From: 11:00:00 To: 13:00:00	One Hour Peak From: 11:30:00 To: 12:30:00
Municipality: Markdale Site #: 2222000001 Intersection: HWY 10 & Fairway Heights TFR File #: 1 Count date: 17-Nov-22		Weather conditions: Person counted: Person prepared: Person checked:	
** Non-Signalized Intersection **		Major Road: HWY 10 runs N/S	

North Leg Total: 377 North Entering: 195 North Peds: 0 Peds Cross:	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: right;">Heavys</td> <td style="text-align: right;">0</td> <td style="text-align: right;">20</td> <td style="text-align: right;">0</td> <td style="border-left: 1px solid black; text-align: right;">20</td> </tr> <tr> <td style="text-align: right;">Trucks</td> <td style="text-align: right;">3</td> <td style="text-align: right;">11</td> <td style="text-align: right;">0</td> <td style="border-left: 1px solid black; text-align: right;">14</td> </tr> <tr> <td style="text-align: right;">Cars</td> <td style="text-align: right;">18</td> <td style="text-align: right;">143</td> <td style="text-align: right;">0</td> <td style="border-left: 1px solid black; text-align: right;">161</td> </tr> <tr> <td style="text-align: right;">Totals</td> <td style="text-align: right;">21</td> <td style="text-align: right;">174</td> <td style="text-align: right;">0</td> <td style="border-left: 1px solid black; text-align: right;"></td> </tr> </table>	Heavys	0	20	0	20	Trucks	3	11	0	14	Cars	18	143	0	161	Totals	21	174	0		<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: right;">Heavys</td> <td style="text-align: right;">11</td> </tr> <tr> <td style="text-align: right;">Trucks</td> <td style="text-align: right;">9</td> </tr> <tr> <td style="text-align: right;">Cars</td> <td style="text-align: right;">162</td> </tr> <tr> <td style="text-align: right;">Totals</td> <td style="text-align: right;">182</td> </tr> </table>	Heavys	11	Trucks	9	Cars	162	Totals	182	East Leg Total: 35 East Entering: 21 East Peds: 0 Peds Cross:
Heavys	0	20	0	20																											
Trucks	3	11	0	14																											
Cars	18	143	0	161																											
Totals	21	174	0																												
Heavys	11																														
Trucks	9																														
Cars	162																														
Totals	182																														

Heavys	Trucks	Cars	Totals
2	3	64	69

HWY 10

Cars	Trucks	Heavys	Totals
3	0	0	3
3	0	0	3
15	0	0	15
21	0	0	

Commercial driveway

Heavys	Trucks	Cars	Totals
1	0	16	17
0	0	0	0
0	2	50	52
1	2	66	

W N E
 S

Fairway Heights

Cars	Trucks	Heavys	Totals
14	0	0	14

Peds Cross:
 West Peds: 0
 West Entering: 69
 West Leg Total: 138

Cars	208
Trucks	13
Heavys	20
Totals	241

Cars	43	143	14	200
Trucks	0	9	0	9
Heavys	2	10	0	12
Totals	45	162	14	

Peds Cross:
 South Peds: 0
 South Entering: 221
 South Leg Total: 462

Comments

<h2>Afternoon Peak Diagram</h2>		Specified Period From: 15:00:00 To: 19:00:00	One Hour Peak From: 16:15:00 To: 17:15:00
Municipality: Markdale Site #: 2222000001 Intersection: HWY 10 & Fairway Heights TFR File #: 1 Count date: 17-Nov-22		Weather conditions: Person counted: Person prepared: Person checked:	
** Non-Signalized Intersection **		Major Road: HWY 10 runs N/S	

North Leg Total: 528 North Entering: 242 North Peds: 0 Peds Cross:	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: right;">Heavys</td> <td style="text-align: right;">0</td> <td style="text-align: right;">13</td> <td style="text-align: right;">0</td> <td style="border-left: 1px solid black; text-align: right;">13</td> </tr> <tr> <td style="text-align: right;">Trucks</td> <td style="text-align: right;">1</td> <td style="text-align: right;">4</td> <td style="text-align: right;">0</td> <td style="border-left: 1px solid black; text-align: right;">5</td> </tr> <tr> <td style="text-align: right;">Cars</td> <td style="text-align: right;">26</td> <td style="text-align: right;">193</td> <td style="text-align: right;">5</td> <td style="border-left: 1px solid black; text-align: right;">224</td> </tr> <tr> <td style="text-align: right;">Totals</td> <td style="text-align: right;">27</td> <td style="text-align: right;">210</td> <td style="text-align: right;">5</td> <td style="border-left: 1px solid black; text-align: right;">246</td> </tr> </table>	Heavys	0	13	0	13	Trucks	1	4	0	5	Cars	26	193	5	224	Totals	27	210	5	246	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: right;">Heavys</td> <td style="text-align: right;">8</td> </tr> <tr> <td style="text-align: right;">Trucks</td> <td style="text-align: right;">3</td> </tr> <tr> <td style="text-align: right;">Cars</td> <td style="text-align: right;">275</td> </tr> <tr> <td style="text-align: right;">Totals</td> <td style="text-align: right;">286</td> </tr> </table>	Heavys	8	Trucks	3	Cars	275	Totals	286	East Leg Total: 36 East Entering: 15 East Peds: 2 Peds Cross:
Heavys	0	13	0	13																											
Trucks	1	4	0	5																											
Cars	26	193	5	224																											
Totals	27	210	5	246																											
Heavys	8																														
Trucks	3																														
Cars	275																														
Totals	286																														

Heavys	Trucks	Cars	Totals
0	1	88	89

HWY 10

Cars	Trucks	Heavys	Totals
4	0	0	4
4	0	0	4
7	0	0	7
15	0	0	15

Commercial driveway

N
S
E
W

Fairway Heights

Heavys	Trucks	Cars	Totals
0	0	28	28
0	0	1	1
0	1	55	56
0	1	84	85

HWY 10

Cars	Trucks	Heavys	Totals
21	0	0	21

Peds Cross: West Peds: 1 West Entering: 85 West Leg Total: 174	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: right;">Cars</td> <td style="text-align: right;">255</td> </tr> <tr> <td style="text-align: right;">Trucks</td> <td style="text-align: right;">5</td> </tr> <tr> <td style="text-align: right;">Heavys</td> <td style="text-align: right;">13</td> </tr> <tr> <td style="text-align: right;">Totals</td> <td style="text-align: right;">273</td> </tr> </table>	Cars	255	Trucks	5	Heavys	13	Totals	273	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: right;">Cars</td> <td style="text-align: right;">58</td> <td style="text-align: right;">243</td> <td style="text-align: right;">15</td> <td style="border-left: 1px solid black; text-align: right;">316</td> </tr> <tr> <td style="text-align: right;">Trucks</td> <td style="text-align: right;">0</td> <td style="text-align: right;">3</td> <td style="text-align: right;">0</td> <td style="border-left: 1px solid black; text-align: right;">3</td> </tr> <tr> <td style="text-align: right;">Heavys</td> <td style="text-align: right;">0</td> <td style="text-align: right;">8</td> <td style="text-align: right;">0</td> <td style="border-left: 1px solid black; text-align: right;">8</td> </tr> <tr> <td style="text-align: right;">Totals</td> <td style="text-align: right;">58</td> <td style="text-align: right;">254</td> <td style="text-align: right;">15</td> <td style="border-left: 1px solid black; text-align: right;">327</td> </tr> </table>	Cars	58	243	15	316	Trucks	0	3	0	3	Heavys	0	8	0	8	Totals	58	254	15	327	Peds Cross: South Peds: 2 South Entering: 327 South Leg Total: 600
Cars	255																														
Trucks	5																														
Heavys	13																														
Totals	273																														
Cars	58	243	15	316																											
Trucks	0	3	0	3																											
Heavys	0	8	0	8																											
Totals	58	254	15	327																											

Comments

Total Count Diagram

Municipality: Markdale
Site #: 2222000001
Intersection: HWY 10 & Fairway Heights
TFR File #: 1
Count date: 17-Nov-22

Weather conditions:

Person counted:
Person prepared:
Person checked:

**** Non-Signalized Intersection ****


Major Road: HWY 10 runs N/S

North Leg Total: 3273
North Entering: 1633
North Peds: 1
Peds Cross: 

	Heavys	Trucks	Cars	Totals
North	3	7	193	203
East	113	46	1245	1404
South	1	0	25	26
West	117	53	1463	1633



	Heavys	Trucks	Cars	Totals
North	94	40	1506	1640
East	311	157	5	473
South	8	1893	3778	5679
West	1	555	1114	1670

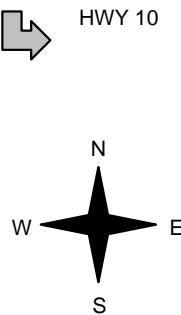
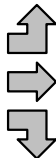
East Leg Total: 311
East Entering: 157
East Peds: 5
Peds Cross: 

Heavys	Trucks	Cars	Totals
6	8	545	559



Commercial driveway

Heavys	Trucks	Cars	Totals
3	0	152	155
0	0	20	20
2	7	371	380
5	7	543	555



HWY 10



Cars	Trucks	Heavys	Totals
34	0	0	34
22	0	0	22
96	0	5	101
152	0	5	157

Fairway Heights



Cars	Trucks	Heavys	Totals
150	0	4	154

Peds Cross: 
West Peds: 3
West Entering: 555
West Leg Total: 1114

	Cars	Trucks	Heavys	Totals
West	1712	53	120	1885
East	330	1	3	334
South	1320	40	91	1451
North	105	0	3	108



	Cars	Trucks	Heavys	Totals
West	330	1	3	334
East	1320	40	91	1451
South	105	0	3	108
North	1755	41	97	1893

Peds Cross: 
South Peds: 8
South Entering: 1893
South Leg Total: 3778

Comments

Toronto Street (Hwy 10) & Main Street

Morning Peak Diagram

Specified Period

From: 6:00:00

To: 10:00:00

One Hour Peak

From: 8:15:00

To: 9:15:00

Municipality: Markdale

Site #: 0000007301

Intersection: Toronto Street (Hwy 10) & Main Street

TFR File #: 1

Count date: 5-Oct-2016

Weather conditions:

Clear

Person(s) who counted:

**** Signalized Intersection ****

Major Road: Toronto Street (Hwy 10) runs N/S

North Leg Total: 542

North Entering: 303

North Peds: 12

Peds Cross: \times

Heavys	0	9	1	10
Trucks	0	14	1	15
Cars	54	193	31	278
Totals	54	216	33	



Heavys	12
Trucks	10
Cars	217
Totals	239

East Leg Total: 241

East Entering: 125

East Peds: 2

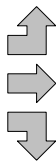
Peds Cross: \times

Heavys	Trucks	Cars	Totals
5	1	125	131

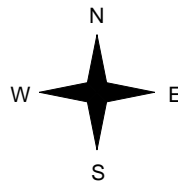


Main Street

Heavys	Trucks	Cars	Totals
1	1	48	50
5	1	58	64
1	6	49	56
7	8	155	



Toronto Street (Hwy 10)



Cars	Trucks	Heavys	Totals
33	0	0	33
47	0	3	50
36	1	5	42
116	1	8	

Main Street



Cars	Trucks	Heavys	Totals
105	2	9	116

Peds Cross: \times

West Peds: 7

West Entering: 170

West Leg Total: 301

Cars	278	Cars	24	136	16	176
Trucks	21	Trucks	1	9	0	10
Heavys	15	Heavys	2	11	3	16
Totals	314	Totals	27	156	19	



Peds Cross: \times

South Peds: 16

South Entering: 202

South Leg Total: 516

Comments

Toronto Street (Hwy 10) & Main Street

Afternoon Peak Diagram

Specified Period

From: 15:00:00

To: 19:00:00

One Hour Peak

From: 16:30:00

To: 17:30:00

Municipality: Markdale

Site #: 0000007301

Intersection: Toronto Street (Hwy 10) & Main Street

TFR File #: 1

Count date: 5-Oct-2016

Weather conditions:

Clear

Person(s) who counted:

**** Signalized Intersection ****

Major Road: Toronto Street (Hwy 10) runs N/S

North Leg Total: 672

North Entering: 320

North Peds: 13

Peds Cross: \times

Heavys	0	14	0	14
Trucks	2	6	0	8
Cars	78	188	32	298
Totals	80	208	32	



Heavys	5
Trucks	8
Cars	339
Totals	352

East Leg Total: 280

East Entering: 152

East Peds: 9

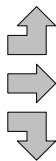
Peds Cross: \times

Heavys	Trucks	Cars	Totals
2	5	208	215

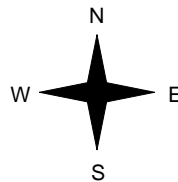


Main Street

Heavys	Trucks	Cars	Totals
0	1	62	63
0	1	65	66
2	0	51	53
2	2	178	



Toronto Street (Hwy 10)



Cars	Trucks	Heavys	Totals
42	1	0	43
73	1	1	75
34	0	0	34
149	2	1	



Main Street



Cars	Trucks	Heavys	Totals
127	1	0	128

Peds Cross: \times

West Peds: 8

West Entering: 182

West Leg Total: 397

Cars	273	Cars	57	235	30	322
Trucks	6	Trucks	2	6	0	8
Heavys	16	Heavys	1	5	0	6
Totals	295	Totals	60	246	30	



Peds Cross: \times

South Peds: 18

South Entering: 336

South Leg Total: 631

Comments

Toronto Street (Hwy 10) & Main Street

Total Count Diagram

Municipality: Markdale

Site #: 0000007301

Intersection: Toronto Street (Hwy 10) & Main Street

TFR File #: 1

Count date: 5-Oct-2016

Weather conditions:

Clear

Person(s) who counted:

**** Signalized Intersection ****

Major Road: Toronto Street (Hwy 10) runs N/S

North Leg Total: 3886

North Entering: 1927

North Peds: 102

Peds Cross: \bowtie

Heavys	2	84	2	88
Trucks	9	64	4	77
Cars	381	1212	169	1762
Totals	392	1360	175	



Heavys	77
Trucks	73
Cars	1809
Totals	1959

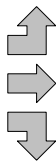
East Leg Total: 1590
East Entering: 844
East Peds: 51
Peds Cross: \bowtie

Heavys	Trucks	Cars	Totals
20	30	1004	1054

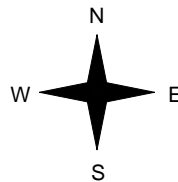


Main Street

Heavys	Trucks	Cars	Totals
2	11	359	372
12	6	364	382
11	19	300	330
25	36	1023	



Toronto Street (Hwy 10)



Cars	Trucks	Heavys	Totals
243	8	2	253
342	8	10	360
219	3	9	231
804	19	21	

Main Street



Cars	Trucks	Heavys	Totals
708	12	26	746

Peds Cross: \bowtie

West Peds: 70

West Entering: 1084

West Leg Total: 2138

Cars	1731	Cars	281	1207	175	1663
Trucks	86	Trucks	13	54	2	69
Heavys	104	Heavys	8	73	12	93
Totals	1921	Totals	302	1334	189	



Peds Cross: \bowtie

South Peds: 125

South Entering: 1825

South Leg Total: 3746

















Comments

Appendix D – Synchro Analysis Output – Existing Traffic Volumes

HCM Unsignalized Intersection Capacity Analysis

6: Toronto St & Commercial Driveway/Fairway Heights

















Loon Call
Existing (2022) - AM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	22	3	63	22	4	5	49	166	13	2	220	37
Future Volume (Veh/h)	22	3	63	22	4	5	49	166	13	2	220	37
Sign Control	Stop			Stop			Free			Free		
Grade	0%			0%			0%			0%		
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Hourly flow rate (vph)	25	3	72	25	5	6	56	189	15	2	250	42
Pedestrians	5			5			5			5		
Lane Width (m)	3.7			3.7			3.7			3.7		
Walking Speed (m/s)	1.1			1.1			1.1			1.1		
Percent Blockage	0			0			0			0		
Right turn flare (veh)												
Median type							None			None		
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	602	601	281	667	614	206	297				209	
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	602	601	281	667	614	206	297				209	
tC, single (s)	7.1	6.5	6.3	7.2	6.5	6.2	4.1				4.1	
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.4	3.6	4.0	3.3	2.2				2.2	
p0 queue free %	93	99	90	92	99	99	96				100	
cM capacity (veh/h)	380	394	741	309	387	831	1258				1367	
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	100	36	260	294								
Volume Left	25	25	56	2								
Volume Right	72	6	15	42								
cSH	586	356	1258	1367								
Volume to Capacity	0.17	0.10	0.04	0.00								
Queue Length 95th (m)	4.6	2.5	1.1	0.0								
Control Delay (s)	12.4	16.2	2.0	0.1								
Lane LOS	B	C	A	A								
Approach Delay (s)	12.4	16.2	2.0	0.1								
Approach LOS	B	C										
Intersection Summary												
Average Delay				3.4								
Intersection Capacity Utilization				43.2%	ICU Level of Service				A			
Analysis Period (min)				15								

HCM Unsignalized Intersection Capacity Analysis

6: Toronto St & Commercial Driveway/Fairway Heights

Loon Call
Existing (2022) - AM

















												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	28	1	56	7	4	4	58	254	15	5	210	27
Future Volume (Veh/h)	28	1	56	7	4	4	58	254	15	5	210	27
Sign Control	Stop			Stop			Free			Free		
Grade	0%			0%			0%			0%		
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Hourly flow rate (vph)	32	1	64	8	5	5	66	289	17	6	239	31
Pedestrians	5			5			5			5		
Lane Width (m)	3.7			3.7			3.7			3.7		
Walking Speed (m/s)	1.1			1.1			1.1			1.1		
Percent Blockage	0			0			0			0		
Right turn flare (veh)												
Median type							None			None		
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	714	714	264	770	722	308	275				311	
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	714	714	264	770	722	308	275				311	
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1				4.1	
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2				2.2	
p0 queue free %	90	100	92	97	98	99	95				100	
cM capacity (veh/h)	323	336	767	271	333	730	1293				1255	
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	97	18	372	276								
Volume Left	32	8	66	6								
Volume Right	64	5	17	31								
cSH	523	350	1293	1255								
Volume to Capacity	0.19	0.05	0.05	0.00								
Queue Length 95th (m)	5.1	1.2	1.2	0.1								
Control Delay (s)	13.5	15.8	1.8	0.2								
Lane LOS	B	C	A	A								
Approach Delay (s)	13.5	15.8	1.8	0.2								
Approach LOS	B	C										
Intersection Summary												
Average Delay				3.0								
Intersection Capacity Utilization				47.8%	ICU Level of Service				A			
Analysis Period (min)				15								

Appendix E – Synchro Analysis Output – Background Traffic Volumes

HCM Unsignalized Intersection Capacity Analysis

6: Toronto St & Commercial Driveway/Fairway Heights

















Loon Call
BG (2025) - AM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	22	3	63	44	2	22	49	284	29	8	327	37
Future Volume (Veh/h)	22	3	63	44	2	22	49	284	29	8	327	37
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Hourly flow rate (vph)	25	3	72	50	2	25	56	323	33	9	372	42
Pedestrians		5			5			5			5	
Lane Width (m)		3.7			3.7			3.7			3.7	
Walking Speed (m/s)		1.1			1.1			1.1			1.1	
Percent Blockage		0			0			0			0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	898	889	403	946	894	350	419			361		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	898	889	403	946	894	350	419			361		
tC, single (s)	7.1	6.5	6.3	7.2	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.4	3.6	4.0	3.3	2.2			2.2		
p0 queue free %	89	99	89	74	99	96	95			99		
cM capacity (veh/h)	232	266	633	194	264	692	1135			1203		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	100	77	412	423								
Volume Left	25	50	56	9								
Volume Right	72	25	33	42								
cSH	429	255	1135	1203								
Volume to Capacity	0.23	0.30	0.05	0.01								
Queue Length 95th (m)	6.8	9.3	1.2	0.2								
Control Delay (s)	15.9	25.1	1.6	0.2								
Lane LOS	C	D	A	A								
Approach Delay (s)	15.9	25.1	1.6	0.2								
Approach LOS	C	D										
Intersection Summary												
Average Delay			4.2									
Intersection Capacity Utilization			59.0%		ICU Level of Service				B			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis

6: Toronto St & Commercial Driveway/Fairway Heights

















Loon Call
BG (2025) - PM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	28	1	56	19	4	16	58	382	35	23	349	27
Future Volume (Veh/h)	28	1	56	19	4	16	58	382	35	23	349	27
Sign Control	Stop			Stop			Free			Free		
Grade	0%			0%			0%			0%		
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Hourly flow rate (vph)	32	1	64	22	5	18	66	434	40	26	397	31
Pedestrians	5			5			5			5		
Lane Width (m)	3.7			3.7			3.7			3.7		
Walking Speed (m/s)	1.1			1.1			1.1			1.1		
Percent Blockage	0			0			0			0		
Right turn flare (veh)												
Median type							None			None		
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	1081	1080	422	1125	1076	464	433				479	
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1081	1080	422	1125	1076	464	433				479	
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1				4.1	
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2				2.2	
p0 queue free %	82	100	90	85	98	97	94				98	
cM capacity (veh/h)	173	200	625	149	201	596	1132				1089	
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	97	45	540	454								
Volume Left	32	22	66	26								
Volume Right	64	18	40	31								
cSH	332	222	1132	1089								
Volume to Capacity	0.29	0.20	0.06	0.02								
Queue Length 95th (m)	9.1	5.6	1.4	0.6								
Control Delay (s)	20.3	25.3	1.6	0.7								
Lane LOS	C	D	A	A								
Approach Delay (s)	20.3	25.3	1.6	0.7								
Approach LOS	C	D										
Intersection Summary												
Average Delay				3.8								
Intersection Capacity Utilization				55.6%	ICU Level of Service				B			
Analysis Period (min)				15								

HCM Unsignalized Intersection Capacity Analysis

6: Toronto St & Commercial Driveway/Fairway Heights

















Loon Call
BG (2030) - AM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	22	3	63	44	2	22	49	302	29	8	352	37
Future Volume (Veh/h)	22	3	63	44	2	22	49	302	29	8	352	37
Sign Control	Stop			Stop			Free			Free		
Grade	0%			0%			0%			0%		
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Hourly flow rate (vph)	25	3	72	50	2	25	56	343	33	9	400	42
Pedestrians	5			5			5			5		
Lane Width (m)	3.7			3.7			3.7			3.7		
Walking Speed (m/s)	1.1			1.1			1.1			1.1		
Percent Blockage	0			0			0			0		
Right turn flare (veh)												
Median type							None			None		
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	946	937	431	994	942	370	447				381	
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	946	937	431	994	942	370	447				381	
tC, single (s)	7.1	6.5	6.3	7.2	6.5	6.2	4.1				4.1	
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.4	3.6	4.0	3.3	2.2				2.2	
p0 queue free %	88	99	88	72	99	96	95				99	
cM capacity (veh/h)	214	249	610	179	247	674	1108				1183	
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	100	77	432	451								
Volume Left	25	50	56	9								
Volume Right	72	25	33	42								
cSH	405	237	1108	1183								
Volume to Capacity	0.25	0.33	0.05	0.01								
Queue Length 95th (m)	7.3	10.3	1.2	0.2								
Control Delay (s)	16.8	27.4	1.6	0.2								
Lane LOS	C	D	A	A								
Approach Delay (s)	16.8	27.4	1.6	0.2								
Approach LOS	C	D										
Intersection Summary												
Average Delay				4.3								
Intersection Capacity Utilization				61.2%	ICU Level of Service				B			
Analysis Period (min)				15								

HCM Unsignalized Intersection Capacity Analysis

6: Toronto St & Commercial Driveway/Fairway Heights

















Loon Call
BG (2030) - PM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	28	1	56	19	4	16	58	410	35	23	372	27
Future Volume (Veh/h)	28	1	56	19	4	16	58	410	35	23	372	27
Sign Control	Stop			Stop			Free			Free		
Grade	0%			0%			0%			0%		
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Hourly flow rate (vph)	32	1	64	22	5	18	66	466	40	26	423	31
Pedestrians	5			5			5			5		
Lane Width (m)	3.7			3.7			3.7			3.7		
Walking Speed (m/s)	1.1			1.1			1.1			1.1		
Percent Blockage	0			0			0			0		
Right turn flare (veh)												
Median type							None			None		
Median storage veh												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	1139	1138	448	1183	1134	496	459				511	
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1139	1138	448	1183	1134	496	459				511	
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1				4.1	
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2				2.2	
p0 queue free %	80	99	89	84	97	97	94				98	
cM capacity (veh/h)	157	184	604	135	186	572	1107				1059	
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	97	45	572	480								
Volume Left	32	22	66	26								
Volume Right	64	18	40	31								
cSH	308	203	1107	1059								
Volume to Capacity	0.31	0.22	0.06	0.02								
Queue Length 95th (m)	10.0	6.2	1.4	0.6								
Control Delay (s)	22.0	27.7	1.6	0.7								
Lane LOS	C	D	A	A								
Approach Delay (s)	22.0	27.7	1.6	0.7								
Approach LOS	C	D										
Intersection Summary												
Average Delay				3.9								
Intersection Capacity Utilization				57.6%	ICU Level of Service				B			
Analysis Period (min)				15								

HCM Unsignalized Intersection Capacity Analysis

6: Toronto St & Commercial Driveway/Fairway Heights

















Loon Call
BG (2035) - AM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	22	3	63	44	2	22	49	323	29	8	379	37
Future Volume (Veh/h)	22	3	63	44	2	22	49	323	29	8	379	37
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Hourly flow rate (vph)	25	3	72	50	2	25	56	367	33	9	431	42
Pedestrians		5			5			5			5	
Lane Width (m)		3.7			3.7			3.7			3.7	
Walking Speed (m/s)		1.1			1.1			1.1			1.1	
Percent Blockage		0			0			0			0	
Right turn flare (veh)												
Median type								None			None	
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	1002	992	462	1049	996	394	478			405		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1002	992	462	1049	996	394	478			405		
tC, single (s)	7.1	6.5	6.3	7.2	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.4	3.6	4.0	3.3	2.2			2.2		
p0 queue free %	87	99	88	69	99	96	95			99		
cM capacity (veh/h)	196	231	586	162	229	653	1079			1159		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	100	77	456	482								
Volume Left	25	50	56	9								
Volume Right	72	25	33	42								
cSH	379	217	1079	1159								
Volume to Capacity	0.26	0.35	0.05	0.01								
Queue Length 95th (m)	7.9	11.5	1.2	0.2								
Control Delay (s)	17.8	30.4	1.6	0.2								
Lane LOS	C	D	A	A								
Approach Delay (s)	17.8	30.4	1.6	0.2								
Approach LOS	C	D										
Intersection Summary												
Average Delay			4.4									
Intersection Capacity Utilization			62.8%	ICU Level of Service						B		
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis

6: Toronto St & Commercial Driveway/Fairway Heights

Loon Call
BG (2035) - PM

















												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	28	1	56	19	4	16	58	441	35	23	398	27
Future Volume (Veh/h)	28	1	56	19	4	16	58	441	35	23	398	27
Sign Control	Stop			Stop			Free			Free		
Grade	0%			0%			0%			0%		
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Hourly flow rate (vph)	32	1	64	22	5	18	66	501	40	26	452	31
Pedestrians	5			5			5			5		
Lane Width (m)	3.7			3.7			3.7			3.7		
Walking Speed (m/s)	1.1			1.1			1.1			1.1		
Percent Blockage	0			0			0			0		
Right turn flare (veh)												
Median type							None			None		
Median storage veh												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	1203	1202	478	1247	1198	531	488				546	
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1203	1202	478	1247	1198	531	488				546	
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1				4.1	
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2				2.2	
p0 queue free %	77	99	89	82	97	97	94				97	
cM capacity (veh/h)	141	169	582	121	170	547	1080				1028	
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	97	45	607	509								
Volume Left	32	22	66	26								
Volume Right	64	18	40	31								
cSH	283	185	1080	1028								
Volume to Capacity	0.34	0.24	0.06	0.03								
Queue Length 95th (m)	11.2	7.0	1.5	0.6								
Control Delay (s)	24.2	30.7	1.6	0.7								
Lane LOS	C	D	A	A								
Approach Delay (s)	24.2	30.7	1.6	0.7								
Approach LOS	C	D										
Intersection Summary												
Average Delay				4.0								
Intersection Capacity Utilization				59.8%	ICU Level of Service				B			
Analysis Period (min)				15								

Appendix F – Synchro Analysis Output – Total Traffic Volumes

HCM Unsignalized Intersection Capacity Analysis

6: Toronto St & Commercial Driveway/Fairway Heights

















Loon Call
Total (2025) - AM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	22	3	63	63	4	37	49	284	34	14	327	37
Future Volume (Veh/h)	22	3	63	63	4	37	49	284	34	14	327	37
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Hourly flow rate (vph)	25	3	72	72	5	42	56	323	39	16	372	42
Pedestrians		5			5			5			5	
Lane Width (m)		3.7			3.7			3.7			3.7	
Walking Speed (m/s)		1.1			1.1			1.1			1.1	
Percent Blockage		0			0			0			0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	934	909	403	963	910	352	419			367		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	934	909	403	963	910	352	419			367		
tC, single (s)	7.1	6.5	6.3	7.2	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.4	3.6	4.0	3.3	2.2			2.2		
p0 queue free %	88	99	89	62	98	94	95			99		
cM capacity (veh/h)	210	257	633	188	257	689	1135			1197		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	100	119	418	430								
Volume Left	25	72	56	16								
Volume Right	72	42	39	42								
cSH	409	257	1135	1197								
Volume to Capacity	0.24	0.46	0.05	0.01								
Queue Length 95th (m)	7.2	17.4	1.2	0.3								
Control Delay (s)	16.6	30.6	1.6	0.4								
Lane LOS	C	D	A	A								
Approach Delay (s)	16.6	30.6	1.6	0.4								
Approach LOS	C	D										
Intersection Summary												
Average Delay			5.8									
Intersection Capacity Utilization			57.9%	ICU Level of Service						B		
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis

6: Toronto St & Commercial Driveway/Fairway Heights











Loon Call
Total (2025) - PM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	28	1	56	31	4	27	58	382	55	40	349	27
Future Volume (Veh/h)	28	1	56	31	4	27	58	382	55	40	349	27
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Hourly flow rate (vph)	32	1	64	35	5	31	66	434	62	45	397	31
Pedestrians		5			5			5			5	
Lane Width (m)		3.7			3.7			3.7			3.7	
Walking Speed (m/s)		1.1			1.1			1.1			1.1	
Percent Blockage		0			0			0			0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	1143	1140	422	1174	1125	475	433			501		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1143	1140	422	1174	1125	475	433			501		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	79	99	90	74	97	95	94			96		
cM capacity (veh/h)	151	181	625	136	185	588	1132			1068		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	97	71	562	473								
Volume Left	32	35	66	45								
Volume Right	64	31	62	31								
cSH	303	210	1132	1068								
Volume to Capacity	0.32	0.34	0.06	0.04								
Queue Length 95th (m)	10.2	10.7	1.4	1.0								
Control Delay (s)	22.4	30.6	1.6	1.2								
Lane LOS	C	D	A	A								
Approach Delay (s)	22.4	30.6	1.6	1.2								
Approach LOS	C	D										
Intersection Summary												
Average Delay			4.8									
Intersection Capacity Utilization			51.2%	ICU Level of Service						A		
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis

1: Toronto St & North Access

















Loon Call
Total (2030) - AM

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	58	50	358	16	22	402
Future Volume (Veh/h)	58	50	358	16	22	402
Sign Control	Stop		Free		Free	Free
Grade	0%		0%			0%
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Hourly flow rate (vph)	66	57	407	18	25	457
Pedestrians	5		5			5
Lane Width (m)	3.7		3.7			3.7
Walking Speed (m/s)	1.1		1.1			1.1
Percent Blockage	0		0			0
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	933	426			430	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	933	426			430	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	77	91			98	
cM capacity (veh/h)	286	622			1124	
Direction, Lane #	WB 1	NB 1	SB 1	SB 2		
Volume Total	123	425	25	457		
Volume Left	66	0	25	0		
Volume Right	57	18	0	0		
cSH	382	1700	1124	1700		
Volume to Capacity	0.32	0.25	0.02	0.27		
Queue Length 95th (m)	10.4	0.0	0.5	0.0		
Control Delay (s)	18.9	0.0	8.3	0.0		
Lane LOS	C		A			
Approach Delay (s)	18.9	0.0	0.4			
Approach LOS	C					
Intersection Summary						
Average Delay		2.5				
Intersection Capacity Utilization		35.4%		ICU Level of Service		A
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis

6: Toronto St & Commercial Driveway/Fairway Heights











Loon Call
Total (2030) - AM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	22	3	63	72	4	34	49	318	38	13	410	37
Future Volume (Veh/h)	22	3	63	72	4	34	49	318	38	13	410	37
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Hourly flow rate (vph)	25	3	72	82	5	39	56	361	43	15	466	42
Pedestrians		5			5			5			5	
Lane Width (m)		3.7			3.7			3.7			3.7	
Walking Speed (m/s)		1.1			1.1			1.1			1.1	
Percent Blockage		0			0			0			0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	1063	1043	497	1095	1042	392	513			409		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1063	1043	497	1095	1042	392	513			409		
tC, single (s)	7.1	6.5	6.3	7.2	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.4	3.6	4.0	3.3	2.2			2.2		
p0 queue free %	85	99	87	45	98	94	95			99		
cM capacity (veh/h)	171	214	560	149	214	654	1047			1155		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	100	126	460	523								
Volume Left	25	82	56	15								
Volume Right	72	39	43	42								
cSH	346	199	1047	1155								
Volume to Capacity	0.29	0.63	0.05	0.01								
Queue Length 95th (m)	8.9	28.0	1.3	0.3								
Control Delay (s)	19.6	49.9	1.6	0.4								
Lane LOS	C	E	A	A								
Approach Delay (s)	19.6	49.9	1.6	0.4								
Approach LOS	C	E										
Intersection Summary												
Average Delay			7.6									
Intersection Capacity Utilization			62.7%		ICU Level of Service				B			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis

1: Toronto St & North Access

















Loon Call
Total (2030) - PM

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	36	39	464	64	61	437
Future Volume (Veh/h)	36	39	464	64	61	437
Sign Control	Stop		Free		Free	Free
Grade	0%		0%			0%
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Hourly flow rate (vph)	41	44	527	73	69	497
Pedestrians	5		5			5
Lane Width (m)	3.7		3.7			3.7
Walking Speed (m/s)	1.1		1.1			1.1
Percent Blockage	0		0			0
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1208	574			605	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1208	574			605	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	78	91			93	
cM capacity (veh/h)	186	514			968	
Direction, Lane #	WB 1	NB 1	SB 1	SB 2		
Volume Total	85	600	69	497		
Volume Left	41	0	69	0		
Volume Right	44	73	0	0		
cSH	278	1700	968	1700		
Volume to Capacity	0.31	0.35	0.07	0.29		
Queue Length 95th (m)	9.6	0.0	1.7	0.0		
Control Delay (s)	23.6	0.0	9.0	0.0		
Lane LOS	C		A			
Approach Delay (s)	23.6	0.0	1.1			
Approach LOS	C					
Intersection Summary						
Average Delay			2.1			
Intersection Capacity Utilization			47.7%		ICU Level of Service	A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

6: Toronto St & Commercial Driveway/Fairway Heights











Loon Call
Total (2030) - PM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	28	1	56	37	4	26	58	474	66	38	408	27
Future Volume (Veh/h)	28	1	56	37	4	26	58	474	66	38	408	27
Sign Control	Stop			Stop			Free			Free		
Grade	0%			0%			0%			0%		
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Hourly flow rate (vph)	32	1	64	42	5	30	66	539	75	43	464	31
Pedestrians	5			5			5			5		
Lane Width (m)	3.7			3.7			3.7			3.7		
Walking Speed (m/s)	1.1			1.1			1.1			1.1		
Percent Blockage	0			0			0			0		
Right turn flare (veh)												
Median type							None			None		
Median storage veh												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	1316	1322	490	1348	1300	586	500				619	
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1316	1322	490	1348	1300	586	500				619	
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1				4.1	
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2				2.2	
p0 queue free %	72	99	89	59	97	94	94				96	
cM capacity (veh/h)	113	140	573	101	145	509	1069				966	
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	97	77	680	538								
Volume Left	32	42	66	43								
Volume Right	64	30	75	31								
cSH	241	151	1069	966								
Volume to Capacity	0.40	0.51	0.06	0.04								
Queue Length 95th (m)	13.9	18.7	1.5	1.1								
Control Delay (s)	29.7	51.1	1.6	1.2								
Lane LOS	D	F	A	A								
Approach Delay (s)	29.7	51.1	1.6	1.2								
Approach LOS	D	F										
Intersection Summary												
Average Delay				6.1								
Intersection Capacity Utilization				58.8%	ICU Level of Service				B			
Analysis Period (min)				15								

HCM Unsignalized Intersection Capacity Analysis

1: Toronto St & North Access

Total (2035) - AM
11/29/2022

















						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	58	50	379	16	22	429
Future Volume (Veh/h)	58	50	379	16	22	429
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Hourly flow rate (vph)	66	57	431	18	25	488
Pedestrians	5		5			5
Lane Width (m)	3.7		3.7			3.7
Walking Speed (m/s)	1.1		1.1			1.1
Percent Blockage	0		0			0
Right turn flare (veh)						
Median type			None			None
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	988	450			454	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	988	450			454	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	75	91			98	
cM capacity (veh/h)	265	603			1101	
Direction, Lane #	WB 1	NB 1	SB 1	SB 2		
Volume Total	123	449	25	488		
Volume Left	66	0	25	0		
Volume Right	57	18	0	0		
cSH	358	1700	1101	1700		
Volume to Capacity	0.34	0.26	0.02	0.29		
Queue Length 95th (m)	11.3	0.0	0.5	0.0		
Control Delay (s)	20.2	0.0	8.3	0.0		
Lane LOS	C		A			
Approach Delay (s)	20.2	0.0	0.4			
Approach LOS	C					
Intersection Summary						
Average Delay			2.5			
Intersection Capacity Utilization			36.8%		ICU Level of Service	A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

6: Toronto St & Commercial Driveway/Fairway Heights

Total (2035) - AM











11/29/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	22	3	63	72	4	34	49	339	38	13	437	37
Future Volume (Veh/h)	22	3	63	72	4	34	49	339	38	13	437	37
Sign Control	Stop			Stop			Free			Free		
Grade	0%			0%			0%			0%		
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Hourly flow rate (vph)	25	3	72	82	5	39	56	385	43	15	497	42
Pedestrians	5			5			5			5		
Lane Width (m)	3.7			3.7			3.7			3.7		
Walking Speed (m/s)	1.1			1.1			1.1			1.1		
Percent Blockage	0			0			0			0		
Right turn flare (veh)												
Median type							None			None		
Median storage veh												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	1118	1098	528	1150	1098	416	544				433	
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1118	1098	528	1150	1098	416	544				433	
tC, single (s)	7.1	6.5	6.3	7.2	6.5	6.2	4.1				4.1	
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.4	3.6	4.0	3.3	2.2				2.2	
p0 queue free %	84	98	87	39	97	94	95				99	
cM capacity (veh/h)	156	198	537	135	198	634	1020				1132	
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	100	126	484	554								
Volume Left	25	82	56	15								
Volume Right	72	39	43	42								
cSH	323	182	1020	1132								
Volume to Capacity	0.31	0.69	0.05	0.01								
Queue Length 95th (m)	9.8	32.0	1.3	0.3								
Control Delay (s)	21.0	60.2	1.6	0.4								
Lane LOS	C	F	A	A								
Approach Delay (s)	21.0	60.2	1.6	0.4								
Approach LOS	C	F										
Intersection Summary												
Average Delay	8.4											
Intersection Capacity Utilization	64.3%			ICU Level of Service					C			
Analysis Period (min)	15											

HCM Unsignalized Intersection Capacity Analysis

1: Toronto St & North Access

















Loon Call
Total (2035) - PM

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	36	39	495	64	61	463
Future Volume (Veh/h)	36	39	495	64	61	463
Sign Control	Stop		Free		Free	Free
Grade	0%		0%			0%
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Hourly flow rate (vph)	41	44	562	73	69	526
Pedestrians	5		5			5
Lane Width (m)	3.7		3.7			3.7
Walking Speed (m/s)	1.1		1.1			1.1
Percent Blockage	0		0			0
Right turn flare (veh)						
Median type			None			None
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1272	608			640	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1272	608			640	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	76	91			93	
cM capacity (veh/h)	170	491			940	
Direction, Lane #	WB 1	NB 1	SB 1	SB 2		
Volume Total	85	635	69	526		
Volume Left	41	0	69	0		
Volume Right	44	73	0	0		
cSH	256	1700	940	1700		
Volume to Capacity	0.33	0.37	0.07	0.31		
Queue Length 95th (m)	10.6	0.0	1.8	0.0		
Control Delay (s)	25.8	0.0	9.1	0.0		
Lane LOS	D		A			
Approach Delay (s)	25.8	0.0	1.1			
Approach LOS	D					
Intersection Summary						
Average Delay			2.1			
Intersection Capacity Utilization			49.4%		ICU Level of Service	A
Analysis Period (min)			15			

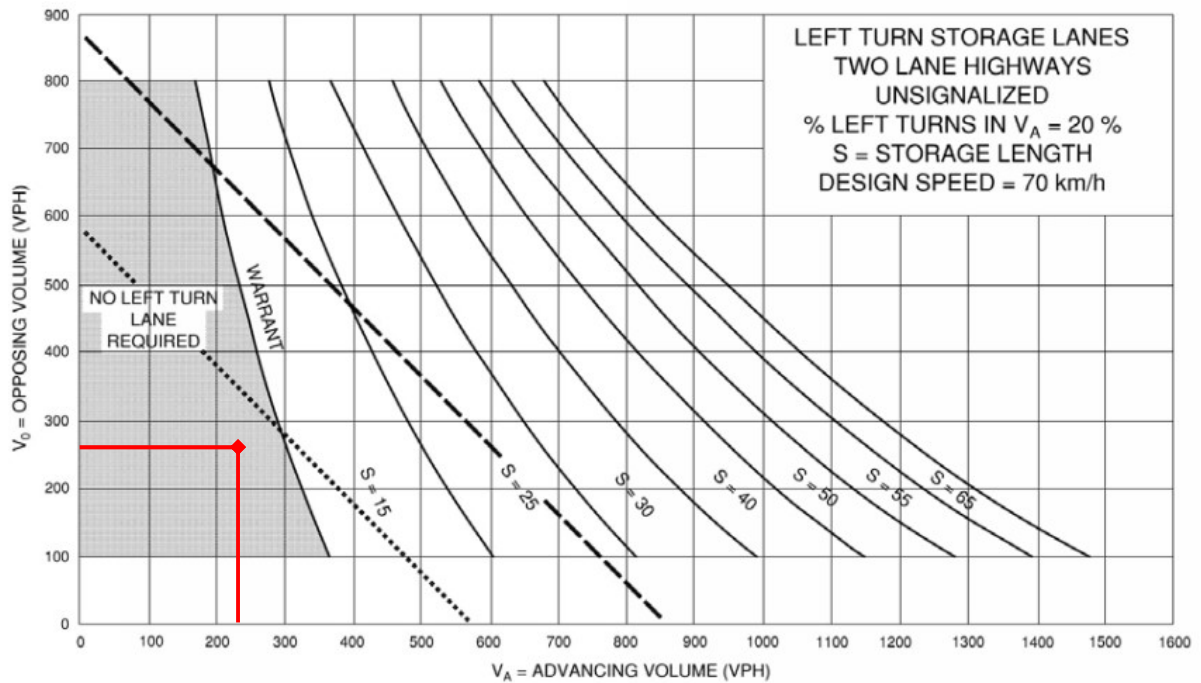
HCM Unsignalized Intersection Capacity Analysis

6: Toronto St & Commercial Driveway/Fairway Heights

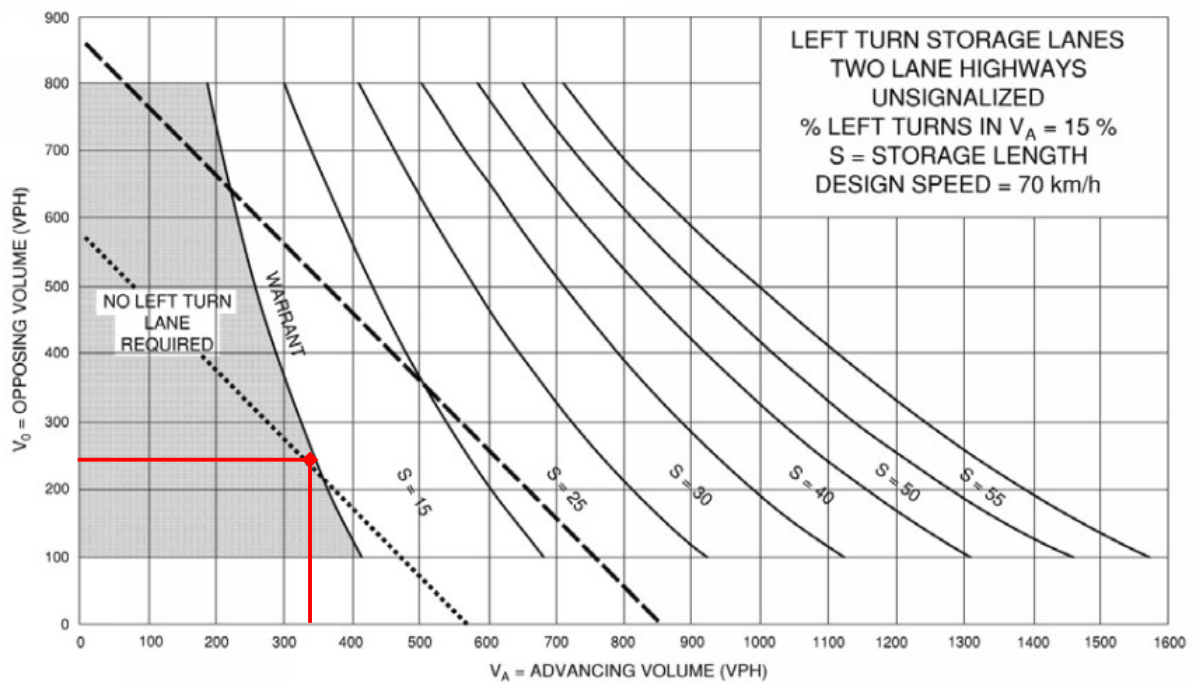
Loon Call
Total (2035) - PM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	28	1	56	37	4	26	58	505	66	38	434	27
Future Volume (Veh/h)	28	1	56	37	4	26	58	505	66	38	434	27
Sign Control	Stop			Stop			Free			Free		
Grade	0%			0%			0%			0%		
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Hourly flow rate (vph)	32	1	64	42	5	30	66	574	75	43	493	31
Pedestrians	5			5			5			5		
Lane Width (m)	3.7			3.7			3.7			3.7		
Walking Speed (m/s)	1.1			1.1			1.1			1.1		
Percent Blockage	0			0			0			0		
Right turn flare (veh)												
Median type							None			None		
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	1380	1386	518	1412	1364	622	529				654	
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1380	1386	518	1412	1364	622	529				654	
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1				4.1	
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2				2.2	
p0 queue free %	68	99	88	54	96	94	94				95	
cM capacity (veh/h)	101	128	552	91	132	486	1043				938	
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	97	77	715	567								
Volume Left	32	42	66	43								
Volume Right	64	30	75	31								
cSH	220	137	1043	938								
Volume to Capacity	0.44	0.56	0.06	0.05								
Queue Length 95th (m)	15.8	21.3	1.5	1.1								
Control Delay (s)	33.6	60.7	1.6	1.2								
Lane LOS	D	F	A	A								
Approach Delay (s)	33.6	60.7	1.6	1.2								
Approach LOS	D	F										
Intersection Summary												
Average Delay				6.7								
Intersection Capacity Utilization				60.9%	ICU Level of Service				B			
Analysis Period (min)				15								

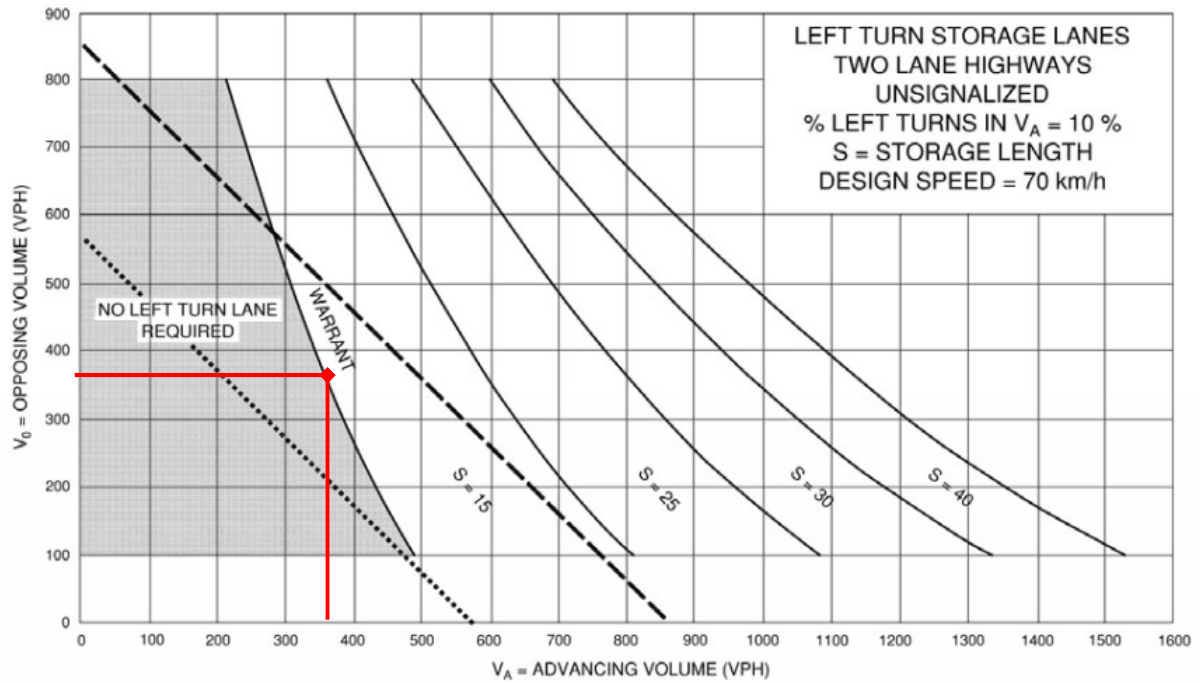
Appendix G – MTO Left Turn Warrant Analysis



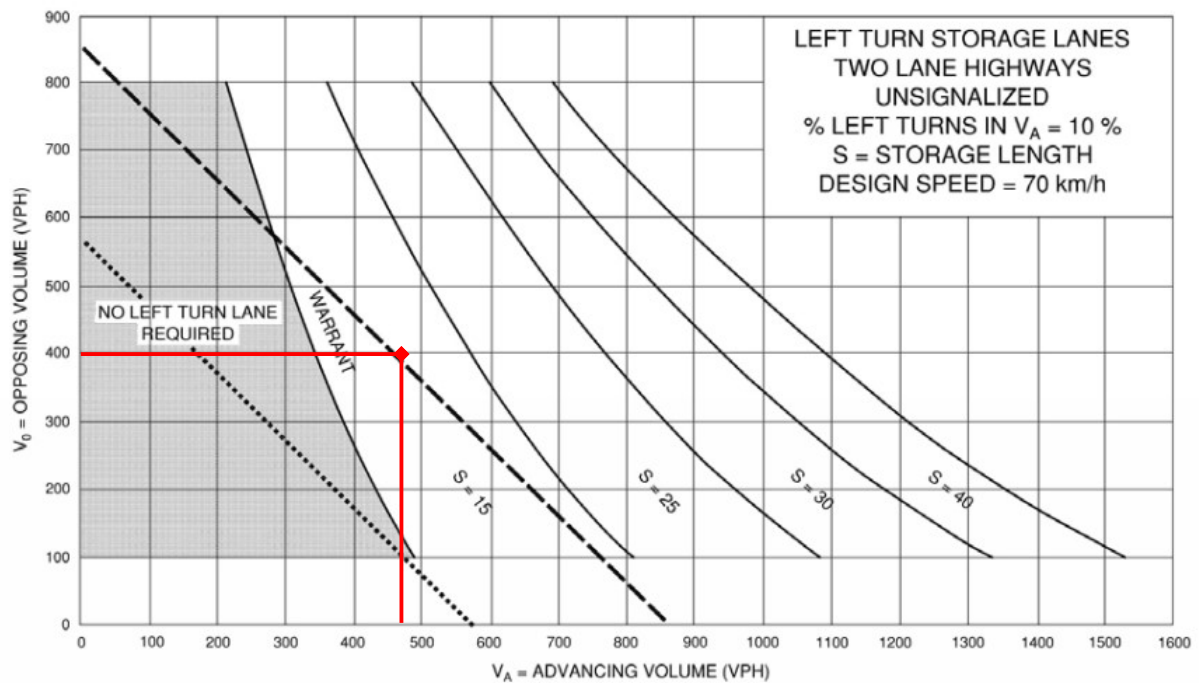
Existing (2022) AM Peak – NB on Toronto Street at Fairway Heights / Commercial Driveway



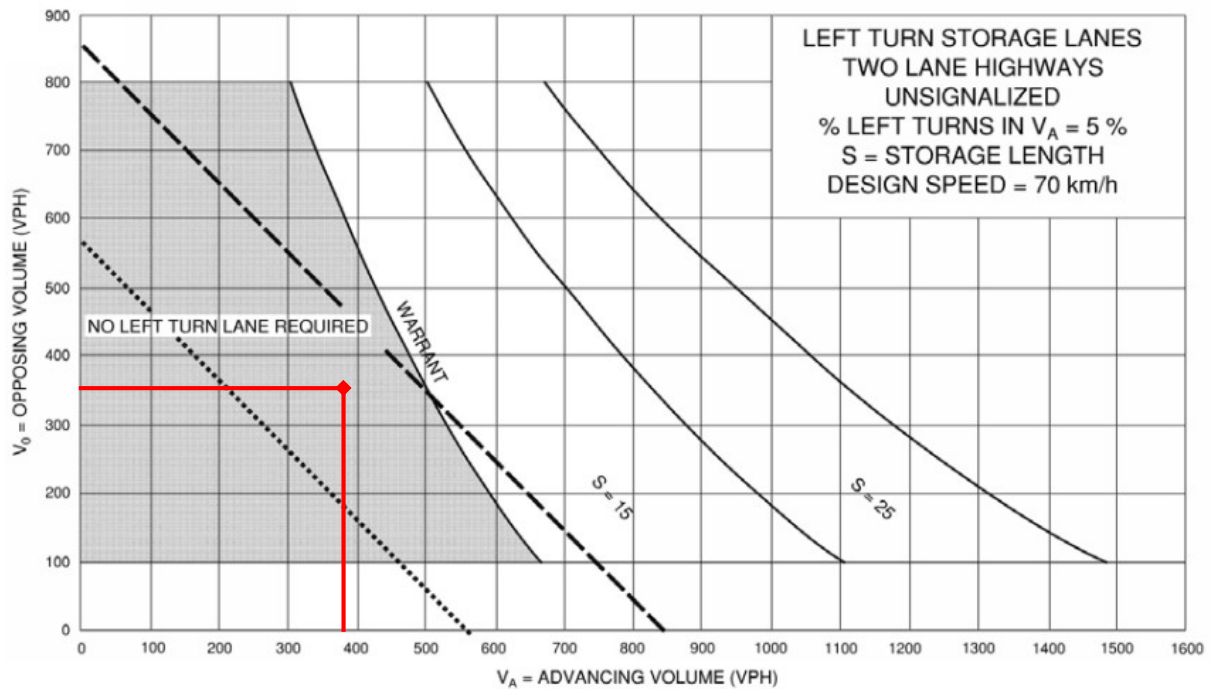
Existing (2022) PM Peak – NB on Toronto Street at Fairway Heights / Commercial Driveway



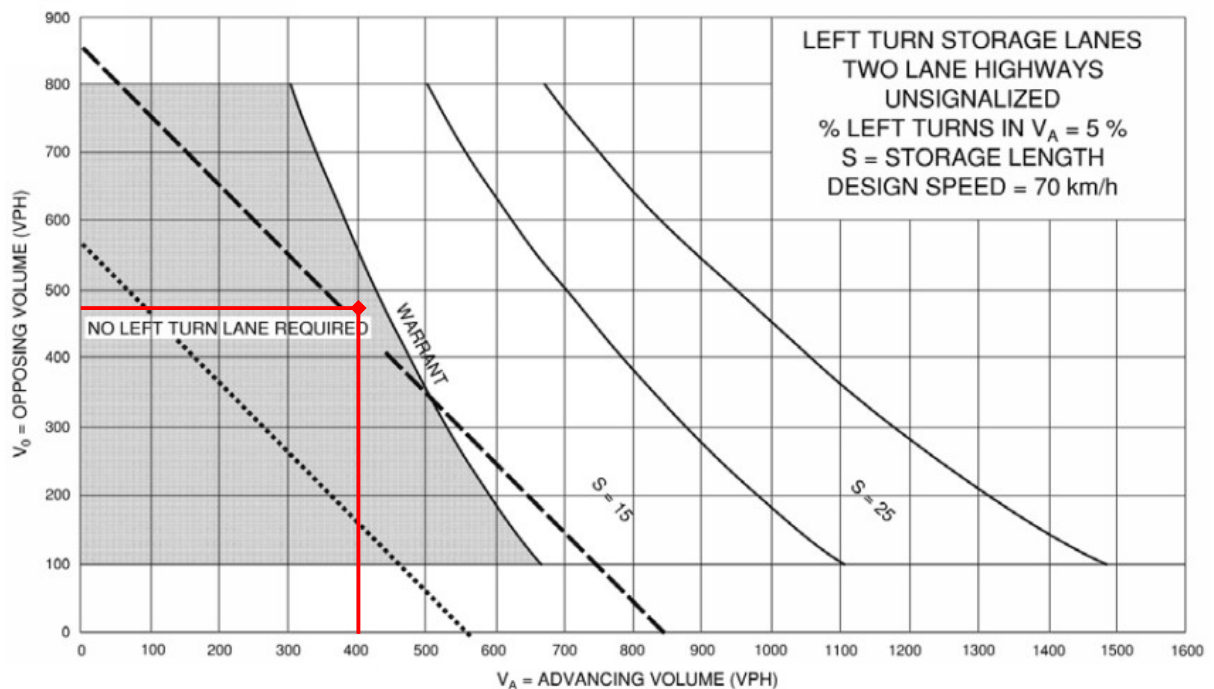
Background (2025) AM Peak – NB on Toronto Street at Fairway Heights / Commercial Driveway



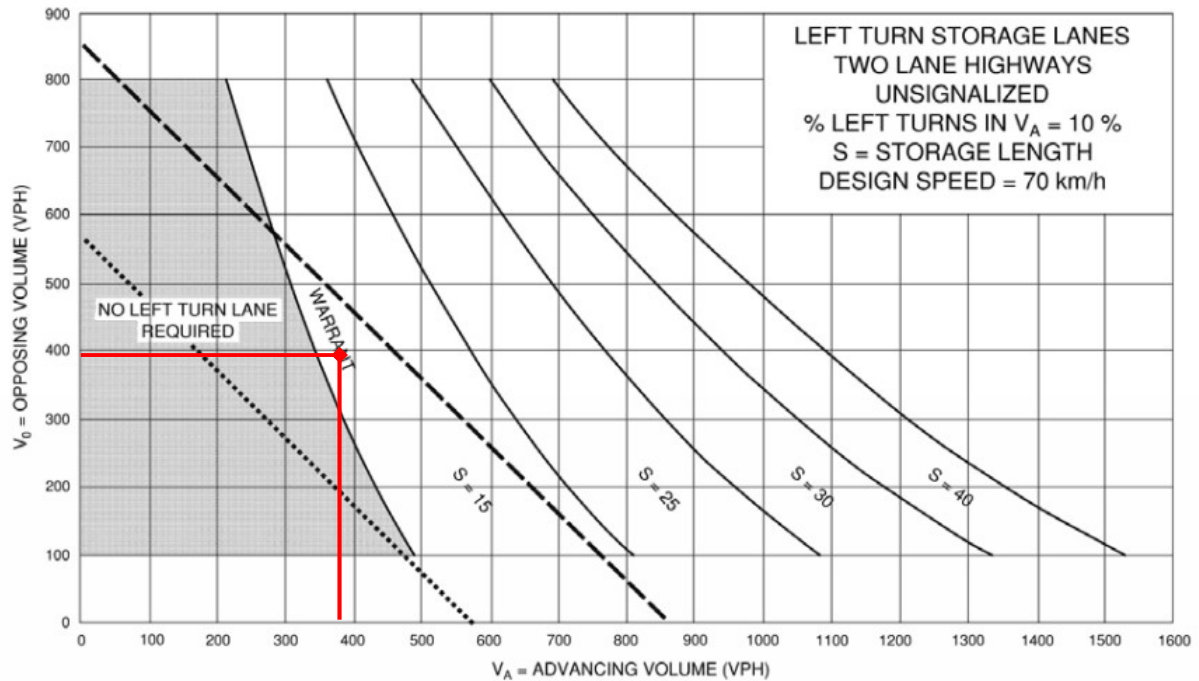
Background (2025) PM Peak – NB on Toronto Street at Fairway Heights / Commercial Driveway



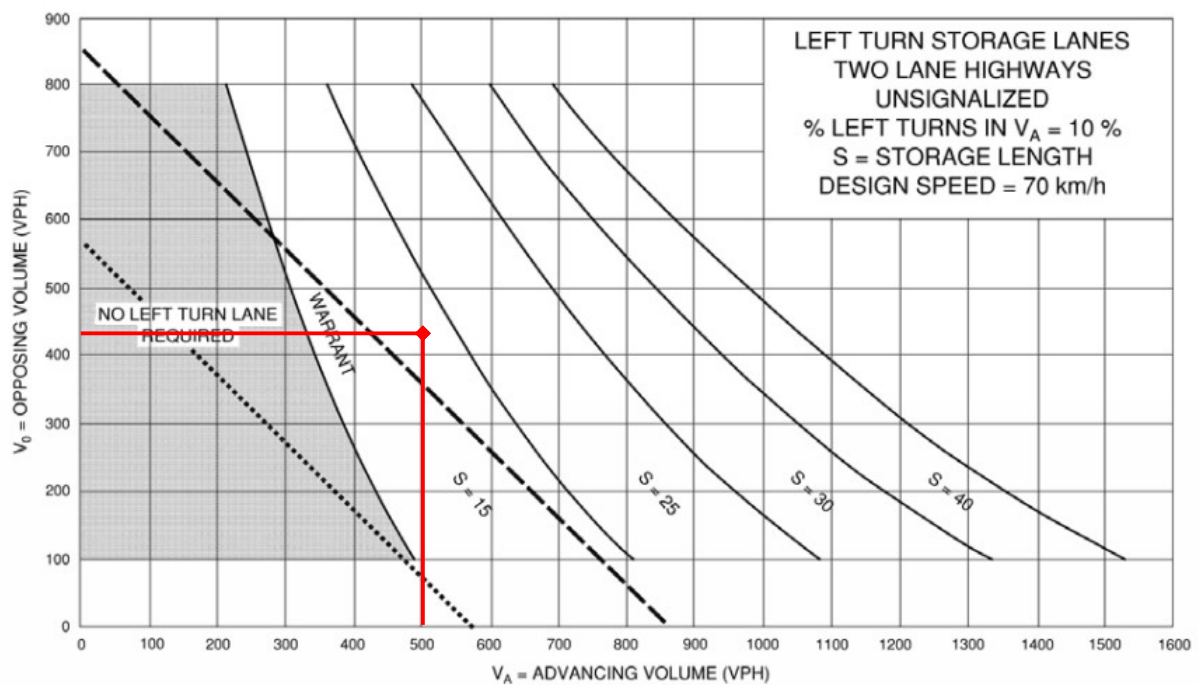
Background (2025) AM Peak – SB on Toronto Street at Fairway Heights / Commercial Driveway



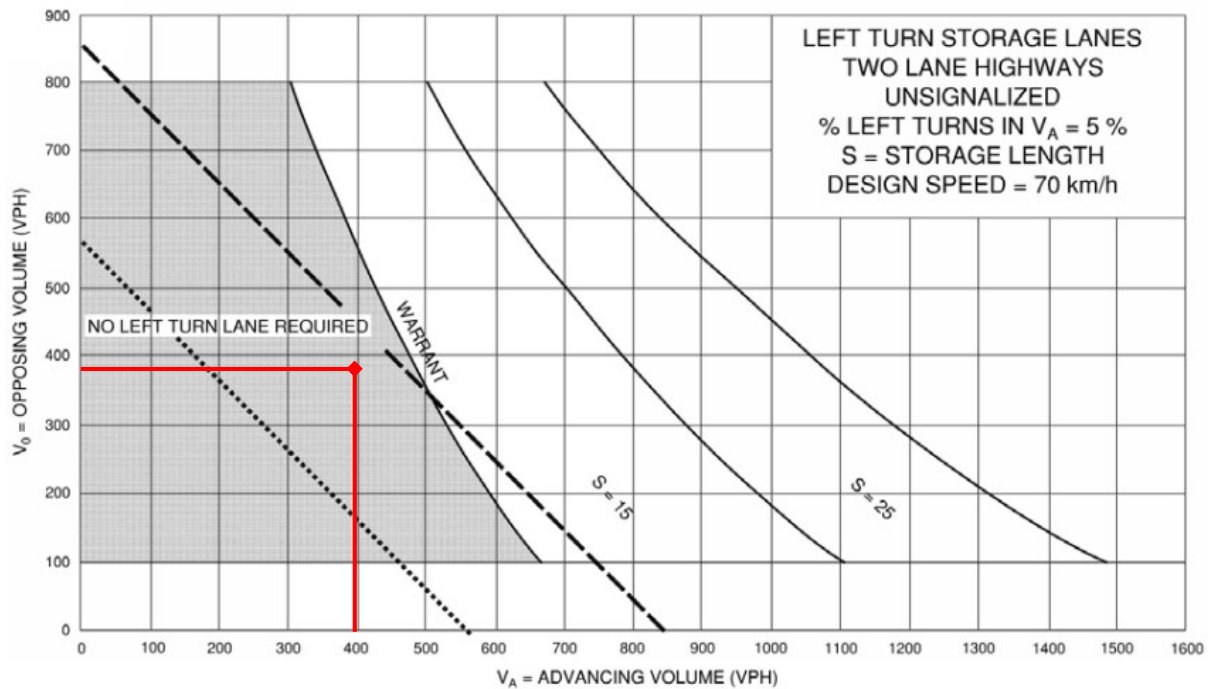
Background (2025) PM Peak – SB on Toronto Street at Fairway Heights / Commercial Driveway



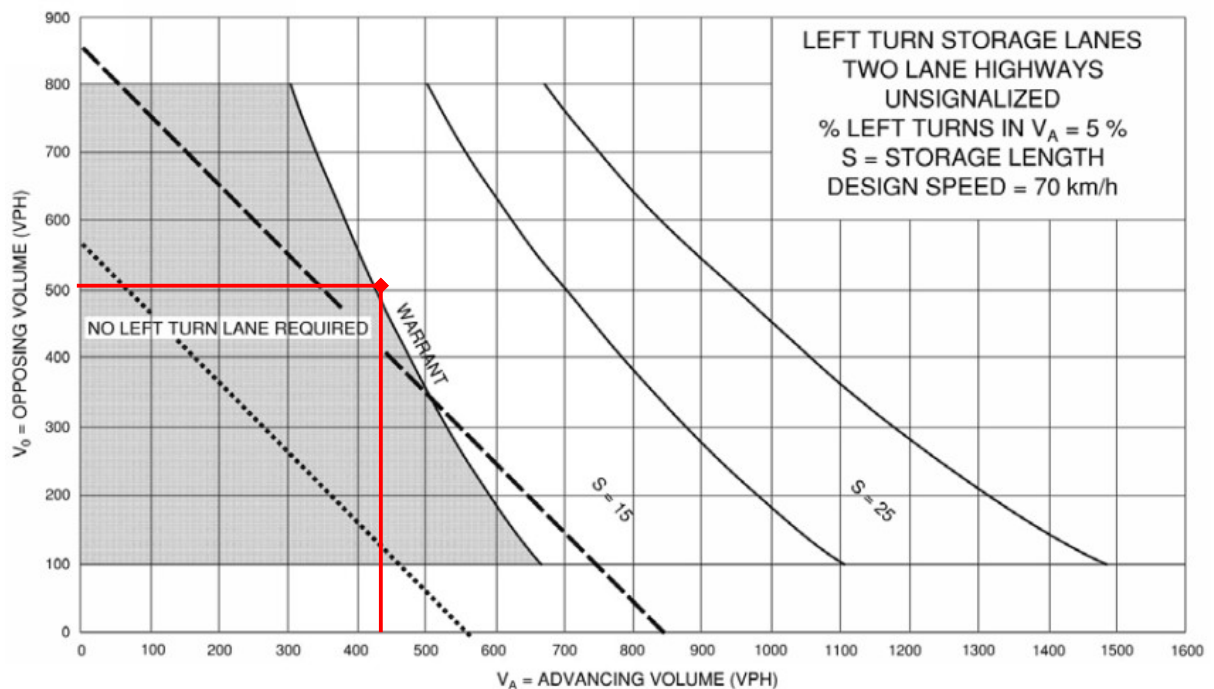
Background (2030) AM Peak – NB on Toronto Street at Fairway Heights / Commercial Driveway



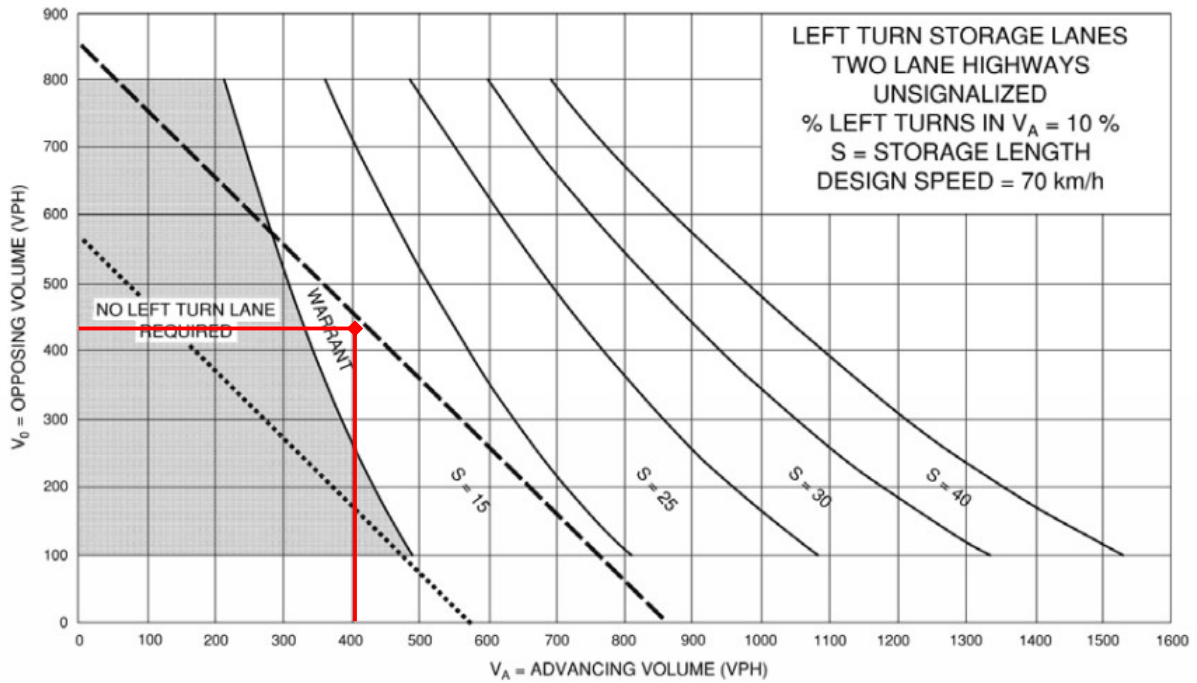
Background (2030) PM Peak – NB on Toronto Street at Fairway Heights / Commercial Driveway



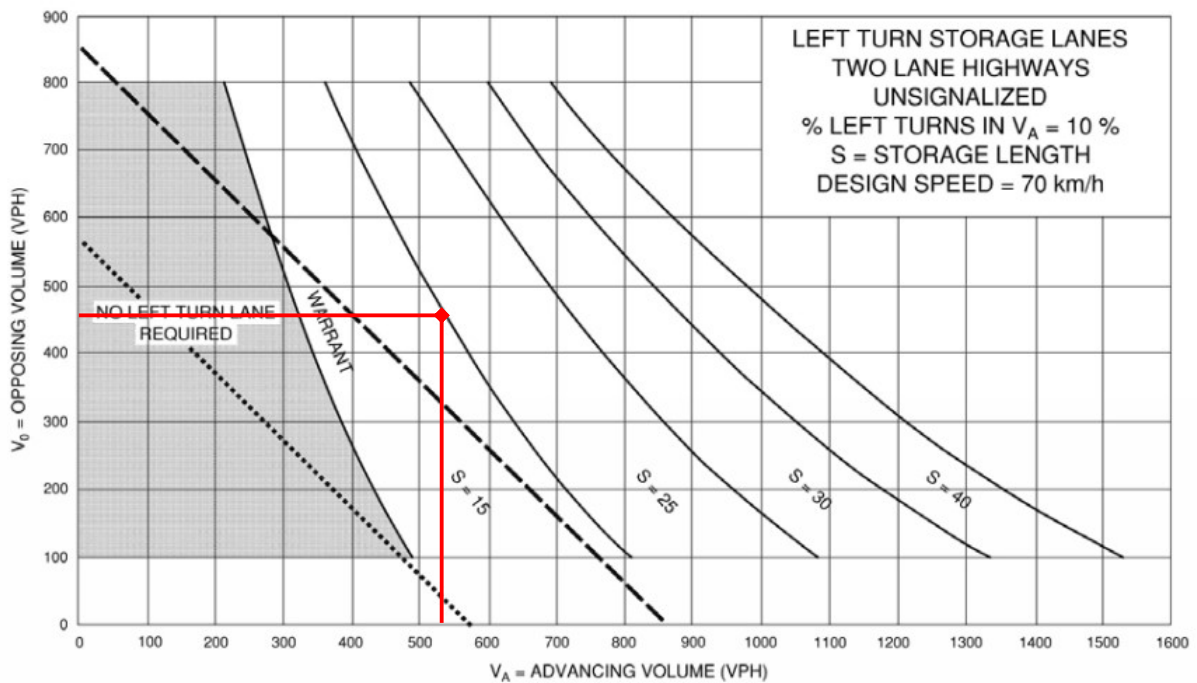
Background (2030) AM Peak – SB on Toronto Street at Fairway Heights / Commercial Driveway



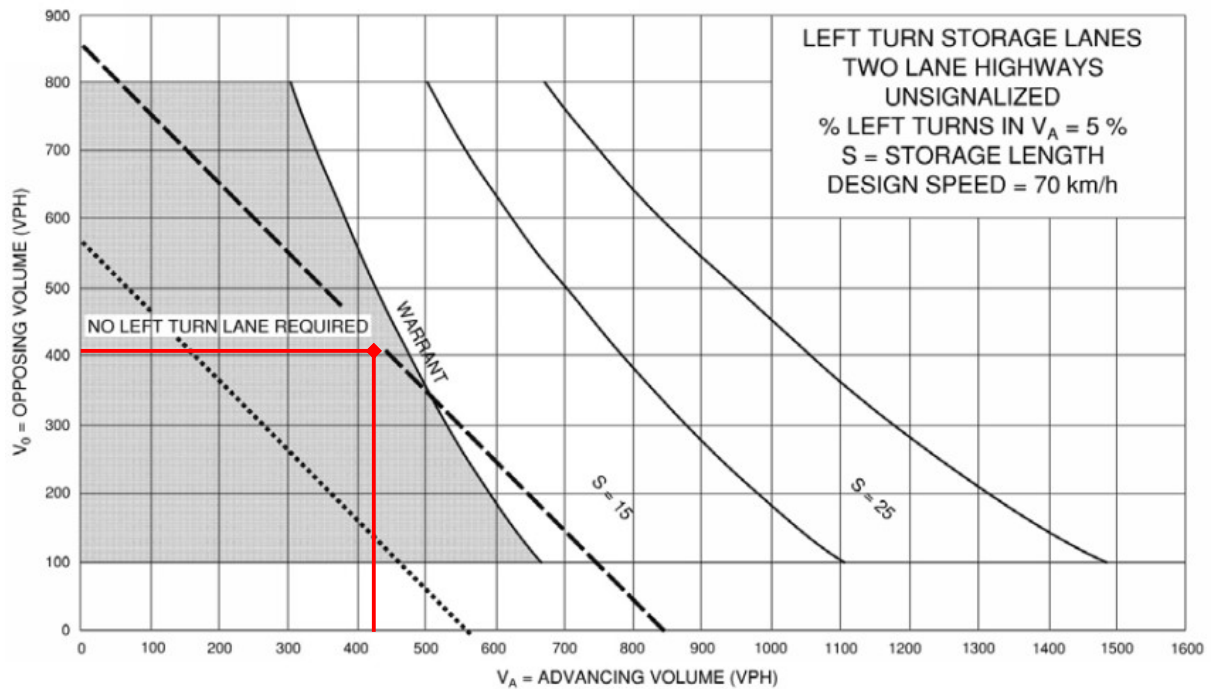
Background (2030) PM Peak – SB on Toronto Street at Fairway Heights / Commercial Driveway



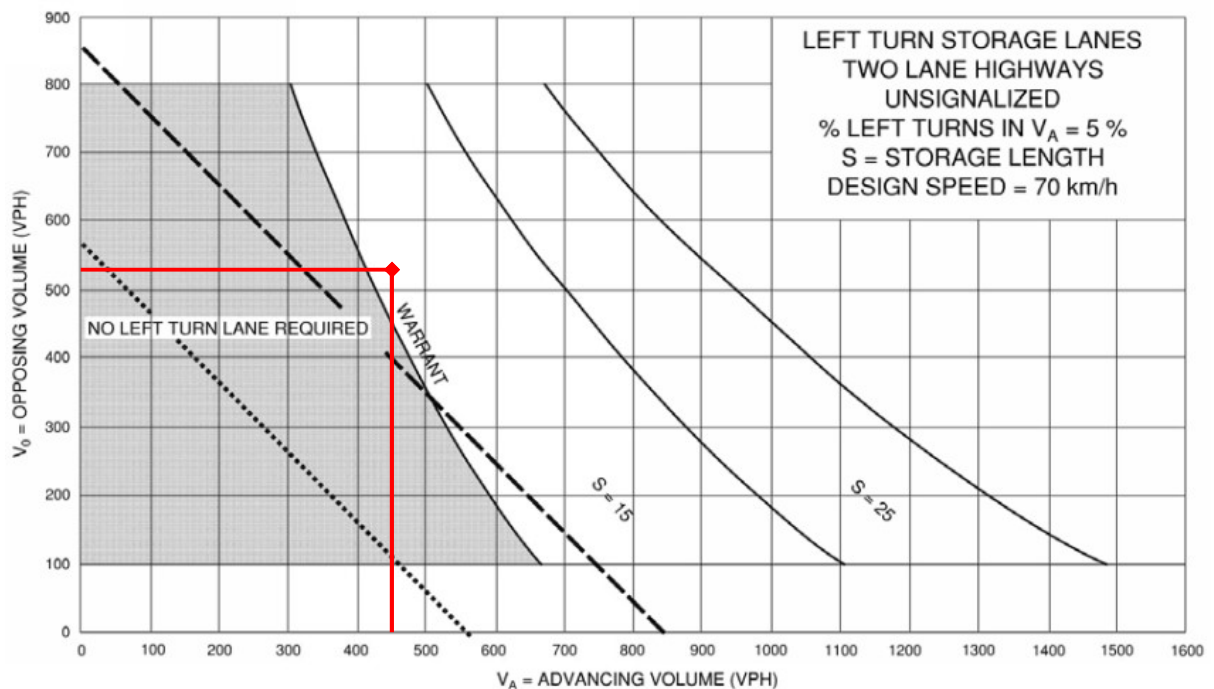
Background (2035) AM Peak – NB on Toronto Street at Fairway Heights / Commercial Driveway



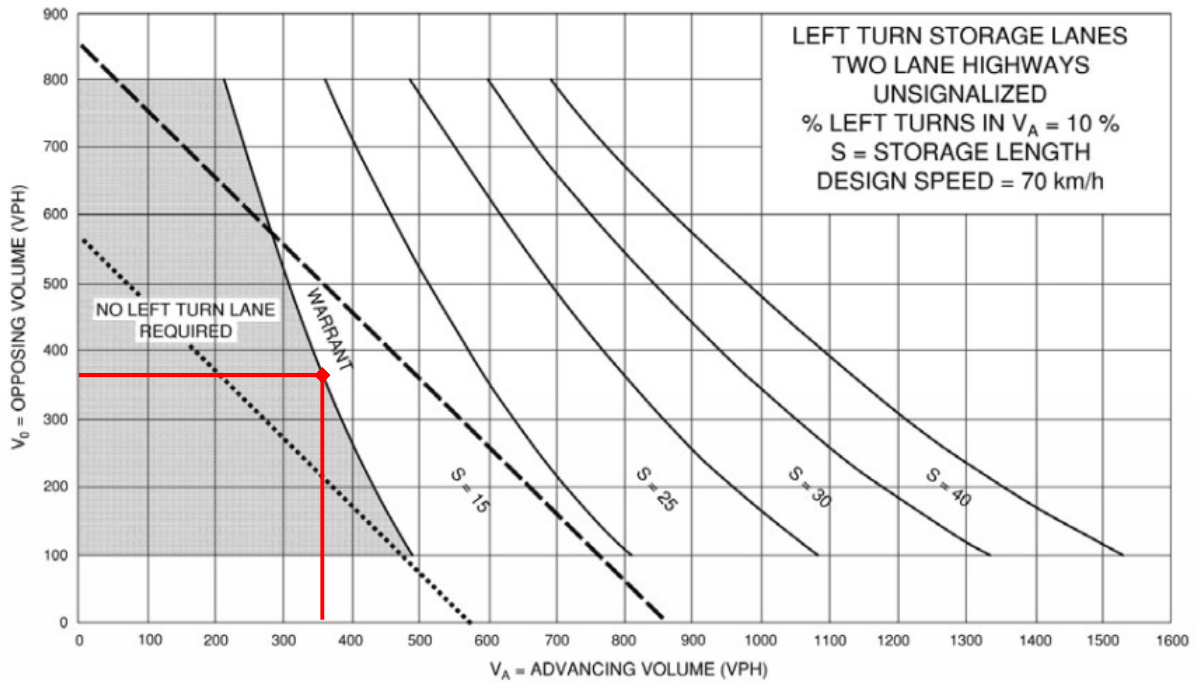
Background (2035) PM Peak – NB on Toronto Street at Fairway Heights / Commercial Driveway



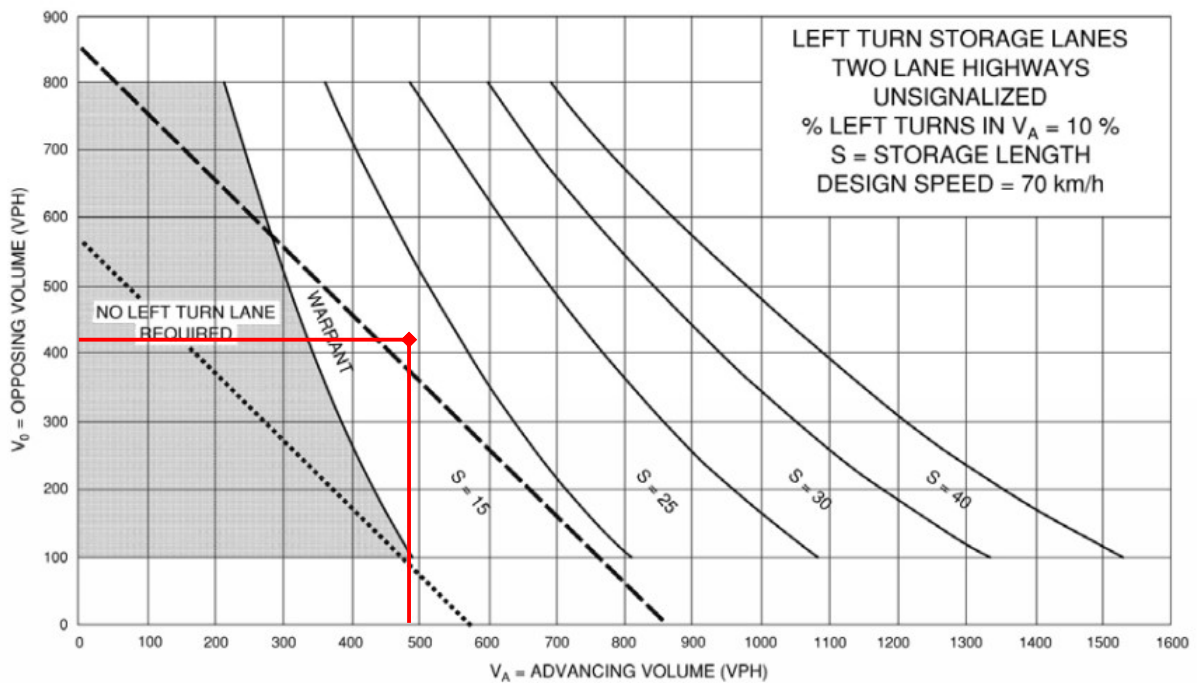
Background (2035) AM Peak – SB on Toronto Street at Fairway Heights / Commercial Driveway



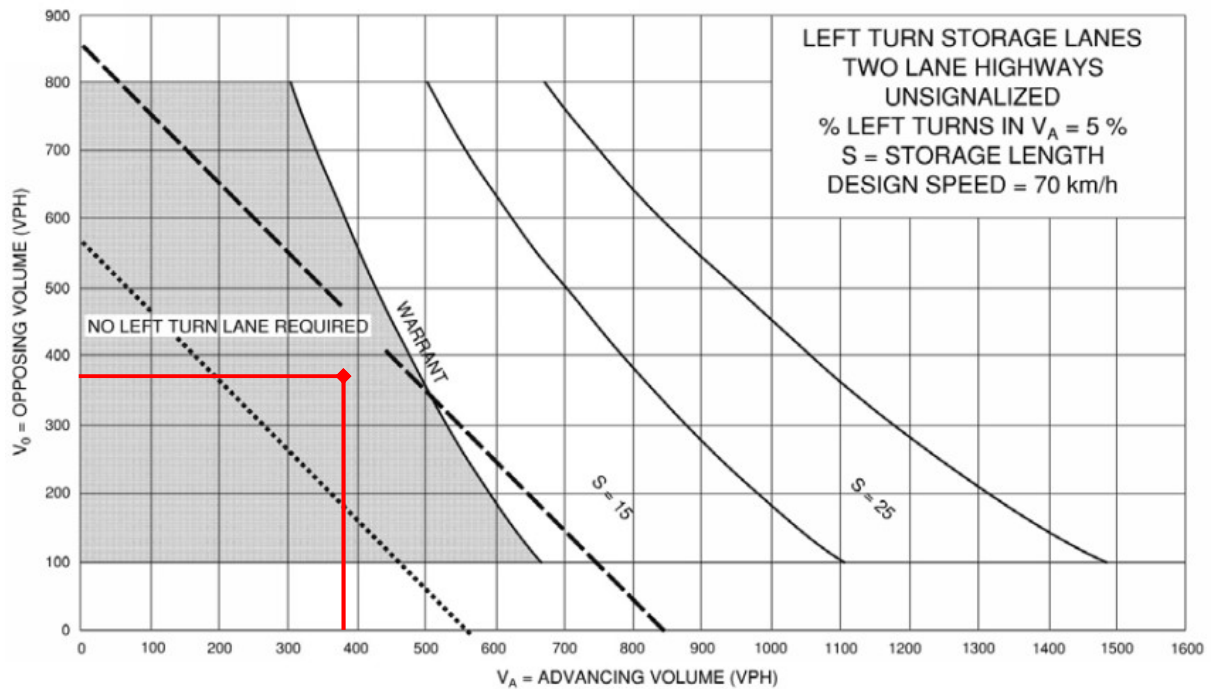
Background (2035) PM Peak – SB on Toronto Street at Fairway Heights / Commercial Driveway



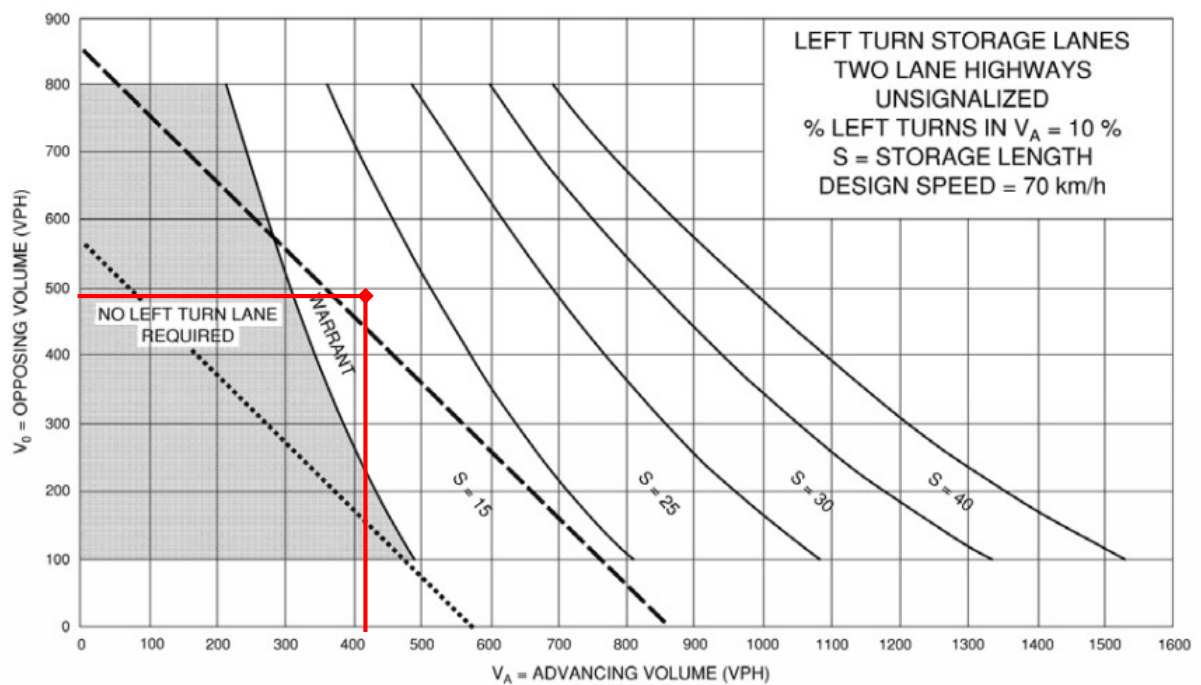
Total (2025) AM Peak – NB on Toronto Street at Fairway Heights / Commercial Driveway



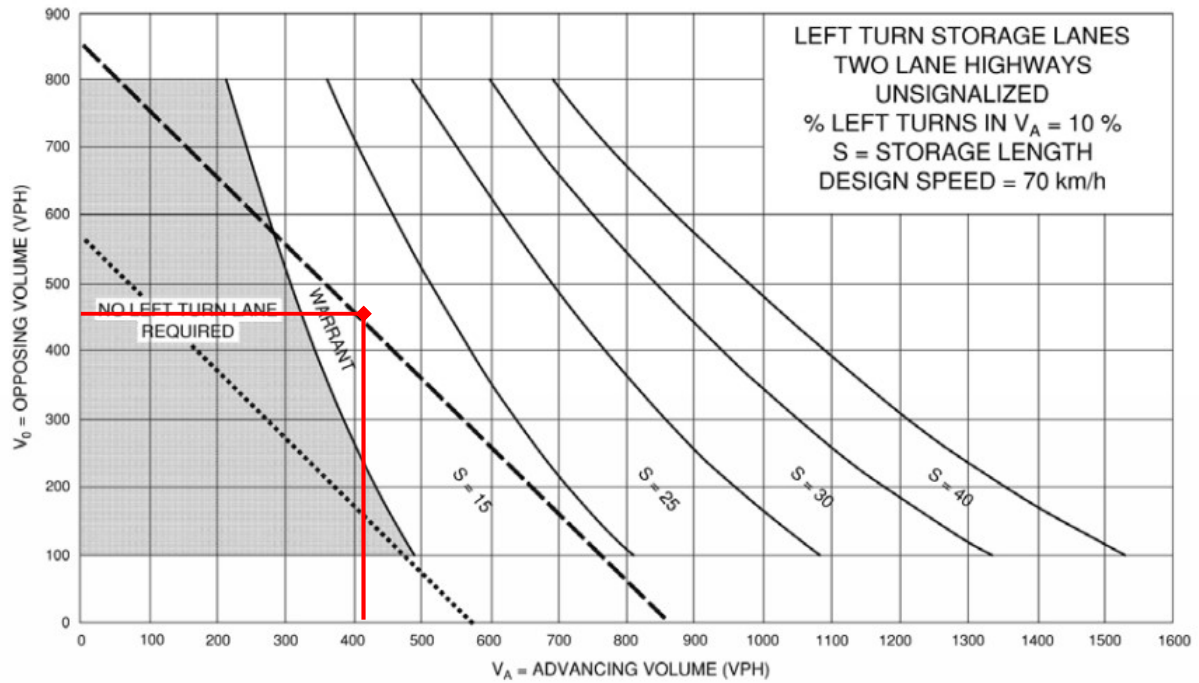
Total (2025) PM Peak – NB on Toronto Street at Fairway Heights / Commercial Driveway



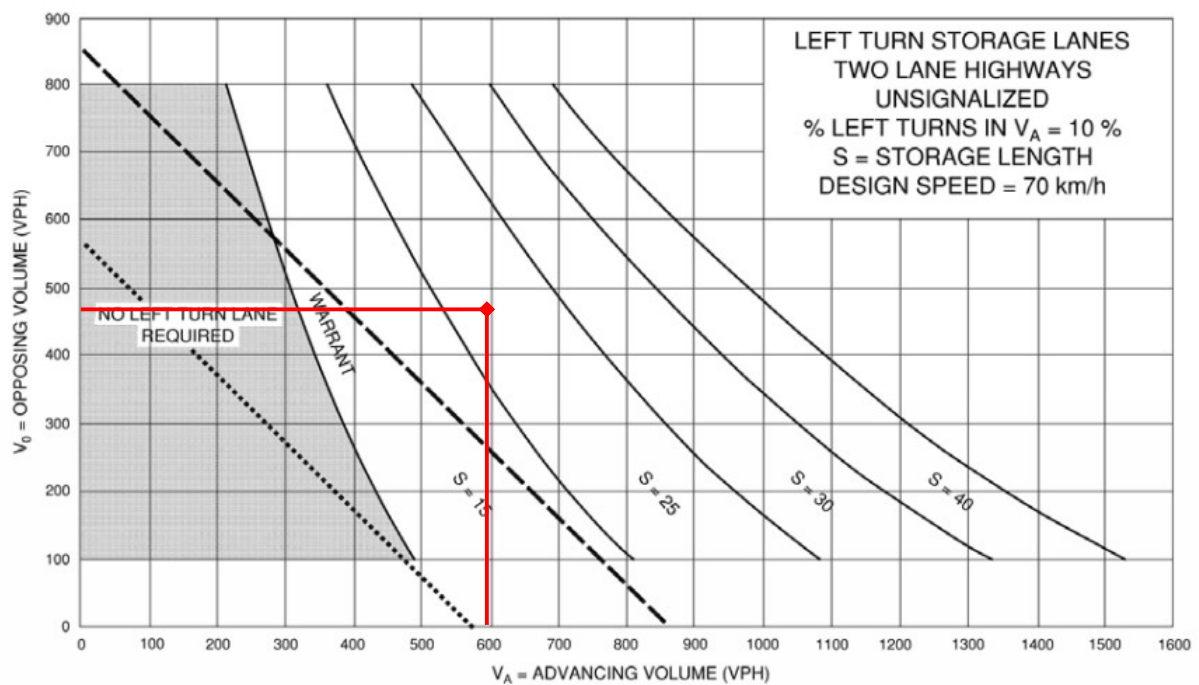
Total (2025) AM Peak – SB on Toronto Street at Fairway Heights / Commercial Driveway



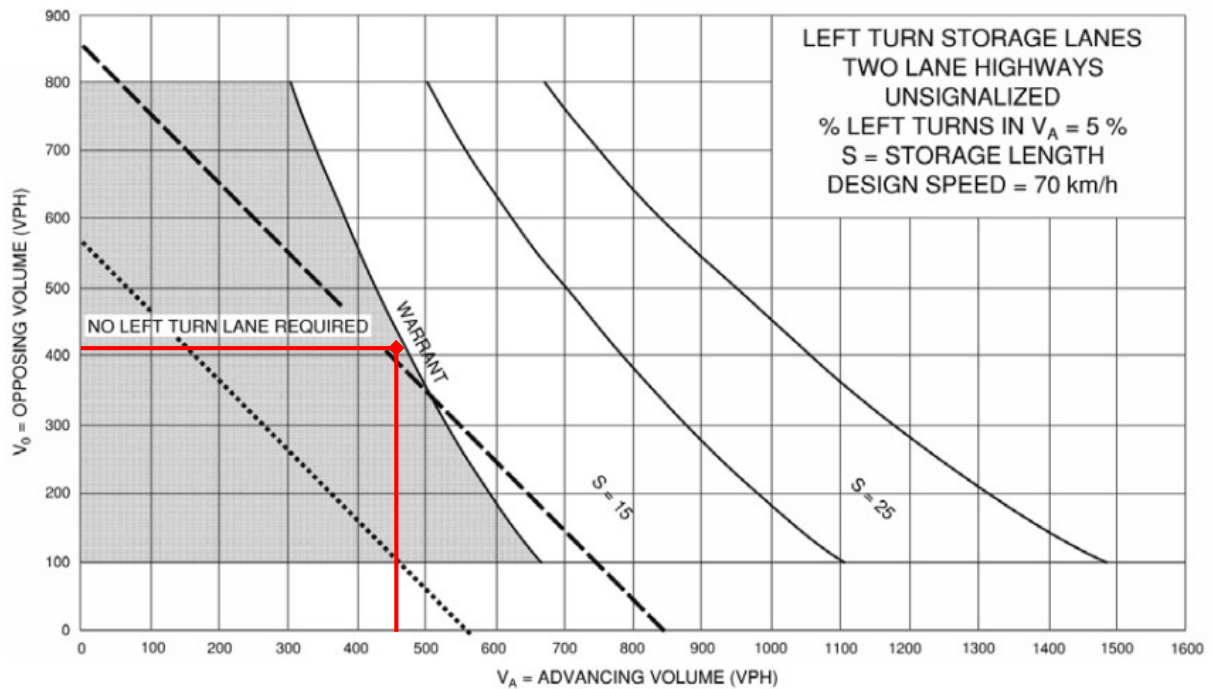
Total (2025) PM Peak – SB on Toronto Street at Fairway Heights / Commercial Driveway



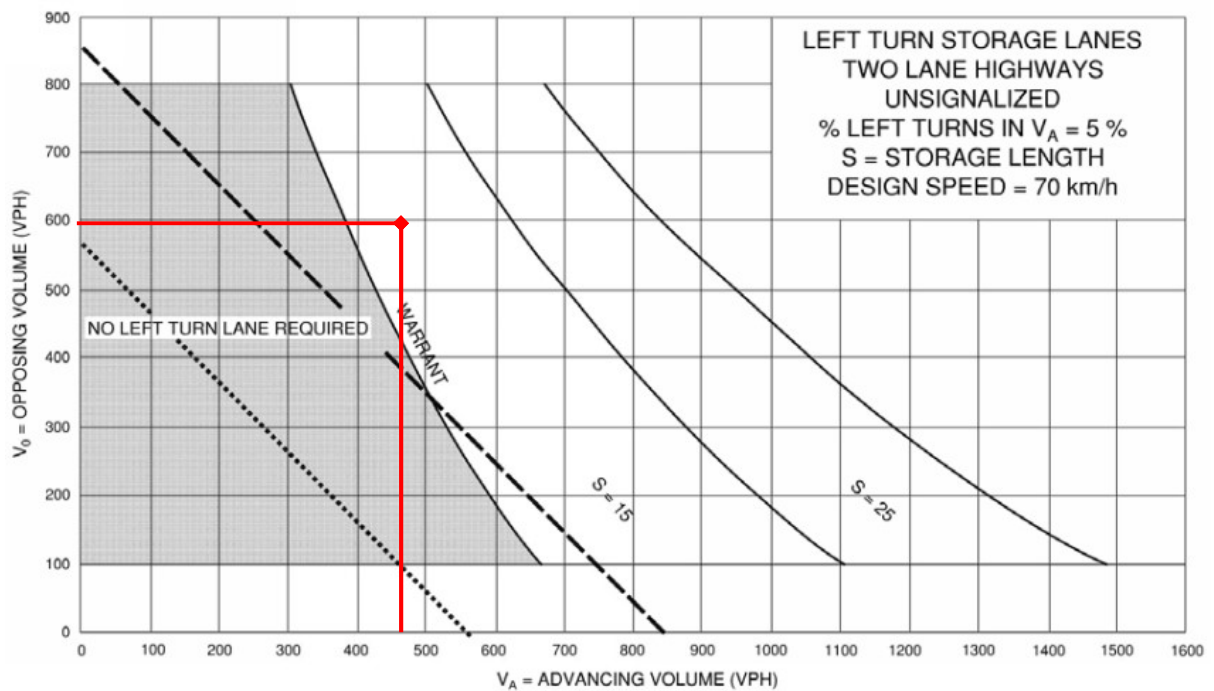
Total (2030) AM Peak – NB on Toronto Street at Fairway Heights / Commercial Driveway



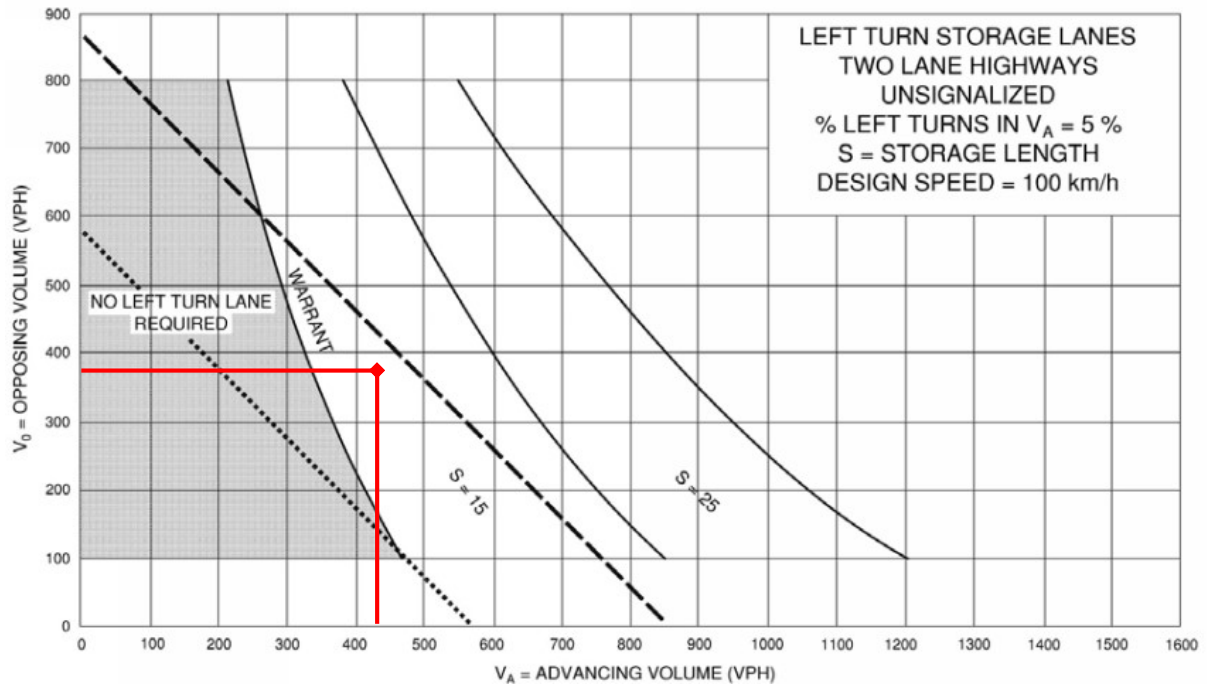
Total (2030) PM Peak – NB on Toronto Street at Fairway Heights / Commercial Driveway



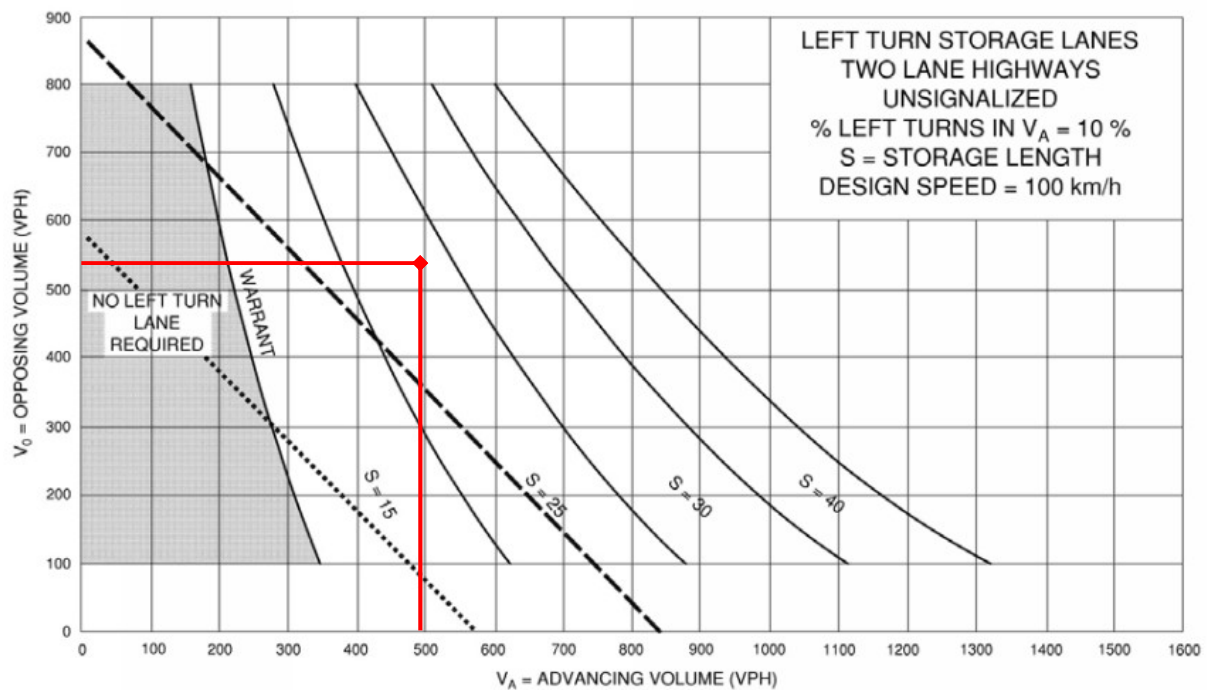
Total (2030) AM Peak – SB on Toronto Street at Fairway Heights / Commercial Driveway



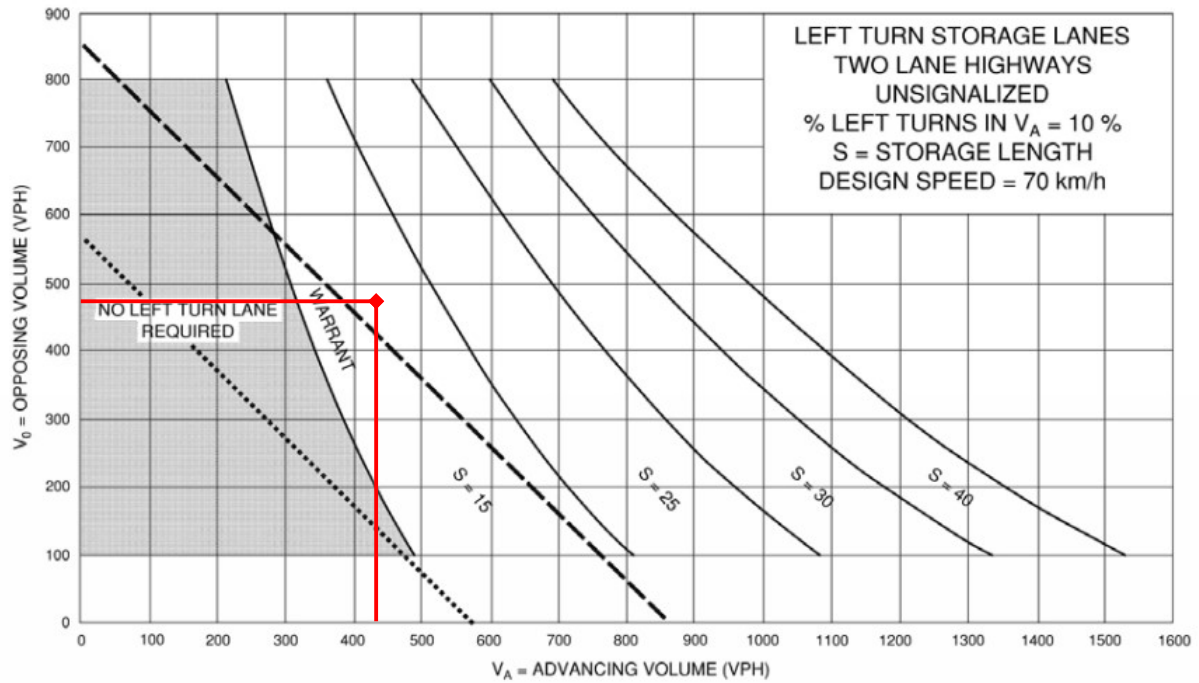
Total (2030) PM Peak – SB on Toronto Street at Fairway Heights / Commercial Driveway



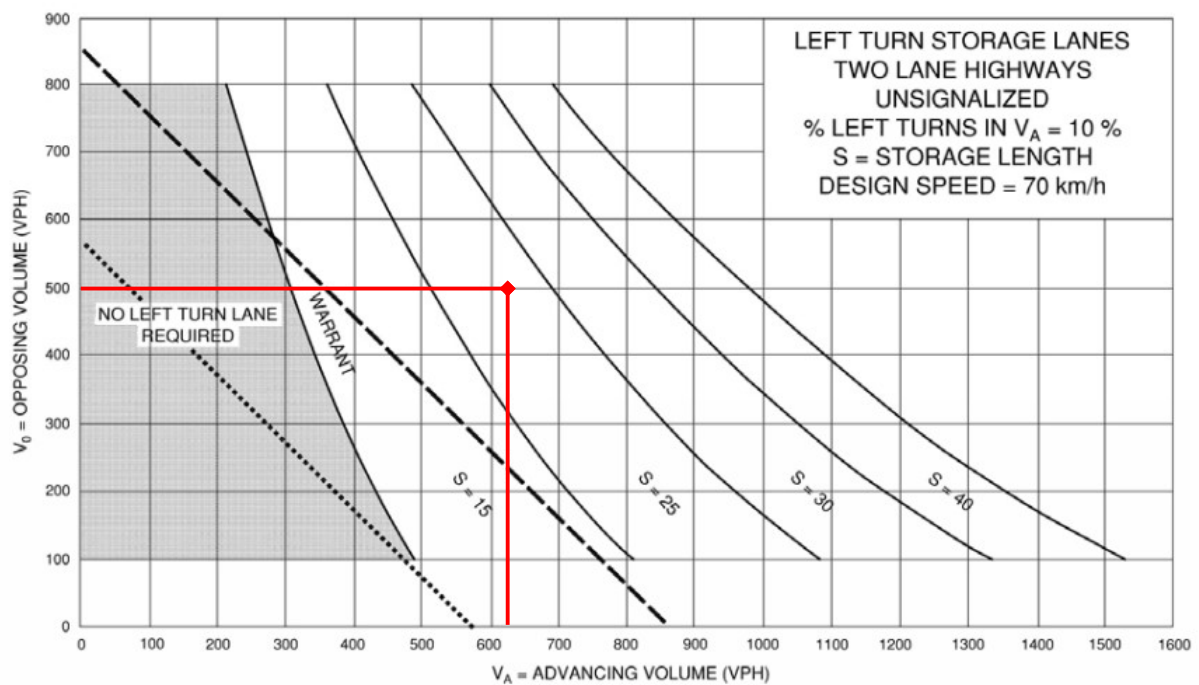
Total (2030) AM Peak – SB on Toronto Street at North Access



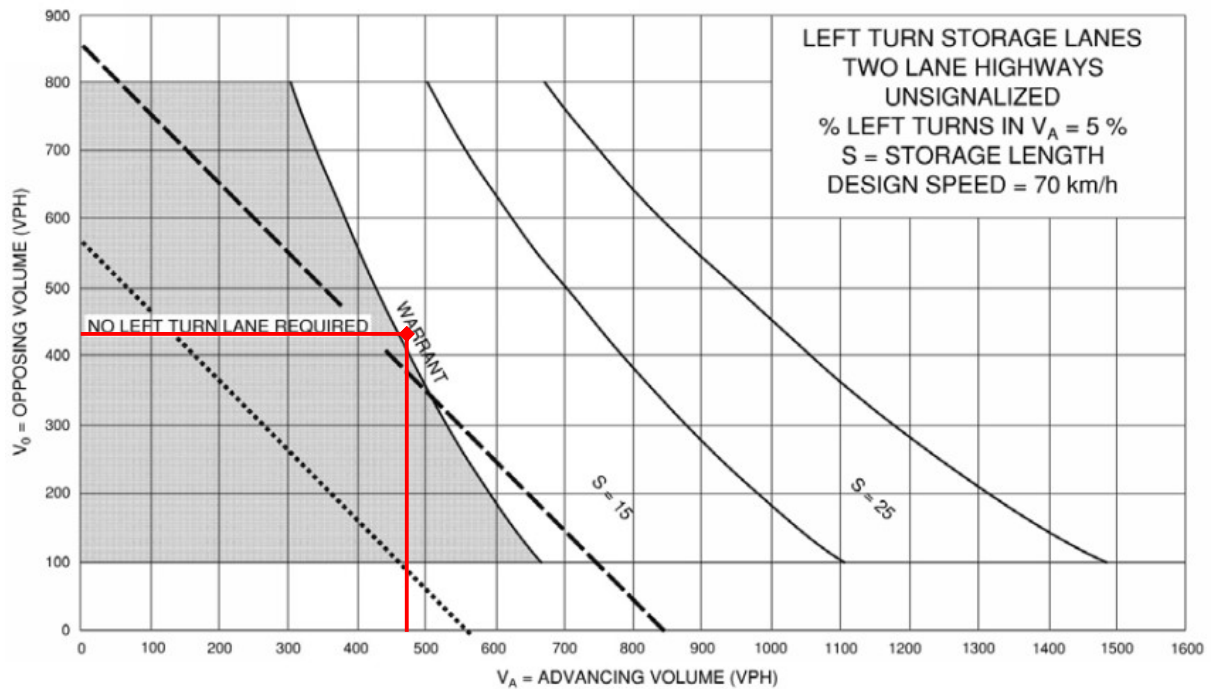
Total (2030) PM Peak – SB on Toronto Street at North Access



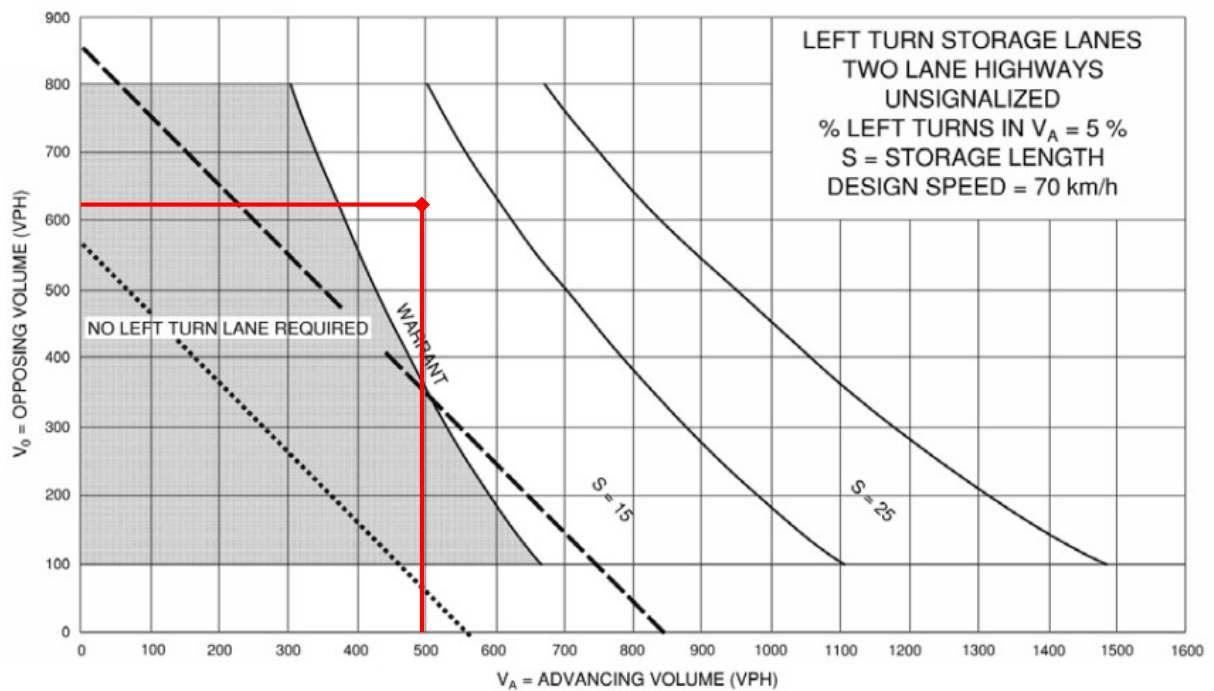
Total (2035) AM Peak – NB on Toronto Street at Fairway Heights / Commercial Driveway



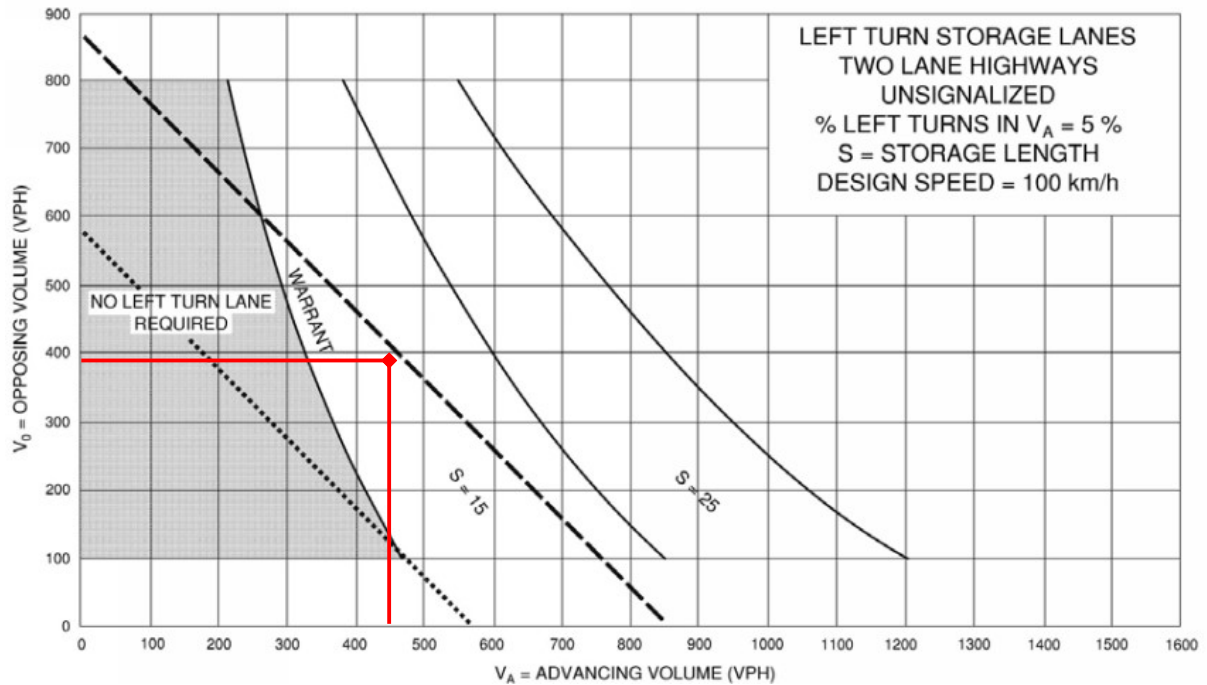
Total (2035) PM Peak – NB on Toronto Street at Fairway Heights / Commercial Driveway



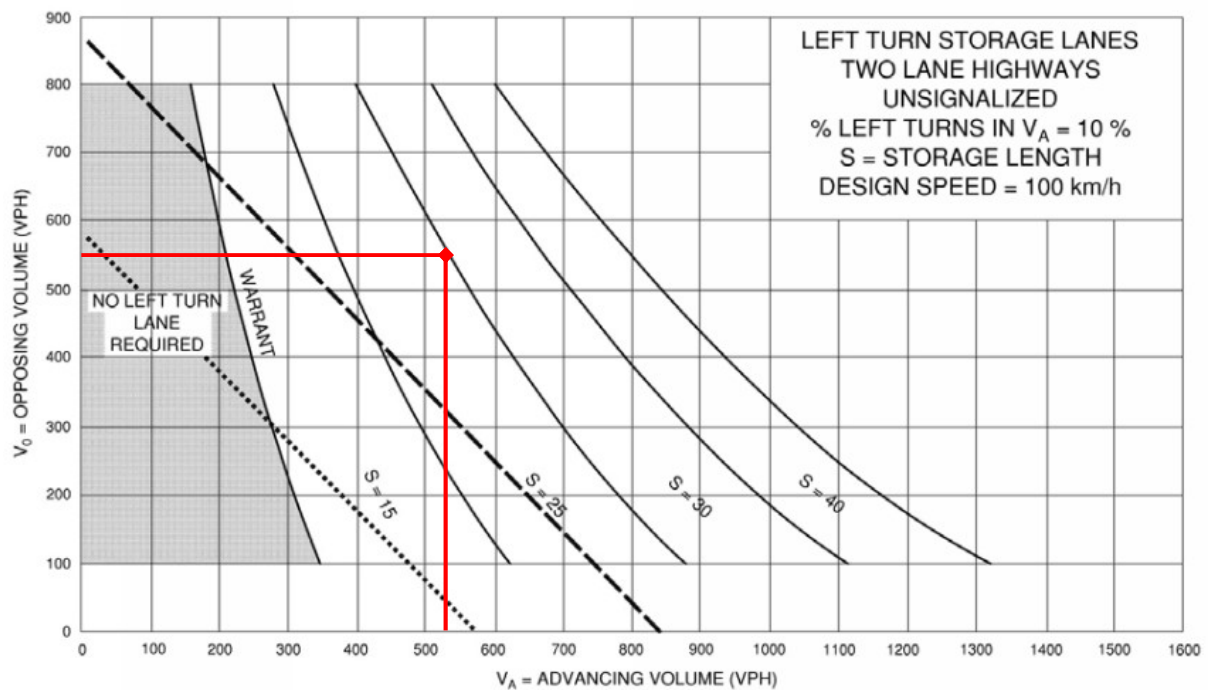
Total (2035) AM Peak – SB on Toronto Street at Fairway Heights / Commercial Driveway



Total (2035) PM Peak – SB on Toronto Street at Fairway Heights / Commercial Driveway



Total (2035) AM Peak – SB on Toronto Street at North Access



Total (2035) PM Peak – SB on Toronto Street at North Access

Appendix H – OTM Signal Justification Sheets

Justification No. 7 - Total (2035) Traffic

Toronto Street / Fairway Heights

Justification	Description		Compliance			Signal Warrant	Underground Provisions Warrant
			Sectional		Entire %		
			Rest. Flow	Numerical			
1. Minimum Vehicular Volume	A. Vehicle volume, all approaches (average hour)	720	598	83%	43%	NO	NO
	B. Vehicle volume, along minor streets (average hour)	170	88	51%		NO	NO
2. Delay to cross traffic	A. Vehicle volume, major street (average hour)	720	468	65%	54%	NO	NO
	B. Combined vehicle and pedestrian volume crossing artery from minor streets (average hour)	75	57	76%		NO	NO

Justification No. 7 - Total (2035) Traffic

Toronto Street / North Access

Justification	Description		Compliance			Signal Warrant	Underground Provisions Warrant	
			Rest. Flow	Sectional				Entire %
				Numerical	%			
1. Minimum Vehicluar Volume	A. Vehicle volume, all aproaches (average hour)	720	558	77%	20%	NO	NO	
	B. Vehicle volume, along minor streets (average hour)	255	76	30%		NO	NO	
2. Delay to cross traffic	A. Vehicle volume, major street (average hour)	720	462	64%	21%	NO	NO	
	B. Combined vehicle and pedestrian volume crossing artery from minor streets (average hour)	75	24	31%		NO	NO	