



Perkin Crescent Residential Subdivision, Listowel

Transportation Impact Study

Paradigm Transportation Solutions Limited

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Executive Summary

Content

Paradigm Transportation Solutions Limited has been retained to conduct this Transportation Impact Study (TIS) for a proposed residential subdivision located east of Perkin Crescent in the community of Listowel, Municipality of North Perth.

This study includes an analysis of existing traffic conditions, a description of the proposed development, traffic forecasts for a five-year horizon from the date of TIS submission (2030), and an assessment of traffic impacts with recommendations to accommodate the proposed development as appropriate.

Development Concept

The subject site is located east of Perkin Crescent. The proposed subdivision includes 67 single-family detached units and 141 multiple residential units. Vehicular access to Walton Avenue North is proposed via Perkin Crescent and Pleasant View Drive.

Conclusions

Based on the investigations carried out, it is concluded that:

- ▶ **Existing Traffic Conditions:** The study area intersections are operating with acceptable levels of service.
- ▶ **Development Trip Generation:** The development is forecast to generate 118 and 140 trips during the AM and PM peak hours, respectively.
- ▶ **2030 Background Traffic Conditions:** The study area intersections are forecast to operate within acceptable levels of service, except for the following movements:

Wallace Avenue North and Winston Boulevard / McKenzie Street East

- The eastbound shared movement is forecast to operate with LOS E during the PM peak hour.

Wallace Avenue North and McDonald Street

- The eastbound shared movement is forecast to operate with LOS F during the PM peak hour.



- ▶ **2030 Total Traffic Conditions:** The study area intersections are forecast to operate similarly to background traffic conditions with the addition of the following critical movement:

Wallace Avenue North and Winston Boulevard / McKenzie Street East

- The westbound shared movement is forecast to operate with LOS F during the PM peak hour. The v/c ratio for this movement is no greater than 0.70 for the 2030 total traffic, indicating that there is capacity for this movement despite the higher delays.
- ▶ **Remedial Measures:**
 - Left-Turn Lanes: A southbound left-turn lane with 25 metres of storage is warranted on Wallace Avenue North at Winston Boulevard / McKenzie Street East and McDonald Street East under 2030 total traffic volumes. The existing two-way centre left-turn lane on Wallace Avenue North can accommodate the southbound left-turns at McKenzie Street East and McDonald Street East.
 - Signal Warrants: Traffic signals are not warranted on Wallace Avenue North at Winston Boulevard / McKenzie Street East under 2030 total traffic volumes.

Recommendations

Based on the findings of this study, it is recommended that the development be approved as proposed with no conditions related to off-site transportation improvements.



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1 Introduction

1.1 Overview

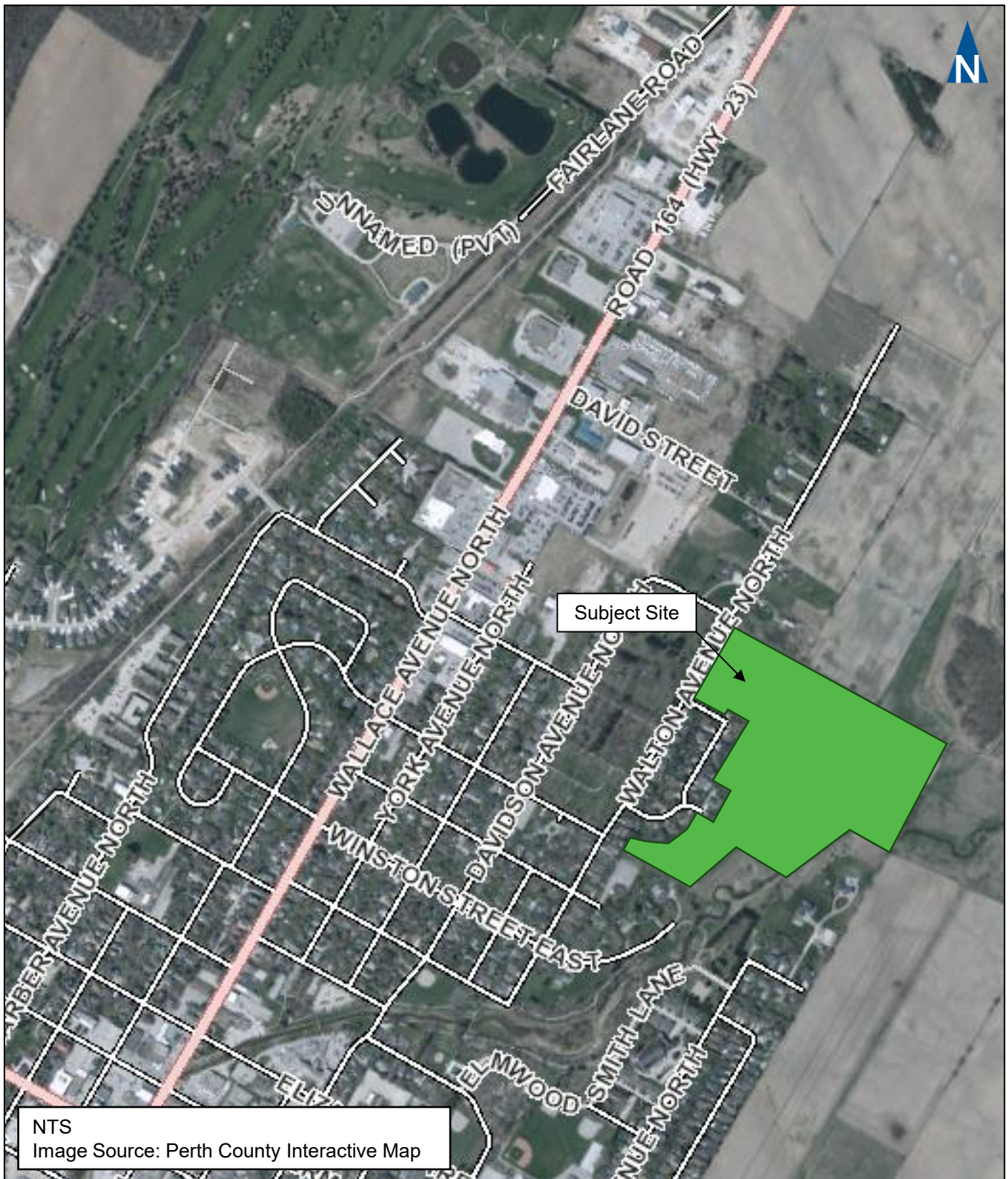
Paradigm Transportation Solutions Limited has been retained to conduct this Transportation Impact Study (TIS) for a proposed residential subdivision located east of Perkin Crescent in the community of Listowel, Municipality of North Perth. **Figure 1.1** illustrates the subject development location.

1.2 Purpose and Scope

The purpose of this report is to identify and assess the potential traffic impact resulting from the proposed development. The scope of the study, developed in consultation with Perth County and Municipality of North Perth staff via e-mail in July 2025, includes:

- ▶ Assessment of the current traffic and site conditions within the study area;
- ▶ Estimates of background traffic growth for five years beyond date of TIS (2030);
- ▶ Estimates of additional traffic generated by the subject site;
- ▶ Analyses of the impact of future traffic on the surrounding road network, including the following study area intersections:
 - Wallace Avenue North and McKenzie Street East;
 - McKenzie Street East and Walton Avenue North;
 - Walton Avenue North and Rhine Street East; and
 - Wallace Avenue North and McDonald Street.
- ▶ Recommendations necessary to mitigate the site generated traffic in a satisfactory manner.





Location of Subject Site

2 Existing Conditions

2.1 Existing Roadways

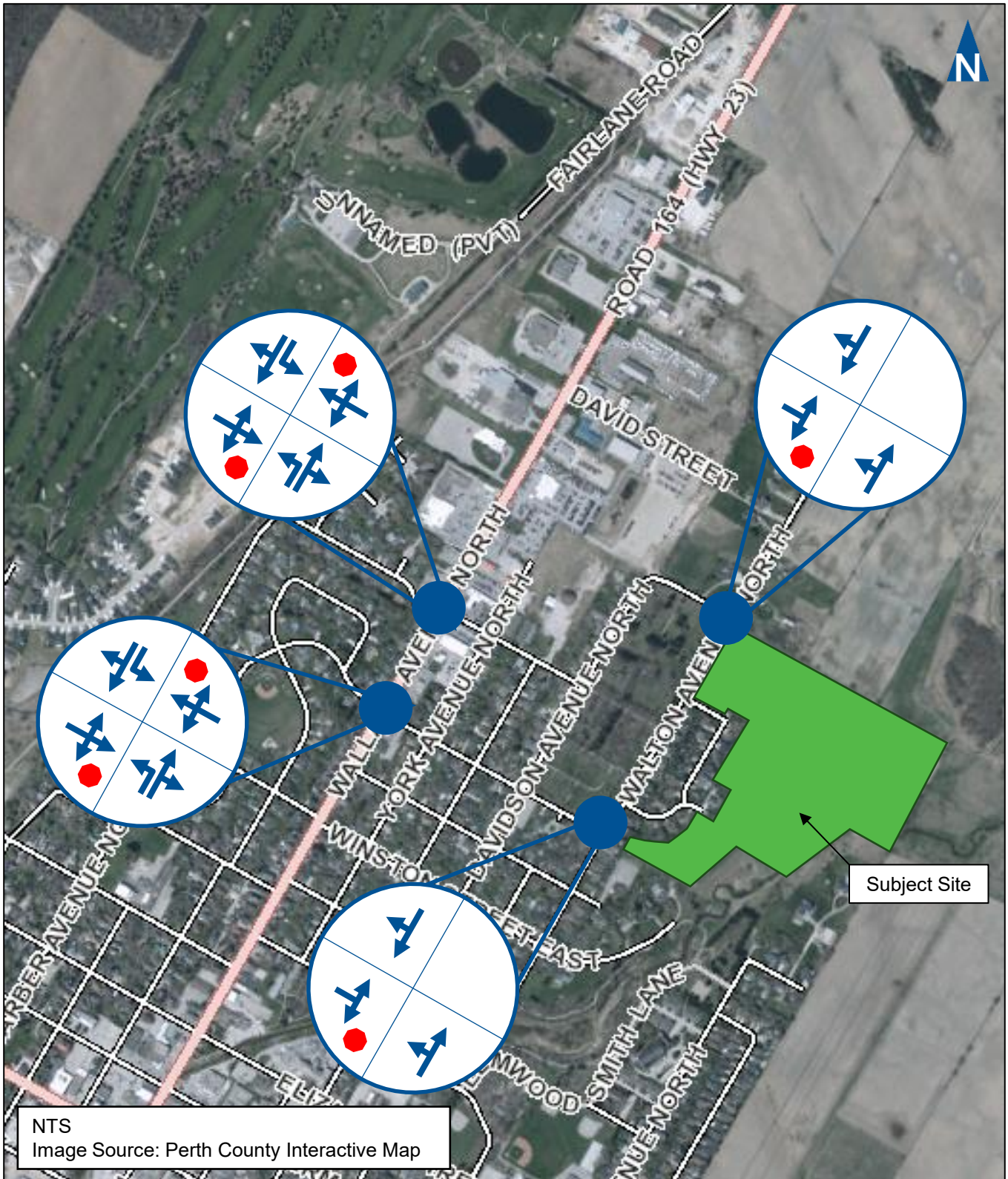
The main roadways near the subject site considered in assessing the traffic impacts of the development include:

- ▶ **Wallace Avenue** is a north-south arterial¹ road with a three-lane cross section including a two-way centre left-turn lane. The roadway operates with a posted speed limit of 50 km/h.
- ▶ **McDonald Street** is an east-west collector road west of Wallace Avenue and a local road east of Wallace Avenue. The roadway operates with an assumed speed limit of 50 km/h.
- ▶ **McKenzie Street** is an east-west local road with a two-lane cross section and an assumed speed limit of 50 km/h.
- ▶ **Walton Avenue** is a north-south local road with a two-lane cross section and an assumed speed limit of 50 km/h.
- ▶ **Rhine Street** is a local road running east-west at Walton Avenue and north-south at McDonald Street. The roadway operates with an assumed speed limit of 50 km/h.

Figure 2.1 illustrates the existing lane configuration and traffic control at the study area intersections.

¹ Matt Ropp, "Council Report – Road Classifications", June 9, 2025.





NTS
Image Source: Perth County Interactive Map



Existing Lane Configuration and Traffic Control

2.2 Active Transportation

The following pedestrian infrastructure is available within the study area:

- ▶ Sidewalks are provided on both sides of Wallace Avenue;
- ▶ Sidewalks are provided on the north side of McDonald Street; and
- ▶ Sidewalks are provided on the south side of McKenzie Street between Wallace Avenue and Davidson Avenue.

Additionally, the nearest multi-use trail is the Rotary Walkway which is located approximately 600 metres from the subject site at Walton Avenue North and Campbell Street East. This multi-use trail loops around the Maitland River in Listowel Memorial Park. The subject site is also located approximately 1.3 kilometres from the Kinsmen Trail at McDonald Street West and Barber Avenue North. The Kinsmen Trail extends from Tremaine Avenue South to Wallace Avenue North just south of Line 87.

While there is no dedicated cycling facility provided within the study area, the Municipality's Transportation Master Plan² indicates that a signed on-road bike route is proposed on McDonald Street between the Kinsmen Trail and Davidson Avenue North.

The subject site has a Walk Score³ of 26 out of 100 meaning most errands require a car and a Cycle Score of 34 out of 100 meaning minimal bike infrastructure exists in the area.

2.3 Transit Service

Public transit service is provided via Perth County (PC) Connect⁴. PC Connect operates three routes which connect Perth County, Stratford, Kitchener-Waterloo and London. Particularly, **Route 1** (KW – Elmira – Listowel) operates between Listowel to Kitchener with stops including Elmira Town Centre, St. Jacobs Farmers Market, and Waterloo Conestoga Mall.

Figure 2.2 illustrates the transit route.

² Municipality of North Perth, *North Perth Transportation Master Plan*, May 2024.

³ "Walk Score", n.d., <https://www.walkscore.com/score/perkin-cres-listowel-on-canada>

⁴ "PC Connect Transit", The Corporation of the City of Stratford, n.d., <https://www.stratford.ca/en/live-here/pc-connect-transit.aspx>





Existing Transit Network

2.4 Traffic Volumes

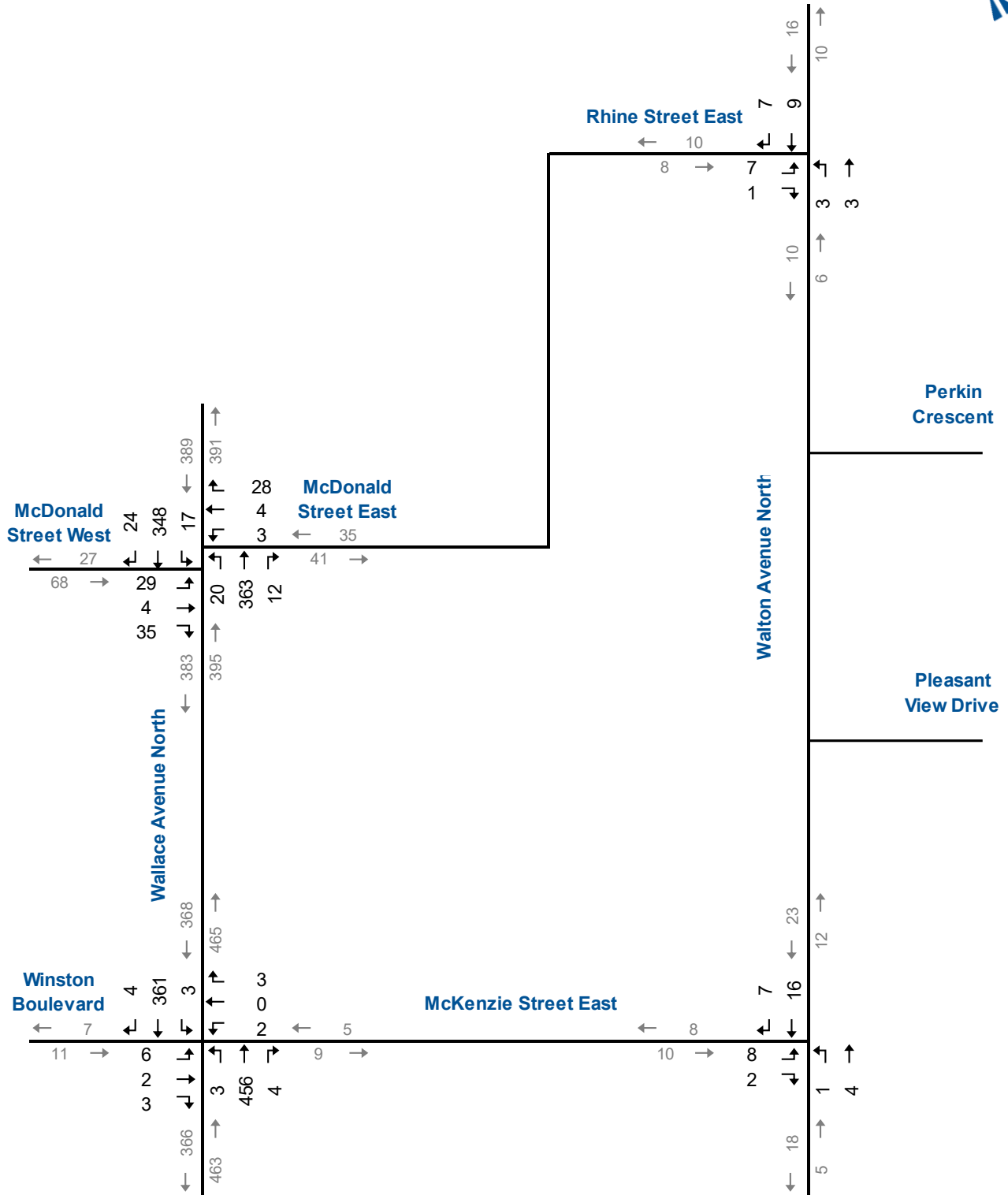
Turning movement counts at Wallace Avenue North and McDonald Street were collected by Paradigm on 2025-08-12 and at all other study area intersections on 2025-07-30.

Figure 2.3a and **Figure 2.3b** illustrate the existing AM and PM weekday peak hour traffic volumes.

Appendix A contains the detailed traffic counts for the study area intersections.

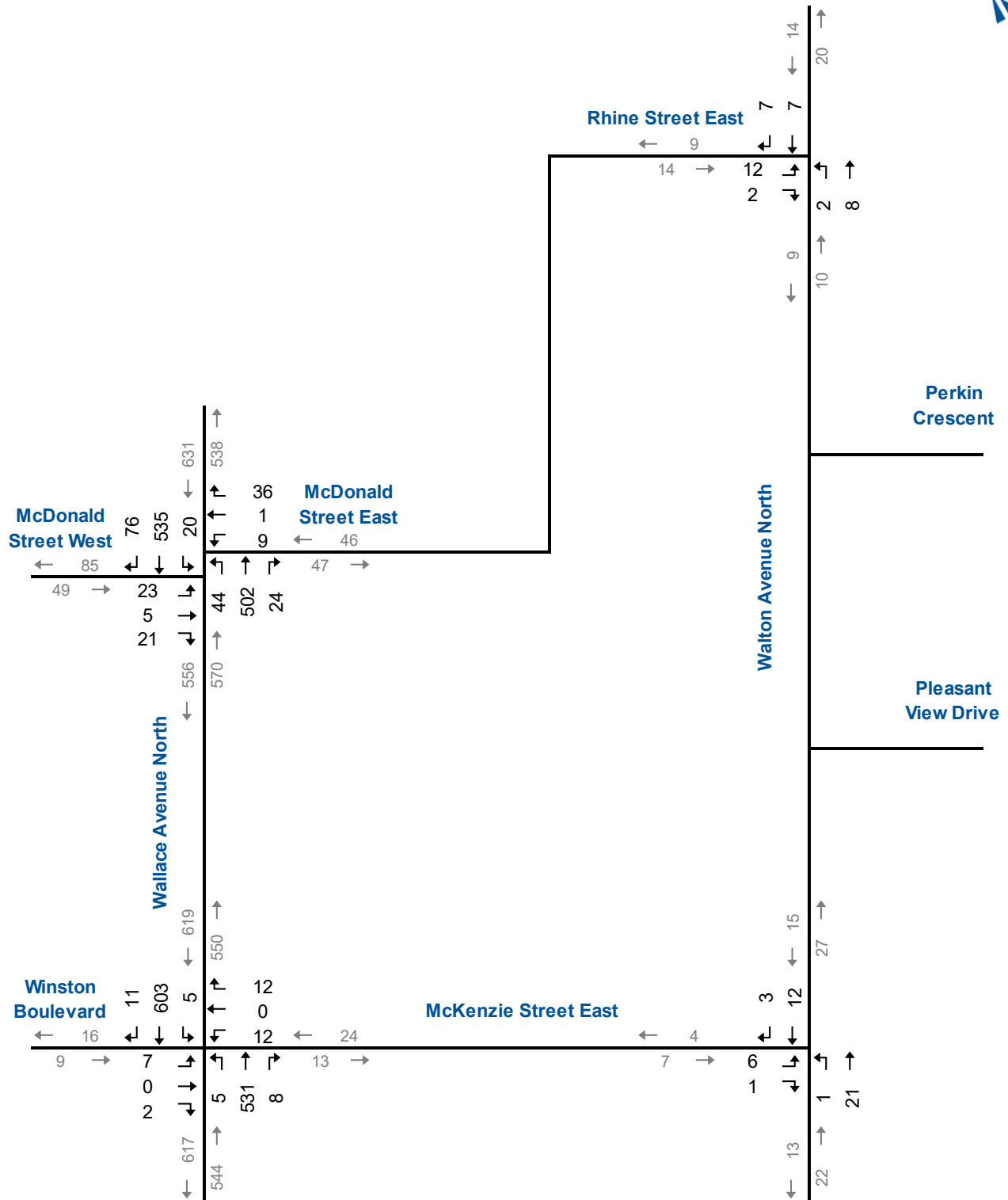


AM Peak Hour



**Existing Traffic Volumes
AM Peak Hour**

PM Peak Hour



**Existing Traffic Volumes
PM Peak Hour**

2.5 Traffic Operations

Intersection level of service (LOS) is a recognized method of quantifying the average delay experienced by drivers at intersections. It is based on the delay experienced by individual vehicles executing various movements. The delay is related to the number of vehicles intending to make a particular movement, compared to the estimated capacity for that movement. The capacity is based on a number of criteria related to the opposing traffic flows and intersection geometry.

The highest possible rating is LOS A, under which the average total delay is equal to or less than 10.0 seconds per vehicle. When the average delay exceeds 80 seconds for signalized intersections, 50 seconds for unsignalized intersections or when the volume to capacity ratio is greater than 1.0, the movement is classed as LOS F and remedial measures are usually implemented, if they are feasible. LOS E is usually used as a guideline for the determination of road improvement needs on through lanes, while LOS F may be acceptable for left-turn movements at peak times, depending on delays.

The operations at the study area intersections have been assessed using Synchro 12. In the absence of the Municipality of North Perth TIS guidelines, the following movements at unsignalized intersections are considered critical under the following conditions:

- ▶ Overall intersection Level of Service E or F; and/or
- ▶ 95th percentile queue lengths for individual movements exceeds available lane storage.

Table 2.1 summarizes the results of the intersection operational analysis under existing conditions, including the AM and PM peak hour LOS, v/c ratios, and 95th percentile queues.

The results indicate that the study area intersections are operating with acceptable levels of service, and with no problem movements.

Appendix B contains the detailed Synchro 12 reports.



TABLE 2.1: EXISTING TRAFFIC OPERATIONS

Analysis Period	Intersection	Control Type	MOE	Direction/Movement/Approach																Overall
				Eastbound				Westbound				Northbound				Southbound				
				Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	
AM Peak Hour	Walton Ave N & Rhine St E	TWSC	LOS Delay V/C Q	A 9 0.01 0	< > > >	> > > >	A 9	<	<	<	<	<	A 4	<	A 8 0.00 0	>	A 0 > >	A 0		
	Walton Ave N & McKenzie St E	TWSC	LOS Delay V/C Q	A 9 0.01 0	< > > >	> > > >	A 9	<	<	<	<	<	A 1	<	A 7 0.00 0	>	A 0 > >	A 0		
	Wallace Ave N & Winston Blvd / McKenzie St E	TWSC	LOS Delay V/C Q Stor. Avail.	< < < < < <	C 17 0.04 1 -> ->	> > > > > >	C 17	<	B 15 0.01 0 -> ->	> > > > > >	B 15	<	A 8 0.00 0 15 15	A 0 > > > >	A 8 0.00 0 15 15	A 0 > > > >	A 0 > > > >	A 0		
	Wallace Ave N & McDonald St W / McDonald St E	TWSC	LOS Delay V/C Q Stor. Avail.	< < < < < <	C 18 0.20 6 -> ->	> > > > > >	C 17	<	B 13 0.08 2 -> ->	> > > > > >	B 13	<	A 8 0.02 1 15 14	A 0 > > > >	A 8 0.02 1 15 14	A 0 > > > >	A 0 > > > >	A 0		
PM Peak Hour	Walton Ave N & Rhine St E	TWSC	LOS Delay V/C Q	A 9 0.01 0	< > > >	> > > >	A 9	<	<	<	<	<	A 1	<	A 7 0.00 0	>	A 0 > >	A 0		
	Walton Ave N & McKenzie St E	TWSC	LOS Delay V/C Q	A 9 0.01 0	< > > >	> > > >	A 9	<	<	<	<	<	A 0	<	A 7 0.00 0	>	A 0 > >	A 0		
	Wallace Ave N & Winston Blvd / McKenzie St E	TWSC	LOS Delay V/C Q Stor. Avail.	< < < < < <	D 29 0.06 2 -> ->	> > > > > >	D 29	<	C 23 0.12 3 -> ->	> > > > > >	C 23	<	A 9 0.01 0 15 15	A 0 > > > >	A 9 0.01 0 15 15	A 0 > > > >	A 0 > > > >	A 0		
	Wallace Ave N & McDonald St W / McDonald St E	TWSC	LOS Delay V/C Q Stor. Avail.	< < < < < <	D 34 0.30 9 -> ->	> > > > > >	D 34	<	C 19 0.16 4 -> ->	> > > > > >	C 19	<	A 9 0.05 2 15 13	A 1 > > > >	A 9 0.02 1 15 14	A 1 > > > >	A 0 > > > >	A 0		

MOE - Measure of Effectiveness Q - 95th Percentile Queue Length (m) </> - Shared with through movement
 LOS - Level of Service Stor. - Existing Storage (m)
 Delay - Average Delay per Vehicle in Seconds Avail. - Available Storage (m)
 V/C - Volume to Capacity Ratio TWSC - Two-Way Stop Control

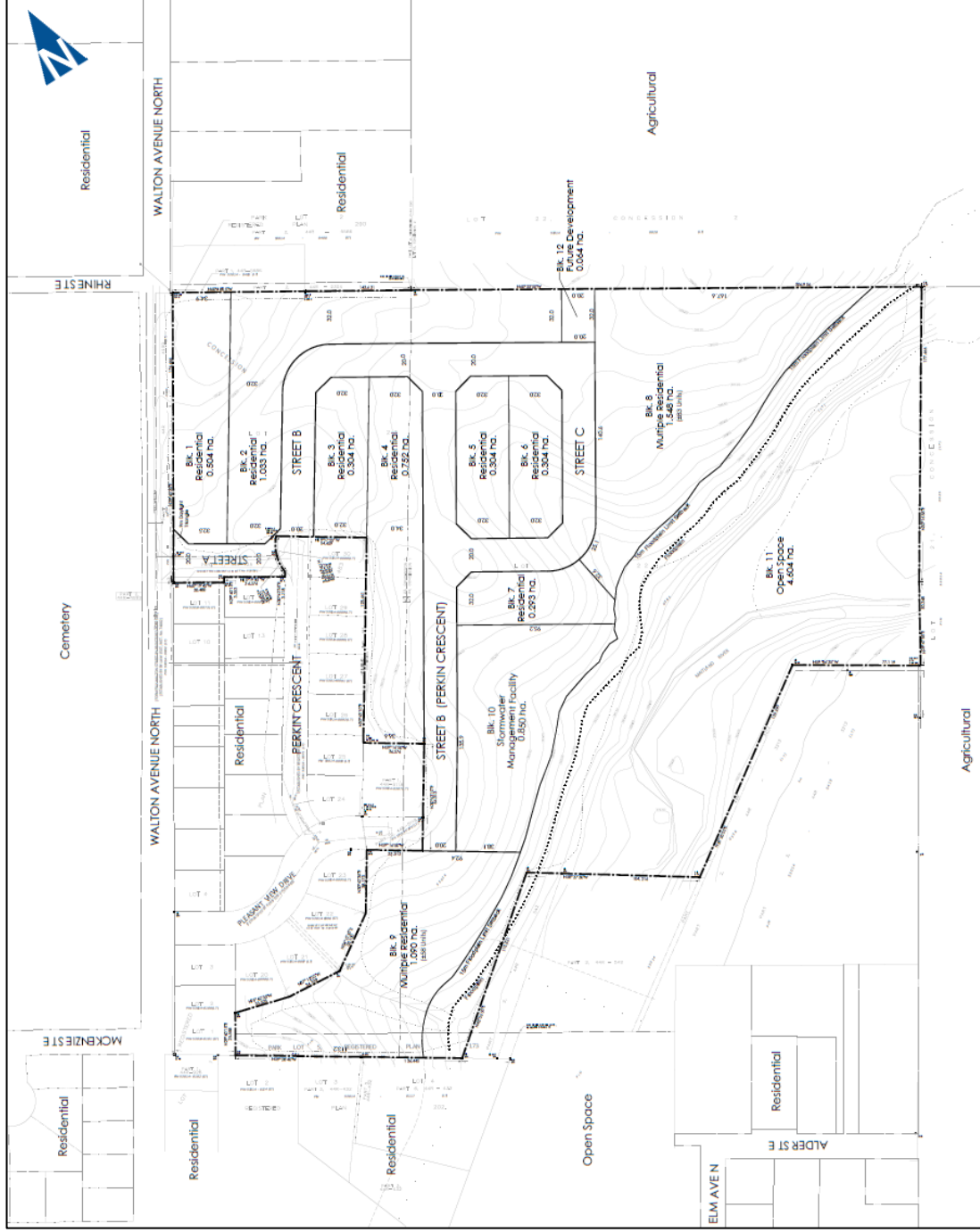
3 Development Concept

3.1 Development Description

The subject site is located east of Perkin Crescent. The proposed subdivision includes 67 single-family detached units and 141 multiple residential units. Vehicular access to Walton Avenue North is proposed via Perkin Crescent and Pleasant View Drive.

Figure 3.1 shows the development concept.





Proposed Concept Plan

Perkin Crescent Residential Subdivision, Listowel TIS
250502

Figure 3.1

3.2 Development Trip Generation

The Institute of Transportation Engineers (ITE) Trip Generation Manual⁵ provides rates and equations used to estimate the peak hour traffic volumes generated by the Land Use Codes (LUC) of this development:

- ▶ LUC 210 (Single Family Detached Housing); and
- ▶ LUC 215 (Single Family Attached Housing).

Table 3.1 summarizes the forecast number of net new trips generated by the proposed development.

TABLE 3.1: TRIP GENERATION

Land Use	Number of Units	AM Peak Hour				PM Peak Hour			
		Rate	In	Out	Total	Rate	In	Out	Total
LUC 210 - Single-Family Detached Housing	67	Eqn ¹	14	36	50	Eqn ¹	41	26	67
LUC 215 - Single-Family Attached Housing	141	Eqn ²	17	51	68	Eqn ²	41	32	73
Total Trip Generation			31	87	118		82	58	140

¹ LUC 210 - AM: $T = 0.67(X) + 5.59$ | PM: $\ln(T) = 0.92\ln(X) + 0.33$

² LUC 215 - AM: $T = 0.59(X) - 15.25$ | PM: $T = 0.57(X) - 7.84$

3.3 Development Trip Distribution and Assignment

The trip distribution was determined based on existing travel patterns within the study area and likely origins/destinations relative to the subject site. It is anticipated that the majority of site trips will travel to/from the south via Wallace Avenue towards the core area of Listowel. **Table 3.2** displays the breakdown of trip distributions used in this study.

TABLE 3.2: ESTIMATED TRIP DISTRIBUTION

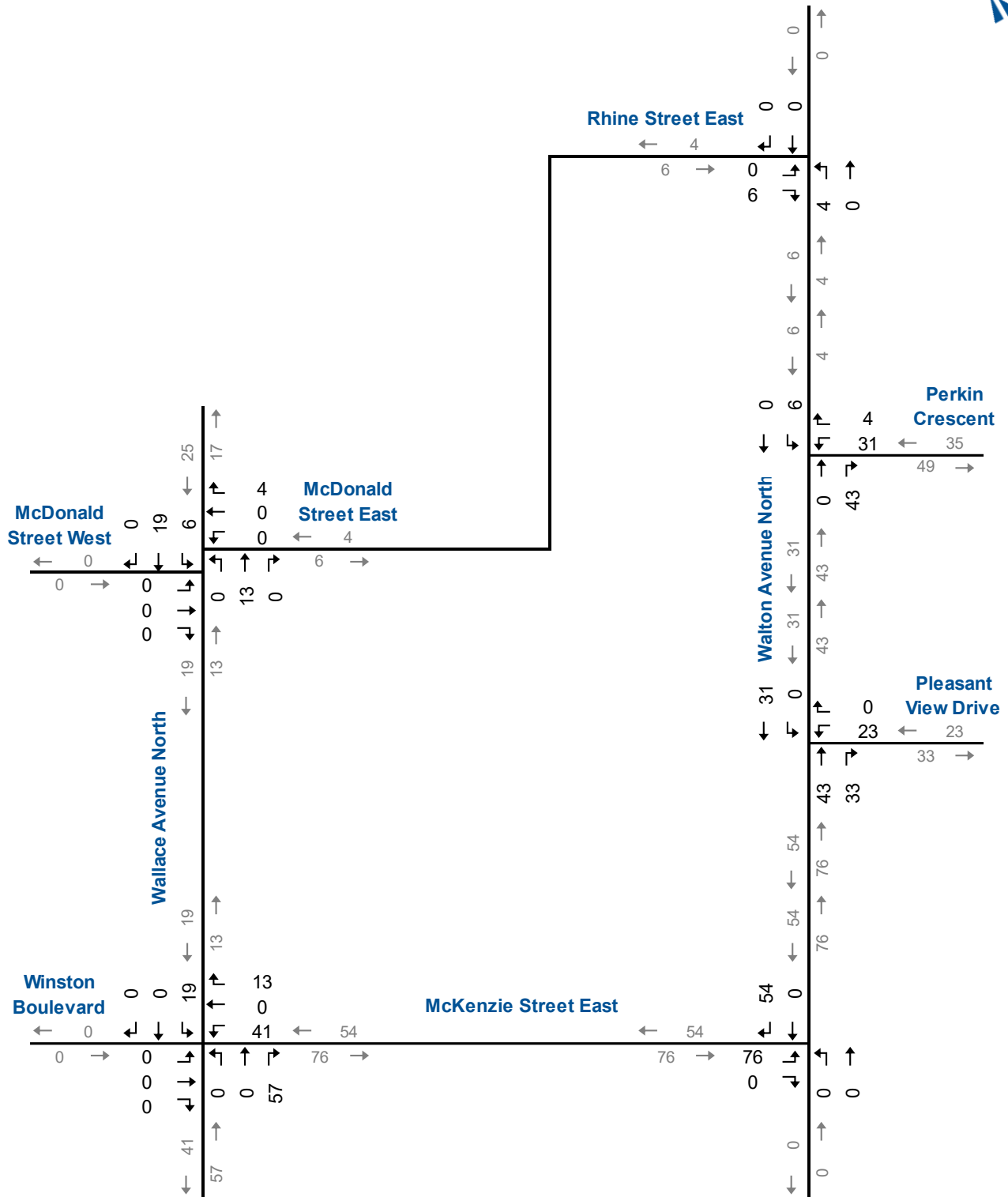
Origin/Destination	Percentage
North via Wallace Avenue North	30%
South via Wallace Avenue North	70%
Total	100%

Figure 3.2a and **Figure 3.2b** illustrate the site-generated traffic volumes for the AM and PM peak hours, respectively.

⁵ Institute of Transportation Engineers, *Trip Generation Manual*, 12th ed., (Washington, DC: ITE, 2025).



PM Peak Hour



**Site Generated Traffic Volumes
PM Peak Hour**

4 Evaluation of Future Traffic Conditions

The assessment of future traffic conditions in this section includes estimates of future background and total traffic volumes, and the analyses for the 2030 horizon.

4.1 Background Traffic Forecasts

To derive the generalized background traffic volumes, a growth rate of 2% was applied to the existing roadway traffic volumes. This growth rate was confirmed with County staff during the pre-study consultation.

4.1.1 Background Development

In addition to general traffic growth, the background development located on the south side of Line 87 east of Highway 23 / Wallace Avenue North has been included in the background traffic volumes.

The background development, also known as the Makem Lands, is proposed to contain approximately 218 single family units and 158 multi-family units. It is understood that the current build-out plan consists of 71 units and the timeline of the remainder of the development is unknown at the time of writing. To ensure a conservative analysis, the 71 units are assumed to be single-family detached units as it produces a higher trip generation compared to single-family attached units. The number of trips anticipated to be generated by the 71 units was estimated following methods consistent with the original study⁶.

Table 4.1 summarizes the net new trips generated by the background development.

TABLE 4.1: BACKGROUND DEVELOPMENT TRIP GENERATION

Land Use	Number of Units	AM Peak Hour			PM Peak Hour				
		Rate	In	Out	Total	Rate	In	Out	Total
LUC 210 - Single-Family Detached Housing	71	Eqn ¹	14	41	55	Eqn ¹	45	27	72
Total Trip Generation			14	41	55		45	27	72

¹ LUC 210 - AM: $\text{Ln}(T) = 0.91\text{Ln}(X) + 0.12$ | PM: $\text{Ln}(T) = 0.94\text{Ln}(X) + 0.27$

Figure 4.1 illustrates the location of the background development relative to the subject site.

Appendix C contains the background development traffic volumes.

⁶ C.F. Crozier & Associates Inc., *Transportation Impact Study Northeast Secondary Plan*, September 2023.





4.2 2030 Background Traffic Operations

Figure 4.2a and **Figure 4.2b** illustrate the 2030 background traffic volumes, including road traffic growth and other area development traffic.

The 2030 background traffic volumes have been analyzed using the same methodology as under existing traffic conditions.

Table 4.2 summarizes the results of the 2030 background traffic operations. The results indicate that the study area intersections are forecast to operate with acceptable levels of service during the AM and PM peak hours, except for the following movements:

Wallace Avenue North and Winston Boulevard / McKenzie Street East

- ▶ The eastbound shared movement is forecast to operate with LOS E during the PM peak hour.

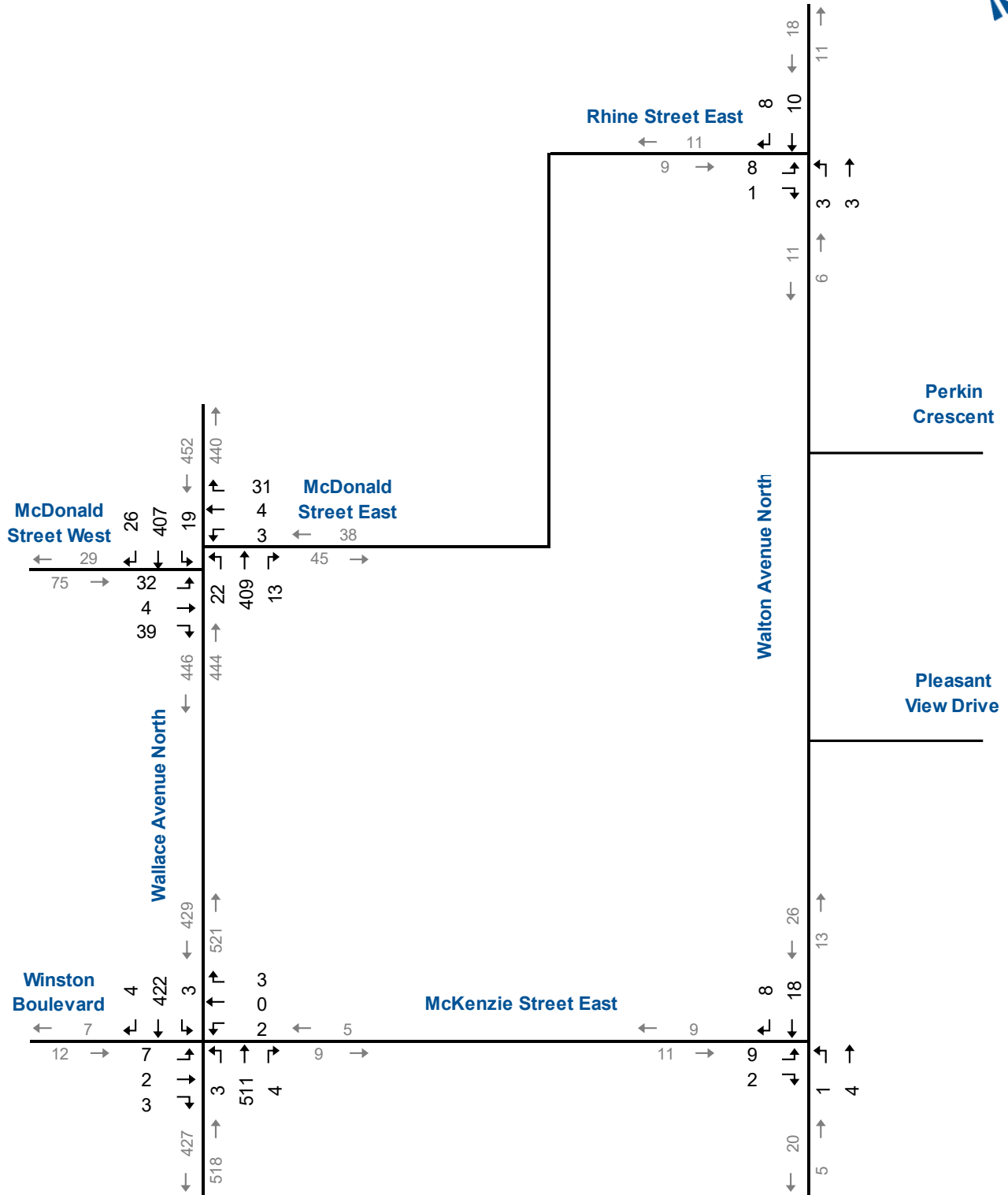
Wallace Avenue North and McDonald Street

- ▶ The eastbound shared movement is forecast to operate with LOS F during the PM peak hour.

Appendix D contains the supporting detailed Synchro 12 reports.

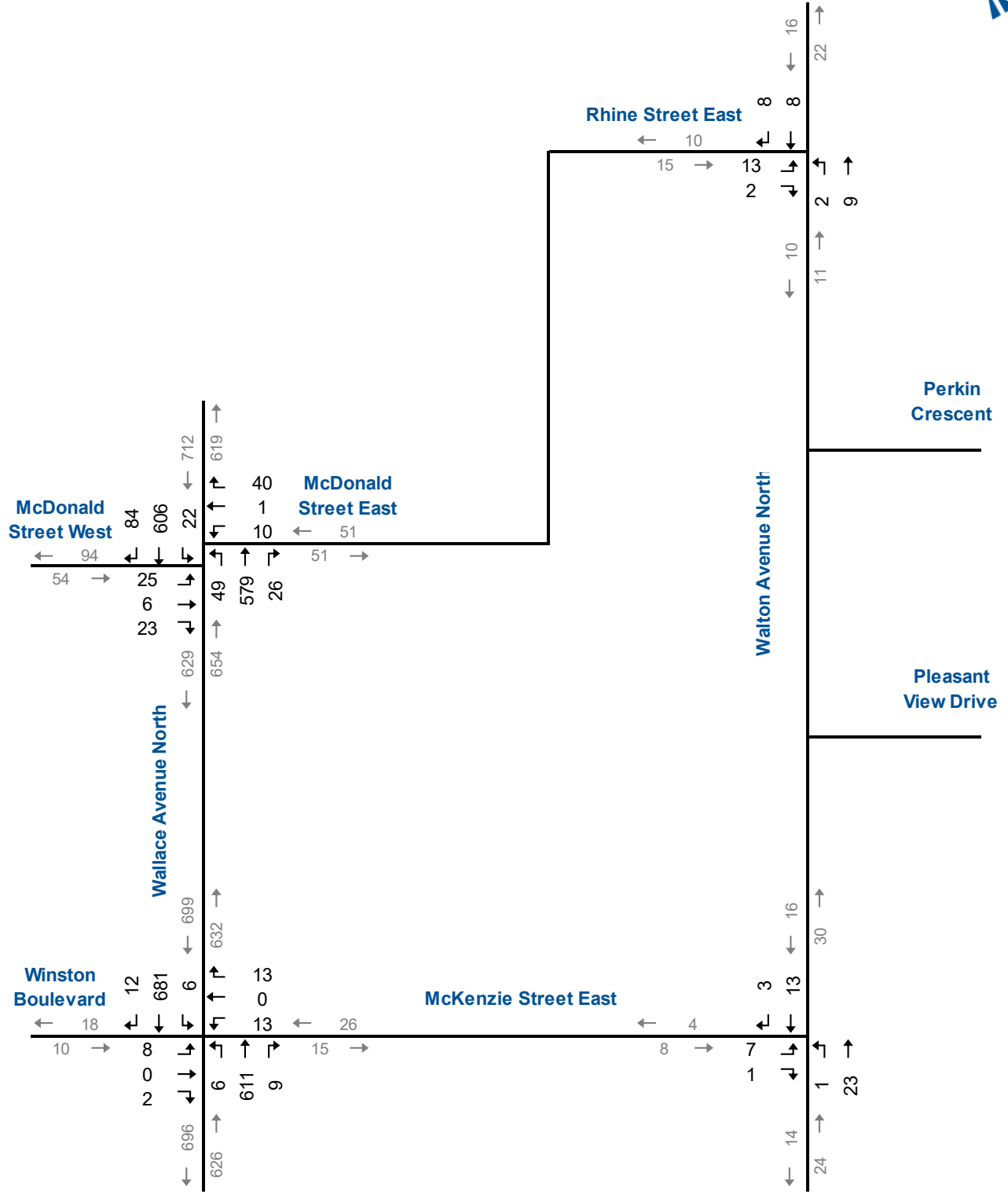


AM Peak Hour



**Background Traffic Volumes
AM Peak Hour**

PM Peak Hour



**Background Traffic Volumes
PM Peak Hour**

TABLE 4.2: 2030 BACKGROUND TRAFFIC OPERATIONS

Analysis Period	Intersection	Control Type	MOE	Direction/Movement/Approach																Overall
				Eastbound				Westbound				Northbound				Southbound				
				Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	
AM Peak Hour	Walton Ave N & Rhine St E	TWSC	LOS Delay V/C Q	A 9 0.01 0	< > > >	> > > >	A 9	< < < <	< < < <	< < < <	< < < <	A 4	< < < <	A 0	> > > >	A 0	< < < <			
	Walton Ave N & McKenzie St E	TWSC	LOS Delay V/C Q	A 9 0.01 0	< > > >	> > > >	A 9	< < < <	< < < <	< < < <	< < < <	A 1	< < < <	A 0	> > > >	A 0	< < < <			
	Wallace Ave N & Winston Blvd / McKenzie St E	TWSC	LOS Delay V/C Q Stor. Avail.	< < < < < <	C 20 0.05 2 - -	> > > > > >	C 20	< < < < < <	C 16 0.02 1 - -	> > > > > >	C 16	A 8 0.00 0 15 15	A 0 > > > >	A 0	A 9 0.00 0 15 15	A 0 > > > >	A 0	< < < < < <		
	Wallace Ave N & McDonald St W / McDonald St E	TWSC	LOS Delay V/C Q Stor. Avail.	< < < < < <	C 21 0.27 8 - -	> > > > > >	C 21	< < < < < <	B 14 0.09 2 - -	> > > > > >	B 14	A 8 0.02 1 15 14	A 0 > > > >	A 0	A 8 0.02 1 15 14	A 0 > > > >	A 0	< < < < < <		
PM Peak Hour	Walton Ave N & Rhine St E	TWSC	LOS Delay V/C Q	A 9 0.02 0	< > > >	> > > >	A 9	< < < <	< < < <	< < < <	< < < <	A 1	< < < <	A 0	> > > >	A 0	< < < <			
	Walton Ave N & McKenzie St E	TWSC	LOS Delay V/C Q	A 9 0.01 0	< > > >	> > > >	A 9	< < < <	< < < <	< < < <	< < < <	A 0	< < < <	A 0	> > > >	A 0	< < < <			
	Wallace Ave N & Winston Blvd / McKenzie St E	TWSC	LOS Delay V/C Q Stor. Avail.	< < < < < <	E 38 0.09 2 - -	> > > > > >	E 38	< < < < < <	D 30 0.16 4 - -	> > > > > >	D 30	A 9 0.01 0 15 15	A 0 > > > >	A 0	A 9 0.01 0 15 15	A 0 > > > >	A 0	< < < < < <		
	Wallace Ave N & McDonald St W / McDonald St E	TWSC	LOS Delay V/C Q Stor. Avail.	< < < < < <	F 51 0.44 14 - -	> > > > > >	F 51	< < < < < <	C 24 0.23 6 - -	> > > > > >	C 24	A 9 0.06 2 15 13	A 1 > > > >	A 1	A 9 0.03 1 15 14	A 0 > > > >	A 0	< < < < < <		

MOE - Measure of Effectiveness Q - 95th Percentile Queue Length (m) </> - Shared with through movement
 LOS - Level of Service Stor. - Existing Storage (m)
 Delay - Average Delay per Vehicle in Seconds Avail. - Available Storage (m)
 V/C - Volume to Capacity Ratio TWSC - Two-Way Stop Control

4.3 2030 Total Traffic Operations

Figure 4.3a and **Figure 4.3b** illustrate the 2030 total traffic volumes, including trips generated by the proposed development.

The 2030 total traffic volumes have been analyzed using the same methodology as under existing and background traffic conditions.

Table 4.3 summarizes the results of the 2030 total traffic operations. The results indicate that the study area intersections are forecast to operate similarly to background traffic conditions with the addition of the following critical movement:

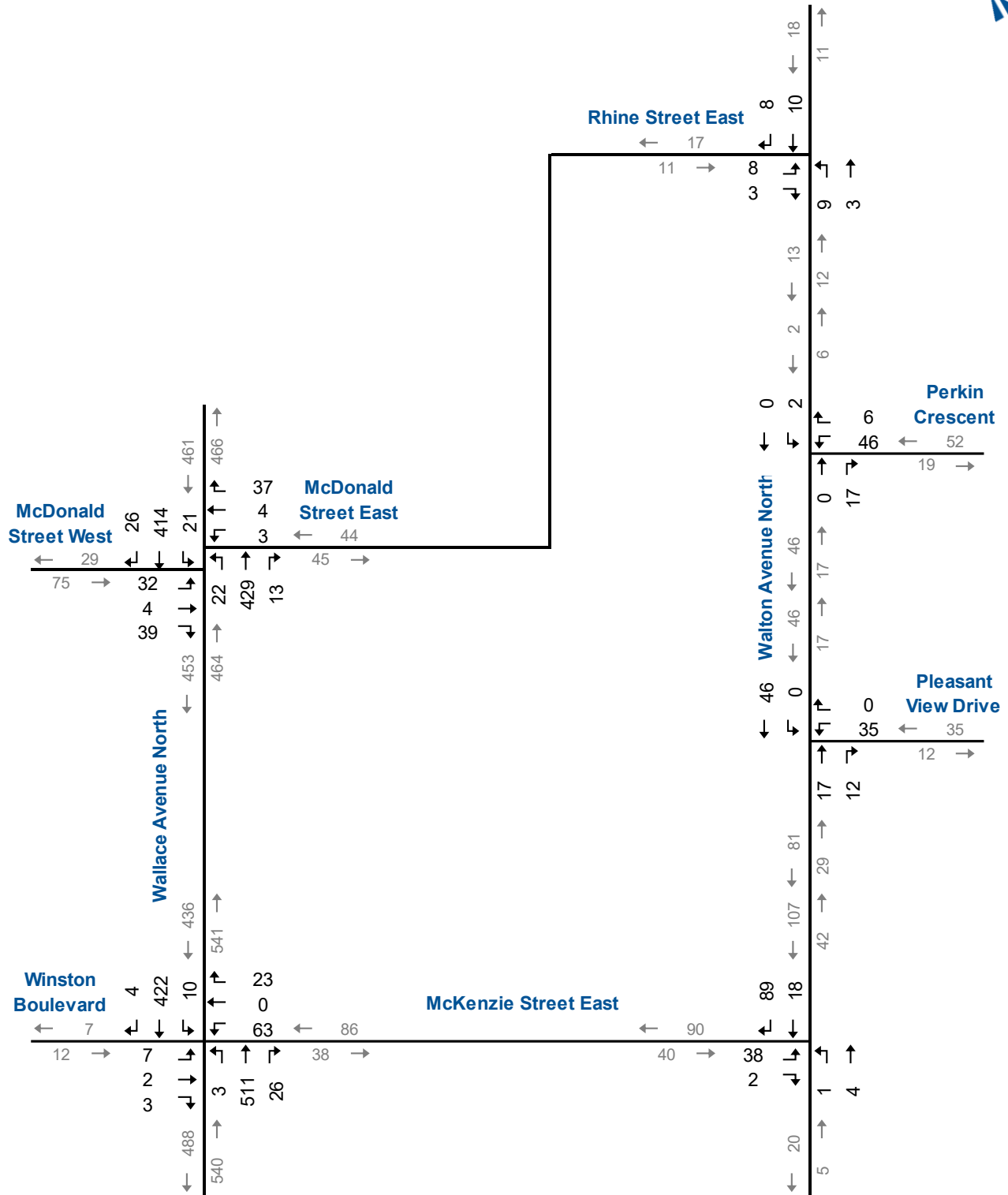
Wallace Avenue North and Winston Boulevard / McKenzie Street East

- ▶ The westbound shared movement is forecast to operate with LOS F during the PM peak hour.

Appendix E contains the supporting detailed Synchro 12 reports.

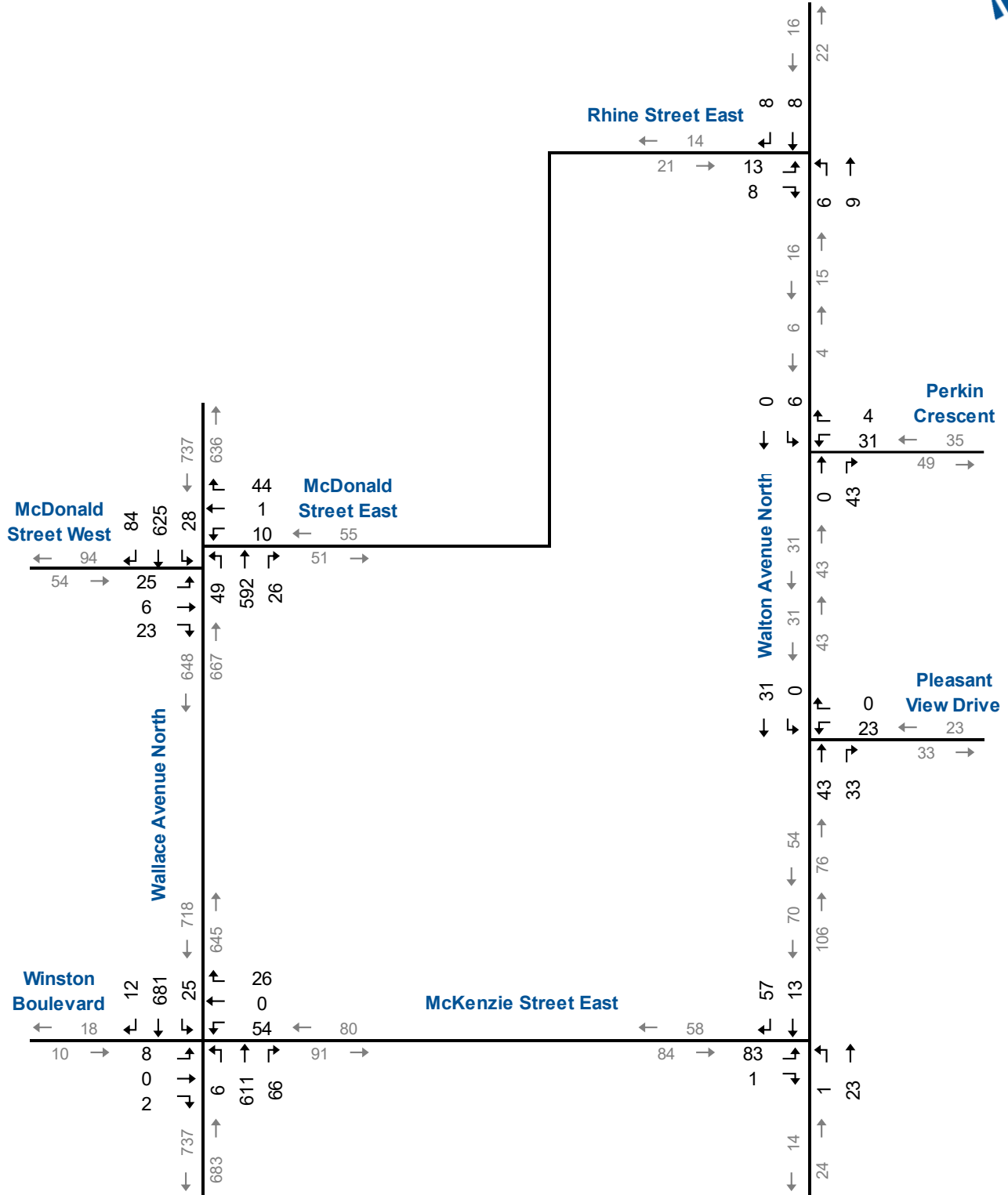


AM Peak Hour



**Total Traffic Volumes
AM Peak Hour**

PM Peak Hour



**Total Traffic Volumes
PM Peak Hour**

TABLE 4.3: 2030 TOTAL TRAFFIC OPERATIONS

Analysis Period	Intersection	Control Type	MOE	Direction/Movement/Approach																Overall					
				Eastbound				Westbound				Northbound				Southbound									
				Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach						
AM Peak Hour	Walton Ave N & Rhine St E	TWSC	LOS Delay 9 V/C 0.01 Q 0	A	<	>	A 9	<	>	>		<	>	>		<	A 8	<	A 6	<	A 0	<	>	A 0	
	Walton Ave N & McKenzie St E	TWSC	LOS Delay 9 V/C 0.05 Q 2	A	<	>	A 9	<	>	>		<	>	>		<	A 7	<	A 1	<	A 0	<	>	A 0	
	Wallace Ave N & Winston Blvd / McKenzie St E	TWSC	LOS Delay < V/C < 0.06 Q < 2 Stor. < - Avail. < -	<	C 21	>	C 21	<	D 30	>	D 30	<	A 8	>	A 0	<	A 0	>	A 0	<	A 9	>	A 0	A 0	
	Wallace Ave N & McDonald St W / McDonald St E	TWSC	LOS Delay < V/C < 0.28 Q < 8 Stor. < - Avail. < -	<	C 22	>	C 22	<	B 14	>	B 14	<	A 8	>	A 0	<	A 0	>	A 0	<	A 8	>	A 0	A 0	
PM Peak Hour	Walton Ave N & Rhine St E	TWSC	LOS Delay 9 V/C 0.02 Q 1	A	<	>	A 9	<	>	>		<	>	>		<	A 7	<	A 3	<	A 0	<	>	A 0	
	Walton Ave N & McKenzie St E	TWSC	LOS Delay 9 V/C 0.10 Q 2	A	<	>	A 9	<	>	>		<	>	>		<	A 7	<	A 0	<	A 0	<	>	A 0	
	Wallace Ave N & Winston Blvd / McKenzie St E	TWSC	LOS Delay < V/C < 0.10 Q < 2 Stor. < - Avail. < -	<	E 42	>	E 42	<	F 83	>	F 83	<	A 9	>	A 0	<	A 0	>	A 0	<	A 9	>	A 0	A 0	
	Wallace Ave N & McDonald St W / McDonald St E	TWSC	LOS Delay < V/C < 0.48 Q < 16 Stor. < - Avail. < -	<	F 59	>	F 59	<	C 25	>	C 25	<	A 10	>	A 1	<	A 0	>	A 1	<	A 9	>	A 0	A 0	

MOE - Measure of Effectiveness
 LOS - Level of Service
 Delay - Average Delay per Vehicle in Seconds
 V/C - Volume to Capacity Ratio
 Q - 95th Percentile Queue Length (m)
 Stor. - Existing Storage (m)
 Avail. - Available Storage (m)
 TWSC - Two-Way Stop Control
 </> - Shared with through movement



5 Remedial Measures

5.1 Left-Turn Lanes

The Ministry of Transportation Design Supplement for the Transportation Association of Canada (TAC) Geometric Design Guide for Canadian Roads⁷ provides guidance on the assessment and/or need for auxiliary left-turn lanes.

Warrant nomographs are used to determine if a left-turn lane is required based on a criterion such as design speed, advancing volume, opposing volume and percent of advancing vehicles performing a left-turn. As nomographs are only provided for 5% increments, a minimum threshold of greater than 2.5% of advancing left-turning vehicles is used in assessing the requirement of a left-turn lane.

Warrants have been calculated for southbound left-turns at Wallace Avenue North and Winston Boulevard / McKenzie Street East. The warrant was calculated using the nomographs for left-turn lanes on a two-lane undivided highway at an unsignalized intersection with a design speed of 60 km/h (10 km/h over the posted speed limit). Based on this criterion, a southbound left-turn lane with 25 metres of storage is warranted at Wallace Avenue North and Winston Boulevard / McKenzie Street East under total traffic volumes. It is noted that a warrant was not calculated for the AM peak hour as the percentage of left-turning vehicles is forecast to be less than 2.5%.

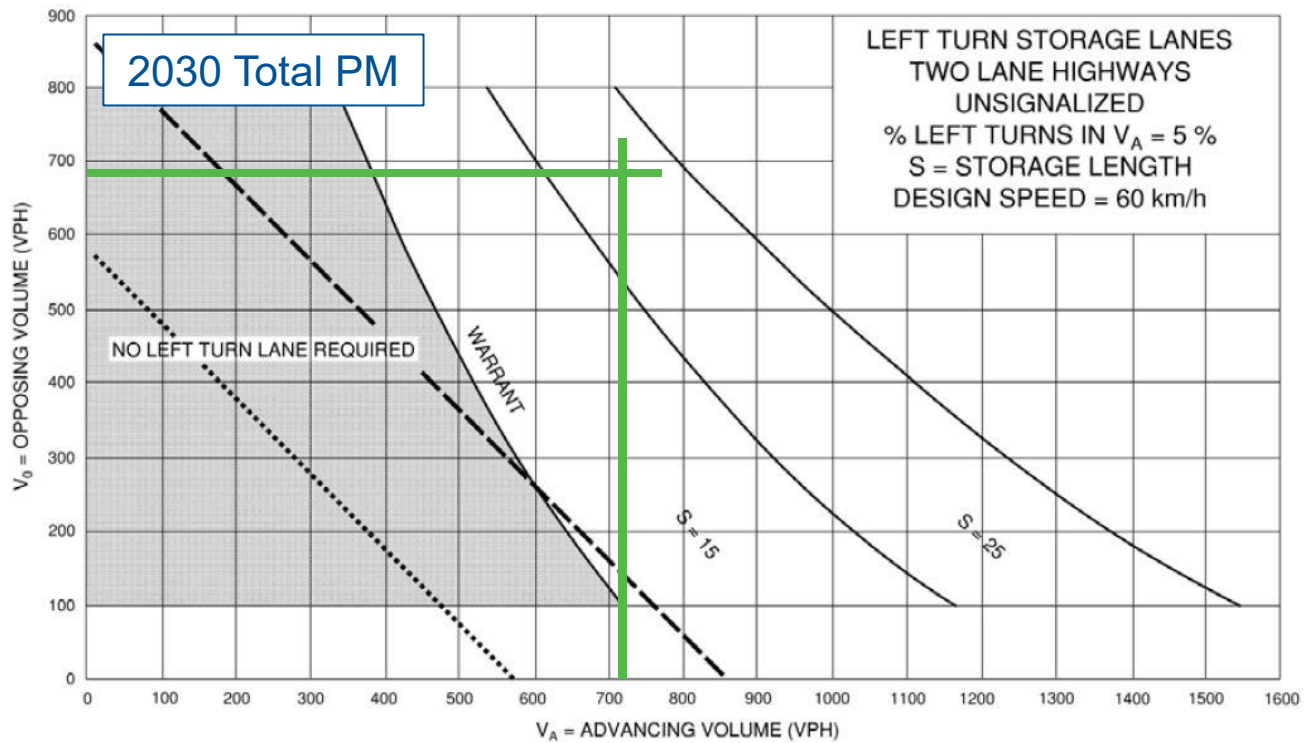
Warrants have also been calculated for southbound left-turns at Wallace Avenue North and McDonald Street East. Based on the above criterion, a southbound left-turn lane with 25 metres of storage is warranted under total traffic volumes.

It is noted that a two-way centre left-turn lane exists along Wallace Avenue North between Inkerman Street and 230 metres north of McDonald Street East. The existing two-way centre left-turn lane can accommodate the southbound left-turns at McKenzie Street East and McDonald Street East.

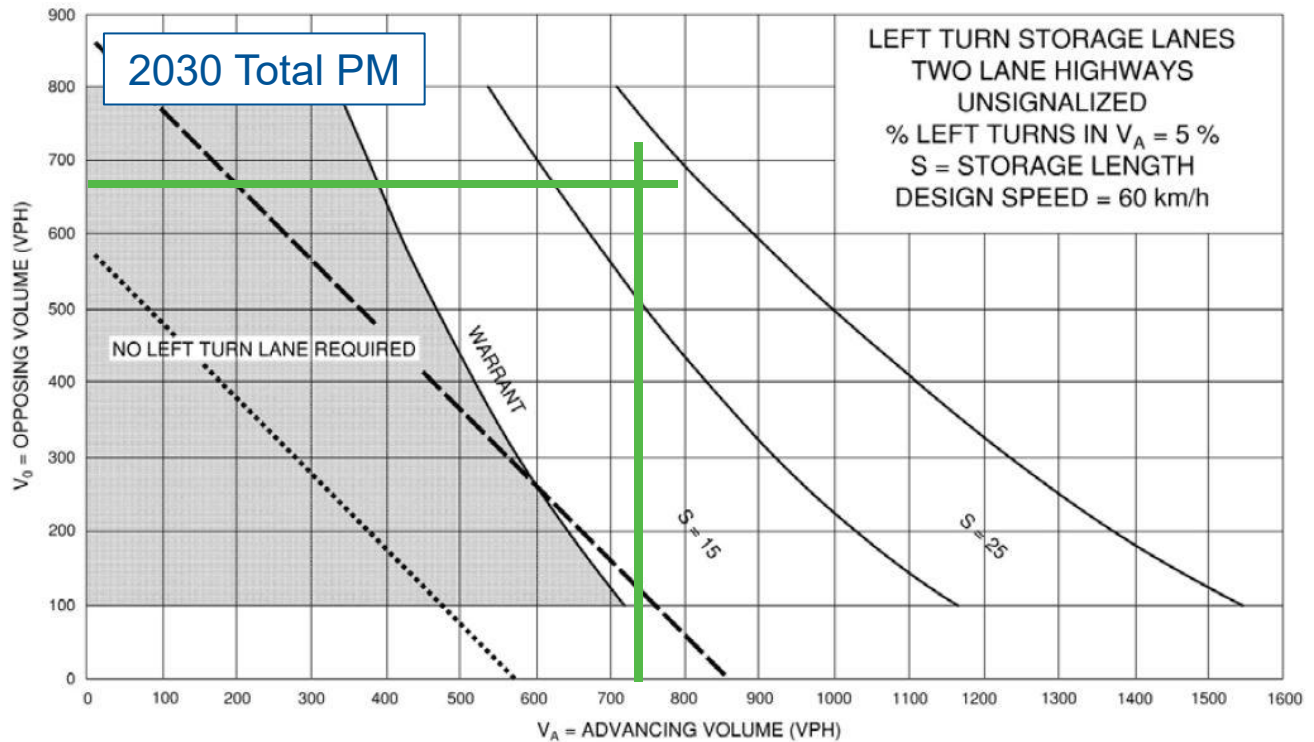
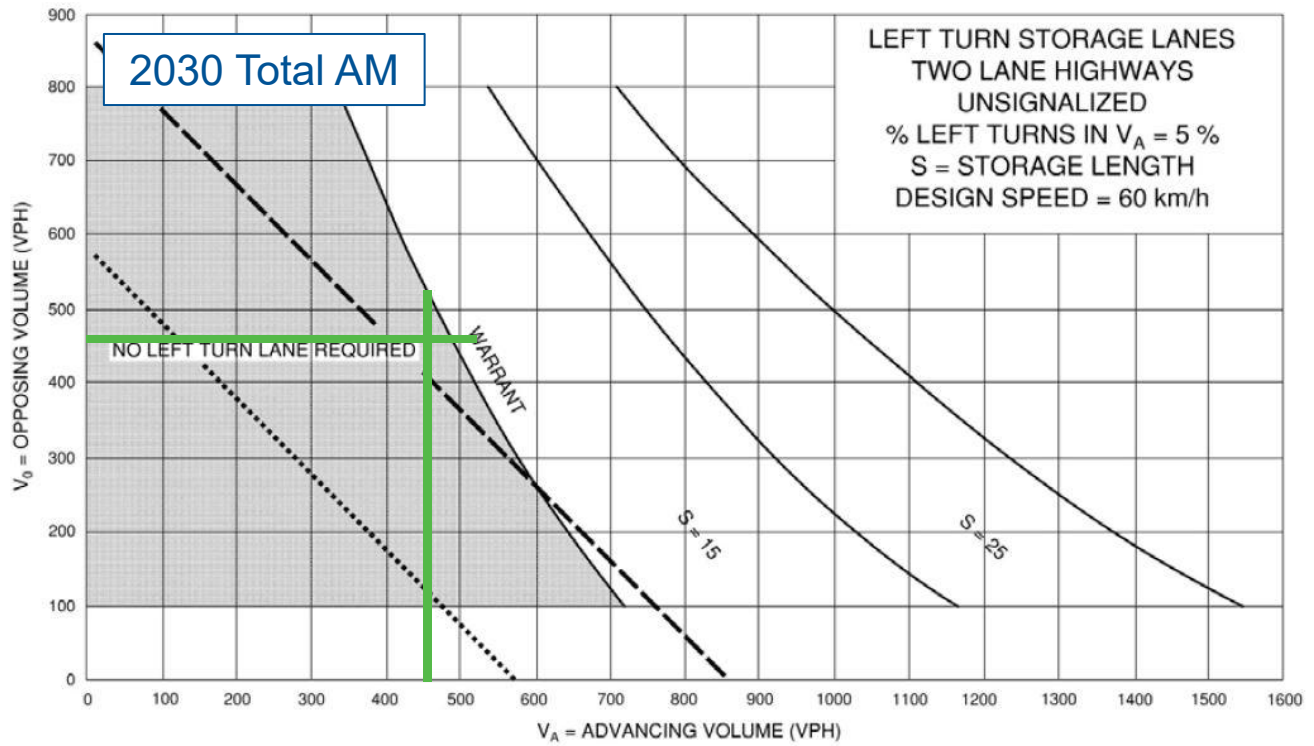
Figure 5.1a and **Figure 5.1b** contain the warrant nomographs.

⁷ MTO Design Supplement for TAC Geometric Design Guide for Canadian Roads, October 2023.





Southbound Left-Turn Lane Warrants Wallace Avenue North & Winston Boulevard / McKenzie Street East



Southbound Left-Turn Lane Warrants Wallace Avenue North & McDonald Street East

5.2 Signal Warrants

A signal justification warrant, using Ontario Traffic Manual (OTM) Book 12 Justification 7⁸, was analyzed for Wallace Avenue North and Winston Boulevard / McKenzie Street East under 2030 total traffic conditions. It was found that a signal is not justified at this intersection, with Warrants 1 and 2 achieving below the 120% requirement.

While the westbound shared movement at Wallace Avenue North and Winston Boulevard / McKenzie Street East is forecast to operate with LOS F during the PM peak hour, the v/c ratio is forecast to operate no greater than 0.70. This indicates while there may be high delay, there is still available capacity for the shared lane.

It is noted that the majority of the site traffic was assigned to McKenzie Street East to provide a conservative analysis for this intersection. However, given the interconnected nature of the street network, it is expected that the site traffic will have the opportunity to be dispersed since there are alternative routes that can be taken besides McKenzie Street East to access Wallace Avenue North. This includes, but is not limited to, Blake Street, Winston Street and Campbell Street. The alternative routes that can be taken to access Wallace Avenue North can help alleviate some delay on McKenzie Street East. Additionally, traffic also has the opportunity to use Davidson Avenue to access Main Street.

Based on the above, no changes to the existing form of traffic control is recommended at this time.

Appendix F contains the warrant worksheet.

⁸ Ontario Ministry of Transportation, *Ontario Traffic Manual Book 12: Traffic Signals*, (Toronto: Queen's Printer for Ontario, 2024).



6 Conclusions and Recommendations

6.1 Conclusions

Based on the investigations carried out, it is concluded that:

- ▶ **Existing Traffic Conditions:** The study area intersections are operating with acceptable levels of service.
- ▶ **Development Trip Generation:** The development is forecast to generate 118 and 140 trips during the AM and PM peak hours, respectively.
- ▶ **2030 Background Traffic Conditions:** The study area intersections are forecast to operate within acceptable levels of service, except for the following movements:

Wallace Avenue North and Winston Boulevard / McKenzie Street East

- The eastbound shared movement is forecast to operate with LOS E during the PM peak hour.

Wallace Avenue North and McDonald Street

- The eastbound shared movement is forecast to operate with LOS F during the PM peak hour.

- ▶ **2030 Total Traffic Conditions:** The study area intersections are forecast to operate similarly to background traffic conditions with the addition of the following critical movement:

Wallace Avenue North and Winston Boulevard / McKenzie Street East

- The westbound shared movement is forecast to operate with LOS F during the PM peak hour. The v/c ratio for this movement is no greater than 0.70 for the 2030 total traffic, indicating that there is capacity for this movement despite the higher delays.

- ▶ **Remedial Measures:**

- Left-Turn Lanes: A southbound left-turn lane with 25 metres of storage is warranted on Wallace Avenue North at Winston Boulevard / McKenzie Street East and McDonald Street East under 2030 total traffic volumes. The existing two-way centre left-turn lane on Wallace Avenue North can accommodate the southbound left-turns at McKenzie Street East and McDonald Street East.



- Signal Warrants: Traffic signals are not warranted on Wallace Avenue North at Winston Boulevard / McKenzie Street East under 2030 total traffic volumes.

6.2 Recommendations

Based on the findings of this study, it is recommended that the development be approved as proposed with no conditions related to off-site transportation improvements.



Appendix A

Existing Traffic Data



Appendix B

Existing Traffic Operations Report



Appendix C

Background Development Traffic Volumes



Appendix D

Background Traffic Operations Report



Appendix E

Total Traffic Operations Report



Appendix F

Signal Warrants

