Stantec Consulting Ltd.
300W-675 Cochrane Drive
Markham ON L3R 0B8

Stantec

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07-T-20252 MW
filed w application

February 26, 2025
File: 163601568

Attention: Mr. Steven deWit
2873633 Ontario Inc.
210 Prescott Street, Unit 1
Kemptville, Ontario
K0G 1J0

Dear Mr. deWit,

Reference: Orchards of Riverbend, 819 County Road 23 –Traffic Memorandum

1 INTRODUCTION

Stantec Consulting Ltd. (Stantec) has been retained by 2873633 Ontario Inc. to prepare a traffic analysis for the proposed subdivision at 819 County Road 23 in the Township of Merrickville-Wolford (Township), in the United Counties of Leeds and Grenville (County), Ontario (herein referred to as the Subject Site). The Subject Site is situated in the rural area of Merrickville-Wolford, approximately 500 m southwest of the County Road 23 and Davis Road intersection on the west side of County Road 23. The Subject Site development was initially planned for 29 single-family residences, but it has now been expanded to include a total of 58 residences. This assumes that each lot will also incorporate a secondary unit. Currently, the Subject Site is occupied by a single-family residential dwelling unit, outbuildings and green space. The existing private road will generally be removed and the Subject Site will be accessed through a new road that intersect with County Road 23 approximately 100 m northeast of the existing private road. **Figure 1** presents the study area showing the Subject Site and the surrounding road network. The detailed draft site plan is included in **Appendix A**.

The purpose of this Traffic Memorandum is to assess the traffic impacts of the purposed development on the road network and to address traffic related comments raised by Township / County staff.

Reference: **Orchards of Riverbend, 819 County Road 23 –Traffic Memorandum**

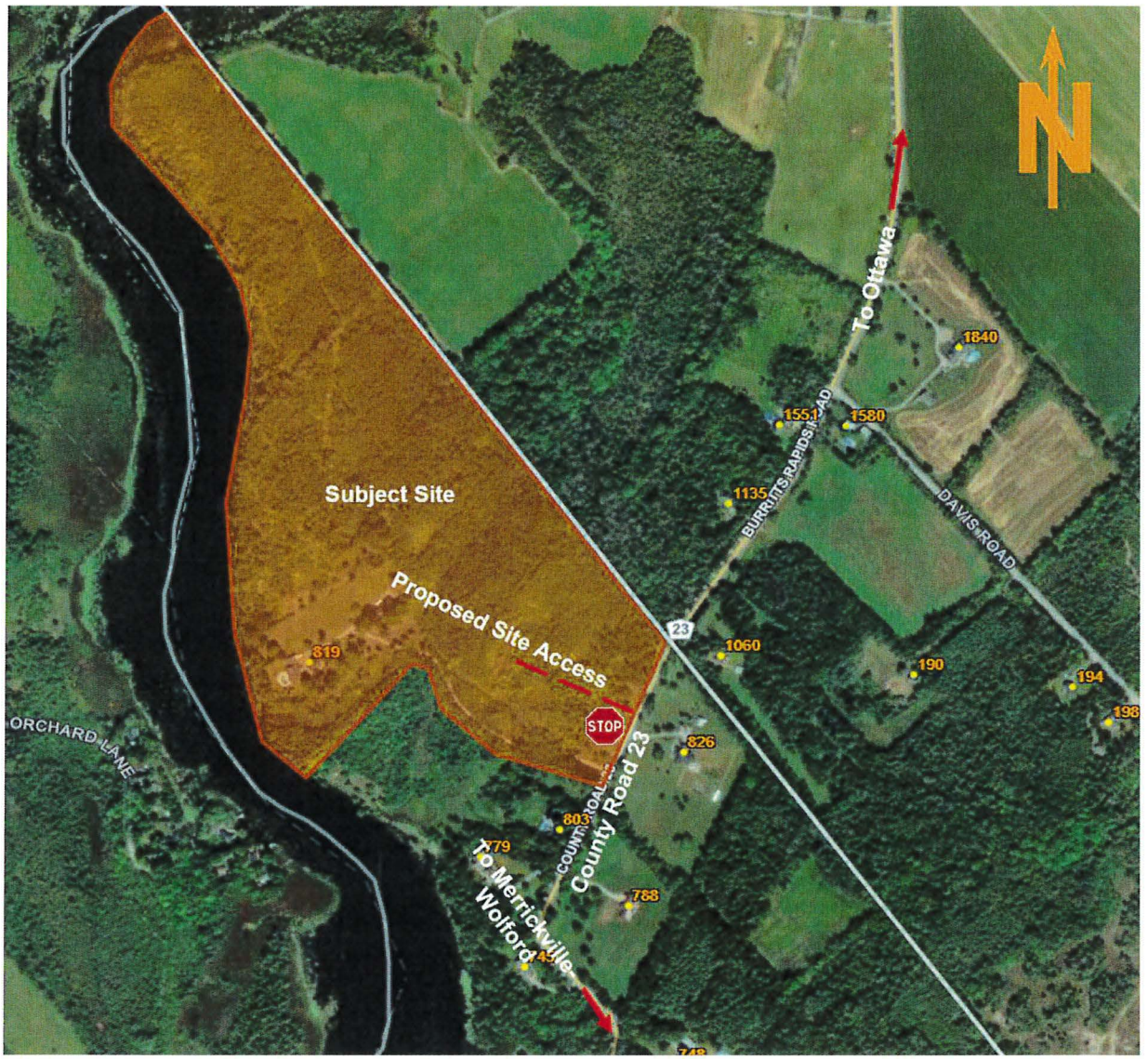


Figure 1: Study Area

2 EXISTING CONDITIONS

2.1 ROADS AND TRAFFIC CONTROL

The Subject Site can be directly accessed from County Road 23 as shown in **Figure 1**. The characteristics of the County Road 23 within the Study Area limits are described below.

County Road 23 is a north-south arterial road under the jurisdiction of the United Counties of Leeds and Grenville. It operates as a two-lane road with a posted speed limit of 60 km/h. On-street parking is restricted.

2.2 ACTIVE TRANSPORTATION

The study area does not have any existing facilities dedicated to pedestrians and cyclists due to the rural nature of the area.

2.3 EXISTING TRAFFIC VOLUMES

Historical average annual daily traffics (AADT) on County Road 23 included in **Appendix B** were provided by the County. Based on the historical AADT, an annual growth rate of 3% is calculated according to the AADT growth from 2013 (1,100 vehicles per day) to 2019 (1,310 vehicles per day) on County Road 23, east of Greenville Street. The 2024 existing AADT of 1,515 vehicles per day on County Road 23 has been calculated based on the estimated growth rate of 3% applied to the 2019 AADT. To determine the peak hour volume in each travel direction on County Road 23, it is assumed that the peak hour volume is 10% of the AADT and traffic is evenly distributed in the two directions. The resultant peak hour volume in each direction is estimated at 76 vehicles per hour. To be conservative for the purposes of this study, it is assumed that the peak hour volume in each direction is 100 vehicles per hour.

2.4 EXISTING TRAFFIC OPERATIONS

The Subject Site is occupied by a single-family residential dwelling unit under the existing conditions so the traffic volumes entering/exiting the existing private road are negligible. It is assumed that vehicles travelling on County Road 23 or exiting from the Subject Site are not experiencing delays, so traffic operations analysis of existing conditions was not considered necessary.

3 GENERATED TRAFFIC

3.1 TRIP GENERATION

Vehicular trips associated with the proposed development were generated according to the rates published in the ITE Trip Generation Manual, 11th Edition, which includes data from sites with similar land uses surveyed in the United States and Canada. Considering the character of Township of Merrickville-Wolford, it is expected that ITE Trip Generation rates are appropriate, with no further adjustment necessary. The land use code for single-family detached housing as proposed for the Subject Site is Land Use 210. The number of proposed housing units is currently 58 as discussed previously.

The development is assumed to generate no internal or pass-by trips, only primary trips. The estimated trip generated by the Subject Site during the AM and PM peak hours is shown in

Table 1. The relevant ITE trip generation equations were used. The total number of trips generated by the development is 45 during the AM peak hour (11 inbound, 34 outbound), and 60 during the PM peak hour (38 inbound, 22 outbound). Mode split reductions were not applied for this site, due to the limited transit availability in the site vicinity and limited infrastructure for pedestrians in the area.

Table 1: Trip Generation

Land Use (ITE Trip Generation Manual, 11th Edition)	Dwelling Units or Average 1000 sq. Feet GFA (X)		AM Peak Hour			PM Peak Hour		
Proposed Development - 819 County Road 23			**Trips In**	**Trips Out**	**Total**	**Trip In**	**Trips Out**	**Total**
LUC 210 Single-Family Detached Housing	58 units	Equation	*Ln(T) = 0.91 Ln(X) + 0.12*			*Ln(T) = 0.94 Ln(X) + 0.27*		
		% In/Out	25%	75%	100%	63%	37%	100%
		Trips	**11**	**34**	**45**	**38**	**22**	**60**

3.2 TRIP DISTRIBUTION

Based on the location of the Subject Site and the land use characteristic of the surrounding areas, it is estimated that 70% of the site generated trips will come from or go to Ottawa while 30% of the site generated trips will come from or go to Merrickville-Wolford during the AM and PM peak hours. The estimated trip distributions are shown in **Table 2**.

Table 2: Trip Distribution

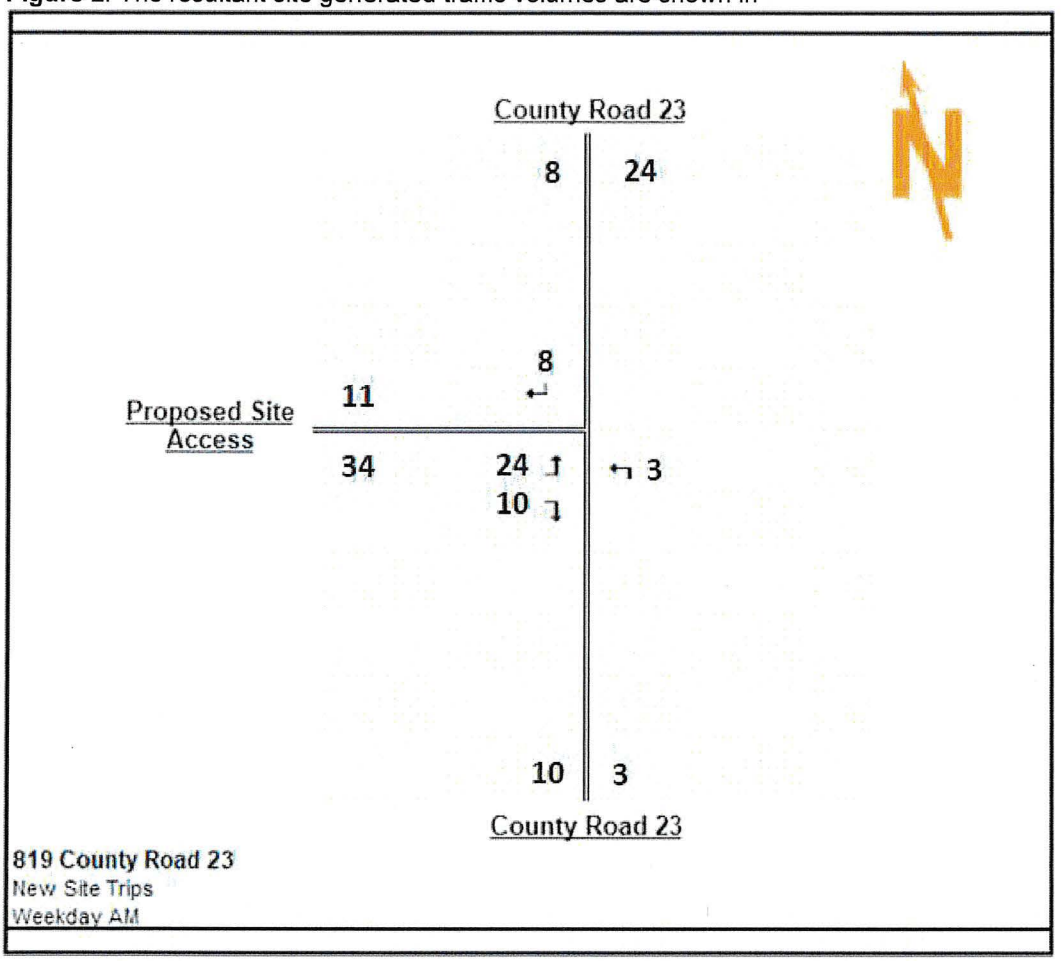
Site Trip Direction	Peak Hour Distribution Percentage
To / From County Road 23 North	70%
To / From County Road 23 South	30%

3.3 TRIP ASSIGNMENT

The Subject Site generated trips were assigned to the road network according to the distribution outlined in **Table 2,** as shown in

Reference: **Orchards of Riverbend, 819 County Road 23 –Traffic Memorandum**

Figure 2. The resultant site generated traffic volumes are shown in



Reference: **Orchards of Riverbend, 819 County Road 23 –Traffic Memorandum**

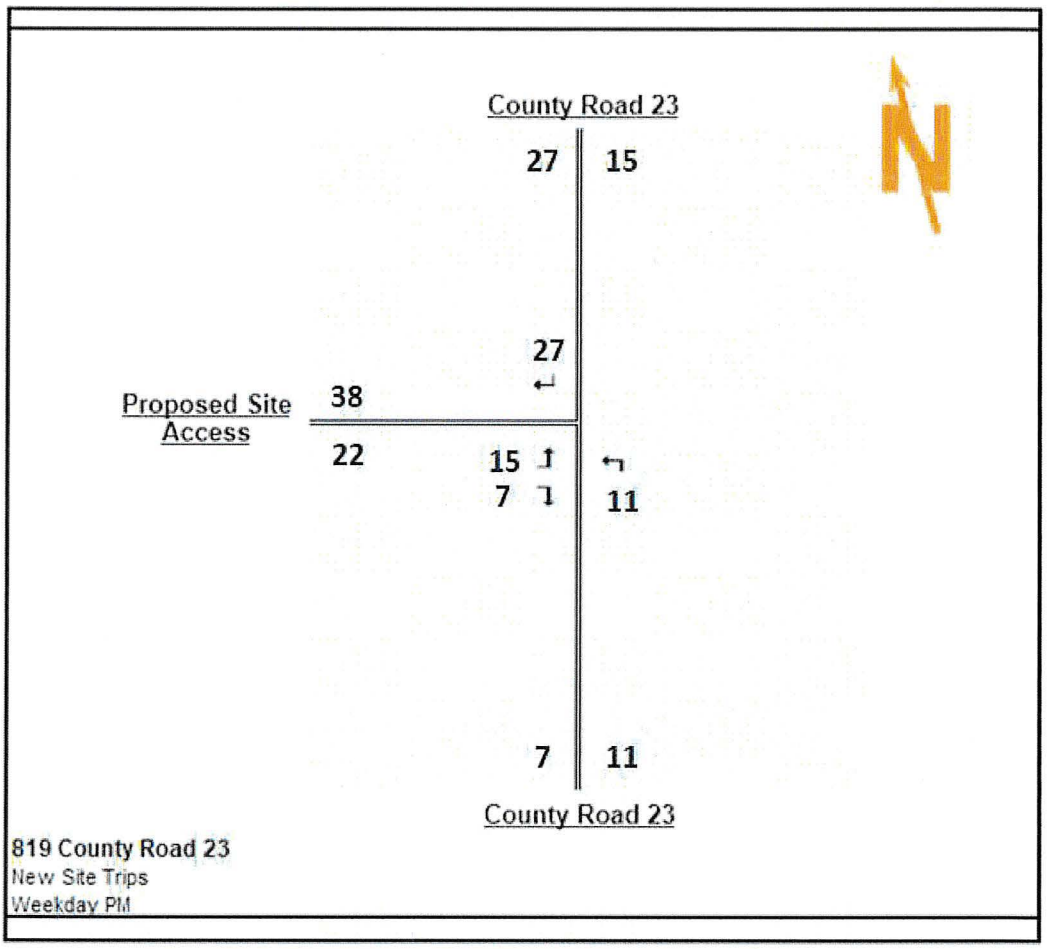


Figure 3 and **Figure** 4 for the AM and PM peak hours respectively.

Reference: **Orchards of Riverbend, 819 County Road 23 –Traffic Memorandum**

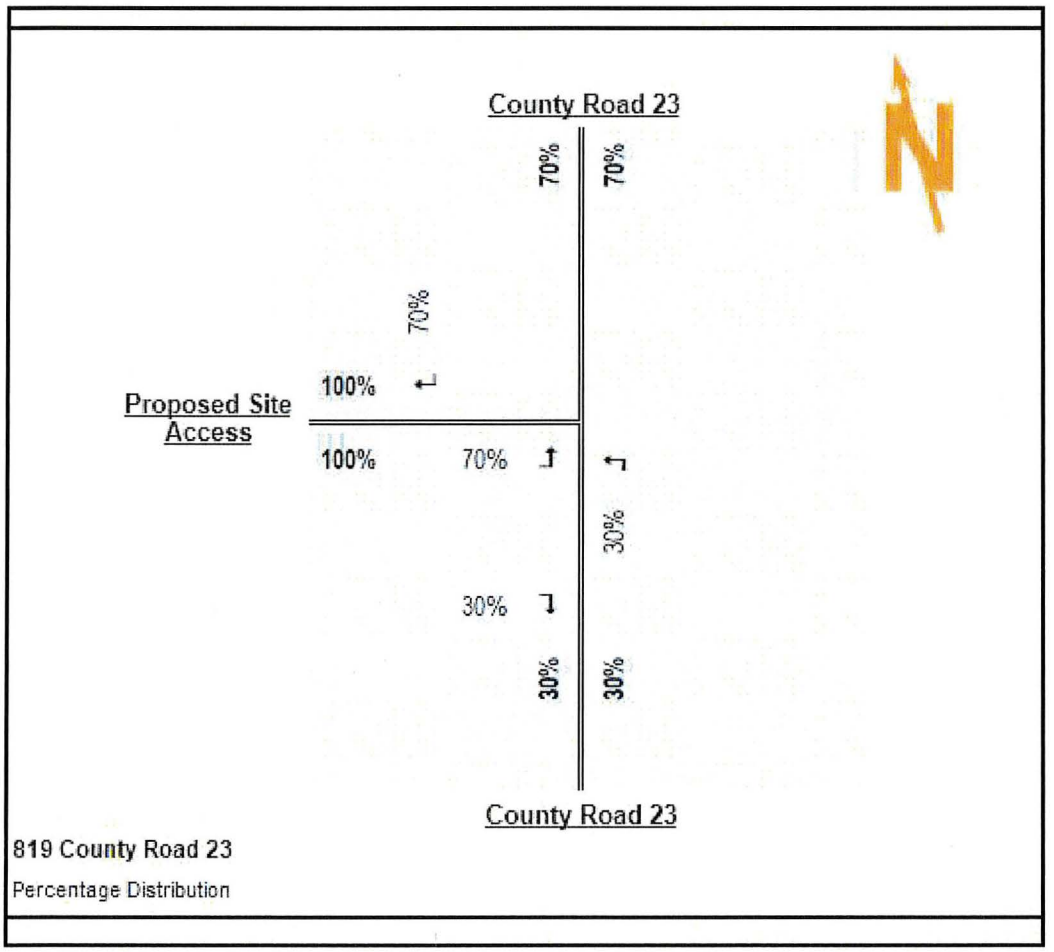


Figure 2: Trip Distribution – AM and PM Peak Hours

Reference: **Orchards of Riverbend, 819 County Road 23 –Traffic Memorandum**

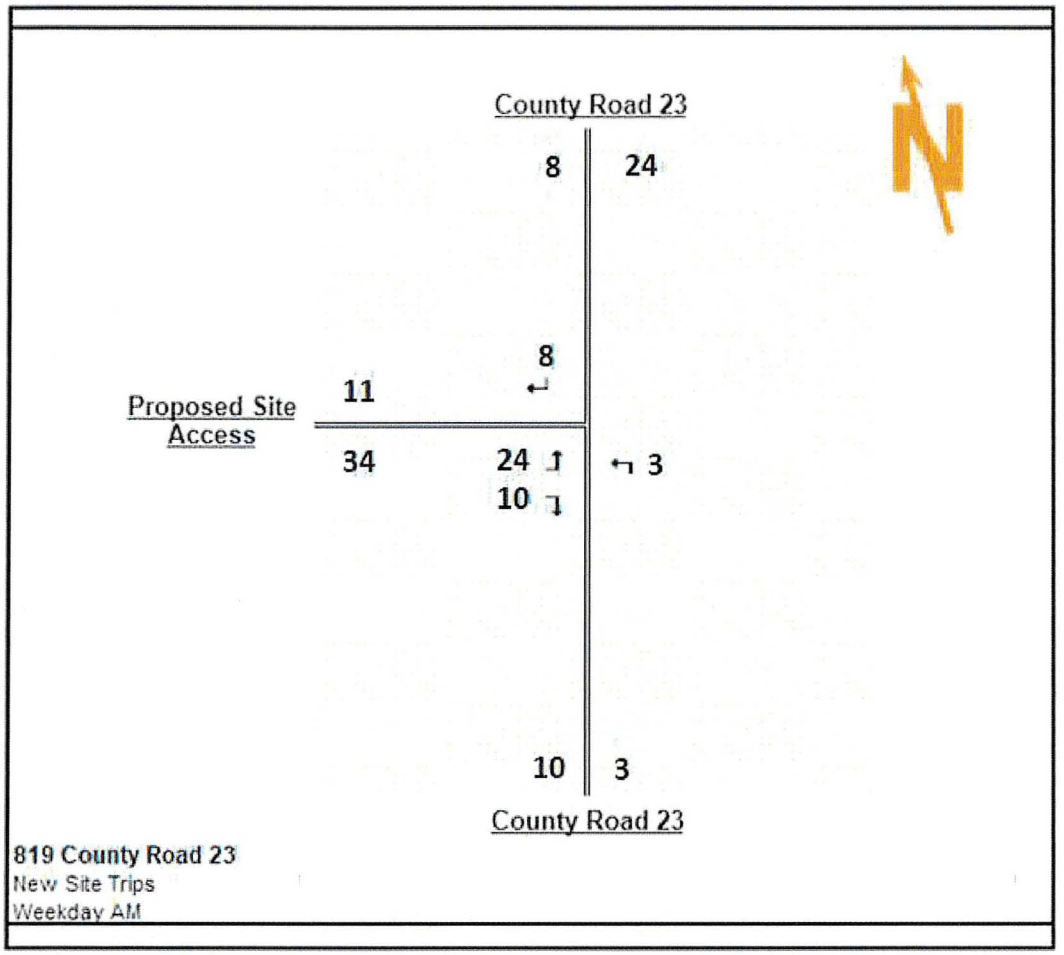


Figure 3: Site Generated Traffic Volumes (vehicles per hour) - AM Peak Hour

Reference: **Orchards of Riverbend, 819 County Road 23 –Traffic Memorandum**

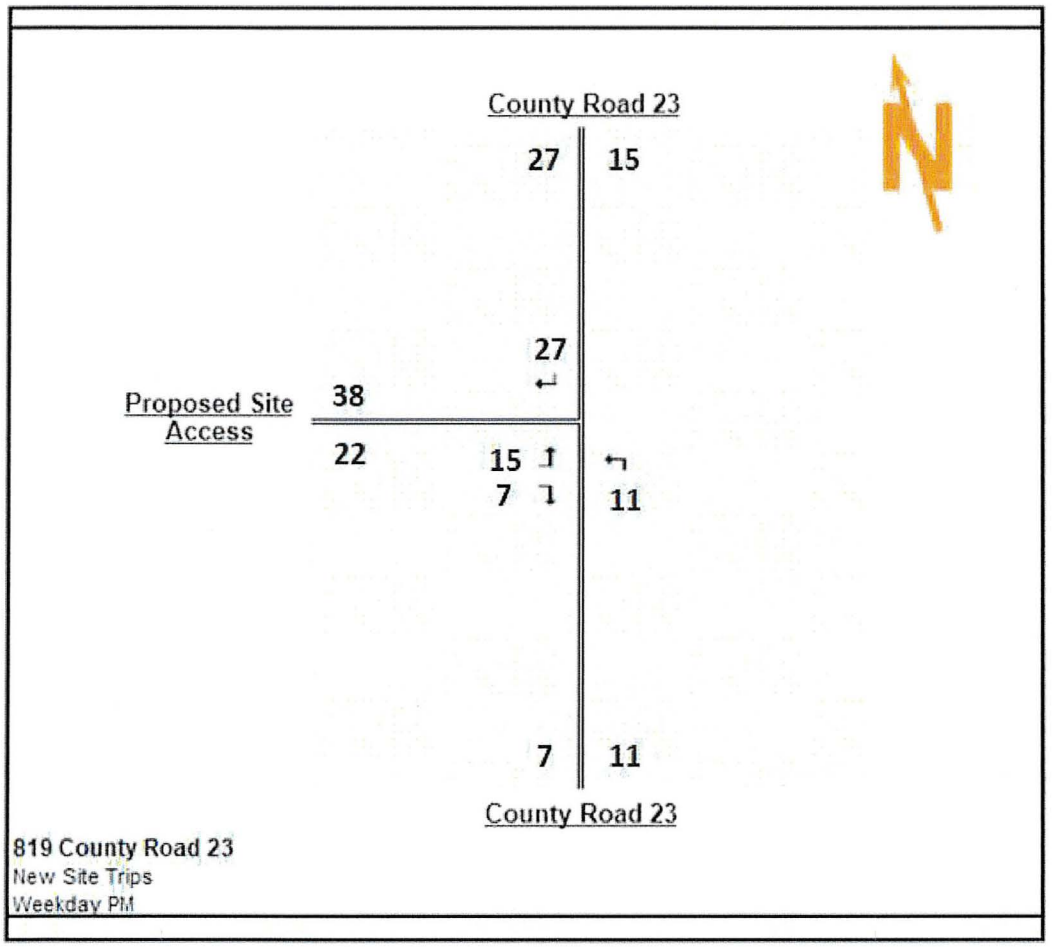


Figure 4: Site Generated Traffic Volumes (vehicles per hour) - PM Peak Hour

4 FUTURE CONDITIONS

4.1 BACKGROUND GROWTH

The future horizon year for the purposes of this study was assumed to be 2029. An annual growth rate of 3% was applied to County Road 23 existing traffic volumes based on the historical AADT. No background development was identified near the study area (Leeds & Grenville Subdivision Tracker, August 18, 2023).

4.2 FUTURE TOTAL VOLUMES

The 2029 future total traffic volumes were obtained by adding the site traffic forecasts to the future background traffic volumes. The forecast 2029 future total traffic volumes are illustrated in **Figure 5** and

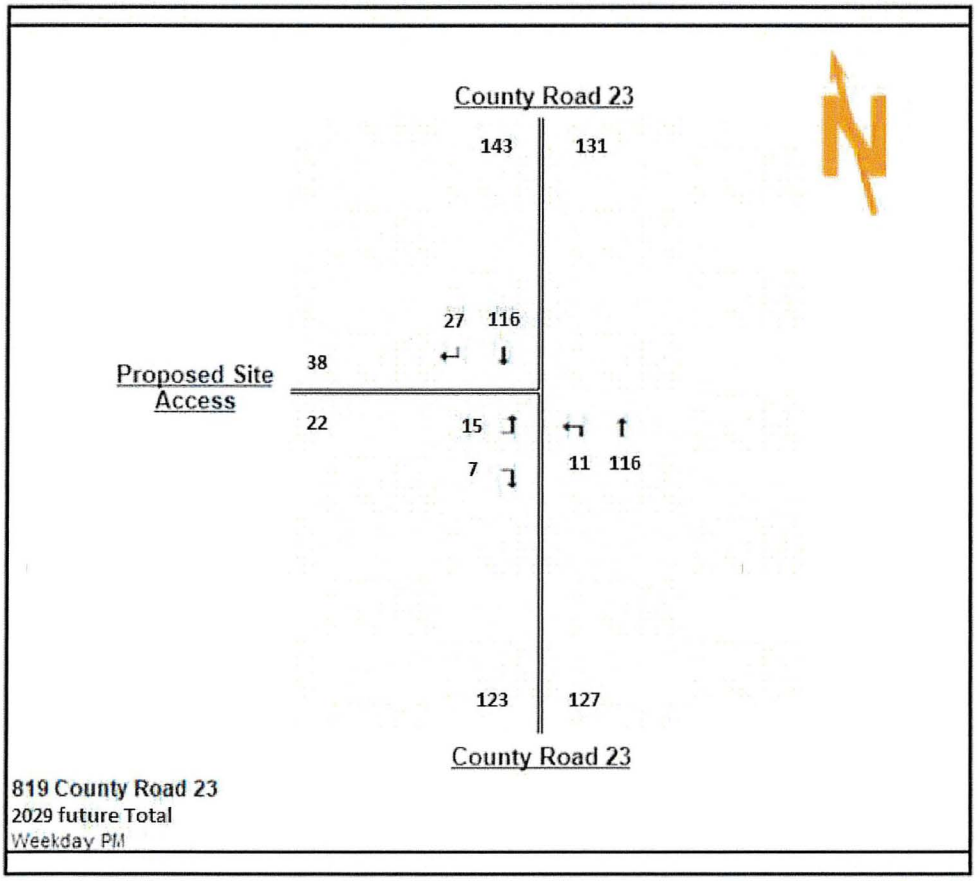


Figure 6 for the AM and PM peak hours respectively.

Reference: **Orchards of Riverbend, 819 County Road 23 –Traffic Memorandum**

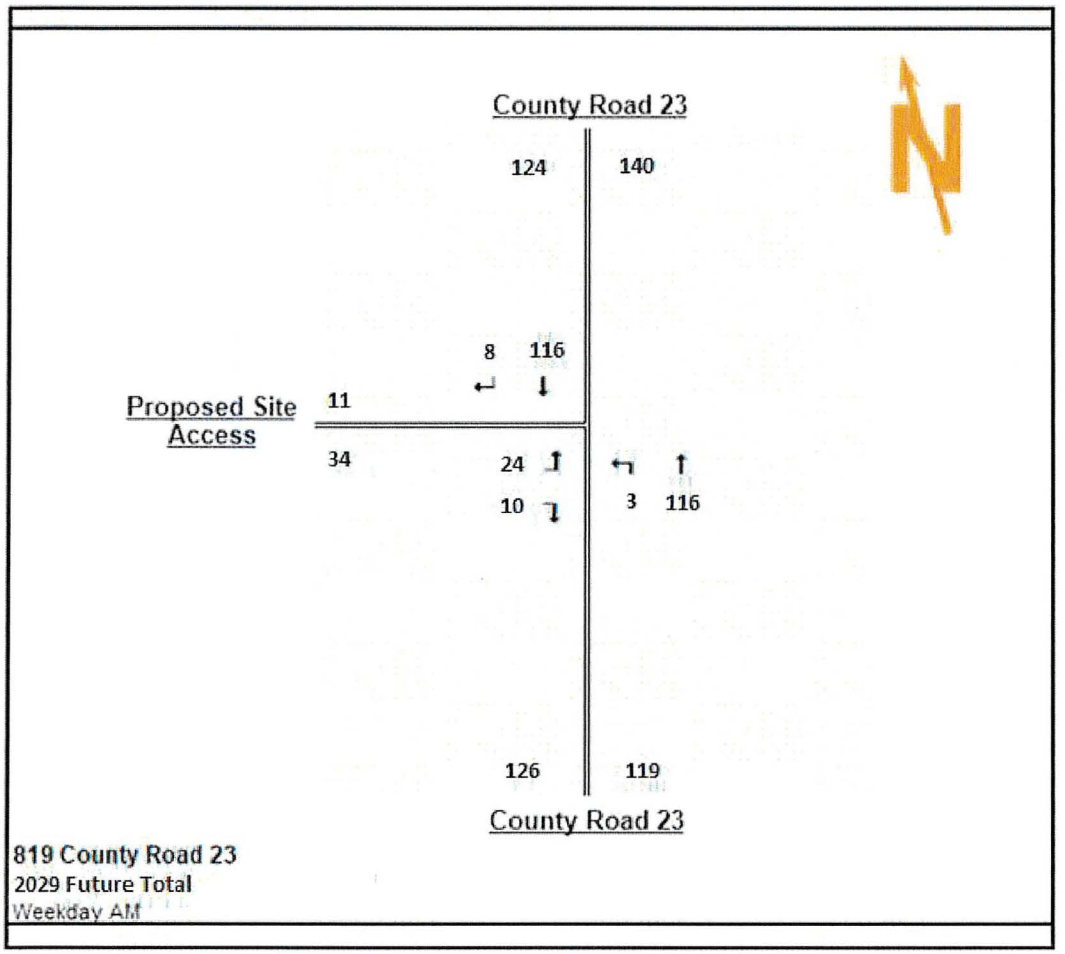


Figure 5: 2029 Future Total Traffic Volumes (vehicles per hour) - AM Peak Hour

Reference: **Orchards of Riverbend, 819 County Road 23 –Traffic Memorandum**

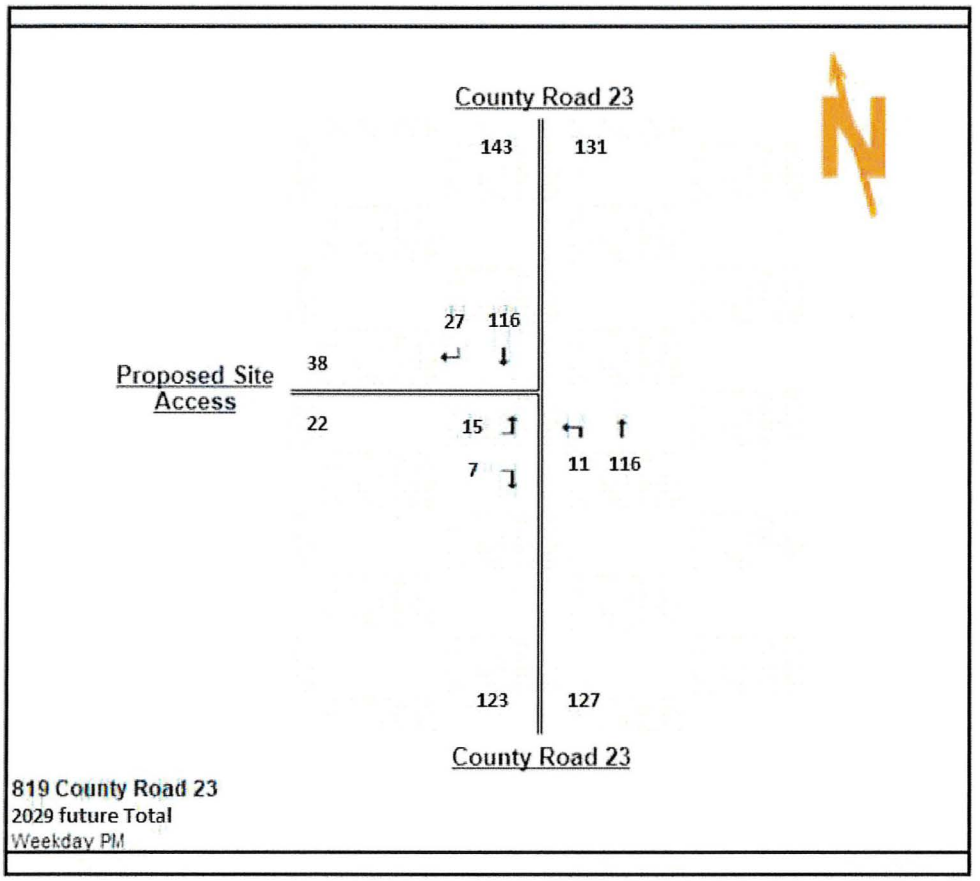


Figure 6: 2029 Future Total Traffic Volumes (vehicles per hour) - PM Peak Hour

4.3 LEFT-TURN LANE WARRANT ANALYSIS

In accordance with Geometric Design Standards for Ontario Highway ("GDSOH"), a left-turn lane warrant analysis was conducted for the proposed intersection (i.e., County Road 23 and Proposed Site Access) under future total 2029 conditions.

As identified in **Table 3**, left-turn lanes are not warranted for any of the intersection approaches on County Road 23 nor the proposed Site Access. The analysis sheets are attached in **Appendix C.**

Table 3 - Future Total 2029 Left-Turn Lane Warrant Analysis

Intersection	AM				PM					
County Road 23 and Proposed Site Access	$V_{opposing}$	$V_{advancing}$	V_{left}	%LT	$V_{opposing}$	$V_{advancing}$	V_{left}	%LT	Warranted	Storage
South Approach	124	119	3	3%	143	127	11	9%	NO	-
East Approach	0	34	24	70%	0	22	15	68%	NO	-

4.4 FUTURE LANE CONFIGURATIONS

Based on the analysis results from **Section 4.3**, the lane configuration at County Road 23 and proposed Site Access in 2029 is shown in **Figure 7**.

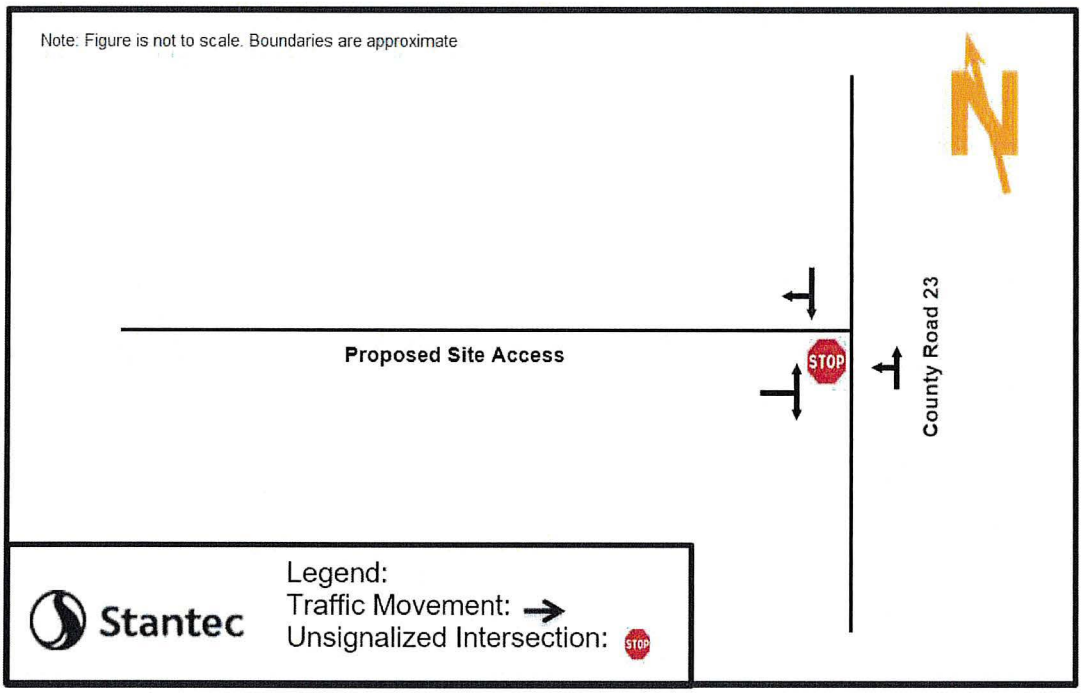


Figure 7 - Lane Configuration

4.5 FUTURE TOTAL TRAFFIC OPERATIONS

The intersection operations at unsignalized intersections has been evaluated in terms of level of service (LOS) and volume to capacity (v/c) as defined by the Highway Capacity Manual 2000 (HCM). LOS is evaluated on the basis of average control delay per vehicle and includes deceleration delay, queue move-up time, stopped delay, and final acceleration delay.

Table 4 presents criteria for each LOS. For unsignalized intersections, the LOS ranges from LOS A for 10 seconds or less average delay to LOS F for average delay greater than 50 seconds.

Capacity is evaluated in terms of the ratio of demand flow (v) to capacity (c) with an at-capacity condition represented by a v/c ratio of 1.00 (i.e. volume demand equals theoretical capacity).

Table 4 - Level of Service

LOS	Unsignalized Intersection-Control Delay
A	≤10 sec
B	10–15 sec
C	15–25 sec
D	25–35 sec
E	35–50 sec
F	>50 sec

The future intersection level of service analysis was conducted using the Synchro 11 software package. Synchro analysis outputs based on the future total traffic volumes in 2029 are included in **Appendix D**.

Table 5 summarizes the analysis results for the County Road 23 and proposed Site Access intersection in the future total 2029 horizon. During the AM and PM peak hours, the unsignalized intersection is expected to operate with acceptable levels of service with spare capacity.

Table 5 - Intersection Capacity Analysis - Future Total 2029

Intersection	Movement	AM Peak Hour				PM Peak Hour			
		LOS	Delay (s)	v/c	Queue (m) 95th	LOS	Delay (s)	v/c	Queue (m) 95th
Proposed Site Access & County Road 23	NBL	A	0.2	0.00	0.0	A	0.7	0.01	0.2
	EBLR	A	9.9	0.05	1.1	A	9.9	0.03	0.7

As shown in **Table 5**, the shared northbound left-turn/through and shared eastbound left-turn/right-turn movements are anticipated to operate with a LOS "A". Therefore, traffic operations at the intersection are not expected to experience excessive delay under the future total 2029 conditions.

5 SIGHT DISTANCE REVIEW

5.1 PROPOSED SITE ACCESS

As noted from the Draft Site Plan, a new site access connected to County Road 23 is proposed. The Site Access intersection will be controlled by a stop sign to control traffic from the minor road (Street 1). An intersection sight distance evaluation at the new intersection was conducted to confirm that there is sufficient sight distance for drivers turning left or right to/from minor or major streets. Based on TAC Geometric Design Guide for Canadian Roads ("TAC") Section 9.9.2.3, the applicable cases are as follows:

- Case B1 – left turn movement from the minor road
- Case B2 – right turn movement from the minor road
- Case F – left turn movement from the major road

Intersection sight distance is calculated using equation 9.9.1 from the TAC Geometric Design Guide for Canadian Roads as outlined below:

$$ISD = 0.278 * V\ major * t_g$$

Where;
ISD = Intersection Sight Distance
V major = design speed of roadway (km/h)
t_g = assumed time gap for vehicles to turn from stop onto roadway (s)

The calculated and design sight distances are further summarized in Tables 9.9.4, Tables 9.9.6 and 9.9.12 of the TAC guide for vehicles turning left from a stop, turning right from a stop, or turning left from the major road, respectively. **Table 6** contains a summary of the intersection sight distance requirements for each of the applicable cases. It is assumed that the design vehicle is a passenger car since the Subject Site is a residential development. 80 km/h (posted speed of 60 km/h + 20 km/h) is selected as the design speed for County Road 23.

Table 6 - Sight Distance Summary

Case	Design Speed	t_g	Stopping Sight Distance	Required Intersection Sight Distance	TAC Reference
B1	80km/h	7.5s	130m	170m	Table 9.9.4
B2	80km/h	6.5s	130m	145m	Table 9.9.6
F	80km/h	5.5s	130m	125m	Table 9.9.12

There is a clear sight line from the proposed Site Access to the north (approximately 200 m) and a clear sight line to the south (approximately 300 m) as shown in **Figure 8** and **Figure 9**. The proposed Site Access is expected to have adequate sight distance.

Figure 8: Looking North from the Proposed Site Access

Figure 9: Looking South from the Proposed Site Access

5.2 INTERNAL ROADS

A review of the proposed plan was completed considering the proposed lotting and general site topography. A 7.0m wide road (2 x 3.5m lanes) with 1m shoulders is proposed to service the subdivision within a 20m right-of-way. The road network includes two cul-de-sacs for vehicle turn-around, one at the west end of Street No. 1 (main access) and second at end of Street No. 2. It is understood the proposed road alignment follows an existing access alignment crossing an unevaluated wetland.

From the review, there are several alignment deflections with centreline radii of 55m or more. Noting that large portions of the site are forested which may restrict sightlines at locations along the street. A Design Speed of 40km/hr has been used for the internal roads. The sightlines must be assessed in coordination with vertical profile of the proposed road to at time of road construction to identify clearing/trimming of

vegetation that will ensure the alignment satisfies the minimum stopping and turning sight distances for each of the site's streets and intersections.

No individual lot access points are identified but are expected to be assessed in advance of entrance construction to again ensure sufficient sightlines are provided for movements.

Drainage ditches are identified within the 20m right-of-way. Proposed driveways must include a driveway culvert appropriately sized for flow and/or minimum municipal standards as well as provide for sufficient site distances for turning movements. Stormwater management blocks are also identified on the plan.

6 SUMMARY AND CONCLUSIONS

Based on the assessment documented herein, the following conclusions are drawn:

- The proposed residential-use development, Orchards of Riverbend, at 819 County Road 23 is is situated in the rural area of Merrickville-Wolford, approximately 500 m south from the County Road 23 and Davis Road intersection on the west side of County Road 23. The Subject Site includes 58 residential lots. The only study area intersection considered in this study is the County Road 23 and proposed Site Access intersection.

- Because the Subject Site only consists of a single-family residential dwelling unit and green spaces under existing and future background conditions, traffic operation analysis is not performed for the existing and future background conditions in this study.

- The Subject Site trip generation was estimated based on ITE trip generation 11th Edition. Trips were added to the road network and assigned to the surrounding road network. It is estimated that 45 (11 inbound, 34 outbound), and 60 (38 inbound, 22 outbound) trips are expected to be added to the local road network during the weekday AM and PM peak hours, respectively.

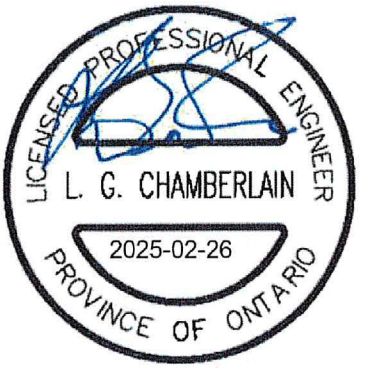
- Left-turn lane warrant analysis was conducted for the intersection of County Road 23 and the proposed Site Access under future total 2029 conditions. Under future total 2029 conditions, no left-turn lane was warranted.

- Under the future total 2029 conditions, the northbound left-turn and shared eastbound left-turn/right-turn movements at the County Road 23 and the proposed Site Access intersection are anticipated to operate with a LOS "A". Therefore, traffic is not expected to experience excessive delays under the future total 2029 conditions.

Reference: **Orchards of Riverbend, 819 County Road 23 –Traffic Memorandum**

Regards,

Stantec Consulting Ltd.



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Attachment:
A: Site Plan
B: Growth Rate Calculation
C: Left-turn Lane Warrant
D: 2029 Future Total Synchro Report

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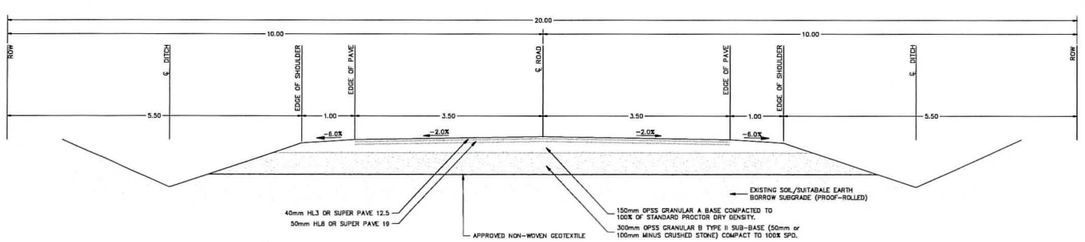
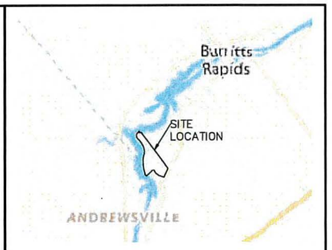


TYPICAL ROAD CROSS SECTION

SCALE = N.T.S.



KEY PLAN

NOT TO SCALE

LEGEND

EXISTING ELEVATION	PROPOSED WELL LOCATION
EXISTING SPOT ELEVATION	PROPERTY LINES
	LOT LINES
DIRECTION OF FLOW	ROW
TOP OF SLOPE	EDGE OF ASPHALT
PROPOSED SEPTIC BED LOCATION	PROPOSED DWELLING LOCATION

NOTES:

No.	REVISION	DATE	BY

CONSULTANTS

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KEMPTVILLE, ONTARIO
K0G 1J0
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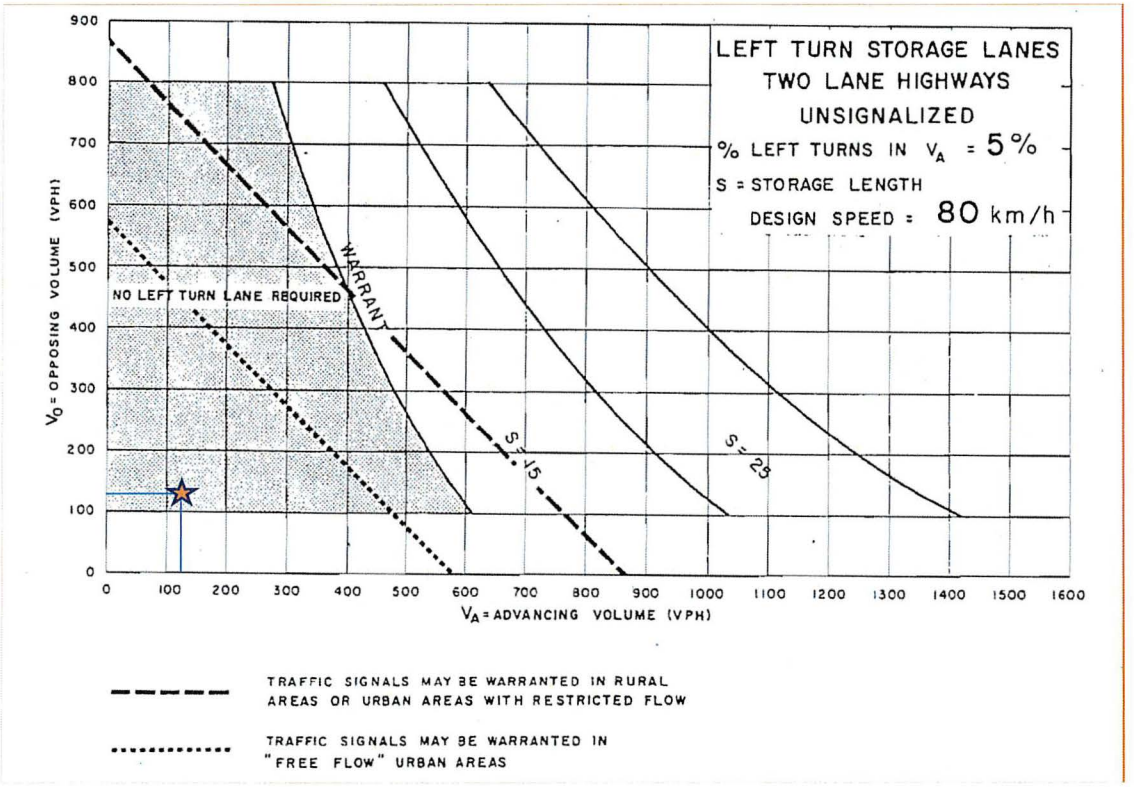
DESIGN	--
DRAWN	JR
CHECKED	SD
APPROVED	SD

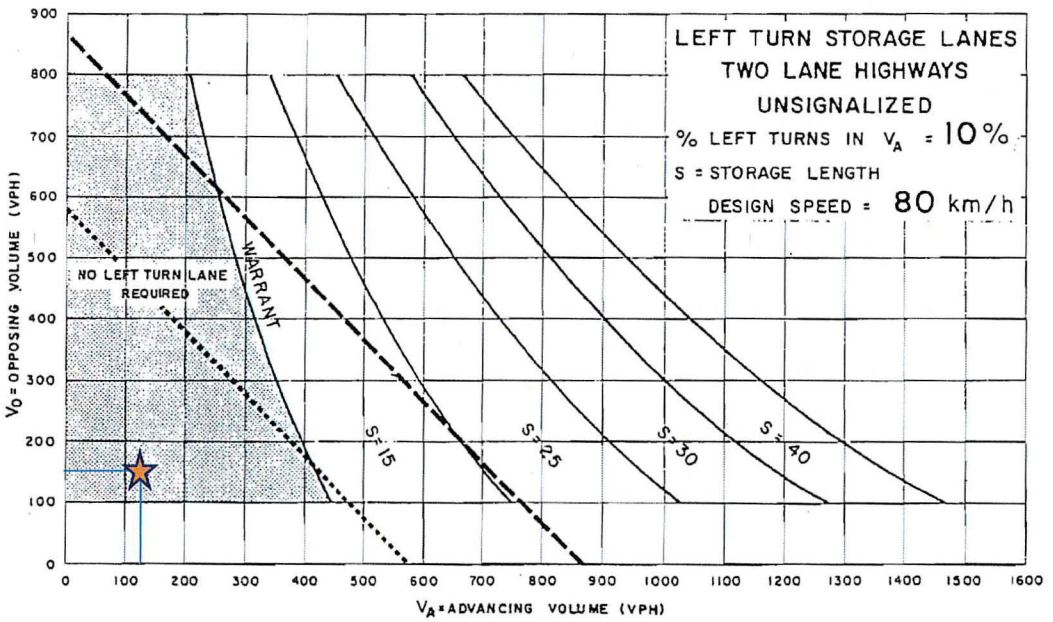
STAMP: *CONCEPT* *SCALE = 1:1500*

CLIENT NAME	2873633 Ontario Inc.
PROJECT NAME	PROPOSED RESIDENTIAL SUBDIVISION
PROJECT LOCATION	819 COUNTY ROAD 23, MERRICKVILLE, ON, K0G 1N0
DRAWING	SITE PLAN
PROJECT No.	210816
DATE	2024.NOV.08
SCALE	AS_NOTED
DRAWING No.	210816-SP

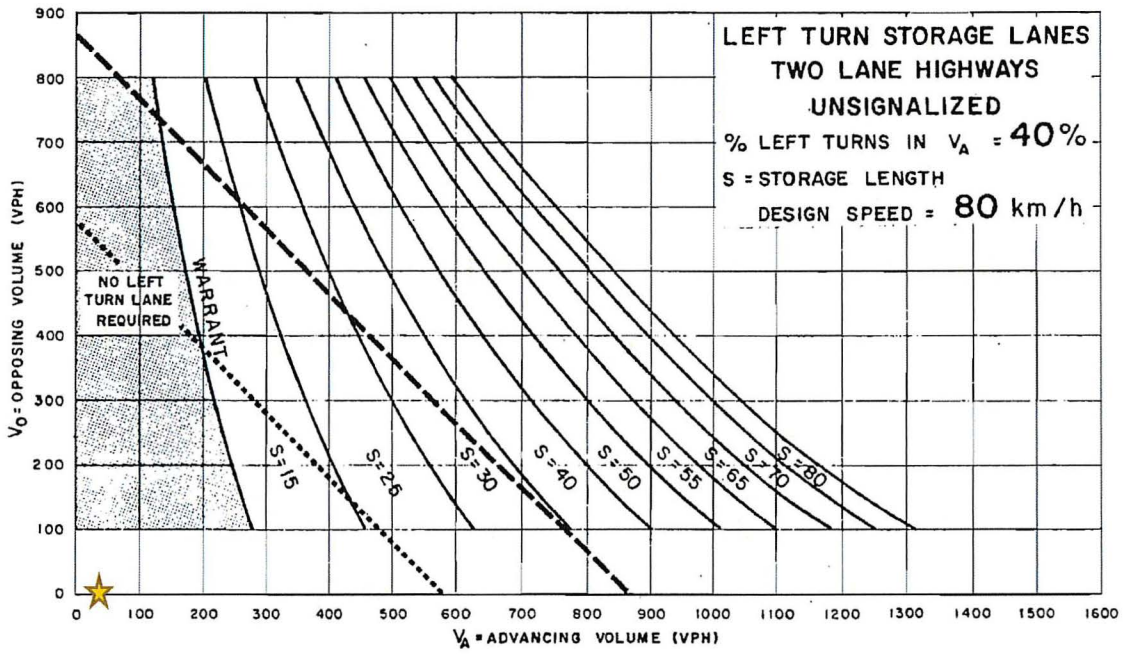
ARCH D

South Approach Left Turn Warrant – AM Peak

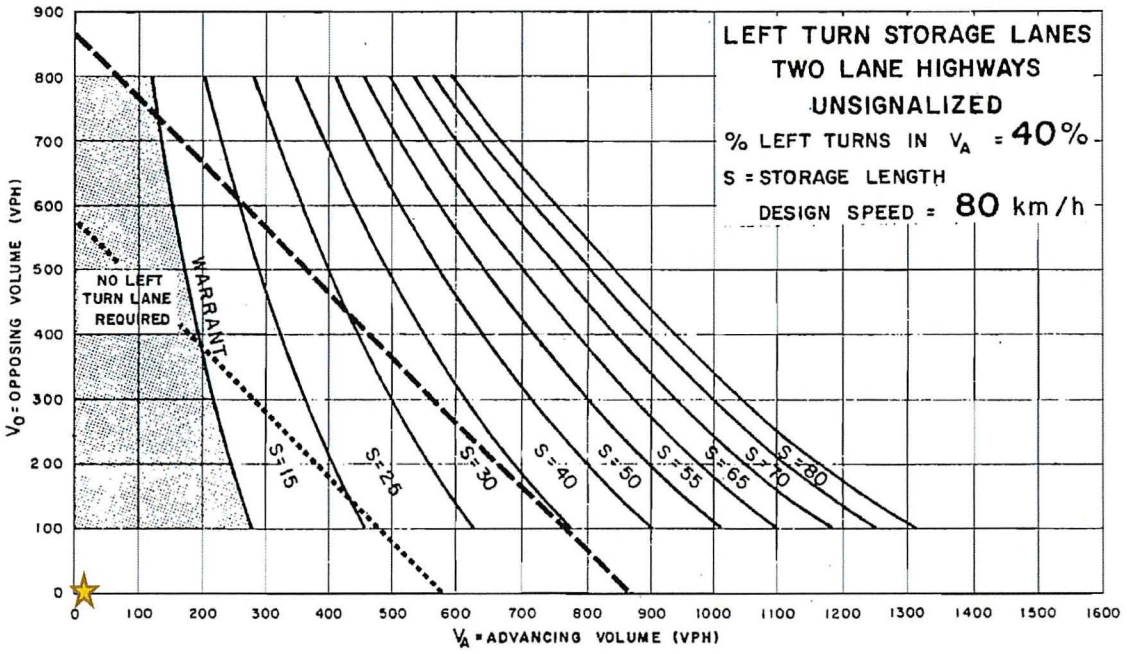




East Approach Left Turn Warrant – AM Peak



East Approach Left Turn Warrant – PM Peak



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	24	10	3	116	116	8
Future Volume (Veh/h)	24	10	3	116	116	8
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	26	11	3	126	126	9
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	262	130	135			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	262	130	135			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	96	99	100			
cM capacity (veh/h)	725	919	1449			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	37	129	135
Volume Left	26	3	0
Volume Right	11	0	9
cSH	774	1449	1700
Volume to Capacity	0.05	0.00	0.08
Queue Length 95th (m)	1.1	0.0	0.0
Control Delay (s)	9.9	0.2	0.0
Lane LOS	A	A	
Approach Delay (s)	9.9	0.2	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	1.3		
Intersection Capacity Utilization	18.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	15	7	11	116	116	27
Future Volume (Veh/h)	15	7	11	116	116	27
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	16	8	12	126	126	29
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	290	140	155			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	290	140	155			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	98	99	99			
cM capacity (veh/h)	694	907	1425			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	24	138	155
Volume Left	16	12	0
Volume Right	8	0	29
cSH	753	1425	1700
Volume to Capacity	0.03	0.01	0.09
Queue Length 95th (m)	0.7	0.2	0.0
Control Delay (s)	9.9	0.7	0.0
Lane LOS	A	A	
Approach Delay (s)	9.9	0.7	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	1.1		
Intersection Capacity Utilization	25.2%	ICU Level of Service	A
Analysis Period (min)	15		