Traffic Impact Study

Strada Aggregates

Strada Pit and Quarry

Township of Melancthon, Ontario

August 20, 2024

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1 Introduction

HDR Corporation ("HDR") was retained by Strada Aggregates to undertake a Traffic Impact Study (TIS) for the existing and operating Melancthon Pit (now named as the Strada Pit and Quarry) located in Parts of Lots 11-14, Concession 3, Township of Melancthon, County of Dufferin.

The pit is currently licenced under the Aggregate Resources Act for shipping of unconsolidated materials, and Strada Aggregates is seeking approvals for an ARA pit/quarry licence to also access the consolidated material below the unconsolidated material. The current licence permits shipping of up to 1.25 million tonnes per year while the application would increase the limit to 2.0 million tonnes per year.

All traffic to/from the site will use the two existing driveway entrances to 4th Line. This study assesses the ultimate conditions with the pit and quarry both operating and using both of the existing driveway entrances to 4th Line.

The general study area and proposed intersections for analysis are shown in **Exhibit 1**. The total traffic analysis horizon was assumed to be 2027 for Phases 1 and 2. Phases 3B, 4A, and 4B will be using only the south driveway and the 2032 horizon year was adopted for that analysis. From a traffic perspective, this application only relates to an increase in tonnage shipping resulting in increased truck activity, and a further horizon year would only capture additional background traffic growth passing through the area.

The study intersections include the major intersections along the primary haul route within the vicinity of the site, and the two site driveways. The operational analysis focused on the critical intersections while a haul route analysis was undertaken to verify the condition of the haul route (pavement condition and signage) and to confirm there are no notable changes since the previous Traffic Review prepared by HDR and dated Thursday July 6, 2017 for the previous pit application (licence #626199). This report documents the Traffic Impact Study scope of work, assumptions, analyses, findings, and recommendations. This traffic impact study report includes documentation of the following components.

- Existing traffic conditions
- Truck activity increase due to increase in yearly tonnage limit to 2 million tonnes per year
- Future total traffic conditions with the increased trips
- Haul route assessment and driveway sightline assessment
- Conclusions and recommendations

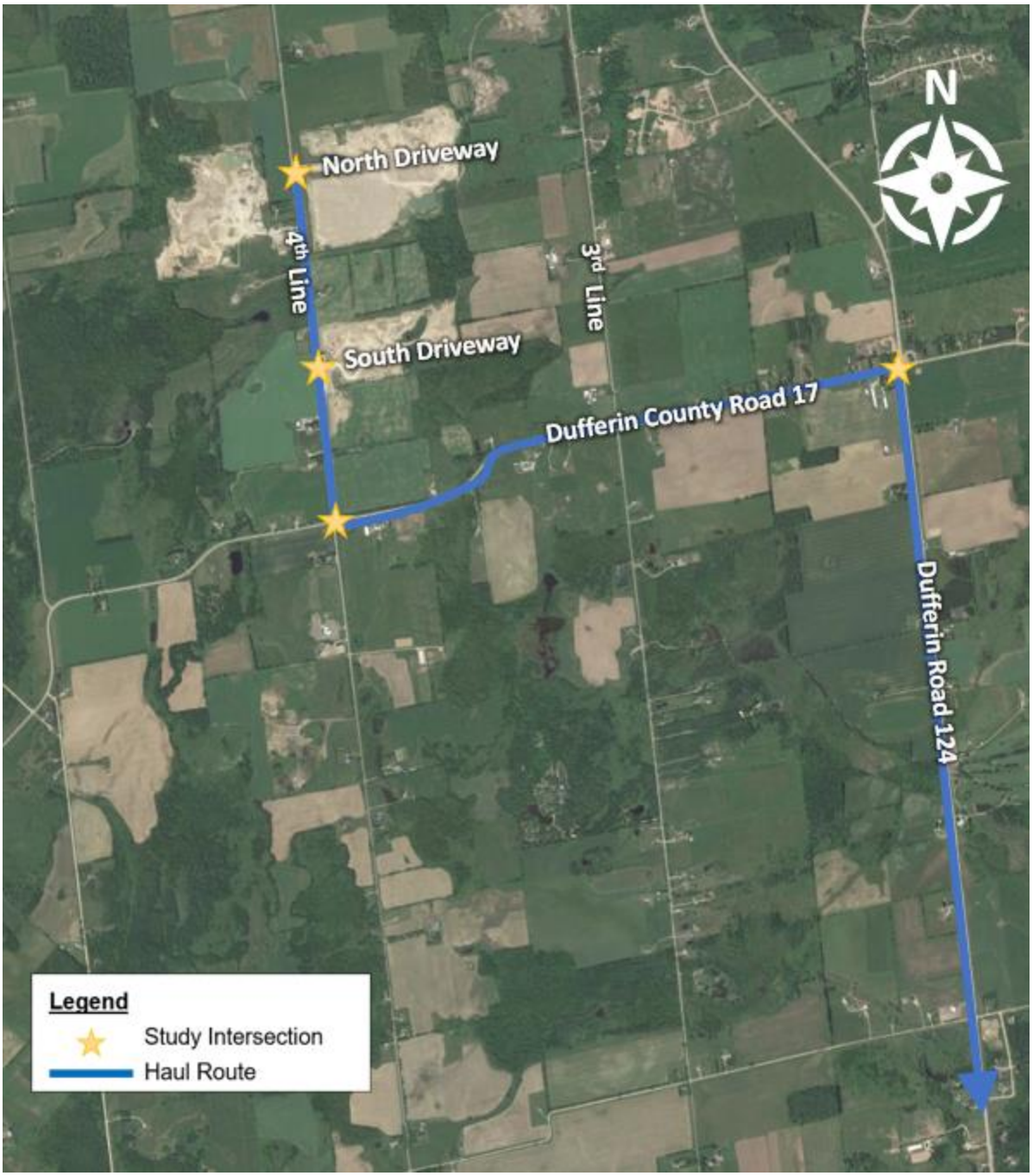


Exhibit 1: Study Area and Haul Route Context

1.1 Scope of Work

The scope of work has been prepared as follows and was agreed with the Township of Melancthon.

Study Area	• Area bounded Dufferin County Road 17 to the south, Dufferin County Road 124 to the east, 4th Line to the west, and the site is the north boundary of the study area. The study area generally follows the primary haul route which is south along 4th Line, east along Dufferin County Road 17, and south along Dufferin County Road 124.
Analysis Scenarios	• Existing 2022 Traffic Conditions • Future 2027 Background and Total Conditions • Future 2032 Background and Total Conditions The horizon of 5-years was selected for Phases 1 and 2. For Phases 3B, 4A, and 4B a horizon year of 2032 was adopted. The increase in site generated traffic is expected to be nominal. During phases 3B onwards, all site traffic will use the south driveway and the north driveway will be closed.
Analysis Time Periods	The following time periods were analyzed as they represent peak trip generation times for the site overlapping with the peak of background traffic: • Weekday AM peak hour between 7:00am and 9:00am • Weekday PM peak hour between 4:00pm and 6:00pm
Study Area Intersections for Analysis	The following intersections were analyzed for capacity, level of service, and delays: 1) 4th Line @ Pit Entrances 2) 4th Line @ Dufferin County Road 17 3) Dufferin County Road 17 @ Dufferin County Road 124 4) North and south site driveways

1.2 Intersection Operations and Analysis Methodology

Intersection operations were assessed for the study area intersection using the software program Synchro Traffic Signal Coordination Software Version 11, which employs methodology from the **Highway Capacity Manual** (HCM 2000) published by the Transportation Research Board National Research Council. Synchro can analyze both signalized and unsignalized intersections in a road corridor or network, taking into account the spacing, interaction, queues and operations between intersections.

The signalized and unsignalized intersection analysis considers three separate measures of performance:

- The capacity of all intersection movements, represented by the volume to capacity (v/c) ratio;
- The level of service (LOS) for all intersection turning movements as well as for the overall intersection. The overall intersection LOS is based on the average control delay per vehicle (weighted) for the various movements through the intersection; and,
- The forecasted queue lengths (95th percentile queue lengths).

LOS is an indicator of how long a vehicle must wait to complete a movement and is represented by a letter between 'A' and 'F', with 'F' being the longest delay. The volume to capacity (v/c) ratio is a measure of the degree of capacity utilized at an intersection. HCM definitions are summarized in **Table 1.**

Table 1: HCM Level of Service Definitions

Level of Service (LOS)	Signalized Control Delay per Vehicles (s)	Unsignalized Control Delay per Vehicle (s)	Description
A	≤ 10	≤ 10	Ideal
B	> 10 and ≤ 20	> 10 and ≤ 15	Acceptable
C	> 20 and ≤ 35	> 15 and ≤ 25	Acceptable
D	> 35 and ≤ 55	> 25 and ≤ 35	Somewhat undesirable
E	> 55 and ≤ 80	> 35 and ≤ 50	Undesirable
F	> 80	> 50	Poor

2 Existing Conditions

2.1 Existing Road Network

The area directly surrounding the site is predominantly rural agricultural and undeveloped lands. The Town of Shelburne is located approximately 7 kilometres to the south of the site. There are single-family detached dwellings and small communities dotted throughout the area.

In the context of the study area, Dufferin Road 124 and 4th Line are described as north-south, while Dufferin Road 17 is east-west.

The existing road network is described below:

Dufferin County Road 124 (CR124)	Dufferin County Road 124 is a north-south road under the jurisdiction of Dufferin County. This roadway provides major connection with neighbouring municipalities and is signalized at Dufferin Road 17. It has a two-lane rural cross section with gravel shoulders of varying width. Exclusive left and right turn lanes are present in the north-south direction at Dufferin County Road 17. There are no sidewalks or bicycle lanes provided. The posted speed limit is 80 km/hr. There is signage indicating caution for slow moving vehicles.
Dufferin County Road 17 (CR17)	Dufferin County Road 17 is an east-west road under the jurisdiction of Dufferin County with a posted speed of 80km/hr. It has a two-lane rural cross section with gravel shoulders. There are no sidewalks or bicycle lanes provided.
4th Line	4th Line is a north-south road under the jurisdiction of the Township of Melancthon. It has a two-lane rural cross section with gravel shoulders. There are no sidewalks or bicycle lanes provided. There is no posted speed limit so the speed limit is assumed to be 50 km/h with a design speed of 60 km/h. There are flashing beacons at Dufferin County Road 17 and it is stop control on the minor approaches along 4th Line. Signage on 4th Line north of CR 17 requests that trucks do not use engine brakes.

The primary haul route for the existing and proposed operation is south along 4th Line to Dufferin Road 17, and then east to Dufferin Road 124. This is the route taken by most trucks and heavy vehicle traffic destined to/from the pit. In atypical cases, vehicles may take other routes if the trucks are destined locally. This study considers the typical haul route. Employee traffic and other smaller vehicles may come and go from any direction surrounding the site.

The existing study area road network is shown **Exhibit 2**, including existing traffic control and lane configuration.

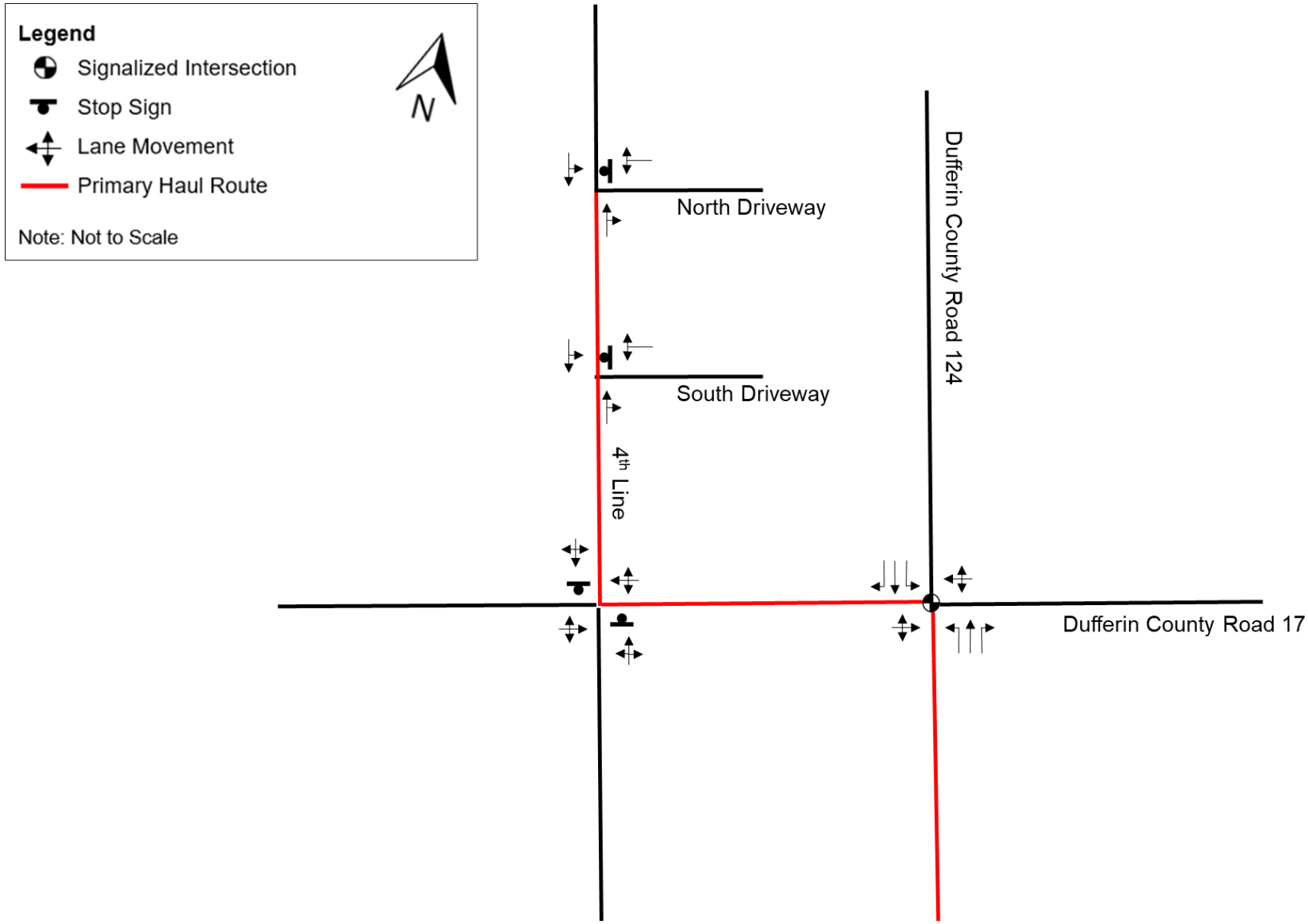


Exhibit 2: Existing Lane Configuration and Traffic Control

2.2 Existing Traffic Volumes

Traffic counts were commissioned by HDR on Tuesday, November 15, 2022 for each study intersection, except for the south pit entrance. The traffic counts captured the typical weekday AM and PM peak periods which overlap with the proposed pit/quarry operations. Therefore, the 7:00am to 9:00am and 4:00pm to 6:00pm time periods were captured in the counts. Detailed counts are provided in **Appendix A**.

South pit driveway volumes were estimated using weigh-scale data provided by Strada which provided the truck volumes directly using the outbound scale times. For the purposes of this analysis, the inbound hourly volume was assumed to match the outbound hourly volume from the weigh scale data. Since other passenger vehicles (i.e. vehicles that are not trucks which pass over the weigh scale) enter and leave the driveways, the passenger vehicle volumes were derived for the south driveway using the volumes balancing between the north driveway (to the north) and the intersection with County Road 17 (to the south).

Furthermore, driveway volumes at the north and south pit driveways were scaled up to the yearly peak hour volumes using weigh-scale data. Details of estimating south pit driveway volumes and the scaling-up of north and south pit driveway volumes are discussed below.

2.2.1 Estimating South Pit Driveway Volumes

Traffic volumes at the south pit entrance were estimated using weigh-scale data provided by Strada Aggregates. The number of transactions occurring between 7:00am to 9:00am and 3:00pm to 5:00pm indicates the number of trucks going in and out of south pit entrance. Any imbalance of volumes between the south pit entrance and north pit entrance or Dufferin County Road 17 are assumed to be passenger cars.

The hourly number of transactions at the south pit on November 15, 2022 (same day as the traffic counts) are shown below in **Exhibit 3**.

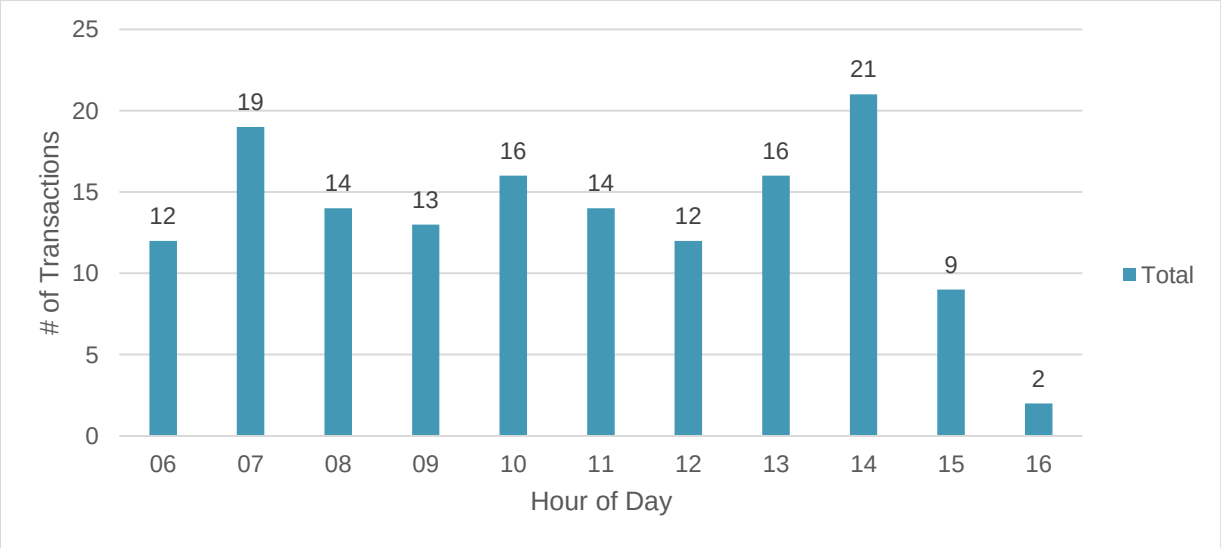


Exhibit 3: Transactions at South Driveway on Day of TMC count day (November 15, 2022)

The number of trucks using the south pit driveway on November 15, 2022 was 19 during AM peak hour and 2 during PM peak hour. Based on the south driveway weigh scale, the site experiences peak activity from 7:00am to 2:00pm, with lower activity during the PM peak hour.

2.2.2 Yearly Peak Hour Volume of the Site

Yearly peak hour volumes for the site were examined for all years from 2020 to 2023. Volumes for both north and south pit driveways were combined to determine the day that the highest AM and PM peak hour volumes occurred on. **Exhibit 4** and **Exhibit 5** Illustrates an example of data visualization and pivot tables used to determine highest peak hour volumes.

Table 2 summarizes the highest AM and PM peak hour volumes at the site for each year between 2020 and 2023. Detailed data visualization used to identified highest AM and PM peak hour volumes are shown in **Appendix B**.

Table 2: Highest Yearly Peak Hour Truck Volumes (Both Driveways) Based on Weigh Scale Data

Period	Time	Day	# of Transactions
2020			
AM period (7-9am)	7:00 am	Friday, June 5, 2020	30
PM period (4-6pm)	4:00 pm	Tuesday, August 11, 2020	11
2021			
AM period (7-9am)	7:00 am	Monday June 7, 2021	41
PM period (4-6pm)	4:00 pm	Monday June 7, 2021	24
2022			
AM period (7-9am)	8:00 am	Tuesday, August 30, 2022	48
PM period (4-6pm)	4:00 pm	Tuesday, August 30, 2022	13
2023			
AM period (7-9am)	8:00 am	Friday, October 6, 2023	30
PM period (4-6pm)	4:00 pm	Wednesday, May 10, 2023	10
Day of TMC (November 15, 2022)			
AM period (7-9am)	7:00 am	Tuesday, November 15, 2022	21
PM period (4-6pm)	4:00 pm	Tuesday, November 15, 2022	5

A scaling factor was calculated by comparing driveway volumes on the TMC day to the highest AM and PM peak hour volumes observed over the previous four years. The scaling factor for the AM peak hour is 2.29 (48/21). The scaling factor for the PM peak hour is 4.8 (24/5). These factors were used to elevate site truck traffic at the north and south pit driveways to the yearly peak hour volumes. Scaling site traffic up to its yearly peak hour volume was done to conduct a conservative analysis representative of a higher activity day. Any volume imbalances between site driveways and 4th Line and Dufferin Road 17 intersections were assumed to be non-truck volumes, which were not scaled.

The existing 2022 traffic volumes are presented in **Exhibit 6**. The site traffic volumes at the site driveway were based on the facility peak trip generation, while the traffic along 4th Line are based directly on the peak hour count. Volumes adjusted to a peak day are shown in **Exhibit 7**.

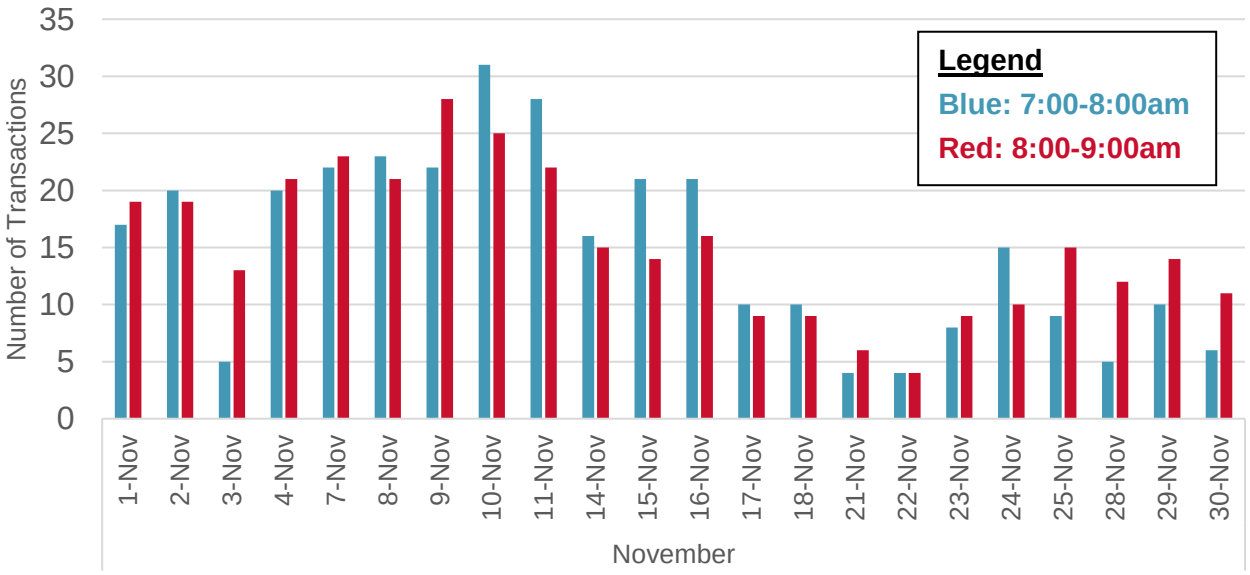


Exhibit 4: Example of Highest AM Peak Hour (7-8am) Truck Traffic in November 2022

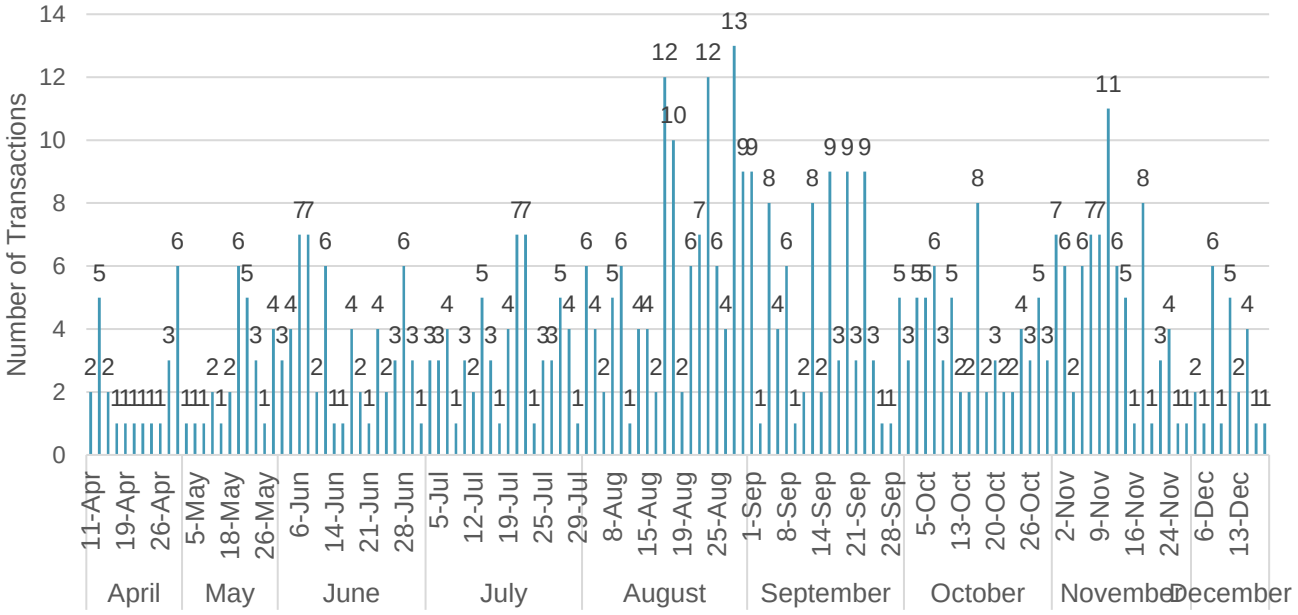


Exhibit 5: Example of Highest PM Peak Hour (4-5pm) Traffic, by Month in 2022

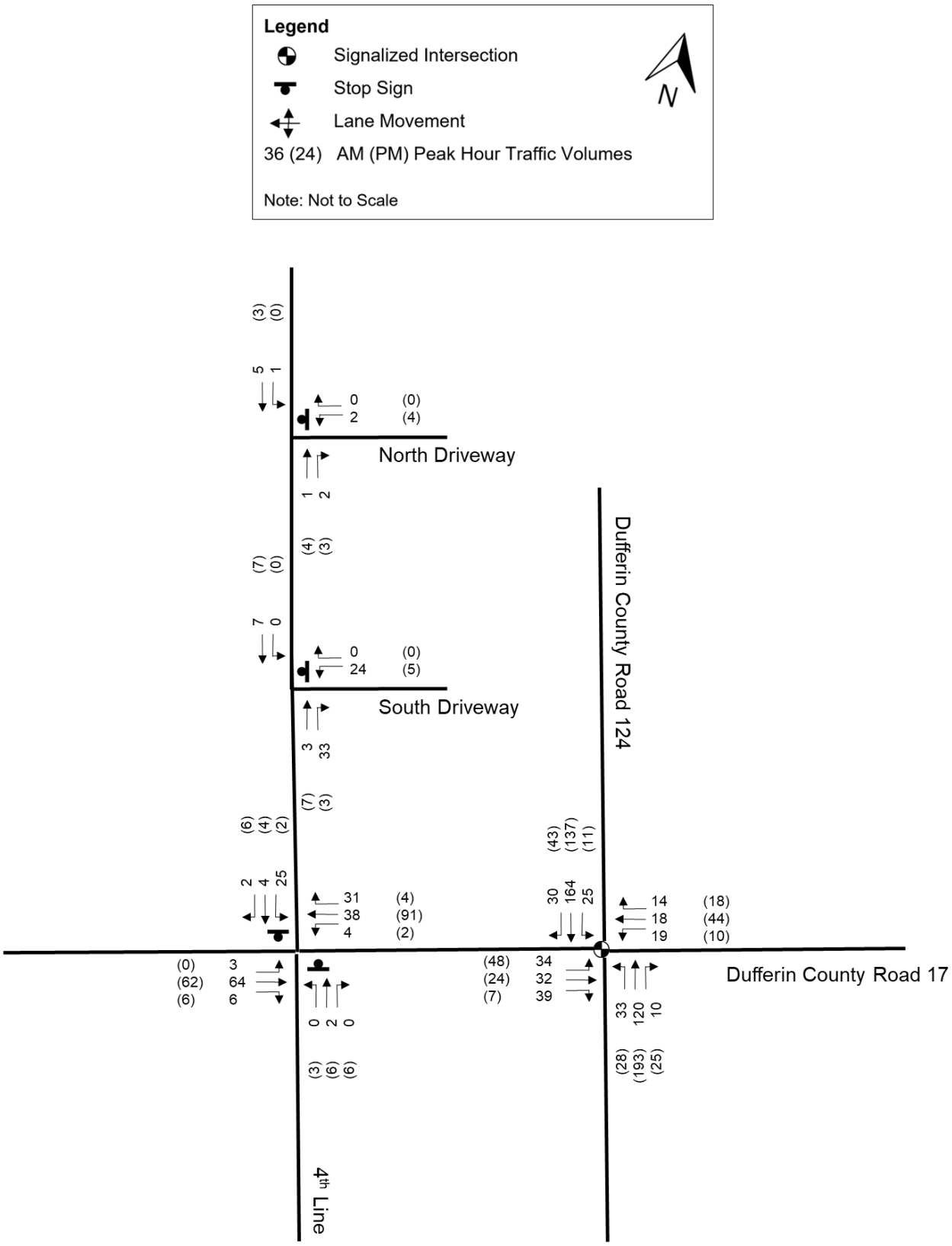


Exhibit 6: Existing 2022 Traffic Volumes (Day of Count)

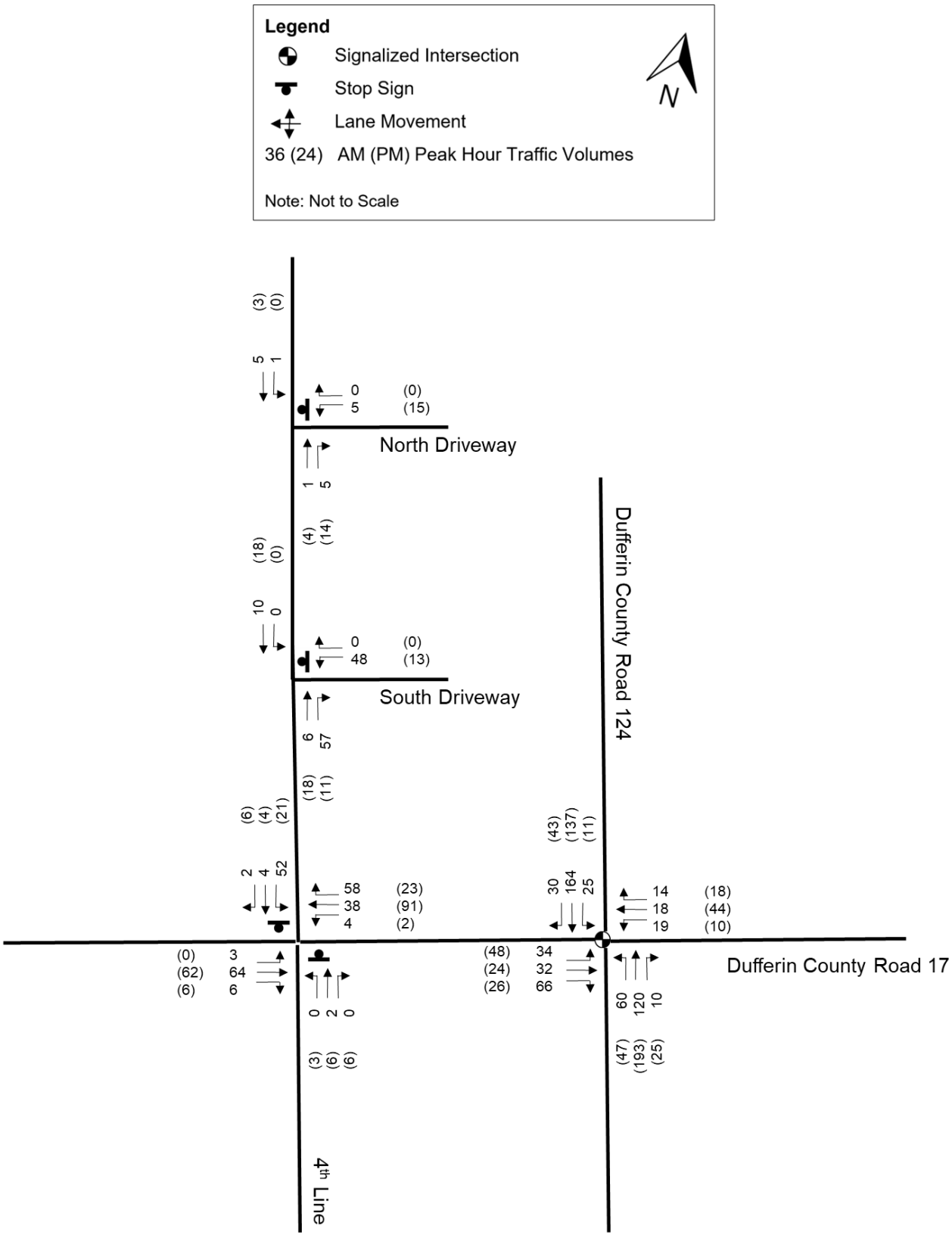


Exhibit 7: Existing 2022 Traffic Volumes (with Site Truck Traffic Adjusted to a Peak Day)

2.3 Existing Traffic Operations

Existing traffic conditions have been analyzed based on the adjusted existing 2022 traffic volumes shown in **Exhibit 7** which represents site truck traffic scaled to a peak day, and the existing road network (**Exhibit 2**). Critical movements are defined as shared through/turning movements with volume to capacity ratio (v/c ratio) greater than 0.85, or exclusive turning (left/right) movements with v/c ratios greater than 1.0. Movements operating with level of service (LOS) 'E' or 'F' are also highlighted in this report.

Table 3 summarizes the level-of-service and v/c ratio for each movement under existing conditions. Detailed Synchro results and reports for all study area intersections are provided in **Appendix C**.

Signal timing for the intersection of Dufferin County Road 17 at Dufferin County Road 124 was not provided by the County. Therefore, a 90 second cycle length was assumed based on the Synchro model optimization, and appropriate clearance times were incorporated. The recall mode was assumed to be such that north-south (Dufferin County Road 124) rests in green unless there is actuation on the east-west minor approaches. This demonstrates the signal has residual capacity.

Table 3: Existing 2022 Traffic Conditions – Traffic Operations

Intersection and Movement		AM Peak Hour			PM Peak Hour		
		LOS	Delay (s)	v/c	LOS	Delay (s)	v/c
Dufferin Road 124 & Dufferin Road 17		**B**	**12.0**	**0.20**	**B**	**12.2**	**0.23**
Eastbound	Left-Through-Right	C	30.4	0.54	D	36.6	0.60
Westbound	Left-Through-Right	C	26.0	0.2	C	29.8	0.28
Northbound	Left	A	4.9	0.14	A	4.2	0.09
	Through	A	4.3	0.10	A	4.4	0.16
	Right	A	3.9	0.01	A	3.7	0.02
Southbound	Left	A	4.0	0.03	A	3.7	0.01
	Through	A	4.5	0.14	A	4.2	0.12
	Right	A	3.9	0.2	A	3.8	0.03
Dufferin Road 17 & 4th Line							
Eastbound	Left-Through-Right	A	0.3	0.00	A	0.0	0.0
Westbound	Left-Through	A	0.7	0.00	A	0.1	0.0
	Right	A	0.0	0.04	A	0.0	0.02
Northbound	Left-Through-Right	B	10.1	0.00	A	9.6	0.02
Southbound	Left-Through-Right	B	10.8	0.09	A	11.0	0.06
4th Line & North Entrance							
Westbound	Left-Right	A	9.4	0.01	A	9.6	0.02
Northbound	Through-Right	A	0.0	0.00	A	0.0	0.01
Southbound	Through-Left	A	0.9	0.00	A	0.0	0.0
4th Line & South Entrance							
Westbound	Left-Right	B	10.1	0.08	A	9.6	0.02
Northbound	Through-Right	A	0	0.05	A	0.0	0.02
Southbound	Through-Left	A	0	0	A	0.0	0.0

Note: LOS = level of service; v/c = volume to capacity ratio; Critical movements are highlighted in **red** as defined by MTO General Guidelines for the Preparation of Traffic Impact Study. Movements operating with level of service 'E' or 'F' are highlighted yellow.

Under existing traffic conditions, all intersections within the study area are operating within acceptable thresholds, with individual movements operating with LOS of 'D' or better with v/c ratios of 0.60 or lower which indicates sufficient residual capacity.

Under existing conditions there is sufficient capacity to accommodate the 95th percentile queue lengths as shown in **Table 4**. The storage lengths were measured based on the parallel storage for turn lanes, exclusive of the taper.

Table 4: Existing Conditions – 95th Percentile Queue Length

Intersection and Movement		Available Storage or Link Length (m)	95th Percentile Queue Length (m)	
			AM Peak Hour	PM Peak Hour
Dufferin Road 124 & Dufferin Road 17				
Eastbound	Left-Through-Right	-	22.8	25.0
Westbound	Left-Through-Right	-	12.2	17.8
Northbound	Left	50.0	8.7	7.1
	Through	-	13.0	20.7
	Right	10.0	0.0	1.5
Southbound	Left	50.0	4.0	2.4
	Through	-	17.2	15.2
	Right	10.0	2.1	3.5
Dufferin Road 17 & 4th Line				
Eastbound	Left-Through-Right	-	0.0	0.0
Westbound	Left-Through	-	0.1	0.0
	Right	40.0	0.0	0.0
Northbound	Left-Through-Right	-	0.1	0.5
Southbound	Left-Through-Right	-	2.4	1.4
4th Line & North Entrance				
Westbound	Left-Right	-	0.2	0.5
Northbound	Through-Right	-	0.0	0.0
Southbound	Through-Left	-	0.0	0.0
4th Line & South Entrance				
Westbound	Left-Right	-	2.1	0.5
Northbound	Through-Right	-	0.0	0.0
Southbound	Through-Left	-	0.0	0.0

Notes: Queue lengths that exceed storage are highlighted in red.
A dash '-' indicates the storage is quite long and even in the event of a long queue is unlikely to cause blockages.

3 Future Background Traffic Conditions

3.1 Planned Road Network Improvements

There are no planned anticipated road network improvements by the Township of Melancthon in the study area by 2032, according to the Dufferin County road construction website[1]. The 2027 and 2032 background road network will remain the same as the existing road network.

3.2 Planned Background Developments

There were no planned background developments identified for incorporation into the forecasts. Therefore, the future background traffic is comprised of existing traffic volumes plus general background growth.

3.3 General Background Traffic Growth

HDR has access to 2008 traffic counts at the study area intersections along Dufferin County Road 17. These counts were used with the 2022 traffic counts to calculate background growth rates. The comparison of the traffic volumes and calculated growth rates are shown in **Appendix D**.

To be conservative, a growth rate of 3% per annum was applied to the through volumes along Dufferin Road 17 and for all movements at the intersection of Dufferin Road 124 at Dufferin Road 7 in the AM peak period, and a growth rate of 2%was used for the PM peak period. No growth was applied to traffic turning to/from 4th Line as this area is a local roadway serving only businesses and residences along 4th Line.

Exhibit 8 and **Exhibit 9** show the forecast 2027 and 2032 background traffic volumes.

3.4 2027 Background Traffic Operations

Future 2027 background traffic conditions have been analyzed using the Synchro 11 traffic analysis software based on the forecast 2027 background traffic volumes (**Exhibit 8**) and the existing road network (**Exhibit 2**). Critical movements are defined as shared through/turning movements with v/c ratio greater than 0.85, or exclusive turning (left/right) movements with v/c ratios greater than 1.0. Movements operating with level of service 'E' or 'F' are also highlighted in this report.

Table 5 summarizes the level-of-service (LOS) and volume/capacity ratio (v/c ratio) for each movement under future background conditions. Detailed Synchro results and reports for all study area intersections are provided in **Appendix B**.

[1] https://www.dufferincounty.ca/index.php/roads-infrastructure/road-construction

Table 5: Future 2027 Background Traffic Conditions – Traffic Operations

Intersection and Movement		AM Peak Hour			PM Peak Hour		
		LOS	Delay (s)	v/c	LOS	Delay (s)	v/c
Dufferin Road 124 & Dufferin Road 17		**B**	**12.0**	**0.24**	**B**	**14.6**	**0.24**
Eastbound	Left-Through-Right	C	27.6	0.52	C	25.1	0.27
Westbound	Left-Through-Right	C	24.0	0.19	C	22.4	0.14
Northbound	Left	A	6.1	0.17	B	11.1	0.12
	Through	A	5.3	0.12	B	11.7	0.23
	Right	A	4.8	0.01	A	9.9	0.02
Southbound	Left	A	4.9	0.04	A	10.0	0.02
	Through	A	5.6	0.17	B	11.1	0.16
	Right	A	4.8	0.02	B	10.1	0.03
Dufferin Road 17 & 4th Line							
Eastbound	Left-Through-Right	A	0.3	0.0	A	0.0	0.00
Westbound	Left-Through	A	0.6	0.0	A	0.1	0.00
	Right	A	0.0	0.04	A	0.0	0.02
Northbound	Left-Through-Right	B	10.3	0.0	A	9.7	0.02
Southbound	Left-Through-Right	B	11.0	0.10	B	11.1	0.06
4th Line & North Entrance							
Westbound	Left-Right	A	9.4	0.01	A	9.6	0.02
Northbound	Through-Right	A	0.0	0.0	A	0.0	0.00
Southbound	Through-Left	A	0.9	0.0	A	0.0	0.00
4th Line & South Entrance							
Westbound	Left-Right	A	10.1	0.08	A	9.6	0.02
Northbound	Through-Right	A	0.0	0.05	A	0.0	0.02
Southbound	Through-Left	A	0.0	0.0	A	0.0	0

Note: LOS = level of service; v/c = volume to capacity ratio; Critical movements are highlighted in **red** as defined by MTO General Guidelines for the Preparation of Traffic Impact Study. Movements operating with level of service 'E' or 'F' are highlighted yellow.

Under future background traffic conditions, all intersections within the study area will continue to operate within acceptable thresholds, with individual movements operating with LOS of ‘C’ or better with v/c ratios of 0.52 or lower which indicates sufficient residual capacity.

Under future 2027 background conditions there is sufficient capacity to accommodate the 95th percentile queue lengths as shown in **Table 4**. The storage lengths were measured based on the parallel storage for turn lanes, exclusive of the taper.

Table 6: Future 2027 Background Traffic Conditions – 95th Percentile Queue Length

Intersection and Movement		Available Storage or Link Length (m)	95th Percentile Queue Length (m)	
			AM Peak Hour	PM Peak Hour
Dufferin Road 124 & Dufferin Road 17				
Eastbound	Left-Through-Right	-	27.3	26.4
Westbound	Left-Through-Right	-	13.7	19.1
Northbound	Left	50.0	10.6	10.8
	Through	-	15.8	33.0
	Right	10.0	0.1	2.5
Southbound	Left	50.0	4.9	3.7
	Through	-	20.9	23.9
	Right	10.0	2.7	5.2
Dufferin Road 17 & 4th Line				
Eastbound	Left-Through-Right	-	0.0	0.0
Westbound	Left-Through	-	0.1	0.0
	Right	40.0	0.0	0.0
Northbound	Left-Through-Right	-	0.1	0.5
Southbound	Left-Through-Right	-	2.4	1.4
4th Line & North Entrance				
Westbound	Left-Right	-	0.2	0.5
Northbound	Through-Right	-	0.0	0.0
Southbound	Through-Left	-	0.0	0.0
4th Line & South Entrance				
Westbound	Left-Right		2.1	0.5
Northbound	Through-Right		0.0	0.0
Southbound	Through-Left		0.0	0.0

Notes: Queue lengths that exceed storage are highlighted in red.
A dash '-' indicates the storage is quite long and even in the event of a long queue is unlikely to cause blockages.

3.5 2032 Background Traffic Operations

Future 2032 background traffic conditions have been analyzed using the Synchro 11 traffic analysis software based on the forecast 2032 background traffic volumes (**Exhibit 9**) and the existing road network (**Exhibit 2**). Critical movements are defined as shared through/turning movements with v/c ratio greater than 0.85, or exclusive turning (left/right) movements with v/c ratios greater than 1.0. Movements operating with level of service 'E' or 'F' are also highlighted in this report.

Table 5 summarizes the level-of-service (LOS) and volume/capacity ratio (v/c ratio) for each movement under future background conditions. Detailed Synchro results and reports for all study area intersections are provided in **Appendix B**.

Table 7: Future 2032 Background Traffic Conditions – Traffic Operations

Intersection and Movement		AM Peak Hour			PM Peak Hour		
		LOS	Delay (s)	v/c	LOS	Delay (s)	v/c
Dufferin Road 124 & Dufferin Road 17		**B**	**12.9**	**0.29**	**B**	**14.8**	**0.27**
Eastbound	Left-Through-Right	C	29.6	0.60	C	25.7	0.31
Westbound	Left-Through-Right	C	23.8	0.20	C	22.5	0.15
Northbound	Left	A	6.9	0.20	B	11.2	0.14
	Through	A	5.9	0.14	B	11.9	0.25
	Right	A	5.2	0.01	A	9.9	0.02
Southbound	Left	A	5.4	0.05	A	10.0	0.02
	Through	A	6.2	0.20	B	11.2	0.18
	Right	A	5.3	0.03	B	10.1	0.04
Dufferin Road 17 & 4th Line							
Eastbound	Left-Through-Right	A	0.2	0.0	A	0.0	0.00
Westbound	Left-Through	A	0.5	0.0	A	0.1	0.00
	Right	A	0.0	0.04	A	0.0	0.02
Northbound	Left-Through-Right	B	10.4	0.0	A	9.9	0.02
Southbound	Left-Through-Right	B	11.3	0.10	B	11.4	0.06
4th Line & North Entrance							
Westbound	Left-Right	A	9.4	0.01	A	9.6	0.02
Northbound	Through-Right	A	0.0	0.0	A	0.0	0.01
Southbound	Through-Left	A	0.9	0.0	A	0.0	0.00
4th Line & South Entrance							
Westbound	Left-Right	B	10.1	0.08	A	9.6	0.02
Northbound	Through-Right	A	0.0	0.05	A	0.0	0.02
Southbound	Through-Left	A	0.0	0.0	A	0.0	0

Note: LOS = level of service; v/c = volume to capacity ratio; Critical movements are highlighted in **red** as defined by MTO General Guidelines for the Preparation of Traffic Impact Study. Movements operating with level of service 'E' or 'F' are highlighted yellow.

Under future 2032 background traffic conditions, all intersections within the study area will continue to operate within acceptable thresholds, with individual movements operating with LOS of ‘C’ or better with v/c ratios of 0.60 or lower which indicates sufficient residual capacity.

Under future 2032 background conditions there is sufficient capacity to accommodate the 95th percentile queue lengths as shown in **Table 4**. The storage lengths were measured based on the parallel storage for turn lanes, exclusive of the taper.

Table 8: Future 2032 Background Traffic Conditions – 95th Percentile Queue Length

Intersection and Movement		Available Storage or Link Length (m)	95th Percentile Queue Length (m)	
			AM Peak Hour	PM Peak Hour
Dufferin Road 124 & Dufferin Road 17				
Eastbound	Left-Through-Right	-	32.6	29.6
Westbound	Left-Through-Right	-	15.0	20.7
Northbound	Left	50.0	13.2	11.8
	Through	-	19.6	36.4
	Right	10.0	0.2	2.8
Southbound	Left	50.0	6.0	3.8
	Through	-	26.2	26.3
	Right	10.0	3.4	5.4
Dufferin Road 17 & 4th Line				
Eastbound	Left-Through-Right	-	0.0	0.0
Westbound	Left-Through	-	0.1	0.0
	Right	40.0	0.0	0.0
Northbound	Left-Through-Right	-	0.1	0.6
Southbound	Left-Through-Right	-	2.5	1.5
4th Line & North Entrance				
Westbound	Left-Right	-	0.2	0.5
Northbound	Through-Right	-	0.0	0.0
Southbound	Through-Left	-	0.0	0.0
4th Line & South Entrance				
Westbound	Left-Right		2.1	0.5
Northbound	Through-Right		0.0	0.0
Southbound	Through-Left		0.0	0.0

Notes: Queue lengths that exceed storage are highlighted in red.
A dash '-' indicates the storage is quite long and even in the event of a long queue is unlikely to cause blockages.

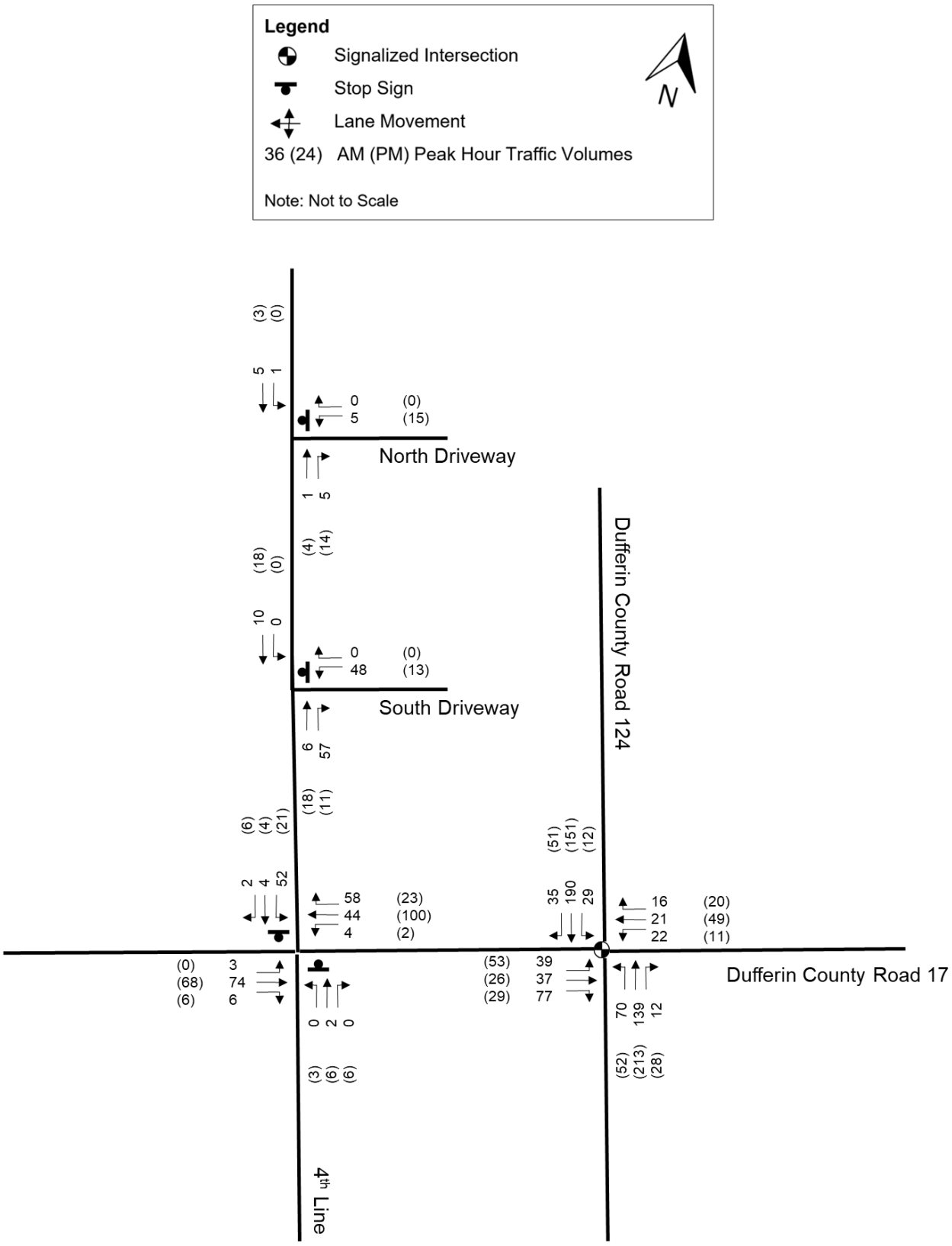


Exhibit 8: Future 2027 Background Traffic

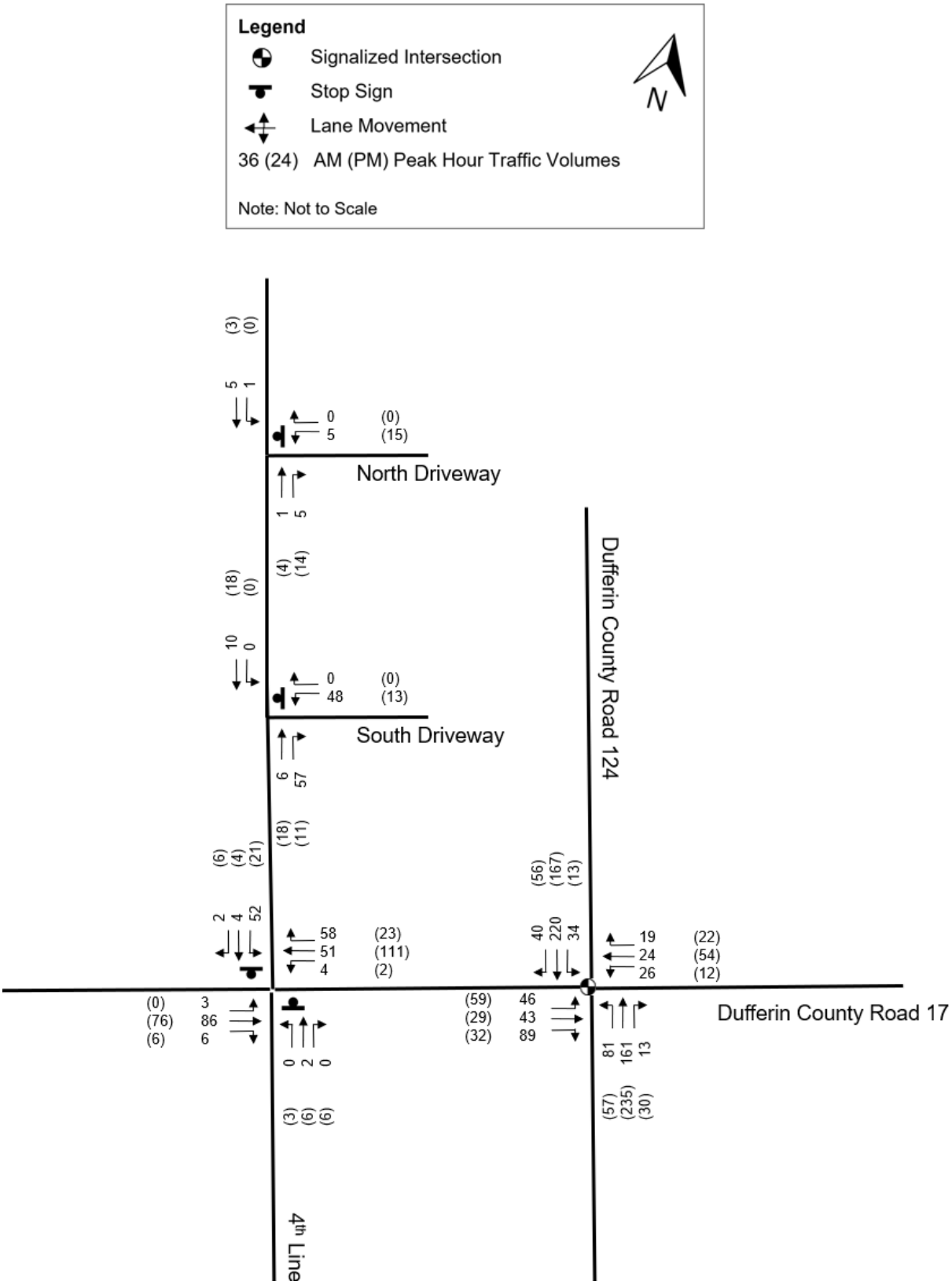


Exhibit 9: Future 2032 Background Traffic

4 Proposed New Licence Application

The pit is currently approved to ship 1.25 million tonnes per year. Strada is applying for a new ARA licence for a pit and quarry and as part of that application includes an increase in the yearly shipping limit to 2.0 million tonnes per year. This is an increase in the yearly tonnage of an additional 0.75 million tonnes per year or a factor of 1.6. This section will discuss the methodology on determining future truck traffic with the increased limit.

4.1 Site Trip Generation

4.1.1 Existing Site Traffic

Existing traffic volumes entering and leaving the north and south pit driveways were derived from the driveway turning movement count and weigh-scale data, respectively. Since the driveway turning movement count captured traffic along 4th Line, the peak hour for traffic volumes at the driveway may be influenced by the traffic along 4th Line, however, traffic volumes traveling passed the site and entering and leaving the site were consistent throughout each of the peak periods.

The peak hour trips for the north pit driveway were 11 trips during the AM peak hour and 31 trips during the PM peak hour. The peak hour trip generation for the south pit driveway was 106 during the AM peak hour and 24 during the PM peak hour.

During the AM peak hour 83% of the vehicles entering and leaving were trucks or heavy vehicles, and during the PM peak hour 91% of the vehicles were trucks or heavy vehicles.

The existing adjusted (scaled up) site traffic volumes are shown in **Exhibit 10** and **Exhibit 11** for regular vehicles and for trucks, respectively. These trips were removed from the network prior to adding future site trips back on to the network.

It should be noted that the existing driveway count showed all trucks heading south along 4th Line. This is discussed in **Section 4.2** with respect to the future site traffic assignment. While it is possible that vehicles may travel to the north or may take a different haul route when serving the local area, the majority of traffic follows the same route via Dufferin County Roads 17 and County Road 124.

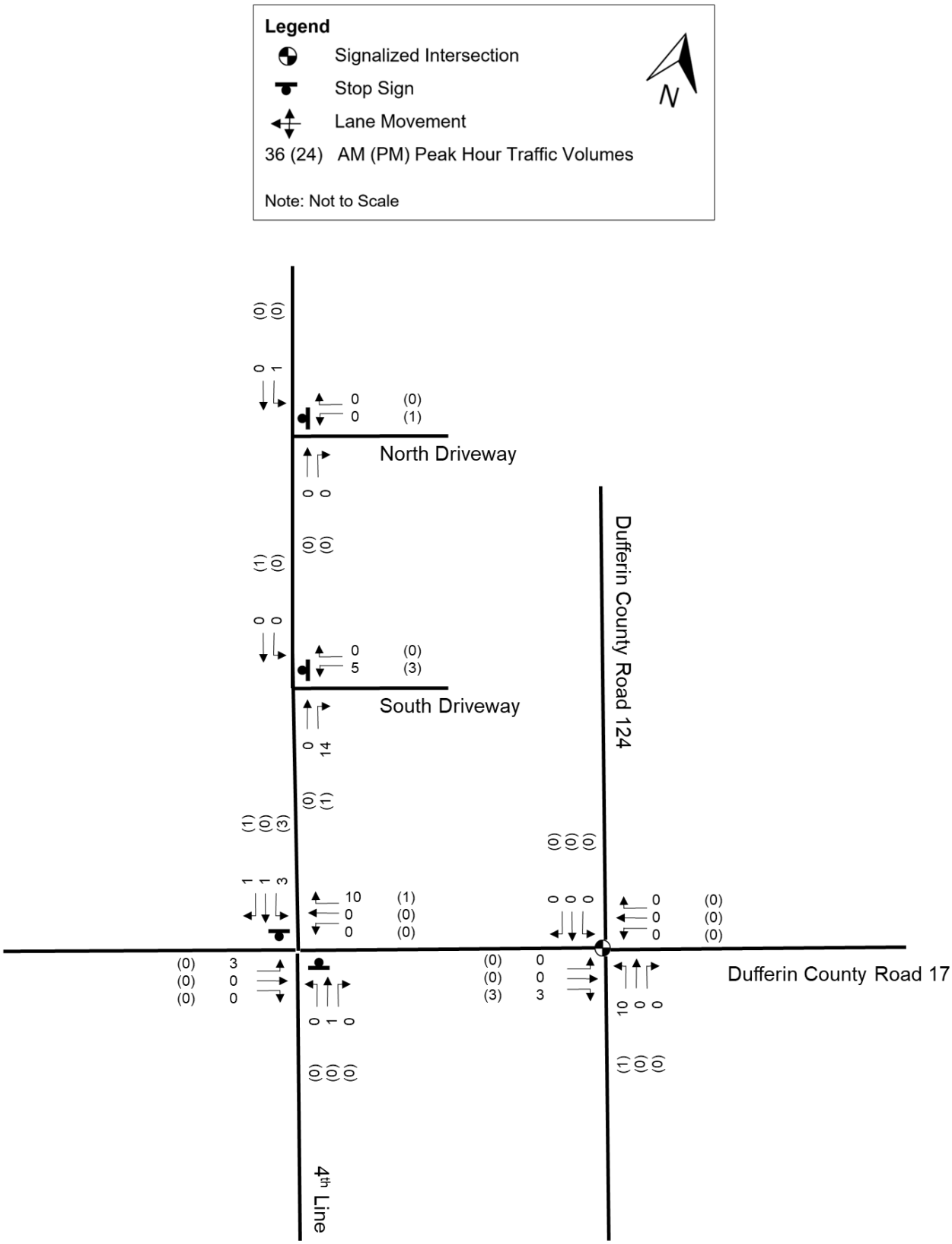


Exhibit 10: Existing Site Trips (Cars)

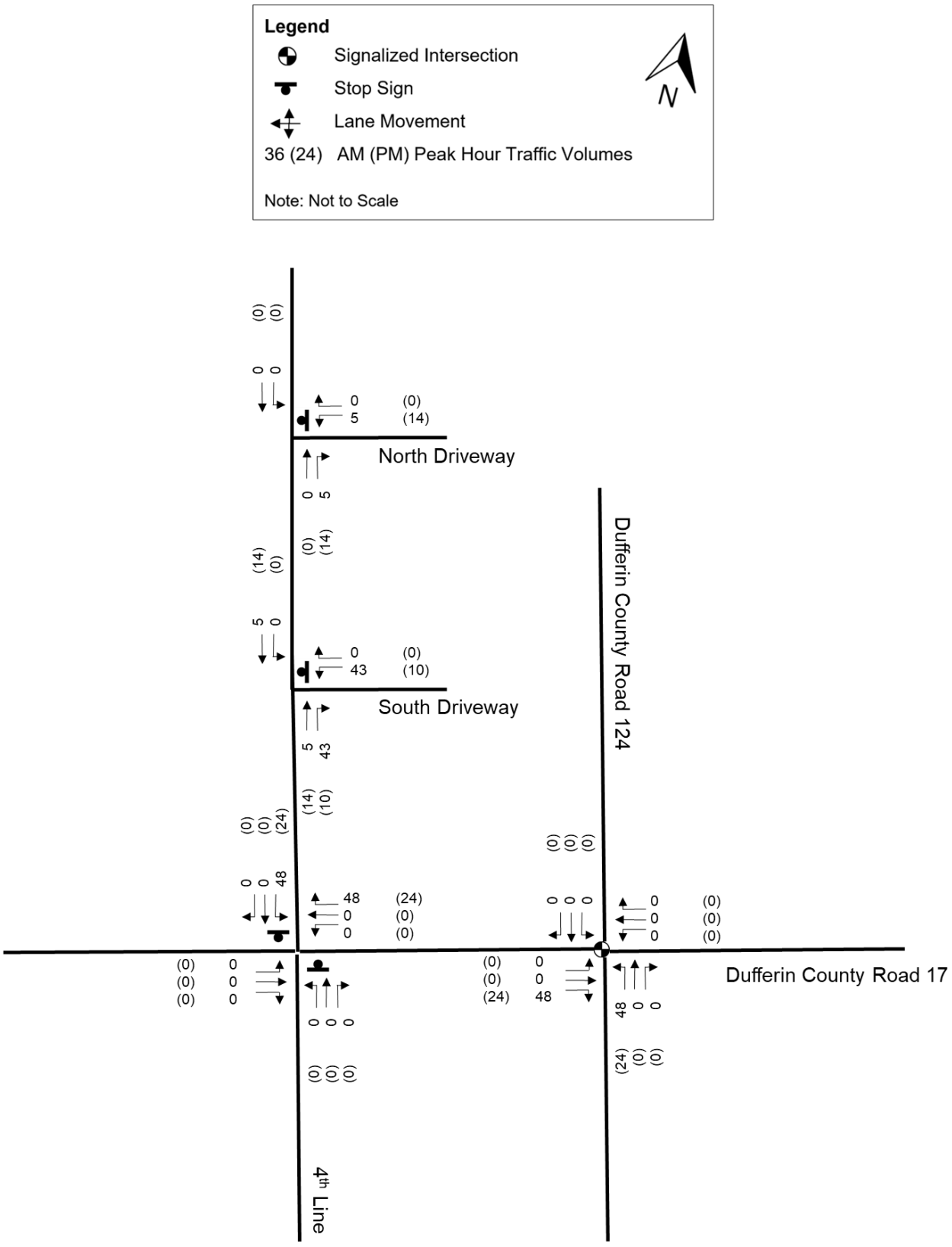


Exhibit 11: Existing Site Trips (Heavy Vehicles/Trucks - Adjusted)

4.1.2 Future Site Traffic

Future site traffic volumes were derived by applying a very conservative assumption that the peak hour trips will increase commensurate to the yearly tonnage increase. In this case, the currently approved yearly shipping limit is 1.25 million tonnes/year and is seeking an increase to 2.0 million tonnes/year. This represents an increase of 1.6x. The resulting future site trips are shown in **Table 9 and Table 10**, for the north and south pit driveways, respectively.

Table 9: Projected Future Peak Hour North Driveway

Time Period	Cars		Trucks/Heavy		Total		
	In	Out	In	Out	In	Out	2-Way
Existing Site Trips							
AM Peak Hour	1	0	5	5	6	5	11
PM Peak Hour	0	1	14	14	14	15	29
Future Site Trips							
AM Peak Hour	1	0	7	7	8	7	15
PM Peak Hour	0	1	23	23	23	24	47
Change in Peak Hour Site Traffic			AM Peak Hour		+2	+2	+4
			PM Peak Hour		+9	+9	+18

Table 10: Projected Future Peak Hour South Driveway

Time Period	Cars		Trucks/Heavy		Total		
	In	Out	In	Out	In	Out	2-Way
Existing Site Trips							
AM Peak Hour	1	5	43	43	57	48	105
PM Peak Hour	1	3	10	10	11	13	24
Future Site Trips							
AM Peak Hour	1	5	69	69	83	74	157
PM Peak Hour	1	3	15	15	16	18	34
Change in Peak Hour Site Traffic			AM Peak Hour		+26	+26	+52
			PM Peak Hour		+5	+5	+10

The increase in site generated trips was estimated for regular vehicles and for trucks. Assuming that the additional tonnage limit and shipping of consolidated material generates trips at the same rate, then the forecast increase in site generated peak hour trips is 4 vehicles during the AM peak hour and 18 vehicles during the PM peak hour for the north pit driveway. The south pit driveway is forecasted to increase site traffic by 52 vehicles during AM peak hour and 10 vehicles during PM peak hour. This increase in site trips is commensurate to the increase in the yearly tonnage limit.

4.2 Site Traffic Distribution and Assignment

As previously mentioned, most site traffic is expected to use the primary haul route along Dufferin County Road 17 and Dufferin County Road 124, with most traffic heading south along Dufferin County Road 124. The distribution of trips was retained from the existing traffic counts, which captured one regular passenger vehicle entering the site driveway from the north along 4th Line.

The future site traffic volumes are shown in **Exhibit 12** and **Exhibit 13** for regular vehicles and trucks, respectively. Future total traffic volumes were derived by removing the existing truck traffic (**Exhibit 10** and **Exhibit 11**) from the existing traffic volumes (**Exhibit 6**), then adding the forecast future site traffic volumes. The resulting future total traffic volumes are shown in **Exhibit 14**.

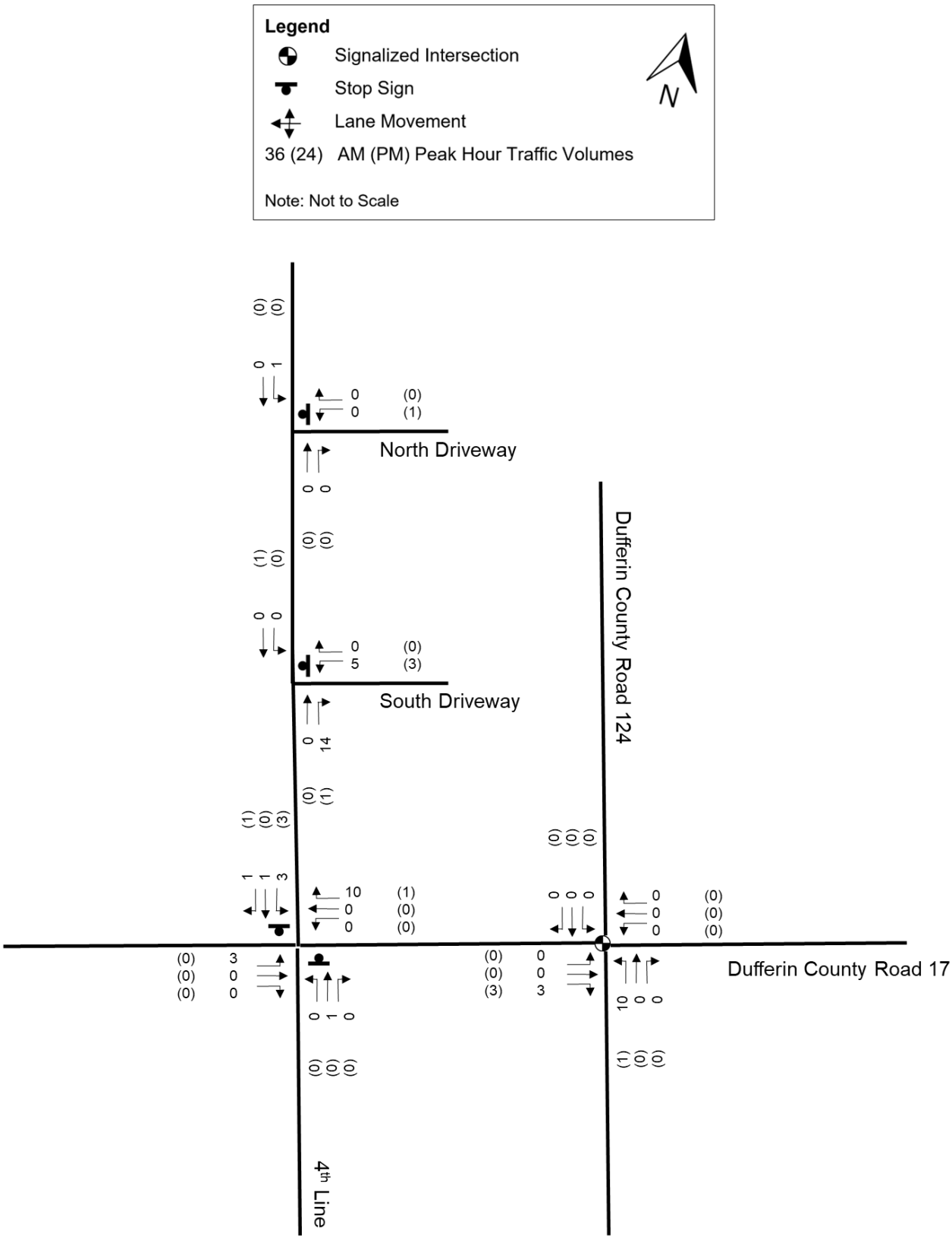


Exhibit 12: Future Site Traffic (Cars) – Phases 1 and 2

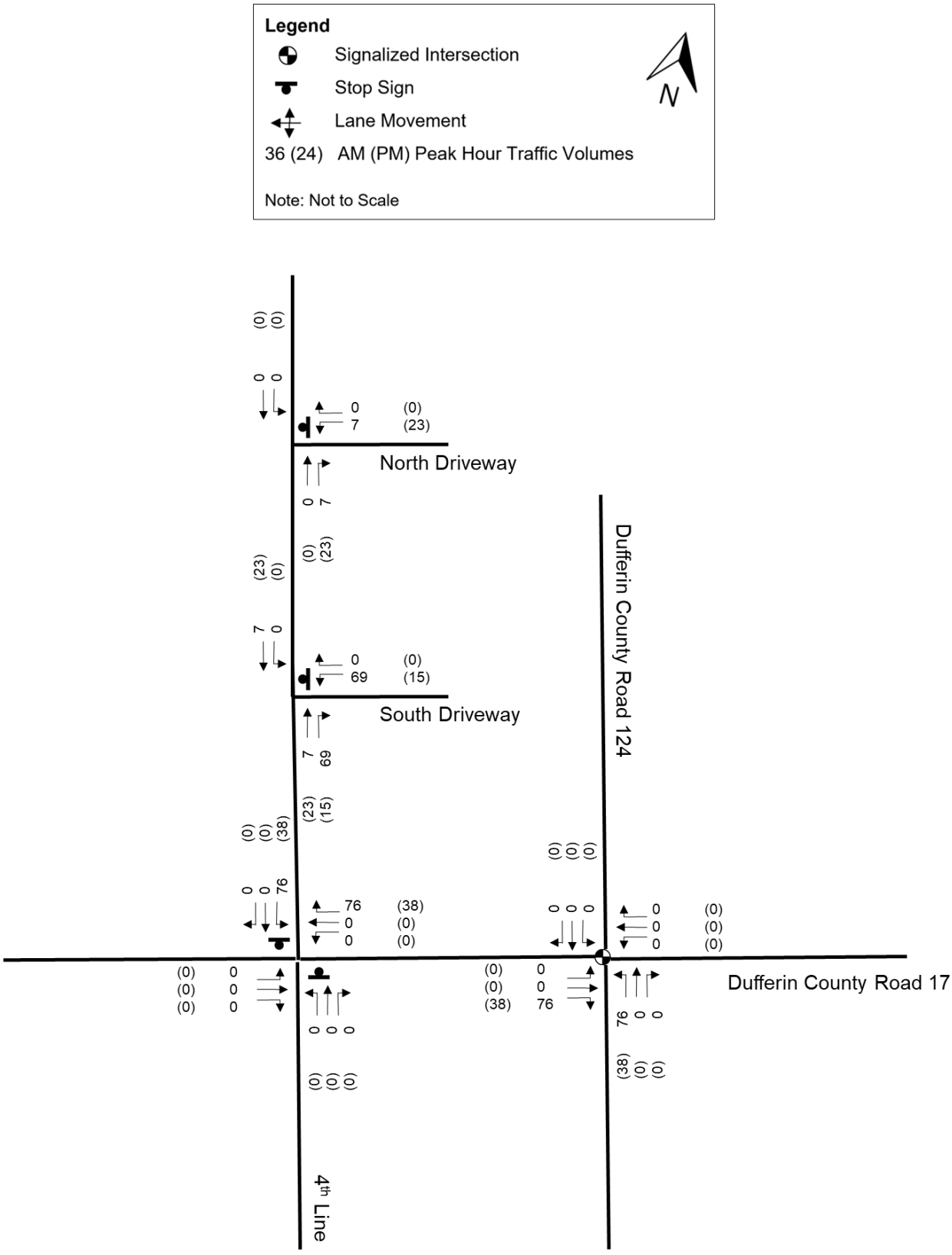


Exhibit 13: Future Site Traffic (Truck) – Phases 1 and 2

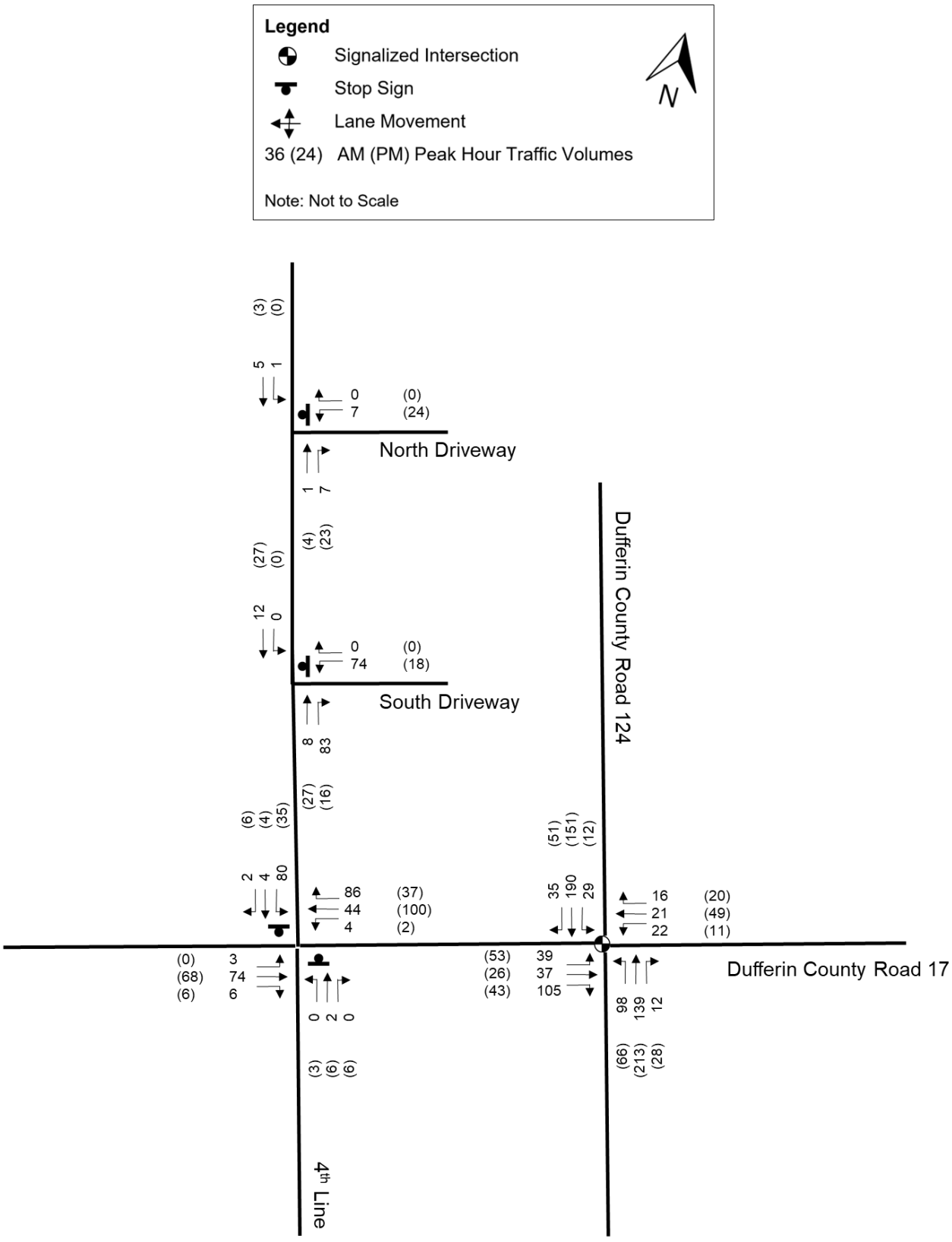


Exhibit 14: 2027 Total Traffic – Phases 1 and 2

4.3 Phase 3B, 4A and 4B Using the South Driveway

After Phases 1 and 2 are completed, the site will continue to operate Phases 3B, 4A, and 4B using only the south driveway. For the purposes of this analysis, the 2032 horizon was adopted and all site traffic including trucks and regular vehicles were assigned to the south driveway. Reassignment of all site traffic to this driveway is conservative even if some non-truck traffic might continue to use the north driveway, since it consolidates all traffic demand on the one entrance for the purposes of the operational analysis.

The future site traffic is shown in **Exhibit 15** for regular vehicles using only the south driveway, **Exhibit 16** for trucks using only the south driveway, and **Exhibit 17** for total traffic volumes using the south driveway.

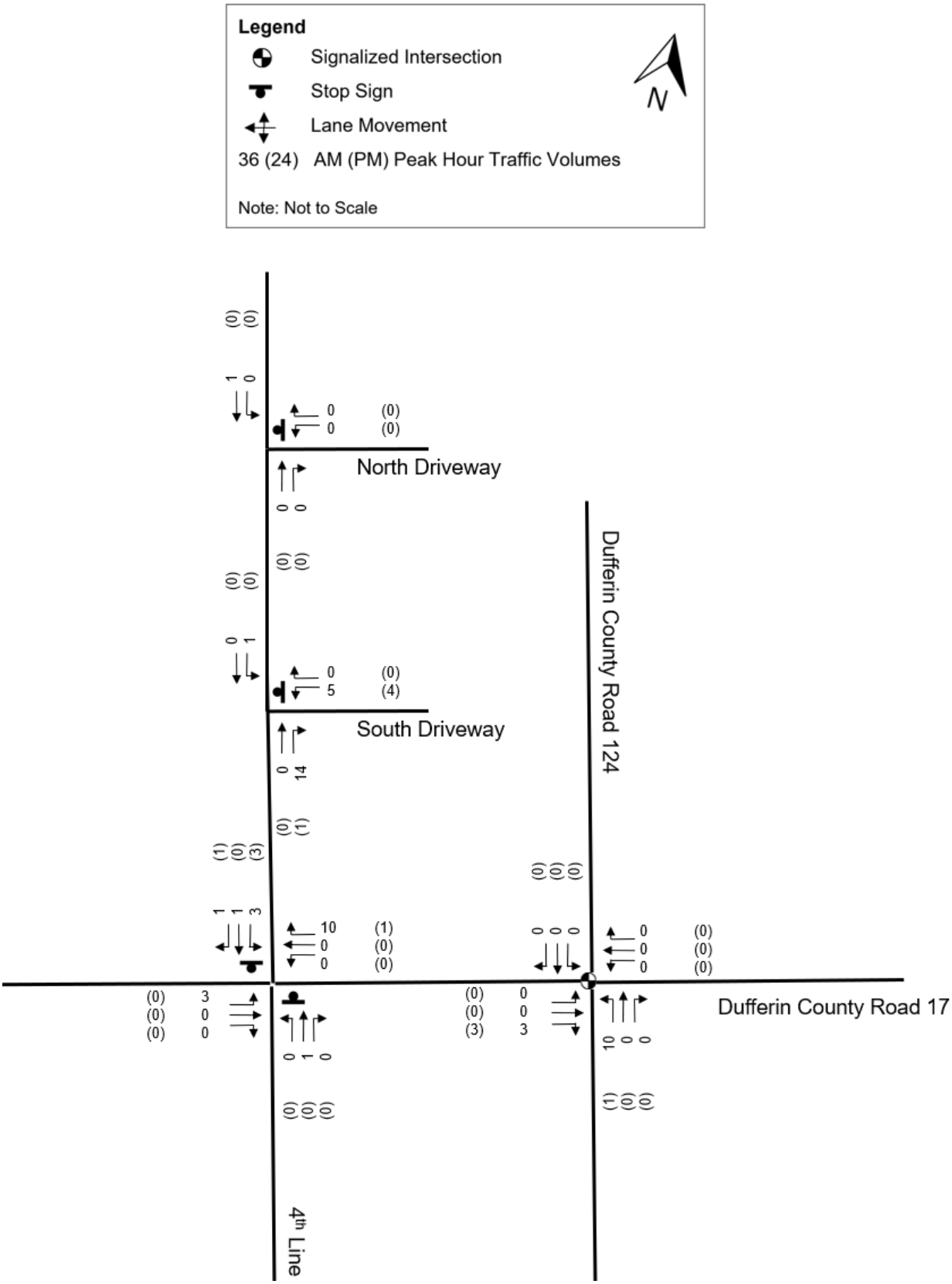


Exhibit 15: Future Site Traffic (Cars) – Phases 3B, 4A, and 4B

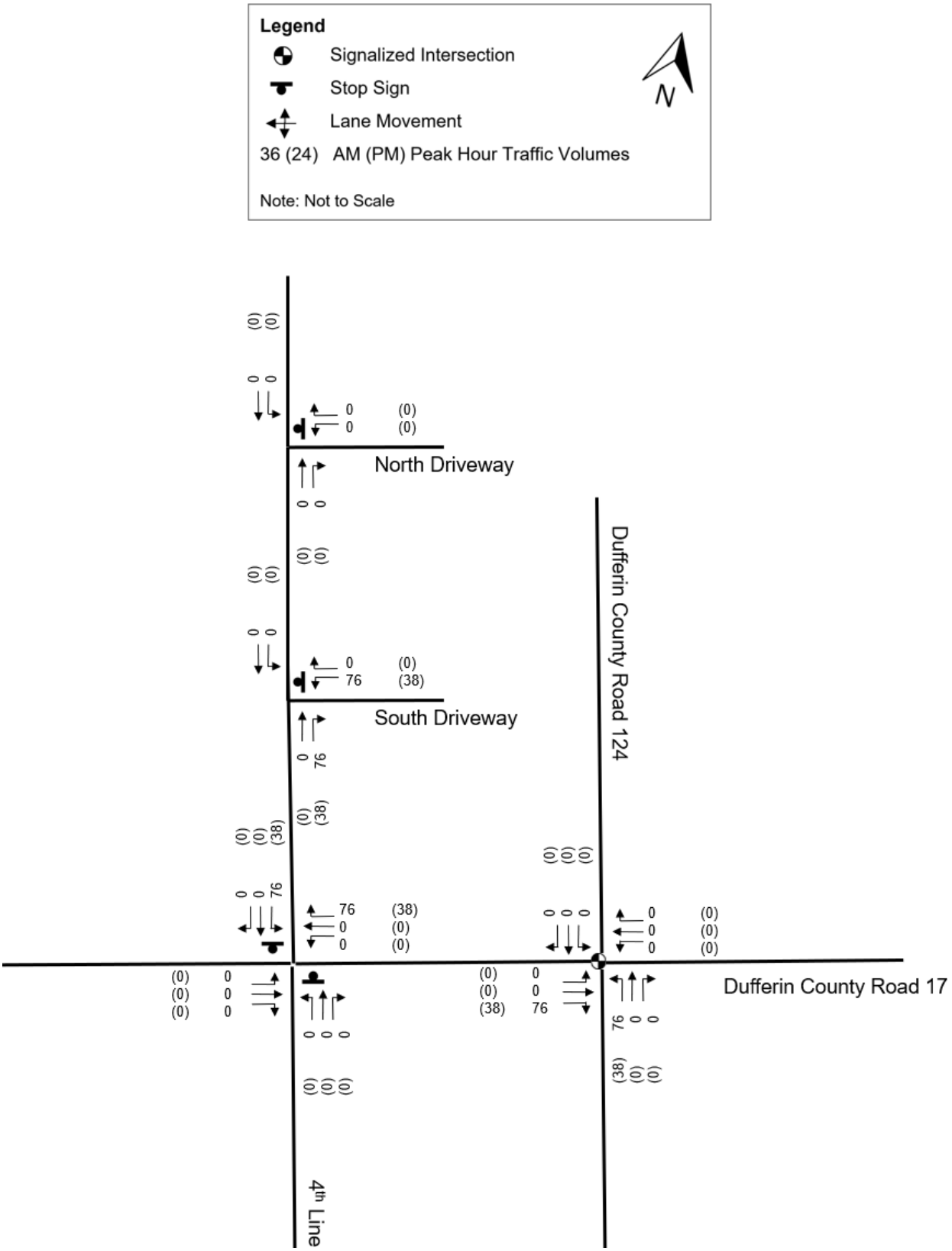


Exhibit 16: Future Site Traffic (Truck) – Phases 3B, 4A, and 4B

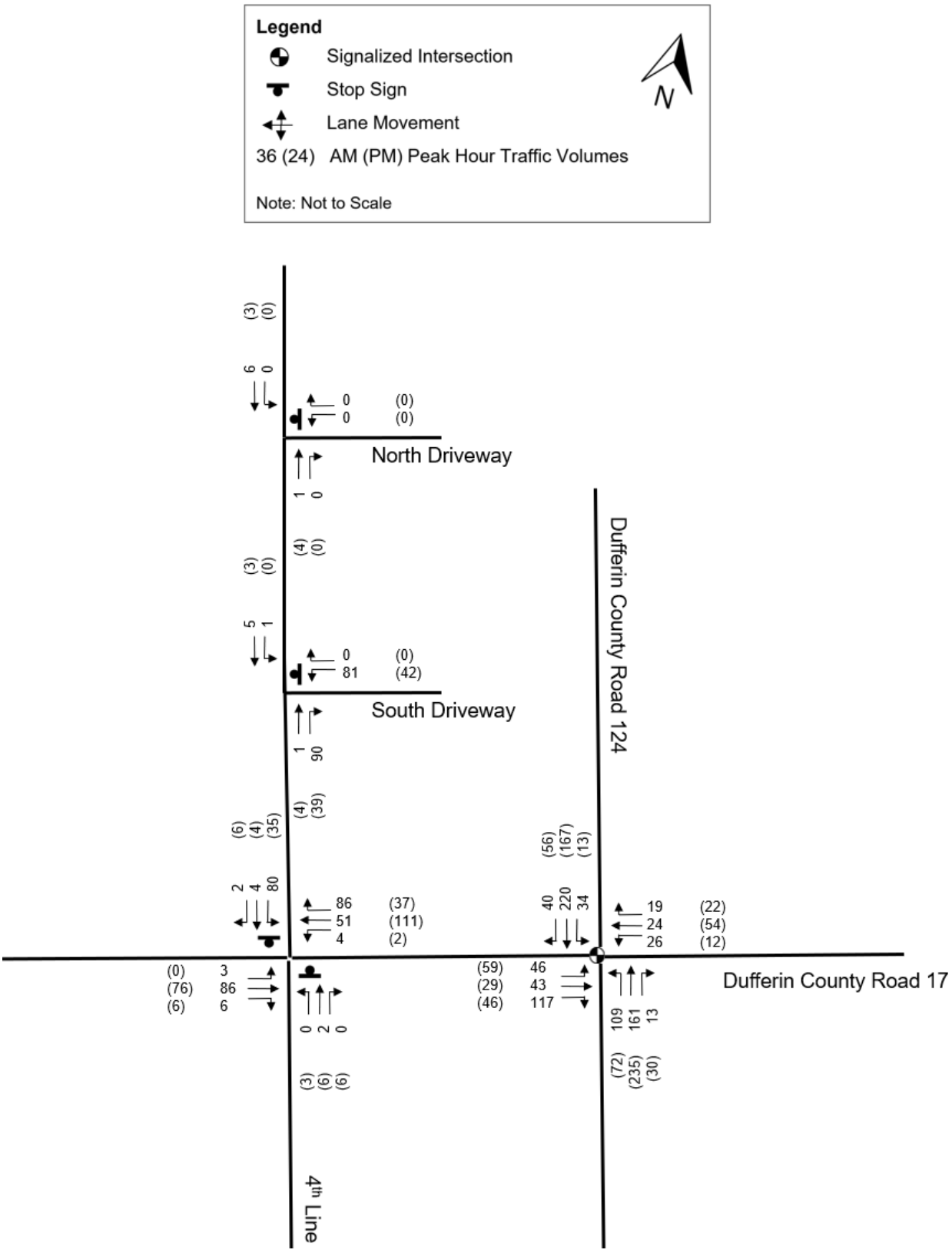


Exhibit 17: 2032 Total Traffic – Phases 3B, 4A, and 4B

5 Future 2027 Total Traffic Conditions

Future 2027 total traffic conditions have been analyzed using the Synchro 11 traffic analysis software based on the forecast 2027 total traffic volumes (**Exhibit 14**) and the existing road network (**Exhibit 2**). Critical movements are defined as shared through/turning movements with v/c ratio greater than 0.85, or exclusive turning (left/right) movements with v/c ratios greater than 1.0. Movements operating with level of service 'E' or 'F' are also highlighted in this report.

Table 11 summarizes the level-of-service (LOS) and volume/capacity ratio (v/c ratio) for each movement under future total traffic conditions. Detailed Synchro results and reports for all study area intersections are provided in **Appendix B**.

Table 11: Future 2027 Total Traffic Conditions – Traffic Operations

Intersection and Movement		AM Peak Hour			PM Peak Hour		
		LOS	Delay (s)	v/c	LOS	Delay (s)	v/c
Dufferin Road 124 & Dufferin Road 17		**B**	**13.1**	**0.32**	**B**	**12.5**	**0.27**
Eastbound	Left-Through-Right	C	29.3	0.58	C	33.0	0.58
Westbound	Left-Through-Right	C	23.7	0.18	C	27.5	0.25
Northbound	Left	A	7.3	0.25	A	5.7	0.14
	Through	A	5.7	0.12	A	5.6	0.19
	Right	A	5.1	0.01	A	4.7	0.02
Southbound	Left	A	5.3	0.04	A	4.7	0.02
	Through	A	5.9	0.17	A	5.3	0.13
	Right	A	5.1	0.02	A	4.8	0.03
Dufferin Road 17 & 4th Line							
Eastbound	Left-Through-Right	A	0.3	0.0	A	0.0	0.0
Westbound	Left-Through	A	0.6	0.0	A	0.1	0.0
	Right	A	0.0	0.06	A	0.0	0.03
Northbound	Left-Through-Right	B	10.5	0.0	A	9.8	0.02
Southbound	Left-Through-Right	B	11.5	0.15	B	11.6	0.09
4th Line & North Entrance							
Westbound	Left-Right	A	9.5	0.01	A	9.7	0.03
Northbound	Through-Right	A	0.0	0.01	A	0.0	0.02
Southbound	Through-Left	A	0.9	0.0	A	0.0	0.0
4th Line & South Entrance							
Westbound	Left-Right	B	10.7	0.13	A	10.0	0.03
Northbound	Through-Right	A	0.0	0.07	A	0.0	0.03
Southbound	Through-Left	A	0.0	0.00	A	0.0	0.0

Note: LOS = level of service; v/c = volume to capacity ratio; Critical movements are highlighted in **red** as defined by MTO General Guidelines for the Preparation of Traffic Impact Study. Movements operating with level of service 'E' or 'F' are highlighted yellow.

Under future total traffic conditions, all intersections within the study area will continue to operate within acceptable thresholds, with individual movements operating with LOS of ‘C’ or better with v/c ratios of 0.58 or lower which indicates sufficient residual capacity.

Under future 2027 total traffic conditions there is sufficient capacity to accommodate the 95th percentile queue lengths as shown in **Table 12**. The storage lengths were measured based on the parallel storage for turn lanes, exclusive of the taper.

Table 12: Future 2027 Total Conditions – 95th Percentile Queue Length

Intersection and Movement		Available Storage or Link Length (m)	95th Percentile Queue Length (m)	
			AM Peak Hour	PM Peak Hour
Dufferin Road 124 & Dufferin Road 17				
Eastbound	Left-Through-Right	-	30.4	29.9
Westbound	Left-Through-Right	-	13.5	19.9
Northbound	Left	50.0	16.3	10.5
	Through	-	17.3	25.4
	Right	10.0	0.1	2.1
Southbound	Left	50.0	5.4	2.9
	Through	-	23.0	18.4
	Right	10.0	2.9	4.0
Dufferin Road 17 & 4th Line				
Eastbound	Left-Through-Right	-	0.0	0.0
Westbound	Left-Through	-	0.1	0.0
	Right	40.0	0.0	0.0
Northbound	Left-Through-Right	-	0.1	0.5
Southbound	Left-Through-Right	-	3.9	2.2
4th Line & North Entrance				
Westbound	Left-Right	-	3.5	0.8
Northbound	Through-Right	-	0.0	0.0
Southbound	Through-Left	-	0.0	0.0
4th Line & South Entrance				
Westbound	Left-Right	-	0.3	0.8
Northbound	Through-Right	-	0.0	0.0
Southbound	Through-Left	-	0.0	0.0

Notes: Queue lengths that exceed storage are highlighted in red.
A dash '-' indicates the storage is quite long and even in the event of a long queue is unlikely to cause blockages.

6 Future 2032 Total Traffic Conditions

Future 2032 total traffic conditions have been analyzed using the Synchro 11 traffic analysis software based on the forecast 2032 total traffic volumes (**Exhibit 17**) and the existing road network (**Exhibit 2**). Critical movements are defined as shared through/turning movements with v/c ratio greater than 0.85, or exclusive turning (left/right) movements with v/c ratios greater than 1.0. Movements operating with level of service 'E' or 'F' are also highlighted in this report.

Table 11 summarizes the level-of-service (LOS) and volume/capacity ratio (v/c ratio) for each movement under future total traffic conditions. Detailed Synchro results and reports for all study area intersections are provided in **Appendix B**.

Table 13: Future 2032 Total Traffic Conditions – Traffic Operations

Intersection and Movement		AM Peak Hour			PM Peak Hour		
		LOS	Delay (s)	v/c	LOS	Delay (s)	v/c
Dufferin Road 124 & Dufferin Road 17		**B**	**13.9**	**0.36**	**B**	**12.9**	**0.29**
Eastbound	Left-Through-Right	C	31.1	0.64	C	34.2	0.61
Westbound	Left-Through-Right	C	23.5	0.20	C	27.4	0.27
Northbound	Left	A	8.1	0.27	A	5.9	0.15
	Through	A	6.2	0.15	A	6.0	0.21
	Right	A	5.5	0.01	A	4.9	0.02
Southbound	Left	A	5.7	0.05	A	5.0	0.02
	Through	A	6.6	0.20	A	5.6	0.15
	Right	A	5.6	0.03	A	5.0	0.04
Dufferin Road 17 & 4th Line							
Eastbound	Left-Through-Right	A	0.2	0.0	A	0.0	0.0
Westbound	Left-Through	A	0.5	0.0	A	0.1	0.0
	Right	A	0.0	0.06	A	0.0	0.03
Northbound	Left-Through-Right	B	10.6	0.0	A	9.9	0.02
Southbound	Left-Through-Right	B	11.7	0.15	B	11.9	0.09
4th Line & South Entrance							
Westbound	Left-Right	B	10.6	0.14	A	9.7	0.07
Northbound	Through-Right	A	0.0	0.07	A	0.0	0.03
Southbound	Through-Left	A	0.9	0.0	A	0.0	0.0

Note: LOS = level of service; v/c = volume to capacity ratio; Critical movements are highlighted in **red** as defined by MTO General Guidelines for the Preparation of Traffic Impact Study. Movements operating with level of service 'E' or 'F' are highlighted yellow.

Under future 2032 total traffic conditions, all intersections within the study area will continue to operate within acceptable thresholds, with individual movements operating with LOS of ‘C’ or better with v/c ratios of 0.61 or lower which indicates sufficient residual capacity.

Under future 2032 total traffic conditions there is sufficient capacity to accommodate the 95th percentile queue lengths as shown in **Table 12**. The storage lengths were measured based on the parallel storage for turn lanes, exclusive of the taper.

Table 14: Future 2032 Total Conditions – 95th Percentile Queue Length

Intersection and Movement		Available Storage or Link Length (m)	95th Percentile Queue Length (m)	
			AM Peak Hour	PM Peak Hour
Dufferin Road 124 & Dufferin Road 17				
Eastbound	Left-Through-Right	-	36.0	32.9
Westbound	Left-Through-Right	-	14.9	21.3
Northbound	Left	50.0	19.2	11.7
	Through	-	21.0	29.4
	Right	10.0	0.1	2.3
Southbound	Left	50.0	6.4	3.1
	Through	-	28.3	21.2
	Right	10.0	3.7	4.5
Dufferin Road 17 & 4th Line				
Eastbound	Left-Through-Right	-	0.0	0.0
Westbound	Left-Through	-	0.1	0.0
	Right	40.0	0.0	0.0
Northbound	Left-Through-Right	-	0.1	0.6
Southbound	Left-Through-Right	-	4.0	2.3
4th Line & South Entrance				
Westbound	Left-Right	-	3.8	1.7
Northbound	Through-Right	-	0.0	0.0
Southbound	Through-Left	-	0.0	0.0

Notes: Queue lengths that exceed storage are highlighted in red.
A dash '-' indicates the storage is quite long and even in the event of a long queue is unlikely to cause blockages.

7 Driveway Sightline Assessment

Sightlines were reviewed for both of the existing driveways on 4th Line. The driveways have both been operating for some time and there have not been any issues or concerns raised and communicated to HDR; however, the sightlines have been reviewed as requested by Strada Aggregates.

Sight distances were assessed using the **Transportation Association of Canada Geometric Design Guide for Canadian Roads (2017)** – referred to as the "GDG". There are three sight distances which have been assessed:

- **Decision Sight Distance** – This is the distance a driver of a vehicle needs to be able to see down the roadway to observe an obstruction in the roadway and safely maneuver around the obstruction. This sight distance is longer than and more conservative than Stopping Sight Distance which is the distance required to observe an obstruction on the roadway and come to a complete stop.
- **Turning Sight Distance for left-turn from stop** – this is the distance a driver of a vehicle exiting the driveway must be able to see to their right to safely merge on to the roadway without causing an approaching vehicle to slow down or stop.
- **Turning Sight Distance for right-turn from stop** – this is the distance a driver of a vehicle exiting the driveway must be able to see to their left to safely merge on to the roadway without causing an approaching vehicle to slow down or stop.

Sight distances were assessed using Google Streetview. An in-field assessment was not performed given the fact that there is minimal horizontal and vertical curvature in the roadway, and there is limited vegetation or foliage at the roadside that would be obstructions to sightlines. There is a vertical curve ("sag") in the roadway between the north and south driveways which does not appear to be pronounced enough to limit sightlines.

Sight distance measurements take into account the location of the stopped vehicle waiting to enter the roadway as well as the height of the driver's eye and the height of the approach vehicle or object in the roadway. Considering the lack of foliage along the roadside and the limited vertical curvature, the driver eye height and vehicle position set back from the roadway are not considered to be limiting factors. Screenshots from Google Streetview showing the perspective from the roadway at the north and south driveways are shown in **Exhibit 18** and **Exhibit 19** which demonstrate that the roadway is straight and relatively flat with no obstructions along the roadside.

4th Line at the North Driveway, Looking North

4th Line at the North Driveway, Looking South

Exhibit 18: North Driveway Google Streetview (June 2023)

4th Line at the South Driveway, Looking North

4th Line at the South Driveway, Looking South

Exhibit 19: South Driveway Google Streetview (June 2023)

There is no posted speed limit on 4th Line, and the design speed is therefore assumed to be 60 km/h. The sight distances are described in the following sections and shown visually in **Exhibit 20** for the north driveway and **Exhibit 21** for the south driveway. The vertical curvature in the roadway is beyond the extents of the required sight distance, and is therefore not a factor when assessing the sight distance.

Exhibit 20: North Driveway Sight Distances

Exhibit 21: South Driveway Sight Distances

7.1 Decision Sight Distance

Decision Sight Distance is taken from Table 2.5.6 of the GDG. Decision Sight Distance is categorized based on the conditions such as rural or urban, and whether the vehicle comes to a complete stop or avoids the obstruction and continues moving around the obstruction. In this case, the conditions would be categorized as Avoidance Maneuver C which represents speed/path/direction change in a rural roadway, with a required sight distance of 175 metres. Based on the desktop review, this sight distance is satisfied.

7.2 Turning Sight Distance for Left-Turn from Stop

Turning sight distance for left-turn from stop is taken from Table 9.9.4 of the GDG. The required turning sight distance for left-turns moving from a stop position is 130 metres. Based on the desktop review, this sight distance is satisfied.

7.3 Turning Sight Distance for Right-Turn from Stop

Turning sight distance for right-turn from stop is taken from Table 9.9.6 of the GDG. The required turning sight distance for right-turns moving from a stop position is 110 metres. Based on the desktop review, this sight distance is satisfied.

8 Haul Route Assessment

8.1 Haul Route Description

The primary haul route for the existing and future operation is south along 4th Line towards Dufferin County Road 17, and then east towards Dufferin Road 124 where the trucks then divert along Dufferin County Road 124. It is possible that some local trips may take other routes but the typical route is to the south along Dufferin County Road 124. The alignment of 4th Line is generally straight with no horizonal curvature in the roadway. Dufferin County Road 17 is generally flat with a portion of rolling hills and a large bend in the roadway between 4th Line and 3rd Line.

In consideration of the above, a review of the haul route was undertaken to assess roadway characteristics that may be affected by the truck operations or may affect truck operations and safety. The condition of pavement markings, signage, and growth of foliage or bushes which may block sightlines was reviewed to identify any concerns in terms of visual obstructions or hazards within the clearway adjacent to the roadway.

Photos of the haul route were captured in November 2022 to revisit the route conditions compared to the 2017 report that was prepared for the previous pit application.

8.2 2022 Haul Route Inventory

A full photo inventory of the study area roadways is provided in **Appendix E** and the findings are discussed below.

8.2.1 Pavement Markings

In the 2017 analysis, there were two deficiencies that were identified. These have both been addressed as of the time of the 2022 inventory:

- Dufferin Road 17 @ 4th Line: the southbound approach stop bar has been repainted and is in good condition (**Exhibit 22**);
- Dufferin Road 17 @ Dufferin Road 124: the northbound left-turn lane, trailing left-turn arrow (nearer the stop bar) has been repainted and is in good condition (**Exhibit 23**).

All deficiencies reported in the 2017 analysis has been addressed and no further pavement markings issues are present based on the 2022 field inventory.

Exhibit 22: Stop Bar Along 4th Line at Dufferin Road 17

Exhibit 23: Dufferin Road 17 @ Dufferin Road 124 Northbound Trailing Left-turn Arrow

8.2.2 Vegetation Overgrowth and Visual Obstructions

The 2022 haul route inventory indicated that there are no vegetation overgrowth concerns along the haul route from the site entrances, along 4th Line to Country Road 17, and then to Dufferin Road 124. There are no visual obstructions of concern along the study area roadways which would limit sight distances or cause any safety concerns.

8.2.3 Pavement Condition

'Alligator cracking' was observed along the length of 4th line in the 2017 report and is no longer an issue during the 2022 site visit. Additionally, there are some localized areas that were in poor condition due to unsupported pavement edges. Cracking has generally improved at the driveway and to the south of the driveway. The 2017 photo shows standing water and possibly poor drainage which was not captured in the 2022 inventory. **Exhibit 24** compares the road conditions at the existing north entrance from 2017 to 2022.

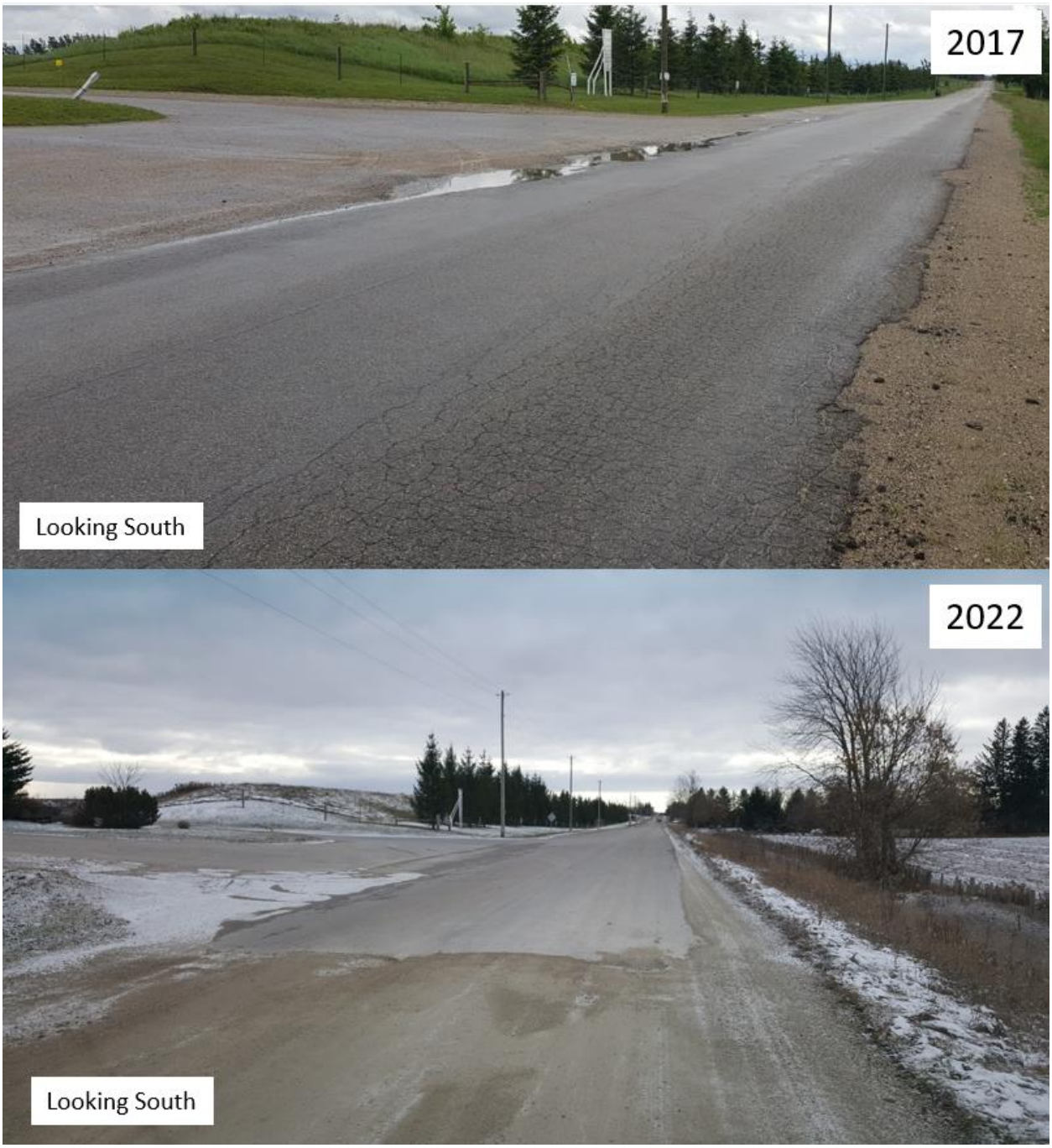


Exhibit 24: Existing Pit North Entrance Standing Water and Raveling Pavement Edges

Potholes and alligator cracking were present along 4th Line in the 2017 report and have been fixed based on the 2022 inventory. 4th Line, from Dufferin Road 17 to the Pit Entrance, would be classified as good condition, as seen in **Exhibit 25,** as no cracking was observed and the pavement edges were in good condition during the 2022 inventory.

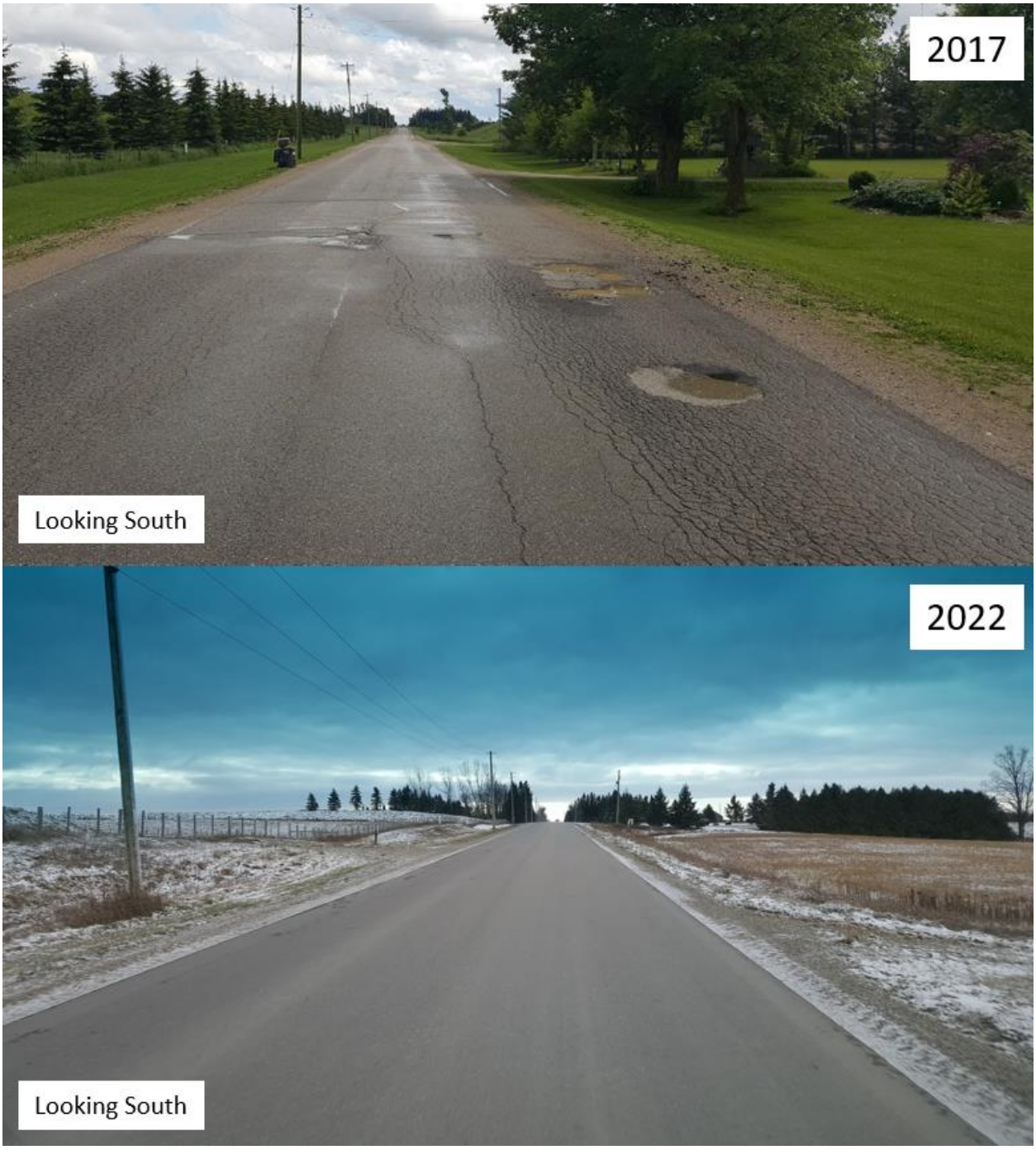


Exhibit 25: Potholes on 4th Lines and Pavement Conditions along 4th Line

Similarly to 4th Line, Dufferin Road 17 and Dufferin Road 124, as seen in **Exhibit 26** and **Exhibit 27**, respectively, would be classified as good as there are no cracking pavement edge issues along the haul route.

Exhibit 26: Pavement Conditions along Dufferin Road 17 Looking West, 2022

Exhibit 27: General Pavement Conditions along Dufferin Road 124 Looking South, 2022

At the intersection of Dufferin Road 17 and Dufferin Road 124, there are longitudinal cracks in the both the north, south, and north left-turn lane as seen in **Exhibit 28**. The cracks were not mentioned during the 2017 analysis; however, the condition is acceptable based on the 2022 inventory.

Exhibit 28: Longitudinal Cracks along Dufferin Road 124 Looking North, 2022

8.2.4 Signage

The study area haul route is generally flat with some horizontal and vertical curves along Dufferin Road 17. Appropriate signage, as seen in **Exhibit 29** and **Exhibit 30** is present when approaching the horizontal curves to alert all drivers to proceed with caution.

Exhibit 29: Signage along Dufferin Road 17 Looking East (Between 4th Line and 3rd Line), 2022

Exhibit 30: Signage along Dufferin Road 17 Looking West (Between 4th Line and 3rd Line), 2022

9 Conclusions

The pit is currently approved to ship 1.25 million tonnes per year. Strada is applying for a new ARA licence for a pit and quarry and as part of that application includes an increase in the yearly shipping limit to 2.0 million tonnes per year. This is an increase in the yearly tonnage of an additional 0.75 million tonnes per year or a factor of 1.6. This traffic impact study was prepared to show the impact of the increased truck trips based on the conservative assessment of a peak activity day and in the traffic scaled up to be representative of a higher yearly tonnage limit. This report also reviewed the haul route conditions compared to the 2017 Traffic Review which also reviewed the haul route condition.

9.1 Transportation Impacts

Under existing conditions, there is available capacity in the road network today as all movements are operating with a v/c of 0.60 or less and with level of service ‘D’ or better during the weekday AM and PM peak hours.

The proposed development is expected to generate an additional 4 and 18 total two-way trips for the north driveway during the AM and PM peak hours, respectively. The proposed development is expected to generate an additional 52 and 10 total two-way trips for the south driveway during the AM and PM peak hours, respectively. All site traffic was assumed to follow the primary haul route south along 4th Line to Dufferin County Road 17 and then east to Dufferin County Road 124, where most traffic heads south.

Future total traffic volumes include a conservative 3% and 2% growth rate per annum during the AM and PM peak periods, respectively. Growth is only applied along Dufferin Road 17 and Dufferin Road 124. 4th Line serves only local traffic. No other background development is expected within the vicinity.

Based on our analysis, all intersections and accesses will continue to operate at a LOS of ‘C’ or better under future total conditions. All v/c ratios will be 0.61 or lower which demonstrates there is residual capacity in the road network and that any increase in traffic will have a nominal impact in terms of trips generated as well as operationally. There are no external road network improvements required to support the increase in the yearly tonnage limit.

Following Phases 1 and 2, all site truck traffic will use the south driveway. For the purposes of this analysis, it has been assumed that Phase 3 onwards will overlap with the 2032 horizon year, and for a conservative analysis it was assumed that all site traffic including regular vehicles will use the south driveway. The consolidation of site traffic to the south driveway to accommodate Phases 3B, 4A, and 4B will have a nominal impact on the driveway operations and the driveway will continue operate within acceptable thresholds.

9.2 Driveway Sightline Assessment

Sight Distances were assessed using the Transportation Association of Canada's Geometric Design Guide for Canadian Roads (2017) with an assumed design speed of 60 km/h. Sight distance for vehicles turning out of the site driveways as well as for vehicles approaching the site driveways were assessed using a desktop review. The desktop review is considered appropriate given the lack of vertical and horizontal curvature in the roadway and the lack of obstructions along the side of the roadway.

It was found that the sightlines are adequate for both the north and the south driveways. Vehicles exiting the driveway will be able to see far enough along the roadway to merge on to 4th Line and accelerate without causing other vehicles on the roadway to stop or slow down. Additionally, vehicles approaching the driveway have adequate sight distance to stop or maneuver around an obstruction (or vehicle) at the site driveways. There are no sightline improvements required to support the increase in the yearly tonnage limit.

9.3 Haul Route Assessment

The study area haul route was reviewed to determine if there are any deficiencies in signage, sightlines (due to obstructions such as vegetation overgrowth or objects in the clearway at the side of the road), poor pavement condition (which may affect safety), or safety signals.

There were no sightline concerns discovered in the review as a result of overgrowth or objects in the clearway. No overgrowth and visual obstruction concerns were observed along the study area route that would limit sight distances or cause any safety concern.

Road conditions are generally good along the haul route apart from some cracking along Dufferin Road 124 at Dufferin Road 17, and the Pit Entrance. Concerns noted in the 2017 Traffic Review were revisited and confirmed to have been addressed.

The haul route is generally flat with some horizontal curves along Dufferin Road 17. Appropriate signage is present at these curves to alert drivers to proceed with caution.

No improvements to the haul rate are required to support the increase in the yearly tonnage limit.

Appendix A: Turning Movement Counts

4th Line & Pit Entrance

Morning Peak Diagram

Specified Period
From: 7:00:00
To: 9:00:00

One Hour Peak
From: 7:15:00
To: 8:15:00

Municipality: Melancthon
Site #: 0000006901
Intersection: 4th Line & Pit Entrance
TFR File #: 1
Count date: 15-Nov-2022

Weather conditions:
Cloudy

Person(s) who counted:

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

Major Road: 4th Line runs N/S

North Leg Total: 8
North Entering: 6
North Peds: 0
Peds Cross: ⋈

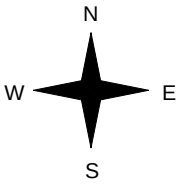
Buses	0	0	0
Trucks	0	0	0
Cars	5	1	6
Totals	5	1	

Buses	1
Trucks	0
Cars	1
Totals	2

East Leg Total: 5
East Entering: 2
East Peds: 0
Peds Cross: ⋈

4th Line

Cars	Trucks	Buses	Totals
0	0	0	0
0	2	0	2
0	2	0	

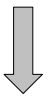


Pit Entrance

Cars	Trucks	Buses	Totals
1	2	0	3

4th Line

Cars	5		
Trucks	2		
Buses	0		
Totals	7		



Cars	1	0	1
Trucks	0	2	2
Buses	1	0	1
Totals	2	2	

Peds Cross: ⋈
South Peds: 0
South Entering: 4
South Leg Total: 11

Comments

There were no cyclists here

4th Line & Pit Entrance

Afternoon Peak Diagram

Specified Period
From: 16:00:00
To: 18:00:00

One Hour Peak
From: 16:00:00
To: 17:00:00

Municipality: Melancthon
Site #: 0000006901
Intersection: 4th Line & Pit Entrance
TFR File #: 1
Count date: 15-Nov-2022

Weather conditions:
Cloudy

Person(s) who counted:

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

Major Road: 4th Line runs N/S

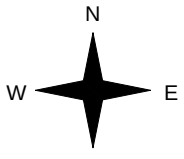
North Leg Total: 7
North Entering: 3
North Peds: 0
Peds Cross: ⋈

Buses	0	0	0
Trucks	0	0	0
Cars	3	0	3
Totals	3	0	

Buses	0
Trucks	0
Cars	4
Totals	4

East Leg Total: 7
East Entering: 4
East Peds: 0
Peds Cross: ⋈

Cars	Trucks	Buses	Totals
0	0	0	0
1	3	0	4
1	3	0	



Pit Entrance

Cars	Trucks	Buses	Totals
0	3	0	3

Cars	4	0	4
Trucks	0	3	3
Buses	0	0	0
Totals	4	3	

Cars	4
Trucks	3
Buses	0
Totals	7

Peds Cross: ⋈
South Peds: 0
South Entering: 7
South Leg Total: 14

Comments

There were no cyclists here

4th Line & Pit Entrance

Total Count Diagram

Municipality: Melancthon
Site #: 0000006901
Intersection: 4th Line & Pit Entrance
TFR File #: 1
Count date: 15-Nov-2022

Weather conditions:
Cloudy

Person(s) who counted:

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

Major Road: 4th Line runs N/S

North Leg Total: 34
North Entering: 14
North Peds: 0
Peds Cross: ⋈

Buses	1	0	1
Trucks	0	0	0
Cars	11	2	13
Totals	12	2	

Buses	1
Trucks	1
Cars	18
Totals	20

East Leg Total: 16
East Entering: 8
East Peds: 0
Peds Cross: ⋈

4th Line

Cars	Trucks	Buses	Totals
0	0	0	0
2	6	0	8
2	6	0	

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Pit Entrance

Cars	Trucks	Buses	Totals
2	6	0	8

4th Line

Cars	13
Trucks	6
Buses	1
Totals	20

Cars	18	0	18
Trucks	1	6	7
Buses	1	0	1
Totals	20	6	

Peds Cross: ⋈
South Peds: 0
South Entering: 26
South Leg Total: 46

Comments

There were no cyclists here

4th Line & Pit Entrance
Traffic Count Summary

Intersection: 4th Line & Pit Entrance | **Count Date:** 15-Nov-2022 | **Municipality:** Melanchton

North Approach Totals

Hour Ending	Includes Cars, Trucks, & Buses: Left	Thru	Right	Grand Total	Total Peds	North/South Total Approaches
7:00:00	0	0	0	0	0	0
8:00:00	1	3	0	4	0	9
9:00:00	1	4	0	5	0	10
16:00:00	0	0	0	0	0	0
17:00:00	0	3	0	3	0	10
18:00:00	0	2	0	2	0	11
Totals:	2	12	0	14	0	40

South Approach Totals

Hour Ending	Includes Cars, Trucks, & Buses: Left	Thru	Right	Grand Total	Total Peds
7:00:00	0	0	0	0	0
8:00:00	0	3	2	5	0
9:00:00	0	4	1	5	0
16:00:00	0	0	0	0	0
17:00:00	0	4	3	7	0
18:00:00	0	9	0	9	0
Totals:	0	20	6	26	0

East Approach Totals

Hour Ending	Includes Cars, Trucks, & Buses: Left	Thru	Right	Grand Total	Total Peds	East/West Total Approaches
7:00:00	0	0	0	0	0	0
8:00:00	2	0	0	2	0	2
9:00:00	2	0	0	2	0	2
16:00:00	0	0	0	0	0	0
17:00:00	4	0	0	4	0	4
18:00:00	0	0	0	0	0	0
Totals:	8	0	0	8	0	8

West Approach Totals

Hour Ending	Includes Cars, Trucks, & Buses: Left	Thru	Right	Grand Total	Total Peds
7:00:00	0	0	0	0	0
8:00:00	0	0	0	0	0
9:00:00	0	0	0	0	0
16:00:00	0	0	0	0	0
17:00:00	0	0	0	0	0
18:00:00	0	0	0	0	0
Totals:	0	0	0	0	0

Calculated Values for Traffic Crossing Major Street

Hours Ending:	7:00	8:00	9:00	16:00	17:00	18:00	18:00	18:00
Crossing Values:	0	2	2	0	4	0	0	0

4th Line & County Road 17

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: Melancthon
Site #: 0000006902
Intersection: County Road 17 & 4th Line
TFR File #: 1
Count date: 15-Nov-2022

Weather conditions:
Cloudy

Person(s) who counted:

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

Major Road: County Road 17 runs W/E

North Leg Total:	67
North Entering:	31
North Peds:	0
Peds Cross:	⋈

Buses	0	1	0	1
Trucks	2	0	22	24
Cars	0	3	3	6
Totals	2	4	25	

Buses	0
Trucks	33
Cars	3
Totals	36

East Leg Total:	162
East Entering:	73
East Peds:	0
Peds Cross:	⧖

4th Line

Buses	Trucks	Cars	Totals
0	7	33	40

Cars	Trucks	Buses	Totals
0	31	0	31
33	5	0	38
2	0	2	4
35	36	2	

County Road 17

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Buses	Trucks	Cars	Totals
0	2	1	3
1	10	53	64
0	0	6	6
1	12	60	

County Road 17

Cars	Trucks	Buses	Totals
56	32	1	89

4th Line

Peds Cross:	⧖
West Peds:	0
West Entering:	73
West Leg Total:	113

Cars	11
Trucks	0
Buses	3
Totals	14

Cars	0	2	0	2
Trucks	0	0	0	0
Buses	0	0	0	0
Totals	0	2	0	

Peds Cross:	⋈
South Peds:	0
South Entering:	2
South Leg Total:	16

Comments

There were no cyclists here

4th Line & County Road 17

Afternoon Peak Diagram

Specified Period
From: 16:00:00
To: 18:00:00

One Hour Peak
From: 16:15:00
To: 17:15:00

Municipality: Melancthon
Site #: 0000006902
Intersection: County Road 17 & 4th Line
TFR File #: 1
Count date: 15-Nov-2022

Weather conditions:
Cloudy

Person(s) who counted:

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

Major Road: County Road 17 runs W/E

North Leg Total:	22
North Entering:	12
North Peds:	0
Peds Cross:	⋈

Buses	0	0	0	0
Trucks	1	0	1	2
Cars	5	4	1	10
Totals	6	4	2	

Buses	0
Trucks	0
Cars	10
Totals	10

East Leg Total:	167
East Entering:	97
East Peds:	0
Peds Cross:	⧖

4th Line

Buses	Trucks	Cars	Totals
0	15	85	100

	Cars	Trucks	Buses	Totals
	4	0	0	4
	77	14	0	91
	2	0	0	2
	83	14	0	

County Road 17

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W E
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Buses	Trucks	Cars	Totals
0	0	0	0
0	3	59	62
0	0	6	6
0	3	65	

County Road 17

Cars	Trucks	Buses	Totals
65	5	0	70

4th Line

Peds Cross:	⧖
West Peds:	0
West Entering:	68
West Leg Total:	168

Cars	12
Trucks	0
Buses	0
Totals	12

Cars	3	6	5	14
Trucks	0	0	1	1
Buses	0	0	0	0
Totals	3	6	6	

Peds Cross:	⋈
South Peds:	0
South Entering:	15
South Leg Total:	27

Comments

There were no cyclists here

4th Line & County Road 17

Total Count Diagram

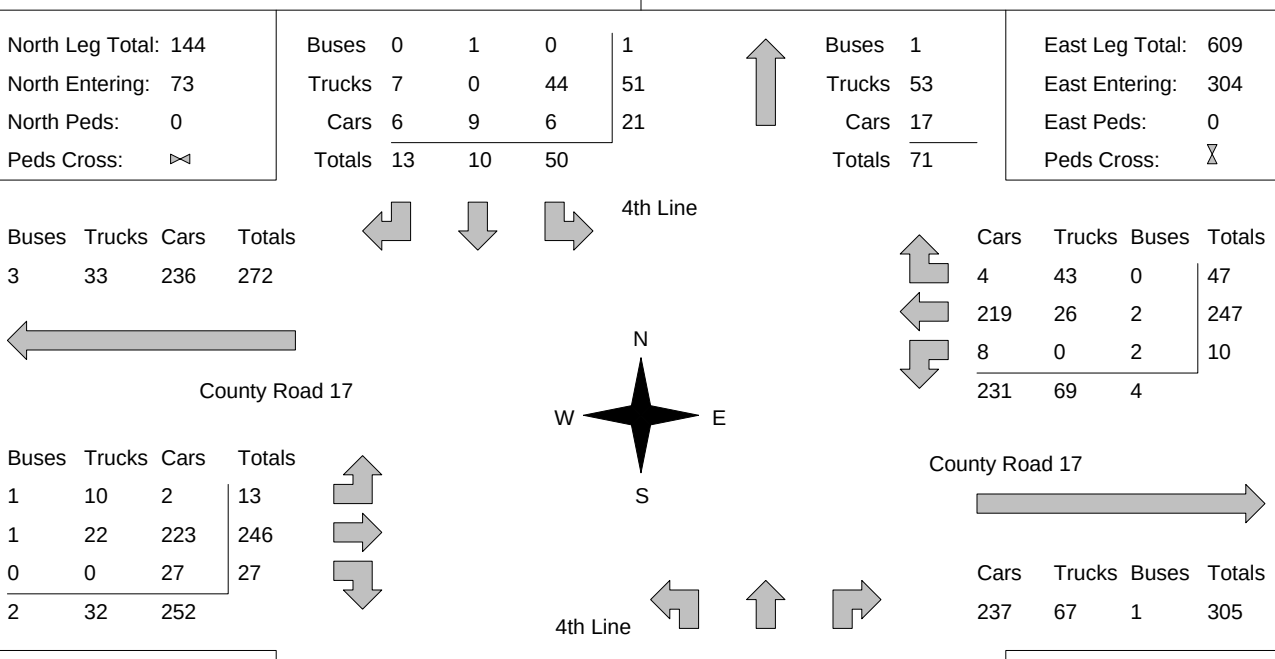
Municipality: Melancthon
Site #: 0000006902
Intersection: County Road 17 & 4th Line
TFR File #: 1
Count date: 15-Nov-2022

Weather conditions:
Cloudy

Person(s) who counted:

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

Major Road: County Road 17 runs W/E



Comments

There were no cyclists here

4th Line & County Road 17
Traffic Count Summary

Intersection: County Road 17 & 4th Line | **Count Date:** 15-Nov-2022 | **Municipality:** Melancthon

North Approach Totals

Hour Ending	Includes Cars, Trucks, & Buses: Left	Thru	Right	Grand Total	Total Peds	North/South Total Approaches
7:00:00	0	0	0	0	0	0
8:00:00	19	0	5	24	0	29
9:00:00	25	4	2	31	0	33
16:00:00	0	0	0	0	0	0
17:00:00	5	4	5	14	0	24
18:00:00	1	2	1	4	0	19
Totals:	50	10	13	73	0	105

South Approach Totals

Hour Ending	Includes Cars, Trucks, & Buses: Left	Thru	Right	Grand Total	Total Peds
7:00:00	0	0	0	0	0
8:00:00	3	0	2	5	0
9:00:00	0	2	0	2	0
16:00:00	0	0	0	0	0
17:00:00	2	3	5	10	0
18:00:00	7	6	2	15	0
	12	11	9	32	0

East Approach Totals

Hour Ending	Includes Cars, Trucks, & Buses: Left	Thru	Right	Grand Total	Total Peds	East/West Total Approaches
7:00:00	0	0	0	0	0	0
8:00:00	1	44	10	55	0	136
9:00:00	4	38	31	73	0	146
16:00:00	0	0	0	0	0	0
17:00:00	1	88	5	94	0	167
18:00:00	4	77	1	82	0	141
Totals:	10	247	47	304	0	590

West Approach Totals

Hour Ending	Includes Cars, Trucks, & Buses: Left	Thru	Right	Grand Total	Total Peds
7:00:00	0	0	0	0	0
8:00:00	8	65	8	81	0
9:00:00	3	64	6	73	0
16:00:00	0	0	0	0	0
17:00:00	2	65	6	73	0
18:00:00	0	52	7	59	0
	13	246	27	286	0

Calculated Values for Traffic Crossing Major Street

Hours Ending:	7:00	8:00	9:00	16:00	17:00	17:00	18:00	18:00
Crossing Values:	0	22	29	0	91	11	14	81

County Road 17 & Dufferin Road 124

Morning Peak Diagram

Specified Period
From: 7:00:00
To: 9:00:00

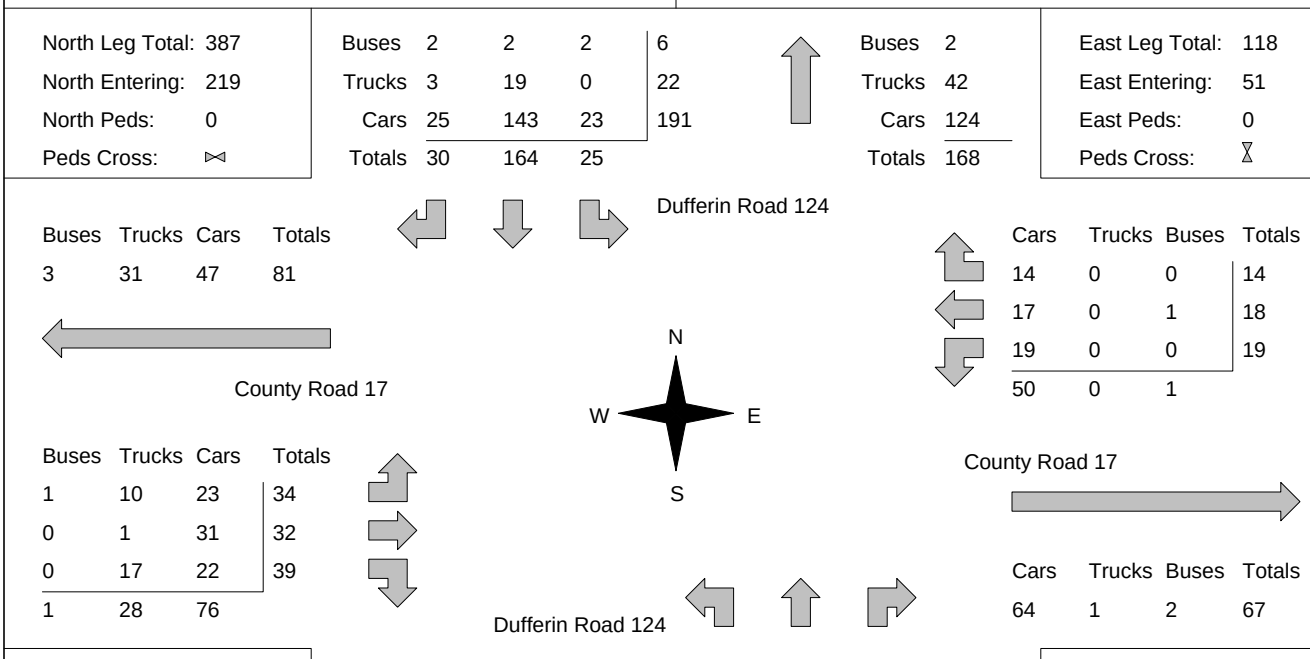
One Hour Peak
From: 7:45:00
To: 8:45:00

Municipality: Melancthon
Site #: 0000006903
Intersection: Dufferin Road 124 & County Road 1
TFR File #: 1
Count date: 15-Nov-2022

Weather conditions:
Cloudy
Person(s) who counted:

**** Signalized Intersection ****

Major Road: Dufferin Road 124 runs N/S



Comments

There were no cyclists here

County Road 17 & Dufferin Road 124

Afternoon Peak Diagram

Specified Period
From: 16:00:00
To: 18:00:00

One Hour Peak
From: 16:15:00
To: 17:15:00

Municipality: Melancthon
Site #: 0000006903
Intersection: Dufferin Road 124 & County Road 1
TFR File #: 1
Count date: 15-Nov-2022

Weather conditions:
Cloudy

Person(s) who counted:

**** Signalized Intersection ****

Major Road: Dufferin Road 124 runs N/S

North Leg Total:	453
North Entering:	194
North Peds:	0
Peds Cross:	⋈

Buses	1	3	0	4
Trucks	10	20	1	31
Cars	35	114	10	159
Totals	46	137	11	

Buses	2
Trucks	16
Cars	241
Totals	259

East Leg Total:	132
East Entering:	72
East Peds:	0
Peds Cross:	⧖

Dufferin Road 124

Buses	Trucks	Cars	Totals
1	14	103	118

Cars	Trucks	Buses	Totals
17	1	0	18
41	3	0	44
10	0	0	10
68	4	0	

County Road 17

N
W E
S

Buses	Trucks	Cars	Totals
1	3	44	48
0	0	24	24
0	2	5	7
1	5	73	

County Road 17

Cars	Trucks	Buses	Totals
58	1	1	60

Dufferin Road 124

Peds Cross:	⧖
West Peds:	0
West Entering:	79
West Leg Total:	197

Cars	129			
Trucks	22			
Buses	3			
Totals	154			

Cars	27	180	24	231
Trucks	1	12	0	13
Buses	0	1	1	2
Totals	28	193	25	

Peds Cross:	⋈
South Peds:	0
South Entering:	246
South Leg Total:	400

Comments

There were no cyclists here

County Road 17 & Dufferin Road 124

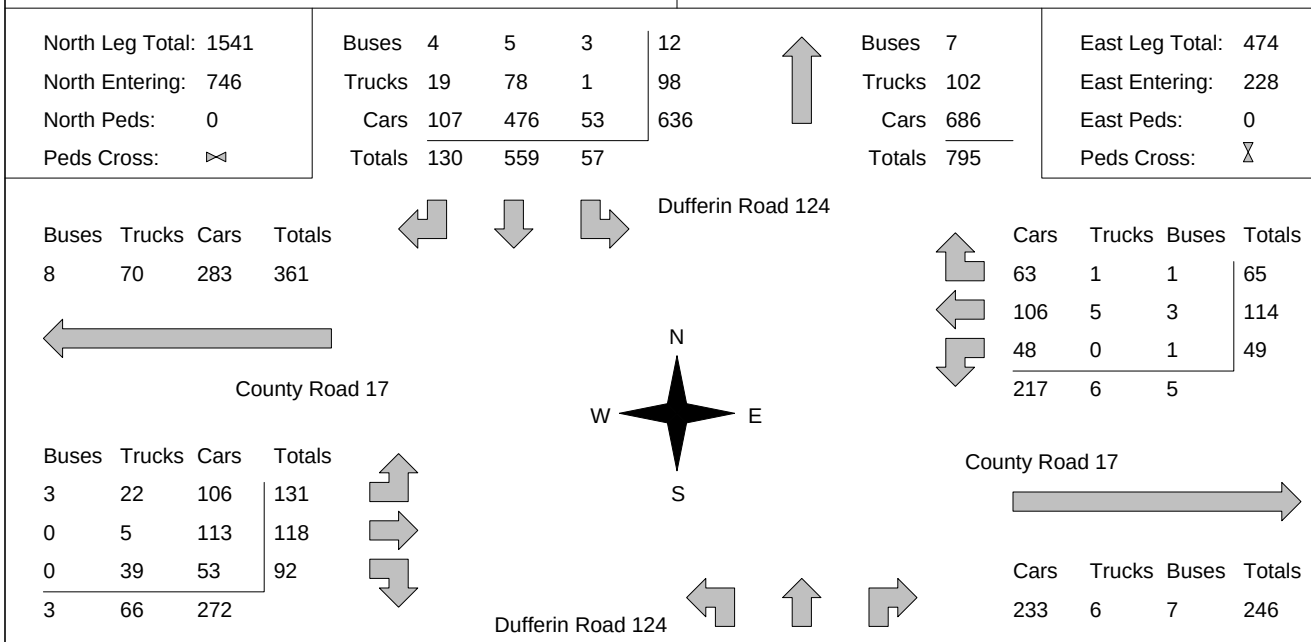
Total Count Diagram

Municipality: Melancthon
Site #: 0000006903
Intersection: Dufferin Road 124 & County Road 1
TFR File #: 1
Count date: 15-Nov-2022

Weather conditions:
Cloudy
Person(s) who counted:

**** Signalized Intersection ****

Major Road: Dufferin Road 124 runs N/S



Comments

There were no cyclists here

County Road 17 & Dufferin Road 124
Traffic Count Summary

Intersection: Dufferin Road 124 & County Road | **Count Date:** 15-Nov-2022 | **Municipality:** Melancthon

North Approach Totals

Hour Ending	Includes Cars, Trucks, & Buses: Left	Thru	Right	Grand Total	Total Peds	North/South Total Approaches
7:00:00	0	0	0	0	0	0
8:00:00	13	141	31	185	0	345
9:00:00	23	159	24	206	0	372
16:00:00	0	0	0	0	0	0
17:00:00	13	124	46	183	0	413
18:00:00	8	135	29	172	0	403
Totals:	57	559	130	746	0	1533

South Approach Totals

Hour Ending	Includes Cars, Trucks, & Buses: Left	Thru	Right	Grand Total	Total Peds
7:00:00	0	0	0	0	0
8:00:00	17	132	11	160	0
9:00:00	40	110	16	166	0
16:00:00	0	0	0	0	0
17:00:00	27	178	25	230	0
18:00:00	33	179	19	231	0
Totals:	117	599	71	787	0

East Approach Totals

Hour Ending	Includes Cars, Trucks, & Buses: Left	Thru	Right	Grand Total	Total Peds	East/West Total Approaches
7:00:00	0	0	0	0	0	0
8:00:00	12	20	10	42	0	135
9:00:00	16	19	9	44	0	151
16:00:00	0	0	0	0	0	0
17:00:00	10	40	18	68	0	150
18:00:00	11	35	28	74	0	133
Totals:	49	114	65	228	0	569

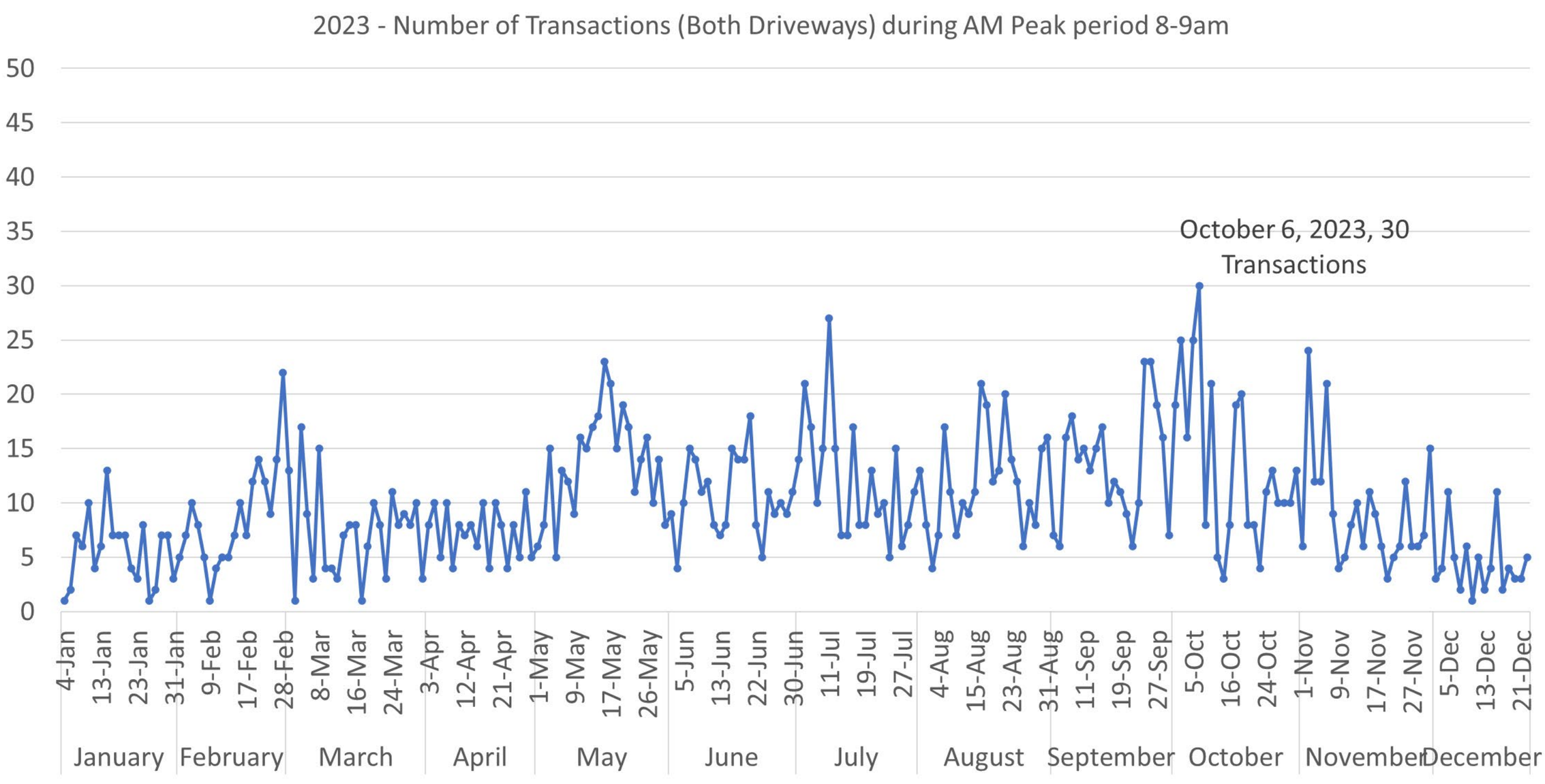
West Approach Totals

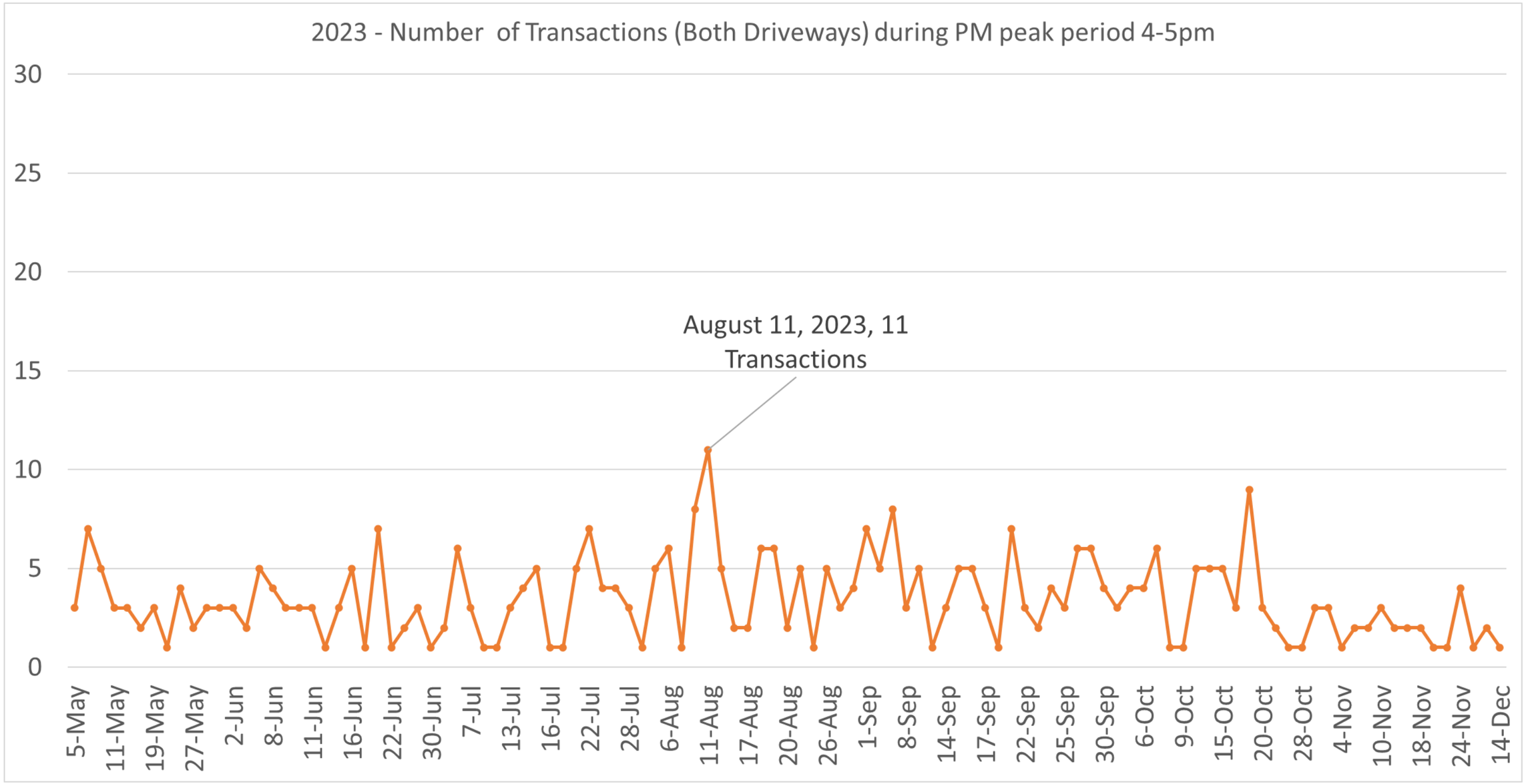
Hour Ending	Includes Cars, Trucks, & Buses: Left	Thru	Right	Grand Total	Total Peds
7:00:00	0	0	0	0	0
8:00:00	34	30	29	93	0
9:00:00	27	33	47	107	0
16:00:00	0	0	0	0	0
17:00:00	44	29	9	82	0
18:00:00	26	26	7	59	0
Totals:	131	118	92	341	0

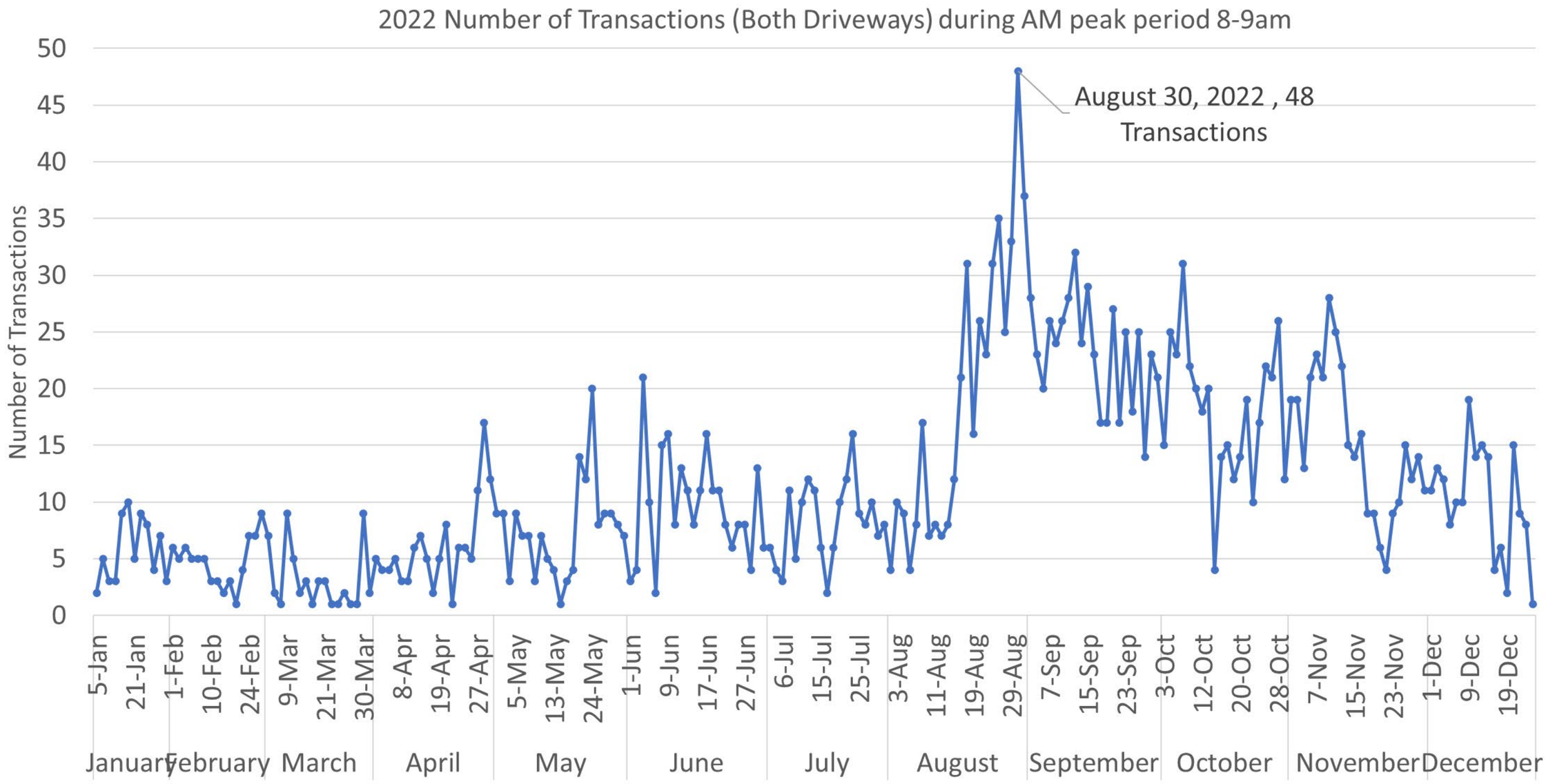
Calculated Values for Traffic Crossing Major Street

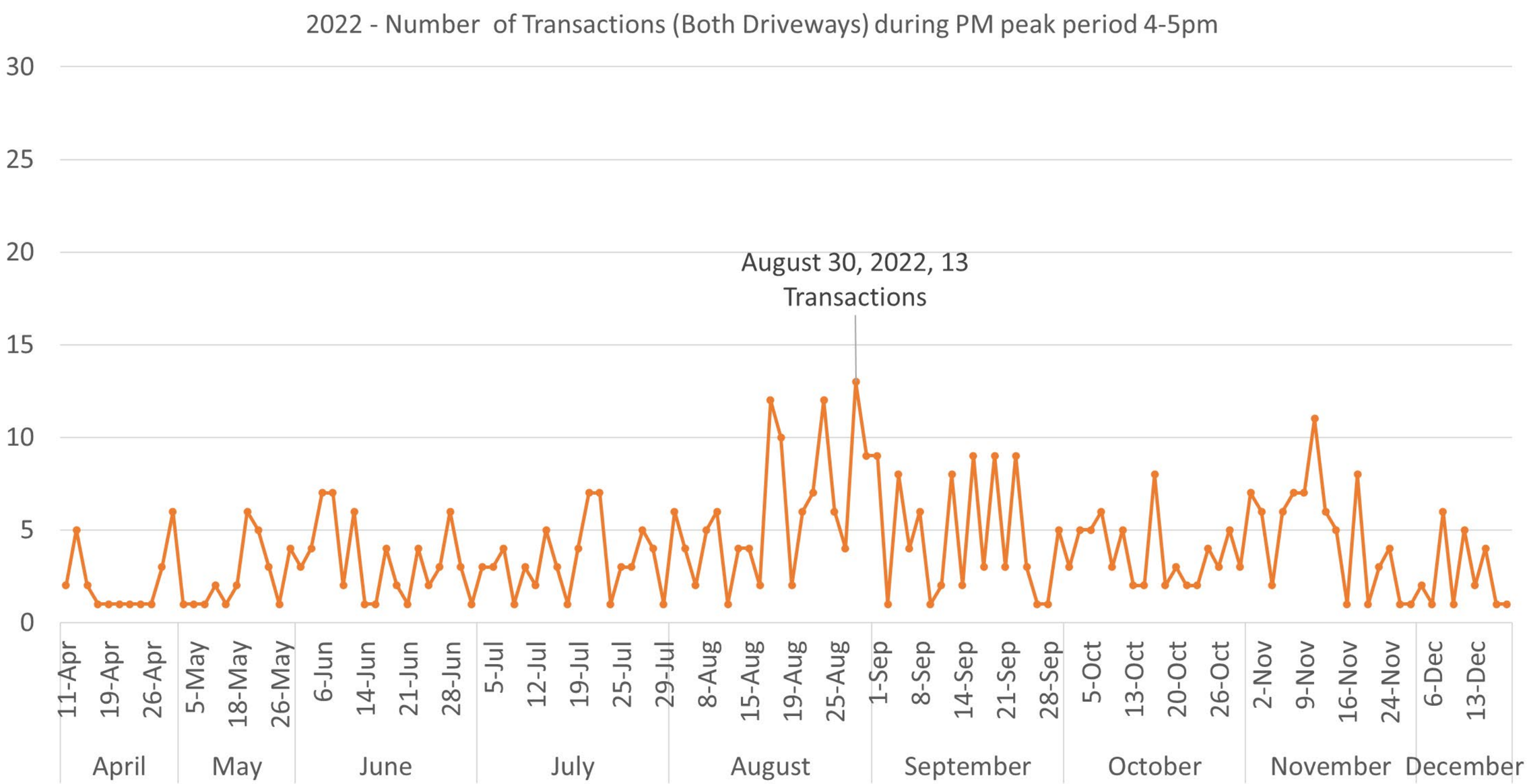
Hours Ending:	7:00	8:00	9:00	16:00	17:00	17:00	18:00	18:00
Crossing Values:	0	76	76	0	94	94	72	72

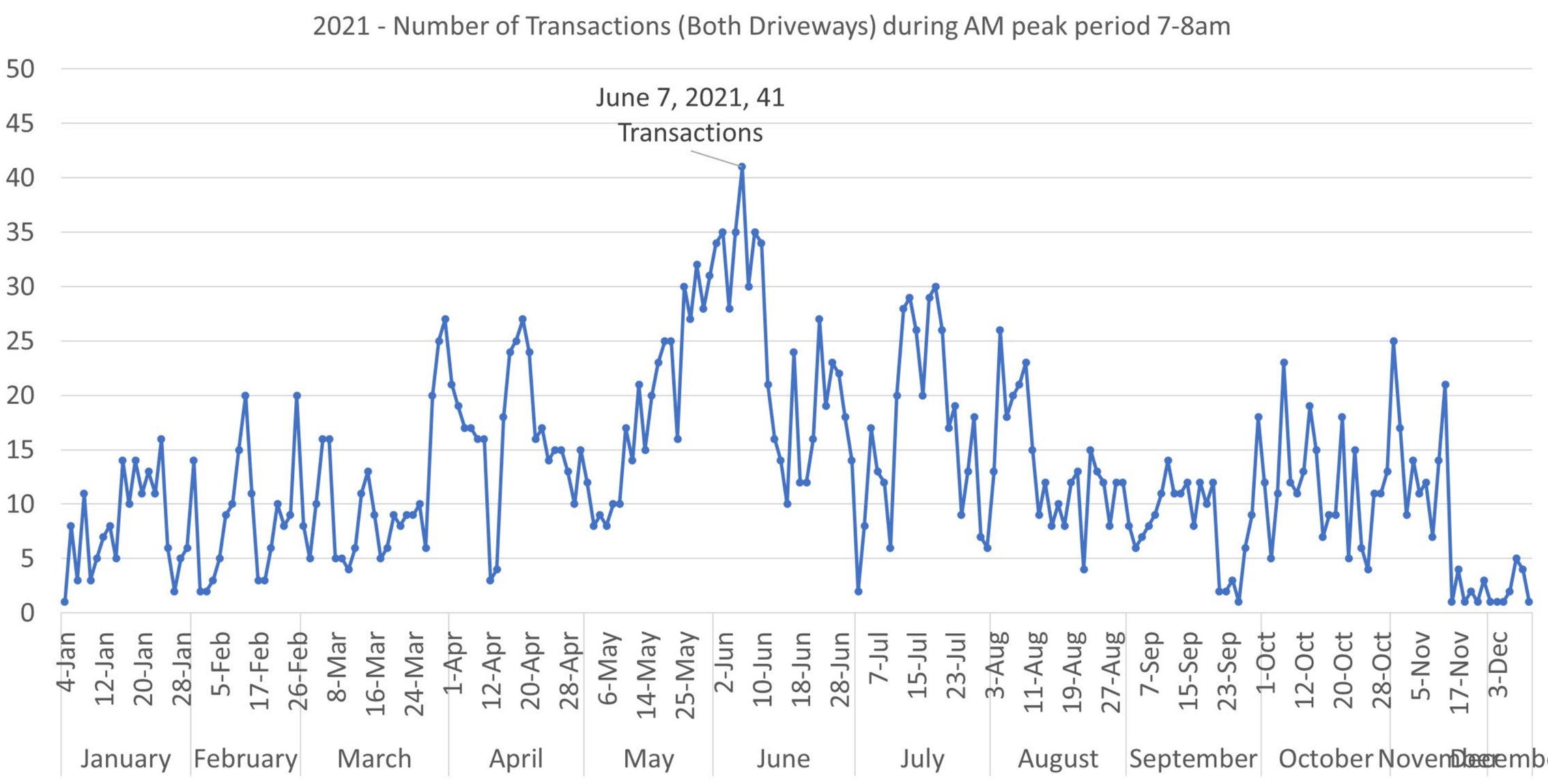
Appendix B: Weigh Scale Data AM and PM Peak Hour Transactions by Year

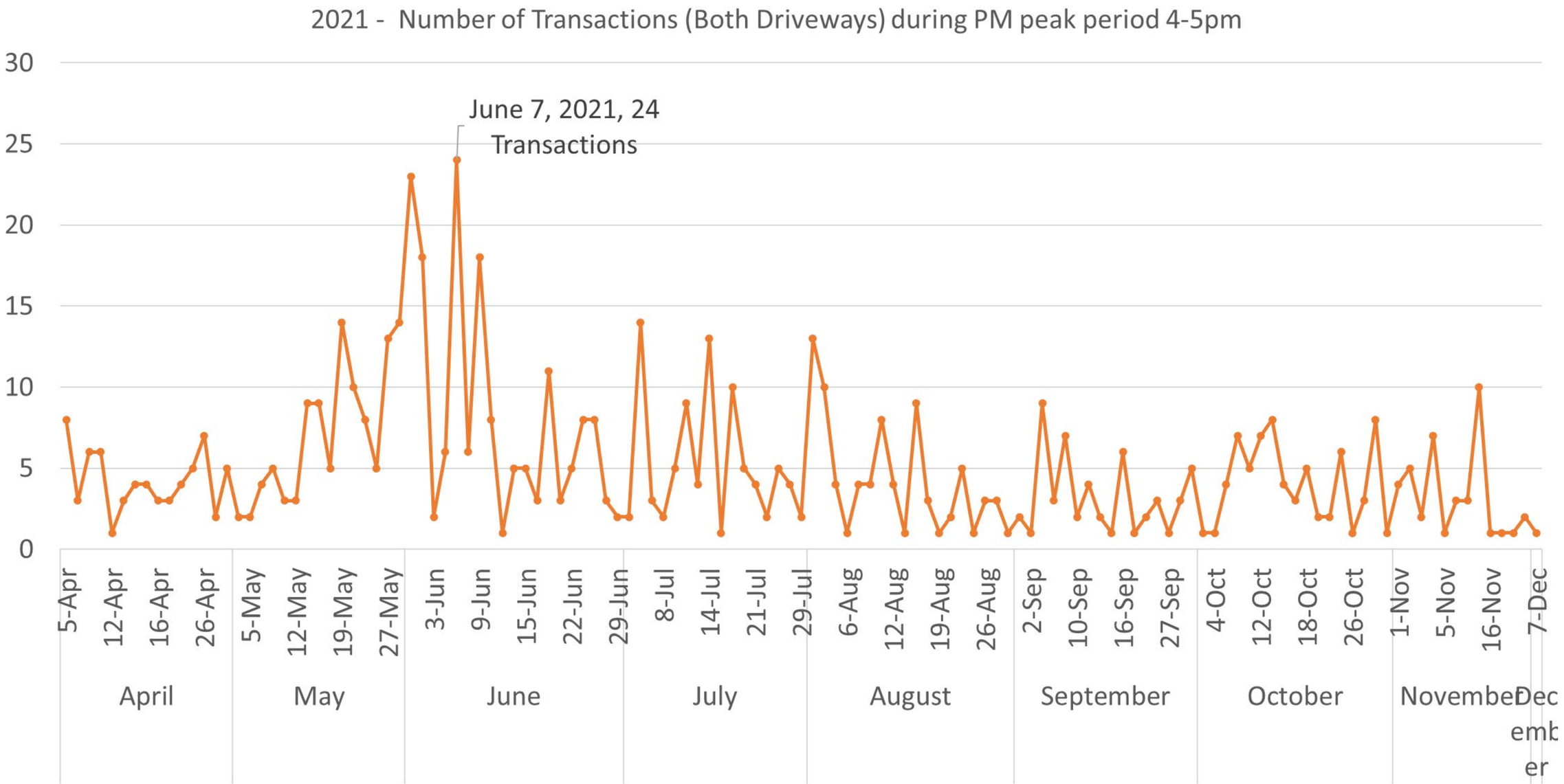

2023 - Number of Transactions (Both Driveways) during AM Peak period 8-9am
October 6, 2023, 30 Transactions
50
45
40
35
30
25
20
15
10
5
0
4-Jan
13-Jan
23-Jan
31-Jan
9-Feb
17-Feb
28-Feb
8-Mar
16-Mar
24-Mar
3-Apr
12-Apr
21-Apr
1-May
9-May
17-May
26-May
5-Jun
13-Jun
22-Jun
30-Jun
11-Jul
19-Jul
27-Jul
4-Aug
15-Aug
23-Aug
31-Aug
11-Sep
19-Sep
27-Sep
5-Oct
16-Oct
24-Oct
1-Nov
9-Nov
17-Nov
27-Nov
5-Dec
13-Dec
21-Dec
January
February
March
April
May
June
July
August
September
October
November
December

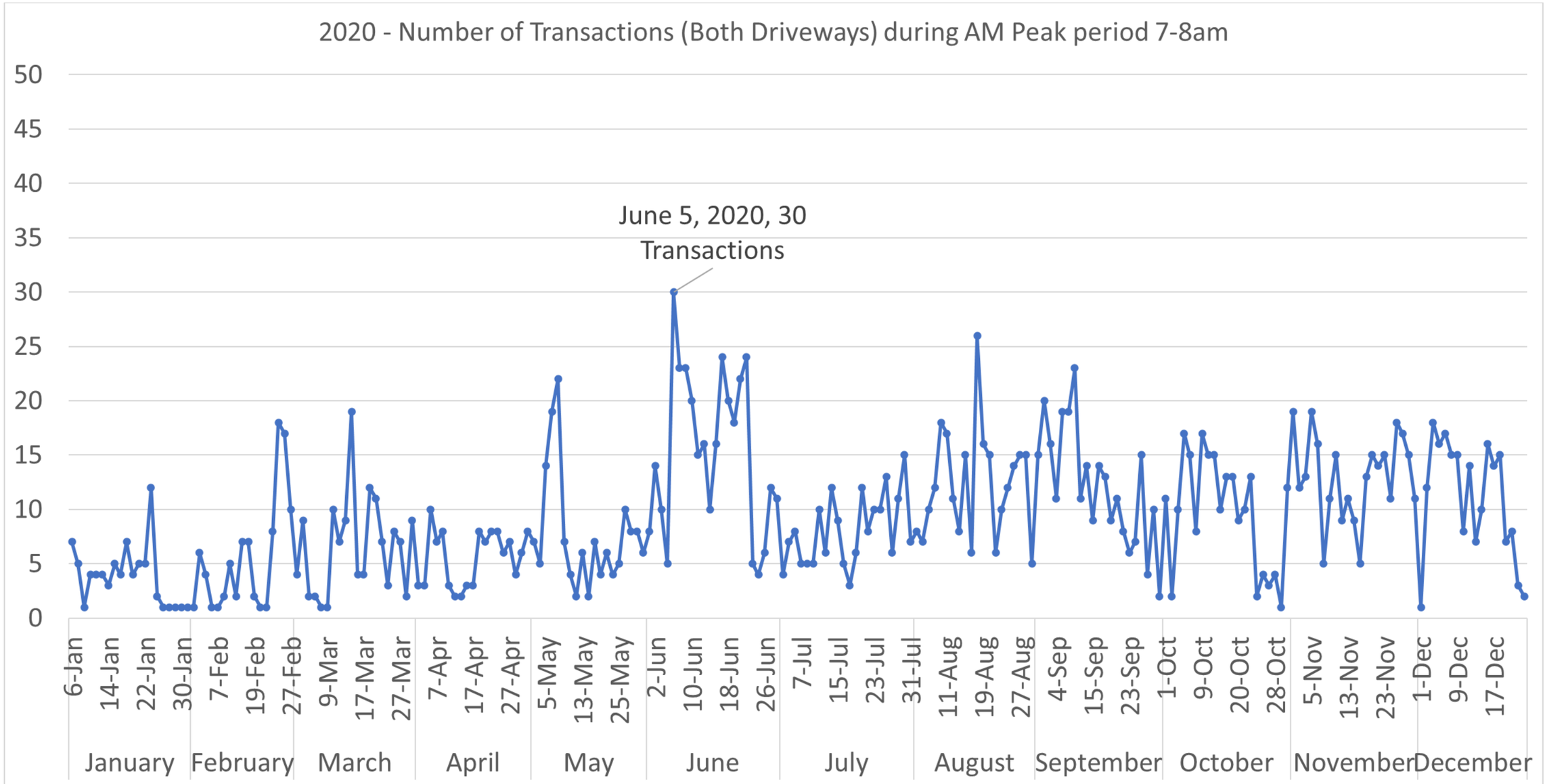

2023 - Number of Transactions (Both Driveways) during PM peak period 4-5pm
August 11, 2023, 11
Transactions
30
25
20
15
10
5
0
5-May
11-May
19-May
27-May
2-Jun
8-Jun
11-Jun
16-Jun
22-Jun
30-Jun
7-Jul
13-Jul
16-Jul
22-Jul
28-Jul
6-Aug
11-Aug
17-Aug
20-Aug
26-Aug
1-Sep
8-Sep
14-Sep
17-Sep
22-Sep
25-Sep
30-Sep
6-Oct
9-Oct
15-Oct
20-Oct
28-Oct
4-Nov
10-Nov
18-Nov
24-Nov
14-Dec

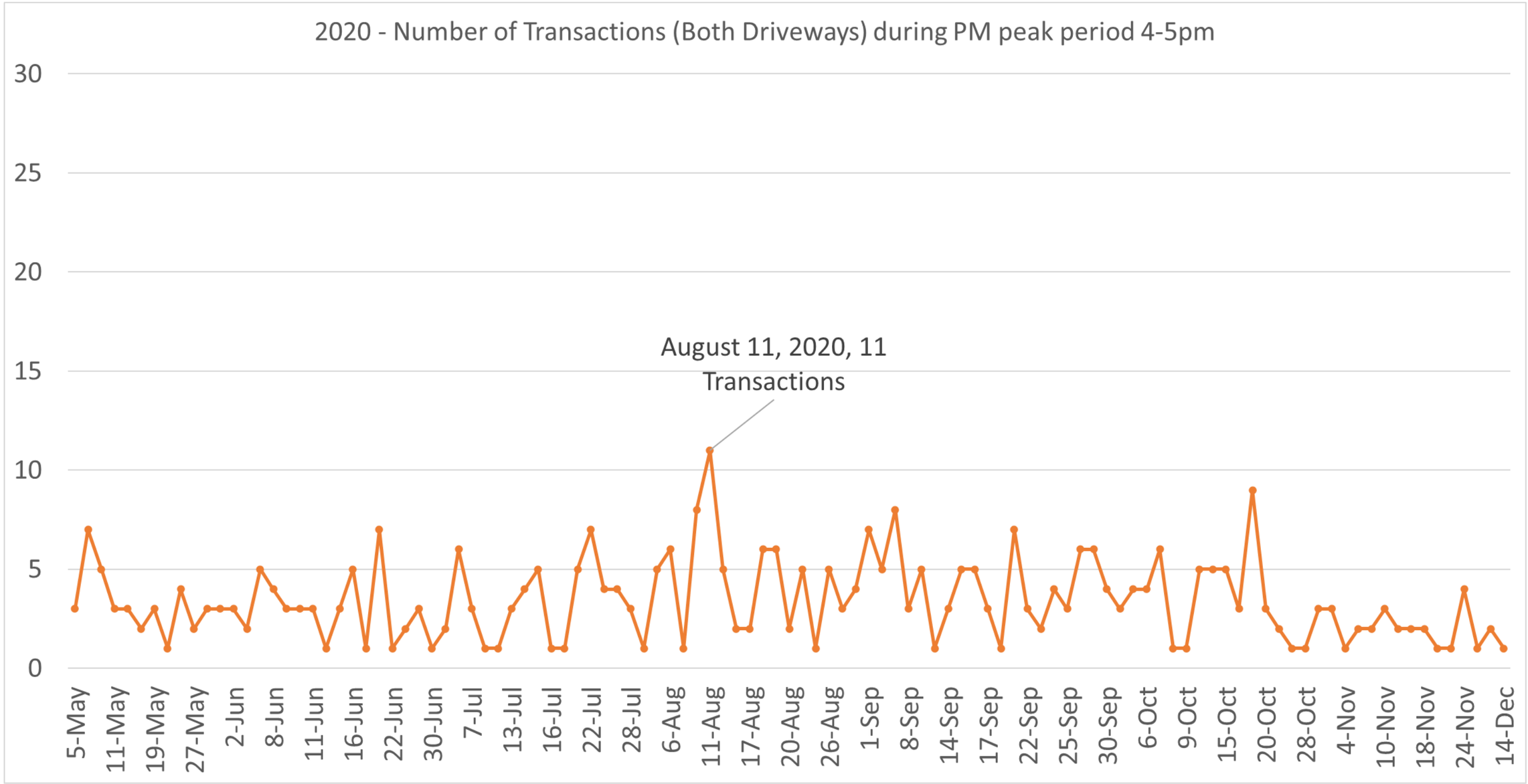

2022 Number of Transactions (Both Driveways) during AM peak period 8-9am
August 30, 2022 , 48 Transactions
Number of Transactions
50
45
40
35
30
25
20
15
10
5
0
5-Jan
21-Jan
1-Feb
10-Feb
24-Feb
9-Mar
21-Mar
30-Mar
8-Apr
19-Apr
27-Apr
5-May
13-May
24-May
1-Jun
9-Jun
17-Jun
27-Jun
6-Jul
15-Jul
25-Jul
3-Aug
11-Aug
19-Aug
29-Aug
7-Sep
15-Sep
23-Sep
3-Oct
12-Oct
20-Oct
28-Oct
7-Nov
15-Nov
23-Nov
1-Dec
9-Dec
19-Dec
January
February
March
April
May
June
July
August
September
October
November
December


2022 - Number of Transactions (Both Driveways) during PM peak period 4-5pm
August 30, 2022, 13 Transactions
30
25
20
15
10
5
0
11-Apr
19-Apr
26-Apr
5-May
18-May
26-May
6-Jun
14-Jun
21-Jun
28-Jun
5-Jul
12-Jul
19-Jul
25-Jul
29-Jul
8-Aug
15-Aug
19-Aug
25-Aug
1-Sep
8-Sep
14-Sep
21-Sep
28-Sep
5-Oct
13-Oct
20-Oct
26-Oct
2-Nov
9-Nov
16-Nov
24-Nov
6-Dec
13-Dec
April
May
June
July
August
September
October
November
December


2021 - Number of Transactions (Both Driveways) during AM peak period 7-8am
June 7, 2021, 41 Transactions
50
45
40
35
30
25
20
15
10
5
0
4-Jan
12-Jan
20-Jan
28-Jan
5-Feb
17-Feb
26-Feb
8-Mar
16-Mar
24-Mar
1-Apr
12-Apr
20-Apr
28-Apr
6-May
14-May
25-May
2-Jun
10-Jun
18-Jun
28-Jun
7-Jul
15-Jul
23-Jul
3-Aug
11-Aug
19-Aug
27-Aug
7-Sep
15-Sep
23-Sep
1-Oct
12-Oct
20-Oct
28-Oct
5-Nov
17-Nov
3-Dec
January
February
March
April
May
June
July
August
September
October
November
Decemb


2021 - Number of Transactions (Both Driveways) during PM peak period 4-5pm
June 7, 2021, 24 Transactions
30
25
20
15
10
5
0
5-Apr
12-Apr
16-Apr
26-Apr
5-May
12-May
19-May
27-May
3-Jun
9-Jun
15-Jun
22-Jun
29-Jun
8-Jul
14-Jul
21-Jul
29-Jul
6-Aug
12-Aug
19-Aug
26-Aug
2-Sep
10-Sep
16-Sep
27-Sep
4-Oct
12-Oct
18-Oct
26-Oct
1-Nov
5-Nov
16-Nov
7-Dec
April
May
June
July
August
September
October
November
December


2020 - Number of Transactions (Both Driveways) during AM Peak period 7-8am
June 5, 2020, 30 Transactions
50
45
40
35
30
25
20
15
10
5
0
6-Jan
14-Jan
22-Jan
30-Jan
7-Feb
19-Feb
27-Feb
9-Mar
17-Mar
27-Mar
7-Apr
17-Apr
27-Apr
5-May
13-May
25-May
2-Jun
10-Jun
18-Jun
26-Jun
7-Jul
15-Jul
23-Jul
31-Jul
11-Aug
19-Aug
27-Aug
4-Sep
15-Sep
23-Sep
1-Oct
9-Oct
20-Oct
28-Oct
5-Nov
13-Nov
23-Nov
1-Dec
9-Dec
17-Dec
January
February
March
April
May
June
July
August
September
October
November
December

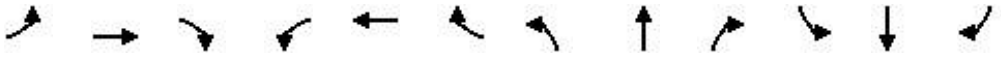

2020 - Number of Transactions (Both Driveways) during PM peak period 4-5pm
30
25
20
15
10
5
0
August 11, 2020, 11
Transactions
5-May
11-May
19-May
27-May
2-Jun
8-Jun
11-Jun
16-Jun
22-Jun
30-Jun
7-Jul
13-Jul
16-Jul
22-Jul
28-Jul
6-Aug
11-Aug
17-Aug
20-Aug
26-Aug
1-Sep
8-Sep
14-Sep
17-Sep
22-Sep
25-Sep
30-Sep
6-Oct
9-Oct
15-Oct
20-Oct
28-Oct
4-Nov
10-Nov
18-Nov
24-Nov
14-Dec

Appendix C: Synchro Reports

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	5	0	1	5	1	5
Future Volume (Veh/h)	5	0	1	5	1	5
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.75	0.75	0.75	0.75	0.75	0.75
Hourly flow rate (vph)	7	0	1	7	1	7
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	14	4			8	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	14	4			8	
tC, single (s)	7.3	6.2			4.1	
tC, 2 stage (s)						
tF (s)	4.3	3.3			2.2	
p0 queue free %	99	100			100	
cM capacity (veh/h)	817	1085			1625	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	7	8	8
Volume Left	7	0	1
Volume Right	0	7	0
cSH	817	1700	1625
Volume to Capacity	0.01	0.00	0.00
Queue Length 95th (m)	0.2	0.0	0.0
Control Delay (s)	9.4	0.0	0.9
Lane LOS	A		A
Approach Delay (s)	9.4	0.0	0.9
Approach LOS	A		

Intersection Summary			
Average Delay	3.2		
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	3	64	6	4	38	58	0	2	0	52	4	2
Future Volume (Veh/h)	3	64	6	4	38	58	0	2	0	52	4	2
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	3	71	7	4	42	64	0	2	0	58	4	2
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	106			78			134	194	74	132	134	42
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	106			78			134	194	74	132	134	42
tC, single (s)	4.1			4.1			7.1	6.5	6.2	8.0	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	4.3	4.0	3.3
p0 queue free %	100			100			100	100	100	91	99	100
cM capacity (veh/h)	1498			1533			834	701	993	667	757	1034

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	SB 1
Volume Total	81	46	64	2	64
Volume Left	3	4	0	0	58
Volume Right	7	0	64	0	2
cSH	1498	1533	1700	701	680
Volume to Capacity	0.00	0.00	0.04	0.00	0.09
Queue Length 95th (m)	0.0	0.1	0.0	0.1	2.4
Control Delay (s)	0.3	0.7	0.0	10.1	10.8
Lane LOS	A	A		B	B
Approach Delay (s)	0.3	0.3		10.1	10.8
Approach LOS				B	B

Intersection Summary				
Average Delay	3.0			
Intersection Capacity Utilization	22.7%	ICU Level of Service		A
Analysis Period (min)	15			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	48	0	6	57	0	10
Future Volume (Veh/h)	48	0	6	57	0	10
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.75	0.75	0.75	0.75	0.75	0.75
Hourly flow rate (vph)	64	0	8	76	0	13
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	59	46			84	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	59	46			84	
tC, single (s)	7.3	6.2			4.1	
tC, 2 stage (s)						
tF (s)	4.3	3.3			2.2	
p0 queue free %	92	100			100	
cM capacity (veh/h)	768	1029			1526	

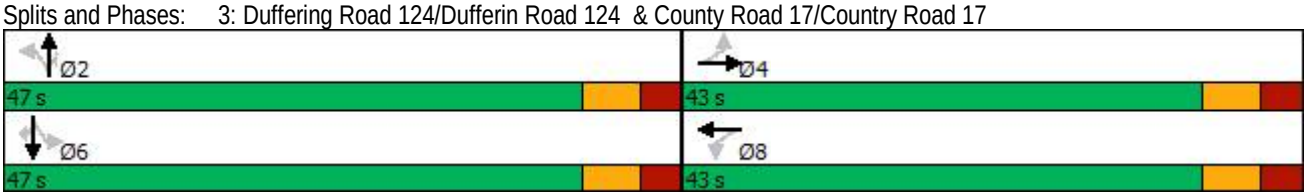
Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	64	84	13
Volume Left	64	0	0
Volume Right	0	76	0
cSH	768	1700	1526
Volume to Capacity	0.08	0.05	0.00
Queue Length 95th (m)	2.1	0.0	0.0
Control Delay (s)	10.1	0.0	0.0
Lane LOS	B		
Approach Delay (s)	10.1	0.0	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	4.0		
Intersection Capacity Utilization	13.8%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	34	32	19	18	60	120	10	25	164	30
Future Volume (vph)	34	32	19	18	60	120	10	25	164	30
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4		8		2			6	
Permitted Phases	4		8		2		2	6		6
Detector Phase	4	4	8	8	2	2	2	6	6	6
Switch Phase										
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Minimum Split (s)	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0
Total Split (s)	43.0	43.0	43.0	43.0	47.0	47.0	47.0	47.0	47.0	47.0
Total Split (%)	47.8%	47.8%	47.8%	47.8%	52.2%	52.2%	52.2%	52.2%	52.2%	52.2%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lost Time Adjust (s)		0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)		7.0		7.0	7.0	7.0	7.0	7.0	7.0	7.0
Lead/Lag										
Lead-Lag Optimize?										
Recall Mode	None	None	None	None	Max	Max	Max	Max	Max	Max
Act Effct Green (s)		10.0		10.0	44.7	44.7	44.7	44.7	44.7	44.7
Actuated g/C Ratio		0.16		0.16	0.70	0.70	0.70	0.70	0.70	0.70
v/c Ratio		0.59		0.21	0.13	0.09	0.01	0.03	0.13	0.03
Control Delay		24.7		19.9	6.7	5.6	0.0	5.7	5.7	1.5
Queue Delay		0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		24.7		19.9	6.7	5.6	0.0	5.7	5.7	1.5
LOS		C		B	A	A	A	A	A	A
Approach Delay		24.7		19.9		5.7			5.1	
Approach LOS		C		B		A			A	

Intersection Summary	
Cycle Length: 90	
Actuated Cycle Length: 64.3	
Natural Cycle: 40	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.59	
Intersection Signal Delay: 10.9	Intersection LOS: B
Intersection Capacity Utilization 40.9%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 3: Duffering Road 124/Dufferin Road 124 & County Road 17/Country Road 17



Lane Group	EBT	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	139	54	63	126	11	26	173	32
v/c Ratio	0.59	0.21	0.13	0.09	0.01	0.03	0.13	0.03
Control Delay	24.7	19.9	6.7	5.6	0.0	5.7	5.7	1.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	24.7	19.9	6.7	5.6	0.0	5.7	5.7	1.5
Queue Length 50th (m)	7.9	4.1	2.5	5.0	0.0	1.0	7.0	0.0
Queue Length 95th (m)	22.8	12.2	8.7	13.0	0.0	4.0	17.2	2.1
Internal Link Dist (m)	2799.2	1348.4		1917.4			634.7	
Turn Bay Length (m)			50.0		10.0	50.0		10.0
Base Capacity (vph)	689	904	480	1334	1149	902	1334	1149
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.20	0.06	0.13	0.09	0.01	0.03	0.13	0.03

Intersection Summary

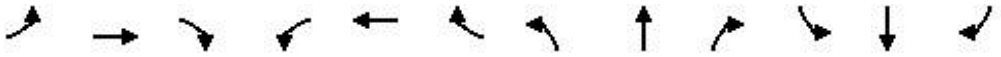
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	34	32	66	19	18	14	60	120	10	25	164	30
Future Volume (vph)	34	32	66	19	18	14	60	120	10	25	164	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		7.0			7.0		7.0	7.0	7.0	7.0	7.0	7.0
Lane Util. Factor		1.00			1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.93			0.96		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.99			0.98		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1299			1815		1014	1921	1633	1825	1921	1633
Flt Permitted		0.89			0.87		0.65	1.00	1.00	0.68	1.00	1.00
Satd. Flow (perm)		1176			1602		692	1921	1633	1299	1921	1633
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	36	34	69	20	19	15	63	126	11	26	173	32
RTOR Reduction (vph)	0	57	0	0	13	0	0	0	4	0	0	11
Lane Group Flow (vph)	0	82	0	0	41	0	63	126	7	26	173	21
Heavy Vehicles (%)	0%	0%	73%	0%	0%	0%	80%	0%	0%	0%	0%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		6
Actuated Green, G (s)		8.5			8.5		43.2	43.2	43.2	43.2	43.2	43.2
Effective Green, g (s)		8.5			8.5		43.2	43.2	43.2	43.2	43.2	43.2
Actuated g/C Ratio		0.13			0.13		0.66	0.66	0.66	0.66	0.66	0.66
Clearance Time (s)		7.0			7.0		7.0	7.0	7.0	7.0	7.0	7.0
Vehicle Extension (s)		3.0			3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)		152			207		455	1263	1073	854	1263	1073
v/s Ratio Prot								0.07			0.09	
v/s Ratio Perm		c0.07			0.03		c0.09		0.00	0.02		0.01
v/c Ratio		0.54			0.20		0.14	0.10	0.01	0.03	0.14	0.02
Uniform Delay, d1		26.8			25.6		4.2	4.1	3.9	3.9	4.2	3.9
Progression Factor		1.00			1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		3.6			0.5		0.6	0.2	0.0	0.1	0.2	0.0
Delay (s)		30.4			26.0		4.9	4.3	3.9	4.0	4.5	3.9
Level of Service		C			C		A	A	A	A	A	A
Approach Delay (s)		30.4			26.0			4.4			4.3	
Approach LOS		C			C			A			A	

Intersection Summary			
HCM 2000 Control Delay	12.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.20		
Actuated Cycle Length (s)	65.7	Sum of lost time (s)	14.0
Intersection Capacity Utilization	40.9%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	15	0	4	14	0	3
Future Volume (Veh/h)	15	0	4	14	0	3
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)	17	0	5	16	0	3
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	16	13			21	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	16	13			21	
tC, single (s)	7.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	4.4	3.3			2.2	
p0 queue free %	98	100			100	
cM capacity (veh/h)	806	1073			1608	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	17	21	3
Volume Left	17	0	0
Volume Right	0	16	0
cSH	806	1700	1608
Volume to Capacity	0.02	0.01	0.00
Queue Length 95th (m)	0.5	0.0	0.0
Control Delay (s)	9.6	0.0	0.0
Lane LOS	A		
Approach Delay (s)	9.6	0.0	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	4.0		
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	62	6	2	91	23	3	6	6	21	4	6
Future Volume (Veh/h)	0	62	6	2	91	23	3	6	6	21	4	6
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Hourly flow rate (vph)	0	75	7	2	110	28	4	7	7	25	5	7
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	138			82			202	220	78	203	196	110
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	138			82			202	220	78	203	196	110
tC, single (s)	4.1			4.1			7.1	6.5	6.2	8.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	4.4	4.0	3.3
p0 queue free %	100			100			99	99	99	96	99	99
cM capacity (veh/h)	1458			1528			750	681	988	576	702	949

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	SB 1
Volume Total	82	112	28	18	37
Volume Left	0	2	0	4	25
Volume Right	7	0	28	7	7
cSH	1458	1528	1700	793	639
Volume to Capacity	0.00	0.00	0.02	0.02	0.06
Queue Length 95th (m)	0.0	0.0	0.0	0.5	1.4
Control Delay (s)	0.0	0.1	0.0	9.6	11.0
Lane LOS		A		A	B
Approach Delay (s)	0.0	0.1		9.6	11.0
Approach LOS				A	B

Intersection Summary				
Average Delay	2.2			
Intersection Capacity Utilization	20.3%	ICU Level of Service		A
Analysis Period (min)	15			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	13	0	18	11	0	18
Future Volume (Veh/h)	13	0	18	11	0	18
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.75	0.75	0.75	0.75	0.92	0.75
Hourly flow rate (vph)	17	0	24	15	0	24
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	56	32			39	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	56	32			39	
tC, single (s)	7.1	6.2			4.1	
tC, 2 stage (s)						
tF (s)	4.2	3.3			2.2	
p0 queue free %	98	100			100	
cM capacity (veh/h)	799	1048			1584	

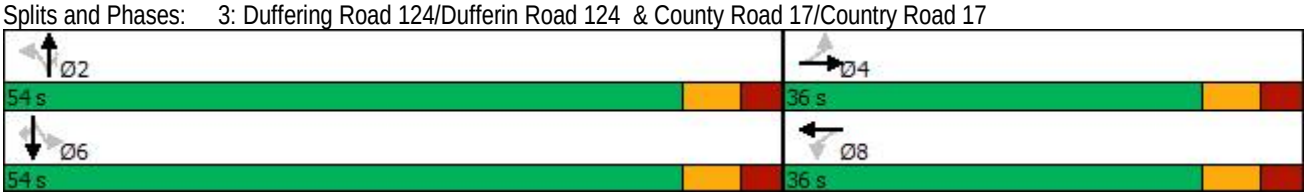
Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	17	39	24
Volume Left	17	0	0
Volume Right	0	15	0
cSH	799	1700	1584
Volume to Capacity	0.02	0.02	0.00
Queue Length 95th (m)	0.5	0.0	0.0
Control Delay (s)	9.6	0.0	0.0
Lane LOS	A		
Approach Delay (s)	9.6	0.0	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	2.0		
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	48	24	10	44	47	193	25	11	137	46
Future Volume (vph)	48	24	10	44	47	193	25	11	137	46
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4		8		2			6	
Permitted Phases	4		8		2		2	6		6
Detector Phase	4	4	8	8	2	2	2	6	6	6
Switch Phase										
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Minimum Split (s)	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0
Total Split (s)	36.0	36.0	36.0	36.0	54.0	54.0	54.0	54.0	54.0	54.0
Total Split (%)	40.0%	40.0%	40.0%	40.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lost Time Adjust (s)		0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)		7.0		7.0	7.0	7.0	7.0	7.0	7.0	7.0
Lead/Lag										
Lead-Lag Optimize?										
Recall Mode	None	None	None	None	Max	Max	Max	Max	Max	Max
Act Effct Green (s)		10.7		10.7	51.7	51.7	51.7	51.7	51.7	51.7
Actuated g/C Ratio		0.15		0.15	0.72	0.72	0.72	0.72	0.72	0.72
v/c Ratio		0.55		0.29	0.09	0.15	0.02	0.01	0.11	0.04
Control Delay		33.8		23.8	5.9	5.4	1.0	5.4	5.3	2.0
Queue Delay		0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		33.8		23.8	5.9	5.4	1.0	5.4	5.3	2.0
LOS		C		C	A	A	A	A	A	A
Approach Delay		33.8		23.8		5.1			4.5	
Approach LOS		C		C		A			A	

Intersection Summary	
Cycle Length: 90	
Actuated Cycle Length: 72	
Natural Cycle: 40	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.55	
Intersection Signal Delay: 11.5	Intersection LOS: B
Intersection Capacity Utilization 45.7%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 3: Duffering Road 124/Dufferin Road 124 & County Road 17/Country Road 17



Lane Group	EBT	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	108	79	52	212	27	12	151	51
v/c Ratio	0.55	0.29	0.09	0.15	0.02	0.01	0.11	0.04
Control Delay	33.8	23.8	5.9	5.4	1.0	5.4	5.3	2.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	33.8	23.8	5.9	5.4	1.0	5.4	5.3	2.0
Queue Length 50th (m)	10.8	7.1	2.1	9.3	0.0	0.5	6.3	0.0
Queue Length 95th (m)	25.0	17.8	7.1	20.7	1.5	2.4	15.2	3.5
Internal Link Dist (m)	2799.2	1348.4		1917.4			634.7	
Turn Bay Length (m)			50.0		10.0	50.0		10.0
Base Capacity (vph)	494	717	603	1378	1185	861	1378	1186
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.22	0.11	0.09	0.15	0.02	0.01	0.11	0.04

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	48	24	26	10	44	18	47	193	25	11	137	46
Future Volume (vph)	48	24	26	10	44	18	47	193	25	11	137	46
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		7.0			7.0		7.0	7.0	7.0	7.0	7.0	7.0
Lane Util. Factor		1.00			1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.96			0.97		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.98			0.99		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1449			1843		1209	1921	1633	1825	1921	1633
Flt Permitted		0.80			0.94		0.66	1.00	1.00	0.63	1.00	1.00
Satd. Flow (perm)		1194			1749		841	1921	1633	1201	1921	1633
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	53	26	29	11	48	20	52	212	27	12	151	51
RTOR Reduction (vph)	0	19	0	0	17	0	0	0	9	0	0	16
Lane Group Flow (vph)	0	89	0	0	62	0	52	212	18	12	151	35
Heavy Vehicles (%)	0%	0%	92%	0%	0%	0%	51%	0%	0%	0%	0%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		6
Actuated Green, G (s)		9.2			9.2		50.2	50.2	50.2	50.2	50.2	50.2
Effective Green, g (s)		9.2			9.2		50.2	50.2	50.2	50.2	50.2	50.2
Actuated g/C Ratio		0.13			0.13		0.68	0.68	0.68	0.68	0.68	0.68
Clearance Time (s)		7.0			7.0		7.0	7.0	7.0	7.0	7.0	7.0
Vehicle Extension (s)		3.0			3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)		149			219		575	1313	1116	821	1313	1116
v/s Ratio Prot								c0.11			0.08	
v/s Ratio Perm		c0.07			0.04		0.06		0.01	0.01		0.02
v/c Ratio		0.60			0.28		0.09	0.16	0.02	0.01	0.12	0.03
Uniform Delay, d1		30.3			29.1		3.9	4.1	3.7	3.7	4.0	3.7
Progression Factor		1.00			1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		6.3			0.7		0.3	0.3	0.0	0.0	0.2	0.1
Delay (s)		36.6			29.8		4.2	4.4	3.7	3.7	4.2	3.8
Level of Service		D			C		A	A	A	A	A	A
Approach Delay (s)		36.6			29.8			4.3			4.0	
Approach LOS		D			C			A			A	

Intersection Summary			
HCM 2000 Control Delay	12.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.23		
Actuated Cycle Length (s)	73.4	Sum of lost time (s)	14.0
Intersection Capacity Utilization	45.7%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	5	0	1	5	1	5
Future Volume (Veh/h)	5	0	1	5	1	5
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.75	0.75	0.75	0.75	0.75	0.75
Hourly flow rate (vph)	7	0	1	7	1	7
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	14	4			8	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	14	4			8	
tC, single (s)	7.3	6.2			4.1	
tC, 2 stage (s)						
tF (s)	4.3	3.3			2.2	
p0 queue free %	99	100			100	
cM capacity (veh/h)	817	1085			1625	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	7	8	8
Volume Left	7	0	1
Volume Right	0	7	0
cSH	817	1700	1625
Volume to Capacity	0.01	0.00	0.00
Queue Length 95th (m)	0.2	0.0	0.0
Control Delay (s)	9.4	0.0	0.9
Lane LOS	A		A
Approach Delay (s)	9.4	0.0	0.9
Approach LOS	A		

Intersection Summary			
Average Delay	3.2		
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	3	74	6	4	44	58	0	2	0	52	4	2
Future Volume (Veh/h)	3	74	6	4	44	58	0	2	0	52	4	2
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	3	82	7	4	49	64	0	2	0	58	4	2
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	113			89			152	212	86	150	152	49
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	113			89			152	212	86	150	152	49
tC, single (s)	4.1			4.1			7.1	6.5	6.2	8.0	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	4.3	4.0	3.3
p0 queue free %	100			100			100	100	100	91	99	100
cM capacity (veh/h)	1489			1519			811	685	979	648	740	1025

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	SB 1
Volume Total	92	53	64	2	64
Volume Left	3	4	0	0	58
Volume Right	7	0	64	0	2
cSH	1489	1519	1700	685	660
Volume to Capacity	0.00	0.00	0.04	0.00	0.10
Queue Length 95th (m)	0.0	0.1	0.0	0.1	2.4
Control Delay (s)	0.3	0.6	0.0	10.3	11.0
Lane LOS	A	A		B	B
Approach Delay (s)	0.3	0.3		10.3	11.0
Approach LOS				B	B

Intersection Summary				
Average Delay	2.8			
Intersection Capacity Utilization	23.3%	ICU Level of Service		A
Analysis Period (min)	15			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	48	0	6	57	0	10
Future Volume (Veh/h)	48	0	6	57	0	10
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.75	0.75	0.75	0.75	0.75	0.75
Hourly flow rate (vph)	64	0	8	76	0	13
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	59	46			84	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	59	46			84	
tC, single (s)	7.3	6.2			4.1	
tC, 2 stage (s)						
tF (s)	4.3	3.3			2.2	
p0 queue free %	92	100			100	
cM capacity (veh/h)	768	1029			1526	

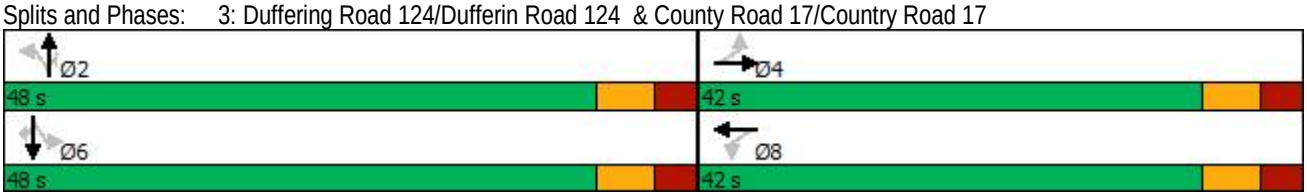
Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	64	84	13
Volume Left	64	0	0
Volume Right	0	76	0
cSH	768	1700	1526
Volume to Capacity	0.08	0.05	0.00
Queue Length 95th (m)	2.1	0.0	0.0
Control Delay (s)	10.1	0.0	0.0
Lane LOS	B		
Approach Delay (s)	10.1	0.0	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	4.0		
Intersection Capacity Utilization	13.8%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	39	37	22	21	70	139	12	29	190	35
Future Volume (vph)	39	37	22	21	70	139	12	29	190	35
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4		8		2			6	
Permitted Phases	4		8		2		2	6		6
Detector Phase	4	4	8	8	2	2	2	6	6	6
Switch Phase										
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Minimum Split (s)	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0
Total Split (s)	42.0	42.0	42.0	42.0	48.0	48.0	48.0	48.0	48.0	48.0
Total Split (%)	46.7%	46.7%	46.7%	46.7%	53.3%	53.3%	53.3%	53.3%	53.3%	53.3%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lost Time Adjust (s)		0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)		7.0		7.0	7.0	7.0	7.0	7.0	7.0	7.0
Lead/Lag										
Lead-Lag Optimize?										
Recall Mode	None	None	None	None	Max	Max	Max	Max	Max	Max
Act Effct Green (s)		11.0		11.0	41.1	41.1	41.1	41.1	41.1	41.1
Actuated g/C Ratio		0.17		0.17	0.62	0.62	0.62	0.62	0.62	0.62
v/c Ratio		0.63		0.23	0.17	0.12	0.01	0.04	0.17	0.04
Control Delay		26.8		20.2	7.5	6.2	0.0	6.1	6.4	1.9
Queue Delay		0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		26.8		20.2	7.5	6.2	0.0	6.1	6.4	1.9
LOS		C		C	A	A	A	A	A	A
Approach Delay		26.8		20.2		6.3			5.8	
Approach LOS		C		C		A			A	

Intersection Summary	
Cycle Length: 90	
Actuated Cycle Length: 66.1	
Natural Cycle: 40	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.63	
Intersection Signal Delay: 11.8	Intersection LOS: B
Intersection Capacity Utilization 43.6%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 3: Duffering Road 124/Dufferin Road 124 & County Road 17/Country Road 17



Lane Group	EBT	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	161	62	74	146	13	31	200	37
v/c Ratio	0.63	0.23	0.17	0.12	0.01	0.04	0.17	0.04
Control Delay	26.8	20.2	7.5	6.2	0.0	6.1	6.4	1.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	26.8	20.2	7.5	6.2	0.0	6.1	6.4	1.9
Queue Length 50th (m)	10.7	4.8	3.2	6.2	0.0	1.3	8.7	0.0
Queue Length 95th (m)	27.3	13.7	10.6	15.8	0.1	4.9	20.9	2.7
Internal Link Dist (m)	2799.2	1348.4		1917.4			634.7	
Turn Bay Length (m)			50.0		10.0	50.0		10.0
Base Capacity (vph)	678	834	446	1194	1033	793	1194	1033
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.24	0.07	0.17	0.12	0.01	0.04	0.17	0.04

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	39	37	77	22	21	16	70	139	12	29	190	35
Future Volume (vph)	39	37	77	22	21	16	70	139	12	29	190	35
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		7.0			7.0		7.0	7.0	7.0	7.0	7.0	7.0
Lane Util. Factor		1.00			1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.93			0.96		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.99			0.98		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1348			1816		1080	1921	1633	1825	1921	1633
Flt Permitted		0.89			0.84		0.63	1.00	1.00	0.66	1.00	1.00
Satd. Flow (perm)		1219			1555		719	1921	1633	1276	1921	1633
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	41	39	81	23	22	17	74	146	13	31	200	37
RTOR Reduction (vph)	0	55	0	0	14	0	0	0	5	0	0	14
Lane Group Flow (vph)	0	106	0	0	48	0	74	146	8	31	200	23
Heavy Vehicles (%)	0%	0%	62%	0%	0%	0%	69%	0%	0%	0%	0%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		6
Actuated Green, G (s)		11.0			11.0		41.1	41.1	41.1	41.1	41.1	41.1
Effective Green, g (s)		11.0			11.0		41.1	41.1	41.1	41.1	41.1	41.1
Actuated g/C Ratio		0.17			0.17		0.62	0.62	0.62	0.62	0.62	0.62
Clearance Time (s)		7.0			7.0		7.0	7.0	7.0	7.0	7.0	7.0
Vehicle Extension (s)		3.0			3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)		202			258		447	1194	1015	793	1194	1015
v/s Ratio Prot								0.08			c0.10	
v/s Ratio Perm		c0.09			0.03		0.10		0.00	0.02		0.01
v/c Ratio		0.52			0.19		0.17	0.12	0.01	0.04	0.17	0.02
Uniform Delay, d1		25.2			23.7		5.3	5.1	4.8	4.8	5.3	4.8
Progression Factor		1.00			1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		2.5			0.3		0.8	0.2	0.0	0.1	0.3	0.0
Delay (s)		27.6			24.0		6.1	5.3	4.8	4.9	5.6	4.8
Level of Service		C			C		A	A	A	A	A	A
Approach Delay (s)		27.6			24.0			5.5			5.4	
Approach LOS		C			C			A			A	

Intersection Summary			
HCM 2000 Control Delay	12.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.24		
Actuated Cycle Length (s)	66.1	Sum of lost time (s)	14.0
Intersection Capacity Utilization	43.6%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	15	0	4	14	0	3
Future Volume (Veh/h)	15	0	4	14	0	3
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)	17	0	5	16	0	3
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	16	13			21	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	16	13			21	
tC, single (s)	7.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	4.4	3.3			2.2	
p0 queue free %	98	100			100	
cM capacity (veh/h)	806	1073			1608	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	17	21	3
Volume Left	17	0	0
Volume Right	0	16	0
cSH	806	1700	1608
Volume to Capacity	0.02	0.01	0.00
Queue Length 95th (m)	0.5	0.0	0.0
Control Delay (s)	9.6	0.0	0.0
Lane LOS	A		
Approach Delay (s)	9.6	0.0	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	4.0		
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	68	6	2	100	23	3	6	6	21	4	6
Future Volume (Veh/h)	0	68	6	2	100	23	3	6	6	21	4	6
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Hourly flow rate (vph)	0	82	7	2	120	28	4	7	7	25	5	7
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	148			89			219	238	86	220	213	120
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	148			89			219	238	86	220	213	120
tC, single (s)	4.1			4.1			7.1	6.5	6.2	8.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	4.4	4.0	3.3
p0 queue free %	100			100			99	99	99	96	99	99
cM capacity (veh/h)	1446			1519			731	666	979	560	687	937

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	SB 1
Volume Total	89	122	28	18	37
Volume Left	0	2	0	4	25
Volume Right	7	0	28	7	7
cSH	1446	1519	1700	778	623
Volume to Capacity	0.00	0.00	0.02	0.02	0.06
Queue Length 95th (m)	0.0	0.0	0.0	0.5	1.4
Control Delay (s)	0.0	0.1	0.0	9.7	11.1
Lane LOS		A		A	B
Approach Delay (s)	0.0	0.1		9.7	11.1
Approach LOS				A	B

Intersection Summary				
Average Delay	2.1			
Intersection Capacity Utilization	20.6%	ICU Level of Service		A
Analysis Period (min)	15			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	13	0	18	11	0	18
Future Volume (Veh/h)	13	0	18	11	0	18
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.75	0.75	0.75	0.75	0.75	0.75
Hourly flow rate (vph)	17	0	24	15	0	24
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	56	32			39	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	56	32			39	
tC, single (s)	7.1	6.2			4.1	
tC, 2 stage (s)						
tF (s)	4.2	3.3			2.2	
p0 queue free %	98	100			100	
cM capacity (veh/h)	799	1048			1584	

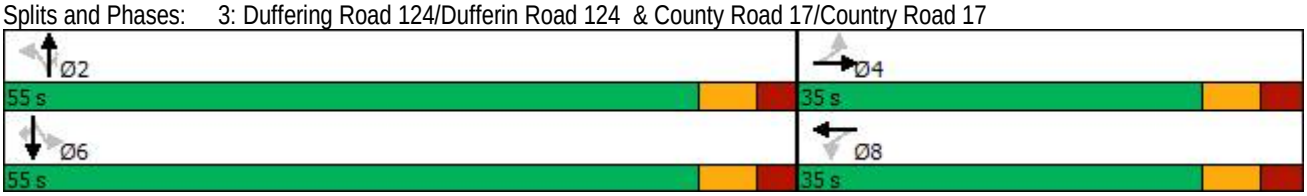
Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	17	39	24
Volume Left	17	0	0
Volume Right	0	15	0
cSH	799	1700	1584
Volume to Capacity	0.02	0.02	0.00
Queue Length 95th (m)	0.5	0.0	0.0
Control Delay (s)	9.6	0.0	0.0
Lane LOS	A		
Approach Delay (s)	9.6	0.0	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	2.0		
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	53	26	11	49	52	213	28	12	151	51
Future Volume (vph)	53	26	11	49	52	213	28	12	151	51
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4		8		2			6	
Permitted Phases	4		8		2		2	6		6
Detector Phase	4	4	8	8	2	2	2	6	6	6
Switch Phase										
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Minimum Split (s)	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0
Total Split (s)	35.0	35.0	35.0	35.0	55.0	55.0	55.0	55.0	55.0	55.0
Total Split (%)	38.9%	38.9%	38.9%	38.9%	61.1%	61.1%	61.1%	61.1%	61.1%	61.1%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lost Time Adjust (s)		0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)		7.0		7.0	7.0	7.0	7.0	7.0	7.0	7.0
Lead/Lag										
Lead-Lag Optimize?										
Recall Mode	Max	Max	None	None	Max	Max	Max	Max	Max	Max
Act Effct Green (s)		28.0		28.0	48.0	48.0	48.0	48.0	48.0	48.0
Actuated g/C Ratio		0.31		0.31	0.53	0.53	0.53	0.53	0.53	0.53
v/c Ratio		0.30		0.16	0.12	0.23	0.03	0.02	0.16	0.06
Control Delay		21.7		18.8	11.5	11.9	1.8	10.1	11.3	3.2
Queue Delay		0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		21.7		18.8	11.5	11.9	1.8	10.1	11.3	3.2
LOS		C		B	B	B	A	B	B	A
Approach Delay		21.7		18.8		10.9			9.3	
Approach LOS		C		B		B			A	

Intersection Summary	
Cycle Length: 90	
Actuated Cycle Length: 90	
Natural Cycle: 40	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.30	
Intersection Signal Delay: 13.0	Intersection LOS: B
Intersection Capacity Utilization 47.3%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 3: Duffering Road 124/Dufferin Road 124 & County Road 17/Country Road 17



Lane Group	EBT	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	119	88	57	234	31	13	166	56
v/c Ratio	0.30	0.16	0.12	0.23	0.03	0.02	0.16	0.06
Control Delay	21.7	18.8	11.5	11.9	1.8	10.1	11.3	3.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	21.7	18.8	11.5	11.9	1.8	10.1	11.3	3.2
Queue Length 50th (m)	12.6	8.5	4.6	20.3	0.0	1.0	13.8	0.0
Queue Length 95th (m)	26.4	19.1	10.8	33.0	2.5	3.7	23.9	5.2
Internal Link Dist (m)	2799.2	1348.4		1917.4			634.7	
Turn Bay Length (m)			50.0		10.0	50.0		10.0
Base Capacity (vph)	399	566	457	1024	893	628	1024	897
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.30	0.16	0.12	0.23	0.03	0.02	0.16	0.06

Intersection Summary

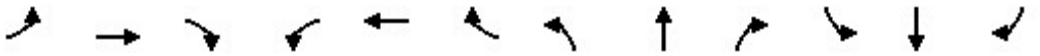
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	53	26	29	11	49	20	52	213	28	12	151	51
Future Volume (vph)	53	26	29	11	49	20	52	213	28	12	151	51
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		7.0			7.0		7.0	7.0	7.0	7.0	7.0	7.0
Lane Util. Factor		1.00			1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.96			0.97		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.98			0.99		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1478			1844		1250	1921	1633	1825	1921	1633
Flt Permitted		0.82			0.96		0.65	1.00	1.00	0.61	1.00	1.00
Satd. Flow (perm)		1238			1780		858	1921	1633	1177	1921	1633
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	58	29	32	12	54	22	57	234	31	13	166	56
RTOR Reduction (vph)	0	14	0	0	13	0	0	0	14	0	0	26
Lane Group Flow (vph)	0	105	0	0	75	0	57	234	17	13	166	30
Heavy Vehicles (%)	0%	0%	83%	0%	0%	0%	46%	0%	0%	0%	0%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		6
Actuated Green, G (s)		28.0			28.0		48.0	48.0	48.0	48.0	48.0	48.0
Effective Green, g (s)		28.0			28.0		48.0	48.0	48.0	48.0	48.0	48.0
Actuated g/C Ratio		0.31			0.31		0.53	0.53	0.53	0.53	0.53	0.53
Clearance Time (s)		7.0			7.0		7.0	7.0	7.0	7.0	7.0	7.0
Vehicle Extension (s)		3.0			3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)		385			553		457	1024	870	627	1024	870
v/s Ratio Prot								c0.12			0.09	
v/s Ratio Perm		c0.08			0.04		0.07		0.01	0.01		0.02
v/c Ratio		0.27			0.14		0.12	0.23	0.02	0.02	0.16	0.03
Uniform Delay, d1		23.3			22.3		10.5	11.2	9.9	9.9	10.7	10.0
Progression Factor		1.00			1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		1.7			0.1		0.6	0.5	0.0	0.1	0.3	0.1
Delay (s)		25.1			22.4		11.1	11.7	9.9	10.0	11.1	10.1
Level of Service		C			C		B	B	A	A	B	B
Approach Delay (s)		25.1			22.4			11.4			10.8	
Approach LOS		C			C			B			B	

Intersection Summary			
HCM 2000 Control Delay	14.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.24		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	14.0
Intersection Capacity Utilization	47.3%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	5	0	1	5	1	5
Future Volume (Veh/h)	5	0	1	5	1	5
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.75	0.75	0.75	0.75	0.75	0.75
Hourly flow rate (vph)	7	0	1	7	1	7
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	14	4			8	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	14	4			8	
tC, single (s)	7.3	6.2			4.1	
tC, 2 stage (s)						
tF (s)	4.3	3.3			2.2	
p0 queue free %	99	100			100	
cM capacity (veh/h)	817	1085			1625	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	7	8	8
Volume Left	7	0	1
Volume Right	0	7	0
cSH	817	1700	1625
Volume to Capacity	0.01	0.00	0.00
Queue Length 95th (m)	0.2	0.0	0.0
Control Delay (s)	9.4	0.0	0.9
Lane LOS	A		A
Approach Delay (s)	9.4	0.0	0.9
Approach LOS	A		

Intersection Summary			
Average Delay	3.2		
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	3	86	6	4	51	58	0	2	0	52	4	2
Future Volume (Veh/h)	3	86	6	4	51	58	0	2	0	52	4	2
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	3	96	7	4	57	64	0	2	0	58	4	2
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	121			103			174	234	100	172	174	57
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	121			103			174	234	100	172	174	57
tC, single (s)	4.1			4.1			7.1	6.5	6.2	8.0	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	4.3	4.0	3.3
p0 queue free %	100			100			100	100	100	91	99	100
cM capacity (veh/h)	1479			1502			785	666	962	625	720	1015

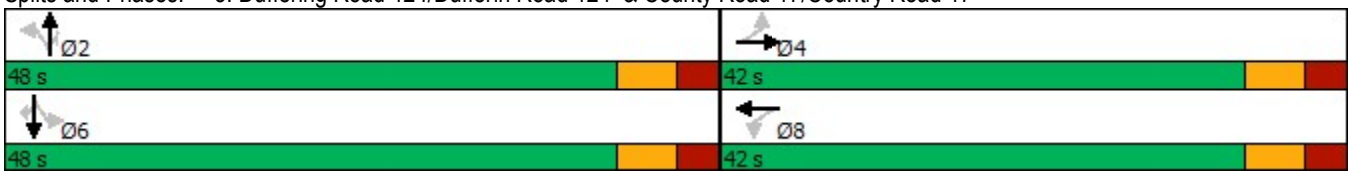
Direction, Lane #	EB 1	WB 1	WB 2	NB 1	SB 1
Volume Total	106	61	64	2	64
Volume Left	3	4	0	0	58
Volume Right	7	0	64	0	2
cSH	1479	1502	1700	666	637
Volume to Capacity	0.00	0.00	0.04	0.00	0.10
Queue Length 95th (m)	0.0	0.1	0.0	0.1	2.5
Control Delay (s)	0.2	0.5	0.0	10.4	11.3
Lane LOS	A	A		B	B
Approach Delay (s)	0.2	0.2		10.4	11.3
Approach LOS				B	B

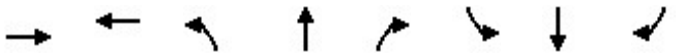
Intersection Summary				
Average Delay	2.7			
Intersection Capacity Utilization	23.9%	ICU Level of Service		A
Analysis Period (min)	15			

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	46	43	26	24	81	161	13	34	220	40
Future Volume (vph)	46	43	26	24	81	161	13	34	220	40
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4		8		2			6	
Permitted Phases	4		8		2		2	6		6
Detector Phase	4	4	8	8	2	2	2	6	6	6
Switch Phase										
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Minimum Split (s)	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0
Total Split (s)	42.0	42.0	42.0	42.0	48.0	48.0	48.0	48.0	48.0	48.0
Total Split (%)	46.7%	46.7%	46.7%	46.7%	53.3%	53.3%	53.3%	53.3%	53.3%	53.3%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lost Time Adjust (s)		0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)		7.0		7.0	7.0	7.0	7.0	7.0	7.0	7.0
Lead/Lag										
Lead-Lag Optimize?										
Recall Mode	None	None	None	None	Max	Max	Max	Max	Max	Max
Act Effct Green (s)		12.4		12.4	41.2	41.2	41.2	41.2	41.2	41.2
Actuated g/C Ratio		0.18		0.18	0.61	0.61	0.61	0.61	0.61	0.61
v/c Ratio		0.68		0.25	0.20	0.14	0.01	0.05	0.20	0.04
Control Delay		29.4		19.8	8.8	7.0	0.0	6.9	7.3	2.4
Queue Delay		0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		29.4		19.8	8.8	7.0	0.0	6.9	7.3	2.4
LOS		C		B	A	A	A	A	A	A
Approach Delay		29.4		19.8		7.2			6.6	
Approach LOS		C		B		A			A	

Intersection Summary	
Cycle Length: 90	
Actuated Cycle Length: 67.6	
Natural Cycle: 40	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.68	
Intersection Signal Delay: 13.0	Intersection LOS: B
Intersection Capacity Utilization 46.9%	ICU Level of Service A
Analysis Period (min) 15	

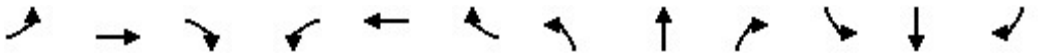
Splits and Phases: 3: Duffering Road 124/Dufferin Road 124 & County Road 17/Country Road 17





Lane Group	EBT	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	187	72	85	169	14	36	232	42
v/c Ratio	0.68	0.25	0.20	0.14	0.01	0.05	0.20	0.04
Control Delay	29.4	19.8	8.8	7.0	0.0	6.9	7.3	2.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	29.4	19.8	8.8	7.0	0.0	6.9	7.3	2.4
Queue Length 50th (m)	13.9	5.6	4.1	7.9	0.0	1.6	11.2	0.0
Queue Length 95th (m)	32.6	15.0	13.2	19.6	0.2	6.0	26.2	3.4
Internal Link Dist (m)	2799.2	1348.4		1917.4			634.7	
Turn Bay Length (m)			50.0		10.0	50.0		10.0
Base Capacity (vph)	662	787	425	1169	1013	760	1169	1013
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.28	0.09	0.20	0.14	0.01	0.05	0.20	0.04

Intersection Summary



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	46	43	89	26	24	19	81	161	13	34	220	40
Future Volume (vph)	46	43	89	26	24	19	81	161	13	34	220	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		7.0			7.0		7.0	7.0	7.0	7.0	7.0	7.0
Lane Util. Factor		1.00			1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.93			0.96		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.99			0.98		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1348			1815		1080	1921	1633	1825	1921	1633
Flt Permitted		0.89			0.81		0.61	1.00	1.00	0.65	1.00	1.00
Satd. Flow (perm)		1214			1498		698	1921	1633	1249	1921	1633
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	48	45	94	27	25	20	85	169	14	36	232	42
RTOR Reduction (vph)	0	54	0	0	16	0	0	0	5	0	0	16
Lane Group Flow (vph)	0	133	0	0	56	0	85	169	9	36	232	26
Heavy Vehicles (%)	0%	0%	62%	0%	0%	0%	69%	0%	0%	0%	0%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		6
Actuated Green, G (s)		12.4			12.4		41.2	41.2	41.2	41.2	41.2	41.2
Effective Green, g (s)		12.4			12.4		41.2	41.2	41.2	41.2	41.2	41.2
Actuated g/C Ratio		0.18			0.18		0.61	0.61	0.61	0.61	0.61	0.61
Clearance Time (s)		7.0			7.0		7.0	7.0	7.0	7.0	7.0	7.0
Vehicle Extension (s)		3.0			3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)		222			274		425	1170	995	761	1170	995
v/s Ratio Prot								0.09			0.12	
v/s Ratio Perm		c0.11			0.04		c0.12		0.01	0.03		0.02
v/c Ratio		0.60			0.20		0.20	0.14	0.01	0.05	0.20	0.03
Uniform Delay, d1		25.3			23.4		5.9	5.7	5.2	5.3	5.9	5.2
Progression Factor		1.00			1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		4.3			0.4		1.1	0.3	0.0	0.1	0.4	0.0
Delay (s)		29.6			23.8		6.9	5.9	5.2	5.4	6.2	5.3
Level of Service		C			C		A	A	A	A	A	A
Approach Delay (s)		29.6			23.8			6.2			6.0	
Approach LOS		C			C			A			A	

Intersection Summary			
HCM 2000 Control Delay	12.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.29		
Actuated Cycle Length (s)	67.6	Sum of lost time (s)	14.0
Intersection Capacity Utilization	46.9%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	48	0	6	57	0	10
Future Volume (Veh/h)	48	0	6	57	0	10
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.75	0.75	0.75	0.75	0.75	0.75
Hourly flow rate (vph)	64	0	8	76	0	13
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	59	46			84	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	59	46			84	
tC, single (s)	7.3	6.2			4.1	
tC, 2 stage (s)						
tF (s)	4.3	3.3			2.2	
p0 queue free %	92	100			100	
cM capacity (veh/h)	768	1029			1526	

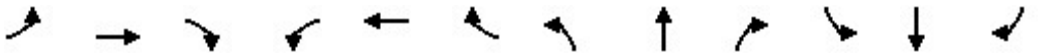
Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	64	84	13
Volume Left	64	0	0
Volume Right	0	76	0
cSH	768	1700	1526
Volume to Capacity	0.08	0.05	0.00
Queue Length 95th (m)	2.1	0.0	0.0
Control Delay (s)	10.1	0.0	0.0
Lane LOS	B		
Approach Delay (s)	10.1	0.0	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	4.0		
Intersection Capacity Utilization	13.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	15	0	4	14	0	3
Future Volume (Veh/h)	15	0	4	14	0	3
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)	17	0	5	16	0	3
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	16	13			21	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	16	13			21	
tC, single (s)	7.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	4.4	3.3			2.2	
p0 queue free %	98	100			100	
cM capacity (veh/h)	806	1073			1608	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	17	21	3
Volume Left	17	0	0
Volume Right	0	16	0
cSH	806	1700	1608
Volume to Capacity	0.02	0.01	0.00
Queue Length 95th (m)	0.5	0.0	0.0
Control Delay (s)	9.6	0.0	0.0
Lane LOS	A		
Approach Delay (s)	9.6	0.0	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	4.0		
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	76	6	2	111	23	3	6	6	21	4	6
Future Volume (Veh/h)	0	76	6	2	111	23	3	6	6	21	4	6
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Hourly flow rate (vph)	0	92	7	2	134	28	4	7	7	25	5	7
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	162			99			243	262	96	244	237	134
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	162			99			243	262	96	244	237	134
tC, single (s)	4.1			4.1			7.1	6.5	6.2	8.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	4.4	4.0	3.3
p0 queue free %	100			100			99	99	99	95	99	99
cM capacity (veh/h)	1429			1507			705	646	967	537	666	920

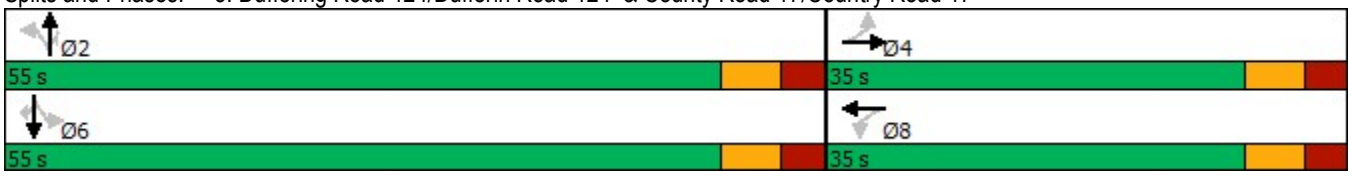
Direction, Lane #	EB 1	WB 1	WB 2	NB 1	SB 1
Volume Total	99	136	28	18	37
Volume Left	0	2	0	4	25
Volume Right	7	0	28	7	7
cSH	1429	1507	1700	758	600
Volume to Capacity	0.00	0.00	0.02	0.02	0.06
Queue Length 95th (m)	0.0	0.0	0.0	0.6	1.5
Control Delay (s)	0.0	0.1	0.0	9.9	11.4
Lane LOS		A		A	B
Approach Delay (s)	0.0	0.1		9.9	11.4
Approach LOS				A	B

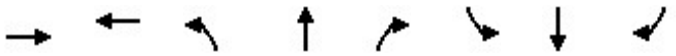
Intersection Summary				
Average Delay	1.9			
Intersection Capacity Utilization	21.0%	ICU Level of Service		A
Analysis Period (min)	15			

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	59	29	12	54	57	235	30	13	167	56
Future Volume (vph)	59	29	12	54	57	235	30	13	167	56
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4		8		2			6	
Permitted Phases	4		8		2		2	6		6
Detector Phase	4	4	8	8	2	2	2	6	6	6
Switch Phase										
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Minimum Split (s)	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0
Total Split (s)	35.0	35.0	35.0	35.0	55.0	55.0	55.0	55.0	55.0	55.0
Total Split (%)	38.9%	38.9%	38.9%	38.9%	61.1%	61.1%	61.1%	61.1%	61.1%	61.1%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lost Time Adjust (s)		0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)		7.0		7.0	7.0	7.0	7.0	7.0	7.0	7.0
Lead/Lag										
Lead-Lag Optimize?										
Recall Mode	Max	Max	None	None	Max	Max	Max	Max	Max	Max
Act Effct Green (s)		28.0		28.0	48.0	48.0	48.0	48.0	48.0	48.0
Actuated g/C Ratio		0.31		0.31	0.53	0.53	0.53	0.53	0.53	0.53
v/c Ratio		0.33		0.17	0.14	0.25	0.04	0.02	0.18	0.07
Control Delay		22.8		19.1	11.7	12.1	2.1	10.2	11.4	3.1
Queue Delay		0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		22.8		19.1	11.7	12.1	2.1	10.2	11.4	3.1
LOS		C		B	B	B	A	B	B	A
Approach Delay		22.8		19.1		11.1			9.4	
Approach LOS		C		B		B			A	

Intersection Summary	
Cycle Length: 90	
Actuated Cycle Length: 90	
Natural Cycle: 40	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.33	
Intersection Signal Delay: 13.3	Intersection LOS: B
Intersection Capacity Utilization 49.1%	ICU Level of Service A
Analysis Period (min) 15	

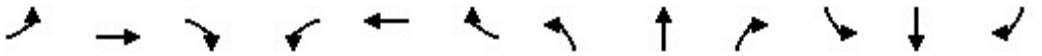
Splits and Phases: 3: Duffering Road 124/Dufferin Road 124 & County Road 17/Country Road 17





Lane Group	EBT	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	132	96	63	258	33	14	184	62
v/c Ratio	0.33	0.17	0.14	0.25	0.04	0.02	0.18	0.07
Control Delay	22.8	19.1	11.7	12.1	2.1	10.2	11.4	3.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	22.8	19.1	11.7	12.1	2.1	10.2	11.4	3.1
Queue Length 50th (m)	14.4	9.5	5.2	22.7	0.0	1.1	15.5	0.0
Queue Length 95th (m)	29.6	20.7	11.8	36.4	2.8	3.8	26.3	5.4
Internal Link Dist (m)	2799.2	1348.4		1917.4			634.7	
Turn Bay Length (m)			50.0		10.0	50.0		10.0
Base Capacity (vph)	395	565	449	1024	893	613	1024	899
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.33	0.17	0.14	0.25	0.04	0.02	0.18	0.07

Intersection Summary



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	59	29	32	12	54	22	57	235	30	13	167	56
Future Volume (vph)	59	29	32	12	54	22	57	235	30	13	167	56
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		7.0			7.0		7.0	7.0	7.0	7.0	7.0	7.0
Lane Util. Factor		1.00			1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.96			0.97		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.98			0.99		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1482			1844		1250	1921	1633	1825	1921	1633
Flt Permitted		0.81			0.96		0.64	1.00	1.00	0.60	1.00	1.00
Satd. Flow (perm)		1226			1775		844	1921	1633	1151	1921	1633
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	65	32	35	13	59	24	63	258	33	14	184	62
RTOR Reduction (vph)	0	14	0	0	13	0	0	0	15	0	0	29
Lane Group Flow (vph)	0	118	0	0	83	0	63	258	18	14	184	33
Heavy Vehicles (%)	0%	0%	83%	0%	0%	0%	46%	0%	0%	0%	0%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		6
Actuated Green, G (s)		28.0			28.0		48.0	48.0	48.0	48.0	48.0	48.0
Effective Green, g (s)		28.0			28.0		48.0	48.0	48.0	48.0	48.0	48.0
Actuated g/C Ratio		0.31			0.31		0.53	0.53	0.53	0.53	0.53	0.53
Clearance Time (s)		7.0			7.0		7.0	7.0	7.0	7.0	7.0	7.0
Vehicle Extension (s)		3.0			3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)		381			552		450	1024	870	613	1024	870
v/s Ratio Prot								c0.13			0.10	
v/s Ratio Perm		c0.10			0.05		0.07		0.01	0.01		0.02
v/c Ratio		0.31			0.15		0.14	0.25	0.02	0.02	0.18	0.04
Uniform Delay, d1		23.6			22.4		10.6	11.3	9.9	9.9	10.8	10.0
Progression Factor		1.00			1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		2.1			0.1		0.7	0.6	0.0	0.1	0.4	0.1
Delay (s)		25.7			22.5		11.2	11.9	9.9	10.0	11.2	10.1
Level of Service		C			C		B	B	A	A	B	B
Approach Delay (s)		25.7			22.5			11.6			10.9	
Approach LOS		C			C			B			B	

Intersection Summary			
HCM 2000 Control Delay	14.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.27		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	14.0
Intersection Capacity Utilization	49.1%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	13	0	18	11	0	18
Future Volume (Veh/h)	13	0	18	11	0	18
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.75	0.75	0.75	0.75	0.75	0.75
Hourly flow rate (vph)	17	0	24	15	0	24
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	56	32			39	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	56	32			39	
tC, single (s)	7.1	6.2			4.1	
tC, 2 stage (s)						
tF (s)	4.2	3.3			2.2	
p0 queue free %	98	100			100	
cM capacity (veh/h)	799	1048			1584	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	17	39	24
Volume Left	17	0	0
Volume Right	0	15	0
cSH	799	1700	1584
Volume to Capacity	0.02	0.02	0.00
Queue Length 95th (m)	0.5	0.0	0.0
Control Delay (s)	9.6	0.0	0.0
Lane LOS	A		
Approach Delay (s)	9.6	0.0	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	2.0		
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	7	0	1	7	1	5
Future Volume (Veh/h)	7	0	1	7	1	5
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.75	0.75	0.75	0.75	0.75	0.75
Hourly flow rate (vph)	9	0	1	9	1	7
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	14	6			10	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	14	6			10	
tC, single (s)	7.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	4.4	3.3			2.2	
p0 queue free %	99	100			100	
cM capacity (veh/h)	801	1083			1623	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	9	10	8
Volume Left	9	0	1
Volume Right	0	9	0
cSH	801	1700	1623
Volume to Capacity	0.01	0.01	0.00
Queue Length 95th (m)	0.3	0.0	0.0
Control Delay (s)	9.5	0.0	0.9
Lane LOS	A		A
Approach Delay (s)	9.5	0.0	0.9
Approach LOS	A		

Intersection Summary			
Average Delay	3.5		
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	3	74	6	4	44	87	0	2	0	81	4	2
Future Volume (Veh/h)	3	74	6	4	44	87	0	2	0	81	4	2
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	3	82	7	4	49	97	0	2	0	90	4	2
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	146			89			152	246	86	150	152	49
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	146			89			152	246	86	150	152	49
tC, single (s)	4.1			4.1			7.1	6.5	6.2	8.0	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	4.4	4.0	3.3
p0 queue free %	100			100			100	100	100	86	99	100
cM capacity (veh/h)	1448			1519			811	657	979	643	740	1025

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	SB 1
Volume Total	92	53	97	2	96
Volume Left	3	4	0	0	90
Volume Right	7	0	97	0	2
cSH	1448	1519	1700	657	652
Volume to Capacity	0.00	0.00	0.06	0.00	0.15
Queue Length 95th (m)	0.0	0.1	0.0	0.1	3.9
Control Delay (s)	0.3	0.6	0.0	10.5	11.5
Lane LOS	A	A		B	B
Approach Delay (s)	0.3	0.2		10.5	11.5
Approach LOS				B	B

Intersection Summary				
Average Delay	3.5			
Intersection Capacity Utilization	24.9%	ICU Level of Service		A
Analysis Period (min)	15			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	74	0	8	83	0	12
Future Volume (Veh/h)	74	0	8	83	0	12
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.75	0.75	0.75	0.75	0.75	0.75
Hourly flow rate (vph)	99	0	11	111	0	16
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	82	66			122	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	82	66			122	
tC, single (s)	7.3	6.2			4.1	
tC, 2 stage (s)						
tF (s)	4.3	3.3			2.2	
p0 queue free %	87	100			100	
cM capacity (veh/h)	736	1003			1478	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	99	122	16
Volume Left	99	0	0
Volume Right	0	111	0
cSH	736	1700	1478
Volume to Capacity	0.13	0.07	0.00
Queue Length 95th (m)	3.5	0.0	0.0
Control Delay (s)	10.7	0.0	0.0
Lane LOS	B		
Approach Delay (s)	10.7	0.0	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	4.5		
Intersection Capacity Utilization	16.3%	ICU Level of Service	A
Analysis Period (min)	15		

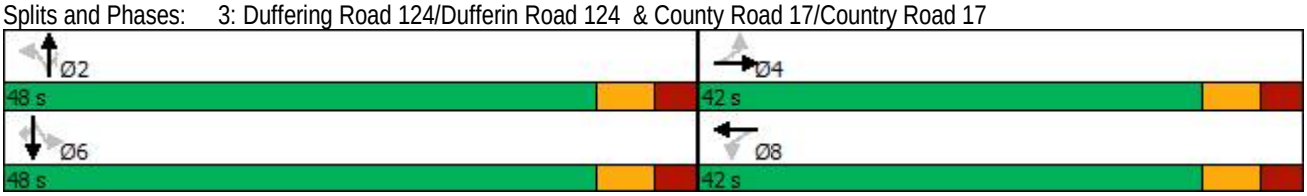
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	39	37	105	22	21	16	98	139	12	29	190	35
Future Volume (vph)	39	37	105	22	21	16	98	139	12	29	190	35
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		7.0			7.0		7.0	7.0	7.0	7.0	7.0	7.0
Lane Util. Factor		1.00			1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.92			0.96		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.99			0.98		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1230			1816		1025	1921	1633	1825	1921	1633
Flt Permitted		0.91			0.81		0.63	1.00	1.00	0.66	1.00	1.00
Satd. Flow (perm)		1129			1501		682	1921	1633	1276	1921	1633
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	41	39	111	23	22	17	103	146	13	31	200	37
RTOR Reduction (vph)	0	75	0	0	14	0	0	0	5	0	0	14
Lane Group Flow (vph)	0	116	0	0	48	0	103	146	8	31	200	23
Heavy Vehicles (%)	0%	0%	73%	0%	0%	0%	78%	0%	0%	0%	0%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		6
Actuated Green, G (s)		12.0			12.0		41.2	41.2	41.2	41.2	41.2	41.2
Effective Green, g (s)		12.0			12.0		41.2	41.2	41.2	41.2	41.2	41.2
Actuated g/C Ratio		0.18			0.18		0.61	0.61	0.61	0.61	0.61	0.61
Clearance Time (s)		7.0			7.0		7.0	7.0	7.0	7.0	7.0	7.0
Vehicle Extension (s)		3.0			3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)		201			268		418	1177	1001	782	1177	1001
v/s Ratio Prot								0.08			0.10	
v/s Ratio Perm		c0.10			0.03		c0.15		0.00	0.02		0.01
v/c Ratio		0.58			0.18		0.25	0.12	0.01	0.04	0.17	0.02
Uniform Delay, d1		25.3			23.4		5.9	5.4	5.1	5.2	5.6	5.1
Progression Factor		1.00			1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		4.0			0.3		1.4	0.2	0.0	0.1	0.3	0.0
Delay (s)		29.3			23.7		7.3	5.7	5.1	5.3	5.9	5.1
Level of Service		C			C		A	A	A	A	A	A
Approach Delay (s)		29.3			23.7			6.3			5.7	
Approach LOS		C			C			A			A	

Intersection Summary			
HCM 2000 Control Delay	13.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.32		
Actuated Cycle Length (s)	67.2	Sum of lost time (s)	14.0
Intersection Capacity Utilization	45.2%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	39	37	22	21	98	139	12	29	190	35
Future Volume (vph)	39	37	22	21	98	139	12	29	190	35
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4		8		2			6	
Permitted Phases	4		8		2		2	6		6
Detector Phase	4	4	8	8	2	2	2	6	6	6
Switch Phase										
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Minimum Split (s)	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0
Total Split (s)	42.0	42.0	42.0	42.0	48.0	48.0	48.0	48.0	48.0	48.0
Total Split (%)	46.7%	46.7%	46.7%	46.7%	53.3%	53.3%	53.3%	53.3%	53.3%	53.3%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lost Time Adjust (s)		0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)		7.0		7.0	7.0	7.0	7.0	7.0	7.0	7.0
Lead/Lag										
Lead-Lag Optimize?										
Recall Mode	None	None	None	None	Max	Max	Max	Max	Max	Max
Act Effct Green (s)		12.0		12.0	41.2	41.2	41.2	41.2	41.2	41.2
Actuated g/C Ratio		0.18		0.18	0.61	0.61	0.61	0.61	0.61	0.61
v/c Ratio		0.69		0.22	0.25	0.12	0.01	0.04	0.17	0.04
Control Delay		27.5		19.6	9.3	6.8	0.0	6.8	7.1	2.1
Queue Delay		0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		27.5		19.6	9.3	6.8	0.0	6.8	7.1	2.1
LOS		C		B	A	A	A	A	A	A
Approach Delay		27.5		19.6		7.5			6.3	
Approach LOS		C		B		A			A	

Intersection Summary	
Cycle Length: 90	
Actuated Cycle Length: 67.3	
Natural Cycle: 40	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.69	
Intersection Signal Delay: 12.9	Intersection LOS: B
Intersection Capacity Utilization 45.2%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 3: Duffering Road 124/Dufferin Road 124 & County Road 17/Country Road 17



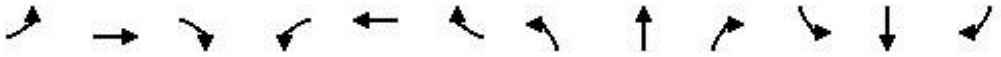
Lane Group	EBT	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	191	62	103	146	13	31	200	37
v/c Ratio	0.69	0.22	0.25	0.12	0.01	0.04	0.17	0.04
Control Delay	27.5	19.6	9.3	6.8	0.0	6.8	7.1	2.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	27.5	19.6	9.3	6.8	0.0	6.8	7.1	2.1
Queue Length 50th (m)	11.4	4.8	5.0	6.5	0.0	1.3	9.1	0.0
Queue Length 95th (m)	30.4	13.5	16.3	17.3	0.1	5.4	23.0	2.9
Internal Link Dist (m)	2799.2	1348.4		1917.4			634.7	
Turn Bay Length (m)			50.0		10.0	50.0		10.0
Base Capacity (vph)	633	793	417	1176	1018	781	1176	1018
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.30	0.08	0.25	0.12	0.01	0.04	0.17	0.04

Intersection Summary

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	24	0	4	23	0	3
Future Volume (Veh/h)	24	0	4	23	0	3
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)	27	0	5	26	0	3
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	21	18			31	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	21	18			31	
tC, single (s)	7.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	4.4	3.3			2.2	
p0 queue free %	97	100			100	
cM capacity (veh/h)	800	1066			1595	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	27	31	3
Volume Left	27	0	0
Volume Right	0	26	0
cSH	800	1700	1595
Volume to Capacity	0.03	0.02	0.00
Queue Length 95th (m)	0.8	0.0	0.0
Control Delay (s)	9.7	0.0	0.0
Lane LOS	A		
Approach Delay (s)	9.7	0.0	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	4.3		
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	68	6	2	100	37	3	6	6	35	4	6
Future Volume (Veh/h)	0	68	6	2	100	37	3	6	6	35	4	6
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Hourly flow rate (vph)	0	82	7	2	120	45	4	7	7	42	5	7
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	165			89			219	254	86	220	213	120
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	165			89			219	254	86	220	213	120
tC, single (s)	4.1			4.1			7.1	6.5	6.2	8.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	4.4	4.0	3.3
p0 queue free %	100			100			99	99	99	92	99	99
cM capacity (veh/h)	1426			1519			731	652	979	560	687	937

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	SB 1
Volume Total	89	122	45	18	54
Volume Left	0	2	0	4	42
Volume Right	7	0	45	7	7
cSH	1426	1519	1700	770	601
Volume to Capacity	0.00	0.00	0.03	0.02	0.09
Queue Length 95th (m)	0.0	0.0	0.0	0.5	2.2
Control Delay (s)	0.0	0.1	0.0	9.8	11.6
Lane LOS		A		A	B
Approach Delay (s)	0.0	0.1		9.8	11.6
Approach LOS				A	B

Intersection Summary				
Average Delay	2.5			
Intersection Capacity Utilization	21.2%	ICU Level of Service		A
Analysis Period (min)	15			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	18	0	27	16	0	27
Future Volume (Veh/h)	18	0	27	16	0	27
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.75	0.75	0.75	0.75	0.75	0.75
Hourly flow rate (vph)	24	0	36	21	0	36
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	82	46			57	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	82	46			57	
tC, single (s)	7.2	6.2			4.1	
tC, 2 stage (s)						
tF (s)	4.3	3.3			2.2	
p0 queue free %	97	100			100	
cM capacity (veh/h)	750	1029			1560	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	24	57	36
Volume Left	24	0	0
Volume Right	0	21	0
cSH	750	1700	1560
Volume to Capacity	0.03	0.03	0.00
Queue Length 95th (m)	0.8	0.0	0.0
Control Delay (s)	10.0	0.0	0.0
Lane LOS	A		
Approach Delay (s)	10.0	0.0	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	2.0		
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		

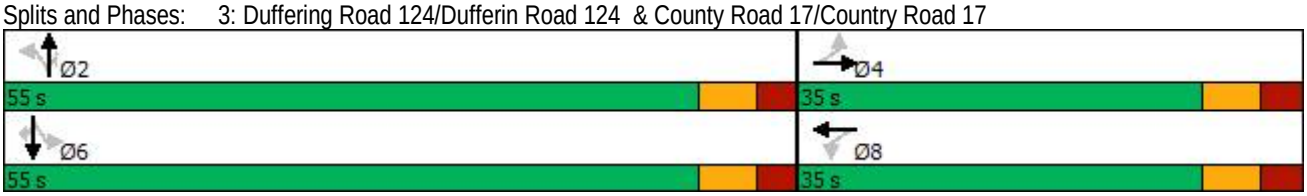
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	53	26	43	11	49	20	66	213	28	12	151	51
Future Volume (vph)	53	26	43	11	49	20	66	213	28	12	151	51
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		7.0			7.0		7.0	7.0	7.0	7.0	7.0	7.0
Lane Util. Factor		1.00			1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.95			0.97		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.98			0.99		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1365			1844		1155	1921	1633	1825	1921	1633
Flt Permitted		0.82			0.94		0.65	1.00	1.00	0.61	1.00	1.00
Satd. Flow (perm)		1142			1746		793	1921	1633	1177	1921	1633
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	58	29	47	12	54	22	73	234	31	13	166	56
RTOR Reduction (vph)	0	26	0	0	16	0	0	0	11	0	0	20
Lane Group Flow (vph)	0	108	0	0	72	0	73	234	20	13	166	36
Heavy Vehicles (%)	0%	0%	89%	0%	0%	0%	58%	0%	0%	0%	0%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		6
Actuated Green, G (s)		12.2			12.2		48.1	48.1	48.1	48.1	48.1	48.1
Effective Green, g (s)		12.2			12.2		48.1	48.1	48.1	48.1	48.1	48.1
Actuated g/C Ratio		0.16			0.16		0.65	0.65	0.65	0.65	0.65	0.65
Clearance Time (s)		7.0			7.0		7.0	7.0	7.0	7.0	7.0	7.0
Vehicle Extension (s)		3.0			3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)		187			286		513	1243	1057	761	1243	1057
v/s Ratio Prot								c0.12			0.09	
v/s Ratio Perm		c0.09			0.04		0.09		0.01	0.01		0.02
v/c Ratio		0.58			0.25		0.14	0.19	0.02	0.02	0.13	0.03
Uniform Delay, d1		28.7			27.1		5.1	5.3	4.7	4.7	5.1	4.7
Progression Factor		1.00			1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		4.3			0.5		0.6	0.3	0.0	0.0	0.2	0.1
Delay (s)		33.0			27.5		5.7	5.6	4.7	4.7	5.3	4.8
Level of Service		C			C		A	A	A	A	A	A
Approach Delay (s)		33.0			27.5			5.5			5.1	
Approach LOS		C			C			A			A	

Intersection Summary			
HCM 2000 Control Delay	12.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.27		
Actuated Cycle Length (s)	74.3	Sum of lost time (s)	14.0
Intersection Capacity Utilization	48.1%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	53	26	11	49	66	213	28	12	151	51
Future Volume (vph)	53	26	11	49	66	213	28	12	151	51
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4		8		2			6	
Permitted Phases	4		8		2		2	6		6
Detector Phase	4	4	8	8	2	2	2	6	6	6
Switch Phase										
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Minimum Split (s)	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0
Total Split (s)	35.0	35.0	35.0	35.0	55.0	55.0	55.0	55.0	55.0	55.0
Total Split (%)	38.9%	38.9%	38.9%	38.9%	61.1%	61.1%	61.1%	61.1%	61.1%	61.1%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lost Time Adjust (s)		0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)		7.0		7.0	7.0	7.0	7.0	7.0	7.0	7.0
Lead/Lag										
Lead-Lag Optimize?										
Recall Mode	None	None	None	None	Max	Max	Max	Max	Max	Max
Act Effct Green (s)		12.2		12.2	48.2	48.2	48.2	48.2	48.2	48.2
Actuated g/C Ratio		0.16		0.16	0.65	0.65	0.65	0.65	0.65	0.65
v/c Ratio		0.63		0.29	0.14	0.19	0.03	0.02	0.13	0.05
Control Delay		35.6		24.2	7.1	6.5	1.4	6.2	6.2	2.2
Queue Delay		0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		35.6		24.2	7.1	6.5	1.4	6.2	6.2	2.2
LOS		D		C	A	A	A	A	A	A
Approach Delay		35.6		24.2		6.1			5.2	
Approach LOS		D		C		A			A	

Intersection Summary	
Cycle Length: 90	
Actuated Cycle Length: 74.4	
Natural Cycle: 40	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.63	
Intersection Signal Delay: 12.8	Intersection LOS: B
Intersection Capacity Utilization 48.1%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 3: Duffering Road 124/Dufferin Road 124 & County Road 17/Country Road 17



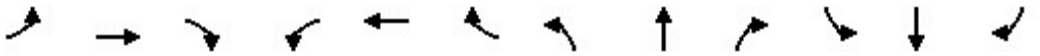
Lane Group	EBT	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	134	88	73	234	31	13	166	56
v/c Ratio	0.63	0.29	0.14	0.19	0.03	0.02	0.13	0.05
Control Delay	35.6	24.2	7.1	6.5	1.4	6.2	6.2	2.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	35.6	24.2	7.1	6.5	1.4	6.2	6.2	2.2
Queue Length 50th (m)	13.4	8.5	3.4	11.2	0.0	0.6	7.6	0.0
Queue Length 95th (m)	29.9	19.9	10.5	25.4	2.1	2.9	18.4	4.0
Internal Link Dist (m)	2799.2	1348.4		1917.4			634.7	
Turn Bay Length (m)			50.0		10.0	50.0		10.0
Base Capacity (vph)	451	671	513	1243	1074	762	1243	1077
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.30	0.13	0.14	0.19	0.03	0.02	0.13	0.05

Intersection Summary

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	0	1	0	0	6
Future Volume (Veh/h)	0	0	1	0	0	6
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.75	0.75	0.75	0.75	0.75	0.75
Hourly flow rate (vph)	0	0	1	0	0	8
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	9	1			1	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	9	1			1	
tC, single (s)	7.3	6.2			4.1	
tC, 2 stage (s)						
tF (s)	4.3	3.3			2.2	
p0 queue free %	100	100			100	
cM capacity (veh/h)	823	1090			1635	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	0	1	8
Volume Left	0	0	0
Volume Right	0	0	0
cSH	1700	1700	1635
Volume to Capacity	0.02	0.00	0.00
Queue Length 95th (m)	0.0	0.0	0.0
Control Delay (s)	0.0	0.0	0.0
Lane LOS	A		
Approach Delay (s)	0.0	0.0	0.0
Approach LOS	A		

Intersection Summary			
Average Delay		0.0	
Intersection Capacity Utilization		6.7%	ICU Level of Service A
Analysis Period (min)		15	



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	3	86	6	4	51	86	0	2	0	80	4	2
Future Volume (Veh/h)	3	86	6	4	51	86	0	2	0	80	4	2
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	3	96	7	4	57	96	0	2	0	89	4	2
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	153			103			174	266	100	172	174	57
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	153			103			174	266	100	172	174	57
tC, single (s)	4.1			4.1			7.1	6.5	6.2	8.0	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	4.3	4.0	3.3
p0 queue free %	100			100			100	100	100	86	99	100
cM capacity (veh/h)	1440			1502			785	640	962	624	720	1015

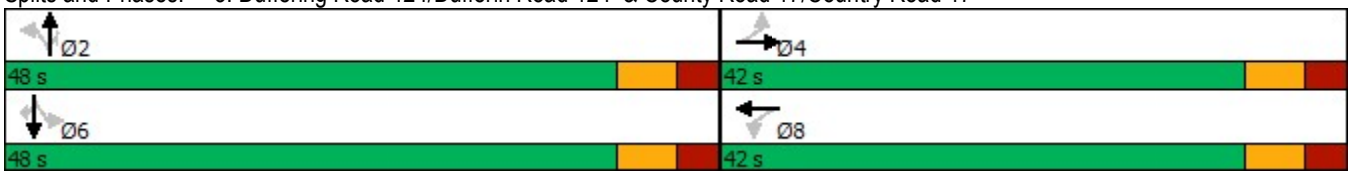
Direction, Lane #	EB 1	WB 1	WB 2	NB 1	SB 1
Volume Total	106	61	96	2	95
Volume Left	3	4	0	0	89
Volume Right	7	0	96	0	2
cSH	1440	1502	1700	640	633
Volume to Capacity	0.00	0.00	0.06	0.00	0.15
Queue Length 95th (m)	0.0	0.1	0.0	0.1	4.0
Control Delay (s)	0.2	0.5	0.0	10.6	11.7
Lane LOS	A	A		B	B
Approach Delay (s)	0.2	0.2		10.6	11.7
Approach LOS				B	B

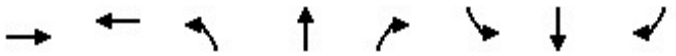
Intersection Summary				
Average Delay	3.3			
Intersection Capacity Utilization	25.4%	ICU Level of Service		A
Analysis Period (min)	15			

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	46	43	26	24	109	161	13	34	220	40
Future Volume (vph)	46	43	26	24	109	161	13	34	220	40
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4		8		2			6	
Permitted Phases	4		8		2		2	6		6
Detector Phase	4	4	8	8	2	2	2	6	6	6
Switch Phase										
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Minimum Split (s)	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0
Total Split (s)	42.0	42.0	42.0	42.0	48.0	48.0	48.0	48.0	48.0	48.0
Total Split (%)	46.7%	46.7%	46.7%	46.7%	53.3%	53.3%	53.3%	53.3%	53.3%	53.3%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lost Time Adjust (s)		0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)		7.0		7.0	7.0	7.0	7.0	7.0	7.0	7.0
Lead/Lag										
Lead-Lag Optimize?										
Recall Mode	None	None	None	None	Max	Max	Max	Max	Max	Max
Act Effct Green (s)		13.3		13.3	41.2	41.2	41.2	41.2	41.2	41.2
Actuated g/C Ratio		0.19		0.19	0.60	0.60	0.60	0.60	0.60	0.60
v/c Ratio		0.72		0.24	0.27	0.15	0.01	0.05	0.20	0.04
Control Delay		29.5		19.2	10.3	7.5	0.0	7.5	7.8	2.5
Queue Delay		0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		29.5		19.2	10.3	7.5	0.0	7.5	7.8	2.5
LOS		C		B	B	A	A	A	A	A
Approach Delay		29.5		19.2		8.3			7.1	
Approach LOS		C		B		A			A	

Intersection Summary	
Cycle Length: 90	
Actuated Cycle Length: 68.6	
Natural Cycle: 40	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.72	
Intersection Signal Delay: 13.9	Intersection LOS: B
Intersection Capacity Utilization 48.7%	ICU Level of Service A
Analysis Period (min) 15	

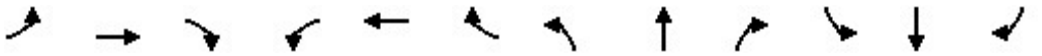
Splits and Phases: 3: Duffering Road 124/Dufferin Road 124 & County Road 17/Country Road 17





Lane Group	EBT	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	216	72	115	169	14	36	232	42
v/c Ratio	0.72	0.24	0.27	0.15	0.01	0.05	0.20	0.04
Control Delay	29.5	19.2	10.3	7.5	0.0	7.5	7.8	2.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	29.5	19.2	10.3	7.5	0.0	7.5	7.8	2.5
Queue Length 50th (m)	15.0	5.6	6.1	8.2	0.0	1.6	11.6	0.0
Queue Length 95th (m)	36.0	14.9	19.2	21.0	0.1	6.4	28.3	3.7
Internal Link Dist (m)	2799.2	1348.4		1917.4			634.7	
Turn Bay Length (m)			50.0		10.0	50.0		10.0
Base Capacity (vph)	649	761	419	1154	1001	750	1154	1001
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.33	0.09	0.27	0.15	0.01	0.05	0.20	0.04

Intersection Summary



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	46	43	117	26	24	19	109	161	13	34	220	40
Future Volume (vph)	46	43	117	26	24	19	109	161	13	34	220	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		7.0			7.0		7.0	7.0	7.0	7.0	7.0	7.0
Lane Util. Factor		1.00			1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.92			0.96		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.99			0.98		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1296			1815		1080	1921	1633	1825	1921	1633
Flt Permitted		0.90			0.79		0.61	1.00	1.00	0.65	1.00	1.00
Satd. Flow (perm)		1183			1464		698	1921	1633	1249	1921	1633
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	48	45	123	27	25	20	115	169	14	36	232	42
RTOR Reduction (vph)	0	70	0	0	16	0	0	0	6	0	0	17
Lane Group Flow (vph)	0	146	0	0	56	0	115	169	8	36	232	25
Heavy Vehicles (%)	0%	0%	62%	0%	0%	0%	69%	0%	0%	0%	0%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		6
Actuated Green, G (s)		13.3			13.3		41.2	41.2	41.2	41.2	41.2	41.2
Effective Green, g (s)		13.3			13.3		41.2	41.2	41.2	41.2	41.2	41.2
Actuated g/C Ratio		0.19			0.19		0.60	0.60	0.60	0.60	0.60	0.60
Clearance Time (s)		7.0			7.0		7.0	7.0	7.0	7.0	7.0	7.0
Vehicle Extension (s)		3.0			3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)		229			284		419	1155	982	751	1155	982
v/s Ratio Prot								0.09			0.12	
v/s Ratio Perm		c0.12			0.04		c0.16		0.01	0.03		0.02
v/c Ratio		0.64			0.20		0.27	0.15	0.01	0.05	0.20	0.03
Uniform Delay, d1		25.4			23.1		6.5	6.0	5.5	5.6	6.2	5.5
Progression Factor		1.00			1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		5.7			0.3		1.6	0.3	0.0	0.1	0.4	0.0
Delay (s)		31.1			23.5		8.1	6.2	5.5	5.7	6.6	5.6
Level of Service		C			C		A	A	A	A	A	A
Approach Delay (s)		31.1			23.5			6.9			6.3	
Approach LOS		C			C			A			A	

Intersection Summary			
HCM 2000 Control Delay	13.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.36		
Actuated Cycle Length (s)	68.5	Sum of lost time (s)	14.0
Intersection Capacity Utilization	48.7%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	81	0	1	90	1	5
Future Volume (Veh/h)	81	0	1	90	1	5
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.75	0.75	0.75	0.75	0.75	0.75
Hourly flow rate (vph)	108	0	1	120	1	7
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	70	61			121	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	70	61			121	
tC, single (s)	7.3	6.2			4.1	
tC, 2 stage (s)						
tF (s)	4.3	3.3			2.2	
p0 queue free %	86	100			100	
cM capacity (veh/h)	755	1010			1479	

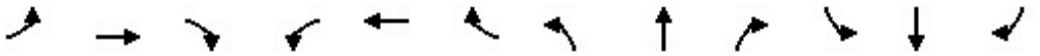
Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	108	121	8
Volume Left	108	0	1
Volume Right	0	120	0
cSH	755	1700	1479
Volume to Capacity	0.14	0.07	0.00
Queue Length 95th (m)	3.8	0.0	0.0
Control Delay (s)	10.6	0.0	0.9
Lane LOS	B		A
Approach Delay (s)	10.6	0.0	0.9
Approach LOS	B		

Intersection Summary			
Average Delay	4.8		
Intersection Capacity Utilization	16.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	0	4	0	0	3
Future Volume (Veh/h)	0	0	4	0	0	3
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)	0	0	5	0	0	3
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	8	5			5	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	8	5			5	
tC, single (s)	7.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	4.4	3.3			2.2	
p0 queue free %	100	100			100	
cM capacity (veh/h)	815	1084			1630	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	0	5	3
Volume Left	0	0	0
Volume Right	0	0	0
cSH	1700	1700	1630
Volume to Capacity	0.00	0.00	0.00
Queue Length 95th (m)	0.0	0.0	0.0
Control Delay (s)	0.0	0.0	0.0
Lane LOS	A		
Approach Delay (s)	0.0	0.0	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	6.7%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	76	6	2	111	37	3	6	6	35	4	6
Future Volume (Veh/h)	0	76	6	2	111	37	3	6	6	35	4	6
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Hourly flow rate (vph)	0	92	7	2	134	45	4	7	7	42	5	7
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	179			99			243	278	96	244	237	134
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	179			99			243	278	96	244	237	134
tC, single (s)	4.1			4.1			7.1	6.5	6.2	8.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	4.4	4.0	3.3
p0 queue free %	100			100			99	99	99	92	99	99
cM capacity (veh/h)	1409			1507			705	632	967	537	666	920

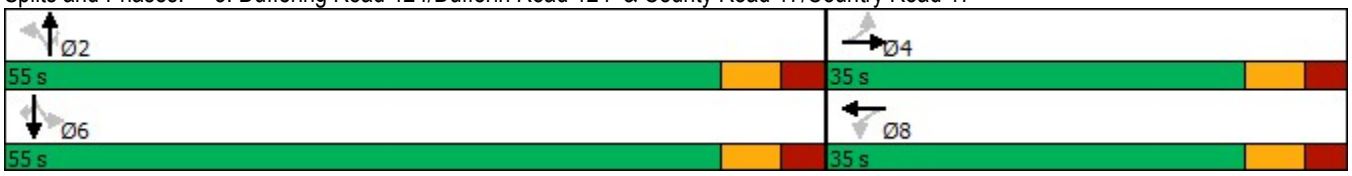
Direction, Lane #	EB 1	WB 1	WB 2	NB 1	SB 1
Volume Total	99	136	45	18	54
Volume Left	0	2	0	4	42
Volume Right	7	0	45	7	7
cSH	1409	1507	1700	750	579
Volume to Capacity	0.00	0.00	0.03	0.02	0.09
Queue Length 95th (m)	0.0	0.0	0.0	0.6	2.3
Control Delay (s)	0.0	0.1	0.0	9.9	11.9
Lane LOS		A		A	B
Approach Delay (s)	0.0	0.1		9.9	11.9
Approach LOS				A	B

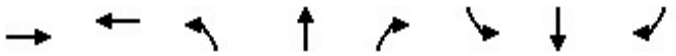
Intersection Summary				
Average Delay	2.4			
Intersection Capacity Utilization	21.8%	ICU Level of Service		A
Analysis Period (min)	15			

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	59	29	12	54	72	235	30	13	167	56
Future Volume (vph)	59	29	12	54	72	235	30	13	167	56
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4		8		2			6	
Permitted Phases	4		8		2		2	6		6
Detector Phase	4	4	8	8	2	2	2	6	6	6
Switch Phase										
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Minimum Split (s)	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0
Total Split (s)	35.0	35.0	35.0	35.0	55.0	55.0	55.0	55.0	55.0	55.0
Total Split (%)	38.9%	38.9%	38.9%	38.9%	61.1%	61.1%	61.1%	61.1%	61.1%	61.1%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lost Time Adjust (s)		0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)		7.0		7.0	7.0	7.0	7.0	7.0	7.0	7.0
Lead/Lag										
Lead-Lag Optimize?										
Recall Mode	None	None	None	None	Max	Max	Max	Max	Max	Max
Act Effct Green (s)		13.0		13.0	48.2	48.2	48.2	48.2	48.2	48.2
Actuated g/C Ratio		0.17		0.17	0.64	0.64	0.64	0.64	0.64	0.64
v/c Ratio		0.66		0.30	0.15	0.21	0.03	0.02	0.15	0.06
Control Delay		36.8		24.2	7.5	7.0	1.6	6.6	6.6	2.2
Queue Delay		0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		36.8		24.2	7.5	7.0	1.6	6.6	6.6	2.2
LOS		D		C	A	A	A	A	A	A
Approach Delay		36.8		24.2		6.6			5.6	
Approach LOS		D		C		A			A	

Intersection Summary	
Cycle Length: 90	
Actuated Cycle Length: 75.2	
Natural Cycle: 40	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.66	
Intersection Signal Delay: 13.3	Intersection LOS: B
Intersection Capacity Utilization 50.0%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 3: Duffering Road 124/Dufferin Road 124 & County Road 17/Country Road 17





Lane Group	EBT	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	148	96	79	258	33	14	184	62
v/c Ratio	0.66	0.30	0.15	0.21	0.03	0.02	0.15	0.06
Control Delay	36.8	24.2	7.5	7.0	1.6	6.6	6.6	2.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	36.8	24.2	7.5	7.0	1.6	6.6	6.6	2.2
Queue Length 50th (m)	15.4	9.5	3.8	13.1	0.0	0.6	9.0	0.0
Queue Length 95th (m)	32.9	21.3	11.7	29.4	2.3	3.1	21.2	4.5
Internal Link Dist (m)	2799.2	1348.4		1917.4			634.7	
Turn Bay Length (m)			50.0		10.0	50.0		10.0
Base Capacity (vph)	451	665	539	1230	1063	738	1230	1068
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.33	0.14	0.15	0.21	0.03	0.02	0.15	0.06

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	59	29	46	12	54	22	72	235	30	13	167	56
Future Volume (vph)	59	29	46	12	54	22	72	235	30	13	167	56
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		7.0			7.0		7.0	7.0	7.0	7.0	7.0	7.0
Lane Util. Factor		1.00			1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.95			0.97		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.98			0.99		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1394			1844		1250	1921	1633	1825	1921	1633
Flt Permitted		0.81			0.94		0.64	1.00	1.00	0.60	1.00	1.00
Satd. Flow (perm)		1158			1751		844	1921	1633	1152	1921	1633
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	65	32	51	13	59	24	79	258	33	14	184	62
RTOR Reduction (vph)	0	26	0	0	16	0	0	0	12	0	0	22
Lane Group Flow (vph)	0	122	0	0	80	0	79	258	21	14	184	40
Heavy Vehicles (%)	0%	0%	83%	0%	0%	0%	46%	0%	0%	0%	0%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		6
Actuated Green, G (s)		13.0			13.0		48.2	48.2	48.2	48.2	48.2	48.2
Effective Green, g (s)		13.0			13.0		48.2	48.2	48.2	48.2	48.2	48.2
Actuated g/C Ratio		0.17			0.17		0.64	0.64	0.64	0.64	0.64	0.64
Clearance Time (s)		7.0			7.0		7.0	7.0	7.0	7.0	7.0	7.0
Vehicle Extension (s)		3.0			3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)		200			302		540	1231	1046	738	1231	1046
v/s Ratio Prot								c0.13			0.10	
v/s Ratio Perm		c0.11			0.05		0.09		0.01	0.01		0.02
v/c Ratio		0.61			0.27		0.15	0.21	0.02	0.02	0.15	0.04
Uniform Delay, d1		28.8			27.0		5.3	5.6	4.9	4.9	5.4	5.0
Progression Factor		1.00			1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		5.4			0.5		0.6	0.4	0.0	0.0	0.3	0.1
Delay (s)		34.2			27.4		5.9	6.0	4.9	5.0	5.6	5.0
Level of Service		C			C		A	A	A	A	A	A
Approach Delay (s)		34.2			27.4			5.9			5.4	
Approach LOS		C			C			A			A	

Intersection Summary			
HCM 2000 Control Delay	12.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.29		
Actuated Cycle Length (s)	75.2	Sum of lost time (s)	14.0
Intersection Capacity Utilization	50.0%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

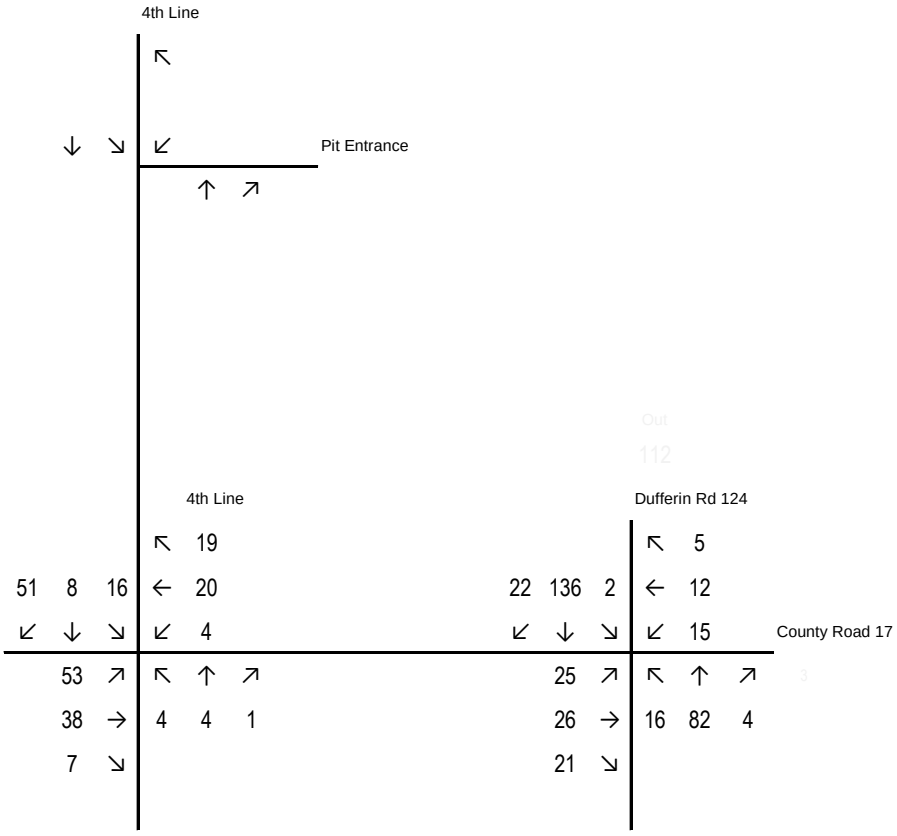
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	42	0	4	39	0	3
Future Volume (Veh/h)	42	0	4	39	0	3
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.75	0.75	0.75	0.75	0.75	0.75
Hourly flow rate (vph)	56	0	5	52	0	4
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	35	31			57	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	35	31			57	
tC, single (s)	7.1	6.2			4.1	
tC, 2 stage (s)						
tF (s)	4.2	3.3			2.2	
p0 queue free %	93	100			100	
cM capacity (veh/h)	823	1049			1560	

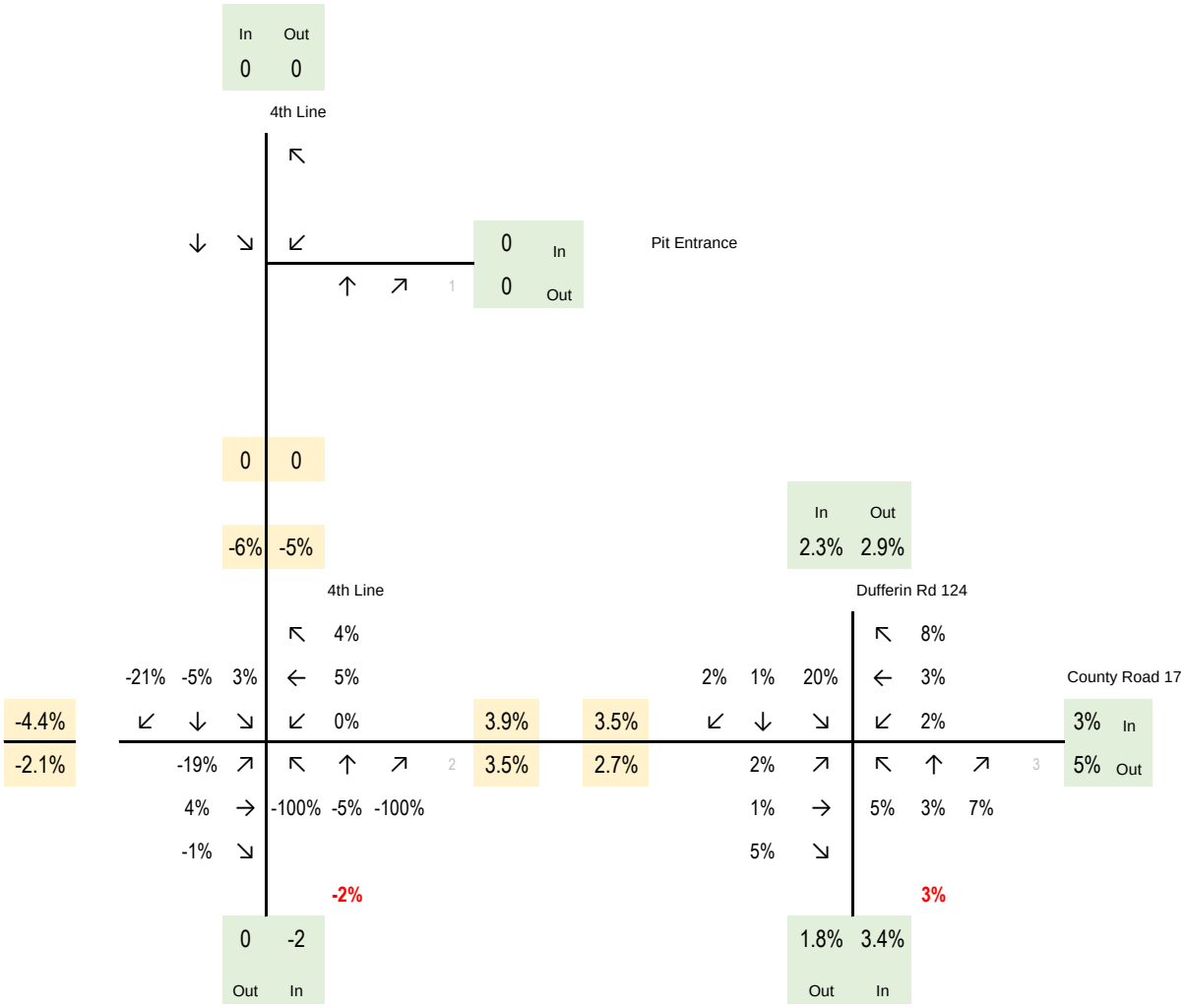
Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	56	57	4
Volume Left	56	0	0
Volume Right	0	52	0
cSH	823	1700	1560
Volume to Capacity	0.07	0.03	0.00
Queue Length 95th (m)	1.7	0.0	0.0
Control Delay (s)	9.7	0.0	0.0
Lane LOS	A		
Approach Delay (s)	9.7	0.0	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	4.6		
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		

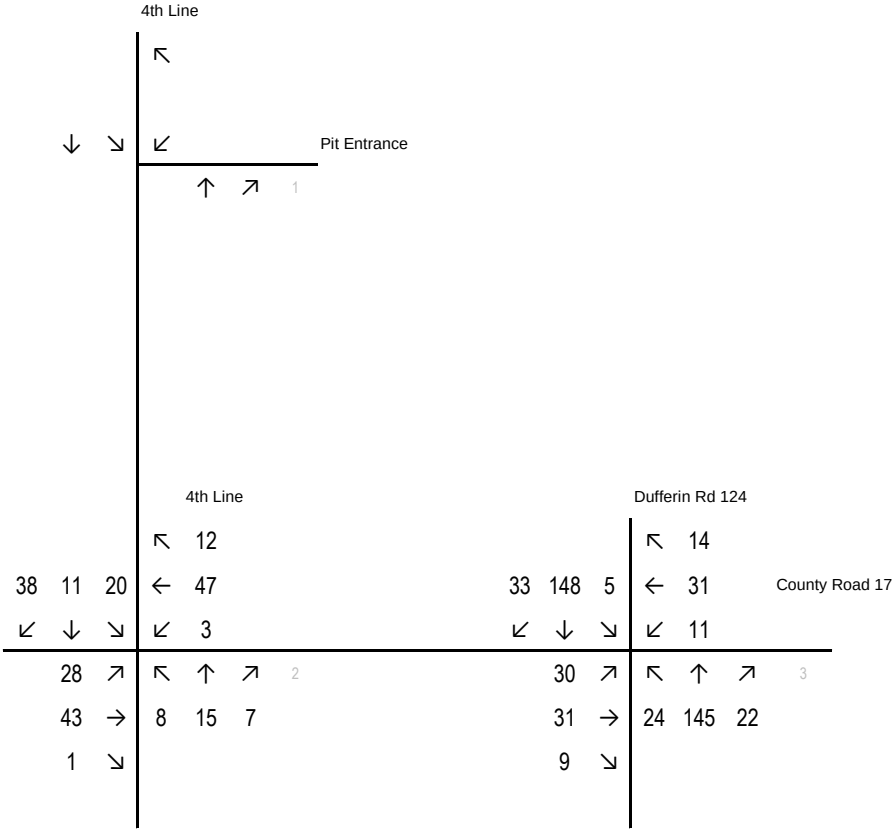
Appendix D: Growth Rate Calculations (2008 to 2022)

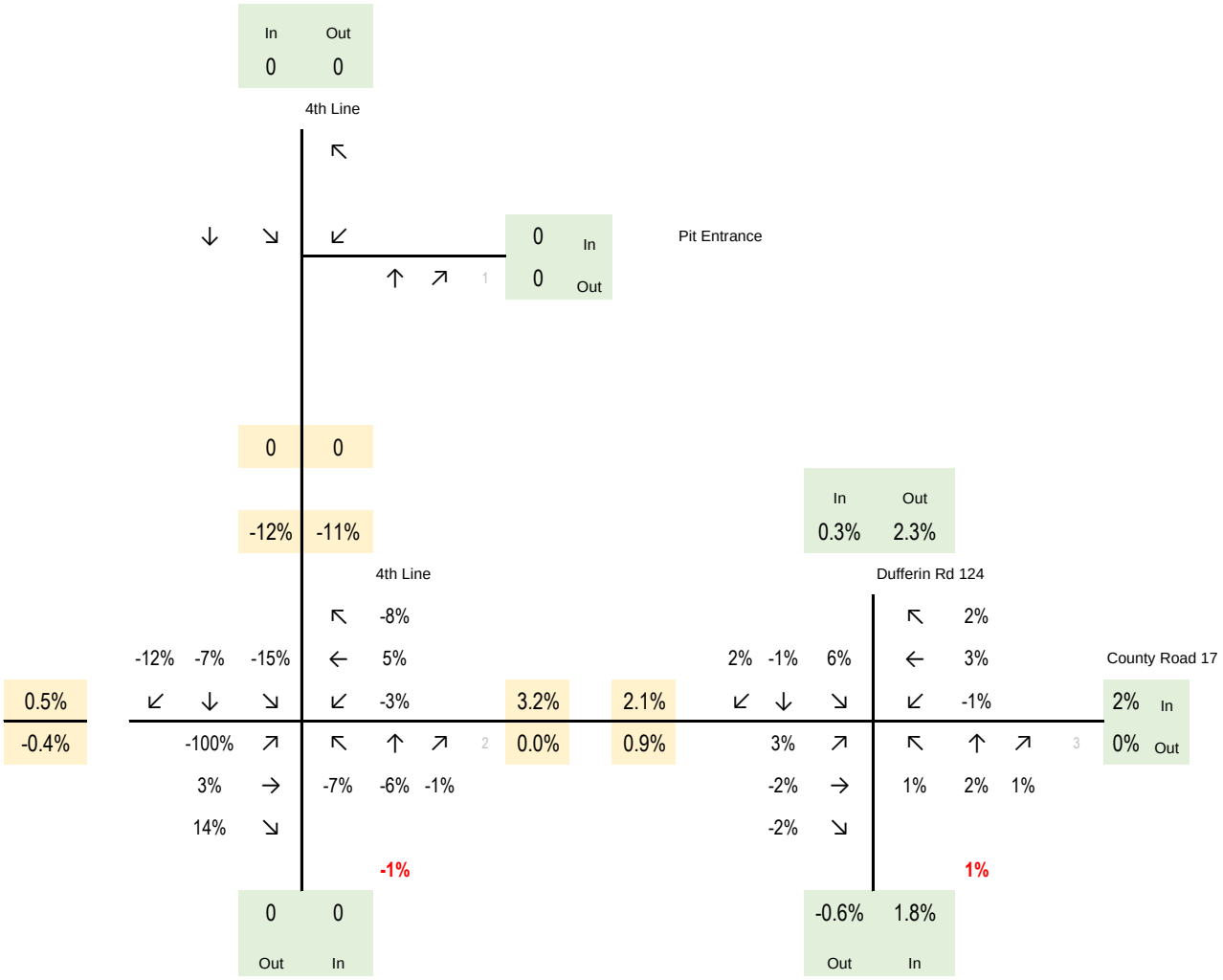
Date: August 6, 2008




In
Out
0
0
4th Line
0
In
0
Out
Pit Entrance
1
0
0
In
Out
2.3%
2.9%
-6%
-5%
4th Line
Dufferin Rd 124
4%
8%
-21%
-5%
3%
5%
3%
2%
1%
20%
County Road 17
-4.4%
0%
3.9%
3.5%
2%
3%
In
-2.1%
-19%
2
3.5%
2.7%
2%
3
5%
Out
4%
-100%
-5%
-100%
1%
5%
3%
7%
-1%
5%
-2%
3%
0
-2
1.8%
3.4%
Out
In
Out
In

Date: August 6, 2008




In
Out
0
0
4th Line
0
In
0
Out
Pit Entrance
1
0
0
In
Out
0.3%
2.3%
-12%
-11%
4th Line
Dufferin Rd 124
-8%
2%
-12%
-7%
-15%
5%
2%
-1%
6%
3%
County Road 17
0.5%
-3%
3.2%
2.1%
-1%
2%
In
-0.4%
-100%
2
0.0%
0.9%
3%
3
0%
Out
3%
-7%
-6%
-1%
-2%
1%
2%
1%
14%
-2%
-1%
1%
0
0
-0.6%
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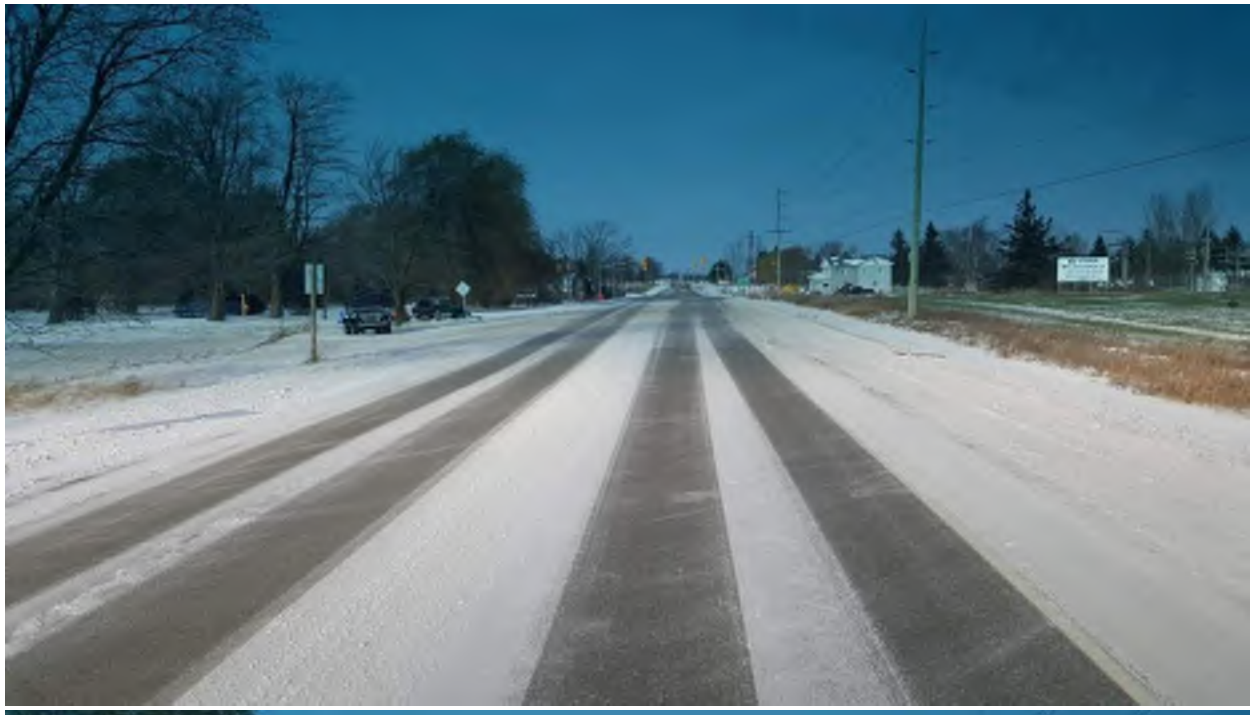
In

Appendix E: Haul Route Photo Inventory

South of County Road 124 to

County Road124 & County Road 17

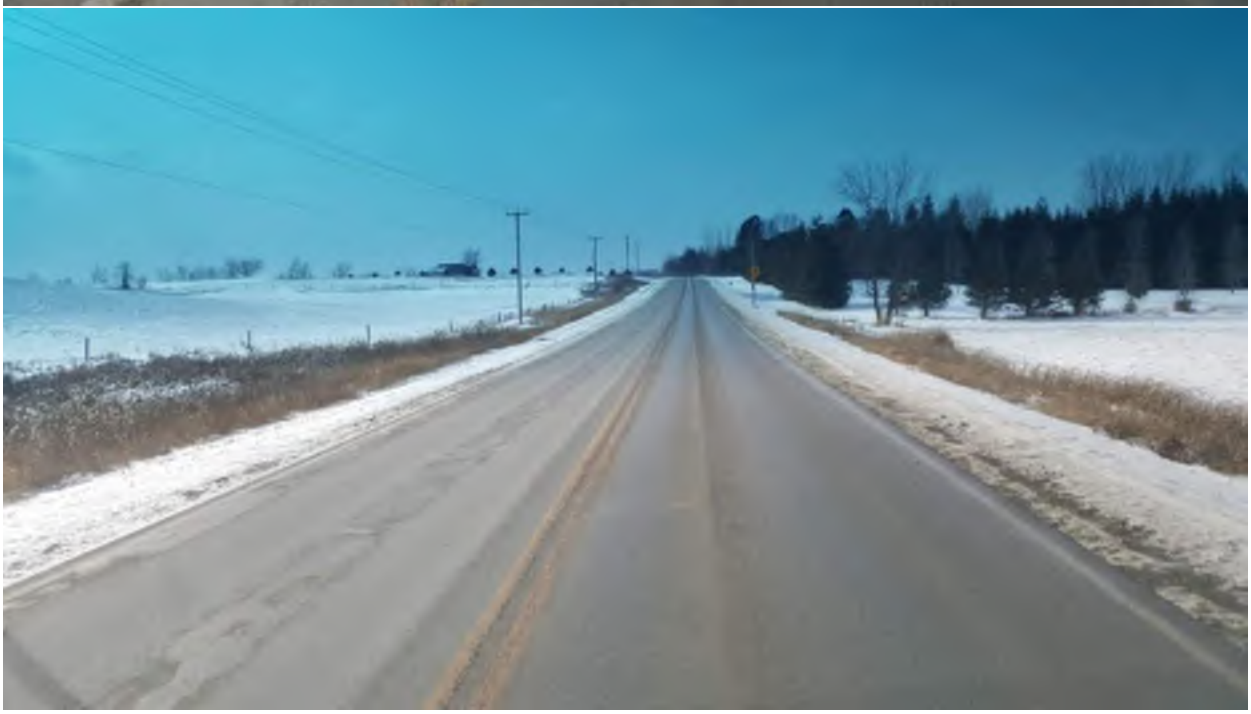


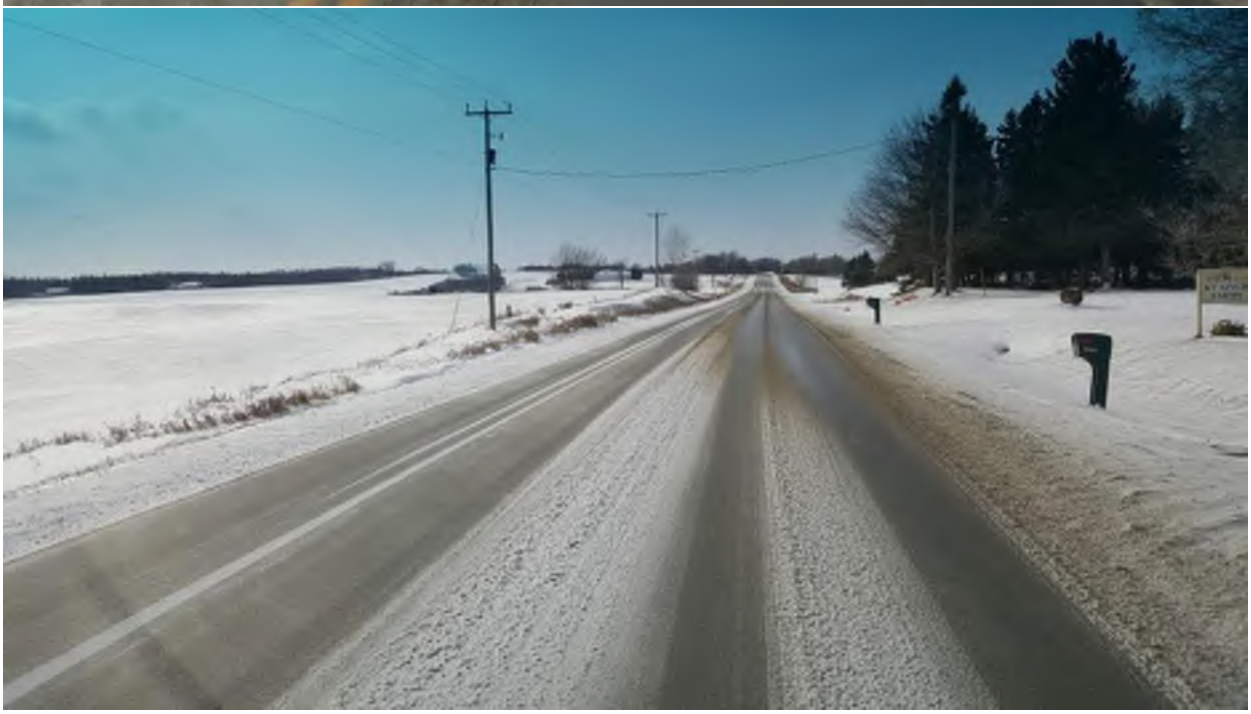
County Road 124 & County Road 17 to
South of County Road 124

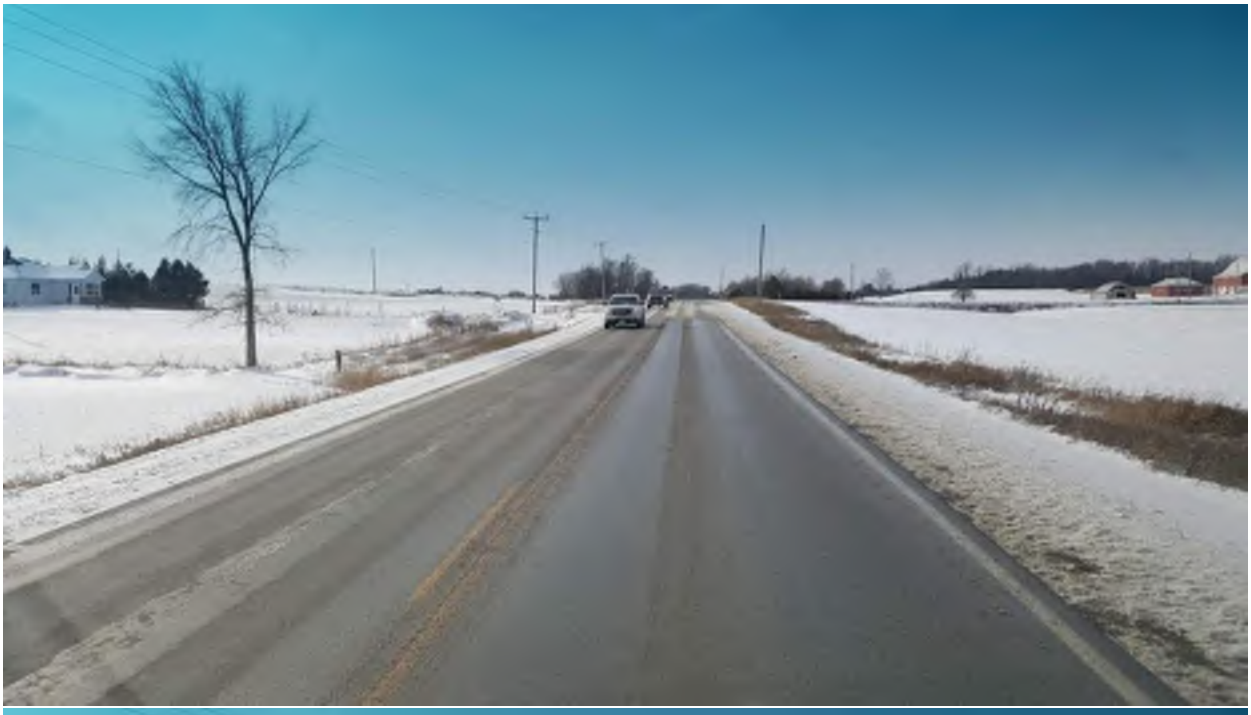

Your Ad Here
1-800-268-9999

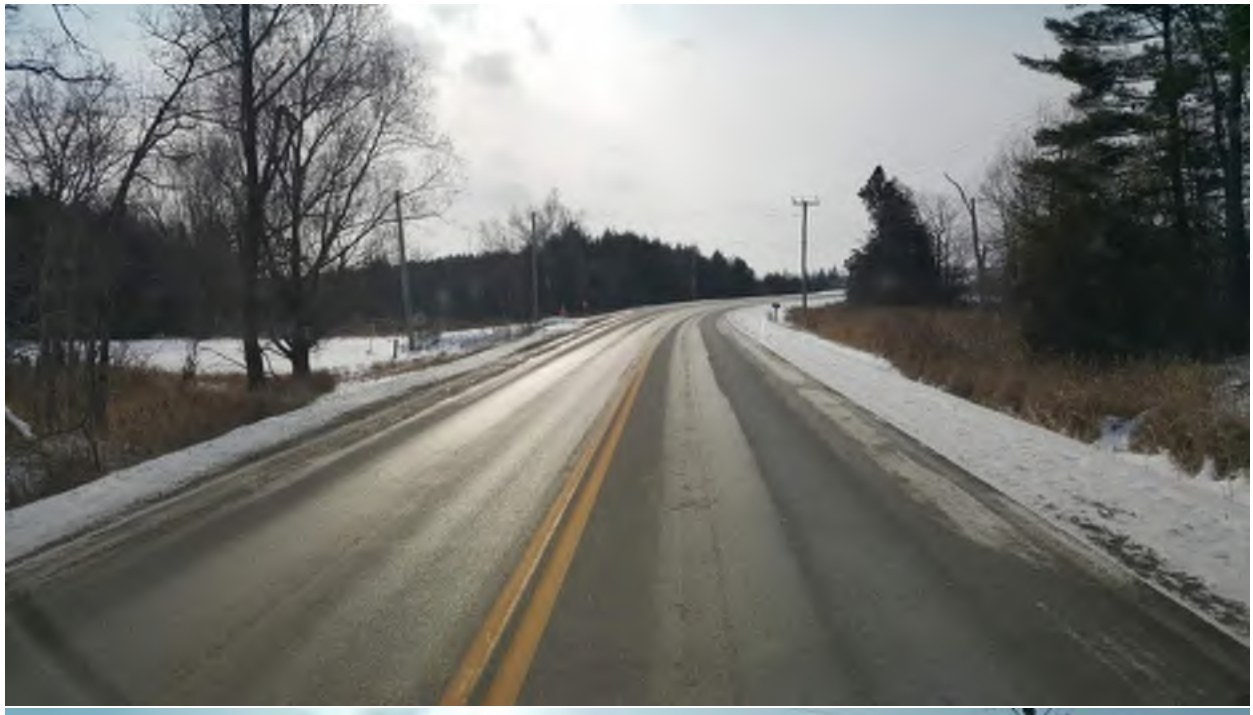
County Road 124 & County Road 17 to
County Road 17 & 4th Line

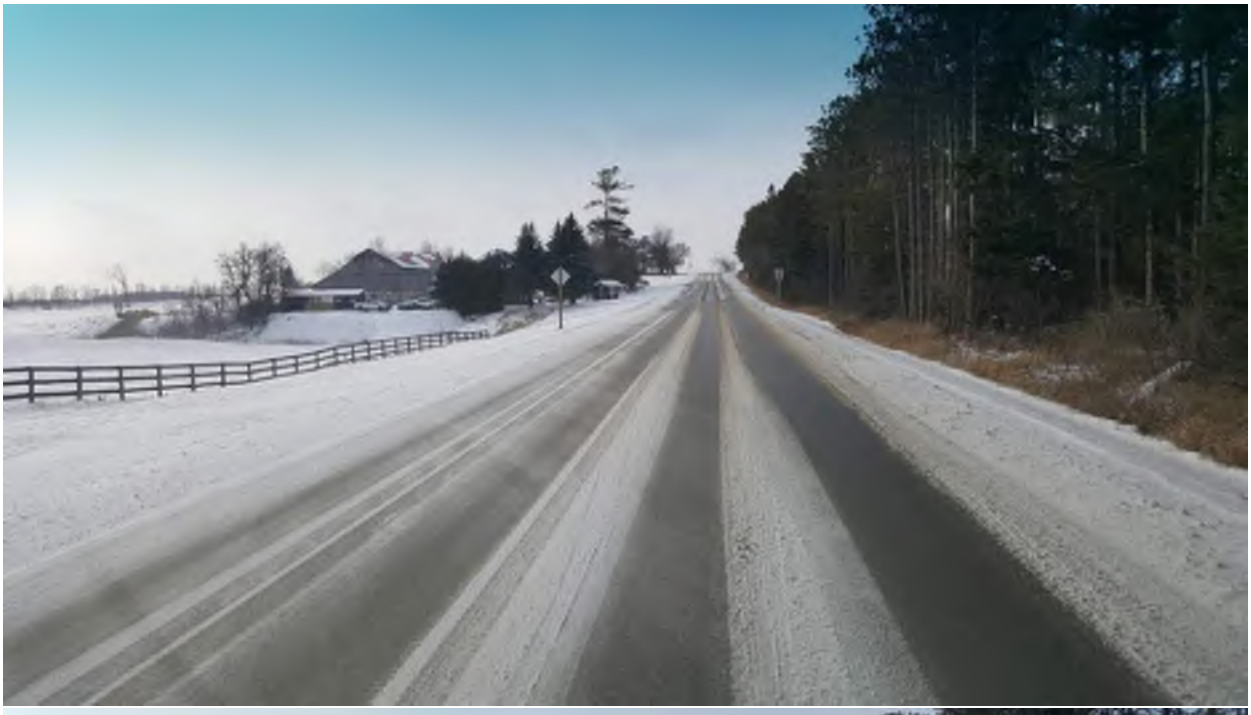

80
17

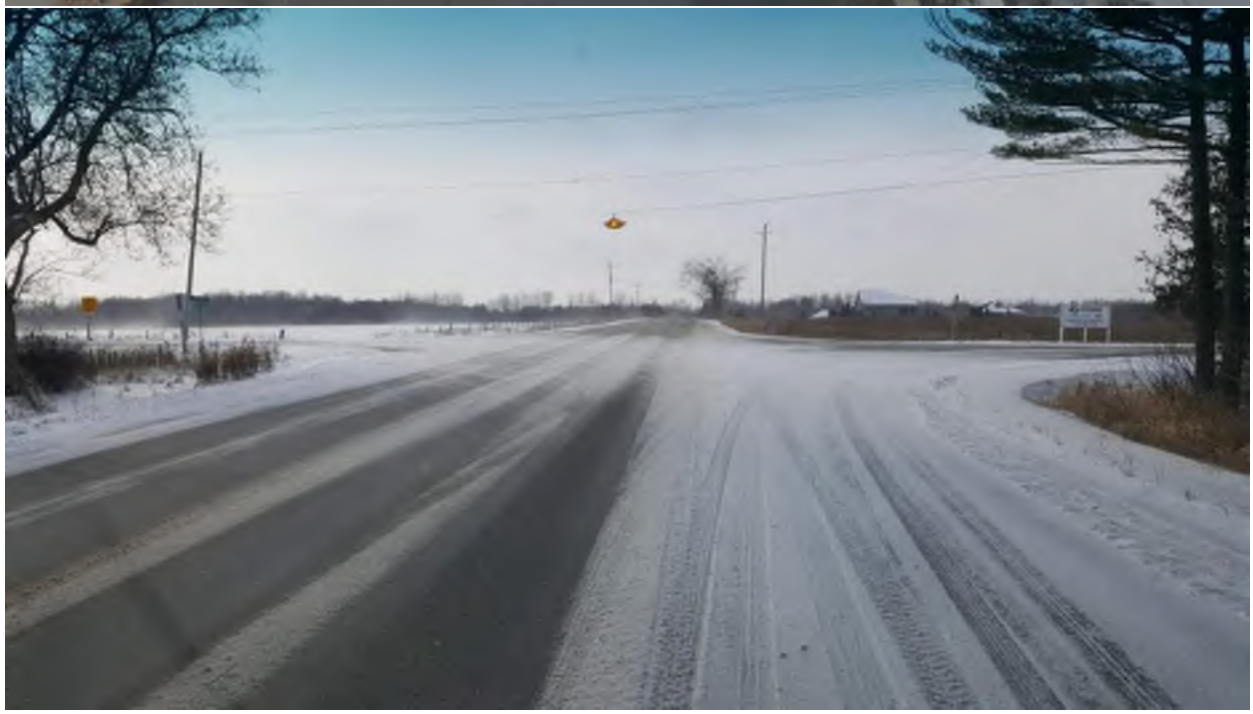






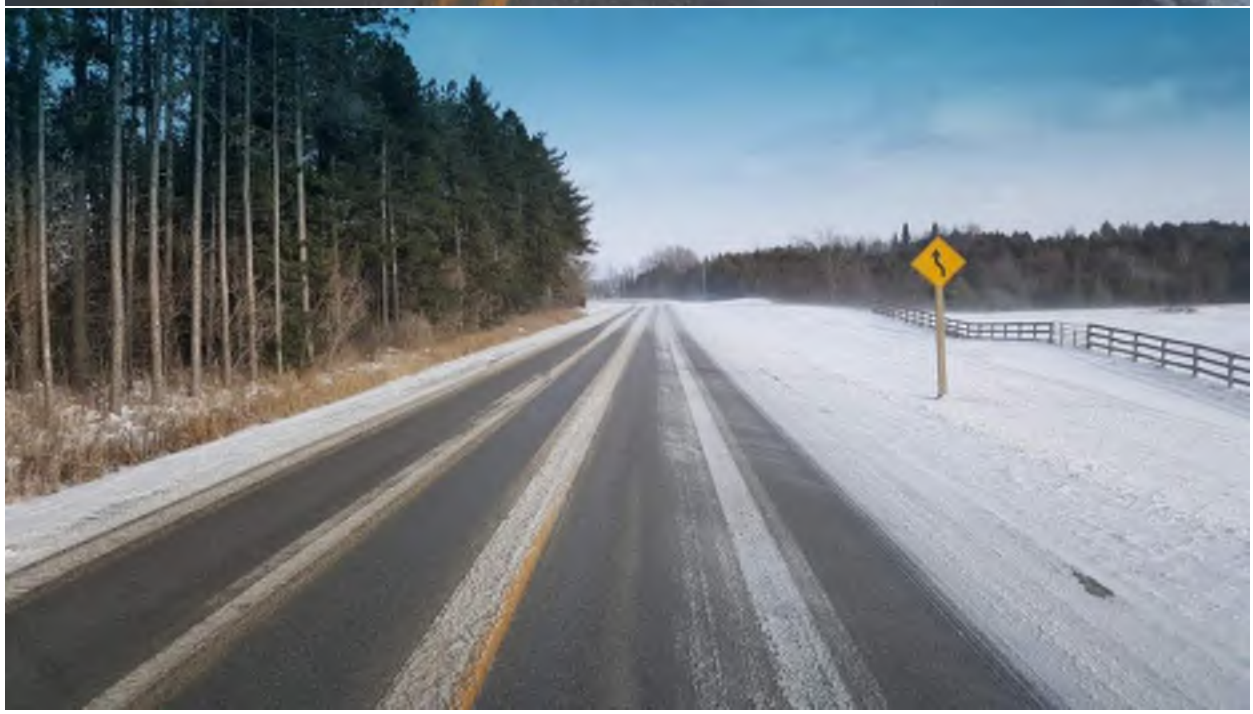


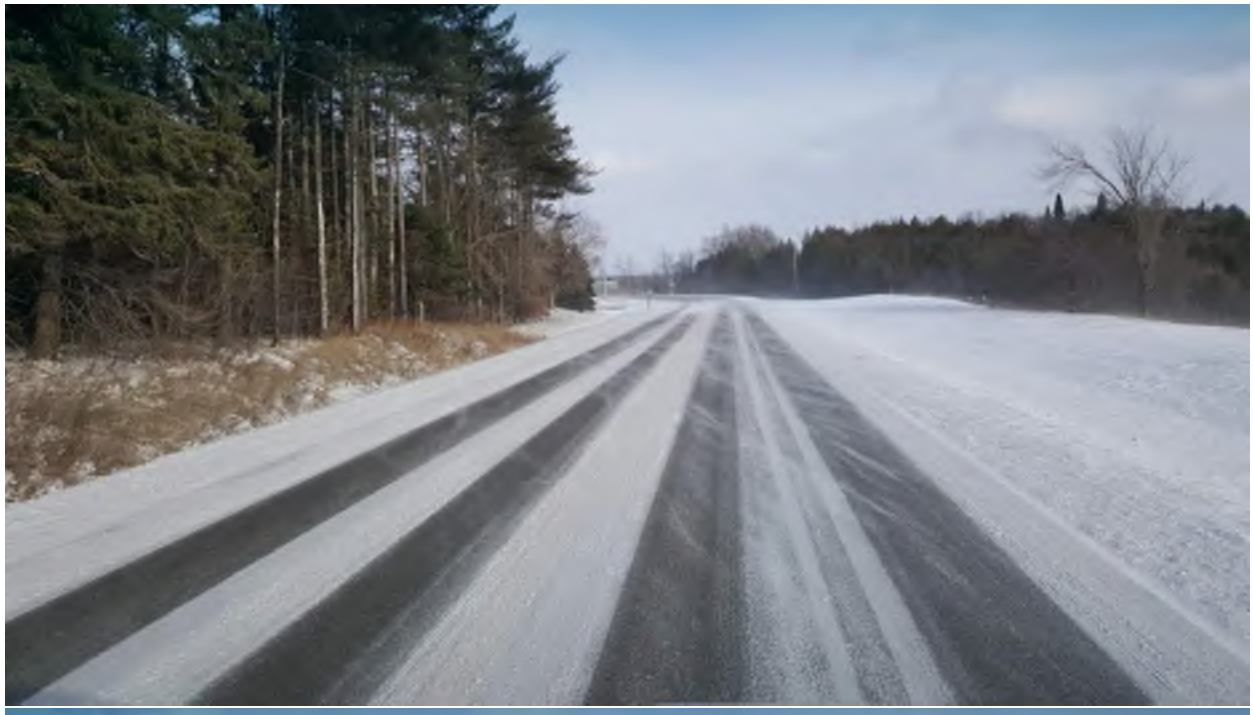


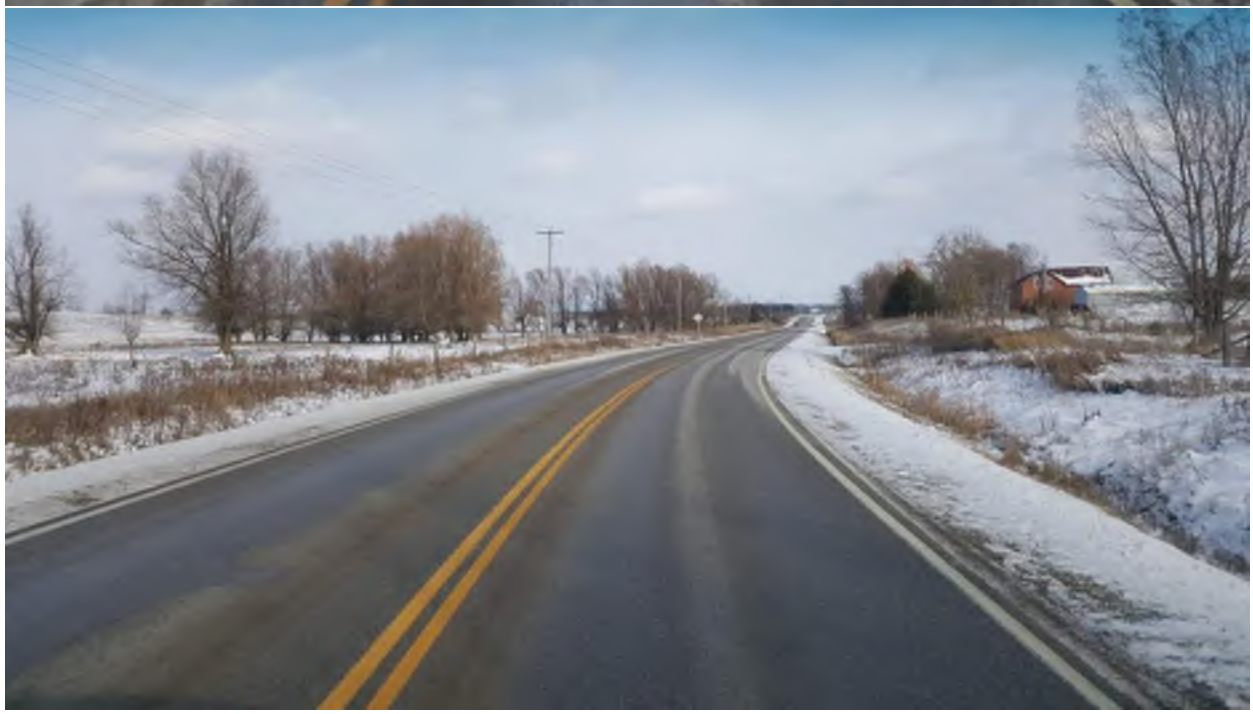


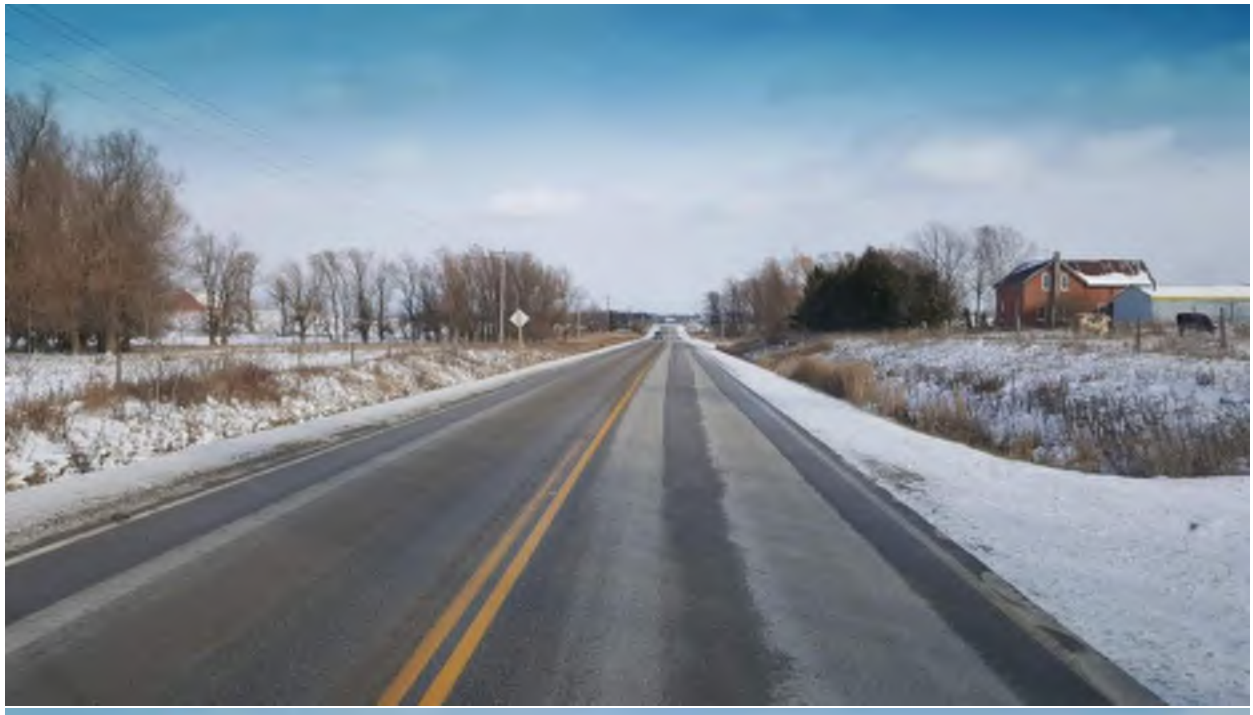
County Road 17 & 4th Line to County Road 124 & County Road 17

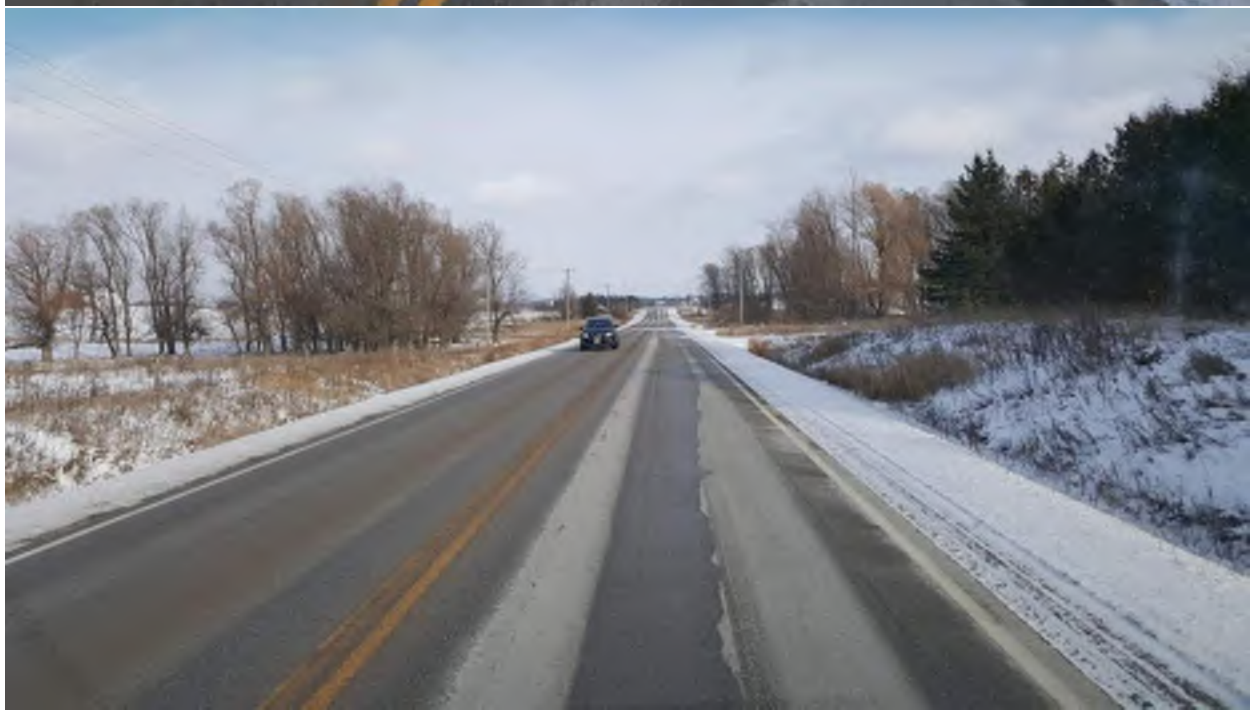

80

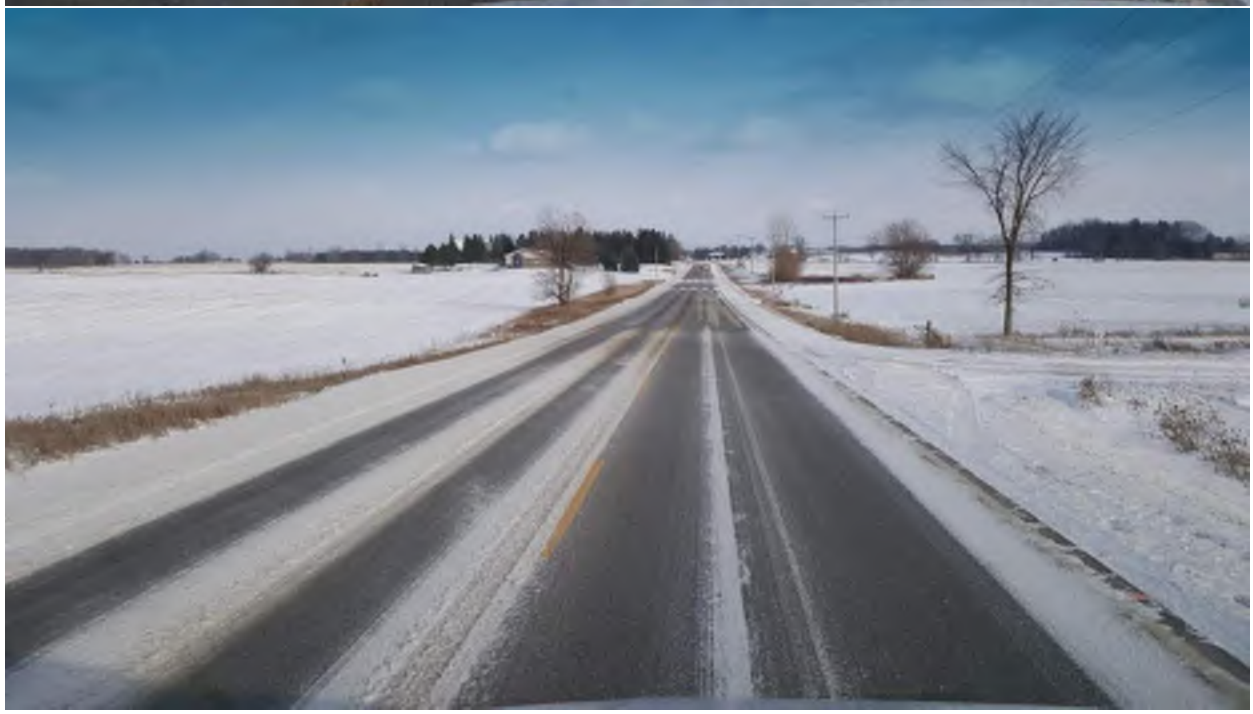


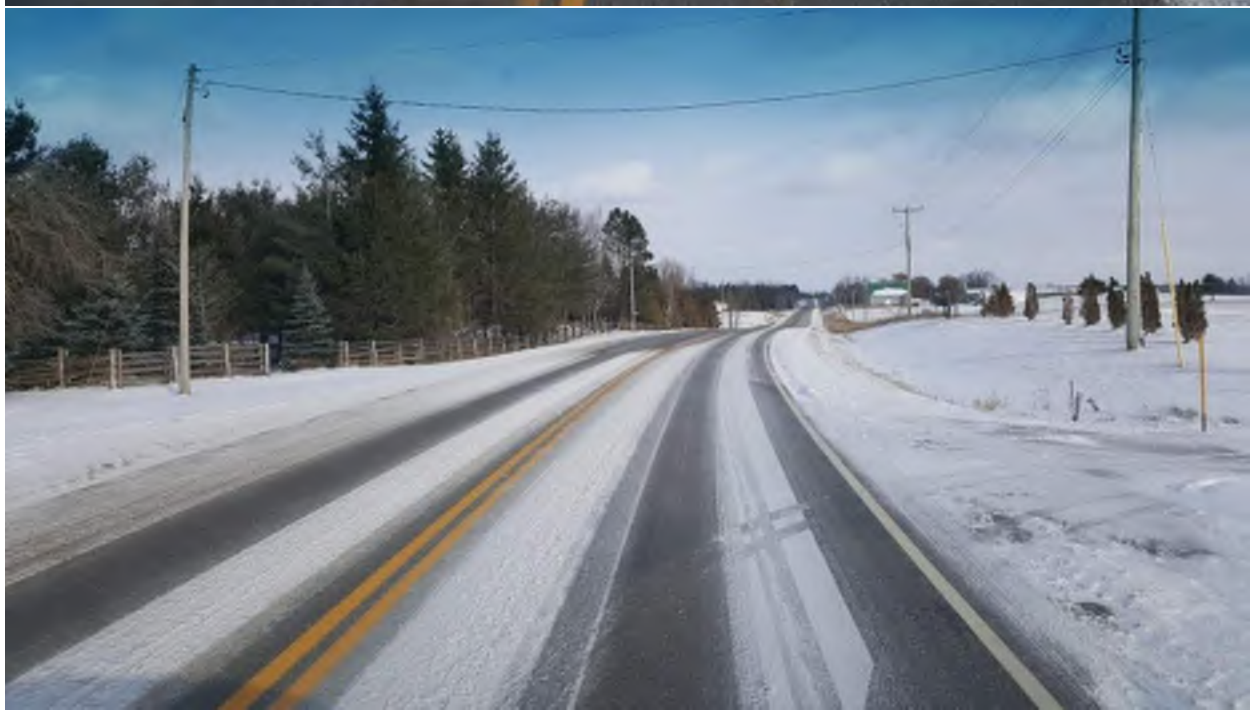


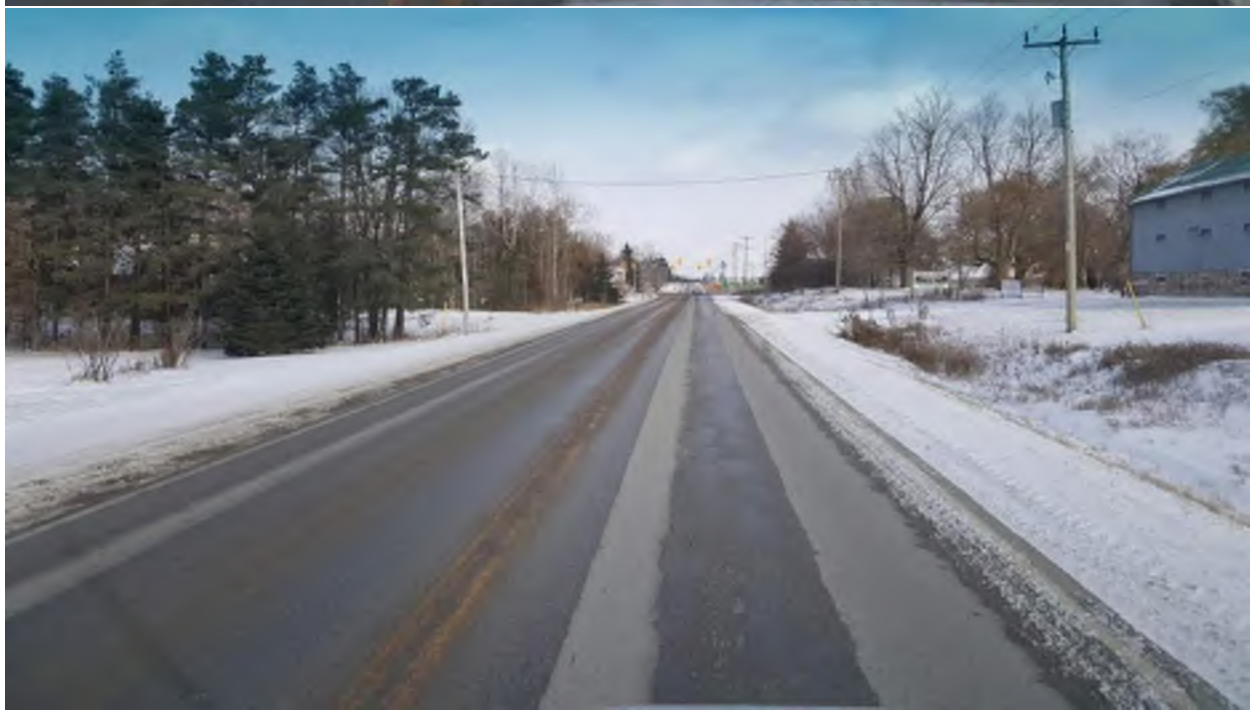






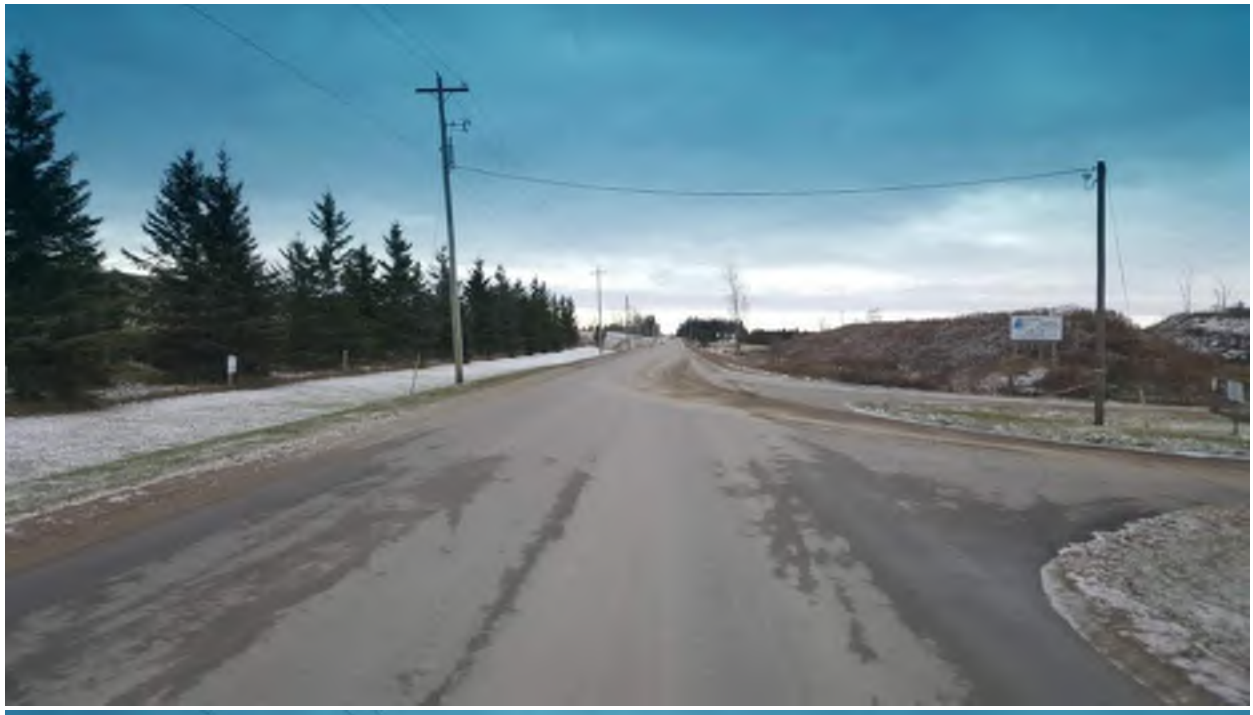


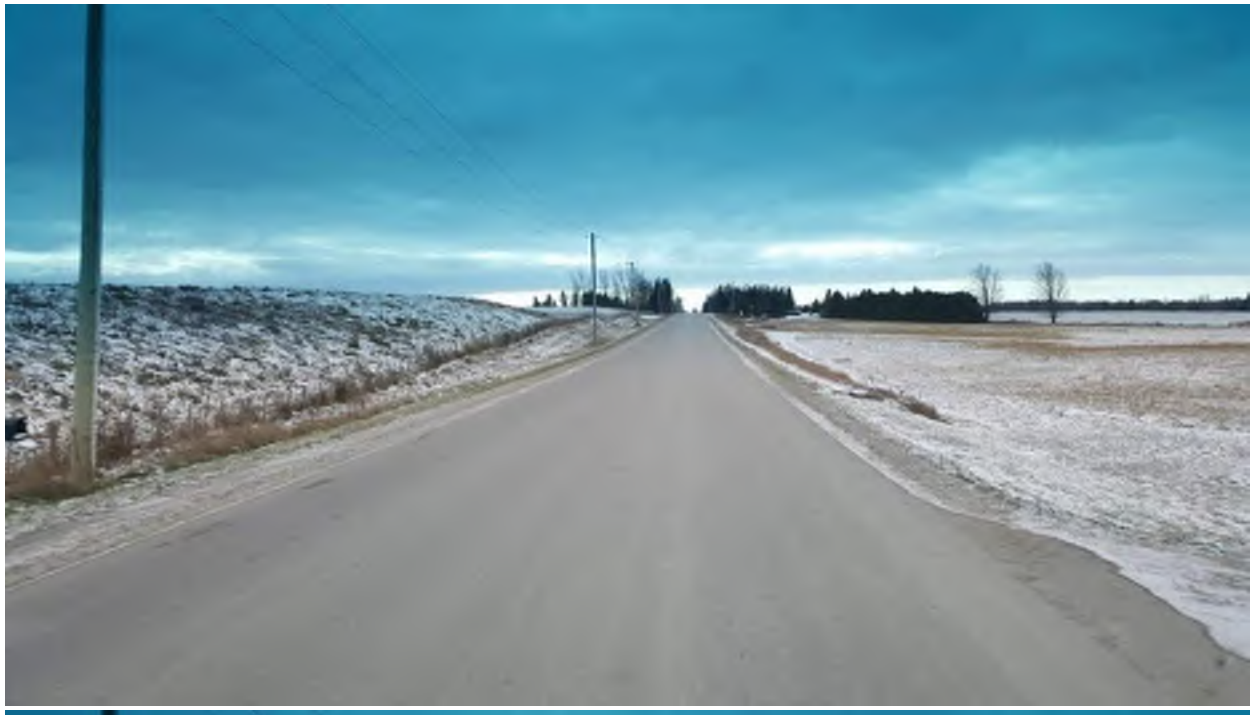


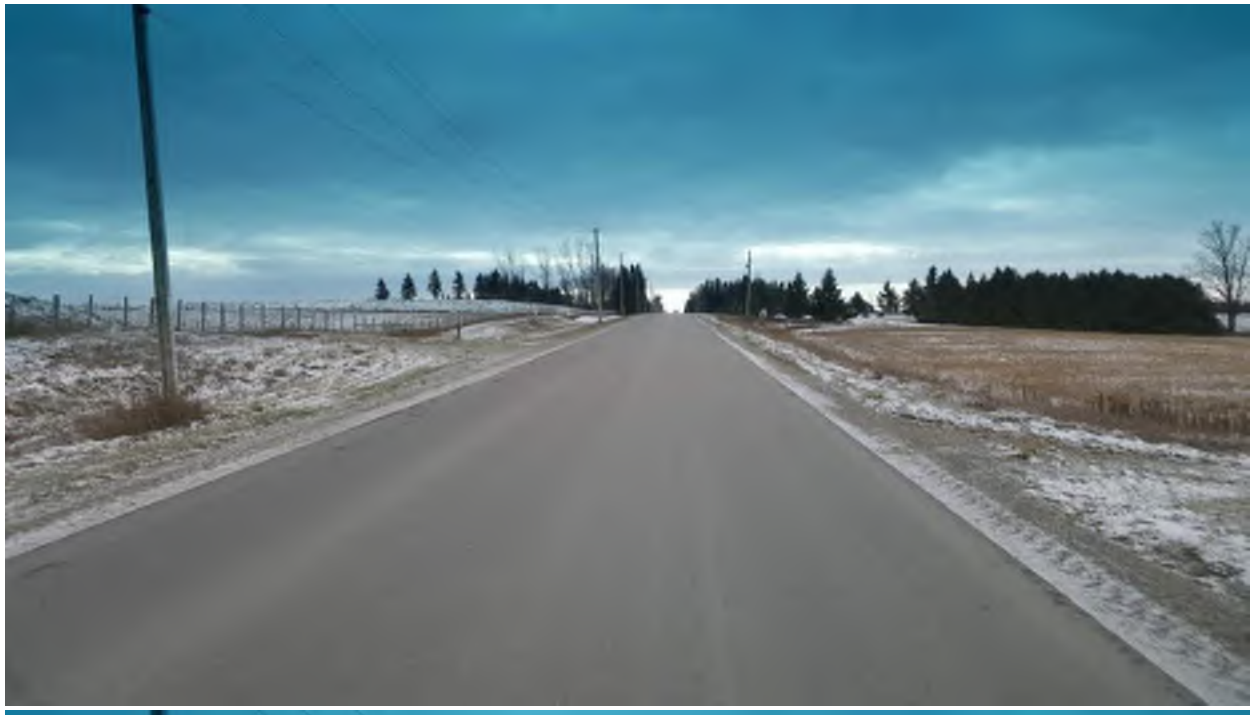


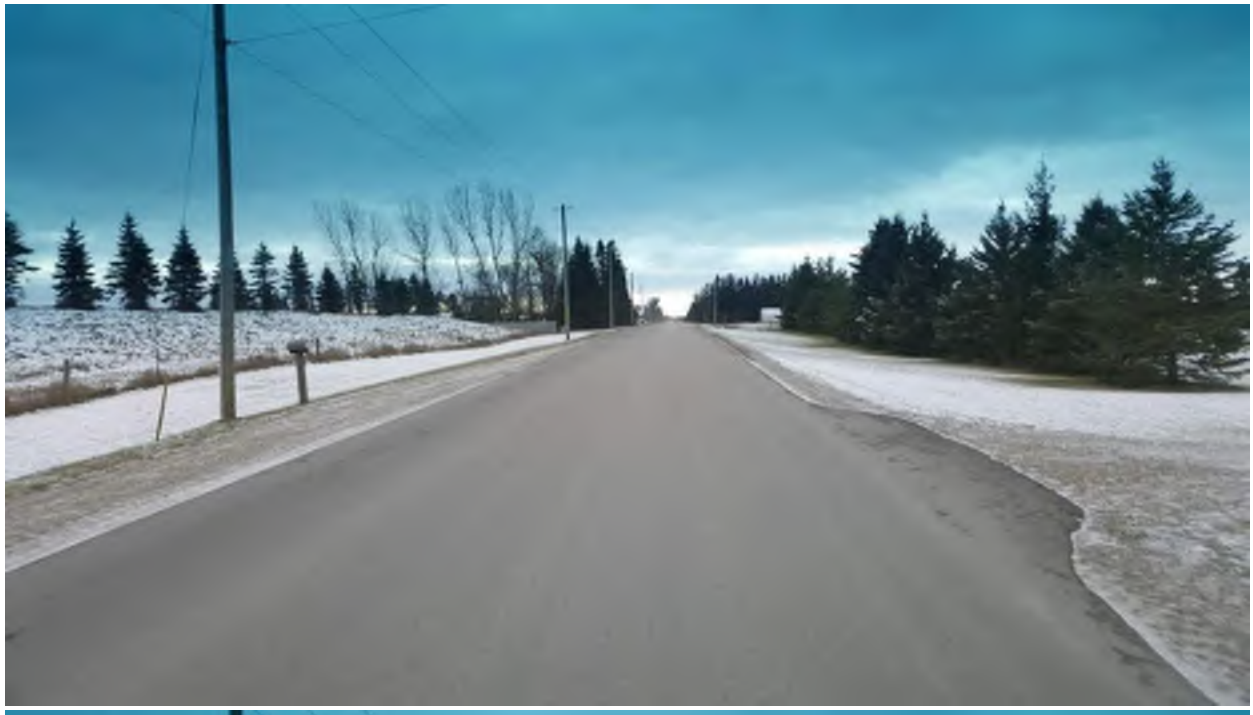
County Road 17 & 4th Line to 4th Line & Pit Entrance

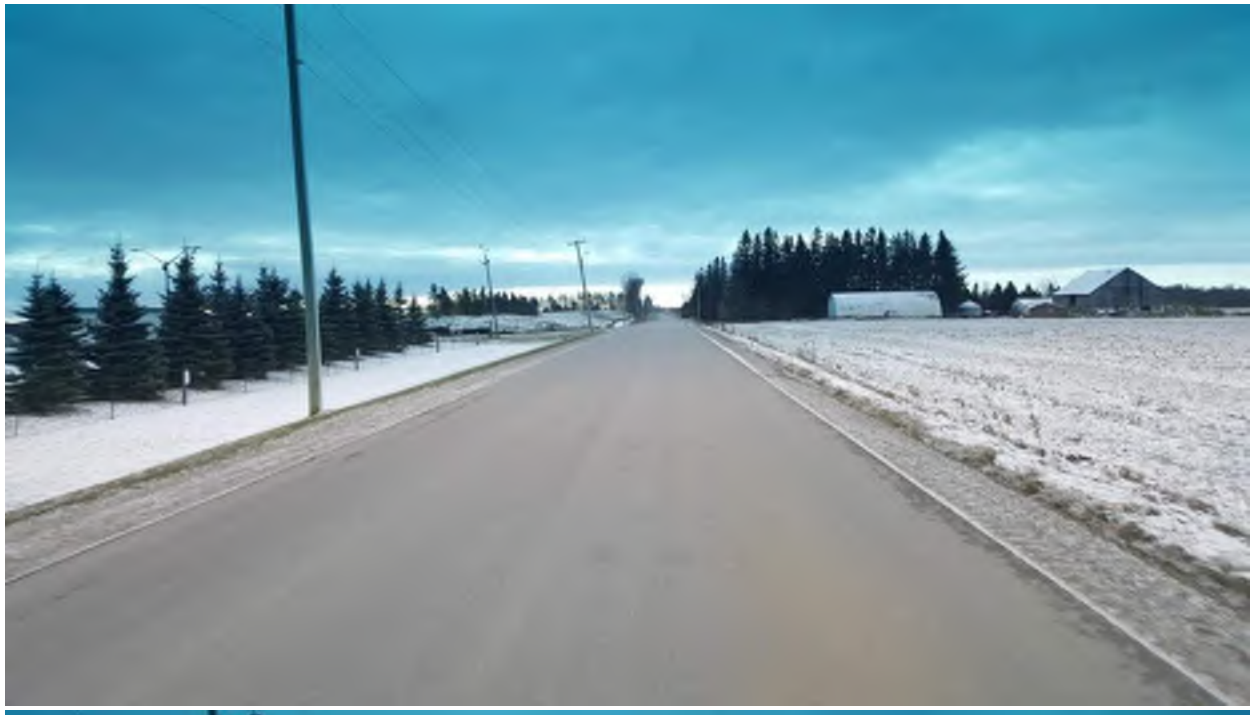
4th Line & Pit Entrance to County Road 17 & 4th Line












STOP

Appendix F: CVs

Adam Beausoleil, P.ENG.

Project Manager

Adam is a Senior Traffic Engineer who specializes in traffic operations and signal coordination, parking supply and design, Transportation Demand Management (TDM), site design and circulation, haul route studies, pedestrian/cyclist analysis, safety, functional designs, collision analysis, and microsimulation.

Adam has extensive experience preparing Transportation Impact Studies (TIS) throughout Canada but predominantly in Ontario and primarily within the Greater Toronto Area, and is familiar with the standard processes and approaches for the preparation of Traffic Impact Studies including guidelines from various review agencies such as the Ministry of Transportation of Ontario and various municipalities. Adam has also supported the traffic components of Environmental Assessments, Transportation Master Plans, and Secondary Plan Studies.

Adam has worked on several projects that involve truck activity including weigh scale data processing of vehicles to develop trip rates based on tonnage received, processed, or shipped. These land uses include quarries/pits and waste transfer stations and typically are associated with license approvals to extend operating life of the facility or to increase tonnage limits.

Adam has performed swept path analysis for various land uses in various configurations and for a multitude of design vehicles. His input has helped shape site plans and ensured that the site is accessible and maneuverable by all vehicles.

EDUCATION

B.A.Sc. Civil Engineering, University of Toronto, 2009

REGISTRATIONS

Registered Professional Engineer (P.Eng.), with the Professional Engineers of Ontario (PEO), member since 2015, License No. 100176636

INDUSTRY TENURE

14 Years

RELEVANT EXPERIENCE

Strada Aggregates, Melancthon Pit, (2022)

Melancthon, Ontario, Canada

Technical Lead. HDR prepared a Transportation Impact Study in support of an increase to tonnage extraction limits for the Strada Aggregates pit in Melancthon. The study involved forecasting traffic volumes and testing operations, but also included a review of pavement markings and signage recommendations to support the quarry operations.

A follow-up assessment was also undertaken following the original Transportation Impact Study. A new Transportation Impact Study for further increases to the facility tonnage capacity is currently being pursued and HDR is preparing the Transportation Impact Study for that capacity increase. Adam was responsible for the technical delivery of the project including the documentation and reporting, and communications with the client.

H&H Construction, Pembroke Quarry Transportation Impact Study, (2022)

Pembroke, Ontario, Canada

Technical Lead. HDR prepared a Transportation Impact Study in support

of an increase to the yearly tonnage extraction limit at Pembroke Quarry. The site has been required to stop extraction early in the year as a result of reaching the yearly extraction limit and H&H was seeking an increase to the extraction limit to allow continuing operations. The transportation study forecasted the future traffic demand by scaling up site traffic to be representative of a high volume day, with the understanding that the actual day-to-day operations would not be expected to change, and the yearly increase would permit the site to continue operating without impacts to the surrounding network.

The analysis was based on processing the weigh scale data provided by H&H. Additionally, a safety review was undertaken for the primary haul route to the facility. Adam was responsible for the technical delivery of the project including the documentation and reporting, and communications with the client.

Palmer Construction Group, Third Line Pit & Quarry Expansion, (2013)

Saulte Ste. Marie, Ontario, Canada

Technical Lead. The scope of work included the assessment of the impacts of quarry extraction expansion, specifically in terms of the additional truck traffic that would be generated, as well as a review of potential haul routes to be used when transferring the new quantities. The quarry is located in the City of Saulte Ste. Marie and trucks are forced to travel through the City to access the highway or the harbour, where the extracted material would be ultimately destined.

As part of the haul route assessment and analysis of impacts, collision history was reviewed to help determine the preferred haul routes and to proposed mitigating measures. Traffic operations and social impacts were also considered. Adam was responsible for the technical traffic analysis and collision history review, including documentation.

Durham Region, Oshawa Waste Management Facility Reconfiguration and Optimization Design, (2022)

Durham Region, Ontario, Canada

Traffic Technical Lead. HDR was retained to assist in the reconfiguration and optimization of the existing Ritson Road Waste Management Facility in Oshawa. The facility serves residents within the Region and the catchment area and population that the facility serves is expected to increase over the foreseeable future. The facility occasionally experiences very high demand and operates at capacity. Traffic entering the site and passing through the inbound weigh scale can queue back on to Ritson Road, despite a long driveway into the site, and this has cascading traffic impacts upstream from the facility. Therefore, there is a need to increase the processing capabilities to protect for future demand.

HDR prepared three alternative facility configurations which represented a range of cost impacts and varying degrees of impacts to the site design. The less expensive option maintained a larger proportion of the current facility design and major infrastructure, such as the location of the inbound weigh scale, the compacting building, and the existing tipping locations. The more expensive options included relocation of these major pieces of infrastructure within the site to allow for higher internal capacity and more efficient movement of vehicles.

HDR’s team assisted in the development of the alternative configurations

by testing vehicle maneuverability using AutoTurn software and reviewing conflict potential. The future hourly processing capacity each alternative facility configuration was also estimated by first developing and calibrating a spreadsheet model of the facility that reflected the number of tipping locations, the average on-site dwell times for vehicles, and the average scale times.

Once the existing model was calibrated, the model was carried forward to test future alternatives and to estimate future capacity. This was then used to develop a SimTraffic microsimulation model that emulated facility processing ability to estimate inbound queues, identify the locations of facility bottlenecks, and to confirm the facility processing capability for each alternative, and the potential impacts to Ritson Road from the perspective of inbound queue spillback.

Adam performed all of the traffic technical analysis including forecasting future demand, preparation of the simulation model, calibration of the model, and assisted in the concept plan development by performing swept path analysis and determining queue requirements.

Regional Municipality of Halton, Halton Waste Management Site Land Use Study (2023)

Halton Region, Ontario, Canada

Traffic Analysis Technical Lead. HDR was retained by the Region of Halton to prepare a land use study for the existing and operating waste management site to accommodate the facility growth into the future using population and employment estimates provided by the Region. The site is currently experiencing congestion and is operating at capacity during peak times, resulting in on-site congestion, confusion for the public, delays to commercial vehicles, and causing traffic operations along the Regional Road 25 due to the queue spillback from the inbound weigh scales.

HDR developed site layouts which utilized the existing infrastructure and expanded on the site to provide greater future capacity while also making traffic flow on-site more efficient and increasing the overall capacity. A microsimulation model was prepared to estimate queues at major delay points within the facility to validate the preferred site layout and recommendations were made regarding the number of inbound and outbound weigh scales based on the observed processing times. Adam oversaw and performed portions of the technical traffic analysis for this study including assisting with the site plan development and preparation of vehicle maneuvering diagrams, and documentation.

Waste Management of Canada Corporation, Twin Creeks Landfill Expansion Environmental Assessment (2022-2023)

Watford, Ontario, Canada

Technical Coordinator. The project scope included a transportation analysis in support of the Twin Creeks landfill expansion. The Twin Creeks landfill is located in Watford Ontario, west of London Ontario, and accepts a large amount of the refuse generated by the Greater Toronto Area. The expansion of the site will not change day-to-day operations, but will extend the operating life of the facility by increasing the sites overall capacity.

Adam served as a transportation Technical Coordinator aiding the project team with the coordination of works related to the review of the existing conditions.

The team analyzed and captured traffic operations data, safety (collision history review) data, and confirmation of driveway geometry in terms of sightlines as well as other potential safety impacts. To share their findings, Adam and the team supported the development of materials for the public information session. These sessions were held with the public to receive feedback on the existing conditions component of the study. The study is now entering the second phase of the study where future impacts will be assessed.

GFL Environmental Inc., Eastern Ontario Waste Handling Facility, (2021)

North Stormont, Ontario, Canada

Technical Lead for Transportation. HDR completed a Transportation Impact Study in support of the Environmental Assessment for the future development of the GFL Environmental Inc. Eastern Ontario Waste Handling Facility. The current Environmental Compliance Approval limits a maximum of 755,000 tonnes annually (equivalent to an average daily rate of 2,500 tonnes per day) and it is expected that with the future development the landfill will continue to operate at this level.

The expansion into the adjoining lands would permit additional total volume which is expected to extend the current operating life of the site by approximately 20 years to 2045, but with no changes to the annual or daily tonnage restrictions. In addition to extending the operating life of the existing compost and landfill facilities on the north side of Lafleche Road, a renewable natural gas facility and a compost bagging facility are proposed future, and the existing compost and curing pads will be relocated. HDR estimated future potential peak site traffic generation, based on the type of loads being handled by the facility. The trip generation is split between regular vehicles, and truck trips.

For the new uses being incorporated into the redesigned facility, trips were generated using first principles based on employee estimates. The historic weigh scale data and traffic data was used to generate trip rates for the existing operations which were then used to forecast the theoretical peak hour traffic volumes for the facility which were then used to forecast future total traffic and vehicular operations. Safety and the need for left-turn lanes along Highway 138 was also reviewed. Adam was responsible for the technical delivery of the project including the documentation and reporting, and coordination with the EA Team Lead.

Salt Storage Lands (Toronto Portlands Harbour), SvN (2022)

Toronto, Ontario, Canada

Technical Lead. HDR was retained to perform various swept path analysis for large articulated and standard dump trucks which access the Toronto harbour salt storage yard. The goal was to maximize the amount of potential salt storage while ensuring maneuverability and safety for vehicles, as well as reducing impacts to the public road system.

Various configurations were presented to the City and recommendations made on the circulation and flow on-site when the salt piles were largest. Adam performed the swept path analysis and prepared the vehicle maneuvering diagrams for various circulation options to test viability and the advantages and disadvantages of each, and prepared comparisons and documentation of each option. The options were provided to SvN to present to the client for consideration.