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4488 County Road 29

TRANSPORTATION IMPACT BRIEF

Kawartha Utility Services

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Prepared by:

Tatham Engineering Limited
5335 Canotek Road, Unit 100
Ottawa, Ontario K1J 9L4

T 613-747-3636
tathameng.com

Prepared for:

Kawartha Utility Services
4108 Highway 28, P.O. Box 695
Lakefield, Ontario K0L 2H0

Authored by:	Reviewed by:
Karolina Kukielka C.E.T., EIT, rcsi Engineering Intern	Michael Cullip B.Eng. & Mgmt., M.Eng, P.Eng. Vice President

LICENSED PROFESSIONAL ENGINEER
M. J. CULLIP
90512237
November 14, 2024
PROVINCE OF ONTARIO

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Issue	Date	Description
1	November 14, 2024	Final Report

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1 Introduction

Tatham Engineering Limited was retained by Kawartha Utility Services to prepare a transportation impact brief in support of the proposed utility building to be located at 4488 County Road 29 in the Township of Douro-Dummer. The location of the development site is illustrated in Figure 1.

1.1 REPORT PURPOSE

The purpose of this report is to review the proposed development from a transportation perspective. Recognizing that the trip generation associated with the subject development will not be significant, the scope of this study has been limited to a traffic impact brief with a focus on the following:

- existing conditions, including a description of the study area road network, traffic volumes, operations and planned/ proposed improvements;
- details of the proposed development and anticipated trip generation;
- on-site circulation and parking provision; and
- transportation impacts associated with the proposed development.

1.2 REPORT STRUCTURE

The report is structured as follows:

- Chapter 1: introduction and study purpose
- Chapter 2: existing conditions, detailing the road system and corresponding traffic operations;
- Chapter 3: proposed development and associated details including land use, access and traffic volumes;
- Chapter 4: future traffic operations associated with the proposed development; and
- Chapter 5: summary of the report and key findings.

2 Existing Conditions

This chapter will describe the road network, traffic volumes and road capacity for the existing conditions.

2.1 ROAD NETWORK

The road network to be addressed by this study consists of Highway 28, County Road 29, County Road 6 and their respective intersection.

Aerial mapping and photographs of the road system are provided in Figure 2.

2.1.1 Road Sections

Highway 28

As per MTO's *Highway Corridor Management Manual*[1], Highway 28 is classified as a 2B-Arterial provincial highway under the jurisdiction of the MTO. It is generally oriented north-south. It has a 2-lane rural cross-section accommodating one travel lane per direction with paved shoulders and open ditches. The posted speed on Highway 28 is 80 km/h and thus a design speed of 100 km/h has been assumed (posted + 20 km/h for highways).

County Road 29

As per Peterborough County's *Transportation Master Plan Update*[2], County Road 29 is a Class A (arterial) County road under the jurisdiction of the County of Peterborough. The road is oriented east-west through the study area and has a 2-lane rural cross-section (including gravel shoulders and open ditches) providing one travel lane per direction. County Road 29 has a speed limit of 60 km/h through the area and thus an 80 km/h design speed has been assumed (posted + 20 km/h for County roads).

County Road 6

As per Peterborough County's *Transportation Master Plan Update,* County Road 6 is a Class B (collector) County road under the jurisdiction of the County. The road is oriented east-west through the study area and has a 2-lane rural cross-section (including gravel shoulders and open

[1] *Highway Corridor Management Manual.* Ministry of Transportation. April 2022.

[2] *Peterborough County 2022 Transportation Master Plan Update.* Paradigm Transportation Solutions Limited and Santec. October 2022.

ditches) providing one travel lane per direction. The speed limit and design speed for County Road 6 are 80 and 100 km/h respectively.

2.1.2 Intersection

Highway 28 & County Road 29/ County Road 6

The intersection of Highway 28 with County Road 29 (west)/County Road 6 (east) is a 4-leg signalized intersection having the following lane arrangement:

- east approach (County Road 6) - left turn lane and a shared through-right lane;
- west approach (County Road 29) - left turn lane and a shared through-right lane;
- north approach (Highway 28) - left turn lane, through lane and a channelized right turn lane; and
- south approach (Highway 28) - left turn lane, through lane and a right turn lane.

2.2 TRAFFIC VOLUMES

2.2.1 Traffic Counts

To determine the existing traffic volumes traffic counts were conducted at the intersection of Highway 28 County Road 29/County Road 6 on Thursday July 18, 2024 from 7:00 to 9:00, 11:00 to 14:00 and 15:00 to 18:00. The observed peak hour traffic volumes, reflective of summer conditions, are illustrated in Figure 3, whereas detailed count sheets are provided in Appendix A. As noted, the greatest traffic volumes occurred during the AM and PM peak hours, and hence only these periods have been considered.

2.3 TRAFFIC OPERATIONS

The assessment of existing conditions provides the baseline from which the future traffic operations (both without and with the subject development) can be assessed. As the capacity, and hence operations of a road system, is effectively dictated by its intersections, the analysis has focused on the operations of the noted key intersections. The analysis is based on the following:

- the 2024 peak hour traffic volumes;
- the existing intersection configurations and controls; and
- procedures outlined in the *2000 Highway Capacity Manual*[3] (using Synchro v.11 software).

[3] *Highway Capacity Manual*. Transportation Research Board, Washington DC, 2000.

For each intersection, the analysis considers:

- the average delay (measured in seconds);
- level of service (LOS); and
- volume to capacity (v/c) for each movement if signalized, or for critical movements only if unsignalized.

With respect to the noted metrics:

- level of service (LOS) - level of service 'A' corresponds to the best operating condition with minimal delays whereas level of service 'F' corresponds to poor operations resulting from high intersection delays (level of service definitions are provided in Appendix B); and
- volume to capacity (v/c) ratios - a v/c ratio of less than 1.0 indicates the intersection movement/approach is operating at less than capacity while v/c of 1.0 indicates capacity has been reached.

A summary of the analysis provided in Table 1; detailed worksheets are included in Appendix C.

Table 1: Intersection Operations – 2024

INTERSECTION, MOVEMENT & CONTROL			WEEKDAY AM PEAK HOUR			WEEKDAY PM PEAK HOUR		
			Delay	LOS	V/C	Delay	LOS	V/C
Highway 28 & County Road 6/ County Road 29	EB L	signal	14	B	0.39	16	B	0.58
	EB TR	signal	13	B	0.19	13	B	0.33
	WB L	signal	13	B	0.13	12	B	0.12
	WB TR	signal	14	B	0.37	12	B	0.19
	NB L	signal	4	A	0.03	4	A	0.02
	NB T	signal	4	A	0.15	6	A	0.37
	NB R	signal	4	A	0.02	4	A	0.02
	SB L	signal	4	A	0.01	4	A	0.01
	SB T	signal	4	A	0.17	5	A	0.24
	SB R	signal	4	A	0.10	4	A	0.01
	overall	signal	8	A	0.23	9	A	0.43

L - left T - through R - right LTR - left-through-right LT - left-through TR - through-right LR - left-right

2.4 NEED FOR IMPROVEMENTS

Based on the existing volumes, intersection configurations and controls, the intersection of Highway 28 with County Road 29/County Road 6 provides excellent overall levels of service (LOS A) with minor delays during peak hours. As such, no intersection improvements are required to support the existing conditions.

3 Proposed Development

This chapter will provide additional details with respect to the proposed development, including its location, land use and the projected site generated traffic volumes and the assignment of such to the adjacent road network.

3.1 LOCATION

As illustrated in Figure 1, the subject site is located at 4488 County Road 29 in the Township of Douro-Dummer.

3.2 LAND USE

The proposed development will be the Kawartha Utility Service Maintenance Shop, with a floor area of approximately 1650 m^2, and 17 service bays. A site plan is provided in Figure 4.

3.3 ACCESS

3.3.1 Location & Configuration

The proposed development will be served by an access point to County Road 29, which will be designed in accordance with County Standards for a low traffic volume entrance (i.e. in accordance with OPSD 301.010, OPSD 301.020, OPSD 301.030 or OPSD 351.010).

3.3.2 Sight Lines

Sight lines at the proposed site access have been reviewed to ensure vehicles can enter and the exit the site in a safe manner. As per the requirements of the County's *Entrance Permit By-law*, the minimum sight distance for a speed limit of 60 km/h is 130 metres (to be provided in both directions).

The sight lines along County Road 29 were established through field measurements. Given the relatively straight and flat nature of the road in the immediate vicinity of the site, the available sight lines to/from the east and west are in excess of 250 metres, thus satisfying the County's minimum sight distance requirements.

3.4 SITE TRAFFIC

3.4.1 Trip Generation

The number of vehicle trips to be generated by the proposed development has been determined based on type of use, development size and trip generation rates published in the *ITE Trip*

Generation Manual, 11th Edition[4]. Based on the proposed development, the trip rates for a *utility* land use (ITE code 170) have been applied (a utility is a free-standing building that can house office space, a storage area and electromechanical or industrial equipment that support a local electrical, communication, water supply or control, or sewage treatment utility).

The associated trip rates and trip estimates are provided in Table 2.

Table 2: Trip Generation – Site

LAND USE	RATE/ ESTIMATE	VARIABLE/ SIZE	WEEKDAY AM PEAK HOUR			WEEKDAY PM PEAK HOUR		
			In	Out	Total	In	Out	Total
utility (ITE 170)	rate	1000 ft² GFA	2.03	0.30	2.33	0.39	1.77	2.16
	estimate	17,757.7 ft²	36	5	41	7	31	38

As indicated, the proposed development is expected to generate 41 trips during the AM peak hour and 38 trips during the PM peak hour (total of inbound and outbound trips).

3.4.2 Trip Distribution

The distribution and assignment of the site generated traffic to the road system has been established based on the traffic patterns along travel corridors, nearby settlements and points of interest. The following has been assumed:

- to/from the north via Highway 28 - 20%;
- to/from the south via Highway 28 - 30%;
- to/from the west via County Road 29 – 40%; and
- to/from the east via County Road 6 – 10%.

The resulting assignment of site traffic to the road network is illustrated in Figure 5.

[4] *ITE Trip Generation Manual, 11th Edition.* Institute of Transportation Engineers, September 2021.

4 Future Conditions

This chapter will address future traffic conditions and the resulting impacts of the proposed development on the adjacent road system. The following areas are to be addressed:

- traffic volumes;
- intersections operations including site access; and
- potential improvements to the study area road network, if necessary.

For the purposes of this study, 2027 (year of buildout) and 2032 (+ 5 years beyond buildout) horizon years have been assessed and otherwise considered appropriate (in context of the number of trips to be generated by the site) to determine the impact of the proposed development on the surrounding road network.

4.1 ROAD NETWORK

It is noted that there are no improvements currently being considered throughout the study area. As such, the road network as described in Section 2.1 has been maintained through the analyses of the future horizons.

4.2 TRAFFIC VOLUMES

4.2.1 Background Growth

Population

Historic census data for the Township of Douro-Dummer indicates that the population decreased from 6,805 persons in 2011 to 6,709 persons in 2016, translating to an annual decrease of 0.3%. The 2021 data indicates a population of 7,632 persons, translating to an annual growth rate of 2.6% when compared to the 2016 population level. For the period 2011 to 2021, the population increased at an annual rate of 1.2%.

The *County of Peterborough Growth Analysis Report*[5] projects the population of the Township to increase to 8,160 persons by 2036. In considering the 2021 census population of 7,632 persons, this translates to an annual growth rate of 0.45%. The *Growth Analysis Report* also projects employment within the Township to increase from 1,450 jobs in 2021 to 1,850 by 2036, or 1.6% per annum.

[5] *County of Peterborough Growth Analysis Report.* Hemson, March 28, 2022.

Traffic

MTO data for Highway 28 for the most recent 5-year period (latest published data is from 2019), was reviewed, considering average annual daily traffic (AADT) and summer average daily traffic (SADT) volumes as summarized in Table 3. In comparing the average and summer volumes, it is noted that the latter are 50 to 70% greater, thus confirming that the traffic counts completed under summer conditions, reflect the peak annual volumes (winter volumes were also reported by MTO, albeit not indicated in the table, and noted as less than the average volumes).

Table 3: Highway 28 Traffic Volumes

ROAD SECTION		DAILY TRAFFIC VOLUME						ANNUAL GROWTH
		2014	2015	2016	2017	2018	2019	
Highway 28 from Peterborough Road 4 to Peterborough Road 6	AADT	6,100	6,200	6,300	6,400	6,500	6,600	1.6%
	SADT	9,150	9,300	9,450	10,700	10,800	11,100	3.9%
	Ratio	1.5	1.5	1.5	1.7	1.7	1.7	
Highway 28 from Peterborough Road 6 to County Road 20	AADT	7,300	7,400	7,500	7,600	7,700	7,800	1.3%
	SADT	10,900	11,110	11,200	12,700	12,800	13,100	3.7%
	Ratio	**1.5**	**1.5**	**1.5**	**1.7**	**1.7**	**1.7**	**1.6%**

[1] annual growth realized over the period 2014 to 2019

As per the noted annual growth rates, the average summer daily volumes increased by approximately 4% per annum over the period 2014 to 2019. It is noted however, that much of this growth was realized between 2016 and 2017. Over the period 2017 to 2019, growth rates of less than 2% per annum have been realized.

In consideration of the above, and to reflect more recent growth realized in the area road system traffic volumes, an annual growth rate of 2.0% has been applied to the volumes on the road network (Highway 28, County Road 29 and County Road 6).

4.2.2 Background Developments

No other planned developments were identified within the study area that would otherwise contribute any meaningful traffic volumes to the adjacent road network.

4.2.3 Future Traffic Volumes

The resulting 2027 and 2032 volumes, which reflect the 2024 volumes, a background growth rate of 2.0% and the additional traffic volumes to be generated by the proposed development, are illustrated in Figure 6 and Figure 7, respectively.

4.3 TRAFFIC OPERATIONS

The study area intersections were analyzed again to consider the future total traffic volumes. In addition, the site access operations have also been reviewed. The site access configuration has considered a single shared left-right outbound lane operating under stop control and a single inbound lane. The results of the operational review are summarized in Table 4 and Table 5, with detailed worksheets provided in Appendix D.

Table 4: Intersection Operations – 2027

INTERSECTION, MOVEMENT & CONTROL			WEEKDAY AM PEAK HOUR			WEEKDAY PM PEAK HOUR		
			Delay	LOS	V/C	Delay	LOS	V/C
Highway 28 & County Road 6/ County Road 29	EB L	signal	14	B	0.41	17	B	0.62
	EB TR	signal	13	B	0.19	13	B	0.36
	WB L	signal	13	B	0.14	12	B	0.12
	WB TR	signal	14	B	0.39	12	B	0.20
	NB L	signal	4	A	0.05	5	A	0.02
	NB T	signal	4	A	0.15	7	A	0.40
	NB R	signal	4	A	0.02	5	A	0.03
	SB L	signal	4	A	0.01	4	A	0.01
	SB T	signal	4	A	0.18	6	A	0.25
	SB R	signal	4	A	0.11	4	A	0.01
	overall	signal	8	A	0.24	10	A	0.47
County Road 29 & Site Access	WB LT	free	1	A	0.02	1	A	0.00
	NB LR	stop	11	B	0.01	11	B	0.06

L - left T - through R - right LTR - left-through-right LT - left-through TR - through-right LR - left-right

Table 5: Intersection Operations – 2032

INTERSECTION, MOVEMENT & CONTROL			WEEKDAY AM PEAK HOUR			WEEKDAY PM PEAK HOUR		
			Delay	LOS	V/C	Delay	LOS	V/C
Highway 28 & County Road 6/ County Road 29	EB L	signal	15	B	0.45	15	B	0.57
	EB TR	signal	13	B	0.21	12	B	0.34
	WB L	signal	13	B	0.15	11	B	0.11
	WB TR	signal	14	B	0.42	11	B	0.19
	NB L	signal	4	A	0.06	6	A	0.03
	NB T	signal	4	A	0.17	9	A	0.47
	NB R	signal	4	A	0.02	6	A	0.03
	SB L	signal	4	A	0.01	5	A	0.01
	SB T	signal	5	A	0.21	7	A	0.30
	SB R	signal	4	A	0.12	5	A	0.01
	overall	signal	8	A	0.27	10	A	0.51
County Road 29 & Site Access	WB LT	free	1	A	0.02	1	A	0.00
	NB LR	stop	11	B	0.01	12	B	0.06

L - left T - through R - right LTR - left-through-right LT - left-through TR - through-right LR - left-right

4.4 NEED FOR IMPROVEMENTS

4.4.1 Traffic Operations

As indicated, the intersection of Highway 28 with County Road 29/ County Road 6 will continue to provide excellent operations (LOS A), as will the site access (LOS B or better) through to the 2032 horizon. As such, no additional improvements are required to accommodate the future total conditions from a traffic operations perspective.

4.4.2 Turn Lane Requirements

Despite the otherwise excellent operations provided at the site access, the need for exclusive turn lanes on County Road 29 at the site access has been reviewed based on the following:

- the 2032 total traffic volumes (the critical horizon), as per Figure 7;

- MTO guidelines[6] for auxiliary lanes at unsignalized intersections; and
- a design speed of 80 km/h (reflective of 60 km/h speed limit on County Road 29).

Right Turn Lane

MTO guidelines suggest that an exclusive right turn lane be considered where right turn volumes exceed 60 vehicles per hour and/or impede the operations of through traffic.

The projected volume right turning vehicles accessing the site will be relatively minor (less than 15 vehicles per hour). As such, a right turn lane on County Road 29 is not warranted.

Left Turn Lane

For unsignalized intersections on two-lane undivided highways, MTO warrants are based on design speed, the volume of left turning traffic, advancing volume (i.e. traffic travelling in the same direction as the left-turning traffic) and opposing volume (i.e. traffic travelling in the opposite direction as the left-turning traffic).

Given the low left turning volumes (less than 25 vehicles) and relatively low volumes on County Road 29, an exclusive left turn lane is not warranted to serve the site (completed left turn warrants are provided in Appendix E).

[6] *MTO Design Supplement for TAC Geometric Design Guide for Canadian Roads*. Ministry of Transportation of Ontario Design Standards & Specifications Office, April 2020.

5 Summary

Proposed Development

The study has addressed the transportation impacts associated with the proposed Kawartha Utility Service Maintenance Shop to be located at 4488 County Road 29 in the Township of Douro-Dummer. Upon completion, the development is expected to generate 41 additional trips during the AM peak and 38 additional trips during the PM peak hour.

Transportation Impacts

In addressing the study area traffic operations, the intersection of Highway 28 with County Road 29/County Road 6 was analysed under existing (2024) and future (2027 and 2032) horizon periods, whereas the site access operations were reviewed under future horizons.

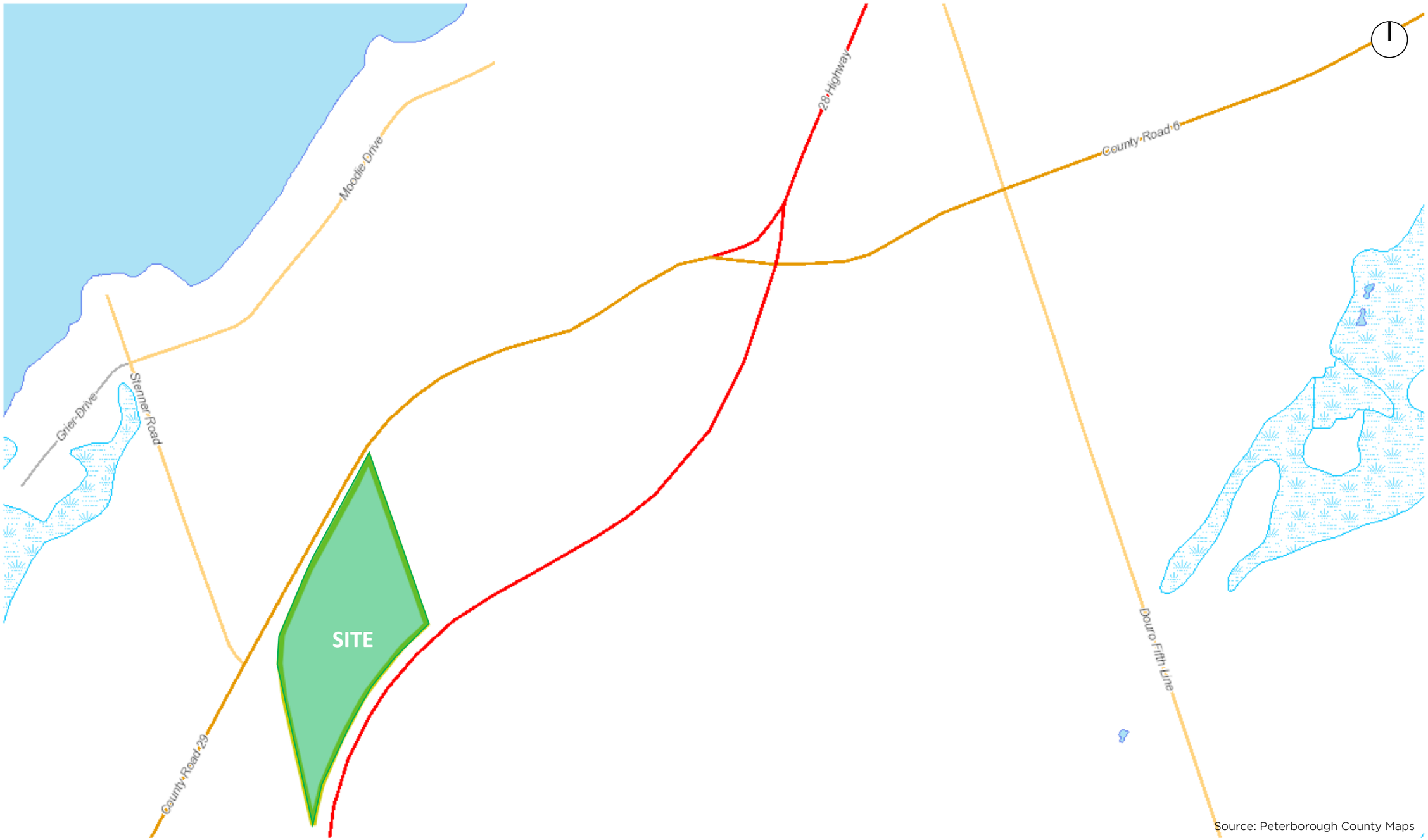
The results of the operational analyses indicate that the subject intersection and the site access will provide excellent operations (LOS B or better) through the 2032 horizon under the total conditions. As such, no improvements are required to support the proposed development from a traffic operations perspective.

Sight Line Assessment

Sight lines along County Road 29 at the site access were reviewed in consideration of the County's minimum visibility requirements. The available sight lines exceed the County's minimum requirements in both directions, and thus vehicles can enter and exit the site in a safe manner.

Turn Lane Requirements

Given the limited volumes accessing the site, exclusive turn lanes are not warranted on County Road 29 to support the proposed development.



Source: Peterborough County Maps

Figure 1: Site Location

Figure 2: Area Road Network

Looking west along County Road 29 from site access

Looking east along County Road 29 from site access

Looking east along County Road 29 towards site access

Looking west along County Road 29 towards site access

Source: Google Streetview

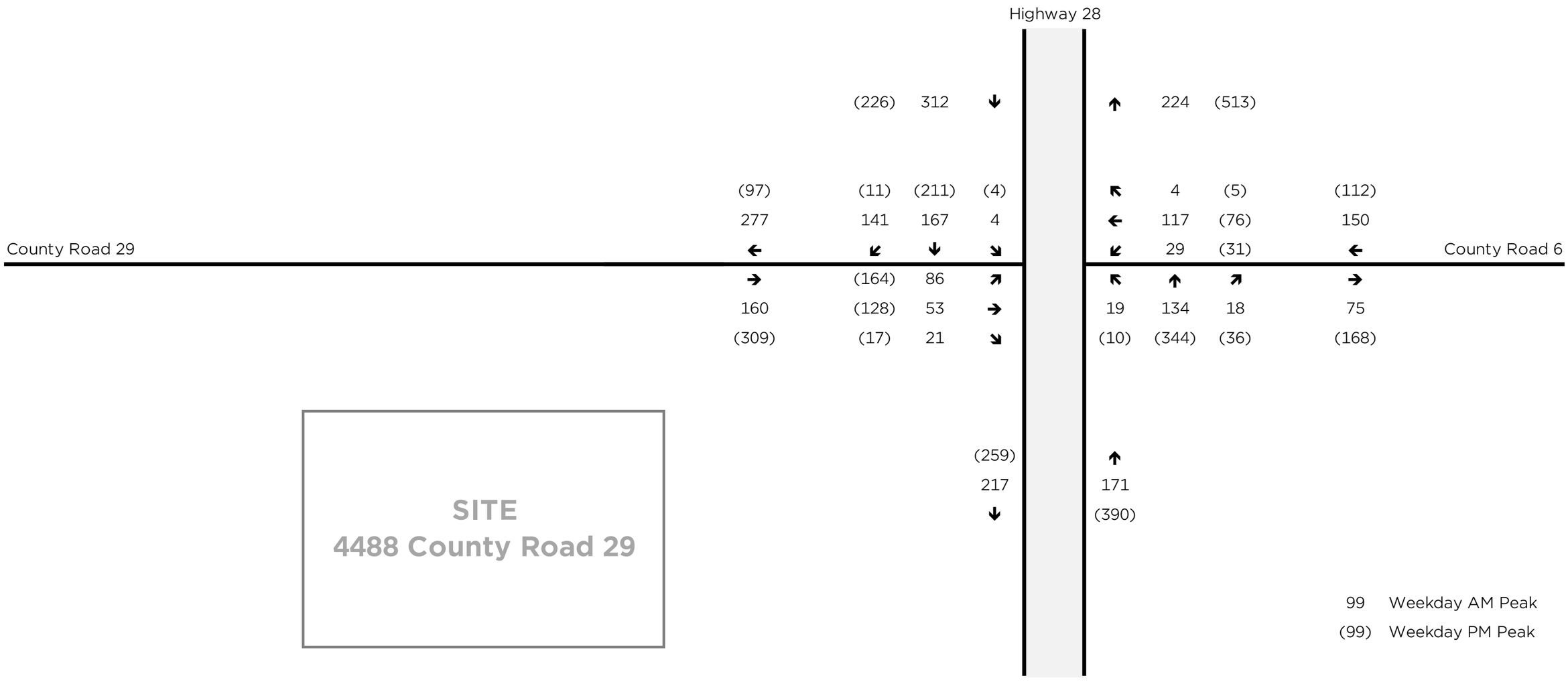
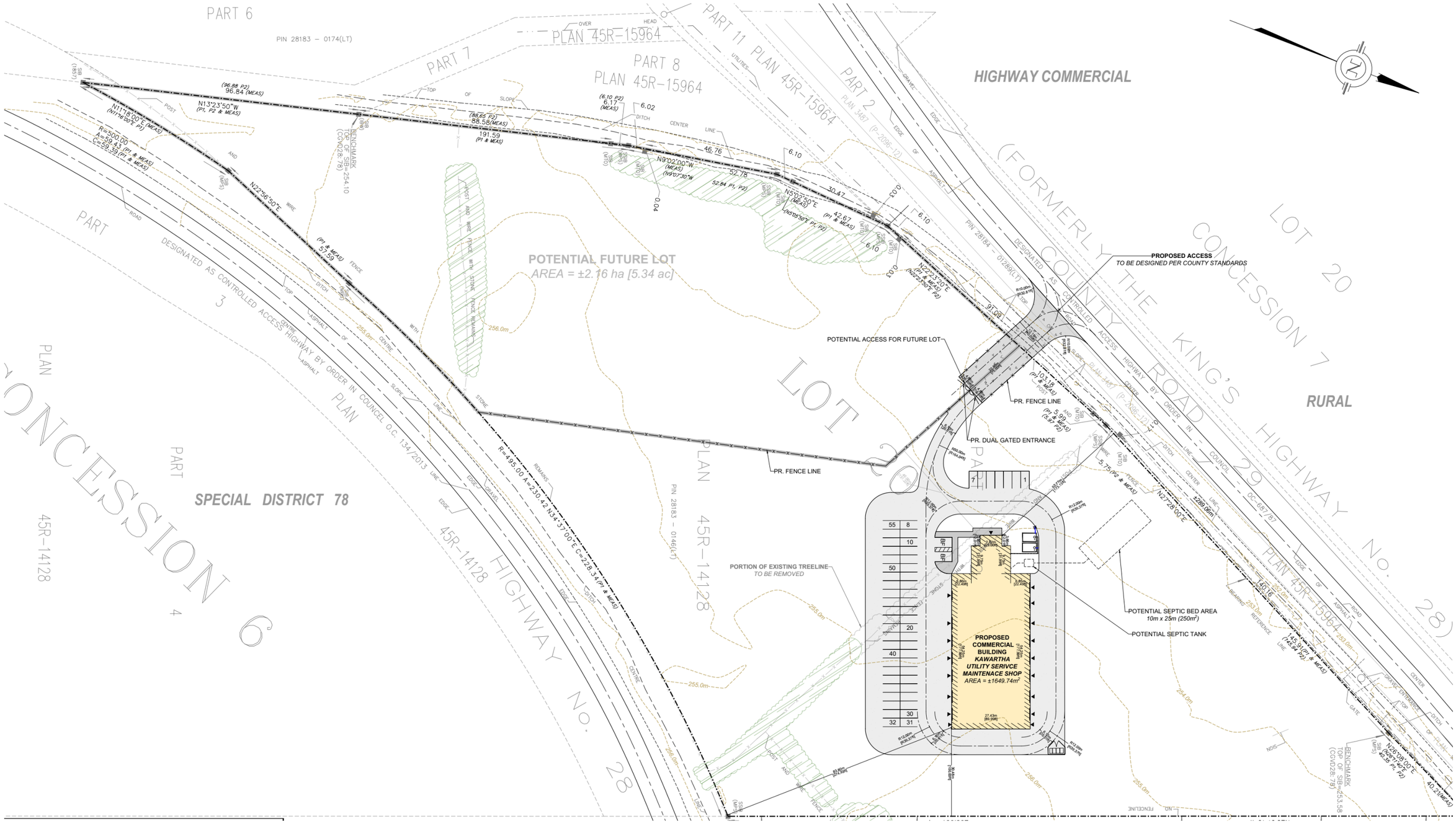


Figure 3: Traffic Volumes – 2024 Counts



4488 COUNTY ROAD 29 – TRANSPORTATION IMPACT BRIEF

Figure 4: Site Plan

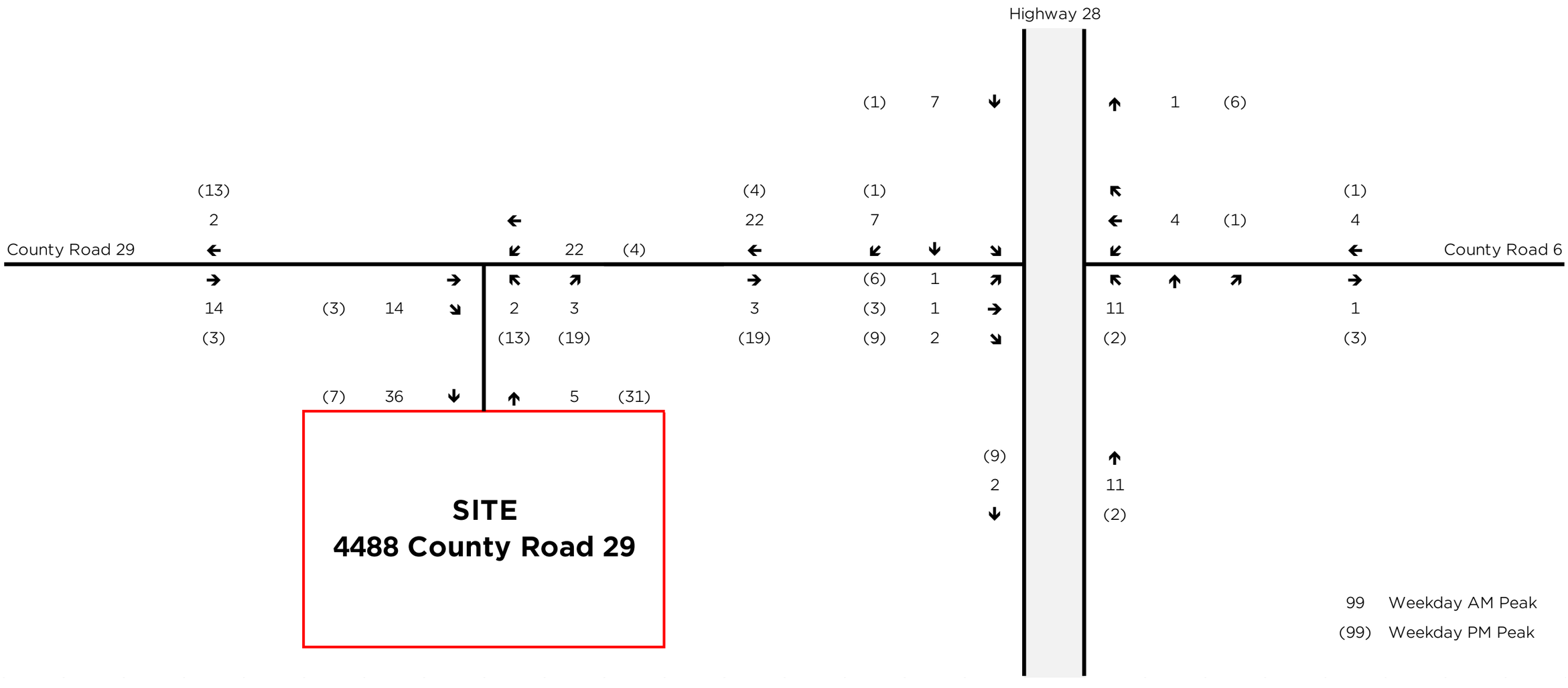


Figure 5: Traffic Volumes – Site

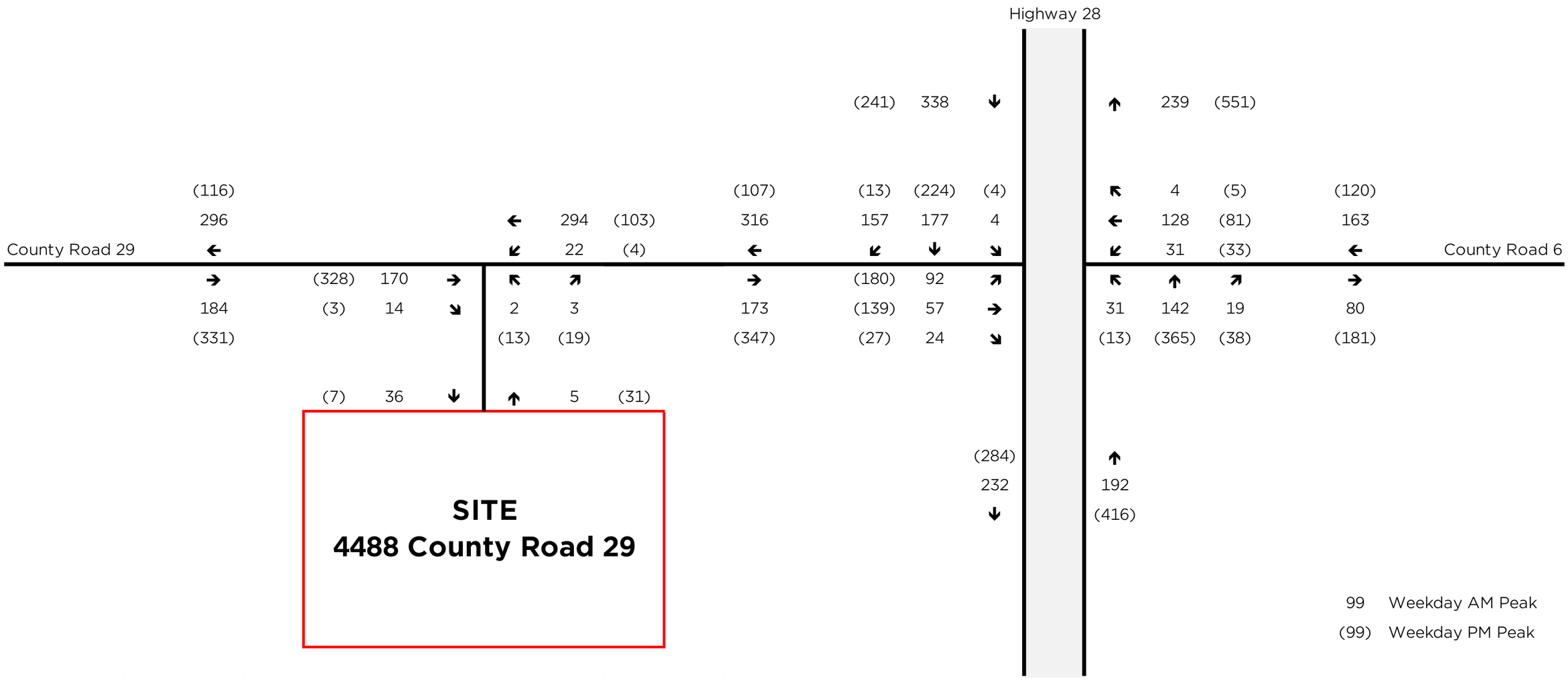


Figure 7: Traffic Volumes – 2027 Total

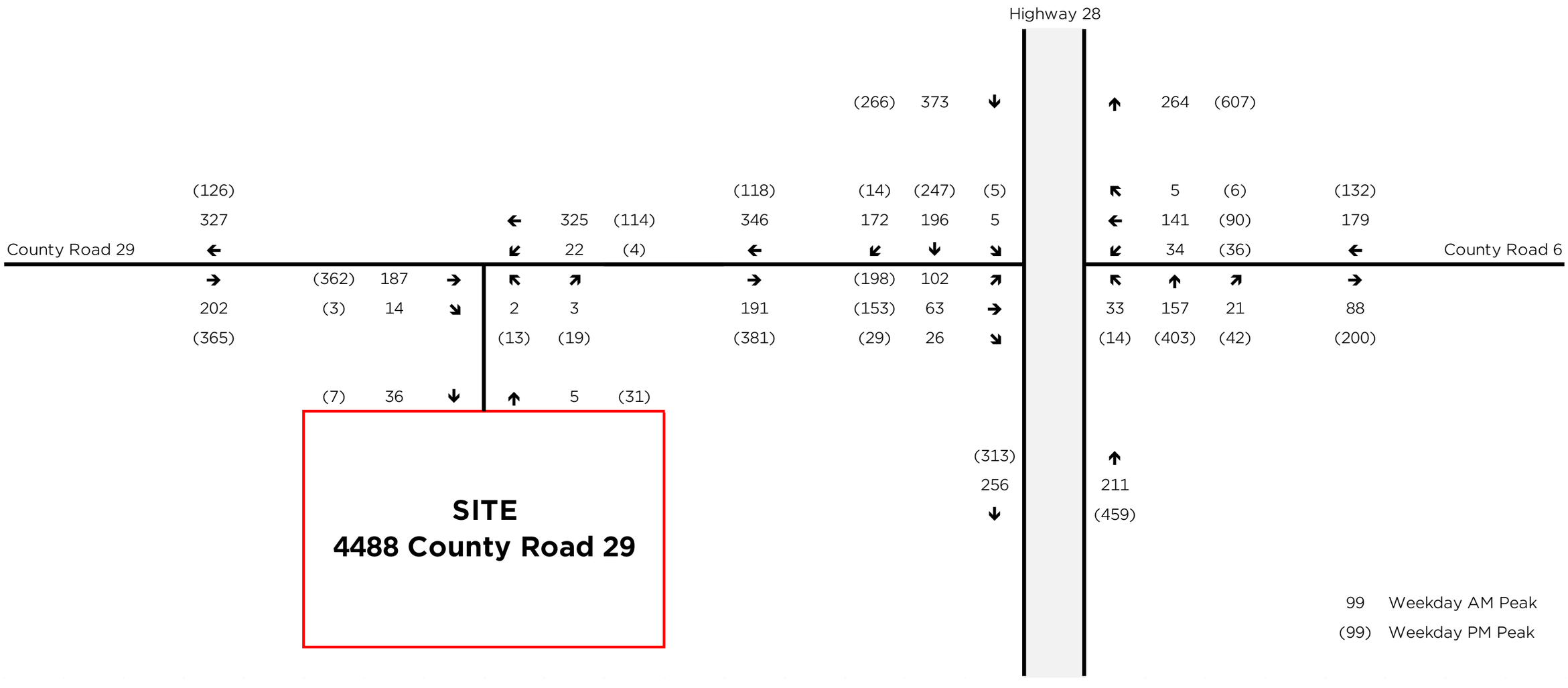


Figure 8: Traffic Volumes – 2032 Total

Appendix A:
Traffic Counts

Accu-Traffic Inc.
Traffic Monitoring & Data Analysis

Morning Peak Diagram

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

One Hour Peak
From: 8:00:00
To: 9:00:00

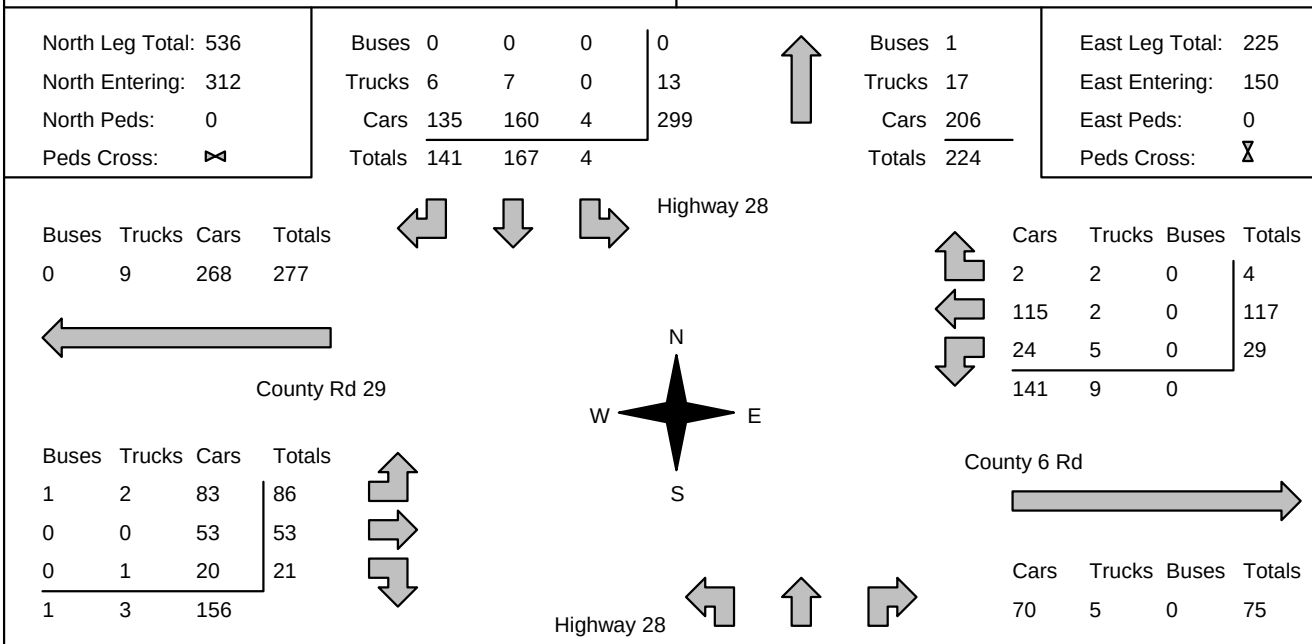
Municipality: Peterborough
Site #: 2413200001
Intersection: Highway 28 & County Rd 29
TFR File #: 1
Count date: 18-Jul-24

Weather conditions:

Person counted:
Person prepared:
Person checked:

**** Signalized Intersection ****

Major Road: Highway 28 runs N/S



Comments

Accu-Traffic Inc.
Traffic Monitoring & Data Analysis

Mid-day Peak Diagram

Specified Period
From: 11:00:00
To: 14:00:00

One Hour Peak
From: 13:00:00
To: 14:00:00

Municipality: Peterborough
Site #: 2413200001
Intersection: Highway 28 & County Rd 29
TFR File #: 1
Count date: 18-Jul-24

Weather conditions:

Person counted:
Person prepared:
Person checked:

**** Signalized Intersection ****

Major Road: Highway 28 runs N/S

North Leg Total: 834
North Entering: 360
North Peds: 0
Peds Cross: ⋈

Buses	1	0	0	1
Trucks	4	12	0	16
Cars	113	223	7	343
Totals	118	235	7	

Buses	1
Trucks	11
Cars	462
Totals	474

East Leg Total: 240
East Entering: 112
East Peds: 0
Peds Cross: ⧗

Highway 28

Buses	Trucks	Cars	Totals
1	9	199	209

County Rd 29

Cars	Trucks	Buses	Totals
5	1	0	6
71	4	0	75
26	5	0	31
102	10	0	

N
W E
S

Buses	Trucks	Cars	Totals
0	0	127	127
0	4	94	98
0	2	21	23
0	6	242	

County 6 Rd

Cars	Trucks	Buses	Totals
119	9	0	128

Highway 28

Peds Cross: ⧗
West Peds: 0
West Entering: 248
West Leg Total: 457

Cars	270			
Trucks	19			
Buses	0			
Totals	289			

Cars	15	330	18	363
Trucks	1	10	5	16
Buses	0	1	0	1
Totals	16	341	23	

Peds Cross: ⋈
South Peds: 0
South Entering: 380
South Leg Total: 669

Comments

Accu-Traffic Inc.
Traffic Monitoring & Data Analysis

Afternoon Peak Diagram

Specified Period
From: 15:00:00
To: 18:00:00

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

Municipality: Peterborough
Site #: 2413200001
Intersection: Highway 28 & County Rd 29
TFR File #: 1
Count date: 18-Jul-24

Weather conditions:

Person counted:
Person prepared:
Person checked:

**** Signalized Intersection ****

Major Road: Highway 28 runs N/S

North Leg Total: 838
North Entering: 325
North Peds: 0
Peds Cross: ⋈

Buses	0	1	0	1
Trucks	3	16	0	19
Cars	107	194	4	305
Totals	110	211	4	

Buses	0
Trucks	4
Cars	509
Totals	513

East Leg Total: 280
East Entering: 112
East Peds: 0
Peds Cross: ⧗

Highway 28

Buses	Trucks	Cars	Totals
0	3	193	196

Cars	Trucks	Buses	Totals
5	0	0	5
76	0	0	76
30	1	0	31
111	1	0	

County Rd 29

N
W E
S

Buses	Trucks	Cars	Totals
0	2	162	164
0	1	127	128
0	0	17	17
0	3	306	

County 6 Rd

Cars	Trucks	Buses	Totals
167	1	0	168

Highway 28

Peds Cross: ⧗
West Peds: 0
West Entering: 309
West Leg Total: 505

Cars	241
Trucks	17
Buses	1
Totals	259

Cars	10	342	36	388
Trucks	0	2	0	2
Buses	0	0	0	0
Totals	10	344	36	

Peds Cross: ⋈
South Peds: 0
South Entering: 390
South Leg Total: 649

Comments

Accu-Traffic Inc.
Traffic Monitoring & Data Analysis

Total Count Diagram

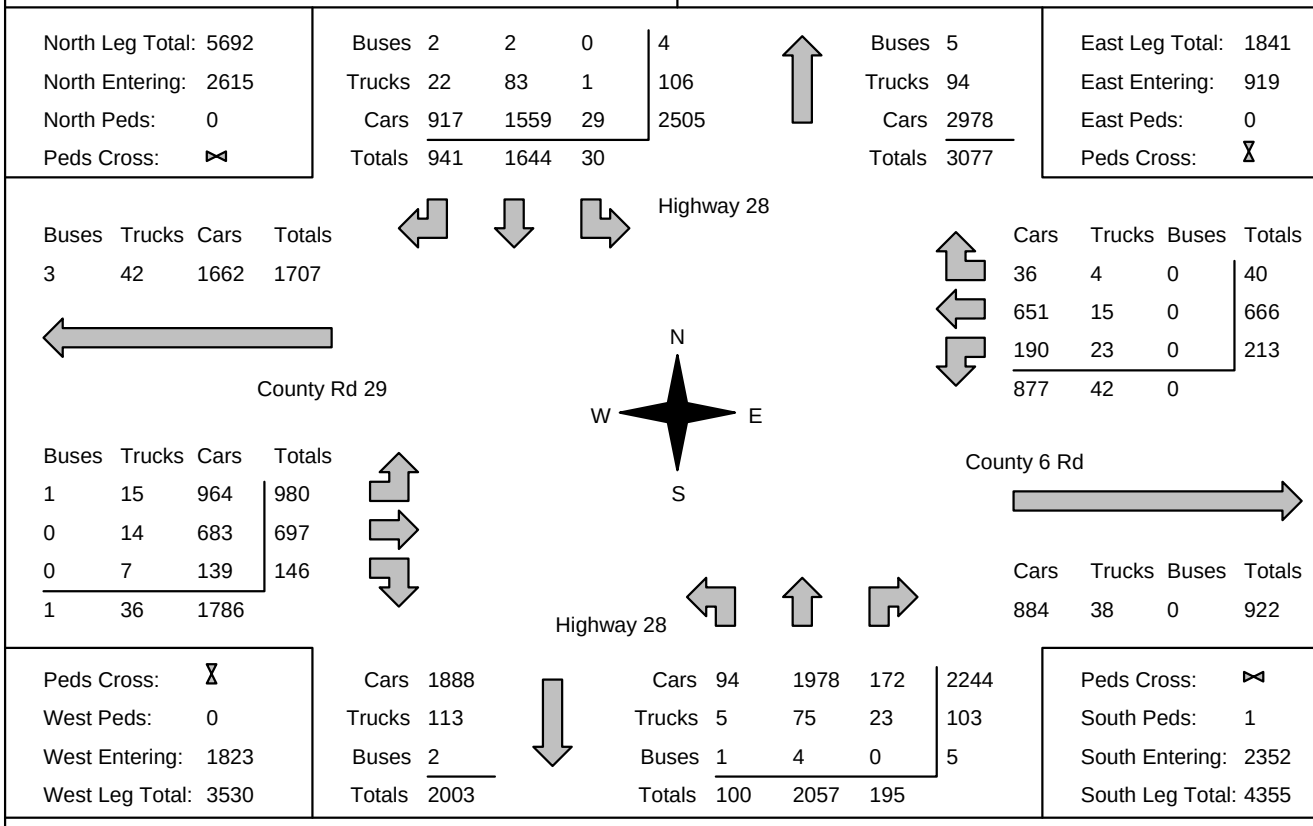
Municipality: Peterborough
Site #: 2413200001
Intersection: Highway 28 & County Rd 29
TFR File #: 1
Count date: 18-Jul-24

Weather conditions:

Person counted:
Person prepared:
Person checked:

**** Signalized Intersection ****

Major Road: Highway 28 runs N/S



Comments

Accu-Traffic Inc.
Traffic Monitoring & Data Analysis

Traffic Count Summary

Intersection: Highway 28 & County Rd 29 | **Count Date:** 18-Jul-24 | **Municipality:** Peterborough

North Approach Totals

Hour Ending	Includes Cars, Trucks, & Buses				Total Peds
	Left	Thru	Right	Grand Total	
7:00:00	0	0	0	0	0
8:00:00	0	120	106	226	0
9:00:00	4	167	141	312	0
11:00:00	0	0	0	0	0
12:00:00	4	256	137	397	0
13:00:00	4	256	112	372	0
14:00:00	7	235	118	360	0
15:00:00	0	0	0	0	0
16:00:00	5	224	104	333	0
17:00:00	4	200	121	325	0
18:00:00	2	186	102	290	0
Totals:	30	1644	941	2615	0

North/South Total Approaches: 4967

South Approach Totals

Hour Ending	Includes Cars, Trucks, & Buses				Total Peds
	Left	Thru	Right	Grand Total	
7:00:00	0	0	0	0	0
8:00:00	7	87	17	111	0
9:00:00	19	134	18	171	1
11:00:00	0	1	0	1	0
12:00:00	14	256	27	297	0
13:00:00	11	280	16	307	0
14:00:00	16	341	23	380	0
15:00:00	0	0	0	0	0
16:00:00	15	328	23	366	0
17:00:00	9	308	43	360	0
18:00:00	9	322	28	359	0
S Totals:	100	2057	195	2352	1

East Approach Totals

Hour Ending	Includes Cars, Trucks, & Buses				Total Peds
	Left	Thru	Right	Grand Total	
7:00:00	0	0	0	0	0
8:00:00	27	75	1	103	0
9:00:00	29	117	4	150	0
11:00:00	0	0	0	0	0
12:00:00	22	94	6	122	0
13:00:00	23	84	6	113	0
14:00:00	31	75	6	112	0
15:00:00	0	0	0	0	0
16:00:00	25	70	7	102	0
17:00:00	32	74	3	109	0
18:00:00	24	77	7	108	0
Totals:	213	666	40	919	0

East/West Total Approaches: 2742

West Approach Totals

Hour Ending	Includes Cars, Trucks, & Buses				Total Peds
	Left	Thru	Right	Grand Total	
7:00:00	0	0	0	0	0
8:00:00	56	53	6	115	0
9:00:00	86	53	21	160	0
11:00:00	0	0	0	0	0
12:00:00	128	89	28	245	0
13:00:00	131	80	16	227	0
14:00:00	127	98	23	248	0
15:00:00	0	0	0	0	0
16:00:00	162	82	24	268	0
17:00:00	167	120	16	303	0
18:00:00	123	122	12	257	0
W Totals:	980	697	146	1823	0

Calculated Values for Traffic Crossing Major Street

Hours Ending:	8:00	9:00	12:00	13:00	14:00	16:00	17:00	18:00
Crossing Values:	158	233	244	238	256	269	319	269

Accu-Traffic Inc.
Traffic Monitoring & Data Analysis

Count Date: 18-Jul-24 Site #: 2413200001

Interval Time	Passenger Cars - North Approach						Trucks - North Approach						Buses - North Approach						Pedestrians	
	Left		Thru		Right		Left		Thru		Right		Left		Thru		Right		North Cross	
	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr
7:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15:00	0	0	25	25	24	24	0	0	4	4	0	0	0	0	0	0	0	0	0	0
7:30:00	0	0	57	32	49	25	0	0	4	0	2	2	0	0	0	0	0	0	0	0
7:45:00	0	0	85	28	69	20	0	0	7	3	2	0	0	0	0	0	1	1	0	0
8:00:00	0	0	112	27	101	32	0	0	8	1	4	2	0	0	0	0	1	0	0	0
8:15:00	0	0	157	45	126	25	0	0	12	4	8	4	0	0	0	0	1	0	0	0
8:30:00	0	0	196	39	165	39	0	0	13	1	9	1	0	0	0	0	1	0	0	0
8:45:00	2	2	244	48	208	43	0	0	13	0	9	0	0	0	0	0	1	0	0	0
9:00:00	4	2	272	28	236	28	0	0	15	2	10	1	0	0	0	0	1	0	0	0
9:15:00	4	0	272	0	236	0	0	0	15	0	10	0	0	0	0	0	1	0	0	0
11:00:00	4	0	272	0	236	0	0	0	15	0	10	0	0	0	0	0	1	0	0	0
11:15:00	4	0	339	67	266	30	1	1	20	5	10	0	0	0	0	0	1	0	0	0
11:30:00	6	2	388	49	312	46	1	0	21	1	10	0	0	0	0	0	1	0	0	0
11:45:00	6	0	462	74	349	37	1	0	24	3	10	0	0	0	0	0	1	0	0	0
12:00:00	7	1	517	55	373	24	1	0	26	2	10	0	0	0	0	0	1	0	0	0
12:15:00	7	0	581	64	398	25	1	0	27	1	10	0	0	0	0	0	1	0	0	0
12:30:00	9	2	658	77	424	26	1	0	28	1	12	2	0	0	0	0	1	0	0	0
12:45:00	9	0	721	63	449	25	1	0	30	2	14	2	0	0	0	0	1	0	0	0
13:00:00	11	2	767	46	481	32	1	0	32	2	14	0	0	0	0	0	1	0	0	0
13:15:00	12	1	819	52	510	29	1	0	36	4	14	0	0	0	0	0	1	0	0	0
13:30:00	15	3	875	56	543	33	1	0	39	3	15	1	0	0	0	0	2	1	0	0
13:45:00	18	3	940	65	566	23	1	0	40	1	16	1	0	0	0	0	2	0	0	0
14:00:00	18	0	990	50	594	28	1	0	44	4	18	2	0	0	0	0	2	0	0	0
14:15:00	18	0	990	0	594	0	1	0	44	0	18	0	0	0	0	0	2	0	0	0
15:00:00	18	0	990	0	594	0	1	0	44	0	18	0	0	0	0	0	2	0	0	0
15:15:00	20	2	1051	61	618	24	1	0	47	3	18	0	0	0	0	0	2	0	0	0
15:30:00	22	2	1096	45	636	18	1	0	49	2	18	0	0	0	0	0	2	0	0	0
15:45:00	23	1	1132	36	664	28	1	0	54	5	18	0	0	0	0	0	2	0	0	0
16:00:00	23	0	1201	69	697	33	1	0	57	3	19	1	0	0	0	0	2	0	0	0
16:15:00	23	0	1245	44	731	34	1	0	58	1	19	0	0	0	1	1	2	0	0	0
16:30:00	25	2	1294	49	763	32	1	0	61	3	19	0	0	0	1	0	2	0	0	0
16:45:00	26	1	1333	39	790	27	1	0	67	6	19	0	0	0	2	1	2	0	0	0
17:00:00	27	1	1386	53	817	27	1	0	70	3	20	1	0	0	2	0	2	0	0	0
17:15:00	27	0	1439	53	838	21	1	0	74	4	22	2	0	0	2	0	2	0	0	0
17:30:00	29	2	1482	43	865	27	1	0	77	3	22	0	0	0	2	0	2	0	0	0
17:45:00	29	0	1524	42	882	17	1	0	80	3	22	0	0	0	2	0	2	0	0	0
18:00:00	29	0	1559	35	917	35	1	0	83	3	22	0	0	0	2	0	2	0	0	0
18:15:00	29	0	1559	0	917	0	1	0	83	0	22	0	0	0	2	0	2	0	0	0
18:15:15	29	0	1559	0	917	0	1	0	83	0	22	0	0	0	2	0	2	0	0	0

Accu-Traffic Inc.
Traffic Monitoring & Data Analysis

Count Date: 18-Jul-24 Site #: 2413200001

Interval Time	Passenger Cars - East Approach						Trucks - East Approach						Buses - East Approach						Pedestrians	
	Left		Thru		Right		Left		Thru		Right		Left		Thru		Right		East Cross	
	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr
7:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15:00	8	8	10	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:30:00	17	9	32	22	1	1	2	2	0	0	0	0	0	0	0	0	0	0	0	0
7:45:00	21	4	52	20	1	0	3	1	0	0	0	0	0	0	0	0	0	0	0	0
8:00:00	23	2	75	23	1	0	4	1	0	0	0	0	0	0	0	0	0	0	0	0
8:15:00	31	8	103	28	1	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0
8:30:00	37	6	130	27	1	0	5	1	0	0	2	2	0	0	0	0	0	0	0	0
8:45:00	41	4	161	31	2	1	7	2	0	0	2	0	0	0	0	0	0	0	0	0
9:00:00	47	6	190	29	3	1	9	2	2	2	2	0	0	0	0	0	0	0	0	0
9:15:00	47	0	190	0	3	0	9	0	2	0	2	0	0	0	0	0	0	0	0	0
11:00:00	47	0	190	0	3	0	9	0	2	0	2	0	0	0	0	0	0	0	0	0
11:15:00	54	7	215	25	3	0	10	1	4	2	3	1	0	0	0	0	0	0	0	0
11:30:00	59	5	234	19	4	1	10	0	4	0	3	0	0	0	0	0	0	0	0	0
11:45:00	62	3	250	16	6	2	10	0	5	1	3	0	0	0	0	0	0	0	0	0
12:00:00	68	6	281	31	8	2	10	0	5	0	3	0	0	0	0	0	0	0	0	0
12:15:00	73	5	297	16	9	1	12	2	6	1	3	0	0	0	0	0	0	0	0	0
12:30:00	79	6	315	18	12	3	14	2	8	2	3	0	0	0	0	0	0	0	0	0
12:45:00	83	4	341	26	14	2	14	0	9	1	3	0	0	0	0	0	0	0	0	0
13:00:00	87	4	361	20	14	0	14	0	9	0	3	0	0	0	0	0	0	0	0	0
13:15:00	95	8	377	16	14	0	15	1	11	2	3	0	0	0	0	0	0	0	0	0
13:30:00	101	6	398	21	18	4	18	3	11	0	3	0	0	0	0	0	0	0	0	0
13:45:00	105	4	418	20	18	0	19	1	12	1	3	0	0	0	0	0	0	0	0	0
14:00:00	113	8	432	14	19	1	19	0	13	1	4	1	0	0	0	0	0	0	0	0
14:15:00	113	0	432	0	19	0	19	0	13	0	4	0	0	0	0	0	0	0	0	0
15:00:00	113	0	432	0	19	0	19	0	13	0	4	0	0	0	0	0	0	0	0	0
15:15:00	119	6	450	18	20	1	21	2	14	1	4	0	0	0	0	0	0	0	0	0
15:30:00	126	7	464	14	22	2	21	0	14	0	4	0	0	0	0	0	0	0	0	0
15:45:00	129	3	476	12	23	1	21	0	14	0	4	0	0	0	0	0	0	0	0	0
16:00:00	135	6	501	25	26	3	22	1	14	0	4	0	0	0	0	0	0	0	0	0
16:15:00	139	4	521	20	26	0	22	0	14	0	4	0	0	0	0	0	0	0	0	0
16:30:00	151	12	538	17	26	0	22	0	14	0	4	0	0	0	0	0	0	0	0	0
16:45:00	157	6	556	18	27	1	22	0	14	0	4	0	0	0	0	0	0	0	0	0
17:00:00	166	9	575	19	29	2	23	1	14	0	4	0	0	0	0	0	0	0	0	0
17:15:00	169	3	597	22	31	2	23	0	14	0	4	0	0	0	0	0	0	0	0	0
17:30:00	178	9	618	21	32	1	23	0	14	0	4	0	0	0	0	0	0	0	0	0
17:45:00	184	6	641	23	34	2	23	0	14	0	4	0	0	0	0	0	0	0	0	0
18:00:00	190	6	651	10	36	2	23	0	15	1	4	0	0	0	0	0	0	0	0	0
18:15:00	190	0	651	0	36	0	23	0	15	0	4	0	0	0	0	0	0	0	0	0
18:15:15	190	0	651	0	36	0	23	0	15	0	4	0	0	0	0	0	0	0	0	0

Count Date: 18-Jul-24 Site #: 2413200001

Interval Time	Passenger Cars - South Approach						Trucks - South Approach						Buses - South Approach						Pedestrians	
	Left		Thru		Right		Left		Thru		Right		Left		Thru		Right		South Cross	
	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr
7:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15:00	3	3	12	12	3	3	0	0	3	3	1	1	0	0	0	0	0	0	0	0
7:30:00	3	0	27	15	4	1	0	0	4	1	4	3	0	0	0	0	0	0	0	0
7:45:00	4	1	50	23	8	4	0	0	9	5	5	1	1	1	0	0	0	0	0	0
8:00:00	6	2	77	27	12	4	0	0	10	1	5	0	1	0	0	0	0	0	0	0
8:15:00	11	5	106	29	14	2	1	1	14	4	6	1	1	0	0	0	0	0	0	0
8:30:00	19	8	128	22	18	4	1	0	18	4	8	2	1	0	0	0	0	0	0	0
8:45:00	20	1	169	41	22	4	1	0	21	3	8	0	1	0	0	0	0	0	1	1
9:00:00	24	4	198	29	25	3	1	0	23	2	10	2	1	0	0	0	0	0	1	0
9:15:00	24	0	199	1	25	0	1	0	23	0	10	0	1	0	0	0	0	0	1	0
11:00:00	24	0	199	0	25	0	1	0	23	0	10	0	1	0	0	0	0	0	1	0
11:15:00	30	6	249	50	28	3	1	0	29	6	11	1	1	0	0	0	0	0	1	0
11:30:00	34	4	307	58	33	5	2	1	34	5	13	2	1	0	1	1	0	0	1	0
11:45:00	37	3	371	64	37	4	2	0	38	4	14	1	1	0	1	0	0	0	1	0
12:00:00	37	0	433	62	47	10	2	0	44	6	15	1	1	0	1	0	0	0	1	0
12:15:00	39	2	490	57	49	2	3	1	47	3	16	1	1	0	2	1	0	0	1	0
12:30:00	42	3	556	66	53	4	3	0	50	3	16	0	1	0	2	0	0	0	1	0
12:45:00	45	3	633	77	58	5	3	0	51	1	16	0	1	0	2	0	0	0	1	0
13:00:00	46	1	703	70	61	3	4	1	53	2	17	1	1	0	2	0	0	0	1	0
13:15:00	48	2	778	75	65	4	4	0	54	1	18	1	1	0	2	0	0	0	1	0
13:30:00	51	3	867	89	67	2	4	0	56	2	20	2	1	0	2	0	0	0	1	0
13:45:00	54	3	946	79	72	5	4	0	57	1	20	0	1	0	3	1	0	0	1	0
14:00:00	61	7	1033	87	79	7	5	1	63	6	22	2	1	0	3	0	0	0	1	0
14:15:00	61	0	1033	0	79	0	5	0	63	0	22	0	1	0	3	0	0	0	1	0
15:00:00	61	0	1033	0	79	0	5	0	63	0	22	0	1	0	3	0	0	0	1	0
15:15:00	63	2	1121	88	83	4	5	0	64	1	22	0	1	0	3	0	0	0	1	0
15:30:00	66	3	1206	85	86	3	5	0	65	1	22	0	1	0	3	0	0	0	1	0
15:45:00	70	4	1281	75	93	7	5	0	67	2	22	0	1	0	4	1	0	0	1	0
16:00:00	76	6	1354	73	102	9	5	0	69	2	22	0	1	0	4	0	0	0	1	0
16:15:00	78	2	1428	74	114	12	5	0	70	1	23	1	1	0	4	0	0	0	1	0
16:30:00	80	2	1504	76	121	7	5	0	70	0	23	0	1	0	4	0	0	0	1	0
16:45:00	85	5	1586	82	131	10	5	0	71	1	23	0	1	0	4	0	0	0	1	0
17:00:00	85	0	1659	73	144	13	5	0	72	1	23	0	1	0	4	0	0	0	1	0
17:15:00	88	3	1770	111	150	6	5	0	72	0	23	0	1	0	4	0	0	0	1	0
17:30:00	90	2	1841	71	157	7	5	0	73	1	23	0	1	0	4	0	0	0	1	0
17:45:00	92	2	1914	73	166	9	5	0	75	2	23	0	1	0	4	0	0	0	1	0
18:00:00	94	2	1978	64	172	6	5	0	75	0	23	0	1	0	4	0	0	0	1	0
18:15:00	94	0	1978	0	172	0	5	0	75	0	23	0	1	0	4	0	0	0	1	0
18:15:15	94	0	1978	0	172	0	5	0	75	0	23	0	1	0	4	0	0	0	1	0

Accu-Traffic Inc.
Traffic Monitoring & Data Analysis

Count Date: 18-Jul-24 Site #: 2413200001

Interval Time	Passenger Cars - West Approach						Trucks - West Approach						Buses - West Approach						Pedestrians	
	Left		Thru		Right		Left		Thru		Right		Left		Thru		Right		West Cross	
	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr
7:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15:00	13	13	5	5	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:30:00	24	11	15	10	2	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0
7:45:00	31	7	42	27	4	2	3	1	1	1	0	0	0	0	0	0	0	0	0	0
8:00:00	53	22	52	10	6	2	3	0	1	0	0	0	0	0	0	0	0	0	0	0
8:15:00	74	21	62	10	9	3	3	0	1	0	0	0	0	0	0	0	0	0	0	0
8:30:00	91	17	79	17	15	6	3	0	1	0	1	1	1	1	0	0	0	0	0	0
8:45:00	114	23	94	15	19	4	3	0	1	0	1	0	1	0	0	0	0	0	0	0
9:00:00	136	22	105	11	26	7	5	2	1	0	1	0	1	0	0	0	0	0	0	0
9:15:00	136	0	105	0	26	0	5	0	1	0	1	0	1	0	0	0	0	0	0	0
11:00:00	136	0	105	0	26	0	5	0	1	0	1	0	1	0	0	0	0	0	0	0
11:15:00	163	27	124	19	32	6	7	2	1	0	2	1	1	0	0	0	0	0	0	0
11:30:00	194	31	145	21	39	7	8	1	2	1	4	2	1	0	0	0	0	0	0	0
11:45:00	227	33	171	26	49	10	8	0	4	2	4	0	1	0	0	0	0	0	0	0
12:00:00	261	34	191	20	51	2	8	0	4	0	4	0	1	0	0	0	0	0	0	0
12:15:00	292	31	207	16	51	0	8	0	4	0	4	0	1	0	0	0	0	0	0	0
12:30:00	328	36	226	19	54	3	9	1	5	1	5	1	1	0	0	0	0	0	0	0
12:45:00	350	22	250	24	59	5	11	2	5	0	5	0	1	0	0	0	0	0	0	0
13:00:00	388	38	268	18	66	7	12	1	7	2	5	0	1	0	0	0	0	0	0	0
13:15:00	422	34	286	18	70	4	12	0	9	2	5	0	1	0	0	0	0	0	0	0
13:30:00	449	27	316	30	74	4	12	0	10	1	6	1	1	0	0	0	0	0	0	0
13:45:00	482	33	340	24	80	6	12	0	10	0	7	1	1	0	0	0	0	0	0	0
14:00:00	515	33	362	22	87	7	12	0	11	1	7	0	1	0	0	0	0	0	0	0
14:15:00	515	0	362	0	87	0	12	0	11	0	7	0	1	0	0	0	0	0	0	0
15:00:00	515	0	362	0	87	0	12	0	11	0	7	0	1	0	0	0	0	0	0	0
15:15:00	560	45	385	23	93	6	12	0	11	0	7	0	1	0	0	0	0	0	0	0
15:30:00	600	40	403	18	96	3	12	0	11	0	7	0	1	0	0	0	0	0	0	0
15:45:00	643	43	426	23	105	9	12	0	12	1	7	0	1	0	0	0	0	0	0	0
16:00:00	677	34	443	17	111	6	12	0	12	0	7	0	1	0	0	0	0	0	0	0
16:15:00	719	42	471	28	112	1	13	1	13	1	7	0	1	0	0	0	0	0	0	0
16:30:00	752	33	499	28	116	4	14	1	14	1	7	0	1	0	0	0	0	0	0	0
16:45:00	795	43	527	28	122	6	14	0	14	0	7	0	1	0	0	0	0	0	0	0
17:00:00	842	47	561	34	127	5	14	0	14	0	7	0	1	0	0	0	0	0	0	0
17:15:00	881	39	598	37	129	2	15	1	14	0	7	0	1	0	0	0	0	0	0	0
17:30:00	916	35	623	25	131	2	15	0	14	0	7	0	1	0	0	0	0	0	0	0
17:45:00	938	22	653	30	134	3	15	0	14	0	7	0	1	0	0	0	0	0	0	0
18:00:00	964	26	683	30	139	5	15	0	14	0	7	0	1	0	0	0	0	0	0	0
18:15:00	964	0	683	0	139	0	15	0	14	0	7	0	1	0	0	0	0	0	0	0
18:15:15	964	0	683	0	139	0	15	0	14	0	7	0	1	0	0	0	0	0	0	0

Appendix B:
LOS Definitions

TATHAM ENGINEERING

Level of Service – Unsignalized Intersections

Level of Service (LOS) for unsignalized intersections is defined in terms of control delay for each critical lane. Control delay includes initial deceleration, queue move-up time, stopped delay and final acceleration delay, and is a function of the service rate or capacity of the approach and degree of saturation.

The following table describes in detail the characteristics of each level of service, with A being the best and F being the worst.

LOS	EXPECTED DELAY TO STREET TRAFFIC	DELAY (sec/veh)
A	Little or no delays	$0 < d \leq 10$
B	Short traffic delays	$10 < d \leq 15$
C	Average traffic delays	$15 < d \leq 25$
D	Long traffic delays	$25 < d \leq 35$
E	Very long traffic delays	$35 < d \leq 50$
F	Extreme delays with queuing which may cause congestion affecting other traffic movements in the intersection	$50 < d$

source: 2010 Highway Capacity Manual

TATHAM ENGINEERING

Level of Service – Signalized Intersections

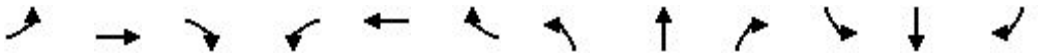
Level of Service (LOS) for signalized intersections is defined in terms of delay, which is made up of a number of factors that relate to control, geometrics, traffic and incidents. Only the portion of total delay attributed to the control facility is quantified. This control delay includes initial deceleration, queue move-up time, stopped delay and final acceleration delay.

The following table describes in detail the characteristics of each level of service, with A being the best and F being the worst.

LOS	EXPECTED DELAY TO STREET TRAFFIC	DELAY (sec/veh)
A	This level of service occurs when progression is extremely favorable and most vehicles arrive during the green phase. Most vehicles do not stop at all at this LOS. Short cycle lengths may also contribute to low delay.	$0 < d \leq 10$
B	This level generally occurs with good progression, short cycle lengths, or both. More vehicles stop at this level than at LOS A, causing longer average delays.	$10 < d \leq 20$
C	These higher delays may result from fair progression, longer cycle length, or both. Individual cycle failures may begin to appear at this level. The number of vehicles stopping is significant, though many still pass through the intersection without stopping.	$20 < d \leq 35$
D	At this level, the influence of congestion becomes more noticeable. Longer delays may result from some combination of unfavourable progression, long cycle lengths, or high volume to capacity ratios. Many vehicles stop, and the proportion of vehicles not stopping declines. Individual cycle failures become noticeable.	$35 < d \leq 55$
E	This level is considered by many agencies to be the limit of acceptable delay. These high delay values generally indicate poor progression, long cycle lengths, and high v/c ratios. Individual cycle failures are frequent occurrences.	$55 < d \leq 80$
F	At this level, oversaturation occurs when arrival flow rates exceed the design capacity of the intersection. It may also occur at high v/c ratios below 1.0 with many individual cycle failures. Poor progression and long cycle lengths may also be major contributing factors to such high delay levels. LOS F is considered to be unacceptable to most drivers.	$80 < d$

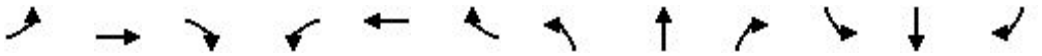
source: 2010 Highway Capacity Manual

Appendix C:
Traffic Operations - Existing



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	86	53	21	29	117	4	19	134	18	4	167	141
Future Volume (vph)	86	53	21	29	117	4	19	134	18	4	167	141
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.96		1.00	1.00		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1789	1793		1722	1850		1738	1762	1296	1789	1847	1570
Flt Permitted	0.67	1.00		0.70	1.00		0.64	1.00	1.00	0.66	1.00	1.00
Satd. Flow (perm)	1268	1793		1277	1850		1176	1762	1296	1251	1847	1570
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	93	58	23	32	127	4	21	146	20	4	182	153
RTOR Reduction (vph)	0	19	0	0	3	0	0	0	9	0	0	66
Lane Group Flow (vph)	93	62	0	32	128	0	21	146	11	4	182	87
Heavy Vehicles (%)	2%	2%	4%	6%	2%	47%	5%	9%	26%	2%	4%	4%
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)	7.0	7.0		7.0	7.0		21.3	21.3	21.3	21.3	21.3	21.3
Effective Green, g (s)	7.0	7.0		7.0	7.0		21.3	21.3	21.3	21.3	21.3	21.3
Actuated g/C Ratio	0.19	0.19		0.19	0.19		0.57	0.57	0.57	0.57	0.57	0.57
Clearance Time (s)	4.5	4.5		4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	237	336		239	347		671	1006	740	714	1054	896
v/s Ratio Prot		0.03			0.07			0.08			c0.10	
v/s Ratio Perm	c0.07			0.03			0.02		0.01	0.00		0.06
v/c Ratio	0.39	0.19		0.13	0.37		0.03	0.15	0.02	0.01	0.17	0.10
Uniform Delay, d1	13.3	12.8		12.6	13.2		3.5	3.7	3.5	3.4	3.8	3.6
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.1	0.3		0.3	0.7		0.1	0.3	0.0	0.0	0.4	0.2
Delay (s)	14.4	13.0		12.9	13.9		3.6	4.0	3.5	3.5	4.2	3.9
Level of Service	B	B		B	B		A	A	A	A	A	A
Approach Delay (s)		13.7			13.7			3.9			4.0	
Approach LOS		B			B			A			A	

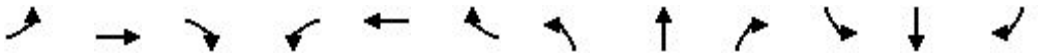
Intersection Summary			
HCM 2000 Control Delay	7.8	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.23		
Actuated Cycle Length (s)	37.3	Sum of lost time (s)	9.0
Intersection Capacity Utilization	38.2%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	164	128	17	31	76	5	10	344	36	4	211	11
Future Volume (vph)	164	128	17	31	76	5	10	344	36	4	211	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.98		1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1789	1851		1789	1867		1789	1883	1601	1789	1795	1296
Flt Permitted	0.70	1.00		0.66	1.00		0.62	1.00	1.00	0.53	1.00	1.00
Satd. Flow (perm)	1318	1851		1238	1867		1160	1883	1601	1002	1795	1296
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	178	139	18	34	83	5	11	374	39	4	229	12
RTOR Reduction (vph)	0	13	0	0	4	0	0	0	18	0	0	6
Lane Group Flow (vph)	178	144	0	34	84	0	11	374	21	4	229	6
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	7%	26%
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		9.2	9.2		21.2	21.2	21.2	21.2	21.2	21.2
Effective Green, g (s)	9.2	9.2		9.2	9.2		21.2	21.2	21.2	21.2	21.2	21.2
Actuated g/C Ratio	0.23	0.23		0.23	0.23		0.54	0.54	0.54	0.54	0.54	0.54
Clearance Time (s)	4.5	4.5		4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	307	432		289	435		624	1013	861	539	965	697
v/s Ratio Prot		0.08			0.05			c0.20			0.13	
v/s Ratio Perm	c0.14			0.03			0.01		0.01	0.00		0.00
v/c Ratio	0.58	0.33		0.12	0.19		0.02	0.37	0.02	0.01	0.24	0.01
Uniform Delay, d1	13.4	12.6		11.9	12.1		4.2	5.2	4.3	4.2	4.8	4.2
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	2.6	0.5		0.2	0.2		0.1	1.0	0.1	0.0	0.6	0.0
Delay (s)	16.0	13.0		12.1	12.3		4.3	6.3	4.3	4.2	5.4	4.2
Level of Service	B	B		B	B		A	A	A	A	A	A
Approach Delay (s)		14.6			12.3			6.0			5.3	
Approach LOS		B			B			A			A	

Intersection Summary			
HCM 2000 Control Delay	9.1	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.43		
Actuated Cycle Length (s)	39.4	Sum of lost time (s)	9.0
Intersection Capacity Utilization	42.7%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Appendix D:
Traffic Operations – Total



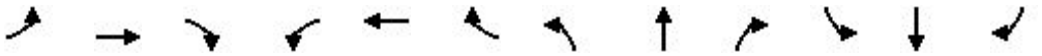
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	92	57	24	31	128	4	31	142	19	4	177	157
Future Volume (vph)	92	57	24	31	128	4	31	142	19	4	177	157
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.96		1.00	1.00		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1789	1790		1722	1853		1738	1762	1296	1789	1847	1570
Flt Permitted	0.67	1.00		0.70	1.00		0.64	1.00	1.00	0.66	1.00	1.00
Satd. Flow (perm)	1254	1790		1268	1853		1165	1762	1296	1242	1847	1570
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	100	62	26	34	139	4	34	154	21	4	192	171
RTOR Reduction (vph)	0	21	0	0	3	0	0	0	9	0	0	74
Lane Group Flow (vph)	100	67	0	34	140	0	34	154	12	4	192	97
Heavy Vehicles (%)	2%	2%	4%	6%	2%	47%	5%	9%	26%	2%	4%	4%
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)	7.2	7.2		7.2	7.2		21.0	21.0	21.0	21.0	21.0	21.0
Effective Green, g (s)	7.2	7.2		7.2	7.2		21.0	21.0	21.0	21.0	21.0	21.0
Actuated g/C Ratio	0.19	0.19		0.19	0.19		0.56	0.56	0.56	0.56	0.56	0.56
Clearance Time (s)	4.5	4.5		4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	242	346		245	358		657	994	731	701	1042	886
v/s Ratio Prot		0.04			0.08			0.09			c0.10	
v/s Ratio Perm	c0.08			0.03			0.03		0.01	0.00		0.06
v/c Ratio	0.41	0.19		0.14	0.39		0.05	0.15	0.02	0.01	0.18	0.11
Uniform Delay, d1	13.1	12.6		12.4	13.1		3.6	3.9	3.6	3.5	3.9	3.8
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.1	0.3		0.3	0.7		0.1	0.3	0.0	0.0	0.4	0.2
Delay (s)	14.3	12.8		12.7	13.8		3.8	4.2	3.6	3.6	4.3	4.0
Level of Service	B	B		B	B		A	A	A	A	A	A
Approach Delay (s)		13.6			13.6			4.1			4.2	
Approach LOS		B			B			A			A	

Intersection Summary			
HCM 2000 Control Delay	7.8	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.24		
Actuated Cycle Length (s)	37.2	Sum of lost time (s)	9.0
Intersection Capacity Utilization	40.6%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	170	14	22	294	2	3
Future Volume (Veh/h)	170	14	22	294	2	3
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	185	15	24	320	2	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			200		560	192
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			200		560	192
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			98		100	100
cM capacity (veh/h)			1372		481	849

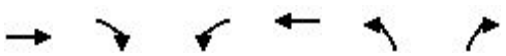
Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	200	344	5
Volume Left	0	24	2
Volume Right	15	0	3
cSH	1700	1372	650
Volume to Capacity	0.12	0.02	0.01
Queue Length 95th (m)	0.0	0.4	0.2
Control Delay (s)	0.0	0.7	10.6
Lane LOS		A	B
Approach Delay (s)	0.0	0.7	10.6
Approach LOS			B

Intersection Summary			
Average Delay	0.5		
Intersection Capacity Utilization	39.8%	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)	180	139	27	33	81	5	13	365	38	4	224	13
Future Volume (vph)	180	139	27	33	81	5	13	365	38	4	224	13
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.98		1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1789	1838		1789	1868		1789	1883	1601	1789	1795	1296
Flt Permitted	0.70	1.00		0.64	1.00		0.61	1.00	1.00	0.51	1.00	1.00
Satd. Flow (perm)	1312	1838		1213	1868		1145	1883	1601	957	1795	1296
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	196	151	29	36	88	5	14	397	41	4	243	14
RTOR Reduction (vph)	0	20	0	0	4	0	0	0	19	0	0	7
Lane Group Flow (vph)	196	160	0	36	89	0	14	397	22	4	243	7
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	7%	26%
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)	9.7	9.7		9.7	9.7		21.2	21.2	21.2	21.2	21.2	21.2
Effective Green, g (s)	9.7	9.7		9.7	9.7		21.2	21.2	21.2	21.2	21.2	21.2
Actuated g/C Ratio	0.24	0.24		0.24	0.24		0.53	0.53	0.53	0.53	0.53	0.53
Clearance Time (s)	4.5	4.5		4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	318	446		294	454		608	1000	850	508	953	688
v/s Ratio Prot		0.09			0.05			c0.21			0.14	
v/s Ratio Perm	c0.15			0.03			0.01		0.01	0.00		0.01
v/c Ratio	0.62	0.36		0.12	0.20		0.02	0.40	0.03	0.01	0.25	0.01
Uniform Delay, d1	13.4	12.5		11.8	12.0		4.4	5.6	4.4	4.4	5.1	4.4
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	3.5	0.5		0.2	0.2		0.1	1.2	0.1	0.0	0.6	0.0
Delay (s)	17.0	13.0		12.0	12.2		4.5	6.7	4.5	4.4	5.7	4.4
Level of Service	B	B		B	B		A	A	A	A	A	A
Approach Delay (s)		15.1			12.1			6.5			5.6	
Approach LOS		B			B			A			A	

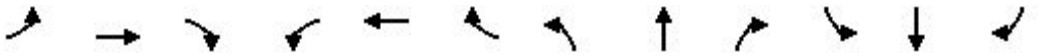
Intersection Summary			
HCM 2000 Control Delay	9.5	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.47		
Actuated Cycle Length (s)	39.9	Sum of lost time (s)	9.0
Intersection Capacity Utilization	45.0%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	328	3	4	103	13	19
Future Volume (Veh/h)	328	3	4	103	13	19
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	357	3	4	112	14	21
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			360		478	358
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			360		478	358
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		97	97
cM capacity (veh/h)			1199		544	686

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	360	116	35
Volume Left	0	4	14
Volume Right	3	0	21
cSH	1700	1199	621
Volume to Capacity	0.21	0.00	0.06
Queue Length 95th (m)	0.0	0.1	1.4
Control Delay (s)	0.0	0.3	11.1
Lane LOS		A	B
Approach Delay (s)	0.0	0.3	11.1
Approach LOS			B

Intersection Summary			
Average Delay	0.8		
Intersection Capacity Utilization	27.4%	ICU Level of Service	A
Analysis Period (min)	15		



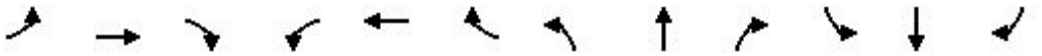
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	102	63	26	34	141	5	33	157	21	5	196	172
Future Volume (vph)	102	63	26	34	141	5	33	157	21	5	196	172
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.96		1.00	1.00		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1789	1791		1722	1849		1738	1762	1296	1789	1847	1570
Flt Permitted	0.66	1.00		0.69	1.00		0.62	1.00	1.00	0.65	1.00	1.00
Satd. Flow (perm)	1237	1791		1259	1849		1143	1762	1296	1223	1847	1570
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	111	68	28	37	153	5	36	171	23	5	213	187
RTOR Reduction (vph)	0	22	0	0	3	0	0	0	10	0	0	82
Lane Group Flow (vph)	111	74	0	37	155	0	36	171	13	5	213	105
Heavy Vehicles (%)	2%	2%	4%	6%	2%	47%	5%	9%	26%	2%	4%	4%
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)	7.5	7.5		7.5	7.5		21.0	21.0	21.0	21.0	21.0	21.0
Effective Green, g (s)	7.5	7.5		7.5	7.5		21.0	21.0	21.0	21.0	21.0	21.0
Actuated g/C Ratio	0.20	0.20		0.20	0.20		0.56	0.56	0.56	0.56	0.56	0.56
Clearance Time (s)	4.5	4.5		4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	247	358		251	369		640	986	725	684	1034	879
v/s Ratio Prot		0.04			0.08			0.10			c0.12	
v/s Ratio Perm	c0.09			0.03			0.03		0.01	0.00		0.07
v/c Ratio	0.45	0.21		0.15	0.42		0.06	0.17	0.02	0.01	0.21	0.12
Uniform Delay, d1	13.2	12.5		12.4	13.1		3.7	4.0	3.7	3.6	4.1	3.9
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.3	0.3		0.3	0.8		0.2	0.4	0.0	0.0	0.5	0.3
Delay (s)	14.5	12.8		12.6	13.9		3.9	4.4	3.7	3.7	4.6	4.2
Level of Service	B	B		B	B		A	A	A	A	A	A
Approach Delay (s)		13.7			13.6			4.3			4.4	
Approach LOS		B			B			A			A	

Intersection Summary			
HCM 2000 Control Delay	7.9	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.27		
Actuated Cycle Length (s)	37.5	Sum of lost time (s)	9.0
Intersection Capacity Utilization	42.9%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	187	14	22	325	2	3
Future Volume (Veh/h)	187	14	22	325	2	3
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	203	15	24	353	2	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			218		612	210
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			218		612	210
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			98		100	100
cM capacity (veh/h)			1352		449	830

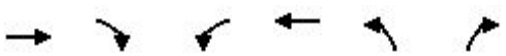
Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	218	377	5
Volume Left	0	24	2
Volume Right	15	0	3
cSH	1700	1352	619
Volume to Capacity	0.13	0.02	0.01
Queue Length 95th (m)	0.0	0.4	0.2
Control Delay (s)	0.0	0.7	10.9
Lane LOS		A	B
Approach Delay (s)	0.0	0.7	10.9
Approach LOS			B

Intersection Summary			
Average Delay	0.5		
Intersection Capacity Utilization	42.3%	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)	198	153	29	36	90	6	14	403	42	5	247	14
Future Volume (vph)	198	153	29	36	90	6	14	403	42	5	247	14
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.98		1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1789	1838		1789	1865		1789	1883	1601	1789	1795	1296
Flt Permitted	0.69	1.00		0.63	1.00		0.59	1.00	1.00	0.45	1.00	1.00
Satd. Flow (perm)	1298	1838		1193	1865		1119	1883	1601	852	1795	1296
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	215	166	32	39	98	7	15	438	46	5	268	15
RTOR Reduction (vph)	0	18	0	0	5	0	0	0	23	0	0	8
Lane Group Flow (vph)	215	180	0	39	100	0	15	438	23	5	268	7
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	7%	26%
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)	12.1	12.1		12.1	12.1		20.8	20.8	20.8	20.8	20.8	20.8
Effective Green, g (s)	12.1	12.1		12.1	12.1		20.8	20.8	20.8	20.8	20.8	20.8
Actuated g/C Ratio	0.29	0.29		0.29	0.29		0.50	0.50	0.50	0.50	0.50	0.50
Clearance Time (s)	4.5	4.5		4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	374	530		344	538		555	934	794	422	891	643
v/s Ratio Prot		0.10			0.05			c0.23			0.15	
v/s Ratio Perm	c0.17			0.03			0.01		0.01	0.01		0.01
v/c Ratio	0.57	0.34		0.11	0.19		0.03	0.47	0.03	0.01	0.30	0.01
Uniform Delay, d1	12.7	11.7		11.0	11.2		5.4	6.9	5.4	5.3	6.2	5.3
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	2.1	0.4		0.1	0.2		0.1	1.7	0.1	0.1	0.9	0.0
Delay (s)	14.8	12.1		11.1	11.4		5.5	8.6	5.5	5.4	7.1	5.4
Level of Service	B	B		B	B		A	A	A	A	A	A
Approach Delay (s)		13.5			11.3			8.2			7.0	
Approach LOS		B			B			A			A	

Intersection Summary			
HCM 2000 Control Delay	9.9	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	41.9	Sum of lost time (s)	9.0
Intersection Capacity Utilization	48.5%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

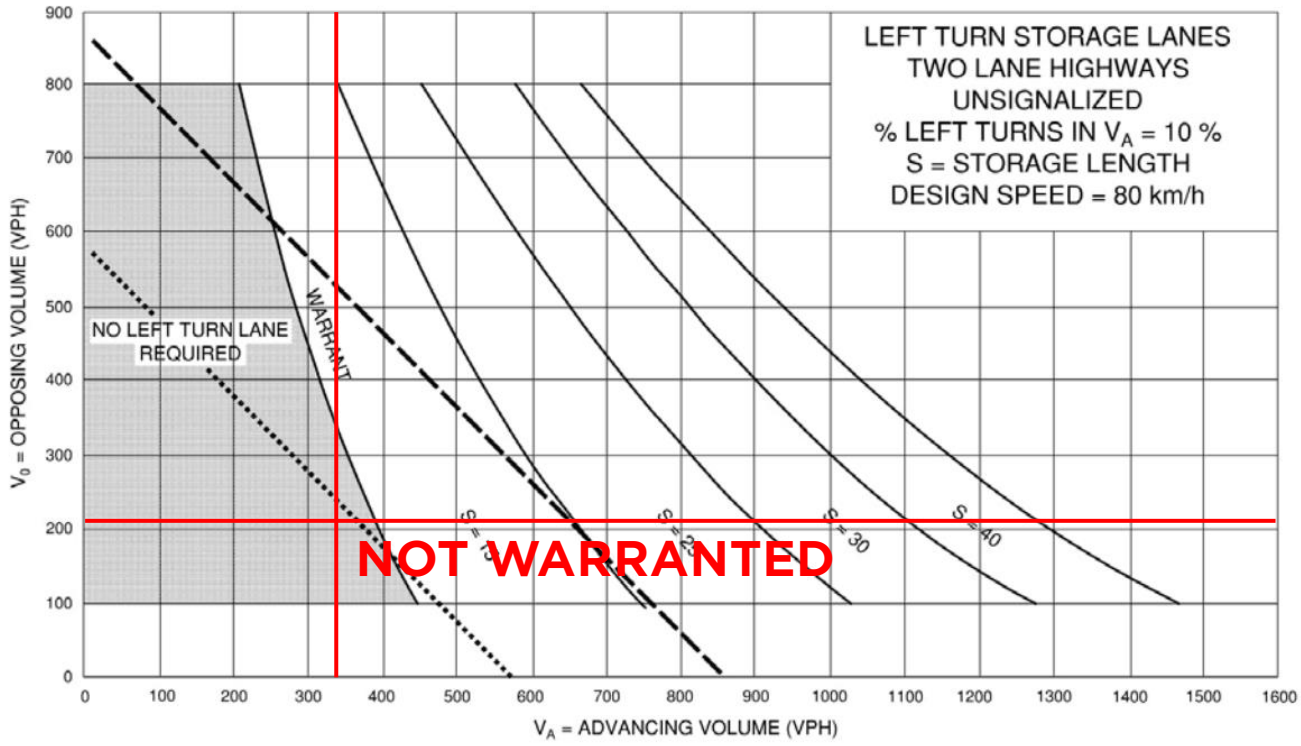


Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	362	3	4	114	13	19
Future Volume (Veh/h)	362	3	4	114	13	19
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	393	3	4	124	14	21
Pedestrians						
Lane Width (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			396		526	394
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			396		526	394
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		97	97
cM capacity (veh/h)			1163		510	655

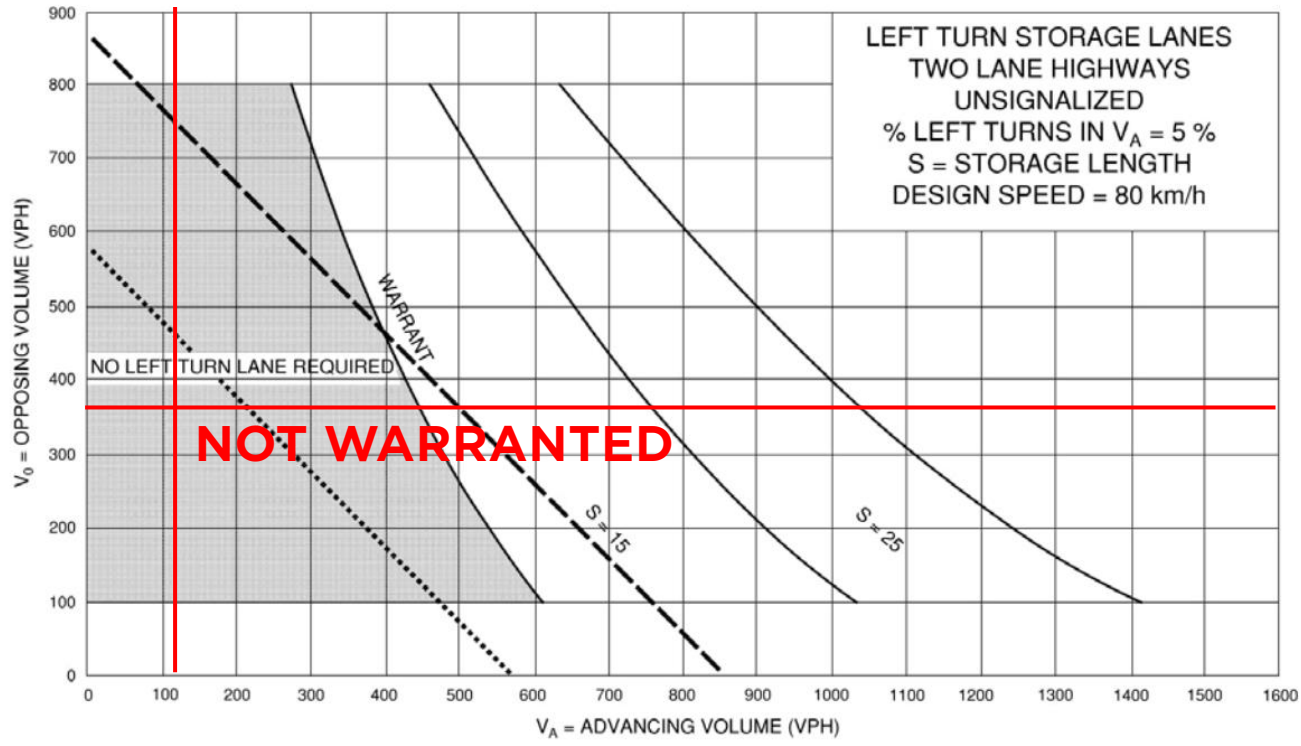
Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	396	128	35
Volume Left	0	4	14
Volume Right	3	0	21
cSH	1700	1163	588
Volume to Capacity	0.23	0.00	0.06
Queue Length 95th (m)	0.0	0.1	1.4
Control Delay (s)	0.0	0.3	11.5
Lane LOS		A	B
Approach Delay (s)	0.0	0.3	11.5
Approach LOS			B

Intersection Summary			
Average Delay	0.8		
Intersection Capacity Utilization	29.2%	ICU Level of Service	A
Analysis Period (min)	15		

Appendix E:
Left Turn Nomographs



AM Peak Hour



PM Peak Hour