Transportation Impact Study
Residential Subdivision
211 Eliza Street
(Sarah Properties)

Broos Properties

Arthur, Township of Wellington North, ON

December 18, 2024

hdrinc.com 100 York Boulevard, Suite 300, Richmond Hill, ON, CA L4B 1J8
(289) 695-4600

Executive Summary

HDR Corporation was retained by Broos Properties (Sarah Properties) to undertake a Transportation Impact Study for the proposed subdivision in Arthur, in the Township of Wellington North. Arthur is located near the intersection of County Road 109 and Highway 6. County Road 109 generally runs east-west, and Highway 6 generally runs north-west to south-east. The majority of the Town of Arthur is north of County Road 109.

The site is currently undeveloped. The subject lands are bound by County Road 109 to the south, Eliza Street to the west, undeveloped/agricultural lands to the east including the Conestogo River, and an existing subdivision to the north. The Arthur Downtown Centre is located only 300 metres to the west of the subject site.

The TIS was submitted on June 17, 2022 and comments have been received from the MTO in an email dated September 29, 2023 and have been incorporated into this revised TIS. Since the first submission, the site statistics have changed as follows; single-family detached homes were reduced from 179 to 155, street townhouse units were increased from 64 to 69, the high-density residential block was changed to medium-density residential block with 130 units in mid-rise multi-unit buildings, and the retail area in the commercial plaza was increased from approximately 25,000 SF to 65,000 SF. The study horizons were also adjusted from 2028 to 2030 since the first submission assumed the project to be built by 2023.

Access to the residential component of the subdivision is being proposed via three access points. The primary access will be directly from County Road 109 near the east end of the subdivision, a secondary access on the west side of the subdivision will be provided via Eliza Street, and a third access to the north will connect to the through existing and established neighborhoods to the north via Schmidt Drive.

The commercial plaza is located at the south-west corner of the proposed subdivision. Access to the plaza is being proposed via two driveways along County Road 109. The plaza is not directly connected to the rest of the proposed subdivision to the north of the development.

The objectives of the study were to:

- Provide an estimate of traffic volumes generated by the subdivision
- Assess the impacts of the subdivision on traffic operations and capacity of the immediate surrounding road network
- Determine access requirements for the subdivision by reviewing sightlines and performing a safety assessment for the proposed access locations along County Road 109, and
- Provide recommendations to mitigate any identified operational deficiencies of safety concerns

Preliminary comments on the subdivision were prepared on behalf of the Township by Triton Engineering Services (in a memorandum dated April 2, 2022), in advance of review of the

transportation impact study. The comments contained in the memorandum which relate to the transportation impact study are as follows:

- TIS required to address issues related to development proposal including:
    - Impacts on local streets/intersections including, but not limited to:
        - Eliza & Street A
        - Eliza & Smith
        - Street J & East Ridge
        - Street H & CR109.
        - Commercial plaza driveways & CR109
- Suitability and assessment of multiple CR109 entrances and any modifications (urbanization etc.) required and the expected impact on residential and commercial/retail traffic.
- Pedestrian movement and access; including along CR109 and/or trail system between block 168 and 82.
- Horse and buggy and agricultural equipment traffic.
- Suitability of the island at the entrance to this subdivision.
    - Note: Consultation with Wellington County for their requirements is imperative.
- Daylighting triangles at the proposed intersection of Eliza & Street A and CR109 & Street H are to be indicated.
- Urbanization of CR109 to be discussed further as the development progresses.

The Township of Wellington was contacted to confirm the scope of work.

The study assessed the impacts of the proposed development for the future horizon year of 2030. The development is anticipated to be occupied by 2030 which represents the 5-year horizon.

This report documents the transportation impact study scope of work, assumptions, traffic impact analyses and operations assessment, analysis findings, and recommendations.

Traffic Forecasts

The proposed development is estimated to generate a total of 414, 657 and 808 two-way vehicle trips during the weekday AM, Mid-day and PM peak hour, respectively. For the residential component of the development, Eliza Street is expected to experience higher traffic activity than the Wellington Road 109 entrance. While a north access to the site will be provided with connection to Schmidt Drive and the established neighbourhood to the north, site traffic is not expected to use this access point. Rather, this access may be used by residents of the neighbourhood to the north to access County Road 109, or to further access the proposed retail plaza along County Road 109.

Traffic Capacity and Operations

Under existing conditions, the surrounding road network is currently operating at desirable level of service. A review of historical travel patterns and magnitude of traffic volumes suggests that there have been some fluctuations in traffic patterns from year to year.

There is residual capacity in the road network to accommodate the projected vehicle volumes. The largest impact to the v/c ratio due to the site traffic is on the intersection of Highway 6 and County Road 109; however, all movements at that intersection will still operate with residual capacity and a v/c ratio of 0.87, or less. All other movements at other intersections are operating at a v/c ratio of 0.71 or less. Overall, all movements within the study area will operate at LOS D or better during all peak periods with two exceptions during the PM peak hour: the westbound approach at the intersection of Highway 6 and Eliza Street (LOS E, v/c ratio of 0.55), and the southbound shared left-right turning lane at the intersection of County Road 109 and the east retail plaza driveway (LOS E, v/c ratio of 0.71).

Recommended Mitigation Measures

Based on the study findings, no mitigation measures to the external road network are required to accommodate the future total traffic conditions. However, signal split optimization for the intersection of Wellington Road 109 and Highway 6 is required for the MD and PM peak hours under future background and future total conditions. As a result, the signal timings are likely to be optimized to account for the development and other changes in traffic patterns or magnitude of traffic volumes, hence making the operations presented in this report conservative and demonstrating that the subject development will not trigger the need for any mitigation.

Wellington Road 109 Sightline & Turn Lane Analysis

A desktop review of the sightlines was performed to confirm that the available sight distances exceed the minimum requirements provided in the Transportation Association of Canada Geometric Design Guide for Canadian Roads for the retail driveway and the residential access located on Wellington Road 109. The analysis focused primarily on the sightline limitations due to the vertical curvature of the roadway. For all 3 driveways, the analysis indicated that there is sufficient sight distance for each new access point.

Additionally, the need for left-turn lanes was reviewed using Ministry of Transportation of Ontario left-turn lane warrants, and industry warrants for right-turns. Right turn lanes are not required for any entrance. However, left turn lanes with 25, 15 and 40 metres of storage should be provided for the west retail driveway, east retail driveway and residential access, respectively.

Signal Warrant Analysis at Highway 6 and Eliza St

A signal warrant was prepared at the intersection of Highway 6 with Eliza Street using the Ontario Traffic Manual (OTM) Book 12 methodology – Justification 7. Based on the findings of the signal warrant analysis, the signalization of the intersection is not warranted as neither the volumes nor delays trigger any warrants.

Contents

Tables

Exhibits

Appendices

Project Team

Project Manager	Carl Wong, P.Eng.
Project Engineer	Rami Rubb, P. Eng
QAQC	Adam Beausoleil, P.Eng.

1 Introduction

HDR Corporation was retained by Broos Properties (Sarah Properties) to undertake a Transportation Impact Study for the proposed subdivision in Arthur, in the Township of Wellington North. Arthur is located near the intersection of County Road 109 (Wellington Road) and Highway 6. County Road 109 generally runs east-west, and Highway 6 generally runs north-west to south-east. The majority of the Town of Arthur is north of County Road 109.

The site is currently undeveloped. The subject lands are bound by County Road 109 to the south, Eliza Street to the west, undeveloped/agricultural lands to the east including the Conestogo River, and an existing subdivision to the north. The Arthur Downtown Centre is located only 300 metres to the west of the subject site.

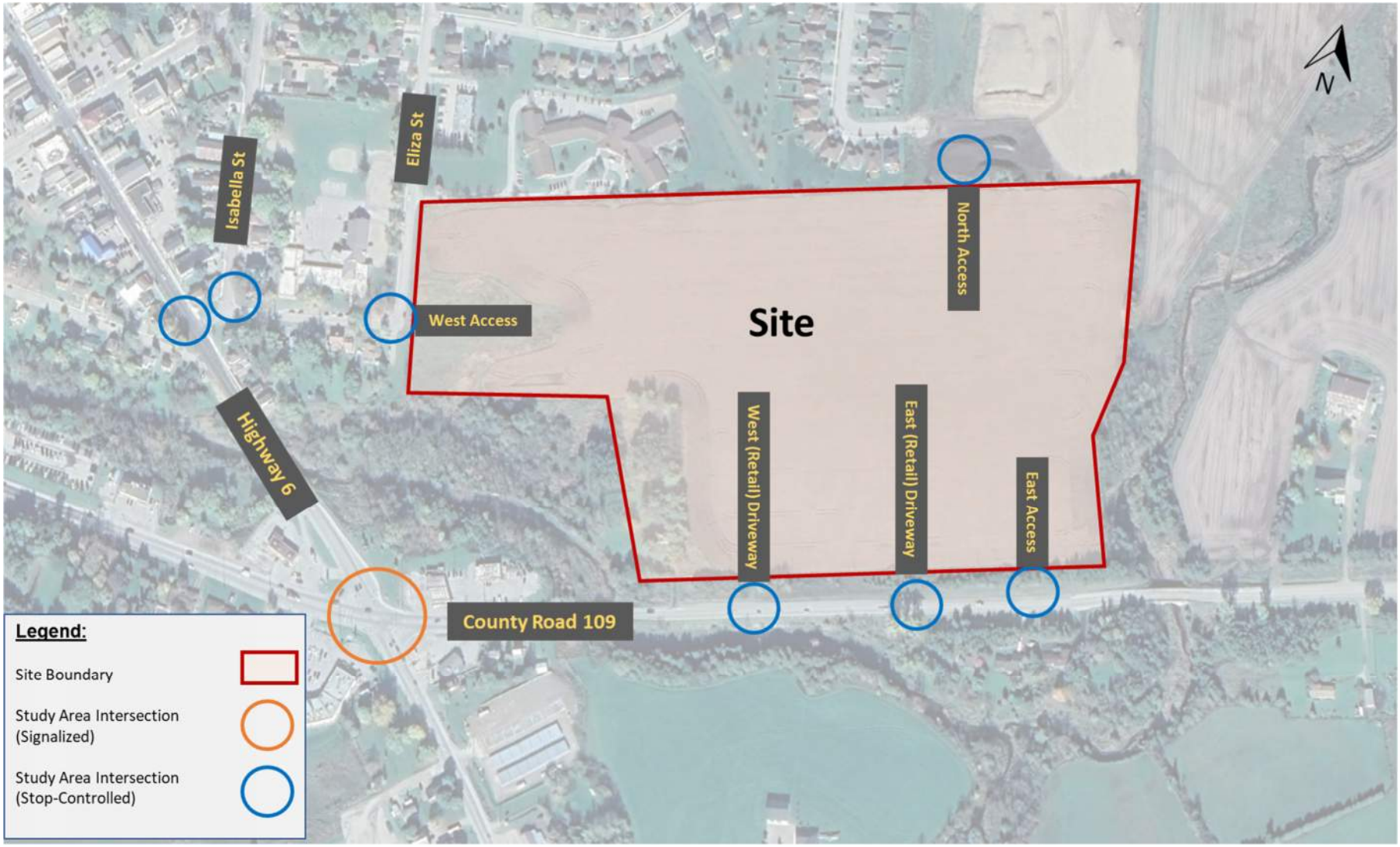
Broos Properties is proposing a subdivision with 155 single-family detached homes, 69 street townhouse units, a high-density residential block with 130 units in a mid-rise multi-unit building, and a commercial plaza with a retail area of 65,000 square feet (SF).

Access to the residential component of the subdivision is being proposed via three access points. The primary access will be directly from County Road 109 near the east end of the subdivision, a secondary access on the west side of the subdivision will be provided via Eliza Street, and a third access to the north will connect to the through existing and established neighborhoods to the north via Schmidt Drive.

The commercial plaza is located at the south-west corner of the proposed subdivision. Access to the plaza is being proposed via two driveways along County Road 109. The plaza is not directly connected to the rest of the proposed subdivision to the north of the development.

The site context and study area are illustrated in **Exhibit 1**.

Exhibit 1: Study Area and Site Context



1.1 Comments on First Submission

The TIS was submitted on June 17, 2022 and comments have been received from the MTO in an email dated September 29, 2023. The comments and actions take are summarized in **Table 1.**

Table 1: MTO Comments Summary

Comment	Action Taken
MTO require that the TIS be stamped and signed by a Licensed Professional Engineer.	The revised TIS will be Stamped and Signed as requested.
The data for Highway 6 and Eliza Street is acceptable for use in the TIS. However, MTO require that the revised TIS be completed using the attached 2021 TMC for Highway 6 and Wellington Rd 109	The traffic counts provided were used for this revision. Instead of the hybrid approach used earlier to counter Covid impacts, other study area intersections were balanced with the new TMC volumes at Highway 6 and CR109.
Exhibit 2 – Lane configuration at Highway 6 & Eliza St intersection does not match with existing conditions. The SB parking lane should not be included as a lane. NB right-shared is a taper only. Therefore, the lane configuration is one thru-left shared lane in SB direction and a thru plus taper in NB direction. MTO require that the TIS be revised using the existing conditions.	Lane configuration was revised, and the analysis was updated accordingly.
Exhibit 3 – Trips on Eliza St between Isabella St and Highway 6 are not balanced. Please provide clarification	Balancing was rechecked with the new traffic data and any balancing applied was documented in this report. The trips along this segment are now balanced with 0 difference between the 2 intersections.
Table 4 & Table 9 – V/C ratio in PM peak hour for Highway 6 / County Rd 109 for WB Thru-Right in future background and total future traffic scenarios has decreased as compared to existing conditions. Please provide clarification	Signal Timing Split optimization is the cause for the improvements from existing to background conditions. Signal Timing Split optimization is documented in the traffic analysis sections.
Highway 6 at Eliza St is an un-signalized intersection in existing conditions. MTO require that a signal warrant analysis for this intersection be completed following OTM Book 12 to ensure signals are not warranted in any of the future conditions	A warrant analysis was added to the report.

1.2 Scope of Work

The scope of work has been prepared in accordance with standard requirements for preparation of Transportation Impact Studies in support of Draft Plan of Subdivisions, and in consultation with the County of Wellington North. The Township of Wellington was contacted to confirm and approve the scope of this study as documented in **Appendix A**. Comments prepared on behalf of the Township were also provided in a memorandum dated April 7, 2022 in advance of the preparation of this study, and contained some comments relating to the transportation analysis. Those comments are also contained in **Appendix A**.

The agreed scope of work is as follows:

Study Area	• Area bounded by County Road 109, Highway 6, Eliza Street, Conestogo River, and the site's north boundary
Analysis Scenarios	• Existing 2024 Traffic Conditions • Future 2030 Background Traffic Conditions (5-year Horizon) *Includes general background traffic growth plus other new development traffic in the vicinity of the site* • Future 2030 Total Traffic Conditions *Includes future background traffic volumes plus traffic resulting from the proposed development*
Analysis Time Periods	The following time periods were analyzed as they represent peak trip generation times for residential developments, and the midday time period was requested by the Township: • Weekday AM peak hour between 7:00am and 9:00am • Weekday Mid-day (MD) peak hour between 12:00pm and 2:00pm • 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) Highway 6 / County Road 109 2) Highway 6 / Eliza Street 3) Eliza Street / Izabella Street 4) Eliza Street / West Access 5) County Road 109 / South Access 6) County Road 109 / West (Retail) Driveway 7) County Road 109 / East (Retail) Driveway 8) Schmidt Drive / North Access
Sightline Review, Safety Assessment, and Analysis of County Road 109 Access Points	A sightline review was performed for the three proposed accesses on County Road 109. Aerial imagery and available survey information including profile and plans of the roadway were used to determine the sight distance based on the horizontal and vertical curvature of the roadway.

1.3 Intersection Operations and Analysis Methodology

Intersection operations were assessed for the study area intersections and driveways using the software program Synchro Traffic Signal Coordination Software Version 11, which employs methodology from the **Highway Capacity Manual** (HCM2000) published by the Transportation Research Board National Research Council. Synchro can analyze both signalized and unsignalized intersections in a road corridor or network accounting for 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 length) and storage requirements.

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 2**.

Table 2: Highway Capacity Manual Level of Service Definitions

Level of Service (LOS)	Signalized Control Delay per Vehicle (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	Unacceptable

2 Existing Conditions

2.1 Site Context

Arthur is a small community in the Township of Wellington North, which is located at the junction of Highway 6 and Wellington Road 109. The majority of the community of Arthur is located on the north side of Wellington Road 109, lining both sides of Highway 6 but primarily on the north-east side. Arthur is approximately 2 kilometres by 1.5 kilometres, and the area surrounding Arthur is predominantly agricultural land. The proposed subdivision is located in the south-east corner of Arthur, and would become the first built area of Arthur that drivers would encounter when arriving from the east on Highway 6. The downtown area of Arthur is located only 300 metres to the west of the site.

2.2 Existing Road Network

The existing road network is shown in **Exhibit 2**, including existing and proposed traffic controls and lane configurations. The existing road network is described below:

Highway 6 Highway 6, officially King's Highway 6, has an approximate length of 480 kilometres connecting Port Dover in the south of Ontario to McKerrow in the north, and it is under the jurisdiction of the Ministry of Transportation of Ontario. Within the study area, the highway has a two-lane cross section and a posted speed of 50 km/hr. Left turning lanes are provided in both directions at the intersection with County Road 109 and the northbound and southbound right-turns are channelized. Sidewalk is provided on the east side of Highway 6, north of Wellington Road 109.

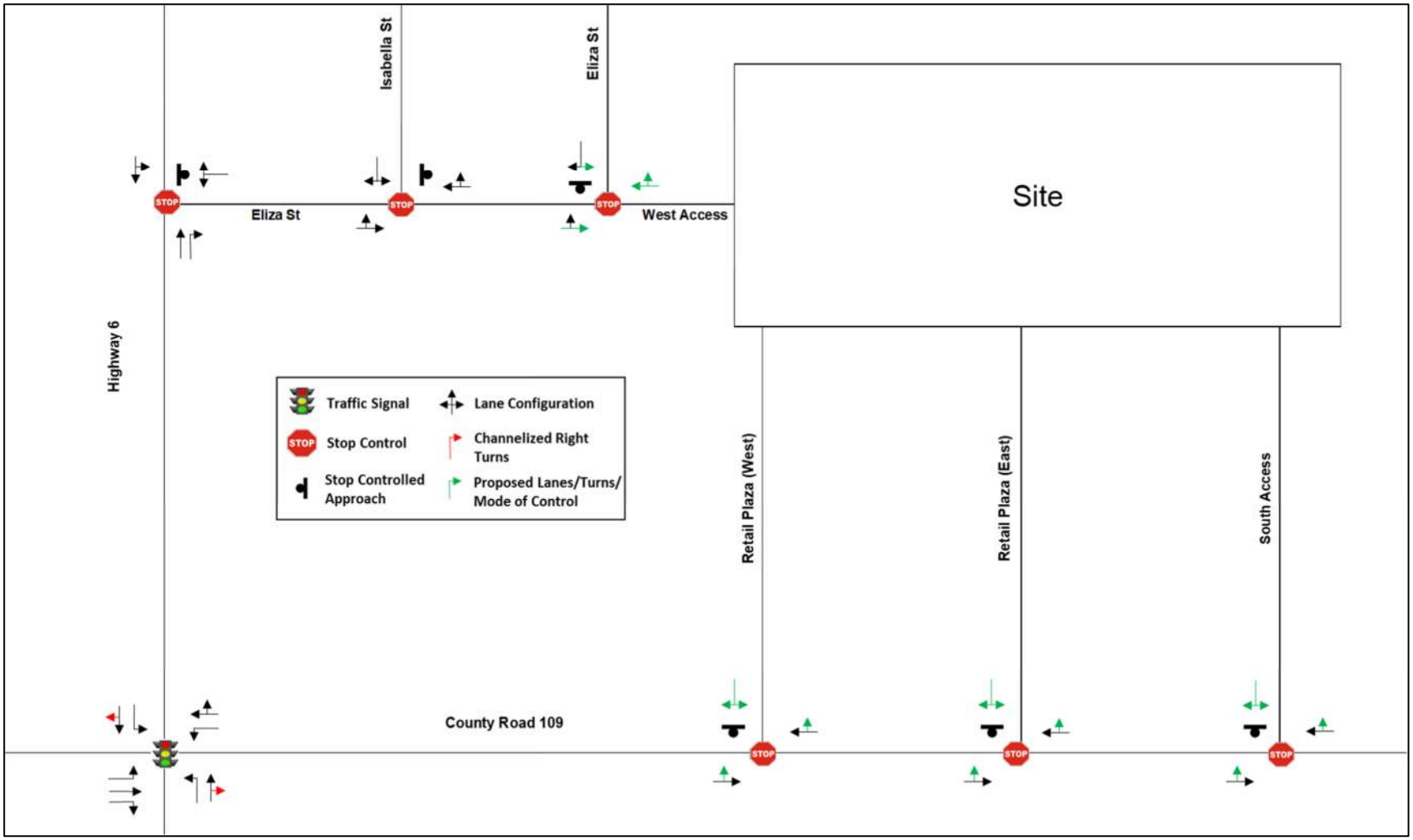
County Road 109 County Road 109 is a two-lane highway under the jurisdiction of the country of Wellington. Within the study area, the highway has a two-lane cross section and a posted speed of 70 km/hr. Left turning lanes are provided in both directions at the intersection with Highway 6. Sidewalk is not provided along Country Road 109.

Eliza Street Between Highway 6 and the development, Eliza Street is an east-west local road with an assumed speed of 50 km/h. It has a two-lane cross section. The direction of the road changes to north-south, at the intersection with development's access and is currently uncontrolled at this location. With the introduction of the development, at least one of the legs of this intersection will need to be converted to stop control. Sidewalks are provided on both sides of Eliza Street.

Isabella Street Isabella Street is a north-south local road with an assumed speed of 50 km/hr. It has a two-lane cross section. Sidewalk is provided on both sides of Isabella Street.

There are no bicycle lanes within the study area.

Exhibit 2: Existing and Proposed Lane Configuration and Traffic Control



2.3 Existing Traffic Volumes

HDR collected historic turning movement count data from the County. Turning movement counts were available for the signalized intersection of Highway 6 and County Road 109 from the year 2017 covering the time periods identified **Section 1.1**. New traffic counts were also undertaken in May and June 2021. Given the pandemic's impact on traffic, any traffic counts conducted during 2021 were at risk of under-representing typical traffic volumes, therefore the 2021 counts were compared against the 2017 ones. Detailed count data are provided in **Appendix B**.

A comparison of the historical traffic counts and the 2021 data revealed that the midday traffic volumes within the study area have been relatively unaffected by the pandemic, possibly since the midday may be comprised of predominantly essential trips (i.e. grocery shopping), as opposed to the weekday AM and PM peak periods which are typically driven by commuter traffic. The midday traffic volumes have increased by 5% between 2017 and 2021. Based on this, an average annual growth rate of 1% was applied for forecasting future background traffic demand. On the other hand, morning and afternoon peak hour volumes decreased significantly between 2017 and 2021 and may be due to these trips being home based work trips which experienced a larger reduction due to the pandemic.

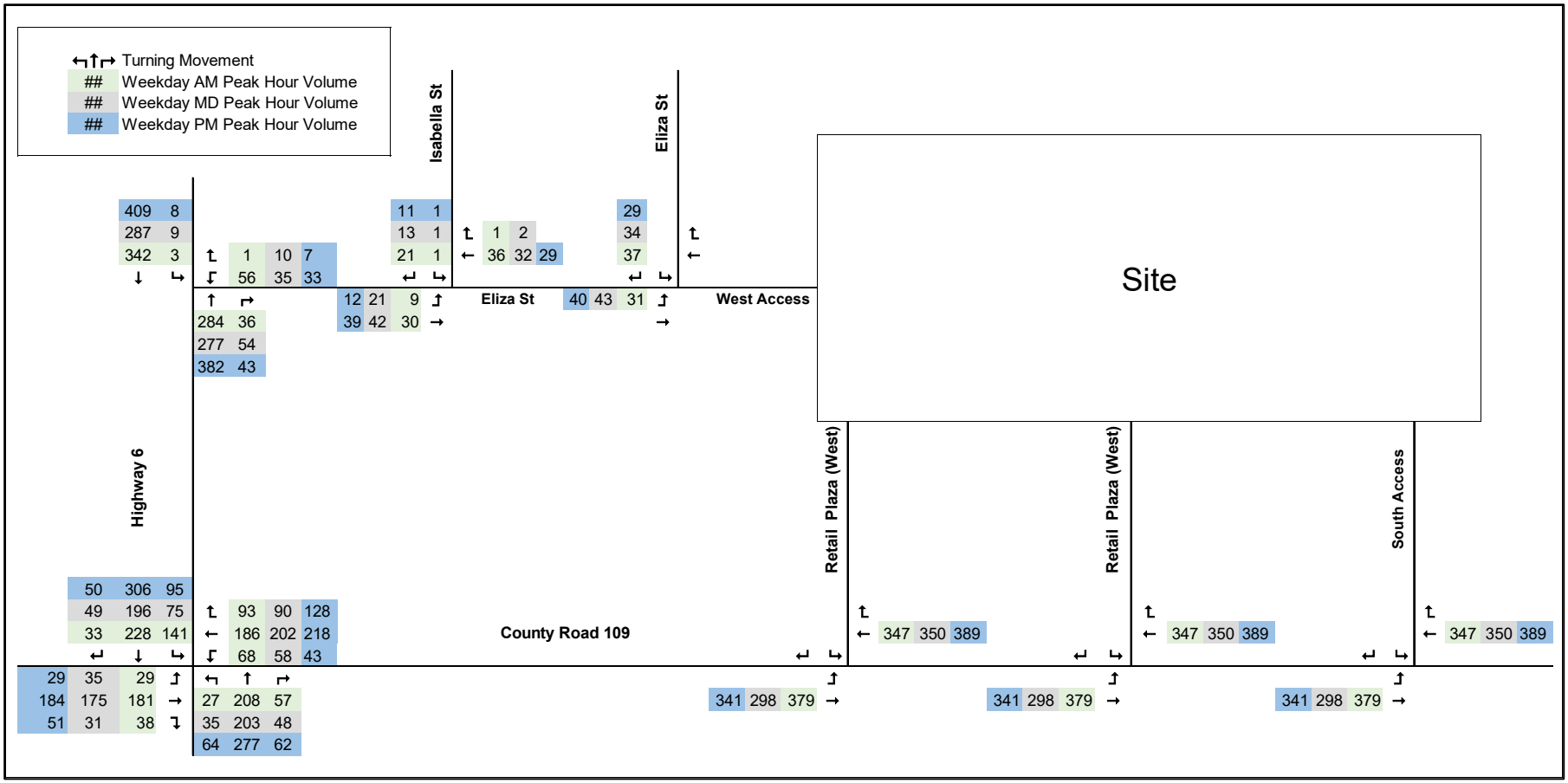
Upon reviewing the first draft of this report, MTO provided new traffic counts at the signalized intersection of Highway 6 and County Road 109 from November 2021 and requested the revised study to be completed using them. As the majority of Covid 19 restrictions were lifted by November 2021, the traffic counts were assumed to be representative of typical traffic conditions and the rest of the study area intersections were balanced by increasing traffic volumes were needed. As a conservative measure, an annual growth rate of 1% was applied in order to estimate the existing 2024 traffic volumes. For forecasting future AM, MD and PM traffic volumes, an annual growth rate of 1% was applied. Details of the growth rate calculations are shown in **Appendix E**.

The resulting balanced existing weekday AM, weekday MD and weekday PM peak hour vehicle volumes are shown in **Exhibit 3**. Individual intersection peak hour traffic volumes are shown and were used in the study analysis, which is more conservative than calculating a network peak hour to maintain volume balancing between study intersections.

Volume balancing between intersections was reviewed and the following balancing was applied:

- Highway 6 and Eliza Street:
  - AM Peak: NBT and SBT volumes were both increased by 100 vph each.
  - PM Peak: NBT and SBT volumes were increased by 90 and 100 vph, respectively.
- Highway 6 and County Road 109
  - MD peak: NBT and SBT volumes were increased by 40 and 10 vph, respectively.
- Eliza Street between Isabella Street and Highway 6
  - Turning volumes at the intersections of Eliza Street with Highway 6 and with Isabella Street were increased by up to 2 vph to avoid any volume differences between the two closely spaced intersections.
  - The impacted movements were EBR, EBL, SBL, and NBL at Highway 6 and Eliza Street as well as SBR and EBT at Eliza Street / Isabelle Street.

Exhibit 3: Existing Traffic Volumes



2.4 Existing Traffic Operations

Based on the existing traffic volumes shown in **Exhibit 3** and the existing road network illustrated in **Exhibit 2**, intersection operations were assessed using the Synchro 11 traffic analysis software. Existing signal timings are provided in **Appendix B**.

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

Under existing traffic conditions, study intersections are operating at overall level of service 'B' or better and all turning movements are operating with a level of service 'C' or better.

Critical movements are defined as shared through/turning movements with v/c ratios greater than 0.85, or exclusive turning movements with v/c ratios greater than 1.00. Based on the analysis results, there are no critical movements observed within the study area. Overall, all study intersections are operating well and with residual capacity.

Table 3: Existing Conditions – Summary of Synchro Results

Intersection and Movement		AM Peak Hour		MD Peak Hour		PM Peak Hour	
		LOS	v/c	LOS	v/c	LOS	v/c
Highway 6 / County Road 109		**B**	**0.43**	**B**	**0.43**	**B**	**0.52**
Eastbound	Left	C	0.14	C	0.23	C	0.23
	Through	C	0.38	C	0.45	C	0.45
	Right	C	0.03	C	0.03	C	0.04
Westbound	Left	C	0.28	C	0.24	C	0.18
	Through-Right	C	0.68	C	0.73	C	0.77
Northbound	Left	A	0.06	A	0.07	A	0.14
	Through-Right	A	0.32	A	0.28	B	0.37
Southbound	Left	A	0.27	A	0.16	A	0.23
	Through-Right	A	0.30	A	0.28	B	0.39
Highway 6 / Eliza St							
Westbound	Left-Right	C	0.15	B	0.10	C	0.12
Northbound	Through	-	0.18	-	0.18	-	0.24
	Right	-	0.02	-	0.03	-	0.03
Southbound	Through-Left	A	0.00	A	0.01	A	0.01
Eliza St / Isabella St							
Eastbound	Through-Right	-	0.02	-	0.04	-	0.03
Westbound	Through-Right	A	0.04	A	0.04	A	0.03
Southbound	Left-Right	A	0.00	A	0.00	A	0.00

Note: LOS = level of service; v/c = volume to capacity ratio; **Red** indicates critical operations.

Queuing results are based on the Synchro 95th percentile queues for signalized intersections and HCM2000 95th percentile for unsignalized intersections. **Table 4** shows the 95th percentile queue length under existing conditions. The queue lengths were also compared to the existing storage

lengths to confirm if they can accommodate the existing queues. All queues are contained within the available storage.

Table 4: Existing Conditions – 95th Percentile Queue Length

Intersection and Movement		Available Queue Lengths	AM Peak Hour	MD Peak Hour	PM Peak Hour
			95th Percentile (m)	95th Percentile (m)	95th Percentile (m)
Highway 6 / County Road 109					
Eastbound	Left	50	9.8	12	10.6
	Through	-	39.9	40.9	41.7
	Right	50	6.5	5.1	7.6
Westbound	Left	50	18.9	16.8	12.9
	Through-Right	-	61.4	68.0	83.3
Northbound	Left	50	5.6	6.7	10.8
	Through-Right	-	34.4	32.3	43.9
Southbound	Left	100	22.3	12.8	15.8
	Through-Right	-	34.4	31.4	47.5
Highway 6 / Eliza St					
Westbound	Left-Right	-	3.9	2.6	3.0
Northbound	Through	-	-	-	-
	Right	20	-	-	-
Southbound	Through-Left	-	0.1	0.2	0.2
Eliza St / Isabella St					
Eastbound	Through-Right	-	-	-	-
Westbound	Through-Right	-	1.0	0.9	0.8
Southbound	Left-Right	-	-	-	-

Notes: **Red** values mean that the 95th Percentile Queue extends past the available storage length.

3 Background Traffic Conditions

3.1 Planned Roadway Improvements

Based on the County's Ongoing Infrastructure & Construction Projects, there are no planned network changes proposed within the study area. The assumed future road network lane configurations are shown in **Exhibit 2** and are comprised of improvements at the site access points where new connections are proposed.

3.2 Background Traffic Volumes

Background traffic volumes are comprised of existing traffic volumes plus general background traffic growth, plus traffic associated with nearby developments.

3.2.1 Background Developments

As part of the analysis, nearby background developments in the study area were accounted for in the traffic forecasting process. Based on feedback from the County and a review of its Development Applications website, there are two background developments which have been considered in this analysis:

- 321 Domville Street: Residential development with 141 single family detached housing units and 99 townhouses. The total trips generated by the development are 151 and 196 during the AM and PM peak hours, respectively.
- North Arthur Residential Development: A mixed-use development with 203 single family detached housing units, 106 townhouses, and a shopping centre with an area of 48,000 SF. The total trips generated by the development are 244 and 445 during the AM and PM peak hours, respectively.

Available net site traffic estimates for the background developments were obtained from the respective transportation impact study and are attached in **Appendix D**. Both traffic impact studies assume that 55% of the trips will arrive or depart to the north or west and hence not passing though this development's study area. The remaining 45% of the trips were distributed along the study area network using the same distribution adopted for this TIS. **Exhibit** 4 shows the total background developments traffic volumes which were incorporated in the 2030 horizon year forecasts.

3.2.2 General Background Growth

The same growth rates applied to estimate the 2024 existing traffic, detailed in **Section 2.3**, were applied to the existing traffic volumes to estimate the future background traffic volumes.

Exhibit 5 shows the total 2030 horizon year future background traffic volumes comprised of the existing traffic (**Exhibit 3**) scaled up using the adopted growth rates, plus the background development traffic volumes (**Exhibit 4**).

Exhibit 4: Background Developments Traffic Volumes

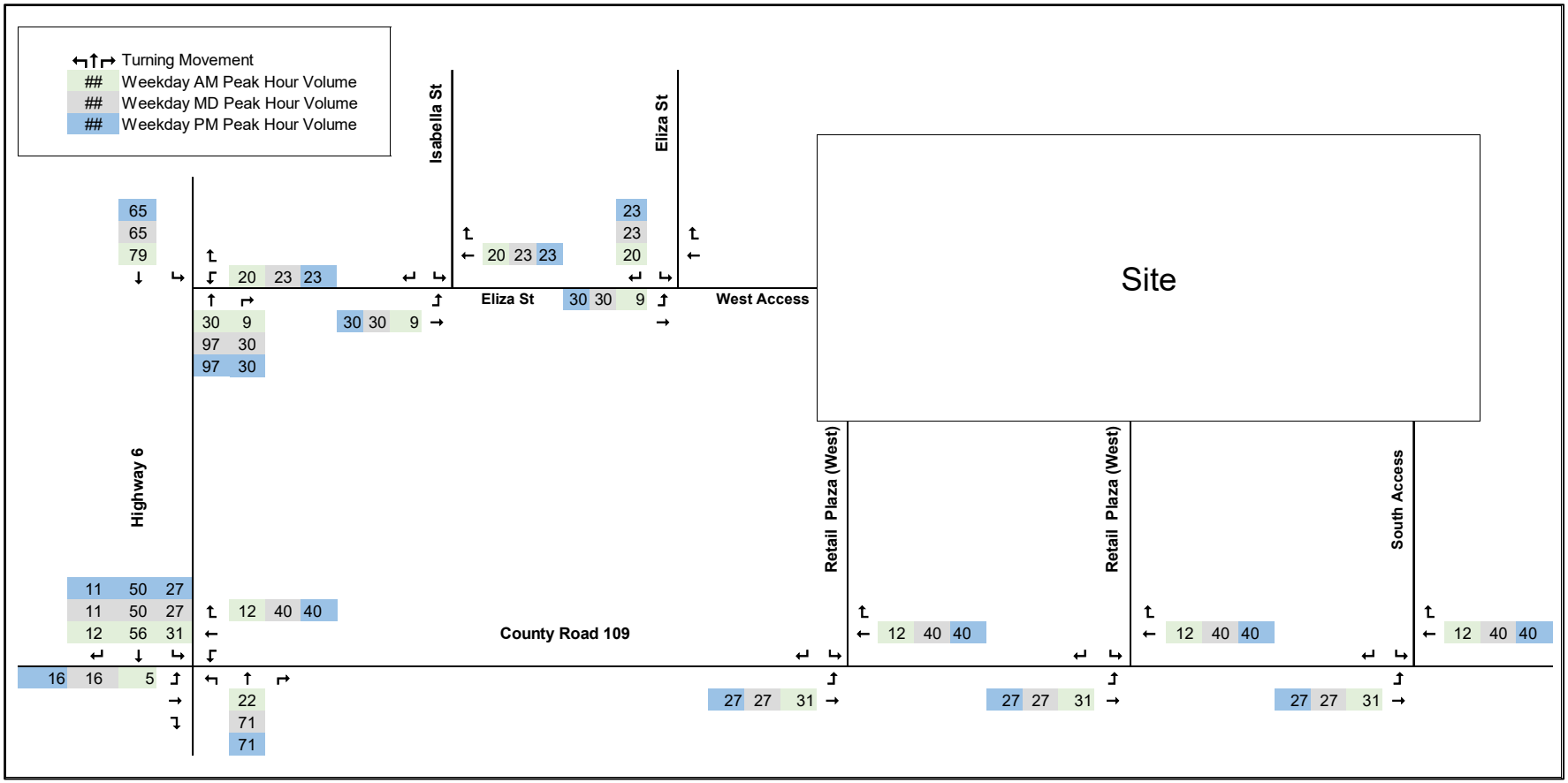
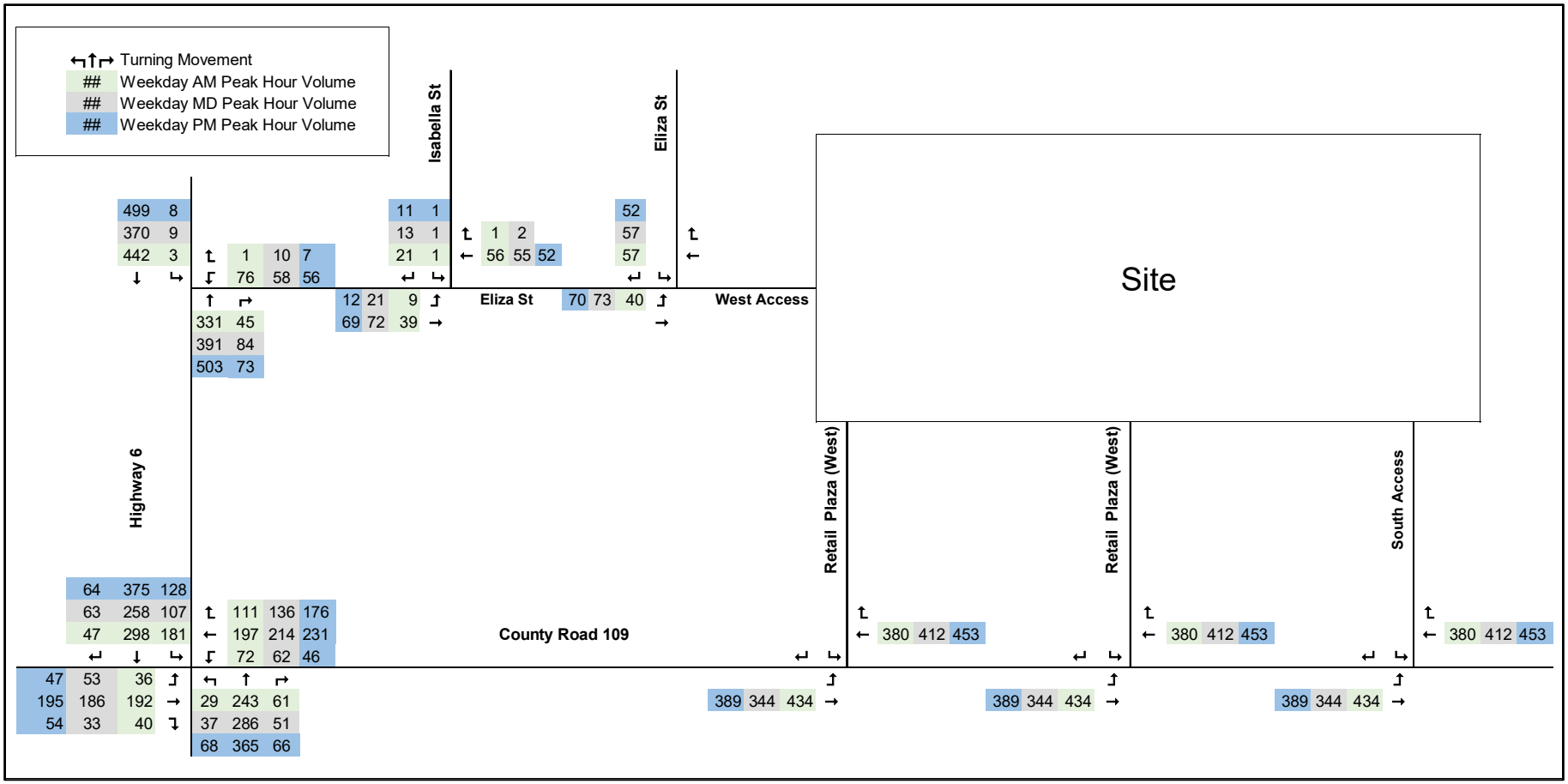


Exhibit 5: 2030 Background Traffic Volumes



3.3 Background Traffic Operations

Table 5 summarizes the LOS and v/c ratio for movements under the 2030 horizon year background conditions based on the forecast traffic volumes shown in **Exhibit 5**.

. Signal timing was kept as per existing conditions and incorporated into the AM Synchro model. Signal timing was optimized for the MD and PM peak hours, by reallocating 5 seconds from the north-south phases to the east-west ones while keeping the same cycle length, to accommodate background traffic growth. Detailed Synchro results and reports for all study area intersections are provided in **Appendix C**.

Under 2030 background traffic conditions, all movements will still be operating with residual capacity and with LOS 'C' or better.

Table 5: 2030 Future Background Conditions – Summary of Synchro Results

Intersection and Movement		AM Peak Hour		MD Peak Hour		PM Peak Hour	
		LOS	v/c	LOS	v/c	LOS	v/c
Highway 6 / County Road 109		**B**	**0.51**	**B**	**0.54**	**B**	**0.63**
Eastbound	Left	C	0.20	C	0.35	C	0.35
	Through	C	0.39	C	0.42	C	0.42
	Right	C	0.03	B	0.03	B	0.04
Westbound	Left	C	0.30	B	0.22	B	0.17
	Through-Right	C	0.74	C	0.76	C	0.79
Northbound	Left	A	0.08	A	0.09	B	0.21
	Through-Right	B	0.37	B	0.41	B	0.51
Southbound	Left	B	0.37	B	0.30	B	0.41
	Through-Right	B	0.40	B	0.40	B	0.53
Highway 6 / Eliza St							
Westbound	Left-Right	C	0.25	C	0.21	C	0.26
Northbound	Through	-	0.21	-	0.25	-	0.31
	Right	-	0.03	-	0.05	-	0.05
Southbound	Through-Left	A	0.00	A	0.01	A	0.01
Eliza St / Isabella St							
Eastbound	Through-Right	-	0.03	-	0.06	-	0.05
Westbound	Through-Right	A	0.06	A	0.07	A	0.06
Southbound	Left-Right	A	0.00	A	0.00	A	0.00

Note: LOS = level of service; v/c = volume to capacity ratio; **Red** indicates critical operations.

Table 6 shows the 95th percentile queue length under future background conditions. Queuing results are based on the Synchro 95th percentile queues for signalized intersections and HCM2000 95th percentile for unsignalized intersections. The queue lengths were also compared to the existing storage lengths to confirm if they can accommodate the existing queues. All of the forecast queues will be accommodated in the available storage.

Table 6: 2030 Future Background Conditions – 95th Percentile Queue Length

Intersection and Movement		Available Queue Lengths	AM Peak Hour	MD Peak Hour	PM Peak Hour
			95th Percentile (m)	95th Percentile (m)	95th Percentile (m)
Highway 6 / County Road 109					
Eastbound	Left	50	11.9	16.2	14.6
	Through	-	42.1	39.1	39.7
	Right	50	6.7	5.0	6.9
Westbound	Left	50	20.0	15.8	12.2
	Through-Right	-	75.0	72.9	81.6
Northbound	Left	50	6.0	8.3	14.2
	Through-Right	-	40.9	53.9	70.0
Southbound	Left	100	30.2	22.0	27.9
	Through-Right	-	47.6	50.8	72.5
Highway 6 / Eliza St					
Westbound	Left-Right	-	7.3	5.9	7.6
Northbound	Through	-	-	-	-
	Right	20	-	-	-
Southbound	Through-Left	-	0.1	0.2	0.2
Eliza St / Isabella St					
Eastbound	Through-Right	-	-	-	-
Westbound	Through-Right	-	1.5	1.6	1.4
Southbound	Left-Right	-	-	-	-

Notes: **Red** values mean that the 95th Percentile Queue extends past the available storage length.

4 Proposed Development

4.1 Conceptual Site Plan

The proposed subdivision includes 155 low density single-family detached homes, 69 street townhouse units, a high-density residential block with approximately 130 units, and a commercial plaza with a retail area of 65,284 SF. Site statistics are summarized in **Table 7**.

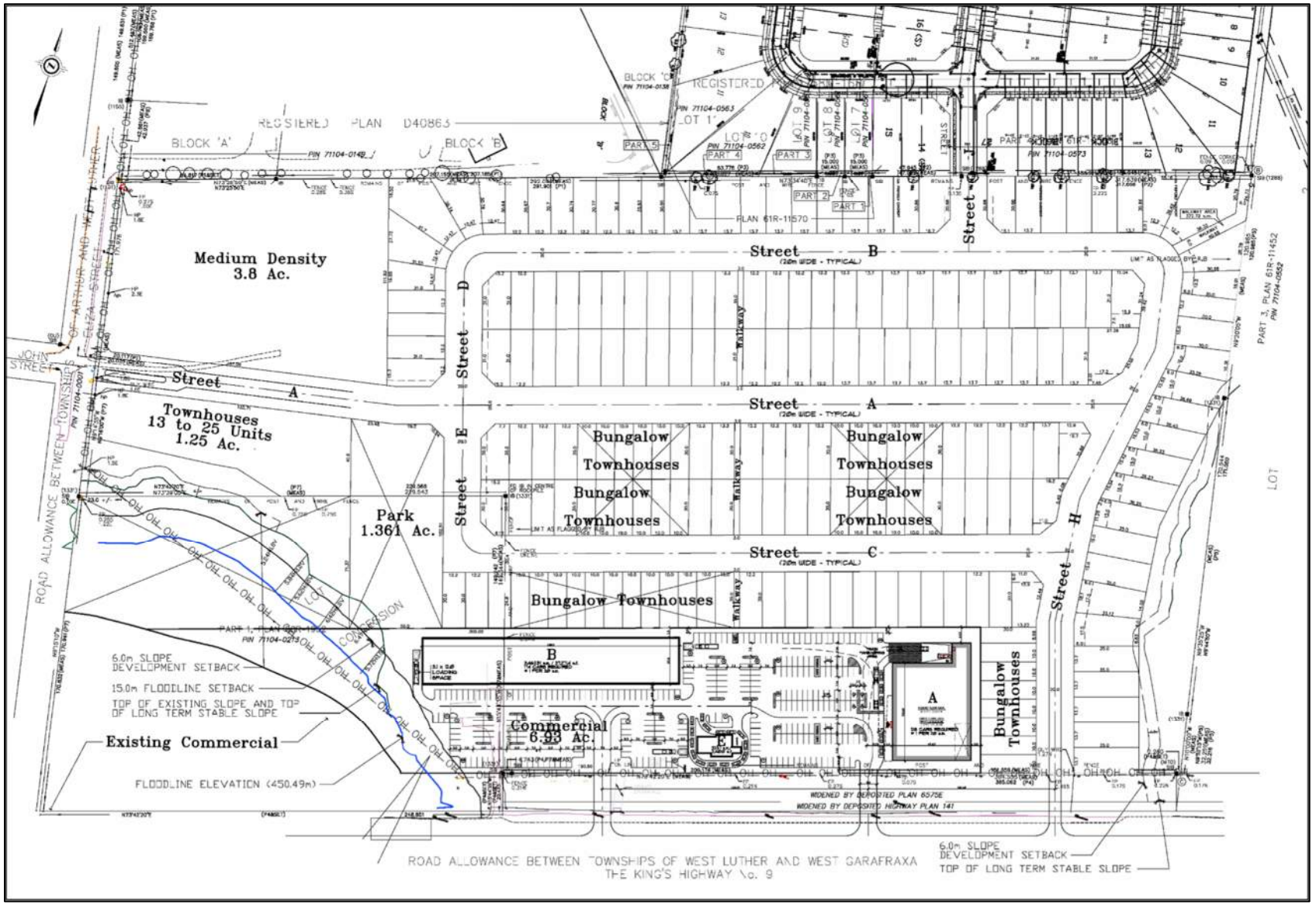
Table 7: Site Plan Statistics

Land Use	Units / Area
Single Detached Residential	155 Units
Street Townhouses	69 Units
High Density Residential	130 Units
Commercial Retail Plaza	65,284 (SF)

Exhibit 6 shows the site plan of the proposed subdivision. The commercial plaza will be located at the south-west corner of the subdivision with two dedicated driveways.

Three accesses to the residential component of the subdivision are being proposed: one along Wellington Road 109, another at Eliza Street, and a third at the north end of the subdivision connecting to Schmidt Dr which will provide access to an existing neighbourhood to the north. The commercial plaza will have two driveways along Wellington Road 109. Site traffic to the residential component are not expected to use the northerly access to Schmidt Drive. However, residents living in the neighbourhood to the north may use this access to connect to Wellington Road 109 or to access the commercial plaza.

Exhibit 6: Conceptual Site Plan (December 2024)



4.2 Site Trip Generation

4.2.1 Vehicle-Trip Generation

Trips were generated for the proposed development using information provided in the Institute of Transportation Engineers (ITE) Trip Generation Informational Report (11th edition).

For residential uses, trip generation rates for Land Use 210 (Single-Family Detached Housing) were applied to the single detached residential land uses, the rates for Land Use 220 (Multifamily Housing – Low Rise) were applied to the townhouses, and the rates for Land Use 221 (Multifamily Housing – Mid Rise) were applied for the multi-unit building. For commercial land uses, the rates for Land Use 821 (Shopping Plaza 40-150k – with supermarket) were used. The rates used assumed general urban/suburban conditions.

The MD peak hour trips were estimated by multiplying the ITE daily trips by the highest ITE hourly distribution factor between 11:00 AM and 2:00 PM. There were no further adjustments made for non-vehicle trips since this development is expected to be primarily vehicle-oriented and the result is a more conservative analysis. The ITE trip generation results are summarized in **Table 8**.

Table 8: ITE Trip Generation (Vehicle-Trips)

Land Use	Weekday AM Peak Hour			Weekday MD Peak Hour			Weekday PM Peak Hour		
	ITE Trip Rate	Split	Trips	ITE Trip Rate	Split	Trips	ITE Trip Rate	Split	Trips
Single-Family Detached Housing	0.70	109		0.56	87		0.94	146	
In	0.17	25%	27	0.28	51%	44	0.59	63%	92
Out	0.53	75%	82	0.28	49%	43	0.35	37%	54
Multifamily Housing (Low Rise)	0.41	28		0.38	26		0.51	35	
In	0.10	25%	7	0.19	50%	13	0.32	63%	22
Out	0.30	75%	21	0.19	50%	13	0.19	37%	13
Multifamily Housing (Mid Rise)	0.37	48		0.22	28		0.39	51	
In	0.08	23%	11	0.11	50%	14	0.24	61%	31
Out	0.28	77%	37	0.11	50%	14	0.15	39%	20
Shopping Plaza (40-150k) with supermarket	3.51	229		7.90	516		8.99	587	
In	2.18	62%	142	3.95	50%	258	4.32	48%	282
Out	1.33	38%	87	3.95	50%	258	4.67	52%	305
Development Total		414			657			808	
In		45%	187		50%	329		52%	420
Out		55%	227		50%	328		48%	388

4.3 Site Traffic Distribution and Assignment

The project site falls outside the area covered by TTS 2016. However, similar "boundary Planning Districts" of Wellington, Grand Valley and Wellesley were reviewed.

Based on the results, it was noted that the majority of trips were between the districts and larger cities to the south and east. The final distribution applied to the proposed development is shown in **Table 9**.

Table 9: Assumed Trip Distributions

To/From	Via	Residential	Commercial
North	Eliza Street	5%	30%
	Isabella Street	0%	20%
	Highway 6	10%	20%
	County Road 109	5%	0%
West	County Road 109	10%	10%
South	Highway 6	35%	10%
	County Road 109	10%	0%
East	County Road 109	25%	10%
	Total	**100%**	**100%**

For the residential component of the development, it was assumed that the majority of trips are home-based work trips to/from the nearby larger cities in the surrounding area and across GTA. Hence, a larger share was assigned to the south and east. For the commercial component of the development, it was assumed that the majority of trips will be local. A larger share of traffic to/from the north was assigned to the north and the remaining trips were equally distributed to the south, east and west.

In terms of residential access roads traffic assignment, the traffic to/from the east was assigned to the south access road, the traffic to/from the north was assigned to the west access road, and the remaining traffic was assigned by a ratio of 80% to the west access road and 20% to the south access road.

For the commercial traffic assignment, traffic to/from the northern neighborhoods were assigned through the internal road network of the development via the west access road (the north access road is expected to attract a percentage of this traffic, but it was all assigned to the west access road to be conservative), reaching County Road 109 via the east access road, and then using the east retail plaza driveway. The remaining traffic to/from the east and west was assigned to the east and west retail plaza driveways on County Road 109, respectively.

The new residential site trips are shown in **Exhibit 7**. Commercial site trips are shown in **Exhibit 8**. The total new site trips are shown in **Exhibit 9** (the combination of **Exhibit 7** and **Exhibit 8**). The total traffic volumes for 2030 are shown in **Exhibit 10**, comprised of the future background traffic shown in **Exhibit 5**, plus site volumes shown in **Exhibit 9.**

Exhibit 7: Residential Site Traffic Volumes

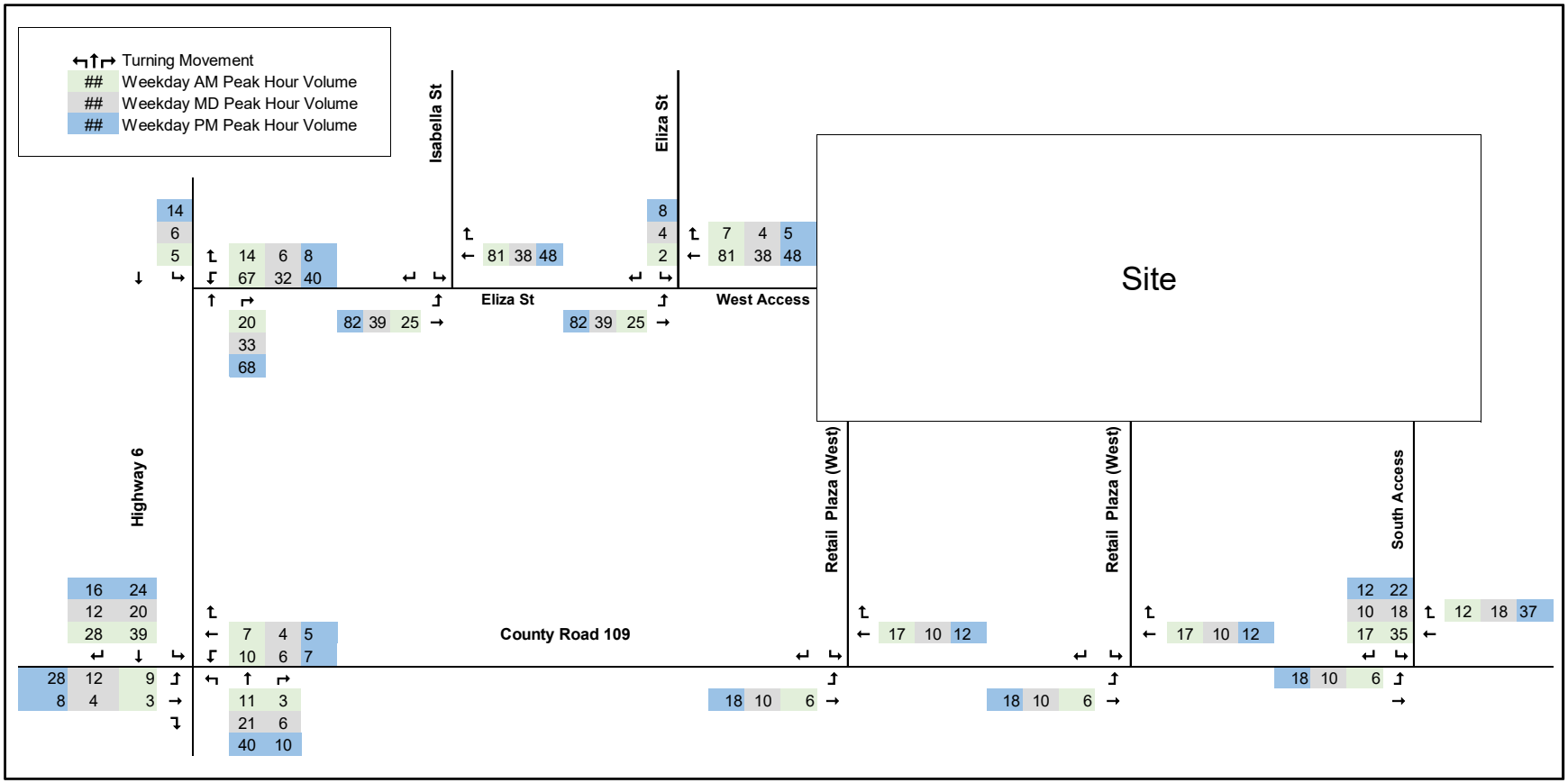


Exhibit 8: Commercial Site Traffic Volumes

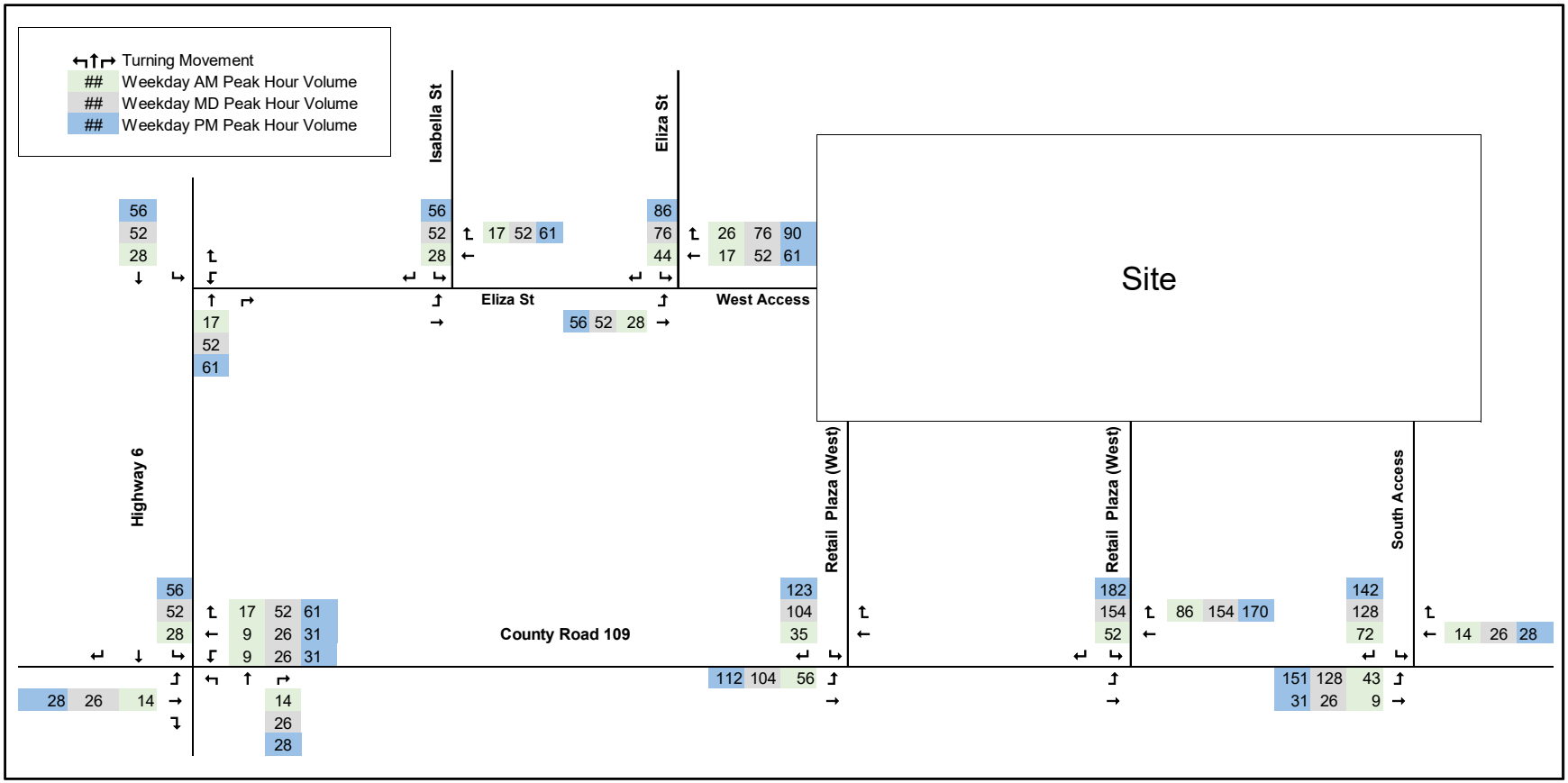


Exhibit 9: Total Development Site Traffic Volumes

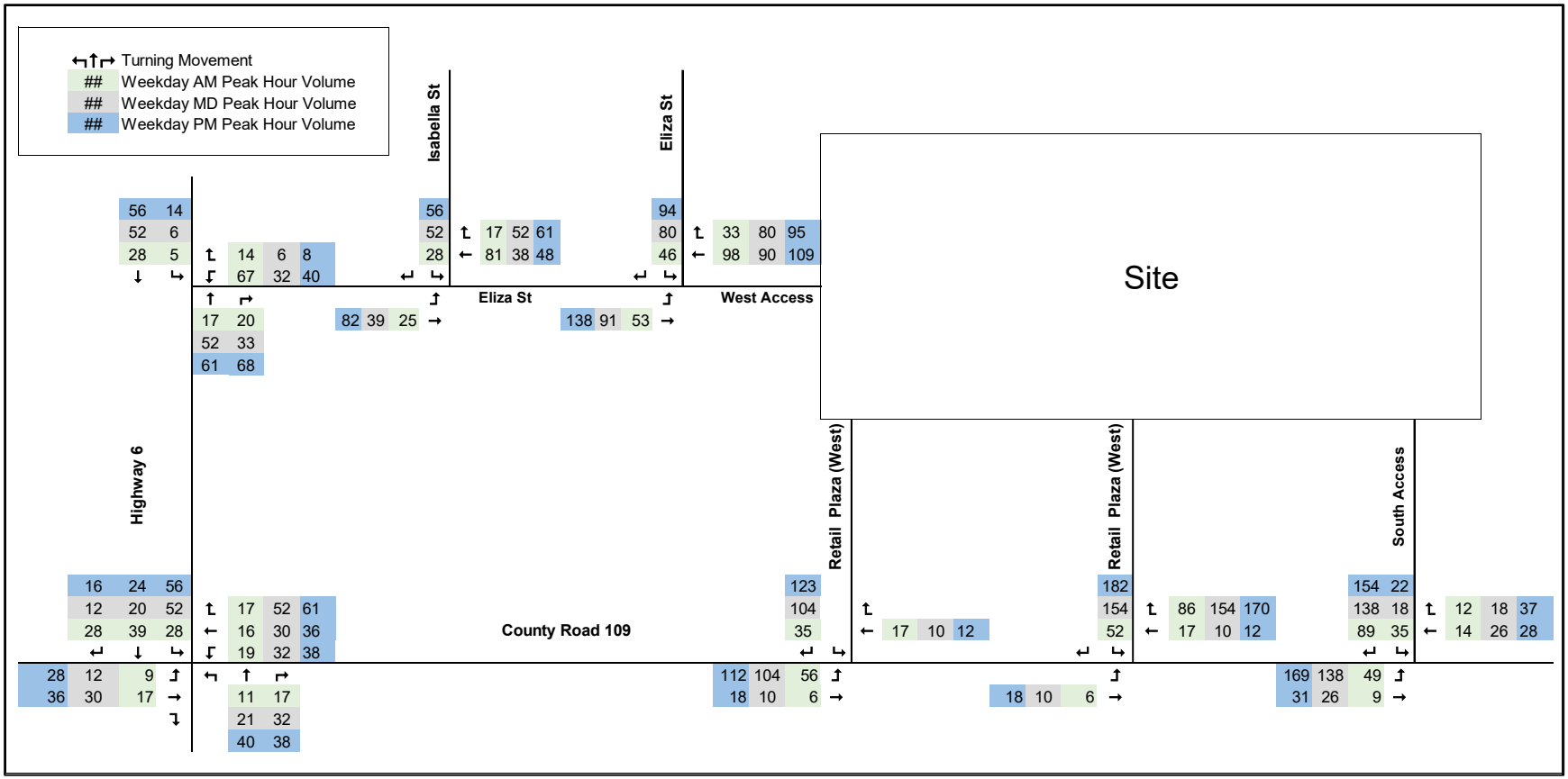
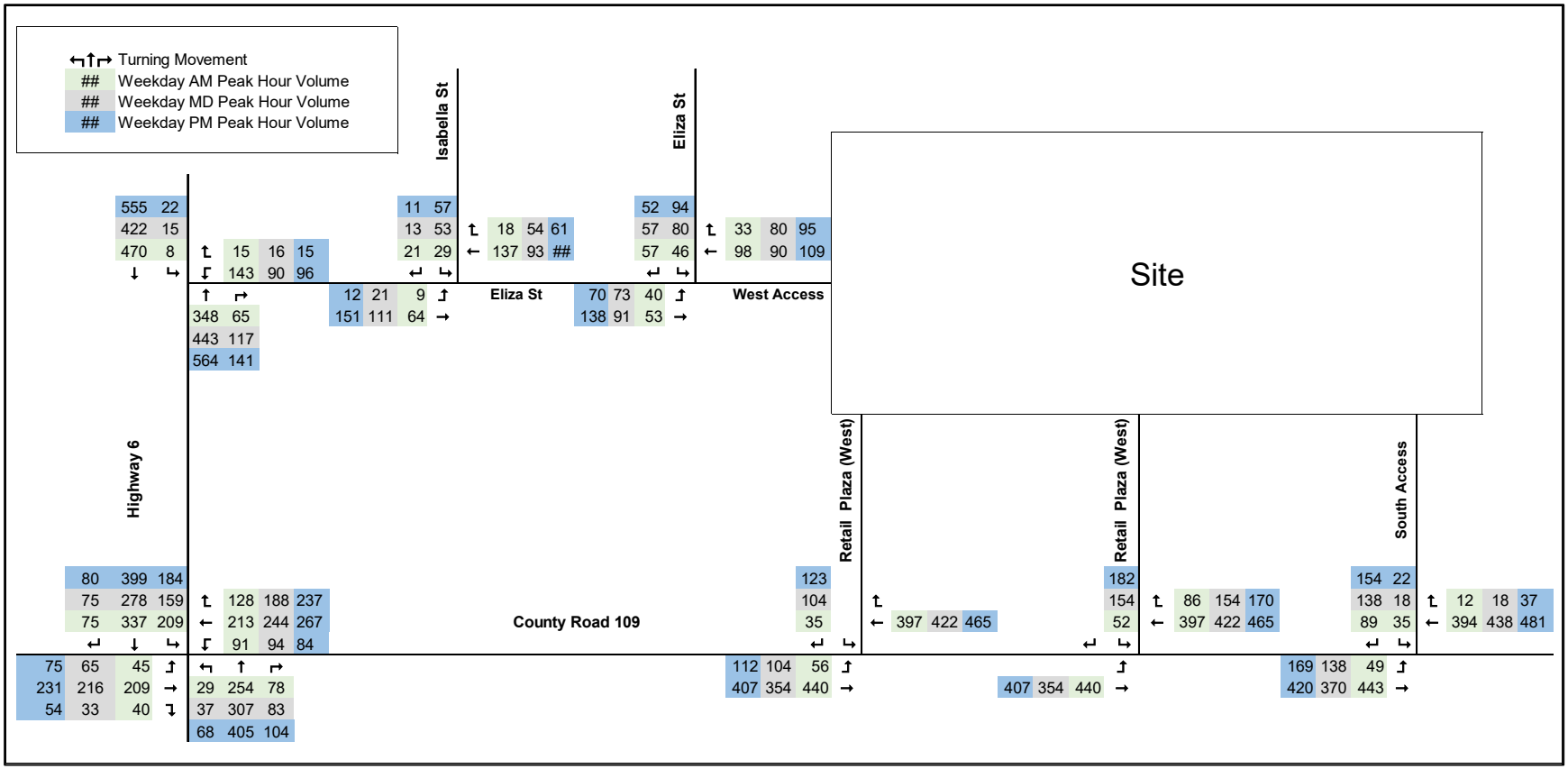


Exhibit 10: 2030 Future Total Traffic Volumes



5 Total Traffic Conditions

Total traffic operations are shown in **Table 10** based on the future total traffic volumes shown in **Exhibit 10** and the existing road network shown in **Exhibit 2**. Signal timing for the intersection of Wellington Street 109 and Highway 6 was kept as per existing conditions and incorporated into the AM Synchro model. Signal timing was optimized for the MD and PM peak hours, by reallocating green time from the north-south phases to the east-west ones while keeping the same cycle length, to accommodate background traffic growth. Detailed Synchro results and reports for all study area intersections are provided in **Appendix C**.

Table 10: 2030 Future Total Conditions – Summary of Synchro Results

Intersection and Movement		AM Peak Hour		MD Peak Hour		PM Peak Hour	
		LOS	v/c	LOS	v/c	LOS	v/c
Highway 6 / County Road 109		**B**	**0.59**	**C**	**0.68**	**C**	**0.85**
Eastbound	Left	C	0.28	B	0.44	C	0.65
	Through	C	0.42	B	0.43	B	0.44
	Right	C	0.03	B	0.03	B	0.04
Westbound	Left	C	0.40	B	0.31	B	0.29
	Through-Right	D	0.81	C	0.81	D	**0.87**
Northbound	Left	A	0.09	B	0.12	B	0.27
	Through-Right	B	0.40	B	0.54	B	0.66
Southbound	Left	B	0.46	C	0.58	D	0.84
	Through-Right	B	0.48	B	0.50	B	0.63
Highway 6 / Eliza St							
Westbound	Left-Right	D	0.53	C	0.39	E	0.55
Northbound	Through	-	0.22	-	0.28	-	0.35
	Right	-	0.04	-	0.07	-	0.09
Southbound	Through-Left	A	0.01	A	0.02	A	0.03
Eliza St / Isabella St							
Eastbound	Through-Right	-	0.05	-	0.08	-	0.10
Westbound	Through-Right	B	0.19	B	0.20	B	0.21
Southbound	Left-Right	A	0.02	A	0.04	A	0.04
Eliza St / West access							
Eastbound	Through-Left	A	0.03	A	0.06	A	0.05
Westbound	Through-Right	-	0.08	-	0.11	-	0.13
Southbound	Left-Right	B	0.13	B	0.22	B	0.25
County Road 109 / South access							
Eastbound	Through-Left	A	0.05	A	0.14	A	0.17
Westbound	Through-Right	-	0.26	-	0.29	-	0.32
Southbound	Left-Right	C	0.30	C	0.37	C	0.45
County Road 109 / Retail Plaza (East)							
Eastbound	Through-Left	-	0.00	-	0.00	-	0.00
Westbound	Through-Right	-	0.31	-	0.37	-	0.39
Southbound	Left-Right	C	0.19	D	0.56	E	0.71
County Road 109 / Retail Plaza (West)							
Eastbound	Through-Left	A	0.05	A	0.10	A	0.11
Westbound	Through-Right	-	0.25	-	0.27	-	0.29
Southbound	Left-Right	B	0.06	B	0.19	B	0.22

Note: LOS = level of service; v/c = volume to capacity ratio; **Red** indicates critical operations.

Under future total conditions, all movements will be operating with LOS 'E' or better, and with residual capacity. Only the westbound through-right at Highway 6 and County Road 109 will approach critical operations during the PM peak hour and will be operating with a v/c ratio of 0.86. However, the movement will operate at a level of service 'D'.

Queuing results are based on the Synchro 95th percentile queues for signalized intersections and HCM2000 95th percentile queues for unsignalized intersections. **Table 11** shows the 95th percentile queue length under future total conditions. The queue lengths were also compared to the existing storage lengths to confirm if they can accommodate the existing queues. Under future total conditions, all of the projected queues can be accommodated within the existing storage.

Table 11: 2030 Future Total Conditions – 95th Percentile Queue Length

Intersection and Movement		Available Queue Lengths	AM Peak 95th Percentile (m)	MD Peak 95th Percentile (m)	PM Peak 95th Percentile (m)
Highway 6 / County Road 109					
Eastbound	Left	50	14.5	19.0	30.5
	Through	-	45.8	40.6	45.2
	Right	50	6.7	4.4	6.6
Westbound	Left	50	25.0	20.6	19.9
	Through-Right	-	87.8	85.4	118.9
Northbound	Left	50	6.1	9.7	15.7
	Through-Right	-	45	73.9	93.5
Southbound	Left	100	37.2	48.6	64.2
	Through-Right	-	59.5	65.8	86.7
Highway 6 / Eliza St					
Westbound	Left-Right	-	22.3	13.4	22.5
Northbound	Through	-	-	-	-
	Right	20	-	-	-
Southbound	Through-Left	-	0.2	0.4	0.7
Eliza St / Isabella St					
Eastbound	Through-Right	-	-	-	-
Westbound	Through-Right	-	5.3	5.5	6.0
Southbound	Left-Right	-	0.5	0.9	1.0
Eliza St / West access					
Eastbound	Through-Left	-	0.7	1.4	1.3
Westbound	Through-Right	-	-	-	-
Southbound	Left-Right	-	3.5	6.3	7.4
County Road 109 / South access					
Eastbound	Through-Left	-	1.1	3.7	4.7
Westbound	Through-Right	-	-	-	-
Southbound	Left-Right	-	9.5	12.6	17.3
County Road 109 / Retail Plaza (East)					
Eastbound	Through-Left	-	-	-	-
Westbound	Through-Right	-	-	-	-
Southbound	Left-Right	-	5.3	24.0	37.5
County Road 109 / Retail Plaza (West)					
Eastbound	Through-Left	-	1.3	2.6	2.8
Westbound	Through-Right	-	-	-	-
Southbound	Left-Right	-	1.5	5.2	6.4

Notes: **Red** values mean that the 95th Percentile Queue extends past the available storage length.

6 Wellington Road 109 Access Roads Sightline Review

6.1 County Road 109 Sightline Review

Three access roads are proposed along County Road 109. Two will be driveways to the commercial retail plaza, while the other one will serve as an access to the residential component of the development. The commercial driveways will be located at the east and west ends of the commercial plot along Wellington Road 109, while the subdivision access will be located east of the commercial plot at the east end of the development. Due to the vertical roadway curvature on County Road 109, a sightline analysis was undertaken.

6.1.1 Sight Distance

Sight distances for the proposed access roads were reviewed to confirm if the sightlines are sufficient to allow for safe operations of the roads. Two sight distances were tested: stopping/decision sight distance and intersection sight distance.

Stopping/decision sight distance is used to evaluate the ability for a vehicle traveling along the major roadway approaching the driveway to stop/maneuver if a vehicle or obstruction is at the side-street location. Intersection sight distance is used to evaluate if a vehicle exiting the access road can see the approaching vehicles and turn on to the roadway without slowing down or conflicting with the vehicle on the main roadway.

Typically sight distances will be checked in the field when there are complex conditions, so that minor obstructions or environmental conditions like foliage can be accounted for. The proposed access roads are in a location with little to no development in the surrounding area, and no obstructions on the sides of the roads. Therefore, a desktop review of the sightlines was performed to confirm that the available sight distances exceed the minimum requirements provided in the Transportation Association of Canada Geometric Design Guide for Canadian Roads (June 2017, the "TAC Manual").

The desktop review approximated sight distances using Google Streetview, and aerial measurements. It should be noted that sight distances typically account for driver eye heights and setback from the roadway, which cannot be accounted for in a desktop review. However, by demonstrating that the sight distances exceed the minimums and without the need to account for roadway obstructions, a desktop review should adequately estimate sight distances.

There is a vertical curvature on County Road 109 which slopes upwards in the eastbound direction, with a crest located near the east commercial driveway. The road crests and drops over approximately 200 metres, before rising again to another crest at the east end of the subject site. There arenot no horizontal curvatures in the roadway to the west nor east of the access roads. Therefore, the vertical curvature is the primary constraint in the sightline analysis. The vertical topography of the roadway is shown in **Exhibit 11**. The dip in the elevation located at the 450 meter mark is due to the elevation reporting the Conestogo River rather than the roadway elevation.

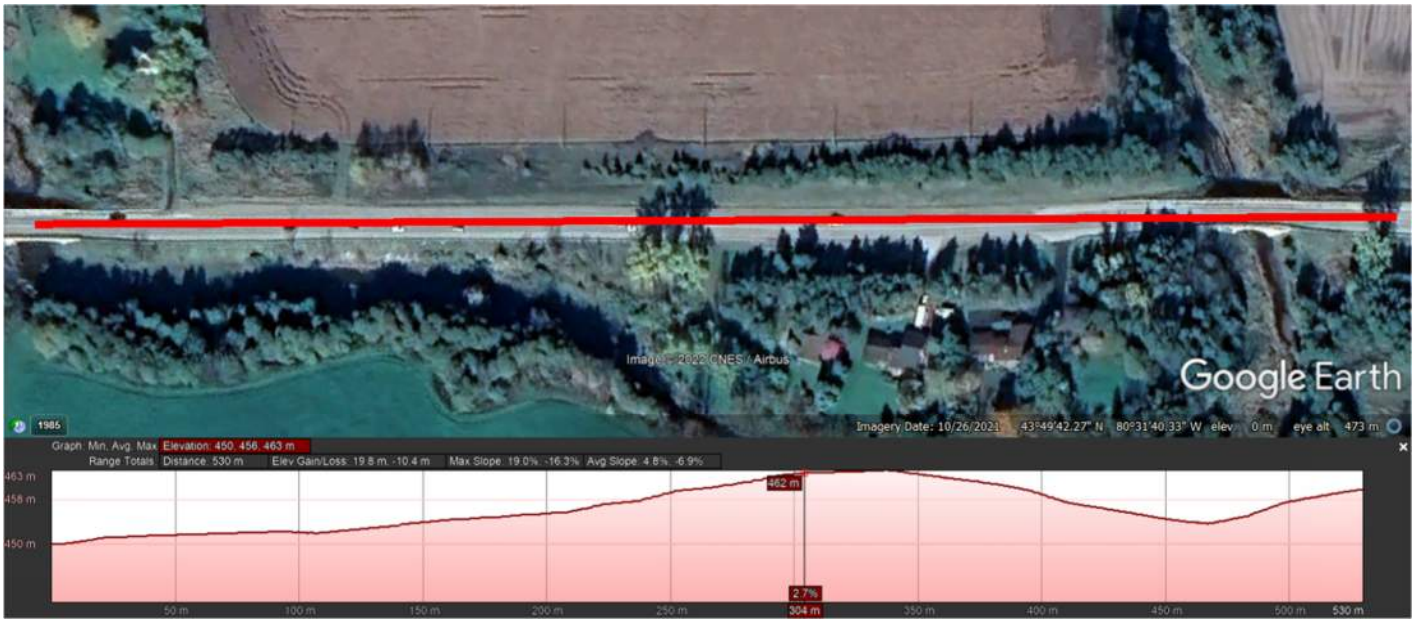


Exhibit 11: Wellington Road 109 Vertical Curvature Profile

Aerial photos showing the sightlines and the estimated available sight distance from the proposed access roads are shown in **Exhibit 12** to **Exhibit 22**.

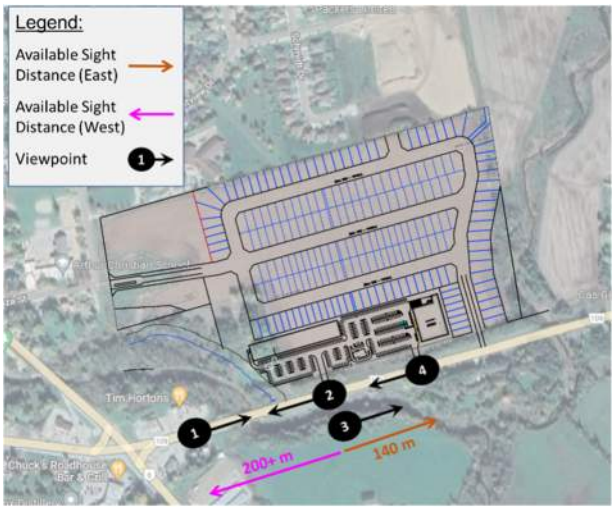


Exhibit 12: Sightline Views (West Retail Driveway)

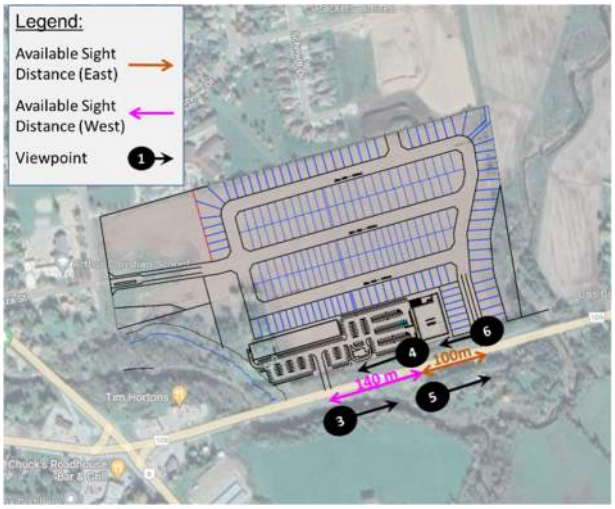


Exhibit 13: Sightline Views (East Retail Access)

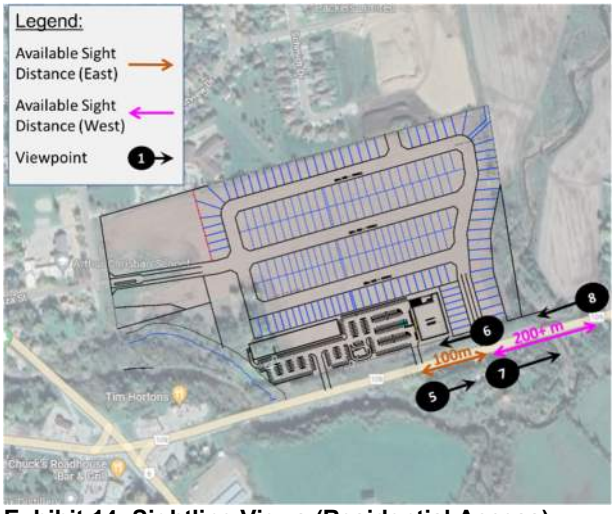


Exhibit 14: Sightline Views (Residential Access)

Exhibit 15: View 1 – Looking Eastbound on CR 109 200m West of the West Retail Driveway

Exhibit 16: View 2 – Looking Westbound on CR 109 from West Retail Driveway

Exhibit 17: View 3 – Looking Eastbound on CR 109 from West Retail Driveway

Exhibit 18: View 4 – Looking Westbound on CR 109 from East Retail Access

Exhibit 19: View 5 – Looking Eastbound on CR 109 from East Retail Access

Exhibit 20: View 6 – Looking Westbound on CR 109 from the Residential Access

Exhibit 21: View 7 – Looking Eastbound on CR 109 from the Residential Access

Exhibit 22: View 8 – Looking Westbound on CR 109 from 200m East of the Residential Access

6.1.2 Stopping/Decision Sight Distance

Stopping sight distance (SSD) is the distance required for a vehicle to come to a stop before impacting obstructions on the roadway ahead. Decision sight distance (DSD) allows for drivers to maneuver their vehicles or vary their operating speeds rather than stop, while maneuvering around the obstruction. The SSD is typically required in non-complex conditions where the drivers will not be surprised by obstructions on the road. DSD is typically required when the driver will have to make unexpected stops and may not have full attention on the hazard, such as in complex environments. The study area is not considered a complex environment hence, SSD was reviewed.

The minimum SSD requirements are calculated based on the guidelines provided in Chapter 2 of the Geometric Design Guide for Canadian Roads. Specifically, Table 2.5.3 (Stopping Sight Distance on Grades).

For the SSD check, the approximate slope of the road has been measured from Google Earth and grades have been accounted for. The crest of the slope on County Road 109 is located near the east retail driveway. The approximate average slope is 5% to the west (extending to the west retail driveway) and 3% to the east (extending beyond the residential access road). The road profile becomes flat to the west of the west retail driveway. For minimum SSD requirements, the 5% was rounded up to 6% for downward slopes and rounded down to 3% for upward slopes, for a more conservative approach. The design speed was assumed to be the posted speeds.

SSD was measured from both the retail plaza driveways as well as the residential access road where the vehicles would be entering and exiting the roadway. **Table 12** shows the minimum and available SSD at the access roads along County Road 109. Excerpts from the TAC manual are provided in **Attachment C**.

Table 12:Stopping Sight Distance

Location	Direction	Slope	Design Speed (km/h)	Required SSD (m)	Available Distance (m)	Notes
CR 109 / Residential Access	Westbound	3%	90	148	200+	-
	Eastbound	5%	80	118	200+	Rounded to 3%
CR 109 / East Retail Plaza Access	Westbound	-5%	80	144	200+	Rounded to -6%
	Eastbound	5%	80	118	200+	Rounded to 3%
CR 109 / West Retail Plaza Access	Westbound	-5%	80	144	200+	Rounded to -6%
	Eastbound	0%	80	130	200+	-

Based on the methodology in TAC manual Table 2.5.3, it can be concluded that the available distances, for both access roads, will provide sufficient reaction and braking time for the vehicles travelling eastbound or west to stop fully, if required.

The available and required SSD are shown in **Exhibit 23**, **Exhibit 24** and **Exhibit 25**.

Exhibit 23: Stopping Sight Distances – Residential Access

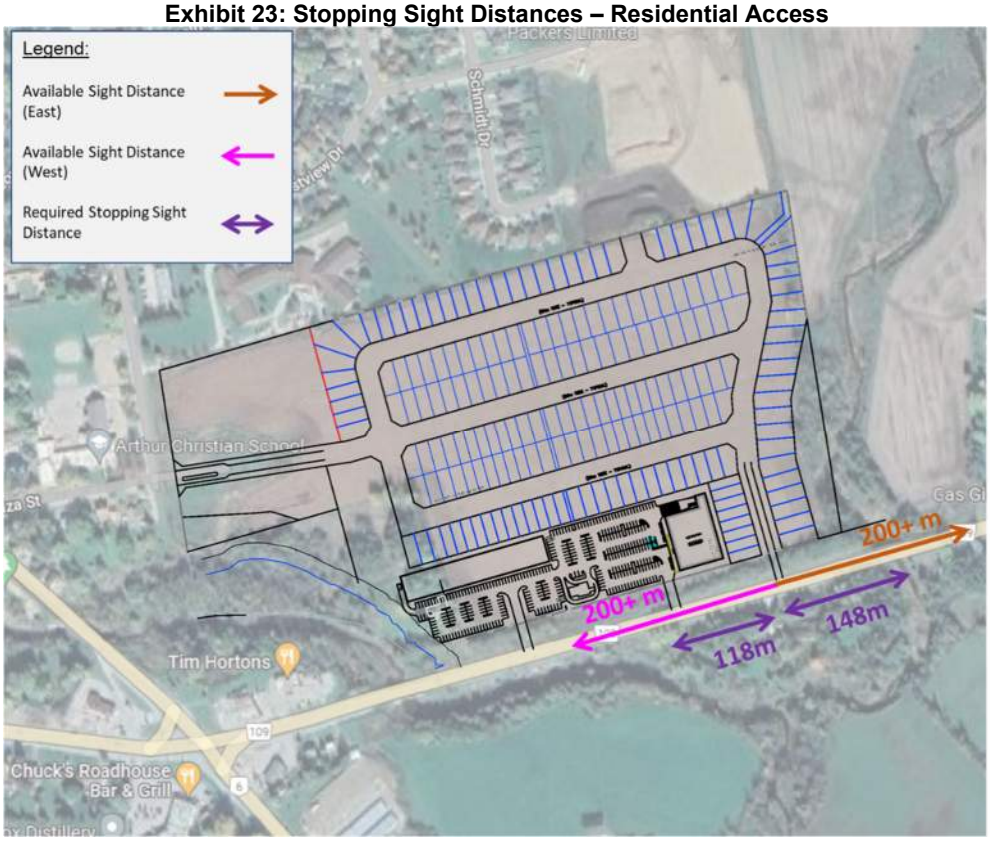


Exhibit 24: Stopping Sight Distances – Retail Plaza Driveway (East)

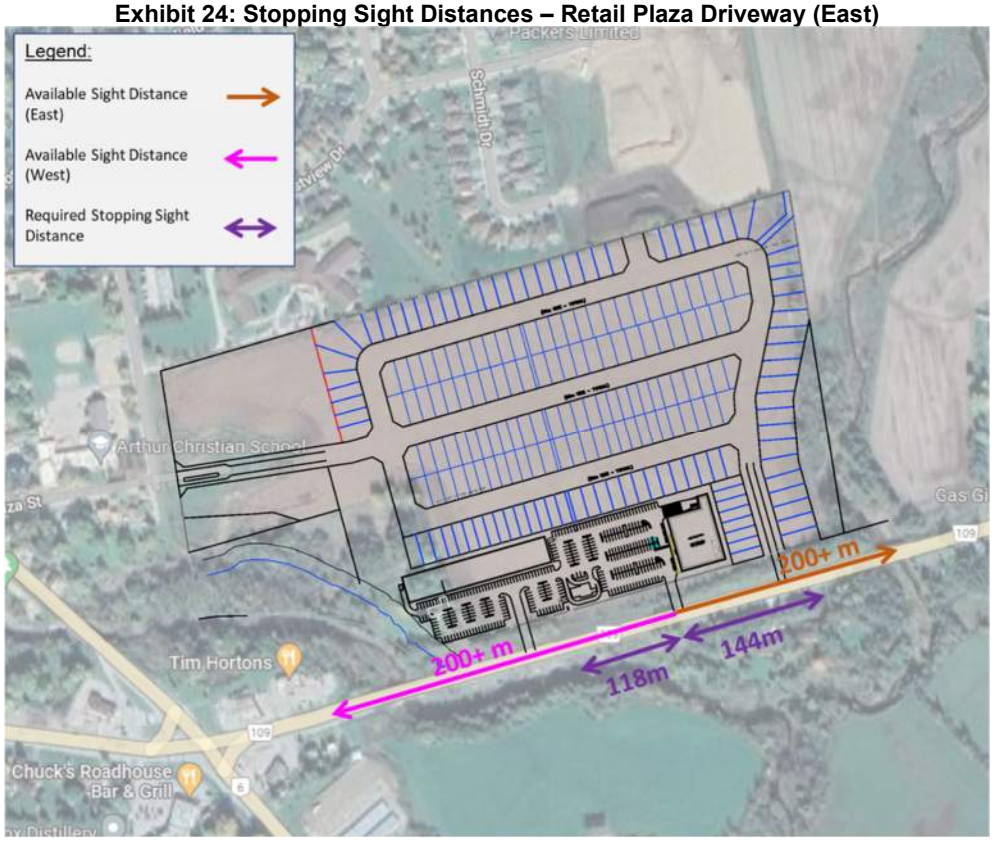
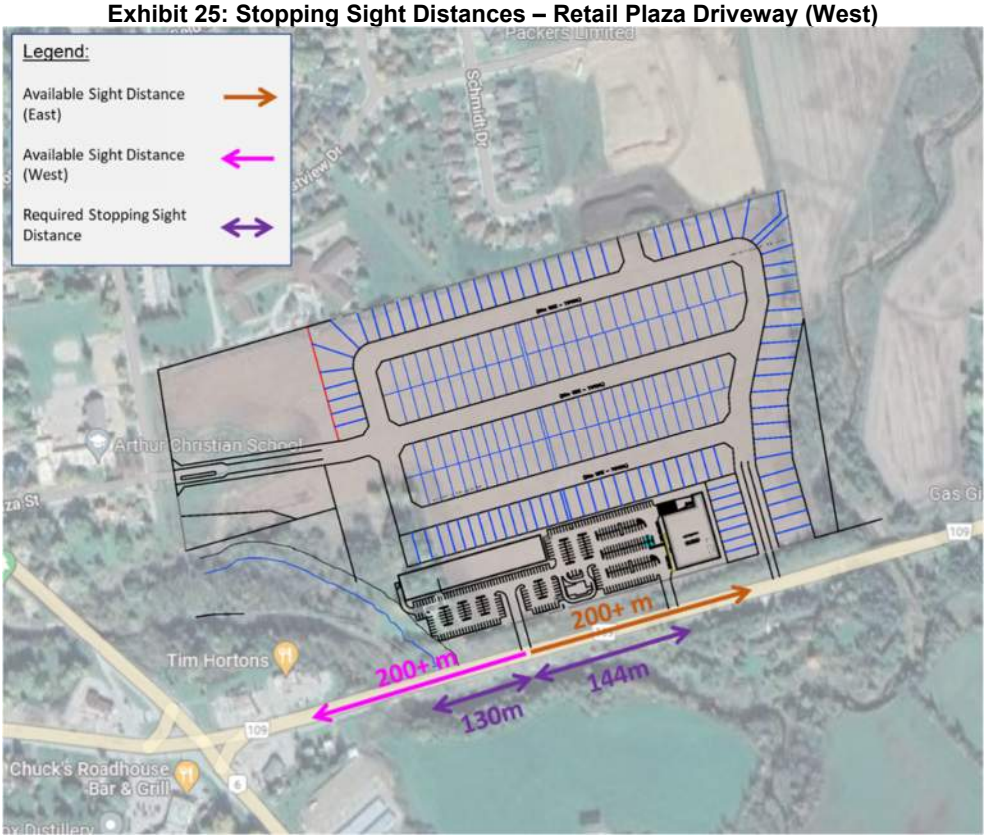


Exhibit 25: Stopping Sight Distances – Retail Plaza Driveway (West)



6.1.3 Intersection Sight Distance

Intersection Sight Distance (ISD) is the distance required for a vehicle entering the major roadway to be able to see other vehicles approaching to allow the entering vehicle time to enter the roadway and accelerate to the posted speed without obstructing the vehicles on the main roadway. There are two ISD that were reviewed from Chapter 9 of the TAC manual: Table 9.9.4 (Decision Intersection Sight Distance – case B1, Left-turn From Stop) and Table 9.9.6 (Decision Intersection Sight Distance – Case B2, Right-Turn From Stop).

ISD was measured from both the retail plaza access roads and the residential access road where the vehicles would be entering and exiting the roadway, looking to the west and east along County Road 109. **Table 13** shows the minimum and available SSD at all access roads.

Table 13: Intersection Sight Distance

Location	Maneuver	Design Speed (km/h)	Required ISD (m)	Available Distance (m)
Retail Plaza Driveways	Left-Turn out on to CR 109	80	170	200+
	Right-Turn out on to CR 109	80	145	200+
Residential Access	Left-Turn out on to CR 109	90	190	200+
	Right-Turn out on to CR 109	90	165	200+

For the retail plaza access, the minimum ISD required according to the TAC manual is 170 metres to the east and west (for left-turns) and 145 metres to the west (for right-turns), without accounting

for grades. For the residential access, the minimum ISD required according to the TAC manual is 190 metres to the east and west (for left-turns) and 165 metres to the west (for right-turns), without accounting for grades. Therefore, the proposed locations of the access roads meet the ISD requirements without accounting for grades.

To account for the grades greater than 3%, it is required that equations be used and the ISD be calculated directly. Since the approximate slope is 5% along County Road 109, time gap adjustments of 0.2 sec (Left-turns) and 0.1 sec (Right-turns) per each percent grade has been applied as recommended by the guidelines. **Table 14** shows the minimum and available ISD after accounting for grades at both access roads.

Table 14: Intersection Sight Distance Adjusted for Grades

Location	Maneuver	Direction	Slope (Abs)	Increase in Slope	Adjustment to time gap as per slope (sec)	ISD (m)	Available Distance (m)
Retail Plaza Driveways	Left-Turn out on to CR 109	West	5%	2%	0.4	176	200+
		East	5%	2%	0.4	176	200+
	Right-Turn out on to CR 109	East	5%	2%	0.2	150	200+
Residential Access	Left-Turn out on to CR 109	West	5%	2%	0.4	198	200+
		East	3%	0%	0	190	200+
	Right-Turn out on to CR 109	East	3%	0%	0	165	200+

For the retail plaza driveways, the required ISD for the vehicle exiting and making a right turn on to County Road 109 is 150m accounting for the additional time gap for increase in slope (5 metres increase compared to the ISD when not accounting for grades). The required ISD for undertaking a left turn on to County Road 109 is 176m on the west and east, which also accounts for the 5% grade to the west. For the residential access road, the required ISD for the vehicle exiting and making a right turn on to County Road 109 remains 165m since no additional time gap is required given that the slope is 3%. The required ISD for undertaking a left turn on to County Road 109 remains 190m to the east but increases to 198m to the east when accounting for the 5% grade to the east. Therefore, the available sight distances for all access roads exceeds the ISD requirement.

The available and required ISD are shown in **Exhibit 26**, **Exhibit 27** and **Exhibit 28**.

Exhibit 26: Intersection Sight Distances – Residential Access

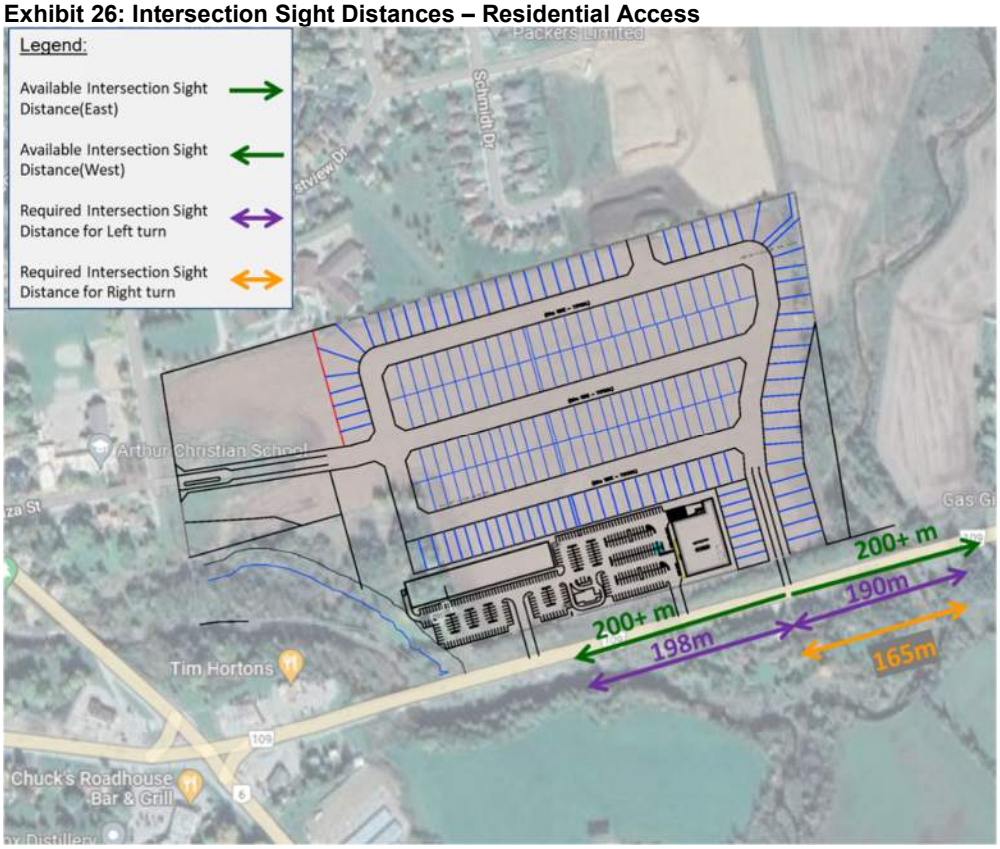


Exhibit 27: Intersection Sight Distances – Retail Driveway (East)

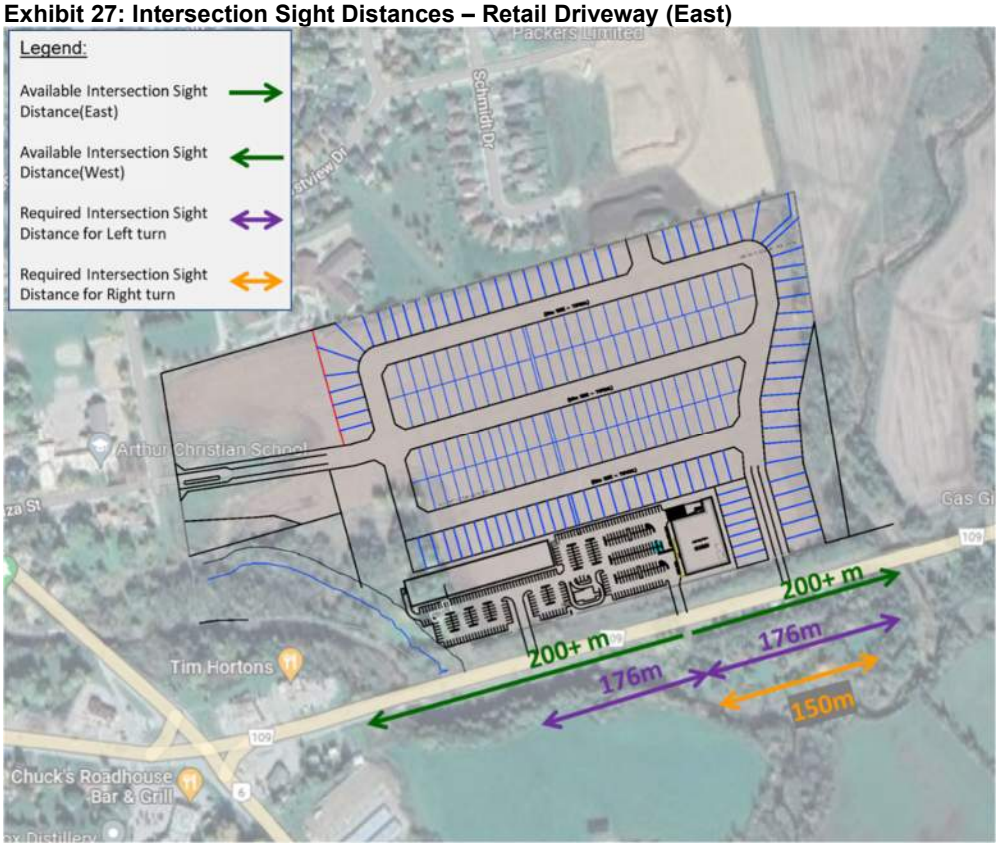
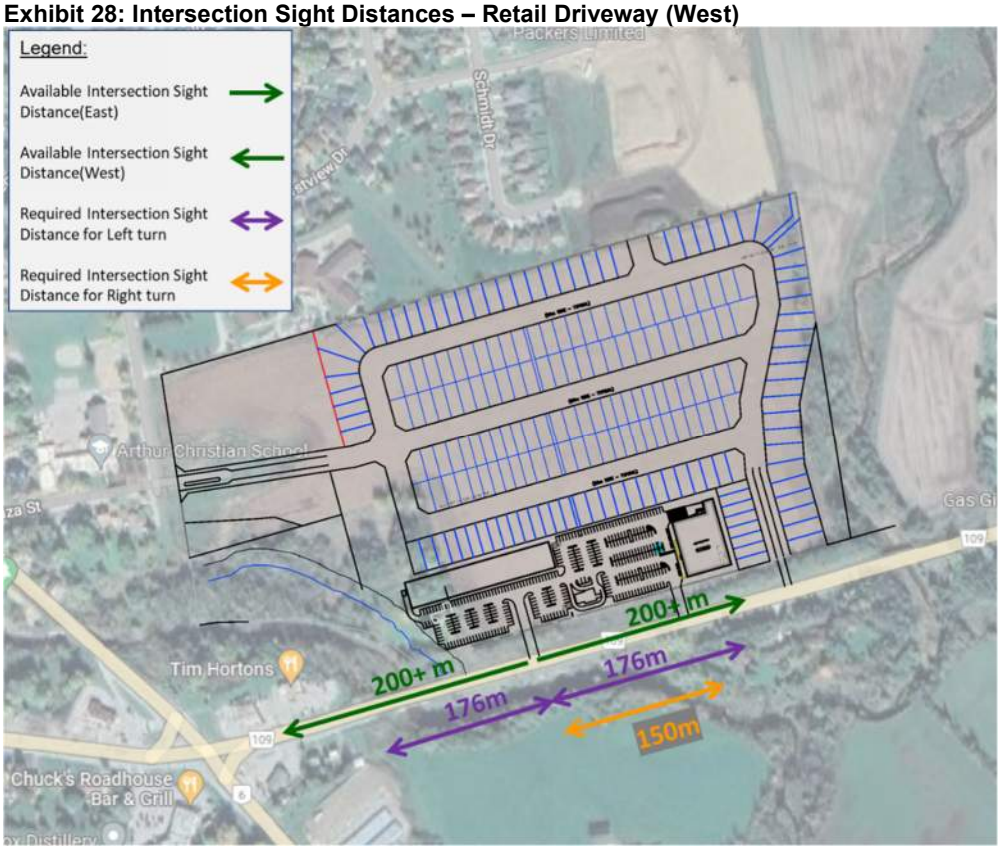


Exhibit 28: Intersection Sight Distances – Retail Driveway (West)



6.2 County Road 109 Left Turn Warrants

Traffic operations are acceptable under existing, future background, and future total conditions during, according to the Synchro analysis, and no road network improvements are necessary with the exception of providing the new roadway connections.

However, the need for left-turn lanes along County Road 109 was also reviewed at the three study intersections using **MTO nomographs from the Ministry of Transportation of Ontario Design Supplement for TAC Geometric Design Guide (CDG) for Canadian Roads (April 2020)**. These standards specify when left-turn lanes are warranted on highways and also detail the amount of storage and taper required. The nomographs are contained within Chapter E: At-Grade Intersections.

The left-turn lane warrants were applied to the weekday AM, Mid-day and PM peak hours, for future total conditions. The design speed of the highway was selected as 70 kph and when the calculation of percent left-turns resulted in a value lying between nomographs, the graph corresponding to the higher volume percentage was selected for a more conservative approach. The results are summarized in **Table 15**.

Table 15: Left-Turn Lane Warrant Results

Scenario	County Road 109 Retail Plaza Driveways Required Storage Length						County Road 109 Residential South Access Required Storage Length		
	East			West					
	AM	MD	PM	AM	MD	PM	AM	MD	PM
Future Total (2030)	15m	-	15m	25m	25m	25m	15m	30m	40m

Based on a review of the nomographs and the projected volumes along County Road 109, a left-turn lane with a length of 15 meters is warranted for the retail plaza east driveway, a left-turn lane with a length of 25 meters is warranted for the retail plaza west driveway, and a left-turn lane with a length of 40 meters is warranted the residential access given the higher left turning traffic volumes.

6.3 County Road 109 Right Turn Warrants

A right turn assessment for a potential westbound right turn taper or lane was also carried out at the three study intersections along County Road 109. Currently there is no right turn warrant methodology used by the Ministry of Transportation or the Transportation Association of Canada. In the absence of a warrant for Ontario, we considered the following factors.

- Westbound through and right turn volumes as shown in **Exhibit 10**
- Grade – 4.5% downhill east of all intersections
- Westbound shoulder – partial paved and gravel shoulder
- Environmental – Conestogo River and the bridge is approximately 50m east of the residential access

We also conducted a search on right turn warrants used elsewhere in Canada and found a warrant used by Alberta Transportation[1].

There are also warrants found for a few US states, but AASHTO does not have any official national methodology for right turn warrants in their guidelines/manuals.

Based on these non-Ontario sources, the forecast volumes in 2030 will not trigger a need for a separate right turn taper or lane given the low AADT and daily right turning volumes at both access roads of the development.

6.4 County Road 109 Gap Study

A vehicular gap survey was conducted on May 21st, 2021 at the location of the proposed south access road. The survey was conducted over 2 hours during the AM peak period (7:00 AM – 9:00

[1] http://www.transportation.alberta.ca/Content/docType233/Production/chap-d.pdf

AM) and 2 hours during the PM peak period (4:00 PM – 6:00 PM). The traffic patterns along County Road 109 are not expected to change at the locations of the retail driveways since there are no developments nor intersections between the two locations. Hence, the collected data is assumed to reflect the traffic flow conditions at both intersections.

The peak hours were found to be 7:45 AM – 8:45 AM and 4:30 PM – 5:30 PM. Based on Synchro's default values, the critical gaps range between 6 seconds and 7 seconds, and the follow up time ranges between 3.3 seconds and 3.5 seconds. These ranges cover both the right and left turning movements. For this analysis, gaps shorter than 10 seconds (highlighted in red) were assumed to be not sufficient for a vehicle to enter the roadway, as a conservative measure. Follow up time was assumed to be 3.5 seconds. The number and duration of available gaps for right turns and left turns are summarized in **Table 16** and **Table 17**, respectively.

Table 16: Right Turn Gap Study Results

Peak Hour	Available Gaps and Durations (s) - Westbound (SBR)															
	0-5	6-10	11-15	16-20	21-25	26-30	31-35	36-40	41-45	46-50	51-55	56-60	1-2 min	2-3 min	Critical SBR Vol	Estimate Capacity
AM	120	30	18	15	14	10	6	10	6	2	4	1	4	1	89	582
PM	166	51	41	23	14	12	7	6	5	1	0	4	0	0	113	452

Note: Gaps highlighted in red were assumed to be insufficient for a vehicle to make the turn

Table 17: Left Turn Gap Study Results

Peak Hour	Available Gaps and Durations (s) - Eastbound & Westbound (SBL)															
	0-5	6-10	11-15	16-20	21-25	26-30	31-35	36-40	41-45	46-50	51-55	56-60	1-2 min	2-3 min	Critical SBL Vol	Estimate Capacity
AM	343	101	47	25	16	7	1	3	0	1	0	0	0	0	52	270
PM	399	103	59	27	6	11	1	0	0	0	0	0	0	0	182	237

Note: Gaps highlighted in red were assumed to be insufficient for a vehicle to make the turn

During the AM peak hour, the estimated traffic assignment resulted in a maximum of 52 southbound left turning and 89 southbound right turning vehicles. During the PM peak hour, the estimated traffic assignments resulted in a maximum of 182 southbound left turning and 152 southbound right turning vehicles. The maximum utilization factor during the AM peak (Southbound right turning traffic) is 19%. The maximum utilization factor during the PM peak (Southbound left traffic) is 77%. Based on these results, it can be concluded that the available gaps are sufficient for all the site traffic to enter the roadway safely.

6.5 Signal Warrant Analysis at Highway 6 and Eliza St

A signal warrant was prepared at the intersection of Highway 6 with Eliza Street using the Ontario Traffic Manual (OTM) Book 12 methodology – Justification 7. The estimated future total AM and PM peak hour volumes average were used to calculate the average hourly volumes used.

Based on the findings of the signal warrant analysis, the signalization of the intersection is not warranted as neither the volumes nor delays trigger any warrants. The signal warrant analysis sheet is provided in **Appendix F**.

7 Conclusions and Recommendations

7.1 Traffic Forecasts

The proposed development is estimated to generate a total of 414, 657 and 808 two-way vehicle trips during the weekday AM, Mid-day and PM peak hour, respectively. For the residential component of the development, Eliza Street is expected to experience higher traffic activity than the Wellington Road 109 entrance. While a north access to the site will be provided with connection to Schmidt Drive and the established neighbourhood to the north, site traffic is not expected to use this access point. Rather, this access may be used by residents of the neighbourhood to the north to access County Road 109, or to further access the proposed retail plaza along County Road 109.

7.2 Traffic Capacity and Operations

Under existing conditions, the surrounding road network is currently operating at desirable level of service. A review of historical travel patterns and magnitude of traffic volumes suggests that there have been some fluctuations in traffic patterns from year to year.

There is residual capacity in the road network to accommodate the projected vehicle volumes. The largest impact to the v/c ratio due to the site traffic is on the intersection of Highway 6 and County Road 109; however, all movements at that intersection will still operate with residual capacity and a v/c ratio of 0.87, or less. All other movements at other intersections are operating at a v/c ratio of 0.71 or less. Overall, all movements within the study area will operate at LOS D or better during all peak periods with two exceptions during the PM peak hour: the westbound approach at the intersection of Highway 6 and Eliza Street (LOS E, v/c ratio of 0.55), and the southbound shared left-right turning lane at the intersection of County Road 109 and the east retail plaza driveway (LOS E, v/c ratio of 0.71).

7.3 Recommended Mitigation Measures

Based on the study findings, no mitigation measures to the external road network are required to accommodate the future total traffic conditions. However, signal split optimization for the intersection of Wellington Road 109 and Highway 6 is required for the MD and PM peak hours under future background and future total conditions. As a result, the signal timings are likely to be optimized to account for the development and other changes in traffic patterns or magnitude of traffic volumes, hence making the operations presented in this report conservative and demonstrating that the subject development will not trigger the need for any mitigation.

7.4 Wellington Road 109 Sightline & Turn Lane Analysis

A desktop review of the sightlines was performed to confirm that the available sight distances exceed the minimum requirements provided in the Transportation Association of Canada Geometric Design Guide for Canadian Roads for the retail driveway and the residential access located on Wellington Road 109. The analysis focused primarily on the sightline limitations due to the vertical curvature of the roadway. For both driveways, the analysis indicated that there is sufficient sight distance for each new access point.

Additionally, the need for left-turn lanes was reviewed using Ministry of Transportation of Ontario left-turn lane warrants, and industry warrants for right-turns. Right turn lanes are not required for any entrance. However, left turn lanes with 25, 15 and 40 metres of storage should be provided for the west retail driveway, east retail driveway and residential access, respectively.

7.5 Signal Warrant Analysis at Highway 6 and Eliza St

A signal warrant was prepared at the intersection of Highway 6 with Eliza Street using the Ontario Traffic Manual (OTM) Book 12 methodology – Justification 7. Based on the findings of the signal warrant analysis, the signalization of the intersection is not warranted as neither the volumes nor delays trigger any warrants.

APPENDIX A

Scoping Correspondence

TRITON ENGINEERING SERVICES LIMITED
Consulting Engineers

Memorandum

DATE:	April 7, 2022
TO:	Tammy Stevenson
FROM:	Ray Kirtz & Dustin Lyttle
RE:	211 Eliza Street, Arthur (Sarah Properties) Draft Plan Submission No. 2 Review
FILE:	A5527A

Submitted Items List:

- Cover Letter of Applications for Draft Plan of Subdivision, Official Plan Amendment and Zoning By-Law Amendment, dated January 19, 2021, prepared by GSP Group Inc. ***(Not Resubmitted)***
- Planning Justification Report, dated March 2022, prepared by GSP Group Inc. ***(Digital Copy)***
- Stage 1-2 Archaeological Property Assessment, (Project Report), dated October 16, 2018, prepared by AMICK Consultants Limited ***(Not Resubmitted)***
- Stage 1-2 Archaeological Property Assessment, (14.0 Project Report Supplementary Documentation), dated October 16, 2018, prepared by AMICK Consultants Limited ***(Not Resubmitted)***
- Hydrogeological Assessment, dated September, 2020, prepared by R.J. Burnside & Associates Limited ***(Not Resubmitted)***
- Functional Servicing and Stormwater Management Report, dated February 28, 2022, prepared by R.J. Burnside & Associates Limited ***(Digital Copy)***
- Geotechnical Investigation/Slope Stability Report, dated January 6, 2020, prepared by CMT Engineering Inc. ***(Not Resubmitted)***
- Environmental Impact Study, dated January 2021, prepared by Natural Resource Solutions Inc. ***(Not Resubmitted)***
- Development Concept, 211 Eliza Street, Arthur, dated November 10, 2020, prepared by GSP Group Inc. ***Update June 24, 2021 (Not Resubmitted)***
- Draft Plan of Subdivision, 211 Eliza Street, Arthur, dated January 13th, 2021, prepared by GSP Group Inc. ***(Digital Copy)***
- Schedule A – Application for Sewage Application, dated March 10, 2022, prepared by Broos Properties ***(Digital Copy)***

Note: Based on the fundamental nature of some of the comments expressed at the Pre-consultation meetings, our review has been limited to general arrangement and high-level servicing issues recognizing that the configuration of the development may change significantly.

Review and comments related to the detailed design will be provided at a later date once these fundamental issues have been addressed and design updated.

Draft Plan Submission No.1 Comments

General Comments:

1.1 Confirm if development will be phased. Note: A temporary secondary access to the site may be required depending on proposed phase sizing***. Pending confirmation.***

1.2 Confirm future road between Lots 31/32 aligns with the proposed street arrangement of adjacent Eastridge development. ***Pending confirmation.***

1.3 Parkland is to be dedicated in accordance with Section 51.1(1) of the Planning Act which indicates 5% of the total land area must be conveyed as parkland, or cash in-lieu. Details regarding requirements to be confirmed later in the process. ***Pending.***

1.4 Further the parkland is to be provided in a more central location with suitable/useable grading. ***Pending, location has not been revised.***

1.5 Approval from GRCA is required related to the following issues: ***Pending.***

- Floodline
- Slope stability
- EIS
- Water Balance
- Stormwater Management design criteria

1.6 Supporting information proposes a Foundation Drain Collector (FDC) to lower groundwater levels below basements. This system will require a "3rd pipe" which is shown in typical road section and mentioned in hydrogeological report. This system is not included in the Municipal Servicing Standards; therefore, it will need to be reviewed in detail prior to acceptance by the Township. ***It is unclear where this system is proposed since it is not included on Drwg CUSP, provide further details.***

1.7 Divided entrance feature indicated at Eliza will need to be reviewed in detail prior to acceptance by the Township. This configuration may cause issues with snow clearing, truck turning and may require additional maintenance by Township staff. Further, a wider ROW may be needed to accommodate wider asphalt width. ***Pending. Details of this entrance feature to be submitted for review/comment.***

1.8 An 18 m road ROW is proposed throughout the development which is not in accordance with the Municipal Servicing Standards. As such, is not acceptable. ***18m ROW remains proposed. This is to be revised to a 20m ROW as per Township standards.***

1.9 Eliza Street is not currently constructed to an urban standard, this will need to be upgraded to support this development. There may be other improvement/upgrades required. Details of external infrastructure upgrades and financing of this work will be the subject of a future agreement. ***Pending, this will be addressed later in the process.***

Sanitary:

1.10 Sewage Treatment allocation is not assured due to WWTP limited Reserve Capacity. Township has an allocation process in place to determine development allocation. Refer to Township Sewage Allocation By-Law 012-19. ***Application has been included as part of current submission. This application may be premature; however, Township will process the application to officially acknowledge it's submission.***

1.11 Confirm the intended use of the servicing block provided fronting onto Highway 109 (CR109). Note: there are no municipal services available along the CR109 frontage of this development parcel. ***This parcel is referenced as Block 169-Commercial. FSR indicates it would be serviced from Street E through easement. Addressed.***

1.12 Due to downstream sewer constraints on Francis Street, sewage flows are to be routed equally between the John Street outlet and through the neighbouring Eastridge Subdivision. ***FSR indicates that sanitary sewage from this development is routed entirely to the John Street outlet, with none conveyed to the Eastridge outlet. <u>This is not acceptable.</u>***

Water:

1.13 One watermain feed is not acceptable for a development of this size due to redundancy concerns. Connection through Eastridge Subdivision Phase V (Walsh Street) is required in addition to the Eliza/John connection. ***FSR does not indicate a second feed from Eastridge, revise accordingly.***

1.14 System water pressures within this development may not be sufficient to accommodate multi-storey building (i.e., apartments), on-site booster pumping may be required. Similarly, fire flows requirements verse availability will need to be reviewed. This will be reviewed further once details regarding fire flow requirements and watermain configuration have been provided. ***Pending.***

Storm Water Management:

1.15 "Normal Level" quality treatment is proposed using OGS; GRCA is to confirm this strategy is acceptable. ***Pending.***

1.16 No quantity control is proposed for this development; GRCA is to confirm this strategy is acceptable. ***Quality control strategy has been proposed utilizing infiltration and underground storage (i.e., superpipes/tanks). This strategy doesn't not appear to provide post to pre control. However, GRCA should comment on the adequacy of this strategy.***

1.17 Proposed discharge to the CR109 to be approved by the County. ***Pending. Details regarding what is proposed and an assessment of the existing/proposed drainage features is to be provided.***

1.18 Infiltration trenches are proposed for water balance which are to be located in rear yards along the north property. Details/logistics regarding these structures needs to be confirmed such as; ownership, easements, maintenance, impacts of lot use. ***Pending.***

1.19 Comments regarding the water balance calculation/strategy will be provided as part of future detailed design. GRCA approval of water balance strategy is required. ***This issue to be reviewed in detail as part of the Hydrogeologic report review. Further comments pending. GRCA comments pending.***

<u>Current Draft Plan Submission Comments</u>

2.1 Future submissions are to include a written response to comments.

2.2 TIS required to address issues related to development proposal including:

a. Impacts on local streets/intersections including, but not limited to:
   i. Eliza & Street A
   ii. Eliza & Smith
   iii. Street J & East Ridge
   iv. Street H & CR109.

b. Suitability and assessment of multiple CR109 entrances and any modifications (urbanization etc.) required and the expected impact on residential and commercial/retail traffic.

c. Pedestrian movement and access; including along CR109 and/or trail system between block 168 and 82.

d. Horse and buggy and agricultural equipment traffic.

e. Future bridge design on CR109.

f. Suitability of the island at the entrance to this subdivision.

Note: Consultation with Wellington County for their requirements is imperative.

2.3 Daylighting triangles at the proposed intersection of Eliza & Street A and CR109 & Street H are to be indicated.

2.4 Noise impacts to be considered for residential lots backing on to CR109 and the retail/commercial block.

2.5 EIS report was submitted as part of Submission 1. Our understanding is that the GRCA will be responsible for review/comment of this report. Comments are to be provided to the Township once available.

2.6 Hydrological report was submitted as part of Submission 1; if not already done so this report should be circulated to the GRCA (SWM, water balance) and County (SWP) for comment. The Township will provide comment once additional information is provided regarding the FDC system and development moves into application.

2.7 Arthur Phase 1 WWTP upgrade has been completed, revise FSR accordingly.

2.8 Reference to the expansion of Fredrick Street Pumping Station with the FSR (page 9) is to be removed as this is no longer required.

2.9 Urbanization of CR109 to be discussed further as the development progresses.

If you have any questions regarding the above comments pleased contact us.

From: Pasquale Costanzo <pasqualec@wellington.ca>
Sent: Monday, May 17, 2021 1:59 PM
To: Beausoleil, Adam <Adam.Beausoleil@hdrinc.com>
Cc: Curtis Marshall <curtism@wellington.ca>
Subject: RE: TIS Scope of Work - Arthur Subdivision

Hi Adam,

I have reviewed your scope with comments below. Highway 9 was download to the County in 1998(ish) and the road is known as Wellington Road 109. I am not sure of all the background development in the area the township could help with this and I have cc'd Curtis from our planning department that could assist as well.

Traffic counts on Wellington Road 109
Station 10906 - AADT 7,900 - counted in 2017 – located 0.2km East of Highway 6 at Bridge
Station 10907 - AADT 5,626 – counted in 2017 – located Between WR 12 and Sideroad 17

If you have any questions please give me a call.
Take care

Pasquale Costanzo, C.E.T., CMMII Infrastructure Specialist
Technical Services Supervisor
County of Wellington, Roads Division
T 519.837.2601 x 2250
E pasqualec@wellington.ca

From: Beausoleil, Adam <Adam.Beausoleil@hdrinc.com>
Sent: Monday, May 17, 2021 8:57 AM
To: Pasquale Costanzo <pasqualec@wellington.ca>
Subject: RE: TIS Scope of Work - Arthur Subdivision

Hi Pasquale – just following up on this request and confirming if you have received it. Thanks

Adam Beausoleil, P.Eng.
D 289.695.4675

hdrinc.com/follow-us

From: Beausoleil, Adam
Sent: Tuesday, May 4, 2021 11:18 AM
To: pasqualec@wellington.ca
Cc: Wong, Carl <carl.wong@hdrinc.com>
Subject: TIS Scope of Work - Arthur Subdivision

Hi Pasquale,

HDR has been retained to undertake a transportation impact study for a new subdivision located in Arthur. I would like to present to you the scope of work for feedback and approval. The site area is in the north-east quadrant of Highway 9 / Highway 6, as shown in the graphic below.

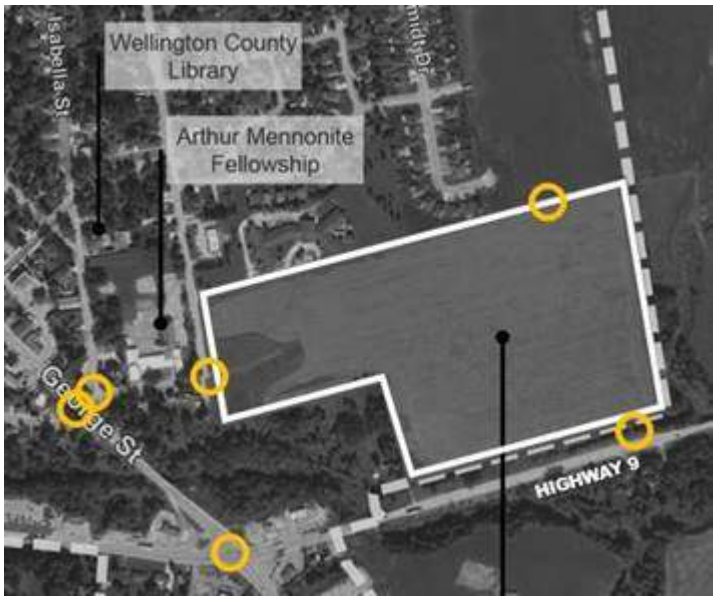
In addition to seeking feedback on the scope, I would like to request any available traffic data and signal timing plans which the County can provide. We will be using pre-covid19 traffic data and adjusting it to 2021 existing conditions using as background growth rate. If there additional counts for the Highway 6/9 intersection, we would like to request both of the most recent counts so that we can calculate background growth to apply to future forecasts. Please confirm any costs associated with the data request.

Thank you

Proposed Scope of Work – Arthur Subdivision Transportation Impact Study

Proposed study intersections:

1. Highway 9 and Highway 6/George St – request most recent and second most recent available turning movement counts (TMC), and current signal timing plan (STP)
   MTO intersection don't have background info
2. Eliza Street / George Street – request most recent available TMC
   Township intersection don't have background info
3. Eliza Street / Isabella Street East – request most recent available TMC
   Township intersection don't have background info
4. Site Driveway / Highway 9
5. Site Driveway / Eliza Street
6. Site Driveway (north)



Proposed Analysis Time Periods:

- Weekday AM Peak Hour (between 7:00 – 9:00 AM)
- Weekday PM Peak Hour (between 4:00 – 6:00 PM)
  Please include mid-day 11am - 2pm

Proposed Scenarios / Horizon Years:

- 2021 Existing Traffic conditions
- 5 year horizon Background Traffic conditions (includes road growth and traffic from approved or under construction background developments in the immediate area)
- 5 year horizon Total Traffic conditions (background plus the subdivision traffic volumes)

Background Developments:

- Please let us know if there are any background developments and/or associated traffic studies which we may integrate into the study forecasts.
- We recognize that there may be plans for an extension of Schmidt Drive and expansion of the subdivision to the north. This would establish a northerly connection with the subject subdivision which is circled in yellow in the graphic above, along the north property line.

Sightlines:

- We will perform a sightline assessment for the proposed access along Highway 9 near the south-east corner of the subdivision, taking into account horizontal and vertical curves in the roadway.

Adam Beausoleil, P.Eng.
Traffic Engineer

HDR
100 York Blvd, Suite 300
Richmond Hill, ON L4B 1J8
D 289.695.4675
Adam.Beausoleil@hdrinc.com

hdrinc.com/follow-us

From: "Pegelo, Jessica (MTO)" <Jessica.Pegelo@ontario.ca>
Subject: Draft Plan of Subdivision - Township of Wellington North - Arthur - Eliza Street
Date: September 29, 2023 at 12:26:04 PM EDT
To: Brandon Flewwelling <brandonf@gspgroup.ca>
Cc: Walter Broos <wbroos@broos.ca>, "carl.wong@hdrinc.com" <carl.wong@hdrinc.com>, "blambert@wellington-north.com" <blambert@wellington-north.com>

Good afternoon Brandon,

Thank you for providing the attached TIS and draft plan for MTO review.

MTO have reviewed the TIS and have the following comments:

1. MTO require that the TIS be stamped and signed by a Licensed Professional Engineer.
2. The data for Highway 6 and Eliza street is acceptable for use in the TIS. However, MTO require that the revised TIS be completed using the attached 2021 TMC for Highway 6 and Wellington Rd 109.
3. Exhibit 2 – Lane configuration at Highway 6 & Eliza St intersection does not match with existing conditions. The SB parking lane should not be included as a lane. NB right-shared is a taper only. Therefore, the lane configuration is one thru-left shared lane in SB direction and a thru plus taper in NB direction. MTO require that the TIS be revised using the existing conditions.
4. Exhibit 3 – Trips on Eliza St between Isabella St and Highway 6 are not balanced. Please provide clarification.
5. Table 4 & Table 9 – V/C ratio in PM peak hour for Highway 6 / County Rd 109 for WB Thru-Right in future background and total future traffic scenarios has decreased as compared to existing conditions. Please provide clarification.
6. Highway 6 at Eliza St is an un-signalized intersection in existing conditions. MTO require that a signal warrant analysis for this intersection be completed following OTM Book 12 to ensure signals are not warranted in any of the future conditions.

MTO anticipate receiving a revised TIS and other documentation for review. To date, MTO have received no other information regarding the draft plan of subdivision application.

If there are any questions, please let me know.

Kind Regards,

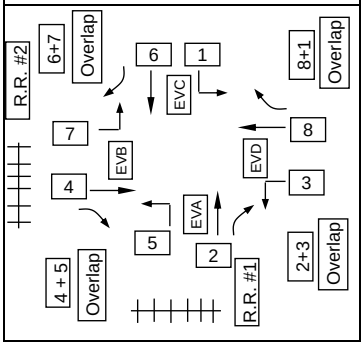
Jessica Pegelo
Ministry of Transportation
Corridor Management Planner
Highway Corridor Management Section
659 Exeter Rd. London, ON N6E 1L3
Telephone: 519-379-4397 Fax: 519-376-6842
E-mail: jessica.pegelo@ontario.ca

Ontario

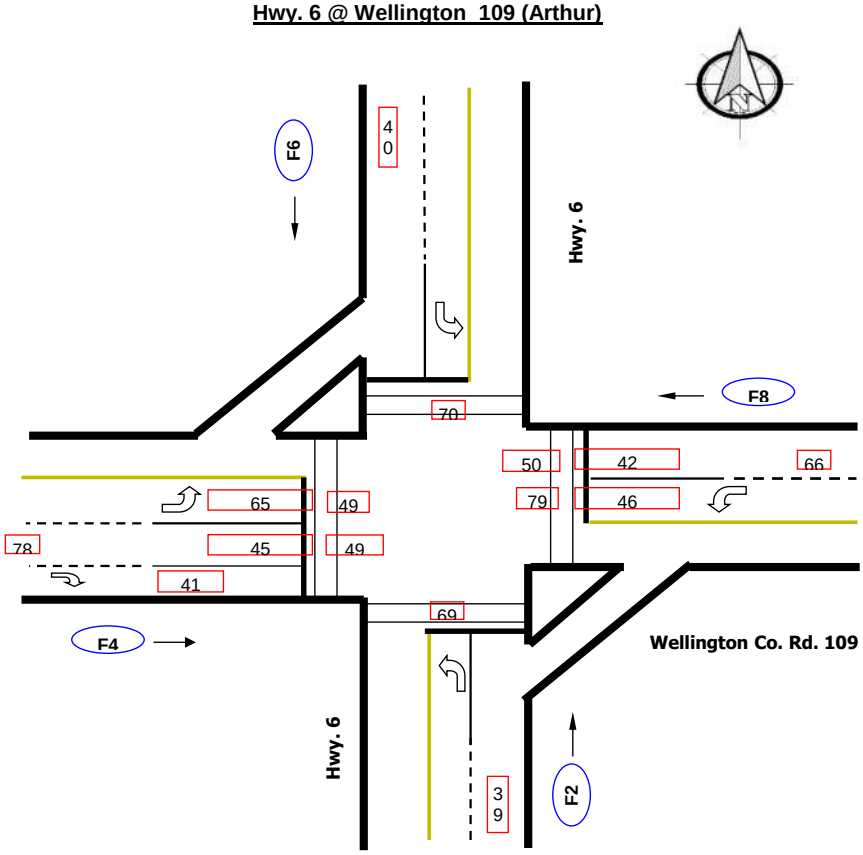
APPENDIX B

Traffic Data

PROVINCE OF ONTARIO 233 TRAFFIC SIGNAL TIMING SHEET
LOCATION:
Hwy. 6 @ Wellington 109 (Arthur)
TIMING BASED ON TM DATED :
TIMING PLAN DATE:
23-Oct-08
TIMING INSTALLATION DATE :
TIMING INSTALLED BY :
COMMENTS :
Reconfigure intersection Oct 2008
Revised Ped and clearance times



Hwy. 6 @ Wellington 109 (Arthur)



Actuated

		PHASE							
		1	2	3	4	5	6	7	8
0	WALK		14		11		14		11
1	DON'T WALK		6		6		6		6
2	MIN INTIAL		20		10		20		10
3	TYPE 3 LIMIT		-		-		-		-
4	ADD PER VEH		2.0		-		2.0		-
5	VEH EXT		3.5		3.5		3.5		3.5
6	MAX GAP		3.5		3.5		3.5		3.5
7	MIN GAP		3.5		3.5		3.5		3.5
8	MAX LIMIT		50		30		50		30
9	MAXIMUM 2		-		-		-		-
A	ADV /DLY WALK		-		-		-		-
B	SEQUENCE TO		-		-		-		-
C	COND SRV MIN		-		-		-		-
D	REDUCE EVERY		-		-		-		-
E	YELLOW		4.5		4.5		4.5		4.5
F	RED CLEAR		1.6		1.6		1.6		1.6

PHASE BANK # 1 < C + O + F = 1 >

		9	A	B	C	D		E
0							RR1 DLY	
1	PHASE 1	-					RR1 CLR	
2	PHASE 2	25					EVA DLY	
3	PHASE 3	-					EVA CLR	
4	PHASE 4	-					EVB DLY	
5	PHASE 5	-					EVB CLR	
6	PHASE 6	25					EVC DLY	
7	PHASE 7	-					EVC CLR	
8	PHASE 8	-					EVD DLY	
		MAX INT	ALT WALK	ALT FLH D/W	ALT INT	ALT EXT	EVD CLR	
							RR2 DLY	
							RR2 CLR	
							EV CLR	
							EV DLY	
							RR CLR	
							RR DLY	

ALL RED START
(F/1 + C +O) = 5.0
RED REVERT
(F/1 + O + F) = 5.0

COLUMN F PHASES

		1	2	3	4	5	6	7	8
0	PERMIT		X		X		X		X
1	RED LOCK								
2	YELLOW LOCK								
3	VEH MIN CALL								
4	PED RECALL		X				X		
5	PEDESTRIANS	View Only							
6	YIELD AT FL D/W								
7	RED REST								
8	DOUBLE ENTRY		X		X		X		X
9	VEH MAX CALL								
A	SOFT RECALL								
B	MAXIMUN 2								
C	COND SERVICE								
D	MAN CONT CALL								
E	YELLOW START		X				X		
F	FIRST PHASES				X				X

< C + O + F = 1 >

COMM ADDRESS
(C/ O + O + O) = 1
ZONE ADDRESS
(C/ O + O + 1) = 1 - Always
AREA NUMBER
(C/ O + 0 + 2) = 1 - Region/Agcy #
AREA ADDRESS
(C/ O + O + 3) = 121 - Assigned by System Admin

PREEMPT MINIMUMS		A RR1-2 SPEV1	B SP EV2	C EMER VEH
A	WLK (DFLT)			
B	D 'T WALK			
C	INITAL			

< C + O + F = 1 >

Issued Date: Oct-08

Installed Date:

ONTARIO 233 PROGRAM
HWY 6 at Well. 109 (Arthur)

Column E Phases / Bits

		1	2	3	4	5	6	7	8
0	EXCLUSIVE								
1	RR1 CLEAR								
2	RR2 CLEAR								
3	RR2 LTD SRV								
4	PROT/PERM								
5	FLH TO PREMT								
6	FLASH ENTRY								
7	DISABL MIN YEL								
8	DISABL OVP YEL								
9	OVP FLH YEL								
A	EM VEH A								
B	EM VEH B								
C	EM VEH C								
D	EM VEH D								
E	EXTRA 1	X		X		X			
F	IC SELECT		X						

Column F Phases / Bits

		1	2	3	4	5	6	7	8
0									
1	EXT PERMIT 1								
2	EXT PERMIT 2								
3	EXCLU PED								
4									
5	PED 2P OUT		X						
6	PED 6P OUT						X		
7	PED 4P OUT				X				
8	PED 8P OUT								X
9	FLH YELLOW								
A									
B									
C									
D									
E	RESTRICTED								
F	EXTRA 2								

< C + O + E = 125 >

Column F

		1	2	3	4	5	6	7	8
0	ADV GRN FLH								
1	PHASE FLASH								
2	FLASH WALK								
3	GUAR PASS								
4	SIMUL GAP								
5	SEQ TIMING								
6	ADV WALK								
7	DELAY WALK								
8	EXT RECALL								
9									
A	MAX EXTEN								
B	INH PED RSRV								
C	SEMI ACTUATD								
D									
E	STRT VEH CALL								
F	STRT PED CALL		X		X		X		X

SPECIALS < C + O + F = 2 >

Dial-out Telephone Number

		D
0	NO. OF DIGITS	11
1	1st DIGIT	1
2	2nd DIGIT	9
3	3rd DIGIT	0
4	4th DIGIT	5
5	5th DIGIT	7
6	6th DIGIT	0
7	7th DIGIT	4
8	8th DIGIT	3
9	9th DIGIT	0
A	10th DIGIT	0
B	11th DIGIT	6
C		
D		
E		
F		

REDIAL TIME - 10
(C/5 + C + 0)
DEFAULT IS : REPORT ALL ALARMS (NO FLAGS SET)

DISABLE ALARM REPORTING

Column F	1	2	3	4	5	6	7	8
0 OMIT ALARMS					X			

< C + O + C = 5 >

1 = STOP TIME
2 = FLASH SENCE
3 = KEYBOARD ENTRY
4 = MANUAL PLAN
5= ENABLE POLICE CONTROL
6 = EXTERNAL ALARM
7 = DETECTOR FAILURE

< C + O + C =5 >

FLASH TO PREEMPT
1 = EVA
2 = EVB
3 = EVC
4 = EVD
5 = RR1
6 = RR2
7 = SE1
8 = SE2

EXTRA 1
1 = TBC TYPE 1
2 = NEMA EXT. COORD.
3 = DAYLIGHT SAVINGS
4 =
5 = EXPANDED STATUS REPORTING
6 = INTERNATIONAL PED
7 = CLEAR OUTPUTS DURING FLASH
8 = SPLIT RING

EXTRA 2
1 = AWR ON DURING PHASE INITAL
2 = LMU INSTALLED

IC SELECT
2 = 2 WAY MODEM
3 = 7 WIRE SLAVE
4 = FLASH / FREE
5 = SIMPLES MASTER
7 = 7 WIRE MASTER
8 = OFFSET INTURP

PRETIMED ONTARIO 233 PROGRAM

PHASE

	1	2	3	4	5	6	7	8
WALK		24		14		24		14
DON'T WALK		6		6		6		6
MIN INTIAL		30		20		30		20
TYPE 3 LIMIT		-		-		-		-
ADD PER VEH		2.0		-		2.0		-
VEH EXT		3.5		3.5		3.5		3.5
MAX GAP		3.5		3.5		3.5		3.5
MIN GAP		3.5		3.5		3.5		3.5
MAX LIMIT		40		20		50		20
MAXIMUM 2		-		-		-		-
ADV / DLY WALK		-		-		-		-
SEQUENCE TO		-		-		-		-
COND SRV MIN		-		-		-		-
REDUCE EVERY		-		-		-		-
YELLOW		4.5		4.5		4.5		4.5
RED CLEAR		1.6		1.6		1.6		1.6

PHASE BANK # < C + O + F = 1 >

Column F

PHASES

		1	2	3	4	5	6	7	8
0	PERMIT		X		X		X		X
1	RED LOCK								
2	YELLOW LOCK								
3	VEH MIN CALL								
4	PED RECALL		X		X		X		X
5	PEDESTRIANS								
6	REST IN WALK								
7	RED REST								
8	DOUBLE ENTRY		X		X		X		X
9	VEH MAX CALL								
A	SOFT RECALL								
B	MAXIMUM 2								
C	CORD SERVICE								
D	MAN CONT CALL								
E	YELLOW START		X				X		
F	FIRST PHASES				X				X

< C + O + F = 1 >

T.O.D. FUNCTIONS

	TIME HH	MM	FUN	DAY OF WEEK S	M	T	W	T	F	S
0	07:30		9		X	X	X	X	X	
1	15:45		9		X	X	X	X	X	
2	18:00		9		X	X	X	X	X	
3	19:00		9		X	X	X	X	X	
4										
5										
6										
7										
8										
9										
A										
B										
C										
D										
E										
F										

< C + O + 7 = 1 >

Column 4

PHASES / BITS

1	2	3	4	5	6	7	8
			X				X
	X		X				X
			X				X

< C+ O + E = 27 >

LOCATION: Hwy 6 at Wellington 109 (Arthur)

BI Tran Systems, Inc.
510 Bercut Dr., Sacremento, Calif. 95814
916/441-0260

*Traffic Signal Program **233** Ontario*
Timing Sheet #2
Revised (02/95)

Issued Date: October 2008

Installed Date:

T.O.D. FUNCTIONS

0 = PERMIT PHASES
1 = RED LOCK
2 = YELLOW LOCK
3 = VEH MIN RECALL
4 = PED RECALL
5 -
6 - REST IN WALK
7 = RED REST
8 = DOUBLE ENTRY
9 = VEH MAX RECALL
A = VEH SOFT RECALL
B = MAXIMUM 2
C = CONDITIONAL SERVICE
D = LAG PHASES
E = BIT 1 - LOCAL OVERIDE
BIT 4 - DISABLE DET OFF MONITOR
BIT 7 - DET COUNT MONITOR
BIT 8 - REAL TIME SPLIT MONITOR
F = OUTPUT BITS 1 THRU 4

STANDARD 332 CABINET LOCATION	column	1	3
		delay	carry over
I-2 U	0		
J-2 U	1		
I-6 U	2	10	
J-6 U	3	5	
1-2 L	4		
J-2 L	5		
1-6 L	6	5	
J-6 L	7	5	
I-4	8		
J-4	9		
I-8	A	5	
J-8	B	10	
J-1	C		
I-1	D		
J-5	E		
I-5	F		
	< C + O + D = 0 >		

Column 0	Column 1								Column 2								Column 3							
C1	ATTRIBUTES								PHASE(S)								ASSIGNMENTS							
pin #	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8
0 39				X	X		X			X							X	X	X					X
1 40				X	X		X							X			X	X	X					X
2 41				X	X		X					X					X	X	X					X
3 42				X	X		X									X	X	X	X					X
4 43																								
5 44																								
6 45				X	X		X					X					X	X	X					X
7 46				X	X		X									X	X	X	X					X
8 47																								
9 48																								
A 49							X					X					X	X	X					X
B 50							X									X	X	X	X					X
C 55																								
D 56																								
E 57																								
F 58																								

DETECTOR ASSIGNMENTS < C + O + E = 126>

STANDARD 332 CABINET LOCATION	column	2	4
		delay	carry over
J-9 U	0		
I-9 U	1		
I-9 L	2		
J-9 L	3		
I-3 U	4		
J-3 U	5		
I-7 U	6	5	
J-7 U	7		
I-12 U	8		
I-13 U	9		
I-12 L	A		
I-13 L	B		
I-3 L	C		
J-3 L	D		
I-7 L	E		
J-7 L	F	5	
	< C + O + D = 0 >		

Column 4	Column 5								Column 6								Column 7							
C1	ATTRIBUTES								PHASE(S)								ASSIGNMENTS							
pin #	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8
0 59																								
1 60																								
2 61																								
3 62																								
4 63																								
5 64																								
6 65				X	X		X					X					X	X	X					X
7 66				X	X		X									X	X	X	X					X
8 67																								
9 68																								
A 69		X										X					X	X	X					X
B 70		X														X	X	X	X					X
C 76																								
D 77																								
E 78				X	X		X					X					X	X	X					X
F 79							X									X	X	X	X					X

DETECTOR ASSIGNMENTS < C + O + E = 126 >

DETECTOR ASSIGNMENT SHEET
ONTARIO 233 PROGRAM

LOCATION:
Hwy 6
at Wellington 109
Issued Date: October 2008
Installed Date:

DETECTOR ATTRIBUTES
1 = FULL TIME DELAY
2 = PEDESTRIAN CALL
3 =
4 = COUNT
5 = EXTENSION
6 = TYPE 3
7 = CALLING
8 = ALTERNATE

DETECTOR ASSIGNMENTS
1 = DET. SET # 1
2 = DET. SET # 2
3 = DET. SET # 3
4 =
5 =
6 = MIN RECALL ON FAILURE
7 = MAX RECALL ON FAILURE
8 - REPORT ON FAILURE

DETECTOR MONITOR
MAX OFF: D/0+0+1=120
MAX ON: D/0+0+2=60

ADVANCE WARNING BEACONS
SIGN #1 SIGN #2
PHASE NUMBER
(F/1+C+F)= (F/1+D+F)=
TIME BEFORE YELLOW
(F/1+C+E)= (F/1+D+E)=
OUTPUT PIN NUMBER
(E/127+E+8)= (E/127+E+9)=

New Input

Input File

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
"I" FILE	**1** Ext, Cnt, Call <C1-56>	**2** Ext, Cnt, Call <C1-39>	**2** Ext, Cnt, Call <C1-63>	**2** Type 3, Call <C1-47>	**3** Ext, Cnt, Call <C1-58>	**4** Ext, Cnt, Call <C1-41>	**4** Ext, Cnt, Call <C1-65>	**4** Type 3, Call <C1-49>	**1** Ext, Cnt, Call <C1-60>	NOT WIRED	Not Assigned <C1-80>	**2** Ped Call <C1-67>	**6** Ped Call <C1-68>	Flash Sense <C1-81>
		2 Ext, Cnt, Call <C1-43>	**2** Ext, Cnt, Call <C1-76>			**4** Ext, Cnt, Call <C1-45>	**4** Ext, Cnt, Call <C1-78>		**3** Ext, Cnt, Call <C1-62>		Not Assigned <C1-53>	**4** Ped Call <C1-69>	**8** Ped Call <C1-70>	Stop Time <C1-82>
"J" FILE	**5** Ext, Cnt, Call <C1-55>	**6** Ext, Cnt, Call <C1-40>	**6** Ext, Cnt, Call <C1-64>	**6** Type 3, Call <C1-48>	**7** Ext, Cnt, Call <C1-57>	**8** Ext, Cnt, Call <C1-42>	**8** Ext, Cnt, Call <C1-66>	**8** Type 3, Call <C1-50>	**5** Ext, Cnt, Call <C1-59>	NOT WIRED	Not Assigned <C1-54>	EV **A** Preempt <C1-71>	EV **B** Preempt <C1-72>	Railroad 1 <C1-51>
		6 Ext, Cnt, Call <C1-44>	**6** Ext, Cnt, Call <C1-77>			**8** Ext, Cnt, Call <C1-46>	**8** Ext, Cnt, Call <C1-79>		**7** Ext, Cnt, Call <C1-61>		Not Assigned <C1-75>	EV **C** Ped Call <C1-73>	EV **D** Preempt <C1-74>	Railroad 2 <C1-52>

DETECTOR TYPES

Ext = Extension Detector
Detector is only active during the Phase's GREEN Intervals (ie, will NOT *Call* the Phase)

Cnt = Count Detector
Used in computing "Added Initial"

Call = Calling Detector
Detector is only active during the Phase's NON-GREEN Intervals (ie, will NOT *Extend* the Phase)

Type 3 = Type 3 Disconnect
Will allow a Calling Detector to Extend its Phase until the Call first drops or the "Type 3 Limit" is reached

BI Tran Systems, Inc.
510 Bercut Dr., Sacramento, Calif. 95814
916/441-0260

Traffic Signal Program 233
Initialized Detector Assignments
(Revised 8/92) 332 Cabinet

Controller Intervals

0 = Walk
1 = FDW
2 = Min. Green
3 =
4= Var. Initial
5 = Extension
6 =
7 = Reduce Gap
8 = Red Rest
9 = Preemption
A = Stop Time
B = Red Revert
C = Yellow-Gap Termination
D = Yellow-Max. Termination
E = Yellow-Forceoff Termination
F = Red Clearance

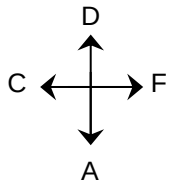
Continuous Memory Error Monitoring

The controller's RAM and EPROM memories are continuously checked for errors. If an erro is found, the intersection will go into FLASH (via Watch Dog Timer), and one of the following will be shown on the controller's display:

bAd A = An error was detected in the CPU's RAM, or a new program has been installed on the memory module. Often caused by a bad controller "gel-cell" battery.

bAd b = An error was detected in the memory module's RAM. Often caused by a bad "lithium" battery on the memory module.

Display Movement Codes



A = Advance ROW
D = Decrement ROW
C = COLUMN Back
F = Forward COLUMN

Special Event Schedules

Special Event #1: C + 0 + E = 27
Special Event #2: C + 0 + E = 28

Current Interval = E + 5 + 0
Current Interval Timer = E + 5 + B
Current Interval Clearance Phases = E + 5 + C

Display Locations

	Plan Select	Offset Select
Manual	C/0 + A + 1	C/0 + B + 1
Master	C/0 + A + 2	C/0 + B + 2
Current	C/0 + A + 3	C/0 + B + 3
Next	C/0 + A + 4	C/0 + B + 4
TOD	C/0 + A +5	C/0 + B + 5

Master Cycle = C/0 + A + 0
Ring A Cycle = C/0 + B + 0
Ring B Cycle = C/0 + D + 0

MIN Cycle = C/0 + A + E
MAX Cycle = C/0 + B + E

Phase Hold = C/0 + F + D
Phase Next = C/0 + F + E
Force Off = C/0 + F + F
(with Ring A Cycle Timer)

Current Calculated Cycle Length = C/0 + B + F
Current Permitted Phases = E/0 + 7 +8

bAd E = An error was detected in the 233 Program EPROM.
bAd F = An error was detected in the Z-RAM (Dallas chip) on the memory module.

412/C Memory Module
Lithium Battery Condition

To check the condition of the 3.6 volt Lithium Battery on the 412/C Memory Module:

If E/112 + 0 + A = 84 - the battery is BAD
If E/112 + 0 + A = 85 - the battery is O.K.

Monitor "Activate" Flags
(Also Requires T.O.D. Function "E" Flag)
Detector Count Recording:
E/2 + 0 + 9 = Not Zero
Real Time Split Monitor:
E/2 + 0 + E = Not Zero

E Page Enable: F/1 + 9 + E = Not Zero

Time of Day Function (7 Key)
Current T.O.D. "E Function"
Control Bits = C/0 + E + E
Current T.O.D. "F Function"
Output Bits = C/0 + E + F

Logic DELAY Gate
Delay Timer Display
DELAY A Timer = C/0 + 9 +A
DELAY B Timer = C/0 + 9 + B
thru thru
DELAY F Timer = C/0 + 9 + F

Interval Timer Display
Ring A = F/0 + A + Interval Row
Ring B = F/0 + B + (Interval Row From PHASE BANK data)

Current Phase
Bank = F/0 + C + E

Last Power Failure:
(HR-MIN-DOW) = 8 + 4
(DOW-YR-MONTH) = 8 + 5
Last Cabinet Flash
(HR-MIN-DOW) = 8 + 6
(DOW-YR-MONTH) = 8 + 7
Power Fail Counts:
(Long Failures) = F/1 + 0 + C
(Short Failures) = F/1 + 0 + D
Current Time:
(HR-MIN-DOW) = 8 + 0
(DOW-YR-MONTH) = 8 + 1
(MIN-SEC-1/10SEC) = 8 + F

BI Tran Systems, Inc.
510 Bercut Dr., Sacramento, Calif. 95814
916/441-0260
Traffic Signal Program 233 "View" Locations

Ontario
Ministry of Transportation

TES - Traffic Engineering System

Turning Movement 15 Minute Report

Description: HWY 6 @ WELLINGTON ROAD 109
Region WEST
Hwy #: HWY 6
LHRS_Offset: 13640_0000
Count Period. 11/9/2021 7:00:00 AM
Count Start Date: 11/9/2021 12:00:00 AM
11/9/2021 6:00:00 PM
Int. Type: Cross

Start Time	North										South										East										West										Total
	Cars			Trucks			Long Trucks			Ped	Cars			Trucks			Long Trucks			Ped	Cars			Trucks			Long Trucks			Ped	Cars			Trucks			Long Trucks			Ped	
	LT	TH	RT	LT	TH	RT	LT	TH	RT		LT	TH	RT	LT	TH	RT	LT	TH	RT		LT	TH	RT	LT	TH	RT	LT	TH	RT		LT	TH	RT	LT	TH	RT	LT	TH	RT		
07:00	29	61	4	1	0	1	4	2	2	0	5	26	11	0	3	0	0	2	0	0	7	16	15	0	1	0	0	8	1	0	4	30	8	0	4	0	2	5	1	0	253
07:15	37	66	3	1	2	0	1	3	1	0	3	43	11	0	4	0	1	0	1	0	15	35	19	0	2	1	3	8	3	0	4	38	13	0	5	1	1	2	0	0	327
07:30	38	57	8	0	0	0	2	2	4	0	4	37	13	0	0	2	0	4	3	0	15	34	20	0	3	2	1	12	0	0	3	27	11	0	3	0	1	10	0	0	316
07:45	25	29	5	0	0	0	1	3	0	0	7	54	13	0	2	0	0	2	7	0	7	41	22	1	0	0	3	11	0	0	4	40	3	2	1	0	2	11	2	0	298
08:00	31	46	6	0	3	0	0	3	2	0	5	33	4	0	2	3	1	1	1	0	19	26	17	0	0	1	2	9	5	0	10	31	5	0	3	2	1	5	0	0	277
08:15	20	46	6	0	3	0	2	5	4	0	9	38	11	0	0	2	0	5	1	0	12	33	22	0	0	2	1	11	1	0	4	38	8	0	1	0	2	9	0	0	296
08:30	14	41	9	2	1	1	1	5	3	0	9	39	11	1	4	3	2	5	1	1	13	48	31	1	0	1	2	6	4	1	5	36	13	0	7	2	2	11	1	0	335
08:45	31	50	7	0	1	0	3	3	2	1	7	40	10	0	3	1	0	1	2	0	11	37	19	0	3	3	1	5	2	0	4	28	8	1	4	0	2	3	0	0	292
11:00	18	39	12	1	0	1	2	3	2	4	3	25	13	0	2	1	0	5	4	1	8	29	20	1	4	1	2	9	1	1	7	41	6	0	6	0	0	14	0	3	280
11:15	18	31	3	1	2	0	3	4	1	0	6	34	7	0	2	0	0	4	1	0	6	33	19	0	4	2	0	8	3	0	5	32	13	1	2	0	2	7	1	0	255
11:30	21	41	11	1	1	1	1	4	0	0	6	33	10	0	1	1	0	2	4	0	9	35	20	0	2	0	0	5	3	0	6	34	11	0	2	0	1	11	0	0	277
11:45	20	41	9	2	1	2	0	3	1	0	8	44	9	0	2	1	0	2	3	0	12	33	24	0	3	0	3	7	4	0	10	24	8	0	0	0	3	9	0	0	288
12:00	15	42	5	0	1	0	1	3	1	1	8	41	6	0	1	4	1	1	2	0	6	27	10	0	4	0	0	8	0	0	7	34	9	0	5	0	1	6	0	0	249
12:15	12	33	15	0	2	3	1	1	1	0	11	37	13	0	1	0	1	7	1	0	17	47	24	0	6	2	1	13	3	0	8	29	5	0	8	0	0	6	0	0	308
12:30	14	42	7	2	0	1	5	4	1	0	9	34	7	1	1	0	1	1	1	0	12	40	12	0	3	1	2	14	2	0	6	46	7	0	3	1	0	9	1	0	290
12:45	11	45	3	0	2	1	2	1	3	0	3	38	12	0	0	0	1	2	1	0	6	20	20	1	3	0	1	7	1	0	6	29	8	2	1	1	2	9	0	0	242
13:00	23	48	10	2	4	0	2	2	4	0	8	38	9	0	0	1	0	2	3	0	13	42	21	0	1	2	4	4	1	1	7	28	6	2	1	1	2	4	1	0	296
13:15	16	27	9	0	2	0	3	3	2	2	9	35	9	1	1	1	0	4	0	2	12	33	22	1	3	0	6	11	1	2	10	20	10	0	4	0	1	4	0	2	260
13:30	17	33	7	0	2	0	0	5	0	0	7	34	4	0	0	0	1	5	3	2	3	28	20	1	2	0	1	8	2	2	7	38	7	0	5	1	1	7	0	0	249
13:45	21	40	8	0	1	0	3	5	0	0	8	42	12	0	2	1	0	4	1	0	6	34	14	0	4	2	1	9	3	0	4	20	10	0	6	1	2	7	0	0	271
15:00	27	59	12	0	2	0	4	2	1	0	7	53	14	0	3	0	0	7	2	0	6	41	23	0	1	1	1	3	3	0	3	44	12	1	1	0	3	7	0	0	343

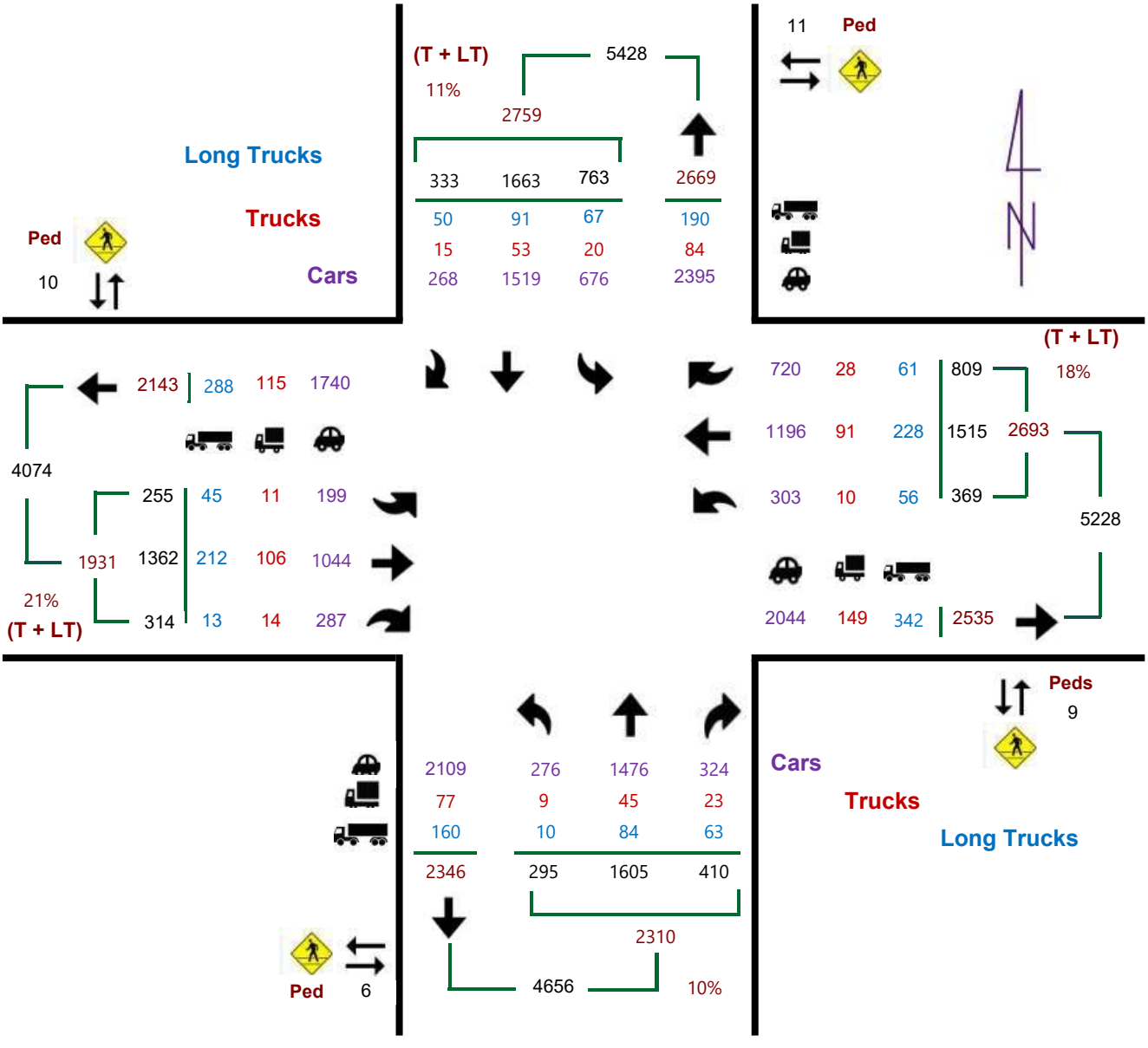
Start Time	North										South										East										West										Total
	Cars			Trucks			Long Trucks			Ped	Cars			Trucks			Long Trucks			Ped	Cars			Trucks			Long Trucks			Ped	Cars			Trucks			Long Trucks			Ped	
	LT	TH	RT	LT	TH	RT	LT	TH	RT		LT	TH	RT	LT	TH	RT	LT	TH	RT		LT	TH	RT	LT	TH	RT	LT	TH	RT		LT	TH	RT	LT	TH	RT	LT	TH	RT	
15:15	22	53	4	0	3	0	3	3	2	0	7	59	10	1	0	0	0	1	3	0	8	43	25	1	7	0	1	4	3	0	13	24	7	1	4	1	2	4	1	0	320
15:30	29	64	11	0	6	2	4	4	2	0	5	45	3	1	0	0	0	3	4	0	10	39	19	0	7	0	2	3	0	0	8	36	4	0	4	0	1	2	1	0	319
15:45	15	64	13	2	5	0	3	1	2	0	11	59	11	2	1	0	1	3	5	0	7	45	25	1	6	0	3	5	5	0	7	33	14	0	2	2	0	8	2	2	363
16:00	18	74	11	1	2	1	1	5	2	2	13	78	10	1	2	0	0	4	0	0	8	57	20	1	3	4	1	6	1	0	2	32	6	0	5	0	3	7	0	1	379
16:15	17	62	7	0	2	0	5	4	2	0	18	56	16	0	1	1	0	3	2	0	7	28	35	0	3	0	4	3	2	0	7	36	10	0	3	0	2	7	0	0	343
16:30	25	69	8	1	2	0	2	1	2	0	14	54	11	1	3	1	0	0	2	0	9	44	28	0	3	0	0	4	2	0	5	32	13	1	3	1	1	7	1	0	350
16:45	12	59	15	0	1	0	3	1	0	0	21	75	9	0	1	0	0	2	3	0	8	43	34	1	4	1	3	5	1	0	6	26	7	0	3	0	1	2	0	1	347
17:00	25	50	10	2	1	0	2	3	0	0	8	69	16	0	1	0	0	1	0	0	16	45	34	0	4	1	2	2	1	1	12	34	17	0	4	0	0	4	0	1	364
17:15	27	38	17	0	0	0	3	1	0	0	16	58	8	0	0	0	0	0	1	0	6	48	30	0	1	0	0	9	2	0	7	46	8	0	1	0	2	2	1	0	332
17:30	11	42	5	0	1	0	0	2	1	1	9	74	11	0	1	0	0	1	1	0	5	52	35	0	2	1	3	7	1	1	2	29	9	0	1	0	1	7	0	0	314
17:45	17	27	8	1	0	1	0	0	2	0	12	51	10	0	1	0	0	0	0	0	4	40	21	0	2	0	2	4	0	0	6	29	11	0	4	0	1	6	0	0	260

Ontario

TES - Traffic Engineering System
Turning Movement Count Period Report - Full Study

Description: HWY 6 @ WELLINGTON ROAD 109
Region WEST
Hwy #: HWY 6
LHRS_Offset: 13640_0000
Count Period: 11/9/2021 07:00 AM to 11/9/2021 06:00 PM
Count Start Date: Tuesday, 09 November, 2021
Int. Type: Cross

Full Study

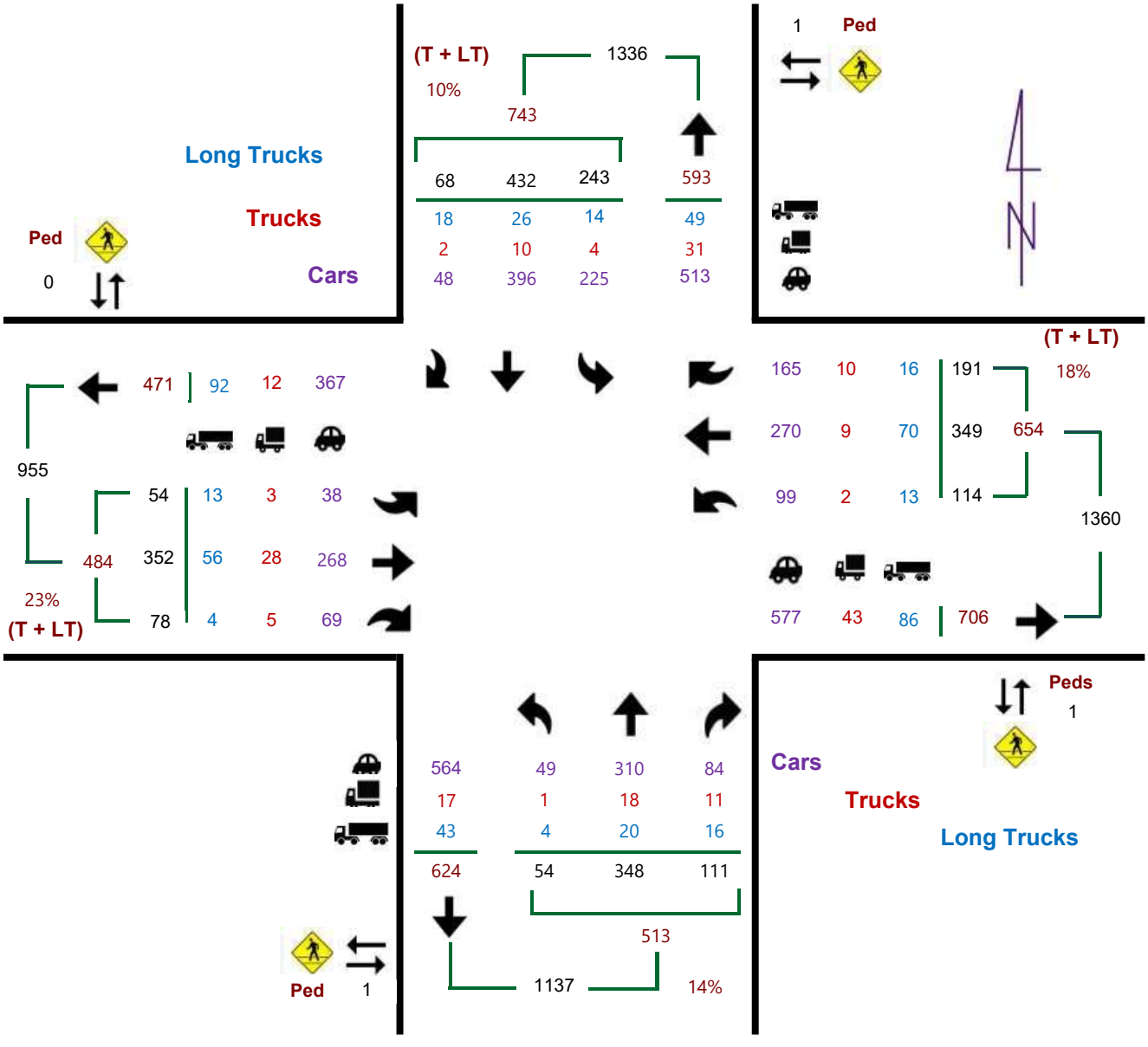


Ontario

TES - Traffic Engineering System
Turning Movement Count Period Report - AM Period

Description: HWY 6 @ WELLINGTON ROAD 109
Region WEST
Hwy #: HWY 6
LHRS_Offset: 13640_0000
Count Period: 11/9/2021 07:00 AM to 11/9/2021 09:00 AM
Count Start Date: Tuesday, 09 November, 2021
Int. Type: Cross

AM Period

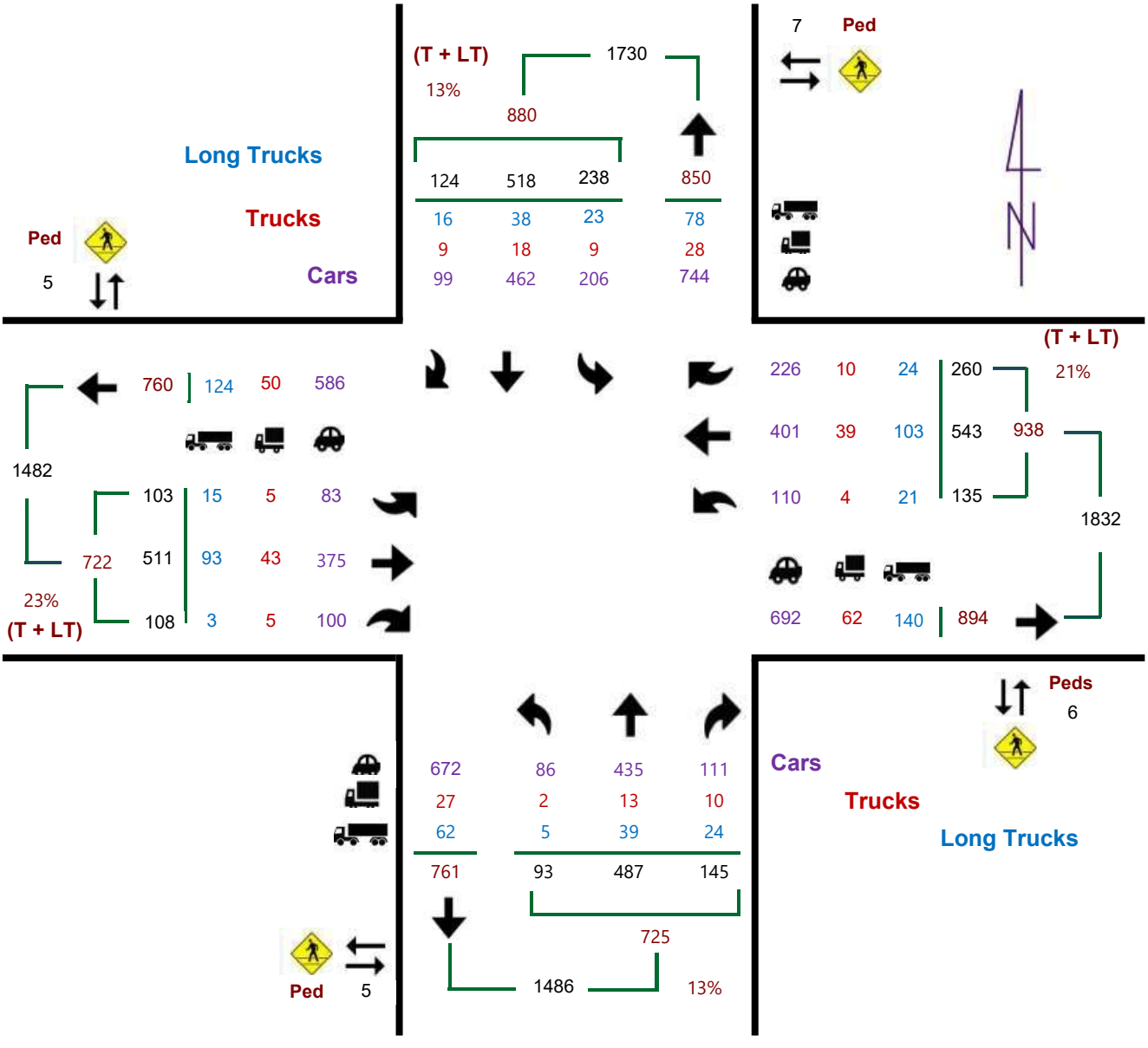


Ontario

TES - Traffic Engineering System
Turning Movement Count Period Report - MD Period

Description: HWY 6 @ WELLINGTON ROAD 109
Region WEST
Hwy #: HWY 6
LHRS_Offset: 13640_0000
Count Period: 11/9/2021 11:00 AM to 11/9/2021 02:00 PM
Count Start Date: Tuesday, 09 November, 2021
Int. Type: Cross

MD Period

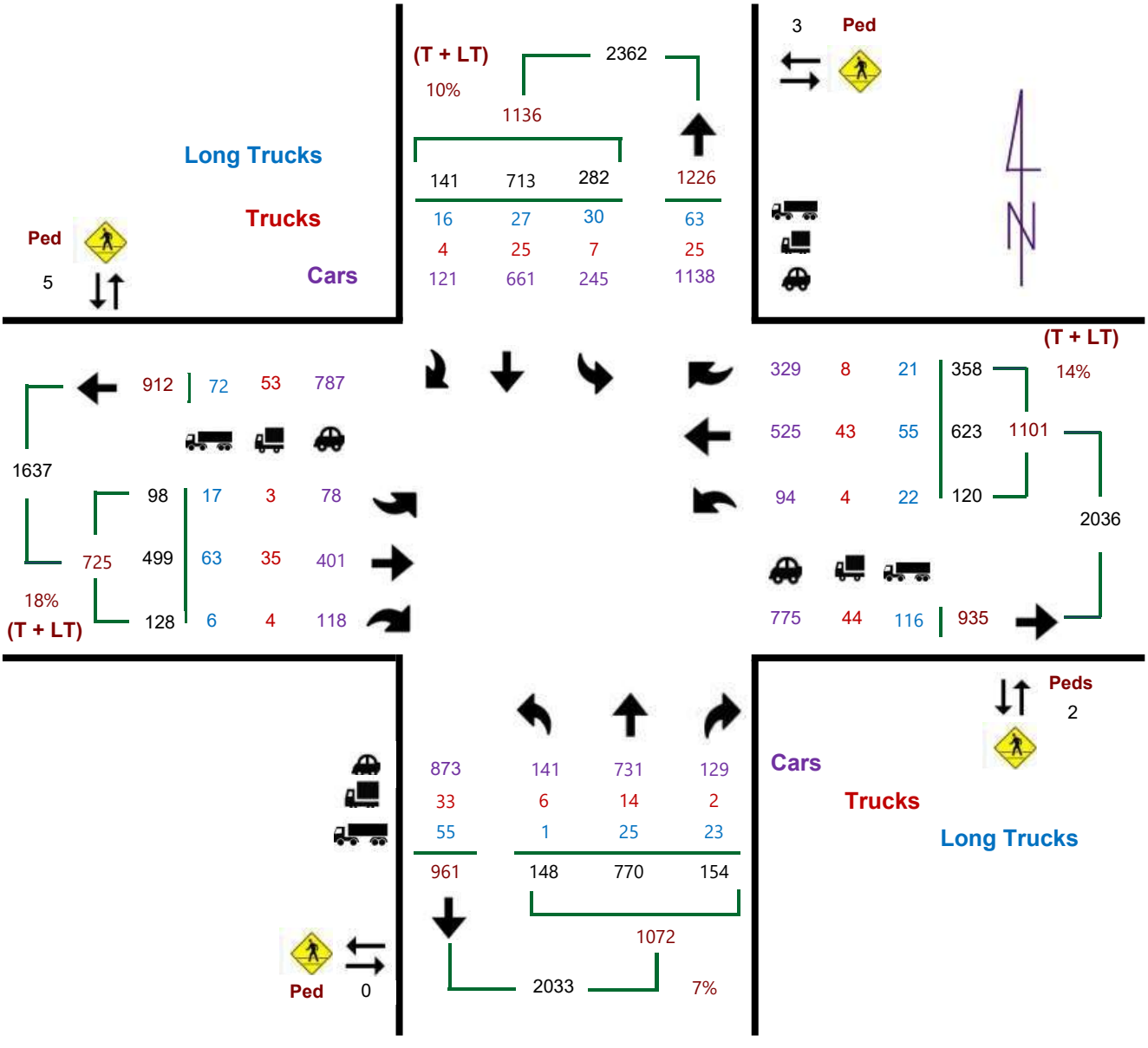


Ontario

TES - Traffic Engineering System
Turning Movement Count Period Report - PM Period

Description: HWY 6 @ WELLINGTON ROAD 109
Region WEST
Hwy #: HWY 6
LHRS_Offset: 13640_0000
Count Period: 11/9/2021 03:00 PM to 11/9/2021 06:00 PM
Count Start Date: Tuesday, 09 November, 2021
Int. Type: Cross

PM Period



Ontario

Ministry of Transportation

TVIS II - Traffic Volume Information System

Turning Movement 15 Minute Report

Description: HWY 6 @ WELLINGTON RD 109
Region: WEST | **Survey Type:** TM – Intersection | **Hwy:** 6
Start Date: 01-Jun-2017 (Thu) | **I/C Side:** | **LHRS:** 13640
End Date: 01-Jun-2017 (Thu) | **Int. Type:** Four Leg | **Offset:** 0
Schedule Summary: TUES-THURS, 07:00-09:00, 11:00-14:00, 15:00-18:00

	Major Road Approaches																				Minor Road Approaches																				
	North HWY 6										South HWY 6										East WELLINGTON RD 109										West WELLINGTON RD 109									
Start Time	Cars			Trucks			Long Trucks			Ped	Cars			Trucks			Long Trucks			Ped	Cars			Trucks			Long Trucks			Ped	Cars			Trucks			Long Trucks			Ped	Total Veh.
	←	↑	→	←	↑	→	←	↑	→		←	↑	→	←	↑	→	←	↑	→		←	↑	→	←	↑	→	←	↑	→		←	↑	→	←	↑	→	←	↑	→		
Period 1																																										
07:00	43	51	4	1	4	0	2	5	1	0	7	21	14	1	1	0	0	3	0	0	16	20	11	0	3	2	0	5	0	0	1	25	12	1	2	0	1	4	1	1	262
07:15	43	75	10	0	3	0	5	3	1	0	2	30	10	1	1	5	0	3	1	0	18	30	11	0	1	1	0	3	1	0	0	33	10	0	8	1	0	9	0	0	319
07:30	28	59	7	1	7	0	2	7	1	0	6	35	16	1	3	2	0	4	0	0	14	21	17	2	1	1	1	5	2	0	6	35	14	0	6	0	1	3	1	0	309
07:45	38	59	7	2	1	0	2	1	1	0	6	43	16	0	1	0	0	1	0	0	19	28	15	0	1	2	0	4	1	0	9	49	6	1	8	0	0	6	0	2	327
08:00	27	57	10	2	5	0	3	5	2	0	6	41	21	0	2	5	0	2	0	0	8	32	24	1	1	1	0	4	1	0	2	37	10	0	4	1	1	4	0	0	319
08:15	16	41	6	3	3	1	2	3	0	0	12	44	10	0	3	2	0	1	1	0	15	35	22	1	2	3	1	8	3	1	1	30	6	1	6	1	1	7	1	1	292
08:30	30	51	8	2	4	0	1	4	1	0	4	44	11	0	3	0	1	1	1	0	9	30	22	2	4	0	0	5	0	0	3	31	9	0	8	0	1	7	0	1	297
08:45	29	54	2	2	1	0	2	4	0	0	3	43	16	0	2	3	1	1	4	0	12	22	13	0	0	2	0	3	1	0	3	23	3	0	3	0	1	3	0	0	256
Period 2																																									
11:00	24	42	3	2	1	0	1	2	0	0	17	40	11	0	2	0	0	4	1	0	9	26	22	0	7	3	1	7	0	0	7	26	8	3	4	0	2	8	1	0	284
11:15	15	38	5	0	3	0	2	1	0	0	10	30	16	1	5	0	0	1	0	0	12	19	22	1	2	1	1	7	0	0	4	51	11	2	8	0	1	5	0	0	274
11:30	23	42	8	1	5	1	1	1	0	0	4	28	6	0	3	0	0	0	2	0	9	26	21	3	7	1	0	9	4	0	3	27	6	1	2	0	1	9	1	1	255
11:45	13	25	10	2	2	1	0	4	0	0	9	48	10	0	5	0	0	2	0	0	10	20	17	0	4	1	1	10	0	0	5	38	5	1	4	1	0	1	0	0	249
12:00	27	42	5	0	5	2	0	2	0	0	12	35	6	1	0	1	0	2	1	0	6	32	13	0	2	3	0	6	1	0	10	26	12	0	5	0	1	8	1	2	267
12:15	23	45	5	1	2	1	1	0	0	0	8	38	7	0	3	2	0	5	1	1	10	33	21	0	2	2	0	4	1	0	7	26	4	1	5	2	1	3	0	0	264
12:30	11	44	9	2	3	0	2	3	0	2	10	47	9	0	3	0	2	0	0	0	9	31	30	2	4	4	1	7	0	0	8	32	8	2	3	1	0	6	0	0	293
12:45	23	32	11	2	3	1	2	2	0	1	11	44	10	0	5	0	0	5	0	0	5	28	16	1	4	1	0	6	1	0	4	41	9	0	6	1	1	8	2	0	285
13:00	28	33	17	1	3	0	0	1	0	0	8	32	7	0	4	0	0	2	0	0	9	15	30	1	6	2	0	3	1	0	3	19	9	0	5	0	0	10	1	0	250
13:15	8	36	4	2	4	1	0	2	0	1	9	48	5	0	4	3	0	3	3	0	11	30	17	2	8	2	3	10	1	0	10	37	11	0	7	0	1	6	0	1	288
13:30	23	29	8	1	3	2	1	3	1	0	6	49	11	0	1	0	2	5	2	0	10	21	20	0	7	1	3	9	2	0	9	25	7	1	4	2	2	2	0	0	272
13:45	23	46	7	1	2	0	2	5	3	0	15	54	5	0	5	1	0	2	1	0	11	29	24	1	6	0	1	7	0	0	5	38	3	0	3	0	0	2	0	1	302

Ontario

Ministry of Transportation

TVIS II - Traffic Volume Information System

Turning Movement 15 Minute Report

Description: HWY 6 @ WELLINGTON RD 109
Region: WEST | **Survey Type:** TM – Intersection | **Hwy:** 6
Start Date: 01-Jun-2017 (Thu) | **I/C Side:** | **LHRS:** 13640
End Date: 01-Jun-2017 (Thu) | **Int. Type:** Four Leg | **Offset:** 0
Schedule Summary: TUES-THURS, 07:00-09:00, 11:00-14:00, 15:00-18:00

	Major Road Approaches																				Minor Road Approaches																				
	North HWY 6										South HWY 6										East WELLINGTON RD 109										West WELLINGTON RD 109									
Start Time	Cars			Trucks			Long Trucks			Ped	Cars			Trucks			Long Trucks			Ped	Cars			Trucks			Long Trucks			Ped	Cars			Trucks			Long Trucks			Ped	Total Veh.
	←	↑	→	←	↑	→	←	↑	→		←	↑	→	←	↑	→	←	↑	→		←	↑	→	←	↑	→	←	↑	→		←	↑	→	←	↑	→	←	↑	→		
Period 3																																										
15:00	24	52	12	3	4	1	2	7	0	0	8	57	9	0	1	1	1	2	1	0	5	30	22	4	5	2	0	7	0	0	11	44	11	1	5	0	1	5	1	0	**339**
15:15	27	60	3	2	3	0	2	0	0	0	19	48	16	1	2	0	0	4	1	0	15	46	21	1	11	2	0	9	2	0	3	31	6	0	3	1	0	4	1	0	**344**
15:30	27	60	7	0	1	2	2	8	3	0	14	82	11	0	2	2	1	2	1	0	11	38	32	0	7	3	0	5	1	0	12	42	6	2	2	0	0	6	4	0	**396**
15:45	29	58	7	1	2	1	0	4	6	2	6	76	24	0	2	2	1	2	2	0	10	35	33	1	4	0	0	4	1	0	6	33	13	1	7	0	1	6	1	2	**379**
16:00	21	53	9	3	3	1	0	2	2	0	14	61	19	1	2	1	0	2	4	0	14	44	38	1	3	3	0	10	1	0	14	36	9	2	6	2	3	3	0	0	**387**
16:15	29	79	6	1	2	1	2	2	1	0	16	81	14	1	3	1	0	2	0	0	7	40	19	1	5	3	1	2	3	1	8	47	6	1	5	0	0	5	2	0	**396**
16:30	29	71	10	1	1	1	0	2	1	0	14	67	20	0	1	0	1	2	1	0	12	58	28	0	7	0	0	4	2	0	8	47	8	0	4	0	2	3	1	0	**406**
16:45	21	41	7	4	0	1	2	0	1	0	18	90	17	0	3	1	1	3	3	0	15	45	35	1	3	1	0	2	0	0	17	45	5	1	2	1	0	8	0	0	**394**
17:00	26	66	10	0	1	0	0	4	0	0	17	76	18	0	5	1	0	3	0	0	7	49	40	1	10	2	0	5	1	0	10	52	8	0	2	1	0	5	0	0	**420**
17:15	26	40	5	2	0	1	0	2	1	0	21	78	13	0	3	1	1	3	5	0	12	50	31	2	3	1	1	6	0	0	14	57	10	0	2	1	1	2	1	0	**396**
17:30	30	53	13	1	1	1	1	3	1	0	24	88	20	0	1	0	1	1	0	0	10	45	34	0	3	0	0	4	0	0	11	47	8	0	2	0	0	2	0	0	**405**
17:45	17	38	11	0	1	0	1	1	0	1	15	100	14	1	4	0	1	0	0	0	6	60	33	0	1	1	2	5	0	0	6	41	10	1	2	0	0	4	0	2	**376**

Ontario

Ministry of Transportation

TVIS II - Traffic Volume Information System

AdHoc Turning Movement Total Count and Peak Summary Report

Description: HWY 6 @ WELLINGTON RD 109

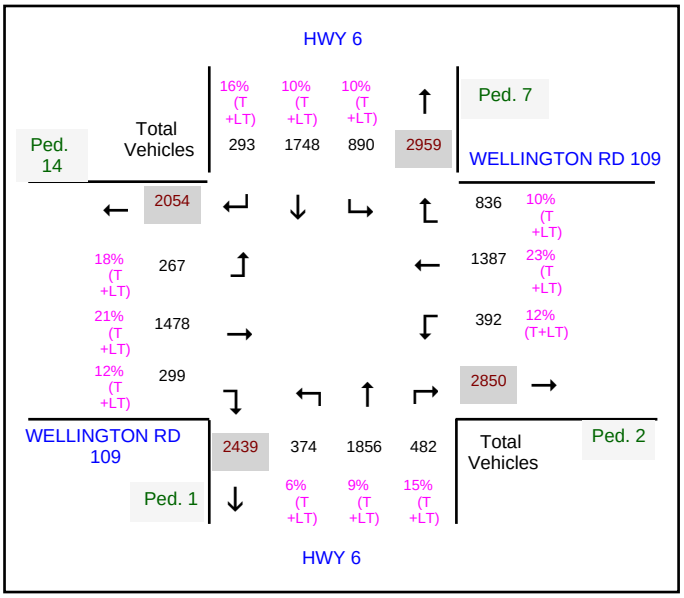
Region: WEST | **Survey Type:** TM – Intersection | **Hwy:** 6

Start Date: 01-Jun-2017 (Thu) | **I/C Side:** | **LHRS:** 13640

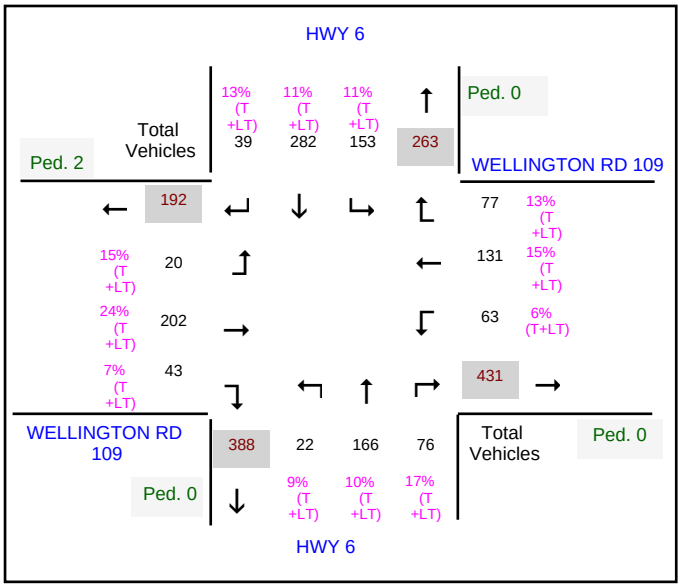
End Date: 01-Jun-2017 (Thu) | **Int. Type:** Four Leg | **Offset:** 0

Schedule Summary: TUES-THURS, 07:00-09:00, 11:00-14:00, 15:00-18:00

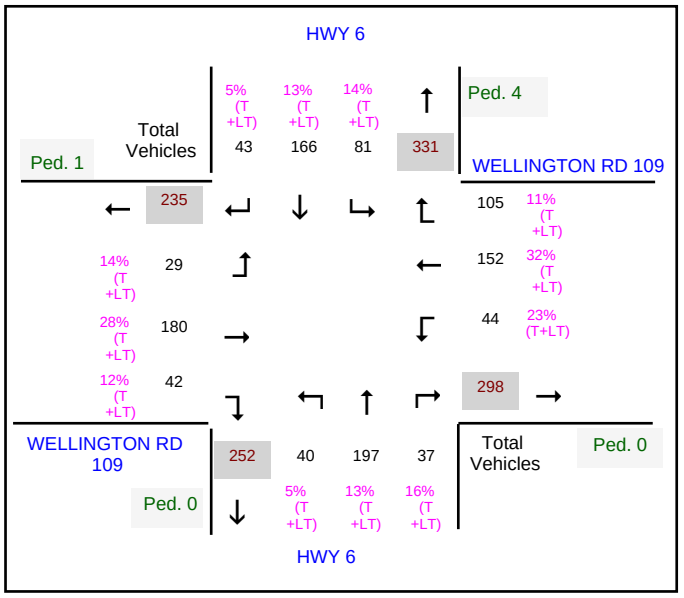
Total Count — Number of hours: 8



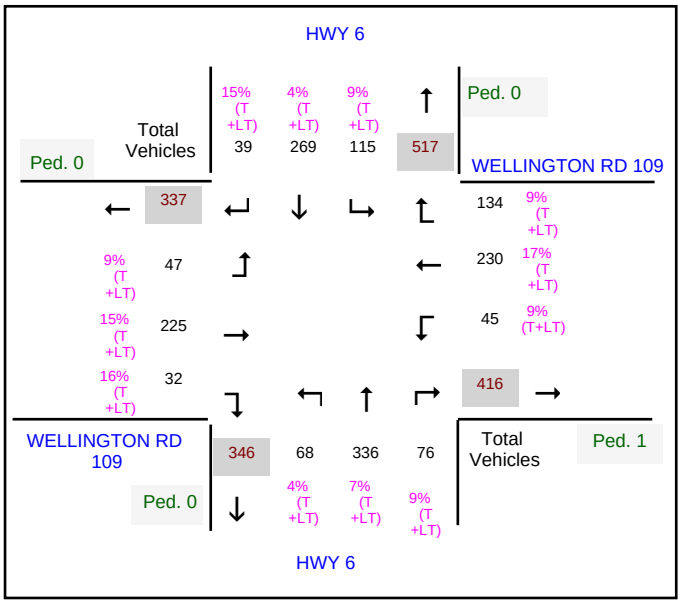
AM Peak Hour Report — Start Time: 07:15



Midday Peak Hour Report — Start Time: 12:30



PM Peak Hour Report — Start Time: 16:15



George Street (Highway 6) & Eliza Street

Morning Peak Diagram

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

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

Municipality: Arthur
Site #: 0000000402
Intersection: George Street (Highway 6) & Eliza
TFR File #: 1
Count date: 26-May-2021

Weather conditions:
Clear

Person(s) who counted:

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

Major Road: George Street (Highway 6) runs N/S

North Leg Total: 547
North Entering: 329
North Peds: 1
Peds Cross: ⋈

Heavys	23	0	23
Trucks	16	0	16
Cars	288	2	290
Totals	327	2	

Heavys	32
Trucks	14
Cars	172
Totals	218

East Leg Total: 93
East Entering: 74
East Peds: 0
Peds Cross: ⋈

George Street (Highway 6)

	Cars	Trucks	Heavys	Totals
	1	0	0	1
	73	0	0	73
	74	0	0	

N
W E
S

Eliza Street

Cars	Trucks	Heavys	Totals
18	1	0	19

George Street (Highway 6)

Cars	361		
Trucks	16		
Heavys	23		
Totals	400		

Cars	171	16	187
Trucks	14	1	15
Heavys	32	0	32
Totals	217	17	

Peds Cross: ⋈
South Peds: 0
South Entering: 234
South Leg Total: 634

Comments

George Street (Highway 6) & Eliza Street

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: Arthur
Site #: 0000000402
Intersection: George Street (Highway 6) & Eliza
TFR File #: 1
Count date: 26-May-2021

Weather conditions:
Clear

Person(s) who counted:

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

Major Road: George Street (Highway 6) runs N/S

North Leg Total: 643
North Entering: 304
North Peds: 1
Peds Cross: ⋈

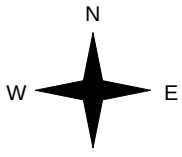
Heavys	23	0	23
Trucks	11	0	11
Cars	266	4	270
Totals	300	4	

Heavys	21
Trucks	10
Cars	308
Totals	339

East Leg Total: 141
East Entering: 59
East Peds: 4
Peds Cross: ⋈

George Street (Highway 6)

Cars	Trucks	Heavys	Totals
8	0	0	8
49	2	0	51
57	2	0	



Eliza Street

Cars	Trucks	Heavys	Totals
82	0	0	82

George Street (Highway 6)

Cars	315
Trucks	13
Heavys	23
Totals	351

Cars	300	78	378
Trucks	10	0	10
Heavys	21	0	21
Totals	331	78	

Peds Cross: ⋈
South Peds: 0
South Entering: 409
South Leg Total: 760

Comments

George Street (Highway 6) & Eliza Street

Total Count Diagram

Municipality: Arthur
Site #: 0000000402
Intersection: George Street (Highway 6) & Eliza
TFR File #: 1
Count date: 26-May-2021

Weather conditions:
Clear

Person(s) who counted:

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

Major Road: George Street (Highway 6) runs N/S

North Leg Total: 2244
North Entering: 1109
North Peds: 2
Peds Cross: ⋈

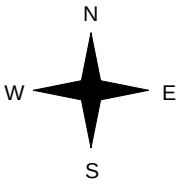
Heavys	91	0	91
Trucks	47	0	47
Cars	951	20	971
Totals	1089	20	

Heavys	96
Trucks	49
Cars	990
Totals	1135

East Leg Total: 452
East Entering: 215
East Peds: 6
Peds Cross: ⋈

George Street (Highway 6)

	Cars	Trucks	Heavys	Totals
	16	0	0	16
	195	4	0	199
	211	4	0	



Eliza Street

Cars	Trucks	Heavys	Totals
234	3	0	237

George Street (Highway 6)

Cars	1146	Cars	974	214	1188
Trucks	51	Trucks	49	3	52
Heavys	91	Heavys	96	0	96
Totals	1288	Totals	1119	217	

Peds Cross: ⋈
South Peds: 1
South Entering: 1336
South Leg Total: 2624

Comments

George Street (Highway 6) & Eliza Street
Traffic Count Summary

Intersection: George Street (Highway 6) & Eliza | **Count Date:** 26-May-2021 | **Municipality:** Arthur

North Approach Totals

Hour Ending	Includes Cars, Trucks, & Heavys: Left	Thru	Right	Grand Total	Total Peds	North/South Total Approaches
7:00:00	0	0	0	0	0	0
8:00:00	2	327	0	329	1	563
9:00:00	4	211	0	215	0	490
16:00:00	0	0	0	0	0	0
17:00:00	10	291	0	301	1	711
18:00:00	4	260	0	264	0	681
Totals:	20	1089	0	1109	2	2445

South Approach Totals

Hour Ending	Includes Cars, Trucks, & Heavys: Left	Thru	Right	Grand Total	Total Peds
7:00:00	0	0	0	0	0
8:00:00	0	217	17	234	0
9:00:00	0	234	41	275	0
16:00:00	0	0	0	0	0
17:00:00	0	325	85	410	0
18:00:00	0	343	74	417	1
	0	1119	217	1336	1

East Approach Totals

Hour Ending	Includes Cars, Trucks, & Heavys: Left	Thru	Right	Grand Total	Total Peds	East/West Total Approaches
7:00:00	0	0	0	0	0	0
8:00:00	73	0	1	74	0	74
9:00:00	36	0	4	40	0	40
16:00:00	0	0	0	0	0	0
17:00:00	50	0	9	59	4	59
18:00:00	40	0	2	42	2	42
Totals:	199	0	16	215	6	215

West Approach Totals

Hour Ending	Includes Cars, Trucks, & Heavys: 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
	0	0	0	0	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	74	36	0	51	51	41	41

Eliza Street & Isabella Street

Morning Peak Diagram

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

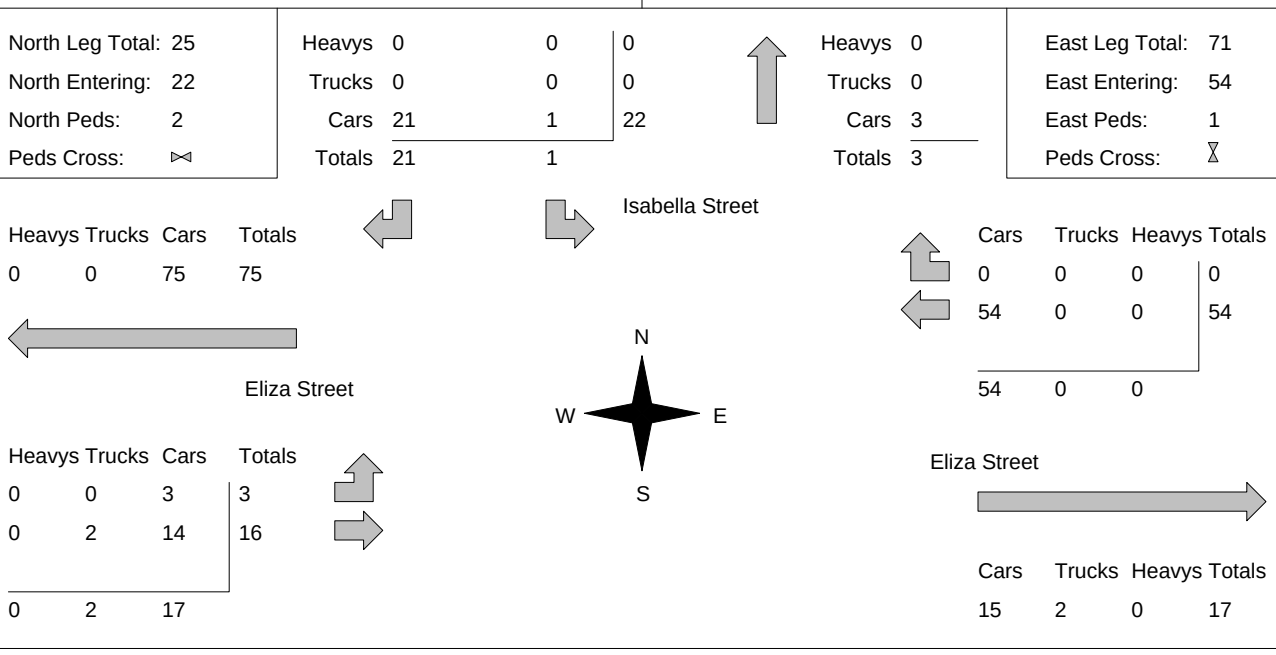
One Hour Peak
From: 7:00:00
To: 8:00:00

Municipality: Arthur
Site #: 0000000403
Intersection: Eliza Street & Isabella Street
TFR File #: 1
Count date: 26-May-2021

Weather conditions:
Clear
Person(s) who counted:

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

Major Road: Eliza Street runs W/E



Peds Cross:
West Peds: 0
West Entering: 19
West Leg Total: 94

Comments

Eliza Street & Isabella Street

Afternoon Peak Diagram

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

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

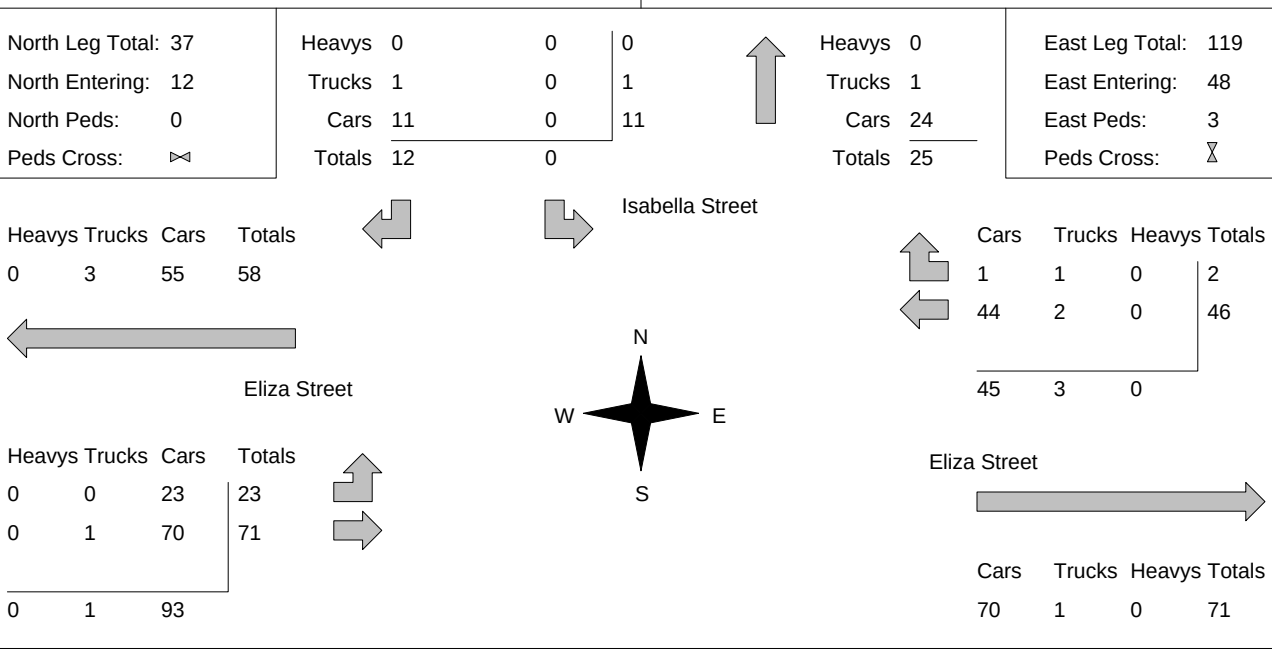
Municipality: Arthur
Site #: 0000000403
Intersection: Eliza Street & Isabella Street
TFR File #: 1
Count date: 26-May-2021

Weather conditions:
Clear

Person(s) who counted:

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

Major Road: Eliza Street runs W/E



Peds Cross:
West Peds: 0
West Entering: 94
West Leg Total: 152

Comments

Eliza Street & Isabella Street

Total Count Diagram

Municipality: Arthur
Site #: 0000000403
Intersection: Eliza Street & Isabella Street
TFR File #: 1
Count date: 26-May-2021

Weather conditions:
Clear

Person(s) who counted:

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

Major Road: Eliza Street runs W/E

North Leg Total: 115
North Entering: 61
North Peds: 4
Peds Cross: ⋈

Heavys	0	0	0
Trucks	1	0	1
Cars	58	2	60
Totals	59	2	

Heavys	0
Trucks	1
Cars	53
Totals	54

East Leg Total: 346
East Entering: 157
East Peds: 6
Peds Cross: ⧖

Isabella Street

Heavys	Trucks	Cars	Totals
0	4	209	213

Cars	Trucks	Heavys	Totals
2	1	0	3
151	3	0	154
153	4	0	

Eliza Street

N
W E
S

Heavys	Trucks	Cars	Totals
0	0	51	51
0	3	184	187
0	3	235	

Eliza Street

Cars	Trucks	Heavys	Totals
186	3	0	189

Peds Cross: ⧖
West Peds: 1
West Entering: 238
West Leg Total: 451

Comments

Eliza Street & Isabella Street
Traffic Count Summary

Intersection: Eliza Street & Isabella Street | **Count Date:** 26-May-2021 | **Municipality:** Arthur

North Approach Totals

Hour Ending	Includes Cars, Trucks, & Heavys: Left	Thru	Right	Grand Total	Total Peds	North/South Total Approaches
7:00:00	0	0	0	0	0	0
8:00:00	1	0	21	22	2	22
9:00:00	0	0	16	16	0	16
16:00:00	0	0	0	0	0	0
17:00:00	0	0	12	12	0	12
18:00:00	1	0	10	11	2	11
Totals:	2	0	59	61	4	61

South Approach Totals

Hour Ending	Includes Cars, Trucks, & Heavys: 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
	0	0	0	0	0

East Approach Totals

Hour Ending	Includes Cars, Trucks, & Heavys: Left	Thru	Right	Grand Total	Total Peds	East/West Total Approaches
7:00:00	0	0	0	0	0	0
8:00:00	0	54	0	54	1	73
9:00:00	0	23	0	23	0	68
16:00:00	0	0	0	0	0	0
17:00:00	0	46	2	48	3	142
18:00:00	0	31	1	32	2	112
Totals:	0	154	3	157	6	395

West Approach Totals

Hour Ending	Includes Cars, Trucks, & Heavys: Left	Thru	Right	Grand Total	Total Peds
7:00:00	0	0	0	0	0
8:00:00	3	16	0	19	0
9:00:00	8	37	0	45	1
16:00:00	0	0	0	0	0
17:00:00	23	71	0	94	0
18:00:00	17	63	0	80	0
	51	187	0	238	1

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	1	0	3	82	3	82

George Street (Highway 6) & Highway 9

Morning Peak Diagram

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

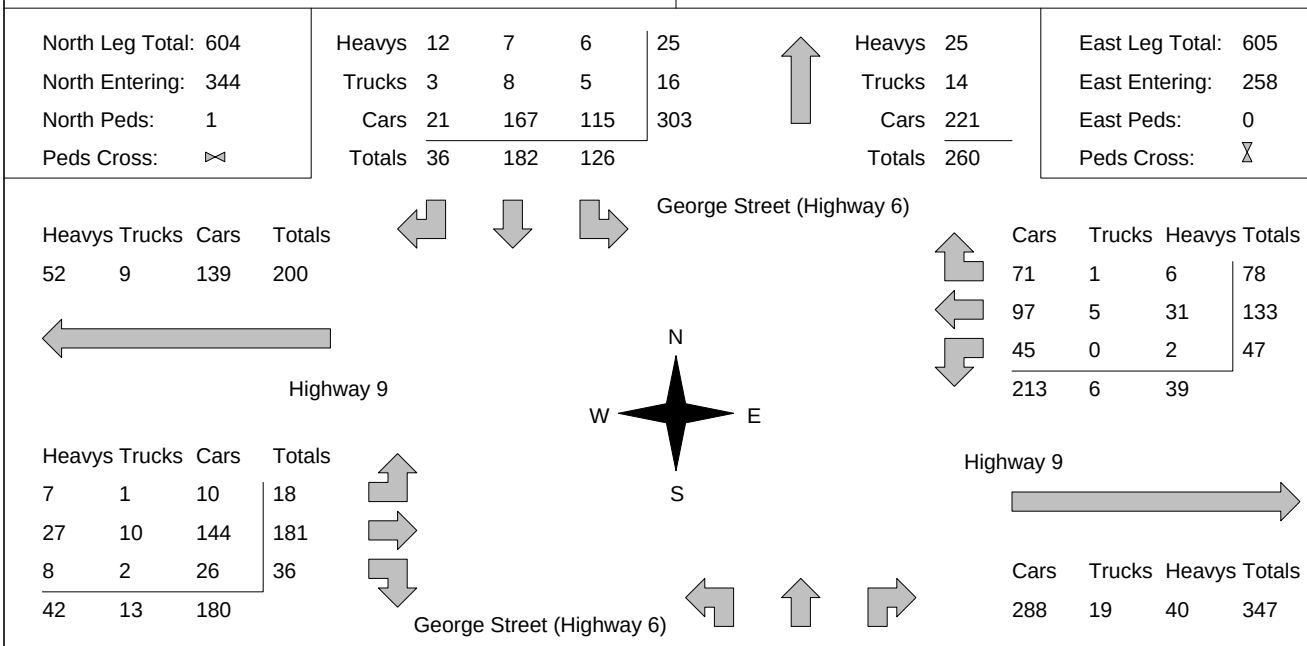
One Hour Peak
From: 7:15:00
To: 8:15:00

Municipality: Arthur
Site #: 0000000401
Intersection: George Street (Highway 6) & Highw
TFR File #: 1
Count date: 2-Jun-2021

Weather conditions:
Clear
Person(s) who counted:

**** Signalized Intersection ****

Major Road: George Street (Highway 6) runs N/S



Comments

George Street (Highway 6) & Highway 9

Mid-day Peak Diagram

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

One Hour Peak
From: 12:30:00
To: 13:30:00

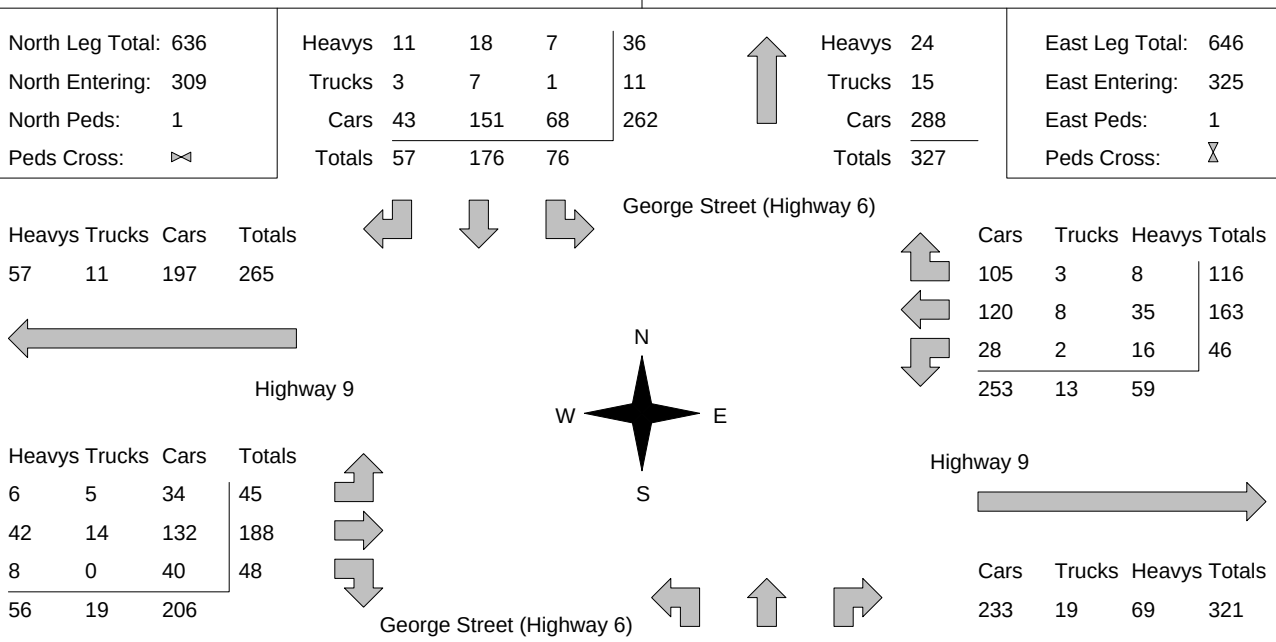
Municipality: Arthur
Site #: 0000000401
Intersection: George Street (Highway 6) & Highw
TFR File #: 1
Count date: 2-Jun-2021

Weather conditions:
Clear

Person(s) who counted:

**** Signalized Intersection ****

Major Road: George Street (Highway 6) runs N/S



Comments

George Street (Highway 6) & Highway 9

Afternoon Peak Diagram

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

One Hour Peak
From: 16:45:00
To: 17:45:00

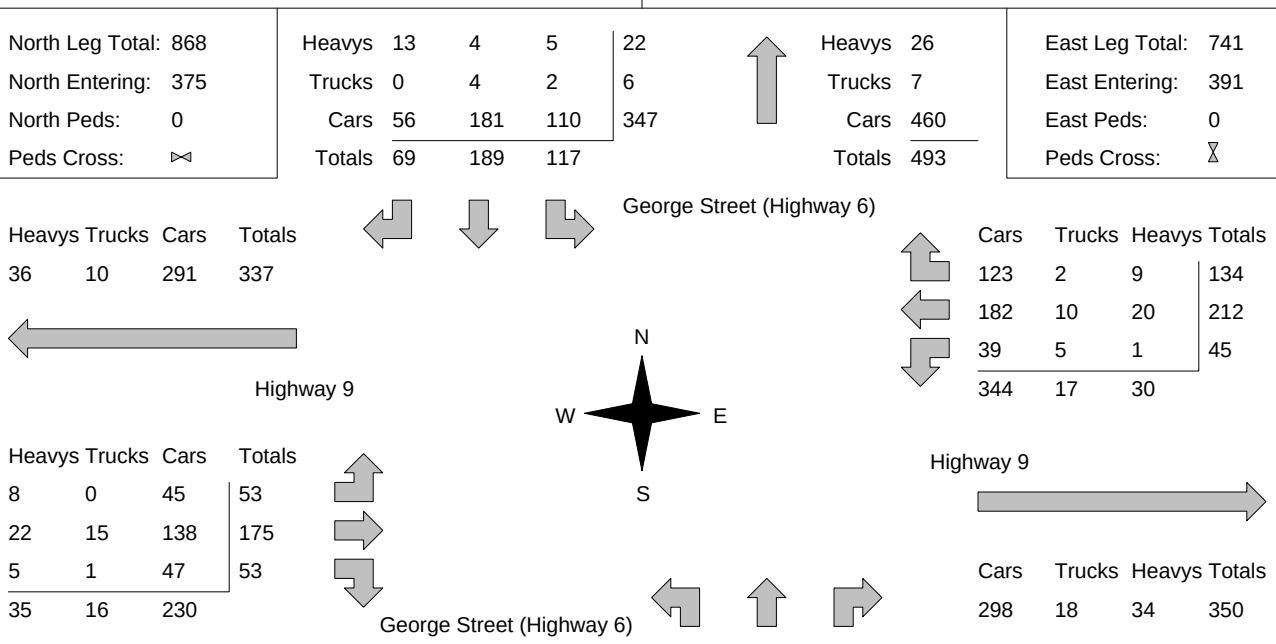
Municipality: Arthur
Site #: 0000000401
Intersection: George Street (Highway 6) & Highw
TFR File #: 1
Count date: 2-Jun-2021

Weather conditions:
Clear

Person(s) who counted:

**** Signalized Intersection ****

Major Road: George Street (Highway 6) runs N/S



Comments

George Street (Highway 6) & Highway 9

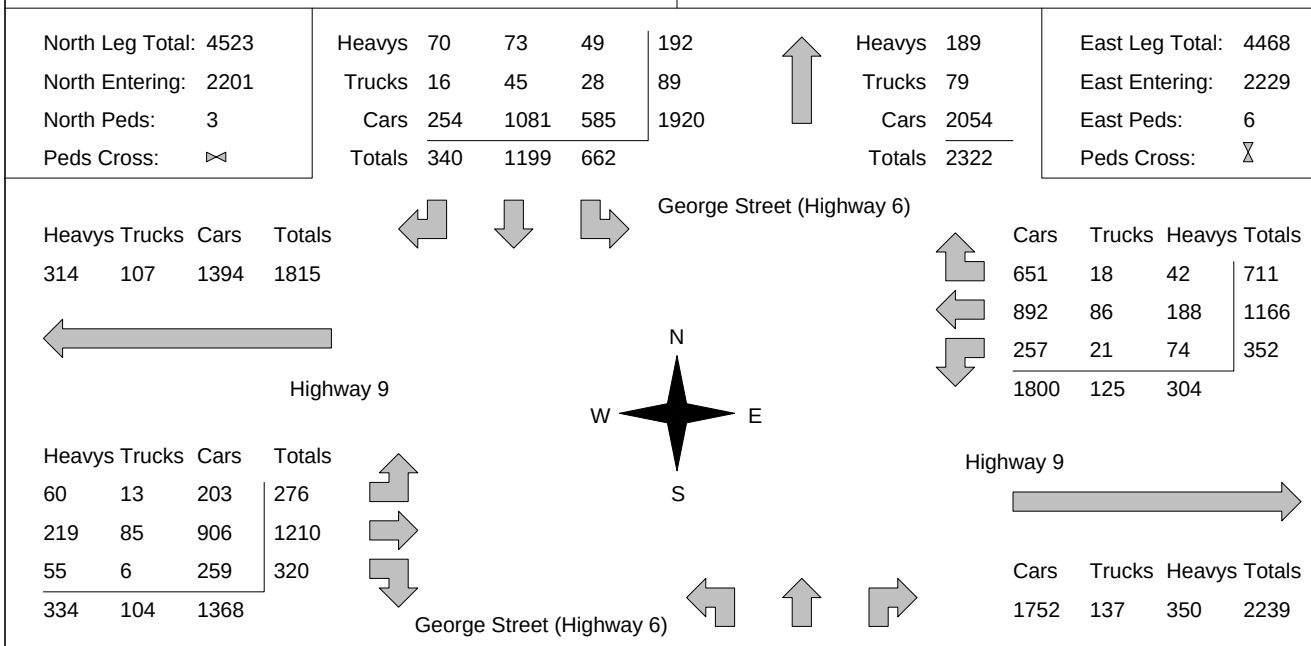
Total Count Diagram

Municipality: Arthur
Site #: 0000000401
Intersection: George Street (Highway 6) & Highw
TFR File #: 1
Count date: 2-Jun-2021

Weather conditions:
Clear
Person(s) who counted:

**** Signalized Intersection ****

Major Road: George Street (Highway 6) runs N/S



Comments

George Street (Highway 6) & Highway 9
Traffic Count Summary

Intersection: George Street (Highway 6) & Highv | **Count Date:** 2-Jun-2021 | **Municipality:** Arthur

North Approach Totals

Hour Ending	Includes Cars, Trucks, & Heavys: Left	Thru	Right	Grand Total	Total Peds	North/South Total Approaches
7:00:00	0	0	0	0	0	0
8:00:00	125	184	35	344	1	566
9:00:00	90	161	26	277	0	508
11:00:00	0	0	0	0	0	0
12:00:00	84	143	56	283	1	530
13:00:00	89	170	51	310	0	585
14:00:00	70	155	56	281	1	548
16:00:00	0	0	0	0	0	0
17:00:00	95	214	46	355	0	732
18:00:00	109	172	70	351	0	743
Totals:	662	1199	340	2201	3	4212

South Approach Totals

Hour Ending	Includes Cars, Trucks, & Heavys: Left	Thru	Right	Grand Total	Total Peds
7:00:00	0	0	0	0	0
8:00:00	31	152	39	222	2
9:00:00	34	138	59	231	0
11:00:00	0	0	0	0	0
12:00:00	39	154	54	247	0
13:00:00	39	176	60	275	0
14:00:00	49	165	53	267	1
16:00:00	0	0	0	0	0
17:00:00	66	259	52	377	0
18:00:00	51	291	50	392	2
Totals:	309	1335	367	2011	5

East Approach Totals

Hour Ending	Includes Cars, Trucks, & Heavys: Left	Thru	Right	Grand Total	Total Peds	East/West Total Approaches
7:00:00	0	0	0	0	0	0
8:00:00	44	124	69	237	0	474
9:00:00	55	149	100	304	0	551
11:00:00	0	0	0	0	0	0
12:00:00	72	169	71	312	2	562
13:00:00	52	145	102	299	0	576
14:00:00	38	163	102	303	1	566
16:00:00	0	0	0	0	0	0
17:00:00	48	182	137	367	0	621
18:00:00	43	234	130	407	3	685
Totals:	352	1166	711	2229	6	4035

West Approach Totals

Hour Ending	Includes Cars, Trucks, & Heavys: Left	Thru	Right	Grand Total	Total Peds
7:00:00	0	0	0	0	0
8:00:00	17	181	39	237	0
9:00:00	33	183	31	247	0
11:00:00	0	0	0	0	0
12:00:00	47	160	43	250	0
13:00:00	39	181	57	277	0
14:00:00	41	170	52	263	0
16:00:00	0	0	0	0	0
17:00:00	47	164	43	254	0
18:00:00	52	171	55	278	2
Totals:	276	1210	320	1806	2

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:	245	271	289	272	251	0	277	331

George Street (Highway 6) & Eliza Street

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: Arthur
Site #: 0000000402
Intersection: George Street (Highway 6) & Eliza
TFR File #: 1
Count date: 2-Jun-2021

Weather conditions:

Person(s) who counted:

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

Major Road: George Street (Highway 6) runs N/S

North Leg Total: 511
North Entering: 284
North Peds: 4
Peds Cross: ⋈

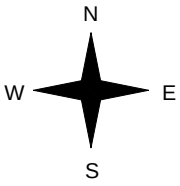
Heavys	25	0	25
Trucks	12	0	12
Cars	245	2	247
Totals	282	2	

Heavys	25
Trucks	9
Cars	193
Totals	227

East Leg Total: 94
East Entering: 57
East Peds: 2
Peds Cross: ⋈

George Street (Highway 6)

	Cars	Trucks	Heavys	Totals
	1	0	0	1
	53	3	0	56
	54	3	0	



Eliza Street

Cars	Trucks	Heavys	Totals
32	5	0	37

George Street (Highway 6)

Cars	298	Cars	192	30	222
Trucks	15	Trucks	9	5	14
Heavys	25	Heavys	25	0	25
Totals	338	Totals	226	35	

Peds Cross: ⋈
South Peds: 0
South Entering: 261
South Leg Total: 599

Comments

George Street (Highway 6) & Eliza Street

Mid-day Peak Diagram

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

One Hour Peak
From: 12:15:00
To: 13:15:00

Municipality: Arthur
Site #: 0000000402
Intersection: George Street (Highway 6) & Eliza
TFR File #: 1
Count date: 2-Jun-2021

Weather conditions:

Person(s) who counted:

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

Major Road: George Street (Highway 6) runs N/S

North Leg Total: 576
North Entering: 293
North Peds: 2
Peds Cross: ⋈

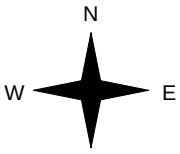
Heavys	32	0	32
Trucks	12	1	13
Cars	240	8	248
Totals	284	9	

Heavys	29
Trucks	13
Cars	241
Totals	283

East Leg Total: 106
East Entering: 43
East Peds: 0
Peds Cross: ⧖

George Street (Highway 6)

Cars	Trucks	Heavys	Totals
9	0	0	9
33	0	1	34
42	0	1	



Eliza Street

Cars	Trucks	Heavys	Totals
61	2	0	63

George Street (Highway 6)

Cars	273
Trucks	12
Heavys	33
Totals	318

Cars	232	53	285
Trucks	13	1	14
Heavys	29	0	29
Totals	274	54	

Peds Cross: ⋈
South Peds: 0
South Entering: 328
South Leg Total: 646

Comments

George Street (Highway 6) & Eliza Street

Afternoon Peak Diagram

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

One Hour Peak
From: 16:30:00
To: 17:30:00

Municipality: Arthur
Site #: 0000000402
Intersection: George Street (Highway 6) & Eliza
TFR File #: 1
Count date: 2-Jun-2021

Weather conditions:

Person(s) who counted:

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

Major Road: George Street (Highway 6) runs N/S

North Leg Total: 777
North Entering: 344
North Peds: 3
Peds Cross: ⋈

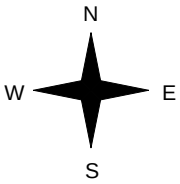
Heavys	20	0	20
Trucks	8	0	8
Cars	305	11	316
Totals	333	11	

Heavys	22
Trucks	11
Cars	400
Totals	433

East Leg Total: 152
East Entering: 66
East Peds: 3
Peds Cross: ⋈

George Street (Highway 6)

Cars	Trucks	Heavys	Totals
13	0	0	13
51	2	0	53
64	2	0	



Eliza Street

Cars	Trucks	Heavys	Totals
86	0	0	86

George Street (Highway 6)

Cars	356
Trucks	10
Heavys	20
Totals	386

Cars	387	75	462
Trucks	11	0	11
Heavys	22	0	22
Totals	420	75	

Peds Cross: ⋈
South Peds: 0
South Entering: 495
South Leg Total: 881

Comments

George Street (Highway 6) & Eliza Street

Total Count Diagram

Municipality: Arthur
Site #: 0000000402
Intersection: George Street (Highway 6) & Eliza
TFR File #: 1
Count date: 2-Jun-2021

Weather conditions:

Person(s) who counted:

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

Major Road: George Street (Highway 6) runs N/S

North Leg Total: 3983
North Entering: 1957
North Peds: 17
Peds Cross: ⋈

Heavys	187	0	187
Trucks	85	1	86
Cars	1645	39	1684
Totals	1917	40	

Heavys	187
Trucks	73
Cars	1766
Totals	2026

East Leg Total: 723
East Entering: 346
East Peds: 14
Peds Cross: ⋈

George Street (Highway 6)

	Cars	Trucks	Heavys	Totals
	38	0	0	38
	297	8	3	308
	335	8	3	

N
W E
S

Eliza Street

Cars	Trucks	Heavys	Totals
365	10	2	377

George Street (Highway 6)

Cars	1942	Cars	1728	326	2054
Trucks	93	Trucks	73	9	82
Heavys	190	Heavys	187	2	189
Totals	2225	Totals	1988	337	

Peds Cross: ⋈
South Peds: 3
South Entering: 2325
South Leg Total: 4550

Comments

George Street (Highway 6) & Eliza Street
Traffic Count Summary

Intersection: George Street (Highway 6) & Eliza | **Count Date:** 2-Jun-2021 | **Municipality:** Arthur

North Approach Totals

Hour Ending	Includes Cars, Trucks, & Heavys: Left	Thru	Right	Grand Total	Total Peds	North/South Total Approaches
7:00:00	0	0	0	0	0	0
8:00:00	3	280	0	283	5	520
9:00:00	3	237	0	240	3	514
11:00:00	0	0	0	0	0	0
12:00:00	4	245	0	249	0	522
13:00:00	8	289	0	297	2	613
14:00:00	6	248	0	254	1	565
16:00:00	0	0	0	0	0	0
17:00:00	11	315	0	326	3	768
18:00:00	5	303	0	308	3	780
Totals:	40	1917	0	1957	17	4282

South Approach Totals

Hour Ending	Includes Cars, Trucks, & Heavys: Left	Thru	Right	Grand Total	Total Peds
7:00:00	0	0	0	0	0
8:00:00	0	208	29	237	0
9:00:00	0	236	38	274	0
11:00:00	0	0	0	0	0
12:00:00	0	242	31	273	1
13:00:00	0	273	43	316	0
14:00:00	0	265	46	311	2
16:00:00	0	0	0	0	0
17:00:00	0	379	63	442	0
18:00:00	0	385	87	472	0
Totals:	0	1988	337	2325	3

East Approach Totals

Hour Ending	Includes Cars, Trucks, & Heavys: Left	Thru	Right	Grand Total	Total Peds	East/West Total Approaches
7:00:00	0	0	0	0	0	0
8:00:00	60	0	1	61	2	61
9:00:00	42	0	4	46	1	46
11:00:00	0	0	0	0	0	0
12:00:00	42	0	2	44	2	44
13:00:00	32	0	6	38	0	38
14:00:00	36	0	9	45	3	45
16:00:00	0	0	0	0	0	0
17:00:00	46	0	9	55	2	55
18:00:00	50	0	7	57	4	57
Totals:	308	0	38	346	14	346

West Approach Totals

Hour Ending	Includes Cars, Trucks, & Heavys: 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
11:00:00	0	0	0	0	0
12:00:00	0	0	0	0	0
13:00:00	0	0	0	0	0
14:00:00	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:	8:00	9:00	12:00	13:00	14:00	16:00	17:00	18:00
Crossing Values:	65	45	43	34	39	0	49	53

Eliza Street & Isabella Street

Morning Peak Diagram

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

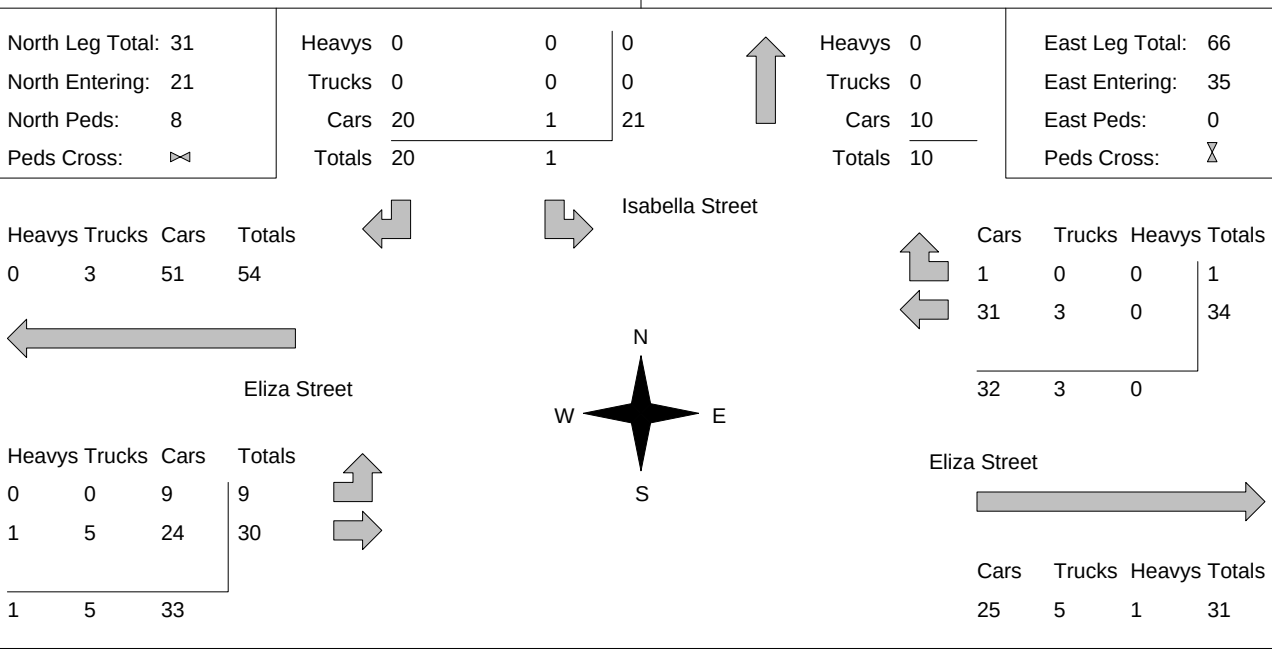
One Hour Peak
From: 7:30:00
To: 8:30:00

Municipality: Arthur
Site #: 0000000403
Intersection: Eliza Street & Isabella Street
TFR File #: 1
Count date: 2-Jun-2021

Weather conditions:
Clear
Person(s) who counted:

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

Major Road: Eliza Street runs W/E



Peds Cross:
West Peds: 0
West Entering: 39
West Leg Total: 93

Comments

Eliza Street & Isabella Street

Mid-day Peak Diagram

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

One Hour Peak
From: 12:15:00
To: 13:15:00

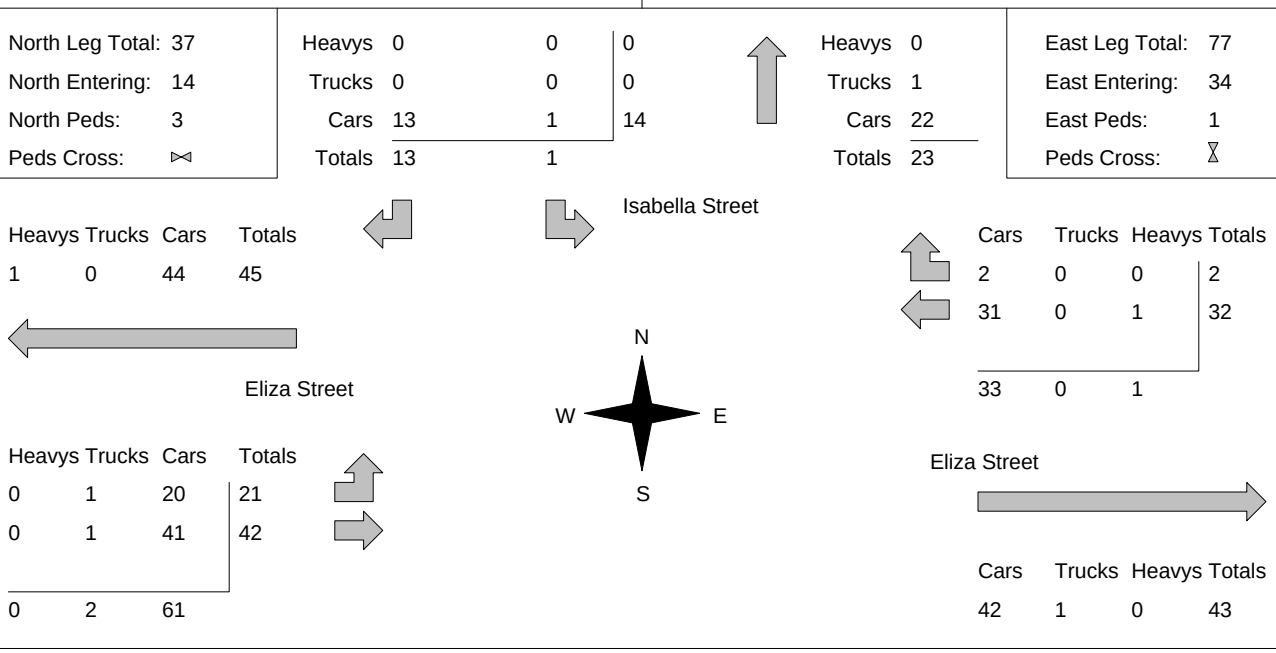
Municipality: Arthur
Site #: 0000000403
Intersection: Eliza Street & Isabella Street
TFR File #: 1
Count date: 2-Jun-2021

Weather conditions:
Clear

Person(s) who counted:

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

Major Road: Eliza Street runs W/E



Peds Cross:
West Peds: 0
West Entering: 63
West Leg Total: 108

Comments

Eliza Street & Isabella Street

Afternoon Peak Diagram

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

One Hour Peak
From: 16:45:00
To: 17:45:00

Municipality: Arthur
Site #: 0000000403
Intersection: Eliza Street & Isabella Street
TFR File #: 1
Count date: 2-Jun-2021

Weather conditions:
Clear

Person(s) who counted:

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

Major Road: Eliza Street runs W/E

North Leg Total: 42
North Entering: 21
North Peds: 2
Peds Cross: ⋈

Heavys	0	0	0
Trucks	0	0	0
Cars	17	4	21
Totals	17	4	

Heavys	0
Trucks	0
Cars	21
Totals	21

East Leg Total: 124
East Entering: 50
East Peds: 1
Peds Cross: ⧖

Isabella Street

Heavys	Trucks	Cars	Totals
0	2	64	66

Cars	Trucks	Heavys	Totals
1	0	0	1
47	2	0	49
48	2	0	

Eliza Street

N
W E
S

Heavys	Trucks	Cars	Totals
0	0	20	20
0	0	70	70
0	0	90	

Eliza Street

Cars	Trucks	Heavys	Totals
74	0	0	74

Peds Cross: ⧖
West Peds: 1
West Entering: 90
West Leg Total: 156

Comments

Eliza Street & Isabella Street

Total Count Diagram

Municipality: Arthur
Site #: 0000000403
Intersection: Eliza Street & Isabella Street
TFR File #: 1
Count date: 2-Jun-2021

Weather conditions:
Clear

Person(s) who counted:

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

Major Road: Eliza Street runs W/E

	North Leg Total: 210			East Leg Total: 548
	North Entering: 111			East Entering: 253
	North Peds: 20			East Peds: 10
	Peds Cross: ⋈			Peds Cross: ⧖

Heavys	1	0	1	
Trucks	0	0	0	
Cars	102	8	110	
Totals	103	8		

Heavys	0	
Trucks	3	
Cars	96	
Totals	99	

Isabella Street

Heavys	Trucks	Cars	Totals
3	8	337	348

Cars	Trucks	Heavys	Totals
7	1	0	8
235	8	2	245
242	9	2	

Eliza Street

N
W E
S

Heavys	Trucks	Cars	Totals
0	2	89	91
2	8	277	287
2	10	366	

Eliza Street

Cars	Trucks	Heavys	Totals
285	8	2	295

Peds Cross:	⧖
West Peds:	1
West Entering:	378
West Leg Total:	726

Comments

Eliza Street & Isabella Street
Traffic Count Summary

Intersection: Eliza Street & Isabella Street | **Count Date:** 2-Jun-2021 | **Municipality:** Arthur

North Approach Totals

Hour Ending	Includes Cars, Trucks, & Heavys: Left	Thru	Right	Grand Total	Total Peds	North/South Total Approaches
7:00:00	0	0	0	0	0	0
8:00:00	0	0	16	16	8	16
9:00:00	3	0	19	22	4	22
11:00:00	0	0	0	0	0	0
12:00:00	0	0	13	13	0	13
13:00:00	1	0	11	12	2	12
14:00:00	0	0	15	15	2	15
16:00:00	0	0	0	0	0	0
17:00:00	3	0	12	15	2	15
18:00:00	1	0	17	18	2	18
Totals:	8	0	103	111	20	111

South Approach Totals

Hour Ending	Includes Cars, Trucks, & Heavys: 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
11:00:00	0	0	0	0	0
12:00:00	0	0	0	0	0
13:00:00	0	0	0	0	0
14:00:00	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
	0	0	0	0	0

East Approach Totals

Hour Ending	Includes Cars, Trucks, & Heavys: Left	Thru	Right	Grand Total	Total Peds	East/West Total Approaches
7:00:00	0	0	0	0	0	0
8:00:00	0	45	0	45	1	77
9:00:00	0	26	1	27	0	68
11:00:00	0	0	0	0	0	0
12:00:00	0	31	2	33	2	68
13:00:00	0	29	0	29	0	80
14:00:00	0	31	3	34	4	86
16:00:00	0	0	0	0	0	0
17:00:00	0	42	1	43	3	119
18:00:00	0	41	1	42	0	133
Totals:	0	245	8	253	10	631

West Approach Totals

Hour Ending	Includes Cars, Trucks, & Heavys: Left	Thru	Right	Grand Total	Total Peds
7:00:00	0	0	0	0	0
8:00:00	3	29	0	32	0
9:00:00	9	32	0	41	0
11:00:00	0	0	0	0	0
12:00:00	9	26	0	35	0
13:00:00	12	39	0	51	0
14:00:00	16	36	0	52	0
16:00:00	0	0	0	0	0
17:00:00	25	51	0	76	0
18:00:00	17	74	0	91	1
	91	287	0	378	1

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:	1	3	2	1	4	0	6	2

Intersection: Highway 9, 580 metres east of Highway 6, Arthur
GAP STUDY

Date: June 2, 2021
Weather: Clear

End of period	Westbound (SBR)														Eastbound + Westbound (SBL)													
	0-5 sec	6-10 sec	11-15 sec	16-20 sec	21-25 sec	26-30 sec	31-35 sec	36-40 sec	41-45 sec	46-50 sec	51-55 sec	56-60 sec	1-2 min	2-3 min	0-5 sec	6-10 sec	11-15 sec	16-20 sec	21-25 sec	26-30 sec	31-35 sec	36-40 sec	41-45 sec	46-50 sec	51-55 sec	56-60 sec	1-2 min	2-3 min
7:15	12	2	1	2	2	1	2	0	1	3	0	3	1	1	53	15	15	5	5	3	1	1	0	0	0	1	0	0
7:30	22	8	4	4	0	2	1	0	1	1	0	1	3	0	61	31	9	13	4	0	2	0	0	0	0	0	0	0
7:45	25	9	7	4	1	4	2	3	1	0	1	0	2	0	85	24	12	6	5	1	0	0	0	0	0	0	1	0
8:00	26	7	5	4	3	2	1	1	0	1	0	1	4	0	79	13	11	5	2	3	2	0	0	0	0	0	2	0
8:15	22	6	2	5	2	1	2	2	3	3	0	0	3	0	79	20	14	7	2	0	0	1	0	0	1	0	1	0
8:30	20	5	4	5	2	3	3	2	1	1	0	0	1	1	78	25	14	7	2	1	1	1	1	0	0	0	0	0
8:45	43	9	11	1	7	3	1	0	0	0	0	1	2	0	87	26	10	6	1	2	0	1	1	0	0	1	0	0
9:00	36	7	9	3	4	3	0	3	0	1	0	1	1	0	97	23	16	8	4	1	0	0	0	0	0	0	0	0
11:15	22	9	7	4	2	3	0	1	0	0	0	1	3	1	71	19	10	10	4	0	1	2	1	0	0	0	0	0
11:30	24	15	3	5	5	3	2	2	0	0	1	0	2	0	60	27	7	12	3	2	2	1	0	0	0	0	0	0
11:45	43	8	3	8	4	4	1	1	0	1	0	0	2	0	88	23	12	6	4	4	0	0	0	0	0	0	0	0
12:00	37	10	3	3	4	3	2	1	2	2	1	1	0	0	93	23	7	7	4	2	1	2	0	0	0	0	0	0
12:15	22	12	3	4	3	1	2	1	1	1	2	0	2	0	80	16	9	3	10	0	2	0	1	0	0	0	0	0
12:30	34	5	5	2	1	3	0	1	1	0	0	2	0	2	88	18	10	8	1	5	1	0	1	0	0	0	0	0
12:45	46	19	3	4	5	3	3	2	2	0	0	0	0	0	101	33	7	5	2	2	1	0	1	0	0	0	0	0
13:00	21	11	7	1	2	2	2	1	0	1	1	1	3	0	73	30	7	9	3	3	1	1	0	0	0	0	0	0
13:15	35	9	3	6	0	6	4	0	1	0	1	0	2	0	87	25	15	9	3	0	1	0	0	0	0	0	0	0
13:30	24	4	9	4	6	0	2	2	1	1	1	1	1	0	70	20	11	6	6	1	3	1	0	0	0	0	0	0
13:45	26	8	3	3	6	3	2	1	3	3	1	0	0	0	72	21	15	4	7	0	1	1	0	1	0	0	0	0
14:00	33	12	5	5	2	2	1	1	2	0	3	1	0	0	70	20	9	8	3	2	2	0	0	0	2	0	0	0
16:15	49	13	7	4	4	4	2	1	0	0	1	1	1	0	111	27	9	4	4	1	0	0	1	1	0	0	0	0
16:30	39	12	4	3	3	1	5	1	2	0	0	0	1	0	89	22	9	3	2	3	4	1	0	0	0	0	0	0
16:45	65	13	4	6	3	2	3	2	0	0	2	0	0	0	116	18	8	6	3	0	2	1	0	0	1	0	0	0
17:00	38	14	7	7	1	4	1	1	1	0	0	0	3	0	132	16	9	4	5	3	0	0	0	0	0	0	0	0
17:15	54	12	7	4	3	5	1	3	1	1	0	0	0	0	130	20	12	2	4	1	3	0	0	0	0	0	0	0
17:30	68	13	6	7	1	2	3	0	2	0	0	2	0	0	135	25	5	7	2	1	2	0	0	0	0	0	0	0
17:45	33	9	3	6	5	1	3	1	1	0	1	0	2	0	89	16	10	9	3	1	1	1	2	0	0	0	0	0
18:00	66	5	5	5	4	0	0	1	0	2	0	0	1	1	122	15	9	4	3	4	2	0	1	0	0	0	0	0

Intersection: Highway 9, 580 metres east of Highway 6, Arthur
GAP STUDY

Date: May 26, 2021
Weather: Clear

End of period	Westbound (SBR)														Eastbound + Westbound (SBL)													
	0-5 sec	6-10 sec	11-15 sec	16-20 sec	21-25 sec	26-30 sec	31-35 sec	36-40 sec	41-45 sec	46-50 sec	51-55 sec	56-60 sec	1-2 min	2-3 min	0-5 sec	6-10 sec	11-15 sec	16-20 sec	21-25 sec	26-30 sec	31-35 sec	36-40 sec	41-45 sec	46-50 sec	51-55 sec	56-60 sec	1-2 min	2-3 min
7:15	13	3	4	3	1	1	3	0	1	1	0	3	2	1	54	21	12	10	2	3	0	2	1	0	0	0	0	0
7:30	32	4	7	3	2	1	3	5	1	0	0	0	3	0	84	25	12	6	3	0	3	0	1	0	0	0	0	0
7:45	19	5	5	4	2	5	1	1	0	1	0	0	3	0	63	17	22	6	2	1	2	0	1	0	0	0	0	0
8:00	28	8	3	4	1	1	1	2	1	0	2	0	1	1	86	26	13	4	5	2	0	0	0	1	0	0	0	0
8:15	34	8	6	2	3	2	0	3	3	1	1	0	1	0	82	26	10	7	6	2	0	0	0	0	0	0	0	0
8:30	26	8	2	2	5	5	2	3	1	1	1	0	1	0	83	27	13	8	1	2	0	1	0	0	0	0	0	0
8:45	32	6	7	7	5	2	3	2	1	0	0	1	1	0	92	22	11	6	4	1	1	2	0	0	0	0	0	0
9:00	37	6	2	4	0	5	2	1	1	1	1	0	2	0	77	16	11	10	5	0	1	0	1	0	0	0	0	0
16:15	40	14	10	9	5	3	1	1	0	0	1	0	1	0	95	25	12	5	5	1	1	0	1	0	0	0	0	0
16:30	40	13	7	6	7	4	0	1	0	0	0	0	2	0	94	15	12	10	2	2	1	1	1	0	0	0	0	0
16:45	41	10	12	5	5	3	3	2	1	0	0	0	0	0	90	26	15	9	2	2	0	0	0	0	0	0	0	0
17:00	47	12	9	5	5	2	0	2	1	1	0	1	0	0	103	25	14	3	3	2	1	0	0	0	0	0	0	0
17:15	26	15	10	11	3	2	3	1	1	0	0	1	0	0	91	27	14	8	0	5	0	0	0	0	0	0	0	0
17:30	52	14	10	2	1	5	1	1	2	0	0	2	0	0	115	25	16	7	1	2	0	0	0	0	0	0	0	0
17:45	38	13	7	5	5	5	1	0	1	1	0	0	2	0	84	25	9	6	5	1	1	0	0	0	0	0	1	0
18:00	36	7	5	4	4	1	2	0	1	2	0	1	1	0	88	23	8	1	4	2	2	1	0	0	0	0	1	0

APPENDIX C

Synchro Outputs

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	56	1	284	36	3	342
Future Volume (Veh/h)	56	1	284	36	3	342
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	60	1	305	39	3	368
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)			294			
pX, platoon unblocked						
vC, conflicting volume	679	305			344	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	679	305			344	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	85	100			100	
cM capacity (veh/h)	412	740			1226	

Direction, Lane #	WB 1	NB 1	NB 2	SB 1
Volume Total	61	305	39	371
Volume Left	60	0	0	3
Volume Right	1	0	39	0
cSH	415	1700	1700	1226
Volume to Capacity	0.15	0.18	0.02	0.00
Queue Length 95th (m)	3.9	0.0	0.0	0.1
Control Delay (s)	15.2	0.0	0.0	0.1
Lane LOS	C			A
Approach Delay (s)	15.2	0.0		0.1
Approach LOS	C			

Intersection Summary			
Average Delay	1.2		
Intersection Capacity Utilization	30.4%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	36	1	9	30	1	21
Future Volume (Veh/h)	36	1	9	30	1	21
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	39	1	10	32	1	23
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	51	26			42	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	51	26			42	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	96	100			100	
cM capacity (veh/h)	962	1056			1580	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	40	42	24
Volume Left	39	0	1
Volume Right	1	32	0
cSH	964	1700	1580
Volume to Capacity	0.04	0.02	0.00
Queue Length 95th (m)	1.0	0.0	0.0
Control Delay (s)	8.9	0.0	0.3
Lane LOS	A		A
Approach Delay (s)	8.9	0.0	0.3
Approach LOS	A		

Intersection Summary			
Average Delay	3.4		
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	31	0	0	0	0	37
Future Volume (Veh/h)	31	0	0	0	0	37
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	33	0	0	0	0	40
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	0				66	0
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	0				66	0
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	96
cM capacity (veh/h)	1636				925	1091

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	33	0	40
Volume Left	33	0	0
Volume Right	0	0	40
cSH	1636	1700	1091
Volume to Capacity	0.02	0.00	0.04
Queue Length 95th (m)	0.5	0.0	0.9
Control Delay (s)	7.2	0.0	8.4
Lane LOS	A		A
Approach Delay (s)	7.2	0.0	8.4
Approach LOS			A

Intersection Summary			
Average Delay	7.9		
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	379	347	0	0	0
Future Volume (Veh/h)	0	379	347	0	0	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	0	408	373	0	0	0
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	373				781	373
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	373				781	373
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				100	100
cM capacity (veh/h)	1197				366	678

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	408	373	0
Volume Left	0	0	0
Volume Right	0	0	0
cSH	1197	1700	1700
Volume to Capacity	0.00	0.22	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	23.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Stop	Stop		Stop	
Traffic Volume (vph)	0	379	347	0	0	0
Future Volume (vph)	0	379	347	0	0	0
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	0	408	373	0	0	0

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total (vph)	408	373	0
Volume Left (vph)	0	0	0
Volume Right (vph)	0	0	0
Hadj (s)	0.00	0.00	0.00
Departure Headway (s)	4.3	4.3	5.5
Degree Utilization, x	0.48	0.45	0.00
Capacity (veh/h)	833	821	572
Control Delay (s)	11.2	10.7	8.5
Approach Delay (s)	11.2	10.7	0.0
Approach LOS	B	B	A

Intersection Summary			
Delay	11.0		
Level of Service	B		
Intersection Capacity Utilization	23.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	379	347	0	0	0
Future Volume (Veh/h)	0	379	347	0	0	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	0	408	373	0	0	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)		227				
pX, platoon unblocked					0.95	
vC, conflicting volume	373				781	373
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	373				739	373
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				100	100
cM capacity (veh/h)	1197				366	678

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	408	373	0
Volume Left	0	0	0
Volume Right	0	0	0
cSH	1197	1700	1700
Volume to Capacity	0.00	0.22	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		23.3%	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)	29	181	38	68	186	93	27	208	57	141	228	33
Future Volume (vph)	29	181	38	68	186	93	27	208	57	141	228	33
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.0	3.5	3.0	3.0	3.5	3.0	3.0	3.5	3.0	3.0	3.5	3.0
Total Lost time (s)	6.1	6.1	6.1	6.1	6.1		6.1	6.1		6.1	6.1	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.95		1.00	0.97		1.00	0.98	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1685	1879	1507	1465	1475		1327	1532		1620	1637	
Flt Permitted	0.44	1.00	1.00	0.61	1.00		0.59	1.00		0.58	1.00	
Satd. Flow (perm)	778	1879	1507	947	1475		819	1532		992	1637	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	31	195	41	73	200	100	29	224	61	152	245	35
RTOR Reduction (vph)	0	0	30	0	23	0	0	12	0	0	6	0
Lane Group Flow (vph)	31	195	11	73	277	0	29	273	0	152	274	0
Heavy Vehicles (%)	0%	0%	0%	15%	25%	13%	27%	17%	25%	4%	10%	31%
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)	21.4	21.4	21.4	21.4	21.4		43.9	43.9		43.9	43.9	
Effective Green, g (s)	21.4	21.4	21.4	21.4	21.4		43.9	43.9		43.9	43.9	
Actuated g/C Ratio	0.28	0.28	0.28	0.28	0.28		0.57	0.57		0.57	0.57	
Clearance Time (s)	6.1	6.1	6.1	6.1	6.1		6.1	6.1		6.1	6.1	
Vehicle Extension (s)	3.5	3.5	3.5	3.5	3.5		3.5	3.5		3.5	3.5	
Lane Grp Cap (vph)	214	518	416	261	407		463	867		561	927	
v/s Ratio Prot		0.10			c0.19			c0.18			0.17	
v/s Ratio Perm	0.04		0.01	0.08			0.04			0.15		
v/c Ratio	0.14	0.38	0.03	0.28	0.68		0.06	0.32		0.27	0.30	
Uniform Delay, d1	21.2	22.7	20.5	22.0	25.0		7.6	8.9		8.6	8.7	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.4	0.5	0.0	0.7	4.8		0.3	1.0		1.2	0.8	
Delay (s)	21.5	23.2	20.5	22.7	29.8		7.8	9.8		9.8	9.6	
Level of Service	C	C	C	C	C		A	A		A	A	
Approach Delay (s)		22.6			28.4			9.6			9.6	
Approach LOS		C			C			A			A	

Intersection Summary			
HCM 2000 Control Delay	17.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.43		
Actuated Cycle Length (s)	77.5	Sum of lost time (s)	12.2
Intersection Capacity Utilization	103.7%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	31	195	41	73	300	29	285	152	280
v/c Ratio	0.14	0.38	0.09	0.28	0.70	0.06	0.32	0.27	0.30
Control Delay	23.0	25.0	7.4	25.2	32.0	8.6	9.5	10.6	9.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	23.0	25.0	7.4	25.2	32.0	8.6	9.5	10.6	9.7
Queue Length 50th (m)	3.4	23.0	0.0	8.4	35.1	1.7	17.2	9.9	17.6
Queue Length 95th (m)	9.8	39.9	6.5	18.9	61.4	5.6	34.4	22.3	34.4
Internal Link Dist (m)		349.6			202.9		670.4		269.8
Turn Bay Length (m)	50.0		50.0	50.0		50.0		100.0	
Base Capacity (vph)	239	579	493	291	477	462	879	561	933
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.13	0.34	0.08	0.25	0.63	0.06	0.32	0.27	0.30

Intersection Summary

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	35	10	277	54	9	287
Future Volume (Veh/h)	35	10	277	54	9	287
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	38	11	301	59	10	312
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)			294			
pX, platoon unblocked						
vC, conflicting volume	633	301			360	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	633	301			360	
tC, single (s)	6.4	6.2			4.2	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.3	
p0 queue free %	91	99			99	
cM capacity (veh/h)	438	743			1151	

Direction, Lane #	WB 1	NB 1	NB 2	SB 1
Volume Total	49	301	59	322
Volume Left	38	0	0	10
Volume Right	11	0	59	0
cSH	483	1700	1700	1151
Volume to Capacity	0.10	0.18	0.03	0.01
Queue Length 95th (m)	2.6	0.0	0.0	0.2
Control Delay (s)	13.3	0.0	0.0	0.3
Lane LOS	B			A
Approach Delay (s)	13.3	0.0		0.3
Approach LOS	B			

Intersection Summary			
Average Delay	1.0		
Intersection Capacity Utilization	32.4%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	32	2	21	42	1	13
Future Volume (Veh/h)	32	2	21	42	1	13
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	35	2	23	46	1	14
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	62	46			69	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	62	46			69	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	96	100			100	
cM capacity (veh/h)	949	1029			1545	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	37	69	15
Volume Left	35	0	1
Volume Right	2	46	0
cSH	953	1700	1545
Volume to Capacity	0.04	0.04	0.00
Queue Length 95th (m)	0.9	0.0	0.0
Control Delay (s)	8.9	0.0	0.5
Lane LOS	A		A
Approach Delay (s)	8.9	0.0	0.5
Approach LOS	A		

Intersection Summary			
Average Delay	2.8		
Intersection Capacity Utilization	13.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	43	0	0	0	0	34
Future Volume (Veh/h)	43	0	0	0	0	34
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)	47	0	0	0	0	37
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	0				94	0
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	0				94	0
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	97				100	97
cM capacity (veh/h)	1636				884	1091

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	47	0	37
Volume Left	47	0	0
Volume Right	0	0	37
cSH	1636	1700	1091
Volume to Capacity	0.03	0.00	0.03
Queue Length 95th (m)	0.7	0.0	0.8
Control Delay (s)	7.3	0.0	8.4
Lane LOS	A		A
Approach Delay (s)	7.3	0.0	8.4
Approach LOS			A

Intersection Summary			
Average Delay	7.8		
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	298	350	0	0	0
Future Volume (Veh/h)	0	298	350	0	0	0
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)	0	324	380	0	0	0
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	380				704	380
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	380				704	380
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				100	100
cM capacity (veh/h)	1190				406	671

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	324	380	0
Volume Left	0	0	0
Volume Right	0	0	0
cSH	1190	1700	1700
Volume to Capacity	0.00	0.22	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		21.8%	ICU Level of Service A
Analysis Period (min)		15	

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Stop	Stop		Stop	
Traffic Volume (vph)	0	298	350	0	0	0
Future Volume (vph)	0	298	350	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	324	380	0	0	0

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total (vph)	324	380	0
Volume Left (vph)	0	0	0
Volume Right (vph)	0	0	0
Hadj (s)	0.00	0.00	0.00
Departure Headway (s)	4.3	4.2	5.4
Degree Utilization, x	0.38	0.44	0.00
Capacity (veh/h)	831	837	594
Control Delay (s)	9.9	10.6	8.4
Approach Delay (s)	9.9	10.6	0.0
Approach LOS	A	B	A

Intersection Summary			
Delay	10.3		
Level of Service	B		
Intersection Capacity Utilization	21.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	298	350	0	0	0
Future Volume (Veh/h)	0	298	350	0	0	0
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)	0	324	380	0	0	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)		227				
pX, platoon unblocked					0.96	
vC, conflicting volume	380				704	380
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	380				668	380
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				100	100
cM capacity (veh/h)	1190				408	671

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	324	380	0
Volume Left	0	0	0
Volume Right	0	0	0
cSH	1190	1700	1700
Volume to Capacity	0.00	0.22	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		21.8%	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)	35	175	31	58	202	90	35	203	48	75	196	49
Future Volume (vph)	35	175	31	58	202	90	35	203	48	75	196	49
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.0	3.5	3.0	3.0	3.5	3.0	3.0	3.5	3.0	3.0	3.5	3.0
Total Lost time (s)	6.1	6.1	6.1	6.1	6.1		6.1	6.1		6.1	6.1	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.95		1.00	0.97		1.00	0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1370	1515	1299	1452	1469		1518	1657		1416	1613	
Flt Permitted	0.41	1.00	1.00	0.62	1.00		0.60	1.00		0.59	1.00	
Satd. Flow (perm)	594	1515	1299	952	1469		951	1657		881	1613	
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)	38	190	34	63	220	98	38	221	52	82	213	53
RTOR Reduction (vph)	0	0	25	0	21	0	0	10	0	0	11	0
Lane Group Flow (vph)	38	190	9	63	297	0	38	263	0	82	255	0
Heavy Vehicles (%)	23%	24%	16%	16%	26%	13%	11%	9%	15%	19%	9%	29%
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)	21.7	21.7	21.7	21.7	21.7		43.9	43.9		43.9	43.9	
Effective Green, g (s)	21.7	21.7	21.7	21.7	21.7		43.9	43.9		43.9	43.9	
Actuated g/C Ratio	0.28	0.28	0.28	0.28	0.28		0.56	0.56		0.56	0.56	
Clearance Time (s)	6.1	6.1	6.1	6.1	6.1		6.1	6.1		6.1	6.1	
Vehicle Extension (s)	3.5	3.5	3.5	3.5	3.5		3.5	3.5		3.5	3.5	
Lane Grp Cap (vph)	165	422	362	265	409		536	934		497	910	
v/s Ratio Prot		0.13			c0.20			c0.16			0.16	
v/s Ratio Perm	0.06		0.01	0.07			0.04			0.09		
v/c Ratio	0.23	0.45	0.03	0.24	0.73		0.07	0.28		0.16	0.28	
Uniform Delay, d1	21.6	23.1	20.4	21.7	25.4		7.7	8.8		8.1	8.8	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.8	0.9	0.0	0.5	6.5		0.3	0.8		0.7	0.8	
Delay (s)	22.5	24.0	20.4	22.2	31.9		7.9	9.5		8.9	9.5	
Level of Service	C	C	C	C	C		A	A		A	A	
Approach Delay (s)		23.3			30.3			9.3			9.4	
Approach LOS		C			C			A			A	

Intersection Summary			
HCM 2000 Control Delay	18.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.43		
Actuated Cycle Length (s)	77.8	Sum of lost time (s)	12.2
Intersection Capacity Utilization	103.7%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	38	190	34	63	318	38	273	82	266
v/c Ratio	0.23	0.45	0.09	0.24	0.74	0.07	0.29	0.16	0.29
Control Delay	25.6	27.0	6.4	24.3	34.7	8.7	9.3	9.7	9.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	25.6	27.0	6.4	24.3	34.7	8.7	9.3	9.7	9.2
Queue Length 50th (m)	4.3	23.0	0.0	7.2	38.6	2.3	16.9	5.2	16.3
Queue Length 95th (m)	12.0	40.9	5.1	16.8	#68.0	6.7	32.3	12.8	31.4
Internal Link Dist (m)		349.6			202.9		670.4		269.8
Turn Bay Length (m)	50.0		50.0	50.0		50.0		100.0	
Base Capacity (vph)	182	465	427	292	471	536	944	497	921
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.21	0.41	0.08	0.22	0.68	0.07	0.29	0.16	0.29

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	33	7	382	43	8	409
Future Volume (Veh/h)	33	7	382	43	8	409
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	35	7	402	45	8	431
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)			294			
pX, platoon unblocked						
vC, conflicting volume	849	402			447	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	849	402			447	
tC, single (s)	6.4	6.2			4.2	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.3	
p0 queue free %	89	99			99	
cM capacity (veh/h)	331	653			1057	

Direction, Lane #	WB 1	NB 1	NB 2	SB 1
Volume Total	42	402	45	439
Volume Left	35	0	0	8
Volume Right	7	0	45	0
cSH	361	1700	1700	1057
Volume to Capacity	0.12	0.24	0.03	0.01
Queue Length 95th (m)	3.0	0.0	0.0	0.2
Control Delay (s)	16.3	0.0	0.0	0.2
Lane LOS	C			A
Approach Delay (s)	16.3	0.0		0.2
Approach LOS	C			

Intersection Summary			
Average Delay	0.8		
Intersection Capacity Utilization	37.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	29	0	12	39	1	11
Future Volume (Veh/h)	29	0	12	39	1	11
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	31	0	13	41	1	12
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	48	34			54	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	48	34			54	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	97	100			100	
cM capacity (veh/h)	967	1046			1564	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	31	54	13
Volume Left	31	0	1
Volume Right	0	41	0
cSH	967	1700	1564
Volume to Capacity	0.03	0.03	0.00
Queue Length 95th (m)	0.8	0.0	0.0
Control Delay (s)	8.8	0.0	0.6
Lane LOS	A		A
Approach Delay (s)	8.8	0.0	0.6
Approach LOS	A		

Intersection Summary			
Average Delay	2.9		
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	40	0	0	0	0	29
Future Volume (Veh/h)	40	0	0	0	0	29
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	42	0	0	0	0	31
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	0				84	0
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	0				84	0
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	97				100	97
cM capacity (veh/h)	1636				899	1091

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	42	0	31
Volume Left	42	0	0
Volume Right	0	0	31
cSH	1636	1700	1091
Volume to Capacity	0.03	0.00	0.03
Queue Length 95th (m)	0.6	0.0	0.7
Control Delay (s)	7.3	0.0	8.4
Lane LOS	A		A
Approach Delay (s)	7.3	0.0	8.4
Approach LOS			A

Intersection Summary			
Average Delay	7.7		
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	341	389	0	0	0
Future Volume (Veh/h)	0	341	389	0	0	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	0	359	409	0	0	0
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	409				768	409
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	409				768	409
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				100	100
cM capacity (veh/h)	1161				373	647

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	359	409	0
Volume Left	0	0	0
Volume Right	0	0	0
cSH	1161	1700	1700
Volume to Capacity	0.00	0.24	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	23.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Stop	Stop		Stop	
Traffic Volume (vph)	0	341	389	0	0	0
Future Volume (vph)	0	341	389	0	0	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	0	359	409	0	0	0

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total (vph)	359	409	0
Volume Left (vph)	0	0	0
Volume Right (vph)	0	0	0
Hadj (s)	0.00	0.00	0.00
Departure Headway (s)	4.3	4.3	5.5
Degree Utilization, x	0.43	0.48	0.00
Capacity (veh/h)	825	831	576
Control Delay (s)	10.5	11.2	8.5
Approach Delay (s)	10.5	11.2	0.0
Approach LOS	B	B	A

Intersection Summary			
Delay	10.8		
Level of Service	B		
Intersection Capacity Utilization	23.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	341	389	0	0	0
Future Volume (Veh/h)	0	341	389	0	0	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	0	359	409	0	0	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)		227				
pX, platoon unblocked					0.95	
vC, conflicting volume	409				768	409
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	409				733	409
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				100	100
cM capacity (veh/h)	1161				373	647

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	359	409	0
Volume Left	0	0	0
Volume Right	0	0	0
cSH	1161	1700	1700
Volume to Capacity	0.00	0.24	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		23.8%	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)	29	184	51	43	218	128	64	277	62	95	306	50
Future Volume (vph)	29	184	51	43	218	128	64	277	62	95	306	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.0	3.5	3.0	3.0	3.5	3.0	3.0	3.5	3.0	3.0	3.5	3.0
Total Lost time (s)	6.1	6.1	6.1	6.1	6.1		6.1	6.1		6.1	6.1	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.94		1.00	0.97		1.00	0.98	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1348	1515	1346	1359	1554		1560	1686		1440	1679	
Flt Permitted	0.34	1.00	1.00	0.62	1.00		0.50	1.00		0.52	1.00	
Satd. Flow (perm)	488	1515	1346	881	1554		826	1686		785	1679	
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)	31	194	54	45	229	135	67	292	65	100	322	53
RTOR Reduction (vph)	0	0	39	0	27	0	0	10	0	0	7	0
Lane Group Flow (vph)	31	194	15	45	337	0	67	347	0	100	368	0
Heavy Vehicles (%)	25%	24%	12%	24%	16%	11%	8%	6%	19%	17%	8%	19%
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)	22.1	22.1	22.1	22.1	22.1		43.9	43.9		43.9	43.9	
Effective Green, g (s)	22.1	22.1	22.1	22.1	22.1		43.9	43.9		43.9	43.9	
Actuated g/C Ratio	0.28	0.28	0.28	0.28	0.28		0.56	0.56		0.56	0.56	
Clearance Time (s)	6.1	6.1	6.1	6.1	6.1		6.1	6.1		6.1	6.1	
Vehicle Extension (s)	3.5	3.5	3.5	3.5	3.5		3.5	3.5		3.5	3.5	
Lane Grp Cap (vph)	137	428	380	248	439		463	946		440	942	
v/s Ratio Prot		0.13			c0.22			0.21			c0.22	
v/s Ratio Perm	0.06		0.01	0.05			0.08			0.13		
v/c Ratio	0.23	0.45	0.04	0.18	0.77		0.14	0.37		0.23	0.39	
Uniform Delay, d1	21.5	23.1	20.4	21.2	25.7		8.2	9.5		8.6	9.6	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.0	0.9	0.1	0.4	8.1		0.7	1.1		1.2	1.2	
Delay (s)	22.5	24.0	20.4	21.6	33.8		8.8	10.6		9.8	10.9	
Level of Service	C	C	C	C	C		A	B		A	B	
Approach Delay (s)		23.1			32.4			10.3			10.6	
Approach LOS		C			C			B			B	

Intersection Summary			
HCM 2000 Control Delay	18.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	78.2	Sum of lost time (s)	12.2
Intersection Capacity Utilization	101.0%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	31	194	54	45	364	67	357	100	375
v/c Ratio	0.23	0.45	0.13	0.18	0.78	0.14	0.37	0.23	0.39
Control Delay	26.3	27.0	7.2	23.3	36.4	9.7	10.5	10.8	11.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	26.3	27.0	7.2	23.3	36.4	9.7	10.5	10.8	11.0
Queue Length 50th (m)	3.5	23.5	0.0	5.0	44.4	4.5	25.6	7.0	28.0
Queue Length 95th (m)	10.6	41.7	7.6	12.9	#83.3	10.8	43.9	15.8	47.5
Internal Link Dist (m)		349.6			202.9		670.4		269.8
Turn Bay Length (m)	50.0		50.0	50.0		50.0		100.0	
Base Capacity (vph)	149	463	448	269	501	464	957	440	950
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.21	0.42	0.12	0.17	0.73	0.14	0.37	0.23	0.39

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	76	1	331	45	3	442
Future Volume (Veh/h)	76	1	331	45	3	442
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	82	1	356	48	3	475
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)			294			
pX, platoon unblocked						
vC, conflicting volume	837	356			404	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	837	356			404	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	75	100			100	
cM capacity (veh/h)	332	693			1166	

Direction, Lane #	WB 1	NB 1	NB 2	SB 1
Volume Total	83	356	48	478
Volume Left	82	0	0	3
Volume Right	1	0	48	0
cSH	334	1700	1700	1166
Volume to Capacity	0.25	0.21	0.03	0.00
Queue Length 95th (m)	7.3	0.0	0.0	0.1
Control Delay (s)	19.3	0.0	0.0	0.1
Lane LOS	C			A
Approach Delay (s)	19.3	0.0		0.1
Approach LOS	C			

Intersection Summary			
Average Delay	1.7		
Intersection Capacity Utilization	36.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	56	1	9	39	1	21
Future Volume (Veh/h)	56	1	9	39	1	21
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	60	1	10	42	1	23
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	31			52	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	56	31			52	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	94	100			100	
cM capacity (veh/h)	956	1049			1567	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	61	52	24
Volume Left	60	0	1
Volume Right	1	42	0
cSH	957	1700	1567
Volume to Capacity	0.06	0.03	0.00
Queue Length 95th (m)	1.5	0.0	0.0
Control Delay (s)	9.0	0.0	0.3
Lane LOS	A		A
Approach Delay (s)	9.0	0.0	0.3
Approach LOS	A		

Intersection Summary			
Average Delay	4.1		
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	40	0	0	0	0	57
Future Volume (Veh/h)	40	0	0	0	0	57
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	43	0	0	0	0	61
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	0				86	0
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	0				86	0
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	97				100	94
cM capacity (veh/h)	1636				896	1091

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	43	0	61
Volume Left	43	0	0
Volume Right	0	0	61
cSH	1636	1700	1091
Volume to Capacity	0.03	0.00	0.06
Queue Length 95th (m)	0.6	0.0	1.3
Control Delay (s)	7.3	0.0	8.5
Lane LOS	A		A
Approach Delay (s)	7.3	0.0	8.5
Approach LOS			A

Intersection Summary			
Average Delay	8.0		
Intersection Capacity Utilization	13.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	434	380	0	0	0
Future Volume (Veh/h)	0	434	380	0	0	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	0	467	409	0	0	0
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	409				876	409
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	409				876	409
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				100	100
cM capacity (veh/h)	1161				322	647

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	467	409	0
Volume Left	0	0	0
Volume Right	0	0	0
cSH	1161	1700	1700
Volume to Capacity	0.00	0.24	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		26.2%	ICU Level of Service A
Analysis Period (min)		15	

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Stop	Stop		Stop	
Traffic Volume (vph)	0	434	380	0	0	0
Future Volume (vph)	0	434	380	0	0	0
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	0	467	409	0	0	0

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total (vph)	467	409	0
Volume Left (vph)	0	0	0
Volume Right (vph)	0	0	0
Hadj (s)	0.00	0.00	0.00
Departure Headway (s)	4.3	4.4	5.7
Degree Utilization, x	0.56	0.50	0.00
Capacity (veh/h)	825	810	548
Control Delay (s)	12.6	11.6	8.7
Approach Delay (s)	12.6	11.6	0.0
Approach LOS	B	B	A

Intersection Summary			
Delay	12.1		
Level of Service	B		
Intersection Capacity Utilization	26.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	434	380	0	0	0
Future Volume (Veh/h)	0	434	380	0	0	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	0	467	409	0	0	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)		227				
pX, platoon unblocked					0.94	
vC, conflicting volume	409				876	409
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	409				835	409
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				100	100
cM capacity (veh/h)	1161				319	647

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	467	409	0
Volume Left	0	0	0
Volume Right	0	0	0
cSH	1161	1700	1700
Volume to Capacity	0.00	0.24	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		26.2%	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)	36	192	40	72	197	111	29	243	61	181	298	47
Future Volume (vph)	36	192	40	72	197	111	29	243	61	181	298	47
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.0	3.5	3.0	3.0	3.5	3.0	3.0	3.5	3.0	3.0	3.5	3.0
Total Lost time (s)	6.1	6.1	6.1	6.1	6.1		6.1	6.1		6.1	6.1	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.95		1.00	0.97		1.00	0.98	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1685	1879	1507	1465	1473		1327	1536		1620	1630	
Flt Permitted	0.39	1.00	1.00	0.60	1.00		0.51	1.00		0.54	1.00	
Satd. Flow (perm)	698	1879	1507	919	1473		708	1536		928	1630	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	39	206	43	77	212	119	31	261	66	195	320	51
RTOR Reduction (vph)	0	0	31	0	26	0	0	11	0	0	7	0
Lane Group Flow (vph)	39	206	12	77	305	0	31	316	0	195	364	0
Heavy Vehicles (%)	0%	0%	0%	15%	25%	13%	27%	17%	25%	4%	10%	31%
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)	21.9	21.9	21.9	21.9	21.9		43.9	43.9		43.9	43.9	
Effective Green, g (s)	21.9	21.9	21.9	21.9	21.9		43.9	43.9		43.9	43.9	
Actuated g/C Ratio	0.28	0.28	0.28	0.28	0.28		0.56	0.56		0.56	0.56	
Clearance Time (s)	6.1	6.1	6.1	6.1	6.1		6.1	6.1		6.1	6.1	
Vehicle Extension (s)	3.5	3.5	3.5	3.5	3.5		3.5	3.5		3.5	3.5	
Lane Grp Cap (vph)	195	527	423	258	413		398	864		522	917	
v/s Ratio Prot		0.11			c0.21			0.21			c0.22	
v/s Ratio Perm	0.06		0.01	0.08			0.04			0.21		
v/c Ratio	0.20	0.39	0.03	0.30	0.74		0.08	0.37		0.37	0.40	
Uniform Delay, d1	21.4	22.7	20.3	22.0	25.5		7.8	9.4		9.4	9.6	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.6	0.6	0.0	0.8	7.0		0.4	1.2		2.0	1.3	
Delay (s)	22.0	23.2	20.4	22.8	32.5		8.2	10.6		11.5	10.9	
Level of Service	C	C	C	C	C		A	B		B	B	
Approach Delay (s)		22.6			30.6			10.4			11.1	
Approach LOS		C			C			B			B	

Intersection Summary			
HCM 2000 Control Delay	17.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	78.0	Sum of lost time (s)	12.2
Intersection Capacity Utilization	104.1%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	39	206	43	77	331	31	327	195	371
v/c Ratio	0.20	0.39	0.09	0.30	0.76	0.08	0.37	0.37	0.40
Control Delay	24.3	25.2	7.5	25.7	35.1	9.0	10.4	12.4	11.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	24.3	25.2	7.5	25.7	35.1	9.0	10.4	12.4	11.1
Queue Length 50th (m)	4.4	24.5	0.0	8.9	39.7	1.9	22.2	14.5	26.8
Queue Length 95th (m)	11.9	42.1	6.7	20.0	#75.0	6.0	40.9	30.2	47.6
Internal Link Dist (m)		349.6			202.9		670.4		269.8
Turn Bay Length (m)	50.0		50.0	50.0		50.0		100.0	
Base Capacity (vph)	213	576	491	281	476	398	876	522	924
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.18	0.36	0.09	0.27	0.70	0.08	0.37	0.37	0.40

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	58	10	391	84	9	370
Future Volume (Veh/h)	58	10	391	84	9	370
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	63	11	425	91	10	402
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)			294			
pX, platoon unblocked						
vC, conflicting volume	847	425			516	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	847	425			516	
tC, single (s)	6.4	6.2			4.2	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.3	
p0 queue free %	81	98			99	
cM capacity (veh/h)	328	634			1005	

Direction, Lane #	WB 1	NB 1	NB 2	SB 1
Volume Total	74	425	91	412
Volume Left	63	0	0	10
Volume Right	11	0	91	0
cSH	353	1700	1700	1005
Volume to Capacity	0.21	0.25	0.05	0.01
Queue Length 95th (m)	5.9	0.0	0.0	0.2
Control Delay (s)	17.9	0.0	0.0	0.3
Lane LOS	C			A
Approach Delay (s)	17.9	0.0		0.3
Approach LOS	C			

Intersection Summary			
Average Delay	1.5		
Intersection Capacity Utilization	37.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	55	2	21	72	1	13
Future Volume (Veh/h)	55	2	21	72	1	13
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	60	2	23	78	1	14
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	78	62			101	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	78	62			101	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	94	100			100	
cM capacity (veh/h)	929	1009			1504	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	62	101	15
Volume Left	60	0	1
Volume Right	2	78	0
cSH	932	1700	1504
Volume to Capacity	0.07	0.06	0.00
Queue Length 95th (m)	1.6	0.0	0.0
Control Delay (s)	9.1	0.0	0.5
Lane LOS	A		A
Approach Delay (s)	9.1	0.0	0.5
Approach LOS	A		

Intersection Summary			
Average Delay	3.2		
Intersection Capacity Utilization	15.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	73	0	0	0	0	57
Future Volume (Veh/h)	73	0	0	0	0	57
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)	79	0	0	0	0	62
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	0				158	0
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	0				158	0
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	95				100	94
cM capacity (veh/h)	1636				797	1091

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	79	0	62
Volume Left	79	0	0
Volume Right	0	0	62
cSH	1636	1700	1091
Volume to Capacity	0.05	0.00	0.06
Queue Length 95th (m)	1.2	0.0	1.4
Control Delay (s)	7.3	0.0	8.5
Lane LOS	A		A
Approach Delay (s)	7.3	0.0	8.5
Approach LOS			A

Intersection Summary			
Average Delay	7.8		
Intersection Capacity Utilization	14.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	344	412	0	0	0
Future Volume (Veh/h)	0	344	412	0	0	0
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)	0	374	448	0	0	0
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	448				822	448
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	448				822	448
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				100	100
cM capacity (veh/h)	1123				346	615

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	374	448	0
Volume Left	0	0	0
Volume Right	0	0	0
cSH	1123	1700	1700
Volume to Capacity	0.00	0.26	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		25.0%	ICU Level of Service A
Analysis Period (min)		15	

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Stop	Stop		Stop	
Traffic Volume (vph)	0	344	412	0	0	0
Future Volume (vph)	0	344	412	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	374	448	0	0	0

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total (vph)	374	448	0
Volume Left (vph)	0	0	0
Volume Right (vph)	0	0	0
Hadj (s)	0.00	0.00	0.00
Departure Headway (s)	4.3	4.3	5.6
Degree Utilization, x	0.45	0.53	0.00
Capacity (veh/h)	817	828	561
Control Delay (s)	10.8	12.0	8.6
Approach Delay (s)	10.8	12.0	0.0
Approach LOS	B	B	A

Intersection Summary			
Delay	11.5		
Level of Service	B		
Intersection Capacity Utilization	25.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	344	412	0	0	0
Future Volume (Veh/h)	0	344	412	0	0	0
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)	0	374	448	0	0	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)		227				
pX, platoon unblocked					0.96	
vC, conflicting volume	448				822	448
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	448				792	448
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				100	100
cM capacity (veh/h)	1123				346	615

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	374	448	0
Volume Left	0	0	0
Volume Right	0	0	0
cSH	1123	1700	1700
Volume to Capacity	0.00	0.26	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		25.0%	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	186	33	62	214	136	37	286	51	107	258	63
Future Volume (vph)	53	186	33	62	214	136	37	286	51	107	258	63
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.0	3.5	3.0	3.0	3.5	3.0	3.0	3.5	3.0	3.0	3.5	3.0
Total Lost time (s)	6.1	6.1	6.1	6.1	6.1		6.1	6.1		6.1	6.1	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.94		1.00	0.98		1.00	0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1370	1515	1299	1452	1463		1518	1671		1416	1615	
Flt Permitted	0.36	1.00	1.00	0.62	1.00		0.52	1.00		0.50	1.00	
Satd. Flow (perm)	523	1515	1299	950	1463		826	1671		746	1615	
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)	58	202	36	67	233	148	40	311	55	116	280	68
RTOR Reduction (vph)	0	0	25	0	31	0	0	7	0	0	10	0
Lane Group Flow (vph)	58	202	11	67	350	0	40	359	0	116	338	0
Heavy Vehicles (%)	23%	24%	16%	16%	26%	13%	11%	9%	15%	19%	9%	29%
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)	23.7	23.7	23.7	23.7	23.7		39.0	39.0		39.0	39.0	
Effective Green, g (s)	23.7	23.7	23.7	23.7	23.7		39.0	39.0		39.0	39.0	
Actuated g/C Ratio	0.32	0.32	0.32	0.32	0.32		0.52	0.52		0.52	0.52	
Clearance Time (s)	6.1	6.1	6.1	6.1	6.1		6.1	6.1		6.1	6.1	
Vehicle Extension (s)	3.5	3.5	3.5	3.5	3.5		3.5	3.5		3.5	3.5	
Lane Grp Cap (vph)	165	479	411	300	462		430	870		388	840	
v/s Ratio Prot		0.13			c0.24			c0.21			0.21	
v/s Ratio Perm	0.11		0.01	0.07			0.05			0.16		
v/c Ratio	0.35	0.42	0.03	0.22	0.76		0.09	0.41		0.30	0.40	
Uniform Delay, d1	19.7	20.2	17.7	18.8	23.0		9.0	11.0		10.2	10.9	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.5	0.7	0.0	0.4	7.2		0.4	1.4		2.0	1.4	
Delay (s)	21.2	20.9	17.7	19.3	30.2		9.5	12.4		12.2	12.3	
Level of Service	C	C	B	B	C		A	B		B	B	
Approach Delay (s)		20.6			28.6			12.1			12.3	
Approach LOS		C			C			B			B	

Intersection Summary			
HCM 2000 Control Delay	18.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	74.9	Sum of lost time (s)	12.2
Intersection Capacity Utilization	106.6%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	58	202	36	67	381	40	366	116	348
v/c Ratio	0.35	0.42	0.08	0.22	0.77	0.09	0.42	0.30	0.41
Control Delay	26.2	23.0	5.7	20.6	31.9	11.1	13.1	14.0	12.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	26.2	23.0	5.7	20.6	31.9	11.1	13.1	14.0	12.8
Queue Length 50th (m)	6.2	22.2	0.0	6.9	42.5	2.6	27.2	8.4	25.2
Queue Length 95th (m)	16.2	39.1	5.0	15.8	72.9	8.3	53.9	22.0	50.8
Internal Link Dist (m)		349.6			202.9		670.4		269.8
Turn Bay Length (m)	50.0		50.0	50.0		50.0		100.0	
Base Capacity (vph)	202	585	528	366	593	429	876	388	851
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.29	0.35	0.07	0.18	0.64	0.09	0.42	0.30	0.41

Intersection Summary

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	56	7	503	73	8	499
Future Volume (Veh/h)	56	7	503	73	8	499
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	59	7	529	77	8	525
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)			294			
pX, platoon unblocked	0.97	0.97			0.97	
vC, conflicting volume	1070	529			606	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1055	495			575	
tC, single (s)	6.4	6.2			4.2	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.3	
p0 queue free %	76	99			99	
cM capacity (veh/h)	241	559			914	

Direction, Lane #	WB 1	NB 1	NB 2	SB 1
Volume Total	66	529	77	533
Volume Left	59	0	0	8
Volume Right	7	0	77	0
cSH	257	1700	1700	914
Volume to Capacity	0.26	0.31	0.05	0.01
Queue Length 95th (m)	7.6	0.0	0.0	0.2
Control Delay (s)	23.8	0.0	0.0	0.2
Lane LOS	C			A
Approach Delay (s)	23.8	0.0		0.2
Approach LOS	C			

Intersection Summary			
Average Delay	1.4		
Intersection Capacity Utilization	42.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	52	0	12	69	1	11
Future Volume (Veh/h)	52	0	12	69	1	11
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	55	0	13	73	1	12
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	64	50			86	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	64	50			86	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	94	100			100	
cM capacity (veh/h)	947	1025			1523	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	55	86	13
Volume Left	55	0	1
Volume Right	0	73	0
cSH	947	1700	1523
Volume to Capacity	0.06	0.05	0.00
Queue Length 95th (m)	1.4	0.0	0.0
Control Delay (s)	9.0	0.0	0.6
Lane LOS	A		A
Approach Delay (s)	9.0	0.0	0.6
Approach LOS	A		

Intersection Summary			
Average Delay	3.3		
Intersection Capacity Utilization	14.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	70	0	0	0	0	52
Future Volume (Veh/h)	70	0	0	0	0	52
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	74	0	0	0	0	55
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	0				148	0
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	0				148	0
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	95				100	95
cM capacity (veh/h)	1636				810	1091

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	74	0	55
Volume Left	74	0	0
Volume Right	0	0	55
cSH	1636	1700	1091
Volume to Capacity	0.05	0.00	0.05
Queue Length 95th (m)	1.1	0.0	1.2
Control Delay (s)	7.3	0.0	8.5
Lane LOS	A		A
Approach Delay (s)	7.3	0.0	8.5
Approach LOS			A

Intersection Summary			
Average Delay	7.8		
Intersection Capacity Utilization	13.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	389	453	0	0	0
Future Volume (Veh/h)	0	389	453	0	0	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	0	409	477	0	0	0
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	477				886	477
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	477				886	477
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				100	100
cM capacity (veh/h)	1096				318	592

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	409	477	0
Volume Left	0	0	0
Volume Right	0	0	0
cSH	1096	1700	1700
Volume to Capacity	0.00	0.28	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	27.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Stop	Stop		Stop	
Traffic Volume (vph)	0	389	453	0	0	0
Future Volume (vph)	0	389	453	0	0	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	0	409	477	0	0	0

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total (vph)	409	477	0
Volume Left (vph)	0	0	0
Volume Right (vph)	0	0	0
Hadj (s)	0.00	0.00	0.00
Departure Headway (s)	4.4	4.3	5.8
Degree Utilization, x	0.50	0.57	0.00
Capacity (veh/h)	812	822	545
Control Delay (s)	11.6	12.9	8.8
Approach Delay (s)	11.6	12.9	0.0
Approach LOS	B	B	A

Intersection Summary			
Delay	12.3		
Level of Service	B		
Intersection Capacity Utilization	27.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	389	453	0	0	0
Future Volume (Veh/h)	0	389	453	0	0	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	0	409	477	0	0	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)		227				
pX, platoon unblocked					0.96	
vC, conflicting volume	477				886	477
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	477				858	477
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				100	100
cM capacity (veh/h)	1096				316	592

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	409	477	0
Volume Left	0	0	0
Volume Right	0	0	0
cSH	1096	1700	1700
Volume to Capacity	0.00	0.28	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		27.2%	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)	47	195	54	46	231	176	68	365	66	128	375	64
Future Volume (vph)	47	195	54	46	231	176	68	365	66	128	375	64
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.0	3.5	3.0	3.0	3.5	3.0	3.0	3.5	3.0	3.0	3.5	3.0
Total Lost time (s)	6.1	6.1	6.1	6.1	6.1		6.1	6.1		6.1	6.1	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.94		1.00	0.98		1.00	0.98	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1348	1515	1346	1359	1543		1560	1700		1440	1677	
Flt Permitted	0.30	1.00	1.00	0.62	1.00		0.41	1.00		0.42	1.00	
Satd. Flow (perm)	432	1515	1346	882	1543		680	1700		640	1677	
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)	49	205	57	48	243	185	72	384	69	135	395	67
RTOR Reduction (vph)	0	0	39	0	37	0	0	8	0	0	7	0
Lane Group Flow (vph)	49	205	18	48	391	0	72	445	0	135	455	0
Heavy Vehicles (%)	25%	24%	12%	24%	16%	11%	8%	6%	19%	17%	8%	19%
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)	24.3	24.3	24.3	24.3	24.3		39.0	39.0		39.0	39.0	
Effective Green, g (s)	24.3	24.3	24.3	24.3	24.3		39.0	39.0		39.0	39.0	
Actuated g/C Ratio	0.32	0.32	0.32	0.32	0.32		0.52	0.52		0.52	0.52	
Clearance Time (s)	6.1	6.1	6.1	6.1	6.1		6.1	6.1		6.1	6.1	
Vehicle Extension (s)	3.5	3.5	3.5	3.5	3.5		3.5	3.5		3.5	3.5	
Lane Grp Cap (vph)	139	487	433	283	496		351	878		330	866	
v/s Ratio Prot		0.14			c0.25			0.26			c0.27	
v/s Ratio Perm	0.11		0.01	0.05			0.11			0.21		
v/c Ratio	0.35	0.42	0.04	0.17	0.79		0.21	0.51		0.41	0.53	
Uniform Delay, d1	19.6	20.1	17.6	18.4	23.3		9.9	12.0		11.2	12.1	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.8	0.7	0.0	0.3	8.4		1.3	2.1		3.7	2.3	
Delay (s)	21.4	20.8	17.6	18.7	31.7		11.2	14.0		14.9	14.4	
Level of Service	C	C	B	B	C		B	B		B	B	
Approach Delay (s)		20.3			30.3			13.7			14.5	
Approach LOS		C			C			B			B	

Intersection Summary			
HCM 2000 Control Delay	19.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	75.5	Sum of lost time (s)	12.2
Intersection Capacity Utilization	104.3%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	49	205	57	48	428	72	453	135	462
v/c Ratio	0.35	0.42	0.12	0.17	0.80	0.21	0.51	0.41	0.53
Control Delay	27.4	22.8	5.9	19.6	33.1	13.1	14.9	17.2	15.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	27.4	22.8	5.9	19.6	33.1	13.1	14.9	17.2	15.3
Queue Length 50th (m)	5.3	22.6	0.0	4.9	48.3	5.2	38.1	11.0	39.5
Queue Length 95th (m)	14.6	39.7	6.9	12.2	81.6	14.2	70.0	27.9	72.5
Internal Link Dist (m)		349.6			202.9		670.4		269.8
Turn Bay Length (m)	50.0		50.0	50.0		50.0		100.0	
Base Capacity (vph)	166	581	551	338	625	351	885	330	873
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.30	0.35	0.10	0.14	0.68	0.21	0.51	0.41	0.53

Intersection Summary

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	143	15	348	65	8	470
Future Volume (Veh/h)	143	15	348	65	8	470
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	154	16	374	70	9	505
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)			294			
pX, platoon unblocked						
vC, conflicting volume	897	374			444	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	897	374			444	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	49	98			99	
cM capacity (veh/h)	304	677			1127	

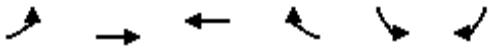
Direction, Lane #	WB 1	NB 1	NB 2	SB 1
Volume Total	170	374	70	514
Volume Left	154	0	0	9
Volume Right	16	0	70	0
cSH	321	1700	1700	1127
Volume to Capacity	0.53	0.22	0.04	0.01
Queue Length 95th (m)	22.3	0.0	0.0	0.2
Control Delay (s)	28.2	0.0	0.0	0.2
Lane LOS	D			A
Approach Delay (s)	28.2	0.0		0.2
Approach LOS	D			

Intersection Summary			
Average Delay	4.4		
Intersection Capacity Utilization	46.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	137	18	9	64	29	21
Future Volume (Veh/h)	137	18	9	64	29	21
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	147	19	10	69	31	23
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	130	44			79	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	130	44			79	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	83	98			98	
cM capacity (veh/h)	852	1031			1532	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	166	79	54
Volume Left	147	0	31
Volume Right	19	69	0
cSH	869	1700	1532
Volume to Capacity	0.19	0.05	0.02
Queue Length 95th (m)	5.3	0.0	0.5
Control Delay (s)	10.1	0.0	4.3
Lane LOS	B		A
Approach Delay (s)	10.1	0.0	4.3
Approach LOS	B		

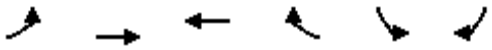
Intersection Summary			
Average Delay	6.4		
Intersection Capacity Utilization	24.7%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	40	53	98	33	46	57
Future Volume (Veh/h)	40	53	98	33	46	57
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	43	57	105	35	49	61
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	140				266	122
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	140				266	122
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	97				93	93
cM capacity (veh/h)	1456				706	934

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	100	140	110
Volume Left	43	0	49
Volume Right	0	35	61
cSH	1456	1700	817
Volume to Capacity	0.03	0.08	0.13
Queue Length 95th (m)	0.7	0.0	3.5
Control Delay (s)	3.4	0.0	10.1
Lane LOS	A		B
Approach Delay (s)	3.4	0.0	10.1
Approach LOS			B

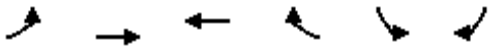
Intersection Summary			
Average Delay	4.1		
Intersection Capacity Utilization	28.2%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	49	443	394	12	35	89
Future Volume (Veh/h)	49	443	394	12	35	89
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	53	476	424	13	38	96
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	437				1012	430
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	437				1012	430
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	95				85	85
cM capacity (veh/h)	1134				255	629

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	529	437	134
Volume Left	53	0	38
Volume Right	0	13	96
cSH	1134	1700	444
Volume to Capacity	0.05	0.26	0.30
Queue Length 95th (m)	1.1	0.0	9.5
Control Delay (s)	1.3	0.0	16.6
Lane LOS	A		C
Approach Delay (s)	1.3	0.0	16.6
Approach LOS			C

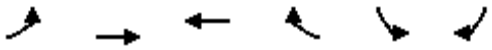
Intersection Summary			
Average Delay	2.7		
Intersection Capacity Utilization	64.9%	ICU Level of Service	C
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	440	397	86	52	0
Future Volume (Veh/h)	0	440	397	86	52	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	0	473	427	92	56	0
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	519				946	473
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	519				946	473
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				81	100
cM capacity (veh/h)	1057				293	595

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	473	519	56
Volume Left	0	0	56
Volume Right	0	92	0
cSH	1057	1700	293
Volume to Capacity	0.00	0.31	0.19
Queue Length 95th (m)	0.0	0.0	5.3
Control Delay (s)	0.0	0.0	20.2
Lane LOS			C
Approach Delay (s)	0.0	0.0	20.2
Approach LOS			C

Intersection Summary			
Average Delay	1.1		
Intersection Capacity Utilization	36.1%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	56	440	397	0	0	35
Future Volume (Veh/h)	56	440	397	0	0	35
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	60	473	427	0	0	38
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)		310				
pX, platoon unblocked					0.95	
vC, conflicting volume	427				1020	427
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	427				994	427
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	95				100	94
cM capacity (veh/h)	1143				246	632

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	533	427	38
Volume Left	60	0	0
Volume Right	0	0	38
cSH	1143	1700	632
Volume to Capacity	0.05	0.25	0.06
Queue Length 95th (m)	1.3	0.0	1.5
Control Delay (s)	1.5	0.0	11.1
Lane LOS	A		B
Approach Delay (s)	1.5	0.0	11.1
Approach LOS			B

Intersection Summary			
Average Delay		1.2	
Intersection Capacity Utilization		60.5%	ICU Level of Service B
Analysis Period (min)		15	

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	45	209	40	91	213	128	29	254	78	209	337	75
Future Volume (vph)	45	209	40	91	213	128	29	254	78	209	337	75
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.0	3.5	3.0	3.0	3.5	3.0	3.0	3.5	3.0	3.0	3.5	3.0
Total Lost time (s)	6.1	6.1	6.1	6.1	6.1		6.1	6.1		6.1	6.1	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.94		1.00	0.96		1.00	0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1685	1879	1507	1465	1471		1327	1525		1620	1605	
Flt Permitted	0.34	1.00	1.00	0.56	1.00		0.45	1.00		0.52	1.00	
Satd. Flow (perm)	606	1879	1507	871	1471		624	1525		882	1605	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	48	225	43	98	229	138	31	273	84	225	362	81
RTOR Reduction (vph)	0	0	31	0	28	0	0	14	0	0	10	0
Lane Group Flow (vph)	48	225	12	98	339	0	31	343	0	225	433	0
Heavy Vehicles (%)	0%	0%	0%	15%	25%	13%	27%	17%	25%	4%	10%	31%
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)	22.3	22.3	22.3	22.3	22.3		43.9	43.9		43.9	43.9	
Effective Green, g (s)	22.3	22.3	22.3	22.3	22.3		43.9	43.9		43.9	43.9	
Actuated g/C Ratio	0.28	0.28	0.28	0.28	0.28		0.56	0.56		0.56	0.56	
Clearance Time (s)	6.1	6.1	6.1	6.1	6.1		6.1	6.1		6.1	6.1	
Vehicle Extension (s)	3.5	3.5	3.5	3.5	3.5		3.5	3.5		3.5	3.5	
Lane Grp Cap (vph)	172	534	428	247	418		349	853		493	898	
v/s Ratio Prot		0.12			c0.23			0.23			c0.27	
v/s Ratio Perm	0.08		0.01	0.11			0.05			0.26		
v/c Ratio	0.28	0.42	0.03	0.40	0.81		0.09	0.40		0.46	0.48	
Uniform Delay, d1	21.8	22.8	20.2	22.6	26.1		8.0	9.8		10.2	10.4	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.0	0.6	0.0	1.2	11.7		0.5	1.4		3.0	1.9	
Delay (s)	22.9	23.4	20.3	23.9	37.7		8.5	11.2		13.2	12.3	
Level of Service	C	C	C	C	D		A	B		B	B	
Approach Delay (s)		22.9			34.8			11.0			12.6	
Approach LOS		C			C			B			B	

Intersection Summary					
HCM 2000 Control Delay	19.7	HCM 2000 Level of Service		B	
HCM 2000 Volume to Capacity ratio	0.59				
Actuated Cycle Length (s)	78.4	Sum of lost time (s)		12.2	
Intersection Capacity Utilization	106.0%	ICU Level of Service		G	
Analysis Period (min)	15				

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	48	225	43	98	367	31	357	225	443
v/c Ratio	0.28	0.42	0.09	0.40	0.82	0.09	0.41	0.46	0.49
Control Delay	26.8	25.5	7.5	28.1	40.2	9.4	11.0	14.4	12.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	26.8	25.5	7.5	28.1	40.2	9.4	11.0	14.4	12.4
Queue Length 50th (m)	5.5	27.1	0.0	11.7	45.6	2.1	26.6	19.2	36.5
Queue Length 95th (m)	14.5	45.8	6.7	25.0	#87.8	6.1	45.0	37.2	59.5
Internal Link Dist (m)		349.6			202.9		670.4		269.8
Turn Bay Length (m)	50.0		50.0	50.0		50.0		100.0	
Base Capacity (vph)	184	572	489	265	475	349	866	493	908
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.26	0.39	0.09	0.37	0.77	0.09	0.41	0.46	0.49

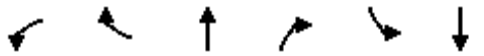
Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	90	16	443	117	15	422
Future Volume (Veh/h)	90	16	443	117	15	422
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	98	17	482	127	16	459
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)			294			
pX, platoon unblocked						
vC, conflicting volume	973	482			609	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	973	482			609	
tC, single (s)	6.4	6.2			4.2	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.3	
p0 queue free %	64	97			98	
cM capacity (veh/h)	274	588			927	

Direction, Lane #	WB 1	NB 1	NB 2	SB 1
Volume Total	115	482	127	475
Volume Left	98	0	0	16
Volume Right	17	0	127	0
cSH	297	1700	1700	927
Volume to Capacity	0.39	0.28	0.07	0.02
Queue Length 95th (m)	13.4	0.0	0.0	0.4
Control Delay (s)	24.6	0.0	0.0	0.5
Lane LOS	C			A
Approach Delay (s)	24.6	0.0		0.5
Approach LOS	C			

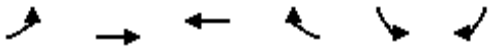
Intersection Summary			
Average Delay	2.6		
Intersection Capacity Utilization	47.0%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	93	54	21	111	53	13
Future Volume (Veh/h)	93	54	21	111	53	13
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	101	59	23	121	58	14
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	214	84			144	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	214	84			144	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	86	94			96	
cM capacity (veh/h)	748	981			1451	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	160	144	72
Volume Left	101	0	58
Volume Right	59	121	0
cSH	820	1700	1451
Volume to Capacity	0.20	0.08	0.04
Queue Length 95th (m)	5.5	0.0	0.9
Control Delay (s)	10.5	0.0	6.2
Lane LOS	B		A
Approach Delay (s)	10.5	0.0	6.2
Approach LOS	B		

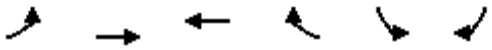
Intersection Summary			
Average Delay	5.6		
Intersection Capacity Utilization	30.0%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	73	91	90	80	80	57
Future Volume (Veh/h)	73	91	90	80	80	57
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)	79	99	98	87	87	62
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	185				398	142
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	185				398	142
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	94				85	93
cM capacity (veh/h)	1402				576	912

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	178	185	149
Volume Left	79	0	87
Volume Right	0	87	62
cSH	1402	1700	681
Volume to Capacity	0.06	0.11	0.22
Queue Length 95th (m)	1.4	0.0	6.3
Control Delay (s)	3.7	0.0	11.8
Lane LOS	A		B
Approach Delay (s)	3.7	0.0	11.8
Approach LOS			B

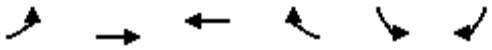
Intersection Summary			
Average Delay	4.7		
Intersection Capacity Utilization	36.4%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	138	370	438	18	18	138
Future Volume (Veh/h)	138	370	438	18	18	138
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)	150	402	476	20	20	150
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	496				1188	486
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	496				1188	486
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	86				89	74
cM capacity (veh/h)	1078				181	585

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	552	496	170
Volume Left	150	0	20
Volume Right	0	20	150
cSH	1078	1700	463
Volume to Capacity	0.14	0.29	0.37
Queue Length 95th (m)	3.7	0.0	12.6
Control Delay (s)	3.6	0.0	17.2
Lane LOS	A		C
Approach Delay (s)	3.6	0.0	17.2
Approach LOS			C

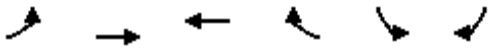
Intersection Summary			
Average Delay	4.0		
Intersection Capacity Utilization	70.8%	ICU Level of Service	C
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	354	422	154	154	0
Future Volume (Veh/h)	0	354	422	154	154	0
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)	0	385	459	167	167	0
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	626				928	542
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	626				928	542
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				44	100
cM capacity (veh/h)	965				300	544

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	385	626	167
Volume Left	0	0	167
Volume Right	0	167	0
cSH	965	1700	300
Volume to Capacity	0.00	0.37	0.56
Queue Length 95th (m)	0.0	0.0	24.0
Control Delay (s)	0.0	0.0	31.0
Lane LOS			D
Approach Delay (s)	0.0	0.0	31.0
Approach LOS			D

Intersection Summary			
Average Delay	4.4		
Intersection Capacity Utilization	46.8%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	104	354	422	0	0	104
Future Volume (Veh/h)	104	354	422	0	0	104
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)	113	385	459	0	0	113
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)		310				
pX, platoon unblocked					0.98	
vC, conflicting volume	459				1070	459
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	459				1062	459
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	90				100	81
cM capacity (veh/h)	1113				220	606

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	498	459	113
Volume Left	113	0	0
Volume Right	0	0	113
cSH	1113	1700	606
Volume to Capacity	0.10	0.27	0.19
Queue Length 95th (m)	2.6	0.0	5.2
Control Delay (s)	2.8	0.0	12.3
Lane LOS	A		B
Approach Delay (s)	2.8	0.0	12.3
Approach LOS			B

Intersection Summary			
Average Delay		2.6	
Intersection Capacity Utilization		63.0%	ICU Level of Service B
Analysis Period (min)		15	

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	90	16	443	117	15	422
Future Volume (Veh/h)	90	16	443	117	15	422
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	98	17	482	127	16	459
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)			294			
pX, platoon unblocked						
vC, conflicting volume	973	482			609	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	973	482			609	
tC, single (s)	6.4	6.2			4.2	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.3	
p0 queue free %	64	97			98	
cM capacity (veh/h)	274	588			927	

Direction, Lane #	WB 1	NB 1	NB 2	SB 1
Volume Total	115	482	127	475
Volume Left	98	0	0	16
Volume Right	17	0	127	0
cSH	297	1700	1700	927
Volume to Capacity	0.39	0.28	0.07	0.02
Queue Length 95th (m)	13.4	0.0	0.0	0.4
Control Delay (s)	24.6	0.0	0.0	0.5
Lane LOS	C			A
Approach Delay (s)	24.6	0.0		0.5
Approach LOS	C			

Intersection Summary			
Average Delay	2.6		
Intersection Capacity Utilization	47.0%	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)	65	216	33	94	244	188	37	307	83	159	278	75
Future Volume (vph)	65	216	33	94	244	188	37	307	83	159	278	75
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.0	3.5	3.0	3.0	3.5	3.0	3.0	3.5	3.0	3.0	3.5	3.0
Total Lost time (s)	6.1	6.1	6.1	6.1	6.1		6.1	6.1		6.1	6.1	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.93		1.00	0.97		1.00	0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1370	1515	1299	1452	1459		1518	1650		1416	1606	
Flt Permitted	0.30	1.00	1.00	0.59	1.00		0.46	1.00		0.43	1.00	
Satd. Flow (perm)	439	1515	1299	906	1459		743	1650		636	1606	
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)	71	235	36	102	265	204	40	334	90	173	302	82
RTOR Reduction (vph)	0	0	23	0	38	0	0	11	0	0	11	0
Lane Group Flow (vph)	71	235	13	102	431	0	40	413	0	173	373	0
Heavy Vehicles (%)	23%	24%	16%	16%	26%	13%	11%	9%	15%	19%	9%	29%
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)	26.6	26.6	26.6	26.6	26.6		34.1	34.1		34.1	34.1	
Effective Green, g (s)	26.6	26.6	26.6	26.6	26.6		34.1	34.1		34.1	34.1	
Actuated g/C Ratio	0.36	0.36	0.36	0.36	0.36		0.47	0.47		0.47	0.47	
Clearance Time (s)	6.1	6.1	6.1	6.1	6.1		6.1	6.1		6.1	6.1	
Vehicle Extension (s)	3.5	3.5	3.5	3.5	3.5		3.5	3.5		3.5	3.5	
Lane Grp Cap (vph)	160	552	473	330	532		347	771		297	751	
v/s Ratio Prot		0.16			c0.30			0.25			0.23	
v/s Ratio Perm	0.16		0.01	0.11			0.05			c0.27		
v/c Ratio	0.44	0.43	0.03	0.31	0.81		0.12	0.54		0.58	0.50	
Uniform Delay, d1	17.5	17.4	14.9	16.6	20.9		10.9	13.8		14.2	13.4	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	2.3	0.6	0.0	0.6	9.1		0.7	2.7		8.1	2.3	
Delay (s)	19.9	18.0	14.9	17.2	30.0		11.6	16.4		22.3	15.8	
Level of Service	B	B	B	B	C		B	B		C	B	
Approach Delay (s)		18.1			27.7			16.0			17.8	
Approach LOS		B			C			B			B	

Intersection Summary					
HCM 2000 Control Delay	20.3	HCM 2000 Level of Service	C		
HCM 2000 Volume to Capacity ratio	0.68				
Actuated Cycle Length (s)	72.9	Sum of lost time (s)	12.2		
Intersection Capacity Utilization	111.3%	ICU Level of Service	H		
Analysis Period (min)	15				

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	71	235	36	102	469	40	424	173	384
v/c Ratio	0.45	0.43	0.07	0.31	0.82	0.12	0.54	0.58	0.50
Control Delay	27.2	19.7	4.6	18.9	31.2	14.2	17.6	26.5	16.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	27.2	19.7	4.6	18.9	31.2	14.2	17.6	26.5	16.9
Queue Length 50th (m)	7.2	23.6	0.0	9.8	50.0	2.9	36.7	16.3	32.2
Queue Length 95th (m)	19.0	40.6	4.4	20.6	85.4	9.7	73.9	#48.6	65.8
Internal Link Dist (m)		349.6			202.9		670.4		269.8
Turn Bay Length (m)	50.0		50.0	50.0		50.0		100.0	
Base Capacity (vph)	204	708	629	424	714	347	782	297	762
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.35	0.33	0.06	0.24	0.66	0.12	0.54	0.58	0.50

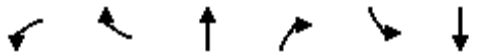
Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	96	15	564	141	22	555
Future Volume (Veh/h)	96	15	564	141	22	555
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	101	16	594	148	23	584
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)			294			
pX, platoon unblocked						
vC, conflicting volume	1224	594			742	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1224	594			742	
tC, single (s)	6.4	6.2			4.2	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.3	
p0 queue free %	48	97			97	
cM capacity (veh/h)	194	509			817	

Direction, Lane #	WB 1	NB 1	NB 2	SB 1
Volume Total	117	594	148	607
Volume Left	101	0	0	23
Volume Right	16	0	148	0
cSH	212	1700	1700	817
Volume to Capacity	0.55	0.35	0.09	0.03
Queue Length 95th (m)	22.5	0.0	0.0	0.7
Control Delay (s)	41.1	0.0	0.0	0.8
Lane LOS	E			A
Approach Delay (s)	41.1	0.0		0.8
Approach LOS	E			

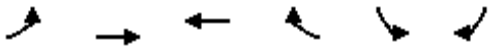
Intersection Summary			
Average Delay	3.6		
Intersection Capacity Utilization	59.9%	ICU Level of Service	B
Analysis Period (min)	15		



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	100	61	12	151	57	11
Future Volume (Veh/h)	100	61	12	151	57	11
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	105	64	13	159	60	12
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	224	92			172	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	224	92			172	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	86	93			96	
cM capacity (veh/h)	736	970			1417	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	169	172	72
Volume Left	105	0	60
Volume Right	64	159	0
cSH	810	1700	1417
Volume to Capacity	0.21	0.10	0.04
Queue Length 95th (m)	6.0	0.0	1.0
Control Delay (s)	10.6	0.0	6.4
Lane LOS	B		A
Approach Delay (s)	10.6	0.0	6.4
Approach LOS	B		

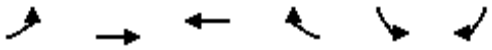
Intersection Summary			
Average Delay	5.5		
Intersection Capacity Utilization	33.0%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	70	138	109	95	94	52
Future Volume (Veh/h)	70	138	109	95	94	52
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	74	145	115	100	99	55
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	215				458	165
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	215				458	165
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	95				81	94
cM capacity (veh/h)	1367				534	885

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	219	215	154
Volume Left	74	0	99
Volume Right	0	100	55
cSH	1367	1700	622
Volume to Capacity	0.05	0.13	0.25
Queue Length 95th (m)	1.3	0.0	7.4
Control Delay (s)	2.9	0.0	12.7
Lane LOS	A		B
Approach Delay (s)	2.9	0.0	12.7
Approach LOS			B

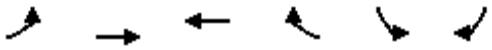
Intersection Summary			
Average Delay	4.4		
Intersection Capacity Utilization	41.1%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	169	420	481	37	22	154
Future Volume (Veh/h)	169	420	481	37	22	154
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	178	442	506	39	23	162
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	545				1324	526
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	545				1324	526
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	83				84	71
cM capacity (veh/h)	1034				144	556

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	620	545	185
Volume Left	178	0	23
Volume Right	0	39	162
cSH	1034	1700	410
Volume to Capacity	0.17	0.32	0.45
Queue Length 95th (m)	4.7	0.0	17.3
Control Delay (s)	4.2	0.0	20.8
Lane LOS	A		C
Approach Delay (s)	4.2	0.0	20.8
Approach LOS			C

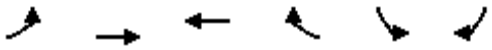
Intersection Summary			
Average Delay	4.8		
Intersection Capacity Utilization	79.7%	ICU Level of Service	D
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	407	465	170	182	0
Future Volume (Veh/h)	0	407	465	170	182	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	0	428	489	179	192	0
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	668				1006	578
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	668				1006	578
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				29	100
cM capacity (veh/h)	931				269	519

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	428	668	192
Volume Left	0	0	192
Volume Right	0	179	0
cSH	931	1700	269
Volume to Capacity	0.00	0.39	0.71
Queue Length 95th (m)	0.0	0.0	37.5
Control Delay (s)	0.0	0.0	45.7
Lane LOS			E
Approach Delay (s)	0.0	0.0	45.7
Approach LOS			E

Intersection Summary			
Average Delay	6.8		
Intersection Capacity Utilization	51.6%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	112	407	465	0	0	123
Future Volume (Veh/h)	112	407	465	0	0	123
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	118	428	489	0	0	129
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)		310				
pX, platoon unblocked					0.97	
vC, conflicting volume	489				1153	489
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	489				1142	489
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	89				100	78
cM capacity (veh/h)	1085				193	583

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	546	489	129
Volume Left	118	0	0
Volume Right	0	0	129
cSH	1085	1700	583
Volume to Capacity	0.11	0.29	0.22
Queue Length 95th (m)	2.8	0.0	6.4
Control Delay (s)	2.9	0.0	12.9
Lane LOS	A		B
Approach Delay (s)	2.9	0.0	12.9
Approach LOS			B

Intersection Summary			
Average Delay	2.8		
Intersection Capacity Utilization	69.7%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	75	231	54	84	267	237	68	405	104	184	399	80
Future Volume (vph)	75	231	54	84	267	237	68	405	104	184	399	80
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.0	3.5	3.0	3.0	3.5	3.0	3.0	3.5	3.0	3.0	3.5	3.0
Total Lost time (s)	6.1	6.1	6.1	6.1	6.1		6.1	6.1		6.1	6.1	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.93		1.00	0.97		1.00	0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1348	1515	1346	1359	1537		1560	1676		1440	1668	
Flt Permitted	0.23	1.00	1.00	0.58	1.00		0.35	1.00		0.32	1.00	
Satd. Flow (perm)	332	1515	1346	827	1537		577	1676		491	1668	
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)	79	243	57	88	281	249	72	426	109	194	420	84
RTOR Reduction (vph)	0	0	36	0	41	0	0	11	0	0	9	0
Lane Group Flow (vph)	79	243	21	88	489	0	72	524	0	194	495	0
Heavy Vehicles (%)	25%	24%	12%	24%	16%	11%	8%	6%	19%	17%	8%	19%
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)	27.6	27.6	27.6	27.6	27.6		35.4	35.4		35.4	35.4	
Effective Green, g (s)	27.6	27.6	27.6	27.6	27.6		35.4	35.4		35.4	35.4	
Actuated g/C Ratio	0.37	0.37	0.37	0.37	0.37		0.47	0.47		0.47	0.47	
Clearance Time (s)	6.1	6.1	6.1	6.1	6.1		6.1	6.1		6.1	6.1	
Vehicle Extension (s)	3.5	3.5	3.5	3.5	3.5		3.5	3.5		3.5	3.5	
Lane Grp Cap (vph)	121	556	494	303	564		271	788		231	785	
v/s Ratio Prot		0.16			c0.32			0.31			0.30	
v/s Ratio Perm	0.24		0.02	0.11			0.12			c0.40		
v/c Ratio	0.65	0.44	0.04	0.29	0.87		0.27	0.66		0.84	0.63	
Uniform Delay, d1	19.8	17.9	15.3	16.9	22.1		12.0	15.3		17.4	15.0	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	12.4	0.7	0.0	0.6	13.5		0.6	2.2		23.1	1.7	
Delay (s)	32.3	18.6	15.3	17.5	35.6		12.7	17.5		40.6	16.7	
Level of Service	C	B	B	B	D		B	B		D	B	
Approach Delay (s)		21.0			33.0			17.0			23.3	
Approach LOS		C			C			B			C	

Intersection Summary			
HCM 2000 Control Delay	23.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	75.2	Sum of lost time (s)	12.2
Intersection Capacity Utilization	118.2%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

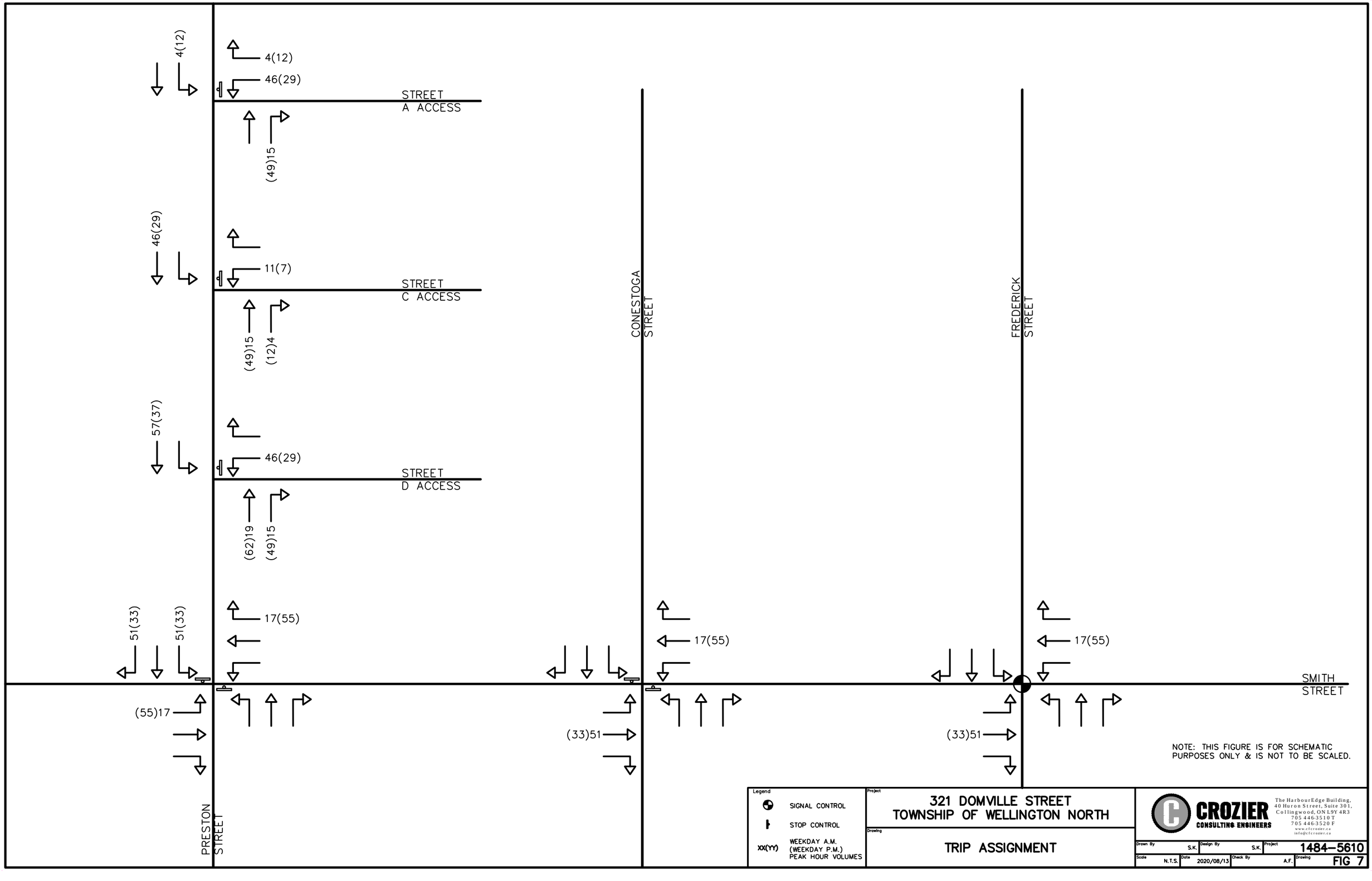
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	79	243	57	88	530	72	535	194	504
v/c Ratio	0.65	0.44	0.11	0.29	0.88	0.27	0.67	0.84	0.64
Control Delay	48.8	21.1	5.4	20.3	37.5	16.5	20.6	53.0	19.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	48.8	21.1	5.4	20.3	37.5	16.5	20.6	53.0	19.7
Queue Length 50th (m)	9.4	26.3	0.0	9.0	63.4	6.5	58.8	25.1	54.4
Queue Length 95th (m)	#30.5	45.2	6.6	19.9	#118.9	15.7	93.5	#64.2	86.7
Internal Link Dist (m)		349.6			202.9		670.4		269.8
Turn Bay Length (m)	50.0		50.0	50.0		50.0		100.0	
Base Capacity (vph)	137	627	590	342	675	285	840	243	834
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.58	0.39	0.10	0.26	0.79	0.25	0.64	0.80	0.60

Intersection Summary

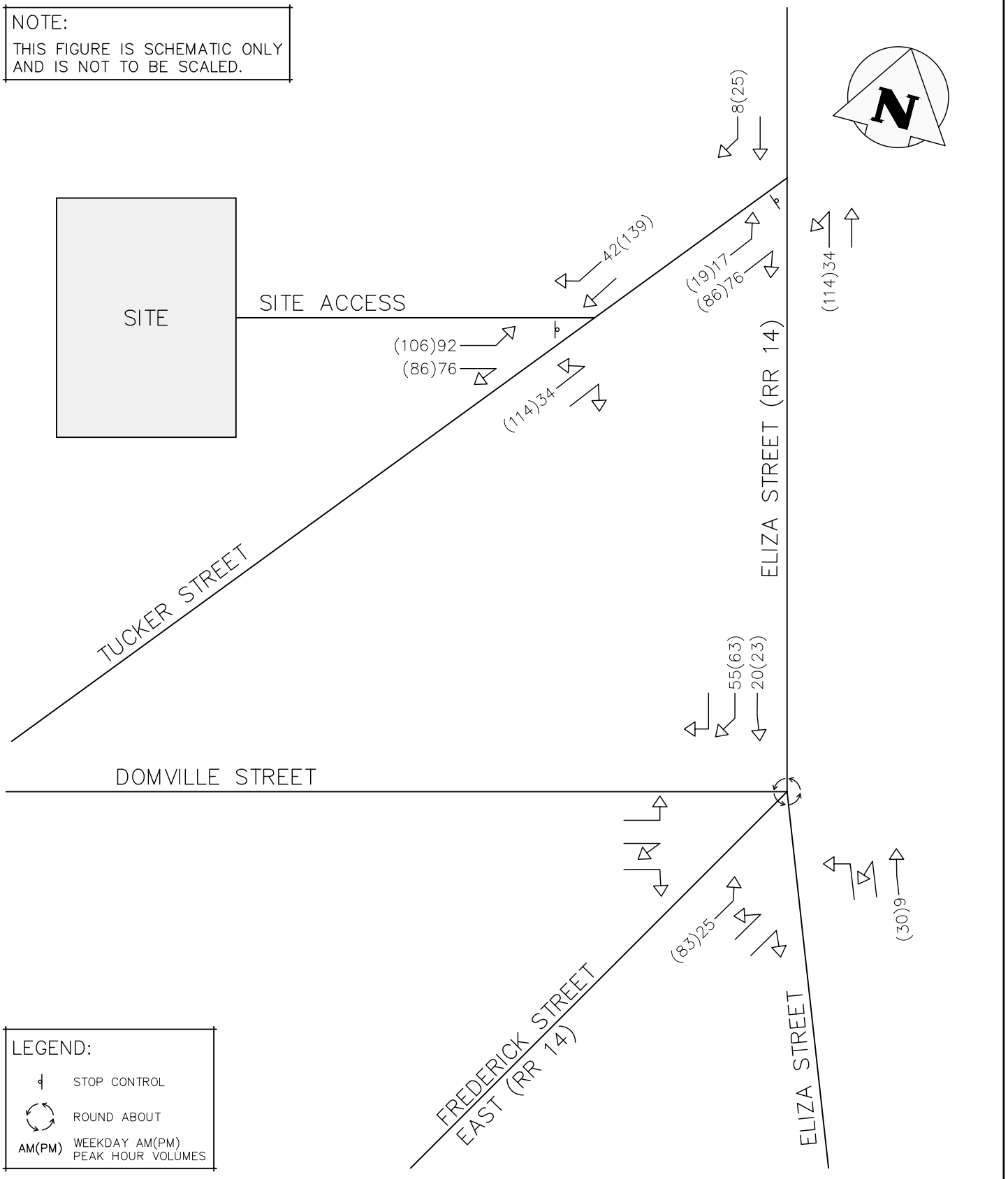
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

APPENDIX D

Background Development Site Traffic


4(12)
4(12)
46(29)
STREET
A ACCESS
(49)15
46(29)
11(7)
STREET
C ACCESS
(49)15
(12)4
57(37)
46(29)
STREET
D ACCESS
(62)19
(49)15
51(33)
51(33)
17(55)
(55)17
(33)51
CONESTOGA
STREET
17(55)
(33)51
FREDERICK
STREET
17(55)
SMITH
STREET
PRESTON
STREET
NOTE: THIS FIGURE IS FOR SCHEMATIC
PURPOSES ONLY & IS NOT TO BE SCALED.
Legend
SIGNAL CONTROL
STOP CONTROL
XX(YY) WEEKDAY A.M. (WEEKDAY P.M.) PEAK HOUR VOLUMES
Project
321 DOMVILLE STREET
TOWNSHIP OF WELLINGTON NORTH
Drawing
TRIP ASSIGNMENT
CROZIER
CONSULTING ENGINEERS
The HarbourEdge Building,
40 Huron Street, Suite 301,
Collingwood, ON L9Y 4R3
705 446-3510 T
705 446-3520 F
www.cfcrozier.ca
info@cfcrozier.ca
Drawn By S.K.
Design By S.K.
Project 1484-5610
Scale N.T.S.
Date 2020/08/13
Check By A.F.
Drawing FIG 7

NOTE:
THIS FIGURE IS SCHEMATIC ONLY AND IS NOT TO BE SCALED.



NORTH ARTHUR RESIDENTIAL DEVELOPMENT
TOWNSHIP OF WELLINGTON NORTH

TRIP ASSIGNMENT

CROZIER CONSULTING ENGINEERS
THE HARBOUREDGE BUILDING,
40 HURON STREET, SUITE 301,
COLLINGWOOD, ON L9Y 4R3
705 446-3510 T
705 446-3520 F
WWW.CFCROZIER.CA
INFO@CFCROZIER.CA

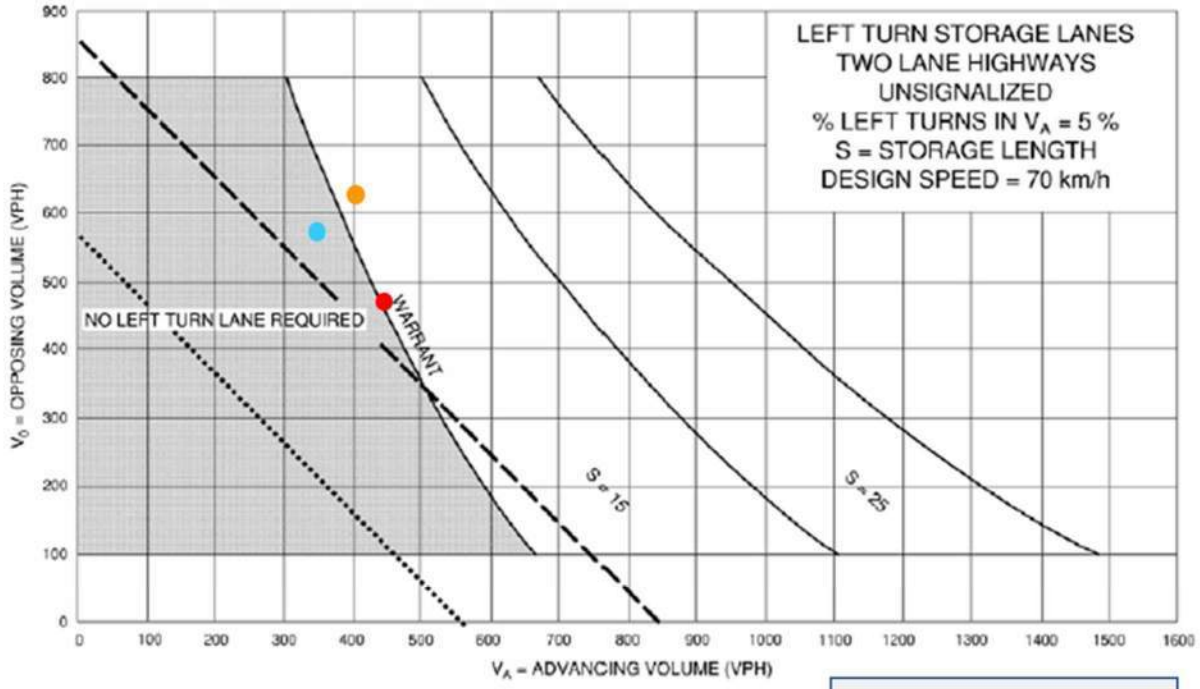
Drawn	Design	Project No.	
T.D.S.	T.D.S.		2024-5844
Date	Check	Scale	Dwg.
2021/03/04	K.H.	N.T.S	FIG. 07

APPENDIX E

Transportation Association of Canada

Geometric Design Guide for Canadian Roads (2017)

Excerpts

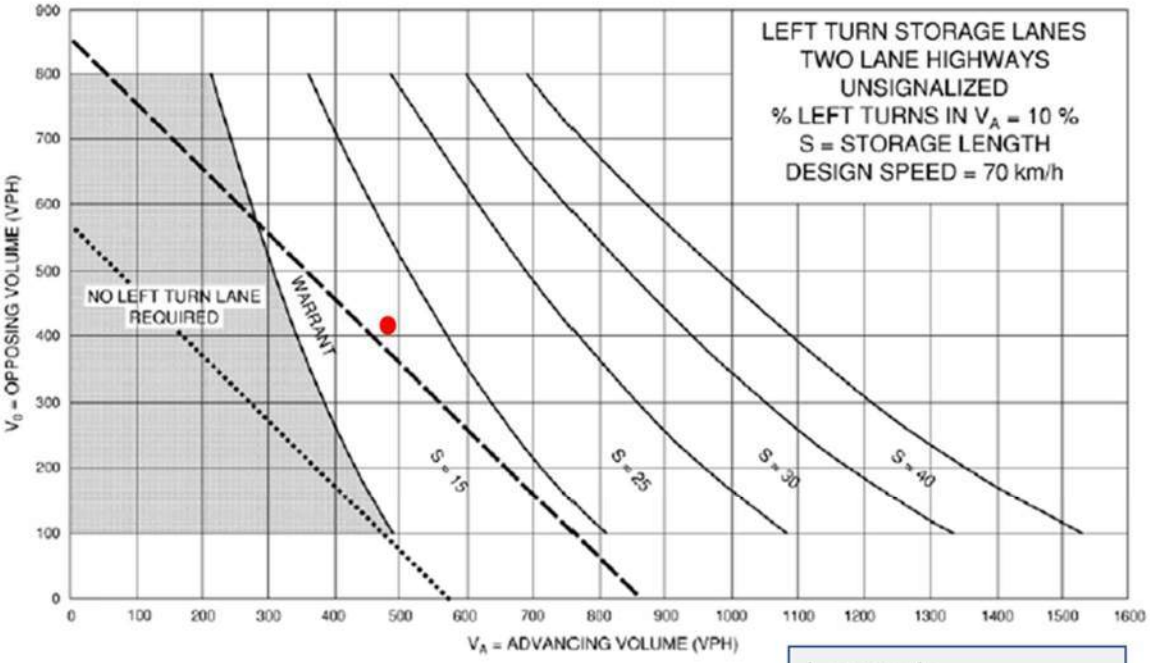


TRAFFIC SIGNALS MAY BE WARRANTED IN RURAL AREAS OR URBAN AREAS WITH RESTRICTED FLOW

TRAFFIC SIGNALS MAY BE WARRANTED IN "FREE FLOW" URBAN AREAS

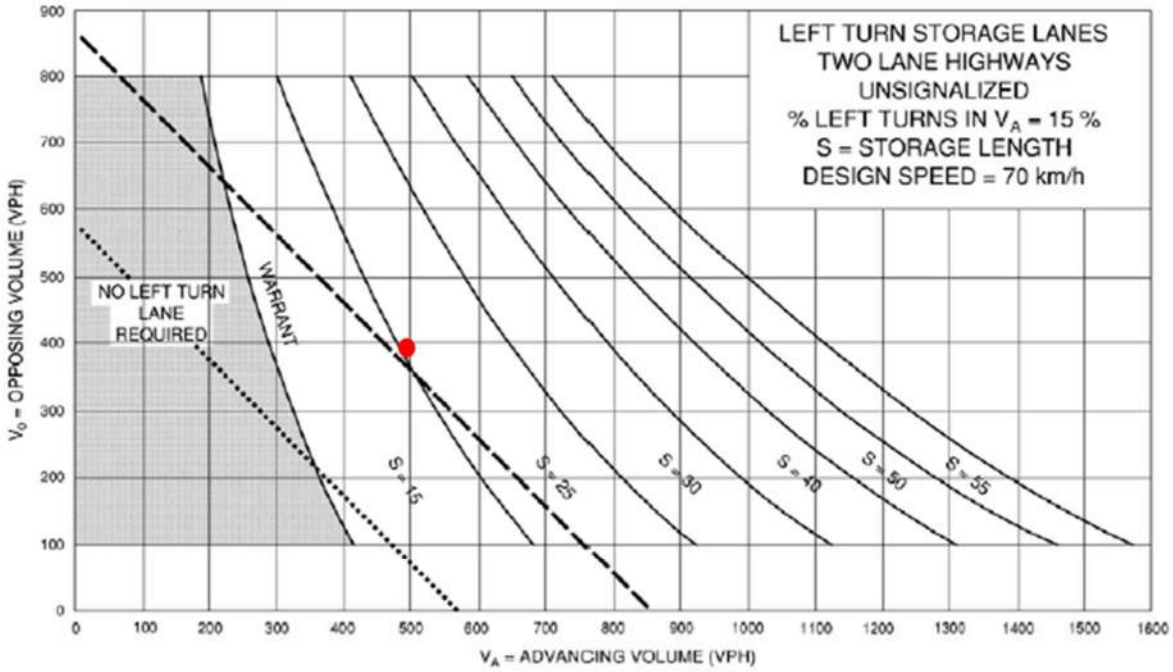
Legend:

- Retail Access East (AM)
- Retail Access East (MD)
- Retail Access East (PM)



Legend:

Residential Access (AM)

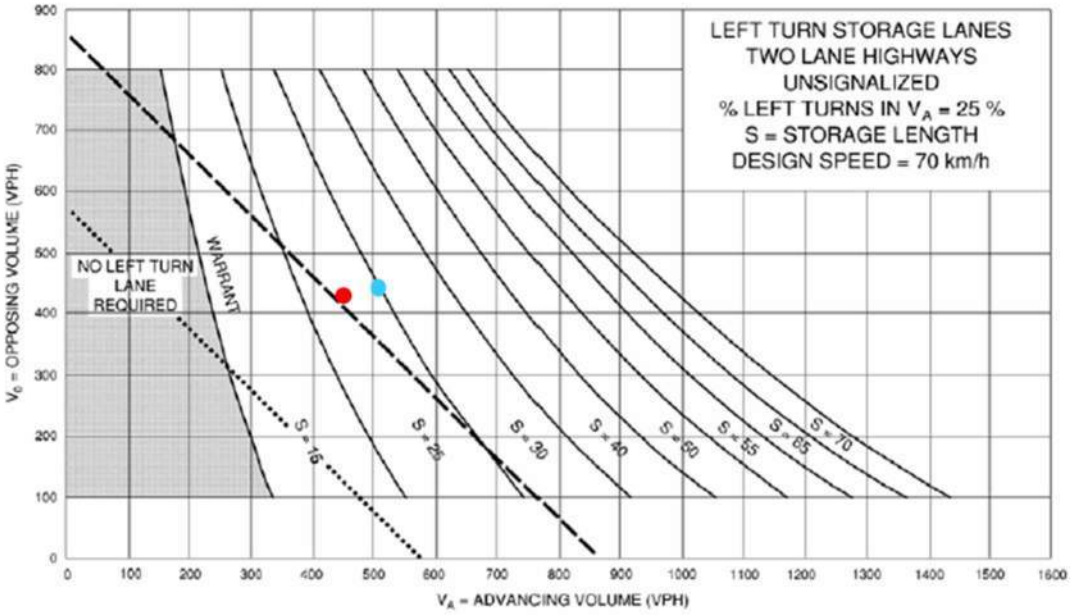


TRAFFIC SIGNALS MAY BE WARRANTED IN RURAL AREAS OR URBAN AREAS WITH RESTRICTED FLOW

TRAFFIC SIGNALS MAY BE WARRANTED IN "FREE FLOW" URBAN AREAS

Legend:

Retail Access West (AM)

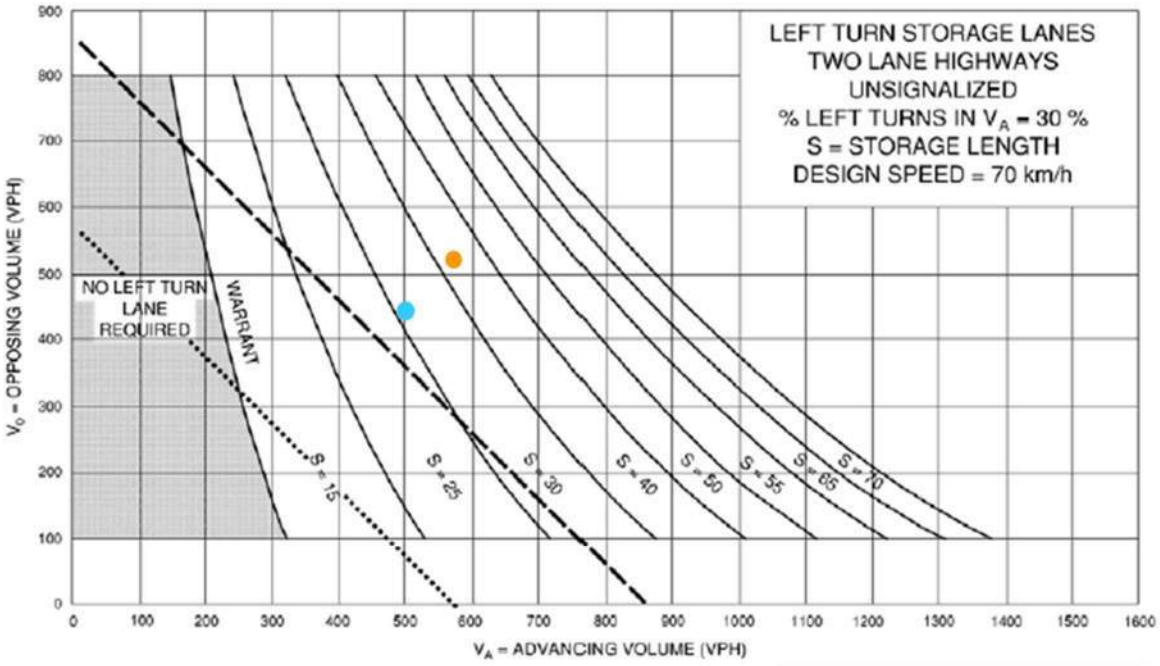


TRAFFIC SIGNALS MAY BE WARRANTED IN RURAL AREAS OR URBAN AREAS WITH RESTRICTED FLOW

TRAFFIC SIGNALS MAY BE WARRANTED IN "FREE FLOW" URBAN AREAS

Legend:

- Retail Access West (MD)
- Retail Access West (PM)



Legend:

- Residential Access (MD)
- Residential Access (PM)

APPENDIX F

Signal Warrant Analysis at Highway 6 / Eliza St

Turning Movement Volumes at Major Road and Minor Road
Horizon: 2030

INPUTS												
Peak Hour	**Major Road** Highway 6						**Minor Road** Eliza St					
	NB / EB			**SB** / WB			NB / **EB**			SB / **WB**		
	T	**L**	**R**	**T**	**L**	**R**	**T**	**L**	**R**	**T**	**L**	**R**
AM Peak Hour	348	0	65	470	8	0					143	15
PM Peak Hour	564	0	141	555	22	0					96	15
Average Hourly Volume (AHV)	228	0	52	256	8	0	0	0	0	0	60	8
										Total Volume (AM+PM):		2,442

CALCULATIONS									
1A	**1B**	**2A**	**2B**	**2B Calculation**					
				Peds					
All	**Minor Street**	**Major Street**	**Traffic Crossing**	crossing	Minor	Heavier	50% Heavier	0.5 Major	0.5 Major
Approaches	**Approaches**	**Approaches**	**Major Street**	major	lefts	Thru minor	LT Major	left	left
1,049	158	891	153	10	143	0	0	0	0
1,393	111	1,282	106	10	96	0	0	0	0
611	67	543	70	10	60	0	0	0	0

Note: In industrial areas or areas with high truck percentages, truck volumes may be converted to PCU using factors of 1.5 to 3.5.

New intersection? Y or N: N
' T ' intersection? Y or N: Y

APPROACH LANES	1		2 OR MORE	
FLOW CONDITION	RURAL	URBAN	RURAL	URBAN
		X		

TRAFFIC SIGNAL WARRANT ANALYSIS FORM FOR INTERSECTION CONTROL

OTM Book 12 Justification 7 Projected Volumes (March 2012)

Major Street: **Highway 6**
Minor Street: **Eliza St**

New intersection? Y or N: **N**
' T ' intersection? Y or N: **Y**

WARRANT 1 - MINIMUM VEHICULAR VOLUME

100% SATISFIED YES [ ] NO [X]
80% SATISFIED YES [ ] NO [X]

	MINIMUM REQUIREMENTS (80% SHOWN IN BRACKETS)				PERCENTAGE WARRANT									
APPROACH LANES	1		2 OR MORE		HOUR ENDING									
FLOW CONDITION	RURAL	URBAN	RURAL	URBAN	AHV									
		X												
1A. ALL APPROACHES	576 (461)	864 (691)	720 (576)	1080 (864)	611								TOTAL ACROSS	
100% FULFILLED					0								0	
80% FULFILLED					0								0	SECTIONAL
ACTUAL % IF BELOW 80% VALUE					71%								71	PERCENT
												TOTAL	71	**71**

	MINIMUM REQUIREMENTS (80% SHOWN IN BRACKETS)				PERCENTAGE WARRANT									
APPROACH LANES	1		2 OR MORE		HOUR ENDING									
FLOW CONDITION	RURAL	URBAN	RURAL	URBAN	AHV									
		X												
1B. MINOR STREET BOTH APPROACHES	216 (173)	306 (245)	216 (173)	306 (245)	67								TOTAL ACROSS	
100% FULFILLED					0								0	
80% FULFILLED					0								0	SECTIONAL
ACTUAL % IF BELOW 80% VALUE					22%								22	PERCENT
												TOTAL	22	**22**

WARRANT 2 - DELAY TO CROSS TRAFFIC

100% SATISFIED YES [ ] NO [X]
80% SATISFIED YES [ ] NO [X]

	MINIMUM REQUIREMENTS (80% SHOWN IN BRACKETS)				PERCENTAGE WARRANT									
APPROACH LANES	1		2 OR MORE		HOUR ENDING									
FLOW CONDITION	RURAL	URBAN	RURAL	URBAN	AHV									
		X												
A. MAJOR STREET BOTH APPROACHES	576 (461)	864 (691)	720 (576)	1080 (864)	543								TOTAL ACROSS	
100% FULFILLED					0								0	
80% FULFILLED					0								0	SECTIONAL
ACTUAL % IF BELOW 80% VALUE					63%								63	PERCENT
												TOTAL	63	**63**

	MINIMUM REQUIREMENTS (80% SHOWN IN BRACKETS)				PERCENTAGE WARRANT									
APPROACH LANES	1		2 OR MORE		HOUR ENDING									
FLOW CONDITION	RURAL	URBAN	RURAL	URBAN	AHV									
		X												
B. TRAFFIC CROSSING MAJOR STREET	60 (48)	90 (72)	144 (115)	204 (163)	70								TOTAL ACROSS	
100% FULFILLED					0								0	
80% FULFILLED					0								0	SECTIONAL
ACTUAL % IF BELOW 80% VALUE					78%								78	PERCENT
												TOTAL	78	**78**

WARRANT 4 - COMBINATION WARRANT

Used if neither Justification 1 or 2 met 100%

SATISFIED YES [ ] NO [X]

REQUIREMENT	WARRANT SATISFIED 80% OR MORE	Yes	No
Two Warrants Satisfied 80%	Warrant 1 - Minimum Vehicular Volume		X
	Warrant 2 - Delay to Cross Traffic		X

FULFILLED	
Yes	No
	X

CONCLUSION: TRAFFIC SIGNALS WARRANTED? **YES** [ ] **NO** [X]