

TOWN OF CALEDON  
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# 12148 Albion Vaughan Road Bolton, ON Traffic Impact & Parking Study

Paradigm Transportation Solutions Limited

September 2024  
200185





**Project Number**  
200185

## 12148 Albion Vaughan Road Traffic Impact & Parking Study

**September 2024**

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Version 1.0.0

# Executive Summary

## Content

This report is an update to the December 2022, and April 2024 study iterations previously prepared. This addresses review comments following the most recent development application submission. Specifically, horizon years for assessment and further investigation regarding auxiliary turn lanes at the site access.

This study has been prepared in support of a proposed residential development for a site located at the municipal address of 12148 Albion Vaughan Road in the community of Bolton, Town of Caledon, Region of Peel.

The development as proposed consists of two residential towers, one six-storey tower and one seven-storey tower. In total the overall development proposes a total of 264 residential dwelling units. A total of 468 parking spaces would be provided on-site to serve the development. Vehicular access would be provided via full-movement driveway connections with Albion Vaughan Road. A total of 86 bicycle parking spaces will also serve the development (56 long-term and 30 short-term spaces).

The study assesses the weekday AM and PM peak hour traffic impact of the proposed development, provides a review of the parking requirements, and a functional review of the proposed site plan.

## Conclusions

The conclusions of the study are as follows:

- ▶ Under the base year conditions, all study area intersections operate at acceptable levels of service and within capacity.
- ▶ For the 2032 background traffic conditions (without subject development), all study area intersections are forecast to operate at acceptable levels of service and within capacity.

The exception would be the Regional Road 50 and Albion Vaughan Road/Mayfield Road intersection, where the overall intersection v/c ratio is forecast to be 0.98 during the AM peak hour. The southbound dual through movement is reported to operate with a v/c of 0.97 during the AM peak hour.

- ▶ Under the 2032 total traffic conditions (with subject development), all study area intersections are forecast to operate at acceptable levels of service and within capacity.



The previously identified critical movements would continue to be reported, albeit slightly exacerbated, with the addition of the westbound left turn movement identified under the AM peak hour.

- ▶ The overall impact of the proposed residential development is anticipated to be minimal. The development is estimated to generate and add a total of 105 and 104 vehicle trips to the adjacent transportation network during the AM and PM peak hours, respectively.

The additional traffic would be less than daily traffic variations typically experienced. It is determined the site generated traffic would increase volumes at the study area intersections between 0.9 to 2.2%;

- ▶ To mitigate identified critical movements under total traffic conditions, the planned road widening of Albion-Vaughan Road, and auxiliary dual left-turn lanes were investigated at the westbound approach at the intersection of Regional Road 50 and Albion Vaughan Road/Mayfield Road intersection.

As analyzed with the planned road widening, and dual left-turn lanes on the westbound approach and optimization of signal timing splits within exiting cycle lengths, the overall intersection is reported to operate at acceptable levels of service and with all movements within capacity under the 2032 horizon.

- ▶ At the main central site access intersection with Albion Vaughan Road, it was determined an auxiliary northbound left-turn lane would be warranted from a volume perspective for the future four-lane cross-section of Albion-Vaughan Road;
- ▶ The proposed vehicular parking supply satisfies the minimum zoning by-law requirements.
- ▶ A review of the site plan was undertaken. No major conflicts or issues were identified for the anticipated design vehicles expected on-site.

## Recommendations

The recommendations of the study are as follows:

- ▶ From a transportation perspective, the planning applications sought should be approved as the development is determined to have a minimal impact on the adjacent transportation network;
- ▶ Provision of a northbound left-turn lane on Albion-Vaughan Road to serve the site's central access;



- ▶ The Town of Caledon to provide the planned widening Albion-Vaughan Road to four-lanes by 2031 as identified within the Multi-Modal Transportation Master Plan; and
- ▶ The intersection volumes and operations at the Regional Road 50 and Albion Vaughan Road/Mayfield Road intersection be monitored by the applicable jurisdiction to determine when dual westbound left-turn lanes should be provided.



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# 1 Introduction

## 1.1 Overview

This report is an update to the December 2022, and April 2024 study iterations which were updates to the original November 2020 study prepared. This addresses review comments following the most recent development application submission. Specifically, horizon years for assessment and further investigation regarding auxiliary turn lanes at the site access.

Paradigm Transportation Solutions Limited (Paradigm) was retained to conduct this Traffic Impact and Parking Study for a proposed residential development in the community of Bolton (Town of Caledon). **Figure 1.1** illustrates the location of the subject site situated on the west side of Albion Vaughan Road, north of Regional Road 50.

## 1.2 Purpose and Scope

The purpose of this report is to identify and assess the potential traffic impacts of the proposed development. The scope of the study was originally developed in consultation with Town of Caledon staff via e-mail correspondence in October 2020.

The study has been updated based on review comments received from Town of Caledon staff to date. At the time of writing of the original study, Region of Peel staff had not responded to our request for pre-study consultation. It is further noted that following the initial and second development application submissions, Region of Peel staff did not have any review comments on the transportation study deliverable. **Appendix A** contains the original terms of reference and pre-study consultation completed with Town staff.

The scope of this study is as follows:

- ▶ A study area comprising the following intersections:
  - Peel Regional Road 50 and Albion Vaughan Road/Mayfield Road;
  - Albion Vaughan Road and Kirby Road; and
  - Albion Vaughan Road and the proposed central site access driveway.
- ▶ Traffic forecasts for 2032, representing a five-year horizon following anticipated build-out/occupancy in 2027;
- ▶ Weekday AM and PM peak hour analysis time periods;



- ▶ A review of parking to confirm the proposed supply will be adequate for the proposed use; and
- ▶ A review of the design of site accesses, internal circulation, and loading areas to confirm they will accommodate the vehicles expected on-site.

The methodology used in this study is summarized below:

- ▶ Estimate the future peak hour background traffic for the horizon year by applying a 2% per annum growth rate as advised by Town staff;
- ▶ Estimate the net increase in vehicular traffic with the proposed development;
- ▶ Combine the future background traffic with the net increase in site traffic to determine the total traffic volumes under the horizon year;
- ▶ Analyze existing, future background, and total traffic conditions;
- ▶ Determine the net impact on operational performance due to site traffic, and the need for road and/or traffic control improvements to address the identified impacts; and
- ▶ Use of AutoTURN software to prepare on-site vehicle maneuvering diagrams.

This study has been carried out in general accordance with the Region's TIS Guidelines<sup>1</sup>, pre-study consultation comments and addressed review comments received from Town staff. **Appendix A** contains the pre-study correspondence and comments.

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<sup>1</sup> Regional Municipality of Peel, *Traffic Impact Study Guidelines*, Accessed 9 November 2020 from <https://www.peelregion.ca/pw/transportation/business/traffic-impact-study.asp>





## Study Area and Site Location

## 2 Proposed Development

The subject site is located at the municipal address of 12148 Albion Vaughan Road. The subject lands are currently occupied by a detached single-family home which would be demolished to facilitate redevelopment of the lands.

**Figure 2.1** illustrates the site plan. The proposed residential development consists of two residential towers. In total the overall development proposes a total of 264 residential dwelling units. The development statistics are as follows:

- ▶ One six-storey residential tower with 114 units total:
  - 37 one-bedroom units;
  - 22 one-bedroom + den units;
  - 31 two-bedroom units;
  - 18 two-bedroom + large balcony units;
  - 6 three-bedroom units.
  
- ▶ One seven-storey residential tower with 150 units total:
  - 40 one-bedroom units;
  - 14 one-bedroom + den units;
  - 68 two-bedroom units;
  - 21 two-bedroom + large balcony units;
  - 7 three-bedroom units.

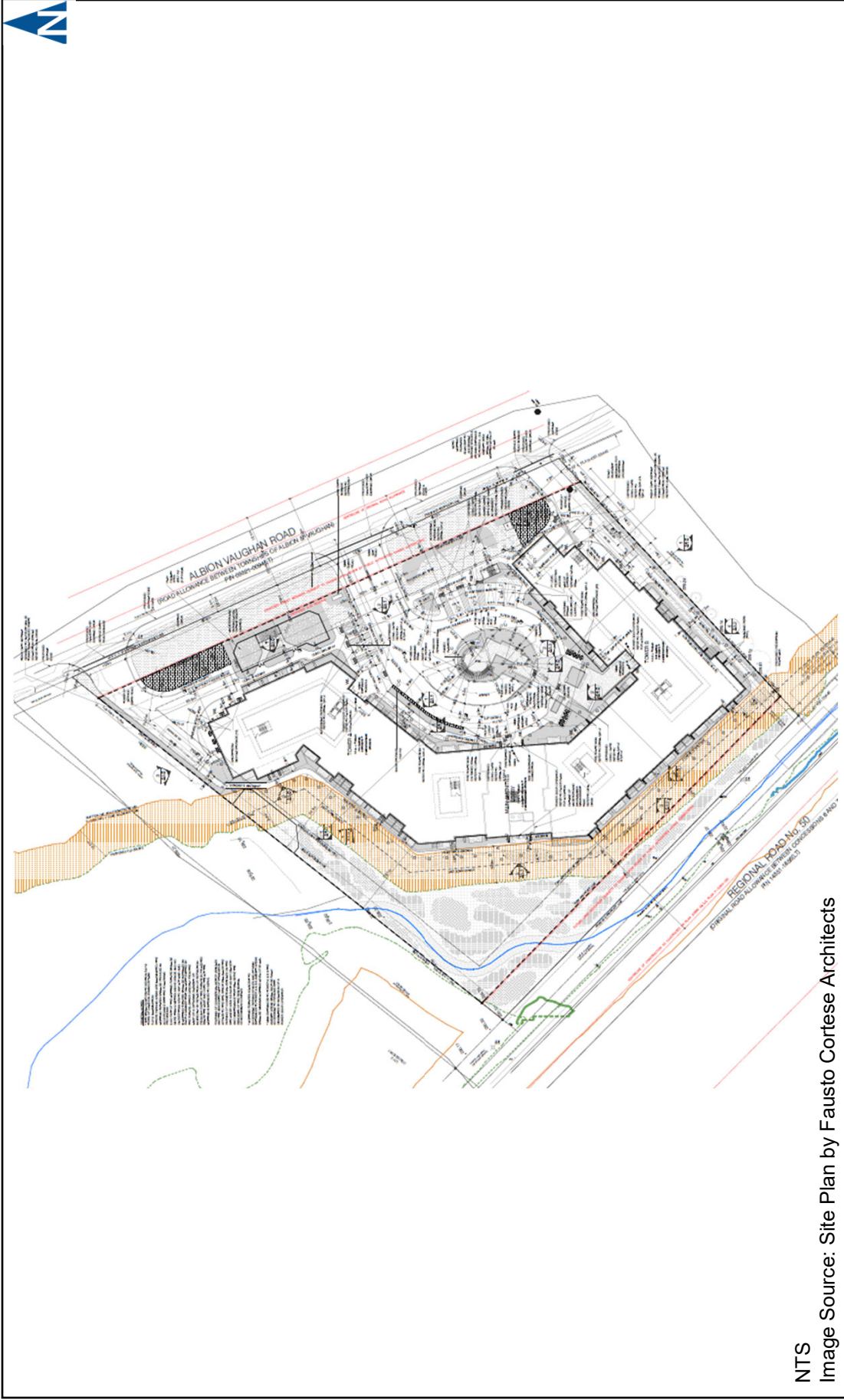
The entire development would be served by several at-grade parking spaces and a two-level underground parking structure. A total parking supply of 468 spaces serving residents and visitors are proposed on-site.

A total of 86 bicycle parking spaces (30 short-term and 56 long-term) are proposed on-site. All 30 short-term spaces are proposed at-grade. All 56 long-term bicycle parking spaces are located within secured storage rooms in the underground structure serving residents.

Three full-movement access driveways are proposed, with two of the three driveways providing dedicated access to the loading area serving each residential tower (i.e., service vehicles only). The main central vehicular access serving the development provides access for building residents and visitors.







NTS  
Image Source: Site Plan by Fausto Cortese Architects



# Site Plan

Figure 2.1

## 3 Existing Conditions

### 3.1 Roads and Traffic Control

The characteristics of the roads and intersections in the vicinity of the subject site are described below. Reference is made to the Town of Caledon's Official Plan – Schedule J: Long Range Road Network<sup>2</sup>. The main roadways that form the study area comprise Albion Vaughan Road-Mayfield Road, Regional Road 50, and Kirby Road. Each roadway is described as follows:

- ▶ **Albion Vaughan Road** is a north-south, two-lane, undivided roadway that operates under the jurisdiction of the Town of Caledon. The road is classified as a medium capacity arterial per the Town's Official Plan, additionally this roadway is identified as the Proposed Bolton Arterial Route (BAR). The roadway has a rural cross section, with gravel shoulders on both sides. The posted maximum speed limit is 60 km/h within the study area limits;
- ▶ **Mayfield Road (Peel Regional Road 14)** is an east-west, two-lane, undivided roadway that operates under the jurisdiction of the Regional Municipality of Peel. The road is classified as a major road under the Region's Official Plan and a high capacity arterial per the Town's Official Plan. The roadway has a semi-urban cross section. The posted maximum speed limit is 60 km/h within the study area limits;
- ▶ **Highway 50 (Peel Regional Road 50)** is a north-south four-lane undivided roadway that operates under the jurisdiction of the Regional Municipality of Peel. The road is classified as a major road under the Region's Official Plan<sup>3</sup> and a high capacity arterial per the Town's Official Plan. The roadway has an urban cross section north of Albion Vaughan Road/Mayfield Road, and a semi-urban cross section south of Albion Vaughan Road/Mayfield Road. The posted maximum speed limit is 80 km/h within the study area limits;
- ▶ The intersection of Regional Road 50/Albion Vaughan Road-Mayfield Road is currently signalized with auxiliary left and right turn lanes are provided on each intersection approach; and

<sup>2</sup> Town of Caledon, *Official Plan, Schedule J – Long Range Road Network*, April 2018.

<sup>3</sup> Regional Municipality of Peel, *Official Plan, Schedule F-2 – Major Road Network*, April 2022.

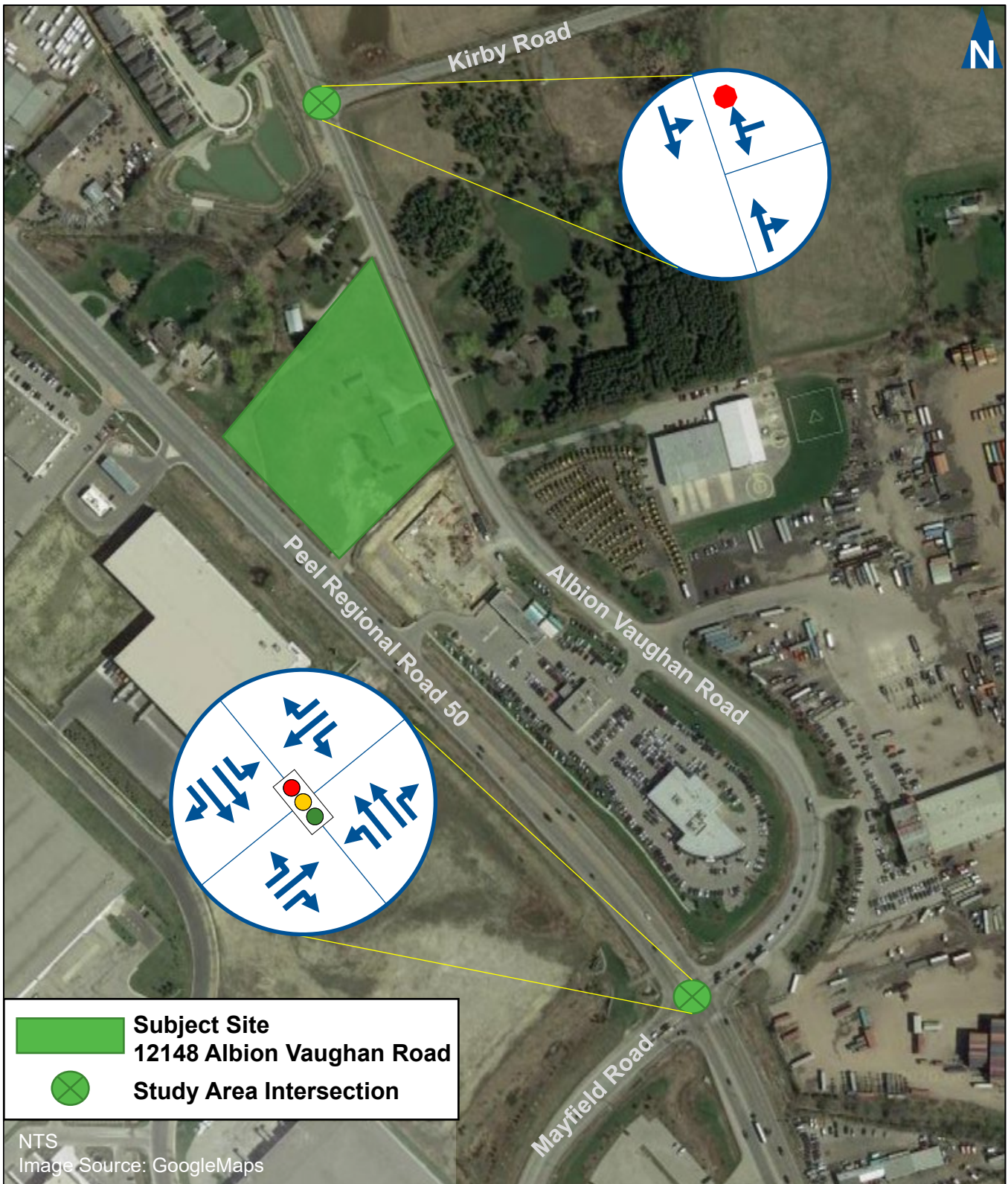


- ▶ The intersection of Albion Vaughan Road/Kirby Road forms an unsignalized “T” intersection. Stop control is provided on the westbound Kirby Road approach.

**Figure 3.1** illustrates the existing lane configurations and traffic control devices at the study area intersections.







## Existing Lane Configurations and Traffic Control

### 3.2 Transit Services

The study area is currently served by limited transit routes/services.

Within the community of Bolton, Brampton Transit currently provides transit services, replacing Voyago which has been serving the community since 2019.

Brampton Transit Route 41 – Bolton operates and serves the same route previously provided under Voyago. That is, transit services along Regional Road 50, operating between Columbia Way/Regional Road 50 and the transit station at Queen Street/Highway 7 in Brampton. At this transit station, riders have the opportunity to connect with other Brampton Transit routes, Mississauga Transit (MiWay), and York Region Transit (YRT and VIVA) routes. In addition, this transit route now provides a loop servicing a segment of Coleraine Drive.

GO Transit provides bus service to the Regional Road 50/Mayfield Road Park and Ride located on the southwest corner of the intersection of Regional Road 50 and Albion Vaughan Road/Mayfield Road. The following route is operated by GO Transit:

- ▶ **Route 38 (Bolton)** operates between Downtown Bolton and Malton GO Station, also stopping at Union Station in Toronto. Service is provided Monday to Friday only.

### 3.3 Active Transportation

Sidewalk and separated bicycle infrastructure is not provided on Regional Road 50 or along Albion Vaughan Road. Pedestrians and cyclists are expected to utilize the gravel shoulder on either roadway or share the travelled roadways with vehicles.

A review of the Region of Peel's Active Transportation Implementation Plan<sup>4</sup> did not identify any existing cycling or pedestrian facilities on the study area roadways. The Long-Term Regional Pedestrian Network (Caledon) proposes sidewalks on the west and east sides of Regional Road 50; however, no horizon year for their implementation is currently known.

The Proposed Long-Term Regional Cycling Network (Caledon) proposes bike lanes on Regional Road 50; however, no horizon year for their implementation is currently known as well. Further review of the Town of Caledon's Active Transportation Master Plan<sup>5</sup>, specifically

<sup>4</sup> Regional Municipality of Peel, *Active Transportation Implementation Plan 2018-2022*.

<sup>5</sup> Town of Caledon, *Active Transportation Master Plan*, Map 5 Network Recommendations, June 2024



Map 5 – Network Recommendations, identifies provision of cycling a Multi-Use Path along Albion Vaughan Road.

Review of the Town of Caledon’s Multi-Modal Transportation Master Plan<sup>6</sup>, Figure 7-4 identified the proposed active transportation facility along Albion-Vaughan Road as “Physically Separated”.

The walk phases incorporated into the signal timing plan for the Regional Road 50 and Albion Vaughan Road/Mayfield Road intersection are push button actuated for pedestrians to cross Regional Road 50. The pedestrian phase is always provided for both the northbound and southbound through phases. Pedestrian signal heads are provided for each approach crossing. The existing volume of crossing pedestrians at this intersection during the weekday AM and PM peak hours was found to have zero pedestrian crossings.

### 3.4 Modal Split

To gain a better understanding of existing travel characteristics of the subject site and surrounding area, 2016 Transportation Tomorrow Survey (TTS) data was reviewed for TTS Zone 3190. Zone 3190 is bounded by Queensgate Boulevard, Regional Road 50, and Albion Vaughan Road.

It is noted the extracted TTS information is solely to understand travel characteristics. The modal split data has not been applied to any trip generation estimates within this assessment.

The existing mode share for travel during the weekday AM and PM peak periods has been reviewed. Inbound and outbound trips during the morning three-hour travel period (6:00 AM – 9:00 AM) and the afternoon three-hour travel period (4:00 PM – 7:00 PM) were assessed.

**Table 3.1** summarizes the existing modal splits. **Appendix C** contains the TTS data for reference.

<sup>6</sup> Town of Caledon, *Multi-Modal Transportation Master Plan*, Figure 7-4 Proposed Active Transportation Network, June 2024



**TABLE 3.1: EXISTING MODAL SPLIT**

Mode	AM Inbound	AM Outbound	PM Inbound	PM Outbound
Auto Driver	84%	76%	88%	85%
Auto Passenger	6%	13%	9%	14%
Transit	0%	2%	2%	0%
Cycle	0%	0%	0%	0%
Walk	10%	9%	1%	1%
<b>Total</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>

Inbound and outbound trips during the AM peak period are predominately automobile based accounting for 90% of trips, whereas 10% of the trips are made via walking. This relatively high percentage of walking trips appears to be attributed to school-related trips.

Similarly, PM peak period trips are predominantly automobile based. Automobile trips account for 97% of PM inbound trips and 99% of PM outbound trips.

### 3.5 Traffic Volumes

Turning movement counts (TMC) quantify the volume and type of vehicles travelling through an intersection. The TMC data is typically collected during peak travel periods to capture peak traffic volumes and patterns.

Beginning in March 2020 the Province of Ontario implemented restrictions for day-to-day activities in response to the COVID-19 global pandemic. Restrictions included the closure of all school institutions under further notice, reduced gathering sizes which has results in limited operations at places of employment. At the time of writing, restrictions were in place to varying degree. As a result, typical travel volumes and travel patterns have been impacted and the collection of turning movement counts would not reflect typical volume conditions within the study area.

For the purposes of this report, Paradigm has referenced historical turning movement counts completed by Traffic Survey Analysis (TSA). TSA completed eight-hour turning movement counts at both intersections on Thursday November 24, 2016. These counts have been factored to a 2022 base year condition by applying a 2.0% compounded per annum growth rate to through movements only as per Town staff review comments. The use of historical data and the growth rate were previously signed-off on by Town staff during pre-study consultation.

Historical traffic volume data (2009 to 2017) along Regional Road 50 and Mayfield Road were reviewed to verify the use of the 2.0% growth





rate on the Regional roads. The data was obtained from Region of Peel OpenData Portal<sup>7</sup>.

On Regional Road 50, the data indicates a growth rate of 1.1% and -0.1% north and south of Albion Vaughan Road/Mayfield Road, respectively, whereas, the Mayfield Road data indicates a growth rate of 0.4%. A conservative approach (i.e., errs on the high side) was adopted by using the same 2.0% compounded per annum growth rate. **Appendix B** contains historical data extracted and growth rate calculations for reference.

The 2016 traffic counts at Regional Road 50 and Albion Vaughan Road/Mayfield Road were completed from 6:00 AM to 10:00 AM, and 2:00 PM to 6:00 PM. The counts at Albion Vaughan Road and Kirby Road were completed from 6:00 AM to 9:00 AM, 11:30 AM to 1:30 PM, and from 3:00 PM to 6:00 PM. All traffic movements, including pedestrian crossings were counted in 15-minute intervals and vehicles were classified by type.

**Figure 3.2** illustrates the base year (2022) traffic volumes. **Appendix C** contains the raw count data for reference.

### 3.6 Traffic Observations

Based upon notes and observations conducted when the traffic counts were collected in November 2016, it was noted that a good level of service was generally provided in the study area.

The exception being that the westbound left-turn movement on Albion Vaughan Road at Regional Road 50 was observed to experience a high level of delay in the AM peak hour.

This observation is further validated by the high volume of vehicles performing the movement. The raw unadjusted 2016 counts recorded 491 vehicles performing this movement exceeding 300 vehicles per hour during the AM peak hour, which is the threshold where both the Highway Capacity Manual and the Transportation Association of Canada Geometric Design Guide for Canadian Roads recommend the consideration of dual left-turn lanes.

Detailed notes from the observations conducted are summarized below:

- ▶ Vehicle operations were observed to be operating well, with good traffic flow noted through the intersection. All movements

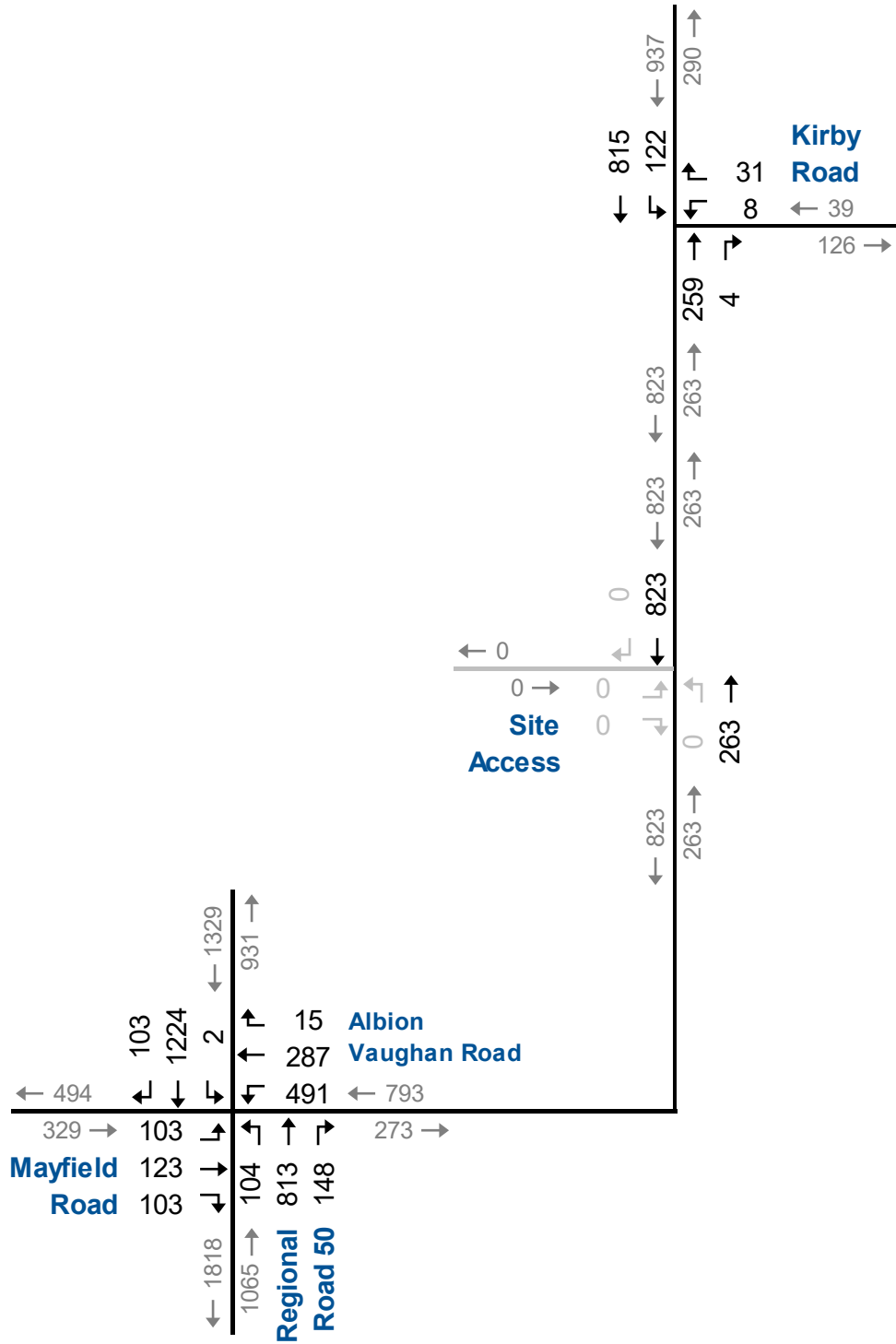
<sup>7</sup> [https://data.peelregion.ca/datasets/844846e93de64ddd910c2b6e964105f1\\_0/explore?location=43.846124%2C-79.693155%2C16.21](https://data.peelregion.ca/datasets/844846e93de64ddd910c2b6e964105f1_0/explore?location=43.846124%2C-79.693155%2C16.21)



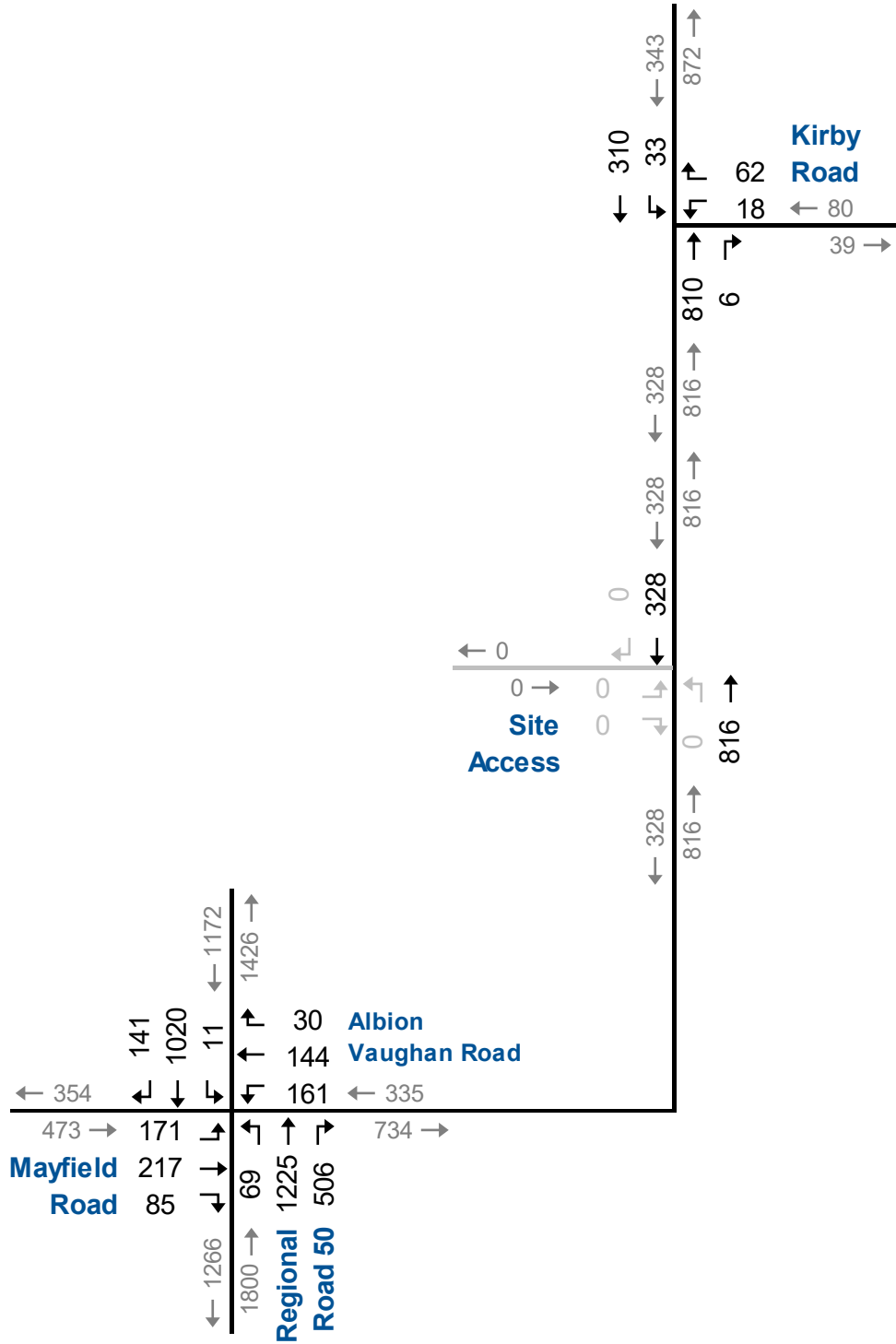
were noted to be within capacity, with the exception of the westbound left turn movement during the AM peak period;

- ▶ Vehicles were processed through the intersection efficiently. No intersection breakdown or capacity issues were observed during AM peak period;
- ▶ Traffic movements along the major roadway (i.e., Highway 50) were flowing well, and as expected the crossroads of Alibion-Vaughan Road/Mayfield Road incurred slightly higher delays due; however, were operating acceptably;
- ▶ Motorists were observed to be attentive and efficient (i.e., little to no lost time); and
- ▶ Vehicular queues were observed to be contained within their provided storage, not obstructing or blocking adjacent through travel lanes.





## Base Year Traffic Volumes AM Peak Hour



## Base Year Traffic Volumes PM Peak Hour



### 3.7 Traffic Operations

Intersection Level of Service (LOS) is a recognized method of quantifying the efficiency of traffic flow at intersections and is based on the delay experienced by individual vehicles executing the various movements. The delay is related to the number of vehicles desiring to make a movement, compared to the estimated capacity for that movement. The capacity is based on several criteria related to opposing traffic flows, and at signalized intersections, signal timing. Capacity is evaluated in terms of the ratio of demand flow to capacity with an at-capacity condition represented by a volume-to-capacity (v/c) ratio of 1.00 (i.e., volume demand equals capacity).

The highest possible rating is LOS A, under which the average total delay at signalized and unsignalized intersections is equal or less than 10 seconds per vehicle. When the average delay for a movement exceeds 80 seconds at signalized intersections, or 50 seconds at unsignalized intersections, the movement is classified as LOS F, and remedial measures are usually implemented, if they are feasible.

To adhere to the Region of Peel guidelines for operational analysis<sup>8</sup>, the following criteria have been used for the determination of the need for capacity or traffic control improvements to the study area intersections.

- ▶ When v/c ratios for overall intersection operations, through movements, or shared through/turning movements exceeds 0.90;
- ▶ When v/c ratios for dedicated turning movements exceeds 1.00; and/or
- ▶ When 95<sup>th</sup> percentile queue lengths for individual movements exceeds available lane storage.

To assess the base year traffic operating conditions, a level of service analysis has been conducted using Synchro software, which implements the methods of the Highway Capacity Manual (HCM). The following parameters have been utilized in the analysis:

- ▶ Existing lane configurations;
- ▶ Signal timing as provided by the Region (and included in **Appendix C** for reference);
- ▶ Heavy vehicles percentages and crossing pedestrian volumes as extracted from the turning movement counts;

<sup>8</sup> Regional Municipality of Peel, *Traffic Impact Study Guidelines*, Accessed 9 November 2020 from <https://www.peelregion.ca/pw/transportation/business/traffic-impact-study.asp>



- ▶ Lane widths as per “Regional Guidelines for Using Synchro”<sup>9</sup>;
- ▶ Peak hour factors of 1.00 as per “Regional Guidelines for Using Synchro”<sup>10</sup>; and
- ▶ Synchro default values for all other inputs.

**Table 3.2** presents the operational analysis results including the level of service (LOS), average delay in seconds, volume to capacity (v/c) ratio, and 95<sup>th</sup> percentile queue length in metres. Any critical movements are highlighted in yellow.

**Appendix D** contains the Synchro analysis outputs for reference.

In summary, the base year operations represent acceptable levels of service. All traffic movements are currently found to operate acceptably and within capacity.

It is noted the westbound left turn movement is approaching capacity under base year traffic conditions.

The 95<sup>th</sup> percentile queue lengths were checked for all turn lanes against provided storage, and queue lengths for through movements were also checked. It was confirmed no spillback issues are present.

<sup>9</sup> Regional Municipality of Peel, *Regional Guidelines for Using Synchro Version 7.73 Rev 8*, December 2010.

<sup>10</sup> Regional Municipality of Peel, *Regional Guidelines for Using Synchro Version 7.73 Rev 8*, December 2010.



**TABLE 3.2: BASE YEAR TRAFFIC OPERATIONS**

Intersection	Approach/ Movement		AM Peak Hour				PM Peak Hour			
			LOS <sup>1</sup>	Delay <sup>2</sup>	V/C <sup>3</sup>	Q <sup>4</sup>	LOS <sup>1</sup>	Delay <sup>2</sup>	V/C <sup>3</sup>	Q <sup>4</sup>
Regional Road 50 & Albion Vaughan Road/Mayfield Road  <i>Signalized</i>	EB	Left	D	55	0.51	31	D	40	0.56	11
		Thru	E	64	0.59	49	D	50	0.67	40
		Right	D	54	0.09	16	D	38	0.07	46
	WB	Left	E	75	0.97	165	D	45	0.65	1
		Thru	D	52	0.66	94	D	44	0.47	12
		Right	D	39	0.01	<1	D	38	0.02	16
	NB	Left	C	27	0.56	27	B	13	0.32	3
		Dual Thru	B	16	0.41	77	B	15	0.59	20
		Right	B	13	0.10	9	B	12	0.34	23
	SB	Left	C	20	0.01	2	B	15	0.07	4
		Dual Thru	D	36	0.79	203	C	21	0.59	<1
		Right	C	21	0.07	11	B	15	0.09	<1
	<b>Overall Intersection</b>			<b>D</b>	<b>39</b>	<b>0.81</b>	<b>-</b>	<b>C</b>	<b>22</b>	<b>0.63</b>
Albion Vaughan Road & Kirby Road  <i>Unsignalized</i>	WB	Left/Right	C	18	0.12	3	C	21	0.27	7
	NB	Thru/Right	Unopposed Movement				Unopposed Movement			
	SB	Left/Thru	A	2	0.09	2	A	1	0.04	1

<sup>1</sup> Level of Service; <sup>2</sup> Average vehicle delay, seconds; <sup>3</sup> Volume to capacity ratio; <sup>4</sup> 95<sup>th</sup> percentile queue, metres



## 4 Future Traffic Conditions

### 4.1 Horizon Year

Traffic forecasts have been developed for the horizon year of 2032 representing a period five-years from the anticipated build-out/occupancy of the site.

### 4.2 Forecast Background Traffic

The future background traffic volumes in the study area are expected to comprise general background growth and specific traffic generated by approved or in-stream developments.

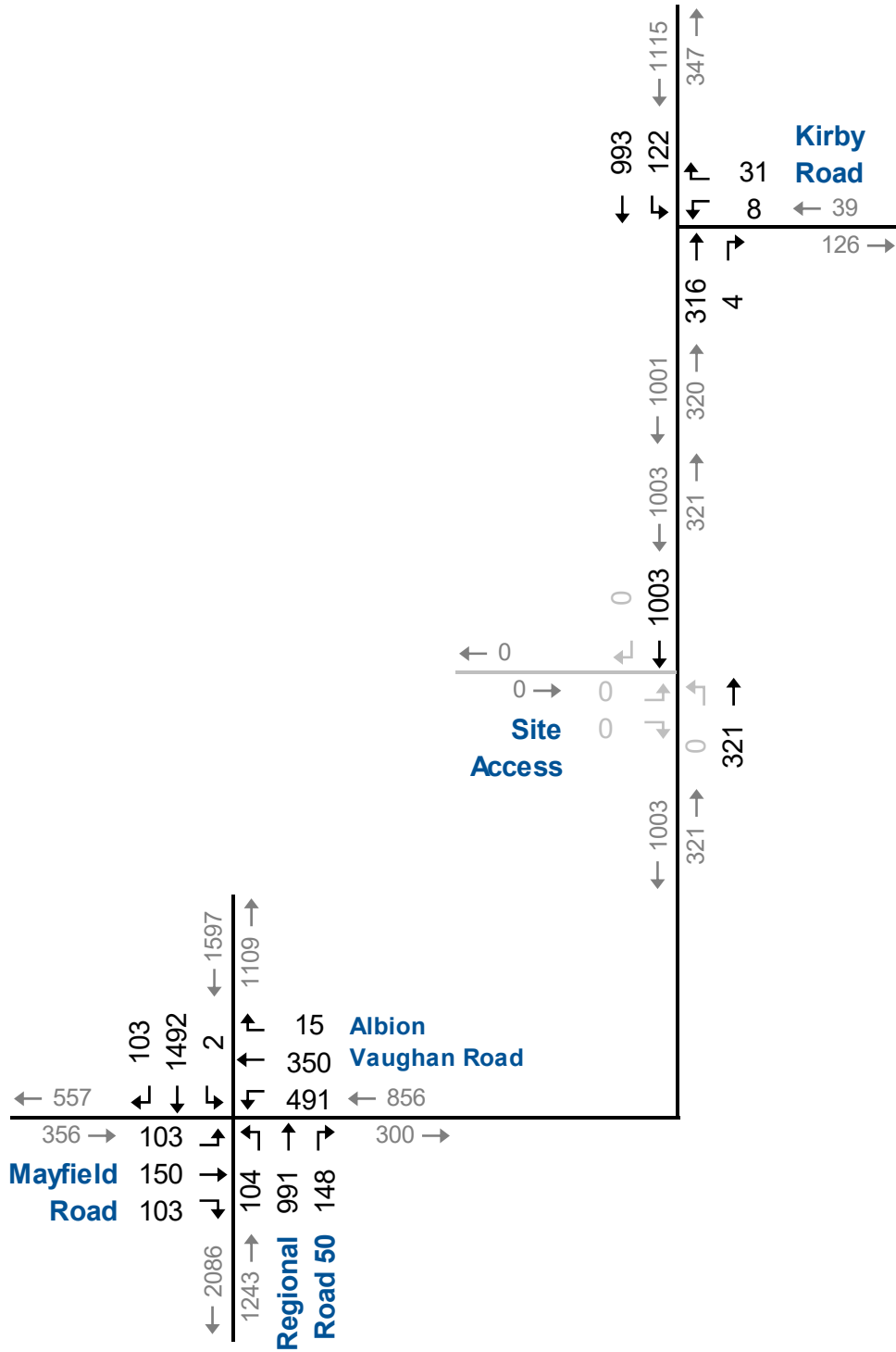
During pre-study consultation, Town staff advised the use of a 2.0% compounded per annum growth rate for application on roadways under the Town's jurisdiction.

We have also applied this growth rate to the Regional roads within the study area. This 2.0% compounded growth rate represents a conservative approach (i.e., errs on the high side). Detailed discussion can be found in **Section 3.5**.

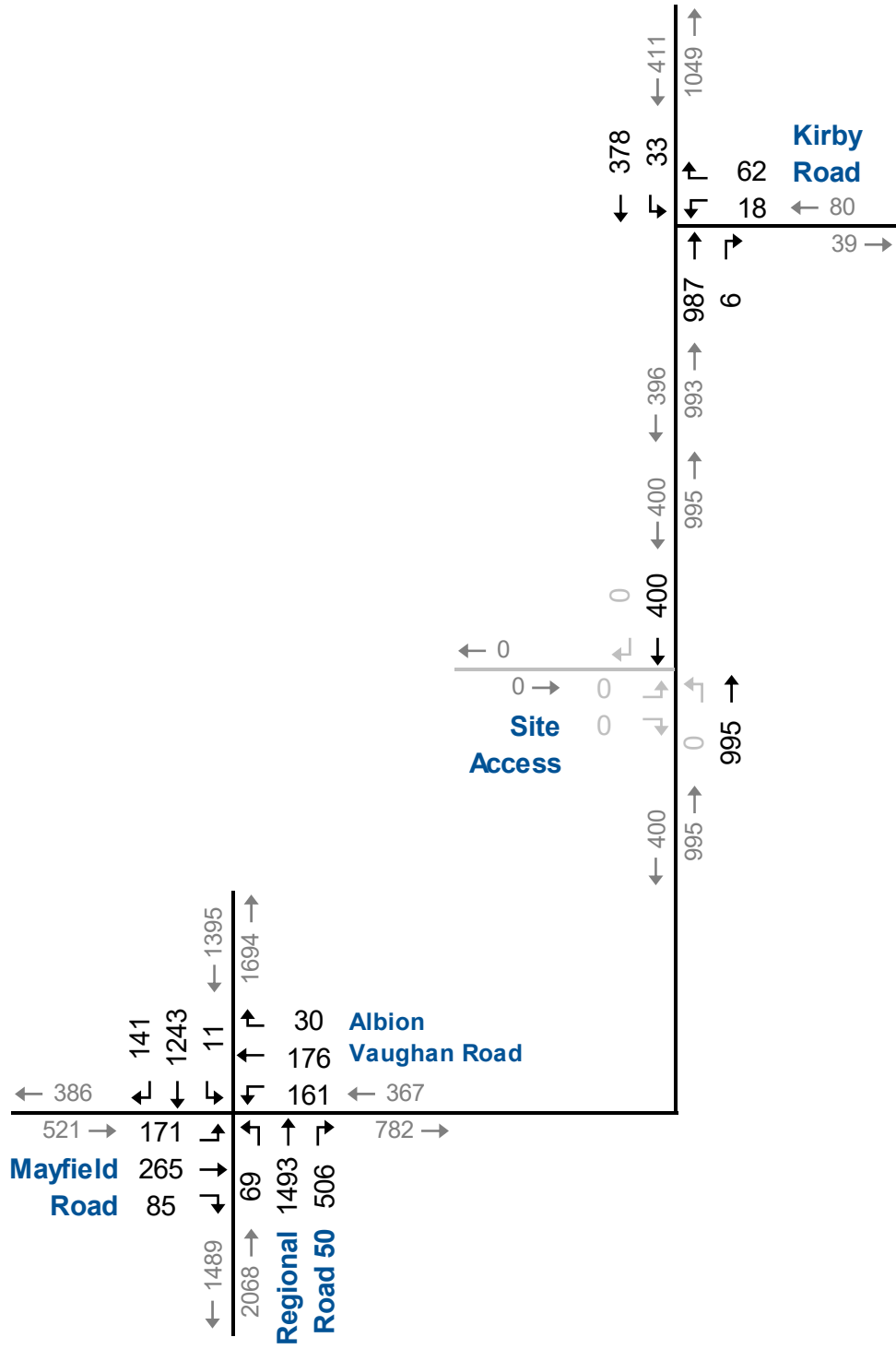
As per review comments, this growth rate has been applied to through movements only on the study roadways. Town staff also confirmed there were no background developments to include as part of the traffic forecasts.

**Figure 4.1** illustrates the forecast background traffic volumes for the 2032 horizon year.





## 2032 Background Traffic Volumes AM Peak Hour



## 2032 Background Traffic Volumes PM Peak Hour

## 4.3 Site Trip Generation

### 4.3.1 Vehicle Trip Generation

Trip generation for the subject development has been estimated using information contained in the Institute of Transportation Engineers (ITE) publication, “Trip Generation Manual, 11<sup>th</sup> Edition”<sup>11</sup>.

Specifically, trip equations for Land Use Code (LUC) 221 – Multifamily Housing (Mid-Rise) were used. This land use is defined as “apartments and condominiums located in a building that has between four and ten floors of living space”.

**Table 4.1** summarizes the trip generation estimates and indicates the site is forecast to generate a total of 105 new vehicle trips in the AM peak hour and 104 new vehicle trips in the PM peak hour.

As noted in **Section 3.4**, trips to and from the study area are predominantly automobile based (accounting for approximately 90% or higher of all trips). It is noted that no adjustments have been made to account for trips made by transit or alternative travel modes.

**TABLE 4.1: SITE TRIP GENERATION**

LUC	Units	AM Peak Hour				PM Peak Hour			
		Rate	In	Out	Total	Rate	In	Out	Total
221	264	Eqn. <sup>1</sup>	24	81	105	Eqn. <sup>2</sup>	63	41	104
<b>Total Trip Generation</b>			<b>24</b>	<b>81</b>	<b>105</b>		<b>63</b>	<b>41</b>	<b>104</b>

<sup>1</sup> – AM:  $T = 0.44(X) - 11.61$  (23% inbound, 77% outbound)

<sup>2</sup> – PM:  $T = 0.39(X) + 0.34$  (61% inbound, 39% outbound)

### 4.3.2 Site Trip Distribution and Assignment

Trip distribution for the development site is based on a review of existing traffic patterns and trip distribution data extracted from 2016 Transportation Tomorrow Survey (TTS) data. **Table 4.2** and **Table 4.3** summarize existing travel patterns based on intersection turning movement count data, and 2016 TTS trip distribution data, respectively.

TTS trip distribution was then combined with existing traffic pattern distributions by estimating by route. **Table 4.4** illustrates the estimated site trip distribution. **Appendix E** details trip distribution calculations.

<sup>11</sup> Institute of Transportation Engineers, *Trip Generation Manual (11th Edition)*, September 2021.



**TABLE 4.2: EXISTING TRAVEL PATTERN DISTRIBUTION**

Origin/Destination	AM Peak Hour		PM Peak Hour	
	In	Out	In	Out
North via Regional Road 50	36%	26%	30%	36%
South via Regional Road 50	29%	52%	48%	32%
West via Mayfield Road	10%	14%	13%	10%
North via Albion Vaughan Road	25%	8%	9%	22%
<b>Total</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>

**TABLE 4.3: TTS TRIP DISTRIBUTION**

Origin/Destination	AM Peak Hour		PM Peak Hour	
	In	Out	In	Out
North	65%	44%	33%	61%
South	23%	50%	57%	22%
West	12%	6%	10%	17%
<b>Total</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>

**TABLE 4.4: ESTIMATED SITE TRIP DISTRIBUTION**

Origin/Destination	AM Peak Hour		PM Peak Hour	
	In	Out	In	Out
North via Regional Road 50	38%	34%	25%	38%
South via Regional Road 50	23%	50%	57%	22%
West via Mayfield Road	12%	6%	10%	17%
North via Albion Vaughan Road	27%	10%	8%	23%
<b>Total</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>

The estimated trip generation has been assigned to the study road network based on the distribution noted in **Table 4.4**. Based on the intended operation of the north and south driveway connections for service and delivery vehicles exclusively, all site traffic has been assigned to the central middle access driveway.

**Figure 4.2** illustrates the site-generated vehicle traffic assignment for the AM and PM peak hours. Slight differences from the trip generation estimates are due to rounding.



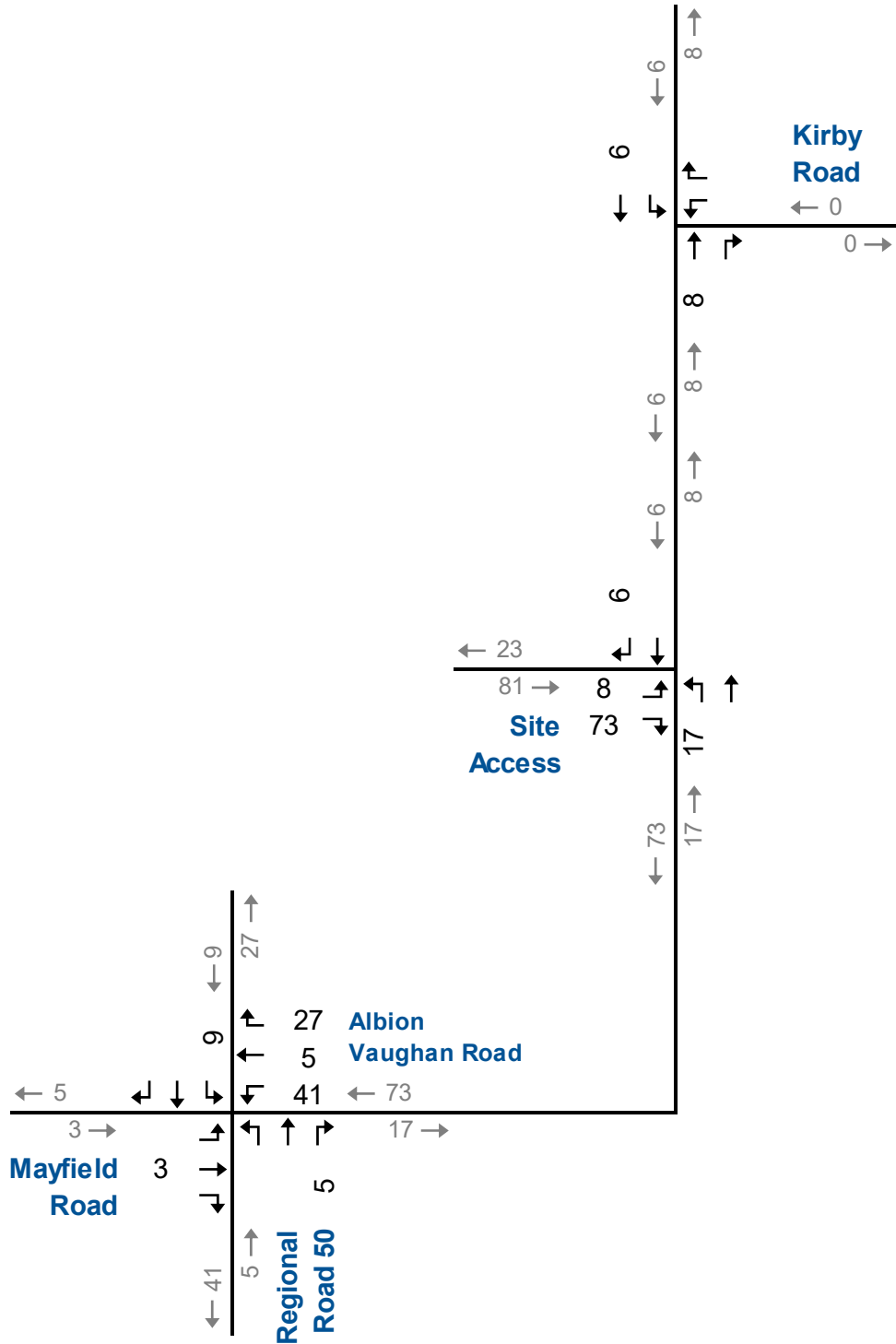


## 4.4 Forecast Total Traffic

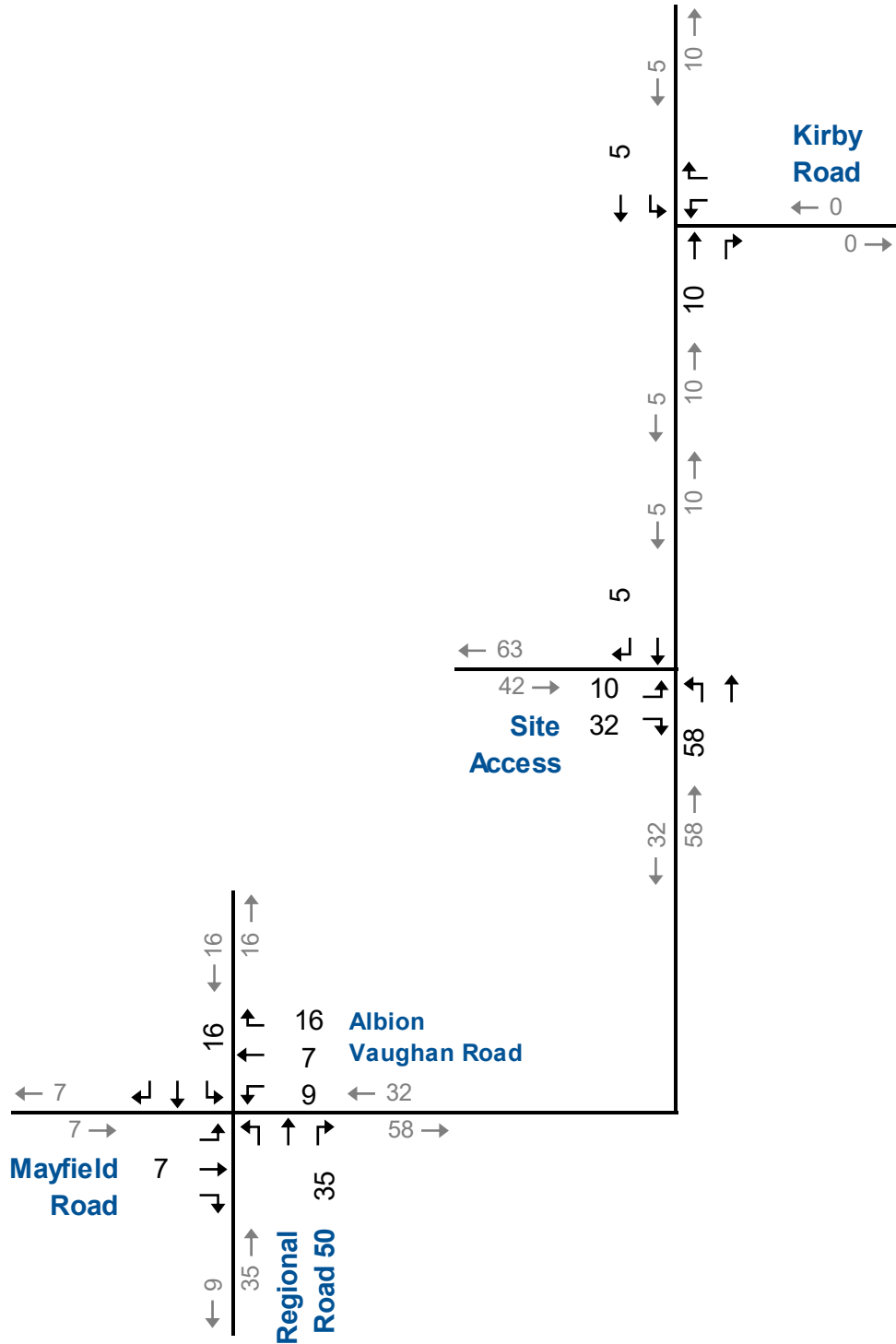
The future background traffic forecasts were combined with the site traffic assignments to estimate the future total traffic volumes for the 2032 horizon year.

**Figure 4.3** illustrates the 2032 total traffic forecasts.

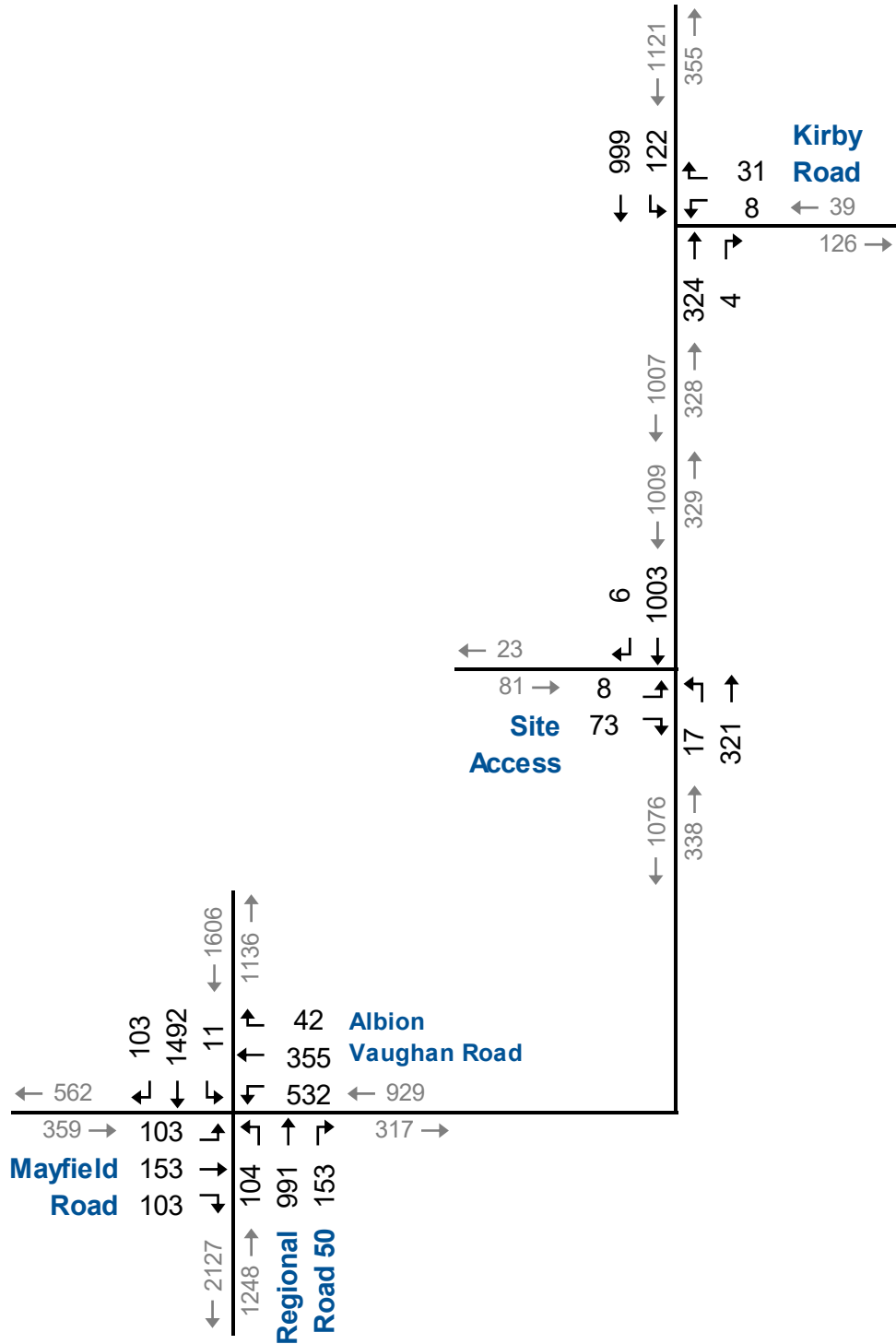




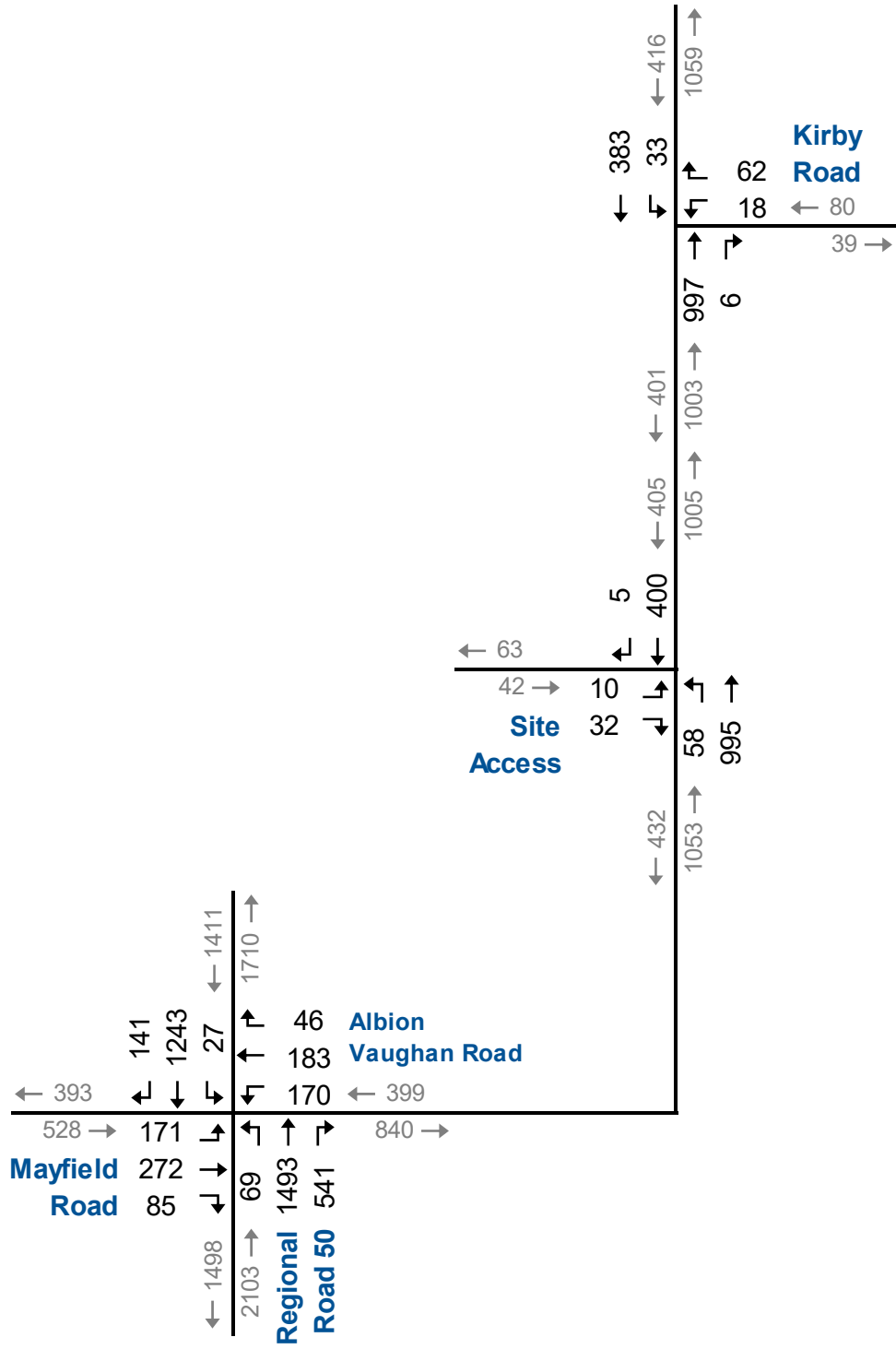
## Site Traffic Volumes AM Peak Hour



## Site Traffic Volumes PM Peak Hour



## 2032 Total Traffic Volumes AM Peak Hour



## 2032 Total Traffic Volumes PM Peak Hour

## 5 Transportation Impact Assessment

### 5.1 Future Transportation Network

Reference is made to the Town of Caledon Multi-Modal Transportation Master Plan, June 2024. Figure 9-1, Proposed Travel Lanes for Town Roads by 2051, identifies the widening of Albion-Vaughan Road between Regional 50 and King Street to be widened to four-lanes by 2031.

As our horizon year for assessment is 2032, we've undertaken our initial analysis without the widening of Albion-Vaughan Road, representing a conservative approach.

### 5.2 Future Background Traffic

To assess the operating conditions for the 2032 horizon year, analyses were undertaken using the same methodology, parameters, and traffic control devices as in the analysis of base year conditions.

The exception includes the optimization of timing splits within existing cycle lengths to improve traffic operations for all movements. **Table 5.1** presents the signal timing splits at the intersection of Regional Road 50 and Albion Vaughan Road/Mayfield Road for the existing and background conditions.

**TABLE 5.1: SIGNAL TIMING SPLITS**

Condition	Phase 1	Phase 2	Phase 3	Phase 4	Phase 6	Phase 7	Phase 8
	NBL	SBTL	WBL	EBTL	NBTL	EBL	WBTL
<b>AM Peak Hour</b>							
Existing	25 s	63 s	27 s	45 s	88 s	10 s	62 s
2032 Background	13.5 s	78 s	39 s	29.5 s	91.5 s	10 s	58.5 s
<i>Change</i>	<i>-11.5 s</i>	<i>+15 s</i>	<i>+12 s</i>	<i>-15.5 s</i>	<i>+3.5 s</i>	<i>Nil</i>	<i>-3.5 s</i>
<b>PM Peak Hour</b>							
Existing	25 s	50 s	10 s	40 s	75 s	10 s	40 s
2032 Background	25 s	50 s	10 s	40 s	75 s	10 s	40 s
<i>Change</i>	<i>Nil</i>	<i>Nil</i>	<i>Nil</i>	<i>Nil</i>	<i>Nil</i>	<i>Nil</i>	<i>Nil</i>



**Table 5.2** presents the operational analysis results including level of service (LOS), average vehicle delay in seconds, volume to capacity (v/c) ratio, and 95<sup>th</sup> percentile queues in metres for the 2032 horizon with the existing signal timing splits.

**Table 5.3** presents the operational analysis results including level of service (LOS), average vehicle delay in seconds, volume to capacity (v/c) ratio, and 95<sup>th</sup> percentile queues length in metres for the 2032 horizon with signal timing optimization. Critical movements are highlighted in yellow, if any.

**Appendix F** contains the detailed Synchro reports.

### Operations – Existing Timing Plans

That analysis of background conditions (without the subject development) indicates the study area intersection of Regional Road 50 and Albion Vaughan Road/Mayfield Road would operate with two critical movements under the AM peak hour.

- ▶ The overall intersection reports a v/c ratio of 1.02;
- ▶ The westbound left turn movement is forecast to operate at a LOS F with a v/c ratio of 1.13; and
- ▶ The southbound dual through movement is forecast to operate at a LOS E with a v/c ratio of 0.98.

### Operations – Optimized Timing Plans

The analysis of background conditions (without the subject development) indicates the study area intersections are forecast to operate at acceptable level of services and within capacity under optimized signal timing plans.

The exception would be at the intersection of Regional Road 50 and Albion Vaughan Road/Mayfield Road during the AM peak hour. It is noted that the overall intersection and the critical movement would be within capacity (i.e., v/c < 1.00). The following critical movements are reported:

- ▶ The overall intersection reports a v/c ratio of 0.98; and
- ▶ Southbound dual through movement is forecast to operate at LOS D with a v/c ratio of 0.97.



**TABLE 5.2: 2032 BACKGROUND TRAFFIC OPERATIONS (EXISTING TIMINGS)**

Intersection	Approach/ Movement		AM Peak Hour				PM Peak Hour			
			LOS <sup>1</sup>	Delay <sup>2</sup>	V/C <sup>3</sup>	Q <sup>4</sup>	LOS <sup>1</sup>	Delay <sup>2</sup>	V/C <sup>3</sup>	Q <sup>4</sup>
Regional Road 50 & Albion Vaughan Road/Mayfield Road  <i>Signalized</i>	EB	Left	D	54	0.52	31	D	40	0.56	43
		Thru	E	65	0.64	55	D	52	0.73	78
		Right	D	53	0.09	15	D	37	0.07	11
	WB	Left	F	128	1.13	207	D	47	0.68	40
		Thru	E	56	0.76	116	D	44	0.51	52
		Right	D	39	0.01	< 1	D	37	0.02	< 1
	NB	Left	D	49	0.65	36	B	19	0.43	13
		Dual Thru	B	19	0.51	109	B	20	0.75	167
		Right	B	14	0.10	10	B	14	0.37	25
	SB	Left	C	22	0.01	2	B	19	0.12	6
		Dual Thru	E	57	0.98	299	C	27	0.74	170
		Right	C	22	0.07	12	B	16	0.09	11
	<b>Overall Intersection</b>			<b>D</b>	<b>54</b>	<b>1.02</b>	<b>-</b>	<b>C</b>	<b>26</b>	<b>0.76</b>
Albion Vaughan Road & Kirby Road  <i>Unsignalized</i>	WB	Left/Right	C	22	0.16	4	D	30	0.36	11
	NB	Thru/Right	Unopposed Movement				Unopposed Movement			
	SB	Left/Thru	A	3	0.10	2	A	1	0.05	1

<sup>1</sup> Level of Service; <sup>2</sup> Average vehicle delay, seconds; <sup>3</sup> Volume to capacity ratio; <sup>4</sup> 95<sup>th</sup> percentile queue, metres

**TABLE 5.3: 2029 BACKGROUND TRAFFIC OPERATIONS (WITH SIGNAL OPTIMIZATION)**

Intersection	Approach/ Movement		AM Peak Hour				PM Peak Hour			
			LOS <sup>1</sup>	Delay <sup>2</sup>	V/C <sup>3</sup>	Q <sup>4</sup>	LOS <sup>1</sup>	Delay <sup>2</sup>	V/C <sup>3</sup>	Q <sup>4</sup>
Regional Road 50 & Albion Vaughan Road/Mayfield Road  <i>Signalized</i>	EB	Left	E	64	0.55	32	D	40	0.56	43
		Thru	E	80	0.72	65	D	52	0.73	78
		Right	E	61	0.09	17	D	37	0.07	11
	WB	Left	E	73	0.96	158	D	47	0.68	40
		Thru	D	50	0.64	119	D	44	0.51	52
		Right	D	37	0.01	0	D	37	0.02	< 1
	NB	Left	F	106	0.91	56	B	19	0.43	13
		Dual Thru	C	24	0.54	117	B	20	0.75	167
		Right	B	18	0.10	10	B	14	0.37	25
	SB	Left	C	24	0.01	2	B	19	0.12	6
		Dual Thru	E	58	0.97	275	C	27	0.74	170
		Right	C	24	0.07	10	B	16	0.09	11
	<b>Overall Intersection</b>			<b>D</b>	<b>51</b>	<b>0.98</b>	<b>-</b>	<b>C</b>	<b>26</b>	<b>0.76</b>
Albion Vaughan Road & Kirby Road  <i>Unsignalized</i>	WB	Left/Right	C	22	0.16	4	D	30	0.36	11
	NB	Thru/Right	Unopposed Movement				Unopposed Movement			
	SB	Left/Thru	A	3	0.10	2	A	1	0.05	1

<sup>1</sup> Level of Service; <sup>2</sup> Average vehicle delay, seconds; <sup>3</sup> Volume to capacity ratio; <sup>4</sup> 95<sup>th</sup> percentile queue, metres





### 5.3 Future Total Traffic

To assess operating conditions for the future total forecasts, an operational analysis was undertaken using the same methodology, parameters, and traffic control devices as in the analysis of background conditions.

**Table 5.3** presents the operational analysis results including level of service (LOS), average vehicle delay in seconds, volume to capacity (v/c) ratio, and 95<sup>th</sup> percentile queues length in metres for the 2032 horizon. Critical movements are highlighted in yellow, if any.

**Appendix G** contains the detailed Synchro reports.

The analysis of total conditions (with the subject development) indicates the study area intersections would continue to operate at acceptable conditions, albeit slightly exacerbated with the inclusion of site-generated traffic.

The previously identified critical movements under background conditions would continue to be reported, albeit slightly exacerbated under total conditions. Under the AM peak hour, the westbound left turn movement is identified as a critical movement.

The site access intersection with Albion Vaughan Road is noted to operate at good levels of service and well within capacity.



**TABLE 5.3: 2032 TOTAL TRAFFIC OPERATIONS**

Intersection	Approach/ Movement		AM Peak Hour				PM Peak Hour			
			LOS <sup>1</sup>	Delay <sup>2</sup>	V/C <sup>3</sup>	Q <sup>4</sup>	LOS <sup>1</sup>	Delay <sup>2</sup>	V/C <sup>3</sup>	Q <sup>4</sup>
Regional Road 50 & Albion Vaughan Road/Mayfield Road  <i>Signalized</i>	EB	Left	E	62	0.53	31	D	40	0.56	43
		Thru	F	83	0.74	67	D	52	0.74	80
		Right	E	62	0.09	17	D	37	0.07	11
	WB	Left	F	84	1.00	182	D	51	0.73	43
		Thru	D	50	0.64	121	D	44	0.53	54
		Right	D	37	0.03	4	D	37	0.04	2
	NB	Left	F	109	0.92	57	B	20	0.43	13
		Dual Thru	C	26	0.55	119	C	20	0.75	167
		Right	B	19	0.11	10	B	14	0.41	34
	SB	Left	C	26	0.08	6	C	26	0.30	14
		Dual Thru	E	64	0.99	278	C	27	0.74	170
		Right	C	25	0.07	10	B	16	0.09	11
	<b>Overall Intersection</b>			<b>D</b>	<b>55</b>	<b>1.01</b>	<b>-</b>	<b>C</b>	<b>27</b>	<b>0.77</b>
Albion Vaughan Road & Kirby Road  <i>Unsignalized</i>	WB	Left/Right	C	23	0.16	4	D	30	0.36	11
	NB	Thru/Right	Unopposed Movement				Unopposed Movement			
	SB	Left/Thru	A	3	0.10	2	A	1	0.05	1
Albion Vaughan Road & Site Access  <i>Unsignalized</i>	EB	Left/Right	C	24	0.30	9	C	18	0.13	3
	NB	Left/Thru	A	1	0.02	1	A	1	0.05	1
	SB	Thru/Right	Unopposed Movement				Unopposed Movement			

<sup>1</sup> Level of Service; <sup>2</sup> Average vehicle delay, seconds; <sup>3</sup> Volume to capacity ratio; <sup>4</sup> 95<sup>th</sup> percentile queue, metres



## 5.4 Impact Assessment Summary

### 5.4.1 Site Traffic

Overall, the incremental impact of the proposed residential development is considered minor. The additional traffic would be less than daily traffic variations typically experienced (approximately 10%).

**Table 5.4** provides a summary of how much traffic volumes will increase by with the subject residential development.

**TABLE 5.4: TRAFFIC VOLUME INCREASE**

Intersection	2029 Background vs. 2029 Total % Volume Increase (Total Entering)	
	AM Peak Hour	PM Peak Hour
Regional Road 50 & Albion Vaughan Road/Mayfield Road	2.2%	2.1%
Albion Vaughan Road & Kirby Road	0.9%	1.0%

Under the 2032 background conditions, the intersection of Regional Road 50 and Albion Vaughan Road/Mayfield Road is reported to operate approaching capacity. Similarly, the southbound dual through movement is forecast to operate approaching capacity. The same critical movements are identified under 2032 total conditions, along with the addition of the westbound left turn movement reported to be at-capacity.

With employers beginning to shift away from traditional office-based environments to work-from-home models and with commercial/retail and service-based businesses adapting by adjusting business hours and/or switching to web-based e-commerce storefronts, travel demands and patterns are changing.

In a post-COVID condition, it is plausible that traffic volumes may never reach pre-COVID levels as a result of this quantum shift that is being experienced. With changes in travel demand, behaviour, and patterns post-COVID due to changes in how office and business environments operate. The forecasts as analyzed are conservative and potentially under post-COVID conditions, traffic volumes may be considerably lower than forecast if the forecast growth is not materialized.

### 5.4.2 Network and Intersection Improvements

Aforementioned, reference to the Town’s June 2024 Multi-Modal Transportation Master Plan identified the widening of Albion-Vaughan



Road from its current two-lane cross-section to a four-lane cross-section by 2031.

At the intersection of Regional Road 50/Albion-Vaughan Road, dual left-turn lanes for the westbound approach has been investigated as a potential mitigation measure to improve the intersection operations and the westbound left turn movement. From a volume perspective the movement would warrant the consideration of a dual left-turn lanes.

The westbound left-turn traffic volume is reported as 491 and 532 vehicles during the AM peak hour under the 2032 background and total traffic conditions, respectively. The amount of left-turn traffic exceeds the 300 vehicles per hour threshold identified by both the Highway Capacity Manual and the Transportation Association of Canada Geometric Design Guide for Canadian Roads for the consideration of dual left-turn lanes.

The following signal timing plan changes are proposed to provide the best possible traffic operations for all movements in the event that westbound dual left-turn lanes are implemented.

- ▶ The westbound left-turn movement turn type shall be changed from permitted/protected to a fully-protected movement; and
- ▶ Optimization of signal timing splits within the existing cycle lengths.

**Table 5.5** presents the proposed signal timing split changes for the AM peak hour for the existing, background and total conditions.

**TABLE 5.5: SIGNAL TIMING SPLITS – WB DUAL LEFT-TURN LANES**

Condition	Phase 1	Phase 2	Phase 3	Phase 4	Phase 6	Phase 7	Phase 8
	NBL	SBTL	WBL	EBTL	NBTL	EBL	WBTL
<b>AM Peak Hour</b>							
Existing	25 s	63 s	27 s	45 s	88 s	10 s	62 s
2032 Background	16 s	76 s	28.5 s	39.5 s	92 s	11.5 s	56.5 s
2032 Total	16 s	76 s	29 s	39 s	92 s	10 s	58 s
<b>PM Peak Hour</b>							
Existing	25 s	50 s	10 s	40 s	75 s	10 s	40 s
2032 Background	11 s	60.4 s	14 s	39.6 s	71.4 s	13 s	40.6 s
2032 Total	9 s	64.4 s	12 s	39.6 s	73.4 s	12 s	39.6 s



**Table 5.6** and **Table 5.7** present the results of the operational analysis for the 2032 background and total traffic conditions, respectively with the implementation of westbound dual left-turn lanes and planned widening of Albion-Vaughan Road. **Appendix H** contains the Synchro analysis outputs for reference.

With the provision of dual left-turn lanes on the westbound approach, and accounting for the planned road widening the Regional Road 50/Albion-Vaughan Road intersection is reported to operate at acceptable levels of service and with all movements within capacity. No more critical movements are identified.

The Albion-Vaughan Road intersections with Kirby Road and at the Site Access driveway are forecast to operate at acceptable conditions and with all movements well within capacity.



**TABLE 5.6: 2032 BACKGROUND TRAFFIC OPERATIONS – IMPROVEMENTS**

Intersection	Approach/ Movement		AM Peak Hour				PM Peak Hour			
			LOS <sup>1</sup>	Delay <sup>2</sup>	V/C <sup>3</sup>	Q <sup>4</sup>	LOS <sup>1</sup>	Delay <sup>2</sup>	V/C <sup>3</sup>	Q <sup>4</sup>
Regional Road 50 & Albion Vaughan Road/Mayfield Road  <i>Signalized</i>	EB	Left	E	59	0.55	32	D	38	0.53	42
		Dual Thru	E	62	0.48	30	D	45	0.54	37
		Right	E	58	0.09	16	D	40	0.07	12
	WB	Dual Left	E	66	0.79	84	D	49	0.50	26
		Dual Thru	D	49	0.47	56	D	42	0.37	26
		Right	D	43	0.01	<1	D	39	0.02	<1
	NB	Left	E	58	0.73	42	B	17	0.45	11
		Dual Thru	B	16	0.48	91	B	18	0.73	141
		Right	B	12	0.10	8	B	12	0.35	15
	SB	Left	B	18	0.01	2	B	16	0.11	5
		Dual Thru	D	40	0.89	224	C	22	0.70	130
		Right	B	19	0.07	9	B	13	0.09	9
<b>Overall Intersection</b>		<b>D</b>	<b>39</b>	<b>0.82</b>	<b>-</b>	<b>C</b>	<b>23</b>	<b>0.69</b>	<b>-</b>	
Albion Vaughan Road & Kirby Road  <i>Unsignalized</i>	WB	Left/Right	C	17	0.11	3	C	21	0.27	7
	NB	Thru- Thru/Right	Unopposed Movement				Unopposed Movement			
	SB	Left/Thru-Thru	A	3	0.10	2	A	3	0.05	1
<sup>1</sup> Level of Service; <sup>2</sup> Average vehicle delay, seconds; <sup>3</sup> Volume to capacity ratio; <sup>4</sup> 95 <sup>th</sup> percentile queue, metres										



**TABLE 5.7: 2032 TOTAL TRAFFIC OPERATIONS – IMPROVEMENTS**

Intersection	Approach/ Movement		AM Peak Hour				PM Peak Hour			
			LOS <sup>1</sup>	Delay <sup>2</sup>	V/C <sup>3</sup>	Q <sup>4</sup>	LOS <sup>1</sup>	Delay <sup>2</sup>	V/C <sup>3</sup>	Q <sup>4</sup>
Regional Road 50 & Albion Vaughan Road/Mayfield Road  <i>Signalized</i>	EB	Left	E	64	0.61	32	D	40	0.56	43
		Dual Thru	E	63	0.48	31	D	45	0.55	38
		Right	E	59	0.09	16	D	40	0.07	12
	WB	Dual Left	E	68	0.85	97	D	55	0.63	28
		Dual Thru	D	47	0.45	56	D	43	0.40	27
		Right	D	42	0.03	4	D	40	0.04	2
	NB	Left	E	58	0.73	43	B	17	0.46	10
		Dual Thru	B	17	0.48	92	B	16	0.71	134
		Right	B	12	0.11	8	B	12	0.40	22
	SB	Left	B	20	0.06	5	B	18	0.25	10
		Dual Thru	D	41	0.90	227	B	19	0.66	121
		Right	B	19	0.07	9	B	12	0.09	9
	<b>Overall Intersection</b>			<b>D</b>	<b>40</b>	<b>0.84</b>	<b>-</b>	<b>C</b>	<b>22</b>	<b>0.70</b>
Albion Vaughan Road & Kirby Road  <i>Unsignalized</i>	WB	Left/Right	C	17	0.12	3	C	22	0.27	8
	NB	Thru- Thru/Right	Unopposed Movement				Unopposed Movement			
	SB	Left/Thru-Thru	A	3	0.10	2	A	3	0.05	1
Albion Vaughan Road & Site Access  <i>Unsignalized</i>	EB	Left/Right	B	14	0.17	4	B	11	0.07	2
	NB	Left/Thru	A	2	0.02	1	A	2	0.05	1
	SB	Thru/Right	Unopposed Movement				Unopposed Movement			

<sup>1</sup> Level of Service; <sup>2</sup> Average vehicle delay, seconds; <sup>3</sup> Volume to capacity ratio; <sup>4</sup> 95<sup>th</sup> percentile queue, metres





### Albion Vaughan Road and Site Access

Aforementioned, the Town's Multi-Modal Transportation Master Plan has identified the widening of Albion-Vaughan Road to a four-lane cross-section by 2031.

From an operational standpoint, auxiliary turn lanes on Albion Vaughan Road are not necessary as the shared northbound left/through-through movement and the shared southbound through-through/right movements are both reported to operate at LOS A and the movements are forecast to be well within capacity.

Regardless, the warrants for left-turn lanes within the Ontario Ministry of Transportation's (MTO) *Design Supplement* to the TAC *Geometric Design Guide for Canadian Roads* (TAC Guide) were investigated for four-lane undivided roads. The warrant is based on a combination of the advancing and opposing design hour volumes, and the design speed of the road.

A warrant analysis has been completed using the nomographs for four-lane, unsignalized intersections, with a design speed of 80 km/h (20 km/h over the posted speed limit). **Table 5.8** summarizes the details of the left-turn warrant analysis. **Appendix I** contains the warrant analysis sheets for reference.

**TABLE 5.8: LEFT-TURN LANE WARRANT ANALYSIS**

Major Street	Albion Vaughan Road	
Minor Street	Site Access	
Approach Direction	Northbound	
Peak Hour	AM	PM
Opposing Volume	1,009	405
Left Turning Volume	17	58
<b>Warranted</b>	<b>Yes</b>	<b>Yes</b>

Based upon 2032 total traffic forecasts, a northbound auxiliary left-turn lane providing a minimum storage length of 15.0 metres is determined to be warranted from a volume perspective.

Based upon the low forecast volumes of southbound right-turn volumes, it is determined that an auxiliary right-turn lane would not be necessary. As the forecast volume of turning traffic is low, it is anticipated that these vehicles will not impede southbound traffic on Albion Vaughan Road or cause any undue hazard to through traffic.



## 6 Parking Review

### 6.1 Development Overview

The proposed residential development comprises two residential towers, with a total of 264 residential dwelling units. The development statistics are as follows:

- ▶ One six-storey residential tower with 114 units total:
  - 37 one-bedroom units;
  - 22 one-bedroom + den units;
  - 31 two-bedroom units;
  - 18 two-bedroom + large balcony units;
  - 6 three-bedroom units.
- ▶ One seven-storey residential tower with 150 units total:
  - 40 one-bedroom units;
  - 14 one-bedroom + den units;
  - 68 two-bedroom units;
  - 21 two-bedroom + large balcony units;
  - 7 three-bedroom units.

A total of 468 parking spaces serving residents and visitors are proposed on-site, including 12 accessible parking spaces. The parking supply breakdown is as follows:

- ▶ 8 spaces at-grade;
- ▶ 223 spaces on parking level P1; and
- ▶ 237 spaces on parking level P2.

### 6.2 Zoning By-law Vehicular Parking Requirements

**Table 6.1** presents a comparison of the required and proposed number of vehicle parking spaces under the Town of Caledon Zoning By-law, Section 5: Parking, Loading and Delivery Standards<sup>12</sup>.

The proposed vehicle parking supply satisfies the Town's By-law requirements and results in a surplus of six (6) parking spaces.

<sup>12</sup> Town of Caledon, *Zoning By-law, Section 5: Parking, Loading and Delivery Standards*, February 10 2022.



**TABLE 6.1: REQUIRED AND PROVIDED PARKING**

Type of Use	By-law Requirement	Parking Spaces		
		Required	Provided	Net Surplus (Deficiency)
Building, Apartment (264 units)	1.5 spaces per dwelling unit for residents	396	401	+5
	0.25 spaces per unit for visitors	66	67	+1
<b>Total</b>		<b>462</b>	<b>468</b>	<b>+6</b>

### 6.3 Accessible Parking Requirements

The accessible parking requirements for the subject site have been verified against the Town of Caledon Zoning By-law 2015-58, Schedule K: Designed Accessible Parking Spaces<sup>13</sup>.

The minimum number of accessible parking spaces is two accessible spaces plus 2% of the proposed parking spaces, when the required number of parking spaces is between 201 and 1000.

**Table 6.2** presents a comparison of the required and proposed number of accessible parking spaces. The proposed accessible parking supply for the residential development meets and satisfies the Town's By-law requirements with a surplus of one accessible parking space.

**TABLE 6.2: REQUIRED AND PROVIDED ACCESSIBLE PARKING**

Proposed Parking Supply	By-law Requirement	Parking Spaces		
		Required	Provided	Net Surplus (Deficiency)
468 spaces	2 spaces + 2% of total proposed parking spaces	11	12	+1
<b>Total</b>		<b>11</b>	<b>12</b>	<b>+1</b>

<sup>13</sup> Town of Caledon, *Zoning By-law 2015-58, Schedule K: Designed Accessible Parking Spaces*, Effective 27 April 2021.



## 6.4 Bicycle Parking

As the Town's ZBL does not stipulate any municipal requirements for bicycle parking, Town staff per the latest review requested that bicycle parking rates for comparable municipalities be provided for information. **Table 6.3** provides a summary.

**TABLE 6.3: BICYCLE PARKING REQUIREMENTS (OTHER MUNICIPALITIES)**

Municipality	Bicycle Parking Requirements
City of Brampton	LT: 0.5 spaces/dwelling unit ST: 0.1 spaces/dwelling unit
City of Vaughan	LT: 0.5 spaces/dwelling unit ST: 0.1 spaces/dwelling unit, or 3 spaces, which is greater
City of Markham	LT: 0.5 spaces/dwelling unit ST: 0.1 spaces/dwelling unit, or 3 spaces, which is greater
Town of Whitby	None
Town of Ajax	None
City of Oshawa	None

A total of 86 bicycle parking spaces, broken down to 30 short-term (0.11 spaces/unit) and 56 long-term (0.21 spaces/unit) spaces are proposed on-site.

It is noted the proposed short-term bicycle parking provisions are generally inline with what other municipalities require. Whereas, the proposed long-term bicycle parking provisions are noted to be deficient in comparison to other municipalities.

Given there is no proposed reduced vehicular parking, and the locational context of the site with no immediate plans for extensions of cycling networks/routes within vicinity of the site, the proposed bicycle parking supply is determined to be currently adequate for the site.

While the provision of a larger compliment of long-term bicycle parking spaces would encourage cycling, it is noted with the absence of any dedicated bicycle infrastructure, cyclists would have to share the travelled roadways with vehicles.

In terms of long-term bicycle parking space specifications, reference is made to the details noted within the City of Vaughan's ZBL. Bicycle parking space dimensions are summarized below:

- ▶ Minimum space dimensions:



- Length = 1.8 m;
- Width = 0.6 m; and
- Vertical clearance from the flow = 1.9 m.

If vertical bicycle parking spaces are proposed, they shall have the following dimensions:

- ▶ Minimum space dimensions for a vertical bicycle parking space:
  - Length or vertical clearance = 1.9 m;
  - Width = 0.6 m; and
  - Clearance from the wall = 1.2 m.

For any stacked bicycle parking spaces, the minimum vertical dimension for each bicycle parking space shall be 1.2 m and the minimum vertical clearance from floor shall be 2.4 m.

Short-term bicycle parking shall be accommodated by bicycle racks.



## 7 Circulation Review

AutoTURN software was used to review and confirm that design of the site accesses, internal circulation, and loading areas will accommodate the types of vehicles expected on-site. This involved the following tasks:

- ▶ Showing how a Region of Peel waste collection vehicle would enter the site, access the loading spaces, and exit the site;
- ▶ Showing how a Pumper Fire Truck would enter the site, circulate the designated fire route, and exit the site;
- ▶ Showing how a TAC Medium Single-Unit (MSU) truck (design vehicle representing typical service and delivery truck) would enter the site, access the loading spaces, and exit the site; and
- ▶ Showing how a TAC Passenger Car (design vehicle representing a large car) would enter the site, circulate, access the underground parking structure, and exit the site.

Our review of the underground parking levels noted that all parking spaces and drive aisle widths meet zoning requirements. Furthermore, no dead-end drive aisles were noted and no parking spaces were flagged to have ingress or egress issues.

Each of the design vehicle manoeuvres described above are accommodated by the design of the site without issue or conflict.

**Appendix J** contains the vehicle maneuvering diagrams for reference.



## 8 Conclusions and Recommendations

### 8.1 Conclusions

The conclusions of the study are as follows:

- ▶ Under the base year conditions, all study area intersections operate at acceptable levels of service and within capacity.
- ▶ For the 2032 background traffic conditions (without subject development), all study area intersections are forecast to operate at acceptable levels of service and within capacity.

The exception would be the Regional Road 50 and Albion Vaughan Road/Mayfield Road intersection, where the overall intersection v/c ratio is forecast to be 0.98 during the AM peak hour. The southbound dual through movement is reported to operate with a v/c of 0.97 during the AM peak hour.

- ▶ Under the 2032 total traffic conditions (with subject development), all study area intersections are forecast to operate at acceptable levels of service and within capacity.

The previously identified critical movements would continue to be reported, albeit slightly exacerbated, with the addition of the westbound left turn movement identified under the AM peak hour.

- ▶ The overall impact of the proposed residential development is anticipated to be minimal. The development is estimated to generate and add a total of 105 and 104 vehicle trips to the adjacent transportation network during the AM and PM peak hours, respectively.

The additional traffic would be less than daily traffic variations typically experienced. It is determined the site generated traffic would increase volumes at the study area intersections between 0.9 to 2.2%;

- ▶ To mitigate identified critical movements under total traffic conditions, the planned road widening of Albion-Vaughan Road, and auxiliary dual left-turn lanes were investigated at the westbound approach at the intersection of Regional Road 50 and Albion Vaughan Road/Mayfield Road intersection.

As analyzed with the planned road widening, and dual left-turn lanes on the westbound approach and optimization of signal timing splits within existing cycle lengths, the overall intersection is reported to operate at acceptable levels of service and with all movements within capacity under the 2032 horizon.



- ▶ At the main central site access intersection with Albion Vaughan Road, it was determined an auxiliary northbound left-turn lane would be warranted from a volume perspective for the future four-lane cross-section of Albion-Vaughan Road;
- ▶ The proposed vehicular parking supply satisfies the minimum zoning by-law requirements.
- ▶ A review of the site plan was undertaken. No major conflicts or issues were identified for the anticipated design vehicles expected on-site.

## 8.2 Recommendations

The recommendations of the study are as follows:

- ▶ From a transportation perspective, the planning applications sought should be approved as the development is determined to have a minimal impact on the adjacent transportation network;
- ▶ Provision of a northbound left-turn lane on Albion-Vaughan Road to serve the site's central access;
- ▶ The Town of Caledon to provide the planned widening Albion-Vaughan Road to four-lanes by 2031 as identified within the Multi-Modal Transportation Master Plan; and
- ▶ The intersection volumes and operations at the Regional Road 50 and Albion Vaughan Road/Mayfield Road intersection be monitored by the applicable jurisdiction to determine when dual westbound left-turn lanes should be provided.





# Appendix A

## Pre-Study Consultation Correspondence



## Adrian Soo

---

**From:** Arash Olia <Arash.Olia@caledon.ca>  
**Sent:** October 23, 2020 11:14 AM  
**To:** Andrew Steinsky; catherine.barnes@peelregion.ca  
**Cc:** Adrian Soo  
**Subject:** RE: 200428 - 12148 Albion Vaughan Road TIS Scope of Work

Hi Andrew,

Please see my comments below in red.

Thanks,

**Arash Olia, Ph.D., P.Eng.**

Manager, Transportation Engineering  
Finance & Infrastructure Services

Office: 905.584.2272 x.4073  
Cell: 416.452.7091  
Email: [arash.olia@caledon.ca](mailto:arash.olia@caledon.ca)

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---

**From:** Andrew Steinsky <asteinsky@ptsl.com>  
**Sent:** Thursday, October 22, 2020 10:45 AM  
**To:** catherine.barnes@peelregion.ca; Arash Olia <Arash.Olia@caledon.ca>  
**Cc:** Adrian Soo <asoo@ptsl.com>  
**Subject:** 200428 - 12148 Albion Vaughan Road TIS Scope of Work

**CAUTION:** This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the contents to be safe.

Hi Arash & Catherine,

We've been retained to prepare a Traffic Impact Study (TIS) for a residential development on the west side of Albion Vaughan Road, south of Kirby Road in Bolton. We're reaching out to both the Region and Town to confirm our scope of work. If you are not the correct point of contact, please let us know so we can contact the correct person. We would appreciate any comments by the week of November 2.

The development proposal includes 240 condominiums in a six-storey building, and 10 townhomes. Access is proposed through a new all-moves driveway connection to Albion Vaughan Road. Two separate driveway connections for loading and delivery vehicles are also proposed on the north and south edges of the site.

Based on the above, we propose the following work plan to carry out the TIS:

1. Analysis of AM and PM peak hours.
2. Horizon year five years ~~from date of study~~ (2025). **Please confirm. From completion/built out date**

3. Study area to include:
  - Highway 50 & Mayfield Road/Albion Vaughan Road; and
  - Albion Vaughan Road & Kirby Road.

We have turning movements completed at both intersections on Thursday November 24, 2016. Are these counts acceptable given the current impacts of COVID-19 on traffic volumes? **Please confirm** an appropriate growth rate to factor these volumes to a 2020 base year. **I suggest adopt 2%**

4. Background traffic to be forecast using a per annum growth rate. **Please confirm appropriate growth rate. 2%**
5. Background developments to be included? **Please confirm. No background development**
6. ITE *Trip Generation Manual (10<sup>th</sup> Edition)* rates to establish trip generation
7. Mode share based on TTS.
8. Trip distribution derived from turning movement counts and origin/destination information obtained from TTS.
9. AutoTURN assessment to include relevant design vehicles expected on the site, and swept path analysis.

Please let me and Adrian Soo (cc'd on this e-mail) if you have any questions on the above work plan.

Thanks,

**Andrew Steinsky, P.Eng.**  
*Transportation Engineer*



### **Paradigm Transportation Solutions Limited**

5A-150 Pinebush Road, Cambridge ON N1R 8J8  
p: 416.479.9684 x507  
e: [asteinsky@ptsl.com](mailto:asteinsky@ptsl.com)  
w: [www.ptsl.com](http://www.ptsl.com)

*Since 1998, our unique "work at home" business model has enabled us to harness technology, offer high quality service and strong communication with our clients and now allows us to carry on our work for you during COVID-19.*

*Let's stay safe and look out for each other. We will get through this together.*

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# Appendix B

## Growth Rate Calculation Based on Historical Traffic Volume Data



Project: 12148 Albion Vaughan  
 Project #: 200185  
 Task: Growth Rate Calculation

**HIGHWAY 50, 1.0 km north of mayfield road**

NE	Volume	SW	Volume	Total
Y 2009 NE	16325	Y 2009 SW	15690	32015
Y 2011 NE	13700	Y 2011 SW	13133	26833
Y 2012 NE	14784	Y 2012 SW	14130	28914
Y 2013 NE	16816	Y 2013 SW	15887	32703
Y 2014 NE	16719	Y 2014 SW	15954	32673
Y 2015 NE	17803	Y 2015 SW	16408	34211

Growth Rate    1.45%                    0.75%    1.11%

**HIGHWAY 50, 0.5 km north of countryside/nashville**

NE	Volume	SW	Volume	Total
Y 2011 NE	12065	Y 2011 SW	12029	24094
Y 2012 NE	12100	Y 2012 SW	0	12100
Y 2013 NE	15333	Y 2013 SW	13319	28652
Y 2014 NE	13552	Y 2014 SW	14574	28126
Y 2015 NE	14835	Y 2015 SW	14804	29639
Y 2016 NE	16860	Y 2016 SW	16767	33627
Y 2017 NE	10860	Y 2017 SW	13040	23900

-1.74%                    1.35%    -0.13%

**Mayfield Road, 0.8 km west of hwy 50**

NE	Volume	SW	Volume	Total
Y 2012 NE	5266	Y 2012 SW	5232	10498
Y 2013 NE	5067	Y 2013 SW	5054	10121
Y 2014 NE	5451	Y 2014 SW	4960	10411
Y 2015 NE	4324	Y 2015 SW	4203	8527
Y 2016 NE	0	Y 2016 SW	0	0
Y 2017 NE	5542	Y 2017 SW	5181	10723

1.03%                    -0.20%    0.43%

# Appendix C

## Traffic Data



# Albion Vaughan Road & Highway 50

## Morning Peak Diagram

### Specified Period

**From:** 6:00:00  
**To:** 10:00:00

### One Hour Peak

**From:** 7:15:00  
**To:** 8:15:00

**Municipality:** Nobleton  
**Site #:** 000009401  
**Intersection:** Highway 50 & Albion Vaughan Road  
**TFR File #:** 1  
**Count date:** 24-Nov-2016

**Weather conditions:**  
Cloudy / Rain  
**Person(s) who counted:**

**\*\* Signalized Intersection \*\***

**Major Road:** Highway 50 runs N/S

North Leg Total: 2032  
North Entering: 1192  
North Peds: 0  
Peds Cross:  $\times$

Heavys	3	31	1	35
Trucks	6	55	0	61
Cars	94	1001	1	1096
Totals	103	1087	2	



Heavys	23
Trucks	45
Cars	772
Totals	840

East Leg Total: 1020  
East Entering: 761  
East Peds: 0  
Peds Cross:  $\times$

Heavys	Trucks	Cars	Totals
30	51	381	462

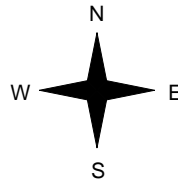


Highway 50

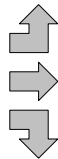
Cars	Trucks	Heavys	Totals
12	2	1	15
232	14	9	255
484	6	1	491
728	22	11	



Albion Vaughan Road



Heavys	Trucks	Cars	Totals
4	9	90	103
9	10	90	109
26	21	56	103
39	40	236	



Albion Vaughan Road



Highway 50



Cars	Trucks	Heavys	Totals
221	21	17	259

Peds Cross:  $\times$   
West Peds: 0  
West Entering: 315  
West Leg Total: 777

Cars	1541
Trucks	82
Heavys	58
Totals	1681



Cars	55	670	130	855
Trucks	31	34	11	76
Heavys	18	18	7	43
Totals	104	722	148	

Peds Cross:  $\times$   
South Peds: 0  
South Entering: 974  
South Leg Total: 2655

## Comments



# Albion Vaughan Road & Highway 50

## Afternoon Peak Diagram

### Specified Period

**From:** 14:00:00

**To:** 18:00:00

### One Hour Peak

**From:** 16:00:00

**To:** 17:00:00

**Municipality:** Nobleton  
**Site #:** 000009401  
**Intersection:** Highway 50 & Albion Vaughan Road  
**TFR File #:** 1  
**Count date:** 24-Nov-2016

### Weather conditions:

Cloudy / Rain

### Person(s) who counted:

### \*\* Signalized Intersection \*\*

**Major Road:** Highway 50 runs N/S

North Leg Total: 2347  
 North Entering: 1058  
 North Peds: 0  
 Peds Cross:  $\nless$

Heavys	3	25	1	29
Trucks	6	35	1	42
Cars	132	846	9	987
<b>Totals</b>	<b>141</b>	<b>906</b>	<b>11</b>	



Heavys	41
Trucks	61
Cars	1187
<b>Totals</b>	<b>1289</b>

East Leg Total: 1029  
 East Entering: 319  
 East Peds: 0  
 Peds Cross:  $\nless$

Heavys	Trucks	Cars	Totals
40	26	272	338

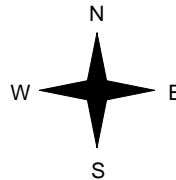


Highway 50

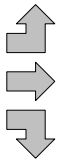
Cars	Trucks	Heavys	Totals
23	6	1	30
106	7	15	128
152	6	3	161
<b>281</b>	<b>19</b>	<b>19</b>	



Albion Vaughan Road



Heavys	Trucks	Cars	Totals
2	9	160	171
11	9	173	193
20	10	55	85
<b>33</b>	<b>28</b>	<b>388</b>	



Albion Vaughan Road



Cars	Trucks	Heavys	Totals
654	12	44	710

Peds Cross:  $\nless$   
 West Peds: 0  
 West Entering: 449  
 West Leg Total: 787

Cars	1053	Cars	34	1004	472	1510
Trucks	51	Trucks	13	46	2	61
Heavys	48	Heavys	22	38	32	92
<b>Totals</b>	<b>1152</b>	<b>Totals</b>	<b>69</b>	<b>1088</b>	<b>506</b>	



Peds Cross:  $\nless$   
 South Peds: 0  
 South Entering: 1663  
 South Leg Total: 2815

## Comments

# Albion Vaughan Road & Highway 50

## Total Count Diagram

**Municipality:** Nobleton  
**Site #:** 000009401  
**Intersection:** Highway 50 & Albion Vaughan Road  
**TFR File #:** 1  
**Count date:** 24-Nov-2016

**Weather conditions:**  
 Cloudy / Rain  
**Person(s) who counted:**

**\*\* Signalized Intersection \*\***

**Major Road:** Highway 50 runs N/S

North Leg Total: 14934  
 North Entering: 7544  
 North Peds: 0  
 Peds Cross:  $\nabla$

Heavys	37	299	6	342
Trucks	49	394	7	450
Cars	759	5946	47	6752
<b>Totals</b>	<b>845</b>	<b>6639</b>	<b>60</b>	



Heavys	296
Trucks	423
Cars	6671
<b>Totals</b>	<b>7390</b>

East Leg Total: 6580  
 East Entering: 3502  
 East Peds: 1  
 Peds Cross:  $\nabla$

Heavys	Trucks	Cars	Totals
286	318	1982	2586

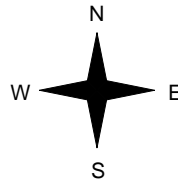


Highway 50

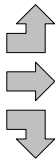
Cars	Trucks	Heavys	Totals
123	18	8	149
926	82	50	1058
2184	65	46	2295
<b>3233</b>	<b>165</b>	<b>104</b>	



Albion Vaughan Road



Heavys	Trucks	Cars	Totals
22	44	800	866
62	79	832	973
208	163	299	670
<b>292</b>	<b>286</b>	<b>1931</b>	



Highway 50

Albion Vaughan Road



Cars	Trucks	Heavys	Totals
2726	144	208	3078

Peds Cross:  $\nabla$   
 West Peds: 0  
 West Entering: 2509  
 West Leg Total: 5095

Cars	8429
Trucks	622
Heavys	553
<b>Totals</b>	<b>9604</b>



Cars	297	5748	1847	7892
Trucks	187	361	58	606
Heavys	199	266	140	605
<b>Totals</b>	<b>683</b>	<b>6375</b>	<b>2045</b>	

Peds Cross:  $\nabla$   
 South Peds: 2  
 South Entering: 9103  
 South Leg Total: 18707

### Comments

# Albion Vaughan Road & Highway 50 Traffic Count Summary

Intersection: Highway 50 & Albion Vaughan Road    Count Date: 24-Nov-2016    Municipality: Nobleton

<b>North Approach Totals</b>						North/South Total Approaches	<b>South Approach Totals</b>					
Hour Ending	Includes Cars, Trucks, & Heavys				Total Peds		Hour Ending	Includes Cars, Trucks, & Heavys				Total Peds
	Left	Thru	Right	Grand Total				Left	Thru	Right	Grand Total	
6:00:00	0	0	0	0	0	0	6:00:00	0	0	0	0	0
7:00:00	0	711	54	765	0	1354	7:00:00	58	457	74	589	0
8:00:00	3	1055	90	1148	0	2048	8:00:00	93	681	126	900	0
9:00:00	4	917	117	1038	0	1971	9:00:00	97	705	131	933	0
10:00:00	14	844	89	947	0	1752	10:00:00	85	634	86	805	2
14:00:00	0	0	0	0	0	0	14:00:00	0	0	0	0	0
15:00:00	17	637	127	781	0	2069	15:00:00	102	927	259	1288	0
16:00:00	9	723	134	866	0	2449	16:00:00	107	1103	373	1583	0
17:00:00	11	906	141	1058	0	2721	17:00:00	69	1088	506	1663	0
18:00:00	2	846	93	941	0	2283	18:00:00	72	780	490	1342	0
Totals:	60	6639	845	7544	0	16647		683	6375	2045	9103	2
<b>East Approach Totals</b>						East/West Total Approaches	<b>West Approach Totals</b>					
Hour Ending	Includes Cars, Trucks, & Heavys				Total Peds		Hour Ending	Includes Cars, Trucks, & Heavys				Total Peds
	Left	Thru	Right	Grand Total				Left	Thru	Right	Grand Total	
6:00:00	0	0	0	0	0	0	6:00:00	0	0	0	0	0
7:00:00	377	128	8	513	0	696	7:00:00	35	97	51	183	0
8:00:00	481	259	14	754	0	1053	8:00:00	79	102	118	299	0
9:00:00	451	154	22	627	0	926	9:00:00	126	90	83	299	0
10:00:00	278	109	17	404	0	715	10:00:00	102	107	102	311	0
14:00:00	0	0	0	0	0	0	14:00:00	0	0	0	0	0
15:00:00	178	73	18	269	0	587	15:00:00	136	91	91	318	0
16:00:00	178	105	25	308	0	656	16:00:00	127	137	84	348	0
17:00:00	161	128	30	319	0	768	17:00:00	171	193	85	449	0
18:00:00	191	102	15	308	1	610	18:00:00	90	156	56	302	0
Totals:	2295	1058	149	3502	1	6011		866	973	670	2509	0
<b>Calculated Values for Traffic Crossing Major Street</b>												
Hours Ending:	7:00	8:00	9:00	10:00				15:00	16:00	17:00	18:00	
Crossing Values:	540	819	731	491				405	442	525	437	

# Albion Vaughan Road & Kirby Road

## Morning Peak Diagram

### Specified Period

**From:** 6:00:00

**To:** 9:00:00

### One Hour Peak

**From:** 7:15:00

**To:** 8:15:00

**Municipality:** Nobleton  
**Site #:** 0000009402  
**Intersection:** Albion Vaughan Road & Kirby Road  
**TFR File #:** 1  
**Count date:** 24-Nov-2016

**Weather conditions:**  
 Cloudy / Rain  
**Person(s) who counted:**

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

**Major Road:** Albion Vaughan Road runs N/S

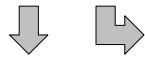
North Leg Total: 1107  
 North Entering: 846  
 North Peds: 0  
 Peds Cross:  $\times$

Heavys	5	2	7
Trucks	20	3	23
Cars	699	117	816
<b>Totals</b>	<b>724</b>	<b>122</b>	

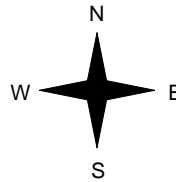


Heavys	15
Trucks	17
Cars	229
<b>Totals</b>	<b>261</b>

East Leg Total: 165  
 East Entering: 39  
 East Peds: 0  
 Peds Cross:  $\times$



Albion Vaughan Road



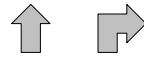
	Cars	Trucks	Heavys	Totals
	24	3	4	31
	1	3	4	8
	<u>25</u>	<u>6</u>	<u>8</u>	

Kirby Road



	Cars	Trucks	Heavys	Totals
	121	3	2	126

Albion Vaughan Road



Cars	700	Cars	205	4	209
Trucks	23	Trucks	14	0	14
Heavys	9	Heavys	11	0	11
<b>Totals</b>	<b>732</b>	<b>Totals</b>	<b>230</b>	<b>4</b>	



Peds Cross:  $\times$   
 South Peds: 0  
 South Entering: 234  
 South Leg Total: 966

## Comments

# Albion Vaughan Road & Kirby Road

## Mid-day Peak Diagram

### Specified Period

**From:** 11:30:00

**To:** 13:30:00

### One Hour Peak

**From:** 12:15:00

**To:** 13:15:00

**Municipality:** Nobleton  
**Site #:** 0000009402  
**Intersection:** Albion Vaughan Road & Kirby Road  
**TFR File #:** 1  
**Count date:** 24-Nov-2016

**Weather conditions:**  
 Cloudy / Rain  
**Person(s) who counted:**

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

**Major Road:** Albion Vaughan Road runs N/S

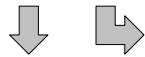
North Leg Total: 497  
 North Entering: 270  
 North Peds: 0  
 Peds Cross:  $\times$

Heavys	18	0	18
Trucks	16	4	20
Cars	196	36	232
<b>Totals</b>	<b>230</b>	<b>40</b>	

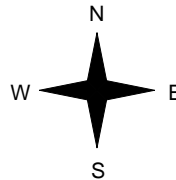


Heavys	10
Trucks	16
Cars	201
<b>Totals</b>	<b>227</b>

East Leg Total: 74  
 East Entering: 28  
 East Peds: 0  
 Peds Cross:  $\times$



Albion Vaughan Road



	Cars	Trucks	Heavys	Totals
Upward arrow	21	2	1	24
Downward arrow	3	1	0	4
<b>Totals</b>	<b>24</b>	<b>3</b>	<b>1</b>	

Kirby Road



	Cars	Trucks	Heavys	Totals
Rightward arrow	40	5	1	46

Cars	199	Cars	180	4	184
Trucks	17	Trucks	14	1	15
Heavys	18	Heavys	9	1	10
<b>Totals</b>	<b>234</b>	<b>Totals</b>	<b>203</b>	<b>6</b>	



Peds Cross:  $\times$   
 South Peds: 0  
 South Entering: 209  
 South Leg Total: 443

## Comments

# Albion Vaughan Road & Kirby Road

## Afternoon Peak Diagram

### Specified Period

**From:** 15:00:00

**To:** 18:00:00

### One Hour Peak

**From:** 16:15:00

**To:** 17:15:00

**Municipality:** Nobleton  
**Site #:** 0000009402  
**Intersection:** Albion Vaughan Road & Kirby Road  
**TFR File #:** 1  
**Count date:** 24-Nov-2016

**Weather conditions:**  
 Cloudy / Rain  
**Person(s) who counted:**

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

**Major Road:** Albion Vaughan Road runs N/S

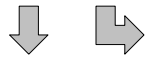
North Leg Total: 1089  
 North Entering: 308  
 North Peds: 0  
 Peds Cross:  $\times$

Heavys	10	0	10
Trucks	8	1	9
Cars	257	32	289
<b>Totals</b>	<b>275</b>	<b>33</b>	

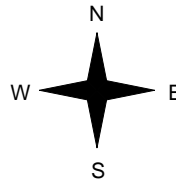


Heavys	10
Trucks	11
Cars	760
<b>Totals</b>	<b>781</b>

East Leg Total: 119  
 East Entering: 80  
 East Peds: 1  
 Peds Cross:  $\times$



Albion Vaughan Road



	Cars	Trucks	Heavys	Totals
↖	61	1	0	62
↙	12	0	6	18
	<b>73</b>	<b>1</b>	<b>6</b>	

Kirby Road



	Cars	Trucks	Heavys	Totals
↖	37	2	0	39

	Cars	269		Cars	699	5	704
	Trucks	8		Trucks	10	1	11
	Heavys	16		Heavys	10	0	10
	<b>Totals</b>	<b>293</b>		<b>Totals</b>	<b>719</b>	<b>6</b>	

Peds Cross:  $\times$   
 South Peds: 0  
 South Entering: 725  
 South Leg Total: 1018

## Comments

# Albion Vaughan Road & Kirby Road

## Total Count Diagram

**Municipality:** Nobleton  
**Site #:** 0000009402  
**Intersection:** Albion Vaughan Road & Kirby Road  
**TFR File #:** 1  
**Count date:** 24-Nov-2016

**Weather conditions:**  
 Cloudy / Rain  
**Person(s) who counted:**

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

**Major Road:** Albion Vaughan Road runs N/S

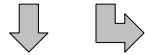
North Leg Total: 6632  
 North Entering: 3543  
 North Peds: 0  
 Peds Cross:  $\nabla$

Heavys	73	3	76
Trucks	120	16	136
Cars	2949	382	3331
<b>Totals</b>	<b>3142</b>	<b>401</b>	

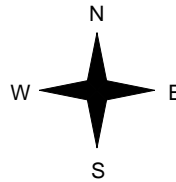


Heavys	80
Trucks	110
Cars	2899
<b>Totals</b>	<b>3089</b>

East Leg Total: 818  
 East Entering: 355  
 East Peds: 1  
 Peds Cross:  $\nabla$



Albion Vaughan Road

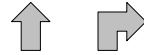


	Cars	Trucks	Heavys	Totals
	264	10	8	282
	52	7	14	73
	316	17	22	

Kirby Road



Albion Vaughan Road



Cars	3001
Trucks	127
Heavys	87
<b>Totals</b>	<b>3215</b>



Cars	2635	52	2687
Trucks	100	6	106
Heavys	72	4	76
<b>Totals</b>	<b>2807</b>	<b>62</b>	

Peds Cross:  $\nabla$   
 South Peds: 0  
 South Entering: 2869  
 South Leg Total: 6084

### Comments

# Albion Vaughan Road & Kirby Road Traffic Count Summary

Intersection: Albion Vaughan Road & Kirby Road    Count Date: 24-Nov-2016    Municipality: Nobleton

<b>North Approach Totals</b>						North/South Total Approaches	<b>South Approach Totals</b>					
Hour Ending	Includes Cars, Trucks, & Heavys				Total Peds		Hour Ending	Includes Cars, Trucks, & Heavys				Total Peds
	Left	Thru	Right	Grand Total				Left	Thru	Right	Grand Total	
6:00:00	0	0	0	0	0	0	6:00:00	0	0	0	0	0
7:00:00	41	549	0	590	0	764	7:00:00	0	168	6	174	0
8:00:00	128	732	0	860	0	1075	8:00:00	0	207	8	215	0
9:00:00	69	612	0	681	0	885	9:00:00	0	198	6	204	0
12:00:00	13	95	0	108	0	206	12:00:00	0	90	8	98	0
13:00:00	39	209	0	248	0	462	13:00:00	0	207	7	214	0
15:00:00	21	119	0	140	0	247	15:00:00	0	101	6	107	0
16:00:00	29	272	0	301	0	796	16:00:00	0	491	4	495	0
17:00:00	35	287	0	322	0	980	17:00:00	0	653	5	658	0
18:00:00	26	267	0	293	0	997	18:00:00	0	692	12	704	0
Totals:	401	3142	0	3543	0	6412		0	2807	62	2869	0
<b>East Approach Totals</b>						East/West Total Approaches	<b>West Approach Totals</b>					
Hour Ending	Includes Cars, Trucks, & Heavys				Total Peds		Hour Ending	Includes Cars, Trucks, & Heavys				Total Peds
	Left	Thru	Right	Grand Total				Left	Thru	Right	Grand Total	
6:00:00	0	0	0	0	0	0	6:00:00	0	0	0	0	0
7:00:00	2	0	9	11	0	11	7:00:00	0	0	0	0	0
8:00:00	8	0	23	31	0	31	8:00:00	0	0	0	0	0
9:00:00	7	0	29	36	0	36	9:00:00	0	0	0	0	0
12:00:00	3	0	13	16	0	16	12:00:00	0	0	0	0	0
13:00:00	6	0	26	32	0	32	13:00:00	0	0	0	0	0
15:00:00	5	0	7	12	0	12	15:00:00	0	0	0	0	0
16:00:00	12	0	64	76	0	76	16:00:00	0	0	0	0	0
17:00:00	13	0	55	68	1	68	17:00:00	0	0	0	0	0
18:00:00	17	0	56	73	0	73	18:00:00	0	0	0	0	0
Totals:	73	0	282	355	1	355		0	0	0	0	0
<b>Calculated Values for Traffic Crossing Major Street</b>												
Hours Ending:	7:00	8:00	9:00	13:00		15:00	16:00	17:00	18:00			
Crossing Values:	2	8	7	6		5	12	13	17			



## REGIONAL MUNICIPALITY OF PEEL

### Traffic Signal Timing Parameters

Database Date	October 2, 2019		Prepared Date	November 11, 2020
Database Rev	18		Completed By	S.J
Timing Card / Field rev	-		Checked By	A.P

**Location** **Highway 50 at Mayfield Road**

Phase #	Street Name - Direction	Vehicle Minimum (s)	Pedestrian Minimum (s)		Amber (s)	All Red (s)	TIME PERIOD (s) (Green+Amber+All Red)		
			WALK	FDWALK			AM SPLITS	PM-1 SPLITS	PM-2 SPLITS
			1	Highway 50 - NBLT Prot. Perm.			5	-	-
2	Highway 50 - SB	20	8	23	4.6	2.0	63	50	39
3	Mayfield Road - WBLT Prot. Perm.	5	-	-	3.0	-	27	10	9
4	Mayfield Road - EB	12	8	25	4.0	2.5	45	40	40
5	Not In Use	-	-	-	-	-	-	-	-
6	Highway 50 - NB	20	8	23	4.6	2.0	88	75	61
7	Mayfield Road - EBLT Prot. Perm.	5	-	-	3.0	-	10	10	9
8	Mayfield Road - WB	12	8	25	4.0	2.5	62	40	40

<b>System Control</b> No <b>Semi-Actuated Mode</b> No, Fully Actuated	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>TIME (M-F)</th> <th>PEAK</th> <th>CYCLE LENGTH (s)</th> <th>OFFSET (s)</th> </tr> </thead> <tbody> <tr style="background-color: #e6f2ff;"> <td>06:00 - 09:00</td> <td>AM</td> <td>160</td> <td>27</td> </tr> <tr> <td>15:00 - 19:30</td> <td>PM-1</td> <td>125</td> <td>72</td> </tr> <tr style="background-color: #e6f2ff;"> <td>19:30 - 22:00</td> <td>PM-2</td> <td>110</td> <td>7</td> </tr> </tbody> </table>	TIME (M-F)	PEAK	CYCLE LENGTH (s)	OFFSET (s)	06:00 - 09:00	AM	160	27	15:00 - 19:30	PM-1	125	72	19:30 - 22:00	PM-2	110	7
TIME (M-F)	PEAK	CYCLE LENGTH (s)	OFFSET (s)														
06:00 - 09:00	AM	160	27														
15:00 - 19:30	PM-1	125	72														
19:30 - 22:00	PM-2	110	7														



# Appendix D

## Base Year Traffic Operations Reports



Lanes, Volumes, Timings

1: Regional Road 50 & Mayfield Road/Albion Vaughan Road

Base Year: AM Peak Hour

	↖	→	↗	↖	←	↖	↖	↖	↖	↖	↖	↖
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↖	↖	↖	↖	↖	↖	↖	↖	↖	↖	↖
Traffic Volume (vph)	103	123	103	491	287	15	104	813	148	2	1224	103
Future Volume (vph)	103	123	103	491	287	15	104	813	148	2	1224	103
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5
Storage Length (m)	100.0		90.0	170.0		70.0	125.0		180.0	35.0		150.0
Storage Lanes	1		1	1		1	1		1	1		1
Taper Length (m)	60.0			40.0			20.0			0.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt			0.850				0.850					0.850
Fit Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1580	1642	1094	1767	1331		1214	3411	1426	1190	3380	1465
Fit Permitted	0.584			0.598			0.098			0.345		
Satd. Flow (perm)	971	1642	1094	1112	1762	1331	125	3411	1426	432	3380	1465
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			103			65			148			103
Link Speed (k/h)		60			60			70				70
Link Distance (m)		289.2			563.9			378.1				686.1
Travel Time (s)		17.4			33.8			19.4				35.3
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	13%	17%	46%	1%	9%	20%	47%	7%	12%	50%	8%	9%
Adj. Flow (vph)	103	123	103	491	287	15	104	813	148	2	1224	103
Shared Lane Traffic (%)												
Lane Group Flow (vph)	103	123	103	491	287	15	104	813	148	2	1224	103
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.5			3.5			3.5			3.5	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												Yes
Headway Factor	1.01	0.99	1.01	1.01	0.99	1.01	1.01	0.99	1.01	1.01	0.99	1.01
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	2.0
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA	Perm

Lanes, Volumes, Timings

1: Regional Road 50 & Mayfield Road/Albion Vaughan Road

Base Year: AM Peak Hour

	↖	→	↗	↖	←	↖	↖	↖	↖	↖	↖	↖
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases	7	4		3	8		1	6				2
Permitted Phases	4		4	8		8	6		6	2		2
Detector Phase	7	4	4	3	8	8	1	6	6	2	2	2
Switch Phase												
Minimum Initial (s)	5.0	12.0	12.0	5.0	12.0	12.0	5.0	20.0	20.0	20.0	20.0	20.0
Minimum Split (s)	8.0	39.5	39.5	8.0	39.5	39.5	8.0	37.6	37.6	37.6	37.6	37.6
Total Split (s)	10.0	45.0	45.0	27.0	62.0	62.0	25.0	88.0	88.0	63.0	63.0	63.0
Total Split (%)	6.3%	28.1%	28.1%	16.9%	38.8%	38.8%	15.6%	55.0%	55.0%	39.4%	39.4%	39.4%
Maximum Green (s)	7.0	38.5	38.5	24.0	55.5	55.5	22.0	81.4	81.4	56.4	56.4	56.4
Yellow Time (s)	3.0	4.0	4.0	3.0	4.0	4.0	3.0	4.6	4.6	4.6	4.6	4.6
All-Red Time (s)	0.0	2.5	2.5	0.0	2.5	2.5	0.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	-3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	3.0	6.5	6.5	0.0	6.5	6.5	3.0	6.6	6.6	6.6	6.6	6.6
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead			Lag	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Recall Mode	None	None	None	None	None	None	None	Max	Max	Max	Max	Max
Walk Time (s)		8.0	8.0		8.0	8.0		8.0	8.0	8.0	8.0	8.0
Flash Dont Walk (s)		25.0	25.0		25.0	25.0		23.0	23.0	23.0	23.0	23.0
Pedestrian Calls (#/hr)		0	0		0	0		0	0	0	0	0
Act Effrt Green (s)	28.1	17.6	17.6	51.1	34.6	34.6	85.1	81.5	81.5	64.0	64.0	64.0
Actuated g/C Ratio	0.20	0.13	0.13	0.37	0.25	0.25	0.61	0.59	0.59	0.46	0.46	0.46
v/c Ratio	0.46	0.59	0.45	0.92	0.66	0.66	0.55	0.41	0.17	0.01	0.79	0.14
Control Delay	42.4	69.4	16.1	62.9	54.7	54.7	27.8	16.9	2.5	25.5	37.6	5.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	42.4	69.4	16.1	62.9	54.7	54.7	27.8	16.9	2.5	25.5	37.6	5.2
LOS	D	E	B	E	D	A	C	B	A	C	D	A
Approach Delay		44.3			58.7			16.0			35.1	
Approach LOS		D			E			B			D	
Intersection Summary												
Area Type:	Other											
Cycle Length:	160											
Actuated Cycle Length:	139.2											
Natural Cycle:	95											
Control Type:	Actuated-Uncoordinated											
Maximum v/c Ratio:	0.92											
Intersection Signal Delay:	35.5											
Intersection Capacity Utilization:	96.1%						ICU Level of Service F					
Analysis Period (min):	15											
Plots and Phases:	1: Regional Road 50 & Mayfield Road/Albion Vaughan Road											
	↖	↖	↖	↖	↖	↖	↖	↖	↖	↖	↖	↖
	ϕ1	ϕ2	ϕ3	ϕ4	ϕ5	ϕ6	ϕ7	ϕ8	ϕ9	ϕ10	ϕ11	ϕ12
	25 s	63 s	27 s	45 s	88 s	10 s	62 s					

Queues

1: Regional Road 50 & Mayfield Road/Albion Vaughan Road

Base Year: AM Peak Hour

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	103	123	103	491	287	15	104	813	148	2	1224	103
v/c Ratio	0.46	0.59	0.45	0.92	0.66	0.04	0.55	0.41	0.17	0.01	0.79	0.14
Control Delay	42.4	69.4	16.1	62.9	54.7	0.2	27.8	16.9	2.5	25.5	37.6	5.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	42.4	69.4	16.1	62.9	54.7	0.2	27.8	16.9	2.5	25.5	37.6	5.2
Queue Length 50th (m)	18.2	29.9	0.0	108.4	65.7	0.0	10.6	56.3	0.0	0.3	134.1	0.0
Queue Length 95th (m)	30.9	49.1	15.5	#164.9	93.8	0.0	27.0	77.0	8.9	2.2	#203.4	10.8
Internal Link Dist (m)		265.2			539.9			354.1			662.1	
Turn Bay Length (m)	100.0		90.0	170.0		70.0	125.0		180.0	35.0		150.0
Base Capacity (vph)	226	454	377	535	703	570	248	1996	896	198	1555	729
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.46	0.27	0.27	0.92	0.41	0.03	0.42	0.41	0.17	0.01	0.79	0.14

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis

1: Regional Road 50 & Mayfield Road/Albion Vaughan Road

Base Year: AM Peak Hour

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	103	123	103	491	287	15	104	813	148	2	1224	103
Future Volume (vph)	103	123	103	491	287	15	104	813	148	2	1224	103
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5
Total Lost time (s)	3.0	6.5	6.5	0.0	6.5	6.5	3.0	6.6	6.6	6.6	6.6	6.6
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frnt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Fit Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1580	1642	1094	1767	1762	1331	1214	3411	1426	1190	3380	1465
Fit Permitted	0.58	1.00	1.00	0.60	1.00	1.00	0.10	1.00	1.00	0.34	1.00	1.00
Satd. Flow (perm)	971	1642	1094	1113	1762	1331	126	3411	1426	432	3380	1465
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	103	123	103	491	287	15	104	813	148	2	1224	103
RTOR Reduction (vph)	0	0	90	0	0	11	0	0	61	0	0	56
Lane Group Flow (vph)	103	123	13	491	287	4	104	813	87	2	1224	97
Heavy Vehicles (%)	13%	17%	46%	1%	9%	20%	47%	7%	12%	50%	8%	9%
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA	Perm
Protected Phases	7	4		3	8		1	6			2	
Permitted Phases	4		4	8		8	6		6	2		2
Actuated Green, G (s)	24.6	17.6	17.6	44.6	34.6	34.6	81.5	81.5	81.5	64.1	64.1	64.1
Effective Green, g (s)	24.6	17.6	17.6	47.6	34.6	34.6	81.5	81.5	81.5	64.1	64.1	64.1
Actuated g/C Ratio	0.18	0.13	0.13	0.34	0.25	0.25	0.59	0.59	0.59	0.46	0.46	0.46
Clearance Time (s)	3.0	6.5	6.5	3.0	6.5	6.5	3.0	6.6	6.6	6.6	6.6	6.6
Vehicle Extension (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lane Grp Cap (vph)	202	207	138	507	437	330	186	1997	834	198	1556	674
v/s Ratio Prot	0.03	0.07		c0.19	0.16		c0.06	0.24			c0.36	
v/s Ratio Perm	0.06		0.01	0.14		0.00	0.27		0.06	0.00		0.03
v/c Ratio	0.51	0.59	0.09	0.97	0.66	0.01	0.56	0.41	0.10	0.01	0.79	0.07
Uniform Delay, d1	50.5	57.4	53.8	42.8	47.0	39.4	21.2	15.7	12.7	20.4	31.8	20.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	4.2	6.8	0.6	32.1	4.7	0.0	6.1	0.6	0.3	0.1	4.1	0.2
Delay (s)	54.7	64.2	54.4	74.9	51.7	39.4	27.3	16.3	13.0	20.4	35.9	21.1
Level of Service	D	E	D	E	D	D	C	B	B	C	D	C
Approach Delay (s)		58.1			65.8			16.9			34.7	
Approach LOS		E			E			B			C	

Intersection Summary

HCM 2000 Control Delay	38.5	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	139.2	Sum of lost time (s)	19.1
Intersection Capacity Utilization	96.1%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Lanes, Volumes, Timings  
2: Albion Vaughan Road & Kirby Road

Base Year: AM Peak Hour

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	8	31	259	4	122	815
Future Volume (vph)	8	31	259	4	122	815
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.5	3.7	3.5	3.7	3.7
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.893		0.998			
Flt Protected	0.990					0.994
Satd. Flow (prot)	1246	0	1730	0	0	1852
Flt Permitted	0.990					0.994
Satd. Flow (perm)	1246	0	1730	0	0	1852
Link Speed (k/h)	80		60			60
Link Distance (m)	414.0		186.1			286.8
Travel Time (s)	18.6		11.2			17.2
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	88%	23%	11%	0%	4%	3%
Adj. Flow (vph)	8	31	259	4	122	815
Shared Lane Traffic (%)						
Lane Group Flow (vph)	39	0	263	0	0	937
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.7		0.0			0.0
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	4.8		4.8			4.8
Two way Left Turn Lane						
Headway Factor	0.99	1.01	0.99	1.01	0.99	0.99
Turning Speed (k/h)	25	15		15	25	
Sign Control	Stop		Free			Free

Intersection Summary	
Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	76.8% ICU Level of Service D
Analysis Period (min)	15

HCM Unsignalized Intersection Capacity Analysis  
2: Albion Vaughan Road & Kirby Road

Base Year: AM Peak Hour

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	8	31	259	4	122	815
Future Volume (Veh/h)	8	31	259	4	122	815
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	8	31	259	4	122	815
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	1320	261			263	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1320	261			263	
tC, single (s)	7.3	6.4			4.1	
tC, 2 stage (s)						
tF (s)	4.3	3.5			2.2	
p0 queue free %	92	96			91	
cM capacity (veh/h)	104	729			1290	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	39	263	937
Volume Left	8	0	122
Volume Right	31	4	0
eSH	328	1700	1290
Volume to Capacity	0.12	0.15	0.09
Queue Length 95th (m)	2.8	0.0	2.2
Control Delay (s)	17.5	0.0	2.3
Lane LOS	C		A
Approach Delay (s)	17.5	0.0	2.3
Approach LOS	C		

Intersection Summary	
Average Delay	2.3
Intersection Capacity Utilization	76.8% ICU Level of Service D
Analysis Period (min)	15

Lanes, Volumes, Timings  
3: Albion Vaughan Road & Driveway

Base Year: AM Peak Hour

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	0	0	0	263	823	0
Future Volume (vph)	0	0	0	263	823	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.5	3.7	3.5	3.7	3.7
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
<b>Fr</b>						
<b>Fit Protected</b>						
Satd. Flow (prot)	1883	0	0	1842	1883	0
<b>Fit Permitted</b>						
Satd. Flow (perm)	1883	0	0	1842	1883	0
Link Speed (k/h)	50			60	60	
Link Distance (m)	75.2			563.9	186.1	
Travel Time (s)	5.4			33.8	11.2	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	0	0	263	823	0
<b>Shared Lane Traffic (%)</b>						
Lane Group Flow (vph)	0	0	0	263	823	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.7			3.5	3.5	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
<b>Two way Left Turn Lane</b>						
Headway Factor	0.99	1.01	0.99	1.01	0.99	0.99
Turning Speed (k/h)	25	15	25			15
Sign Control	Stop			Free	Free	
<b>Intersection Summary</b>						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	46.6%			ICU Level of Service A		
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis  
3: Albion Vaughan Road & Driveway

Base Year: AM Peak Hour

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	0	0	263	823	0
Future Volume (Veh/h)	0	0	0	263	823	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	0	0	263	823	0
<b>Pedestrians</b>						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None	None		
Median storage (veh)						
Upstream signal (m)						
<b>pX, platoon unblocked</b>						
vC, conflicting volume	1086	823	823			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1086	823	823			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	239	373	807			
<b>Direction, Lane #</b>						
	EB 1	NB 1	SB 1			
Volume Total	0	263	823			
Volume Left	0	0	0			
Volume Right	0	0	0			
eSH	1700	807	1700			
Volume to Capacity	0.00	0.00	0.48			
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					
<b>Intersection Summary</b>						
Average Delay		0.0				
Intersection Capacity Utilization	46.6%			ICU Level of Service		A
Analysis Period (min)	15					

Lanes, Volumes, Timings

1: Regional Road 50 & Mayfield Road/Albion Vaughan Road

Base Year: PM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	171	217	85	161	144	30	69	1225	506	11	1020	141
Future Volume (vph)	171	217	85	161	144	30	69	1225	506	11	1020	141
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5
Storage Length (m)	100.0		90.0	170.0		70.0	125.0		180.0	35.0		150.0
Storage Lanes	1		1	1		1	1		1	1		1
Taper Length (m)	60.0			40.0			20.0			0.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt			0.850				0.850			0.850		0.850
Fit Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1684	1746	1183	1684	1642	1298	1182	3380	1493	1513	3411	1507
Fit Permitted	0.617			0.440			0.188			0.203		
Satd. Flow (perm)	1094	1746	1183	780	1642	1298	234	3380	1493	323	3411	1507
Right Turn on Red			Yes			Yes		Yes		Yes		Yes
Satd. Flow (RTOR)			85			84				505		141
Link Speed (k/h)		60			60			70				70
Link Distance (m)		289.2			552.1			378.1				686.1
Travel Time (s)		17.4			33.1			19.4				35.3
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	6%	10%	35%	6%	17%	23%	51%	8%	7%	18%	7%	6%
Adj. Flow (vph)	171	217	85	161	144	30	69	1225	506	11	1020	141
Shared Lane Traffic (%)												
Lane Group Flow (vph)	171	217	85	161	144	30	69	1225	506	11	1020	141
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.5			3.5			3.5			3.5	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												Yes
Headway Factor	1.01	0.99	1.01	1.01	0.99	1.01	1.01	0.99	1.01	1.01	0.99	1.01
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	2.0
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA	Perm

Lanes, Volumes, Timings

1: Regional Road 50 & Mayfield Road/Albion Vaughan Road

Base Year: PM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases	7	4		3	8		1	6				2
Permitted Phases	4		4	8		8	6		6	2		2
Detector Phase	7	4	4	3	8	8	1	6	6	2	2	2
Switch Phase												
Minimum Initial (s)	5.0	12.0	12.0	5.0	12.0	12.0	5.0	20.0	20.0	20.0	20.0	20.0
Minimum Split (s)	8.0	39.5	39.5	8.0	39.5	39.5	8.0	37.6	37.6	37.6	37.6	37.6
Total Split (s)	10.0	40.0	40.0	10.0	40.0	40.0	25.0	75.0	75.0	50.0	50.0	50.0
Total Split (%)	8.0%	32.0%	32.0%	8.0%	32.0%	32.0%	20.0%	60.0%	60.0%	40.0%	40.0%	40.0%
Maximum Green (s)	7.0	33.5	33.5	7.0	33.5	33.5	22.0	68.4	68.4	43.4	43.4	43.4
Yellow Time (s)	3.0	4.0	4.0	3.0	4.0	4.0	3.0	4.6	4.6	4.6	4.6	4.6
All-Red Time (s)	0.0	2.5	2.5	0.0	2.5	2.5	0.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	3.0	6.5	6.5	3.0	6.5	6.5	3.0	6.6	6.6	6.6	6.6	6.6
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead			Lag	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Recall Mode	None	None	None	None	None	None	None	Max	Max	Max	Max	Max
Walk Time (s)		8.0	8.0		8.0	8.0		8.0	8.0	8.0	8.0	8.0
Flash Dont Walk (s)		25.0	25.0		25.0	25.0		23.0	23.0	23.0	23.0	23.0
Pedestrian Calls (#/hr)		0	0		0	0		0	0	0	0	0
Act Effct Green (s)	31.5	21.0	21.0	31.5	21.0	21.0	72.2	68.5	68.5	57.7	57.7	57.7
Actuated g/C Ratio	0.28	0.19	0.19	0.28	0.19	0.19	0.64	0.61	0.61	0.51	0.51	0.51
v/c Ratio	0.50	0.67	0.29	0.59	0.47	0.10	0.29	0.60	0.46	0.07	0.58	0.17
Control Delay	36.3	52.9	10.6	40.3	45.8	0.6	12.2	15.8	2.5	19.9	22.8	3.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	36.3	52.9	10.6	40.3	45.8	0.6	12.2	15.8	2.5	19.9	22.8	3.7
LOS	D	D	B	D	D	A	B	B	A	B	C	A
Approach Delay		39.3			39.1			11.9			20.5	
Approach LOS		D			D			B			C	
Intersection Summary												
Area Type:	Other											
Cycle Length:	125											
Actuated Cycle Length:	112.7											
Natural Cycle:	95											
Control Type:	Actuated-Uncoordinated											
Maximum v/c Ratio:	0.67											
Intersection Signal Delay:	20.4											
Intersection Capacity Utilization:	90.6%						ICU Level of Service E					
Analysis Period (min):	15											
Plots and Phases:	1: Regional Road 50 & Mayfield Road/Albion Vaughan Road											



Queues

1: Regional Road 50 & Mayfield Road/Albion Vaughan Road

Base Year: PM Peak Hour

	↖	→	↘	↙	←	↖	↙	↑	↘	↙	↓	↘
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	171	217	85	161	144	30	69	1225	506	11	1020	141
v/c Ratio	0.50	0.67	0.29	0.59	0.47	0.10	0.29	0.60	0.46	0.07	0.58	0.17
Control Delay	36.3	52.9	10.6	40.3	45.8	0.6	12.2	15.8	2.5	19.9	22.8	3.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	36.3	52.9	10.6	40.3	45.8	0.6	12.2	15.8	2.5	19.9	22.8	3.7
Queue Length 50th (m)	26.7	41.2	0.0	24.9	26.2	0.0	4.9	74.5	0.1	1.1	75.7	0.0
Queue Length 95th (m)	42.8	63.7	11.6	40.7	43.8	0.0	12.2	111.7	13.1	5.1	115.4	10.6
Internal Link Dist (m)		265.2		528.1			354.1			662.1		
Turn Bay Length (m)	100.0		90.0	170.0		70.0	125.0		180.0	35.0		150.0
Base Capacity (vph)	342	519	412	274	488	445	335	2055	1105	165	1745	840
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.50	0.42	0.21	0.59	0.30	0.07	0.21	0.60	0.46	0.07	0.58	0.17

Intersection Summary

HCM Signalized Intersection Capacity Analysis

1: Regional Road 50 & Mayfield Road/Albion Vaughan Road

Base Year: PM Peak Hour

	↖	→	↘	↙	←	↖	↙	↑	↘	↙	↓	↘
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↖	↖	↖	↖	↖	↖	↖	↖	↖	↖	↖
Traffic Volume (vph)	171	217	85	161	144	30	69	1225	506	11	1020	141
Future Volume (vph)	171	217	85	161	144	30	69	1225	506	11	1020	141
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5	3.7	3.5	3.7
Total Lost time (s)	3.0	6.5	6.5	3.0	6.5	6.5	3.0	6.6	6.6	6.6	6.6	6.6
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frnt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Fit Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1684	1746	1183	1684	1642	1298	1182	3380	1493	1513	3411	1507
Fit Permitted	0.62	1.00	1.00	0.44	1.00	1.00	0.19	1.00	1.00	0.20	1.00	1.00
Satd. Flow (perm)	1093	1746	1183	780	1642	1298	234	3380	1493	323	3411	1507
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	171	217	85	161	144	30	69	1225	506	11	1020	141
RTOR Reduction (vph)	0	0	69	0	0	24	0	0	197	0	0	69
Lane Group Flow (vph)	171	217	16	161	144	6	69	1225	309	11	1020	72
Heavy Vehicles (%)	6%	10%	35%	6%	17%	23%	51%	8%	7%	18%	7%	6%
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA	Perm
Protected Phases	7	4		3	8		1	6			2	
Permitted Phases	4		4	8		8	6		6	2		2
Actuated Green, G (s)	28.0	21.0	21.0	28.0	21.0	21.0	69.2	69.2	69.2	57.7	57.7	57.7
Effective Green, g (s)	28.0	21.0	21.0	28.0	21.0	21.0	69.2	69.2	69.2	57.7	57.7	57.7
Actuated g/C Ratio	0.25	0.19	0.19	0.25	0.19	0.19	0.61	0.61	0.61	0.51	0.51	0.51
Clearance Time (s)	3.0	6.5	6.5	3.0	6.5	6.5	3.0	6.6	6.6	6.6	6.6	6.6
Vehicle Extension (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lane Grp Cap (vph)	306	323	219	248	304	240	214	2064	911	164	1737	767
v/s Ratio Prot	0.03	c0.12		c0.04	0.09		0.02	c0.36			0.30	
v/s Ratio Perm	0.10		0.01	0.12		0.00	0.17		0.21	0.03		0.05
v/c Ratio	0.56	0.67	0.07	0.65	0.47	0.02	0.32	0.59	0.34	0.07	0.59	0.09
Uniform Delay, d1	36.3	42.9	38.1	37.0	41.2	37.8	11.3	13.5	10.8	14.1	19.5	14.3
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	3.7	7.0	0.3	7.8	2.4	0.1	1.8	1.3	1.0	0.8	1.5	0.2
Delay (s)	40.0	50.0	38.4	44.8	43.6	37.8	13.2	14.7	11.8	14.9	20.9	14.6
Level of Service	D	D	D	D	D	D	B	B	B	B	C	B
Approach Delay (s)		44.3			43.7		13.9			20.1		
Approach LOS		D			D		B			C		

Intersection Summary

HCM 2000 Control Delay	22.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	113.3	Sum of lost time (s)	19.1
Intersection Capacity Utilization	90.6%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Lanes, Volumes, Timings  
2: Albion Vaughan Road & Kirby Road

Base Year: PM Peak Hour

	↙	↖	↑	↗	↘	↓
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↖		↗			↘
Traffic Volume (vph)	18	62	810	6	33	310
Future Volume (vph)	18	62	810	6	33	310
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.5	3.7	3.5	3.7	3.7
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.895		0.999			
Flt Protected	0.989					0.995
Satd. Flow (prot)	1560	0	1861	0	0	1793
Flt Permitted	0.989					0.995
Satd. Flow (perm)	1560	0	1861	0	0	1793
Link Speed (k/h)	80		60			60
Link Distance (m)	414.0		186.1			286.8
Travel Time (s)	18.6		11.2			17.2
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	33%	2%	3%	17%	3%	7%
Adj. Flow (vph)	18	62	810	6	33	310
Shared Lane Traffic (%)						
Lane Group Flow (vph)	80	0	816	0	0	343
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.7		0.0			0.0
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	4.8		4.8			4.8
Two way Left Turn Lane						
Headway Factor	0.99	1.01	0.99	1.01	0.99	0.99
Turning Speed (k/h)	25	15		15	25	
Sign Control	Stop		Free			Free

Intersection Summary	
Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	55.3% ICU Level of Service B
Analysis Period (min)	15

HCM Unsignalized Intersection Capacity Analysis  
2: Albion Vaughan Road & Kirby Road

Base Year: PM Peak Hour

	↙	↖	↑	↗	↘	↓
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↖		↗			↘
Traffic Volume (veh/h)	18	62	810	6	33	310
Future Volume (Veh/h)	18	62	810	6	33	310
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	18	62	810	6	33	310
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	1189	813			816	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1189	813			816	
tC, single (s)	6.7	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.8	3.3			2.2	
p0 queue free %	90	84			96	
cM capacity (veh/h)	173	378			807	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	80	816	343
Volume Left	18	0	33
Volume Right	62	6	0
eSH	299	1700	807
Volume to Capacity	0.27	0.48	0.04
Queue Length 95th (m)	7.4	0.0	0.9
Control Delay (s)	21.4	0.0	1.4
Lane LOS	C		A
Approach Delay (s)	21.4	0.0	1.4
Approach LOS	C		

Intersection Summary	
Average Delay	1.8
Intersection Capacity Utilization	55.3% ICU Level of Service B
Analysis Period (min)	15

Lanes, Volumes, Timings  
3: Albion Vaughan Road & Driveway

Base Year: PM Peak Hour

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	0	0	0	816	328	0
Future Volume (vph)	0	0	0	816	328	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.5	3.7	3.5	3.7	3.7
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
<b>Fr</b>						
<b>Fit Protected</b>						
Satd. Flow (prot)	1883	0	0	1842	1883	0
<b>Fit Permitted</b>						
Satd. Flow (perm)	1883	0	0	1842	1883	0
Link Speed (k/h)	50			60	60	
Link Distance (m)	75.2			552.1	186.1	
Travel Time (s)	5.4			33.1	11.2	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	0	0	816	328	0
<b>Shared Lane Traffic (%)</b>						
Lane Group Flow (vph)	0	0	0	816	328	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.7			3.5	3.5	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
<b>Two way Left Turn Lane</b>						
Headway Factor	0.99	1.01	0.99	1.01	0.99	0.99
Turning Speed (k/h)	25	15	25			15
Sign Control	Stop			Free	Free	
<b>Intersection Summary</b>						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	46.3%			ICU Level of Service A		
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis  
3: Albion Vaughan Road & Driveway

Base Year: PM Peak Hour

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	0	0	816	328	0
Future Volume (Veh/h)	0	0	0	816	328	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	0	0	816	328	0
<b>Pedestrians</b>						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (m)						
<b>pX, platoon unblocked</b>						
vC, conflicting volume	1144	328	328			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1144	328	328			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	221	713	1232			
<b>Direction, Lane #</b>						
	EB 1	NB 1	SB 1			
Volume Total	0	816	328			
Volume Left	0	0	0			
Volume Right	0	0	0			
eSH	1700	1232	1700			
Volume to Capacity	0.00	0.00	0.19			
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					
<b>Intersection Summary</b>						
Average Delay				0.0		
Intersection Capacity Utilization	46.3%			ICU Level of Service A		
Analysis Period (min)	15					

# Appendix E

## Trip Distribution Calculation



**TTS Results**

Into/Out of Caledon	AM Peak Hour		PM Peak Hour	
	In	Out	In	Out
North	20%	3%	6%	9%
East	0%	0%	0%	0%
South	23%	50%	57%	22%
West	9%	3%	1%	7%
Total	51%	56%	64%	38%

Within Caledon	AM Peak Hour		PM Peak Hour	
	In	Out	In	Out
North	46%	40%	27%	52%
East	0%	0%	0%	0%
South	0%	0%	0%	0%
West	3%	3%	9%	10%
Total	49%	44%	36%	62%

All TTS Zones	AM Peak Hour		PM Peak Hour	
	In	Out	In	Out
North	65%	44%	33%	61%
East	0%	0%	0%	0%
South	23%	50%	57%	22%
West	12%	6%	10%	17%
Total	100%	100%	100%	100%

**TMC Travel Patterns**

Direction	AM Peak Hour		PM Peak Hour	
	In	Out	In	Out
North	61%	34%	39%	58%
East	0%	0%	0%	0%
South	29%	52%	48%	32%
West	10%	14%	13%	10%

**TMC Travel Patterns by Route**

Distribution by Direction (from TMCs)	AM Peak Hour		PM Peak Hour	
	IN	OUT	IN	OUT
North via Regional Road 50	59%	76%	77%	62%
North via Albion Vaughan Road	41%	24%	23%	38%
South via Regional Road 50	100%	100%	100%	100%
West via Mayfield Road	100%	100%	100%	100%

Note: number represents % of traffic assigned to each direction by route

**Estimated Site Trip Distribution**

Distribution by Direction	AM Peak Hour		PM Peak Hour	
	IN	OUT	IN	OUT
North via Regional Road 50	38%	34%	25%	38%
North via Albion Vaughan Road	27%	10%	8%	23%
South via Regional Road 50	23%	50%	57%	22%
West via Mayfield Road	12%	6%	10%	17%
<b>Total</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>

Note: Cross-multiplication of TTS distribution (all TTS zones) and TMC travel patterns by route

**AM Inbound**

Fri Nov 18 2022 14:34:38 GMT-0500 (Eastern Standard Time) - Run Time: 2485ms

Cross Tabulation Query Form - Trip - 2016 v1.1

Row: 2006 GTA zone of destination - gta06\_dest  
Column: Planning district of origin - pd\_orig

Filters:  
(2006 GTA zone of destination - gta06\_dest In 3190  
and  
Start time of trip - start\_time In 599-900)

Trip 2016

ROW : gta06\_dest

COLUMN : pd\_orig

gta06_dest	pd_orig	total	Jurisdiction	Study Direc	Percent
3190	10	32	Toronto	South	1.94%
3190	32	115	King	North	6.97%
3190	33	101	Vaughan	South	6.12%
3190	34	809	Caleodn	Internal	49.00%
<b>3190</b>	<b>35</b>	<b>124</b>	<b>Brampton</b>	<b>South</b>	<b>7.51%</b>
		<b>123</b>	<b>Brampton</b>	<b>West</b>	<b>7%</b>
3190	36	58	Mississauga	South	3.51%
3190	38	20	Milton	South	1.21%
3190	39	12	Oakville	South	0.73%
<b>3190</b>	<b>72</b>	<b>25</b>	<b>Guelph/Eramosa</b>	<b>South</b>	<b>1.51%</b>
		<b>24</b>	<b>Guelph/Eramosa</b>	<b>West</b>	<b>1%</b>
3190	80	11	Orangeville	North	0.67%
3190	84	165	Tecumseth	North	9.99%
3190	85	23	Adjala-Tosorontio	North	1.39%
3190	140	9	Mulmur	North	0.55%
		1651			

**AM Outbound**

Fri Nov 18 2022 14:36:31 GMT-0500 (Eastern Standard Time) - Run Time: 2705ms

Cross Tabulation Query Form - Trip - 2016 v1.1

Row: 2006 GTA zone of origin - gta06\_orig  
Column: Planning district of destination - pd\_dest

Filters:  
(2006 GTA zone of origin - gta06\_orig In 3190  
and  
Start time of trip - start\_time In 599-900)

Trip 2016

ROW : gta06\_orig

COLUMN : pd\_dest

gta06_orig	pd_dest	total	Jurisdiction	Study Direc	Percent
3190	1	96	Toronto	South	3.90%
3190	3	63	Toronto	South	2.56%
3190	4	60	Toronto	South	2.44%
3190	8	101	Toronto	South	4.10%
3190	9	57	Toronto	South	2.32%
3190	10	107	Toronto	South	4.35%
3190	13	46	Toronto	South	1.87%
3190	28	22	Aurora	North	0.89%
3190	29	10	Richmond Hill	South	0.41%
3190	31	23	Markham	South	0.93%
3190	33	405	Vaughan	South	16.45%
3190	34	1072	Caleodn	Internal	43.54%
<b>3190</b>	<b>35</b>	<b>64</b>	<b>Brampton</b>	<b>South</b>	<b>2.60%</b>
		<b>63</b>	<b>Brampton</b>	<b>West</b>	<b>2.56%</b>
3190	36	210	Mississauga	South	8.53%
3190	80	20	Orangeville	North	0.81%
3190	81	43	Barrie	North	1.75%

2462

	AM In	AM Out	PM In	PM Out
North	19.56%	3.45%	6.31%	9.17%
East	0.00%	0.00%	0.00%	0.00%
South	22.53%	50.45%	56.53%	22.01%
West	8.90%	2.56%	1.07%	6.94%
<b>Total</b>	<b>51.00%</b>	<b>56.46%</b>	<b>63.92%</b>	<b>38.12%</b>
<b>Internal</b>	<b>49.00%</b>	<b>43.54%</b>	<b>36.08%</b>	<b>61.88%</b>

**PM Inbound**

Fri Nov 18 2022 14:35:11 GMT-0500 (Eastern Standard Time) - Run Time: 2535ms

Cross Tabulation Query Form - Trip - 2016 v1.1

Row: 2006 GTA zone of destination - gta06\_dest  
Column: Planning district of origin - pd\_orig

Filters:  
(2006 GTA zone of destination - gta06\_dest In 3190  
and  
Start time of trip - start\_time In 1599-1900)

Trip 2016

ROW : gta06\_dest

COLUMN : pd\_orig

gta06_dest	pd_orig	total	Jurisdiction	Study Direc	Percent
3190	1	64	Toronto	South	2.75%
3190	3	63	Toronto	South	2.71%
3190	4	27	Toronto	South	1.16%
3190	8	101	Toronto	South	4.34%
3190	9	93	Toronto	South	3.99%
3190	10	159	Toronto	South	6.83%
3190	11	30	Toronto	South	1.29%
3190	26	43	East Gwillibury	North	1.85%
3190	28	39	Aurora	North	1.68%
3190	29	10	Richmond Hill	South	0.43%
3190	31	23	Markham	South	0.99%
3190	32	43	King	North	1.85%
3190	33	490	Vaughan	South	21.05%
3190	34	840	Caleodn	Internal	36.08%
<b>3190</b>	<b>35</b>	<b>25</b>	<b>Brampton</b>	<b>South</b>	<b>1.07%</b>
		<b>25</b>	<b>Brampton</b>	<b>West</b>	<b>1.07%</b>
3190	36	231	Mississauga	South	9.92%
3190	85	22	Adjala-Tosorontio	North	0.95%

2328

**PM Outbound**

Fri Nov 18 2022 14:36:02 GMT-0500 (Eastern Standard Time) - Run Time: 3130ms

Cross Tabulation Query Form - Trip - 2016 v1.1

Row: 2006 GTA zone of origin - gta06\_orig  
Column: Planning district of destination - pd\_dest

Filters:  
(2006 GTA zone of origin - gta06\_orig In 3190  
and  
Start time of trip - start\_time In 1599-1900)

Trip 2016

ROW : gta06\_orig

COLUMN : pd\_dest

gta06_orig	pd_dest	total	Jurisdiction	Study Direc	Percent
3190	5	9	Toronto	South	0.54%
3190	10	43	Toronto	South	2.59%
3190	14	8	Toronto	South	0.48%
3190	32	39	King	North	2.35%
3190	33	114	Vaughan	South	6.88%
3190	34	1026	Caleodn	Internal	61.88%
<b>3190</b>	<b>35</b>	<b>61</b>	<b>Brampton</b>	<b>South</b>	<b>3.68%</b>
		<b>62</b>	<b>Brampton</b>	<b>West</b>	<b>4%</b>
3190	36	94	Mississauga	South	5.67%
3190	39	12	Oakville	South	0.72%
<b>3190</b>	<b>72</b>	<b>24</b>	<b>Guelph/Eramosa</b>	<b>South</b>	<b>1.45%</b>
		<b>25</b>	<b>Guelph/Eramosa</b>	<b>West</b>	<b>2%</b>
3190	84	85	Tecumseth	North	5.13%
<b>3190</b>	<b>144</b>	<b>28</b>	<b>Mono</b>	<b>North</b>	<b>1.69%</b>
		<b>28</b>	<b>Mono</b>	<b>West</b>	<b>1.69%</b>

1658

**AM Inbound**

Fri Nov 18 2022 14:40:50 GMT-0500 (Eastern Standard Time) - Run Time: 2852ms

Cross Tabulation Query Form - Trip - 2016 v1.1

Row: 2006 GTA zone of destination - gta06\_dest  
Column: 2006 GTA zone of origin - gta06\_orig

Filters:

(2006 GTA zone of destination - gta06\_dest In 3190  
and  
Start time of trip - start\_time In 599-900  
and  
Planning district of origin - pd\_orig In 34, )

Trip 2016

ROW : gta06\_dest

COLUMN : gta06\_orig

gta06_dest gta06_orig total		From TTS (I 49.00%		Study Dire%	Weighting
3190	3002	10	North	1.23%	0.60%
		9	West	1.11%	0.54%
3190	3003	27	North	3.33%	1.63%
3190	3152	41	North	5.06%	2.48%
		41	West	5.06%	2.48%
3190	3189	6	North	0.74%	0.36%
		7	West	0.86%	0.42%
3190	3190	418	North	51.60%	25.29%
3190	3192	32	North	3.95%	1.94%
3190	3193	157	North	19.38%	9.50%
3190	3194	55	North	6.79%	3.33%
3190	3195	7	North	0.86%	0.42%

810

**AM Outbound**

Fri Nov 18 2022 14:42:08 GMT-0500 (Eastern Standard Time) - Run Time: 2504ms

Cross Tabulation Query Form - Trip - 2016 v1.1

Row: 2006 GTA zone of origin - gta06\_orig  
Column: 2006 GTA zone of destination - gta06\_dest

Filters:

(2006 GTA zone of origin - gta06\_orig In 3190  
and  
Start time of trip - start\_time In 599-900  
and  
Planning district of destination - pd\_dest In 34, )

Trip 2016

ROW : gta06\_orig

COLUMN : gta06\_dest

gta06_orig gta06_dest total		From TTS (I 43.54%		Study Dire%	Weighting
3190	3002	10	North	0.93%	0.41%
		9	West	0.84%	0.37%
3190	3003	194	North	18.08%	7.87%
3190	3189	2	North	0.19%	0.08%
		2	West	0.19%	0.08%
3190	3190	418	North	38.96%	16.96%
3190	3191	67	West	6.24%	2.72%
3190	3192	69	North	6.43%	2.80%
3190	3193	260	North	24.23%	10.55%
3190	3194	42	North	3.91%	1.70%

1073

	AM In	AM Out	PM In	PM Out
North	45.55%	40.38%	26.80%	52.00%
East	0.00%	0.00%	0.00%	0.00%
South	0.00%	0.00%	0.00%	0.00%
West	3.45%	3.17%	9.28%	9.88%
Total	49.00%	43.54%	36.08%	61.88%

**PM Inbound**

Fri Nov 18 2022 14:41:25 GMT-0500 (Eastern Standard Time) - Run Time: 2492ms

Cross Tabulation Query Form - Trip - 2016 v1.1

Row: 2006 GTA zone of destination - gta06\_dest  
Column: 2006 GTA zone of origin - gta06\_orig

Filters:

(2006 GTA zone of destination - gta06\_dest In 3190  
and  
Start time of trip - start\_time In 1599-1900  
and  
Planning district of origin - pd\_orig In 34, )

Trip 2016

ROW : gta06\_dest

COLUMN : gta06\_orig

gta06_dest gta06_orig total		From TTS (PD) 36.08%		Study Dire%	Weighting
3190	3003	31	North	3.69%	1.33%
3190	3010	23	West	2.74%	0.99%
3190	3015	43	West	5.12%	1.85%
3190	3100	14	North	1.67%	0.60%
		14	West	1.67%	0.60%
3190	3190	114	North	13.57%	4.90%
3190	3191	136	West	16.19%	5.84%
3190	3192	142	North	16.90%	6.10%
3190	3193	188	North	22.38%	8.08%
3190	3194	83	North	9.88%	3.57%
3190	3195	36	North	4.29%	1.55%
3190	3199	16	North	1.90%	0.69%

840

**PM Outbound**

Fri Nov 18 2022 14:42:24 GMT-0500 (Eastern Standard Time) - Run Time: 3014ms

Cross Tabulation Query Form - Trip - 2016 v1.1

Row: 2006 GTA zone of origin - gta06\_orig  
Column: 2006 GTA zone of destination - gta06\_dest

Filters:

(2006 GTA zone of origin - gta06\_orig In 3190  
and  
Start time of trip - start\_time In 1599-1900  
and  
Planning district of destination - pd\_dest In 34, )

Trip 2016

ROW : gta06\_orig

COLUMN : gta06\_dest

gta06_orig gta06_dest total		From TTS (PD) 61.88%		Study Dire%	Weighting
3190	3003	42	North	4.09%	2.53%
3190	3010	23	West	2.24%	1.39%
3190	3015	77	West	7.50%	4.64%
3190	3151	8	North	0.78%	0.48%
		9	West	0.88%	0.54%
3190	3153	83	North	8.08%	5.00%
3190	3190	114	North	11.10%	6.87%
3190	3191	27	West	2.63%	1.63%
3190	3192	220	North	21.42%	13.26%
3190	3193	260	North	25.32%	15.67%
3190	3194	61	North	5.94%	3.68%
3190	3195	10	North	0.97%	0.60%
3190	3197	19	North	1.85%	1.14%
		20	West	1.95%	1.21%
3190	3198	8	North	0.78%	0.48%
		8	West	0.78%	0.48%
3190	3199	38	North	3.70%	2.29%

1027

# Appendix F

## Background Traffic Operations Reports





























Lanes, Volumes, Timings

Existing STP

1: Regional Road 50 & Mayfield Road/Albion Vaughan Road

Future Background: AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	103	150	103	491	350	15	104	991	148	2	1492	103
Future Volume (vph)	103	150	103	491	350	15	104	991	148	2	1492	103
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5
Storage Length (m)	100.0		90.0	170.0		70.0	125.0		180.0	35.0		150.0
Storage Lanes	1		1	1		1	1		1	1		1
Taper Length (m)	60.0			40.0			20.0			0.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Fr <sub>t</sub>			0.850			0.850			0.850			0.850
Fl <sub>t</sub> Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1580	1642	1094	1767	1762	1331	1214	3411	1426	1190	3380	1465
Fl <sub>t</sub> Permitted	0.503			0.448			0.060			0.287		
Satd. Flow (perm)	836	1642	1094	833	1762	1331	77	3411	1426	359	3380	1465
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			103			65			148			102
Link Speed (k/h)		60			60			70			70	
Link Distance (m)		289.2			563.9			378.1			686.1	
Travel Time (s)		17.4			33.8			19.4			35.3	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	13%	17%	46%	1%	9%	20%	47%	7%	12%	50%	8%	9%
Adj. Flow (vph)	103	150	103	491	350	15	104	991	148	2	1492	103
Shared Lane Traffic (%)												
Lane Group Flow (vph)	103	150	103	491	350	15	104	991	148	2	1492	103
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.5			3.5			3.5			3.5	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												Yes
Headway Factor	1.01	0.99	1.01	1.01	0.99	1.01	1.01	0.99	1.01	1.01	0.99	1.01
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	2.0
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA	Perm

Lanes, Volumes, Timings

Existing STP

1: Regional Road 50 & Mayfield Road/Albion Vaughan Road

Future Background: AM Peak Hour

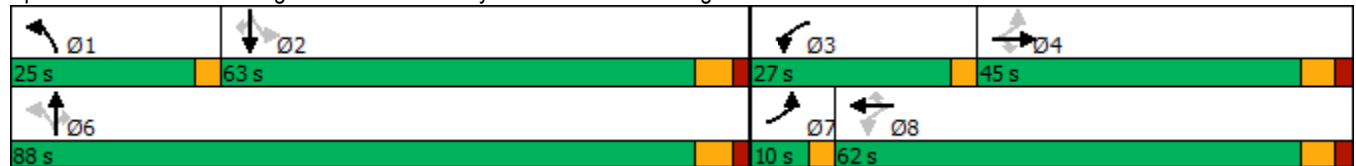


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases	7	4		3	8		1	6			2	
Permitted Phases	4		4	8		8	6		6	2		2
Detector Phase	7	4	4	3	8	8	1	6	6	2	2	2
Switch Phase												
Minimum Initial (s)	5.0	12.0	12.0	5.0	12.0	12.0	5.0	20.0	20.0	20.0	20.0	20.0
Minimum Split (s)	8.0	39.5	39.5	8.0	39.5	39.5	8.0	37.6	37.6	37.6	37.6	37.6
Total Split (s)	10.0	45.0	45.0	27.0	62.0	62.0	25.0	88.0	88.0	63.0	63.0	63.0
Total Split (%)	6.3%	28.1%	28.1%	16.9%	38.8%	38.8%	15.6%	55.0%	55.0%	39.4%	39.4%	39.4%
Maximum Green (s)	7.0	38.5	38.5	24.0	55.5	55.5	22.0	81.4	81.4	56.4	56.4	56.4
Yellow Time (s)	3.0	4.0	4.0	3.0	4.0	4.0	3.0	4.6	4.6	4.6	4.6	4.6
All-Red Time (s)	0.0	2.5	2.5	0.0	2.5	2.5	0.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	3.0	6.5	6.5	3.0	6.5	6.5	3.0	6.6	6.6	6.6	6.6	6.6
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead			Lag	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Recall Mode	None	None	None	None	None	None	None	Max	Max	Max	Max	Max
Walk Time (s)		8.0	8.0		8.0	8.0		8.0	8.0	8.0	8.0	8.0
Flash Dont Walk (s)		25.0	25.0		25.0	25.0		23.0	23.0	23.0	23.0	23.0
Pedestrian Calls (#/hr)		0	0		0	0		0	0	0	0	0
Act Effct Green (s)	30.9	20.4	20.4	51.0	37.4	37.4	85.1	81.5	81.5	64.0	64.0	64.0
Actuated g/C Ratio	0.22	0.14	0.14	0.36	0.26	0.26	0.60	0.57	0.57	0.45	0.45	0.45
v/c Ratio	0.47	0.64	0.42	1.08	0.75	0.04	0.64	0.51	0.17	0.01	0.98	0.14
Control Delay	42.2	69.6	14.4	103.4	59.1	0.2	47.3	20.0	2.8	28.0	57.6	5.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	42.2	69.6	14.4	103.4	59.1	0.2	47.3	20.0	2.8	28.0	57.6	5.7
LOS	D	E	B	F	E	A	D	B	A	C	E	A
Approach Delay		45.7			83.5			20.2			54.2	
Approach LOS		D			F			C			D	

Intersection Summary

Area Type:	Other
Cycle Length:	160
Actuated Cycle Length:	142.1
Natural Cycle:	125
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	1.08
Intersection Signal Delay:	49.2
Intersection LOS:	D
Intersection Capacity Utilization:	101.8%
ICU Level of Service:	G
Analysis Period (min):	15

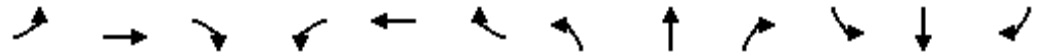
Splits and Phases: 1: Regional Road 50 & Mayfield Road/Albion Vaughan Road



Queues

1: Regional Road 50 & Mayfield Road/Albion Vaughan Road

Existing STP  
Future Background: AM Peak Hour



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	103	150	103	491	350	15	104	991	148	2	1492	103
v/c Ratio	0.47	0.64	0.42	1.08	0.75	0.04	0.64	0.51	0.17	0.01	0.98	0.14
Control Delay	42.2	69.6	14.4	103.4	59.1	0.2	47.3	20.0	2.8	28.0	57.6	5.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	42.2	69.6	14.4	103.4	59.1	0.2	47.3	20.0	2.8	28.0	57.6	5.7
Queue Length 50th (m)	18.2	37.1	0.0	~125.1	83.7	0.0	15.2	77.2	0.0	0.3	193.8	0.1
Queue Length 95th (m)	30.7	58.0	15.3	#207.3	115.8	0.0	35.5	108.9	9.6	2.1	#298.8	11.6
Internal Link Dist (m)		265.2			539.9			354.1			662.1	
Turn Bay Length (m)	100.0		90.0	170.0		70.0	125.0		180.0	35.0		150.0
Base Capacity (vph)	218	445	371	456	689	560	222	1956	881	161	1521	715
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.47	0.34	0.28	1.08	0.51	0.03	0.47	0.51	0.17	0.01	0.98	0.14

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.

























Queue shown is maximum after two cycles.

# 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis  
 1: Regional Road 50 & Mayfield Road/Albion Vaughan Road

Existing STP  
 Future Background: AM Peak Hour

														
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR		
Lane Configurations														
Traffic Volume (vph)	103	150	103	491	350	15	104	991	148	2	1492	103		
Future Volume (vph)	103	150	103	491	350	15	104	991	148	2	1492	103		
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900		
Lane Width	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5		
Total Lost time (s)	3.0	6.5	6.5	3.0	6.5	6.5	3.0	6.6	6.6	6.6	6.6	6.6		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00		
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85		
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00		
Satd. Flow (prot)	1580	1642	1094	1767	1762	1331	1214	3411	1426	1190	3380	1465		
Flt Permitted	0.50	1.00	1.00	0.45	1.00	1.00	0.06	1.00	1.00	0.29	1.00	1.00		
Satd. Flow (perm)	837	1642	1094	833	1762	1331	76	3411	1426	359	3380	1465		
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		
Adj. Flow (vph)	103	150	103	491	350	15	104	991	148	2	1492	103		
RTOR Reduction (vph)	0	0	88	0	0	11	0	0	63	0	0	56		
Lane Group Flow (vph)	103	150	15	491	350	4	104	991	85	2	1492	47		
Heavy Vehicles (%)	13%	17%	46%	1%	9%	20%	47%	7%	12%	50%	8%	9%		
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA	Perm		
Protected Phases	7	4		3	8		1	6			2			
Permitted Phases	4		4	8		8	6		6	2		2		
Actuated Green, G (s)	27.4	20.4	20.4	47.4	37.4	37.4	81.6	81.6	81.6	64.0	64.0	64.0		
Effective Green, g (s)	27.4	20.4	20.4	47.4	37.4	37.4	81.6	81.6	81.6	64.0	64.0	64.0		
Actuated g/C Ratio	0.19	0.14	0.14	0.33	0.26	0.26	0.57	0.57	0.57	0.45	0.45	0.45		
Clearance Time (s)	3.0	6.5	6.5	3.0	6.5	6.5	3.0	6.6	6.6	6.6	6.6	6.6		
Vehicle Extension (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		
Lane Grp Cap (vph)	197	235	157	435	463	350	160	1958	818	161	1522	659		
v/s Ratio Prot	0.03	0.09		c0.19	0.20		c0.07	0.29			c0.44			
v/s Ratio Perm	0.07		0.01	c0.19		0.00	0.30		0.06	0.01		0.03		
v/c Ratio	0.52	0.64	0.09	1.13	0.76	0.01	0.65	0.51	0.10	0.01	0.98	0.07		
Uniform Delay, d1	49.8	57.4	52.8	44.3	48.2	38.7	36.5	18.2	13.7	21.6	38.4	22.2		
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		
Incremental Delay, d2	4.7	7.7	0.5	83.2	8.2	0.0	12.0	0.9	0.3	0.1	18.8	0.2		
Delay (s)	54.5	65.1	53.4	127.5	56.3	38.7	48.6	19.1	14.0	21.7	57.3	22.4		
Level of Service	D	E	D	F	E	D	D	B	B	C	E	C		
Approach Delay (s)		58.6			96.8			20.9			55.0			
Approach LOS		E			F			C			D			
<b>Intersection Summary</b>														
HCM 2000 Control Delay			53.7									HCM 2000 Level of Service	D	
HCM 2000 Volume to Capacity ratio			1.02											
Actuated Cycle Length (s)			142.1								19.1			
Intersection Capacity Utilization			101.8%										ICU Level of Service	G
Analysis Period (min)			15											

c Critical Lane Group

Lanes, Volumes, Timings  
2: Albion Vaughan Road & Kirby Road

Existing STP  
Future Background: AM Peak Hour



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	8	31	316	4	122	993
Future Volume (vph)	8	31	316	4	122	993
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.5	3.7	3.5	3.7	3.7
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.893		0.998			
Flt Protected	0.990					0.995
Satd. Flow (prot)	1246	0	1729	0	0	1854
Flt Permitted	0.990					0.995
Satd. Flow (perm)	1246	0	1729	0	0	1854
Link Speed (k/h)	80		60			60
Link Distance (m)	414.0		186.1			286.8
Travel Time (s)	18.6		11.2			17.2
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	88%	23%	11%	0%	4%	3%
Adj. Flow (vph)	8	31	316	4	122	993
Shared Lane Traffic (%)						
Lane Group Flow (vph)	39	0	320	0	0	1115
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.7		0.0			0.0
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	4.8		4.8			4.8
Two way Left Turn Lane						
Headway Factor	0.99	1.01	0.99	1.01	0.99	0.99
Turning Speed (k/h)	25	15		15	25	
Sign Control	Stop		Free			Free

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	89.2%
Analysis Period (min)	15
	ICU Level of Service E

# HCM Unsignalized Intersection Capacity Analysis

## 2: Albion Vaughan Road & Kirby Road

Existing STP  
Future Background: AM Peak Hour



























Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	8	31	316	4	122	993
Future Volume (Veh/h)	8	31	316	4	122	993
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	8	31	316	4	122	993
<b>Pedestrians</b>						
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	1555	318			320	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1555	318			320	
tC, single (s)	7.3	6.4			4.1	
tC, 2 stage (s)						
tF (s)	4.3	3.5			2.2	
p0 queue free %	89	95			90	
cM capacity (veh/h)	72	676			1229	
<b>Direction, Lane #</b>	<b>WB 1</b>	<b>NB 1</b>	<b>SB 1</b>			
Volume Total	39	320	1115			
Volume Left	8	0	122			
Volume Right	31	4	0			
cSH	247	1700	1229			
Volume to Capacity	0.16	0.19	0.10			
Queue Length 95th (m)	3.8	0.0	2.3			
Control Delay (s)	22.3	0.0	2.7			
Lane LOS	C		A			
Approach Delay (s)	22.3	0.0	2.7			
Approach LOS	C					
<b>Intersection Summary</b>						
Average Delay			2.6			
Intersection Capacity Utilization			89.2%	ICU Level of Service	E	
Analysis Period (min)			15			

Lanes, Volumes, Timings

1: Regional Road 50 & Mayfield Road/Albion Vaughan Road

Future Background: AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	103	150	103	491	350	15	104	991	148	2	1492	103
Future Volume (vph)	103	150	103	491	350	15	104	991	148	2	1492	103
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5
Storage Length (m)	100.0		90.0	170.0		70.0	125.0		180.0	35.0		150.0
Storage Lanes	1		1	1		1	1		1	1		1
Taper Length (m)	60.0			40.0			20.0			0.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1580	1642	1094	1767	1762	1331	1214	3411	1426	1190	3380	1465
Flt Permitted	0.551			0.403			0.054			0.252		
Satd. Flow (perm)	916	1642	1094	750	1762	1331	69	3411	1426	316	3380	1465
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			103			65			148			103
Link Speed (k/h)		60			60			70			70	
Link Distance (m)		289.2			563.9			378.1			686.1	
Travel Time (s)		17.4			33.8			19.4			35.3	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	13%	17%	46%	1%	9%	20%	47%	7%	12%	50%	8%	9%
Adj. Flow (vph)	103	150	103	491	350	15	104	991	148	2	1492	103
Shared Lane Traffic (%)												
Lane Group Flow (vph)	103	150	103	491	350	15	104	991	148	2	1492	103
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.5			3.5			3.5			3.5	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												Yes
Headway Factor	1.01	0.99	1.01	1.01	0.99	1.01	1.01	0.99	1.01	1.01	0.99	1.01
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	2.0
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA	Perm

Lanes, Volumes, Timings

1: Regional Road 50 & Mayfield Road/Albion Vaughan Road

Future Background: AM Peak Hour

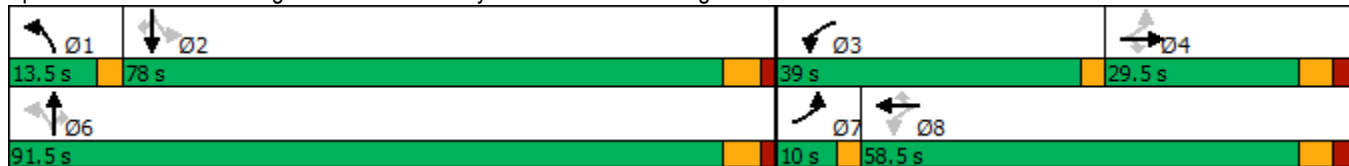


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases	7	4		3	8		1	6			2	
Permitted Phases	4		4	8		8	6		6	2		2
Detector Phase	7	4	4	3	8	8	1	6	6	2	2	2
Switch Phase												
Minimum Initial (s)	5.0	12.0	12.0	5.0	12.0	12.0	5.0	20.0	20.0	20.0	20.0	20.0
Minimum Split (s)	8.0	39.5	39.5	8.0	39.5	39.5	8.0	37.6	37.6	37.6	37.6	37.6
Total Split (s)	10.0	29.5	29.5	39.0	58.5	58.5	13.5	91.5	91.5	78.0	78.0	78.0
Total Split (%)	6.3%	18.4%	18.4%	24.4%	36.6%	36.6%	8.4%	57.2%	57.2%	48.8%	48.8%	48.8%
Maximum Green (s)	7.0	23.0	23.0	36.0	52.0	52.0	10.5	84.9	84.9	71.4	71.4	71.4
Yellow Time (s)	3.0	4.0	4.0	3.0	4.0	4.0	3.0	4.6	4.6	4.6	4.6	4.6
All-Red Time (s)	0.0	2.5	2.5	0.0	2.5	2.5	0.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	3.0	6.5	6.5	3.0	6.5	6.5	3.0	6.6	6.6	6.6	6.6	6.6
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead			Lag	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Recall Mode	None	None	None	None	None	None	None	Max	Max	Max	Max	Max
Walk Time (s)		8.0	8.0		8.0	8.0		8.0	8.0	8.0	8.0	8.0
Flash Dont Walk (s)		25.0	25.0		25.0	25.0		23.0	23.0	23.0	23.0	23.0
Pedestrian Calls (#/hr)		0	0		0	0		0	0	0	0	0
Act Effct Green (s)	30.4	19.9	19.9	62.1	48.6	48.6	88.6	85.0	85.0	71.5	71.5	71.5
Actuated g/C Ratio	0.19	0.13	0.13	0.40	0.31	0.31	0.57	0.54	0.54	0.46	0.46	0.46
v/c Ratio	0.50	0.72	0.45	0.93	0.64	0.03	0.90	0.54	0.18	0.01	0.97	0.14
Control Delay	46.3	85.3	16.8	65.4	52.6	0.1	97.5	24.9	3.1	25.5	58.1	4.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	46.3	85.3	16.8	65.4	52.6	0.1	97.5	24.9	3.1	25.5	58.1	4.7
LOS	D	F	B	E	D	A	F	C	A	C	E	A
Approach Delay		54.2			59.0			28.3			54.6	
Approach LOS		D			E			C			D	

Intersection Summary

Area Type:	Other
Cycle Length:	160
Actuated Cycle Length:	156.7
Natural Cycle:	125
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	0.97
Intersection Signal Delay:	47.4
Intersection LOS:	D
Intersection Capacity Utilization:	101.8%
ICU Level of Service:	G
Analysis Period (min):	15

Splits and Phases: 1: Regional Road 50 & Mayfield Road/Albion Vaughan Road





Queues

1: Regional Road 50 & Mayfield Road/Albion Vaughan Road

Future Background: AM Peak Hour



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	103	150	103	491	350	15	104	991	148	2	1492	103
v/c Ratio	0.50	0.72	0.45	0.93	0.64	0.03	0.90	0.54	0.18	0.01	0.97	0.14
Control Delay	46.3	85.3	16.8	65.4	52.6	0.1	97.5	24.9	3.1	25.5	58.1	4.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	46.3	85.3	16.8	65.4	52.6	0.1	97.5	24.9	3.1	25.5	58.1	4.7
Queue Length 50th (m)	19.0	42.0	0.0	117.1	86.6	0.0	20.0	96.6	0.0	0.3	221.7	0.0
Queue Length 95th (m)	31.5	65.1	16.9	#157.5	118.5	0.0	#56.3	116.8	10.1	2.0	#274.6	10.2
Internal Link Dist (m)		265.2			539.9			354.1			662.1	
Turn Bay Length (m)	100.0		90.0	170.0		70.0	125.0		180.0	35.0		150.0
Base Capacity (vph)	207	241	248	530	585	485	115	1849	841	144	1541	723
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.50	0.62	0.42	0.93	0.60	0.03	0.90	0.54	0.18	0.01	0.97	0.14

























Intersection Summary

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

# HCM Signalized Intersection Capacity Analysis

## 1: Regional Road 50 & Mayfield Road/Albion Vaughan Road

Future Background: AM Peak Hour

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	103	150	103	491	350	15	104	991	148	2	1492	103	
Future Volume (vph)	103	150	103	491	350	15	104	991	148	2	1492	103	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Lane Width	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5	
Total Lost time (s)	3.0	6.5	6.5	3.0	6.5	6.5	3.0	6.6	6.6	6.6	6.6	6.6	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	1580	1642	1094	1767	1762	1331	1214	3411	1426	1190	3380	1465	
Flt Permitted	0.55	1.00	1.00	0.40	1.00	1.00	0.05	1.00	1.00	0.25	1.00	1.00	
Satd. Flow (perm)	917	1642	1094	750	1762	1331	69	3411	1426	316	3380	1465	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Adj. Flow (vph)	103	150	103	491	350	15	104	991	148	2	1492	103	
RTOR Reduction (vph)	0	0	90	0	0	10	0	0	68	0	0	56	
Lane Group Flow (vph)	103	150	13	491	350	5	104	991	80	2	1492	47	
Heavy Vehicles (%)	13%	17%	46%	1%	9%	20%	47%	7%	12%	50%	8%	9%	
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA	Perm	
Protected Phases	7	4		3	8		1	6			2		
Permitted Phases	4		4	8		8	6		6	2		2	
Actuated Green, G (s)	26.9	19.9	19.9	58.6	48.6	48.6	85.0	85.0	85.0	71.5	71.5	71.5	
Effective Green, g (s)	26.9	19.9	19.9	58.6	48.6	48.6	85.0	85.0	85.0	71.5	71.5	71.5	
Actuated g/C Ratio	0.17	0.13	0.13	0.37	0.31	0.31	0.54	0.54	0.54	0.46	0.46	0.46	
Clearance Time (s)	3.0	6.5	6.5	3.0	6.5	6.5	3.0	6.6	6.6	6.6	6.6	6.6	
Vehicle Extension (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Lane Grp Cap (vph)	187	208	138	512	546	412	114	1850	773	144	1542	668	
v/s Ratio Prot	0.02	0.09		c0.22	0.20		c0.06	0.29			c0.44		
v/s Ratio Perm	0.07		0.01	c0.14		0.00	0.44		0.06	0.01		0.03	
v/c Ratio	0.55	0.72	0.09	0.96	0.64	0.01	0.91	0.54	0.10	0.01	0.97	0.07	
Uniform Delay, d1	57.7	65.7	60.4	43.5	46.5	37.4	46.6	23.1	17.4	23.3	41.5	23.9	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	5.9	14.1	0.6	29.8	3.5	0.0	59.6	1.1	0.3	0.2	16.4	0.2	
Delay (s)	63.5	79.8	61.1	73.3	50.0	37.4	106.2	24.2	17.7	23.5	57.9	24.1	
Level of Service	E	E	E	E	D	D	F	C	B	C	E	C	
Approach Delay (s)		69.7			63.2			30.3			55.7		
Approach LOS		E			E			C			E		
<b>Intersection Summary</b>													
HCM 2000 Control Delay			50.7									HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio			0.98										
Actuated Cycle Length (s)			156.7									Sum of lost time (s)	19.1
Intersection Capacity Utilization			101.8%									ICU Level of Service	G
Analysis Period (min)			15										

























c Critical Lane Group

Lanes, Volumes, Timings

Existing STP

1: Regional Road 50 & Mayfield Road/Albion Vaughan Road

Future Background: PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	171	265	85	161	176	30	69	1493	506	11	1243	141
Future Volume (vph)	171	265	85	161	176	30	69	1493	506	11	1243	141
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5
Storage Length (m)	100.0		90.0	170.0		70.0	125.0		180.0	35.0		150.0
Storage Lanes	1		1	1		1	1		1	1		1
Taper Length (m)	60.0			40.0			20.0			0.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1684	1746	1183	1684	1642	1298	1182	3380	1493	1513	3411	1507
Flt Permitted	0.553			0.365			0.112			0.119		
Satd. Flow (perm)	980	1746	1183	647	1642	1298	139	3380	1493	189	3411	1507
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			85			84			438			141
Link Speed (k/h)		60			60			70				70
Link Distance (m)		289.2			552.1			378.1				686.1
Travel Time (s)		17.4			33.1			19.4				35.3
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	6%	10%	35%	6%	17%	23%	51%	8%	7%	18%	7%	6%
Adj. Flow (vph)	171	265	85	161	176	30	69	1493	506	11	1243	141
Shared Lane Traffic (%)												
Lane Group Flow (vph)	171	265	85	161	176	30	69	1493	506	11	1243	141
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.5			3.5			3.5			3.5	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												Yes
Headway Factor	1.01	0.99	1.01	1.01	0.99	1.01	1.01	0.99	1.01	1.01	0.99	1.01
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	2.0
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA	Perm

Lanes, Volumes, Timings

Existing STP

1: Regional Road 50 & Mayfield Road/Albion Vaughan Road

Future Background: PM Peak Hour



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases	7	4		3	8		1	6			2	
Permitted Phases	4		4	8		8	6		6	2		2
Detector Phase	7	4	4	3	8	8	1	6	6	2	2	2
Switch Phase												
Minimum Initial (s)	5.0	12.0	12.0	5.0	12.0	12.0	5.0	20.0	20.0	20.0	20.0	20.0
Minimum Split (s)	8.0	39.5	39.5	8.0	39.5	39.5	8.0	37.6	37.6	37.6	37.6	37.6
Total Split (s)	10.0	40.0	40.0	10.0	40.0	40.0	25.0	75.0	75.0	50.0	50.0	50.0
Total Split (%)	8.0%	32.0%	32.0%	8.0%	32.0%	32.0%	20.0%	60.0%	60.0%	40.0%	40.0%	40.0%
Maximum Green (s)	7.0	33.5	33.5	7.0	33.5	33.5	22.0	68.4	68.4	43.4	43.4	43.4
Yellow Time (s)	3.0	4.0	4.0	3.0	4.0	4.0	3.0	4.6	4.6	4.6	4.6	4.6
All-Red Time (s)	0.0	2.5	2.5	0.0	2.5	2.5	0.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	3.0	6.5	6.5	3.0	6.5	6.5	3.0	6.6	6.6	6.6	6.6	6.6
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead			Lag	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Recall Mode	None	None	None	None	None	None	None	Max	Max	Max	Max	Max
Walk Time (s)		8.0	8.0		8.0	8.0		8.0	8.0	8.0	8.0	8.0
Flash Dont Walk (s)		25.0	25.0		25.0	25.0		23.0	23.0	23.0	23.0	23.0
Pedestrian Calls (#/hr)		0	0		0	0		0	0	0	0	0
Act Effct Green (s)	34.9	24.4	24.4	34.9	24.4	24.4	72.2	68.6	68.6	57.3	57.3	57.3
Actuated g/C Ratio	0.30	0.21	0.21	0.30	0.21	0.21	0.62	0.59	0.59	0.49	0.49	0.49
v/c Ratio	0.51	0.72	0.27	0.63	0.51	0.09	0.38	0.75	0.48	0.12	0.74	0.17
Control Delay	35.7	54.4	9.7	41.8	45.7	0.5	16.4	21.4	3.9	25.5	29.1	4.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	35.7	54.4	9.7	41.8	45.7	0.5	16.4	21.4	3.9	25.5	29.1	4.1
LOS	D	D	A	D	D	A	B	C	A	C	C	A
Approach Delay		41.0			40.3			16.9			26.6	
Approach LOS		D			D			B			C	

Intersection Summary

Area Type:	Other
Cycle Length:	125
Actuated Cycle Length:	116.1
Natural Cycle:	95
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	0.75
Intersection Signal Delay:	24.9
Intersection LOS:	C
Intersection Capacity Utilization:	94.5%
ICU Level of Service:	F
Analysis Period (min):	15

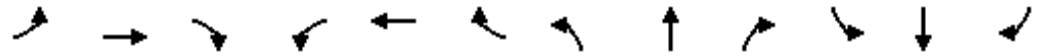
Splits and Phases: 1: Regional Road 50 & Mayfield Road/Albion Vaughan Road



Queues

1: Regional Road 50 & Mayfield Road/Albion Vaughan Road

Existing STP  
Future Background: PM Peak Hour



























Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	171	265	85	161	176	30	69	1493	506	11	1243	141
v/c Ratio	0.51	0.72	0.27	0.63	0.51	0.09	0.38	0.75	0.48	0.12	0.74	0.17
Control Delay	35.7	54.4	9.7	41.8	45.7	0.5	16.4	21.4	3.9	25.5	29.1	4.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	35.7	54.4	9.7	41.8	45.7	0.5	16.4	21.4	3.9	25.5	29.1	4.1
Queue Length 50th (m)	26.7	51.9	0.0	24.9	32.8	0.0	5.4	113.4	5.8	1.3	109.3	0.0
Queue Length 95th (m)	42.5	77.5	11.3	40.4	52.3	0.0	13.1	167.2	24.8	5.9	#169.8	11.3
Internal Link Dist (m)		265.2			528.1			354.1			662.1	
Turn Bay Length (m)	100.0		90.0	170.0		70.0	125.0		180.0	35.0		150.0
Base Capacity (vph)	337	505	402	257	475	435	284	1996	1061	93	1683	815
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.51	0.52	0.21	0.63	0.37	0.07	0.24	0.75	0.48	0.12	0.74	0.17

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis  
 1: Regional Road 50 & Mayfield Road/Albion Vaughan Road

Existing STP  
 Future Background: PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	171	265	85	161	176	30	69	1493	506	11	1243	141
Future Volume (vph)	171	265	85	161	176	30	69	1493	506	11	1243	141
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5
Total Lost time (s)	3.0	6.5	6.5	3.0	6.5	6.5	3.0	6.6	6.6	6.6	6.6	6.6
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1684	1746	1183	1684	1642	1298	1182	3380	1493	1513	3411	1507
Flt Permitted	0.55	1.00	1.00	0.37	1.00	1.00	0.11	1.00	1.00	0.12	1.00	1.00
Satd. Flow (perm)	981	1746	1183	648	1642	1298	139	3380	1493	189	3411	1507
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	171	265	85	161	176	30	69	1493	506	11	1243	141
RTOR Reduction (vph)	0	0	67	0	0	24	0	0	178	0	0	72
Lane Group Flow (vph)	171	265	18	161	176	6	69	1493	328	11	1243	69
Heavy Vehicles (%)	6%	10%	35%	6%	17%	23%	51%	8%	7%	18%	7%	6%
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA	Perm
Protected Phases	7	4		3	8		1	6			2	
Permitted Phases	4		4	8		8	6		6	2		2
Actuated Green, G (s)	31.4	24.4	24.4	31.4	24.4	24.4	69.2	69.2	69.2	57.3	57.3	57.3
Effective Green, g (s)	31.4	24.4	24.4	31.4	24.4	24.4	69.2	69.2	69.2	57.3	57.3	57.3
Actuated g/C Ratio	0.27	0.21	0.21	0.27	0.21	0.21	0.59	0.59	0.59	0.49	0.49	0.49
Clearance Time (s)	3.0	6.5	6.5	3.0	6.5	6.5	3.0	6.6	6.6	6.6	6.6	6.6
Vehicle Extension (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lane Grp Cap (vph)	306	365	247	236	343	271	161	2004	885	92	1674	739
v/s Ratio Prot	0.03	c0.15		c0.04	0.11		0.03	c0.44			0.36	
v/s Ratio Perm	0.12		0.02	0.14		0.00	0.22		0.22	0.06		0.05
v/c Ratio	0.56	0.73	0.07	0.68	0.51	0.02	0.43	0.75	0.37	0.12	0.74	0.09
Uniform Delay, d1	35.7	43.0	37.1	36.9	40.9	36.7	15.5	17.3	12.4	16.1	23.8	15.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	3.7	8.6	0.3	10.0	2.6	0.1	3.8	2.6	1.2	2.6	3.0	0.3
Delay (s)	39.5	51.6	37.3	46.9	43.5	36.8	19.3	19.9	13.6	18.7	26.8	16.1
Level of Service	D	D	D	D	D	D	B	B	B	B	C	B
Approach Delay (s)		45.3			44.4			18.3			25.7	
Approach LOS		D			D			B			C	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			26.1				HCM 2000 Level of Service				C	
HCM 2000 Volume to Capacity ratio			0.76									
Actuated Cycle Length (s)			116.7				Sum of lost time (s)				19.1	
Intersection Capacity Utilization			94.5%				ICU Level of Service				F	
Analysis Period (min)			15									

c Critical Lane Group

Lanes, Volumes, Timings  
2: Albion Vaughan Road & Kirby Road

Existing STP  
Future Background: PM Peak Hour



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	18	62	987	6	33	378
Future Volume (vph)	18	62	987	6	33	378
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.5	3.7	3.5	3.7	3.7
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.895		0.999			
Flt Protected	0.989					0.996
Satd. Flow (prot)	1560	0	1862	0	0	1794
Flt Permitted	0.989					0.996
Satd. Flow (perm)	1560	0	1862	0	0	1794
Link Speed (k/h)	80		60			60
Link Distance (m)	414.0		186.1			286.8
Travel Time (s)	18.6		11.2			17.2
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	33%	2%	3%	17%	3%	7%
Adj. Flow (vph)	18	62	987	6	33	378
Shared Lane Traffic (%)						
Lane Group Flow (vph)	80	0	993	0	0	411
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.7		0.0			0.0
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	4.8		4.8			4.8
Two way Left Turn Lane						
Headway Factor	0.99	1.01	0.99	1.01	0.99	0.99
Turning Speed (k/h)	25	15		15	25	
Sign Control	Stop		Free			Free

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	63.8%
Analysis Period (min)	15
	ICU Level of Service B

# HCM Unsignalized Intersection Capacity Analysis

## 2: Albion Vaughan Road & Kirby Road

Existing STP  
Future Background: PM Peak Hour



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	18	62	987	6	33	378
Future Volume (Veh/h)	18	62	987	6	33	378
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	18	62	987	6	33	378
<b>Pedestrians</b>						
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	1434	990			993	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1434	990			993	
tC, single (s)	6.7	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.8	3.3			2.2	
p0 queue free %	85	79			95	
cM capacity (veh/h)	120	299			693	
<b>Direction, Lane #</b>	<b>WB 1</b>	<b>NB 1</b>	<b>SB 1</b>			
Volume Total	80	993	411			
Volume Left	18	0	33			
Volume Right	62	6	0			
cSH	224	1700	693			
Volume to Capacity	0.36	0.58	0.05			
Queue Length 95th (m)	10.8	0.0	1.0			
Control Delay (s)	29.8	0.0	1.4			
Lane LOS	D		A			
Approach Delay (s)	29.8	0.0	1.4			
Approach LOS	D					
<b>Intersection Summary</b>						
Average Delay			2.0			
Intersection Capacity Utilization			63.8%	ICU Level of Service		B
Analysis Period (min)			15			



# Appendix G

























## Total Traffic Operations Reports



Lanes, Volumes, Timings

1: Regional Road 50 & Mayfield Road/Albion Vaughan Road

Future Total: AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	103	153	103	532	355	42	104	991	153	11	1492	103
Future Volume (vph)	103	153	103	532	355	42	104	991	153	11	1492	103
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5
Storage Length (m)	100.0		90.0	170.0		70.0	125.0		180.0	35.0		150.0
Storage Lanes	1		1	1		1	1		1	1		1
Taper Length (m)	60.0			40.0			20.0			0.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1580	1642	1094	1767	1762	1331	1214	3411	1426	1190	3380	1465
Flt Permitted	0.549			0.390			0.054			0.248		
Satd. Flow (perm)	913	1642	1094	726	1762	1331	69	3411	1426	311	3380	1465
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			103			65			153			103
Link Speed (k/h)		60			60			70			70	
Link Distance (m)		289.2			563.9			378.1			686.1	
Travel Time (s)		17.4			33.8			19.4			35.3	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	13%	17%	46%	1%	9%	20%	47%	7%	12%	50%	8%	9%
Adj. Flow (vph)	103	153	103	532	355	42	104	991	153	11	1492	103
Shared Lane Traffic (%)												
Lane Group Flow (vph)	103	153	103	532	355	42	104	991	153	11	1492	103
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.5			3.5			3.5			3.5	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												Yes
Headway Factor	1.01	0.99	1.01	1.01	0.99	1.01	1.01	0.99	1.01	1.01	0.99	1.01
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	2.0
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA	Perm

Lanes, Volumes, Timings

1: Regional Road 50 & Mayfield Road/Albion Vaughan Road

Future Total: AM Peak Hour

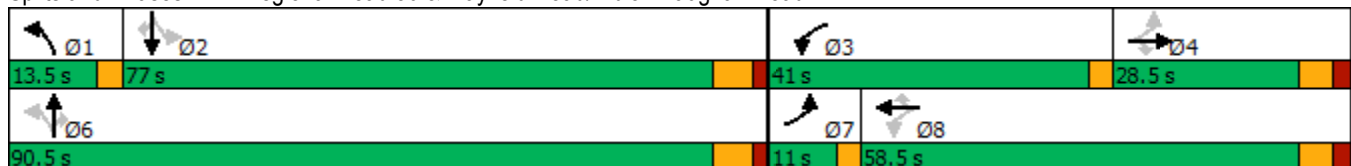


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases	7	4		3	8		1	6			2	
Permitted Phases	4		4	8		8	6		6	2		2
Detector Phase	7	4	4	3	8	8	1	6	6	2	2	2
Switch Phase												
Minimum Initial (s)	5.0	12.0	12.0	5.0	12.0	12.0	5.0	20.0	20.0	20.0	20.0	20.0
Minimum Split (s)	8.0	39.5	39.5	8.0	39.5	39.5	8.0	37.6	37.6	37.6	37.6	37.6
Total Split (s)	11.0	28.5	28.5	41.0	58.5	58.5	13.5	90.5	90.5	77.0	77.0	77.0
Total Split (%)	6.9%	17.8%	17.8%	25.6%	36.6%	36.6%	8.4%	56.6%	56.6%	48.1%	48.1%	48.1%
Maximum Green (s)	8.0	22.0	22.0	38.0	52.0	52.0	10.5	83.9	83.9	70.4	70.4	70.4
Yellow Time (s)	3.0	4.0	4.0	3.0	4.0	4.0	3.0	4.6	4.6	4.6	4.6	4.6
All-Red Time (s)	0.0	2.5	2.5	0.0	2.5	2.5	0.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	3.0	6.5	6.5	3.0	6.5	6.5	3.0	6.6	6.6	6.6	6.6	6.6
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead			Lag	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Recall Mode	None	None	None	None	None	None	None	Max	Max	Max	Max	Max
Walk Time (s)		8.0	8.0		8.0	8.0		8.0	8.0	8.0	8.0	8.0
Flash Dont Walk (s)		25.0	25.0		25.0	25.0		23.0	23.0	23.0	23.0	23.0
Pedestrian Calls (#/hr)		0	0		0	0		0	0	0	0	0
Act Effct Green (s)	31.3	19.8	19.8	64.3	49.8	49.8	87.6	84.0	84.0	70.4	70.4	70.4
Actuated g/C Ratio	0.20	0.13	0.13	0.41	0.32	0.32	0.55	0.53	0.53	0.45	0.45	0.45
v/c Ratio	0.48	0.75	0.45	0.97	0.64	0.09	0.91	0.55	0.18	0.08	0.99	0.15
Control Delay	43.5	88.4	17.1	73.2	52.3	3.2	101.3	26.1	3.1	28.2	63.9	4.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	43.5	88.4	17.1	73.2	52.3	3.2	101.3	26.1	3.1	28.2	63.9	4.8
LOS	D	F	B	E	D	A	F	C	A	C	E	A
Approach Delay		55.1			62.0			29.5			59.9	
Approach LOS		E			E			C			E	

Intersection Summary

Area Type:	Other
Cycle Length:	160
Actuated Cycle Length:	157.9
Natural Cycle:	125
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	0.99
Intersection Signal Delay:	50.8
Intersection LOS:	D
Intersection Capacity Utilization:	104.1%
ICU Level of Service:	G
Analysis Period (min):	15

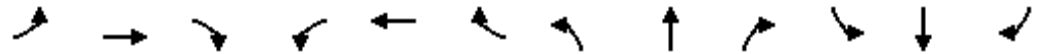
Splits and Phases: 1: Regional Road 50 & Mayfield Road/Albion Vaughan Road



Queues

1: Regional Road 50 & Mayfield Road/Albion Vaughan Road

Future Total: AM Peak Hour



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	103	153	103	532	355	42	104	991	153	11	1492	103
v/c Ratio	0.48	0.75	0.45	0.97	0.64	0.09	0.91	0.55	0.18	0.08	0.99	0.15
Control Delay	43.5	88.4	17.1	73.2	52.3	3.2	101.3	26.1	3.1	28.2	63.9	4.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	43.5	88.4	17.1	73.2	52.3	3.2	101.3	26.1	3.1	28.2	63.9	4.8
Queue Length 50th (m)	18.8	43.3	0.0	129.6	88.2	0.0	20.4	100.2	0.0	1.9	~230.0	0.0
Queue Length 95th (m)	31.1	67.0	17.0	#182.2	120.6	3.8	#56.6	118.5	10.3	6.0	#278.0	10.4
Internal Link Dist (m)		265.2			539.9			354.1			662.1	
Turn Bay Length (m)	100.0		90.0	170.0		70.0	125.0		180.0	35.0		150.0
Base Capacity (vph)	214	228	241	546	580	482	114	1813	829	138	1508	710
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.48	0.67	0.43	0.97	0.61	0.09	0.91	0.55	0.18	0.08	0.99	0.15

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

























# 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

# HCM Signalized Intersection Capacity Analysis

## 1: Regional Road 50 & Mayfield Road/Albion Vaughan Road










Future Total: AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	103	153	103	532	355	42	104	991	153	11	1492	103
Future Volume (vph)	103	153	103	532	355	42	104	991	153	11	1492	103
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5
Total Lost time (s)	3.0	6.5	6.5	3.0	6.5	6.5	3.0	6.6	6.6	6.6	6.6	6.6
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1580	1642	1094	1767	1762	1331	1214	3411	1426	1190	3380	1465
Flt Permitted	0.55	1.00	1.00	0.39	1.00	1.00	0.05	1.00	1.00	0.25	1.00	1.00
Satd. Flow (perm)	912	1642	1094	726	1762	1331	70	3411	1426	311	3380	1465
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	103	153	103	532	355	42	104	991	153	11	1492	103
RTOR Reduction (vph)	0	0	90	0	0	29	0	0	72	0	0	57
Lane Group Flow (vph)	103	153	13	532	355	13	104	991	81	11	1492	46
Heavy Vehicles (%)	13%	17%	46%	1%	9%	20%	47%	7%	12%	50%	8%	9%
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA	Perm
Protected Phases	7	4		3	8		1	6			2	
Permitted Phases	4		4	8		8	6		6	2		2
Actuated Green, G (s)	27.8	19.8	19.8	60.8	49.8	49.8	83.9	83.9	83.9	70.4	70.4	70.4
Effective Green, g (s)	27.8	19.8	19.8	60.8	49.8	49.8	83.9	83.9	83.9	70.4	70.4	70.4
Actuated g/C Ratio	0.18	0.13	0.13	0.39	0.32	0.32	0.53	0.53	0.53	0.45	0.45	0.45
Clearance Time (s)	3.0	6.5	6.5	3.0	6.5	6.5	3.0	6.6	6.6	6.6	6.6	6.6
Vehicle Extension (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lane Grp Cap (vph)	194	206	137	530	556	420	113	1813	758	138	1507	653
v/s Ratio Prot	0.03	0.09		c0.24	0.20		c0.06	0.29			c0.44	
v/s Ratio Perm	0.07		0.01	c0.14		0.01	0.43		0.06	0.04		0.03
v/c Ratio	0.53	0.74	0.09	1.00	0.64	0.03	0.92	0.55	0.11	0.08	0.99	0.07
Uniform Delay, d1	57.3	66.5	61.1	44.0	46.3	37.3	47.1	24.4	18.4	25.1	43.4	25.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	5.0	16.0	0.6	40.0	3.3	0.1	62.0	1.2	0.3	1.1	20.9	0.2
Delay (s)	62.4	82.5	61.7	84.0	49.6	37.4	109.1	25.6	18.6	26.2	64.3	25.2
Level of Service	E	F	E	F	D	D	F	C	B	C	E	C
Approach Delay (s)		70.8			68.8			31.7			61.5	
Approach LOS		E			E			C			E	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			55.0			HCM 2000 Level of Service			D			
HCM 2000 Volume to Capacity ratio			1.01									
Actuated Cycle Length (s)			157.8			Sum of lost time (s)			19.1			
Intersection Capacity Utilization			104.1%			ICU Level of Service			G			
Analysis Period (min)			15									

c Critical Lane Group

Lanes, Volumes, Timings  
 2: Albion Vaughan Road & Kirby Road










Future Total: AM Peak Hour

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	8	31	324	4	122	999
Future Volume (vph)	8	31	324	4	122	999
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.5	3.7	3.5	3.7	3.7
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.893		0.998			
Flt Protected	0.990					0.995
Satd. Flow (prot)	1246	0	1729	0	0	1854
Flt Permitted	0.990					0.995
Satd. Flow (perm)	1246	0	1729	0	0	1854
Link Speed (k/h)	80		60			60
Link Distance (m)	414.0		186.1			286.8
Travel Time (s)	18.6		11.2			17.2
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	88%	23%	11%	0%	4%	3%
Adj. Flow (vph)	8	31	324	4	122	999
Shared Lane Traffic (%)						
Lane Group Flow (vph)	39	0	328	0	0	1121
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.7		0.0			0.0
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	4.8		4.8			4.8
Two way Left Turn Lane						
Headway Factor	0.99	1.01	0.99	1.01	0.99	0.99
Turning Speed (k/h)	25	15		15	25	
Sign Control	Stop		Free			Free
<b>Intersection Summary</b>						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	90.0%			ICU Level of Service E		
Analysis Period (min)	15					

# HCM Unsignalized Intersection Capacity Analysis

## 2: Albion Vaughan Road & Kirby Road

Future Total: AM Peak Hour

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	8	31	324	4	122	999
Future Volume (Veh/h)	8	31	324	4	122	999
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	8	31	324	4	122	999
<b>Pedestrians</b>						
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	1569	326			328	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1569	326			328	
tC, single (s)	7.3	6.4			4.1	
tC, 2 stage (s)						
tF (s)	4.3	3.5			2.2	
p0 queue free %	89	95			90	
cM capacity (veh/h)	70	669			1220	
<b>Direction, Lane #</b>	<b>WB 1</b>	<b>NB 1</b>	<b>SB 1</b>			
Volume Total	39	328	1121			
Volume Left	8	0	122			
Volume Right	31	4	0			
cSH	243	1700	1220			
Volume to Capacity	0.16	0.19	0.10			
Queue Length 95th (m)	3.9	0.0	2.3			
Control Delay (s)	22.7	0.0	2.7			
Lane LOS	C		A			
Approach Delay (s)	22.7	0.0	2.7			
Approach LOS	C					
<b>Intersection Summary</b>						
Average Delay			2.6			
Intersection Capacity Utilization			90.0%		ICU Level of Service	E
Analysis Period (min)			15			

Lanes, Volumes, Timings  
3: Albion Vaughan Road & Driveway

Future Total: AM Peak Hour



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	8	73	17	321	1003	6
Future Volume (vph)	8	73	17	321	1003	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.5	3.7	3.5	3.7	3.7
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.878				0.999	
Flt Protected	0.995			0.997		
Satd. Flow (prot)	1645	0	0	1837	1882	0
Flt Permitted	0.995			0.997		
Satd. Flow (perm)	1645	0	0	1837	1882	0
Link Speed (k/h)	50			60	60	
Link Distance (m)	75.2			563.9	186.1	
Travel Time (s)	5.4			33.8	11.2	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	8	73	17	321	1003	6
Shared Lane Traffic (%)						
Lane Group Flow (vph)	81	0	0	338	1009	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.7			3.5	3.5	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	0.99	1.01	0.99	1.01	0.99	0.99
Turning Speed (k/h)	25	15	25			15
Sign Control	Stop			Free	Free	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	64.8%
ICU Level of Service	C
Analysis Period (min)	15



# HCM Unsignalized Intersection Capacity Analysis

## 3: Albion Vaughan Road & Driveway

Future Total: AM Peak Hour



























Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	8	73	17	321	1003	6
Future Volume (Veh/h)	8	73	17	321	1003	6
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	8	73	17	321	1003	6
<b>Pedestrians</b>						
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	1361	1006	1009			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1361	1006	1009			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	95	75	98			
cM capacity (veh/h)	159	293	687			
<b>Direction, Lane #</b>	<b>EB 1</b>	<b>NB 1</b>	<b>SB 1</b>			
Volume Total	81	338	1009			
Volume Left	8	17	0			
Volume Right	73	0	6			
cSH	270	687	1700			
Volume to Capacity	0.30	0.02	0.59			
Queue Length 95th (m)	8.5	0.5	0.0			
Control Delay (s)	23.9	0.8	0.0			
Lane LOS	C	A				
Approach Delay (s)	23.9	0.8	0.0			
Approach LOS	C					
<b>Intersection Summary</b>						
Average Delay			1.6			
Intersection Capacity Utilization			64.8%	ICU Level of Service	C	
Analysis Period (min)			15			

Lanes, Volumes, Timings

1: Regional Road 50 & Mayfield Road/Albion Vaughan Road

Future Total: PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	171	272	85	170	183	46	69	1493	541	27	1243	141
Future Volume (vph)	171	272	85	170	183	46	69	1493	541	27	1243	141
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5
Storage Length (m)	100.0		90.0	170.0		70.0	125.0		180.0	35.0		150.0
Storage Lanes	1		1	1		1	1		1	1		1
Taper Length (m)	60.0			40.0			20.0			0.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1684	1746	1183	1684	1642	1298	1182	3380	1493	1513	3411	1507
Flt Permitted	0.540			0.355			0.111			0.118		
Satd. Flow (perm)	957	1746	1183	629	1642	1298	138	3380	1493	188	3411	1507
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			85			84			429			141
Link Speed (k/h)		60			60			70				70
Link Distance (m)		289.2			552.1			378.1				686.1
Travel Time (s)		17.4			33.1			19.4				35.3
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	6%	10%	35%	6%	17%	23%	51%	8%	7%	18%	7%	6%
Adj. Flow (vph)	171	272	85	170	183	46	69	1493	541	27	1243	141
Shared Lane Traffic (%)												
Lane Group Flow (vph)	171	272	85	170	183	46	69	1493	541	27	1243	141
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.5			3.5			3.5			3.5	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												Yes
Headway Factor	1.01	0.99	1.01	1.01	0.99	1.01	1.01	0.99	1.01	1.01	0.99	1.01
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	2.0
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA	Perm

Lanes, Volumes, Timings

1: Regional Road 50 & Mayfield Road/Albion Vaughan Road

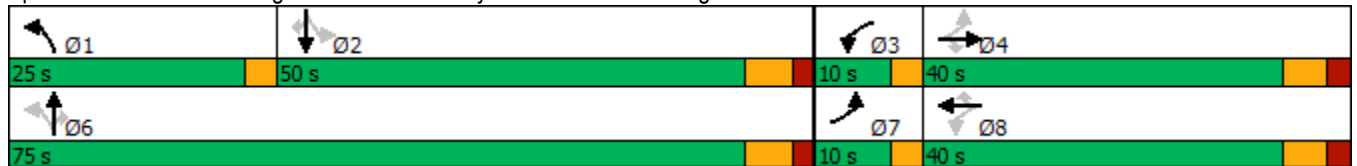
Future Total: PM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases	7	4		3	8		1	6			2	
Permitted Phases	4		4	8		8	6		6	2		2
Detector Phase	7	4	4	3	8	8	1	6	6	2	2	2
Switch Phase												
Minimum Initial (s)	5.0	12.0	12.0	5.0	12.0	12.0	5.0	20.0	20.0	20.0	20.0	20.0
Minimum Split (s)	8.0	39.5	39.5	8.0	39.5	39.5	8.0	37.6	37.6	37.6	37.6	37.6
Total Split (s)	10.0	40.0	40.0	10.0	40.0	40.0	25.0	75.0	75.0	50.0	50.0	50.0
Total Split (%)	8.0%	32.0%	32.0%	8.0%	32.0%	32.0%	20.0%	60.0%	60.0%	40.0%	40.0%	40.0%
Maximum Green (s)	7.0	33.5	33.5	7.0	33.5	33.5	22.0	68.4	68.4	43.4	43.4	43.4
Yellow Time (s)	3.0	4.0	4.0	3.0	4.0	4.0	3.0	4.6	4.6	4.6	4.6	4.6
All-Red Time (s)	0.0	2.5	2.5	0.0	2.5	2.5	0.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	3.0	6.5	6.5	3.0	6.5	6.5	3.0	6.6	6.6	6.6	6.6	6.6
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead			Lag	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Recall Mode	None	None	None	None	None	None	None	Max	Max	Max	Max	Max
Walk Time (s)		8.0	8.0		8.0	8.0		8.0	8.0	8.0	8.0	8.0
Flash Dont Walk (s)		25.0	25.0		25.0	25.0		23.0	23.0	23.0	23.0	23.0
Pedestrian Calls (#/hr)		0	0		0	0		0	0	0	0	0
Act Effct Green (s)	35.3	24.8	24.8	35.3	24.8	24.8	72.2	68.6	68.6	57.3	57.3	57.3
Actuated g/C Ratio	0.30	0.21	0.21	0.30	0.21	0.21	0.62	0.59	0.59	0.49	0.49	0.49
v/c Ratio	0.51	0.73	0.27	0.67	0.52	0.13	0.38	0.75	0.51	0.29	0.74	0.17
Control Delay	35.9	54.8	9.7	44.5	46.0	2.1	16.5	21.7	5.0	34.1	29.4	4.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	35.9	54.8	9.7	44.5	46.0	2.1	16.5	21.7	5.0	34.1	29.4	4.1
LOS	D	D	A	D	D	A	B	C	A	C	C	A
Approach Delay		41.4			40.3			17.2			27.0	
Approach LOS		D			D			B			C	

Intersection Summary

Area Type:	Other
Cycle Length:	125
Actuated Cycle Length:	116.5
Natural Cycle:	95
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	0.75
Intersection Signal Delay:	25.3
Intersection LOS:	C
Intersection Capacity Utilization:	95.3%
ICU Level of Service:	F
Analysis Period (min):	15

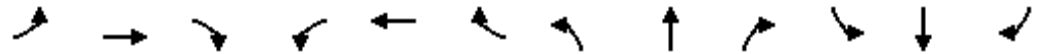
Splits and Phases: 1: Regional Road 50 & Mayfield Road/Albion Vaughan Road



Queues

1: Regional Road 50 & Mayfield Road/Albion Vaughan Road

Future Total: PM Peak Hour



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	171	272	85	170	183	46	69	1493	541	27	1243	141
v/c Ratio	0.51	0.73	0.27	0.67	0.52	0.13	0.38	0.75	0.51	0.29	0.74	0.17
Control Delay	35.9	54.8	9.7	44.5	46.0	2.1	16.5	21.7	5.0	34.1	29.4	4.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	35.9	54.8	9.7	44.5	46.0	2.1	16.5	21.7	5.0	34.1	29.4	4.1
Queue Length 50th (m)	26.7	53.6	0.0	26.5	34.3	0.0	5.5	114.6	9.9	3.4	110.3	0.0
Queue Length 95th (m)	42.5	79.7	11.3	42.5	54.2	1.9	13.1	167.2	34.3	13.5	#169.8	11.3
Internal Link Dist (m)		265.2			528.1			354.1			662.1	
Turn Bay Length (m)	100.0		90.0	170.0		70.0	125.0		180.0	35.0		150.0
Base Capacity (vph)	333	503	401	254	473	434	283	1989	1055	92	1677	812
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.51	0.54	0.21	0.67	0.39	0.11	0.24	0.75	0.51	0.29	0.74	0.17

























Intersection Summary

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

# HCM Signalized Intersection Capacity Analysis

## 1: Regional Road 50 & Mayfield Road/Albion Vaughan Road










Future Total: PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	171	272	85	170	183	46	69	1493	541	27	1243	141
Future Volume (vph)	171	272	85	170	183	46	69	1493	541	27	1243	141
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5
Total Lost time (s)	3.0	6.5	6.5	3.0	6.5	6.5	3.0	6.6	6.6	6.6	6.6	6.6
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1684	1746	1183	1684	1642	1298	1182	3380	1493	1513	3411	1507
Flt Permitted	0.54	1.00	1.00	0.35	1.00	1.00	0.11	1.00	1.00	0.12	1.00	1.00
Satd. Flow (perm)	957	1746	1183	629	1642	1298	138	3380	1493	188	3411	1507
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	171	272	85	170	183	46	69	1493	541	27	1243	141
RTOR Reduction (vph)	0	0	67	0	0	36	0	0	175	0	0	72
Lane Group Flow (vph)	171	272	18	170	183	10	69	1493	366	27	1243	69
Heavy Vehicles (%)	6%	10%	35%	6%	17%	23%	51%	8%	7%	18%	7%	6%
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA	Perm
Protected Phases	7	4		3	8		1	6			2	
Permitted Phases	4		4	8		8	6		6	2		2
Actuated Green, G (s)	31.8	24.8	24.8	31.8	24.8	24.8	69.2	69.2	69.2	57.3	57.3	57.3
Effective Green, g (s)	31.8	24.8	24.8	31.8	24.8	24.8	69.2	69.2	69.2	57.3	57.3	57.3
Actuated g/C Ratio	0.27	0.21	0.21	0.27	0.21	0.21	0.59	0.59	0.59	0.49	0.49	0.49
Clearance Time (s)	3.0	6.5	6.5	3.0	6.5	6.5	3.0	6.6	6.6	6.6	6.6	6.6
Vehicle Extension (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lane Grp Cap (vph)	303	369	250	233	347	274	160	1997	882	91	1669	737
v/s Ratio Prot	0.03	c0.16		c0.04	0.11		0.03	c0.44			0.36	
v/s Ratio Perm	0.12		0.02	0.15		0.01	0.22		0.24	0.14		0.05
v/c Ratio	0.56	0.74	0.07	0.73	0.53	0.04	0.43	0.75	0.41	0.30	0.74	0.09
Uniform Delay, d1	35.7	43.1	36.9	37.6	40.9	36.7	15.7	17.6	13.0	17.9	24.0	16.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	3.9	9.0	0.3	13.2	2.7	0.1	3.9	2.6	1.4	8.1	3.1	0.3
Delay (s)	39.7	52.1	37.2	50.7	43.7	36.8	19.6	20.2	14.4	26.0	27.1	16.3
Level of Service	D	D	D	D	D	D	B	C	B	C	C	B
Approach Delay (s)		45.7			45.9			18.7			26.0	
Approach LOS		D			D			B			C	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			26.6			HCM 2000 Level of Service		C				
HCM 2000 Volume to Capacity ratio			0.77									
Actuated Cycle Length (s)			117.1			Sum of lost time (s)		19.1				
Intersection Capacity Utilization			95.3%			ICU Level of Service		F				
Analysis Period (min)			15									

c Critical Lane Group

Lanes, Volumes, Timings  
 2: Albion Vaughan Road & Kirby Road










Future Total: PM Peak Hour

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	18	62	997	6	33	383
Future Volume (vph)	18	62	997	6	33	383
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.5	3.7	3.5	3.7	3.7
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.895		0.999			
Flt Protected	0.989					0.996
Satd. Flow (prot)	1560	0	1862	0	0	1794
Flt Permitted	0.989					0.996
Satd. Flow (perm)	1560	0	1862	0	0	1794
Link Speed (k/h)	80		60			60
Link Distance (m)	414.0		186.1			286.8
Travel Time (s)	18.6		11.2			17.2
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	33%	2%	3%	17%	3%	7%
Adj. Flow (vph)	18	62	997	6	33	383
Shared Lane Traffic (%)						
Lane Group Flow (vph)	80	0	1003	0	0	416
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.7		0.0			0.0
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	4.8		4.8			4.8
Two way Left Turn Lane						
Headway Factor	0.99	1.01	0.99	1.01	0.99	0.99
Turning Speed (k/h)	25	15		15	25	
Sign Control	Stop		Free			Free
<b>Intersection Summary</b>						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	64.3%		ICU Level of Service C			
Analysis Period (min)	15					

# HCM Unsignalized Intersection Capacity Analysis

## 2: Albion Vaughan Road & Kirby Road

Future Total: PM Peak Hour

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	18	62	997	6	33	383
Future Volume (Veh/h)	18	62	997	6	33	383
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	18	62	997	6	33	383
<b>Pedestrians</b>						
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	1449	1000			1003	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1449	1000			1003	
tC, single (s)	6.7	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.8	3.3			2.2	
p0 queue free %	85	79			95	
cM capacity (veh/h)	117	295			687	
<b>Direction, Lane #</b>	<b>WB 1</b>	<b>NB 1</b>	<b>SB 1</b>			
Volume Total	80	1003	416			
Volume Left	18	0	33			
Volume Right	62	6	0			
cSH	220	1700	687			
Volume to Capacity	0.36	0.59	0.05			
Queue Length 95th (m)	11.0	0.0	1.1			
Control Delay (s)	30.4	0.0	1.4			
Lane LOS	D		A			
Approach Delay (s)	30.4	0.0	1.4			
Approach LOS	D					
<b>Intersection Summary</b>						
Average Delay			2.0			
Intersection Capacity Utilization			64.3%		ICU Level of Service	C
Analysis Period (min)			15			

Lanes, Volumes, Timings  
3: Albion Vaughan Road & Driveway

Future Total: PM Peak Hour



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	10	32	58	995	400	5
Future Volume (vph)	10	32	58	995	400	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.5	3.7	3.5	3.7	3.7
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.897				0.998	
Flt Protected	0.988			0.997		
Satd. Flow (prot)	1669	0	0	1837	1880	0
Flt Permitted	0.988			0.997		
Satd. Flow (perm)	1669	0	0	1837	1880	0
Link Speed (k/h)	50			60	60	
Link Distance (m)	75.2			552.1	186.1	
Travel Time (s)	5.4			33.1	11.2	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	10	32	58	995	400	5
Shared Lane Traffic (%)						
Lane Group Flow (vph)	42	0	0	1053	405	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.7			3.5	3.5	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	0.99	1.01	0.99	1.01	0.99	0.99
Turning Speed (k/h)	25	15	25			15
Sign Control	Stop			Free	Free	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	90.3%
Analysis Period (min)	15
	ICU Level of Service E



# HCM Unsignalized Intersection Capacity Analysis

## 3: Albion Vaughan Road & Driveway

Future Total: PM Peak Hour



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	10	32	58	995	400	5
Future Volume (Veh/h)	10	32	58	995	400	5
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	10	32	58	995	400	5
<b>Pedestrians</b>						
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	1514	402	405			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1514	402	405			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	92	95	95			
cM capacity (veh/h)	125	648	1154			
<b>Direction, Lane #</b>	<b>EB 1</b>	<b>NB 1</b>	<b>SB 1</b>			
Volume Total	42	1053	405			
Volume Left	10	58	0			
Volume Right	32	0	5			
cSH	325	1154	1700			
Volume to Capacity	0.13	0.05	0.24			
Queue Length 95th (m)	3.1	1.1	0.0			
Control Delay (s)	17.7	1.4	0.0			
Lane LOS	C	A				
Approach Delay (s)	17.7	1.4	0.0			
Approach LOS	C					
<b>Intersection Summary</b>						
Average Delay			1.5			
Intersection Capacity Utilization			90.3%	ICU Level of Service	E	
Analysis Period (min)			15			

# Appendix H

## Traffic Operations Reports with Improvements



Lanes, Volumes, Timings

1: Regional Road 50 & Mayfield Road/Albion Vaughan Road

Future Background: AM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	103	150	103	491	350	15	104	991	148	2	1492	103
Future Volume (vph)	103	150	103	491	350	15	104	991	148	2	1492	103
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5
Storage Length (m)	100.0		90.0	170.0		70.0	125.0		180.0	35.0		150.0
Storage Lanes	1		1	2		1	1		1	1		1
Taper Length (m)	60.0			40.0			20.0			0.0		
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1580	3120	1094	3429	3349	1331	1214	3411	1426	1190	3380	1465
Flt Permitted	0.542			0.950			0.055			0.286		
Satd. Flow (perm)	901	3120	1094	3429	3349	1331	70	3411	1426	358	3380	1465
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			103			65			148			103
Link Speed (k/h)		60			60			70			70	
Link Distance (m)		289.2			563.9			378.1			686.1	
Travel Time (s)		17.4			33.8			19.4			35.3	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	13%	17%	46%	1%	9%	20%	47%	7%	12%	50%	8%	9%
Adj. Flow (vph)	103	150	103	491	350	15	104	991	148	2	1492	103
Shared Lane Traffic (%)												
Lane Group Flow (vph)	103	150	103	491	350	15	104	991	148	2	1492	103
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		7.0			7.0			3.5			3.5	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												Yes
Headway Factor	1.01	0.99	1.01	1.01	0.99	1.01	1.01	0.99	1.01	1.01	0.99	1.01
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	2.0
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA	Perm	Prot	NA	Perm	pm+pt	NA	Perm	Perm	NA	Perm

Lanes, Volumes, Timings

1: Regional Road 50 & Mayfield Road/Albion Vaughan Road

Future Background: AM Peak Hour

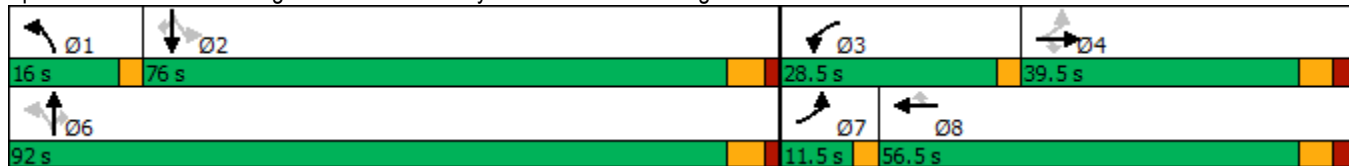


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases	7	4		3	8		1	6			2	
Permitted Phases	4		4			8	6		6	2		2
Detector Phase	7	4	4	3	8	8	1	6	6	2	2	2
Switch Phase												
Minimum Initial (s)	5.0	12.0	12.0	5.0	12.0	12.0	5.0	20.0	20.0	20.0	20.0	20.0
Minimum Split (s)	8.0	39.5	39.5	8.0	39.5	39.5	8.0	37.6	37.6	37.6	37.6	37.6
Total Split (s)	11.5	39.5	39.5	28.5	56.5	56.5	16.0	92.0	92.0	76.0	76.0	76.0
Total Split (%)	7.2%	24.7%	24.7%	17.8%	35.3%	35.3%	10.0%	57.5%	57.5%	47.5%	47.5%	47.5%
Maximum Green (s)	8.5	33.0	33.0	25.5	50.0	50.0	13.0	85.4	85.4	69.4	69.4	69.4
Yellow Time (s)	3.0	4.0	4.0	3.0	4.0	4.0	3.0	4.6	4.6	4.6	4.6	4.6
All-Red Time (s)	0.0	2.5	2.5	0.0	2.5	2.5	0.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	3.0	6.5	6.5	3.0	6.5	6.5	3.0	6.6	6.6	6.6	6.6	6.6
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead			Lag	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Recall Mode	None	None	None	Max	None	None	Min	Max	Max	Max	Max	Max
Walk Time (s)		8.0	8.0		8.0	8.0		8.0	8.0	8.0	8.0	8.0
Flash Dont Walk (s)		25.0	25.0		25.0	25.0		23.0	23.0	23.0	23.0	23.0
Pedestrian Calls (#/hr)		0	0		0	0		0	0	0	0	0
Act Effct Green (s)	26.3	14.3	14.3	25.5	31.3	31.3	89.0	85.4	85.4	69.9	69.9	69.9
Actuated g/C Ratio	0.19	0.10	0.10	0.18	0.22	0.22	0.63	0.60	0.60	0.49	0.49	0.49
v/c Ratio	0.50	0.48	0.51	0.79	0.47	0.04	0.72	0.48	0.16	0.01	0.89	0.13
Control Delay	45.6	65.1	19.4	66.0	50.1	0.3	57.5	16.7	2.2	19.5	40.8	3.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	45.6	65.1	19.4	66.0	50.1	0.3	57.5	16.7	2.2	19.5	40.8	3.9
LOS	D	E	B	E	D	A	E	B	A	B	D	A
Approach Delay		46.3			58.3			18.4			38.4	
Approach LOS		D			E			B			D	

Intersection Summary

Area Type:	Other
Cycle Length:	160
Actuated Cycle Length:	141.3
Natural Cycle:	145
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.89
Intersection Signal Delay:	37.2
Intersection LOS:	D
Intersection Capacity Utilization	88.6%
ICU Level of Service	E
Analysis Period (min)	15

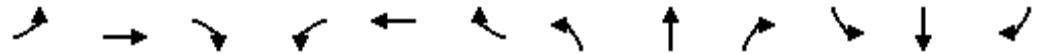
Splits and Phases: 1: Regional Road 50 & Mayfield Road/Albion Vaughan Road



Queues

1: Regional Road 50 & Mayfield Road/Albion Vaughan Road

Future Background: AM Peak Hour



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	103	150	103	491	350	15	104	991	148	2	1492	103
v/c Ratio	0.50	0.48	0.51	0.79	0.47	0.04	0.72	0.48	0.16	0.01	0.89	0.13
Control Delay	45.6	65.1	19.4	66.0	50.1	0.3	57.5	16.7	2.2	19.5	40.8	3.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	45.6	65.1	19.4	66.0	50.1	0.3	57.5	16.7	2.2	19.5	40.8	3.9
Queue Length 50th (m)	19.1	19.5	0.0	62.9	41.6	0.0	15.7	70.9	0.0	0.3	179.3	0.0
Queue Length 95th (m)	32.3	30.1	16.4	#83.5	55.9	0.0	#42.3	91.1	8.2	1.8	#223.6	9.0
Internal Link Dist (m)		265.2			539.9			354.1			662.1	
Turn Bay Length (m)	100.0		90.0	170.0		70.0	125.0		180.0	35.0		150.0
Base Capacity (vph)	208	728	334	619	1185	513	149	2061	920	176	1671	776
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.50	0.21	0.31	0.79	0.30	0.03	0.70	0.48	0.16	0.01	0.89	0.13

























Intersection Summary

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

# HCM Signalized Intersection Capacity Analysis

## 1: Regional Road 50 & Mayfield Road/Albion Vaughan Road













Future Background: AM Peak Hour

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	103	150	103	491	350	15	104	991	148	2	1492	103	
Future Volume (vph)	103	150	103	491	350	15	104	991	148	2	1492	103	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Lane Width	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5	
Total Lost time (s)	3.0	6.5	6.5	3.0	6.5	6.5	3.0	6.6	6.6	6.6	6.6	6.6	
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	1580	3120	1094	3429	3349	1331	1214	3411	1426	1190	3380	1465	
Flt Permitted	0.54	1.00	1.00	0.95	1.00	1.00	0.05	1.00	1.00	0.29	1.00	1.00	
Satd. Flow (perm)	901	3120	1094	3429	3349	1331	70	3411	1426	359	3380	1465	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Adj. Flow (vph)	103	150	103	491	350	15	104	991	148	2	1492	103	
RTOR Reduction (vph)	0	0	93	0	0	12	0	0	59	0	0	52	
Lane Group Flow (vph)	103	150	10	491	350	3	104	991	89	2	1492	51	
Heavy Vehicles (%)	13%	17%	46%	1%	9%	20%	47%	7%	12%	50%	8%	9%	
Turn Type	pm+pt	NA	Perm	Prot	NA	Perm	pm+pt	NA	Perm	Perm	NA	Perm	
Protected Phases	7	4		3	8		1	6			2		
Permitted Phases	4		4			8	6		6	2		2	
Actuated Green, G (s)	22.8	14.3	14.3	25.5	31.3	31.3	85.4	85.4	85.4	69.9	69.9	69.9	
Effective Green, g (s)	22.8	14.3	14.3	25.5	31.3	31.3	85.4	85.4	85.4	69.9	69.9	69.9	
Actuated g/C Ratio	0.16	0.10	0.10	0.18	0.22	0.22	0.60	0.60	0.60	0.49	0.49	0.49	
Clearance Time (s)	3.0	6.5	6.5	3.0	6.5	6.5	3.0	6.6	6.6	6.6	6.6	6.6	
Vehicle Extension (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Lane Grp Cap (vph)	186	315	110	618	741	294	143	2061	861	177	1672	724	
v/s Ratio Prot	0.03	0.05		c0.14	c0.10		c0.06	0.29			c0.44		
v/s Ratio Perm	0.06		0.01			0.00	0.37		0.06	0.01		0.03	
v/c Ratio	0.55	0.48	0.09	0.79	0.47	0.01	0.73	0.48	0.10	0.01	0.89	0.07	
Uniform Delay, d1	53.2	60.0	57.6	55.4	47.8	42.9	37.7	15.6	11.8	18.1	32.3	18.7	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	5.9	2.4	0.8	10.1	1.0	0.0	20.2	0.8	0.2	0.1	7.7	0.2	
Delay (s)	59.1	62.3	58.4	65.5	48.8	43.0	57.8	16.4	12.0	18.3	40.0	18.9	
Level of Service	E	E	E	E	D	D	E	B	B	B	D	B	
Approach Delay (s)		60.3			58.3			19.3			38.6		
Approach LOS		E			E			B			D		
<b>Intersection Summary</b>													
HCM 2000 Control Delay			38.8									HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio			0.82										
Actuated Cycle Length (s)			141.3									Sum of lost time (s)	19.1
Intersection Capacity Utilization			88.6%									ICU Level of Service	E
Analysis Period (min)			15										

c Critical Lane Group










Lanes, Volumes, Timings  
2: Albion Vaughan Road & Kirby Road

Future Background: AM Peak Hour

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations			 			  
Traffic Volume (vph)	8	31	316	4	122	993
Future Volume (vph)	8	31	316	4	122	993
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.5	3.7	3.5	3.7	3.7
Lane Util. Factor	1.00	1.00	0.95	0.95	0.95	0.95
Frt	0.893		0.998			
Flt Protected	0.990					0.995
Satd. Flow (prot)	1246	0	3286	0	0	3522
Flt Permitted	0.990					0.995
Satd. Flow (perm)	1246	0	3286	0	0	3522
Link Speed (k/h)	80		60			60
Link Distance (m)	414.0		186.1			286.8
Travel Time (s)	18.6		11.2			17.2
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	88%	23%	11%	0%	4%	3%
Adj. Flow (vph)	8	31	316	4	122	993
Shared Lane Traffic (%)						
Lane Group Flow (vph)	39	0	320	0	0	1115
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.7		0.0			0.0
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	4.8		4.8			4.8
Two way Left Turn Lane						
Headway Factor	0.99	1.01	0.99	1.01	0.99	0.99
Turning Speed (k/h)	25	15		15	25	
Sign Control	Stop		Free			Free
<b>Intersection Summary</b>						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	53.2%			ICU Level of Service A		
Analysis Period (min)	15					

## HCM Unsignalized Intersection Capacity Analysis 2: Albion Vaughan Road & Kirby Road

Future Background: AM Peak Hour

























						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	8	31	316	4	122	993
Future Volume (Veh/h)	8	31	316	4	122	993
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	8	31	316	4	122	993
<b>Pedestrians</b>						
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	1058	160			320	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1058	160			320	
tC, single (s)	8.6	7.4			4.2	
tC, 2 stage (s)						
tF (s)	4.4	3.5			2.2	
p0 queue free %	92	96			90	
cM capacity (veh/h)	106	794			1222	
<b>Direction, Lane #</b>	<b>WB 1</b>	<b>NB 1</b>	<b>NB 2</b>	<b>SB 1</b>	<b>SB 2</b>	
Volume Total	39	211	109	453	662	
Volume Left	8	0	0	122	0	
Volume Right	31	0	4	0	0	
cSH	341	1700	1700	1222	1700	
Volume to Capacity	0.11	0.12	0.06	0.10	0.39	
Queue Length 95th (m)	2.7	0.0	0.0	2.3	0.0	
Control Delay (s)	16.9	0.0	0.0	3.0	0.0	
Lane LOS	C			A		
Approach Delay (s)	16.9	0.0		1.2		
Approach LOS	C					
<b>Intersection Summary</b>						
Average Delay			1.4			
Intersection Capacity Utilization			53.2%	ICU Level of Service	A	
Analysis Period (min)			15			



# Lanes, Volumes, Timings

## 1: Regional Road 50 & Mayfield Road/Albion Vaughan Road

Future Background: PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	171	265	85	161	176	30	69	1493	506	11	1243	141
Future Volume (vph)	171	265	85	161	176	30	69	1493	506	11	1243	141
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5
Storage Length (m)	100.0		90.0	170.0		70.0	125.0		180.0	35.0		150.0
Storage Lanes	1		1	2		1	1		1	1		1
Taper Length (m)	60.0			40.0			20.0			0.0		
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1684	3318	1183	3267	3120	1298	1182	3380	1493	1513	3411	1507
Flt Permitted	0.641			0.950			0.126			0.121		
Satd. Flow (perm)	1136	3318	1183	3267	3120	1298	157	3380	1493	193	3411	1507
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			85			84			481			141
Link Speed (k/h)		60			60			70				70
Link Distance (m)		289.2			552.1			378.1				686.1
Travel Time (s)		17.4			33.1			19.4				35.3
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	6%	10%	35%	6%	17%	23%	51%	8%	7%	18%	7%	6%
Adj. Flow (vph)	171	265	85	161	176	30	69	1493	506	11	1243	141
Shared Lane Traffic (%)												
Lane Group Flow (vph)	171	265	85	161	176	30	69	1493	506	11	1243	141
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		7.0			7.0			3.5				3.5
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		4.8			4.8			4.8				4.8
Two way Left Turn Lane												Yes
Headway Factor	1.01	0.99	1.01	1.01	0.99	1.01	1.01	0.99	1.01	1.01	0.99	1.01
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	2.0
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		9.4			9.4			9.4				9.4
Detector 2 Size(m)		0.6			0.6			0.6				0.6
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0
Turn Type	pm+pt	NA	Perm	Prot	NA	Perm	pm+pt	NA	Perm	Perm	NA	Perm

Lanes, Volumes, Timings

1: Regional Road 50 & Mayfield Road/Albion Vaughan Road

Future Background: PM Peak Hour



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases	7	4		3	8		1	6			2	
Permitted Phases	4		4			8	6		6	2		2
Detector Phase	7	4	4	3	8	8	1	6	6	2	2	2
Switch Phase												
Minimum Initial (s)	5.0	12.0	12.0	5.0	12.0	12.0	5.0	20.0	20.0	20.0	20.0	20.0
Minimum Split (s)	8.0	39.5	39.5	8.0	39.5	39.5	8.0	37.6	37.6	37.6	37.6	37.6
Total Split (s)	13.0	39.6	39.6	14.0	40.6	40.6	11.0	71.4	71.4	60.4	60.4	60.4
Total Split (%)	10.4%	31.7%	31.7%	11.2%	32.5%	32.5%	8.8%	57.1%	57.1%	48.3%	48.3%	48.3%
Maximum Green (s)	10.0	33.1	33.1	11.0	34.1	34.1	8.0	64.8	64.8	53.8	53.8	53.8
Yellow Time (s)	3.0	4.0	4.0	3.0	4.0	4.0	3.0	4.6	4.6	4.6	4.6	4.6
All-Red Time (s)	0.0	2.5	2.5	0.0	2.5	2.5	0.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	3.0	6.5	6.5	3.0	6.5	6.5	3.0	6.6	6.6	6.6	6.6	6.6
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead			Lag	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Recall Mode	None	None	None	None	None	None	None	Max	Max	Max	Max	Max
Walk Time (s)		8.0	8.0		8.0	8.0		8.0	8.0	8.0	8.0	8.0
Flash Dont Walk (s)		25.0	25.0		25.0	25.0		23.0	23.0	23.0	23.0	23.0
Pedestrian Calls (#/hr)		0	0		0	0		0	0	0	0	0
Act Effct Green (s)	29.4	15.9	15.9	10.7	16.6	16.6	68.5	64.9	64.9	56.1	56.1	56.1
Actuated g/C Ratio	0.27	0.15	0.15	0.10	0.15	0.15	0.64	0.60	0.60	0.52	0.52	0.52
v/c Ratio	0.47	0.54	0.34	0.49	0.37	0.11	0.39	0.73	0.46	0.11	0.70	0.17
Control Delay	33.7	46.7	12.8	52.1	42.7	0.8	14.9	18.4	2.8	19.2	23.2	3.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	33.7	46.7	12.8	52.1	42.7	0.8	14.9	18.4	2.8	19.2	23.2	3.2
LOS	C	D	B	D	D	A	B	B	A	B	C	A
Approach Delay		36.9			43.4			14.5			21.2	
Approach LOS		D			D			B			C	

Intersection Summary

Area Type:	Other
Cycle Length:	125
Actuated Cycle Length:	107.6
Natural Cycle:	95
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	0.73
Intersection Signal Delay:	21.8
Intersection LOS:	C
Intersection Capacity Utilization:	91.1%
ICU Level of Service:	F
Analysis Period (min):	15

Splits and Phases: 1: Regional Road 50 & Mayfield Road/Albion Vaughan Road



Queues

1: Regional Road 50 & Mayfield Road/Albion Vaughan Road

Future Background: PM Peak Hour



























Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	171	265	85	161	176	30	69	1493	506	11	1243	141
v/c Ratio	0.47	0.54	0.34	0.49	0.37	0.11	0.39	0.73	0.46	0.11	0.70	0.17
Control Delay	33.7	46.7	12.8	52.1	42.7	0.8	14.9	18.4	2.8	19.2	23.2	3.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	33.7	46.7	12.8	52.1	42.7	0.8	14.9	18.4	2.8	19.2	23.2	3.2
Queue Length 50th (m)	25.3	25.3	0.0	15.3	16.2	0.0	4.7	100.4	1.8	1.1	95.4	0.0
Queue Length 95th (m)	41.7	37.0	12.2	26.0	25.5	0.0	10.9	140.7	14.9	4.9	130.3	9.2
Internal Link Dist (m)		265.2			528.1			354.1			662.1	
Turn Bay Length (m)	100.0		90.0	170.0		70.0	125.0		180.0	35.0		150.0
Base Capacity (vph)	361	1021	423	334	989	469	176	2037	1091	100	1780	853
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.47	0.26	0.20	0.48	0.18	0.06	0.39	0.73	0.46	0.11	0.70	0.17

Intersection Summary

# HCM Signalized Intersection Capacity Analysis

## 1: Regional Road 50 & Mayfield Road/Albion Vaughan Road












Future Background: PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	171	265	85	161	176	30	69	1493	506	11	1243	141
Future Volume (vph)	171	265	85	161	176	30	69	1493	506	11	1243	141
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5
Total Lost time (s)	3.0	6.5	6.5	3.0	6.5	6.5	3.0	6.6	6.6	6.6	6.6	6.6
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1684	3318	1183	3267	3120	1298	1182	3380	1493	1513	3411	1507
Flt Permitted	0.64	1.00	1.00	0.95	1.00	1.00	0.13	1.00	1.00	0.12	1.00	1.00
Satd. Flow (perm)	1136	3318	1183	3267	3120	1298	156	3380	1493	193	3411	1507
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	171	265	85	161	176	30	69	1493	506	11	1243	141
RTOR Reduction (vph)	0	0	72	0	0	25	0	0	190	0	0	68
Lane Group Flow (vph)	171	265	13	161	176	5	69	1493	316	11	1243	73
Heavy Vehicles (%)	6%	10%	35%	6%	17%	23%	51%	8%	7%	18%	7%	6%
Turn Type	pm+pt	NA	Perm	Prot	NA	Perm	pm+pt	NA	Perm	Perm	NA	Perm
Protected Phases	7	4		3	8		1	6			2	
Permitted Phases	4		4			8	6		6	2		2
Actuated Green, G (s)	25.9	15.9	15.9	10.7	16.6	16.6	65.4	65.4	65.4	56.1	56.1	56.1
Effective Green, g (s)	25.9	15.9	15.9	10.7	16.6	16.6	65.4	65.4	65.4	56.1	56.1	56.1
Actuated g/C Ratio	0.24	0.15	0.15	0.10	0.15	0.15	0.60	0.60	0.60	0.52	0.52	0.52
Clearance Time (s)	3.0	6.5	6.5	3.0	6.5	6.5	3.0	6.6	6.6	6.6	6.6	6.6
Vehicle Extension (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lane Grp Cap (vph)	322	488	174	323	479	199	154	2044	903	100	1770	782
v/s Ratio Prot	c0.05	c0.08		0.05	0.06		0.03	c0.44			0.36	
v/s Ratio Perm	0.08		0.01			0.00	0.24		0.21	0.06		0.05
v/c Ratio	0.53	0.54	0.07	0.50	0.37	0.02	0.45	0.73	0.35	0.11	0.70	0.09
Uniform Delay, d1	34.8	42.7	39.7	46.2	41.0	38.9	13.1	15.1	10.7	13.3	19.7	13.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	3.1	2.2	0.4	2.5	1.0	0.1	4.3	2.3	1.1	2.2	2.4	0.2
Delay (s)	37.8	44.9	40.1	48.7	42.0	39.0	17.4	17.5	11.8	15.5	22.0	13.4
Level of Service	D	D	D	D	D	D	B	B	B	B	C	B
Approach Delay (s)		41.8			44.7			16.1			21.1	
Approach LOS		D			D			B			C	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			23.2	HCM 2000 Level of Service				C				
HCM 2000 Volume to Capacity ratio			0.69									
Actuated Cycle Length (s)			108.1	Sum of lost time (s)					19.1			
Intersection Capacity Utilization			91.1%	ICU Level of Service				F				
Analysis Period (min)			15									

c Critical Lane Group

Lanes, Volumes, Timings  
 2: Albion Vaughan Road & Kirby Road










Future Background: PM Peak Hour

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations			 			 
Traffic Volume (vph)	18	62	987	6	33	378
Future Volume (vph)	18	62	987	6	33	378
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.5	3.7	3.5	3.7	3.7
Lane Util. Factor	1.00	1.00	0.95	0.95	0.95	0.95
Frt	0.895		0.999			
Flt Protected	0.989					0.996
Satd. Flow (prot)	1560	0	3537	0	0	3408
Flt Permitted	0.989					0.996
Satd. Flow (perm)	1560	0	3537	0	0	3408
Link Speed (k/h)	80		60			60
Link Distance (m)	414.0		186.1			286.8
Travel Time (s)	18.6		11.2			17.2
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	33%	2%	3%	17%	3%	7%
Adj. Flow (vph)	18	62	987	6	33	378
Shared Lane Traffic (%)						
Lane Group Flow (vph)	80	0	993	0	0	411
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.7		0.0			0.0
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	4.8		4.8			4.8
Two way Left Turn Lane						
Headway Factor	0.99	1.01	0.99	1.01	0.99	0.99
Turning Speed (k/h)	25	15		15	25	
Sign Control	Stop		Free			Free
<b>Intersection Summary</b>						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	47.3%		ICU Level of Service A			
Analysis Period (min)	15					

# HCM Unsignalized Intersection Capacity Analysis

## 2: Albion Vaughan Road & Kirby Road

























Future Background: PM Peak Hour

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	18	62	987	6	33	378
Future Volume (Veh/h)	18	62	987	6	33	378
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	18	62	987	6	33	378
<b>Pedestrians</b>						
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	1245	496			993	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1245	496			993	
tC, single (s)	7.5	6.9			4.2	
tC, 2 stage (s)						
tF (s)	3.8	3.3			2.2	
p0 queue free %	85	88			95	
cM capacity (veh/h)	122	519			686	
<b>Direction, Lane #</b>	<b>WB 1</b>	<b>NB 1</b>	<b>NB 2</b>	<b>SB 1</b>	<b>SB 2</b>	
Volume Total	80	658	335	159	252	
Volume Left	18	0	0	33	0	
Volume Right	62	0	6	0	0	
cSH	300	1700	1700	686	1700	
Volume to Capacity	0.27	0.39	0.20	0.05	0.15	
Queue Length 95th (m)	7.4	0.0	0.0	1.1	0.0	
Control Delay (s)	21.3	0.0	0.0	2.6	0.0	
Lane LOS	C			A		
Approach Delay (s)	21.3	0.0		1.0		
Approach LOS	C					
<b>Intersection Summary</b>						
Average Delay			1.4			
Intersection Capacity Utilization			47.3%	ICU Level of Service	A	
Analysis Period (min)			15			

Lanes, Volumes, Timings

1: Regional Road 50 & Mayfield Road/Albion Vaughan Road

Future Total: AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	103	153	103	532	355	42	104	991	153	11	1492	103
Future Volume (vph)	103	153	103	532	355	42	104	991	153	11	1492	103
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5
Storage Length (m)	100.0		90.0	170.0		70.0	125.0		180.0	35.0		150.0
Storage Lanes	1		1	2		1	1		1	1		1
Taper Length (m)	60.0			40.0			20.0			0.0		
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1580	3120	1094	3429	3349	1331	1214	3411	1426	1190	3380	1465
Flt Permitted	0.539			0.950			0.055			0.286		
Satd. Flow (perm)	896	3120	1094	3429	3349	1331	70	3411	1426	358	3380	1465
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			103			65			153			103
Link Speed (k/h)		60			60			70			70	
Link Distance (m)		289.2			563.9			378.1			686.1	
Travel Time (s)		17.4			33.8			19.4			35.3	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	13%	17%	46%	1%	9%	20%	47%	7%	12%	50%	8%	9%
Adj. Flow (vph)	103	153	103	532	355	42	104	991	153	11	1492	103
Shared Lane Traffic (%)												
Lane Group Flow (vph)	103	153	103	532	355	42	104	991	153	11	1492	103
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		7.0			7.0			3.5			3.5	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												Yes
Headway Factor	1.01	0.99	1.01	1.01	0.99	1.01	1.01	0.99	1.01	1.01	0.99	1.01
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	2.0
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA	Perm	Prot	NA	Perm	pm+pt	NA	Perm	Perm	NA	Perm

Lanes, Volumes, Timings

1: Regional Road 50 & Mayfield Road/Albion Vaughan Road

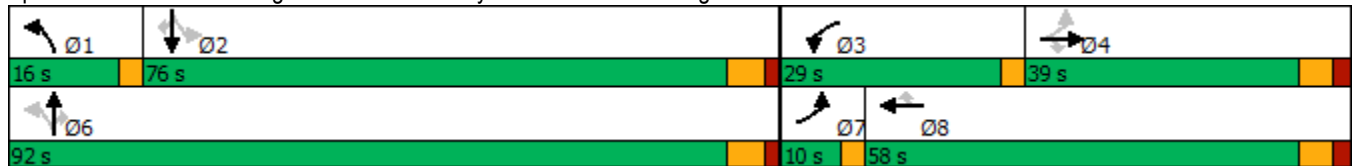
Future Total: AM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases	7	4		3	8		1	6			2	
Permitted Phases	4		4			8	6		6	2		2
Detector Phase	7	4	4	3	8	8	1	6	6	2	2	2
Switch Phase												
Minimum Initial (s)	5.0	12.0	12.0	5.0	12.0	12.0	5.0	20.0	20.0	20.0	20.0	20.0
Minimum Split (s)	8.0	39.5	39.5	8.0	39.5	39.5	8.0	37.6	37.6	37.6	37.6	37.6
Total Split (s)	10.0	39.0	39.0	29.0	58.0	58.0	16.0	92.0	92.0	76.0	76.0	76.0
Total Split (%)	6.3%	24.4%	24.4%	18.1%	36.3%	36.3%	10.0%	57.5%	57.5%	47.5%	47.5%	47.5%
Maximum Green (s)	7.0	32.5	32.5	26.0	51.5	51.5	13.0	85.4	85.4	69.4	69.4	69.4
Yellow Time (s)	3.0	4.0	4.0	3.0	4.0	4.0	3.0	4.6	4.6	4.6	4.6	4.6
All-Red Time (s)	0.0	2.5	2.5	0.0	2.5	2.5	0.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	3.0	6.5	6.5	3.0	6.5	6.5	3.0	6.6	6.6	6.6	6.6	6.6
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead			Lag	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Recall Mode	None	None	None	None	None	None	None	Max	Max	Max	Max	Max
Walk Time (s)		8.0	8.0		8.0	8.0		8.0	8.0	8.0	8.0	8.0
Flash Dont Walk (s)		25.0	25.0		25.0	25.0		23.0	23.0	23.0	23.0	23.0
Pedestrian Calls (#/hr)		0	0		0	0		0	0	0	0	0
Act Effct Green (s)	24.9	14.4	14.4	25.9	33.3	33.3	89.0	85.4	85.4	69.9	69.9	69.9
Actuated g/C Ratio	0.18	0.10	0.10	0.18	0.23	0.23	0.63	0.60	0.60	0.49	0.49	0.49
v/c Ratio	0.54	0.48	0.51	0.85	0.45	0.12	0.72	0.48	0.17	0.06	0.90	0.13
Control Delay	50.0	65.5	19.4	69.9	48.4	4.2	58.1	17.0	2.3	21.4	41.4	4.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	50.0	65.5	19.4	69.9	48.4	4.2	58.1	17.0	2.3	21.4	41.4	4.0
LOS	D	E	B	E	D	A	E	B	A	C	D	A
Approach Delay		47.8			58.7			18.6			38.9	
Approach LOS		D			E			B			D	

Intersection Summary

Area Type:	Other
Cycle Length:	160
Actuated Cycle Length:	141.9
Natural Cycle:	145
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	0.90
Intersection Signal Delay:	38.0
Intersection LOS:	D
Intersection Capacity Utilization:	89.8%
ICU Level of Service:	E
Analysis Period (min):	15

Splits and Phases: 1: Regional Road 50 & Mayfield Road/Albion Vaughan Road





Queues

1: Regional Road 50 & Mayfield Road/Albion Vaughan Road

Future Total: AM Peak Hour



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	103	153	103	532	355	42	104	991	153	11	1492	103
v/c Ratio	0.54	0.48	0.51	0.85	0.45	0.12	0.72	0.48	0.17	0.06	0.90	0.13
Control Delay	50.0	65.5	19.4	69.9	48.4	4.2	58.1	17.0	2.3	21.4	41.4	4.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	50.0	65.5	19.4	69.9	48.4	4.2	58.1	17.0	2.3	21.4	41.4	4.0
Queue Length 50th (m)	19.1	20.0	0.0	69.2	41.6	0.0	15.8	71.9	0.0	1.5	181.3	0.0
Queue Length 95th (m)	32.3	30.7	16.4	#96.8	55.6	4.3	#42.8	92.3	8.4	5.1	#227.3	9.1
Internal Link Dist (m)		265.2			539.9			354.1			662.1	
Turn Bay Length (m)	100.0		90.0	170.0		70.0	125.0		180.0	35.0		150.0
Base Capacity (vph)	190	714	330	628	1216	524	148	2053	919	176	1664	773
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.54	0.21	0.31	0.85	0.29	0.08	0.70	0.48	0.17	0.06	0.90	0.13

























Intersection Summary

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

# HCM Signalized Intersection Capacity Analysis

## 1: Regional Road 50 & Mayfield Road/Albion Vaughan Road












Future Total: AM Peak Hour

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	103	153	103	532	355	42	104	991	153	11	1492	103	
Future Volume (vph)	103	153	103	532	355	42	104	991	153	11	1492	103	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Lane Width	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5	
Total Lost time (s)	3.0	6.5	6.5	3.0	6.5	6.5	3.0	6.6	6.6	6.6	6.6	6.6	
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	1580	3120	1094	3429	3349	1331	1214	3411	1426	1190	3380	1465	
Flt Permitted	0.54	1.00	1.00	0.95	1.00	1.00	0.05	1.00	1.00	0.29	1.00	1.00	
Satd. Flow (perm)	897	3120	1094	3429	3349	1331	70	3411	1426	358	3380	1465	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Adj. Flow (vph)	103	153	103	532	355	42	104	991	153	11	1492	103	
RTOR Reduction (vph)	0	0	93	0	0	32	0	0	61	0	0	52	
Lane Group Flow (vph)	103	153	10	532	355	10	104	991	92	11	1492	51	
Heavy Vehicles (%)	13%	17%	46%	1%	9%	20%	47%	7%	12%	50%	8%	9%	
Turn Type	pm+pt	NA	Perm	Prot	NA	Perm	pm+pt	NA	Perm	Perm	NA	Perm	
Protected Phases	7	4		3	8		1	6			2		
Permitted Phases	4		4			8	6		6	2		2	
Actuated Green, G (s)	21.4	14.4	14.4	25.9	33.3	33.3	85.5	85.5	85.5	69.9	69.9	69.9	
Effective Green, g (s)	21.4	14.4	14.4	25.9	33.3	33.3	85.5	85.5	85.5	69.9	69.9	69.9	
Actuated g/C Ratio	0.15	0.10	0.10	0.18	0.23	0.23	0.60	0.60	0.60	0.49	0.49	0.49	
Clearance Time (s)	3.0	6.5	6.5	3.0	6.5	6.5	3.0	6.6	6.6	6.6	6.6	6.6	
Vehicle Extension (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Lane Grp Cap (vph)	168	316	111	625	785	312	143	2055	859	176	1664	721	
v/s Ratio Prot	0.03	0.05		c0.16	0.11		c0.06	0.29			c0.44		
v/s Ratio Perm	c0.06		0.01			0.01	0.37		0.06	0.03		0.03	
v/c Ratio	0.61	0.48	0.09	0.85	0.45	0.03	0.73	0.48	0.11	0.06	0.90	0.07	
Uniform Delay, d1	54.8	60.2	57.8	56.1	46.5	41.9	37.9	15.8	12.0	18.8	32.7	18.9	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	9.2	2.4	0.8	11.8	0.9	0.1	20.2	0.8	0.3	0.7	8.0	0.2	
Delay (s)	64.0	62.7	58.6	67.9	47.4	42.0	58.1	16.6	12.2	19.5	40.7	19.1	
Level of Service	E	E	E	E	D	D	E	B	B	B	D	B	
Approach Delay (s)		61.9			58.9			19.5			39.2		
Approach LOS		E			E			B			D		
<b>Intersection Summary</b>													
HCM 2000 Control Delay			39.7									HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio			0.84										
Actuated Cycle Length (s)			141.9									Sum of lost time (s)	19.1
Intersection Capacity Utilization			89.8%									ICU Level of Service	E
Analysis Period (min)			15										

c Critical Lane Group

Lanes, Volumes, Timings  
 2: Albion Vaughan Road & Kirby Road










Future Total: AM Peak Hour

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations			 			 
Traffic Volume (vph)	8	31	324	4	122	999
Future Volume (vph)	8	31	324	4	122	999
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.5	3.7	3.5	3.7	3.7
Lane Util. Factor	1.00	1.00	0.95	0.95	0.95	0.95
Frt	0.893		0.998			
Flt Protected	0.990					0.995
Satd. Flow (prot)	1246	0	3286	0	0	3522
Flt Permitted	0.990					0.995
Satd. Flow (perm)	1246	0	3286	0	0	3522
Link Speed (k/h)	80		60			60
Link Distance (m)	414.0		186.1			286.8
Travel Time (s)	18.6		11.2			17.2
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	88%	23%	11%	0%	4%	3%
Adj. Flow (vph)	8	31	324	4	122	999
Shared Lane Traffic (%)						
Lane Group Flow (vph)	39	0	328	0	0	1121
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.7		0.0			0.0
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	4.8		4.8			4.8
Two way Left Turn Lane						
Headway Factor	0.99	1.01	0.99	1.01	0.99	0.99
Turning Speed (k/h)	25	15		15	25	
Sign Control	Stop		Free			Free
<b>Intersection Summary</b>						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	53.6%			ICU Level of Service A		
Analysis Period (min)	15					

# HCM Unsignalized Intersection Capacity Analysis

## 2: Albion Vaughan Road & Kirby Road

Future Total: AM Peak Hour

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	8	31	324	4	122	999
Future Volume (Veh/h)	8	31	324	4	122	999
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	8	31	324	4	122	999
<b>Pedestrians</b>						
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	1070	164			328	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1070	164			328	
tC, single (s)	8.6	7.4			4.2	
tC, 2 stage (s)						
tF (s)	4.4	3.5			2.2	
p0 queue free %	92	96			90	
cM capacity (veh/h)	104	790			1214	
<b>Direction, Lane #</b>	<b>WB 1</b>	<b>NB 1</b>	<b>NB 2</b>	<b>SB 1</b>	<b>SB 2</b>	
Volume Total	39	216	112	455	666	
Volume Left	8	0	0	122	0	
Volume Right	31	0	4	0	0	
cSH	336	1700	1700	1214	1700	
Volume to Capacity	0.12	0.13	0.07	0.10	0.39	
Queue Length 95th (m)	2.7	0.0	0.0	2.3	0.0	
Control Delay (s)	17.1	0.0	0.0	3.0	0.0	
Lane LOS	C			A		
Approach Delay (s)	17.1	0.0			1.2	
Approach LOS	C					
<b>Intersection Summary</b>						
Average Delay			1.4			
Intersection Capacity Utilization			53.6%		ICU Level of Service	A
Analysis Period (min)	15					

Lanes, Volumes, Timings  
3: Albion Vaughan Road & Driveway

Future Total: AM Peak Hour



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	8	73	17	321	1003	6
Future Volume (vph)	8	73	17	321	1003	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.5	3.7	3.5	3.7	3.7
Lane Util. Factor	1.00	1.00	0.95	0.95	0.95	0.95
Frt	0.878				0.999	
Flt Protected	0.995			0.997		
Satd. Flow (prot)	1645	0	0	3489	3575	0
Flt Permitted	0.995			0.997		
Satd. Flow (perm)	1645	0	0	3489	3575	0
Link Speed (k/h)	50			60	60	
Link Distance (m)	75.2			563.9	186.1	
Travel Time (s)	5.4			33.8	11.2	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	8	73	17	321	1003	6
Shared Lane Traffic (%)						
Lane Group Flow (vph)	81	0	0	338	1009	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.7			7.0	7.0	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	0.99	1.01	0.99	1.01	0.99	0.99
Turning Speed (k/h)	25	15	25			15
Sign Control	Stop			Free	Free	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	39.5%
	ICU Level of Service A
Analysis Period (min)	15

# HCM Unsignalized Intersection Capacity Analysis

## 3: Albion Vaughan Road & Driveway

Future Total: AM Peak Hour



























Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	8	73	17	321	1003	6
Future Volume (Veh/h)	8	73	17	321	1003	6
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	8	73	17	321	1003	6
<b>Pedestrians</b>						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				Raised	Raised	
Median storage veh				1	1	
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1200	504	1009			
vC1, stage 1 conf vol	1006					
vC2, stage 2 conf vol	194					
vCu, unblocked vol	1200	504	1009			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)	5.8					
tF (s)	3.5	3.3	2.2			
p0 queue free %	97	86	98			
cM capacity (veh/h)	263	513	683			
<b>Direction, Lane #</b>	<b>EB 1</b>	<b>NB 1</b>	<b>NB 2</b>	<b>SB 1</b>	<b>SB 2</b>	
Volume Total	81	124	214	669	340	
Volume Left	8	17	0	0	0	
Volume Right	73	0	0	0	6	
cSH	469	683	1700	1700	1700	
Volume to Capacity	0.17	0.02	0.13	0.39	0.20	
Queue Length 95th (m)	4.3	0.5	0.0	0.0	0.0	
Control Delay (s)	14.3	1.7	0.0	0.0	0.0	
Lane LOS	B	A				
Approach Delay (s)	14.3	0.6		0.0		
Approach LOS	B					
<b>Intersection Summary</b>						
Average Delay	1.0					
Intersection Capacity Utilization	39.5%			ICU Level of Service	A	
Analysis Period (min)	15					

Lanes, Volumes, Timings

1: Regional Road 50 & Mayfield Road/Albion Vaughan Road

Future Total: PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	171	272	85	170	183	46	69	1493	541	27	1243	141
Future Volume (vph)	171	272	85	170	183	46	69	1493	541	27	1243	141
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5
Storage Length (m)	100.0		90.0	170.0		70.0	125.0		180.0	35.0		150.0
Storage Lanes	1		1	2		1	1		1	1		1
Taper Length (m)	60.0			40.0			20.0			0.0		
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1684	3318	1183	3267	3120	1298	1182	3380	1493	1513	3411	1507
Flt Permitted	0.636			0.950			0.137			0.123		
Satd. Flow (perm)	1127	3318	1183	3267	3120	1298	170	3380	1493	196	3411	1507
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			85			84			459			141
Link Speed (k/h)		60			60			70				70
Link Distance (m)		289.2			552.1			378.1				686.1
Travel Time (s)		17.4			33.1			19.4				35.3
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	6%	10%	35%	6%	17%	23%	51%	8%	7%	18%	7%	6%
Adj. Flow (vph)	171	272	85	170	183	46	69	1493	541	27	1243	141
Shared Lane Traffic (%)												
Lane Group Flow (vph)	171	272	85	170	183	46	69	1493	541	27	1243	141
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		7.0			7.0			3.5			3.5	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												Yes
Headway Factor	1.01	0.99	1.01	1.01	0.99	1.01	1.01	0.99	1.01	1.01	0.99	1.01
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	2.0
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA	Perm	Prot	NA	Perm	pm+pt	NA	Perm	Perm	NA	Perm

Lanes, Volumes, Timings

1: Regional Road 50 & Mayfield Road/Albion Vaughan Road

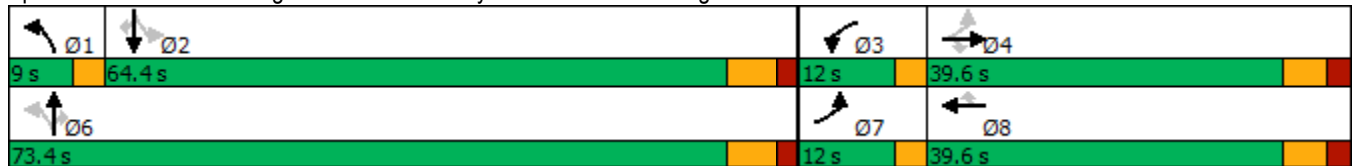
Future Total: PM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases	7	4		3	8		1	6			2	
Permitted Phases	4		4			8	6		6	2		2
Detector Phase	7	4	4	3	8	8	1	6	6	2	2	2
Switch Phase												
Minimum Initial (s)	5.0	12.0	12.0	5.0	12.0	12.0	5.0	20.0	20.0	20.0	20.0	20.0
Minimum Split (s)	8.0	39.5	39.5	8.0	39.5	39.5	8.0	37.6	37.6	37.6	37.6	37.6
Total Split (s)	12.0	39.6	39.6	12.0	39.6	39.6	9.0	73.4	73.4	64.4	64.4	64.4
Total Split (%)	9.6%	31.7%	31.7%	9.6%	31.7%	31.7%	7.2%	58.7%	58.7%	51.5%	51.5%	51.5%
Maximum Green (s)	9.0	33.1	33.1	9.0	33.1	33.1	6.0	66.8	66.8	57.8	57.8	57.8
Yellow Time (s)	3.0	4.0	4.0	3.0	4.0	4.0	3.0	4.6	4.6	4.6	4.6	4.6
All-Red Time (s)	0.0	2.5	2.5	0.0	2.5	2.5	0.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	3.0	6.5	6.5	3.0	6.5	6.5	3.0	6.6	6.6	6.6	6.6	6.6
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead			Lag	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Recall Mode	None	None	None	None	None	None	None	Max	Max	Max	Max	Max
Walk Time (s)		8.0	8.0		8.0	8.0		8.0	8.0	8.0	8.0	8.0
Flash Dont Walk (s)		25.0	25.0		25.0	25.0		23.0	23.0	23.0	23.0	23.0
Pedestrian Calls (#/hr)		0	0		0	0		0	0	0	0	0
Act Effct Green (s)	28.6	16.1	16.1	9.0	16.1	16.1	70.4	66.8	66.8	59.7	59.7	59.7
Actuated g/C Ratio	0.26	0.15	0.15	0.08	0.15	0.15	0.65	0.62	0.62	0.55	0.55	0.55
v/c Ratio	0.50	0.55	0.34	0.62	0.39	0.17	0.41	0.71	0.49	0.25	0.66	0.16
Control Delay	36.0	47.0	12.7	59.3	44.0	3.2	15.1	16.9	3.6	22.3	20.1	2.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	36.0	47.0	12.7	59.3	44.0	3.2	15.1	16.9	3.6	22.3	20.1	2.8
LOS	D	D	B	E	D	A	B	B	A	C	C	A
Approach Delay		37.9			45.8			13.4			18.4	
Approach LOS		D			D			B			B	

Intersection Summary

Area Type:	Other
Cycle Length:	125
Actuated Cycle Length:	108
Natural Cycle:	95
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	0.71
Intersection Signal Delay:	20.8
Intersection LOS:	C
Intersection Capacity Utilization:	91.1%
ICU Level of Service:	F
Analysis Period (min):	15

Splits and Phases: 1: Regional Road 50 & Mayfield Road/Albion Vaughan Road

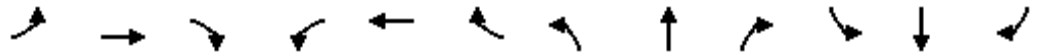




Queues

1: Regional Road 50 & Mayfield Road/Albion Vaughan Road

Future Total: PM Peak Hour



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	171	272	85	170	183	46	69	1493	541	27	1243	141
v/c Ratio	0.50	0.55	0.34	0.62	0.39	0.17	0.41	0.71	0.49	0.25	0.66	0.16
Control Delay	36.0	47.0	12.7	59.3	44.0	3.2	15.1	16.9	3.6	22.3	20.1	2.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	36.0	47.0	12.7	59.3	44.0	3.2	15.1	16.9	3.6	22.3	20.1	2.8
Queue Length 50th (m)	26.1	26.0	0.0	16.7	17.1	0.0	4.5	95.8	5.9	2.7	88.1	0.0
Queue Length 95th (m)	42.9	38.0	12.2	#28.0	26.7	2.4	10.4	134.3	22.0	9.9	120.8	8.6
Internal Link Dist (m)		265.2			528.1			354.1			662.1	
Turn Bay Length (m)	100.0		90.0	170.0		70.0	125.0		180.0	35.0		150.0
Base Capacity (vph)	344	1017	421	272	956	456	167	2091	1098	108	1885	895
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.50	0.27	0.20	0.63	0.19	0.10	0.41	0.71	0.49	0.25	0.66	0.16

























Intersection Summary

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

# HCM Signalized Intersection Capacity Analysis

## 1: Regional Road 50 & Mayfield Road/Albion Vaughan Road











Future Total: PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	171	272	85	170	183	46	69	1493	541	27	1243	141
Future Volume (vph)	171	272	85	170	183	46	69	1493	541	27	1243	141
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5
Total Lost time (s)	3.0	6.5	6.5	3.0	6.5	6.5	3.0	6.6	6.6	6.6	6.6	6.6
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1684	3318	1183	3267	3120	1298	1182	3380	1493	1513	3411	1507
Flt Permitted	0.64	1.00	1.00	0.95	1.00	1.00	0.14	1.00	1.00	0.12	1.00	1.00
Satd. Flow (perm)	1128	3318	1183	3267	3120	1298	171	3380	1493	196	3411	1507
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	171	272	85	170	183	46	69	1493	541	27	1243	141
RTOR Reduction (vph)	0	0	72	0	0	39	0	0	174	0	0	64
Lane Group Flow (vph)	171	272	13	170	183	7	69	1493	367	27	1243	77
Heavy Vehicles (%)	6%	10%	35%	6%	17%	23%	51%	8%	7%	18%	7%	6%
Turn Type	pm+pt	NA	Perm	Prot	NA	Perm	pm+pt	NA	Perm	Perm	NA	Perm
Protected Phases	7	4		3	8		1	6			2	
Permitted Phases	4		4			8	6		6	2		2
Actuated Green, G (s)	25.1	16.1	16.1	9.0	16.1	16.1	67.5	67.5	67.5	59.7	59.7	59.7
Effective Green, g (s)	25.1	16.1	16.1	9.0	16.1	16.1	67.5	67.5	67.5	59.7	59.7	59.7
Actuated g/C Ratio	0.23	0.15	0.15	0.08	0.15	0.15	0.62	0.62	0.62	0.55	0.55	0.55
Clearance Time (s)	3.0	6.5	6.5	3.0	6.5	6.5	3.0	6.6	6.6	6.6	6.6	6.6
Vehicle Extension (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lane Grp Cap (vph)	306	491	175	270	462	192	150	2098	927	107	1873	827
v/s Ratio Prot	0.05	0.08		c0.05	0.06		0.02	c0.44			0.36	
v/s Ratio Perm	c0.08		0.01			0.01	0.26		0.25	0.14		0.05
v/c Ratio	0.56	0.55	0.07	0.63	0.40	0.04	0.46	0.71	0.40	0.25	0.66	0.09
Uniform Delay, d1	35.8	43.0	39.9	48.2	41.9	39.7	11.9	14.0	10.4	12.8	17.4	11.6
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	3.7	2.3	0.4	6.4	1.2	0.2	4.6	2.1	1.3	5.6	1.9	0.2
Delay (s)	39.5	45.3	40.2	54.6	43.1	39.8	16.5	16.1	11.6	18.4	19.3	11.9
Level of Service	D	D	D	D	D	D	B	B	B	B	B	B
Approach Delay (s)		42.6			47.6			14.9			18.5	
Approach LOS		D			D			B			B	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			22.3	HCM 2000 Level of Service				C				
HCM 2000 Volume to Capacity ratio			0.70									
Actuated Cycle Length (s)			108.7	Sum of lost time (s)				19.1				
Intersection Capacity Utilization			91.1%	ICU Level of Service				F				
Analysis Period (min)			15									

c Critical Lane Group

Lanes, Volumes, Timings  
 2: Albion Vaughan Road & Kirby Road










Future Total: PM Peak Hour

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	18	62	997	6	33	383
Future Volume (vph)	18	62	997	6	33	383
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.5	3.7	3.5	3.7	3.7
Lane Util. Factor	1.00	1.00	0.95	0.95	0.95	0.95
Frt	0.895		0.999			
Flt Protected	0.989					0.996
Satd. Flow (prot)	1560	0	3537	0	0	3408
Flt Permitted	0.989					0.996
Satd. Flow (perm)	1560	0	3537	0	0	3408
Link Speed (k/h)	80		60			60
Link Distance (m)	414.0		186.1			286.8
Travel Time (s)	18.6		11.2			17.2
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	33%	2%	3%	17%	3%	7%
Adj. Flow (vph)	18	62	997	6	33	383
Shared Lane Traffic (%)						
Lane Group Flow (vph)	80	0	1003	0	0	416
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.7		0.0			0.0
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	4.8		4.8			4.8
Two way Left Turn Lane						
Headway Factor	0.99	1.01	0.99	1.01	0.99	0.99
Turning Speed (k/h)	25	15		15	25	
Sign Control	Stop		Free			Free
<b>Intersection Summary</b>						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	47.4%			ICU Level of Service A		
Analysis Period (min)	15					

# HCM Unsignalized Intersection Capacity Analysis

## 2: Albion Vaughan Road & Kirby Road

Future Total: PM Peak Hour

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	18	62	997	6	33	383
Future Volume (Veh/h)	18	62	997	6	33	383
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	18	62	997	6	33	383
<b>Pedestrians</b>						
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	1258	502			1003	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1258	502			1003	
tC, single (s)	7.5	6.9			4.2	
tC, 2 stage (s)						
tF (s)	3.8	3.3			2.2	
p0 queue free %	85	88			95	
cM capacity (veh/h)	120	515			680	
<b>Direction, Lane #</b>	<b>WB 1</b>	<b>NB 1</b>	<b>NB 2</b>	<b>SB 1</b>	<b>SB 2</b>	
Volume Total	80	665	338	161	255	
Volume Left	18	0	0	33	0	
Volume Right	62	0	6	0	0	
cSH	296	1700	1700	680	1700	
Volume to Capacity	0.27	0.39	0.20	0.05	0.15	
Queue Length 95th (m)	7.5	0.0	0.0	1.1	0.0	
Control Delay (s)	21.6	0.0	0.0	2.6	0.0	
Lane LOS	C			A		
Approach Delay (s)	21.6	0.0			1.0	
Approach LOS	C					
<b>Intersection Summary</b>						
Average Delay			1.4			
Intersection Capacity Utilization			47.4%	ICU Level of Service	A	
Analysis Period (min)			15			

Lanes, Volumes, Timings  
3: Albion Vaughan Road & Driveway

Future Total: PM Peak Hour



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	10	32	58	995	400	5
Future Volume (vph)	10	32	58	995	400	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.5	3.7	3.5	3.7	3.7
Lane Util. Factor	1.00	1.00	0.95	0.95	0.95	0.95
Frt	0.897				0.998	
Flt Protected	0.988			0.997		
Satd. Flow (prot)	1669	0	0	3489	3571	0
Flt Permitted	0.988			0.997		
Satd. Flow (perm)	1669	0	0	3489	3571	0
Link Speed (k/h)	50			60	60	
Link Distance (m)	75.2			552.1	186.1	
Travel Time (s)	5.4			33.1	11.2	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	10	32	58	995	400	5
Shared Lane Traffic (%)						
Lane Group Flow (vph)	42	0	0	1053	405	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.7			7.0	7.0	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	0.99	1.01	0.99	1.01	0.99	0.99
Turning Speed (k/h)	25	15	25			15
Sign Control	Stop			Free	Free	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	53.7%
	ICU Level of Service A
Analysis Period (min)	15

# HCM Unsignalized Intersection Capacity Analysis

## 3: Albion Vaughan Road & Driveway

Future Total: PM Peak Hour



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	10	32	58	995	400	5
Future Volume (Veh/h)	10	32	58	995	400	5
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	10	32	58	995	400	5
<b>Pedestrians</b>						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				Raised	Raised	
Median storage veh				1	1	
Upstream signal (m)						
<b>pX, platoon unblocked</b>						
vC, conflicting volume	1016	202	405			
vC1, stage 1 conf vol	402					
vC2, stage 2 conf vol	614					
vCu, unblocked vol	1016	202	405			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)	5.8					
tF (s)	3.5	3.3	2.2			
p0 queue free %	97	96	95			
cM capacity (veh/h)	348	805	1150			
<b>Direction, Lane #</b>	<b>EB 1</b>	<b>NB 1</b>	<b>NB 2</b>	<b>SB 1</b>	<b>SB 2</b>	
Volume Total	42	390	663	267	138	
Volume Left	10	58	0	0	0	
Volume Right	32	0	0	0	5	
cSH	613	1150	1700	1700	1700	
Volume to Capacity	0.07	0.05	0.39	0.16	0.08	
Queue Length 95th (m)	1.5	1.1	0.0	0.0	0.0	
Control Delay (s)	11.3	1.7	0.0	0.0	0.0	
Lane LOS	B	A				
Approach Delay (s)	11.3	0.6		0.0		
Approach LOS	B					
<b>Intersection Summary</b>						
Average Delay	0.8					
Intersection Capacity Utilization	53.7%			ICU Level of Service	A	
Analysis Period (min)	15					

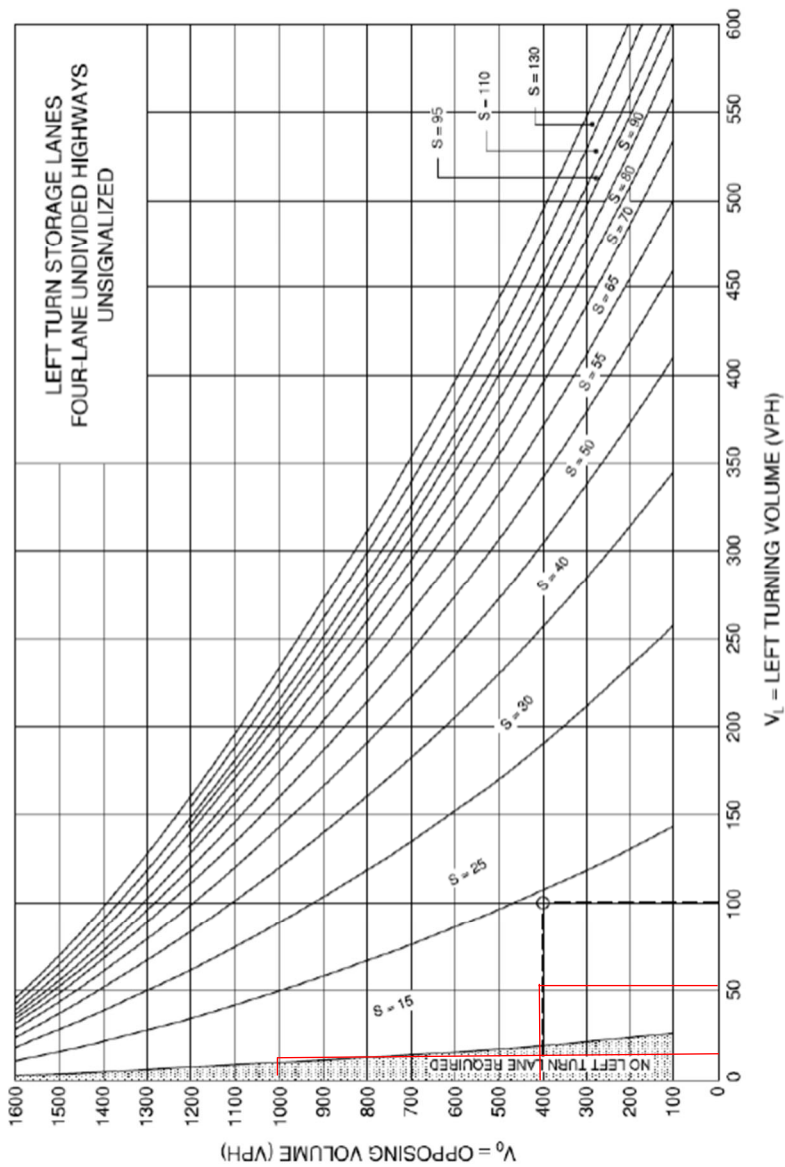
# Appendix I

## Left Turn Lane Warrant Analysis



<b>Major Street</b>	<b>Albion Vaughan Road</b>	
<b>Minor Street</b>	<b>Site Access</b>	
<b>Approach Direction</b>	<b>Northbound</b>	
<b>Peak Hour</b>	<b>AM</b>	<b>PM</b>
<b>Opposing Volume</b>	1,009	405
<b>Left Turning Volume</b>	17	58
<b>Warranted</b>	<b>Yes</b>	<b>Yes</b>

**Exhibit 9A-30**

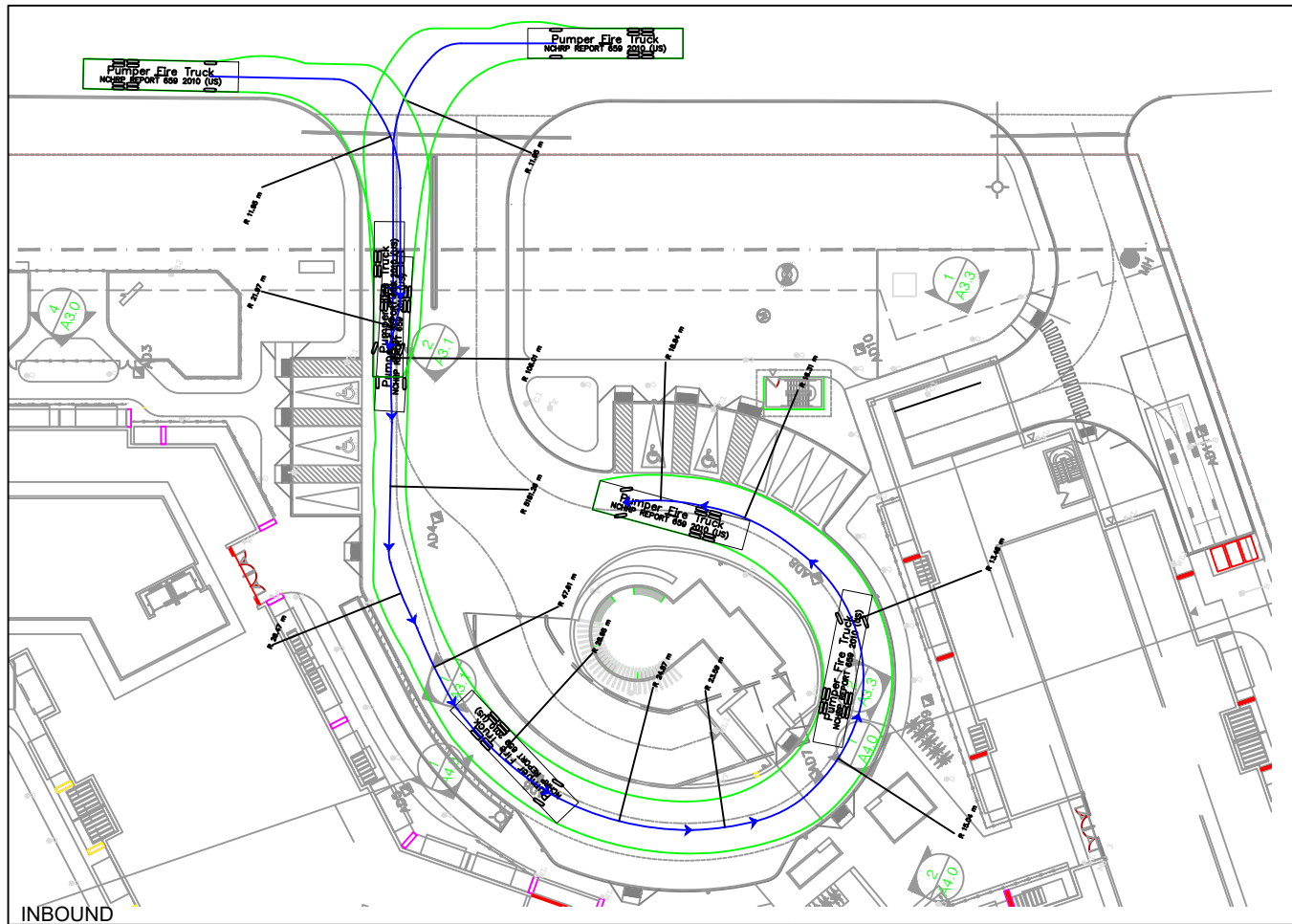




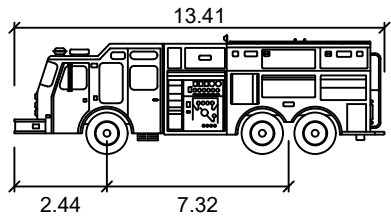
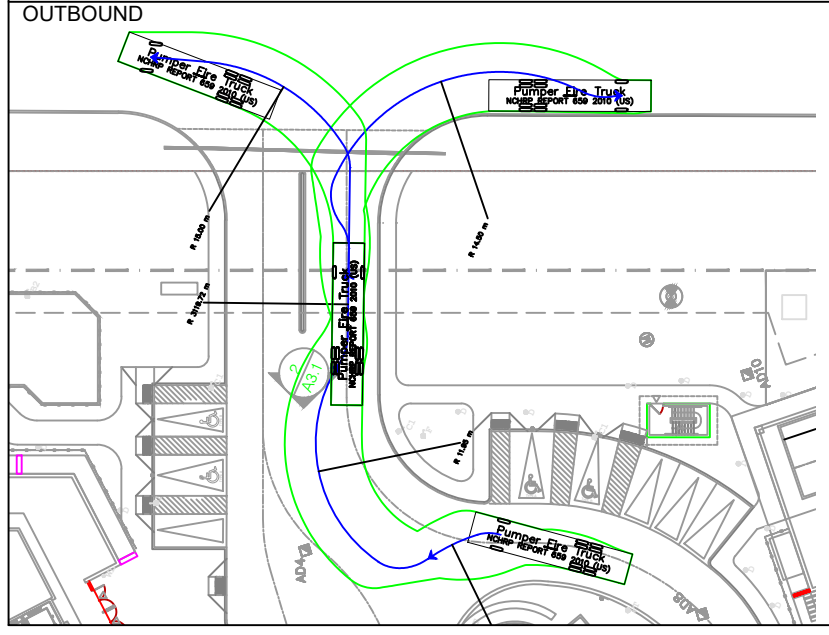
# Appendix J

## AutoTURN Analysis – Vehicle Maneuvering Diagrams



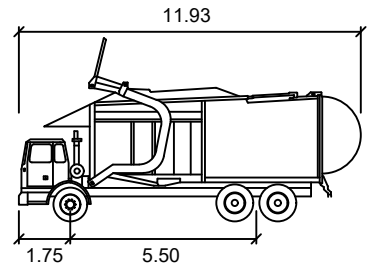
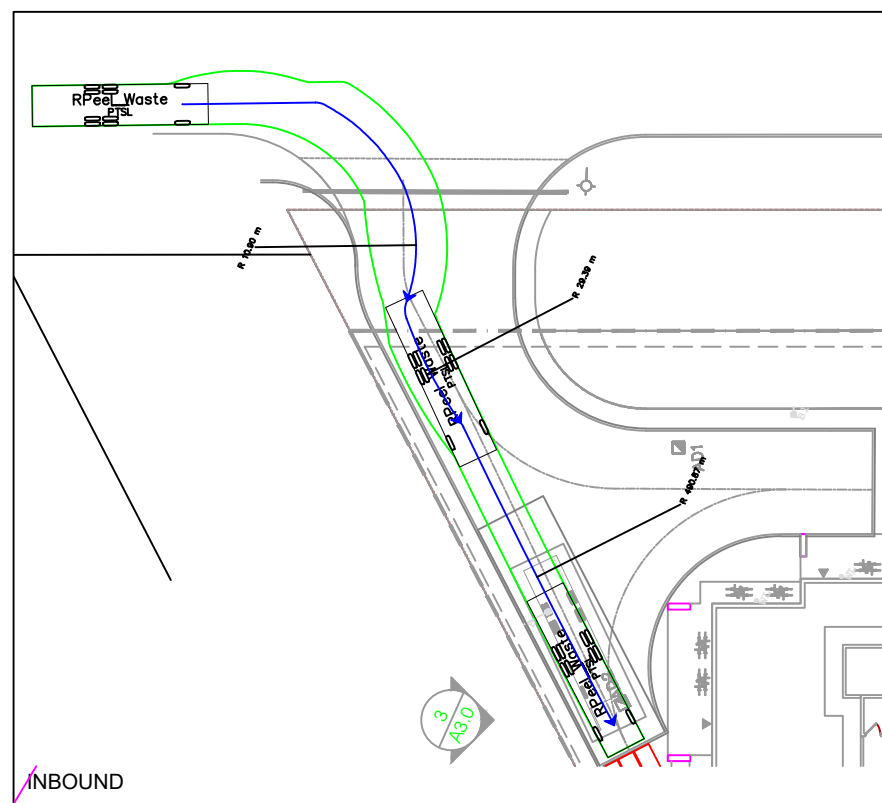


INBOUND  
OUTBOUND



Pumper Fire Truck

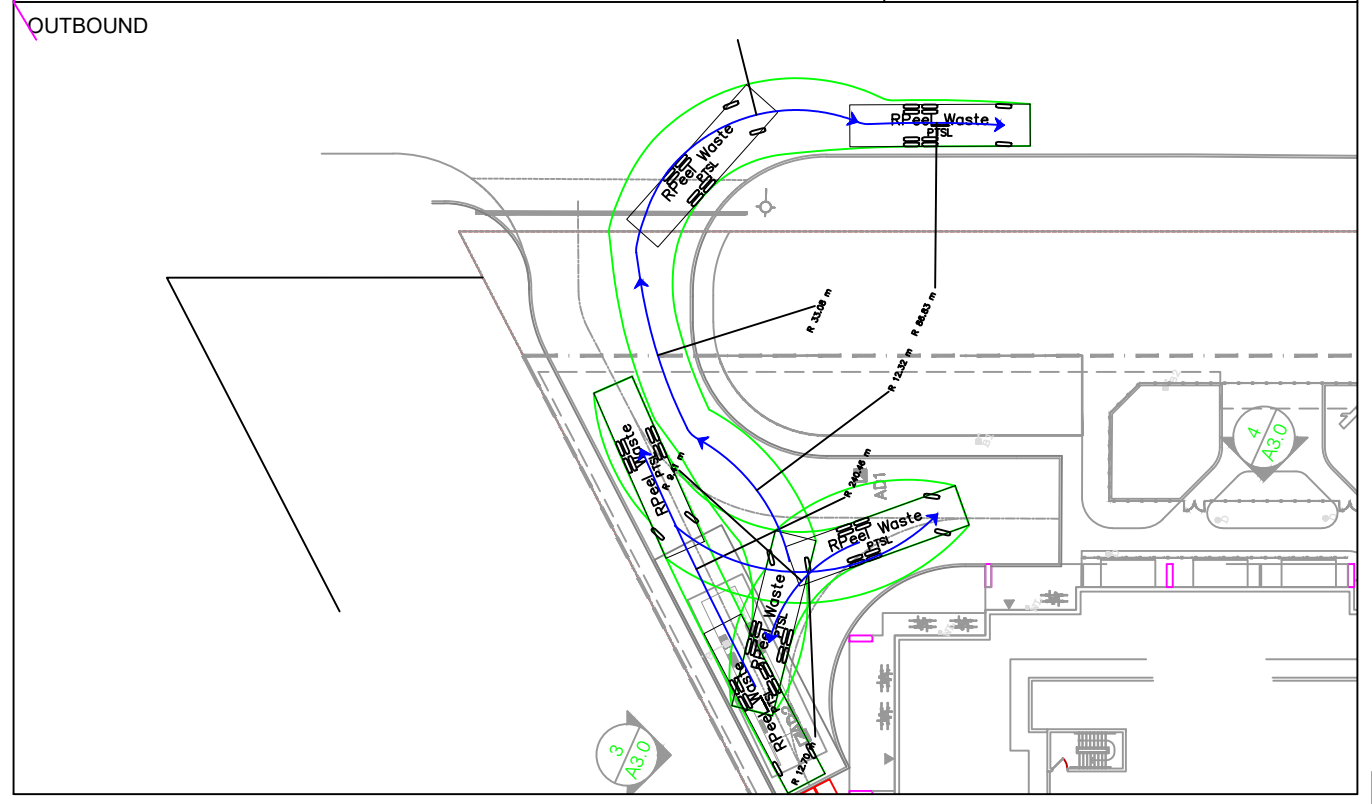
	meters
Width	: 2.59
Track	: 2.59
Lock to Lock Time	: 6.0
Steering Angle	: 37.8

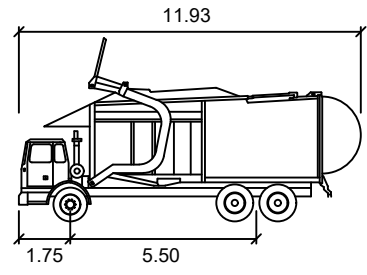
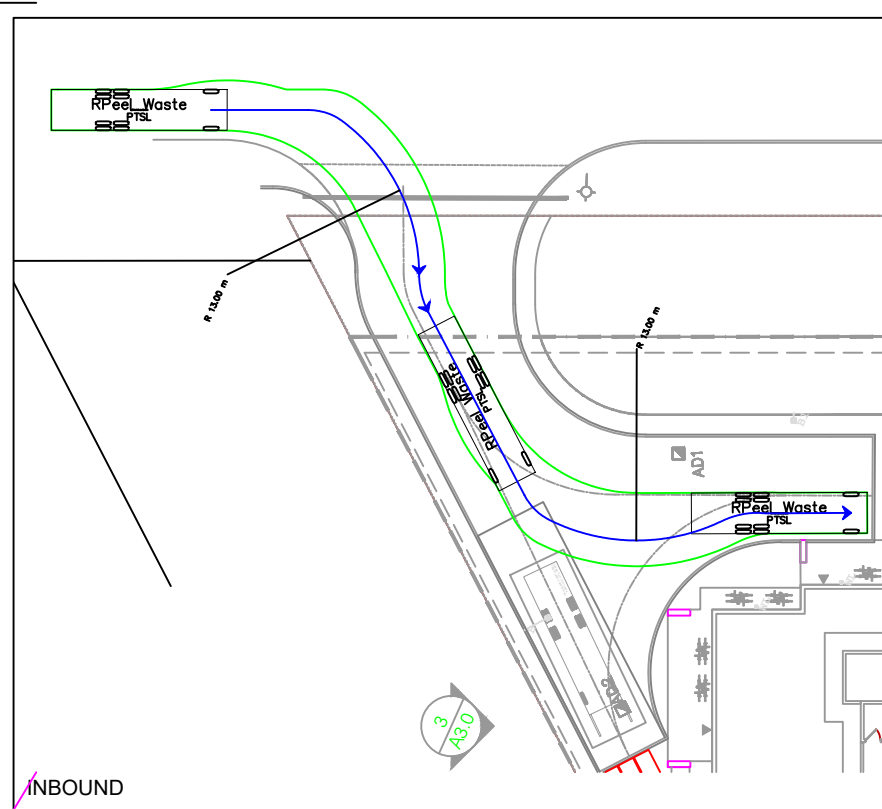


**RPeel Garbage**

	meters
Width	: 2.77
Track	: 2.77
Lock to Lock Time	: 6.0
Steering Angle	: 30.3

INBOUND  
OUTBOUND

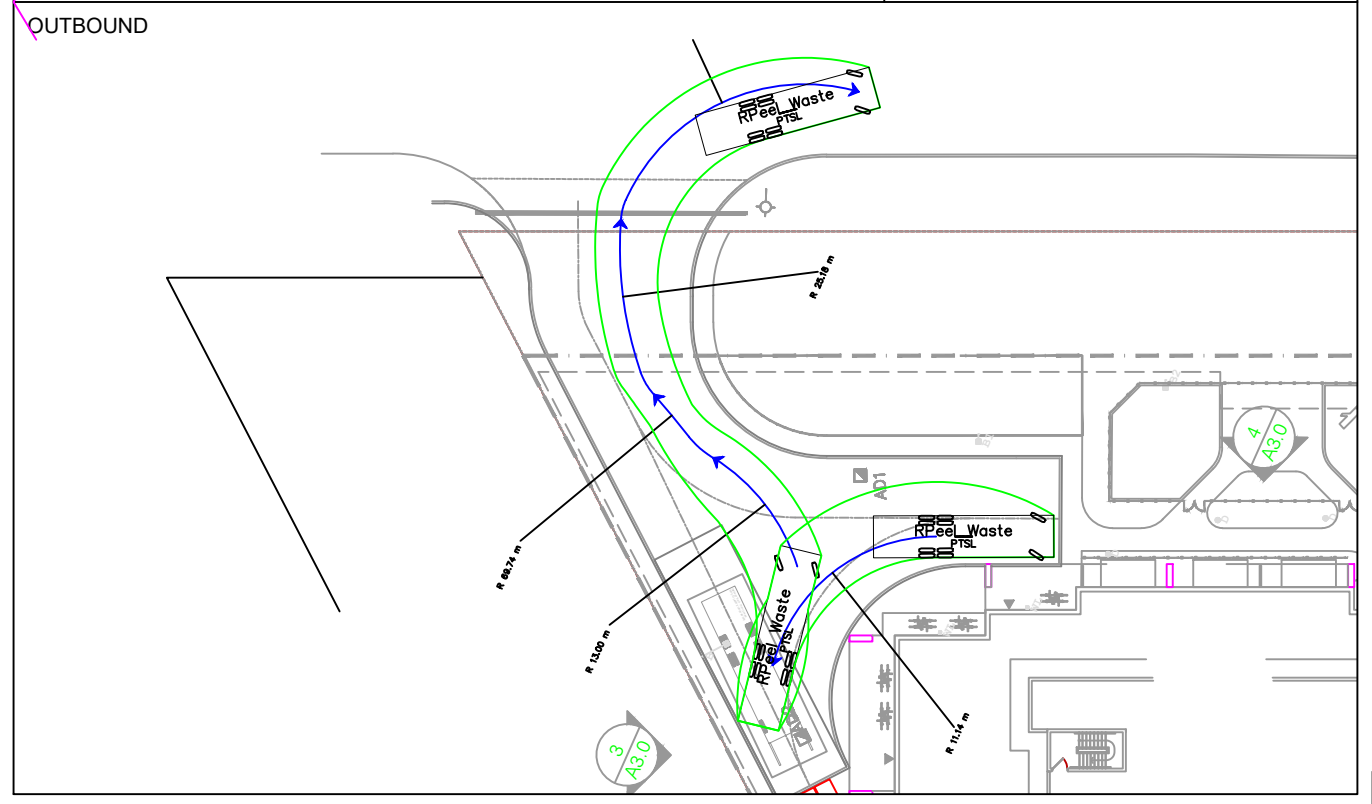


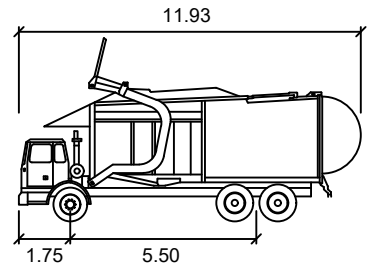
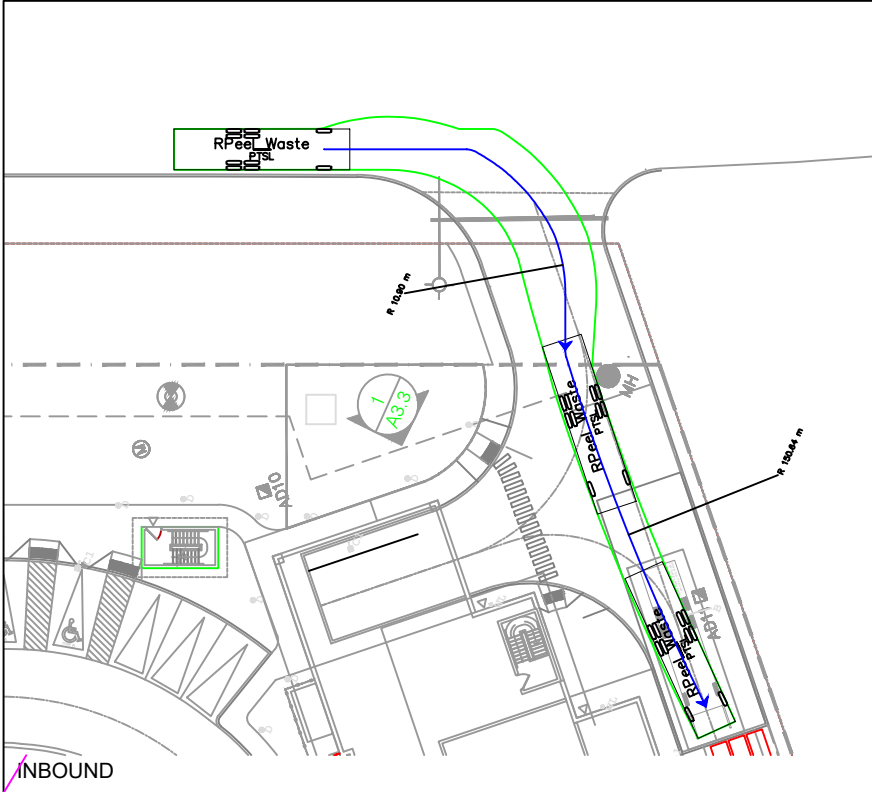


**RPeel Garbage**

	meters
Width	: 2.77
Track	: 2.77
Lock to Lock Time	: 6.0
Steering Angle	: 30.3

INBOUND  
OUTBOUND

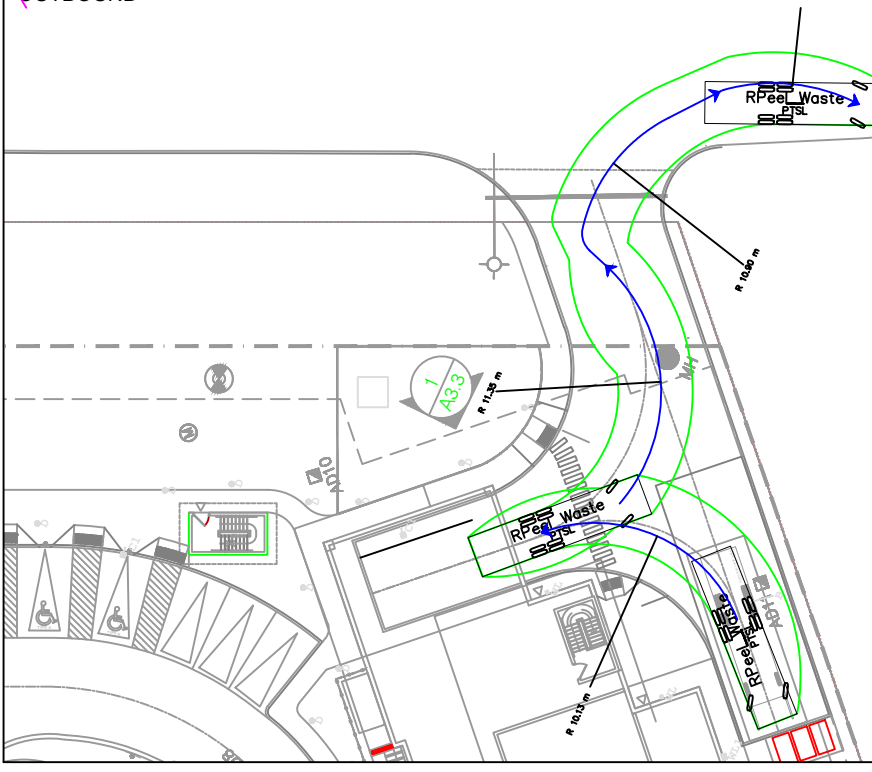


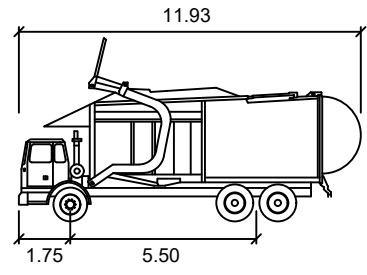
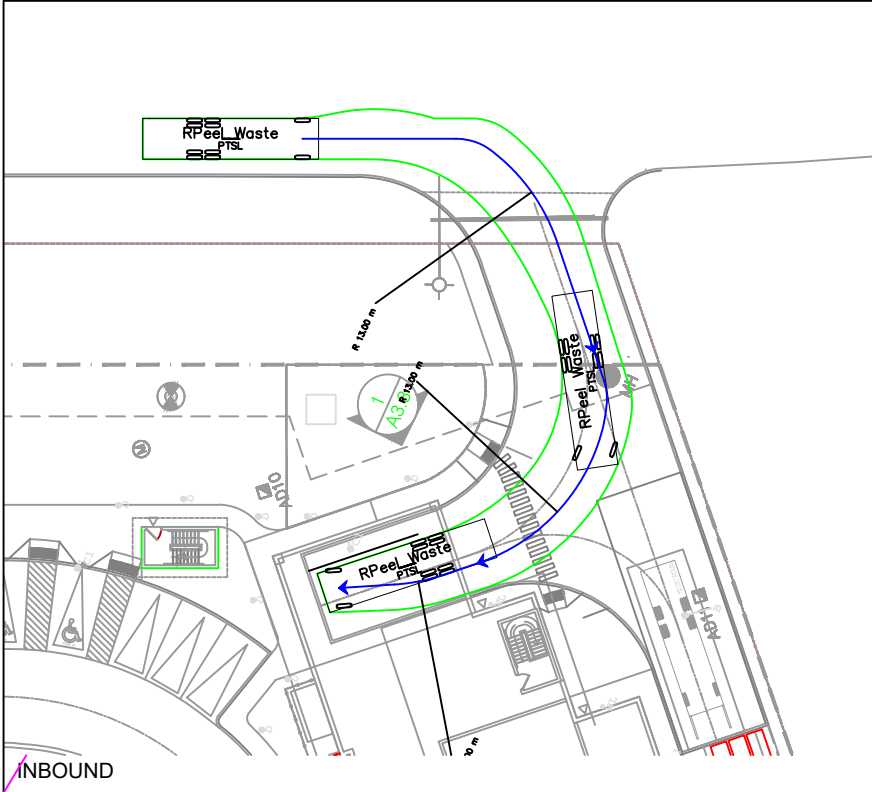


**RPeel Garbage**

	meters
Width	: 2.77
Track	: 2.77
Lock to Lock Time	: 6.0
Steering Angle	: 30.3

INBOUND  
OUTBOUND

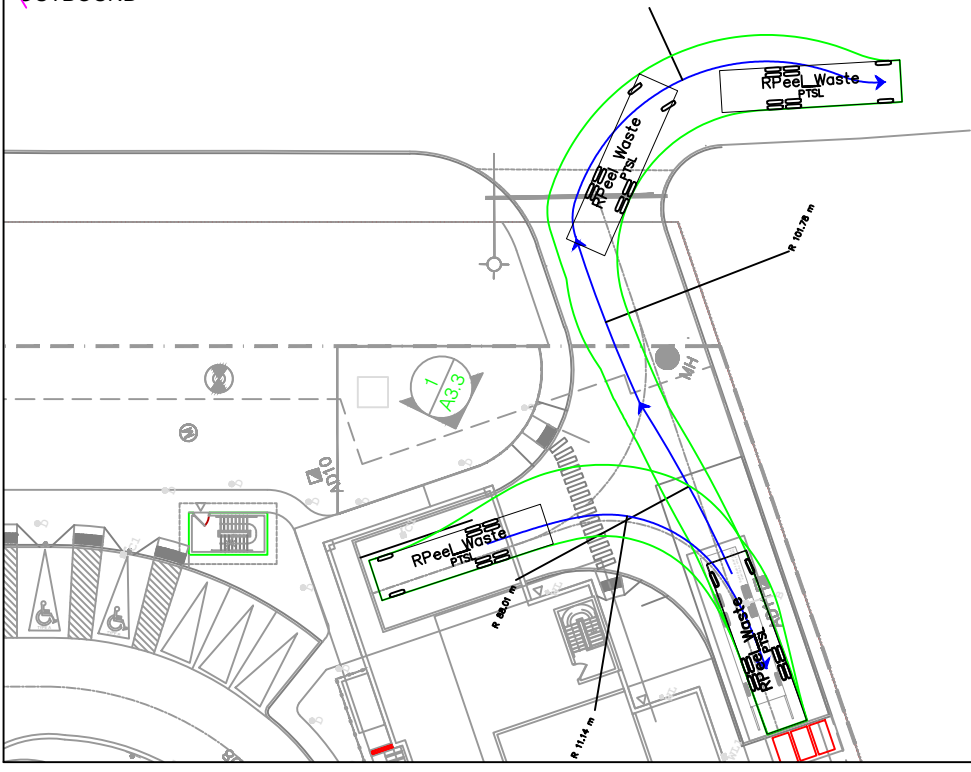


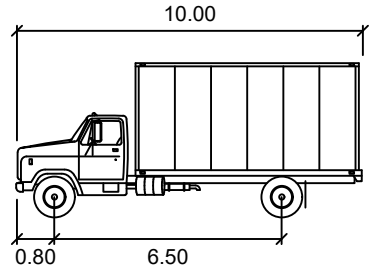
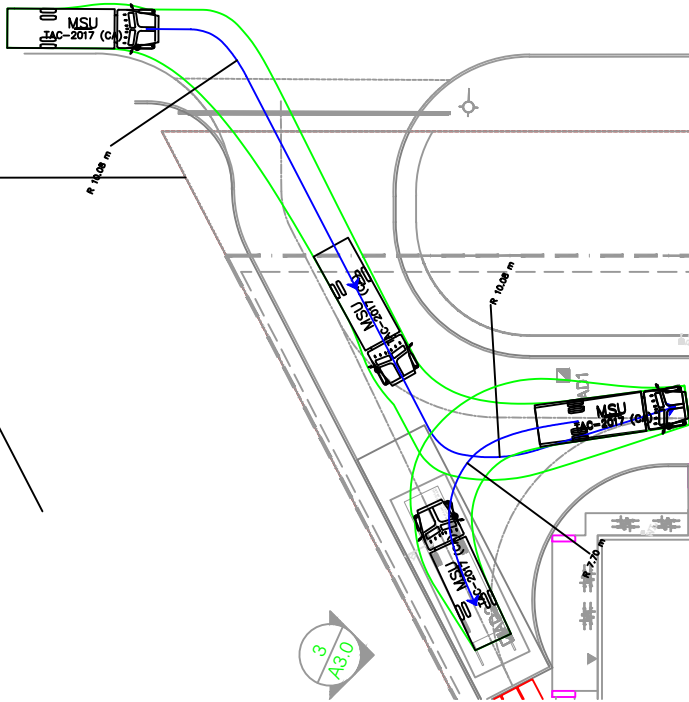


**RPeel Garbage**

	meters
Width	: 2.77
Track	: 2.77
Lock to Lock Time	: 6.0
Steering Angle	: 30.3

INBOUND  
OUTBOUND



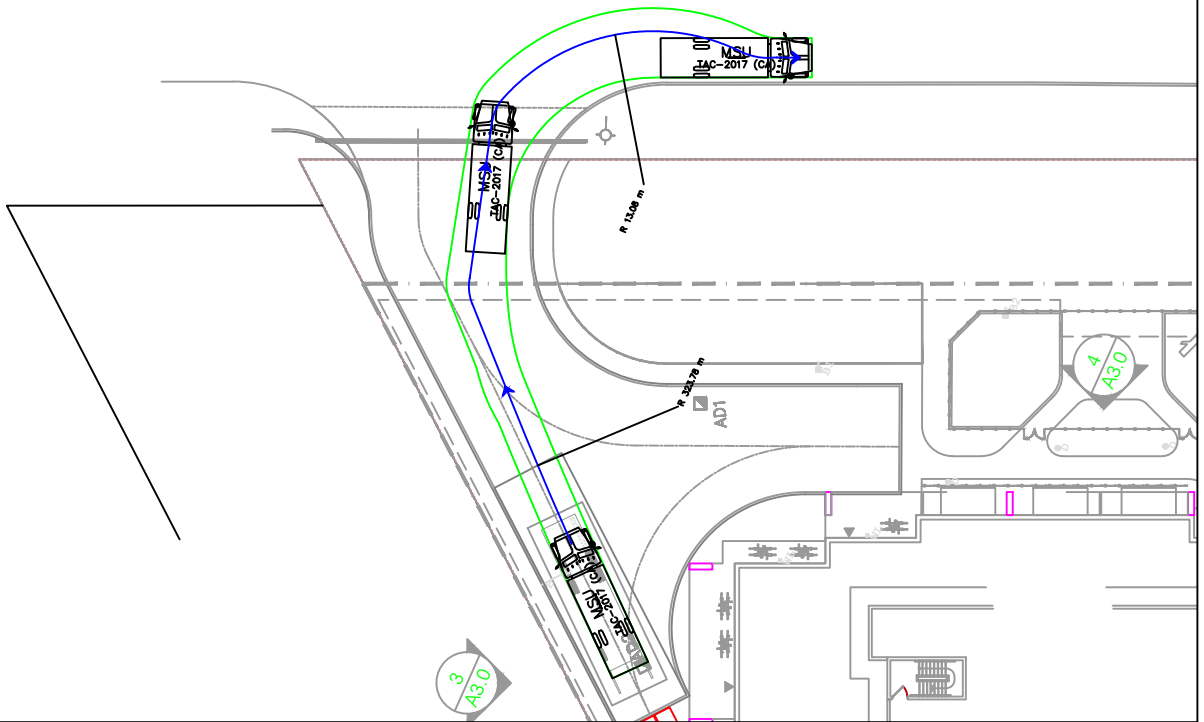


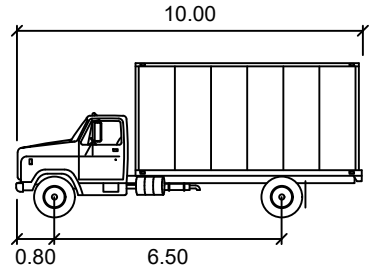
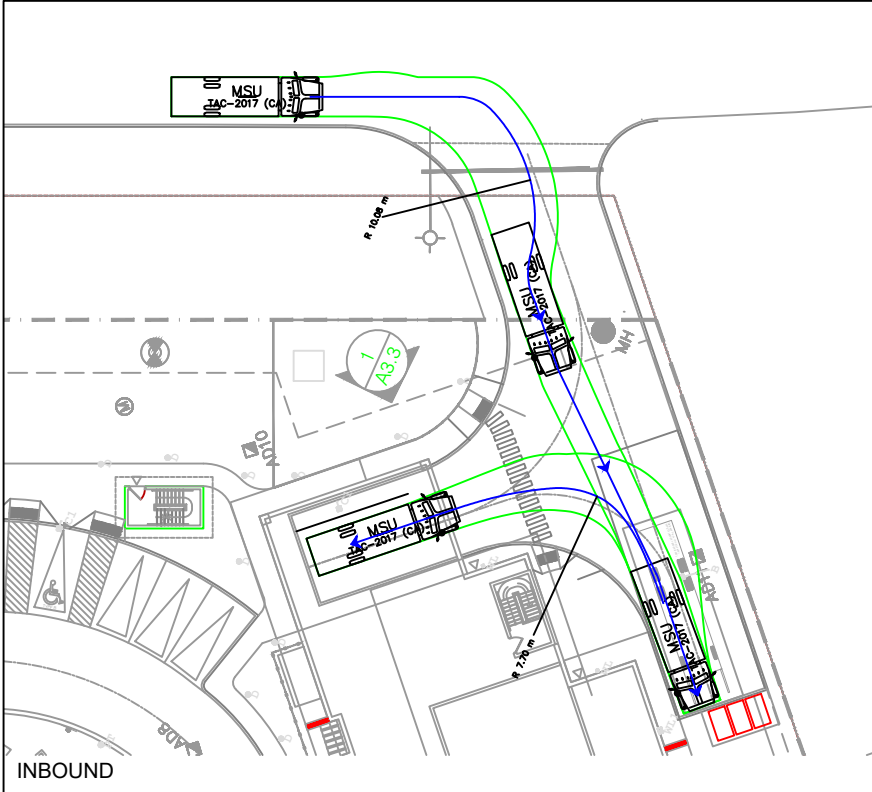
MSU

	meters
Width	: 2.60
Track	: 2.60
Lock to Lock Time	: 6.0
Steering Angle	: 40.2

INBOUND

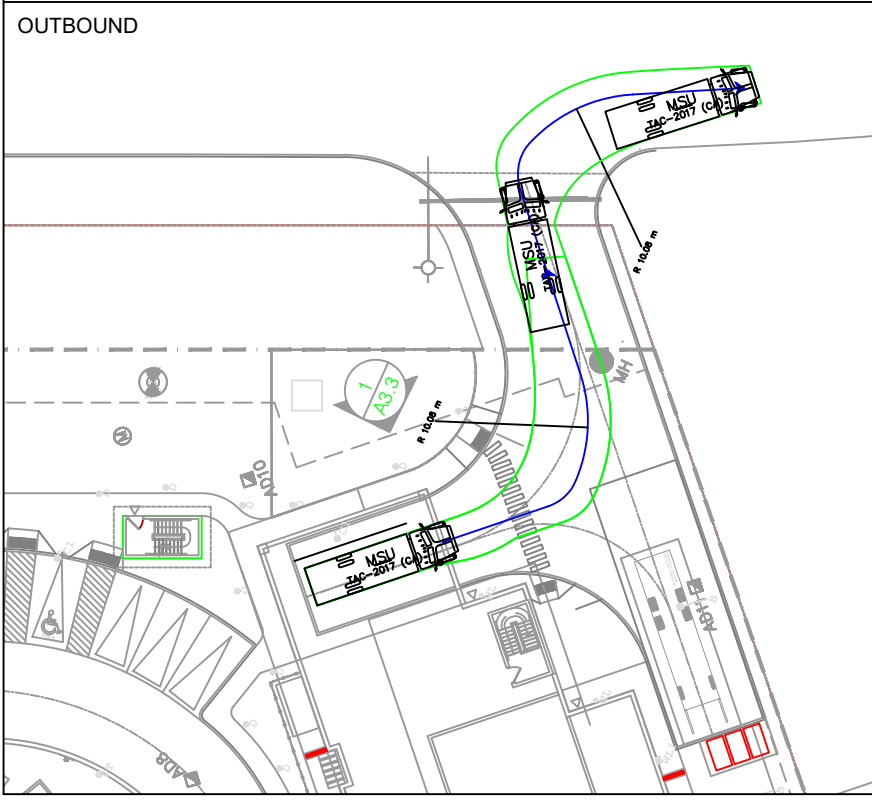
OUTBOUND



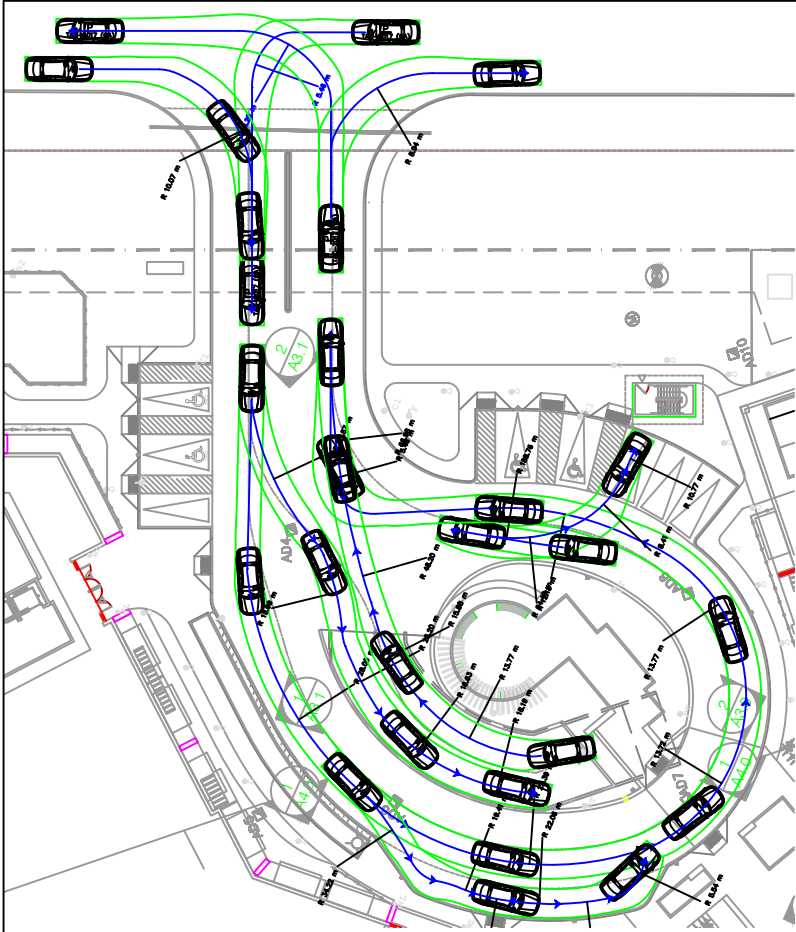


**MSU**

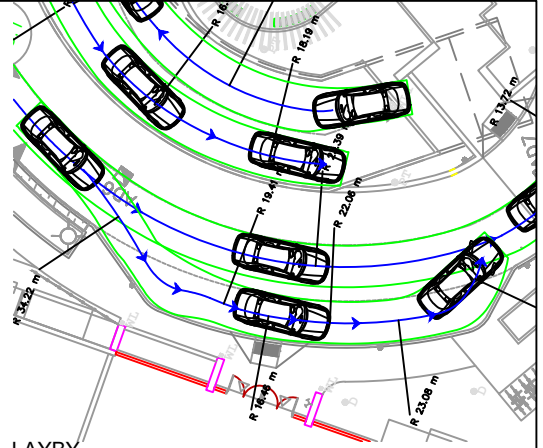
	meters
Width	: 2.60
Track	: 2.60
Lock to Lock Time	: 6.0
Steering Angle	: 40.2



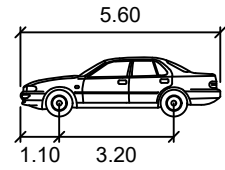




SURFACE LEVEL



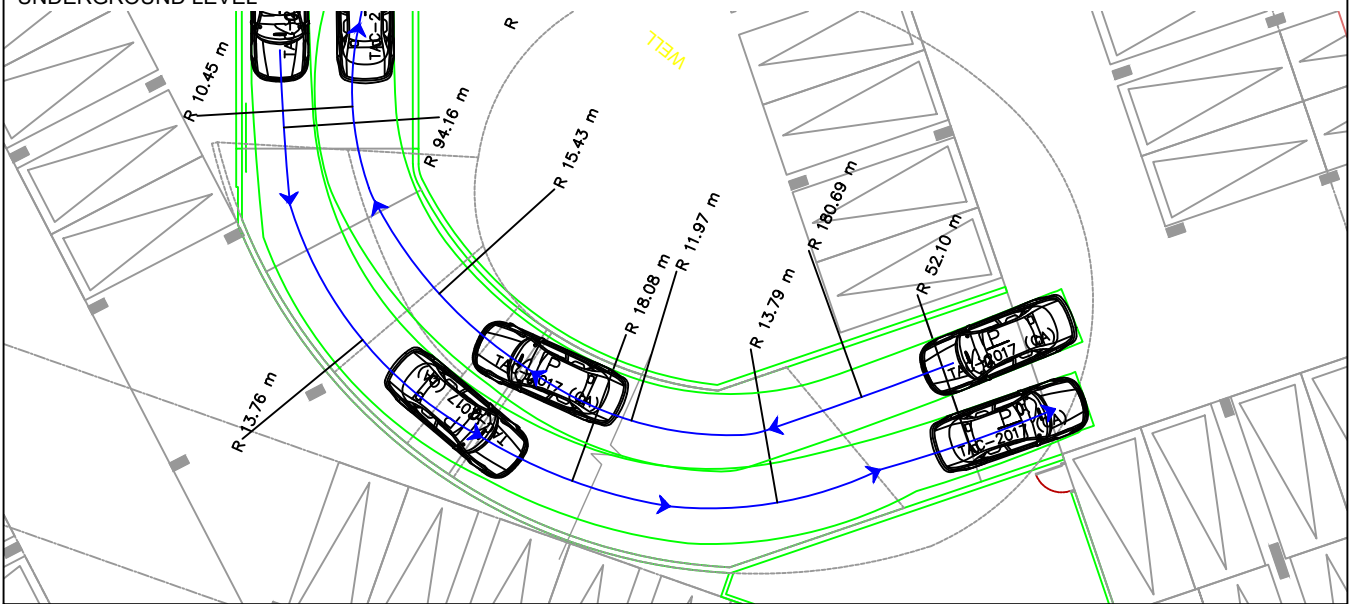
LAYBY



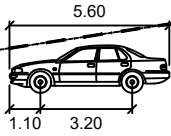
P

	meters
Width	: 2.00
Track	: 2.00
Lock to Lock Time	: 6.0
Steering Angle	: 35.9

UNDERGROUND LEVEL



# PARKING LEVEL 1

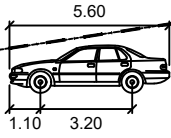


P

	parameters	units
Width	: 2.00	meters
Track	: 2.00	meters
Lock to Lock Time	: 6.0	
Steering Angle	: 35.9	



# PARKING LEVEL 2



P

	parameters	units
Width	: 2.00	meters
Track	: 2.00	meters
Lock to Lock Time	: 6.0	
Steering Angle	: 35.9	

