

220 Arkell Road Transportation Impact Study

Paradigm Transportation Solutions Limited

April 2019

Project: 180099



Project Summary



Project Number

180099

April 2019

Client

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220 Arkell Road Transportation Impact Study

Signatures





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Executive Summary

Content

Rockpoint Properties Inc. retained Paradigm Transportation Solutions Limited (Paradigm) to conduct this Transportation Impact Study for a proposed residential development located at 220 Arkell Road in Guelph, Ontario. **Figure 1.1** details the study area and location of the subject development.

This Transportation Impact Study (TIS) analyzes existing traffic conditions, describes the proposed development, forecasts future traffic volumes for an assumed year for full build-out (2021), a horizon of five years from full build-out (2026), a horizon of ten years from full build-out (2031) both with and without the proposed site development, investigates if remedial measures are needed to mitigate the forecast traffic impacts and provides recommendations for remedial measures if required to accommodate the proposed development.

Development Concept

The proposed development is located at 220 Arkell Road in Guelph, Ontario. The development will include 31 single-family homes and 60 cluster townhouse dwellings for a total of 91 units.

The subject site does not have direct road access to Arkell Road, therefore access will be provided via the neighbouring developments (Victoria Park Village to the north and future developments to the south/east). Temporary emergency access will be provided through Block 20 on Dawes Avenue. The development is expected to begin construction in 2019 and be completed and fully occupied by 2021.

Conclusions

Based on the investigations carried out, it is concluded that:

Existing Traffic Operations

Currently, all intersections within the study area operation at acceptable levels of service during the AM and PM peak hours, with no individual problem movements, except:

- Victoria Road and Arkell Road:
 - Eastbound left-turn movement AM peak hour;
 - Westbound left-turn movement AM and PM peak hours;
 - Northbound through-right movement AM and PM peak hours; and



Southbound through-right movement – PM peak hour.

Background Growth & Other Planned Developments

A growth rate of 2.0% per year for 2017 to 2026, and a rate of 3.0% per year beyond 2026 was used for traffic in the study area, as requested by the City of Guelph.

The City requested that the traffic generated by other "approved but not yet built" developments in the study area be included in the background traffic forecasts, including: Kortright East, Victoria Park Village, Westminister Woods, Northwest Arkell Road and Victoria Road, and 388 Arkell Road Secondary School.

2021 Background Traffic Operations

Under 2021 background traffic conditions all intersections within the study area are forecast to operate at overall acceptable levels of service. The following critical movements are noted:

- Arkell Road and Colonial Road:
 - Northbound left-through-right movement AM peak hour; and
 - Southbound left-through-right movement AM and PM peak hours.
- Victoria Road and Arkell Road:
 - Eastbound left-turn movement AM and PM peak hours;
 - Westbound left-turn movement AM and PM peak hours;
 - Northbound through-right movement AM and PM peak hours;
 - Southbound through-right movement AM and PM peak hours;
 and
 - Overall intersection AM and PM peak hours.
- Victoria Road and 388 Arkell Road Access 2:
 - Northbound through movement AM and PM peak hours;
- Victoria Road and Victoria Park Village Road:
 - Eastbound left-turn movement AM and PM peak hours; and
 - Overall intersection AM and PM peak hours.

2026 Background Traffic Operations

Under 2026 background traffic conditions all intersections within the study area are forecast to operate at overall acceptable levels of service. The following critical movements are noted:

Arkell Road and Colonial Road:



- Northbound left-through-right movement AM and PM peak hours; and
- Southbound left-through-right movement AM and PM peak hours.
- Victoria Road and Arkell Road:
 - Eastbound left-turn movement AM and PM peak hours;
 - Westbound left-turn movement AM and PM peak hours;
 - Northbound through-right movement AM and PM peak hours;
 - Southbound through-right movement AM and PM peak hours;
 and
 - Overall intersection –AM and PM peak hours.
- Victoria Road and 388 Arkell Road Access 2:
 - Northbound through movement AM and PM peak hours; and
 - Southbound through movement PM peak hour.
- Victoria Road and Victoria Park Village Road:
 - Eastbound left-turn movement AM and PM peak hours; and
 - Overall intersection AM and PM peak hours.

2031 Background Traffic Operations

Under 2031 background traffic conditions all intersections within the study area are forecast to operate at overall acceptable levels of service. The following critical movements are noted:

- Arkell Road and Colonial Road:
 - Northbound left-through-right movement AM and PM peak hours;
 - Southbound left-through-right movement AM and PM peak hours; and
 - Overall intersection AM peak hour.
- Arkell Road and 388 Arkell Road Access 1:
 - Southbound left-turn movement AM peak hour.
- Victoria Road and Arkell Road:
 - Eastbound left-turn movement AM and PM peak hours;
 - Westbound left-turn movement AM and PM peak hours;
 - Northbound through-right movement AM and PM peak hours;
 - Southbound through-right movement AM and PM peak hours;
 and
 - Overall intersection AM and PM peak hours.



- Victoria Road and 388 Arkell Road Access 2:
 - Northbound through movement AM and PM peak hours;
 - Southbound through movement PM peak hours; and
 - Overall intersection AM peak hour.
- Victoria Road and Victoria Park Village Road:
 - Eastbound left-turn movement AM and PM peak hours;
 - Eastbound right-turn movement PM peak hour; and
 - Overall intersection AM and PM peak hours.

Background Remedial Measures

The following remedial measures are required in order to provide acceptable levels of service at the study area intersections under background conditions:

- Signal timing and phasing optimization at all signalized intersections;
- ► Eastbound dual left-turn lanes and fully-protected phase at Victoria Road and Arkell Road;
- Northbound and southbound right-turn lanes at Victoria Road and Arkell Road;
- ► Traffic Control Signals at Arkell Road and Colonial Road, and Victoria Road and Victoria Park Village Road; and
- Road Widening on Victoria Road to four (4) lanes from Clair Road north to MacAllister Boulevard.

2031 Background Remedial Measures Traffic Operations

Under 2031 background traffic conditions with remedial measures in place, all intersections within the study area are forecast to operate at overall acceptable levels of service. The following critical movements are noted:

- Victoria Road and Arkell Road:
 - Eastbound left-turn movement 95th percentile queues exceeding available storage by 42 metres and 22 metres during the AM and PM peak hours, respectively; and
 - Westbound left-turn movement 95th percentile queues exceeding available storage by 10 metres and 15 metres during the AM and PM peak hours, respectively.

Development Trip Generation

The development is forecast to generate 56 and 70 new trips during the AM and PM peak hours, respectively at full build-out.



The site generated traffic accounts for a maximum of 0.9% and 1.0% of all study area traffic, during the AM and PM peak hours, respectively.

2021 Total Traffic Operations

Under 2021 total traffic conditions all intersections within the study area are forecast to operate at overall acceptable levels of service. The following critical movements are noted:

- Arkell Road and Colonial Road:
 - Northbound left-through-right movement AM peak hour; and
 - Southbound left-through-right movement AM and PM peak hours.
- Victoria Road and Arkell Road:
 - Eastbound left-turn movement AM and PM peak hours;
 - Westbound left-turn movement AM and PM peak hours;
 - Northbound through-right movement AM and PM peak hours;
 - Southbound through-right movement AM and PM peak hours; and
 - Overall intersection AM and PM peak hours.
- Victoria Road and 388 Arkell Road Access 2:
 - Northbound through movement AM and PM peak hours;
- Victoria Road and Victoria Park Village Road:
 - Eastbound left-turn movement AM and PM peak hours; and
 - Overall intersection AM and PM peak hours.

2026 Total Traffic Operations

Under 2026 total traffic conditions all intersections within the study area are forecast to operate at overall acceptable levels of service. The following critical movements are noted:

- Arkell Road and Colonial Road:
 - Northbound left-through-right movement AM and PM peak hours; and
 - Southbound left-through-right movement AM and PM peak hours.
- Victoria Road and Arkell Road:
 - Eastbound left-turn movement AM and PM peak hours;
 - Westbound left-turn movement AM and PM peak hours;
 - Northbound through-right movement AM and PM peak hours;



- Southbound through-right movement AM and PM peak hours; and
- Overall intersection AM and PM peak hours.
- Victoria Road and 388 Arkell Road Access 2:
 - Northbound through movement AM and PM peak hours; and
 - Southbound through movement PM peak hour.
- Victoria Road and Victoria Park Village Road:
 - Eastbound left-turn movement AM and PM peak hours; and
 - Overall intersection AM and PM peak hours.

2031 Total Traffic Operations

Under 2031 total traffic conditions all intersections within the study area are forecast to operate at overall acceptable levels of service. The following critical movements are noted:

- Arkell Road and Colonial Road:
 - Northbound left-through-right movement AM and PM peak hours;
 - Southbound left-through-right movement AM and PM peak hours; and
 - Overall intersection AM peak hour.
- Arkell Road and 388 Arkell Road Access 1:
 - Southbound left-turn movement AM peak hour.
- Victoria Road and Arkell Road:
 - Eastbound left-turn movement AM and PM peak hours;
 - Westbound left-turn movement AM and PM peak hours;
 - Northbound through-right movement AM and PM peak hours;
 - Southbound through-right movement AM and PM peak hours; and
 - Overall intersection AM and PM peak hours.
- Victoria Road and 388 Arkell Road Access 2:
 - Northbound through movement AM and PM peak hours;
 - Southbound through movement PM peak hours; and
 - Overall intersection AM peak hour.
- Victoria Road and Victoria Park Village Road:
 - Eastbound left-turn movement AM and PM peak hours;
 - Eastbound right-turn movement PM peak hour; and



Overall intersection – AM and PM peak hours.

Development Impact to Study Area

The specific impact of the subject development without other area developments was examined against 2021 generalized background growth. The addition of subject development traffic to the general background traffic does not trigger the need for any remedial measures.

2031 Total Remedial Measures Traffic Operations

Under 2031 total traffic conditions, with remedial measures in place, all intersections within the study area are forecast to operate at overall acceptable levels of service. The following critical movements are noted:

- Victoria Road and Arkell Road:
 - Eastbound left-turn movement 95th percentile queues exceeding available storage by 42 metres and 22 metres during the AM and PM peak hours, respectively; and
 - Westbound left-turn movement 95th percentile queues exceeding available storage by 10 metres and 15 metres during the AM and PM peak hours, respectively.

Traffic Control Signal Warrants

Traffic signal control warrants were completed for all unsignalized study area intersections, for the 2031 total traffic horizon. The analyses indicate traffic control signals are not warranted at any unsignalized intersection.

However, to provide acceptable levels of service for the northbound and southbound movements at the intersection of Arkell Road and Colonial Road and the eastbound movement at the intersection of Victoria Road and Victoria Park Village Road, it is recommended traffic signals are installed by the 2031 horizon year.

Potential Traffic Infiltration

While the proposed development does not have direct access to Arkell Road and traffic must travel through the neighbouring developments (Victoria Park Village, Northwest Arkell and Victoria), it would not be considered infiltration into the neighbourhood.

Once the entire neighbourhood is built-out, there will be an additional connection between Arkell Road and Victoria Road through the neighbourhood. This connection is not a direct route with reduced speed limits, therefore the potential for traffic infiltration is low. No traffic calming measures are required.



Recommendations

Based on the findings of this study, the subject development does not require offsite road improvements specific to the development. It is recommended that the development be approved as proposed.

In consideration of all of the area developments reviewed in this study, it is further recommended that the City monitor and review the need for:

- Signal timing and phasing optimization at all signalized intersections;
- Eastbound dual left-turn lanes and fully-protected phase at Victoria Road and Arkell Road;
- Northbound and southbound right-turn lanes at Victoria Road and Arkell Road;
- ► Traffic Control Signals at Arkell Road and Colonial Road, and Victoria Road and Victoria Park Village Road; and
- Road Widening on Victoria Road to four (4) lanes from Clair Road north to MacAllister Boulevard.



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1 Introduction

1.1 Overview

Rockpoint Properties Inc. retained Paradigm Transportation Solutions Limited (Paradigm) to conduct this Transportation Impact Study for a proposed residential development located at 220 Arkell Road in Guelph, Ontario. **Figure 1.1** details the study area and location of the subject development.

The development will include 31 single-family homes and 60 cluster townhouse dwellings for a total of 91 units. The subject site does not have direct road access to Arkell Road, therefore access will be provided via neighbouring developments (Victoria Park Village to the north and future developments to the south/east). Temporary emergency access will be provided through Block 20 on Dawes Avenue. The development is expected to begin construction in 2019 and be completed and fully occupied by 2021.

1.2 Purpose and Scope

The purpose of this study is to assess the impacts of the subject site on the adjacent roadway network, to determine if improvements are required to mitigate impacts, to make recommendations for improvements as identified and to assess the adequacy of the proposed parking supply.

The scope of the study includes the following:

- Determination and assessment of the current traffic conditions in the vicinity of the site;
- Determination and assessment of the additional traffic that will be generated by the proposed development;
- Analyses of the impacts of the additional traffic; and
- ▶ Recommendations on the measures required to accommodate the additional traffic impact in a satisfactory manner.

This report has been prepared to meet the City of Guelph Traffic Impact Study (TIS) Guidelines¹. This report assesses traffic conditions corresponding to the 2021 (opening year), 2026 horizon (5-years from occupancy) and 2031 horizon (10-years from occupancy), as required under the City of Guelph Guidelines.

The scope of the study was developed in consultation with the City of Guelph via e-mail in April 2018. **Appendix A** contains the pre-study consultation correspondence with the City of Guelph staff.



¹ City of Guelph. *Traffic Impact Study Guidelines*. April 2016.

1.3 Study Area Intersections

The following intersections were investigated in this study:

- Victoria Road and Arkell Road (signalized);
- Arkell Road and Summerfield Drive (two-way stop controlled);
- Arkell Road and Zecca Drive/Amos Drive (two-way stop controlled);
- Arkell Road and Colonial Drive (two-way stop controlled); and
- Arkell Road and 388 Arkell Road Site Driveway (two-way stop controlled);
- Victoria Road and 388 Arkell Road Site Driveway (two-way stop controlled); and
- Victoria Road and Victoria Park Village Road (two-way stop controlled).







Study Area and Subject Development Location

2 Existing Conditions

This section documents current traffic conditions, operational deficiencies and constraints experienced by the public travelling at the intersections within the study area. The operational deficiencies and constraints identified at this stage will be fundamental to the process of defining the required remedial measures.

2.1 Road Network

The characteristics of the roadways in the study area are described below. Reference was made to the City of Guelph's Official Plan².

- Arkell Road, an east-west arterial road with a posted speed limit of 50 km/h and assumed operating speed of 60 km/h. Arkell Road has a two-lane urban cross-section with on-street bicycle lanes on both sides of the roadway. Parking is restricted along both sides of the roadway. Heavy vehicles are not permitted on Arkell Road, with the exception of local deliveries.
- ▶ Victoria Road, a north-south arterial road with a posted speed limit of 70 km/h and assumed operating speed of 80 km/h. South of Arkell Road, Victoria Road has a two-lane cross-section with curb and gutter on the west side of the roadway and a gravel shoulder and ditch on the east side. Between Arkell Road and MacAllister Boulevard, Victoria Road has a three-lane urban cross-section with a single travel lane in each direction and a centre two-way left-turn lane (TWLTL). North of MacAllister Boulevard, Victoria Road has a four-lane urban cross-section. On-street bicycle lanes are provided on both sides of Victoria Road for the entirety of the study area. Parking is restricted along both sides of the roadway. Victoria Road is a 24-hour truck route.
- ▶ Zecca Drive/Amos Drive, a north-south local road with an assumed speed limit of 50 km/h. Zecca Drive/Amos Drive has a two-lane urban cross-section. Parking restrictions are not posted on Zecca Drive/Amos Drive. Therefore, parking is limited to a maximum of 48 hours under the City of Guelph Traffic By-law³.
- ▶ Summerfield Drive, a north-south collector road with an assumed speed limit of 50 km/h. Summerfield Drive has a two-lane urban cross-section. Parking restrictions are not posted on Summerfield Drive. Therefore, parking is limited to a maximum of 48 hours under the City of Guelph Traffic By-law.
- Colonial Drive, a north-south collector road with an assumed speed limit of 50 km/h. A 30 km/h school zone speed limit begins approximately 100 metres south of Arkell Road and extends to Grey



² City of Guelph. *The City of Guelph Official Plan – Schedule 5: Road & Rail Network.* March 2018.

³ City of Guelph. *Traffic By-law (2002)-17017.* 2012.

Oak Drive. Colonial Drive has a two-lane urban cross-section. Parking restrictions are not posted on Colonial Drive. Therefore, parking is limited to a maximum of 48 hours under the City of Guelph Traffic By-law.

▶ Victoria Park Village Road (currently unnamed) is a future east-west local road with an assumed speed limit of 50 km/h. The road is proposed to have a two-lane urban cross-section. It is expected Victoria Park Village Road will have separate eastbound left-turn and right-turn lanes at the intersection with Victoria Road. If parking restrictions are not posted, parking will be limited to a maximum of 48 hours under the City of Guelph Traffic By-law.

Existing land uses in the area consist mainly of residential properties to the west of Victoria Road and agricultural land to the east. Commercial developments are centred around the arterial road intersections. A golf course is present on the east side of Victoria Road, north of Arkell Road.

The intersection of Victoria Road and Arkell Road is signalized. The remaining study area intersections are two-way stop-controlled. **Figure 2.1** shows the existing lane configuration and traffic control.

2.2 Existing Transit Service

Guelph Transit is the public transit system operator in Guelph, Ontario. **Figure 2.2** shows the transit routes in the vicinity of the subject development. Presently, two (2) transit routes are available in the study area along Arkell Road (Route 5 and Route 56U).

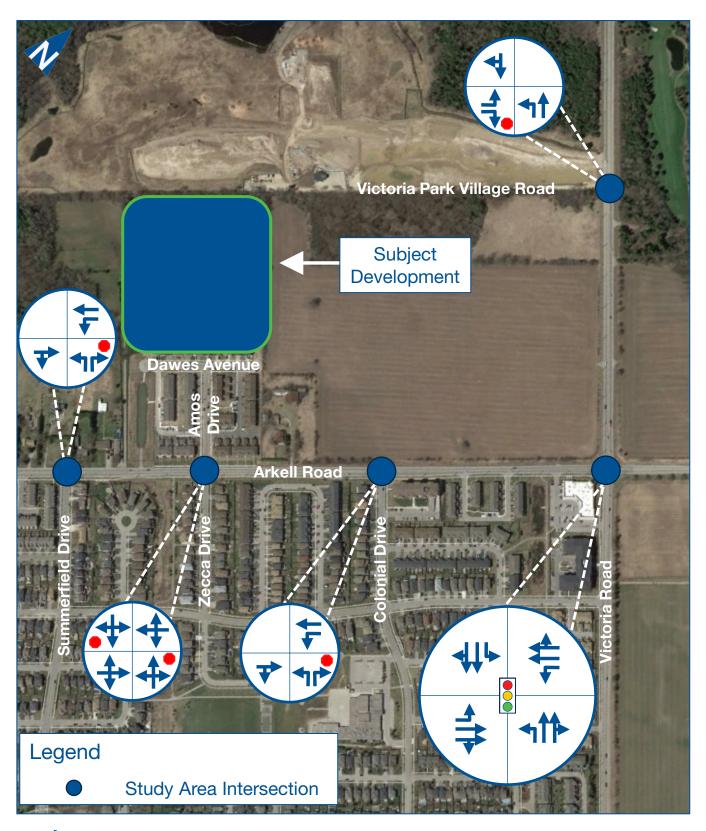
The transit routes in the study area are described as follows:

- ▶ Route 5 Goodwin⁴ services southeast Guelph, with major stops at University Centre, Victoria at MacAllister, Summerfield at Amsterdam, Frederick at Waterford, Gordon at Lowes, and Gordon at Edinburgh. Monday to Saturday service operates from 5:50 AM to 12:43 AM on 30-minute headways. Sunday and holiday service operates from 9:20 AM to 7:12 PM on 30-minute headways.
- ▶ Route 56U Colonial⁵ services southeast Guelph, with major stops at University Centre, Gordon at Kortright, Lowes at Gordon, Goodwin at Samuel and Gordon at Arkell. Service operates from 7:15 AM to 12:56 AM on 20-minute headways. Service is provided Monday to Friday, from September to April, during the University of Guelph fall and winter semesters. There is no holiday service and no service during winter and spring breaks.



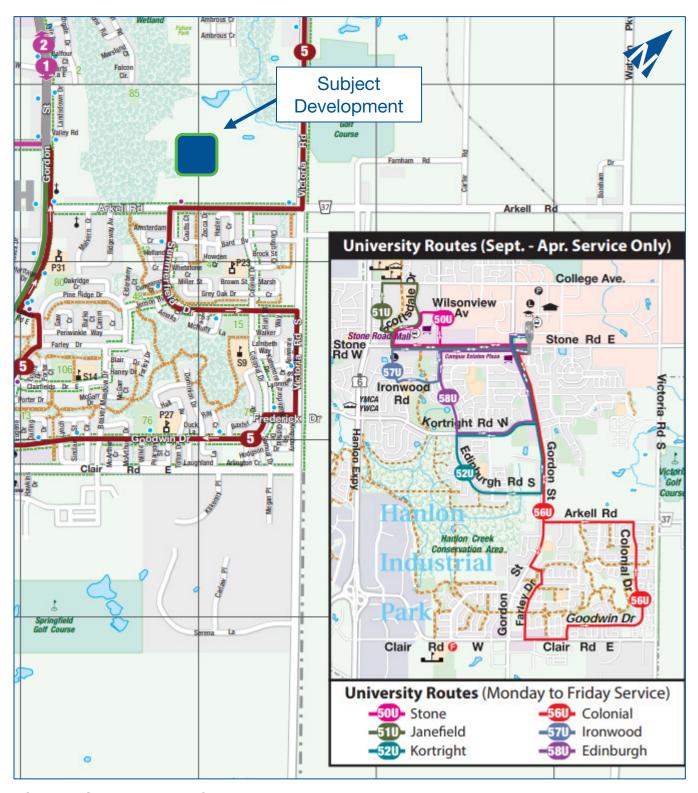
⁴ Guelph Transit. Route 5 Goodwin Schedule. January 2018.

⁵ Guelph Transit. *Route 56U Colonial Schedule*. January 2018.





Existing Lane Configuration and Traffic Control



Source: Guelph Transit. System Map. 16 July 2017.



Existing Transit Routes

The nearest bus stop to the subject development is located at Arkell Road and Amos Drive on the north side of the roadway.

2.3 Active Transportation

2.3.1 Walkability

Pedestrian sidewalks are provided throughout the study area as follows:

- Arkell Road:
 - A sidewalk is provided on the south side of the roadway west of Victoria Road.
- Victoria Road:
 - A sidewalk is provided along the west side of the roadway. The sidewalk is not present between Victoria Park East Golf Club at 1096 Victoria Road and Arkell Road, and ends 100 metres north of Clair Road.
- ▶ Zecca Drive/Amos Drive, Summerfield Drive and Colonial Drive:
 - Sidewalks are provided on both sides of the roadway.

It is expected a sidewalk will be provided along at least one side of Victoria Park Village Road once constructed.

2.3.2 Cycling

On-street bike lanes are provided within the study area on Arkell Road and Victoria Road.

2.3.3 Trails

The City of Guelph Active Transportation Network Map 2015⁶ identifies the following trails in the study area:

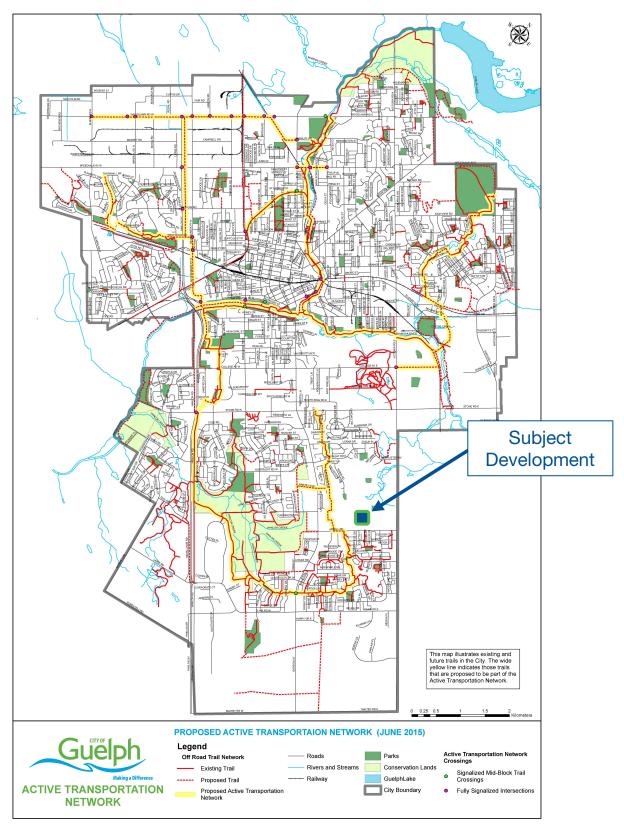
- An existing trail east of Ridgeway Avenue connecting Arkell Road southerly to Clair Road. An extension of the trail is proposed along Arkell Road and through the wooded areas north of Malvern Crescent;
- An existing trail to the west of Zecca Drive between Arkell Road and Howden Crescent Park; and
- ► An existing trail west of the commercial development on the west side of Victoria Road between Arkell Road and the south end of Clough Crescent.

Figure 2.3 shows the location of the trails within the study area.

⁶ City of Guelph. *Proposed Active Transportation Network.* June 2015.



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Active Transportation Network

2.4 Existing Traffic Volumes

On October 4 to 6, 2016, using surveyors, study area intersection turning movement count (TMC) data were collected during the AM (7:00 AM to 10:00 AM) and PM (3:00 PM to 6:00 PM) peak periods.

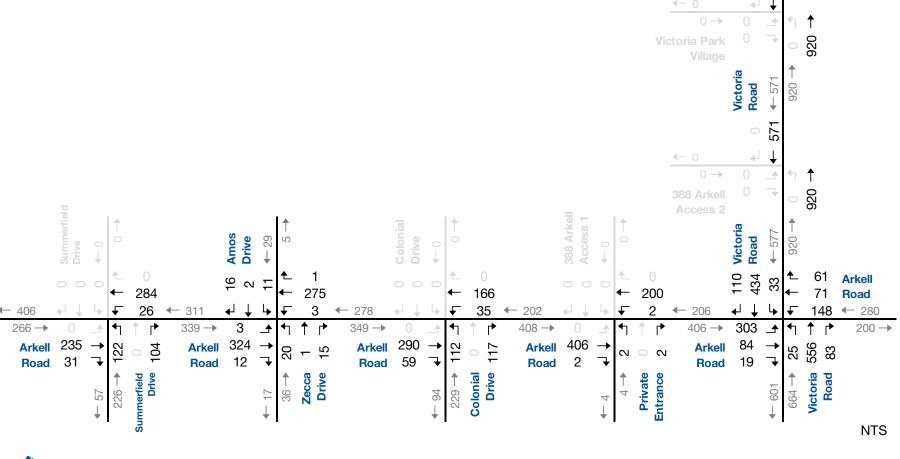
A growth rate of two percent per annum compounded was applied to all intersection volumes for two years to reflect 2018 conditions. This growth rate was provided by the City of Guelph during pre-study consultation.

To ensure consistency, network traffic volumes on Arkell Road were balanced using the higher volume intersections. Any further resultant traffic volume discrepancies were equalized based on percent distribution.

Figure 2.4 and **Figure 2.5** summarize the existing AM (8:00 to 9:00) and PM (4:30 to 5:30) peak hour traffic volumes, respectively. **Appendix B** contains the detailed count data and signal timings.





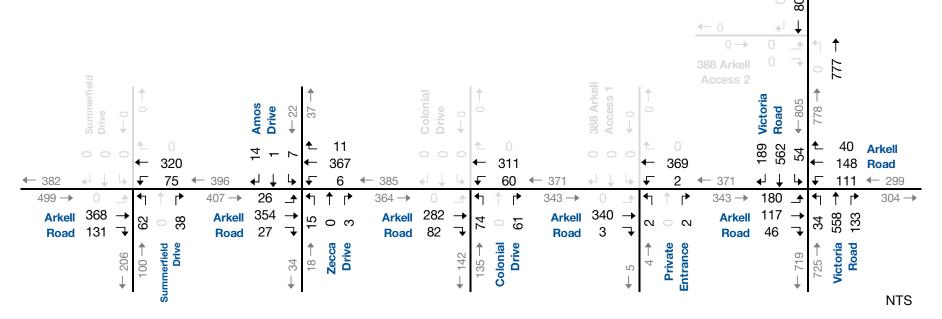




Base Year (2018) AM Traffic Volumes

Victoria







Base Year (2018) PM Traffic Volumes

Victoria

Victoria Road

Victoria Park Village

2.5 Traffic Operations

Intersection level of service (LOS) is a recognized method of quantifying the delay experienced by drivers at intersections. The term "Level of Service" denotes how well a traffic movement operates under given traffic demands, lane arrangements, and traffic controls. Each level is determined by the average amount of control delay per vehicle. Control delay is the total delay associated with stopping for a signal or stop sign, and includes four components: deceleration delay, stopped delay, queue move up time and final acceleration delay.

Table 2.1 contains the level of service criteria for signalized and stop-controlled intersections. As shown, LOS A indicates small average control delays (less than 10 second per vehicle) whereas LOS F indicates intersection failure, which results in extensive vehicular queues and long delays (over 50 seconds per vehicle at an unsignalized intersection, and over 80 seconds per vehicle at a signalized intersection). LOS D is typically considered acceptable peak-hour performance in an urban setting, and lower LOS values are tolerable for short-term time periods during peak hours when heavier traffic volumes are expected.

Signalized Intersections **Unsignalized Intersections** Level of Service Average Total Delay Average Total Delay (sec/veh) (sec/veh) < = 10< = 10Α В > 10 & < = 20 > 10 & < = 15 С > 20 & < = 35 > 15 & < = 25 > 35 & < = 55 > 25 & < = 35 D Ε > 55 & < = 80 > 35 & < = 50 F > 80 > 50

TABLE 2.1: VEHICLE LEVEL OF SERVICE DEFINITIONS

As per the City of Guelph TIS Guidelines⁷, the following defines critical movements or intersections:

- Volume to capacity ratios for overall intersection operation, through movements or shared through/turning movements that operate at 0.85 or greater for signalized intersections;
- Volume to capacity ratios for exclusive turning movements that operate at 0.90 or greater for signalized intersections;
- Level of service, based on average delay per vehicle or individual movements is LOS E or greater for unsignalized intersections; and



⁷ City of Guelph. *Traffic Impact Study Guidelines*. April 2016.

► Estimated 95th percentile queue lengths exceed available turning lane storage.

The operations of the study intersections under existing, or base year (2018), traffic conditions were evaluated using Synchro 9 with HCM 2010 procedures. The intersection analysis considered three separate measures of performance:

- ▶ LOS for each movement and the entire intersection;
- ► The volume to capacity (v/c) ratio for each movement; and
- ▶ The estimated 95th percentile queue length for each movement.

Table 2.2 and **Table 2.3** indicate the existing levels of service (LOS), volume to capacity ratios (V/C) and 95th percentile queues experienced within the study area, for the AM and PM peak hours, respectively.

The analyses indicate that all intersections and movements within the study area currently operate at overall acceptable levels of service, with the following exceptions:

- Victoria Road and Arkell Road:
 - Eastbound left-turn movement LOS D, v/c 0.91 and 95th
 percentile queues exceeding available storage by 45 metres
 during the AM peak hour;
 - Westbound left-turn movement 95th percentile queues exceeding available storage by 10 metres and 2 metres during the AM and PM peak hours, respectively;
 - Northbound through-right movement LOS D, v/c 0.94 during the AM peak hour and LOS E, v/c 1.03 during the PM peak hour;
 - Southbound through-right movement LOS E, v/c 1.06 during the PM peak hour.

Appendix C provides the detailed Synchro 9 reports.



TABLE 2.2: BASE YEAR (2018) AM PEAK HOUR TRAFFIC OPERATIONS SUMMARY

ō				Direction / Movement / Approach																
erio	Intersection	Control Type		Eastbound				Westbound				Northbound				Southbound				
Analysis Period			MOE	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Overall
	Arkell Road & Summerfield Drive	TWSC	LOS Delay V/C Q Ex Avail.		A 0 - -	^ ^ ^ ^ ^ ^	0	A 8 0.02 0 60	A 0 - -		1	B 14 0.37 2 -		^ ^ ^ ^ ^	B 14					4
Hour	Arkell Road & Zecca Drive/ Amos Drive	TWSC	LOS Delay V/C Q	A 8 0.00 0	A 0 -	^ ^ ^ ^	0	A 8 0.00 0	A 0 -	^ ^ ^ ^ ^	0	< < <	B 14 0.08 0	> > >	B 14	· · · · ·	B 13 0.06 0		B 13	1
AM Peak Hour	Arkell Road & Colonial Road	TWSC	LOS Delay V/C Q Ex Avail.	< < < < < < <	A 0 - -	>	0	A 8 0.03 0 60 60	A 0 - - -	>	1	< < < < < < <	C 20 0.51 3 -	> > > >	C 20					6
	Victoria Road & Arkell Road	TCS	LOS Delay V/C Q Ex Avail.	D 51 0.91 85 40 -45	C 27 0.45 27 -	^ ^ ^ ^ ^ ^ ^ ^ ^	D 45	C 21 0.41 30 20 -10	C 29 0.63 28 -	^ ^ ^ ^ ^ ^ ^	C 25	B 12 0.09 5 90 85	D 37 0.94 178 -	>	D 36	B 14 0.15 6 50 44	C 23 0.81 144 -		C 22	C 32

MOE - Measure of Effectiveness LOS - Level of Service

Delay - Average Delay per Vehicle in Seconds

Q - 95th Percentile Queue Length Ex. - Existing Available Storage Avail. - Available Storage TCS - Traffic Control Signal TWSC - Two-Way Stop Control AWSC - All-Way Stop Control RBT - Roundabout

< - Shared Left Movement > - Shared Right Movement

TABLE 2.3: BASE YEAR (2018) PM PEAK HOUR TRAFFIC OPERATIONS SUMMARY

ō			Direction / Movement / Approach																	
erio	Intersection	Control Type		Eastbound				Westbound				Northbound				Southbound				
Analysis Period			MOE	ц	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Overall
	Arkell Road & Summerfield Drive	TWSC	LOS Delay V/C Q Ex Avail.		A 0 - -	>	0	A 9 0.07 0 60 60	A 0 - -		2	C 15 0.23 1 -		^ ^ ^ ^ ^ ^	C 15					2
Hour	Arkell Road & Zecca Drive/ Amos Drive	TWSC	LOS Delay V/C Q	A 8 0.02 0	A 0 -	> > >	1	A 8 0.01 0	A 0 -	^ ^ ^ ^ ^	0	< < <	C 19 0.07 0	^ ^ ^ ^ ^	C 19	< < <	B 14 0.05 0	v v v v	B 14	1
PM Peak Hour	Arkell Road & Colonial Road	TWSC	LOS Delay V/C Q Ex Avail.	< < < < < < < < < < < < < < < < < < <	A 0 - -	> > > >	0	A 8 0.05 0 60 60	A 0 - - -	>	1	< < < < < < < < < < < < < < < < < < <	C 19 0.36 2 -	>	C 19					4
	Victoria Road & Arkell Road	TCS	LOS Delay V/C Q Ex Avail.	C 23 0.54 34 40 6	C 28 0.56 37 -	> > > >	C 25	C 21 0.33 22 20 -2	C 30 0.69 44 -	^ ^ ^ ^ ^ ^	C 27	B 16 0.18 7 90 83	E 63 1.03 204 -	^ ^ ^ ^ ^ ^	E 61	B 16 0.25 10 50 41	E 70 1.06 225 -		E 67	D 53

MOE - Measure of Effectiveness LOS - Level of Service

Delay - Average Delay per Vehicle in Seconds

Q - 95th Percentile Queue Length Ex. - Existing Available Storage Avail. - Available Storage TCS - Traffic Control Signal TWSC - Two-Way Stop Control AWSC - All-Way Stop Control RBT - Roundabout < - Shared Left Movement

> - Shared Right Movement



3 Background Conditions

3.1 Horizon Years

To adhere to the terms of reference established during pre-study consultation with the City of Guelph engineering staff, three (3) horizon years, 2021, 2026 and 2031 were analyzed in this study. The 2021 horizon represents opening year of the development, and the 2026 and 2031 horizons represent five (5) and ten (10) year horizons from development occupancy, respectively.

3.2 Background Growth Rate

The non-site traffic increase represents generalized traffic growth in the southeast area of Guelph. A growth rate of 2.0% per year for 2018 to 2026, and a rate of 3.0% per year beyond 2026 was used for traffic in the study area, as requested by the City of Guelph. This rate generally reflects typical annual increases within stable communities and in this context, accounts for the general population and employment growth that may occur. Statistics Canada data indicates that over the 2011-2016 period the City of Guelph population grew at 1.65% per annum. Therefore, a 2% to 3% annual traffic growth rate is conservative.

Figure 3.1 and **Figure 3.2** show the 2021 general background traffic forecasts for the AM and PM peak hours.

3.3 Other Area Developments

The City requested that the traffic generated by other "approved but not yet built" developments in the study area be included in the background traffic forecasts. There are five (5) other developments with traffic expected to impact the study area. The traffic volumes generated by these developments, which were assumed to be completed by the 2021, are included in the background traffic over and above the general background road traffic growth. **Figure 3.3** shows the development locations.

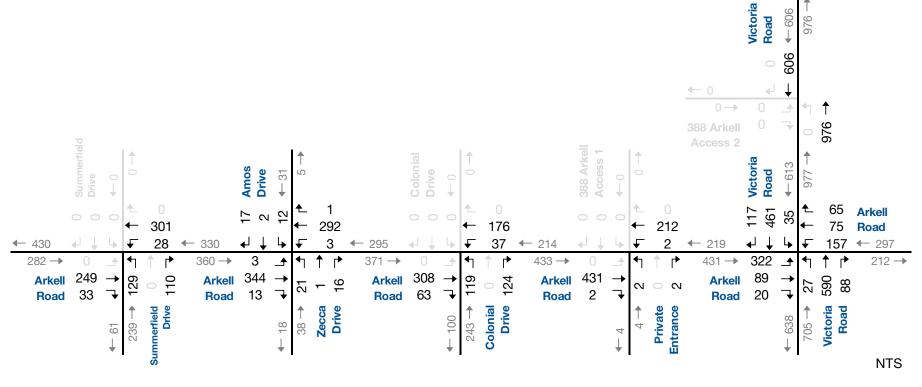
The City of Guelph provided the 2015 Westminister Woods Development Traffic Impact Study. Paradigm previously completed the TIS for 388 Arkell Road, updated in July 2018. TIS reports are not available for the other three developments; therefore, peak hour trip forecasts to be generated by the three (3) developments are based on the Institute of Transportation Engineers (ITE) Trip Generation Manual⁸ for the following Land Use Codes (LUC):

⁸ Institute of Transportation Engineers. *Trip Generation Manual 10th Edition.* September 2017.



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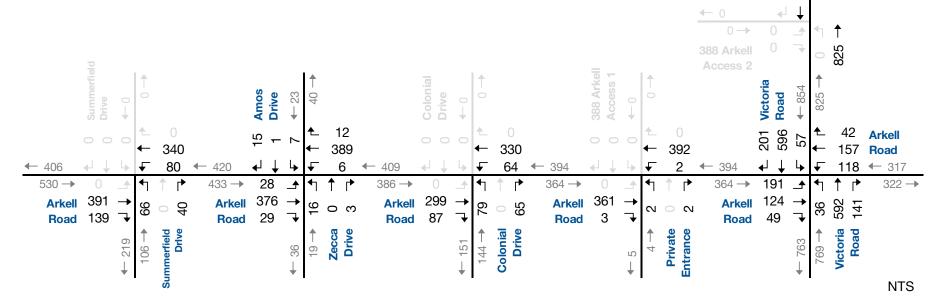
2021 AM Generalized Growth **Background Traffic Forecasts**

Victoria Road

> 909 Road

Victoria Park Village





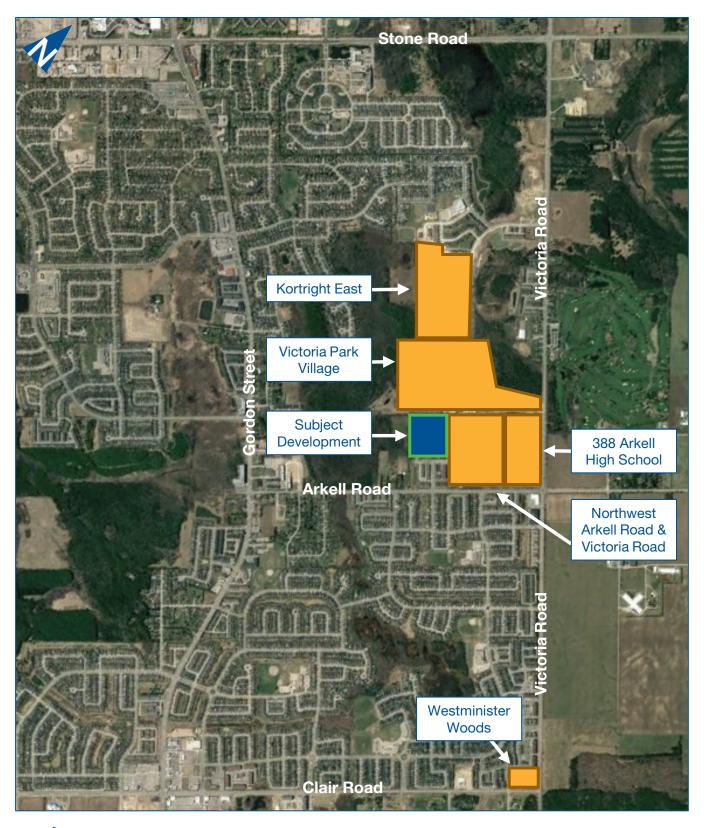


2021 PM Generalized Growth Background Traffic Forecasts

Victoria Road

Victoria Road

Victoria Park Village





Location of Other Area Developments

- ▶ LUC 210 Single-Family Detached Housing: Includes all single-family detached homes on individual lots.
- ▶ LUC 220 Multifamily Housing (Low Rise): Includes apartments, townhouses, and condominiums located within the same building with at least three other dwelling units and that have one or two levels (floors).
- ▶ LUC 221 Multifamily Housing (Mid-Rise): Includes apartments, townhouses, and condominiums located within the same building with at least three other dwelling units and that have between three and 10 levels (floors).

3.3.1 Kortright East

The Kortright East Development is located on the west side of Victoria Road at the extension of McCann Street and MacAllister Boulevard. The development is approved for Phase 3 and Phase 4, consisting of 102 semi-detached units and 161 single family dwellings.

Table 3.1 summarizes the estimated trip generation for the development, indicating a total of 168 and 220 new trips are forecast to be generated during the AM and PM peak hours, respectively, based on ITE rates.

3.3.2 Victoria Park Village

Victoria Park Village Development is located at the site of the former Victoria Park West Golf Club on the west side of Victoria Road, immediately north of the subject development. The development will be constructed in two phases, with a total of 82 single family dwellings, 36 semi-detached units, 212 townhouses and 168 apartment units. The development will have one street connection to Victoria Road approximately 400 metres north of Arkell Road.

Table 3.2 summarizes the estimated trip generation for the development, indicating a total of 233 and 290 new trips are forecast to be generated during the AM and PM peak hours, respectively, based on ITE rates.

3.3.3 Westminister Woods

Westminister Woods Development located at the northwest corner of Victoria Road and Clair Road, south of the subject development. The development will be constructed in a single phase, with a total of 101 apartment units and 745 m² of commercial retail space.

Table 3.3 summarizes the estimated trip generation for the development, indicating a total of 70 and 110 new trips are forecast to be generated during the AM and PM peak hours, respectively, based on the development's TIS report for this development.



3.3.4 Northwest Arkell Road and Victoria Road

Northwest Arkell Road and Victoria Road potential development located immediately west of the subject development. No approved development plans are available. Using current OP densities, potential residential development consisting of an estimated 172 single family dwellings, 231 townhouses and 95 apartment units was assumed for the area. Access to the area is expected to be via Amos Drive and the extensions of Colonial Drive and Dawes Avenue. It is anticipated the development will have vehicular access to the Victoria Park Village development.

Table 3.4 summarizes the estimated trip generation for the development, indicating a total of 266 and 337 new trips are forecast to be generated during the AM and PM peak hours, respectively, based on ITE rates.

3.3.5 388 Arkell Road Secondary School

A new secondary school is proposed at 388 Arkell Road, located at the northwest corner of Arkell Road and Victoria Road, east of the subject development. The development includes a multi-storey high school, with associated running track, sports field and parking facilities to accommodate 1,200 students. The school will be constructed in a single phase, planned to open in 2020 with 1,200 pupil spaces. It is anticipated the development will have vehicular access to Victoria Road and Arkell Road.

Paradigm completed the TIS report for 388 Arkell Road in August 2017, updated in July 2018. The TIS analyzes the PM peak hour of the school (3:00 PM to 4:00 PM), not the peak hour of the roadway. To ensure consistency with the PM peak hour of the roadway analyzed in this report, ITE LUC 530 (High School) was referenced.

Table 3.5 summarizes the estimated trip generation for the development indicating a total of 522 and 168 new trips are forecast to be generated during the AM and PM peak hours based on the TIS report and ITE rates, respectively.

3.3.6 Total Background Development Trip Generation

Table 3.6 summarizes the estimated trip generation for the study area developments included in the analysis, indicating a total of 1259 and 1125 new trips are forecast to be generated during the AM and PM peak hours, respectively.

Figure 3.4 and **Figure 3.5** show the traffic volumes from the other developments in the study area. Note that not all trips generated by the other planned developments will enter the study area. The trips were assigned to the road network based on the assignment detailed in their respective TIS reports and the existing distribution of traffic within the study area. **Appendix D** provides the AM and PM peak hour individual traffic forecasts for the other area development traffic.



TABLE 3.1: KORTRIGHT EAST TRIP GENERATION

	Land Use	Unit of	Units/		AM Pea	ak Hour			PM Pea	ak Hour	
	Land Use	Measure	GFA	Rate	ln	Out	Total	Rate	ln	Out	Total
ht East	LUC 210 - Single Family Detached	Units	161	FCE ¹	30	89	119	FCE ²	101	59	160
Kortright	LUC 220 - Multifamily Housing (Low-Rise)	Units	102	FCE ³	11	38	49	FCE ⁴	38	22	60
	Tota	t East		41	127	168		139	81	220	

 $^{^{1}}$ T = 0.71(x) + 4.80

TABLE 3.2: VICTORIA PARK VILLAGE TRIP GENERATION

	Land Use	Unit of	Units/		AM Pea	ak Hour			PM Pea	ak Hour	
	Land Use	Measure	GFA	Rate	ln	Out	Total	Rate	ln	Out	Total
Village	LUC 210 - Single Family Detached	Units	82	FCE ¹	16	47	63	FCE ²	53	31	84
Park	LUC 220 - Multifamily Housing (Low-Rise)	Units	248	FCE ³	26	87	113	FCE ⁴	84	49	133
Victoria	LUC 221 - Multifamily Housing (Mid-Rise)	Units	168	FCE ⁵	15	42	57	FCE ⁶	45	28	73
	Total Victor	oria Park V	/illage		57	176	233		182	108	290

 $^{^{1}}$ T = 0.71(x) + 4.80

4
 ln(t) = 0.89*ln(x) - 0.02

TABLE 3.3: WESTMINISTER WOODS TRIP GENERATION

Land Use	Unit of	Units/		AM Pea	ak Hour			PM Pea	ak Hour	
Land USE	Measure	GFA	Rate	ln	Out	Total	Rate	ln	Out	Total
Westminister Woo TIS Report	ds Units	101	-	38	32	70	1	53	57	110
Total W	estminister \	Woods		38	32	70		53	57	110



 $^{^{2} \}ln(t) = 0.96*\ln(x) + 0.20$

 $^{^{3} \}ln(t) = 0.95*\ln(x) - 0.51$

 $^{^{4}}$ ln(t) = 0.89*ln(x) - 0.02

 $^{^{2}}$ ln(t) = 0.96*ln(x) + 0.20

 $^{^{3}}$ In(t) = 0.95*In(x) - 0.51

 $^{^{5}}$ ln(t) = 0.99*ln(x) - 0.98

 $^{^{4}}$ ln(t) = 0.89*ln(x) - 0.02

TABLE 3.4: NORTHWEST ARKELL AND VICTORIA TRIP GENERATION

	Land Use	Unit of	Units/		AM Pea	ak Hour			PM Pea	ık Hour	
	Land Use	Measure	GFA	Rate	ln	Out	Total	Rate	ln	Out	Total
st oria	LUC 210 - Single Family Detached	Units	172	FCE ¹	32	95	127	FCE ²	108	63	171
Northwest Arkell/Victoria	LUC 220 - Multifamily Housing (Low-Rise)	Units	231	FCE ³	24	82	106	FCE ⁴	78	46	124
N Ark	LUC 221 - Multifamily Housing (Mid-Rise)	Units	95	FCE ⁵	9	24	33	FCE ⁶	26	16	42
	Total Northwest Ar	ctoria		65	201	266		212	125	337	

TABLE 3.5: 388 ARKELL ROAD SECONDARY SCHOOL TRIP GENERATION

	Landllan	Unit of	Units/		AM Pea	ak Hour			PM Pea	ak Hour	
	Land Use	Measure	GFA	Rate	ln	Out	Total	Rate	ln	Out	Total
388 Arkell	388 Arkell TIS Report	Students	1,200	-	331	191	456	0.14	78	90	168
	Total 388 Arkell Road (High School				331	191	522		78	90	168

 $^{^{2} \}ln(t) = 0.96 \ln(x) + 0.20$

 $^{^{1}}$ T = 0.71(x) + 4.80 2 In(t) = 0.96*In(x) + 0.20 3 In(t) = 0.95*In(x) - 0.51 4 In(t) = 0.89*In(x) - 0.02 5 In(t) = 0.99*In(x) - 0.98 4 In(t) = 0.89*In(x) - 0.02

TABLE 3.6: OTHER AREA DEVELOPMENTS TRIP GENERATION

		Unit of	Units/		AM Pea	ak Hour			PM Pea	ak Hour	
	Land Use	Measure	GFA	Rate	ln	Out	Total	Rate	ln	Out	Total
Kortright East	LUC 210 - Single Family Detached	Units	161	FCE ¹	30	89	119	FCE ²	101	59	160
Kortrig	LUC 220 - Multifamily Housing (Low-Rise)	Units	102	FCE ³	11	38	49	FCE ⁴	38	22	60
	Tota	al Kortrigh	t East		41	127	168		139	81	220
Village	LUC 210 - Single Family Detached	Units	82	FCE ¹	16	47	63	FCE ²	53	31	84
Victoria Park Village	LUC 220 - Multifamily Housing (Low-Rise)	Units	248	FCE ³	26	87	113	FCE ⁴	84	49	133
Victori	LUC 221 - Multifamily Housing (Mid-Rise)	Units	168	FCE ⁵	15	42	57	FCE ⁶	45	28	73
	Total Victo	oria Park \	/illage		57	176	233		182	108	290
Westmini ster Woods	Westminister Woods TIS Report	Units	101	-	38	32	70	-	53	57	110
	Total West	tminister V	Voods		38	32	70		53	57	110
st oria	LUC 210 - Single Family Detached	Units	172	FCE ¹	32	95	127	FCE ²	108	63	171
Northwest Arkell/Victoria	LUC 220 - Multifamily Housing (Low-Rise)	Units	231	FCE ³	24	82	106	FCE ⁴	78	46	124
N	LUC 221 - Multifamily Housing (Mid-Rise)	Units	95	FCE ⁵	9	24	33	FCE ⁶	26	16	42
	Total Northwest Ar	kell and Vi	ctoria		65	201	266		212	125	337
388 Arkell	388 Arkell TIS Report	Students	1,200	1	331	191	456	0.14	78	90	168
	Total 388 Arkell Roa	ad (High S	chool)		331	191	522		78	90	168
		Total New	Trips		532	727	1259		664	461	1125
					71(x) + 4				0.96*ln(x		

 $^{^{2}}$ ln(t) = 0.96*ln(x) + 0.20

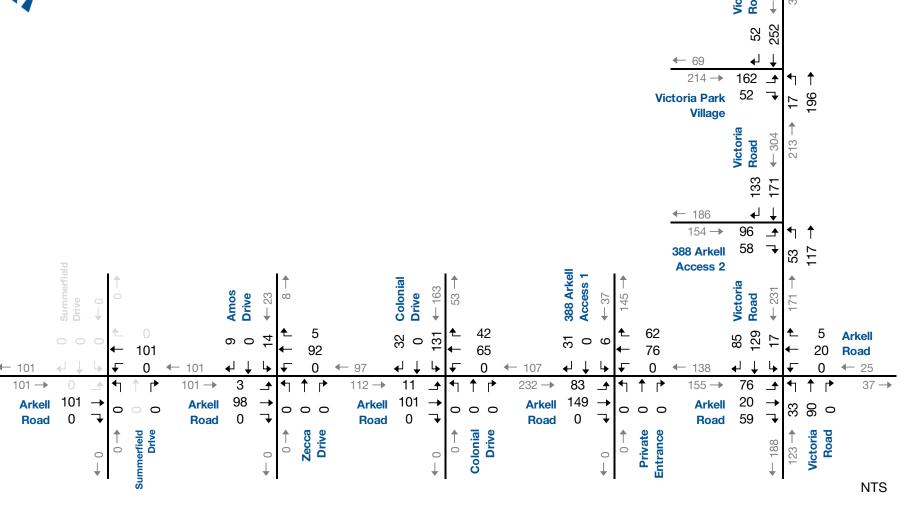
 $^{^{3}}$ ln(t) = 0.95*ln(x) - 0.51

 $^{^{4}}$ ln(t) = 0.89*ln(x) - 0.02

 $^{^{5}}$ ln(t) = 0.99*ln(x) - 0.98

 $^{^{4}}$ ln(t) = 0.89*ln(x) - 0.02

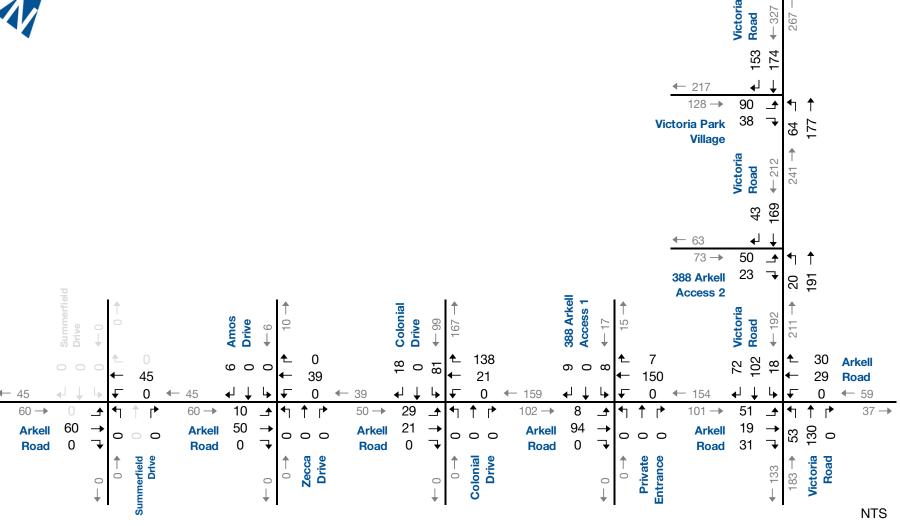






2021 AM Other Area Development Trip Assignment







2021 PM Other Area Development Trip Assignment

3.4 2021 Background

3.4.1 2021 Total Background Traffic Forecasts

Figure 3.6 and **Figure 3.7** illustrate the 2021 total background traffic including the generalized background road traffic and site traffic from the above-noted area developments for the AM and PM peak hours, respectively.

3.4.2 2021 Background Traffic Operations

The operations of the study area intersections under 2021 background traffic volumes were analyzed using Synchro 9 with HCM 2010 procedures.

Table 3.7 and **Table 3.8** summarize the 2021 background traffic operations for the AM and PM peak hours, respectively. The analyses indicate all intersections and movements within the study area are forecast to operate at overall acceptable levels of service. The following exceptions are noted:

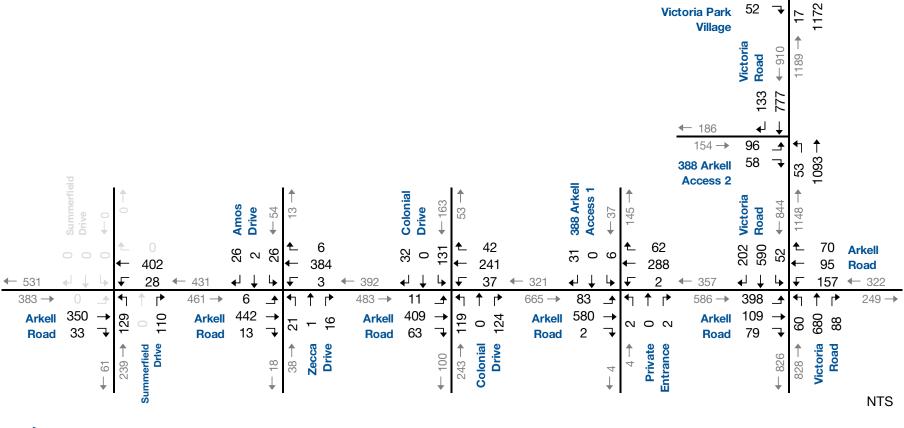
- Arkell Road and Colonial Road:
 - Northbound left-through-right movement LOS E, v/c 0.80 during the AM peak hour; and
 - Southbound left-through-right movement LOS F, v/c 0.84 during the AM peak hour and LOS E, v/c 0.51 during the PM peak hour.
- Victoria Road and Arkell Road:
 - Eastbound left-turn movement LOS F, v/c 1.20 and 95th percentile queues exceeding available storage by 77 metres during the AM peak hour and 95th percentile queues exceeding available storage by 12 metres during the PM peak hour;
 - Westbound left-turn movement 95th percentile queues exceeding available storage by 11 metres and 4 metres during the AM and PM peak hours, respectively;
 - Northbound through-right movement LOS F, v/c 1.19 during the AM peak hour and LOS F, v/c 1.37 during the PM peak hour;
 - Southbound through-right movement LOS F, v/c 1.31 during the AM peak hour and LOS F, v/c 1.54 during the PM peak hour; and
 - Overall intersection LOS F during the AM and PM peak hours.
- Victoria Road and 388 Arkell Road Access 2:
 - Northbound through movement LOS C, v/c 0.95 during the AM peak hour and LOS B, v/c 0.86 during the PM peak hour.
- Victoria Road and Victoria Park Village Road:
 - Eastbound left-turn movement LOS F, v/c 4.10 during the AM peak hour and LOS F, v/c 4.25 during the PM peak hour; and



Overall intersection – LOS F during the AM and PM peak hours.

Appendix E contains the detailed supporting Synchro 9 reports.





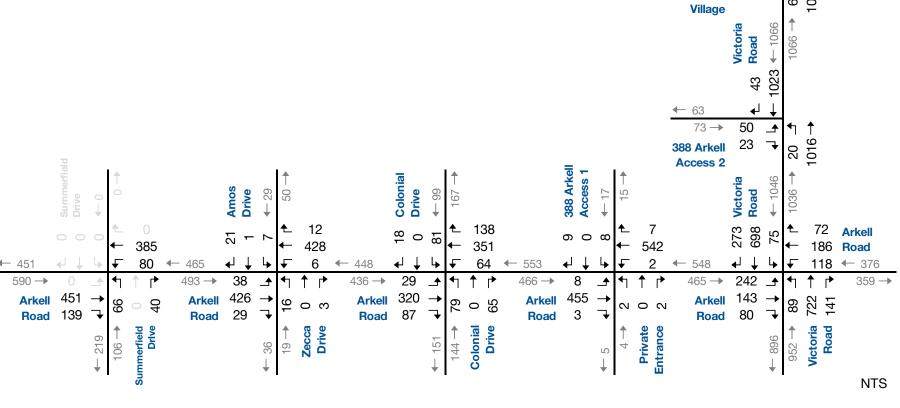


2021 AM Total Background Traffic Forecasts

Victoria

162







2021 PM Total Background Traffic Forecasts

Victoria Road

> 90 38

Victoria Park

TABLE 3.7: 2021 AM BACKGROUND TRAFFIC OPERATIONS SUMMARY

ਰ										Direction	on / M	oveme	nt / Ap	oroach	1					
erio					Eastb	ound			Westk	ound			North	oound			South	bound		
Analysis Period	Intersection	Control Type	MOE	цеТ	Through	Right	Approach	ц	Through	Right	Approach	ц	Through	Right	Approach	цеТ	Through	Right	Approach	Overall
	Arkell Road & Summerfield Drive	TWSC	LOS Delay V/C Q Ex Avail.		A 0 - -	^ ^ ^ ^ ^ ^ ^	0	A 8 0.03 0 60 60	A 0		1	C 18 0.47 3 -		^ ^ ^ ^ ^ ^ ^	C 18					4
	Arkell Road & Zecca Drive/ Amos Drive	TWSC	LOS Delay V/C Q	A 8 0.01 0	A 0 -	^ ^ ^	0	A 8 0.00 0	A 0 -	v v v v	0	< < < <	C 18 0.13 0		C 18	< < < <	C 17 0.16 1	^ ^ ^	C 17	2
	Arkell Road & Colonial Road	TWSC	LOS Delay V/C Q Ex Avail.	A 8 0.01 0.00 60 60	A 0 - -	^ ^ ^ ^ ^	0	A 9 0.04 0 60 60	A 0 - -		1	· · · · · · · · · · · · · · · · · · ·	E 48 0.80 7 -	· · · · · ·	E 48	· · · · · · ·	F 73 0.84 6 -	^ ^ ^ ^ ^	F 73	20
AM Peak Hour	Arkell Road & Residential Entrance/ 388 Access 1	TWSC	LOS Delay V/C Q Ex Avail.	A 8 0.08 0 25 25	A 0 - - -	· · · · · ·	1	A 9 0.00 0 -	A 0 - -	· · · · ·	0	· · · · · · · · · · · · · · · · · · ·	C 21 0.02 0 -	>	C 21	D 28 0.04 0 -	B 10 0.05 0 -	^ ^ ^ ^ ^ ^	B 13	1
	Victoria Road & Arkell Road	TCS	LOS Delay V/C Q Ex Avail.	F 140 1.20 117 40 -77	C 31 0.71 42 -	· · · · · ·	F 105	C 22 0.50 31 20	C 29 0.61 36 -	· · · · ·	C 26	B 17 0.28 11 90 79	F 121 1.19 247 -	>	F 113	B 17 0.26 10 50 40	F 171 1.31 259 -	· · · · · ·	F 161	F 116
	Victoria Road & 388 Access 2	TCS	LOS Delay V/C Q Ex Avail.	C 30 0.43 28 -		C 29 0.29 10 -	C 29					B 15 0.17 8 -	C 26 0.95 261 -		C 25		A 10 0.69 113 -	A 4 0.13 5 60 55	A 9	B 19
	Victoria Road & Victoria Park Village Road	TWSC	LOS Delay V/C Q	F 1585 4.10 20	0.05	C 19 0.18 1	F 1204				TOO	B 10 0.03 0	A 0 -		0		A 0 - -	> > >	0	112

MOE - Measure of Effectiveness LOS - Level of Service Delay - Average Delay per Vehicle in Seconds Q - 95th Percentile Queue Length Ex. - Existing Available Storage Avail. - Available Storage TCS - Traffic Control Signal TWSC - Two-Way Stop Control AWSC - All-Way Stop Control RBT - Roundabout < - Shared Left Movement > - Shared Right Movement



TABLE 3.8: 2021 PM BACKGROUND TRAFFIC OPERATIONS SUMMARY

75										Directi	on / M	oveme	nt / Apı	oroach	<u> </u>					
erio					Eastb	ound			Westl				North				South	bound		
Analysis Period	Intersection	Control Type	MOE	IJeТ	Through	Right	Approach	Пеff	Through	Right	Approach	Left	Through	Right	Approach	ц	Through	Right	Approach	Overall
	Arkell Road & Summerfield Drive	TWSC	LOS Delay V/C Q Ex Avail.		A 0 - -	^ ^ ^ ^ ^ ^ ^	0	A 9 0.09 0 60 60	A 0		2	C 17 0.28 1 -		^ ^ ^ ^ ^ ^ ^	C 17					2
	Arkell Road & Zecca Drive/ Amos Drive	TWSC	LOS Delay V/C Q	A 8 0.04 0	A 0 -	^ ^ ^ ^	1	A 8 0.01 0	A 0 -	\ \ \ \ \	0	< < < < < <	C 24 0.09 0	^ ^ ^ ^	C 24	· · · · ·	B 15 0.08 0	>	B 15	1
	Arkell Road & Colonial Road	TWSC	LOS Delay V/C Q Ex Avail.	A 9 0.03 0.10 60 60	A 0 - -	· · · · · ·	1	A 8 0.06 0 60 60	A 0 - -		1	· · · · · · · · · · · · · · · · · · ·	D 32 0.53 3 -	· · · · · ·	D 32	· · · · · · · · · · · · · · · · · · ·	E 40 0.51 3 -	· · · · · · ·	E 40	8
PM Peak Hour	Arkell Road & Residential Entrance/ 388 Access 1	TWSC	LOS Delay V/C Q Ex Avail.	A 9 0.01 0 25 25	A 0 - - -	· · · · · · ·	0	A 8 0.00 0 -	A 0 - -	· · · · · ·	0	< < < < < <	C 18 0.02 0 -		C 18	D 25 0.05 0 -	B 12 0.02 0 -	>	C 18	0
	Victoria Road & Arkell Road	TCS	LOS Delay V/C Q Ex Avail.	D 36 0.78 52 40 -12	C 29 0.64 50 -	^	C 32	C 21 0.37 24 20 -4	C 33 0.77 60 -	· · · · · ·	C 29	B 18 0.39 15 90 75	F 197 1.37 278	^	F 180	B 18 0.34 13 50 37	F 276 1.54 317 -	>	F 257	F 164
	Victoria Road & 388 Access 2	TCS	LOS Delay V/C Q Ex Avail.	C 29 0.27 17 -		C 28 0.14 7 -	C 29					B 19 0.09 3 -	B 15 0.86 218 -		B 15		B 14 0.84 215 -	A 3 0.04 3 60 57	B 13	B 15
	Victoria Road & Victoria Park Village Road	TWSC	LOS Delay V/C Q	F 1808 4.25 12		D 29 0.22 1	F 1280	Dugue				B 14 0.14 1	A 0 -	Signa	1		A 0 -	>	0	65

MOE - Measure of Effectiveness LOS - Level of Service Delay - Average Delay per Vehicle in Seconds Q - 95th Percentile Queue Length Ex. - Existing Available Storage Avail. - Available Storage TCS - Traffic Control Signal TWSC - Two-Way Stop Control AWSC - All-Way Stop Control RBT - Roundabout < - Shared Left Movement > - Shared Right Movement



3.5 2026 Background

3.5.1 2026 Background Traffic Forecasts

Figure 3.8 and **Figure 3.9** illustrate the 2026 total background traffic including the generalized background traffic and site traffic from the abovenoted area developments for the AM and PM peak hours, respectively.

3.5.2 2026 Background Traffic Operations

The operations of the study area intersections under 2026 background traffic volumes were analyzed using Synchro 9 with HCM 2010 procedures.

Table 3.9 and **Table 3.10** summarize the 2026 background traffic operations for the AM and PM peak hours, respectively. The analyses indicate all intersections and movements within the study area are forecast to operate at overall acceptable levels of service. The following exceptions are noted:

- Arkell Road and Colonial Road:
 - Northbound left-through-right movement LOS F, v/c 0.97 during the AM peak hour and LOS E, v/c 0.67 during the PM peak hour; and
 - Southbound left-through-right movement LOS F, v/c 0.98 during the AM peak hour and LOS F, v/c 0.60 during the PM peak hour.
- Victoria Road and Arkell Road:
 - Eastbound left-turn movement LOS F, v/c 1.32 and 95th percentile queues exceeding available storage by 101 metres during the AM peak hour and 95th percentile queues exceeding available storage by 25 metres during the PM peak hour;
 - Westbound left-turn movement 95th percentile queues exceeding available storage by 14 metres and 6 metres during the AM and PM peak hours, respectively;
 - Northbound through-right movement LOS F, v/c 1.32 during the AM peak hour and LOS F, v/c 1.51 during the PM peak hour;
 - Southbound through-right movement LOS F, v/c 1.42 during the AM peak hour and LOS F, v/c 1.70 during the PM peak hour; and
 - Overall intersection LOS F during the AM and PM peak hours.
- Victoria Road and 388 Arkell Road Access 2:
 - Northbound through movement LOS D, v/c 1.04 during the AM peak hour and LOS C, v/c 0.93 during the PM peak hour; and
 - Southbound through movement LOS B, v/c 0.92 during the PM peak hour.
- Victoria Road and Victoria Park Village Road:

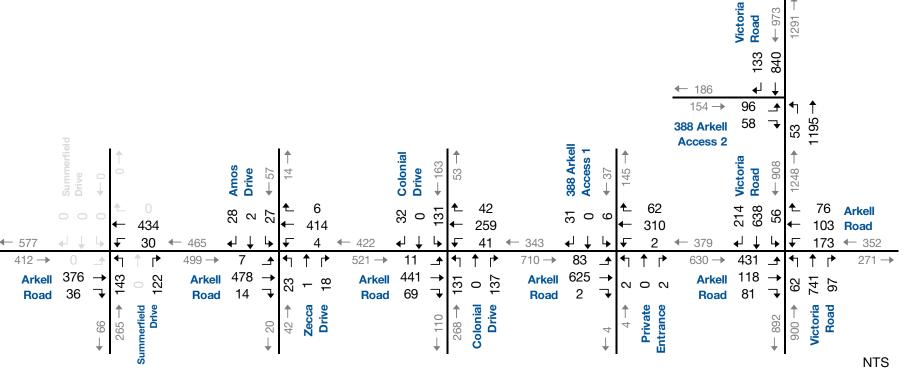


- Eastbound left-turn movement LOS F, v/c 5.34 during the AM peak hour and LOS F v/c 5.44 during the PM peak hour; and
- Overall intersection LOS F during the AM and PM peak hours.

Appendix F contains the detailed supporting Synchro 9 reports.







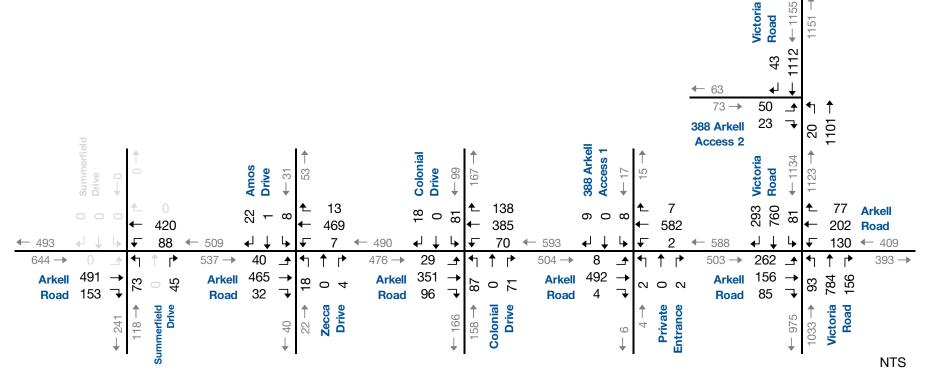


2026 AM Background Traffic Forecasts

52

Victoria Park Village







2026 PM Background Traffic Forecasts

Victoria

90 38

Victoria Park Village

TABLE 3.9: 2026 AM BACKGROUND TRAFFIC OPERATIONS SUMMARY

ō										Directi	on / M	oveme	nt / Ap	proach	1					
Period					Eastb	ound			Westk	ound			North	bound			South	bound		
Analysis P	Intersection	Control Type	MOE	ц	Through	Right	Approach	Пeft	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Overall
	Arkell Road & Summerfield Drive	TWSC	LOS Delay V/C Q Ex Avail.		A 0	^	0	A 8 0.03 0 60 60	A 0		1	C 21 0.55 3 -		^ ^ ^ ^ ^ ^ ^	C 21					5
	Arkell Road & Zecca Drive/ Amos Drive	TWSC	LOS Delay V/C Q	A 8 0.01 0	A 0 -	> > >	0	A 9 0.00 0	A 0 -	\ \ \ \ \	0	v v v	C 20 0.15 1	^ ^ ^	C 20	v v v	C 19 0.18 1	^ ^ ^ ^ ^	C 19	2
	Arkell Road & Colonial Road	TWSC	LOS Delay V/C Q Ex Avail.	A 8 0.01 0.00 60 60	A 0 - -	>	0	A 9 0.05 0 60 60	A 0	v v v v v	1	· · · · · · ·	F 82 0.97 10 -	^ ^ ^ ^ ^ ^	F 82	· · · · · · · ·	F 116 0.98 8 -		F 116	32
AM Peak Hour	Arkell Road & Residential Entrance/ 388 Access 1	TWSC	LOS Delay V/C Q Ex Avail.	A 8 0.08 0 25 25	A 0 - - -	> > > >	1	A 9 0.00 0 -	A 0 - -	· · · · · ·	0	< < < < <	C 23 0.02 0 -		C 23	D 31 0.05 0 -	B 11 0.05 0 -	· · · · · ·	B 14	1
	Victoria Road & Arkell Road	TCS	LOS Delay V/C Q Ex Avail.	F 191 1.32 141 40 -101	C 31 0.73 45 -	> > > > >	F 140	C 23 0.55 34 20 -14	C 29 0.64 39 -	· · · · · ·	C 26	B 17 0.29 11 90 79	F 176 1.32 279 -	>	F 165	B 17 0.28 11 50 39	F 220 1.42 288 -	· · · · · · ·	F 207	F 156
	Victoria Road & 388 Access 2	TCS	LOS Delay V/C Q Ex Avail.	C 30 0.43 28 -		C 29 0.29 10 -	C 29					B 17 0.19 8 -	D 47 1.04 298 -		D 46		B 11 0.74 135 -	A 4 0.13 5 60 55	A 10	C 30
MOE	Victoria Road & Victoria Park Village Road	TWSC	LOS Delay V/C Q	F 2191 5.34 21	0.05	C 21 0.20 1	F 1664				TO0	B 11 0.03 0	A 0 -		0		A 0 - -	> > > >	0	144

MOE - Measure of Effectiveness LOS - Level of Service Delay - Average Delay per Vehicle in Seconds Q - 95th Percentile Queue Length Ex. - Existing Available Storage Avail. - Available Storage TCS - Traffic Control Signal TWSC - Two-Way Stop Control AWSC - All-Way Stop Control RBT - Roundabout < - Shared Left Movement > - Shared Right Movement



TABLE 3.10: 2026 PM BACKGROUND TRAFFIC OPERATIONS SUMMARY

Analysis Period	Intersection Arkell Road & Summerfield Drive	Control Type	MOE	Left	Through gases	Right puno	oach	Direction / Movement / Approach Eastbound Westbound Northbound Southbound U U U U U U U U U U U U U U U U U U U													
Analysis P	Arkell Road &			Left	Through	light	oach		4												
			50		-	4	Approach	ц	Through	Right	Approach	μеη	Through	Right	Approach	ц	Through	Right	Approach	Overall	
		TWSC	Delay V/C Q Ex Avail.		A 0	^ ^ ^ ^ ^ ^ ^	0	A 9 0.10 0 60 60	A 0 - -		2	C 20 0.33 1 -		\ \ \ \ \ \ \	C 20					3	
	Arkell Road & Zecca Drive/ Amos Drive	TWSC	LOS Delay V/C Q	A 9 0.04 0	A 0	^ ^ ^ ^	1	A 9 0.01 0	A 0 -	\ \ \ \ \	0	v v v v	D 27 0.13 0	^ ^ ^	D 27	v v v v	C 17 0.10 0	\ \ \ \ \	C 17	1	
	Arkell Road & Colonial Road	TWSC	LOS Delay V/C Q Ex Avail.	A 9 0.03 0.10 60 60	A 0	^ ^ ^ ^ ^ ^	1	A 9 0.07 0 60 60	A 0		1	^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^	E 45 0.67 4 -		E 45	V V V V V	F 53 0.60 3 -		F 53	10	
PM Peak Hour	Arkell Road & Residential Entrance/ 388 Access 1	TWSC	LOS Delay V/C Q Ex Avail.	A 9 0.01 0 25 25	A 0 - -	· · · · · ·	0	A 9 0.00 0	A 0 - -	· · · · ·	0	· · · · · · ·	C 20 0.02 0	· · · · · ·	C 20	D 29 0.05 0	B 13 0.02 0	· · · · ·	C 20	0	
	Victoria Road & Arkell Road	TCS	LOS Delay V/C Q Ex Avail.	D 47 0.87 65 40	C 29 0.67 54 -	^ ^ ^ ^ ^	D 39	C 22 0.41 26 20	C 35 0.79 66 -	·	C 31	B 18 0.41 15 90 75	F 262 1.51 308 -	^ ^ ^ ^	F 240	B 18 0.36 14 50 36	F 345 1.70 349	·	F 322	F 210	
	Victoria Road & 388 Access 2	TCS	LOS Delay V/C Q Ex Avail.	C 29 0.27 17 -		C 28 0.14 7 -	C 29					C 26 0.12 3 -	C 22 0.93 248 -		C 22		B 20 0.92 246 -	A 3 0.04 3 60 57	B 19	C 21	
	Victoria Road & Victoria Park Village Road	TWSC	LOS Delay V/C Q	F 2421 5.44 13		D 34 0.25 1 th Perc	F 1712					B 15 0.16 1	A 0 - - Control		1		A 0 -	> > > > Rounda	0	81	

MOE - Measure of Effectiveness LOS - Level of Service Delay - Average Delay per Vehicle in Seconds Q - 95th Percentile Queue Length Ex. - Existing Available Storage Avail. - Available Storage TCS - Traffic Control Signal TWSC - Two-Way Stop Control AWSC - All-Way Stop Control

< - Shared Left Movement
> - Shared Right Movement



3.6 2031 Background

3.6.1 2031 Background Traffic Forecasts

Figure 3.10 and **Figure 3.11** illustrate the 2031 total background traffic including the generalized background traffic and site traffic from the abovenoted area developments for the AM and PM peak hours, respectively.

3.6.2 2031 Background Traffic Operations

The operations of the study area intersections under 2031 background traffic volumes were analyzed using Synchro 9 with HCM 2010 procedures.

Table 3.11 and **Table 3.12** summarize the 2031 background traffic operations for the AM and PM peak hours, respectively. The analyses indicate all intersections and movements within the study area are forecast to operate at overall acceptable levels of service. The following exceptions are noted:

- Arkell Road and Colonial Road:
 - Northbound left-through-right movement LOS F, v/c 1.26 during the AM peak hour and LOS F, v/c 0.91 during the PM peak hour;
 - Southbound left-through-right movement LOS F, v/c 1.28 during the AM peak hour and LOS F, v/c 0.76 during the PM peak hour: and
 - Overall intersection LOS F during the AM peak hour.
- Arkell Road and 388 Arkell Road Access 1:
 - Southbound left-turn movement LOS E, v/c 0.05 during the AM peak hour.
- Victoria Road and Arkell Road:
 - Eastbound left-turn movement LOS F, v/c 1.51 and 95th percentile queues exceeding available storage by 125 metres during the AM peak hour and LOS E, v/c 1.00 and 95th percentile queues exceeding available storage by 41 metres during the PM peak hour;
 - Westbound left-turn movement 95th percentile queues exceeding available storage by 18 metres and 9 metres during the AM and PM peak hours, respectively;
 - Northbound through-right movement LOS F, v/c 1.51 during the AM peak hour and LOS F, v/c 1.73 during the PM peak hour;
 - Southbound through-right movement LOS F, v/c 1.59 during the AM peak hour and LOS F, v/c 1.93 during the PM peak hour; and
 - Overall intersection LOS F during the AM and PM peak hours.
- Victoria Road and 388 Arkell Road Access 2:

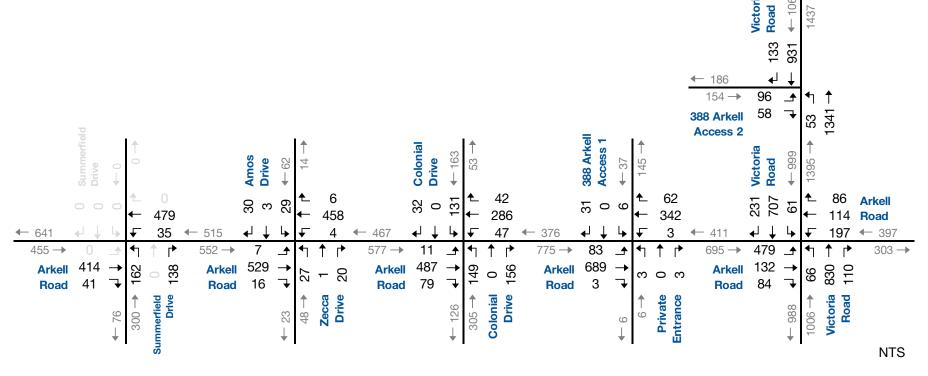


- Northbound through movement LOS F, v/c 1.17 during the AM peak hour and LOS D, v/c 1.04 during the PM peak hour;
- Southbound through movement LOS D, v/c 1.01 during the PM peak hour; and
- Overall intersection LOS E during the AM peak hour.
- Victoria Road and Victoria Park Village Road:
 - Eastbound left-turn movement LOS F, v/c 8.00 during the AM peak hour and LOS F v/c 8.15 during the PM peak hour;
 - Eastbound right-turn movement LOS E, v/c 0.30 during the PM peak hour; and
 - Overall intersection LOS F during the AM and PM peak hours.

Appendix G contains the detailed supporting Synchro 9 reports.









2031 AM Background Traffic Forecasts

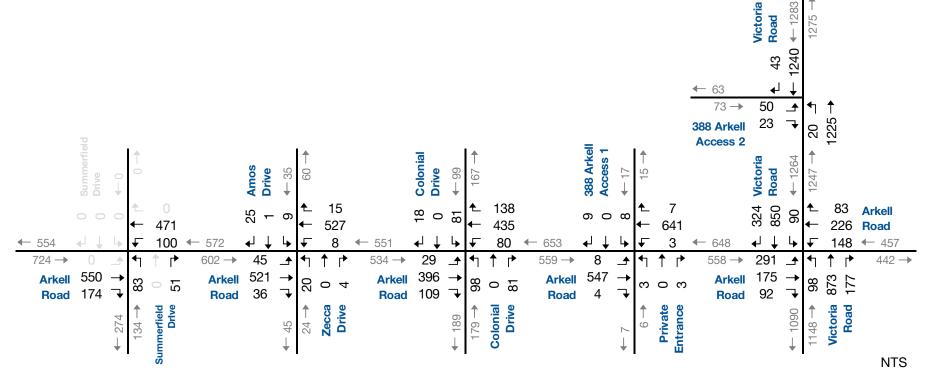
Victoria

162 52

Victoria

Victoria Park Village







2031 PM Background Traffic Forecasts

Victoria

Victoria Park Village

TABLE 3.11: 2031 AM BACKGROUND TRAFFIC OPERATIONS SUMMARY

ਰ										Directi	on / M	oveme	nt / Ap	proach	1					$\overline{}$
erio					Eastb	ound			Westl	ound			North	bound			South	bound		
Analysis Period	Intersection	Control Type	MOE	ц	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Teft	Through	Right	Approach	Overall
	Arkell Road & Summerfield Drive	TWSC	LOS Delay V/C Q Ex Avail.		A 0 - -	^	0	A 9 0.03 0 60 60	A 0		1	D 27 0.67 5 -		^ ^ ^ ^ ^ ^ ^	D 27					7
	Arkell Road & Zecca Drive/ Amos Drive	TWSC	LOS Delay V/C Q	A 8 0.01 0	A 0 -	> > >	0	A 9 0.00 0	A 0 -	\ \ \ \ \	0	· · · ·	C 24 0.21 1		C 24	v v v	C 22 0.23 1	^ ^ ^	C 22	2
	Arkell Road & Colonial Road	TWSC	LOS Delay V/C Q Ex Avail.	A 8 0.01 0.00 60 60	A 0 - -	>	0	A 9 0.06 0 60 60	A 0 - -		1	· · · · · · · · · · · · · · · · · · ·	F 181 1.26 16 -	· · · · · ·	F 181	· · · · · · ·	F 229 1.28 11 -	^ ^ ^ ^ ^	F 229	66
AM Peak Hour	Arkell Road & Residential Entrance/ 388 Access 1	TWSC	LOS Delay V/C Q Ex Avail.	A 9 0.08 0 25 25	A 0 - - -	> > > >	1	A 9 0.00 0 -	A 0 - - -	· · · · · ·	0	<	D 26 0.04 0 -		D 26	E 36 0.05 0	B 11 0.05 0 -	· · · · · ·	C 15	1
	Victoria Road & Arkell Road	TCS	LOS Delay V/C Q Ex Avail.	F 271 1.51 165 40 -125	C 31 0.74 50 -	> > > > >	F 197	C 26 0.64 38 20 -18	C 30 0.68 45 -	· · · · · ·	C 28	B 17 0.31 12 90 78	F 257 1.51 322 -	>	F 241	B 17 0.30 11 50 39	F 294 1.59 323 -	· · · · · ·	F 277	F 215
	Victoria Road & 388 Access 2	TCS	LOS Delay V/C Q Ex Avail.	C 30 0.43 28 -		C 29 0.29 10 -	C 29					C 23 0.24 9 -	F 94 1.17 350 -		F 92		B 14 0.82 206 -	A 4 0.13 5 60 55	B 13	E 56
	Victoria Road & Victoria Park Village Road	TWSC	LOS Delay V/C Q	F 3498 8.00 22	0.05	C 24 0.23 1	F 2653				TOO	B 11 0.03 0	A 0 -		0		A 0 - -	> > >	0	209

MOE - Measure of Effectiveness LOS - Level of Service

Delay - Average Delay per Vehicle in Seconds

Q - 95th Percentile Queue Length Ex. - Existing Available Storage Avail. - Available Storage

TCS - Traffic Control Signal TWSC - Two-Way Stop Control AWSC - All-Way Stop Control RBT - Roundabout < - Shared Left Movement > - Shared Right Movement



TABLE 3.12: 2031 PM BACKGROUND TRAFFIC OPERATIONS SUMMARY

٦										Directi	on / M	oveme	nt / Ap	proach	1					
erio					Easth	ound			Westk	ound			North	bound			South	bound		
Analysis Period	Intersection	Control Type	MOE	ц	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Overall
	Arkell Road & Summerfield Drive	TWSC	LOS Delay V/C Q Ex Avail.		A 0 - -	>	0	A 10 0.12 0 60 60	A 0		2	C 24 0.42 2 -		^ ^ ^ ^ ^ ^ ^	C 24					3
	Arkell Road & Zecca Drive/ Amos Drive	TWSC	LOS Delay V/C Q	A 9 0.05 0	A 0 -	> > >	1	A 9 0.01 0	A 0 -	\ \ \ \ \	0	v v v	D 35 0.17 1	^ ^ ^	D 35	v v v	C 19 0.13 0	^ ^ ^	C 19	2
	Arkell Road & Colonial Road	TWSC	LOS Delay V/C Q Ex Avail.	A 9 0.03 0.10 60 60	A 0 - -	>	1	A 9 0.08 0 60 60	A 0 - -	V V V V V	1	· · · · · · · · · · · · · · · · · · ·	F 88 0.91 7 -	· · · · · ·	F 88	· · · · · · · · · · · · · · · · · · ·	F 88 0.76 5 -		F 88	17
PM Peak Hour	Arkell Road & Residential Entrance/ 388 Access 1	TWSC	LOS Delay V/C Q Ex Avail.	A 9 0.01 0 25 25	A 0 - - -	> > > > >	0	A 9 0.00 0 -	A 0 - -	· · · · · ·	0	< < < < <	C 23 0.03 0 -		C 23	D 34 0.07 0 -	B 13 0.02 0 -	^ ^ ^ ^	C 23	1
	Victoria Road & Arkell Road	TCS	LOS Delay V/C Q Ex Avail.	E 77 1.00 81 40 -41	C 32 0.71 61 -	> > > > >	E 55	C 22 0.47 29 20	D 38 0.82 76 -	· · · · · ·	C 33	B 19 0.43 16 90 74	F 360 1.73 351 -		F 331	B 19 0.40 15 50 35	F 449 1.93 396 -	· · · · · ·	F 418	F 278
	Victoria Road & 388 Access 2	TCS	LOS Delay V/C Q Ex Avail.	C 29 0.27 17 -		C 28 0.14 7 -	C 29					D 40 0.21 5 -	D 46 1.04 291 -		D 45		D 40 1.02 290 -	A 3 0.04 3 60 57	D 39	D 42
	Victoria Road & Victoria Park Village Road	TWSC	LOS Delay V/C Q	F 3835 8.15 14		E 42 0.30 1	F 2709					C 16 0.18 1	A 0 -		1		A 0 -	> > >	0	117

MOE - Measure of Effectiveness LOS - Level of Service

Delay - Average Delay per Vehicle in Seconds

Q - 95th Percentile Queue Length Ex. - Existing Available Storage Avail. - Available Storage TCS - Traffic Control Signal TWSC - Two-Way Stop Control AWSC - All-Way Stop Control RBT - Roundabout < - Shared Left Movement > - Shared Right Movement



4 Background Network Improvements

4.1 Remedial Measures

4.1.1 Signal Optimization

Under 2021, 2026 and 2031 background conditions, the signalized intersection at Victoria Road and Arkell Road has movements operating at LOS E or greater with v/c ratios greater than 0.85 during the AM peak hour. With forecast traffic growth, movements and intersections are forecast to operate at unacceptable levels of service with long delays. Re-timing and optimization of the signals may help to alleviate some of the potential delay for these movements and the overall intersections.

4.1.2 Dual Left-Turn Lane Warrants

The eastbound left turn at Arkell Road and Victoria Road operates below acceptable levels of service with heavy volumes. Dual left-turn lanes may help to alleviate the delay for this movement.

The Transportation Association of Canada (TAC) Geometric Design Guide for Canadian Roads (GDGCR)⁹ recommends dual left-turns when peak hour left-turn volumes exceed 300 vehicles per hour. The following left-turn volumes are forecast at the intersection:

- Arkell Road and Victoria Road Eastbound Left-Turn:
 - Base Year (2018) AM peak hour volume 303 vph
 - Background 2021 AM peak hour volume 398 vph

Based on the existing eastbound left-turn traffic volumes, dual left-turn lanes are warranted at Arkell Road and Victoria Road. By 2031, the 95th percentile queues are forecast to extend 125 metres past the existing 40 metres of storage, further intensifying the need for dual left-turn lanes.

To accommodate the dual-left turn lanes, Victoria Road north of Arkell Road would need to be widened to accommodate two receiving lanes at Arkell Road. In addition, a centre-median would be required on Arkell Road to restrict the commercial plaza entrance on the south side of Arkell Road to right-in/right-out access only.

4.1.3 Right-Turn Lane Warrants

By 2021, northbound and southbound through-right movements at the Arkell Road and Victoria Road intersection are forecast to approach capacity during both peak hours. This is likely caused by the general increase in

⁹ Transportation Association of Canada. *Geometric Design Guide for Canadian Roads.* June 2017.



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through traffic coupled with the increase in right-turning traffic due to study area developments.

The TAC GDGCR details the requirements for auxiliary right-turn lanes. The GDGCR recommends a right-turn lane at a signalized intersection without a separate signal indication "when the volume of right-turning traffic is 10% to 20% of the total approaching volume". The following details the right-turning traffic percentage of the total approach volume for critical through-right movements at Victoria Road and Arkell Road:

- Northbound Through-Right:
 - Base Year (2018): 13% AM and 13% PM
 - Background (2021): 11% AM and 16% PM
- Southbound Through-Right:
 - Base Year (2018): 19% AM and 25% PM
 - Background (2021): 26% AM and 28% PM

Based on the TAC GDGCR, right-turn lanes should be provided for both the northbound and southbound movement based on existing conditions.

The GDGCR further details the requirements for right-turn lanes with parallel deceleration lanes. On Victoria Road, at a design speed of 80 km/h (10km/h over posted), the minimum lane (60 metres) + taper (52 metres) length is 120 metres.

4.1.4 Traffic Control Signal Warrants

Ontario Traffic Manual (OTM) Book 12 provides warrants for the installation of traffic control signals. Justification 7 is used to determine the need for traffic control signals based on projected volumes at existing or planned intersections. There is increased uncertainty of volume projections for proposed new developments, therefore the warrant must be fulfilled 120% for existing intersections and 150% for future intersections.

Traffic signal control warrants were completed for the following study area intersections, for the 2031 background traffic horizon, as this represents the "worst case scenario". If signals are not warranted at this horizon, they will not be warranted for the 2021 and 2026 horizons. The warrants are fulfilled as noted:

- Arkell Road and Colonial Drive 100.2%, signals not warranted;
- Victoria Road and Victoria Park Village Road 126.0%, signals not warranted.

Under 2031 background conditions, the above intersections operate with considerable delay to the minor road movements. All-way Stop is not appropriate for the intersections, as Arkell Road and Victoria Road are



arterial roadways with considerably higher traffic volumes than the minor approaches, Colonial Drive and Victoria Park Village Road, respectively. The installation of a traffic control signal was examined as it would help to alleviate the potential delay for the minor road movements and the overall intersection. The signal warrants are not fulfilled for either intersection.

However, to provide acceptable levels of service for the northbound and southbound movements at the intersection of Arkell Road and Colonial Road and the eastbound movement at the intersection of Victoria Road and Victoria Park Village Road, it is recommended traffic signals are installed by the 2031 horizon year.

Appendix H includes the signal warrant justification worksheets.

4.1.5 Widening Victoria Road to 4 Lanes

The 2021 background AM peak hour through movements on Victoria Road at Arkell Road are operating above capacity. The addition of background traffic growth to 2026 and 2031 horizons further increases delays along Victoria Road. To accommodate the increase in background traffic, it is recommended to widen Victoria Road to 4 lanes south of MacAllister Boulevard to Clair Road. It is noted that the widening of Victoria Road from MacAllister Boulevard to Clair Road is identified as a Development Charges project for the 2031-2033 time frame, in the City of Guelph's infrastructure cost estimates¹⁰.

4.2 Background Operations with Remedial Measures

Paradigm completed Synchro 9 level of service analyses with HCM 2010 procedures for the intersections with the following improvements:

- Signal timing and phasing optimization at all signalized intersections;
- Eastbound dual left-turn lanes and fully-protected phase at Victoria Road and Arkell Road;
- Northbound and southbound right-turn lanes at Victoria Road and Arkell Road:
- Traffic Control Signals at Arkell Road and Colonial Road, and Victoria Road and Victoria Park Village Road; and
- Widening Victoria Road to four (4) lanes from Clair Road to MacAllister Boulevard.

The intersections were assessed for the 2031 background traffic horizon, as this represents the "worst case scenario". If the intersection improvements provide acceptable levels of service for all movements at this horizon, they will provide acceptable levels of service for the 2021 and 2026 horizons.

¹⁰ Watson & Associates Economists Ltd. *2018 Guelph DC – Infrastructure Costs Covered in the DC Calculation*. 22 May 2018.



Table 4.1 and **Table 4.2** summarize the total traffic operations for the AM and PM peak hours, respectively. Based on the analyses, it is concluded that the intersections are forecast to operate at acceptable levels of service. The following exceptions are noted:

- Victoria Road and Arkell Road:
 - Eastbound left-turn movement 95th percentile queues exceeding available storage by 42 metres and 22 metres during the AM and PM peak hours, respectively; and
 - Westbound left-turn movement 95th percentile queues exceeding available storage by 10 metres and 15 metres during the AM and PM peak hours, respectively.

Appendix I provides the detailed supporting Synchro 9 output.

If eastbound dual left-turn lanes are installed at Arkell Road and Victoria Road, the analyses indicate the 95th percentile queue is forecast to be 82 metres, which will not impact the operations at 388 Arkell Road Access 1. The tapers for the dual left-turn lanes will need to be designed to start east of Access 1.

The City can mitigate queues spillback into the through lanes by increasing the queue storage to contain the 95th percentile queues. It is important to note the 95th percentile queues only occur for approximately 5% of the peak hour or for about three minutes during the peak hour. The remaining movements are operating at acceptable levels of service but are reaching capacity.



TABLE 4.1: 2031 AM REMEDIAL MEASURES BACKGROUND TRAFFIC OPERATIONS SUMMARY

ō				Direction / Movement / Approach																
Analysis Period	Intersection	Control Type		Eastbound				Westl	ound			Northbound			Southbound					
			MOE	цец	Through	Right	Approach	ų	Through	Right	Approach	ų	Through	Right	Approach	ų	Through	Right	Approach	Overall
	Arkell Road & Colonial Road	TCS	LOS Delay V/C Q Ex	C 21 0.03 4 60	C 23 0.76 130	^ ^ ^ ^	C 23	C 34 0.24 16 60	B 17 0.45 64 -	\ \ \ \ \ \	B 19	V V V V	C 22 0.50 76		C 22	V V V V	B 20 0.31 40 -	^ ^ ^ ^	B 20	C 22
AM Peak Hour	Victoria Road & Arkell Road	TCS	Avail. LOS Delay V/C Q Ex Avail.	56 D 44 0.85 82 40	- C 30 0.56 58 -	> > > > >	D 39	26 0.48 42 20	D 41 0.77 60 -	^	C 34	8180.25169074	- C 20 0.22 114 -	> > > > >	C 26	S 19 0.26 15 50 35	- C 23 0.50 94 -	>	C 24	C 29
	Victoria Road & Victoria Park Village Road	TCS	LOS Delay V/C Q	D 44 0.78 53		D 36 0.28 10	D 42					A 7 0.05 4	A 6 0.59 106		A 6		A 6 0.43 67	^ ^ ^	A 6	A 9

MOE - Measure of Effectiveness

LOS - Level of Service

Delay - Average Delay per Vehicle in Seconds

Q - 95th Percentile Queue Length Ex. - Existing Available Storage Avail. - Available Storage TCS - Traffic Control Signal TWSC - Two-Way Stop Control AWSC - All-Way Stop Control RBT - Roundabout < - Shared Left Movement > - Shared Right Movement

TABLE 4.2: 2031 PM REMEDIAL MEASURES BACKGROUND TRAFFIC OPERATIONS SUMMARY

ō				Direction / Movement / Approach																
Analysis Period	Intersection	Control Type		Eastbound					Westl	ound			North	oound			Southbound			
			MOE	цец	Through	Right	Approach	ų	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Overall
			LOS	C	В	>	В	С	В	>	В	<	В	>	В	<	В	>	В	В
Arkell Road &		Delay V/C	27 0.11	17 0.61	> >	17	26 0.26	18 0.70	>	19	< <	19 0.29	> >	19	< <	18 0.17	>	18	19	
	Colonial Road	TCS	Q	8	90	>		20	108	>		<	33	>		<	19	>		
			Ex	60 52	-	>		60	-	>		<	-	>		<	-	>		
lno _O			Avail. LOS	D D	C	>	D	40 C	 D	>	D	< 	C	>	С	< В	C	>	С	С
X T		TCS	Delay	49	32	>	41	27	44	>	38	19	21	>	25	19	24	>	25	29
Pea	Victoria Road &		V/C	0.79	0.59	>		0.43	0.82	>		0.38	0.31	>		0.35	0.56	>		
Σ	W W W W W W W W W W W W W W W W W W W		Q	50	73	>		35	97	>		22	119	>		21	113	>		
٩			Ex	40	-	>		20	-	>		90	-	>		50	-	>		
			Avail. LOS	-10 D	-	> D	D	-15	-	>		68	_	>		29	-	>	Α.	
Victoria	Victoria Road &	TCS	Delay	40		38	40					B 15	A 5		A 6		A 7	>	A 7	A 8
	Victoria Park Village Road		V/C	0.51		0.24	70					0.28	0.53				0.61	>	,	3
	violona i ant vinage rioda		Q	33		9						16	69				94	>		

MOE - Measure of Effectiveness LOS - Level of Service

Delay - Average Delay per Vehicle in Seconds

Q - 95th Percentile Queue Length Ex. - Existing Available Storage Avail. - Available Storage TCS - Traffic Control Signal TWSC - Two-Way Stop Control AWSC - All-Way Stop Control RBT - Roundabout < - Shared Left Movement

> - Shared Right Movement



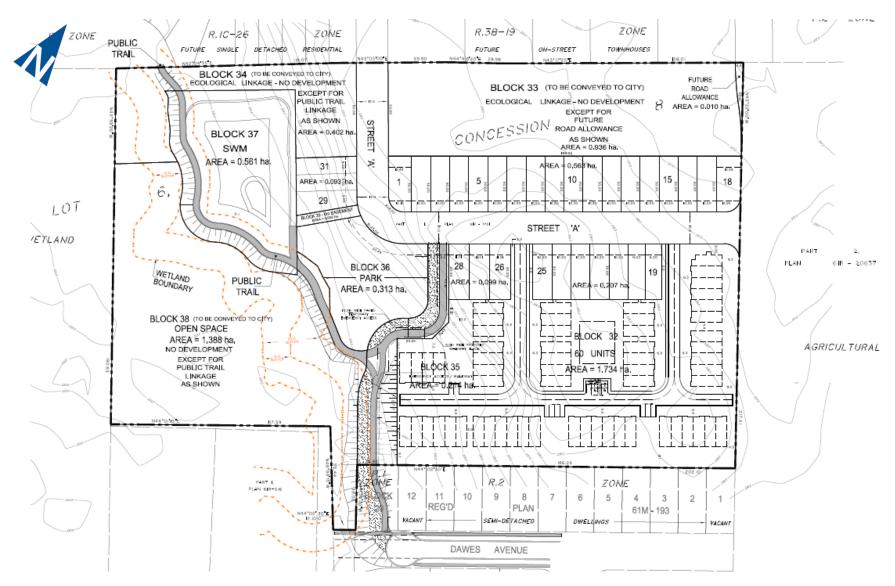
5 Development Concept

5.1 Development Description

The proposed development is located at 220 Arkell Road in Guelph, Ontario. The development will include 31 single-family homes and 60 cluster townhouse dwellings for a total of 91 units.

The subject site does not have direct road access to Arkell Road, therefore access will be provided via neighbouring developments (Victoria Park Village to the north and future developments to the south/east). Temporary emergency access will be provided through Block 20 on Dawes Avenue. The development is expected to begin construction in 2019 and be completed and fully occupied by 2021.

Figure 5.1 illustrates the proposed development concept site plan.





Development Concept Site Plan

5.2 Development Trip Generation

Trip generation information is used to forecast the anticipated level of traffic activity to occur as a result of the development of the site.

The Institute of Transportation Engineers (ITE) Trip Generation Manual 10th Edition provide rates and equations to estimate the constituent component development peak hour traffic volumes. The following ITE Land Use Codes (LUC) were utilized in this study:

- ▶ LUC 210 Single-Family Detached Housing: Includes all single-family detached homes on individual lots.
- ▶ LUC 220 Multifamily Housing (Low Rise): Includes apartments, townhouses, and condominiums located within the same building with at least three other dwelling units and that have one or two levels (floors).

The regression equations were utilized for the development as all criteria for their use was met.

Table 5.1 summarizes the resulting base trip generation and indicates that the site will generate a total of 56 AM peak hour trips and 70 PM peak hour trips upon full build-out.

TABLE 5.1: TRIP GENERATION

	Unit of	Units/		AM Pea	ak Hour		PM Peak Hour					
	Measure	GFA	Rate	ln	Out	Total	Rate	ln	Out	Total		
LUC 210 - Single Family Detached	Units	31	FCE ¹	7	20	27	FCE ²	21	12	33		
LUC 220 - Multifamily Housing (Low-Rise)	Units	60	FCE ³	7	22	29	FCE ⁴	23	14	37		
		14	42	56		44	26	70				

 1 T = 0.71(x) + 4.80

 3 ln(t) = 0.95*ln(x) - 0.51

 2 ln(t) = 0.96*ln(x) + 0.20

 4 In(t) = 0.89*In(x) - 0.02

5.3 Development Trip Distribution and Assignment

The estimated site generated trips were assigned to the roadway network based on the existing distribution of traffic within the study area. As the subject site does not have direct road access to Arkell Road, it is anticipated vehicles will exit the development via Dawes Avenue/Amos Drive to Arkell Road or Victoria Park Village Road to Victoria Road based on their destination.

Table 3.2 details the estimated trip distribution for the development.

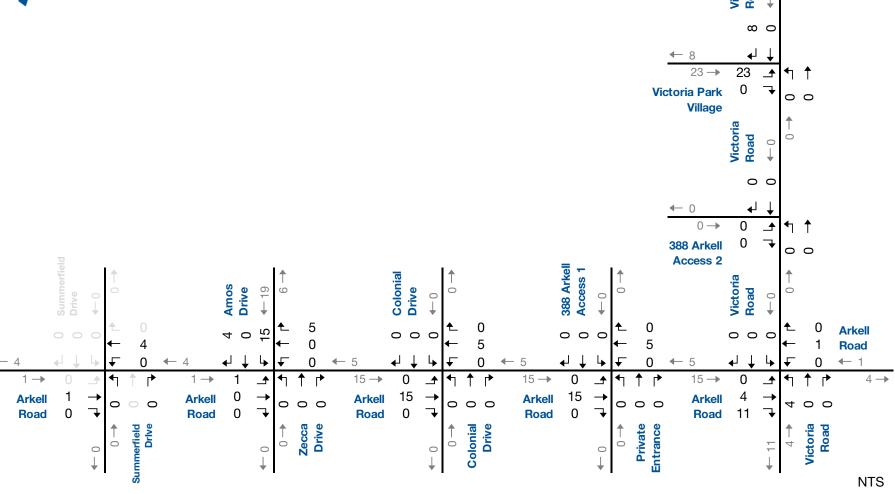
TABLE 5.2: TRIP DISTRIBUTION

Origin/Destination	AM/PM Peak Hour
East via Arkell Road	10%
West via Arkell Road	10%
North via Victoria Road	55%
South via Victoria Road	25%
Total	100%

Using the trip generation and trip distribution estimates, the site traffic was assigned to the road network. **Figure 5.2** and **Figure 5.3** illustrate the trip assignment for the development during the AM and PM peak hours, respectively.

In future, it is anticipated Dawes Avenue will be extended to meet Arkell Road at Summerfield Drive. As the anticipated number of trips using this intersection during the peak hours (less than 10 trips) is well within daily volume variation, this scenario was not assessed. The analyses presented in **Section 6** indicate that the Summerfield Drive and Arkell Road intersection is forecast to operate within acceptable levels of service for all peak hours to 2031.

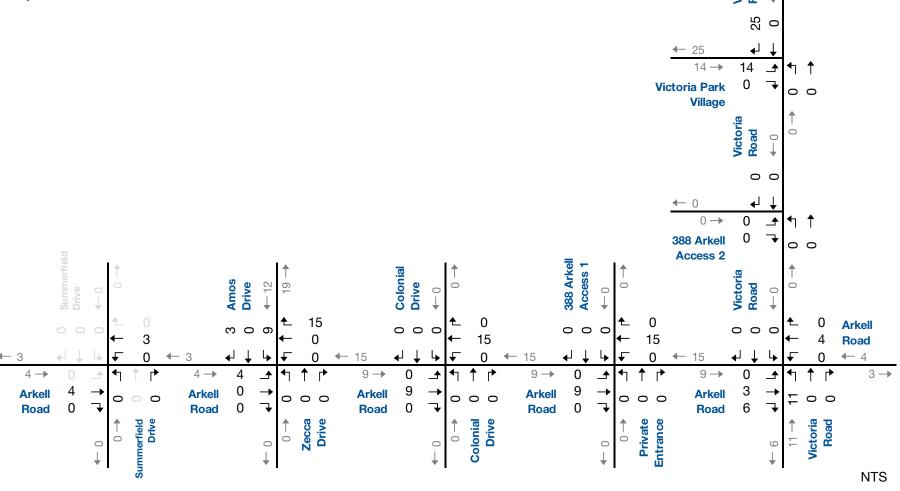






AM Development Traffic Forecasts







PM Development Traffic Forecasts

6 Evaluation of Future Total Traffic Conditions

The assessment of future total traffic conditions contained in this section includes estimates of future total traffic volumes and analysis for the 2021, 2026 and 2031 horizons. The future total traffic volumes include increased non-site traffic volumes (generalized background road traffic), traffic generated by other developments in the area, and the traffic generated by the proposed development.

6.1 2021 Horizon

6.1.1 2021 Future Total Traffic Volumes

Figure 6.1 and **Figure 6.2** illustrate the forecast 2021 total traffic (background + site) volumes, for the AM and PM peak hours, respectively.

6.1.2 2021 Future Total Traffic Operations

The operations of the study area intersection under 2021 total traffic volumes were analyzed using Synchro 9 with HCM 2010 procedures. No changes to the existing signal timings were made in this analysis.

Table 6.1 and **Table 6.2** summarize the 2021 future total traffic operations for the AM and PM peak hours, respectively. Based on the analyses, it is concluded that the intersections are forecast to operate similar to the background conditions. The following critical movements are noted:

- Arkell Road and Colonial Road:
 - Northbound left-through-right movement LOS F, v/c 0.82 during the AM peak hour; and
 - Southbound left-through-right movement LOS F, v/c 0.87 during the AM peak hour and LOS E, v/c 0.53 during the PM peak hour.
- Victoria Road and Arkell Road:
 - Eastbound left-turn movement LOS F, v/c 1.17 and 95th percentile queues exceeding available storage by 75 metres during the AM peak hour and 95th percentile queues exceeding available storage by 13 metres during the PM peak hour;
 - Westbound left-turn movement 95th percentile queues exceeding available storage by 11 metres and 4 metres during the AM and PM peak hours, respectively;
 - Northbound through-right movement LOS F, v/c 1.20 during the AM peak hour and LOS F, v/c 1.36 during the PM peak hour;

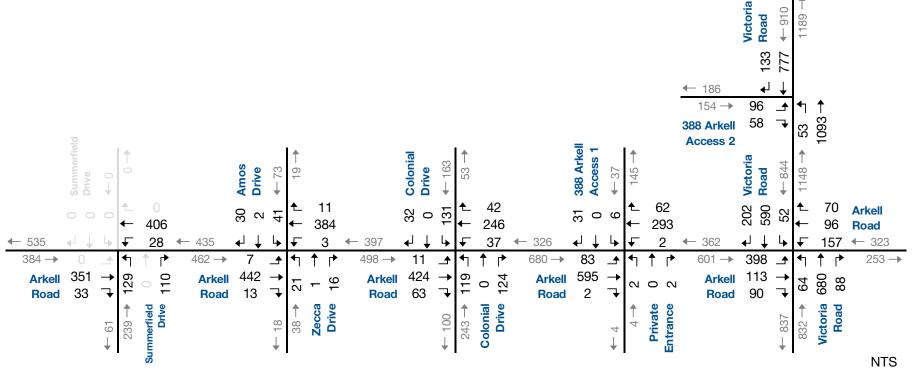


- Southbound through-right movement LOS F, v/c 1.33 during the AM peak hour and LOS F, v/c 1.56 during the PM peak hour; and
- Overall intersection LOS F during the AM and PM peak hours.
- ▶ Victoria Road and 388 Access 2:
 - Northbound through movement LOS C, v/c 0.95 during the AM peak hour and LOS B, v/c 0.86 during the PM peak hour.
- Victoria Road and Victoria Park Village Road:
 - Eastbound left-turn movement LOS F, v/c 4.70 during the AM peak hour and LOS F v/c 4.96 during the PM peak hour; and
 - Overall intersection LOS F during the AM and PM peak hours.

Appendix J provides the detailed supporting Synchro reports.









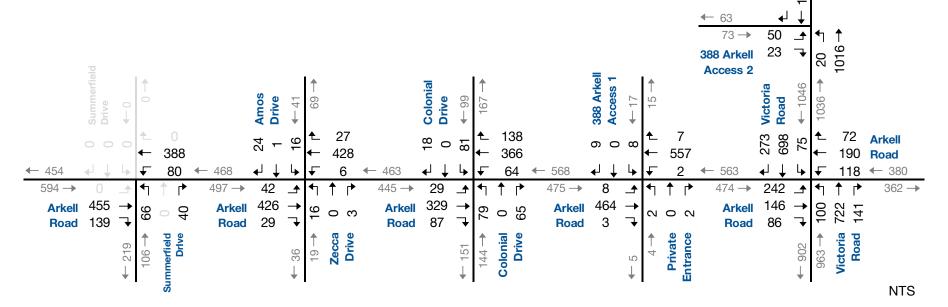
2021 AM Total Traffic Forecasts

Victoria Road

185 52

Victoria Park Village







2021 PM Total Traffic Forecasts

Victoria Road

104 38

Victoria

Road ← 1066

Victoria Park Village

TABLE 6.1: 2021 AM TOTAL TRAFFIC OPERATIONS SUMMARY

ਰ										Directi	on / M	oveme	nt / Ap	oroach	1					\neg
erio					Eastb	ound			West	ound			North	oound			South	bound		
Analysis Period	Intersection	Control Type	MOE	цеТ	Through	Right	Approach	Left	Through	Right	Approach	ц	Through	Right	Approach	ц	Through	Right	Approach	Overall
	Arkell Road & Summerfield Drive	TWSC	LOS Delay V/C Q Ex Avail.		A 0	^ ^ ^ ^ ^ ^ ^	0	A 8 0.03 0 60 60	A 0		1	C 18 0.47 3 -		^ ^ ^ ^ ^ ^ ^	C 18					4
	Arkell Road & Zecca Drive/ Amos Drive	TWSC	LOS Delay V/C Q	A 8 0.01 0	A 0 -	^ ^ ^	0	A 8 0.00 0	A 0 -	v v v v	0	< < < <	C 18 0.13 0		C 18	V V V	C 19 0.23 1	v v v v	C 19	2
	Arkell Road & Colonial Road	TWSC	LOS Delay V/C Q Ex Avail.	A 8 0.01 0.00 60 60	A 0 - -	^ ^ ^ ^ ^	0	A 9 0.04 0 60 60	A 0 - -		1	· · · · · · · · · · · · · · · · · · ·	F 52 0.82 7 -	· · · · · ·	F 52	· · · · · ·	F 82 0.87 7 -		F 82	22
AM Peak Hour	Arkell Road & Residential Entrance/ 388 Access 1	TWSC	LOS Delay V/C Q Ex Avail.	A 8 0.08 0 25 25	A 0 - - -	^ ^ ^ ^ ^ ^	1	A 9 0.00 0 -	A 0 - - -	^ ^ ^ ^ ^ ^	0	· · · · · · · · · · · · · · · · · · ·	C 21 0.02 0 -	>	C 21	D 29 0.04 0 -	B 10 0.05 0	^ ^ ^ ^	B 13	1
	Victoria Road & Arkell Road	TCS	LOS Delay V/C Q Ex Avail.	F 130 1.17 115 40 -75	C 31 0.74 45 -	· · · · · ·	F 97	C 22 0.51 31 20	C 28 0.58 36 -	· · · · · ·	C 25	B 17 0.30 12 90 78	F 126 1.20 252 -	>	F 118	B 17 0.26 10 50 40	F 180 1.33 264 -	· · · · · ·	F 170	F 118
	Victoria Road & 388 Access 2	TCS	LOS Delay V/C Q Ex Avail.	C 30 0.43 28 -		C 29 0.29 10 -	C 29					B 15 0.17 8 -	C 26 0.95 261 -		C 25		A 10 0.69 113 -	A 4 0.13 5 60 55	A 9	B 19
	Victoria Road & Victoria Park Village Road	TWSC	LOS Delay V/C Q	F 1855 4.70 23	0.05	C 19 0.18 1	F 1454				TOO	B 10 0.03 0	A 0 -		0		A 0 -	> > >	0	148

MOE - Measure of Effectiveness LOS - Level of Service Delay - Average Delay per Vehicle in Seconds Q - 95th Percentile Queue Length Ex. - Existing Available Storage Avail. - Available Storage TCS - Traffic Control Signal TWSC - Two-Way Stop Control AWSC - All-Way Stop Control RBT - Roundabout < - Shared Left Movement > - Shared Right Movement



TABLE 6.2: 2021 PM TOTAL TRAFFIC OPERATIONS SUMMARY

ō										Directi	on / M	oveme	nt / Ap	proach	1					
Period					Eastb	ound			Westl	ound			North	bound			South	bound		
Analysis P	Intersection	Control Type	MOE	ц	Through	Right	Approach	цец	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Overall
	Arkell Road & Summerfield Drive	TWSC	LOS Delay V/C Q Ex Avail.		A 0	^	0	A 9 0.09 0 60 60	A 0		2	C 17 0.28 1 -		^ ^ ^ ^ ^ ^ ^	C 17					2
	Arkell Road & Zecca Drive/ Amos Drive	TWSC	LOS Delay V/C Q	A 9 0.04 0	A 0 -	> > >	1	A 8 0.01 0	A 0 -	^ ^ ^ ^	0	< < <	C 25 0.10 0	^ ^ ^	C 25	v v v	C 18 0.13	^ ^ ^ ^	C 18	2
	Arkell Road & Colonial Road	TWSC	LOS Delay V/C Q Ex Avail.	A 9 0.03 0.10 60 60	A 0 - -	>	1	A 8 0.06 0 60 60	A 0 - -		1	· · · · · · · · · · · · · · · · · · ·	D 34 0.55 3	· · · · · ·	D 34	· · · · · · · · · · · · · · · · · · ·	E 43 0.53 3 -	^ ^ ^ ^ ^	E 43	8
PM Peak Hour	Arkell Road & Residential Entrance/ 388 Access 1	TWSC	LOS Delay V/C Q Ex Avail.	A 9 0.01 0 25 25	A 0 - - -	> > > >	0	A 8 0.00 0 -	A 0 - -	· · · · · ·	0	< < < < < <	C 19 0.02 0 -		C 19	D 26 0.05 0 -	B 12 0.02 0 -	^ ^ ^ ^ ^ ^	C 19	0
	Victoria Road & Arkell Road	TCS	LOS Delay V/C Q Ex Avail.	D 37 0.79 53 40 -13	C 29 0.66 51 -	> > > > >	C 33	C 22 0.38 24 20 -4	C 34 0.77 62 -	· · · · · ·	C 30	B 18 0.43 16 90 74	F 196 1.36 278		F 178	B 18 0.34 13 50 37	F 280 1.56 317 -	· · · · · ·	F 261	F 165
	Victoria Road & 388 Access 2	TCS	LOS Delay V/C Q Ex Avail.	C 29 0.27 17 -		C 28 0.14 7 -	C 29					B 19 0.09 3 -	B 15 0.86 218 -		B 15		B 14 0.84 215 -	A 3 0.04 3 60 57	B 13	B 15
MOE	Victoria Road & Victoria Park Village Road	TWSC	LOS Delay V/C Q	F 2123 4.96 14	0.05	D 30 0.22 1	F 1567				TOO	B 14 0.15 1	A 0 -		1		A 0 - -	> > >	0	87

MOE - Measure of Effectiveness LOS - Level of Service Delay - Average Delay per Vehicle in Seconds Q - 95th Percentile Queue Length Ex. - Existing Available Storage Avail. - Available Storage TCS - Traffic Control Signal TWSC - Two-Way Stop Control AWSC - All-Way Stop Control RBT - Roundabout < - Shared Left Movement > - Shared Right Movement



6.2 2026 Horizon

6.2.1 2026 Future Total Traffic Volumes

Figure 6.3 and **Figure 6.4** illustrate the forecast 2026 total traffic (background + site) volumes, for the AM and PM peak hours, respectively.

6.2.2 2026 Future Total Traffic Operations

The operations of the study area intersections under 2026 total traffic volumes were analyzed using Synchro 9 with HCM 2010 procedures. No changes to the existing signal timings were made in this analysis.

Table 6.3 and **Table 6.4** summarize the 2026 total traffic operations for the AM and PM peak hours, respectively. Based on the analyses, it is concluded that the intersections are forecast to operate similar to the 2026 background conditions. The following critical movements are noted:

- Arkell Road and Colonial Road:
 - Northbound left-through-right movement LOS F, v/c 0.99 during the AM peak hour and LOS E, v/c 0.69 during the PM peak hour; and
 - Southbound left-through-right movement LOS F, v/c 1.03 during the AM peak hour and LOS F, v/c 0.62 during the PM peak hour.
- Victoria Road and Arkell Road:
 - Eastbound left-turn movement LOS F, v/c 1.30 and 95th percentile queues exceeding available storage by 101 metres during the AM peak hour and 95th percentile queues exceeding available storage by 25 metres during the PM peak hour;
 - Westbound left-turn movement 95th percentile queues exceeding available storage by 14 metres and 6 metres during the AM and PM peak hours, respectively;
 - Northbound through-right movement LOS F, v/c 1.33 during the AM peak hour and LOS F, v/c 1.51 during the PM peak hour;
 - Southbound through-right movement LOS F, v/c 1.44 during the AM peak hour and LOS F, v/c 1.71 during the PM peak hour; and
 - Overall intersection LOS F during the AM and PM peak hours.
- Victoria Road and 388 Access 2:
 - Northbound through movement LOS D, v/c 1.04 during the AM peak hour and LOS C, v/c 0.93 during the PM peak hour; and
 - Southbound through movement LOS B, v/c 0.92 during the PM peak hour.
- Victoria Road and Victoria Park Village Road:

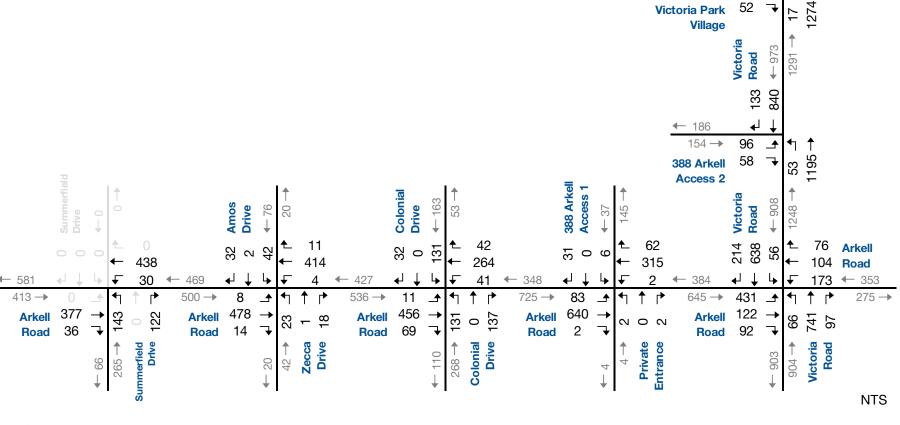


- Eastbound left-turn movement LOS F, v/c 6.13 during the AM peak hour and LOS F v/c 6.71 during the PM peak hour; and
- Overall intersection LOS F during the AM and PM peak hours.

Appendix K provides the detailed supporting Synchro reports.





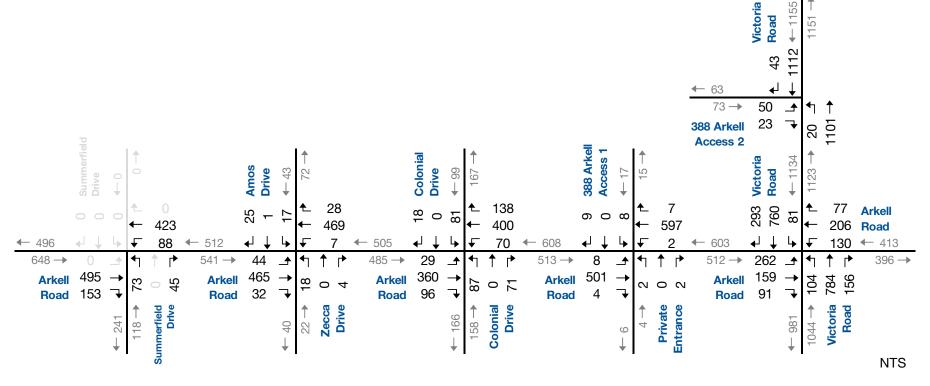




2026 AM Total Traffic Forecasts

Victoria Road







2026 PM Total Traffic Forecasts

Victoria

38

Victoria Park Village

TABLE 6.3: 2026 AM TOTAL TRAFFIC OPERATIONS SUMMARY

ō										Directi	on / M	oveme	nt / Ap	oroach	1					\neg
Period					Eastb	ound			West	ound			North	oound			South	bound		
Analysis P	Intersection	Control Type	MOE	ц	Through	Right	Approach	цец	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Overall
	Arkell Road & Summerfield Drive	TWSC	LOS Delay V/C Q Ex Avail.		A 0 - -	^ ^ ^ ^ ^ ^ ^	0	A 8 0.03 0 60 60	A 0		1	C 21 0.55 3 -		^ ^ ^ ^ ^ ^ ^	C 21					5
	Arkell Road & Zecca Drive/ Amos Drive	TWSC	LOS Delay V/C Q	A 8 0.01 0	A 0 -	^ ^ ^	0	A 9 0.00 0	A 0 -	^ ^ ^ ^	0	< < <	C 20 0.16 1	^ ^ ^ ^	C 20	v v v	C 21 0.27 1	^ ^ ^ ^ ^	C 21	3
	Arkell Road & Colonial Road	TWSC	LOS Delay V/C Q Ex Avail.	A 8 0.01 0.00 60 60	A 0 - -	^ ^ ^ ^ ^ ^	0	A 9 0.05 0 60 60	A 0		1	· · · · · · · · · · · · · · · · · · ·	F 90 0.99 10 -	^ ^ ^ ^ ^	F 90	· · · · · · · ·	F 131 1.03 9 -		F 131	35
AM Peak Hour	Arkell Road & Residential Entrance/ 388 Access 1	TWSC	LOS Delay V/C Q Ex Avail.	A 8 0.08 0 25 25	A 0 - - -	· · · · · · ·	1	A 9 0.00 0 -	A 0 - -	· · · · · ·	0	< < < < < <	C 23 0.02 0 -		C 23	D 32 0.05 0 -	B 11 0.05 0 -	· · · · · ·	B 14	1
	Victoria Road & Arkell Road	TCS	LOS Delay V/C Q Ex Avail.	F 180 1.30 141 40 -101	C 32 0.75 48 -		F 131	C 23 0.56 34 20 -14	C 29 0.61 40 -	· · · · · ·	C 26	B 17 0.31 12 90 78	F 181 1.33 280 -		F 169	B 17 0.28 11 50 39	F 230 1.44 289 -	· · · · · · · · · · · · · · · · · · ·	F 217	F 158
	Victoria Road & 388 Access 2	TCS	LOS Delay V/C Q Ex Avail.	C 30 0.43 28 -		C 29 0.29 10 -	C 29					B 17 0.19 8 -	D 47 1.04 298 -		D 46		B 11 0.74 135 -	A 4 0.13 5 60 55	A 10	C 30
MOE	Victoria Road & Victoria Park Village Road	TWSC	LOS Delay V/C Q	F 2545 6.13 24	0.05	C 21 0.20 1	F 1993				TOO	B 11 0.03 0	A 0 -		0		A 0 - -	> > > >	0	189

MOE - Measure of Effectiveness LOS - Level of Service Delay - Average Delay per Vehicle in Seconds Q - 95th Percentile Queue Length Ex. - Existing Available Storage Avail. - Available Storage TCS - Traffic Control Signal TWSC - Two-Way Stop Control AWSC - All-Way Stop Control RBT - Roundabout < - Shared Left Movement > - Shared Right Movement



TABLE 6.4: 2026 PM TOTAL TRAFFIC OPERATIONS SUMMARY

٦										Directi	on / M	oveme	nt / Ap	proach	1					
erio					Eastb	ound			Westl	oound			North	bound			South	bound		
Analysis Period	Intersection	Control Type	MOE	ц	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Overall
	Arkell Road & Summerfield Drive	TWSC	LOS Delay V/C Q Ex Avail.		A 0 - -		0	A 9 0.10 0 60 60	A 0 - -		2	C 20 0.33 1 -		^ ^ ^ ^ ^ ^ ^	C 20					2
	Arkell Road & Zecca Drive/ Amos Drive	TWSC	LOS Delay V/C Q	A 9 0.05 0	A 0 -	> > >	1	A 9 0.01 0	A 0 -	^ ^ ^	0	< < <	D 28 0.13 0	^ ^ ^ ^	D 28	v v v	C 20 0.16 1	>	C 20	2
	Arkell Road & Colonial Road	TWSC	LOS Delay V/C Q Ex Avail.	A 9 0.03 0.10 60 60	A 0 - -	> > > >	1	A 9 0.07 0 60 60	A 0 - -		1	< < < < < < < < < < < < < < < < < < <	E 48 0.69 5 -	>	E 48	< < < < < <	F 57 0.62 3 -	>	F 57	10
PM Peak Hour	Arkell Road & Residential Entrance/ 388 Access 1	TWSC	LOS Delay V/C Q Ex Avail.	A 9 0.01 0 25 25	A 0 - -	> > > > > > > > > > > > > > > > > > > >	0	A 9 0.00 0 -	A 0 - -	^ ^ ^ ^	0	< < < < < <	C 20 0.02 0 -	>	C 20	D 29 0.06 0 -	B 13 0.02 0 -	·	C 21	0
	Victoria Road & Arkell Road	TCS	LOS Delay V/C Q Ex Avail.	D 48 0.87 65 40	C 30 0.69 56 -	> > > > > > > > > > > > > > > > > > > >	D 39	C 22 0.42 26 20 -6	D 35 0.79 67 -	^ ^ ^ ^ ^ ^	C 31	B 18 0.45 17 90 73	F 262 1.51 308 -	^	F 238	B 18 0.36 14 50 36	F 350 1.71 349 -	·	F 327	F 210
	Victoria Road & 388 Access 2	TCS	LOS Delay V/C Q Ex Avail.	C 29 0.27 17 -		C 28 0.14 7 -	C 29					C 26 0.12 3 -	C 22 0.93 248 -		C 22		B 20 0.92 246 -	A 3 0.04 3 60 57	B 19	C 21
	Victoria Road & Victoria Park Village Road	TWSC	LOS Delay V/C Q	F 3016 6.71 15		D 34 0.25 1	F 2224				T00	B 15 0.16 1	A 0 - -		1		A 0 -	>	0	116

MOE - Measure of Effectiveness LOS - Level of Service

Delay - Average Delay per Vehicle in Seconds

Q - 95th Percentile Queue Length Ex. - Existing Available Storage Avail. - Available Storage TCS - Traffic Control Signal TWSC - Two-Way Stop Control AWSC - All-Way Stop Control RBT - Roundabout < - Shared Left Movement > - Shared Right Movement



6.3 2031 Horizon

6.3.1 2031 Future Total Traffic Volumes

Figure 6.5 and **Figure 6.6** illustrate the forecast 2031 total traffic (background + site) volumes, for the AM and PM peak hours, respectively.

6.3.2 2031 Future Total Traffic Operations

The operations of the study area intersections under 2031 total traffic volumes were analyzed using Synchro 9 with HCM 2010 procedures. No changes to the existing signal timings were made in this analysis.

Table 6.5 and **Table 6.6** summarize the forecast operational results for the AM and PM peak hours, respectively. Based on the analyses, it is concluded that the intersections are forecast to operate similar to the background conditions. The following critical movements are noted:

- Arkell Road and Zecca Drive/Amos Drive:
 - Northbound left-through-right movement LOS E, v/c 0.18 during the PM peak hour.
- Arkell Road and Colonial Road:
 - Northbound left-through-right movement LOS F, v/c 1.31 during the AM peak hour and LOS F, v/c 0.94 during the PM peak hour;
 - Southbound left-through-right movement LOS F, v/c 1.33 during the AM peak hour and LOS F, v/c 0.79 during the PM peak hour; and
 - Overall intersection LOS F during the AM peak hour.
- Arkell Road and 388 Access 1:
 - Southbound left-turn movement LOS E, v/c 0.06 during the AM peak hour and LOS E, v/c 0.07 during the PM peak hour.
- Victoria Road and Arkell Road:
 - Eastbound left-turn movement LOS F, v/c 1.48 and 95th percentile queues exceeding available storage by 125 metres during the AM peak hour and LOS E, v/c 1.01 and 95th percentile queues exceeding available storage by 42 metres during the PM peak hour;
 - Westbound left-turn movement 95th percentile queues exceeding available storage by 18 metres and 9 metres during the AM and PM peak hours, respectively;
 - Northbound through-right movement LOS F, v/c 1.52 during the AM peak hour and LOS F, v/c 1.73 during the PM peak hour;
 - Southbound through-right movement LOS F, v/c 1.61 during the AM peak hour and LOS F, v/c 1.94 during the PM peak hour; and

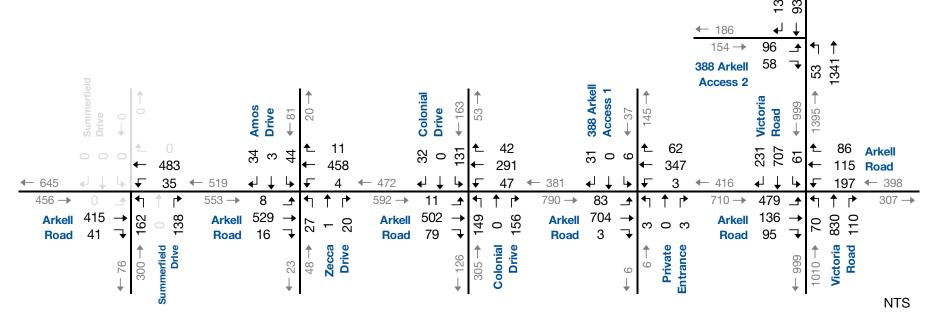


- Overall intersection LOS F during the AM and PM peak hours.
- Victoria Road and 388 Access 2:
 - Northbound through movement LOS F, v/c 1.17 during the AM peak hour and LOS D, v/c 1.04 during the PM peak hour;
 - Southbound through movement LOS D, v/c 1.02 during the PM peak hour; and
 - Overall intersection LOS E during the AM peak hour.
- Victoria Road and Victoria Park Village Road:
 - Eastbound left-turn movement LOS F, v/c 9.19 during the AM peak hour and LOS F v/c 10.38 during the PM peak hour;
 - Eastbound right-turn movement LOS E, v/c 0.31 during the PM peak hour; and
 - Overall intersection LOS F during the AM and PM peak hours.

Appendix L provides the detailed supporting Synchro reports.









2031 AM Total Traffic Forecasts

Victoria Road

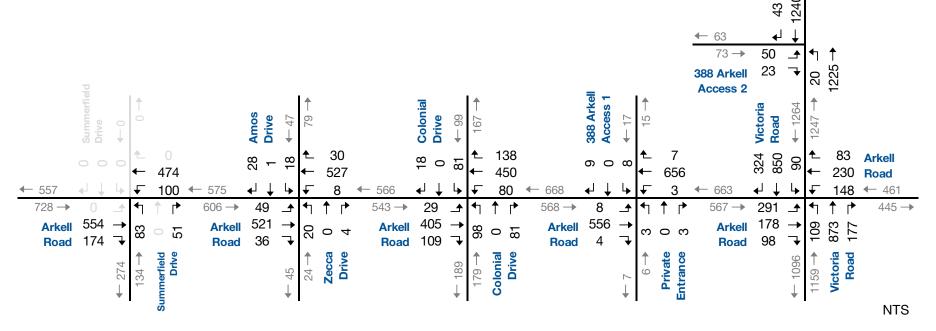
185 52

Victoria

Road← 1064

Victoria Park Village







2031 PM Total Traffic Forecasts

Victoria

38

Victoria

Victoria Park Village

TABLE 6.5: 2031 AM TOTAL TRAFFIC OPERATIONS SUMMARY

٥										Directi	on / M	oveme	nt / Ap	proach	1					
erio					Eastb	ound			Westk	ound			North	bound			South	bound		
Analysis Period	Intersection	Control Type	MOE	ц	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	ц	Through	Right	Approach	Overall
	Arkell Road & Summerfield Drive	TWSC	LOS Delay V/C Q Ex Avail.		A 0 - -		0	A 9 0.03 0 60 60	A 0 - -		1	D 27 0.67 5 -		^ ^ ^ ^ ^ ^ ^	D 27					7
	Arkell Road & Zecca Drive/ Amos Drive	TWSC	LOS Delay V/C Q	A 8 0.01 0	A 0	>	0	A 9 0.00 0	A 0 -	\ \ \ \ \	0	v v v v	C 24 0.21 1	^ ^ ^ ^	C 24	v v v v	D 26 0.33 1	^ ^ ^	D 26	3
	Arkell Road & Colonial Road	TWSC	LOS Delay V/C Q Ex Avail.	A 8 0.01 0.00 60 60	A 0 - -	>	0	A 9 0.06 0 60 60	A 0 - -	<pre></pre>	1	< < < < < < < < < < < < < < < < < < <	F 202 1.31 17 -	>	F 202	< < < < < < < < < < < < < < < < < < <	F 255 1.33 11 -	^ ^ ^ ^ ^ ^	F 255	72
AM Peak Hour	Arkell Road & Residential Entrance/ 388 Access 1	TWSC	LOS Delay V/C Q Ex Avail.	A 9 0.08 0 25 25	A 0 - -	> > > >	1	A 9 0.00 0 -	A 0 - -	· · · · · ·	0	· · · · · · · · · · · · · · · · · · ·	D 26 0.04 0 -	>	D 26	E 38 0.06 0 -	B 11 0.05 0 -	· · · · · ·	C 15	1
	Victoria Road & Arkell Road	TCS	LOS Delay V/C Q Ex Avail.	F 258 1.48 165 40 -125	C 33 0.76 53 -	> > > > >	F 185	C 26 0.65 38 20	C 29 0.65 45 -	· · · · · · · · · · · · · · · · · · ·	C 28	B 17 0.33 13 90 77	F 264 1.52 322 -	>	F 247	B 17 0.30 11 50 39	F 304 1.61 323 -	· · · · · · ·	F 287	F 217
	Victoria Road & 388 Access 2	TCS	LOS Delay V/C Q Ex Avail.	C 30 0.43 28 -		C 29 0.29 10 -	C 29					C 23 0.24 9 -	F 94 1.17 350 -		F 92		B 14 0.82 206 -	A 4 0.13 5 60 55	B 13	E 56
	Victoria Road & Victoria Park Village Road	TWSC	LOS Delay V/C Q	F 4029 9.19 26		C 24 0.23 1	F 3154					B 11 0.03 0	A 0 -		0		A 0 -	^ ^ ^ ^ ^	0	273

MOE - Measure of Effectiveness LOS - Level of Service Delay - Average Delay per Vehicle in Seconds Q - 95th Percentile Queue Length Ex. - Existing Available Storage Avail. - Available Storage TCS - Traffic Control Signal TWSC - Two-Way Stop Control AWSC - All-Way Stop Control RBT - Roundabout < - Shared Left Movement > - Shared Right Movement



TABLE 6.6: 2031 PM TOTAL TRAFFIC OPERATIONS SUMMARY

٦										Direction	on / M	oveme	nt / Ap	oroach)					
erio					Eastb	ound			Westk	ound			North	oound			South	bound		
Analysis Period	Intersection	Control Type	MOE	ц	Through	Right	Approach	ц	Through	Right	Approach	ц	Through	Right	Approach	ц	Through	Right	Approach	Overall
	Arkell Road & Summerfield Drive	TWSC	LOS Delay V/C Q Ex Avail.		A 0	^ ^ ^ ^ ^ ^ ^	0	A 10 0.12 0 60 60	A 0		2	C 24 0.43 2 -		^ ^ ^ ^ ^ ^ ^	C 24					3
	Arkell Road & Zecca Drive/ Amos Drive	TWSC	LOS Delay V/C Q	A 9 0.05 0	A 0 -	^ ^ ^	1	A 9 0.01 0	A 0 -	v v v v	0	· · · ·	E 37 0.18 1	>	E 37	v v v	C 24 0.21 1	^ ^ ^	C 24	2
	Arkell Road & Colonial Road	TWSC	LOS Delay V/C Q Ex Avail.	A 9 0.03 0.10 60 60	A 0 - -	^ ^ ^ ^ ^	1	A 9 0.08 0 60 60	A 0 - -	v v v v v	1	· · · · · · · · ·	F 99 0.94 8 -	· · · · · ·	F 99	· · · · · · ·	F 96 0.79 5 -	^ ^ ^ ^ ^	F 96	19
PM Peak Hour	Arkell Road & Residential Entrance/ 388 Access 1	TWSC	LOS Delay V/C Q Ex Avail.	A 9 0.01 0 25 25	A 0 - - -	· · · · · ·	0	A 9 0.00 0 -	A 0 - -	· · · · ·	0	· · · · · · · · · · · · · · · · · · ·	C 24 0.03 0 -	>	C 24	E 35 0.07 0 -	B 14 0.02 0 -	^ ^ ^ ^ ^ ^	C 24	1
	Victoria Road & Arkell Road	TCS	LOS Delay V/C Q Ex Avail.	E 80 1.01 82 40 -42	C 32 0.73 63 -		E 57	C 22 0.48 29 20	D 39 0.83 82 -	· · · · ·	C 33	B 19 0.47 18 90 72	F 360 1.73 351 -	>	F 328	B 19 0.40 15 50 35	F 454 1.94 396 -	· · · · · ·	F 423	F 279
	Victoria Road & 388 Access 2	TCS	LOS Delay V/C Q Ex Avail.	C 29 0.27 17 -		C 28 0.14 7 -	C 29					D 40 0.21 5 -	D 46 1.04 291 -		D 45		D 40 1.02 290 -	A 3 0.04 3 60 57	D 39	D 42
	Victoria Road & Victoria Park Village Road	TWSC	LOS Delay V/C Q	F 4887 10.38 16	0.05	E 43 0.31 1	F 3600				T00	C 16 0.18 1	A 0 -		1		A 0 - -	> > >	0	171

MOE - Measure of Effectiveness LOS - Level of Service Delay - Average Delay per Vehicle in Seconds Q - 95th Percentile Queue Length Ex. - Existing Available Storage Avail. - Available Storage TCS - Traffic Control Signal TWSC - Two-Way Stop Control AWSC - All-Way Stop Control RBT - Roundabout < - Shared Left Movement > - Shared Right Movement



6.4 Development Impact to Study Area Traffic

The study area traffic is comprised of the existing traffic + background growth, background developments and the site traffic. **Table 6.7** and **Table 6.8** display the breakdown of the traffic entering and exiting the study area during all horizon years for the AM and PM peak hours, respectively.

The tables indicate the site generated traffic accounts for a maximum of 0.9% and 1.0% of all study area traffic, during the AM and PM peak hours, respectively.

TABLE 6.7: STUDY AREA AM PEAK HOUR TRAFFIC BREAKDOWN

Component	20	18	20	21	20	26	20	31
Existing + Growth	4609	100%	4889	79.1%	4987	79.4%	5136	79.9%
Background Developments	1	0%	1237	20.0%	1237	19.7%	1237	19.2%
Site	-	0%	56	0.9%	56	0.9%	56	0.9%
Total	4609	100%	6182	100%	6280	100%	6429	100%

TABLE 6.8: STUDY AREA PM PEAK HOUR TRAFFIC BREAKDOWN

Component	20	18	20	21	20	26	20	31
Existing + Growth	5213	100%	5533	80.4%	5644	80.7%	5813	81.2%
Background Developments	1	0%	1280	18.6%	1280	18.3%	1280	17.9%
Site	-	0%	70	1.0%	70	1.0%	70	1.0%
Total	5213	100%	6883	100%	6994	100%	7163	100%

7 Need for Network Improvements

7.1 Development Impact to Study Area

The traffic operations analysis for the study area indicated several network deficiencies are forecast under background conditions at the 2021, 2026 and 2031 horizons based on the City of Guelph TIS Guidelines described in **Sections**, **3.4**, **3.5** and **3.6**. **Section 4.1** further details the required remedial measures within the study area under background conditions. The additional subject development traffic further intensifies the need for the remedial measures identified in **Chapter 6**. However, the subject development has minimal impact in comparison with the background traffic. **Table 7.1**, **Table 7.2** and **Table 7.3** summarize the network deficiencies, incremental impact from the subject development and resolution to provide acceptable levels of service in the study area for the 2021, 2026 and 2031 horizons, respectively.

The tables indicate the development increases overall delay for a number of movements; however, all physical roadway improvements are warranted under background conditions.

Several remedial measures were proposed in **Section 4.1** to reduce and/or eliminate the network deficiencies, including:

- Signal timing and phasing optimization at all signalized intersections;
- Eastbound dual left-turn lanes and fully-protected phase at Victoria Road and Arkell Road;
- Northbound and southbound right-turn lanes at Victoria Road and Arkell Road:
- ► Traffic Control Signals at Arkell Road and Colonial Road, and Victoria Road and Victoria Park Village Road; and
- Road Widening on Victoria Road to four (4) lanes from Clair Road north to MacAllister Boulevard.

While signal optimization is relatively inexpensive and should be reviewed regularly, extensive reconstruction of roadways requires a capital budget. Before reconstruction occurs, forecasted traffic volumes should meet the warrant threshold for additional lanes.

Background traffic in the analyses includes forecasted traffic growth as well as several planned developments in the study area under various stages of approval. The analyses assume the planned developments will be constructed prior to the opening of the development in 2021, however, it is highly improbable development will proceed at such a rapid pace. It is important to determine the threshold which road improvements will be required if development of the subject site proceeds other planned developments in the study area.



TABLE 7.1: 2020 NETWORK DEFICIENCIES, DEVELOPMENT IMPACT AND RESOLUTION

Location	Peak Hour	Incremental Impact of Development	Resolution
Arkell Road and Colonial Drive			
Northbound Left-Through-Right	AM	LOS E to LOS F	Traffic Signals unwarranted
Southbound Left-Through Right	AM	At LOS F - Increased delay]
	PM	No impact from development	
Victoria Road and Arkell Road			
Eastbound Left-Turn	AM	No impact from development	Dual eastbound left-turn lanes warranted under existing conditions, signal optimization
	PM	QES - 12m to 13m	
Westbound Left-Turn	AM & PM	No impact from development	Increase storage
Northbound Through-Right	AM	v/c - 1.19 to 1.20	Four lane cross-section north of Arkell Road warranted by 2020 background
	PM	No impact from development	conditions, Signal Optimization
Southbound Through-Right	AM	v/c - 1.31 to 1.33	Four lane cross-section north of Arkell Road warranted by 2020 background
	PM	No impact from development	conditions, Signal Optimization
Victoria Road and 388 Access 2			
Northbound Through	AM	No impact from development	Right-turn lane warranted under existing
	PM	v/c - 0.91 to 0.98	conditions, Signal Optimization
Victoria Road and Victoria Park Vil	lage Road		
Eastbound Left-Turn	AM & PM	At LOS F - Increased delay	Right-turn lane warranted under existing conditions, Signal Optimization

QES - Queue Exceeding Storage

TABLE 7.2: 2025 NETWORK DEFICIENCIES, DEVELOPMENT IMPACT AND RESOLUTION

Location	Peak Hour	Incremental Impact of Development	Resolution
Arkell Road and Colonial Drive			
Northbound Left-Through-Right	AM	At LOS F - Increased delay	Traffic Signals unwarranted
	PM	No impact from development]
Southbound Left-Through Right	AM	At LOS F - Increased delay]
	PM	No impact from development]
Victoria Road and Arkell Road			
Eastbound Left-Turn	AM	No impact from development	Dual eastbound left-turn lanes warranted under existing conditions, signal
	PM	No impact from development	optimization
Westbound Left-Turn	AM & PM	No impact from development	Increase storage
Northbound Through-Right	AM	v/c - 1.32 to 1.42	Four lane cross-section north of Arkell Road warranted by 2020 background
	PM	No impact from development	conditions, Signal Optimization
Southbound Through-Right	AM	v/c - 1.42 to 1.44	Four lane cross-section north of Arkell Road warranted by 2020 background
	PM	v/c - 1.70 to 1.71	conditions, Signal Optimization
Victoria Road and 388 Access 2			
Northbound Through	AM	No impact from development	Right-turn lane warranted under existing
	PM	v/c - 0.91 to 0.98	conditions, Signal Optimization
Victoria Road and Victoria Park Vil	lage Road		
Eastbound Left-Turn	AM & PM	At LOS F - Increased delay	Right-turn lane warranted under existing conditions, Signal Optimization

QES - Queue Exceeding Storage

TABLE 7.3: 2030 NETWORK DEFICIENCIES, DEVELOPMENT IMPACT AND RESOLUTION

Location	Peak Hour	Incremental Impact of Development	Resolution
Arkell Road and Colonial Drive			
Northbound Left-Through-Right	AM	At LOS F - Increased delay	Traffic Signals unwarranted
	PM	No impact from development	1
Southbound Left-Through Right	AM	At LOS F - Increased delay	1
	PM	No impact from development	1
Arkell Road and 388 Access 1			
Southbound Left-Turn	AM	v/c - 0.05 to 0.06	Traffic Signals unwarranted
Victoria Road and Arkell Road			
Eastbound Left-Turn	AM	No impact from development	Dual eastbound left-turn lanes warranted under existing conditions, signal
	PM	QES - 41m to 42m	optimization
Westbound Left-Turn	AM & PM	No impact from development	Increase storage
Northbound Through-Right	AM	v/c - 1.51 to 1.52	Four lane cross-section north of Arkell Road warranted by 2020 background
	PM	No impact from development	conditions, Signal Optimization
Southbound Through-Right	AM	v/c - 1.59 to 1.61	Four lane cross-section north of Arkell Road warranted by 2020 background
	PM	v/c - 1.93 to 1.94	conditions, Signal Optimization
Victoria Road and 388 Access 2			
Northbound Through	AM	No impact from development	Right-turn lane warranted under existing
	PM	v/c - 0.91 to 0.98	conditions, Signal Optimization
Southbound Through	PM	No impact from development	Four lane cross-section north of Arkell Road warranted by 2020 background conditions, Signal Optimization
Victoria Road and Victoria Park Vil	lage Road		
Eastbound Left-Turn	AM & PM	At LOS F - Increased delay	Traffic Signals unwarranted

QES - Queue Exceeding Storage

Table 7.4 details the warrant and development requirements in the study area to necessitate reconstruction of the roadways. To determine the true impact of the subject development, without other planned developments, the table examines existing, 2021 background (only 2% growth per annum, no planned developments) and 2021 background with the subject development to determine if and when improvements are required. If improvements are not required under those scenarios, the number of additional households required to meet the warrant criteria was calculated. The table indicates:

- Arkell Road and Victoria Road Eastbound Left-Turn volumes meet the warrant for dual left-turn lanes under existing conditions. If dual left-turn lanes are constructed, two northbound receiving lanes are required on Victoria Road;
- Victoria Road north of Arkell Road Northbound volumes exceed the capacity of the single northbound lane and warrant construction of a second lane. If eastbound dual left-turn lanes are constructed at the intersection of Arkell Road, two northbound receiving lanes are required on Victoria Road. It is expected an additional southbound lane would be reconstructed at the same time, effectively making a four-lane cross-section on Victoria Road, north of Arkell Road;
- ▶ Victoria Road north of Arkell Road Southbound volumes do not exceed the capacity of the roadway under existing, 2021 generalized background growth or total traffic conditions (without other area developments). An additional 46 PM peak hour trips are required, or construction of 90 residential units to exceed capacity. It is expected an additional southbound lane would be reconstructed at the same time as the northbound lanes, which are warranted under 2021 background conditions.
- ▶ Victoria Road south of Arkell Road Northbound and Southbound volumes do not exceed the capacity of the roadway under existing, 2021 generalized background growth or total traffic conditions (without other area developments). An additional 131 northbound and 137 southbound PM peak hour trips are required, or construction of 257 and 269 residential units, respectively to meet the warrant criteria. At a build out rate of 100 units per year, reconstruction would be required by 2024.



TABLE 7.4: WARRANT AND DEVELOPMENT REQUIREMENTS FOR NETWORK IMPROVEMENTS

Location	Warrant			ting 18)	Warranted Under Existing?	20 Backg		aranted Under Background?	Develo Gene	pment rated	Warranted with Development?	ional Trips to Warrant	Number of idential Units*
Location	Wallalit		AM	РМ	Warrante Exist	AM	РМ	Waranted Backgro	AM	РМ	Warrant Develop	Additional Warra	Number Residential
Arkell Road and Victoria Road Eastbound Dual Left-Turn Lanes	300 vph durir peak hour	ng	303	180	NO	322	191	YES [†]	0	0	YES [†]	-	_
Victoria Road	000	NB	920	777	NO	976	825	YES	0	0	YES	-	-
4-Lane Cross-Section North of Arkell Road	900 vph/lane	SB	577	805	NO	613	854	NO	0	0	NO	46	90
Victoria Road	000	NB	664	725	NO	705	769	NO	4	11	NO	131	257
4-Lane Cross-Section South of Arkell Road	900 vph/lane	SB	601	719	NO	638	763	NO	12	6	NO	137	269

^{! 2021} Background does not include other planned developments detailed in Section 3.3



^{*}Based on ITE LUS 210 - Single Family Detached Housing, AM Peak Hour of Adjacent Street Traffic AverageRate = 0.51 trips/unit

[†]Construction of eastbound dual left-turn lanes requires two receiving lanes on Victoria Road

7.2 Total Traffic Operations with Remedial Measures

Paradigm completed Synchro 9 level of service analyses with HCM 2010 procedures under total traffic conditions for the intersections with the proposed improvements:

- Signal timing and phasing optimization at all signalized intersections;
- Eastbound dual left-turn lanes and fully-protected phase at Victoria Road and Arkell Road;
- Northbound and southbound right-turn lanes at Victoria Road and Arkell Road;
- ► Traffic Control Signals at Arkell Road and Colonial Road, and Victoria Road and Victoria Park Village Road; and
- Road Widening on Victoria Road to four (4) lanes from Clair Road north to MacAllister Boulevard.

The intersections were assessed for the 2031 total traffic horizon, as this represents the "worst case scenario". If the intersection improvements provide acceptable levels of service for all movements at this horizon, they will provide acceptable levels of service for the 2021 and 2026 horizons. These analyses detail whether operational improvements in addition to those detailed under background conditions are required for the study area.

Table 7.5 and **Table 7.6** summarize the total traffic operations for the AM and PM peak hours, respectively. Based on the analyses, it is concluded that the intersections are forecast to operate at acceptable levels of service. The following exceptions are noted:

- Victoria Road and Arkell Road:
 - Eastbound left-turn movement 95th percentile queues exceeding available storage by 42 metres and 22 metres during the AM and PM peak hours, respectively; and
 - Westbound left-turn movement 95th percentile queues exceeding available storage by 10 metres and 15 metres during the AM and PM peak hours, respectively.

Appendix M provides the detailed supporting Synchro 9 output.

The City can mitigate queues spillback into the through lanes by increasing the queue storage to contain the 95th percentile queues. It is important to note the 95th percentile queues only occur for approximately 5% of the peak hour or for about three minutes during the peak hour.

With the inclusion of the development traffic, there are no additional problem movements, indicating there are no off-site remedial measure requirements as a result of the development.



TABLE 7.5: 2031 AM REMEDIAL MEASURES TOTAL TRAFFIC OPERATIONS SUMMARY

Ď	Intersection									Directi	on / M	oveme	nt / Ap	proach												
Analysis Period		Control Type	MOE	Eastbound				Westbound				Northbound				Southbound										
				цец	Through	Right	Approach	ų	Through	Right	Approach	ų	Through	Right	Approach	ų	Through	Right	Approach	Overall						
AM Peak Hour	Arkell Road & Colonial Road		LOS	С	С	>	O	С	В	^	В	<	С	>	O	<	С	>	O	С						
			Delay	21	24	>	24	35	17	>	19	<	23	>	23	<	21	>	21	22						
		TCS	V/C Q	0.03	0.77 135	>		0.25 17	0.45 64	>		< <	0.51 79	>		< <	0.32 41	>								
			Ex	60	-	>		60	-	>		<	-	>		<	-	>								
			Avail.	56	-	>		43	-	>		<	-	>		<	-	>								
	Victoria Road & Arkell Road		LOS	D	С	>	D	С	D	>	С	В	С	>	С	В	С	>	O	С						
			Delay		30	>	39	26	41	>	34	18	20	>	26	19	23	>	24	30						
		TCS	V/C Q	0.85 82	0.60 62	>		0.50 42	0.77 60	>		0.26 17	0.22 114	>		0.26 15	0.50 94	>								
			Ex	62 40	- 02	>		20	-	>		90	114	>		50	94	>								
			Avail.	-42	-	>		-22	-	>		74	-	>		35	-	>								
	Victoria Road & Victoria Park Village Road		LOS	D		D	D					Α	Α		Α		Α	>	Α	Α						
		TCS	Delay	44		35	42					8	7		7		6	>	6	10						
		100	V/C	0.81		0.26						0.05	0.60				0.45	>								
			Q	60		10						4	112				71	>								

MOE - Measure of Effectiveness

LOS - Level of Service Delay - Average Delay per Vehicle in Seconds Q - 95th Percentile Queue Length Ex. - Existing Available Storage Avail. - Available Storage TCS - Traffic Control Signal TWSC - Two-Way Stop Control AWSC - All-Way Stop Control RBT - Roundabout < - Shared Left Movement > - Shared Right Movement

TABLE 7.6: 2031 PM REMEDIAL MEASURES TOTAL TRAFFIC OPERATIONS SUMMARY

Intersection									Directi	on / M	oveme	nt / Ap	proach												
	Control Type	MOE	Eastbound				Westbound				Northbound				Southbound										
			Left	Through	Right	Approach	ц	Through	Right	Approach	ц	Through	Right	Approach	IJeŢ	Through	Right	Approach	Overall						
Arkell Road & Colonial Road		LOS	С	В	>	В	С	В	>	В	<	С	>	С	<	В	>	В	В						
		Delay	27	17	>	17	26	18	>	19	<	20	>	20	<	19	>	19	19						
	TCS						-				-				-		>								
				92			-	- 111				- 34				-									
		Avail.	52	-	>		40	-	>		<	-	>		<	-	>								
Victoria Road & Arkell Road		LOS	D	С	>	D	С	D	>	D	В	С	>	С	В	С	>	С	С						
		Delay	49	32	>	41	27	44	>	39	20	21	>	25	19	24	>	25	29						
	TCS				>				>		-		>				>								
								99	-																
				-				_	>			-	>			-	>								
Victoria Road & 388 Access 2		LOS	D		D	D	- 1				Α	Α		Α		Α	Α	Α	Α						
	TCS	Delay	42		41	42					7	4		4		4	2	4	5						
		V/C	0.33		0.17						0.07	0.50				0.49	0.04								
		Q	22		8						3	56				56									
			-		_						_	_				-									
	Arkell Road & Colonial Road Victoria Road & Arkell Road Victoria Road &	Arkell Road & TCS Victoria Road & TCS Victoria Road & TCS Victoria Road & TCS	Arkell Road & TCS Delay V/C Q Ex Avail. Victoria Road & TCS Delay V/C Q Ex Avail. LOS Delay V/C Q Ex Avail. LOS Delay V/C Q Ex Avail. LOS Delay V/C Delay V/C Q Ex Avail. LOS Delay V/C Delay V	Type MOE Hype H	Intersection	Intersection	Intersection Control Type MOE	Intersection	Control Type	Control Type	Intersection MOE	Intersection MOE Hope MOE Hope H	Intersection Control Type MOE H												

MOE - Measure of Effectiveness LOS - Level of Service

Delay - Average Delay per Vehicle in Seconds

Q - 95th Percentile Queue Length Ex. - Existing Available Storage Avail. - Available Storage TCS - Traffic Control Signal TWSC - Two-Way Stop Control AWSC - All-Way Stop Control RBT - Roundabout < - Shared Left Movement > - Shared Right Movement



7.3 Traffic Control Signal Warrants

Ontario Traffic Manual (OTM) Book 12 provides warrants for the installation of traffic control signals. Justification 7 is used to determine the need for traffic control signals based on projected volumes at existing or planned intersections. There is increased uncertainty of volume projections for proposed new developments, therefore the warrant must be fulfilled 120% for existing intersections and 150% for future intersections.

Traffic signal control warrants were completed for the following study area intersections, for the 2031 total traffic horizon, as this represents the "worst case scenario". If signals are not warranted at this horizon, they will not be warranted for the 2021 and 2026 horizons. The warrants are fulfilled as noted:

- ▶ Arkell Road and Summerfield Drive 79.1%, signals not warranted;
- Arkell Road and Amos Drive/Zecca Drive 38.0%, signals not warranted;
- ▶ Arkell Road and Colonial Drive 109.7%, signals not warranted;
- ▶ Arkell Road and 388 Access 1 9.7%, signals not warranted;
- Victoria Road and 388 Access 2 73.0%, signals not warranted; and
- ▶ Victoria Road and Victoria Park Village Road 145.5%, signals not warranted.

The City should continue to monitor the above intersection operations and complete a signal warrant analysis, should traffic increase.

However, as noted in **Section 4.1.4**, to provide acceptable levels of service for the northbound and southbound movements at the intersection of Arkell Road and Colonial Road and the eastbound movement at the intersection of Victoria Road and Victoria Park Village Road, it is recommended traffic signals are installed by the 2031 horizon year.

Appendix N includes the signal warrant justification worksheets.

7.4 Potential Traffic Infiltration

During pre-study consultation, the City of Guelph requested the report include recommendations for traffic calming measures to address potential traffic infiltration. While the proposed development does not have direct access to Arkell Road and traffic must travel through the neighbouring developments (Victoria Park Village, Northwest Arkell and Victoria), it would not be considered infiltration into the neighbourhood. The development is part of the overall neighbourhood and vehicles would use the local streets to access their residences.



Once the entire neighbourhood is built-out, there will be an additional connection between Arkell Road and Victoria Road through the neighbourhood. It is unlikely this new connection will result in traffic infiltration as it is not a direct route and speed limits are lower than on Arkell Road and Victoria Road. Therefore, there are no recommended traffic calming measures.



8 Conclusions and Recommendations

8.1 Conclusions

Based on the investigations carried out, it is concluded that:

Existing Traffic Operations

Currently, all intersections within the study area operation at acceptable levels of service during the AM and PM peak hours, with no individual problem movements, except:

- Victoria Road and Arkell Road:
 - Eastbound left-turn movement AM peak hour;
 - Westbound left-turn movement AM and PM peak hours;
 - Northbound through-right movement AM and PM peak hours; and
 - Southbound through-right movement PM peak hour.

Background Growth & Other Planned Developments

A growth rate of 2.0% per year for 2017 to 2026, and a rate of 3.0% per year beyond 2026 was used for traffic in the study area, as requested by the City of Guelph.

The City requested that the traffic generated by other "approved but not yet built" developments in the study area be included in the background traffic forecasts, including: Kortright East, Victoria Park Village, Westminister Woods, Northwest Arkell Road and Victoria Road, and 388 Arkell Road Secondary School.

2021 Background Traffic Operations

Under 2021 background traffic conditions all intersections within the study area are forecast to operate at overall acceptable levels of service. The following critical movements are noted:

- Arkell Road and Colonial Road:
 - Northbound left-through-right movement AM peak hour; and
 - Southbound left-through-right movement AM and PM peak hours.
- Victoria Road and Arkell Road:
 - Eastbound left-turn movement AM and PM peak hours;
 - Westbound left-turn movement AM and PM peak hours;
 - Northbound through-right movement AM and PM peak hours;



- Southbound through-right movement AM and PM peak hours; and
- Overall intersection AM and PM peak hours.
- Victoria Road and 388 Arkell Road Access 2:
 - Northbound through movement AM and PM peak hours;
- Victoria Road and Victoria Park Village Road:
 - Eastbound left-turn movement AM and PM peak hours; and
 - Overall intersection AM and PM peak hours.

2026 Background Traffic Operations

Under 2026 background traffic conditions all intersections within the study area are forecast to operate at overall acceptable levels of service. The following critical movements are noted:

- Arkell Road and Colonial Road:
 - Northbound left-through-right movement AM and PM peak hours; and
 - Southbound left-through-right movement AM and PM peak hours.
- Victoria Road and Arkell Road:
 - Eastbound left-turn movement AM and PM peak hours;
 - Westbound left-turn movement AM and PM peak hours;
 - Northbound through-right movement AM and PM peak hours;
 - Southbound through-right movement AM and PM peak hours;
 and
 - Overall intersection –AM and PM peak hours.
- Victoria Road and 388 Arkell Road Access 2:
 - Northbound through movement AM and PM peak hours; and
 - Southbound through movement PM peak hour.
- Victoria Road and Victoria Park Village Road:
 - Eastbound left-turn movement AM and PM peak hours; and
 - Overall intersection AM and PM peak hours.

2031 Background Traffic Operations

Under 2031 background traffic conditions all intersections within the study area are forecast to operate at overall acceptable levels of service. The following critical movements are noted:



- Arkell Road and Colonial Road:
 - Northbound left-through-right movement AM and PM peak hours;
 - Southbound left-through-right movement AM and PM peak hours; and
 - Overall intersection AM peak hour.
- Arkell Road and 388 Arkell Road Access 1:
 - Southbound left-turn movement AM peak hour.
- Victoria Road and Arkell Road:
 - Eastbound left-turn movement AM and PM peak hours;
 - Westbound left-turn movement AM and PM peak hours;
 - Northbound through-right movement AM and PM peak hours;
 - Southbound through-right movement AM and PM peak hours; and
 - Overall intersection AM and PM peak hours.
- Victoria Road and 388 Arkell Road Access 2:
 - Northbound through movement AM and PM peak hours;
 - Southbound through movement PM peak hours; and
 - Overall intersection AM peak hour.
- Victoria Road and Victoria Park Village Road:
 - Eastbound left-turn movement AM and PM peak hours;
 - Eastbound right-turn movement PM peak hour; and
 - Overall intersection AM and PM peak hours.

Background Remedial Measures

The following remedial measures are required in order to provide acceptable levels of service at the study area intersections under background conditions:

- Signal timing and phasing optimization at all signalized intersections;
- ► Eastbound dual left-turn lanes and fully-protected phase at Victoria Road and Arkell Road;
- Northbound and southbound right-turn lanes at Victoria Road and Arkell Road;
- ► Traffic Control Signals at Arkell Road and Colonial Road, and Victoria Road and Victoria Park Village Road; and
- ▶ Road Widening on Victoria Road to four (4) lanes from Clair Road north to MacAllister Boulevard.



2031 Background Remedial Measures Traffic Operations

Under 2031 background traffic conditions with remedial measures in place, all intersections within the study area are forecast to operate at overall acceptable levels of service. The following critical movements are noted:

- Victoria Road and Arkell Road:
 - Eastbound left-turn movement 95th percentile queues exceeding available storage by 42 metres and 22 metres during the AM and PM peak hours, respectively; and
 - Westbound left-turn movement 95th percentile queues exceeding available storage by 10 metres and 15 metres during the AM and PM peak hours, respectively.

Development Trip Generation

The development is forecast to generate 56 and 70 new trips during the AM and PM peak hours, respectively at full build-out.

The site generated traffic accounts for a maximum of 0.9% and 1.0% of all study area traffic, during the AM and PM peak hours, respectively.

2021 Total Traffic Operations

Under 2021 total traffic conditions all intersections within the study area are forecast to operate at overall acceptable levels of service. The following critical movements are noted:

- Arkell Road and Colonial Road:
 - Northbound left-through-right movement AM peak hour; and
 - Southbound left-through-right movement AM and PM peak hours.
- Victoria Road and Arkell Road:
 - Eastbound left-turn movement AM and PM peak hours;
 - Westbound left-turn movement AM and PM peak hours;
 - Northbound through-right movement AM and PM peak hours;
 - Southbound through-right movement AM and PM peak hours; and
 - Overall intersection AM and PM peak hours.
- Victoria Road and 388 Arkell Road Access 2:
 - Northbound through movement AM and PM peak hours;
- Victoria Road and Victoria Park Village Road:
 - Eastbound left-turn movement AM and PM peak hours; and
 - Overall intersection AM and PM peak hours.



2026 Total Traffic Operations

Under 2026 total traffic conditions all intersections within the study area are forecast to operate at overall acceptable levels of service. The following critical movements are noted:

- Arkell Road and Colonial Road:
 - Northbound left-through-right movement AM and PM peak hours; and
 - Southbound left-through-right movement AM and PM peak hours.
- Victoria Road and Arkell Road:
 - Eastbound left-turn movement AM and PM peak hours;
 - Westbound left-turn movement AM and PM peak hours;
 - Northbound through-right movement AM and PM peak hours;
 - Southbound through-right movement AM and PM peak hours; and
 - Overall intersection AM and PM peak hours.
- Victoria Road and 388 Arkell Road Access 2:
 - Northbound through movement AM and PM peak hours; and
 - Southbound through movement PM peak hour.
- Victoria Road and Victoria Park Village Road:
 - Eastbound left-turn movement AM and PM peak hours; and
 - Overall intersection AM and PM peak hours.

2031 Total Traffic Operations

Under 2031 total traffic conditions all intersections within the study area are forecast to operate at overall acceptable levels of service. The following critical movements are noted:

- Arkell Road and Colonial Road:
 - Northbound left-through-right movement AM and PM peak hours;
 - Southbound left-through-right movement AM and PM peak hours; and
 - Overall intersection AM peak hour.
- Arkell Road and 388 Arkell Road Access 1:
 - Southbound left-turn movement AM peak hour.
- Victoria Road and Arkell Road:
 - Eastbound left-turn movement AM and PM peak hours;



- Westbound left-turn movement AM and PM peak hours;
- Northbound through-right movement AM and PM peak hours;
- Southbound through-right movement AM and PM peak hours;
 and
- Overall intersection AM and PM peak hours.
- Victoria Road and 388 Arkell Road Access 2:
 - Northbound through movement AM and PM peak hours;
 - Southbound through movement PM peak hours; and
 - Overall intersection AM peak hour.
- Victoria Road and Victoria Park Village Road:
 - Eastbound left-turn movement AM and PM peak hours;
 - Eastbound right-turn movement PM peak hour; and
 - Overall intersection AM and PM peak hours.

Development Impact to Study Area

The specific impact of the subject development without other area developments was examined against 2021 generalized background growth. The addition of subject development traffic to the general background traffic does not trigger the need for any remedial measures.

2031 Total Remedial Measures Traffic Operations

Under 2031 total traffic conditions, with remedial measures in place, all intersections within the study area are forecast to operate at overall acceptable levels of service. The following critical movements are noted:

- Victoria Road and Arkell Road:
 - Eastbound left-turn movement 95th percentile queues exceeding available storage by 42 metres and 22 metres during the AM and PM peak hours, respectively; and
 - Westbound left-turn movement 95th percentile queues exceeding available storage by 10 metres and 15 metres during the AM and PM peak hours, respectively.

Traffic Control Signal Warrants

Traffic signal control warrants were completed for all unsignalized study area intersections, for the 2031 total traffic horizon. The analyses indicate traffic control signals are not warranted at any unsignalized intersection.

However, to provide acceptable levels of service for the northbound and southbound movements at the intersection of Arkell Road and Colonial Road and the eastbound movement at the intersection of Victoria Road and



Victoria Park Village Road, it is recommended traffic signals are installed by the 2031 horizon year.

Potential Traffic Infiltration

While the proposed development does not have direct access to Arkell Road and traffic must travel through the neighbouring developments (Victoria Park Village, Northwest Arkell and Victoria), it would not be considered infiltration into the neighbourhood.

Once the entire neighbourhood is built-out, there will be an additional connection between Arkell Road and Victoria Road through the neighbourhood. This connection is not a direct route with reduced speed limits, therefore the potential for traffic infiltration is low. No traffic calming measures are recommended.

8.2 Recommendations

Based on the findings of this study, the subject development does not require offsite road improvements specific to the development. It is recommended that the development be approved as proposed.

In consideration of all of the area developments reviewed in this study, it is further recommended that the City monitor and review the need for:

- Signal timing and phasing optimization at all signalized intersections;
- Eastbound dual left-turn lanes and fully-protected phase at Victoria Road and Arkell Road;
- Northbound and southbound right-turn lanes at Victoria Road and Arkell Road;
- ► Traffic Control Signals at Arkell Road and Colonial Road, and Victoria Road and Victoria Park Village Road; and
- Road Widening on Victoria Road to four (4) lanes from Clair Road north to MacAllister Boulevard.



Appendix A

Pre-Study Consultation Documentation





22 King Street South, Suite 300 Waterloo, ON N2J 1N8 p: 519.896.3163 905.381.2229 f: 1.855.764.7349

www.ptsl.com

13 April 2018 Project: 180099

Gwen Zhang Engineering Services City of Guelph 1 Carden Street Guelph ON N1H 3A1

Dear Ms. Zhang:

RE: 220 ARKELL ROAD, GUELPH, ON – PROPOSED RESIDENTIAL DEVELOPMENT TRAFFIC IMPACT AND TDM OPTIONS STUDY

Paradigm Transportation Solutions Limited (Paradigm) was retained on behalf of Carson Reid Homes Ltd. (the Client) to prepare a Transportation Impact Study (TIS) and Transportation Demand Management (TDM) Options Report for a proposed development in the City of Guelph. The subject lands are located on the north side of Arkell Road, east of Summerfield Drive and west of Victoria Road South.

The following details our understanding of the assignment, and proposed work plan to complete the study.

Project Understanding

The development seeks to develop 34 single-family homes and 60 cluster townhouse dwellings for a total of 94 units. Vehicular access to the site will be provided via Amos Avenue. The development is expected to begin construction in 2019 and be completed and fully occupied by 2021.

Consultation with City of Guelph staff (the review agency) has identified that they require two (2) reports:

- Transportation Impact Study (TIS); and
- Transportation Demand Management (TDM) Options Report (to be included as part of the TIS).

For previous applications, staff has agreed that these reports can be combined into a single document. The TIS/TDM Options Study will evaluate the effects of the proposed development on the transportation system, and recommended improvements, if necessary, to address potential impacts.

In assessing the transportation impacts, subject to City of Guelph concurrence, we intend to analyze the operation of the intersections of:

- Victoria Road South and Victoria Park Village Road (unsignalized);
- Arkell Road and Victoria Road (signalized);
- Arkell Road and Colonial Drive (unsignalized);
- Arkell Road and Amos Drive/Zecca Drive (unsignalized); and
- Arkell Road and Summerfield Drive (unsignalized).

We will complete the TIS in accordance with the *City of Guelph Traffic Impact Study Guidelines* (dated April 2016) posted on the City's website and any further direction provided by City staff during preconsultation.

Work Plan

The following outlines our proposed work plan to carry out of this assignment:

- ► Task 1 Pre-Study Consultation: We will contact the review agency by telephone/e-mail to confirm and refine the study scope and assumptions prior to undertaking the TIS.
- ▶ Task 2 Data Collection: Through pre-study consultation with the review agencies, we will request available traffic counts, traffic signal timings, background growth rates, transit routes/ridership, relevant background reports, and any other information about the study area pertinent to the assessment (e.g., other development applications in the vicinity). If the review agency does not have traffic counts collected within the past two (2) years, we will arrange for an eight-hour weekday turning movement count at the study area intersections.
 - While the traffic data is being collected, we will conduct a site visit to view and assess current road and transportation conditions in the study area during the typical peak periods for commuter traffic flow (weekday morning (AM) and afternoon (PM) peak hours).
- ► Task 3 Traffic Forecasting: We will request confirmation of the opening year and site plan statistics for the proposed development. According to the agency TIS guidelines, we have assumed that we will be requested to develop traffic forecasts for the weekday AM and PM peak hours for two (2) future horizon years: opening of the development (2021) and five (5) years (2026) from full occupancy. The components of the traffic forecasts are:
 - Existing (Base Year) We will develop Existing (2018) vehicle traffic volumes for the AM
 and PM peak hours from available counts for the study intersections and the proposed site
 driveway. Counts collected prior to 2018 will be factored to the base year using a growth
 rate, preferably approved by the review agencies.
 - Future (Horizon Year) Background We will estimate Future Background (2021 and 2026) vehicle traffic volumes for the AM and PM peak hours by applying a growth rate to the Existing volumes and adding anticipated trips from nearby approved developments.
 - Future (Horizon Year) Total We will forecast the AM and PM peak hour vehicle traffic volumes generated by the proposed development based on the Institute of Transportation Engineers (ITE) *Trip Generation Manual* (10th Edition) as appropriate. The site vehicle trips will be distributed to the adjacent road network based on existing traffic patterns, and added to the Future Background estimates to produce Future Total traffic volumes for each horizon year.



- City staff has noted that since the road network within the study area has not been finalized, the study will include the following two scenarios:
 - With two north-south connections to Arkell Road via Colonial Drive and Amos Drive; and
 - With three north-south connections to Arkell Road via Colonial Drive, Amos Drive and Summerfield Drive northerly extension.
- ▶ Task 4 Operational Analyses: We will evaluate the operation of the identified intersections for the Existing, Future Background and Future Total AM and PM peak hour traffic conditions for each horizon year. The operational analyses will assess volume-to-capacity (v/c) ratios, Level of Service (LOS) and queuing conditions. Based on the analysis results, we will identify any existing deficiencies, as well as the net impact of the proposed development on the study area road network. The need for road improvements (e.g., provision of auxiliary turn lanes) and/or modifications to traffic control devices (e.g., addition of traffic control signals) to address any deficiencies will be determined. An assessment of whether these measures are required due to non-site traffic (i.e. Existing or Future Background) or the increase in traffic resulting from the proposed development will be completed. In addition, a qualitative assessment of the potential impact on transit services and active transportation facilities (i.e. walking and cycling modes) will be provided.
- ▶ Task 5 Site Access: The proposed site access locations will be evaluated in terms of capacity, safety and adequacy of queue storage capacity, pedestrian safety. The access points will be checked for conflicts, with utilities, other driveway locations (including those of other sites), bus stop locations, on-street weaving problems, pedestrian/bicycle safety, etc. On-site parking/circulation systems will be evaluated to demonstrate a high degree of safety with respect to the possibility of queues backing onto municipal roads, the need for vehicles to back onto roads, etc. Sight-lines for roads and access points will be evaluated to ensure safe conditions in accordance with accepted standards where these are affected by the site design. Service vehicle/truck loading facilities and access to these facilities will be evaluated to ensure that they are adequately sized, designed, and provided with suitable access so that they will not adversely affect traffic operations on municipal roads. Any required turning or other restrictions will be identified. Adequate access for emergency vehicles will be assessed.
- ▶ Task 6 TDM Options: We will prepare a TDM Options section within the overall TIS report to identify potential TDM measures that can be implemented during both the pre-occupancy and post-occupancy periods of the development. The City's TDM policy provides several TDM options that can be implemented during both the pre-construction period and post-construction that are feasible given the developments site and situation characteristics. We will assess the potential benefits for the proposed plan and its support for non-auto initiatives available including public transit, walkability, and the potential for other TDM initiatives identified by the City of Guelph:
 - Measure to encourage active transportation to/from the site (e.g. enhanced bicycle storage);
 - Measures to support public transit ridership to/from the site;
 - Discussion of how parking and site layout can enhance pedestrian connectivity to municipal street and trails; and



- Measures to support the reduction of single-occupancy vehicle ownership and use (e.g. unbundle parking, designate carpool parking, provision of community carshare).
- ▶ Task 7 Report and Recommendations: We will prepare a final report documenting the study findings and conclusions, and providing recommendations regarding the proposed development from a transportation perspective. The final report will include appendices containing relevant traffic data as well as the detailed output generated by the operational analysis software.

We trust the foregoing work plan is acceptable. If you have any questions related to this project please contact Heather Goodman at (416)-479-9684 x502 or by email at hgoodman@ptsl.com

Yours very truly,

PARADIGM TRANSPORTATION SOLUTIONS LIMITED

Jim Mallett

M.A.Sc., P.Eng., PTOE

President

Heather Goodman

From: Gwen.Zhang@guelph.ca
Sent: April 26, 2018 11:23 AM
To: Heather Goodman

Cc: Rajan Philips; Julie.Tot@guelph.ca; Jennifer.Juste@guelph.ca

Subject: RE: 180099 (220 Arkell Road TIS & TDM) - Scope of Work

Hi Heather,

We'd suggest using the same growth rate as in the 388 Arkell study (a rate of 2% to 2026 and 3% afterwards).

Thanks, Gwen

From: Heather Goodman [mailto:hgoodman@ptsl.com]

Sent: April 20, 2018 9:25 AM

To: Gwen Zhang

Cc: Rajan Philips; Julie Tot; Jennifer Juste

Subject: RE: 180099 (220 Arkell Road TIS & TDM) - Scope of Work

Hi Gwen,

Thank you for your comments, please see the attached site plan.

As for the growth rate, in the 388 Arkell study, we had a rate of 2% to 2026 and 3% afterwards. Are these rates applicable to this study, or do you want the rate to stay at 2% for all horizons?

Thanks,

Heather Goodman, B.Eng., EIT, MITE

Transportation Consultant



Paradigm Transportation Solutions Limited

p: 416.479.9684 x502 m: 905.506.0454

From: Gwen.Zhang@guelph.ca [mailto:Gwen.Zhang@guelph.ca]

Sent: April 19, 2018 10:03 AM

To: Heather Goodman < hgoodman@ptsl.com>

Cc: Rajan Philips <rphilips@ptsl.com>; Julie.Tot@guelph.ca; Jennifer.Juste@guelph.ca

Subject: RE: 180099 (220 Arkell Road TIS & TDM) - Scope of Work

Hi Heather,

We have reviewed the proposed Scope of Work. In addition to the listed tasks, the study should also cover the following work:

- Provide a site concept plan. If the concept plan shows more than one access to the subject site (not just on Amos Drive alone), the study area should cover all the access intersections;
- Add two intersections in the study area for the proposed new high school with one access on Arkell Road and another one on Victoria Road. Use a diagram to show the trips to/from the high school;
- Refer to the study "388 Arkell Road Transportation Impact Study," prepared by Paradigm in August 2017, for other developments including all the developments listed under Section "5.1.2 Other Planned Developments";
- Add one more future horizon year, i.e., 10 years after the build-out;
- Provide signal warrant analysis for currently unsignalized intersections on Arkell Road and Victoria Road;
- Provide a detailed functional plan for any mitigating measures identified in the analysis;
- Provide recommendations on traffic calming measures to address potential traffic infiltration; and
- Include cyclist volumes in any new traffic counts.

We suggest the general background traffic would grow at a rate of 2% per annum.

Regards,

Gwen Zhang, M.Sc., P.Eng | Transportation Planning Engineer
Engineering and Capital Infrastructure Services | **Infrastructure, Development & Enterprise**T 519-822-1260 x 2638
E gwen.zhang@guelph.ca

From: Heather Goodman [mailto:hgoodman@ptsl.com]

Sent: April 18, 2018 11:11 AM

To: Gwen Zhang **Cc:** Rajan Philips

Subject: 180099 (220 Arkell Road TIS & TDM) - Scope of Work

Hi Gwen,

Paradigm would like to inform the City that we will be undertaking a Transportation Impact Study and TDM Options Study for the proposed residential development of lands located at 220 Arkell Road, detailed in the enclosed project overview and work plan. We ask that you please review the work plan to ensure the scope of the study is acceptable and provide comments if necessary.

In addition, we request the following information from the City for our study:

- The following intersections will be included in the study, please confirm that this is acceptable. Paradigm previously collection TMCs at all intersections except Victoria Park Village Road (currently under construction). The counts are from November 2016, please confirm these are acceptable:
 - o Victoria Road South and Victoria Park Village Road (unsignalized);
 - Arkell Road and Victoria Road (signalized);
 - Arkell Road and Colonial Drive (unsignalized);
 - o Arkell Road and Amos Drive/Zecca Drive (unsignalized); and
 - Arkell Road and Summerfield Drive (unsignalized).
- The transportation impact study will assess two (2) future horizons year representing opening of the development (2021) and 5 years from full occupancy (2026). Please confirm that this is acceptable.
- The study will conform to City Guidelines. Please confirm this is acceptable.
- Any in-stream or recently approved developments to included in the background forecasts. We assume
 the following developments will need to be included in the background growth, please add any
 additional developments:
 - o Arkell Road High School
 - Victoria Park Village
- The growth rate to use for the study.

Due to the time sensitive nature of the project, we ask that you please provide comments at your earliest convenience. Please do not hesitate to contact me if you have questions relating to this project.

Regards,

Heather Goodman, B.Eng., EIT, MITE

Transportation Consultant



Paradigm Transportation Solutions Limited

5000 Yonge Street, Suite 1901, Toronto ON M2N 7E9 p: 416.479.9684 x502

m: 905.506.0454 e: hgoodman@ptsl.com w: www.ptsl.com

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Appendix B

Detailed Turning Movement Count Data & Signal Timings



Arkell Rd @ Summerfield Dr **Specified Period Morning Peak Diagram One Hour Peak From:** 7:00:00 From: 7:45:00 To: 9:00:00 To: 8:45:00 Municipality: Guelph Weather conditions: Site #: Clear/Dry 000000006 Intersection: Arkell Rd & Summerfield Dr Person(s) who counted: Linda TFR File #: Count date: 5-Oct-2016 ** Non-Signalized Intersection ** Major Road: Arkell Rd runs W/E East Leg Total: 614 East Entering: 289 East Peds: 0 \mathbb{X} Peds Cross: Trucks Heavys Totals Heavys Trucks Cars Totals Cars 12 361 382 247 11 265 22 2 24 Arkell Rd 269 13 Heavys Trucks Cars Totals Arkell Rd 215 225 4 0 26 30 Trucks Heavys Totals Cars 9 325 241 311 Summerfield Dr \mathbb{X} Peds Cross: Cars 114 210 Peds Cross: \bowtie Cars 48 96 West Peds: South Peds: 0 Trucks 0 Trucks 2 1 3 9 West Entering: 255 3 4 South Entering: 217 Heavys 6 Heavys 1 West Leg Total: 637 Totals 54 Totals 117 100 South Leg Total: 271 **Comments**

Arkell Rd @ Summerfield Dr Mid-day Peak Diagram **Specified Period One Hour Peak** From: 12:00:00 From: 11:00:00 To: 14:00:00 To: 13:00:00 Municipality: Guelph Weather conditions: Site #: Clear/Dry 000000006 Intersection: Arkell Rd & Summerfield Dr Person(s) who counted: Linda TFR File #: Count date: 5-Oct-2016 ** Non-Signalized Intersection ** Major Road: Arkell Rd runs W/E East Leg Total: 395 East Entering: 191 East Peds: 0 \mathbb{X} Peds Cross: Trucks Heavys Totals Heavys Trucks Cars Totals Cars 224 230 177 172 3 14 14 Arkell Rd 186 Heavys Trucks Cars Totals Arkell Rd 179 186 2 0 70 72 Trucks Heavys Totals Cars 3 249 197 204 Summerfield Dr \mathbb{X} Peds Cross: 70 Peds Cross: \bowtie Cars 84 Cars 52 18 West Peds: South Peds: 0 Trucks 0 Trucks 1 0 1 3 West Entering: 258 Heavys 2 Heavys 0 0 0 South Entering: 71 West Leg Total: 488 Totals 86 Totals 53 South Leg Total: 157 **Comments**

Arkell Rd @ Summerfield Dr **Afternoon Peak Diagram Specified Period One Hour Peak** From: 16:45:00 From: 15:00:00 To: 17:45:00 18:00:00 To: Municipality: Guelph Weather conditions: Site #: Clear/Dry 000000006 Intersection: Arkell Rd & Summerfield Dr Person(s) who counted: Linda TFR File #: Count date: 5-Oct-2016 ** Non-Signalized Intersection ** Major Road: Arkell Rd runs W/E East Leg Total: 758 East Entering: 376 East Peds: 1 \mathbb{X} Peds Cross: Trucks Heavys Totals Heavys Trucks Cars Totals Cars 360 364 304 300 2 72 72 372 Arkell Rd Heavys Trucks Cars Totals Arkell Rd 342 345 122 126 Trucks Heavys Totals 3 1 Cars 379 0 382 464 Summerfield Dr \mathbb{X} Peds Cross: 97 Peds Cross: \bowtie Cars 194 Cars 60 37 West Peds: 0 South Peds: 0 Trucks 1 Trucks 0 0 3 West Entering: 471 Heavys 3 Heavys 0 0 0 South Entering: 97 West Leg Total: 835 Totals 198 Totals 60 South Leg Total: 295 **Comments**

Arkell Rd @ Summerfield Dr

Total Count Diagram

Municipality: Guelph

Site #: 0000000006

Intersection: Arkell Rd & Summerfield Dr

TFR File #: 3

Count date: 5-Oct-2016

Weather conditions:

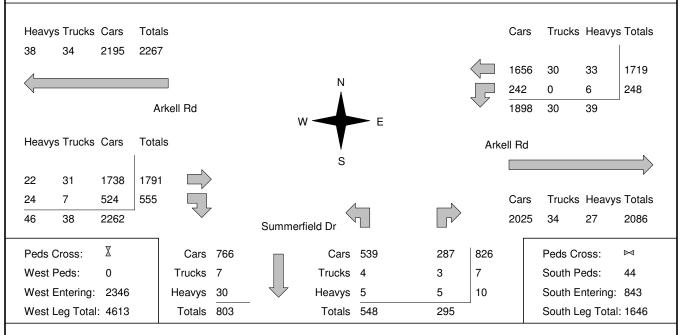
Clear/Dry

Person(s) who counted:

Linda

** Non-Signalized Intersection ** Major Road: Arkell Rd runs W/E

East Leg Total: 4053
East Entering: 1967
East Peds: 2
Peds Cross: \[\bar{x} \]



Comments

Arkell Rd @ Zecca Dr / Amos Dr **Specified Period One Hour Peak Morning Peak Diagram** From: 7:45:00 From: 7:00:00 To: 9:00:00 To: 8:45:00 Municipality: Guelph Weather conditions: Clear/Dry Site #: 000000005 Intersection: Arkell Rd & Zecca Dr Person(s) who counted: Matt TFR File #: Count date: 5-Oct-2016 ** Non-Signalized Intersection ** Major Road: Arkell Rd runs W/E North Leg Total: 33 Heavys 0 0 0 Heavys 0 East Leg Total: 604 Trucks 0 0 Trucks 0 North Entering: 28 0 East Entering: 268 North Peds: East Peds: Cars 15 2 11 28 Cars 5 10 \mathbb{X} Totals 5 Peds Cross: Totals 15 11 Peds Cross: ⋈ Amos Dr Totals Trucks Heavys Totals Heavys Trucks Cars Cars 13 278 298 0 245 12 264 0 3 3 Arkell Rd 246 15 Heavys Trucks Cars Totals Arkell Rd 0 3 3 297 311 Trucks Heavys Totals 0 12 12 0 Cars 322 9 312 336 \mathbb{X} Peds Cross: Peds Cross: \bowtie Cars 14 Cars 18 14 33 West Peds: 13 Trucks 0 Trucks 0 0 0 South Peds: 8 West Entering: 326 1 South Entering: 34 Heavys 3 Heavys 1 0 West Leg Total: 624 Totals 17 Totals 19 South Leg Total: 51 **Comments**

Arkell Rd @ Zecca Dr / Amos Dr **Specified Period One Hour Peak** Mid-day Peak Diagram **From:** 12:15:00 From: 11:00:00 To: 14:00:00 To: 13:15:00 Municipality: Guelph Weather conditions: Clear/Dry Site #: 000000005 Intersection: Arkell Rd & Zecca Dr Person(s) who counted: Matt TFR File #: Count date: 5-Oct-2016 ** Non-Signalized Intersection ** Major Road: Arkell Rd runs W/E North Leg Total: 28 Heavys 0 0 0 Heavys 0 East Leg Total: 386 North Entering: 12 Trucks 0 0 Trucks 0 East Entering: 0 194 North Peds: East Peds: Cars 10 0 2 12 Cars 16 0 \mathbb{X} 2 Peds Cross: Totals 10 Totals 16 Peds Cross: ⋈ Amos Dr Totals Trucks Heavys Totals Heavys Trucks Cars Cars 2 200 204 0 182 178 2 0 6 Arkell Rd 190 2 Heavys Trucks Cars Totals Arkell Rd 0 9 9 3 180 186 14 15 Trucks Heavys Totals 0 1 Cars 3 203 186 192 Zecca Dr \mathbb{X} Peds Cross: 17 Peds Cross: \bowtie Cars 20 Cars 12 0 West Peds: 1 Trucks 1 Trucks 0 0 0 South Peds: 4 0 West Entering: 210 South Entering: 17 Heavys 0 Heavys 0 0 West Leg Total: 414 Totals 21 Totals 12 South Leg Total: 38 **Comments**

Arkell Rd @ Zecca Dr / Amos Dr **Afternoon Peak Diagram Specified Period One Hour Peak** From: 16:45:00 From: 15:00:00 To: 18:00:00 To: 17:45:00 Municipality: Guelph Weather conditions: Clear/Dry Site #: 000000005 Intersection: Arkell Rd & Zecca Dr Person(s) who counted: Matt TFR File #: Count date: 5-Oct-2016 ** Non-Signalized Intersection ** Major Road: Arkell Rd runs W/E North Leg Total: 57 Heavys 0 0 0 Heavys 0 East Leg Total: 706 North Entering: 21 Trucks 0 0 East Entering: 0 Trucks 0 370 East Peds: North Peds: Cars 13 7 21 Cars 36 7 7 \mathbb{X} Peds Cross: Totals 13 Totals 36 Peds Cross: ⋈ Amos Dr Totals Trucks Heavys Totals Heavys Trucks Cars Cars 2 376 380 0 0 11 353 349 2 0 6 6 Arkell Rd 366 2 Heavys Trucks Cars Totals Arkell Rd 0 25 25 3 323 326 0 26 26 Trucks Heavys Totals 0 Cars 0 374 333 336 Zecca Dr \mathbb{X} Peds Cross: 17 Peds Cross: \bowtie Cars 33 Cars 14 3 West Peds: 7 0 Trucks 0 Trucks 0 0 South Peds: 9 West Entering: 377 0 South Entering: 17 Heavys 0 Heavys 0 0 West Leg Total: 757 Totals 33 Totals 14 South Leg Total: 50 **Comments**

Arkell Rd @ Zecca Dr / Amos Dr

Total Count Diagram

Municipality: Guelph

Site #: 000000005

Intersection: Arkell Rd & Zecca Dr

TFR File #:

North Leg Total: 275

North Entering: 139

North Peds:

Peds Cross:

Count date: 5-Oct-2016 Weather conditions:

Clear/Dry

Person(s) who counted:

Matt

** Non-Signalized Intersection **

Heavys 0 0 0 2 Trucks 1 1 Cars 85 5 47 137

Totals 86 48 Major Road: Arkell Rd runs W/E

Heavys 0 Trucks 1 Cars 135

Totals 136

East Entering: 1919 East Peds: 31 \mathbb{X} Peds Cross:

East Leg Total: 3859

Heavys Trucks Cars Totals 30 1944 2013

⋈



Arkell Rd

Trucks 3

Heavys 5

Totals 159

Heavys	Trucks	Cars	Totals
0	0	86	86
26	32	1799	1857
1	3	120	124
27	35	2005	

 \mathbb{X} Cars 151

Peds Cross: West Peds: 37 West Entering: 2067 West Leg Total: 4080







Amos Dr



Trucks Heavys Totals Cars 0 46 1778 29 36 1843 26 4 30 1850 40

Arkell Rd



Cars 81 34 118 Trucks 0 0 1 4 Heavys 3 1 Totals 84

Trucks Heavys Totals Cars 1880 27 1940

> Peds Cross: \bowtie South Peds: 57 South Entering: 123 South Leg Total: 282

Comments

Arkell Rd @ Colonial Dr **Morning Peak Diagram Specified Period One Hour Peak** From: 8:00:00 **From:** 7:00:00 To: 9:00:00 9:00:00 To: Municipality: Guelph Weather conditions: Site #: Clear/Dry 000000007 Intersection: Arkell Rd & Colonial Dr Person(s) who counted: Rick TFR File #: Count date: 6-Oct-2016 ** Non-Signalized Intersection ** Major Road: Arkell Rd runs W/E East Leg Total: 563 East Entering: 189 East Peds: 1 \mathbb{X} Peds Cross: Trucks Heavys Totals Heavys Trucks Cars Totals Cars 11 238 260 155 142 7 32 1 34 Arkell Rd Heavys Trucks Cars Totals Arkell Rd 252 262 50 54 Trucks Heavys Totals 3 1 Cars 7 374 302 359 Colonial Dr \mathbb{X} Peds Cross: 203 Peds Cross: \bowtie Cars 82 Cars 96 107 West Peds: 0 Trucks 2 Trucks 5 2 7 South Peds: 11 7 West Entering: 316 3 South Entering: 217 Heavys 4 Heavys 4 West Leg Total: 576 Totals 88 Totals 105 South Leg Total: 305 **Comments**

Arkell Rd @ Colonial Dr Mid-day Peak Diagram **Specified Period One Hour Peak** From: 12:00:00 From: 11:00:00 To: 14:00:00 To: 13:00:00 Municipality: Guelph Weather conditions: Site #: Clear/Dry 000000007 Intersection: Arkell Rd & Colonial Dr Person(s) who counted: Rick TFR File #: Count date: 6-Oct-2016 ** Non-Signalized Intersection ** Major Road: Arkell Rd runs W/E East Leg Total: 337 East Entering: 173 East Peds: 0 \mathbb{X} Peds Cross: Trucks Heavys Totals Heavys Trucks Cars Totals Cars 208 217 151 1 157 16 16 Arkell Rd 167 Heavys Trucks Cars Totals Arkell Rd 2 128 133 0 0 54 54 Trucks Heavys Totals Cars 3 182 159 164 Colonial Dr \mathbb{X} Peds Cross: Cars 70 88 Peds Cross: \bowtie Cars 57 31 West Peds: 0 South Peds: 0 Trucks 0 Trucks 0 0 1 3 West Entering: 187 Heavys 3 0 South Entering: 91 Heavys 0 West Leg Total: 404 Totals 70 Totals 60 South Leg Total: 161 **Comments**

Arkell Rd @ Colonial Dr **Afternoon Peak Diagram Specified Period One Hour Peak** From: 16:30:00 From: 15:00:00 To: 17:30:00 18:00:00 To: Municipality: Guelph Weather conditions: Site #: Clear/Dry 000000007 Intersection: Arkell Rd & Colonial Dr Person(s) who counted: Rick TFR File #: Count date: 6-Oct-2016 ** Non-Signalized Intersection ** Major Road: Arkell Rd runs W/E East Leg Total: 684 East Entering: 355 East Peds: 0 \mathbb{X} Peds Cross: Trucks Heavys Totals Heavys Trucks Cars Totals Cars 360 367 298 293 0 57 57 Arkell Rd 350 Heavys Trucks Cars Totals Arkell Rd 3 268 272 0 80 80 Trucks Heavys Totals 0 Cars 325 348 329 Colonial Dr \mathbb{X} Peds Cross: Peds Cross: \bowtie Cars 137 Cars 67 124 West Peds: 0 South Peds: 0 Trucks 0 Trucks 0 0 8 2 West Entering: 352 Heavys 0 Heavys 2 0 South Entering: 126 West Leg Total: 719 Totals 137 Totals 69 South Leg Total: 263 **Comments**

Arkell Rd @ Colonial Dr

Total Count Diagram

Municipality: Guelph

Site #: 0000000007

Intersection: Arkell Rd & Colonial Dr

TFR File #: 4

Count date: 6-Oct-2016

Weather conditions:

Clear/Dry

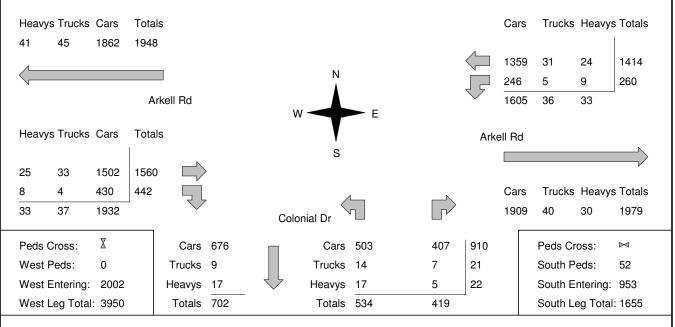
Person(s) who counted:

Rick

** Non-Signalized Intersection ** Major Road: Arkell Rd runs W/E

East Leg Total: 3653
East Entering: 1674
East Peds: 3
Peds Cross:

X



Comments

Victoria Rd @ Arkell Rd **Specified Period Morning Peak Diagram One Hour Peak** From: 8:00:00 From: 7:00:00 To: 9:00:00 To: 9:00:00 Municipality: Guelph Weather conditions: Clear/Dry Site #: 000000002 Intersection: Victoria Rd & Arkell Rd Person(s) who counted: Diane TFR File #: Count date: 6-Oct-2016 ** Signalized Intersection ** Major Road: Victoria Rd runs N/S North Leg Total: 1426 Heavys 0 19 1 20 Heavys 22 East Leg Total: 453 27 East Entering: North Entering: 552 Trucks 11 16 0 Trucks 26 264 East Peds: North Peds: Cars 92 382 31 505 Cars 826 0 \mathbb{X} Totals 103 Totals 874 Peds Cross: 417 32 Peds Cross: \bowtie Victoria Rd Totals Trucks Heavys Totals Heavys Trucks Cars Cars 13 176 189 3 0 59 61 0 63 140 1 142 Arkell Rd 257 Heavys Trucks Cars Totals Arkell Rd 11 270 281 2 75 77 2 16 18 0 Cars Trucks Heavys Totals 15 361 181 189 Victoria Rd \mathbb{X} Peds Cross: Peds Cross: \bowtie Cars 538 Cars 23 500 75 598 West Peds: 3 Trucks 19 Trucks 0 12 5 17 South Peds: 0 West Entering: 376 Heavys 0 0 22 South Entering: 637 Heavys 20 22 West Leg Total: 565 Totals 23 South Leg Total: 1214 Totals 577 **Comments**

Victoria Rd @ Arkell Rd Mid-day Peak Diagram **Specified Period One Hour Peak** From: 11:00:00 **From:** 12:45:00 To: 14:00:00 To: 13:45:00 Municipality: Guelph Weather conditions: Clear/Dry Site #: 000000002 Intersection: Victoria Rd & Arkell Rd Person(s) who counted: Diane TFR File #: Count date: 6-Oct-2016 ** Signalized Intersection ** Major Road: Victoria Rd runs N/S North Leg Total: 797 Heavys 2 20 1 23 Heavys 16 East Leg Total: 312 Trucks 2 2 15 East Entering: North Entering: 416 11 Trucks 14 143 North Peds: East Peds: 0 Cars 84 264 30 378 Cars 351 0 \mathbb{X} Peds Cross: Totals 88 295 33 Totals 381 Peds Cross: \bowtie Victoria Rd Totals Trucks Heavys Totals Heavys Trucks Cars Cars 156 162 2 0 31 48 0 50 60 1 62 Arkell Rd 137 Heavys Trucks Cars Totals Arkell Rd 0 64 65 65 66 Trucks Heavys Totals 0 25 25 0 Cars 2 154 159 169 Victoria Rd \mathbb{X} Peds Cross: Peds Cross: \bowtie Cars 349 Cars 24 258 64 346 West Peds: 3 Trucks 12 Trucks 0 12 5 17 South Peds: 0 West Entering: 156 Heavys 21 Heavys 0 South Entering: 379 15 1 16 West Leg Total: 318 Totals 24 South Leg Total: 761 Totals 382 **Comments**

Victoria Rd @ Arkell Rd **Specified Period Afternoon Peak Diagram One Hour Peak** From: 15:00:00 **From:** 16:30:00 To: 18:00:00 To: 17:30:00 Municipality: Guelph Weather conditions: Clear/Dry Site #: 000000002 Intersection: Victoria Rd & Arkell Rd Person(s) who counted: Diane TFR File #: Count date: 6-Oct-2016 ** Signalized Intersection ** Major Road: Victoria Rd runs N/S North Leg Total: 1510 Heavys 0 11 0 11 Heavys 10 East Leg Total: 570 7 East Entering: North Entering: 763 Trucks 1 0 Trucks 28 278 East Peds: North Peds: 745 Cars 170 523 52 Cars 709 0 \mathbb{X} Totals 747 Peds Cross: ⋈ Totals 171 540 52 Peds Cross: Victoria Rd Totals Trucks Heavys Totals Heavys Trucks Cars Cars 2 333 335 38 132 0 133 101 2 107 Arkell Rd 270 3 Heavys Trucks Cars Totals Arkell Rd 171 173 1 111 112 Trucks Heavys Totals 44 44 0 0 Cars 326 288 292 Victoria Rd \mathbb{X} Peds Cross: Peds Cross: \bowtie Cars 668 Cars 31 501 125 657 West Peds: 6 Trucks 10 Trucks 0 26 3 29 South Peds: 0 West Entering: 329 Heavys 0 0 9 South Entering: 695 Heavys 13 9 West Leg Total: 664 Totals 31 South Leg Total: 1386 Totals 691 128 **Comments**

Victoria Rd @ Arkell Rd

Total Count Diagram

Municipality: Guelph

Site #: 000000002

Intersection: Victoria Rd & Arkell Rd

TFR File #:

Count date: 6-Oct-2016 Weather conditions:

Clear/Dry

Person(s) who counted:

Diane

** Signalized Intersection **

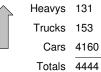
North Leg Total: 8667 North Entering: 4223 North Peds:

Peds Cross: \bowtie

Heavys	4	135	5	1
Trucks	30	122	9	1
Cars	810	2849	259	3
Totals	844	3106	273	

44 161 3918

Victoria Rd



Major Road: Victoria Rd runs N/S

East Leg Total: 3162 East Entering: 1621 East Peds: 0 \mathbb{X} Peds Cross:

Heavys Trucks Cars Totals 1600 1652



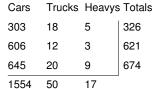
Arkell Rd

Heavys	Trucks	Cars	Total
4	31	1050	1085
1	14	643	658
0	8	222	230
5	53	1915	









Arkell Rd

 \mathbb{X} Peds Cross: West Peds: 41

West Entering: 1973

West Leg Total: 3625

Cars 3716 Trucks 150 Heavys 144 Totals 4010



Victoria Rd

Cars 184 2807 580 3571 Trucks 2 104 24 130 Heavys 1 122 129 Totals 187 3033

Cars Trucks Heavys Totals 1482 1541

> Peds Cross: \bowtie South Peds: 8 South Entering: 3830 South Leg Total: 7840

Comments

CITY OF GUELPH Traffic Signal Timing Parameters From Field **Prepared Date:** March. 13, 2018 Database Date Completed By: Sh.H Checked By: Arkell Road and Victoria Rd S **GREEN TIME PERIOD** Location: (sec.) **Vehicle Pedestrian** All Red Amber **Phase Direction Minimum** Minimum (sec.) (sec.) (sec.) Day Night MAX **FDWALK** MAX # WALK (sec.) **SBLT** 3.0 7.0 1 7.0 10.0 13.0 15.0 2.0 28.0 2 NB 4.0 3 **EBLT** 3.0 7.0 7.0 WB 10.0 7.0 13.0 2.0 20.0 4 4.0 7.0 5 **NBLT** 3.0 7.0 13.0 28.0 6 SB 10.0 15.0 4.0 2.0 **SBLT** 3.0 7 7.0 7.0 8 EB 10.0 7.0 13.0 4.0 2.0 20.0 System Control No TIME (M-F) **Local Control** Yes PEAK CYCLE LENGTH (sec.) OFFSET (sec.) **Fully-Actuated Mode** 7:00 - 21:00 Yes Free Day 21:00-7:00 Free Night Note: P+P = Protected Permissive Phase **Prot. = Fully Protected Phase**

Appendix C

Base Year (2018) Traffic Operations Reports



1: Summerfield Drive & Arkell Road

	-	•	•	←	1		
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	
Lane Configurations	1>		ች		¥		
Traffic Volume (vph)	235	31	26	284	122	104	
Future Volume (vph)	235	31	26	284	122	104	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Storage Length (m)		0.0	60.0		0.0	0.0	
Storage Lanes		0	1		1	0	
Taper Length (m)			7.5		7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	
Ped Bike Factor							
Frt	0.984				0.938		
Flt Protected			0.950		0.974		
Satd. Flow (prot)	1780	0	1671	1776	1678	0	
Flt Permitted			0.950		0.974		
Satd. Flow (perm)	1780	0	1671	1776	1678	0	
Link Speed (k/h)	50			50	50		
Link Distance (m)	290.6			206.6	213.5		
Travel Time (s)	20.9			14.9	15.4		
Confl. Peds. (#/hr)		9	9				
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	
Heavy Vehicles (%)	4%	13%	8%	7%	3%	4%	
Adj. Flow (vph)	240	32	27	290	124	106	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	272	0	27	290	230	0	
Enter Blocked Intersection	No	No	No	No	No	No	
Lane Alignment	Left	Right	Left	Left	Left	Right	
Median Width(m)	3.6			3.6	3.6		
Link Offset(m)	0.0			0.0	0.0		
Crosswalk Width(m)	4.8			4.8	4.8		
Two way Left Turn Lane	Yes						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	
Turning Speed (k/h)	_	15	25	_	25	15	
Sign Control	Free			Free	Stop		
Intersection Summary							
	Other						
Control Type: Unsignalized							
Intersection Capacity Utilizat	tion 40.8%			IC	CU Level	of Service A	Α
Analysis Period (min) 15							

Intersection						
Int Delay, s/veh	4.3					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	£B1	EDR	WDL	WD1	INDL.	NDK
Traffic Vol, veh/h	235	31	1 26	T 284	122	104
Future Vol. veh/h	235	31	26	284	122	104
	230	9	9	204	0	104
Conflicting Peds, #/hr		Free		Free		_
Sign Control RT Channelized	Free -	None	Free -	None	Stop	Stop
			600	None -	-	None
Storage Length	-	-	600		0	
Veh in Median Storage,		-		0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	98	98	98	98	98	98
Heavy Vehicles, %	4	13	8	7	3	4
Mvmt Flow	240	32	27	290	124	106
Major/Minor N	lajor1	ı	Major2		Minor1	
Conflicting Flow All	0	0	280	0	608	265
Stage 1	-	-	-	-	265	200
Stage 2					343	
Critical Hdwy			4.18		6.43	6.24
Critical Hdwy Stg 1			7.10		5.43	0.24
Critical Hdwy Stg 2			-	-	5.43	
Follow-up Hdwy			2.272		3.527	
Pot Cap-1 Maneuver			1249		457	769
Stage 1		-	1249		777	709
Stage 2	-	-	-	-	716	
		-	-		/10	-
Platoon blocked, %	-		1249	-	444	763
Mov Cap-1 Maneuver	-	-		-		
Mov Cap-2 Maneuver	-	-	-	-	537	-
Stage 1	-	-	-	-	771	-
Stage 2	-	-	-	-	701	-
Approach	EB		WB		NB	
HCM Control Delay, s	0		0.7		14.2	
HCM LOS	U		0.7		В	
TIGW E03					D	
Minor Lane/Major Mvmt	1	VBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)		622	-	-	1249	-
HCM Lane V/C Ratio		0.371	-	-	0.021	-
HCM Control Delay (s)		14.2	-	-	7.9	
HCM Lane LOS		В	-	-	Α	-
HCM 95th %tile Q(veh)		1.7	-	-	0.1	-

2: Zecca Drive/Amos Drive & Arkell Road

	۶	→	\rightarrow	•	←	•	4	†	<i>></i>	-	↓	4
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		4			4			4			4	
Traffic Volume (vph)	3	324	12	3	275	1	20	1	15	11	2	16
Future Volume (vph)	3	324	12	3	275	1	20	1	15	11	2	16
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. 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
Ped Bike Factor												
Frt		0.995						0.945			0.926	
FIt Protected					0.999			0.972			0.981	
Satd. Flow (prot)	0	1804	0	0	1775	0	0	1697	0	0	1726	0
Flt Permitted					0.999			0.972			0.981	
Satd. Flow (perm)	0	1804	0	0	1775	0	0	1697	0	0	1726	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		206.6			261.6			219.2			154.5	
Travel Time (s)		14.9			18.8			15.8			11.1	
Confl. Peds. (#/hr)	1		8	8		1	13		10	10		13
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	0%	5%	0%	5%	7%	0%	5%	0%	0%	0%	0%	0%
Adj. Flow (vph)	3	334	12	3	284	1	21	1	15	11	2	16
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	349	0	0	288	0	0	37	0	0	29	0
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)		3.6			3.6			0.0			0.0	
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	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Headway 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
Turning Speed (k/h)	25	_	15	25	-	15	25	CI	15	25	CI	15
Sign Control		Free			Free			Stop			Stop	
Intersection Summary												
	Other											
Control Type: Unsignalized												
Intersection Capacity Utilizati	ion 33.1%			IC	CU Level	of Service	Α					
Analysis Period (min) 15												

Intersection												
Int Delay, s/veh	1.4											
init Delay, siveri												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		4			4			4			4	
Traffic Vol, veh/h	3	324	12	3	275	1	20	1	15	11	2	16
Future Vol, veh/h	3	324	12	3	275	1	20	1	15	11	2	16
Conflicting Peds, #/hr	1	0	8	8	0	1	13	0	10	10	0	13
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage	2,# -	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	97	97	97	97	97	97	97	97	97	97	97	97
Heavy Vehicles, %	0	5	0	5	7	0	5	0	0	0	0	0
Mvmt Flow	3	334	12	3	284	1	21	1	15	11	2	16
Major/Minor I	Major1			Major2			Vinor1			Minor2		
Conflicting Flow All	286	0	0	354	0	0	666	646	358	656	652	298
Stage 1	-	-	-	-	-	-	354	354	-	291	291	270
Stage 2				-		-	312	292	-	365	361	
Critical Hdwy	4.1	-	-	4.15		-	7.15	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1				-			6.15	5.5	-	6.1	5.5	- 0.2
Critical Hdwy Stg 2				-	-	-	6.15	5.5	-	6.1	5.5	
Follow-up Hdwy	2.2			2.245		-	3.545	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1288	-	-	1188		-	369	393	691	382	390	746
Stage 1							657	634	-	721	675	- 10
Stage 2		-	-	-		-	692	675	_	658	629	-
Platoon blocked, %						-						
Mov Cap-1 Maneuver	1274			1178	-		351	388	681	367	385	737
Mov Cap-2 Maneuver				-			351	388	-	367	385	-
Stage 1					-		651	628		718	672	
Stage 2			-				665	672		635	623	
A	ED			WD			ND			CD		
Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.1			0.1			13.9			12.5		
HCM LOS							В			В		
Minor Lane/Major Mvm	nt I	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1			
Capacity (veh/h)		441	1274	-	-	1178	-		510			
HCM Lane V/C Ratio		0.084	0.002			0.003			0.059			
HCM Control Delay (s)		13.9	7.8	0		8.1	0		12.5			
HCM Lane LOS		В	Α	A		А	A		В			
HCM 95th %tile Q(veh))	0.3	0	-		0	-		0.2			
70111 701110 2(1011)	,	0.0	- 0						0.2			

3: Colonial Drive & Arkell Road

	٠	→	\rightarrow	•	←	•	4	†	/	-	↓	1
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	Ţ	ĥ		7	ĵ.			4			4	
Traffic Volume (vph)	0	290	59	35	166	0	112	0	117	0	0	0
Future Volume (vph)	0	290	59	35	166	0	112	0	117	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	50.0		0.0	60.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	1		0	0		0	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. 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
Ped Bike Factor												
Frt		0.975						0.931				
Flt Protected				0.950				0.976				
Satd. Flow (prot)	1863	1773	0	1703	1759	0	0	1622	0	0	1863	0
Flt Permitted				0.950				0.976				
Satd. Flow (perm)	1863	1773	0	1703	1759	0	0	1622	0	0	1863	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		261.6			193.8			209.6			91.7	
Travel Time (s)		18.8			14.0			15.1			6.6	
Confl. Peds. (#/hr)			11	11					1			
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	4%	7%	6%	8%	2%	9%	2%	4%	2%	2%	2%
Adj. Flow (vph)	0	315	64	38	180	0	122	0	127	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	379	0	38	180	0	0	249	0	0	0	0
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)		3.6	J		3.6	J		0.0	J		0.0	, i
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												
Headway 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
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Free			Free			Stop			Stop	
Intersection Summary												
	Other											
Control Type: Unsignalized												
Intersection Capacity Utilizati	ion 45.8%			IC	U Level	of Service	Α					
Analysis Period (min) 15												

Intersection												
Int Delay, s/veh	6.2											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	ሻ	ĵ.		ሻ	ĵ.			44			4	
Traffic Vol, veh/h	0	290	59	35	166	0	112	0	117	0	0	0
Future Vol, veh/h	0	290	59	35	166	0	112	0	117	0	0	0
Conflicting Peds, #/hr	0	0	11	11	0	0	0	0	1	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	500			600		-		-	-	-		-
Veh in Median Storage,	# -	0	-	-	0	-	-	0			0	
Grade, %	-	0	-	-	0	-		0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	4	7	6	8	2	9	2	4	2	2	2
Mvmt Flow	0	315	64	38	180	0	122	0	127	0	0	0
Major/Minor N	Najor1			Major2			Minor1			Minor2		
Conflicting Flow All	180	0	0	390	0	0	615	615	359	669	647	180
Stage 1	-	-	U	370	-	U	358	358	-	257	257	100
Stage 2							257	257		412	390	
Critical Hdwy	4.12			4.16			7.19	6.52	6.24	7.12	6.52	6.22
Critical Hdwy Stg 1	4.12			4.10			6.19	5.52	0.24	6.12	5.52	0.22
Critical Hdwy Stg 2							6.19	5.52		6.12	5.52	
	2.218			2.254			3.581	4.018	3.336		4.018	3 318
Pot Cap-1 Maneuver	1396			1147			394	4.010	681	371	390	863
Stage 1	1390			1147			646	628	001	748	695	- 003
Stage 2		-					732	695		617	608	
Platoon blocked. %			-				132	073		017	000	
Mov Cap-1 Maneuver	1396			1146			380	390	674	293	374	863
Mov Cap-1 Maneuver	1390			1140			380	390	0/4	293	374	003
Stage 1				_			640	622		748	672	
Stage 2			-				708	672		500	602	
Staye 2	-			-		-	100	012		500	002	
Approach	EB			WB			NB			SB		
HCM Control Delay, s	0			1.4			19.7			<u> </u>		
HCM LOS	U			1.4			19.7 C			A		
TIGIVI LUS							C			А		
Minnel one/Maine to		IDI 1	EDI	EDZ	EDD	MDI	WDT	WDD	CDI1			
Minor Lane/Major Mvmt	l ľ	VBLn1	EBL	EBT	EBR	WBL	WBT	WBR :	2RFU.I			
Capacity (veh/h)		489	1396	-	-	1146	-	-	-			
HCM Lane V/C Ratio		0.509	-	-	-	0.033	-	-	-			
HCM Control Delay (s)		19.7	0	-	-	8.2	-	-	0			
HCM Lane LOS		С	Α	-	-	Α	-	-	Α			
HCM 95th %tile Q(veh)		2.8	0		_	0.1						

220 Arkell Road TIS 5:00 pm 07-04-2018 2018 AM Base Year

Synchro 9 Report Page 7 Lanes, Volumes, Timings 5: Victoria Road & Arkell Road

07-24-2018

	•	-	•	•	—	•	1	†	~	-	ţ	4
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Detector Phase	7	4		3	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0		7.0	10.0		7.0	10.0	
Minimum Split (s)	10.0	26.0		10.0	26.0		10.0	34.0		10.0	34.0	
Total Split (s)	10.0	26.0		10.0	26.0		10.0	34.0		10.0	34.0	
Total Split (%)	12.5%	32.5%		12.5%	32.5%		12.5%	42.5%		12.5%	42.5%	
Maximum Green (s)	7.0	20.0		7.0	20.0		7.0	28.0		7.0	28.0	
Yellow Time (s)	3.0	4.0		3.0	4.0		3.0	4.0		3.0	4.0	
All-Red Time (s)	0.0	2.0		0.0	2.0		0.0	2.0		0.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	3.0	6.0		3.0	6.0		3.0	6.0		3.0	6.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	None		None	None	
Walk Time (s)		7.0			7.0			13.0			13.0	
Flash Dont Walk (s)		13.0			13.0			15.0			15.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)	18.0	9.6		17.2	9.6		34.2	28.7		34.2	28.7	
Actuated g/C Ratio	0.29	0.16		0.28	0.16		0.55	0.47		0.55	0.47	
v/c Ratio	0.90	0.40		0.39	0.47		0.06	0.85		0.11	0.75	
Control Delay	50.0	27.2		18.9	23.1		7.4	31.3		7.8	24.7	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	50.0	27.2		18.9	23.1		7.4	31.3		7.8	24.7	
LOS	D	С		В	С		Α	С		Α	С	
Approach Delay		44.2			20.9			30.4			23.7	
Approach LOS		D			С			С			С	

**		
Intersection Summary		
Area Type: Other		
Cycle Length: 80		
Actuated Cycle Length: 61.7		
Natural Cycle: 90		
Control Type: Actuated-Uncoordinated		
Maximum v/c Ratio: 0.90		
Intersection Signal Delay: 29.9	Intersection LOS: C	
Intersection Canacity Hilization 72.2%	ICITI aval of Sancica C	

Splits and Phases: 5: Victoria Road & Arkell Road

Analysis Period (min) 15



	۶	-	•	•	4	†	\	ļ
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	333	113	163	145	27	702	36	598
v/c Ratio	0.90	0.40	0.39	0.47	0.06	0.85	0.11	0.75
Control Delay	50.0	27.2	18.9	23.1	7.4	31.3	7.8	24.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	50.0	27.2	18.9	23.1	7.4	31.3	7.8	24.7
Queue Length 50th (m)	28.5	10.3	12.4	9.7	1.4	64.4	1.8	50.0
Queue Length 95th (m)	#85.3	26.8	30.0	27.9	4.9	#178.3	6.0	#144.4
Internal Link Dist (m)		120.3		333.4		799.5		131.4
Turn Bay Length (m)	40.0		20.0		90.0		50.0	
Base Capacity (vph)	371	597	418	595	423	824	333	796
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.90	0.19	0.39	0.24	0.06	0.85	0.11	0.75
Intersection Summary								

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

Queue shown is maximum after two cycles.

HCM 2010 Signalized Intersection Summary 5: Victoria Road & Arkell Road

	۶	→	*	•	←	4	1	†	~	1	ļ	1
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	ሻ	ĵ.		ሻ	1>		7	ĵ»		ሻ	ĵ»	
Traffic Volume (veh/h)	303	84	19	148	71	61	25	556	83	33	434	110
Future Volume (veh/h)	303	84	19	148	71	61	25	556	83	33	434	110
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	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 Sat Flow, veh/h/ln	1827	1818	1900	1881	1828	1900	1900	1792	1900	1845	1749	1900
Adj Flow Rate, veh/h	333	92	21	163	78	67	27	611	91	36	477	121
Adj No. of Lanes	1	1	0	1	1	0	1	1	0	1	1	0
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Percent Heavy Veh, %	4	3	3	1	3	3	0	6	6	3	8	8
Cap, veh/h	365	203	46	401	123	106	292	650	97	233	587	149
Arrive On Green	0.11	0.14	0.14	0.10	0.14	0.14	0.04	0.43	0.43	0.05	0.44	0.44
Sat Flow, veh/h	1740	1432	327	1792	908	780	1810	1524	227	1757	1346	342
Grp Volume(v), veh/h	333	0	113	163	0	145	27	0	702	36	0	598
Grp Sat Flow(s), veh/h/ln	1740	0	1759	1792	0	1687	1810	0	1751	1757	0	1688
Q Serve(q_s), s	7.0	0.0	3.8	4.9	0.0	5.3	0.5	0.0	24.8	0.7	0.0	20.0
Cycle Q Clear(q c), s	7.0	0.0	3.8	4.9	0.0	5.3	0.5	0.0	24.8	0.7	0.0	20.0
Prop In Lane	1.00		0.19	1.00		0.46	1.00		0.13	1.00		0.20
Lane Grp Cap(c), veh/h	365	0	249	401	0	229	292	0	747	233	0	736
V/C Ratio(X)	0.91	0.00	0.45	0.41	0.00	0.63	0.09	0.00	0.94	0.15	0.00	0.81
Avail Cap(c a), veh/h	365	0.00	544	411	0.00	522	413	0.00	758	333	0.00	736
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	25.1	0.0	25.5	20.8	0.0	26.4	12.3	0.0	17.8	14.0	0.0	15.9
Incr Delay (d2), s/veh	26.3	0.0	1.3	0.7	0.0	2.9	0.1	0.0	19.4	0.3	0.0	6.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.2	0.0	1.9	2.5	0.0	2.6	0.3	0.0	15.9	0.4	0.0	10.5
LnGrp Delay(d),s/veh	51.3	0.0	26.8	21.4	0.0	29.3	12.4	0.0	37.2	14.3	0.0	22.8
LnGrp LOS	D	0.0	C	C	0.0	C	В	0.0	D	В	0.0	C
Approach Vol, veh/h		446			308			729			634	
Approach Delay, s/veh		45.1			25.1			36.3			22.3	
Approach LOS		40.1 D			23.1 C			30.3 D			22.3 C	
	1	_	2	1	-		7	_				
Timer	1 1	2	3	4	5	6	7	8				
Assigned Phs			3		5	6		8				
Phs Duration (G+Y+Rc), s	6.3	33.6	9.6	15.1	5.7	34.2	10.0	14.8				
Change Period (Y+Rc), s	3.0	6.0	3.0	6.0	3.0	6.0	3.0	6.0				
Max Green Setting (Gmax), s	7.0	28.0	7.0	20.0	7.0	28.0	7.0	20.0				
Max Q Clear Time (g_c+l1), s	2.7	26.8	6.9	5.8	2.5	22.0	9.0	7.3				
Green Ext Time (p_c), s	0.0	0.7	0.0	1.4	0.0	4.2	0.0	1.3				
Intersection Summary			00.0									
HCM 2010 Ctrl Delay			32.3									
HCM 2010 LOS			С									

Intersection						
Int Delay, s/veh	2.2					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	\$				¥	
Traffic Vol, veh/h	368	131	75	320	62	38
Future Vol. veh/h	368	131	75	320	62	38
Conflicting Peds, #/hr	0	3	3	0.20	0	1
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	600	-	0	-
Veh in Median Storage			-	0	0	
Grade, %	0			0	0	
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	1	3	0	1	0	0
	383	136	78	333	65	40
Mvmt Flow	383	130	78	333	00	40
Major/Minor	Major1	N	Major2	1	Minor1	
Conflicting Flow All	0	0	523	0	945	456
Stage 1	-	-	-	-	455	-
Stage 2	-	-	-		490	-
Critical Hdwy	-	-	4.1	-	6.4	6.2
Critical Hdwy Stg 1	-	-			5.4	-
Critical Hdwy Stg 2			-	-	5.4	
Follow-up Hdwy			2.2	-	3.5	3.3
Pot Cap-1 Maneuver			1054		293	609
Stage 1			-		643	-
Stage 2					620	
Platoon blocked. %					020	
Mov Cap-1 Maneuver			1053		271	607
Mov Cap-1 Maneuver			1000		399	- 007
		-				
Stage 1	-	-	-	-	641	-
Stage 2	-	-	-	-	574	-
Approach	EB		WB		NB	
HCM Control Delay, s	0		1.7		15.1	
HCM LOS	U		17		C	
TICW EOS					C	
Minor Lane/Major Mvm	nt 1	VBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)		459	-	-	1053	-
HCM Lane V/C Ratio		0.227	-	-	0.074	-
HCM Control Delay (s)		15.1	-	-	8.7	-
HCM Lane LOS		С	-	-	Α	
HCM 95th %tile Q(veh)	0.9	-	-	0.2	

2: Zecca Drive/Amos Drive & Arkell Road

	۶	→	•	•	←	•	4	†	/	-	↓	4
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		4			4			4			4	
Traffic Volume (vph)	26	354	27	6	367	11	15	0	3	7	1	14
Future Volume (vph)	26	354	27	6	367	11	15	0	3	7	1	14
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. 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
Ped Bike Factor												
Frt		0.991			0.996			0.979			0.912	
Flt Protected		0.997			0.999			0.960			0.985	
Satd. Flow (prot)	0	1861	0	0	1873	0	0	1786	0	0	1707	0
Flt Permitted		0.997			0.999			0.960			0.985	
Satd. Flow (perm)	0	1861	0	0	1873	0	0	1786	0	0	1707	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		206.6			261.6			219.2			154.5	
Travel Time (s)		14.9			18.8			15.8			11.1	
Confl. Peds. (#/hr)			9	9			7		7	7		7
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	0%	1%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	27	373	28	6	386	12	16	0	3	7	1	15
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	428	0	0	404	0	0	19	0	0	23	0
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)		3.6			3.6			0.0			0.0	
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		4.00		4.00	4.00		4.00			4.00	4.00	4.00
Headway 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
Turning Speed (k/h)	25	_	15	25	_	15	25		15	25		15
Sign Control		Free			Free			Stop			Stop	
Intersection Summary												
	ther											
Control Type: Unsignalized												
Intersection Capacity Utilizati	on 47.4%			IC	CU Level	of Service	Α					
Analysis Period (min) 15												

Intersection												
Int Delay, s/veh	1.1											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		44			44			4			44	
Traffic Vol, veh/h	26	354	27	6	367	11	15	0	3	7	1	14
Future Vol, veh/h	26	354	27	6	367	11	15	0	3	7	1	14
Conflicting Peds, #/hr	0	0	9	9	0	0	7	0	7	7	0	7
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage	,# -	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	0	1	0	0	1	0	0	0	0	0	0	0
Mvmt Flow	27	373	28	6	386	12	16	0	3	7	1	15
Major/Minor N	Major1		1	Major2			Vinor1			Minor2		
Conflicting Flow All	398	0	0	410	0	0	871	862	403	855	870	399
Stage 1	-			-	-		451	451	-	405	405	
Stage 2	-	-	-	-	-	-	420	411	-	450	465	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1172	-	-	1160	-	-	274	295	652	281	292	655
Stage 1	-	-	-	-	-	-	592	574	-	626	602	-
Stage 2	-	-	-	-	-	-	615	598	-	592	566	
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1165	-	-	1153	-	-	256	282	643	270	279	651
Mov Cap-2 Maneuver	-	-	-	-	-	-	256	282	-	270	279	-
Stage 1	-	-	-	-	-	-	570	553	-	607	598	-
Stage 2	-	-	-	-	-	-	592	594	-	568	545	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.5			0.1			18.5			13.8		
HCM LOS							С			В		
Minor Lane/Major Mvm	it	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR :	SBLn1			
Capacity (veh/h)		285	1165	-	-	1153	-		431			
HCM Lane V/C Ratio		0.066	0.023			0.005			0.054			
HCM Control Delay (s)		18.5	8.2	0	-	8.1	0		13.8			
HCM Lane LOS		С	A	Ā		Α	A		В			
HCM 95th %tile Q(veh))	0.2	0.1	-	-	0	-		0.2			
2(1011)						-						

3: Colonial Drive & Arkell Road

Lane Group WBT Lane Configurations Traffic Volume (vph) 282 60 311 0 0 Future Volume (vph) 0 282 82 60 311 0 74 0 61 0 0 0 Ideal Flow (vphpl) 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 Storage Length (m) 50.0 60.0 0.0 0.0 0.0 0.0 0.0 0.0 Storage Lanes 0 0 Taper Length (m) 7.5 7.5 7.5 7.5 Lane Util. 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 Ped Bike Factor 0.966 0.939 Flt Protected 0.950 0.973 Satd. Flow (prot) 1900 1821 1805 1863 1708 0 1900 Flt Permitted 0.950 0.973 Satd. Flow (perm) 1900 1821 1805 1863 1708 1900 Link Speed (k/h) 50 50 50 50 Link Distance (m) 193.8 261.6 209.6 91.7 Travel Time (s) 18.8 14.0 15.1 6.6 Confl. Peds. (#/hr) Peak Hour Factor 0.96 0.96 0.96 0.96 0.96 0.96 0.96 0.96 0.96 0.96 0.96 0.96 Heavy Vehicles (%) 1% 0% 0% 2% 0% 0% Adj. Flow (vph) 294 324 77 0 85 63 0 0 64 0 0 0 Shared Lane Traffic (%) Lane Group Flow (vph) 0 379 0 63 324 0 141 0 0 0 0 0 Enter Blocked Intersection No No No No No No No Lane Alignment Left Left Left Right Right Right Right Left Left Left Left Left Median Width(m) 3.6 3.6 0.0 0.0 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 Headway Factor 1.00 1.00 1.00 1.00 1.00 1.00 1.00 Turning Speed (k/h) 25 15 Sign Control Free Free Stop Stop Intersection Summary Area Type: Other Control Type: Unsignalized Intersection Capacity Utilization 41.2% ICU Level of Service A

Intersection												
Int Delay, s/veh	3.5											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	ች	ĵ»		ች	1>			44			4	
Traffic Vol, veh/h	0	282	82	60	311	0	74	0	61	0	0	0
Future Vol, veh/h	0	282	82	60	311	0	74	0	61	0	0	0
Conflicting Peds, #/hr	0	0	8	8	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	500	-	-	600	-	-	-	-	-		-	-
Veh in Median Storage,	# -	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	96	96	96	96	96	96	96	96	96	96	96	96
Heavy Vehicles, %	0	1	0	0	2	0	3	0	0	0	0	0
Mvmt Flow	0	294	85	63	324	0	77	0	64	0	0	0
Major/Minor N	Major1		1	Major2			Vinor1		N	/linor2		
Conflicting Flow All	324	0	0	387	0	0	793	793	344	817	836	324
Stage 1	-	-	-	-	-	-	344	344	-	449	449	-
Stage 2	-	-	-	-	-	-	449	449	-	368	387	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.13	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.13	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.13	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.527	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1247	-	-	1183	-	-	305	323	703	298	305	722
Stage 1	-	-	-	-	-	-	669	640	-	593	576	-
Stage 2	-	-		-	-		587	576		656	613	
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1247	-	-	1183	-	-	291	304	698	260	287	722
Mov Cap-2 Maneuver	-	-	-	-	-	-	291	304	-	260	287	-
Stage 1	-	-	-	-	-	-	664	636		593	545	-
Stage 2	-	-	-	-	-	-	556	545	-	596	609	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	0			1.3			19.1			0		
HCM LOS							С			Α		
Minor Lane/Major Mvmt	1	VBLn1	EBL	EBT	EBR	WBL	WBT	WBR :	SBLn1			
Capacity (veh/h)		395	1247	-	-	1183	-	-	-			
HCM Lane V/C Ratio		0.356				0.053						
HCM Control Delay (s)		19.1	0	-	-	8.2	-		0			
HCM Lane LOS		С	A			A	-		A			
HCM 95th %tile Q(veh)		1.6	0	-	-	0.2	-	-	-			

Analysis Period (min) 15

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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	٦	ĵ»		7	ĥ		*	f)		7	î»	
Traffic Volume (vph)	180	117	46	111	148	40	34	558	133	54	562	189
Future Volume (vph)	180	117	46	111	148	40	34	558	133	54	562	189
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	40.0		0.0	20.0		0.0	90.0		0.0	50.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. 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
Ped Bike Factor							1.00				0.99	
Frt		0.958			0.968			0.971			0.962	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1787	1807	0	1703	1813	0	1805	1753	0	1805	1771	0
Flt Permitted	0.506			0.648			0.138			0.132		
Satd. Flow (perm)	952	1807	0	1162	1813	0	262	1753	0	251	1771	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		24			16			16			23	
Link Speed (k/h)		50			60			70			70	
Link Distance (m)		144.3			357.4			823.5			155.4	
Travel Time (s)		10.4			21.4			42.4			8.0	
Confl. Peds. (#/hr)							6					6
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles (%)	1%	1%	0%	6%	1%	3%	0%	6%	2%	0%	3%	1%
Adj. Flow (vph)	191	124	49	118	157	43	36	594	141	57	598	201
Shared Lane Traffic (%)												
Lane Group Flow (vph)	191	173	0	118	200	0	36	735	0	57	799	0
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)		3.6			3.6			3.6			3.6	
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												
Headway 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
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	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	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	CI+Ex	CI+Ex		CI+Ex	CI+Ex		CI+Ex	CI+Ex		CI+Ex	CI+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	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	
Detector 1 Delay (s)	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		CI+Ex			CI+Ex			CI+Ex			CI+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Detector 2 Extend (s)	0.0	0.0	0.0	0.0
220 Arkell Road TIS 5:00 pm 07	7-04-2018 2018 PM Base Y	ear/		Synchro 9 Report Page 7

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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBF
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Detector Phase	7	4		3	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0		7.0	10.0		7.0	10.0	
Minimum Split (s)	10.0	26.0		10.0	26.0		10.0	34.0		10.0	34.0	
Total Split (s)	10.0	26.0		10.0	26.0		10.0	34.0		10.0	34.0	
Total Split (%)	12.5%	32.5%		12.5%	32.5%		12.5%	42.5%		12.5%	42.5%	
Maximum Green (s)	7.0	20.0		7.0	20.0		7.0	28.0		7.0	28.0	
Yellow Time (s)	3.0	4.0		3.0	4.0		3.0	4.0		3.0	4.0	
All-Red Time (s)	0.0	2.0		0.0	2.0		0.0	2.0		0.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	3.0	6.0		3.0	6.0		3.0	6.0		3.0	6.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	None		None	None	
Walk Time (s)		7.0			7.0			13.0			13.0	
Flash Dont Walk (s)		13.0			13.0			15.0			15.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)	23.1	14.7		22.4	12.3		35.3	28.4		35.9	30.3	
Actuated g/C Ratio	0.34	0.21		0.33	0.18		0.52	0.41		0.52	0.44	
v/c Ratio	0.47	0.43		0.27	0.59		0.12	1.00		0.20	1.00	
Control Delay	20.4	25.6		17.2	32.0		9.2	57.9		9.9	56.5	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	20.4	25.6		17.2	32.0		9.2	57.9		9.9	56.5	
LOS	С	С		В	C		Α	E		A	E	
Approach Delay		22.9			26.5			55.6			53.4	
Approach LOS		С			С			E			D	
Intersection Summary												
Area Type:	Other											
Cycle Length: 80												
Actuated Cycle Length: 68.	5											
Natural Cycle: 90												
Control Type: Actuated-Un	coordinated	d										
Maximum v/c Ratio: 1.00												
Intersection Signal Delay: 4					ntersection							
Intersection Capacity Utiliza	ation 78.4%	5		10	CU Level o	of Service	e D					
Analysis Period (min) 15												
Splits and Phases: 5: Vio	toria Road	& Arkell F	Road									
Spins and mases. S. vic	a rtodu							A				

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Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	
Lane Group Flow (vph)	191	173	118	200	36	735	57	799	
v/c Ratio	0.47	0.43	0.27	0.59	0.12	1.00	0.20	1.00	
Control Delay	20.4	25.6	17.2	32.0	9.2	57.9	9.9	56.5	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	20.4	25.6	17.2	32.0	9.2	57.9	9.9	56.5	
Queue Length 50th (m)	19.5	19.5	11.6	24.6	2.1	~118.5	3.4	89.4	
Queue Length 95th (m)	34.3	37.3	22.4	44.4	6.8	#203.9	9.5	#224.9	
Internal Link Dist (m)		120.3		333.4		799.5		131.4	
Turn Bay Length (m)	40.0		20.0		90.0		50.0		
Base Capacity (vph)	408	552	436	549	295	736	292	796	
Starvation Cap Reductn	0	0	0	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.47	0.31	0.27	0.36	0.12	1.00	0.20	1.00	

		-	•	•			,	•	'		•	
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	٦	ĵ.		ሻ	ĵ»		7	ĵ»		7	ĵ.	
Traffic Volume (veh/h)	180	117	46	111	148	40	34	558	133	54	562	189
Future Volume (veh/h)	180	117	46	111	148	40	34	558	133	54	562	189
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		0.99	1.00		0.99
Parking Bus, Adj	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 Sat Flow, veh/h/ln	1881	1886	1900	1792	1873	1900	1900	1806	1900	1900	1854	1900
Adj Flow Rate, veh/h	191	124	49	118	157	43	36	594	141	57	598	201
Adj No. of Lanes	1	1	0	1	1	0	1	1	0	1	1	0
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	1	1	1	6	1	1	0	6	6	0	3	3
Cap, veh/h	354	221	87	357	228	62	196	575	136	227	563	189
Arrive On Green	0.10	0.17	0.17	0.09	0.16	0.16	0.05	0.41	0.41	0.07	0.42	0.42
Sat Flow, veh/h	1792	1288	509	1707	1417	388	1810	1409	334	1810	1326	446
Grp Volume(v), veh/h	191	0	173	118	0	200	36	0	735	57	0	799
Grp Sat Flow(s),veh/h/ln	1792	0	1797	1707	0	1805	1810	0	1744	1810	0	1771
Q Serve(g_s), s	6.0	0.0	6.1	3.8	0.0	7.2	0.8	0.0	28.0	1.2	0.0	29.2
Cycle Q Clear(g_c), s	6.0	0.0	6.1	3.8	0.0	7.2	0.8	0.0	28.0	1.2	0.0	29.2
Prop In Lane	1.00		0.28	1.00		0.22	1.00		0.19	1.00		0.25
Lane Grp Cap(c), veh/h	354	0	308	357	0	290	196	0	711	227	0	752
V/C Ratio(X)	0.54	0.00	0.56	0.33	0.00	0.69	0.18	0.00	1.03	0.25	0.00	1.06
Avail Cap(c_a), veh/h	354	0	523	375	0	526	289	0	711	289	0	752
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	21.3	0.0	26.1	20.9	0.0	27.2	16.0	0.0	20.3	15.4	0.0	19.8
Incr Delay (d2), s/veh	1.6	0.0	1.6	0.5	0.0	2.9	0.4	0.0	42.8	0.6	0.0	50.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.1	0.0	3.1	1.8	0.0	3.8	0.4	0.0	21.7	0.6	0.0	24.6
LnGrp Delay(d),s/veh	23.0	0.0	27.7	21.4	0.0	30.1	16.4	0.0	63.1	16.0	0.0	70.3
LnGrp LOS	С		С	С		С	В		F	В		F
Approach Vol, veh/h		364			318			771			856	
Approach Delay, s/veh		25.2			26.9			60.9			66.7	
Approach LOS		С			С			E			E	

Timer	1	2	3	4	5	6	7	8	
Assigned Phs	1	2	3	4	5	6	7	8	
Phs Duration (G+Y+Rc), s	7.6	34.0	9.3	17.8	6.5	35.2	10.0	17.0	
Change Period (Y+Rc), s	3.0	6.0	3.0	6.0	3.0	6.0	3.0	6.0	
Max Green Setting (Gmax), s	7.0	28.0	7.0	20.0	7.0	28.0	7.0	20.0	
Max Q Clear Time (g_c+l1), s	3.2	30.0	5.8	8.1	2.8	31.2	8.0	9.2	
Green Ext Time (p_c), s	0.0	0.0	0.0	2.0	0.0	0.0	0.0	1.8	

intersection summary	
HCM 2010 Ctrl Delay	52.8
HCM 2010 LOS	D

HCM 2010 Signalized Intersection Summary

5: Victoria Road & Arkell Road

Volume exceeds capacity, queue is theoretically infinite.
 Oueue shown is maximum after two cycles.

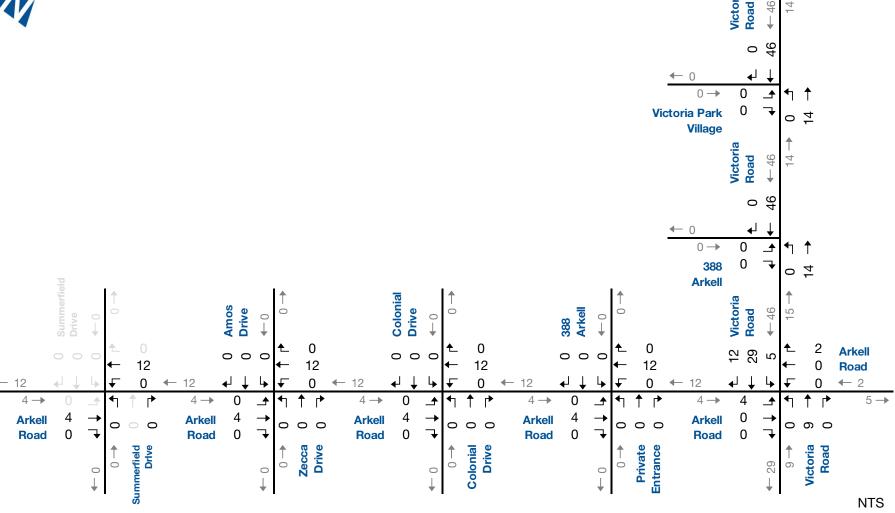
95th percentile volume exceeds capacity, queue may be longer.
 Oueue shown is maximum after two cycles.

Appendix D

Other Planned Developments Trip Assignment



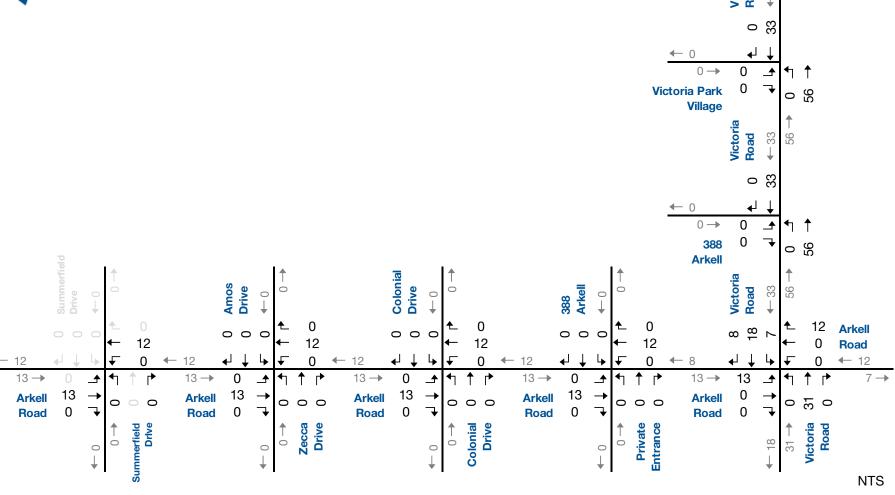






Kortright East AM Trip Assignment

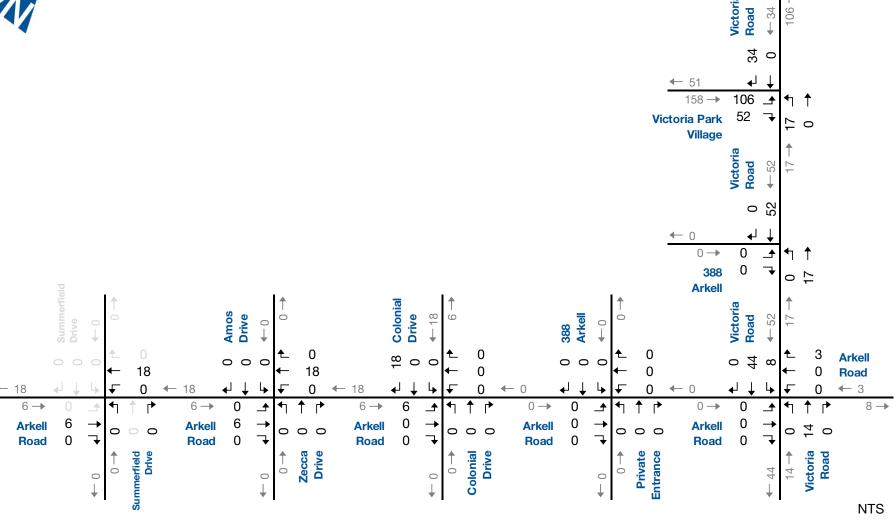






Kortright East PM Trip Assignment

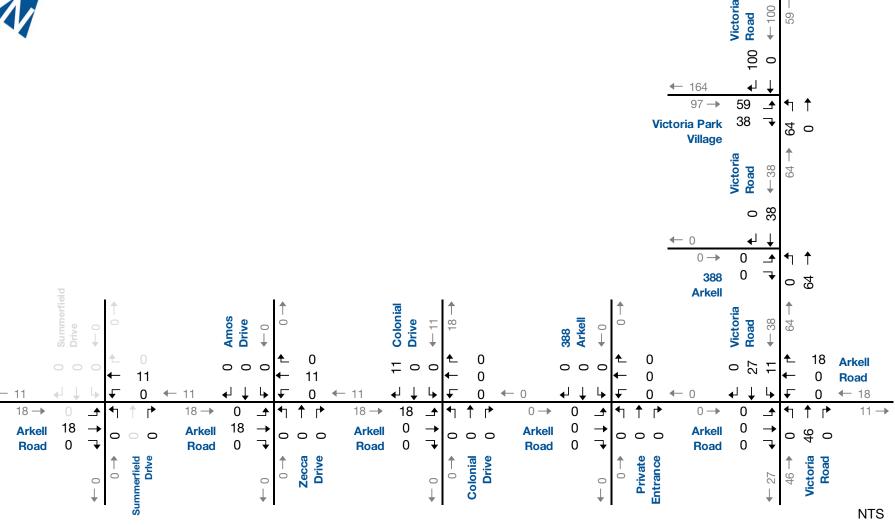






Victoria Park Village AM Trip Assignment

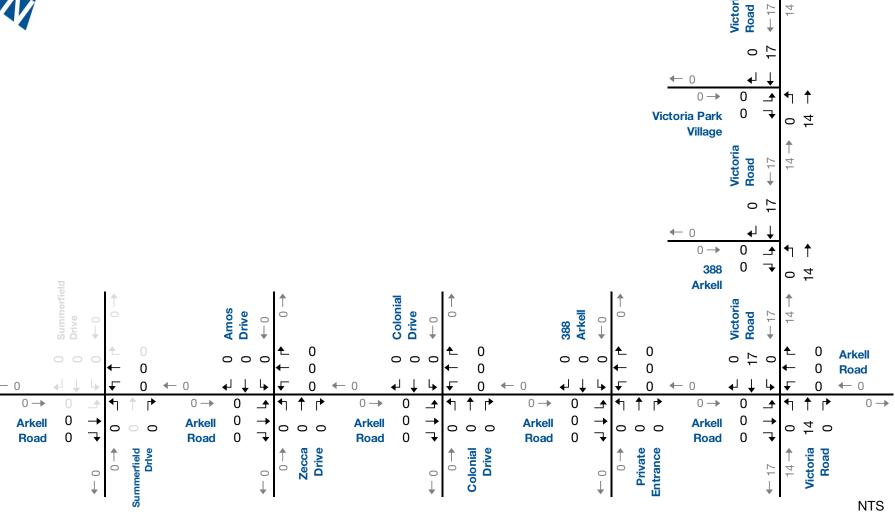






Victoria Park Village PM Trip Assignment

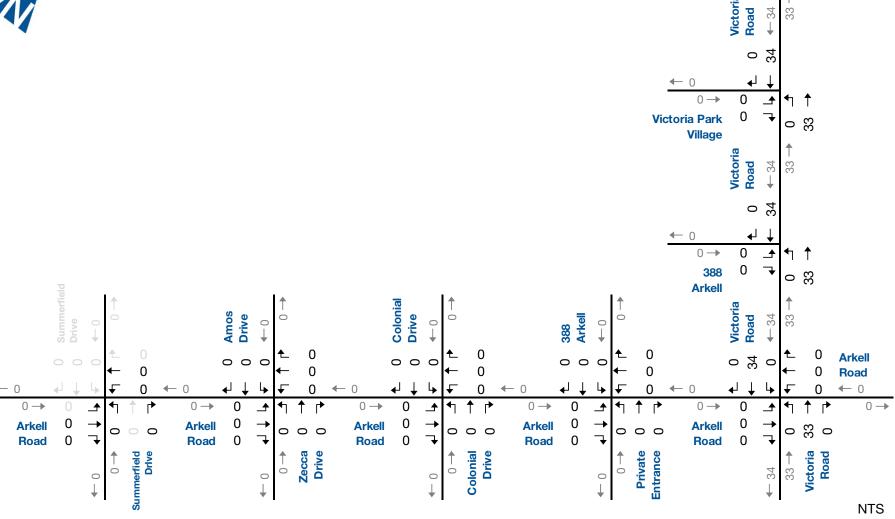






Westminister Woods AM Trip Assignment

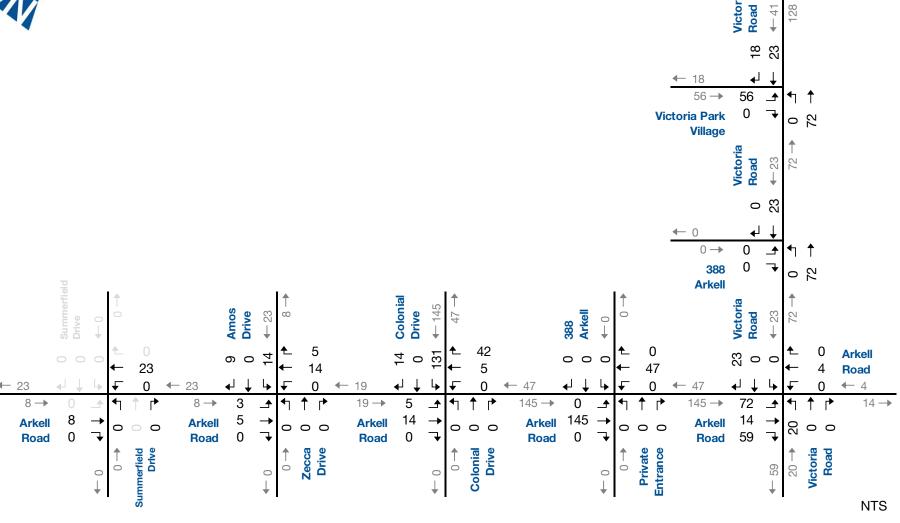






Westminister Woods PM Trip Assignment

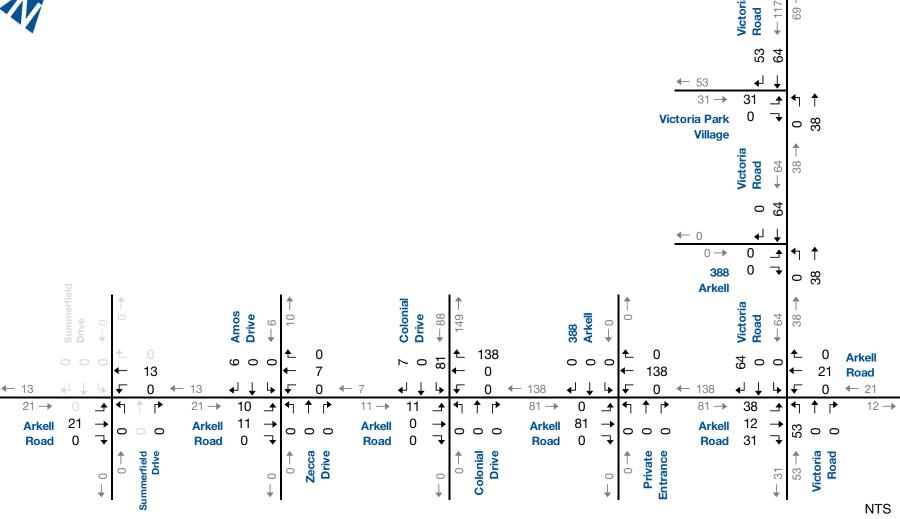






Northwest Arkell and Victoria AM Trip Assignment

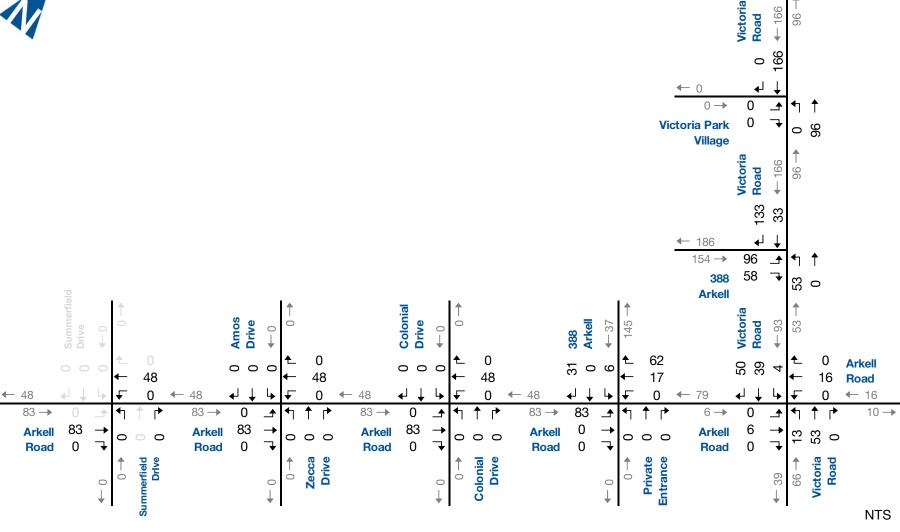






Northwest Arkell and Victoria PM Trip Assignment

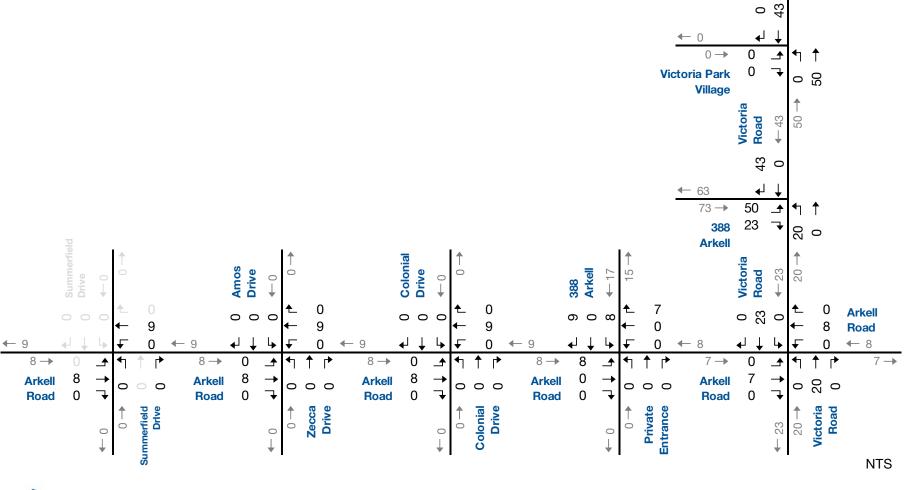






388 Arkell Road Secondary School **AM Trip Assignment**







388 Arkell Road Secondary School PM Trip Assignment

Victoria

Appendix E

2021 Background Traffic Operations Reports



Lane Group

Lane Configurations Traffic Volume (vph)

Future Volume (vph)

Ideal Flow (vphpl)

Storage Lanes Taper Length (m)

Lane Util. Factor

Ped Bike Factor

Satd. Flow (prot)

Satd. Flow (perm)

Link Distance (m)

Confl. Peds. (#/hr) Peak Hour Factor

Heavy Vehicles (%)

Shared Lane Traffic (%) Lane Group Flow (vph)

Enter Blocked Intersection

Adj. Flow (vph)

Lane Alignment

Median Width(m)

Headway Factor

Sign Control

Turning Speed (k/h)

Intersection Summary
Area Type:

Control Type: Unsignalized Intersection Capacity Utilization 43.8%

Analysis Period (min) 15

Crosswalk Width(m)

Two way Left Turn Lane

Link Offset(m)

Link Speed (k/h)

Travel Time (s)

Flt Protected

Flt Permitted

Storage Length (m)

350

1900

0.988

1792

1792

290.6

20.9

0.98

4%

357

391

No

Left Right

3.6

0.0

4.8

Yes

1.00

Free

Other

0.98

13%

34

0 29 410

No

1.00 1.00

50

33

33

0.0

1900

1.00 1.00

28

28 402

1900

60.0

7.5

1.00

0.950

1671

0.950

0.98

8%

29 410

Left

0 1671

402

1900

1.00

1776 1678

14.9 15.4

0.98

7%

Left

3.6

0.0

4.8 4.8

1.00

Free Stop

206.6 213.5

129

129

1900

0.0

7.5

1.00

0.938

0.974

1776 1678

0.974

50 50

0.98

3%

132

244

No

Left

3.6

0.0

1.00

25

ICU Level of Service A

NBR

110

110

1900

0.0

1.00

0.98

4%

112

0

Right

15

Intersection

IIICOIOOCIOII						
Int Delay, s/veh	4.3					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	1>		ħ	↑	¥	
Traffic Vol, veh/h	350	33	28	402	129	110
Future Vol, veh/h	350	33	28	402	129	110
Conflicting Peds, #/hr	0	9	9	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length		-	600	-	0	-
Veh in Median Storage	e, # 0			0	0	
Grade, %	0	-		0	0	-
Peak Hour Factor	98	98	98	98	98	98
Heavy Vehicles, %	4	13	8	7	3	4
Mymt Flow	357	34	29	410	132	112
	007	01	_,	110	102	
		_		_		
	Major1		Major2		Minor1	
Conflicting Flow All	0	0	400	0	850	383
Stage 1	-	-	-	-	383	-
Stage 2	-	-	-	-	467	-
Critical Hdwy		-	4.18	-	6.43	6.24
Critical Hdwy Stg 1	-	-	-	-	5.43	-
Critical Hdwy Stg 2	-	-	-	-	5.43	-
Follow-up Hdwy	-	-	2.272	-	3.527	3.336
Pot Cap-1 Maneuver	-	-	1127	-	330	660
Stage 1	-	-	-	-	687	-
Stage 2	-	-	-	-	629	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1127	-	319	655
Mov Cap-2 Maneuver	-	-	-	-	439	-
Stage 1	-	-	-	-	682	-
Stage 2	-	-	-	-	613	-
Approach	EB		WB		NB	
Approach					18	
HCM Control Delay, s	0		0.5		18 C	
HCM LOS					C	
Minor Lane/Major Mvm	nt I	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)		518	-	-	1127	
HCM Lane V/C Ratio		0.471		-	0.025	-
HCM Control Delay (s))	18		-	8.3	-
HCM Lane LOS		С			A	
HCM 95th %tile Q(veh)	2.5	-		0.1	
	,	0				

07-24-2018

2: Zecca Drive/Amos Drive & Arkell Road

	۶	→	•	•	←	•	4	†	/	-	↓	4
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		4			4			4			4	
Traffic Volume (vph)	6	442	13	3	384	6	21	1	16	26	2	26
Future Volume (vph)	6	442	13	3	384	6	21	1	16	26	2	26
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. 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
Ped Bike Factor												
Frt		0.996			0.998			0.945			0.935	
Flt Protected		0.999						0.973			0.976	
Satd. Flow (prot)	0	1804	0	0	1774	0	0	1699	0	0	1734	0
Flt Permitted		0.999						0.973			0.976	
Satd. Flow (perm)	0	1804	0	0	1774	0	0	1699	0	0	1734	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		206.6			261.6			219.2			154.5	
Travel Time (s)		14.9			18.8			15.8			11.1	
Confl. Peds. (#/hr)	1		8	8		1	13		10	10		13
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	0%	5%	0%	5%	7%	0%	5%	0%	0%	0%	0%	0%
Adj. Flow (vph)	6	456	13	3	396	6	22	1	16	27	2	27
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	475	0	0	405	0	0	39	0	0	56	0
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)		3.6			3.6			0.0			0.0	
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	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Headway 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
Turning Speed (k/h)	25	-	15	25	-	15	25	CI	15	25	CI	15
Sign Control		Free			Free			Stop			Stop	
Intersection Summary												
	ther											
Control Type: Unsignalized												
Intersection Capacity Utilizati	on 42.1%			IC	CU Level	of Service	Α					
Analysis Period (min) 15												

Intersection												
Int Delay, s/veh	1.8											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		4	LDIT	*****	4	· · · · · ·	1100	4	HUIT	ODL	4	ODIT
Traffic Vol, veh/h	6	442	13	3	384	6	21	1	16	26	2	26
Future Vol. veh/h	6	442	13	3	384	6	21	1	16	26	2	26
Conflicting Peds, #/hr	1	0	8	8	0	1	13	0	10	10	0	13
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized		-	None	-	-	None			None	-	-	None
Storage Length	-		-		-		-	-	-		-	-
Veh in Median Storage	,# -	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	97	97	97	97	97	97	97	97	97	97	97	97
Heavy Vehicles, %	0	5	0	5	7	0	5	0	0	0	0	0
Mvmt Flow	6	456	13	3	396	6	22	1	16	27	2	27
Major/Minor N	Major1			Major2			Vinor1		N	Minor2		
Conflicting Flow All	403	0	0	477	0	0	916	892	480	900	895	413
Stage 1		-	-	-	-		483	483	-	406	406	
Stage 2							433	409		494	489	
Critical Hdwy	4.1	-	-	4.15	-		7.15	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-		-		-		6.15	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.15	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.245	-	-	3.545	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1167	-	-	1070	-	-	250	283	590	262	282	643
Stage 1	-	-	-	-	-	-	559	556	-	626	601	-
Stage 2	-	-	-	-	-	-	595	600	-	561	553	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1154	-	-	1061	-	-	232	278	581	249	277	635
Mov Cap-2 Maneuver	-	-	-	-	-	-	232	278	-	249	277	-
Stage 1	-	-	-	-	-	-	551	548	-	621	598	-
Stage 2	-	-	-	-	-	-	559	597	-	536	545	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.1			0.1			18.2			17.1		
HCM LOS							С			С		
Minor Lane/Major Mvm	ıt I	VBLn1	EBL	EBT	EBR	WBL	WBT	WBR:	SRI n1			
Capacity (veh/h)		312	1154	LD1	- LDIK	1061	-	WDIX.	354			
HCM Lane V/C Ratio		0.126				0.003		•	0.157			
HCM Control Delay (s)		18.2	8.1	0		8.4	0		17.1			
HCM Lane LOS		16.2 C	ο. 1	A		0.4 A	A		17.1			
HCM 95th %tile Q(veh)	١	0.4	0	^		0	А		0.6			
TICIVI 95(II /otile Q(VeII)		0.4	0			0			0.0			

3: Colonial Drive & Arkell Road

Lane Group WBT Lane Configurations Traffic Volume (vph) 409 63 37 241 0 124 32 Future Volume (vph) 11 409 63 37 241 42 119 0 124 131 0 32 Ideal Flow (vphpl) 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 Storage Length (m) 50.0 60.0 0.0 0.0 0.0 0.0 0.0 0.0 Storage Lanes 0 0 0 Taper Length (m) 7.5 7.5 7.5 7.5 Lane Util. 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 Ped Bike Factor 0.980 0.931 0.973 Flt Protected 0.950 0.950 0.976 0.961 Satd. Flow (prot) 1770 1784 1703 1622 1742 1735 Flt Permitted 0.950 0.950 0.976 0.961 Satd. Flow (perm) 1770 1784 1703 1735 1622 1742 Link Speed (k/h) 50 50 50 50 Link Distance (m) 193.8 261.6 209.6 91.7 Travel Time (s) 18.8 14.0 15.1 6.6 Confl. Peds. (#/hr) Peak Hour Factor 0.92 0.92 0.92 0.92 0.92 0.92 0.92 0.92 0.92 0.92 0.92 0.92 Heavy Vehicles (%) 2% 7% 6% 8% 2% 2% 4% 2% 2% 2% Adj. Flow (vph) 12 445 262 129 135 142 68 40 46 0 0 35 Shared Lane Traffic (%) Lane Group Flow (vph) 12 513 0 40 308 264 0 177 0 0 0 0 Enter Blocked Intersection No No No No No No No Lane Alignment Left Left Right Right Right Right Left Left Left Left Left Left Median Width(m) 3.6 3.6 0.0 0.0 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 Headway Factor 1.00 1.00 1.00 1.00 1.00 1.00 1.00 Turning Speed (k/h) 25 15 Sign Control Free Free Stop Stop Intersection Summary Area Type: Other Control Type: Unsignalized Intersection Capacity Utilization 52.0% ICU Level of Service A

Intersection												
Int Delay, s/veh	19.9											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
	EDL		EDK	WDL		WDR	NDL		INDK	SDL		SDK
Lane Configurations Traffic Vol, veh/h	<u>ባ</u> 11	1 →	63	1 37	1 → 241	42	119	↔ 0	124	131	↔ 0	32
· ·	11	409	63	37	241	42		0	124	131	0	32
Future Vol, veh/h		409	11		241		119				0	32 0
Conflicting Peds, #/hr	0	-		11	-	0	0	0	1	0	-	-
Sign Control RT Channelized	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
	-	-	None	-	-	None		-	None		-	None
Storage Length	500	-		600	-	-	-	-	-	-	-	-
Veh in Median Storage,		0	-	-	0	-		0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	4	7	6	8	2	9	2	4	2	2	2
Mvmt Flow	12	445	68	40	262	46	129	0	135	142	0	35
Major/Minor N	/lajor1			Major2			Vinor1			Minor2		
Conflicting Flow All	308	0	0	524	0	0	897	902	491	936	913	285
Stage 1				-			514	514	-	365	365	-
Stage 2							383	388		571	548	-
Critical Hdwy	4.12			4.16			7.19	6.52	6.24	7.12	6.52	6.22
Critical Hdwy Stg 1				-			6.19	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2				-			6.19	5.52	-	6.12	5.52	-
	2.218			2.254			3.581	4.018	3.336	3.518	4.018	3.318
Pot Cap-1 Maneuver	1253			1023			253	277	573	245	273	754
Stage 1							531	535	-	654	623	-
Stage 2							626	609		506	517	-
Platoon blocked. %												
Mov Cap-1 Maneuver	1253			1022	-		230	261	567	180	257	754
Mov Cap-2 Maneuver	-			-			230	261	-	180	257	-
Stage 1		-					521	525		648	599	
Stage 2							574	585		382	507	
olago E							0.1	000		002	557	
Approach	EB			WB			NB			SB		
	0.2			W D			48.1			73.1		
HCM Control Delay, s HCM LOS	0.2						48.1 E			/3.1 F		
HCIVI LUS										г		
Minor Lane/Major Mvmt	t N	VBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1			
Capacity (veh/h)		330	1253	-	-	1022	-	-	212			
HCM Lane V/C Ratio		0.8	0.01	-	-	0.039	-	-	0.836			
HCM Control Delay (s)		48.1	7.9	-	-	8.7	-	-	73.1			
HCM Lane LOS		Ε	Α	-	-	Α	-	-	F			
HCM 95th %tile Q(veh)		6.7	0		-	0.1			6.3			

Analysis Period (min) 15

4: Residential Entrance/Access 1 & Arkell Road

	۶	→	\rightarrow	•	←	•	4	†	<i>></i>	>	↓	1
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	,	î,			4			4		ሻ		7
Traffic Volume (vph)	83	580	2	2	288	62	2	0	2	6	0	31
Future Volume (vph)	83	580	2	2	288	62	2	0	2	6	0	31
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	25.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	0		0	0		0	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. 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
Frt					0.976			0.932				0.850
Flt Protected	0.950							0.976		0.950		
Satd. Flow (prot)	1805	1827	0	0	1740	0	0	1728	0	1805	0	1615
Flt Permitted	0.950							0.976		0.950		
Satd. Flow (perm)	1805	1827	0	0	1740	0	0	1728	0	1805	0	1615
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		193.8			144.3			68.0			96.7	
Travel Time (s)		14.0			10.4			4.9			7.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	4%	0%	0%	8%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	90	630	2	2	313	67	2	0	2	7	0	34
Shared Lane Traffic (%)												
Lane Group Flow (vph)	90	632	0	0	382	0	0	4	0	7	0	34
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)		3.6	-		3.6	_		3.6	-		3.6	_
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												
Headway 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
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Free			Free			Stop			Stop	
Intersection Summary												
Area Type: C	Other											
Control Type: Unsignalized												
Intersection Capacity Utilizat	ion 63.0%			IC	CU Level	of Service	B					
Analysis Period (min) 15												

Intersection												
Int Delay, s/veh	1.2											
		FDT	500	14/51	WOT		ND	NET	NDD	0.01	007	000
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	Ţ	ĥ			4			4		7		7
Traffic Vol, veh/h	83	580	2	2	288	62	2	0	2	6	0	31
Future Vol, veh/h	83	580	2	2	288	62	2	0	2	6	0	31
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	250	-	-	-	-	-	-	-	-	0	-	0
Veh in Median Storage	,# -	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	0	4	0	0	8	0	0	0	0	0	0	0
Mvmt Flow	90	630	2	2	313	67	2	0	2	7	0	34
Major/Minor N	/lajor1		N	/lajor2			Vinor1			Minor2		
Conflicting Flow All	380	0	0	633	0	0	1163	1197	632	1164	-	347
Stage 1	500	-	-	-	-	-	812	812	002	351		517
Stage 2							351	385		813		
Critical Hdwy	4.1			4.1			7.1	6.5	6.2	7.1		6.2
Critical Hdwy Stg 1	7.1			7.1			6.1	5.5	0.2	6.1		0.2
Critical Hdwy Stg 2							6.1	5.5	-	6.1		
Follow-up Hdwy	2.2			2.2			3.5	4	3.3	3.5		3.3
Pot Cap-1 Maneuver	1190			960			173	187	484	173	0	701
Stage 1	1170			900			376	395	404	670	0	701
Stage 2			_				670	614		375	0	
Platoon blocked. %							070	014		3/3	0	
Mov Cap-1 Maneuver	1190		-	960			155	172	484	162		701
Mov Cap-1 Maneuver	1190			900		-	155	172	404	162		701
Stage 1				-			348	365	-	619	-	
Stage 1 Stage 2							636	612		345		-
Staye 2				-			030	012		343		
				ME			ND			C.D.		
Approach	EB			WB			NB			SB		
HCM Control Delay, s	1			0			20.6			13.3		
HCM LOS							С			В		
Minor Lane/Major Mvm	t I	VBLn1	EBL	EBT	EBR	WBL	WBT	WBR:	SBLn1	SBLn2		
Capacity (veh/h)		235	1190	-	-	960	-	-	162	701		
HCM Lane V/C Ratio		0.019	0.076	-	-	0.002	-	-	0.04	0.048		
HCM Control Delay (s)		20.6	8.3			8.8	0		28.2	10.4		
HCM Lane LOS		С	A			А	A		D	В		
HCM 95th %tile Q(veh)		0.1	0.2			0	-		0.1	0.2		
/0 /0 2(4011)		0.1	0.2			3			0.1	0.2		

0.0

0.0

220 Arkell Road TIS 5:00 pm 07-04-2018 2021 AM Background

0.0

Detector 2 Channel

Detector 2 Extend (s)

0.0 Synchro 9 Report Page 9 Lanes, Volumes, Timings 5: Victoria Road & Arkell Road

07-24-2018

	•	-	•	•	-	•	1	†	/	-	ţ	4
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Detector Phase	7	4		3	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0		7.0	10.0		7.0	10.0	
Minimum Split (s)	10.0	26.0		10.0	26.0		10.0	34.0		10.0	34.0	
Total Split (s)	10.0	26.0		10.0	26.0		10.0	34.0		10.0	34.0	
Total Split (%)	12.5%	32.5%		12.5%	32.5%		12.5%	42.5%		12.5%	42.5%	
Maximum Green (s)	7.0	20.0		7.0	20.0		7.0	28.0		7.0	28.0	
Yellow Time (s)	3.0	4.0		3.0	4.0		3.0	4.0		3.0	4.0	
All-Red Time (s)	0.0	2.0		0.0	2.0		0.0	2.0		0.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	3.0	6.0		3.0	6.0		3.0	6.0		3.0	6.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	None		None	None	
Walk Time (s)		7.0			7.0			13.0			13.0	
Flash Dont Walk (s)		13.0			13.0			15.0			15.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)	22.5	12.3		22.5	12.3		35.3	28.4		35.3	28.4	
Actuated g/C Ratio	0.33	0.18		0.33	0.18		0.51	0.41		0.51	0.41	
v/c Ratio	1.01	0.61		0.41	0.53		0.22	1.15		0.20	1.23	
Control Delay	69.8	29.1		19.2	25.6		10.3	106.4		10.1	140.3	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	69.8	29.1		19.2	25.6		10.3	106.4		10.1	140.3	
LOS	E	С		В	С		В	F		В	F	
Approach Delay		56.7			22.5			99.5			132.3	
Approach LOS		E			С			F			F	

Intersection Summary		
Area Type:	Other	
Cycle Length: 80		
Actuated Cycle Length	n: 68.6	
Natural Cycle: 150		
Control Type: Actuate	d-Uncoordinated	
Maximum v/c Ratio: 1.	23	
Intersection Signal De	lay: 90.9	Intersection LOS: F
Intersection Capacity I	Utilization 94.8%	ICU Level of Service F
Analysis Period (min)	15	



	•	→	•	←	4	†	-	ļ	
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	
Lane Group Flow (vph)	437	207	173	181	66	844	57	870	
v/c Ratio	1.01	0.61	0.41	0.53	0.22	1.15	0.20	1.23	
Control Delay	69.8	29.1	19.2	25.6	10.3	106.4	10.1	140.3	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	69.8	29.1	19.2	25.6	10.3	106.4	10.1	140.3	
Queue Length 50th (m)	~58.5	21.7	17.5	17.9	3.9	~152.8	3.3	~163.7	
Queue Length 95th (m)	#116.6	42.0	31.2	36.3	10.7	#246.9	9.7	#258.8	
Internal Link Dist (m)		120.3		333.4		799.5		131.4	
Turn Bay Length (m)	40.0		20.0		90.0		50.0		
Base Capacity (vph)	434	526	419	533	296	735	287	706	
Starvation Cap Reductn	0	0	0	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0	
Reduced v/c Ratio	1.01	0.39	0.41	0.34	0.22	1.15	0.20	1.23	

Adj Flow Rate, veh/h Adj No. of Lanes Peak Hour Factor Percent Heavy Veh, % Cap, veh/h Arrive On Green Sat Flow, veh/h Grp Volume(v), veh/h Grp Sat Flow(s), veh/h/ln Q Serve(g_s), s Cycle Q Clear(g_c), s Prop In Lane Lane Grp Cap(c), veh/h V/C Ratio(X) Avail Cap(c_a), veh/h HCM Platoon Ratio Upstream Filter(I) Uniform Delay (d), s/veh	398 398 398 7 0 1.00	109 109 4	79 79	WBL	WBT	WBR	NBL	NBT	NBR	SBL	CDT	
Traffic Volume (veh/h) Future Volume (veh/h) Number Initial O (Ob), veh Ped-Bike Adj(A_pbT) Parking Bus, Adj Adj Sat Flow, veh/h/ln Adj Flow Rate, veh/h Adj No. of Lanes Peak Hour Factor Percent Heavy Veh, % Cap, veh/h Arrive On Green Sat Flow, veh/h Grp Volume(v), veh/h Grp Sat Flow(s), veh/h/ln Q Serve(g_s), s Cycle O Clear(g_c), s Prop In Lane Lane Grp Cap(c), veh/h V/C Ratio(X) Avail Cap(c_a), veh/h HCM Platoon Ratio Upstream Filter(I) Uniform Delay (d), s/veh	398 398 7 0 1.00	109 109 4							INDK		SBT	SBR
Future Volume (veh/h) Number Initial Q (Ob), veh Ped-Bike Adj(A_pbT) Parking Bus, Adj Adj Sat Flow, veh/h/ln Adj Flow Rate, veh/h Adj Flow Rate, veh/h Adj No. of Lanes Peak Hour Factor Percent Heavy Veh, % Cap, veh/h Arrive On Green Sat Flow, veh/h Grp Volume(v), veh/h Grp Sat Flow(s), veh/h/ln Q Serve(g_s), s Cycle Q Clear(g_c), s Prop In Lane Lane Grp Cap(c), veh/h V/C Ratio(X) Avail Cap(c_a), veh/h HCM Platoon Ratio Upstream Filter(I) Uniform Delay (d), s/veh	398 7 0 1.00	109 4			₽		ሻ	î,		ሻ	f)	
Number Initial O (Ob), veh Ped-Bike Adj(A_pbT) Parking Bus, Adj Adj Sat Flow, veh/h/ln Adj Flow Rate, veh/h Adj No. of Lanes Peak Hour Factor Percent Heavy Veh, % Cap, veh/h Arrive On Green Sat Flow, veh/h Grp Volume(v), veh/h Grp Sat Flow(s), veh/h/ln Q Serve(g_s), s Cycle Q Clear(g_c), s Prop In Lane Lane Grp Cap(c), veh/h VIC Ratio(X) Avail Cap(c_a), veh/h HCM Platoon Ratio Upstream Filter(I) Uniform Delay (d), s/veh	7 0 1.00	4	70	157	95	70	60	680	88	52	590	202
Initial Q (Ob), veh Ped-Bike Adj(A_pbT) Parking Bus, Adj Adj Sat Flow, veh/h/n Adj No. of Lanes Peak Hour Factor Percent Heavy Veh, % Cap, veh/h Arrive On Green Sat Flow, veh/h Grp Volume(v), veh/h Grp Sat Flow(s), veh/h/in Q Serve(g_s), s Cycle Q Clear(g_c), s Prop In Lane Lane Grp Cap(c), veh/h V/C Ratio(X) Avail Cap(c_a), veh/h HOtloon Ratio Upstream Filter(I) Uniform Delay (d), s/veh	0 1.00			157	95	70	60	680	88	52	590	202
Ped-Bike Adj(A_pbT) Parking Bus, Adj Add Sat Flow, veh/h/ln Adj Son Flow, veh/h/ln Adj No. of Lanes Peak Hour Factor Percent Heavy Veh, % Cap, veh/h Arrive On Green Sat Flow, veh/h Grp Volume(v), veh/h Grp Volume(v), veh/h O Serve(g_s), s Cycle Q Clear(g_c), s Prop In Lane Lane Grp Cap(c), veh/h HCM Platoon Ratio Upstream Filter(f) Uniform Delay (d), s/veh	1.00		14	3	8	18	5	2	12	1	6	16
Parking Bus, Adj Adj Sal Flow, veh/h/ln Adj Flow Rate, veh/h Adj No. of Lanes Peak Hour Factor Percent Heavy Veh, % Cap, veh/h Arrive On Green Sat Flow, veh/h Grp Volume(v), veh/h Grp Sat Flow(s), veh/h/ln Q Serve(g_S), s Cycle Q Clear(g_C), s Prop In Lane Lane Grp Cap(c), veh/h V/C Ratio(X) Avail Cap(c_a), veh/h HCM Platoon Ratio Upstream Filter(i) Uniform Delay (d), s/veh		0	0	0	0	0	0	0	0	0	0	(
Adj Sat Flow, veh/h/ln Adj Flow Rate, veh/h Adj No. of Lanes Peak Hour Factor Percent Heavy Veh, % Cap, veh/h Arrive On Green Sat Flow, veh/h Grp Volume(v), veh/h Grp Sat Flow(s), veh/h/ln Q Serve(g_ S), s Cycle Q Clear(g_ c), s Prop In Lane Lane Grp Cap(c), veh/h HCM Platoon Ratio Upstream Filter(I) Upstream Filter(I) Uniform Delay (d), s/veh			1.00	1.00		1.00	1.00		1.00	1.00		1.00
Adj Flow Rate, veh/h Adj No. of Lanes Peak Hour Factor Percent Heavy Veh, % Cap, veh/h Arrive On Green Sat Flow, veh/h Grp Sat Flow(s), veh/h/in Q Serve(g_s), s Cycle Q Clear(g_c), s Prop In Lane Lane Grp Cap(c), veh/h V/C Ratio(X) Avail Cap(c_a), veh/h HOtloon Ratio Upstream Filter(I) Uniform Delay (d), s/veh	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 No. of Lanes Peak Hour Factor Percent Heavy Veh, % Cap, veh/h Arrive On Green Sat Flow, veh/h Grp Volume(v), veh/h In O Serve(g_s), s Cycle O Clear(g_c), s Prop In Lane Lane Grp Cap(c), veh/h V/C Ratio(X) Avail Cap(c_a), veh/h HCM Platoon Ratio Upstream Fitter(I) Uniform Delay (d), s/veh	1827	1786	1900	1881	1830	1900	1900	1792	1900	1845	1747	1900
Peak Hour Factor Percent Heavy Veh, % Cap, veh/h Arrive On Green Sat Flow, veh/h Grp Volume(v), veh/h Grp Sat Flow(s), veh/h/ln O Serve(g_S), s Cycle O Clear(g_C), s Prop In Lane Lane Grp Cap(c), veh/h V/C Ratio(X) Avail Cap(c_a), veh/h HCM Platoon Ratio Upstream Filter(I) Uniform Delay (d), s/veh	437	120	87	173	104	77	66	747	97	57	648	222
Percent Heavy Veh, % Cap, veh/h Arrive On Green Sat Flow, veh/h Grp Volume(v), veh/h Grp Sat Flow(s), veh/h/in Grp Sat Flow(s), veh/h/in Q Serve(g_s), s Cycle Q Clear(g_c), s Prop In Lane Lane Grp Cap(c), veh/h V/C Ratio(X) Avail Cap(c_a), veh/h HCM Platoon Ratio Upstream Filter(I) Uniform Delay (d), s/veh	1	1	0	1	1	0	1	1	0	1	1	(
Cap, veh/h Arrive On Green Sat Flow, veh/h Grp Volume(v), veh/h Grp Sat Flow(s), veh/h/ln Q Serve(g_s), s Cycle Q Clear(g_c), s Prop In Lane Lane Grp Cap(c), veh/h V/C Ratio(X) Avail Cap(c_a), veh/h HHOtoon Ratio Upstream Filter(I) Uniform Delay (d), s/veh	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Arrive On Green Sat Flow, veh/h Grp Volume(v), veh/h Grp Sat Flow(s),veh/h/ln O Serve(g_s), s Cycle O Clear(g_c), s Prop In Lane Lane Grp Cap(c), veh/h V/C Ratio(X) Avail Cap(c_a), veh/h HCM Platoon Ratio Upstream Filter(I) Uniform Delay (d), s/veh	4	3	3	1	3	3	0	6	6	3	8	8
Sat Flow, veh/h Grp Volume(v), veh/h Grp Sat Flow(s), veh/h/ln O Serve(g_s), s Cycle Q Clear(g_c), s Prop In Lane Lane Grp Cap(c), veh/h V/C Ratio(X) Avail Cap(c_a), veh/h H/CM Platoon Ratio Upstream Filter(I) Uniform Delay (d), s/veh	365	168	122	348	170	126	233	627	81	220	495	170
Grp Volume(v), veh/h Grp Sat Flow(s), veh/h/ln O Serve(g_s), s Cycle Q Clear(g_c), s Prop In Lane Lane Grp Cap(c), veh/h V/C Ratio(X) Avail Cap(c_a), veh/h HCM Platoon Ratio Upstream Filter(I) Uniform Delay (d), s/veh	0.10	0.17	0.17	0.10	0.17	0.17	0.07	0.40	0.40	0.07	0.40	0.40
Grp Sat Flow(s), veh/h/ln Q Serve(g_s), s Cycle Q Clear(g_c), s Prop In Lane Lane Grp Cap(c), veh/h V/C Ratio(X) Avail Cap(c_a), veh/h HCM Palcon Ratio Upstream Filter(I) Uniform Delay (d), s/veh	1740	963	698	1792	977	723	1810	1554	202	1757	1244	426
Grp Sat Flow(s), veh/h/ln Q Serve(g_s), s Cycle Q Clear(g_c), s Prop In Lane Lane Grp Cap(c), veh/h V/C Ratio(X) Avail Cap(c_a), veh/h HCM Palcon Ratio Upstream Filter(I) Uniform Delay (d), s/veh	437	0	207	173	0	181	66	0	844	57	0	870
Q Serve(g_s), s Cycle Q Clear(g_c), s Prop In Lane Lane Grp Cap(c), veh/h V/C Ratio(X) Avail Cap(c_a), veh/h HHOtaton Ratio Upstream Filter(I) Uniform Delay (d), s/veh	1740	0	1661	1792	0	1700	1810	0	1756	1757	0	1670
Cycle Q Člear(g_c), s Prop In Lane Lane Grp Cap(c), veh/h V/C Ratio(X) Avail Cap(c_a), veh/h HCM Platoon Ratio Upstream Filter(I) Uniform Delay (d), s/veh	7.0	0.0	8.3	5.5	0.0	6.9	1.4	0.0	28.4	1.3	0.0	28.0
Prop In Lane Lane Grp Cap(c), veh/h V/C Ratio(X) Avail Cap(c_a), veh/h HCM Platoon Ratio Upstream Filter(I) Uniform Delay (d), s/veh	7.0	0.0	8.3	5.5	0.0	6.9	1.4	0.0	28.4	1.3	0.0	28.0
Lane Grp Cap(c), veh/h V/C Ratio(X) Avail Cap(c_a), veh/h HCM Platoon Ratio Upstream Filter(I) Uniform Delay (d), s/veh	1.00		0.42	1.00		0.43	1.00		0.11	1.00		0.26
V/C Ratio(X) Avail Cap(c_a), veh/h HCM Platoon Ratio Upstream Filter(I) Uniform Delay (d), s/veh	365	0	290	348	0	296	233	0	708	220	0	665
Avail Cap(c_a), veh/h HCM Platoon Ratio Upstream Filter(I) Uniform Delay (d), s/veh	1.20	0.00	0.71	0.50	0.00	0.61	0.28	0.00	1.19	0.26	0.00	1.31
HCM Platoon Ratio Upstream Filter(I) Uniform Delay (d), s/veh	365	0	472	348	0	483	282	0	708	277	0	665
Upstream Filter(I) Uniform Delay (d), s/veh	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
	27.0	0.0	27.4	21.1	0.0	26.8	15.8	0.0	21.0	16.0	0.0	21.2
	112.8	0.0	3.3	1.1	0.0	2.0	0.7	0.0	99.9	0.6	0.0	149.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	15.1	0.0	4.1	2.7	0.0	3.4	0.7	0.0	33.2	0.6	0.0	40.4
	139.8	0.0	30.7	22.2	0.0	28.9	16.5	0.0	120.9	16.6	0.0	170.8
LnGrp LOS	F		С	C		С	В		F	В		F
Approach Vol, veh/h		644			354			910			927	
Approach Delay, s/veh		104.7			25.6			113.3			161.4	
Approach LOS		F			C			F			F	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	7.7	34.4	10.0	18.3	8.1	34.0	10.0	18.3				
Change Period (Y+Rc), s	3.0	6.0	3.0	6.0	3.0	6.0	3.0	6.0				
Max Green Setting (Gmax), s	7.0	28.0	7.0	20.0	7.0	28.0	7.0	20.0				
Max Q Clear Time (q_c+l1), s	3.3	30.4	7.5	10.3	3.4	30.0	9.0	8.9				
Green Ext Time (p_c), s	0.0	0.0	0.0	1.8	0.0	0.0	0.0	2.0				
Intersection Summary												
HCM 2010 Ctrl Delay			116.1									
HCM 2010 LOS			F									

HCM 2010 Signalized Intersection Summary

5: Victoria Road & Arkell Road

Volume exceeds capacity, queue is theoretically infinite.
 Oueue shown is maximum after two cycles.

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

Lanes, Volumes, Timings 6: Victoria Road & Access 2

	•	•	1	Ť	ţ	4
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	*	7	ኘ	A	<u>→</u>	7
Traffic Volume (vph)	96	58	53	1093	777	133
Future Volume (vph)	96	58	53	1093	777	133
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	0.0	30.0	1700	1700	60.0
Storage Lanes	1	1	1			1
Taper Length (m)	7.5		7.5			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.850	1.00			0.850
Flt Protected	0.950	0.000	0.950			0.000
Satd. Flow (prot)	1805	1615	1805	1792	1759	1615
Flt Permitted	0.950	1013	0.271	1172	1737	1013
Satd. Flow (perm)	1805	1615	515	1792	1759	1615
Right Turn on Red	1000	Yes	313	1172	1739	Yes
Satd. Flow (RTOR)		63				145
Link Speed (k/h)	50	03		70	70	140
					308.2	
Link Distance (m)	97.9			155.4		
Travel Time (s)	7.0	0.02	0.02	8.0	15.9	0.02
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	6%	8%	0%
Adj. Flow (vph)	104	63	58	1188	845	145
Shared Lane Traffic (%)						
Lane Group Flow (vph)	104	63	58	1188	845	145
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	3.6	
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	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15	25			15
Number of Detectors	1	1	1	2	2	1
Detector Template	Left	Right	Left	Thru	Thru	Right
Leading Detector (m)	2.0	2.0	2.0	10.0	10.0	2.0
Trailing Detector (m)	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
Detector 1 Size(m)	2.0	2.0	2.0	0.6	0.6	2.0
Detector 1 Type	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex
Detector 1 Channel	OI. LK	31. LX	31. LX	31. LK	3 LX	J LA
Detector 1 Extend (s)	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
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)	0.0	0.0	0.0	9.4	9.4	0.0
Detector 2 Size(m)				0.6	0.6	
Detector 2 Type				CI+Ex	CI+Ex	
Detector 2 Type Detector 2 Channel				OI+EX	OI+EX	
				0.0	0.0	
Detector 2 Extend (s)	Des. 1	D	D	0.0	0.0	D
Turn Type	Prot	Perm	Perm	NA	NA	Perm
Protected Phases	4			2	6	

220 Arkell Road TIS 5:00 pm 07-04-2018 2021 AM Background

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Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Permitted Phases		4	2			6
Detector Phase	4	4	2	2	6	6
Switch Phase						
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	24.0	24.0	24.0	24.0	24.0	24.0
Total Split (s)	24.0	24.0	56.0	56.0	56.0	56.0
Total Split (%)	30.0%	30.0%	70.0%	70.0%	70.0%	70.0%
Maximum Green (s)	18.0	18.0	50.0	50.0	50.0	50.0
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	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
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	Max	Max	Max	Max
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	7.0
Flash Dont Walk (s)	11.0	11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0	0	0	0	0
Act Effct Green (s)	10.8	10.8	56.9	56.9	56.9	56.9
Actuated g/C Ratio	0.14	0.14	0.76	0.76	0.76	0.76
v/c Ratio	0.40	0.22	0.15	0.87	0.63	0.12
Control Delay	33.9	9.9	5.4	20.2	9.2	1.1
Queue Delay	0.0	0.0	0.0	5.8	0.0	0.0
Total Delay	33.9	9.9	5.4	25.9	9.2	1.1
LOS	С	Α	Α	С	Α	Α
Approach Delay	24.9			25.0	8.0	
Approach LOS	С			С	Α	
Intersection Summary						
Area Type:	Other					
Cycle Length: 80						
Actuated Cycle Length: 7	75.1					
Natural Cycle: 90						
Control Type: Semi Act-U	Jncoord					
Maximum v/c Ratio: 0.87						
Intersection Signal Delay	r: 18.0			Ir	ntersectio	n LOS: B
Intersection Capacity Util	lization 75.9%)		[(CU Level	of Service
Analysis Period (min) 15						



	•	\rightarrow	4	†	↓	4
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	104	63	58	1188	845	145
v/c Ratio	0.40	0.22	0.15	0.87	0.63	0.12
Control Delay	33.9	9.9	5.4	20.2	9.2	1.1
Queue Delay	0.0	0.0	0.0	5.8	0.0	0.0
Total Delay	33.9	9.9	5.4	25.9	9.2	1.1
Queue Length 50th (m)	14.1	0.0	2.3	125.8	57.9	0.0
Queue Length 95th (m)	27.7	9.8	7.5	#261.4	112.7	5.0
Internal Link Dist (m)	73.9			131.4	284.2	
Turn Bay Length (m)			30.0			60.0
Base Capacity (vph)	433	435	390	1358	1332	1258
Starvation Cap Reductn	0	0	0	131	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.24	0.14	0.15	0.97	0.63	0.12
Intersection Cummany						

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

HCM 2010 Signalized Intersection Summary 6: Victoria Road & Access 2

	۶	•	4	†	ļ	4	
Movement	EBL	EBR	NBL	NBT	SBT	SBR	
Lane Configurations	Ť	7	ሻ	^	^	7	
Traffic Volume (veh/h)	96	58	53	1093	777	133	
Future Volume (veh/h)	96	58	53	1093	777	133	
Number	7	14	5	2	6	16	
Initial Q (Qb), veh	0	0	0	0	0	0	
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	
Adj Sat Flow, veh/h/ln	1900	1900	1900	1792	1759	1900	
Adj Flow Rate, veh/h	104	63	58	1188	845	145	
Adj No. of Lanes	1	1	1	1	1	1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	
Percent Heavy Veh, %	0	0	0	6	8	0	
Cap, veh/h	243	217	342	1251	1228	1127	
Arrive On Green	0.13	0.13	0.70	0.70	0.70	0.70	
Sat Flow, veh/h	1810	1615	578	1792	1759	1615	
Grp Volume(v), veh/h	104	63	58	1188	845	145	
Grp Sat Flow(s), veh/h/ln	1810	1615	578	1792	1759	1615	
Q Serve(g_s), s	3.8	2.5	4.6	42.5	20.0	2.1	
Cycle Q Clear(g_c), s	3.8	2.5	24.6	42.5	20.0	2.1	
Prop In Lane	1.00	1.00	1.00			1.00	
Lane Grp Cap(c), veh/h	243	217	342	1251	1228	1127	
V/C Ratio(X)	0.43	0.29	0.17	0.95	0.69	0.13	
Avail Cap(c_a), veh/h	455	406	342	1251	1228	1127	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	
Uniform Delay (d), s/veh	28.5	27.9	13.5	9.7	6.3	3.6	
Incr Delay (d2), s/veh	1.2	0.7	1.1	15.9	3.2	0.2	
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	
%ile BackOfQ(50%),veh/ln	2.0	1.2	0.8	26.0	10.5	1.0	
LnGrp Delay(d),s/veh	29.7	28.6	14.5	25.6	9.5	3.8	
LnGrp LOS	С	С	В	С	Α	Α	
Approach Vol, veh/h	167			1246	990		
Approach Delay, s/veh	29.3			25.1	8.6		
Approach LOS	С			С	Α		
Timer	1	2	3	4	5	6	7
Assigned Phs		2		4		6	
Phs Duration (G+Y+Rc), s		56.0		15.6		56.0	
Change Period (Y+Rc), s		6.0		6.0		6.0	
Max Green Setting (Gmax), s		50.0		18.0		50.0	
Max Q Clear Time (q_c+l1), s		44.5		5.8		22.0	
Green Ext Time (p c), s		5.1		0.5		23.2	
4 - 7:		5.1		0.0		20.2	
ntersection Summary			10./				
HCM 2010 Ctrl Delay			18.6				
HCM 2010 LOS			В				

7: Victoria Road & Victoria Park Village Road

	۶	\rightarrow	4	†	↓	4
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	ሻ	7	ሻ	†	^	
Traffic Volume (vph)	162	52	17	1172	858	52
Future Volume (vph)	162	52	17	1172	858	52
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	20.0	0.0	30.0			0.0
Storage Lanes	1	1	1			0
Taper Length (m)	7.5		7.5			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850			0.992	
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1770	1583	1770	1863	1848	0
Flt Permitted	0.950		0.950			
Satd. Flow (perm)	1770	1583	1770	1863	1848	0
Link Speed (k/h)	50			50	70	
Link Distance (m)	325.8			308.2	342.0	
Travel Time (s)	23.5			22.2	17.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	176	57	18	1274	933	57
Shared Lane Traffic (%)						
Lane Group Flow (vph)	176	57	18	1274	990	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	3.6	
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	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15	25			15
Sign Control	Stop			Free	Free	
Intersection Summary						
	Other					
Control Type: Unsignalized	5 11101					
Intersection Capacity Utilizat	tion 77.3%			10	CU Level o	of Service I
Analysis Period (min) 15	71070					
7.1.1.1.313 1 GIIOG (IIIII) 13						

Intersection									
Int Delay, s/veh	111.5								
Movement	EBL	EBR	NBL	NBT	SBT	SBR			
Lane Configurations	ች	7		†	1>				
Traffic Vol, veh/h	162	52	17	1172	858	52			
Future Vol, veh/h	162	52	17	1172	858	52			
Conflicting Peds, #/hr	0	0	0	0	0	0			
Sign Control	Stop	Stop	Free	Free	Free	Free			
RT Channelized	-	None	-	None	-	None			
Storage Length	200	0	300			-			
Veh in Median Storage	e, # 0	-	-	0	0	-			
Grade, %	0		-	0	0	-			
Peak Hour Factor	92	92	92	92	92	92			
Heavy Vehicles, %	2	2	2	2	2	2			
Mvmt Flow	176	57	18	1274	933	57			
Major/Minor I	Minor2		Major1		Major2				
Conflicting Flow All	2272	961	989	0	viajui z	0			
Stage 1	961	901	707	0		U			
Stage 2	1311								
Critical Hdwy	6.42	6.22	4.12			-			
Critical Hdwy Stg 1	5.42	0.22	4.12						
Critical Hdwy Stg 2	5.42								
Follow-up Hdwy	3.518	3.318	2 218						
Pot Cap-1 Maneuver	~ 44	311	699						
Stage 1	371	-	0//						
Stage 2	252								
Platoon blocked, %	202								
Mov Cap-1 Maneuver	~ 43	311	699	- 1					
Mov Cap-1 Maneuver	~ 43	-	- 077						
Stage 1	371								
Stage 2	246								
olago L	0								
\nnroach	EB		NB		SB				
Approach HCM Control Delay, \$			0.1		<u> </u>				
HCM LOS	1204.2 F		0.1		U				
HCWI LU3	Г								
Minor Lane/Major Mvm	nt	NBL	NBT	EBLn1		SBT	SBR		
Capacity (veh/h)		699	-	43	311	-	-		
HCM Lane V/C Ratio		0.026		4.095		-	-		
HCM Control Delay (s)		10.3		1584.6	19.1	-	-		
ICM Lane LOS		В	-	F	С	-	-		
HCM 95th %tile Q(veh))	0.1	-	19.9	0.7	-	-		
Votes									
: Volume exceeds ca	nacity	\$: Da	elay exc	reeds 3	00s	+. C0m	nutation N	lot Defined	a *: All major volume in platoon
. Volume exceeds ca	pacity	ψ. D	July CAL	occus J	003	i. Colli	patation	O DOMINE	. All major volume in platoon

	-	•	•	←	4	~
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	1 >		ሻ	†	Y	
Traffic Volume (vph)	451	139	80	385	66	40
Future Volume (vph)	451	139	80	385	66	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)		0.0	60.0		0.0	0.0
Storage Lanes		0	1		1	0
Taper Length (m)			7.5		7.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.968				0.949	
Flt Protected			0.950		0.970	
Satd. Flow (prot)	1813	0	1805	1881	1749	0
Flt Permitted	1010	J	0.950	1001	0.970	Ü
Satd. Flow (perm)	1813	0	1805	1881	1749	0
Link Speed (k/h)	50	U	.500	50	50	0
Link Distance (m)	290.6			206.6	213.5	
Travel Time (s)	20.9			14.9	15.4	
Confl. Peds. (#/hr)	20.7	3	3	11.7	10.1	1
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	1%	3%	0%	1%	0.76	0%
Adj. Flow (vph)	470	145	83	401	69	42
Shared Lane Traffic (%)	170	110	0.5	101	0,	12
Lane Group Flow (vph)	615	0	83	401	111	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6	rtigrit	LCIT	3.6	3.6	rtigrit
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane	Yes			4.0	4.0	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	1.00	1.00	25	1.00	25	1.00
Sign Control	Free	10	20	Free		10
Sign Control	Free			rree	Stop	
Intersection Summary						
	Other					
Control Type: Unsignalized						
Intersection Capacity Utilizat						
Analysis Period (min) 15	tion 53.1%			IC	U Level o	of Service A

Intersection						
Int Delay, s/veh	2.2					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	ĵ.		ች	↑	¥	
Traffic Vol, veh/h	451	139	80	385	66	40
Future Vol, veh/h	451	139	80	385	66	40
Conflicting Peds, #/hr	0	3	3	0	0	1
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length		-	600	-	0	-
Veh in Median Storage	2, # 0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	1	3	0	1	0	0
Mvmt Flow	470	145	83	401	69	42
Major/Minor 1	Major1	N	Major2	N	/linor1	
Conflicting Flow All	0	0	618	0	1113	546
Stage 1	-	-	010	-	545	340
Stage 2					568	
Critical Hdwy			4.1		6.4	6.2
Critical Hdwy Stg 1			7.1		5.4	0.2
Critical Hdwy Stg 2			-		5.4	
Follow-up Hdwy			2.2		3.5	3.3
Pot Cap-1 Maneuver			972		233	541
Stage 1			712		585	J4 I
Stage 2					571	
Platoon blocked, %					3/1	
Mov Cap-1 Maneuver			971		213	539
Mov Cap-1 Maneuver			7/1		348	-
Stage 1					584	
Stage 2					522	
Stage 2					322	
Approach	EB		WB		NB	
HCM Control Delay, s	0		1.6		17.3	
HCM LOS					С	
Minor Lane/Major Mvm	nt t	VBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)		402	-	-	971	-
HCM Lane V/C Ratio		0.275			0.086	
HCM Control Delay (s)		17.3			9.1	
HCM Lane LOS		C			A	
HCM 95th %tile Q(veh))	1.1			0.3	
7011 70110 Q(VCII)	,	1.1			0.0	

2: Zecca Drive/Amos Drive & Arkell Road

	۶	→	•	•	←	•	4	†	/	-	↓	4
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		4			4			4			4	
Traffic Volume (vph)	38	426	29	6	428	12	16	0	3	7	1	21
Future Volume (vph)	38	426	29	6	428	12	16	0	3	7	1	21
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. 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
Ped Bike Factor												
Frt		0.992			0.996			0.980			0.901	
Flt Protected		0.996			0.999			0.959			0.988	
Satd. Flow (prot)	0	1861	0	0	1873	0	0	1786	0	0	1691	0
Flt Permitted		0.996			0.999			0.959			0.988	
Satd. Flow (perm)	0	1861	0	0	1873	0	0	1786	0	0	1691	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		206.6			261.6			219.2			154.5	
Travel Time (s)		14.9			18.8			15.8			11.1	
Confl. Peds. (#/hr)			9	9			7		7	7		7
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	0%	1%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	40	448	31	6	451	13	17	0	3	7	1	22
Shared Lane Traffic (%)	_		_						_			
Lane Group Flow (vph)	0	519	0	0	470	0	0	20	0	0	30	0
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)		3.6			3.6			0.0			0.0	
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	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
Headway 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
Turning Speed (k/h)	25	_	15	25	_	15	25	0.	15	25	0.	15
Sign Control		Free			Free			Stop			Stop	
Intersection Summary												
	ther											
Control Type: Unsignalized												
Intersection Capacity Utilizati	on 59.4%			IC	CU Level	of Service	В					
Analysis Period (min) 15												

Intersection												
Int Delay, s/veh	1.2											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		4			44			4			4	
Traffic Vol, veh/h	38	426	29	6	428	12	16	0	3	7	1	21
Future Vol. veh/h	38	426	29	6	428	12	16	0	3	7	1	21
Conflicting Peds, #/hr	0	0	9	9	0	0	7	0	7	7	0	7
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-		None		-	None	-	-	None	-	-	None
Storage Length		-	-	-		-			-	-		-
Veh in Median Storage,	.# -	0	-	-	0	-		0	-	-	0	-
Grade, %	-	0			0		-	0			0	
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	0	1	0	0	1	0	0	0	0	0	0	0
Mvmt Flow	40	448	31	6	451	13	17	0	3	7	1	22
Major/Minor N	/lajor1			Major2		1	Minor1		M	Minor2		
Conflicting Flow All	463	0	0	488	0	0	1041	1029	480	1021	1037	464
Stage 1	-	-	-	-	-	-	553	553	-	469	469	-
Stage 2	-	-	-	-	-	-	488	476	-	552	568	
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1109	-	-	1086	-	-	210	236	590	217	233	602
Stage 1	-	-	-	-	-	-	521	518	-	579	564	-
Stage 2	-	-	-	-	-	-	565	560	-	522	510	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1102	-	-	1080	-	-	190	221	582	205	218	598
Mov Cap-2 Maneuver	-	-	-	-	-	-	190	221	-	205	218	-
Stage 1	-	-	-	-	-	-	491	488	-	550	560	-
Stage 2	-	-	-	-	-	-	536	556	-	490	481	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.6			0.1			23.6			14.9		
HCM LOS							С			В		
Minor Lane/Major Mvml	t	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1			
Capacity (veh/h)		213	1102	-	-	1080	-	-	393			
HCM Lane V/C Ratio		0.094	0.036	-	-	0.006	-	-	0.078			
HCM Control Delay (s)		23.6	8.4	0	-	8.4	0	-	14.9			
HCM Lane LOS		С	Α	Α	-	Α	Α		В			
HCM 95th %tile Q(veh)		0.3	0.1	-	-	0	-	-	0.3			
-(- /												

3: Colonial Drive & Arkell Road

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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	Ţ	ĥ		٦	ĥ			4			4	
Traffic Volume (vph)	29	320	87	64	351	138	79	0	65	81	0	18
Future Volume (vph)	29	320	87	64	351	138	79	0	65	81	0	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	50.0		0.0	60.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	1		0	0		0	0		(
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. 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
Ped Bike Factor												
Frt		0.968			0.958			0.939			0.975	
Flt Protected	0.950			0.950				0.973			0.961	
Satd. Flow (prot)	1805	1825	0	1805	1794	0	0	1708	0	0	1780	(
Flt Permitted	0.950			0.950				0.973			0.961	
Satd. Flow (perm)	1805	1825	0	1805	1794	0	0	1708	0	0	1780	(
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		261.6			193.8			209.6			91.7	
Travel Time (s)		18.8			14.0			15.1			6.6	
Confl. Peds. (#/hr)			8	8								
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	0%	1%	0%	0%	2%	0%	3%	0%	0%	0%	0%	0%
Adj. Flow (vph)	30	333	91	67	366	144	82	0	68	84	0	19
Shared Lane Traffic (%)												
Lane Group Flow (vph)	30	424	0	67	510	0	0	150	0	0	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	Righ
Median Width(m)		3.6	J		3.6	J		0.0	J		0.0	J
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												
Headway 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
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Free			Free			Stop			Stop	
Intersection Summary												
	Other											
Control Type: Unsignalized												
Intersection Capacity Utilizat	ion 48.5%			IC	CU Level	of Service	Α					
Analysis Period (min) 15												

Intersection												
Int Delay, s/veh	7.6											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	ሻ	ĵ.			ĵ.			4			4	
Traffic Vol. veh/h	29	320	87	64	351	138	79	0	65	81	0	18
Future Vol. veh/h	29	320	87	64	351	138	79	0	65	81	0	18
Conflicting Peds, #/hr	0	0	8	8	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	- '-	-	None
Storage Length	500		-	600		-	-		-	-		-
Veh in Median Storage,	# -	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	96	96	96	96	96	96	96	96	96	96	96	96
Heavy Vehicles, %	0	1	0	0	2	0	3	0	0	0	0	0
Mvmt Flow	30	333	91	67	366	144	82	0	68	84	0	19
Major/Minor N	Major1			Major2			Minor1		N	/linor2		
Conflicting Flow All	509	0	0	432	0	0	1027	1090	387	1044	1063	438
Stage 1	-	-	-	-	-	-	447	447	-	571	571	_
Stage 2							580	643		473	492	
Critical Hdwy	4.1	-		4.1	-		7.13	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-			-			6.13	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-		-	-		6.13	5.5	-	6.1	5.5	
Follow-up Hdwy	2.2		-	2.2	-	-	3.527	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1066	-	-	1138	-	-	212	217	665	209	225	623
Stage 1				-	-		589	577	-	509	508	-
Stage 2	-				-		498	472	-	576	551	
Platoon blocked, %			-		-	-						
Mov Cap-1 Maneuver	1066	-	-	1138	-	-	191	197	660	175	204	623
Mov Cap-2 Maneuver	-	-	-	-	-	-	191	197	-	175	204	-
Stage 1	-	-	-	-	-	-	569	557	-	495	478	-
Stage 2	-	-	-	-	-	-	455	444	-	502	532	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.6			1			31.6			40.4		
HCM LOS							D			E		
										-		
Minor Lane/Major Mvml		NBLn1	EBL	EBT	EBR	WBL	WBT	WBR:	SBLn1			
Capacity (veh/h)		281	1066	-	-	1138	-	-	201			
HCM Lane V/C Ratio		0.534	0.028	-	-	0.059	-	-	0.513			
HCM Control Delay (s)		31.6	8.5	-	-	8.4	-	-	40.4			
HCM Lane LOS		D	Α	-	-	Α	-	-	Е			
HCM 95th %tile Q(veh)		2.9	0.1	-	-	0.2	-	-	2.6			

4: Residential Entrance/Access 1 & Arkell Road

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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	J.	f)			4			4		٦		ř
Traffic Volume (vph)	8	455	3	2	542	7	2	0	2	8	0	9
Future Volume (vph)	8	455	3	2	542	7	2	0	2	8	0	ç
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	25.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	0		0	0		0	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. 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
Frt		0.999			0.998			0.932				0.850
Flt Protected	0.950							0.976		0.950		
Satd. Flow (prot)	1805	1826	0	0	1758	0	0	1728	0	1805	0	1615
Flt Permitted	0.950							0.976		0.950		
Satd. Flow (perm)	1805	1826	0	0	1758	0	0	1728	0	1805	0	1615
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		193.8			144.3			68.0			96.7	
Travel Time (s)		14.0			10.4			4.9			7.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	4%	0%	0%	8%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	9	495	3	2	589	8	2	0	2	9	0	10
Shared Lane Traffic (%)												
Lane Group Flow (vph)	9	498	0	0	599	0	0	4	0	9	0	10
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)		3.6			3.6			3.6			3.6	
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												
Headway 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
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Free			Free			Stop			Stop	
Intersection Summary												
	Other											
Control Type: Unsignalized												
Intersection Capacity Utilizat	ion 45.7%	ı		IC	CU Level	of Service	A .					
Analysis Period (min) 15												

Intersection Int Delay, s/veh													
Movement EBI EBT EBR WBI WBR NBI NBR NBR SBI SBR SBR													
Lane Configurations	Int Delay, s/veh	0.4											
Traffic Vol, veh/h Future Vol, veh/h 8 455 3 2 542 7 2 0 2 8 0 9 Future Vol, veh/h 8 455 3 2 542 7 2 0 2 8 0 9 Future Vol, veh/h 8 455 3 2 542 7 2 0 2 8 0 9 Future Vol, veh/h 8 455 3 2 542 7 2 0 2 8 0 9 Conflicting Peds, #hr 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Sign Confirol Free Free Free Free Free Free Free Fre	Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h Fiture Vol, veh/h 8 455 3 2 542 7 2 0 2 8 0 9 Future Vol, veh/h 8 455 3 2 542 7 2 0 2 8 0 9 Future Vol, veh/h 8 455 3 2 542 7 2 0 2 8 0 9 Future Vol, veh/h 8 455 3 2 542 7 2 0 2 8 0 9 Conflicting Peds, #hr 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Sign Confirol Free Free Free Free Free Free Free Fre	Lane Configurations	- 1	ĵ.			43-			44		*		7
Conflicting Peds, #hr				3	2		7	2		2		0	
Sign Control Free Free		8	455	3	2	542	7	2	0	2	8	0	9
Sign Control Free RTCE RTCE Free RTCE None Free RTCE None Free None Free None Stop None None - None	Conflicting Peds. #/hr	0	0	0	0	0	0	0	0	0	0	0	0
RT Channelized - None 0 <t< td=""><td></td><td>Free</td><td>Free</td><td>Free</td><td>Free</td><td></td><td>Free</td><td></td><td></td><td>Stop</td><td>Stop</td><td>Stop</td><td>Stop</td></t<>		Free	Free	Free	Free		Free			Stop	Stop	Stop	Stop
Storage Length 250													
Weh in Median Storage, # 0 - 0 - 0 - 0 - 0 - 0 - 0 - 0 - 0 - 0 - 0 - 0 - 0 - 0 <td></td> <td>250</td> <td>-</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>0</td> <td></td> <td></td>		250	-								0		
Grade, % - 0 0 0 0 0 0 0 Peak Hour Factor 92 92 92 92 92 92 92 92 92 92 92 92 92		# -	0	-	-	0		-	0		-	0	
Peak Hour Factor 92 90 10 Major/Minor Major/Minor Major Major Minor Minor Minor Minor 2 Stage 1 - - - - - - - - <th< td=""><td></td><td></td><td>0</td><td>-</td><td></td><td>0</td><td>-</td><td></td><td>0</td><td></td><td>-</td><td>0</td><td>-</td></th<>			0	-		0	-		0		-	0	-
Heavy Vehicles, %		92		92	92		92	92		92	92	92	92
Major/Minor Major1 Major2 Minor1 Minor2													
Major/Minor Major1 Major2 Minor1 Minor2					-			-		-		-	
Conflicting Flow All 597 0 0 498 0 0 1111 1115 496 1112 - 593	TIOW	,	173	3		507	3		J		,	0	10
Conflicting Flow All 597 0 0 498 0 0 1111 1115 496 1112 593	Major/Minor	loior1			Anior?			Ainor1			Minor		
Stage 1									1115				F02
Stage 2		597		0	498	0	0			496		-	593
Critical Hdwy 4.1 - 4.1 - 7.1 6.5 6.2 7.1 - 6.2 Critical Hdwy Stg 1 - - - 6.1 5.5 6.1 - - Critical Hdwy Stg 2 - - - 6.1 5.5 6.1 - - Critical Hdwy Stg 2 - - - 6.1 5.5 6.1 - - Critical Hdwy Stg 1 - - - 6.1 5.5 6.1 - - - 6.1 5.5 6.1 - - - - 3.3 3.3 3.3 3.3 3.3 5 3.3 9.3 - 493 0.5 549 549 549 549 0.5 - - - 547 539 - 493 0.2 - - - - - - - - - - - - - - - <		-		-	-	-	-			-		-	-
Critical Hdwy Stg 1				-									
Critical Hdwy Sig 2 - - - - 6.1 5.5 6.1 - - - Follow-up Hdwy 2.2 - 2.2 - 3.5 4 3.3 3.5 - 3.3 Pot Cap-1 Maneuver 989 - 1076 - 188 210 578 188 0 509 Stage 1 - - - - 547 539 - 493 0 - Stage 2 - - - - 493 493 - 546 0 - Platoon blocked, % - - - - - 493 493 - 546 0 - Mov Cap-1 Maneuver 989 - 1076 - 183 207 578 186 - 509 Mov Cap-2 Maneuver - - - - 542 534 - 489 - - 5186 - - - 482 492 - 539 - - - <													
Follow-up Hidwy 2.2 - 2.2 - 3.5 4 3.3 3.5 - 3.3 Pot Cap-1 Maneuver 989 - 1076 - 188 210 578 188 0 509 Stage 1 5 - 547 539 - 493 0 - Stage 2 5 - 547 539 - 493 0 - Platoon blocked, % Mov Cap-1 Maneuver 989 - 1076 - 183 207 578 186 - 509 Mov Cap-2 Maneuver 183 207 578 186 - 509 Mov Cap-2 Maneuver 183 207 578 186 - 509 Mov Cap-2 Maneuver 542 534 - 489 Stage 1 542 534 - 489 Stage 2 183 207 578 186 - 509 Mov Cap-2 Maneuver 542 534 - 489 Stage 2 183 207 578 186 - 509 Mov Cap-2 Maneuver 542 534 - 489 Stage 1 542 534 - 489 Stage 2 182 88		-		-	-	-							-
Pot Cap-1 Maneuver		-		-	-	-							-
Stage 1				-		-							
Stage 2				-	1076	-						-	509
Platoon blocked, % - - - - - - - 509 Mov Cap-1 Maneuver 989 - 1076 - 183 207 578 186 - 509 Mov Cap-2 Maneuver - - - - 183 207 - 186 - - 509 Stage 1 - - - - 542 534 - 489 - - Stage 2 - - - - - 482 492 - 539 - - Approach EB WB NB NB SB -			-	-	-	-							-
Mov Cap-1 Maneuver 989 - - 1076 - - 183 207 578 186 - 509 Mov Cap-2 Maneuver - - - - 183 207 - 186 - - Stage 1 - - - - 542 534 - 489 - - Stage 2 - - - - 482 492 - 539 - - Approach EB WB NB SB -		-	-	-	-	-	-	493	493	-	546	0	-
Mov Cap-2 Maneuver			-	-		-	-						
Stage 1				-		-							
Stage 2		-	-	-	-	-	-			-		-	-
Approach EB WB NB SB HCM Control Delay, S 0.1 0 18.2 18.4 HCM LOS C C		-	-	-	-	-	-			-		-	-
HCM Control Delay, s 0.1 0 18.2 18.4 HCM LOS C C Minor Lane/Major Mvmt NBLn1 EBL EBT EBR WBL WBT WBR SBLn1 SBLn2	Stage 2	-	-	-	-	-	-	482	492	-	539	-	-
HCM Control Delay, s 0.1 0 18.2 18.4 HCM LOS C C Minor Lane/Major Mvmt NBLn1 EBL EBT EBR WBL WBT WBR SBLn1 SBLn2													
HCM Control Delay, s 0.1 0 18.2 18.4 HCM LOS C C Minor Lane/Major Mvmt NBLn1 EBL EBT EBR WBL WBT WBR SBLn1 SBLn2	Approach	EB			WB			NB			SB		
HCM LOS C C C													
Minor Lane/Major Mvmt NBLn1 EBL EBT EBR WBL WBT WBR SBLn1 SBLn2 Capacity (veh/h) 278 989 - - 1076 - - 186 509 HCM Lane V/C Ratio 0.016 0.009 - - 0.002 - - 0.047 0.019 HCM Control Delay (s) 18.2 8.7 - 8.4 0 - 25.3 12.2 HCM Lane LOS C A - A A D B		0.1			Ü								
Capacity (veh/h) 278 989 - - 1076 - - 186 509 HCM Lane V/C Ratio 0.016 0.009 - - 0.002 - - 0.047 0.019 HCM Control Delay (s) 18.2 8.7 - 8.4 0 - 25.3 12.2 HCM Lane LOS C A - A A - D B								J			J		
Capacity (veh/h) 278 989 - - 1076 - - 186 509 HCM Lane V/C Ratio 0.016 0.009 - - 0.002 - - 0.047 0.019 HCM Control Delay (s) 18.2 8.7 - 8.4 0 - 25.3 12.2 HCM Lane LOS C A - A A - D B	Minor Long/Major M.		UDL 4	EDI	EDZ	EDD	WDI	WDT	WDD	CDL -4	CDIC		
HCM Lane V/C Ratio 0.016 0.009 - 0.002 - 0.047 0.019 HCM Control Delay (s) 18.2 8.7 - 8.4 0 - 25.3 12.2 HCM Lane LOS C A - A A - D B						FRK							
HCM Control Delay (s) 18.2 8.7 - - 8.4 0 - 25.3 12.2 HCM Lane LOS C A - - A A - D B						-							
HCM Lane LOS C A A A - D B						-							
						-		-					
HCM 95th %tile Q(veh) 0 0 0 0.1 0.1					-	-		Α	-				
	HCM 95th %tile Q(veh)		0	0	-	-	0	-	-	0.1	0.1		

07-24-2018

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Lane Group El	BL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	ħ	ĥ		7	î,		ሻ	1>		*	î,	
Traffic Volume (vph) 2	42	143	80	118	186	72	89	722	141	75	698	273
Future Volume (vph) 2	42	143	80	118	186	72	89	722	141	75	698	273
	00	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
	0.0		0.0	20.0		0.0	90.0		0.0	50.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
	7.5			7.5			7.5			7.5		
	00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor							1.00				0.99	
Frt		0.946			0.958			0.975			0.958	
Flt Protected 0.9	50			0.950			0.950			0.950		
Satd. Flow (prot) 17	87	1786	0	1703	1792	0	1805	1758	0	1805	1763	0
Flt Permitted 0.3				0.579			0.141			0.141		
	05	1786	0	1038	1792	0	268	1758	0	268	1763	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd, Flow (RTOR)		34			23			14			27	
Link Speed (k/h)		50			60			70			70	
Link Distance (m)		144.3			357.4			823.5			155.4	
Travel Time (s)		10.4			21.4			42.4			8.0	
Confl. Peds. (#/hr)							6					6
	94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
	1%	1%	0%	6%	1%	3%	0%	6%	2%	0%	3%	1%
	57	152	85	126	198	77	95	768	150	80	743	290
Shared Lane Traffic (%)												
	57	237	0	126	275	0	95	918	0	80	1033	0
	No	No	No	No	No	No	No	No	No	No	No	No
	.eft	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6	3		3.6	3		3.6	,		3.6	,
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												
	00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template L	.eft	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m) 2	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
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		0.0	0.0		0.0	0.0	
Detector 1 Size(m) 2	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type CI+	Ex	CI+Ex		CI+Ex	CI+Ex		CI+Ex	CI+Ex		CI+Ex	CI+Ex	
Detector 1 Channel												
Detector 1 Extend (s) (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		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		CI+Ex			CI+Ex			CI+Ex			CI+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

220 Arkell Road TIS 5:00 pm 07-04-2018 2021 PM Background

Synchro 9 Report Page 9 Lanes, Volumes, Timings 5: Victoria Road & Arkell Road

07-24-201

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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBF
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Detector Phase	7	4		3	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0		7.0	10.0		7.0	10.0	
Minimum Split (s)	10.0	26.0		10.0	26.0		10.0	34.0		10.0	34.0	
Total Split (s)	10.0	26.0		10.0	26.0		10.0	34.0		10.0	34.0	
Total Split (%)	12.5%	32.5%		12.5%	32.5%		12.5%	42.5%		12.5%	42.5%	
Maximum Green (s)	7.0	20.0		7.0	20.0		7.0	28.0		7.0	28.0	
Yellow Time (s)	3.0	4.0		3.0	4.0		3.0	4.0		3.0	4.0	
All-Red Time (s)	0.0	2.0		0.0	2.0		0.0	2.0		0.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	3.0	6.0		3.0	6.0		3.0	6.0		3.0	6.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	None		None	None	
Walk Time (s)		7.0			7.0			13.0			13.0	
Flash Dont Walk (s)		13.0			13.0			15.0			15.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)	25.9	17.5		25.2	15.0		36.7	28.3		36.7	28.3	
Actuated g/C Ratio	0.35	0.24		0.34	0.20		0.50	0.39		0.50	0.39	
v/c Ratio	0.73	0.52		0.30	0.71		0.34	1.33		0.28	1.48	
Control Delay	31.8	26.9		17.6	36.0		12.8	184.7		12.0	247.2	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	31.8	26.9		17.6	36.0		12.8	184.7		12.0	247.2	
LOS	С	С		В	D		В	F		В	F	
Approach Delay		29.5			30.2			168.6			230.3	
Approach LOS		С			С			F			F	

Intersection Summary

Area Type: Other
Cycle Length: 80

Actuated Cycle Length: 73.3

Natural Cycle: 140

Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 1.48

Intersection Signal Delay: 150.2 Intersection LOS: F

Intersection Capacity Utilization 103.6% ICU Level of Service G

Analysis Period (min) 15



	•	→	•	←	4	†	-	. ↓	
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	
Lane Group Flow (vph)	257	237	126	275	95	918	80	1033	
v/c Ratio	0.73	0.52	0.30	0.71	0.34	1.33	0.28	1.48	
Control Delay	31.8	26.9	17.6	36.0	12.8	184.7	12.0	247.2	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	31.8	26.9	17.6	36.0	12.8	184.7	12.0	247.2	
Queue Length 50th (m)	27.4	27.6	12.4	35.4	6.4	~188.9	5.4	~223.5	
Queue Length 95th (m)	#51.9	49.6	23.7	60.2	15.0	#278.2	13.0	#317.2	
Internal Link Dist (m)		120.3		333.4		799.5		131.4	
Turn Bay Length (m)	40.0		20.0		90.0		50.0		
Base Capacity (vph)	353	518	420	511	282	688	282	698	
Starvation Cap Reductn	0	0	0	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.73	0.46	0.30	0.54	0.34	1.33	0.28	1.48	

Volume exceeds capacity, queue is theoretically infinite.
 Oueue shown is maximum after two cycles.

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

		-	•	•			,	'	•		•	
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	٦	ĵ.		ሻ	ĵ»		ሻ	î»		ሻ	î»	
Traffic Volume (veh/h)	242	143	80	118	186	72	89	722	141	75	698	273
Future Volume (veh/h)	242	143	80	118	186	72	89	722	141	75	698	273
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		0.99	1.00		0.99
Parking Bus, Adj	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 Sat Flow, veh/h/ln	1881	1888	1900	1792	1871	1900	1900	1804	1900	1900	1855	1900
Adj Flow Rate, veh/h	257	152	85	126	198	77	95	768	150	80	743	290
Adj No. of Lanes	1	1	0	1	1	0	1	1	0	1	1	0
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	1	1	1	6	1	1	0	6	6	0	3	3
Cap, veh/h	328	237	132	341	258	100	245	563	110	236	481	188
Arrive On Green	0.09	0.21	0.21	0.09	0.20	0.20	0.08	0.38	0.38	0.08	0.38	0.38
Sat Flow, veh/h	1792	1139	637	1707	1284	499	1810	1464	286	1810	1268	495
Grp Volume(v), veh/h	257	0	237	126	0	275	95	0	918	80	0	1033
Grp Sat Flow(s),veh/h/ln	1792	0	1776	1707	0	1783	1810	0	1750	1810	0	1763
Q Serve(g_s), s	7.0	0.0	9.0	4.2	0.0	10.8	2.2	0.0	28.4	1.9	0.0	28.0
Cycle Q Clear(g_c), s	7.0	0.0	9.0	4.2	0.0	10.8	2.2	0.0	28.4	1.9	0.0	28.0
Prop In Lane	1.00		0.36	1.00		0.28	1.00		0.16	1.00		0.28
Lane Grp Cap(c), veh/h	328	0	369	341	0	358	245	0	672	236	0	669
V/C Ratio(X)	0.78	0.00	0.64	0.37	0.00	0.77	0.39	0.00	1.37	0.34	0.00	1.54
Avail Cap(c_a), veh/h	328	0	481	353	0	483	269	0	672	269	0	669
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	24.3	0.0	26.7	20.7	0.0	27.9	16.6	0.0	22.7	16.7	0.0	22.9
Incr Delay (d2), s/veh	11.6	0.0	1.9	0.7	0.0	5.2	1.0	0.0	173.8	0.8	0.0	252.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.8	0.0	4.6	2.0	0.0	5.8	1.2	0.0	45.9	1.0	0.0	60.3
LnGrp Delay(d),s/veh	35.9	0.0	28.6	21.4	0.0	33.0	17.6	0.0	196.5	17.6	0.0	275.6
LnGrp LOS	D		С	С		С	В		F	В		F
Approach Vol, veh/h		494			401			1013			1113	
Approach Delay, s/veh		32.4			29.4			179.7			257.0	
Approach LOS		С			С			F			F	

Assigned Phs	1	2	3	4	5	6	7	8	
Phs Duration (G+Y+Rc), s	8.6	34.4	9.5	21.3	9.0	34.0	10.0	20.8	
Change Period (Y+Rc), s	3.0	6.0	3.0	6.0	3.0	6.0	3.0	6.0	
Max Green Setting (Gmax), s	7.0	28.0	7.0	20.0	7.0	28.0	7.0	20.0	
Max Q Clear Time (g_c+l1), s	3.9	30.4	6.2	11.0	4.2	30.0	9.0	12.8	
Green Ext Time (p_c), s	0.1	0.0	0.0	2.4	0.1	0.0	0.0	2.1	

intersection Summary	
HCM 2010 Ctrl Delay	164.2
HCM 2010 LOS	F

HCM 2010 Signalized Intersection Summary 5: Victoria Road & Arkell Road

	•	•	4	†	ļ	4
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	T T	T T	NDL T	ND1	<u>JD1</u>	3DK
Traffic Volume (vph)	50	23	20	1016	1023	43
Future Volume (vph)	50	23	20	1016	1023	43
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	0.0	30.0	1700	1700	60.0
Storage Lanes	1	1	30.0			1
Taper Length (m)	7.5	1	7.5			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Earle Ottil. Factor	1.00	0.850	1.00	1.00	1.00	0.850
FIt Protected	0.950	0.650	0.950			0.000
Satd. Flow (prot)	1805	1615	1805	1792	1845	1615
Flt Permitted	0.950	1013	0.169	1/72	1043	1013
Satd. Flow (perm)	1805	1615	321	1792	1845	1615
	1005	Yes	321	1792	1045	Yes
Right Turn on Red		Yes 25				43
Satd. Flow (RTOR)	Γ^	25		70	70	43
Link Speed (k/h)	50			70	70	
Link Distance (m)	97.9			155.4	308.2	
Travel Time (s)	7.0			8.0	15.9	0.05
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	6%	3%	0%
Adj. Flow (vph)	54	25	22	1104	1112	47
Shared Lane Traffic (%)						
Lane Group Flow (vph)	54	25	22	1104	1112	47
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	3.6	
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	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15	25			15
Number of Detectors	1	1	1	2	2	1
Detector Template	Left	Right	Left	Thru	Thru	Right
Leading Detector (m)	2.0	2.0	2.0	10.0	10.0	2.0
Trailing Detector (m)	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
Detector 1 Size(m)	2.0	2.0	2.0	0.6	0.6	2.0
Detector 1 Type	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex
Detector 1 Channel	O. LA	51. LK	0 LX	31. LK	0 LX	J LA
Detector 1 Extend (s)	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
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)	0.0	0.0	0.0	9.4	9.4	0.0
Detector 2 Size(m)				0.6	0.6	
Detector 2 Type				CI+Ex	CI+Ex	
Detector 2 Type Detector 2 Channel				CITEX	CITEX	
				0.0	0.0	
Detector 2 Extend (s)	Dec 1	D	D			D
Turn Type	Prot	Perm	Perm	NA	NA	Perm
Protected Phases	4			2	6	

Lane Configurations	. ነ	7	- ሽ			7
Traffic Volume (vph)	50	23	20	1016	1023	43
Future Volume (vph)	50	23	20	1016	1023	43
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	0.0	30.0			60.0
Storage Lanes	1	1	1			1
Taper Length (m)	7.5		7.5			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850				0.850
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1805	1615	1805	1792	1845	1615
Flt Permitted	0.950		0.169			
Satd. Flow (perm)	1805	1615	321	1792	1845	1615
Right Turn on Red	1000	Yes	OL.		1010	Yes
Satd. Flow (RTOR)		25				43
Link Speed (k/h)	50	2.0		70	70	-13
	97.9			155.4	308.2	
Link Distance (m) Travel Time (s)	7.0			8.0	15.9	
		0.00	0.02			0.02
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	6%	3%	0%
Adj. Flow (vph)	54	25	22	1104	1112	47
Shared Lane Traffic (%)		0.5	0.5			
Lane Group Flow (vph)	54	25	22	1104	1112	47
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	3.6	
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	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15	25			15
Number of Detectors	1	1	1	2	2	1
Detector Template	Left	Right	Left	Thru	Thru	Right
Leading Detector (m)	2.0	2.0	2.0	10.0	10.0	2.0
Trailing Detector (m)	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
Detector 1 Size(m)	2.0	2.0	2.0	0.6	0.6	2.0
Detector 1 Type	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex
Detector 1 Channel	CITEX	SITEX	SITEX	SITEX	SITEX	SITEX
Detector 1 Extend (s)	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
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)				9.4	9.4	
Detector 2 Size(m)				0.6	0.6	
Detector 2 Type				CI+Ex	CI+Ex	
Detector 2 Channel						
Detector 2 Extend (s)				0.0	0.0	
Turn Type	Prot	Perm	Perm	NA	NA	Perm
Protected Phases	4			2	6	

220 Arkell Road TIS 5:00 pm 07-04-2018 2021 PM Background	Synchro 9 Report
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	•	•	4	†	1	4
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Permitted Phases	LUL	4	2	1101	051	6
Detector Phase	4	4	2	2	6	6
Switch Phase						
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	24.0	24.0	24.0	24.0	24.0	24.0
Total Split (s)	24.0	24.0	56.0	56.0	56.0	56.0
Total Split (%)	30.0%	30.0%	70.0%	70.0%	70.0%	70.0%
Maximum Green (s)	18.0	18.0	50.0	50.0	50.0	50.0
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	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
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	Max	Max	Max	Max
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	7.0
Flash Dont Walk (s)	11.0	11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0	0	0	0	0
Act Effct Green (s)	10.1	10.1	63.4	63.4	63.4	63.4
Actuated g/C Ratio	0.13	0.13	0.83	0.83	0.83	0.83
v/c Ratio	0.23	0.11	0.08	0.74	0.72	0.03
Control Delay	32.7	13.3	4.2	11.1	10.4	1.4
Queue Delay	0.0	0.0	0.0	1.4	0.0	0.0
Total Delay	32.7	13.3	4.2	12.6	10.4	1.4
LOS	С	В	Α	В	В	Α
Approach Delay	26.6			12.4	10.0	
Approach LOS	С			В	В	
Intersection Summary						
Area Type:	Other					
Cycle Length: 80						
Actuated Cycle Length: 76	.1					
Natural Cycle: 90						
Control Type: Semi Act-Un	coord					
Maximum v/c Ratio: 0.74						
Intersection Signal Delay:	11.7			Ir	ntersectio	n LOS: B
Intersection Capacity Utiliz	ation 72.2%			10	CU Level	of Service
Analysis Period (min) 15						
Splits and Phases: 6: Vi	ctoria Road	& Access	s 2			
+			_			
Ø2						

	•	•	4	†	↓	4
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	54	25	22	1104	1112	47
v/c Ratio	0.23	0.11	0.08	0.74	0.72	0.03
Control Delay	32.7	13.3	4.2	11.1	10.4	1.4
Queue Delay	0.0	0.0	0.0	1.4	0.0	0.0
Total Delay	32.7	13.3	4.2	12.6	10.4	1.4
Queue Length 50th (m)	8.8	0.0	0.9	102.7	99.7	0.2
Queue Length 95th (m)	16.8	6.5	3.1	#218.0	#214.8	2.7
Internal Link Dist (m)	73.9			131.4	284.2	
Turn Bay Length (m)			30.0			60.0
Base Capacity (vph)	429	403	267	1492	1536	1352
Starvation Cap Reductn	0	0	0	206	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.13	0.06	0.08	0.86	0.72	0.03
Intersection Summary						

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

Queue shown is maximum after two cycles.

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		*	1	†	¥	*	
Movement	EBL	EBR	NBL	NBT	SBT	SBR	
Lane Configurations	٦	7	ሻ	^	↑	7	
Traffic Volume (veh/h)	50	23	20	1016	1023	43	
Future Volume (veh/h)	50	23	20	1016	1023	43	
Number	7	14	5	2	6	16	
Initial Q (Qb), veh	0	0	0	0	0	0	
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	
Adj Sat Flow, veh/h/ln	1900	1900	1900	1792	1845	1900	
Adj Flow Rate, veh/h	54	25	22	1104	1112	47	
Adj No. of Lanes	1	1	1	1	1	1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	
Percent Heavy Veh, %	0	0	0	6	3	0	
Cap, veh/h	203	181	243	1283	1321	1156	
Arrive On Green	0.11	0.11	0.72	0.72	0.72	0.72	
Sat Flow, veh/h	1810	1615	492	1792	1845	1615	
Grp Volume(v), veh/h	54	25	22	1104	1112	47	
Grp Sat Flow(s),veh/h/ln	1810	1615	492	1792	1845	1615	
Q Serve(g_s), s	1.9	1.0	2.3	31.8	30.1	0.6	
Cycle Q Clear(q_c), s	1.9	1.0	32.4	31.8	30.1	0.6	
Prop In Lane	1.00	1.00	1.00			1.00	
Lane Grp Cap(c), veh/h	203	181	243	1283	1321	1156	
V/C Ratio(X)	0.27	0.14	0.09	0.86	0.84	0.04	
Avail Cap(c_a), veh/h	466	416	243	1283	1321	1156	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	
Uniform Delay (d), s/veh	28.4	28.0	18.7	7.3	7.1	2.9	
Incr Delay (d2), s/veh	0.7	0.3	0.7	7.7	6.6	0.1	
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	
%ile BackOfQ(50%),veh/ln	1.0	0.4	0.4	18.1	17.3	0.3	
LnGrp Delay(d),s/veh	29.1	28.3	19.4	15.0	13.7	3.0	
LnGrp LOS	С	С	В	В	В	Α	
Approach Vol, veh/h	79			1126	1159		
Approach Delay, s/veh	28.8			15.1	13.3		
Approach LOS	C			В	В		
Timer	1	2	3	4	5	6	
Assigned Phs		2		4		6	
Phs Duration (G+Y+Rc), s		56.0		13.8		56.0	
Change Period (Y+Rc), s		6.0		6.0		6.0	
Max Green Setting (Gmax), s		50.0		18.0		50.0	
Max Q Clear Time (g_c+l1), s		34.4		3.9		32.1	
Green Ext Time (p_c), s		14.1		0.2		16.1	
Intersection Summary							
HCM 2010 Ctrl Delay			14.7				
HCM 2010 LOS			В				

Phs Duration (G+Y+Rc), s	56.0	13.8	56.0	
Change Period (Y+Rc), s	6.0	6.0	6.0	
Max Green Setting (Gmax), s	50.0	18.0	50.0	
Max Q Clear Time (g_c+l1), s	34.4	3.9	32.1	
Green Ext Time (p_c), s	14.1	0.2	16.1	
Intersection Summary				

intersection Summary	
HCM 2010 Ctrl Delay	14.7
HCM 2010 LOS	В

HCM 2010 Signalized Intersection Summary 6: Victoria Road & Access 2

7: Victoria Road & Victoria Park Village Road

	•	•		†	↓	4
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	ሻ	7	ሻ	†	ĥ	
Traffic Volume (vph)	90	38	64	1048	1151	153
Future Volume (vph)	90	38	64	1048	1151	153
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	20.0	0.0	30.0			0.0
Storage Lanes	1	1	1			0
Taper Length (m)	7.5		7.5			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850			0.984	
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1805	1615	1805	1792	1821	0
Flt Permitted	0.950		0.950			
Satd. Flow (perm)	1805	1615	1805	1792	1821	0
Link Speed (k/h)	50			50	70	
Link Distance (m)	325.8			308.2	342.0	
Travel Time (s)	23.5			22.2	17.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	6%	3%	0%
Adj. Flow (vph)	98	41	70	1139	1251	166
Shared Lane Traffic (%)						
Lane Group Flow (vph)	98	41	70	1139	1417	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	3.6	,
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	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15	25			15
Sign Control	Stop			Free	Free	
•						
Intersection Summary	0.11					
	Other					
Control Type: Unsignalized						
Intersection Capacity Utiliza	tion 81.5%			IC	U Level	of Service I
Analysis Period (min) 15						

ntersection								
Int Delay, s/veh	64.7							
Movement	EBL	EBR	NBL	NBT	SBT	SBR		
ane Configurations	ሻ	7	ች		ĵ.			
Traffic Vol, veh/h	90	38	64	1048	1151	153		
Future Vol, veh/h	90	38	64	1048	1151	153		
Conflicting Peds, #/hr	0	0	0	0	0	0		
Sign Control	Stop	Stop	Free	Free	Free	Free		
RT Channelized	-	None	-	None	-	None		
Storage Length	200	0	300	-	-	-		
Veh in Median Storage	e, # 0	-	-	0	0	-		
Grade, %	0	-	-	0	0	-		
Peak Hour Factor	92	92	92	92	92	92		
Heavy Vehicles, %	0	0	0	6	3	0		
Mvmt Flow	98	41	70	1139	1251	166		
Major/Minor I	Minor2	N	Najor1	ı	Major2			
Conflicting Flow All	2612	1334	1417	0	-	0		
Stage 1	1334	-	-		-			
Stage 2	1278		-	-	-	-		
Critical Hdwy	6.4	6.2	4.1	-	-	-		
Critical Hdwy Stg 1	5.4	-	-	-	-	-		
Critical Hdwy Stg 2	5.4	-	-	-	-	-		
Follow-up Hdwy	3.5	3.3	2.2	-	-	-		
Pot Cap-1 Maneuver	~ 27	190	487	-	-	-		
Stage 1	248	-	-	-	-	-		
Stage 2	264	-	-	-	-	-		
Platoon blocked, %				-	-	-		
Mov Cap-1 Maneuver	~ 23	190	487	-	-	-		
Mov Cap-2 Maneuver	~ 23	-	-	-	-	-		
Stage 1	248		-		-			
Stage 2	226	-	-	-	-			
, , ,								
Approach	EB		NB		SB			
HCM Control Delay, \$	1279.5		0.8		0			
HCM LOS	F							
Minor Lane/Major Mvm	nt	NBL	NBT	EBLn1	EBLn2	SBT	SBR	
Capacity (veh/h)		487	-	23	190	-	-	
HCM Lane V/C Ratio		0.143	-	4.253	0.217		-	
HCM Control Delay (s)		13.6		1807.5	29.1		-	
HCM Lane LOS		В	-	F	D		-	
HCM 95th %tile Q(veh))	0.5	-	12.3	0.8	-	-	
Notes								
-: Volume exceeds car	pacity	\$: De	elav exc	eeds 3	00s	+: Com	putation Not Define	d *: All major volume in platoon
	- 3011	ψ. Σ	one		- 50			

Appendix F

2026 Background Traffic Operations Reports



	-	•	•	←	4	-
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	₽		ሻ	↑	Y	
Traffic Volume (vph)	376	36	30	434	143	122
Future Volume (vph)	376	36	30	434	143	122
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)		0.0	60.0		0.0	0.0
Storage Lanes		0	1		1	0
Taper Length (m)			7.5		7.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.988				0.938	
Flt Protected			0.950		0.974	
Satd. Flow (prot)	1791	0	1671	1776	1678	0
Flt Permitted			0.950		0.974	
Satd. Flow (perm)	1791	0	1671	1776	1678	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	290.6			206.6	213.5	
Travel Time (s)	20.9			14.9	15.4	
Confl. Peds. (#/hr)		9	9			
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98
Heavy Vehicles (%)	4%	13%	8%	7%	3%	4%
Adj. Flow (vph)	384	37	31	443	146	124
Shared Lane Traffic (%)						
Lane Group Flow (vph)	421	0	31	443	270	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane	Yes					
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)		15	25		25	15
Sign Control	Free			Free	Stop	
Intersection Summary						
Area Type:	Other					
Castani Tana Hastanaliana						
Control Type: Unsignalized						
Intersection Capacity Utilizat				IC	:U Level o	of Service A

			_			
Intersection						
Int Delay, s/veh	5					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	ĵ.			↑	¥	
Traffic Vol. veh/h	376	36	30	434	143	122
Future Vol. veh/h	376	36	30	434	143	122
Conflicting Peds, #/hr	0	9	9	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	Jiop -	None
Storage Length		INUITE -	600	NONE -	0	INUITE -
Veh in Median Storage		-	-	0	0	
	2, # 0			0	0	
Grade, %		-	-		_	-
Peak Hour Factor	98	98	98	98	98	98
Heavy Vehicles, %	4	13	8	7	3	4
Mvmt Flow	384	37	31	443	146	124
Major/Minor I	Major1		Major2		Minor1	
Conflicting Flow All	0	0	429	0	915	411
Stage 1	-	-	-	-	411	
Stage 2					504	
Critical Hdwy			4.18		6.43	6.24
	-	-	4.10		5.43	0.24
Critical Hdwy Stg 1	-	-				
Critical Hdwy Stg 2	-	-	-	-	5.43	-
Follow-up Hdwy	-	-	2.272		3.527	
Pot Cap-1 Maneuver	-	-	1099	-	302	636
Stage 1	-	-	-	-	667	-
Stage 2	-	-	-	-	605	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1099	-	291	631
Mov Cap-2 Maneuver	-	-	-	-	416	-
Stage 1	-	_	-	_	662	-
Stage 2				-	588	
Stage 2					300	
Approach	EB		WB		NB	
HCM Control Delay, s	0		0.5		20.8	
HCM LOS					С	
		UDL 4	EDT	EDD	WD	WDT
	ו זו	VBLn1	EBT	EBR	WBL	WBT
Minor Lane/Major Mvm	10				1099	-
Capacity (veh/h)		493	-			
Capacity (veh/h) HCM Lane V/C Ratio		0.548	-	-	0.028	-
Capacity (veh/h) HCM Lane V/C Ratio HCM Control Delay (s)		0.548 20.8			0.028 8.4	-
Capacity (veh/h) HCM Lane V/C Ratio HCM Control Delay (s) HCM Lane LOS		0.548 20.8 C	-		0.028	- - -
Capacity (veh/h) HCM Lane V/C Ratio HCM Control Delay (s)		0.548 20.8	-	-	0.028 8.4	-

2: Zecca Drive/Amos Drive & Arkell Road

Lane Group EBL EBT EBR WBL WBT WBR NBL NBT NBR SBL SBT SBR Lane Configurations		۶	→	•	•	←	•	4	†	/	>	ļ	4
Traffic Volume (vph)	Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Future Volume (vph)	Lane Configurations		4			4			4			4	
Ideal Flow (vphph)	Traffic Volume (vph)		478	14	4	414	6	23	1	18		2	28
Lane Util. Factor							-						
Ped Bike Factor Fit													
Fit Protected 0.999		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Fite Protected 0.999 1774 0 0 1695 0 0 1734 0 0 1695 0 0 1734 0 0 1695 0 0 1734 0 0 1695 0 0 1734 0 0 1695 0 0 1734 0 0 1734 0 0 1695 0 0 1734 0 0 0 1734 0 0 1695 0 0 1734 0 0 1734 0 0 1695 0 0 1734 0 0 1734 0 0 1695 0 0 1734 0 0 1695 0 0 1734 0 0 1695 0 0 1734 0 0 1695 0 0 1734 0 0 1695 0 0 1734 0 0 1695 0 0 1734 0 0 1695 0 0 1734 0 0 1695 0 0 1734 0 0 1695 0 0 1734 0 0 1695 0 0 1734 0 0 1695 0 0 1734 0 0 1734 0 0 1734 0 17													
Satd. Flow (prot)						0.998							
Fit Permitted													
Satd. Flow (perm)		0		0	0	1774	0	0		0	0		0
Link Speed (k/h)													
Link Distance (m)		0		0	0		0	0		0	0		0
Travel Time (s)													
Confil Peds. (#/hr)													
Peak Hour Factor			14.9	_	_	18.8			15.8			11.1	
Heavy Vehicles (%)													
Adj. Flow (vph) 7 493 14 4 427 6 24 1 19 28 2 29 Shared Lane Traffic (%) Lane Group Flow (vph) 0 514 0 0 437 0 0 44 0 0 59 0 Enter Blocked Intersection No No <td></td>													
Shared Lane Traffic (%) Lane Group Flow (yph) 0 514 0 0 437 0 0 44 0 0 59 0													
Lane Group Flow (vph)		7	493	14	4	427	6	24	1	19	28	2	29
Enter Blocked Intersection						407							
Lane Alignment Left Left Right Left Right Left Right Left Right Left Right Left Left Right Left Left Right Left Left Left Right Left Left Right Left Left Right Left Left Left Right Left Left Right Left Left Right Left Left Right Left Left <td></td> <td></td> <td></td> <td>-</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>				-									
Median Width(m) 3.6 3.6 0.0 1.00													
Link Offset(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 0.0 0.0 4.8		Left		Right	Left		Right	Left		Right	Left		Right
Crosswalk Width(m)													
Two way Left Turn Lane Headway Factor 1.00													
Headway Factor 1.00			4.8			4.8			4.8			4.8	
Turning Speed (k/h) 25 15 25 15 25 15 25 15 Stop Stop Its <		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Sign Control Free Free Stop Stop Intersection Summary Area Type: Other Control Type: Unsignalized Intersection Capacity Utilization 44.7% ICU Level of Service A			1.00			1.00			1.00			1.00	
Intersection Summary Area Type: Other Control Type: Unsignalized Intersection Capacity Utilization 44.7% ICU Level of Service A		25	F	15	25	F	15	25	Ct	15	25	Ct	15
Area Type: Other Control Type: Unsignalized Intersection Capacity Utilization 44.7% ICU Level of Service A	Sign Control		Free			Free			Stop			Stop	
Control Type: Unsignalized Intersection Capacity Utilization 44.7% ICU Level of Service A	Intersection Summary												
Intersection Capacity Utilization 44.7% ICU Level of Service A	Area Type: C)ther											
	Control Type: Unsignalized												
Analysis Period (min) 15	Intersection Capacity Utilizati	on 44.7%			IC	CU Level	of Service	Α					
	Analysis Period (min) 15												

Intercection												
Intersection	^											
Int Delay, s/veh	2											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		4			4			44			4	
Traffic Vol, veh/h	7	478	14	4	414	6	23	1	18	27	2	28
Future Vol, veh/h	7	478	14	4	414	6	23	1	18	27	2	28
Conflicting Peds, #/hr	1	0	8	8	0	1	13	0	10	10	0	13
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-		-	-
Veh in Median Storage,	# -	0	-	-	0	-	-	0	-		0	-
Grade, %	-	0	-	-	0	-	-	0	-		0	-
Peak Hour Factor	97	97	97	97	97	97	97	97	97	97	97	97
Heavy Vehicles, %	0	5	0	5	7	0	5	0	0	0	0	0
Mvmt Flow	7	493	14	4	427	6	24	1	19	28	2	29
Major/Minor M	laior1			Major2			Minor1		N	/linor2		
Conflicting Flow All	434	0	0	515	0	0	989	964	518	973	969	444
Stage 1	707	J	U	313	U	U	522	522	310	439	439	444
Stage 2							467	442		534	530	
Critical Hdwy	4.1			4.15			7.15	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1				1.10			6.15	5.5	0.2	6.1	5.5	0.2
Critical Hdwy Stg 2		-		-		-	6.15	5.5		6.1	5.5	_
Follow-up Hdwy	2.2			2.245			3.545	4	3.3	3.5	4	3.3
	1136	-	-	1035	-	-	223	257	562	233	256	618
Stage 1	-			-			532	534	-	601	582	-
Stage 2							570	580		534	530	
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1123	-	-	1026	-	-	205	251	553	220	251	611
Mov Cap-2 Maneuver	-	-	-	-	-	-	205	251		220	251	-
Stage 1	-						524	526		595	579	
Stage 2	-	-	-	-	-	-	533	577	-	506	522	-
Approach	FB			WB			NB			SB		
HCM Control Delay, s	0.1			0.1			20.1			18.6		
HCM LOS	0.1			0.1			20.1			C		
TIOM EOG							U			C		
		UDI 6	ED:	EDT	EDD	MIDI	WDT	MDD	CDL C			
Minor Lane/Major Mvmt		VBLn1	EBL	EBT	EBR	WBL	WBT	WBR :				
Capacity (veh/h)		282	1123	-	-	1026	-	-	323			
HCM Carter Dalay (a)		0.154	0.006	-	-	0.004	-		0.182			
HCM Control Delay (s)		20.1	8.2	0	-	8.5	0	-	18.6			
HCM Lane LOS		C	A	Α	-	A	Α	-	C			
HCM 95th %tile Q(veh)		0.5	0	-	-	0	-	-	0.7			

3: Colonial Drive & Arkell Road

Lane Group WBT Lane Configurations Traffic Volume (vph) 441 259 131 0 137 0 32 Future Volume (vph) 11 441 69 41 259 42 131 0 137 131 0 32 Ideal Flow (vphpl) 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 Storage Length (m) 50.0 60.0 0.0 0.0 0.0 0.0 0.0 0.0 Storage Lanes 0 0 0 Taper Length (m) 7.5 7.5 7.5 7.5 Lane Util. 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 Ped Bike Factor Frt 0.980 0.931 0.973 Flt Protected 0.950 0.950 0.976 0.961 Satd. Flow (prot) 1770 1703 1622 1742 1783 1736 Flt Permitted 0.950 0.950 0.976 0.961 Satd. Flow (perm) 1770 1783 1703 1736 1622 1742 Link Speed (k/h) 50 50 50 50 Link Distance (m) 193.8 261.6 209.6 91.7 Travel Time (s) 18.8 14.0 15.1 6.6 Confl. Peds. (#/hr) 0.92 0.92 0.92 Peak Hour Factor 0.92 0.92 0.92 0.92 0.92 0.92 0.92 0.92 0.92 Heavy Vehicles (%) 2% 7% 6% 8% 2% 2% 4% 2% 2% 2% Adj. Flow (vph) 12 479 282 142 149 142 75 45 46 0 0 35 Shared Lane Traffic (%) Lane Group Flow (vph) 12 554 0 45 328 291 0 177 0 0 0 0 Enter Blocked Intersection No No No No No No No Lane Alignment Left Left Right Right Right Right Left Left Left Left Left Left Median Width(m) 3.6 3.6 0.0 0.0 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 Headway Factor 1.00 1.00 1.00 1.00 1.00 1.00 Turning Speed (k/h) 25 15 Sign Control Free Free Stop Intersection Summary Area Type: Other Control Type: Unsignalized Intersection Capacity Utilization 56.1% ICU Level of Service B Analysis Period (min) 15

Movement Sel													
Movement EBL EBT EBR WBL WBR WBR NBL NBT NBR SBL SBR SBR Cane Configurations Tarffic Vol, veh/h 11 441 69 41 259 42 131 0 137 131 0 32 20nflicting Peds, #hr 0 0 0 11 11 0 0 0 0	Intersection	0-											
Carne Configurations	Int Delay, s/veh	32											
Traffic Vol, veh/h	Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Future Vol, veh/h Future Vol, veh/h O 0 11 11 1441 69 41 259 42 131 0 137 131 0 32 Conflicting Peds, #/hr O 0 0 11 11 10 0 0 0 0 1 1 0 0 0 0 Sign Control Free Free Free Free Free Free Free Fre	Lane Configurations	ሻ	1>		7	ĵ.			4			4	
Conflicting Peds, #/hr Pree Free Stop Sto	Traffic Vol, veh/h	11	441	69	41	259	42	131	0	137	131	0	32
Sign Control Free RTPRENT FROM TOWN TOWN TOWN TOWN TOWN TOWN TOWN TOWN	Future Vol, veh/h	11	441	69	41	259	42	131	0	137	131	0	32
None	Conflicting Peds, #/hr	0	0	11	11	0	0	0	0	1	0	0	0
None	Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
Veh in Median Storage, # - 0	RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Zeh in Median Storage, # 0 - 2 3 3 3 3 3 3 3 3 3 3 3 3 </td <td>Storage Length</td> <td>500</td> <td>-</td> <td>-</td> <td>600</td> <td></td> <td>-</td> <td></td> <td>-</td> <td>-</td> <td></td> <td></td> <td>-</td>	Storage Length	500	-	-	600		-		-	-			-
Grade, % - 0 - 0 - 0 - 0 - 0 - 0 - 0 - 0 - 0 -		e,# -	0	-	-	0	-	-	0	-	-	0	-
Heavy Vehicles, % 2 4 7 6 8 2 9 2 4 2 2 2 2 2 2 2 2	Grade, %		0	-		0	-		0	-		0	-
Major Minor Major Major Minor Mino	Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Major Majo	Heavy Vehicles, %	2	4	7	6	8	2	9	2	4	2	2	2
Stage 1	Mymt Flow	12	479	75	45	282	46	142	0	149	142	0	35
Stage 1													
Stage 1	Major/Minor	Major1		,	Major?			Minor1			Minor		
Stage 1			0			^			040			002	204
Stage 2		321		U	202					529			304
Critical Hdwy 4.12 - 4.16 - 7.19 6.52 6.24 7.12 6.52 6.22 Critical Hdwy Stg 1 - 6 - 6.19 5.52 6.22 7.11 Call Hdwy Stg 1 - 6 - 6.19 5.52 6.22 7.11 Call Hdwy Stg 1 - 6 - 6.19 5.52 6.22 6.12 5.52 7.11 Call Hdwy Stg 2 - 6.12 5.52 7.11 Call Hdwy Stg 2 7.11 Call Hdwy Stg 2 7.12 5.11 Call Hdwy Stg 2 7.11 Call Hdwy Stg 3 7.12 7.11 Call Hdwy Stg 3 7.11 7.11 Call Hdwy Stg 3 7.11 7.11 7.11 7.11 7.11 7.11 7.11 7.		-		-	-					-			-
Critical Hdwy Stg 1 6.19 5.52 - 6.12 5.52 - Critical Hdwy Stg 2 6.19 5.52 - 6.12 5.52 - Critical Hdwy Stg 2 6.19 5.52 - 6.12 5.52 - Collow-up Hdwy 2.218 2.254 3.581 4.018 3.316 3.518 4.018 3.18 6.00				-	- 4.17		-						
Critical Hdwy Stg 2				-			-						
Follow-up Hdwy 2.218 - 2.254 - 3.581 4.018 3.336 3.518 4.018 3.318 20t Cap-1 Maneuver 1233 - 987 - 228 254 546 219 249 736 Stage 1 - 5 - 5 - 506 515 - 632 606 - Stage 2 - 6 - 604 592 - 478 495 - 2010 tool blocked, % - 7 - 7 - 7 - 7 - 7 - 7 - 7 - 7 - 7 -		-	-	-			-			-			-
Pot Cap-1 Maneuver 1233 - 987 - 228 254 546 219 249 736 Stage 1 - - - - 506 515 - 632 606 - Platoon blocked, % - - - - - - 604 592 - 478 495 - Mov Cap-1 Maneuver 1233 - 986 - 206 238 540 152 233 736 Mov Cap-2 Maneuver - - - - 206 238 540 152 233 736 Stage 1 - - - - 206 238 540 152 233 - 85 - 206 238 - 152 233 - 85 - 206 238 - 152 233 - 85 - 549 565 - 343 486 - -		- 0.010	-	-	- 0.054		-			- 0.007			- 0.10
Stage 1 - - - - 506 515 - 632 606 - Stage 2 - - - - 604 592 478 495 - Platoon blocked, % -<			-	-									
Stage 2		1233	-	-	987								/36
Palatoon blocked, % dov Cap-1 Maneuver 1233 - 986 - 206 238 540 152 233 736 Mov Cap-2 Maneuver 206 238 540 152 233 736 Mov Cap-2 Maneuver 206 238 540 152 233 736 Mov Cap-2 Maneuver 206 238 540 152 233 736 Mov Cap-2 Maneuver 206 238 540 152 233 736 Mov Cap-2 Maneuver 206 238 540 152 233 736 Mov Cap-2 Move Cap-2		-	-	-	-		-						-
Mov Cap-1 Maneuver 1233 - 986 - 206 238 540 152 233 736 Mov Cap-2 Maneuver - - - - 206 238 - 152 233 - Stage 1 - - - - - 496 505 - 626 578 - Stage 2 - - - - - 549 565 - 343 486 - Approach EB WB NB SB SB - <td></td> <td>-</td> <td>-</td> <td>-</td> <td>-</td> <td></td> <td>-</td> <td>604</td> <td>592</td> <td>-</td> <td>478</td> <td>495</td> <td>-</td>		-	-	-	-		-	604	592	-	478	495	-
Mov Cap-2 Maneuver			-	-									
Stage 1			-	-									
Stage 2		-	-	-	-	-	-			-			-
Approach EB WB NB SB		-	-	-	-	-	-			-			-
CM Control Delay, s 0.2 1.1 82.2 115.7	Stage 2	-	-	-	-	-	-	549	565	-	343	486	-
CM Control Delay, s 0.2 1.1 82.2 115.7													
CM Control Delay, s 0.2 1.1 82.2 115.7	Approach	EB			WB			NB			SB		
F F F F		0.2			1.1			82.2			115.7		
### Allow Control Delay (s) F A - A - F ### Allow Canacity (veh/h) 301 1233 - 986 - 180 ### Allow Control Delay (s) 82.2 7.9 - 8.8 - 115.7 ### Allow Control Delay (s) F A - A - F	HCM LOS	0.2											
Capacity (veh/h) 301 1233 - - 986 - - 180 HCM Lane V/C Ratio 0.968 0.01 - - 0.045 - - 0.984 HCM Control Delay (s) 82.2 7.9 - 8.8 - 115.7 HCM Lane LOS F A - A - F	1101111200												
Capacity (veh/h) 301 1233 - - 986 - - 180 HCM Lane V/C Ratio 0.968 0.01 - - 0.045 - - 0.984 HCM Control Delay (s) 82.2 7.9 - 8.8 - 115.7 HCM Lane LOS F A - A - F			NIDL 4	EDI	EDT	EDD	WDI	MOT	WDD	CDL 4			
1CM Lane V/C Ratio 0.968 0.01 0.045 0.984 1CM Control Delay (s) 82.2 7.9 - 8.8 115.7 1CM Lane LOS F A - A - F		nt							WBR				
HCM Control Delay (s) 82.2 7.9 - 8.8 - 115.7 HCM Lane LOS F A - A - F									-				
HCM Lane LOS F A A F					-			-	-				
· · · · · · · · · · · · · · · · · · ·	, , ,)			-			-	-				
HCM 95th %tile Q(veh) 9.9 0 0.1 8	HCM Lane LOS				-	-		-	-				
	HCM 95th %tile Q(veh	1)	9.9	0	-	-	0.1	-	-	8			

4: Residential Entrance/Access 1 & Arkell Road

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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	ሻ	ĵ.			4			4		ሻ		7
Traffic Volume (vph)	83	625	2	2	310	62	2	0	2	6	0	31
Future Volume (vph)	83	625	2	2	310	62	2	0	2	6	0	31
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	25.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	0		0	0		0	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. 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
Frt					0.978			0.932				0.850
Flt Protected	0.950							0.976		0.950		
Satd. Flow (prot)	1805	1827	0	0	1742	0	0	1728	0	1805	0	1615
Flt Permitted	0.950							0.976		0.950		
Satd. Flow (perm)	1805	1827	0	0	1742	0	0	1728	0	1805	0	1615
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		193.8			144.3			68.0			96.7	
Travel Time (s)		14.0			10.4			4.9			7.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	4%	0%	0%	8%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	90	679	2	2	337	67	2	0	2	7	0	34
Shared Lane Traffic (%)												
Lane Group Flow (vph)	90	681	0	0	406	0	0	4	0	7	0	34
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)		3.6			3.6			3.6			3.6	
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												
Headway 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
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Free			Free			Stop			Stop	
Intersection Summary												
	Other											
Control Type: Unsignalized												
Intersection Capacity Utilizat	ion 66.5%			IC	CU Level	of Service	С					
Analysis Period (min) 15												

Intersection												
Int Delay, s/veh	1.2											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	*	ĵ.			44			4		*		7
Traffic Vol, veh/h	83	625	2	2	310	62	2	0	2	6	0	31
Future Vol, veh/h	83	625	2	2	310	62	2	0	2	6	0	31
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	250		-			-	-		-	0		0
Veh in Median Storage	.# -	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	0	4	0	0	8	0	0	0	0	0	0	0
Mvmt Flow	90	679	2	2	337	67	2	0	2	7	0	34
Major/Minor N	/lajor1		N	Najor2			Vinor1		ı	Minor2		
Conflicting Flow All	404	0	0	682	0	0	1236	1270	680	1237	-	371
Stage 1			-			-	861	861	-	375		-
Stage 2							375	409		862		
Critical Hdwy	4.1		-	4.1			7.1	6.5	6.2	7.1		6.2
Critical Hdwy Stg 1							6.1	5.5	-	6.1		
Critical Hdwy Stg 2			-				6.1	5.5		6.1		
Follow-up Hdwy	2.2			2.2			3.5	4	3.3	3.5		3.3
Pot Cap-1 Maneuver	1166		-	920			154	170	454	154	0	679
Stage 1	-			-			353	375	-	650	0	-
Stage 2							650	600		353	0	
Platoon blocked, %								-000				
Mov Cap-1 Maneuver	1166	-	-	920	-	-	137	156	454	144	-	679
Mov Cap-2 Maneuver	-			-			137	156	-	144		-
Stage 1							326	346	-	600		
Stage 2							616	598		324		
							2.5	2.0				
Approach	EB			WB			NB			SB		
HCM Control Delay, s	1			0			22.5			13.9		
HCM LOS							С			В		
Minor Lane/Major Mvm	t I	VBLn1	EBL	EBT	EBR	WBL	WBT	WBR :	SBLn1 S	SBLn2		
Capacity (veh/h)		210	1166	-	-	920			144	679		
HCM Lane V/C Ratio		0.021	0.077			0.002			0.045	0.05		
HCM Control Delay (s)		22.5	8.3	-		8.9	0		31.2	10.6		
HCM Lane LOS		C	A			A	A		D	В		
HCM 95th %tile Q(veh)		0.1	0.3			0	-		0.1	0.2		
/ 0 / 0 0 2(4011)		0.1	0.0						0.1	0.2		

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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	ሻ	î,		ሻ	ĵ.		ሻ	î,		ሻ	î,	
Traffic Volume (vph)	431	118	81	173	103	76	62	741	97	56	638	214
Future Volume (vph)	431	118	81	173	103	76	62	741	97	56	638	214
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	40.0		0.0	20.0		0.0	90.0		0.0	50.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. 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
Ped Bike Factor	1.00				0.99		1.00				0.99	
Frt		0.939			0.936			0.983			0.962	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1736	1679	0	1787	1696	0	1805	1762	0	1752	1670	0
Flt Permitted	0.571			0.515			0.132			0.138		
Satd. Flow (perm)	1042	1679	0	969	1696	0	251	1762	0	255	1670	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		41			45			9			23	
Link Speed (k/h)		50			60			70			70	
Link Distance (m)		144.3			357.4			823.5			155.4	
Travel Time (s)		10.4			21.4			42.4			8.0	
Confl. Peds. (#/hr)	1					1	3					3
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles (%)	4%	3%	11%	1%	3%	5%	0%	6%	6%	3%	8%	11%
Adj. Flow (vph)	474	130	89	190	113	84	68	814	107	62	701	235
Shared Lane Traffic (%)												
Lane Group Flow (vph)	474	219	0	190	197	0	68	921	0	62	936	0
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)		3.6			3.6			3.6			3.6	
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												
Headway 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
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	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	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	CI+Ex	CI+Ex		CI+Ex	CI+Ex		CI+Ex	CI+Ex		CI+Ex	CI+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	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	
Detector 1 Delay (s)	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		CI+Ex			CI+Ex			CI+Ex			CI+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBF
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Detector Phase	7	4		3	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0		7.0	10.0		7.0	10.0	
Minimum Split (s)	10.0	26.0		10.0	26.0		10.0	34.0		10.0	34.0	
Total Split (s)	10.0	26.0		10.0	26.0		10.0	34.0		10.0	34.0	
Total Split (%)	12.5%	32.5%		12.5%	32.5%		12.5%	42.5%		12.5%	42.5%	
Maximum Green (s)	7.0	20.0		7.0	20.0		7.0	28.0		7.0	28.0	
Yellow Time (s)	3.0	4.0		3.0	4.0		3.0	4.0		3.0	4.0	
All-Red Time (s)	0.0	2.0		0.0	2.0		0.0	2.0		0.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	3.0	6.0		3.0	6.0		3.0	6.0		3.0	6.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	None		None	None	
Walk Time (s)		7.0			7.0			13.0			13.0	
Flash Dont Walk (s)		13.0			13.0			15.0			15.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)	23.1	13.0		23.1	13.0		37.4	30.4		36.8	28.4	
Actuated g/C Ratio	0.32	0.18		0.32	0.18		0.52	0.43		0.52	0.40	
v/c Ratio	1.17	0.65		0.48	0.57		0.24	1.22		0.22	1.38	
Control Delay	123.3	31.4		21.2	27.4		10.8	134.4		10.6	204.0	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	123.3	31.4		21.2	27.4		10.8	134.4		10.6	204.0	
LOS	F	С		С	С		В	F		В	F	
Approach Delay		94.2			24.3			125.9			192.0	
Approach LOS		F			С			F			F	
Intersection Summary												
Area Type:	Other											
Cycle Length: 80												
Actuated Cycle Length: 71	.3											
Natural Cycle: 150												
Control Type: Actuated-Ur	coordinated											
Maximum v/c Ratio: 1.38												
Intersection Signal Delay:	127.4			In	tersection	LOS: F						
Intersection Capacity Utilization 99.1%				ICU Level of Service F								
Analysis Period (min) 15												
Splits and Phases: 5: Vi	ctoria Road	8. Arkall D	nad									
Spiils and Friases. 5. VI	CIUIIA RUAU	a Aireii K	.uau			_						
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Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	474	219	190	197	68	921	62	936
v/c Ratio	1.17	0.65	0.48	0.57	0.24	1.22	0.22	1.38
Control Delay	123.3	31.4	21.2	27.4	10.8	134.4	10.6	204.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	123.3	31.4	21.2	27.4	10.8	134.4	10.6	204.0
Queue Length 50th (m)	~74.7	24.0	19.4	20.0	4.1	~179.7	3.7	~187.4
Queue Length 95th (m)	#141.2	45.2	33.9	39.4	11.3	#279.2	10.6	#287.5
Internal Link Dist (m)		120.3		333.4		799.5		131.4
Turn Bay Length (m)	40.0		20.0		90.0		50.0	
Base Capacity (vph)	406	506	395	514	286	756	280	678
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.17	0.43	0.48	0.38	0.24	1.22	0.22	1.38

5:	Victoria	Road &	Arkell Ro	ad	

HCM 2010 Signalized Intersection Summary

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	ሻ	ĵ.		ሻ	ĵ.		7	ĵ.		٦	î,	
Traffic Volume (veh/h)	431	118	81	173	103	76	62	741	97	56	638	214
Future Volume (veh/h)	431	118	81	173	103	76	62	741	97	56	638	214
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	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 Sat Flow, veh/h/ln	1827	1788	1900	1881	1830	1900	1900	1792	1900	1845	1747	1900
Adj Flow Rate, veh/h	474	130	89	190	113	84	68	814	107	62	701	235
Adj No. of Lanes	1	1	0	1	1	0	1	1	0	1	1	0
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Percent Heavy Veh, %	4	3	3	1	3	3	0	6	6	3	8	8
Cap, veh/h	358	179	123	345	177	131	233	617	81	224	493	165
Arrive On Green	0.10	0.18	0.18	0.10	0.18	0.18	0.07	0.40	0.40	0.07	0.39	0.39
Sat Flow, veh/h	1740	989	677	1792	975	725	1810	1552	204	1757	1252	420
Grp Volume(v), veh/h	474	0	219	190	0	197	68	0	921	62	0	936
Grp Sat Flow(s),veh/h/ln	1740	0	1666	1792	0	1699	1810	0	1756	1757	0	1671
Q Serve(g_s), s	7.0	0.0	8.8	6.1	0.0	7.6	1.5	0.0	28.2	1.4	0.0	28.0
Cycle Q Clear(g_c), s	7.0	0.0	8.8	6.1	0.0	7.6	1.5	0.0	28.2	1.4	0.0	28.0
Prop In Lane	1.00		0.41	1.00		0.43	1.00		0.12	1.00		0.25
Lane Grp Cap(c), veh/h	358	0	302	345	0	308	233	0	698	224	0	659
V/C Ratio(X)	1.32	0.00	0.73	0.55	0.00	0.64	0.29	0.00	1.32	0.28	0.00	1.42
Avail Cap(c_a), veh/h	358	0	469	345	0	478	280	0	698	274	0	659
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	27.1	0.0	27.4	21.3	0.0	26.9	16.0	0.0	21.4	16.1	0.0	21.5
Incr Delay (d2), s/veh	163.8	0.0	3.3	1.9	0.0	2.2	0.7	0.0	154.1	0.7	0.0	198.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	22.0	0.0	4.3	3.2	0.0	3.7	0.8	0.0	43.4	0.7	0.0	49.1
LnGrp Delay(d),s/veh	190.9	0.0	30.7	23.1	0.0	29.1	16.7	0.0	175.5	16.8	0.0	219.9
LnGrp LOS	F		С	С		С	В		F	В		F
Approach Vol, veh/h		693			387			989			998	
Approach Delay, s/veh		140.2			26.2			164.6			207.2	
Approach LOS		F			С			F			F	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	7.9	34.2	10.0	18.9	8.2	34.0	10.0	18.9				
Change Period (Y+Rc), s	3.0	6.0	3.0	6.0	3.0	6.0	3.0	6.0				
Max Green Setting (Gmax), s	7.0	28.0	7.0	20.0	7.0	28.0	7.0	20.0				
Max Q Clear Time (g_c+I1), s	3.4	30.2	8.1	10.8	3.5	30.0	9.0	9.6				
Green Ext Time (p_c), s	0.0	0.0	0.0	1.9	0.0	0.0	0.0	2.1				
Intersection Summary												
HCM 2010 Ctrl Delay			155.5									
HCM 2010 LOS			F									

intersection Summary	
HCM 2010 Ctrl Delay	155.5
HCM 2010 LOS	F

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.

07-24-2018

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Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	ሻ	7	ኘ	<u>↑</u>	<u> </u>	7
Traffic Volume (vph)	96	58	53	1195	840	133
Future Volume (vph)	96	58	53	1195	840	133
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	0.0	30.0	1700	1700	60.0
Storage Lanes	1	1	30.0			1
Taper Length (m)	7.5	- 1	7.5			- 1
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Earle Util. Factor	1.00	0.850	1.00	1.00	1.00	0.850
Flt Protected	0.950	0.650	0.950			0.000
	1805	141F	1805	1702	1750	1615
Satd. Flow (prot)		1615		1792	1759	1015
FIt Permitted	0.950	1/15	0.237	1700	1750	1/15
Satd. Flow (perm)	1805	1615	450	1792	1759	1615
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		63				145
Link Speed (k/h)	50			70	70	
Link Distance (m)	97.9			155.4	308.2	
Travel Time (s)	7.0			8.0	15.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	6%	8%	0%
Adj. Flow (vph)	104	63	58	1299	913	145
Shared Lane Traffic (%)						
Lane Group Flow (vph)	104	63	58	1299	913	145
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6	rtigilt	LUIT	3.6	3.6	rtigill
Link Offset(m)	0.0			0.0	0.0	
. ,	4.8			4.8	4.8	
Crosswalk Width(m)	4.0			4.0	4.0	
Two way Left Turn Lane	1.00	1.00	1.00	1.00	1.00	1.00
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15	25			15
Number of Detectors	1	1	1	2	_ 2	1
Detector Template	Left	Right	Left	Thru	Thru	Right
Leading Detector (m)	2.0	2.0	2.0	10.0	10.0	2.0
Trailing Detector (m)	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
Detector 1 Size(m)	2.0	2.0	2.0	0.6	0.6	2.0
Detector 1 Type	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex
Detector 1 Channel						
Detector 1 Extend (s)	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
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)	0.0	0.0	0.0	9.4	9.4	0.0
Detector 2 Size(m)				0.6	0.6	
Detector 2 Type				CI+Ex	CI+Ex	
Detector 2 Channel						
Detector 2 Extend (s)		_	_	0.0	0.0	_
Turn Type	Prot	Perm	Perm	NA	NA	Perm
Protected Phases	4			2	6	

	۶	•	4	†	↓	4
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Permitted Phases		4	2			6
Detector Phase	4	4	2	2	6	6
Switch Phase						
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	24.0	24.0	24.0	24.0	24.0	24.0
Total Split (s)	24.0	24.0	56.0	56.0	56.0	56.0
Total Split (%)	30.0%	30.0%	70.0%	70.0%	70.0%	70.0%
Maximum Green (s)	18.0	18.0	50.0	50.0	50.0	50.0
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	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
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	Max	Max	Max	Max
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	7.0
Flash Dont Walk (s)	11.0	11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0	0	0	0	0
Act Effct Green (s)	10.8	10.8	56.9	56.9	56.9	56.9
Actuated g/C Ratio	0.14	0.14	0.76	0.76	0.76	0.76
v/c Ratio	0.40	0.22	0.17	0.96	0.69	0.12
Control Delay	33.9	9.9	5.8	30.4	10.5	1.1
Queue Delay	0.0	0.0	0.0	17.0	0.0	0.0
Total Delay	33.9	9.9	5.8	47.4	10.5	1.1
LOS	С	Α	A	D	В	Α
Approach Delay	24.9			45.6	9.2	
Approach LOS	С			D	Α	
Intersection Summary						
Area Type:	Other					
Cycle Length: 80						
Actuated Cycle Length: 75	5.1					
Natural Cycle: 100						
Control Type: Semi Act-U	ncoord					
Maximum v/c Ratio: 0.96						
Intersection Signal Delay:				li	ntersectio	n LOS: C
Intersection Capacity Utiliz	zation 81.2%)		10	CU Level	of Service
Analysis Period (min) 15						
	ictoria Road	& Access	5 2			
≪ †						



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Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	104	63	58	1299	913	145
v/c Ratio	0.40	0.22	0.17	0.96	0.69	0.12
Control Delay	33.9	9.9	5.8	30.4	10.5	1.1
Queue Delay	0.0	0.0	0.0	17.0	0.0	0.0
Total Delay	33.9	9.9	5.8	47.4	10.5	1.1
Queue Length 50th (m)	14.1	0.0	2.4	~207.9	67.7	0.0
Queue Length 95th (m)	27.7	9.8	7.9	#297.7	134.8	5.0
Internal Link Dist (m)	73.9			131.4	284.2	
Turn Bay Length (m)			30.0			60.0
Base Capacity (vph)	433	435	340	1358	1332	1258
Starvation Cap Reductn	0	0	0	101	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.24	0.14	0.17	1.03	0.69	0.12

	<u> </u>	_	•	†	1	1
		▼			♥ CDT	
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations		7		+	+	7
Traffic Volume (veh/h)	96	58	53	1195	840	133
Future Volume (veh/h)	96	58	53	1195	840	133
Number	7	14	5	2	6	16
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1900	1900	1792	1759	1900
Adj Flow Rate, veh/h	104	63	58	1299	913	145
Adj No. of Lanes	1	1	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	0	0	0	6	8	0
Cap, veh/h	243	217	302	1251	1228	1127
Arrive On Green	0.13	0.13	0.70	0.70	0.70	0.70
Sat Flow, veh/h	1810	1615	542	1792	1759	1615
Grp Volume(v), veh/h	104	63	58	1299	913	145
Grp Sat Flow(s), veh/h/ln	1810	1615	542	1792	1759	1615
Q Serve(g_s), s	3.8	2.5	5.4	50.0	23.3	2.1
	3.8	2.5	28.7	50.0	23.3	2.1
Cycle Q Clear(g_c), s				50.0	23.3	
Prop In Lane	1.00	1.00	1.00	4054	4000	1.00
Lane Grp Cap(c), veh/h	243	217	302	1251	1228	1127
V/C Ratio(X)	0.43	0.29	0.19	1.04	0.74	0.13
Avail Cap(c_a), veh/h	455	406	302	1251	1228	1127
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	28.5	27.9	15.8	10.8	6.8	3.6
Incr Delay (d2), s/veh	1.2	0.7	1.4	36.0	4.1	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.0	1.2	0.9	36.5	12.6	1.0
LnGrp Delay(d),s/veh	29.7	28.6	17.2	46.8	10.9	3.8
LnGrp LOS	С	С	В	F	В	Α
Approach Vol, veh/h	167			1357	1058	
Approach Delay, s/veh	29.3			45.5	9.9	
Approach LOS	C C			D	Α.,	
Approach EOS						
Timer	1	2	3	4	5	6
Assigned Phs		2		4		6
Phs Duration (G+Y+Rc), s		56.0		15.6		56.0
Change Period (Y+Rc), s		6.0		6.0		6.0
Max Green Setting (Gmax), s		50.0		18.0		50.0
Max Q Clear Time (q_c+I1), s		52.0		5.8		25.3
Green Ext Time (p_c), s		0.0		0.5		22.1
Intersection Summary						
			29.9			
HCM 2010 Ctrl Delay						
HCM 2010 LOS			С			

Assigned Phs	2	4	6	
Phs Duration (G+Y+Rc), s	56.0	15.6	56.0	
Change Period (Y+Rc), s	6.0	6.0	6.0	
Max Green Setting (Gmax), s	50.0	18.0	50.0	
Max Q Clear Time (g_c+I1), s	52.0	5.8	25.3	
Green Ext Time (p_c), s	0.0	0.5	22.1	

intersection Summary	
HCM 2010 Ctrl Delay	29.9
HCM 2010 LOS	С

HCM 2010 Signalized Intersection Summary

6: Victoria Road & Access 2

Volume exceeds capacity, queue is theoretically infinite.
 Oueue shown is maximum after two cycles.

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

7: Victoria Road & Victoria Park Village Road

	•	•	4	†	↓	4
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	ሻ	7	ሻ	↑	f)	
Traffic Volume (vph)	162	52	17	1274	921	52
Future Volume (vph)	162	52	17	1274	921	52
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	20.0	0.0	30.0			0.0
Storage Lanes	1	1	1			0
Taper Length (m)	7.5		7.5			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850			0.993	
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1770	1583	1770	1863	1850	0
Flt Permitted	0.950		0.950			
Satd. Flow (perm)	1770	1583	1770	1863	1850	0
Link Speed (k/h)	50			50	70	
Link Distance (m)	325.8			308.2	342.0	
Travel Time (s)	23.5			22.2	17.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	176	57	18	1385	1001	57
Shared Lane Traffic (%)						
Lane Group Flow (vph)	176	57	18	1385	1058	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	3.6	Ü
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	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15	25			15
Sign Control	Stop			Free	Free	
Intersection Summary						
Area Type:	Other					
Control Type: Unsignalized						
Intersection Capacity Utilizat						
	tion 82.7%			IC	CU Level	of Service E

ntersection								
nt Delay, s/veh	143.8							
Movement	EBL	EBR	NBL	NBT	SBT	SBR		
ane Configurations	ሻ	7	ሻ	†	7>	ODIT		
Fraffic Vol, veh/h	162	52	17	1274	921	52		
uture Vol. veh/h	162	52	17	1274	921	52		
Conflicting Peds, #/hr	0	0	0	0	0	0		
Sign Control	Stop	Stop	Free	Free	Free	Free		
RT Channelized	-	None		None	-	None		
Storage Length	200	0	300	-		-		
eh in Median Storage	e, # 0	-	-	0	0	-		
Grade, %	0		-	0	0	-		
Peak Hour Factor	92	92	92	92	92	92		
Heavy Vehicles, %	2	2	2	2	2	2		
Nymt Flow	176	57	18	1385	1001	57		
Major/Minor I	Minor2		Major1		Major2			
Conflicting Flow All	2451	1029	1058	0	viajui z -	0		
Stage 1	1029	1029	1008	0	-	U		
Stage 2	1422							
Critical Hdwy	6.42	6.22	4.12			-		
Critical Hdwy Stg 1	5.42	0.22	4.12					
Critical Hdwy Stg 2	5.42							
ollow-up Hdwy	3.518	3.318	2 219					
Pot Cap-1 Maneuver	~ 34	284	658					
Stage 1	345	204	000					
Stage 2	223							
Platoon blocked, %	223							
Mov Cap-1 Maneuver	~ 33	284	658					
Mov Cap-1 Maneuver	~ 33	204	000					
Stage 1	345							
Stage 2	217							
Stage 2	217							
Approach	EB		NB		SB			
HCM Control Delay, s			0.1		0			
ICM LOS	\$ 1004 F		0.1		U			
IOW EOS								
liner Lane/Major Marin		ND	NDT	TDI n1	EDI 52	CDT	CDD	
Minor Lane/Major Mvm	IL	NBL	INRII	EBLn1		SBT	SBR	
Capacity (veh/h)		658	-	33 5.336	284	-	-	
HCM Cantrol Dolay (s)		0.028		2191.4	20.8	-	-	
HCM Control Delay (s)			\$ 4	2191.4 F				
HCM Lane LOS	١	0.1		21	0.7		-	
HCM 95th %tile Q(veh))	U. I	-	21	U. /	-	-	
lotes								
-: Volume exceeds car	nacity	\$: De	elay exc	eeds 3	00s	+: Com	putation Not Defined	*: All major volume in platoon

	-	•	•	←	•	/
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	f _a		ሻ	^	¥	
Traffic Volume (vph)	491	153	88	420	73	45
Future Volume (vph)	491	153	88	420	73	45
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)		0.0	60.0		0.0	0.0
Storage Lanes		0	1		1	0
Taper Length (m)			7.5		7.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.968				0.948	
Flt Protected			0.950		0.970	
Satd. Flow (prot)	1812	0	1805	1881	1747	0
Flt Permitted			0.950		0.970	
Satd. Flow (perm)	1812	0	1805	1881	1747	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	290.6			206.6	213.5	
Travel Time (s)	20.9			14.9	15.4	
Confl. Peds. (#/hr)		3	3			1
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	1%	3%	0%	1%	0%	0%
Adj. Flow (vph)	511	159	92	438	76	47
Shared Lane Traffic (%)						
Lane Group Flow (vph)	670	0	92	438	123	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane	Yes					
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)		15	25		25	15
Sign Control	Free			Free	Stop	
Intersection Summary						
Area Type:						
Control Type, Ungignalized	Other					
Control Type: Unsignalized	Other					
Intersection Capacity Utiliza				IC	CU Level o	of Service E

Intersection						
Int Delay, s/veh	2.5					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	₽		ሻ	↑	¥	
Traffic Vol, veh/h	491	153	88	420	73	45
Future Vol. veh/h	491	153	88	420	73	45
Conflicting Peds, #/hr	0	3	3	0	0	1
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None		None	-	None
Storage Length			600	-	0	
Veh in Median Storage	# 0	-	-	0	0	-
Grade, %	0	-		0	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	1	3	0	1	0	0
Mymt Flow	511	159	92	438	76	47
	011	107	,_	100	, 0	
	/lajor1		Major2		Vinor1	
Conflicting Flow All	0	0	674	0	1215	595
Stage 1	-	-	-	-	594	-
Stage 2	-	-	-	-	621	-
Critical Hdwy	-	-	4.1	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	927	-	202	508
Stage 1	-	-	-	-	555	-
Stage 2	-	-	-	-	540	-
Platoon blocked, %		-		-		
Mov Cap-1 Maneuver		-	926	-	181	506
Mov Cap-2 Maneuver				-	318	
Stage 1					554	
Stage 2					486	
Stage 2					400	
Approach	EB		WB		NB	
HCM Control Delay, s	0		1.6		19.5	
HCM LOS					С	
N.C		IDI 1	EDT	EDD	WDI	MOT
Minor Lane/Major Mvm	l I	VBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)		370	-	-	926	-
HCM Lane V/C Ratio		0.332	-	-	0.099	-
HCM Control Delay (s)		19.5	-	-	9.3	-
HCM Lane LOS		С	-	-	Α	-
HCM 95th %tile Q(veh)		1.4	-	-	0.3	-

2: Zecca Drive/Amos Drive & Arkell Road

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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		4			4			4			4	
Traffic Volume (vph)	40	465	32	7	469	13	18	0	4	8	1	22
Future Volume (vph)	40	465	32	7	469	13	18	0	4	8	1	22
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. 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
Ped Bike Factor												
Frt		0.992			0.996			0.977			0.903	
Flt Protected		0.996			0.999			0.960			0.988	
Satd. Flow (prot)	0	1861	0	0	1873	0	0	1782	0	0	1695	0
Flt Permitted		0.996			0.999			0.960			0.988	
Satd. Flow (perm)	0	1861	0	0	1873	0	0	1782	0	0	1695	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		206.6			261.6			219.2			154.5	
Travel Time (s)		14.9			18.8			15.8			11.1	
Confl. Peds. (#/hr)			9	9			7		7	7		7
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	0%	1%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	42	489	34	7	494	14	19	0	4	8	1	23
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	565	0	0	515	0	0	23	0	0	32	0
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)		3.6			3.6			0.0			0.0	
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	4.00	4.00		4.00	4.00		4.00	4.00		4.00	4.00	4.00
Headway 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
Turning Speed (k/h)	25	_	15	25	_	15	25		15	25		15
Sign Control		Free			Free			Stop			Stop	
Intersection Summary												
	ther											
Control Type: Unsignalized												
Intersection Capacity Utilizati	on 62.4%			IC	CU Level	of Service	B B					
Analysis Period (min) 15												

Int Delay, s/veh	1.4											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	LDL	4	LDIN	WDL	4	WDIX	INDL	4	NDIX	JUL	- 3B1	JUIN
	40		22	7		10	10			0		22
Traffic Vol, veh/h	40	465	32	7	469	13	18	0	4	8	1	22
Future Vol, veh/h	40	465	32	7	469	13	18	0	4	8	1	22
Conflicting Peds, #/hr	0	0	- 9	9	0	0	7	0	7	7	0	7
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage	,# -	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	0	1	0	0	1	0	0	0	0	0	0	0
Mvmt Flow	42	489	34	7	494	14	19	0	4	8	1	23
Major/Minor N	Major1		1	Major2		N	/linor1		ı	/linor2		
Conflicting Flow All	507	0	0	532	0	0	1134	1122	522	1115	1131	508
Stage 1	-	-	-		-	-	600	600	-	515	515	-
Stage 2							534	522		600	616	
Critical Hdwy	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1							6.1	5.5	0.2	6.1	5.5	0.2
Critical Hdwy Stg 2							6.1	5.5		6.1	5.5	
Follow-up Hdwy	2.2			2.2			3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1068			1046			181	208	559	187	205	569
Stage 1	1000			1040			491	493	559	546	538	309
Stage 2			-				534	534		491	485	-
Platoon blocked. %	-			-			334	334	-	491	400	-
Mov Cap-1 Maneuver	1062	-	-	1040			162	193	551	175	190	566
Mov Cap-1 Maneuver	1062		-	1040			162	193	551	175	190	500
	-			-		-		462		515	533	-
Stage 1	-	-	-	-	-	-	460		-			-
Stage 2	-	-	-	-	-	-	504	529	-	457	454	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.6			0.1			27.1			16.5		
HCM LOS							D			С		
Minor Lane/Major Mvm	it 1	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR:	SBLn1			
Capacity (veh/h)		186	1062	-		1040	-	-	345			
HCM Lane V/C Ratio		0.125	0.04			0.007			0.095			
HCM Control Delay (s)		27.1	8.5	0		8.5	0		16.5			
HCM Lane LOS		D	A	A		A	Ā		С			
HCM 95th %tile Q(veh))	0.4	0.1	-		0	-		0.3			
/5111 /51116 (2(1/611)		0.7	0.1			J						

3: Colonial Drive & Arkell Road

Lane Group WBT Lane Configurations Traffic Volume (vph) 29 351 70 385 0 Future Volume (vph) 29 351 96 70 385 138 87 0 71 81 0 18 Ideal Flow (vphpl) 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 Storage Length (m) 50.0 60.0 0.0 0.0 0.0 0.0 0.0 0.0 Storage Lanes 0 0 0 Taper Length (m) 7.5 7.5 7.5 7.5 Lane Util. 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 Ped Bike Factor 0.968 0.960 0.939 0.975 Flt Protected 0.950 0.950 0.973 0.961 Satd. Flow (prot) 1805 1805 1708 1780 1825 1798 Flt Permitted 0.950 0.950 0.973 0.961 Satd. Flow (perm) 1805 1825 1805 1798 1708 1780 Link Speed (k/h) 50 50 50 50 Link Distance (m) 261.6 193.8 209.6 91.7 Travel Time (s) 18.8 14.0 15.1 6.6 Confl. Peds. (#/hr) 0.96 0.96 0.96 0.96 Peak Hour Factor 0.96 0.96 0.96 0.96 0.96 0.96 0.96 0.96 Heavy Vehicles (%) 0% 1% 0% 0% 2% 3% 0% 0% Adj. Flow (vph) 30 366 100 144 91 73 401 0 74 84 0 19 Shared Lane Traffic (%) Lane Group Flow (vph) 30 466 0 73 545 165 0 103 0 0 0 0 Enter Blocked Intersection No No No No No No No Lane Alignment Left Right Left Right Left Left Left Left Right Left Left Right Median Width(m) 3.6 3.6 0.0 0.0 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 Headway Factor 1.00 1.00 1.00 1.00 1.00 1.00 1.00 Turning Speed (k/h) 25 Sign Control Free Free Stop Intersection Summary Area Type: Other Control Type: Unsignalized Intersection Capacity Utilization 51.0% ICU Level of Service A

Intersection												
Int Delay, s/veh	9.9											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	ሻ	1₃		- 1	ĵ.			4			4	
Traffic Vol, veh/h	29	351	96	70	385	138	87	0	71	81	0	18
Future Vol, veh/h	29	351	96	70	385	138	87	0	71	81	0	18
Conflicting Peds, #/hr	0	0	8	8	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	500	-	-	600	-	-	-	-	-	-	-	-
Veh in Median Storage	,# -	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	96	96	96	96	96	96	96	96	96	96	96	96
Heavy Vehicles, %	0	1	0	0	2	0	3	0	0	0	0	0
Mvmt Flow	30	366	100	73	401	144	91	0	74	84	0	19
Major/Minor N	/lajor1		1	Major2			Vinor1		- 1	Minor2		
Conflicting Flow All	545	0	0	474	0	0	1112	1175	424	1132	1153	473
Stage 1	-	-	-	-	-		484	484	-	619	619	-
Stage 2	-	-	-	-	-	-	628	691	-	513	534	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.13	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.13	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.13	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.527	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1034	-	-	1099	-	-	185	193	634	182	199	595
Stage 1	-	-	-	-	-	-	562	555	-	480	483	-
Stage 2	-	-	-	-	-	-	469	449	-	548	528	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1034	-	-	1099	-	-	165	174	630	149	179	595
Mov Cap-2 Maneuver	-	-	-	-	-	-	165	174	-	149	179	-
Stage 1	-	-	-	-	-	-	542	535	-	466	451	-
Stage 2	-	-	-	-	-	-	424	419	-	470	509	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.5			1			44.5			52.6		
							Ε			F		
HCM LOS												
HCM LOS	t	NRI n1	FRI	FRT	FRP	WRI	WRT	WRP	SRI n1			
HCM LOS Minor Lane/Major Mvm	t I	NBLn1	EBL 1034	EBT	EBR	WBL	WBT	WBR				
HCM LOS Minor Lane/Major Mvm Capacity (veh/h)	t I	247	1034	-	-	1099	-	-	173			
HCM LOS Minor Lane/Major Mvm Capacity (veh/h) HCM Lane V/C Ratio	t I	247 0.666	1034 0.029		-	1099 0.066		-	173 0.596			
HCM LOS Minor Lane/Major Mvm Capacity (veh/h)	t I	247	1034	-	-	1099	-	-	173			

Analysis Period (min) 15

4: Residential Entrance/Access 1 & Arkell Road

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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	ሻ	î			4			4		٦		7
Traffic Volume (vph)	8	492	4	2	582	7	2	0	2	8	0	9
Future Volume (vph)	8	492	4	2	582	7	2	0	2	8	0	9
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	25.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	0		0	0		0	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. 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
Frt		0.999			0.998			0.932				0.850
Flt Protected	0.950							0.976		0.950		
Satd. Flow (prot)	1805	1826	0	0	1758	0	0	1728	0	1805	0	1615
Flt Permitted	0.950							0.976		0.950		
Satd. Flow (perm)	1805	1826	0	0	1758	0	0	1728	0	1805	0	1615
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		193.8			144.3			68.0			96.7	
Travel Time (s)		14.0			10.4			4.9			7.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	4%	0%	0%	8%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	9	535	4	2	633	8	2	0	2	9	0	10
Shared Lane Traffic (%)												
Lane Group Flow (vph)	9	539	0	0	643	0	0	4	0	9	0	10
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)		3.6			3.6			3.6			3.6	
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												
Headway 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
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Free			Free			Stop			Stop	
Intersection Summary												
	Other											
Control Type: Unsignalized												
Intersection Capacity Utilizat	ion 47.8%			10	CU Level	of Service	: A					
Analysis Period (min) 15												

Intersection												
Int Delay, s/veh	0.4											
		EDT	555	14/01	WOT		NIDI	NET	NDD	0.01	0.0.7	000
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	7	ĵ.		_	4	_		4	_	ሻ		7
Traffic Vol, veh/h	8	492	4	2	582	7	2	0	2	8	0	9
Future Vol, veh/h	8	492	4	2	582	7	2	0	2	8	0	9
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	250	-	-	-	-	-	-	-	-	0	-	0
Veh in Median Storage,	# -	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	0	4	0	0	8	0	0	0	0	0	0	0
Mvmt Flow	9	535	4	2	633	8	2	0	2	9	0	10
Major/Minor N	lajor1		1	Najor2			Vinor1		ı	Minor2		
Conflicting Flow All	640	0	0	539	0	0	1195	1199	537	1196		636
Stage 1	040	-	U	337	U	U	554	554	337	641		030
			-				641	645		555		
Stage 2 Critical Hdwy	4.1	-		4.1			7.1	6.5	6.2	7.1		6.2
	4.1			4.1	- 1		6.1	5.5	0.2	6.1		0.2
Critical Hdwy Stg 1	-		-		-			5.5		6.1		-
Critical Hdwy Stg 2	2.2	-	-	2.2		-	6.1		3.3	3.5	-	3.3
Follow-up Hdwy	2.2	-	-		-	-		4			-	
Pot Cap-1 Maneuver	954	-	-	1040	-	-	165	187	548	164	0	481
Stage 1	-	-	-		-	-	520	517		466	0	-
Stage 2	-	-	-	-	-	-	466	471	-	520	0	-
Platoon blocked, %	05:	-	-	1015	-	-	415	105	= 45	415		100
Mov Cap-1 Maneuver	954	-	-	1040	-	-	160	185	548	162	-	481
Mov Cap-2 Maneuver	-	-	-	-	-	-	160	185	-	162	-	-
Stage 1	-	-	-	-	-	-	515	512	-	462	-	-
Stage 2	-	-	-	-	-	-	455	470	-	513	-	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.1			0			19.8			20.1		
HCM LOS							С			С		
Minor Lane/Major Mvmt	1	VBLn1	EBL	EBT	EBR	WBL	WBT	WRR	SBLn1 S	SBI n2		
Capacity (veh/h)		248	954	-	LOIK	1040			162	481		
HCM Lane V/C Ratio		0.018				0.002			0.054	0.02		
		19.8	8.8	-	-	8.5	0		28.5	12.6		
HCM Long LOS		19.8 C	8.8 A			8.5 A	A		28.5 D	12.6 B		
HCM Lane LOS					-		Α					
HCM 95th %tile Q(veh)		0.1	0	-	-	0	-	-	0.2	0.1		

5: Victoria Road & A	AIKEII F	toau									07-2	24-2010
	۶	→	*	•	+	•	•	†	~	/	 	- ✓
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	Ţ	ĥ		Ţ	ĵ»		7	ĵ»		7	ĥ	
Traffic Volume (vph)	262	156	85	130	202	77	93	784	156	81	760	293
Future Volume (vph)	262	156	85	130	202	77	93	784	156	81	760	293
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	40.0		0.0	20.0		0.0	90.0		0.0	50.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. 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
Ped Bike Factor							1.00				0.99	
Frt		0.947			0.959			0.975			0.958	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1787	1788	0	1703	1794	0	1805	1759	0	1805	1763	0
Flt Permitted	0.345			0.541			0.141			0.141		
Satd. Flow (perm)	649	1788	0	970	1794	0	268	1759	0	268	1763	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		33			23			14			27	
Link Speed (k/h)		50			60			70			70	
Link Distance (m)		144.3			357.4			823.5			155.4	
Travel Time (s)		10.4			21.4			42.4			8.0	
Confl. Peds. (#/hr)							6					6
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles (%)	1%	1%	0%	6%	1%	3%	0%	6%	2%	0%	3%	1%
Adj. Flow (vph)	279	166	90	138	215	82	99	834	166	86	809	312
Shared Lane Traffic (%)												
Lane Group Flow (vph)	279	256	0	138	297	0	99	1000	0	86	1121	0
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)		3.6	J		3.6	,		3.6	J		3.6	3
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												
Headway 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
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	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	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	CI+Ex	CI+Ex		CI+Ex	CI+Ex		CI+Ex	CI+Ex		CI+Ex	CI+Ex	
Detector 1 Channel	OI. LX	SI. LX		31. LK	OI. LX		51. LK	J L.X		3 LX	SI. LX	
Detector 1 Extend (s)	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	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)	0.0	9.4		0.0	9.4		0.0	9.4		0.0	9.4	
Detector 2 Size(m)		0.6			0.6			0.4			0.6	

0.0

CI+Ex

CI+Ex

0.0

Detector 2 Extend (s)	0.0
220 Arkell Road TIS 5:00 pm	n 07-04-2018 2026 PM Background

Detector 2 Size(m)

Detector 2 Channel

Detector 2 Type

0.6

CI+Ex

0.0	
Synchro 9 Repor	

0.6

CI+Ex

5: Victoria Road & Arkell Road

Lanes, Volumes, Timings

	•	-	•	•	•	•	1	T		-	¥	*
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA										
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Detector Phase	7	4		3	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0		7.0	10.0		7.0	10.0	
Minimum Split (s)	10.0	26.0		10.0	26.0		10.0	34.0		10.0	34.0	
Total Split (s)	10.0	26.0		10.0	26.0		10.0	34.0		10.0	34.0	
Total Split (%)	12.5%	32.5%		12.5%	32.5%		12.5%	42.5%		12.5%	42.5%	
Maximum Green (s)	7.0	20.0		7.0	20.0		7.0	28.0		7.0	28.0	
Yellow Time (s)	3.0	4.0		3.0	4.0		3.0	4.0		3.0	4.0	
All-Red Time (s)	0.0	2.0		0.0	2.0		0.0	2.0		0.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	3.0	6.0		3.0	6.0		3.0	6.0		3.0	6.0	
Lead/Lag	Lead	Lag										
Lead-Lag Optimize?	Yes	Yes										
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None										
Walk Time (s)		7.0			7.0			13.0			13.0	
Flash Dont Walk (s)		13.0			13.0			15.0			15.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)	26.7	18.3		26.0	15.8		36.7	28.4		36.7	28.4	
Actuated g/C Ratio	0.36	0.25		0.35	0.21		0.50	0.38		0.50	0.38	
v/c Ratio	0.82	0.55		0.34	0.74		0.35	1.47		0.31	1.62	
Control Delay	39.8	27.6		18.0	37.3		13.4	242.4		12.6	309.6	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	39.8	27.6		18.0	37.3		13.4	242.4		12.6	309.6	
LOS	D	С		В	D		В	F		В	F	
Approach Delay		34.0			31.2			221.8			288.4	
Approach LOS		С			С			F			F	

Intersection Summary Area Type: Other Cycle Length: 80 Actuated Cycle Length: 74.1 Natural Cycle: 150 Control Type: Actuated-Uncoordinated Maximum v/c Ratio: 1.62 Intersection Signal Delay: 190.4 Intersection Capacity Utilization 110.3% Intersection LOS: F

Splits and Phases: 5: Victoria Road & Arkell Road

Analysis Period (min) 15



ICU Level of Service H

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Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	
Lane Group Flow (vph)	279	256	138	297	99	1000	86	1121	
v/c Ratio	0.82	0.55	0.34	0.74	0.35	1.47	0.31	1.62	
Control Delay	39.8	27.6	18.0	37.3	13.4	242.4	12.6	309.6	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	39.8	27.6	18.0	37.3	13.4	242.4	12.6	309.6	
Queue Length 50th (m)	30.2	30.7	13.7	39.0	7.0	~220.5	6.0	~257.7	
Queue Length 95th (m)	#64.7	54.3	25.6	65.5	15.4	#308.3	13.7	#349.1	
Internal Link Dist (m)		120.3		333.4		799.5		131.4	
Turn Bay Length (m)	40.0		20.0		90.0		50.0		
Base Capacity (vph)	342	512	409	506	279	681	279	691	
Starvation Cap Reductn	0	0	0	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.82	0.50	0.34	0.59	0.35	1.47	0.31	1.62	

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBF
Lane Configurations		₽		ሻ	₽		ሻ	f.		- ሻ	₽	
Traffic Volume (veh/h)	262	156	85	130	202	77	93	784	156	81	760	293
Future Volume (veh/h)	262	156	85	130	202	77	93	784	156	81	760	293
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	(
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		0.99	1.00		0.99
Parking Bus, Adj	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 Sat Flow, veh/h/ln	1881	1888	1900	1792	1871	1900	1900	1804	1900	1900	1855	1900
Adj Flow Rate, veh/h	279	166	90	138	215	82	99	834	166	86	809	312
Adj No. of Lanes	1	1	0	1	1	0	1	1	0	1	1	(
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	1	1	1	6	1	1	0	6	6	0	3	3
Cap, veh/h	322	249	135	337	272	104	244	551	110	237	476	183
Arrive On Green	0.09	0.22	0.22	0.09	0.21	0.21	0.08	0.38	0.38	0.08	0.37	0.37
Sat Flow, veh/h	1792	1153	625	1707	1291	493	1810	1459	290	1810	1273	491
Grp Volume(v), veh/h	279	0	256	138	0	297	99	0	1000	86	0	1121
Grp Sat Flow(s), veh/h/ln	1792	0	1777	1707	0	1784	1810	0	1750	1810	0	1763
Q Serve(q_s), s	7.0	0.0	9.9	4.6	0.0	11.8	2.4	0.0	28.3	2.0	0.0	28.0
Cycle Q Clear(q_c), s	7.0	0.0	9.9	4.6	0.0	11.8	2.4	0.0	28.3	2.0	0.0	28.0
Prop In Lane	1.00		0.35	1.00		0.28	1.00		0.17	1.00		0.28
Lane Grp Cap(c), veh/h	322	0	384	337	0	376	244	0	661	237	0	659
V/C Ratio(X)	0.87	0.00	0.67	0.41	0.00	0.79	0.41	0.00	1.51	0.36	0.00	1.70
Avail Cap(c_a), veh/h	322	0	475	346	0	476	265	0	661	265	0	659
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	25.5	0.0	26.9	20.7	0.0	28.0	17.0	0.0	23.3	17.1	0.0	23.5
Incr Delay (d2), s/veh	21.4	0.0	2.6	0.8	0.0	6.8	1.1	0.0	239.1	0.9	0.0	321.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.2	0.0	5.1	2.2	0.0	6.5	1.2	0.0	57.3	1.1	0.0	72.3
LnGrp Delay(d),s/veh	46.8	0.0	29.4	21.5	0.0	34.8	18.1	0.0	262.4	18.0	0.0	345.3
LnGrp LOS	D		С	С		С	В		F	В		F
Approach Vol, veh/h		535			435			1099			1207	
Approach Delay, s/veh		38.5			30.6			240.4			322.0	
Approach LOS		D			C			F			F	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	8.8	34.3	9.6	22.2	9.1	34.0	10.0	21.8				
Change Period (Y+Rc), s	3.0	6.0	3.0	6.0	3.0	6.0	3.0	6.0				
Max Green Setting (Gmax), s	7.0	28.0	7.0	20.0	7.0	28.0	7.0	20.0				
Max Q Clear Time (q_c+l1), s	4.0	30.3	6.6	11.9	4.4	30.0	9.0	13.8				
Green Ext Time (p_c), s	0.1	0.0	0.0	2.4	0.1	0.0	0.0	2.0				
Intersection Summary												
HCM 2010 Ctrl Delay			209.6									
HCM 2010 LOS			F									

HCM 2010 Signalized Intersection Summary

5: Victoria Road & Arkell Road

Volume exceeds capacity, queue is theoretically infinite.
 Oueue shown is maximum after two cycles.

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

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Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	7	7	ኘ	<u> </u>	<u> </u>	7
Traffic Volume (vph)	50	23	20	1101	1112	43
Future Volume (vph)	50	23	20	1101	1112	43
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	0.0	30.0	1700	1700	60.0
Storage Lanes	1	1	1			1
Taper Length (m)	7.5	- 1	7.5			- 1
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ert	1.00	0.850	1.00	1.00	1.00	0.850
FIt Protected	0.950	0.000	0.950			0.000
	1805	1415	1805	1792	1845	1615
Satd. Flow (prot)	0.950	1615	0.124	1792	1045	1015
Flt Permitted		1/15		1702	1045	1/15
Satd. Flow (perm)	1805	1615	236	1792	1845	1615
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		25		-	-	40
Link Speed (k/h)	50			70	70	
Link Distance (m)	97.9			155.4	308.2	
Travel Time (s)	7.0			8.0	15.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	6%	3%	0%
Adj. Flow (vph)	54	25	22	1197	1209	47
Shared Lane Traffic (%)						
Lane Group Flow (vph)	54	25	22	1197	1209	47
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6	Ĭ		3.6	3.6	Ĭ
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane				0	0	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15	25		0	15
Number of Detectors	1	1	1	2	2	1
Detector Template	Left	Right	Left	Thru	Thru	Right
Leading Detector (m)	2.0	2.0	2.0	10.0	10.0	2.0
Trailing Detector (m)	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
Detector 1 Size(m)	2.0	2.0	2.0	0.6	0.6	2.0
Detector 1 Type	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex
Detector 1 Channel		0.5				0.5
Detector 1 Extend (s)	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
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)				9.4	9.4	
Detector 2 Size(m)				0.6	0.6	
Detector 2 Type				CI+Ex	CI+Ex	
Detector 2 Channel						
Detector 2 Extend (s)				0.0	0.0	
Turn Type	Prot	Perm	Perm	NA	NA	Perm
Protected Phases	4			2	6	

Synchro 9 Report Page 13

	•	•	4	†	ļ	4
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Permitted Phases		4	2			6
Detector Phase	4	4	2	2	6	6
Switch Phase						
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	24.0	24.0	24.0	24.0	24.0	24.0
Total Split (s)	24.0	24.0	56.0	56.0	56.0	56.0
Total Split (%)	30.0%	30.0%	70.0%	70.0%	70.0%	70.0%
Maximum Green (s)	18.0	18.0	50.0	50.0	50.0	50.0
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	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
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	Max	Max	Max	Max
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	7.0
Flash Dont Walk (s)	11.0	11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	10.1	10.1	63.4	63.4	63.4	63.4
Act Effct Green (s) Actuated g/C Ratio	0.13	0.13	0.83	0.83	0.83	0.83
v/c Ratio	0.13	0.13	0.03	0.80	0.63	0.03
Control Delay	32.7	13.3	5.0	13.9	12.9	1.5
Queue Delay	0.0	0.0	0.0	2.2	0.0	0.0
Total Delay	32.7	13.3	5.0	16.2	12.9	1.5
LOS	C	В	Α.	В	В.	A
Approach Delay	26.6			16.0	12.5	
Approach LOS	С			В	В	
Intersection Summary						
Area Type:	Other					
Cycle Length: 80						
Actuated Cycle Length: 76	.1					
Natural Cycle: 90						
Control Type: Semi Act-Un	coord					
Maximum v/c Ratio: 0.80						
Intersection Signal Delay:					tersectio	
Intersection Capacity Utiliz Analysis Period (min) 15	ation 76.9%)		10	CU Level	ot Service

Splits and Phases: 6: Victoria Road & Access 2

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Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	54	25	22	1197	1209	47
v/c Ratio	0.23	0.11	0.11	0.80	0.79	0.03
Control Delay	32.7	13.3	5.0	13.9	12.9	1.5
Queue Delay	0.0	0.0	0.0	2.2	0.0	0.0
Total Delay	32.7	13.3	5.0	16.2	12.9	1.5
Queue Length 50th (m)	8.8	0.0	0.9	128.6	125.1	0.3
Queue Length 95th (m)	16.8	6.5	3.4	#247.8	#246.1	2.8
Internal Link Dist (m)	73.9			131.4	284.2	
Turn Bay Length (m)			30.0			60.0
Base Capacity (vph)	429	403	196	1492	1536	1351
Starvation Cap Reductn	0	0	0	173	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.13	0.06	0.11	0.91	0.79	0.03
Internation Comment						

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

Queue shown is maximum after two cycles.

-							
	ၨ	`	1	†	Ţ	4	
Movement	EBL	EBR	NBL	NBT	SBT	SBR	
Lane Configurations							
Traffic Volume (veh/h)	5 0	7 23	ሻ 20	1101	↑ 1112	7 43	
Future Volume (veh/h)	50	23	20	1101	1112	43	
Number	7	14	5	2	6	16	
Initial Q (Qb), veh	0	0	0	0	0	0	
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00	U	U	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	
	1900	1900	1900	1792	1845	1900	
Adj Sat Flow, veh/h/ln	54	25	22	1197	1209	47	
Adj Flow Rate, veh/h Adj No. of Lanes	1	1	1	1197	1209	1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	
Percent Heavy Veh, %	0.92	0.92	0.92	0.92	0.92	0.92	
	203	181	182	1283	1321	1156	
Cap, veh/h Arrive On Green	0.11	0.11	0.72	0.72	0.72	0.72	
Sat Flow, veh/h	1810	1615	449	1792	1845	1615	
	54	25	22	1197	1209	47	
Grp Volume(v), veh/h							
Grp Sat Flow(s), veh/h/ln	1810	1615	449	1792	1845	1615	
Q Serve(g_s), s	1.9	1.0	3.0	39.9	37.7	0.6	
Cycle Q Clear(g_c), s	1.9	1.0	40.7	39.9	37.7	0.6	
Prop In Lane	1.00	1.00	1.00	1000	1001	1.00	
Lane Grp Cap(c), veh/h	203	181	182	1283	1321	1156	
V/C Ratio(X)	0.27	0.14	0.12	0.93	0.92	0.04	
Avail Cap(c_a), veh/h	466	416	182	1283	1321	1156	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	
Uniform Delay (d), s/veh	28.4	28.0	25.0	8.5	8.2	2.9	
Incr Delay (d2), s/veh	0.7	0.3	1.4	13.5	11.4	0.1	
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	
%ile BackOfQ(50%),veh/ln	1.0	0.4	0.4	23.8	22.6	0.3	
LnGrp Delay(d),s/veh	29.1	28.3	26.3	22.0	19.5	3.0	
LnGrp LOS	C	С	С	С	В	A	
Approach Vol, veh/h	79			1219	1256		
Approach Delay, s/veh	28.8			22.0	18.9		
Approach LOS	С			С	В		
Timer	1	2	3	4	5	6	
Assigned Phs		2		4		6	
Phs Duration (G+Y+Rc), s		56.0		13.8		56.0	
Change Period (Y+Rc), s		6.0		6.0		6.0	
Max Green Setting (Gmax), s		50.0		18.0		50.0	
Max Q Clear Time (q c+l1), s		42.7		3.9		39.7	
Green Ext Time (p_c), s		7.1		0.2		9.8	
Intersection Summary							
HCM 2010 Ctrl Delay			20.7				
HCM 2010 LOS			C				

Green Ext Time (p_c), s	7.1	0.2
Intersection Summary		
HCM 2010 Ctrl Delay	20.7	
LICM 2010 LOC	0	

HCM 2010 Signalized Intersection Summary 6: Victoria Road & Access 2

7: Victoria Road & Victoria Park Village Road

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Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	ሻ	7	ሻ	†	î»	
Traffic Volume (vph)	90	38	64	1133	1240	153
Future Volume (vph)	90	38	64	1133	1240	153
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	20.0	0.0	30.0			0.0
Storage Lanes	1	1	1			0
Taper Length (m)	7.5		7.5			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850			0.985	
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1805	1615	1805	1792	1823	0
Flt Permitted	0.950		0.950			
Satd. Flow (perm)	1805	1615	1805	1792	1823	0
Link Speed (k/h)	50			50	70	
Link Distance (m)	325.8			308.2	342.0	
Travel Time (s)	23.5			22.2	17.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	6%	3%	0%
Adj. Flow (vph)	98	41	70	1232	1348	166
Shared Lane Traffic (%)						
Lane Group Flow (vph)	98	41	70	1232	1514	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	3.6	, ,
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	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15	25			15
Sign Control	Stop			Free	Free	
•						
Intersection Summary	0.11					
	Other					
Control Type: Unsignalized						
Intersection Capacity Utiliza	tion 86.2%			10	U Level	of Service I
Analysis Period (min) 15						

ntersection									
nt Delay, s/veh	81								
Movement	EBL	EBR	NBL	NBT	SBT	SBR			
ane Configurations	ሻ	7	ሻ	↑	ĵ.				
raffic Vol, veh/h	90	38	64	1133	1240	153			
uture Vol, veh/h	90	38	64	1133	1240	153			
Conflicting Peds, #/hr	0	0	0	0	0	0			
Sign Control	Stop	Stop	Free	Free	Free	Free			
RT Channelized	-	None	-	None	-	None			
Storage Length	200	0	300	-	-	-			
eh in Median Storag	e,# 0	-	-	0	0	-			
Grade, %	0	-	-	0	0	-			
Peak Hour Factor	92	92	92	92	92	92			
leavy Vehicles, %	0	0	0	6	3	0			
/lvmt Flow	98	41	70	1232	1348	166			
//ajor/Minor	Minor2		Major1		Major2				ı
Conflicting Flow All	2802	1431	1514	0	-	0			
Stage 1	1431		-		-				
Stage 2	1371								
Critical Hdwy	6.4	6.2	4.1						
Critical Hdwy Stg 1	5.4		-						
Critical Hdwy Stg 2	5.4	-	-	-	-	-			
ollow-up Hdwy	3.5	3.3	2.2	-	-				
ot Cap-1 Maneuver	~ 21	167	447						
Stage 1	223		-						
Stage 2	238	-	-	-	-				
Platoon blocked, %				-	-				
Nov Cap-1 Maneuver	~ 18	167	447	-	-	-			
Nov Cap-2 Maneuver	~ 18	-	-	-	-				
Stage 1	223	-	-	-	-				
Stage 2	201			-	-				
, y .									
Approach	EB		NB		SB				
CM Control Delay, \$			0.8		0				
ICM LOS	1712.4 F		0.0		U				
ICIVI EUS	г								
/linor Lane/Major Mvr	nt	NBL	NBT	EBLn1		SBT	SBR		
Capacity (veh/h)		447	-	18	167	-	-		
ICM Lane V/C Ratio		0.156		5.435		-	-		
HCM Control Delay (s)	14.5	\$:	2421.3	33.5				
ICM Lane LOS		В	-	F	D	-	-		
ICM 95th %tile Q(veh	1)	0.5	-	12.8	0.9	-	-		
lotes									
: Volume exceeds ca	nacity	\$. Da	alay ove	ceeds 3	ΛΛs	+: Com	putation Not	Defined	
. Volume exceeds ca	распу	φ. De	Jay ext	ccus 3	003	i. Colli	paration 140t	Delined	*

Appendix G

2031 Background Traffic Operations Reports



1: Summerfield Drive & Arkell Road

Lane Group NBR Lane Configurations Traffic Volume (vph) 414 479 162 138 Future Volume (vph) 414 41 35 479 162 138 Ideal Flow (vphpl) 1900 1900 1900 1900 1900 1900 Storage Length (m) 60.0 0.0 0.0 0.0 Storage Lanes Taper Length (m) 7.5 7.5 Lane Util. Factor 1.00 1.00 1.00 1.00 1.00 1.00 Ped Bike Factor 0.988 0.938 Flt Protected 0.950 0.974 Satd. Flow (prot) 1791 1671 1678 1776 Flt Permitted 0.950 0.974 Satd. Flow (perm) 1791 0 1671 1776 1678 Link Speed (k/h) 50 50 50 Link Distance (m) 290.6 206.6 213.5 Travel Time (s) 20.9 14.9 15.4 Confl. Peds. (#/hr) Peak Hour Factor 0.98 0.98 0.98 0.98 0.98 0.98 Heavy Vehicles (%) 4% 13% 8% 7% 3% 4% Adj. Flow (vph) 422 489 165 141 42 36 Shared Lane Traffic (%) Lane Group Flow (vph) 464 0 36 489 306 0 Enter Blocked Intersection No No No Lane Alignment Left Right Left Right Left Left Median Width(m) 3.6 3.6 3.6 Link Offset(m) 0.0 0.0 0.0 Crosswalk Width(m) 4.8 4.8 4.8 Two way Left Turn Lane Yes Headway Factor 1.00 1.00 1.00 1.00 1.00 Turning Speed (k/h) 25 15 Sign Control Free Free Stop Intersection Summary Area Type: Other Control Type: Unsignalized Intersection Capacity Utilization 53.2% ICU Level of Service A Analysis Period (min) 15

Intersection						
Intersection Int Delay, s/veh	6.6					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	ĥ			↑	Y	
Traffic Vol, veh/h	414	41	35	479	162	138
Future Vol, veh/h	414	41	35	479	162	138
Conflicting Peds, #/hr	0	9	9	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	600	-	0	-
Veh in Median Storage	, # 0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	98	98	98	98	98	98
Heavy Vehicles, %	4	13	8	7	3	4
Mymt Flow	422	42	36	489	165	141
			00	107	100	
	Major1		Major2		Minor1	
Conflicting Flow All	0	0	473	0	1012	452
Stage 1	-	-	-	-	452	-
Stage 2	-	-	-	-	560	-
Critical Hdwy	-	-	4.18	-	6.43	6.24
Critical Hdwy Stg 1	-	-	-	-	5.43	-
Critical Hdwy Stg 2	-	-	-	-	5.43	-
Follow-up Hdwy	-	-	2.272	-	3.527	3.336
Pot Cap-1 Maneuver	-	-	1058	-	264	603
Stage 1	-	-	-	-	639	-
Stage 2	-	-	-	-	570	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver		-	1058		253	598
Mov Cap-2 Maneuver		-	-		384	-
Stage 1		_			634	
Stage 2					551	
Stage 2					331	
Approach	EB		WB		NB	
HCM Control Delay, s	0		0.6		27.1	
HCM LOS					D	
Minor Lane/Major Mvm	+ 1	NBLn1	EBT	EBR	WBL	WBT
	l I	460	EDI	EDK -	1058	WDI
Capacity (veh/h)					0.034	
HCM Cantral Dalay (a)		0.665	-		8.5	-
HCM Control Delay (s)		27.1	-	-		-
HCM Lane LOS		D	-	-	A	-
HCM 95th %tile Q(veh)		4.8	-	-	0.1	-

2: Zecca Drive/Amos Drive & Arkell Road

	•	→	•	•	←	•	4	†	1	-	↓	4
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		4			4			4			4	
Traffic Volume (vph)	7	529	16	4	458	6	27	1	20	29	3	30
Future Volume (vph)	7	529	16	4	458	6	27	1	20	29	3	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. 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
Ped Bike Factor												
Frt		0.996			0.998			0.943			0.935	
FIt Protected		0.999						0.973			0.977	
Satd. Flow (prot)	0	1804	0	0	1774	0	0	1696	0	0	1736	0
Flt Permitted		0.999						0.973			0.977	
Satd. Flow (perm)	0	1804	0	0	1774	0	0	1696	0	0	1736	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		206.6			261.6			219.2			154.5	
Travel Time (s)		14.9			18.8			15.8			11.1	
Confl. Peds. (#/hr)	1		8	8		1	13		10	10		13
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	0%	5%	0%	5%	7%	0%	5%	0%	0%	0%	0%	0%
Adj. Flow (vph)	7	545	16	4	472	6	28	1	21	30	3	31
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	568	0	0	482	0	0	50	0	0	64	0
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)		3.6			3.6			0.0			0.0	
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	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Headway 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
Turning Speed (k/h)	25	-	15	25	-	15	25	CL	15	25	CI	15
Sign Control		Free			Free			Stop			Stop	
Intersection Summary												
	Other											
Control Type: Unsignalized												
Intersection Capacity Utilizat	ion 47.8%			IC	CU Level	of Service	A					
Analysis Period (min) 15												

Intersection												
Int Delay, s/veh	2.3											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		4			4			44			4	
Traffic Vol, veh/h	7	529	16	4	458	6	27	1	20	29	3	30
Future Vol. veh/h	7	529	16	4	458	6	27	1	20	29	3	30
Conflicting Peds, #/hr	1	0	8	8	0	1	13	0	10	10	0	13
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-			-	-	-	-	-	-	-	-	-
Veh in Median Storage	,# -	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0		-	0	-	-	0	-	-	0	-
Peak Hour Factor	97	97	97	97	97	97	97	97	97	97	97	97
Heavy Vehicles, %	0	5	0	5	7	0	5	0	0	0	0	0
Mvmt Flow	7	545	16	4	472	6	28	1	21	30	3	31
Major/Minor N	Major1			Major2			Vinor1			Vinor2		
Conflicting Flow All	479	0	0	570	0	0	1090	1064	572	1074	1069	489
Stage 1	-	-		-	-		576	576	-	485	485	-
Stage 2	-			-	-	-	514	488	-	589	584	-
Critical Hdwy	4.1	-	-	4.15	-	-	7.15	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.15	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.15	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.245	-	-	3.545	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1094	-	-	988	-	-	190	225	523	199	223	583
Stage 1	-	-	-	-	-	-	497	505	-	567	555	-
Stage 2	-				-		538	553		498	501	
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1082	-	-	980	-	-	173	220	515	186	218	576
Mov Cap-2 Maneuver	-	-	-	-	-	-	173	220	-	186	218	-
Stage 1	-	-	-	-	-	-	489	497		561	551	-
Stage 2	-	-	-	-	-	-	498	549	-	469	493	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.1			0.1			23.8			21.6		
HCM LOS							С			С		
Minor Lane/Major Mvm	it I	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR :	SBLn1			
Capacity (veh/h)		241	1082	-		980	-		280			
HCM Lane V/C Ratio		0.205	0.007			0.004			0.228			
HCM Control Delay (s)		23.8	8.3	0		8.7	0		21.6			
HCM Lane LOS		C	Α.	A		Α.	A		C			
HCM 95th %tile Q(veh))	0.8	0			0	-		0.9			
/o /o Q(vor)		0.0	U			U			0.7			

3: Colonial Drive & Arkell Road

	۶	-	•	•	←	•	4	†	-	\	ļ	1
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	Ţ	ĥ		*	f)			4			4	
Traffic Volume (vph)	11	487	79	47	286	42	149	0	156	131	0	32
Future Volume (vph)	11	487	79	47	286	42	149	0	156	131	0	32
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	50.0		0.0	60.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	1		0	0		0	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. 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
Ped Bike Factor												
Frt		0.979			0.981			0.931			0.973	
Flt Protected	0.950			0.950				0.976			0.961	
Satd. Flow (prot)	1770	1781	0	1703	1738	0	0	1622	0	0	1742	0
Flt Permitted	0.950			0.950				0.976			0.961	
Satd. Flow (perm)	1770	1781	0	1703	1738	0	0	1622	0	0	1742	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		261.6			193.8			209.6			91.7	
Travel Time (s)		18.8			14.0			15.1			6.6	
Confl. Peds. (#/hr)			11	11					1			
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	4%	7%	6%	8%	2%	9%	2%	4%	2%	2%	2%
Adj. Flow (vph)	12	529	86	51	311	46	162	0	170	142	0	35
Shared Lane Traffic (%)												
Lane Group Flow (vph)	12	615	0	51	357	0	0	332	0	0	177	0
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)		3.6	3		3.6	,		0.0	,		0.0	3
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												
Headway 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
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Free			Free			Stop			Stop	
Intersection Summary												
Area Type: C	Other											
Control Type: Unsignalized												
Intersection Capacity Utilizati	ion 61.4%			IC	CU Level	of Service	: B					
Analysis Period (min) 15												

Int Delay, s/veh	65.6											
Movement	FBI	FBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	S
Lane Configurations	*	ĵ,	LDIT	ኘ	1	· · · ·	1100	4	HOIL	ODL	4	
Traffic Vol. veh/h	11	487	79	47	286	42	149	0	156	131	0	3
Future Vol. veh/h	11	487	79	47	286	42	149	0	156	131	0	3
Conflicting Peds, #/hr	0	0	11	11	0	0	0	0	1	0	0	0.
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	1100	None	Jiop -	Jiop -	None	Jiop -	этор	None
Storage Length	500		-	600		-			-			140110
Veh in Median Storage		0		-	0			0			0	
Grade, %	-, "	0			0			0			0	
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	4	7	6	8	2	9	2	4	2	2	2
Mymt Flow	12	529	86	51	311	46	162	0	170	142	0	35
WWW. Tiow	12	027	00	01	311	10	102	U	170	112	U	Ju
Maia-/Mina-	\A-!1			4-:2			M:1			M:		
	Major1	0		Major2	0		Minor1	10//		Minor2	1007	224
Conflicting Flow All	357	0	0	626	0	0	1060	1066	584	1118	1086	334
Stage 1	-		-	-		-	607	607		436	436	-
Stage 2	4.10	-	-	4.1.	-	-	453	459	- (0 4	682	650	- (00
Critical Hdwy	4.12	-	-	4.16	-	-	7.19	6.52	6.24	7.12	6.52	6.22
Critical Hdwy Stg 1	-		-	-	-	-	6.19	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	2 210	-	-	2.254	-	-	6.19	5.52	- 227	6.12	5.52	2 210
Follow-up Hdwy	2.218	-	-	2.254	-	-	3.581	4.018	3.336		4.018	3.318
Pot Cap-1 Maneuver	1202	-	-	937	-	-	196	222	508	184	216	708
Stage 1	-	-	-	-		-	472	486		599	580	-
Stage 2	-	-	-	-	-	-	573	566		440	465	-
Platoon blocked, %	1202	-		936	-	-	176	206	F02	11/	200	708
Mov Cap-1 Maneuver	1202	-	-	930	-	-				~ 116		708
Mov Cap-2 Maneuver	-		-	-	-	-	176 463	206 477	-	~ 116 593	200 548	-
Stage 1	-	-	-	-	-	-	515	535	- 1	289	456	-
Stage 2	-				-	-	010	030		209	400	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.2			1.1			181.1			229.3		
HCM LOS							F			F		
Minor Lane/Major Mvm	nt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR:				
Capacity (veh/h)		264	1202	-	-	936	-	-	139			
HCM Lane V/C Ratio		1.256	0.01	-	-	0.055	-	-	1.275			
HCM Control Delay (s)		181.1	8	-	-	9.1	-	-	229.3			
HCM Lane LOS		F	Α	-	-	Α	-	-	F			
HCM 95th %tile Q(veh))	16.1	0	-	-	0.2	-	-	10.9			
Notes												

4: Residential Entrance/Access 1 & Arkell Road

	۶	→	•	•	←	•	4	†	/	-	ļ	4
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	ľ	f)			4			4		,		7
Traffic Volume (vph)	83	689	3	3	342	62	3	0	3	6	0	31
Future Volume (vph)	83	689	3	3	342	62	3	0	3	6	0	31
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	25.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	0		0	0		0	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. 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
Frt		0.999			0.980			0.932				0.850
Flt Protected	0.950							0.976		0.950		
Satd. Flow (prot)	1805	1825	0	0	1745	0	0	1728	0	1805	0	1615
Flt Permitted	0.950							0.976		0.950		
Satd. Flow (perm)	1805	1825	0	0	1745	0	0	1728	0	1805	0	1615
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		193.8			144.3			68.0			96.7	
Travel Time (s)		14.0			10.4			4.9			7.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	4%	0%	0%	8%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	90	749	3	3	372	67	3	0	3	7	0	34
Shared Lane Traffic (%)												
Lane Group Flow (vph)	90	752	0	0	442	0	0	6	0	7	0	34
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)		3.6	ŭ		3.6	, i		3.6			3.6	ŭ
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												
Headway 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
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Free			Free			Stop			Stop	
Intersection Summary												
	Other											
Control Type: Unsignalized												
Intersection Capacity Utilizat	ion 71.7%			IC	CU Level	of Service	С					
Analysis Period (min) 15												

Intersection												
Int Delay, s/veh	1.2											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	ኘ	13	LDIN	WDL	4	WDIC	NOL	4	IVDIC	<u> </u>	301	7
Traffic Vol, veh/h	83	689	3	3	342	62	3	0	3	6	0	31
Future Vol. veh/h	83	689	3	3	342	62	3	0	3	6	0	31
Conflicting Peds, #/hr	0	0	0	0	0.2	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	250		-			-	-		-	0	-	0
Veh in Median Storage	,# -	0	-	-	0		-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	0	4	0	0	8	0	0	0	0	0	0	0
Mvmt Flow	90	749	3	3	372	67	3	0	3	7	0	34
Major/Minor N	/lajor1		N	Major2		I	Minor1		I	Minor2		
Conflicting Flow All	439	0	0	752	0	0	1343	1377	751	1345	-	405
Stage 1	-	-	-	-	-	-	931	931	-	412	-	-
Stage 2	-	-	-	-	-	-	412	446	-	933	-	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.5	6.2	7.1	-	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	-	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	-	3.3
Pot Cap-1 Maneuver	1132	-	-	867	-	-	130	146	414	130	0	650
Stage 1	-	-	-	-	-	-	323	348	-	621	0	-
Stage 2	-	-	-	-	-	-	621	577	-	322	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1132	-	-	867	-	-	115	134	414	121	-	650
Mov Cap-2 Maneuver	-	-	-	-	-	-	115	134	-	121	-	-
Stage 1	-	-	-	-	-	-	297	320	-	572	-	-
Stage 2	-	-	-	-	-	-	586	574	-	294	-	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.9			0.1			25.8			15		
HCM LOS							D			С		
Minor Lane/Major Mvm	t I	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1:	SBLn2		
Capacity (veh/h)		180	1132	-	-	867	-	-	121	650		
HCM Lane V/C Ratio		0.036	0.08	-	-	0.004	-	-	0.054			
HCM Control Delay (s)		25.8	8.5	-	-	9.2	0	-	36.4	10.8		
HCM Lane LOS		D	Α	-	-	Α	Α	-	Ε	В		
HCM 95th %tile Q(veh)		0.1	0.3	-	-	0	-	-	0.2	0.2		

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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	ř	ĵ»		ř	ĥ		ř	ĵ.		ሻ	î»	
Traffic Volume (vph)	479	132	84	197	114	86	66	830	110	61	707	231
Future Volume (vph)	479	132	84	197	114	86	66	830	110	61	707	231
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	40.0		0.0	20.0		0.0	90.0		0.0	50.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. 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
Ped Bike Factor	1.00				0.99		1.00				0.99	
Frt		0.942			0.935			0.982			0.963	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1736	1687	0	1787	1694	0	1805	1760	0	1752	1673	0
Flt Permitted	0.518			0.477			0.132			0.138		
Satd. Flow (perm)	945	1687	0	897	1694	0	251	1760	0	255	1673	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		38			46			9			23	
Link Speed (k/h)		50			60			70			70	
Link Distance (m)		144.3			357.4			823.5			155.4	
Travel Time (s)		10.4			21.4			42.4			8.0	
Confl. Peds. (#/hr)	1					1	3					3
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles (%)	4%	3%	11%	1%	3%	5%	0%	6%	6%	3%	8%	11%
Adj. Flow (vph)	526	145	92	216	125	95	73	912	121	67	777	254
Shared Lane Traffic (%)												
Lane Group Flow (vph)	526	237	0	216	220	0	73	1033	0	67	1031	0
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)		3.6			3.6			3.6	J		3.6	3
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												
Headway 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
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	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	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	CI+Ex	CI+Ex		CI+Ex	CI+Ex		CI+Ex	CI+Ex		CI+Ex	CI+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	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	
Detector 1 Delay (s)	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		CI+Ex			CI+Ex			CI+Ex			CI+Ex	
Detector 2 Channel		51. EX			5 LX			J L.X			3 LX	
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
DOLUCIO Z EXICITA (5)		0.0			0.0			0.0			0.0	

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Lane Group	EBL	EBT	EBR	₩BL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBF
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Detector Phase	7	4		3	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0		7.0	10.0		7.0	10.0	
Minimum Split (s)	10.0	26.0		10.0	26.0		10.0	34.0		10.0	34.0	
Total Split (s)	10.0	26.0		10.0	26.0		10.0	34.0		10.0	34.0	
Total Split (%)	12.5%	32.5%		12.5%	32.5%		12.5%	42.5%		12.5%	42.5%	
Maximum Green (s)	7.0	20.0		7.0	20.0		7.0	28.0		7.0	28.0	
Yellow Time (s)	3.0	4.0		3.0	4.0		3.0	4.0		3.0	4.0	
All-Red Time (s)	0.0	2.0		0.0	2.0		0.0	2.0		0.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	3.0	6.0		3.0	6.0		3.0	6.0		3.0	6.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	None		None	None	
Walk Time (s)		7.0			7.0			13.0			13.0	
Flash Dont Walk (s)		13.0			13.0			15.0			15.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)	23.8	13.7		23.8	13.7		37.4	30.4		36.7	28.4	
Actuated g/C Ratio	0.33	0.19		0.33	0.19		0.52	0.42		0.51	0.39	
v/c Ratio	1.35	0.67		0.56	0.61		0.26	1.38		0.24	1.53	
Control Delay	196.5	33.0		23.3	28.9		11.3	203.5		11.1	270.0	
Queue Delay	0.0	0.0 33.0		0.0	0.0 28.9		0.0	0.0		0.0	0.0	
Total Delay	196.5			23.3			11.3	203.5		11.1	270.0	
LOS	F	C		С	C		В	F		В	F 254.2	
Approach Delay		145.7			26.1			190.8			254.2	
Approach LOS		F			С			F			F	
Intersection Summary												
	Other											
Cycle Length: 80												
Actuated Cycle Length: 72												
Natural Cycle: 150												
Control Type: Actuated-Unc	oordinated											
Maximum v/c Ratio: 1.53												
Intersection Signal Delay: 1		,			tersection		0					
Intersection Capacity Utiliza	tion 106.25	6		IC	CU Level o	of Service	9 G					
Analysis Period (min) 15												
Splits and Phases: 5: Vici	oria Road	& Arkell R	oad									
Ø1 Ø2						√ ø3	,	<u></u> ⊅ 04				
7Ø1 Ø2 10 s 34 s						10 s	,	26 s				
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Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	
Lane Group Flow (vph)	526	237	216	220	73	1033	67	1031	
v/c Ratio	1.35	0.67	0.56	0.61	0.26	1.38	0.24	1.53	
Control Delay	196.5	33.0	23.3	28.9	11.3	203.5	11.1	270.0	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	196.5	33.0	23.3	28.9	11.3	203.5	11.1	270.0	
Queue Length 50th (m)	~99.8	27.2	22.4	23.3	4.6	~219.3	4.2	~221.2	
Queue Length 95th (m)	#165.4	49.6	38.4	44.5	12.0	#321.5	11.3	#323.0	
Internal Link Dist (m)		120.3		333.4		799.5		131.4	
Turn Bay Length (m)	40.0		20.0		90.0		50.0		
Base Capacity (vph)	390	502	384	509	283	747	277	673	
Starvation Cap Reductn	0	0	0	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0	
Reduced v/c Ratio	1.35	0.47	0.56	0.43	0.26	1.38	0.24	1.53	

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5: Victoria Road & Arkell Road	

HCM 2010 Signalized Intersection Summary

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBF
Lane Configurations	7	f)		ሻ	1•		7	f)		ሻ	1 >	
Traffic Volume (veh/h)	479	132	84	197	114	86	66	830	110	61	707	231
Future Volume (veh/h)	479	132	84	197	114	86	66	830	110	61	707	231
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	(
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	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 Sat Flow, veh/h/ln	1827	1791	1900	1881	1829	1900	1900	1792	1900	1845	1747	1900
Adj Flow Rate, veh/h	526	145	92	216	125	95	73	912	121	67	777	254
Adj No. of Lanes	1	1	0	1	1	0	1	1	0	1	1	(
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.9
Percent Heavy Veh, %	4	3	3	1	3	3	0	6	6	3	8	8
Cap, veh/h	348	196	124	340	184	140	235	606	80	226	489	160
Arrive On Green	0.10	0.19	0.19	0.10	0.19	0.19	0.07	0.39	0.39	0.07	0.39	0.39
Sat Flow, veh/h	1740	1024	650	1792	965	733	1810	1550	206	1757	1261	412
Grp Volume(v), veh/h	526	0	237	216	0	220	73	0	1033	67	0	1031
Grp Sat Flow(s), veh/h/ln	1740	0	1674	1792	0	1698	1810	0	1755	1757	0	1673
Q Serve(q_s), s	7.0	0.0	9.6	7.0	0.0	8.7	1.6	0.0	28.2	1.5	0.0	28.0
Cycle Q Clear(q_c), s	7.0	0.0	9.6	7.0	0.0	8.7	1.6	0.0	28.2	1.5	0.0	28.0
Prop In Lane	1.00		0.39	1.00		0.43	1.00		0.12	1.00		0.25
Lane Grp Cap(c), veh/h	348	0	320	340	0	324	235	0	686	226	0	649
V/C Ratio(X)	1.51	0.00	0.74	0.64	0.00	0.68	0.31	0.00	1.51	0.30	0.00	1.59
Avail Cap(c a), veh/h	348	0.00	464	340	0	471	275	0	686	270	0.00	649
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	27.1	0.0	27.5	21.6	0.0	27.1	16.3	0.0	22.0	16.4	0.0	22.1
Incr Delay (d2), s/veh	243.9	0.0	3.7	3.9	0.0	2.5	0.7	0.0	235.0	0.7	0.0	272.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	29.1	0.0	4.7	3.8	0.0	4.3	0.8	0.0	58.3	0.8	0.0	61.9
LnGrp Delay(d),s/veh	271.0	0.0	31.2	25.5	0.0	29.6	17.0	0.0	257.0	17.1	0.0	294.1
LnGrp LOS	F	0.0	C	C	0.0	C	В	0.0	F	В	0.0	- 7
Approach Vol, veh/h		763			436			1106	-		1098	
Approach Delay, s/veh		196.5			27.6			241.1			277.2	
Approach LOS		F			27.0 C			F F			Z//.Z	
							_					
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	8.2	34.2	10.0	19.8	8.4	34.0	10.0	19.8				
Change Period (Y+Rc), s	3.0	6.0	3.0	6.0	3.0	6.0	3.0	6.0				
Max Green Setting (Gmax), s	7.0	28.0	7.0	20.0	7.0	28.0	7.0	20.0				
Max Q Clear Time (g_c+I1), s	3.5	30.2	9.0	11.6	3.6	30.0	9.0	10.7				
Green Ext Time (p_c), s	0.0	0.0	0.0	2.0	0.1	0.0	0.0	2.2				
Intersection Summary												
HCM 2010 Ctrl Delay			215.4									
HCM 2010 LOS			F									

Assigned Fils	- 1		3	4	0	U	/	0
Phs Duration (G+Y+Rc), s	8.2	34.2	10.0	19.8	8.4	34.0	10.0	19.8
Change Period (Y+Rc), s	3.0	6.0	3.0	6.0	3.0	6.0	3.0	6.0
Max Green Setting (Gmax), s	7.0	28.0	7.0	20.0	7.0	28.0	7.0	20.0
Max Q Clear Time (g_c+I1), s	3.5	30.2	9.0	11.6	3.6	30.0	9.0	10.7
Green Ext Time (p_c), s	0.0	0.0	0.0	2.0	0.1	0.0	0.0	2.2

intersection Summary	
HCM 2010 Ctrl Delay	215.4
HCM 2010 LOS	F

Volume exceeds capacity, queue is theoretically infinite.
 Oueue shown is maximum after two cycles.

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

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Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	T T	T T	NDL 1	ND1	<u> </u>	7000
Traffic Volume (vph)	96	58	53	1341	931	133
Future Volume (vph)	96	58	53	1341	931	133
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	0.0	30.0	1700	1700	60.0
Storage Lanes	1	1	30.0			1
Taper Length (m)	7.5	- '	7.5			1
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.850	1.00	1.00	1.00	0.850
Flt Protected	0.950	0.000	0.950			0.000
Satd. Flow (prot)	1805	1615	1805	1792	1759	1615
Flt Permitted	0.950	1013	0.188	1172	1137	1013
Satd. Flow (perm)	1805	1615	357	1792	1759	1615
Right Turn on Red	1003	Yes	331	1172	1137	Yes
Satd. Flow (RTOR)		63				145
Link Speed (k/h)	50	US		70	70	140
Link Speed (k/II) Link Distance (m)	97.9			155.4	308.2	
Travel Time (s)	7.0			8.0	15.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0.92	0.92	0.92	6%	8%	0.92
Adj. Flow (vph)	104	63	58	1458	1012	145
	104	03	36	1436	1012	140
Shared Lane Traffic (%)	104	42	EO	1450	1012	145
Lane Group Flow (vph)	104	63 No.	58	1458	1012	145
Enter Blocked Intersection	No	No Dight	No	No	No	No Dight
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane	4.0-	4.0-	1.00	4.0-	4.00	4.05
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15	25			15
Number of Detectors	1	1	1	2	2	1
Detector Template	Left	Right	Left	Thru	Thru	Right
Leading Detector (m)	2.0	2.0	2.0	10.0	10.0	2.0
Trailing Detector (m)	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
Detector 1 Size(m)	2.0	2.0	2.0	0.6	0.6	2.0
Detector 1 Type	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex
Detector 1 Channel						
Detector 1 Extend (s)	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
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)				9.4	9.4	
Detector 2 Size(m)				0.6	0.6	
Detector 2 Type				CI+Ex	CI+Ex	
Detector 2 Channel						
Detector 2 Extend (s)				0.0	0.0	
Turn Type	Prot	Perm	Perm	NA	NA	Perm
Protected Phases	4			2	6	
	7				0	

Lane Group EBL EBR NBL NBT SBT SBR Permitted Phases 4 4 2 6 6 6 Detector Phase 4 4 2 2 6 6 Switch Phase 8 6 10.0 <t< th=""></t<>
Detector Phase 4 4 2 2 6 6 Switch Phase Minimum Initial (s) 10.0 12.0
Switch Phase Incompanies Incompanies
Minimum Initial (s) 10.0 24.0 24.0 24.0 24.0 24.0 25.0 56.0 56.0 56.0 56.0 56.0 50.0 70.0%
Minimum Split (s) 24.0 24.0 24.0 24.0 24.0 24.0 24.0 24.0 24.0 56.0 56.0 56.0 56.0 56.0 56.0 56.0 70.0% 70.
Total Split (s) 24.0 24.0 56.0 56.0 56.0 56.0 Total Split (%) 30.0% 30.0% 70.0%
Total Split (s) 24.0 24.0 56.0 56.0 56.0 56.0 Total Split (%) 30.0% 30.0% 70.0% 70.0% 70.0% 70.0% Maximum Green (s) 18.0 18.0 50.0 50.0 50.0 50.0 Yellow Time (s) 4.0 4.0 4.0 4.0 4.0 4.0 All-Red Time (s) 2.0 2.0 2.0 2.0 2.0 2.0
Total Split (%) 30.0% 30.0% 70.0% 70.0% 70.0% 70.0% Maximum Green (s) 18.0 18.0 50.0 50.0 50.0 50.0 Yellow Time (s) 4.0 4.0 4.0 4.0 4.0 4.0 All-Red Time (s) 2.0 2.0 2.0 2.0 2.0 2.0
Maximum Green (s) 18.0 18.0 50.0 50.0 50.0 50.0 Yellow Time (s) 4.0 4.0 4.0 4.0 4.0 4.0 All-Red Time (s) 2.0 2.0 2.0 2.0 2.0 2.0
All-Red Time (s) 2.0 2.0 2.0 2.0 2.0 2.0
All-Red Time (s) 2.0 2.0 2.0 2.0 2.0 2.0
Total Lost Time (s) 6.0 6.0 6.0 6.0 6.0 6.0
Lead/Lag
Lead-Lag Optimize?
Vehicle Extension (s) 3.0 3.0 3.0 3.0 3.0 3.0
Recall Mode None None Max Max Max Max
Walk Time (s) 7.0 7.0 7.0 7.0 7.0 7.0
Flash Dont Walk (s) 11.0 11.0 11.0 11.0 11.0
Pedestrian Calls (#/hr) 0 0 0 0 0 0
Act Effct Green (s) 10.8 10.8 56.9 56.9 56.9 56.9
Actuated g/C Ratio 0.14 0.14 0.76 0.76 0.76
v/c Ratio 0.40 0.22 0.21 1.07 0.76 0.12
Control Delay 33.9 9.9 6.9 63.3 13.3 1.1
Queue Delay 0.0 0.0 0.0 11.0 0.0 0.0
Total Delay 33.9 9.9 6.9 74.3 13.3 1.1
LOS C A A E B A
Approach Delay 24.9 71.8 11.8
Approach LOS C E B
Intersection Summary
Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 75.1
Natural Cycle: 150
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 1.07
Intersection Signal Delay: 44.6 Intersection LOS: D
Intersection Capacity Utilization 88.9% ICU Level of Service E
Analysis Period (min) 15
Splits and Phases: 6: Victoria Road & Access 2
↑ _{Ø2}

Synchro 9 Report Page 13

→ → → → → →
Lane Group EBL EBR NBL NBT SBT SBR
Lane Group Flow (vph) 104 63 58 1458 1012 145
v/c Ratio 0.40 0.22 0.21 1.07 0.76 0.12
Control Delay 33.9 9.9 6.9 63.3 13.3 1.1
Queue Delay 0.0 0.0 0.0 11.0 0.0 0.0
Total Delay 33.9 9.9 6.9 74.3 13.3 1.1
Queue Length 50th (m) 14.1 0.0 2.5 ~257.1 84.9 0.0
Queue Length 95th (m) 27.7 9.8 8.8 #350.2 #206.0 5.0
Internal Link Dist (m) 73.9 131.4 284.2
Turn Bay Length (m) 30.0 60.0
Base Capacity (vph) 433 435 270 1358 1332 1258
Starvation Cap Reductn 0 0 0 59 0 0
Spillback Cap Reductn 0 0 0 0 0
Storage Cap Reductn 0 0 0 0 0 0
Reduced v/c Ratio 0.24 0.14 0.21 1.12 0.76 0.12

	•	•	4	†	ţ	4	
Movement	EBL	EBR	NBL	NBT	SBT	SBR	
Lane Configurations	ň	7	٦	^	†	7	
Traffic Volume (veh/h)	96	58	53	1341	931	133	
Future Volume (veh/h)	96	58	53	1341	931	133	
Number	7	14	5	2	6	16	
Initial Q (Qb), veh	0	0	0	0	0	0	
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	
Adj Sat Flow, veh/h/ln	1900	1900	1900	1792	1759	1900	
Adj Flow Rate, veh/h	104	63	58	1458	1012	145	
Adj No. of Lanes	1	1	1	1	1	1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	
Percent Heavy Veh, %	0	0	0	6	8	0	
Cap, veh/h	243	217	243	1251	1228	1127	
Arrive On Green	0.13	0.13	0.70	0.70	0.70	0.70	
Sat Flow, veh/h	1810	1615	493	1792	1759	1615	
Grp Volume(v), veh/h	104	63	58	1458	1012	145	
Grp Sat Flow(s),veh/h/ln	1810	1615	493	1792	1759	1615	
Q Serve(g_s), s	3.8	2.5	6.8	50.0	29.3	2.1	
Cycle Q Clear(g_c), s	3.8	2.5	36.1	50.0	29.3	2.1	
Prop In Lane	1.00	1.00	1.00			1.00	
Lane Grp Cap(c), veh/h	243	217	243	1251	1228	1127	
V/C Ratio(X)	0.43	0.29	0.24	1.17	0.82	0.13	
Avail Cap(c_a), veh/h	455	406	243	1251	1228	1127	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	
Uniform Delay (d), s/veh	28.5	27.9	20.5	10.8	7.7	3.6	
Incr Delay (d2), s/veh	1.2	0.7	2.3	83.5	6.4	0.2	
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	
%ile BackOfQ(50%),veh/ln	2.0	1.2	1.1	53.0	15.9	1.0	
LnGrp Delay(d),s/veh	29.7	28.6	22.8	94.3	14.1	3.8	
LnGrp LOS	С	С	С	F	В	Α	
Approach Vol, veh/h	167			1516	1157		
Approach Delay, s/veh	29.3			91.6	12.8		
Approach LOS	С			F	В		
Timer	1	2	3	4	5	6	
Assigned Phs		2		4		6	
Phs Duration (G+Y+Rc), s		56.0		15.6		56.0	
Change Period (Y+Rc), s		6.0		6.0		6.0	
Max Green Setting (Gmax), s		50.0		18.0		50.0	
Max Q Clear Time (q_c+l1), s		52.0		5.8		31.3	
Green Ext Time (p_c), s		0.0		0.5		18.0	
Intersection Summary							
HCM 2010 Ctrl Delay			55.8				
HCM 2010 LOS			Ε				

HCM 2010 Signalized Intersection Summary

6: Victoria Road & Access 2

Volume exceeds capacity, queue is theoretically infinite.
 Oueue shown is maximum after two cycles.

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

7: Victoria Road & Victoria Park Village Road

	۶	\rightarrow	4	†	↓	4
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	٦	7	ሻ	†	ĵ.	
Traffic Volume (vph)	162	52	17	1420	1012	52
Future Volume (vph)	162	52	17	1420	1012	52
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	20.0	0.0	30.0			0.0
Storage Lanes	1	1	1			0
Taper Length (m)	7.5		7.5			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850			0.993	
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1770	1583	1770	1863	1850	0
Flt Permitted	0.950		0.950			
Satd. Flow (perm)	1770	1583	1770	1863	1850	0
Link Speed (k/h)	50			50	70	
Link Distance (m)	325.8			308.2	342.0	
Travel Time (s)	23.5			22.2	17.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	176	57	18	1543	1100	57
Shared Lane Traffic (%)						
Lane Group Flow (vph)	176	57	18	1543	1157	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	3.6	
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	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15	25			15
Sign Control	Stop			Free	Free	
Intersection Summary						
	Other					
Control Type: Unsignalized						
Intersection Capacity Utilizat	tion 90.4%			IC	CU Level	of Service E
Analysis Period (min) 15						

ntersection										
nt Delay, s/veh	209.2									
Movement	EBL	EBR	NBL	NBT	SBT	SBR				
Lane Configurations	ሻ	7	ሽ	↑	ĵ.					
Traffic Vol, veh/h	162	52	17	1420	1012	52				
Future Vol, veh/h	162	52	17	1420	1012	52				
Conflicting Peds, #/hr	0	0	0	0	0	0				
Sign Control	Stop	Stop	Free	Free	Free	Free				
RT Channelized		None	-	None	-	None				
Storage Length	200	0	300	-		-				
Veh in Median Storage	e,# 0	-	-	0	0	-				
Grade, %	0			0	0					
Peak Hour Factor	92	92	92	92	92	92				
Heavy Vehicles, %	2	2	2	2	2	2				
Mvmt Flow	176	57	18	1543	1100	57				
Major/Minor	Minor2		Major1		Major2					
Conflicting Flow All	2708	1128	1157	0	viajui z -	0				
Stage 1	1128	1120	1157	-		-				
Stage 2	1580				-					
Critical Hdwy	6.42	6.22	4.12			-				
Critical Hdwy Stg 1	5.42			-	-					
Critical Hdwy Stg 2	5.42	- 0.010	- 0.10	-	-	-				
Follow-up Hdwy		3.318		-	-	-				
Pot Cap-1 Maneuver	~ 23	249	604	-	-	-				
Stage 1	309	-	-	-	-	-				
Stage 2	186	-	-	-	-	-				
Platoon blocked, %	0.0	0.40	(0.1	-	-	-				
Mov Cap-1 Maneuver		249	604	-	-	-				
Mov Cap-2 Maneuver		-	-	-	-	-				
Stage 1	309	-	-	-	-					
Stage 2	180	-	-	-	-	-				
Approach	EB		NB		SB					
HCM Control Delay, \$	2653.4		0.1		0					
HCM LOS	F									
Minor Lane/Major Mvn	nt	NBL	NIRT	EBLn1	ERI no	SBT	SBR			
	IL		INDI	22	249		SDK			
Capacity (veh/h)		604	-			-				
HCM Cantral Dalay (a)	١	0.031		8.004		-	-			
HCM Control Delay (s))	11.1		3497.5	23.7	-	-			
HCM Lane LOS	\	В	-	F	С	-	-			
HCM 95th %tile Q(veh	1)	0.1	-	22.2	0.9	-	-			
Notes										
~: Volume exceeds ca	pacity	\$: De	elay exc	ceeds 3	00s	+: Com	putation Not Defi	ned *: All ma	jor volume in plato	on
22 22 200 00	,,		-, -,						,	

	-	•	•	←	4	1
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	f		ሻ	↑	¥	
Traffic Volume (vph)	550	174	100	471	83	51
Future Volume (vph)	550	174	100	471	83	51
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)		0.0	60.0		0.0	0.0
Storage Lanes		0	1		1	0
Taper Length (m)			7.5		7.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.968				0.949	
Flt Protected			0.950		0.970	
Satd. Flow (prot)	1812	0	1805	1881	1749	0
Flt Permitted			0.950		0.970	
Satd. Flow (perm)	1812	0	1805	1881	1749	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	290.6			206.6	213.5	
Travel Time (s)	20.9			14.9	15.4	
Confl. Peds. (#/hr)		3	3			1
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	1%	3%	0%	1%	0%	0%
Adj. Flow (vph)	573	181	104	491	86	53
Shared Lane Traffic (%)						
Lane Group Flow (vph)	754	0	104	491	139	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane	Yes					
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)		15	25		25	15
Sign Control	Free			Free	Stop	
Intersection Summary						
Area Type: (Other					
Control Type: Unsignalized						
Intersection Capacity Utilizat	tion 63.1%			IC	CU Level o	of Service I
Analysis Period (min) 15						
inaryono i oriod (iliii) io						

2.9					
	EDD	WDI	W/DT	NDI	NIDD
	EBK				NBR
	174				F.4
					51
					51
-	-	-	-	-	1
					Stop
-					None
					-
					-
0	-	-		0	-
96	96	96	96	96	96
1	3	0	1	0	0
573	181	104	491	86	53
Maior1	N	Maior?	N	Minor1	
					668
-	-		-		-
					6.2
					0.2
					3.3
-	-				
-	-				462
					-
		-		497	-
-	-				
-	-	862	-		460
-	-	-	-		-
-	-	-	-	513	-
-	-	-	-	437	-
FR		WR		MR	
U		1.7			
				·	
	NIDL 4	EDT	EDD	WDI	WDT
nt I			EBR		WBT
	330	-	-	862	-
	0.423	-	-	0.121	-
	23.7	-	-	9.8	-
			-	9.8 A	-
	e, # 0 0 0 96 1 573 Major1 0	550 174 550 174 550 174 550 174 0 3 Free Free - None - None - 96 96 1 3 573 181 Major1 N	174 100 550 174 100 550 174 100 550 174 100 550 174 100 550 174 100 550 174 100 576	100	The state of the

2: Zecca Drive/Amos Drive & Arkell Road

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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		4			4			4			4	
Traffic Volume (vph)	45	521	36	8	527	15	20	0	4	9	1	25
Future Volume (vph)	45	521	36	8	527	15	20	0	4	9	1	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. 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
Ped Bike Factor												
Frt		0.992			0.996			0.978			0.902	
Flt Protected		0.996			0.999			0.960			0.988	
Satd. Flow (prot)	0	1861	0	0	1873	0	0	1784	0	0	1693	0
Flt Permitted		0.996			0.999			0.960			0.988	
Satd. Flow (perm)	0	1861	0	0	1873	0	0	1784	0	0	1693	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		206.6			261.6			219.2			154.5	
Travel Time (s)		14.9			18.8			15.8			11.1	
Confl. Peds. (#/hr)			9	9			7		7	7		7
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	0%	1%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	47	548	38	8	555	16	21	0	4	9	1	26
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	633	0	0	579	0	0	25	0	0	36	0
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)		3.6			3.6			0.0			0.0	
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	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
Headway 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
Turning Speed (k/h)	25	_	15	25	_	15	25	0.	15	25	0.	15
Sign Control		Free			Free			Stop			Stop	
Intersection Summary												
	ther											
Control Type: Unsignalized												
Intersection Capacity Utilizati	on 68.7%			IC	CU Level	of Service	С					
Analysis Period (min) 15												

Intersection												
Int Delay, s/veh	1.6											
3 .												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		4			4			4			4	
Traffic Vol, veh/h	45	521	36	8	527	15	20	0	4	9	1	25
Future Vol, veh/h	45	521	36	8	527	15	20	0	4	9	1	25
Conflicting Peds, #/hr	0	0	9	9	0	0	7	0	7	7	0	7
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage,	# -	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	0	1	0	0	1	0	0	0	0	0	0	0
Mvmt Flow	47	548	38	8	555	16	21	0	4	9	1	26
Major/Minor M	lajor1			Major2			Vinor1		N	Minor2		
Conflicting Flow All	571	0	0	595	0	0	1271	1258	583	1250	1269	570
Stage 1	3/1	-	U	373	-	-	671	671	505	579	579	370
Stage 2							600	587		671	690	
Critical Hdwy	4.1		-	4.1	-		7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	4.1			4.1			6.1	5.5	0.2	6.1	5.5	0.2
Critical Hdwy Stg 2			-	-	-		6.1	5.5		6.1	5.5	-
Follow-up Hdwy	2.2			2.2			3.5	3.3	3.3	3.5	3.3	3.3
	1012			991			146	172	516	151	170	525
Stage 1	1012			991			449	458	210	504	504	525
	-		-		-		449	500		449	449	
Stage 2 Platoon blocked. %		-		-	-		491	500	-	449	449	
	1006	-		985	-		128	157	509	140	155	522
	1006			985	-		128	157	509	140	155	522
Mov Cap-2 Maneuver	-			-	-				-			
Stage 1	-	-	-	-	-		414	423		469	498	-
Stage 2	-	-	-	-	-	-	457	494	-	412	414	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.7			0.1			34.7			18.9		
HCM LOS							D			С		
Minor Lane/Major Mvmt		NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SRI n1			
Capacity (veh/h)		146	1006	-	LDI	985	WD1	.TDIC	295			
HCM Lane V/C Ratio		0.173	0.047			0.009			0.125			
HCM Control Delay (s)		34.7	8.8	0		8.7	0		18.9			
HCM Lane LOS		34.7 D	0.0 A	A		6.7 A	A		16.9 C			
		0.6	0.1	A		A 0	А		0.4			
HCM 95th %tile Q(veh)		0.0	U. I	-	-	0	-		0.4			

3: Colonial Drive & Arkell Road

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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	J.	î,		J.	î,			4			4	
Traffic Volume (vph)	29	396	109	80	435	138	98	0	81	81	0	18
Future Volume (vph)	29	396	109	80	435	138	98	0	81	81	0	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	50.0		0.0	60.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	1		0	0		0	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. 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
Ped Bike Factor												
Frt		0.968			0.964			0.939			0.975	
Flt Protected	0.950			0.950				0.973			0.961	
Satd. Flow (prot)	1805	1825	0	1805	1804	0	0	1708	0	0	1780	0
Flt Permitted	0.950			0.950				0.973			0.961	
Satd. Flow (perm)	1805	1825	0	1805	1804	0	0	1708	0	0	1780	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		261.6			193.8			209.6			91.7	
Travel Time (s)		18.8			14.0			15.1			6.6	
Confl. Peds. (#/hr)			8	8								
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	0%	1%	0%	0%	2%	0%	3%	0%	0%	0%	0%	0%
Adj. Flow (vph)	30	413	114	83	453	144	102	0	84	84	0	19
Shared Lane Traffic (%)												
Lane Group Flow (vph)	30	527	0	83	597	0	0	186	0	0	103	0
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)		3.6	J		3.6	J		0.0	,		0.0	J
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												
Headway 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
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Free			Free			Stop			Stop	
Intersection Summary												
Area Type: C	Other											
Control Type: Unsignalized												
Intersection Capacity Utilizat	ion 54.9%			IC	CU Level	of Service	A					
Analysis Period (min) 15												

Intersection												
Int Delay, s/veh	17.4											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	ሻ	1	LDIN	ሻ	1	WOR	HUL	4	NDIX	JDL	4	JUIN
Traffic Vol, veh/h	29	396	109	80	435	138	98	0	81	81	0	18
Future Vol. veh/h	29	396	109	80	435	138	98	0	81	81	0	18
Conflicting Peds, #/hr	0	0,0	8	8	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-		None	-	-	None	-	-	None	-	-	None
Storage Length	500		-	600		-	-		-	-		-
Veh in Median Storage,	# -	0		-	0	-	-	0	-	-	0	
Grade, %	-	0	-	-	0	-	-	0	-		0	-
Peak Hour Factor	96	96	96	96	96	96	96	96	96	96	96	96
Heavy Vehicles, %	0	1	0	0	2	0	3	0	0	0	0	0
Mvmt Flow	30	413	114	83	453	144	102	0	84	84	0	19
Major/Minor N	1ajor1		1	Major2			Vinor1		ı	Minor2		
Conflicting Flow All	597	0	0	534	0	0	1239	1302	477	1264	1286	525
Stage 1	-	-	-	-	-		538	538		692	692	-
Stage 2							701	764		572	594	
Critical Hdwy	4.1			4.1			7.13	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-			-			6.13	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-		6.13	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.527	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	989	-	-	1044	-		152	162	592	148	166	556
Stage 1	-	-	-	-	-	-	525	526	-	437	448	-
Stage 2	-	-	-	-	-	-	428	416	-	509	496	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	989	-	-	1044	-	-	134	144	588	116	147	556
Mov Cap-2 Maneuver	-	-	-	-	-	-	134	144	-	116	147	-
Stage 1	-	-	-	-	-	-	506	507	-	424	412	-
Stage 2	-	-	-	-	-	-	381	383	-	423	478	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.5			1.1			88.2			88		
HCM LOS							F			F		
Minor Lane/Major Mvmt		VBLn1	EBL	EBT	EBR	WBL	WBT	WBR:	CDI n1			
		206	989		EDK	1044		WDK.	135			
Capacity (veh/h) HCM Lane V/C Ratio		0.905		-		0.08	-		0.764			
		88.2	8.8	-		8.7			0.764			
HCM Control Delay (s) HCM Lane LOS		88.2 F	8.8 A			8.7 A		-	88 F			
		7.2	0.1			0.3			4.5			
HCM 95th %tile Q(veh)		1.2	U. I	-	-	0.3	-	-	4.5			

4: Residential Entrance/Access 1 & Arkell Road

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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	7	î»			4			4		٦		7
Traffic Volume (vph)	8	547	4	3	641	7	3	0	3	8	0	9
Future Volume (vph)	8	547	4	3	641	7	3	0	3	8	0	9
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	25.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	0		0	0		0	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. 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
Frt		0.999			0.998			0.932				0.850
Flt Protected	0.950							0.976		0.950		
Satd. Flow (prot)	1805	1826	0	0	1758	0	0	1728	0	1805	0	1615
Flt Permitted	0.950							0.976		0.950		
Satd. Flow (perm)	1805	1826	0	0	1758	0	0	1728	0	1805	0	1615
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		193.8			144.3			68.0			96.7	
Travel Time (s)		14.0			10.4			4.9			7.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	4%	0%	0%	8%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	9	595	4	3	697	8	3	0	3	9	0	10
Shared Lane Traffic (%)												
Lane Group Flow (vph)	9	599	0	0	708	0	0	6	0	9	0	10
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)		3.6			3.6			3.6			3.6	
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												
Headway 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
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Free			Free			Stop			Stop	
Intersection Summary												
	Other											
Control Type: Unsignalized												
Intersection Capacity Utilizat	ion 51.0%			IC	CU Level	of Service	A					
Analysis Period (min) 15												

Intersection												
Int Delay, s/veh	0.5											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	ሻ	ĵ.			4			4		ች		7
Traffic Vol, veh/h	8	547	4	3	641	7	3	0	3	8	0	9
Future Vol, veh/h	8	547	4	3	641	7	3	0	3	8	0	9
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None		-	None
Storage Length	250	-	-			-	-			0	-	0
Veh in Median Storage,	# -	0	-	-	0	-	-	0		-	0	-
Grade, %		0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	0	4	0	0	8	0	0	0	0	0	0	0
Mvmt Flow	9	595	4	3	697	8	3	0	3	9	0	10
Major/Minor N	Najor1		N	Najor2		1	Minor1			Minor2		
Conflicting Flow All	704	0	0	599	0	0	1321	1325	597	1323	-	701
Stage 1			-			-	614	614	-	707		-
Stage 2		-					707	711		616	-	
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.5	6.2	7.1	-	6.2
Critical Hdwy Stg 1	-	-	-	-	-		6.1	5.5	-	6.1	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	-	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	-	3.3
Pot Cap-1 Maneuver	903	-	-	988	-	-	135	157	507	135	0	442
Stage 1	-	-	-	-	-	-	483	486	-	429	0	-
Stage 2	-	-	-	-	-	-	429	439	-	481	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	903	-	-	988	-	-	131	155	507	133	-	442
Mov Cap-2 Maneuver	-	-	-	-	-	-	131	155	-	133	-	-
Stage 1	-	-	-	-	-	-	478	481	-	425	-	-
Stage 2	-	-	-	-	-	-	417	437	-	473	-	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.1			0			22.9			23		
HCM LOS							С			С		
Minor Lane/Major Mvmt	1	VBLn1	EBL	EBT	EBR	WBL	WBT	WBR:	SBLn1:	SBLn2		
Capacity (veh/h)		208	903	-		988	-		133	442		
HCM Lane V/C Ratio		0.031	0.01			0.003			0.065	–		
HCM Control Delay (s)		22.9	9	-		8.7	0		34	13.3		
HCM Lane LOS		C	Á			A	Ā		D	В		
HCM 95th %tile Q(veh)		0.1	0	-	-	0	-	-	0.2	0.1		
		3.1	U			U			0.2	5.1		

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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	ች	1 >		*	1 >		ሻ	1>		*	1>	
Traffic Volume (vph)	291	175	92	148	226	83	98	873	177	90	850	324
Future Volume (vph)	291	175	92	148	226	83	98	873	177	90	850	324
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	40.0		0.0	20.0		0.0	90.0		0.0	50.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. 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
Ped Bike Factor							1.00				0.99	
Frt		0.948			0.960			0.975			0.959	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1787	1789	0	1703	1796	0	1805	1759	0	1805	1765	0
Flt Permitted	0.325			0.411			0.141			0.141		
Satd. Flow (perm)	611	1789	0	737	1796	0	268	1759	0	268	1765	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		32			22			14			26	
Link Speed (k/h)		50			60			70			70	
Link Distance (m)		144.3			357.4			823.5			155.4	
Travel Time (s)		10.4			21.4			42.4			8.0	
Confl. Peds. (#/hr)							6					6
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles (%)	1%	1%	0%	6%	1%	3%	0%	6%	2%	0%	3%	1%
Adj. Flow (vph)	310	186	98	157	240	88	104	929	188	96	904	345
Shared Lane Traffic (%)												
Lane Group Flow (vph)	310	284	0	157	328	0	104	1117	0	96	1249	0
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)		3.6	J		3.6	3		3.6	J		3.6	3
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												
Headway 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
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	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	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	CI+Ex	CI+Ex		CI+Ex	CI+Ex		CI+Ex	CI+Ex		CI+Ex	CI+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	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	
Detector 1 Delay (s)	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		CI+Ex			CI+Ex			CI+Ex			CI+Ex	
Detector 2 Channel												

Jalu. How (perili)	011	1/07	U	131	1/70	U	200	1/37	U	200	1700	U
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		32			22			14			26	
Link Speed (k/h)		50			60			70			70	
Link Distance (m)		144.3			357.4			823.5			155.4	
Travel Time (s)		10.4			21.4			42.4			8.0	
Confl. Peds. (#/hr)							6					6
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles (%)	1%	1%	0%	6%	1%	3%	0%	6%	2%	0%	3%	1%
Adj. Flow (vph)	310	186	98	157	240	88	104	929	188	96	904	345
Shared Lane Traffic (%)												
Lane Group Flow (vph)	310	284	0	157	328	0	104	1117	0	96	1249	0
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)		3.6			3.6			3.6			3.6	
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												
Headway 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
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	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	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	CI+Ex	CI+Ex		CI+Ex	CI+Ex		CI+Ex	CI+Ex		CI+Ex	CI+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	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	
Detector 1 Delay (s)	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		CI+Ex			CI+Ex			CI+Ex			CI+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
220 Arkell Road TIS 5:00 pm	n 07-04-20)18 2031	PM Back	ground							Synchro 9	Report Page 9

Synchr	o 9 Report
	Page 9

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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBI
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Detector Phase	7	4		3	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0		7.0	10.0		7.0	10.0	
Minimum Split (s)	10.0	26.0		10.0	26.0		10.0	34.0		10.0	34.0	
Total Split (s)	10.0	26.0		10.0	26.0		10.0	34.0		10.0	34.0	
Total Split (%)	12.5%	32.5%		12.5%	32.5%		12.5%	42.5%		12.5%	42.5%	
Maximum Green (s)	7.0	20.0		7.0	20.0		7.0	28.0		7.0	28.0	
Yellow Time (s)	3.0	4.0		3.0	4.0		3.0	4.0		3.0	4.0	
All-Red Time (s)	0.0	2.0		0.0	2.0		0.0	2.0		0.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	3.0	6.0		3.0	6.0		3.0	6.0		3.0	6.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	None		None	None	
Walk Time (s)		7.0			7.0			13.0			13.0	
Flash Dont Walk (s)		13.0			13.0			15.0			15.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)	26.9	16.8		26.9	16.8		36.7	28.3		36.7	28.3	
Actuated g/C Ratio	0.36	0.22		0.36	0.22		0.49	0.38		0.49	0.38	
v/c Ratio	0.94	0.67		0.44	0.78		0.38	1.66		0.35	1.83	
Control Delay	59.5	32.3		20.0	40.3		14.0	326.5		13.5	400.8	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	59.5	32.3		20.0	40.3		14.0	326.5		13.5	400.8	
LOS	E	С		В	D		В	F		В	F	
Approach Delay		46.5			33.7			299.8			373.1	
Approach LOS		D			С			F			F	
Intersection Summary												
Area Type:	Other											
Cycle Length: 80												
Actuated Cycle Length: 75												
Natural Cycle: 150												
Control Type: Actuated-Un	coordinated	i										
Maximum v/c Ratio: 1.83												
Intersection Signal Delay: 2		24			tersection							
Intersection Capacity Utiliz	ation 120.2°	%		10	CU Level	of Service	e H					
Analysis Period (min) 15												

Splits and Phases: 5: Victoria Road & Arkell Road

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Lane Group EBL EBT WBL WBT NBL NBT SBL SBT Lane Group Flow (vph) 310 284 157 328 104 1117 96 1249 v/c Ratio 0.94 0.67 0.44 0.78 0.38 1.66 0.35 1.83 Control Delay 59.5 32.3 20.0 40.3 14.0 326.5 13.5 400.8 Queue Delay 0.0		•	→	1	—	4	†	-	↓
V/c Ratio 0.94 0.67 0.44 0.78 0.38 1.66 0.35 1.83 Control Delay 59.5 32.3 20.0 40.3 14.0 326.5 13.5 400.8 Queue Delay 0.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 0	Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Control Delay 59.5 32.3 20.0 40.3 14.0 326.5 13.5 400.8 Queue Delay 0.0 0.	Lane Group Flow (vph)	310	284	157	328	104	1117	96	1249
Queue Delay 0.0 <th< td=""><td>v/c Ratio</td><td>0.94</td><td>0.67</td><td>0.44</td><td>0.78</td><td>0.38</td><td>1.66</td><td>0.35</td><td>1.83</td></th<>	v/c Ratio	0.94	0.67	0.44	0.78	0.38	1.66	0.35	1.83
Total Delay 59.5 32.3 20.0 40.3 14.0 326.5 13.5 400.8 Queue Length 50th (m) 34.2 35.5 15.8 44.6 7.8 -268.3 7.2 -310.2 Queue Length 95th (m) #81.0 60.9 28.8 #75.9 16.1 #351.0 15.0 #395.7 Internal Link Dist (m) 120.3 333.4 799.5 131.4 Turn Bay Length (m) 40.0 20.0 90.0 50.0 Base Capacity (vph) 330 506 355 500 276 673 276 682 Starvation Cap Reductn 0<	Control Delay	59.5	32.3	20.0	40.3	14.0	326.5	13.5	400.8
Queue Length 50th (m) 34.2 35.5 15.8 44.6 7.8 -268.3 7.2 -310.2 Queue Length 95th (m) #81.0 60.9 28.8 #75.9 16.1 #351.0 15.0 #395.7 Internal Link Dist (m) 120.3 333.4 799.5 131.4 Turn Bay Length (m) 40.0 20.0 90.0 50.0 Base Capacity (vph) 330 506 355 500 276 673 276 682 Starvation Cap Reductn 0 0 0 0 0 0 0 0 Spillback Cap Reductn 0 0 0 0 0 0 0 0 Storage Cap Reductn 0 0 0 0 0 0 0 0 0	Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Queue Length 95th (m) #81.0 60.9 28.8 #75.9 16.1 #351.0 15.0 #395.7 Internal Link Dist (m) 120.3 333.4 799.5 131.4 Turn Bay Length (m) 40.0 20.0 90.0 50.0 Base Capacity (vph) 330 506 355 500 276 673 276 682 Starvation Cap Reductn 0 0 0 0 0 0 0 0 Spillback Cap Reductn 0 0 0 0 0 0 0 0 Storage Cap Reductn 0 0 0 0 0 0 0 0	Total Delay	59.5	32.3	20.0	40.3	14.0	326.5	13.5	400.8
Internal Link Dist (m) 120.3 333.4 799.5 131.4 Turn Bay Length (m) 40.0 20.0 90.0 50.0 Base Capacity (vph) 330 506 355 500 276 673 276 682 Starvation Cap Reductn 0 0 0 0 0 0 0 0 Spillback Cap Reductn 0 0 0 0 0 0 0 Storage Cap Reductn 0 0 0 0 0 0 0	Queue Length 50th (m)	34.2	35.5	15.8	44.6	7.8	~268.3	7.2	~310.2
Turn Bay Length (m) 40.0 20.0 90.0 50.0 Base Capacity (vph) 330 506 355 500 276 673 276 682 Starvation Cap Reductn 0	Queue Length 95th (m)	#81.0	60.9	28.8	#75.9	16.1	#351.0	15.0	#395.7
Base Capacity (vph) 330 506 355 500 276 673 276 682 Starvation Cap Reductn 0 0 0 0 0 0 0 0 Spillback Cap Reductn 0 0 0 0 0 0 0 0 Storage Cap Reductn 0 0 0 0 0 0 0 0	Internal Link Dist (m)		120.3		333.4		799.5		131.4
Starvation Cap Reductn 0 0 0 0 0 0 0 Spillback Cap Reductn 0 0 0 0 0 0 0 0 Storage Cap Reductn 0 0 0 0 0 0 0 0	Turn Bay Length (m)	40.0		20.0		90.0		50.0	
Spillback Cap Reductn 0 0 0 0 0 0 0 Storage Cap Reductn 0 0 0 0 0 0 0 0	Base Capacity (vph)	330	506	355	500	276	673	276	682
Storage Cap Reductn 0 0 0 0 0 0 0	Starvation Cap Reductn	0	0	0	0	0	0	0	0
g	Spillback Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio 0.94 0.56 0.44 0.66 0.38 1.66 0.35 1.83	Storage Cap Reductn	0	0	0	0	0	0	0	0
	Reduced v/c Ratio	0.94	0.56	0.44	0.66	0.38	1.66	0.35	1.83

Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	ሻ	1•		ሻ	f)		ሻ	1>		ሻ	ĵ.	
Traffic Volume (veh/h)	291	175	92	148	226	83	98	873	177	90	850	324
Future Volume (veh/h)	291	175	92	148	226	83	98	873	177	90	850	324
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		0.99	1.00		0.99
Parking Bus, Adj	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 Sat Flow, veh/h/ln	1881	1888	1900	1792	1871	1900	1900	1804	1900	1900	1855	1900
Adj Flow Rate, veh/h	310	186	98	157	240	88	104	929	188	96	904	345
Adj No. of Lanes	1	1	0	1	1	0	1	1	0	1	1	0
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	1	1	1	6	1	1	0	6	6	0	3	3
Cap, veh/h	311	261	138	331	293	107	242	536	109	239	468	179
Arrive On Green	0.09	0.22	0.22	0.09	0.22	0.22	0.08	0.37	0.37	0.08	0.37	0.37
Sat Flow, veh/h	1792	1165	614	1707	1307	479	1810	1455	294	1810	1277	487
Grp Volume(v), veh/h	310	0	284	157	0	328	104	0	1117	96	0	1249
Grp Sat Flow(s), veh/h/ln	1792	0	1779	1707	0	1787	1810	0	1749	1810	0	1764
Q Serve(g_s), s	7.0	0.0	11.2	5.3	0.0	13.3	2.6	0.0	28.1	2.4	0.0	28.0
Cycle Q Clear(g_c), s	7.0	0.0	11.2	5.3	0.0	13.3	2.6	0.0	28.1	2.4	0.0	28.0
Prop In Lane	1.00		0.35	1.00		0.27	1.00		0.17	1.00		0.28
Lane Grp Cap(c), veh/h	311	0	399	331	0	400	242	0	645	239	0	647
V/C Ratio(X)	1.00	0.00	0.71	0.47	0.00	0.82	0.43	0.00	1.73	0.40	0.00	1.93
Avail Cap(c_a), veh/h	311	0	466	331	0	468	260	0	645	260	0	647
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Unstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00

Approach Vol, veh/h		594			485			1221	1345	
Approach Delay, s/veh		55.2			32.6			330.9	417.8	
Approach LOS		Е			С			F	F	
Timer	1	2	3	4	5	6	7	8		
Assigned Phs	1	2	3	4	5	6	7	8		
Phs Duration (G+Y+Rc), s	9.1	34.1	10.0	23.1	9.2	34.0	10.0	23.1		
Change Period (Y+Rc), s	3.0	6.0	3.0	6.0	3.0	6.0	3.0	6.0		
Max Green Setting (Gmax), s	7.0	28.0	7.0	20.0	7.0	28.0	7.0	20.0		
Max Q Clear Time (g_c+l1), s	4.4	30.1	7.3	13.2	4.6	30.0	9.0	15.3		
Green Ext Time (p_c), s	0.1	0.0	0.0	2.4	0.1	0.0	0.0	1.8		

Intersection Summary HCM 2010 Ctrl Delay 278.4 HCM 2010 LOS

Uniform Delay (d), s/veh

Incr Delay (d2), s/veh Initial Q Delay(d3),s/veh

LnGrp Delay(d),s/veh

LnGrp LOS

%ile BackOfQ(50%),veh/ln

26.9

50.0

0.0

7.4

0.0

0.0

0.0

0.0

0.0

27.3

0.0

6.0

31.5 21.7

20.7

2.5

0.0 28.1

0.0

0.0

0.0

0.0

0.0

7.6

37.8 18.7

17.5

1.2

1.3

0.0 24.1

0.0 335.9

0.0 0.0

0.0 73.6

360.0

17.5

1.1

1.2

18.6

0.0 24.2

0.0 424.4

0.0 0.0

0.0

0.0 448.5

89.7

HCM 2010 Signalized Intersection Summary

5: Victoria Road & Arkell Road

Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

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

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Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	ኘ	7	ኘ	1	<u> </u>	7
Traffic Volume (vph)	50	23	20	1225	1240	43
Future Volume (vph)	50	23	20	1225	1240	43
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	0.0	30.0	1700	1700	60.0
Storage Lanes	1	1	30.0			1
Taper Length (m)	7.5	- 1	7.5			- 1
	1.00	1.00	1.00	1.00	1.00	1.00
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	
Frt	0.050	0.850	0.050			0.850
Flt Protected	0.950	4.45	0.950	4700	1015	4/45
Satd. Flow (prot)	1805	1615	1805	1792	1845	1615
Flt Permitted	0.950		0.066			
Satd. Flow (perm)	1805	1615	125	1792	1845	1615
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		25				36
Link Speed (k/h)	50			70	70	
Link Distance (m)	97.9			155.4	308.2	
Travel Time (s)	7.0			8.0	15.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0.92	0.92	0.92	6%	3%	0.92
Adj. Flow (vph)	54	25	22	1332	1348	47
, ,,,	54	25	22	1332	1340	47
Shared Lane Traffic (%)		0.5		4000	40.40	
Lane Group Flow (vph)	54	25	22	1332	1348	47
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	3.6	
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	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15	25			15
Number of Detectors	1	1	1	2	2	1
Detector Template	Left	Right	Left	Thru	Thru	Right
	2.0	2.0	2.0	10.0	10.0	2.0
Leading Detector (m)						
Trailing Detector (m)	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
Detector 1 Size(m)	2.0	2.0	2.0	0.6	0.6	2.0
Detector 1 Type	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex
Detector 1 Channel						
Detector 1 Extend (s)	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
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)				9.4	9.4	
Detector 2 Size(m)				0.6	0.6	
Detector 2 Type				CI+Ex	CI+Ex	
Detector 2 Channel				OITEX	OITEX	
				0.0	0.0	
Detector 2 Extend (s)	D					
Turn Type	Prot	Perm	Perm	NA	NA	Perm
Protected Phases	4			2	6	

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Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Permitted Phases		4	2			6
Detector Phase	4	4	2	2	6	6
Switch Phase						
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	24.0	24.0	24.0	24.0	24.0	24.0
Total Split (s)	24.0	24.0	56.0	56.0	56.0	56.0
Total Split (%)	30.0%	30.0%	70.0%	70.0%	70.0%	70.0%
Maximum Green (s)	18.0	18.0	50.0	50.0	50.0	50.0
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	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
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	Max	Max	Max	Max
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	7.0
Flash Dont Walk (s)	11.0	11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0	0	0	0	0
Act Effct Green (s)	10.1	10.1	63.4	63.4	63.4	63.4
Actuated g/C Ratio	0.13	0.13	0.83	0.83	0.83	0.83
v/c Ratio	0.23	0.11	0.21	0.89	0.88	0.03
Control Delay	32.7	13.3	9.9	20.2	18.6	1.7
Queue Delay	0.0	0.0	0.0	6.0	0.0	0.0
Total Delay	32.7	13.3	9.9	26.1	18.6	1.7
LOS	С	В	Α	С	В	Α
Approach Delay	26.6			25.9	18.0	
Approach LOS	С			С	В	
Intersection Summary						
Area Type:	Other					
Cycle Length: 80	Ollici					
Actuated Cycle Length: 76	4.1					
Natural Cycle: 110	J. I					
Control Type: Semi Act-U	ncoord					
Maximum v/c Ratio: 0.89	ricooru					
Intersection Signal Delay:	22.0			l.	ntersectio	n I OS. C
Intersection Capacity Utiliz						of Service
Analysis Period (min) 15	2011011 03.070	,		10	20 Fevel	UI JEI VICE
Analysis Fellou (IIIII) 15						
Splits and Phases: 6: V	ictoria Road	& Access	s 2			
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220 Arkell Road TIS 5:00 pm 07-04-2018 2031 PM Background

Synchro 9 Report Page 13 220 Arkell Road TIS 5:00 pm 07-04-2018 2031 PM Background

Synchro 9 Report Page 14

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Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	54	25	22	1332	1348	47
v/c Ratio	0.23	0.11	0.21	0.89	0.88	0.03
Control Delay	32.7	13.3	9.9	20.2	18.6	1.7
Queue Delay	0.0	0.0	0.0	6.0	0.0	0.0
Total Delay	32.7	13.3	9.9	26.1	18.6	1.7
Queue Length 50th (m)	8.8	0.0	1.0	185.2	178.7	0.4
Queue Length 95th (m)	16.8	6.5	5.3	#290.6	#290.2	2.9
Internal Link Dist (m)	73.9			131.4	284.2	
Turn Bay Length (m)			30.0			60.0
Base Capacity (vph)	429	403	104	1492	1536	1351
Starvation Cap Reductn	0	0	0	127	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.13	0.06	0.21	0.98	0.88	0.03
latana alian Communi						

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

Queue shown is maximum after two cycles.

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Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	ሻ	7	ሻ	↑	↑	7
Traffic Volume (veh/h)	50	23	20	1225	1240	43
Future Volume (veh/h)	50	23	20	1225	1240	43
Number	7	14	5	2	6	16
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1900	1900	1792	1845	1900
Adj Flow Rate, veh/h	54	25	22	1332	1348	47
Adj No. of Lanes	1	1	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	0.72	0.72	0.72	6	3	0.72
Cap, veh/h	203	181	103	1283	1321	1156
Arrive On Green	0.11	0.11	0.72	0.72	0.72	0.72
Sat Flow, veh/h	1810	1615	393	1792	1845	1615
Grp Volume(v), veh/h	54	25	22	1332	1348	47
Grp Sat Flow(s), veh/h/ln	1810	1615	393	1792	1845	1615
Q Serve(q s), s	1.9	1.0	0.0	50.0	50.0	0.6
Cycle Q Clear(q c), s	1.9	1.0	50.0	50.0	50.0	0.6
) to= /:				50.0	50.0	
Prop In Lane Lane Grp Cap(c), veh/h	1.00	1.00	1.00	1202	1001	1.00
	203	181	103	1283	1321	1156
V/C Ratio(X)	0.27	0.14	0.21	1.04	1.02	0.04
Avail Cap(c_a), veh/h	466	416	103	1283	1321	1156
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	28.4	28.0	34.9	9.9	9.9	2.9
Incr Delay (d2), s/veh	0.7	0.3	4.7	35.5	30.1	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.0	0.4	0.5	36.5	35.6	0.3
LnGrp Delay(d),s/veh	29.1	28.3	39.6	45.5	40.0	3.0
LnGrp LOS	С	С	D	F	F	A
Approach Vol, veh/h	79			1354	1395	
Approach Delay, s/veh	28.8			45.4	38.8	
Approach LOS	С			D	D	
Timer	1	2	3	4	5	6
Assigned Phs		2	- 3	4	J	6
		56.0		13.8		56.0
Phs Duration (G+Y+Rc), s		6.0		6.0		6.0
Change Period (Y+Rc), s						
Max Green Setting (Gmax), s		50.0		18.0		50.0
Max Q Clear Time (g_c+I1), s		52.0		3.9		52.0
Green Ext Time (p_c), s		0.0		0.2		0.0
Intersection Summary						
HCM 2010 Ctrl Delay			41.7			
HCM 2010 LOS			D			

HCM 2010 Signalized Intersection Summary 6: Victoria Road & Access 2

7: Victoria Road & Victoria Park Village Road

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Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	ሻ	7	ሻ	1	- 1>	
Traffic Volume (vph)	90	38	64	1257	1368	153
Future Volume (vph)	90	38	64	1257	1368	153
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	20.0	0.0	30.0			0.0
Storage Lanes	1	1	1			0
Taper Length (m)	7.5		7.5			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850			0.986	
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1805	1615	1805	1792	1824	0
Flt Permitted	0.950		0.950			
Satd. Flow (perm)	1805	1615	1805	1792	1824	0
Link Speed (k/h)	50			50	70	
Link Distance (m)	325.8			308.2	342.0	
Travel Time (s)	23.5			22.2	17.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	6%	3%	0%
Adj. Flow (vph)	98	41	70	1366	1487	166
Shared Lane Traffic (%)						
Lane Group Flow (vph)	98	41	70	1366	1653	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane	1.0			1.0	1.0	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15	25	1.00	1.00	15
Sign Control	Stop	10	20	Free	Free	10
<u> </u>	Этор			1100	1100	
Intersection Summary						
	Other					
Control Type: Unsignalized						
Intersection Capacity Utilizat	ion 92.9%			IC	CU Level of	of Service F
Analysis Period (min) 15						

Intersection								
Int Delay, s/veh	117.1							
Movement	EBL	EBR	NBL	NBT	SBT	SBR		
Lane Configurations		7	ች		ĵ.			
Traffic Vol, veh/h	90	38	64	1257	1368	153		
Future Vol, veh/h	90	38	64	1257	1368	153		
Conflicting Peds, #/hr	0	0	0	0	0	0		
Sign Control	Stop	Stop	Free	Free	Free	Free		
RT Channelized	- '-	None	-	None	-	None		
Storage Length	200	0	300	-	-	-		
Veh in Median Storage	e, # 0		-	0	0	-		
Grade, %	0	-	-	0	0			
Peak Hour Factor	92	92	92	92	92	92		
Heavy Vehicles, %	0	0	0	6	3	0		
Mvmt Flow	98	41	70	1366	1487	166		
Major/Minor I	Minor2		Major1		Major2			
Conflicting Flow All	3075	1570	1653	0	-	0		
Stage 1	1570	-	-	-	-	-		
Stage 2	1505	-	-	-	-	-		
Critical Hdwy	6.4	6.2	4.1	-	-	-		
Critical Hdwy Stg 1	5.4	-	-	-	-			
Critical Hdwy Stg 2	5.4		-	-	-			
Follow-up Hdwy	3.5	3.3	2.2	-	-	-		
Pot Cap-1 Maneuver	~ 14	138	396	-	-	-		
Stage 1	190	-	-	-	-	-		
Stage 2	205		-		-			
Platoon blocked, %				-	-	-		
Mov Cap-1 Maneuver	~ 12	138	396	-	-	-		
Mov Cap-2 Maneuver	~ 12	-	-	-	-	-		
Stage 1	190		-	-	-			
Stage 2	169	-	-	-	-	-		
ű								
Approach	EB		NB		SB			
HCM Control Delay, \$ 3	2709.1		0.8		0			
HCM LOS	F							
Minor Lane/Major Mvm	nt	NBL	NRT	EBLn1	FRI n2	SBT	SBR	
Capacity (veh/h)	it.	396	-	12	138	-	-	
HCM Lane V/C Ratio		0.176		8.152				
HCM Control Delay (s)		16		3835.2	41.9			
HCM Lane LOS		C	Ψ·	F	F1.7			
HCM 95th %tile Q(veh))	0.6	-		1.2			
	,	0.0		10.0	1.2			
Notes		4.0						
~: Volume exceeds cap	pacity	\$: De	elay exc	eeds 3	UUS	+: Com	outation Not Define	d *: All major volume in p

Appendix H

Background Traffic Signal Warrant Justification Worksheets



Signal Justification Calculation for Forecasted Volumes (OTM Book 12 - Justification 7)



Horizon Year: 2031 Background
Region/City/Township: City of Guelph

Major Street: Arkell Road

Minor Street: Colonial Drive

North/South?: N

Number of Approach Lanes: 1
Tee Intersection? N
Flow Conditions: Restricted

		Warrant Results
150% Satisfied	No	Justification for new intersections with forecast traffic
120% Satisfied	No	Justification for existing intersections with forecast traffic

PM Forecast Only? N

Major Street						Minor Street							
	Arkell Road						Colonial Drive						
		Eastbound			Westbound			Northbound			Southbound		
Time Period	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	Main Road
AM Peak Hour	11	487	79	47	286	42	149	0	156	131	0	32	
PM Peak Hour	29	396	109	80	435	138	98	0	81	81	0	18	
Average Hourly Volume	10	221	47	32	180	45	62	0	59	53	0	13	0

Warrant	AHV				
1A - All	721				
1B - Minor	187				
2A - Major	535				
2B - Cross	115				

Warrant 1 - Minimum Vehicular Volume

	Approach Lanes		1	2 or	Average	
	Flow Conditions	Free	Restricted	Free	Restricted	Hourly
1A	Flow Conditions		Х			Volume
	All Approaches	480	720	600	900	721
	All Approaches				% Fulfilled	100.2%

	Approach Lanes		1	2 or	more	Average
	Flow Conditions	Free	Restricted	Free	Restricted	Hourly
1B	Flow Conditions		Х			Volume
1	Minor Street	120	170	120	170	187
1	Approaches				% Fulfilled	109.7%

Warrant 2 - Delay To Cross Traffic

	Approach Lanes		1	2 or	Average	
	Flow Conditions	Free	Restricted	Free	Restricted	Hourly
2A	Flow Conditions		Х			Volume
	Major Street	480	720	600	900	535
	Approaches				% Fulfilled	74.3%

	Approach Lanes		1	2 or	Average	
	Flow Conditions	Free	Restricted	Free	Restricted	Hourly
2B	Flow Conditions		X			Volume
	Traffic Crossing Major	50	75	50	75	115
	Street				% Fulfilled	153.0%

Signal Justification Calculation for Forecasted Volumes (OTM Book 12 - Justification 7)



Horizon Year: 2031 Background
Region/City/Township: City of Guelph

Major Street: Victoria Road
Minor Street: Victoria Park Village Road

North/South?: Y

Number of Approach Lanes: 2 or more
Tee Intersection? Y
Flow Conditions: Free

		Warrant Results
150% Satisfied	No	Justification for new intersections with forecast traffic
120% Satisfied	Yes	Justification for existing intersections with forecast traffic

PM Forecast Only? N

Major Street					Minor Street								
	Victoria Road						Victoria Park Village Road						
		Northbound			Southbound	Į.	Eastbound			Westbound			Peds Crossing
Time Period	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	Main Road
AM Peak Hour	17	1420			1012	52	162		52				
PM Peak Hour	64	1257			1368	153	90		38				
Average Hourly Volume	20	669	0	0	595	51	63	0	23	0	0	0	0

Warrant	AHV
1A - All	1421
1B - Minor	86
2A - Major	1336
2B - Cross	63

Warrant 1 - Minimum Vehicular Volume

	Approach Lanes	1		2 or more		Average
1A	Flow Conditions	Free	Restricted	Free	Restricted	Hourly
				X		Volume
	All Approaches	480	720	600	900	1421
					% Fulfilled	236.9%

	Approach Lanes	1		2 or more		Average
1B	Flow Conditions	Free	Restricted	Free	Restricted	Hourly
				X		Volume
	Minor Street	180	255	180	255	86
	Approaches				% Fulfilled	47.5%

Warrant 2 - Delay To Cross Traffic

	Approach Lanes	1		2 or more		Average
	Flow Conditions	Free	Restricted	Free	Restricted	Hourly
2A				X		Volume
	Major Street	480	720	600	900	1336
	Approaches				% Fulfilled	222.6%

	Approach Lanes	1		2 or	Average	
2B	Flow Conditions	Free	Restricted	Free	Restricted	Hourly
				X		Volume
	Traffic Crossing Major	50	75	50	75	63
	Street				% Fulfilled	126.0%

Appendix I

2031 Background Remedial Measures Traffic Operations Reports



	•	-	\rightarrow	•	←	•	4	†	/	-	↓	4
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	ሻ	î,		7	î,			4			43-	
Traffic Volume (vph)	11	487	79	47	286	42	149	0	156	131	0	32
Future Volume (vph)	11	487	79	47	286	42	149	0	156	131	0	32
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	50.0		0.0	60.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	1		0	0		0	0		0
Taper Length (m)	7.5		-	7.5		-	7.5		-	7.5		-
Lane Util. 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
Ped Bike Factor		0.99						0.99				
Frt		0.979			0.981			0.931			0.973	
Flt Protected	0.950	0.777		0.950	0.701			0.976			0.961	
Satd. Flow (prot)	1770	1769	0	1703	1738	0	0	1603	0	0	1742	0
Flt Permitted	0.444	1707	U	0.175	1730	U	U	0.769	U	U	0.578	U
Satd. Flow (perm)	827	1769	0	314	1738	0	0	1263	0	0	1048	0
Right Turn on Red	021	1707	Yes	314	1730	Yes	U	1203	Yes	U	1040	Yes
Satd. Flow (RTOR)		12	163		11	163		60	163		33	163
Link Speed (k/h)		50			50			50			50	
-1		261.6			193.8			209.6			91.7	
Link Distance (m)												
Travel Time (s)		18.8	11	11	14.0			15.1	1		6.6	
Confl. Peds. (#/hr)	0.00	0.00	11	11	0.00	0.00	0.00	0.00	1	0.00	0.00	0.00
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	4%	7%	6%	8%	2%	9%	2%	4%	2%	2%	2%
Adj. Flow (vph)	12	529	86	51	311	46	162	0	170	142	0	35
Shared Lane Traffic (%)	4.0				057						477	
Lane Group Flow (vph)	12	615	0	51	357	0	0	332	0	0	177	0
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)		3.6			3.6			0.0			0.0	
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												
Headway 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
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	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	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	CI+Ex	CI+Ex		CI+Ex	CI+Ex		CI+Ex	CI+Ex		CI+Ex	CI+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	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	
Detector 1 Delay (s)	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		CI+Ex			CI+Ex			CI+Ex			CI+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

32 900 0.0 0			
.00			
0			
0 es			
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.92 2% 35			
0 No ght			
.00 15			
ort	•		

	•	-	\rightarrow	•	←	•	4	†	/	>	ļ	4
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SB
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Detector Phase	2	2		6	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	24.0	24.0		24.0	24.0		24.0	24.0		24.0	24.0	
Total Split (s)	57.0	57.0		57.0	57.0		43.0	43.0		43.0	43.0	
Total Split (%)	57.0%	57.0%		57.0%	57.0%		43.0%	43.0%		43.0%	43.0%	
Maximum Green (s)	51.0	51.0		51.0	51.0		37.0	37.0		37.0	37.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	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	
Total Lost Time (s)	6.0	6.0		6.0	6.0			6.0			6.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		Max	Max		Max	Max	
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)	33.1	33.1		33.1	33.1			37.5			37.5	
Actuated g/C Ratio	0.40	0.40		0.40	0.40			0.45			0.45	
v/c Ratio	0.04	0.86		0.41	0.51			0.55			0.36	
Control Delay	13.8	34.7		27.6	20.1			19.8			17.0	
Queue Delay	0.0	0.0		0.0	0.0			0.0			0.0	
Total Delay	13.8	34.7		27.6	20.1			19.8			17.0	
LOS	В	С		C	С			В			В	
Approach Delay	_	34.3			21.0			19.8			17.0	
Approach LOS		C			C			В			В	
• • • • • • • • • • • • • • • • • • • •												
Intersection Summary Area Type:	Other											
Cycle Length: 100	Otriei											
Actuated Cycle Length: 8	22.0											
Natural Cycle: 55	02.0											
Control Type: Semi Act-l	Incoord											
Maximum v/c Ratio: 0.86												
Intersection Signal Delay				1.	ntersection	n I OC. C						
					itersection CU Level							
Intersection Capacity Uti Analysis Period (min) 15)		10	JU Levei i	oi Servic	eC					
-												
Splits and Phases: 3:	Colonial Drive	& Arkell I	Road			1.1						
→ _{Ø2}							Ø4					
57 s						43 s						
*-						- 4,						

	•	-	1	•	†	↓
Lane Group	EBL	EBT	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	12	615	51	357	332	177
v/c Ratio	0.04	0.86	0.41	0.51	0.55	0.36
Control Delay	13.8	34.7	27.6	20.1	19.8	17.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	13.8	34.7	27.6	20.1	19.8	17.0
Queue Length 50th (m)	1.2	88.2	5.9	41.5	30.4	14.3
Queue Length 95th (m)	4.2	129.9	16.2	63.8	76.4	40.3
Internal Link Dist (m)		237.6		169.8	185.6	67.7
Turn Bay Length (m)	50.0		60.0			
Base Capacity (vph)	516	1108	195	1088	604	492
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.02	0.56	0.26	0.33	0.55	0.36
Intersection Summary						

	۶	-	•	•	•	•	1	†		-	ţ	4
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	Ť	ĵ»		ሻ	1>			4			4	
Traffic Volume (veh/h)	11	487	79	47	286	42	149	0	156	131	0	32
Future Volume (veh/h)	11	487	79	47	286	42	149	0	156	131	0	32
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	C
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		0.99	1.00		1.00	1.00		1.00
Parking Bus, Adj	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 Sat Flow, veh/h/ln	1863	1820	1900	1792	1772	1900	1900	1785	1900	1900	1863	1900
Adj Flow Rate, veh/h	12	529	86	51	311	46	162	0	170	142	0	35
Adj No. of Lanes	1	1	0	1	1	0	0	1	0	0	1	C
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	4	4	6	8	8	2	2	2	2	2	2
Cap, veh/h	400	695	113	209	687	102	335	19	308	462	8	98
Arrive On Green	0.46	0.46	0.46	0.46	0.46	0.46	0.41	0.00	0.41	0.41	0.00	0.41
Sat Flow, veh/h	1018	1524	248	774	1507	223	670	45	751	949	19	239
Grp Volume(v), veh/h	12	0	615	51	0	357	332	0	0	177	0	C
Grp Sat Flow(s), veh/h/ln	1018	0	1772	774	0	1729	1466	0	0	1207	0	C
Q Serve(q_s), s	0.7	0.0	26.0	5.3	0.0	12.7	4.4	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(q_c), s	13.5	0.0	26.0	31.3	0.0	12.7	14.4	0.0	0.0	10.0	0.0	0.0
Prop In Lane	1.00		0.14	1.00		0.13	0.49		0.51	0.80		0.20
Lane Grp Cap(c), veh/h	400	0	808	209	0	789	662	0	0	568	0	C
V/C Ratio(X)	0.03	0.00	0.76	0.24	0.00	0.45	0.50	0.00	0.00	0.31	0.00	0.00
Avail Cap(c_a), veh/h	512	0	1003	294	0	979	662	0	0	568	0	C
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	21.4	0.0	20.4	33.5	0.0	16.8	19.7	0.0	0.0	18.5	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.0	2.7	0.6	0.0	0.4	2.7	0.0	0.0	1.4	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	0.0	13.3	1.2	0.0	6.1	6.7	0.0	0.0	3.3	0.0	0.0
LnGrp Delay(d),s/veh	21.4	0.0	23.1	34.1	0.0	17.2	22.4	0.0	0.0	19.9	0.0	0.0
LnGrp LOS	С		С	С		В	С			В		
Approach Vol, veh/h		627			408			332			177	
Approach Delay, s/veh		23.1			19.3			22.4			19.9	
Approach LOS		С			В			С			В	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		47.1		43.0		47.1		43.0				
Change Period (Y+Rc), s		6.0		6.0		6.0		6.0				
Max Green Setting (Gmax), s		51.0		37.0		51.0		37.0				
Max Q Clear Time (g_c+l1), s		28.0		12.0		33.3		16.4				
Green Ext Time (p_c), s		8.8		4.2		7.7		3.9				

Assigned Phs	2	4	6	8	
Phs Duration (G+Y+Rc), s	47.1	43.0	47.1	43.0	
Change Period (Y+Rc), s	6.0	6.0	6.0	6.0	
Max Green Setting (Gmax), s	51.0	37.0	51.0	37.0	
Max Q Clear Time (g_c+l1), s	28.0	12.0	33.3	16.4	
Green Ext Time (p_c), s	8.8	4.2	7.7	3.9	
Intersection Summary					
HCM 2010 Ctrl Delay	21.	6			
HCM 2010 LOS		C			

HCM 2010 Signalized Intersection Summary

3: Colonial Drive & Arkell Road

Lane Group

Lane Configurations Traffic Volume (vph)

Future Volume (vph)

Ideal Flow (vphpl)

Storage Length (m)

Storage Lanes

Taper Length (m)

Lane Util. Factor

Ped Bike Factor

Satd. Flow (prot)

Satd. Flow (perm)

Right Turn on Red

Satd. Flow (RTOR)

Link Speed (k/h)

Link Distance (m)

Confl. Peds. (#/hr)

Peak Hour Factor Heavy Vehicles (%)

Adj. Flow (vph)

Lane Alignment

Median Width(m)

Headway Factor

Turning Speed (k/h)

Number of Detectors

Leading Detector (m)

Trailing Detector (m)

Detector 1 Size(m)

Detector 1 Channel
Detector 1 Extend (s)

Detector 1 Queue (s)

Detector 1 Delay (s)

Detector 2 Size(m)

Detector 2 Channel

Detector 2 Extend (s)

Detector 2 Type

Detector 2 Position(m)

Detector 1 Type

Detector 1 Position(m)

Detector Template

Crosswalk Width(m)

Two way Left Turn Lane

Link Offset(m)

Shared Lane Traffic (%) Lane Group Flow (vph)

Enter Blocked Intersection

Travel Time (s)

Flt Protected

Flt Permitted

Frt

479

479

1900

40.0

2

7.5

0.97

1.00

0.950

3367

0.950

3361

0.91

4%

526

526 237

No

Left

1.00

25

Left Thru

2.0

0.0

0.0

2.0

0.0

0.0

CI+Ex CI+Ex

132

132

1900

1.00

0.942

1687

1687

32

50

144.3

10.4

0.91

3% 11%

145

No

Left

7.2

0.0

4.8

1.00

10.0

0.0

0.0

0.6

0.0

0.0

0.0

9.4

0.6

0.0

CI+Ex

WBT

114

114

1900

1.00

0.99

0.935

1700

1700

60

357.4

21.4

0.91

3%

125

220

No

Left Right

7.2

0.0

4.8

1.00

Thru

10.0

0.0

0.0

0.6

0.0

9.4

0.6

0.0

CI+Ex

CI+Ex

86

86

1900

0.0

1.00

Yes

0.91

5%

95

0

No

1.00

15

197

20.0

7.5

1.00

0.950

1787

0.611

1149

0.91

1%

No

Left

1.00

25

Left

2.0

0.0

0.0

20

0.0 0.0

CI+Ex

84 197

1900 1900

0.0

1.00

0

Yes

0.91

92 216

0 216

Nο

Right

1.00

15

NBT

830

830

1900

0.95

3406

3406

70

823.5

42.4

0.91

6%

912

912 121

No

Left Right

3.6

0.0

4.8

1.00

Thru

10.0

0.0

0.0

0.6

0.0

0.0

9.4

0.6

0.0

CI+Ex

CI+Ex

66

66

1900

90.0

7.5

1.00

1.00

0.950

1805

0.216

410

0.91

0%

73

73

No

Left

1.00

25

Left

2.0

0.0

0.0

20

0.0

0.0

CI+Ex

110

110

1900

60.0

1.00

1524

1524

Yes

153

0.91

6%

121

No

1.00

Right

2.0

0.0

0.0

2.0

0.0

0.0

CI+Ex

15

231

231

1900

60.0

0.97

0.850

1418

Yes

254

0.91

254

254

1.00

15

2.0

0.0

0.0

2.0

0.0

0.0

0.0

3343 1455

44

707

1900

0.95 1.00

3343

70

155.4

0.91

8% 11%

No No

Left Right

3.6

0.0

4.8

1.00

Thru Right

10.0

0.0

0.0

0.6

0.0

0.0

9.4

0.6

0.0

CI+Ex

CI+Ex

8.0

61 707

1900

50.0

7.5

1.00

0.950

1752

0.147

271

0.91

3%

67 777

67 777

No

Left

1.00

25

Left

2.0

0.0

0.0

2.0

0.0

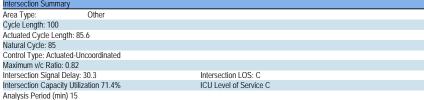
CI+Ex

220 Arkell Road TIS 5:00 pm 07-04-2018 2031 AM Background Remedial

Synchro 9 Report Page 5 Lanes, Volumes, Timings 5: Victoria Road & Arkell Road

07-24-2018

	۶	→	•	•	←	•	4	†	~	/	↓	4
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Prot	NA		pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases				8			2		2	6		6
Detector Phase	7	4		3	8		5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0		7.0	10.0	10.0	7.0	10.0	10.0
Minimum Split (s)	12.0	26.0		10.0	26.0		10.0	34.0	34.0	12.0	34.0	34.0
Total Split (s)	23.0	34.0		15.0	26.0		12.0	39.0	39.0	12.0	39.0	39.0
Total Split (%)	23.0%	34.0%		15.0%	26.0%		12.0%	39.0%	39.0%	12.0%	39.0%	39.0%
Maximum Green (s)	18.0	28.0		12.0	20.0		9.0	33.0	33.0	9.0	33.0	33.0
Yellow Time (s)	3.0	4.0		3.0	4.0		3.0	4.0	4.0	3.0	4.0	4.0
All-Red Time (s)	2.0	2.0		0.0	2.0		0.0	2.0	2.0	0.0	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
Total Lost Time (s)	5.0	6.0		3.0	6.0		3.0	6.0	6.0	3.0	6.0	6.0
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None		None	None	None	None	None	None
Walk Time (s)		7.0			7.0			13.0	13.0		13.0	13.0
Flash Dont Walk (s)		13.0			13.0			15.0	15.0		15.0	15.0
Pedestrian Calls (#/hr)		0			0			0	0		0	0
Act Effct Green (s)	17.1	23.2		28.5	14.7		37.0	28.0	28.0	36.9	27.9	27.9
Actuated g/C Ratio	0.20	0.27		0.33	0.17		0.43	0.33	0.33	0.43	0.33	0.33
v/c Ratio	0.78	0.49		0.47	0.69		0.24	0.82	0.20	0.26	0.71	0.40
Control Delay	44.6	28.6		20.1	41.9		15.6	34.7	3.0	16.3	30.7	5.4
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	44.6	28.6		20.1	41.9		15.6	34.7	3.0	16.3	30.7	5.4
LOS	D	С		С	D		В	С	Α	В	С	Α
Approach Delay		39.6			31.1			30.0			23.9	
Approach LOS		D			С			С			С	
Intersection Summary												
Area Type:	Other											
Cuala Lanath, 100												





	٠	→	•	←	4	†	<i>></i>	-	↓	4	
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Group Flow (vph)	526	237	216	220	73	912	121	67	777	254	
v/c Ratio	0.78	0.49	0.47	0.69	0.24	0.82	0.20	0.26	0.71	0.40	
Control Delay	44.6	28.6	20.1	41.9	15.6	34.7	3.0	16.3	30.7	5.4	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	44.6	28.6	20.1	41.9	15.6	34.7	3.0	16.3	30.7	5.4	
Queue Length 50th (m)	48.6	32.6	24.3	32.9	7.1	80.1	0.0	6.4	65.3	0.0	
Queue Length 95th (m)	#82.3	58.4	42.4	59.7	15.7	114.2	7.6	14.7	94.3	17.1	
Internal Link Dist (m)		120.3		333.4		799.5			131.4		
Turn Bay Length (m)	40.0		20.0		90.0		60.0	50.0		60.0	
Base Capacity (vph)	741	599	501	442	335	1375	706	282	1350	724	
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.71	0.40	0.43	0.50	0.22	0.66	0.17	0.24	0.58	0.35	
I . I											

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

Queue shown is maximum after two cycles.

HCM 2010 Signalized Intersection Summary 5: Victoria Road & Arkell Road

	۶	→	•	•	←	4	1	†	~	/		4
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	ሻሻ	ĵ»		Ť	ĵ»		ሻ	^	7	7	^	7
Traffic Volume (veh/h)	479	132	84	197	114	86	66	830	110	61	707	231
Future Volume (veh/h)	479	132	84	197	114	86	66	830	110	61	707	231
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	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 Sat Flow, veh/h/ln	1827	1791	1900	1881	1829	1900	1900	1792	1792	1845	1759	1712
Adj Flow Rate, veh/h	526	145	92	216	125	95	73	912	121	67	777	254
Adj No. of Lanes	2	1	0	1	1	0	1	2	1	1	2	1
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Percent Heavy Veh, %	4	3	3	1	3	3	0	6	6	3	8	11
Cap, veh/h	617	260	165	449	163	124	290	1211	539	260	1181	512
Arrive On Green	0.18	0.25	0.25	0.12	0.17	0.17	0.07	0.36	0.36	0.06	0.35	0.35
Sat Flow, veh/h	3375	1025	650	1792	965	733	1810	3406	1517	1757	3343	1449
Grp Volume(v), veh/h	526	0	237	216	0	220	73	912	121	67	777	254
Grp Sat Flow(s),veh/h/ln	1688	0	1675	1792	0	1698	1810	1703	1517	1757	1671	1449
Q Serve(q s), s	13.2	0.0	10.8	8.5	0.0	10.8	2.1	20.6	4.9	2.0	17.1	12.0
Cycle Q Clear(q_c), s	13.2	0.0	10.8	8.5	0.0	10.8	2.1	20.6	4.9	2.0	17.1	12.0
Prop In Lane	1.00		0.39	1.00		0.43	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	617	0	424	449	0	287	290	1211	539	260	1181	512
V/C Ratio(X)	0.85	0.00	0.56	0.48	0.00	0.77	0.25	0.75	0.22	0.26	0.66	0.50
Avail Cap(c_a), veh/h	694	0	536	478	0	388	356	1285	572	328	1261	546
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	34.6	0.0	28.4	25.2	0.0	34.7	17.3	24.8	19.7	18.1	23.8	22.2
Incr Delay (d2), s/veh	9.2	0.0	1.2	0.8	0.0	6.3	0.5	2.4	0.2	0.5	1.2	0.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.9	0.0	5.1	4.3	0.0	5.6	1.1	10.0	2.1	1.0	8.1	4.9
LnGrp Delay(d),s/veh	43.8	0.0	29.6	26.0	0.0	41.0	17.7	27.2	20.0	18.7	25.0	22.9
LnGrp LOS	D		С	С		D	В	С	В	В	С	С
Approach Vol, veh/h		763			436			1106			1098	
Approach Delay, s/veh		39.4			33.5			25.8			24.1	
Approach LOS		D D			C			23.0 C			C C	
Timer	1	2	3	4	5	6	7	8			C	
	1	2	3	4	5	6	7	8				
Assigned Phs		_	-			-		-				
Phs Duration (G+Y+Rc), s	8.6	37.1	13.6	28.2	8.8	36.9	21.0	20.8				
Change Period (Y+Rc), s	3.0	6.0	3.0	6.0	3.0	6.0	5.0	6.0				
Max Green Setting (Gmax), s	9.0	33.0	12.0	28.0	9.0	33.0	18.0	20.0				
Max Q Clear Time (g_c+I1), s	4.0	22.6	10.5	12.8	4.1	19.1	15.2	12.8				
Green Ext Time (p_c), s	0.1	8.5	0.1	2.8	0.1	10.9	8.0	1.8				
Intersection Summary			20.2									
HCM 2010 Ctrl Delay			29.3 C									
HCM 2010 LOS			C									

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Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	ች	7	*	**	^	7
Traffic Volume (vph)	96	58	53	1341	931	133
Future Volume (vph)	96	58	53	1341	931	133
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	0.0	30.0	1700	1700	60.0
Storage Lanes	1	1	1			1
Taper Length (m)	7.5	- '	7.5			'
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00
Frt	1.00	0.850	1.00	0.75	0.75	0.850
Flt Protected	0.950	0.000	0.950			0.000
Satd. Flow (prot)	1805	1615	1805	3406	3343	1615
Flt Permitted	0.950	1013	0.272	3400	3343	1013
Satd. Flow (perm)	1805	1615	517	3406	3343	1615
Right Turn on Red	1003	Yes	517	3400	3343	Yes
Satd. Flow (RTOR)		7es 63				145
	EA	03		70	70	140
Link Speed (k/h)	50			70	70	
Link Distance (m)	97.9			155.4	308.2	
Travel Time (s)	7.0	0.00	0.00	8.0	15.9	0.00
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	6%	8%	0%
Adj. Flow (vph)	104	63	58	1458	1012	145
Shared Lane Traffic (%)						
Lane Group Flow (vph)	104	63	58	1458	1012	145
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	3.6	
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	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15	25			15
Number of Detectors	1	1	1	2	2	1
Detector Template	Left	Right	Left	Thru	Thru	Right
Leading Detector (m)	2.0	2.0	2.0	10.0	10.0	2.0
Trailing Detector (m)	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
Detector 1 Size(m)	2.0	2.0	2.0	0.6	0.6	2.0
Detector 1 Type	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex
Detector 1 Type Detector 1 Channel	CITEX	CITLX	CITLX	CITLX	CITEX	CITLX
Detector 1 Extend (s)	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
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)				9.4	9.4	
Detector 2 Size(m)				0.6	0.6	
Detector 2 Type				CI+Ex	CI+Ex	
Detector 2 Channel						
Detector 2 Extend (s)				0.0	0.0	
Turn Type	Prot	Perm	Perm	NA	NA	Perm
Protected Phases	4			2	6	

Synchro 9 Report Page 9

	•	•	4	†	ļ	4
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Permitted Phases		4	2			6
Detector Phase	4	4	2	2	6	6
Switch Phase						
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	24.0	24.0	24.0	24.0	24.0	24.0
Total Split (s)	26.0	26.0	74.0	74.0	74.0	74.0
Total Split (%)	26.0%	26.0%	74.0%	74.0%	74.0%	74.0%
Maximum Green (s)	20.0	20.0	68.0	68.0	68.0	68.0
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	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
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag	0.0	0.0	0.0	0.0	0.0	0.0
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	Max	Max	Max	Max
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	7.0
Flash Dont Walk (s)	11.0	11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0	0	0	0	0
Act Effct Green (s)	11.5	11.5	74.6	74.6	74.6	74.6
Actuated g/C Ratio	0.12	0.12	0.80	0.80	0.80	0.80
v/c Ratio	0.12	0.12	0.14	0.54	0.38	0.00
Control Delay	45.2	12.2	4.7	5.6	4.4	0.11
Queue Delay	0.0	0.0	0.0	0.5	0.0	0.0
Total Delay	45.2	12.2	4.7	6.1	4.4	0.9
LOS	73.2 D	В	Α.,	Α	Α.	Α.
Approach Delay	32.8	ь	Α.	6.0	3.9	
Approach LOS	52.0 C			Α.	3.7 A	
	C			A	А	
Intersection Summary	0.11					
Area Type:	Other					
Cycle Length: 100						
Actuated Cycle Length: 9	3.5					
Natural Cycle: 60						
Control Type: Semi Act-U						
Maximum v/c Ratio: 0.54						
Intersection Signal Delay						n LOS: A
Intersection Capacity Utili	ization 57.4%			10	CU Level	of Service
Analysis Period (min) 15						
Splits and Phases: 6: \	/ictoria Road	S. Accoss	- 2			
Spins allu Filases. 0: \	viciona Ruau	α ACCG2	3 4			

Lanes, Volumes, Timings 6: Victoria Road & Access 2

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Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	104	63	58	1458	1012	145
v/c Ratio	0.47	0.25	0.14	0.54	0.38	0.11
Control Delay	45.2	12.2	4.7	5.6	4.4	0.9
Queue Delay	0.0	0.0	0.0	0.5	0.0	0.0
Total Delay	45.2	12.2	4.7	6.1	4.4	0.9
Queue Length 50th (m)	18.5	0.0	2.4	49.5	28.2	0.0
Queue Length 95th (m)	34.1	11.5	7.4	78.7	45.4	4.7
Internal Link Dist (m)	73.9			131.4	284.2	
Turn Bay Length (m)			30.0			60.0
Base Capacity (vph)	386	395	412	2717	2667	1318
Starvation Cap Reductn	0	0	0	703	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.27	0.16	0.14	0.72	0.38	0.11
Intersection Summary						

	۶	\rightarrow	1	†	ţ	4		
Movement	EBL	EBR	NBL	NBT	SBT	SBR		
Lane Configurations	*	7	ች	^	^	7		
Traffic Volume (veh/h)	96	58	53	1341	931	133		
Future Volume (veh/h)	96	58	53	1341	931	133		
Number	7	14	5	2	6	16		
Initial Q (Qb), veh	0	0	0	0	0	0		
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00		
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00		
Adj Sat Flow, veh/h/ln	1900	1900	1900	1792	1759	1900		
Adj Flow Rate, veh/h	104	63	58	1458	1012	145		
Adj No. of Lanes	1	1	1	2	2	1		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92		
Percent Heavy Veh, %	0	0	0	6	8	0		
Cap, veh/h	198	177	401	2578	2530	1222		
Arrive On Green	0.11	0.11	0.76	0.76	0.76	0.76		
Sat Flow, veh/h	1810	1615	493	3495	3431	1615		
Grp Volume(v), veh/h	104	63	58	1458	1012	145		
Grp Sat Flow(s),veh/h/ln	1810	1615	493	1703	1671	1615		
Q Serve(g_s), s	4.9	3.2	4.2	16.4	9.5	2.2		
Cycle Q Clear(g_c), s	4.9	3.2	13.7	16.4	9.5	2.2		
Prop In Lane	1.00	1.00	1.00			1.00		
Lane Grp Cap(c), veh/h	198	177	401	2578	2530	1222		
V/C Ratio(X)	0.52	0.36	0.14	0.57	0.40	0.12		
Avail Cap(c_a), veh/h	403	360	401	2578	2530	1222		
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00		
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00		
Uniform Delay (d), s/veh	37.8	37.1	6.2	4.6	3.8	2.9		
Incr Delay (d2), s/veh	2.1	1.2	0.8	0.9	0.5	0.2		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	2.5	1.5	0.6	7.8	4.4	1.0		
LnGrp Delay(d),s/veh	39.9	38.3	6.9	5.5	4.3	3.1		
LnGrp LOS	D	D	A	A	A	A		
Approach Vol, veh/h	167			1516	1157			
Approach Delay, s/veh	39.3			5.6	4.1			
Approach LOS	D			Α	Α			
Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		
Phs Duration (G+Y+Rc), s		74.0		15.8		74.0		
Change Period (Y+Rc), s		6.0		6.0		6.0		
Max Green Setting (Gmax), s		68.0		20.0		68.0		
Max Q Clear Time (q_c+l1), s		18.4		6.9		11.5		
Green Ext Time (p_c), s		38.8		0.5		42.9		
Intersection Summary								
HCM 2010 Ctrl Delay			7.0					
HCM 2010 LOS			7.0 A					
2010 200			,,					

HCM 2010 Signalized Intersection Summary 6: Victoria Road & Access 2

Splits and Phases: 7: Victoria Road & Victoria Park Village Road

Cycle Length: 100
Actuated Cycle Length: 96.1
Natural Cycle: 60
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.65

Intersection Signal Delay: 10.2 Intersection Capacity Utilization 58.2%

Analysis Period (min) 15

Lanes, Volumes, Timings

7: Victoria Road & Victoria Park Village Road



Intersection LOS: B

ICU Level of Service B

	•	•	1	Ţ	¥	4
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	ሻ	7	ሻ	^	† Ъ	
Traffic Volume (vph)	162	52	17	1420	1012	52
Future Volume (vph)	162	52	17	1420	1012	52
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	20.0	0.0	30.0			0.0
Storage Lanes	1	1	1			0.0
Taper Length (m)	7.5		7.5			
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	0.95
Frt		0.850		20	0.993	20
Flt Protected	0.950	0.000	0.950		0.770	
Satd. Flow (prot)	1770	1583	1770	3539	3514	0
Flt Permitted	0.950	1000	0.218	5557	5511	,
Satd. Flow (perm)	1770	1583	406	3539	3514	0
Right Turn on Red	1770	Yes	700	3337	3314	Yes
Satd. Flow (RTOR)		57			11	162
Link Speed (k/h)	50	37		50	70	
Link Distance (m)	325.8			308.2	342.0	
Travel Time (s)	23.5	0.02	0.02	22.2	17.6	0.00
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	176	57	18	1543	1100	57
Shared Lane Traffic (%)	47:		4.0	45.45	4455	-
Lane Group Flow (vph)	176	57	18	1543	1157	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	3.6	
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	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15	25			15
Number of Detectors	1	1	1	2	2	
Detector Template	Left	Right	Left	Thru	Thru	
Leading Detector (m)	2.0	2.0	2.0	10.0	10.0	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	
Detector 1 Size(m)	2.0	2.0	2.0	0.6	0.6	
Detector 1 Type	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	
Detector 1 Channel	OITEX	JIILA	SITEX	JIILA	JIILA	
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(m)	0.0	0.0	0.0	9.4	9.4	
Detector 2 Size(m)				0.6	0.6	
Detector 2 Type				CI+Ex	CI+Ex	
				CI+EX	CI+EX	
Detector 2 Channel				0.0	0.0	
Detector 2 Extend (s)	Б.			0.0	0.0	
Turn Type	Prot	Perm	Perm	NA	NA	
Protected Phases	4			2	6	
Permitted Phases		4	2			

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220 Arkell Road TIS 5:00 pm 07-04-2018 2031 AM Background Remedial

Synchro 9 Report Page 13 220 Arkell Road TIS 5:00 pm 07-04-2018 2031 AM Background Remedial

Synchro 9 Report Page 14

07-24-2018

	•	•	4	†	↓
Lane Group	EBL	EBR	NBL	NBT	SBT
Lane Group Flow (vph)	176	57	18	1543	1157
v/c Ratio	0.65	0.20	0.06	0.60	0.46
Control Delay	48.7	10.9	5.6	8.4	6.6
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	48.7	10.9	5.6	8.4	6.6
Queue Length 50th (m)	31.3	0.0	0.9	65.0	40.4
Queue Length 95th (m)	52.5	10.3	3.7	105.7	66.7
Internal Link Dist (m)	301.8			284.2	318.0
Turn Bay Length (m)	20.0		30.0		
Base Capacity (vph)	405	407	292	2551	2536
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.43	0.14	0.06	0.60	0.46
Intersection Summary					

	۶	*	1	†	+	4
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	*	7	ኘ	^	↑ ₽	
Traffic Volume (veh/h)	162	52	17	1420	1012	52
Future Volume (veh/h)	162	52	17	1420	1012	52
Number	7	14	5	2	6	16
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1900
Adj Flow Rate, veh/h	176	57	18	1543	1100	57
Adj No. of Lanes	170	1	1	2	2	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	0.92	0.92	0.92	0.92	0.92	0.92
	224	200	378	2616	2531	131
Cap, veh/h Arrive On Green	0.13	0.13	0.74	0.74	0.74	0.74
Sat Flow, veh/h	1774	1583	484	3632	3517	177
Grp Volume(v), veh/h	176	57	18	1543	568	589
Grp Sat Flow(s),veh/h/ln	1774	1583	484	1770	1770	1831
Q Serve(g_s), s	8.6	2.9	1.3	18.0	11.0	11.0
Cycle Q Clear(g_c), s	8.6	2.9	12.4	18.0	11.0	11.0
Prop In Lane	1.00	1.00	1.00			0.10
Lane Grp Cap(c), veh/h	224	200	378	2616	1308	1354
V/C Ratio(X)	0.78	0.28	0.05	0.59	0.43	0.43
Avail Cap(c_a), veh/h	437	390	378	2616	1308	1354
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	37.8	35.3	6.8	5.4	4.5	4.5
Incr Delay (d2), s/veh	6.0	0.8	0.2	1.0	1.1	1.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.6	1.3	0.2	8.9	5.6	5.8
LnGrp Delay(d),s/veh	43.8	36.1	7.1	6.4	5.5	5.5
LnGrp LOS	D	D	A	A	A	A
Approach Vol, veh/h	233			1561	1157	
Approach Delay, s/veh	41.9			6.4	5.5	
Approach LOS	41.7 D			0.4 A	J.5	
Approacti LOS	D			А	А	
Timer	1	2	3	4	5	6
Assigned Phs		2		4		6
Phs Duration (G+Y+Rc), s		72.0		17.3		72.0
Change Period (Y+Rc), s		6.0		6.0		6.0
Max Green Setting (Gmax), s		66.0		22.0		66.0
Max Q Clear Time (q_c+l1), s		20.0		10.6		13.0
Green Ext Time (p_c), s		37.6		0.7		42.1
* .						
Intersection Summary						
HCM 2010 Ctrl Delay			8.8			
HCM 2010 LOS			Α			

HCM 2010 Signalized Intersection Summary

7: Victoria Road & Victoria Park Village Road

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Traffic Volume (vph)		ၨ	-	•	•	←	•	4	†	<i>></i>	/	ţ	1
Traffic Volume (vph)	Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Future Volume (vph)	Lane Configurations	Ţ	ĵ»		*	î»			4			4	
Ideal Flow (phiph) 1900 1000	Traffic Volume (vph)	29	396	109	80	435	138	98	0	81	81	0	18
Storage Length (m) 50.0 0.0 60.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	Future Volume (vph)	29	396	109	80	435	138	98	0	81	81	0	18
Storage Lanes	Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Taper Length (m) Taper Taper (m) Taper Taper Taper Taper (m) Taper Taper Taper Taper (Storage Length (m)	50.0		0.0	60.0		0.0	0.0		0.0	0.0		0.0
Lane Util. Factor	Storage Lanes	1		0	1		0	0		0	0		0
Ped Bike Factor	Taper Length (m)	7.5			7.5			7.5			7.5		
Fit Protected 0.950 0.968 0.950 0.973 0.975 0.961 Fit Protected 0.950 0.950 0.973 0.961 Fit Permitted 0.194 0.267 0.798 0.686 Satid. Flow (perm) 369 1808 0 1808 0 1805 1804 0 0.798 0.686 Satid. Flow (perm) 369 1808 0 503 1804 0 0.798 0.686 Satid. Flow (perm) 369 1808 0 503 1804 0 0.798 0.686 Satid. Flow (perm) 369 1808 0 503 1804 0 0.798 0.686 Satid. Flow (perm) 369 1808 0 503 1804 0 0.798 0.798 0.686 Satid. Flow (perm) 369 1808 0 503 1804 0 0.798 0.798 0.686 Satid. Flow (perm) 369 1808 0 503 1804 0 0.798 0.798 0.686 Satid. Flow (perm) 369 1808 0 503 1804 0 0.798 0.798 0.798 Satid. Flow (perm) 369 1808 0 503 1804 0 0.798 0.798 0.798 Satid. Flow (perm) 50 5 50 50 50 50 50 50 50 50 50 50 50 5	Lane Util. 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
File Protected 0.950	Ped Bike Factor		0.99		0.99								
Satd. Flow (prot) 1805 1808 0 1805 1804 0 0 1708 0 0 1708 0 0 1708 0 0 1708 0 0 1708 0 0 1708 0 0 1708 0 0 1708 0 0 1708 0 0 1708 0 0 1708 0 0 1708 0 0 1708 0 0 1708 0 0 1708 0 0 1708 0 0 1708 0 0 0 1708 0 0 1708 0 0 1708 0 0 1708 0 0 0 1708 0 0 0 0 0 0 0 0 0	Frt		0.968			0.964			0.939			0.975	
Fit Permitted 0.194 0.267 0.798 0.686 Satic Flow (perm) 369 1808 0 503 1804 0 0 1401 0 0 1271 0 Satic Flow (perm) 369 1808 0 503 1804 0 0 1401 0 0 1271 0 Yes Satic Flow (RTOR) 23 27 38 30 Link Speed (k/h) 50 50 50 50 50 Link Speed (k/h) 150 188 140 1515. 66.6 Confl. Peds. (#Irr) 8 8 8 Peak Hour Factor 0.96 0.96 0.96 0.96 0.96 0.96 0.96 0.96	Flt Protected	0.950			0.950				0.973			0.961	
Satd. Flow (perm) 369 1808 0 503 1804 0 0 1401 0 0 1271 0	Satd. Flow (prot)	1805	1808	0	1805	1804	0	0	1708	0	0	1780	0
Right Turn on Red	Flt Permitted	0.194			0.267				0.798			0.686	
Saltd. Flow (RTOR)	Satd. Flow (perm)	369	1808	0	503	1804	0	0	1401	0	0	1271	0
Link Speed (k/h)	Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (k/h)	Satd. Flow (RTOR)		23			27			38			30	
Link Distance (m)			50			50			50			50	
Travel Time (s)			261.6			193.8			209.6				
Confi. Peds. (#/hr)			18.8			14.0			15.1			6.6	
Peak Hour Factor 0.96				8	8								
Heavy Vehicles (%)		0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph) 30 413 114 83 453 144 102 0 84 84 0 19 Shared Lane Traffic (%) Lane Group Flow (vph) 30 527 0 83 597 0 0 186 0 0 103 0 Enter Blocked Intersection No		0%	1%	0%	0%	2%	0%	3%	0%	0%	0%	0%	0%
Shared Lane Traffic (%) Lane Group Flow (yph) 30 527 0 83 597 0 0 186 0 0 103 0							144		0	84			
Lane Group Flow (vph) 30 527 0 83 597 0 0 186 0 0 103 0 Enter Blocked Intersection No													
Enter Blocked Intersection No No <th< td=""><td></td><td>30</td><td>527</td><td>0</td><td>83</td><td>597</td><td>0</td><td>0</td><td>186</td><td>0</td><td>0</td><td>103</td><td>0</td></th<>		30	527	0	83	597	0	0	186	0	0	103	0
Lane Alignment			No	No	No	No	No	No	No	No	No	No	No
Median Width(m) 3.6 3.6 0.0 0.0 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 Headway Factor 1.00													
Link Offset(m) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 Crosswalk Width(m) 4.8 4.8 4.8 4.8 4.8 4.8 4.8 4.8 4.8 4.8													
Crosswalk Width(m) 4.8 4.8 4.8 4.8 4.8 Two way Left Turn Lane 1.00 <													
Two way Left Turn Lane Headway Factor 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.0	/												
Headway Factor	. ,		1.0						110			1.0	
Turning Speed (k/h) 25 15 25 15 25 15 25 15 Number of Detectors 1 2 1 0 2 10 0<		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Number of Detectors 1 2 1			1100			1100			1100			1100	
Detector Template			2			2			2			2	
Leading Detector (m) 2.0 10.0 2.0 10.0 2.0 10.0 2.0 10.0 2.0 10.0 2.0 10.0					Left								
Trailing Detector (m) 0.0													
Detector 1 Position(m) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0													
Detector 1 Size(m) 2.0													
Detector 1 Type CI+Ex													
Detector 1 Channel Detector 1 Extend (s) 0.0 <td></td>													
Detector 1 Extend (s) 0.0		OITEX	OITEX		OITEX	OITEX		OITEX	OITEX		OITEX	OITEX	
Detector 1 Queue (s) 0.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s) 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 CI+Ex CI+Ex CI+Ex CI+Ex													
Detector 2 Size(m) 0.6 0.6 0.6 0.6 Detector 2 Type CI+Ex CI+Ex CI+Ex CI+Ex		0.0			0.0			0.0			0.0		
Detector 2 Type CI+Ex CI+Ex CI+Ex CI+Ex													
	. ,												
	Detector 2 Channel		CITLX			CITLX			CITEX			CITLA	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SB
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Detector Phase	2	2		6	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	24.0	24.0		24.0	24.0		23.0	23.0		24.0	24.0	
Total Split (s)	73.0	73.0		73.0	73.0		37.0	37.0		37.0	37.0	
Total Split (%)	66.4%	66.4%		66.4%	66.4%		33.6%	33.6%		33.6%	33.6%	
Maximum Green (s)	67.0	67.0		67.0	67.0		32.0	32.0		31.0	31.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		1.0	1.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0			0.0	
Total Lost Time (s)	6.0	6.0		6.0	6.0			5.0			6.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		Max	Max		Max	Max	
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)	27.8	27.8		27.8	27.8			32.3			31.3	
Actuated g/C Ratio	0.39	0.39		0.39	0.39			0.45			0.44	
v/c Ratio	0.21	0.73		0.42	0.83			0.28			0.18	
Control Delay	17.4	24.0		22.6	29.2			12.8			12.1	
Queue Delay	0.0	0.0		0.0	0.0			0.0			0.0	
Total Delay	17.4	24.0		22.6	29.2			12.8			12.1	
LOS	В	С		С	С			В			В	
Approach Delay		23.6			28.4			12.8			12.1	
Approach LOS		С			С			В			В	
Intersection Summary												
Area Type:	Other											
Cycle Length: 110												
Actuated Cycle Length: 71	1.2											
Natural Cycle: 55												
Control Type: Semi Act-Ur	ncoord											
Maximum v/c Ratio: 0.83												
Intersection Signal Delay:	23.7			Ir	tersection	LOS: C						
Intersection Capacity Utiliz)		10	CU Level	of Service	e C					
Analysis Period (min) 15												
-												
Splits and Phases: 3: C	olonial Drive	& Arkell F	Road									
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220 Arkell Road TIS 5:00 pm 07-04-2018 2031 PM Background Remedial

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Detector 2 Extend (s)

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220 Arkell Road TIS 5:00 pm 07-04-2018 2031 PM Background Remedial

Synchro 9 Report Page 2

	•	-	•	-	†	↓	
Lane Group	EBL	EBT	WBL	WBT	NBT	SBT	
Lane Group Flow (vph)	30	527	83	597	186	103	
v/c Ratio	0.21	0.73	0.42	0.83	0.28	0.18	
Control Delay	17.4	24.0	22.6	29.2	12.8	12.1	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	17.4	24.0	22.6	29.2	12.8	12.1	
Queue Length 50th (m)	2.7	58.1	8.2	69.7	12.1	5.8	
Queue Length 95th (m)	8.4	89.9	20.0	107.5	32.6	18.9	
Internal Link Dist (m)		237.6		169.8	185.6	67.7	
Turn Bay Length (m)	50.0		60.0				
Base Capacity (vph)	343	1682	467	1678	657	575	
Starvation Cap Reductn	0	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	0	
Reduced v/c Ratio	0.09	0.31	0.18	0.36	0.28	0.18	
Intersection Summary							

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	Ť	ĵ»		ሻ	ĵ»			4			4	
Traffic Volume (veh/h)	29	396	109	80	435	138	98	0	81	81	0	18
Future Volume (veh/h)	29	396	109	80	435	138	98	0	81	81	0	18
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	C
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		0.99	1.00		1.00	1.00		1.00
Parking Bus, Adj	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 Sat Flow, veh/h/ln	1900	1885	1900	1900	1872	1900	1900	1869	1900	1900	1900	1900
Adj Flow Rate, veh/h	30	412	114	83	453	144	102	0	84	84	0	19
Adj No. of Lanes	1	1	0	1	1	0	0	1	0	0	1	C
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	0	1	1	0	2	2	0	0	0	0	0	C
Cap, veh/h	266	678	187	320	649	206	363	19	259	504	8	98
Arrive On Green	0.48	0.48	0.48	0.48	0.48	0.48	0.38	0.00	0.38	0.38	0.00	0.38
Sat Flow, veh/h	834	1419	393	891	1359	432	780	49	683	1123	21	259
Grp Volume(v), veh/h	30	0	526	83	0	597	186	0	0	103	0	C
Grp Sat Flow(s), veh/h/ln	834	0	1812	891	0	1791	1511	0	0	1403	0	C
Q Serve(q_s), s	2.5	0.0	18.0	6.4	0.0	22.0	2.8	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(q_c), s	24.5	0.0	18.0	24.4	0.0	22.0	6.6	0.0	0.0	3.8	0.0	0.0
Prop In Lane	1.00		0.22	1.00		0.24	0.55		0.45	0.82		0.18
Lane Grp Cap(c), veh/h	266	0	865	320	0	855	641	0	0	611	0	C
V/C Ratio(X)	0.11	0.00	0.61	0.26	0.00	0.70	0.29	0.00	0.00	0.17	0.00	0.00
Avail Cap(c a), veh/h	531	0	1442	604	0	1425	641	0	0	611	0	C
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	26.8	0.0	16.2	25.2	0.0	17.2	18.1	0.0	0.0	17.3	0.0	0.0
Incr Delay (d2), s/veh	0.2	0.0	0.7	0.4	0.0	1.0	1.1	0.0	0.0	0.6	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.6	0.0	9.1	1.6	0.0	11.0	3.2	0.0	0.0	1.7	0.0	0.0
LnGrp Delay(d),s/veh	27.0	0.0	16.9	25.6	0.0	18.3	19.3	0.0	0.0	17.9	0.0	0.0
LnGrp LOS	С		В	С		В	В			В		
Approach Vol, veh/h		556			680			186			103	
Approach Delay, s/veh		17.4			19.2			19.3			17.9	
Approach LOS		В			В			В			В	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		46.2		38.0		46.2		38.0				
Change Period (Y+Rc), s		6.0		6.0		6.0		* 6				
Max Green Setting (Gmax), s		67.0		31.0		67.0		* 32				
Max Q Clear Time (g_c+I1), s		26.5		5.8		26.4		8.6				
Green Ext Time (p_c), s		13.7		2.1		13.7		2.1				
Intersection Summary												
HCM 2010 Ctrl Delay			18.5									
HCM 2010 LOS			В									
Motos												

Synchro 9 Report Page 3 HCM 2010 Signalized Intersection Summary 3: Colonial Drive & Arkell Road

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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	ሻሻ	f _a		ሻ	î,		ሻ	^	7	<u>ነ</u>	^	7
Traffic Volume (vph)	291	175	92	148	226	83	98	873	177	90	850	324
Future Volume (vph)	291	175	92	148	226	83	98	873	177	90	850	324
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	40.0		0.0	20.0		0.0	90.0		60.0	50.0		60.0
Storage Lanes	2		0	1		0	1		1	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor							1.00					0.97
Frt		0.948			0.960				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3467	1789	0	1703	1796	0	1805	3406	1583	1805	3505	1599
Flt Permitted	0.950			0.584			0.164			0.152		
Satd. Flow (perm)	3467	1789	0	1047	1796	0	311	3406	1583	289	3505	1549
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		25			16				170			321
Link Speed (k/h)		50			60			70			70	
Link Distance (m)		144.3			357.4			823.5			155.4	
Travel Time (s)		10.4			21.4			42.4			8.0	
Confl. Peds. (#/hr)							6					6
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles (%)	1%	1%	0%	6%	1%	3%	0%	6%	2%	0%	3%	1%
Adj. Flow (vph)	310	186	98	157	240	88	104	929	188	96	904	345
Shared Lane Traffic (%)												
Lane Group Flow (vph)	310	284	0	157	328	0	104	929	188	96	904	345
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)		7.2			7.2			3.6			3.6	
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												
Headway 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
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2	1	1	2	1
Detector Template	Left	Thru		Left	Thru		Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	2.0	10.0		2.0	10.0		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
Detector 1 Position(m)	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	0.6		2.0	0.6	2.0	2.0	0.6	2.0
Detector 1 Type	CI+Ex	CI+Ex		CI+Ex	CI+Ex		CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+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
Detector 1 Queue (s)	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
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		CI+Ex			CI+Ex			CI+Ex			CI+Ex	
Detector 2 Channel		0.0			0.0			0.0			0.0	
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

220 Arkell Road TIS 5:00 pm 07-04-2018 2031 PM Background Remedial

Synchro 9 Report Page 6

Intersection Summary

Area Type: Other
Cycle Length: 110
Actuated Cycle Length: 91.1

Natural Cycle: 85

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.78 Intersection Signal Delay: 29.3 Intersection Capacity Utilization 72.7%

Intersection LOS: C
ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 5: Victoria Road & Arkell Road



Queues

5: Victoria Road & Arkell Road

07-24-2018

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Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Group Flow (vph)	310	284	157	328	104	929	188	96	904	345	
v/c Ratio	0.64	0.51	0.35	0.76	0.40	0.78	0.28	0.39	0.74	0.46	
Control Delay	46.7	29.3	19.7	45.5	19.4	32.9	6.1	19.1	31.2	5.9	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	46.7	29.3	19.7	45.5	19.4	32.9	6.1	19.1	31.3	5.9	
Queue Length 50th (m)	29.4	41.0	17.5	57.1	10.8	85.2	2.3	10.0	81.2	3.1	
Queue Length 95th (m)	50.3	73.4	34.9	96.9	22.2	118.7	17.4	20.7	113.2	23.3	
Internal Link Dist (m)		120.3		333.4		799.5			131.4		
Turn Bay Length (m)	40.0		20.0		90.0		60.0	50.0		60.0	
Base Capacity (vph)	561	739	457	592	257	1615	839	249	1662	903	
Starvation Cap Reductn	0	0	0	0	0	0	0	0	58	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.55	0.38	0.34	0.55	0.40	0.58	0.22	0.39	0.56	0.38	
Intersection Summary											

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	777	1		ሻ	1 2		ሻ	^	7	*	^	7
Traffic Volume (veh/h)	291	175	92	148	226	83	98	873	177	90	850	324
Future Volume (veh/h)	291	175	92	148	226	83	98	873	177	90	850	324
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		0.99	1.00		0.99
Parking Bus, Adj	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 Sat Flow, veh/h/ln	1881	1888	1900	1792	1871	1900	1900	1792	1863	1900	1845	1881
Adj Flow Rate, veh/h	310	186	98	157	240	88	104	929	188	96	904	345
Adj No. of Lanes	2	1	0	1	1	0	1	2	1	1	2	1
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	1	1	1	6	1	1	0	6	2	0	3	1
Cap, veh/h	391	314	165	362	294	108	276	1330	614	277	1365	618
Arrive On Green	0.11	0.27	0.27	0.09	0.22	0.22	0.07	0.39	0.39	0.07	0.39	0.39
Sat Flow, veh/h	3476	1165	614	1707	1307	479	1810	3406	1571	1810	3505	1587
Grp Volume(v), veh/h	310	0	284	157	0	328	104	929	188	96	904	345
Grp Sat Flow(s), veh/h/ln	1738	0	1779	1707	0	1787	1810	1703	1571	1810	1752	1587
Q Serve(q s), s	8.5	0.0	13.5	6.8	0.0	17.0	3.2	22.2	8.1	3.0	20.7	16.5
Cycle Q Clear(q_c), s	8.5	0.0	13.5	6.8	0.0	17.0	3.2	22.2	8.1	3.0	20.7	16.5
Prop In Lane	1.00		0.35	1.00		0.27	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	391	0	479	362	0	402	276	1330	614	277	1365	618
V/C Ratio(X)	0.79	0.00	0.59	0.43	0.00	0.82	0.38	0.70	0.31	0.35	0.66	0.56
Avail Cap(c_a), veh/h	500	0	640	369	0	514	284	1435	662	287	1477	669
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	42.1	0.0	30.9	25.7	0.0	35.8	18.1	24.9	20.5	18.3	24.4	23.2
Incr Delay (d2), s/veh	6.6	0.0	1.2	0.8	0.0	7.9	0.8	1.4	0.3	0.7	1.0	0.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.4	0.0	6.8	3.3	0.0	9.3	1.7	10.7	3.5	1.5	10.1	7.3
LnGrp Delay(d),s/veh	48.7	0.0	32.1	26.6	0.0	43.7	18.9	26.2	20.8	19.0	25.4	24.1
LnGrp LOS	D		С	С		D	В	С	С	В	С	С
Approach Vol, veh/h		594			485			1221			1345	
Approach Delay, s/veh		40.7			38.2			24.8			24.6	
Approach LOS		D			D			С			С	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	9.5	44.0	11.7	32.2	9.6	43.9	16.0	27.9				
Change Period (Y+Rc), s	3.0	6.0	3.0	6.0	3.0	6.0	5.0	6.0				
Max Green Setting (Gmax), s	7.0	41.0	9.0	35.0	7.0	41.0	14.0	28.0				
Max Q Clear Time (q_c+l1), s	5.0	24.2	8.8	15.5	5.2	22.7	10.5	19.0				
Green Ext Time (p_c), s	0.0	13.7	0.0	4.4	0.0	14.8	0.5	2.9				

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Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	ሻ	7	ሻ	^	^	7
Traffic Volume (vph)	50	23	20	1225	1240	43
Future Volume (vph)	50	23	20	1225	1240	43
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	0.0	30.0			60.0
Storage Lanes	1	1	1			1
Taper Length (m)	7.5		7.5			
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00
Frt		0.850	0	0.70	0.70	0.850
Flt Protected	0.950	0.000	0.950			0.000
Satd. Flow (prot)	1805	1615	1805	3406	3505	1615
Flt Permitted	0.950	1013	0.186	3400	3303	1013
Satd. Flow (perm)	1805	1615	353	3406	3505	1615
	1003	Yes	303	3400	3303	Yes
Right Turn on Red						
Satd. Flow (RTOR)	ΓΔ.	25		70	70	47
Link Speed (k/h)	50			70	70	
Link Distance (m)	97.9			155.4	308.2	
Travel Time (s)	7.0			8.0	15.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	6%	3%	0%
Adj. Flow (vph)	54	25	22	1332	1348	47
Shared Lane Traffic (%)						
Lane Group Flow (vph)	54	25	22	1332	1348	47
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	3.6	3
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane	7.0			7.0	7.0	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	1.00	25	1.00	1.00	1.00
Number of Detectors	25 1	15	25 1	2	2	15
Detector Template	Left	Right	Left	Thru	Thru	Right
Leading Detector (m)	2.0	2.0	2.0	10.0	10.0	2.0
Trailing Detector (m)	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
Detector 1 Size(m)	2.0	2.0	2.0	0.6	0.6	2.0
Detector 1 Type	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex
Detector 1 Channel						
Detector 1 Extend (s)	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
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)	2.0	2.0	2.0	9.4	9.4	2.0
Detector 2 Size(m)				0.6	0.6	
Detector 2 Type				CI+Ex	CI+Ex	
Detector 2 Channel				OITEA	CITEX	
Detector 2 Extend (s)				0.0	0.0	
	Dret	Dorm	Dorre			Dorre
Turn Type	Prot	Perm	Perm	NA	NA	Perm
Protected Phases	4			2	6	

220 Arkell Road TIS 5:00 pm 07-04-2018 2031 PM Background Remedial

29.1 С

Intersection Summary
HCM 2010 Ctrl Delay
HCM 2010 LOS

Synchro 9 Report Page 9

220 Arkell Road TIS 5:00 pm 07-04-2018 2031 PM Background Remedial

Lanes, Volumes, Timings 6: Victoria Road & Access 2 07-24-2018

Lane Group EBL Permitted Phases Detector Phase 6 Switch Phase Minimum Initial (s) 10.0 10.0 10.0 10.0 10.0 Minimum Split (s) 24.0 24.0 24.0 24.0 24.0 24.0 Total Split (s) 28.0 28.0 82.0 82.0 82.0 82.0 Total Split (%) 25.5% 25.5% 74.5% 74.5% 74.5% 74.5% Maximum Green (s) 76.0 22.0 22.0 76.0 76.0 76.0 Yellow Time (s) 4.0 4.0 4.0 4.0 4.0 4.0 All-Red Time (s) 2.0 2.0 2.0 2.0 2.0 2.0 Lost Time Adjust (s) 0.0 0.0 0.0 0.0 0.0 Total Lost Time (s) 6.0 6.0 6.0 6.0 6.0 6.0 Lead/Lag Lead-Lag Optimize? Vehicle Extension (s) 3.0 3.0 3.0 3.0 3.0 3.0 Recall Mode Max Max Max Max None None Walk Time (s) 7.0 7.0 7.0 7.0 7.0 Flash Dont Walk (s) 11.0 11.0 11.0 11.0 11.0 11.0 Pedestrian Calls (#/hr) 0 0 0 0 Act Effct Green (s) 10.3 10.3 88.5 88.5 88.5 88.5 Actuated g/C Ratio 0.83 0.10 0.10 0.83 0.83 0.83 v/c Ratio 0.31 0.14 0.07 0.47 0.46 0.03 Control Delay 17.6 3.9 0.9 49.6 3.3 4.0 Queue Delay 0.0 0.0 0.0 0.5 0.0 0.0 Total Delay 49.6 17.6 3.9 3.3 4.5 0.9 LOS D В Α Α Α Approach Delay 39.5 Approach LOS D Α Intersection Summary Other Area Type: Cycle Length: 110 Actuated Cycle Length: 106 Natural Cycle: 60 Control Type: Semi Act-Uncoord Maximum v/c Ratio: 0.47 Intersection Signal Delay: 5.1 Intersection LOS: A Intersection Capacity Utilization 52.6% ICU Level of Service A

Splits and Phases: 6: Victoria Road & Access 2 ₹_{Ø4} **∜** ø6

Queues

6: Victoria Road & Access 2

220 Arkell Road TIS 5:00 pm 07-04-2018 2031 PM Background Remedial

07-24-2018

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Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	54	25	22	1332	1348	47
v/c Ratio	0.31	0.14	0.07	0.47	0.46	0.03
Control Delay	49.6	17.6	3.3	4.0	3.9	0.9
Queue Delay	0.0	0.0	0.0	0.5	0.0	0.0
Total Delay	49.6	17.6	3.3	4.5	3.9	0.9
Queue Length 50th (m)	12.0	0.0	0.9	41.0	41.1	0.0
Queue Length 95th (m)	22.4	8.0	2.9	55.7	55.6	2.2
Internal Link Dist (m)	73.9			131.4	284.2	
Turn Bay Length (m)			30.0			60.0
Base Capacity (vph)	375	356	294	2842	2924	1355
Starvation Cap Reductn	0	0	0	959	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.14	0.07	0.07	0.71	0.46	0.03
Intersection Summary						

Analysis Period (min) 15

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Movement	EBL	EBR	NBL	NBT	SBT	SBR	
Lane Configurations	ች	7	ች	^	^	7	_
Traffic Volume (veh/h)	50	23	20	1225	1240	43	
Future Volume (veh/h)	50	23	20	1225	1240	43	
Number	7	14	5	2	6	16	
Initial Q (Qb), veh	0	0	0	0	0	0	
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	
Adj Sat Flow, veh/h/ln	1900	1900	1900	1792	1845	1900	
Adj Flow Rate, veh/h	54	25	22	1332	1348	47	
Adj No. of Lanes	1	1	1	2	2	1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	
Percent Heavy Veh, %	0	0	0	6	3	0	
Cap, veh/h	165	147	330	2674	2752	1268	
Arrive On Green	0.09	0.09	0.79	0.79	0.79	0.79	
Sat Flow, veh/h	1810	1615	393	3495	3597	1615	
Grp Volume(v), veh/h	54	25	22	1332	1348	47	
Grp Sat Flow(s), veh/h/ln	1810	1615	393	1703	1752	1615	
Q Serve(q s), s	2.7	1.4	2.0	13.4	13.0	0.6	
Cycle Q Clear(q_c), s	2.7	1.4	15.0	13.4	13.0	0.6	
Prop In Lane	1.00	1.00	1.00	13.4	13.0	1.00	
Lane Grp Cap(c), veh/h	165	147	330	2674	2752	1268	
V/C Ratio(X)	0.33	0.17	0.07	0.50	0.49	0.04	
Avail Cap(c a), veh/h	411	367	330	2674	2752	1268	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	
Uniform Delay (d), s/veh	41.2	40.6	6.3	3.7	3.6	2.3	
Incr Delay (d2), s/veh	1.1	0.5	0.4	0.7	0.6	0.1	
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	
%ile BackOfQ(50%),veh/ln	1.4	0.6	0.0	6.4	6.4	0.0	
LnGrp Delay(d),s/veh	42.4	41.2	6.6	4.3	4.3	2.4	
LnGrp LOS	42.4 D	41.2 D	ο.ο	4.3 A	4.3 A	2.4 A	
	79	D	A	1354	1395	A	
Approach Vol, veh/h							
Approach Delay, s/veh	42.0			4.4	4.2		
Approach LOS	D			Α	Α		
Timer	1	2	3	4	5	6	
Assigned Phs		2		4		6	
Phs Duration (G+Y+Rc), s		82.0		14.8		82.0	
Change Period (Y+Rc), s		6.0		6.0		6.0	
Max Green Setting (Gmax), s		76.0		22.0		76.0	
Max Q Clear Time (g_c+I1), s		17.0		4.7		15.0	
Green Ext Time (p_c), s		46.1		0.2		47.3	
Intersection Summary							
HCM 2010 Ctrl Delay			5.3				

Synchro 9 Report Page 13

anes	s, voi	umes,	ımıngs			
· Vic	toria	Road &	Victoria	Park	Village	Road

	۶	•	4	†	↓	4
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	*	7	ሻ	^	↑ 1>	
Traffic Volume (vph)	90	38	64	1257	1368	153
Future Volume (vph)	90	38	64	1257	1368	153
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	20.0	0.0	30.0	1700	1700	0.0
Storage Lanes	20.0	1	1			0.0
Taper Length (m)	7.5		7.5			U
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	0.95
Ert	1.00	0.850	1.00	0.73	0.985	0.73
Fit Protected	0.950	0.650	0.950		0.900	
	1805	1615	1805	3406	3462	0
Satd. Flow (prot)		1015		3400	3402	U
Flt Permitted	0.950	1/15	0.121	2401	24/2	
Satd. Flow (perm)	1805	1615	230	3406	3462	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		41			21	
Link Speed (k/h)	50			50	70	
Link Distance (m)	325.8			308.2	342.0	
Travel Time (s)	23.5			22.2	17.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	6%	3%	0%
Adj. Flow (vph)	98	41	70	1366	1487	166
Shared Lane Traffic (%)						
Lane Group Flow (vph)	98	41	70	1366	1653	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6	Rigiti	Len	3.6	3.6	Rigiti
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	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15	25			15
Number of Detectors	1	1	1	2	2	
Detector Template	Left	Right	Left	Thru	Thru	
Leading Detector (m)	2.0	2.0	2.0	10.0	10.0	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	
Detector 1 Size(m)	2.0	2.0	2.0	0.6	0.6	
Detector 1 Type	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	
Detector 1 Channel	CITEX	OHEX	SITEX	SITEA	SITEX	
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	
	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)			0.0			
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(m)				9.4	9.4	
Detector 2 Size(m)				0.6	0.6	
Detector 2 Type				CI+Ex	CI+Ex	
Detector 2 Channel						
Detector 2 Extend (s)				0.0	0.0	
Turn Type	Prot	Perm	Perm	NA	NA	
Protected Phases	4			2	6	

220 Arkell Road TIS 5:00 pm 07-04-2018 2031 PM Background Remedial

7: Victoria Road & Victoria Park Village Road

07-24-2018

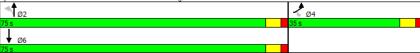
	•	•	1	Ţ	¥	4	
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR	
Permitted Phases		4	2				
Detector Phase	4	4	2	2	6		
Switch Phase							
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0		
Minimum Split (s)	24.0	24.0	24.0	24.0	24.0		
Total Split (s)	35.0	35.0	75.0	75.0	75.0		
Total Split (%)	31.8%	31.8%	68.2%	68.2%	68.2%		
Maximum Green (s)	29.0	29.0	69.0	69.0	69.0		
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0		
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0		
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0		
Lead/Lag							
Lead-Lag Optimize?							
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		
Recall Mode	None	None	Max	Max	Max		
Walk Time (s)	7.0	7.0	7.0	7.0	7.0		
Flash Dont Walk (s)	11.0	11.0	11.0	11.0	11.0		
Pedestrian Calls (#/hr)	0	0	0	0	0		
Act Effct Green (s)	11.4	11.4	77.3	77.3	77.3		
Actuated g/C Ratio	0.12	0.12	0.81	0.81	0.81		
v/c Ratio	0.46	0.18	0.38	0.50	0.59		
Control Delay	46.4	13.5	11.8	5.1	6.0		
Queue Delay	0.0	0.0	0.0	0.0	0.0		
Total Delay	46.4	13.5	11.8	5.1	6.0		
LOS	D	В	В	Α	Α		
Approach Delay	36.7			5.4	6.0		
Approach LOS	D			Α	Α		
Intersection Summary							
Area Type:	Other						
Cycle Length: 110							

Cycle Length: 110
Actuated Cycle Length: 96
Natural Cycle: 60
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.59
Intersection Signal Delay: 7.0
Intersection Capacity Utilization 71.5%
Analysis Deriod (min) 15

Intersection LOS: A ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 7: Victoria Road & Victoria Park Village Road



Queues

7: Victoria Road & Victoria Park Village Road

07-24-2018

	•	•	1	†	↓
Lane Group	EBL	EBR	NBL	NBT	SBT
Lane Group Flow (vph)	98	41	70	1366	1653
v/c Ratio	0.46	0.18	0.38	0.50	0.59
Control Delay	46.4	13.5	11.8	5.1	6.0
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	46.4	13.5	11.8	5.1	6.0
Queue Length 50th (m)	18.4	0.0	3.7	44.0	60.0
Queue Length 95th (m)	32.9	9.3	16.1	68.5	93.5
Internal Link Dist (m)	301.8			284.2	318.0
Turn Bay Length (m)	20.0		30.0		
Base Capacity (vph)	547	518	185	2742	2792
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.18	0.08	0.38	0.50	0.59
Intersection Summary					

	•		_	•	1	7
		*	7	Ť	+	*
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	ř	7	٦	^	∱ β	
Traffic Volume (veh/h)	90	38	64	1257	1368	153
Future Volume (veh/h)	90	38	64	1257	1368	153
Number	7	14	5	2	6	16
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1900	1900	1792	1850	1900
Adj Flow Rate, veh/h	98	41	70	1366	1487	166
Adj No. of Lanes	1	1	1	2	2	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	0	0	0	6	3	3
Cap, veh/h	193	173	248	2591	2428	269
Arrive On Green	0.11	0.11	0.76	0.76	0.76	0.76
Sat Flow, veh/h	1810	1615	307	3495	3285	353
Grp Volume(v), veh/h	98	41	70	1366	813	840
Grp Sat Flow(s), veh/h/ln	1810	1615	307	1703	1758	1788
Q Serve(q s), s	4.6	2.1	12.1	14.5	18.7	19.2
Cycle Q Clear(q c), s	4.6	2.1	31.4	14.5	18.7	19.2
Prop In Lane	1.00	1.00	1.00	17.5	10.7	0.20
Lane Grp Cap(c), veh/h	193	173	248	2591	1337	1360
V/C Ratio(X)	0.51	0.24	0.28	0.53	0.61	0.62
Avail Cap(c a), veh/h	579	516	248	2591	1337	1360
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	38.2	37.1	12.0	4.3	4.8	4.9
Uniform Delay (d), s/veh						
Incr Delay (d2), s/veh	2.0	0.7	2.8	0.8	2.1	2.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.4	1.0	1.2	6.9	9.6	10.1
LnGrp Delay(d),s/veh	40.3	37.8	14.8	5.1	6.9	7.0
LnGrp LOS	D	D	В	A	A	A
Approach Vol, veh/h	139			1436	1653	
Approach Delay, s/veh	39.6			5.6	7.0	
Approach LOS	D			Α	Α	
Timer	1	2	3	4	5	6
Assigned Phs	•	2		4		6
Phs Duration (G+Y+Rc), s		75.0		15.7		75.0
Change Period (Y+Rc), s		6.0		6.0		6.0
Max Green Setting (Gmax), s		69.0		29.0		69.0
Max Q Clear Time (q c+l1), s		33.4		6.6		21.2
Green Ext Time (p_c), s		32.9		0.5		43.0
* .		32.9		0.5		43.0
Intersection Summary						
HCM 2010 Ctrl Delay			7.7			
HCM 2010 LOS			Α			

Appendix J

2021 Total Traffic Operations Reports



	-	•	•	←	4	<i>></i>
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	î,		ሻ	^	¥	
Traffic Volume (vph)	351	33	28	406	129	110
Future Volume (vph)	351	33	28	406	129	110
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)		0.0	60.0		0.0	0.0
Storage Lanes		0	1		1	0
Taper Length (m)			7.5		7.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.988				0.938	
Flt Protected			0.950		0.974	
Satd. Flow (prot)	1792	0	1671	1776	1678	0
Flt Permitted			0.950		0.974	
Satd. Flow (perm)	1792	0	1671	1776	1678	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	290.6			206.6	213.5	
Travel Time (s)	20.9			14.9	15.4	
Confl. Peds. (#/hr)		9	9			
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98
Heavy Vehicles (%)	4%	13%	8%	7%	3%	4%
Adj. Flow (vph)	358	34	29	414	132	112
Shared Lane Traffic (%)						
Lane Group Flow (vph)	392	0	29	414	244	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane	Yes			1.0	1.0	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	1.00	1.00	25	1.00	25	15
Sign Control	Free	13	23	Free	Stop	13
3	1100			1100	Этор	
Intersection Summary						
	Other					
Control Type: Unsignalized						
Intersection Capacity Utilizat	tion 43.8%			IC	CU Level	of Service A
Analysis Period (min) 15						

Intersection						
Int Delay, s/veh	4.3					
		EDD	WDI	WDT	NDI	NDD
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	ĵ.	00	ነ	^	¥	440
Traffic Vol, veh/h	351	33	28	406	129	110
Future Vol, veh/h	351	33	28	406	129	110
Conflicting Peds, #/hr	0	9	9	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	600	-	0	-
Veh in Median Storage	, # 0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	98	98	98	98	98	98
Heavy Vehicles, %	4	13	8	7	3	4
Mymt Flow	358	34	29	414	132	112
	Major1		Major2		Vinor1	
Conflicting Flow All	0	0	401	0	855	384
Stage 1	-	-	-	-	384	-
Stage 2	-	-	-	-	471	-
Critical Hdwy	-	-	4.18	-	6.43	6.24
Critical Hdwy Stg 1	-	-	-	-	5.43	-
Critical Hdwy Stg 2	-	-	-	-	5.43	-
Follow-up Hdwy	-	-	2.272	-	3.527	3.336
Pot Cap-1 Maneuver	-		1126	-	327	659
Stage 1	-		-	-	686	-
Stage 2					626	
Platoon blocked, %					020	
Mov Cap-1 Maneuver			1126		316	654
Mov Cap-1 Maneuver			1120	-	437	004
	-	-	-			-
Stage 1	-	-	-	-	681	-
Stage 2	-	-	-	-	610	-
Approach	EB		WB		NB	
HCM Control Delay, s	0		0.5		18.1	
HCM LOS	U		0.5		C	
HCIVI EUS					C	
		NBLn1	EBT	EBR	WBL	WBT
Minor Lane/Major Mvm	nt I	NDLIII			1126	-
	nt I	516	-	-	1120	
Minor Lane/Major Mvm Capacity (veh/h) HCM Lane V/C Ratio	nt I		-			
Capacity (veh/h) HCM Lane V/C Ratio		516				
Capacity (veh/h) HCM Lane V/C Ratio HCM Control Delay (s)		516 0.473 18.1	-		0.025	-
Capacity (veh/h) HCM Lane V/C Ratio		516 0.473	-	-	0.025	-

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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		4			4			4			4	
Traffic Volume (vph)	7	442	13	3	384	11	21	1	16	42	2	30
Future Volume (vph)	7	442	13	3	384	11	21	1	16	42	2	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. 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
Ped Bike Factor												
Frt		0.996			0.996			0.945			0.945	
FIt Protected		0.999						0.973			0.972	
Satd. Flow (prot)	0	1804	0	0	1772	0	0	1699	0	0	1745	0
FIt Permitted		0.999						0.973			0.972	
Satd. Flow (perm)	0	1804	0	0	1772	0	0	1699	0	0	1745	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		206.6			261.6			219.2			154.5	
Travel Time (s)		14.9			18.8			15.8			11.1	
Confl. Peds. (#/hr)	1		8	8		1	13		10	10		13
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	0%	5%	0%	5%	7%	0%	5%	0%	0%	0%	0%	0%
Adj. Flow (vph)	7	456	13	3	396	11	22	1	16	43	2	31
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	476	0	0	410	0	0	39	0	0	76	0
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)		3.6			3.6			0.0			0.0	
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	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00			1.00
Headway 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
Turning Speed (k/h)	25	_	15	25	_	15	25	0.	15	25		15
Sign Control		Free			Free			Stop			Stop	
Intersection Summary												
	Other											
Control Type: Unsignalized												
Intersection Capacity Utilizati	on 43.8%			IC	CU Level	of Service	Α					
Analysis Period (min) 15												

Intersection												
Int Delay, s/veh	2.3											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	LDL	4	LDIN	WDL	4	WDIX	INDL	4	NDIX	JUL	4	JUIN
Traffic Vol, veh/h	7	442	13	3	384	11	21	1	16	42	2	30
Future Vol. veh/h	7	442	13	3	384	11	21	1	16	42	2	30
Conflicting Peds, #/hr	1	0	8	8	0	1	13	0	10	10	0	13
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	- Jiop	Jiop -	None	Jiop -	Jiop -	None
Storage Length			-			-			-			-
Veh in Median Storage	.# -	0			0			0			0	
Grade. %	-	0			0			0			0	
Peak Hour Factor	97	97	97	97	97	97	97	97	97	97	97	97
Heavy Vehicles, %	0	5	0	5	7	0	5	0	0	0	0	0
Mymt Flow	7	456	13	3	396	11	22	1	16	43	2	31
Major/Minor N	Major1			Major2			Minor1		D.	/linor2		
Conflicting Flow All	408	0	0	477	0	0	922	899	480	905	901	416
Stage 1	400	-	U	4//	-	U	485	485	400	409	409	410
Stage 2							437	414		496	492	
Critical Hdwy	4.1			4.15			7.15	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1				1.10			6.15	5.5	0.2	6.1	5.5	0.2
Critical Hdwy Stg 2							6.15	5.5	-	6.1	5.5	
Follow-up Hdwy	2.2			2.245			3.545	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1162		-	1070	-		248	281	590	260	280	641
Stage 1	- 1102			-			558	555	-	623	600	-
Stage 2							592	597	-	559	551	-
Platoon blocked, %												
Mov Cap-1 Maneuver	1149	-	-	1061	-	-	228	276	581	247	275	633
Mov Cap-2 Maneuver	-	-	-	-	-	-	228	276	-	247	275	-
Stage 1	-	-	-	-	-	-	550	547	-	617	597	-
Stage 2		-	-	-	-		553	594	-	533	543	-
Ü												
Approach	FB			WB			NB			SB		
HCM Control Delay, s	0.1			0.1			18.4			19.2		
HCM LOS	0.1			0.1			C			C		
		NIDL 4	EDI	EDT	EDD	WDI	MOT	WDD	CDL 4			
Minor Lane/Major Mvm	I I	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR				
Capacity (veh/h)		308	1149	-	-	1061	-	-	329			
HCM Cantral Dalay (a)		0.127		-	-	0.003	-		0.232			
HCM Control Delay (s)		18.4	8.2	0	-	8.4	0	-	19.2			
HCM Lane LOS		C	A	Α	-	A	Α	-	С			
HCM 95th %tile Q(veh))	0.4	0	-	-	0	-	-	0.9			

2: Zecca Drive/Amos Drive & Arkell Road

	۶	→	•	•	•	•	4	†	/	-	↓	1
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	, T	ĵ.		٦	ĥ			4			4	
Traffic Volume (vph)	11	425	63	37	246	42	119	0	124	131	0	32
Future Volume (vph)	11	425	63	37	246	42	119	0	124	131	0	32
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	50.0		0.0	60.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	1		0	0		0	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. 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
Ped Bike Factor												
Frt		0.981			0.978			0.931			0.973	
Flt Protected	0.950			0.950				0.976			0.961	
Satd. Flow (prot)	1770	1786	0	1703	1735	0	0	1622	0	0	1742	0
Flt Permitted	0.950			0.950				0.976			0.961	
Satd. Flow (perm)	1770	1786	0	1703	1735	0	0	1622	0	0	1742	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		261.6			193.8			209.6			91.7	
Travel Time (s)		18.8			14.0			15.1			6.6	
Confl. Peds. (#/hr)			11	11					1			
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	4%	7%	6%	8%	2%	9%	2%	4%	2%	2%	2%
Adj. Flow (vph)	12	462	68	40	267	46	129	0	135	142	0	35
Shared Lane Traffic (%)												
Lane Group Flow (vph)	12	530	0	40	313	0	0	264	0	0	177	0
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)		3.6	J		3.6	J		0.0	J		0.0	, i
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												
Headway 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
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Free			Free			Stop			Stop	
Intersection Summary												
Area Type: C)ther											
Control Type: Unsignalized												
Intersection Capacity Utilizati	on 52.0%			IC	CU Level	of Service	A					
Analysis Period (min) 15												

Intersection												
Int Delay, s/veh	21.5											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	*	ĵ.		*	ĵ.			4			4	
Traffic Vol, veh/h	11	425	63	37	246	42	119	0	124	131	0	32
Future Vol. veh/h	11	425	63	37	246	42	119	0	124	131	0	32
Conflicting Peds, #/hr	0	0	11	11	0	0	0	0	1	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-		None	-	-	None	-	-	None	-	-	None
Storage Length	500		-	600		-						-
Veh in Median Storage		0			0			0			0	
Grade, %	-	0			0			0			0	
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	4	7	6	8	2	9	2	4	2	2	2
Mymt Flow	12	462	68	40	267	46	129	0	135	142	0	35
		102	- 50		207	.0	,	- 3	.00		- 0	- 55
Major/Minor 1	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	313	0	0	541	0	0	919	924	508	960	936	290
Stage 1	515	-	-	511	-	-	531	531	-	371	371	270
Stage 2							388	393		589	565	
Critical Hdwy	4.12			4.16			7.19	6.52	6.24	7.12	6.52	6.22
Critical Hdwy Stg 1	7.12			4.10			6.19	5.52	0.24	6.12	5.52	0.22
Critical Hdwy Stg 2							6.19	5.52		6.12	5.52	
Follow-up Hdwy	2.218			2.254			3.581	4.018	3 336		4.018	3 318
Pot Cap-1 Maneuver	1247			1008			245	269	561	236	265	749
Stage 1	1247			1000			519	526	301	649	620	749
Stage 2							622	606		494	508	
Platoon blocked, %							UZZ	000	-	474	300	
Mov Cap-1 Maneuver	1247			1007			223	253	555	172	250	749
Mov Cap-1 Maneuver	1247			1007			223	253	- 555	172	250	749
Stage 1							509	516	-	643	595	
Stage 2							570	582		370	498	
Staye 2							370	502		3/0	470	
Approach	FB			WB			NB			SB		
HCM Control Delay, s	0.2			1			52.1			82.3		
HCM LOS	0.2						52.1 F			02.3 F		
TIOW EUS							r			г		
Minor Lane/Major Mvm	nt I	VBLn1	EBL	EBT	EBR	WBL	WBT	WBR:	SRI n1			
Capacity (veh/h)		321	1247	LDI	LDIN	1007	******	VI DIC.	203			
HCM Lane V/C Ratio		0.823	0.01			0.04			0.873			
HCM Control Delay (s)		52.1	7.9			8.7	-		82.3			
		52.1 F	7.9 A	-		8.7 A			82.3 F			
HCM Lane LOS	١		A 0	-	-		-	-				
HCM 95th %tile Q(veh))	7	0	-	-	0.1	-	-	6.7			

3: Colonial Drive & Arkell Road

	ၨ	→	\rightarrow	•	←	•	4	†	/	-	↓	4
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	,	f)			4			4		,		7
Traffic Volume (vph)	83	596	2	2	293	62	2	0	2	6	0	31
Future Volume (vph)	83	596	2	2	293	62	2	0	2	6	0	31
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	25.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	0		0	0		0	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. 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
Frt					0.977			0.932				0.850
Flt Protected	0.950							0.976		0.950		
Satd. Flow (prot)	1805	1827	0	0	1742	0	0	1728	0	1805	0	1615
Flt Permitted	0.950							0.976		0.950		
Satd. Flow (perm)	1805	1827	0	0	1742	0	0	1728	0	1805	0	1615
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		193.8			144.3			68.0			96.7	
Travel Time (s)		14.0			10.4			4.9			7.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	4%	0%	0%	8%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	90	648	2	2	318	67	2	0	2	7	0	34
Shared Lane Traffic (%)												
Lane Group Flow (vph)	90	650	0	0	387	0	0	4	0	7	0	34
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)		3.6			3.6			3.6			3.6	
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												
Headway 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
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Free			Free			Stop			Stop	
Intersection Summary												
	Other											
Control Type: Unsignalized												
Intersection Capacity Utilizat	ion 64.1%			IC	CU Level	of Service	С					
Analysis Period (min) 15												

Intersection												
Int Delay, s/veh	1.2											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	ř	ĵ,			4			4		Ť		7
Traffic Vol, veh/h	83	596	2	2	293	62	2	0	2	6	0	31
Future Vol, veh/h	83	596	2	2	293	62	2	0	2	6	0	31
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None		-	None
Storage Length	250		-	-		-	-		-	0	-	0
Veh in Median Storage	,# -	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	0	4	0	0	8	0	0	0	0	0	0	0
Mvmt Flow	90	648	2	2	318	67	2	0	2	7	0	34
Major/Minor N	Major1		N	Major2		- 1	Minor1			Minor2		
Conflicting Flow All	386	0	0	650	0	0	1186	1219	649	1187	-	352
Stage 1			-	-		-	829	829		357		-
Stage 2			-			-	357	390		830		-
Critical Hdwy	4.1	-	-	4.1	-		7.1	6.5	6.2	7.1	-	6.2
Critical Hdwy Stg 1	-		-	-		-	6.1	5.5	-	6.1	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	-	-
Follow-up Hdwy	2.2		-	2.2			3.5	4	3.3	3.5	-	3.3
Pot Cap-1 Maneuver	1184	-	-	946	-	-	167	182	473	167	0	696
Stage 1	-						368	388	-	665	0	-
Stage 2	-	-	-	-	-	-	665	611	-	367	0	-
Platoon blocked, %			-		-	-						
Mov Cap-1 Maneuver	1184	-	-	946	-	-	149	168	473	156	-	696
Mov Cap-2 Maneuver	-		-	-	-	-	149	168	-	156	-	-
Stage 1	-	-	-	-	-	-	340	359	-	614	-	-
Stage 2	-		-	-	-	-	631	609	-	338	-	-
ű												
Approach	EB			WB			NB			SB		
HCM Control Delay, s	1			0			21.2			13.4		
HCM LOS							С			В		
Minor Lane/Major Mvm	1 1	VBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBI n2		
Capacity (veh/h)		227	1184			946			156	696		
HCM Lane V/C Ratio		0.019	0.076			0.002			0.042			
HCM Control Delay (s)		21.2	8.3			8.8	0		29.1	10.4		
HCM Lane LOS		21.2 C	Α.5			Α.	A		27.1 D	В		
HCM 95th %tile Q(veh)		0.1	0.2			0	А		0.1	0.2		
HOW YOU WILL (Ven)		U. I	0.2	-	-	U	-	-	U. I	0.2		

4: Residential Entrance/Access 1 & Arkell Road

Lane Group

,	Arkell R	oad									07-2	4-2018
	۶	→	•	•	—	•	1	†	~	/	ļ	4
	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
IS	, A	î»		, A	î,		, A	î»		, J	î»	
1)	398	113	91	157	96	70	64	680	88	52	590	202
h)	398	113	91	157	96	70	64	680	88	52	590	202
	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
)	40.0		0.0	20.0		0.0	90.0		0.0	50.0		0.0
	1		0	1		0	1		0	1		0
	7.5			7.5			7.5			7.5		
	1.00	1 00	1.00	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00

Lane Group	EBL	EBI	EBR	WBL	WBI	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	٦	î		Ţ	f)		7	f)		ľ	î	
Traffic Volume (vph)	398	113	91	157	96	70	64	680	88	52	590	202
Future Volume (vph)	398	113	91	157	96	70	64	680	88	52	590	202
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	40.0		0.0	20.0		0.0	90.0		0.0	50.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. 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
Ped Bike Factor	1.00				0.99		1.00				0.99	
Frt		0.933			0.937			0.983			0.962	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1736	1663	0	1787	1698	0	1805	1762	0	1752	1670	0
Flt Permitted	0.609			0.502			0.132			0.138		
Satd. Flow (perm)	1111	1663	0	944	1698	0	251	1762	0	255	1670	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		48			44			9			24	
Link Speed (k/h)		50			60			70			70	
Link Distance (m)		144.3			357.4			823.5			155.4	
Travel Time (s)		10.4			21.4			42.4			8.0	
Confl. Peds. (#/hr)	1					1	3					3
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles (%)	4%	3%	11%	1%	3%	5%	0%	6%	6%	3%	8%	11%
Adj. Flow (vph)	437	124	100	173	105	77	70	747	97	57	648	222
Shared Lane Traffic (%)												
Lane Group Flow (vph)	437	224	0	173	182	0	70	844	0	57	870	0
Enter Blocked Intersection	No											
Lane Alignment	Left	Left	Right									
Median Width(m)		3.6			3.6			3.6			3.6	
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												
Headway 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
Turning Speed (k/h)	25	1.00	15	25	1100	15	25	1100	15	25	1100	15
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru										
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	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	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	CI+Ex	CI+Ex										
Detector 1 Channel	CITEX	SITEX		SITEX	SITEX		SITEX	SITEA		SITEX	SITEX	
Detector 1 Extend (s)	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	
Detector Criede (2)	0.0	U.U		0.0	U.U		U.U	U.U		0.0	U.U	

Detector 1 Queue (s)
Detector 1 Delay (s)
Detector 2 Position(m) 0.0 0.0 0.0 0.0 9.4 9.4 9.4 9.4 Detector 2 Size(m) 0.6 0.6 0.6 0.6 Detector 2 Type Detector 2 Channel CI+Ex CI+Ex CI+Ex CI+Ex Detector 2 Extend (s) 0.0 0.0 0.0 0.0

220 Arkell Road TIS 5:00 pm 07-04-2018 2021 AM Total

Synchro 9 Report Page 9

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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SE
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Detector Phase	7	4		3	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0		7.0	10.0		7.0	10.0	
Minimum Split (s)	10.0	26.0		10.0	26.0		10.0	34.0		10.0	34.0	
Total Split (s)	10.0	26.0		10.0	26.0		10.0	34.0		10.0	34.0	
Total Split (%)	12.5%	32.5%		12.5%	32.5%		12.5%	42.5%		12.5%	42.5%	
Maximum Green (s)	7.0	20.0		7.0	20.0		7.0	28.0		7.0	28.0	
Yellow Time (s)	3.0	4.0		3.0	4.0		3.0	4.0		3.0	4.0	
All-Red Time (s)	0.0	2.0		0.0	2.0		0.0	2.0		0.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	3.0	6.0		3.0	6.0		3.0	6.0		3.0	6.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	None		None	None	
Walk Time (s)		7.0			7.0			13.0			13.0	
Flash Dont Walk (s)		13.0			13.0			15.0			15.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)	23.1	13.0		23.1	13.0		37.4	30.4		36.8	28.4	
Actuated g/C Ratio	0.32	0.18		0.32	0.18		0.52	0.43		0.52	0.40	
v/c Ratio	1.04	0.65		0.44	0.53		0.24	1.12		0.20	1.28	
Control Delay	78.3	30.9		20.4	25.8		10.9	94.8		10.4	162.1	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	78.3	30.9		20.4	25.8		10.9	94.8		10.4	162.1	
LOS	E	С		С	С		В	F		В	F	
Approach Delay		62.3			23.1			88.3			152.8	
Approach LOS		Е			С			F			F	
Intersection Summary												
Area Type:	Other											
Cycle Length: 80												
Actuated Cycle Length: 71	1.3											
Natural Cycle: 150												
Control Type: Actuated-U	ncoordinated											
Maximum v/c Ratio: 1.28												
Intersection Signal Delay:					ntersection							
Intersection Capacity Utiliz	zation 97.6%			10	CU Level	of Service	e F					
Analysis Period (min) 15												

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Splits and Phases: 5: Victoria Road & Arkell Road

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Lanes, Volumes, Timings

5: Victoria Road & Arkell Road

Lane Group EBL EBT WBL WBT NBL NBT SBL SBT
Lane Group Flow (vph) 437 224 173 182 70 844 57 870
v/c Ratio 1.04 0.65 0.44 0.53 0.24 1.12 0.20 1.28
Control Delay 78.3 30.9 20.4 25.8 10.9 94.8 10.4 162.1
Queue Delay 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
Total Delay 78.3 30.9 20.4 25.8 10.9 94.8 10.4 162.1
Queue Length 50th (m) ~58.1 23.7 17.5 18.0 4.2 ~155.4 3.4 ~166.3
Queue Length 95th (m) #115.1 45.1 31.1 36.2 11.7 #252.1 10.0 #263.7
Internal Link Dist (m) 120.3 333.4 799.5 131.4
Turn Bay Length (m) 40.0 20.0 90.0 50.0
Base Capacity (vph) 422 507 390 514 286 756 280 679
Starvation Cap Reductn 0 0 0 0 0 0 0
Spillback Cap Reductn 0 0 0 0 0 0 0
Storage Cap Reductn 0 0 0 0 0 0 0
Reduced v/c Ratio 1.04 0.44 0.44 0.35 0.24 1.12 0.20 1.28

HCM 2010 Signalized Intersection Summary
5: Victoria Road & Arkell Road

	•	→	•	•	+	•	•	†	~	/	 	4
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	7	1>		ሻ	1•		ሻ	f)		ሻ	^	
Traffic Volume (veh/h)	398	113	91	157	96	70	64	680	88	52	590	202
Future Volume (veh/h)	398	113	91	157	96	70	64	680	88	52	590	202
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	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 Sat Flow, veh/h/ln	1827	1783	1900	1881	1830	1900	1900	1792	1900	1845	1747	1900
Adj Flow Rate, veh/h	437	124	100	173	105	77	70	747	97	57	648	222
Adj No. of Lanes	1	1	0	1	1	0	1	1	0	1	1	0
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Percent Heavy Veh, %	4	3	3	1	3	3	0	6	6	3	8	8
Cap, veh/h	372	168	135	341	180	132	234	621	81	218	488	167
Arrive On Green	0.10	0.18	0.18	0.10	0.18	0.18	0.07	0.40	0.40	0.07	0.39	0.39
Sat Flow, veh/h	1740	914	737	1792	981	719	1810	1554	202	1757	1244	426
Grp Volume(v), veh/h	437	0	224	173	0	182	70	0	844	57	0	870
Grp Sat Flow(s), veh/h/ln	1740	0	1650	1792	0	1700	1810	0	1756	1757	0	1670
Q Serve(q s), s	7.0	0.0	9.1	5.5	0.0	7.0	1.5	0.0	28.5	1.3	0.0	28.0
Cycle Q Clear(q_c), s	7.0	0.0	9.1	5.5	0.0	7.0	1.5	0.0	28.5	1.3	0.0	28.0
Prop In Lane	1.00		0.45	1.00		0.42	1.00		0.11	1.00		0.26
Lane Grp Cap(c), veh/h	372	0	303	341	0	313	234	0	701	218	0	655
V/C Ratio(X)	1.17	0.00	0.74	0.51	0.00	0.58	0.30	0.00	1.20	0.26	0.00	1.33
Avail Cap(c a), veh/h	372	0	462	341	0	476	278	0	701	273	0	655
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	27.2	0.0	27.5	21.1	0.0	26.6	16.1	0.0	21.4	16.3	0.0	21.7
Incr Delay (d2), s/veh	102.9	0.0	3.5	1.2	0.0	1.7	0.7	0.0	104.7	0.6	0.0	158.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	16.4	0.0	4.5	2.8	0.0	3.4	0.8	0.0	34.0	0.6	0.0	41.5
LnGrp Delay(d),s/veh	130.2	0.0	31.0	22.3	0.0	28.3	16.8	0.0	126.1	16.9	0.0	179.8
LnGrp LOS	F		С	С		С	В		F	В		F
Approach Vol, veh/h		661			355			914			927	
Approach Delay, s/veh		96.6			25.4			117.8			169.7	
Approach LOS		70.0 F			C			F			F	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	7.7	34.5	10.0	19.1	8.3	34.0	10.0	19.1				
Change Period (Y+Rc), s	3.0	6.0	3.0	6.0	3.0	6.0	3.0	6.0				
	7.0	28.0	7.0	20.0	7.0	28.0	7.0	20.0				
Max Green Setting (Gmax), s	3.3		7.0		3.5		9.0	9.0				
Max Q Clear Time (g_c+l1), s	0.0	30.5 0.0	0.0	11.1	0.0	30.0	0.0	2.1				
Green Ext Time (p_c), s	0.0	0.0	0.0	1.0	0.0	0.0	0.0	Z. I				
Intersection Summary			110.0									
HCM 2010 Ctrl Delay			118.2									
HCM 2010 LOS			F									

Volume exceeds capacity, queue is theoretically infinite.
 Oueue shown is maximum after two cycles.

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

07-24-2018

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Lane Group	FBI	EBR	NBL	NBT	SBT	SBR
Lane Configurations	7	7	Ť	<u>ND1</u>	<u> </u>	7
Traffic Volume (vph)	96	58	53	1093	777	133
Future Volume (vph)	96	58	53	1093	777	133
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	0.0	30.0	1700	1700	60.0
Storage Lanes	1	1	30.0			1
	7.5	- 1	7.5			- 1
Taper Length (m)		1.00		1.00	1.00	1.00
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.050	0.850	0.050			0.850
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1805	1615	1805	1792	1759	1615
Flt Permitted	0.950		0.271			
Satd. Flow (perm)	1805	1615	515	1792	1759	1615
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		63				145
Link Speed (k/h)	50			70	70	
Link Distance (m)	97.9			155.4	308.2	
Travel Time (s)	7.0			8.0	15.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0.72	0.72	0.72	6%	8%	0.72
Adj. Flow (vph)	104	63	58	1188	845	145
Shared Lane Traffic (%)	104	03	50	1100	043	140
Lane Group Flow (vph)	104	63	58	1188	845	145
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	3.6	
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	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15	25			15
Number of Detectors	1	1	1	2	2	1
Detector Template	Left	Right	Left	Thru	Thru	Right
Leading Detector (m)	2.0	2.0	2.0	10.0	10.0	2.0
Trailing Detector (m)	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
Detector 1 Size(m)	2.0	2.0	2.0	0.6	0.6	2.0
,						CI+Ex
Detector 1 Type	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+EX
Detector 1 Channel	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Extend (s)	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
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)				9.4	9.4	
Detector 2 Size(m)				0.6	0.6	
Detector 2 Type				CI+Ex	CI+Ex	
Detector 2 Channel						
Detector 2 Extend (s)				0.0	0.0	
Turn Type	Prot	Perm	Perm	NA	NA	Perm
Protected Phases	4	1 Cilli	1 Cilli	2	6	1 Cilli
FIVIECIEU FIIASES	4			2	0	

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Lane Group	EBL	EBR	NBL	NBT	SBT	SBR	
Permitted Phases		4	2			6	
Detector Phase	4	4	2	2	6	6	
Switch Phase							
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	
Minimum Split (s)	24.0	24.0	24.0	24.0	24.0	24.0	
Total Split (s)	24.0	24.0	56.0	56.0	56.0	56.0	
Total Split (%)	30.0%	30.0%	70.0%	70.0%	70.0%	70.0%	
Maximum Green (s)	18.0	18.0	50.0	50.0	50.0	50.0	
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)	2.0	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	
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0	6.0	
Lead/Lag							
Lead-Lag Optimize?							
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None	Max	Max	Max	Max	
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	
Flash Dont Walk (s)	11.0	11.0	11.0	11.0	11.0	11.0	
Pedestrian Calls (#/hr)	0	0	0	0	0	0	
Act Effct Green (s)	10.8	10.8	56.9	56.9	56.9	56.9	
Actuated g/C Ratio	0.14	0.14	0.76	0.76	0.76	0.76	
v/c Ratio	0.40	0.22	0.15	0.87	0.63	0.12	
Control Delay	33.9	9.9	5.4	20.2	9.2	1.1	
Queue Delay	0.0	0.0	0.0	5.8	0.0	0.0	
Total Delay	33.9	9.9	5.4	25.9	9.2	1.1	
LOS	С	Α	Α	С	Α	Α	
Approach Delay	24.9			25.0	8.0		
Approach LOS	C			С	A		
Intersection Summary							
Area Type:	Other						
Cycle Length: 80							
Actuated Cycle Length: 75	i.1						
Natural Cycle: 90							
Control Type: Semi Act-Ur	ncoord						
Maximum v/c Ratio: 0.87							
Intersection Signal Delay:					ntersectio		
Intersection Capacity Utiliz	zation 75.9%			10	CU Level	of Service	D
Analysis Period (min) 15							
Splits and Phases: 6: Vi	ictoria Road	& Access	3 2				
<†							
™ Ø2							
56 s							

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Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	104	63	58	1188	845	145
v/c Ratio	0.40	0.22	0.15	0.87	0.63	0.12
Control Delay	33.9	9.9	5.4	20.2	9.2	1.1
Queue Delay	0.0	0.0	0.0	5.8	0.0	0.0
Total Delay	33.9	9.9	5.4	25.9	9.2	1.1
Queue Length 50th (m)	14.1	0.0	2.3	125.8	57.9	0.0
Queue Length 95th (m)	27.7	9.8	7.5	#261.4	112.7	5.0
Internal Link Dist (m)	73.9			131.4	284.2	
Turn Bay Length (m)			30.0			60.0
Base Capacity (vph)	433	435	390	1358	1332	1258
Starvation Cap Reductn	0	0	0	131	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.24	0.14	0.15	0.97	0.63	0.12
Intersection Cummens						

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

Queue shown is maximum after two cycles.

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Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	ħ	T T	NDE.	<u> </u>		JDIK 7
Traffic Volume (veh/h)	96	58	53	T 1093	T 777	133
Future Volume (veh/h)	96	58	53	1093	777	133
Number	70	14	5	2	6	16
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00	U	U	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1900	1900	1792	1759	1900
Adj Flow Rate, veh/h	104	63	58	1188	845	145
Adj No. of Lanes	104	1	1	1 100	040	145
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	0.92	0.92	0.92	0.92	0.92	0.92
	243	217	342	1251	1228	1127
Cap, veh/h	0.13	0.13		0.70	0.70	0.70
Arrive On Green			0.70			
Sat Flow, veh/h	1810	1615	578	1792	1759	1615
Grp Volume(v), veh/h	104	63	58	1188	845	145
Grp Sat Flow(s), veh/h/ln	1810	1615	578	1792	1759	1615
Q Serve(g_s), s	3.8	2.5	4.6	42.5	20.0	2.1
Cycle Q Clear(g_c), s	3.8	2.5	24.6	42.5	20.0	2.1
Prop In Lane	1.00	1.00	1.00	4054	4000	1.00
Lane Grp Cap(c), veh/h	243	217	342	1251	1228	1127
V/C Ratio(X)	0.43	0.29	0.17	0.95	0.69	0.13
Avail Cap(c_a), veh/h	455	406	342	1251	1228	1127
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	28.5	27.9	13.5	9.7	6.3	3.6
Incr Delay (d2), s/veh	1.2	0.7	1.1	15.9	3.2	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.0	1.2	0.8	26.0	10.5	1.0
LnGrp Delay(d),s/veh	29.7	28.6	14.5	25.6	9.5	3.8
LnGrp LOS	С	С	В	С	A	A
Approach Vol, veh/h	167			1246	990	
Approach Delay, s/veh	29.3			25.1	8.6	
Approach LOS	С			С	Α	
Timer	1	2	3	4	5	6
Assigned Phs		2		4		6
Phs Duration (G+Y+Rc), s		56.0		15.6		56.0
Change Period (Y+Rc), s		6.0		6.0		6.0
Max Green Setting (Gmax), s		50.0		18.0		50.0
Max Q Clear Time (q_c+l1), s		44.5		5.8		22.0
		5.1		0.5		23.2
Green Ext Time (p_c), s		5.1		0.5		23.2
Intersection Summary						
HCM 2010 Ctrl Delay			18.6			
HCM 2010 LOS			В			

TITICI	 	J		J	U	,
Assigned Phs	2		4		6	
Phs Duration (G+Y+Rc), s	56.0		15.6		56.0	
Change Period (Y+Rc), s	6.0		6.0		6.0	
Max Green Setting (Gmax), s	50.0		18.0		50.0	
Max Q Clear Time (g_c+l1), s	44.5		5.8		22.0	
Green Ext Time (p_c), s	5.1		0.5		23.2	

intersection Summary	
HCM 2010 Ctrl Delay	18.6
HCM 2010 LOS	В

HCM 2010 Signalized Intersection Summary 6: Victoria Road & Access 2

7: Victoria Road & Victoria Park Village Road

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Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	ሻ	7	ሻ	†	1 2	
Traffic Volume (vph)	186	52	17	1172	858	60
Future Volume (vph)	186	52	17	1172	858	60
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	20.0	0.0	30.0			0.0
Storage Lanes	1	1	1			0
Taper Length (m)	7.5		7.5			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850			0.991	
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1770	1583	1770	1863	1846	0
Flt Permitted	0.950		0.950			
Satd. Flow (perm)	1770	1583	1770	1863	1846	0
Link Speed (k/h)	50			50	70	
Link Distance (m)	325.8			308.2	342.0	
Travel Time (s)	23.5			22.2	17.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	202	57	18	1274	933	65
Shared Lane Traffic (%)						
Lane Group Flow (vph)	202	57	18	1274	998	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	3.6	
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	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15	25			15
Sign Control	Stop			Free	Free	
Intersection Summary						
Area Type:	Other					

Area Type: Other
Control Type: Unsignalized
Intersection Capacity Utilization 78.7%
ICU Level of Service D
Analysis Period (min) 15

HCM 2010 TWSC

7: Victoria Road & Victoria Park Village Road

07-24-2018

tersection								
t Delay, s/veh	147.6							
ovement	EBL	EBR	NBL	NBT	SBT	SBR		
ne Configurations	ች	7	ች		1			
affic Vol, veh/h	186	52	17	1172	858	60		
uture Vol. veh/h	186	52	17	1172	858	60		
onflicting Peds, #/hr	0	0	0	0	0.00	0		
gn Control	Stop	Stop	Free	Free	Free	Free		
T Channelized	Jiop -		-		-			
orage Length	200	0	300	NONE -		NONE		
eh in Median Storage		-	300	0	0			
rade, %	e,# 0 0			0	0			
eak Hour Factor	92	92	92	92	92	92		
	92	92	2	2	92	92		
eavy Vehicles, %	202	57	18		933	65		
vmt Flow	202	5/	18	1274	933	00		
-i/h 4i	Minne		\		4-:0			
	Minor2		Major1		Major2			
onflicting Flow All	2276	965	998	0	-	0		
Stage 1	965	-	-	-	-	-		
Stage 2	1311	-	-	-	-	-		
ritical Hdwy	6.42	6.22	4.12	-	-	-		
ritical Hdwy Stg 1	5.42	-	-	-	-	-		
ritical Hdwy Stg 2	5.42	-	-	-	-	-		
ollow-up Hdwy		3.318	2.218	-	-	-		
ot Cap-1 Maneuver	~ 44	309	693	-	-	-		
Stage 1	370	-	-	-	-	-		
Stage 2	252	-	-	-	-	-		
atoon blocked, %				-	-	-		
ov Cap-1 Maneuver	~ 43	309	693	-	-	-		
ov Cap-2 Maneuver	~ 43	-	-	-	-	-		
Stage 1	370	-	-	-	-	-		
Stage 2	245		-	-	-	-		
, , , , , , , , , , , , , , , , , , ,								
proach	EB		NB		SB			
CM Control Delay, \$	1453.7		0.1		0			
CM LOS	F							
inor Lane/Major Mvn	nt	NBL	NBT I	EBLn1	FBI n2	SBT	SBR	
apacity (veh/h)		693	-	43	309	-	-	
CM Lane V/C Ratio		0.027		4.702				
CM Control Delay (si)	10.3		1854.8	19.2			
CM Lane LOS	,	В	- J		17.2 C			
CM 95th %tile Q(veh	1)	0.1	-		0.7		-	
Jun 70.110 Q(VOI	,	0.1		20.2	0.7			
ntoc								
otes Volume exceeds ca		ф. D	elay exc		00-		outation Not Defined	*: All major volume in platoon

Intersection						
Int Delay, s/veh	2.2					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	1>		ች	↑	W	
Traffic Vol, veh/h	456	139	80	388	66	40
Future Vol, veh/h	456	139	80	388	66	40
Conflicting Peds, #/hr	0	3	3	0	0	1
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	600	-	0	-
Veh in Median Storage	, # 0		-	0	0	-
Grade, %	0		-	0	0	
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	1	3	0	1	0	0
Mymt Flow	475	145	83	404	69	42
Major/Minor N	Major1		Major		Minor1	
	Major1 0	0	Major2 623	0	Minor1 1121	551
Conflicting Flow All Stage 1	-	-	023	-	550	201
Stage 2					571	
Critical Hdwy			4.1	-	6.4	6.2
Critical Hdwy Stg 1			4.1		5.4	0.2
Critical Hdwy Stg 2			-	-	5.4	-
	-	-	2.2			3.3
Follow-up Hdwy	-	-		-	3.5	
Pot Cap-1 Maneuver	-	-	968	-	230	538
Stage 1	-	-	-	-	582	-
Stage 2	-	-	-	-	569	-
Platoon blocked, %	-	-	0/7	-	010	F0/
Mov Cap-1 Maneuver	-	-	967	-	210	536
Mov Cap-2 Maneuver	-	-	-	-	346	-
Stage 1	-	-	-	-	581	-
Stage 2	-		-	-	520	-
Approach	EB		WB		NB	
HCM Control Delay, s	0		1.6		17.4	
HCM LOS					С	
Min on Laws (Mains M		UDI -1	EDT	EDD	WDI	WDT
Minor Lane/Major Mvm	it i	VBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)		399	-	-	967	-
HCM Lane V/C Ratio		0.277	-			-
HCM Control Delay (s)		17.4	-	-	9.1	-
HCM Lane LOS HCM 95th %tile Q(veh)		C 1.1	-	-	0.3	-
				-		-

Lane Group Lane Configurations Traffic Volume (vph) 43 426 428 0 24 Future Volume (vph) 43 426 29 6 428 28 16 0 3 16 24 Ideal Flow (vphpl) 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 Lane Util. 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 Ped Bike Factor 0.992 0.992 0.980 0.922 Flt Protected 0.996 0.999 0.959 0.981 Satd. Flow (prot) 0 1861 0 0 1866 0 0 1786 0 0 1719 0 Flt Permitted 0.996 0.999 0.959 0.981 Satd. Flow (perm) 0 1861 0 0 1786 0 1719 0 1866 0 0 0 Link Speed (k/h) 50 50 50 50 Link Distance (m) 206.6 261.6 219.2 154.5 Travel Time (s) 14.9 18.8 15.8 11.1 Confl. Peds. (#/hr) 9 9 Peak Hour Factor 0.95 0.95 0.95 0.95 0.95 0.95 0.95 0.95 0.95 0.95 Heavy Vehicles (%) 1% 0% 0% 1% 0% 0% 0% 0% 0% 0% 0% 448 Adj. Flow (vph) 31 451 29 25 Shared Lane Traffic (%) Lane Group Flow (vph) 0 524 486 20 Enter Blocked Intersection No Lane Alignment Left Left Right Left Right Left Right Left Left Right Left Left Median Width(m) 0.0 0.0 3.6 3.6 Link Offset(m) 0.0 0.0 Crosswalk Width(m) 4.8 4.8 4.8 4.8 Two way Left Turn Lane Headway 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 Turning Speed (k/h) 25 25 15 25 15 25 15 15 Sign Control Stop Stop Free Free Intersection Summary Area Type: Other Control Type: Unsignalized Intersection Capacity Utilization 62.8% ICU Level of Service B Analysis Period (min) 15

Intersection												
Int Delay, s/veh	1.6											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		44			4			44			4	
Traffic Vol. veh/h	43	426	29	6	428	28	16	0	3	16	1	24
Future Vol, veh/h	43	426	29	6	428	28	16	0	3	16	1	24
Conflicting Peds, #/hr	0	0	9	9	0	0	7	0	7	7	0	7
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized		-	None		-	None	-	-	None	-	-	None
Storage Length	-		-	-		-			-	-		-
Veh in Median Storage	2.# -	0	-	-	0	-		0	-	-	0	-
Grade, %		0	-	-	0	-		0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	0	1	0	0	1	0	0	0	0	0	0	0
Mymt Flow	45	448	31	6	451	29	17	0	3	17	1	25
Major/Minor I	Major1			Major2			Minor1		-	Minor2		
Conflicting Flow All	480	0	0	488	0	0	1061	1056	480	1041	1056	472
Stage 1			-	-		-	563	563	-	478	478	-
Stage 2			-	-		-	498	493		563	578	-
Critical Hdwy	4.1			4.1	-		7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1							6.1	5.5	- 0.2	6.1	5.5	- 0.2
Critical Hdwy Stg 2					-		6.1	5.5		6.1	5.5	
Follow-up Hdwy	2.2			2.2			3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1093			1086	-		203	227	590	210	227	596
Stage 1	-						514	512	-	572	559	-
Stage 2					-		558	550	-	514	504	
Platoon blocked, %												
Mov Cap-1 Maneuver	1087			1080			182	211	582	197	211	592
Mov Cap-2 Maneuver							182	211		197	211	-
Stage 1					-		481	479	-	539	555	
Stage 2							526	546	-	479	472	
								2.0				
Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.7			0.1			24.6			17.8		
HCM LOS							С			С		
Minor Lane/Major Mvm	nt I	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1			
Capacity (veh/h)		204	1087	-	-	1080		-	324			
HCM Lane V/C Ratio			0.042			0.006			0.133			
HCM Control Delay (s)		24.6	8.5	0	-	8.4	0		17.8			
HCM Lane LOS		C	A	A		A	A		C			
HCM 95th %tile Q(veh)	0.3	0.1			0	- '		0.5			
rour rounc Q(veri	,	0.5	0.1			0			0.0			

HCM 2010 TWSC

2: Zecca Drive/Amos Drive & Arkell Road

	•	→	\rightarrow	•	←	•	4	†	~	-	ţ	1
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	ሻ	ĥ		ሻ	ĥ			4			4	
Traffic Volume (vph)	29	329	87	64	367	138	79	0	65	81	0	18
Future Volume (vph)	29	329	87	64	367	138	79	0	65	81	0	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	50.0		0.0	60.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	1		0	0		0	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. 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
Ped Bike Factor												
Frt		0.969			0.959			0.939			0.975	
Flt Protected	0.950			0.950				0.973			0.961	
Satd. Flow (prot)	1805	1827	0	1805	1796	0	0	1708	0	0	1780	0
Flt Permitted	0.950			0.950				0.973			0.961	
Satd. Flow (perm)	1805	1827	0	1805	1796	0	0	1708	0	0	1780	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		261.6			193.8			209.6			91.7	
Travel Time (s)		18.8			14.0			15.1			6.6	
Confl. Peds. (#/hr)			8	8								
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	0%	1%	0%	0%	2%	0%	3%	0%	0%	0%	0%	0%
Adj. Flow (vph)	30	343	91	67	382	144	82	0	68	84	0	19
Shared Lane Traffic (%)												
Lane Group Flow (vph)	30	434	0	67	526	0	0	150	0	0	103	0
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)		3.6	ŭ		3.6	ŭ		0.0	, i		0.0	ŭ
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												
Headway 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
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Free			Free			Stop			Stop	
Intersection Summary												
	Other											
Control Type: Unsignalized												
Intersection Capacity Utilizat	ion 49.3%			IC	CU Level	of Service	Α					
Analysis Period (min) 15												

Intersection												
Int Delay, s/veh	7.9											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	T	₽	LDIN	YVDE.	1	WDIX	NDL	4	NDIX	JUL	4	JUIN
Traffic Vol, veh/h	29	329	87	64	367	138	79	0	65	81	0	18
Future Vol. veh/h	29	329	87	64	367	138	79	0	65	81	0	18
Conflicting Peds, #/hr	0	0	8	8	0	0	0	0	0	0	0	0
Sian Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	500		-	600								-
Veh in Median Storage,	# -	0		-	0	-	-	0	-	-	0	
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	96	96	96	96	96	96	96	96	96	96	96	96
Heavy Vehicles, %	0	1	0	0	2	0	3	0	0	0	0	0
Mvmt Flow	30	343	91	67	382	144	82	0	68	84	0	19
Major/Minor N	/lajor1			Major2			Minor1			Minor2		
Conflicting Flow All	526	0	0	441	0	0	1053	1115	396	1070	1090	454
Stage 1	-			-	-		456	456	-	588	588	-
Stage 2							597	659		482	502	
Critical Hdwy	4.1	-	-	4.1	-	-	7.13	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-			-	-		6.13	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-			-	-		6.13	5.5	-	6.1	5.5	
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.527	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1051	-	-	1130	-	-	203	210	658	201	217	610
Stage 1	-	-	-	-	-	-	582	572	-	499	499	-
Stage 2	-	-	-	-	-	-	488	464	-	569	545	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1051	-	-	1130	-	-	183	191	654	168	197	610
Mov Cap-2 Maneuver	-	-	-	-	-	-	183	191	-	168	197	-
Stage 1	-	-	-	-	-	-	562	552	-	485	469	-
Stage 2	-	-	-	-	-	-	445	436	-	496	526	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.6			0.9			33.6			43.2		
HCM LOS							D			Ε		
Minor Lane/Major Mvmt	t I	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR :	SBLn1			
Capacity (veh/h)		271	1051	-	-	1130	-	-	193			
HCM Lane V/C Ratio		0.554	0.029		-	0.059			0.534			
HCM Control Delay (s)		33.6	8.5		-	8.4	-		43.2			
HCM Lane LOS		D	А	-	-	А	-	-	E			
HCM 95th %tile Q(veh)		3.1	0.1		-	0.2			2.8			
2(1011)												

3: Colonial Drive & Arkell Road

	ᄼ	-	•	•	←	•	4	†	/	-	ţ	4
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	,	f)			4			4		Į.		7
Traffic Volume (vph)	8	464	3	2	558	7	2	0	2	8	0	9
Future Volume (vph)	8	464	3	2	558	7	2	0	2	8	0	9
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	25.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	0		0	0		0	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. 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
Frt		0.999			0.998			0.932				0.850
Flt Protected	0.950							0.976		0.950		
Satd. Flow (prot)	1805	1826	0	0	1758	0	0	1728	0	1805	0	1615
Flt Permitted	0.950							0.976		0.950		
Satd. Flow (perm)	1805	1826	0	0	1758	0	0	1728	0	1805	0	1615
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		193.8			144.3			68.0			96.7	
Travel Time (s)		14.0			10.4			4.9			7.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	4%	0%	0%	8%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	9	504	3	2	607	8	2	0	2	9	0	10
Shared Lane Traffic (%)												
Lane Group Flow (vph)	9	507	0	0	617	0	0	4	0	9	0	10
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)		3.6			3.6			3.6			3.6	
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												
Headway 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
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Free			Free			Stop			Stop	
Intersection Summary												
	Other											
Control Type: Unsignalized												
Intersection Capacity Utilizat	ion 46.6%			IC	CU Level	of Service	Α					
Analysis Period (min) 15												

Intersection												
Int Delay, s/veh	0.4											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	ች	ĵ.			4			44				7
Traffic Vol, veh/h	8	464	3	2	558	7	2	0	2	8	0	9
Future Vol, veh/h	8	464	3	2	558	7	2	0	2	8	0	9
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	Jiop -	Jiop -	None	Jiop -	Jiop -	None
Storage Length	250		-			-			-	0		0
Veh in Median Storage,		0			0			0		-	0	-
Grade, %		0			0			0			0	
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	0	4	0	0	8	0	0	0	0	0	0	0
Mymt Flow	9	504	3	2	607	8	2	0	2	9	0	10
IVIVIIII I IOW	7	304	J	2	007	U	2	U	2	7	U	10
Major/Minor	loior1			Majora			linor1			/inor?		
	lajor1			Major2	^		Minor1	1141		Minor2		/10
Conflicting Flow All	614	0	0	508	0	0	1138	1141	506	1139	-	610
Stage 1	-	-	-	-	-	-	523	523	-	615	-	-
Stage 2	-	-	-	-	-	-	615	618	- (0	524	-	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.5	6.2	7.1	-	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	-	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	-	3.3
Pot Cap-1 Maneuver	975	-	-	1067	-	-	180	202	570	180	0	498
Stage 1	-	-	-	-	-	-	541	534	-	482	0	-
Stage 2	-	-	-	-	-	-	482	484	-	540	0	-
Platoon blocked, %	075	-	-	10/7	-	-	475	000	570	470		100
Mov Cap-1 Maneuver	975	-	-	1067	-	-	175	200	570	178	-	498
Mov Cap-2 Maneuver	-	-	-	-	-	-	175	200	-	178	-	-
Stage 1	-	-	-	-	-	-	536	529	-	478	-	-
Stage 2	-	-	-	-	-	-	471	483	-	533	-	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.1			0			18.7			18.9		
HCM LOS							С			С		
Minor Lane/Major Mvmt	1	VBLn1	EBL	EBT	EBR	WBL	WBT	WBR:	SBLn1 S	SBLn2		
Capacity (veh/h)		268	975	-	-	1067	-	-	178	498		
HCM Lane V/C Ratio		0.016				0.002	-		0.049	0.02		
HCM Control Delay (s)		18.7	8.7			8.4	0		26.3	12.4		
HCM Lane LOS		С	A			A	Ā		D	В		
HCM 95th %tile Q(veh)		0	0	-	-	0	-		0.2	0.1		
		-										

4: Residential Entrance/Access 1 & Arkell Road

242

242

1900

40.0

7.5

1.00

0.950

1787

0.368

692

0.94

1%

257

257

No

Left

1.00

25

Left Thru

2.0

0.0

0.0

2.0

0.0

CI+Ex CI+Ex

146

146

1900

1.00

0.945

1784

1784

35

50

144.3

10.4

0.94

1%

155

246

No

Left

3.6

0.0

4.8

1.00

10.0

0.0

0.0

0.6

0.0

0.0

0.0

9.4

0.6

CI+Ex

WBL

118

20.0

7.5

1.00

0.950

1703

0.560

1004

0.94

6%

No

Left

1.00

25

Left

2.0

0.0

0.0

2.0

0.0

CI+Ex

86 118

1900 1900

0.0

1.00

0

Yes

0.94

0%

91 126

0 126

Nο

Right

1.00

15

WBT

191

1900

1.00

23

60

357.4

21.4

0.94

1%

203

280

No

Left Right

3.6

0.0

4.8

1.00

Thru

10.0

0.0

0.0

0.6

0.0

0.0

9.4

0.6

0.0

CI+Ex

CI+Ex

72

72 100

1900

0.0

1.00

Yes

0.94

3%

77

0 106

No

1.00

15

100

1900

90.0

7.5

1.00

1.00

0.950

1805

0.141

268

0.94

0%

106

No

Left

1.00

25

Left

2.0

0.0

0.0

20

0.0

0.0

CI+Ex CI+Ex

722

722

1900

1.00

1758

70

823.5

42.4

0.94

6%

768

918

No

Left Right

3.6

0.0

4.8

1.00

Thru

10.0

0.0

0.0

0.6

0.0

0.0

0.0

9.4

0.6

0.0

CI+Ex

141

1900

0.0

1.00

Yes

0.94 0.94

2%

150

0 80 1033

No

1.00

15

Lane Group

Lane Configurations Traffic Volume (vph)

Future Volume (vph)

Ideal Flow (vphpl)

Storage Length (m)

Storage Lanes

Taper Length (m)

Lane Util. Factor

Ped Bike Factor

Satd. Flow (prot)

Satd. Flow (perm)

Right Turn on Red

Satd. Flow (RTOR)

Link Speed (k/h)

Link Distance (m)

Confl. Peds. (#/hr)

Peak Hour Factor Heavy Vehicles (%)

Adj. Flow (vph)

Lane Alignment

Median Width(m)

Headway Factor

Turning Speed (k/h)

Number of Detectors **Detector Template**

Leading Detector (m)

Trailing Detector (m)

Detector 1 Size(m)

Detector 1 Channel Detector 1 Extend (s)

Detector 1 Queue (s)

Detector 1 Delay (s)

Detector 2 Size(m)

Detector 2 Extend (s)

Detector 2 Type

Detector 2 Position(m)

Detector 1 Type

Detector 1 Position(m)

Crosswalk Width(m)

Two way Left Turn Lane

Link Offset(m)

Shared Lane Traffic (%) Lane Group Flow (vph)

Enter Blocked Intersection

Travel Time (s)

Flt Protected

Flt Permitted

Frt

273

273

0.0

0

Yes

0.94

1%

290

0

No

15

698

1900 1900

1.00 1.00

0.99

0.958

1763

1763

27

70

155.4

8.0

0.94

3%

No

Left Right

3.6

0.0

4.8

1.00 1.00

10.0

0.0

0.0

0.6

0.0

0.0

0.0

9.4

0.6

CI+Ex

CI+Ex

SBI

75

75 698

1900

50.0

7.5

1.00

0.950

1805

0.141

268

0%

80 743

No

Left

1.00

25

Left Thru

2.0

0.0

0.0

2.0

0.0

0.0

0.0

CI+Ex

	_	-	•	•		`	7	ı	- 7	_	*	•
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SE
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Detector Phase	7	4		3	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0		7.0	10.0		7.0	10.0	
Minimum Split (s)	10.0	26.0		10.0	26.0		10.0	34.0		10.0	34.0	
Total Split (s)	10.0	26.0		10.0	26.0		10.0	34.0		10.0	34.0	
Total Split (%)	12.5%	32.5%		12.5%	32.5%		12.5%	42.5%		12.5%	42.5%	
Maximum Green (s)	7.0	20.0		7.0	20.0		7.0	28.0		7.0	28.0	
Yellow Time (s)	3.0	4.0		3.0	4.0		3.0	4.0		3.0	4.0	
All-Red Time (s)	0.0	2.0		0.0	2.0		0.0	2.0		0.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	3.0	6.0		3.0	6.0		3.0	6.0		3.0	6.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	None		None	None	
Walk Time (s)		7.0			7.0			13.0			13.0	
Flash Dont Walk (s)		13.0			13.0			15.0			15.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)	26.1	17.7		25.4	15.2		36.7	28.4		36.7	28.4	
Actuated g/C Ratio	0.36	0.24		0.35	0.21		0.50	0.39		0.50	0.39	
v/c Ratio	0.73	0.54		0.31	0.72		0.38	1.34		0.28	1.48	
Control Delay	32.2	27.2		17.6	36.3		13.5	186.2		12.1	248.7	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	32.2	27.2		17.6	36.3		13.5	186.2		12.1	248.7	
LOS	С	С		В	D		В	F		В	F	
Approach Delay		29.8			30.5			168.4			231.7	
Approach LOS		С			С			F			F	
Intersection Summary												
Area Type:	Other											
Cycle Length: 80												
Actuated Cycle Length: 7	3.5											
Natural Cycle: 150												
Control Type: Actuated-U	ncoordinated	l										
Maximum v/c Ratio: 1.48												
Intersection Signal Delay:				li	ntersectio	ո LOS։ F						
Intersection Capacity Utili	zation 103.99	%		- 10	CU Level	of Service	e G					
Analysis Period (min) 15												

Splits and Phases: 5: Victoria Road & Arkell Road ÿ3

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Detector 2 Channel 0.0

220 Arkell Road TIS 5:00 pm 07-04-2018 2021 PM Total

0.0 Synchro 9 Report Page 9

220 Arkell Road TIS 5:00 pm 07-04-2018 2021 PM Total

Synchro 9 Report Page 10

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Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	
Lane Group Flow (vph)	257	246	126	280	106	918	80	1033	
v/c Ratio	0.73	0.54	0.31	0.72	0.38	1.34	0.28	1.48	
Control Delay	32.2	27.2	17.6	36.3	13.5	186.2	12.1	248.7	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	32.2	27.2	17.6	36.3	13.5	186.2	12.1	248.7	
Queue Length 50th (m)	27.4	28.9	12.4	36.2	7.3	~190.1	5.4	~224.8	
Queue Length 95th (m)	#52.8	51.4	23.7	61.6	16.4	#278.2	13.0	#317.2	
Internal Link Dist (m)		120.3		333.4		799.5		131.4	
Turn Bay Length (m)	40.0		20.0		90.0		50.0		
Base Capacity (vph)	351	516	413	511	282	686	282	696	
Starvation Cap Reductn	0	0	0	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.73	0.48	0.31	0.55	0.38	1.34	0.28	1.48	

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	٦	ĵ»		ሻ	ĵ»		7	ĵ.		ሻ	f)	
Traffic Volume (veh/h)	242	146	86	118	191	72	100	722	141	75	698	273
Future Volume (veh/h)	242	146	86	118	191	72	100	722	141	75	698	273
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		0.99	1.00		0.99
Parking Bus, Adj	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 Sat Flow, veh/h/ln	1881	1888	1900	1792	1871	1900	1900	1804	1900	1900	1855	1900
Adj Flow Rate, veh/h	257	155	91	126	203	77	106	768	150	80	743	290
Adj No. of Lanes	1	1	0	1	1	0	1	1	0	1	1	0
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	1	1	1	6	1	1	0	6	6	0	3	3
Cap, veh/h	326	235	138	336	263	100	248	563	110	235	478	186
Arrive On Green	0.09	0.21	0.21	0.09	0.20	0.20	0.08	0.38	0.38	0.08	0.38	0.38
Sat Flow, veh/h	1792	1117	656	1707	1294	491	1810	1464	286	1810	1268	495
Grp Volume(v), veh/h	257	0	246	126	0	280	106	0	918	80	0	1033
Grp Sat Flow(s),veh/h/ln	1792	0	1772	1707	0	1784	1810	0	1750	1810	0	1763
Q Serve(g_s), s	7.0	0.0	9.5	4.2	0.0	11.0	2.5	0.0	28.6	1.9	0.0	28.0
Cycle Q Clear(g_c), s	7.0	0.0	9.5	4.2	0.0	11.0	2.5	0.0	28.6	1.9	0.0	28.0
Prop In Lane	1.00		0.37	1.00		0.28	1.00		0.16	1.00		0.28
Lane Grp Cap(c), veh/h	326	0	372	336	0	362	248	0	673	235	0	664
V/C Ratio(X)	0.79	0.00	0.66	0.38	0.00	0.77	0.43	0.00	1.36	0.34	0.00	1.56
Avail Cap(c_a), veh/h	326	0	477	348	0	480	267	0	673	267	0	664
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	24.5	0.0	26.9	20.8	0.0	28.0	16.8	0.0	22.9	16.9	0.0	23.2
Incr Delay (d2), s/veh	12.1	0.0	2.2	0.7	0.0	5.5	1.2	0.0	173.5	0.9	0.0	257.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.9	0.0	4.8	2.0	0.0	6.0	1.3	0.0	46.1	1.0	0.0	60.9
LnGrp Delay(d),s/veh	36.6	0.0	29.2	21.5	0.0	33.5	17.9	0.0	196.4	17.8	0.0	280.3
LnGrp LOS	D		С	С		С	В		F	В		F
Approach Vol, veh/h		503			406			1024			1113	
Approach Delay, s/veh		33.0			29.8			177.9			261.4	
Approach LOS		С			С			F			F	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	8.7	34.6	9.5	21.6	9.2	34.0	10.0	21.1				
Change Period (Y+Rc), s	3.0	6.0	3.0	6.0	3.0	6.0	3.0	6.0				
Max Green Setting (Gmax), s	7.0	28.0	7.0	20.0	7.0	28.0	7.0	20.0				
Max Q Clear Time (q c+l1), s	3.9	30.6	6.2	11.5	4.5	30.0	9.0	13.0				
Green Ext Time (p_c), s	0.1	0.0	0.0	2.4	0.1	0.0	0.0	2.1				
Intersection Summary												
HCM 2010 Ctrl Delay			164.7									
HCM 2010 LOS			F									

HCM 2010 Signalized Intersection Summary 5: Victoria Road & Arkell Road

Volume exceeds capacity, queue is theoretically infinite.
 Oueue shown is maximum after two cycles.

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

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Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	ሻ	7	7	11.	<u> </u>	7
Traffic Volume (vph)	50	23	20	1016	1023	43
Future Volume (vph)	50	23	20	1016	1023	43
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	0.0	30.0	1700	1700	60.0
Storage Lanes	1	1	1			1
Taper Length (m)	7.5		7.5			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.850	1.00	1.00	1.00	0.850
Flt Protected	0.950	0.000	0.950			0.000
Satd. Flow (prot)	1805	1615	1805	1792	1845	1615
Flt Permitted	0.950	1013	0.169	1172	1043	1013
Satd. Flow (perm)	1805	1615	321	1792	1845	1615
Right Turn on Red	1003	Yes	JZ I	1172	1043	Yes
Satd. Flow (RTOR)		25				43
Link Speed (k/h)	50	25		70	70	43
				155.4	308.2	
Link Distance (m)	97.9 7.0			8.0	15.9	
Travel Time (s)		0.02	0.02			0.02
Peak Hour Factor	0.92	0.92	0.92	0.92 6%	0.92	0.92
Heavy Vehicles (%)						0% 47
Adj. Flow (vph)	54	25	22	1104	1112	47
Shared Lane Traffic (%)		0.5		4404		
Lane Group Flow (vph)	54	25	22	1104	1112	47
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	3.6	
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	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15	25			15
Number of Detectors	1	1	1	2	2	1
Detector Template	Left	Right	Left	Thru	Thru	Right
Leading Detector (m)	2.0	2.0	2.0	10.0	10.0	2.0
Trailing Detector (m)	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
Detector 1 Size(m)	2.0	2.0	2.0	0.6	0.6	2.0
Detector 1 Type	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex
Detector 1 Channel						
Detector 1 Extend (s)	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
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)				9.4	9.4	
Detector 2 Size(m)				0.6	0.6	
Detector 2 Type				CI+Ex	CI+Ex	
Detector 2 Channel				3 LX	3 LX	
Detector 2 Extend (s)				0.0	0.0	
Turn Type	Prot	Perm	Perm	NA	NA	Perm
Protected Phases	4	1 CHII	CHIL	2	6	I CIIII
FIDIECIEU FIIASES	4			2	0	

220 Arkell Road TIS 5:00 pm 07-04-2018 2021 PM Total

Synchro	9 Report
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Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Permitted Phases		4	2			6
Detector Phase	4	4	2	2	6	6
Switch Phase						
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	24.0	24.0	24.0	24.0	24.0	24.0
Total Split (s)	24.0	24.0	56.0	56.0	56.0	56.0
Total Split (%)	30.0%	30.0%	70.0%	70.0%	70.0%	70.0%
Maximum Green (s)	18.0	18.0	50.0	50.0	50.0	50.0
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	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
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	Max	Max	Max	Max
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	7.0
Flash Dont Walk (s)	11.0	11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0	0	0	0	0
Act Effct Green (s)	10.1	10.1	63.4	63.4	63.4	63.4
Actuated g/C Ratio	0.13	0.13	0.83	0.83	0.83	0.83
v/c Ratio	0.23	0.11	0.08	0.74	0.72	0.03
Control Delay	32.7	13.3	4.2	11.1	10.4	1.4
Queue Delay	0.0	0.0	0.0	1.4	0.0	0.0
Total Delay	32.7	13.3	4.2	12.6	10.4	1.4
LOS	C	В	Α	В	В	A
Approach Delay	26.6		- '`	12.4	10.0	- / .
Approach LOS	C			В	В	
Intersection Summary Area Type:	Other					
Cycle Length: 80	Other					
	. 1					
Actuated Cycle Length: 7	D. I					
Natural Cycle: 90						
Control Type: Semi Act-L						
Maximum v/c Ratio: 0.74						
Intersection Signal Delay					tersectio	
Intersection Capacity Util	ization 72.2%			10	CU Level	of Service
Analysis Period (min) 15						
Splits and Phases: 6: \	/ictoria Road	& Access	5.2			
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™ Ø2						
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Lanes, Volumes, Timings 6: Victoria Road & Access 2

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Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	54	25	22	1104	1112	47
v/c Ratio	0.23	0.11	0.08	0.74	0.72	0.03
Control Delay	32.7	13.3	4.2	11.1	10.4	1.4
Queue Delay	0.0	0.0	0.0	1.4	0.0	0.0
Total Delay	32.7	13.3	4.2	12.6	10.4	1.4
Queue Length 50th (m)	8.8	0.0	0.9	102.7	99.7	0.2
Queue Length 95th (m)	16.8	6.5	3.1	#218.0	#214.8	2.7
Internal Link Dist (m)	73.9			131.4	284.2	
Turn Bay Length (m)			30.0			60.0
Base Capacity (vph)	429	403	267	1492	1536	1352
Starvation Cap Reductn	0	0	0	206	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.13	0.06	0.08	0.86	0.72	0.03
Interspetion Cummens						

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

Queue shown is maximum after two cycles.

Movement EBL EBR NBL NBT SBT SBR
Lane Configurations Traffic Volume (veh/h) 50 23 20 1016 1023 43
Traffic Volume (veh/h)
Traffic Volume (veh/h)
Number 7
Initial Q (Ob), veh Ped-Bike Adji(A pbT) Parking Bus, Adj
Ped-Bike Adj(A_pbT)
Parking Bus, Adj
Adj Sal Flow, veh/h/ln 1900 1900 1792 1845 1900 Adj Flow Rate, veh/h 54 25 22 1104 1112 47 Adj No. of Lanes 1
Adj Flow Rate, veh/h 54 25 22 1104 1112 47 Adj No. of Lanes 1 <
Adj No. of Lanes 1 1 1 1 1 1 1 1 1 1 1 Peak Hour Factor 0.92 0.72 0.72 0.72 0.72 0.72
Peak Hour Factor 0.92 0.72
Percent Heavy Veh, %
Cap, veh/h Arrive On Green O.11 0.11 0.11 0.72 0.72 0.72 0.72 0.72 Sat Flow, veh/h 1810 1615 492 1792 1845 1615 Grp Volume(v), veh/h 54 25 22 1104 1112 47 Grp Sat Flow(s), veh/h/ln 1810 1615 492 1792 1845 1615 Q Serve(g_s), s 1.9 1.0 2.3 31.8 30.1 0.6 Cycle O Clear(g_c), s 1.9 1.0 32.4 31.8 30.1 0.6 Prop In Lane 1.00 1.00 1.00 1.00 Lane Grp Cap(c), veh/h 203 181 243 1283 1321 1156 W/C Ratio(X) 0.27 0.14 0.09 0.86 0.84 0.04 Avail Cap(c_a), veh/h 466 416 243 1283 1321 1156 HCM Platono Ratio 1.00 1.00 1.00 1.00 1.00 1.00 Upstream Filter(l) 1.00 1.00 1.00 1.00 1.00 Uniform Delay (d), s/veh 28.4 28.0 18.7 7.3 7.1 2.9 Incr Delay (d2), s/veh 0.7 0.3 0.7 7.7 6.6 0.1 Initial O Delay(d3),s/veh 0.0 0.0 0.0 0.0 0.0 %ile BackOfO(50%),veh/ln 1.0 0.4 0.4 18.1 17.3 0.3 LnGrp Delay(d), s/veh 29.1 28.3 19.4 15.0 13.7 3.0 LnGrp Delay(d), s/veh 79 1126 1159 Approach Delay, s/veh 28.8 15.1 13.3 Approach LOS C B B B Timer 1 2 3 4 6 6 Phs Duration (G+Y+Rc), s 6.0 6.0 6.0 Max Green Setting (Gmax), s Max O Clear Time (g_c+I1), s 34.4 3.9 32.1 Intersection Summary
Arrive On Green
Sat Flow, veh/h 1810 1615 492 1792 1845 1615 Gry Volume(v), veh/h 54 25 22 1104 1112 47 Gry Sat Flow(s), veh/h/ln 1810 1615 492 1792 1845 1615 O Serve(g_s), s 1.9 1.0 2.3 31.8 30.1 0.6 Cycle Q Clear(g_c), s 1.9 1.0 32.4 31.8 30.1 0.6 Prop In Lane 1.00 1.00 1.00 1.00 1.00 Lane Gry Cap(c), veh/h 203 181 243 1283 1321 1156 V/C Ratio(X) 0.27 0.14 0.09 0.86 0.84 0.04 Avail Cap(c_a), veh/h 466 416 243 1283 1321 1156 HCM Platoon Ratio 1.00 1.00 1.00 1.00 1.00 1.00 1.00 Uniform Delay (d), s/veh 28.4 28.0 18.7 7.3 7.1 2.9 <tr< td=""></tr<>
Grp Volume(v), veh/h 54 25 22 1104 1112 47 Grp Sat Flow(s), veh/h/ln 1810 1615 492 1792 1845 1615 O Serve(g_s), s 1.9 1.0 2.3 31.8 30.1 0.6 Cycle O Clear(g_c), s 1.9 1.0 23 31.8 30.1 0.6 Prop In Lane 1.00 1.00 1.00 1.00 1.00 Lane Grp Cap(c), veh/h 203 181 243 1283 1321 1156 V/C Ratio(X) 0.27 0.14 0.09 0.86 0.84 0.04 Avail Cap(c_a), veh/h 466 416 243 1283 1321 1156 HCM Platoon Ratio 1.00 1.00 1.00 1.00 1.00 1.00 1.00 Unsiream Filter(I) 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00
Grp Sat Flow(s), veh/h/ln
Grp Sat Flow(s), veh/h/ln
Cycle Q Clear(g_ c), s 1.9 1.0 32.4 31.8 30.1 0.6 Prop In Lane 1.00 1.00 1.00 1.00 Lane Grp Cap(c), veh/h 203 181 243 1283 1321 1156 V/C Ratio(X) 0.27 0.14 0.09 0.86 0.84 0.04 Avail Cap(c_a), veh/h 466 416 243 1283 1321 1156 HCM Platoon Ratio 1.00
Prop In Lane
Lane Grp Cap(c), veh/h V/C Ratio(X) 0.27 0.14 0.09 0.86 0.84 0.04 Avail Cap(c_a), veh/h 466 416 243 1283 1321 1156 HCM Platoon Ratio 1.00 1
V/C Ratio(X) 0.27 0.14 0.09 0.86 0.84 0.04 Avail Cap(c_a), veh/h 466 416 243 1283 1321 1156 HCM Platoon Ratio 1.00 1.00 1.00 1.00 1.00 1.00 Upstream Filter(I) 1.00 1.00 1.00 1.00 1.00 1.00 Uniform Delay (d), s/veh 28.4 28.0 18.7 7.3 7.1 2.9 Incr Delay (d2), s/veh 0.7 0.3 0.7 7.7 6.6 0.1 Initial O Delay (d3), s/veh 0.0 0.0 0.0 0.0 0.0 0.0 Bile BackOf0(50%), veh/ln 1.0 0.4 0.4 18.1 17.3 0.3 LnGrp Delay(d), s/veh 29.1 28.3 19.4 15.0 13.7 3.0 LnGrp LOS C C B B B A Approach Vol, veh/h 79 1126 1159 A Approach LOS C
Avail Cap(c_a), veh/h HCM Platoon Ratio 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.0
HCM Platoon Ratio
Upstream Filter(I) 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.0
Uniform Delay (d), s/veh 28.4 28.0 18.7 7.3 7.1 2.9 Incr Delay (d2), s/veh 0.7 0.3 0.7 7.7 6.6 0.1 Initial Q Delay(d3), s/veh 0.0 0.0 0.0 0.0 0.0 0.0 0.0 %ile BackOfQ(50%), veh/ln 1.0 0.4 0.4 18.1 17.3 0.3 InGrp Delay(d), s/veh 29.1 28.3 19.4 15.0 13.7 3.0 InGrp Delay(d), s/veh 29.1 28.3 19.4 15.0 13.7 3.0 InGrp LOS C C B B B B A A Approach Vol, veh/ln 79 1126 1159 Approach Delay, s/veh 28.8 15.1 13.3 Approach Delay, s/veh 28.8 15.1 13.3 Approach LOS C B B B B A A Individual Company Signature (a) Signature (b) Signature (c) Sign
Incr Delay (d2), s/veh
Initial Q Delay(d3),s/veh 0.0 13.8 15.0
%ile BackOfO(50%),veh/ln 1.0 0.4 0.4 18.1 17.3 0.3 LnGrp Delay(d),s/veh 29.1 28.3 19.4 15.0 13.7 3.0 LnGrp LOS C C B B B A Approach Vol, veh/h 79 1126 1159 Approach Delay, s/veh 28.8 15.1 13.3 Approach LOS C B B Immer 1 2 3 4 5 6 7 8 Assigned Phs 2 4 6
LnGrp Delay(d),s/veh 29.1 28.3 19.4 15.0 13.7 3.0 LnGrp LOS C C B B B B A Approach Vol, veh/h 79 1126 1159 A Approach LOS C B B B B A Approach LOS C B B B B A Assigned LOS C B B B B A A Assigned Phs C B B A A Assigned Phs C B A <td< td=""></td<>
LnGrp LOS C C B B B A Approach Vol, veh/h 79 1126 1159 Approach Delay, s/veh 28.8 15.1 13.3 Approach LOS C B B Timer 1 2 3 4 5 6 7 8 Assigned Phs 2 4 6 6 Phs Duration (G+Y+Rc), s 56.0 13.8 56.0 56.0 Change Period (Y+Rc), s 6.0 6.0 6.0 6.0 Max Green Setting (Gmax), s 50.0 18.0 50.0 Max Green Setting (G-c+I1), s 34.4 3.9 32.1 Green Ext Time (p_c), s 14.1 0.2 16.1 Intersection Summary
LnGrp LOS C C B B B A Approach Vol, veh/h 79 1126 1159 1159 Approach Delay, s/veh 28.8 15.1 13.3 Approach LOS C B B Filmer 1 2 3 4 5 6 7 8 Assigned Phs 2 4 6 6 6 6 6 6 0 6.0 6.0 6.0 6.0 6.0 6.0 6.0 6.0 Max Green Setting (Gmax), s 50.0 18.0 50.0 50.0 Max Green Setting (G_c+IT), s 34.4 3.9 32.1 32.1 Green Ext Time (p_c), s 14.1 0.2 16.1 Intersection Summary
Approach Delay, s/veh 28.8 15.1 13.3 Approach LOS C B B Timer 1 2 3 4 5 6 7 8 Assigned Phs 2 4 6 Phs Duration (G+Y+Rc), s 56.0 13.8 56.0 Change Period (Y+Rc), s 6.0 6.0 6.0 6.0 Max Green Setting (Gmax), s 50.0 18.0 50.0 Max Q Clear Time (g_c+I1), s 34.4 3.9 32.1 Green Ext Time (p_c), s 14.1 0.2 16.1 Intersection Summary
Approach LOS C B B Timer 1 2 3 4 5 6 7 8 Assigned Phs 2 4 6 6 6 6 6 6 6 6 6 6 6 6 6 6 0 8 9 8 9 9 8 18 8
Approach LOS C B B Timer 1 2 3 4 5 6 7 8 Assigned Phs 2 4 6 8 8 3 3 2 1 8 3 3 2 1 6 1 8 4 3 9 32.1 3 3 1 4 1 <td< td=""></td<>
Assigned Phs 2 4 6 Phs Duration (G+Y+Rc), s 56.0 13.8 56.0 Change Period (Y+Rc), s 6.0 6.0 6.0 Max Green Setting (Gmax), s 50.0 18.0 50.0 Max Q Clear Time (g_c+I1), s 34.4 3.9 32.1 Green Ext Time (p_c), s 14.1 0.2 16.1 Intersection Summary
Assigned Phs 2 4 6 Phs Duration (G+Y+Rc), s 56.0 13.8 56.0 Change Period (Y+Rc), s 6.0 6.0 6.0 Max Green Setting (Gmax), s 50.0 18.0 50.0 Max Q Clear Time (g_c+I1), s 34.4 3.9 32.1 Green Ext Time (p_c), s 14.1 0.2 16.1 Intersection Summary
Phs Duration (G+Y+Rc), s 56.0 13.8 56.0 Change Period (Y+Rc), s 6.0 6.0 6.0 6.0 Max Green Setting (Gmax), s 50.0 18.0 50.0 Max C Clear Time (g_c+t1), s 34.4 3.9 32.1 Green Ext Time (p_c), s 14.1 0.2 16.1 Intersection Summary
Change Period (Y+Rc), s 6.0 6.0 6.0 Max Green Setting (Gmax), s 50.0 18.0 50.0 Max Q Clear Time (g_c+l1), s 34.4 3.9 32.1 Green Ext Time (p_c), s 14.1 0.2 16.1 Intersection Summary
Max Green Setting (Gmax), s 50.0 18.0 50.0 Max Q Clear Time (g_c+l1), s 34.4 3.9 32.1 Green Ext Time (p_c), s 14.1 0.2 16.1 Intersection Summary
Max Q Clear Time (g_c+l1), s 34.4 3.9 32.1 Green Ext Time (p_c), s 14.1 0.2 16.1 Intersection Summary
Green Ext Time (p_c), s 14.1 0.2 16.1 Intersection Summary
Intersection Summary
HCM 2010 Ctrl Delay 14.7
HCM 2010 LOS B

HCM 2010 Signalized Intersection Summary 6: Victoria Road & Access 2

	•	•	4	†	↓	4
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	ሻ	7	ሻ	†	ĥ	
Traffic Volume (vph)	105	38	64	1048	1151	178
Future Volume (vph)	105	38	64	1048	1151	178
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	20.0	0.0	30.0			0.0
Storage Lanes	1	1	1			0
Taper Length (m)	7.5		7.5			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850			0.982	
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1805	1615	1805	1792	1819	0
Flt Permitted	0.950		0.950			
Satd. Flow (perm)	1805	1615	1805	1792	1819	0
Link Speed (k/h)	50			50	70	
Link Distance (m)	325.8			308.2	342.0	
Travel Time (s)	23.5			22.2	17.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	6%	3%	0%
Adj. Flow (vph)	114	41	70	1139	1251	193
Shared Lane Traffic (%)						
Lane Group Flow (vph)	114	41	70	1139	1444	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6	3		3.6	3.6	, ,
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	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15	25			15
Sign Control	Stop			Free	Free	
•						
Intersection Summary	0.11					
	Other					
Control Type: Unsignalized						
Intersection Capacity Utiliza	tion 83.9%			IC	U Level	of Service I
Analysis Period (min) 15						

Intersection									
Int Delay, s/veh	87								
Movement	EBL	EBR	NBL	NBT	SBT	SBR			
Lane Configurations	*	7	*	A	7	ODIT			
Traffic Vol, veh/h	105	38	64	1048	1151	178			
Future Vol. veh/h	105	38	64	1048	1151	178			
Conflicting Peds, #/hr	0	0	0	0	0	0			
Sign Control	Stop	Stop	Free	Free	Free	Free			
RT Channelized	-	None	-	None	-				
Storage Length	200	0	300	-		-			
Veh in Median Storage		-	-	0	0	-			
Grade, %	0	-		0	0				
Peak Hour Factor	92	92	92	92	92	92			
Heavy Vehicles, %	0	0	0	6	3	0			
Mymt Flow	114	41	70	1139	1251	193			
			, 3	,	.201	.,,			
Major/Minor	Minor?		Anior1		Major				
	Minor2		Major1		Major2	0			
Conflicting Flow All	2626	1348	1445	0	-	0			
Stage 1	1348	-	-	-	-	-			
Stage 2	1278	- (0	-	-	-	-			
Critical Hdwy	6.4	6.2	4.1	-	-	-			
Critical Hdwy Stg 1	5.4	-	-	-	-	-			
Critical Hdwy Stg 2	5.4	-	-	-	-	-			
Follow-up Hdwy	3.5	3.3	2.2	-	-	-			
Pot Cap-1 Maneuver	~ 27	186	475	-	-	-			
Stage 1	244	-	-	-	-	-			
Stage 2	264	-	-	-	-	-			
Platoon blocked, %	00	401	475	-	-	-			
Mov Cap-1 Maneuver	~ 23	186	475	-	-	-			
Mov Cap-2 Maneuver	~ 23	-	-	-	-	-			
Stage 1	244	-	-	-	-	-			
Stage 2	225	-	-	-	-	-			
Approach	EB		NB		SB				
HCM Control Delay, \$ 1	1566.5		0.8		0				
HCM LOS	F								
Minor Long/Major Marin		NDI	NDT	TDI nd I	EDI 52	CDT	CDD		
Minor Lane/Major Mvm	ı	NBL		EBLn1 I		SBT	SBR		
Capacity (veh/h)		475	-	23	186	-	-		
HCM Lane V/C Ratio		0.146		4.962		-	-		
HCM Control Delay (s)		13.9		2122.7	29.8	-	-		
HCM Lane LOS		В	-	F	D	-	-		
HCM 95th %tile Q(veh)		0.5	-	14.4	0.8	-	-		
Notes									

7: Victoria Road & Victoria Park Village Road

Appendix K

2026 Total Traffic Operations Reports



	-	\rightarrow	•	←	4	~				
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR				
ane Configurations	1		ሻ	^	¥					
Traffic Volume (vph)	377	36	30	438	143	122				
Future Volume (vph)	377	36	30	438	143	122				
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900				
Storage Length (m)		0.0	60.0		0.0	0.0				
Storage Lanes		0	1		1	0				
Taper Length (m)			7.5		7.5					
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00				
Ped Bike Factor										
Frt	0.988				0.938					
FIt Protected			0.950		0.974					
Satd. Flow (prot)	1791	0	1671	1776	1678	0				
FIt Permitted			0.950		0.974					
Satd. Flow (perm)	1791	0	1671	1776	1678	0				
Link Speed (k/h)	50			50	50					
Link Distance (m)	290.6			206.6	213.5					
Travel Time (s)	20.9			14.9	15.4					
Confl. Peds. (#/hr)		9	9							
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98				
Heavy Vehicles (%)	4%	13%	8%	7%	3%	4%				
Adj. Flow (vph)	385	37	31	447	146	124				
Shared Lane Traffic (%)										
Lane Group Flow (vph)	422	0	31	447	270	0				
Enter Blocked Intersection	No	No	No	No	No	No				
Lane Alignment	Left	Right	Left	Left	Left	Right				
Median Width(m)	3.6	, ,		3.6	3.6	3				
Link Offset(m)	0.0			0.0	0.0					
Crosswalk Width(m)	4.8			4.8	4.8					
Two way Left Turn Lane	Yes									
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00				
Furning Speed (k/h)		15	25		25	15				
Sign Control	Free			Free	Stop					
Intersection Summary										
	Other									
Control Type: Unsignalized	J 101									
Intersection Capacity Utilization 47.0% ICU Level of Service										
Analysis Period (min) 15				- 10	JO LOVOI V	or our vice	,,			
marysis i chou (min) 15										

07-24-2018

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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		4			4			4			4	
Traffic Volume (vph)	8	478	14	4	414	11	23	1	18	43	2	32
Future Volume (vph)	8	478	14	4	414	11	23	1	18	43	2	32
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. 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
Ped Bike Factor												
Frt		0.996			0.997			0.942			0.944	
Flt Protected		0.999						0.973			0.973	
Satd. Flow (prot)	0	1804	0	0	1774	0	0	1695	0	0	1745	0
Flt Permitted		0.999						0.973			0.973	
Satd. Flow (perm)	0	1804	0	0	1774	0	0	1695	0	0	1745	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		206.6			261.6			219.2			154.5	
Travel Time (s)		14.9			18.8			15.8	4.0		11.1	4.0
Confl. Peds. (#/hr)	1		8	8		1	13		10	10		13
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	0%	5%	0%	5%	7%	0%	5%	0%	0%	0%	0%	0%
Adj. Flow (vph)	8	493	14	4	427	11	24	1	19	44	2	33
Shared Lane Traffic (%)		545			440						70	
Lane Group Flow (vph)	0	515	0	0	442	0	0	44	0	0	79	0
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)		3.6			3.6			0.0			0.0	
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	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Headway Factor	1.00	1.00			1.00			1.00			1.00	1.00
Turning Speed (k/h)	25	F	15	25	F	15	25	Ct	15	25	Ct	15
Sign Control		Free			Free			Stop			Stop	
Intersection Summary												
Area Type: C)ther											
Control Type: Unsignalized												
Intersection Capacity Utilizati	on 46.3%			IC	CU Level	of Service	Α					
Analysis Period (min) 15												

Intersection												
	2.5											
Int Delay, s/veh	2.5											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		4			4			44			4	
Traffic Vol, veh/h	8	478	14	4	414	11	23	1	18	43	2	32
Future Vol, veh/h	8	478	14	4	414	11	23	1	18	43	2	32
Conflicting Peds, #/hr	1	0	8	8	0	1	13	0	10	10	0	13
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-		-	-		-		-	-
Veh in Median Storage,	# -	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-		0	-
Peak Hour Factor	97	97	97	97	97	97	97	97	97	97	97	97
Heavy Vehicles, %	0	5	0	5	7	0	5	0	0	0	0	0
Mymt Flow	8	493	14	4	427	11	24	1	19	44	2	33
Major/Minor	loior1			Major			Ainor1			liner?		
	lajor1			Major2	^		Minor1	074		/linor2	074	447
Conflicting Flow All	439	0	0	515	0	0	995	971	518	978	974	446
Stage 1	-	-	-	-		-	524	524	-	442	442	-
Stage 2	-	-	-	- 4.45	-	-	471	447	-	536	532	- (0
Critical Hdwy	4.1	-	-	4.15	-	-	7.15	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.15	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	2.2	-	-	2.245	-	-	6.15	5.5	3.3	6.1 3.5	5.5	-
Follow-up Hdwy		-	-		-	-	3.545					3.3
Pot Cap-1 Maneuver	1132	-	-	1035	-	-	221	255	562	232	254	617
Stage 1 Stage 2	-	-			-		531 568	533 577	-	598 532	580 529	
Platoon blocked. %	-		-	-		-	200	5//		332	529	
Mov Cap-1 Maneuver	1120	-		1026	-	-	202	249	553	219	248	610
Mov Cap-1 Maneuver	1120			1026		-	202	249	553	219	248	610
Stage 1	-		-		-		522	524		592	577	
			-	-		-	522	524	-	592	520	
Stage 2		-		-	-		527	5/4		304	020	
Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.1			0.1			20.3			21.3		
HCM LOS							С			С		
Minor Lane/Major Mvmt		VBLn1	EBL	EBT	EBR	WBL	WBT	WBR:	SRI n1			
Capacity (veh/h)		279	1120	LDI	LDIX	1026	WD1	WDIX .	300			
HCM Lane V/C Ratio		0.155	0.007		- 1	0.004			0.265			
HCM Control Delay (s)		20.3	8.2	0		8.5	0		21.3			
HCM Lane LOS		20.3 C	6.2 A	A	- 1	6.5 A	A		21.3 C			
		0.5	A 0	A	-	0	A	_	1			
HCM 95th %tile Q(veh)		0.0	0	-	-	U	-	-				

2: Zecca Drive/Amos Drive & Arkell Road

	•	→	\rightarrow	•	←	•	4	†	/	-	↓	4
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	Ţ	ĥ		٦	ĥ			4			4	
Traffic Volume (vph)	11	457	69	41	264	42	131	0	137	131	0	32
Future Volume (vph)	11	457	69	41	264	42	131	0	137	131	0	32
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	50.0		0.0	60.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	1		0	0		0	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. 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
Ped Bike Factor												
Frt		0.980			0.979			0.931			0.973	
Flt Protected	0.950			0.950				0.976			0.961	
Satd. Flow (prot)	1770	1784	0	1703	1736	0	0	1622	0	0	1742	0
Flt Permitted	0.950			0.950				0.976			0.961	
Satd. Flow (perm)	1770	1784	0	1703	1736	0	0	1622	0	0	1742	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		261.6			193.8			209.6			91.7	
Travel Time (s)		18.8			14.0			15.1			6.6	
Confl. Peds. (#/hr)			11	11					1			
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	4%	7%	6%	8%	2%	9%	2%	4%	2%	2%	2%
Adj. Flow (vph)	12	497	75	45	287	46	142	0	149	142	0	35
Shared Lane Traffic (%)												
Lane Group Flow (vph)	12	572	0	45	333	0	0	291	0	0	177	0
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)		3.6	ŭ		3.6	ŭ		0.0	Ů		0.0	ŭ
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												
Headway 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
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Free			Free			Stop			Stop	
Intersection Summary												
	Other											
Control Type: Unsignalized												
Intersection Capacity Utilization 56.1% ICU Level of Service B												
Analysis Period (min) 15												

Intersection												
Int Delay, s/veh	35											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	ሻ	1>	LDIN	ች	1	****	1100	4	11011	ODL	4	ODIT
Traffic Vol, veh/h	11	457	69	41	264	42	131	0	137	131	0	32
Future Vol. veh/h	11	457	69	41	264	42	131	0	137	131	0	32
Conflicting Peds, #/hr	0	0	11	11	0	0	0	0	1	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized			None		-	None	-	-	None	-	-	None
Storage Length	500		-	600						-	-	-
Veh in Median Storage	2,# -	0	-	-	0	-	-	0	-	-	0	
Grade, %		0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	4	7	6	8	2	9	2	4	2	2	2
Mvmt Flow	12	497	75	45	287	46	142	0	149	142	0	35
Major/Minor I	Major1		1	Major2			Vinor1			Minor2		
Conflicting Flow All	333	0	0	583	0	0	985	991	546	1033	1006	310
Stage 1							569	569	-	399	399	-
Stage 2	-		-				416	422		634	607	
Critical Hdwy	4.12			4.16			7.19	6.52	6.24	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-			6.19	5.52	-	6.12	5.52	
Critical Hdwy Stg 2	-	-	-	-	-	-	6.19	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.254	-		3.581	4.018	3.336	3.518	4.018	3.318
Pot Cap-1 Maneuver	1226	-	-	972	-	-	221	246	534	211	241	730
Stage 1	-	-	-	-	-	-	495	506	-	627	602	-
Stage 2	-	-	-	-	-	-	600	588	-	467	486	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1226	-	-	971	-	-	200	230	529	145	225	730
Mov Cap-2 Maneuver	-	-	-	-	-	-	200	230	-	145	225	-
Stage 1	-	-	-	-	-	-	486	496	-	621	574	-
Stage 2	-	-	-	-	-	-	545	561	-	332	477	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.2			1			90.1			131.4		
HCM LOS							F			F		
Minor Lane/Major Mvm	nt I	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	CRI n1			
Capacity (veh/h)	it i	293	1226	LDI	LDIN	971	-	WDI	172			
HCM Lane V/C Ratio		0.994	0.01			0.046			1.03			
HCM Control Delay (s)		90.1	0.01	-	-	8.9			131.4			
HCM Lane LOS		90.1 F	A		-	6.9 A	- 1	-	131.4 F			
HCM 95th %tile Q(veh	١	10.3	0	_		0.1			8.5			
ucini April write ra(neu)	10.3	U	-	-	U. I	-	-	0.5			

3: Colonial Drive & Arkell Road

	•	-	\rightarrow	•	←	•	4	†	/	-	ţ	4
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	ሻ	ĥ			4			4		ሻ		7
Traffic Volume (vph)	83	641	2	2	315	62	2	0	2	6	0	31
Future Volume (vph)	83	641	2	2	315	62	2	0	2	6	0	31
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	25.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	0		0	0		0	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. 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
Frt					0.978			0.932				0.850
Flt Protected	0.950							0.976		0.950		
Satd. Flow (prot)	1805	1827	0	0	1742	0	0	1728	0	1805	0	1615
Flt Permitted	0.950							0.976		0.950		
Satd. Flow (perm)	1805	1827	0	0	1742	0	0	1728	0	1805	0	1615
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		193.8			144.3			68.0			96.7	
Travel Time (s)		14.0			10.4			4.9			7.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	4%	0%	0%	8%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	90	697	2	2	342	67	2	0	2	7	0	34
Shared Lane Traffic (%)												
Lane Group Flow (vph)	90	699	0	0	411	0	0	4	0	7	0	34
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)		3.6			3.6			3.6			3.6	
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												
Headway 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
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Free			Free			Stop			Stop	
Intersection Summary												
	Other											
Control Type: Unsignalized												
Intersection Capacity Utilizat	ion 67.6%			IC	CU Level	of Service	· C					
Analysis Period (min) 15												

Intersection												
Int Delay, s/veh	1.2											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		ĵ.			4			4		ች		7
Traffic Vol, veh/h	83	641	2	2	315	62	2	0	2	6	0	31
Future Vol. veh/h	83	641	2	2	315	62	2	0	2	6	0	31
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None			None	-	-	None	-	-	None
Storage Length	250		-			-			-	0		0
Veh in Median Storage,		0			0			0		-	0	-
Grade, %	-	0			0			0			0	
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	0	4	0	0	8	0	0	0	0	0	0	0
Mymt Flow	90	697	2	2	342	67	2	0	2	7	0	34
IVIVIIIL I IOW	70	077	2		342	07	2	U	2	,	U	34
	/lajor1			Najor2			Vinor1			Minor2		
Conflicting Flow All	410	0	0	699	0	0	1258	1292	698	1259	-	376
Stage 1	-	-	-	-	-	-	878	878	-	380	-	-
Stage 2	-	-	-	-	-	-	380	414	-	879	-	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.5	6.2	7.1	-	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	-	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	-	3.3
Pot Cap-1 Maneuver	1160	-	-	907	-	-	149	165	444	149	0	675
Stage 1	-	-	-	-	-	-	345	368	-	646	0	-
Stage 2	-	-	-	-	-	-	646	597	-	345	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1160	-	-	907	-	-	133	152	444	139	-	675
Mov Cap-2 Maneuver	-	-	-	-	-	-	133	152	-	139	-	-
Stage 1				-			318	339	-	596	-	
Stage 2	-	-	-	-	-		612	595	-	317	-	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	1			0			22.9			14.1		
HCM LOS							C			В		
Minor Lane/Major Mvmt	t N	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1 S	SBLn2		
Capacity (veh/h)		205	1160	-	-	907	-	-	139	675		
HCM Lane V/C Ratio		0.021	0.078			0.002	-		0.047	0.05		
HCM Control Delay (s)		22.9	8.4	-		9	0		32.2	10.6		
HCM Lane LOS		С	А			A	A		D	В		
HCM 95th %tile Q(veh)		0.1	0.3	-		0	-		0.1	0.2		
2(1011)												

4: Residential Entrance/Access 1 & Arkell Road

			* *
Lane Group EBL EBT EBR WBL WBT WBF	R NBL NE	BT NBR SBL	SBT SBR
Lane Configurations 7 6	ሻ	ĵ. *	fr fr
Traffic Volume (vph) 431 122 93 173 104 76	6 66 7	41 97 56	638 214
Future Volume (vph) 431 122 93 173 104 76	6 66 7	41 97 56	638 214
Ideal Flow (vphpl) 1900 1900 1900 1900 1900 1900	0 1900 19	00 1900 1900	1900 1900
Storage Length (m) 40.0 0.0 20.0 0.0	0 90.0	0.0 50.0	0.0
Storage Lanes 1 0 1 (0 1	0 1	0
Taper Length (m) 7.5 7.5	7.5	7.5	
Lane Util. Factor 1.00 1.00 1.00 1.00 1.00 1.00	0 1.00 1.0	00 1.00 1.00	1.00 1.00
Ped Bike Factor 1.00 0.99	1.00		0.99
Frt 0.935 0.936	0.9	83	0.962
Flt Protected 0.950 0.950	0.950	0.950	
Satd. Flow (prot) 1736 1669 0 1787 1697 (0 1805 17	62 0 1752	1670 0
Flt Permitted 0.570 0.477	0.132	0.138	
Satd. Flow (perm) 1040 1669 0 897 1697 (0 251 17	62 0 255	1670 0
Right Turn on Red Yes Yes	S	Yes	Yes
Satd. Flow (RTOR) 46 44		9	23
Link Speed (k/h) 50 60		70	70
Link Distance (m) 144.3 357.4	823	3.5	155.4
Travel Time (s) 10.4 21.4	42	2.4	8.0
Confl. Peds. (#/hr) 1	1 3		3
Peak Hour Factor 0.91 0.91 0.91 0.91 0.91 0.91	1 0.91 0.	91 0.91 0.91	0.91 0.91
Heavy Vehicles (%) 4% 3% 11% 1% 3% 5%	6 0% 6	5% 6% 3%	8% 11%
Adj. Flow (vph) 474 134 102 190 114 84	4 73 8	14 107 62	701 235
Shared Lane Traffic (%)			
Lane Group Flow (vph) 474 236 0 190 198 (0 73 9	21 0 62	936 0
Enter Blocked Intersection No No No No No No	o No c	No No No	No No
Lane Alignment Left Left Right Left Left Righ	it Left L	eft Right Left	Left Right
Median Width(m) 3.6 3.6	3	3.6	3.6
Link Offset(m) 0.0 0.0	C	0.0	0.0
Crosswalk Width(m) 4.8 4.8	4	1.8	4.8
Two way Left Turn Lane			
Headway Factor 1.00 1.00 1.00 1.00 1.00 1.00	0 1.00 1.0	00 1.00 1.00	1.00 1.00
Turning Speed (k/h) 25 15 25 15	5 25	15 25	15
Number of Detectors 1 2 1 2	1	2 1	2
Detector Template Left Thru Left Thru	Left Th	nru Left	Thru
Leading Detector (m) 2.0 10.0 2.0 10.0	2.0 10	0.0 2.0	10.0
Trailing Detector (m) 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
Detector 1 Size(m) 2.0 0.6 2.0 0.6	2.0	0.6 2.0	0.6
Detector 1 Type CI+Ex CI+Ex CI+Ex CI+Ex	CI+Ex CI+I	Ex CI+Ex	CI+Ex
Detector 1 Channel			
Detector 1 Extend (s) 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	
Detector 1 Delay (s) 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).6	0.6
Detector 2 Type CI+Ex CI+Ex	CI+l		CI+Ex
Detector 2 Channel	OITI		27. EA
Detector 2 Extend (s) 0.0 0.0	C	0.0	0.0

	-	*	₹		_	-7	ı	1	•	*
EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
pm+pt			pm+pt			pm+pt			pm+pt	NA
	4			8			2			6
			-			_				
7	4		3	8		5	2		1	6
										10.0
										34.0
										34.0
										42.5%
										28.0
										4.0
										2.0
										0.0
3.0	6.0		3.0	6.0		3.0	6.0		3.0	6.0
Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag
Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes
3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0
None	None		None	None		None	None		None	None
	7.0			7.0			13.0			13.0
	13.0			13.0			15.0			15.0
	0			0			0			0
23.6	13.5		23.6	13.5		37.4	30.4		36.8	28.4
0.33	0.19		0.33	0.19		0.52	0.42		0.51	0.40
1.16	0.67		0.50	0.56		0.26	1.23		0.22	1.39
118.8	32.0		21.5	27.0		11.2	138.0		10.8	208.1
0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0
118.8	32.0		21.5	27.0		11.2	138.0		10.8	208.1
F	С		С	С		В	F		В	F
	89.9			24.3			128.7			195.8
	F						F			F
	•						•			•
Othor										
Otrici										
0										
.0										
coordinator										
Loorumated										
120 /			le.	torcoction	I OS. F					
	0/					. C				
au011 102.45	/0		10	o Level (or Service	. 0				
ctoria Road	& Arkell R	Road								
					ÿ3	3	A 04			
					10 s		26 s			
					10 s 		26 s ₹ Ø8			
1	pm+pt 7 4 4 7 7 7.0 10.0 10.0 10.0 12.5% 7.0 3.0 0.0 3.0 Lead Yes 3.0 None 23.6 0.33 1.16 118.8 0.0 118.8 F	m+pt 7 4 4 7 4 7 4 7 7 4 7.0 7.0 10.0 26.0 10.0 26.0 12.5% 32.5% 7.0 20.0 3.0 4.0 0.0 2.0 0.0 0.0 3.0 6.0 Lead Lag Yes Yes 3.0 3.0 None None 7.0 13.0 0 23.6 13.5 0.33 0.19 1.16 0.67 118.8 32.0 0.0 0.0 118.8 32.0 F C 89.9 F Other 8 coordinated	pm+pt NA 7 4 4 7 4 7 4 7 0 7.0 10.0 26.0 10.0 26.0 112.5% 32.5% 7.0 20.0 3.0 4.0 0.0 2.0 0.0 0.0 3.0 6.0 Lead Lag Yes Yes 3.0 3.0 None None 7.0 13.0 0 23.6 13.5 0.33 0.19 1.16 0.67 118.8 32.0 F C 89.9 F Other 8 coordinated	pm+pt NA pm+pt 7 4 3 4 8 7 7 4 3 7 7.0 7.0 10.0 26.0 10.0 10.0 26.0 10.0 10.0 26.0 12.5% 7.0 20.0 7.0 3.0 4.0 3.0 0.0 2.0 0.0 0.0 2.0 0.0 0.0 2.0 0.0 0.0 0.0 3.0 Lead Lag Lead Yes Yes Yes 3.0 3.0 3.0 None None None 7.0 13.0 0 23.6 13.5 23.6 0.33 0.9 0.33 1.16 0.67 0.50 118.8 32.0 21.5 0.0 0.0 0.0 118.8 32.0	pm+pt NA pm+pt NA 7 4 3 8 4 8 7 4 3 8 7 4 3 8 7 0 7.0 7.0 7.0 10.0 26.0 10.0 26.0 10.0 26.0 10.0 26.0 10.0 26.0 12.5% 32.5% 32.5% 7.0 20.0 30.0 4.0 30.0 30.0 30.0 30.0 30.0 30.0 30.0 30.0 30.0 30.0 3	pm+pt NA pm+pt NA 7 4 3 8 4 8 7 4 3 8 7 4 3 8 7 0 7.0 7.0 7.0 10.0 26.0 10.0 26.0 10.0 26.0 12.5% 32.5% 12.5% 32.5% 7.0 20.0 32.5% 7.0 20.0 30.4.0 30.0 30.0 30.0 30.0 30.0 30.0 30.0 30.0 30.0 30.0 30.0 <	pm+pt NA pm+pt NA pm+pt 7 4 3 8 5 4 8 2 7 7 4 3 8 5 7 4 3 8 5 7 0 7.0 7.0 7.0 10.0 26.0 10.0 26.0 10.0 10.0 26.0 10.0 26.0 10.0 10.0 26.0 10.0 26.0 10.0 10.0 26.0 10.0 26.0 10.0 10.0 26.0 10.0 26.0 10.0 3.0 4.0 3.0 4.0 3.0 3.0 4.0 3.0 4.0 3.0 3.0 4.0 3.0 4.0 3.0 3.0 6.0 3.0 4.0 3.0 4.0 3.0 4.0 3.0 3.0 8 Yes Yes Yes	Dm+pt	Dm+pt	Dm+pt

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Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	
Lane Group Flow (vph)	474	236	190	198	73	921	62	936	
v/c Ratio	1.16	0.67	0.50	0.56	0.26	1.23	0.22	1.39	
Control Delay	118.8	32.0	21.5	27.0	11.2	138.0	10.8	208.1	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	118.8	32.0	21.5	27.0	11.2	138.0	10.8	208.1	
Queue Length 50th (m)	~73.9	25.9	19.4	20.3	4.5	~182.1	3.8	~189.8	
Queue Length 95th (m)	#141.2	48.3	33.9	39.8	12.0	#280.2	10.7	#288.5	
Internal Link Dist (m)		120.3		333.4		799.5		131.4	
Turn Bay Length (m)	40.0		20.0		90.0		50.0		
Base Capacity (vph)	410	504	382	510	284	751	278	674	
Starvation Cap Reductn	0	0	0	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0	
Reduced v/c Ratio	1.16	0.47	0.50	0.39	0.26	1.23	0.22	1.39	

HCM 2010 Signalized Intersection Summary 5: Victoria Road & Arkell Road

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBF
Lane Configurations	ሻ	î»		ሻ	ĵ»		7	ĵ.		٦	î,	
Traffic Volume (veh/h)	431	122	93	173	104	76	66	741	97	56	638	214
Future Volume (veh/h)	431	122	93	173	104	76	66	741	97	56	638	214
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	C
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	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 Sat Flow, veh/h/ln	1827	1785	1900	1881	1830	1900	1900	1792	1900	1845	1747	1900
Adj Flow Rate, veh/h	474	134	102	190	114	84	73	814	107	62	701	235
Adj No. of Lanes	1	1	0	1	1	0	1	1	0	1	1	C
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Percent Heavy Veh, %	4	3	3	1	3	3	0	6	6	3	8	8
Cap, veh/h	365	179	136	338	186	137	235	611	80	221	486	163
Arrive On Green	0.10	0.19	0.19	0.10	0.19	0.19	0.07	0.39	0.39	0.07	0.39	0.39
Sat Flow, veh/h	1740	940	716	1792	979	721	1810	1552	204	1757	1252	420
Grp Volume(v), veh/h	474	0	236	190	0	198	73	0	921	62	0	936
Grp Sat Flow(s), veh/h/ln	1740	0	1656	1792	0	1700	1810	0	1756	1757	0	1671
Q Serve(q_s), s	7.0	0.0	9.7	6.1	0.0	7.7	1.6	0.0	28.4	1.4	0.0	28.0
Cycle Q Clear(q_c), s	7.0	0.0	9.7	6.1	0.0	7.7	1.6	0.0	28.4	1.4	0.0	28.0
Prop In Lane	1.00		0.43	1.00		0.42	1.00		0.12	1.00		0.25
Lane Grp Cap(c), veh/h	365	0	315	338	0	324	235	0	691	221	0	649
V/C Ratio(X)	1.30	0.00	0.75	0.56	0.00	0.61	0.31	0.00	1.33	0.28	0.00	1.44
Avail Cap(c_a), veh/h	365	0	459	338	0	472	276	0	691	270	0	649
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	27.3	0.0	27.6	21.3	0.0	26.7	16.3	0.0	21.9	16.4	0.0	22.1
Incr Delay (d2), s/veh	152.6	0.0	3.9	2.1	0.0	1.9	0.7	0.0	159.2	0.7	0.0	207.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	21.3	0.0	4.7	3.2	0.0	3.7	0.8	0.0	44.2	0.7	0.0	50.2
LnGrp Delay(d),s/veh	179.9	0.0	31.5	23.4	0.0	28.6	17.0	0.0	181.0	17.1	0.0	229.8
LnGrp LOS	F		С	С		С	В		F	В		F
Approach Vol, veh/h		710			388			994			998	
Approach Delay, s/veh		130.5			26.1			169.0			216.6	
Approach LOS		F			С			F			F	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	8.0	34.4	10.0	19.7	8.4	34.0	10.0	19.7				
Change Period (Y+Rc), s	3.0	6.0	3.0	6.0	3.0	6.0	3.0	6.0				
Max Green Setting (Gmax), s	7.0	28.0	7.0	20.0	7.0	28.0	7.0	20.0				
Max Q Clear Time (q_c+I1), s	3.4	30.4	8.1	11.7	3.6	30.0	9.0	9.7				
Green Ext Time (p_c), s	0.0	0.0	0.0	1.9	0.1	0.0	0.0	2.2				
Intersection Summary												
HCM 2010 Ctrl Delay			157.6									
HCM 2010 LOS			F									

Max Green Setting (Gmax), s	7.0	28.0	7.0	20.0	7.0	28.0	7.0	
Max Q Clear Time (g_c+I1), s	3.4	30.4	8.1	11.7	3.6	30.0	9.0	
Green Ext Time (p_c), s	0.0	0.0	0.0	1.9	0.1	0.0	0.0	
Intersection Summary								

intersection Summary	
HCM 2010 Ctrl Delay	157.6
HCM 2010 LOS	F

Volume exceeds capacity, queue is theoretically infinite.
 Oueue shown is maximum after two cycles.

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

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Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	ች	7	*	↑	†	7
Traffic Volume (vph)	96	58	53	1195	840	133
Future Volume (vph)	96	58	53	1195	840	133
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	0.0	30.0	.,.0	.,.0	60.0
Storage Lanes	1	1	1			1
Taper Length (m)	7.5		7.5			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frf		0.850		0		0.850
Flt Protected	0.950	0.000	0.950			0.000
Satd. Flow (prot)	1805	1615	1805	1792	1759	1615
Flt Permitted	0.950	1013	0.237	11.72	1707	1013
Satd. Flow (perm)	1805	1615	450	1792	1759	1615
Right Turn on Red	1003	Yes	730	1172	1737	Yes
Satd. Flow (RTOR)		63				145
Link Speed (k/h)	50	US		70	70	140
	97.9			155.4	308.2	
Link Distance (m)	7.0					
Travel Time (s) Peak Hour Factor	0.92	0.92	0.92	8.0 0.92	15.9 0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	1200	8%	0%
Adj. Flow (vph)	104	63	58	1299	913	145
Shared Lane Traffic (%)	10:	40	50	1000	010	1.45
Lane Group Flow (vph)	104	63	58	1299	913	145
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	3.6	
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	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15	25			15
Number of Detectors	1	1	1	2	2	1
Detector Template	Left	Right	Left	Thru	Thru	Right
Leading Detector (m)	2.0	2.0	2.0	10.0	10.0	2.0
Trailing Detector (m)	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
Detector 1 Size(m)	2.0	2.0	2.0	0.6	0.6	2.0
Detector 1 Type	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex
Detector 1 Channel						
Detector 1 Extend (s)	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
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)	0.0	0.0	0.0	9.4	9.4	0.0
Detector 2 Size(m)				0.6	0.6	
Detector 2 Type				CI+Ex	CI+Ex	
Detector 2 Channel				CITLX	CITLX	
Detector 2 Extend (s)				0.0	0.0	
	Prot	Perm	Perm	NA	NA	Perm
Turn Type		Perm	Perm			Perm
Protected Phases	4			2	6	

220 Arkell Road TIS 5:00 pm 07-04-2018 2026 AM Total	Synchro 9 Report Page 13
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	•	/	*	†	1	4	
		*	,		•		
_ane Group	EBL	EBR	NBL	NBT	SBT	SBR	
Permitted Phases		4	2			6	
Detector Phase	4	4	2	2	6	6	
Switch Phase							
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	
Vlinimum Split (s)	24.0	24.0	24.0	24.0	24.0	24.0	
Total Split (s)	24.0	24.0	56.0	56.0	56.0	56.0	
Fotal Split (%)	30.0%	30.0%	70.0%	70.0%	70.0%	70.0%	
Maximum Green (s)	18.0	18.0	50.0	50.0	50.0	50.0	
/ellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	
ost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0	6.0	
_ead/Lag							
Lead-Lag Optimize?							
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None	Max	Max	Max	Max	
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	
Flash Dont Walk (s)	11.0	11.0	11.0	11.0	11.0	11.0	
Pedestrian Calls (#/hr)	0	0	0	0	0	0	
Act Effct Green (s)	10.8	10.8	56.9	56.9	56.9	56.9	
Actuated g/C Ratio	0.14	0.14	0.76	0.76	0.76	0.76	
//c Ratio	0.40	0.22	0.17	0.96	0.69	0.12	
Control Delay	33.9	9.9	5.8	30.4	10.5	1.1	
Queue Delay	0.0	0.0	0.0	17.0	0.0	0.0	
Fotal Delay	33.9	9.9	5.8	47.4	10.5	1.1	
_OS	C	A	Α.	D	В	A	
Approach Delay	24.9	- / \	- / (45.6	9.2	,,	
Approach LOS	24.7 C			43.0 D	Α.2		
• •	C			U			
ntersection Summary							
Area Type:	Other						
Cycle Length: 80							
Actuated Cycle Length: 75	.1						
Natural Cycle: 100							
Control Type: Semi Act-Ur	ncoord						
Maximum v/c Ratio: 0.96							
ntersection Signal Delay:	29.3			Ir	ntersectio	n LOS: C	
ntersection Capacity Utiliz	ation 81.2%)		10	CU Level	of Service D	
Analysis Period (min) 15							
Splits and Phases: 6: Vi	ctoria Road	& Access	3 2				
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Ø2							™ Ø4

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Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	104	63	58	1299	913	145
v/c Ratio	0.40	0.22	0.17	0.96	0.69	0.12
Control Delay	33.9	9.9	5.8	30.4	10.5	1.1
Queue Delay	0.0	0.0	0.0	17.0	0.0	0.0
Total Delay	33.9	9.9	5.8	47.4	10.5	1.1
Queue Length 50th (m)	14.1	0.0	2.4	~207.9	67.7	0.0
Queue Length 95th (m)	27.7	9.8	7.9	#297.7	134.8	5.0
Internal Link Dist (m)	73.9			131.4	284.2	
Turn Bay Length (m)			30.0			60.0
Base Capacity (vph)	433	435	340	1358	1332	1258
Starvation Cap Reductn	0	0	0	101	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.24	0.14	0.17	1.03	0.69	0.12

HCM 2010 Signalized Intersection Summary	
6: Victoria Road & Access 2	
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Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	*	7	*			7
Traffic Volume (veh/h)	96	58	53	1195	840	133
Future Volume (veh/h)	96	58	53	1195	840	133
Number	7	14	5	2	6	16
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00		Ū	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adi Sat Flow, veh/h/ln	1900	1900	1900	1792	1759	1900
Adj Flow Rate, veh/h	104	63	58	1299	913	145
Adi No. of Lanes	104	1	1	1299	1	140
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	243	217	302		1228	1127
Cap, veh/h				1251		
Arrive On Green	0.13	0.13	0.70	0.70	0.70	0.70
Sat Flow, veh/h	1810	1615	542	1792	1759	1615
Grp Volume(v), veh/h	104	63	58	1299	913	145
Grp Sat Flow(s),veh/h/ln	1810	1615	542	1792	1759	1615
Q Serve(g_s), s	3.8	2.5	5.4	50.0	23.3	2.1
Cycle Q Clear(g_c), s	3.8	2.5	28.7	50.0	23.3	2.1
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	243	217	302	1251	1228	1127
V/C Ratio(X)	0.43	0.29	0.19	1.04	0.74	0.13
Avail Cap(c a), veh/h	455	406	302	1251	1228	1127
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	28.5	27.9	15.8	10.8	6.8	3.6
Incr Delay (d2), s/veh	1.2	0.7	1.4	36.0	4.1	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.0	1.2	0.0	36.5	12.6	1.0
LnGrp Delay(d),s/veh	29.7	28.6	17.2	46.8	10.9	3.8
	29.7 C	28.6 C	17.2 B	46.8 F	10.9 B	
LnGrp LOS		U	Ď			A
Approach Vol, veh/h	167			1357	1058	
Approach Delay, s/veh	29.3			45.5	9.9	
Approach LOS	С			D	Α	
Timer	1	2	3	4	5	6
Assigned Phs		2		4		6
Phs Duration (G+Y+Rc), s		56.0		15.6		56.0
Change Period (Y+Rc), s		6.0		6.0		6.0
Max Green Setting (Gmax), s		50.0		18.0		50.0
Max Q Clear Time (q c+l1), s		52.0		5.8		25.3
Green Ext Time (p c), s		0.0		0.5		22.1
4 - 7.		0.0		0.0		22.1
Intersection Summary						
HCM 2010 Ctrl Delay			29.9			
HCM 2010 LOS			С			

Volume exceeds capacity, queue is theoretically infinite.
 Oueue shown is maximum after two cycles.

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

	•	•	4	†	↓	4	
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR	
Lane Configurations	ሻ	7	ሻ	^	1>		
Traffic Volume (vph)	186	52	17	1274	921	60	
Future Volume (vph)	186	52	17	1274	921	60	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Storage Length (m)	20.0	0.0	30.0			0.0	
Storage Lanes	1	1	1			0	
Taper Length (m)	7.5		7.5				
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	
Frt		0.850			0.992		
Flt Protected	0.950		0.950				
Satd. Flow (prot)	1770	1583	1770	1863	1848	0	
Flt Permitted	0.950		0.950				
Satd. Flow (perm)	1770	1583	1770	1863	1848	0	
Link Speed (k/h)	50			50	70		
Link Distance (m)	325.8			308.2	342.0		
Travel Time (s)	23.5			22.2	17.6		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	
Adj. Flow (vph)	202	57	18	1385	1001	65	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	202	57	18	1385	1066	0	
Enter Blocked Intersection	No	No	No	No	No	No	
Lane Alignment	Left	Right	Left	Left	Left	Right	
Median Width(m)	3.6			3.6	3.6		
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	1.00	1.00	1.00	1.00	1.00	1.00	
Turning Speed (k/h)	25	15	25			15	
Sign Control	Stop			Free	Free		
Intersection Summary							
	Other						
Control Type: Unsignalized							
Intersection Capacity Utilizat	ion 84.0%			10	CU Level of	of Service I	Ε
Analysis Period (min) 15							

Intersection								
nt Delay, s/veh	189.1							
Movement	EBL	EBR	NBL	NBT	SBT	SBR		
Lane Configurations	*	7	ሻ		ĵ.			
Traffic Vol, veh/h	186	52	17	1274	921	60		
Future Vol, veh/h	186	52	17	1274	921	60		
Conflicting Peds, #/hr	0	0	0	0	0	0		
Sign Control	Stop	Stop	Free	Free	Free	Free		
RT Channelized	-	None	-	None	-	None		
Storage Length	200	0	300	-	-	-		
Veh in Median Storage	e,# 0	-	-	0	0	-		
Grade, %	0			0	0	-		
Peak Hour Factor	92	92	92	92	92	92		
Heavy Vehicles, %	2	2	2	2	2	2		
Mvmt Flow	202	57	18	1385	1001	65		
						-		
Major/Minor	Minor		Major1		Majora			
Conflicting Flow All	Minor2 2456	1034	Major1 1066	0	Major2	0		
Stage 1	1034	1034	1000	U		U		
	1422							
Stage 2 Critical Hdwy	6.42	6.22	4.12	-				
Critical Hdwy Stg 1	5.42	0.22	4.12		- 1			
Critical Howy Stg 1 Critical Howy Stg 2	5.42			-				
		3.318		-				
Follow-up Hdwy	~ 34	282	654			-		
Pot Cap-1 Maneuver Stage 1	343	282	054	-				
Stage 2	223			-				
Platoon blocked, %	223	-						
Mov Cap-1 Maneuver	~ 33	282	654	-		-		
Mov Cap-1 Maneuver Mov Cap-2 Maneuver	~ 33	282	054			-		
	~ 33 343	-						
Stage 1				-				
Stage 2	217	-	-	-	-			
Approach	EB		NB		SB			
HCM Control Delay, \$			0.1		0			
HCM LOS	F							
Minor Lane/Major Mvn	nt	NBL	NBT	EBLn1 I	EBLn2	SBT	SBR	
Capacity (veh/h)		654	-	33	282	-	-	
HCM Lane V/C Ratio		0.028		6.126	0.2		-	
HCM Control Delay (si)	10.7		2544.7	20.9		-	
HCM Lane LOS	,	В	-	F	C		-	
HCM 95th %tile Q(veh	1)	0.1		24.3	0.7		-	
· ·	,	0.1		25	0.7			
Notes		A D	. 1		00	0	L.P. N. I.P. C	1 * All
~: Volume exceeds ca	pacity	\$: De	elay exc	ceeds 3	UUS	+: Com	putation Not Define	ed *: All major volume in platoon

7: Victoria Road & Victoria Park Village Road

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Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	ĵ.		ሻ	↑	¥	
Traffic Volume (vph)	496	153	88	423	73	45
Future Volume (vph)	496	153	88	423	73	45
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)		0.0	60.0		0.0	0.0
Storage Lanes		0	1		1	0
Taper Length (m)			7.5		7.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.968				0.948	
Flt Protected			0.950		0.970	
Satd. Flow (prot)	1813	0	1805	1881	1747	0
Flt Permitted			0.950		0.970	
Satd. Flow (perm)	1813	0	1805	1881	1747	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	290.6			206.6	213.5	
Travel Time (s)	20.9			14.9	15.4	
Confl. Peds. (#/hr)		3	3			1
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	1%	3%	0%	1%	0%	0%
Adj. Flow (vph)	517	159	92	441	76	47
Shared Lane Traffic (%)						
Lane Group Flow (vph)	676	0	92	441	123	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6	J		3.6	3.6	J
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane	Yes					
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)		15	25		25	15
Sign Control	Free			Free	Stop	
Intersection Summary						
	Other					
Control Type: Unsignalized	Ollici					
Intersection Capacity Utiliza	tion 57 /1%			10	III aval (of Service I
Analysis Period (min) 15	11011 37.470			- 10	o rever	JI JEIVICE I
Analysis Fellou (IIIII) 15						

Intersection						
Int Delay, s/veh	2.4					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	ħ		ች	^	¥	
Traffic Vol, veh/h	496	153	88	423	73	45
Future Vol, veh/h	496	153	88	423	73	45
Conflicting Peds, #/hr	0	3	3	0	0	1
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	600	-	0	-
Veh in Median Storage,	# 0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	1	3	0	1	0	0
Mvmt Flow	517	159	92	441	76	47
Major/Minor M	lajor1	N.	Major2	D.	Minor1	
Conflicting Flow All	0	0	679	0	1223	600
Stage 1	-	-	-	-	599	-
Stage 2					624	
Critical Hdwy			4.1		6.4	6.2
Critical Hdwy Stg 1			4.1		5.4	0.2
Critical Hdwy Stg 2					5.4	
Follow-up Hdwy			2.2		3.5	3.3
Pot Cap-1 Maneuver		_	923		200	505
Stage 1			923		553	505
Stage 2					538	
Platoon blocked, %					330	-
Mov Cap-1 Maneuver	-	-	922	_	180	503
Mov Cap-1 Maneuver			922		317	503
		-				
Stage 1	-	-	-	-	552	-
Stage 2	-	-	-	-	484	-
Approach	EB		WB		NB	
HCM Control Delay, s	0		1.6		19.6	
HCM LOS					С	
Min I /M-i M I		NIDL =1	EDT	EDD	WDI	WDT
Minor Lane/Major Mvmt	- 1	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)		369	-	-	922	-
HCM Cantral Dalay (a)		0.333		-	0.099	-
HCM Control Delay (s) HCM Lane LOS		19.6	-	-		-
EL MITABLE LOS		С	-	-	Α	-
HCM 95th %tile Q(veh)		1.4		_	0.3	_

Lane Group EBL EBT EBR WBL WBT WBR NBL NBT NBR SBL SBT SBR		۶	-	•	•	←	•	4	†	/	/	ţ	4
Traffic Volume (vph) 45 465 32 7 469 29 18 0 4 17 1 25 Future Volume (vph) 45 465 32 7 469 29 18 0 4 17 1 25 future Volume (vph) 45 465 32 7 469 29 18 0 4 17 1 25 fuel (leaf Flow (prot)) 1900 <td< th=""><th>Lane Group</th><th>EBL</th><th>EBT</th><th>EBR</th><th>WBL</th><th>WBT</th><th>WBR</th><th>NBL</th><th>NBT</th><th>NBR</th><th>SBL</th><th>SBT</th><th>SBR</th></td<>	Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Future Volume (vph) 45 465 32 7 469 29 18 0 4 17 1 25 Ideal Flow (vphpl) 1900 <td< td=""><td>Lane Configurations</td><td></td><td>4</td><td></td><td></td><td>4</td><td></td><td></td><td>4</td><td></td><td></td><td>4</td><td></td></td<>	Lane Configurations		4			4			4			4	
Ideal Flow (vphpl) 1900 <td>Traffic Volume (vph)</td> <td>45</td> <td>465</td> <td>32</td> <td>7</td> <td>469</td> <td>29</td> <td>18</td> <td>0</td> <td>4</td> <td>17</td> <td>1</td> <td>25</td>	Traffic Volume (vph)	45	465	32	7	469	29	18	0	4	17	1	25
Lane Util. Factor 1.00 <td>Future Volume (vph)</td> <td>45</td> <td>465</td> <td>32</td> <td>7</td> <td>469</td> <td>29</td> <td>18</td> <td>0</td> <td>4</td> <td>17</td> <td>1</td> <td>25</td>	Future Volume (vph)	45	465	32	7	469	29	18	0	4	17	1	25
Ped Bike Factor Fit													
Frt 0.992 0.992 0.977 0.922 Flt Protected 0.996 0.999 0.960 0.980 Satd. Flow (prot) 0 1861 0 0 1862 0 0 1717 0 Flt Permitted 0.996 0.999 0.960 0.980 0.980 Satd. Flow (perm) 0 1861 0 0 1862 0 0 1717 0 Link Speed (k/h) 50 50 50 50 50 50 154.5		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Fit Protected 0.996 0.999 0.960 0.980 Satd. Flow (prot) 0 1861 0 0 1866 0 0 1782 0 0 1717 0 Fit Permitted 0.996 0.999 0.960 0.980 0.980 Satd. Flow (perm) 0 1861 0 0 1782 0 0 1717 0 Link Speed (k/h) 50 50 50 50 50 50 154.5 Travel Time (s) 14.9 18.8 15.8 11.1 1 Confl. Peds. (#/hr) 9 9 7 7 7 7 7 7 7 7 Peak Hour Factor 0.95													
Satd. Flow (prot) 0 1861 0 0 1866 0 0 1782 0 0 1717 0 Flt Permitted 0.996 0.999 0.960 0.980 0.971 0 0.971 0.980 0.971 0.971 0.971 0 0.971 0.971 0 0.971 0.971 0 0 1717 0 0 1717 0 0 1717 0 0 1717 0 0 1717 0 0 0 1717 0 0 0 1717 0 0 0 0 1717 0 0 0 1717 0 0 0 1717 0 0 0 1717 0 0 0 1717 0													
Fit Permitted 0.996 0.999 0.960 0.980 Satd. Flow (perm) 0 1861 0 0 1866 0 0 1782 0 0 1717 0 Link Speed (k/h) 50 50 50 50 50 154.5 154.5 154.5 154.5 154.5 154.5 154.5 154.5 154.5 154.5 158.8 11.1 150.0 154.5													
Satd. Flow (perm) 0 1861 0 0 1866 0 0 1782 0 0 1717 0 Link Speed (k/h) 50 50 50 50 50 154.5 <td></td> <td>0</td> <td></td> <td>0</td> <td>0</td> <td></td> <td>0</td> <td>0</td> <td></td> <td>0</td> <td>0</td> <td></td> <td>0</td>		0		0	0		0	0		0	0		0
Link Speed (k/h) 50 80 70													
Link Distance (m) 206.6 261.6 219.2 154.5 Travel Time (s) 14.9 18.8 15.8 11.1 11.1 Confl. Peds. (#/hr) 9 9 7 7 7 7 7 Peak Hour Factor 0.95		0		0	0		0	0		0	0		0
Travel Time (s) 14.9 18.8 15.8 11.1 7 9.95 0.95													
Confl. Peds. (#/hr) 9 9 7 7 7 7 7 Peak Hour Factor 0.95													
Peak Hour Factor 0.95			14.9	_	_	18.8		_	15.8	_	_	11.1	
Heavy Vehicles (%) 0% 1% 0% 0% 1% 0%													
Adj. Flow (vph) 47 489 34 7 494 31 19 0 4 18 1 26 Shared Lane Traffic (%)													
Shared Lane Traffic (%)													
		4/	489	34	1	494	31	19	0	4	18	1	26
			570			F00							
Lane Group Flow (vph) 0 570 0 0 532 0 0 23 0 0 45 0		-		-	-		-	-		-	-		
Enter Blocked Intersection No													
Lane Alignment Left Left Right Left Right Left Right Left Right		Left		Right	Left		Right	Left		Right	Left		Right
Median Width(m) 3.6 3.6 0.0 0.0													
Link Offset(m) 0.0 0.0 0.0													
Crosswalk Width(m) 4.8 4.8 4.8 4.8			4.8			4.8			4.8			4.8	
Two way Left Turn Lane Headway Factor 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.0		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
			1.00			1.00			1.00			1.00	
		25	Fron	15	25	Fron	15	25	Cton	15	25	Cton	15
Sign Control Free Free Stop Stop	Sign Control		riee			riee			Stop			Stop	
Intersection Summary	Intersection Summary												
Area Type: Other	Area Type: C)ther											
Control Type: Unsignalized	Control Type: Unsignalized												
Intersection Capacity Utilization 65.7% ICU Level of Service C	Intersection Capacity Utilizati	on 65.7%			IC	CU Level	of Service	С					
Analysis Period (min) 15	Analysis Period (min) 15												

Intersection												
Int Delay, s/veh	1.7											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		4			4			4			4	
Traffic Vol, veh/h	45	465	32	7	469	29	18	0	4	17	1	25
Future Vol. veh/h	45	465	32	7	469	29	18	0	4	17	1	25
Conflicting Peds, #/hr	0	0	9	9	0	0	7	0	7	7	0	7
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-		-			-			-			-
Veh in Median Storage,	# -	0	-		0		-	0			0	-
Grade. %	-	0			0	-		0			0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	0	1	0	0	1	0	0	0	0	0	0	0
Mymt Flow	47	489	34	7	494	31	19	0	4	18	1	26
								-				
Major/Minor N	Najor1			Major2			Vinor1		N	/linor2		
Conflicting Flow All	524	0	0	532	0	0	1154	1149	522	1134	1151	516
	524	-	U	332	-	U	610	610	522	524	524	210
Stage 1		-		-			544	539	-	610	627	
Stage 2 Critical Hdwy	4.1	-	-	4.1	-		7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	4.1			4.1			6.1	5.5	0.2	6.1	5.5	0.2
	-	-	-				6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2 Follow-up Hdwy	2.2			2.2			3.5	4	3.3	3.5	4	3.3
				1046		-			559			
Pot Cap-1 Maneuver Stage 1	1053	-		1040	-		176 485	200 488	559	181 540	200 533	563
Stage 1 Stage 2	-		-	-	-		527	525	-	485	479	
Platoon blocked, %	-			-	-		527	025	-	400	4/9	
Mov Cap-1 Maneuver	1047			1040	-	-	156	184	551	169	184	560
Mov Cap-1 Maneuver	1047	-		1040			156	184	551	169	184	500
	-	-		-								-
Stage 1	-		-		-	-	451	453	-	505	528 445	
Stage 2	-	-		-	-	-	493	520	-	448	445	-
A	ED			WD			ND			CD		
Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.7			0.1			28.1			20		
HCM LOS							D			С		
Minor Lane/Major Mvmt	t	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR				
Capacity (veh/h)		179	1047	-	-	1040	-	-	285			
HCM Lane V/C Ratio		0.129	0.045	-	-	0.007	-	-	0.159			
HCM Control Delay (s)		28.1	8.6	0	-	8.5	0	-	20			
HCM Lane LOS		D	Α	Α	-	Α	Α	-	С			
HCM 95th %tile Q(veh)		0.4	0.1	-	-	0	-	-	0.6			

2: Zecca Drive/Amos Drive & Arkell Road

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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	*	ĵ,		ň	î,			44			4	
Traffic Volume (vph)	29	360	96	70	401	138	87	0	71	81	0	18
Future Volume (vph)	29	360	96	70	401	138	87	0	71	81	0	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	50.0		0.0	60.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	1		0	0		0	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. 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
Ped Bike Factor												
Frt		0.968			0.962			0.939			0.975	
Flt Protected	0.950			0.950				0.973			0.961	
Satd. Flow (prot)	1805	1825	0	1805	1801	0	0	1708	0	0	1780	0
FIt Permitted	0.950			0.950				0.973			0.961	
Satd. Flow (perm)	1805	1825	0	1805	1801	0	0	1708	0	0	1780	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		261.6			193.8			209.6			91.7	
Travel Time (s)		18.8			14.0			15.1			6.6	
Confl. Peds. (#/hr)			8	8								
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	0%	1%	0%	0%	2%	0%	3%	0%	0%	0%	0%	0%
Adj. Flow (vph)	30	375	100	73	418	144	91	0	74	84	0	19
Shared Lane Traffic (%)												
Lane Group Flow (vph)	30	475	0	73	562	0	0	165	0	0	103	0
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)		3.6			3.6			0.0			0.0	
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												
Headway 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
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Free			Free			Stop			Stop	
Intersection Summary												

Area Type: Other
Control Type: Unsignalized
Intersection Capacity Utilization 51.9%
Analysis Period (min) 15

ICU Level of Service A

220 Arkell Road TIS 5:00 pm 07-04-2018 2026 PM Total

Synchro 9 Report Page 5

HCM 2010 TWSC

3: Colonial Drive & Arkell Road

07-24-2018

Intersection												
	10.4											
Int Delay, s/veh	10.4											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	ሻ	ĵ,		٦	ĵ,			4			4	
Traffic Vol, veh/h	29	360	96	70	401	138	87	0	71	81	0	18
Future Vol, veh/h	29	360	96	70	401	138	87	0	71	81	0	18
Conflicting Peds, #/hr	0	0	8	8	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	500	-	-	600	-	-	-	-	-	-	-	-
Veh in Median Storage	,# -	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	96	96	96	96	96	96	96	96	96	96	96	96
Heavy Vehicles, %	0	1	0	0	2	0	3	0	0	0	0	0
Mvmt Flow	30	375	100	73	418	144	91	0	74	84	0	19
Major/Minor N	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	561	0	0	483	0	0	1138	1200	433	1157	1178	490
	301	-	0	403	-	-	493	493	433	635	635	490
Stage 1					- 1		645	707		522	543	
Stage 2 Critical Hdwy	4.1			4.1		-	7.13	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	4.1			4.1			6.13	5.5	0.2	6.1	5.5	0.2
Critical Hdwy Stg 2							6.13	5.5	-	6.1	5.5	
Follow-up Hdwy	2.2			2.2			3.527	3.3	3.3	3.5	3.3	3.3
Pot Cap-1 Maneuver	1020			1090			178	187	627	175	192	582
Stage 1	1020			1070			556	550	027	470	476	302
Stage 2							459	441		542	523	
Platoon blocked. %							407	441		J4Z	323	
Mov Cap-1 Maneuver	1020			1090			159	168	623	143	173	582
Mov Cap-1 Maneuver	1020			1070			159	168	023	143	173	302
Stage 1	-				_		536	530	-	456	444	
Stage 2							414	411		464	504	
Stuge 2							717	711		104	504	
										0.5		
Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.5			1			47.9			56.9		
HCM LOS							Е			F		
Minor Lane/Major Mvm	it I	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1			
Capacity (veh/h)		239	1020	-	-	1090	-		166			
HCM Lane V/C Ratio		0.689	0.03			0.067			0.621			
HCM Control Delay (s)		47.9	8.6		-	8.5	-		56.9			
HCM Lane LOS		E	А			Α	-		F			
HCM 95th %tile Q(veh))	4.5	0.1	-	-	0.2	-		3.4			
70111 701110 2(1011)			0.1			0.2			0.1			

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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	ሻ	f)			4			4		ሻ		7
Traffic Volume (vph)	8	501	4	2	598	7	2	0	2	8	0	9
Future Volume (vph)	8	501	4	2	598	7	2	0	2	8	0	9
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	25.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	0		0	0		0	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. 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
Frt		0.999			0.998			0.932				0.850
Flt Protected	0.950							0.976		0.950		
Satd. Flow (prot)	1805	1826	0	0	1758	0	0	1728	0	1805	0	1615
Flt Permitted	0.950							0.976		0.950		
Satd. Flow (perm)	1805	1826	0	0	1758	0	0	1728	0	1805	0	1615
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		193.8			144.3			68.0			96.7	
Travel Time (s)		14.0			10.4			4.9			7.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	4%	0%	0%	8%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	9	545	4	2	650	8	2	0	2	9	0	10
Shared Lane Traffic (%)												
Lane Group Flow (vph)	9	549	0	0	660	0	0	4	0	9	0	10
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)		3.6			3.6			3.6			3.6	
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												
Headway 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
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Free			Free			Stop			Stop	
Intersection Summary												
	Other											
Control Type: Unsignalized												
Intersection Capacity Utilizat	ion 48.7%			IC	CU Level	of Service	Α					
Analysis Period (min) 15												

Intersection												
Int Delay, s/veh	0.4											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	*	ĵ.			44			44		*		7
Traffic Vol, veh/h	8	501	4	2	598	7	2	0	2	8	0	9
Future Vol, veh/h	8	501	4	2	598	7	2	0	2	8	0	9
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-		None	-	-	None	-	-	None	-	-	None
Storage Length	250		-	-		-			-	0		0
Veh in Median Storage,		0	_	-	0	-	-	0		-	0	-
Grade, %		0	-	-	0			0		-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	0	4	0	0	8	0	0	0	0	0	0	0
Mymt Flow	9	545	4	2	650	8	2	0	2	9	0	10
WWW. Tiow	,	373	7	2	030	U	2	U		,	U	10
Major/Minor N	1ajor1		,	Major2			Vinor1			Minor2		
	658	0	0	549	0	0	1222	1226	547	1223		654
Conflicting Flow All	658		U	549	U	U			547			054
Stage 1	-	-	-	-	-	-	564	564	-	658	-	-
Stage 2	-	-	-	-	-	-	658	662	-	565	-	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.5	6.2	7.1	-	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	-	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	-	3.3
Pot Cap-1 Maneuver	939	-	-	1031	-		158	180	541	158	0	470
Stage 1	-	-	-	-	-	-	514	512	-	457	0	-
Stage 2	-	-	-	-	-	-	457	462	-	513	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	939	-	-	1031	-	-	153	178	541	156	-	470
Mov Cap-2 Maneuver	-	-	-	-	-	-	153	178	-	156	-	-
Stage 1	-	-	-	-	-	-	509	507	-	453	-	-
Stage 2	-	-	-	-	-	-	446	461	-	506	-	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.1			0			20.3			20.6		
HCM LOS							С			С		
Minor Lane/Major Mvmt		VBLn1	EBL	EBT	EBR	WBL	WBT	WRR	SBLn1	SRI n2		
Capacity (veh/h)		239	939	-		1031			156	470		
HCM Lane V/C Ratio			0.009			0.002			0.056			
HCM Control Delay (s)		20.3	8.9	-		8.5	0		29.4	12.8		
HCM Lane LOS		20.3 C	Α.			Ο.5	A		27.4 D	12.0 B		
HCM 95th %tile Q(veh)		0.1	0	_		0	А	-	0.2	0.1		
HOW YOU WILL (Ven)		U. I	U	-	-	U	-	-	0.2	U. I		

4: Residential Entrance/Access 1 & Arkell Road

07-24-2018

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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	ሻ	ĵ.		7	1>		ሻ	f a		7	ĵ.	
Traffic Volume (vph)	262	159	91	130	207	77	104	784	156	81	760	293
Future Volume (vph)	262	159	91	130	207	77	104	784	156	81	760	293
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	40.0		0.0	20.0		0.0	90.0		0.0	50.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. 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
Ped Bike Factor							1.00				0.99	
Frt		0.945			0.959			0.975			0.958	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1787	1784	0	1703	1794	0	1805	1759	0	1805	1763	0
Flt Permitted	0.338			0.522			0.141			0.141		
Satd. Flow (perm)	636	1784	0	936	1794	0	268	1759	0	268	1763	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		34			22			14			27	
Link Speed (k/h)		50			60			70			70	
Link Distance (m)		144.3			357.4			823.5			155.4	
Travel Time (s)		10.4			21.4			42.4			8.0	
Confl. Peds. (#/hr)							6					6
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles (%)	1%	1%	0%	6%	1%	3%	0%	6%	2%	0%	3%	1%
Adj. Flow (vph)	279	169	97	138	220	82	111	834	166	86	809	312
Shared Lane Traffic (%)												
Lane Group Flow (vph)	279	266	0	138	302	0	111	1000	0	86	1121	0
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)		3.6	3		3.6	,		3.6	,		3.6	,
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												
Headway 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
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	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	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	CI+Ex	CI+Ex		CI+Ex	CI+Ex		CI+Ex	CI+Ex		CI+Ex	CI+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	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	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)	0.0	9.4		0.0	9.4		0.0	9.4		0.0	9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		CI+Ex			CI+Ex			Cl+Ex			CI+Ex	
Detector 2 Channel		SITEM			SITEX			SITEN			JITEN	
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

220 Arkell Road TIS 5:00 pm 07-04-2018 2026 PM Total

Synchro 9 Report Page 9 Lanes, Volumes, Timings 5: Victoria Road & Arkell Road

07-24-2018

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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Detector Phase	7	4		3	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0		7.0	10.0		7.0	10.0	
Minimum Split (s)	10.0	26.0		10.0	26.0		10.0	34.0		10.0	34.0	
Total Split (s)	10.0	26.0		10.0	26.0		10.0	34.0		10.0	34.0	
Total Split (%)	12.5%	32.5%		12.5%	32.5%		12.5%	42.5%		12.5%	42.5%	
Maximum Green (s)	7.0	20.0		7.0	20.0		7.0	28.0		7.0	28.0	
Yellow Time (s)	3.0	4.0		3.0	4.0		3.0	4.0		3.0	4.0	
All-Red Time (s)	0.0	2.0		0.0	2.0		0.0	2.0		0.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	3.0	6.0		3.0	6.0		3.0	6.0		3.0	6.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	None		None	None	
Walk Time (s)		7.0			7.0			13.0			13.0	
Flash Dont Walk (s)		13.0			13.0			15.0			15.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)	26.8	18.5		26.1	16.0		36.7	28.3		36.7	28.3	
Actuated g/C Ratio	0.36	0.25		0.35	0.22		0.49	0.38		0.49	0.38	
v/c Ratio	0.82	0.57		0.34	0.75		0.40	1.47		0.31	1.63	
Control Delay	40.6	28.1		18.1	37.9		14.2	244.0		12.7	310.8	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	40.6	28.1		18.1	37.9		14.2	244.0		12.7	310.8	
LOS	D	С		В	D		В	F		В	F	
Approach Delay		34.5			31.7			221.0			289.6	
Approach LOS		С			С			F			F	
Intersection Summary												

Intersection Summary			
Area Type: Oth	ner		
Cycle Length: 80			
Actuated Cycle Length: 74.2			
Natural Cycle: 140			
Control Type: Actuated-Uncoor	rdinated		
Maximum v/c Ratio: 1.63			
Intersection Signal Delay: 190.		Intersection LOS: F	
Intersection Capacity Utilization	n 110.6%	ICU Level of Service H	
Analysis Period (min) 15			



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Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	
Lane Group Flow (vph)	279	266	138	302	111	1000	86	1121	
v/c Ratio	0.82	0.57	0.34	0.75	0.40	1.47	0.31	1.63	
Control Delay	40.6	28.1	18.1	37.9	14.2	244.0	12.7	310.8	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	40.6	28.1	18.1	37.9	14.2	244.0	12.7	310.8	
Queue Length 50th (m)	30.2	32.2	13.7	40.1	7.9	~221.8	6.1	~259.2	
Queue Length 95th (m)	#65.3	56.3	25.6	67.2	16.9	#308.3	13.7	#349.1	
Internal Link Dist (m)		120.3		333.4		799.5		131.4	
Turn Bay Length (m)	40.0		20.0		90.0		50.0		
Base Capacity (vph)	340	511	402	505	279	680	279	689	
Starvation Cap Reductn	0	0	0	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.82	0.52	0.34	0.60	0.40	1.47	0.31	1.63	

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	7	ĵ»			1>		ሻ	ĵ»		<u>ች</u>	₽	
Traffic Volume (veh/h)	262	159	91	130	207	77	104	784	156	81	760	293
Future Volume (veh/h)	262	159	91	130	207	77	104	784	156	81	760	293
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		0.99	1.00		0.99
Parking Bus, Adj	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 Sat Flow, veh/h/ln	1881	1888	1900	1792	1871	1900	1900	1804	1900	1900	1855	1900
Adj Flow Rate, veh/h	279	169	97	138	220	82	111	834	166	86	809	312
Adj No. of Lanes	1	1	0	1	1	0	1	1	0	1	1	0
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	1	1	1	6	1	1	0	6	6	0	3	3
Cap, veh/h	319	246	141	331	277	103	247	551	110	236	473	182
Arrive On Green	0.09	0.22	0.22	0.09	0.21	0.21	0.08	0.38	0.38	0.08	0.37	0.37
Sat Flow, veh/h	1792	1127	647	1707	1301	485	1810	1459	290	1810	1273	491
Grp Volume(v), veh/h	279	0	266	138	0	302	111	0	1000	86	0	1121
Grp Sat Flow(s), veh/h/ln	1792	0	1774	1707	0	1786	1810	0	1750	1810	0	1763
Q Serve(q_s), s	7.0	0.0	10.4	4.6	0.0	12.1	2.7	0.0	28.5	2.1	0.0	28.0
Cycle Q Clear(g_c), s	7.0	0.0	10.4	4.6	0.0	12.1	2.7	0.0	28.5	2.1	0.0	28.0
Prop In Lane	1.00		0.36	1.00		0.27	1.00		0.17	1.00		0.28
Lane Grp Cap(c), veh/h	319	0	387	331	0	380	247	0	661	236	0	655
V/C Ratio(X)	0.87	0.00	0.69	0.42	0.00	0.79	0.45	0.00	1.51	0.36	0.00	1.71
Avail Cap(c_a), veh/h	319	0	471	340	0	474	264	0	661	264	0	655
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	25.6	0.0	27.1	20.8	0.0	28.1	17.1	0.0	23.5	17.2	0.0	23.7
Incr Delay (d2), s/veh	22.5	0.0	3.2	0.8	0.0	7.3	1.3	0.0	238.6	0.9	0.0	326.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.3	0.0	5.4	2.2	0.0	6.7	1.4	0.0	57.4	1.1	0.0	72.9
LnGrp Delay(d),s/veh	48.1	0.0	30.3	21.6	0.0	35.4	18.4	0.0	262.1	18.2	0.0	350.3
LnGrp LOS	D		С	С		D	В		F	В		F
Approach Vol, veh/h		545			440			1111			1207	
Approach Delay, s/veh		39.4			31.1			237.8			326.6	
Approach LOS		D			С			F			F	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	8.8	34.5	9.6	22.5	9.3	34.0	10.0	22.1				
Change Period (Y+Rc), s	3.0	6.0	3.0	6.0	3.0	6.0	3.0	6.0				
Max Green Setting (Gmax), s	7.0	28.0	7.0	20.0	7.0	28.0	7.0	20.0				
Max Q Clear Time (q c+l1), s	4.1	30.5	6.6	12.4	4.7	30.0	9.0	14.1				
Green Ext Time (p c), s	0.1	0.0	0.0	2.4	0.1	0.0	0.0	2.0				
Intersection Summary	0	0.0	0.0		0	0.0	0.0	2.0				
			210.0									
HCM 2010 Ctrl Delay			210.0 F									
HCM 2010 LOS			r									

HCM 2010 Signalized Intersection Summary 5: Victoria Road & Arkell Road

Volume exceeds capacity, queue is theoretically infinite.
 Oueue shown is maximum after two cycles.

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

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Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	ሻ	7	ኘ	<u> </u>	<u> </u>	7
Traffic Volume (vph)	50	23	20	1101	1112	43
Future Volume (vph)	50	23	20	1101	1112	43
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	0.0	30.0	1700	1700	60.0
Storage Lanes	1	1	1			1
Taper Length (m)	7.5	'	7.5			'
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.850	1.00	1.00	1.00	0.850
Flt Protected	0.950	0.000	0.950			0.000
Satd. Flow (prot)	1805	1615	1805	1792	1845	1615
Flt Permitted	0.950	1013	0.124	1172	1043	1013
Satd. Flow (perm)	1805	1615	236	1792	1845	1615
Right Turn on Red	1003	Yes	230	1/72	1043	Yes
3		7es 25				40
Satd. Flow (RTOR)	Γ^	25		70	70	40
Link Speed (k/h)	50			70	70	
Link Distance (m)	97.9			155.4	308.2	
Travel Time (s)	7.0			8.0	15.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	6%	3%	0%
Adj. Flow (vph)	54	25	22	1197	1209	47
Shared Lane Traffic (%)						
Lane Group Flow (vph)	54	25	22	1197	1209	47
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6	Ŭ		3.6	3.6	Ŭ
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane	0					
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	1.00	25	1.00	1.00	1.00
Number of Detectors	1	1	1	2	2	1
Detector Template	Left	Right	Left	Thru	Thru	Right
	2.0	2.0	2.0	10.0	10.0	2.0
Leading Detector (m)	0.0		0.0			
Trailing Detector (m)		0.0		0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	2.0	2.0	2.0	0.6	0.6	2.0
Detector 1 Type	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex
Detector 1 Channel						
Detector 1 Extend (s)	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
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)				9.4	9.4	
Detector 2 Size(m)				0.6	0.6	
Detector 2 Type				CI+Ex	CI+Ex	
Detector 2 Channel						
Detector 2 Extend (s)				0.0	0.0	
Turn Type	Prot	Perm	Perm	NA	NA	Perm
Protected Phases	4	r ciiii	r ciiii	2	6	r cilli
FIVIELIEU FIIASES	4			2	0	

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Lane Group	EBL	EBR	NBL	NBT	SBT	SBR	
Permitted Phases		4	2			6	
Detector Phase	4	4	2	2	6	6	
Switch Phase							
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	
Minimum Split (s)	24.0	24.0	24.0	24.0	24.0	24.0	
Total Split (s)	24.0	24.0	56.0	56.0	56.0	56.0	
Total Split (%)	30.0%	30.0%	70.0%	70.0%	70.0%	70.0%	
Maximum Green (s)	18.0	18.0	50.0	50.0	50.0	50.0	
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s) Total Lost Time (s)	0.0 6.0	0.0 6.0	0.0 6.0	0.0 6.0	0.0 6.0	0.0 6.0	
Lead/Lag	0.0	0.0	0.0	0.0	0.0	0.0	
Lead-Lag Optimize?							
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None None	Max	Max	Max	Max	
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	
Flash Dont Walk (s)	11.0	11.0	11.0	11.0	11.0	11.0	
Pedestrian Calls (#/hr)	0	0	0	0	0	0	
Act Effct Green (s)	10.1	10.1	63.4	63.4	63.4	63.4	
Actuated g/C Ratio	0.13	0.13	0.83	0.83	0.83	0.83	
v/c Ratio	0.23	0.11	0.11	0.80	0.79	0.03	
Control Delay	32.7	13.3	5.0	13.9	12.9	1.5	
Queue Delay	0.0	0.0	0.0	2.2	0.0	0.0	
Total Delay	32.7	13.3	5.0	16.2	12.9	1.5	
LOS	С	В	Α	В	В	Α	
Approach Delay	26.6			16.0	12.5		
Approach LOS	С			В	В		
Intersection Summary							
Area Type:	Other						
Cycle Length: 80							
Actuated Cycle Length: 76	.T						
Natural Cycle: 90							
Control Type: Semi Act-Un	coord						
Maximum v/c Ratio: 0.80	144			1	torood!-	n I OC. D	
Intersection Signal Delay:					ntersection		`
Intersection Capacity Utiliz Analysis Period (min) 15	au011 / 6.9%)		10	o Level	of Service D)
Analysis Pellou (IIIII) 15							
Splits and Phases: 6: Vi	ctoria Road	& Access	s 2				
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56 s							24
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220 Arkell Road TIS 5:00 pm 07-04-2018 2026 PM Total

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Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	54	25	22	1197	1209	47
v/c Ratio	0.23	0.11	0.11	0.80	0.79	0.03
Control Delay	32.7	13.3	5.0	13.9	12.9	1.5
Queue Delay	0.0	0.0	0.0	2.2	0.0	0.0
Total Delay	32.7	13.3	5.0	16.2	12.9	1.5
Queue Length 50th (m)	8.8	0.0	0.9	128.6	125.1	0.3
Queue Length 95th (m)	16.8	6.5	3.4	#247.8	#246.1	2.8
Internal Link Dist (m)	73.9			131.4	284.2	
Turn Bay Length (m)			30.0			60.0
Base Capacity (vph)	429	403	196	1492	1536	1351
Starvation Cap Reductn	0	0	0	173	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.13	0.06	0.11	0.91	0.79	0.03
Internation Comme						

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

Queue shown is maximum after two cycles.

HCM 2010 Signalized Intersection Summary 6: Victoria Road & Access 2

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Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	ች	7	ች	†	^	7
Traffic Volume (veh/h)	50	23	20	1101	1112	43
Future Volume (veh/h)	50	23	20	1101	1112	43
Number	7	14	5	2	6	16
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1900	1900	1792	1845	1900
Adj Flow Rate, veh/h	54	25	22	1197	1209	47
Adj No. of Lanes	1	1	1	1	1207	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	0.72	0.72	0.72	6	3	0.72
Cap, veh/h	203	181	182	1283	1321	1156
Arrive On Green	0.11	0.11	0.72	0.72	0.72	0.72
Sat Flow, veh/h	1810	1615	449	1792	1845	1615
						47
Grp Volume(v), veh/h	54	25	22	1197	1209	
Grp Sat Flow(s), veh/h/ln	1810	1615	449	1792	1845	1615
Q Serve(g_s), s	1.9	1.0	3.0	39.9	37.7	0.6
Cycle Q Clear(g_c), s	1.9	1.0	40.7	39.9	37.7	0.6
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	203	181	182	1283	1321	1156
V/C Ratio(X)	0.27	0.14	0.12	0.93	0.92	0.04
Avail Cap(c_a), veh/h	466	416	182	1283	1321	1156
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	28.4	28.0	25.0	8.5	8.2	2.9
Incr Delay (d2), s/veh	0.7	0.3	1.4	13.5	11.4	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.0	0.4	0.4	23.8	22.6	0.3
LnGrp Delay(d),s/veh	29.1	28.3	26.3	22.0	19.5	3.0
LnGrp LOS	С	С	С	С	В	Α
Approach Vol, veh/h	79			1219	1256	
Approach Delay, s/veh	28.8			22.0	18.9	
Approach LOS	C			C	В.	
				-		
Timer	1	2	3	4	5	6
Assigned Phs		2		4		6
Phs Duration (G+Y+Rc), s		56.0		13.8		56.0
Change Period (Y+Rc), s		6.0		6.0		6.0
Max Green Setting (Gmax), s		50.0		18.0		50.0
Max Q Clear Time (g_c+I1), s		42.7		3.9		39.7
Green Ext Time (p_c), s		7.1		0.2		9.8
Intersection Summary						
HCM 2010 Ctrl Delay			20.7			
HCM 2010 LOS			20.7 C			
TIGINI 2010 LU3			C			

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Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	ሻ	7	ሻ	↑	f)	
Traffic Volume (vph)	105	38	64	1133	1240	178
Future Volume (vph)	105	38	64	1133	1240	178
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	20.0	0.0	30.0			0.0
Storage Lanes	1	1	1			0
Taper Length (m)	7.5		7.5			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850			0.983	
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1805	1615	1805	1792	1820	0
FIt Permitted	0.950		0.950			
Satd. Flow (perm)	1805	1615	1805	1792	1820	0
Link Speed (k/h)	50			50	70	
Link Distance (m)	325.8			308.2	342.0	
Travel Time (s)	23.5			22.2	17.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	6%	3%	0%
Adj. Flow (vph)	114	41	70	1232	1348	193
Shared Lane Traffic (%)						
Lane Group Flow (vph)	114	41	70	1232	1541	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	3.6	
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	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15	25			15
Sign Control	Stop			Free	Free	
Intersection Summary						
Area Type:	Other					
Control Type: Unsignalized						
Intersection Capacity Utilizat	tion 88.5%			IC	CU Level	of Service I
Analysis Period (min) 15						

IIILEI SECTION								
Int Delay, s/veh	115.7							
Movement	EBL	EBR	NBL	NBT	SBT	SBR		
Lane Configurations	ች	7	ሻ	†	1>			
Traffic Vol, veh/h	105	38	64	1133	1240	178		
Future Vol, veh/h	105	38	64	1133	1240	178		
Conflicting Peds, #/hr	0	0	0	0	0	0		
Sign Control	Stop	Stop	Free	Free	Free	Free		
RT Channelized	-	None	-	None	-	None		
Storage Length	200	0	300	-	-	-		
Veh in Median Storage	e, # 0	-	-	0	0	-		
Grade, %	0	-	-	0	0	-		
Peak Hour Factor	92	92	92	92	92	92		
Heavy Vehicles, %	0	0	0	6	3	0		
Mvmt Flow	114	41	70	1232	1348	193		
Major/Minor I	Minor2	- 1	Major1		Major2			
Conflicting Flow All	2816	1445	1541	0	-	0		
Stage 1	1445		-	-	-	-		
Stage 2	1371	-	-		-	-		
Critical Hdwy	6.4	6.2	4.1	-	-	-		
Critical Hdwy Stg 1	5.4	-	-	-	-	-		
Critical Hdwy Stg 2	5.4	-	-	-	-	-		
Follow-up Hdwy	3.5	3.3	2.2	-	-	-		
Pot Cap-1 Maneuver	~ 20	163	437	-	-	-		
Stage 1	219	-	-	-	-	-		
Stage 2	238	-	-	-	-	-		
Platoon blocked, %				-	-	-		
Mov Cap-1 Maneuver	~ 17	163	437	-	-	-		
Mov Cap-2 Maneuver	~ 17	-	-	-	-	-		
Stage 1	219	-	-	-	-	-		
Stage 2	200	-	-	-	-	-		
Approach	EB		NB		SB			
HCM Control Delay, s:	\$ 2224		0.8		0			
HCM LOS	F							
Minor Lane/Major Mvm	nt	NBL	NBT	EBLn1	EBLn2	SBT	SBR	
Capacity (veh/h)		437	-	17	163	-	-	
HCM Lane V/C Ratio		0.159		6.714			-	
HCM Control Delay (s)		14.8		3016.4	34.4			
HCM Lane LOS		В	-	F	D	-	-	
HCM 95th %tile Q(veh))	0.6	-	15	1	-	-	
Notes								
~: Volume exceeds ca	nacity	¢. D.	elay exc	node 2	ΛΛc	L. Com	putation Not Defin	ed *: All major volume in platoon
~. voiume exceeds ca	pacity	\$. De	eidy ext	eeus 3	005	+. Com	putation Not Delin	eu . All major volume in piatoon

220 Arkell Road TIS 5:00 pm 07-04-2018 2026 PM Total

Synchro 9 Report Page 17

220 Arkell Road TIS 5:00 pm 07-04-2018 2026 PM Total

HCM 2010 TWSC

Intersection

7: Victoria Road & Victoria Park Village Road

Appendix L

2031 Total Traffic Operations Reports



	-	•	•	←	4	/
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	î,		7	^	¥	
Traffic Volume (vph)	415	41	35	483	162	138
Future Volume (vph)	415	41	35	483	162	138
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)		0.0	60.0		0.0	0.0
Storage Lanes		0	1		1	0
Taper Length (m)			7.5		7.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.988				0.938	
Flt Protected			0.950		0.974	
Satd. Flow (prot)	1791	0	1671	1776	1678	0
Flt Permitted			0.950		0.974	
Satd. Flow (perm)	1791	0	1671	1776	1678	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	290.6			206.6	213.5	
Travel Time (s)	20.9			14.9	15.4	
Confl. Peds. (#/hr)		9	9			
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98
Heavy Vehicles (%)	4%	13%	8%	7%	3%	4%
Adj. Flow (vph)	423	42	36	493	165	141
Shared Lane Traffic (%)						
Lane Group Flow (vph)	465	0	36	493	306	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6	ŭ		3.6	3.6	, i
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane	Yes					
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)		15	25		25	15
Sign Control	Free			Free	Stop	
Intersection Summary						
Area Type:	Other					
Control Type: Unsignalized						
Intersection Capacity Utilizat	tion 53.2%			10	CU Level o	of Service
Analysis Period (min) 15						
, 5.5 1 5.104 (1.11.) 15						

Intersection						
Int Delay, s/veh	6.7					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
		EDR	WBL		INBL	NDK
Lane Configurations Traffic Vol. veh/h	1 → 415	41	1 35	402	1 62	138
	415	41	35	483 483	162	138
Future Vol, veh/h			35			
Conflicting Peds, #/hr	0	9		0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	600	-	0	-
Veh in Median Storage,		-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	98	98	98	98	98	98
Heavy Vehicles, %	4	13	8	7	3	4
Mvmt Flow	423	42	36	493	165	141
Major/Minor M	lajor1	N	Major2	-	Minor1	
Conflicting Flow All	0	0	474	0	1017	453
		U		-	453	403
Stage 1	-	-	-		564	
Stage 2	-	-	- 4.10	-		- (0.4
Critical Hdwy	-	-	4.18	-	6.43	6.24
Critical Hdwy Stg 1	-	-	-	-	5.43	-
Critical Hdwy Stg 2	-	-	-	-	5.43	-
Follow-up Hdwy	-	-	2.272	-	3.527	
Pot Cap-1 Maneuver	-	-	1057	-	262	603
Stage 1	-	-	-	-	638	-
Stage 2	-	-	-	-	567	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1057	-	251	598
Mov Cap-2 Maneuver	-	-	-	-	382	-
Stage 1	-	-	-	-	633	-
Stage 2	-	-	-	-	548	-
J						
Approach	EB		WB		NB	
HCM Control Delay, s	0		0.6		27.3	
HCM LOS	U		0.0		21.3 D	
HCIVI LUS					U	
Minor Lane/Major Mvmt		NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)		458	-	-	1057	-
HCM Lane V/C Ratio		0.668	-	-	0.034	-
HCM Control Delay (s)		27.3	-		8.5	-
HCM Lane LOS		D			A	
HCM 95th %tile Q(veh)		4.8	-		0.1	
TIOW 75th 75th Ca(VCH)		1.0			0.1	

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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		4			4			4			4	
Traffic Volume (vph)	8	529	16	4	458	11	27	1	20	45	3	34
Future Volume (vph)	8	529	16	4	458	11	27	1	20	45	3	34
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. 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
Ped Bike Factor												
Frt		0.996			0.997			0.943			0.944	
Flt Protected		0.999						0.973			0.973	
Satd. Flow (prot)	0	1804	0	0	1773	0	0	1696	0	0	1745	0
FIt Permitted		0.999						0.973			0.973	
Satd. Flow (perm)	0	1804	0	0	1773	0	0	1696	0	0	1745	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		206.6			261.6			219.2			154.5	
Travel Time (s)		14.9			18.8			15.8			11.1	
Confl. Peds. (#/hr)	1		8	8		1	13		10	10		13
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	0%	5%	0%	5%	7%	0%	5%	0%	0%	0%	0%	0%
Adj. Flow (vph)	8	545	16	4	472	11	28	1	21	46	3	35
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	569	0	0	487	0	0	50	0	0	84	0
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)		3.6			3.6			0.0			0.0	
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												
Headway 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
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Free			Free			Stop			Stop	
Intersection Summary												
	Other											
Control Type: Unsignalized												
Intersection Capacity Utilizati	on 49.4%			IC	CU Level	of Service	Α					
Analysis Period (min) 15												

Intersection												
Int Delay, s/veh	2.9											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		4			4			4			4	
Traffic Vol. veh/h	8	529	16	4	458	11	27	1	20	45	3	34
Future Vol, veh/h	8	529	16	4	458	11	27	1	20	45	3	34
Conflicting Peds, #/hr	1	0	8	8	0	1	13	0	10	10	0	13
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage	2,# -	0	-		0	-	-	0		-	0	
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	97	97	97	97	97	97	97	97	97	97	97	97
Heavy Vehicles, %	0	5	0	5	7	0	5	0	0	0	0	0
Mvmt Flow	8	545	16	4	472	11	28	1	21	46	3	35
Major/Minor I	Major1			Major2			Minor1		- 1	Minor2		
Conflicting Flow All	485	0	0	570	0	0	1096	1071	572	1078	1073	492
Stage 1	-	-	-	-	-	-	578	578	-	487	487	-
Stage 2	-	-	-	-	-	-	518	493	-	591	586	-
Critical Hdwy	4.1	-	-	4.15	-	-	7.15	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.15	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.15	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.245	-	-	3.545	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1088	-	-	988	-	-	188	223	523	198	222	581
Stage 1	-	-	-	-	-	-	496	504	-	566	554	-
Stage 2	-	-	-	-	-	-	535	550	-	497	500	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1076	-	-	980	-	-	169	218	515	185	217	574
Mov Cap-2 Maneuver	-	-	-	-	-	-	169	218	-	185	217	-
Stage 1		-	-	-	-	-	487	495		559	550	-
Stage 2	-	-	-	-	-	-	491	546	-	467	491	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.1			0.1			24.3			25.5		
HCM LOS							С			D		
Minor Lane/Major Mvm	nt 1	VBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1			
Capacity (veh/h)		236	1076	-	-	980	-	-	259			
HCM Lane V/C Ratio		0.21	0.008	-	-	0.004	-	-	0.326			
HCM Control Delay (s)		24.3	8.4	0	-	8.7	0		25.5			
HCM Lane LOS		С	Α	Α	-	Α	Α	-	D			
HCM 95th %tile Q(veh))	0.8	0	-	-	0	-	-	1.4			

2: Zecca Drive/Amos Drive & Arkell Road

07-24-2018

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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	Ť	1>		ሻ	ĵ.			4			4	
Traffic Volume (vph)	11	503	79	47	291	42	149	0	156	131	0	32
Future Volume (vph)	11	503	79	47	291	42	149	0	156	131	0	32
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	50.0		0.0	60.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	1		0	0		0	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. 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
Ped Bike Factor												
Frt		0.980			0.981			0.931			0.973	
Flt Protected	0.950			0.950				0.976			0.961	
Satd. Flow (prot)	1770	1783	0	1703	1738	0	0	1622	0	0	1742	0
Flt Permitted	0.950			0.950				0.976			0.961	
Satd. Flow (perm)	1770	1783	0	1703	1738	0	0	1622	0	0	1742	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		261.6			193.8			209.6			91.7	
Travel Time (s)		18.8			14.0			15.1			6.6	
Confl. Peds. (#/hr)			11	11					1			
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	4%	7%	6%	8%	2%	9%	2%	4%	2%	2%	2%
Adj. Flow (vph)	12	547	86	51	316	46	162	0	170	142	0	35
Shared Lane Traffic (%)												
Lane Group Flow (vph)	12	633	0	51	362	0	0	332	0	0	177	0
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)		3.6			3.6			0.0			0.0	
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												
Headway 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
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Free			Free			Stop			Stop	
Intersection Summary												
	Other											
Control Type: Unsignalized												
Intersection Capacity Utilizat	ion 62.3%			IC	CU Level	of Service	В					
Analysis Period (min) 15												

Intersection													
Int Delay, s/veh	71.9												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations	7	1>	LDIK	ሻ	î,	WOR	IVDL	4	NDIX	JDL	4	JUIN	
Traffic Vol, veh/h	11	503	79	47	291	42	149	0	156	131	0	32	
Future Vol. veh/h	11	503	79	47	291	42	149	0	156	131	0	32	
	0	0	11	11	0	0	0	0	130	0	0	0	
Conflicting Peds, #/hr	Free	Free	Free	Free	Free	Free	Stop	Stop		-	Stop	Stop	
Sign Control RT Channelized	riee	riee -	None	riee -	riee -	None	Siup -	Siup -	Stop None	Stop	Siup -	None	
	500		None -	600		None			None -			None -	
Storage Length Veh in Median Storage		0		- 000	0			0		-	0	-	
Veri iri wediari Storage Grade, %		0			0			0			0		
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92	
		4	7	92	8	2	92	2	4	2	2	2	
Heavy Vehicles, %	12	547						0			0	35	
Mvmt Flow	12	547	86	51	316	46	162	U	170	142	U	35	
Major/Minor N	Major1			Major2			Vinor1			Minor2			
Conflicting Flow All	362	0	0	644	0	0	1084	1089	602	1140	1109	339	
Stage 1	-	-	-	-	-	-	625	625	-	441	441	-	
Stage 2	-	-	-	-	-	-	459	464	-	699	668	-	
Critical Hdwy	4.12	-	-	4.16	-	-	7.19	6.52	6.24	7.12	6.52	6.22	
Critical Hdwy Stg 1	-	-	-	-	-	-	6.19	5.52	-	6.12	5.52	-	
Critical Hdwy Stg 2	-	-	-	-	-	-	6.19	5.52	-	6.12	5.52	-	
Follow-up Hdwy	2.218	-	-	2.254	-	-	3.581	4.018	3.336	3.518	4.018	3.318	
Pot Cap-1 Maneuver	1197	-	-	922	-	-	189	215	496	178	210	703	
Stage 1	-	-	-	-	-	-	461	477	-	595	577	-	
Stage 2	-	-	-	-	-	-	569	564	-	430	456	-	
Platoon blocked, %		-	-		-	-							
Mov Cap-1 Maneuver	1197	-	-	921	-	-	169	199	491	~ 111	195	703	
Mov Cap-2 Maneuver	-	-	-	-	-	-	169	199	-	~ 111	195	-	
Stage 1	-	-	-	-	-	-	452	468	-	589	545	-	
Stage 2		-	-	-	-	-	511	533	-	278	447	-	
ŭ													
Approach	EB			WB			NB			SB			
	0.1			1.1			202			254.5			
HCM Control Delay, s HCM LOS	U. I			1.1			202 F			254.5 F			
ITOIVI LUS							r			r			
Minor Lane/Major Mvm	it I	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR:					
Capacity (veh/h)		254	1197	-	-	921	-	-	133				
HCM Lane V/C Ratio		1.305	0.01	-	-	0.055	-	-	1.332				
HCM Control Delay (s)		202	8	-	-	9.1	-	-	254.5				
HCM Lane LOS		F	Α	-	-	Α	-	-	F				
HCM 95th %tile Q(veh))	17	0	-	-	0.2	-	-	11.4				
Notes													
	nacity	¢. D.	lay ove	coode 2	00c	Com	nutatio	n Not D	ofinod	*, AII	major	(olumo	in platoon
 Volume exceeds cap 	Jacily	\$: D6	elay ext	ceeds 3	005	+. Cum	putatio	n Not D	enned	: All	major v	volume	iii piatuun

HCM 2010 TWSC

3: Colonial Drive & Arkell Road

	•	-	\rightarrow	•	←	•	1	†	/	-	ţ	1
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	ሻ	ĵ.			4			4		ሻ		7
Traffic Volume (vph)	83	705	3	3	347	62	3	0	3	6	0	31
Future Volume (vph)	83	705	3	3	347	62	3	0	3	6	0	31
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	25.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	0		0	0		0	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. 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
Frt		0.999			0.980			0.932				0.850
Flt Protected	0.950							0.976		0.950		
Satd. Flow (prot)	1805	1825	0	0	1744	0	0	1728	0	1805	0	1615
Flt Permitted	0.950							0.976		0.950		
Satd. Flow (perm)	1805	1825	0	0	1744	0	0	1728	0	1805	0	1615
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		193.8			144.3			68.0			96.7	
Travel Time (s)		14.0			10.4			4.9			7.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	4%	0%	0%	8%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	90	766	3	3	377	67	3	0	3	7	0	34
Shared Lane Traffic (%)												
Lane Group Flow (vph)	90	769	0	0	447	0	0	6	0	7	0	34
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)		3.6			3.6			3.6			3.6	
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												
Headway 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
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Free			Free			Stop			Stop	
Intersection Summary												
	Other											
Control Type: Unsignalized												
Intersection Capacity Utilizat	ion 72.2%			IC	CU Level	of Service	С					
Analysis Period (min) 15												

Intersection												
Int Delay, s/veh	1.2											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		1≽			4			44				7
Traffic Vol, veh/h	83	705	3	3	347	62	3	0	3	6	0	31
Future Vol. veh/h	83	705	3	3	347	62	3	0	3	6	0	31
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	250		-			-				0		0
Veh in Median Storage	.# -	0	-		0		-	0		-	0	
Grade. %	-	0			0	-		0			0	
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	0	4	0	0	8	0	0	0	0	0	0	0
Mymt Flow	90	766	3	3	377	67	3	0	3	7	0	34
	,,	,,,,			011	0,				•		0.
Major/Minor N	Najor1		N	Major2			Vinor1			Minor2		
Conflicting Flow All	445	0	0	770	0	0	1365	1399	768	1367		411
Stage 1	440	-	U	770	-	U	948	948	700	417		411
Stage 2							417	451		950		
Critical Hdwy	4.1	-	-	4.1			7.1	6.5	6.2	7.1	-	6.2
	4.1	-		4.1	- 1		6.1	5.5	0.2	6.1		0.2
Critical Hdwy Stg 1 Critical Hdwy Stg 2		-	-		-	-	6.1	5.5	-	6.1	-	
	2.2	-		2.2			3.5	3.3	3.3	3.5		3.3
Follow-up Hdwy		-	-			-						
Pot Cap-1 Maneuver	1126	-	-	854	-	-	126	142	405	125	0	645
Stage 1	-	-	-	-	-		316	342	-	617	0	-
Stage 2	-	-	-	-		-	617	574	-	315	0	
Platoon blocked, %	110/	-	-	05.4	-		110	120	405	11/		/ 45
Mov Cap-1 Maneuver	1126	-	-	854	-	-	112	130	405	116	-	645
Mov Cap-2 Maneuver		-	-	-	-	-	112	130	-	116	-	-
Stage 1	-	-	-	-	-	-	291	315	-	568	-	-
Stage 2	-	-	-	-	-	-	582	571	-	287	-	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.9			0.1			26.4			15.3		
HCM LOS							D			С		
Minor Lane/Major Mvm	t N	VBLn1	EBL	EBT	EBR	WBL	WBT	WBR :	SBLn1	SBLn2		
Capacity (veh/h)		175	1126	-	-	854	-		116	645		
HCM Lane V/C Ratio		0.037	0.08			0.004			0.056			
HCM Control Delay (s)		26.4	8.5	-		9.2	0		37.9	10.9		
HCM Lane LOS		D	A			A	Ā		E	В		
HCM 95th %tile Q(veh)		0.1	0.3			0	-		0.2	0.2		
/our /our @(veri)		0.1	0.5			J			0.2	0.2		

4: Residential Entrance/Access 1 & Arkell Road

NA

34.0

0.0

Lag

Yes

13.0

15.0

6

pm+pt

7.0 10.0

10.0

10.0 34.0

7.0 28.0

3.0 4.0

0.0 2.0

0.0

3.0 6.0

Lead

Yes

3.0 3.0

None None

36.7 28.4

0.51 0.39

0.24 1.54

0.0 0.0

11.3 274.8

11.3 274.8 258.7

12.5% 42.5%

	۶	→	•	•	←	•	4	†	~	/	ļ	4
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	ሻ	ĵ.		ሻ	1>		ሻ	fa fa		ሻ	f.	
Traffic Volume (vph)	479	136	96	197	115	86	70	830	110	61	707	231
Future Volume (vph)	479	136	96	197	115	86	70	830	110	61	707	231
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	40.0		0.0	20.0		0.0	90.0		0.0	50.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. 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
Ped Bike Factor	1.00				0.99		1.00				0.99	
Frt		0.938			0.936			0.982			0.963	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1736	1676	0	1787	1696	0	1805	1760	0	1752	1673	0
Flt Permitted	0.519			0.442			0.132			0.138		
Satd. Flow (perm)	947	1676	0	831	1696	0	251	1760	0	255	1673	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		42			45			9			23	
Link Speed (k/h)		50			60			70			70	
Link Distance (m)		144.3			357.4			823.5			155.4	
Travel Time (s)		10.4			21.4			42.4			8.0	
Confl. Peds. (#/hr)	1					1	3					3
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles (%)	4%	3%	11%	1%	3%	5%	0%	6%	6%	3%	8%	11%
Adj. Flow (vph)	526	149	105	216	126	95	77	912	121	67	777	254
Shared Lane Traffic (%)												
Lane Group Flow (vph)	526	254	0	216	221	0	77	1033	0	67	1031	0
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)		3.6	J		3.6	,		3.6	J		3.6	J
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												
Headway 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
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	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	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	CI+Ex	CI+Ex		CI+Ex	CI+Ex		CI+Ex	CI+Ex		CI+Ex	CI+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	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	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)	0.0	9.4		0.0	9.4		0.0	9.4		0.0	9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		CI+Ex			CI+Ex			CI+Ex			CI+Ex	
Detector 2 Channel		SILLY			JIILA			SITEX			JITEK	
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
DOLOGIO E ENIGINA (3)		0.0			0.0			0.0			0.0	

	→	•	•	←	•	1	†
_	EBT	EBR	WBL	WBT	WBR	NBL	NBT
t	NA		pm+pt	NA		pm+pt	NA
7	4		3	8		5	2
1			8			2	
7	4		3	8		5	2
)	7.0		7.0	7.0		7.0	10.0
)	26.0		10.0	26.0		10.0	34.0
)	26.0		10.0	26.0		10.0	34.0
5 3	32.5%		12.5%	32.5%		12.5%	42.5%
)	20.0		7.0	20.0		7.0	28.0
)	4.0		3.0	4.0		3.0	4.0
)	2.0		0.0	2.0		0.0	2.0
)	0.0		0.0	0.0		0.0	0.0
)	6.0		3.0	6.0		3.0	6.0
i	Lag		Lead	Lag		Lead	Lag
S	Yes		Yes	Yes		Yes	Yes
)	3.0		3.0	3.0		3.0	3.0
,	None		None	None		None	None
	7.0			7.0			13.0
	13.0			13.0			15.0
	0			0			0
3	14.2		24.3	14.2		37.4	30.4
1	0.20		0.34	0.20		0.52	0.42
3	0.70		0.58	0.60		0.27	1.39
7	33.8		23.9	28.4		11.7	207.7
)	0.0		0.0	0.0		0.0	0.0
7	33.8		23.9	28.4		11.7	207.7
	С		С	С		В	F
	139.0			26.2			194.1
	F			С			F
ed							
			Ir	ntersection	1 LOS: F		
6%			[(CU Level	of Service	e H	
1.0		S I					
a &	Arkell F	koad			1		-
					ÿ:	3	- Z
					10 s		26 s
					Ø	7	₩ Ø8
					10 s		26 s
						10s	

	•	-	•	←	4	†	-	. ↓
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	526	254	216	221	77	1033	67	1031
v/c Ratio	1.33	0.70	0.58	0.60	0.27	1.39	0.24	1.54
Control Delay	189.7	33.8	23.9	28.4	11.7	207.7	11.3	274.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	189.7	33.8	23.9	28.4	11.7	207.7	11.3	274.8
Queue Length 50th (m)	~98.1	29.3	22.4	23.6	5.0	~223.0	4.3	~224.8
Queue Length 95th (m)	#165.3	53.1	38.4	44.9	12.6	#321.5	11.3	#323.0
Internal Link Dist (m)		120.3		333.4		799.5		131.4
Turn Bay Length (m)	40.0		20.0		90.0		50.0	
Base Capacity (vph)	395	498	372	506	281	742	275	668
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.33	0.51	0.58	0.44	0.27	1.39	0.24	1.54

	_	_	•	•		_	١,	- 1	- /	-	•	•
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	ሻ	ĵ»		ሻ	ĵ»		ሻ	î»		٦	î,	
Traffic Volume (veh/h)	479	136	96	197	115	86	70	830	110	61	707	231
Future Volume (veh/h)	479	136	96	197	115	86	70	830	110	61	707	231
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	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 Sat Flow, veh/h/ln	1827	1787	1900	1881	1829	1900	1900	1792	1900	1845	1747	1900
Adj Flow Rate, veh/h	526	149	105	216	126	95	77	912	121	67	777	254
Adj No. of Lanes	1	1	0	1	1	0	1	1	0	1	1	0
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Percent Heavy Veh, %	4	3	3	1	3	3	0	6	6	3	8	8
Cap, veh/h	355	195	137	333	193	146	235	600	80	223	483	158
Arrive On Green	0.10	0.20	0.20	0.10	0.20	0.20	0.08	0.39	0.39	0.07	0.38	0.38
Sat Flow, veh/h	1740	976	688	1792	968	730	1810	1550	206	1757	1261	412
Grp Volume(v), veh/h	526	0	254	216	0	221	77	0	1033	67	0	1031
Grp Sat Flow(s),veh/h/ln	1740	0	1664	1792	0	1698	1810	0	1755	1757	0	1673
Q Serve(g_s), s	7.0	0.0	10.5	7.0	0.0	8.8	1.8	0.0	28.3	1.6	0.0	28.0
Cycle Q Clear(g_c), s	7.0	0.0	10.5	7.0	0.0	8.8	1.8	0.0	28.3	1.6	0.0	28.0
Prop In Lane	1.00		0.41	1.00		0.43	1.00		0.12	1.00		0.25
Lane Grp Cap(c), veh/h	355	0	332	333	0	339	235	0	680	223	0	640
V/C Ratio(X)	1.48	0.00	0.76	0.65	0.00	0.65	0.33	0.00	1.52	0.30	0.00	1.61
Avail Cap(c_a), veh/h	355	0	455	333	0	464	272	0	680	267	0	640
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	27.3	0.0	27.6	21.7	0.0	26.9	16.6	0.0	22.4	16.7	0.0	22.6
Incr Delay (d2), s/veh	230.5	0.0	5.2	4.4	0.0	2.1	0.8	0.0	241.3	0.7	0.0	281.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	28.4	0.0	5.3	3.8	0.0	4.3	0.9	0.0	59.2	0.8	0.0	62.9
LnGrp Delay(d),s/veh	257.8	0.0	32.8	26.1	0.0	29.0	17.4	0.0	263.7	17.4	0.0	304.4
LnGrp LOS	F		С	С		С	В		F	В		F
Approach Vol, veh/h		780			437			1110			1098	
Approach Delay, s/veh		184.5			27.6			246.6			286.9	
Approach LOS		F			С			F			F	

Timer	1	2	3	4	5	6	7	8	
Assigned Phs	1	2	3	4	5	6	7	8	
Phs Duration (G+Y+Rc), s	8.2	34.3	10.0	20.6	8.5	34.0	10.0	20.6	
Change Period (Y+Rc), s	3.0	6.0	3.0	6.0	3.0	6.0	3.0	6.0	
Max Green Setting (Gmax), s	7.0	28.0	7.0	20.0	7.0	28.0	7.0	20.0	
Max Q Clear Time (g_c+l1), s	3.6	30.3	9.0	12.5	3.8	30.0	9.0	10.8	
Green Ext Time (p_c), s	0.0	0.0	0.0	1.9	0.1	0.0	0.0	2.3	

intersection summary	
HCM 2010 Ctrl Delay	217.4
HCM 2010 LOS	F

HCM 2010 Signalized Intersection Summary

5: Victoria Road & Arkell Road

Volume exceeds capacity, queue is theoretically infinite.
 Oueue shown is maximum after two cycles.

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

	•	•	4	†	ļ	1
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	ኘ	7	ሻ	11.	<u> </u>	7
Traffic Volume (vph)	96	58	53	1341	931	133
Future Volume (vph)	96	58	53	1341	931	133
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	0.0	30.0	1700	1700	60.0
Storage Lanes	1	1	30.0			1
	7.5	- 1	7.5			- 1
Taper Length (m) Lane Util, Factor	1.00	1.00	1.00	1.00	1.00	1.00
Eane Util. Factor	1.00	0.850	1.00	1.00	1.00	0.850
	0.050	0.850	0.050			0.850
Flt Protected	0.950	4/45	0.950	1700	4750	4/45
Satd. Flow (prot)	1805	1615	1805	1792	1759	1615
Flt Permitted	0.950		0.188			
Satd. Flow (perm)	1805	1615	357	1792	1759	1615
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		63				145
Link Speed (k/h)	50			70	70	
Link Distance (m)	97.9			155.4	308.2	
Travel Time (s)	7.0			8.0	15.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0.72	6%	8%	0.72
Adj. Flow (vph)	104	63	58	1458	1012	145
Shared Lane Traffic (%)	104	03	30	1430	1012	173
Lane Group Flow (vph)	104	63	58	1458	1012	145
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	3.6	
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	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15	25			15
Number of Detectors	1	1	1	2	2	1
Detector Template	Left	Right	Left	Thru	Thru	Right
Leading Detector (m)	2.0	2.0	2.0	10.0	10.0	2.0
Trailing Detector (m)	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
	2.0		2.0			2.0
Detector 1 Size(m)		2.0		0.6	0.6	
Detector 1 Type	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex
Detector 1 Channel						
Detector 1 Extend (s)	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
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)				9.4	9.4	
Detector 2 Size(m)				0.6	0.6	
Detector 2 Type				CI+Ex	CI+Ex	
Detector 2 Channel						
Detector 2 Extend (s)				0.0	0.0	
Turn Type	Prot	Perm	Perm	NA	NA	Perm
Protected Phases	4	r ciiii	r ciiii	2	6	r ciiii
FIDIECIEU PIIASES	4			2	0	

Lane Group EBL EBR NBL NBT SBT SBR Permitted Phases 4 2 6 6 Detector Phase 4 4 2 2 6 6 Switch Phase 5 4 4 2 2 6 6
Detector Phase 4 4 2 2 6 6 Switch Phase
Switch Phase
Minimum Initial (s) 10.0 10.0 10.0 10.0 10.0
Minimum Split (s) 24.0 24.0 24.0 24.0 24.0 24.0
Total Split (s) 24.0 24.0 56.0 56.0 56.0 56.0
Total Split (%) 30.0% 30.0% 70.0% 70.0% 70.0% 70.0%
Maximum Green (s) 18.0 18.0 50.0 50.0 50.0 50.0
Yellow Time (s) 4.0 4.0 4.0 4.0 4.0
All-Red Time (s) 2.0 2.0 2.0 2.0 2.0 2.0
Lost Time Adjust (s) 0.0 0.0 0.0 0.0 0.0
Total Lost Time (s) 6.0 6.0 6.0 6.0 6.0
Lead/Lag
Lead-Lag Optimize?
Vehicle Extension (s) 3.0 3.0 3.0 3.0 3.0 3.0
Recall Mode None None Max Max Max Max
Walk Time (s) 7.0 7.0 7.0 7.0 7.0 7.0
Flash Dont Walk (s) 11.0 11.0 11.0 11.0 11.0 11.0
Pedestrian Calls (#/hr) 0 0 0 0 0 0
Act Effct Green (s) 10.8 10.8 56.9 56.9 56.9 56.9
Actuated g/C Ratio 0.14 0.76 0.76 0.76 0.76
v/c Ratio 0.40 0.22 0.21 1.07 0.76 0.12
Control Delay 33.9 9.9 6.9 63.3 13.3 1.1
Queue Delay 0.0 0.0 0.0 11.0 0.0 0.0 Total Delay 33.9 9.9 6.9 74.3 13.3 1.1
Total Delay 33.9 9.9 6.9 74.3 13.3 1.1 LOS C A A E B A
Approach Delay 24.9 71.8 11.8
11
Intersection Summary
Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 75.1
Natural Cycle: 150
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 1.07
Intersection Signal Delay: 44.6 Intersection LOS: D
Intersection Capacity Utilization 88.9% ICU Level of Service E
Analysis Period (min) 15
Splits and Phases: 6: Victoria Road & Access 2
↑ Ø2
1 Ø2
4

220 Arkell Road TIS 5:00 pm 07-04-2018 2031 AM Total Synchro 9 Report Page 13

220 Arkell Road TIS 5:00 pm 07-04-2018 2031 AM Total

Synchro 9 Report Page 14

	•	•	4	†	ļ	4
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	104	63	58	1458	1012	145
v/c Ratio	0.40	0.22	0.21	1.07	0.76	0.12
Control Delay	33.9	9.9	6.9	63.3	13.3	1.1
Queue Delay	0.0	0.0	0.0	11.0	0.0	0.0
Total Delay	33.9	9.9	6.9	74.3	13.3	1.1
Queue Length 50th (m)	14.1	0.0	2.5	~257.1	84.9	0.0
Queue Length 95th (m)	27.7	9.8	8.8	#350.2	#206.0	5.0
Internal Link Dist (m)	73.9			131.4	284.2	
Turn Bay Length (m)			30.0			60.0
Base Capacity (vph)	433	435	270	1358	1332	1258
Starvation Cap Reductn	0	0	0	59	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.24	0.14	0.21	1.12	0.76	0.12

	۶	•	1	†	ţ	4
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	7	7	ሻ	†	↑	7
Traffic Volume (veh/h)	96	58	53	1341	931	133
Future Volume (veh/h)	96	58	53	1341	931	133
Number	7	14	5	2	6	16
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1900	1900	1792	1759	1900
Adj Flow Rate, veh/h	104	63	58	1458	1012	145
Adj No. of Lanes	1	1	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	0.72	0.72	0.72	6	8	0.72
Cap, veh/h	243	217	243	1251	1228	1127
Arrive On Green	0.13	0.13	0.70	0.70	0.70	0.70
Sat Flow, veh/h	1810	1615	493	1792	1759	1615
	104					
Grp Volume(v), veh/h		63	58	1458	1012	145
Grp Sat Flow(s),veh/h/ln	1810	1615	493	1792	1759	1615
Q Serve(g_s), s	3.8	2.5	6.8	50.0	29.3	2.1
Cycle Q Clear(g_c), s	3.8	2.5	36.1	50.0	29.3	2.1
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	243	217	243	1251	1228	1127
V/C Ratio(X)	0.43	0.29	0.24	1.17	0.82	0.13
Avail Cap(c_a), veh/h	455	406	243	1251	1228	1127
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	28.5	27.9	20.5	10.8	7.7	3.6
Incr Delay (d2), s/veh	1.2	0.7	2.3	83.5	6.4	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.0	1.2	1.1	53.0	15.9	1.0
LnGrp Delay(d),s/veh	29.7	28.6	22.8	94.3	14.1	3.8
LnGrp LOS	C	C	C	F	В	A
Approach Vol, veh/h	167			1516	1157	- '
Approach Delay, s/veh	29.3			91.6	12.8	
Approach LOS	29.3 C			91.0 F	12.0 B	
Approacti LOS	C			Г	D	
Timer	1	2	3	4	5	6
Assigned Phs		2		4		6
Phs Duration (G+Y+Rc), s		56.0		15.6		56.0
Change Period (Y+Rc), s		6.0		6.0		6.0
Max Green Setting (Gmax), s		50.0		18.0		50.0
Max Q Clear Time (g_c+l1), s		52.0		5.8		31.3
Green Ext Time (p. c), s		0.0		0.5		18.0
4 - 7:		5.5		0.0		
Intersection Summary						
HCM 2010 Ctrl Delay			55.8			
HCM 2010 LOS			E			

HCM 2010 Signalized Intersection Summary 6: Victoria Road & Access 2

Volume exceeds capacity, queue is theoretically infinite.
 Oueue shown is maximum after two cycles.

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

7: Victoria Road & Victoria Park Village Road

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Lane Group	EBL	EBR	NBL	NBT	SBT	SBR	
Lane Configurations	ሻ	7	ሻ	†	ĥ		
Traffic Volume (vph)	186	52	17	1420	1012	60	
Future Volume (vph)	186	52	17	1420	1012	60	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Storage Length (m)	20.0	0.0	30.0			0.0	
Storage Lanes	1	1	1			0	
Taper Length (m)	7.5		7.5				
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	
Frt		0.850			0.992		
Flt Protected	0.950		0.950				
Satd. Flow (prot)	1770	1583	1770	1863	1848	0	
Flt Permitted	0.950		0.950				
Satd. Flow (perm)	1770	1583	1770	1863	1848	0	
Link Speed (k/h)	50			50	70		
Link Distance (m)	325.8			308.2	342.0		
Travel Time (s)	23.5			22.2	17.6		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	
Adj. Flow (vph)	202	57	18	1543	1100	65	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	202	57	18	1543	1165	0	
Enter Blocked Intersection	No	No	No	No	No	No	
Lane Alignment	Left	Right	Left	Left	Left	Right	
Median Width(m)	3.6			3.6	3.6		
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	1.00	1.00	1.00	1.00	1.00	1.00	
Turning Speed (k/h)	25	15	25			15	
Sign Control	Stop			Free	Free		
Intersection Summary							
	Other						
Control Type: Unsignalized							
Intersection Capacity Utilizat	ion 91.7%			IC	CU Level	of Service F	
Analysis Period (min) 15							

220 Arkell Road TIS 5:00 pm 07-04-2018 2031 AM Total

HCM 2010 TWSC

7: Victoria Road & Victoria Park Village Road

07-24-2018

Section Delay, siveh 273.3 273 3 4 4 4 4 4 4 4 4
See
March Marc
March Marc
affic Vol, veh/h 186 52 17 1420 1012 60 ture Vol, veh/h 186 52 17 1420 1012 60 millicting Peds, #hr 0 0 0 0 0 0 0 0 millicting Peds, #hr 0 0 0 0 0 0 0 0 millicting Peds, #hr 0 0 0 0 0 0 0 millicting Peds, #hr 0 0 0 0 0 0 0 millicting Peds, #hr 0 0 0 300 h in Median Storage, # 0 0 0 0 - ade, % 0 0 0 0 0 - ade, % 1 0 0 0 0 - ade, % 2 2 2 2 2 2 2 2 mit Flow 202 57 18 1543 1100 65 sign/Minor Minor2 Major1 Major2 millicting Flow All 2713 1133 1165 0 - 0 Stage 1 1133 Stage 1 1133 Stage 1 1580 titical Hdwy 54g 1 5.42 titical Hdwy Stg 1 5.42 titical Hdwy Stg 1 5.42 Stage 1 307 Stage 2 - 186 Stage 2 - 186 Stage 1 307 Stage 2 - 186 Stage 2 - 180
ture Vol, veh/h ture V
Inflicting Peds, #/hr 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
Channelized
Channelized - None - None - None rarge Length 200 0 300 hin Median Storage, # 0 0 0 0 - ade, % 0 0 0 0 - ade Hour Factor 92 92 92 92 92 92 92 yavy Vehicles, % 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
prage Length 200 0 300
h in Median Storage, # 0
ade, % 0 - 0 0 0 - ak Hour Factor 92 92 92 92 92 92 92 92 92 avy Vehicles, % 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
ak Hour Factor 92 92 92 92 92 92 92 92 92 any Vehicles, % 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
avy Vehicles, % 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
mir Flow 202 57 18 1543 1100 65
Stage 1 1133 1165 0 - 0
Inflicting Flow All 2713 1133 1165 0 - 0 Stage 1 1133 Stage 2 1580 titical Howy 6.42 6.22 4.12 titical Howy Stg 1 5.42 titical Howy Stg 5 5.42 titical Howy Stg 1 5.42 titical Howy Stg 2 5.42 titical Howy Stg 3 5.42 titical Howy Stg 3 5.42 titical Howy Stg 1 5.42 titical Howy Stg 2 5.42 titical Howy Stg 3 5.42 titical Howy Stg 2 5.42 titical Howy Stg 3 5.42 - titical Howy Stg 4 5.42 - titical Howy St
Inflicting Flow All 2713 1133 1165 0 - 0 Stage 1 1133 Stage 2 1580 titical Howy 6.42 6.22 4.12 titical Howy Stg 1 5.42 titical Howy Stg 5 5.42 titical Howy Stg 1 5.42 titical Howy Stg 2 5.42 titical Howy Stg 3 5.42 titical Howy Stg 3 5.42 titical Howy Stg 1 5.42 titical Howy Stg 2 5.42 titical Howy Stg 2 5.42 titical Howy Stg 3 5.42 titical Howy Stg 2 5.42 titical Howy Stg 3 5.42 titical Howy Stg 2 5.42 titical Howy Stg 3 5.42 - titical Howy Stg 3 5.42 titical Howy Stg 3 5.42 - titical Howy Stg 3 5.42
Stage 1
Stage 2
tical Hdwy Stg 1 5.42
tical Hdwy Stg 1 5.42
titical Hdwy Stg 2 5.42
Stage 1
t Cap-1 Maneuver
Stage 1 307 -
Stage 2
Stoon blocked, %
ov Cap-1 Maneuver - 22 247 600
No Cap-2 Maneuver
Stage 1 307 -
Stage 2
proach
proach
M Control Delay, \$ 3154.1 0.1 0 M LOS F NOT Lane/Major Mvmt NBL NBT EBLn1 EBLn2 SBT SBR pacity (veh/h) 600 - 22 247 M Lane V/C Ratio 0.031 - 9.19 0.229 M Control Delay (s) 11.2 \$ 4029.3 23.8 M Lane LOS B F C M 95th %tile Q(veh) 0.1 - 25.5 0.9 tes
M Control Delay, \$ 3154.1 0.1 0 M LOS F NOT Lane/Major Mvmt NBL NBT EBLn1 EBLn2 SBT SBR pacity (veh/h) 600 - 22 247 M Lane V/C Ratio 0.031 - 9.19 0.229 M Control Delay (s) 11.2 \$ 4029.3 23.8 M Lane LOS B F C M 95th %tile Q(veh) 0.1 - 25.5 0.9 tes
MLOS F March Major Mvmt NBL NBT EBLn1 EBLn2 SBT SBR
nor Lane/Major Mvmt NBL NBT EBLn1 EBLn2 SBT SBR pacity (veh/h) 600 - 22 247 M Lane V/C Ratio 0.031 - 9.19 0.229 M Control Delay (s) 11.2 \$4029.3 23.8 M Lane LOS B - F C M 95th %tile Q(veh) 0.1 - 25.5 0.9 tes
pacity (veh/h) 600 - 22 247
pacity (veh/h) 600 - 22 247
M Lane V/C Ratio 0.031 - 9.19 0.229 M Control Delay (s) 11.2 \$4029.3 23.8 M Lane LOS B - F C M 95th %tile Q(veh) 0.1 - 25.5 0.9 tes
CM Control Delay (s) 11.2 \$4029.3 23.8
CM Lane LOS B - F C CM 95th %tile Q(veh) 0.1 - 25.5 0.9 tes
CM 95th %tile Q(veh) 0.1 - 25.5 0.9 tes
tes
volume encoded capacity 9. Delay encoded 5005 1. Computation Not Defined . All fillagor volume in platform

	-	*	•	←	4	-
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	î,		ሻ	^	¥	
Traffic Volume (vph)	555	174	100	474	83	51
Future Volume (vph)	555	174	100	474	83	51
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)		0.0	60.0		0.0	0.0
Storage Lanes		0	1		1	0
Taper Length (m)			7.5		7.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.968				0.949	
Flt Protected			0.950		0.970	
Satd. Flow (prot)	1812	0	1805	1881	1749	0
Flt Permitted			0.950		0.970	
Satd. Flow (perm)	1812	0	1805	1881	1749	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	290.6			206.6	213.5	
Travel Time (s)	20.9			14.9	15.4	
Confl. Peds. (#/hr)		3	3			1
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	1%	3%	0%	1%	0%	0%
Adj. Flow (vph)	578	181	104	494	86	53
Shared Lane Traffic (%)						
Lane Group Flow (vph)	759	0	104	494	139	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6	ŭ		3.6	3.6	Ĭ
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane	Yes					
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)		15	25		25	15
Sign Control	Free			Free	Stop	
Intersection Summary						
Area Type:	Other					
Control Type: Unsignalized						
Intersection Capacity Utiliza	tion 63.4%			IC	CU Level o	of Service E
Analysis Period (min) 15						

Intersection						
Int Delay, s/veh	2.9					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	£61 1 ≽	EDR	WDL	WD1	INDL W	NDR
Traffic Vol. veh/h	555	174	100	T 474	83	51
Future Vol. ven/h	555	174	100	474	83	51
						1
Conflicting Peds, #/hr	0	3	3	0	0	
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-		-	None
Storage Length	-	-	600	-	0	-
Veh in Median Storage		-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	1	3	0	1	0	0
Mvmt Flow	578	181	104	494	86	53
Major/Minor	Major1	N	Major2	N	/linor1	
Conflicting Flow All	0	0	762	0	1374	673
	-	-	762	-	672	
Stage 1						-
Stage 2	-	-	-	-	702	-
Critical Hdwy	-	-	4.1	-	6.4	6.2
Critical Hdwy Stg 1		-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	859	-	162	459
Stage 1	-	-	-	-	511	-
Stage 2	-	-	-	-	495	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	858	-	142	457
Mov Cap-2 Maneuver		-	-		279	-
Stage 1		-			510	
Stage 2					435	
Stage 2					100	
Approach	EB		WB		NB	
HCM Control Delay, s	0		1.7		23.9	
HCM LOS					С	
Minor Lane/Major Mvm	nt I	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	it I	328	EDI	EDR -	858	WDI
HCM Cantral Dalay (a)		0.426	-		0.121	-
HCM Control Delay (s)		23.9	-	-	9.8	-
HCM Lane LOS		С	-	-	Α	-
HCM 95th %tile Q(veh))	2	-	-	0.4	-
JVI YOU WILL DIVEN	1	,	-	-	0.4	-

2: Zecca Drive/Amos Drive & Arkell Road

	•	→	•	•	←	•	4	†	1	-	↓	4
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		4			4			4			4	
Traffic Volume (vph)	50	521	36	8	527	31	20	0	4	18	1	28
Future Volume (vph)	50	521	36	8	527	31	20	0	4	18	1	28
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. 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
Ped Bike Factor												
Frt		0.992			0.993			0.978			0.920	
FIt Protected		0.996			0.999			0.960			0.981	
Satd. Flow (prot)	0	1861	0	0	1867	0	0	1784	0	0	1715	0
FIt Permitted		0.996			0.999			0.960			0.981	
Satd. Flow (perm)	0	1861	0	0	1867	0	0	1784	0	0	1715	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		206.6			261.6			219.2			154.5	
Travel Time (s)		14.9			18.8			15.8			11.1	
Confl. Peds. (#/hr)			9	9			7		7	7		7
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	0%	1%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	53	548	38	8	555	33	21	0	4	19	1	29
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	639	0	0	596	0	0	25	0	0	49	0
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)		3.6			3.6			0.0			0.0	
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	4.00	4.00		4.00	4.00		4.00	4.00	4.00			
Headway 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
Turning Speed (k/h)	25	_	15	25	_	15	25		15	25		15
Sign Control		Free			Free			Stop			Stop	
Intersection Summary												
	Other											
Control Type: Unsignalized												
Intersection Capacity Utilizat	ion 71.8%			IC	CU Level	of Service	С					
Analysis Period (min) 15												

Intersection												
Int Delay, s/veh	2											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	LDL	4	LDIN	WDL	4	WDIC	NOL	4	IVDIC	JDL	4	JUIN
Traffic Vol, veh/h	50	521	36	8	527	31	20	0	4	18	1	28
Future Vol. veh/h	50	521	36	8	527	31	20	0	4	18	1	28
Conflicting Peds, #/hr	0	0	9	9	0.	0	7	0	7	7	0	7
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length			-						-			
Veh in Median Storage,	.# -	0			0			0			0	
Grade, %	-	0			0			0			0	
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	0	1	0	0	1	0	0	0	0	0	0	0
Mvmt Flow	53	548	38	8	555	33	21	0	4	19	1	29
Major/Minor N	Najor1		1	Major2			Vinor1		- 1	Minor2		
Conflicting Flow All	587	0	0	595	0	0	1292	1286	583	1270	1289	578
Stage 1	-			-			682	682		588	588	-
Stage 2							610	604		682	701	
Critical Hdwy	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1		-	-	-		-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-		-	-		6.1	5.5		6.1	5.5	
Follow-up Hdwy	2.2		-	2.2	-		3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	998	-	-	991	-		141	166	516	146	165	519
Stage 1	-	-	-	-	-	-	443	453	-	499	499	-
Stage 2	-	-	-	-	-	-	485	491	-	443	444	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	992	-	-	985	-	-	121	150	509	134	149	516
Mov Cap-2 Maneuver	-	-	-	-	-	-	121	150	-	134	149	-
Stage 1	-	-	-	-	-	-	404	414	-	459	493	-
Stage 2	-	-	-	-	-	-	448	485	-	402	405	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.7			0.1			36.6			23.8		
HCM LOS							Е			С		
Minor Lane/Major Mvmt	1	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SRI n1			
Capacity (veh/h)		139	992	-	-	985			241			
HCM Lane V/C Ratio		0.182				0.009			0.205			
HCM Control Delay (s)		36.6	8.8	0		8.7	0		23.8			
HCM Lane LOS		30.0 E	Α.	A		Ο.7	A		23.0 C			
HCM 95th %tile Q(veh)		0.6	0.2	Α.		0	^		0.8			
TIGINI 73111 70111E Q(VEII)		0.0	0.2			0			0.0			

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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBF
Lane Configurations	ሻ	ĵ.		ሻ	ĥ			4			4	
Traffic Volume (vph)	29	405	109	80	451	138	98	0	81	81	0	1
Future Volume (vph)	29	405	109	80	451	138	98	0	81	81	0	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	190
Storage Length (m)	50.0		0.0	60.0		0.0	0.0		0.0	0.0		0.
Storage Lanes	1		0	1		0	0		0	0		
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.0
Ped Bike Factor												
Frt		0.968			0.965			0.939			0.975	
Flt Protected	0.950			0.950				0.973			0.961	
Satd. Flow (prot)	1805	1825	0	1805	1806	0	0	1708	0	0	1780	
Flt Permitted	0.950			0.950				0.973			0.961	
Satd. Flow (perm)	1805	1825	0	1805	1806	0	0	1708	0	0	1780	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		261.6			193.8			209.6			91.7	
Travel Time (s)		18.8			14.0			15.1			6.6	
Confl. Peds. (#/hr)			8	8								
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.9
Heavy Vehicles (%)	0%	1%	0%	0%	2%	0%	3%	0%	0%	0%	0%	09
Adj. Flow (vph)	30	422	114	83	470	144	102	0	84	84	0	1
Shared Lane Traffic (%)												
Lane Group Flow (vph)	30	536	0	83	614	0	0	186	0	0	103	
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	N
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Righ
Median Width(m)		3.6			3.6			0.0			0.0	
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		110			1.0						1.0	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.0
Turning Speed (k/h)	25	1,00	15	25	1100	15	25	1.00	15	25	1100	1
Sign Control	20	Free			Free			Stop			Stop	
Intersection Summary												
	Other											
Control Type: Unsignalized												
Intersection Capacity Utilizat	ion 55.7%			10	CU Level	of Service	В					
Analysis Period (min) 15				- 10	20 20001	J. 001 VI00	_					

HCM 2010 TWSC

3: Colonial Drive & Arkell Road

Intersection												
Int Delay, s/veh	18.9											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	ሻ	1	LDI	ሻ	1	WDIX	IVDL	4	IVDIC	JDL	4	JUIN
Traffic Vol, veh/h	29	405	109	80	451	138	98	0	81	81	0	18
Future Vol. veh/h	29	405	109	80	451	138	98	0	81	81	0	18
Conflicting Peds, #/hr	0	0	8	8	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	500		-	600					-	-		
Veh in Median Storage,	# -	0			0			0			0	
Grade. %		0	-	-	0		-	0	-	-	0	-
Peak Hour Factor	96	96	96	96	96	96	96	96	96	96	96	96
Heavy Vehicles, %	0	1	0	0	2	0	3	0	0	0	0	0
Mvmt Flow	30	422	114	83	470	144	102	0	84	84	0	19
Major/Minor N	Major1			Major2			Minor1		- 1	Minor2		
Conflicting Flow All	614	0	0	543	0	0	1265	1327	487	1289	1312	542
Stage 1	-	-	-	343	-	-	547	547	-	708	708	372
Stage 2							718	780		581	604	
Critical Hdwy	4.1			4.1			7.13	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1							6.13	5.5	0.2	6.1	5.5	0.2
Critical Hdwy Stg 2			-	-			6.13	5.5		6.1	5.5	-
Follow-up Hdwy	2.2			2.2				4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	975	-		1036	-		145	157	585	142	160	544
Stage 1	-			-			519	521	-	429	441	-
Stage 2	-						419	409		503	491	
Platoon blocked, %		-			-	-						
Mov Cap-1 Maneuver	975	-	-	1036	-	-	128	139	581	111	142	544
Mov Cap-2 Maneuver	-			-	-	-	128	139	-	111	142	-
Stage 1	-	-	-	-	-	-	500	502	-	416	406	-
Stage 2	-			-	-	-	372	376	-	417	473	-
-												
Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.5			1			98.8			95.9		
HCM LOS							F			F		
Minor Lane/Major Mvml		VBLn1	EBL	EBT	EBR	WBL	WBT	WBR:	CDI n1			
		198	975		EDK	1036		WDK.	130			
Capacity (veh/h)		0.942		-		0.08	-	-	0.793			
HCM Control Dolay (c)		98.8	8.8	-		8.8	-	-	95.9			
HCM Control Delay (s) HCM Lane LOS		98.8 F	8.8 A			8.8 A		-	95.9 F			
		7.7	0.1	-		0.3			4.8			
HCM 95th %tile Q(veh)		1.1	U. I	-	-	0.3	-	-	4.8			

07-24-2018

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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	7	ĵ»			4			4		Ĭ		7
Traffic Volume (vph)	8	556	4	3	657	7	3	0	3	8	0	9
Future Volume (vph)	8	556	4	3	657	7	3	0	3	8	0	9
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	25.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	0		0	0		0	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. 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
Frt		0.999			0.999			0.932				0.850
Flt Protected	0.950							0.976		0.950		
Satd. Flow (prot)	1805	1826	0	0	1759	0	0	1728	0	1805	0	1615
FIt Permitted	0.950							0.976		0.950		
Satd. Flow (perm)	1805	1826	0	0	1759	0	0	1728	0	1805	0	1615
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		193.8			144.3			68.0			96.7	
Travel Time (s)		14.0			10.4			4.9			7.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	4%	0%	0%	8%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	9	604	4	3	714	8	3	0	3	9	0	10
Shared Lane Traffic (%)												
Lane Group Flow (vph)	9	608	0	0	725	0	0	6	0	9	0	10
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)		3.6			3.6			3.6			3.6	
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												
Headway 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
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Free			Free			Stop			Stop	
Intersection Summary												
	Other											
Control Type: Unsignalized												
Intersection Capacity Utilizat	ion 51.8%			IC	CU Level	of Service	: A					
Analysis Period (min) 15												

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Intersection Int Delay, s/veh	0.5											
		FDT	500	14/01	WOT	WDD	NIDI	NOT	NDD	0.01	0.0.7	000
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	ሻ	f			4	_		4		7		7
Traffic Vol, veh/h	8	556	4	3	657	7	3	0	3	8	0	9
Future Vol, veh/h	8	556	4	3	657	7	3	0	3	8	0	9
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	250	-	-	-	-	-	-	-	-	0	-	0
Veh in Median Storage,	# -	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	0	4	0	0	8	0	0	0	0	0	0	0
Mvmt Flow	9	604	4	3	714	8	3	0	3	9	0	10
Major/Minor M	1ajor1		N	Najor2		1	Minor1			Minor2		
Conflicting Flow All	722	0	0	609	0	0	1348	1352	607	1350	-	718
Stage 1	,	-	-	-	-	-	624	624	-	724		7.10
Stage 2							724	728		626		
Critical Hdwy	4.1			4.1			7.1	6.5	6.2	7.1		6.2
Critical Hdwy Stg 1	1.1						6.1	5.5	0.2	6.1		0.2
Critical Hdwy Stg 2							6.1	5.5		6.1		
Follow-up Hdwy	2.2			2.2			3.5	4	3.3	3.5		3.3
Pot Cap-1 Maneuver	889			979			129	151	500	129	0	432
Stage 1	-						477	481	-	420	0	102
Stage 2							420	432		475	0	
Platoon blocked, %							120	102		173	0	
Mov Cap-1 Maneuver	889			979			125	149	500	127		432
Mov Cap-1 Maneuver	-			-			125	149	-	127		- 432
Stage 1			_				472	476		416		
Stage 2							408	430		467		
Stage 2							700	730		707		
Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.1			0			23.6			23.8		
HCM LOS							С			С		
Minor Lane/Major Mvmt	1	VBLn1	EBL	EBT	EBR	WBL	WBT	WBR :	SBLn1	SBLn2		
Capacity (veh/h)		200	889		-	979	-		127	432		
HCM Lane V/C Ratio		0.033	0.01			0.003			0.068			
HCM Control Delay (s)		23.6	9.1			8.7	0		35.4	13.5		
HCM Lane LOS		23.0 C	Α.			Α.	A		55.4 F	В		
HCM 95th %tile Q(veh)		0.1	0			0	-		0.2	0.1		
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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	7	ĵ.		7	ĵ.		ሻ	f _a		ሻ	î,	
Traffic Volume (vph)	291	178	98	148	231	83	109	873	177	90	850	324
Future Volume (vph)	291	178	98	148	231	83	109	873	177	90	850	324
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	40.0		0.0	20.0		0.0	90.0		0.0	50.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	7.5		-	7.5		-	7.5		-	7.5		-
Lane Util. 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
Ped Bike Factor	1.00	1.00	1.00	1100	1.00	1100	1.00	1100	1100	1.00	0.99	1100
Frt		0.947			0.960		1.00	0.975			0.959	
Flt Protected	0.950	0.717		0.950	0.700		0.950	0.770		0.950	0.707	
Satd. Flow (prot)	1787	1788	0	1703	1797	0	1805	1759	0	1805	1765	0
Flt Permitted	0.317	1700	U	0.396	1777	U	0.141	1737	U	0.141	1703	U
Satd. Flow (perm)	596	1788	0	710	1797	0	268	1759	0	268	1765	0
Right Turn on Red	370	1700	Yes	, 10	1777	Yes	200	1737	Yes	200	1703	Yes
Satd. Flow (RTOR)		33	103		21	103		14	103		26	103
Link Speed (k/h)		50			60			70			70	
Link Distance (m)		144.3			357.4			823.5			155.4	
Travel Time (s)		10.4			21.4			42.4			8.0	
Confl. Peds. (#/hr)		10.4			21.4		6	42.4			0.0	6
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
	1%	1%	0.94	6%	1%	3%	0.94	6%	2%	0.94	3%	1%
Heavy Vehicles (%)	310		104			3% 88				96	3% 904	
Adj. Flow (vph)	310	189	104	157	246	88	116	929	188	96	904	345
Shared Lane Traffic (%)	210	202	0	157	224	0	11/	1117	0	0/	1040	0
Lane Group Flow (vph)	310	293	0	157	334	0	116	1117	0	96	1249	0
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)		3.6			3.6			3.6			3.6	
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												
Headway 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
Turning Speed (k/h)	25		15	25		15	25		15	25	_	15
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	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	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	CI+Ex	CI+Ex		CI+Ex	CI+Ex		CI+Ex	CI+Ex		CI+Ex	CI+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	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	_
Detector 1 Delay (s)	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		CI+Ex			CI+Ex			CI+Ex			CI+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SB
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Detector Phase	7	4		3	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0		7.0	10.0		7.0	10.0	
Minimum Split (s)	10.0	26.0		10.0	26.0		10.0	34.0		10.0	34.0	
Total Split (s)	10.0	26.0		10.0	26.0		10.0	34.0		10.0	34.0	
Total Split (%)	12.5%	32.5%		12.5%	32.5%		12.5%	42.5%		12.5%	42.5%	
Maximum Green (s)	7.0	20.0		7.0	20.0		7.0	28.0		7.0	28.0	
Yellow Time (s)	3.0	4.0		3.0	4.0		3.0	4.0		3.0	4.0	
All-Red Time (s)	0.0	2.0		0.0	2.0		0.0	2.0		0.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	3.0	6.0		3.0	6.0		3.0	6.0		3.0	6.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	None		None	None	
Walk Time (s)	110110	7.0		140110	7.0		110110	13.0		140110	13.0	
Flash Dont Walk (s)		13.0			13.0			15.0			15.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)	27.1	17.0		27.1	17.0		36.7	28.3		36.7	28.3	
Actuated g/C Ratio	0.36	0.23		0.36	0.23		0.49	0.38		0.49	0.38	
v/c Ratio	0.95	0.68		0.45	0.79		0.42	1.67		0.35	1.84	
Control Delay	61.7	32.7		20.1	40.8		14.9	329.1		13.6	403.7	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	61.7	32.7		20.1	40.8		14.9	329.1		13.6	403.7	
LOS	E	C		C	D		В	F		В	F	
Approach Delay		47.6		Ŭ	34.2			299.6			375.8	
Approach LOS		D			C C			277.0 F			575.6 F	
• • • • • • • • • • • • • • • • • • • •					-							
Intersection Summary	Other											
Area Type:	Other											
Cycle Length: 80	- 0											
Actuated Cycle Length: 7	5.2											
Natural Cycle: 150	P											
Control Type: Actuated-U	ncoordinated	1										
Maximum v/c Ratio: 1.84	050 /											
Intersection Signal Delay:		0.4			ntersection							
Intersection Capacity Utili	zation 120.7	%		10	CU Level	of Service	e H					
Analysis Period (min) 15												
Splits and Phases: 5: V	ictoria Road	& Arkell R	Road									
V _{Ø1}	,					√ Ø:	,	<u></u>				
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0.00	-					1 / /2	7	- an				

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Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	
Lane Group Flow (vph)	310	293	157	334	116	1117	96	1249	
v/c Ratio	0.95	0.68	0.45	0.79	0.42	1.67	0.35	1.84	
Control Delay	61.7	32.7	20.1	40.8	14.9	329.1	13.6	403.7	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	61.7	32.7	20.1	40.8	14.9	329.1	13.6	403.7	
Queue Length 50th (m)	34.2	36.8	15.8	45.8	8.9	~270.7	7.3	~313.0	
Queue Length 95th (m)	#81.7	63.0	28.8	#81.7	17.6	#351.0	15.0	#395.7	
Internal Link Dist (m)		120.3		333.4		799.5		131.4	
Turn Bay Length (m)	40.0		20.0		90.0		50.0		
Base Capacity (vph)	327	504	349	498	275	670	275	680	
Starvation Cap Reductn	0	0	0	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.95	0.58	0.45	0.67	0.42	1.67	0.35	1.84	

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	7	₽		. ነ	₽		. ነ	1>		ሻ	₽	
Traffic Volume (veh/h)	291	178	98	148	231	83	109	873	177	90	850	324
Future Volume (veh/h)	291	178	98	148	231	83	109	873	177	90	850	324
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		0.99	1.00		0.99
Parking Bus, Adj	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 Sat Flow, veh/h/ln	1881	1888	1900	1792	1871	1900	1900	1804	1900	1900	1855	1900
Adj Flow Rate, veh/h	310	189	104	157	246	88	116	929	188	96	904	345
Adj No. of Lanes	1	1	0	1	1	0	1	1	0	1	1	0
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	1	1	1	6	1	1	0	6	6	0	3	3
Cap, veh/h	308	259	143	326	298	107	245	536	109	237	466	178
Arrive On Green	0.09	0.23	0.23	0.09	0.23	0.23	0.08	0.37	0.37	0.08	0.36	0.36
Sat Flow, veh/h	1792	1146	631	1707	1317	471	1810	1455	294	1810	1277	487
Grp Volume(v), veh/h	310	0	293	157	0	334	116	0	1117	96	0	1249
Grp Sat Flow(s),veh/h/ln	1792	0	1777	1707	0	1788	1810	0	1749	1810	0	1764
Q Serve(g_s), s	7.0	0.0	11.7	5.3	0.0	13.6	2.9	0.0	28.3	2.4	0.0	28.0
Cycle Q Clear(g_c), s	7.0	0.0	11.7	5.3	0.0	13.6	2.9	0.0	28.3	2.4	0.0	28.0
Prop In Lane	1.00		0.35	1.00		0.26	1.00		0.17	1.00		0.28
Lane Grp Cap(c), veh/h	308	0	402	326	0	405	245	0	645	237	0	643
V/C Ratio(X)	1.01	0.00	0.73	0.48	0.00	0.83	0.47	0.00	1.73	0.40	0.00	1.94
Avail Cap(c_a), veh/h	308	0	463	326	0	466	259	0	645	259	0	643
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	27.0	0.0	27.5	20.8	0.0	28.3	17.6	0.0	24.2	17.6	0.0	24.4
Incr Delay (d2), s/veh	52.8	0.0	4.9	1.1	0.0	10.3	1.4	0.0	335.8	1.1	0.0	429.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	7.6	0.0	6.3	2.5	0.0	7.8	1.5	0.0	73.6	1.2	0.0	90.1
LnGrp Delay(d),s/veh	79.8	0.0	32.4	21.9	0.0	38.6	19.0	0.0	360.0	18.7	0.0	453.9
LnGrp LOS	F		С	С		D	В		F	В		F
Approach Vol, veh/h		603			491			1233			1345	
Approach Delay, s/veh		56.8			33.3			327.9			422.8	
Approach LOS		Е			С			F			F	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	9.1	34.3	10.0	23.4	9.4	34.0	10.0	23.4				
Change Period (Y+Rc), s	3.0	6.0	3.0	6.0	3.0	6.0	3.0	6.0				
Max Green Setting (Gmax), s	7.0	28.0	7.0	20.0	7.0	28.0	7.0	20.0				
Max Q Clear Time (q_c+l1), s	4.4	30.3	7.3	13.7	4.9	30.0	9.0	15.6				
Green Ext Time (p_c), s	0.1	0.0	0.0	2.3	0.1	0.0	0.0	1.7				
Intersection Summary												
HCM 2010 Ctrl Delay			278.8									
HCM 2010 LOS			F									

HCM 2010 Signalized Intersection Summary 5: Victoria Road & Arkell Road

220 Arkell Road TIS 5:00 pm 07-04-2018 2031 PM Total

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Volume exceeds capacity, queue is theoretically infinite.
 Oueue shown is maximum after two cycles.

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

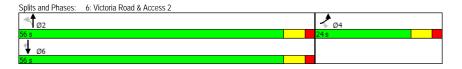
07-24-201	18
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Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	*	7	ኘ	A	<u>→</u>	7
Traffic Volume (vph)	50	23	20	1225	1240	43
Future Volume (vph)	50	23	20	1225	1240	43
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	0.0	30.0	.,,,,	.,.0	60.0
Storage Lanes	1	1	1			1
Taper Length (m)	7.5	- '	7.5			'
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.850	1.00	1.00	1.00	0.850
Flt Protected	0.950	0.000	0.950			0.000
Satd. Flow (prot)	1805	1615	1805	1792	1845	1615
Flt Permitted	0.950	1013	0.066	1/72	1040	1013
Satd. Flow (perm)	1805	1615	125	1792	1845	1615
Right Turn on Red	1003	Yes	123	1172	1043	Yes
Satd. Flow (RTOR)		25				36
	50	20		70	70	30
Link Speed (k/h)	97.9			155.4	70 308.2	
Link Distance (m)						
Travel Time (s)	7.0	0.02	0.02	8.0	15.9	0.02
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	6%		0%
Adj. Flow (vph)	54	25	22	1332	1348	47
Shared Lane Traffic (%)	F.	0.5	00	4000	1040	
Lane Group Flow (vph)	54	25	22	1332	1348	47
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	3.6	
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	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15	25			15
Number of Detectors	1	1	1	2	2	1
Detector Template	Left	Right	Left	Thru	Thru	Right
Leading Detector (m)	2.0	2.0	2.0	10.0	10.0	2.0
Trailing Detector (m)	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
Detector 1 Size(m)	2.0	2.0	2.0	0.6	0.6	2.0
Detector 1 Type	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex
Detector 1 Channel						
Detector 1 Extend (s)	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
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)	0.0	0.0	0.0	9.4	9.4	0.0
Detector 2 Size(m)				0.6	0.6	
Detector 2 Type				CI+Ex	CI+Ex	
Detector 2 Channel				CITLX	CITLX	
Detector 2 Extend (s)				0.0	0.0	
	Dret	Dorm	Dorm			Dorm
Turn Type	Prot	Perm	Perm	NA	NA	Perm
Protected Phases	4			2	6	

220 Arkell Road TIS 5:00 pm 07-04-2018 2031 PM Total

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Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Permitted Phases		4	2			6
Detector Phase	4	4	2	2	6	6
Switch Phase						
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	24.0	24.0	24.0	24.0	24.0	24.0
Total Split (s)	24.0	24.0	56.0	56.0	56.0	56.0
Total Split (%)	30.0%	30.0%	70.0%	70.0%	70.0%	70.0%
Maximum Green (s)	18.0	18.0	50.0	50.0	50.0	50.0
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	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
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	Max	Max	Max	Max
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	7.0
Flash Dont Walk (s)	11.0	11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0	0	0	0	0
Act Effct Green (s)	10.1	10.1	63.4	63.4	63.4	63.4
Actuated g/C Ratio	0.13	0.13	0.83	0.83	0.83	0.83
v/c Ratio	0.23	0.11	0.21	0.89	0.88	0.03
Control Delay	32.7	13.3	9.9	20.2	18.6	1.7
Queue Delay	0.0	0.0	0.0	6.0	0.0	0.0
Total Delay	32.7	13.3	9.9	26.1	18.6	1.7
LOS	С	В	Α	С	В	Α
Approach Delay	26.6			25.9	18.0	
Approach LOS	С			С	В	
Intersection Summary						
Area Type:	Other					
Cycle Length: 80						
Actuated Cycle Length: 76.	.1					
Natural Cycle: 110						
Control Type: Semi Act-Un	coord					
Maximum v/c Ratio: 0.89						
Intersection Signal Delay: 2				Ir	ntersectio	n LOS: C
Intersection Capacity Utiliza	ation 83.6%			10	CU Level	of Service
Analysis Period (min) 15						



Lanes, Volumes, Timings

6: Victoria Road & Access 2

Synchro 9 Report

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Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	54	25	22	1332	1348	47
v/c Ratio	0.23	0.11	0.21	0.89	0.88	0.03
Control Delay	32.7	13.3	9.9	20.2	18.6	1.7
Queue Delay	0.0	0.0	0.0	6.0	0.0	0.0
Total Delay	32.7	13.3	9.9	26.1	18.6	1.7
Queue Length 50th (m)	8.8	0.0	1.0	185.2	178.7	0.4
Queue Length 95th (m)	16.8	6.5	5.3	#290.6	#290.2	2.9
Internal Link Dist (m)	73.9			131.4	284.2	
Turn Bay Length (m)			30.0			60.0
Base Capacity (vph)	429	403	104	1492	1536	1351
Starvation Cap Reductn	0	0	0	127	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.13	0.06	0.21	0.98	0.88	0.03

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

Queue shown is maximum after two cycles.

Movement NBT SBT Lane Configurations Traffic Volume (veh/h) 1225 1240 Future Volume (veh/h) 50 23 20 1225 1240 43 Number Initial Q (Qb), veh 0 0 Ped-Bike Adj(A_pbT) 1.00 1.00 1.00 1.00 Parking Bus, Adj 1.00 1.00 1.00 1.00 1.00 1.00 Adj Sat Flow, veh/h/ln 1900 1900 1900 1792 1845 1900 Adj Flow Rate, veh/h 54 25 22 1332 1348 47 Adj No. of Lanes Peak Hour Factor 0.92 0.92 0.92 0.92 0.92 0.92 Percent Heavy Veh, % 0 0 0 0 Cap, veh/h 203 181 103 1321 1156 1283 Arrive On Green 0.11 0.72 0.72 0.72 0.11 0.72 Sat Flow, veh/h 1810 1615 393 1792 1845 1615 Grp Volume(v), veh/h 22 1332 1348 47 25 Grp Sat Flow(s), veh/h/ln 1810 1615 393 1792 1845 1615 Q Serve(g_s), s 1.0 50.0 1.9 0.0 50.0 0.6 Cycle Q Clear(g_c), s 50.0 50.0 50.0 1.9 1.0 0.6 Prop In Lane 1.00 1.00 1.00 1.00 Lane Grp Cap(c), veh/h 1283 1321 203 181 103 1156 V/C Ratio(X) 1.04 1.02 0.04 0.27 0.14 0.21 Avail Cap(c_a), veh/h 466 416 103 1283 1321 1156 HCM Platoon Ratio 1.00 1.00 1.00 1.00 1.00 1.00 Upstream Filter(I) 1.00 1.00 1.00 1.00 1.00 1.00 Uniform Delay (d), s/veh 28.4 28.0 34.9 9.9 2.9 Incr Delay (d2), s/veh 0.7 0.3 4.7 35.5 30.1 0.1 Initial Q Delay(d3),s/veh 0.0 0.0 0.0 0.0 0.0 0.0 %ile BackOfQ(50%),veh/ln 1.0 0.4 0.5 36.5 35.6 0.3 LnGrp Delay(d),s/veh 29.1 28.3 39.6 LnGrp LOS Α Approach Vol, veh/h 79 1354 1395 Approach Delay, s/veh 28.8 45.4 38.8 Approach LOS С D D Assigned Phs 2 4 6 Phs Duration (G+Y+Rc), s 56.0 13.8 56.0 Change Period (Y+Rc), s 6.0 6.0 6.0 Max Green Setting (Gmax), s 50.0 18.0 50.0 Max Q Clear Time (g_c+l1), s 52.0 3.9 52.0

Green Ext Time (p_c), s

Intersection Summary
HCM 2010 Ctrl Delay

HCM 2010 LOS

0.0

41.7

D

0.2

0.0

HCM 2010 Signalized Intersection Summary

6: Victoria Road & Access 2

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Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	ሻ	7	ሻ	↑	î»	
Traffic Volume (vph)	105	38	64	1257	1368	178
Future Volume (vph)	105	38	64	1257	1368	178
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	20.0	0.0	30.0			0.0
Storage Lanes	1	1	1			0
Taper Length (m)	7.5		7.5			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850			0.984	
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1805	1615	1805	1792	1821	0
Flt Permitted	0.950		0.950			
Satd. Flow (perm)	1805	1615	1805	1792	1821	0
Link Speed (k/h)	50			50	70	
Link Distance (m)	325.8			308.2	342.0	
Travel Time (s)	23.5			22.2	17.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	6%	3%	0%
Adj. Flow (vph)	114	41	70	1366	1487	193
Shared Lane Traffic (%)						
Lane Group Flow (vph)	114	41	70	1366	1680	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	3.6	,
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	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15	25			15
Sign Control	Stop			Free	Free	
Intersection Summary						
	Other					
Control Type: Unsignalized						
Intersection Capacity Utilizat	ion 95.3%			IC	CU Level	of Service I
Analysis Period (min) 15						

ITILETSECTION									
Int Delay, s/veh	171.4								
Movement	EBL	EBR	NBL	NBT	SBT	SBR			
Lane Configurations	*	1	ች		ĵ.				
Traffic Vol, veh/h	105	38	64	1257	1368	178			
Future Vol, veh/h	105	38	64	1257	1368	178			
Conflicting Peds, #/hr	0	0	0	0	0	0			
Sign Control	Stop	Stop	Free	Free	Free	Free			
RT Channelized	-	None	-	None	-	None			
Storage Length	200	0	300	-	-	-			
Veh in Median Storage	e, # 0	-	-	0	0	-			
Grade, %	0	-	-	0	0	-			
Peak Hour Factor	92	92	92	92	92	92			
Heavy Vehicles, %	0	0	0	6	3	0			
Mvmt Flow	114	41	70	1366	1487	193			
Major/Minor	Minor2	N	Major1	- 1	Major2				
Conflicting Flow All	3089	1584	1680	0	-	0			
Stage 1	1584	-	-	-	-	-			
Stage 2	1505	-	-	-	-	-			
Critical Hdwy	6.4	6.2	4.1	-	-	-			
Critical Hdwy Stg 1	5.4	-	-	-	-	-			
Critical Hdwy Stg 2	5.4	-	-	-	-	-			
Follow-up Hdwy	3.5	3.3	2.2	-	-	-			
Pot Cap-1 Maneuver	~ 13	135	386	-	-	-			
Stage 1	187	-	-	-	-	-			
Stage 2	205	-	-	-	-	-			
Platoon blocked, %				-	-	-			
Mov Cap-1 Maneuver	~ 11	135	386	-	-	-			
Mov Cap-2 Maneuver	~ 11	-	-	-	-	-			
Stage 1	187	-	-	-	-	-			
Stage 2	168	-	-	-	-	-			
Approach	EB		NB		SB				
HCM Control Delay, \$	3599.6		0.8		0				
HCM LOS	F								
Minor Lane/Major Mvn	nt	NBL	NBT I	EBLn1	EBLn2	SBT	SBR		
Capacity (veh/h)		386	-	11	135	-	-		
HCM Lane V/C Ratio		0.18	- 1	10.375	0.306	-	-		
HCM Control Delay (s))	16.4	\$ 4	4886.7	43	-			
HCM Lane LOS		С	-		E	-	-		
HCM 95th %tile Q(veh)	0.6	-	15.6	1.2	-	-		
Notes									
~: Volume exceeds ca	pacity	\$: De	elav exc	eeds 3	00s	+: Com	putation Not Defined	*: All major volume in platoon	
	Facility	ψ. υ	one		- 30	00111			

220 Arkell Road TIS 5:00 pm 07-04-2018 2031 PM Total

Synchro 9 Report Page 17 220 Arkell Road TIS 5:00 pm 07-04-2018 2031 PM Total

HCM 2010 TWSC

Intersection

7: Victoria Road & Victoria Park Village Road

Appendix M

2031 Total Remedial Measures Traffic Operations Reports



	۶	-	•	•	←	•	4	†	~	/	ļ	4
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	ሻ	f)		ሻ	ĵ.			4			4	
Traffic Volume (vph)	11	503	79	47	291	42	149	0	156	131	0	32
Future Volume (vph)	11	503	79	47	291	42	149	0	156	131	0	32
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	50.0		0.0	60.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	1		0	0		0	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. 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
Ped Bike Factor		0.99						0.99				
Frt		0.980			0.981			0.931			0.973	
Flt Protected	0.950			0.950				0.976			0.961	
Satd. Flow (prot)	1770	1771	0	1703	1738	0	0	1603	0	0	1742	0
Flt Permitted	0.443			0.167				0.770			0.576	
Satd. Flow (perm)	825	1771	0	299	1738	0	0	1265	0	0	1044	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		12			11			60			33	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		261.6			193.8			209.6			91.7	
Travel Time (s)		18.8			14.0			15.1			6.6	
Confl. Peds. (#/hr)			11	11					1			
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	4%	7%	6%	8%	2%	9%	2%	4%	2%	2%	2%
Adj. Flow (vph)	12	547	86	51	316	46	162	0	170	142	0	35
Shared Lane Traffic (%)												
Lane Group Flow (vph)	12	633	0	51	362	0	0	332	0	0	177	0
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)		3.6			3.6			0.0			0.0	
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												
Headway 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
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	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	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	CI+Ex	CI+Ex		CI+Ex	CI+Ex		CI+Ex	CI+Ex		CI+Ex	CI+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	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	
Detector 1 Delay (s)	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		CI+Ex			CI+Ex			CI+Ex			CI+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Synchro 9 Report Page 1

Lanes, Volumes, Timings 3: Colonial Drive & Arkell Road

		\rightarrow	→ ✓	_	_	1	T		-	¥	*
Lane Group	EBL	EBT	EBR WBL	. WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Perm	NA	Perm	ı NA		Perm	NA		Perm	NA	
Protected Phases		2		6			8			4	
Permitted Phases	2		ϵ)		8			4		
Detector Phase	2	2	ϵ	6		8	8		4	4	
Switch Phase											
Minimum Initial (s)	10.0	10.0	10.0			10.0	10.0		10.0	10.0	
Minimum Split (s)	24.0	24.0	24.0	24.0		24.0	24.0		24.0	24.0	
Total Split (s)	57.0	57.0	57.0	57.0		43.0	43.0		43.0	43.0	
Total Split (%)	57.0%	57.0%	57.0%	57.0%		43.0%	43.0%		43.0%	43.0%	
Maximum Green (s)	51.0	51.0	51.0	51.0		37.0	37.0		37.0	37.0	
Yellow Time (s)	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0	2.0	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	
Total Lost Time (s)	6.0	6.0	6.0	6.0			6.0			6.0	
Lead/Lag											
Lead-Lag Optimize?											
Vehicle Extension (s)	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None	None	None		Max	Max		Max	Max	
Walk Time (s)	7.0	7.0	7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	11.0	11.0	11.0	11.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0	(0		0	0		0	0	
Act Effct Green (s)	34.4	34.4	34.4	34.4			37.5			37.5	
Actuated g/C Ratio	0.41	0.41	0.41	0.41			0.45			0.45	
v/c Ratio	0.04	0.87	0.42	0.50			0.56			0.37	
Control Delay	13.5	34.9	28.3	19.8			20.6			17.7	
Queue Delay	0.0	0.0	0.0	0.0			0.0			0.0	
Total Delay	13.5	34.9	28.3	19.8			20.6			17.7	
LOS	В	С	C	В			С			В	
Approach Delay		34.5		20.8			20.6			17.7	
Approach LOS		С		С			С			В	
Intersection Summary											
Area Type:	Other										
Cycle Length: 100											
Actuated Cycle Length: 9	1/1										

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 84.1
Natural Cycle: 55
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.87
Intersection Signal Delay: 26.0
Intersection Capacity Utilization 66.6%
Analysis Period (min) 15

Intersection LOS: C ICU Level of Service C



	•	-	1	•	†	↓
Lane Group	EBL	EBT	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	12	633	51	362	332	177
v/c Ratio	0.04	0.87	0.42	0.50	0.56	0.37
Control Delay	13.5	34.9	28.3	19.8	20.6	17.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	13.5	34.9	28.3	19.8	20.6	17.7
Queue Length 50th (m)	1.2	92.2	5.9	42.2	31.4	14.7
Queue Length 95th (m)	4.1	134.8	16.7	64.4	78.5	41.4
Internal Link Dist (m)		237.6		169.8	185.6	67.7
Turn Bay Length (m)	50.0		60.0			
Base Capacity (vph)	507	1093	183	1073	597	483
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.02	0.58	0.28	0.34	0.56	0.37
Intersection Summary						

	ၨ	→	•	•	←	•	1	†	~	-	↓	4
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		î,		ሻ	î,			4			4	
Traffic Volume (veh/h)	11	503	79	47	291	42	149	0	156	131	0	32
Future Volume (veh/h)	11	503	79	47	291	42	149	0	156	131	0	32
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	C
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		0.99	1.00		1.00	1.00		1.00
Parking Bus, Adj	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 Sat Flow, veh/h/ln	1863	1820	1900	1792	1772	1900	1900	1785	1900	1900	1863	1900
Adj Flow Rate, veh/h	12	547	86	51	316	46	162	0	170	142	0	35
Adj No. of Lanes	1	1	0	1	1	0	0	1	0	0	1	C
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	4	4	6	8	8	2	2	2	2	2	2
Cap, veh/h	404	710	112	205	699	102	331	18	304	455	8	96
Arrive On Green	0.46	0.46	0.46	0.46	0.46	0.46	0.41	0.00	0.41	0.41	0.00	0.41
Sat Flow, veh/h	1014	1533	241	761	1510	220	670	45	751	946	19	238
Grp Volume(v), veh/h	12	0	633	51	0	362	332	0	0	177	0	C
	1014	0	1774	761	0	1730	1467	0	0	1203	0	C
Q Serve(q_s), s	0.7	0.0	27.2	5.5	0.0	13.0	4.5	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(q c), s	13.7	0.0	27.2	32.7	0.0	13.0	14.7	0.0	0.0	10.2	0.0	0.0
Prop In Lane	1.00		0.14	1.00		0.13	0.49		0.51	0.80		0.20
Lane Grp Cap(c), veh/h	404	0	821	205	0	801	653	0	0	559	0	C
V/C Ratio(X)	0.03	0.00	0.77	0.25	0.00	0.45	0.51	0.00	0.00	0.32	0.00	0.00
Avail Cap(c_a), veh/h	501	0	991	277	0	967	653	0	0	559	0	C
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	21.3	0.0	20.5	34.1	0.0	16.6	20.3	0.0	0.0	19.1	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.0	3.1	0.6	0.0	0.4	2.8	0.0	0.0	1.5	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	0.0	13.9	1.2	0.0	6.2	6.8	0.0	0.0	3.4	0.0	0.0
LnGrp Delay(d),s/veh	21.3	0.0	23.5	34.7	0.0	17.0	23.2	0.0	0.0	20.6	0.0	0.0
LnGrp LOS	С		С	С		В	С			С		
Approach Vol, veh/h		645			413			332			177	
Approach Delay, s/veh		23.5			19.2			23.2			20.6	
Approach LOS		C			В			C			C	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		48.3		43.0		48.3		43.0				
Change Period (Y+Rc), s		6.0		6.0		6.0		6.0				
Max Green Setting (Gmax), s		51.0		37.0		51.0		37.0				
Max Q Clear Time (q_c+l1), s		29.2		12.2		34.7		16.7				
Green Ext Time (p_c), s		8.9		4.2		7.6		3.9				
* '												
Intersection Summary												
Intersection Summary HCM 2010 Ctrl Delay			22.0									

220 Arkell Road TIS 5:00 pm 07-04-2018 2031 AM Total Remedial

Synchro 9 Report Page 3 220 Arkell Road TIS 5:00 pm 07-04-2018 2031 AM Total Remedial

HCM 2010 Signalized Intersection Summary 3: Colonial Drive & Arkell Road

220 Arkell Road TIS 5:00 pm 07-04-2018 2031 AM Total Remedial

Synchro 9 Report Page 5 Lanes, Volumes, Timings 5: Victoria Road & Arkell Road

07-25-2018

	•	-	•	•	←	*	4	†	1	-	ļ	1
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Prot	NA		pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases				8			2		2	6		6
Detector Phase	7	4		3	8		5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0		7.0	10.0	10.0	7.0	10.0	10.0
Minimum Split (s)	12.0	26.0		10.0	26.0		10.0	34.0	34.0	12.0	34.0	34.0
Total Split (s)	23.0	34.0		15.0	26.0		12.0	39.0	39.0	12.0	39.0	39.0
Total Split (%)	23.0%	34.0%		15.0%	26.0%		12.0%	39.0%	39.0%	12.0%	39.0%	39.0%
Maximum Green (s)	18.0	28.0		12.0	20.0		9.0	33.0	33.0	9.0	33.0	33.0
Yellow Time (s)	3.0	4.0		3.0	4.0		3.0	4.0	4.0	3.0	4.0	4.0
All-Red Time (s)	2.0	2.0		0.0	2.0		0.0	2.0	2.0	0.0	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
Total Lost Time (s)	5.0	6.0		3.0	6.0		3.0	6.0	6.0	3.0	6.0	6.0
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None		None	None	None	None	None	None
Walk Time (s)		7.0			7.0			13.0	13.0		13.0	13.0
Flash Dont Walk (s)		13.0			13.0			15.0	15.0		15.0	15.0
Pedestrian Calls (#/hr)		0			0			0	0		0	0
Act Effct Green (s)	17.1	23.2		28.6	14.7		37.1	28.0	28.0	36.9	27.9	27.9
Actuated g/C Ratio	0.20	0.27		0.33	0.17		0.43	0.33	0.33	0.43	0.33	0.33
v/c Ratio	0.79	0.53		0.47	0.69		0.25	0.82	0.20	0.26	0.71	0.40
Control Delay	44.6	29.4		20.1	41.9		15.8	34.7	3.0	16.3	30.8	5.4
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	44.6	29.4		20.1	41.9		15.8	34.7	3.0	16.3	30.8	5.4
LOS	D	С		С	D		В	С	Α	В	С	Α
Approach Delay		39.7			31.1			30.0			24.0	
Approach LOS		D			С			С			С	
Intersection Summany												

Intersection Summary

Area Type: Other
Cycle Length: 100

Actuated Cycle Length: 85.7

Natural Cycle: 85

Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.82

Intersection Signal Delay: 30.4 Intersection LOS: C
Intersection Capacity Utilization 71.5% ICU Level of Service C

Analysis Period (min) 15



	۶	→	•	←	4	†	<i>></i>	-	ļ	4	
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Group Flow (vph)	526	254	216	221	77	912	121	67	777	254	
v/c Ratio	0.79	0.53	0.47	0.69	0.25	0.82	0.20	0.26	0.71	0.40	
Control Delay	44.6	29.4	20.1	41.9	15.8	34.7	3.0	16.3	30.8	5.4	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	44.6	29.4	20.1	41.9	15.8	34.7	3.0	16.3	30.8	5.4	
Queue Length 50th (m)	48.6	35.2	24.3	33.1	7.5	80.2	0.0	6.5	65.5	0.0	
Queue Length 95th (m)	#82.3	62.4	42.4	60.1	16.5	114.2	7.6	14.7	94.3	17.1	
Internal Link Dist (m)		120.3		333.4		799.5			131.4		
Turn Bay Length (m)	40.0		20.0		90.0		60.0	50.0		60.0	
Base Capacity (vph)	741	597	498	442	334	1375	706	281	1349	724	
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.71	0.43	0.43	0.50	0.23	0.66	0.17	0.24	0.58	0.35	

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

HCM 2010 Signalized Intersection Summary 5: Victoria Road & Arkell Road

	ၨ	→	*	1	←	4	1	†	~	/	 	1
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	ሻሻ	₽		ሻ	₽		ሻ	^	7	- ሽ	^	7
Traffic Volume (veh/h)	479	136	96	197	115	86	70	830	110	61	707	231
Future Volume (veh/h)	479	136	96	197	115	86	70	830	110	61	707	231
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	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 Sat Flow, veh/h/ln	1827	1787	1900	1881	1829	1900	1900	1792	1792	1845	1759	1712
Adj Flow Rate, veh/h	526	149	105	216	126	95	77	912	121	67	777	254
Adj No. of Lanes	2	1	0	1	1	0	1	2	1	1	2	1
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Percent Heavy Veh, %	4	3	3	1	3	3	0	6	6	3	8	11
Cap, veh/h	616	249	175	435	165	124	291	1209	539	259	1175	509
Arrive On Green	0.18	0.25	0.25	0.12	0.17	0.17	0.07	0.36	0.36	0.06	0.35	0.35
Sat Flow, veh/h	3375	977	688	1792	969	730	1810	3406	1517	1757	3343	1449
Grp Volume(v), veh/h	526	0	254	216	0	221	77	912	121	67	777	254
Grp Sat Flow(s),veh/h/ln	1688	0	1665	1792	0	1699	1810	1703	1517	1757	1671	1449
Q Serve(q_s), s	13.2	0.0	11.8	8.5	0.0	10.9	2.3	20.7	4.9	2.0	17.2	12.1
Cycle Q Clear(q_c), s	13.2	0.0	11.8	8.5	0.0	10.9	2.3	20.7	4.9	2.0	17.2	12.1
Prop In Lane	1.00		0.41	1.00		0.43	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	616	0	424	435	0	289	291	1209	539	259	1175	509
V/C Ratio(X)	0.85	0.00	0.60	0.50	0.00	0.77	0.26	0.75	0.22	0.26	0.66	0.50
Avail Cap(c_a), veh/h	693	0	532	463	0	388	354	1282	571	327	1258	545
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	34.7	0.0	28.7	25.2	0.0	34.7	17.4	24.9	19.8	18.3	24.0	22.3
Incr Delay (d2), s/veh	9.3	0.0	1.4	0.9	0.0	6.3	0.5	2.4	0.2	0.5	1.2	0.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.9	0.0	5.5	4.3	0.0	5.6	1.2	10.0	2.1	1.0	8.1	4.9
LnGrp Delay(d),s/veh	43.9	0.0	30.1	26.1	0.0	41.0	17.9	27.3	20.0	18.8	25.2	23.1
LnGrp LOS	D		С	С		D	В	С	С	В	С	С
Approach Vol, veh/h		780			437			1110			1098	
Approach Delay, s/veh		39.4			33.6			25.9			24.3	
Approach LOS		D			C			23.7 C			24.5 C	
Timer	1	2	3	4	5	6	7	8			- 0	
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	8.6	37.1	13.6	28.3	8.9	36.8	21.0	20.9				
Change Period (Y+Rc), s	3.0	6.0	3.0	6.0	3.0	6.0	5.0	6.0				
Max Green Setting (Gmax), s	9.0	33.0	12.0	28.0	9.0	33.0	18.0	20.0				
Max Q Clear Time (g_c+I1), s	4.0	22.7	10.5	13.8	4.3	19.2	15.2	12.9				
Green Ext Time (p_c), s	0.1	8.4	0.1	2.9	0.1	10.8	0.8	1.9				
Intersection Summary			00.5									
HCM 2010 Ctrl Delay			29.5									
HCM 2010 LOS			С									

	•	•	4	†	ţ	1
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	ሻ	7	NDE.	*	^	7
Traffic Volume (vph)	96	58	53	1341	931	133
Future Volume (vph)	96	58	53	1341	931	133
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	0.0	30.0	.,.0	.,,,,	60.0
Storage Lanes	1	1	1			1
Taper Length (m)	7.5		7.5			
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00
Frt		0.850		20	20	0.850
Flt Protected	0.950	0.000	0.950			0.000
Satd. Flow (prot)	1805	1615	1805	3406	3343	1615
Flt Permitted	0.950	.0.0	0.272	0.00	00.0	
Satd. Flow (perm)	1805	1615	517	3406	3343	1615
Right Turn on Red	1000	Yes	517	3 100	5515	Yes
Satd. Flow (RTOR)		63				145
Link Speed (k/h)	50	03		70	70	173
Link Distance (m)	97.9			155.4	308.2	
Travel Time (s)	7.0			8.0	15.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0.92	0.92	0.92	6%	8%	0.92
Adj. Flow (vph)	104	63	58	1458	1012	145
	104	03	50	1400	1012	140
Shared Lane Traffic (%)	104	42	EO	1450	1012	145
Lane Group Flow (vph)	104	63 No.	58	1458	1012	145
Enter Blocked Intersection	No	No Dight	No	No	No	No Dight
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	3.6	
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	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15	25			15
Number of Detectors	1	1	1	2	_ 2	1
Detector Template	Left	Right	Left	Thru	Thru	Right
Leading Detector (m)	2.0	2.0	2.0	10.0	10.0	2.0
Trailing Detector (m)	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
Detector 1 Size(m)	2.0	2.0	2.0	0.6	0.6	2.0
Detector 1 Type	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex
Detector 1 Channel						
Detector 1 Extend (s)	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
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)				9.4	9.4	
Detector 2 Size(m)				0.6	0.6	
Detector 2 Type				CI+Ex	CI+Ex	
Detector 2 Channel						
Detector 2 Extend (s)				0.0	0.0	
Turn Type	Prot	Perm	Perm	NA	NA	Perm
Protected Phases	4		. 0	2	6	. 0
i rotoctou i nasos	4				U	

220 Arkell Road TIS 5:00 pm 07-04-2018 2031 AM Total Remedial

Synchro 9 Report Page 9

	•	•	4	†	ļ	4
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Permitted Phases		4	2			6
Detector Phase	4	4	2	2	6	6
Switch Phase						
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	24.0	24.0	24.0	24.0	24.0	24.0
Total Split (s)	26.0	26.0	74.0	74.0	74.0	74.0
Total Split (%)	26.0%	26.0%	74.0%	74.0%	74.0%	74.0%
Maximum Green (s)	20.0	20.0	68.0	68.0	68.0	68.0
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	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
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	Max	Max	Max	Max
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	7.0
Flash Dont Walk (s)	11.0	11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0	0	0	0	0
Act Effct Green (s)	11.5	11.5	74.6	74.6	74.6	74.6
Actuated g/C Ratio	0.12	0.12	0.80	0.80	0.80	0.80
v/c Ratio	0.47	0.25	0.14	0.54	0.38	0.11
Control Delay	45.2	12.2	4.7	5.6	4.4	0.9
Queue Delay	0.0	0.0	0.0	0.5	0.0	0.0
Total Delay	45.2	12.2	4.7	6.1	4.4	0.9
LOS	D	В	Α	Α	Α	Α
Approach Delay	32.8			6.0	3.9	
Approach LOS	С			Α	Α	
Intersection Summary						
Area Type:	Other					
Cycle Length: 100						
Actuated Cycle Length: 93	.5					
Natural Cycle: 60						
Control Type: Semi Act-Ur	ncoord					
Maximum v/c Ratio: 0.54						
Intersection Signal Delay:	6.8			Ir	ntersectio	n LOS: A
Intersection Capacity Utiliz)		[(CU Level	of Service
Analysis Period (min) 15						
,,						



Lanes, Volumes, Timings 6: Victoria Road & Access 2

	•	•	4	†	. ↓	4
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	104	63	58	1458	1012	145
v/c Ratio	0.47	0.25	0.14	0.54	0.38	0.11
Control Delay	45.2	12.2	4.7	5.6	4.4	0.9
Queue Delay	0.0	0.0	0.0	0.5	0.0	0.0
Total Delay	45.2	12.2	4.7	6.1	4.4	0.9
Queue Length 50th (m)	18.5	0.0	2.4	49.5	28.2	0.0
Queue Length 95th (m)	34.1	11.5	7.4	78.7	45.4	4.7
Internal Link Dist (m)	73.9			131.4	284.2	
Turn Bay Length (m)			30.0			60.0
Base Capacity (vph)	386	395	412	2717	2667	1318
Starvation Cap Reductn	0	0	0	703	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.27	0.16	0.14	0.72	0.38	0.11
Intersection Summary						

	۶	\rightarrow	1	†	↓	4		
Movement	EBL	EBR	NBL	NBT	SBT	SBR		
Lane Configurations	ች	7	ች	^	^	1		
Traffic Volume (veh/h)	96	58	53	1341	931	133		
Future Volume (veh/h)	96	58	53	1341	931	133		
Number	7	14	5	2	6	16		
Initial Q (Qb), veh	0	0	0	0	0	0		
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00		
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00		
Adj Sat Flow, veh/h/ln	1900	1900	1900	1792	1759	1900		
Adj Flow Rate, veh/h	104	63	58	1458	1012	145		
Adj No. of Lanes	1	1	1	2	2	1		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92		
Percent Heavy Veh, %	0	0	0	6	8	0		
Cap, veh/h	198	177	401	2578	2530	1222		
Arrive On Green	0.11	0.11	0.76	0.76	0.76	0.76		
Sat Flow, veh/h	1810	1615	493	3495	3431	1615		
Grp Volume(v), veh/h	104	63	58	1458	1012	145		
Grp Sat Flow(s), veh/h/ln	1810	1615	493	1703	1671	1615		
Q Serve(g_s), s	4.9	3.2	4.2	16.4	9.5	2.2		
Cycle Q Clear(g_c), s	4.9	3.2	13.7	16.4	9.5	2.2		
Prop In Lane	1.00	1.00	1.00			1.00		
Lane Grp Cap(c), veh/h	198	177	401	2578	2530	1222		
V/C Ratio(X)	0.52	0.36	0.14	0.57	0.40	0.12		
Avail Cap(c_a), veh/h	403	360	401	2578	2530	1222		
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00		
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00		
Uniform Delay (d), s/veh	37.8	37.1	6.2	4.6	3.8	2.9		
Incr Delay (d2), s/veh	2.1	1.2	0.8	0.9	0.5	0.2		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	2.5	1.5	0.6	7.8	4.4	1.0		
LnGrp Delay(d),s/veh	39.9	38.3	6.9	5.5	4.3	3.1		
LnGrp LOS	D	D	A	A	A	A		
Approach Vol, veh/h	167			1516	1157			
Approach Delay, s/veh	39.3			5.6	4.1			
Approach LOS	D			Α	Α			
Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		
Phs Duration (G+Y+Rc), s		74.0		15.8		74.0		
Change Period (Y+Rc), s		6.0		6.0		6.0		
Max Green Setting (Gmax), s		68.0		20.0		68.0		
Max Q Clear Time (g_c+I1), s		18.4		6.9		11.5		
Green Ext Time (p_c), s		38.8		0.5		42.9		
Intersection Summary								
HCM 2010 Ctrl Delay			7.0					
HCM 2010 LOS			Α					

HCM 2010 Signalized Intersection Summary 6: Victoria Road & Access 2

Lane Group

Lane Configurations

Traffic Volume (vph)

Future Volume (vph)

Ideal Flow (vphpl)

Storage Lanes

Taper Length (m)

Lane Util. Factor

Satd. Flow (prot)

Satd. Flow (perm)

Right Turn on Red

Satd. Flow (RTOR)

Link Speed (k/h)

Link Distance (m)

Travel Time (s)

Adj. Flow (vph)

Lane Alignment

Link Offset(m)

Headway Factor

Median Width(m)

Crosswalk Width(m)

Turning Speed (k/h)

Number of Detectors

Detector Template

Leading Detector (m)

Trailing Detector (m)

Detector 1 Size(m)

Detector 1 Channel Detector 1 Extend (s)

Detector 1 Queue (s)

Detector 1 Delay (s)

Detector 2 Size(m)

Detector 2 Channel Detector 2 Extend (s)

Protected Phases

Permitted Phases

Detector 2 Type

Turn Type

Detector 2 Position(m)

Detector 1 Type

Detector 1 Position(m)

Two way Left Turn Lane

Peak Hour Factor

Shared Lane Traffic (%) Lane Group Flow (vph)

Enter Blocked Intersection

Flt Permitted

Frt Flt Protected

Storage Length (m)

186

186

1900

20.0

7.5

1.00

0.950

1770

0.950

1770

325.8

23.5

0.92

202

No

3.6

0.0

4.8

1.00

25

Left Right

2.0

0.0

0.0

2.0

0.0

0.0

0.0

Prot Perm Perm

CI+Ex CI+Ex

52

1900

1.00 0.850

1583

1583

Yes

57

0.92

57

57

No

Right

1.00

15

2.0

0.0

0.0

2.0

0.0

0.0

0.0

4 2

0.0

NBT

^

1420 1012

1900

3539

50 70

308.2 342.0

22.2 17.6

0.92

No

3.6

0.0

4.8

1.00

2

Thru

10.0

0.0

0.0

0.6

0.0

0.0

0.0

9.4

0.6

0.0 0.0

NA NA

2 6

CI+Ex CI+Ex

CI+Ex CI+Ex

17 1420

1900

30.0

7.5

1.00

0.950

1770

0.213

397 3539 3511

0.92

18 1543 1100

18 1543 1165

No

1.00

25

Left

2.0

0.0

0.0

2.0

0.0

0.0

0.0

CI+Ex

SBT

ħ۵

1012

1900

0.992

3511

13

0.92

No

Left Right

3.6

0.0

4.8

1.00

2

Thru

10.0

0.0

0.0

0.6

0.0

0.0

0.0

9.4

0.6

0.95 0.95

SBR

60

60

1900

0.0

0.95

0

0

Yes

0.92

65

0

No

1.00

0

Synchro 9 Report Page 13 Lanes, Volumes, Timings

7: Victoria Road & Victoria Park Village Road

07-25-2018

	•	•	4	†	↓	4	
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR	
Detector Phase	4	4	2	2	6		
Switch Phase							
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0		
Minimum Split (s)	24.0	24.0	24.0	24.0	24.0		
Total Split (s)	28.0	28.0	72.0	72.0	72.0		
Total Split (%)	28.0%	28.0%	72.0%	72.0%	72.0%		
Maximum Green (s)	22.0	22.0	66.0	66.0	66.0		
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0		
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0		
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0		
Lead/Lag							
Lead-Lag Optimize?							
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		
Recall Mode	None	None	Max	Max	Max		
Walk Time (s)	7.0	7.0	7.0	7.0	7.0		
Flash Dont Walk (s)	11.0	11.0	11.0	11.0	11.0		
Pedestrian Calls (#/hr)	0	0	0	0	0		
Act Effct Green (s)	16.1	16.1	68.7	68.7	68.7		
Actuated g/C Ratio v/c Ratio	0.17	0.17 0.18	0.71	0.71	0.71		
		10.4			7.2		
Control Delay	49.7 0.0	0.0	6.1 0.0	9.1			
Queue Delay	49.7	10.4	6.1	0.0 9.1	0.0 7.2		
Total Delay LOS	49.7 D	10.4 B	0.1 A	9.1 A	7.2 A		
Approach Delay	41.1	Б	А	9.1	7.2		
Approach LOS	41.1 D			9.1 A	7.2 A		
••	U			A	A		
Intersection Summary							
	Other						
Cycle Length: 100							
Actuated Cycle Length: 96.8							
Natural Cycle: 60							
Control Type: Semi Act-Unco	oord						
Maximum v/c Ratio: 0.69	0					1.00 D	
Intersection Signal Delay: 11					itersection		
Intersection Capacity Utilizati	ion 59.6%			IC	U Level o	of Service B	
Analysis Period (min) 15							



	•	•	1	†	↓
Lane Group	EBL	EBR	NBL	NBT	SBT
Lane Group Flow (vph)	202	57	18	1543	1165
v/c Ratio	0.69	0.18	0.06	0.61	0.47
Control Delay	49.7	10.4	6.1	9.1	7.2
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	49.7	10.4	6.1	9.1	7.2
Queue Length 50th (m)	36.5	0.0	0.9	69.7	43.7
Queue Length 95th (m)	59.7	10.3	3.9	111.8	71.2
Internal Link Dist (m)	301.8			284.2	318.0
Turn Bay Length (m)	20.0		30.0		
Base Capacity (vph)	403	404	281	2511	2495
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.50	0.14	0.06	0.61	0.47
Intersection Summary					

	_			_		-,
	ၨ	*	1	Ť	↓	4
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	ሻ	7	NDE.	**	↑ ↑	JUIN
Traffic Volume (veh/h)	186	52	17	1420	1012	60
Future Volume (veh/h)	186	52	17	1420	1012	60
Number	7	14	5	2	6	16
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00	U	U	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1900
Adj Flow Rate, veh/h	202	57	18	1543	1100	65
Adj No. of Lanes	1	1	1	2	2	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	250	223	365	2573	2469	146
Arrive On Green	0.14	0.14	0.73	0.73	0.73	0.73
Sat Flow, veh/h	1774	1583	480	3632	3489	201
Grp Volume(v), veh/h	202	57	18	1543	573	592
Grp Sat Flow(s),veh/h/ln	1774	1583	480	1770	1770	1827
Q Serve(g_s), s	10.0	2.9	1.4	19.2	11.9	11.9
Cycle Q Clear(g_c), s	10.0	2.9	13.3	19.2	11.9	11.9
Prop In Lane	1.00	1.00	1.00			0.11
Lane Grp Cap(c), veh/h	250	223	365	2573	1287	1329
V/C Ratio(X)	0.81	0.26	0.05	0.60	0.45	0.45
Avail Cap(c a), veh/h	430	384	365	2573	1287	1329
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	37.8	34.8	7.7	6.0	5.0	5.0
Incr Delay (d2), s/veh	6.2	0.6	0.3	1.0	1.1	1.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.3	1.3	0.2	9.6	6.1	6.3
LnGrp Delay(d),s/veh	44.0	35.4	7.9	7.0	6.1	6.1
LnGrp LOS	44.0 D	33.4 D	7.7 A	Α.	Α	Α.
Approach Vol, veh/h	259	U		1561	1165	- 1
Approach LOS	42.1			7.0	6.1	
Approach LOS	D			Α	Α	
Timer	1	2	3	4	5	6
Assigned Phs		2		4		6
Phs Duration (G+Y+Rc), s		72.0		18.8		72.0
Change Period (Y+Rc), s		6.0		6.0		6.0
Max Green Setting (Gmax), s		66.0		22.0		66.0
Max Q Clear Time (q_c+l1), s		21.2		12.0		13.9
Green Ext Time (p_c), s		36.9		0.8		41.7
Intersection Summary			0.7			
HCM 2010 Ctrl Delay			9.7			
HCM 2010 LOS			Α			

HCM 2010 Signalized Intersection Summary 7: Victoria Road & Victoria Park Village Road

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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	ሻ	- 1>		7	- 1>			4			4	
Traffic Volume (vph)	29	405	109	80	451	138	98	0	81	81	0	18
Future Volume (vph)	29	405	109	80	451	138	98	0	81	81	0	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	50.0		0.0	60.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	1		0	0		0	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. 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
Ped Bike Factor		0.99		0.99								
Frt		0.968			0.965			0.939			0.975	
Flt Protected	0.950			0.950				0.973			0.961	
Satd. Flow (prot)	1805	1808	0	1805	1806	0	0	1708	0	0	1780	0
Flt Permitted	0.186			0.265				0.797			0.685	
Satd. Flow (perm)	353	1808	0	500	1806	0	0	1399	0	0	1269	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		23			26			38			30	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		261.6			193.8			209.6			91.7	
Travel Time (s)		18.8			14.0			15.1			6.6	
Confl. Peds. (#/hr)			8	8								
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	0%	1%	0%	0%	2%	0%	3%	0%	0%	0%	0%	0%
Adj. Flow (vph)	30	422	114	83	470	144	102	0	84	84	0	19
Shared Lane Traffic (%)												
Lane Group Flow (vph)	30	536	0	83	614	0	0	186	0	0	103	0
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)		3.6			3.6			0.0			0.0	
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												
Headway 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
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	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	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	CI+Ex	CI+Ex		CI+Ex	CI+Ex		CI+Ex	CI+Ex		CI+Ex	CI+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	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	
Detector 1 Delay (s)	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		CI+Ex			CI+Ex			CI+Ex			CI+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

220 Arkell Road TIS 5:00	pm 07-04-2018 2031	PM Total Remedial
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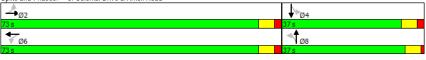
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Lanes, Volumes, Timings 3: Colonial Drive & Arkell Road

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Lane Group	EBL	EBT	EBR WI	BL WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Perm	NA	Per	m NA		Perm	NA		Perm	NA	
Protected Phases		2		6			8			4	
Permitted Phases	2			6		8			4		
Detector Phase	2	2		6 6		8	8		4	4	
Switch Phase											
Minimum Initial (s)	10.0	10.0	10	.0 10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	24.0	24.0	24			23.0	23.0		24.0	24.0	
Total Split (s)	73.0	73.0	73	.0 73.0		37.0	37.0		37.0	37.0	
Total Split (%)	66.4%	66.4%	66.4	% 66.4%		33.6%	33.6%		33.6%	33.6%	
Maximum Green (s)	67.0	67.0	67	.0 67.0		32.0	32.0		31.0	31.0	
Yellow Time (s)	4.0	4.0	4	.0 4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0	2	.0 2.0		1.0	1.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0	C	.0 0.0			0.0			0.0	
Total Lost Time (s)	6.0	6.0	6	.0 6.0			5.0			6.0	
Lead/Lag											
Lead-Lag Optimize?											
Vehicle Extension (s)	3.0	3.0	3	.0 3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None	No	ne None		Max	Max		Max	Max	
Walk Time (s)	7.0	7.0	7	.0 7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	11.0	11.0	11	.0 11.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0		0 0		0	0		0	0	
Act Effct Green (s)	28.9	28.9	28	.9 28.9			32.4			31.4	
Actuated g/C Ratio	0.40	0.40	0.	10 0.40			0.45			0.43	
v/c Ratio	0.21	0.73	0	12 0.83			0.29			0.18	
Control Delay	17.4	23.5	22	.0 29.2			13.5			12.7	
Queue Delay	0.0	0.0	C	.0 0.0			0.0			0.0	
Total Delay	17.4	23.5	22	.0 29.2			13.5			12.7	
LOS	В	С		C C			В			В	
Approach Delay		23.2		28.3			13.5			12.7	
Approach LOS		С		С			В			В	
Intersection Summary											
Area Type:	Other										
Cycle Length: 110											
Actuated Cycle Length: 7.	2.4										
Natural Cycle: 55											
Control Type: Semi Act-U	Incoord										
Maximum v/c Ratio: 0.83											

Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.83
Intersection Signal Delay: 23.6
Intersection Capacity Utilization 64.9%
Analysis Period (min) 15

Splits and Phases: 3: Colonial Drive & Arkell Road



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Lane Group	EBL	EBT	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	30	536	83	614	186	103
v/c Ratio	0.21	0.73	0.42	0.83	0.29	0.18
Control Delay	17.4	23.5	22.0	29.2	13.5	12.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	17.4	23.5	22.0	29.2	13.5	12.7
Queue Length 50th (m)	2.7	59.6	8.2	72.9	12.5	6.0
Queue Length 95th (m)	8.5	91.7	19.8	111.3	34.1	19.8
Internal Link Dist (m)		237.6		169.8	185.6	67.7
Turn Bay Length (m)	50.0		60.0			
Base Capacity (vph)	324	1664	459	1662	646	566
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.09	0.32	0.18	0.37	0.29	0.18
Intersection Summary						

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	7	ĵ»		ሻ	f)			4			4	
Traffic Volume (veh/h)	29	405	109	80	451	138	98	0	81	81	0	18
Future Volume (veh/h)	29	405	109	80	451	138	98	0	81	81	0	18
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		0.99	1.00		1.00	1.00		1.00
Parking Bus, Adj	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 Sat Flow, veh/h/ln	1900	1885	1900	1900	1871	1900	1900	1869	1900	1900	1900	1900
Adj Flow Rate, veh/h	30	422	114	83	470	144	102	0	84	84	0	19
Adj No. of Lanes	1	1	0	1	1	0	0	1	0	0	1	0
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	0	1	1	0	2	2	0	0	0	0	0	0
Cap, veh/h	263	693	187	322	667	204	357	18	256	496	8	97
Arrive On Green	0.49	0.49	0.49	0.49	0.49	0.49	0.37	0.00	0.37	0.37	0.00	0.37
Sat Flow, veh/h	821	1428	386	882	1373	421	781	49	683	1121	21	258
Grp Volume(v), veh/h	30	0	536	83	0	614	186	0	0	103	0	0
Grp Sat Flow(s), veh/h/ln	821	0	1813	882	0	1793	1513	0	0	1401	0	0
Q Serve(q_s), s	2.5	0.0	18.5	6.5	0.0	22.9	2.8	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(q_c), s	25.5	0.0	18.5	24.9	0.0	22.9	6.8	0.0	0.0	3.9	0.0	0.0
Prop In Lane	1.00		0.21	1.00		0.23	0.55		0.45	0.82		0.18
Lane Grp Cap(c), veh/h	263	0	881	322	0	871	631	0	0	600	0	0
V/C Ratio(X)	0.11	0.00	0.61	0.26	0.00	0.70	0.29	0.00	0.00	0.17	0.00	0.00
Avail Cap(c_a), veh/h	507	0	1420	585	0	1404	631	0	0	600	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	27.2	0.0	16.1	25.2	0.0	17.2	18.8	0.0	0.0	18.0	0.0	0.0
Incr Delay (d2), s/veh	0.2	0.0	0.7	0.4	0.0	1.1	1.2	0.0	0.0	0.6	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.6	0.0	9.4	1.6	0.0	11.5	3.3	0.0	0.0	1.7	0.0	0.0
LnGrp Delay(d),s/veh	27.3	0.0	16.7	25.6	0.0	18.3	20.0	0.0	0.0	18.6	0.0	0.0
LnGrp LOS	С		В	С		В	В			В		
Approach Vol, veh/h		566			697			186			103	
Approach Delay, s/veh		17.3			19.1			20.0			18.6	
Approach LOS		В			В			В			В	
	1	2	3	4	5	6	7	8				
Timer Assigned Phs		2	3	4	5	6	/	8				
Phs Duration (G+Y+Rc), s		47.6		38.0		47.6		38.0				
Change Period (Y+Rc), s		6.0		6.0		6.0		* 6				
Max Green Setting (Gmax), s		67.0		31.0		67.0		* 32				
Max Q Clear Time (q c+l1), s		27.5		5.9		26.9		8.8				
Green Ext Time (p c), s		14.1		2.1		14.2		2.1				
1 - 7		14.1		2.1		14.2		2.1				
Intersection Summary												
HCM 2010 Ctrl Delay			18.5									
HCM 2010 LOS			В									
Notes												

220 Arkell Road TIS 5:00 pm 07-04-2018 2031 PM Total Remedial Sync

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Lanes, Volumes, Timings 5: Victoria Road & Arkell Road

07-25-2018

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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	ሻሻ	f.		ሻ	î,		ሻ	44	7	ሻ	^	7
Traffic Volume (vph)	291	178	98	148	231	83	109	873	177	90	850	324
Future Volume (vph)	291	178	98	148	231	83	109	873	177	90	850	324
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	40.0		0.0	20.0		0.0	90.0		60.0	50.0		60.0
Storage Lanes	2		0	1		0	1		1	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor							1.00					0.97
Frt		0.947			0.960				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3467	1788	0	1703	1797	0	1805	3406	1583	1805	3505	1599
Flt Permitted	0.950			0.556			0.151			0.173		
Satd. Flow (perm)	3467	1788	0	997	1797	0	286	3406	1583	329	3505	1549
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		26			16				170			321
Link Speed (k/h)		50			60			70			70	
Link Distance (m)		144.3			357.4			823.5			155.4	
Travel Time (s)		10.4			21.4			42.4			8.0	
Confl. Peds. (#/hr)							6					6
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles (%)	1%	1%	0%	6%	1%	3%	0%	6%	2%	0%	3%	1%
Adj. Flow (vph)	310	189	104	157	246	88	116	929	188	96	904	345
Shared Lane Traffic (%)												
Lane Group Flow (vph)	310	293	0	157	334	0	116	929	188	96	904	345
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)		7.2			7.2			3.6			3.6	
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												
Headway 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
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2	1	1	2	1
Detector Template	Left	Thru		Left	Thru		Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	2.0	10.0		2.0	10.0		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
Detector 1 Position(m)	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	0.6		2.0	0.6	2.0	2.0	0.6	2.0
Detector 1 Type	CI+Ex	CI+Ex		CI+Ex	CI+Ex		CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+E)
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
Detector 1 Queue (s)	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
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		CI+Ex			CI+Ex			CI+Ex			CI+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

220 Arkell Road TIS 5:00 pm 07-04-2018 2031 PM Total Remedial

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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Prot	NA		pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases				8			2		2	6		6
Detector Phase	7	4		3	8		5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0		7.0	10.0	10.0	7.0	10.0	10.0
Minimum Split (s)	12.0	26.0		10.0	26.0		10.0	34.0	34.0	10.0	34.0	34.0
Total Split (s)	19.0	41.0		12.0	34.0		10.0	47.0	47.0	10.0	47.0	47.0
Total Split (%)	17.3%	37.3%		10.9%	30.9%		9.1%	42.7%	42.7%	9.1%	42.7%	42.7%
Maximum Green (s)	14.0	35.0		9.0	28.0		7.0	41.0	41.0	7.0	41.0	41.0
Yellow Time (s)	3.0	4.0		3.0	4.0		3.0	4.0	4.0	3.0	4.0	4.0
All-Red Time (s)	2.0	2.0		0.0	2.0		0.0	2.0	2.0	0.0	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
Total Lost Time (s)	5.0	6.0		3.0	6.0		3.0	6.0	6.0	3.0	6.0	6.0
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None		None	None	None	None	None	None
Walk Time (s)		7.0			7.0			13.0	13.0		13.0	13.0
Flash Dont Walk (s)		13.0			13.0			15.0	15.0		15.0	15.0
Pedestrian Calls (#/hr)		0			0			0	0		0	0
Act Effct Green (s)	12.7	27.3		33.2	21.4		42.8	34.4	34.4	42.0	31.7	31.7
Actuated g/C Ratio	0.14	0.29		0.36	0.23		0.46	0.37	0.37	0.45	0.34	0.34
v/c Ratio	0.66	0.54		0.37	0.79		0.47	0.74	0.27	0.37	0.76	0.47
Control Delay	48.1	30.1		20.2	47.8		21.0	31.5	6.0	18.7	32.7	5.9
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.1	0.0
Total Delay	48.1	30.1		20.2	47.8		21.0	31.5	6.0	18.7	32.7	5.9
LOS	D	С		С	D		С	С	Α	В	С	Α
Approach Delay		39.4			39.0			26.6			24.8	
Approach LOS		D			D			С			С	

Intersection Summary Intersection Summary
Area Type: Other
Cycle Length: 110
Actuated Cycle: 85
Control Type: Actuated-Uncoordinated
Maximum vic Ratio: 0.79
Intersection Signal Delay: 29.7
Intersection Capacity Utilization 73.0%
Analysis Period (min) 15

Intersection LOS: C ICU Level of Service C

Splits and Phases: 5: Victoria Road & Arkell Road



220 Arkell Road TIS 5:00 pm 07-04-2018 2031 PM Total Remedial

Queues

5: Victoria Road & Arkell Road

07-25-2018

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Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Group Flow (vph)	310	293	157	334	116	929	188	96	904	345	
v/c Ratio	0.66	0.54	0.37	0.79	0.47	0.74	0.27	0.37	0.76	0.47	
Control Delay	48.1	30.1	20.2	47.8	21.0	31.5	6.0	18.7	32.7	5.9	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	
Total Delay	48.1	30.1	20.2	47.8	21.0	31.5	6.0	18.7	32.7	5.9	
Queue Length 50th (m)	29.6	42.7	17.6	58.5	12.2	85.7	2.3	10.0	81.7	3.1	
Queue Length 95th (m)	50.3	75.7	34.9	99.1	24.3	118.7	17.4	20.7	113.2	23.3	
Internal Link Dist (m)		120.3		333.4		799.5			131.4		
Turn Bay Length (m)	40.0		20.0		90.0		60.0	50.0		60.0	
Base Capacity (vph)	535	705	429	565	247	1538	808	261	1583	875	
Starvation Cap Reductn	0	0	0	0	0	0	0	0	58	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.58	0.42	0.37	0.59	0.47	0.60	0.23	0.37	0.59	0.39	
Intersection Summary											

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	ሻሻ	1>		ሻ	₽		ሻ	^	7	ሻ	^	7
Traffic Volume (veh/h)	291	178	98	148	231	83	109	873	177	90	850	324
Future Volume (veh/h)	291	178	98	148	231	83	109	873	177	90	850	324
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		0.99	1.00		0.99
Parking Bus, Adj	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 Sat Flow, veh/h/ln	1881	1888	1900	1792	1871	1900	1900	1792	1863	1900	1845	1881
Adj Flow Rate, veh/h	310	189	104	157	246	88	116	929	188	96	904	345
Adj No. of Lanes	2	1	0	1	1	0	1	2	1	1	2	1
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	1	1	1	6	1	1	0	6	2	0	3	1
Cap, veh/h	391	312	171	358	300	107	276	1325	611	276	1356	614
Arrive On Green	0.11	0.27	0.27	0.09	0.23	0.23	0.07	0.39	0.39	0.07	0.39	0.39
Sat Flow, veh/h	3476	1146	631	1707	1317	471	1810	3406	1571	1810	3505	1587
Grp Volume(v), veh/h	310	0	293	157	0	334	116	929	188	96	904	345
Grp Sat Flow(s),veh/h/ln	1738	0	1777	1707	0	1788	1810	1703	1571	1810	1752	1587
Q Serve(g_s), s	8.5	0.0	14.1	6.8	0.0	17.3	3.6	22.4	8.1	3.0	20.8	16.7
Cycle Q Clear(g_c), s	8.5	0.0	14.1	6.8	0.0	17.3	3.6	22.4	8.1	3.0	20.8	16.7
Prop In Lane	1.00		0.35	1.00		0.26	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	391	0	483	358	0	407	276	1325	611	276	1356	614
V/C Ratio(X)	0.79	0.00	0.61	0.44	0.00	0.82	0.42	0.70	0.31	0.35	0.67	0.56
Avail Cap(c_a), veh/h	498	0	636	364	0	512	282	1428	659	285	1470	665
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	42.3	0.0	31.0	25.7	0.0	35.9	18.5	25.1	20.7	18.5	24.8	23.5
Incr Delay (d2), s/veh	6.7	0.0	1.2	0.8	0.0	8.3	1.0	1.4	0.3	0.8	1.0	0.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.5	0.0	7.1	3.2	0.0	9.5	1.9	10.7	3.5	1.6	10.2	7.4
LnGrp Delay(d),s/veh	49.0	0.0	32.3	26.6	0.0	44.2	19.5	26.5	21.0	19.3	25.8	24.4
LnGrp LOS	D		С	С		D	В	С	С	В	С	C
Approach Vol, veh/h		603			491			1233			1345	
Approach Delay, s/veh		40.9			38.6			25.0			25.0	
Approach LOS		D			D			С			С	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	9.5	44.0	11.7	32.6	9.7	43.8	16.0	28.2				
Change Period (Y+Rc), s	3.0	6.0	3.0	6.0	3.0	6.0	5.0	6.0				
Max Green Setting (Gmax), s	7.0	41.0	9.0	35.0	7.0	41.0	14.0	28.0				
Max Q Clear Time (q c+l1), s	5.0	24.4	8.8	16.1	5.6	22.8	10.5	19.3				
Green Ext Time (p_c), s	0.0	13.6	0.0	4.5	0.0	14.7	0.5	2.9				
Intersection Summary												
HCM 2010 Ctrl Delay			29.4									
HCM 2010 LOS			С									

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Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	*	7	ኘ	^	^	7
Traffic Volume (vph)	50	23	20	1225	1240	43
Future Volume (vph)	50	23	20	1225	1240	43
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	0.0	30.0	1700	1700	60.0
Storage Lanes	1	1	30.0			1
Taper Length (m)	7.5		7.5			- 1
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00
Edile Otili. Factor	1.00	0.850	1.00	0.93	0.93	0.850
	0.050	0.850	0.050			0.830
Flt Protected	0.950 1805	141F	0.950 1805	2404	2E0E	1415
Satd. Flow (prot)		1615		3406	3505	1615
Flt Permitted	0.950	1/15	0.186	2401	2505	1/15
Satd. Flow (perm)	1805	1615	353	3406	3505	1615
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		25				47
Link Speed (k/h)	50			70	70	
Link Distance (m)	97.9			155.4	308.2	
Travel Time (s)	7.0			8.0	15.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	6%	3%	0%
Adj. Flow (vph)	54	25	22	1332	1348	47
Shared Lane Traffic (%)						
Lane Group Flow (vph)	54	25	22	1332	1348	47
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6	Nigill	LCIL	3.6	3.6	Nigill
Link Offset(m)	0.0			0.0	0.0	
. ,						
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane	4.00	4.05	1.00	4.05	1.05	4.0-
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15	25			15
Number of Detectors	1	1	1	2	2	1
Detector Template	Left	Right	Left	Thru	Thru	Right
Leading Detector (m)	2.0	2.0	2.0	10.0	10.0	2.0
Trailing Detector (m)	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
Detector 1 Size(m)	2.0	2.0	2.0	0.6	0.6	2.0
Detector 1 Type	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex
Detector 1 Channel	OITEX	SITEM	SILLY	SITEN	SILLY	SITEK
Detector 1 Extend (s)	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
Detector 1 Delay (s)	0.0	0.0	0.0	0.0		0.0
Detector 2 Position(m)				9.4	9.4	
Detector 2 Size(m)				0.6	0.6	
Detector 2 Type				CI+Ex	CI+Ex	
Detector 2 Channel						
Detector 2 Extend (s)				0.0	0.0	
Turn Type	Prot	Perm	Perm	NA	NA	Perm
Protected Phases	4			2	6	

220 Arkell Road TIS 5:00 pm 07-04-2018 2031 PM Total Remedial

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220 Arkell Road TIS 5:00 pm 07-04-2018 2031 PM Total Remedial

Lanes, Volumes, Timings 6: Victoria Road & Access 2

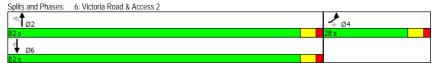
6: Victoria Road & Access 2

07-25-2018

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Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Permitted Phases		4	2			6
Detector Phase	4	4	2	2	6	6
Switch Phase						
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	24.0	24.0	24.0	24.0	24.0	24.0
Total Split (s)	28.0	28.0	82.0	82.0	82.0	82.0
Total Split (%)	25.5%	25.5%	74.5%	74.5%	74.5%	74.5%
Maximum Green (s)	22.0	22.0	76.0	76.0	76.0	76.0
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	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
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	Max	Max	Max	Max
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	7.0
Flash Dont Walk (s)	11.0	11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0	0	0	0	0
Act Effct Green (s)	10.3	10.3	88.5	88.5	88.5	88.5
Actuated g/C Ratio	0.10	0.10	0.83	0.83	0.83	0.83
v/c Ratio	0.31	0.14	0.07	0.47	0.46	0.03
Control Delay	49.6	17.6	3.3	4.0	3.9	0.9
Queue Delay	0.0	0.0	0.0	0.5	0.0	0.0
Total Delay	49.6	17.6	3.3	4.5	3.9	0.9
LOS	D	В	Α	Α	Α	Α
Approach Delay	39.5			4.5	3.8	
Approach LOS	D			Α	Α	
Intersection Summary						
Area Type:	Other					
Cycle Length: 110						
Actuated Cycle Length: 1	06					

Actuated Cycle Length: 106
Natural Cycle: 60
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.47
Intersection Signal Delay: 5.1
Intersection Capacity Utilization 52.6%
Analysis Period (min) 15

Intersection LOS: A ICU Level of Service A



Queues

6: Victoria Road & Access 2

07-25-2018

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Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	54	25	22	1332	1348	47
v/c Ratio	0.31	0.14	0.07	0.47	0.46	0.03
Control Delay	49.6	17.6	3.3	4.0	3.9	0.9
Queue Delay	0.0	0.0	0.0	0.5	0.0	0.0
Total Delay	49.6	17.6	3.3	4.5	3.9	0.9
Queue Length 50th (m)	12.0	0.0	0.9	41.0	41.1	0.0
Queue Length 95th (m)	22.4	8.0	2.9	55.7	55.6	2.2
Internal Link Dist (m)	73.9			131.4	284.2	
Turn Bay Length (m)			30.0			60.0
Base Capacity (vph)	375	356	294	2842	2924	1355
Starvation Cap Reductn	0	0	0	959	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.14	0.07	0.07	0.71	0.46	0.03
Intersection Summary						

	ᄼ	•	4	†	+	4		
Movement	EBL	EBR	NBL	NBT	SBT	SBR		
Lane Configurations	ሻ	7	ሻ	^	^	7		
Traffic Volume (veh/h)	50	23	20	1225	1240	43		
Future Volume (veh/h)	50	23	20	1225	1240	43		
Number	7	14	5	2	6	16		
Initial Q (Qb), veh	0	0	0	0	0	0		
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00		
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00		
Adj Sat Flow, veh/h/ln	1900	1900	1900	1792	1845	1900		
Adj Flow Rate, veh/h	54	25	22	1332	1348	47		
Adj No. of Lanes	1	1	1	2	2	1		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92		
Percent Heavy Veh, %	0	0	0	6	3	0		
Cap, veh/h	165	147	330	2674	2752	1268		
Arrive On Green	0.09	0.09	0.79	0.79	0.79	0.79		
Sat Flow, veh/h	1810	1615	393	3495	3597	1615		-
Grp Volume(v), veh/h	54	25	22	1332	1348	47		
Grp Sat Flow(s), veh/h/ln	1810 2.7	1615 1.4	393 2.0	1703 13.4	1752 13.0	1615 0.6		
Q Serve(g_s), s Cycle Q Clear(g_c), s	2.7	1.4	15.0	13.4	13.0	0.6		
Cycle Q Clear(g_c), s Prop In Lane	1.00	1.00	1.00	13.4	13.0	1.00		
Lane Grp Cap(c), veh/h	1.00	1.00	330	2674	2752	1268		
V/C Ratio(X)	0.33	0.17	0.07	0.50	0.49	0.04		
Avail Cap(c a), veh/h	411	367	330	2674	2752	1268		
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00		
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00		
Uniform Delay (d), s/veh	41.2	40.6	6.3	3.7	3.6	2.3		
Incr Delay (d2), s/veh	1.1	0.5	0.4	0.7	0.6	0.1		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	1.4	0.6	0.2	6.4	6.4	0.3		
LnGrp Delay(d),s/veh	42.4	41.2	6.6	4.3	4.3	2.4		
LnGrp LOS	D	D	A	A	A	A		
Approach Vol, veh/h	79			1354	1395			
Approach Delay, s/veh	42.0			4.4	4.2			
Approach LOS	D			Α	Α			
Timer	1	2	3	4	5	6	7	8
Assigned Phs	'	2	<u> </u>	4	<u> </u>	6	,	- 0
Phs Duration (G+Y+Rc), s		82.0		14.8		82.0		
Change Period (Y+Rc), s		6.0		6.0		6.0		
Max Green Setting (Gmax), s		76.0		22.0		76.0		
Max Q Clear Time (q. c+l1), s		17.0		4.7		15.0		
Green Ext Time (p_c), s		46.1		0.2		47.3		
Intersection Summary								
HCM 2010 Ctrl Delay			5.3					
HCM 2010 Cur Delay			0.5 A					
110W 2010 E03								

220 Arkell Road TIS 5:00 pm 07-04-2018 2031 PM Total Remedial

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Lanes, Volumes, Timings
7: Victoria Road & Victoria Park Village Road

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Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	ች	7	ኘ	^	† 1>	
Traffic Volume (vph)	105	38	64	1257	1368	178
Future Volume (vph)	105	38	64	1257	1368	178
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	20.0	0.0	30.0	1700	1700	0.0
Storage Lanes	1	1	1			0.0
Taper Length (m)	7.5	'	7.5			- 3
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	0.95
Frt	1.00	0.850	1.00	0.75	0.983	0.73
Flt Protected	0.950	0.000	0.950		0.703	
Satd. Flow (prot)	1805	1615	1805	3406	3457	0
Flt Permitted	0.950	1013	0.111	3400	J4J/	U
Satd. Flow (perm)	1805	1615	211	3406	3457	0
Right Turn on Red	1000	Yes	211	3400	J4J/	Yes
Satd. Flow (RTOR)		41			25	162
	50	41		50	70	
Link Speed (k/h)						
Link Distance (m)	325.8			308.2	342.0	
Travel Time (s)	23.5	0.00	0.00	22.2	17.6	0.00
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	6%	3%	0%
Adj. Flow (vph)	114	41	70	1366	1487	193
Shared Lane Traffic (%)						
Lane Group Flow (vph)	114	41	70	1366	1680	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	3.6	
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	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15	25			15
Number of Detectors	1	1	1	2	2	
Detector Template	Left	Right	Left	Thru	Thru	
Leading Detector (m)	2.0	2.0	2.0	10.0	10.0	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	
Detector 1 Size(m)	2.0	2.0	2.0	0.6	0.6	
Detector 1 Type	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	
Detector 1 Channel	CI+EX	OI+EX	CI+EX	CI+EX	CITEX	
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	
. ,						
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(m)				9.4	9.4	
Detector 2 Size(m)				0.6	0.6	
Detector 2 Type				CI+Ex	CI+Ex	
Detector 2 Channel						
Detector 2 Extend (s)				0.0	0.0	
Turn Type	Prot	Perm	Perm	NA	NA	
Protected Phases	4			2	6	

220 Arkell Road TIS 5:00 pm 07-04-2018 2031 PM Total Remedial

Synchro 9 Report Page 14 7: Victoria Road & Victoria Park Village Road

07-25-2018

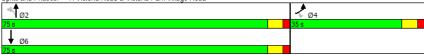
	•	*	1	Ť	¥	4	
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR	
Permitted Phases		4	2				
Detector Phase	4	4	2	2	6		
Switch Phase							
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0		
Minimum Split (s)	24.0	24.0	24.0	24.0	24.0		
Total Split (s)	35.0	35.0	75.0	75.0	75.0		
Total Split (%)	31.8%	31.8%	68.2%	68.2%	68.2%		
Maximum Green (s)	29.0	29.0	69.0	69.0	69.0		
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0		
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0		
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0		
Lead/Lag							
Lead-Lag Optimize?							
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		
Recall Mode	None	None	Max	Max	Max		
Walk Time (s)	7.0	7.0	7.0	7.0	7.0		
Flash Dont Walk (s)	11.0	11.0	11.0	11.0	11.0		
Pedestrian Calls (#/hr)	0	0	0	0	0		
Act Effct Green (s)	12.0	12.0	74.6	74.6	74.6		
Actuated g/C Ratio	0.12	0.12	0.76	0.76	0.76		
v/c Ratio	0.52	0.18	0.44	0.53	0.64		
Control Delay	48.1	13.3	15.7	6.0	7.3		
Queue Delay	0.0	0.0	0.0	0.0	0.0		
Total Delay	48.1	13.3	15.7	6.0	7.3		
LOS	D	В	В	Α	Α		
Approach Delay	38.9			6.5	7.3		
Approach LOS	D			Α	Α		
Intersection Summary							
Area Type:	Other						
Cycle Length: 110							
Actuated Cycle Length: 9	8.6						

Actuated Cycle Lengin: 98.6
Natural Cycle: 60
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.64
Intersection Signal Delay: 8.4
Intersection Capacity Utilization 71.5%

Intersection LOS: A ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 7: Victoria Road & Victoria Park Village Road



Queues

7: Victoria Road & Victoria Park Village Road

07-25-2018

	•	•	1	Ť	¥
Lane Group	EBL	EBR	NBL	NBT	SBT
Lane Group Flow (vph)	114	41	70	1366	1680
v/c Ratio	0.52	0.18	0.44	0.53	0.64
Control Delay	48.1	13.3	15.7	6.0	7.3
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	48.1	13.3	15.7	6.0	7.3
Queue Length 50th (m)	21.1	0.0	4.1	46.2	65.0
Queue Length 95th (m)	37.3	9.3	19.4	72.5	101.9
Internal Link Dist (m)	301.8			284.2	318.0
Turn Bay Length (m)	20.0		30.0		
Base Capacity (vph)	531	504	159	2576	2621
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.21	0.08	0.44	0.53	0.64
Intersection Summary					

	_			_	1	
	_	•	1	†	¥	*
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	ሻ	7	ሻ	^	† 1>	
Traffic Volume (veh/h)	105	38	64	1257	1368	178
Future Volume (veh/h)	105	38	64	1257	1368	178
Number	7	14	5	2	6	16
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1900	1900	1792	1851	1900
Adj Flow Rate, veh/h	114	41	70	1366	1487	193
Adj No. of Lanes	1	1	1	2	2	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	0	0	0	6	3	3
Cap, veh/h	195	174	240	2588	2383	306
Arrive On Green	0.11	0.11	0.76	0.76	0.76	0.76
Sat Flow, veh/h	1810	1615	299	3495	3228	402
Grp Volume(v), veh/h	114	41	70	1366	826	854
Grp Sat Flow(s), veh/h/ln	1810	1615	299	1703	1758	1780
Q Serve(q s), s	5.4	2.1	12.8	14.6	19.3	20.1
Cycle Q Clear(q c), s	5.4	2.1	32.9	14.6	19.3	20.1
Prop In Lane	1.00	1.00	1.00	11.0	17.0	0.23
Lane Grp Cap(c), veh/h	195	174	240	2588	1336	1353
V/C Ratio(X)	0.58	0.24	0.29	0.53	0.62	0.63
Avail Cap(c a), veh/h	578	516	240	2588	1336	1353
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	38.6	37.1	12.6	4.4	4.9	5.0
Incr Delay (d2), s/veh	2.8	0.7	3.1	0.8	2.2	2.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.9	1.0	1.3	6.9	10.0	10.3
LnGrp Delay(d),s/veh	41.3	37.8	15.7	5.1	7.1	7.3
LnGrp LOS	41.3 D	37.0 D	13.7 B	Α.	Α.Τ	7.5 A
Approach Vol, veh/h	155			1436	1680	- /1
	40.4			5.7	7.2	
Approach LOS	40.4 D			5.7 A	7.2 A	
Approach LOS	D			А	А	
Timer	1	2	3	4	5	6
Assigned Phs		2		4		6
Phs Duration (G+Y+Rc), s		75.0		15.8		75.0
Change Period (Y+Rc), s		6.0		6.0		6.0
Max Green Setting (Gmax), s		69.0		29.0		69.0
Max Q Clear Time (q_c+I1), s		34.9		7.4		22.1
Green Ext Time (p c), s		31.7		0.6		42.6
Intersection Summary						
HCM 2010 Ctrl Delay			8.1			
HCM 2010 CIT Delay			0.1 A			
HCIVI 2010 LOS			А			

Appendix N

Total Traffic Signal Warrant Justification Worksheets





Horizon Year: 2031 Total
Region/City/Township: City of Guelph

Major Street: Arkell Road
Minor Street: Summerfield Drive

North/South?: N

Number of Approach Lanes: 1
Tee Intersection? Y
Flow Conditions: Restricted

150% Satisfied No Justification for new intersections with forecast traffic			Warrant Results
	150% Satisfied	No	Justification for new intersections with forecast traffic
120% Satisfied No Justification for existing intersections with forecast traff	120% Satisfied	No	Justification for existing intersections with forecast traffic

PM Forecast Only? N

			Major	Street			Minor Street						
			Arkell	Road			Summerfield Drive						
		Eastbound			Westbound			Northbound Southbou			Southbound		Peds Crossing
Time Period	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	Main Road
AM Peak Hour	0	415	41	35	483	0	162	0	138	0	0	0	
PM Peak Hour	0	555	174	100	474	0	83	0	51	0	0	0	
Average Hourly Volume	0	243	54	34	239	0	61	0	47	0	0	0	0

Warrant	AHV
1A - All	678
1B - Minor	109
2A - Major	569
2B - Cross	61

Warrant 1 - Minimum Vehicular Volume

	Approach Lanes		1	2 or	more	Average
	Flow Conditions	Free	Restricted	Free	Restricted	Hourly
1A	Flow Conditions		X			Volume
	All Approaches	480	720	600	900	678
	All Approacties				% Fulfilled	94.1%

	Approach Lanes		1	2 or	more	Average
	Flow Conditions	Free	Restricted	Free	Restricted	Hourly
1B	Flow Conditions		Х			Volume
1	Minor Street	180	255	180	255	109
1	Approaches				% Fulfilled	42.5%

	Approach Lanes		1	2 or	more	Average
	Flow Conditions	Free	Restricted	Free	Restricted	Hourly
2A	Flow Conditions		Х			Volume
	Major Street	480	720	600	900	569
	Approaches				% Fulfilled	79.1%

	Approach Lanes		1	2 or	more	Average
	Flow Conditions	Free	Restricted	Free	Restricted	Hourly
2B	Flow Conditions		X			Volume
	Traffic Crossing Major	50	75	50	75	61
	Street				% Fulfilled	81.7%



Horizon Year: 2031 Total
Region/City/Township: City of Guelph

Major Street: Arkell Road
Minor Street: Amos/Zecca Drive

North/South?: N

Number of Approach Lanes: 1
Tee Intersection? N
Flow Conditions: Restricted

150% Satisfied No Justification for new intersections with forecast traffic 120% Satisfied No Justification for existing intersections with forecast traffic			Warrant Results
120% Satisfied No Justification for existing intersections with forecast traffic	150% Satisfied	No	Justification for new intersections with forecast traffic
	120% Satisfied	No	Justification for existing intersections with forecast traffic

PM Forecast Only? N

			Minor Street										
			Arkell	Road			Amos/Zecca Drive						
		Eastbound			Westbound			Northbound Southbound				Peds Crossing	
Time Period	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	Main Road
AM Peak Hour	8	529	16	4	458	11	27	1	20	45	3	34	
PM Peak Hour	50	521	36	8	527	31	20	0	4	18	1	28	
Average Hourly Volume	15	263	13	3	246	11	12	0	6	16	1	16	0

Warrant	AHV
1A - All	600
1B - Minor	50
2A - Major	550
2B - Cross	29

Warrant 1 - Minimum Vehicular Volume

	Approach Lanes		1	2 or	more	Average
	Flow Conditions	Free	Restricted	Free	Restricted	Hourly
1A	Flow Conditions		X			Volume
	All Approaches	480	720	600	900	600
	All Approacties				% Fulfilled	83.3%

	Approach Lanes		1	2 or	Average	
	Flow Conditions	Free	Restricted	Free	Restricted	Hourly
1B	Flow Conditions		X			Volume
	Minor Street	120	170	120	170	50
	Approaches				% Fulfilled	29.6%

	Approach Lanes		1	2 or	Average		
	Flow Conditions	Free	Restricted	Free	Restricted	Hourly	
2A			Х			Volume	
	Major Street	480	720	600	900	550	
	Approaches				% Fulfilled	76.4%	

	Approach Lanes		1	2 or	more	Average
2B	Flow Conditions	Free	Restricted	Free	Restricted	Hourly
	Flow Conditions		X			Volume
	Traffic Crossing Major	50	75	50	75	29
	Street				% Fulfilled	38.0%



Horizon Year: 2031 Total
Region/City/Township: City of Guelph

Major Street: Arkell Road
Minor Street: Colonial Drive

North/South?: N

Number of Approach Lanes: 1
Tee Intersection? N
Flow Conditions: Restricted

			Warrant Results
Γ	150% Satisfied	No	Justification for new intersections with forecast traffic
L	120% Satisfied	No	Justification for existing intersections with forecast traffic

PM Forecast Only? N

			Major	Street					Minor	Street			
			Arkell	Road			Colonial Drive						
		Eastbound Westbound				Northbound Southbound					Peds Crossing		
Time Period	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	Main Road
AM Peak Hour	11	503	79	47	291	42	149	0	156	131	0	32	
PM Peak Hour	29	405	109	80	451	138	98	0	81	81	0	18	
Average Hourly Volume	10	227	47	32	186	45	62	0	59	53	0	13	0

Warrant	AHV
1A - All	733
1B - Minor	187
2A - Major	546
2B - Cross	115

Warrant 1 - Minimum Vehicular Volume

	Approach Lanes		1	2 or	Average		
1A	Flow Conditions	Free	Restricted	Free	Restricted	Hourly	
			X			Volume	
	All Approaches	480	720	600	900	733	
	All Approaches				% Fulfilled	101.8%	

	Approach Lanes		1	2 or	Average			
	Flow Conditions	Free	Restricted	Free	Restricted	Hourly		
1B	Flow Conditions		Х			Volume		
	Minor Street	120	170	120	170	187		
	Approaches				% Fulfilled	109.7%		

2A	Approach Lanes		1	2 or	Average	
	Flow Conditions	Free	Restricted	Free	Restricted	Hourly
			Х			Volume
	Major Street	480	720	600	900	546
	Approaches				% Fulfilled	75.9%

	Approach Lanes		1	2 or	Average	
2B	Flow Conditions	Free	Restricted	Free	Restricted	Hourly
	Flow Conditions		X			Volume
	Traffic Crossing Major	50	75	50	75	115
İ	Street				% Fulfilled	153.0%



Horizon Year: 2031 Total
Region/City/Township: City of Guelph

Major Street: Arkell Road
Minor Street: 388 Access 1

North/South?: N

Number of Approach Lanes: 1
Tee Intersection? N
Flow Conditions: Restricted

ı			Warrant Results
ı	150% Satisfied	No	Justification for new intersections with forecast traffic
	120% Satisfied	No	Justification for existing intersections with forecast traffic

PM Forecast Only? N

			Major	Street			Minor Street						
			Arkell	Road			388 Access 1						1
	Eastbound Westbound					Northbound Southbound					Peds Crossing		
Time Period	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	Main Road
AM Peak Hour	83	705	3	3	347	62	3	0	3	6	0	31	
PM Peak Hour	8	556	4	3	667	74	3	0	3	8	0	9	
Average Hourly Volume	23	315	2	2	254	34	2	0	2	4	0	10	0

Warrant	AHV
1A - All	645
1B - Minor	17
2A - Major	629
2B - Cross	5

Warrant 1 - Minimum Vehicular Volume

	Approach Lanes	1		2 or	Average	
1A	Flow Conditions	Free	Restricted	Free	Restricted	Hourly
			Х			Volume
	All Ammunashas	480	720	600	900	645
	All Approaches				% Fulfilled	89.6%

Approach Lanes		1		2 or	Average	
	Flam Canditiana	Free	Restricted	Free	Restricted	Hourly
1B	Flow Conditions		Х			Volume
	Minor Street	120	170	120	170	17
	Approaches				% Fulfilled	9.7%

	Approach Lanes	1		2 or	Average	
2A	Flow Conditions	Free	Restricted	Free	Restricted	Hourly
	Flow Conditions		Х			Volume
	Major Street	480	720	600	900	629
	Approaches				% Fulfilled	87.3%

	Approach Lanes	1		2 or	Average	
	Flow Conditions	Free	Restricted	Free	Restricted	Hourly
2B	Flow Conditions		X			Volume
	Traffic Crossing Major	50	75	50	75	5
	Street				% Fulfilled	6.7%



Horizon Year: 2031 Total
Region/City/Township: City of Guelph

Major Street: Victoria Road
Minor Street: 388 Access 2

North/South?: Y

Number of Approach Lanes: 2 or more
Tee Intersection? Y
Flow Conditions: Free

		Warrant Results
150% Satisfied	No	Justification for new intersections with forecast traffic
120% Satisfied	No	Justification for existing intersections with forecast traffic

PM Forecast Only? N

			Major	Street			Minor Street						
	Victoria Road				388 Access 2								
	Northbound Southbound			Eastbound Westbound				Peds Crossing					
Time Period	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	Main Road
AM Peak Hour	53	1341			931	133	96		58				
PM Peak Hour	20	1225			1240	43	50		23				
Average Hourly Volume	18	642	0	0	543	44	37	0	20	0	0	0	0

Warrant	AHV
1A - All	1303
1B - Minor	57
2A - Major	1247
2B - Cross	37

Warrant 1 - Minimum Vehicular Volume

	Approach Lanes	1		2 or	Average	
1A	Flow Conditions	Free	Restricted	Free	Restricted	Hourly
				Х		Volume
	A II . A	480	720	600	900	1303
	All Approaches				% Fulfilled	217.2%

	Approach Lanes		1		2 or more		
	Flam Canditiana	Free	Restricted	Free	Restricted	Hourly	
1B	Flow Conditions			Х		Volume	
	Minor Street	180	255	180	255	57	
	Approaches				% Fulfilled	31.5%	

	Approach Lanes	1		2 or more		Average
	Flow Conditions	Free	Restricted	Free	Restricted	Hourly
2A				Х		Volume
	Major Street	480	720	600	900	1247
	Approaches				% Fulfilled	207.8%

	Approach Lanes	1		2 or more		Average
2B	Flow Conditions	Free	Restricted	Free	Restricted	Hourly
				Х		Volume
	Traffic Crossing Major	50	75	50	75	37
	Street				% Fulfilled	73.0%



Horizon Year: 2031 Total
Region/City/Township: City of Guelph

Major Street: Victoria Road
Minor Street: Victoria Park Village Road

North/South?: Y

Number of Approach Lanes: 2 or more
Tee Intersection? Y
Flow Conditions: Free

Warrant Results								
150% Satisfied	No	Justification for new intersections with forecast traffic						
120% Satisfied	Yes	Justification for existing intersections with forecast traffic						

PM Forecast Only? N

			Major	Street					Minor	Street			
	Victoria Road					Victoria Park Village Road							
		Northbound			Southbound	Į.		Eastbound			Westbound		Peds Crossing
Time Period	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	Main Road
AM Peak Hour	17	1420			1012	60	186		52				
PM Peak Hour	64	1257			1368	178	105		38				
Average Hourly Volume	20	669	0	0	595	60	73	0	23	0	0	0	0

Warrant	AHV
1A - All	1439
1B - Minor	95
2A - Major	1344
2B - Cross	73

Warrant 1 - Minimum Vehicular Volume

	Approach Lanes		1	2 or	Average	
	Flow Conditions	Free	Restricted	Free	Restricted	Hourly
1A				Х		Volume
	All Approaches	480	720	600	900	1439
	All Approacties				% Fulfilled	239.9%

	Approach Lanes		1	2 or	Average	
	Flow Conditions	Free	Restricted	Free	Restricted	Hourly
1B				Х		Volume
1	Minor Street	180	255	180	255	95
1	Approaches				% Fulfilled	52.9%

	Approach Lanes		1	2 or	more	Average
	Flow Conditions	Free	Restricted	Free	Restricted	Hourly
2A	Flow Collultions			Х		Volume
	Major Street	480	720	600	900	1344
l	Approaches				% Fulfilled	224.0%

	Approach Lanes		1	2 or	Average	
	Flow Conditions	Free	Restricted	Free	Restricted	Hourly
2B				X		Volume
	Traffic Crossing Major	50	75	50	75	73
	Street				% Fulfilled	145.5%