



220 Arkell Road Transportation Impact Study

Paradigm Transportation Solutions Limited

April 2019

Project: 180099



Project Summary



Project Number

180099

220 Arkell Road

Transportation Impact Study

April 2019

Client

Rockpoint Properties Inc.

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A handwritten signature in black ink, appearing to read "R. Philips", written over a horizontal line.

Signature



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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, Westminster 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.

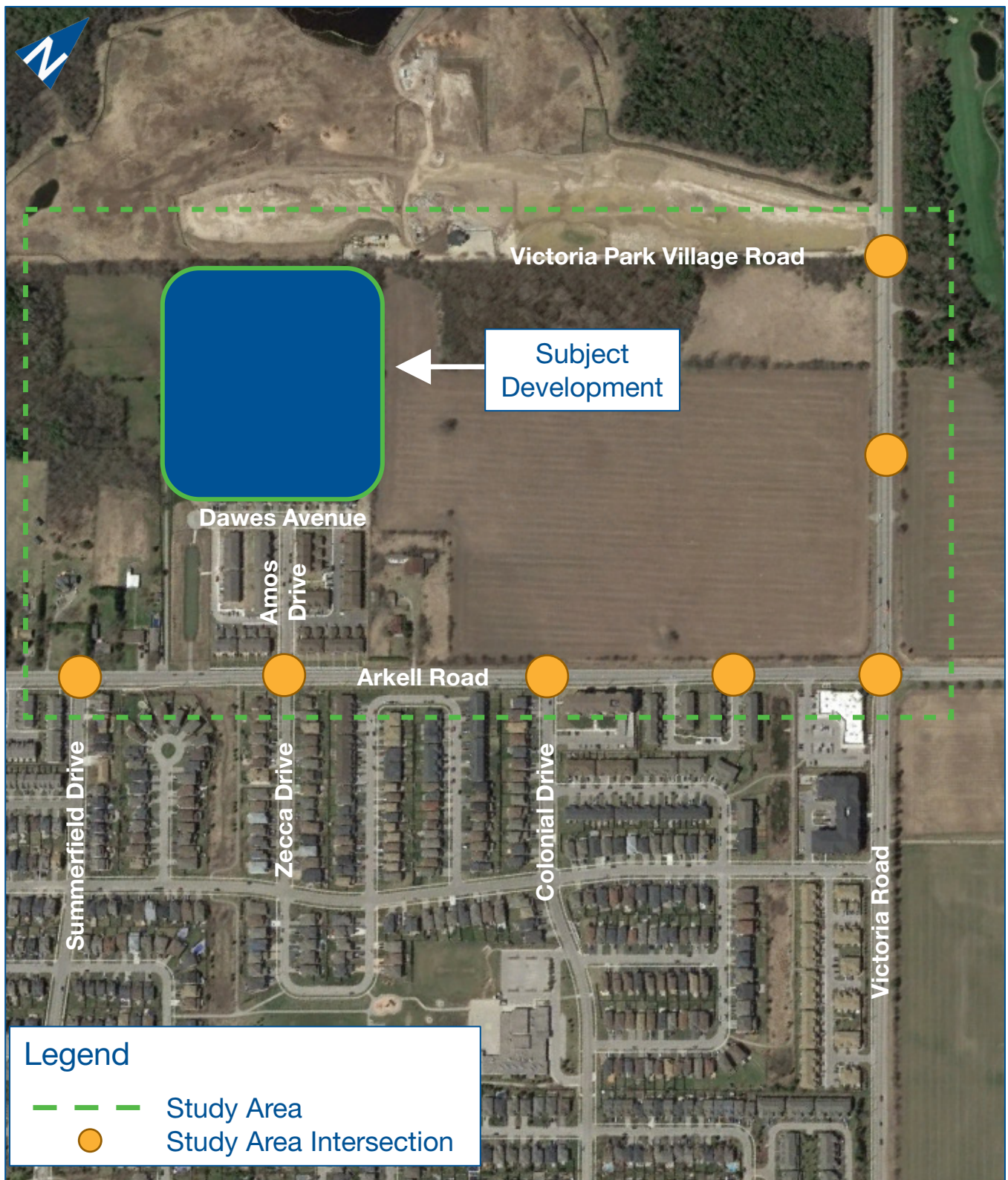


1.3 Study Area Intersections

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).





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).

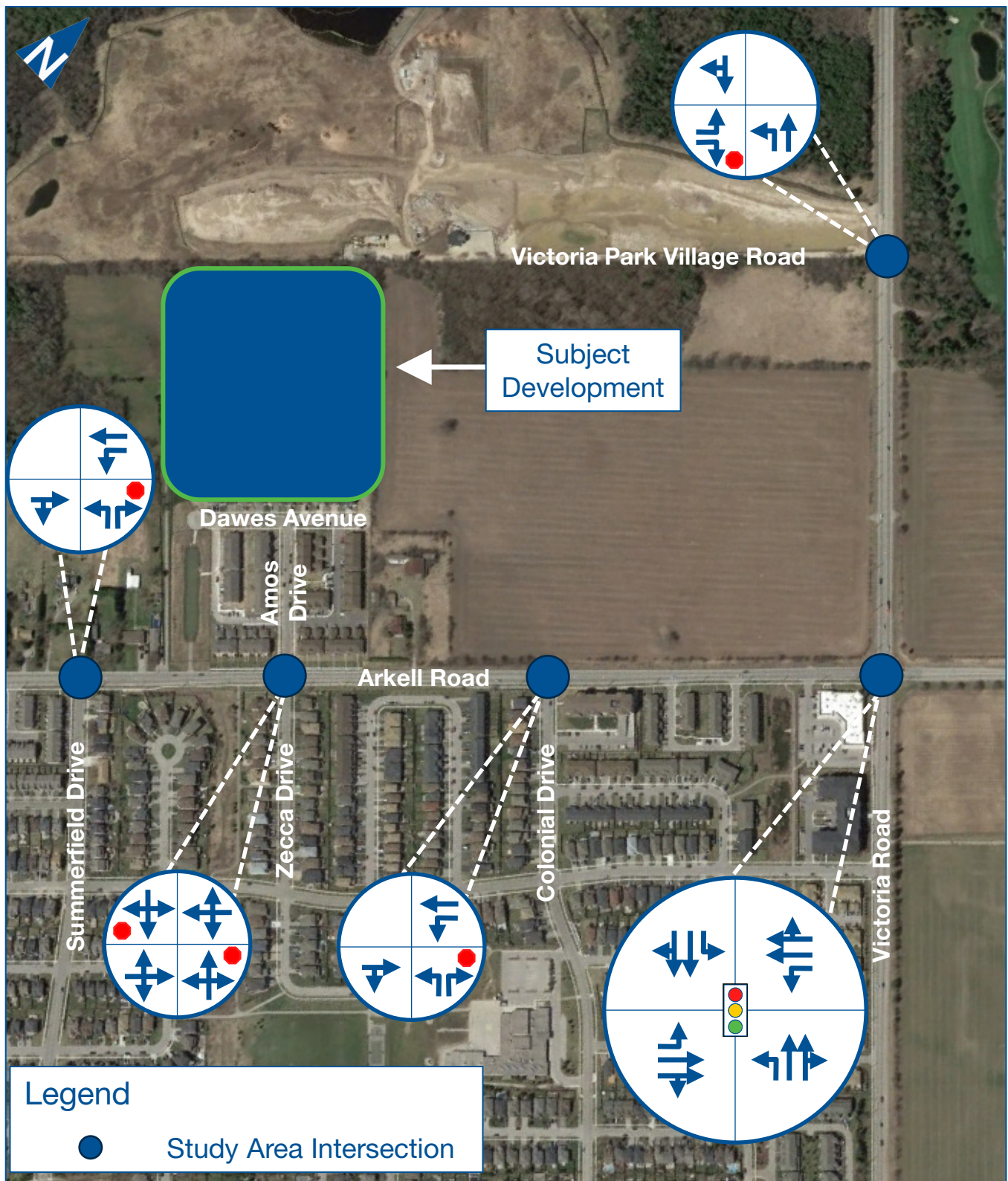
The transit routes in the study area are described as follows:

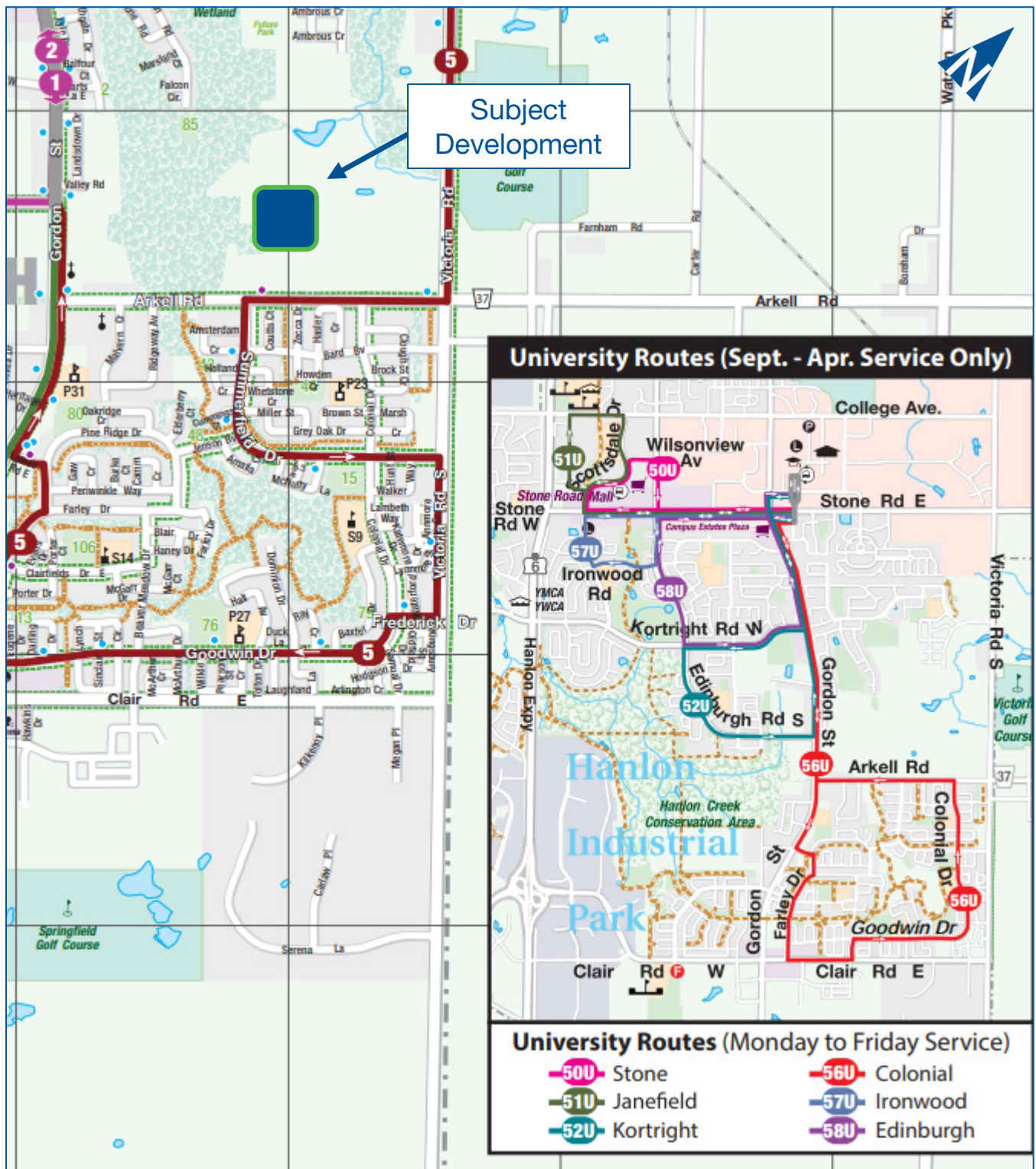
- ▶ **Route 5 Goodwin**⁴ services southeast Guelph, with major stops at University Centre, Victoria at MacAllister, Summerfield at Amsterdam, Frederick at Waterford, Gordon at Lowes, and Gordon at Edinburgh. Monday to Saturday service operates from 5:50 AM to 12:43 AM on 30-minute headways. Sunday and holiday service operates from 9:20 AM to 7:12 PM on 30-minute headways.
- ▶ **Route 56U Colonial**⁵ 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.







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

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

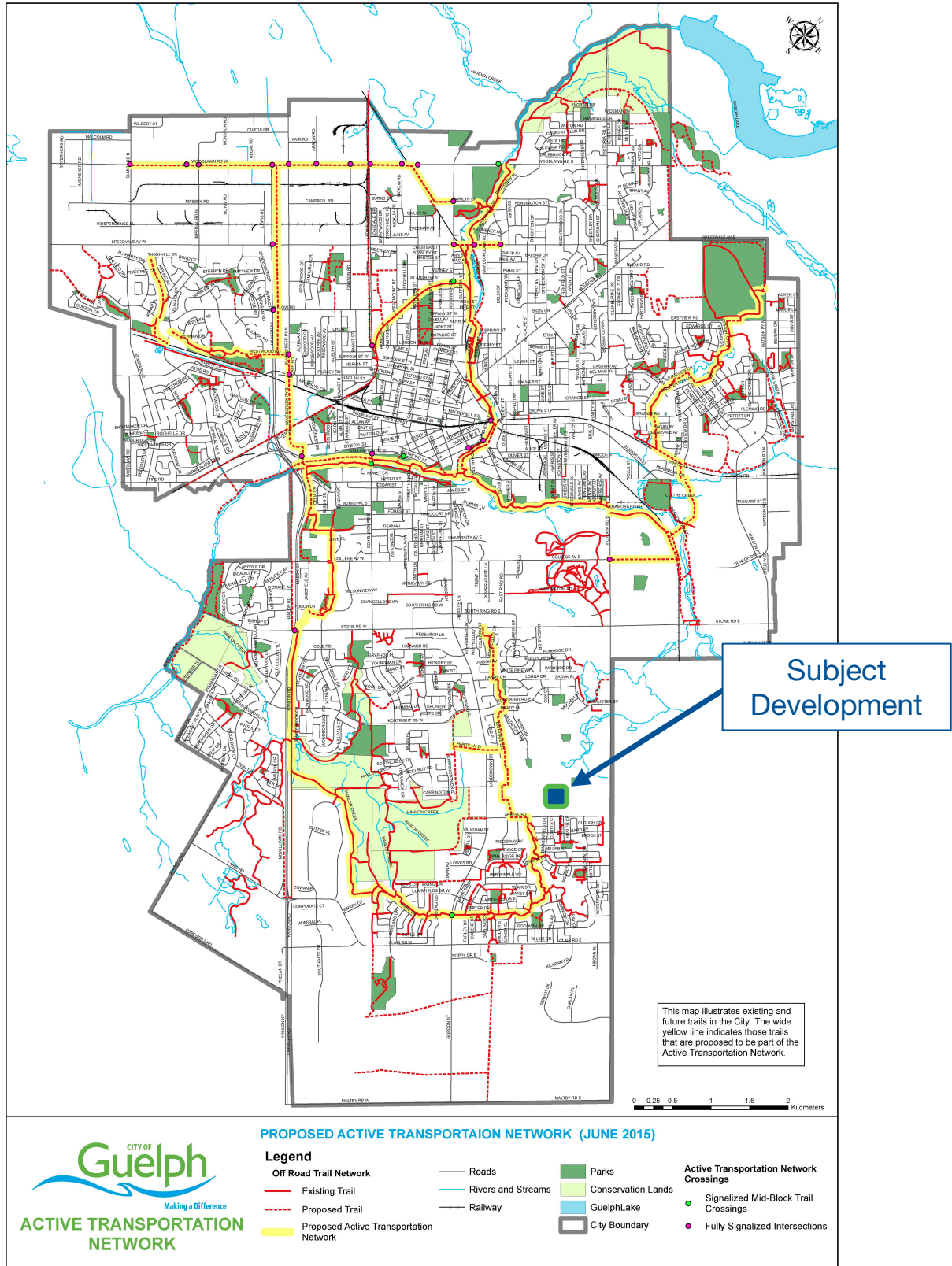
The City of Guelph Active Transportation Network Map 2015⁶ identifies the following trails in the study area:

- ▶ 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.





2.4 Existing Traffic Volumes

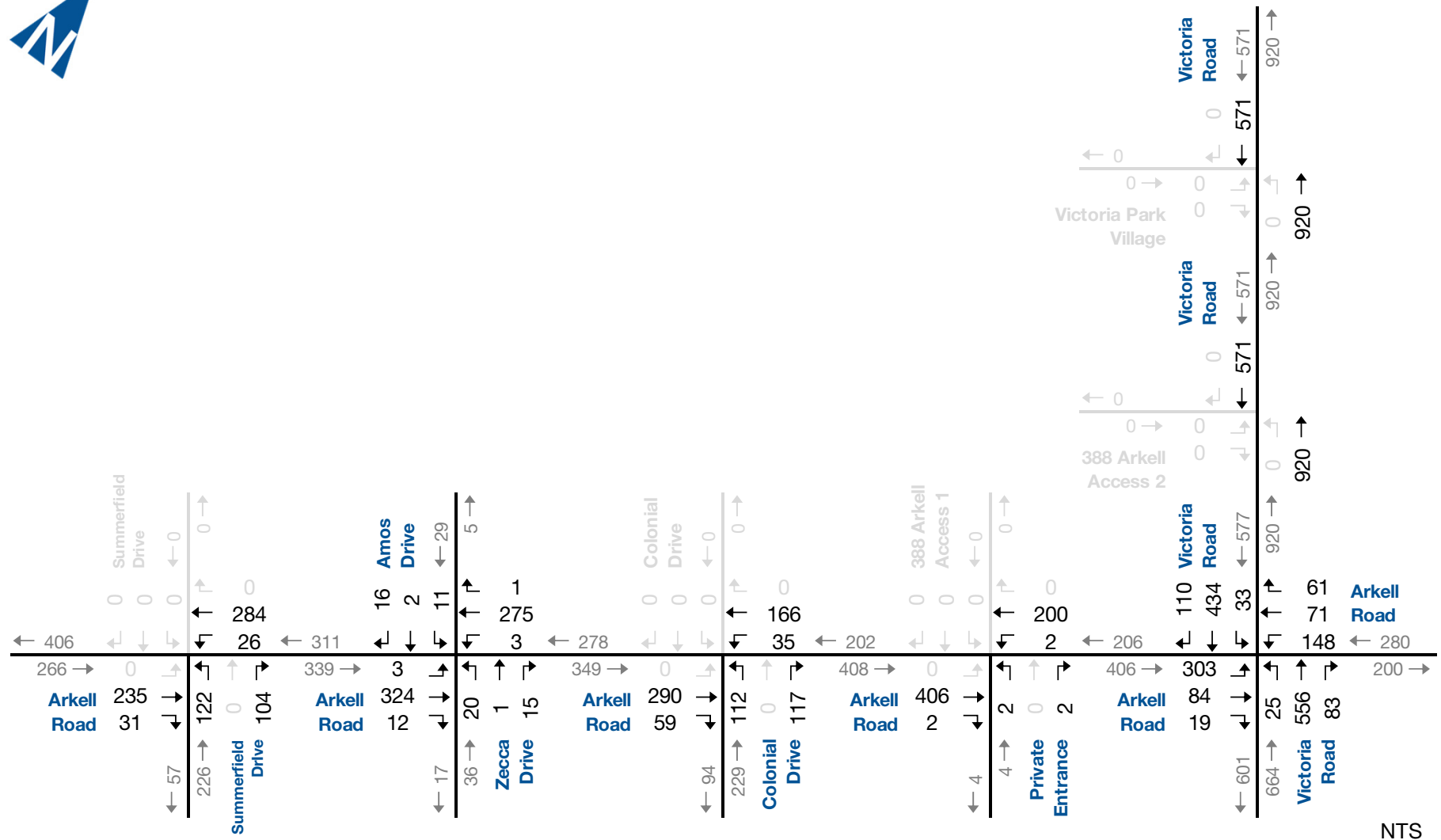
On October 4 to 6, 2016, using surveyors, study area intersection turning movement count (TMC) data were collected during the AM (7:00 AM to 10:00 AM) and PM (3:00 PM to 6:00 PM) peak periods.

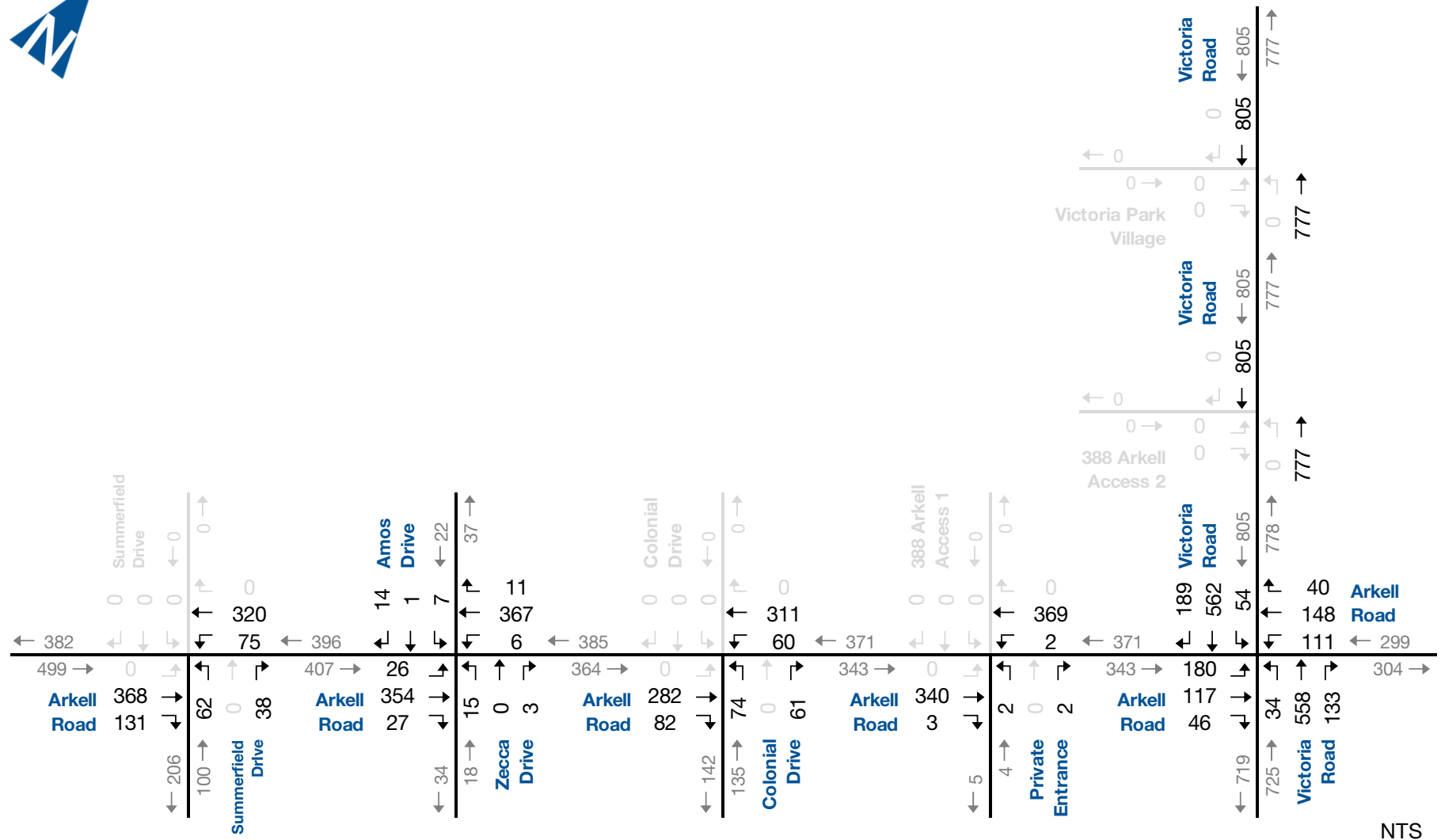
A growth rate of two percent per annum compounded was applied to all intersection volumes for two years to reflect 2018 conditions. This growth rate was provided by the City of Guelph during pre-study consultation.

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.







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.

TABLE 2.1: VEHICLE LEVEL OF SERVICE DEFINITIONS

| Level of Service | Signalized Intersections Average Total Delay (sec/veh) | Unsignalized Intersections Average Total Delay (sec/veh) |
|------------------|--|--|
| A | < = 10 | < = 10 |
| B | > 10 & < = 20 | > 10 & < = 15 |
| C | > 20 & < = 35 | > 15 & < = 25 |
| D | > 35 & < = 55 | > 25 & < = 35 |
| E | > 55 & < = 80 | > 35 & < = 50 |
| F | > 80 | > 50 |

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; and
 - 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

| Analysis Period | Intersection | Control Type | MOE | Direction / Movement / Approach | | | | | | | | | | | | | | | | |
|-----------------|--|--------------|---------------------------------------|------------------------------------|----------------------------|-----------------------|----------|------------------------------------|----------------------------|-----------------------|----------|----------------------------------|-----------------------------|-----------------------|----------|----------------------------------|-----------------------------|-----------------------|----------|---------|
| | | | | Eastbound | | | | Westbound | | | | Northbound | | | | Southbound | | | | Overall |
| | | | | Left | Through | Right | Approach | Left | Through | Right | Approach | Left | Through | Right | Approach | Left | Through | Right | Approach | |
| AM Peak Hour | Arkell Road & Summerfield Drive | TWSC | LOS Delay V/C Q Ex Avail. | | A 0 - - - | > > > > > | 0 | A 8 0.02 0 60 60 | A 0 - - - | | 1 | B 14 0.37 2 - | | > > > > > | B 14 | | | | | 4 |
| | 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 |
| | 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

| Analysis Period | Intersection | Control Type | MOE | Direction / Movement / Approach | | | | | | | | | | | | | | | | |
|-----------------|--|--------------|---------------------------------------|----------------------------------|---------------------------------|-----------------------|----------|-----------------------------------|---------------------------------|-----------------------|----------|----------------------------------|----------------------------------|-----------------------|----------|-----------------------------------|----------------------------------|-----------------------|----------|---------|
| | | | | Eastbound | | | | Westbound | | | | Northbound | | | | Southbound | | | | Overall |
| | | | | Left | Through | Right | Approach | Left | Through | Right | Approach | Left | Through | Right | Approach | Left | Through | Right | Approach | |
| PM Peak Hour | 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 |
| | 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 | > > > > | B 14 | 1 |
| | 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.

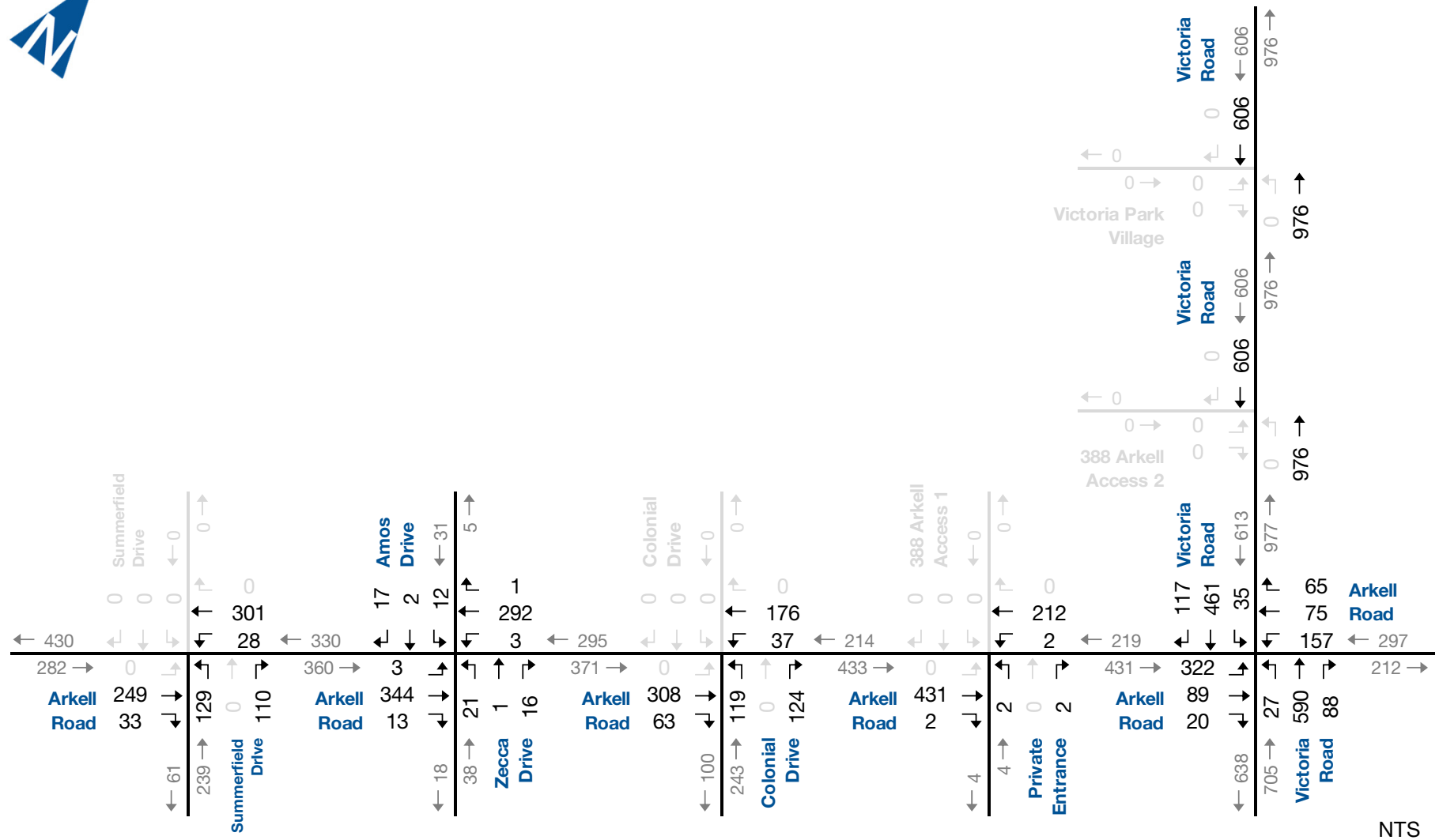
3.3 Other Area Developments

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.

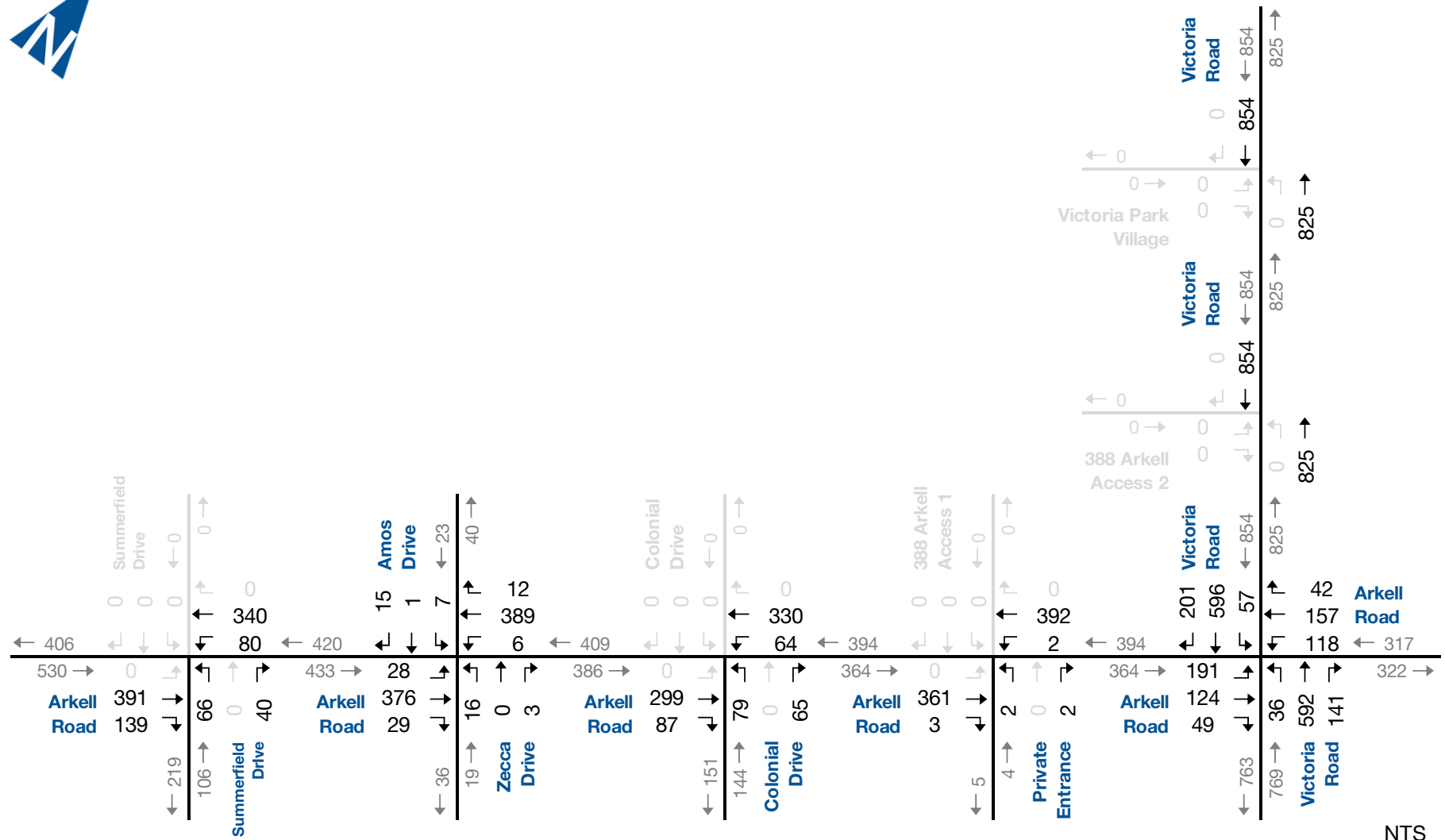




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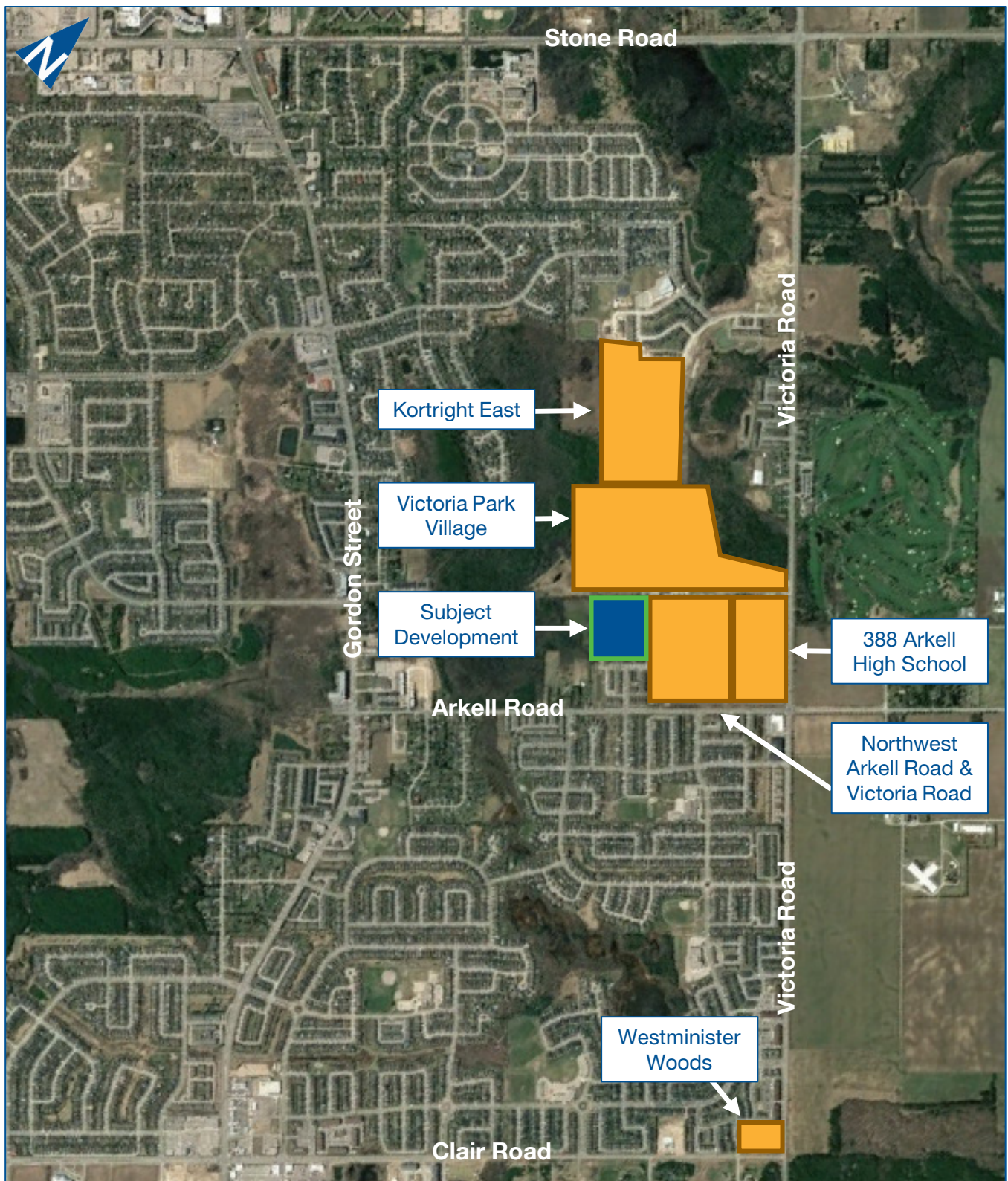
2021 AM Generalized Growth Background Traffic Forecasts



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2021 PM Generalized Growth Background Traffic Forecasts



- ▶ **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 Measure | Units/ GFA | AM Peak Hour | | | | PM Peak Hour | | | |
|----------------------|--|-----------------|---------------|------------------|----|-----|-------|------------------|-----|-----|-------|
| | | | | Rate | In | Out | Total | Rate | In | Out | Total |
| Kortright East | LUC 210 - Single Family Detached | Units | 161 | FCE ¹ | 30 | 89 | 119 | FCE ² | 101 | 59 | 160 |
| | LUC 220 - Multifamily Housing (Low-Rise) | Units | 102 | FCE ³ | 11 | 38 | 49 | FCE ⁴ | 38 | 22 | 60 |
| Total Kortright East | | | | | 41 | 127 | 168 | | 139 | 81 | 220 |

¹ $T = 0.71(x) + 4.80$

² $\ln(t) = 0.96 \cdot \ln(x) + 0.20$

³ $\ln(t) = 0.95 \cdot \ln(x) - 0.51$

⁴ $\ln(t) = 0.89 \cdot \ln(x) - 0.02$

TABLE 3.2: VICTORIA PARK VILLAGE TRIP GENERATION

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

¹ $T = 0.71(x) + 4.80$

² $\ln(t) = 0.96 \cdot \ln(x) + 0.20$

³ $\ln(t) = 0.95 \cdot \ln(x) - 0.51$

⁴ $\ln(t) = 0.89 \cdot \ln(x) - 0.02$

⁵ $\ln(t) = 0.99 \cdot \ln(x) - 0.98$

⁶ $\ln(t) = 0.89 \cdot \ln(x) - 0.02$

TABLE 3.3: WESTMINISTER WOODS TRIP GENERATION

| Land Use | | Unit of Measure | Units/ GFA | AM Peak Hour | | | | PM Peak Hour | | | |
|-------------------|-------------------------------|-----------------|---------------|--------------|----|-----|-------|--------------|----|-----|-------|
| | | | | Rate | In | Out | Total | Rate | In | Out | Total |
| Westminster Woods | Westminister Woods TIS Report | Units | 101 | - | 38 | 32 | 70 | - | 53 | 57 | 110 |
| | Total Westminster Woods | | | | 38 | 32 | 70 | | 53 | 57 | 110 |



TABLE 3.4: NORTHWEST ARKELL AND VICTORIA TRIP GENERATION

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

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

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

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

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

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

$$^6 \ln(t) = 0.89*\ln(x) - 0.02$$

TABLE 3.5: 388 ARKELL ROAD SECONDARY SCHOOL TRIP GENERATION

| Land Use | | Unit of Measure | Units/ GFA | AM Peak Hour | | | | PM Peak Hour | | | |
|-------------------------------------|-----------------------|-----------------|------------|--------------|-----|-----|-------|--------------|----|-----|-------|
| | | | | Rate | In | Out | Total | Rate | In | 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 |



TABLE 3.6: OTHER AREA DEVELOPMENTS TRIP GENERATION

| Land Use | | Unit of Measure | Units/ GFA | AM Peak Hour | | | | PM Peak Hour | | | |
|-------------------------------------|--|-----------------|------------|------------------|-----|-----|-------|------------------|-----|-----|-------|
| | | | | Rate | In | Out | Total | Rate | In | Out | Total |
| Kortright East | LUC 210 - Single Family Detached | Units | 161 | FCE ¹ | 30 | 89 | 119 | FCE ² | 101 | 59 | 160 |
| | LUC 220 - Multifamily Housing (Low-Rise) | Units | 102 | FCE ³ | 11 | 38 | 49 | FCE ⁴ | 38 | 22 | 60 |
| Total Kortright East | | | | | 41 | 127 | 168 | | 139 | 81 | 220 |
| Victoria Park Village | LUC 210 - Single Family Detached | Units | 82 | FCE ¹ | 16 | 47 | 63 | FCE ² | 53 | 31 | 84 |
| | LUC 220 - Multifamily Housing (Low-Rise) | Units | 248 | FCE ³ | 26 | 87 | 113 | FCE ⁴ | 84 | 49 | 133 |
| | LUC 221 - Multifamily Housing (Mid-Rise) | Units | 168 | FCE ⁵ | 15 | 42 | 57 | FCE ⁶ | 45 | 28 | 73 |
| Total Victoria Park Village | | | | | 57 | 176 | 233 | | 182 | 108 | 290 |
| Westminster Woods | Westminster Woods TIS Report | Units | 101 | - | 38 | 32 | 70 | - | 53 | 57 | 110 |
| Total Westminster Woods | | | | | 38 | 32 | 70 | | 53 | 57 | 110 |
| Northwest Arkell/Victoria | LUC 210 - Single Family Detached | Units | 172 | FCE ¹ | 32 | 95 | 127 | FCE ² | 108 | 63 | 171 |
| | LUC 220 - Multifamily Housing (Low-Rise) | Units | 231 | FCE ³ | 24 | 82 | 106 | FCE ⁴ | 78 | 46 | 124 |
| | LUC 221 - Multifamily Housing (Mid-Rise) | Units | 95 | FCE ⁵ | 9 | 24 | 33 | FCE ⁶ | 26 | 16 | 42 |
| Total Northwest Arkell and Victoria | | | | | 65 | 201 | 266 | | 212 | 125 | 337 |
| 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 |
| Total New Trips | | | | | 532 | 727 | 1259 | | 664 | 461 | 1125 |

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

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

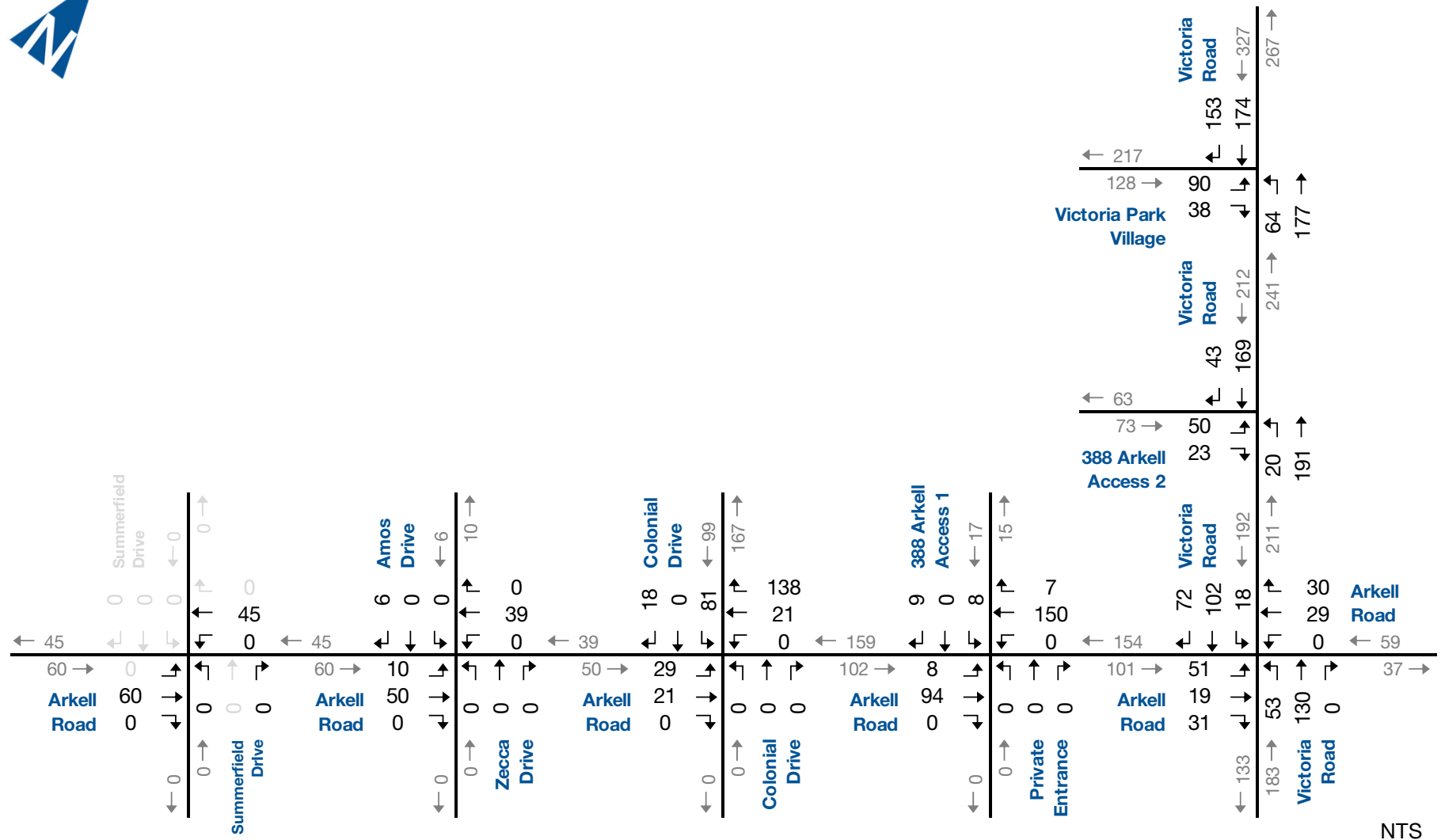
$$^5 \ln(t) = 0.99 \ln(x) - 0.98$$

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

$$^4 \ln(t) = 0.89 \ln(x) - 0.02$$

$$^4 \ln(t) = 0.89 \ln(x) - 0.02$$





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:

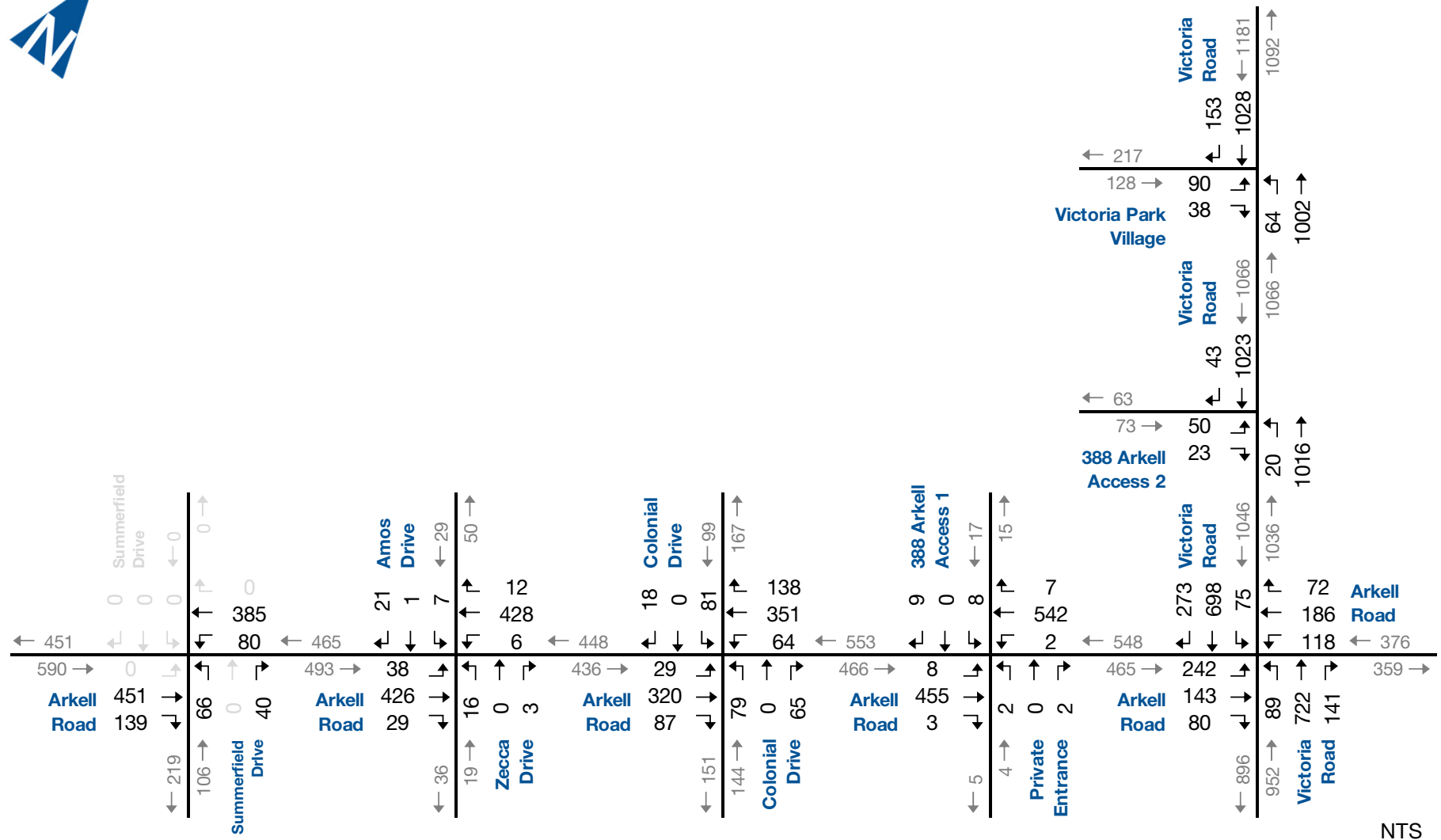
- ▶ Arkell Road and Colonial Road:
 - Northbound left-through-right movement – LOS E, v/c 0.80 during the AM peak hour; and
 - Southbound left-through-right movement – LOS F, v/c 0.84 during the AM peak hour and LOS E, v/c 0.51 during the PM peak hour.
- ▶ Victoria Road and Arkell Road:
 - Eastbound 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.





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2021 PM Total Background Traffic Forecasts

TABLE 3.7: 2021 AM BACKGROUND TRAFFIC OPERATIONS SUMMARY

| Analysis Period | Intersection | Control Type | MOE | Direction / Movement / Approach | | | | | | | | | | | | | | | | |
|-----------------|---|--------------|---------------------------------------|--------------------------------------|----------------------------|----------------------------|-----------|------------------------------------|----------------------------|-----------------------|----------|-----------------------------------|------------------------------|-----------------------|--------------------------------|-----------------------------------|------------------------------|---------------------------------|----------|----------|
| | | | | Eastbound | | | | Westbound | | | | Northbound | | | | Southbound | | | | Overall |
| | | | | Left | Through | Right | Approach | Left | Through | Right | Approach | Left | Through | Right | Approach | Left | Through | Right | Approach | |
| AM Peak Hour | 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 - - | > > > > | 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 | | |
| | 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 -11 | 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 | | C 19 0.18 1 | F 1204 | | | | | 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

| Analysis Period | Intersection | Control Type | MOE | Direction / Movement / Approach | | | | | | | | | | | | | | | | |
|-----------------|--|--------------|---------------------------|---------------------------------|----------------|---------------|----------|--------------------|----------------|-------|----------|--------------------|------------------|---------|----------|--------------------|------------------|------------------|----------|---------|
| | | | | Eastbound | | | | Westbound | | | | Northbound | | | | Southbound | | | | Overall |
| | | | | Left | Through | Right | Approach | Left | Through | Right | Approach | Left | Through | Right | Approach | Left | Through | Right | Approach | |
| PM Peak Hour | Arkell Road & Summerfield Drive | TWSC | LOS Delay V/C Q Ex Avail. | | A 0 - - - | > > > > | 0 | A 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 0.01 0 | A 0 - - | > > > | 0 | < 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 0.06 0 60 60 | A 0 - - - | > > > | 1 | < 32 0.53 3 - | < < < | > > > | D 32 | < < < | E 40 0.51 3 - | > > > | E 40 | 8 |
| | 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 0.00 0 - - | A 0 - - - | > > > | 0 | < 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 | | | | | B 14 0.14 1 | A 0 - - | | 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 above-noted 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:

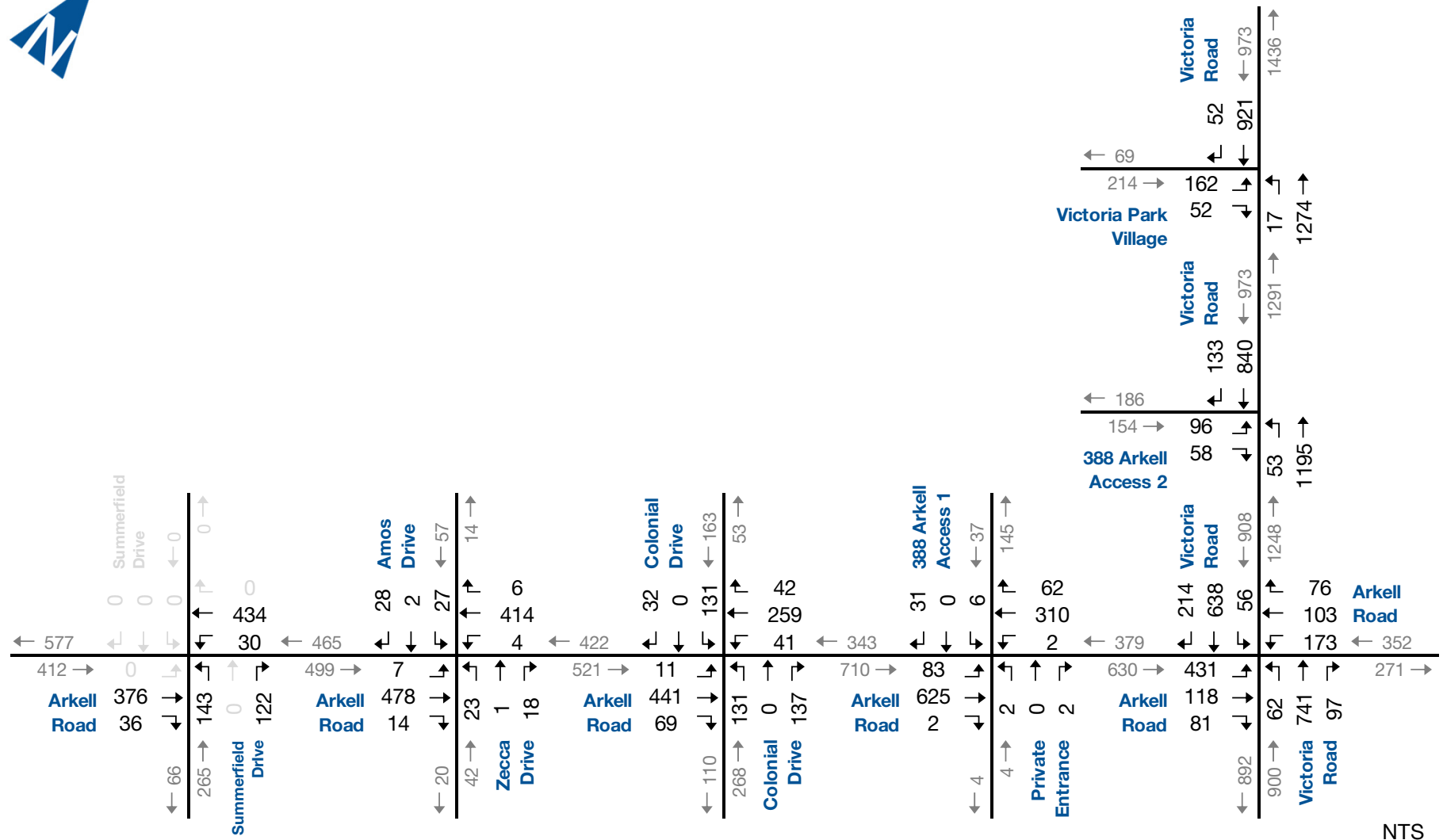
- ▶ Arkell Road and Colonial Road:
 - Northbound left-through-right movement – LOS F, v/c 0.97 during the AM peak hour and LOS E, v/c 0.67 during the PM peak hour; and
 - Southbound left-through-right movement – LOS F, v/c 0.98 during the AM peak hour and LOS F, v/c 0.60 during the PM peak hour.
- ▶ 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:

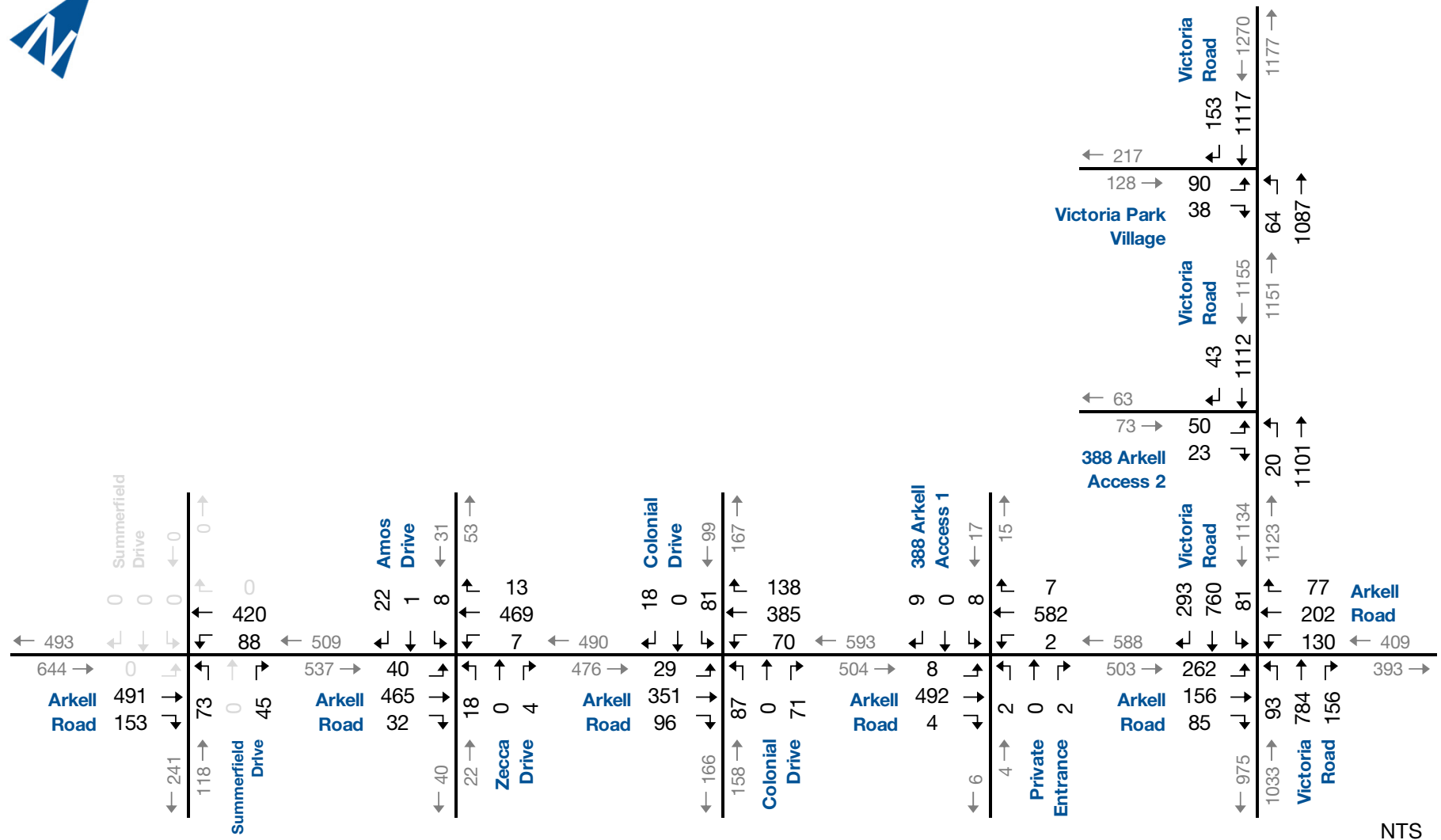


- Eastbound left-turn movement – LOS F, v/c 5.34 during the AM peak hour and LOS F v/c 5.44 during the PM peak hour; and
- Overall intersection – LOS F during the AM and PM peak hours.

Appendix F contains the detailed supporting Synchro 9 reports.







2026 PM Background Traffic Forecasts

TABLE 3.9: 2026 AM BACKGROUND TRAFFIC OPERATIONS SUMMARY

| Analysis Period | Intersection | Control Type | MOE | Direction / Movement / Approach | | | | | | | | | | | | | | | | |
|-----------------|--|--------------|---------------------------|---------------------------------|----------------|----------------|----------|---------------------|----------------|---------|----------|--------------------|------------------|---------|----------------|--------------------|------------------|------------------|----------|---------|
| | | | | Eastbound | | | | Westbound | | | | Northbound | | | | Southbound | | | | Overall |
| | | | | Left | Through | Right | Approach | Left | Through | Right | Approach | Left | Through | Right | Approach | Left | Through | Right | Approach | |
| AM Peak Hour | 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 | < 20 0.15 1 | > > > > | C 20 | < 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 - - - | > > > > | 1 | < 82 0.97 10 - | > > > > | F 82 | < 116 0.98 8 - | > > > > | F 116 | 32 | | |
| | 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 - - - | A 0 - - - | > > > > | 0 | < 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 |
| | Victoria Road & Victoria Park Village Road | TWSC | LOS Delay V/C Q | F 2191 5.34 21 | | C 21 0.20 1 | F 1664 | | | | | 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 | Control Type | MOE | Direction / Movement / Approach | | | | | | | | | | | | | | | | | |
|-----------------|--|--------------|---------------------------|---------------------------------|----------------|---------------|----------|--------------------|----------------|---------|----------|--------------------|------------------|---------|---------------|--------------------|------------------|------------------|----------|---------|------|
| | | | | Eastbound | | | | Westbound | | | | Northbound | | | | Southbound | | | | Overall | |
| | | | | Left | Through | Right | Approach | Left | Through | Right | Approach | Left | Through | Right | Approach | Left | Through | Right | Approach | | |
| PM Peak Hour | Arkell Road & Summerfield Drive | TWSC | LOS Delay V/C Q Ex Avail. | | A 0 - - - | > > > > | 0 | A 9 0.10 0 60 60 | A 9 - - - | > > > > | 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 | < 27 0.13 0 | D 27 | < < < < | 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 | < 45 0.67 4 - | E 45 | < < < < | F 53 0.60 3 - | > > > > | F 53 | 10 | | | |
| | 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 - - - | A 0 - - - | > > > > | 0 | < 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 -25 | C 29 0.67 54 - | > > > > | D 39 | C 22 0.41 26 20 -6 | 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 | F 1712 | | | | | B 15 0.16 1 | A 0 - - | | 1 | | A 0 - - | > > > > | 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

RBT - Roundabout

< - 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 above-noted 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:

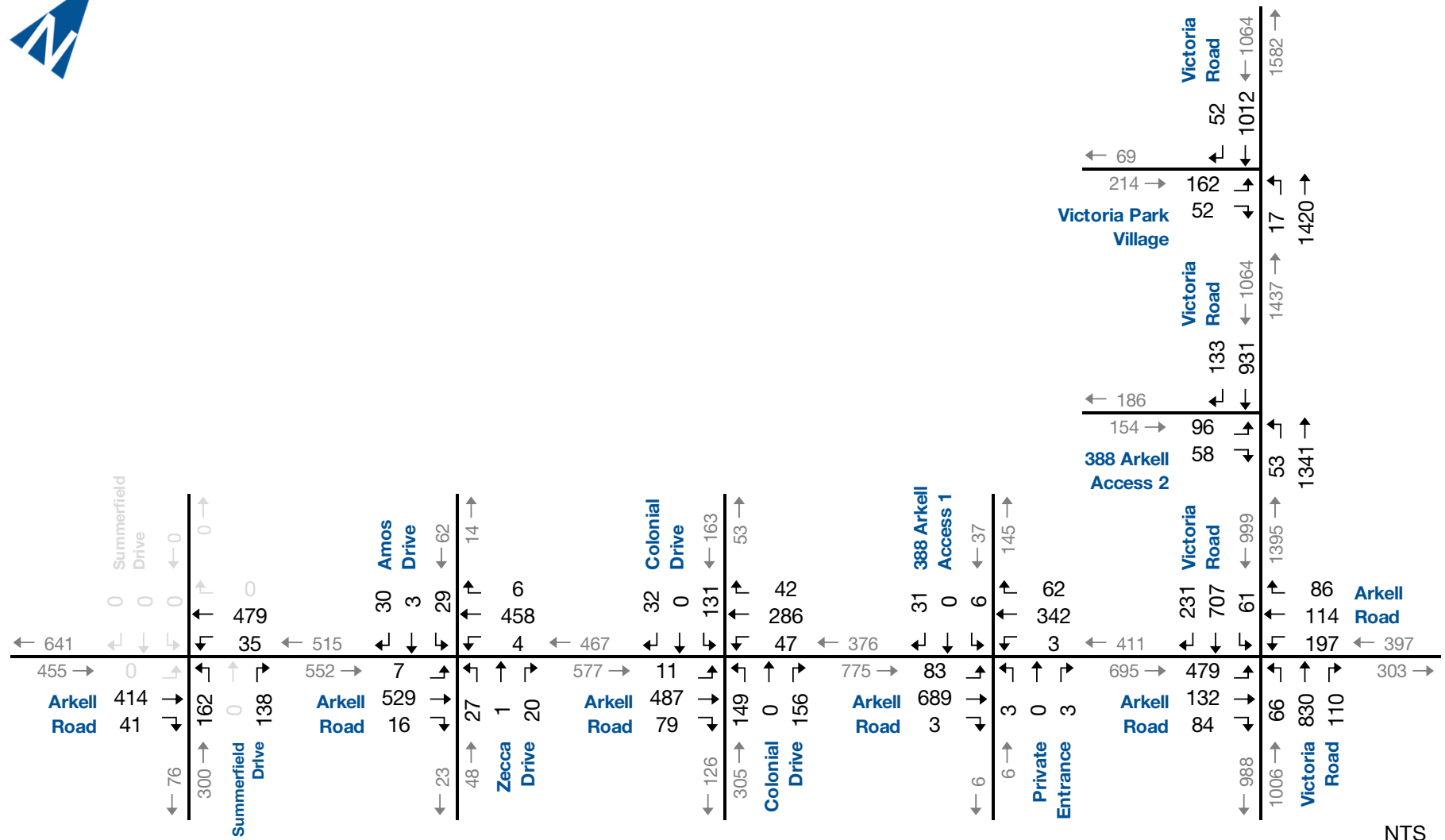
- ▶ Arkell Road and Colonial Road:
 - Northbound left-through-right movement – LOS F, v/c 1.26 during the AM peak hour and LOS F, v/c 0.91 during the PM peak hour;
 - Southbound left-through-right movement – LOS F, v/c 1.28 during the AM peak hour and LOS F, v/c 0.76 during the PM peak hour; and
 - Overall 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.





NTS



2031 AM Background Traffic Forecasts

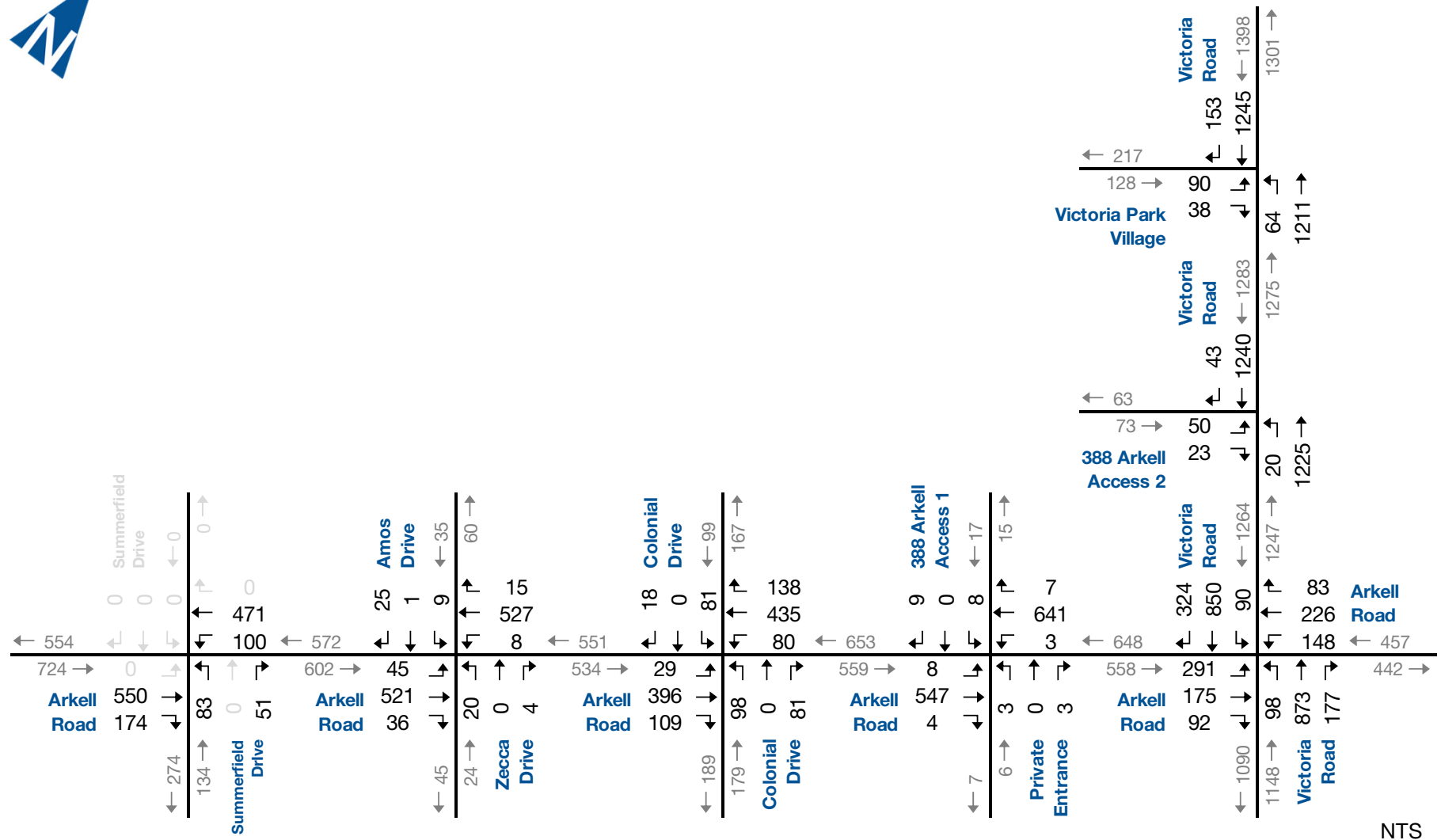


TABLE 3.11: 2031 AM BACKGROUND TRAFFIC OPERATIONS SUMMARY

| Analysis Period | Intersection | Control Type | MOE | Direction / Movement / Approach | | | | | | | | | | | | | | | | | |
|-----------------|--|--------------|---------------------------|---------------------------------|----------------|----------------|----------|---------------------|----------------|---------|----------|--------------------|------------------|---------|----------|--------------------|------------------|------------------|----------|---------|------|
| | | | | Eastbound | | | | Westbound | | | | Northbound | | | | Southbound | | | | Overall | |
| | | | | Left | Through | Right | Approach | Left | Through | Right | Approach | Left | Through | Right | Approach | Left | Through | Right | Approach | | |
| AM Peak Hour | Arkell Road & Summerfield Drive | TWSC | LOS Delay V/C Q Ex Avail. | | A 0 - - - | > > > > | 0 | A 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 0.00 0 - | A 0 - - - | > > > > | 0 | < 24 0.21 1 | < < < < | > > > > | C 24 | < < < < | 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 60 60 | A 0 - - - | > > > > | 0 | A 0.06 0 60 60 | A 0 - - - | > > > > | 1 | < 181 1.26 16 - | < < < < | > > > > | F 181 | < < < < | F 229 1.28 11 - | > > > > | F 229 | 66 | |
| | 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 0.00 - - - | A 0 - - - | > > > > | 0 | < 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 | | C 24 0.23 1 | F 2653 | | | | | 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

| Analysis Period | Intersection | Control Type | MOE | Direction / Movement / Approach | | | | | | | | | | | | | | | | |
|-----------------|--|--------------|---------------------------|---------------------------------|--------------|-------------|----------|--------------------|--------------|-------|----------|--------------------|----------------|-------------|--------------------|----------------|------------------|-------|----------|---------|
| | | | | Eastbound | | | | Westbound | | | | Northbound | | | | Southbound | | | | Overall |
| | | | | Left | Through | Right | Approach | Left | Through | Right | Approach | Left | Through | Right | Approach | Left | Through | Right | Approach | |
| PM Peak Hour | 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 | < 35 0.17 1 | D 35 | < | 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 | > | 1 | < F 88 0.91 7 | F 88 | < | F 88 0.76 5 | > | F 88 | 17 | | |
| | 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 -9 | 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.



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; and
- ▶ **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

| Analysis Period | Intersection | Control Type | MOE | Direction / Movement / Approach | | | | | | | | | | | | | | | | |
|-----------------|--|--------------|--------|---------------------------------|---------|-------|----------|-----------|---------|-------|----------|------------|---------|-------|----------|------------|---------|-------|----------|---------|
| | | | | Eastbound | | | | Westbound | | | | Northbound | | | | Southbound | | | | Overall |
| | | | | Left | Through | Right | Approach | Left | Through | Right | Approach | Left | Through | Right | Approach | Left | Through | Right | Approach | |
| AM Peak Hour | Arkell Road & Colonial Road | TCS | LOS | C | C | > | C | C | B | > | B | < | C | > | C | < | B | > | B | C |
| | | | Delay | 21 | 23 | > | 23 | 34 | 17 | > | 19 | < | 22 | > | 22 | < | 20 | > | 20 | 22 |
| | | | V/C | 0.03 | 0.76 | > | | 0.24 | 0.45 | > | | < | 0.50 | > | | < | 0.31 | > | | |
| | | | Q | 4 | 130 | > | | 16 | 64 | > | | < | 76 | > | | < | 40 | > | | |
| | Victoria Road & Arkell Road | TCS | Ex | 60 | - | > | | 60 | - | > | | < | - | > | | < | - | > | | |
| | | | Avail. | 56 | - | > | | 44 | - | > | | < | - | > | | < | - | > | | |
| | | | LOS | D | C | > | D | C | D | > | C | B | C | > | C | B | C | > | C | C |
| | | | Delay | 44 | 30 | > | 39 | 26 | 41 | > | 34 | 18 | 20 | > | 26 | 19 | 23 | > | 24 | 29 |
| | Victoria Road & Victoria Park Village Road | TCS | V/C | 0.85 | 0.56 | > | | 0.48 | 0.77 | > | | 0.25 | 0.22 | > | | 0.26 | 0.50 | > | | |
| | | | Q | 82 | 58 | > | | 42 | 60 | > | | 16 | 114 | > | | 15 | 94 | > | | |
| | | | Ex | 40 | - | > | | 20 | - | > | | 90 | - | > | | 50 | - | > | | |
| | | | Avail. | -42 | - | > | | -22 | - | > | | 74 | - | > | | 35 | - | > | | |

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

| Analysis Period | Intersection | Control Type | MOE | Direction / Movement / Approach | | | | | | | | | | | | | | | | |
|--|--|--------------|--------|---------------------------------|---------|-------|----------|-----------|---------|-------|----------|------------|---------|-------|----------|------------|---------|-------|----------|---------|
| | | | | Eastbound | | | | Westbound | | | | Northbound | | | | Southbound | | | | Overall |
| | | | | Left | Through | Right | Approach | Left | Through | Right | Approach | Left | Through | Right | Approach | Left | Through | Right | Approach | |
| AM Peak Hour | Arkell Road & Colonial Road | TCS | LOS | C | B | > | B | C | B | > | B | < | B | > | B | < | B | > | B | B |
| | | | Delay | 27 | 17 | > | 17 | 26 | 18 | > | 19 | < | 19 | > | 19 | < | 18 | > | 18 | 19 |
| | | | V/C | 0.11 | 0.61 | > | | 0.26 | 0.70 | > | | < | 0.29 | > | | < | 0.17 | > | | |
| | | | Q | 8 | 90 | > | | 20 | 108 | > | | < | 33 | > | | < | 19 | > | | |
| | Victoria Road & Arkell Road | TCS | Ex | 60 | - | > | | 60 | - | > | | < | - | > | | < | - | > | | |
| | | | Avail. | 52 | - | > | | 40 | - | > | | < | - | > | | < | - | > | | |
| | | | LOS | D | C | > | D | C | D | > | D | B | C | > | C | B | C | > | C | C |
| | | | Delay | 49 | 32 | > | 41 | 27 | 44 | > | 38 | 19 | 21 | > | 25 | 19 | 24 | > | 25 | 29 |
| | Victoria Road & Victoria Park Village Road | TCS | V/C | 0.79 | 0.59 | > | | 0.43 | 0.82 | > | | 0.38 | 0.31 | > | | 0.35 | 0.56 | > | | |
| | | | Q | 50 | 73 | > | | 35 | 97 | > | | 22 | 119 | > | | 21 | 113 | > | | |
| | | | Ex | 40 | - | > | | 20 | - | > | | 90 | - | > | | 50 | - | > | | |
| | | | Avail. | -10 | - | > | | -15 | - | > | | 68 | - | > | | 29 | - | > | | |
| Victoria Road & Victoria Park Village Road | TCS | LOS | D | | D | D | | | | | B | A | | A | A | > | A | A | | |
| | | Delay | 40 | | 38 | 40 | | | | | 15 | 5 | | 6 | 7 | > | 7 | 8 | | |
| | | V/C | 0.51 | | 0.24 | | | | | | 0.28 | 0.53 | | 0.61 | 0.61 | > | 0.61 | | | |
| | | Q | 33 | | 9 | | | | | | 16 | 69 | | 94 | 94 | > | 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.





Figure 5.1

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 Measure | Units/ GFA | AM Peak Hour | | | | PM Peak Hour | | | |
|--|-----------------|---------------|------------------|-----------|-----------|-----------|------------------|-----------|-----------|-----------|
| | | | Rate | In | Out | Total | Rate | In | 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 |
| Total Trips | | | | 14 | 42 | 56 | | 44 | 26 | 70 |

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

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

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

$$^4 \ln(t) = 0.89 \ln(x) - 0.02$$



5.3 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.

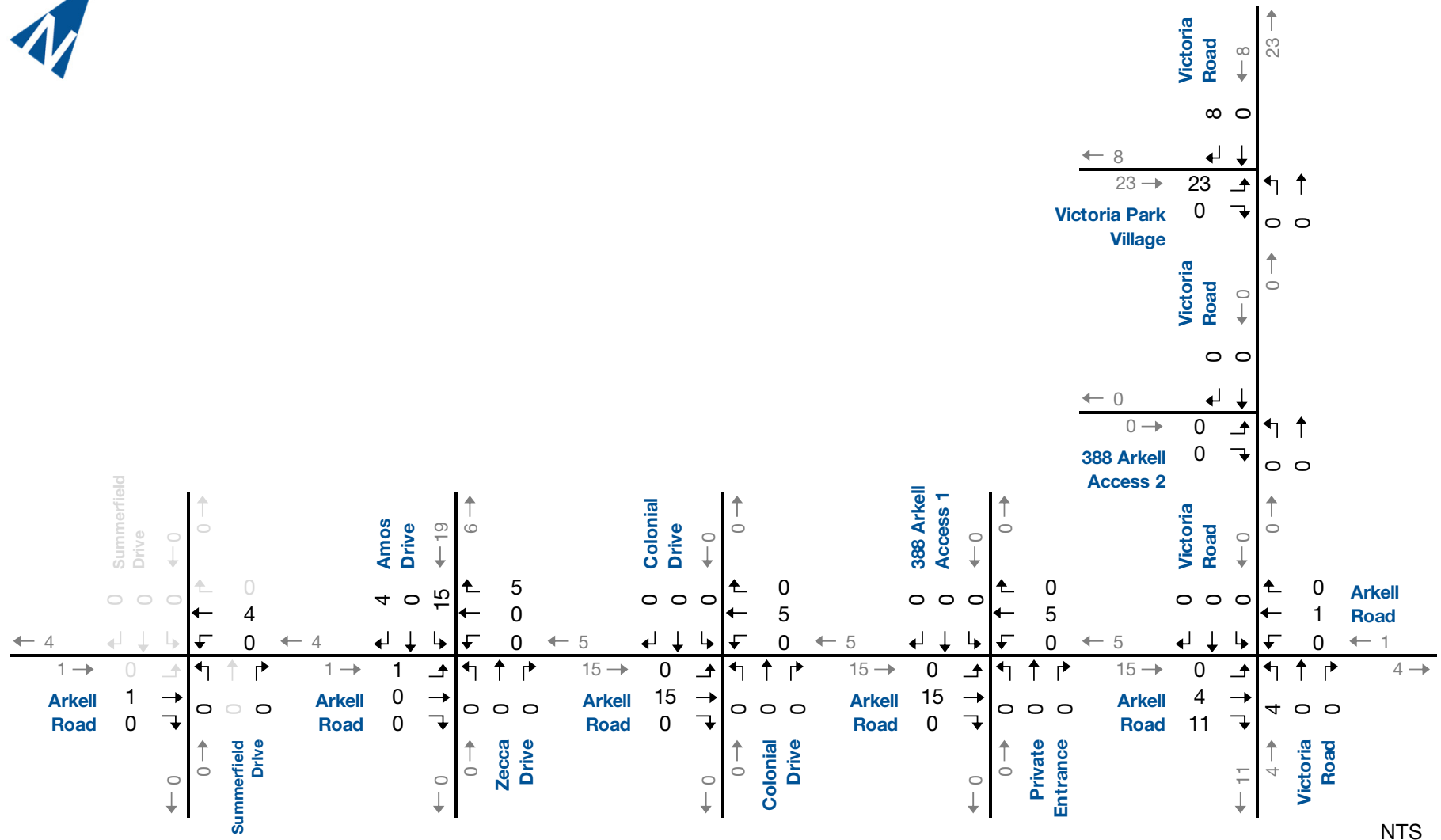
TABLE 5.2: TRIP DISTRIBUTION

| 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.

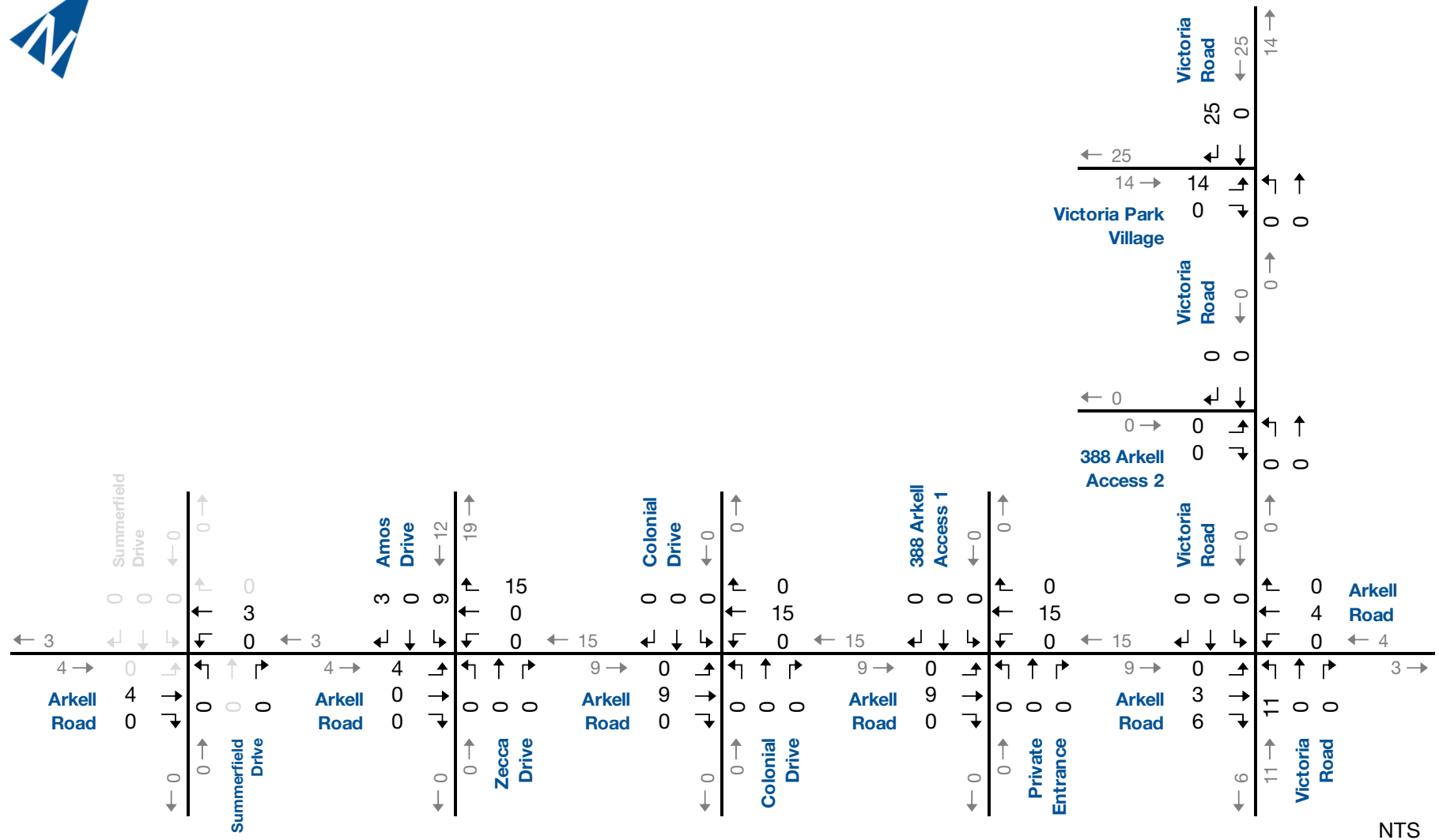




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AM Development Traffic Forecasts



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:

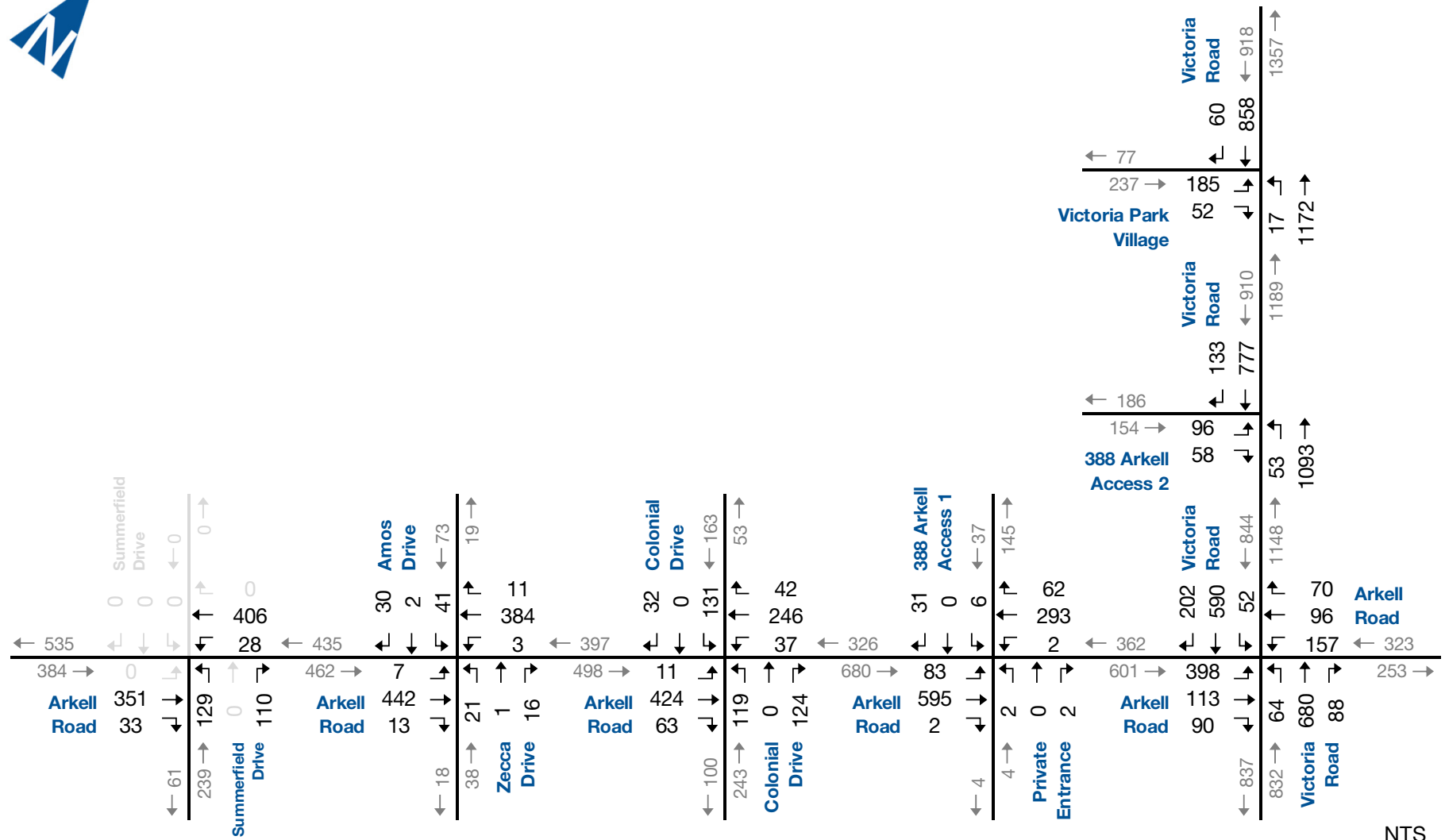
- ▶ Arkell Road and Colonial Road:
 - Northbound left-through-right movement – LOS F, v/c 0.82 during the AM peak hour; and
 - Southbound left-through-right movement – LOS F, v/c 0.87 during the AM peak hour and LOS E, v/c 0.53 during the PM peak hour.
- ▶ Victoria Road and Arkell Road:
 - Eastbound 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.

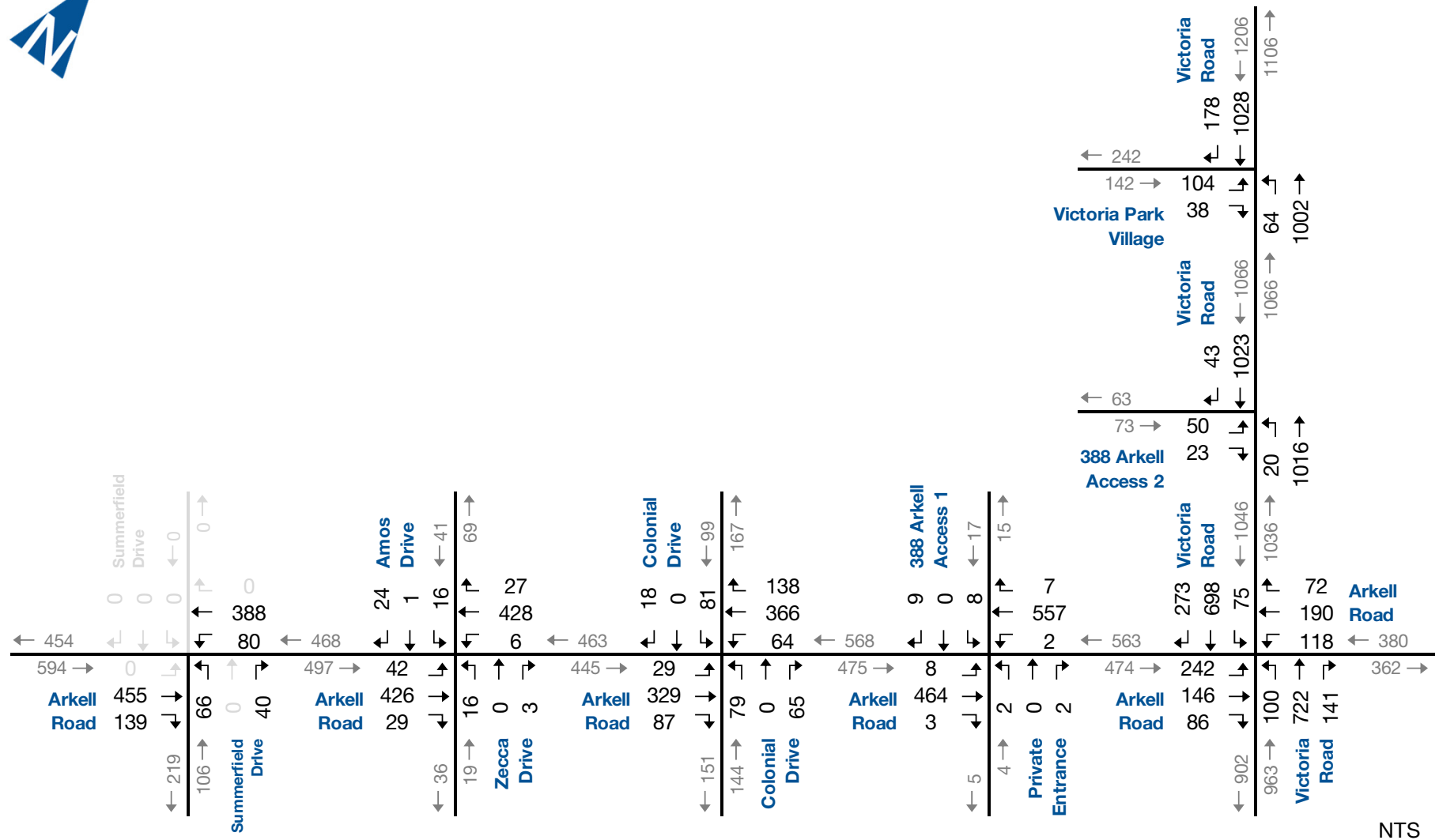




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2021 AM Total Traffic Forecasts



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2021 PM Total Traffic Forecasts

TABLE 6.1: 2021 AM TOTAL TRAFFIC OPERATIONS SUMMARY

| Analysis Period | Intersection | Control Type | MOE | Direction / Movement / Approach | | | | | | | | | | | | | | | | | |
|-----------------|--|--------------|---------------------------|---------------------------------|----------------|----------------|----------|---------------------|----------------|---------|----------|--------------------|------------------|---------|-----------------|--------------------|------------------|------------------|----------|---------|------|
| | | | | Eastbound | | | | Westbound | | | | Northbound | | | | Southbound | | | | Overall | |
| | | | | Left | Through | Right | Approach | Left | Through | Right | Approach | Left | Through | Right | Approach | Left | Through | Right | Approach | | |
| AM Peak Hour | 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 0.00 0 | A 0 - - - | > > > > | 0 | < 18 0.13 0 | > > > > | C 18 | < 19 0.23 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 0.04 0 60 60 | A 0 - - - | > > > > | 1 | < F 52 0.82 7 - | > > > > | F 52 | < F 82 0.87 7 - | > > > > | F 82 | 22 | | | |
| | 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 0.00 - - - | A 0 - - - | > > > > | 0 | < 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 -11 | 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 | | C 19 0.18 1 | F 1454 | | | | | 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

AWS - All-Way Stop Control

RBT - Roundabout

< - Shared Left Movement

> - Shared Right Movement



TABLE 6.2: 2021 PM TOTAL TRAFFIC OPERATIONS SUMMARY

| Analysis Period | Intersection | Control Type | MOE | Direction / Movement / Approach | | | | | | | | | | | | | | | | | |
|-----------------|--|--------------|---------------------------|---------------------------------|----------------|---------------|----------|--------------------|----------------|-------|----------|--------------------|------------------|---------|----------|--------------------|------------------|------------------|----------|---------|------|
| | | | | Eastbound | | | | Westbound | | | | Northbound | | | | Southbound | | | | Overall | |
| | | | | Left | Through | Right | Approach | Left | Through | Right | Approach | Left | Through | Right | Approach | Left | Through | Right | Approach | | |
| PM Peak Hour | Arkell Road & Summerfield Drive | TWSC | LOS Delay V/C Q Ex Avail. | | A 0 - - - | > > > > | 0 | A 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 | < 25 0.10 0 | C 25 | < < < < | C 25 | C 18 0.13 1 | > > > | 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 | < 34 0.55 3 - | D 34 | < < < < | D 34 | E 43 0.53 3 - | > > > | E 43 | 8 | | |
| | 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 - - - | A 0 - - - | > > > | 0 | < 19 0.02 0 - | C 19 | < < < < | 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 |
| | Victoria Road & Victoria Park Village Road | TWSC | LOS Delay V/C Q | F 2123 4.96 14 | | D 30 0.22 1 | F 1567 | | | | | 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:

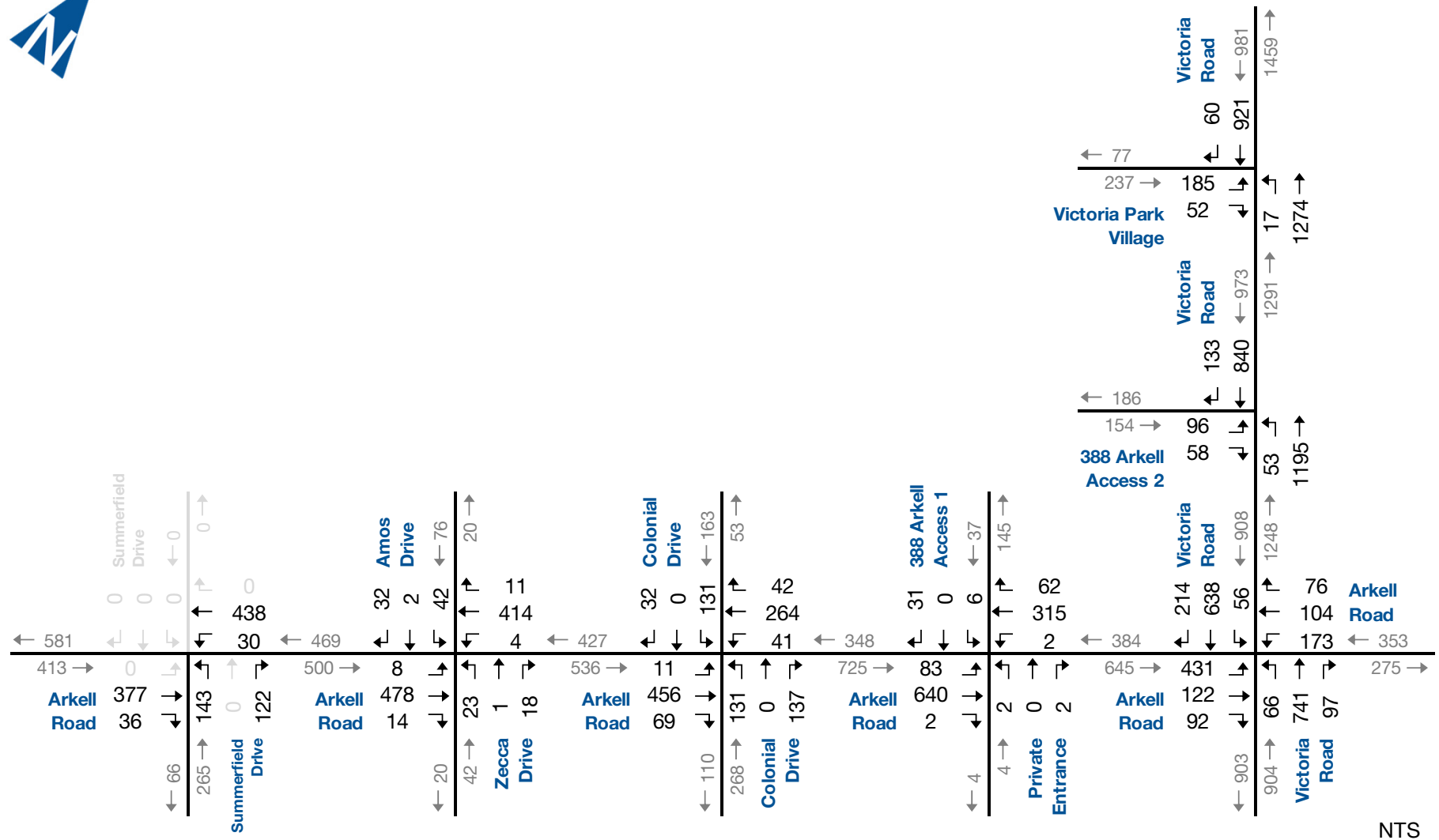
- ▶ Arkell Road and Colonial Road:
 - Northbound left-through-right movement – LOS F, v/c 0.99 during the AM peak hour and LOS E, v/c 0.69 during the PM peak hour; and
 - Southbound left-through-right movement – LOS F, v/c 1.03 during the AM peak hour and LOS F, v/c 0.62 during the PM peak hour.
- ▶ 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:

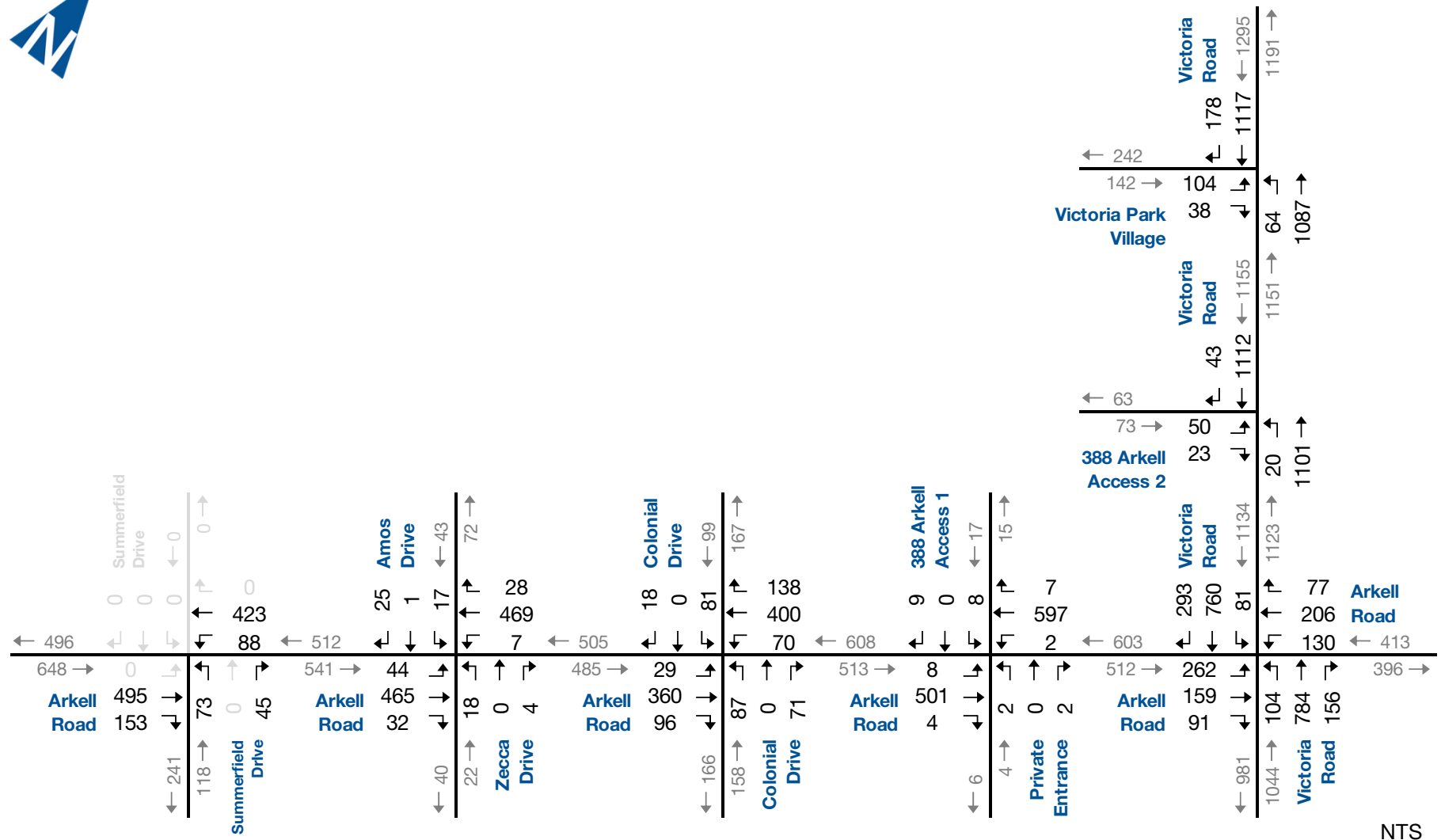


- Eastbound left-turn movement – LOS F, v/c 6.13 during the AM peak hour and LOS F v/c 6.71 during the PM peak hour; and
- Overall intersection – LOS F during the AM and PM peak hours.

Appendix K provides the detailed supporting Synchro reports.







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2026 PM Total Traffic Forecasts

TABLE 6.3: 2026 AM TOTAL TRAFFIC OPERATIONS SUMMARY

| Analysis Period | Intersection | Control Type | MOE | Direction / Movement / Approach | | | | | | | | | | | | | | | | |
|-----------------|--|--------------|---------------------------|---------------------------------|----------------|------------------|----------|---------------------|----------------|---------|----------|--------------------|--------------------|---------|------------------|--------------------|--------------------|---------|----------|---------|
| | | | | Eastbound | | | | Westbound | | | | Northbound | | | | Southbound | | | | Overall |
| | | | | Left | Through | Right | Approach | Left | Through | Right | Approach | Left | Through | Right | Approach | Left | Through | Right | Approach | |
| AM Peak Hour | 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 0.00 0 | A 0 - - - | > > > > | 0 | < 20 0.16 1 | > > > > | C 20 | < 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 0.05 0 60 60 | A 0 - - - | > > > > | 1 | < 90 0.99 10 - - | > > > > | F 90 | < 131 1.03 9 - - | > > > > | F 131 | 35 | | |
| | 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 0.00 - - - | A 0 - - - | > > > > | 0 | < 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 | |
| | Victoria Road & Victoria Park Village Road | TWSC | LOS Delay V/C Q | F 2545 6.13 24 | | C 21 0.20 1 | F 1993 | | | | | 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

| Analysis Period | Intersection | Control Type | MOE | Direction / Movement / Approach | | | | | | | | | | | | | | | | |
|-----------------|--|--------------|---------------------------|---------------------------------|----------------|-----------------|----------|--------------------|----------------|---------|----------|--------------------|-------------------|---------|-----------------|--------------------|------------------|---------|----------|---------|
| | | | | Eastbound | | | | Westbound | | | | Northbound | | | | Southbound | | | | Overall |
| | | | | Left | Through | Right | Approach | Left | Through | Right | Approach | Left | Through | Right | Approach | Left | Through | Right | Approach | |
| PM Peak Hour | 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 | < 28 0.13 0 | > > > > | D 28 | < 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 | < 48 0.69 5 - - | > > > > | E 48 | < 57 0.62 3 - - | > > > > | F 57 | 10 | | |
| | 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 - - - | A 0 - - - | > > > > | 0 | < 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 -25 | 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 | | | | | 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:

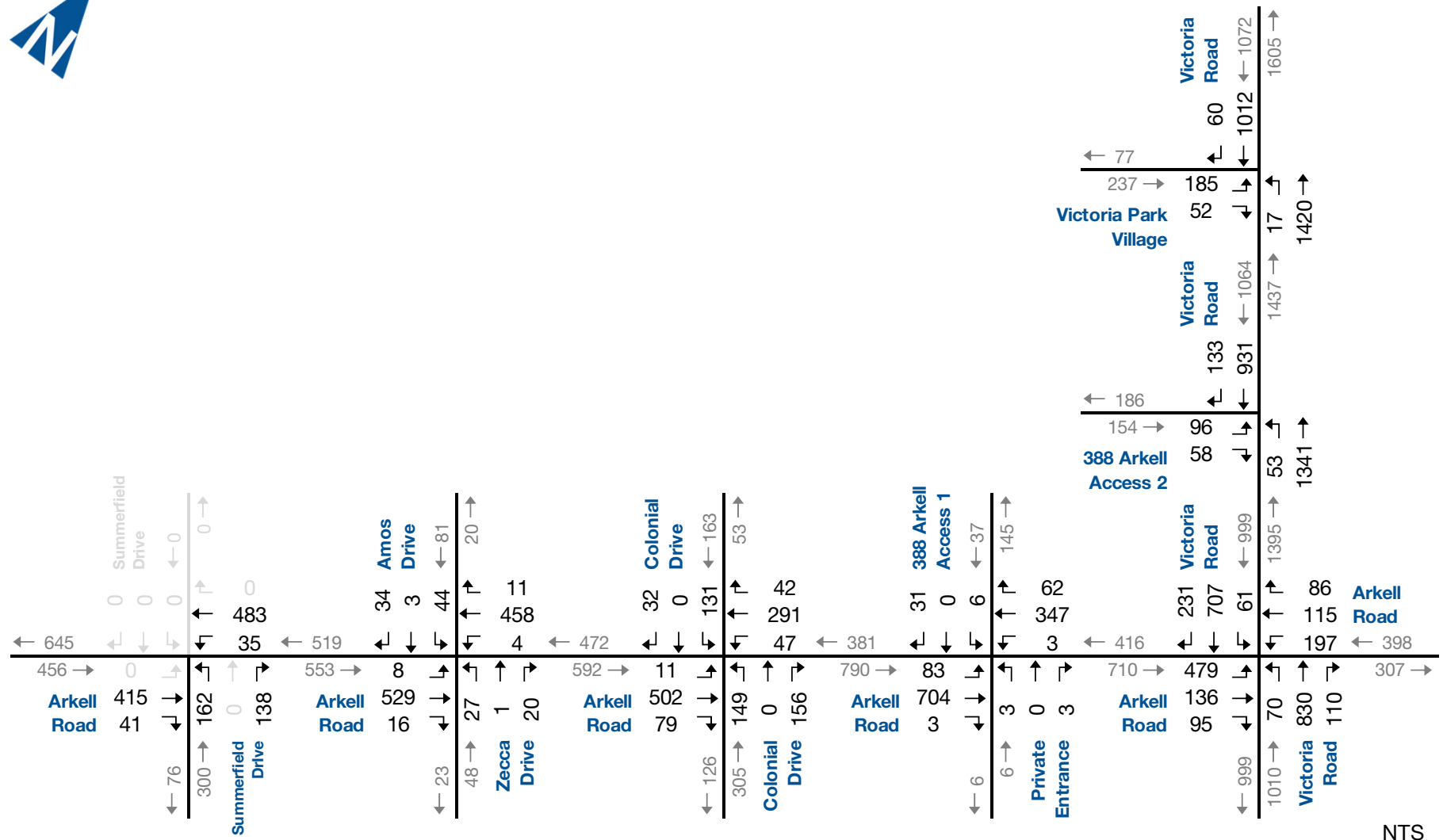
- ▶ Arkell Road and Zecca Drive/Amos Drive:
 - Northbound left-through-right movement – LOS E, v/c 0.18 during the PM peak hour.
- ▶ Arkell Road and Colonial Road:
 - Northbound left-through-right movement – LOS F, v/c 1.31 during the AM peak hour and LOS F, v/c 0.94 during the PM peak hour;
 - Southbound 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



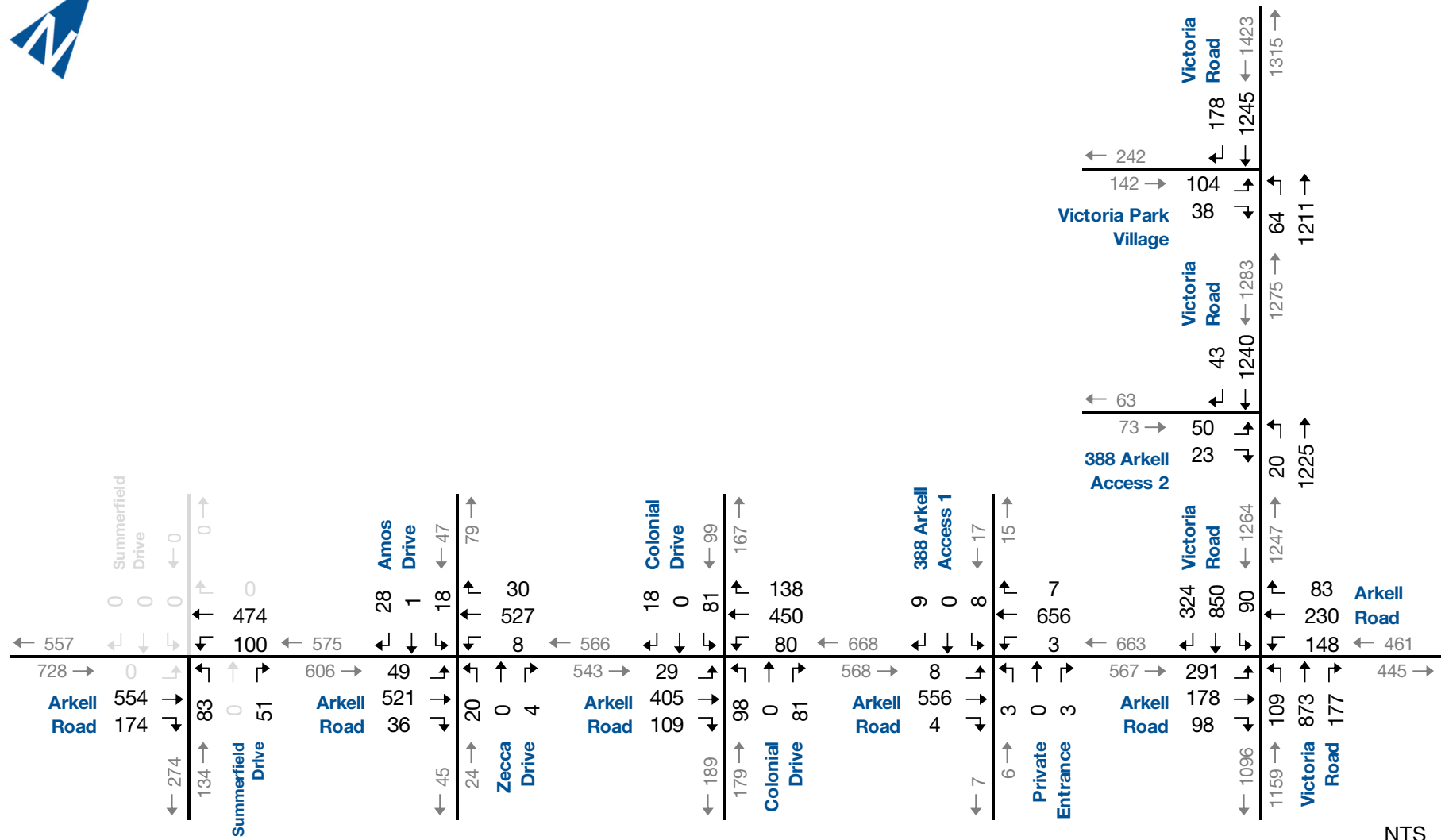
- Overall intersection – LOS F during the AM and PM peak hours.
- ▶ Victoria Road and 388 Access 2:
 - Northbound through movement – LOS F, v/c 1.17 during the AM peak hour and LOS D, v/c 1.04 during the PM peak hour;
 - Southbound through movement – LOS D, v/c 1.02 during the PM peak hour; and
 - Overall 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.





NTS



NTS



2031 PM Total Traffic Forecasts

TABLE 6.5: 2031 AM TOTAL TRAFFIC OPERATIONS SUMMARY

| Analysis Period | Intersection | Control Type | MOE | Direction / Movement / Approach | | | | | | | | | | | | | | | | |
|-----------------|--|--------------|---------------------------|---------------------------------|----------------|----------------|----------|---------------------|----------------|---------|----------|--------------------|------------------|-------|--------------------|------------------|------------------|-------|----------|---------|
| | | | | Eastbound | | | | Westbound | | | | Northbound | | | | Southbound | | | | Overall |
| | | | | Left | Through | Right | Approach | Left | Through | Right | Approach | Left | Through | Right | Approach | Left | Through | Right | Approach | |
| AM Peak Hour | 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 | < 24 0.21 1 | > > > > | C 24 | < 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 - - - | > > > > | 1 | < 202 1.31 17 - | > > > > | F 202 | < 255 1.33 11 - | > > > > | F 255 | 72 | | |
| | 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 - - | A 0 - - | > > > > | 0 | < 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 -18 | 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

| Analysis Period | Intersection | Control Type | MOE | Direction / Movement / Approach | | | | | | | | | | | | | | | | |
|-----------------|--|--------------|---------------------------|---------------------------------|--------------|-------------|----------|--------------------|--------------|-------|----------|--------------------|----------------|-------|-------------|--------------------|----------------|------------------|----------|---------|
| | | | | Eastbound | | | | Westbound | | | | Northbound | | | | Southbound | | | | Overall |
| | | | | Left | Through | Right | Approach | Left | Through | Right | Approach | Left | Through | Right | Approach | Left | Through | Right | Approach | |
| PM Peak Hour | 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 | > | 0 | < 37 0.18 1 | E 37 | > | E 37 | < | 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 | > | 1 | < 99 0.94 8 | F 99 | > | F 99 | < | F 96 0.79 5 | > | F 96 | 19 |
| | 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 | < 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 -9 | 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 | | E 43 0.31 1 | F 3600 | | | | | 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 | 2018 | | 2021 | | 2026 | | 2031 | |
|-------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Existing + Growth | 4609 | 100% | 4889 | 79.1% | 4987 | 79.4% | 5136 | 79.9% |
| Background Developments | - | 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 | 2018 | | 2021 | | 2026 | | 2031 | |
|-------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Existing + Growth | 5213 | 100% | 5533 | 80.4% | 5644 | 80.7% | 5813 | 81.2% |
| Background Developments | - | 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 conditions, Signal Optimization |
| | PM | No impact from development | |
| Southbound Through-Right | AM | v/c - 1.31 to 1.33 | Four lane cross-section north of Arkell Road warranted by 2020 background conditions, Signal Optimization |
| | PM | No impact from development | |
| Victoria Road and 388 Access 2 | | | |
| Northbound Through | AM | No impact from development | Right-turn lane warranted under existing conditions, Signal Optimization |
| | PM | v/c - 0.91 to 0.98 | |
| Victoria Road and Victoria Park Village 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 optimization |
| | PM | No impact from development | |
| 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 conditions, Signal Optimization |
| | PM | No impact from development | |
| Southbound Through-Right | AM | v/c - 1.42 to 1.44 | Four lane cross-section north of Arkell Road warranted by 2020 background conditions, Signal Optimization |
| | PM | v/c - 1.70 to 1.71 | |
| Victoria Road and 388 Access 2 | | | |
| Northbound Through | AM | No impact from development | Right-turn lane warranted under existing conditions, Signal Optimization |
| | PM | v/c - 0.91 to 0.98 | |
| Victoria Road and Victoria Park Village 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 | |
| Southbound Left-Through Right | AM | At LOS F - Increased delay | |
| | PM | No impact from development | |
| 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 optimization |
| | PM | QES - 41m to 42m | |
| 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 conditions, Signal Optimization |
| | PM | No impact from development | |
| Southbound Through-Right | AM | v/c - 1.59 to 1.61 | Four lane cross-section north of Arkell Road warranted by 2020 background conditions, Signal Optimization |
| | PM | v/c - 1.93 to 1.94 | |
| Victoria Road and 388 Access 2 | | | |
| Northbound Through | AM | No impact from development | Right-turn lane warranted under existing conditions, Signal Optimization |
| | PM | v/c - 0.91 to 0.98 | |
| 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 Village 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 | | Existing (2018) | | Warranted Under Existing? | 2021 Background ¹ | | Warranted Under Background? | Development Generated | | Warranted with Development? | Additional Trips to Warrant | Number of Residential Units* |
|--|--------------------------|----|-----------------|-----|---------------------------|------------------------------|-----|-----------------------------|-----------------------|----|-----------------------------|-----------------------------|------------------------------|
| | | | AM | PM | | AM | PM | | AM | PM | | | |
| Arkell Road and Victoria Road Eastbound Dual Left-Turn Lanes | 300 vph during peak hour | | 303 | 180 | NO | 322 | 191 | YES [†] | 0 | 0 | YES [†] | - | - |
| Victoria Road 4-Lane Cross-Section North of Arkell Road | 900 vph/lane | NB | 920 | 777 | NO | 976 | 825 | YES | 0 | 0 | YES | - | - |
| | | SB | 577 | 805 | NO | 613 | 854 | NO | 0 | 0 | NO | 46 | 90 |
| Victoria Road 4-Lane Cross-Section South of Arkell Road | 900 vph/lane | NB | 664 | 725 | NO | 705 | 769 | NO | 4 | 11 | NO | 131 | 257 |
| | | 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

| Analysis Period | Intersection | Control Type | MOE | Direction / Movement / Approach | | | | | | | | | | | | | | | | |
|--|--|--------------|-----------|---------------------------------|---------|-------|----------|-----------|---------|-------|----------|------------|---------|-------|----------|------------|---------|-------|----------|---------|
| | | | | Eastbound | | | | Westbound | | | | Northbound | | | | Southbound | | | | Overall |
| | | | | Left | Through | Right | Approach | Left | Through | Right | Approach | Left | Through | Right | Approach | Left | Through | Right | Approach | |
| AM Peak Hour | Arkell Road & Colonial Road | TCS | LOS | C | C | > | C | C | B | > | B | < | C | > | C | < | C | > | C | C |
| | | | Delay | 21 | 24 | > | 24 | 35 | 17 | > | 19 | < | 23 | > | 23 | < | 21 | > | 21 | 22 |
| | | | V/C | 0.03 | 0.77 | > | | 0.25 | 0.45 | > | | < | 0.51 | > | | < | 0.32 | > | | |
| | | | Q | 4 | 135 | > | | 17 | 64 | > | | < | 79 | > | | < | 41 | > | | |
| | Victoria Road & Arkell Road | TCS | Ex Avail. | 60 | - | > | | 60 | - | > | | < | - | > | | < | - | > | | |
| | | | | 56 | - | > | | 43 | - | > | | < | - | > | | < | - | > | | |
| | | | LOS | D | C | > | D | C | D | > | C | B | C | > | C | B | C | > | C | C |
| | | | Delay | 44 | 30 | > | 39 | 26 | 41 | > | 34 | 18 | 20 | > | 26 | 19 | 23 | > | 24 | 30 |
| | Victoria Road & Victoria Park Village Road | TCS | V/C | 0.85 | 0.60 | > | | 0.50 | 0.77 | > | | 0.26 | 0.22 | > | | 0.26 | 0.50 | > | | |
| | | | Q | 82 | 62 | > | | 42 | 60 | > | | 17 | 114 | > | | 15 | 94 | > | | |
| | | | Ex Avail. | 40 | - | > | | 20 | - | > | | 90 | - | > | | 50 | - | > | | |
| | | | | -42 | - | > | | -22 | - | > | | 74 | - | > | | 35 | - | > | | |
| Victoria Road & Victoria Park Village Road | TCS | LOS | D | | D | D | | | | | A | A | | A | A | > | A | A | | |
| | | Delay | 44 | | 35 | 42 | | | | | 8 | 7 | | 7 | 6 | > | 6 | 10 | | |
| | | 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

| Analysis Period | Intersection | Control Type | MOE | Direction / Movement / Approach | | | | | | | | | | | | | | | | |
|-----------------|------------------------------|--------------|--------|---------------------------------|---------|-------|----------|-----------|---------|-------|----------|------------|---------|-------|----------|------------|---------|-------|----------|---------|
| | | | | Eastbound | | | | Westbound | | | | Northbound | | | | Southbound | | | | Overall |
| | | | | Left | Through | Right | Approach | Left | Through | Right | Approach | Left | Through | Right | Approach | Left | Through | Right | Approach | |
| AM Peak Hour | Arkell Road & Colonial Road | TCS | LOS | C | B | > | B | C | B | > | B | < | C | > | C | < | B | > | B | B |
| | | | Delay | 27 | 17 | > | 17 | 26 | 18 | > | 19 | < | 20 | > | 20 | < | 19 | > | 19 | 19 |
| | | | V/C | 0.11 | 0.61 | > | | 0.26 | 0.70 | > | | < | 0.29 | > | | < | 0.17 | > | | |
| | | | Q | 9 | 92 | > | | 20 | 111 | > | | < | 34 | > | | < | 20 | > | | |
| | Victoria Road & Arkell Road | TCS | Ex | 60 | - | > | | 60 | - | > | | < | - | > | | < | - | > | | |
| | | | Avail. | 52 | - | > | | 40 | - | > | | < | - | > | | < | - | > | | |
| | | | LOS | D | C | > | D | C | D | > | D | B | C | > | C | B | C | > | C | C |
| | | | Delay | 49 | 32 | > | 41 | 27 | 44 | > | 39 | 20 | 21 | > | 25 | 19 | 24 | > | 25 | 29 |
| | Victoria Road & 388 Access 2 | TCS | V/C | 0.79 | 0.61 | > | | 0.44 | 0.82 | > | | 0.42 | 0.31 | > | | 0.35 | 0.56 | > | | |
| | | | Q | 50 | 76 | > | | 35 | 99 | > | | 24 | 119 | > | | 21 | 113 | > | | |
| | | | Ex | 40 | - | > | | 20 | - | > | | 90 | - | > | | 50 | - | > | | |
| | | | Avail. | -10 | - | > | | -15 | - | > | | 66 | - | > | | 29 | - | > | | |

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





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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 pre-consultation.

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@pts1.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:
 - 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).
- 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:
 - 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

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w: www.ptsl.com

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Appendix B

Detailed Turning Movement Count Data & Signal Timings



Arkell Rd @ Summerfield Dr

Morning Peak Diagram

Specified Period

From: 7:00:00

To: 9:00:00

One Hour Peak

From: 7:45:00

To: 8:45:00

Municipality: 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: 614

East Entering: 289

East Peds: 0

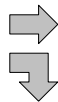
Peds Cross: X

| Heavys | Trucks | Cars | Totals |
|--------|--------|------|--------|
| 12 | 9 | 361 | 382 |

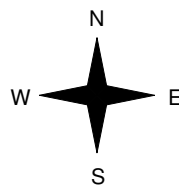


Arkell Rd

| Heavys | Trucks | Cars | Totals |
|--------|--------|------|--------|
| 6 | 4 | 215 | 225 |
| 4 | 0 | 26 | 30 |
| 10 | 4 | 241 | |



Summerfield Dr



| Cars | Trucks | Heavys | Totals |
|------|--------|--------|--------|
| 247 | 7 | 11 | 265 |
| 22 | 0 | 2 | 24 |
| 269 | 7 | 13 | |



Arkell Rd

| Cars | Trucks | Heavys | Totals |
|------|--------|--------|--------|
| 311 | 5 | 9 | 325 |

Peds Cross: X
West Peds: 0
West Entering: 255
West Leg Total: 637

| | |
|--------|----|
| Cars | 48 |
| Trucks | 0 |
| Heavys | 6 |
| Totals | 54 |



| | | | |
|--------|-----|-----|-----|
| Cars | 114 | 96 | 210 |
| Trucks | 2 | 1 | 3 |
| Heavys | 1 | 3 | 4 |
| Totals | 117 | 100 | |

Peds Cross: X
South Peds: 9
South Entering: 217
South Leg Total: 271

Comments

Arkell Rd @ Summerfield Dr

Mid-day Peak Diagram

Specified Period

From: 11:00:00

To: 14:00:00

One Hour Peak

From: 12:00:00

To: 13:00:00

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: 395

East Entering: 191

East Peds: 0

Peds Cross: X

| Heavys | Trucks | Cars | Totals |
|--------|--------|------|--------|
| 3 | 3 | 224 | 230 |



Arkell Rd

| Heavys | Trucks | Cars | Totals |
|--------|--------|------|--------|
| 3 | 4 | 179 | 186 |
| 2 | 0 | 70 | 72 |
| 5 | 4 | 249 | |



Summerfield Dr

| | |
|---------------|-----------|
| Cars | 84 |
| Trucks | 0 |
| Heavys | 2 |
| Totals | 86 |



| | | | |
|---------------|-----------|-----------|----|
| Cars | 52 | 18 | 70 |
| Trucks | 1 | 0 | 1 |
| Heavys | 0 | 0 | 0 |
| Totals | 53 | 18 | |

| Cars | Trucks | Heavys | Totals |
|------|--------|--------|--------|
| 172 | 2 | 3 | 177 |
| 14 | 0 | 0 | 14 |
| 186 | 2 | 3 | |



Arkell Rd



| Cars | Trucks | Heavys | Totals |
|------|--------|--------|--------|
| 197 | 4 | 3 | 204 |

Peds Cross: X

West Peds: 0

West Entering: 258

West Leg Total: 488

Peds Cross: X

South Peds: 3

South Entering: 71

South Leg Total: 157

Comments

Arkell Rd @ Summerfield Dr

Afternoon Peak Diagram

Specified Period

From: 15:00:00

To: 18:00:00

One Hour Peak

From: 16:45:00

To: 17:45:00

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: 758

East Entering: 376

East Peds: 1

Peds Cross: 8

| Heavys | Trucks | Cars | Totals |
|--------|--------|------|--------|
| 2 | 2 | 360 | 364 |

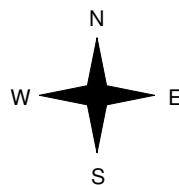


Arkell Rd

| Heavys | Trucks | Cars | Totals |
|--------|--------|------|--------|
| 0 | 3 | 342 | 345 |
| 3 | 1 | 122 | 126 |
| 3 | 4 | 464 | |



Summerfield Dr



| Cars | Trucks | Heavys | Totals |
|------|--------|--------|--------|
| 300 | 2 | 2 | 304 |
| 72 | 0 | 0 | 72 |
| 372 | 2 | 2 | |



Arkell Rd

| Cars | Trucks | Heavys | Totals |
|------|--------|--------|--------|
| 379 | 3 | 0 | 382 |

Peds Cross: 8
West Peds: 0
West Entering: 471
West Leg Total: 835

| | |
|--------|-----|
| Cars | 194 |
| Trucks | 1 |
| Heavys | 3 |
| Totals | 198 |



| | | | |
|--------|----|----|----|
| Cars | 60 | 37 | 97 |
| Trucks | 0 | 0 | 0 |
| Heavys | 0 | 0 | 0 |
| Totals | 60 | 37 | |

Peds Cross: 3
South Peds: 3
South Entering: 97
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

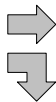
East Leg Total: 4053
 East Entering: 1967
 East Peds: 2
 Peds Cross: 8

| Heavys | Trucks | Cars | Totals |
|--------|--------|------|--------|
| 38 | 34 | 2195 | 2267 |

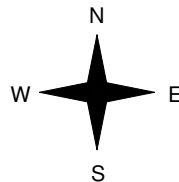


Arkell Rd

| Heavys | Trucks | Cars | Totals |
|--------|--------|------|--------|
| 22 | 31 | 1738 | 1791 |
| 24 | 7 | 524 | 555 |
| 46 | 38 | 2262 | |



Summerfield Dr



| Cars | Trucks | Heavys | Totals |
|------|--------|--------|--------|
| 1656 | 30 | 33 | 1719 |
| 242 | 0 | 6 | 248 |
| 1898 | 30 | 39 | |



Arkell Rd

| Cars | Trucks | Heavys | Totals |
|------|--------|--------|--------|
| 2025 | 34 | 27 | 2086 |



Peds Cross: 8
 West Peds: 0
 West Entering: 2346
 West Leg Total: 4613

| Cars | Trucks | Heavys | Totals |
|------|--------|--------|--------|
| 766 | 7 | 30 | 803 |



| Cars | Trucks | Heavys | Totals |
|------|--------|--------|--------|
| 539 | 4 | 5 | 548 |
| 287 | 3 | 5 | 295 |
| 826 | 7 | 10 | |

Peds Cross: 2
 South Peds: 44
 South Entering: 843
 South Leg Total: 1646

Comments

Arkell Rd @ Zecca Dr / Amos Dr

Morning Peak Diagram

Specified Period

From: 7:00:00

To: 9:00:00

One Hour Peak

From: 7:45:00

To: 8:45:00

Municipality: Guelph

Site #: 0000000005

Intersection: Arkell Rd & Zecca Dr

TFR File #: 3

Count date: 5-Oct-2016

Weather conditions:

Clear/Dry

Person(s) who counted:

Matt

** Non-Signalized Intersection **

Major Road: Arkell Rd runs W/E

North Leg Total: 33

North Entering: 28

North Peds: 1

Peds Cross: \times

| | | | | |
|--------|----|---|----|----|
| Heavys | 0 | 0 | 0 | 0 |
| Trucks | 0 | 0 | 0 | 0 |
| Cars | 15 | 2 | 11 | 28 |
| Totals | 15 | 2 | 11 | |



Heavys 0

Trucks 0

Cars 5

Totals 5

East Leg Total: 604

East Entering: 268

East Peds: 10

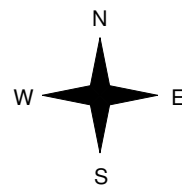
Peds Cross: \times

| Heavys | Trucks | Cars | Totals |
|--------|--------|------|--------|
| 13 | 7 | 278 | 298 |



Arkell Rd

| Heavys | Trucks | Cars | Totals |
|--------|--------|------|--------|
| 0 | 0 | 3 | 3 |
| 9 | 5 | 297 | 311 |
| 0 | 0 | 12 | 12 |
| 9 | 5 | 312 | |



Amos Dr

Zecca Dr

| Cars | Trucks | Heavys | Totals |
|------|--------|--------|--------|
| 1 | 0 | 0 | 1 |
| 245 | 7 | 12 | 264 |
| 0 | 0 | 3 | 3 |
| 246 | 7 | 15 | |

Arkell Rd



| Cars | Trucks | Heavys | Totals |
|------|--------|--------|--------|
| 322 | 5 | 9 | 336 |

Peds Cross: \times

West Peds: 13

West Entering: 326

West Leg Total: 624

| | |
|--------|----|
| Cars | 14 |
| Trucks | 0 |
| Heavys | 3 |
| Totals | 17 |



| | | | | |
|--------|----|---|----|----|
| Cars | 18 | 1 | 14 | 33 |
| Trucks | 0 | 0 | 0 | 0 |
| Heavys | 1 | 0 | 0 | 1 |
| Totals | 19 | 1 | 14 | |

Peds Cross: \times

South Peds: 8

South Entering: 34

South Leg Total: 51

Comments

Arkell Rd @ Zecca Dr / Amos Dr

Mid-day Peak Diagram

Specified Period

From: 11:00:00

To: 14:00:00

One Hour Peak

From: 12:15:00

To: 13:15:00

Municipality: Guelph

Site #: 0000000005

Intersection: Arkell Rd & Zecca Dr

TFR File #: 3

Count date: 5-Oct-2016

Weather conditions:

Clear/Dry

Person(s) who counted:

Matt

** Non-Signalized Intersection **

Major Road: Arkell Rd runs W/E

North Leg Total: 28

North Entering: 12

North Peds: 0

Peds Cross: \nless

| | | | | |
|--------|----|---|---|----|
| Heavys | 0 | 0 | 0 | 0 |
| Trucks | 0 | 0 | 0 | 0 |
| Cars | 10 | 0 | 2 | 12 |
| Totals | 10 | 0 | 2 | |



Heavys 0

Trucks 0

Cars 16

Totals 16

East Leg Total: 386

East Entering: 194

East Peds: 0

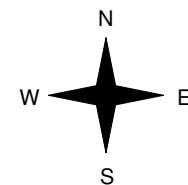
Peds Cross: \nless

| Heavys | Trucks | Cars | Totals |
|--------|--------|------|--------|
| 2 | 2 | 200 | 204 |



Arkell Rd

| Heavys | Trucks | Cars | Totals |
|--------|--------|------|--------|
| 0 | 0 | 9 | 9 |
| 3 | 3 | 180 | 186 |
| 0 | 1 | 14 | 15 |
| 3 | 4 | 203 | |



Amos Dr

Zecca Dr

| Cars | Trucks | Heavys | Totals |
|------|--------|--------|--------|
| 6 | 0 | 0 | 6 |
| 178 | 2 | 2 | 182 |
| 6 | 0 | 0 | 6 |
| 190 | 2 | 2 | |

Arkell Rd



| Cars | Trucks | Heavys | Totals |
|------|--------|--------|--------|
| 186 | 3 | 3 | 192 |

Peds Cross: \nless

West Peds: 1

West Entering: 210

West Leg Total: 414

| | |
|--------|----|
| Cars | 20 |
| Trucks | 1 |
| Heavys | 0 |
| Totals | 21 |



| | | | | |
|--------|----|---|---|----|
| Cars | 12 | 1 | 4 | 17 |
| Trucks | 0 | 0 | 0 | 0 |
| Heavys | 0 | 0 | 0 | 0 |
| Totals | 12 | 1 | 4 | |

Peds Cross: \nless

South Peds: 4

South Entering: 17

South Leg Total: 38

Comments

Arkell Rd @ Zecca Dr / Amos Dr

Afternoon Peak Diagram

Specified Period

From: 15:00:00

To: 18:00:00

One Hour Peak

From: 16:45:00

To: 17:45:00

Municipality: Guelph

Site #: 0000000005

Intersection: Arkell Rd & Zecca Dr

TFR File #: 3

Count date: 5-Oct-2016

Weather conditions:

Clear/Dry

Person(s) who counted:

Matt

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

Major Road: Arkell Rd runs W/E

North Leg Total: 57

North Entering: 21

North Peds: 0

Peds Cross: 0

| | | | | |
|--------|----|---|---|----|
| Heavys | 0 | 0 | 0 | 0 |
| Trucks | 0 | 0 | 0 | 0 |
| Cars | 13 | 1 | 7 | 21 |
| Totals | 13 | 1 | 7 | |



Heavys 0

Trucks 0

Cars 36

Totals 36

East Leg Total: 706

East Entering: 370

East Peds: 7

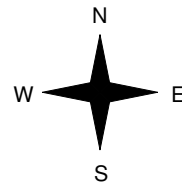
Peds Cross: 7

| Heavys | Trucks | Cars | Totals |
|--------|--------|------|--------|
| 2 | 2 | 376 | 380 |



Arkell Rd

| Heavys | Trucks | Cars | Totals |
|--------|--------|------|--------|
| 0 | 0 | 25 | 25 |
| 0 | 3 | 323 | 326 |
| 0 | 0 | 26 | 26 |
| 0 | 3 | 374 | |



Amos Dr

Zecca Dr

| Cars | Trucks | Heavys | Totals |
|------|--------|--------|--------|
| 11 | 0 | 0 | 11 |
| 349 | 2 | 2 | 353 |
| 6 | 0 | 0 | 6 |
| 366 | 2 | 2 | |

Arkell Rd



| Cars | Trucks | Heavys | Totals |
|------|--------|--------|--------|
| 333 | 3 | 0 | 336 |

Peds Cross: 0

West Peds: 7

West Entering: 377

West Leg Total: 757

| | |
|--------|----|
| Cars | 33 |
| Trucks | 0 |
| Heavys | 0 |
| Totals | 33 |



| | | | | |
|--------|----|---|---|----|
| Cars | 14 | 0 | 3 | 17 |
| Trucks | 0 | 0 | 0 | 0 |
| Heavys | 0 | 0 | 0 | 0 |
| Totals | 14 | 0 | 3 | |

Peds Cross: 0

South Peds: 9

South Entering: 17

South Leg Total: 50

Comments

Arkell Rd @ Zecca Dr / Amos Dr

Total Count Diagram

Municipality: Guelph
Site #: 0000000005
Intersection: Arkell Rd & Zecca Dr
TFR File #: 3
Count date: 5-Oct-2016

Weather conditions:
 Clear/Dry
Person(s) who counted:
 Matt

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

Major Road: Arkell Rd runs W/E

North Leg Total: 275
 North Entering: 139
 North Peds: 2
 Peds Cross: \times

| Heavys | 0 | 0 | 0 | 0 |
|--------|----|---|----|-----|
| Trucks | 1 | 0 | 1 | 2 |
| Cars | 85 | 5 | 47 | 137 |
| Totals | 86 | 5 | 48 | |



| Heavys | 0 |
|--------|-----|
| Trucks | 1 |
| Cars | 135 |
| Totals | 136 |

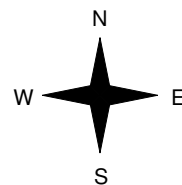
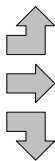
East Leg Total: 3859
 East Entering: 1919
 East Peds: 31
 Peds Cross: \times

| Heavys | Trucks | Cars | Totals |
|--------|--------|------|--------|
| 39 | 30 | 1944 | 2013 |



Arkell Rd

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



Zecca Dr



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

Arkell Rd



| Cars | Trucks | Heavys | Totals |
|------|--------|--------|--------|
| 1880 | 33 | 27 | 1940 |

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

| Cars | 151 |
|--------|-----|
| Trucks | 3 |
| Heavys | 5 |
| Totals | 159 |



| Cars | 81 | 3 | 34 | 118 |
|--------|----|---|----|-----|
| Trucks | 0 | 1 | 0 | 1 |
| Heavys | 3 | 0 | 1 | 4 |
| Totals | 84 | 4 | 35 | |

Peds Cross: \times
 South Peds: 57
 South Entering: 123
 South Leg Total: 282

Comments

Arkell Rd @ Colonial Dr

Morning Peak Diagram

Specified Period

From: 7:00:00

To: 9:00:00

One Hour Peak

From: 8:00:00

To: 9:00:00

Municipality: 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: 563

East Entering: 189

East Peds: 1

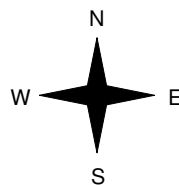
Peds Cross: X

| Heavys | Trucks | Cars | Totals |
|--------|--------|------|--------|
| 11 | 11 | 238 | 260 |



Arkell Rd

| Heavys | Trucks | Cars | Totals |
|--------|--------|------|--------|
| 4 | 6 | 252 | 262 |
| 3 | 1 | 50 | 54 |
| 7 | 7 | 302 | |



Colonial Dr

| Cars | Trucks | Heavys | Totals |
|------|--------|--------|--------|
| 142 | 6 | 7 | 155 |
| 32 | 1 | 1 | 34 |
| 174 | 7 | 8 | |



Arkell Rd

| Cars | Trucks | Heavys | Totals |
|------|--------|--------|--------|
| 359 | 8 | 7 | 374 |

Peds Cross: X
West Peds: 0
West Entering: 316
West Leg Total: 576

| | |
|---------------|-----------|
| Cars | 82 |
| Trucks | 2 |
| Heavys | 4 |
| Totals | 88 |



| | | | |
|---------------|------------|------------|-----|
| Cars | 96 | 107 | 203 |
| Trucks | 5 | 2 | 7 |
| Heavys | 4 | 3 | 7 |
| Totals | 105 | 112 | |

Peds Cross: X
South Peds: 11
South Entering: 217
South Leg Total: 305

Comments

Arkell Rd @ Colonial Dr

Mid-day Peak Diagram

Specified Period

From: 11:00:00

To: 14:00:00

One Hour Peak

From: 12:00:00

To: 13:00:00

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: 337

East Entering: 173

East Peds: 0

Peds Cross: X

| Heavys | Trucks | Cars | Totals |
|--------|--------|------|--------|
| 4 | 5 | 208 | 217 |

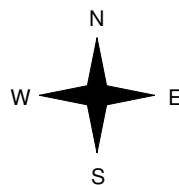


Arkell Rd

| Heavys | Trucks | Cars | Totals |
|--------|--------|------|--------|
| 3 | 2 | 128 | 133 |
| 0 | 0 | 54 | 54 |
| 3 | 2 | 182 | |



Colonial Dr



| Cars | Trucks | Heavys | Totals |
|------|--------|--------|--------|
| 151 | 5 | 1 | 157 |
| 16 | 0 | 0 | 16 |
| 167 | 5 | 1 | |



Arkell Rd

| Cars | Trucks | Heavys | Totals |
|------|--------|--------|--------|
| 159 | 2 | 3 | 164 |

Peds Cross: X
West Peds: 0
West Entering: 187
West Leg Total: 404

| | |
|--------|----|
| Cars | 70 |
| Trucks | 0 |
| Heavys | 0 |
| Totals | 70 |



| | | | |
|--------|----|----|----|
| Cars | 57 | 31 | 88 |
| Trucks | 0 | 0 | 0 |
| Heavys | 3 | 0 | 3 |
| Totals | 60 | 31 | |

Peds Cross: X
South Peds: 1
South Entering: 91
South Leg Total: 161

Comments

Arkell Rd @ Colonial Dr

Afternoon Peak Diagram

Specified Period

From: 15:00:00

To: 18:00:00

One Hour Peak

From: 16:30:00

To: 17:30:00

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: 684

East Entering: 355

East Peds: 0

Peds Cross: X

| Heavys | Trucks | Cars | Totals |
|--------|--------|------|--------|
| 2 | 5 | 360 | 367 |

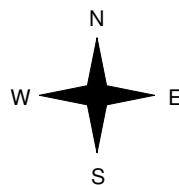


Arkell Rd

| Heavys | Trucks | Cars | Totals |
|--------|--------|------|--------|
| 1 | 3 | 268 | 272 |
| 0 | 0 | 80 | 80 |
| 1 | 3 | 348 | |



Colonial Dr



| Cars | Trucks | Heavys | Totals |
|------|--------|--------|--------|
| 293 | 5 | 0 | 298 |
| 57 | 0 | 0 | 57 |
| 350 | 5 | 0 | |



Arkell Rd

| Cars | Trucks | Heavys | Totals |
|------|--------|--------|--------|
| 325 | 3 | 1 | 329 |

Peds Cross: X
West Peds: 0
West Entering: 352
West Leg Total: 719

| | |
|---------------|------------|
| Cars | 137 |
| Trucks | 0 |
| Heavys | 0 |
| Totals | 137 |



| | | | |
|---------------|-----------|-----------|-----|
| Cars | 67 | 57 | 124 |
| Trucks | 0 | 0 | 0 |
| Heavys | 2 | 0 | 2 |
| Totals | 69 | 57 | |

Peds Cross: X
South Peds: 8
South Entering: 126
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

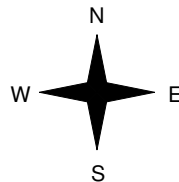
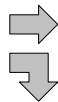
East Leg Total: 3653
 East Entering: 1674
 East Peds: 3
 Peds Cross: 8

| Heavys | Trucks | Cars | Totals |
|--------|--------|------|--------|
| 41 | 45 | 1862 | 1948 |



Arkell Rd

| Heavys | Trucks | Cars | Totals |
|--------|--------|------|--------|
| 25 | 33 | 1502 | 1560 |
| 8 | 4 | 430 | 442 |
| 33 | 37 | 1932 | |



Colonial Dr

| Cars | Trucks | Heavys | Totals |
|------|--------|--------|--------|
| 1359 | 31 | 24 | 1414 |
| 246 | 5 | 9 | 260 |
| 1605 | 36 | 33 | |



Arkell Rd

| Cars | Trucks | Heavys | Totals |
|------|--------|--------|--------|
| 1909 | 40 | 30 | 1979 |



Peds Cross: 8
 West Peds: 0
 West Entering: 2002
 West Leg Total: 3950

| | |
|--------|-----|
| Cars | 676 |
| Trucks | 9 |
| Heavys | 17 |
| Totals | 702 |



| | | | |
|--------|-----|-----|-----|
| Cars | 503 | 407 | 910 |
| Trucks | 14 | 7 | 21 |
| Heavys | 17 | 5 | 22 |
| Totals | 534 | 419 | |

Peds Cross: 2
 South Peds: 52
 South Entering: 953
 South Leg Total: 1655

Comments

Victoria Rd @ Arkell Rd

Morning Peak Diagram

Specified Period

From: 7:00:00

To: 9:00:00

One Hour Peak

From: 8:00:00

To: 9:00:00

Municipality: Guelph

Site #: 0000000002

Intersection: Victoria Rd & Arkell Rd

TFR File #: 4

Count date: 6-Oct-2016

Weather conditions:

Clear/Dry

Person(s) who counted:

Diane

** Signalized Intersection **

Major Road: Victoria Rd runs N/S

North Leg Total: 1426

North Entering: 552

North Peds: 1

Peds Cross: \times

| | | | | |
|--------|-----|-----|----|-----|
| Heavys | 0 | 19 | 1 | 20 |
| Trucks | 11 | 16 | 0 | 27 |
| Cars | 92 | 382 | 31 | 505 |
| Totals | 103 | 417 | 32 | |

Heavys 22

Trucks 26

Cars 826

Totals 874

East Leg Total: 453

East Entering: 264

East Peds: 0

Peds Cross: \times

| Heavys | Trucks | Cars | Totals |
|--------|--------|------|--------|
| 0 | 13 | 176 | 189 |

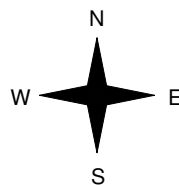


Arkell Rd

| Heavys | Trucks | Cars | Totals |
|--------|--------|------|--------|
| 0 | 11 | 270 | 281 |
| 0 | 2 | 75 | 77 |
| 0 | 2 | 16 | 18 |
| 0 | 15 | 361 | |



Victoria Rd



| Cars | Trucks | Heavys | Totals |
|------|--------|--------|--------|
| 56 | 3 | 0 | 59 |
| 61 | 2 | 0 | 63 |
| 140 | 1 | 1 | 142 |
| 257 | 6 | 1 | |

Arkell Rd



| Cars | Trucks | Heavys | Totals |
|------|--------|--------|--------|
| 181 | 7 | 1 | 189 |

Peds Cross: \times

West Peds: 3

West Entering: 376

West Leg Total: 565

| | | | | | | |
|--------|-----|--------|----|-----|----|-----|
| Cars | 538 | Cars | 23 | 500 | 75 | 598 |
| Trucks | 19 | Trucks | 0 | 12 | 5 | 17 |
| Heavys | 20 | Heavys | 0 | 22 | 0 | 22 |
| Totals | 577 | Totals | 23 | 534 | 80 | |

Peds Cross: \times

South Peds: 0

South Entering: 637

South Leg Total: 1214

Comments

Victoria Rd @ Arkell Rd

Mid-day Peak Diagram

Specified Period

From: 11:00:00

To: 14:00:00

One Hour Peak

From: 12:45:00

To: 13:45:00

Municipality: Guelph

Site #: 0000000002

Intersection: Victoria Rd & Arkell Rd

TFR File #: 4

Count date: 6-Oct-2016

Weather conditions:

Clear/Dry

Person(s) who counted:

Diane

** Signalized Intersection **

Major Road: Victoria Rd runs N/S

North Leg Total: 797

North Entering: 416

North Peds: 0

Peds Cross: \nlessgtr

| | | | | |
|--------|----|-----|----|-----|
| Heavys | 2 | 20 | 1 | 23 |
| Trucks | 2 | 11 | 2 | 15 |
| Cars | 84 | 264 | 30 | 378 |
| Totals | 88 | 295 | 33 | |



Heavys 16

Trucks 14

Cars 351

Totals 381

East Leg Total: 312

East Entering: 143

East Peds: 0

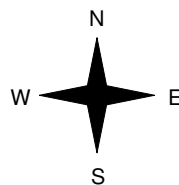
Peds Cross: \nlessgtr

| Heavys | Trucks | Cars | Totals |
|--------|--------|------|--------|
| 2 | 4 | 156 | 162 |



Arkell Rd

| Heavys | Trucks | Cars | Totals |
|--------|--------|------|--------|
| 1 | 0 | 64 | 65 |
| 0 | 1 | 65 | 66 |
| 0 | 0 | 25 | 25 |
| 1 | 1 | 154 | |



Victoria Rd



| Cars | Trucks | Heavys | Totals |
|------|--------|--------|--------|
| 29 | 2 | 0 | 31 |
| 48 | 2 | 0 | 50 |
| 60 | 1 | 1 | 62 |
| 137 | 5 | 1 | |

Arkell Rd



| Cars | Trucks | Heavys | Totals |
|------|--------|--------|--------|
| 159 | 8 | 2 | 169 |

Peds Cross: \nlessgtr

West Peds: 3

West Entering: 156

West Leg Total: 318

Cars 349

Trucks 12

Heavys 21

Totals 382



| | | | | |
|--------|----|-----|----|-----|
| Cars | 24 | 258 | 64 | 346 |
| Trucks | 0 | 12 | 5 | 17 |
| Heavys | 0 | 15 | 1 | 16 |
| Totals | 24 | 285 | 70 | |

Peds Cross: \nlessgtr

South Peds: 0

South Entering: 379

South Leg Total: 761

Comments

Victoria Rd @ Arkell Rd

Afternoon Peak Diagram

Specified Period

From: 15:00:00

To: 18:00:00

One Hour Peak

From: 16:30:00

To: 17:30:00

Municipality: Guelph

Site #: 0000000002

Intersection: Victoria Rd & Arkell Rd

TFR File #: 4

Count date: 6-Oct-2016

Weather conditions:

Clear/Dry

Person(s) who counted:

Diane

** Signalized Intersection **

Major Road: Victoria Rd runs N/S

North Leg Total: 1510

North Entering: 763

North Peds: 0

Peds Cross: \times

| | | | | |
|--------|-----|-----|----|-----|
| Heavys | 0 | 11 | 0 | 11 |
| Trucks | 1 | 6 | 0 | 7 |
| Cars | 170 | 523 | 52 | 745 |
| Totals | 171 | 540 | 52 | |



Heavys 10

Trucks 28

Cars 709

Totals 747

East Leg Total: 570

East Entering: 278

East Peds: 0

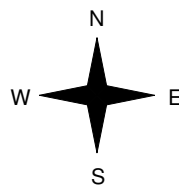
Peds Cross: \times

| Heavys | Trucks | Cars | Totals |
|--------|--------|------|--------|
| 0 | 2 | 333 | 335 |



Arkell Rd

| Heavys | Trucks | Cars | Totals |
|--------|--------|------|--------|
| 0 | 2 | 171 | 173 |
| 1 | 0 | 111 | 112 |
| 0 | 0 | 44 | 44 |
| 1 | 2 | 326 | |



Victoria Rd

| Cars | Trucks | Heavys | Totals |
|------|--------|--------|--------|
| 37 | 0 | 1 | 38 |
| 132 | 1 | 0 | 133 |
| 101 | 4 | 2 | 107 |
| 270 | 5 | 3 | |

Arkell Rd



| Cars | Trucks | Heavys | Totals |
|------|--------|--------|--------|
| 288 | 3 | 1 | 292 |

Peds Cross: \times

West Peds: 6

West Entering: 329

West Leg Total: 664

| | | | | | | |
|--------|-----|--------|----|-----|-----|-----|
| Cars | 668 | Cars | 31 | 501 | 125 | 657 |
| Trucks | 10 | Trucks | 0 | 26 | 3 | 29 |
| Heavys | 13 | Heavys | 0 | 9 | 0 | 9 |
| Totals | 691 | Totals | 31 | 536 | 128 | |



Peds Cross: \times

South Peds: 0

South Entering: 695

South Leg Total: 1386

Comments

Victoria Rd @ Arkell Rd

Total Count Diagram

Municipality: Guelph
Site #: 0000000002
Intersection: Victoria Rd & Arkell Rd
TFR File #: 4
Count date: 6-Oct-2016

Weather conditions:
Clear/Dry
Person(s) who counted:
Diane

**** Signalized Intersection ****

Major Road: Victoria Rd runs N/S

North Leg Total: 8667
North Entering: 4223
North Peds: 3
Peds Cross: \times

| | Heavys | Trucks | Cars | Totals |
|-------|--------|--------|------|--------|
| North | 4 | 30 | 810 | 844 |
| East | 135 | 122 | 2849 | 3106 |
| South | 5 | 9 | 259 | 273 |
| West | 144 | 161 | 3918 | 4160 |



| | Heavys | Trucks | Cars | Totals |
|-------|--------|--------|------|--------|
| North | 131 | 153 | 4160 | 4444 |

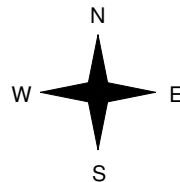
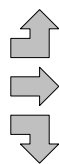
East Leg Total: 3162
East Entering: 1621
East Peds: 0
Peds Cross: \times

| Heavys | Trucks | Cars | Totals |
|--------|--------|------|--------|
| 8 | 44 | 1600 | 1652 |



Arkell Rd

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



Victoria Rd



| Cars | Trucks | Heavys | Totals |
|------|--------|--------|--------|
| 303 | 18 | 5 | 326 |
| 606 | 12 | 3 | 621 |
| 645 | 20 | 9 | 674 |
| 1554 | 50 | 17 | |

Arkell Rd



| Cars | Trucks | Heavys | Totals |
|------|--------|--------|--------|
| 1482 | 47 | 12 | 1541 |

Peds Cross: \times
West Peds: 41
West Entering: 1973
West Leg Total: 3625

| | Cars | Trucks | Heavys | Totals |
|------|------|--------|--------|--------|
| West | 3716 | 150 | 144 | 4010 |



| | Cars | Trucks | Heavys | Totals |
|-------|------|--------|--------|--------|
| West | 184 | 2 | 1 | 187 |
| East | 2807 | 104 | 122 | 3033 |
| South | 580 | 24 | 6 | 610 |
| North | 3571 | 130 | 129 | |

Peds Cross: \times
South Peds: 8
South Entering: 3830
South Leg Total: 7840

Comments

CITY OF GUELPH

Traffic Signal Timing Parameters

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

Appendix C

Base Year (2018) Traffic Operations Reports



Lanes, Volumes, Timings

1: Summerfield Drive & Arkell Road

07-24-2018

| | → | ↖ | ↗ | ← | ↖ | ↗ |
|----------------------------|-------|-------|-------|-------|-------|-------|
| Lane Group | EBT | EBR | WBL | WBT | NBL | NBR |
| Lane Configurations | ↖ | | ↖ | ↖ | ↖ | |
| 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

| | |
|-----------------------------------|------------------------|
| Area Type: | Other |
| Control Type: | Unsignalized |
| Intersection Capacity Utilization | 40.8% |
| Analysis Period (min) | 15 |
| | ICU Level of Service A |

HCM 2010 TWSC

1: Summerfield Drive & Arkell Road

07-24-2018

| Intersection | | | | | | |
|--------------------------|------|------|------|------|------|------|
| Int Delay, s/veh | 4.3 | | | | | |
| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
| Lane Configurations | ↖ | | ↖ | ↖ | ↖ | |
| Traffic Vol, veh/h | 235 | 31 | 26 | 284 | 122 | 104 |
| Future Vol, veh/h | 235 | 31 | 26 | 284 | 122 | 104 |
| 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 |
| Mvmt Flow | 240 | 32 | 27 | 290 | 124 | 106 |

| Major/Minor | Major1 | Major2 | Minor1 |
|----------------------|--------|--------|--------|
| Conflicting Flow All | 0 | 0 | 280 |
| Stage 1 | - | - | - |
| Stage 2 | - | - | - |
| Critical Hdwy | - | - | 4.18 |
| Critical Hdwy Stg 1 | - | - | - |
| Critical Hdwy Stg 2 | - | - | - |
| Follow-up Hdwy | - | - | 2.272 |
| Pot Cap-1 Maneuver | - | - | 1249 |
| Stage 1 | - | - | - |
| Stage 2 | - | - | - |
| Platoon blocked, % | - | - | - |
| Mov Cap-1 Maneuver | - | - | 1249 |
| Mov Cap-2 Maneuver | - | - | - |
| Stage 1 | - | - | - |
| Stage 2 | - | - | - |

| Approach | EB | WB | NB |
|----------------------|----|-----|------|
| HCM Control Delay, s | 0 | 0.7 | 14.2 |
| HCM LOS | | | B |

| Minor Lane/Major Mvmt | NBLn1 | 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 | B | - | - | A | - |
| HCM 95th %tile Q(veh) | 1.7 | - | - | 0.1 | - |

Lanes, Volumes, Timings

2: Zecca Drive/Amos Drive & Arkell Road

07-24-2018

| | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|----------------------------|------|-------|-------|------|-------|-------|------|-------|-------|------|-------|-------|
| Lane Configurations | | ↔ | | | ↔ | | | ↔ | | | ↔ | |
| 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 | |
| Flt 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 | | | | | | | | | | | | |
| 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 33.1%

ICU Level of Service A

Analysis Period (min) 15

HCM 2010 TWSC

2: Zecca Drive/Amos Drive & Arkell Road

07-24-2018

Intersection

Int Delay, s/veh 1.4

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|--------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Lane Configurations | | ↔ | | | ↔ | | | ↔ | | | ↔ | |
| 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, # | - | 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 | Major1 | Major2 | Minor1 | Minor2 |
|----------------------|--------|--------|--------|--------|
| Conflicting Flow All | 286 | 0 | 0 | 354 |
| Stage 1 | - | - | - | 354 |
| Stage 2 | - | - | - | 312 |
| Critical Hdwy | 4.1 | - | 4.15 | - |
| Critical Hdwy Stg 1 | - | - | - | 6.15 |
| Critical Hdwy Stg 2 | - | - | - | 6.15 |
| Follow-up Hdwy | 2.2 | - | 2.245 | - |
| Pot Cap-1 Maneuver | 1288 | - | 1188 | - |
| Stage 1 | - | - | - | 657 |
| Stage 2 | - | - | - | 692 |
| Platoon blocked, % | - | - | - | - |
| Mov Cap-1 Maneuver | 1274 | - | 1178 | - |
| Mov Cap-2 Maneuver | - | - | - | 351 |
| Stage 1 | - | - | - | 651 |
| Stage 2 | - | - | - | 665 |

| Approach | EB | WB | NB | SB |
|----------------------|-----|-----|------|------|
| HCM Control Delay, s | 0.1 | 0.1 | 13.9 | 12.5 |
| HCM LOS | | | B | B |

| Minor Lane/Major Mvmt | 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 | B | A | A | - | A | A | - | B |
| HCM 95th %tile Q(veh) | 0.3 | 0 | - | - | 0 | - | - | 0.2 |

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

07-24-2018













| | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|----------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations |  |  |  |  |  |  |  |  |  |  |  |  |
| 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 | | | 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 45.8% | ICU Level of Service A |
| Analysis Period (min) | 15 |

HCM 2010 TWSC
3: Colonial Drive & Arkell Road

07-24-2018

| Intersection | | | | | | | | | | | | |
|--------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Int Delay, s/veh | 6.2 | | | | | | | | | | | |
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  |  |  |  |  |  |  |  |  |  |  |
| 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 | Major1 | Major2 | Minor1 | Minor2 |
|----------------------|--------|--------|--------|--------|
| Conflicting Flow All | 180 | 0 | 0 | 390 |
| Stage 1 | - | - | - | - |
| Stage 2 | - | - | - | - |
| Critical Hdwy | 4.12 | - | 4.16 | - |
| Critical Hdwy Stg 1 | - | - | - | - |
| Critical Hdwy Stg 2 | - | - | - | - |
| Follow-up Hdwy | 2.218 | - | 2.254 | - |
| Pot Cap-1 Maneuver | 1396 | - | 1147 | - |
| Stage 1 | - | - | - | - |
| Stage 2 | - | - | - | - |
| Platoon blocked, % | - | - | - | - |
| Mov Cap-1 Maneuver | 1396 | - | 1146 | - |
| Mov Cap-2 Maneuver | - | - | - | - |
| Stage 1 | - | - | - | - |
| Stage 2 | - | - | - | - |

| Approach | EB | WB | NB | SB |
|----------------------|----|-----|------|----|
| HCM Control Delay, s | 0 | 1.4 | 19.7 | 0 |
| HCM LOS | | | C | A |

| Minor Lane/Major Mvmt | NBLn1 | EBL | EBT | EBR | WBL | WBT | WBR | SBLn1 |
|-----------------------|-------|------|-----|-----|-------|-----|-----|-------|
| 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 | C | A | - | - | A | - | - | A |
| HCM 95th %tile Q(veh) | 2.8 | 0 | - | - | 0.1 | - | - | - |

Lanes, Volumes, Timings
5: Victoria Road & Arkell Road

07-24-2018

| | ↖ | → | ↘ | ↙ | ← | ↖ | ↙ | ↗ | ↘ | ↖ | ↙ | ↗ | ↘ |
|----------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|---|
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR | |
| Lane Configurations | ↖ | ↖ | | ↖ | ↖ | | ↖ | ↖ | | ↖ | ↖ | | |
| Traffic Volume (vph) | 303 | 84 | 19 | 148 | 71 | 61 | 25 | 556 | 83 | 33 | 434 | 110 | |
| Future Volume (vph) | 303 | 84 | 19 | 148 | 71 | 61 | 25 | 556 | 83 | 33 | 434 | 110 | |
| 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 | | | | 1.00 | | |
| Frt | | 0.972 | | | 0.931 | | | 0.981 | | | 0.970 | | |
| Flt Protected | 0.950 | | | 0.950 | | | 0.950 | | | 0.950 | | | |
| Satd. Flow (prot) | 1736 | 1767 | 0 | 1787 | 1685 | 0 | 1805 | 1758 | 0 | 1752 | 1689 | 0 | |
| Flt Permitted | 0.494 | | | 0.684 | | | 0.256 | | | 0.161 | | | |
| Satd. Flow (perm) | 901 | 1767 | 0 | 1287 | 1685 | 0 | 486 | 1758 | 0 | 297 | 1689 | 0 | |
| Right Turn on Red | | | Yes | | | Yes | | | Yes | | | Yes | |
| Satd. Flow (RTOR) | | 14 | | | 52 | | | 10 | | | 18 | | |
| 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) | 333 | 92 | 21 | 163 | 78 | 67 | 27 | 611 | 91 | 36 | 477 | 121 | |
| Shared Lane Traffic (%) | | | | | | | | | | | | | |
| Lane Group Flow (vph) | 333 | 113 | 0 | 163 | 145 | 0 | 27 | 702 | 0 | 36 | 598 | 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 | Cl+Ex | Cl+Ex | | Cl+Ex | Cl+Ex | | Cl+Ex | Cl+Ex | | Cl+Ex | Cl+Ex | | |
| Detector 1 Channel | | | | | | | | | | | | | |
| Detector 1 Extend (s) | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | | |
| 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 | | Cl+Ex | | | Cl+Ex | | | Cl+Ex | | | Cl+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 2018 AM Base Year

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

07-24-2018

| | ↖ | → | ↘ | ↙ | ← | ↖ | ↙ | ↗ | ↘ | ↖ | ↙ | ↗ | ↘ |
|-------------------------|-------|-------|-----|-------|-------|-----|-------|-------|-----|-------|-------|-----|---|
| 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 Effect 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 | C | | B | C | | A | C | | A | C | | |
| Approach Delay | | 44.2 | | | 20.9 | | | 30.4 | | | 23.7 | | |
| Approach LOS | | D | | | C | | | C | | | C | | |

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 Capacity Utilization 72.2%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 5: Victoria Road & Arkell Road

| | | | |
|------|------|------|------|
| ↖ Ø1 | ↖ Ø2 | ↖ Ø3 | ↖ Ø4 |
| 10 s | 34 s | 10 s | 26 s |
| ↖ Ø5 | ↖ Ø6 | ↖ Ø7 | ↖ Ø8 |
| 10 s | 34 s | 10 s | 26 s |

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

Synchro 9 Report
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Queues

5: Victoria Road & Arkell Road

07-24-2018

| | EBL | EBT | WBL | WBT | NBL | NBT | SBL | SBT |
|------------------------|-------|-------|------|-------|------|--------|------|--------|
| 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

95th 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

07-24-2018

| | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | ↰ | ↱ | ↱ | ↰ | ↱ | ↱ | ↰ | ↱ | ↱ | ↰ | ↱ | ↱ |
| Traffic Volume (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 (Ob), 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 |
| 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(g_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(g_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 | 544 | 411 | 0 | 522 | 413 | 0 | 758 | 333 | 0 | 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(l) | 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 | | C | C | | C | B | | D | B | | C |
| Approach Vol, veh/h | | 446 | | | 308 | | | 729 | | | 634 | |
| Approach Delay, s/veh | | 45.1 | | | 25.1 | | | 36.3 | | | 22.3 | |
| Approach LOS | | D | | | C | | | D | | | C | |
| 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 | 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+I1), 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

HCM 2010 Ctrl Delay 32.3
HCM 2010 LOS C

Lanes, Volumes, Timings

1: Summerfield Drive & Arkell Road

07-24-2018

| | EBT | EBR | WBL | WBT | NBL | NBR |
|----------------------------|-------|-------|-------|-------|-------|-------|
| Lane Group | EBT | EBR | WBL | WBT | NBL | NBR |
| Lane Configurations | ↔ | ↔ | ↔ | ↔ | ↔ | ↔ |
| Traffic Volume (vph) | 368 | 131 | 75 | 320 | 62 | 38 |
| Future Volume (vph) | 368 | 131 | 75 | 320 | 62 | 38 |
| 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 | 0.965 | | | | 0.949 | |
| Flt Protected | | | 0.950 | | 0.970 | |
| Satd. Flow (prot) | 1806 | 0 | 1805 | 1881 | 1749 | 0 |
| Flt Permitted | | | 0.950 | | 0.970 | |
| Satd. Flow (perm) | 1806 | 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) | 383 | 136 | 78 | 333 | 65 | 40 |
| Shared Lane Traffic (%) | | | | | | |
| Lane Group Flow (vph) | 519 | 0 | 78 | 333 | 105 | 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 Utilization 47.6% | ICU Level of Service A |
| Analysis Period (min) | 15 |

HCM 2010 TWSC

1: Summerfield Drive & Arkell Road

07-24-2018

| 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 | 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 | 383 | 136 | 78 | 333 | 65 | 40 |

| Major/Minor | Major1 | Major2 | Minor1 | | |
|----------------------|--------|--------|--------|---|-----|
| Conflicting Flow All | 0 | 0 | 523 | 0 | 945 |
| Stage 1 | - | - | - | - | 455 |
| Stage 2 | - | - | - | - | 490 |
| Critical Hdwy | - | - | 4.1 | - | 6.4 |
| Critical Hdwy Stg 1 | - | - | - | - | 5.4 |
| Critical Hdwy Stg 2 | - | - | - | - | 5.4 |
| Follow-up Hdwy | - | - | 2.2 | - | 3.5 |
| Pot Cap-1 Maneuver | - | - | 1054 | - | 293 |
| Stage 1 | - | - | - | - | 643 |
| Stage 2 | - | - | - | - | 620 |
| Platoon blocked, % | - | - | - | - | - |
| Mov Cap-1 Maneuver | - | - | 1053 | - | 271 |
| Mov Cap-2 Maneuver | - | - | - | - | 399 |
| Stage 1 | - | - | - | - | 641 |
| Stage 2 | - | - | - | - | 574 |

| Approach | EB | WB | NB |
|----------------------|----|-----|------|
| HCM Control Delay, s | 0 | 1.7 | 15.1 |
| HCM LOS | | | C |

| Minor Lane/Major Mvmt | NBLn1 | 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 | C | - | - | A | - |
| HCM 95th %tile Q(veh) | 0.9 | - | - | 0.2 | - |

Lanes, Volumes, Timings

2: Zecca Drive/Amos Drive & Arkell Road

07-24-2018

| | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|----------------------------|------|-------|-------|------|-------|-------|------|-------|-------|------|-------|-------|
| Lane Configurations | | ↔ | | | ↔ | | | ↔ | | | ↔ | |
| 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 | | | | | | | | | | | | |
| 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 47.4%

ICU Level of Service A

Analysis Period (min) 15

HCM 2010 TWSC

2: Zecca Drive/Amos Drive & Arkell Road

07-24-2018

| Intersection | | | | | | | | | | | | |
|--------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Int Delay, s/veh | 1.1 | | | | | | | | | | | |
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | | ↔ | | | ↔ | | | ↔ | | | ↔ | |
| 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 | Major1 | Major2 | Minor1 | Minor2 |
|----------------------|--------|--------|--------|--------|
| Conflicting Flow All | 398 | 0 | 0 | 410 |
| Stage 1 | - | - | - | - |
| Stage 2 | - | - | - | - |
| Critical Hdwy | 4.1 | - | - | 4.1 |
| Critical Hdwy Stg 1 | - | - | - | - |
| Critical Hdwy Stg 2 | - | - | - | - |
| Follow-up Hdwy | 2.2 | - | - | 2.2 |
| Pot Cap-1 Maneuver | 1172 | - | - | 1160 |
| Stage 1 | - | - | - | - |
| Stage 2 | - | - | - | - |
| Platoon blocked, % | - | - | - | - |
| Mov Cap-1 Maneuver | 1165 | - | - | 1153 |
| Mov Cap-2 Maneuver | - | - | - | - |
| Stage 1 | - | - | - | - |
| Stage 2 | - | - | - | - |

| Approach | EB | WB | NB | SB |
|----------------------|-----|-----|------|------|
| HCM Control Delay, s | 0.5 | 0.1 | 18.5 | 13.8 |
| HCM LOS | | | C | B |

| Minor Lane/Major Mvmt | 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 | C | A | A | - | A | A | - | B |
| HCM 95th %tile Q(veh) | 0.2 | 0.1 | - | - | 0 | - | - | 0.2 |

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

07-24-2018

| |  |  |  |  |  |  |  |  |  |  |  |  |
|----------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  | |  |  | | |  | | |  | |
| Traffic Volume (vph) | 0 | 282 | 82 | 60 | 311 | 0 | 74 | 0 | 61 | 0 | 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 | | 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 | | 0.966 | | | | | | 0.939 | | | | |
| Flt Protected | | | | 0.950 | | | | 0.973 | | | | |
| Satd. Flow (prot) | 1900 | 1821 | 0 | 1805 | 1863 | 0 | 0 | 1708 | 0 | 0 | 1900 | 0 |
| Flt Permitted | | | | 0.950 | | | | 0.973 | | | | |
| Satd. Flow (perm) | 1900 | 1821 | 0 | 1805 | 1863 | 0 | 0 | 1708 | 0 | 0 | 1900 | 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) | 0 | 294 | 85 | 63 | 324 | 0 | 77 | 0 | 64 | 0 | 0 | 0 |
| Shared Lane Traffic (%) | | | | | | | | | | | | |
| Lane Group Flow (vph) | 0 | 379 | 0 | 63 | 324 | 0 | 0 | 141 | 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 | | | 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 41.2% | ICU Level of Service A |
| Analysis Period (min) | 15 |

HCM 2010 TWSC
3: Colonial Drive & Arkell Road

07-24-2018

Intersection

| Int Delay, s/veh | 3.5 | | | | | | | | | | | |
|--------------------------|---|---|------|---|---|------|------|---|------|------|---|------|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  | |  |  | | |  | | |  | |
| 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 | Major1 | | | Major2 | | | Minor1 | | | Minor2 | | |
|----------------------|--------|---|---|--------|---|---|--------|-----|-----|--------|-----|-----|
| 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 | | | C | A |

| Minor Lane/Major Mvmt | NBLn1 | 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 | C | A | - | - | A | - | - | A |
| HCM 95th %tile Q(veh) | 1.6 | 0 | - | - | 0.2 | - | - | - |

Lanes, Volumes, Timings
5: Victoria Road & Arkell Road

07-24-2018

| | ↖ | → | ↘ | ↙ | ← | ↖ | ↙ | ↗ | ↘ | ↖ | ↙ | ↗ | ↘ |
|----------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|---|
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR | |
| Lane Configurations | ↖ | ↖ | | ↖ | ↖ | | ↖ | ↖ | | ↖ | ↖ | ↖ | |
| 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 | Cl+Ex | Cl+Ex | | Cl+Ex | Cl+Ex | | Cl+Ex | Cl+Ex | | Cl+Ex | Cl+Ex | | |
| Detector 1 Channel | | | | | | | | | | | | | |
| Detector 1 Extend (s) | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | | |
| 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 | | Cl+Ex | | | Cl+Ex | | | Cl+Ex | | | Cl+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 2018 PM Base Year

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

07-24-2018

| | ↖ | → | ↘ | ↙ | ← | ↖ | ↙ | ↗ | ↘ | ↖ | ↙ | ↗ | ↘ |
|-------------------------|-------|-------|-----|-------|-------|-----|-------|-------|-----|-------|-------|-----|---|
| 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 Effect 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 | C | C | | B | C | | A | E | | A | E | | |
| Approach Delay | | 22.9 | | | 26.5 | | | 55.6 | | | 53.4 | | |
| Approach LOS | | C | | | C | | | E | | | D | | |

Intersection Summary

Area Type: Other

Cycle Length: 80

Actuated Cycle Length: 68.5

Natural Cycle: 90

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 1.00

Intersection Signal Delay: 45.6

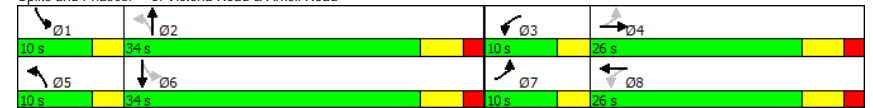
Intersection LOS: D

Intersection Capacity Utilization 78.4%

ICU Level of Service D

Analysis Period (min) 15

Splits and Phases: 5: Victoria Road & Arkell Road



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

Synchro 9 Report
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Queues

5: Victoria Road & Arkell Road

07-24-2018

| | EBL | EBT | WBL | WBT | NBL | NBT | SBL | SBT |
|------------------------|------|-------|------|-------|------|--------|------|--------|
| 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 |

Intersection Summary

- Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

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

Queue shown is maximum after two cycles.

HCM 2010 Signalized Intersection Summary

5: Victoria Road & Arkell Road

07-24-2018

| | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | ↰ | ↱ | ↱ | ↰ | ↱ | ↱ | ↰ | ↱ | ↱ | ↰ | ↱ | ↱ |
| Traffic Volume (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(l) | 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 | C | | C | C | | C | B | | F | B | | F |
| Approach Vol, veh/h | 364 | | | 318 | | | 771 | | | 856 | | |
| Approach Delay, s/veh | 25.2 | | | 26.9 | | | 60.9 | | | 66.7 | | |
| Approach LOS | C | | | C | | | 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+1), 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

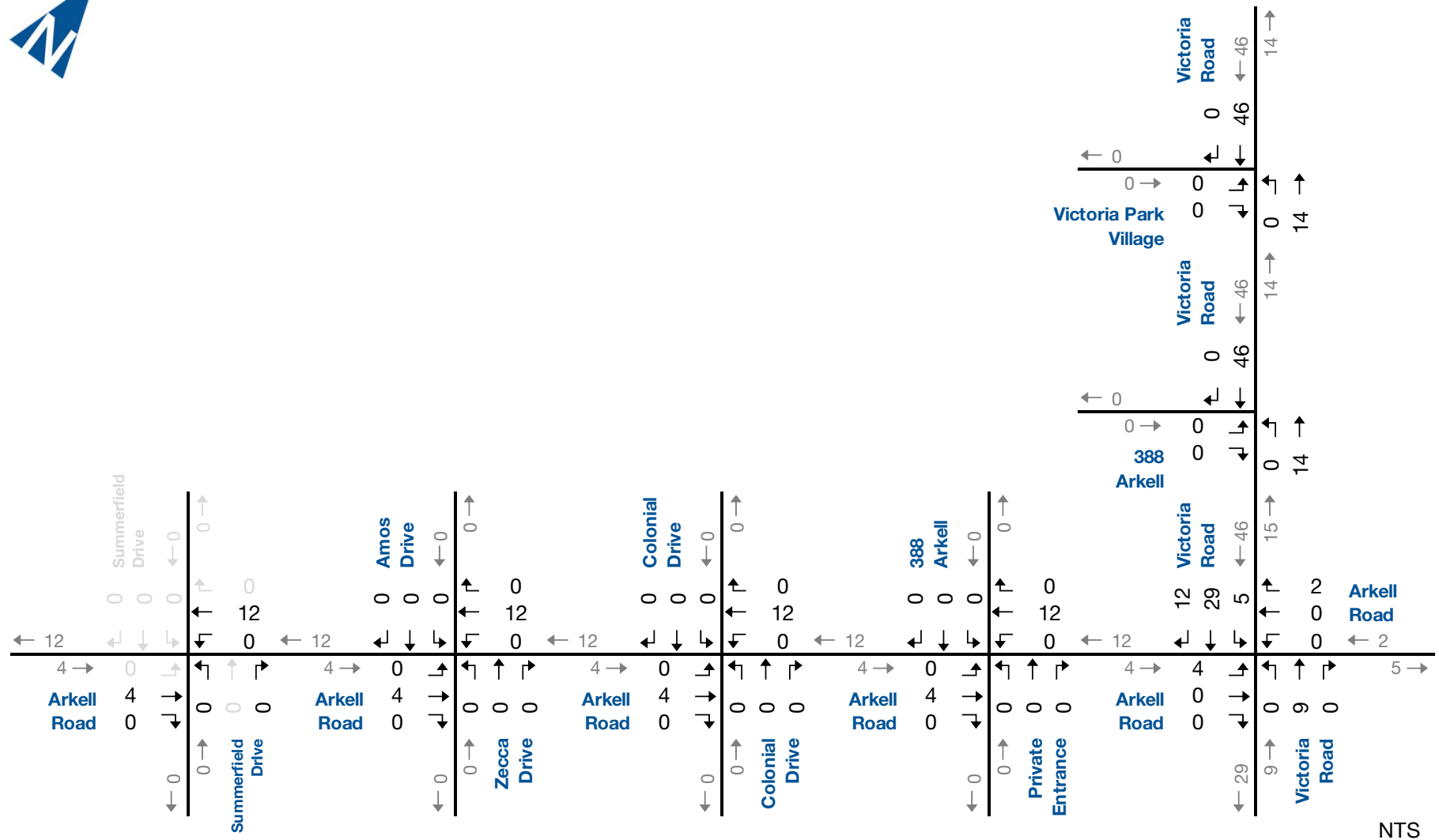
HCM 2010 Ctrl Delay 52.8

HCM 2010 LOS D

Appendix D

Other Planned Developments Trip Assignment

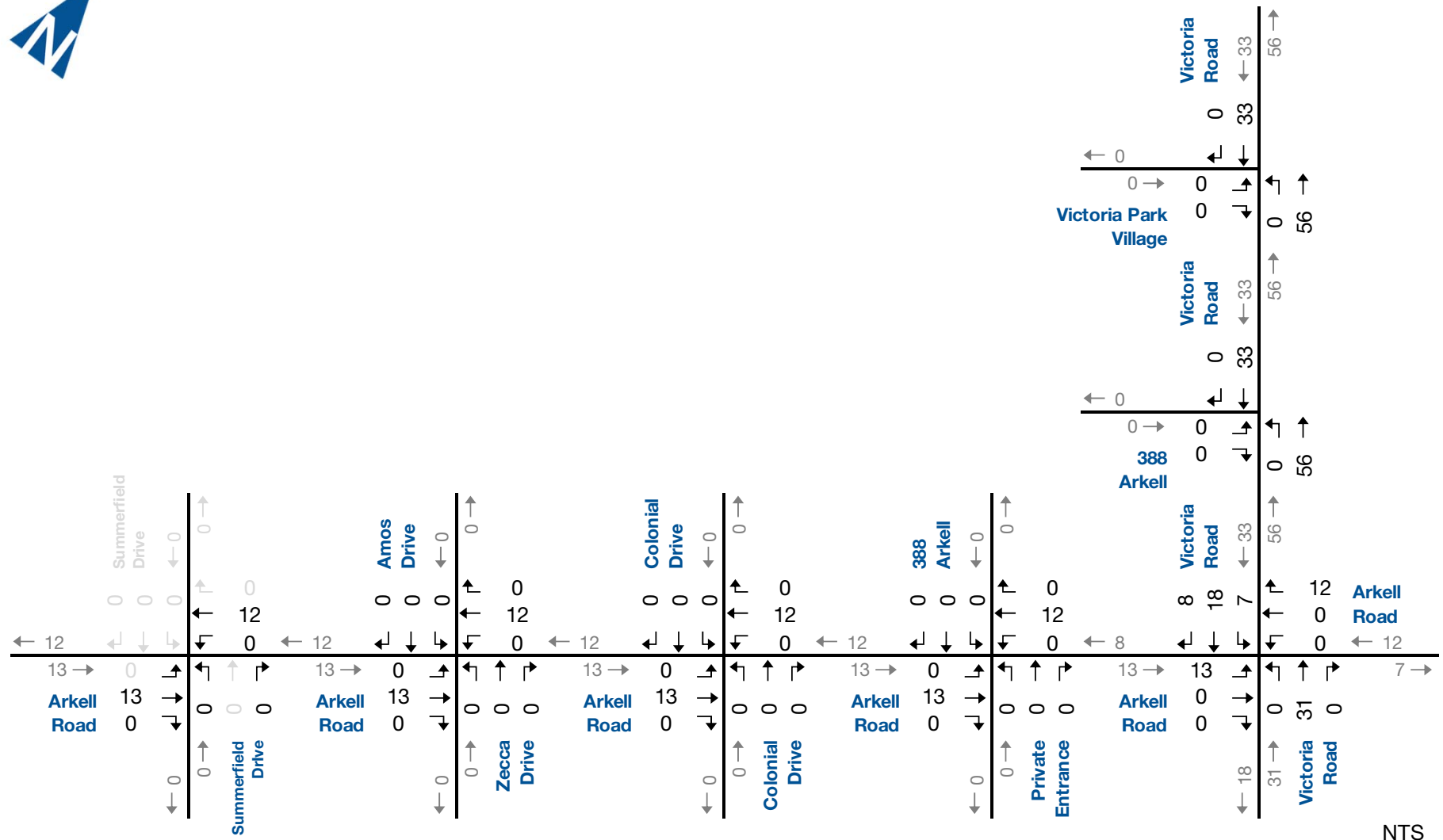




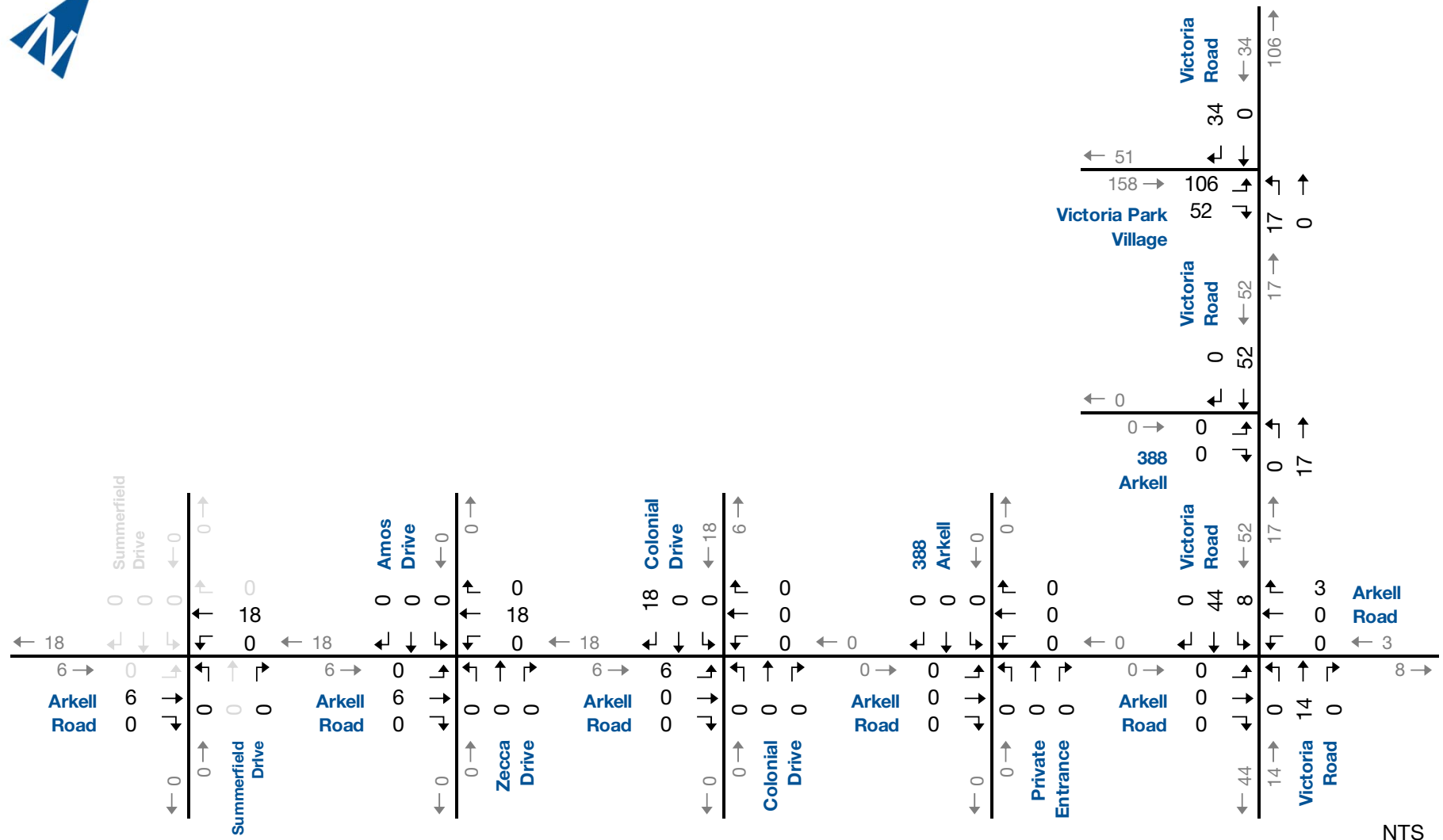
NTS



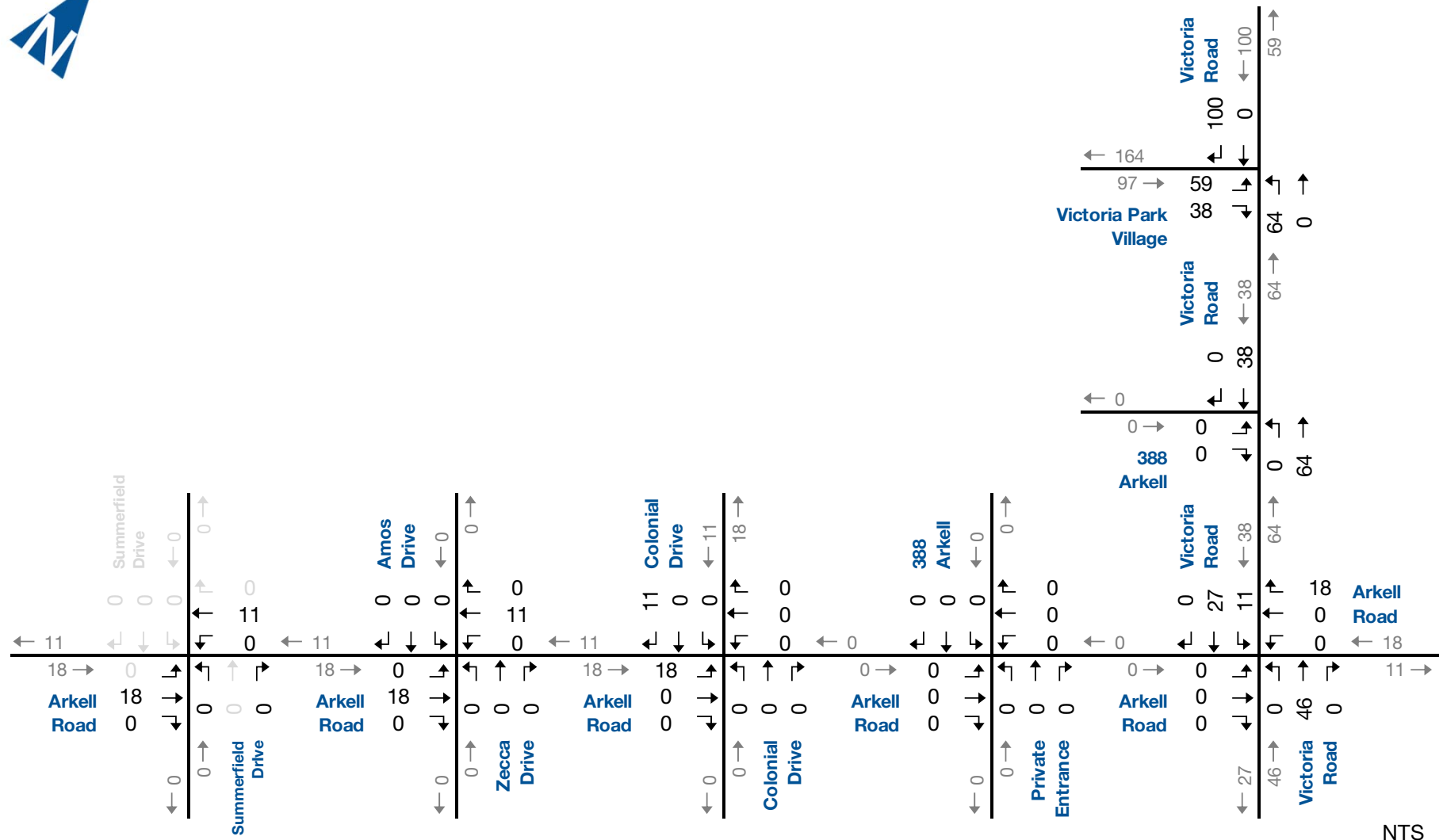
Kortright East AM Trip Assignment

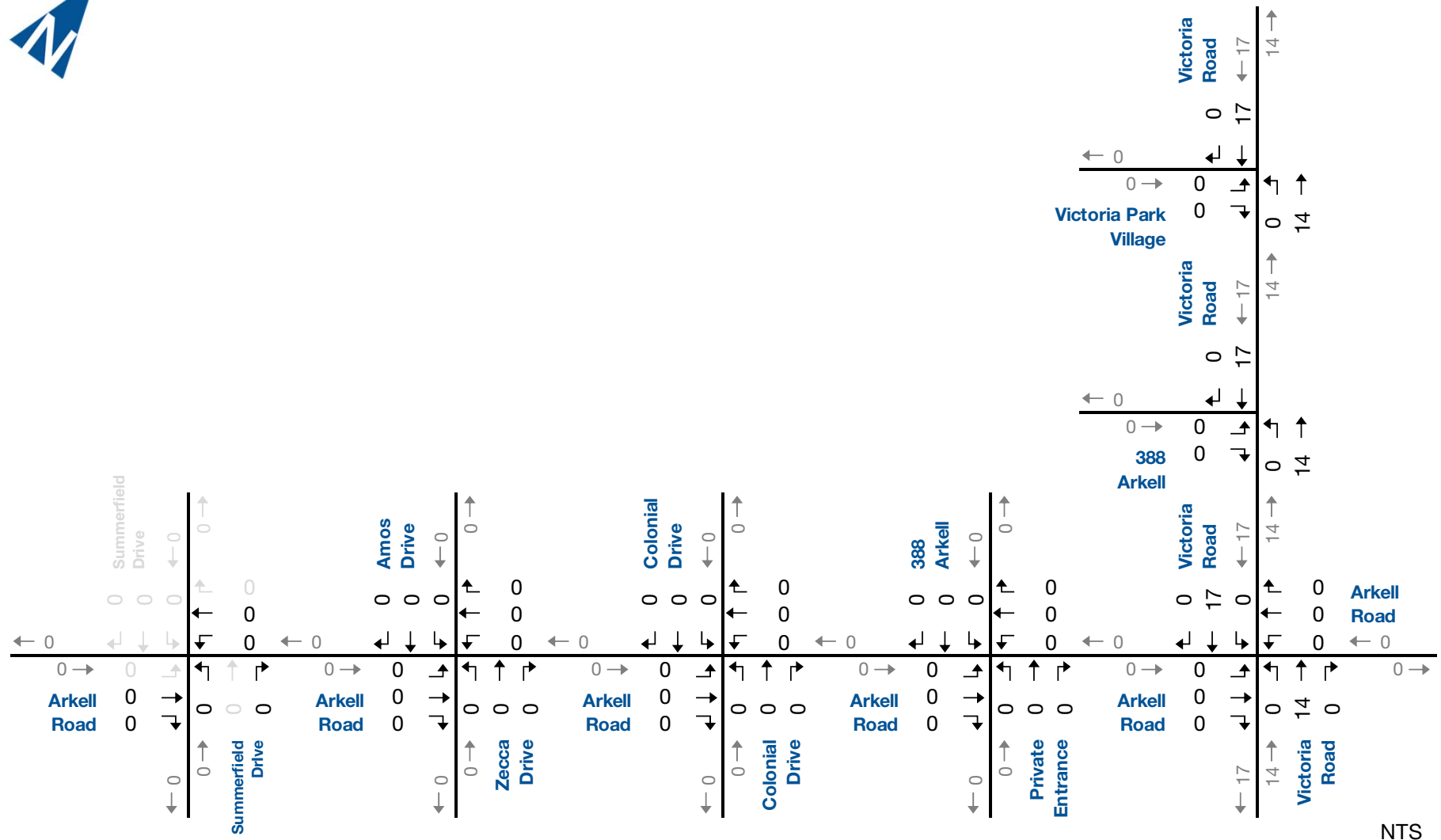


Kortright East PM Trip Assignment

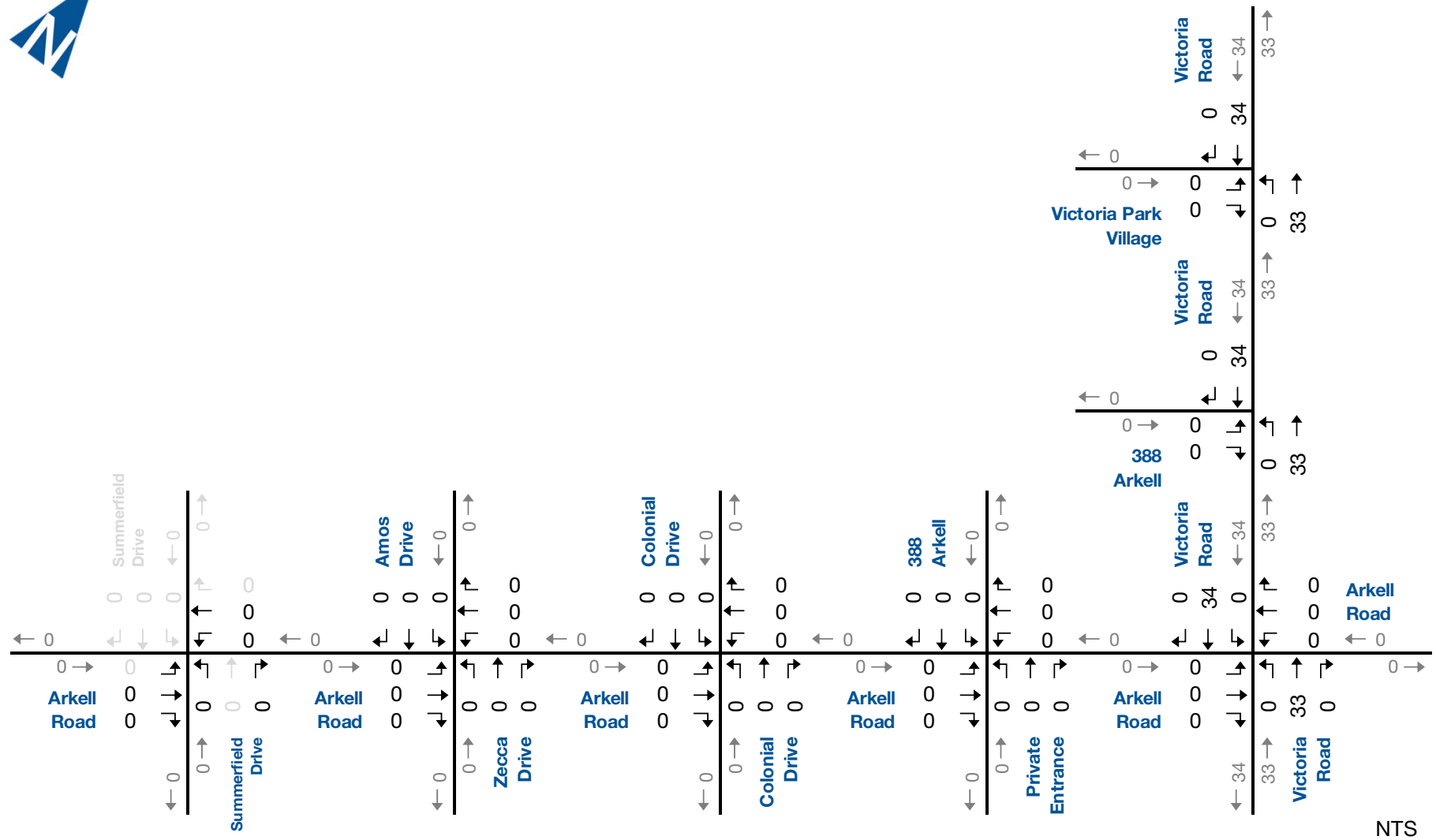


Victoria Park Village AM Trip Assignment

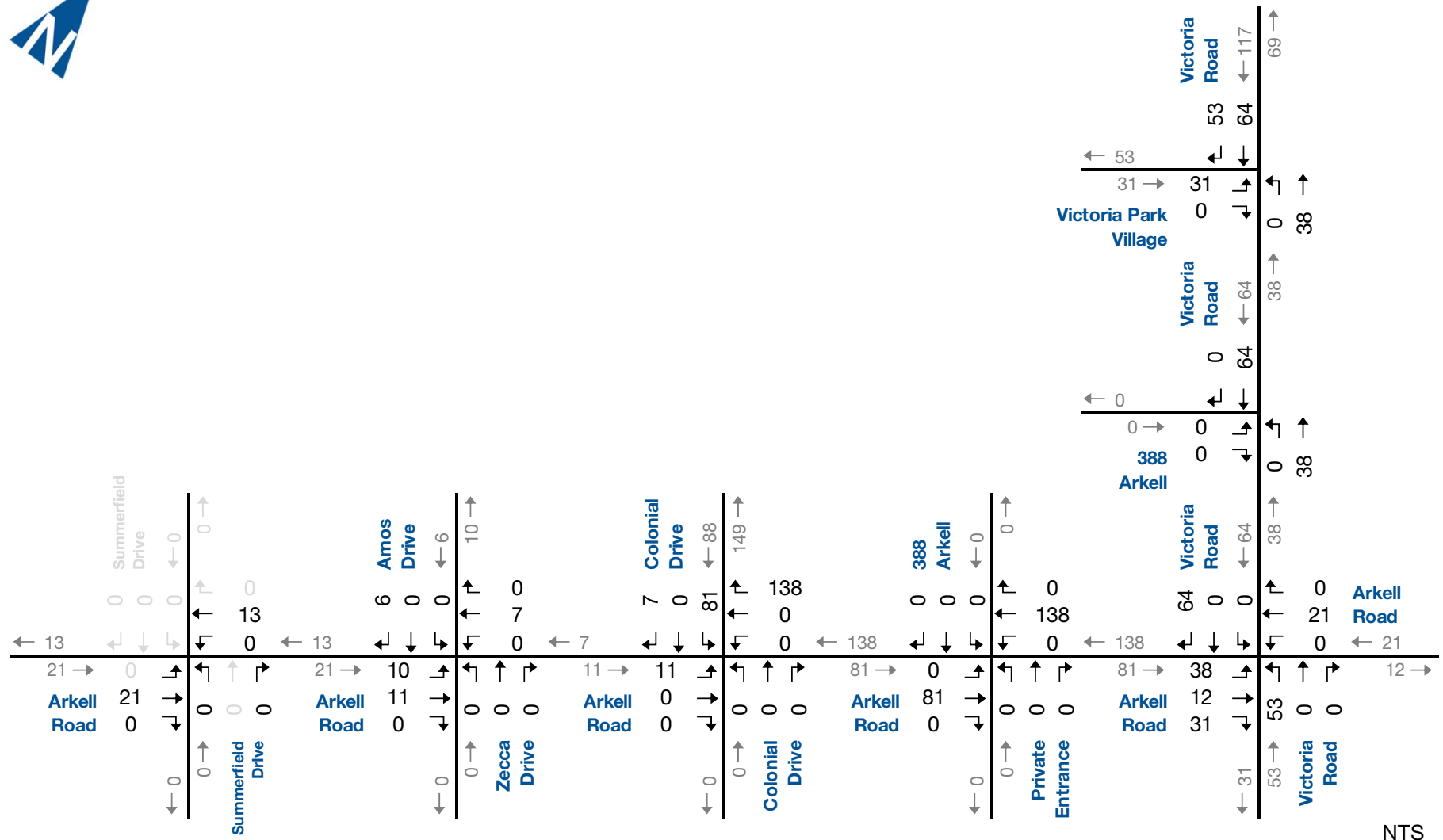




Westminister Woods AM Trip Assignment



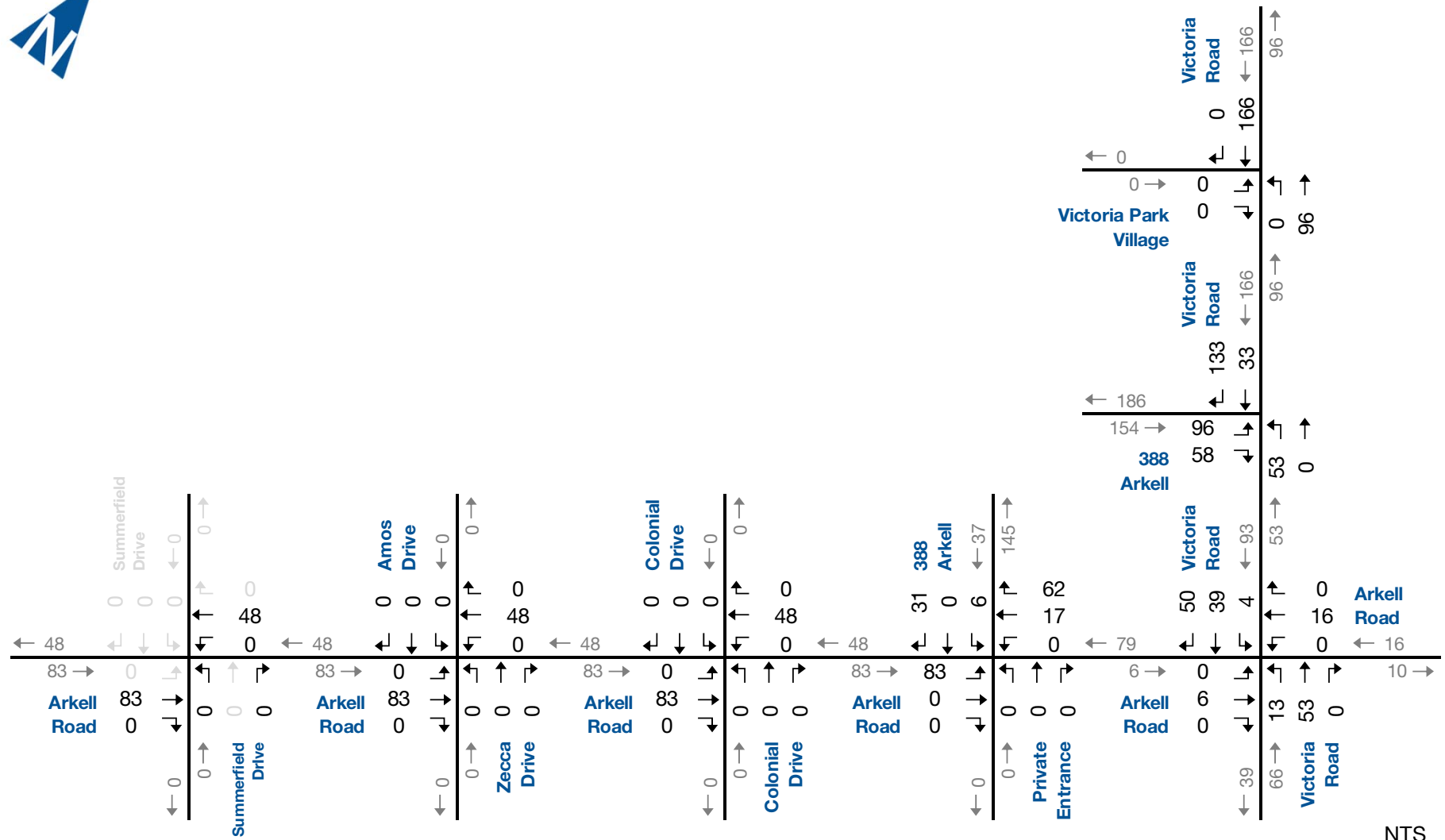
220 Arkell Road Transportation Impact Study
180099



NTS



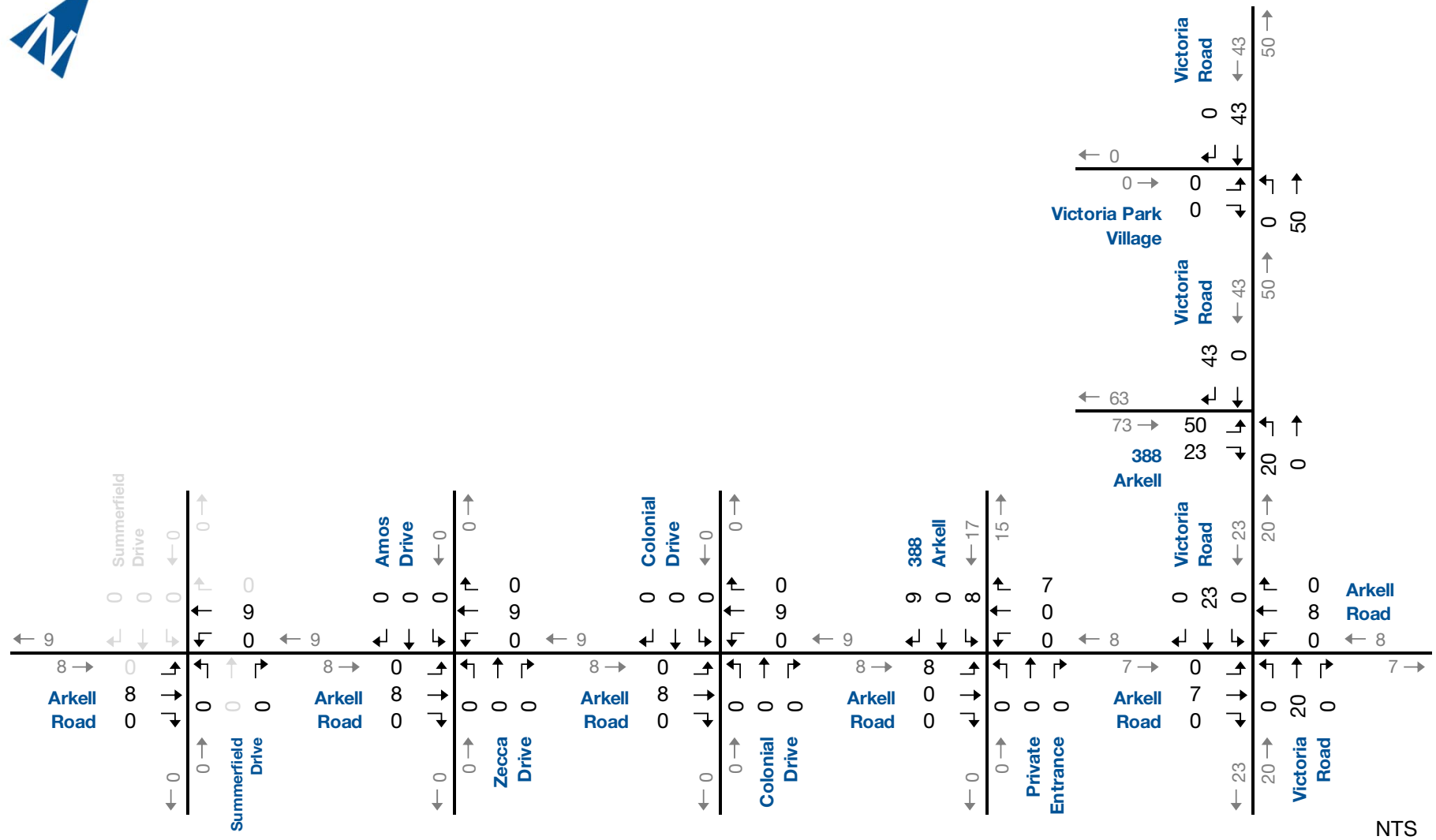
Northwest Arkell and Victoria PM Trip Assignment



NTS



388 Arkell Road Secondary School AM Trip Assignment



NTS



388 Arkeil Road Secondary School PM Trip Assignment

Appendix E

2021 Background Traffic Operations Reports



Lanes, Volumes, Timings

1: Summerfield Drive & Arkell Road

07-24-2018

| | → | ↖ | ↗ | ← | ↖ | ↗ |
|----------------------------|-------|-------|-------|-------|-------|-------|
| Lane Group | EBT | EBR | WBL | WBT | NBL | NBR |
| Lane Configurations | ↖ | | ↖ | ↖ | ↖ | |
| Traffic Volume (vph) | 350 | 33 | 28 | 402 | 129 | 110 |
| Future Volume (vph) | 350 | 33 | 28 | 402 | 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) | 357 | 34 | 29 | 410 | 132 | 112 |
| Shared Lane Traffic (%) | | | | | | |
| Lane Group Flow (vph) | 391 | 0 | 29 | 410 | 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 | | | | | |
| 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 Utilization 43.8% | ICU Level of Service A |
| Analysis Period (min) | 15 |

HCM 2010 TWSC

1: Summerfield Drive & Arkell Road

07-24-2018

| Intersection | | | | | | |
|--------------------------|------|------|------|------|------|------|
| Int Delay, s/veh | 4.3 | | | | | |
| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
| Lane Configurations | ↖ | | ↖ | ↖ | ↖ | |
| 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, # | 0 | - | - | 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 | 357 | 34 | 29 | 410 | 132 | 112 |

| Major/Minor | Major1 | Major2 | Minor1 | | |
|----------------------|--------|--------|--------|---|-------|
| Conflicting Flow All | 0 | 0 | 400 | 0 | 850 |
| Stage 1 | - | - | - | - | 383 |
| Stage 2 | - | - | - | - | 467 |
| Critical Hdwy | - | - | 4.18 | - | 6.43 |
| Critical Hdwy Stg 1 | - | - | - | - | 5.43 |
| Critical Hdwy Stg 2 | - | - | - | - | 5.43 |
| Follow-up Hdwy | - | - | 2.272 | - | 3.527 |
| Pot Cap-1 Maneuver | - | - | 1127 | - | 330 |
| Stage 1 | - | - | - | - | 687 |
| Stage 2 | - | - | - | - | 629 |
| Platoon blocked, % | - | - | - | - | - |
| Mov Cap-1 Maneuver | - | - | 1127 | - | 319 |
| Mov Cap-2 Maneuver | - | - | - | - | 439 |
| Stage 1 | - | - | - | - | 682 |
| Stage 2 | - | - | - | - | 613 |

| Approach | EB | WB | NB |
|----------------------|----|-----|----|
| HCM Control Delay, s | 0 | 0.5 | 18 |
| HCM LOS | | | C |

| Minor Lane/Major Mvmt | 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 | C | - | - | A | - |
| HCM 95th %tile Q(veh) | 2.5 | - | - | 0.1 | - |

Lanes, Volumes, Timings

2: Zecca Drive/Amos Drive & Arkell Road

07-24-2018

| | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|----------------------------|------|-------|-------|------|-------|-------|------|-------|-------|------|-------|-------|
| Lane Configurations | | | | | | | | | | | | |
| 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 | | | | | | | | | | | | |
| 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 42.1%

ICU Level of Service A

Analysis Period (min) 15

HCM 2010 TWSC

2: Zecca Drive/Amos Drive & Arkell Road

07-24-2018

Intersection

Int Delay, s/veh 1.8

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|--------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Lane Configurations | | | | | | | | | | | | |
| 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 | Major1 | Major2 | Minor1 | Minor2 |
|----------------------|--------|--------|--------|--------|
| Conflicting Flow All | 403 | 0 | 0 | 477 |
| Stage 1 | - | - | - | - |
| Stage 2 | - | - | - | - |
| Critical Hdwy | 4.1 | - | - | 4.15 |
| Critical Hdwy Stg 1 | - | - | - | - |
| Critical Hdwy Stg 2 | - | - | - | - |
| Follow-up Hdwy | 2.2 | - | - | 2.245 |
| Pot Cap-1 Maneuver | 1167 | - | - | 1070 |
| Stage 1 | - | - | - | - |
| Stage 2 | - | - | - | - |
| Platoon blocked, % | - | - | - | - |
| Mov Cap-1 Maneuver | 1154 | - | - | 1061 |
| Mov Cap-2 Maneuver | - | - | - | - |
| Stage 1 | - | - | - | - |
| Stage 2 | - | - | - | - |

| Approach | EB | WB | NB | SB |
|----------------------|-----|-----|------|------|
| HCM Control Delay, s | 0.1 | 0.1 | 18.2 | 17.1 |
| HCM LOS | | | C | C |

| Minor Lane/Major Mvmt | NBLn1 | EBL | EBT | EBR | WBL | WBT | WBR | SBLn1 |
|-----------------------|-------|-------|-----|-----|-------|-----|-----|-------|
| Capacity (veh/h) | 312 | 1154 | - | - | 1061 | - | - | 354 |
| HCM Lane V/C Ratio | 0.126 | 0.005 | - | - | 0.003 | - | - | 0.157 |
| HCM Control Delay (s) | 18.2 | 8.1 | 0 | - | 8.4 | 0 | - | 17.1 |
| HCM Lane LOS | C | A | A | - | A | A | - | C |
| HCM 95th %tile Q(veh) | 0.4 | 0 | - | - | 0 | - | - | 0.6 |

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

07-24-2018

| | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|----------------------------|-------|-------|-------|-------|-------|-------|------|-------|-------|------|-------|-------|
| Lane Configurations | ↰ | ↱ | | ↰ | ↱ | | | ↕ | | | ↕ | |
| Traffic Volume (vph) | 11 | 409 | 63 | 37 | 241 | 42 | 119 | 0 | 124 | 131 | 0 | 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 | | 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 | | | 0.978 | | | 0.931 | | | 0.973 | |
| Flt Protected | 0.950 | | | 0.950 | | | | 0.976 | | | 0.961 | |
| Satd. Flow (prot) | 1770 | 1784 | 0 | 1703 | 1735 | 0 | 0 | 1622 | 0 | 0 | 1742 | 0 |
| Flt Permitted | 0.950 | | | 0.950 | | | | 0.976 | | | 0.961 | |
| Satd. Flow (perm) | 1770 | 1784 | 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 | 445 | 68 | 40 | 262 | 46 | 129 | 0 | 135 | 142 | 0 | 35 |
| Shared Lane Traffic (%) | | | | | | | | | | | | |
| Lane Group Flow (vph) | 12 | 513 | 0 | 40 | 308 | 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 | | | 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 | |
| Sign Control | | Free | | | Free | | | Stop | | | Stop | |

Intersection Summary

| | |
|-----------------------------------|--------------|
| Area Type: | Other |
| Control Type: | Unsignalized |
| Intersection Capacity Utilization | 52.0% |
| Analysis Period (min) | 15 |
| ICU Level of Service | A |

HCM 2010 TWSC
3: Colonial Drive & Arkell Road

07-24-2018

| Intersection | | | | | | | | | | | | |
|--------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Int Delay, s/veh | 19.9 | | | | | | | | | | | |
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | ↰ | ↱ | | ↰ | ↱ | | | ↕ | | | ↕ | |
| Traffic Vol, veh/h | 11 | 409 | 63 | 37 | 241 | 42 | 119 | 0 | 124 | 131 | 0 | 32 |
| Future Vol, veh/h | 11 | 409 | 63 | 37 | 241 | 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 |
| Mvmt Flow | 12 | 445 | 68 | 40 | 262 | 46 | 129 | 0 | 135 | 142 | 0 | 35 |

| Major/Minor | Major1 | Major2 | Minor1 | 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 | - | - |
| Follow-up Hdwy | 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 | - | - |

| Approach | EB | WB | NB | SB |
|----------------------|-----|----|------|------|
| HCM Control Delay, s | 0.2 | 1 | 48.1 | 73.1 |
| HCM LOS | | | E | F |

| Minor Lane/Major Mvmt | NBLn1 | 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 | E | A | - | - | A | - | - | F |
| HCM 95th %tile Q(veh) | 6.7 | 0 | - | - | 0.1 | - | - | 6.3 |

Lanes, Volumes, Timings

4: Residential Entrance/Access 1 & Arkell Road

07-24-2018

| | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|----------------------------|-------|------|-------|------|-------|-------|------|-------|-------|-------|------|-------|
| Lane Configurations | ↩ | ↩ | | ↩ | ↩ | ↩ | ↩ | ↩ | ↩ | ↩ | ↩ | ↩ |
| 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: Other

Control Type: Unsignalized

Intersection Capacity Utilization 63.0%

ICU Level of Service B

Analysis Period (min) 15

HCM 2010 TWSC

4: Residential Entrance/Access 1 & Arkell Road

07-24-2018

| Intersection | | | | | | | | | | | | |
|--------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Int Delay, s/veh | 1.2 | | | | | | | | | | | |
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | ↩ | ↩ | | ↩ | ↩ | ↩ | ↩ | ↩ | ↩ | ↩ | ↩ | ↩ |
| 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 | Major1 | Major2 | Minor1 | Minor2 |
|----------------------|--------|--------|--------|--------|
| Conflicting Flow All | 380 | 0 | 0 | 633 |
| Stage 1 | - | - | - | - |
| Stage 2 | - | - | - | - |
| Critical Hdwy | 4.1 | - | - | 4.1 |
| Critical Hdwy Stg 1 | - | - | - | - |
| Critical Hdwy Stg 2 | - | - | - | - |
| Follow-up Hdwy | 2.2 | - | - | 2.2 |
| Pot Cap-1 Maneuver | 1190 | - | - | 960 |
| Stage 1 | - | - | - | - |
| Stage 2 | - | - | - | - |
| Platoon blocked, % | - | - | - | - |
| Mov Cap-1 Maneuver | 1190 | - | - | 960 |
| Mov Cap-2 Maneuver | - | - | - | - |
| Stage 1 | - | - | - | - |
| Stage 2 | - | - | - | - |

| Approach | EB | WB | NB | SB |
|----------------------|----|----|------|------|
| HCM Control Delay, s | 1 | 0 | 20.6 | 13.3 |
| HCM LOS | | | C | B |

| Minor Lane/Major Mvmt | NBLn1 | 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 | C | A | - | - | A | A | - | D | B |
| HCM 95th %tile Q(veh) | 0.1 | 0.2 | - | - | 0 | - | - | 0.1 | 0.2 |

Lanes, Volumes, Timings
5: Victoria Road & Arkell Road

07-24-2018

| | ↖ | → | ↘ | ↙ | ← | ↖ | ↙ | ↗ | ↘ | ↖ | ↙ | ↗ |
|----------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | ↖ | ↖ | ↖ | ↖ | ↖ | ↖ | ↖ | ↖ | ↖ | ↖ | ↖ | ↖ |
| Traffic Volume (vph) | 398 | 109 | 79 | 157 | 95 | 70 | 60 | 680 | 88 | 52 | 590 | 202 |
| Future Volume (vph) | 398 | 109 | 79 | 157 | 95 | 70 | 60 | 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 | | 0.937 | | | 0.936 | | | 0.983 | | | 0.962 | |
| Flt Protected | 0.950 | | | 0.950 | | | 0.950 | | | 0.950 | | |
| Satd. Flow (prot) | 1736 | 1674 | 0 | 1787 | 1696 | 0 | 1805 | 1762 | 0 | 1752 | 1670 | 0 |
| Flt Permitted | 0.622 | | | 0.554 | | | 0.140 | | | 0.140 | | |
| Satd. Flow (perm) | 1134 | 1674 | 0 | 1042 | 1696 | 0 | 266 | 1762 | 0 | 258 | 1670 | 0 |
| Right Turn on Red | | | Yes | | | Yes | | | Yes | | | Yes |
| Satd. Flow (RTOR) | | 44 | | | 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 | 120 | 87 | 173 | 104 | 77 | 66 | 747 | 97 | 57 | 648 | 222 |
| Shared Lane Traffic (%) | | | | | | | | | | | | |
| Lane Group Flow (vph) | 437 | 207 | 0 | 173 | 181 | 0 | 66 | 844 | 0 | 57 | 870 | 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 | Cl+Ex | Cl+Ex | | Cl+Ex | Cl+Ex | | Cl+Ex | Cl+Ex | | Cl+Ex | Cl+Ex | |
| Detector 1 Channel | | | | | | | | | | | | |
| Detector 1 Extend (s) | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | |
| 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 | | Cl+Ex | | | Cl+Ex | | | Cl+Ex | | | Cl+Ex | |
| Detector 2 Channel | | | | | | | | | | | | |
| Detector 2 Extend (s) | | 0.0 | | | 0.0 | | | 0.0 | | | 0.0 | |

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

07-24-2018

| | ↖ | → | ↘ | ↙ | ← | ↖ | ↙ | ↗ | ↘ | ↖ | ↙ | ↗ |
|-------------------------|-------|-------|-----|-------|-------|-----|-------|-------|-----|-------|-------|-----|
| 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 Effect 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 | C | | B | C | | B | F | | B | F | |
| Approach Delay | | 56.7 | | | 22.5 | | | 99.5 | | | 132.3 | |
| Approach LOS | | E | | | C | | | F | | | F | |

Intersection Summary

Area Type: Other

Cycle Length: 80

Actuated Cycle Length: 68.6

Natural Cycle: 150

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 1.23

Intersection Signal Delay: 90.9

Intersection LOS: F

Intersection Capacity Utilization 94.8%

ICU Level of Service F

Analysis Period (min) 15

Splits and Phases: 5: Victoria Road & Arkell Road

| | | | |
|------|------|------|------|
| ↖ Ø1 | ↖ Ø2 | ↖ Ø3 | ↖ Ø4 |
| 10 s | 34 s | 10 s | 26 s |
| ↖ Ø5 | ↖ Ø6 | ↖ Ø7 | ↖ Ø8 |
| 10 s | 34 s | 10 s | 26 s |

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Synchro 9 Report
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Queues

5: Victoria Road & Arkell Road

07-24-2018

| | EBL | EBT | WBL | WBT | NBL | NBT | SBL | SBT |
|------------------------|--------|-------|------|-------|------|--------|------|--------|
| 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 |

Intersection Summary

- Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

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

Queue shown is maximum after two cycles.

HCM 2010 Signalized Intersection Summary

5: Victoria Road & Arkell Road

07-24-2018

| | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------------|-------|------|------|------|------|------|-------|------|-------|-------|------|-------|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | ↰ | ↱ | ↱ | ↰ | ↱ | ↱ | ↰ | ↱ | ↱ | ↰ | ↱ | ↱ |
| Traffic Volume (veh/h) | 398 | 109 | 79 | 157 | 95 | 70 | 60 | 680 | 88 | 52 | 590 | 202 |
| Future Volume (veh/h) | 398 | 109 | 79 | 157 | 95 | 70 | 60 | 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 | 1786 | 1900 | 1881 | 1830 | 1900 | 1900 | 1792 | 1900 | 1845 | 1747 | 1900 |
| Adj Flow Rate, veh/h | 437 | 120 | 87 | 173 | 104 | 77 | 66 | 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 | 365 | 168 | 122 | 348 | 170 | 126 | 233 | 627 | 81 | 220 | 495 | 170 |
| Arrive On Green | 0.10 | 0.17 | 0.17 | 0.10 | 0.17 | 0.17 | 0.07 | 0.40 | 0.40 | 0.07 | 0.40 | 0.40 |
| Sat Flow, veh/h | 1740 | 963 | 698 | 1792 | 977 | 723 | 1810 | 1554 | 202 | 1757 | 1244 | 426 |
| Grp Volume(v), veh/h | 437 | 0 | 207 | 173 | 0 | 181 | 66 | 0 | 844 | 57 | 0 | 870 |
| Grp Sat Flow(s), veh/h/ln | 1740 | 0 | 1661 | 1792 | 0 | 1700 | 1810 | 0 | 1756 | 1757 | 0 | 1670 |
| Q Serve(g_s), s | 7.0 | 0.0 | 8.3 | 5.5 | 0.0 | 6.9 | 1.4 | 0.0 | 28.4 | 1.3 | 0.0 | 28.0 |
| Cycle Q Clear(g_c), s | 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 | 1.00 | | 0.42 | 1.00 | | 0.43 | 1.00 | | 0.11 | 1.00 | | 0.26 |
| Lane Grp Cap(c), veh/h | 365 | 0 | 290 | 348 | 0 | 296 | 233 | 0 | 708 | 220 | 0 | 665 |
| V/C Ratio(X) | 1.20 | 0.00 | 0.71 | 0.50 | 0.00 | 0.61 | 0.28 | 0.00 | 1.19 | 0.26 | 0.00 | 1.31 |
| Avail Cap(c_a), veh/h | 365 | 0 | 472 | 348 | 0 | 483 | 282 | 0 | 708 | 277 | 0 | 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(l) | 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 | 27.4 | 21.1 | 0.0 | 26.8 | 15.8 | 0.0 | 21.0 | 16.0 | 0.0 | 21.2 |
| Incr Delay (d2), s/veh | 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 |
| LnGrp Delay(d), s/veh | 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 | | C | C | | C | B | | F | B | | 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 (g_c+I1), 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

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

07-24-2018

| | EBL | EBR | NBL | NBT | SBT | SBR |
|----------------------------|-------|-------|-------|-------|-------|-------|
| Lane Configurations | ↰ | ↱ | ↰ | ↱ | ↱ | ↱ |
| 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 | | | 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 | 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% | 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 | | | | | | |
| 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 | |

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

07-24-2018

| | 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 Effect 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 | C | A | A | C | A | A |
| Approach Delay | 24.9 | | | 25.0 | 8.0 | |
| Approach LOS | C | | | C | A | |

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 75.1
Natural Cycle: 90
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.87
Intersection Signal Delay: 18.0
Intersection Capacity Utilization 75.9%
Analysis Period (min) 15

Intersection LOS: B
ICU Level of Service D

Splits and Phases: 6: Victoria Road & Access 2



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

Synchro 9 Report
Page 14

Queues

6: Victoria Road & Access 2

07-24-2018

| | EBL | EBR | NBL | NBT | SBT | SBR |
|------------------------|------|------|------|--------|-------|------|
| 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 Summary

95th 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

07-24-2018

| |  |  |  |  |  |  | | |
|------------------------------|---|---|---|---|---|---|---|---|
| Movement | EBL | EBR | NBL | NBT | SBT | SBR | | |
| Lane Configurations |  |  |  |  |  |  | | |
| 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(l) | 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 | C | C | B | C | A | A | | |
| Approach Vol, veh/h | 167 | | | 1246 | 990 | | | |
| Approach Delay, s/veh | 29.3 | | | 25.1 | 8.6 | | | |
| Approach LOS | C | | | C | A | | | |
| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 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 | | 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 | | | | B | | | | |

Lanes, Volumes, Timings

7: Victoria Road & Victoria Park Village Road






07-24-2018

| | EBL | EBR | NBL | NBT | SBT | SBR |
|---|------------------------|-------|-------|-------|-------|-------|
| Lane Group | EBL | EBR | NBL | NBT | SBT | SBR |
| Lane Configurations | ↔ | ↔ | ↔ | ↔ | ↔ | ↔ |
| 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 | | | | | | |
| Area Type: | Other | | | | | |
| Control Type: | Unsignalized | | | | | |
| Intersection Capacity Utilization 77.3% | ICU Level of Service D | | | | | |
| Analysis Period (min) 15 | | | | | | |

HCM 2010 TWSC

7: Victoria Road & Victoria Park Village Road

07-24-2018

| Intersection | | | | | | |
|--|---|---|---|---|---|------|
| Int Delay, s/veh | 111.5 | | | | | |
| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
| Lane Configurations |  |  |  |  |  | |
| 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, # | 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 | | | | | | |
| | Minor2 | Major1 | | Major2 | | |
| Conflicting Flow All | 2272 | 961 | 989 | 0 | - | 0 |
| Stage 1 | 961 | - | - | - | - | - |
| Stage 2 | 1311 | - | - | - | - | - |
| Critical Hdwy | 6.42 | 6.22 | 4.12 | - | - | - |
| Critical Hdwy Stg 1 | 5.42 | - | - | - | - | - |
| 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 | - | - | - | - | - |
| Stage 2 | 252 | - | - | - | - | - |
| Platoon blocked, % | | | | - | - | - |
| Mov Cap-1 Maneuver | ~ 43 | 311 | 699 | - | - | - |
| Mov Cap-2 Maneuver | ~ 43 | - | - | - | - | - |
| Stage 1 | 371 | - | - | - | - | - |
| Stage 2 | 246 | - | - | - | - | - |
| Approach | | | | | | |
| | EB | NB | | SB | | |
| HCM Control Delay, \$ 1204.2 | | 0.1 | | 0 | | |
| HCM LOS | F | | | | | |
| Minor Lane/Major Mvmt | | | | | | |
| | NBL | NBT | EBLn1 | EBLn2 | SBT | SBR |
| Capacity (veh/h) | 699 | - | 43 | 311 | - | - |
| HCM Lane V/C Ratio | 0.026 | - | 4.095 | 0.182 | - | - |
| HCM Control Delay (s) | 10.3 | \$ 1584.6 | 19.1 | - | - | - |
| HCM Lane LOS | B | - | F | C | - | - |
| HCM 95th %tile Q(veh) | 0.1 | - | 19.9 | 0.7 | - | - |
| Notes | | | | | | |
| -: Volume exceeds capacity \$: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon | | | | | | |

Lanes, Volumes, Timings

1: Summerfield Drive & Arkell Road

07-24-2018

| | EBT | EBR | WBL | WBT | NBL | NBR |
|----------------------------|-------|-------|-------|-------|-------|-------|
| Lane Group | EBT | EBR | WBL | WBT | NBL | NBR |
| Lane Configurations | ↔ | ↔ | ↔ | ↔ | ↔ | ↔ |
| 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 | | | 0.950 | | 0.970 | |
| Satd. Flow (perm) | 1813 | 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) | 470 | 145 | 83 | 401 | 69 | 42 |
| Shared Lane Traffic (%) | | | | | | |
| 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 | | | 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 Utilization 53.1% | ICU Level of Service A |
| Analysis Period (min) | 15 |

HCM 2010 TWSC

1: Summerfield Drive & Arkell Road

07-24-2018

| Intersection | | | | | | |
|--------------------------|------|------|------|------|------|------|
| Int Delay, s/veh | 2.2 | | | | | |
| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
| Lane Configurations | ↔ | ↔ | ↔ | ↔ | ↔ | ↔ |
| 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, # | 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 | Major1 | Major2 | Minor1 |
|----------------------|--------|--------|--------|
| Conflicting Flow All | 0 | 0 | 618 |
| Stage 1 | - | - | - |
| Stage 2 | - | - | - |
| Critical Hdwy | - | - | 4.1 |
| Critical Hdwy Stg 1 | - | - | - |
| Critical Hdwy Stg 2 | - | - | - |
| Follow-up Hdwy | - | - | 2.2 |
| Pot Cap-1 Maneuver | - | - | 972 |
| Stage 1 | - | - | - |
| Stage 2 | - | - | - |
| Platoon blocked, % | - | - | - |
| Mov Cap-1 Maneuver | - | - | 971 |
| Mov Cap-2 Maneuver | - | - | - |
| Stage 1 | - | - | - |
| Stage 2 | - | - | - |

| Approach | EB | WB | NB |
|----------------------|----|-----|------|
| HCM Control Delay, s | 0 | 1.6 | 17.3 |
| HCM LOS | | | C |

| Minor Lane/Major Mvmt | NBLn1 | 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 | - |

Lanes, Volumes, Timings

2: Zecca Drive/Amos Drive & Arkell Road

07-24-2018

| | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|----------------------------|------|-------|-------|------|-------|-------|------|-------|-------|------|-------|-------|
| Lane Configurations | | ↔ | | | ↔ | | | ↔ | | | ↔ | |
| 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 | | | | | | | | | | | | |
| 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 59.4%

ICU Level of Service B

Analysis Period (min) 15

HCM 2010 TWSC

2: Zecca Drive/Amos Drive & Arkell Road

07-24-2018

| Intersection | | | | | | | | | | | | |
|--------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Int Delay, s/veh | 1.2 | | | | | | | | | | | |
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | | ↔ | | | ↔ | | | ↔ | | | ↔ | |
| 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 | Major1 | Major2 | Minor1 | Minor2 |
|----------------------|--------|--------|--------|--------|
| Conflicting Flow All | 463 | 0 | 0 | 488 |
| Stage 1 | - | - | - | 553 |
| Stage 2 | - | - | - | 488 |
| Critical Hdwy | 4.1 | - | 4.1 | - |
| Critical Hdwy Stg 1 | - | - | - | 6.1 |
| Critical Hdwy Stg 2 | - | - | - | 6.1 |
| Follow-up Hdwy | 2.2 | - | 2.2 | - |
| Pot Cap-1 Maneuver | 1109 | - | 1086 | - |
| Stage 1 | - | - | - | 521 |
| Stage 2 | - | - | - | 565 |
| Platoon blocked, % | - | - | - | - |
| Mov Cap-1 Maneuver | 1102 | - | 1080 | - |
| Mov Cap-2 Maneuver | - | - | - | 190 |
| Stage 1 | - | - | - | 491 |
| Stage 2 | - | - | - | 536 |

| Approach | EB | WB | NB | SB |
|----------------------|-----|-----|------|------|
| HCM Control Delay, s | 0.6 | 0.1 | 23.6 | 14.9 |
| HCM LOS | | | C | B |

| Minor Lane/Major Mvmt | 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 | C | A | A | - | A | A | - | B |
| HCM 95th %tile Q(veh) | 0.3 | 0.1 | - | - | 0 | - | - | 0.3 |

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

07-24-2018













| |  |  |  |  |  |  |  |  |  |  |  |  |
|----------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  |  |  |  |  |  |  |  |  |  |  |
| 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 | | 0 |
| Taper Length (m) | 7.5 | | | 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 | 0 |
| Flt Permitted | 0.950 | | | 0.950 | | | | 0.973 | | | 0.961 | |
| Satd. Flow (perm) | 1805 | 1825 | 0 | 1805 | 1794 | 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 | 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 | 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 | 48.5% |
| Analysis Period (min) | 15 |
| ICU Level of Service | A |

HCM 2010 TWSC
3: Colonial Drive & Arkell Road

07-24-2018

| Intersection | | | | | | | | | | | | |
|--------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Int Delay, s/veh | 7.6 | | | | | | | | | | | |
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  |  |  |  |  |  |  |  |  |  |  |
| 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 | Major1 | Major2 | Minor1 | Minor2 |
|----------------------|--------|--------|--------|--------|
| Conflicting Flow All | 509 | 0 | 0 | 432 |
| Stage 1 | - | - | - | - |
| Stage 2 | - | - | - | - |
| Critical Hdwy | 4.1 | - | - | 4.1 |
| Critical Hdwy Stg 1 | - | - | - | - |
| Critical Hdwy Stg 2 | - | - | - | - |
| Follow-up Hdwy | 2.2 | - | - | 2.2 |
| Pot Cap-1 Maneuver | 1066 | - | - | 1138 |
| Stage 1 | - | - | - | - |
| Stage 2 | - | - | - | - |
| Platoon blocked, % | - | - | - | - |
| Mov Cap-1 Maneuver | 1066 | - | - | 1138 |
| Mov Cap-2 Maneuver | - | - | - | - |
| Stage 1 | - | - | - | - |
| Stage 2 | - | - | - | - |

| Approach | EB | WB | NB | SB |
|----------------------|-----|----|------|------|
| HCM Control Delay, s | 0.6 | 1 | 31.6 | 40.4 |
| HCM LOS | | | D | E |

| Minor Lane/Major Mvmt | 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 | A | - | - | A | - | - | E |
| HCM 95th %tile Q(veh) | 2.9 | 0.1 | - | - | 0.2 | - | - | 2.6 |

Lanes, Volumes, Timings

4: Residential Entrance/Access 1 & Arkell Road

07-24-2018

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|----------------------------|-------|-------|-------|------|-------|-------|------|-------|-------|-------|------|-------|
| Lane Configurations | ↰ | ↱ | | ↰ | ↱ | | ↰ | ↱ | | ↰ | ↱ | |
| 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 | 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 | 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

Area Type: Other

Control Type: Unsignalized

Intersection Capacity Utilization 45.7%

ICU Level of Service A

Analysis Period (min) 15

HCM 2010 TWSC

4: Residential Entrance/Access 1 & Arkell Road

07-24-2018

| Intersection | | | | | | | | | | | | |
|--------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Int Delay, s/veh | 0.4 | | | | | | | | | | | |
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | ↰ | ↱ | | ↰ | ↱ | | ↰ | ↱ | | ↰ | ↱ | |
| Traffic 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 |
| 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 | 495 | 3 | 2 | 589 | 8 | 2 | 0 | 2 | 9 | 0 | 10 |

| Major/Minor | Major1 | Major2 | Minor1 | Minor2 |
|----------------------|--------|--------|--------|--------|
| Conflicting Flow All | 597 | 0 | 0 | 498 |
| Stage 1 | - | - | - | - |
| Stage 2 | - | - | - | - |
| Critical Hdwy | 4.1 | - | - | 4.1 |
| Critical Hdwy Stg 1 | - | - | - | - |
| Critical Hdwy Stg 2 | - | - | - | - |
| Follow-up Hdwy | 2.2 | - | - | 2.2 |
| Pot Cap-1 Maneuver | 989 | - | - | 1076 |
| Stage 1 | - | - | - | - |
| Stage 2 | - | - | - | - |
| Platoon blocked, % | - | - | - | - |
| Mov Cap-1 Maneuver | 989 | - | - | 1076 |
| 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 |

| 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 |
| HCM 95th %tile Q(veh) | 0 | 0 | - | - | 0 | - | - | 0.1 | 0.1 |

Lanes, Volumes, Timings
5: Victoria Road & Arkell Road

07-24-2018

| | ↖ | → | ↗ | ↙ | ← | ↖ | ↗ | ↙ | ↘ | ↖ | ↗ | ↙ | ↘ |
|----------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|---|
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR | |
| Lane Configurations | ↖ | ↗ | | ↖ | ↗ | | ↖ | ↗ | | ↖ | ↗ | | |
| Traffic Volume (vph) | 242 | 143 | 80 | 118 | 186 | 72 | 89 | 722 | 141 | 75 | 698 | 273 | |
| Future Volume (vph) | 242 | 143 | 80 | 118 | 186 | 72 | 89 | 722 | 141 | 75 | 698 | 273 | |
| 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 | | 0.946 | | | 0.958 | | | 0.975 | | | 0.958 | | |
| Flt Protected | 0.950 | | | 0.950 | | | 0.950 | | | 0.950 | | | |
| Satd. Flow (prot) | 1787 | 1786 | 0 | 1703 | 1792 | 0 | 1805 | 1758 | 0 | 1805 | 1763 | 0 | |
| Flt Permitted | 0.375 | | | 0.579 | | | 0.141 | | | 0.141 | | | |
| Satd. Flow (perm) | 705 | 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 | |
| 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) | 257 | 152 | 85 | 126 | 198 | 77 | 95 | 768 | 150 | 80 | 743 | 290 | |
| Shared Lane Traffic (%) | | | | | | | | | | | | | |
| Lane Group Flow (vph) | 257 | 237 | 0 | 126 | 275 | 0 | 95 | 918 | 0 | 80 | 1033 | 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 | Cl+Ex | Cl+Ex | | Cl+Ex | Cl+Ex | | Cl+Ex | Cl+Ex | | Cl+Ex | Cl+Ex | | |
| Detector 1 Channel | | | | | | | | | | | | | |
| Detector 1 Extend (s) | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | | |
| 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 | | Cl+Ex | | | Cl+Ex | | | Cl+Ex | | | Cl+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

07-24-2018

| | ↖ | → | ↗ | ↙ | ← | ↖ | ↗ | ↙ | ↘ | ↖ | ↗ | ↙ | ↘ |
|-------------------------|-------|-------|-----|-------|-------|-----|-------|-------|-----|-------|-------|-----|---|
| 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 Effect 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 | C | C | | B | D | | B | F | | B | F | | |
| Approach Delay | | 29.5 | | | 30.2 | | | 168.6 | | | 230.3 | | |
| Approach LOS | | C | | | C | | | 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

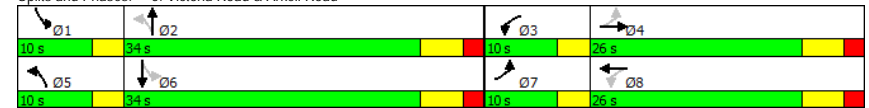
Intersection LOS: F

Intersection Capacity Utilization 103.6%

ICU Level of Service G

Analysis Period (min) 15

Splits and Phases: 5: Victoria Road & Arkell Road



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

Synchro 9 Report
Page 10

Queues

5: Victoria Road & Arkell Road

07-24-2018

| | EBL | EBT | WBL | WBT | NBL | NBT | SBL | SBT |
|------------------------|-------|-------|------|-------|------|--------|------|--------|
| 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 |

Intersection Summary

- Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

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

Queue shown is maximum after two cycles.

HCM 2010 Signalized Intersection Summary

5: Victoria Road & Arkell Road

07-24-2018

| | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------------|------|------|------|------|------|------|------|-------|-------|------|-------|-------|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | ↰ | ↱ | | ↰ | ↱ | | ↰ | ↱ | | ↰ | ↱ | |
| Traffic Volume (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 (Ob), 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(l) | 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 | | C | C | | C | B | | F | B | | F |
| Approach Vol, veh/h | 494 | | | | 401 | | | 1013 | | | 1113 | |
| Approach Delay, s/veh | 32.4 | | | | 29.4 | | | 179.7 | | | 257.0 | |
| Approach LOS | C | | | | 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 | 8.6 | 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+I1), 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

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

07-24-2018

| | EBL | EBR | NBL | NBT | SBT | SBR |
|----------------------------|-------|-------|-------|-------|-------|-------|
| Lane Configurations | ↰ | ↱ | ↰ | ↱ | ↱ | ↱ |
| 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 | | Yes | | | | Yes |
| Satd. Flow (RTOR) | | 25 | | | | 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 | |
| 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 | | | | | | |
| 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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Lanes, Volumes, Timings
6: Victoria Road & Access 2

07-24-2018

| | 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 Effect 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 | B | A | B | B | A |
| Approach Delay | 26.6 | | | 12.4 | 10.0 | |
| Approach LOS | C | | | B | B | |

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 76.1
Natural Cycle: 90
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.74
Intersection Signal Delay: 11.7
Intersection Capacity Utilization 72.2%
Analysis Period (min) 15

Intersection LOS: B
ICU Level of Service C

Splits and Phases: 6: Victoria Road & Access 2



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

Synchro 9 Report
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Queues

6: Victoria Road & Access 2

07-24-2018

| | EBL | EBR | NBL | NBT | SBT | SBR |
|------------------------|------|------|------|--------|--------|------|
| 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

95th 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

07-24-2018

| |  |  |  |  |  |  | | |
|------------------------------|---|---|---|---|---|---|---|---|
| Movement | EBL | EBR | NBL | NBT | SBT | SBR | | |
| Lane Configurations |  |  |  |  |  |  | | |
| 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 (Ob), 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(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 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | |
| Upstream Filter(l) | 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 | 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 | | |
| 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

HCM 2010 Ctrl Delay 14.7
HCM 2010 LOS B

Lanes, Volumes, Timings

7: Victoria Road & Victoria Park Village Road

07-24-2018

| Lane Group | EBL | EBR | NBL | NBT | SBT | SBR |
|----------------------------|---|---|---|---|---|---|
| Lane Configurations |  |  |  |  |  |  |
| 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

Area Type: Other

Control Type: Unsignalized

Intersection Capacity Utilization 81.5%







ICU Level of Service D

Analysis Period (min) 15

HCM 2010 TWSC

7: Victoria Road & Victoria Park Village Road

07-24-2018

| Intersection | | | | | | |
|--------------------------|---|---|---|---|---|---|
| Int Delay, s/veh | 64.7 | | | | | |
| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
| Lane Configurations |  |  |  |  |  |  |
| 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, # | 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 | Minor2 | Major1 | 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 Mvmt | 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 | B | - | F | D | - | - |
| HCM 95th %tile Q(veh) | 0.5 | - | 12.3 | 0.8 | - | - |

Notes

--: Volume exceeds capacity \$: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Appendix F

2026 Background Traffic Operations Reports



Lanes, Volumes, Timings

1: Summerfield Drive & Arkell Road

07-24-2018

| | → | ↖ | ↗ | ← | ↖ | ↗ |
|---|------------------------|-------|-------|-------|-------|-------|
| Lane Group | EBT | EBR | WBL | WBT | NBL | NBR |
| Lane Configurations | ↖ | | ↖ | ↖ | ↖ | |
| 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 | | | | | |
| Control Type: | Unsignalized | | | | | |
| Intersection Capacity Utilization 47.0% | ICU Level of Service A | | | | | |
| Analysis Period (min) 15 | | | | | | |

HCM 2010 TWSC

1: Summerfield Drive & Arkell Road

07-24-2018

| Intersection | | | | | | |
|--------------------------|------|------|------|------|------|------|
| Int Delay, s/veh | 5 | | | | | |
| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
| Lane Configurations | ↖ | | ↖ | ↖ | ↖ | |
| 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 | - | 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 |
| Mvmt Flow | 384 | 37 | 31 | 443 | 146 | 124 |

| Major/Minor | Major1 | Major2 | Minor1 |
|----------------------|--------|--------|--------|
| Conflicting Flow All | 0 | 0 | 429 |
| Stage 1 | - | - | - |
| Stage 2 | - | - | - |
| Critical Hdwy | - | - | 4.18 |
| Critical Hdwy Stg 1 | - | - | - |
| Critical Hdwy Stg 2 | - | - | - |
| Follow-up Hdwy | - | - | 2.272 |
| Pot Cap-1 Maneuver | - | - | 1099 |
| Stage 1 | - | - | - |
| Stage 2 | - | - | - |
| Platoon blocked, % | - | - | - |
| Mov Cap-1 Maneuver | - | - | 1099 |
| Mov Cap-2 Maneuver | - | - | - |
| Stage 1 | - | - | - |
| Stage 2 | - | - | - |

| Approach | EB | WB | NB |
|----------------------|----|-----|------|
| HCM Control Delay, s | 0 | 0.5 | 20.8 |
| HCM LOS | | | C |

| Minor Lane/Major Mvmt | NBLn1 | EBT | EBR | WBL | WBT |
|-----------------------|-------|-----|-----|-------|-----|
| Capacity (veh/h) | 493 | - | - | 1099 | - |
| HCM Lane V/C Ratio | 0.548 | - | - | 0.028 | - |
| HCM Control Delay (s) | 20.8 | - | - | 8.4 | - |
| HCM Lane LOS | C | - | - | A | - |
| HCM 95th %tile Q(veh) | 3.3 | - | - | 0.1 | - |

Lanes, Volumes, Timings

2: Zecca Drive/Amos Drive & Arkell Road

07-24-2018

| | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|----------------------------|------|-------|-------|------|-------|-------|------|-------|-------|------|-------|-------|
| Lane Configurations | | ↔ | | | ↔ | | | ↔ | | | ↔ | |
| Traffic Volume (vph) | 7 | 478 | 14 | 4 | 414 | 6 | 23 | 1 | 18 | 27 | 2 | 28 |
| Future Volume (vph) | 7 | 478 | 14 | 4 | 414 | 6 | 23 | 1 | 18 | 27 | 2 | 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 | | 0.996 | | | 0.998 | | | 0.942 | | | 0.934 | |
| Flt Protected | | 0.999 | | | | | | 0.973 | | | 0.977 | |
| Satd. Flow (prot) | 0 | 1804 | 0 | 0 | 1774 | 0 | 0 | 1695 | 0 | 0 | 1734 | 0 |
| Flt Permitted | | 0.999 | | | | | | 0.973 | | | 0.977 | |
| Satd. Flow (perm) | 0 | 1804 | 0 | 0 | 1774 | 0 | 0 | 1695 | 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) | 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 | 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 44.7%

ICU Level of Service A

Analysis Period (min) 15

HCM 2010 TWSC

2: Zecca Drive/Amos Drive & Arkell Road

07-24-2018

| Intersection | | | | | | | | | | | | |
|--------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Int Delay, s/veh | 2 | | | | | | | | | | | |
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | | ↔ | | | ↔ | | | ↔ | | | ↔ | |
| 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 | Major1 | | Major2 | | Minor1 | | Minor2 | | | | | |
|----------------------|--------|---|--------|-------|--------|---|--------|-----|-----|-----|-----|-----|
| Conflicting Flow All | 434 | 0 | 0 | 515 | 0 | 0 | 989 | 964 | 518 | 973 | 969 | 444 |
| Stage 1 | - | - | - | - | - | - | 522 | 522 | - | 439 | 439 | - |
| 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 | - | - | - | - | - | - | 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 | 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 | EB | WB | NB | SB |
|----------------------|-----|-----|------|------|
| HCM Control Delay, s | 0.1 | 0.1 | 20.1 | 18.6 |
| HCM LOS | | | C | C |

| Minor Lane/Major Mvmt | NBLn1 | EBL | EBT | EBR | WBL | WBT | WBR | SBLn1 |
|-----------------------|-------|-------|-----|-----|-------|-----|-----|-------|
| Capacity (veh/h) | 282 | 1123 | - | - | 1026 | - | - | 323 |
| HCM Lane V/C Ratio | 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 | A | - | A | A | - | C |
| HCM 95th %tile Q(veh) | 0.5 | 0 | - | - | 0 | - | - | 0.7 |

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

07-24-2018













| | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|----------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations |  |  |  |  |  |  |  |  |  |  |  |  |
| Traffic Volume (vph) | 11 | 441 | 69 | 41 | 259 | 42 | 131 | 0 | 137 | 131 | 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 | | 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 | 1783 | 0 | 1703 | 1736 | 0 | 0 | 1622 | 0 | 0 | 1742 | 0 |
| Flt Permitted | 0.950 | | | 0.950 | | | | 0.976 | | | 0.961 | |
| Satd. Flow (perm) | 1770 | 1783 | 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 | 479 | 75 | 45 | 282 | 46 | 142 | 0 | 149 | 142 | 0 | 35 |
| Shared Lane Traffic (%) | | | | | | | | | | | | |
| Lane Group Flow (vph) | 12 | 554 | 0 | 45 | 328 | 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 | | | 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 | 56.1% |
| Analysis Period (min) | 15 |
| ICU Level of Service | B |

HCM 2010 TWSC
3: Colonial Drive & Arkell Road

07-24-2018

| Intersection | | | | | | | | | | | | |
|--------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Int Delay, s/veh | 32 | | | | | | | | | | | |
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  |  |  |  |  |  |  |  |  |  |  |
| Traffic Vol, veh/h | 11 | 441 | 69 | 41 | 259 | 42 | 131 | 0 | 137 | 131 | 0 | 32 |
| Future Vol, veh/h | 11 | 441 | 69 | 41 | 259 | 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, # | - | 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 | 479 | 75 | 45 | 282 | 46 | 142 | 0 | 149 | 142 | 0 | 35 |

| Major/Minor | Major1 | Major2 | Minor1 | Minor2 |
|----------------------|--------|--------|--------|--------|
| Conflicting Flow All | 327 | 0 | 0 | 565 |
| Stage 1 | - | - | - | - |
| Stage 2 | - | - | - | - |
| Critical Hdwy | 4.12 | - | 4.16 | - |
| Critical Hdwy Stg 1 | - | - | - | - |
| Critical Hdwy Stg 2 | - | - | - | - |
| Follow-up Hdwy | 2.218 | - | 2.254 | - |
| Pot Cap-1 Maneuver | 1233 | - | 987 | - |
| Stage 1 | - | - | - | - |
| Stage 2 | - | - | - | - |
| Platoon blocked, % | - | - | - | - |
| Mov Cap-1 Maneuver | 1233 | - | 986 | - |
| Mov Cap-2 Maneuver | - | - | - | - |
| Stage 1 | - | - | - | - |
| Stage 2 | - | - | - | - |

| Approach | EB | WB | NB | SB |
|----------------------|-----|-----|------|-------|
| HCM Control Delay, s | 0.2 | 1.1 | 82.2 | 115.7 |
| HCM LOS | | | F | F |

| Minor Lane/Major Mvmt | NBLn1 | EBL | EBT | EBR | WBL | WBT | WBR | SBLn1 |
|-----------------------|-------|------|-----|-----|-------|-----|-----|-------|
| 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 |
| HCM 95th %tile Q(veh) | 9.9 | 0 | - | - | 0.1 | - | - | 8 |

Lanes, Volumes, Timings

4: Residential Entrance/Access 1 & Arkell Road

07-24-2018

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|----------------------------|-------|------|-------|------|-------|-------|------|-------|-------|-------|------|-------|
| Lane Configurations | ↰ | ↱ | | ↰ | ↱ | | ↰ | ↱ | | ↰ | ↱ | |
| 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

Area Type: Other

Control Type: Unsignalized

Intersection Capacity Utilization 66.5%

ICU Level of Service C

Analysis Period (min) 15

HCM 2010 TWSC

4: Residential Entrance/Access 1 & Arkell Road

07-24-2018

| Intersection | | | | | | | | | | | | |
|--------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Int Delay, s/veh | 1.2 | | | | | | | | | | | |
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | ↰ | ↱ | | ↰ | ↱ | | ↰ | ↱ | | ↰ | ↱ | |
| 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 | - | 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 | Major1 | Major2 | Minor1 | Minor2 |
|----------------------|--------|--------|--------|--------|
| Conflicting Flow All | 404 | 0 | 0 | 682 |
| Stage 1 | - | - | - | - |
| Stage 2 | - | - | - | - |
| Critical Hdwy | 4.1 | - | - | 4.1 |
| Critical Hdwy Stg 1 | - | - | - | - |
| Critical Hdwy Stg 2 | - | - | - | - |
| Follow-up Hdwy | 2.2 | - | - | 2.2 |
| Pot Cap-1 Maneuver | 1166 | - | - | 920 |
| Stage 1 | - | - | - | - |
| Stage 2 | - | - | - | - |
| Platoon blocked, % | - | - | - | - |
| Mov Cap-1 Maneuver | 1166 | - | - | 920 |
| Mov Cap-2 Maneuver | - | - | - | - |
| Stage 1 | - | - | - | - |
| Stage 2 | - | - | - | - |

| Approach | EB | WB | NB | SB |
|----------------------|----|----|------|------|
| HCM Control Delay, s | 1 | 0 | 22.5 | 13.9 |
| HCM LOS | | | C | B |

| Minor Lane/Major Mvmt | NBLn1 | EBL | EBT | EBR | WBL | WBT | WBR | SBLn1 | 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 | B |
| HCM 95th %tile Q(veh) | 0.1 | 0.3 | - | - | 0 | - | - | 0.1 | 0.2 |

Lanes, Volumes, Timings
5: Victoria Road & Arkell Road

07-24-2018

| | ↖ | → | ↘ | ↙ | ← | ↖ | ↙ | ↗ | ↘ | ↖ | ↙ | ↗ | ↘ |
|----------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|---|
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR | |
| Lane Configurations | ↖ | ↖ | | ↖ | ↖ | | ↖ | ↖ | | ↖ | ↖ | | |
| 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 | Cl+Ex | Cl+Ex | | Cl+Ex | Cl+Ex | | Cl+Ex | Cl+Ex | | Cl+Ex | Cl+Ex | | |
| Detector 1 Channel | | | | | | | | | | | | | |
| Detector 1 Extend (s) | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | | |
| 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 | | Cl+Ex | | | Cl+Ex | | | Cl+Ex | | | Cl+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 2026 AM Background

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

07-24-2018

| | ↖ | → | ↘ | ↙ | ← | ↖ | ↙ | ↗ | ↘ | ↖ | ↙ | ↗ | ↘ |
|-------------------------|-------|-------|-----|-------|-------|-----|-------|-------|-----|-------|-------|-----|---|
| 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 Effect 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 | C | | C | C | | B | F | | B | F | | |
| Approach Delay | | 94.2 | | | 24.3 | | | 125.9 | | | 192.0 | | |
| Approach LOS | | F | | | C | | | F | | | F | | |

Intersection Summary

Area Type: Other

Cycle Length: 80

Actuated Cycle Length: 71.3

Natural Cycle: 150

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 1.38

Intersection Signal Delay: 127.4

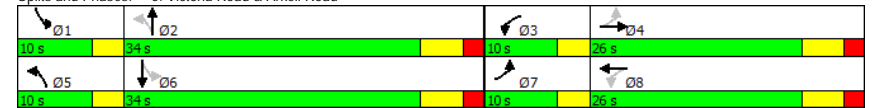
Intersection LOS: F

Intersection Capacity Utilization 99.1%

ICU Level of Service F

Analysis Period (min) 15

Splits and Phases: 5: Victoria Road & Arkell Road



220 Arkell Road TIS 5:00 pm 07-04-2018 2026 AM Background

Synchro 9 Report
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Queues

5: Victoria Road & Arkell Road

07-24-2018

| | EBL | EBT | WBL | WBT | NBL | NBT | SBL | SBT |
|------------------------|--------|-------|------|-------|------|--------|------|--------|
| 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 |

Intersection Summary

- Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

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

Queue shown is maximum after two cycles.

HCM 2010 Signalized Intersection Summary

5: Victoria Road & Arkell Road

07-24-2018

| | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------------|-------|------|------|------|------|------|-------|------|-------|-------|------|-------|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | ↰ | ↱ | ↱ | ↰ | ↱ | ↱ | ↰ | ↱ | ↱ | ↰ | ↱ | ↱ |
| Traffic Volume (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 (Ob), 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 | | C | C | | C | B | | F | B | | F |
| Approach Vol, veh/h | 693 | | | 387 | | | 989 | | | 998 | | |
| Approach Delay, s/veh | 140.2 | | | 26.2 | | | 164.6 | | | 207.2 | | |
| 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 | 7.9 | 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 | | | | | | | | | | | |

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

07-24-2018

| | EBL | EBR | NBL | NBT | SBT | SBR |
|----------------------------|-------|-------|-------|-------|-------|-------|
| Lane Configurations | ↰ | ↱ | ↰ | ↱ | ↱ | ↱ |
| 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 | | | 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 | 1759 | 1615 |
| Flt Permitted | 0.950 | | 0.237 | | | |
| 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 | | | 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 | | | 2 | 6 | |

220 Arkell Road TIS 5:00 pm 07-04-2018 2026 AM Background

Synchro 9 Report
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Lanes, Volumes, Timings
6: Victoria Road & Access 2

07-24-2018

| | 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 Effect 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 | C | A | A | D | B | A |
| Approach Delay | 24.9 | | | 45.6 | 9.2 | |
| Approach LOS | C | | | D | A | |

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 75.1
Natural Cycle: 100
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.96
Intersection Signal Delay: 29.3
Intersection Capacity Utilization 81.2%
Analysis Period (min) 15

Intersection LOS: C
ICU Level of Service D

Splits and Phases: 6: Victoria Road & Access 2




220 Arkell Road TIS 5:00 pm 07-04-2018 2026 AM Background

Synchro 9 Report
Page 14

Queues

6: Victoria Road & Access 2

07-24-2018



| 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 |

Intersection Summary

- Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.


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

Queue shown is maximum after two cycles.

HCM 2010 Signalized Intersection Summary

6: Victoria Road & Access 2

07-24-2018



| Movement | EBL | EBR | NBL | NBT | SBT | SBR | | |
|------------------------------|------|------|------|------|------|------|---|---|
| Lane Configurations | ↰ | ↱ | ↰ | ↱ | ↱ | ↱ | | |
| 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 | | |
| 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(l) | 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 | C | C | B | F | B | A | | |
| Approach Vol, veh/h | 167 | | | 1357 | 1058 | | | |
| Approach Delay, s/veh | 29.3 | | | 45.5 | 9.9 | | | |
| Approach LOS | C | | | D | A | | | |
| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 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

C

Lanes, Volumes, Timings

7: Victoria Road & Victoria Park Village Road

07-24-2018

| | ↖ | ↗ | ↖ | ↗ | ↘ | ↙ |
|---|------------------------|-------|-------|-------|-------|-------|
| Lane Group | EBL | EBR | NBL | NBT | SBT | SBR |
| Lane Configurations | ↖ | ↗ | ↖ | ↗ | ↘ | ↙ |
| 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 | |
| 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 Utilization 82.7% | ICU Level of Service E | | | | | |
| Analysis Period (min) 15 | | | | | | |

HCM 2010 TWSC

7: Victoria Road & Victoria Park Village Road

07-24-2018

| Intersection | | | | | | |
|--------------------------|-------|------|------|------|------|------|
| Int Delay, s/veh | 143.8 | | | | | |
| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
| Lane Configurations | ↖ | ↗ | ↖ | ↗ | ↘ | ↙ |
| Traffic Vol, veh/h | 162 | 52 | 17 | 1274 | 921 | 52 |
| Future 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 | - | - | - |
| Veh in Median Storage, # | 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 | 1385 | 1001 | 57 |

| Major/Minor | Minor2 | Major1 | Major2 | | | |
|----------------------|--------|--------|--------|---|---|---|
| Conflicting Flow All | 2451 | 1029 | 1058 | 0 | - | 0 |
| Stage 1 | 1029 | - | - | - | - | - |
| Stage 2 | 1422 | - | - | - | - | - |
| Critical Hdwy | 6.42 | 6.22 | 4.12 | - | - | - |
| Critical Hdwy Stg 1 | 5.42 | - | - | - | - | - |
| Critical Hdwy Stg 2 | 5.42 | - | - | - | - | - |
| Follow-up Hdwy | 3.518 | 3.318 | 2.218 | - | - | - |
| Pot Cap-1 Maneuver | - 34 | 284 | 658 | - | - | - |
| Stage 1 | 345 | - | - | - | - | - |
| Stage 2 | 223 | - | - | - | - | - |
| Platoon blocked, % | | | | - | - | - |
| Mov Cap-1 Maneuver | - 33 | 284 | 658 | - | - | - |
| Mov Cap-2 Maneuver | - 33 | - | - | - | - | - |
| Stage 1 | 345 | - | - | - | - | - |
| Stage 2 | 217 | - | - | - | - | - |

| Approach | EB | NB | SB |
|------------------------------|----|-----|----|
| HCM Control Delay, s \$ 1664 | | 0.1 | 0 |
| HCM LOS | | F | |

| Minor Lane/Major Mvmt | NBL | NBT | EBLn1 | EBLn2 | SBT | SBR |
|-----------------------|-------|-----|-----------|-------|-----|-----|
| Capacity (veh/h) | 658 | - | 33 | 284 | - | - |
| HCM Lane V/C Ratio | 0.028 | - | 5.336 | 0.199 | - | - |
| HCM Control Delay (s) | 10.6 | - | \$ 2191.4 | 20.8 | - | - |
| HCM Lane LOS | B | - | F | C | - | - |
| HCM 95th %tile Q(veh) | 0.1 | - | 21 | 0.7 | - | - |

| | | | | | | |
|----------------------------|------------------------|----------------------------|--------------------------------|--|--|--|
| Notes | | | | | | |
| -: Volume exceeds capacity | \$: Delay exceeds 300s | +: Computation Not Defined | *: All major volume in platoon | | | |

Lanes, Volumes, Timings

1: Summerfield Drive & Arkell Road

07-24-2018

| | EBT | EBR | WBL | WBT | NBL | NBR |
|----------------------------|-------|-------|-------|-------|-------|-------|
| Lane Group | EBT | EBR | WBL | WBT | NBL | NBR |
| Lane Configurations | ↔ | ↔ | ↔ | ↔ | ↔ | ↔ |
| 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: Other

Control Type: Unsignalized

Intersection Capacity Utilization 57.2%

ICU Level of Service B

Analysis Period (min) 15

HCM 2010 TWSC

1: Summerfield Drive & Arkell Road

07-24-2018

| Intersection | | | | | | |
|--------------------------|------|------|------|------|------|------|
| Int Delay, s/veh | 2.5 | | | | | |
| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
| Lane Configurations | ↔ | ↔ | ↔ | ↔ | ↔ | ↔ |
| 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 |
| Mvmt Flow | 511 | 159 | 92 | 438 | 76 | 47 |

| Major/Minor | Major1 | Major2 | Minor1 |
|----------------------|--------|--------|--------|
| Conflicting Flow All | 0 | 0 | 674 |
| Stage 1 | - | - | 594 |
| Stage 2 | - | - | 621 |
| Critical Hdwy | - | - | 4.1 |
| Critical Hdwy Stg 1 | - | - | 5.4 |
| Critical Hdwy Stg 2 | - | - | 5.4 |
| Follow-up Hdwy | - | - | 2.2 |
| Pot Cap-1 Maneuver | - | - | 927 |
| Stage 1 | - | - | 555 |
| Stage 2 | - | - | 540 |
| Platoon blocked, % | - | - | - |
| Mov Cap-1 Maneuver | - | - | 926 |
| Mov Cap-2 Maneuver | - | - | 318 |
| Stage 1 | - | - | 554 |
| Stage 2 | - | - | 486 |

| Approach | EB | WB | NB |
|----------------------|----|-----|------|
| HCM Control Delay, s | 0 | 1.6 | 19.5 |
| HCM LOS | | | C |

| Minor Lane/Major Mvmt | NBLn1 | 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 | C | - | - | A | - |
| HCM 95th %tile Q(veh) | 1.4 | - | - | 0.3 | - |

Lanes, Volumes, Timings

2: Zecca Drive/Amos Drive & Arkell Road

07-24-2018

| | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|----------------------------|------|-------|-------|------|-------|-------|------|-------|-------|------|-------|-------|
| Lane Configurations | | ↔ | | | ↔ | | | ↔ | | | ↔ | |
| 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 | | | | | | | | | | | | |
| 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 62.4%

ICU Level of Service B

Analysis Period (min) 15

HCM 2010 TWSC

2: Zecca Drive/Amos Drive & Arkell Road

07-24-2018

Intersection

Int Delay, s/veh 1.4

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|--------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Lane Configurations | | ↔ | | | ↔ | | | ↔ | | | ↔ | |
| 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 | Major1 | Major2 | Minor1 | Minor2 |
|----------------------|--------|--------|--------|--------|
| Conflicting Flow All | 507 | 0 | 0 | 532 |
| Stage 1 | - | - | - | 600 |
| Stage 2 | - | - | - | 534 |
| Critical Hdwy | 4.1 | - | 4.1 | - |
| Critical Hdwy Stg 1 | - | - | - | 6.1 |
| Critical Hdwy Stg 2 | - | - | - | 6.1 |
| Follow-up Hdwy | 2.2 | - | 2.2 | - |
| Pot Cap-1 Maneuver | 1068 | - | 1046 | - |
| Stage 1 | - | - | - | 491 |
| Stage 2 | - | - | - | 534 |
| Platoon blocked, % | - | - | - | - |
| Mov Cap-1 Maneuver | 1062 | - | 1040 | - |
| Mov Cap-2 Maneuver | - | - | - | 162 |
| Stage 1 | - | - | - | 460 |
| Stage 2 | - | - | - | 504 |

| Approach | EB | WB | NB | SB |
|----------------------|-----|-----|------|------|
| HCM Control Delay, s | 0.6 | 0.1 | 27.1 | 16.5 |
| HCM LOS | | | D | C |

| Minor Lane/Major Mvmt | 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 | A | - | C |
| HCM 95th %tile Q(veh) | 0.4 | 0.1 | - | - | 0 | - | - | 0.3 |

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

07-24-2018

| | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|----------------------------|-------|-------|-------|-------|-------|-------|------|-------|-------|------|-------|-------|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 29 | 351 | 96 | 70 | 385 | 138 | 87 | 0 | 71 | 81 | 0 | 18 |
| 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 | | 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 | | | 0.960 | | | 0.939 | | | 0.975 | |
| Flt Protected | 0.950 | | | 0.950 | | | | 0.973 | | | 0.961 | |
| Satd. Flow (prot) | 1805 | 1825 | 0 | 1805 | 1798 | 0 | 0 | 1708 | 0 | 0 | 1780 | 0 |
| Flt Permitted | 0.950 | | | 0.950 | | | | 0.973 | | | 0.961 | |
| Satd. Flow (perm) | 1805 | 1825 | 0 | 1805 | 1798 | 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 | 366 | 100 | 73 | 401 | 144 | 91 | 0 | 74 | 84 | 0 | 19 |
| Shared Lane Traffic (%) | | | | | | | | | | | | |
| Lane Group Flow (vph) | 30 | 466 | 0 | 73 | 545 | 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 51.0% | ICU Level of Service A |
| Analysis Period (min) | 15 |

HCM 2010 TWSC
3: Colonial Drive & Arkell Road

07-24-2018

Intersection

| Int Delay, s/veh | 9.9 | | | | | | | | | | | |
|--------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | | | | | | | | | | | | |
| 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 | Major1 | Major2 | Minor1 | Minor2 |
|----------------------|--------|--------|--------|--------|
| Conflicting Flow All | 545 | 0 | 0 | 474 |
| Stage 1 | - | - | - | - |
| Stage 2 | - | - | - | - |
| Critical Hdwy | 4.1 | - | - | 4.1 |
| Critical Hdwy Stg 1 | - | - | - | - |
| Critical Hdwy Stg 2 | - | - | - | - |
| Follow-up Hdwy | 2.2 | - | - | 2.2 |
| Pot Cap-1 Maneuver | 1034 | - | - | 1099 |
| Stage 1 | - | - | - | - |
| Stage 2 | - | - | - | - |
| Platoon blocked, % | - | - | - | - |
| Mov Cap-1 Maneuver | 1034 | - | - | 1099 |
| Mov Cap-2 Maneuver | - | - | - | - |
| Stage 1 | - | - | - | - |
| Stage 2 | - | - | - | - |

| Approach | EB | WB | NB | SB |
|----------------------|-----|----|------|------|
| HCM Control Delay, s | 0.5 | 1 | 44.5 | 52.6 |
| HCM LOS | | | E | F |

| Minor Lane/Major Mvmt | NBLn1 | EBL | EBT | EBR | WBL | WBT | WBR | SBLn1 |
|-----------------------|-------|-------|-----|-----|-------|-----|-----|-------|
| Capacity (veh/h) | 247 | 1034 | - | - | 1099 | - | - | 173 |
| HCM Lane V/C Ratio | 0.666 | 0.029 | - | - | 0.066 | - | - | 0.596 |
| HCM Control Delay (s) | 44.5 | 8.6 | - | - | 8.5 | - | - | 52.6 |
| HCM Lane LOS | E | A | - | - | A | - | - | F |
| HCM 95th %tile Q(veh) | 4.2 | 0.1 | - | - | 0.2 | - | - | 3.2 |

Lanes, Volumes, Timings

4: Residential Entrance/Access 1 & Arkell Road

07-24-2018

| | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|----------------------------|-------|-------|-------|------|-------|-------|------|-------|-------|-------|------|-------|
| Lane Configurations | ↰ | ↱ | | ↰ | ↱ | | ↰ | ↱ | | ↰ | ↱ | |
| 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

Area Type: Other

Control Type: Unsignalized

Intersection Capacity Utilization 47.8%

ICU Level of Service A

Analysis Period (min) 15

HCM 2010 TWSC

4: Residential Entrance/Access 1 & Arkell Road

07-24-2018

| Intersection | | | | | | | | | | | | |
|--------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Int Delay, s/veh | 0.4 | | | | | | | | | | | |
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | ↰ | ↱ | | ↰ | ↱ | | ↰ | ↱ | | ↰ | ↱ | |
| 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 | Major1 | Major2 | Minor1 | Minor2 | | | | | | | | |
|----------------------|--------|--------|--------|--------|---|---|------|------|-----|------|---|-----|
| Conflicting Flow All | 640 | 0 | 0 | 539 | 0 | 0 | 1195 | 1199 | 537 | 1196 | - | 636 |
| Stage 1 | - | - | - | - | - | - | 554 | 554 | - | 641 | - | - |
| Stage 2 | - | - | - | - | - | - | 641 | 645 | - | 555 | - | - |
| 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 | 954 | - | - | 1040 | - | - | 165 | 187 | 548 | 164 | 0 | 481 |
| Stage 1 | - | - | - | - | - | - | 520 | 517 | - | 466 | 0 | - |
| Stage 2 | - | - | - | - | - | - | 466 | 471 | - | 520 | 0 | - |
| Platoon blocked, % | - | - | - | - | - | - | - | - | - | - | - | - |
| 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 | | | C | C |

| Minor Lane/Major Mvmt | NBLn1 | EBL | EBT | EBR | WBL | WBT | WBR | SBLn1 | SBLn2 |
|-----------------------|-------|-------|-----|-----|-------|-----|-----|-------|-------|
| Capacity (veh/h) | 248 | 954 | - | - | 1040 | - | - | 162 | 481 |
| HCM Lane V/C Ratio | 0.018 | 0.009 | - | - | 0.002 | - | - | 0.054 | 0.02 |
| HCM Control Delay (s) | 19.8 | 8.8 | - | - | 8.5 | 0 | - | 28.5 | 12.6 |
| HCM Lane LOS | C | A | - | - | A | A | - | D | B |
| HCM 95th %tile Q(veh) | 0.1 | 0 | - | - | 0 | - | - | 0.2 | 0.1 |

Lanes, Volumes, Timings
5: Victoria Road & Arkell Road

07-24-2018

| | ↖ | → | ↘ | ↙ | ← | ↖ | ↙ | ↗ | ↘ | ↖ | ↙ | ↗ | ↘ |
|----------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|---|
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR | |
| Lane Configurations | ↖ | ↖ | | ↖ | ↖ | | ↖ | ↖ | | ↖ | ↖ | | |
| 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 | | | 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 | Cl+Ex | Cl+Ex | | Cl+Ex | Cl+Ex | | Cl+Ex | Cl+Ex | | Cl+Ex | Cl+Ex | | |
| Detector 1 Channel | | | | | | | | | | | | | |
| Detector 1 Extend (s) | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | | |
| 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 | | Cl+Ex | | | Cl+Ex | | | Cl+Ex | | | Cl+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 2026 PM Background

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

07-24-2018

| | ↖ | → | ↘ | ↙ | ← | ↖ | ↙ | ↗ | ↘ | ↖ | ↙ | ↗ | ↘ |
|-------------------------|-------|-------|-----|-------|-------|-----|-------|-------|-----|-------|-------|-----|---|
| 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 Effect 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 | C | | B | D | | B | F | | B | F | | |
| Approach Delay | | 34.0 | | | 31.2 | | | 221.8 | | | 288.4 | | |
| Approach LOS | | C | | | C | | | 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 LOS: F

Intersection Capacity Utilization 110.3%

ICU Level of Service H

Analysis Period (min) 15

Splits and Phases: 5: Victoria Road & Arkell Road

| | | | |
|------|------|------|------|
| ↖ Ø1 | ↖ Ø2 | ↖ Ø3 | ↖ Ø4 |
| 10 s | 34 s | 10 s | 26 s |
| ↖ Ø5 | ↖ Ø6 | ↖ Ø7 | ↖ Ø8 |
| 10 s | 34 s | 10 s | 26 s |

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

Synchro 9 Report
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Queues

5: Victoria Road & Arkell Road

07-24-2018

| | EBL | EBT | WBL | WBT | NBL | NBT | SBL | SBT |
|------------------------|-------|-------|------|-------|------|--------|------|--------|
| 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 |

Intersection Summary

- Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

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

Queue shown is maximum after two cycles.

HCM 2010 Signalized Intersection Summary

5: Victoria Road & Arkell Road

07-24-2018

| | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------|------|------|------|------|-------|------|-------|------|-------|------|-------|-------|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | ↰ | ↱ | | ↰ | ↱ | | ↰ | ↱ | | ↰ | ↱ | |
| Traffic Volume (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 | 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 | 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 | 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 | 0.08 | 0.38 | 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(g_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(g_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(l) | 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 | | C | C | | C | B | | F | B | | 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+1), 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 | | | | | | | |

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

07-24-2018

| | EBL | EBR | NBL | NBT | SBT | SBR |
|----------------------------|-------|-------|-------|-------|-------|-------|
| Lane Configurations | ↰ | ↱ | ↰ | ↱ | ↱ | ↱ |
| 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 | | | 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 | | 0.124 | | | |
| 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 | | | 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 | | | 2 | 6 | |

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

07-24-2018

| | 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 Effect 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 | C | B | A | B | B | A |
| Approach Delay | 26.6 | | | 16.0 | 12.5 | |
| Approach LOS | C | | | B | B | |

Intersection Summary

Area Type: Other

Cycle Length: 80

Actuated Cycle Length: 76.1

Natural Cycle: 90

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.80

Intersection Signal Delay: 14.6

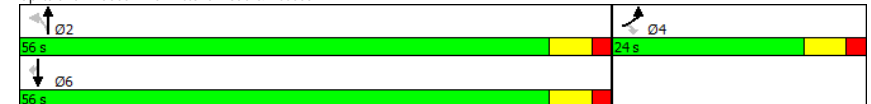
Intersection LOS: B

Intersection Capacity Utilization 76.9%

ICU Level of Service D

Analysis Period (min) 15

Splits and Phases: 6: Victoria Road & Access 2



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

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Queues

6: Victoria Road & Access 2

07-24-2018

| | EBL | EBR | NBL | NBT | SBT | SBR |
|------------------------|------|------|------|--------|--------|------|
| 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 |













Intersection Summary

95th 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

07-24-2018

| |  |  |  |  |  |  | | |
|------------------------------|---|---|---|---|---|---|---|---|
| Movement | EBL | EBR | NBL | NBT | SBT | SBR | | |
| Lane Configurations |  |  |  |  |  |  | | |
| 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 | 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 | 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 | | |
| Grp Volume(v), veh/h | 54 | 25 | 22 | 1197 | 1209 | 47 | | |
| 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 | C | C | C | C | B | A | | |
| Approach Vol, veh/h | 79 | | | 1219 | 1256 | | | |
| Approach Delay, s/veh | 28.8 | | | 22.0 | 18.9 | | | |
| Approach LOS | C | | | C | 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 | | |
| 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 | | | | C | | | | |

Lanes, Volumes, Timings

7: Victoria Road & Victoria Park Village Road

07-24-2018

| | EBL | EBR | NBL | NBT | SBT | SBR |
|----------------------------|-------|-------|-------|-------|-------|-------|
| Lane Configurations | ↰ | ↱ | ↰ | ↱ | ↰ | ↱ |
| 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

Area Type: Other

Control Type: Unsignalized

Intersection Capacity Utilization 86.2%

ICU Level of Service E

Analysis Period (min) 15

HCM 2010 TWSC

7: Victoria Road & Victoria Park Village Road

07-24-2018

| Intersection | | | | | | |
|--------------------------|------|------|------|------|------|------|
| Int Delay, s/veh | 81 | | | | | |
| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
| Lane Configurations | ↰ | ↱ | ↰ | ↱ | ↰ | ↱ |
| Traffic Vol, veh/h | 90 | 38 | 64 | 1133 | 1240 | 153 |
| Future 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 | - | - | - |
| Veh in Median Storage, # | 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 | 1232 | 1348 | 166 |

| Major/Minor | Minor2 | Major1 | Major2 | | | |
|----------------------|--------|--------|--------|---|---|---|
| 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 | - | - | - | - | - |
| Follow-up Hdwy | 3.5 | 3.3 | 2.2 | - | - | - |
| Pot Cap-1 Maneuver | - 21 | 167 | 447 | - | - | - |
| Stage 1 | 223 | - | - | - | - | - |
| Stage 2 | 238 | - | - | - | - | - |
| Platoon blocked, % | | | | - | - | - |
| Mov Cap-1 Maneuver | - 18 | 167 | 447 | - | - | - |
| Mov Cap-2 Maneuver | - 18 | - | - | - | - | - |
| Stage 1 | 223 | - | - | - | - | - |
| Stage 2 | 201 | - | - | - | - | - |

| Approach | EB | NB | SB |
|------------------------------|----|-----|----|
| HCM Control Delay, \$ 1712.4 | | 0.8 | 0 |
| HCM LOS | F | | |

| Minor Lane/Major Mvmt | NBL | NBT | EBLn1 | EBLn2 | SBT | SBR |
|-----------------------|-------|-----|-----------|-------|-----|-----|
| Capacity (veh/h) | 447 | - | 18 | 167 | - | - |
| HCM Lane V/C Ratio | 0.156 | - | 5.435 | 0.247 | - | - |
| HCM Control Delay (s) | 14.5 | - | \$ 2421.3 | 33.5 | - | - |
| HCM Lane LOS | B | - | F | D | - | - |
| HCM 95th %tile Q(veh) | 0.5 | - | 12.8 | 0.9 | - | - |

Notes

--: Volume exceeds capacity \$: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Appendix G

2031 Background Traffic Operations Reports



Lanes, Volumes, Timings
1: Summerfield Drive & Arkell Road

07-24-2018

| | → | ↖ | ↗ | ← | ↖ | ↗ |
|---|------------------------|-------|-------|-------|-------|-------|
| Lane Group | EBT | EBR | WBL | WBT | NBL | NBR |
| Lane Configurations | ↖ | | ↗ | ↖ | ↗ | |
| Traffic Volume (vph) | 414 | 41 | 35 | 479 | 162 | 138 |
| Future Volume (vph) | 414 | 41 | 35 | 479 | 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) | 422 | 42 | 36 | 489 | 165 | 141 |
| Shared Lane Traffic (%) | | | | | | |
| Lane Group Flow (vph) | 464 | 0 | 36 | 489 | 306 | 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 Utilization 53.2% | ICU Level of Service A | | | | | |
| Analysis Period (min) 15 | | | | | | |

HCM 2010 TWSC
1: Summerfield Drive & Arkell Road

07-24-2018

| Intersection | | | | | | |
|--------------------------|------|------|------|------|------|------|
| Int Delay, s/veh | 6.6 | | | | | |
| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
| Lane Configurations | ↖ | | ↗ | ↖ | ↗ | |
| 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 |
| Mvmt Flow | 422 | 42 | 36 | 489 | 165 | 141 |

| Major/Minor | Major1 | Major2 | Minor1 |
|----------------------|--------|--------|--------|
| Conflicting Flow All | 0 | 0 | 473 |
| Stage 1 | - | - | - |
| Stage 2 | - | - | - |
| Critical Hdwy | - | - | 4.18 |
| Critical Hdwy Stg 1 | - | - | - |
| Critical Hdwy Stg 2 | - | - | - |
| Follow-up Hdwy | - | - | 2.272 |
| Pot Cap-1 Maneuver | - | - | 1058 |
| Stage 1 | - | - | - |
| Stage 2 | - | - | - |
| Platoon blocked, % | - | - | - |
| Mov Cap-1 Maneuver | - | - | 1058 |
| Mov Cap-2 Maneuver | - | - | - |
| Stage 1 | - | - | - |
| Stage 2 | - | - | - |

| Approach | EB | WB | NB |
|----------------------|----|-----|------|
| HCM Control Delay, s | 0 | 0.6 | 27.1 |
| HCM LOS | | | D |

| Minor Lane/Major Mvmt | NBLn1 | EBT | EBR | WBL | WBT |
|-----------------------|-------|-----|-----|-------|-----|
| Capacity (veh/h) | 460 | - | - | 1058 | - |
| HCM Lane V/C Ratio | 0.665 | - | - | 0.034 | - |
| HCM Control Delay (s) | 27.1 | - | - | 8.5 | - |
| HCM Lane LOS | D | - | - | A | - |
| HCM 95th %tile Q(veh) | 4.8 | - | - | 0.1 | - |

Lanes, Volumes, Timings

2: Zecca Drive/Amos Drive & Arkell Road

07-24-2018

| | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|----------------------------|------|-------|-------|------|-------|-------|------|-------|-------|------|-------|-------|
| Lane Configurations | | ↔ | | | ↔ | | | ↔ | | | ↔ | |
| 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 | |
| Flt 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 | | | | | | | | | | | | |
| 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 47.8%

ICU Level of Service A

Analysis Period (min) 15

HCM 2010 TWSC

2: Zecca Drive/Amos Drive & Arkell Road

07-24-2018

Intersection

Int Delay, s/veh 2.3

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|--------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Lane Configurations | | ↔ | | | ↔ | | | ↔ | | | ↔ | |
| 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 | Major1 | Major2 | Minor1 | Minor2 |
|----------------------|--------|--------|--------|--------|
| Conflicting Flow All | 479 | 0 | 0 | 570 |
| Stage 1 | - | - | - | 576 |
| Stage 2 | - | - | - | 514 |
| Critical Hdwy | 4.1 | - | 4.15 | - |
| Critical Hdwy Stg 1 | - | - | - | 6.15 |
| Critical Hdwy Stg 2 | - | - | - | 6.15 |
| Follow-up Hdwy | 2.2 | - | 2.245 | - |
| Pot Cap-1 Maneuver | 1094 | - | 988 | - |
| Stage 1 | - | - | - | 497 |
| Stage 2 | - | - | - | 538 |
| Platoon blocked, % | - | - | - | - |
| Mov Cap-1 Maneuver | 1082 | - | 980 | - |
| Mov Cap-2 Maneuver | - | - | - | 173 |
| Stage 1 | - | - | - | 489 |
| Stage 2 | - | - | - | 498 |

| Approach | EB | WB | NB | SB |
|----------------------|-----|-----|------|------|
| HCM Control Delay, s | 0.1 | 0.1 | 23.8 | 21.6 |
| HCM LOS | | | C | C |

| Minor Lane/Major Mvmt | 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 | A | A | - | A | A | - | C |
| HCM 95th %tile Q(veh) | 0.8 | 0 | - | - | 0 | - | - | 0.9 |

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

07-24-2018

| | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|----------------------------|-------|-------|-------|-------|-------|-------|------|-------|-------|------|-------|-------|
| Lane Configurations | ↰ | ↱ | | ↰ | ↱ | | | ↕ | | | ↕ | |
| 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 | | | 3.6 | | | 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 | |
| Sign Control | | Free | | | Free | | | Stop | | | Stop | |

Intersection Summary

| | |
|-----------------------------------|--------------|
| Area Type: | Other |
| Control Type: | Unsignalized |
| Intersection Capacity Utilization | 61.4% |
| Analysis Period (min) | 15 |
| ICU Level of Service | B |

HCM 2010 TWSC
3: Colonial Drive & Arkell Road

07-24-2018

| Intersection | | | | | | | | | | | | |
|--------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Int Delay, s/veh | 65.6 | | | | | | | | | | | |
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | ↰ | ↱ | | ↰ | ↱ | | | ↕ | | | ↕ | |
| Traffic Vol, veh/h | 11 | 487 | 79 | 47 | 286 | 42 | 149 | 0 | 156 | 131 | 0 | 32 |
| Future Vol, veh/h | 11 | 487 | 79 | 47 | 286 | 42 | 149 | 0 | 156 | 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 |
| Mvmt Flow | 12 | 529 | 86 | 51 | 311 | 46 | 162 | 0 | 170 | 142 | 0 | 35 |

| Major/Minor | Major1 | Major2 | Minor1 | Minor2 |
|----------------------|--------|--------|--------|--------|
| Conflicting Flow All | 357 | 0 | 0 | 626 |
| Stage 1 | - | - | - | - |
| Stage 2 | - | - | - | - |
| Critical Hdwy | 4.12 | - | - | 4.16 |
| Critical Hdwy Stg 1 | - | - | - | - |
| Critical Hdwy Stg 2 | - | - | - | - |
| Follow-up Hdwy | 2.218 | - | - | 2.254 |
| Pot Cap-1 Maneuver | 1202 | - | - | 937 |
| Stage 1 | - | - | - | - |
| Stage 2 | - | - | - | - |
| Platoon blocked, % | - | - | - | - |
| Mov Cap-1 Maneuver | 1202 | - | - | 936 |
| Mov Cap-2 Maneuver | - | - | - | - |
| Stage 1 | - | - | - | - |
| Stage 2 | - | - | - | - |

| Approach | EB | WB | NB | SB |
|----------------------|-----|-----|-------|-------|
| HCM Control Delay, s | 0.2 | 1.1 | 181.1 | 229.3 |
| HCM LOS | | | F | F |

| Minor Lane/Major Mvmt | NBLn1 | EBL | EBT | EBR | WBL | WBT | WBR | SBLn1 |
|-----------------------|-------|------|-----|-----|-------|-----|-----|-------|
| 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 | A | - | - | A | - | - | F |
| HCM 95th %tile Q(veh) | 16.1 | 0 | - | - | 0.2 | - | - | 10.9 |

Notes

--: Volume exceeds capacity \$: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Lanes, Volumes, Timings

4: Residential Entrance/Access 1 & Arkell Road

07-24-2018

| | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|----------------------------|-------|-------|-------|------|-------|-------|------|-------|-------|-------|------|-------|
| Lane Configurations | ↔ | ↔ | | ↔ | ↔ | | ↔ | ↔ | | ↔ | ↔ | ↔ |
| 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 | | | 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: Other

Control Type: Unsignalized

Intersection Capacity Utilization 71.7%

ICU Level of Service C

Analysis Period (min) 15

HCM 2010 TWSC

4: Residential Entrance/Access 1 & Arkell Road

07-24-2018

| Intersection | | | | | | | | | | | | |
|--------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Int Delay, s/veh | 1.2 | | | | | | | | | | | |
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | ↔ | ↔ | | ↔ | ↔ | | ↔ | ↔ | | ↔ | ↔ | ↔ |
| 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 | 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 | Major1 | Major2 | Minor1 | 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 | C |

| Minor Lane/Major Mvmt | 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 | 0.052 |
| HCM Control Delay (s) | 25.8 | 8.5 | - | - | 9.2 | 0 | - | 36.4 | 10.8 |
| HCM Lane LOS | D | A | - | - | A | A | - | E | B |
| HCM 95th %tile Q(veh) | 0.1 | 0.3 | - | - | 0 | - | - | 0.2 | 0.2 |

Lanes, Volumes, Timings
5: Victoria Road & Arkell Road

07-24-2018

| | ↖ | → | ↘ | ↙ | ← | ↖ | ↙ | ↗ | ↘ | ↖ | ↙ | ↗ | ↘ |
|----------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|---|
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR | |
| Lane Configurations | ↖ | ↘ | | ↖ | ↘ | | ↖ | ↘ | | ↖ | ↘ | | |
| 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 | | | 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 | Cl+Ex | Cl+Ex | | Cl+Ex | Cl+Ex | | Cl+Ex | Cl+Ex | | Cl+Ex | Cl+Ex | | |
| Detector 1 Channel | | | | | | | | | | | | | |
| Detector 1 Extend (s) | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | | |
| 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 | | Cl+Ex | | | Cl+Ex | | | Cl+Ex | | | Cl+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 AM Background

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

07-24-2018

| | ↖ | → | ↘ | ↙ | ← | ↖ | ↙ | ↗ | ↘ | ↖ | ↙ | ↗ | ↘ |
|-------------------------|-------|-------|-----|-------|-------|-----|-------|-------|-----|-------|-------|-----|---|
| 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 Effect 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 | | 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 | | |
| LOS | F | C | | C | C | | B | F | | B | F | | |
| Approach Delay | | 145.7 | | | 26.1 | | | 190.8 | | | 254.2 | | |
| Approach LOS | | F | | | C | | | F | | | F | | |

Intersection Summary

Area Type: Other

Cycle Length: 80

Actuated Cycle Length: 72

Natural Cycle: 150

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 1.53

Intersection Signal Delay: 180.1

Intersection LOS: F

Intersection Capacity Utilization 106.2%

ICU Level of Service G

Analysis Period (min) 15

Splits and Phases: 5: Victoria Road & Arkell Road

| | | | |
|------|------|------|------|
| Ø1 | Ø2 | Ø3 | Ø4 |
| 10 s | 34 s | 10 s | 26 s |
| Ø5 | Ø6 | Ø7 | Ø8 |
| 10 s | 34 s | 10 s | 26 s |

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

Synchro 9 Report
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Queues

5: Victoria Road & Arkell Road

07-24-2018

| | EBL | EBT | WBL | WBT | NBL | NBT | SBL | SBT |
|------------------------|--------|-------|------|-------|------|--------|------|--------|
| 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 |

Intersection Summary

- Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

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

Queue shown is maximum after two cycles.

HCM 2010 Signalized Intersection Summary

5: Victoria Road & Arkell Road

07-24-2018

| | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------------|-------|-------|------|------|------|------|------|-------|-------|------|-------|-------|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | ↰ | ↱ | | ↰ | ↱ | | ↰ | ↱ | | ↰ | ↱ | |
| Traffic Volume (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 | 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 | 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 | | 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(g_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(g_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 | 464 | 340 | 0 | 471 | 275 | 0 | 686 | 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(l) | 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 | | C | C | | C | B | | F | B | | F |
| Approach Vol, veh/h | | 763 | | | 436 | | | 1106 | | | 1098 | |
| Approach Delay, s/veh | | 196.5 | | | 27.6 | | | 241.1 | | | 277.2 | |
| 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 | 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

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

07-24-2018

| | EBL | EBR | NBL | NBT | SBT | SBR |
|----------------------------|-------|-------|-------|-------|-------|-------|
| Lane Configurations | ↰ | ↱ | ↰ | ↱ | ↱ | ↱ |
| 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 | | | 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 | 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% | 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 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 | |

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

Synchro 9 Report
Page 13

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

07-24-2018

| | 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 Effect 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 | 0.21 | 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 Capacity Utilization 88.9%
Analysis Period (min) 15

Intersection LOS: D

ICU Level of Service E

Splits and Phases: 6: Victoria Road & Access 2



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

Synchro 9 Report
Page 14

Queues

6: Victoria Road & Access 2

07-24-2018

| | EBL | EBR | NBL | NBT | SBT | SBR |
|------------------------|------|------|------|--------|--------|------|
| 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 |

Intersection Summary

- Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.













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

Queue shown is maximum after two cycles.

HCM 2010 Signalized Intersection Summary

6: Victoria Road & Access 2

07-24-2018

| |  |  |  |  |  |  | | |
|------------------------------|---|---|---|---|---|---|---|---|
| Movement | EBL | EBR | NBL | NBT | SBT | SBR | | |
| Lane Configurations |  |  |  |  |  |  | | |
| 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 (Ob), 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(l) | 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 | B | A | | |
| Approach Vol, veh/h | 167 | | | 1516 | 1157 | | | |
| Approach Delay, s/veh | 29.3 | | | 91.6 | 12.8 | | | |
| Approach LOS | C | | | F | B | | | |
| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 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 | | 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 E

Lanes, Volumes, Timings

7: Victoria Road & Victoria Park Village Road

07-24-2018

| | ↖ | ↗ | ↖ | ↗ | ↖ | ↗ |
|---|------------------------|-------|-------|-------|-------|-------|
| Lane Group | EBL | EBR | NBL | NBT | SBT | SBR |
| Lane Configurations | ↖ | ↗ | ↖ | ↗ | ↖ | ↗ |
| 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 | | | | | | |
| Area Type: | Other | | | | | |
| Control Type: | Unsignalized | | | | | |
| Intersection Capacity Utilization 90.4% | ICU Level of Service E | | | | | |
| Analysis Period (min) 15 | | | | | | |

HCM 2010 TWSC

7: Victoria Road & Victoria Park Village Road

07-24-2018

| Intersection | | | | | | |
|--|--------|-----------|--------|-------|------|------|
| Int Delay, s/veh | 209.2 | | | | | |
| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
| Lane Configurations | ↖ | ↗ | ↖ | ↗ | ↖ | ↗ |
| 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, # | 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 | - | 0 |
| Stage 1 | 1128 | - | - | - | - | - |
| Stage 2 | 1580 | - | - | - | - | - |
| Critical Hdwy | 6.42 | 6.22 | 4.12 | - | - | - |
| Critical Hdwy Stg 1 | 5.42 | - | - | - | - | - |
| Critical Hdwy Stg 2 | 5.42 | - | - | - | - | - |
| Follow-up Hdwy | 3.518 | 3.318 | 2.218 | - | - | - |
| Pot Cap-1 Maneuver | - 23 | 249 | 604 | - | - | - |
| Stage 1 | 309 | - | - | - | - | - |
| Stage 2 | 186 | - | - | - | - | - |
| Platoon blocked, % | | | | - | - | - |
| Mov Cap-1 Maneuver | - 22 | 249 | 604 | - | - | - |
| Mov Cap-2 Maneuver | - 22 | - | - | - | - | - |
| Stage 1 | 309 | - | - | - | - | - |
| Stage 2 | 180 | - | - | - | - | - |
| Approach | EB | NB | SB | | | |
| HCM Control Delay, \$ 2653.4 | | 0.1 | 0 | | | |
| HCM LOS | | F | | | | |
| Minor Lane/Major Mvmt | NBL | NBT | EBLn1 | EBLn2 | SBT | SBR |
| Capacity (veh/h) | 604 | - | 22 | 249 | - | - |
| HCM Lane V/C Ratio | 0.031 | - | 8.004 | 0.227 | - | - |
| HCM Control Delay (s) | 11.1 | \$ 3497.5 | 23.7 | - | - | - |
| HCM Lane LOS | B | - | F | C | - | - |
| HCM 95th %tile Q(veh) | 0.1 | - | 22.2 | 0.9 | - | - |
| Notes | | | | | | |
| -: Volume exceeds capacity \$: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon | | | | | | |

Lanes, Volumes, Timings
1: Summerfield Drive & Arkell Road

07-24-2018

| | → | ↖ | ↗ | ← | ↖ | ↗ |
|---|------------------------|-------|-------|-------|-------|-------|
| Lane Group | EBT | EBR | WBL | WBT | NBL | NBR |
| Lane Configurations | ↖ | | ↗ | ↖ | ↗ | |
| 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 Utilization 63.1% | ICU Level of Service B | | | | | |
| Analysis Period (min) 15 | | | | | | |

HCM 2010 TWSC
1: Summerfield Drive & Arkell Road

07-24-2018

| Intersection | | | | | | |
|--------------------------|------|------|------|------|------|------|
| Int Delay, s/veh | 2.9 | | | | | |
| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
| Lane Configurations | ↖ | | ↗ | ↖ | ↗ | |
| Traffic Vol, veh/h | 550 | 174 | 100 | 471 | 83 | 51 |
| Future Vol, veh/h | 550 | 174 | 100 | 471 | 83 | 51 |
| 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 | 573 | 181 | 104 | 491 | 86 | 53 |

| Major/Minor | Major1 | Major2 | Minor1 |
|----------------------|--------|--------|--------|
| Conflicting Flow All | 0 | 0 | 757 |
| Stage 1 | - | - | - |
| Stage 2 | - | - | - |
| Critical Hdwy | - | - | 4.1 |
| Critical Hdwy Stg 1 | - | - | - |
| Critical Hdwy Stg 2 | - | - | - |
| Follow-up Hdwy | - | - | 2.2 |
| Pot Cap-1 Maneuver | - | - | 863 |
| Stage 1 | - | - | - |
| Stage 2 | - | - | - |
| Platoon blocked, % | - | - | - |
| Mov Cap-1 Maneuver | - | - | 862 |
| Mov Cap-2 Maneuver | - | - | - |
| Stage 1 | - | - | - |
| Stage 2 | - | - | - |

| Approach | EB | WB | NB |
|----------------------|----|-----|------|
| HCM Control Delay, s | 0 | 1.7 | 23.7 |
| HCM LOS | | | C |

| Minor Lane/Major Mvmt | NBLn1 | EBT | EBR | WBL | WBT |
|-----------------------|-------|-----|-----|-------|-----|
| Capacity (veh/h) | 330 | - | - | 862 | - |
| HCM Lane V/C Ratio | 0.423 | - | - | 0.121 | - |
| HCM Control Delay (s) | 23.7 | - | - | 9.8 | - |
| HCM Lane LOS | C | - | - | A | - |
| HCM 95th %tile Q(veh) | 2 | - | - | 0.4 | - |

Lanes, Volumes, Timings

2: Zecca Drive/Amos Drive & Arkell Road

07-24-2018

| | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|----------------------------|------|-------|-------|------|-------|-------|------|-------|-------|------|-------|-------|
| Lane Configurations | | | | | | | | | | | | |
| 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 | | | | | | | | | | | | |
| 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 68.7%

ICU Level of Service C

Analysis Period (min) 15

HCM 2010 TWSC

2: Zecca Drive/Amos Drive & Arkell Road

07-24-2018

Intersection

Int Delay, s/veh 1.6

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|--------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Lane Configurations | | | | | | | | | | | | |
| 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 | 7 | 0 | 7 | 0 | 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 | Major1 | Major2 | Minor1 | Minor2 |
|----------------------|--------|--------|--------|--------|
| Conflicting Flow All | 571 | 0 | 0 | 595 |
| Stage 1 | - | - | - | - |
| Stage 2 | - | - | - | - |
| Critical Hdwy | 4.1 | - | - | 4.1 |
| Critical Hdwy Stg 1 | - | - | - | - |
| Critical Hdwy Stg 2 | - | - | - | - |
| Follow-up Hdwy | 2.2 | - | - | 2.2 |
| Pot Cap-1 Maneuver | 1012 | - | - | 991 |
| Stage 1 | - | - | - | - |
| Stage 2 | - | - | - | - |
| Platoon blocked, % | - | - | - | - |
| Mov Cap-1 Maneuver | 1006 | - | - | 985 |
| Mov Cap-2 Maneuver | - | - | - | - |
| Stage 1 | - | - | - | - |
| Stage 2 | - | - | - | - |

| Approach | EB | WB | NB | SB |
|----------------------|-----|-----|------|------|
| HCM Control Delay, s | 0.7 | 0.1 | 34.7 | 18.9 |
| HCM LOS | | | D | C |

| Minor Lane/Major Mvmt | NBLn1 | EBL | EBT | EBR | WBL | WBT | WBR | SBLn1 |
|-----------------------|-------|-------|-----|-----|-------|-----|-----|-------|
| Capacity (veh/h) | 146 | 1006 | - | - | 985 | - | - | 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 | D | A | A | - | A | A | - | C |
| HCM 95th %tile Q(veh) | 0.6 | 0.1 | - | - | 0 | - | - | 0.4 |

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

07-24-2018







| |  |  |  |  |  |  |  |  |  |  |  |  |
|----------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  | |  |  | | |  | | |  | |
| 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 |
| 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 | | | 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 | |
| Sign Control | | Free | | | Free | | | Stop | | | Stop | |

Intersection Summary

| | |
|-----------------------------------|--------------|
| Area Type: | Other |
| Control Type: | Unsignalized |
| Intersection Capacity Utilization | 54.9% |
| Analysis Period (min) | 15 |
| ICU Level of Service | A |

HCM 2010 TWSC
3: Colonial Drive & Arkell Road

07-24-2018

| Intersection | | | | | | | | | | | | |
|--------------------------|---|---|------|---|---|------|------|---|------|------|---|------|
| Int Delay, s/veh | 17.4 | | | | | | | | | | | |
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  | |  |  | | |  | | |  | |
| 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 | 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 | Major1 | Major2 | Minor1 | 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 | NBLn1 | EBL | EBT | EBR | WBL | WBT | WBR | SBLn1 |
|-----------------------|-------|-------|-----|-----|------|-----|-----|-------|
| Capacity (veh/h) | 206 | 989 | - | - | 1044 | - | - | 135 |
| HCM Lane V/C Ratio | 0.905 | 0.031 | - | - | 0.08 | - | - | 0.764 |
| HCM Control Delay (s) | 88.2 | 8.8 | - | - | 8.7 | - | - | 88 |
| HCM Lane LOS | F | A | - | - | A | - | - | F |
| HCM 95th %tile Q(veh) | 7.2 | 0.1 | - | - | 0.3 | - | - | 4.5 |

Lanes, Volumes, Timings

4: Residential Entrance/Access 1 & Arkell Road

07-24-2018

| | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|----------------------------|-------|-------|-------|------|-------|-------|------|-------|-------|-------|------|-------|
| Lane Configurations | ↰ | ↱ | | ↰ | ↱ | | ↰ | ↱ | | ↰ | ↱ | |
| 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

Area Type: Other

Control Type: Unsignalized

Intersection Capacity Utilization 51.0%

ICU Level of Service A

Analysis Period (min) 15

HCM 2010 TWSC

4: Residential Entrance/Access 1 & Arkell Road

07-24-2018

| Intersection | | | | | | | | | | | | |
|--------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Int Delay, s/veh | 0.5 | | | | | | | | | | | |
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | ↰ | ↱ | | ↰ | ↱ | | ↰ | ↱ | | ↰ | ↱ | |
| 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 | - | 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 | Major1 | Major2 | Minor1 | Minor2 |
|----------------------|--------|--------|--------|--------|
| Conflicting Flow All | 704 | 0 | 0 | 599 |
| Stage 1 | - | - | - | - |
| Stage 2 | - | - | - | - |
| Critical Hdwy | 4.1 | - | - | 4.1 |
| Critical Hdwy Stg 1 | - | - | - | - |
| Critical Hdwy Stg 2 | - | - | - | - |
| Follow-up Hdwy | 2.2 | - | - | 2.2 |
| Pot Cap-1 Maneuver | 903 | - | - | 988 |
| Stage 1 | - | - | - | - |
| Stage 2 | - | - | - | - |
| Platoon blocked, % | - | - | - | - |
| Mov Cap-1 Maneuver | 903 | - | - | 988 |
| Mov Cap-2 Maneuver | - | - | - | - |
| Stage 1 | - | - | - | - |
| Stage 2 | - | - | - | - |

| Approach | EB | WB | NB | SB |
|----------------------|-----|----|------|----|
| HCM Control Delay, s | 0.1 | 0 | 22.9 | 23 |
| HCM LOS | | | C | C |

| Minor Lane/Major Mvmt | NBLn1 | 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 | 0.022 |
| HCM Control Delay (s) | 22.9 | 9 | - | - | 8.7 | 0 | - | 34 | 13.3 |
| HCM Lane LOS | C | A | - | - | A | A | - | D | B |
| HCM 95th %tile Q(veh) | 0.1 | 0 | - | - | 0 | - | - | 0.2 | 0.1 |

Lanes, Volumes, Timings
5: Victoria Road & Arkell Road

07-24-2018

| | ↖ | → | ↘ | ↙ | ← | ↖ | ↙ | ↗ | ↘ | ↖ | ↙ | ↗ |
|----------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | ↖ | ↖ | | ↖ | ↖ | | ↖ | ↖ | | ↖ | ↖ | |
| 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 | | | 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 | Cl+Ex | Cl+Ex | | Cl+Ex | Cl+Ex | | Cl+Ex | Cl+Ex | | Cl+Ex | Cl+Ex | |
| Detector 1 Channel | | | | | | | | | | | | |
| Detector 1 Extend (s) | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | |
| 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 | | Cl+Ex | | | Cl+Ex | | | Cl+Ex | | | Cl+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 Background

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

07-24-2018

| | ↖ | → | ↘ | ↙ | ← | ↖ | ↙ | ↗ | ↘ | ↖ | ↙ | ↗ |
|-------------------------|-------|-------|-----|-------|-------|-----|-------|-------|-----|-------|-------|-----|
| 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 Effect 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 | C | | B | D | | B | F | | B | F | |
| Approach Delay | | 46.5 | | | 33.7 | | | 299.8 | | | 373.1 | |
| Approach LOS | | D | | | C | | | F | | | F | |

Intersection Summary

Area Type: Other

Cycle Length: 80

Actuated Cycle Length: 75

Natural Cycle: 150

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 1.83

Intersection Signal Delay: 250.2

Intersection LOS: F

Intersection Capacity Utilization 120.2%

ICU Level of Service H

Analysis Period (min) 15

Splits and Phases: 5: Victoria Road & Arkell Road

| | | | |
|------|------|------|------|
| ↖ Ø1 | ↖ Ø2 | ↖ Ø3 | ↖ Ø4 |
| 10 s | 34 s | 10 s | 26 s |
| ↖ Ø5 | ↖ Ø6 | ↖ Ø7 | ↖ Ø8 |
| 10 s | 34 s | 10 s | 26 s |

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Queues

5: Victoria Road & Arkell Road

07-24-2018

| | EBL | EBT | WBL | WBT | NBL | NBT | SBL | SBT |
|------------------------|-------|-------|------|-------|------|--------|------|--------|
| 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 | 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 |
| 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 |
| Reduced v/c Ratio | 0.94 | 0.56 | 0.44 | 0.66 | 0.38 | 1.66 | 0.35 | 1.83 |

Intersection Summary

- Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

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

Queue shown is maximum after two cycles.

HCM 2010 Signalized Intersection Summary

5: Victoria Road & Arkell Road

07-24-2018

| | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------------|------|------|------|------|------|------|------|-------|-------|------|------|-------|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | ↰ | ↱ | | ↰ | ↱ | | ↰ | ↱ | | ↰ | ↱ | |
| Traffic Volume (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 (Ob), 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 |
| Upstream Filter(l) | 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 | 26.9 | 0.0 | 27.3 | 20.7 | 0.0 | 28.1 | 17.5 | 0.0 | 24.1 | 17.5 | 0.0 | 24.2 |
| Incr Delay (d2), s/veh | 50.0 | 0.0 | 4.2 | 1.1 | 0.0 | 9.7 | 1.2 | 0.0 | 335.9 | 1.1 | 0.0 | 424.4 |
| 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 | 7.4 | 0.0 | 6.0 | 2.5 | 0.0 | 7.6 | 1.3 | 0.0 | 73.6 | 1.2 | 0.0 | 89.7 |
| LnGrp Delay(d), s/veh | 76.9 | 0.0 | 31.5 | 21.7 | 0.0 | 37.8 | 18.7 | 0.0 | 360.0 | 18.6 | 0.0 | 448.5 |
| LnGrp LOS | E | | C | C | | D | B | | F | B | | F |
| Approach Vol, veh/h | 594 | | | | 485 | | | 1221 | | | | 1345 |
| Approach Delay, s/veh | 55.2 | | | | 32.6 | | | 330.9 | | | | 417.8 |
| Approach LOS | E | | | | 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 | 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+I1), 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 F

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

07-24-2018

| | EBL | EBR | NBL | NBT | SBT | SBR |
|----------------------------|-------|-------|-------|-------|-------|-------|
| Lane Configurations | ↰ | ↱ | ↰ | ↱ | ↱ | ↱ |
| 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 | 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 | | 0.066 | | | |
| 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% | 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 | |
| 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 | | | 2 | 6 | |

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

07-24-2018

| | 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 Effect 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 | C | B | A | C | B | A |
| Approach Delay | 26.6 | | | 25.9 | 18.0 | |
| Approach LOS | C | | | C | B | |

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 76.1
Natural Cycle: 110
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.89
Intersection Signal Delay: 22.0
Intersection Capacity Utilization 83.6%
Analysis Period (min) 15

Intersection LOS: C
ICU Level of Service E

Splits and Phases: 6: Victoria Road & Access 2



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

Synchro 9 Report
Page 14

Queues

6: Victoria Road & Access 2

07-24-2018

| | EBL | EBR | NBL | NBT | SBT | SBR |
|------------------------|------|------|------|--------|--------|------|
| 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 |













Intersection Summary

95th 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







07-24-2018

| |  |  |  |  |  |  | | |
|------------------------------|---|---|---|---|---|---|---|---|
| Movement | EBL | EBR | NBL | NBT | SBT | SBR | | |
| Lane Configurations |  |  |  |  |  |  | | |
| 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 | 0 | 0 | 6 | 3 | 0 | | |
| 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(g_s), s | 1.9 | 1.0 | 0.0 | 50.0 | 50.0 | 0.6 | | |
| Cycle Q Clear(g_c), s | 1.9 | 1.0 | 50.0 | 50.0 | 50.0 | 0.6 | | |
| Prop In Lane | 1.00 | 1.00 | 1.00 | | | 1.00 | | |
| Lane Grp Cap(c), veh/h | 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(l) | 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 | C | C | D | F | F | A | | |
| Approach Vol, veh/h | 79 | | | 1354 | 1395 | | | |
| Approach Delay, s/veh | 28.8 | | | 45.4 | 38.8 | | | |
| Approach LOS | C | | | D | D | | | |
| 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 | | |
| 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 | | | | |

Lanes, Volumes, Timings

7: Victoria Road & Victoria Park Village Road

07-24-2018

| Lane Group | EBL | EBR | NBL | NBT | SBT | SBR |
|----------------------------|---|---|---|---|---|---|
| Lane Configurations |  |  |  |  |  |  |
| 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 | | | | | | |
| 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 Utilization 92.9%







ICU Level of Service F

Analysis Period (min) 15

HCM 2010 TWSC

7: Victoria Road & Victoria Park Village Road

07-24-2018

| Intersection | | | | | | |
|--------------------------|---|---|---|---|---|---|
| Int Delay, s/veh | 117.1 | | | | | |
| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
| Lane Configurations |  |  |  |  |  |  |
| 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, # | 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 | 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 | - | - | - | - | - |

| Approach | EB | NB | SB |
|------------------------------|----|-----|----|
| HCM Control Delay, \$ 2709.1 | | 0.8 | 0 |
| HCM LOS | | F | |

| Minor Lane/Major Mvmt | NBL | NBT | EBLn1 | EBLn2 | SBT | SBR |
|-----------------------|-------|-----|-----------|-------|-----|-----|
| Capacity (veh/h) | 396 | - | 12 | 138 | - | - |
| HCM Lane V/C Ratio | 0.176 | - | 8.152 | 0.299 | - | - |
| HCM Control Delay (s) | 16 | - | \$ 3835.2 | 41.9 | - | - |
| HCM Lane LOS | C | - | F | E | - | - |
| HCM 95th %tile Q(veh) | 0.6 | - | 13.5 | 1.2 | - | - |

Notes

--: Volume exceeds capacity \$: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

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
PM Forecast Only? N

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

| Time Period | Major Street | | | | | | Minor Street | | | | | | Peds Crossing Main Road |
|-----------------------|--------------|---------|-------|-----------|---------|-------|----------------|---------|-------|------------|---------|-------|----------------------------|
| | Arkell Road | | | | | | Colonial Drive | | | | | | |
| | Eastbound | | | Westbound | | | Northbound | | | Southbound | | | |
| | Left | Through | Right | Left | Through | Right | Left | Through | Right | Left | Through | Right | |
| 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

| | | | | | | |
|-------------|----------------------------|------|------------|-----------|------------|-----------------------------|
| 1A | Approach Lanes | 1 | | 2 or more | | Average Hourly Volume |
| | Flow Conditions | Free | Restricted | Free | Restricted | |
| | | | X | | | |
| | All Approaches | 480 | 720 | 600 | 900 | |
| % Fulfilled | | | | | | 100.2% |
| 1B | Approach Lanes | 1 | | 2 or more | | Average Hourly Volume |
| | Flow Conditions | Free | Restricted | Free | Restricted | |
| | | | X | | | |
| | Minor Street Approaches | 120 | 170 | 120 | 170 | |
| % Fulfilled | | | | | | 109.7% |

Warrant 2 - Delay To Cross Traffic

| | | | | | | |
|-------------|----------------------------------|------|------------|-----------|------------|-----------------------------|
| 2A | Approach Lanes | 1 | | 2 or more | | Average Hourly Volume |
| | Flow Conditions | Free | Restricted | Free | Restricted | |
| | | | X | | | |
| | Major Street Approaches | 480 | 720 | 600 | 900 | |
| % Fulfilled | | | | | | 74.3% |
| 2B | Approach Lanes | 1 | | 2 or more | | Average Hourly Volume |
| | Flow Conditions | Free | Restricted | Free | Restricted | |
| | | | X | | | |
| | Traffic Crossing Major Street | 50 | 75 | 50 | 75 | |
| % 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
PM Forecast Only? N

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

| Time Period | Major Street | | | | | | Minor Street | | | | | | Peds Crossing Main Road |
|-----------------------|---------------|---------|-------|------------|---------|-------|----------------------------|---------|-------|-----------|---------|-------|----------------------------|
| | Victoria Road | | | | | | Victoria Park Village Road | | | | | | |
| | Northbound | | | Southbound | | | Eastbound | | | Westbound | | | |
| | Left | Through | Right | Left | Through | Right | Left | Through | Right | Left | Through | Right | |
| 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 | |

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

Warrant 1 - Minimum Vehicular Volume

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

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

Warrant 2 - Delay To Cross Traffic

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

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

Appendix I

2031 Background Remedial Measures Traffic Operations Reports



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

07-24-2018

| | ↖ | → | ↗ | ↘ | ← | ↖ | ↗ | ↘ | ↙ | ↘ | ↙ | ↘ |
|----------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | ↖ | ↗ | | ↖ | ↗ | | | ↖ | ↗ | | ↖ | ↗ |
| 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 | | | 0.950 | | | | 0.976 | | | 0.961 | |
| Satd. Flow (prot) | 1770 | 1769 | 0 | 1703 | 1738 | 0 | 0 | 1603 | 0 | 0 | 1742 | 0 |
| Flt Permitted | 0.444 | | | 0.175 | | | | 0.769 | | | 0.578 | |
| Satd. Flow (perm) | 827 | 1769 | 0 | 314 | 1738 | 0 | 0 | 1263 | 0 | 0 | 1048 | 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 | 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 | | | 3.6 | | | 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 | Cl+Ex | Cl+Ex | | Cl+Ex | Cl+Ex | | Cl+Ex | Cl+Ex | | Cl+Ex | Cl+Ex | |
| Detector 1 Channel | | | | | | | | | | | | |
| Detector 1 Extend (s) | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | |
| 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 | | Cl+Ex | | | Cl+Ex | | | Cl+Ex | | | Cl+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 AM Background Remedial

Synchro 9 Report
Page 1

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

07-24-2018

| | ↖ | → | ↗ | ↘ | ← | ↖ | ↗ | ↘ | ↙ | ↘ | ↙ | ↘ |
|-------------------------|-------|-------|-----|-------|-------|-----|-------|-------|-----|-------|-------|-----|
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| 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 | | 0.0 | 0.0 | |
| Total Lost Time (s) | 6.0 | 6.0 | | 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 Effect Green (s) | 33.1 | 33.1 | | 33.1 | 33.1 | | 37.5 | 37.5 | | 37.5 | 37.5 | |
| Actuated g/C Ratio | 0.40 | 0.40 | | 0.40 | 0.40 | | 0.45 | 0.45 | | 0.45 | 0.45 | |
| v/c Ratio | 0.04 | 0.86 | | 0.41 | 0.51 | | 0.55 | 0.55 | | 0.36 | 0.36 | |
| Control Delay | 13.8 | 34.7 | | 27.6 | 20.1 | | 19.8 | 19.8 | | 17.0 | 17.0 | |
| Queue Delay | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | |
| Total Delay | 13.8 | 34.7 | | 27.6 | 20.1 | | 19.8 | 19.8 | | 17.0 | 17.0 | |
| LOS | B | C | | C | C | | B | B | | B | B | |
| Approach Delay | | 34.3 | | | 21.0 | | 19.8 | 19.8 | | 17.0 | 17.0 | |
| Approach LOS | | C | | | C | | B | B | | B | B | |

Intersection Summary

Area Type: Other

Cycle Length: 100

Actuated Cycle Length: 82.8

Natural Cycle: 55

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.86

Intersection Signal Delay: 25.7

Intersection LOS: C

Intersection Capacity Utilization 66.6%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 3: Colonial Drive & Arkell Road



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

Synchro 9 Report
Page 2

Queues

3: Colonial Drive & Arkell Road



















07-24-2018

| | EBL | EBT | WBL | WBT | NBT | SBT |
|------------------------|------|-------|------|-------|-------|------|
| 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 | | | | | | |

HCM 2010 Signalized Intersection Summary

3: Colonial Drive & Arkell Road

07-24-2018

| |  |  |  |  |  |  |  |  |  |  |  |  |
|------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  | |  |  | | |  | | |  | |
| 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 (Ob), 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 | 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 | 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 |
| 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 | 0 |
| Grp Sat Flow(s),veh/h/ln | 1018 | 0 | 1772 | 774 | 0 | 1729 | 1466 | 0 | 0 | 1207 | 0 | 0 |
| Q Serve(g_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(g_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 | 0 |
| 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 | 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 | 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 | C | | C | C | | B | C | | | B | | |
| Approach Vol, veh/h | 627 | | | 408 | | | 332 | | | 177 | | |
| Approach Delay, s/veh | 23.1 | | | 19.3 | | | 22.4 | | | 19.9 | | |
| Approach LOS | C | | | B | | | C | | | B | | |
| 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+I1), 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 | | | | | | | | | | | |

Lanes, Volumes, Timings
5: Victoria Road & Arkell Road

07-24-2018

| | ↖ | → | ↘ | ↙ | ← | ↖ | ↗ | ↘ | ↙ | ↖ | ↗ | ↘ | ↙ |
|----------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|------|
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR | |
| Lane Configurations | ↖ | ↖ | ↖ | ↖ | ↖ | ↖ | ↖ | ↖ | ↖ | ↖ | ↖ | ↖ | |
| 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 | | 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 | | | | | | 0.99 | | 1.00 | | | | 0.97 |
| Frt | | 0.942 | | | 0.935 | | | | 0.850 | | | 0.850 | |
| Flt Protected | 0.950 | | | 0.950 | | | 0.950 | | | 0.950 | | | |
| Satd. Flow (prot) | 3367 | 1687 | 0 | 1787 | 1700 | 0 | 1805 | 3406 | 1524 | 1752 | 3343 | 1455 | |
| Flt Permitted | 0.950 | | | 0.611 | | | 0.216 | | | 0.147 | | | |
| Satd. Flow (perm) | 3361 | 1687 | 0 | 1149 | 1700 | 0 | 410 | 3406 | 1524 | 271 | 3343 | 1418 | |
| Right Turn on Red | | | Yes | | | Yes | | | Yes | | | Yes | |
| Satd. Flow (RTOR) | | 32 | | | 34 | | | | 153 | | | 254 | |
| 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 | 912 | 121 | 67 | 777 | 254 | |
| 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 | Cl+Ex | Cl+Ex | | Cl+Ex | Cl+Ex | | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | |
| Detector 1 Channel | | | | | | | | | | | | | |
| Detector 1 Extend (s) | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| 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 | | Cl+Ex | | | Cl+Ex | | | Cl+Ex | | | Cl+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 AM Background Remedial

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

07-24-2018

| | ↖ | → | ↘ | ↙ | ← | ↖ | ↗ | ↘ | ↙ | ↖ | ↗ | ↘ | ↙ |
|-------------------------|-------|-------|-----|-------|-------|-----|-------|-------|-------|-------|-------|-------|---|
| 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 Effect 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 | C | | C | D | | B | C | A | B | C | A | |
| Approach Delay | | 39.6 | | | 31.1 | | | 30.0 | | | 23.9 | | |
| Approach LOS | | D | | | C | | | C | | | C | | |

Intersection Summary

Area Type: Other

Cycle Length: 100

Actuated Cycle Length: 85.6

Natural Cycle: 85

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.82

Intersection Signal Delay: 30.3

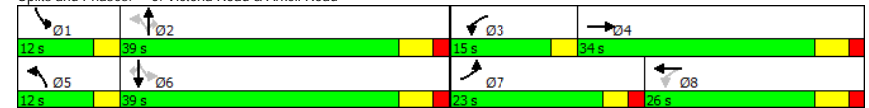
Intersection LOS: C

Intersection Capacity Utilization 71.4%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 5: Victoria Road & Arkell Road



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

Synchro 9 Report
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Queues

5: Victoria Road & Arkell Road

07-24-2018

| | EBL | EBT | WBL | WBT | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|-------|-------|------|-------|------|-------|------|------|-------|------|
| 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 |

Intersection Summary

95th 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

07-24-2018

| | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | ↰ | ↱ | ↲ | ↰ | ↱ | ↲ | ↰ | ↱ | ↲ | ↰ | ↱ | ↲ |
| Traffic Volume (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 (Ob), 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(g_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(g_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(l) | 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 | | C | C | | D | B | C | B | B | C | C |
| Approach Vol, veh/h | | 763 | | | 436 | | | 1106 | | | 1098 | |
| Approach Delay, s/veh | | 39.4 | | | 33.5 | | | 25.8 | | | 24.1 | |
| Approach LOS | | D | | | C | | | C | | | C | |
| 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 | 8.6 | 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+1), 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 | 0.8 | 1.8 | | | | |

Intersection Summary

HCM 2010 Ctrl Delay 29.3
HCM 2010 LOS C

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

07-24-2018

| | EBL | EBR | NBL | NBT | SBT | SBR |
|----------------------------|-------|-------|-------|-------|-------|-------|
| Lane Configurations | ↰ | ↱ | ↰ | ↱ | ↱ | ↱ |
| 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 | | | 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 | | | | 0.850 |
| Flt Protected | 0.950 | | 0.950 | | | |
| Satd. Flow (prot) | 1805 | 1615 | 1805 | 3406 | 3343 | 1615 |
| Flt Permitted | 0.950 | | 0.272 | | | |
| Satd. Flow (perm) | 1805 | 1615 | 517 | 3406 | 3343 | 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 | 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 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 | |

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

07-24-2018

| | 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 Effect 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 | B | A | A | A | A |
| Approach Delay | 32.8 | | | 6.0 | 3.9 | |
| Approach LOS | C | | | A | A | |

Intersection Summary

Area Type: Other

Cycle Length: 100

Actuated Cycle Length: 93.5

Natural Cycle: 60

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.54

Intersection Signal Delay: 6.8

Intersection LOS: A

Intersection Capacity Utilization 57.4%

ICU Level of Service B

Analysis Period (min) 15

Splits and Phases: 6: Victoria Road & Access 2



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Queues

6: Victoria Road & Access 2













07-24-2018

| | EBL | EBR | NBL | NBT | SBT | SBR |
|------------------------|------|------|------|-------|-------|------|
| 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 | | | | | | |

HCM 2010 Signalized Intersection Summary

6: Victoria Road & Access 2

07-24-2018

| |  |  |  |  |  |  | | |
|------------------------------|---|---|---|---|---|---|---|---|
| Movement | EBL | EBR | NBL | NBT | SBT | SBR | | |
| Lane Configurations |  |  |  |  |  |  | | |
| 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(l) | 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 | | | A | A | | | |
| 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 | | | | A | | | | |

Lanes, Volumes, Timings

7: Victoria Road & Victoria Park Village Road

07-24-2018

| | EBL | EBR | NBL | NBT | SBT | SBR |
|----------------------------|-------|-------|-------|-------|-------|-------|
| Lane Group | EBL | EBR | NBL | NBT | SBT | SBR |
| Lane Configurations | ↰ | ↱ | ↰ | ↱ | ↱ | ↰ |
| 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 | 0.95 | 0.95 | 0.95 |
| Frt | | 0.850 | | | 0.993 | |
| Flt Protected | 0.950 | | 0.950 | | | |
| Satd. Flow (prot) | 1770 | 1583 | 1770 | 3539 | 3514 | 0 |
| Flt Permitted | 0.950 | | 0.218 | | | |
| Satd. Flow (perm) | 1770 | 1583 | 406 | 3539 | 3514 | 0 |
| Right Turn on Red | | Yes | | | | Yes |
| Satd. Flow (RTOR) | | 57 | | | 11 | |
| 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 |
| 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 | | | | | | |
| 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 | |
| Permitted Phases | | 4 | 2 | | | |

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Synchro 9 Report
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Lanes, Volumes, Timings

7: Victoria Road & Victoria Park Village Road

07-24-2018

| | EBL | EBR | NBL | NBT | SBT | SBR |
|-------------------------|-------|-------|-------|-------|-------|-----|
| 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 Effect Green (s) | 14.8 | 14.8 | 69.3 | 69.3 | 69.3 | |
| Actuated g/C Ratio | 0.15 | 0.15 | 0.72 | 0.72 | 0.72 | |
| 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 | |
| LOS | D | B | A | A | A | |
| Approach Delay | 39.5 | | | 8.4 | 6.6 | |
| Approach LOS | D | | | A | A | |

Intersection Summary

Area Type: Other

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 LOS: B

Intersection Capacity Utilization 58.2%

ICU Level of Service B

Analysis Period (min) 15

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



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

Synchro 9 Report
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Queues

7: Victoria Road & Victoria Park Village Road












07-24-2018

| | EBL | EBR | NBL | NBT | SBT |
|-----------------------------|-------|------|------|-------|-------|
| 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 | | | | | |

HCM 2010 Signalized Intersection Summary

7: Victoria Road & Victoria Park Village Road

07-24-2018

| |  |  |  |  |  |  | | |
|------------------------------|---|---|---|---|---|---|---|---|
| Movement | EBL | EBR | NBL | NBT | SBT | SBR | | |
| Lane Configurations |  |  |  |  |  | | | |
| 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 | 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 | 224 | 200 | 378 | 2616 | 2531 | 131 | | |
| 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(l) | 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 | D | | | A | A | | | |
| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 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 (g_c+I1), 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 | | | A | | | | | |

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

07-24-2018

| | ← | → | ↖ | ↗ | ← | ↖ | ↗ | ↖ | ↗ | ↖ | ↗ | ↖ | ↗ |
|----------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|---|
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR | |
| Lane Configurations | ↖ | ↗ | | ↖ | ↗ | | | ↖ | ↗ | ↖ | ↗ | | |
| 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 | | | 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 | | | 0.964 | | | 0.939 | | | 0.975 | | |
| Flt Protected | 0.950 | | | 0.950 | | | | 0.973 | | | 0.961 | | |
| Satd. Flow (prot) | 1805 | 1808 | 0 | 1805 | 1804 | 0 | 0 | 1708 | 0 | 0 | 1780 | 0 | |
| Flt Permitted | 0.194 | | | 0.267 | | | | 0.798 | | | 0.686 | | |
| Satd. Flow (perm) | 369 | 1808 | 0 | 503 | 1804 | 0 | 0 | 1401 | 0 | 0 | 1271 | 0 | |
| Right Turn on Red | | | Yes | | | Yes | | | Yes | | | Yes | |
| Satd. Flow (RTOR) | | 23 | | | 27 | | | 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 | 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 | | | 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 | Cl+Ex | Cl+Ex | | Cl+Ex | Cl+Ex | | Cl+Ex | Cl+Ex | | Cl+Ex | Cl+Ex | | |
| Detector 1 Channel | | | | | | | | | | | | | |
| Detector 1 Extend (s) | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | | |
| 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 | | Cl+Ex | | | Cl+Ex | | | Cl+Ex | | | Cl+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 Background Remedial

Synchro 9 Report
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Lanes, Volumes, Timings
3: Colonial Drive & Arkell Road

07-24-2018

| | ← | → | ↖ | ↗ | ← | ↖ | ↗ | ↖ | ↗ | ↖ | ↗ | ↖ | ↗ |
|-------------------------|-------|-------|-----|-------|-------|-----|-------|-------|-----|-------|-------|-----|---|
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR | |
| 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 | | 0.0 | 0.0 | | |
| Total Lost Time (s) | 6.0 | 6.0 | | 6.0 | 6.0 | | 5.0 | 5.0 | | 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 Effect 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 | B | C | | C | C | | B | | | B | | | |
| Approach Delay | | 23.6 | | | 28.4 | | 12.8 | | | 12.1 | | | |
| Approach LOS | | C | | | C | | B | | | B | | | |

Intersection Summary

Area Type: Other

Cycle Length: 110

Actuated Cycle Length: 71.2

Natural Cycle: 55

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.83

Intersection Signal Delay: 23.7

Intersection LOS: C

Intersection Capacity Utilization 64.0%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 3: Colonial Drive & Arkell Road



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

Synchro 9 Report
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Queues

3: Colonial Drive & Arkell Road



















07-24-2018

| | EBL | EBT | WBL | WBT | NBT | SBT |
|------------------------|------|-------|------|-------|-------|------|
| 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 | | | | | | |

HCM 2010 Signalized Intersection Summary

3: Colonial Drive & Arkell Road

07-24-2018

| |  |  |  |  |  |  |  |  |  |  |  |  |
|------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  | |  |  | | |  | | |  | |
| 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 (Ob), 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 | 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 | 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 | 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 | 0 |
| Grp Sat Flow(s), veh/h/ln | 834 | 0 | 1812 | 891 | 0 | 1791 | 1511 | 0 | 0 | 1403 | 0 | 0 |
| Q Serve(g_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(g_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 | 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 | 531 | 0 | 1442 | 604 | 0 | 1425 | 641 | 0 | 0 | 611 | 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 | 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 | C | | B | C | | B | B | | | B | | |
| Approach Vol, veh/h | 556 | | | 680 | | | 186 | | | 103 | | |
| Approach Delay, s/veh | 17.4 | | | 19.2 | | | 19.3 | | | 17.9 | | |
| Approach LOS | B | | | B | | | B | | | B | | |
| 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 | | | B | | | | | | | | | |
| Notes | | | | | | | | | | | | |


HCM 2010 Signalized Intersection Summary
3: Colonial Drive & Arkell Road

07-24-2018

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

Lanes, Volumes, Timings
5: Victoria Road & Arkell Road

07-24-2018

| |  | | | | | | | | | | | |
|----------------------------|---|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | ↰ | ↱ | ↲ | ↰ | ↱ | ↲ | ↰ | ↱ | ↲ | ↰ | ↱ | ↲ |
| 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 | Cl+Ex | Cl+Ex | | Cl+Ex | Cl+Ex | | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex |
| Detector 1 Channel | | | | | | | | | | | | |
| Detector 1 Extend (s) | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 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 | | Cl+Ex | | | Cl+Ex | | | Cl+Ex | | | | Cl+Ex |
| Detector 2 Channel | | | | | | | | | | | | |
| Detector 2 Extend (s) | | 0.0 | | | 0.0 | | | 0.0 | | | | 0.0 |

Lanes, Volumes, Timings
5: Victoria Road & Arkell Road

07-24-2018

| | ↖ | → | ↗ | ↙ | ← | ↖ | ↙ | ↗ | ↘ | ↖ | ↙ | ↘ |
|-------------------------|-------|-------|-----|-------|-------|-----|-------|-------|-------|-------|-------|-------|
| 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 Effect Green (s) | 12.8 | 27.2 | | 33.2 | 21.2 | | 40.1 | 31.8 | 31.8 | 40.1 | 31.8 | 31.8 |
| Actuated g/C Ratio | 0.14 | 0.30 | | 0.36 | 0.23 | | 0.44 | 0.35 | 0.35 | 0.44 | 0.35 | 0.35 |
| 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 |
| LOS | D | C | | B | D | | B | C | A | B | C | A |
| Approach Delay | | 38.4 | | | 37.1 | | | 27.6 | | | 23.9 | |
| Approach LOS | | D | | | D | | | C | | | C | |

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 LOS: C

Intersection Capacity Utilization 72.7%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 5: Victoria Road & Arkell Road

| | | | |
|------|------|------|------|
| ↖ Ø1 | ↗ Ø2 | ↙ Ø3 | ↘ Ø4 |
| 10 s | 47 s | 12 s | 41 s |
| ↖ Ø5 | ↗ Ø6 | ↙ Ø7 | ↘ Ø8 |
| 10 s | 47 s | 19 s | 34 s |

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Synchro 9 Report
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Queues
5: Victoria Road & Arkell Road

07-24-2018

| | ↖ | → | ↗ | ↙ | ← | ↖ | ↙ | ↗ | ↘ | ↖ | ↙ | ↘ |
|------------------------|------|-------|------|-------|------|-------|------|------|-------|------|---|---|
| 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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Synchro 9 Report
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HCM 2010 Signalized Intersection Summary
5: Victoria Road & Arkell Road

07-24-2018

| | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | ↰ | ↱ | ↱ | ↰ | ↱ | ↱ | ↰ | ↱ | ↱ | ↰ | ↱ | ↱ |
| Traffic Volume (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 (Ob), 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(g_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(g_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 | | C | C | | D | B | C | C | B | C | C |
| Approach Vol, veh/h | 594 | | | 485 | | | 1221 | | | 1345 | | |
| Approach Delay, s/veh | 40.7 | | | 38.2 | | | 24.8 | | | 24.6 | | |
| Approach LOS | D | | | D | | | C | | | C | | |
| 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 (g_c+I1), 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 | | | | |
| Intersection Summary | | | | | | | | | | | | |
| HCM 2010 Ctrl Delay | 29.1 | | | | | | | | | | | |
| HCM 2010 LOS | C | | | | | | | | | | | |

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

07-24-2018

| | EBL | EBR | NBL | NBT | SBT | SBR |
|----------------------------|-------|-------|-------|-------|-------|-------|
| Lane Configurations | ↰ | ↱ | ↰ | ↱ | ↱ | ↱ |
| 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 | | | | | 0.850 |
| Flt Protected | 0.950 | | 0.950 | | | |
| Satd. Flow (prot) | 1805 | 1615 | 1805 | 3406 | 3505 | 1615 |
| Flt Permitted | 0.950 | | 0.186 | | | |
| 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 | | | 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 | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex |
| Detector 1 Channel | | | | | | |
| Detector 1 Extend (s) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 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 | | | | Cl+Ex | Cl+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 | |

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Synchro 9 Report
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Lanes, Volumes, Timings
6: Victoria Road & Access 2

07-24-2018

| | EBL | EBR | NBL | NBT | SBT | SBR |
|-------------------------|-------|-------|-------|-------|-------|-------|
| 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 Effect 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 | B | A | A | A | A |
| Approach Delay | 39.5 | | | 4.5 | 3.8 | |
| Approach LOS | D | | | A | A | |

Intersection Summary

Area Type: Other

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

Analysis Period (min) 15

Splits and Phases: 6: Victoria Road & Access 2

| | |
|--|--|
|  Ø2  Ø6 |  Ø4 |
| 82 s | 28 s |

Queues
6: Victoria Road & Access 2













07-24-2018

| | EBL | EBR | NBL | NBT | SBT | SBR |
|------------------------|------|------|------|-------|-------|------|
| 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

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

07-24-2018

| |  |  |  |  |  |  | | |
|------------------------------|---|---|---|---|---|---|---|---|
| Movement | EBL | EBR | NBL | NBT | SBT | SBR | | |
| Lane Configurations |  |  |  |  |  |  | | |
| 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 (Ob), 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(g_s), s | 2.7 | 1.4 | 2.0 | 13.4 | 13.0 | 0.6 | | |
| Cycle Q Clear(g_c), s | 2.7 | 1.4 | 15.0 | 13.4 | 13.0 | 0.6 | | |
| Prop In Lane | 1.00 | 1.00 | 1.00 | | | 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 | 0.2 | 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 | | | A | A | | | |
| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 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 | | | | | |
| HCM 2010 LOS | | | A | | | | | |

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

Synchro 9 Report
Page 13

Lanes, Volumes, Timings
7: Victoria Road & Victoria Park Village Road

07-24-2018

| | EBL | EBR | NBL | NBT | SBT | SBR |
|----------------------------|-------|-------|-------|-------|-------|-------|
| Lane Group | EBL | EBR | NBL | NBT | SBT | SBR |
| Lane Configurations | ↰ | ↱ | ↰ | ↱ | ↱ | ↱ |
| 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 | 0.95 | 0.95 | 0.95 |
| Frt | | 0.850 | | | 0.985 | |
| Flt Protected | 0.950 | | 0.950 | | | |
| Satd. Flow (prot) | 1805 | 1615 | 1805 | 3406 | 3462 | 0 |
| Flt Permitted | 0.950 | | 0.121 | | | |
| 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 | | | 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 | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | |
| Detector 1 Channel | | | | | | |
| Detector 1 Extend (s) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| 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 | | | | Cl+Ex | Cl+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

Synchro 9 Report
Page 14

Lanes, Volumes, Timings

7: Victoria Road & Victoria Park Village Road

07-24-2018

| | EBL | EBR | NBL | NBT | SBT | SBR |
|-------------------------|-------|-------|-------|-------|-------|-----|
| 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 | B | B | A | A | |
| Approach Delay | 36.7 | | | 5.4 | 6.0 | |
| Approach LOS | D | | | A | A | |

Intersection Summary

Area Type: Other

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 LOS: A

Intersection Capacity Utilization 71.5%

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

| | EBL | EBR | NBL | NBT | SBT |
|------------------------|-------|------|------|-------|-------|
| 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

HCM 2010 Signalized Intersection Summary
7: Victoria Road & Victoria Park Village Road

07-24-2018

| |  |  |  |  |  |  | | |
|------------------------------|---|---|---|---|---|---|---|---|
| Movement | EBL | EBR | NBL | NBT | SBT | SBR | | |
| Lane Configurations |  |  |  |  |  |  | | |
| 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 (Ob), 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(g_s), s | 4.6 | 2.1 | 12.1 | 14.5 | 18.7 | 19.2 | | |
| Cycle Q Clear(g_c), s | 4.6 | 2.1 | 31.4 | 14.5 | 18.7 | 19.2 | | |
| Prop In Lane | 1.00 | 1.00 | 1.00 | | | 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 | | |
| Upstream Filter(I) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | |
| Uniform Delay (d), s/veh | 38.2 | 37.1 | 12.0 | 4.3 | 4.8 | 4.9 | | |
| 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 | B | A | A | A | | |
| Approach Vol, veh/h | 139 | | | 1436 | 1653 | | | |
| Approach Delay, s/veh | 39.6 | | | 5.6 | 7.0 | | | |
| Approach LOS | D | | | A | A | | | |
| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 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 (g_c+I1), s | | 33.4 | | 6.6 | | 21.2 | | |
| Green Ext Time (p_c), s | | 32.9 | | 0.5 | | 43.0 | | |
| Intersection Summary | | | | | | | | |
| HCM 2010 Ctrl Delay | | | 7.7 | | | | | |
| HCM 2010 LOS | | | A | | | | | |

Appendix J

2021 Total Traffic Operations Reports



Lanes, Volumes, Timings

1: Summerfield Drive & Arkell Road

07-24-2018

| | EBT | EBR | WBL | WBT | NBL | NBR |
|----------------------------|-------|-------|-------|-------|-------|-------|
| Lane Group | EBT | EBR | WBL | WBT | NBL | NBR |
| Lane Configurations | ↔ | ↔ | ↔ | ↔ | ↔ | ↔ |
| 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 | | | | | |
| 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 Utilization 43.8% | ICU Level of Service A |
| Analysis Period (min) | 15 |

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

Synchro 9 Report
Page 1

HCM 2010 TWSC

1: Summerfield Drive & Arkell Road

07-24-2018

| Intersection | | | | | | |
|--------------------------|------|------|------|------|------|------|
| Int Delay, s/veh | 4.3 | | | | | |
| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
| Lane Configurations | ↔ | ↔ | ↔ | ↔ | ↔ | ↔ |
| 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 |
| Mvmt Flow | 358 | 34 | 29 | 414 | 132 | 112 |

| Major/Minor | Major1 | Major2 | Minor1 |
|----------------------|--------|--------|--------|
| Conflicting Flow All | 0 | 0 | 401 |
| Stage 1 | - | - | - |
| Stage 2 | - | - | - |
| Critical Hdwy | - | - | 4.18 |
| Critical Hdwy Stg 1 | - | - | - |
| Critical Hdwy Stg 2 | - | - | - |
| Follow-up Hdwy | - | - | 2.272 |
| Pot Cap-1 Maneuver | - | - | 1126 |
| Stage 1 | - | - | - |
| Stage 2 | - | - | - |
| Platoon blocked, % | - | - | - |
| Mov Cap-1 Maneuver | - | - | 1126 |
| Mov Cap-2 Maneuver | - | - | - |
| Stage 1 | - | - | - |
| Stage 2 | - | - | - |

| Approach | EB | WB | NB |
|----------------------|----|-----|------|
| HCM Control Delay, s | 0 | 0.5 | 18.1 |
| HCM LOS | | | C |

| Minor Lane/Major Mvmt | NBLn1 | EBT | EBR | WBL | WBT |
|-----------------------|-------|-----|-----|-------|-----|
| Capacity (veh/h) | 516 | - | - | 1126 | - |
| HCM Lane V/C Ratio | 0.473 | - | - | 0.025 | - |
| HCM Control Delay (s) | 18.1 | - | - | 8.3 | - |
| HCM Lane LOS | C | - | - | A | - |
| HCM 95th %tile Q(veh) | 2.5 | - | - | 0.1 | - |

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

Synchro 9 Report
Page 2

Lanes, Volumes, Timings

2: Zecca Drive/Amos Drive & Arkell Road

07-24-2018

| | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|----------------------------|------|-------|-------|------|-------|-------|------|-------|-------|------|-------|-------|
| Lane Configurations | | ↔ | | | ↔ | | | ↔ | | | ↔ | |
| 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 | |
| Flt Protected | | 0.999 | | | | | | 0.973 | | | 0.972 | |
| Satd. Flow (prot) | 0 | 1804 | 0 | 0 | 1772 | 0 | 0 | 1699 | 0 | 0 | 1745 | 0 |
| Flt 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 | | | | | | | | | | | | |
| 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 43.8%

ICU Level of Service A

Analysis Period (min) 15

HCM 2010 TWSC

2: Zecca Drive/Amos Drive & Arkell Road

07-24-2018

Intersection

Int Delay, s/veh 2.3

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|--------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Lane Configurations | | ↔ | | | ↔ | | | ↔ | | | ↔ | |
| 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 | - | - | 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 | 456 | 13 | 3 | 396 | 11 | 22 | 1 | 16 | 43 | 2 | 31 |

























| Major/Minor | Major1 | Major2 | Minor1 | Minor2 |
|----------------------|--------|--------|--------|--------|
| Conflicting Flow All | 408 | 0 | 0 | 477 |
| Stage 1 | - | - | - | - |
| Stage 2 | - | - | - | - |
| Critical Hdwy | 4.1 | - | - | 4.15 |
| Critical Hdwy Stg 1 | - | - | - | - |
| Critical Hdwy Stg 2 | - | - | - | - |
| Follow-up Hdwy | 2.2 | - | - | 2.245 |
| Pot Cap-1 Maneuver | 1162 | - | - | 1070 |
| Stage 1 | - | - | - | - |
| Stage 2 | - | - | - | - |
| Platoon blocked, % | - | - | - | - |
| Mov Cap-1 Maneuver | 1149 | - | - | 1061 |
| Mov Cap-2 Maneuver | - | - | - | - |
| Stage 1 | - | - | - | - |
| Stage 2 | - | - | - | - |

| Approach | EB | WB | NB | SB |
|----------------------|-----|-----|------|------|
| HCM Control Delay, s | 0.1 | 0.1 | 18.4 | 19.2 |
| HCM LOS | | | C | C |

| Minor Lane/Major Mvmt | NBLn1 | EBL | EBT | EBR | WBL | WBT | WBR | SBLn1 |
|-----------------------|-------|-------|-----|-----|-------|-----|-----|-------|
| Capacity (veh/h) | 308 | 1149 | - | - | 1061 | - | - | 329 |
| HCM Lane V/C Ratio | 0.127 | 0.006 | - | - | 0.003 | - | - | 0.232 |
| HCM Control Delay (s) | 18.4 | 8.2 | 0 | - | 8.4 | 0 | - | 19.2 |
| HCM Lane LOS | C | A | A | - | A | A | - | C |
| HCM 95th %tile Q(veh) | 0.4 | 0 | - | - | 0 | - | - | 0.9 |

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

07-24-2018













| |  |  |  |  |  |  |  |  |  |  |  |  |
|----------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  |  |  |  |  |  |  |  |  |  |  |
| 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 | | | 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 | |
| Sign Control | | Free | | | Free | | | Stop | | | Stop | |

Intersection Summary

| | |
|---|------------------------|
| Area Type: | Other |
| Control Type: | Unsignalized |
| Intersection Capacity Utilization 52.0% | ICU Level of Service A |
| Analysis Period (min) | 15 |

HCM 2010 TWSC
3: Colonial Drive & Arkell Road

07-24-2018

| Intersection | | | | | | | | | | | | |
|--------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Int Delay, s/veh | 21.5 | | | | | | | | | | | |
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  |  |  |  |  |  |  |  |  |  |  |
| 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 |
| Mvmt Flow | 12 | 462 | 68 | 40 | 267 | 46 | 129 | 0 | 135 | 142 | 0 | 35 |

| Major/Minor | Major1 | Major2 | Minor1 | Minor2 |
|----------------------|--------|--------|--------|--------|
| Conflicting Flow All | 313 | 0 | 0 | 541 |
| Stage 1 | - | - | - | - |
| Stage 2 | - | - | - | - |
| Critical Hdwy | 4.12 | - | - | 4.16 |
| Critical Hdwy Stg 1 | - | - | - | - |
| Critical Hdwy Stg 2 | - | - | - | - |
| Follow-up Hdwy | 2.218 | - | - | 2.254 |
| Pot Cap-1 Maneuver | 1247 | - | - | 1008 |
| Stage 1 | - | - | - | - |
| Stage 2 | - | - | - | - |
| Platoon blocked, % | - | - | - | - |
| Mov Cap-1 Maneuver | 1247 | - | - | 1007 |
| Mov Cap-2 Maneuver | - | - | - | - |
| Stage 1 | - | - | - | - |
| Stage 2 | - | - | - | - |

| Approach | EB | WB | NB | SB |
|----------------------|-----|----|------|------|
| HCM Control Delay, s | 0.2 | 1 | 52.1 | 82.3 |
| HCM LOS | | | F | F |

| Minor Lane/Major Mvmt | NBLn1 | EBL | EBT | EBR | WBL | WBT | WBR | SBLn1 |
|-----------------------|-------|------|-----|-----|------|-----|-----|-------|
| Capacity (veh/h) | 321 | 1247 | - | - | 1007 | - | - | 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 |
| HCM Lane LOS | F | A | - | - | A | - | - | F |
| HCM 95th %tile Q(veh) | 7 | 0 | - | - | 0.1 | - | - | 6.7 |

Lanes, Volumes, Timings

4: Residential Entrance/Access 1 & Arkell Road

07-24-2018

| | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|----------------------------|-------|------|-------|------|-------|-------|------|-------|-------|-------|------|-------|
| Lane Configurations | ↰ | ↱ | | ↰ | ↱ | | ↰ | ↱ | | ↰ | ↱ | |
| 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

Area Type: Other

Control Type: Unsignalized

Intersection Capacity Utilization 64.1%

ICU Level of Service C

Analysis Period (min) 15

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

Synchro 9 Report
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HCM 2010 TWSC

4: Residential Entrance/Access 1 & Arkell Road

07-24-2018

| Intersection | | | | | | | | | | | | |
|--------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Int Delay, s/veh | 1.2 | | | | | | | | | | | |
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | ↰ | ↱ | | ↰ | ↱ | | ↰ | ↱ | | ↰ | ↱ | |
| 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 | Major1 | Major2 | 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 | - | - |

| Approach | EB | WB | NB | SB |
|----------------------|----|----|------|------|
| HCM Control Delay, s | 1 | 0 | 21.2 | 13.4 |
| HCM LOS | | | C | B |

| Minor Lane/Major Mvmt | NBLn1 | EBL | EBT | EBR | WBL | WBT | WBR | SBLn1 | SBLn2 |
|-----------------------|-------|-------|-----|-----|-------|-----|-----|-------|-------|
| Capacity (veh/h) | 227 | 1184 | - | - | 946 | - | - | 156 | 696 |
| HCM Lane V/C Ratio | 0.019 | 0.076 | - | - | 0.002 | - | - | 0.042 | 0.048 |
| HCM Control Delay (s) | 21.2 | 8.3 | - | - | 8.8 | 0 | - | 29.1 | 10.4 |
| HCM Lane LOS | C | A | - | - | A | A | - | D | B |
| HCM 95th %tile Q(veh) | 0.1 | 0.2 | - | - | 0 | - | - | 0.1 | 0.2 |

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

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

07-24-2018

| | ↖ | → | ↘ | ↙ | ← | ↖ | ↙ | ↗ | ↘ | ↖ | ↙ | ↗ | ↘ |
|----------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|---|
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR | |
| Lane Configurations | ↖ | ↖ | ↖ | ↖ | ↖ | ↖ | ↖ | ↖ | ↖ | ↖ | ↖ | ↖ | |
| 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 | 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 | Cl+Ex | Cl+Ex | | Cl+Ex | Cl+Ex | | Cl+Ex | Cl+Ex | | Cl+Ex | Cl+Ex | | |
| Detector 1 Channel | | | | | | | | | | | | | |
| Detector 1 Extend (s) | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | | |
| 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 | | Cl+Ex | | | Cl+Ex | | | Cl+Ex | | | Cl+Ex | | |
| Detector 2 Channel | | | | | | | | | | | | | |
| Detector 2 Extend (s) | | 0.0 | | | 0.0 | | | 0.0 | | | 0.0 | | |

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

07-24-2018

| | ↖ | → | ↘ | ↙ | ← | ↖ | ↙ | ↗ | ↘ | ↖ | ↙ | ↗ | ↘ |
|-------------------------|-------|-------|-----|-------|-------|-----|-------|-------|-----|-------|-------|-----|---|
| 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 Effect 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 | C | | C | C | | B | F | | B | F | | |
| Approach Delay | | 62.3 | | | 23.1 | | | 88.3 | | | 152.8 | | |
| Approach LOS | | E | | | C | | | F | | | F | | |

Intersection Summary

Area Type: Other

Cycle Length: 80

Actuated Cycle Length: 71.3

Natural Cycle: 150

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 1.28

Intersection Signal Delay: 95.1

Intersection LOS: F

Intersection Capacity Utilization 97.6%

ICU Level of Service F

Analysis Period (min) 15

Splits and Phases: 5: Victoria Road & Arkell Road

| | | | |
|------|------|------|------|
| ↖ Ø1 | ↖ Ø2 | ↖ Ø3 | ↖ Ø4 |
| 10 s | 34 s | 10 s | 26 s |
| ↖ Ø5 | ↖ Ø6 | ↖ Ø7 | ↖ Ø8 |
| 10 s | 34 s | 10 s | 26 s |

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Queues

5: Victoria Road & Arkell Road

07-24-2018

| | EBL | EBT | WBL | WBT | NBL | NBT | SBL | SBT |
|------------------------|--------|-------|------|-------|------|--------|------|--------|
| 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 | 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 | 1.04 | 0.44 | 0.44 | 0.35 | 0.24 | 1.12 | 0.20 | 1.28 |

Intersection Summary

- Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

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

Queue shown is maximum after two cycles.

HCM 2010 Signalized Intersection Summary

5: Victoria Road & Arkell Road

07-24-2018

| | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------|-------|------|------|------|-------|------|------|-------|-------|------|------|-------|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | ↰ | ↱ | ↱ | ↰ | ↱ | ↱ | ↰ | ↱ | ↱ | ↰ | ↱ | ↱ |
| Traffic Volume (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 (Ob), 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 |
| Parking Bus, Adj | 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(g_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(g_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(l) | 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 | | C | C | | C | B | | F | B | | F |
| Approach Vol, veh/h | 661 | | | | 355 | | | 914 | | | | 927 |
| Approach Delay, s/veh | 96.6 | | | | 25.4 | | | 117.8 | | | | 169.7 |
| 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 | 34.5 | 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 | | | | |
| 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+1), s | 3.3 | 30.5 | 7.5 | 11.1 | 3.5 | 30.0 | 9.0 | 9.0 | | | | |
| Green Ext Time (p_c), s | 0.0 | 0.0 | 0.0 | 1.8 | 0.0 | 0.0 | 0.0 | 2.1 | | | | |
| Intersection Summary | | | | | | | | | | | | |
| HCM 2010 Ctrl Delay | | | | | 118.2 | | | | | | | |
| HCM 2010 LOS | | | | | F | | | | | | | |

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

07-24-2018

| | EBL | EBR | NBL | NBT | SBT | SBR |
|----------------------------|-------|-------|-------|-------|-------|-------|
| Lane Configurations | ↰ | ↱ | ↰ | ↱ | ↱ | ↱ |
| 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 | | | 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 | 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% | 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 | | | | | | |
| 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 | |

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Synchro 9 Report
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Lanes, Volumes, Timings
6: Victoria Road & Access 2

07-24-2018

| | 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 Effect 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 | C | A | A | C | A | A |
| Approach Delay | 24.9 | | | 25.0 | 8.0 | |
| Approach LOS | C | | | C | A | |

Intersection Summary

Area Type: Other

Cycle Length: 80

Actuated Cycle Length: 75.1

Natural Cycle: 90

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.87

Intersection Signal Delay: 18.0

Intersection LOS: B

Intersection Capacity Utilization 75.9%

ICU Level of Service D

Analysis Period (min) 15

Splits and Phases: 6: Victoria Road & Access 2



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

Synchro 9 Report
Page 14

Queues

6: Victoria Road & Access 2

07-24-2018

| | EBL | EBR | NBL | NBT | SBT | SBR |
|------------------------|------|------|------|--------|-------|------|
| 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 Summary

95th 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

07-24-2018

| |  |  |  |  |  |  | | |
|------------------------------|---|---|---|---|---|---|---|---|
| Movement | EBL | EBR | NBL | NBT | SBT | SBR | | |
| Lane Configurations |  |  |  |  |  |  | | |
| 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(l) | 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 | C | C | B | C | A | A | | |
| Approach Vol, veh/h | 167 | | | 1246 | 990 | | | |
| Approach Delay, s/veh | 29.3 | | | 25.1 | 8.6 | | | |
| Approach LOS | C | | | C | A | | | |
| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 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 | | 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 | | | | B | | | | |

Lanes, Volumes, Timings

7: Victoria Road & Victoria Park Village Road

07-24-2018

| | EBL | EBR | NBL | NBT | SBT | SBR |
|---|------------------------|-------|-------|-------|-------|-------|
| Lane Group | EBL | EBR | NBL | NBT | SBT | SBR |
| Lane Configurations | ↩ | ↩ | ↩ | ↩ | ↩ | ↩ |
| 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 | | | | | |
| 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

| | | | | | | |
|--|-----------|-----------|-------|------|------|------|
| Intersection | | | | | | |
| Int Delay, s/veh | 147.6 | | | | | |
| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
| Lane Configurations | ↩ | ↩ | ↩ | ↩ | ↩ | ↩ |
| Traffic Vol, veh/h | 186 | 52 | 17 | 1172 | 858 | 60 |
| Future Vol, veh/h | 186 | 52 | 17 | 1172 | 858 | 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 | - | 0 | - |
| Veh in Median Storage, # | 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 | 1274 | 933 | 65 |
| Major/Minor | | | | | | |
| Minor2 | Major1 | Major2 | | | | |
| Conflicting Flow All | 2276 | 965 | 998 | 0 | - | 0 |
| Stage 1 | 965 | - | - | - | - | - |
| Stage 2 | 1311 | - | - | - | - | - |
| Critical Hdwy | 6.42 | 6.22 | 4.12 | - | - | - |
| Critical Hdwy Stg 1 | 5.42 | - | - | - | - | - |
| Critical Hdwy Stg 2 | 5.42 | - | - | - | - | - |
| Follow-up Hdwy | 3.518 | 3.318 | 2.218 | - | - | - |
| Pot Cap-1 Maneuver | - 44 | 309 | 693 | - | - | - |
| Stage 1 | 370 | - | - | - | - | - |
| Stage 2 | 252 | - | - | - | - | - |
| Platoon blocked, % | | | | - | - | - |
| Mov Cap-1 Maneuver | - 43 | 309 | 693 | - | - | - |
| Mov Cap-2 Maneuver | - 43 | - | - | - | - | - |
| Stage 1 | 370 | - | - | - | - | - |
| Stage 2 | 245 | - | - | - | - | - |
| Approach | | | | | | |
| EB | NB | SB | | | | |
| HCM Control Delay, \$ 1453.7 | 0.1 | 0 | | | | |
| HCM LOS | F | | | | | |
| Minor Lane/Major Mvmt | | | | | | |
| NBL | NBT EBLn1 | EBLn2 | SBT | SBR | | |
| Capacity (veh/h) | 693 | - 43 | 309 | - | - | |
| HCM Lane V/C Ratio | 0.027 | - 4.702 | 0.183 | - | - | |
| HCM Control Delay (s) | 10.3 | \$ 1854.8 | 19.2 | - | - | |
| HCM Lane LOS | B | - F | C | - | - | |
| HCM 95th %tile Q(veh) | 0.1 | - 23.2 | 0.7 | - | - | |
| Notes | | | | | | |
| -: Volume exceeds capacity \$: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon | | | | | | |

Lanes, Volumes, Timings

1: Summerfield Drive & Arkell Road

07-24-2018

| | EBT | EBR | WBL | WBT | NBL | NBR |
|----------------------------|-------|-------|-------|-------|-------|-------|
| Lane Group | EBT | EBR | WBL | WBT | NBL | NBR |
| Lane Configurations | ↔ | ↔ | ↔ | ↔ | ↔ | ↔ |
| Traffic Volume (vph) | 456 | 139 | 80 | 388 | 66 | 40 |
| Future Volume (vph) | 456 | 139 | 80 | 388 | 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 | | | 0.950 | | 0.970 | |
| Satd. Flow (perm) | 1813 | 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) | 475 | 145 | 83 | 404 | 69 | 42 |
| Shared Lane Traffic (%) | | | | | | |
| Lane Group Flow (vph) | 620 | 0 | 83 | 404 | 111 | 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 Utilization 53.3% | ICU Level of Service A |
| Analysis Period (min) | 15 |

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

Synchro 9 Report
Page 1

HCM 2010 TWSC

1: Summerfield Drive & Arkell Road

07-24-2018

| Intersection | | | | | | |
|--------------------------|------|------|------|------|------|------|
| Int Delay, s/veh | 2.2 | | | | | |
| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
| Lane Configurations | ↔ | ↔ | ↔ | ↔ | ↔ | ↔ |
| 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 |
| Mvmt Flow | 475 | 145 | 83 | 404 | 69 | 42 |

| Major/Minor | Major1 | Major2 | Minor1 |
|----------------------|--------|--------|--------|
| Conflicting Flow All | 0 | 0 | 623 |
| Stage 1 | - | - | - |
| Stage 2 | - | - | - |
| Critical Hdwy | - | - | 4.1 |
| Critical Hdwy Stg 1 | - | - | - |
| Critical Hdwy Stg 2 | - | - | - |
| Follow-up Hdwy | - | - | 2.2 |
| Pot Cap-1 Maneuver | - | - | 968 |
| Stage 1 | - | - | - |
| Stage 2 | - | - | - |
| Platoon blocked, % | - | - | - |
| Mov Cap-1 Maneuver | - | - | 967 |
| Mov Cap-2 Maneuver | - | - | - |
| Stage 1 | - | - | - |
| Stage 2 | - | - | - |

| Approach | EB | WB | NB |
|----------------------|----|-----|------|
| HCM Control Delay, s | 0 | 1.6 | 17.4 |
| HCM LOS | | | C |

| Minor Lane/Major Mvmt | NBLn1 | EBT | EBR | WBL | WBT |
|-----------------------|-------|-----|-----|-------|-----|
| Capacity (veh/h) | 399 | - | - | 967 | - |
| HCM Lane V/C Ratio | 0.277 | - | - | 0.086 | - |
| HCM Control Delay (s) | 17.4 | - | - | 9.1 | - |
| HCM Lane LOS | C | - | - | A | - |
| HCM 95th %tile Q(veh) | 1.1 | - | - | 0.3 | - |

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

Synchro 9 Report
Page 2

Lanes, Volumes, Timings

2: Zecca Drive/Amos Drive & Arkell Road

07-24-2018

| | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|----------------------------|------|-------|-------|------|-------|-------|------|-------|-------|------|-------|-------|
| Lane Configurations | | ↔ | | | ↔ | | | ↔ | | | ↔ | |
| Traffic Volume (vph) | 43 | 426 | 29 | 6 | 428 | 28 | 16 | 0 | 3 | 16 | 1 | 24 |
| Future Volume (vph) | 43 | 426 | 29 | 6 | 428 | 28 | 16 | 0 | 3 | 16 | 1 | 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 | | | | | | | | | | | | |
| Frt | | 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 | 1866 | 0 | 0 | 1786 | 0 | 0 | 1719 | 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) | 45 | 448 | 31 | 6 | 451 | 29 | 17 | 0 | 3 | 17 | 1 | 25 |
| Shared Lane Traffic (%) | | | | | | | | | | | | |
| Lane Group Flow (vph) | 0 | 524 | 0 | 0 | 486 | 0 | 0 | 20 | 0 | 0 | 43 | 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 62.8%

ICU Level of Service B

Analysis Period (min) 15

HCM 2010 TWSC

2: Zecca Drive/Amos Drive & Arkell Road

07-24-2018

Intersection

Int Delay, s/veh 1.6

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|--------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Lane Configurations | | ↔ | | | ↔ | | | ↔ | | | ↔ | |
| 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 | 7 | 0 | 7 | 0 | 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 | 45 | 448 | 31 | 6 | 451 | 29 | 17 | 0 | 3 | 17 | 1 | 25 |

| Major/Minor | Major1 | Major2 | Minor1 | Minor2 |
|----------------------|--------|--------|--------|--------|
| Conflicting Flow All | 480 | 0 | 0 | 488 |
| Stage 1 | - | - | - | 563 |
| Stage 2 | - | - | - | 498 |
| Critical Hdwy | 4.1 | - | 4.1 | - |
| Critical Hdwy Stg 1 | - | - | - | 6.1 |
| Critical Hdwy Stg 2 | - | - | - | 6.1 |
| Follow-up Hdwy | 2.2 | - | 2.2 | - |
| Pot Cap-1 Maneuver | 1093 | - | 1086 | - |
| Stage 1 | - | - | - | 514 |
| Stage 2 | - | - | - | 558 |
| Platoon blocked, % | - | - | - | - |
| Mov Cap-1 Maneuver | 1087 | - | 1080 | - |
| Mov Cap-2 Maneuver | - | - | - | 182 |
| Stage 1 | - | - | - | 481 |
| Stage 2 | - | - | - | 526 |

| Approach | EB | WB | NB | SB |
|----------------------|-----|-----|------|------|
| HCM Control Delay, s | 0.7 | 0.1 | 24.6 | 17.8 |
| HCM LOS | | | C | C |

| Minor Lane/Major Mvmt | NBLn1 | EBL | EBT | EBR | WBL | WBT | WBR | SBLn1 |
|-----------------------|-------|-------|-----|-----|-------|-----|-----|-------|
| Capacity (veh/h) | 204 | 1087 | - | - | 1080 | - | - | 324 |
| HCM Lane V/C Ratio | 0.098 | 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 |

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

07-24-2018

| | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|----------------------------|-------|-------|-------|-------|-------|-------|------|-------|-------|------|-------|-------|
| Lane Configurations | ↰ | ↱ | | ↰ | ↱ | | | ↕ | | | ↕ | |
| 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 | | | 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 49.3%

ICU Level of Service A

Analysis Period (min) 15

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

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HCM 2010 TWSC
3: Colonial Drive & Arkell Road

07-24-2018

Intersection

Int Delay, s/veh 7.9

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|--------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Lane Configurations | ↰ | ↱ | | ↰ | ↱ | | | ↕ | | | ↕ | |
| 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 |
| 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 | 343 | 91 | 67 | 382 | 144 | 82 | 0 | 68 | 84 | 0 | 19 |

| Major/Minor | Major1 | Major2 | Minor1 | Minor2 |
|----------------------|--------|--------|--------|--------|
| Conflicting Flow All | 526 | 0 | 0 | 441 |
| Stage 1 | - | - | - | - |
| Stage 2 | - | - | - | - |
| Critical Hdwy | 4.1 | - | - | 4.1 |
| Critical Hdwy Stg 1 | - | - | - | - |
| Critical Hdwy Stg 2 | - | - | - | - |
| Follow-up Hdwy | 2.2 | - | - | 2.2 |
| Pot Cap-1 Maneuver | 1051 | - | - | 1130 |
| Stage 1 | - | - | - | - |
| Stage 2 | - | - | - | - |
| Platoon blocked, % | - | - | - | - |
| Mov Cap-1 Maneuver | 1051 | - | - | 1130 |
| Mov Cap-2 Maneuver | - | - | - | - |
| Stage 1 | - | - | - | - |
| Stage 2 | - | - | - | - |

| Approach | EB | WB | NB | SB |
|----------------------|-----|-----|------|------|
| HCM Control Delay, s | 0.6 | 0.9 | 33.6 | 43.2 |
| HCM LOS | | | D | E |

| Minor Lane/Major Mvmt | 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 | A | - | - | A | - | - | E |
| HCM 95th %tile Q(veh) | 3.1 | 0.1 | - | - | 0.2 | - | - | 2.8 |

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

Synchro 9 Report
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Lanes, Volumes, Timings

4: Residential Entrance/Access 1 & Arkell Road

07-24-2018

| | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|----------------------------|-------|-------|-------|------|-------|-------|------|-------|-------|-------|------|-------|
| Lane Configurations | ↰ | ↱ | | | ↰ | ↱ | | ↰ | ↱ | ↰ | ↱ | |
| 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

Area Type: Other

Control Type: Unsignalized

Intersection Capacity Utilization 46.6%

ICU Level of Service A

Analysis Period (min) 15

HCM 2010 TWSC

4: Residential Entrance/Access 1 & Arkell Road

07-24-2018

Intersection

Int Delay, s/veh 0.4

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|--------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Lane Configurations | ↰ | ↱ | | | ↰ | ↱ | | ↰ | ↱ | ↰ | ↱ | |
| 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 | - | - | None | - | - | None |
| Storage Length | 250 | | - | - | - | - | - | - | - | 0 | - | 0 |
| Veh in Median Storage, # | - | 0 | - | - | 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 | 504 | 3 | 2 | 607 | 8 | 2 | 0 | 2 | 9 | 0 | 10 |

| Major/Minor | Major1 | Major2 | Minor1 | Minor2 |
|----------------------|--------|--------|--------|--------|
| Conflicting Flow All | 614 | 0 | 0 | 508 |
| Stage 1 | - | - | - | 523 |
| Stage 2 | - | - | - | 615 |
| Critical Hdwy | 4.1 | - | 4.1 | - |
| Critical Hdwy Stg 1 | - | - | - | 6.1 |
| Critical Hdwy Stg 2 | - | - | - | 6.1 |
| Follow-up Hdwy | 2.2 | - | 2.2 | - |
| Pot Cap-1 Maneuver | 975 | - | 1067 | - |
| Stage 1 | - | - | - | 541 |
| Stage 2 | - | - | - | 482 |
| Platoon blocked, % | - | - | - | - |
| Mov Cap-1 Maneuver | 975 | - | 1067 | - |
| Mov Cap-2 Maneuver | - | - | - | 175 |
| Stage 1 | - | - | - | 536 |
| Stage 2 | - | - | - | 471 |

| Approach | EB | WB | NB | SB |
|----------------------|-----|----|------|------|
| HCM Control Delay, s | 0.1 | 0 | 18.7 | 18.9 |
| HCM LOS | | | C | C |

| Minor Lane/Major Mvmt | NBLn1 | EBL | EBT | EBR | WBL | WBT | WBR | SBLn1 | SBLn2 |
|-----------------------|-------|-------|-----|-----|-------|-----|-----|-------|-------|
| Capacity (veh/h) | 268 | 975 | - | - | 1067 | - | - | 178 | 498 |
| HCM Lane V/C Ratio | 0.016 | 0.009 | - | - | 0.002 | - | - | 0.049 | 0.02 |
| HCM Control Delay (s) | 18.7 | 8.7 | - | - | 8.4 | 0 | - | 26.3 | 12.4 |
| HCM Lane LOS | C | A | - | - | A | A | - | D | B |
| HCM 95th %tile Q(veh) | 0 | 0 | - | - | 0 | - | - | 0.2 | 0.1 |

Lanes, Volumes, Timings
5: Victoria Road & Arkell Road

07-24-2018

| | ↖ | → | ↘ | ↙ | ← | ↖ | ↙ | ↗ | ↘ | ↖ | ↙ | ↗ | ↘ |
|----------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|---|
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR | |
| Lane Configurations | ↖ | ↖ | | ↖ | ↖ | | ↖ | ↖ | | ↖ | ↖ | | |
| Traffic Volume (vph) | 242 | 146 | 86 | 118 | 191 | 72 | 100 | 722 | 141 | 75 | 698 | 273 | |
| Future Volume (vph) | 242 | 146 | 86 | 118 | 191 | 72 | 100 | 722 | 141 | 75 | 698 | 273 | |
| 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 | 1758 | 0 | 1805 | 1763 | 0 | |
| Flt Permitted | 0.368 | | | 0.560 | | | 0.141 | | | 0.141 | | | |
| Satd. Flow (perm) | 692 | 1784 | 0 | 1004 | 1794 | 0 | 268 | 1758 | 0 | 268 | 1763 | 0 | |
| Right Turn on Red | | | Yes | | | Yes | | | Yes | | | Yes | |
| Satd. Flow (RTOR) | | 35 | | | 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) | 257 | 155 | 91 | 126 | 203 | 77 | 106 | 768 | 150 | 80 | 743 | 290 | |
| Shared Lane Traffic (%) | | | | | | | | | | | | | |
| Lane Group Flow (vph) | 257 | 246 | 0 | 126 | 280 | 0 | 106 | 918 | 0 | 80 | 1033 | 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 | Cl+Ex | Cl+Ex | | Cl+Ex | Cl+Ex | | Cl+Ex | Cl+Ex | | Cl+Ex | Cl+Ex | | |
| Detector 1 Channel | | | | | | | | | | | | | |
| Detector 1 Extend (s) | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | | |
| 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 | | Cl+Ex | | | Cl+Ex | | | Cl+Ex | | | Cl+Ex | | |
| Detector 2 Channel | | | | | | | | | | | | | |
| Detector 2 Extend (s) | | 0.0 | | | 0.0 | | | 0.0 | | | 0.0 | | |

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

07-24-2018

| | ↖ | → | ↘ | ↙ | ← | ↖ | ↙ | ↗ | ↘ | ↖ | ↙ | ↗ | ↘ |
|-------------------------|-------|-------|-----|-------|-------|-----|-------|-------|-----|-------|-------|-----|---|
| 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 Effect 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 | C | C | | B | D | | B | F | | B | F | | |
| Approach Delay | | 29.8 | | | 30.5 | | | 168.4 | | | 231.7 | | |
| Approach LOS | | C | | | C | | | F | | | F | | |

Intersection Summary

Area Type: Other

Cycle Length: 80

Actuated Cycle Length: 73.5

Natural Cycle: 150

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 1.48

Intersection Signal Delay: 150.3

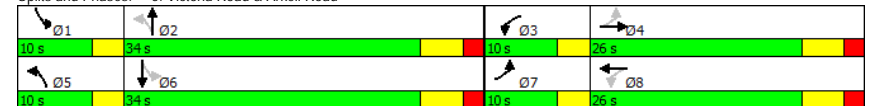
Intersection LOS: F

Intersection Capacity Utilization 103.9%

ICU Level of Service G

Analysis Period (min) 15

Splits and Phases: 5: Victoria Road & Arkell Road



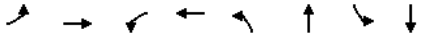
220 Arkell Road TIS 5:00 pm 07-04-2018 2021 PM Total

Synchro 9 Report
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Queues

5: Victoria Road & Arkell Road

07-24-2018

| |  | | | | | | | |
|------------------------|---|-------|------|-------|------|--------|------|--------|
| 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 |

Intersection Summary

- Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

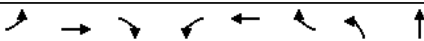
95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM 2010 Signalized Intersection Summary

5: Victoria Road & Arkell Road

07-24-2018

| |  | | | | | | | | | | | |
|------------------------------|---|------|------|------|------|------|-------|------|-------|-------|------|-------|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | | | | | | | | | | | | |
| 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 (Ob), 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(l) | 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 | | C | C | | C | B | | F | B | | F |
| Approach Vol, veh/h | 503 | | | 406 | | | 1024 | | | 1113 | | |
| Approach Delay, s/veh | 33.0 | | | 29.8 | | | 177.9 | | | 261.4 | | |
| Approach LOS | C | | | 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 | 8.7 | 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 (g_c+I1), 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

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

07-24-2018

| | EBL | EBR | NBL | NBT | SBT | SBR |
|----------------------------|-------|-------|-------|-------|-------|-------|
| Lane Configurations | ↰ | ↱ | ↰ | ↱ | ↱ | ↱ |
| 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 | | Yes | | | | Yes |
| Satd. Flow (RTOR) | | 25 | | | | 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 | |
| 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 | | | | | | |
| 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 Total

Synchro 9 Report
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Lanes, Volumes, Timings
6: Victoria Road & Access 2

07-24-2018

| | 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 Effect 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 | B | A | B | B | A |
| Approach Delay | 26.6 | | | 12.4 | 10.0 | |
| Approach LOS | C | | | B | B | |

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 76.1
Natural Cycle: 90
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.74
Intersection Signal Delay: 11.7
Intersection Capacity Utilization 72.2%
Analysis Period (min) 15

Intersection LOS: B

ICU Level of Service C

Splits and Phases: 6: Victoria Road & Access 2



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

Synchro 9 Report
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Queues

6: Victoria Road & Access 2

07-24-2018

| | EBL | EBR | NBL | NBT | SBT | SBR |
|------------------------|------|------|------|--------|--------|------|
| 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

95th 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

07-24-2018

| |  |  |  |  |  |  | | |
|------------------------------|---|---|---|---|---|---|---|---|
| Movement | EBL | EBR | NBL | NBT | SBT | SBR | | |
| Lane Configurations |  |  |  |  |  |  | | |
| 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(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 | 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 | 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 | | |
| 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

HCM 2010 Ctrl Delay 14.7
HCM 2010 LOS B

Lanes, Volumes, Timings

7: Victoria Road & Victoria Park Village Road

07-24-2018

| Lane Group | EBL | EBR | NBL | NBT | SBT | SBR |
|----------------------------|---|---|---|---|---|---|
| Lane Configurations |  |  |  |  |  |  |
| 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 | | | 3.6 | 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 Utilization 83.9%

ICU Level of Service E

Analysis Period (min) 15







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

Synchro 9 Report
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HCM 2010 TWSC

7: Victoria Road & Victoria Park Village Road

07-24-2018

| Intersection | | | | | | |
|--------------------------|---|---|---|---|---|---|
| Int Delay, s/veh | 87 | | | | | |
| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
| Lane Configurations |  |  |  |  |  |  |
| 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 | - | None |
| Storage Length | 200 | 0 | 300 | - | 0 | - |
| Veh in Median Storage, # | 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 | 1139 | 1251 | 193 |

| Major/Minor | Minor2 | Major1 | Major2 |
|----------------------|--------|--------|--------|
| Conflicting Flow All | 2626 | 1348 | 1445 |
| Stage 1 | 1348 | - | - |
| 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 | 186 | 475 |
| Stage 1 | 244 | - | - |
| Stage 2 | 264 | - | - |
| Platoon blocked, % | | | |
| 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, s | 1566.5 | 0.8 | 0 |
| HCM LOS | F | | |

| Minor Lane/Major Mvmt | NBL | NBT | EBLn1 | EBLn2 | SBT | SBR |
|-----------------------|-------|-----|-----------|-------|-----|-----|
| Capacity (veh/h) | 475 | - | 23 | 186 | - | - |
| HCM Lane V/C Ratio | 0.146 | - | 4.962 | 0.222 | - | - |
| HCM Control Delay (s) | 13.9 | - | \$ 2122.7 | 29.8 | - | - |
| HCM Lane LOS | B | - | F | D | - | - |
| HCM 95th %tile Q(veh) | 0.5 | - | 14.4 | 0.8 | - | - |

Notes

--: Volume exceeds capacity \$: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

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

Synchro 9 Report
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Appendix K

2026 Total Traffic Operations Reports



Lanes, Volumes, Timings

1: Summerfield Drive & Arkell Road

07-24-2018

| | → | ↖ | ↗ | ← | ↖ | ↗ |
|----------------------------|-------|-------|-------|-------|-------|-------|
| Lane Group | EBT | EBR | WBL | WBT | NBL | NBR |
| Lane Configurations | ↖ | | ↖ | ↖ | ↖ | |
| 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 | |
| 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) | 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 | |
| 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 Utilization 47.0% | ICU Level of Service A |
| Analysis Period (min) | 15 |

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

Synchro 9 Report
Page 1

HCM 2010 TWSC

1: Summerfield Drive & Arkell Road

07-24-2018

| Intersection | | | | | | |
|--------------------------|------|------|------|------|------|------|
| Int Delay, s/veh | 5 | | | | | |
| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
| Lane Configurations | ↖ | | ↖ | ↖ | ↖ | |
| Traffic Vol, veh/h | 377 | 36 | 30 | 438 | 143 | 122 |
| Future Vol, veh/h | 377 | 36 | 30 | 438 | 143 | 122 |
| 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 |
| Mvmt Flow | 385 | 37 | 31 | 447 | 146 | 124 |

| Major/Minor | Major1 | Major2 | Minor1 |
|----------------------|--------|--------|--------|
| Conflicting Flow All | 0 | 0 | 430 |
| Stage 1 | - | - | - |
| Stage 2 | - | - | - |
| Critical Hdwy | - | - | 4.18 |
| Critical Hdwy Stg 1 | - | - | - |
| Critical Hdwy Stg 2 | - | - | - |
| Follow-up Hdwy | - | - | 2.272 |
| Pot Cap-1 Maneuver | - | - | 1098 |
| Stage 1 | - | - | - |
| Stage 2 | - | - | - |
| Platoon blocked, % | - | - | - |
| Mov Cap-1 Maneuver | - | - | 1098 |
| Mov Cap-2 Maneuver | - | - | - |
| Stage 1 | - | - | - |
| Stage 2 | - | - | - |

| Approach | EB | WB | NB |
|----------------------|----|-----|------|
| HCM Control Delay, s | 0 | 0.5 | 20.9 |
| HCM LOS | | | C |

| Minor Lane/Major Mvmt | NBLn1 | EBT | EBR | WBL | WBT |
|-----------------------|-------|-----|-----|-------|-----|
| Capacity (veh/h) | 492 | - | - | 1098 | - |
| HCM Lane V/C Ratio | 0.55 | - | - | 0.028 | - |
| HCM Control Delay (s) | 20.9 | - | - | 8.4 | - |
| HCM Lane LOS | C | - | - | A | - |
| HCM 95th %tile Q(veh) | 3.3 | - | - | 0.1 | - |

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

Synchro 9 Report
Page 2

Lanes, Volumes, Timings

2: Zecca Drive/Amos Drive & Arkell Road

07-24-2018

| | ↗ | → | ↘ | ↖ | ← | ↙ | ↘ | ↖ | ↗ | ↘ | ↖ | ↗ |
|----------------------------|------|-------|-------|------|-------|-------|------|-------|-------|------|-------|-------|
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | | ↕ | | | ↕ | | | ↕ | | | ↕ | |
| 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 | | | 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 | 493 | 14 | 4 | 427 | 11 | 24 | 1 | 19 | 44 | 2 | 33 |
| Shared Lane Traffic (%) | | | | | | | | | | | | |
| 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 | | | | | | | | | | | | |
| 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 46.3%

ICU Level of Service A

Analysis Period (min) 15

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

Synchro 9 Report
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HCM 2010 TWSC

2: Zecca Drive/Amos Drive & Arkell Road

07-24-2018

Intersection

Int Delay, s/veh 2.5

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|--------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Lane Configurations | | ↕ | | | ↕ | | | ↕ | | | ↕ | |
| 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 |
| Mvmt Flow | 8 | 493 | 14 | 4 | 427 | 11 | 24 | 1 | 19 | 44 | 2 | 33 |

| Major/Minor | Major1 | Major2 | Minor1 | Minor2 |
|----------------------|--------|--------|--------|--------|
| Conflicting Flow All | 439 | 0 | 0 | 515 |
| Stage 1 | - | - | - | - |
| Stage 2 | - | - | - | - |
| Critical Hdwy | 4.1 | - | - | 4.15 |
| Critical Hdwy Stg 1 | - | - | - | - |
| Critical Hdwy Stg 2 | - | - | - | - |
| Follow-up Hdwy | 2.2 | - | - | 2.245 |
| Pot Cap-1 Maneuver | 1132 | - | - | 1035 |
| Stage 1 | - | - | - | - |
| Stage 2 | - | - | - | - |
| Platoon blocked, % | - | - | - | - |
| Mov Cap-1 Maneuver | 1120 | - | - | 1026 |
| Mov Cap-2 Maneuver | - | - | - | - |
| Stage 1 | - | - | - | - |
| Stage 2 | - | - | - | - |

| Approach | EB | WB | NB | SB |
|----------------------|-----|-----|------|------|
| HCM Control Delay, s | 0.1 | 0.1 | 20.3 | 21.3 |
| HCM LOS | | | C | C |













| Minor Lane/Major Mvmt | NBLn1 | EBL | EBT | EBR | WBL | WBT | WBR | SBLn1 |
|-----------------------|-------|-------|-----|-----|-------|-----|-----|-------|
| Capacity (veh/h) | 279 | 1120 | - | - | 1026 | - | - | 300 |
| HCM Lane V/C Ratio | 0.155 | 0.007 | - | - | 0.004 | - | - | 0.265 |
| HCM Control Delay (s) | 20.3 | 8.2 | 0 | - | 8.5 | 0 | - | 21.3 |
| HCM Lane LOS | C | A | A | - | A | A | - | C |
| HCM 95th %tile Q(veh) | 0.5 | 0 | - | - | 0 | - | - | 1 |

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

Synchro 9 Report
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Lanes, Volumes, Timings
3: Colonial Drive & Arkell Road

07-24-2018













| | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|----------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations |  |  |  |  |  |  |  |  |  |  |  |  |
| 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 | | | 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 | |
| Sign Control | | Free | | | Free | | | Stop | | | Stop | |

Intersection Summary

| | |
|-----------------------------------|--------------|
| Area Type: | Other |
| Control Type: | Unsignalized |
| Intersection Capacity Utilization | 56.1% |
| Analysis Period (min) | 15 |
| ICU Level of Service | B |

HCM 2010 TWSC
3: Colonial Drive & Arkell Road

07-24-2018

| Intersection | | | | | | | | | | | | |
|--------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Int Delay, s/veh | 35 | | | | | | | | | | | |
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  |  |  |  |  |  |  |  |  |  |  |
| 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, # | - | 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 | Major1 | Major2 | Minor1 | 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 Mvmt | NBLn1 | EBL | EBT | EBR | WBL | WBT | WBR | SBLn1 |
|-----------------------|-------|------|-----|-----|-------|-----|-----|-------|
| Capacity (veh/h) | 293 | 1226 | - | - | 971 | - | - | 172 |
| HCM Lane V/C Ratio | 0.994 | 0.01 | - | - | 0.046 | - | - | 1.03 |
| HCM Control Delay (s) | 90.1 | 8 | - | - | 8.9 | - | - | 131.4 |
| HCM Lane LOS | F | A | - | - | A | - | - | F |
| HCM 95th %tile Q(veh) | 10.3 | 0 | - | - | 0.1 | - | - | 8.5 |

Lanes, Volumes, Timings

4: Residential Entrance/Access 1 & Arkell Road

07-24-2018

| | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|----------------------------|-------|------|-------|------|-------|-------|------|-------|-------|-------|------|-------|
| Lane Configurations | ↰ | ↱ | | ↰ | ↱ | | ↰ | ↱ | | ↰ | ↱ | |
| 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

Area Type: Other

Control Type: Unsignalized

Intersection Capacity Utilization 67.6%

ICU Level of Service C

Analysis Period (min) 15

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

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HCM 2010 TWSC

4: Residential Entrance/Access 1 & Arkell Road

07-24-2018

| Intersection | | | | | | | | | | | | |
|--------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Int Delay, s/veh | 1.2 | | | | | | | | | | | |
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | ↰ | ↱ | | ↰ | ↱ | | ↰ | ↱ | | ↰ | ↱ | |
| 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 |
| Mvmt Flow | 90 | 697 | 2 | 2 | 342 | 67 | 2 | 0 | 2 | 7 | 0 | 34 |

| Major/Minor | Major1 | Major2 | Minor1 | 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 | B |

| Minor Lane/Major Mvmt | NBLn1 | EBL | EBT | EBR | WBL | WBT | WBR | SBLn1 | 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 | C | A | - | - | A | A | - | D | B |
| HCM 95th %tile Q(veh) | 0.1 | 0.3 | - | - | 0 | - | - | 0.1 | 0.2 |

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Lanes, Volumes, Timings
5: Victoria Road & Arkell Road

07-24-2018

| | ↖ | → | ↘ | ↙ | ← | ↖ | ↙ | ↗ | ↘ | ↖ | ↙ | ↗ | ↘ |
|----------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|---|
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR | |
| Lane Configurations | ↖ | ↖ | | ↖ | ↖ | | ↖ | ↖ | | ↖ | ↖ | | |
| Traffic Volume (vph) | 431 | 122 | 93 | 173 | 104 | 76 | 66 | 741 | 97 | 56 | 638 | 214 | |
| Future Volume (vph) | 431 | 122 | 93 | 173 | 104 | 76 | 66 | 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 | | 0.935 | | | 0.936 | | | 0.983 | | | 0.962 | | |
| Flt Protected | 0.950 | | | 0.950 | | | 0.950 | | | 0.950 | | | |
| Satd. Flow (prot) | 1736 | 1669 | 0 | 1787 | 1697 | 0 | 1805 | 1762 | 0 | 1752 | 1670 | 0 | |
| Flt Permitted | 0.570 | | | 0.477 | | | 0.132 | | | 0.138 | | | |
| Satd. Flow (perm) | 1040 | 1669 | 0 | 897 | 1697 | 0 | 251 | 1762 | 0 | 255 | 1670 | 0 | |
| Right Turn on Red | | | Yes | | | Yes | | | Yes | | | Yes | |
| Satd. Flow (RTOR) | | 46 | | | 44 | | | 9 | | | 23 | | |
| Link Speed (k/h) | | 50 | | | 60 | | | 70 | | | 70 | | |
| Link Distance (m) | | 144.3 | | | 357.4 | | | 823.5 | | | 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 | 134 | 102 | 190 | 114 | 84 | 73 | 814 | 107 | 62 | 701 | 235 | |
| Shared Lane Traffic (%) | | | | | | | | | | | | | |
| Lane Group Flow (vph) | 474 | 236 | 0 | 190 | 198 | 0 | 73 | 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 | Cl+Ex | Cl+Ex | | Cl+Ex | Cl+Ex | | Cl+Ex | Cl+Ex | | Cl+Ex | Cl+Ex | | |
| Detector 1 Channel | | | | | | | | | | | | | |
| Detector 1 Extend (s) | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | | |
| 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 | | Cl+Ex | | | Cl+Ex | | | Cl+Ex | | | Cl+Ex | | |
| Detector 2 Channel | | | | | | | | | | | | | |
| Detector 2 Extend (s) | | 0.0 | | | 0.0 | | | 0.0 | | | 0.0 | | |

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Lanes, Volumes, Timings
5: Victoria Road & Arkell Road

07-24-2018

| | ↖ | → | ↘ | ↙ | ← | ↖ | ↙ | ↗ | ↘ | ↖ | ↙ | ↗ | ↘ |
|-------------------------|-------|-------|-----|-------|-------|-----|-------|-------|-----|-------|-------|-----|---|
| 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 Effect Green (s) | 23.6 | 13.5 | | 23.6 | 13.5 | | 37.4 | 30.4 | | 36.8 | 28.4 | | |
| Actuated g/C Ratio | 0.33 | 0.19 | | 0.33 | 0.19 | | 0.52 | 0.42 | | 0.51 | 0.40 | | |
| 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 | | |
| LOS | F | C | | C | C | | B | F | | B | F | | |
| Approach Delay | | 89.9 | | | 24.3 | | | 128.7 | | | 195.8 | | |
| Approach LOS | | F | | | C | | | F | | | F | | |

Intersection Summary

Area Type: Other

Cycle Length: 80

Actuated Cycle Length: 71.8

Natural Cycle: 150

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 1.39

Intersection Signal Delay: 128.4

Intersection LOS: F

Intersection Capacity Utilization 102.4%

ICU Level of Service G

Analysis Period (min) 15

Splits and Phases: 5: Victoria Road & Arkell Road

| | | | |
|------|------|------|------|
| ⤵ Ø1 | ⤴ Ø2 | ⤵ Ø3 | ⤴ Ø4 |
| 10 s | 34 s | 10 s | 26 s |
| ⤵ Ø5 | ⤴ Ø6 | ⤵ Ø7 | ⤴ Ø8 |
| 10 s | 34 s | 10 s | 26 s |

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Queues

5: Victoria Road & Arkell Road

07-24-2018

| | EBL | EBT | WBL | WBT | NBL | NBT | SBL | SBT |
|------------------------|--------|-------|------|-------|------|--------|------|--------|
| 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 |

Intersection Summary

- Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

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

Queue shown is maximum after two cycles.

HCM 2010 Signalized Intersection Summary

5: Victoria Road & Arkell Road

07-24-2018

| | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------------|-------|-------|------|------|------|------|------|-------|-------|------|------|-------|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | ↰ | ↱ | | ↰ | ↱ | | ↰ | ↱ | | ↰ | ↱ | |
| Traffic Volume (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 (Ob), 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 | 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 | 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 | 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(g_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(g_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(l) | 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 | | C | C | | C | B | | F | B | | F |
| Approach Vol, veh/h | | 710 | | | 388 | | | 994 | | | | 998 |
| Approach Delay, s/veh | | 130.5 | | | 26.1 | | | 169.0 | | | | 216.6 |
| 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 | 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 (g_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

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

07-24-2018

| | EBL | EBR | NBL | NBT | SBT | SBR |
|----------------------------|-------|-------|-------|-------|-------|-------|
| Lane Configurations | ↰ | ↱ | ↰ | ↱ | ↱ | ↱ |
| 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 | | | 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 | 1759 | 1615 |
| Flt Permitted | 0.950 | | 0.237 | | | |
| 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 | | | 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 | | | 2 | 6 | |

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

Synchro 9 Report
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Lanes, Volumes, Timings
6: Victoria Road & Access 2

07-24-2018

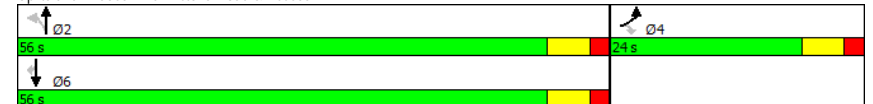
| | EBL | EBR | NBL | NBT | SBT | SBR |
|-------------------------|-------|-------|-------|-------|-------|-------|
| Permitted Phases | | 4 | 2 | | | 6 |
| Detector Phase | 4 | 4 | 2 | 2 | 6 | 6 |
| Switch Phase | | | | | | |
| Minimum Initial (s) | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 |
| Minimum 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 Effect 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 | C | A | A | D | B | A |
| Approach Delay | 24.9 | | | 45.6 | 9.2 | |
| Approach LOS | C | | | D | A | |

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 75.1
Natural Cycle: 100
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.96
Intersection Signal Delay: 29.3
Intersection Capacity Utilization 81.2%
Analysis Period (min) 15

Intersection LOS: C
ICU Level of Service D

Splits and Phases: 6: Victoria Road & Access 2



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

Synchro 9 Report
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Queues

6: Victoria Road & Access 2

07-24-2018

| | EBL | EBR | NBL | NBT | SBT | SBR |
|------------------------|------|------|------|--------|-------|------|
| 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 |

Intersection Summary

- Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.













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

Queue shown is maximum after two cycles.

HCM 2010 Signalized Intersection Summary

6: Victoria Road & Access 2

07-24-2018

| |  |  |  |  |  |  | | |
|------------------------------|---|---|---|---|---|---|---|---|
| Movement | EBL | EBR | NBL | NBT | SBT | SBR | | |
| Lane Configurations |  |  |  |  |  |  | | |
| 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 | | |
| 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(l) | 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 | C | C | B | F | B | A | | |
| Approach Vol, veh/h | 167 | | | 1357 | 1058 | | | |
| Approach Delay, s/veh | 29.3 | | | 45.5 | 9.9 | | | |
| Approach LOS | C | | | D | A | | | |
| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 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

C

Lanes, Volumes, Timings

7: Victoria Road & Victoria Park Village Road

07-24-2018

| | EBL | EBR | NBL | NBT | SBT | SBR |
|---|------------------------|-------|-------|-------|-------|-------|
| Lane Group | EBL | EBR | NBL | NBT | SBT | SBR |
| Lane Configurations | ↰ | ↱ | ↰ | ↱ | ↰ | ↱ |
| 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 | | | | | | |
| Area Type: | Other | | | | | |
| Control Type: | Unsignalized | | | | | |
| Intersection Capacity Utilization 84.0% | ICU Level of Service E | | | | | |
| Analysis Period (min) 15 | | | | | | |

HCM 2010 TWSC

7: Victoria Road & Victoria Park Village Road

07-24-2018

| | | | | | | |
|--|-----------|--------|-----------|------|------|------|
| Intersection | | | | | | |
| Int Delay, s/veh | 189.1 | | | | | |
| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
| Lane Configurations | ↰ | ↱ | ↰ | ↱ | ↰ | ↱ |
| 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 | - | 0 | - |
| Veh in Median Storage, # | 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 | | | | | | |
| Minor2 | Major1 | Major2 | | | | |
| Conflicting Flow All | 2456 | 1034 | 1066 | 0 | - | 0 |
| Stage 1 | 1034 | - | - | - | - | - |
| Stage 2 | 1422 | - | - | - | - | - |
| Critical Hdwy | 6.42 | 6.22 | 4.12 | - | - | - |
| Critical Hdwy Stg 1 | 5.42 | - | - | - | - | - |
| Critical Hdwy Stg 2 | 5.42 | - | - | - | - | - |
| Follow-up Hdwy | 3.518 | 3.318 | 2.218 | - | - | - |
| Pot Cap-1 Maneuver | - 34 | 282 | 654 | - | - | - |
| Stage 1 | 343 | - | - | - | - | - |
| Stage 2 | 223 | - | - | - | - | - |
| Platoon blocked, % | | | | - | - | - |
| Mov Cap-1 Maneuver | - 33 | 282 | 654 | - | - | - |
| Mov Cap-2 Maneuver | - 33 | - | - | - | - | - |
| Stage 1 | 343 | - | - | - | - | - |
| Stage 2 | 217 | - | - | - | - | - |
| Approach | | | | | | |
| EB | NB | SB | | | | |
| HCM Control Delay, \$ 1993.3 | 0.1 | 0 | | | | |
| HCM LOS | F | | | | | |
| Minor Lane/Major Mvmt | | | | | | |
| NBL | NBT EBLn1 | EBLn2 | SBT | SBR | | |
| Capacity (veh/h) | 654 | - | 33 | 282 | - | - |
| HCM Lane V/C Ratio | 0.028 | - | 6.126 | 0.2 | - | - |
| HCM Control Delay (s) | 10.7 | - | \$ 2544.7 | 20.9 | - | - |
| HCM Lane LOS | B | - | F | C | - | - |
| HCM 95th %tile Q(veh) | 0.1 | - | 24.3 | 0.7 | - | - |
| Notes | | | | | | |
| -: Volume exceeds capacity \$: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon | | | | | | |

Lanes, Volumes, Timings

1: Summerfield Drive & Arkell Road

07-24-2018

| | EBT | EBR | WBL | WBT | NBL | NBR |
|----------------------------|-------|-------|-------|-------|-------|-------|
| Lane Group | EBT | EBR | WBL | WBT | NBL | NBR |
| Lane Configurations | ↔ | ↔ | ↔ | ↔ | ↔ | ↔ |
| 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 | | | 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 Utilization 57.4% | ICU Level of Service B |
| Analysis Period (min) | 15 |

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Synchro 9 Report
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HCM 2010 TWSC

1: Summerfield Drive & Arkell Road

07-24-2018

| Intersection | | | | | | |
|--------------------------|------|------|------|------|------|------|
| Int Delay, s/veh | 2.4 | | | | | |
| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
| Lane Configurations | ↔ | ↔ | ↔ | ↔ | ↔ | ↔ |
| 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 | Major1 | Major2 | Minor1 |
|----------------------|--------|--------|--------|
| Conflicting Flow All | 0 | 0 | 679 |
| Stage 1 | - | - | - |
| Stage 2 | - | - | - |
| Critical Hdwy | - | - | 4.1 |
| Critical Hdwy Stg 1 | - | - | - |
| Critical Hdwy Stg 2 | - | - | - |
| Follow-up Hdwy | - | - | 2.2 |
| Pot Cap-1 Maneuver | - | - | 923 |
| Stage 1 | - | - | - |
| Stage 2 | - | - | - |
| Platoon blocked, % | - | - | - |
| Mov Cap-1 Maneuver | - | - | 922 |
| Mov Cap-2 Maneuver | - | - | - |
| Stage 1 | - | - | - |
| Stage 2 | - | - | - |

| Approach | EB | WB | NB |
|----------------------|----|-----|------|
| HCM Control Delay, s | 0 | 1.6 | 19.6 |
| HCM LOS | | | C |

| Minor Lane/Major Mvmt | NBLn1 | EBT | EBR | WBL | WBT |
|-----------------------|-------|-----|-----|-------|-----|
| Capacity (veh/h) | 369 | - | - | 922 | - |
| HCM Lane V/C Ratio | 0.333 | - | - | 0.099 | - |
| HCM Control Delay (s) | 19.6 | - | - | 9.3 | - |
| HCM Lane LOS | C | - | - | A | - |
| HCM 95th %tile Q(veh) | 1.4 | - | - | 0.3 | - |

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

Synchro 9 Report
Page 2

Lanes, Volumes, Timings

2: Zecca Drive/Amos Drive & Arkell Road

07-24-2018

| | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|----------------------------|------|-------|-------|------|-------|-------|------|-------|-------|------|-------|-------|
| Lane Configurations | | | | | | | | | | | | |
| 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 |
| 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 | | | 0.992 | | | 0.977 | | | 0.922 | |
| Flt Protected | | 0.996 | | | 0.999 | | | 0.960 | | | 0.980 | |
| 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 | |
| Satd. Flow (perm) | 0 | 1861 | 0 | 0 | 1866 | 0 | 0 | 1782 | 0 | 0 | 1717 | 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 | 489 | 34 | 7 | 494 | 31 | 19 | 0 | 4 | 18 | 1 | 26 |
| Shared Lane Traffic (%) | | | | | | | | | | | | |
| Lane Group Flow (vph) | 0 | 570 | 0 | 0 | 532 | 0 | 0 | 23 | 0 | 0 | 45 | 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 65.7%

ICU Level of Service C

Analysis Period (min) 15

HCM 2010 TWSC

2: Zecca Drive/Amos Drive & Arkell Road

07-24-2018

Intersection

Int Delay, s/veh 1.7

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|--------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Lane Configurations | | | | | | | | | | | | |
| 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 |
| Mvmt Flow | 47 | 489 | 34 | 7 | 494 | 31 | 19 | 0 | 4 | 18 | 1 | 26 |

| Major/Minor | Major1 | Major2 | Minor1 | Minor2 |
|----------------------|--------|--------|--------|--------|
| Conflicting Flow All | 524 | 0 | 0 | 532 |
| Stage 1 | - | - | - | - |
| Stage 2 | - | - | - | - |
| Critical Hdwy | 4.1 | - | - | 4.1 |
| Critical Hdwy Stg 1 | - | - | - | - |
| Critical Hdwy Stg 2 | - | - | - | - |
| Follow-up Hdwy | 2.2 | - | - | 2.2 |
| Pot Cap-1 Maneuver | 1053 | - | - | 1046 |
| Stage 1 | - | - | - | - |
| Stage 2 | - | - | - | - |
| Platoon blocked, % | - | - | - | - |
| Mov Cap-1 Maneuver | 1047 | - | - | 1040 |
| Mov Cap-2 Maneuver | - | - | - | - |
| Stage 1 | - | - | - | - |
| Stage 2 | - | - | - | - |

| Approach | EB | WB | NB | SB |
|----------------------|-----|-----|------|----|
| HCM Control Delay, s | 0.7 | 0.1 | 28.1 | 20 |
| HCM LOS | | | D | C |

| Minor Lane/Major Mvmt | NBLn1 | EBL | EBT | EBR | WBL | WBT | WBR | SBLn1 |
|-----------------------|-------|-------|-----|-----|-------|-----|-----|-------|
| 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 | A | A | - | A | A | - | C |
| HCM 95th %tile Q(veh) | 0.4 | 0.1 | - | - | 0 | - | - | 0.6 |

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

07-24-2018

| | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|----------------------------|-------|-------|-------|-------|-------|-------|------|-------|-------|------|-------|-------|
| Lane Configurations | | | | | | | | | | | | |
| 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 |
| Flt 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 | |
| Sign Control | | Free | | | Free | | | Stop | | | Stop | |

Intersection Summary

| | |
|---|------------------------|
| Area Type: | Other |
| Control Type: | Unsignalized |
| Intersection Capacity Utilization 51.9% | ICU Level of Service A |
| Analysis Period (min) | 15 |

HCM 2010 TWSC
3: Colonial Drive & Arkell Road

07-24-2018

| Intersection | | | | | | | | | | | | |
|--------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Int Delay, s/veh | 10.4 | | | | | | | | | | | |
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | | | | | | | | | | | | |
| 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 | Major1 | Major2 | Minor1 | Minor2 |
|----------------------|--------|--------|--------|--------|
| Conflicting Flow All | 561 | 0 | 0 | 483 |
| Stage 1 | - | - | - | - |
| Stage 2 | - | - | - | - |
| Critical Hdwy | 4.1 | - | - | 4.1 |
| Critical Hdwy Stg 1 | - | - | - | - |
| Critical Hdwy Stg 2 | - | - | - | - |
| Follow-up Hdwy | 2.2 | - | - | 2.2 |
| Pot Cap-1 Maneuver | 1020 | - | - | 1090 |
| Stage 1 | - | - | - | - |
| Stage 2 | - | - | - | - |
| Platoon blocked, % | - | - | - | - |
| Mov Cap-1 Maneuver | 1020 | - | - | 1090 |
| Mov Cap-2 Maneuver | - | - | - | - |
| Stage 1 | - | - | - | - |
| Stage 2 | - | - | - | - |

| Approach | EB | WB | NB | SB |
|----------------------|-----|----|------|------|
| HCM Control Delay, s | 0.5 | 1 | 47.9 | 56.9 |
| HCM LOS | | | E | F |

| Minor Lane/Major Mvmt | 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 | A | - | - | A | - | - | F |
| HCM 95th %tile Q(veh) | 4.5 | 0.1 | - | - | 0.2 | - | - | 3.4 |

Lanes, Volumes, Timings

4: Residential Entrance/Access 1 & Arkell Road

07-24-2018

| | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|----------------------------|-------|-------|-------|------|-------|-------|------|-------|-------|-------|------|-------|
| Lane Configurations | ↰ | ↱ | | ↰ | ↱ | | ↰ | ↱ | | ↰ | ↱ | |
| 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

Area Type: Other

Control Type: Unsignalized

Intersection Capacity Utilization 48.7%

ICU Level of Service A

Analysis Period (min) 15

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

Synchro 9 Report
Page 7

HCM 2010 TWSC

4: Residential Entrance/Access 1 & Arkell Road

07-24-2018

| Intersection | | | | | | | | | | | | |
|--------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Int Delay, s/veh | 0.4 | | | | | | | | | | | |
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | ↰ | ↱ | | ↰ | ↱ | | ↰ | ↱ | | ↰ | ↱ | |
| 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 |
| Mvmt Flow | 9 | 545 | 4 | 2 | 650 | 8 | 2 | 0 | 2 | 9 | 0 | 10 |

| Major/Minor | Major1 | Major2 | Minor1 | Minor2 |
|----------------------|--------|--------|--------|--------|
| Conflicting Flow All | 658 | 0 | 0 | 549 |
| Stage 1 | - | - | - | - |
| Stage 2 | - | - | - | - |
| Critical Hdwy | 4.1 | - | - | 4.1 |
| Critical Hdwy Stg 1 | - | - | - | - |
| Critical Hdwy Stg 2 | - | - | - | - |
| Follow-up Hdwy | 2.2 | - | - | 2.2 |
| Pot Cap-1 Maneuver | 939 | - | - | 1031 |
| Stage 1 | - | - | - | - |
| Stage 2 | - | - | - | - |
| Platoon blocked, % | - | - | - | - |
| Mov Cap-1 Maneuver | 939 | - | - | 1031 |
| Mov Cap-2 Maneuver | - | - | - | - |
| Stage 1 | - | - | - | - |
| Stage 2 | - | - | - | - |

| Approach | EB | WB | NB | SB |
|----------------------|-----|----|------|------|
| HCM Control Delay, s | 0.1 | 0 | 20.3 | 20.6 |
| HCM LOS | | | C | C |

| Minor Lane/Major Mvmt | NBLn1 | EBL | EBT | EBR | WBL | WBT | WBR | SBLn1 | SBLn2 |
|-----------------------|-------|-------|-----|-----|-------|-----|-----|-------|-------|
| Capacity (veh/h) | 239 | 939 | - | - | 1031 | - | - | 156 | 470 |
| HCM Lane V/C Ratio | 0.018 | 0.009 | - | - | 0.002 | - | - | 0.056 | 0.021 |
| HCM Control Delay (s) | 20.3 | 8.9 | - | - | 8.5 | 0 | - | 29.4 | 12.8 |
| HCM Lane LOS | C | A | - | - | A | A | - | D | B |
| HCM 95th %tile Q(veh) | 0.1 | 0 | - | - | 0 | - | - | 0.2 | 0.1 |

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

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

07-24-2018

| | ↖ | → | ↘ | ↙ | ← | ↖ | ↙ | ↗ | ↘ | ↖ | ↙ | ↗ | ↘ |
|----------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|---|
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR | |
| Lane Configurations | ↖ | ↘ | | ↖ | ↘ | | ↖ | ↘ | | ↖ | ↘ | | |
| 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 | | | 3.6 | | | 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 | Cl+Ex | Cl+Ex | | Cl+Ex | Cl+Ex | | Cl+Ex | Cl+Ex | | Cl+Ex | Cl+Ex | | |
| Detector 1 Channel | | | | | | | | | | | | | |
| Detector 1 Extend (s) | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | | |
| 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 | | Cl+Ex | | | Cl+Ex | | | Cl+Ex | | | Cl+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 2026 PM Total

Synchro 9 Report
Page 9

Lanes, Volumes, Timings
5: Victoria Road & Arkell Road

07-24-2018

| | ↖ | → | ↘ | ↙ | ← | ↖ | ↙ | ↗ | ↘ | ↖ | ↙ | ↗ | ↘ |
|-------------------------|-------|-------|-----|-------|-------|-----|-------|-------|-----|-------|-------|-----|---|
| 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 Effect 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 | C | | B | D | | B | F | | B | F | | |
| Approach Delay | | 34.5 | | | 31.7 | | | 221.0 | | | 289.6 | | |
| Approach LOS | | C | | | C | | | F | | | F | | |

Intersection Summary

Area Type: Other

Cycle Length: 80

Actuated Cycle Length: 74.2

Natural Cycle: 140

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 1.63

Intersection Signal Delay: 190.1

Intersection LOS: F

Intersection Capacity Utilization 110.6%

ICU Level of Service H

Analysis Period (min) 15

Splits and Phases: 5: Victoria Road & Arkell Road

| | | | |
|------|------|------|------|
| ↖ Ø1 | ↘ Ø2 | ↖ Ø3 | ↘ Ø4 |
| 10 s | 34 s | 10 s | 26 s |
| ↖ Ø5 | ↘ Ø6 | ↖ Ø7 | ↘ Ø8 |
| 10 s | 34 s | 10 s | 26 s |


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

Synchro 9 Report
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Queues

5: Victoria Road & Arkell Road

07-24-2018

| |  | | | | | | | |
|------------------------|---|-------|------|-------|------|--------|------|--------|
| 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 |

Intersection Summary

- Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.










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

Queue shown is maximum after two cycles.

HCM 2010 Signalized Intersection Summary

5: Victoria Road & Arkell Road

07-24-2018

| |  | | | | | | | | | | | |
|------------------------------|---|---|------|---|---|------|---|---|-------|---|---|-------|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  | |  |  | |  |  | |  |  | |
| 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(g_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(l) | 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 | | C | C | | D | B | | F | B | | F |
| Approach Vol, veh/h | 545 | | | 440 | | | 1111 | | | 1207 | | |
| Approach Delay, s/veh | 39.4 | | | 31.1 | | | 237.8 | | | 326.6 | | |
| 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 | 34.5 | 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 (g_c+I1), 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

HCM 2010 Ctrl Delay 210.0

HCM 2010 LOS F

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

07-24-2018

| | EBL | EBR | NBL | NBT | SBT | SBR |
|----------------------------|-------|-------|-------|-------|-------|-------|
| Lane Configurations | ↰ | ↱ | ↰ | ↱ | ↱ | ↱ |
| 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 | | | 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 | | 0.124 | | | |
| 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 | | | 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 | | | 2 | 6 | |

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

Synchro 9 Report
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Lanes, Volumes, Timings
6: Victoria Road & Access 2

07-24-2018

| | 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 Effect 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 | C | B | A | B | B | A |
| Approach Delay | 26.6 | | | 16.0 | 12.5 | |
| Approach LOS | C | | | B | B | |

Intersection Summary

Area Type: Other

Cycle Length: 80

Actuated Cycle Length: 76.1

Natural Cycle: 90

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.80

Intersection Signal Delay: 14.6

Intersection LOS: B

Intersection Capacity Utilization 76.9%

ICU Level of Service D

Analysis Period (min) 15

Splits and Phases: 6: Victoria Road & Access 2



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

Synchro 9 Report
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Queues

6: Victoria Road & Access 2

07-24-2018

| | EBL | EBR | NBL | NBT | SBT | SBR |
|------------------------|------|------|------|--------|--------|------|
| 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 |













Intersection Summary

95th 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







07-24-2018

| |  |  |  |  |  |  | | |
|------------------------------|---|---|---|---|---|---|---|---|
| Movement | EBL | EBR | NBL | NBT | SBT | SBR | | |
| Lane Configurations |  |  |  |  |  |  | | |
| 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 | 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 | 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 | | |
| Grp Volume(v), veh/h | 54 | 25 | 22 | 1197 | 1209 | 47 | | |
| 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(l) | 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 | C | C | C | B | A | | |
| Approach Vol, veh/h | 79 | | | 1219 | 1256 | | | |
| Approach Delay, s/veh | 28.8 | | | 22.0 | 18.9 | | | |
| Approach LOS | C | | | C | 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 | | |
| 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 | | | | C | | | | |

Lanes, Volumes, Timings

7: Victoria Road & Victoria Park Village Road

07-24-2018

| Lane Group | EBL | EBR | NBL | NBT | SBT | SBR |
|----------------------------|---|---|---|---|---|---|
| Lane Configurations |  |  |  |  |  |  |
| 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 |
| Flt 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 Utilization 88.5%

ICU Level of Service E

Analysis Period (min) 15







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

Synchro 9 Report
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HCM 2010 TWSC

7: Victoria Road & Victoria Park Village Road

07-24-2018

| Intersection | | | | | | |
|--------------------------|---|---|---|---|---|---|
| Int Delay, s/veh | 115.7 | | | | | |
| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
| Lane Configurations |  |  |  |  |  |  |
| 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, # | 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 | Minor2 | 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 Mvmt | NBL | NBT | EBLn1 | EBLn2 | SBT | SBR |
|-----------------------|-------|-----------|-------|-------|-----|-----|
| Capacity (veh/h) | 437 | - | 17 | 163 | - | - |
| HCM Lane V/C Ratio | 0.159 | - | 6.714 | 0.253 | - | - |
| HCM Control Delay (s) | 14.8 | \$ 3016.4 | | 34.4 | - | - |
| HCM Lane LOS | B | - | F | D | - | - |
| HCM 95th %tile Q(veh) | 0.6 | - | 15 | 1 | - | - |

Notes

--: Volume exceeds capacity \$: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

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

Synchro 9 Report
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Appendix L

2031 Total Traffic Operations Reports



Lanes, Volumes, Timings

1: Summerfield Drive & Arkell Road

07-24-2018

| | → | ↖ | ↗ | ← | ↖ | ↗ |
|----------------------------|-------|-------|-------|-------|-------|-------|
| Lane Group | EBT | EBR | WBL | WBT | NBL | NBR |
| Lane Configurations | ↖ | | ↖ | ↖ | ↖ | |
| 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 | | | 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 Utilization 53.2% | ICU Level of Service A |
| Analysis Period (min) | 15 |

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

Synchro 9 Report
Page 1

HCM 2010 TWSC

1: Summerfield Drive & Arkell Road

07-24-2018

| Intersection | | | | | | |
|--------------------------|------|------|------|------|------|------|
| Int Delay, s/veh | 6.7 | | | | | |
| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
| Lane Configurations | ↖ | | ↖ | ↖ | ↖ | |
| Traffic Vol, veh/h | 415 | 41 | 35 | 483 | 162 | 138 |
| Future Vol, veh/h | 415 | 41 | 35 | 483 | 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 |
| Mvmt Flow | 423 | 42 | 36 | 493 | 165 | 141 |

| Major/Minor | Major1 | Major2 | Minor1 |
|----------------------|--------|--------|--------|
| Conflicting Flow All | 0 | 0 | 474 |
| Stage 1 | - | - | - |
| Stage 2 | - | - | - |
| Critical Hdwy | - | - | 4.18 |
| Critical Hdwy Stg 1 | - | - | - |
| Critical Hdwy Stg 2 | - | - | - |
| Follow-up Hdwy | - | - | 2.272 |
| Pot Cap-1 Maneuver | - | - | 1057 |
| Stage 1 | - | - | - |
| Stage 2 | - | - | - |
| Platoon blocked, % | - | - | - |
| Mov Cap-1 Maneuver | - | - | 1057 |
| Mov Cap-2 Maneuver | - | - | - |
| Stage 1 | - | - | - |
| Stage 2 | - | - | - |

| Approach | EB | WB | NB |
|----------------------|----|-----|------|
| HCM Control Delay, s | 0 | 0.6 | 27.3 |
| HCM LOS | | | D |

| 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 | - |

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

Synchro 9 Report
Page 2

Lanes, Volumes, Timings

2: Zecca Drive/Amos Drive & Arkell Road

07-24-2018

| | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|----------------------------|------|-------|-------|------|-------|-------|------|-------|-------|------|-------|-------|
| Lane Configurations | | ↔ | | | ↔ | | | ↔ | | | ↔ | |
| 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 |
| Flt 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

Area Type: Other

Control Type: Unsignalized

Intersection Capacity Utilization 49.4%

ICU Level of Service A

Analysis Period (min) 15

HCM 2010 TWSC

2: Zecca Drive/Amos Drive & Arkell Road

07-24-2018

Intersection

Int Delay, s/veh 2.9

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|--------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Lane Configurations | | ↔ | | | ↔ | | | ↔ | | | ↔ | |
| 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, # | - | 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 | Major1 | Major2 | Minor1 | Minor2 |
|----------------------|--------|--------|--------|--------|
| Conflicting Flow All | 485 | 0 | 0 | 570 |
| Stage 1 | - | - | - | - |
| Stage 2 | - | - | - | - |
| Critical Hdwy | 4.1 | - | - | 4.15 |
| Critical Hdwy Stg 1 | - | - | - | - |
| Critical Hdwy Stg 2 | - | - | - | - |
| Follow-up Hdwy | 2.2 | - | - | 2.245 |
| Pot Cap-1 Maneuver | 1088 | - | - | 988 |
| Stage 1 | - | - | - | - |
| Stage 2 | - | - | - | - |
| Platoon blocked, % | - | - | - | - |
| Mov Cap-1 Maneuver | 1076 | - | - | 980 |
| Mov Cap-2 Maneuver | - | - | - | - |
| Stage 1 | - | - | - | - |
| Stage 2 | - | - | - | - |

| Approach | EB | WB | NB | SB |
|----------------------|-----|-----|------|------|
| HCM Control Delay, s | 0.1 | 0.1 | 24.3 | 25.5 |
| HCM LOS | | | C | D |

| Minor Lane/Major Mvmt | NBLn1 | 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 | C | A | A | - | A | A | - | D |
| HCM 95th %tile Q(veh) | 0.8 | 0 | - | - | 0 | - | - | 1.4 |

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

07-24-2018

| | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|----------------------------|-------|-------|-------|-------|-------|-------|------|-------|-------|------|-------|-------|
| Lane Configurations | ↰ | ↱ | ↱ | ↰ | ↱ | ↱ | ↰ | ↱ | ↱ | ↰ | ↱ | ↱ |
| 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

| | |
|---|------------------------|
| Area Type: | Other |
| Control Type: | Unsignalized |
| Intersection Capacity Utilization 62.3% | ICU Level of Service B |
| Analysis Period (min) | 15 |

HCM 2010 TWSC
3: Colonial Drive & Arkell Road

07-24-2018

Intersection

| Int Delay, s/veh | 71.9 | | | | | | | | | | | |
|--------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | ↰ | ↱ | ↱ | ↰ | ↱ | ↱ | | ↱ | ↱ | ↰ | ↱ | ↱ |
| 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 |
| 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 | 12 | 547 | 86 | 51 | 316 | 46 | 162 | 0 | 170 | 142 | 0 | 35 |

| Major/Minor | Major1 | Major2 | Minor1 | 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 | - |

| Approach | EB | WB | NB | SB |
|----------------------|-----|-----|-----|-------|
| HCM Control Delay, s | 0.1 | 1.1 | 202 | 254.5 |
| HCM LOS | | | F | F |

| Minor Lane/Major Mvmt | NBLn1 | EBL | EBT | EBR | WBL | WBT | WBR | SBLn1 |
|-----------------------|-------|------|-----|-----|-------|-----|-----|-------|
| 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 | A | - | - | A | - | - | F |
| HCM 95th %tile Q(veh) | 17 | 0 | - | - | 0.2 | - | - | 11.4 |

Notes

--: Volume exceeds capacity \$: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Lanes, Volumes, Timings

4: Residential Entrance/Access 1 & Arkell Road

07-24-2018

| | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|----------------------------|-------|-------|-------|------|-------|-------|------|-------|-------|-------|------|-------|
| Lane Configurations | ↰ | ↱ | | ↰ | ↱ | | ↰ | ↱ | | ↰ | ↱ | |
| 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

Area Type: Other

Control Type: Unsignalized

Intersection Capacity Utilization 72.2%

ICU Level of Service C

Analysis Period (min) 15

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

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HCM 2010 TWSC

4: Residential Entrance/Access 1 & Arkell Road

07-24-2018

| Intersection | | | | | | | | | | | | |
|--------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Int Delay, s/veh | 1.2 | | | | | | | | | | | |
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | ↰ | ↱ | | ↰ | ↱ | | ↰ | ↱ | | ↰ | ↱ | |
| 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 |
| Mvmt Flow | 90 | 766 | 3 | 3 | 377 | 67 | 3 | 0 | 3 | 7 | 0 | 34 |

| Major/Minor | Major1 | Major2 | Minor1 | Minor2 | | | | | | | | |
|----------------------|--------|--------|--------|--------|---|---|------|------|-----|------|---|-----|
| Conflicting Flow All | 445 | 0 | 0 | 770 | 0 | 0 | 1365 | 1399 | 768 | 1367 | - | 411 |
| Stage 1 | - | - | - | - | - | - | 948 | 948 | - | 417 | - | - |
| Stage 2 | - | - | - | - | - | - | 417 | 451 | - | 950 | - | - |
| 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 | 1126 | - | - | 854 | - | - | 126 | 142 | 405 | 125 | 0 | 645 |
| Stage 1 | - | - | - | - | - | - | 316 | 342 | - | 617 | 0 | - |
| Stage 2 | - | - | - | - | - | - | 617 | 574 | - | 315 | 0 | - |
| Platoon blocked, % | - | - | - | - | - | - | - | - | - | - | - | - |
| 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 | C |

| Minor Lane/Major Mvmt | NBLn1 | 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 | 0.052 |
| HCM Control Delay (s) | 26.4 | 8.5 | - | - | 9.2 | 0 | - | 37.9 | 10.9 |
| HCM Lane LOS | D | A | - | - | A | A | - | E | B |
| HCM 95th %tile Q(veh) | 0.1 | 0.3 | - | - | 0 | - | - | 0.2 | 0.2 |

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Lanes, Volumes, Timings
5: Victoria Road & Arkell Road

07-24-2018

| | ↖ | → | ↘ | ↙ | ← | ↖ | ↙ | ↗ | ↘ | ↖ | ↙ | ↗ | ↘ |
|----------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|---|
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR | |
| Lane Configurations | ↖ | ↖ | | ↖ | ↖ | | ↖ | ↖ | | ↖ | ↖ | | |
| 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 | | | 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 | Cl+Ex | Cl+Ex | | Cl+Ex | Cl+Ex | | Cl+Ex | Cl+Ex | | Cl+Ex | Cl+Ex | | |
| Detector 1 Channel | | | | | | | | | | | | | |
| Detector 1 Extend (s) | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | | |
| 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 | | Cl+Ex | | | Cl+Ex | | | Cl+Ex | | | Cl+Ex | | |
| Detector 2 Channel | | | | | | | | | | | | | |
| Detector 2 Extend (s) | | 0.0 | | | 0.0 | | | 0.0 | | | 0.0 | | |

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Lanes, Volumes, Timings
5: Victoria Road & Arkell Road

07-24-2018

| | ↖ | → | ↘ | ↙ | ← | ↖ | ↙ | ↗ | ↘ | ↖ | ↙ | ↗ | ↘ |
|-------------------------|-------|-------|-----|-------|-------|-----|-------|-------|-----|-------|-------|-----|---|
| 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 Effect Green (s) | 24.3 | 14.2 | | 24.3 | 14.2 | | 37.4 | 30.4 | | 36.7 | 28.4 | | |
| Actuated g/C Ratio | 0.34 | 0.20 | | 0.34 | 0.20 | | 0.52 | 0.42 | | 0.51 | 0.39 | | |
| 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 | | |
| LOS | F | C | | C | C | | B | F | | B | F | | |
| Approach Delay | | 139.0 | | | 26.2 | | | 194.1 | | | 258.7 | | |
| Approach LOS | | F | | | C | | | F | | | F | | |

Intersection Summary

Area Type: Other

Cycle Length: 80

Actuated Cycle Length: 72.5

Natural Cycle: 150

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 1.54

Intersection Signal Delay: 180.8

Intersection LOS: F

Intersection Capacity Utilization 109.6%

ICU Level of Service H

Analysis Period (min) 15

Splits and Phases: 5: Victoria Road & Arkell Road

| | | | |
|------|------|------|------|
| ⤵ Ø1 | ⤴ Ø2 | ⤵ Ø3 | ⤴ Ø4 |
| 10 s | 34 s | 10 s | 26 s |
| ⤵ Ø5 | ⤴ Ø6 | ⤵ Ø7 | ⤴ Ø8 |
| 10 s | 34 s | 10 s | 26 s |

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Queues

5: Victoria Road & Arkell Road

07-24-2018

| | EBL | EBT | WBL | WBT | NBL | NBT | SBL | SBT |
|------------------------|--------|-------|------|-------|------|--------|------|--------|
| 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 |

Intersection Summary

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

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

Synchro 9 Report
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HCM 2010 Signalized Intersection Summary

5: Victoria Road & Arkell Road

07-24-2018

| | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------------|-------|------|------|------|------|------|-------|------|-------|-------|------|-------|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | ↰ | ↱ | ↱ | ↰ | ↱ | ↱ | ↰ | ↱ | ↱ | ↰ | ↱ | ↱ |
| Traffic Volume (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 (Ob), 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 | | C | C | | C | B | | F | B | | F |
| Approach Vol, veh/h | 780 | | | 437 | | | 1110 | | | 1098 | | |
| Approach Delay, s/veh | 184.5 | | | 27.6 | | | 246.6 | | | 286.9 | | |
| 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 | 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+I1), 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

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

Synchro 9 Report
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Lanes, Volumes, Timings
6: Victoria Road & Access 2

07-24-2018

| | EBL | EBR | NBL | NBT | SBT | SBR |
|----------------------------|-------|-------|-------|-------|-------|-------|
| Lane Configurations | ↰ | ↱ | ↰ | ↱ | ↱ | ↱ |
| 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 | | | 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 | 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% | 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 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 | |

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

Synchro 9 Report
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Lanes, Volumes, Timings
6: Victoria Road & Access 2

07-24-2018

| | 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 Effect 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 | 0.21 | 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 Capacity Utilization 88.9%
Analysis Period (min) 15

Splits and Phases: 6: Victoria Road & Access 2



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

Synchro 9 Report
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Queues

6: Victoria Road & Access 2

07-24-2018

| | EBL | EBR | NBL | NBT | SBT | SBR |
|------------------------|------|------|------|--------|--------|------|
| 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 |

Intersection Summary

- Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.













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

Queue shown is maximum after two cycles.

HCM 2010 Signalized Intersection Summary

6: Victoria Road & Access 2

07-24-2018

| |  |  |  |  |  |  | | |
|------------------------------|---|---|---|---|---|---|---|---|
| Movement | EBL | EBR | NBL | NBT | SBT | SBR | | |
| Lane Configurations |  |  |  |  |  |  | | |
| 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 | C | C | C | F | B | A | | |
| Approach Vol, veh/h | 167 | | | 1516 | 1157 | | | |
| Approach Delay, s/veh | 29.3 | | | 91.6 | 12.8 | | | |
| Approach LOS | C | | | F | B | | | |
| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 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 | | 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 E

Lanes, Volumes, Timings

7: Victoria Road & Victoria Park Village Road

07-24-2018

| | EBL | EBR | NBL | NBT | SBT | SBR |
|---|------------------------|-------|-------|-------|-------|-------|
| Lane Group | EBL | EBR | NBL | NBT | SBT | SBR |
| Lane Configurations | ↔ | ↔ | ↔ | ↔ | ↔ | ↔ |
| 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 | | | | | | |
| Area Type: | Other | | | | | |
| Control Type: | Unsignalized | | | | | |
| Intersection Capacity Utilization 91.7% | ICU Level of Service F | | | | | |
| Analysis Period (min) 15 | | | | | | |

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

Synchro 9 Report
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HCM 2010 TWSC

7: Victoria Road & Victoria Park Village Road

07-24-2018

| Intersection | | | | | | |
|--|--------|-----------|-------|--------|------|------|
| Int Delay, s/veh | 273.3 | | | | | |
| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
| Lane Configurations | ↔ | ↔ | ↔ | ↔ | ↔ | |
| Traffic Vol, veh/h | 186 | 52 | 17 | 1420 | 1012 | 60 |
| Future Vol, veh/h | 186 | 52 | 17 | 1420 | 1012 | 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, # | 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 | 1543 | 1100 | 65 |
| Major/Minor | | | | | | |
| | Minor2 | Major1 | | Major2 | | |
| Conflicting Flow All | 2713 | 1133 | 1165 | 0 | - | 0 |
| Stage 1 | 1133 | - | - | - | - | - |
| Stage 2 | 1580 | - | - | - | - | - |
| Critical Hdwy | 6.42 | 6.22 | 4.12 | - | - | - |
| Critical Hdwy Stg 1 | 5.42 | - | - | - | - | - |
| Critical Hdwy Stg 2 | 5.42 | - | - | - | - | - |
| Follow-up Hdwy | 3.518 | 3.318 | 2.218 | - | - | - |
| Pot Cap-1 Maneuver | ~ 23 | 247 | 600 | - | - | - |
| Stage 1 | 307 | - | - | - | - | - |
| Stage 2 | ~ 186 | - | - | - | - | - |
| Platoon blocked, % | | | | - | - | - |
| Mov Cap-1 Maneuver | ~ 22 | 247 | 600 | - | - | - |
| Mov Cap-2 Maneuver | ~ 22 | - | - | - | - | - |
| Stage 1 | 307 | - | - | - | - | - |
| Stage 2 | ~ 180 | - | - | - | - | - |
| Approach | | | | | | |
| | EB | NB | | SB | | |
| HCM Control Delay, \$ 3154.1 | | 0.1 | | 0 | | |
| HCM LOS | F | | | | | |
| Minor Lane/Major Mvmt | | | | | | |
| | NBL | NBT | EBLn1 | EBLn2 | SBT | SBR |
| Capacity (veh/h) | 600 | - | 22 | 247 | - | - |
| HCM Lane V/C Ratio | 0.031 | - | 9.19 | 0.229 | - | - |
| HCM Control Delay (s) | 11.2 | \$ 4029.3 | 23.8 | - | - | - |
| HCM Lane LOS | B | - | F | C | - | - |
| HCM 95th %tile Q(veh) | 0.1 | - | 25.5 | 0.9 | - | - |
| Notes | | | | | | |
| ~: Volume exceeds capacity \$: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon | | | | | | |

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

Synchro 9 Report
Page 18

Lanes, Volumes, Timings

1: Summerfield Drive & Arkell Road

07-24-2018

| | → | ↖ | ↗ | ← | ↖ | ↗ |
|----------------------------|-------|-------|-------|-------|-------|-------|
| Lane Group | EBT | EBR | WBL | WBT | NBL | NBR |
| Lane Configurations | ↖ | | ↖ | ↖ | ↖ | |
| 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 | | | 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 Utilization 63.4% | ICU Level of Service B |
| Analysis Period (min) | 15 |

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

Synchro 9 Report
Page 1

HCM 2010 TWSC

1: Summerfield Drive & Arkell Road

07-24-2018

| Intersection | | | | | | |
|--------------------------|------|------|------|------|------|------|
| Int Delay, s/veh | 2.9 | | | | | |
| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
| Lane Configurations | ↖ | | ↖ | ↖ | ↖ | |
| Traffic Vol, veh/h | 555 | 174 | 100 | 474 | 83 | 51 |
| Future Vol, veh/h | 555 | 174 | 100 | 474 | 83 | 51 |
| 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 | 578 | 181 | 104 | 494 | 86 | 53 |

| Major/Minor | Major1 | Major2 | Minor1 |
|----------------------|--------|--------|--------|
| Conflicting Flow All | 0 | 0 | 762 |
| Stage 1 | - | - | - |
| Stage 2 | - | - | - |
| Critical Hdwy | - | - | 4.1 |
| Critical Hdwy Stg 1 | - | - | - |
| Critical Hdwy Stg 2 | - | - | - |
| Follow-up Hdwy | - | - | 2.2 |
| Pot Cap-1 Maneuver | - | - | 859 |
| Stage 1 | - | - | - |
| Stage 2 | - | - | - |
| Platoon blocked, % | - | - | - |
| Mov Cap-1 Maneuver | - | - | 858 |
| Mov Cap-2 Maneuver | - | - | - |
| Stage 1 | - | - | - |
| Stage 2 | - | - | - |

| Approach | EB | WB | NB |
|----------------------|----|-----|------|
| HCM Control Delay, s | 0 | 1.7 | 23.9 |
| HCM LOS | | | C |

| Minor Lane/Major Mvmt | NBLn1 | EBT | EBR | WBL | WBT |
|-----------------------|-------|-----|-----|-------|-----|
| Capacity (veh/h) | 328 | - | - | 858 | - |
| HCM Lane V/C Ratio | 0.426 | - | - | 0.121 | - |
| HCM Control Delay (s) | 23.9 | - | - | 9.8 | - |
| HCM Lane LOS | C | - | - | A | - |
| HCM 95th %tile Q(veh) | 2 | - | - | 0.4 | - |

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

Synchro 9 Report
Page 2

Lanes, Volumes, Timings

2: Zecca Drive/Amos Drive & Arkell Road

07-24-2018

| | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|----------------------------|------|-------|-------|------|-------|-------|------|-------|-------|------|-------|-------|
| Lane Configurations | | | | | | | | | | | | |
| 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 | |
| Flt Protected | | 0.996 | | | 0.999 | | | 0.960 | | | 0.981 | |
| Satd. Flow (prot) | 0 | 1861 | 0 | 0 | 1867 | 0 | 0 | 1784 | 0 | 0 | 1715 | 0 |
| Flt 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 | | | | | | | | | | | | |
| 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 71.8%

ICU Level of Service C

Analysis Period (min) 15

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

Synchro 9 Report
Page 3

HCM 2010 TWSC

2: Zecca Drive/Amos Drive & Arkell Road

07-24-2018

Intersection

Int Delay, s/veh 2

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|--------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Lane Configurations | | | | | | | | | | | | |
| 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 | Major1 | Major2 | Minor1 | Minor2 |
|----------------------|--------|--------|--------|--------|
| Conflicting Flow All | 587 | 0 | 0 | 595 |
| Stage 1 | - | - | - | - |
| Stage 2 | - | - | - | - |
| Critical Hdwy | 4.1 | - | - | 4.1 |
| Critical Hdwy Stg 1 | - | - | - | - |
| Critical Hdwy Stg 2 | - | - | - | - |
| Follow-up Hdwy | 2.2 | - | - | 2.2 |
| Pot Cap-1 Maneuver | 998 | - | - | 991 |
| Stage 1 | - | - | - | - |
| Stage 2 | - | - | - | - |
| Platoon blocked, % | - | - | - | - |
| Mov Cap-1 Maneuver | 992 | - | - | 985 |
| Mov Cap-2 Maneuver | - | - | - | - |
| Stage 1 | - | - | - | - |
| Stage 2 | - | - | - | - |

| Approach | EB | WB | NB | SB |
|----------------------|-----|-----|------|------|
| HCM Control Delay, s | 0.7 | 0.1 | 36.6 | 23.8 |
| HCM LOS | | | E | C |

| Minor Lane/Major Mvmt | NBLn1 | EBL | EBT | EBR | WBL | WBT | WBR | SBLn1 |
|-----------------------|-------|-------|-----|-----|-------|-----|-----|-------|
| Capacity (veh/h) | 139 | 992 | - | - | 985 | - | - | 241 |
| HCM Lane V/C Ratio | 0.182 | 0.053 | - | - | 0.009 | - | - | 0.205 |
| HCM Control Delay (s) | 36.6 | 8.8 | 0 | - | 8.7 | 0 | - | 23.8 |
| HCM Lane LOS | E | A | A | - | A | A | - | C |
| HCM 95th %tile Q(veh) | 0.6 | 0.2 | - | - | 0 | - | - | 0.8 |

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

Synchro 9 Report
Page 4

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

07-24-2018

| | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|----------------------------|-------|-------|-------|-------|-------|-------|------|-------|-------|------|-------|-------|
| Lane Configurations | ↰ | ↱ | | ↰ | ↱ | | | ↕ | | | ↕ | |
| 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 | | | | | | | | | | | | |
| 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 | 0 |
| Flt Permitted | 0.950 | | | 0.950 | | | | 0.973 | | | 0.961 | |
| Satd. Flow (perm) | 1805 | 1825 | 0 | 1805 | 1806 | 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 | 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 | |
| Sign Control | | Free | | | Free | | | Stop | | | Stop | |

Intersection Summary

| | |
|---|------------------------|
| Area Type: | Other |
| Control Type: | Unsignalized |
| Intersection Capacity Utilization 55.7% | ICU Level of Service B |
| Analysis Period (min) | 15 |

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

Synchro 9 Report
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HCM 2010 TWSC
3: Colonial Drive & Arkell Road

07-24-2018

| Intersection | | | | | | | | | | | | |
|--------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Int Delay, s/veh | 18.9 | | | | | | | | | | | |
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | ↰ | ↱ | | ↰ | ↱ | | | ↕ | | | ↕ | |
| 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 | Major1 | Major2 | Minor1 | Minor2 |
|----------------------|--------|--------|--------|--------|
| Conflicting Flow All | 614 | 0 | 0 | 543 |
| Stage 1 | - | - | - | - |
| Stage 2 | - | - | - | - |
| Critical Hdwy | 4.1 | - | - | 4.1 |
| Critical Hdwy Stg 1 | - | - | - | - |
| Critical Hdwy Stg 2 | - | - | - | - |
| Follow-up Hdwy | 2.2 | - | - | 2.2 |
| Pot Cap-1 Maneuver | 975 | - | - | 1036 |
| Stage 1 | - | - | - | - |
| Stage 2 | - | - | - | - |
| Platoon blocked, % | - | - | - | - |
| Mov Cap-1 Maneuver | 975 | - | - | 1036 |
| Mov Cap-2 Maneuver | - | - | - | - |
| Stage 1 | - | - | - | - |
| Stage 2 | - | - | - | - |

| Approach | EB | WB | NB | SB |
|----------------------|-----|----|------|------|
| HCM Control Delay, s | 0.5 | 1 | 98.8 | 95.9 |
| HCM LOS | | | F | F |

| Minor Lane/Major Mvmt | NBLn1 | EBL | EBT | EBR | WBL | WBT | WBR | SBLn1 |
|-----------------------|-------|-------|-----|-----|------|-----|-----|-------|
| Capacity (veh/h) | 198 | 975 | - | - | 1036 | - | - | 130 |
| HCM Lane V/C Ratio | 0.942 | 0.031 | - | - | 0.08 | - | - | 0.793 |
| HCM Control Delay (s) | 98.8 | 8.8 | - | - | 8.8 | - | - | 95.9 |
| HCM Lane LOS | F | A | - | - | A | - | - | F |
| HCM 95th %tile Q(veh) | 7.7 | 0.1 | - | - | 0.3 | - | - | 4.8 |

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

Synchro 9 Report
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Lanes, Volumes, Timings

4: Residential Entrance/Access 1 & Arkell Road

07-24-2018

| | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|----------------------------|-------|-------|-------|------|-------|-------|------|-------|-------|-------|------|-------|
| Lane Configurations | ↰ | ↱ | | ↰ | ↱ | | ↰ | ↱ | | ↰ | ↱ | |
| 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 |
| Flt 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

Area Type: Other

Control Type: Unsignalized

Intersection Capacity Utilization 51.8%

ICU Level of Service A

Analysis Period (min) 15

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

Synchro 9 Report
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HCM 2010 TWSC

4: Residential Entrance/Access 1 & Arkell Road

07-24-2018

| Intersection | | | | | | | | | | | | |
|--------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Int Delay, s/veh | 0.5 | | | | | | | | | | | |
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | ↰ | ↱ | | ↰ | ↱ | | ↰ | ↱ | | ↰ | ↱ | |
| 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 | Major1 | Major2 | Minor1 | Minor2 |
|----------------------|--------|--------|--------|--------|
| Conflicting Flow All | 722 | 0 | 0 | 609 |
| Stage 1 | - | - | - | - |
| Stage 2 | - | - | - | - |
| Critical Hdwy | 4.1 | - | - | 4.1 |
| Critical Hdwy Stg 1 | - | - | - | - |
| Critical Hdwy Stg 2 | - | - | - | - |
| Follow-up Hdwy | 2.2 | - | - | 2.2 |
| Pot Cap-1 Maneuver | 889 | - | - | 979 |
| Stage 1 | - | - | - | - |
| Stage 2 | - | - | - | - |
| Platoon blocked, % | - | - | - | - |
| Mov Cap-1 Maneuver | 889 | - | - | 979 |
| Mov Cap-2 Maneuver | - | - | - | - |
| Stage 1 | - | - | - | - |
| Stage 2 | - | - | - | - |

| Approach | EB | WB | NB | SB |
|----------------------|-----|----|------|------|
| HCM Control Delay, s | 0.1 | 0 | 23.6 | 23.8 |
| HCM LOS | | | C | C |

| Minor Lane/Major Mvmt | NBLn1 | 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 | 0.023 |
| HCM Control Delay (s) | 23.6 | 9.1 | - | - | 8.7 | 0 | - | 35.4 | 13.5 |
| HCM Lane LOS | C | A | - | - | A | A | - | E | B |
| HCM 95th %tile Q(veh) | 0.1 | 0 | - | - | 0 | - | - | 0.2 | 0.1 |

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

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Lanes, Volumes, Timings
5: Victoria Road & Arkell Road

07-24-2018

| | ↖ | → | ↘ | ↙ | ← | ↖ | ↙ | ↗ | ↘ | ↖ | ↙ | ↗ |
|----------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | ↖ | ↖ | | ↖ | ↖ | | ↖ | ↖ | | ↖ | ↖ | |
| 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 | | | | 0.99 | |
| Frt | | 0.947 | | | 0.960 | | | 0.975 | | | 0.959 | |
| Flt Protected | 0.950 | | | 0.950 | | | 0.950 | | | 0.950 | | |
| Satd. Flow (prot) | 1787 | 1788 | 0 | 1703 | 1797 | 0 | 1805 | 1759 | 0 | 1805 | 1765 | 0 |
| Flt Permitted | 0.317 | | | 0.396 | | | 0.141 | | | 0.141 | | |
| Satd. Flow (perm) | 596 | 1788 | 0 | 710 | 1797 | 0 | 268 | 1759 | 0 | 268 | 1765 | 0 |
| Right Turn on Red | | | Yes | | | Yes | | | Yes | | | Yes |
| Satd. Flow (RTOR) | | 33 | | | 21 | | | 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 | 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 | 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 | Cl+Ex | Cl+Ex | | Cl+Ex | Cl+Ex | | Cl+Ex | Cl+Ex | | Cl+Ex | Cl+Ex | |
| Detector 1 Channel | | | | | | | | | | | | |
| Detector 1 Extend (s) | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | |
| 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 | | Cl+Ex | | | Cl+Ex | | | Cl+Ex | | | Cl+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

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Lanes, Volumes, Timings
5: Victoria Road & Arkell Road

07-24-2018

| | ↖ | → | ↘ | ↙ | ← | ↖ | ↙ | ↗ | ↘ | ↖ | ↙ | ↗ |
|-------------------------|-------|-------|-----|-------|-------|-----|-------|-------|-----|-------|-------|-----|
| 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 Effect 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 | | B | F | | B | F | |
| Approach Delay | | 47.6 | | | 34.2 | | | 299.6 | | | 375.8 | |
| Approach LOS | | D | | | C | | | F | | | F | |

Intersection Summary

Area Type: Other

Cycle Length: 80

Actuated Cycle Length: 75.2

Natural Cycle: 150

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 1.84

Intersection Signal Delay: 250.6

Intersection LOS: F

Intersection Capacity Utilization 120.7%

ICU Level of Service H

Analysis Period (min) 15

Splits and Phases: 5: Victoria Road & Arkell Road

| | | | |
|------|------|------|------|
| ↖ Ø1 | ↖ Ø2 | ↖ Ø3 | ↖ Ø4 |
| 10 s | 34 s | 10 s | 26 s |
| ↖ Ø5 | ↖ Ø6 | ↖ Ø7 | ↖ Ø8 |
| 10 s | 34 s | 10 s | 26 s |


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Synchro 9 Report
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Queues

5: Victoria Road & Arkell Road

07-24-2018

| |  | | | | | | | |
|------------------------|---|-------|------|-------|------|--------|------|--------|
| 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 |

Intersection Summary

- Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

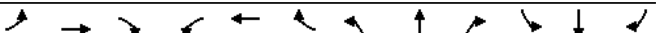









95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM 2010 Signalized Intersection Summary

5: Victoria Road & Arkell Road

07-24-2018

| |  | | | | | | | | | | | |
|------------------------------|---|---|------|---|---|------|---|---|-------|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  | |  |  | |  |  | |  |  |  |
| 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 (Ob), 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(l) | 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 | | C | C | | D | B | | F | B | | F |
| Approach Vol, veh/h | 603 | | | 491 | | | 1233 | | | 1345 | | |
| Approach Delay, s/veh | 56.8 | | | 33.3 | | | 327.9 | | | 422.8 | | |
| Approach LOS | E | | | 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 | 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 (g_c+I1), 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

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

07-24-2018

| | EBL | EBR | NBL | NBT | SBT | SBR |
|----------------------------|---|---|---|---|---|---|
| Lane Configurations |  |  |  |  |  |  |
| 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 | 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 | | 0.066 | | | |
| 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% | 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 | |
| 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 | | | 2 | 6 | |

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

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

07-24-2018

| | 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 Effect 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 | C | B | | C | B | A |
| Approach Delay | 26.6 | | | 25.9 | 18.0 | |
| Approach LOS | C | | | C | B | |

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 76.1
Natural Cycle: 110
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.89
Intersection Signal Delay: 22.0
Intersection Capacity Utilization 83.6%
Analysis Period (min) 15

Intersection LOS: C

ICU Level of Service E

Splits and Phases: 6: Victoria Road & Access 2



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

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Queues

6: Victoria Road & Access 2

07-24-2018

| | EBL | EBR | NBL | NBT | SBT | SBR |
|------------------------|------|------|------|--------|--------|------|
| 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 |













Intersection Summary

95th 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







07-24-2018

| |  |  |  |  |  |  | | |
|------------------------------|---|---|---|---|---|---|---|---|
| Movement | EBL | EBR | NBL | NBT | SBT | SBR | | |
| Lane Configurations |  |  |  |  |  |  | | |
| 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 | 0 | 0 | 6 | 3 | 0 | | |
| 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(g_s), s | 1.9 | 1.0 | 0.0 | 50.0 | 50.0 | 0.6 | | |
| Cycle Q Clear(g_c), s | 1.9 | 1.0 | 50.0 | 50.0 | 50.0 | 0.6 | | |
| Prop In Lane | 1.00 | 1.00 | 1.00 | | | 1.00 | | |
| Lane Grp Cap(c), veh/h | 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 | C | C | D | F | F | A | | |
| Approach Vol, veh/h | 79 | | | 1354 | 1395 | | | |
| Approach Delay, s/veh | 28.8 | | | 45.4 | 38.8 | | | |
| Approach LOS | C | | | D | D | | | |
| 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 | | |
| 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 | | | | |

Lanes, Volumes, Timings

7: Victoria Road & Victoria Park Village Road

07-24-2018

| Lane Group | EBL | EBR | NBL | NBT | SBT | SBR |
|----------------------------|---|---|---|---|---|---|
| Lane Configurations |  |  |  |  |  |  |
| 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

Area Type: Other

Control Type: Unsignalized

Intersection Capacity Utilization 95.3%

ICU Level of Service F

Analysis Period (min) 15







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

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HCM 2010 TWSC

7: Victoria Road & Victoria Park Village Road

07-24-2018

| Intersection | | | | | | |
|--------------------------|---|---|---|---|---|---|
| Int Delay, s/veh | 171.4 | | | | | |
| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
| Lane Configurations |  |  |  |  |  |  |
| 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, # | 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 | Major1 | 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 Mvmt | NBL | NBT | EBLn1 | EBLn2 | SBT | SBR |
|-----------------------|------|-----------|--------|-------|-----|-----|
| Capacity (veh/h) | 386 | - | 11 | 135 | - | - |
| HCM Lane V/C Ratio | 0.18 | - | 10.375 | 0.306 | - | - |
| HCM Control Delay (s) | 16.4 | \$ 4886.7 | 43 | - | - | - |
| HCM Lane LOS | C | - | F | E | - | - |
| HCM 95th %tile Q(veh) | 0.6 | - | 15.6 | 1.2 | - | - |

Notes

--: Volume exceeds capacity \$: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

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

Synchro 9 Report
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Appendix M

2031 Total Remedial Measures Traffic Operations Reports



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

07-25-2018

| | ↖ | → | ↘ | ↙ | ← | ↖ | ↗ | ↘ | ↙ | ↖ | ↗ | ↘ | ↙ |
|----------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|---|
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR | |
| Lane Configurations | ↖ | ↘ | | ↖ | ↘ | | | ↖ | ↘ | | ↖ | ↘ | |
| 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 | Cl+Ex | Cl+Ex | | Cl+Ex | Cl+Ex | | Cl+Ex | Cl+Ex | | Cl+Ex | Cl+Ex | | |
| Detector 1 Channel | | | | | | | | | | | | | |
| Detector 1 Extend (s) | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | | |
| 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 | | Cl+Ex | | | Cl+Ex | | | Cl+Ex | | | Cl+Ex | | |
| Detector 2 Channel | | | | | | | | | | | | | |
| Detector 2 Extend (s) | | 0.0 | | | 0.0 | | | 0.0 | | | 0.0 | | |

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

07-25-2018

| | ↖ | → | ↘ | ↙ | ← | ↖ | ↗ | ↘ | ↙ | ↖ | ↗ | ↘ | ↙ |
|-------------------------|-------|-------|-----|-------|-------|-----|-------|-------|-----|-------|-------|-----|---|
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR | |
| 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 | | | | | | | | |
| 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 Effect 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 | B | C | | C | B | | | C | | | B | | |
| Approach Delay | | 34.5 | | | 20.8 | | | 20.6 | | | 17.7 | | |
| Approach LOS | | C | | | C | | | C | | | B | | |

Intersection Summary

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 LOS: C

Intersection Capacity Utilization 66.6%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 3: Colonial Drive & Arkell Road



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

Synchro 9 Report
Page 2

Queues

3: Colonial Drive & Arkell Road



















07-25-2018

| | EBL | EBT | WBL | WBT | NBT | SBT |
|------------------------|------|-------|------|-------|-------|------|
| 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 | | | | | | |

HCM 2010 Signalized Intersection Summary

3: Colonial Drive & Arkell Road

07-25-2018

| |  |  |  |  |  |  |  |  |  |  |  |  |
|------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  | |  |  | | |  | | |  | |
| 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 | 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 | 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 | 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 |
| 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 | 0 |
| Grp Sat Flow(s), veh/h/ln | 1014 | 0 | 1774 | 761 | 0 | 1730 | 1467 | 0 | 0 | 1203 | 0 | 0 |
| Q Serve(g_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(g_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 | 0 |
| 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 | 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 | 1.00 | 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 | C | | C | C | | B | C | | | C | | |
| Approach Vol, veh/h | 645 | | | 413 | | | 332 | | | 177 | | |
| Approach Delay, s/veh | 23.5 | | | 19.2 | | | 23.2 | | | 20.6 | | |
| Approach LOS | C | | | B | | | 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 (g_c+I1), 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 | | | | | | | | | | | | |
| HCM 2010 Ctrl Delay | | | | 22.0 | | | | | | | | |
| HCM 2010 LOS | | | | C | | | | | | | | |

Lanes, Volumes, Timings
5: Victoria Road & Arkell Road

07-25-2018

| | ↖ | → | ↘ | ↙ | ← | ↖ | ↗ | ↘ | ↙ | ↖ | ↗ | ↘ | ↙ |
|----------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|------|
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR | |
| Lane Configurations | ↖ | ↗ | ↘ | ↙ | ↖ | ↗ | ↘ | ↙ | ↖ | ↗ | ↘ | ↙ | |
| 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 | | 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 | | | | | 0.99 | | 1.00 | | | | | 0.97 |
| Frt | | 0.938 | | | 0.936 | | | 0.850 | | | | 0.850 | |
| Flt Protected | 0.950 | | | 0.950 | | | 0.950 | | | 0.950 | | | |
| Satd. Flow (prot) | 3367 | 1676 | 0 | 1787 | 1702 | 0 | 1805 | 3406 | 1524 | 1752 | 3343 | 1455 | |
| Flt Permitted | 0.950 | | | 0.602 | | | 0.216 | | | 0.146 | | | |
| Satd. Flow (perm) | 3361 | 1676 | 0 | 1132 | 1702 | 0 | 410 | 3406 | 1524 | 269 | 3343 | 1418 | |
| Right Turn on Red | | | Yes | | | Yes | | | Yes | | | Yes | |
| Satd. Flow (RTOR) | | 35 | | | 34 | | | | 153 | | | 254 | |
| 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 | 912 | 121 | 67 | 777 | 254 | |
| 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 | Cl+Ex | Cl+Ex | | Cl+Ex | Cl+Ex | | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | |
| Detector 1 Channel | | | | | | | | | | | | | |
| Detector 1 Extend (s) | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| 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 | | Cl+Ex | | | Cl+Ex | | | Cl+Ex | | | Cl+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 AM Total Remedial

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

07-25-2018

| | ↖ | → | ↘ | ↙ | ← | ↖ | ↗ | ↘ | ↙ | ↖ | ↗ | ↘ | ↙ |
|-------------------------|-------|-------|-----|-------|-------|-----|-------|-------|-------|-------|-------|-------|---|
| 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 Effect 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 | C | | C | D | | B | C | A | B | C | A | |
| Approach Delay | | 39.7 | | | 31.1 | | | 30.0 | | | 24.0 | | |
| Approach LOS | | D | | | C | | | C | | | C | | |

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

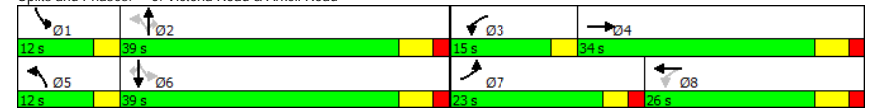
Intersection LOS: C

Intersection Capacity Utilization 71.5%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 5: Victoria Road & Arkell Road



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

Synchro 9 Report
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Queues

5: Victoria Road & Arkell Road

07-25-2018

| | EBL | EBT | WBL | WBT | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|-------|-------|------|-------|------|-------|------|------|-------|------|
| 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 |

Intersection Summary

95th 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

07-25-2018

| | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | ↔ | ↔ | ↔ | ↔ | ↔ | ↔ | ↔ | ↔ | ↔ | ↔ | ↔ | ↔ |
| Traffic Volume (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 (Ob), 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(g_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(g_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 | | C | C | | D | B | C | C | B | C | C |
| Approach Vol, veh/h | | 780 | | | 437 | | | 1110 | | | 1098 | |
| Approach Delay, s/veh | | 39.4 | | | 33.6 | | | 25.9 | | | 24.3 | |
| Approach LOS | | D | | | C | | | C | | | C | |
| 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 | 8.6 | 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

HCM 2010 Ctrl Delay 29.5
HCM 2010 LOS C

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

07-25-2018

| | EBL | EBR | NBL | NBT | SBT | SBR |
|----------------------------|-------|-------|-------|-------|-------|-------|
| Lane Configurations | ↰ | ↱ | ↰ | ↱ | ↱ | ↱ |
| 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 | | | 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 | | | | 0.850 |
| Flt Protected | 0.950 | | 0.950 | | | |
| Satd. Flow (prot) | 1805 | 1615 | 1805 | 3406 | 3343 | 1615 |
| Flt Permitted | 0.950 | | 0.272 | | | |
| Satd. Flow (perm) | 1805 | 1615 | 517 | 3406 | 3343 | 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 | 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 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 | |

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Synchro 9 Report
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Lanes, Volumes, Timings
6: Victoria Road & Access 2

07-25-2018

| | 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 Effect 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 | B | A | A | A | A |
| Approach Delay | 32.8 | | | 6.0 | 3.9 | |
| Approach LOS | C | | | A | A | |

Intersection Summary

Area Type: Other

Cycle Length: 100

Actuated Cycle Length: 93.5

Natural Cycle: 60

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.54

Intersection Signal Delay: 6.8

Intersection LOS: A

Intersection Capacity Utilization 57.4%

ICU Level of Service B

Analysis Period (min) 15

Splits and Phases: 6: Victoria Road & Access 2



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

Synchro 9 Report
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Queues

6: Victoria Road & Access 2













07-25-2018

| | EBL | EBR | NBL | NBT | SBT | SBR |
|------------------------|------|------|------|-------|-------|------|
| 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 | | | | | | |

HCM 2010 Signalized Intersection Summary

6: Victoria Road & Access 2

07-25-2018

| |  |  |  |  |  |  | | |
|------------------------------|---|---|---|---|---|---|---|---|
| Movement | EBL | EBR | NBL | NBT | SBT | SBR | | |
| Lane Configurations |  |  |  |  |  |  | | |
| 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(l) | 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 | | | A | A | | | |
| 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 | | | | A | | | | |

Lanes, Volumes, Timings

7: Victoria Road & Victoria Park Village Road

07-25-2018

| | EBL | EBR | NBL | NBT | SBT | SBR |
|----------------------------|-------|-------|-------|-------|-------|-------|
| Lane Group | EBL | EBR | NBL | NBT | SBT | SBR |
| Lane Configurations | ↰ | ↱ | ↰ | ↱ | ↱ | ↰ |
| 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 | 0.95 | 0.95 | 0.95 |
| Frt | | 0.850 | | | 0.992 | |
| Flt Protected | 0.950 | | 0.950 | | | |
| Satd. Flow (prot) | 1770 | 1583 | 1770 | 3539 | 3511 | 0 |
| Flt Permitted | 0.950 | | 0.213 | | | |
| Satd. Flow (perm) | 1770 | 1583 | 397 | 3539 | 3511 | 0 |
| Right Turn on Red | | Yes | | | | Yes |
| Satd. Flow (RTOR) | | 57 | | | 13 | |
| 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 |
| 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 | | | | | | |
| 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 | |
| Permitted Phases | | 4 | 2 | | | |

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Synchro 9 Report
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Lanes, Volumes, Timings

7: Victoria Road & Victoria Park Village Road

07-25-2018

| | EBL | EBR | NBL | NBT | SBT | SBR |
|-------------------------|-------|-------|-------|-------|-------|-----|
| 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 Effect Green (s) | 16.1 | 16.1 | 68.7 | 68.7 | 68.7 | |
| Actuated g/C Ratio | 0.17 | 0.17 | 0.71 | 0.71 | 0.71 | |
| 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 | |
| LOS | D | B | A | A | A | |
| Approach Delay | 41.1 | | | 9.1 | 7.2 | |
| Approach LOS | D | | | A | A | |

Intersection Summary

Area Type: Other

Cycle Length: 100

Actuated Cycle Length: 96.8

Natural Cycle: 60

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.69

Intersection Signal Delay: 11.2

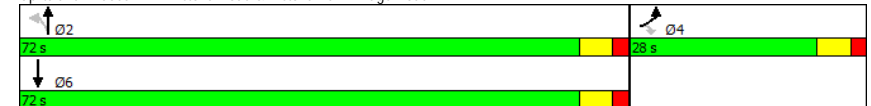
Intersection LOS: B

Intersection Capacity Utilization 59.6%

ICU Level of Service B

Analysis Period (min) 15

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



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

Synchro 9 Report
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Queues

7: Victoria Road & Victoria Park Village Road













07-25-2018

| | EBL | EBR | NBL | NBT | SBT |
|-----------------------------|-------|------|------|-------|-------|
| 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 | | | | | |

HCM 2010 Signalized Intersection Summary

7: Victoria Road & Victoria Park Village Road

07-25-2018

| |  |  |  |  |  |  | | |
|------------------------------|---|---|---|---|---|---|---|---|
| Movement | EBL | EBR | NBL | NBT | SBT | SBR | | |
| Lane Configurations |  |  |  |  |  |  | | |
| 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 | | | 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(l) | 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 | D | D | A | A | A | A | | |
| Approach Vol, veh/h | 259 | | | 1561 | 1165 | | | |
| Approach Delay, s/veh | 42.1 | | | 7.0 | 6.1 | | | |
| Approach LOS | D | | | A | A | | | |
| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 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 (g_c+I1), s | | 21.2 | | 12.0 | | 13.9 | | |
| Green Ext Time (p_c), s | | 36.9 | | 0.8 | | 41.7 | | |
| Intersection Summary | | | | | | | | |
| HCM 2010 Ctrl Delay | | | | 9.7 | | | | |
| HCM 2010 LOS | | | | A | | | | |

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

07-25-2018

| | ↖ | → | ↗ | ↘ | ← | ↖ | ↗ | ↘ | ↙ | ↘ | ↙ | ↘ |
|----------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | ↖ | ↖ | | ↖ | ↖ | | | ↖ | | ↖ | ↖ | |
| 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 | Cl+Ex | Cl+Ex | | Cl+Ex | Cl+Ex | | Cl+Ex | Cl+Ex | | Cl+Ex | Cl+Ex | |
| Detector 1 Channel | | | | | | | | | | | | |
| Detector 1 Extend (s) | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | |
| 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 | | Cl+Ex | | | Cl+Ex | | | Cl+Ex | | | Cl+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

Synchro 9 Report
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Lanes, Volumes, Timings
3: Colonial Drive & Arkell Road

07-25-2018

| | ↖ | → | ↗ | ↘ | ← | ↖ | ↗ | ↘ | ↙ | ↘ | ↙ | ↘ |
|-------------------------|-------|-------|-----|-------|-------|-----|-------|-------|-----|-------|-------|-----|
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| 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 | | 0.0 | 0.0 | |
| Total Lost Time (s) | 6.0 | 6.0 | | 6.0 | 6.0 | | 5.0 | 5.0 | | 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 Effect Green (s) | 28.9 | 28.9 | | 28.9 | 28.9 | | 32.4 | 32.4 | | 31.4 | 31.4 | |
| Actuated g/C Ratio | 0.40 | 0.40 | | 0.40 | 0.40 | | 0.45 | 0.45 | | 0.43 | 0.43 | |
| v/c Ratio | 0.21 | 0.73 | | 0.42 | 0.83 | | 0.29 | 0.29 | | 0.18 | 0.18 | |
| Control Delay | 17.4 | 23.5 | | 22.0 | 29.2 | | 13.5 | 13.5 | | 12.7 | 12.7 | |
| Queue Delay | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | |
| Total Delay | 17.4 | 23.5 | | 22.0 | 29.2 | | 13.5 | 13.5 | | 12.7 | 12.7 | |
| LOS | B | C | | C | C | | B | B | | B | B | |
| Approach Delay | | 23.2 | | | 28.3 | | | 13.5 | | | 12.7 | |
| Approach LOS | | C | | | C | | | B | | | B | |

Intersection Summary

Area Type: Other

Cycle Length: 110

Actuated Cycle Length: 72.4

Natural Cycle: 55

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.83

Intersection Signal Delay: 23.6

Intersection LOS: C

Intersection Capacity Utilization 64.9%

ICU Level of Service C

Analysis Period (min) 15

Split and Phases: 3: Colonial Drive & Arkell Road



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

Synchro 9 Report
Page 2

Queues

3: Colonial Drive & Arkell Road



















07-25-2018

| | EBL | EBT | WBL | WBT | NBT | SBT |
|------------------------|------|-------|------|-------|-------|------|
| 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 | | | | | | |

HCM 2010 Signalized Intersection Summary

3: Colonial Drive & Arkell Road

07-25-2018

| |  |  |  |  |  |  |  |  |  |  |  |  |
|------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  | |  |  | | |  | | |  | |
| 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 (Ob), 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(g_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(g_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 | C | | B | C | | B | B | | | B | | |
| Approach Vol, veh/h | 566 | | | 697 | | | 186 | | | 103 | | |
| Approach Delay, s/veh | 17.3 | | | 19.1 | | | 20.0 | | | 18.6 | | |
| Approach LOS | B | | | B | | | B | | | B | | |
| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | | | | |
| Assigned Phs | 2 | | 4 | | 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 (g_c+I1), s | 27.5 | | 5.9 | | 26.9 | | 8.8 | | | | | |
| Green Ext Time (p_c), s | 14.1 | | 2.1 | | 14.2 | | 2.1 | | | | | |
| Intersection Summary | | | | | | | | | | | | |
| HCM 2010 Ctrl Delay | | | 18.5 | | | | | | | | | |
| HCM 2010 LOS | | | B | | | | | | | | | |
| Notes | | | | | | | | | | | | |


HCM 2010 Signalized Intersection Summary
3: Colonial Drive & Arkell Road

07-25-2018

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

Lanes, Volumes, Timings
5: Victoria Road & Arkell Road

07-25-2018

| |  | | | | | | | | | | | |
|----------------------------|---|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | ↰ | ↱ | ↱ | ↰ | ↱ | ↱ | ↰ | ↱ | ↱ | ↰ | ↱ | ↱ |
| 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 | Cl+Ex | Cl+Ex | | Cl+Ex | Cl+Ex | | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex |
| Detector 1 Channel | | | | | | | | | | | | |
| Detector 1 Extend (s) | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 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 | | Cl+Ex | | | Cl+Ex | | | Cl+Ex | | | | Cl+Ex |
| Detector 2 Channel | | | | | | | | | | | | |
| Detector 2 Extend (s) | | 0.0 | | | 0.0 | | | 0.0 | | | | 0.0 |

Lanes, Volumes, Timings
5: Victoria Road & Arkell Road

07-25-2018

| | ↖ | → | ↗ | ↘ | ← | ↖ | ↗ | ↘ | ↙ | ↘ | ↙ | ↘ |
|-------------------------|-------|-------|-----|-------|-------|-----|-------|-------|-------|-------|-------|-------|
| 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 Effect 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 | C | | C | D | | C | C | A | B | C | A |
| Approach Delay | | 39.4 | | | 39.0 | | | 26.6 | | | 24.8 | |
| Approach LOS | | D | | | D | | | C | | | C | |

Intersection Summary

Area Type: Other

Cycle Length: 110

Actuated Cycle Length: 93.5

Natural Cycle: 85

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.79

Intersection Signal Delay: 29.7

Intersection LOS: C

Intersection Capacity Utilization 73.0%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 5: Victoria Road & Arkell Road

| | | | |
|------|------|------|------|
| ↖ Ø1 | ↗ Ø2 | ↘ Ø3 | ↙ Ø4 |
| 10 s | 47 s | 12 s | 41 s |
| ↖ Ø5 | ↗ Ø6 | ↘ Ø7 | ↙ Ø8 |
| 10 s | 47 s | 19 s | 34 s |

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Synchro 9 Report
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Queues
5: Victoria Road & Arkell Road

07-25-2018

| | ↖ | → | ↗ | ↘ | ← | ↖ | ↗ | ↘ | ↙ | ↘ | ↙ | ↘ |
|------------------------|------|-------|------|-------|------|-------|------|------|-------|------|---|---|
| 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

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

Synchro 9 Report
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HCM 2010 Signalized Intersection Summary
5: Victoria Road & Arkell Road

07-25-2018

| | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | ↔ | ↔ | ↔ | ↔ | ↔ | ↔ | ↔ | ↔ | ↔ | ↔ | ↔ | ↔ |
| Traffic Volume (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 (Ob), 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 | | C | C | | D | B | C | C | B | C | 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 | | | C | | | C | | |
| 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 (g_c+I1), 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 | C | | | | | | | | | | | |

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

07-25-2018

| | EBL | EBR | NBL | NBT | SBT | SBR |
|----------------------------|-------|-------|-------|-------|-------|-------|
| Lane Configurations | ↔ | ↔ | ↔ | ↔ | ↔ | ↔ |
| 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 | | | | | 0.850 |
| Flt Protected | 0.950 | | 0.950 | | | |
| Satd. Flow (prot) | 1805 | 1615 | 1805 | 3406 | 3505 | 1615 |
| Flt Permitted | 0.950 | | 0.186 | | | |
| 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 | | | 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 | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex |
| Detector 1 Channel | | | | | | |
| Detector 1 Extend (s) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 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 | | | | Cl+Ex | Cl+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

Synchro 9 Report
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Lanes, Volumes, Timings
6: Victoria Road & Access 2

07-25-2018

| | EBL | EBR | NBL | NBT | SBT | SBR |
|-------------------------|-------|-------|-------|-------|-------|-------|
| 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 Effect 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 | B | A | A | A | A |
| Approach Delay | 39.5 | | | 4.5 | 3.8 | |
| Approach LOS | D | | | A | A | |

Intersection Summary

Area Type: Other

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

Analysis Period (min) 15

Splits and Phases: 6: Victoria Road & Access 2

| | |
|--|--|
|  Ø2  Ø6 |  Ø4 |
| 82 s | 28 s |

Queues
6: Victoria Road & Access 2













07-25-2018

| | EBL | EBR | NBL | NBT | SBT | SBR |
|------------------------|------|------|------|-------|-------|------|
| 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

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

07-25-2018

| |  |  |  |  |  |  | | |
|------------------------------|---|---|---|---|---|---|---|---|
| Movement | EBL | EBR | NBL | NBT | SBT | SBR | | |
| Lane Configurations |  |  |  |  |  |  | | |
| 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 (Ob), 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(g_s), s | 2.7 | 1.4 | 2.0 | 13.4 | 13.0 | 0.6 | | |
| Cycle Q Clear(g_c), s | 2.7 | 1.4 | 15.0 | 13.4 | 13.0 | 0.6 | | |
| Prop In Lane | 1.00 | 1.00 | 1.00 | | | 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 | 0.2 | 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 | | | A | A | | | |
| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 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 | | | | | |
| HCM 2010 LOS | | | A | | | | | |

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

Synchro 9 Report
Page 13

Lanes, Volumes, Timings
7: Victoria Road & Victoria Park Village Road

07-25-2018

| | EBL | EBR | NBL | NBT | SBT | SBR |
|----------------------------|-------|-------|-------|-------|-------|-------|
| Lane Group | EBL | EBR | NBL | NBT | SBT | SBR |
| Lane Configurations | ↰ | ↱ | ↰ | ↱ | ↱ | ↱ |
| 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 | 0.95 | 0.95 | 0.95 |
| Frt | | 0.850 | | | 0.983 | |
| Flt Protected | 0.950 | | 0.950 | | | |
| Satd. Flow (prot) | 1805 | 1615 | 1805 | 3406 | 3457 | 0 |
| Flt Permitted | 0.950 | | 0.111 | | | |
| Satd. Flow (perm) | 1805 | 1615 | 211 | 3406 | 3457 | 0 |
| Right Turn on Red | | Yes | | | | Yes |
| Satd. Flow (RTOR) | | 41 | | | 25 | |
| 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 |
| 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 | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | |
| Detector 1 Channel | | | | | | |
| Detector 1 Extend (s) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| 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 | | | | Cl+Ex | Cl+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

Lanes, Volumes, Timings

7: Victoria Road & Victoria Park Village Road

07-25-2018

| | EBL | EBR | NBL | NBT | SBT | SBR |
|-------------------------|-------|-------|-------|-------|-------|-----|
| 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 Effect 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 | B | B | A | A | |
| Approach Delay | 38.9 | | | 6.5 | 7.3 | |
| Approach LOS | D | | | A | A | |

Intersection Summary

Area Type: Other

Cycle Length: 110

Actuated Cycle Length: 98.6

Natural Cycle: 60

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.64

Intersection Signal Delay: 8.4

Intersection LOS: A

Intersection Capacity Utilization 71.5%

ICU Level of Service C

Analysis Period (min) 15

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

| | |
|------|------|
| | |
| 75 s | 35 s |
| 75 s | |

Queues

7: Victoria Road & Victoria Park Village Road













07-25-2018

| | EBL | EBR | NBL | NBT | SBT |
|------------------------|-------|------|------|-------|-------|
| 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

HCM 2010 Signalized Intersection Summary
7: Victoria Road & Victoria Park Village Road

07-25-2018

| |  |  |  |  |  |  | | |
|------------------------------|---|---|---|---|---|---|---|---|
| Movement | EBL | EBR | NBL | NBT | SBT | SBR | | |
| Lane Configurations |  |  |  |  |  |  | | |
| 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(g_s), s | 5.4 | 2.1 | 12.8 | 14.6 | 19.3 | 20.1 | | |
| Cycle Q Clear(g_c), s | 5.4 | 2.1 | 32.9 | 14.6 | 19.3 | 20.1 | | |
| Prop In Lane | 1.00 | 1.00 | 1.00 | | | 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 | D | D | B | A | A | A | | |
| Approach Vol, veh/h | 155 | | | 1436 | 1680 | | | |
| Approach Delay, s/veh | 40.4 | | | 5.7 | 7.2 | | | |
| Approach LOS | D | | | A | A | | | |
| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 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 (g_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 LOS | | | A | | | | | |

Appendix N

Total Traffic Signal Warrant Justification Worksheets



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



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
PM Forecast Only? N

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

| Time Period | Major Street | | | | | | Minor Street | | | | | | Peds Crossing Main Road |
|-----------------------|--------------|---------|-------|-----------|---------|-------|-------------------|---------|-------|------------|---------|-------|----------------------------|
| | Arkell Road | | | | | | Summerfield Drive | | | | | | |
| | Eastbound | | | Westbound | | | Northbound | | | Southbound | | | |
| | Left | Through | Right | Left | Through | Right | Left | Through | Right | Left | Through | Right | |
| 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

| | | | | | | |
|-------------|----------------------------|------|------------|-----------|------------|-----------------------------|
| 1A | Approach Lanes | 1 | | 2 or more | | Average Hourly Volume |
| | Flow Conditions | Free | Restricted | Free | Restricted | |
| | | | X | | | |
| | All Approaches | 480 | 720 | 600 | 900 | |
| % Fulfilled | | | | | | 94.1% |
| 1B | Approach Lanes | 1 | | 2 or more | | Average Hourly Volume |
| | Flow Conditions | Free | Restricted | Free | Restricted | |
| | | | X | | | |
| | Minor Street Approaches | 180 | 255 | 180 | 255 | |
| % Fulfilled | | | | | | 42.5% |

Warrant 2 - Delay To Cross Traffic

| | | | | | | |
|-------------|----------------------------------|------|------------|-----------|------------|-----------------------------|
| 2A | Approach Lanes | 1 | | 2 or more | | Average Hourly Volume |
| | Flow Conditions | Free | Restricted | Free | Restricted | |
| | | | X | | | |
| | Major Street Approaches | 480 | 720 | 600 | 900 | |
| % Fulfilled | | | | | | 79.1% |
| 2B | Approach Lanes | 1 | | 2 or more | | Average Hourly Volume |
| | Flow Conditions | Free | Restricted | Free | Restricted | |
| | | | X | | | |
| | Traffic Crossing Major Street | 50 | 75 | 50 | 75 | |
| % Fulfilled | | | | | | 81.7% |

Signal Justification Calculation for Forecasted Volumes (OTM Book 12 - Justification 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
PM Forecast Only? N

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

| Time Period | Major Street | | | | | | Minor Street | | | | | | Peds Crossing Main Road |
|-----------------------|--------------|---------|-------|-----------|---------|-------|------------------|---------|-------|------------|---------|-------|----------------------------|
| | Arkell Road | | | | | | Amos/Zecca Drive | | | | | | |
| | Eastbound | | | Westbound | | | Northbound | | | Southbound | | | |
| | Left | Through | Right | Left | Through | Right | Left | Through | Right | Left | Through | Right | |
| 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

| | | | | | | |
|-------------|----------------------------|------|------------|-----------|------------|-----------------------------|
| 1A | Approach Lanes | 1 | | 2 or more | | Average Hourly Volume |
| | Flow Conditions | Free | Restricted | Free | Restricted | |
| | | | X | | | |
| | All Approaches | 480 | 720 | 600 | 900 | |
| % Fulfilled | | | | | | 83.3% |
| 1B | Approach Lanes | 1 | | 2 or more | | Average Hourly Volume |
| | Flow Conditions | Free | Restricted | Free | Restricted | |
| | | | X | | | |
| | Minor Street Approaches | 120 | 170 | 120 | 170 | |
| % Fulfilled | | | | | | 29.6% |

Warrant 2 - Delay To Cross Traffic

| | | | | | | |
|-------------|----------------------------------|------|------------|-----------|------------|-----------------------------|
| 2A | Approach Lanes | 1 | | 2 or more | | Average Hourly Volume |
| | Flow Conditions | Free | Restricted | Free | Restricted | |
| | | | X | | | |
| | Major Street Approaches | 480 | 720 | 600 | 900 | |
| % Fulfilled | | | | | | 76.4% |
| 2B | Approach Lanes | 1 | | 2 or more | | Average Hourly Volume |
| | Flow Conditions | Free | Restricted | Free | Restricted | |
| | | | X | | | |
| | Traffic Crossing Major Street | 50 | 75 | 50 | 75 | |
| % Fulfilled | | | | | | 38.0% |

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



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
PM Forecast Only? N

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

| Time Period | Major Street Arkell Road | | | | | | Minor Street Colonial Drive | | | | | | Peds Crossing Main Road |
|-----------------------|-----------------------------|---------|-------|-----------|---------|-------|--------------------------------|---------|-------|------------|---------|-------|----------------------------|
| | Eastbound | | | Westbound | | | Northbound | | | Southbound | | | |
| | Left | Through | Right | Left | Through | Right | Left | Through | Right | Left | Through | Right | |
| 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

| | | | | | | |
|-------------|----------------------------|------|------------|-----------|------------|-----------------------------|
| 1A | Approach Lanes | 1 | | 2 or more | | Average Hourly Volume |
| | Flow Conditions | Free | Restricted | Free | Restricted | |
| | | | X | | | |
| | All Approaches | 480 | 720 | 600 | 900 | |
| % Fulfilled | | | | | | 101.8% |
| 1B | Approach Lanes | 1 | | 2 or more | | Average Hourly Volume |
| | Flow Conditions | Free | Restricted | Free | Restricted | |
| | | | X | | | |
| | Minor Street Approaches | 120 | 170 | 120 | 170 | |
| % Fulfilled | | | | | | 109.7% |

Warrant 2 - Delay To Cross Traffic

| | | | | | | |
|-------------|----------------------------------|------|------------|-----------|------------|-----------------------------|
| 2A | Approach Lanes | 1 | | 2 or more | | Average Hourly Volume |
| | Flow Conditions | Free | Restricted | Free | Restricted | |
| | | | X | | | |
| | Major Street Approaches | 480 | 720 | 600 | 900 | |
| % Fulfilled | | | | | | 75.9% |
| 2B | Approach Lanes | 1 | | 2 or more | | Average Hourly Volume |
| | Flow Conditions | Free | Restricted | Free | Restricted | |
| | | | X | | | |
| | Traffic Crossing Major Street | 50 | 75 | 50 | 75 | |
| % Fulfilled | | | | | | 153.0% |

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



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
PM Forecast Only? N

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

| Time Period | Major Street | | | | | | Minor Street | | | | | | Peds Crossing Main Road |
|-----------------------|--------------|---------|-------|-----------|---------|-------|--------------|---------|-------|------------|---------|-------|----------------------------|
| | Arkell Road | | | | | | 388 Access 1 | | | | | | |
| | Eastbound | | | Westbound | | | Northbound | | | Southbound | | | |
| | Left | Through | Right | Left | Through | Right | Left | Through | Right | Left | Through | Right | |
| 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

| | | | | | | |
|-------------|----------------------------|------|------------|-----------|------------|-----------------------------|
| 1A | Approach Lanes | 1 | | 2 or more | | Average Hourly Volume |
| | Flow Conditions | Free | Restricted | Free | Restricted | |
| | | | X | | | |
| | All Approaches | 480 | 720 | 600 | 900 | |
| % Fulfilled | | | | | | 89.6% |
| 1B | Approach Lanes | 1 | | 2 or more | | Average Hourly Volume |
| | Flow Conditions | Free | Restricted | Free | Restricted | |
| | | | X | | | |
| | Minor Street Approaches | 120 | 170 | 120 | 170 | |
| % Fulfilled | | | | | | 9.7% |

Warrant 2 - Delay To Cross Traffic

| | | | | | | |
|-------------|----------------------------------|------|------------|-----------|------------|-----------------------------|
| 2A | Approach Lanes | 1 | | 2 or more | | Average Hourly Volume |
| | Flow Conditions | Free | Restricted | Free | Restricted | |
| | | | X | | | |
| | Major Street Approaches | 480 | 720 | 600 | 900 | |
| % Fulfilled | | | | | | 87.3% |
| 2B | Approach Lanes | 1 | | 2 or more | | Average Hourly Volume |
| | Flow Conditions | Free | Restricted | Free | Restricted | |
| | | | X | | | |
| | Traffic Crossing Major Street | 50 | 75 | 50 | 75 | |
| % Fulfilled | | | | | | 6.7% |

Signal Justification Calculation for Forecasted Volumes (OTM Book 12 - Justification 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
PM Forecast Only? N

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

| Time Period | Major Street Victoria Road | | | | | | Minor Street 388 Access 2 | | | | | | Peds Crossing Main Road |
|-----------------------|-------------------------------|---------|-------|------------|---------|-------|------------------------------|---------|-------|-----------|---------|-------|----------------------------|
| | Northbound | | | Southbound | | | Eastbound | | | Westbound | | | |
| | Left | Through | Right | Left | Through | Right | Left | Through | Right | Left | Through | Right | |
| | | | | | | | | | | | | | |
| 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 | |

| | |
|------------|------|
| Warrant | AHV |
| 1A - All | 1303 |
| 1B - Minor | 57 |
| 2A - Major | 1247 |
| 2B - Cross | 37 |

Warrant 1 - Minimum Vehicular Volume

| | | | | | | |
|-------------|----------------------------|------|------------|-----------|------------|-----------------------------|
| 1A | Approach Lanes | 1 | | 2 or more | | Average Hourly Volume |
| | Flow Conditions | Free | Restricted | Free | Restricted | |
| | | | | X | | |
| | All Approaches | 480 | 720 | 600 | 900 | |
| % Fulfilled | | | | | | 217.2% |
| 1B | Approach Lanes | 1 | | 2 or more | | Average Hourly Volume |
| | Flow Conditions | Free | Restricted | Free | Restricted | |
| | | | | X | | |
| | Minor Street Approaches | 180 | 255 | 180 | 255 | |
| % Fulfilled | | | | | | 31.5% |

Warrant 2 - Delay To Cross Traffic

| | | | | | | |
|-------------|----------------------------------|------|------------|-----------|------------|-----------------------------|
| 2A | Approach Lanes | 1 | | 2 or more | | Average Hourly Volume |
| | Flow Conditions | Free | Restricted | Free | Restricted | |
| | | | | X | | |
| | Major Street Approaches | 480 | 720 | 600 | 900 | |
| % Fulfilled | | | | | | 207.8% |
| 2B | Approach Lanes | 1 | | 2 or more | | Average Hourly Volume |
| | Flow Conditions | Free | Restricted | Free | Restricted | |
| | | | | X | | |
| | Traffic Crossing Major Street | 50 | 75 | 50 | 75 | |
| % Fulfilled | | | | | | 73.0% |

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



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
PM Forecast Only? N

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

| Time Period | Major Street Victoria Road | | | | | | Minor Street Victoria Park Village Road | | | | | | Peds Crossing Main Road |
|-----------------------|-------------------------------|---------|-------|------------|---------|-------|--|---------|-------|-----------|---------|-------|----------------------------|
| | Northbound | | | Southbound | | | Eastbound | | | Westbound | | | |
| | Left | Through | Right | Left | Through | Right | Left | Through | Right | Left | Through | Right | |
| | | | | | | | | | | | | | |
| 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 | |

| | |
|------------|------|
| Warrant | AHV |
| 1A - All | 1439 |
| 1B - Minor | 95 |
| 2A - Major | 1344 |
| 2B - Cross | 73 |

Warrant 1 - Minimum Vehicular Volume

| | | | | | | |
|-------------|-----------------|------|------------|-----------|------------|-----------------------------|
| 1A | Approach Lanes | 1 | | 2 or more | | Average Hourly Volume |
| | Flow Conditions | Free | Restricted | Free | Restricted | |
| | | | | X | | |
| | All Approaches | 480 | 720 | 600 | 900 | |
| % Fulfilled | | | | | | 239.9% |

| | | | | | | |
|-------------|----------------------------|------|------------|-----------|------------|-----------------------------|
| 1B | Approach Lanes | 1 | | 2 or more | | Average Hourly Volume |
| | Flow Conditions | Free | Restricted | Free | Restricted | |
| | | | | X | | |
| | Minor Street Approaches | 180 | 255 | 180 | 255 | |
| % Fulfilled | | | | | | 52.9% |

Warrant 2 - Delay To Cross Traffic

| | | | | | | |
|-------------|----------------------------|------|------------|-----------|------------|-----------------------------|
| 2A | Approach Lanes | 1 | | 2 or more | | Average Hourly Volume |
| | Flow Conditions | Free | Restricted | Free | Restricted | |
| | | | | X | | |
| | Major Street Approaches | 480 | 720 | 600 | 900 | |
| % Fulfilled | | | | | | 224.0% |

| | | | | | | |
|-------------|----------------------------------|------|------------|-----------|------------|-----------------------------|
| 2B | Approach Lanes | 1 | | 2 or more | | Average Hourly Volume |
| | Flow Conditions | Free | Restricted | Free | Restricted | |
| | | | | X | | |
| | Traffic Crossing Major Street | 50 | 75 | 50 | 75 | |
| % Fulfilled | | | | | | 145.5% |