

# 403 Richmond Road

## Transportation Impact Assessment



September 10, 2020

CIMA+ file number: A001046



# 403 Richmond Road

## Transportation Impact Assessment

Prepared for:

Starwood Group Inc.  
115 Champagne Ave, South  
Ottawa, Ontario



240 Catherine Street, Suite 110  
Ottawa, Ontario, Canada K2P 2G8

CIMA+ file number: A001046  
September 10, 2020

## Table of Contents

<b>1.</b>	<b>Step 1 - Screening Form .....</b>	<b>1</b>
<b>2.</b>	<b>Step 2 - Scoping.....</b>	<b>1</b>
2.1	Existing and Planned Conditions .....	1
	Description of Proposed Development.....	1
	Existing Conditions.....	4
	Area Road Network.....	4
	Study Area Intersections .....	4
	Existing Driveways to Adjacent Development .....	6
	Pedestrian/Cycling Network.....	8
	Transit Network.....	11
	Area Traffic Management.....	13
	Peak Hour Travel Demands.....	15
	Existing Road Safety Conditions.....	18
	Planned Conditions .....	20
	Study Area Transportation Network Changes .....	20
	Other Area Development .....	22
2.2	Study Area and Time Periods.....	23
	Study Area.....	23
	Time Periods .....	23
	Horizon Years.....	23
2.3	Exemptions Review.....	24
<b>3.</b>	<b>Step 3 – Forecasting .....</b>	<b>25</b>
3.1	Development-Generated Travel Demand .....	25
	Trip Generation.....	25
	Travel Mode Shares .....	26
	Trip Distribution .....	27
	Trip Assignment.....	27
3.2	Background Network Travel Demands.....	29
	Transportation Network Plans.....	29
	Other Area Developments.....	29
	Background Growth.....	29
3.3	Demand Rationalization .....	30
	Existing and Background Conditions .....	30
	Adjustments to Background Network Demands.....	34
	Total Projected Conditions .....	34
	Adjustments to Site-Generated Demand .....	36
	<b>Step 4 – Analysis .....</b>	<b>37</b>
4.1	Development Design .....	37
	Design for Sustainable Modes .....	37
	Circulation and Access.....	38
	New Street Networks.....	38
4.2	Parking.....	40
	Parking Supply .....	40
	Vehicular parking .....	40
	Bike Parking .....	40
	Spillover parking.....	41
4.3	Boundary Street Design .....	41
	Mobility .....	41
	Segment MMLOS Summary .....	41
	Pedestrian LOS.....	42
	Bike LOS .....	42
	Transit LOS .....	42
	Truck LOS .....	42

	Road Safety.....	43
	Neighbourhood Traffic Management (NTM) .....	44
4.4	Access Intersection Design .....	44
	Location and Design of Access.....	44
	Intersection Control .....	44
	Intersection Design.....	45
	Intersection MMLOS Summary.....	45
	Pedestrian LOS.....	45
	Bike LOS .....	45
	Transit LOS .....	46
	Truck LOS .....	46
	Auto LOS.....	46
4.5	Transportation Demand Management.....	46
4.6	Neighbourhood Traffic Management.....	46
4.7	Transit.....	46
	Route Capacity .....	46
	Transit Priority .....	47
4.8	Review of Network Concept .....	47
4.9	Intersection Design.....	47
	Intersection Control .....	47
	Intersection Design.....	47
5.	<b>Findings and Recommendations .....</b>	<b>48</b>

## List of Tables

Table 1:	OC Transpo Stop Information.....	11
Table 2:	OC Transpo Route Information .....	12
Table 3:	Area Development .....	22
Table 4:	Module Exemption Review .....	24
Table 5:	ITE Trip Generation Rates.....	25
Table 6:	Modified Person Site Trip Generation (Phase 1 & Phase 2) .....	26
Table 7:	Projected Vehicular Site Trip Generation .....	27
Table 8:	Study Area Intersection Operations - Existing Conditions .....	31
Table 9:	Study Area Intersection Operations - 2025 and Beyond Background Conditions .....	33
Table 10:	Study Area Intersection Operations - Total Projected Conditions (2025, 2030) .....	35
Table 11:	Existing Transit Facilities .....	37
Table 12:	Vehicular Parking Supply .....	40
Table 13:	Bike Parking Supply .....	40
Table 15:	Segment MMLOS – Existing LOS(Target LOS) .....	42
Table 15:	Historical Collision Data Summary by Road Segment .....	43
Table 16:	Historical Collision Data Summary by Intersection.....	44
Table 17:	Intersection MMLOS – Existing LOS(Target LOS).....	45

## List of Figures

Figure 1:	Local Context .....	2
Figure 2:	Proposed Development Concept Plan .....	3
Figure 3:	Adjacent Driveways.....	7
Figure 4:	Existing Pedestrian Network .....	9
Figure 5:	Existing Cycling Network.....	10
Figure 6:	Transit Routes Within Study Area (Source: OC Transpo System Map) .....	12



Figure 7: Transit Stops Within Study Area .....	13
Figure 8: Area Traffic Management.....	14
Figure 9: Existing Vehicular Volumes AM(PM) .....	16
Figure 10: Existing Volumes AM(PM) - Non-motorists.....	17
Figure 11: Collision Frequency.....	19
Figure 12: Connectivity Projects Near Dominion Station .....	20
Figure 13: Upcoming Constructions and Infrastructure Projects.....	22
Figure 14: 'New' Projected Site-Generated Traffic.....	28
Figure 15: 'Pass-by' Projected Site-Generated Traffic.....	28
Figure 16: Combined Volumes from Adjacent TIA Studies .....	29
Figure 17: Background Traffic Volumes (2025, 2030).....	30
Figure 18: Total Projected Traffic Volumes (2025,2030).....	34
Figure 19: Circulation and Access.....	39
Figure 20: Road Classification.....	41

## List of Appendices

Appendix A – Traffic Count Data

Appendix B – Collision Data

Appendix C – Excerpts from 371 Richmond Road, 386 Richmond Road, 319 - 327 Richmond Road and Byron-Ravenhill Complex

Appendix D – Existing and Background Conditions Output Data

Appendix E – Total Projected Conditions Output Data

Appendix F – Transportation Demand Management (TDM) Strategies

Appendix G – Segment MMLOS

Appendix H – Collision Analysis

Appendix I – Intersection MMLOS

Appendix J – TDM Checklist

Appendix K – Transit Map

Appendix L – Transit Ridership Data

## 1. Step 1 - Screening Form

With respect to the City of Ottawa's 2017 Transportation Impact Assessment (TIA) Guidelines, the proposed development (described below in Section 2.1) triggered the trip generation, location, and the safety criteria outlined in the City's TIA Step 1 – Screening form. Given these three (3) triggers were met, a formal TIA (i.e. completed Steps 1-5) must accompany the subject development application.

## 2. Step 2 - Scoping

### 2.1 Existing and Planned Conditions

#### *Description of Proposed Development*

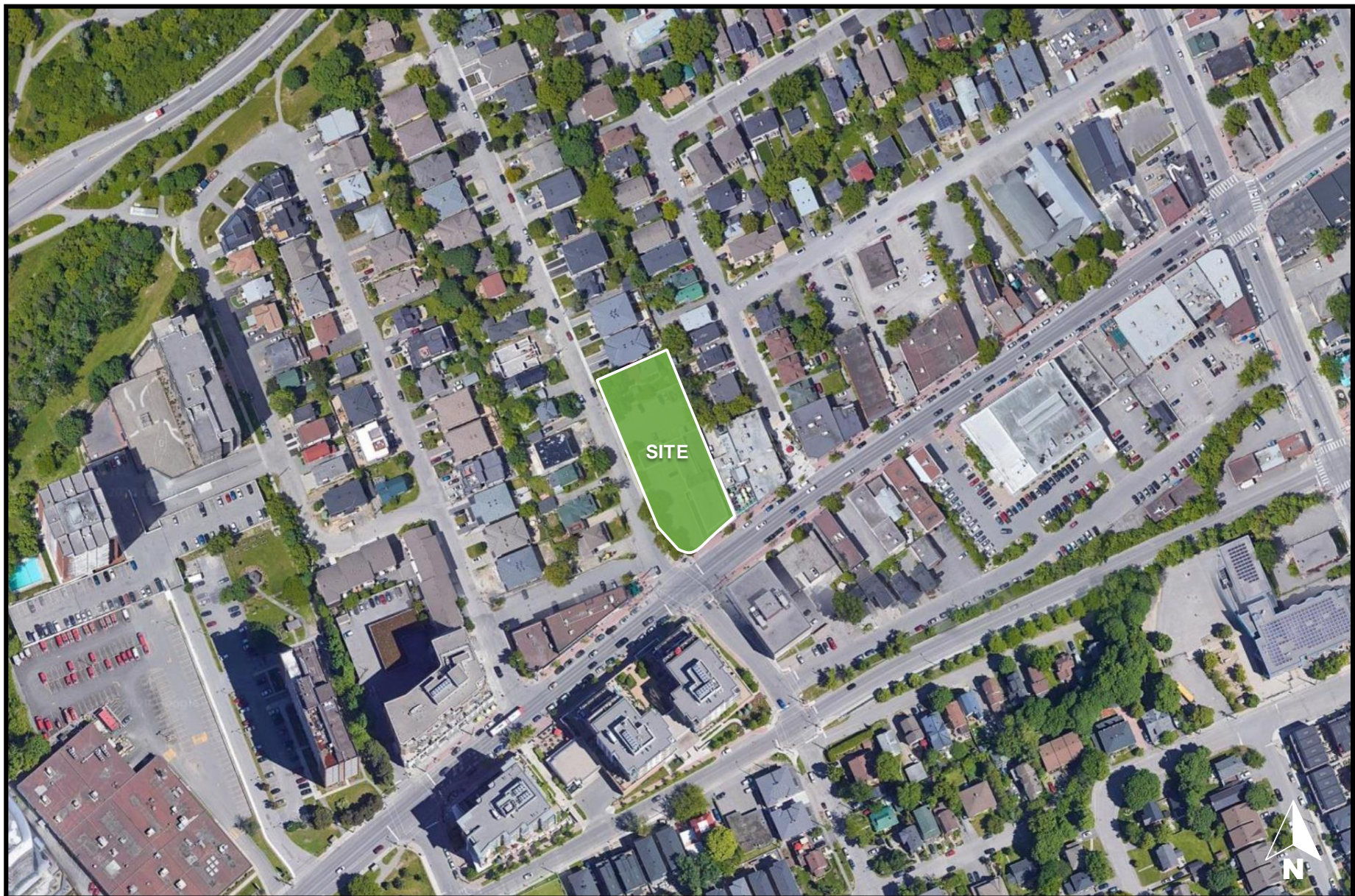
The subject site is municipally known as 403 Richmond Road and 389 Roosevelt Avenue, and is currently bound by Richmond Road to the south, Roosevelt Avenue to the west, commercial/residential land uses to the east and residential land uses to the north. Based on the available/provided information, the subject site is currently occupied by a funeral home (403 Richmond Road) and a single family home (389 Roosevelt Avenue) and is planned to be replaced by a 9 storey mix-used building with 170 residential units, a 10<sup>th</sup> floor amenity space and 6,286 ft<sup>2</sup> of ground floor commercial space. The development will be constructed in a single phase, with an estimated build-out year of 2025.

The latest Concept Plan depicts that the development will have one vehicular full-movement access point utilizing the existing driveway connection at Roosevelt Avenue, which is to the west of the site. All parking will be provided in an underground parking facility with access/egress located on the back side of the building. There will be no vehicular access point from Richmond Road (i.e. the existing driveway connection to Richmond Road will be closed).

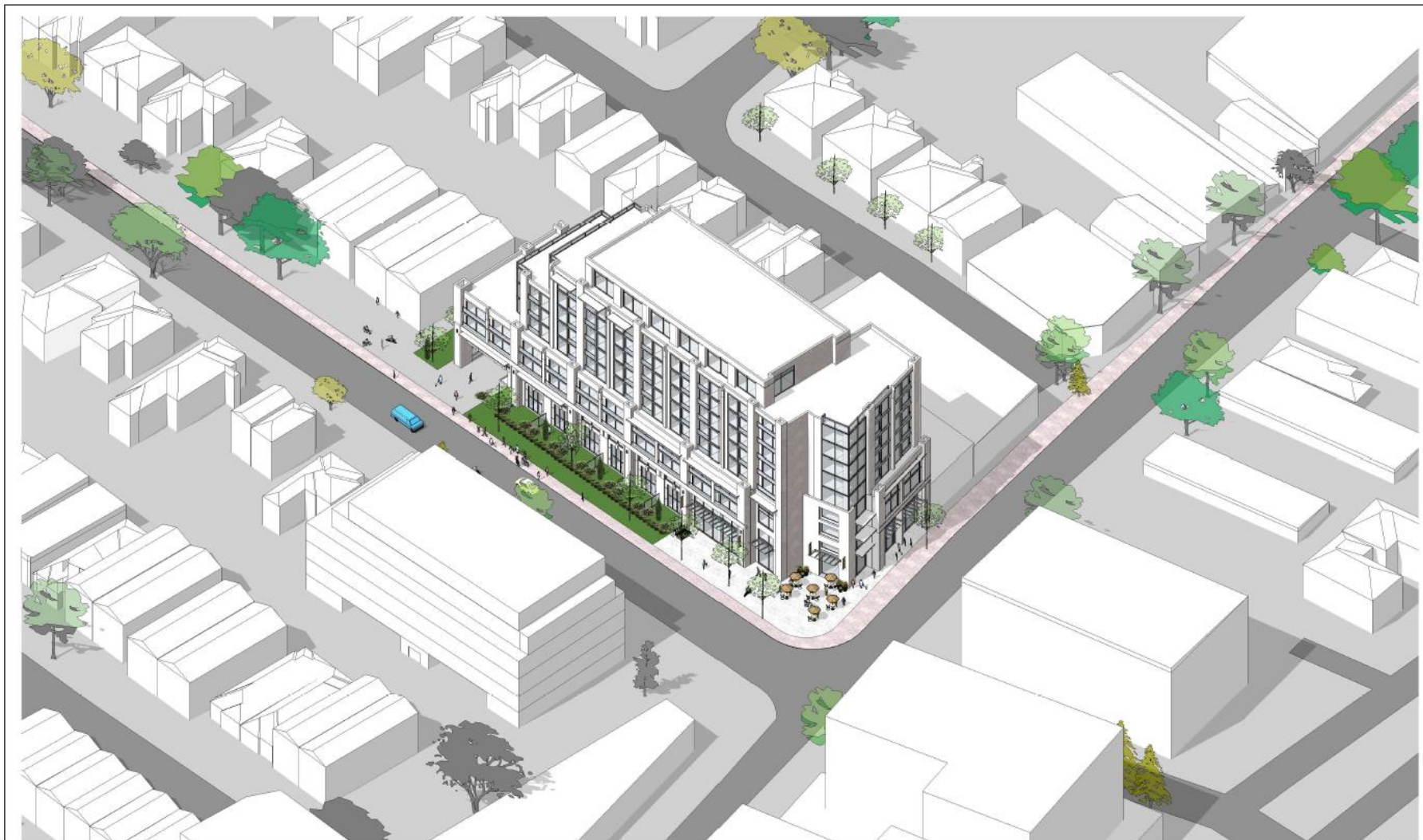
Pedestrians will have direct access to existing sidewalks along both Roosevelt Avenue and Richmond Road, which connects with a well-developed surrounding pedestrian network. Cyclists will be able to use the dedicated cycling network along Scott Street to the north, or Byron Avenue to the south to access the City's established off-road cycling network. The surrounding active transportation network also provides convenient access to/from the public transit via the existing BRT Dominion station, as well as local bus service along Richmond Road and Churchill Avenue.

The local context of the subject development site is provided in the following **Figure 1**, and the proposed Concept Plan is provided in the subsequent **Figure 2**.









rla/architecture

AERIAL VIEW  
SCALE  
17/JULY/2020

403 RICHMOND ROAD  
OTTAWA, ON

STARWOOD GROUP INC.

SHEET #  
D109  
PLOT 140

## Existing Conditions

### Area Road Network

**Richmond Road** is a two-lane arterial roadway (i.e. one travel lane per direction) south of the subjected site. It extends from the Island Park Drive in the east and continue as Robertson Road in the west. Within the vicinity of the subject site, the speed limit is not posted (the statutory speed limit is 50 km/h), and on-street parking is permitted along both sides of the roadway between Golden Avenue and Churchill Avenue.

**Roosevelt Avenue** is a two-lane local roadway (i.e. one travel lane per direction) west of the subject site. It extends from the Cole Avenue South in the south and terminates south of the Transitway. Within the vicinity of the subject site, the posted speed limit is 40 km/h, and on-street parking is not permitted along either side of the roadway between Richmond Road and Byron Avenue.

**Churchill Avenue North** is a two-lane major collector roadway (i.e. one travel lane per direction), which extends north-south from Ferndale Avenue in the north and it terminates at the HWY 417 in the south. Its classified as arterial roadway between Richmond Road and Scott Street, a major collector between Richmond Road and HWY 417 and it is a local road between Scott Street and Ferndale Avenue. Within the vicinity of the subject site, the speed limit is not posted (the statutory speed limit is 50 km/h), and on-street parking is generally permitted along both sides of the roadway.

**Byron Avenue** is a two-lane collector roadway (i.e. one travel lane per direction), which extends from the Richardson Avenue in the west to Holland Avenue in the east. Within the vicinity of the subject site, the speed limit is not posted (the statutory speed limit is 50 km/h), and on-street parking is not permitted along either side of the roadway between Golden Avenue and Churchill Avenue.

**Golden Avenue** is a two-lane local roadway (i.e. one travel lane per direction), it extends from Tillbury Avenue in the south to Richmond Road in the north. Within the vicinity of the subject site, the speed limit is not posted (the statutory speed limit is 50 km/h), and on-street parking is permitted along the east side of the roadway between Richmond Road and Byron Avenue.

### Study Area Intersections

#### Richmond/Golden

The Richmond/Golden intersection is a signalized, four-legged intersection. The eastbound approach consists of one through lane and a single left-turn lane. The remaining north, south and westbound approaches consist of a single shared lane that accommodates all movements. It should be noted that the southbound approach is a private driveway connection.

All movements are permitted at this location. The crosswalk type is standard transverse marking, and a bike box is provided on the southbound approach.

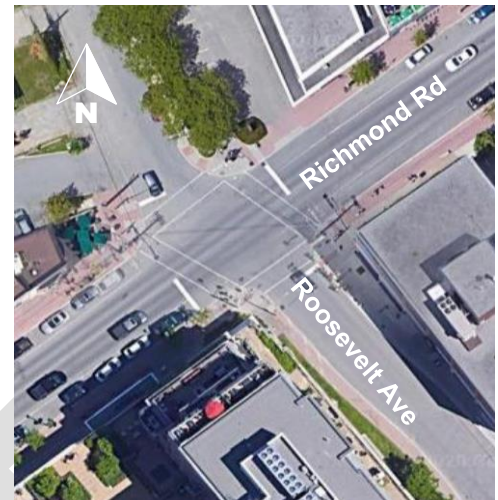




### Richmond/Roosevelt

The Richmond/Roosevelt intersection is a signalized four-legged intersection. All approaches consist of a single shared lane that accommodates all movements.

All movements are permitted at this location. However, it should be noted that heavy vehicles are not permitted on Roosevelt Avenue, south of Richmond Road. The crosswalk type is standard transverse marking, and no cycling accommodation.



### Richmond/Churchill

The Richmond/Churchill intersection is a signalized four-legged intersection. The north and southbound approaches consist of a single lane that accommodates all movements. The east and westbound approaches consist of a single shared through/right-turn lane and a single auxiliary left-turn lane.

All movements are permitted at this location. The crosswalk type is zebra stripe high visibility marking, and no cycling accommodation.



### Byron/Roosevelt

The Byron/Roosevelt intersection is a signalized four-legged intersection. All approaches consist of a single lane that accommodates all possible movements.

All movements are permitted at this location. The crosswalk type is standard transverse marking. The eastbound cycling lane is painted green through the intersection with respect to cycling accommodation.



### Byron/Churchill

The Byron/Churchill intersection is a signalized four-legged intersection. The east and westbound approaches consist of a single lane that accommodates all movements. The north and southbound approaches consist of a single shared through/right-turn lane and a single left-turn lane.

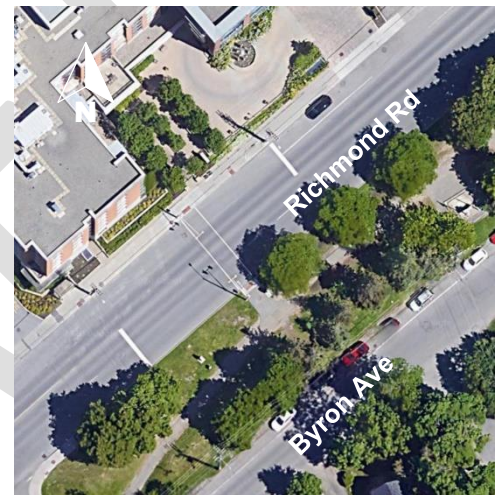
All movements are permitted at this location. However, it should be noted that heavy vehicles are not permitted on Byron Avenue, east of Churchill Avenue North. The crosswalk type is zebra stripe high visibility marking, and no cycling accommodation. The eastbound cycling lane is painted in dashed lines through the intersection with respect to cycling accommodation.



### Richmond/Pedestrian Crossing

The Richmond Road signalized pedestrian crosswalk connects to pedestrian sidewalks and the Byron Multi-use Pathway (MUP). The eastbound approach consists of a two through lanes, and the westbound approach consist one through lane. This signal is activated by a pedestrian pushbutton.

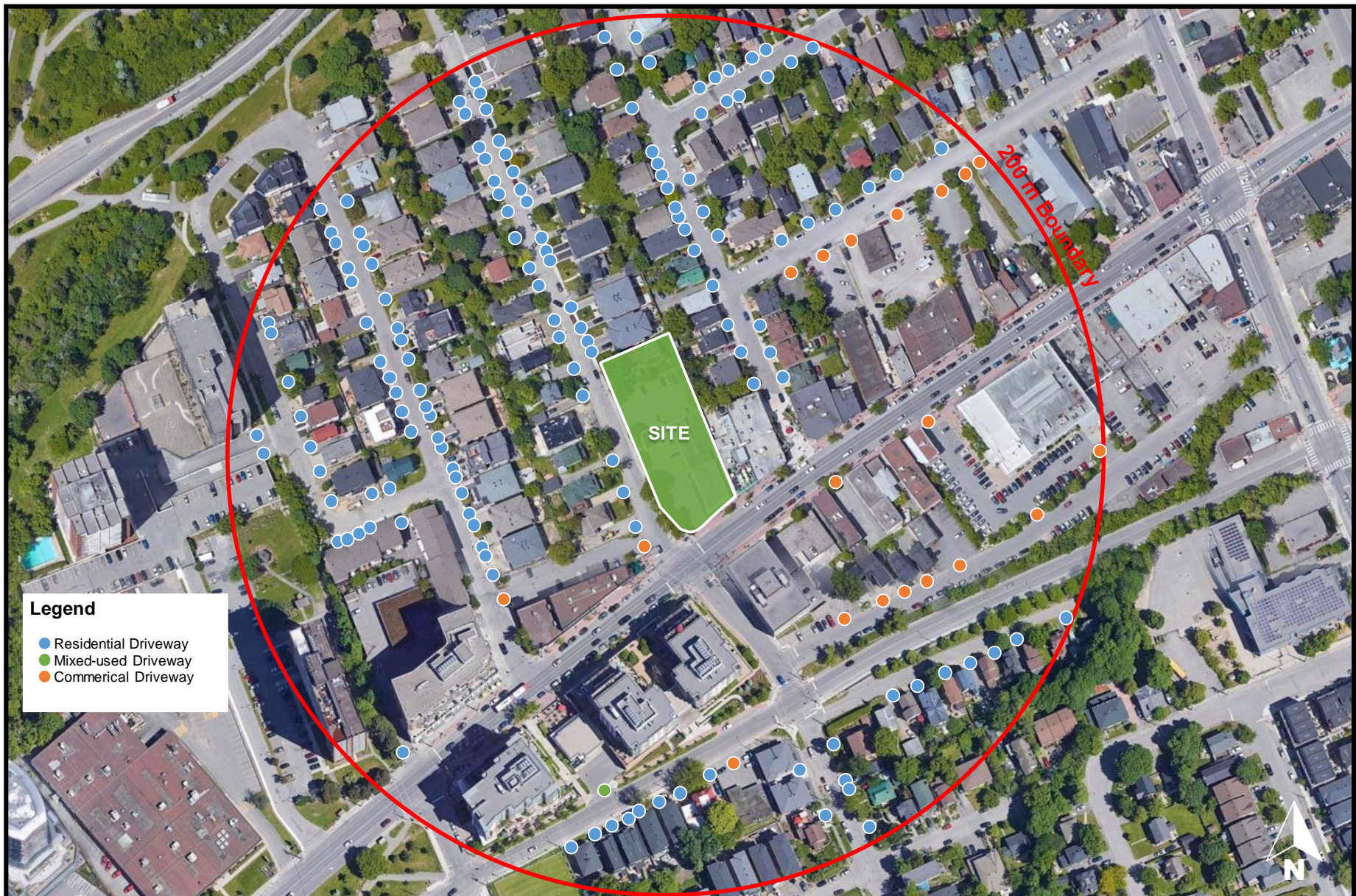
The crosswalk type is standard transverse marking, and no cycling accommodation.



### Existing Driveways to Adjacent Development

There are approximately 162 driveways within a 200 m boundary of the site. Approximately 90% of the driveways provide access/egress for private, low-rise residential land uses, such as single-family homes and townhouses, and no driveways are provided directly to Richmond Road within the study area, with the exception to the MEC Ottawa store and a Scotia Bank (both stores have a full-movement driveway connection, west of their store fronts). The majority of land uses along Richmond Road have rear yard access/egress (i.e. no direct access to/from Richmond Road). Detailed driveway location and associated land uses are depicted in the following **Figure 3**.







### ***Pedestrian/Cycling Network***

The network for active transportation modes in the vicinity of the subject site is fairly well developed. Sidewalks on Richmond Road, Churchill Avenue North, Golden Avenue (between Richmond and Byron), and Byron Avenue (between Golden and Roosevelt) are provided along both sides of the roadway. Along Roosevelt Avenue, sidewalks are only provided on the east side of the roadway, along the subject site's frontage. Along Byron Avenue, between Roosevelt and Churchill Avenue North, a sidewalk is only provided on the south side of the roadway. A bi-directional multi-use pathway (MUP) is provided along the north side of Byron Avenue west past Golden Avenue and east past Eden Avenue. In addition to the Byron Avenue MUP, there is an existing eastbound bike lane on the south side of Byron Avenue beginning at Golden Avenue, connecting the MUP and the cycle tracks on Churchill Avenue, south of Byron Avenue. To the north of the site, there is an entrance to the MUP network at the north end of Roosevelt Avenue. This provides connections to the City's extensive MUP network (e.g. NCC MUPs, MUP along Scott Street, etc.).

The existing pedestrian/cycling network within the vicinity of the subject site, and how it connects to the greater network for active modes is depicted as **Figure 4** and **Figure 5**, as sourced from the City's online maps (i.e. GeoOttawa).



### Figure 4: Existing Pedestrian Network





### Figure 5: Existing Cycling Network

### Transit Network

OC Transpo currently provides high-order BRT transit service within the vicinity of the subject site. The Dominion BRT Station, located in the north, is approximately 500 m (approximate 6 min) walking distance to/from the proposed development site. Given this close proximity, the subject development will benefit from convenient access to/from OC Transpo's Rapid Transit network, which will reduce the reliance on the private automobile.

In addition to the BRT service, there are eight (8) OC Transpo local transit bus stops that are located within walking distance to/from the subject development site. The following **Table 1** summarizes existing bus stops, their associated routes and direction of travel.

**Table 1: OC Transpo Stop Information**

Stop #	Location	Route Identifier	Direction
#3013	500 m of (6 min) walking distance north west from the site	57,61,62,63,74,75,83,87	East/Westbound
#7406	Immediately east of Richmond/Roosevelt	11,153	Westbound
#2436	Immediately east of Richmond/Roosevelt	11,153	Eastbound
#4876	Immediately west of Richmond/Churchill	11,153	Westbound
#4987	Immediately north of Richmond/Churchill	153	Northbound
#5616	Immediately north of Richmond/Churchill	153	Southbound
#4870	Immediately east of Richmond/Churchill	11	Eastbound
#4922	Immediately west of Richmond/Golden	11,153,57,61,62,63,74,75,83,87	Westbound
#4941	Immediately west of Richmond/Golden	11,153	Eastbound
<b>Note:</b> Routes in red were detoured from Sir John A. Macdonald Parkway due to the partial closure of the parkway. The detour schedule is every Saturday and Sunday until September 6, 2020, from 8 am to 4 pm.			

The following **Figure 6** depicts the OC Transpo routes within the vicinity of the development, and **Table 2** provides additional information with respect OC Transpo service identified in **Table 1**.



Figure 6: Transit Routes Within Study Area (Source: OC Transpo System Map)

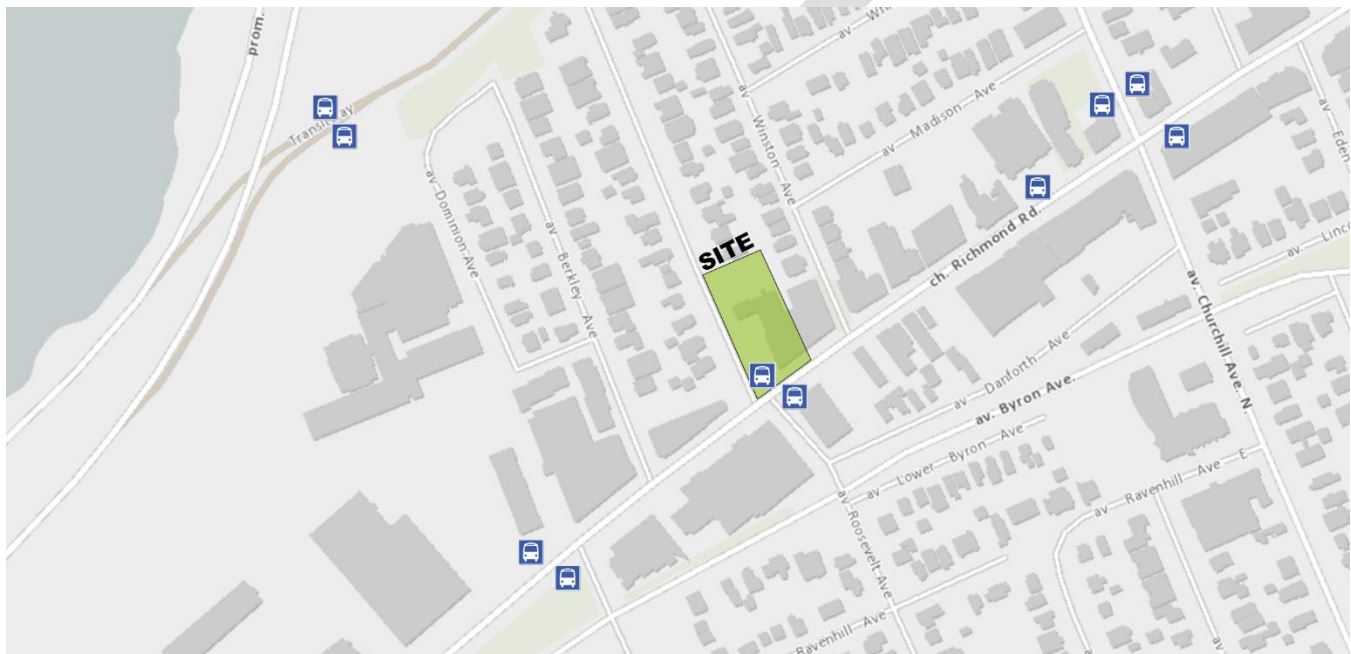
Table 2: OC Transpo Route Information

Route	Origin/Destination	Service Type	Peak Hour Headway
11	Bayshore ↔ Parliament	Frequent	15 min
153	Tunney's Pasture ↔ Lincoln Field	Local	1 schedule
57	Tunney's Pasture/N Rideau/Gatineau ↔ Bells Corners	Frequent	10 - 20 min
61	Tunney's Pasture/N Rideau/Gatineau ↔ Stittsville	Rapid	15 min
62	Tunney's Pasture ↔ Stittsville & Terry Fox	Rapid	30 min
63	Briarbrook ↔ Tunney's Pasture	Rapid	15 min
74	Tunney's Pasture ↔ Riverview	Rapid	15 min
75	Barrhaven Centre ↔ Gatineau	Rapid	15 min
83	Tunney's Pasture ↔ Viewmount	Local	15 min
87	Tunney's Pasture ↔ Baseline	Frequent	15 - 30 min



Based on information provided by the City, it should be noted that the main local transit service within the study area is provided by the Route 11 and Route 153, which utilize transit stops along Richmond Road. The two closest regular transit stops, #7406 and #2436 are immediately south to the site, 3 m (approx. <1 min) and 35 m (approx. <1 min) of walking distance from the subject development, respectively. Stop #7406 provides transit service for westbound buses that connect to Bayshore Station and stop #2436 provides transit service for eastbound buses that connect to Tunney's Pasture LRT station. The Dominion BRT station provides transit access to the city's BRT network, with a nearby transfer to the Confederation LRT line at Tunney's Pasture. Additionally, the BRT network west of Tunney's Pasture will be converted to LRT as a part of the City's Stage 2 LRT project (including the study area Dominion BRT station), to be completed by the year 2025 (before the completion of 403 Richmond).

The following **Figure 7** identifies transit stop locations with the vicinity of the subject development site.



**Figure 7: Transit Stops Within Study Area**

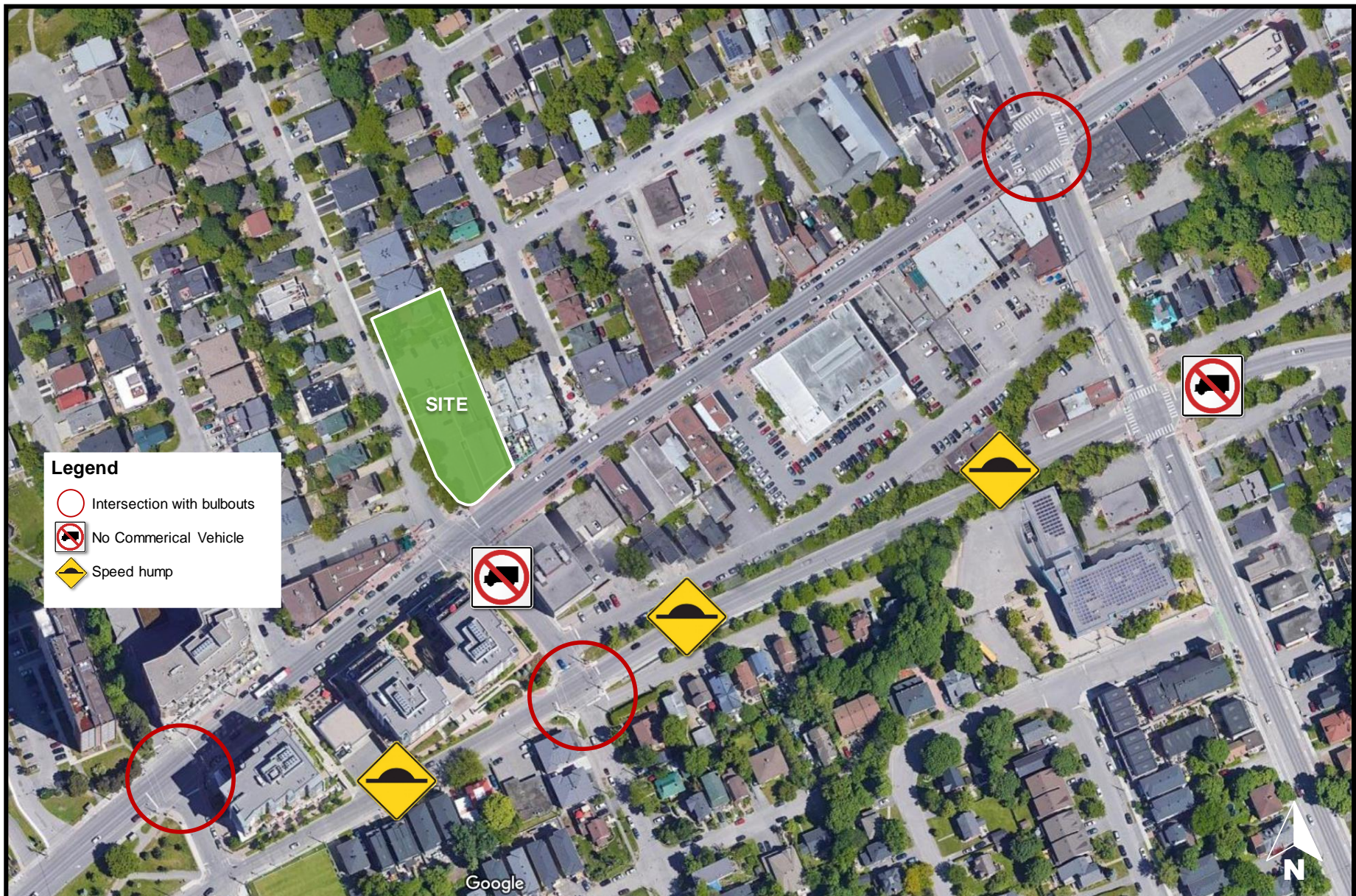
### Area Traffic Management

Within the study area, the following traffic measures are provided:

- + Bulb outs at the following intersections:
  - + Richmond/Golden;
  - + Byron/Roosevelt; and
  - + Richmond/Churchill.
- + Speed humps and speed limit signs between the Byron/Churchill and Byron/Golden intersections
- + Prohibition of heavy vehicles to enter south leg of the Roosevelt/Richmond intersection and the east leg of the Byron/Churchill intersection

The following **Figure 8** highlights some of the traffic calming measures provided within the study area.





### ***Peak Hour Travel Demands***

For the purpose of this assessment and based on discussions with City Staff, the following study area intersections have been identified for intersection capacity analysis:

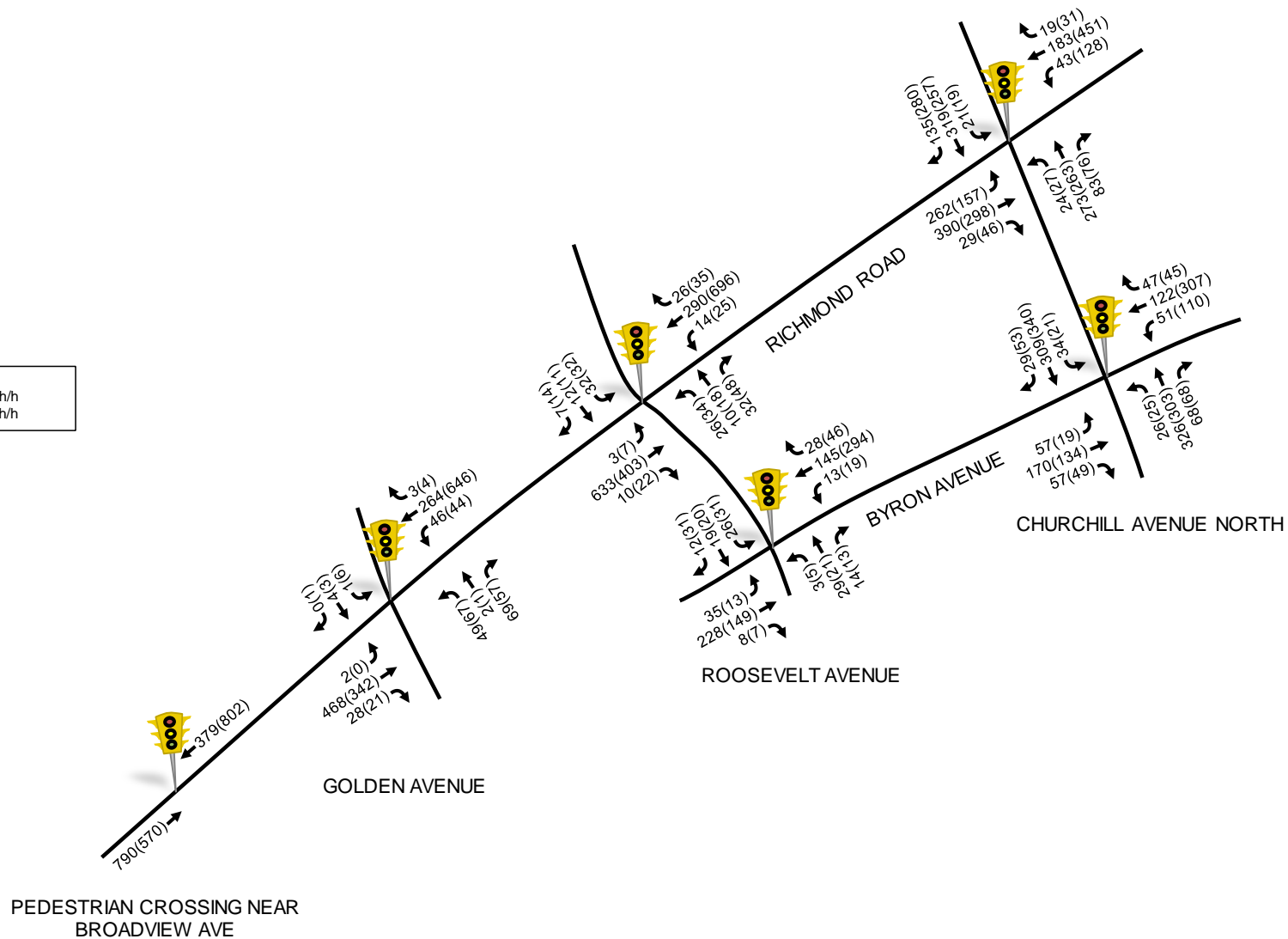
- + Richmond/Golden
- + Richmond/Roosevelt
- + Richmond/Churchill
- + Byron/Roosevelt
- + Byron/Churchill
- + Richmond/Pedestrian Crossing

The following **Figure 9** depicts observed weekday morning and afternoon peak hour vehicle volumes at the study area intersections and **Figure 10** depicts pedestrian and cyclist volumes over the same peak hours. Detailed traffic volume data is provided in **Appendix A**.





**LEGEND**  
 xx AM Peak Hour veh/h  
 (yy) PM Peak Hour veh/h





### ***Existing Road Safety Conditions***

The most recent collision history for the past five (5) years was obtained from the City (i.e. available collision data for the years 2014 – 2018, inclusive). The collision data includes all collisions occurring at intersections and roadway segments within the study area surrounding the subject development site.

Based on the most recent available historical collision data, the five-year total number of recorded collisions within the study area is 131. Most collisions within the study area (a total of 117 collisions, or 82%) resulted in property damage only, and the remaining collisions resulted in personal injuries (a total of 25 collisions, or 18%). The most frequent types of collisions, as cited by police, were rear-end (23%), SMV (20%) and angle (19%) type collisions. The following **Figure 11** is a map that depicts the locations and total number of collisions within the study area.

It should be noted that within the five (5) years of recorded collision data, there were seven (7) collisions involving pedestrians. These reported collisions involving pedestrians were non-fatal; however, personal injuries were reported for all collisions.

The source collision data is provided in **Appendix B**, and a more detail collision analysis is included in the subsequent *Step 4 - Analysis* section of this report.



1001

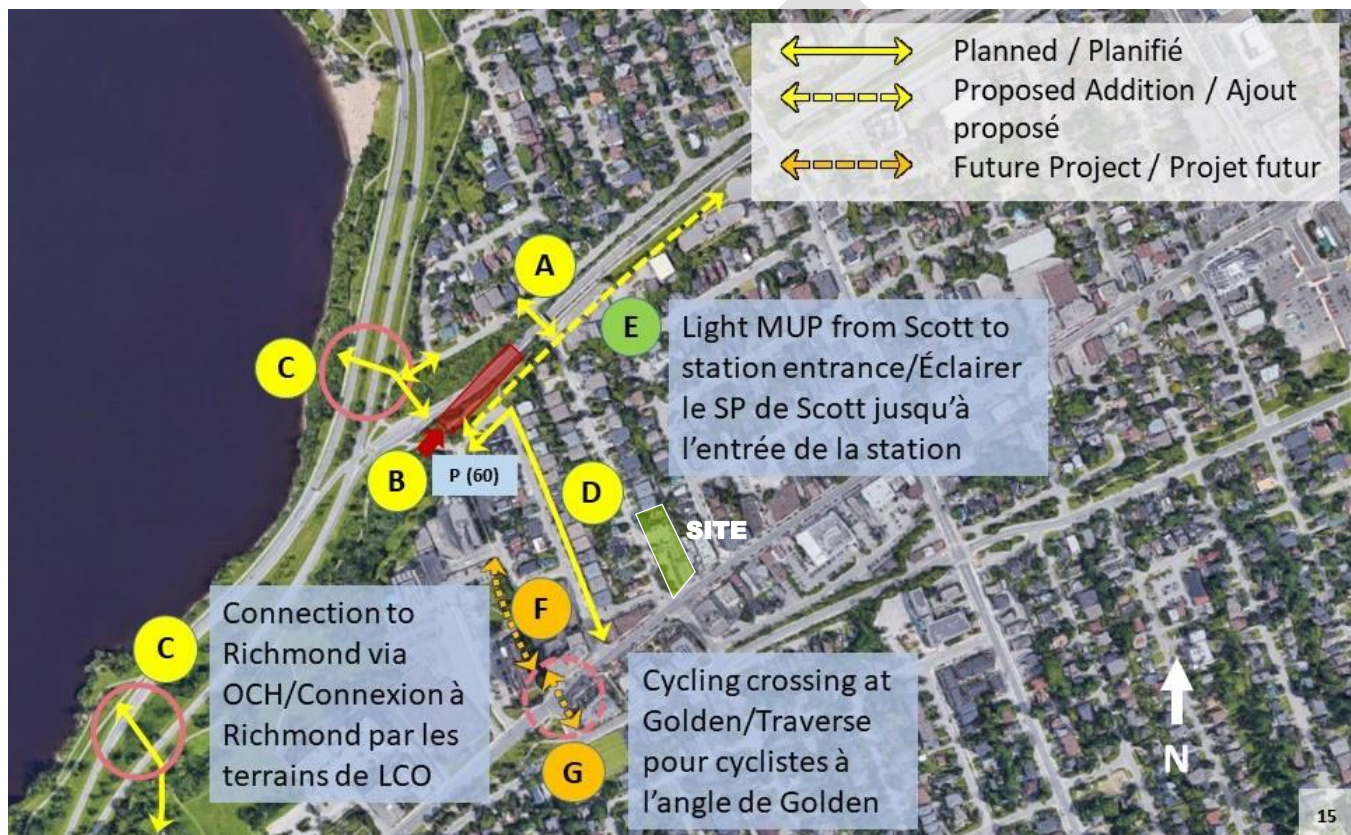
## Planned Conditions

### Study Area Transportation Network Changes

#### Transit Projects

According to City's Transportation Master Plan (TMP), transit signal priority and queue jump lanes are planned for selected intersections along Richmond Road between Woodroffe Avenue and Bank Street. This network change is identified as part of the City's planned 2031 Affordable Network.

The existing Ottawa West BRT route will be upgrade to LRT as part of the City's Stage 2 LRT extension project, with a planned completion date of 2025. This upgrade will include the reconstruction of the Dominion Station and enhanced active mobility infrastructure through the Byron-Richmond Corridor. The following **Figure 12** depicts the planned construction and upgrades, near the Dominion Station<sup>1</sup>.



**Figure 12: Connectivity Projects Near Dominion Station**

As depicted in **Figure 12**, the following should be noted:

#### Planned

- A. Replacement of pedestrian bridge over rail corridor at Roosevelt Street.
- B. Station plaza with three (3) Passenger Pick-up and Drop-off (PPUDO) parking spaces and bicycle parking for 60 bikes with space allocated to double in future when required.

<sup>1</sup> Stage 2 LRT Station Connectivity Enhancement Study, City of Ottawa

- C. New at-grade pedestrian signalized crosswalk at Sir John A. Macdonald Parkway and Rochester Field and at Dominion Station with a pedestrian connection to Workman Avenue.
- D. New sidewalk along Dominion Avenue and Berkley Avenue to connect to Richmond Road sidewalk.

#### ***Proposed Enhancements***

- E. Multi-use Pathway (MUP) with lighting along south side of alignment between Dominion Station and Churchill Street.

#### ***Feasibility Assessment***

- F. Provide MUP connection through Ottawa the Community Housing Lands.
- G. Provide signalized cycling crossing at Golden Avenue and Richmond Road.

#### ***Cycling Projects***

City of Ottawa is planning to divert the Crosstown Bikeway #2 alignment from Churchill (Scott to Richmond) and Richmond (Churchill to Golden) due to the insufficient space in the roadways for dedicated cycling infrastructure due to existing commercial buildouts and well-established on-street parking. The planned alternate route would be along Scott Street west of Churchill and along Dominion and through the 445 Richmond property. The plan will be presented to the public and formalized after the new Active Transportation Plan is approved by Council, expected in 2022-3.

Richmond and Roosevelt will remain a designated cycling route after the relocation of the Crosstown Bikeway. Cycling enhancements may be applied to Roosevelt Avenue, including markings such as sharrows and bike route signage.

A new bikeway route would follow the east-west MUP to be built as part of the Stage 2 LRT implementation from Churchill to Dominion. Although cyclists could continue west of the new station and reach the Ottawa River Pathway on a new MUP crossing of SJAM Parkway, the bikeway would turn south onto Dominion Street, travel south along this quiet street for 150 m. then across the 445 property to reach the intersection of Golden/Richmond. The bikeway is then to continue west along Richmond. Status of the project is that the planning process should be initiated soon.

#### ***Road Projects***

Referencing the City's Construction and Infrastructure Projects website, new road construction projects are not anticipated to impact the study area network. However, it should be noted that segments of Richmond Road and Byron Avenue, fringing the study area, are scheduled for construction this year (2020) and within the next two years, respectively. The linear construction projects are shown below by year of planned construction in **Figure 13**.



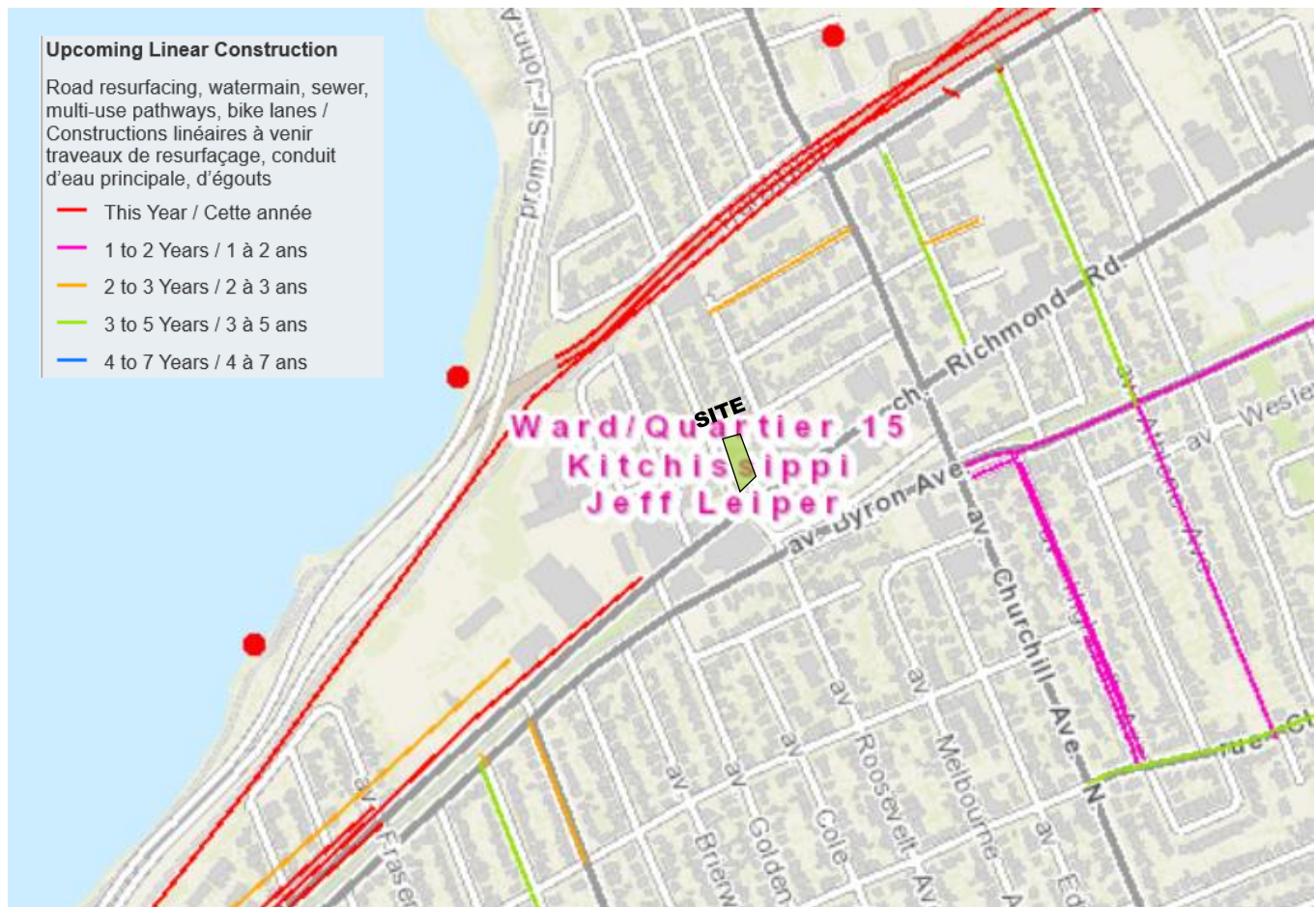


Figure 13: Upcoming Constructions and Infrastructure Projects

### Other Area Development

Planned developments within the vicinity of the subject site have been identified using the City's online Development Application Search Tool. The following **Table 3** below summarizes registered developments within the vicinity of the subject development lands.

Table 3: Area Development

Location	Anticipated Build-Out Year	Size	Land Use
576,570,566 Byron Ave 425,419,417,415,411 Ravenhill Ave 440,436 Roosevelt Ave	2019	64 units (replacing 34 units)	Apartments
386 Richmond	2020	16 apartment units 230 m <sup>2</sup> office	Mixed-Used Development
371 Richmond	TBD	100 units	Condominium
319 - 327 Richmond Road, 380 Winona Avenue, 381 Churchill Avenue	2022	184 apartment units 1738 m <sup>2</sup> retail	Mixed-Used Development

It should be noted that the projected impact of the developments summarized in **Table 3** has been included in the subsequent *Step 3 - Forecasting* section of this report.

## 2.2 Study Area and Time Periods

### *Study Area*

As previously mentioned, City staff confirmed the following study area intersections for the purpose of this assessment:

- + Richmond/Golden
- + Richmond/Roosevelt
- + Richmond/Churchill
- + Byron/Roosevelt
- + Byron/Churchill
- + Richmond/Pedestrian Crossing

### *Time Periods*

Given that the surrounding road network (e.g. Richmond Road, Roosevelt Avenue, etc.) typically experiences the heaviest traffic volumes during the weekday morning and afternoon peak hours, this assessment considered weekday morning and afternoon peak hours for analysis purposes only.

### *Horizon Years*

For the purpose of this assessment, the following development timeline was assumed:

- + **2025:** Estimated full build-out of the subject development; and
- + **2030:** 5-years beyond full build-out, consistent with the City's TIA Guidelines.



## 2.3 Exemptions Review

Given the size and nature of the proposed development lands, **Table 4** highlights which elements identified in the 2017 Transportation Impact Assessment Guidelines can be exempt from this analysis.

*Table 4: Module Exemption Review*

Module	Element	Exemption Criteria	Exemption Status
<b>Design Review</b>			
4.1 Development Design	4.1.2 Circulation and Access	Required for Site Plans	<b>Not Exempt</b>
	4.1.3 New Street Network	Required for Plans of Subdivision	Exempt
4.2 Parking	4.2.1 Parking Supply	Required for Site Plans	<b>Not Exempt</b>
	4.2.2 Spillover Parking	Required for Site Plans where parking supply will be 15% below unconstrained demand	Exempt
<b>Network Impact</b>			
4.5 Transportation Demand Management	All Elements	Not required for non-residential Site Plans expected to have fewer than 60 employees and/or students on location at any given time	<b>Not Exempt</b>
4.6 Neighbourhood Traffic Management	All Elements	Required when the development relies on local or collector streets for access and total volumes exceed ATM capacity thresholds	<b>Not Exempt</b>
4.8 Network Concept	All Elements	Required when development is projected to generate more than 200 person-trips during the peak hour, in excess of the equivalent volume permitted by the established zoning	Exempt

### 3. Step 3 – Forecasting

#### 3.1 Development-Generated Travel Demand

##### *Trip Generation*

As previously described, the subject site is currently occupied by a funeral home, which is currently envisioned to be replaced by a 9-storey mixed use building, including 170 dwelling units and a 10<sup>th</sup> floor amenity space, with ground floor retail space of approximately 6,286 ft<sup>2</sup> GFA. The proposed development will be built in a single phase, with an anticipated buildout year in 2025.

For the purpose of this assessment, projected site-generated traffic was estimated using appropriate trip generation rates from the 10<sup>th</sup> Edition of the Institute of Transportation Engineers (ITE) Trip Generation Manual and the Ottawa-specific TRANS Trip Generation Study Report from 2009. Based on the location and type of the development envisioned, the following **Table 5** summarizes appropriate trip generation rates for estimating projected site-generated traffic.

*Table 5: ITE Trip Generation Rates*

Land Use	ITE Land Use Code	AM Peak Hour	PM Peak Hour
Apartment	TRANS Study Table 6.3 & 3.13 Person Trips	$T = 0.65(X);$	$T = 0.70 (X);$
Ground Floor Retail	ITE 814 General Urban/Suburban Vehicle Trips	$T = 3.18 (X);$	$T = 6.84 (X);$
Notes: $T$ = Average Trip Ends $X = 1,000 \text{ ft}^2$ of Gross Floor Area / Apartment dwelling units			

With respect to ITE trip generation rates, the data used to develop these rates only include vehicle trips (i.e. walking, cycling and transit trips are not captured in this data). To properly consider the multi-modal trips generated by the proposed development, projected site-generated traffic (estimated using ITE trip generation rates) are converted to projected site-generated person trips, which can then be subdivided into different transportation modes based on area travel patterns and available facilities/network connections (e.g. the availability of transit, walking and cycling facilities).

To convert projected ITE vehicle trips to person trips, an auto occupancy factor and non-auto trip factor is applied to the ITE trip generation rates. With respect to the City's TIA Guidelines, and based on available American Census data, the typical modal share of non-auto person trips is approximately 10% and the typical auto occupancy is 1.15. Therefore, when combined, a factor of 1.28 is used to convert vehicle trips to person trips.

Based on the foregoing, the projected weekday morning and afternoon peak hour person trip generation for the proposed development is summarized in **Table 6**.

**Table 6: Modified Person Site Trip Generation (Phase 1 & Phase 2)**

Land Use	Units/Area (ft <sup>2</sup> )	AM Peak (Person Trips/h)			PM Peak (Person Trips/h)		
		In	Out	Total	In	Out	Total
Apartment	170 units	26	84	110	72	47	119
Ground Floor Commercial	6,286 ft <sup>2</sup>	14	12	26	28	27	55
<b>Total 'New' Person Trips</b>		<b>40</b>	<b>96</b>	<b>136</b>	<b>100</b>	<b>74</b>	<b>174</b>

As summarized in **Table 6**, the proposed development is projected to generate an approximate two-way total of 136 and 174 person trips/h during weekday morning and afternoon peak hours, respectively. Directional distribution (i.e. inbound vs outbound trips) was obtained from the ITE Trip Generation Manual and the TRANS Trip Generation Study Report.

To determine the number of person trips arriving/departing by travel mode, total projected person trips are subdivided by mode share values, derived from the 2011 TRANS National Capital Region (NCR) Origin-Destination (OD) survey data, the nature/context of the proposed development and local area knowledge. Key factors that are taken into consideration, beyond NCR OD survey data, include; proximity and quality of transit, pedestrian and cycling facilities, purpose of trips, etc.

It should be noted that a small percentage of the projected site-generated trips can be attributed to 'pass-by' traffic (i.e. a quick diversion to/from the new development on someone's normal daily commute). This does not impact overall network capacity, as 'pass-by' trips is traffic already using the adjacent transportation network; however, 'pass-by' trips do impact the performance of turning movements at intersections, typically where development site access/egress is provided.

### **Travel Mode Shares**

Following discussions with City staff regarding the subject site's proximity/connectivity to higher order transit (i.e. its proximity to bus rapid transit/BRT service), it was agreed that the proposed development will likely have a travel mode share similar to the City's 2014 Transit Oriented Development (TOD) Plans. As such, the following summarizes the projected modal split of site-generated traffic for the subject development:

15% Auto Driver;  
5% Auto Passenger;  
65% Transit; and  
+ 15% Walk and Cycling.  

---

100%

Based on the foregoing, the vehicle trips generated by the proposed development was calculated and summarized in **Table 7** below.

**Table 7: Projected Vehicular Site Trip Generation**

Travel Mode	Mode Share	AM Peak (Person Trips/hr)			PM Peak (Person Trips/hr)		
		In	Out	Total	In	Out	Total
Auto Driver	15%	7	15	22	16	13	29
Auto Passenger	5%	2	6	8	5	3	8
Transit	65%	26	62	88	65	47	112
Non-motorized	15%	5	13	18	14	11	25
Total Person Trips	100%	40	96	136	100	74	174
<i>Less Pass-by (34%, PM only)</i>		0	0	0	0	-2	-2
<b>Total 'New' Auto Trips</b>		<b>7</b>	<b>15</b>	<b>22</b>	<b>14</b>	<b>11</b>	<b>25</b>

As shown in **Table 7**, the proposed development is projected to generate approximate two-way vehicle volumes of 22 veh/h and 25 veh/h during weekday morning and afternoon peak hours, respectively.

With regard to active modes, the proposed development is projected to generate approximate two-way person trips in the order of 18 trips/h and 25 trips/h, during weekday morning and afternoon peak hours, respectively.

With regard to transit trips during weekday morning and afternoon peak hours, the proposed development is projected to generate approximately two-way person trips in the order of 106 trips/h and 137 trips/h, respectively. It should be noted that given most transit trips begin or end as an active mode, it can be expected that approximately 1 trips/h and 184 trips/h will be made to/from the subject development as an active mode during weekday morning and afternoon peak hours, respectively.

It should be noted that, due to the low trip generation from the commercial site (5 and 6 'new' auto trips generated by the site during AM and PM peak hour, respectively), the internal trip reduction between the residential portion and the commercial portion of the development was not considered.

### **Trip Distribution**

The projected distribution of site-generated traffic was derived based on existing travel patterns, the site's connections to/from the surrounding road network, our local area knowledge (e.g. the location and proximity of other area shopping, communities, recreational opportunities, etc.). For analysis purposes and to be consistent with other area studies, the following approximate distribution of projected site-generated traffic was assumed:

50% to/from the east via Richmond Road;  
20% to/from the west via Richmond Road;  
10% to/from the north via Churchill Avenue North;  
10% to/from the south via Churchill Avenue North; and,  
+ 10% to/from the south via Roosevelt Avenue.  

---

100%

### **Trip Assignment**

Based on the above assumed distribution, projected 'new' site-generated traffic was assigned to the study area network and is depicted in the following **Figure 14**. Similarly, projected 'pass-by' site-generated traffic, which represents existing traffic temporarily diverted to/from the subject site, is depicted in the following **Figure 15**.

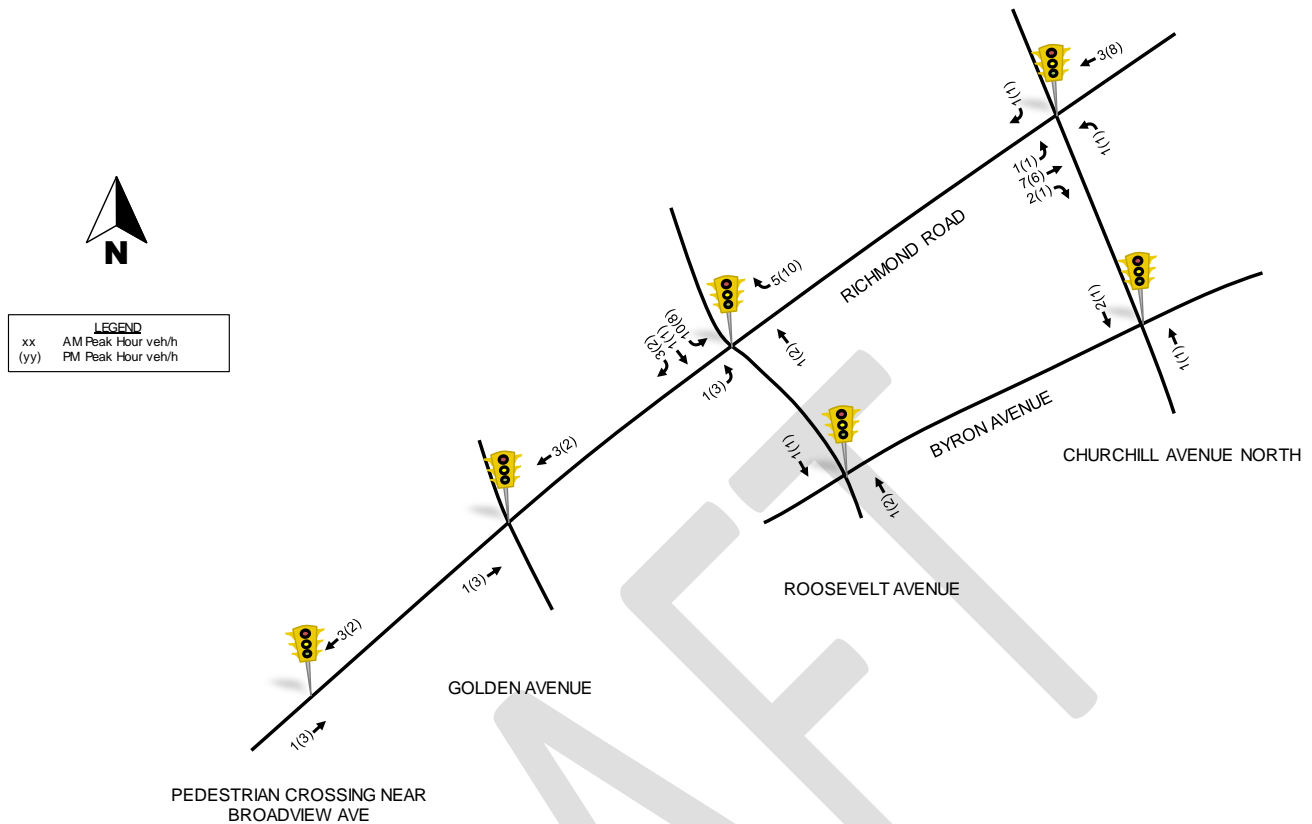


Figure 14: 'New' Projected Site-Generated Traffic

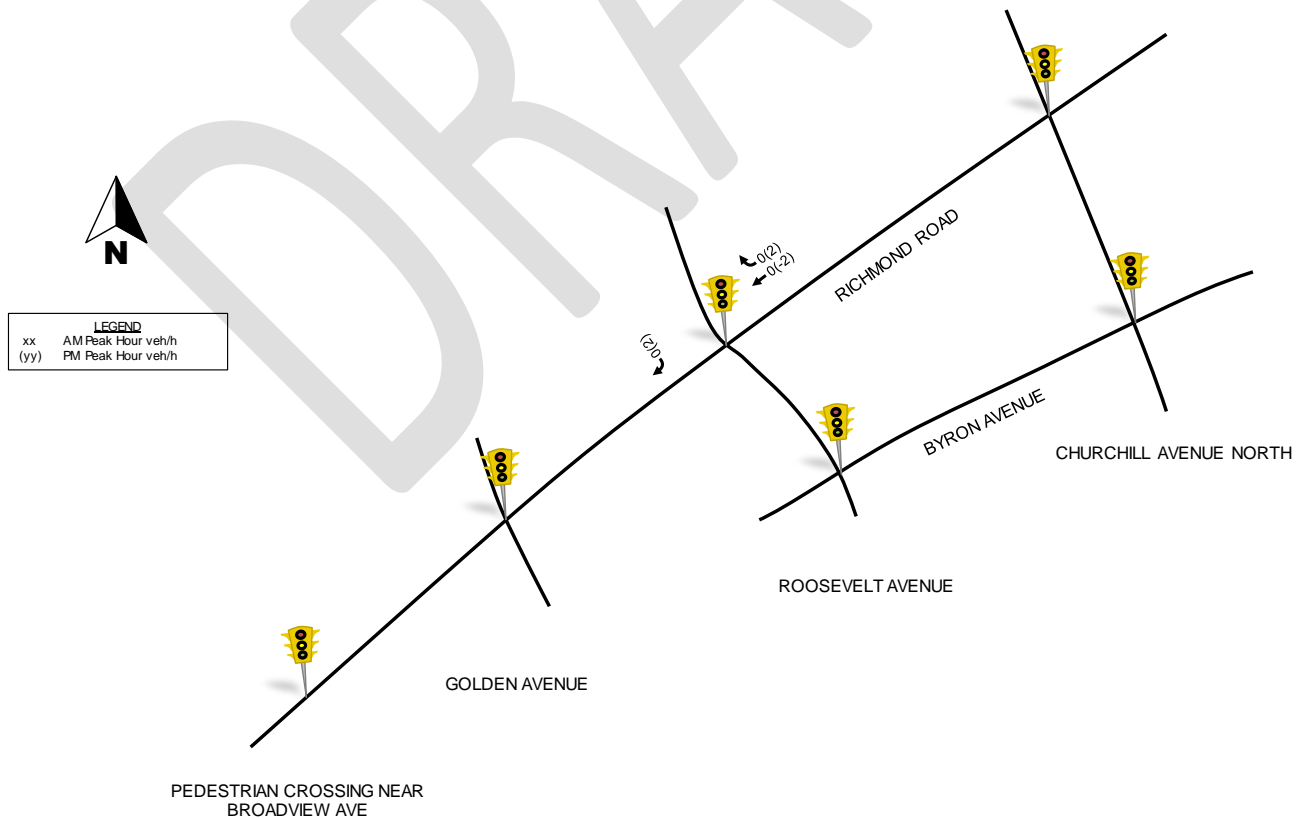


Figure 15: 'Pass-by' Projected Site-Generated Traffic

## 3.2 Background Network Travel Demands

### Transportation Network Plans

At this time, and according to Ottawa's Transportation Master Plan (TMP), there are no expected road reconstruction projects within the vicinity of the subject site.

### Other Area Developments

Using the City's online Development Application Tool, there are three (3) proposed developments identified as having potential impacts on the study area network. As such, the projected site-generated traffic for the proposed developments at 371 Richmond Road, 386 Richmond Road, 319 - 327 Richmond Road and the Byron-Ravenhill Complex will be included in the subsequent analysis. For the purpose of this assessment, all developments have been assumed to be fully built-out by the horizon year 2025. Excerpts from the developments at 371 Richmond Road, 386 Richmond Road and the Byron-Ravenhill Complex TIA reports, depicting projected site-generated traffic, are included as **Appendix C**. The combined new trips generated by the identified area development sites are depicted as **Figure 16**.

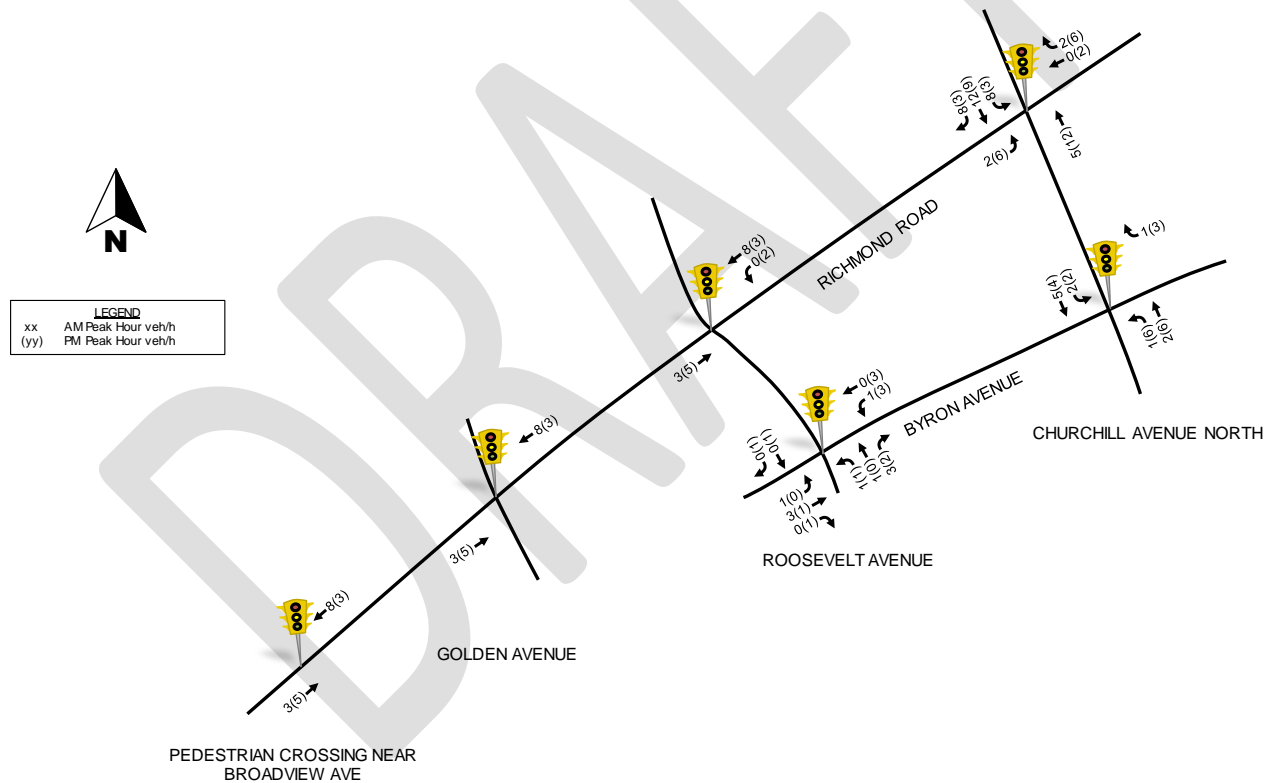


Figure 16: Combined Volumes from Adjacent TIA Studies

### Background Growth

All adjacent TIA studies mentioned previously (published between 2014 - 2018) had recommended a background traffic growth rate of 0%. Therefore, to be consistent with previous studies in the immediate vicinity of the subject site, the rate of background traffic growth for this study has been assumed to be 0%.

**LEGEND**

xx	AM Peak Hour veh/h
(yy)	PM Peak Hour veh/h

**Map Details:**

- Streets:** RICHMOND ROAD, BYRON AVENUE, CHURCHILL AVENUE NORTH, ROOSEVELT AVENUE, GOLDEN AVENUE.
- Signal Locations:** Indicated by yellow traffic light icons at intersections.
- Vehicle Counts (AM Peak Hour / PM Peak Hour):**
  - Richmond Road:**
    - Northbound: 21(37) / 183(453) / 43(128)
    - Southbound: 264(163) / 390(298) / 29(46)
  - Byron Avenue:**
    - Eastbound: 48(48) / 122(307) / 51(110)
    - Westbound: 57(19) / 170(134) / 57(49)
  - Churchill Avenue North:**
    - Northbound: 27(1) / 60(89) / 62(2)
    - Southbound: 57(19) / 170(134) / 57(49)
  - Roosevelt Avenue:**
    - Eastbound: 36(13) / 150(50) / 8(8)
    - Westbound: 30(12) / 11(1) / 4(6)
  - Golden Avenue:**
    - Eastbound: 337(805)
    - Westbound: 2(0) / 471(347) / 28(21)

### 3.3 Demand Rationalization

Using the intersection capacity analysis software Synchro (v9), study area intersections were assessed in terms of vehicle delay (seconds), 95<sup>th</sup> percentile queues (metres), a volume-to-capacity ratio (V/C ratio) and a corresponding Auto Level of Service (Auto-LOS). It should be noted that the overall performance of a signalized intersection is calculated as a weighted V/C ratio and assigned a corresponding Auto-LOS, and individual vehicular movements are assigned a LOS based on their respective V/C ratio.

The following **Table 8** and **Table 9** summarize existing and projected background conditions at study area intersections, in the absence of the proposed development. The objective of this analysis is to determine if network

improvements are or will be required to support background traffic. Detailed Synchro output data for existing and future background conditions are provided in **Appendix D**.

It should be noted that given the frequency of transit service along Richmond Road is low (i.e. a single bus every 15 min during peak hours), the advanced transit only signal phasing was not coded in Synchro for the Golden/Richmond intersection because this phase is only activated on average four times during peak hours, which cannot be explicitly coded in Synchro due to its limited capabilities. If transit service was more frequent (e.g. a single bus every 1 to 2 min), the advanced transit only signal phase could be coded as a phase that is triggered every signal cycle. This assumption was carried through all future conditions.

Additionally, given the exceptionally wide north and southbound approaches at the Richmond/Churchill intersection, a single shared through/left-turn lane and a single right-turn lane was coded in Synchro, which is reflective of how this intersection operates in the field, despite the lack of lane markings. This assumption was carried through all future conditions.

**Table 8: Study Area Intersection Operations - Existing Conditions**

Movement	Lanes	Storage Length / Distance to upstream intersection (m)	AM Peak Hour				PM Peak Hour			
			v/c	Delay (s)	LOS	95 <sup>th</sup> %ile Queue (m)	v/c	Delay (s)	LOS	95 <sup>th</sup> %ile Queue (m)
Churchill Avenue North/Byron Avenue - Actuated-Coordinated Signal										
EBL/T/R	1 L/T/R	250	0.72	33.0	C	61	0.34	17.2	A	39
WBL/T/R	1 L/T/R	620	0.60	27.7	A	47	0.86	39.2	D	117
NBL	1 L	30	0.06	8.7	A	6	0.08	14.4	A	8
NBT/R	1 T/R	440	0.42	10.4	A	66	0.47	17.1	A	77
SBL	1 L	30	0.08	3.4	A	3	0.06	11.9	A	4
SBT/R	1 T/R	90	0.35	3.6	A	19	0.50	15.2	A	71
Overall			0.48	16.4	A	-	0.59	23.6	A	-
Roosevelt Avenue/Byron Avenue - Semi Act-Uncoord Signal										
EBL/T/R	1 L/T/R	250	0.22	3.9	A	25	0.15	4.2	A	15
WBL/T/R	1 L/T/R	150	0.15	3.3	A	15	0.31	5.0	A	33
NBL/T/R	1 L/T/R	60	0.16	18.8	A	12	0.14	18.0	A	11
SBL/T/R	1 L/T/R	240	0.23	21.9	A	15	0.30	19.2	A	18
Overall			0.18	6.8	A	-	0.25	7.4	A	-
Golden Avenue/Richmond Rd - Actuated-Coordinated Signal										
EBL/T	1 T	175	0.47	11.5	A	73	0.33	8.2	A	46
EBR	1 R	175	0.04	2.5	A	3	0.03	1.8	A	2
WBL/T/R	1 L/T/R	130	0.35	10.2	A	46	0.70	15.1	B	136
NBL/T/R	1 L/T/R	30	0.29	8.5	A	15	0.39	16.8	A	24
SBL/T/R	1 L/T/R	50	0.01	12.2	A	2	0.03	18.5	A	5
Overall			0.38	10.4	A	-	0.55	13.7	A	-
Roosevelt Avenue/Richmond Rd - Actuated-Coordinated Signal										
EBL/T/R	1 L/T/R	130	0.58	10.7	A	99	0.37	6.4	A	52
WBL/T/R	1 L/T/R	270	0.31	7.0	A	38	0.66	11.1	B	134
NBL/T/R	1 L/T/R	60	0.22	13.2	A	13	0.40	20.5	A	23
SBL/T/R	1 L/T/R	300	0.18	18.3	A	13	0.25	24.0	A	17
Overall			0.44	10.2	A	-	0.51	11.0	A	-
Churchill Avenue North/Richmond Rd - Actuated-Coordinated Signal										
EBL	1 L	50	0.55	29.1	A	77	0.51	39.7	A	61
EBT/R	1 T/R	270	0.42	9.1	A	63	0.35	8.3	A	52
WBL	1 L	45	0.22	25.5	A	15	0.46	25.7	A	38
WBT/R	1 T/R	245	0.47	27.3	A	50	0.74	29.9	C	124



Movement	Lanes	Storage Length / Distance to upstream intersection (m)	AM Peak Hour				PM Peak Hour			
			v/c	Delay (s)	LOS	95 <sup>th</sup> %ile Queue (m)	v/c	Delay (s)	LOS	95 <sup>th</sup> %ile Queue (m)
NBT	1 T/L & 1 T/R	90	0.57	20.3	A	28	0.66	23.6	B	23
SBT	1 T/L & 1 T/R	300	0.68	26.6	B	45	0.77	23.3	C	46
Overall			0.54	21.6	A	-	0.67	23.9	B	-
Ped Crossing/Richmond Rd - Actuated-Coordinated Signal										
EBT	2 T	280	0.47	9.8	A	45	0.34	8.6	A	31
WBT	1 T	175	0.43	10.2	A	47	0.91	29.5	E	174
Overall			0.46	10.0	A	-	0.67	20.8	B	-

As shown in **Table 8**, study area intersections are currently operating with an acceptable overall Auto-LOS 'B' or better during weekday morning and afternoon peak hours.

While the overall Auto-LOS for each intersection is within acceptable standards, there are some individual movements exceeding available capacity. The eastbound left-turn movement at the Churchill/Richmond intersection is exceeding the available storage lane capacity during both AM and PM peak hours. At the Richmond Road signalized pedestrian crossing, the westbound movement is operating near capacity with a LOS 'E' and a V/C ratio of 0.91, and the 95<sup>th</sup> percentile queue is approaching the upstream intersection during the PM peak hour. At the Golden/Richmond intersection, the westbound 95<sup>th</sup> percentile queue is estimated to spillback to the upstream Roosevelt/Richmond intersection during the PM peak hour.

Potential measures to improve these individual movements that are operating near or over capacity during weekday AM and PM peak hours, include:

- + Lengthen the eastbound left-turn storage lane from 50 m to 80 m at Richmond/Churchill intersection, or reduce eastbound left-turn volumes by at least 130 veh/h during the AM peak and 20 veh/h during the PM peak; and
- + Widen Richmond Road from two to four lanes, or reduce westbound through volumes by at least 30 veh/h during the PM peak.

The suggested improvement measures mentioned above are only provided for information/decision making purposes only and will not be assumed in the subsequent analysis. If any of these possible measures are desirable by the City, further investigation of their feasibility may be required to support their justification.

The following **Table 9** summarizes intersection operations for future scenarios with the addition of background traffic volumes only for the 2025 horizon year and beyond. This future background scenario assumes no intersection improvements from the existing scenario.

**Table 9: Study Area Intersection Operations - 2025 and Beyond Background Conditions**

Movement	Lanes	Storage Length / Distance to upstream intersection (m)	AM Peak Hour				PM Peak Hour			
			v/c	Delay (s)	LOS	95 <sup>th</sup> %ile Queue (m)	v/c	Delay (s)	LOS	95 <sup>th</sup> %ile Queue (m)
Churchill Avenue North/Byron Avenue - Actuated-Coordinated Signal										
EBL/T/R	1 L/T/R	250	0.72	33.0	C	61	0.34	17.2	A	39
WBL/T/R	1 L/T/R	620	0.60	27.7	A	47	0.86	39.3	D	118
NBL	1 L	30	0.06	8.7	A	7	0.10	14.6	A	10
NBT/R	1 T/R	440	0.42	10.5	A	66	0.48	17.3	A	79
SBL	1 L	30	0.09	3.4	A	3	0.07	11.7	A	4
SBT/R	1 T/R	90	0.36	3.5	A	19	0.51	14.8	A	67
Overall			0.48	16.3	A	-	0.59	23.5	A	-
Roosevelt Avenue/Byron Avenue - Semi Act-Uncoord Signal										
EBL/T/R	1 L/T/R	250	0.23	4.0	A	25	0.15	4.2	A	15
WBL/T/R	1 L/T/R	150	0.15	3.3	A	16	0.32	5.1	A	33
NBL/T/R	1 L/T/R	60	0.18	18.3	A	13	0.15	17.4	A	11
SBL/T/R	1 L/T/R	240	0.22	21.6	A	15	0.31	19.0	A	18
Overall			0.18	6.8	A	-	0.25	7.4	A	-
Golden Avenue/Richmond Rd - Actuated-Coordinated Signal										
EBL/T	1 T	175	0.47	11.5	A	73	0.34	8.3	A	47
EBR	1 R	175	0.04	2.5	A	3	0.03	1.8	A	2
WBL/T/R	1 L/T/R	130	0.36	10.3	A	48	0.71	15.3	C	138
NBL/T/R	1 L/T/R	30	0.29	8.5	A	15	0.39	16.8	A	24
SBL/T/R	1 L/T/R	50	0.01	12.2	A	2	0.03	18.5	A	5
Overall			0.39	10.5	A	-	0.56	13.8	A	-
Roosevelt Avenue/Richmond Rd - Actuated-Coordinated Signal										
EBL/T/R	1 L/T/R	130	0.59	10.7	A	100	0.38	6.5	A	52
WBL/T/R	1 L/T/R	270	0.32	7.1	A	40	0.67	11.3	B	137
NBL/T/R	1 L/T/R	60	0.22	13.2	A	13	0.40	20.5	A	23
SBL/T/R	1 L/T/R	300	0.18	18.3	A	13	0.25	24.0	A	17
Overall			0.45	10.3	A	-	0.52	11.1	A	-
Churchill Avenue North/Richmond Rd - Actuated-Coordinated Signal										
EBL	1 L	50	0.57	31.1	A	82	0.52	40.3	A	64
EBT/R	1 T/R	270	0.43	9.8	A	65	0.35	8.5	A	52
WBL	1 L	45	0.22	25.5	A	15	0.47	26.3	A	38
WBT/R	1 T/R	245	0.47	27.2	A	50	0.77	31.8	C	132
NBT	1 T/L & 1 T/R	90	0.55	19.2	A	27	0.67	23.6	B	25
SBT	1 T/L & 1 T/R	300	0.70	26.7	B	48	0.79	24.7	C	49
Overall			0.55	21.9	A	-	0.69	24.9	B	-
Ped Crossing/Richmond Rd - Actuated-Coordinated Signal										
EBT	2 T	280	0.47	9.8	A	45	0.34	8.6	A	31
WBT	1 T	175	0.44	10.4	A	48	0.92	29.9	E	175
Overall			0.46	10.0	A	-	0.68	21.0	B	-

As shown in **Table 9**, study area intersections are projected to operate with an acceptable overall Auto-LOS 'B' or better during weekday morning and afternoon peak hours.

Similar to existing conditions, there are some individual movements approaching/exceeding available capacity, which can be improved with the measures mentioned previously.

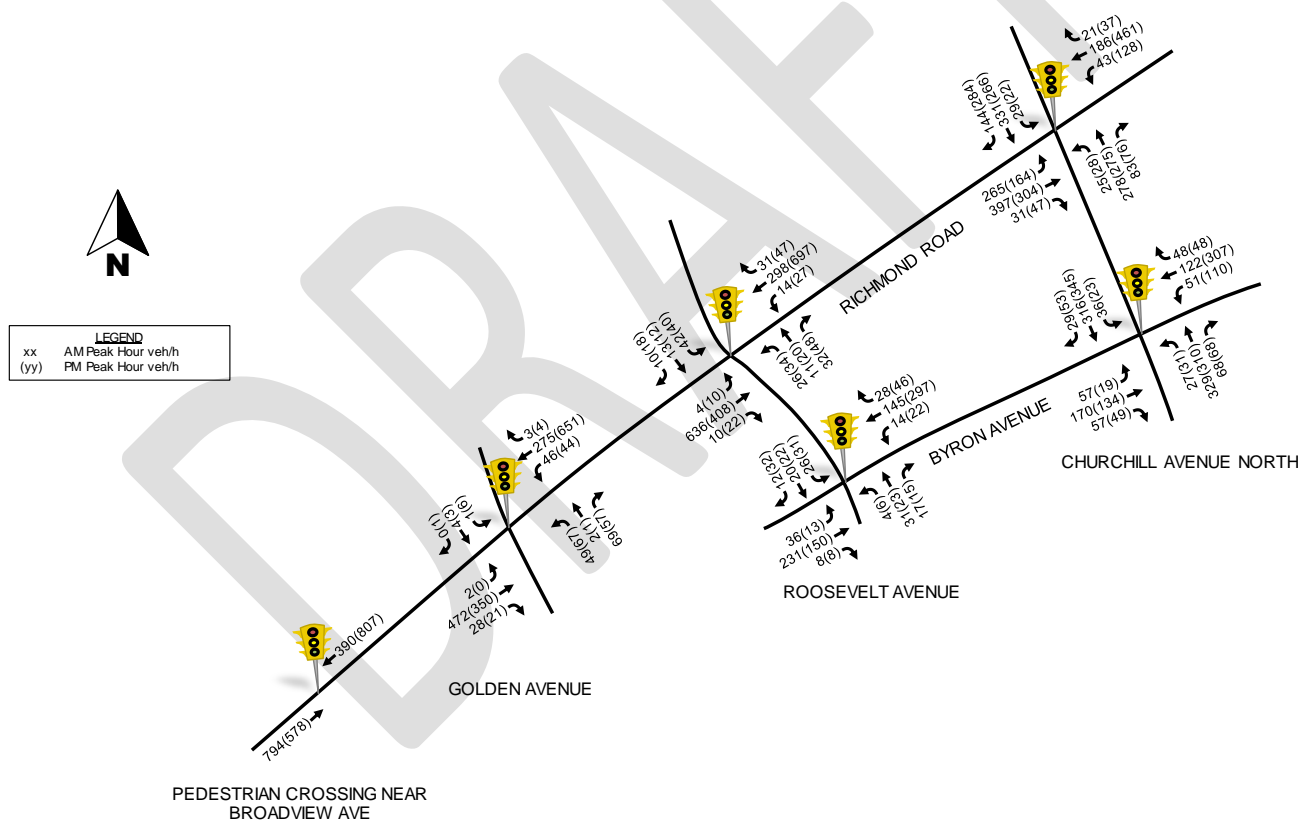
## Adjustments to Background Network Demands

Given study area intersections are projected to have overall spare capacity during future background conditions, it is not considered necessary to adjust background demands at this time. However, it should be noted that with the planned Stage 2 LRT extension that will replace the nearby BRT line, it is anticipated that there will be an increase in the number of area transit users, which has the potential to free up capacity at the study intersections.

## Total Projected Conditions

The following section summarizes the intersection capacity analysis of 'total' projected volume scenarios for the 2025 horizon year. It should be noted that since background traffic growth has been assumed to be 0%, total projected scenario for the 2030 horizon year is expected to yield the same results as the 2025 horizon year.

The following **Figure 18** depicts the future 'total' volumes, which were derived by superimposing site-generated traffic volumes onto projected background traffic volumes (e.g. summing volumes together from **Figure 14**, **Figure 15** and **Figure 17**, resulting in **Figure 18**).



Similar to existing and future background conditions, total projected conditions were assessed using the intersection capacity analysis software Synchro (v9). Metrics such as Auto-LOS, V/C Ratio, 95<sup>th</sup> percentile queue (metres) and vehicular delay (seconds) were analyzed. Assuming no intersection improvements, the following **Table 10** summarizes the intersection operational analysis of the study area intersections for the total projected 2025 horizon year and beyond. Detailed Synchro output data for future total projected conditions is provided in **Appendix E**.

**Table 10: Study Area Intersection Operations - Total Projected Conditions (2025, 2030)**

Movement	Lanes	Storage Length (m)	AM Peak Hour				PM Peak Hour			
			v/c	Delay (s)	LOS	Queue (m)	v/c	Delay (s)	LOS	Queue (m)
Churchill Avenue North/Byron Avenue - Actuated-Coordinated Signal										
EBL/T/R	1 L/T/R	250	0.72	33.0	C	61	0.34	17.2	A	39
WBL/T/R	1 L/T/R	620	0.60	27.7	A	47	0.86	39.3	D	118
NBL	1 L	30	0.06	8.7	A	7	0.10	14.6	A	10
NBT/R	1 T/R	440	0.42	10.5	A	66	0.48	17.3	A	79
SBL	1 L	30	0.09	3.5	A	3	0.07	11.7	A	4
SBT/R	1 T/R	90	0.36	3.6	A	19	0.51	14.8	A	67
Overall			0.48	16.3	A	-	0.59	23.6	A	-
Roosevelt Avenue/Byron Avenue - Semi Act-Uncoord Signal										
EBL/T/R	1 L/T/R	250	0.23	4.0	A	25	0.15	4.3	A	15
WBL/T/R	1 L/T/R	150	0.15	3.4	A	16	0.32	5.1	A	33
NBL/T/R	1 L/T/R	60	0.18	18.4	A	13	0.16	17.8	A	12
SBL/T/R	1 L/T/R	240	0.23	21.7	A	15	0.31	19.1	A	18
Overall			0.18	6.8	A	-	0.25	7.5	A	-
Golden Avenue/Richmond Rd - Actuated-Coordinated Signal										
EBL/T	1 T	175	0.47	11.5	A	73	0.34	8.3	A	47
EBR	1 R	175	0.04	2.5	A	3	0.03	1.8	A	2
WBL/T/R	1 L/T/R	130	0.36	10.3	A	48	0.71	15.3	C	138
NBL/T/R	1 L/T/R	30	0.29	8.5	A	15	0.39	16.8	A	24
SBL/T/R	1 L/T/R	50	0.01	12.2	A	2	0.03	18.5	A	5
Overall			0.39	10.5	A	-	0.56	13.8	A	-
Roosevelt Avenue/Richmond Rd - Actuated-Coordinated Signal										
EBL/T/R	1 L/T/R	130	0.59	10.8	A	101	0.38	6.5	A	53
WBL/T/R	1 L/T/R	270	0.33	7.1	A	40	0.68	11.7	B	141
NBL/T/R	1 L/T/R	60	0.22	13.4	A	14	0.40	20.8	A	23
SBL/T/R	1 L/T/R	300	0.23	18.9	A	16	0.31	24.7	A	20
Overall			0.44	10.4	A	-	0.52	11.4	A	-
Churchill Avenue North/Richmond Rd - Actuated-Coordinated Signal										
EBL	1 L	50	0.58	31.3	A	83	0.52	40.3	A	65
EBT/R	1 T/R	270	0.44	10.0	A	67	0.36	8.6	A	53
WBL	1 L	45	0.22	25.5	A	15	0.47	26.5	A	38
WBT/R	1 T/R	245	0.48	27.4	A	51	0.78	32.8	C	141
NBT	1 T/L & 1 T/R	90	0.55	19.2	A	27	0.68	23.7	B	25
SBT	1 T/L & 1 T/R	300	0.69	26.6	B	48	0.79	24.7	C	49
Overall			0.55	21.9	A	-	0.69	25.1	B	-
Ped Crossing/Richmond Rd - Actuated-Coordinated Signal										
EBT	2 T	280	0.47	9.8	A	45	0.35	8.7	A	31
WBT	1 T	175	0.44	10.4	A	49	0.92	30.3	E	176
Overall			0.46	10.0	A	-	0.68	21.3	B	-

As shown in **Table 10**, assuming no intersection improvements from the 2025 future background scenario, study area intersection are projected to continue operating with an acceptable overall Auto-LOS 'C' or better during weekday morning and afternoon peak hours.

With the additional traffic generated by the subject site, the eastbound left-turn movement at the Churchill/Richmond intersection is will continue to exceed the available storage lane capacity during both AM and PM peak hours . The



Richmond Road signalized pedestrian crossing, the westbound movement is projected to operate with an Auto-LOS 'E' and a V/C ratio of 0.91, and the 95<sup>th</sup> percentile queue is projected to spillback to the upstream signalized intersection during the PM peak hour. At the Golden/Richmond intersection, the westbound 95<sup>th</sup> percentile queue is projected to spillback to the upstream Roosevelt/Richmond intersection during the PM peak hour.

Similar to the assessment of background conditions, there are some individual movements approaching/exceeding available capacity, which can be improved with measures mentioned previously. However, the suggested improvement measures are only provided for information/decision making purposes only. If any of the possible measures are desirable by the City, further investigation of their feasibility may be required to support their justification.

### ***Adjustments to Site-Generated Demand***

With respect to projected site-generated traffic for the subject development lands and other area developments, adjusting modal splits away from projected auto trips further, is difficult to justify, as certain individuals will ultimately be required to drive for one reason or another (e.g. distance between origin/destination is too great, travel is a requirement for employment, physical disabilities limit travel options to personal vehicle, etc.). Additionally, adjusting the auto modal share for site-generated traffic much lower will have a negligible affect on the performance of study area network (*note: study area intersections are projected to continue operating similar to background conditions, only with minor increases in volumes and delays*).

## Step 4 – Analysis

With respect to the City of Ottawa TIA Guidelines, this module reviews the proposed transportation network elements within the development study area to ensure that they provide effective access for all users while creating an environment that encourages walking, cycling and transit use and prioritizes safety.

### 4.1 Development Design

#### *Design for Sustainable Modes*

The subject development is conveniently located within 600m of the Dominion BRT station, which is planned to be converted to an LRT station as part of the City's Stage 2 LRT expansion project. Residents and visitors to/from the subject development also have nearby access to wide sidewalks along both sides of Richmond Road, and an extensive MUP network (e.g. the Ottawa River Pathway/Trans Canada Trail, etc.)

**Pedestrian Facilities:** Continuous sidewalks exist along both sides of Richmond Road, and on the east side of Roosevelt Avenue. No additional sidewalks are planned; however, the proposed development will be fully integrated with the existing surrounding pedestrian network.

**Cycle Facilities:** As mentioned in the *Section 2 - Scoping* section, the subject site currently benefits from a number of excellent cycling facilities. During the subsequent Site Plan Application process, on-site cycling facilities will be determined (e.g. number and location of bike parking, secure storage, change facilities, etc.).

**Transit Facilities:** The following **Table 11** summarizes available OC Transpo routes and their associated stop numbers and location, the direction of each route, and the approximate walking distances between main the proposed main entrance and existing transit stops/stations.

*Table 11: Existing Transit Facilities*

Stop #	Location	Operating Route	Direction	Approximate Walking Distance in Metres (m) to/from Building Entrances
#3013	500 m walking distance north west from the site	57,61,62,63, 74,75,83,87	Inbound/ Outbound	500
#7406	Immediately east of Richmond/Roosevelt	11,153	Outbound	70
#2436	Immediately east of Richmond/Roosevelt	11,153	Inbound	105
#4876	Immediately west of Richmond/Churchill	11,153	Outbound	300
#4987	Immediately north of Richmond/Churchill	153	Inbound	395
#5616	Immediately north of Richmond/Churchill	153	Outbound	385
#4870	Immediately east of Richmond/Churchill	11	Inbound	410
#4922	Immediately west of Richmond/Golden	11,153,57,61, 62,63,74,75, 83,87	Outbound	260
#4941	Immediately west of Richmond/Golden	11,153	Inbound	270
<b>Note:</b> Routes in red were detoured from Sir John A. Macdonald Parkway due to the partial closure of the parkway. The detour schedule is every Saturday and Sunday until September 6, 2020, from 8 am to 4 pm.				

It should be noted that most transit stops (78%) listed in **Table 11** are located within the OC Transpo's service design guideline of 400m to/from the subject development site. A Transportation Demand Management (TDM) checklist, which includes strategies to promote transit use, is provided as **Appendix F**.

### ***Circulation and Access***

The width of proposed site driveway access to underground parking is proposed to be 6m, which satisfies the City's Zoning By-Law provisions for "Aisles and Driveways". The following **Figure 19** depicts the current access/egress design for the development.

As shown in **Figure 19**, the main entrance for residents is located near the northwest corner of the building and along the west side of the building for individual ground floor units. The plan for the ground floor commercial will be to provide pedestrian access/egress along the Richmond Road and/or Roosevelt Avenue frontage of the building.

A layby/loading zone is planned along the northern frontage of the building, which includes space for a "hammerhead" vehicle turnaround and with respect to emergency vehicle access, a clear 6m wide fire route will be provided, which satisfies Building Code requirements. During the subsequent Site Plan Application process, a trucking turning analysis will be conducted to ensure sufficient turning radii will be provided.

The proposed underground parking lot will be accessed via Roosevelt Avenue (i.e. there is no plan to provide vehicular access/egress to Richmond Road).

### ***New Street Networks***

With respect to the City's TIA Guidelines, this module is exempt.

### Figure 19: Circulation and Access



## 4.2 Parking

With respect to the City's TIA guidelines, this module reviews the development's planned parking supply to ensure a balance between operational needs, the encouragement of sustainable travel modes, and the desire to minimize neighbourhood impacts.

### Parking Supply

#### Vehicular parking

The proposed development is located in Area Y (Inner Urban Mainstreet), identified in Schedule 1A of the City's Zoning By-law, which identifies areas near Ottawa traditional main street.

The following **Table 12** summarizes the minimum residence and Visitor parking space requirements, in accordance with the City's Zoning By-law, Section 101, Table 101.

**Table 12: Vehicular Parking Supply**

Type	Zoning Requirement	GFA	Minimum parking Requirement
Residence Parking	0.5 per dwelling unit for mid-rise apartment	170 units of Apartment	85
Visitor Parking	0.1 per dwelling unit for mid-rise apartment	170 units of Apartment	17
<b>Total Required</b>			<b>102</b>
Provided (As shown in the site plan)			115

As summarized in **Table 12**, the amount of provided auto parking will satisfy Zoning By-law requirements.

#### Bike Parking

The following **Table 13** summarizes the minimum bike parking space requirements, in accordance with the City's Zoning By-law, Section 111, Table 111A. It should be noted that, the bike parking for the residential component of the site is unknown at this stage, and will be determined during the subsequent development applications.

**Table 13: Bike Parking Supply**

Type	Zoning Requirement	GFA	Minimum parking Requirement
Bike Parking	0.5 per dwelling unit for Apartment 1 per 250 m <sup>2</sup> GFA for Retail	170 units of Apartment 584 m <sup>2</sup> GFA of Retail	85 for Apartment 3 for Ground Floor Commercial
<b>Total Required</b>			<b>102</b>
Provided (As shown in the site plan)			Undetermined for Apartment 5 for Ground Floor Commercial

As summarized in **Table 13**, the amount of provided ground floor commercial bike parking will satisfy Zoning By-law requirements.

## Spillover parking

Given the proponent will not be seeking a reduction in minimum supply of parking for the subject development, this module is exempt, with respect to the City's TIA Guidelines.

## 4.3 Boundary Street Design

With respect to the City's TIA guidelines, this module determines design elements of boundary streets required to accommodate the proposed development, consistent with the City's complete streets philosophy and its urban design objectives for the development area. The identified boundary streets for the subject site are Richmond Road and Roosevelt Avenue, which are both owned and maintained by the City of Ottawa.

## Mobility

A Multi-Modal Level of Service (MMLOS) assessment was conducted for the subject site's boundary streets, which is a measure of risk, comfort and stress for active modes and a measure of impedance, delay and reliability for trucks/buses. With respect to the City of Ottawa's MMLOS guidelines, target MMLOS values were obtained from Exhibit 22 of the MMLOS guidelines and are identified in brackets in the following **Table 15**. The detailed assessment is included as **Appendix G**.

### Segment MMLOS Summary

The following **Figure 20** depicts the road classification from the City's Geo Ottawa website. It should be noted that Richmond Road and Churchill Avenue North are designated as a truck routes.

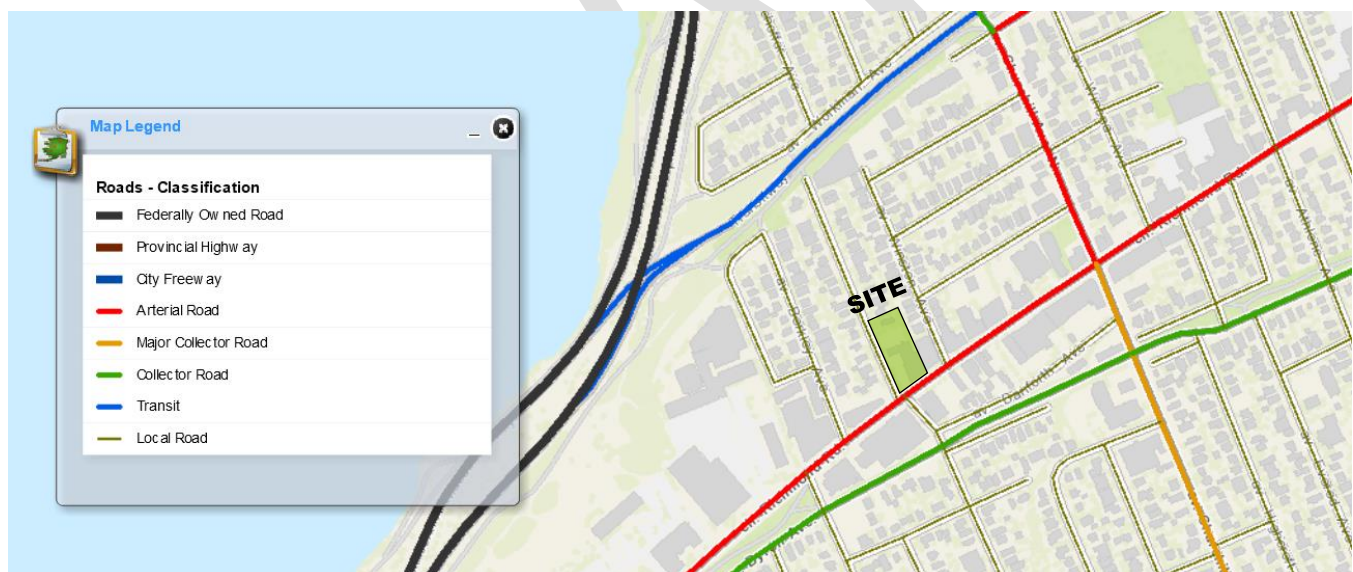


Figure 20: Road Classification

The following **Table 15** is a MMLOS summary for existing conditions for all modes (i.e. Pedestrian, Cycling, Transit and Truck) along the road segments described above. LOS results highlighted in red indicate that the target MMLOS was not met for that segment.

It should be noted that MMLOS segment analysis focuses on local transit provided along the boundary streets only, as there is no mechanism to explicitly consider near-by BRT service within the City's MMLOS analysis tools.

**Table 14: Segment MMLOS – Existing LOS(Target LOS)**

No.	Road Name	Segment Between	PLOS	BLOS	TLOS	TkLOS
1	Richmond Rd	Churchill & Roosevelt	<b>B</b> (A)	<b>D</b> (A)	D(D)	B(D)
2	Richmond Rd	Roosevelt & Golden	<b>B</b> (A)	<b>D</b> (A)	D(D)	B(D)
3	Roosevelt Ave	Richmond & Byron	B(B)	B(C)	- (D)	- (-)
4	Churchill Ave N	Churchill & Roosevelt	B(C)	<b>D</b> (C)	D(D)	B(D)
5	South Side Byron Ave	Churchill & Roosevelt	C(C)	B(B)	- (D)	B(-)
	North Side Byron Ave		- (C)	B(B)	- (D)	B(-)
6	South Side Richmond Rd	Golden & Broadview PXO	B(B)	A(A)	D(D)	C(D)
	North Side Richmond Rd		B(B)	<b>D</b> (A)	D(D)	C(D)

Note: '-' denotes No Target/ No facility/ No service

Based on the results summarized in **Table 15**, the following should be noted/considered:

#### **Pedestrian LOS**

- + Both segments on Richmond Road do not meet the PLOS targets; however, are considered to very good Levels of Service; and
- + The segments of Richmond Road that fail to meet targets can be attributed to high volumes of vehicular traffic. Based on the existing MMLOS guidelines, there are limited measures that can be implemented to improve the PLOS.

#### **Bike LOS**

- + Segments along Richmond Road and Churchill Avenue North do not meet the BLOS targets; and
- + Introducing dedicated bike lanes can improve the BLOS.

#### **Transit LOS**

- + Boundary street segments meet TLOS targets.

#### **Truck LOS**

- + Boundary street segments meet TLOS targets.

It should be noted that although the above network modifications are all technically possible, they may not be feasible due to physical, economical, political or other technical constraints. Therefore, the possible measures to improve the performance of study area road segments, mentioned above, are only provided for information/decision making purposes only. If any of these possible measures are desirable, further analysis may be required to support their justification.

Given road improvement projects are not planned for study area road segments, a future segment MMLOS analysis will yield the same LOS results summarized in **Table 15**.

## Road Safety

For the purpose of an engineering review, collision records for boundary streets are examined to determine if locations exhibit any collision trends that might be mitigated by engineering intervention. If there is a collision trend that is outside the norm of what is expected, then the potential exists to reduce the collision experience by addressing the over-represented collision trend. Whenever changes are being made to the road environment, it is an opportunity to examine whether a safety intervention could result in meaningful safety benefits. Where there are identifiable safety trends, it is worthwhile to mitigate those, such that the added traffic from a new development does not increase the risk of new collisions.

Based on a review of the most recent five (5) years of historical collision data (collected from January 1<sup>st</sup>, 2014 to December 31<sup>st</sup>, 2018), the following **Table 15** summarizes the number and rate (i.e. collisions per million vehicle kilometres) of collisions within the vicinity of the subject development lands.

It should be noted that, there are four (4) collisions on Danforth Avenue near Roosevelt Avenue. All four of these collisions were included as Roosevelt Avenue for summary purposes. It should also be noted that the impact of intersection modifications to Richmond/Churchill (westbound approach bulb out extension) and Richmond/Golden (additional bike box on the southbound approach) will not be captured since those projects were completed more recently.

**Table 15: Historical Collision Data Summary by Road Segment**

Segment	Between	Total Collisions (5 Year Total)	Rate (C/MVK)	Classification		
				Property Damage	Non-fatal Injury	Fatal Injury
Richmond	Churchill & Roosevelt	37	1.45	34	3	0
Richmond	Roosevelt & Golden	23	1.23	19	4	0
Richmond	Golden & Broadview	7	0.30	6	1	0
Roosevelt	Richmond & Byron (Including Danforth)	4	1.11	4	0	0
Byron	Roosevelt & Churchill	1	0.11	1	0	0
Churchill	Richmond & Byron	9	0.47	7	2	0
<b>Total</b>		<b>81</b>	<b>-</b>	<b>71</b>	<b>10</b>	<b>0</b>
Notes: ** Denotes data was not available C/MVK = Collisions per Million Vehicle Kilometers						

As shown in **Table 15**, based on the available data, the collision rates for all road segments adjacent to the subject development site are considered to be low, and the severity of collisions along all section are also low (e.g. mostly rear end and single motor vehicle type collisions were cited).

Based on the same most recent five (5) years of historical collision data (collected from January 1<sup>st</sup>, 2014 to December 31<sup>st</sup>, 2018), the following **Table 16** summarizes the number and rate (i.e. collisions per million entering vehicles) of collisions within the vicinity of the subject development lands, at study area intersections.



**Table 16: Historical Collision Data Summary by Intersection**

Intersection	Total Collisions (5 Year Total)	Rate (C/MEK)	Classification		
			Property Damage	Non-fatal Injury	Fatal Injury
Richmond/Churchill	31	0.73	24	7	0
Richmond/Roosevelt	4	0.14	2	2	0
Richmond/Golden	7	0.33	5	2	0
Richmond/Broadview	0	0	0	0	0
Byron/Roosevelt	12	1.01	8	4	0
Byron/Churchill	7	0.24	7	0	0
<b>Total</b>	<b>61</b>	<b>-</b>	<b>46</b>	<b>15</b>	<b>0</b>

Notes: C/MEK = Collisions per Million Entering Vehicles

As shown in **Table 18**, based on the available data, the collision rates at study area intersections appear to be low.

A more detailed collision analysis for road segments and intersections within the study area are included in **Appendix H**. As previously mentioned, source collision data is included in **Appendix B**.

### **Neighbourhood Traffic Management (NTM)**

The subject development site will have a single connection to/from Roosevelt Avenue. Given projected traffic volumes on Roosevelt Avenue are currently, and are projected to continue to remain under the volume threshold for a local street classification (i.e. 120 veh/h during peak hours). Therefore, the with respect to the City's TIA Guidelines, a review of potential neighbourhood traffic management strategies is not required.

It should be noted that Churchill Avenue North will be a major route for travel to/from the south and the subject site, and the existing and projected traffic volumes on Churchill Avenue North are currently, and are anticipated to continue to exceed the threshold for a major collector street classification (i.e. vehicle volumes currently exceed 600 veh/h during peak hours). However, given the proposed development is projected to generate very low peak hour traffic volumes, any neighbourhood traffic management strategies to mitigate volumes on Churchill Avenue North should not be a condition of approval for the subject development application.

## **4.4 Access Intersection Design**

With respect to the City's TIA guidelines, this module determines design elements of the points of access to the development, consistent with the City's complete streets philosophy, MMLOS guidelines, and its urban design objectives for the development area.

### **Location and Design of Access**

The location of main access to/from the subjected development is a single two-way approach, located around 90 m north of the Richmond/Roosevelt intersection, as shown in **Figure 2**. With respect to the City's Private Approach By-Law No. 2003-447, the new proposed driveway connection will satisfy By-Law requirements.

### **Intersection Control**

Main access points to/from the development are proposed to be full movement and YIELD controlled on the minor approach will be sufficient.

## Intersection Design

The following is a MMLOS analysis at signalized study area intersections. As previously mentioned, MMLOS is a measure of risk, comfort and stress for active modes and a measure of impedance, delay and reliability for trucks/buses. With respect to the City of Ottawa's MMLOS guidelines, target MMLOS values were obtained from Exhibit 22 of the MMLOS guidelines and are identified in brackets in the following **Table 17**.

### Intersection MMLOS Summary

Similar to the MMLOS analysis conducted for the Boundary Street Design, the following **Table 17** summarize existing and projected MMLOS analysis completed for all modes, at study area signalized intersections. The detailed intersection MMLOS analysis is provided in **Appendix I**.

**Table 17: Intersection MMLOS – Existing LOS(Target LOS)**

No.	Intersection	PLOS	BLOS	TLOS	TkLOS	AutoLOS
1	Richmond/Churchill	B(B)	D(A)	D(D)	E(D)	C(D)
2	Richmond/Roosevelt	B(A)	D(A)	B(D)	E(D)	A(D)
3	Richmond/Golden	C(A)	D(A)	B(D)	E(D)	B(D)
4	Byron/Roosevelt	B(C)	D(B)	-(D)	E(-)	A(D)
5	Byron/Churchill	C(C)	E(C)	C(D)	E(D)	A(D)
6	Richmond/Broadview PXO	A(B)	D(A)	B(D)	-(D)	A(D)
Note: '-' denotes No Target/No facility/No service						

Based on the results summarized in **Table 17**, the following should be noted/considered:

### Pedestrian LOS

- + Richmond/Roosevelt and Richmond/Golden intersections do not meet PLOS targets.
- + Failing PLOS at Richmond/Golden is a combination of the size (e.g. the more vehicle travel lanes pedestrians have to cross increases their/exposure to potential collisions), and lack of pedestrian comfort measures such as leading pedestrian intervals (LPI), and "Zebra" pavement markings. Failing PLOS at Richmond/Roosevelt is mainly due to the lack of pedestrian comfort measures.
- + Possible measures to improve PLOS:
  - Implement pedestrian leading intervals (LPI);
  - "Zebra" pavement markings on all crosswalks;
  - Provide median pedestrian refuges; and
  - Prohibit right-turn-on-red.

### Bike LOS

- + All study area intersections do not meet BLOS targets.
- + Failing BLOS is mainly attributed to the lack of cycling infrastructure and the number of lanes that are required to cross to perform a left-turn (without a 2-stage left turn or bike box).
- + Possible measures to improve BLOS:
  - Implement cycling lanes on Richmond Road, and extend the cycling lanes on Churchill Avenue North to Richmond Road; and
  - Implement two stage left-turn bike boxes on all intersections.

### **Transit LOS**

- + All intersections meet TLOS targets.

### **Truck LOS**

- + All intersections do not meet TkLOS targets due to small turning corner radii.

### **Auto LOS**

- + All intersections are expected to meet or exceed AutoLOS targets.

It should be noted that although the above network modifications are all technically possible, they may not be feasible due to physical, economical, political or other technical constraints. Therefore, the possible measures to improve the performance of study area intersections, mentioned above, are only provided for information/decision making purposes only. If any of these possible measures are desirable, further analysis may be required to support their justification.

Given road improvement projects are not planned for study area intersections, a future intersection MMLOS analysis will yield the same LOS results summarized in **Table 17**, with the exception of minor changes in AutoLOS (e.g. the existing LOS 'B' at the Richmond/Churchill intersection during the afternoon peak is projected to operate with a LOS 'C' with increased traffic volumes).

## **4.5 Transportation Demand Management**

With respect to the City's TIA Guidelines, an analysis of Transportation Demand Management (TDM) measures is required for this development. As such, a formal TDM Checklist (provided by the City) was completed to determine if TDM measures should be implemented, based on available information.

Although it is anticipated that the proponent will maintain the ownership of the property, future tenants will determine what TDM measures can be implemented. Therefore, it is recommended that the TDM measures checklist be discussed with future tenant(s). The City's TDM checklist is attached as **Appendix J**.

## **4.6 Neighbourhood Traffic Management**

With respect to the City's TIA guidelines, this module reviews significant access routes to/from the development and identifies any required neighbourhood traffic management (NTM) measures to mitigate impacts on collector and local roads.

As mentioned in the *Step 3 - Forecasting* section of this report, the proposed development is projected to generate very low site-generated traffic volumes, and therefore, additional NTM measures are not recommended.

## **4.7 Transit**

Transit stops that serve the development site were previously summarized in **Table 11**, which included stop information, routes, and the distance to/from the development site. The transit route information, including peak hour headway and service type, were previously summarized in **Table 2** in the *Step 2 - Scoping* section of this report. Detailed transit maps are included in **Appendix K**.

### **Route Capacity**

Current transit ridership data for bus stops listed in **Table 11** was provided by the City and is included as **Appendix L**. Based the projected modal split of site-generated traffic, it is anticipated that 65% of the trips generated by the

site will be accommodated by transit (i.e. a two-way total of 72 to 80 trips/hr during peak hours), and that the majority of transit trips to/from the subject development will be completed by the future LRT.

Based upon the analysis provided in the *Step 3 - Forecasting* section, there will be approximately 72 to 80 additional transit trips for each peak hour generated by the subject development at full build-out, most of which can be assumed to be accommodated by the planned future LRT system (the current BRT is planned to upgrade to LRT before the full buildout of the subjected development). According available information provided by OC Transpo, the City is expecting an increase in the current planned LRT capacity of 21,400 passengers per hour to 36,000 passengers per hour by the year 2031, and 48,000 passengers per hour at the ultimate build out<sup>2</sup>.

With respect to local transit, the study area is serviced by 40ft buses on approximate 15 min headways, which have a person capacity of approximately 50 passengers per bus. According to passenger on/off data provided by the City, there are approximately 10 to 20 passengers per bus that arrive/depart the bus stops within the vicinity of the subject development during peak hours.

Assuming projected site-generated transit trips to/from the subject development will be spread between the many number of local bus stops and the Dominion transitway station, future transit users will be easily accommodated.

### ***Transit Priority***

Given the highest order transit is within the vicinity of the subject development lands, transit travel times should be unimpeded. Additionally, transit signal priority and queue jump lanes are planned for selected intersections along Richmond Road between Woodroffe Avenue and Bank Street by 2031. Therefore, additional transit priority measures will not be required.

## **4.8 Review of Network Concept**

With respect to the City's TIA Guidelines, this module is exempt.

## **4.9 Intersection Design**

With respect to the City's TIA Guidelines, this module determines the design elements of study area intersections required to accommodate the proposed development, consistent with the City's complete streets philosophy and MMLOS practices.

### ***Intersection Control***

Based on intersection capacity analysis in the *Step 3 - Forecasting* section, and consistent with City's policies, goals and objectives, additional signal or intersection control will not be warranted.

### ***Intersection Design***

Based on intersection capacity analysis in the *Step 3 - Forecasting* section, and the consistent with City's policies, goals and objectives, additional intersection or road widenings will not be warranted.

---

<sup>2</sup> [https://www.ctranspo.com/en/ready-for-rail/o\\_train\\_confederation\\_line\\_system\\_faqs](https://www.ctranspo.com/en/ready-for-rail/o_train_confederation_line_system_faqs)



## 5. Findings and Recommendations

As is typical of infill developments, the introduction of mid- to high-density intensification will have impacts on the surrounding transportation network. CIMA+ has completed a review of these impacts and summarized the findings within this transportation assessment, which follows the format of a Traffic Impact Assessment (TIA) Study, as requested by the City of Ottawa. At this stage, and with respect to the City's Transportation Impact Assessment Guidelines, the following findings and conclusions are offered:

- + Study area intersections are currently operating with spare capacity and there are no prevailing safety concerns, based on historical collision data. However, some queues may exceed available storage.
- + Transit is assumed to be the primary mode of travel with a 65% mode share target for the proposed development, which is consistent with the City's goals and objectives, given the context of the study area.
- + With additional traffic generated by area development and the subject development itself, both the local bus and nearby BRT routes (future LRT), and study area intersections are projected to continue operating acceptably.

The proposed development fits well into the context of the surrounding area and it is projected to have a minimal impact on the surrounding transportation network. The design and location of the proposed development serves the City of Ottawa's policies, goals and objectives by providing facilities and connectivity to help promote active and transit modes.

Based on the foregoing, the proposed development located at 403 Richmond Road is recommended from a transportation perspective.

# A

## Appendix A – Traffic Count Data

**Survey Date:** Thursday, January 23, 2020

**Start Time:** 07:00

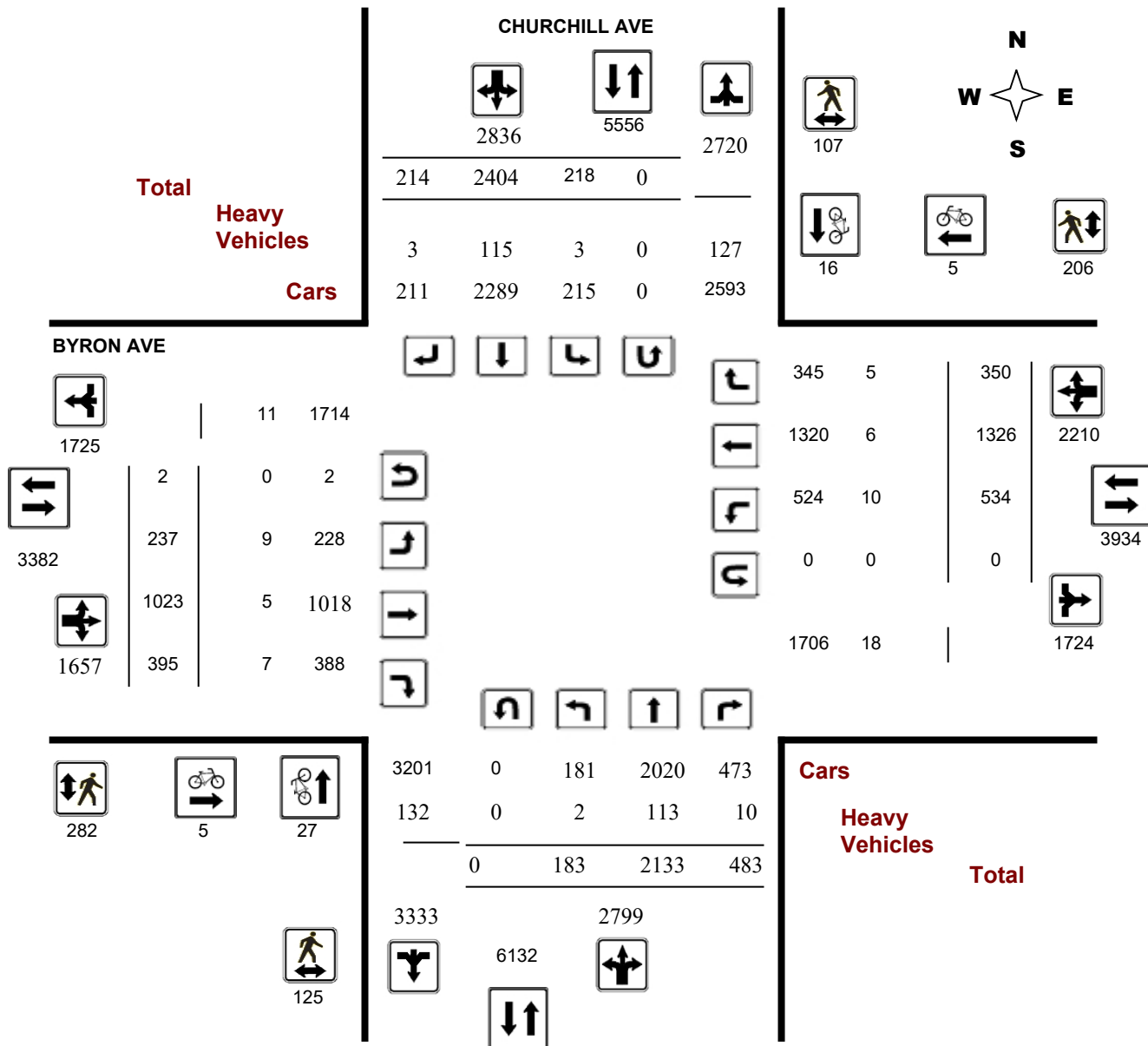
**WO No:**

39387

**Device:**

Miovision

### Full Study Diagram



5472205 - THU JAN 23, 2020 - 8HRS - LORETTA

## Turning Movement Count - Study Results

## BYRON AVE @ CHURCHILL AVE

**Survey Date:** Thursday, January 23, 2020

**Start Time:** 07:00

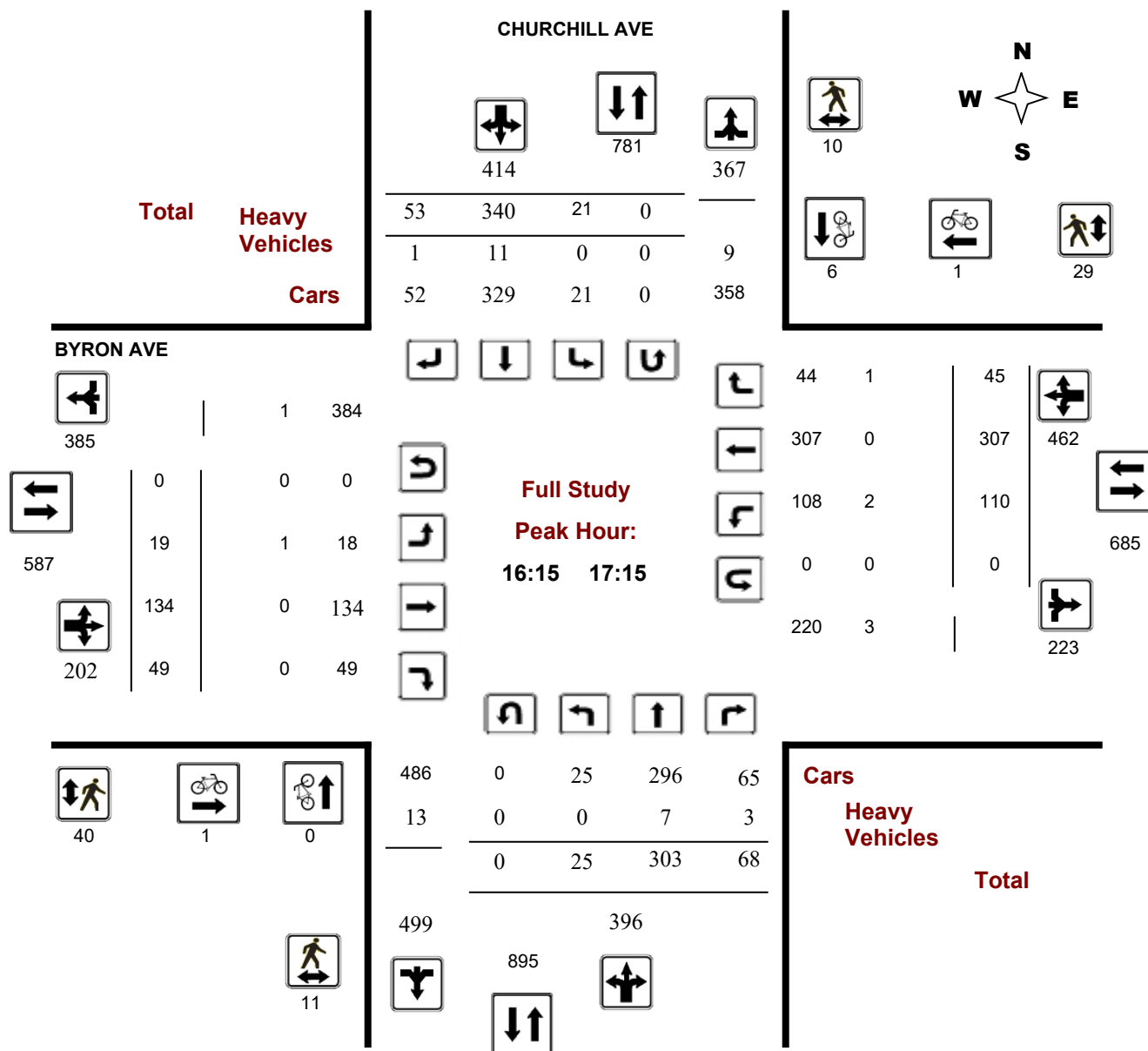
**WO No:**

39387

**Device:**

## Miovision

## Full Study Peak Hour Diagram



5472205 - THU JAN 23, 2020 - 8HRS - LORETTA





# Transportation Services - Traffic Services

## Turning Movement Count - Peak Hour Diagram

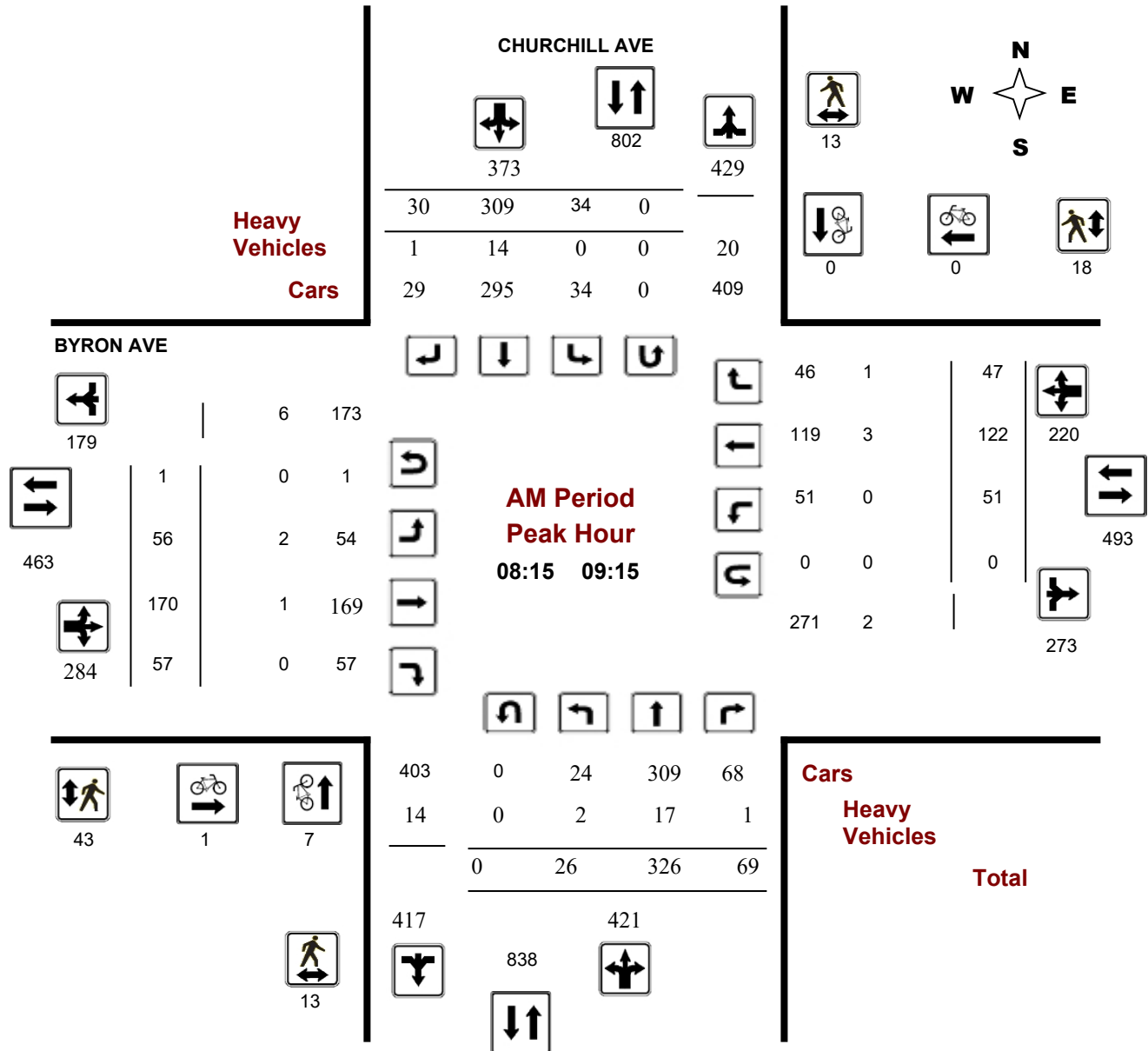
### BYRON AVE @ CHURCHILL AVE

**Survey Date:** Thursday, January 23, 2020

**Start Time:** 07:00

**WO No:** 39387

**Device:** Miovision





# Transportation Services - Traffic Services

## Turning Movement Count - Peak Hour Diagram

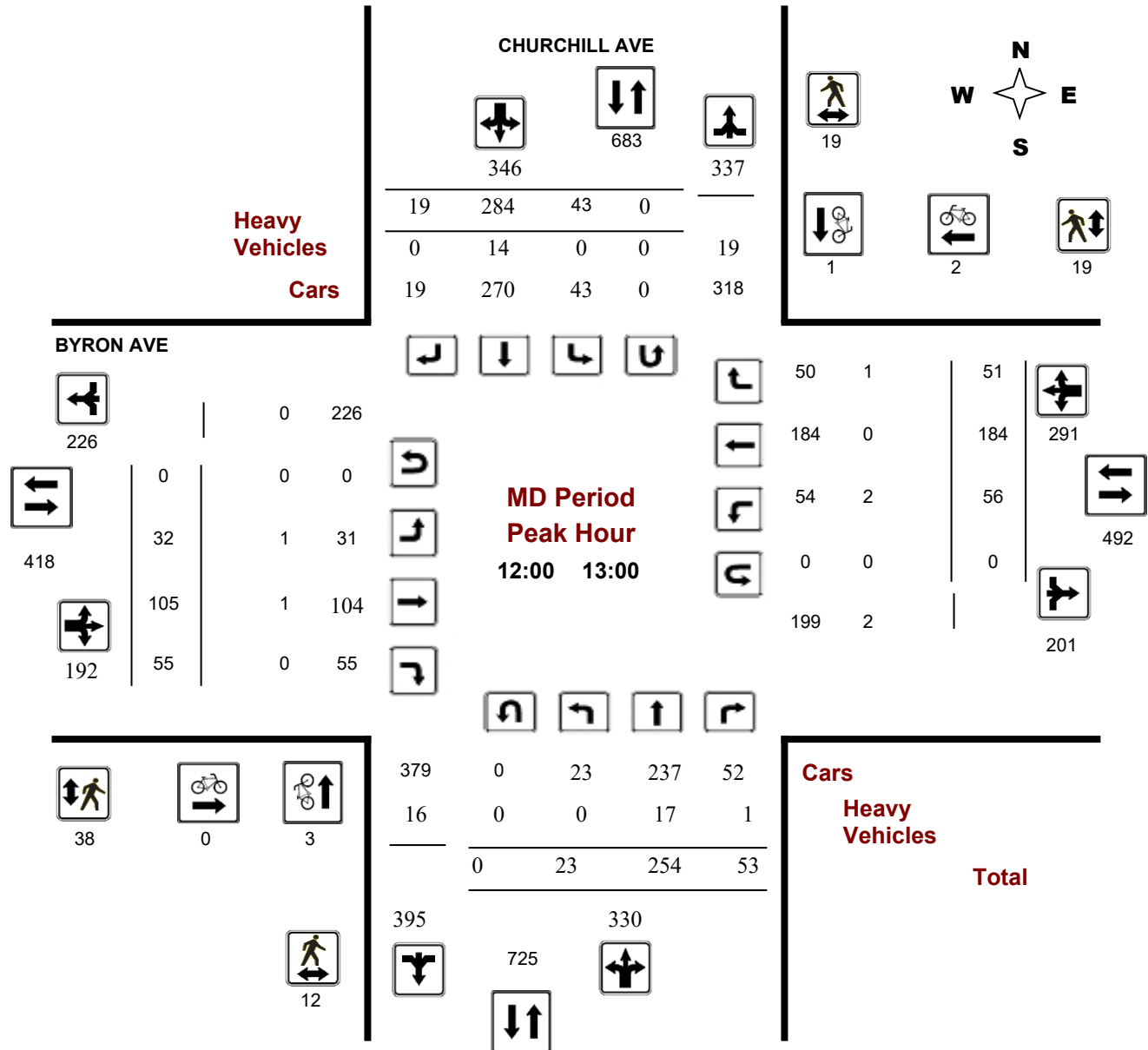
### BYRON AVE @ CHURCHILL AVE

**Survey Date:** Thursday, January 23, 2020

**Start Time:** 07:00

**WO No:** 39387

**Device:** Miovision





# Transportation Services - Traffic Services

## Turning Movement Count - Peak Hour Diagram

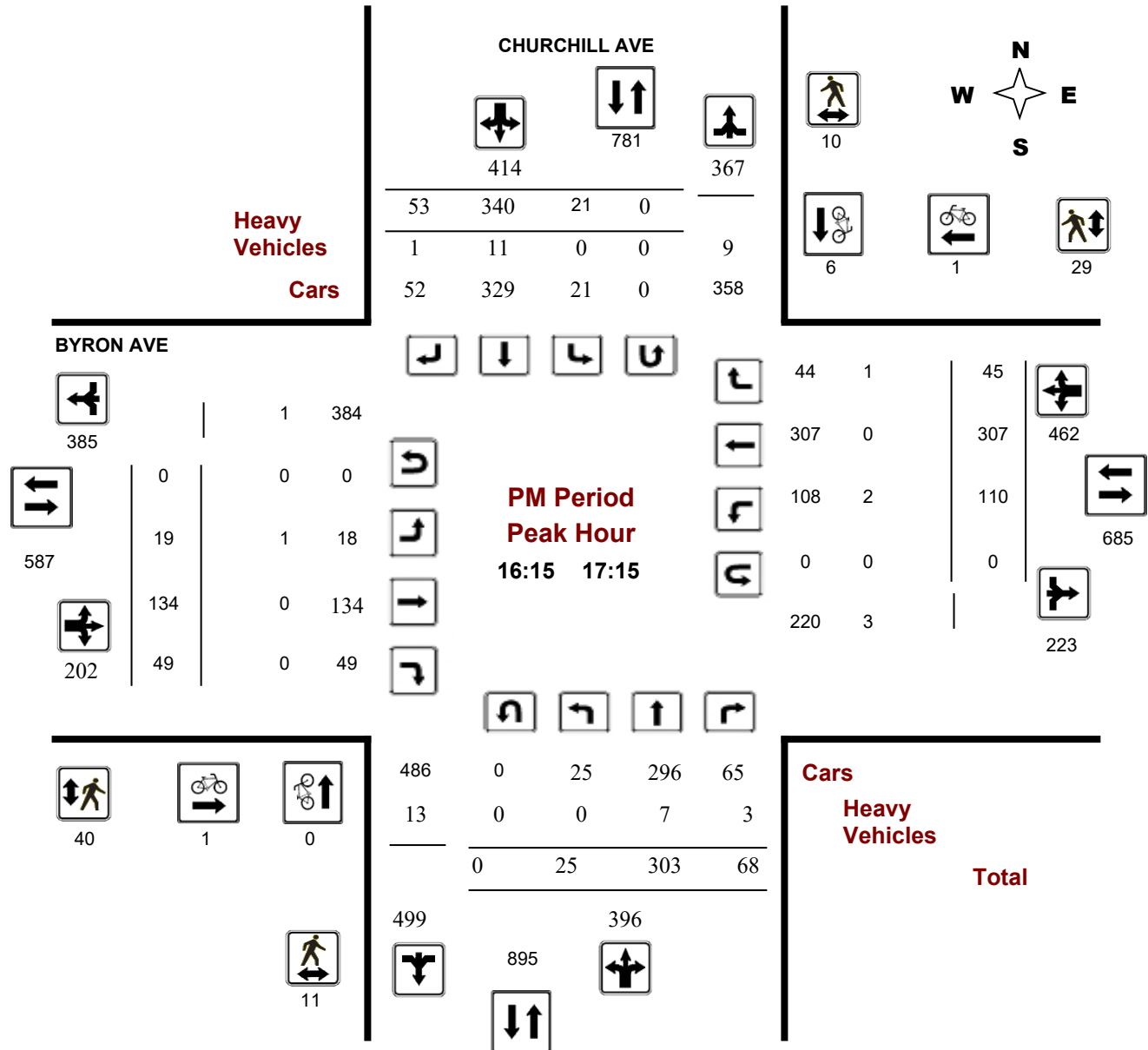
### BYRON AVE @ CHURCHILL AVE

**Survey Date:** Thursday, January 23, 2020

**Start Time:** 07:00

**WO No:** 39387

**Device:** Miovision



**Comments** 5472205 - THU JAN 23, 2020 - 8HRS - LORETTA



# Transportation Services - Traffic Services

## Turning Movement Count - Study Results

### BYRON AVE @ CHURCHILL AVE

**Survey Date:** Thursday, January 23, 2020

**WO No:** 39387

**Start Time:** 07:00

**Device:** Miovision

### Full Study Summary (8 HR Standard)

**Survey Date:** Thursday, January 23, 2020

#### Total Observed U-Turns

Northbound: 0 Southbound: 0  
Eastbound: 2 Westbound: 0

#### AADT Factor

1.00

#### CHURCHILL AVE

#### BYRON AVE

Period	CHURCHILL AVE Northbound					CHURCHILL AVE Southbound					BYRON AVE Eastbound					BYRON AVE Westbound					Grand Total
	LT	ST	RT	NB TOT		LT	ST	RT	SB TOT	STR TOT	LT	ST	RT	EB TOT		LT	ST	RT	WB TOT	STR TOT	
07:00 08:00	12	215	42	269		18	255	3	276	545	20	89	34	143		42	70	22	134	277	822
08:00 09:00	25	325	62	412		32	293	25	350	762	53	165	53	271		50	108	43	201	472	1234
09:00 10:00	23	273	65	361		19	257	25	301	662	36	125	51	212		32	99	48	179	391	1053
11:30 12:30	25	240	73	338		40	275	17	332	670	24	126	46	196		58	153	59	270	466	1136
12:30 13:30	23	240	49	312		39	284	26	349	661	27	105	48	180		56	192	39	287	467	1128
15:00 16:00	23	257	52	332		25	373	30	428	760	24	150	70	244		85	213	46	344	588	1348
16:00 17:00	22	293	72	387		22	346	50	418	805	25	122	46	193		111	280	49	440	633	1438
17:00 18:00	30	290	68	388		23	321	38	382	770	28	141	47	216		100	211	44	355	571	1341
<b>Sub Total</b>	183	2133	483	2799		218	2404	214	2836	5635	237	1023	395	1655		534	1326	350	2210	3865	9500
<b>U Turns</b>				0					0	0				2					0	2	2
<b>Total</b>	183	2133	483	2799		218	2404	214	2836	5635	237	1023	395	1657		534	1326	350	2210	3867	9502
<b>EQ 12Hr</b>	254	2965	671	3891		303	3342	297	3942	7833	329	1422	549	2303		742	1843	486	3072	5375	13208
Note: These values are calculated by multiplying the totals by the appropriate expansion factor.														<b>1.39</b>							
<b>AVG 12Hr</b>	240	2794	633	3667		286	3149	280	3715	7833	310	1340	517	2171		700	1737	458	2895	5375	13208
Note: These volumes are calculated by multiplying the Equivalent 12 hr. totals by the AADT factor.														<b>1</b>							
<b>AVG 24Hr</b>	314	3660	829	4803		374	4126	367	4867	9670	407	1756	678	2844		916	2276	601	3793	6637	16307

Note: These volumes are calculated by multiplying the Average Daily 12 hr. totals by 12 to 24 expansion factor.

**1.31**

Note: U-Turns provided for approach totals. Refer to 'U-Turn' Report for specific breakdown.





# Transportation Services - Traffic Services

## Turning Movement Count - Study Results

### BYRON AVE @ CHURCHILL AVE

**Survey Date:** Thursday, January 23, 2020

**WO No:** 39387

**Start Time:** 07:00

**Device:** Miovision

## Full Study 15 Minute Increments

### CHURCHILL AVE

### BYRON AVE

Northbound

Southbound

Eastbound

Westbound

Time Period	LT	ST	RT	N TOT	LT	ST	RT	S TOT	STR TOT	LT	ST	RT	E TOT	LT	ST	RT	W TOT	STR TOT	Grand Total
07:00 07:15	2	40	10	52	4	53	0	57	4	1	15	7	23	5	3	7	15	4	147
07:15 07:30	0	32	7	39	5	56	1	62	4	4	31	10	45	6	20	1	27	4	173
07:30 07:45	6	62	11	79	3	64	2	69	10	3	17	12	32	17	15	6	38	10	218
07:45 08:00	4	81	14	99	6	82	0	88	7	12	26	5	43	14	32	8	54	7	284
08:00 08:15	7	80	9	96	5	66	6	77	7	8	38	8	54	10	12	9	31	7	258
08:15 08:30	6	89	14	109	16	83	3	102	7	13	38	15	66	10	17	15	42	7	319
08:30 08:45	5	85	22	112	8	67	11	86	8	20	45	14	79	15	31	9	55	8	332
08:45 09:00	7	71	17	95	3	77	5	85	8	12	44	16	73	15	48	10	73	8	326
09:00 09:15	8	81	16	105	7	82	11	100	12	11	43	12	66	11	26	13	50	12	321
09:15 09:30	2	62	15	79	5	69	5	79	16	14	37	13	64	8	24	12	44	16	266
09:30 09:45	4	71	14	89	4	53	7	64	12	4	18	16	38	4	19	9	32	12	223
09:45 10:00	9	59	20	88	3	53	2	58	10	7	27	10	44	9	30	14	53	10	243
11:30 11:45	6	54	27	87	6	75	3	84	19	2	37	9	48	11	24	14	49	19	268
11:45 12:00	7	71	20	98	9	56	7	72	13	6	37	9	52	17	42	14	73	13	295
12:00 12:15	6	62	15	83	14	77	2	93	12	9	26	13	48	15	43	16	74	12	298
12:15 12:30	6	53	11	70	11	67	5	83	5	7	26	15	48	15	44	15	74	5	275
12:30 12:45	5	68	11	84	11	74	4	89	10	7	28	14	49	13	34	8	55	10	277
12:45 13:00	6	71	16	93	7	66	8	81	5	9	25	13	47	13	63	12	88	5	309
13:00 13:15	7	52	11	70	6	77	10	93	9	5	28	11	44	17	45	8	70	9	277
13:15 13:30	5	49	11	65	15	67	4	86	11	6	24	10	40	13	50	11	74	11	265
15:00 15:15	5	65	11	81	7	103	4	114	9	5	45	23	73	18	47	12	77	9	345
15:15 15:30	5	64	10	79	5	99	8	112	5	8	50	17	76	21	55	14	90	5	357
15:30 15:45	7	60	18	85	9	81	7	97	3	5	25	14	44	18	50	9	77	3	303
15:45 16:00	6	68	13	87	4	90	11	105	3	6	30	16	52	28	61	11	100	3	344
16:00 16:15	10	71	25	106	4	91	5	100	5	7	30	11	48	25	53	13	91	5	345
16:15 16:30	7	82	17	106	6	73	18	97	8	7	33	16	56	30	78	9	117	8	376
16:30 16:45	3	73	14	90	6	93	13	112	7	4	23	10	37	25	77	13	115	7	354
16:45 17:00	2	67	16	85	6	89	14	109	5	7	36	9	52	31	72	14	117	5	363
17:00 17:15	13	81	21	115	3	85	8	96	2	1	42	14	57	24	80	9	113	2	381
17:15 17:30	5	76	14	95	4	86	10	100	4	10	35	9	54	28	48	7	83	4	332
17:30 17:45	7	63	16	86	8	80	10	98	5	8	36	13	57	18	52	13	83	5	324
17:45 18:00	5	70	17	92	8	70	10	88	1	9	28	11	48	30	31	15	76	1	304
Total:	183	2133	483	2799	218	2404	214	2836	246	237	1023	395	1657	534	1326	350	2210	246	9,502

Note: U-Turns are included in Totals.



# Transportation Services - Traffic Services

## Turning Movement Count - Study Results

### BYRON AVE @ CHURCHILL AVE

**Survey Date:** Thursday, January 23, 2020

**WO No:** 39387

**Start Time:** 07:00

**Device:** Miovision

### Full Study Cyclist Volume

		CHURCHILL AVE			BYRON AVE			Grand Total
Time Period		Northbound	Southbound	Street Total	Eastbound	Westbound	Street Total	
07:00	07:15	1	0	1	0	0	0	1
07:15	07:30	1	1	2	0	0	0	2
07:30	07:45	1	0	1	1	1	2	3
07:45	08:00	4	0	4	0	0	0	4
08:00	08:15	6	0	6	0	0	0	6
08:15	08:30	4	0	4	0	0	0	4
08:30	08:45	1	0	1	1	0	1	2
08:45	09:00	0	0	0	0	0	0	0
09:00	09:15	2	0	2	0	0	0	2
09:15	09:30	0	0	0	1	0	1	1
09:30	09:45	0	0	0	0	0	0	0
09:45	10:00	1	0	1	0	0	0	1
11:30	11:45	0	0	0	0	0	0	0
11:45	12:00	1	0	1	0	0	0	1
12:00	12:15	2	1	3	0	0	0	3
12:15	12:30	0	0	0	0	0	0	0
12:30	12:45	0	0	0	0	1	1	1
12:45	13:00	1	0	1	0	1	1	2
13:00	13:15	0	0	0	0	0	0	0
13:15	13:30	0	0	0	0	0	0	0
15:00	15:15	0	0	0	0	0	0	0
15:15	15:30	0	0	0	0	0	0	0
15:30	15:45	0	0	0	0	0	0	0
15:45	16:00	0	1	1	1	0	1	2
16:00	16:15	0	1	1	0	0	0	1
16:15	16:30	0	0	0	0	0	0	0
16:30	16:45	0	1	1	0	0	0	1
16:45	17:00	0	0	0	0	0	0	0
17:00	17:15	0	5	5	1	1	2	7
17:15	17:30	0	3	3	0	0	0	3
17:30	17:45	0	3	3	0	1	1	4
17:45	18:00	2	0	2	0	0	0	2
Total		27	16	43	5	5	10	53



# Transportation Services - Traffic Services

## Turning Movement Count - Study Results

### BYRON AVE @ CHURCHILL AVE

**Survey Date:** Thursday, January 23, 2020

**WO No:** 39387

**Start Time:** 07:00

**Device:** Miovision

### Full Study Pedestrian Volume

#### CHURCHILL AVE

#### BYRON AVE

Time Period	NB Approach (E or W Crossing)	SB Approach (E or W Crossing)	Total	EB Approach (N or S Crossing)	WB Approach (N or S Crossing)	Total	Grand Total
07:00 07:15	0	0	0	2	1	3	3
07:15 07:30	6	0	6	1	6	7	13
07:30 07:45	5	3	8	7	3	10	18
07:45 08:00	11	5	16	22	5	27	43
08:00 08:15	18	6	24	18	6	24	48
08:15 08:30	2	5	7	12	2	14	21
08:30 08:45	6	0	6	11	6	17	23
08:45 09:00	2	3	5	13	4	17	22
09:00 09:15	3	5	8	7	6	13	21
09:15 09:30	2	4	6	3	7	10	16
09:30 09:45	2	2	4	3	3	6	10
09:45 10:00	6	6	12	7	7	14	26
11:30 11:45	3	2	5	6	1	7	12
11:45 12:00	4	2	6	10	7	17	23
12:00 12:15	4	9	13	8	2	10	23
12:15 12:30	3	5	8	10	4	14	22
12:30 12:45	3	1	4	13	3	16	20
12:45 13:00	2	4	6	7	10	17	23
13:00 13:15	2	1	3	6	7	13	16
13:15 13:30	3	2	5	4	6	10	15
15:00 15:15	2	2	4	8	10	18	22
15:15 15:30	2	5	7	13	6	19	26
15:30 15:45	4	10	14	13	17	30	44
15:45 16:00	4	4	8	7	7	14	22
16:00 16:15	5	3	8	10	7	17	25
16:15 16:30	2	4	6	18	10	28	34
16:30 16:45	2	1	3	6	5	11	14
16:45 17:00	4	3	7	11	11	22	29
17:00 17:15	3	2	5	5	3	8	13
17:15 17:30	8	2	10	8	13	21	31
17:30 17:45	1	2	3	9	10	19	22
17:45 18:00	1	4	5	4	11	15	20
<b>Total</b>	<b>125</b>	<b>107</b>	<b>232</b>	<b>282</b>	<b>206</b>	<b>488</b>	<b>720</b>

5472205 - THU JAN 23, 2020 - 8HRS - LORETTA



# Transportation Services - Traffic Services

## Turning Movement Count - Study Results

### BYRON AVE @ CHURCHILL AVE

**Survey Date:** Thursday, January 23, 2020

**WO No:** 39387

**Start Time:** 07:00

**Device:** Miovision

## Full Study Heavy Vehicles

### CHURCHILL AVE

### BYRON AVE

Northbound

Southbound

Eastbound

Westbound

Time Period		Northbound			N TOT	Southbound			S TOT	STR TOT	Eastbound			E TOT	Westbound			W TOT	STR TOT	Grand Total
		LT	ST	RT		LT	ST	RT			LT	ST	RT		LT	ST	RT			
07:00	07:15	0	2	1	3	0	1	0	1	4	0	0	1	1	0	0	0	0	1	5
07:15	07:30	0	2	0	2	0	2	0	2	4	1	0	0	1	0	1	0	1	2	6
07:30	07:45	0	6	0	6	0	4	0	4	10	1	0	1	2	3	0	0	3	5	15
07:45	08:00	0	3	0	3	0	4	0	4	7	0	0	1	1	0	0	0	0	1	8
08:00	08:15	0	6	0	6	0	1	0	1	7	0	0	0	0	0	0	0	0	0	7
08:15	08:30	1	2	0	3	0	4	0	4	7	0	0	0	0	0	1	0	1	1	8
08:30	08:45	0	7	0	7	0	1	0	1	8	2	0	0	2	0	0	0	0	2	10
08:45	09:00	1	4	1	6	0	1	1	2	8	0	0	0	0	0	0	1	1	1	9
09:00	09:15	0	4	0	4	0	8	0	8	12	0	1	0	1	0	2	0	2	3	15
09:15	09:30	0	8	0	8	0	8	0	8	16	0	0	0	0	0	0	0	0	0	16
09:30	09:45	0	10	0	10	0	2	0	2	12	0	0	0	0	0	0	1	1	1	13
09:45	10:00	0	5	0	5	0	5	0	5	10	1	0	1	2	0	0	0	0	2	12
11:30	11:45	0	5	2	7	0	12	0	12	19	0	0	0	0	0	0	0	0	0	19
11:45	12:00	0	10	0	10	0	3	0	3	13	0	0	1	1	0	1	0	1	2	15
12:00	12:15	0	6	0	6	0	6	0	6	12	0	0	0	0	0	0	0	0	0	12
12:15	12:30	0	0	1	1	0	4	0	4	5	1	1	0	2	0	0	0	0	2	7
12:30	12:45	0	7	0	7	0	3	0	3	10	0	0	0	0	2	0	0	2	2	12
12:45	13:00	0	4	0	4	0	1	0	1	5	0	0	0	0	0	0	1	1	1	6
13:00	13:15	0	4	0	4	1	4	0	5	9	0	0	0	0	0	0	0	0	0	9
13:15	13:30	0	0	0	0	1	10	0	11	11	0	1	0	1	0	0	1	1	2	13
15:00	15:15	0	3	0	3	1	5	0	6	9	1	1	0	2	1	0	0	1	3	12
15:15	15:30	0	1	0	1	0	4	0	4	5	0	1	0	1	0	0	0	0	1	6
15:30	15:45	0	0	0	0	0	2	1	3	3	0	0	0	0	0	0	0	0	0	3
15:45	16:00	0	1	1	2	0	1	0	1	3	0	0	1	1	0	0	0	0	1	4
16:00	16:15	0	2	1	3	0	2	0	2	5	1	0	1	2	2	0	0	2	4	9
16:15	16:30	0	3	1	4	0	3	1	4	8	1	0	0	1	1	0	0	1	2	10
16:30	16:45	0	1	1	2	0	5	0	5	7	0	0	0	0	1	0	0	1	1	8
16:45	17:00	0	1	1	2	0	3	0	3	5	0	0	0	0	0	0	1	1	1	6
17:00	17:15	0	2	0	2	0	0	0	0	2	0	0	0	0	0	0	0	0	0	2
17:15	17:30	0	2	0	2	0	2	0	2	4	0	0	0	0	0	1	0	1	1	5
17:30	17:45	0	2	0	2	0	3	0	3	5	0	0	0	0	0	0	0	0	0	5
17:45	18:00	0	0	0	0	0	1	0	1	1	0	0	0	0	0	0	0	0	0	1
Total:	None	2	113	10	125	3	115	3	121	246	9	5	7	21	10	6	5	21	42	288





# Transportation Services - Traffic Services

## Turning Movement Count - Study Results

### BYRON AVE @ CHURCHILL AVE

**Survey Date:** Thursday, January 23, 2020

**WO No:** 39387

**Start Time:** 07:00

**Device:** Miovision

### Full Study 15 Minute U-Turn Total

#### CHURCHILL AVE

#### BYRON AVE

Time Period		Northbound U-Turn Total	Southbound U-Turn Total	Eastbound U-Turn Total	Westbound U-Turn Total	Total
07:00	07:15	0	0	0	0	0
07:15	07:30	0	0	0	0	0
07:30	07:45	0	0	0	0	0
07:45	08:00	0	0	0	0	0
08:00	08:15	0	0	0	0	0
08:15	08:30	0	0	0	0	0
08:30	08:45	0	0	0	0	0
08:45	09:00	0	0	1	0	1
09:00	09:15	0	0	0	0	0
09:15	09:30	0	0	0	0	0
09:30	09:45	0	0	0	0	0
09:45	10:00	0	0	0	0	0
11:30	11:45	0	0	0	0	0
11:45	12:00	0	0	0	0	0
12:00	12:15	0	0	0	0	0
12:15	12:30	0	0	0	0	0
12:30	12:45	0	0	0	0	0
12:45	13:00	0	0	0	0	0
13:00	13:15	0	0	0	0	0
13:15	13:30	0	0	0	0	0
15:00	15:15	0	0	0	0	0
15:15	15:30	0	0	1	0	1
15:30	15:45	0	0	0	0	0
15:45	16:00	0	0	0	0	0
16:00	16:15	0	0	0	0	0
16:15	16:30	0	0	0	0	0
16:30	16:45	0	0	0	0	0
16:45	17:00	0	0	0	0	0
17:00	17:15	0	0	0	0	0
17:15	17:30	0	0	0	0	0
17:30	17:45	0	0	0	0	0
17:45	18:00	0	0	0	0	0
Total		0	0	2	0	2

**Survey Date:** Wednesday, February 27, 2019

**Start Time:** 07:00

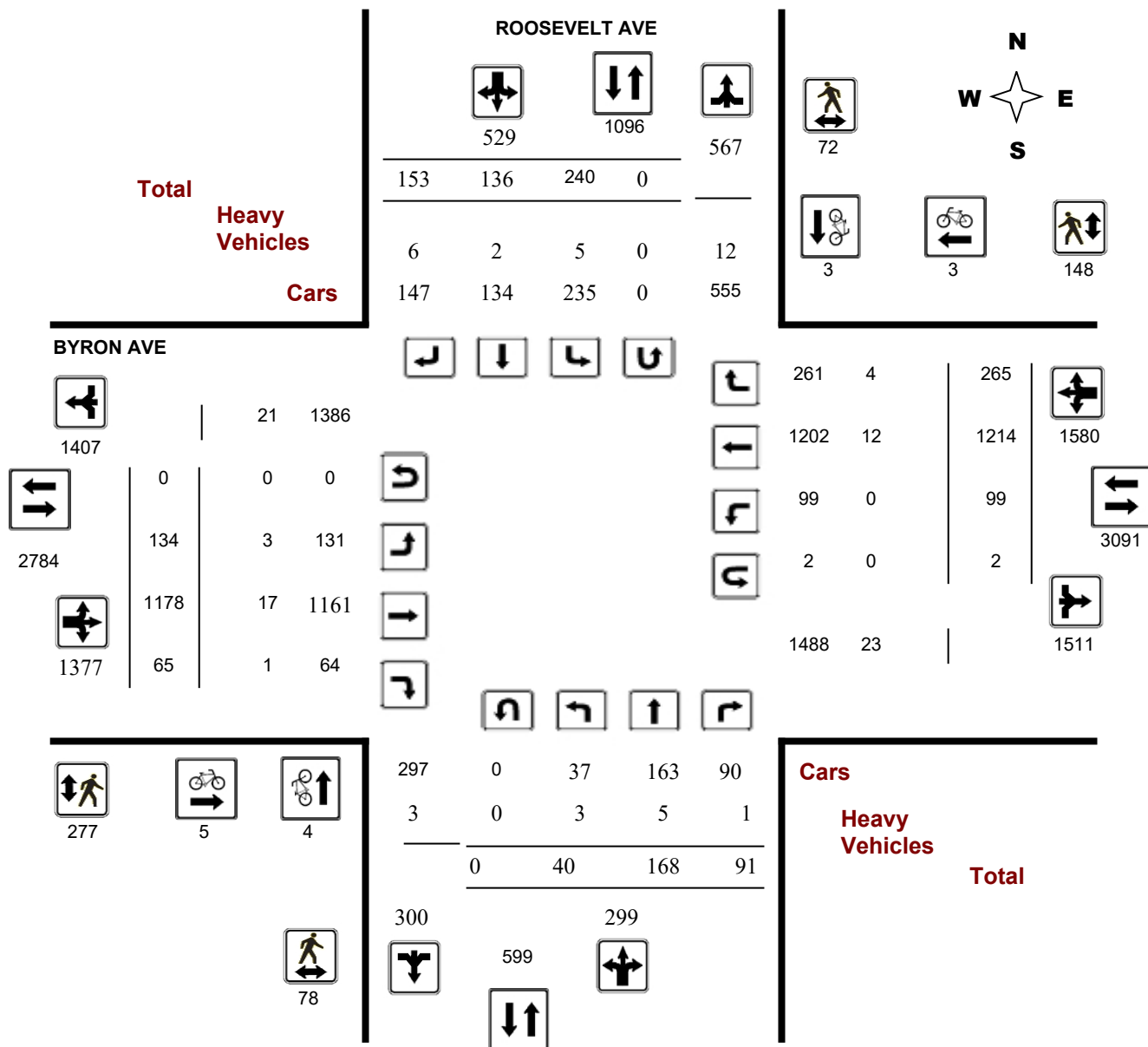
**WO No:**

38395

**Device:**

Miovision

### Full Study Diagram



## Turning Movement Count - Study Results

### BYRON AVE @ ROOSEVELT AVE

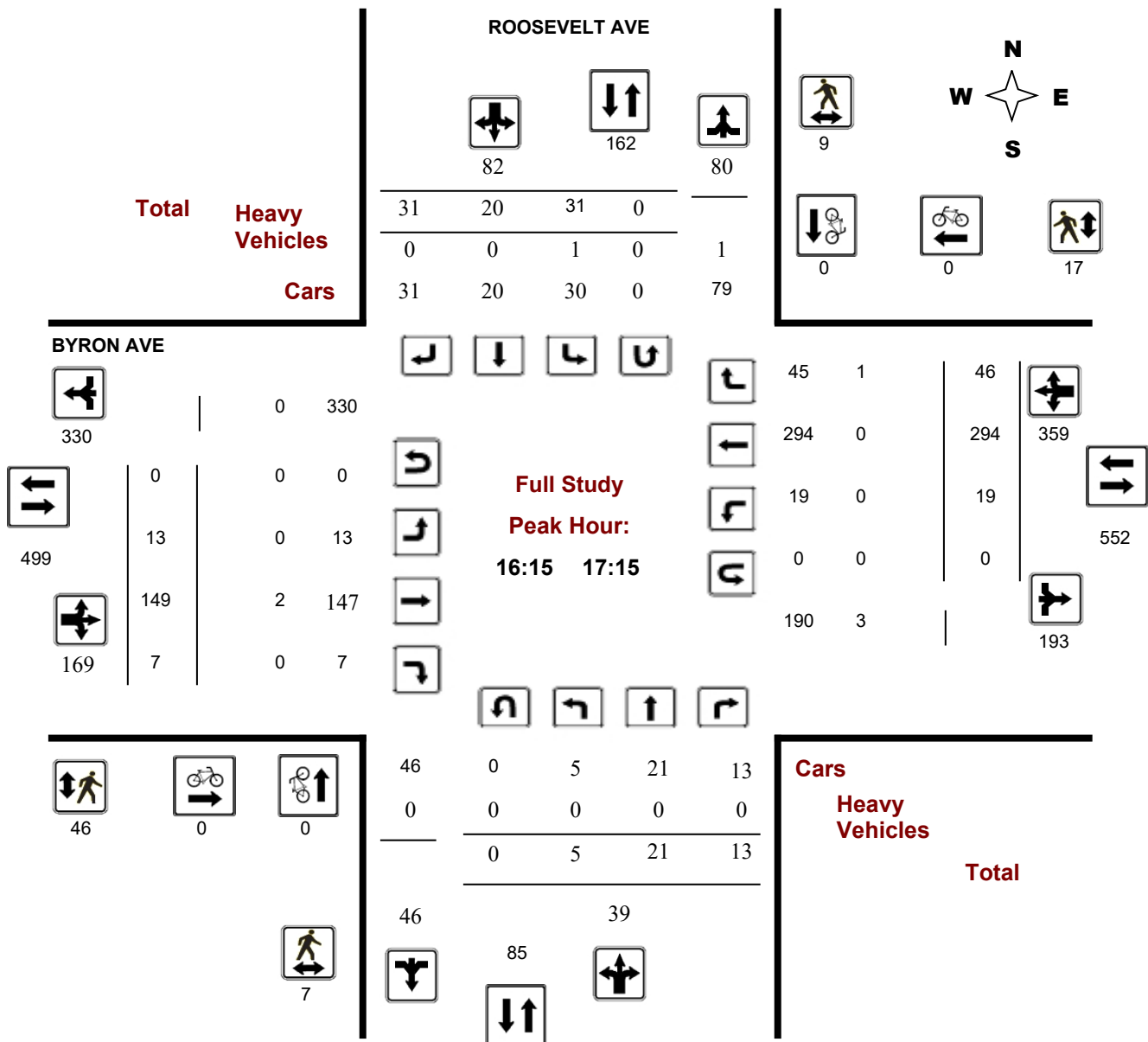
**Survey Date:** Wednesday, February 27, 2019

**WO No:** 38395

**Start Time:** 07:00

**Device:** Miovision

### Full Study Peak Hour Diagram



## Turning Movement Count - Peak Hour Diagram

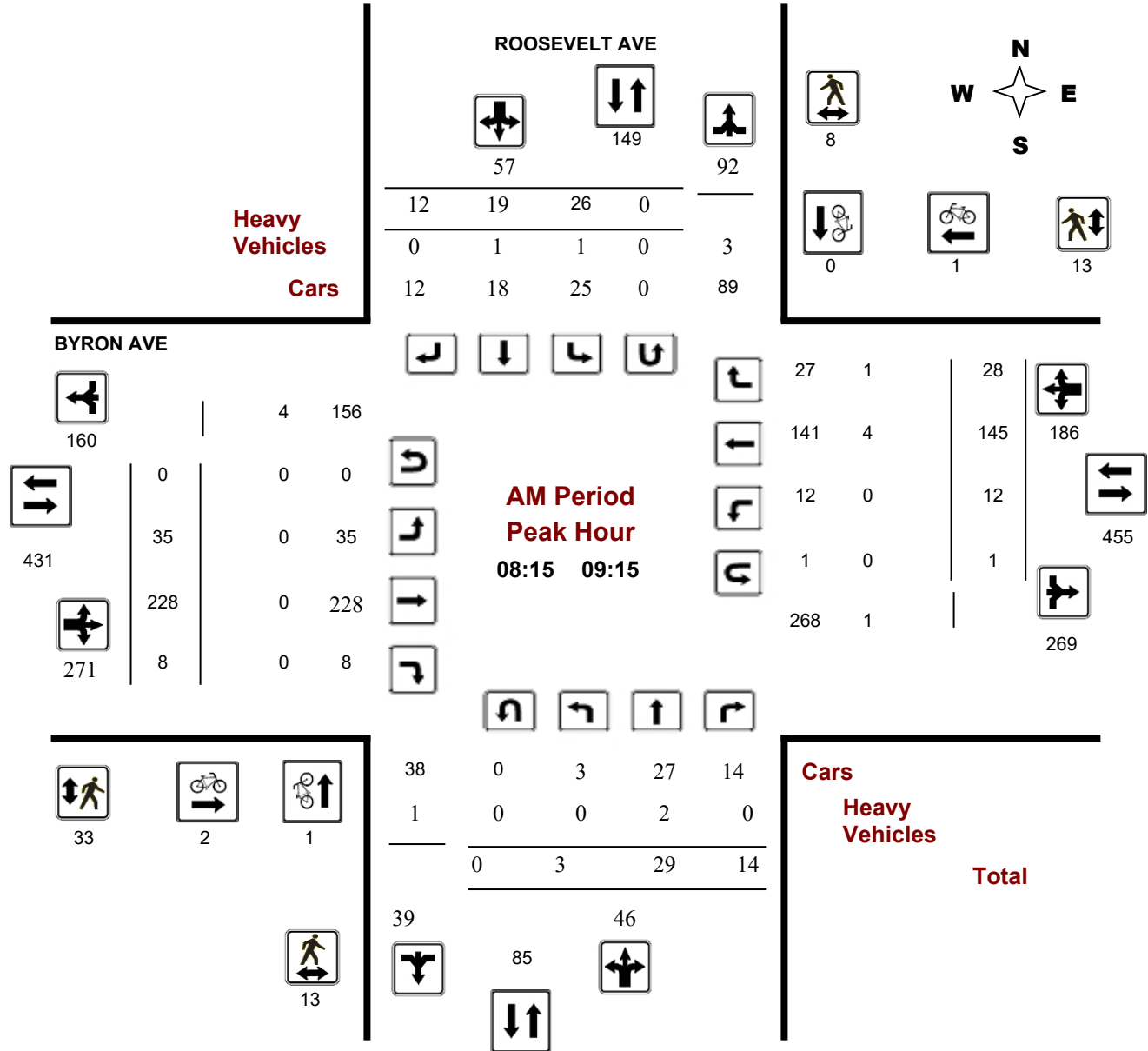
### BYRON AVE @ ROOSEVELT AVE

**Survey Date:** Wednesday, February 27, 2019

**Start Time:** 07:00

**WO No:** 38395

**Device:** Miovision





## Turning Movement Count - Peak Hour Diagram

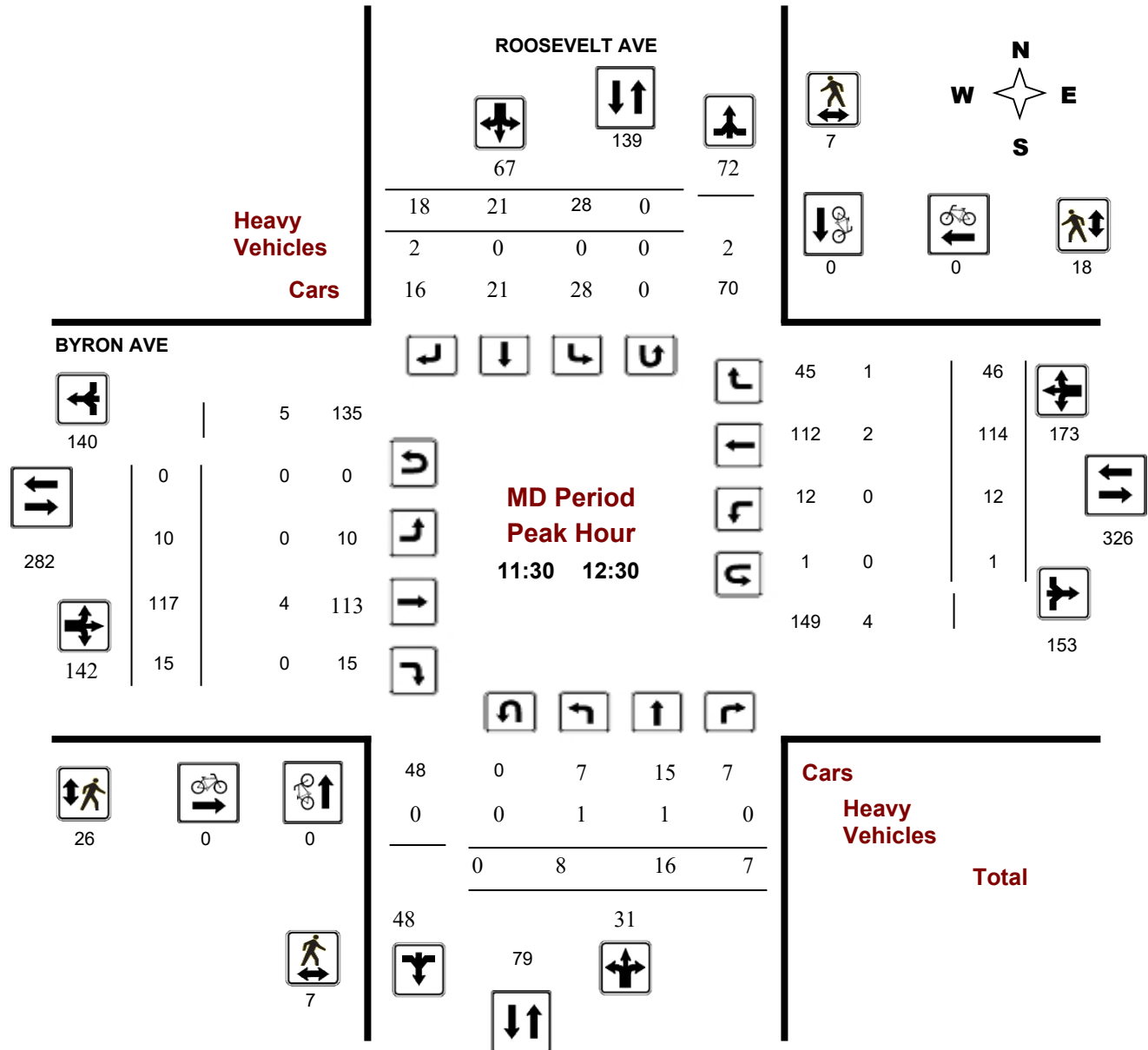
### BYRON AVE @ ROOSEVELT AVE

**Survey Date:** Wednesday, February 27, 2019

**Start Time:** 07:00

**WO No:** 38395

**Device:** Miovision



## Turning Movement Count - Peak Hour Diagram

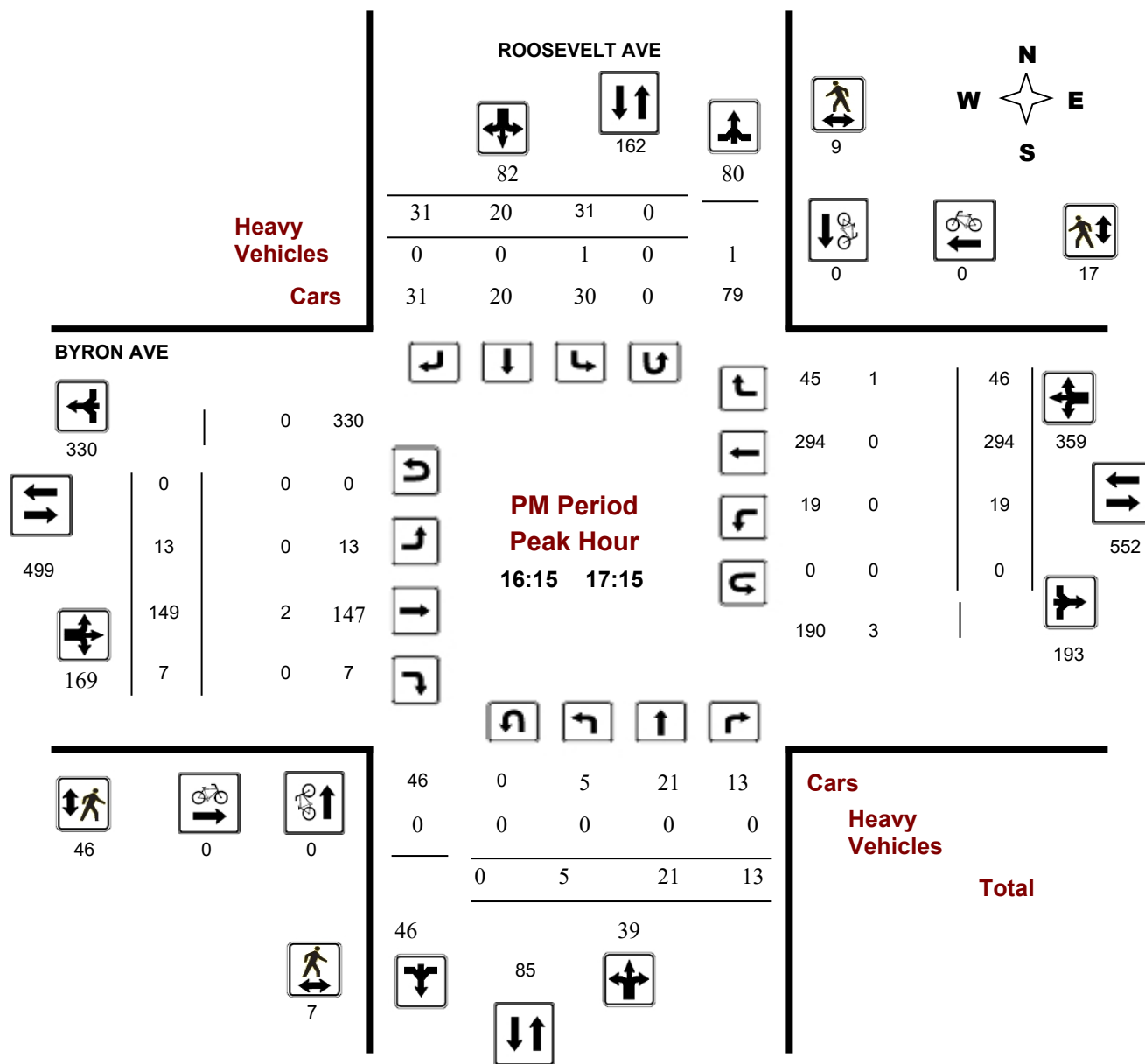
### BYRON AVE @ ROOSEVELT AVE

**Survey Date:** Wednesday, February 27, 2019

**Start Time:** 07:00

**WO No:** 38395

**Device:** Miovision



**Comments**



# Transportation Services - Traffic Services

## Turning Movement Count - Study Results

### BYRON AVE @ ROOSEVELT AVE

**Survey Date:** Wednesday, February 27, 2019

**WO No:** 38395

**Start Time:** 07:00

**Device:** Miovision

### Full Study Summary (8 HR Standard)

**Survey Date:** Wednesday, February 27, 2019

#### Total Observed U-Turns

Northbound: 0 Southbound: 0  
Eastbound: 0 Westbound: 2

#### AADT Factor

1.00

#### ROOSEVELT AVE

#### BYRON AVE

		Northbound				Southbound				Eastbound				Westbound							
Period		LT	ST	RT	NB TOT	LT	ST	RT	SB TOT	STR TOT	LT	ST	RT	EB TOT	LT	ST	RT	WB TOT	STR TOT	Grand Total	
07:00	08:00	3	19	17	39	14	9	7	30	69	9	161	7	177	5	54	17	76	253	322	
08:00	09:00	3	32	17	52	27	15	12	54	106	28	247	2	277	10	138	28	176	453	559	
09:00	10:00	0	25	13	38	21	15	12	48	86	28	152	12	192	12	104	30	146	338	424	
11:30	12:30	8	16	7	31	28	21	18	67	98	10	117	15	142	12	114	46	172	314	412	
12:30	13:30	11	18	6	35	37	20	24	81	116	17	101	4	122	13	111	30	154	276	392	
15:00	16:00	8	14	9	31	38	19	22	79	110	16	133	5	154	12	189	31	232	386	496	
16:00	17:00	6	23	9	38	30	21	29	80	118	12	137	12	161	14	253	47	314	475	593	
17:00	18:00	1	21	13	35	45	16	29	90	125	14	130	8	152	21	251	36	308	460	585	
Sub Total		40	168	91	299	240	136	153	529	828	134	1178	65	1377	99	1214	265	1578	2955	3783	
U Turns		0				0				0	0				2				2	2	
Total		40	168	91	299	240	136	153	529	828	134	1178	65	1377	99	1214	265	1580	2957	3785	
EQ 12Hr		56	234	126	416	334	189	213	735	1151	186	1637	90	1914	138	1687	368	2196	4110	5261	
Note: These values are calculated by multiplying the totals by the appropriate expansion factor.															1.39						
AVG 12Hr		52	220	119	392	314	178	200	693	1151	176	1543	85	1804	130	1590	347	2070	4110	5261	
Note: These volumes are calculated by multiplying the Equivalent 12 hr. totals by the AADT factor.															1						
AVG 24Hr		69	288	156	513	412	233	263	908	1421	230	2022	112	2363	170	2083	455	2711	5074	6495	

Note: These volumes are calculated by multiplying the Average Daily 12 hr. totals by 12 to 24 expansion factor.

**1.31**

Note: U-Turns provided for approach totals. Refer to 'U-Turn' Report for specific breakdown.



# Transportation Services - Traffic Services

## Turning Movement Count - Study Results

### BYRON AVE @ ROOSEVELT AVE

**Survey Date:** Wednesday, February 27, 2019

**WO No:** 38395

**Start Time:** 07:00

**Device:** Miovision

### Full Study 15 Minute Increments

#### ROOSEVELT AVE

#### BYRON AVE

Northbound

Southbound

Eastbound

Westbound

Time Period	LT	ST	RT	N TOT	LT	ST	RT	S TOT	STR TOT	LT	ST	RT	E TOT	LT	ST	RT	W TOT	STR TOT	Grand Total
07:00 07:15	0	5	3	8	3	2	1	6	0	1	17	0	18	0	4	2	6	0	38
07:15 07:30	2	4	4	10	3	2	0	5	0	1	45	0	46	1	14	2	17	0	78
07:30 07:45	0	6	2	8	4	2	3	9	0	2	41	2	45	2	14	5	21	0	83
07:45 08:00	1	4	8	13	4	3	3	10	0	5	58	5	68	2	22	8	32	0	123
08:00 08:15	0	11	7	18	7	3	2	12	2	5	66	0	71	3	30	5	38	2	139
08:15 08:30	1	13	5	19	6	4	4	14	1	7	69	0	76	2	25	8	36	1	145
08:30 08:45	0	6	2	8	10	1	5	16	1	9	60	1	70	2	32	11	45	1	139
08:45 09:00	2	2	3	7	4	7	1	12	0	7	52	1	60	3	51	4	58	0	137
09:00 09:15	0	8	4	12	6	7	2	15	2	12	47	6	65	5	37	5	47	2	139
09:15 09:30	0	6	3	9	5	2	1	8	0	10	40	3	53	2	23	7	32	0	102
09:30 09:45	0	5	3	8	4	1	2	7	0	3	37	2	42	2	25	8	35	0	92
09:45 10:00	0	6	3	9	6	5	7	18	1	3	28	1	32	3	19	10	32	1	91
11:30 11:45	2	3	0	5	8	4	4	16	2	3	35	7	45	2	26	10	38	2	104
11:45 12:00	3	6	2	11	5	5	5	15	2	3	27	4	34	5	30	11	46	2	106
12:00 12:15	2	3	2	7	6	8	7	21	0	2	27	0	29	0	32	12	44	0	101
12:15 12:30	1	4	3	8	9	4	2	15	0	2	28	4	34	5	26	13	45	0	102
12:30 12:45	5	4	2	11	9	3	7	19	1	4	21	0	25	1	33	8	42	1	97
12:45 13:00	0	5	2	7	10	5	5	20	1	7	29	1	37	3	29	7	39	1	103
13:00 13:15	3	6	2	11	12	3	2	17	0	5	23	2	30	7	24	9	40	0	98
13:15 13:30	3	3	0	6	6	9	10	25	0	1	28	1	30	2	25	6	33	0	94
15:00 15:15	4	3	2	9	7	5	6	18	3	7	24	0	31	4	36	7	47	3	105
15:15 15:30	3	4	1	8	14	6	7	27	2	3	36	4	43	2	44	11	57	2	135
15:30 15:45	1	3	0	4	7	4	6	17	1	2	38	0	40	3	51	7	61	1	122
15:45 16:00	0	4	6	10	10	4	3	17	1	4	35	1	40	3	58	6	67	1	134
16:00 16:15	1	10	2	13	9	4	6	19	1	4	30	5	39	2	46	15	63	1	134
16:15 16:30	1	3	3	7	3	7	2	12	0	3	33	0	36	4	77	13	94	0	149
16:30 16:45	1	7	3	11	8	5	12	25	1	1	24	1	26	4	57	8	69	1	131
16:45 17:00	3	3	1	7	10	5	9	24	0	4	50	6	60	4	73	11	88	0	179
17:00 17:15	0	8	6	14	10	3	8	21	0	5	42	0	47	7	87	14	108	0	190
17:15 17:30	1	3	3	7	7	4	8	19	0	5	27	3	35	9	72	5	86	0	147
17:30 17:45	0	6	1	7	12	4	8	24	0	4	31	2	37	2	53	8	63	0	131
17:45 18:00	0	4	3	7	16	5	5	26	0	0	30	3	33	3	39	9	51	0	117
Total:	40	168	91	299	240	136	153	529	22	134	1178	65	1377	99	1214	265	1580	22	3,785

Note: U-Turns are included in Totals.





# Transportation Services - Traffic Services

## Turning Movement Count - Study Results

### BYRON AVE @ ROOSEVELT AVE

**Survey Date:** Wednesday, February 27, 2019

**WO No:** 38395

**Start Time:** 07:00

**Device:** Miovision

### Full Study Cyclist Volume

#### ROOSEVELT AVE

#### BYRON AVE

Time Period	Northbound	Southbound	Street Total	Eastbound	Westbound	Street Total	Grand Total
07:00 07:15	0	0	0	0	0	0	0
07:15 07:30	1	0	1	1	0	1	2
07:30 07:45	0	0	0	0	0	0	0
07:45 08:00	1	0	1	0	0	0	1
08:00 08:15	1	0	1	2	0	2	3
08:15 08:30	0	0	0	1	0	1	1
08:30 08:45	1	0	1	0	0	0	1
08:45 09:00	0	0	0	1	1	2	2
09:00 09:15	0	0	0	0	0	0	0
09:15 09:30	0	0	0	0	0	0	0
09:30 09:45	0	0	0	0	2	2	2
09:45 10:00	0	0	0	0	0	0	0
11:30 11:45	0	0	0	0	0	0	0
11:45 12:00	0	0	0	0	0	0	0
12:00 12:15	0	0	0	0	0	0	0
12:15 12:30	0	0	0	0	0	0	0
12:30 12:45	0	0	0	0	0	0	0
12:45 13:00	0	0	0	0	0	0	0
13:00 13:15	0	0	0	0	0	0	0
13:15 13:30	0	0	0	0	0	0	0
15:00 15:15	0	0	0	0	0	0	0
15:15 15:30	0	0	0	0	0	0	0
15:30 15:45	0	0	0	0	0	0	0
15:45 16:00	0	0	0	0	0	0	0
16:00 16:15	0	1	1	0	0	0	1
16:15 16:30	0	0	0	0	0	0	0
16:30 16:45	0	0	0	0	0	0	0
16:45 17:00	0	0	0	0	0	0	0
17:00 17:15	0	0	0	0	0	0	0
17:15 17:30	0	0	0	0	0	0	0
17:30 17:45	0	1	1	0	0	0	1
17:45 18:00	0	1	1	0	0	0	1
Total	4	3	7	5	3	8	15



# Transportation Services - Traffic Services

## Turning Movement Count - Study Results

### BYRON AVE @ ROOSEVELT AVE

**Survey Date:** Wednesday, February 27, 2019

**WO No:** 38395

**Start Time:** 07:00

**Device:** Miovision

### Full Study Pedestrian Volume

#### ROOSEVELT AVE

#### BYRON AVE

Time Period	NB Approach (E or W Crossing)	SB Approach (E or W Crossing)	Total	EB Approach (N or S Crossing)	WB Approach (N or S Crossing)	Total	Grand Total
07:00 07:15	2	0	2	4	1	5	7
07:15 07:30	2	1	3	7	2	9	12
07:30 07:45	1	0	1	5	2	7	8
07:45 08:00	2	0	2	13	4	17	19
08:00 08:15	2	1	3	9	5	14	17
08:15 08:30	5	2	7	12	2	14	21
08:30 08:45	4	3	7	7	4	11	18
08:45 09:00	3	3	6	10	5	15	21
09:00 09:15	1	0	1	4	2	6	7
09:15 09:30	2	3	5	9	0	9	14
09:30 09:45	1	1	2	3	3	6	8
09:45 10:00	1	0	1	0	3	3	4
11:30 11:45	1	0	1	6	1	7	8
11:45 12:00	1	4	5	10	8	18	23
12:00 12:15	2	1	3	7	6	13	16
12:15 12:30	3	2	5	3	3	6	11
12:30 12:45	16	17	33	26	18	44	77
12:45 13:00	1	0	1	10	7	17	18
13:00 13:15	2	3	5	12	8	20	25
13:15 13:30	1	2	3	6	2	8	11
15:00 15:15	6	4	10	4	8	12	22
15:15 15:30	0	1	1	0	6	6	7
15:30 15:45	1	3	4	9	7	16	20
15:45 16:00	2	5	7	14	5	19	26
16:00 16:15	3	2	5	14	6	20	25
16:15 16:30	0	1	1	9	8	17	18
16:30 16:45	0	4	4	11	1	12	16
16:45 17:00	3	4	7	11	4	15	22
17:00 17:15	4	0	4	15	4	19	23
17:15 17:30	4	2	6	10	6	16	22
17:30 17:45	1	1	2	13	3	16	18
17:45 18:00	1	2	3	4	4	8	11
<b>Total</b>	<b>78</b>	<b>72</b>	<b>150</b>	<b>277</b>	<b>148</b>	<b>425</b>	<b>575</b>



# Transportation Services - Traffic Services

## Turning Movement Count - Study Results

### BYRON AVE @ ROOSEVELT AVE

**Survey Date:** Wednesday, February 27, 2019

**WO No:** 38395

**Start Time:** 07:00

**Device:** Miovision

### Full Study Heavy Vehicles

#### ROOSEVELT AVE

#### BYRON AVE

Northbound

Southbound

Eastbound

Westbound

Time Period	LT	ST	RT	N TOT	LT	ST	RT	S TOT	STR TOT	LT	ST	RT	E TOT	LT	ST	RT	W TOT	STR TOT	Grand Total
07:00 07:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:15 07:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:30 07:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	1
07:45 08:00	0	0	0	0	0	0	0	0	0	0	2	0	2	0	0	0	0	2	2
08:00 08:15	0	0	0	0	0	0	2	2	2	0	0	0	0	0	1	0	1	1	3
08:15 08:30	0	1	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1
08:30 08:45	0	0	0	0	1	0	0	1	1	0	0	0	0	0	1	1	2	2	3
08:45 09:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	2	2
09:00 09:15	0	1	0	1	0	1	0	1	2	0	0	0	0	0	1	0	1	1	3
09:15 09:30	0	0	0	0	0	0	0	0	0	1	1	0	2	0	0	0	0	2	2
09:30 09:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09:45 10:00	0	0	0	0	0	1	0	1	1	0	0	0	0	0	0	0	0	0	1
11:30 11:45	0	1	0	1	0	0	1	1	2	0	2	0	2	0	1	0	1	3	5
11:45 12:00	1	0	0	1	0	0	1	1	2	0	2	0	2	0	0	0	0	2	4
12:00 12:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	1
12:15 12:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1
12:30 12:45	0	1	0	1	0	0	0	0	1	0	1	0	1	0	0	0	0	1	2
12:45 13:00	0	0	0	0	1	0	0	1	1	0	1	0	1	0	0	0	0	1	2
13:00 13:15	0	0	0	0	0	0	0	0	0	1	1	1	3	0	0	0	0	3	3
13:15 13:30	0	0	0	0	0	0	0	0	0	0	2	0	2	0	0	0	0	2	2
15:00 15:15	2	0	0	2	1	0	0	1	3	1	2	0	3	0	0	1	1	4	7
15:15 15:30	0	0	0	0	0	0	2	2	2	0	0	0	0	0	2	0	2	2	4
15:30 15:45	0	0	0	0	1	0	0	1	1	0	0	0	0	0	0	0	0	0	1
15:45 16:00	0	0	1	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1
16:00 16:15	0	1	0	1	0	0	0	0	1	0	1	0	1	0	1	0	1	2	3
16:15 16:30	0	0	0	0	0	0	0	0	0	0	2	0	2	0	0	1	1	3	3
16:30 16:45	0	0	0	0	1	0	0	1	1	0	0	0	0	0	0	0	0	0	1
16:45 17:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:00 17:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:15 17:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	1
17:30 17:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:45 18:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total: None	3	5	1	9	5	2	6	13	22	3	17	1	21	0	12	4	16	37	59



# Transportation Services - Traffic Services

## Turning Movement Count - Study Results

### BYRON AVE @ ROOSEVELT AVE

**Survey Date:** Wednesday, February 27, 2019

**WO No:** 38395

**Start Time:** 07:00

**Device:** Miovision

### Full Study 15 Minute U-Turn Total

#### ROOSEVELT AVE

#### BYRON AVE

Time Period		Northbound U-Turn Total	Southbound U-Turn Total	Eastbound U-Turn Total	Westbound U-Turn Total	Total
07:00	07:15	0	0	0	0	0
07:15	07:30	0	0	0	0	0
07:30	07:45	0	0	0	0	0
07:45	08:00	0	0	0	0	0
08:00	08:15	0	0	0	0	0
08:15	08:30	0	0	0	1	1
08:30	08:45	0	0	0	0	0
08:45	09:00	0	0	0	0	0
09:00	09:15	0	0	0	0	0
09:15	09:30	0	0	0	0	0
09:30	09:45	0	0	0	0	0
09:45	10:00	0	0	0	0	0
11:30	11:45	0	0	0	0	0
11:45	12:00	0	0	0	0	0
12:00	12:15	0	0	0	0	0
12:15	12:30	0	0	0	1	1
12:30	12:45	0	0	0	0	0
12:45	13:00	0	0	0	0	0
13:00	13:15	0	0	0	0	0
13:15	13:30	0	0	0	0	0
15:00	15:15	0	0	0	0	0
15:15	15:30	0	0	0	0	0
15:30	15:45	0	0	0	0	0
15:45	16:00	0	0	0	0	0
16:00	16:15	0	0	0	0	0
16:15	16:30	0	0	0	0	0
16:30	16:45	0	0	0	0	0
16:45	17:00	0	0	0	0	0
17:00	17:15	0	0	0	0	0
17:15	17:30	0	0	0	0	0
17:30	17:45	0	0	0	0	0
17:45	18:00	0	0	0	0	0
Total		0	0	0	2	2

## Turning Movement Count - Study Results

**CHURCHILL AVE @ RICHMOND RD**

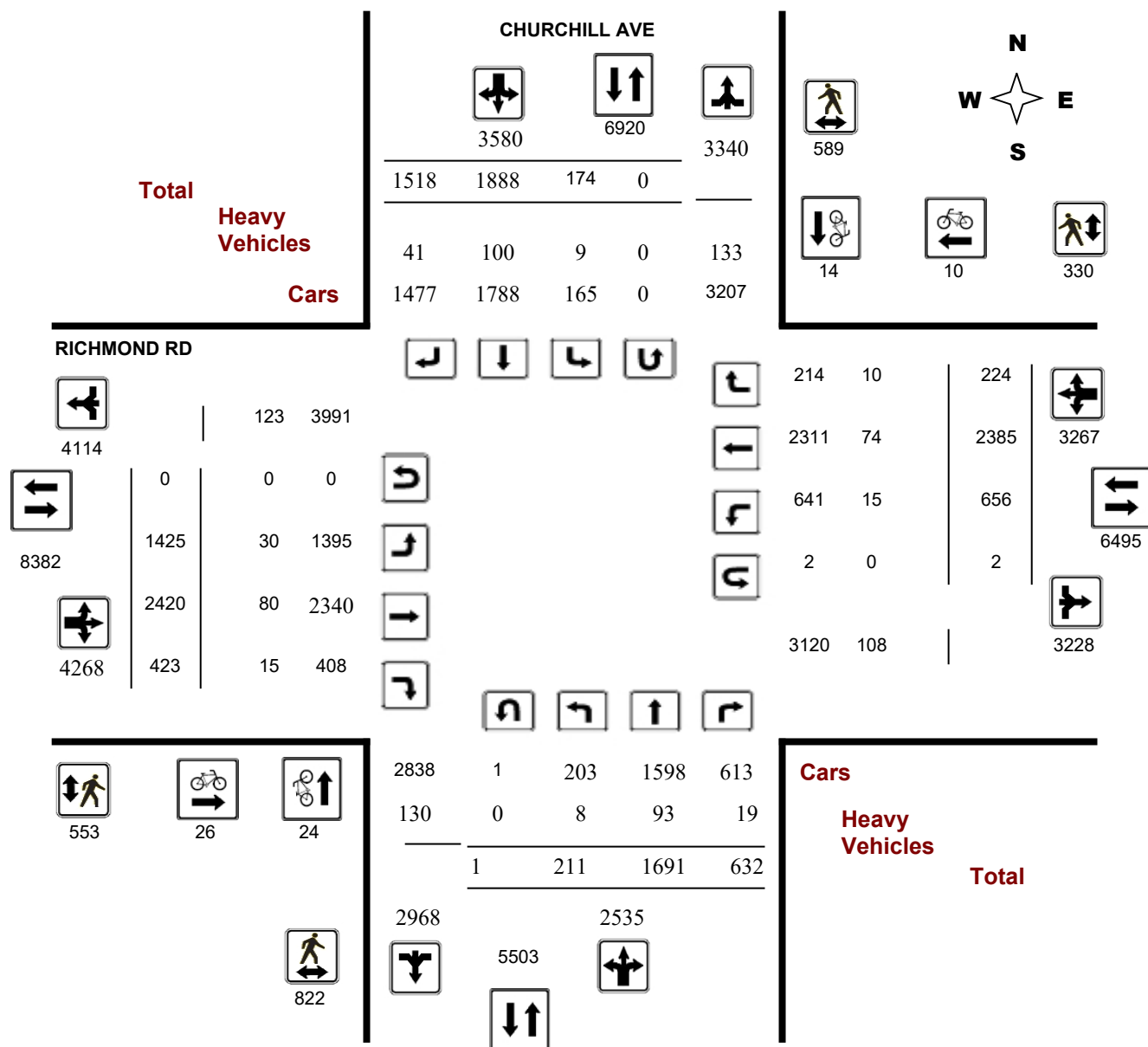
**Survey Date:** Thursday, January 23, 2020

**Start Time:** 07:00

WO No: 39644

Device: Miovision

## Full Study Diagram





## Turning Movement Count - Study Results

**CHURCHILL AVE @ RICHMOND RD**

**Survey Date:** Thursday, January 23, 2020

**Start Time:** 07:00

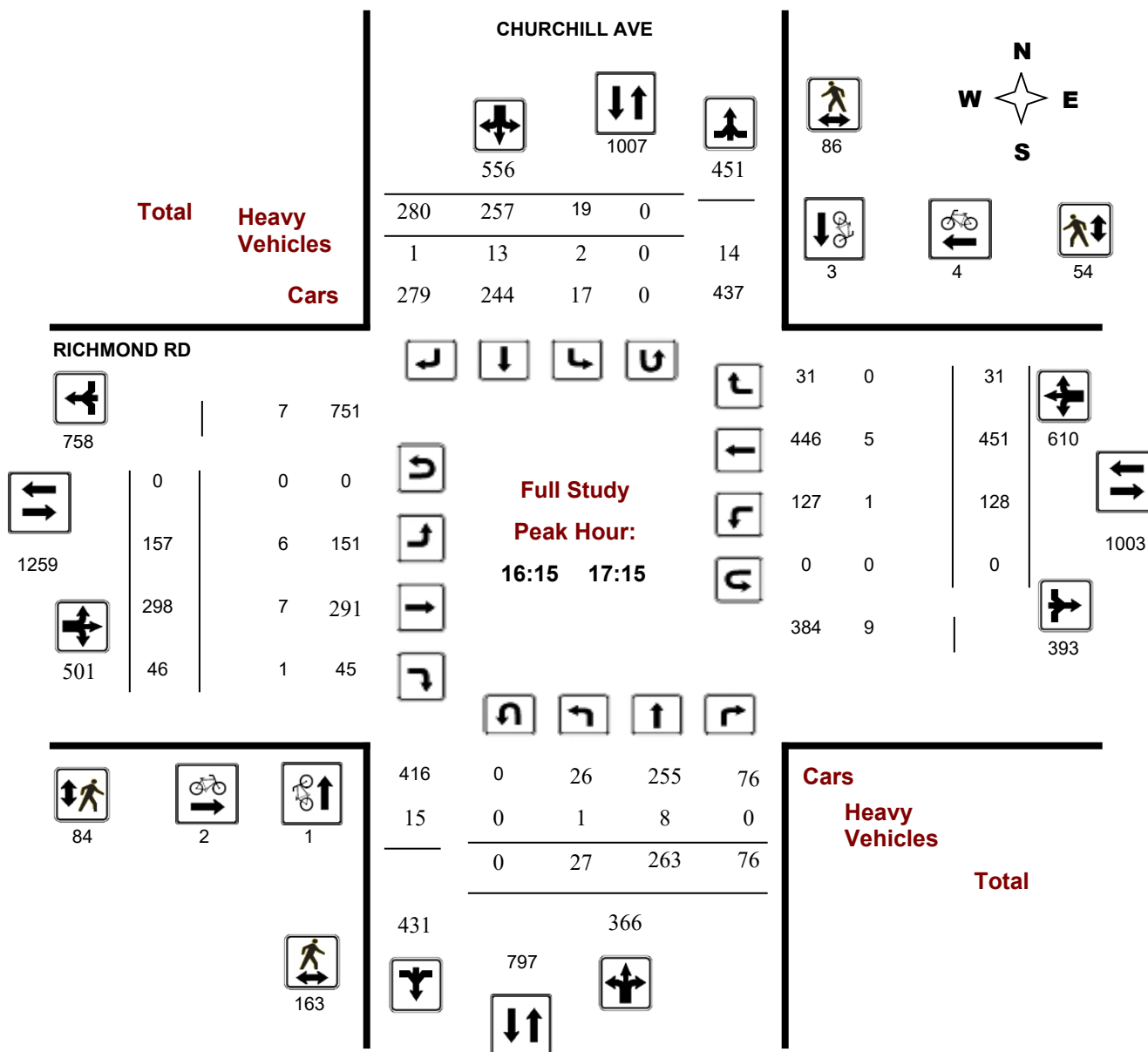
**WO No:**

39644

**Device:**

Miovision

## Full Study Peak Hour Diagram





# Transportation Services - Traffic Services

## Turning Movement Count - Study Results

### CHURCHILL AVE @ RICHMOND RD

**Survey Date:** Thursday, January 23, 2020

**WO No:** 39644

**Start Time:** 07:00

**Device:** Miovision

### Full Study Summary (8 HR Standard)

**Survey Date:** Thursday, January 23, 2020

#### Total Observed U-Turns

#### AADT Factor

Northbound: 1 Southbound: 0

1.00

Eastbound: 0 Westbound: 2

#### CHURCHILL AVE

#### RICHMOND RD

Period	Northbound				Southbound				STR TOT	Eastbound				Westbound				STR TOT	Grand Total
	LT	ST	RT	NB TOT	LT	ST	RT	SB TOT		LT	ST	RT	EB TOT	LT	ST	RT	WB TOT		
07:00 08:00	14	161	59	234	16	226	90	332	566	274	347	24	645	35	126	22	183	828	1394
08:00 09:00	16	270	93	379	21	296	136	453	832	287	373	32	692	40	182	16	238	930	1762
09:00 10:00	27	205	81	313	18	219	137	374	687	162	329	35	526	64	173	33	270	796	1483
11:30 12:30	42	173	77	292	36	195	161	392	684	122	289	72	483	79	308	33	420	903	1587
12:30 13:30	31	183	83	297	30	215	187	432	729	128	254	83	465	73	340	27	440	905	1634
15:00 16:00	28	201	84	313	18	247	276	541	854	145	283	78	506	116	393	29	538	1044	1898
16:00 17:00	28	260	71	359	16	256	270	542	901	145	279	57	481	132	453	25	610	1091	1992
17:00 18:00	25	238	84	347	19	234	261	514	861	162	266	42	470	117	410	39	566	1036	1897
<b>Sub Total</b>	211	1691	632	2534	174	1888	1518	3580	6114	1425	2420	423	4268	656	2385	224	3265	7533	13647
<b>U Turns</b>				1				0	1				0				2	2	3
<b>Total</b>	211	1691	632	2535	174	1888	1518	3580	6115	1425	2420	423	4268	656	2385	224	3267	7535	13650
<b>EQ 12Hr</b>	293	2350	878	3524	242	2624	2110	4976	8500	1981	3364	588	5933	912	3315	311	4541	10474	18974
Note: These values are calculated by multiplying the totals by the appropriate expansion factor.													1.39						
<b>AVG 12Hr</b>	276	2215	828	3321	228	2473	1989	4690	8500	1867	3170	554	5591	859	3124	293	4280	10474	18974
Note: These volumes are calculated by multiplying the Equivalent 12 hr. totals by the AADT factor.													1						
<b>AVG 24Hr</b>	362	2902	1085	4350	299	3240	2605	6144	10494	2445	4153	726	7324	1126	4093	384	5606	12930	23424

Note: These volumes are calculated by multiplying the Average Daily 12 hr. totals by 12 to 24 expansion factor.

1.31

Note: U-Turns provided for approach totals. Refer to 'U-Turn' Report for specific breakdown.

## Turning Movement Count - Peak Hour Diagram

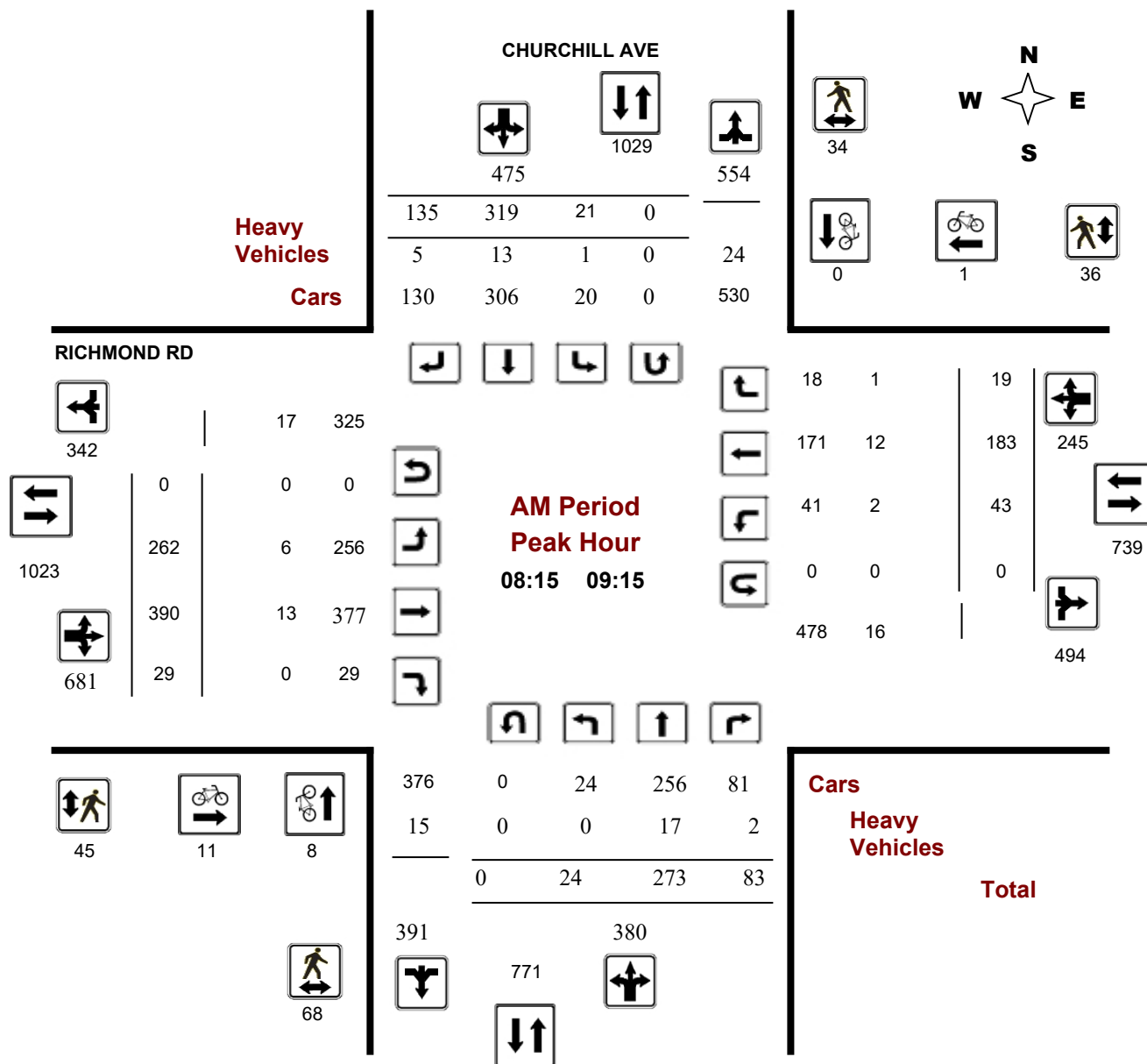
## CHURCHILL AVE @ RICHMOND RD

**Survey Date:** Thursday, January 23, 2020

**Start Time:** 07:00

**WO No:** 39644

**Device:** Miovision



## Comments

## Turning Movement Count - Peak Hour Diagram

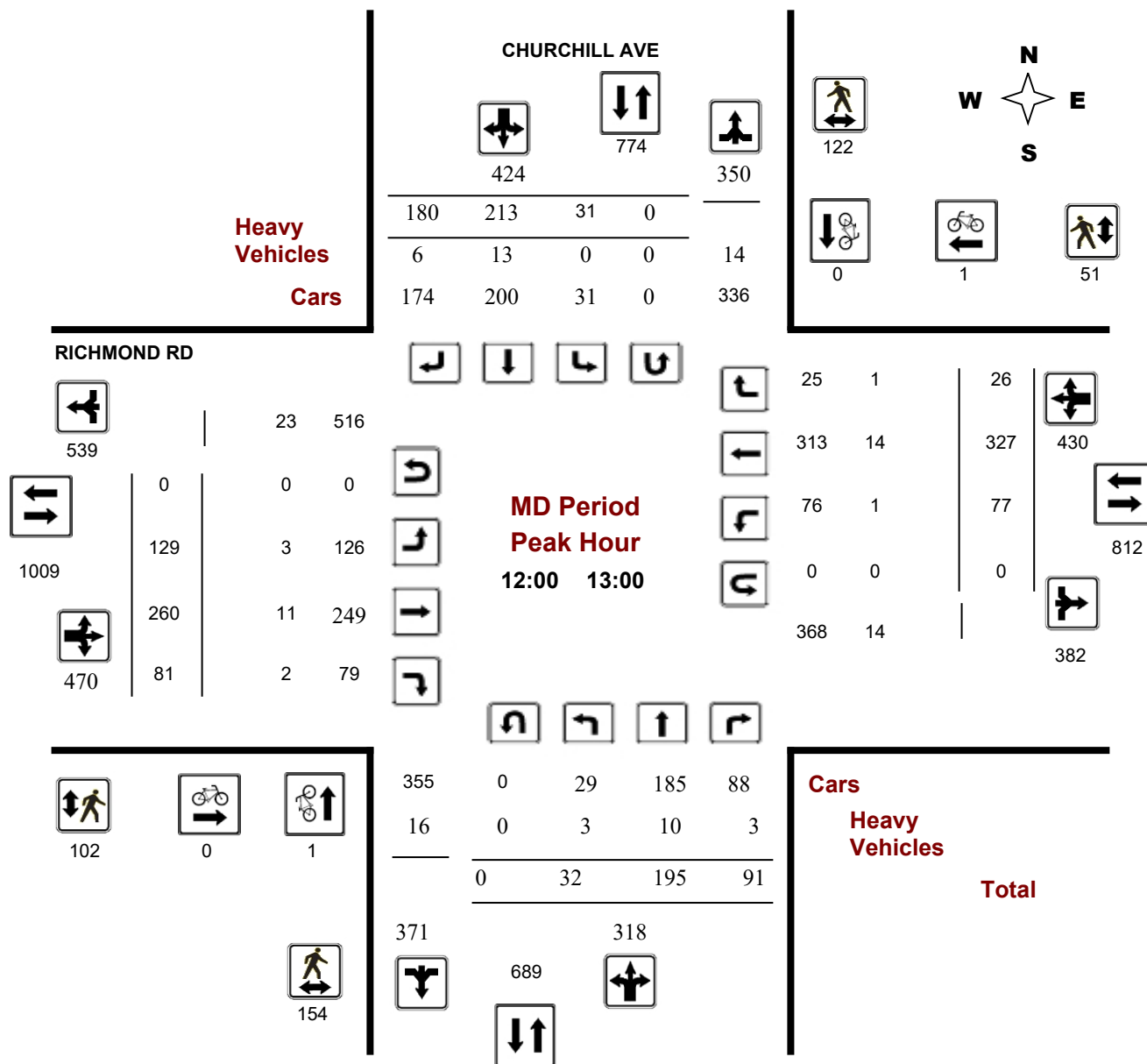
### CHURCHILL AVE @ RICHMOND RD

**Survey Date:** Thursday, January 23, 2020

**Start Time:** 07:00

**WO No:** 39644

**Device:** Miovision



## Turning Movement Count - Peak Hour Diagram

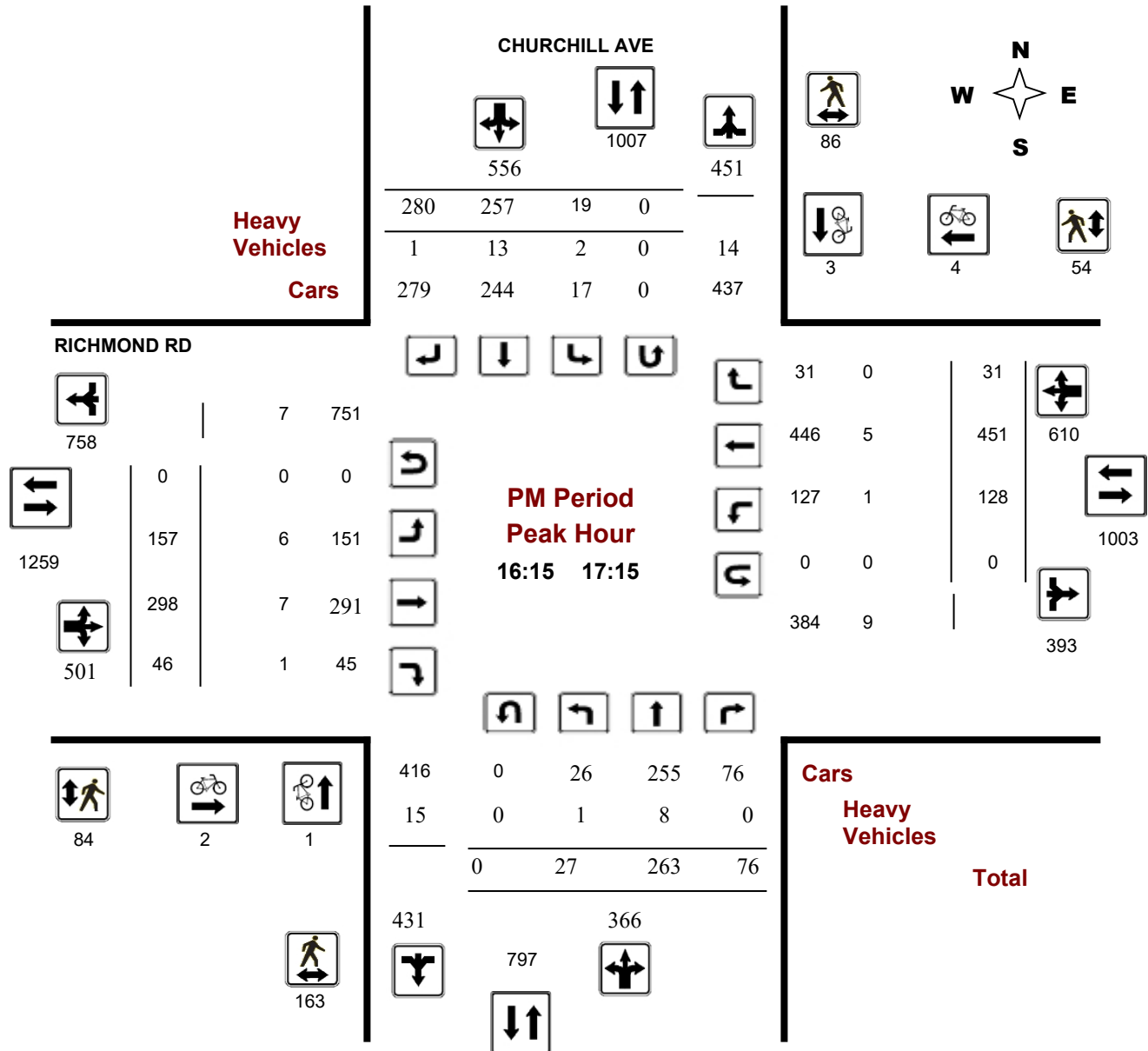
### CHURCHILL AVE @ RICHMOND RD

**Survey Date:** Thursday, January 23, 2020

**Start Time:** 07:00

**WO No:** 39644

**Device:** Miovision



**Comments**





# Transportation Services - Traffic Services

## Turning Movement Count - Study Results

### CHURCHILL AVE @ RICHMOND RD

**Survey Date:** Thursday, January 23, 2020

**WO No:** 39644

**Start Time:** 07:00

**Device:** Miovision

### Full Study 15 Minute Increments

#### CHURCHILL AVE

#### RICHMOND RD

##### Northbound

##### Southbound

##### Eastbound

##### Westbound

Time Period	LT	ST	RT	N TOT	LT	ST	RT	S TOT	STR TOT	LT	ST	RT	E TOT	LT	ST	RT	W TOT	STR TOT	Grand Total	
07:00	07:15	4	25	10	39	3	46	20	69	4	56	75	5	136	7	27	6	40	4	284
07:15	07:30	4	28	8	40	2	50	19	71	6	63	91	5	159	5	35	2	42	6	312
07:30	07:45	2	37	18	57	9	59	24	92	13	80	85	10	175	11	26	4	41	13	365
07:45	08:00	4	71	23	98	2	71	27	100	8	75	96	4	175	12	38	10	60	8	433
08:00	08:15	1	69	22	93	6	60	32	98	10	72	83	11	166	11	39	3	53	10	410
08:15	08:30	6	60	30	96	7	83	29	119	7	77	95	7	179	9	43	7	59	7	453
08:30	08:45	4	66	20	90	3	74	36	113	11	76	83	8	167	8	53	4	65	11	435
08:45	09:00	5	75	21	101	5	79	39	123	8	62	112	6	180	12	47	2	61	8	465
09:00	09:15	9	72	12	93	6	83	31	120	12	47	100	8	155	14	40	6	60	12	428
09:15	09:30	4	48	27	79	5	55	39	99	13	46	79	12	137	14	37	6	58	13	373
09:30	09:45	6	46	19	71	4	43	34	81	17	38	74	8	120	19	56	10	85	17	357
09:45	10:00	8	39	23	70	3	38	33	74	12	31	76	7	114	17	40	11	68	12	326
11:30	11:45	9	32	16	57	12	46	29	87	14	28	75	13	116	22	78	11	111	14	371
11:45	12:00	15	52	19	86	8	43	39	90	14	31	73	22	126	19	63	12	94	14	396
12:00	12:15	10	48	22	80	7	59	44	110	14	31	82	20	133	17	90	6	113	14	436
12:15	12:30	8	41	20	69	9	47	49	105	5	32	59	17	108	21	77	4	102	5	384
12:30	12:45	5	46	25	76	9	51	41	101	10	31	52	27	110	16	77	6	99	10	386
12:45	13:00	9	60	24	93	6	56	46	108	6	35	67	17	119	23	83	10	116	6	436
13:00	13:15	11	42	13	66	6	50	56	112	9	30	70	24	124	17	83	4	104	9	406
13:15	13:30	6	35	21	62	9	58	44	111	12	32	65	15	112	17	97	7	121	12	406
15:00	15:15	10	48	16	74	5	61	62	128	7	32	77	34	143	28	98	11	137	7	482
15:15	15:30	10	53	24	87	6	66	71	143	8	46	74	18	138	32	84	7	123	8	491
15:30	15:45	4	49	15	68	6	57	61	124	4	35	68	9	112	30	110	8	148	4	452
15:45	16:00	4	51	29	84	1	63	82	146	3	32	64	17	113	26	101	3	131	3	474
16:00	16:15	4	53	15	72	4	57	62	123	7	28	60	18	106	36	114	5	155	7	456
16:15	16:30	8	70	12	90	4	60	68	132	6	37	76	12	125	29	113	7	149	6	496
16:30	16:45	6	64	23	93	4	71	67	142	8	43	72	13	128	35	114	7	156	8	519
16:45	17:00	10	73	21	104	4	68	73	145	7	37	71	14	122	32	112	6	150	7	521
17:00	17:15	3	56	20	79	7	58	72	137	4	40	79	7	126	32	112	11	155	4	497
17:15	17:30	10	62	16	88	5	61	68	134	4	44	52	16	112	28	116	8	152	4	486
17:30	17:45	8	59	22	89	3	68	66	137	6	40	72	5	117	28	89	7	124	6	467
17:45	18:00	4	61	26	91	4	47	55	106	1	38	63	14	115	29	93	13	135	1	447
Total:		211	1691	632	2535	174	1888	1518	3580	270	1425	2420	423	4268	656	2385	224	3267	270	13,650

Note: U-Turns are included in Totals.



# Transportation Services - Traffic Services

## Turning Movement Count - Study Results

### CHURCHILL AVE @ RICHMOND RD

**Survey Date:** Thursday, January 23, 2020

**WO No:** 39644

**Start Time:** 07:00

**Device:** Miovision

### Full Study Cyclist Volume

		CHURCHILL AVE			RICHMOND RD			Grand Total
Time Period		Northbound	Southbound	Street Total	Eastbound	Westbound	Street Total	
07:00	07:15	0	0	0	1	0	1	1
07:15	07:30	2	0	2	0	0	0	2
07:30	07:45	1	0	1	0	0	0	1
07:45	08:00	3	0	3	4	0	4	7
08:00	08:15	4	1	5	0	1	1	6
08:15	08:30	5	0	5	4	0	4	9
08:30	08:45	2	0	2	2	1	3	5
08:45	09:00	0	0	0	2	0	2	2
09:00	09:15	1	0	1	3	0	3	4
09:15	09:30	2	1	3	0	1	1	4
09:30	09:45	0	1	1	1	1	2	3
09:45	10:00	1	0	1	0	0	0	1
11:30	11:45	0	0	0	0	0	0	0
11:45	12:00	0	0	0	0	0	0	0
12:00	12:15	0	0	0	0	0	0	0
12:15	12:30	0	0	0	0	1	1	1
12:30	12:45	0	0	0	0	0	0	0
12:45	13:00	1	0	1	0	0	0	1
13:00	13:15	0	0	0	0	0	0	0
13:15	13:30	0	0	0	0	0	0	0
15:00	15:15	0	0	0	1	0	1	1
15:15	15:30	0	0	0	1	0	1	1
15:30	15:45	0	0	0	2	0	2	2
15:45	16:00	0	1	1	1	0	1	2
16:00	16:15	0	2	2	0	1	1	3
16:15	16:30	0	0	0	0	1	1	1
16:30	16:45	0	1	1	0	0	0	1
16:45	17:00	0	0	0	1	0	1	1
17:00	17:15	1	2	3	1	3	4	7
17:15	17:30	0	2	2	0	0	0	2
17:30	17:45	0	1	1	2	0	2	3
17:45	18:00	1	2	3	0	0	0	3
Total		24	14	38	26	10	36	74



# Transportation Services - Traffic Services

## Turning Movement Count - Study Results

### CHURCHILL AVE @ RICHMOND RD

**Survey Date:** Thursday, January 23, 2020

**WO No:** 39644

**Start Time:** 07:00

**Device:** Miovision

### Full Study Pedestrian Volume

#### CHURCHILL AVE

#### RICHMOND RD

Time Period	NB Approach (E or W Crossing)	SB Approach (E or W Crossing)	Total	EB Approach (N or S Crossing)	WB Approach (N or S Crossing)	Total	Grand Total
07:00 07:15	3	2	5	2	2	4	9
07:15 07:30	4	3	7	6	3	9	16
07:30 07:45	10	8	18	4	2	6	24
07:45 08:00	17	4	21	14	4	18	39
08:00 08:15	11	9	20	6	3	9	29
08:15 08:30	18	5	23	10	11	21	44
08:30 08:45	19	15	34	18	10	28	62
08:45 09:00	15	7	22	8	10	18	40
09:00 09:15	16	7	23	9	5	14	37
09:15 09:30	8	16	24	6	4	10	34
09:30 09:45	14	8	22	12	6	18	40
09:45 10:00	14	9	23	10	7	17	40
11:30 11:45	26	24	50	19	7	26	76
11:45 12:00	23	28	51	24	14	38	89
12:00 12:15	46	21	67	31	12	43	110
12:15 12:30	34	35	69	20	16	36	105
12:30 12:45	32	34	66	24	8	32	98
12:45 13:00	42	32	74	27	15	42	116
13:00 13:15	37	19	56	18	11	29	85
13:15 13:30	35	28	63	33	14	47	110
15:00 15:15	33	27	60	26	14	40	100
15:15 15:30	28	20	48	24	12	36	84
15:30 15:45	23	28	51	17	18	35	86
15:45 16:00	28	24	52	16	12	28	80
16:00 16:15	27	16	43	24	5	29	72
16:15 16:30	29	23	52	16	15	31	83
16:30 16:45	48	20	68	24	11	35	103
16:45 17:00	48	25	73	18	17	35	108
17:00 17:15	38	18	56	26	11	37	93
17:15 17:30	31	27	58	27	11	38	96
17:30 17:45	33	24	57	17	16	33	90
17:45 18:00	32	23	55	17	24	41	96
<b>Total .....</b>	<b>822</b>	<b>589</b>	<b>1411</b>	<b>553</b>	<b>330</b>	<b>883</b>	<b>2294</b>



# Transportation Services - Traffic Services

## Turning Movement Count - Study Results

### CHURCHILL AVE @ RICHMOND RD

**Survey Date:** Thursday, January 23, 2020

**WO No:** 39644

**Start Time:** 07:00

**Device:** Miovision

## Full Study Heavy Vehicles

### CHURCHILL AVE

### RICHMOND RD

#### Northbound

#### Southbound

#### Eastbound

#### Westbound

Time Period		Northbound			N TOT	Southbound			S TOT	STR TOT	Eastbound			E TOT	Westbound			W TOT	STR TOT	Grand Total
		LT	ST	RT		LT	ST	RT			LT	ST	RT		LT	ST	RT			
07:00	07:15	0	1	1	2	0	1	1	2	4	3	2	0	5	0	1	0	1	6	10
07:15	07:30	0	1	2	3	0	2	1	3	6	1	4	0	5	0	2	0	2	7	13
07:30	07:45	0	5	1	6	1	2	4	7	13	1	1	2	4	1	1	0	2	6	19
07:45	08:00	1	2	1	4	1	3	0	4	8	1	2	0	3	1	4	1	6	9	17
08:00	08:15	0	8	0	8	1	1	0	2	10	2	4	0	6	0	5	1	6	12	22
08:15	08:30	0	2	0	2	1	4	0	5	7	1	4	0	5	0	3	1	4	9	16
08:30	08:45	0	5	2	7	0	1	3	4	11	3	3	0	6	0	2	0	2	8	19
08:45	09:00	0	7	0	7	0	1	0	1	8	2	2	0	4	1	3	0	4	8	16
09:00	09:15	0	3	0	3	0	7	2	9	12	0	4	0	4	1	4	0	5	9	21
09:15	09:30	0	6	1	7	0	5	1	6	13	0	5	0	5	1	1	1	3	8	21
09:30	09:45	1	7	2	10	1	3	3	7	17	0	5	0	5	1	3	0	4	9	26
09:45	10:00	0	2	3	5	0	4	3	7	12	1	5	0	6	2	1	1	4	10	22
11:30	11:45	0	2	1	3	1	10	0	11	14	0	1	1	2	0	4	2	6	8	22
11:45	12:00	1	7	2	10	0	2	2	4	14	0	3	0	3	0	2	1	3	6	20
12:00	12:15	0	4	2	6	0	6	2	8	14	0	4	2	6	0	4	1	5	11	25
12:15	12:30	1	0	0	1	0	4	0	4	5	2	2	0	4	0	3	0	3	7	12
12:30	12:45	1	4	0	5	0	3	2	5	10	1	2	0	3	0	6	0	6	9	19
12:45	13:00	1	2	1	4	0	0	2	2	6	0	3	0	3	1	1	0	2	5	11
13:00	13:15	0	4	0	4	1	3	1	5	9	1	2	1	4	0	1	0	1	5	14
13:15	13:30	0	2	0	2	0	8	2	10	12	3	1	1	5	2	4	0	6	11	23
15:00	15:15	1	1	0	2	0	3	2	5	7	1	5	4	10	2	4	0	6	16	23
15:15	15:30	0	3	0	3	0	4	1	5	8	0	1	1	2	0	2	0	2	4	12
15:30	15:45	0	0	0	0	0	2	2	4	4	0	2	1	3	0	0	0	0	3	7
15:45	16:00	0	1	0	1	0	1	1	2	3	1	2	0	3	0	2	0	2	5	8
16:00	16:15	0	2	0	2	0	1	4	5	7	0	2	0	2	1	3	1	5	7	14
16:15	16:30	0	2	0	2	0	4	0	4	6	1	1	1	3	0	2	0	2	5	11
16:30	16:45	1	2	0	3	1	4	0	5	8	3	1	0	4	0	0	0	0	4	12
16:45	17:00	0	2	0	2	0	5	0	5	7	1	3	0	4	1	0	0	1	5	12
17:00	17:15	0	2	0	2	1	0	1	2	4	1	2	0	3	0	3	0	3	6	10
17:15	17:30	0	2	0	2	0	1	1	2	4	0	1	1	2	0	1	0	1	3	7
17:30	17:45	0	2	0	2	0	4	0	4	6	0	0	0	0	0	1	0	1	1	7
17:45	18:00	0	0	0	0	0	1	0	1	1	0	1	0	1	0	1	0	1	2	3
Total:		8	93	19	120	9	100	41	150	270	30	80	15	125	15	74	10	99	224	494



# Transportation Services - Traffic Services

## Turning Movement Count - Study Results

### CHURCHILL AVE @ RICHMOND RD

**Survey Date:** Thursday, January 23, 2020

**WO No:** 39644

**Start Time:** 07:00

**Device:** Miovision

### Full Study 15 Minute U-Turn Total

#### CHURCHILL AVE

#### RICHMOND RD

Time Period		Northbound U-Turn Total	Southbound U-Turn Total	Eastbound U-Turn Total	Westbound U-Turn Total	Total
07:00	07:15	0	0	0	0	0
07:15	07:30	0	0	0	0	0
07:30	07:45	0	0	0	0	0
07:45	08:00	0	0	0	0	0
08:00	08:15	1	0	0	0	1
08:15	08:30	0	0	0	0	0
08:30	08:45	0	0	0	0	0
08:45	09:00	0	0	0	0	0
09:00	09:15	0	0	0	0	0
09:15	09:30	0	0	0	1	1
09:30	09:45	0	0	0	0	0
09:45	10:00	0	0	0	0	0
11:30	11:45	0	0	0	0	0
11:45	12:00	0	0	0	0	0
12:00	12:15	0	0	0	0	0
12:15	12:30	0	0	0	0	0
12:30	12:45	0	0	0	0	0
12:45	13:00	0	0	0	0	0
13:00	13:15	0	0	0	0	0
13:15	13:30	0	0	0	0	0
15:00	15:15	0	0	0	0	0
15:15	15:30	0	0	0	0	0
15:30	15:45	0	0	0	0	0
15:45	16:00	0	0	0	1	1
16:00	16:15	0	0	0	0	0
16:15	16:30	0	0	0	0	0
16:30	16:45	0	0	0	0	0
16:45	17:00	0	0	0	0	0
17:00	17:15	0	0	0	0	0
17:15	17:30	0	0	0	0	0
17:30	17:45	0	0	0	0	0
17:45	18:00	0	0	0	0	0
Total		1	0	0	2	3

**Survey Date:** Thursday, October 24, 2019

**Start Time:** 07:00

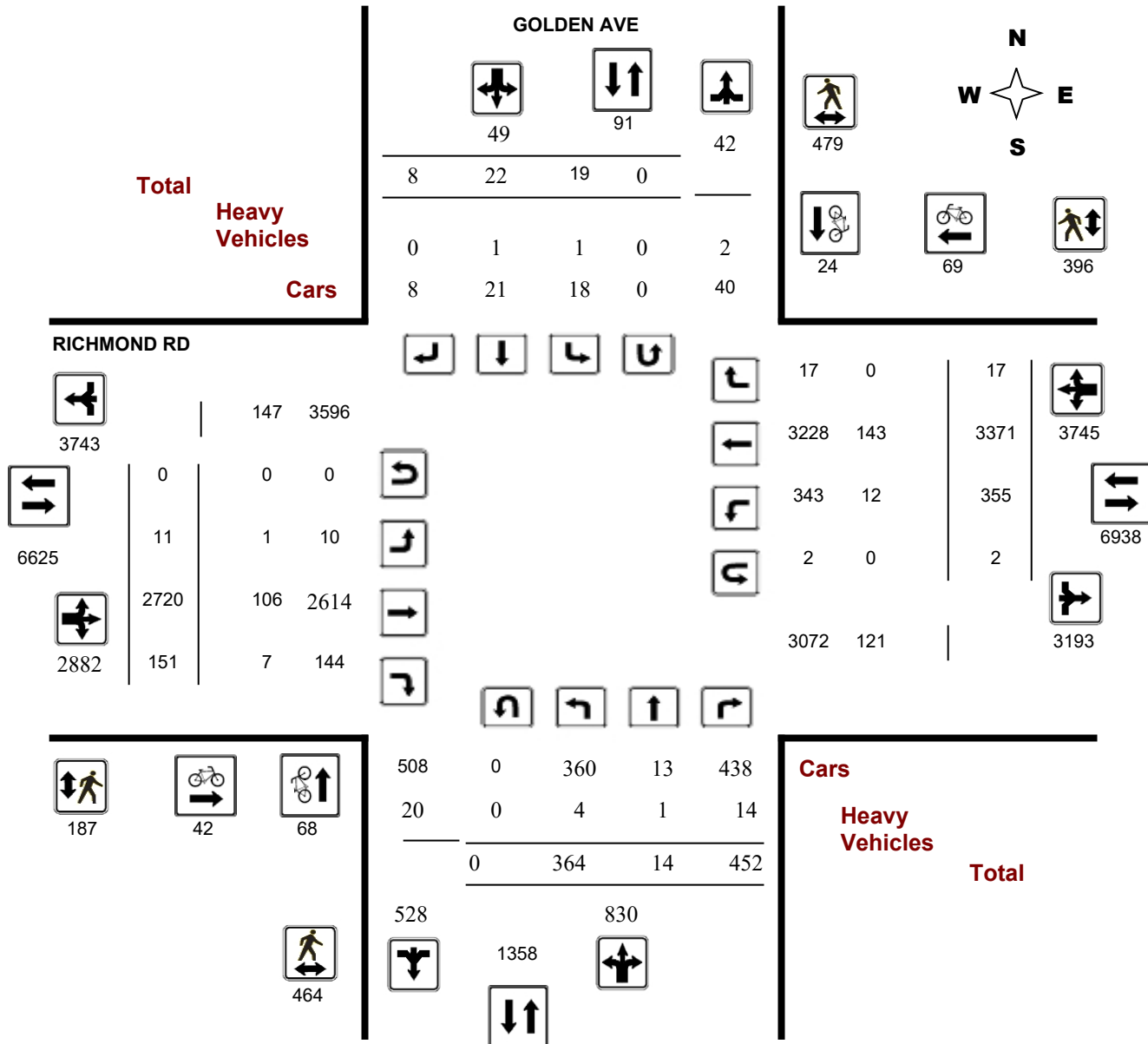
**WO No:**

38905

**Device:**

Miovision

### Full Study Diagram





## Turning Movement Count - Study Results

**GOLDEN AVE @ RICHMOND RD**

**Survey Date:** Thursday, October 24, 2019

**WO No:**

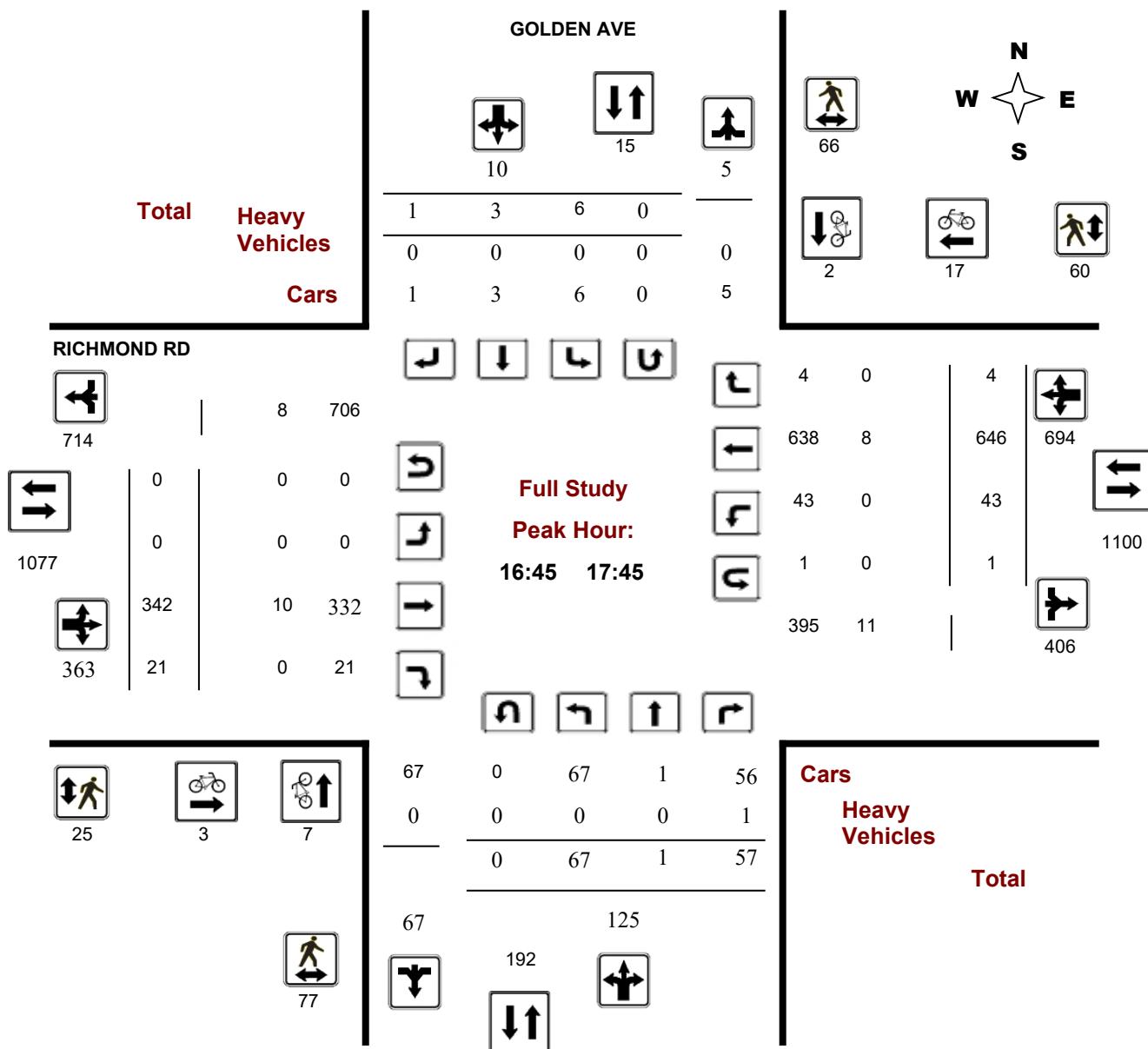
38905

**Start Time:** 07:00

**Device:**

Miovision

## Full Study Peak Hour Diagram



## Turning Movement Count - Peak Hour Diagram

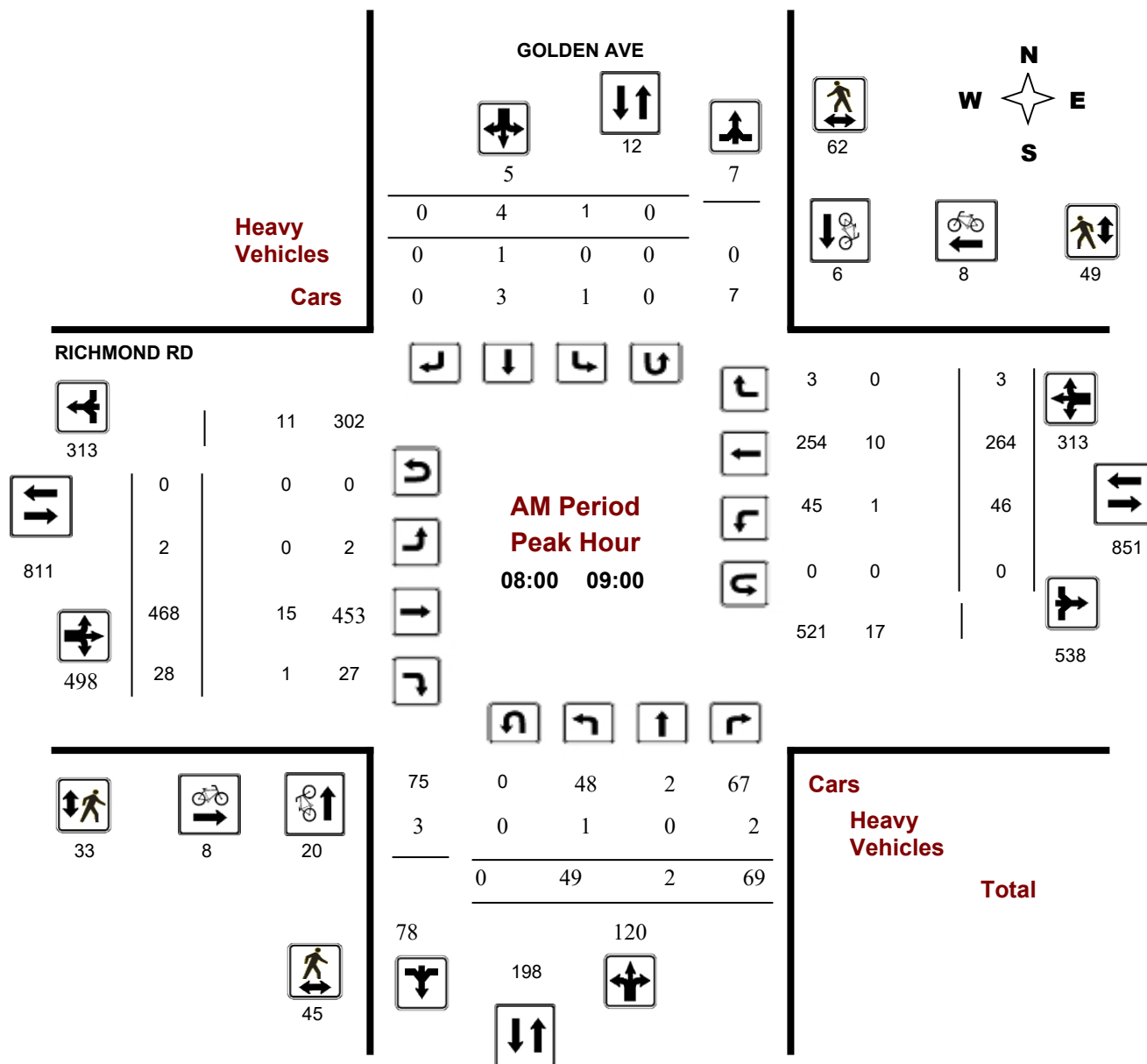
### GOLDEN AVE @ RICHMOND RD

**Survey Date:** Thursday, October 24, 2019

**Start Time:** 07:00

**WO No:** 38905

**Device:** Miovision



## Turning Movement Count - Peak Hour Diagram

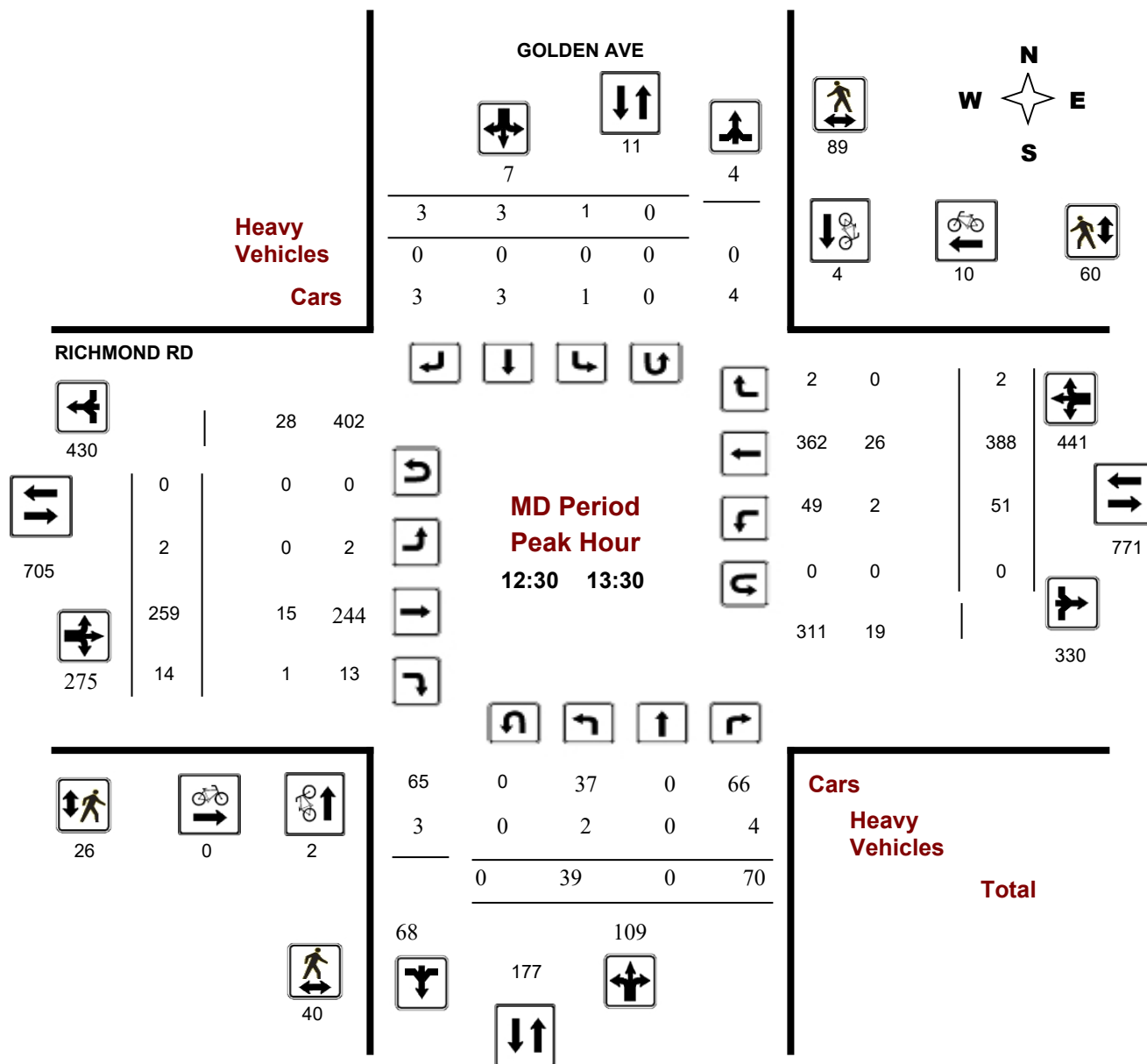
### GOLDEN AVE @ RICHMOND RD

**Survey Date:** Thursday, October 24, 2019

**Start Time:** 07:00

**WO No:** 38905

**Device:** Miovision



## Turning Movement Count - Peak Hour Diagram

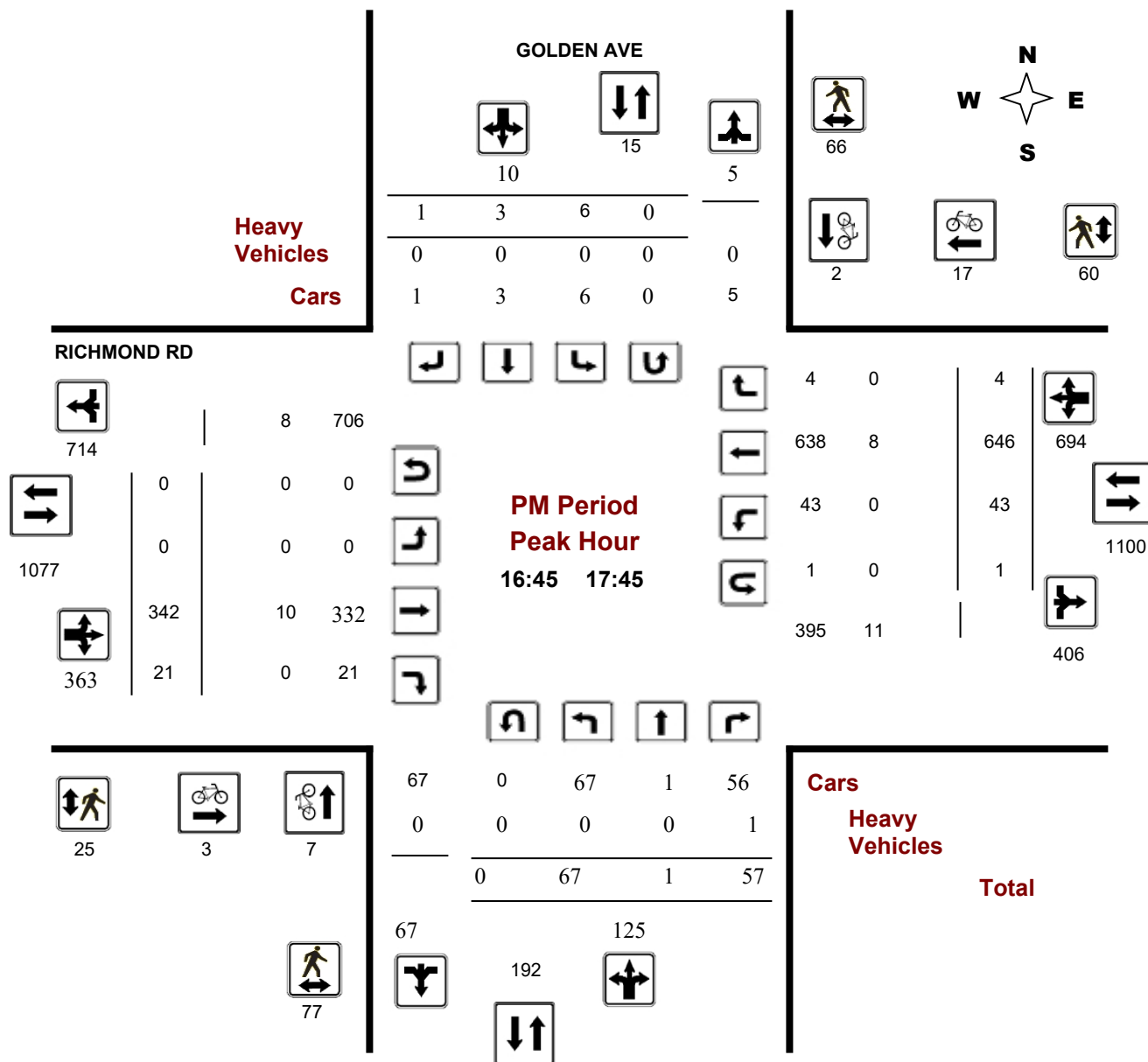
### GOLDEN AVE @ RICHMOND RD

**Survey Date:** Thursday, October 24, 2019

**Start Time:** 07:00

**WO No:** 38905

**Device:** Miovision





# Transportation Services - Traffic Services

## Turning Movement Count - Study Results

### GOLDEN AVE @ RICHMOND RD

**Survey Date:** Thursday, October 24, 2019

**WO No:** 38905

**Start Time:** 07:00

**Device:** Miovision

### Full Study Summary (8 HR Standard)

**Survey Date:** Thursday, October 24, 2019

#### Total Observed U-Turns

#### AADT Factor

Northbound: 0 Southbound: 0  
Eastbound: 0 Westbound: 2  
.90

#### GOLDEN AVE

#### RICHMOND RD

Period	Northbound					Southbound					Eastbound					Westbound					Grand Total
	LT	ST	RT	NB TOT		LT	ST	RT	SB TOT	STR TOT	LT	ST	RT	EB TOT		LT	ST	RT	WB TOT	STR TOT	
07:00 08:00	22	1	25	48		0	2	2	4	52	0	481	16	497		23	217	0	240	737	789
08:00 09:00	49	2	69	120		1	4	0	5	125	2	468	28	498		46	264	3	313	811	936
09:00 10:00	38	1	64	103		2	3	0	5	108	1	309	21	331		35	286	1	322	653	761
11:30 12:30	22	2	50	74		4	2	1	7	81	2	278	21	301		64	357	4	425	726	807
12:30 13:30	39	0	70	109		1	3	3	7	116	2	259	14	275		51	388	2	441	716	832
15:00 16:00	57	4	62	123		1	1	1	3	126	3	266	12	281		39	610	0	649	930	1056
16:00 17:00	70	2	69	141		3	3	0	6	147	1	333	18	352		47	626	2	675	1027	1174
17:00 18:00	67	2	43	112		7	4	1	12	124	0	326	21	347		50	623	5	678	1025	1149
<b>Sub Total</b>	364	14	452	830		19	22	8	49	879	11	2720	151	2882		355	3371	17	3743	6625	7504
<b>U Turns</b>				0					0	0				0					2	2	2
<b>Total</b>	364	14	452	830		19	22	8	49	879	11	2720	151	2882		355	3371	17	3745	6627	7506
<b>EQ 12Hr</b>	506	19	628	1154		26	31	11	68	1222	15	3781	210	4006		493	4686	24	5206	9212	10433
Note: These values are calculated by multiplying the totals by the appropriate expansion factor.														<b>1.39</b>							
<b>AVG 12Hr</b>	429	17	533	979		22	26	9	58	1100	13	3207	178	3398		419	3974	20	4415	8291	9390
Note: These volumes are calculated by multiplying the Equivalent 12 hr. totals by the AADT factor.														<b>0.9</b>							
<b>AVG 24Hr</b>	562	22	698	1282		29	34	12	76	1358	17	4201	233	4451		548	5206	26	5784	10235	11593

Note: These volumes are calculated by multiplying the Average Daily 12 hr. totals by 12 to 24 expansion factor. **1.31**

Note: U-Turns provided for approach totals. Refer to 'U-Turn' Report for specific breakdown.



# Transportation Services - Traffic Services

## Turning Movement Count - Study Results

### GOLDEN AVE @ RICHMOND RD

**Survey Date:** Thursday, October 24, 2019

**WO No:** 38905

**Start Time:** 07:00

**Device:** Miovision

### Full Study 15 Minute Increments

#### GOLDEN AVE

#### RICHMOND RD

##### Northbound

##### Southbound

##### Eastbound

##### Westbound

Time Period	LT	ST	RT	N TOT	LT	ST	RT	S TOT	STR TOT	LT	ST	RT	E TOT	LT	ST	RT	W TOT	STR TOT	Grand Total	
07:00	07:15	4	0	3	7	0	0	1	1	0	0	102	2	104	3	43	0	46	0	158
07:15	07:30	7	0	8	15	0	0	0	0	1	0	107	6	113	7	45	0	52	1	180
07:30	07:45	5	0	6	11	0	1	0	1	1	0	149	4	153	5	62	0	68	1	233
07:45	08:00	6	1	8	15	0	1	1	2	2	0	123	4	127	8	67	0	75	2	219
08:00	08:15	19	2	16	37	0	1	0	1	2	0	121	2	123	4	49	2	55	2	216
08:15	08:30	8	0	12	20	0	0	0	0	0	1	118	5	124	15	57	1	73	0	217
08:30	08:45	9	0	18	27	1	2	0	3	1	1	125	11	137	13	80	0	93	1	260
08:45	09:00	13	0	23	36	0	1	0	1	1	0	104	10	114	14	78	0	92	1	243
09:00	09:15	9	0	13	22	1	1	0	2	0	0	94	4	98	6	68	0	74	0	196
09:15	09:30	12	0	22	34	0	0	0	0	0	0	87	5	92	8	78	1	87	0	213
09:30	09:45	11	0	15	26	1	1	0	2	1	1	58	6	65	8	69	0	77	1	170
09:45	10:00	6	1	14	21	0	1	0	1	1	0	70	6	76	13	71	0	84	1	182
11:30	11:45	3	1	10	14	0	1	0	1	0	0	73	5	78	18	87	1	106	0	199
11:45	12:00	3	0	17	20	3	1	0	4	0	1	74	6	81	16	86	2	104	0	209
12:00	12:15	8	1	14	23	0	0	1	1	0	0	59	4	63	20	96	0	116	0	203
12:15	12:30	8	0	9	17	1	0	0	1	0	1	72	6	79	10	88	1	99	0	196
12:30	12:45	6	0	14	20	1	2	1	4	1	0	70	7	77	16	92	0	108	1	209
12:45	13:00	12	0	22	34	0	0	1	1	0	0	60	3	63	10	106	1	117	0	215
13:00	13:15	9	0	20	29	0	1	1	2	0	1	59	3	63	15	99	1	115	0	209
13:15	13:30	12	0	14	26	0	0	0	0	5	1	70	1	72	10	91	0	101	5	199
15:00	15:15	18	0	16	34	0	0	1	1	2	1	66	2	69	8	127	0	135	2	239
15:15	15:30	12	2	20	34	0	1	0	1	0	0	68	6	74	11	158	0	169	0	278
15:30	15:45	14	2	15	31	0	0	0	0	0	1	69	2	72	14	156	0	170	0	273
15:45	16:00	13	0	11	24	1	0	0	1	0	1	63	2	66	6	169	0	175	0	266
16:00	16:15	21	0	20	41	2	2	0	4	2	0	84	6	90	16	156	1	173	2	308
16:15	16:30	20	0	18	38	1	0	0	1	0	1	86	2	89	9	164	1	174	0	302
16:30	16:45	19	2	10	31	0	0	0	0	0	0	72	4	76	9	142	0	151	0	258
16:45	17:00	10	0	21	31	0	1	0	1	0	0	91	6	97	13	164	0	177	0	306
17:00	17:15	21	0	14	35	2	0	1	3	0	0	70	7	77	11	178	0	189	0	304
17:15	17:30	15	1	9	25	2	1	0	3	1	0	101	0	101	12	157	2	171	1	300
17:30	17:45	21	0	13	34	2	1	0	3	0	0	80	8	88	7	147	2	157	0	282
17:45	18:00	10	1	7	18	1	2	0	3	0	0	75	6	81	20	141	1	162	0	264
Total:		364	14	452	830	19	22	8	49	21	11	2720	151	2882	355	3371	17	3745	21	7,506

Note: U-Turns are included in Totals.





# Transportation Services - Traffic Services

## Turning Movement Count - Study Results

### GOLDEN AVE @ RICHMOND RD

**Survey Date:** Thursday, October 24, 2019

**WO No:** 38905

**Start Time:** 07:00

**Device:** Miovision

### Full Study Cyclist Volume

		GOLDEN AVE			RICHMOND RD			Grand Total
Time Period		Northbound	Southbound	Street Total	Eastbound	Westbound	Street Total	
07:00	07:15	2	1	3	2	1	3	6
07:15	07:30	5	0	5	5	1	6	11
07:30	07:45	4	1	5	2	2	4	9
07:45	08:00	6	0	6	5	1	6	12
08:00	08:15	5	0	5	2	1	3	8
08:15	08:30	9	0	9	3	1	4	13
08:30	08:45	4	1	5	1	2	3	8
08:45	09:00	2	5	7	2	4	6	13
09:00	09:15	2	2	4	0	3	3	7
09:15	09:30	3	0	3	1	0	1	4
09:30	09:45	1	0	1	0	1	1	2
09:45	10:00	0	0	0	0	1	1	1
11:30	11:45	0	0	0	0	0	0	0
11:45	12:00	2	0	2	3	0	3	5
12:00	12:15	2	0	2	1	0	1	3
12:15	12:30	0	0	0	1	1	2	2
12:30	12:45	0	3	3	0	7	7	10
12:45	13:00	0	0	0	0	0	0	0
13:00	13:15	2	1	3	0	2	2	5
13:15	13:30	0	0	0	0	1	1	1
15:00	15:15	1	0	1	0	0	0	1
15:15	15:30	3	0	3	5	0	5	8
15:30	15:45	2	2	4	0	1	1	5
15:45	16:00	1	1	2	0	3	3	5
16:00	16:15	3	0	3	1	1	2	5
16:15	16:30	1	1	2	3	4	7	9
16:30	16:45	1	2	3	1	9	10	13
16:45	17:00	4	1	5	2	5	7	12
17:00	17:15	2	1	3	0	3	3	6
17:15	17:30	1	0	1	0	6	6	7
17:30	17:45	0	0	0	1	3	4	4
17:45	18:00	0	2	2	1	5	6	8
Total		68	24	92	42	69	111	203



# Transportation Services - Traffic Services

## Turning Movement Count - Study Results

### GOLDEN AVE @ RICHMOND RD

**Survey Date:** Thursday, October 24, 2019

**WO No:** 38905

**Start Time:** 07:00

**Device:** Miovision

### Full Study Pedestrian Volume

#### GOLDEN AVE

#### RICHMOND RD

Time Period	NB Approach (E or W Crossing)	SB Approach (E or W Crossing)	Total	EB Approach (N or S Crossing)	WB Approach (N or S Crossing)	Total	Grand Total
07:00 07:15	4	6	10	4	4	8	18
07:15 07:30	8	4	12	2	5	7	19
07:30 07:45	4	10	14	6	9	15	29
07:45 08:00	8	4	12	3	6	9	21
08:00 08:15	9	13	22	8	8	16	38
08:15 08:30	8	8	16	5	10	15	31
08:30 08:45	15	21	36	9	11	20	56
08:45 09:00	13	20	33	11	20	31	64
09:00 09:15	9	9	18	3	6	9	27
09:15 09:30	8	15	23	8	10	18	41
09:30 09:45	10	7	17	3	14	17	34
09:45 10:00	9	9	18	6	7	13	31
11:30 11:45	13	11	24	1	8	9	33
11:45 12:00	25	12	37	6	17	23	60
12:00 12:15	17	17	34	1	13	14	48
12:15 12:30	22	27	49	11	15	26	75
12:30 12:45	8	27	35	6	21	27	62
12:45 13:00	16	21	37	11	11	22	59
13:00 13:15	5	24	29	3	19	22	51
13:15 13:30	11	17	28	6	9	15	43
15:00 15:15	15	9	24	2	8	10	34
15:15 15:30	34	22	56	5	26	31	87
15:30 15:45	13	16	29	11	16	27	56
15:45 16:00	23	32	55	8	16	24	79
16:00 16:15	16	14	30	4	19	23	53
16:15 16:30	25	9	34	6	5	11	45
16:30 16:45	25	13	38	9	10	19	57
16:45 17:00	24	15	39	9	11	20	59
17:00 17:15	33	26	59	4	19	23	82
17:15 17:30	11	13	24	5	14	19	43
17:30 17:45	9	12	21	7	16	23	44
17:45 18:00	14	16	30	4	13	17	47
<b>Total .....</b>	<b>464</b>	<b>479</b>	<b>943</b>	<b>187</b>	<b>396</b>	<b>583</b>	<b>1526</b>



# Transportation Services - Traffic Services

## Turning Movement Count - Study Results

### GOLDEN AVE @ RICHMOND RD

**Survey Date:** Thursday, October 24, 2019

**WO No:** 38905

**Start Time:** 07:00

**Device:** Miovision

### Full Study Heavy Vehicles

#### GOLDEN AVE

#### RICHMOND RD

##### Northbound

##### Southbound

##### Eastbound

##### Westbound

Time Period	LT	ST	RT	N TOT	LT	ST	RT	S TOT	STR TOT	LT	ST	RT	E TOT	LT	ST	RT	W TOT	STR TOT	Grand Total
07:00 07:15	0	0	0	0	0	0	0	0	0	0	2	1	3	0	6	0	6	9	9
07:15 07:30	1	0	0	1	0	0	0	0	1	0	4	0	4	1	6	0	7	11	12
07:30 07:45	0	0	1	1	0	0	0	0	1	0	5	1	6	1	5	0	6	12	13
07:45 08:00	0	1	1	2	0	0	0	0	2	0	5	0	5	1	1	0	2	7	9
08:00 08:15	0	0	1	1	0	1	0	1	2	0	4	0	4	0	2	0	2	6	8
08:15 08:30	0	0	0	0	0	0	0	0	0	0	4	0	4	0	2	0	2	6	6
08:30 08:45	1	0	0	1	0	0	0	0	1	0	6	1	7	0	1	0	1	8	9
08:45 09:00	0	0	1	1	0	0	0	0	1	0	1	0	1	1	5	0	6	7	8
09:00 09:15	0	0	0	0	0	0	0	0	0	0	7	0	7	0	8	0	8	15	15
09:15 09:30	0	0	0	0	0	0	0	0	0	0	8	0	8	0	6	0	6	14	14
09:30 09:45	0	0	0	0	1	0	0	1	1	1	4	0	5	1	8	0	9	14	15
09:45 10:00	0	0	1	1	0	0	0	0	1	0	5	0	5	1	4	0	5	10	11
11:30 11:45	0	0	0	0	0	0	0	0	0	0	2	0	2	0	6	0	6	8	8
11:45 12:00	0	0	0	0	0	0	0	0	0	0	4	0	4	0	4	0	4	8	8
12:00 12:15	0	0	0	0	0	0	0	0	0	0	1	1	2	1	6	0	7	9	9
12:15 12:30	0	0	0	0	0	0	0	0	0	0	5	0	5	1	2	0	3	8	8
12:30 12:45	0	0	1	1	0	0	0	0	1	0	3	1	4	1	7	0	8	12	13
12:45 13:00	0	0	0	0	0	0	0	0	0	0	3	0	3	1	4	0	5	8	8
13:00 13:15	0	0	0	0	0	0	0	0	0	0	3	0	3	0	7	0	7	10	10
13:15 13:30	2	0	3	5	0	0	0	0	5	0	6	0	6	0	8	0	8	14	19
15:00 15:15	0	0	2	2	0	0	0	0	2	0	2	0	2	0	8	0	8	10	12
15:15 15:30	0	0	0	0	0	0	0	0	0	0	2	0	2	0	6	0	6	8	8
15:30 15:45	0	0	0	0	0	0	0	0	0	0	2	0	2	0	5	0	5	7	7
15:45 16:00	0	0	0	0	0	0	0	0	0	0	2	0	2	0	5	0	5	7	7
16:00 16:15	0	0	2	2	0	0	0	0	2	0	1	2	3	2	7	0	9	12	14
16:15 16:30	0	0	0	0	0	0	0	0	0	0	3	0	3	0	4	0	4	7	7
16:30 16:45	0	0	0	0	0	0	0	0	0	0	2	0	2	0	2	0	2	4	4
16:45 17:00	0	0	0	0	0	0	0	0	0	0	3	0	3	0	3	0	3	6	6
17:00 17:15	0	0	0	0	0	0	0	0	0	0	1	0	1	0	2	0	2	3	3
17:15 17:30	0	0	1	1	0	0	0	0	1	0	5	0	5	0	1	0	1	6	7
17:30 17:45	0	0	0	0	0	0	0	0	0	0	1	0	1	0	2	0	2	3	3
17:45 18:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total: None	4	1	14	19	1	1	0	2	21	1	106	7	114	12	143	0	155	269	290



# Transportation Services - Traffic Services

## Turning Movement Count - Study Results

### GOLDEN AVE @ RICHMOND RD

**Survey Date:** Thursday, October 24, 2019

**WO No:** 38905

**Start Time:** 07:00

**Device:** Miovision

### Full Study 15 Minute U-Turn Total

GOLDEN AVE

RICHMOND RD

Time Period		Northbound U-Turn Total	Southbound U-Turn Total	Eastbound U-Turn Total	Westbound U-Turn Total	Total
07:00	07:15	0	0	0	0	0
07:15	07:30	0	0	0	0	0
07:30	07:45	0	0	0	1	1
07:45	08:00	0	0	0	0	0
08:00	08:15	0	0	0	0	0
08:15	08:30	0	0	0	0	0
08:30	08:45	0	0	0	0	0
08:45	09:00	0	0	0	0	0
09:00	09:15	0	0	0	0	0
09:15	09:30	0	0	0	0	0
09:30	09:45	0	0	0	0	0
09:45	10:00	0	0	0	0	0
11:30	11:45	0	0	0	0	0
11:45	12:00	0	0	0	0	0
12:00	12:15	0	0	0	0	0
12:15	12:30	0	0	0	0	0
12:30	12:45	0	0	0	0	0
12:45	13:00	0	0	0	0	0
13:00	13:15	0	0	0	0	0
13:15	13:30	0	0	0	0	0
15:00	15:15	0	0	0	0	0
15:15	15:30	0	0	0	0	0
15:30	15:45	0	0	0	0	0
15:45	16:00	0	0	0	0	0
16:00	16:15	0	0	0	0	0
16:15	16:30	0	0	0	0	0
16:30	16:45	0	0	0	0	0
16:45	17:00	0	0	0	0	0
17:00	17:15	0	0	0	0	0
17:15	17:30	0	0	0	0	0
17:30	17:45	0	0	0	1	1
17:45	18:00	0	0	0	0	0
Total		0	0	0	2	2

**Survey Date:** Thursday, January 23, 2020

**Start Time:** 07:00

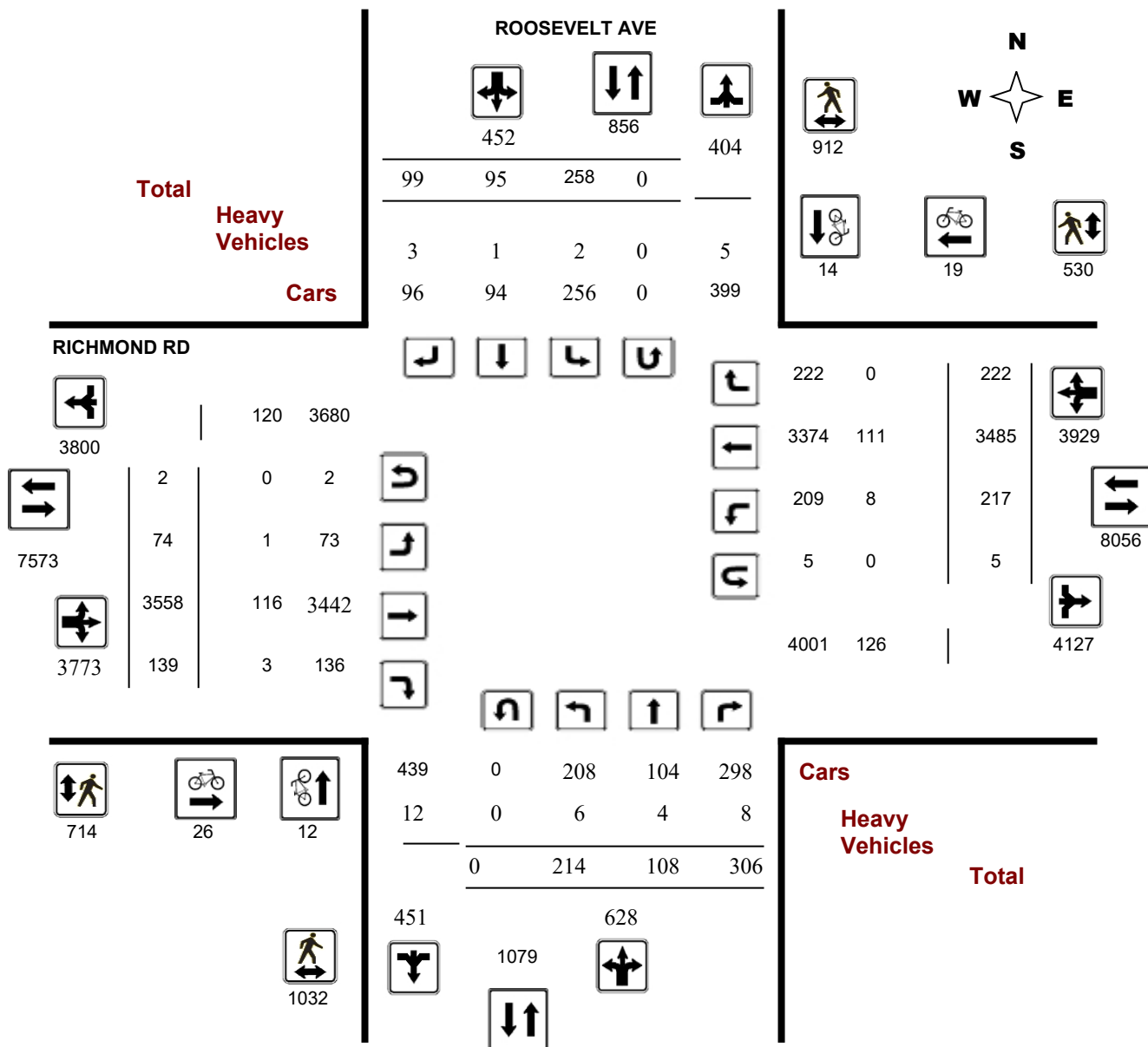
**WO No:**

39385

**Device:**

Miovision

### Full Study Diagram



5472203 - THU JAN 23, 2020 - 8HRS - LORETTA

**Survey Date:** Thursday, January 23, 2020

**WO No:**

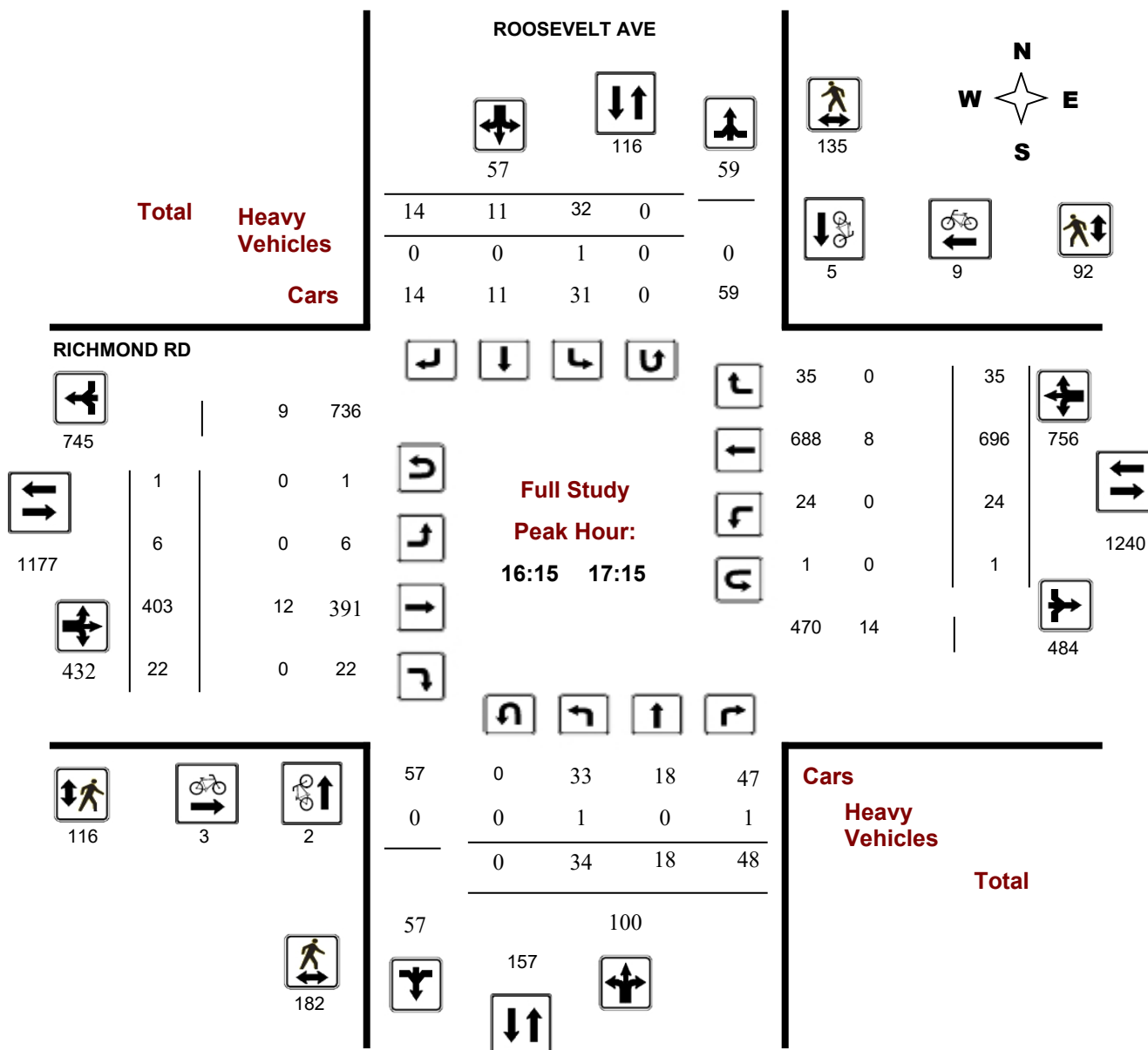
39385

**Start Time:** 07:00

**Device:**

Miovision

### Full Study Peak Hour Diagram



5472203 - THU JAN 23, 2020 - 8HRS - LORETTA





# Transportation Services - Traffic Services

## Turning Movement Count - Peak Hour Diagram

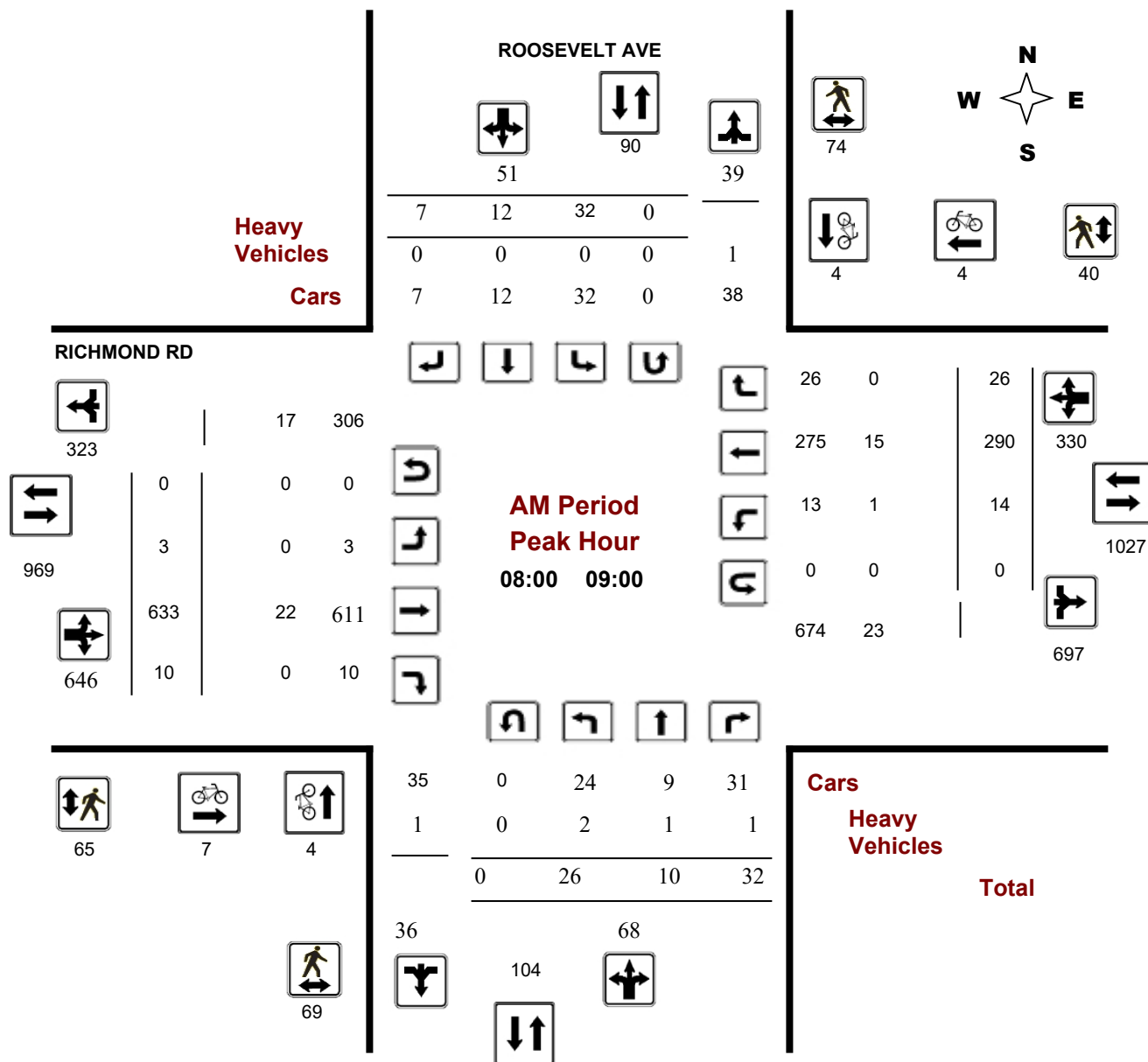
### ROOSEVELT AVE @ RICHMOND RD

**Survey Date:** Thursday, January 23, 2020

**Start Time:** 07:00

**WO No:** 39385

**Device:** Miovision



**Comments** 5472203 - THU JAN 23, 2020 - 8HRS - LORETTA



# Transportation Services - Traffic Services

## Turning Movement Count - Peak Hour Diagram

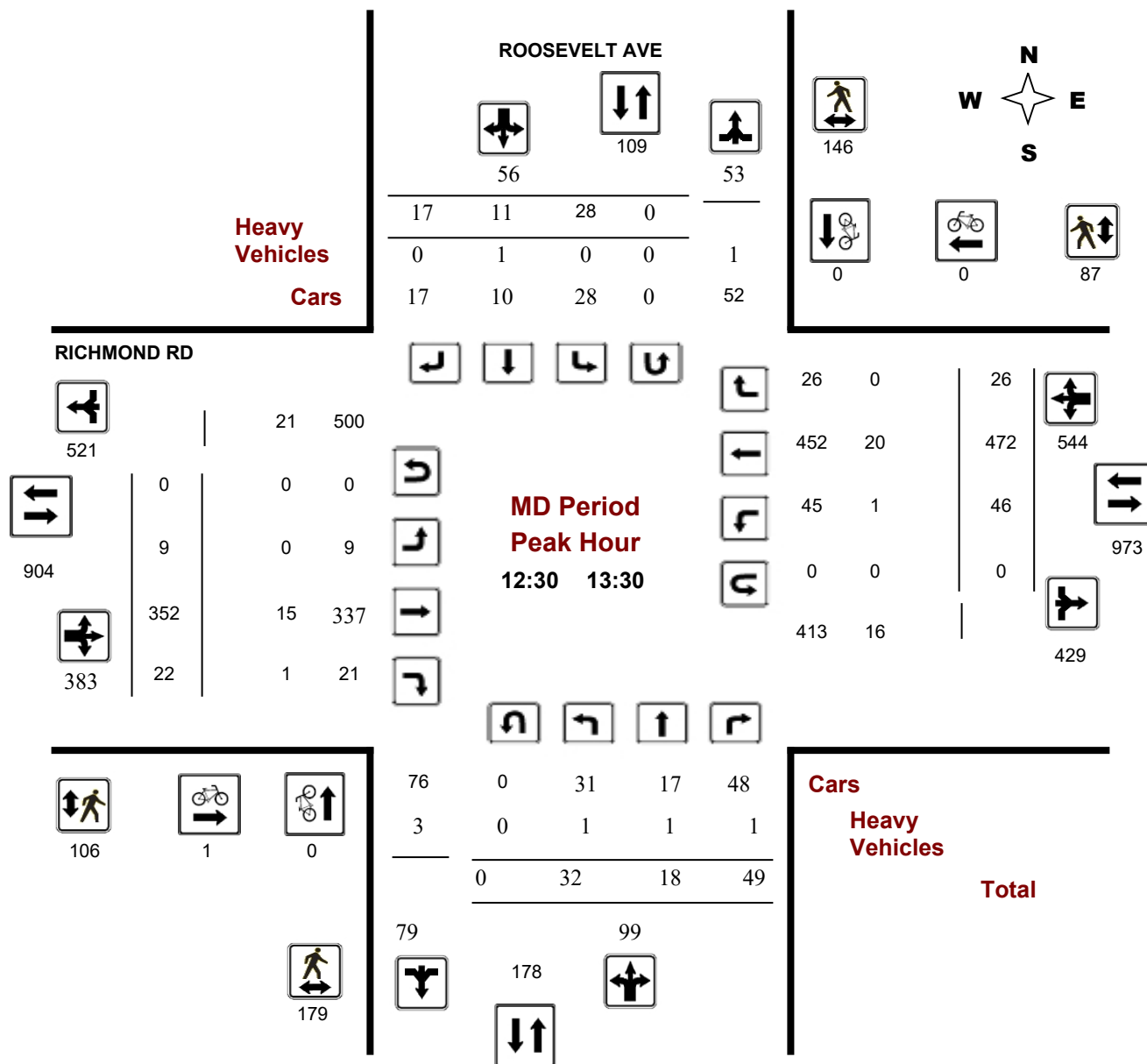
### ROOSEVELT AVE @ RICHMOND RD

**Survey Date:** Thursday, January 23, 2020

**Start Time:** 07:00

**WO No:** 39385

**Device:** Miovision



## Turning Movement Count - Peak Hour Diagram

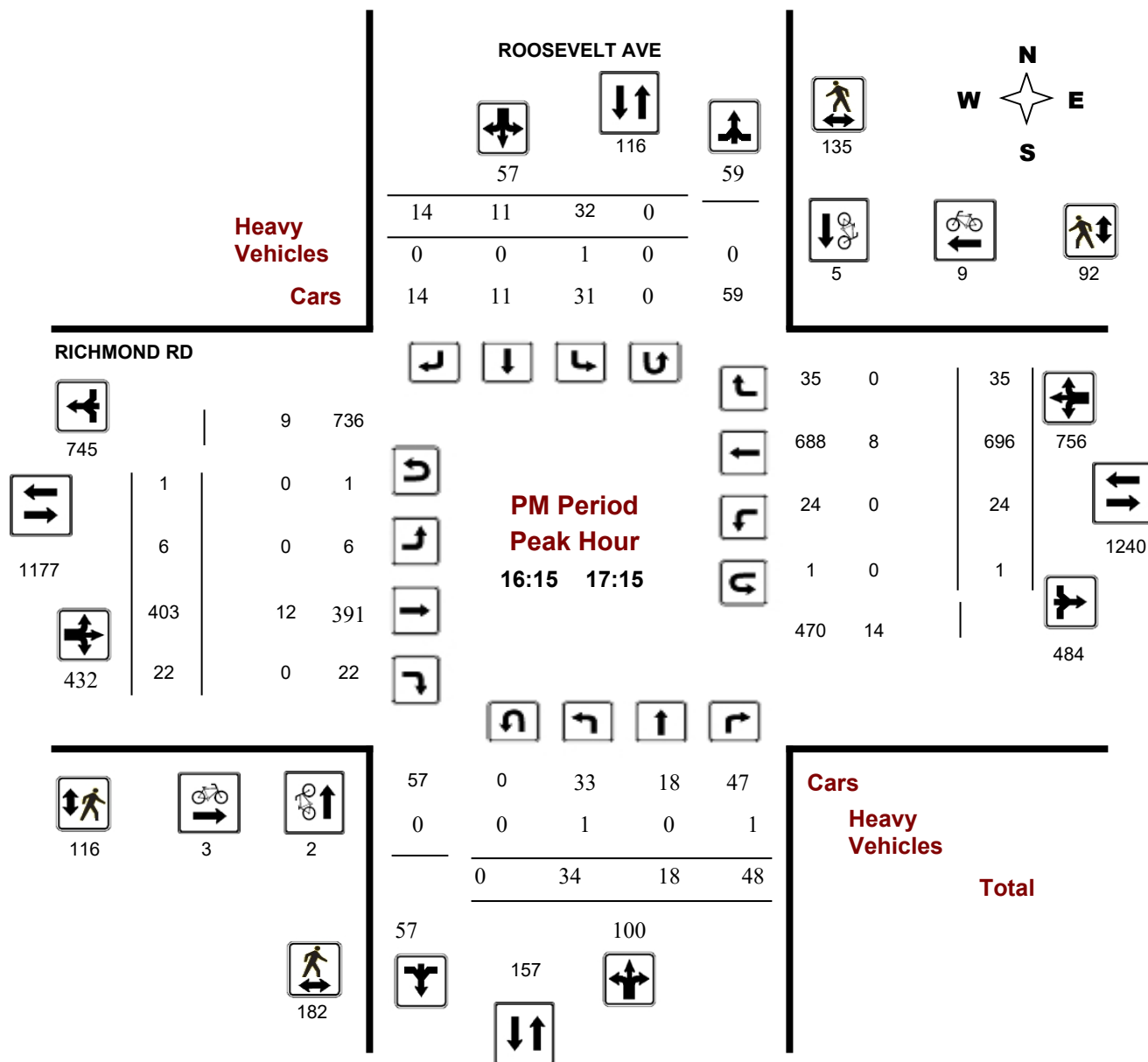
### ROOSEVELT AVE @ RICHMOND RD

**Survey Date:** Thursday, January 23, 2020

**Start Time:** 07:00

**WO No:** 39385

**Device:** Miovision



**Comments** 5472203 - THU JAN 23, 2020 - 8HRS - LORETTA



# Transportation Services - Traffic Services

## Turning Movement Count - Study Results

### ROOSEVELT AVE @ RICHMOND RD

**Survey Date:** Thursday, January 23, 2020

**WO No:** 39385

**Start Time:** 07:00

**Device:** Miovision

### Full Study Summary (8 HR Standard)

**Survey Date:** Thursday, January 23, 2020

#### Total Observed U-Turns

Northbound: 0 Southbound: 0  
Eastbound: 2 Westbound: 5

#### AADT Factor

1.39

#### ROOSEVELT AVE

#### RICHMOND RD

Period	Northbound				Southbound				STR TOT	Eastbound				Westbound				STR TOT	Grand Total
	LT	ST	RT	NB TOT	LT	ST	RT	SB TOT		LT	ST	RT	EB TOT	LT	ST	RT	WB TOT		
07:00 08:00	13	3	23	39	21	10	6	37	76	10	605	10	625	7	195	8	210	835	911
08:00 09:00	26	10	32	68	32	12	7	51	119	3	633	10	646	14	290	26	330	976	1095
09:00 10:00	20	18	27	65	34	15	8	57	122	4	462	12	478	25	263	21	309	787	909
11:30 12:30	30	16	62	108	39	15	16	70	178	15	359	20	394	41	375	48	464	858	1036
12:30 13:30	32	18	49	99	28	11	17	56	155	9	352	22	383	46	472	26	544	927	1082
15:00 16:00	31	14	27	72	36	10	21	67	139	16	401	27	444	32	603	27	662	1106	1245
16:00 17:00	27	18	50	95	27	13	13	53	148	8	376	22	406	17	670	37	724	1130	1278
17:00 18:00	35	11	36	82	41	9	11	61	143	9	370	16	395	35	617	29	681	1076	1219
<b>Sub Total</b>	214	108	306	628	258	95	99	452	1080	74	3558	139	3771	217	3485	222	3924	7695	8775
<b>U Turns</b>				0				0	0				2				5	7	7
<b>Total</b>	214	108	306	628	258	95	99	452	1080	74	3558	139	3773	217	3485	222	3929	7702	8782
<b>EQ 12Hr</b>	297	150	425	873	359	132	138	628	1501	103	4946	193	5244	302	4844	309	5461	10706	12207
Note: These values are calculated by multiplying the totals by the appropriate expansion factor.													1.39						
<b>AVG 12Hr</b>	297	150	425	873	359	132	138	628	1501	103	4946	193	5244	302	4844	309	5461	10706	12207
Note: These volumes are calculated by multiplying the Equivalent 12 hr. totals by the AADT factor.													1						
<b>AVG 24Hr</b>	390	197	557	1144	470	173	180	823	1967	135	6479	253	6870	395	6346	404	7154	14024	15991

Note: These volumes are calculated by multiplying the Average Daily 12 hr. totals by 12 to 24 expansion factor. **1.31**

Note: U-Turns provided for approach totals. Refer to 'U-Turn' Report for specific breakdown.



# Transportation Services - Traffic Services

## Turning Movement Count - Study Results

### ROOSEVELT AVE @ RICHMOND RD

**Survey Date:** Thursday, January 23, 2020

**WO No:** 39385

**Start Time:** 07:00

**Device:** Miovision

### Full Study 15 Minute Increments

#### ROOSEVELT AVE

#### RICHMOND RD

##### Northbound

##### Southbound

##### Eastbound

##### Westbound

Time Period	LT	ST	RT	N TOT	LT	ST	RT	S TOT	STR TOT	LT	ST	RT	E TOT	LT	ST	RT	W TOT	STR TOT	Grand Total	
07:00	07:15	1	1	1	3	2	1	1	4	16	2	132	2	136	0	43	3	46	16	189
07:15	07:30	3	1	2	6	7	4	1	12	34	3	150	2	155	3	47	3	53	34	226
07:30	07:45	7	1	9	17	6	2	2	10	35	1	163	2	166	1	46	1	48	35	241
07:45	08:00	2	0	11	13	6	3	2	11	39	4	160	4	168	3	59	1	63	39	255
08:00	08:15	3	5	7	15	12	3	1	16	52	1	154	4	159	1	68	7	76	52	266
08:15	08:30	4	2	7	13	8	5	1	14	47	1	161	3	165	3	68	6	77	47	269
08:30	08:45	12	2	7	21	6	2	2	10	50	0	154	1	155	6	75	8	89	50	275
08:45	09:00	7	1	11	19	6	2	3	11	45	1	164	2	167	4	79	5	88	45	285
09:00	09:15	5	2	7	14	5	5	2	12	46	1	141	3	145	6	69	3	78	46	249
09:15	09:30	4	5	9	18	11	5	1	17	60	1	122	0	123	6	58	8	73	60	231
09:30	09:45	5	5	4	14	8	4	2	14	56	1	98	6	106	7	79	5	91	56	225
09:45	10:00	6	6	7	19	10	1	3	14	55	1	101	3	105	6	57	5	68	55	206
11:30	11:45	7	3	17	27	9	6	6	21	91	7	88	6	101	10	87	11	108	91	257
11:45	12:00	7	3	18	28	13	1	4	18	88	4	101	6	111	10	79	18	107	88	264
12:00	12:15	8	8	15	31	9	1	4	14	83	2	87	3	92	13	109	11	134	83	271
12:15	12:30	8	2	12	22	8	7	2	17	71	2	83	5	90	8	100	8	116	71	245
12:30	12:45	10	7	19	36	6	2	4	12	74	1	81	4	86	4	102	8	114	74	248
12:45	13:00	8	2	12	22	7	3	5	15	72	1	82	3	86	17	111	9	137	72	260
13:00	13:15	4	5	6	15	7	2	3	12	69	3	90	9	102	18	125	5	148	69	277
13:15	13:30	10	4	12	26	8	4	5	17	72	4	99	6	109	7	134	4	145	72	297
15:00	15:15	6	3	7	16	6	3	7	16	73	4	119	11	134	13	132	7	152	73	318
15:15	15:30	9	5	11	25	12	2	5	19	84	4	98	7	109	11	131	11	153	84	306
15:30	15:45	11	2	7	20	13	3	6	22	65	6	88	4	98	5	176	3	184	65	324
15:45	16:00	5	4	2	11	5	2	3	10	43	2	96	5	103	3	164	6	173	43	297
16:00	16:15	5	5	12	22	7	3	5	15	65	3	74	5	82	5	149	7	162	65	281
16:15	16:30	7	5	13	25	4	5	5	14	70	2	108	5	115	3	179	11	193	70	347
16:30	16:45	9	5	16	30	6	1	2	9	65	2	97	7	106	5	181	6	192	65	337
16:45	17:00	6	3	9	18	10	4	1	15	63	1	97	5	104	4	161	13	179	63	316
17:00	17:15	12	5	10	27	12	1	6	19	75	1	101	5	107	12	175	5	192	75	345
17:15	17:30	8	2	12	22	7	4	1	12	59	1	82	3	86	4	164	11	179	59	299
17:30	17:45	9	2	6	17	16	0	1	17	57	4	93	4	101	5	141	8	155	57	290
17:45	18:00	6	2	8	16	6	4	3	13	61	3	94	4	101	14	137	5	156	61	286
Total:		214	108	306	628	258	95	99	452	1935	74	3558	139	3773	217	3485	222	3929	1935	8,782

Note: U-Turns are included in Totals.



# Transportation Services - Traffic Services

## Turning Movement Count - Study Results

### ROOSEVELT AVE @ RICHMOND RD

**Survey Date:** Thursday, January 23, 2020

**WO No:** 39385

**Start Time:** 07:00

**Device:** Miovision

### Full Study Cyclist Volume

#### ROOSEVELT AVE

#### RICHMOND RD

Time Period	Northbound	Southbound	Street Total	Eastbound	Westbound	Street Total	Grand Total
07:00 07:15	0	0	0	1	0	1	1
07:15 07:30	0	0	0	0	0	0	0
07:30 07:45	0	0	0	3	1	4	4
07:45 08:00	2	0	2	3	0	3	5
08:00 08:15	0	2	2	3	1	4	6
08:15 08:30	3	1	4	1	2	3	7
08:30 08:45	1	1	2	2	1	3	5
08:45 09:00	0	0	0	1	0	1	1
09:00 09:15	0	1	1	3	0	3	4
09:15 09:30	0	0	0	0	1	1	1
09:30 09:45	0	0	0	1	0	1	1
09:45 10:00	0	0	0	0	0	0	0
11:30 11:45	0	0	0	0	0	0	0
11:45 12:00	0	0	0	0	0	0	0
12:00 12:15	0	0	0	0	0	0	0
12:15 12:30	1	0	1	0	0	0	1
12:30 12:45	0	0	0	1	0	1	1
12:45 13:00	0	0	0	0	0	0	0
13:00 13:15	0	0	0	0	0	0	0
13:15 13:30	0	0	0	0	0	0	0
15:00 15:15	0	0	0	1	0	1	1
15:15 15:30	1	2	3	0	1	1	4
15:30 15:45	0	0	0	0	0	0	0
15:45 16:00	0	0	0	1	0	1	1
16:00 16:15	0	1	1	1	0	1	2
16:15 16:30	0	0	0	0	3	3	3
16:30 16:45	1	2	3	2	3	5	8
16:45 17:00	0	1	1	1	1	2	3
17:00 17:15	1	2	3	0	2	2	5
17:15 17:30	0	1	1	0	1	1	2
17:30 17:45	2	0	2	1	1	2	4
17:45 18:00	0	0	0	0	1	1	1
Total	12	14	26	26	19	45	71





# Transportation Services - Traffic Services

## Turning Movement Count - Study Results

### ROOSEVELT AVE @ RICHMOND RD

**Survey Date:** Thursday, January 23, 2020

**WO No:** 39385

**Start Time:** 07:00

**Device:** Miovision

### Full Study Pedestrian Volume

#### ROOSEVELT AVE

#### RICHMOND RD

Time Period	NB Approach (E or W Crossing)	SB Approach (E or W Crossing)	Total	EB Approach (N or S Crossing)	WB Approach (N or S Crossing)	Total	Grand Total
07:00 07:15	3	7	10	5	3	8	18
07:15 07:30	6	7	13	10	4	14	27
07:30 07:45	9	10	19	18	6	24	43
07:45 08:00	10	13	23	8	9	17	40
08:00 08:15	9	10	19	13	8	21	40
08:15 08:30	14	15	29	20	4	24	53
08:30 08:45	29	17	46	18	13	31	77
08:45 09:00	17	32	49	14	15	29	78
09:00 09:15	9	18	27	16	15	31	58
09:15 09:30	23	8	31	11	7	18	49
09:30 09:45	15	20	35	5	15	20	55
09:45 10:00	28	25	53	19	12	31	84
11:30 11:45	39	26	65	16	14	30	95
11:45 12:00	50	39	89	33	32	65	154
12:00 12:15	42	66	108	31	22	53	161
12:15 12:30	34	45	79	29	13	42	121
12:30 12:45	36	32	68	31	23	54	122
12:45 13:00	43	31	74	21	25	46	120
13:00 13:15	51	32	83	15	19	34	117
13:15 13:30	49	51	100	39	20	59	159
15:00 15:15	35	39	74	20	26	46	120
15:15 15:30	52	34	86	31	20	51	137
15:30 15:45	57	39	96	23	17	40	136
15:45 16:00	48	46	94	36	26	62	156
16:00 16:15	38	41	79	39	24	63	142
16:15 16:30	39	37	76	24	23	47	123
16:30 16:45	56	34	90	29	23	52	142
16:45 17:00	34	25	59	38	23	61	120
17:00 17:15	53	39	92	25	23	48	140
17:15 17:30	33	21	54	17	14	31	85
17:30 17:45	39	31	70	35	17	52	122
17:45 18:00	32	22	54	25	15	40	94
<b>Total</b>	<b>1032</b>	<b>912</b>	<b>1944</b>	<b>714</b>	<b>530</b>	<b>1244</b>	<b>3188</b>

5472203 - THU JAN 23, 2020 - 8HRS - LORETTA



# Transportation Services - Traffic Services

## Turning Movement Count - Study Results

### ROOSEVELT AVE @ RICHMOND RD

**Survey Date:** Thursday, January 23, 2020

**WO No:** 39385

**Start Time:** 07:00

**Device:** Miovision

## Full Study Heavy Vehicles

### ROOSEVELT AVE

### RICHMOND RD

#### Northbound

#### Southbound

#### Eastbound

#### Westbound

Time Period		Northbound			N TOT	Southbound			S TOT	STR TOT	Eastbound			E TOT	Westbound			W TOT	STR TOT	Grand Total
		LT	ST	RT		LT	ST	RT			LT	ST	RT		LT	ST	RT			
07:00	07:15	0	0	0	0	0	0	0	0	0	0	5	0	7	0	2	0	7	14	7
07:15	07:30	0	0	0	2	0	0	0	0	2	0	4	1	8	1	3	0	8	16	9
07:30	07:45	0	0	1	1	0	0	0	0	1	0	3	0	8	0	5	0	9	17	9
07:45	08:00	0	0	0	0	0	0	0	0	0	0	2	0	5	0	3	0	5	10	5
08:00	08:15	0	0	0	0	0	0	0	0	0	0	7	0	12	0	5	0	12	24	12
08:15	08:30	1	0	1	2	0	0	0	0	2	0	4	0	9	0	4	0	9	18	10
08:30	08:45	1	1	0	3	0	0	0	1	4	0	6	0	10	1	3	0	10	20	12
08:45	09:00	0	0	0	0	0	0	0	0	0	0	5	0	8	0	3	0	8	16	8
09:00	09:15	0	0	0	0	0	0	1	2	2	1	4	0	12	0	6	0	10	22	12
09:15	09:30	0	0	0	0	0	0	1	1	1	0	5	0	8	0	2	0	7	15	8
09:30	09:45	0	0	0	0	0	0	0	0	0	0	5	0	11	0	6	0	11	22	11
09:45	10:00	0	2	1	3	0	0	0	2	5	0	6	0	10	0	4	0	11	21	13
11:30	11:45	0	0	1	2	0	0	0	0	2	0	1	0	4	1	3	0	6	10	6
11:45	12:00	0	0	0	2	0	0	0	0	2	0	4	0	7	2	3	0	9	16	9
12:00	12:15	0	0	1	2	0	0	0	0	2	0	5	0	11	1	6	0	13	24	13
12:15	12:30	1	0	0	2	0	0	0	0	2	0	5	0	9	1	3	0	9	18	10
12:30	12:45	0	0	1	2	0	0	0	0	2	0	3	1	13	0	9	0	13	26	14
12:45	13:00	0	0	0	1	0	1	0	1	2	0	4	0	8	0	4	0	8	16	9
13:00	13:15	1	0	0	2	0	0	0	0	2	0	3	0	5	1	1	0	5	10	6
13:15	13:30	0	1	0	1	0	0	0	1	2	0	5	0	11	0	6	0	11	22	12
15:00	15:15	0	0	1	1	0	0	0	0	1	0	6	0	8	0	2	0	9	17	9
15:15	15:30	0	0	0	0	1	0	0	1	1	0	1	0	6	0	5	0	7	13	7
15:30	15:45	0	0	0	0	0	0	0	0	0	0	3	0	5	0	2	0	5	10	5
15:45	16:00	0	0	0	0	0	0	1	1	1	0	3	0	7	0	3	0	6	13	7
16:00	16:15	1	0	0	2	0	0	0	0	2	0	3	1	11	0	6	0	9	20	11
16:15	16:30	0	0	0	0	0	0	0	0	0	0	2	0	5	0	3	0	5	10	5
16:30	16:45	1	0	1	2	0	0	0	0	2	0	3	0	5	0	1	0	5	10	6
16:45	17:00	0	0	0	0	0	0	0	0	0	0	4	0	4	0	0	0	4	8	4
17:00	17:15	0	0	0	0	1	0	0	1	1	0	3	0	7	0	4	0	8	15	8
17:15	17:30	0	0	0	0	0	0	0	0	0	0	1	0	2	0	1	0	2	4	2
17:30	17:45	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	0	2	4	2
17:45	18:00	0	0	0	0	0	0	0	0	0	0	1	0	2	0	1	0	2	4	2
Total:	None	6	4	8	30	2	1	3	11	41	1	116	3	240	8	111	0	245	485	263



# Transportation Services - Traffic Services

## Turning Movement Count - Study Results

### ROOSEVELT AVE @ RICHMOND RD

**Survey Date:** Thursday, January 23, 2020

**WO No:** 39385

**Start Time:** 07:00

**Device:** Miovision

### Full Study 15 Minute U-Turn Total

#### ROOSEVELT AVE

#### RICHMOND RD

Time Period		Northbound U-Turn Total	Southbound U-Turn Total	Eastbound U-Turn Total	Westbound U-Turn Total	Total
07:00	07:15	0	0	0	0	0
07:15	07:30	0	0	0	0	0
07:30	07:45	0	0	0	0	0
07:45	08:00	0	0	0	0	0
08:00	08:15	0	0	0	0	0
08:15	08:30	0	0	0	0	0
08:30	08:45	0	0	0	0	0
08:45	09:00	0	0	0	0	0
09:00	09:15	0	0	0	0	0
09:15	09:30	0	0	0	1	1
09:30	09:45	0	0	1	0	1
09:45	10:00	0	0	0	0	0
11:30	11:45	0	0	0	0	0
11:45	12:00	0	0	0	0	0
12:00	12:15	0	0	0	1	1
12:15	12:30	0	0	0	0	0
12:30	12:45	0	0	0	0	0
12:45	13:00	0	0	0	0	0
13:00	13:15	0	0	0	0	0
13:15	13:30	0	0	0	0	0
15:00	15:15	0	0	0	0	0
15:15	15:30	0	0	0	0	0
15:30	15:45	0	0	0	0	0
15:45	16:00	0	0	0	0	0
16:00	16:15	0	0	0	1	1
16:15	16:30	0	0	0	0	0
16:30	16:45	0	0	0	0	0
16:45	17:00	0	0	1	1	2
17:00	17:15	0	0	0	0	0
17:15	17:30	0	0	0	0	0
17:30	17:45	0	0	0	1	1
17:45	18:00	0	0	0	0	0
Total		0	0	2	5	7

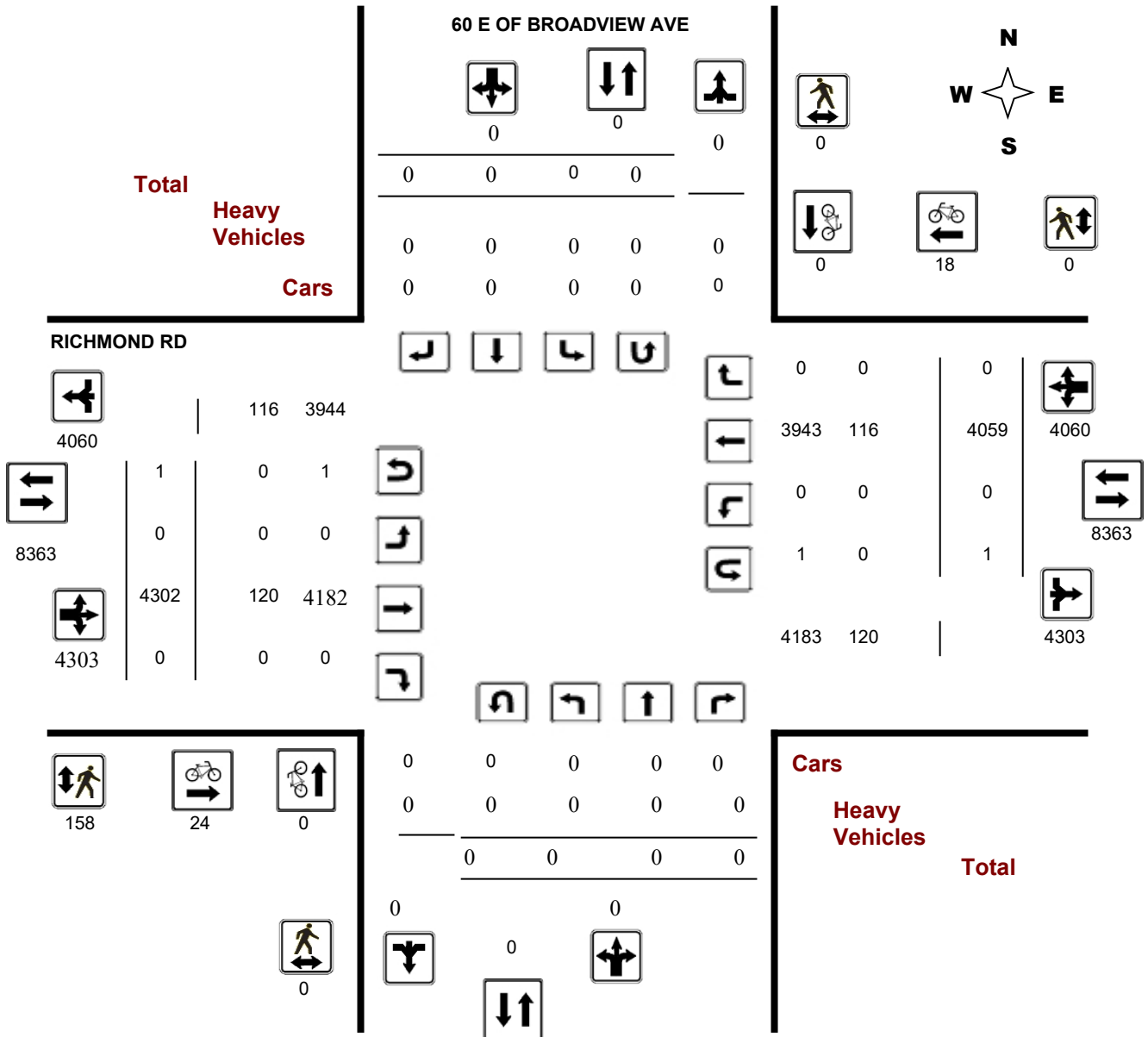
**Survey Date:** Wednesday, November 22, 2017

**WO No:** 37469

**Start Time:** 07:00

**Device:** Miovision

### Full Study Diagram



## Turning Movement Count - Study Results

**60 E OF BROADVIEW AVE @ RICHMOND RD**

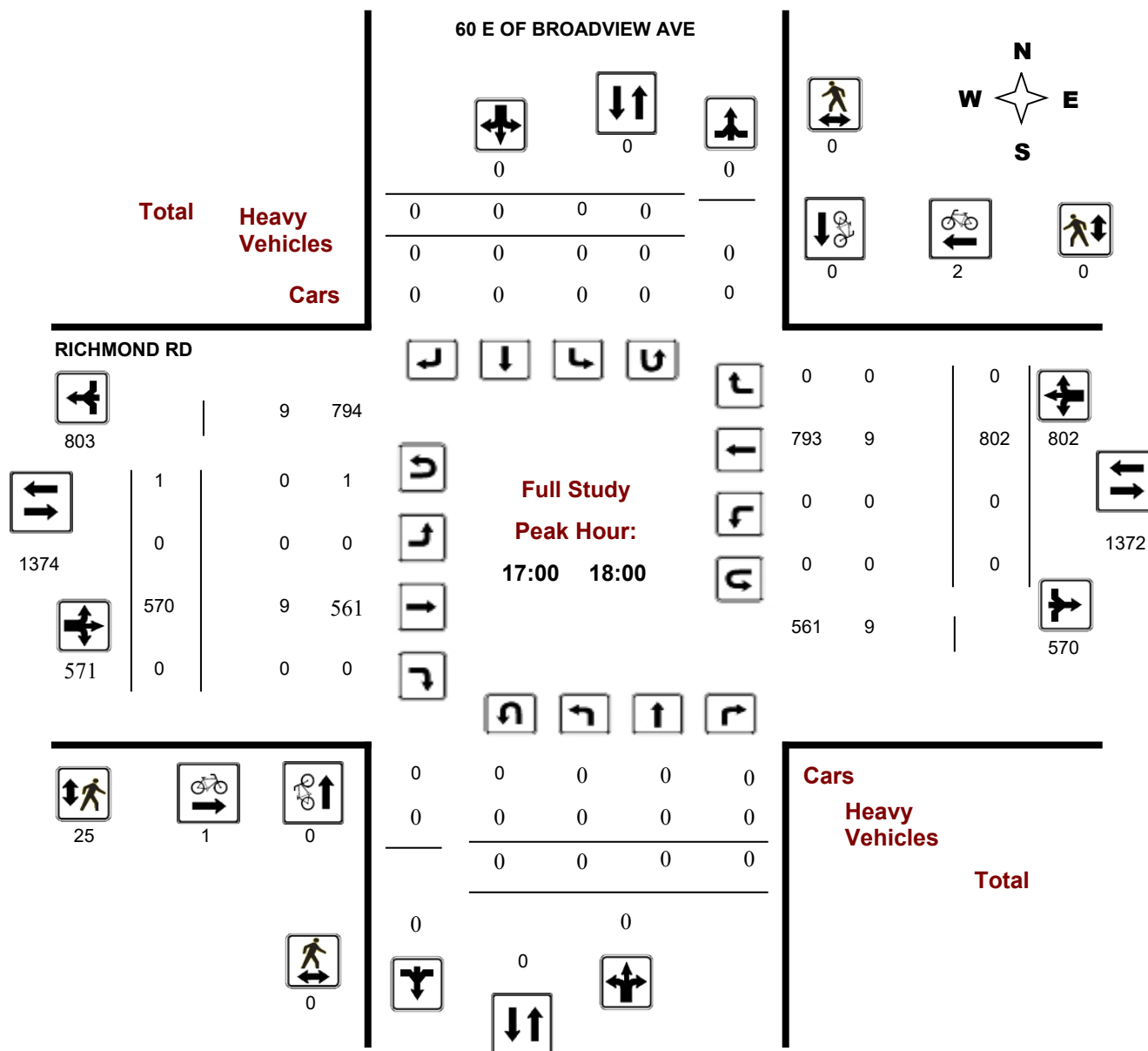
**Survey Date:** Wednesday, November 22, 2017

**WO No:** 37469

**Start Time:** 07:00

Device: Miovision

## Full Study Peak Hour Diagram



## Turning Movement Count - Peak Hour Diagram

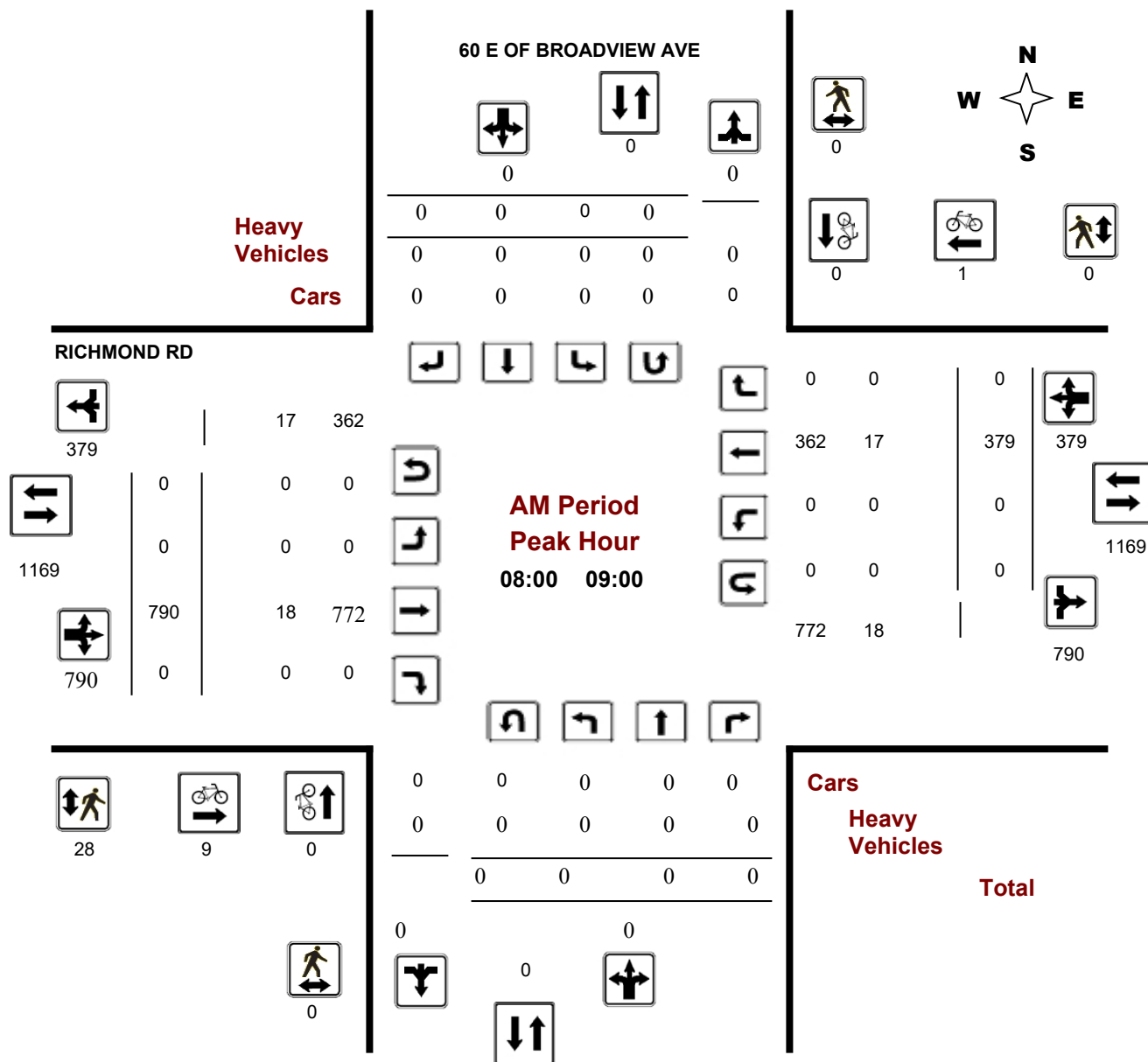
**60 E OF BROADVIEW AVE @ RICHMOND RD**

**Survey Date:** Wednesday, November 22, 2017

**Start Time:** 07:00

**WO No:** 37469

**Device:** Miovision



## Comments



## Turning Movement Count - Peak Hour Diagram

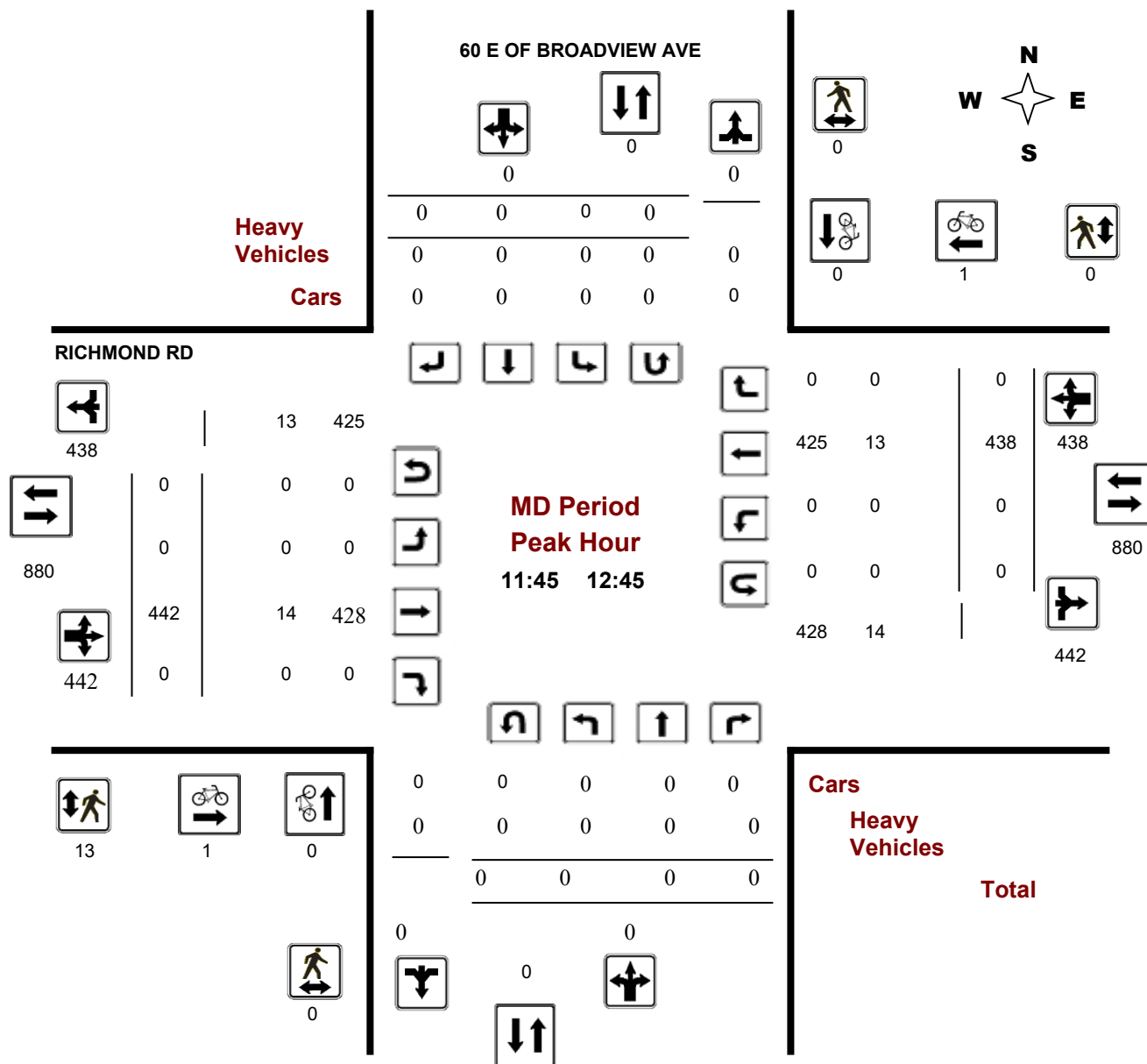
**60 E OF BROADVIEW AVE @ RICHMOND RD**

**Survey Date:** Wednesday, November 22, 2017

**Start Time:** 07:00

**WO No:** 37469

Device: Miovision



## Comments

## Turning Movement Count - Peak Hour Diagram

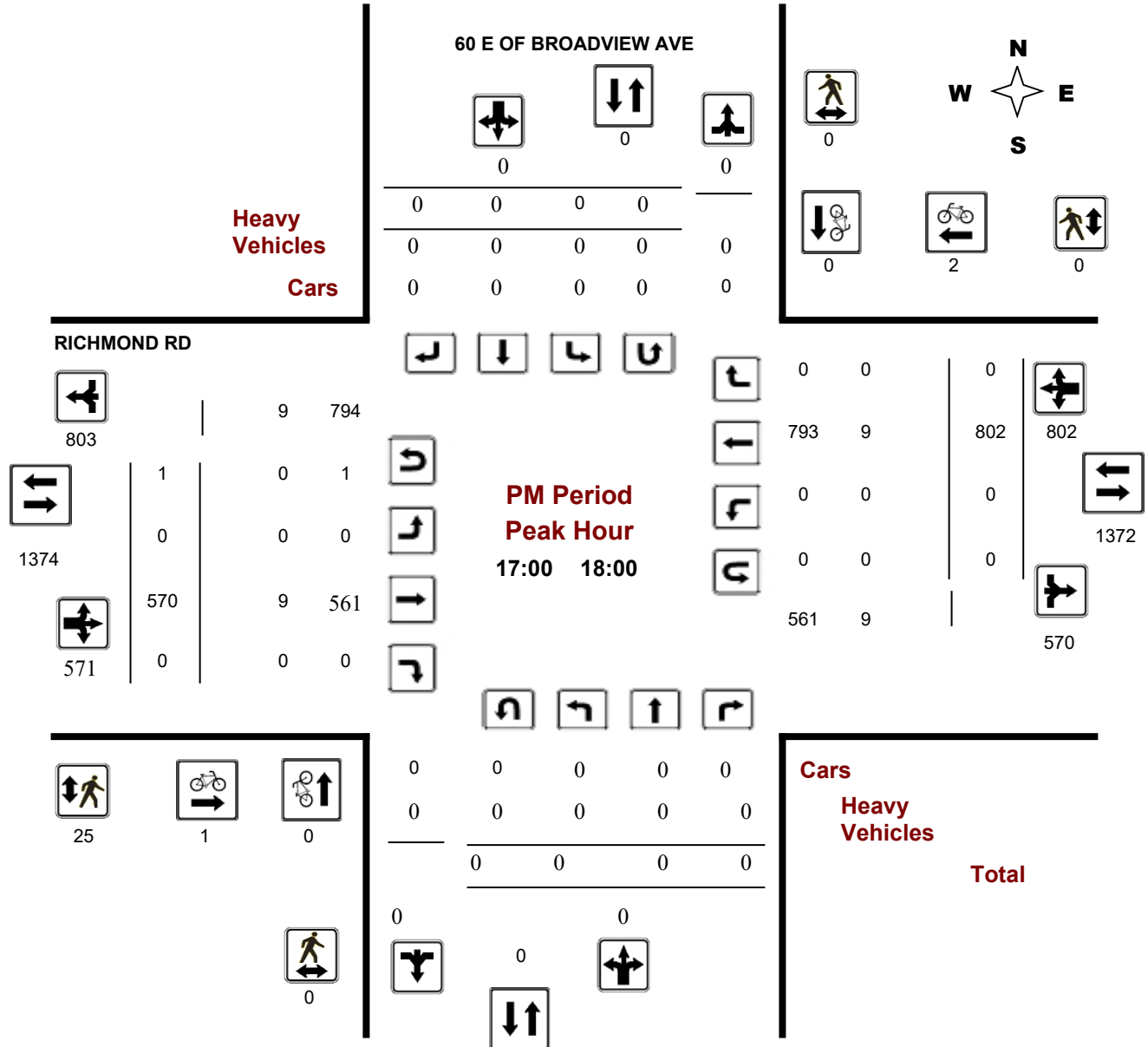
### 60 E OF BROADVIEW AVE @ RICHMOND RD

**Survey Date:** Wednesday, November 22, 2017

**Start Time:** 07:00

**WO No:** 37469

**Device:** Miovision





# Transportation Services - Traffic Services

## Turning Movement Count - Study Results

### 60 E OF BROADVIEW AVE @ RICHMOND RD

**Survey Date:** Wednesday, November 22, 2017

**WO No:** 37469

**Start Time:** 07:00

**Device:** Miovision

### Full Study Summary (8 HR Standard)

**Survey Date:** Wednesday, November 22, 2017

#### Total Observed U-Turns

#### AADT Factor

Northbound: 0 Southbound: 0

Eastbound: 1 Westbound: 1

.90

#### 60 E OF BROADVIEW AVE

#### RICHMOND RD

Period	Northbound					Southbound					Eastbound					Westbound					STR TOT	Grand Total
	LT	ST	RT	NB TOT		LT	ST	RT	SB TOT	STR TOT	LT	ST	RT	EB TOT		LT	ST	RT	WB TOT			
07:00 08:00	0	0	0	0		0	0	0	0	0	0	642	0	642		0	246	0	246		888	888
08:00 09:00	0	0	0	0		0	0	0	0	0	0	790	0	790		0	379	0	379		1169	1169
09:00 10:00	0	0	0	0		0	0	0	0	0	0	570	0	570		0	314	0	314		884	884
11:30 12:30	0	0	0	0		0	0	0	0	0	0	433	0	433		0	441	0	441		874	874
12:30 13:30	0	0	0	0		0	0	0	0	0	0	469	0	469		0	409	0	409		878	878
15:00 16:00	0	0	0	0		0	0	0	0	0	0	427	0	427		0	678	0	678		1105	1105
16:00 17:00	0	0	0	0		0	0	0	0	0	0	401	0	401		0	790	0	790		1191	1191
17:00 18:00	0	0	0	0		0	0	0	0	0	0	570	0	570		0	802	0	802		1372	1372
<b>Sub Total</b>	0	0	0	0		0	0	0	0	0	0	4302	0	4302		0	4059	0	4059		8361	8361
<b>U Turns</b>				0					0	0				1					1		2	2
<b>Total</b>	0	0	0	0		0	0	0	0	0	0	4302	0	4303		0	4059	0	4060		8363	8363
<b>EQ 12Hr</b>	0	0	0	0		0	0	0	0	0	0	5980	0	5981		0	5642	0	5643		11625	11625

Note: These values are calculated by multiplying the totals by the appropriate expansion factor.

**1.39**

**AVG 12Hr** 0 0 0 0 0 0 0 0 0 0 0 5072 0 5073 0 4786 0 4787 10462 10462

Note: These volumes are calculated by multiplying the Equivalent 12 hr. totals by the AADT factor.

**0.9**

**AVG 24Hr** 0 0 0 0 0 0 0 0 0 0 0 6644 0 6646 0 6269 0 6271 12917 12917

Note: These volumes are calculated by multiplying the Average Daily 12 hr. totals by 12 to 24 expansion factor.

**1.31**

Note: U-Turns provided for approach totals. Refer to 'U-Turn' Report for specific breakdown.



# Transportation Services - Traffic Services

## Turning Movement Count - Study Results

### 60 E OF BROADVIEW AVE @ RICHMOND RD

**Survey Date:** Wednesday, November 22, 2017

**WO No:** 37469

**Start Time:** 07:00

**Device:** Miovision

### Full Study 15 Minute Increments

#### 60 E OF BROADVIEW AVE

#### RICHMOND RD

##### Northbound

##### Southbound

##### Eastbound

##### Westbound

Time Period	LT	ST	RT	N TOT	LT	ST	RT	S TOT	STR TOT	LT	ST	RT	E TOT	LT	ST	RT	W TOT	STR TOT	Grand Total
07:00 07:15	0	0	0	0	0	0	0	0	0	0	144	0	144	0	54	0	54	0	198
07:15 07:30	0	0	0	0	0	0	0	0	0	0	135	0	135	0	48	0	48	0	183
07:30 07:45	0	0	0	0	0	0	0	0	0	0	173	0	173	0	61	0	61	0	234
07:45 08:00	0	0	0	0	0	0	0	0	0	0	190	0	190	0	83	0	83	0	273
08:00 08:15	0	0	0	0	0	0	0	0	0	0	204	0	204	0	71	0	71	0	275
08:15 08:30	0	0	0	0	0	0	0	0	0	0	191	0	191	0	95	0	95	0	286
08:30 08:45	0	0	0	0	0	0	0	0	0	0	216	0	216	0	113	0	113	0	329
08:45 09:00	0	0	0	0	0	0	0	0	0	0	179	0	179	0	100	0	100	0	279
09:00 09:15	0	0	0	0	0	0	0	0	0	0	172	0	172	0	89	0	89	0	261
09:15 09:30	0	0	0	0	0	0	0	0	0	0	130	0	130	0	73	0	73	0	203
09:30 09:45	0	0	0	0	0	0	0	0	0	0	152	0	152	0	81	0	81	0	233
09:45 10:00	0	0	0	0	0	0	0	0	0	0	116	0	116	0	71	0	72	0	188
11:30 11:45	0	0	0	0	0	0	0	0	0	0	105	0	105	0	115	0	115	0	220
11:45 12:00	0	0	0	0	0	0	0	0	0	0	100	0	100	0	118	0	118	0	218
12:00 12:15	0	0	0	0	0	0	0	0	0	0	108	0	108	0	106	0	106	0	214
12:15 12:30	0	0	0	0	0	0	0	0	0	0	120	0	120	0	102	0	102	0	222
12:30 12:45	0	0	0	0	0	0	0	0	0	0	114	0	114	0	112	0	112	0	226
12:45 13:00	0	0	0	0	0	0	0	0	0	0	105	0	105	0	94	0	94	0	199
13:00 13:15	0	0	0	0	0	0	0	0	0	0	121	0	121	0	102	0	102	0	223
13:15 13:30	0	0	0	0	0	0	0	0	0	0	129	0	129	0	101	0	101	0	230
15:00 15:15	0	0	0	0	0	0	0	0	0	0	86	0	86	0	165	0	165	0	251
15:15 15:30	0	0	0	0	0	0	0	0	0	0	106	0	106	0	146	0	146	0	252
15:30 15:45	0	0	0	0	0	0	0	0	0	0	103	0	103	0	181	0	181	0	284
15:45 16:00	0	0	0	0	0	0	0	0	0	0	132	0	132	0	186	0	186	0	318
16:00 16:15	0	0	0	0	0	0	0	0	0	0	116	0	116	0	179	0	179	0	295
16:15 16:30	0	0	0	0	0	0	0	0	0	0	89	0	89	0	213	0	213	0	302
16:30 16:45	0	0	0	0	0	0	0	0	0	0	95	0	95	0	196	0	196	0	291
16:45 17:00	0	0	0	0	0	0	0	0	0	0	101	0	101	0	202	0	202	0	303
17:00 17:15	0	0	0	0	0	0	0	0	0	0	120	0	120	0	216	0	216	0	336
17:15 17:30	0	0	0	0	0	0	0	0	0	0	154	0	154	0	202	0	202	0	356
17:30 17:45	0	0	0	0	0	0	0	0	0	0	142	0	143	0	191	0	191	0	334
17:45 18:00	0	0	0	0	0	0	0	0	0	0	154	0	154	0	193	0	193	0	347
Total:	0	0	0	0	0	0	0	0	0	0	4302	0	4303	0	4059	0	4060	0	8,363

Note: U-Turns are included in Totals.



# Transportation Services - Traffic Services

## Turning Movement Count - Study Results

### 60 E OF BROADVIEW AVE @ RICHMOND RD

**Survey Date:** Wednesday, November 22, 2017

**WO No:** 37469

**Start Time:** 07:00

**Device:** Miovision

### Full Study Cyclist Volume

#### 60 E OF BROADVIEW AVE

#### RICHMOND RD

Time Period	Northbound	Southbound	Street Total	Eastbound	Westbound	Street Total	Grand Total
07:00 07:15	0	0	0	1	2	3	3
07:15 07:30	0	0	0	1	0	1	1
07:30 07:45	0	0	0	4	1	5	5
07:45 08:00	0	0	0	1	2	3	3
08:00 08:15	0	0	0	1	0	1	1
08:15 08:30	0	0	0	4	0	4	4
08:30 08:45	0	0	0	2	1	3	3
08:45 09:00	0	0	0	2	0	2	2
09:00 09:15	0	0	0	0	1	1	1
09:15 09:30	0	0	0	0	0	0	0
09:30 09:45	0	0	0	2	1	3	3
09:45 10:00	0	0	0	0	0	0	0
11:30 11:45	0	0	0	0	0	0	0
11:45 12:00	0	0	0	1	1	2	2
12:00 12:15	0	0	0	0	0	0	0
12:15 12:30	0	0	0	0	0	0	0
12:30 12:45	0	0	0	0	0	0	0
12:45 13:00	0	0	0	0	1	1	1
13:00 13:15	0	0	0	0	0	0	0
13:15 13:30	0	0	0	0	0	0	0
15:00 15:15	0	0	0	2	0	2	2
15:15 15:30	0	0	0	0	0	0	0
15:30 15:45	0	0	0	0	1	1	1
15:45 16:00	0	0	0	0	1	1	1
16:00 16:15	0	0	0	0	0	0	0
16:15 16:30	0	0	0	1	0	1	1
16:30 16:45	0	0	0	1	4	5	5
16:45 17:00	0	0	0	0	0	0	0
17:00 17:15	0	0	0	0	0	0	0
17:15 17:30	0	0	0	1	0	1	1
17:30 17:45	0	0	0	0	2	2	2
17:45 18:00	0	0	0	0	0	0	0
Total	0	0	0	24	18	42	42



# Transportation Services - Traffic Services

## Turning Movement Count - Study Results

### 60 E OF BROADVIEW AVE @ RICHMOND RD

**Survey Date:** Wednesday, November 22, 2017

**WO No:** 37469

**Start Time:** 07:00

**Device:** Miovision

## Full Study Pedestrian Volume

### 60 E OF BROADVIEW AVE

### RICHMOND RD

Time Period	NB Approach (E or W Crossing)	SB Approach (E or W Crossing)	Total	EB Approach (N or S Crossing)	WB Approach (N or S Crossing)	Total	Grand Total
07:00 07:15	0	0	0	0	0	0	0
07:15 07:30	0	0	0	1	0	1	1
07:30 07:45	0	0	0	4	0	4	4
07:45 08:00	0	0	0	7	0	7	7
08:00 08:15	0	0	0	9	0	9	9
08:15 08:30	0	0	0	7	0	7	7
08:30 08:45	0	0	0	5	0	5	5
08:45 09:00	0	0	0	7	0	7	7
09:00 09:15	0	0	0	6	0	6	6
09:15 09:30	0	0	0	5	0	5	5
09:30 09:45	0	0	0	2	0	2	2
09:45 10:00	0	0	0	11	0	11	11
11:30 11:45	0	0	0	0	0	0	0
11:45 12:00	0	0	0	6	0	6	6
12:00 12:15	0	0	0	1	0	1	1
12:15 12:30	0	0	0	5	0	5	5
12:30 12:45	0	0	0	1	0	1	1
12:45 13:00	0	0	0	6	0	6	6
13:00 13:15	0	0	0	3	0	3	3
13:15 13:30	0	0	0	2	0	2	2
15:00 15:15	0	0	0	6	0	6	6
15:15 15:30	0	0	0	20	0	20	20
15:30 15:45	0	0	0	3	0	3	3
15:45 16:00	0	0	0	3	0	3	3
16:00 16:15	0	0	0	4	0	4	4
16:15 16:30	0	0	0	3	0	3	3
16:30 16:45	0	0	0	4	0	4	4
16:45 17:00	0	0	0	2	0	2	2
17:00 17:15	0	0	0	4	0	4	4
17:15 17:30	0	0	0	17	0	17	17
17:30 17:45	0	0	0	3	0	3	3
17:45 18:00	0	0	0	1	0	1	1
<b>Total .....</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>158</b>	<b>0</b>	<b>158</b>	<b>158</b>



# Transportation Services - Traffic Services

## Turning Movement Count - Study Results

### 60 E OF BROADVIEW AVE @ RICHMOND RD

**Survey Date:** Wednesday, November 22, 2017

**WO No:** 37469

**Start Time:** 07:00

**Device:** Miovision

### Full Study Heavy Vehicles

#### 60 E OF BROADVIEW AVE

#### RICHMOND RD

##### Northbound

##### Southbound

##### Eastbound

##### Westbound

Time Period		Northbound			N TOT	Southbound			S TOT	STR TOT	Eastbound			E TOT	Westbound			W TOT	STR TOT	Grand Total
		LT	ST	RT		LT	ST	RT			LT	ST	RT		LT	ST	RT			
07:00	07:15	0	0	0	0	0	0	0	0	0	0	6	0	6	0	3	0	3	9	9
07:15	07:30	0	0	0	0	0	0	0	0	0	0	1	0	1	0	2	0	2	3	3
07:30	07:45	0	0	0	0	0	0	0	0	0	0	6	0	6	0	3	0	3	9	9
07:45	08:00	0	0	0	0	0	0	0	0	0	0	1	0	1	0	3	0	3	4	4
08:00	08:15	0	0	0	0	0	0	0	0	0	0	4	0	4	0	2	0	2	6	6
08:15	08:30	0	0	0	0	0	0	0	0	0	0	4	0	4	0	4	0	4	8	8
08:30	08:45	0	0	0	0	0	0	0	0	0	0	6	0	6	0	6	0	6	12	12
08:45	09:00	0	0	0	0	0	0	0	0	0	0	4	0	4	0	5	0	5	9	9
09:00	09:15	0	0	0	0	0	0	0	0	0	0	1	0	1	0	3	0	3	4	4
09:15	09:30	0	0	0	0	0	0	0	0	0	0	9	0	9	0	2	0	2	11	11
09:30	09:45	0	0	0	0	0	0	0	0	0	0	5	0	5	0	2	0	2	7	7
09:45	10:00	0	0	0	0	0	0	0	0	0	0	4	0	4	0	8	0	8	12	12
11:30	11:45	0	0	0	0	0	0	0	0	0	0	6	0	6	0	4	0	4	10	10
11:45	12:00	0	0	0	0	0	0	0	0	0	0	2	0	2	0	7	0	7	9	9
12:00	12:15	0	0	0	0	0	0	0	0	0	0	4	0	4	0	3	0	3	7	7
12:15	12:30	0	0	0	0	0	0	0	0	0	0	5	0	5	0	0	0	0	5	5
12:30	12:45	0	0	0	0	0	0	0	0	0	0	3	0	3	0	3	0	3	6	6
12:45	13:00	0	0	0	0	0	0	0	0	0	0	3	0	3	0	6	0	6	9	9
13:00	13:15	0	0	0	0	0	0	0	0	0	0	6	0	6	0	8	0	8	14	14
13:15	13:30	0	0	0	0	0	0	0	0	0	0	5	0	5	0	2	0	2	7	7
15:00	15:15	0	0	0	0	0	0	0	0	0	0	5	0	5	0	4	0	4	9	9
15:15	15:30	0	0	0	0	0	0	0	0	0	0	5	0	5	0	5	0	5	10	10
15:30	15:45	0	0	0	0	0	0	0	0	0	0	3	0	3	0	3	0	3	6	6
15:45	16:00	0	0	0	0	0	0	0	0	0	0	5	0	5	0	4	0	4	9	9
16:00	16:15	0	0	0	0	0	0	0	0	0	0	3	0	3	0	4	0	4	7	7
16:15	16:30	0	0	0	0	0	0	0	0	0	0	2	0	2	0	5	0	5	7	7
16:30	16:45	0	0	0	0	0	0	0	0	0	0	2	0	2	0	0	0	0	2	2
16:45	17:00	0	0	0	0	0	0	0	0	0	0	1	0	1	0	6	0	6	7	7
17:00	17:15	0	0	0	0	0	0	0	0	0	0	2	0	2	0	2	0	2	4	4
17:15	17:30	0	0	0	0	0	0	0	0	0	0	3	0	3	0	2	0	2	5	5
17:30	17:45	0	0	0	0	0	0	0	0	0	0	3	0	3	0	4	0	4	7	7
17:45	18:00	0	0	0	0	0	0	0	0	0	0	1	0	1	0	1	0	1	2	2
Total:	None	0	0	0	0	0	0	0	0	0	0	120	0	120	0	116	0	116	236	236





# Transportation Services - Traffic Services

## Turning Movement Count - Study Results

### 60 E OF BROADVIEW AVE @ RICHMOND RD

**Survey Date:** Wednesday, November 22, 2017

**WO No:** 37469

**Start Time:** 07:00

**Device:** Miovision

### Full Study 15 Minute U-Turn Total

60 E OF BROADVIEW AVE

RICHMOND RD

Time Period		Northbound U-Turn Total	Southbound U-Turn Total	Eastbound U-Turn Total	Westbound U-Turn Total	Total
07:00	07:15	0	0	0	0	0
07:15	07:30	0	0	0	0	0
07:30	07:45	0	0	0	0	0
07:45	08:00	0	0	0	0	0
08:00	08:15	0	0	0	0	0
08:15	08:30	0	0	0	0	0
08:30	08:45	0	0	0	0	0
08:45	09:00	0	0	0	0	0
09:00	09:15	0	0	0	0	0
09:15	09:30	0	0	0	0	0
09:30	09:45	0	0	0	0	0
09:45	10:00	0	0	0	1	1
11:30	11:45	0	0	0	0	0
11:45	12:00	0	0	0	0	0
12:00	12:15	0	0	0	0	0
12:15	12:30	0	0	0	0	0
12:30	12:45	0	0	0	0	0
12:45	13:00	0	0	0	0	0
13:00	13:15	0	0	0	0	0
13:15	13:30	0	0	0	0	0
15:00	15:15	0	0	0	0	0
15:15	15:30	0	0	0	0	0
15:30	15:45	0	0	0	0	0
15:45	16:00	0	0	0	0	0
16:00	16:15	0	0	0	0	0
16:15	16:30	0	0	0	0	0
16:30	16:45	0	0	0	0	0
16:45	17:00	0	0	0	0	0
17:00	17:15	0	0	0	0	0
17:15	17:30	0	0	0	0	0
17:30	17:45	0	0	1	0	1
17:45	18:00	0	0	0	0	0
Total		0	0	1	1	2

# B

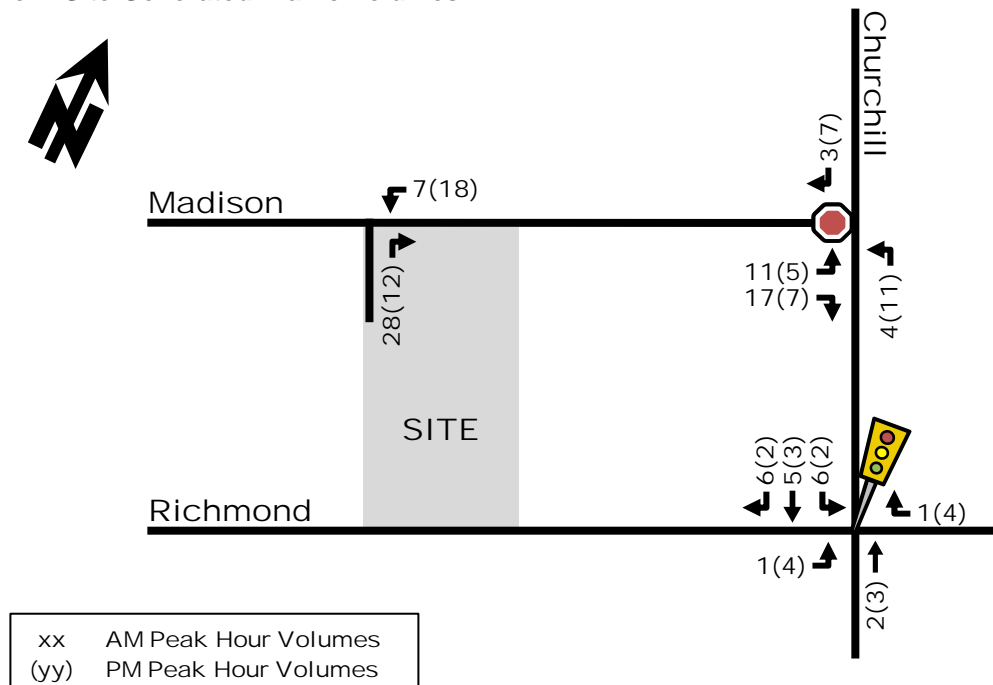
## Appendix B – Collision Data

FID	Location	Year	Date	Time	Classificat	Impact_Typ	Environmen	Light	Road_Surfa	Traffic_Co	Traffic__1	No_of_Peds
1316	GOLDEN AVE @ RICHMOND RD	2018	5/11/2018 0:00	10:00:00 AM	03 - P.D. only	04 - Sideswipe	01 - Clear	01 - Daylight	01 - Dry	01 - Traffic signal	01 - Functioning	0
1539	CHURCHILL AVE @ RICHMOND RD	2018	6/9/2018 0:00	10:48:00 AM	03 - P.D. only	02 - Angle	01 - Clear	01 - Daylight	01 - Dry	01 - Traffic signal	01 - Functioning	0
2666	RICHMOND RD btwn WINSTON AVE & CHURCHILL AVE N	2018	1/7/2018 0:00	12:45:00 PM	03 - P.D. only	05 - Turning movement	01 - Clear	01 - Daylight	01 - Dry	10 - No control		0
2935	ROOSEVELT AVE @ RICHMOND RD	2018	1/2/2018 0:00	12:14:00 PM	03 - P.D. only	03 - Rear end	03 - Snow	01 - Daylight	03 - Loose snow	01 - Traffic signal	01 - Functioning	0
3802	CHURCHILL AVE @ RICHMOND RD	2018	10/27/2018 0:00	9:39:00 PM	02 - Non-fatal injury	07 - SMV other	03 - Snow	07 - Dark	02 - Wet	01 - Traffic signal	01 - Functioning	2
3923	RICHMOND RD btwn BROADVIEW AVE & GOLDEN AVE	2018	10/22/2018 0:00	7:45:00 AM	03 - P.D. only	02 - Angle	01 - Clear	01 - Daylight	01 - Dry	10 - No control		0
4052	RICHMOND RD btwn BROADVIEW AVE & GOLDEN AVE	2018	10/3/2018 0:00	1:06:00 PM	03 - P.D. only	99 - Other	01 - Clear	01 - Daylight	01 - Dry	10 - No control		0
5078	RICHMOND RD btwn WINSTON AVE & CHURCHILL AVE N	2018	9/7/2018 0:00	1:40:00 PM	03 - P.D. only	03 - Rear end	01 - Clear	01 - Daylight	01 - Dry	10 - No control		0
5216	CHURCHILL AVE @ RICHMOND RD	2018	9/11/2018 0:00	6:51:00 PM	03 - P.D. only	05 - Turning movement	01 - Clear	01 - Daylight	01 - Dry	01 - Traffic signal	01 - Functioning	0
5773	CHURCHILL AVE @ RICHMOND RD	2018	2/9/2018 0:00	12:45:00 PM	03 - P.D. only	04 - Sideswipe	01 - Clear	01 - Daylight	02 - Wet	01 - Traffic signal	01 - Functioning	0
6842	CHURCHILL AVE N btwn RICHMOND RD & DANFORTH AVE	2018	4/23/2018 0:00	3:30:00 PM	03 - P.D. only	05 - Turning movement	01 - Clear	01 - Daylight	01 - Dry	10 - No control		0
7008	BERKELEY AVE @ RICHMOND RD	2018	4/10/2018 0:00	4:13:00 PM	03 - P.D. only	99 - Other	01 - Clear	01 - Daylight	01 - Dry	02 - Stop sign	01 - Functioning	0
7050	RICHMOND RD btwn BERKLEY AVE & ROOSEVELT AVE	2018	4/4/2018 0:00	6:38:00 PM	03 - P.D. only	06 - SMV unattended vehicle	01 - Clear	05 - Dusk	01 - Dry	10 - No control		0
7150	RICHMOND RD btwn WINSTON AVE & CHURCHILL AVE N	2018	3/24/2018 0:00	12:19:00 PM	03 - P.D. only	99 - Other	01 - Clear	01 - Daylight	01 - Dry	10 - No control		0
7343	CHURCHILL AVE @ DANFORTH AVE	2018	3/21/2018 0:00	11:46:00 AM	03 - P.D. only	04 - Sideswipe	01 - Clear	01 - Daylight	01 - Dry	02 - Stop sign	01 - Functioning	0
7842	RICHMOND RD btwn BERKLEY AVE & ROOSEVELT AVE	2018	7/4/2018 0:00	3:26:00 PM	02 - Non-fatal injury	03 - Rear end	01 - Clear	01 - Daylight	01 - Dry	10 - No control		0
9125	GOLDEN AVE @ RICHMOND RD	2018	2/27/2018 0:00	6:59:00 PM	02 - Non-fatal injury	07 - SMV other	01 - Clear	07 - Dark	01 - Dry	01 - Traffic signal	01 - Functioning	1
9465	CHURCHILL AVE @ RICHMOND RD	2018	3/12/2018 0:00	10:21:00 AM	03 - P.D. only	05 - Turning movement	01 - Clear	01 - Daylight	01 - Dry	01 - Traffic signal	01 - Functioning	0
12212	CHURCHILL AVE @ RICHMOND RD	2018	11/6/2018 0:00	1:25:00 PM	02 - Non-fatal injury	03 - Rear end	02 - Rain	01 - Daylight	02 - Wet	01 - Traffic signal	01 - Functioning	0
13510	CHURCHILL AVE @ RICHMOND RD	2018	12/17/2018 0:00	10:39:00 AM	03 - P.D. only	04 - Sideswipe	01 - Clear	01 - Daylight	01 - Dry	01 - Traffic signal	01 - Functioning	0
14413	DANFORTH AVE btwn ROOSEVELT AVE & CHURCHILL AVE N	2018	12/21/2018 0:00	10:00:00 AM	03 - P.D. only	02 - Angle	01 - Clear	01 - Daylight	01 - Dry	10 - No control		0
15571	BYRON AVE @ CHURCHILL AVE	2017	9/12/2017 0:00	7:43 PM	03 - P.D. only	05 - Turning movement	01 - Clear	01 - Daylight	01 - Dry	01 - Traffic signal		0
15587	BYRON AVE @ ROOSEVELT AVE	2017	10/12/2017 0:00	8:26 PM	03 - P.D. only	05 - Turning movement	01 - Clear	01 - Daylight	01 - Dry	01 - Traffic signal		0
15590	BYRON AVE @ ROOSEVELT AVE	2017	2/11/2017 0:00	1:55 PM	03 - P.D. only	99 - Other	01 - Clear	01 - Daylight	05 - Packed snow	01 - Traffic signal		0
15599	BYRON AVE @ ROOSEVELT AVE	2017	3/24/2017 0:00	3:41 PM	03 - P.D. only	99 - Other	03 - Snow	01 - Daylight	05 - Packed snow	01 - Traffic signal		0
17107	CHURCHILL AVE N btwn RICHMOND RD & DANFORTH AVE	2017	6/29/2017 0:00	9:39 PM	03 - P.D. only	04 - Sideswipe	02 - Rain	01 - Daylight	02 - Wet	10 - No control		0
17108	CHURCHILL AVE N btwn RICHMOND RD & DANFORTH AVE	2017	4/13/2017 0:00	8:00 PM	03 - P.D. only	06 - SMV unattended vehicle	01 - Clear	01 - Daylight	01 - Dry	10 - No control		0
17113	CHURCHILL AVE @ RICHMOND RD	2017	9/6/2017 0:00	5:00 AM	03 - P.D. only	06 - SMV unattended vehicle	01 - Clear	00 - Unknown	01 - Dry	01 - Traffic signal		0
17114	CHURCHILL AVE @ RICHMOND RD	2017	9/26/2017 0:00	12:08 AM	03 - P.D. only	05 - Turning movement	01 - Clear	05 - Dusk	01 - Dry	01 - Traffic signal		0
17115	CHURCHILL AVE @ RICHMOND RD	2017	1/28/2017 0:00	8:02 PM	02 - Non-fatal injury	03 - Rear end	03 - Snow	01 - Daylight	02 - Wet	01 - Traffic signal		0
18050	DANFORTH AVE @ ROOSEVELT AVE	2017	8/12/2017 0:00	7:08 PM	03 - P.D. only	99 - Other	01 - Clear	01 - Daylight	01 - Dry	02 - Stop sign		0
21328	BERKELEY AVE @ RICHMOND RD	2017	12/7/2017 0:00	1:31 AM	03 - P.D. only	03 - Rear end	01 - Clear	07 - Dark	01 - Dry	02 - Stop sign		0
25889	RICHMOND RD btwn WINSTON AVE & CHURCHILL AVE N	2017	4/27/2017 0:00	1:51 PM	03 - P.D. only	02 - Angle	01 - Clear	01 - Daylight	01 - Dry	10 - No control		0
25890	RICHMOND RD btwn WINSTON AVE & CHURCHILL AVE N	2017	8/23/2017 0:00	5:30 PM	03 - P.D. only	06 - SMV unattended vehicle	01 - Clear	01 - Daylight	01 - Dry	10 - No control		0
25891	RICHMOND RD btwn WINSTON AVE & CHURCHILL AVE N	2017	8/21/2017 0:00	8:23 PM	03 - P.D. only	06 - SMV unattended vehicle	01 - Clear	01 - Daylight	01 - Dry	10 - No control		0
25892	RICHMOND RD btwn WINSTON AVE & CHURCHILL AVE N	2017	10/6/2017 0:00	9:39 PM	03 - P.D. only	04 - Sideswipe	01 - Clear	01 - Daylight	01 - Dry	10 - No control		0
25893	RICHMOND RD btwn WINSTON AVE & CHURCHILL AVE N	2017	10/19/2017 0:00	4:35 PM	03 - P.D. only	06 - SMV unattended vehicle	01 - Clear	01 - Daylight	01 - Dry	10 - No control		0
25896	RICHMOND RD btwn WINSTON AVE & CHURCHILL AVE N	2017	1/4/2017 0:00	12:38 AM	03 - P.D. only	05 - Turning movement	01 - Clear	07 - Dark	02 - Wet	10 - No control		0
25897	RICHMOND RD btwn WINSTON AVE & CHURCHILL AVE N	2017	2/25/2017 0:00	5:35 PM	03 - P.D. only	06 - SMV unattended vehicle	03 - Snow	01 - Daylight	02 - Wet	10 - No control		0
26279	RICHMOND RD btwn BERKLEY AVE & ROOSEVELT AVE	2017	10/19/2017 0:00	10:36 PM	03 - P.D. only	06 - SMV unattended vehicle	01 - Clear	01 - Daylight	01 - Dry	10 - No control		0
26280	RICHMOND RD btwn BROADVIEW AVE & GOLDEN AVE	2017	12/1/2017 0:00	12:11 AM	02 - Non-fatal injury	06 - SMV unattended vehicle	01 - Clear	07 - Dark	01 - Dry	10 - No control		0
26281	RICHMOND RD btwn BROADVIEW AVE & GOLDEN AVE	2017	3/21/2017 0:00	10:30 PM	03 - P.D. only	02 - Angle	01 - Clear	01 - Daylight	01 - Dry	10 - No control		0
26321	RICHMOND RD btwn ROOSEVELT AVE & WINSTON AVE	2017	3/29/2017 0:00	5:00 AM	03 - P.D. only	06 - SMV unattended vehicle	01 - Clear	00 - Unknown	01 - Dry	10 - No control		0
28912	RICHMOND RD btwn WINSTON AVE & CHURCHILL AVE N	2016	1/28/2016 0:00	5:16:00 PM	03 - P.D. only	99 - Other	03 - Snow	01 - Daylight	02 - Wet	10 - No control		0
28961	GOLDEN AVE @ RICHMOND RD	2016	1/29/2016 0:00	9:47:00 PM	02 - Non-fatal injury	03 - Rear end	01 - Clear	05 - Dusk	02 - Wet	01 - Traffic signal	01 - Functioning	0
29243	CHURCHILL AVE N btwn RICHMOND RD & DANFORTH AVE	2016	2/11/2016 0:00	8:37:00 PM	03 - P.D. only	03 - Rear end	01 - Clear	01 - Daylight	01 - Dry	10 - No control		0
29747	GOLDEN AVE @ RICHMOND RD	2016	2/9/2016 0:00	8:00:00 PM	03 - P.D. only	02 - Angle	01 - Clear	01 - Daylight	01 - Dry	01 - Traffic signal	01 - Functioning	0
29801	RICHMOND RD btwn WINSTON AVE & CHURCHILL AVE N	2016	2/15/2016 0:00	3:35:00 PM	03 - P.D. only	06 - SMV unattended vehicle	01 - Clear	01 - Daylight	01 - Dry	10 - No control		0
30944	CHURCHILL AVE N btwn RICHMOND RD & DANFORTH AVE	2016	1/4/2016 0:00	4:23:00 PM	03 - P.D. only	04 - Sideswipe	01 - Clear	01 - Daylight	03 - Loose snow	10 - No control		0
30946	CHURCHILL AVE @ RICHMOND RD	2016	1/4/2016 0:00	5:08:00 PM	03 - P.D. only	03 - Rear end	01 - Clear	01 - Daylight	02 - Wet	01 - Traffic signal	01 - Functioning	0
31924	RICHMOND RD btwn WINSTON AVE & CHURCHILL AVE N	2016	8/19/2016 0:00	8:45:00 PM	03 - P.D. only	02 - Angle	02 - Rain	01 - Daylight	02 - Wet	10 - No control		0
32500	CHURCHILL AVE @ RICHMOND RD	2016	8/7/2016 0:00	5:12:00 PM	03 - P.D. only	03 - Rear end	01 - Clear	01 - Daylight	01 - Dry	01 - Traffic signal	01 - Functioning	0
32655	CHURCHILL AVE @ RICHMOND RD	2016	8/13/2016 0:00	5:00:00 PM	03 - P.D. only	06 - SMV unattended vehicle	01 - Clear	00 - Unknown	01 - Dry	01 - Traffic signal	00 - Unknown	0
33362	BERKELEY AVE @ RICHMOND RD	2016	6/25/2016 0:00	2:50:00 AM	02 - Non-fatal injury	05 - Turning movement	01 - Clear	07 - Dark	01 - Dry	02 - Stop sign	01 - Functioning	0
33824	RICHMOND RD btwn BERKLEY AVE & ROOSEVELT AVE	2016	7/5/2016 0:00	5:46:00 PM	03 - P.D. only	04 - Sideswipe	01 - Clear	01 - Daylight	01 - Dry	10 - No control		0
34368	RICHMOND RD btwn WINSTON AVE & CHURCHILL AVE N	2016	2/26/2016 0:00	6:30:00 PM	03 - P.D. only	06 - SMV unattended vehicle	01 - Clear	01 - Daylight	06 - Ice	10 - No control		0
34665	RICHMOND RD btwn WINSTON AVE & CHURCHILL AVE N	2016	2/18/2016 0:00	10:12:00 PM	03 - P.D. only	04 - Sideswipe	02 - Rain	05 - Dusk	02 - Wet	10 - No control		0
35273	BYRON AVE @ CHURCHILL AVE	2016	6/11/2016 0:00	2:49:00 PM	03 - P.D. only	05 - Turning movement	02 - Rain	01 - Daylight	02 - Wet	01 - Traffic signal	01 - Functioning	0
35693	CHURCHILL AVE @ RICHMOND RD	2016	6/2/2016 0:00	7:22:00 PM	02 - Non-fatal injury	07 - SMV other	01 - Clear	01 - Daylight	01 - Dry	01 - Traffic signal	01 - Functioning	1
35813	CHURCHILL AVE @ RICHMOND RD	2016	6/17/2016 0:00	10:29:00 AM	03 - P.D. only	02 - Angle	01 - Clear	03 - Dawn	01 - Dry	01 - Traffic signal	01 - Functioning	0
36151	ROOSEVELT AVE @ RICHMOND RD	2016	4/9/2016 0:00	3:57:00 PM	03 - P.D. only	03 - Rear end	01 - Clear	01 - Daylight	01 - Dry	01 - Traffic signal	01 - Functioning	0
36374	BYRON AVE @ CHURCHILL AVE	2016	3/26/2016 0:00	5:30:00 PM	03 - P.D. only	03 - Rear end	01 - Clear	01 - Daylight	01 - Dry	01 - Traffic signal	01 - Functioning	0
37308	RICHMOND RD btwn WINSTON AVE & CHURCHILL AVE N	2016	11/25/2016 0:00	7:45:00 PM	03 - P.D. only	04 - Sideswipe	01 - Clear	01 - Daylight	02 - Wet	10 - No control		0
37587	RICHMOND RD btwn GOLDEN AVE & BERKLEY AVE	2016	11/3/2016 0:00	1:03:00 AM	03 - P.D. only	05 - Turning movement	02 - Rain	07 - Dark	02 - Wet	10 - No control		0
37818	GOLDEN AVE @ RICHMOND RD	2016	11/24/2016 0:00	1:36:00 PM	03 - P.D. only	03 - Rear end	03 - Snow	01 - Daylight	05 - Packed snow	01 - Traffic signal	01 - Functioning	0
39310	RICHMOND RD btwn BERKLEY AVE & ROOSEVELT AVE	2016	5/18/2016 0:00	4:52:00 PM	03 - P.D. only	06 - SMV unattended vehicle	01 - Clear	01 - Daylight	01 - Dry	10 - No control		0
39435	DANFORTH AVE btwn ROOSEVELT AVE & CHURCHILL AVE N	2016	5/12/2016 0:00	8:51:00 PM	03 - P.D. only	02 - Angle	01 - Clear	01 - Daylight	01 - Dry	10 - No control		0
40075	CHURCHILL AVE @ RICHMOND RD	2016	12/9/2016 0:00	1:40:00 PM	03 - P.D. only	03 - Rear end	01 - Clear	01 - Daylight	06 - Ice	01 - Traffic signal	01 - Functioning	0
40314	RICHMOND RD btwn WINSTON AVE & CHURCHILL AVE N	2016	12/14/2016 0:00	12:16:00 AM	03 - P.D. only	04 - Sideswipe	01 - Clear	07 - Dark	01 - Dry	10 - No control		0
40719	RICHMOND RD btwn WINSTON AVE & CHURCHILL AVE N	2016	12/2/2016 0:00	6:00:00 PM	02 - Non-fatal injury	02 - Angle	01 - Clear	01 - Daylight	01 - Dry	10 - No control		0
42698	CHURCHILL AVE N btwn RICHMOND RD & DANFORTH AVE	2016	12/16/2016 0:00	8:45:00 PM	02 - Non-fatal injury	07 - SMV other	01 - Clear	01 - Daylight	01 - Dry	10 - No control		1
42851	CHURCHILL AVE @ RICHMOND RD	2016	12/31/2016 0:00	5:01:00 PM	02 - Non-fatal injury	07 - SMV other	03 - Snow	01 - Daylight	03 - Loose snow	01 - Traffic signal	01 - Functioning	1

42868	RICHMOND RD btwn ROOSEVELT AVE & WINSTON AVE	2016	12/31/2016 0:00	9:20:00 PM 03 - P.D. only	07 - SMV other	03 - Snow	05 - Dusk	03 - Loose snow	10 - No control		0
43015	CHURCHILL AVE @ RICHMOND RD	2015	1/25/2015 0:00	7:02 PM 02 - Non-fatal injury	03 - Rear end	01 - Clear	01 - Daylight	01 - Dry	01 - Traffic signal	01 - Functioning	0
43128	GOLDEN AVE @ RICHMOND RD	2015	1/19/2015 0:00	11:23 PM 03 - P.D. only	03 - Rear end	01 - Clear	07 - Dark	04 - Slush	01 - Traffic signal	01 - Functioning	0
43457	CHURCHILL AVE @ RICHMOND RD	2015	1/31/2015 0:00	1:21 AM 03 - P.D. only	05 - Turning movement	03 - Snow	07 - Dark	03 - Loose snow	01 - Traffic signal	01 - Functioning	0
43643	BYRON AVE @ CHURCHILL AVE	2015	1/29/2015 0:00	9:00 PM 03 - P.D. only	02 - Angle	01 - Clear	01 - Daylight	06 - Ice	01 - Traffic signal	01 - Functioning	0
43987	GOLDEN AVE @ RICHMOND RD	2015	2/4/2015 0:00	8:37 PM 03 - P.D. only	03 - Rear end	03 - Snow	01 - Daylight	03 - Loose snow	01 - Traffic signal	01 - Functioning	0
44383	RICHMOND RD btwn BROADVIEW AVE & GOLDEN AVE	2015	2/10/2015 0:00	2:10 PM 03 - P.D. only	02 - Angle	01 - Clear	01 - Daylight	04 - Slush	10 - No control		0
46091	BYRON AVE @ ROOSEVELT AVE	2015	9/18/2015 0:00	6:57 PM 02 - Non-fatal injury	05 - Turning movement	01 - Clear	01 - Daylight	01 - Dry	01 - Traffic signal	01 - Functioning	0
47660	CHURCHILL AVE @ RICHMOND RD	2015	6/18/2015 0:00	2:14 PM 03 - P.D. only	04 - Sideswipe	01 - Clear	01 - Daylight	01 - Dry	01 - Traffic signal	01 - Functioning	0
47746	RICHMOND RD btwn GOLDEN AVE & BERKLEY AVE	2015	6/1/2015 0:00	3:34 PM 02 - Non-fatal injury	03 - Rear end	01 - Clear	01 - Daylight	01 - Dry	10 - No control		0
47778	BYRON AVE @ CHURCHILL AVE	2015	6/9/2015 0:00	3:04 PM 03 - P.D. only	03 - Rear end	02 - Rain	01 - Daylight	02 - Wet	01 - Traffic signal	01 - Functioning	0
47798	RICHMOND RD btwn BERKLEY AVE & ROOSEVELT AVE	2015	6/5/2015 0:00	12:42 AM 03 - P.D. only	03 - Rear end	01 - Clear	01 - Daylight	01 - Dry	10 - No control		0
48843	RICHMOND RD btwn ROOSEVELT AVE & WINSTON AVE	2015	12/31/2015 0:00	2:47 PM 03 - P.D. only	01 - Approaching	01 - Clear	01 - Daylight	02 - Wet	10 - No control		0
48994	RICHMOND RD btwn WINSTON AVE & CHURCHILL AVE N	2015	1/10/2015 0:00	2:30 AM 03 - P.D. only	06 - SMV unattended vehicle	03 - Snow	07 - Dark	04 - Slush	10 - No control		0
49626	CHURCHILL AVE @ RICHMOND RD	2015	1/16/2015 0:00	3:39 PM 03 - P.D. only	02 - Angle	01 - Clear	01 - Daylight	04 - Slush	01 - Traffic signal	01 - Functioning	0
50031	BERKELEY AVE @ RICHMOND RD	2015	2/24/2015 0:00	10:30 PM 03 - P.D. only	03 - Rear end	01 - Clear	05 - Dusk	02 - Wet	02 - Stop sign	00 - Unknown	0
50214	RICHMOND RD btwn BROADVIEW AVE & GOLDEN AVE	2015	2/26/2015 0:00	6:02 PM 03 - P.D. only	06 - SMV unattended vehicle	01 - Clear	01 - Daylight	03 - Loose snow	10 - No control		0
50230	CHURCHILL AVE @ RICHMOND RD	2015	2/26/2015 0:00	10:03 PM 03 - P.D. only	02 - Angle	01 - Clear	01 - Daylight	02 - Wet	01 - Traffic signal	01 - Functioning	0
51324	CHURCHILL AVE @ RICHMOND RD	2015	10/3/2015 0:00	4:00 PM 03 - P.D. only	03 - Rear end	01 - Clear	01 - Daylight	01 - Dry	01 - Traffic signal	01 - Functioning	0
51910	RICHMOND RD btwn WINSTON AVE & CHURCHILL AVE N	2015	9/11/2015 0:00	5:00 PM 03 - P.D. only	03 - Rear end	01 - Clear	01 - Daylight	01 - Dry	10 - No control		0
52317	RICHMOND RD btwn ROOSEVELT AVE & WINSTON AVE	2015	11/3/2015 0:00	9:00 PM 03 - P.D. only	06 - SMV unattended vehicle	01 - Clear	01 - Daylight	01 - Dry	10 - No control		0
52598	ROOSEVELT AVE @ RICHMOND RD	2015	11/7/2015 0:00	11:34 PM 02 - Non-fatal injury	05 - Turning movement	01 - Clear	07 - Dark	01 - Dry	01 - Traffic signal	01 - Functioning	0
52669	CHURCHILL AVE N btwn DANFORTH AVE & BYRON AVE	2015	11/17/2015 0:00	12:50 AM 03 - P.D. only	06 - SMV unattended vehicle	01 - Clear	07 - Dark	01 - Dry	10 - No control		0
52720	CHURCHILL AVE @ RICHMOND RD	2015	11/19/2015 0:00	3:56 PM 03 - P.D. only	03 - Rear end	01 - Clear	01 - Daylight	02 - Wet	01 - Traffic signal	01 - Functioning	0
54465	RICHMOND RD btwn BROADVIEW AVE & GOLDEN AVE	2015	12/3/2015 0:00	8:59 PM 03 - P.D. only	02 - Angle	01 - Clear	05 - Dusk	02 - Wet	10 - No control		0
55321	RICHMOND RD btwn WINSTON AVE & CHURCHILL AVE N	2015	4/28/2015 0:00	3:10 AM 03 - P.D. only	06 - SMV unattended vehicle	01 - Clear	07 - Dark	01 - Dry	10 - No control		0
55534	RICHMOND RD btwn GOLDEN AVE & BERKLEY AVE	2015	4/28/2015 0:00	7:28 PM 03 - P.D. only	06 - SMV unattended vehicle	01 - Clear	01 - Daylight	01 - Dry	10 - No control		0
56079	CHURCHILL AVE @ RICHMOND RD	2015	4/11/2015 0:00	5:34 PM 03 - P.D. only	04 - Sideswipe	01 - Clear	01 - Daylight	01 - Dry	01 - Traffic signal	01 - Functioning	0
56158	RICHMOND RD btwn BERKLEY AVE & ROOSEVELT AVE	2015	4/16/2015 0:00	1:07 AM 03 - P.D. only	99 - Other	01 - Clear	07 - Dark	01 - Dry	10 - No control		0
56630	BYRON AVE @ ROOSEVELT AVE	2015	3/22/2015 0:00	3:47 PM 03 - P.D. only	02 - Angle	01 - Clear	01 - Daylight	01 - Dry	01 - Traffic signal	01 - Functioning	0
56804	DANFORTH AVE btwn ROOSEVELT AVE & CHURCHILL AVE N	2015	3/24/2015 0:00	4:50 PM 03 - P.D. only	99 - Other	01 - Clear	01 - Daylight	01 - Dry	10 - No control		0
57502	RICHMOND RD btwn ROOSEVELT AVE & WINSTON AVE	2015	8/4/2015 0:00	6:30 PM 03 - P.D. only	03 - Rear end	01 - Clear	01 - Daylight	01 - Dry	10 - No control		0
57820	CHURCHILL AVE @ RICHMOND RD	2015	7/24/2015 0:00	7:25 PM 03 - P.D. only	03 - Rear end	01 - Clear	01 - Daylight	01 - Dry	01 - Traffic signal	01 - Functioning	0
58550	BYRON AVE @ ROOSEVELT AVE	2014	1/18/2014 0:00	4:34 PM 03 - P.D. only	02 - Angle	01 - Clear	01 - Daylight	02 - Wet	01 - Traffic signal	01 - Functioning	0
59141	BYRON AVE @ ROOSEVELT AVE	2014	2/26/2014 0:00	7:44 PM 02 - Non-fatal injury	02 - Angle	01 - Clear	01 - Daylight	01 - Dry	01 - Traffic signal	01 - Functioning	0
59142	CHURCHILL AVE @ RICHMOND RD	2014	2/26/2014 0:00	7:52 PM 03 - P.D. only	02 - Angle	01 - Clear	01 - Daylight	01 - Dry	01 - Traffic signal	01 - Functioning	0
59603	BYRON AVE @ ROOSEVELT AVE	2014	3/6/2014 0:00	9:43 PM 03 - P.D. only	02 - Angle	01 - Clear	01 - Daylight	01 - Dry	01 - Traffic signal	01 - Functioning	0
59859	RICHMOND RD btwn WINSTON AVE & CHURCHILL AVE N	2014	3/3/2014 0:00	4:00 PM 03 - P.D. only	04 - Sideswipe	01 - Clear	01 - Daylight	01 - Dry	10 - No control		0
60525	RICHMOND RD btwn WINSTON AVE & CHURCHILL AVE N	2014	2/6/2014 0:00	7:44 PM 03 - P.D. only	03 - Rear end	01 - Clear	01 - Daylight	01 - Dry	10 - No control		0
60907	RICHMOND RD btwn ROOSEVELT AVE & ROOSEVELT AVE	2014	2/8/2014 0:00	11:48 PM 03 - P.D. only	06 - SMV unattended vehicle	01 - Clear	07 - Dark	02 - Wet	10 - No control		0
61039	RICHMOND RD btwn WINSTON AVE & CHURCHILL AVE N	2014	4/9/2014 0:00	9:30 PM 03 - P.D. only	06 - SMV unattended vehicle	01 - Clear	01 - Daylight	01 - Dry	10 - No control		0
61395	CHURCHILL AVE @ RICHMOND RD	2014	5/1/2014 0:00	12:54 AM 02 - Non-fatal injury	07 - SMV other	01 - Clear	01 - Daylight	01 - Dry	01 - Traffic signal	01 - Functioning	1
62481	BERKELEY AVE @ RICHMOND RD	2014	3/27/2014 0:00	7:21 PM 03 - P.D. only	02 - Angle	01 - Clear	01 - Daylight	02 - Wet	02 - Stop sign	01 - Functioning	0
62603	RICHMOND RD btwn WINSTON AVE & CHURCHILL AVE N	2014	4/5/2014 0:00	6:40 PM 03 - P.D. only	03 - Rear end	01 - Clear	01 - Daylight	01 - Dry	10 - No control		0
62656	RICHMOND RD btwn WINSTON AVE & CHURCHILL AVE N	2014	3/28/2014 0:00	10:16 PM 03 - P.D. only	06 - SMV unattended vehicle	02 - Rain	01 - Daylight	02 - Wet	10 - No control		0
63298	RICHMOND RD btwn GOLDEN AVE & BERKLEY AVE	2014	7/24/2014 0:00	5:00 AM 03 - P.D. only	06 - SMV unattended vehicle	01 - Clear	00 - Unknown	01 - Dry	10 - No control		0
63344	BYRON AVE @ CHURCHILL AVE	2014	7/25/2014 0:00	8:29 PM 03 - P.D. only	99 - Other	01 - Clear	01 - Daylight	08 - Loose sand or	01 - Traffic signal	01 - Functioning	0
64955	BYRON AVE @ ROOSEVELT AVE	2014	9/13/2014 0:00	6:00 PM 02 - Non-fatal injury	02 - Angle	02 - Rain	01 - Daylight	02 - Wet	01 - Traffic signal	01 - Functioning	0
65127	RICHMOND RD btwn GOLDEN AVE & BERKLEY AVE	2014	7/2/2014 0:00	11:47 PM 03 - P.D. only	04 - Sideswipe	01 - Clear	01 - Daylight	01 - Dry	10 - No control		0
65432	ROOSEVELT AVE @ RICHMOND RD	2014	6/29/2014 0:00	3:07 PM 02 - Non-fatal injury	07 - SMV other	01 - Clear	01 - Daylight	01 - Dry	01 - Traffic signal	01 - Functioning	1
65696	RICHMOND RD btwn WINSTON AVE & CHURCHILL AVE N	2014	7/8/2014 0:00	6:15 PM 02 - Non-fatal injury	03 - Rear end	01 - Clear	01 - Daylight	01 - Dry	10 - No control		0
65864	BYRON AVE @ ROOSEVELT AVE	2014	6/24/2014 0:00	3:58 PM 03 - P.D. only	02 - Angle	02 - Rain	01 - Daylight	02 - Wet	01 - Traffic signal	01 - Functioning	0
65983	BERKELEY AVE @ RICHMOND RD	2014	6/27/2014 0:00	6:17 PM 03 - P.D. only	04 - Sideswipe	01 - Clear	01 - Daylight	01 - Dry	02 - Stop sign	01 - Functioning	0
66202	BYRON AVE @ CHURCHILL AVE	2014	10/2/2014 0:00	3:57 PM 03 - P.D. only	03 - Rear end	01 - Clear	01 - Daylight	01 - Dry	01 - Traffic signal	01 - Functioning	0
66235	BYRON AVE @ ROOSEVELT AVE	2014	9/17/2014 0:00	8:24 PM 03 - P.D. only	02 - Angle	01 - Clear	01 - Daylight	01 - Dry	01 - Traffic signal	01 - Functioning	0
66459	BYRON AVE @ ROOSEVELT AVE	2014	10/9/2014 0:00	5:31 PM 02 - Non-fatal injury	02 - Angle	01 - Clear	01 - Daylight	02 - Wet	01 - Traffic signal	01 - Functioning	0
66835	CHURCHILL AVE @ RICHMOND RD	2014	10/6/2014 0:00	5:46 AM 03 - P.D. only	02 - Angle	01 - Clear	07 - Dark	01 - Dry	01 - Traffic signal	01 - Functioning	0
69117	CHURCHILL AVE @ RICHMOND RD	2014	10/20/2014 0:00	2:40 PM 03 - P.D. only	04 - Sideswipe	01 - Clear	01 - Daylight	01 - Dry	01 - Traffic signal	01 - Functioning	0
69575	BERKELEY AVE @ RICHMOND RD	2014	10/16/2014 0:00	11:40 PM 02 - Non-fatal injury	03 - Rear end	02 - Rain	07 - Dark	02 - Wet	02 - Stop sign	00 - Unknown	0
69579	RICHMOND RD btwn GOLDEN AVE & BERKLEY AVE	2014	10/16/2014 0:00	11:41 PM 03 - P.D. only	04 - Sideswipe	02 - Rain	07 - Dark	02 - Wet	10 - No control		0
69850	RICHMOND RD btwn BERKLEY AVE & ROOSEVELT AVE	2014	11/26/2014 0:00	12:03 AM 03 - P.D. only	99 - Other	01 - Clear	07 - Dark	01 - Dry	10 - No control		0
69867	RICHMOND RD btwn ROOSEVELT AVE & ROOSEVELT AVE	2014	11/27/2014 0:00	3:09 PM 02 - Non-fatal injury	05 - Turning movement	01 - Clear	01 - Daylight	01 - Dry	10 - No control		0
70036	RICHMOND RD btwn BERKLEY AVE & ROOSEVELT AVE	2014	11/25/2014 0:00	6:50 PM 03 - P.D. only	06 - SMV unattended vehicle	01 - Clear	01 - Daylight	01 - Dry	10 - No control		0
70161	RICHMOND RD btwn WINSTON AVE & CHURCHILL AVE N	2014	11/16/2014 0:00	6:18 AM 03 - P.D. only	06 - SMV unattended vehicle	01 - Clear	07 - Dark	01 - Dry	10 - No control		0
70532	CHURCHILL AVE N btwn RICHMOND RD & DANFORTH AVE	2014	11/21/2014 0:00	9:22 PM 02 - Non-fatal injury	03 - Rear end	01 - Clear	05 - Dusk	01 - Dry	10 - No control		0
71347	BYRON AVE btwn ROOSEVELT AVE & CHURCHILL AVE N	2014	12/17/2014 0:00	2:30 PM 03 - P.D. only	06 - SMV unattended vehicle	01 - Clear	01 - Daylight	01 - Dry	10 - No control		0
71448	RICHMOND RD btwn WINSTON AVE & CHURCHILL AVE N	2014	12/12/2014 0:00	7:20 PM 03 - P.D. only	05 - Turning movement	01 - Clear	01 - Daylight	01 - Dry	10 - No control		0
71547	RICHMOND RD btwn GOLDEN AVE & BERKLEY AVE	2014	12/10/2014 0:00	2:26 AM 03 - P.D. only	06 - SMV unattended vehicle	03 - Snow	07 - Dark	03 - Loose snow	10 - No control		0
71624	RICHMOND RD btwn WINSTON AVE & CHURCHILL AVE N	2014	12/21/2014 0:00	9:07 PM 03 - P.D. only	04 - Sideswipe	01 - Clear	05 - Dusk	01 - Dry	10 - No control		0
72723	CHURCHILL AVE @ RICHMOND RD	2014	6/13/2014 0:00	11:47 AM 03 - P.D. only	02 - Angle	02 - Rain	01 - Daylight	02 - Wet	01 - Traffic signal	01 - Functioning	0

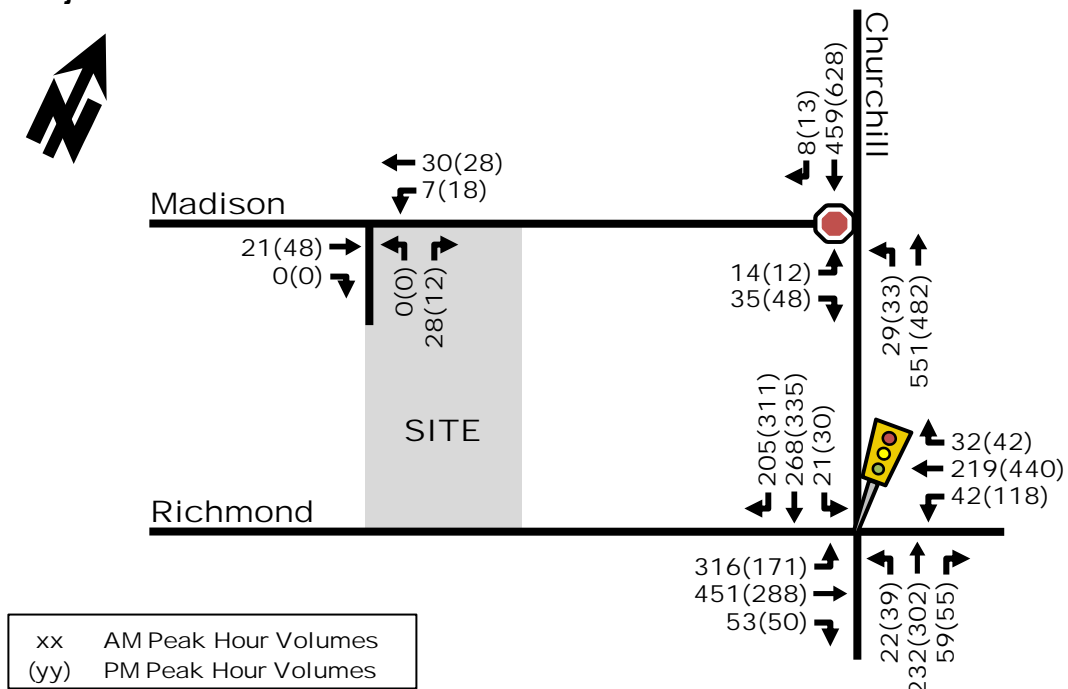
# C

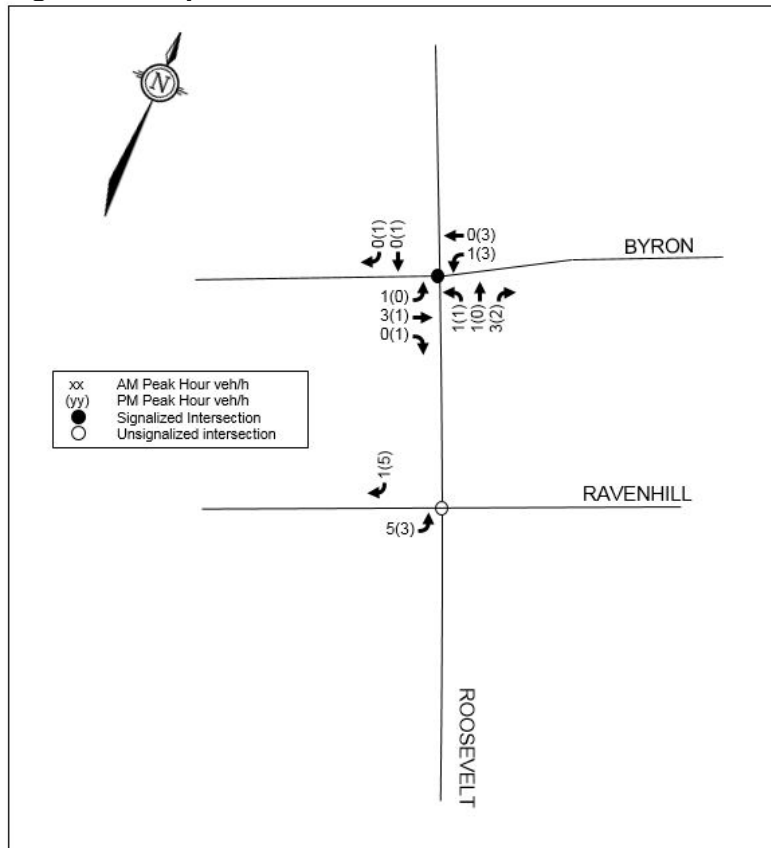
Appendix C - Excerpts from 371 Richmond Road, 386 Richmond Road, 319 - 327 Richmond Road and Byron-Ravenhill Complex

**Figure 4: 'New' Site-Generated Traffic Volumes**

#### 4. Future Traffic Operations

For the purpose of this study, the total projected traffic volumes were derived by superimposing 'new' site-generated traffic (Figure 4) onto existing volumes (Figure 3). As the amount of site traffic generation does not require any traffic analysis based on the City guidelines, we have not accounted for any potential background growth. The resulting total projected traffic volumes used in the subsequent analysis are illustrated as Figure 5.

**Figure 5: Projected Traffic Volumes**

**Figure 6: Proposed Site Generated Traffic Volumes**

## 4.2 Background Traffic

Background growth rates were not reviewed due to the low volume of site generated traffic.

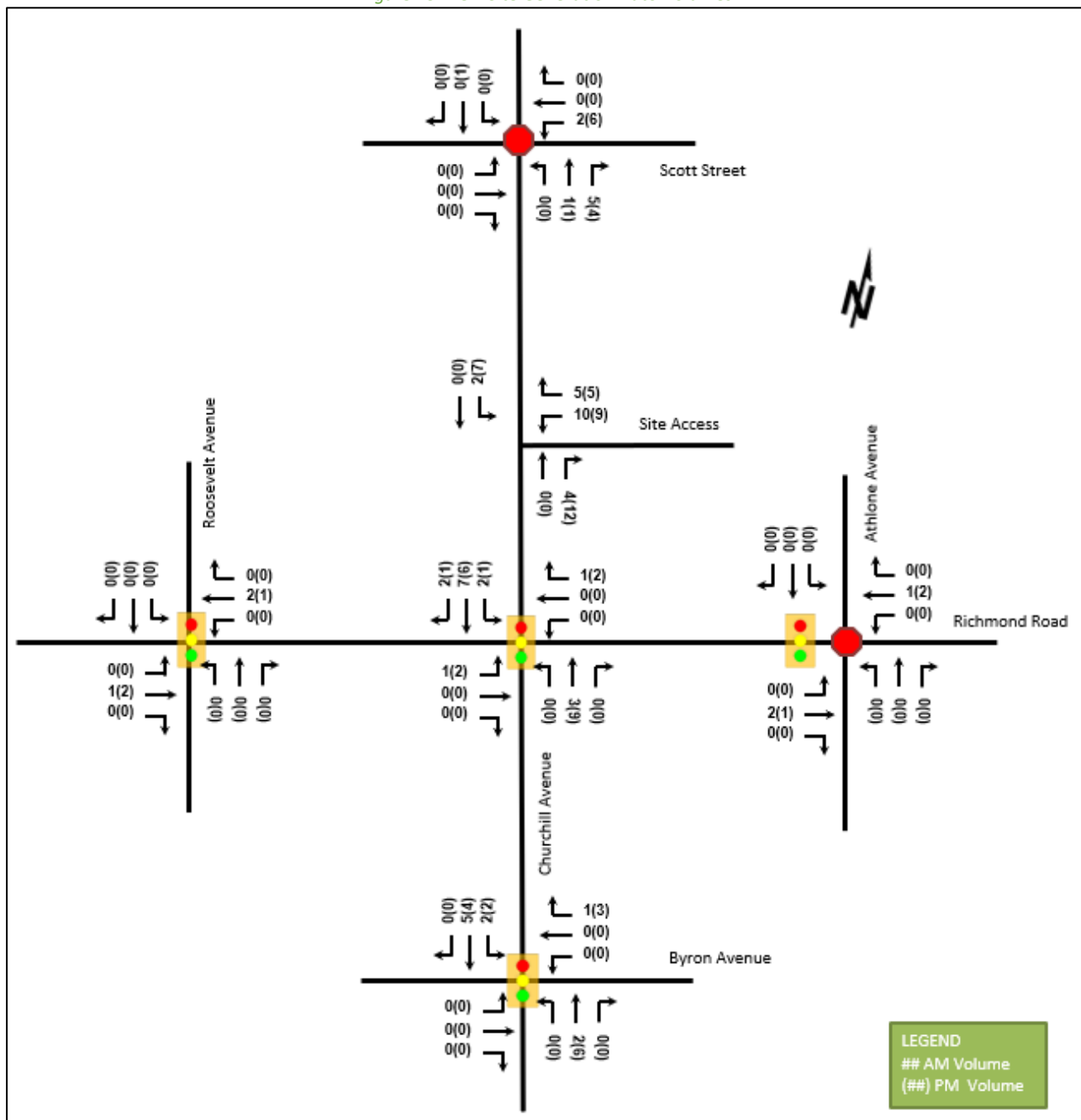
### 4.2.1 Other Area Development

It is our understanding that there are no other developments under construction, approved, or in the approval process within the study area.

The total existing, approved and proposed site generated traffic volumes are shown in **Figure 7** for the weekday a.m. and p.m. peak hours.



Figure 13: New Site Generation Auto Volumes



## 6 Background Network Travel Demands

### 6.1 Transportation Network Plans

The transportation network plans were discussed in Section 2.3.1. Both TOD policies and the opening of the Westboro LRT station and Dominion LRT station have been accounted for within the modal share assumptions. No road improvements are noted for this area with the exception of future road sewer, and water work along Winona Avenue.

Table 3: Mode Share Targets for the Development

Travel Mode	Mode Share Target	Rationale
Auto Driver	0%	See rationale below
Auto Passenger	0%	See rationale below
Transit	75%	See rationale below
Walking	10%	See rationale below
Cycling	15%	See rationale below

The modes shares presented in Table 3 have been estimated based on local knowledge, the proposed development context, as well as the proximity to the future Dominion LRT Station (approximately 400m north of the subject site).

Using the mode share and total person trips, both documented above, the person trips by mode were estimated. The person trips shown in Table 2 for the proposed site were reduced by modal share values for the 2019 scenario, with the total site-generated traffic summarized in Table 4.

Table 4: Total Site Trip Generation

Travel Mode	Mode Share	AM Peak (Person Trips/hr)			PM Peak (Person Trips/hr)		
		In	Out	Total	In	Out	Total
Auto Driver	0%	0	0	0	0	0	0
Auto Passenger	0%	0	0	0	0	0	0
Transit	75%	6	9	15	10	13	23
Non-motorized	25%	1	3	4	3	4	7
Total Person Trips	100%	7	12	19	13	17	30
Total 'New' Auto Trips		0	0	0	0	0	0

As shown in Table 4, no 'new' two-way vehicle trips are anticipated as a result of the proposed development.

## 5. DEVELOPMENT DESIGN

### 5.1. DESIGN FOR SUSTAINABLE MODES

#### 5.1.1. BICYCLE PARKING

The proposed development includes 10 bicycle parking spaces including eight interior spaces and two exterior spaces.

#### 5.1.2. PEDESTRIAN ROUTES AND FACILITIES

The building will have at-grade accesses directly on to Richmond Road providing access directly to the sidewalk. No internal walkways or site circulation is required.

#### 5.1.3. LOCATION OF TRANSIT FACILITIES

As documented in Figure 5 below, the subject site is approximately 530m walking distance from the Dominion Future LRT Station. Additionally, there are eastbound and westbound transit stops located 80m and 60m to the east of the site, respectively.

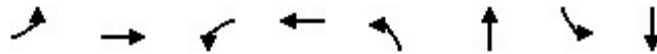
# D

## Appendix D – Existing and Background Conditions Output Data

# Conditions

## 1: Churchill Avenue North & Byron Avenue

2020 Existing AM



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	57	170	51	122	26	326	34	309
Future Volume (vph)	57	170	51	122	26	326	34	309
Lane Group Flow (vph)	0	315	0	245	29	438	38	375
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		4		8		2		6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	2	2	6	6
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	30.6	30.6	30.6	30.6	26.4	26.4	26.4	26.4
Total Split (s)	38.0	38.0	38.0	38.0	42.0	42.0	42.0	42.0
Total Split (%)	47.5%	47.5%	47.5%	47.5%	52.5%	52.5%	52.5%	52.5%
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	2.3	2.3	2.3	2.3	2.1	2.1	2.1	2.1
Lost Time Adjust (s)		-1.6		-1.6	-1.4	-1.4	-1.4	-1.4
Total Lost Time (s)		4.0		4.0	4.0	4.0	4.0	4.0
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	C-Max	C-Max	C-Max	C-Max
Act Effct Green (s)		22.8		22.8	49.2	49.2	49.2	49.2
Actuated g/C Ratio		0.28		0.28	0.62	0.62	0.62	0.62
v/c Ratio		0.72		0.60	0.06	0.42	0.08	0.35
Control Delay		32.9		27.6	8.7	10.4	3.4	3.6
Queue Delay		0.0		0.0	0.0	0.0	0.0	0.3
Total Delay		32.9		27.6	8.7	10.4	3.4	3.8
LOS		C		C	A	B	A	A
Approach Delay		32.9		27.6		10.3		3.8
Approach LOS		C		C		B		A
Queue Length 50th (m)		42.2		30.6	1.7	31.0	1.1	10.3
Queue Length 95th (m)		60.9		46.5	6.4	65.6	m2.7	18.9
Internal Link Dist (m)		244.6		113.6		126.7		100.0
Turn Bay Length (m)					30.0		30.0	
Base Capacity (vph)		642		600	513	1052	468	1068
Starvation Cap Reductn		0		0	0	0	0	246
Spillback Cap Reductn		0		0	0	0	0	0
Storage Cap Reductn		0		0	0	0	0	0
Reduced v/c Ratio		0.49		0.41	0.06	0.42	0.08	0.46

### Intersection Summary

Cycle Length: 80

Actuated Cycle Length: 80

Offset: 74 (93%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green

Natural Cycle: 60

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.72

Intersection Signal Delay: 16.3

Intersection LOS: B

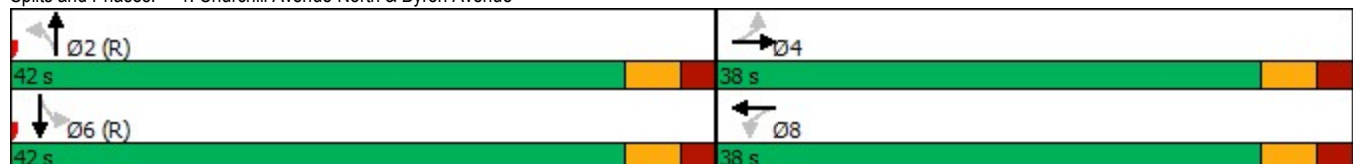
Intersection Capacity Utilization 57.8%

ICU Level of Service B

Analysis Period (min) 15

m Volume for 95th percentile queue is metered by upstream signal.



















Splits and Phases: 1: Churchill Avenue North & Byron Avenue



Conditions

1: Churchill Avenue North & Byron Avenue

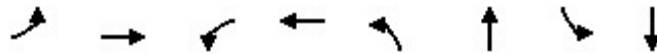
2020 Existing AM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	57	170	57	51	122	47	26	326	68	34	309	29
Future Volume (vph)	57	170	57	51	122	47	26	326	68	34	309	29
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)		4.0			4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes		0.99			0.99		1.00	0.99		1.00	1.00	
Flpb, ped/bikes		1.00			1.00		0.96	1.00		0.96	1.00	
Frt		0.97			0.97		1.00	0.97		1.00	0.99	
Flt Protected		0.99			0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1683			1682		1603	1702		1612	1734	
Flt Permitted		0.87			0.81		0.49	1.00		0.45	1.00	
Satd. Flow (perm)		1484			1386		833	1702		759	1734	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	63	189	63	57	136	52	29	362	76	38	343	32
RTOR Reduction (vph)	0	14	0	0	15	0	0	7	0	0	3	0
Lane Group Flow (vph)	0	301	0	0	230	0	29	431	0	38	372	0
Confl. Peds. (#/hr)	13		13	13		13	43		18	43		18
Confl. Bikes (#/hr)			1						7			
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		21.2			21.2		47.8	47.8		47.8	47.8	
Effective Green, g (s)		22.8			22.8		49.2	49.2		49.2	49.2	
Actuated g/C Ratio		0.29			0.29		0.62	0.62		0.62	0.62	
Clearance Time (s)		5.6			5.6		5.4	5.4		5.4	5.4	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		422			395		512	1046		466	1066	
v/s Ratio Prot								c0.25				0.21
v/s Ratio Perm		c0.20			0.17		0.03			0.05		
v/c Ratio		0.71			0.58		0.06	0.41		0.08	0.35	
Uniform Delay, d1		25.7			24.5		6.1	7.9		6.2	7.5	
Progression Factor		1.00			1.00		1.00	1.00		0.36	0.31	
Incremental Delay, d2		5.6			2.2		0.2	1.2		0.3	0.8	
Delay (s)		31.3			26.7		6.4	9.1		2.6	3.1	
Level of Service		C			C		A	A		A	A	
Approach Delay (s)		31.3			26.7			9.0			3.1	
Approach LOS		C			C			A			A	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			15.2			HCM 2000 Level of Service				B		
HCM 2000 Volume to Capacity ratio			0.51									
Actuated Cycle Length (s)			80.0			Sum of lost time (s)			8.0			
Intersection Capacity Utilization			57.8%			ICU Level of Service			B			
Analysis Period (min)			15									
c Critical Lane Group												

# Conditions

## 2: Roosevelt Avenue & Byron Avenue

2020 Existing AM



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	35	228	13	145	3	29	26	19
Future Volume (vph)	35	228	13	145	3	29	26	19
Lane Group Flow (vph)	0	301	0	206	0	51	0	63
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		2		6		4		8
Permitted Phases	2		6		4		8	
Detector Phase	2	2	6	6	4	4	8	8
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	22.5	22.5	22.5	22.5	20.0	20.0	20.0	20.0
Total Split (s)	50.0	50.0	50.0	50.0	20.0	20.0	20.0	20.0
Total Split (%)	71.4%	71.4%	71.4%	71.4%	28.6%	28.6%	28.6%	28.6%
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	2.2	2.2	2.2	2.2	1.7	1.7	1.7	1.7
Lost Time Adjust (s)		-1.5		-1.5		-1.0		-1.0
Total Lost Time (s)		4.0		4.0		4.0		4.0
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	Max	Max	Max	Max	None	None	None	None
Act Effct Green (s)		56.3		56.3		13.0		13.0
Actuated g/C Ratio		0.81		0.81		0.19		0.19
v/c Ratio		0.22		0.15		0.16		0.23
Control Delay		3.9		3.3		18.8		21.9
Queue Delay		0.0		0.0		0.0		0.0
Total Delay		3.9		3.3		18.8		21.9
LOS		A		A		B		C
Approach Delay		3.9		3.3		18.8		21.9
Approach LOS		A		A		B		C
Queue Length 50th (m)		10.4		5.8		4.5		6.6
Queue Length 95th (m)		24.8		15.3		12.1		15.1
Internal Link Dist (m)		50.9		244.6		129.2		56.5
Turn Bay Length (m)								
Base Capacity (vph)		1353		1369		389		335
Starvation Cap Reductn		0		0		0		0
Spillback Cap Reductn		0		0		0		0
Storage Cap Reductn		0		0		0		0
Reduced v/c Ratio		0.22		0.15		0.13		0.19

### Intersection Summary

Cycle Length: 70

Actuated Cycle Length: 69.2

Natural Cycle: 45

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.23

Intersection Signal Delay: 6.8

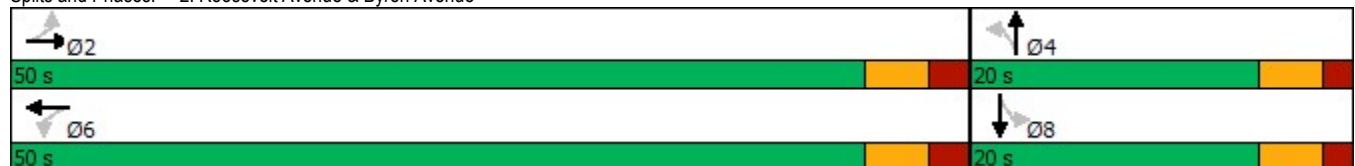
Intersection Capacity Utilization 42.8%

Analysis Period (min) 15

Intersection LOS: A

ICU Level of Service A

















Splits and Phases: 2: Roosevelt Avenue & Byron Avenue



# Conditions

## 2: Roosevelt Avenue & Byron Avenue

2020 Existing AM

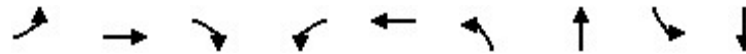
												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	35	228	8	13	145	28	3	29	14	26	19	12
Future Volume (vph)	35	228	8	13	145	28	3	29	14	26	19	12
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)		4.0			4.0			4.0			4.0	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frpb, ped/bikes		1.00			0.99			0.98			0.98	
Flpb, ped/bikes		1.00			1.00			1.00			0.99	
Frt		1.00			0.98			0.96			0.97	
Flt Protected		0.99			1.00			1.00			0.98	
Satd. Flow (prot)		1741			1711			1652			1621	
Flt Permitted		0.95			0.98			0.98			0.85	
Satd. Flow (perm)		1663			1677			1626			1403	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	39	253	9	14	161	31	3	32	16	29	21	13
RTOR Reduction (vph)	0	1	0	0	6	0	0	14	0	0	11	0
Lane Group Flow (vph)	0	300	0	0	200	0	0	37	0	0	52	0
Confl. Peds. (#/hr)	8		13	13		8	33		13	13		33
Confl. Bikes (#/hr)			2			1						1
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2			6			4			8		
Actuated Green, G (s)		53.0			53.0			7.7			7.7	
Effective Green, g (s)		54.5			54.5			8.7			8.7	
Actuated g/C Ratio		0.77			0.77			0.12			0.12	
Clearance Time (s)		5.5			5.5			5.0			5.0	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		1272			1283			198			171	
v/s Ratio Prot												
v/s Ratio Perm		c0.18			0.12			0.02			c0.04	
v/c Ratio		0.24			0.16			0.19			0.30	
Uniform Delay, d1		2.4			2.2			28.1			28.5	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		0.4			0.3			0.5			1.0	
Delay (s)		2.8			2.5			28.5			29.5	
Level of Service		A			A			C			C	
Approach Delay (s)		2.8			2.5			28.5			29.5	
Approach LOS		A			A			C			C	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			7.5			HCM 2000 Level of Service			A			
HCM 2000 Volume to Capacity ratio			0.24									
Actuated Cycle Length (s)			71.2			Sum of lost time (s)			8.0			
Intersection Capacity Utilization			42.8%			ICU Level of Service			A			
Analysis Period (min)			15									
c Critical Lane Group												



# Conditions

## 3: Golden Avenue & Richmond Rd

2020 Existing AM



Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations		↑	↗		↖		↖		↗
Traffic Volume (vph)	2	468	28	46	264	49	2	1	4
Future Volume (vph)	2	468	28	46	264	49	2	1	4
Lane Group Flow (vph)	0	522	31	0	347	0	133	0	5
Turn Type	Perm	NA	Perm	Perm	NA	Perm	NA	Perm	NA
Protected Phases		2			6		4		8
Permitted Phases	2		2	6		4		8	
Detector Phase	2	2	2	6	6	4	4	8	8
Switch Phase									
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	28.8	28.8	28.8	28.8	28.8	28.6	28.6	28.6	28.6
Total Split (s)	35.0	35.0	35.0	35.0	35.0	29.0	29.0	29.0	29.0
Total Split (%)	54.7%	54.7%	54.7%	54.7%	54.7%	45.3%	45.3%	45.3%	45.3%
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	2.5	2.5	2.5	2.5	2.5	2.3	2.3	2.3	2.3
Lost Time Adjust (s)		-1.8	-1.8		-1.8		-1.6		-1.6
Total Lost Time (s)		4.0	4.0		4.0		4.0		4.0
Lead/Lag									
Lead-Lag Optimize?									
Recall Mode	C-Max	C-Max	C-Max	C-Max	C-Max	None	None	None	None
Act Effct Green (s)		40.5	40.5		40.5		19.4		19.4
Actuated g/C Ratio		0.63	0.63		0.63		0.30		0.30
v/c Ratio		0.47	0.04		0.35		0.29		0.01
Control Delay		11.5	2.5		10.2		8.5		12.2
Queue Delay		0.0	0.0		0.0		0.0		0.0
Total Delay		11.5	2.5		10.2		8.5		12.2
LOS		B	A		B		A		B
Approach Delay		11.0			10.2		8.5		12.3
Approach LOS		B			B		A		B
Queue Length 50th (m)		43.9	0.0		26.3		4.3		0.4
Queue Length 95th (m)		72.8	2.8		46.0		14.6		2.3
Internal Link Dist (m)		37.9			130.2		72.7		29.6
Turn Bay Length (m)									
Base Capacity (vph)		1116	883		986		570		654
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		0.47	0.04		0.35		0.23		0.01

### Intersection Summary

Cycle Length: 64

Actuated Cycle Length: 64

Offset: 21 (33%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green

Natural Cycle: 60

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.47

Intersection Signal Delay: 10.4

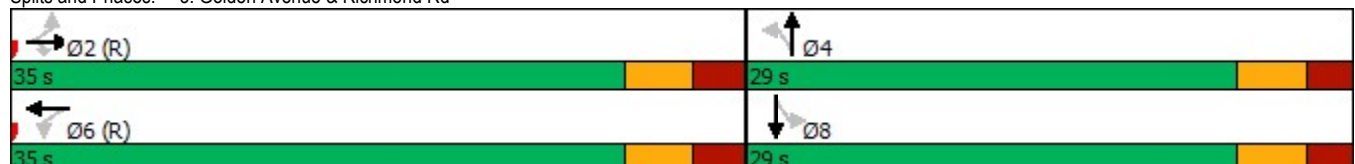
Intersection LOS: B

Intersection Capacity Utilization 73.9%

ICU Level of Service D

Analysis Period (min) 15


















Splits and Phases: 3: Golden Avenue & Richmond Rd



# Conditions

## 3: Golden Avenue & Richmond Rd

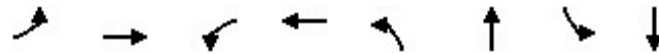
2020 Existing AM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	2	468	28	46	264	3	49	2	69	1	4	0
Future Volume (vph)	2	468	28	46	264	3	49	2	69	1	4	0
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)		4.0	4.0		4.0			4.0			4.0	
Lane Util. Factor		1.00	1.00		1.00			1.00			1.00	
Frpb, ped/bikes		1.00	0.91		1.00			0.95			1.00	
Flpb, ped/bikes		1.00	1.00		1.00			0.98			0.99	
Frt		1.00	0.85		1.00			0.92			1.00	
Flt Protected		1.00	1.00		0.99			0.98			0.99	
Satd. Flow (prot)		1764	1371		1741			1479			1729	
Flt Permitted		1.00	1.00		0.89			0.89			0.96	
Satd. Flow (perm)		1763	1371		1557			1340			1676	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	2	520	31	51	293	3	54	2	77	1	4	0
RTOR Reduction (vph)	0	0	12	0	0	0	0	56	0	0	0	0
Lane Group Flow (vph)	0	522	19	0	347	0	0	77	0	0	5	0
Confl. Peds. (#/hr)	62		45	45		62	33		49	49		33
Confl. Bikes (#/hr)			8			8			6			20
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2		2	6			4			8		
Actuated Green, G (s)		36.8	36.8		36.8			15.8			15.8	
Effective Green, g (s)		38.6	38.6		38.6			17.4			17.4	
Actuated g/C Ratio		0.60	0.60		0.60			0.27			0.27	
Clearance Time (s)		5.8	5.8		5.8			5.6			5.6	
Vehicle Extension (s)		3.0	3.0		3.0			3.0			3.0	
Lane Grp Cap (vph)		1063	826		939			364			455	
v/s Ratio Prot												
v/s Ratio Perm		c0.30	0.01		0.22			c0.06			0.00	
v/c Ratio		0.49	0.02		0.37			0.21			0.01	
Uniform Delay, d1		7.2	5.1		6.5			18.0			17.0	
Progression Factor		1.00	1.00		1.00			1.00			1.00	
Incremental Delay, d2		1.6	0.1		1.1			0.3			0.0	
Delay (s)		8.8	5.2		7.6			18.3			17.0	
Level of Service		A	A		A			B			B	
Approach Delay (s)		8.6			7.6			18.3			17.0	
Approach LOS		A			A			B			B	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			9.5								A	
HCM 2000 Volume to Capacity ratio			0.40									
Actuated Cycle Length (s)			64.0						8.0			
Intersection Capacity Utilization			73.9%								D	
Analysis Period (min)			15									
c Critical Lane Group												

# Conditions

## 4: Roosevelt Avenue & Richmond Rd

2020 Existing AM



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	3	633	14	290	26	10	32	12
Future Volume (vph)	3	633	14	290	26	10	32	12
Lane Group Flow (vph)	0	717	0	367	0	76	0	57
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		2		6		4		8
Permitted Phases	2		6		4		8	
Detector Phase	2	2	6	6	4	4	8	8
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	33.4	33.4	33.4	33.4	24.6	24.6	24.6	24.6
Total Split (s)	45.0	45.0	45.0	45.0	25.0	25.0	25.0	25.0
Total Split (%)	64.3%	64.3%	64.3%	64.3%	35.7%	35.7%	35.7%	35.7%
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	2.1	2.1	2.1	2.1	2.3	2.3	2.3	2.3
Lost Time Adjust (s)		-1.4		-1.4		-1.6		-1.6
Total Lost Time (s)		4.0		4.0		4.0		4.0
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	C-Max	C-Max	C-Max	C-Max	None	None	None	None
Act Effct Green (s)		48.9		48.9		17.0		17.0
Actuated g/C Ratio		0.70		0.70		0.24		0.24
v/c Ratio		0.58		0.31		0.22		0.18
Control Delay		10.7		7.0		13.2		18.3
Queue Delay		0.3		0.0		0.0		0.0
Total Delay		10.9		7.0		13.2		18.3
LOS		B		A		B		B
Approach Delay		10.9		7.0		13.2		18.3
Approach LOS		B		A		B		B
Queue Length 50th (m)		60.7		22.8		4.0		4.9
Queue Length 95th (m)		99.2		38.4		13.3		13.1
Internal Link Dist (m)		130.2		276.4		56.5		123.0
Turn Bay Length (m)								
Base Capacity (vph)		1227		1170		425		398
Starvation Cap Reductn		117		0		0		0
Spillback Cap Reductn		0		0		0		0
Storage Cap Reductn		0		0		0		0
Reduced v/c Ratio		0.65		0.31		0.18		0.14

### Intersection Summary

Cycle Length: 70

Actuated Cycle Length: 70

Offset: 27 (39%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green

Natural Cycle: 60

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.58

Intersection Signal Delay: 10.2

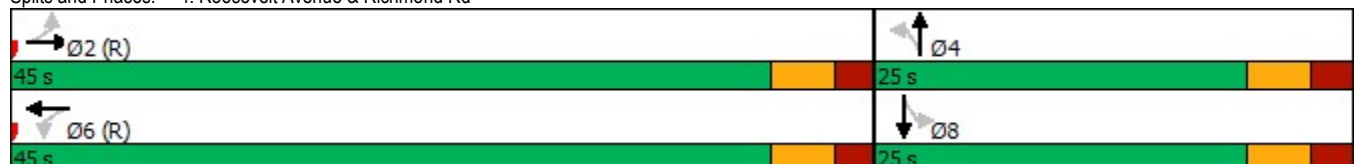
Intersection LOS: B

Intersection Capacity Utilization 58.6%

ICU Level of Service B

Analysis Period (min) 15

















Splits and Phases: 4: Roosevelt Avenue & Richmond Rd



# Conditions

## 4: Roosevelt Avenue & Richmond Rd

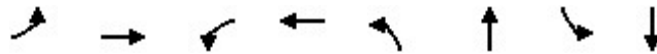
2020 Existing AM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	3	633	10	14	290	26	26	10	32	32	12	7
Future Volume (vph)	3	633	10	14	290	26	26	10	32	32	12	7
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)		4.0			4.0			4.0			4.0	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frpb, ped/bikes		1.00			0.99			0.95			0.98	
Flpb, ped/bikes		1.00			1.00			0.96			0.96	
Frt		1.00			0.99			0.94			0.98	
Flt Protected		1.00			1.00			0.98			0.97	
Satd. Flow (prot)		1757			1723			1480			1578	
Flt Permitted		1.00			0.97			0.88			0.81	
Satd. Flow (perm)		1756			1670			1333			1312	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	3	703	11	16	322	29	29	11	36	36	13	8
RTOR Reduction (vph)	0	1	0	0	4	0	0	28	0	0	6	0
Lane Group Flow (vph)	0	716	0	0	363	0	0	48	0	0	51	0
Confl. Peds. (#/hr)	74		69	69		74	65		40	40		65
Confl. Bikes (#/hr)			7			4			4			4
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2			6			4			8		
Actuated Green, G (s)		45.6			45.6			13.4			13.4	
Effective Green, g (s)		47.0			47.0			15.0			15.0	
Actuated g/C Ratio		0.67			0.67			0.21			0.21	
Clearance Time (s)		5.4			5.4			5.6			5.6	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		1179			1121			285			281	
v/s Ratio Prot												
v/s Ratio Perm		c0.41			0.22			0.04			c0.04	
v/c Ratio		0.61			0.32			0.17			0.18	
Uniform Delay, d1		6.4			4.8			22.4			22.5	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		2.3			0.8			0.3			0.3	
Delay (s)		8.7			5.6			22.7			22.8	
Level of Service		A			A			C			C	
Approach Delay (s)		8.7			5.6			22.7			22.8	
Approach LOS		A			A			C			C	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			9.3			HCM 2000 Level of Service			A			
HCM 2000 Volume to Capacity ratio			0.50									
Actuated Cycle Length (s)			70.0			Sum of lost time (s)			8.0			
Intersection Capacity Utilization			58.6%			ICU Level of Service			B			
Analysis Period (min)			15									
c Critical Lane Group												

# Conditions

## 5: Churchill Avenue North & Richmond Rd

2020 Existing AM



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	Ø9	Ø10
Lane Configurations										
Traffic Volume (vph)	262	390	43	183	24	273	21	319		
Future Volume (vph)	262	390	43	183	24	273	21	319		
Lane Group Flow (vph)	291	465	48	224	0	422	0	527		
Turn Type	Prot	NA	Perm	NA	Perm	NA	Perm	NA		
Protected Phases	5	2		6		4		8	9	10
Permitted Phases			6		4		8	8		
Detector Phase	5	2	6	6	4	4	8	8		
Switch Phase										
Minimum Initial (s)	5.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	1.0	1.0
Minimum Split (s)	11.1	26.1	26.1	26.1	26.1	26.1	26.2	26.2	5.0	5.0
Total Split (s)	14.0	40.0	26.0	26.0	30.0	30.0	30.0	30.0	5.0	5.0
Total Split (%)	17.5%	50.0%	32.5%	32.5%	37.5%	37.5%	37.5%	37.5%	6%	6%
Yellow Time (s)	3.3	3.3	3.3	3.3	3.6	3.6	3.6	3.6	2.0	2.0
All-Red Time (s)	2.8	2.8	2.8	2.8	2.6	2.6	2.6	2.6	0.0	0.0
Lost Time Adjust (s)	-2.1	-2.1	-2.1	-2.1		-2.2		-2.2		
Total Lost Time (s)	4.0	4.0	4.0	4.0		4.0		4.0		
Lead/Lag	Lead		Lag	Lag						
Lead-Lag Optimize?			Yes	Yes						
Recall Mode	None	C-Max	C-Max	C-Max	None	None	None	None	None	None
Act Effct Green (s)	25.5	51.5	22.0	22.0		20.5		20.5		
Actuated g/C Ratio	0.32	0.64	0.28	0.28		0.26		0.26		
v/c Ratio	0.55	0.42	0.22	0.47		0.57		0.68		
Control Delay	29.1	9.1	25.5	27.3		20.3		26.6		
Queue Delay	0.0	0.0	0.0	0.0		0.0		0.0		
Total Delay	29.1	9.1	25.5	27.3		20.3		26.6		
LOS	C	A	C	C		C		C		
Approach Delay		16.8		27.0		20.3		26.6		
Approach LOS		B		C		C		C		
Queue Length 50th (m)	38.0	31.3	5.9	28.8		18.3		33.7		
Queue Length 95th (m)	#76.6	62.6	15.0	49.8		28.2		45.4		
Internal Link Dist (m)		276.4		61.0		100.0		41.6		
Turn Bay Length (m)	50.0		45.0							
Base Capacity (vph)	533	1113	223	480		927		969		
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	0.55	0.42	0.22	0.47		0.46		0.54		

### Intersection Summary

Cycle Length: 80

Actuated Cycle Length: 80

Offset: 43 (54%), Referenced to phase 6:WBTL and 2:EBT, Start of Green

Natural Cycle: 80

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.68

Intersection Signal Delay: 21.6

Intersection LOS: C

Intersection Capacity Utilization 73.3%

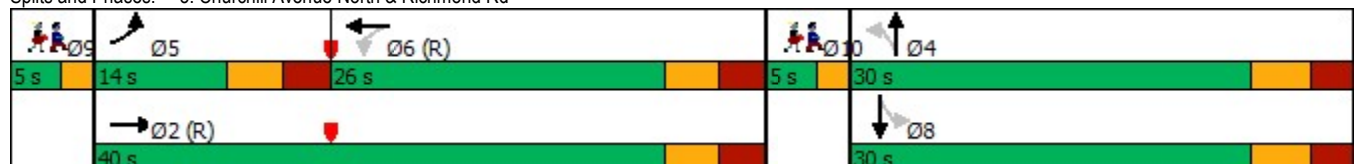
ICU Level of Service D

Analysis Period (min) 15

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

Queue shown is maximum after two cycles.



















### Splits and Phases: 5: Churchill Avenue North & Richmond Rd



Conditions

5: Churchill Avenue North & Richmond Rd

2020 Existing AM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	262	390	29	43	183	19	24	273	83	21	319	135
Future Volume (vph)	262	390	29	43	183	19	24	273	83	21	319	135
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0			4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			0.95			0.95	
Frpb, ped/bikes	1.00	0.99		1.00	1.00			0.97			0.95	
Flpb, ped/bikes	1.00	1.00		0.93	1.00			1.00			1.00	
Frt	1.00	0.99		1.00	0.99			0.97			0.96	
Flt Protected	0.95	1.00		0.95	1.00			1.00			1.00	
Satd. Flow (prot)	1676	1727		1557	1731			3132			3045	
Flt Permitted	0.95	1.00		0.50	1.00			0.88			0.92	
Satd. Flow (perm)	1676	1727		813	1731			2750			2810	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	291	433	32	48	203	21	27	303	92	23	354	150
RTOR Reduction (vph)	0	2	0	0	4	0	0	35	0	0	59	0
Lane Group Flow (vph)	291	463	0	48	220	0	0	387	0	0	468	0
Confl. Peds. (#/hr)	34		68	68		34	45		36	36		45
Confl. Bikes (#/hr)			11			1						8
Turn Type	Prot	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases	5	2			6			4			8	
Permitted Phases				6			4			8	8	
Actuated Green, G (s)	23.4	49.4		19.9	19.9			18.3			18.3	
Effective Green, g (s)	25.5	51.5		22.0	22.0			20.5			20.5	
Actuated g/C Ratio	0.32	0.64		0.28	0.28			0.26			0.26	
Clearance Time (s)	6.1	6.1		6.1	6.1			6.2			6.2	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	534	1111		223	476			704			720	
v/s Ratio Prot	c0.17	c0.27			0.13							
v/s Ratio Perm				0.06				0.14			c0.17	
v/c Ratio	0.54	0.42		0.22	0.46			0.55			0.65	
Uniform Delay, d1	22.5	6.9		22.3	24.1			25.8			26.6	
Progression Factor	1.00	1.00		1.00	1.00			0.78			1.00	
Incremental Delay, d2	1.1	1.2		2.2	3.2			0.8			2.1	
Delay (s)	23.6	8.1		24.5	27.3			21.0			28.7	
Level of Service	C	A		C	C			C			C	
Approach Delay (s)		14.1			26.8			21.0			28.7	
Approach LOS		B			C			C			C	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			21.2		HCM 2000 Level of Service					C		
HCM 2000 Volume to Capacity ratio			0.58									
Actuated Cycle Length (s)			80.0		Sum of lost time (s)					16.0		
Intersection Capacity Utilization			73.3%		ICU Level of Service					D		
Analysis Period (min)			15									
c Critical Lane Group												

# Conditions

## 6: Ped Crossing & Richmond Rd

2020 Existing AM



Lane Group	EBT	WBT	Ø4	Ø8
Lane Configurations	↑↑↑	↑		
Traffic Volume (vph)	790	379		
Future Volume (vph)	790	379		
Lane Group Flow (vph)	878	421		
Turn Type	NA	NA		
Protected Phases	2	6	4	8
Permitted Phases				
Detector Phase	2	6		
Switch Phase				
Minimum Initial (s)	10.0	10.0	10.0	10.0
Minimum Split (s)	15.1	15.1	25.0	25.0
Total Split (s)	40.0	40.0	25.0	25.0
Total Split (%)	61.5%	61.5%	38%	38%
Yellow Time (s)	3.0	3.0	3.0	3.0
All-Red Time (s)	2.1	2.1	1.0	1.0
Lost Time Adjust (s)	-1.1	-1.1		
Total Lost Time (s)	4.0	4.0		
Lead/Lag				
Lead-Lag Optimize?				
Recall Mode	C-Max	C-Max	Ped	Ped
Act Effct Green (s)	36.0	36.0		
Actuated g/C Ratio	0.55	0.55		
v/c Ratio	0.47	0.43		
Control Delay	9.8	10.2		
Queue Delay	0.0	0.0		
Total Delay	9.8	10.2		
LOS	A	B		
Approach Delay	9.8	10.2		
Approach LOS	A	B		
Queue Length 50th (m)	32.0	28.2		
Queue Length 95th (m)	45.1	47.1		
Internal Link Dist (m)	41.2	106.6		
Turn Bay Length (m)				
Base Capacity (vph)	1857	977		
Starvation Cap Reductn	0	0		
Spillback Cap Reductn	0	0		
Storage Cap Reductn	0	0		
Reduced v/c Ratio	0.47	0.43		

### Intersection Summary

Cycle Length: 65	
Actuated Cycle Length: 65	
Offset: 11 (17%), Referenced to phase 2:EBT and 6:WBT, Start of Green	
Natural Cycle: 45	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.47	
Intersection Signal Delay: 10.0	Intersection LOS: A
Intersection Capacity Utilization 26.4%	ICU Level of Service A
Analysis Period (min) 15	
















Splits and Phases: 6: Ped Crossing & Richmond Rd




Conditions

6: Ped Crossing & Richmond Rd

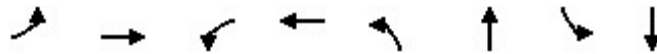
2020 Existing AM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 										
Traffic Volume (vph)	0	790	0	0	379	0	0	0	0	0	0	0
Future Volume (vph)	0	790	0	0	379	0	0	0	0	0	0	0
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)		4.0			4.0							
Lane Util. Factor		0.95			1.00							
Frpb, ped/bikes		1.00			1.00							
Flpb, ped/bikes		1.00			1.00							
Frt		1.00			1.00							
Flt Protected		1.00			1.00							
Satd. Flow (prot)		3353			1765							
Flt Permitted		1.00			1.00							
Satd. Flow (perm)		3353			1765							
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	0	878	0	0	421	0	0	0	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	878	0	0	421	0	0	0	0	0	0	0
Confl. Peds. (#/hr)							14		14	14		14
Confl. Bikes (#/hr)									1			9
Turn Type		NA			NA							
Protected Phases		2			6							
Permitted Phases												
Actuated Green, G (s)		34.9			34.9							
Effective Green, g (s)		36.0			36.0							
Actuated g/C Ratio		0.55			0.55							
Clearance Time (s)		5.1			5.1							
Vehicle Extension (s)		3.0			3.0							
Lane Grp Cap (vph)		1857			977							
v/s Ratio Prot		0.26			0.24							
v/s Ratio Perm												
v/c Ratio		0.47			0.43							
Uniform Delay, d1		8.8			8.5							
Progression Factor		1.00			1.00							
Incremental Delay, d2		0.9			1.4							
Delay (s)		9.6			9.9							
Level of Service		A			A							
Approach Delay (s)		9.6			9.9			0.0			0.0	
Approach LOS		A			A			A			A	
<b>Intersection Summary</b>												
HCM 2000 Control Delay		9.7			HCM 2000 Level of Service			A				
HCM 2000 Volume to Capacity ratio		0.30										
Actuated Cycle Length (s)		65.0			Sum of lost time (s)			8.0				
Intersection Capacity Utilization		26.4%			ICU Level of Service			A				
Analysis Period (min)		15										
c Critical Lane Group												

# Conditions

## 1: Churchill Avenue North & Byron Avenue

2020 Existing PM



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	19	134	110	307	25	303	21	340
Future Volume (vph)	19	134	110	307	25	303	21	340
Lane Group Flow (vph)	0	224	0	513	28	413	23	437
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		4		8		2		6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	2	2	6	6
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	30.6	30.6	30.6	30.6	26.4	26.4	26.4	26.4
Total Split (s)	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0
Total Split (%)	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	2.3	2.3	2.3	2.3	2.1	2.1	2.1	2.1
Lost Time Adjust (s)		-1.6		-1.6	-1.4	-1.4	-1.4	-1.4
Total Lost Time (s)		4.0		4.0	4.0	4.0	4.0	4.0
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	C-Max	C-Max	C-Max	C-Max
Act Effct Green (s)		36.1		36.1	45.9	45.9	45.9	45.9
Actuated g/C Ratio		0.40		0.40	0.51	0.51	0.51	0.51
v/c Ratio		0.34		0.86	0.08	0.47	0.06	0.50
Control Delay		17.2		39.2	14.3	17.0	11.8	15.2
Queue Delay		0.0		0.0	0.0	0.0	0.0	0.9
Total Delay		17.2		39.2	14.3	17.0	11.8	16.1
LOS		B		D	B	B	B	B
Approach Delay		17.2		39.2		16.9		15.9
Approach LOS		B		D		B		B
Queue Length 50th (m)		23.7		79.6	2.6	45.9	1.9	43.6
Queue Length 95th (m)		38.5		116.9	8.1	77.4	m4.0	70.8
Internal Link Dist (m)		244.6		113.6		126.7		100.0
Turn Bay Length (m)					30.0		30.0	
Base Capacity (vph)		735		676	344	877	373	875
Starvation Cap Reductn		0		0	0	0	0	207
Spillback Cap Reductn		0		0	0	0	0	0
Storage Cap Reductn		0		0	0	0	0	0
Reduced v/c Ratio		0.30		0.76	0.08	0.47	0.06	0.65

### Intersection Summary

Cycle Length: 90

Actuated Cycle Length: 90

Offset: 40 (44%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green

Natural Cycle: 60

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.86

Intersection Signal Delay: 23.6

Intersection LOS: C

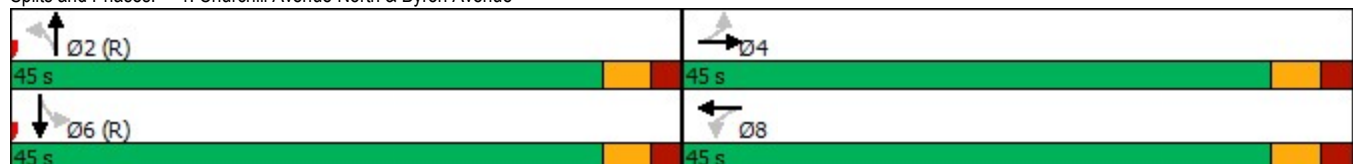
Intersection Capacity Utilization 73.8%

ICU Level of Service D

Analysis Period (min) 15

m Volume for 95th percentile queue is metered by upstream signal.



















Splits and Phases: 1: Churchill Avenue North & Byron Avenue



# Conditions

## 1: Churchill Avenue North & Byron Avenue

2020 Existing PM

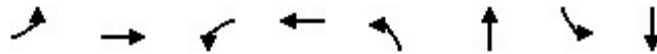
												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	19	134	49	110	307	45	25	303	68	21	340	53
Future Volume (vph)	19	134	49	110	307	45	25	303	68	21	340	53
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)		4.0			4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes		0.99			1.00		1.00	0.99		1.00	0.99	
Flpb, ped/bikes		1.00			1.00		0.96	1.00		1.00	1.00	
Frt		0.97			0.99		1.00	0.97		1.00	0.98	
Flt Protected		1.00			0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1683			1713		1617	1706		1669	1705	
Flt Permitted		0.94			0.85		0.40	1.00		0.42	1.00	
Satd. Flow (perm)		1588			1475		675	1706		732	1705	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	21	149	54	122	341	50	28	337	76	23	378	59
RTOR Reduction (vph)	0	14	0	0	5	0	0	8	0	0	5	0
Lane Group Flow (vph)	0	210	0	0	508	0	28	405	0	23	432	0
Confl. Peds. (#/hr)	3		11	11		3	40			5		40
Confl. Bikes (#/hr)			1						1			
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		34.5			34.5		44.5	44.5		44.5	44.5	
Effective Green, g (s)		36.1			36.1		45.9	45.9		45.9	45.9	
Actuated g/C Ratio		0.40			0.40		0.51	0.51		0.51	0.51	
Clearance Time (s)		5.6			5.6		5.4	5.4		5.4	5.4	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		636			591		344	870		373	869	
v/s Ratio Prot								0.24			c0.25	
v/s Ratio Perm		0.13			c0.34		0.04			0.03		
v/c Ratio		0.33			0.86		0.08	0.47		0.06	0.50	
Uniform Delay, d1		18.6			24.6		11.3	14.2		11.2	14.5	
Progression Factor		1.00			1.00		1.00	1.00		0.84	0.86	
Incremental Delay, d2		0.3			11.9		0.5	1.8		0.3	1.6	
Delay (s)		18.9			36.6		11.7	16.0		9.7	14.0	
Level of Service		B			D		B	B		A	B	
Approach Delay (s)		18.9			36.6			15.7			13.8	
Approach LOS		B			D			B			B	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			22.1			HCM 2000 Level of Service				C		
HCM 2000 Volume to Capacity ratio			0.66									
Actuated Cycle Length (s)			90.0			Sum of lost time (s)			8.0			
Intersection Capacity Utilization			73.8%			ICU Level of Service			D			
Analysis Period (min)			15									

c Critical Lane Group

# Conditions

## 2: Roosevelt Avenue & Byron Avenue

2020 Existing PM



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	13	149	19	294	5	21	31	20
Future Volume (vph)	13	149	19	294	5	21	31	20
Lane Group Flow (vph)	0	188	0	399	0	43	0	90
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		2		6		4		8
Permitted Phases	2		6		4		8	
Detector Phase	2	2	6	6	4	4	8	8
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	22.5	22.5	22.5	22.5	20.0	20.0	20.0	20.0
Total Split (s)	50.0	50.0	50.0	50.0	20.0	20.0	20.0	20.0
Total Split (%)	71.4%	71.4%	71.4%	71.4%	28.6%	28.6%	28.6%	28.6%
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	2.2	2.2	2.2	2.2	1.7	1.7	1.7	1.7
Lost Time Adjust (s)		-1.5		-1.5		-1.0		-1.0
Total Lost Time (s)		4.0		4.0		4.0		4.0
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	Max	Max	Max	Max	None	None	None	None
Act Effct Green (s)		54.3		54.3		14.1		14.1
Actuated g/C Ratio		0.75		0.75		0.20		0.20
v/c Ratio		0.15		0.31		0.14		0.30
Control Delay		4.2		5.0		18.0		19.2
Queue Delay		0.0		0.0		0.0		0.0
Total Delay		4.2		5.0		18.0		19.2
LOS		A		A		B		B
Approach Delay		4.2		5.0		18.0		19.2
Approach LOS		A		A		B		B
Queue Length 50th (m)		8.1		19.4		3.5		7.0
Queue Length 95th (m)		15.1		32.8		10.7		17.7
Internal Link Dist (m)		50.9		244.6		129.2		56.5
Turn Bay Length (m)								
Base Capacity (vph)		1277		1278		362		335
Starvation Cap Reductn		0		0		0		0
Spillback Cap Reductn		0		0		0		0
Storage Cap Reductn		0		0		0		0
Reduced v/c Ratio		0.15		0.31		0.12		0.27

### Intersection Summary

Cycle Length: 70

Actuated Cycle Length: 72.2

Natural Cycle: 45

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.31

Intersection Signal Delay: 7.4

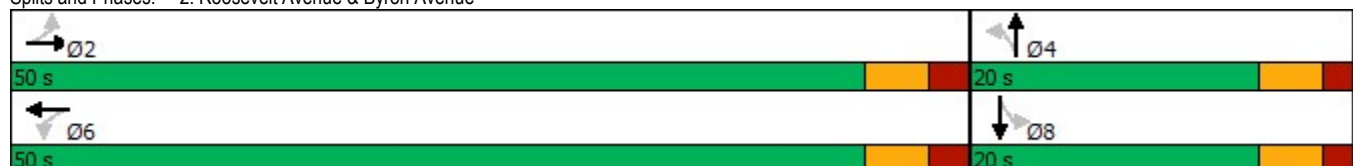
Intersection Capacity Utilization 44.0%

Analysis Period (min) 15

Intersection LOS: A

ICU Level of Service A

















Splits and Phases: 2: Roosevelt Avenue & Byron Avenue



# Conditions

## 2: Roosevelt Avenue & Byron Avenue

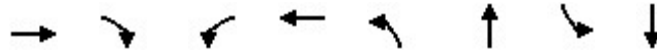
2020 Existing PM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	13	149	7	19	294	46	5	21	13	31	20	31
Future Volume (vph)	13	149	7	19	294	46	5	21	13	31	20	31
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)		4.0			4.0			4.0			4.0	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frpb, ped/bikes		1.00			0.99			0.99			0.95	
Flpb, ped/bikes		1.00			1.00			0.99			0.99	
Frt		0.99			0.98			0.96			0.95	
Flt Protected		1.00			1.00			0.99			0.98	
Satd. Flow (prot)		1743			1716			1632			1551	
Flt Permitted		0.97			0.98			0.96			0.88	
Satd. Flow (perm)		1695			1692			1576			1383	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	14	166	8	21	327	51	6	23	14	34	22	34
RTOR Reduction (vph)	0	2	0	0	6	0	0	12	0	0	29	0
Lane Group Flow (vph)	0	186	0	0	393	0	0	31	0	0	61	0
Confl. Peds. (#/hr)	17		7	7		17	46		9	9		46
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2			6			4			8		
Actuated Green, G (s)		51.9			51.9			10.8			10.8	
Effective Green, g (s)		53.4			53.4			11.8			11.8	
Actuated g/C Ratio		0.73			0.73			0.16			0.16	
Clearance Time (s)		5.5			5.5			5.0			5.0	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		1236			1234			254			222	
v/s Ratio Prot												
v/s Ratio Perm		0.11			c0.23			0.02			c0.04	
v/c Ratio		0.15			0.32			0.12			0.28	
Uniform Delay, d1		3.0			3.5			26.3			27.0	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		0.3			0.7			0.2			0.7	
Delay (s)		3.3			4.2			26.5			27.6	
Level of Service		A			A			C			C	
Approach Delay (s)		3.3			4.2			26.5			27.6	
Approach LOS		A			A			C			C	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			8.2			HCM 2000 Level of Service				A		
HCM 2000 Volume to Capacity ratio			0.31									
Actuated Cycle Length (s)			73.2			Sum of lost time (s)			8.0			
Intersection Capacity Utilization			44.0%			ICU Level of Service			A			
Analysis Period (min)			15									
c Critical Lane Group												

# Conditions

## 3: Golden Avenue & Richmond Rd

2020 Existing PM



Lane Group	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	342	21	44	646	67	1	6	3
Future Volume (vph)	342	21	44	646	67	1	6	3
Lane Group Flow (vph)	380	23	0	771	0	138	0	11
Turn Type	NA	Perm	Perm	NA	Perm	NA	Perm	NA
Protected Phases	2			6		4		8
Permitted Phases		2	6		4		8	
Detector Phase	2	2	6	6	4	4	8	8
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	28.8	28.8	28.8	28.8	28.6	28.6	28.6	28.6
Total Split (s)	50.0	50.0	50.0	50.0	29.0	29.0	29.0	29.0
Total Split (%)	63.3%	63.3%	63.3%	63.3%	36.7%	36.7%	36.7%	36.7%
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	2.5	2.5	2.5	2.5	2.3	2.3	2.3	2.3
Lost Time Adjust (s)	-1.8	-1.8		-1.8		-1.6		-1.6
Total Lost Time (s)	4.0	4.0		4.0		4.0		4.0
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	C-Max	C-Max	C-Max	C-Max	None	None	None	None
Act Effct Green (s)	51.6	51.6		51.6		19.4		19.4
Actuated g/C Ratio	0.65	0.65		0.65		0.25		0.25
v/c Ratio	0.33	0.03		0.70		0.39		0.03
Control Delay	8.2	1.8		15.1		16.8		18.5
Queue Delay	0.0	0.0		0.9		0.0		0.0
Total Delay	8.2	1.8		16.1		16.8		18.5
LOS	A	A		B		B		B
Approach Delay	7.8			16.1		16.8		18.5
Approach LOS	A			B		B		B
Queue Length 50th (m)	28.7	0.0		84.3		9.4		1.1
Queue Length 95th (m)	45.6	1.9		136.2		23.6		4.7
Internal Link Dist (m)	37.9			130.2		72.7		29.6
Turn Bay Length (m)								
Base Capacity (vph)	1152	844		1097		444		450
Starvation Cap Reductn	0	0		126		0		0
Spillback Cap Reductn	0	0		0		0		0
Storage Cap Reductn	0	0		0		0		0
Reduced v/c Ratio	0.33	0.03		0.79		0.31		0.02

### Intersection Summary

Cycle Length: 79

Actuated Cycle Length: 79

Offset: 5 (6%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green

Natural Cycle: 70

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.70

Intersection Signal Delay: 13.7

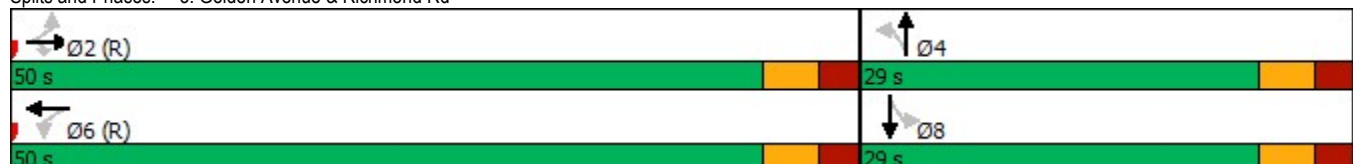
Intersection LOS: B

Intersection Capacity Utilization 86.0%

ICU Level of Service E

Analysis Period (min) 15


















Splits and Phases: 3: Golden Avenue & Richmond Rd



# Conditions

## 3: Golden Avenue & Richmond Rd

2020 Existing PM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	342	21	44	646	4	67	1	57	6	3	1
Future Volume (vph)	0	342	21	44	646	4	67	1	57	6	3	1
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)		4.0	4.0		4.0			4.0			4.0	
Lane Util. Factor		1.00	1.00		1.00			1.00			1.00	
Frpb, ped/bikes		1.00	0.85		1.00			0.94			0.99	
Flpb, ped/bikes		1.00	1.00		1.00			0.98			0.95	
Frt		1.00	0.85		1.00			0.94			0.99	
Flt Protected		1.00	1.00		1.00			0.97			0.97	
Satd. Flow (prot)		1765	1273		1749			1487			1596	
Flt Permitted		1.00	1.00		0.96			0.84			0.86	
Satd. Flow (perm)		1765	1273		1680			1283			1421	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	0	380	23	49	718	4	74	1	63	7	3	1
RTOR Reduction (vph)	0	0	8	0	0	0	0	42	0	0	1	0
Lane Group Flow (vph)	0	380	15	0	771	0	0	96	0	0	10	0
Confl. Peds. (#/hr)	66		77		66		25		60		60	
Confl. Bikes (#/hr)			3			17			2			7
Turn Type		NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2		2	6			4			8		
Actuated Green, G (s)		49.8	49.8		49.8			17.8			17.8	
Effective Green, g (s)		51.6	51.6		51.6			19.4			19.4	
Actuated g/C Ratio		0.65	0.65		0.65			0.25			0.25	
Clearance Time (s)		5.8	5.8		5.8			5.6			5.6	
Vehicle Extension (s)		3.0	3.0		3.0			3.0			3.0	
Lane Grp Cap (vph)		1152	831		1097			315			348	
v/s Ratio Prot		0.22										
v/s Ratio Perm			0.01		c0.46			c0.07			0.01	
v/c Ratio		0.33	0.02		0.70			0.30			0.03	
Uniform Delay, d1		6.1	4.8		8.8			24.3			22.6	
Progression Factor		1.00	1.00		1.00			1.00			1.00	
Incremental Delay, d2		0.8	0.0		3.8			0.5			0.0	
Delay (s)		6.8	4.8		12.5			24.8			22.7	
Level of Service		A	A		B			C			C	
Approach Delay (s)		6.7			12.5			24.8			22.7	
Approach LOS		A			B			C			C	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			12.1		HCM 2000 Level of Service						B	
HCM 2000 Volume to Capacity ratio			0.59									
Actuated Cycle Length (s)			79.0		Sum of lost time (s)						8.0	
Intersection Capacity Utilization			86.0%		ICU Level of Service						E	
Analysis Period (min)			15									

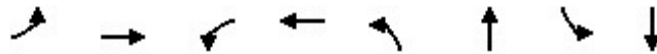
c Critical Lane Group



# Conditions

## 4: Roosevelt Avenue & Richmond Rd

2020 Existing PM



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	7	403	25	696	34	18	32	11
Future Volume (vph)	7	403	25	696	34	18	32	11
Lane Group Flow (vph)	0	480	0	840	0	111	0	64
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		2		6		4		8
Permitted Phases	2		6		4		8	
Detector Phase	2	2	6	6	4	4	8	8
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	33.4	33.4	33.4	33.4	24.6	24.6	24.6	24.6
Total Split (s)	60.0	60.0	60.0	60.0	25.0	25.0	25.0	25.0
Total Split (%)	70.6%	70.6%	70.6%	70.6%	29.4%	29.4%	29.4%	29.4%
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	2.1	2.1	2.1	2.1	2.3	2.3	2.3	2.3
Lost Time Adjust (s)		-1.4		-1.4		-1.6		-1.6
Total Lost Time (s)		4.0		4.0		4.0		4.0
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	C-Max	C-Max	C-Max	C-Max	None	None	None	None
Act Effct Green (s)		63.9		63.9		17.0		17.0
Actuated g/C Ratio		0.75		0.75		0.20		0.20
v/c Ratio		0.37		0.66		0.40		0.25
Control Delay		6.4		11.1		20.5		24.0
Queue Delay		0.3		0.0		0.0		0.0
Total Delay		6.7		11.1		20.5		24.0
LOS		A		B		C		C
Approach Delay		6.7		11.1		20.5		24.0
Approach LOS		A		B		C		C
Queue Length 50th (m)		33.0		83.3		8.2		6.5
Queue Length 95th (m)		51.5		133.8		22.8		17.2
Internal Link Dist (m)		130.2		276.4		56.5		123.0
Turn Bay Length (m)								
Base Capacity (vph)		1282		1270		332		306
Starvation Cap Reductn		309		0		0		0
Spillback Cap Reductn		0		0		0		0
Storage Cap Reductn		0		0		0		0
Reduced v/c Ratio		0.49		0.66		0.33		0.21

### Intersection Summary

Cycle Length: 85

Actuated Cycle Length: 85

Offset: 78 (92%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green

Natural Cycle: 65

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.66

Intersection Signal Delay: 11.0

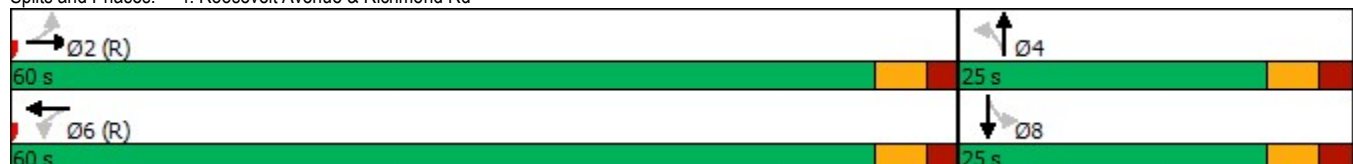
Intersection LOS: B

Intersection Capacity Utilization 78.2%

ICU Level of Service D

Analysis Period (min) 15

















Splits and Phases: 4: Roosevelt Avenue & Richmond Rd



# Conditions

## 4: Roosevelt Avenue & Richmond Rd

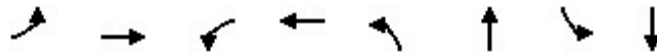
2020 Existing PM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	7	403	22	25	696	35	34	18	48	32	11	14
Future Volume (vph)	7	403	22	25	696	35	34	18	48	32	11	14
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)		4.0			4.0			4.0			4.0	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frpb, ped/bikes		0.98			0.99			0.89			0.93	
Flpb, ped/bikes		1.00			1.00			0.92			0.91	
Frt		0.99			0.99			0.94			0.97	
Flt Protected		1.00			1.00			0.98			0.97	
Satd. Flow (prot)		1722			1723			1332			1408	
Flt Permitted		0.99			0.98			0.88			0.83	
Satd. Flow (perm)		1703			1687			1191			1196	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	8	448	24	28	773	39	38	20	53	36	12	16
RTOR Reduction (vph)	0	2	0	0	2	0	0	42	0	0	13	0
Lane Group Flow (vph)	0	478	0	0	838	0	0	69	0	0	51	0
Confl. Peds. (#/hr)	135		182	182		135	116		92	92		116
Confl. Bikes (#/hr)			3			9			5			2
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2			6			4			8		
Actuated Green, G (s)		60.6			60.6			13.4			13.4	
Effective Green, g (s)		62.0			62.0			15.0			15.0	
Actuated g/C Ratio		0.73			0.73			0.18			0.18	
Clearance Time (s)		5.4			5.4			5.6			5.6	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		1242			1230			210			211	
v/s Ratio Prot												
v/s Ratio Perm		0.28			0.50			0.06			0.04	
v/c Ratio		0.38			0.68			0.33			0.24	
Uniform Delay, d1		4.3			6.2			30.6			30.1	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		0.9			3.1			0.9			0.6	
Delay (s)		5.2			9.3			31.5			30.7	
Level of Service		A			A			C			C	
Approach Delay (s)		5.2			9.3			31.5			30.7	
Approach LOS		A			A			C			C	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			10.5									
HCM 2000 Volume to Capacity ratio			0.61									
Actuated Cycle Length (s)			85.0						8.0			
Intersection Capacity Utilization			78.2%									
Analysis Period (min)			15									
c Critical Lane Group												

# Conditions

## 5: Churchill Avenue North & Richmond Rd

2020 Existing PM



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	Ø9	Ø10
Lane Configurations										
Traffic Volume (vph)	157	298	128	451	27	263	19	257		
Future Volume (vph)	157	298	128	451	27	263	19	257		
Lane Group Flow (vph)	174	382	142	535	0	406	0	618		
Turn Type	Prot	NA	Perm	NA	Perm	NA	Perm	NA		
Protected Phases	5	2		6		4		8	9	10
Permitted Phases			6		4		8	8		
Detector Phase	5	2	6	6	4	4	8	8		
Switch Phase										
Minimum Initial (s)	5.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	1.0	1.0
Minimum Split (s)	11.1	26.1	26.1	26.1	26.1	26.1	26.2	26.2	5.0	5.0
Total Split (s)	12.0	52.0	40.0	40.0	28.0	28.0	28.0	28.0	5.0	5.0
Total Split (%)	13.3%	57.8%	44.4%	44.4%	31.1%	31.1%	31.1%	31.1%	6%	6%
Yellow Time (s)	3.3	3.3	3.3	3.3	3.6	3.6	3.6	3.6	2.0	2.0
All-Red Time (s)	2.8	2.8	2.8	2.8	2.6	2.6	2.6	2.6	0.0	0.0
Lost Time Adjust (s)	-2.1	-2.1	-2.1	-2.1		-2.2		-2.2		
Total Lost Time (s)	4.0	4.0	4.0	4.0		4.0		4.0		
Lead/Lag	Lead		Lag	Lag						
Lead-Lag Optimize?			Yes	Yes						
Recall Mode	None	C-Max	C-Max	C-Max	None	None	None	None	None	None
Act Effct Green (s)	18.5	60.1	37.6	37.6		21.9		21.9		
Actuated g/C Ratio	0.21	0.67	0.42	0.42		0.24		0.24		
v/c Ratio	0.51	0.35	0.46	0.74		0.67		0.77		
Control Delay	39.7	8.2	25.7	29.8		23.8		23.4		
Queue Delay	0.0	0.0	0.0	0.0		0.0		0.2		
Total Delay	39.7	8.2	25.7	29.8		23.8		23.6		
LOS	D	A	C	C		C		C		
Approach Delay		18.1		28.9		23.8		23.6		
Approach LOS		B		C		C		C		
Queue Length 50th (m)	27.6	24.9	18.6	81.0		16.2		30.7		
Queue Length 95th (m)	#60.8	51.9	37.7	#124.4		m23.3		45.7		
Internal Link Dist (m)		276.4		61.0		100.0		41.6		
Turn Bay Length (m)	50.0		45.0							
Base Capacity (vph)	343	1100	309	727		696		883		
Starvation Cap Reductn	0	0	0	0		0		0		
Spillback Cap Reductn	0	0	0	0		0		25		
Storage Cap Reductn	0	0	0	0		0		0		
Reduced v/c Ratio	0.51	0.35	0.46	0.74		0.58		0.72		

### Intersection Summary

Cycle Length: 90

Actuated Cycle Length: 90

Offset: 0 (0%), Referenced to phase 6:WBTL and 2:EBT, Start of Green

Natural Cycle: 80

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.77

Intersection Signal Delay: 23.9

Intersection LOS: C

Intersection Capacity Utilization 82.1%

ICU Level of Service E

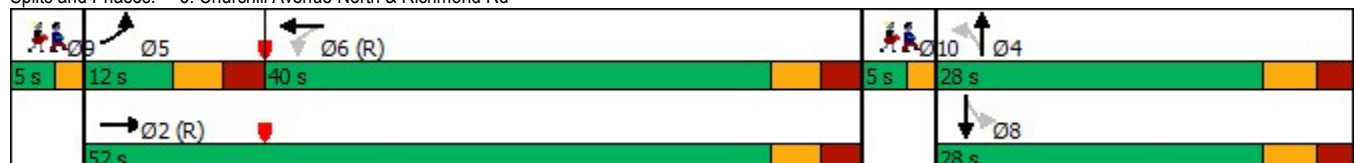
Analysis Period (min) 15

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

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.



















### Splits and Phases: 5: Churchill Avenue North & Richmond Rd



Conditions

5: Churchill Avenue North & Richmond Rd

2020 Existing PM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	157	298	46	128	451	31	27	263	76	19	257	280
Future Volume (vph)	157	298	46	128	451	31	27	263	76	19	257	280
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0			4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			0.95			0.95	
Frpb, ped/bikes	1.00	0.95		1.00	0.99			0.96			0.85	
Flpb, ped/bikes	1.00	1.00		0.78	1.00			0.99			1.00	
Frt	1.00	0.98		1.00	0.99			0.97			0.92	
Flt Protected	0.95	1.00		0.95	1.00			1.00			1.00	
Satd. Flow (prot)	1676	1642		1315	1734			3082			2610	
Flt Permitted	0.95	1.00		0.54	1.00			0.77			0.93	
Satd. Flow (perm)	1676	1642		741	1734			2388			2429	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	174	331	51	142	501	34	30	292	84	21	286	311
RTOR Reduction (vph)	0	4	0	0	3	0	0	26	0	0	210	0
Lane Group Flow (vph)	174	378	0	142	532	0	0	380	0	0	408	0
Confl. Peds. (#/hr)	86		163	163		86	84		54	54		84
Confl. Bikes (#/hr)			2			4			3			1
Turn Type	Prot	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases	5	2			6			4			8	
Permitted Phases				6			4			8	8	
Actuated Green, G (s)	16.4	58.0		35.5	35.5			19.7			19.7	
Effective Green, g (s)	18.5	60.1		37.6	37.6			21.9			21.9	
Actuated g/C Ratio	0.21	0.67		0.42	0.42			0.24			0.24	
Clearance Time (s)	6.1	6.1		6.1	6.1			6.2			6.2	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	344	1096		309	724			581			591	
v/s Ratio Prot	c0.10	0.23			c0.31							
v/s Ratio Perm				0.19				0.16			c0.17	
v/c Ratio	0.51	0.34		0.46	0.73			0.65			0.69	
Uniform Delay, d1	31.7	6.5		18.9	22.0			30.6			31.0	
Progression Factor	1.00	1.00		1.00	1.00			0.69			1.00	
Incremental Delay, d2	1.2	0.9		4.9	6.5			2.3			3.4	
Delay (s)	32.9	7.3		23.7	28.5			23.4			34.3	
Level of Service	C	A		C	C			C			C	
Approach Delay (s)		15.3			27.5			23.4			34.3	
Approach LOS		B			C			C			C	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			25.6			HCM 2000 Level of Service				C		
HCM 2000 Volume to Capacity ratio			0.70									
Actuated Cycle Length (s)			90.0			Sum of lost time (s)			16.0			
Intersection Capacity Utilization			82.1%			ICU Level of Service			E			
Analysis Period (min)			15									
c Critical Lane Group												

# Conditions

## 6: Ped Crossing & Richmond Rd

2020 Existing PM



Lane Group	EBT	WBT	Ø4	Ø8
Lane Configurations	↑↑	↑		
Traffic Volume (vph)	570	802		
Future Volume (vph)	570	802		
Lane Group Flow (vph)	633	891		
Turn Type	NA	NA		
Protected Phases	2	6	4	8
Permitted Phases				
Detector Phase	2	6		
Switch Phase				
Minimum Initial (s)	10.0	10.0	10.0	10.0
Minimum Split (s)	23.1	23.1	25.0	25.0
Total Split (s)	40.0	40.0	25.0	25.0
Total Split (%)	61.5%	61.5%	38%	38%
Yellow Time (s)	3.0	3.0	3.0	3.0
All-Red Time (s)	2.1	2.1	1.0	1.0
Lost Time Adjust (s)	-1.1	-1.1		
Total Lost Time (s)	4.0	4.0		
Lead/Lag				
Lead-Lag Optimize?				
Recall Mode	C-Max	C-Max	Ped	Ped
Act Effct Green (s)	36.0	36.0		
Actuated g/C Ratio	0.55	0.55		
v/c Ratio	0.34	0.91		
Control Delay	8.6	29.5		
Queue Delay	0.0	0.0		
Total Delay	8.6	29.5		
LOS	A	C		
Approach Delay	8.6	29.5		
Approach LOS	A	C		
Queue Length 50th (m)	21.0	92.2		
Queue Length 95th (m)	30.5	#174.0		
Internal Link Dist (m)	41.2	106.6		
Turn Bay Length (m)				
Base Capacity (vph)	1857	977		
Starvation Cap Reductn	0	0		
Spillback Cap Reductn	0	0		
Storage Cap Reductn	0	0		
Reduced v/c Ratio	0.34	0.91		

### Intersection Summary

Cycle Length: 65

Actuated Cycle Length: 65

Offset: 40 (62%), Referenced to phase 2:EBT and 6:WBT, Start of Green

Natural Cycle: 70

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.91

Intersection Signal Delay: 20.8

Intersection LOS: C

Intersection Capacity Utilization 47.9%

ICU Level of Service A

Analysis Period (min) 15

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

Queue shown is maximum after two cycles.













Splits and Phases: 6: Ped Crossing & Richmond Rd

Ø2 (R) 40 s	Ø4 25 s
Ø6 (R) 40 s	Ø8 25 s

Conditions

6: Ped Crossing & Richmond Rd

2020 Existing PM

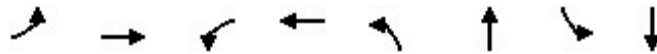
												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑			↑							
Traffic Volume (vph)	0	570	0	0	802	0	0	0	0	0	0	0
Future Volume (vph)	0	570	0	0	802	0	0	0	0	0	0	0
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)		4.0			4.0							
Lane Util. Factor		0.95			1.00							
Frpb, ped/bikes		1.00			1.00							
Flpb, ped/bikes		1.00			1.00							
Frt		1.00			1.00							
Flt Protected		1.00			1.00							
Satd. Flow (prot)		3353			1765							
Flt Permitted		1.00			1.00							
Satd. Flow (perm)		3353			1765							
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	0	633	0	0	891	0	0	0	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	633	0	0	891	0	0	0	0	0	0	0
Confl. Peds. (#/hr)							13		12	12		13
Confl. Bikes (#/hr)									2			1
Turn Type		NA			NA							
Protected Phases		2			6							
Permitted Phases												
Actuated Green, G (s)		34.9			34.9							
Effective Green, g (s)		36.0			36.0							
Actuated g/C Ratio		0.55			0.55							
Clearance Time (s)		5.1			5.1							
Vehicle Extension (s)		3.0			3.0							
Lane Grp Cap (vph)		1857			977							
v/s Ratio Prot		0.19			c0.50							
v/s Ratio Perm												
v/c Ratio		0.34			0.91							
Uniform Delay, d1		8.0			13.1							
Progression Factor		1.00			1.00							
Incremental Delay, d2		0.5			14.1							
Delay (s)		8.5			27.2							
Level of Service		A			C							
Approach Delay (s)		8.5			27.2			0.0			0.0	
Approach LOS		A			C			A			A	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			19.4			HCM 2000 Level of Service				B		
HCM 2000 Volume to Capacity ratio			0.58									
Actuated Cycle Length (s)			65.0			Sum of lost time (s)				8.0		
Intersection Capacity Utilization			47.9%			ICU Level of Service				A		
Analysis Period (min)			15									

c Critical Lane Group

# Conditions

## 1: Churchill Avenue North & Byron Avenue

2025 Future Background AM



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	57	170	51	122	27	328	36	314
Future Volume (vph)	57	170	51	122	27	328	36	314
Lane Group Flow (vph)	0	315	0	246	30	440	40	381
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		4		8		2		6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	2	2	6	6
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	30.6	30.6	30.6	30.6	26.4	26.4	26.4	26.4
Total Split (s)	38.0	38.0	38.0	38.0	42.0	42.0	42.0	42.0
Total Split (%)	47.5%	47.5%	47.5%	47.5%	52.5%	52.5%	52.5%	52.5%
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	2.3	2.3	2.3	2.3	2.1	2.1	2.1	2.1
Lost Time Adjust (s)		-1.6		-1.6	-1.4	-1.4	-1.4	-1.4
Total Lost Time (s)		4.0		4.0	4.0	4.0	4.0	4.0
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	C-Max	C-Max	C-Max	C-Max
Act Effct Green (s)		22.8		22.8	49.2	49.2	49.2	49.2
Actuated g/C Ratio		0.28		0.28	0.62	0.62	0.62	0.62
v/c Ratio		0.72		0.60	0.06	0.42	0.09	0.36
Control Delay		33.0		27.7	8.7	10.5	3.4	3.5
Queue Delay		0.0		0.0	0.0	0.0	0.0	0.3
Total Delay		33.0		27.7	8.7	10.5	3.4	3.8
LOS		C		C	A	B	A	A
Approach Delay		33.0		27.7		10.3		3.7
Approach LOS		C		C		B		A
Queue Length 50th (m)		42.2		30.7	1.7	31.2	1.1	10.2
Queue Length 95th (m)		60.9		46.6	6.6	65.9	m2.5	18.7
Internal Link Dist (m)		244.6		113.6		126.7		100.0
Turn Bay Length (m)					30.0		30.0	
Base Capacity (vph)		641		601	509	1052	467	1068
Starvation Cap Reductn		0		0	0	0	0	236
Spillback Cap Reductn		0		0	0	0	0	0
Storage Cap Reductn		0		0	0	0	0	0
Reduced v/c Ratio		0.49		0.41	0.06	0.42	0.09	0.46

### Intersection Summary

Cycle Length: 80

Actuated Cycle Length: 80

Offset: 74 (93%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green

Natural Cycle: 60

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.72

Intersection Signal Delay: 16.3

Intersection LOS: B

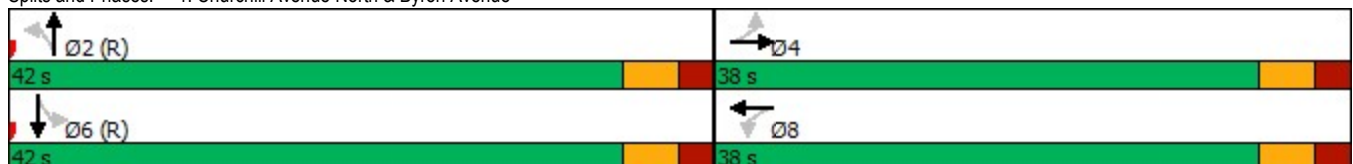
Intersection Capacity Utilization 59.5%

ICU Level of Service B

Analysis Period (min) 15

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1: Churchill Avenue North & Byron Avenue























# Conditions

## 1: Churchill Avenue North & Byron Avenue

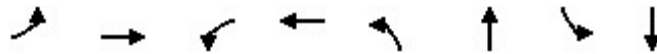
2025 Future Background AM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	57	170	57	51	122	48	27	328	68	36	314	29
Future Volume (vph)	57	170	57	51	122	48	27	328	68	36	314	29
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)		4.0			4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes		0.99			0.99		1.00	0.99		1.00	1.00	
Flpb, ped/bikes		1.00			1.00		0.96	1.00		0.96	1.00	
Frt		0.97			0.97		1.00	0.97		1.00	0.99	
Flt Protected		0.99			0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1683			1681		1604	1702		1613	1735	
Flt Permitted		0.87			0.82		0.49	1.00		0.45	1.00	
Satd. Flow (perm)		1482			1386		826	1702		757	1735	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	63	189	63	57	136	53	30	364	76	40	349	32
RTOR Reduction (vph)	0	14	0	0	15	0	0	7	0	0	3	0
Lane Group Flow (vph)	0	301	0	0	231	0	30	433	0	40	378	0
Confl. Peds. (#/hr)	13		13	13		13	43		18	43		18
Confl. Bikes (#/hr)			1						7			
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		21.2			21.2		47.8	47.8		47.8	47.8	
Effective Green, g (s)		22.8			22.8		49.2	49.2		49.2	49.2	
Actuated g/C Ratio		0.29			0.29		0.62	0.62		0.62	0.62	
Clearance Time (s)		5.6			5.6		5.4	5.4		5.4	5.4	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		422			395		507	1046		465	1067	
v/s Ratio Prot								c0.25			0.22	
v/s Ratio Perm		c0.20			0.17		0.04			0.05		
v/c Ratio		0.71			0.58		0.06	0.41		0.09	0.35	
Uniform Delay, d1		25.7			24.5		6.2	8.0		6.3	7.6	
Progression Factor		1.00			1.00		1.00	1.00		0.36	0.30	
Incremental Delay, d2		5.6			2.2		0.2	1.2		0.3	0.8	
Delay (s)		31.3			26.7		6.4	9.2		2.6	3.1	
Level of Service		C			C		A	A		A	A	
Approach Delay (s)		31.3			26.7			9.0			3.0	
Approach LOS		C			C			A			A	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			15.1			HCM 2000 Level of Service				B		
HCM 2000 Volume to Capacity ratio			0.51									
Actuated Cycle Length (s)			80.0			Sum of lost time (s)				8.0		
Intersection Capacity Utilization			59.5%			ICU Level of Service				B		
Analysis Period (min)			15									
c Critical Lane Group												

# Conditions

## 2: Roosevelt Avenue & Byron Avenue

2025 Future Background AM



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	36	231	14	145	4	30	26	19
Future Volume (vph)	36	231	14	145	4	30	26	19
Lane Group Flow (vph)	0	306	0	208	0	56	0	63
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		2		6		4		8
Permitted Phases	2		6		4		8	
Detector Phase	2	2	6	6	4	4	8	8
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	22.5	22.5	22.5	22.5	20.0	20.0	20.0	20.0
Total Split (s)	50.0	50.0	50.0	50.0	20.0	20.0	20.0	20.0
Total Split (%)	71.4%	71.4%	71.4%	71.4%	28.6%	28.6%	28.6%	28.6%
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	2.2	2.2	2.2	2.2	1.7	1.7	1.7	1.7
Lost Time Adjust (s)		-1.5		-1.5		-1.0		-1.0
Total Lost Time (s)		4.0		4.0		4.0		4.0
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	Max	Max	Max	Max	None	None	None	None
Act Effct Green (s)		56.0		56.0		13.0		13.0
Actuated g/C Ratio		0.81		0.81		0.19		0.19
v/c Ratio		0.23		0.15		0.18		0.22
Control Delay		4.0		3.3		18.3		21.6
Queue Delay		0.0		0.0		0.0		0.0
Total Delay		4.0		3.3		18.3		21.6
LOS		A		A		B		C
Approach Delay		4.0		3.3		18.3		21.6
Approach LOS		A		A		B		C
Queue Length 50th (m)		10.7		5.9		4.7		6.5
Queue Length 95th (m)		25.2		15.5		12.7		15.0
Internal Link Dist (m)		50.9		244.6		129.2		56.5
Turn Bay Length (m)								
Base Capacity (vph)		1350		1361		389		344
Starvation Cap Reductn		0		0		0		0
Spillback Cap Reductn		0		0		0		0
Storage Cap Reductn		0		0		0		0
Reduced v/c Ratio		0.23		0.15		0.14		0.18

### Intersection Summary

Cycle Length: 70

Actuated Cycle Length: 68.9

Natural Cycle: 45

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.23

Intersection Signal Delay: 6.8

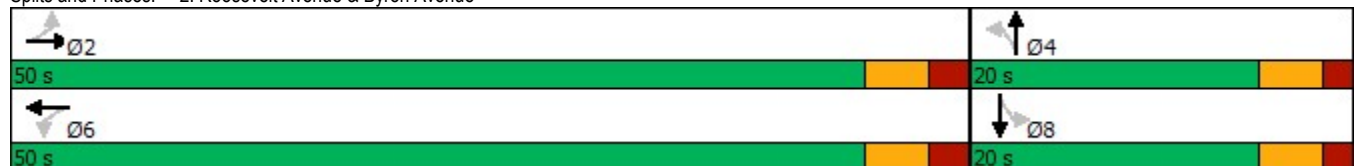
Intersection Capacity Utilization 42.8%

Analysis Period (min) 15

Intersection LOS: A

ICU Level of Service A

















Splits and Phases: 2: Roosevelt Avenue & Byron Avenue



# Conditions

## 2: Roosevelt Avenue & Byron Avenue

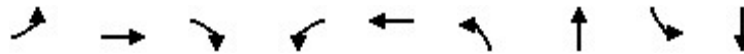
2025 Future Background AM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	36	231	8	14	145	28	4	30	17	26	19	12
Future Volume (vph)	36	231	8	14	145	28	4	30	17	26	19	12
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)		4.0			4.0			4.0			4.0	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frpb, ped/bikes		1.00			0.99			0.98			0.98	
Flpb, ped/bikes		1.00			1.00			1.00			0.99	
Frt		1.00			0.98			0.95			0.97	
Flt Protected		0.99			1.00			1.00			0.98	
Satd. Flow (prot)		1741			1711			1641			1622	
Flt Permitted		0.95			0.97			0.98			0.87	
Satd. Flow (perm)		1661			1670			1609			1436	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	40	257	9	16	161	31	4	33	19	29	21	13
RTOR Reduction (vph)	0	1	0	0	6	0	0	17	0	0	11	0
Lane Group Flow (vph)	0	305	0	0	202	0	0	39	0	0	52	0
Confl. Peds. (#/hr)	8		13	13		8	33		13	13		33
Confl. Bikes (#/hr)			2			1						1
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2			6			4			8		
Actuated Green, G (s)		52.7			52.7			7.7			7.7	
Effective Green, g (s)		54.2			54.2			8.7			8.7	
Actuated g/C Ratio		0.76			0.76			0.12			0.12	
Clearance Time (s)		5.5			5.5			5.0			5.0	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		1269			1276			197			176	
v/s Ratio Prot												
v/s Ratio Perm		c0.18			0.12			0.02			c0.04	
v/c Ratio		0.24			0.16			0.20			0.29	
Uniform Delay, d1		2.4			2.2			28.0			28.3	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		0.4			0.3			0.5			0.9	
Delay (s)		2.9			2.5			28.5			29.2	
Level of Service		A			A			C			C	
Approach Delay (s)		2.9			2.5			28.5			29.2	
Approach LOS		A			A			C			C	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			7.6			HCM 2000 Level of Service			A			
HCM 2000 Volume to Capacity ratio			0.25									
Actuated Cycle Length (s)			70.9			Sum of lost time (s)			8.0			
Intersection Capacity Utilization			42.8%			ICU Level of Service			A			
Analysis Period (min)			15									
c Critical Lane Group												

# Conditions

## 3: Golden Avenue & Richmond Rd

2025 Future Background AM



Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations		↑	↗		↖		↖		↗
Traffic Volume (vph)	2	471	28	46	272	49	2	1	4
Future Volume (vph)	2	471	28	46	272	49	2	1	4
Lane Group Flow (vph)	0	525	31	0	356	0	133	0	5
Turn Type	Perm	NA	Perm	Perm	NA	Perm	NA	Perm	NA
Protected Phases		2			6		4		8
Permitted Phases	2		2	6		4		8	
Detector Phase	2	2	2	6	6	4	4	8	8
Switch Phase									
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	28.8	28.8	28.8	28.8	28.8	28.6	28.6	28.6	28.6
Total Split (s)	35.0	35.0	35.0	35.0	35.0	29.0	29.0	29.0	29.0
Total Split (%)	54.7%	54.7%	54.7%	54.7%	54.7%	45.3%	45.3%	45.3%	45.3%
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	2.5	2.5	2.5	2.5	2.5	2.3	2.3	2.3	2.3
Lost Time Adjust (s)		-1.8	-1.8		-1.8		-1.6		-1.6
Total Lost Time (s)		4.0	4.0		4.0		4.0		4.0
Lead/Lag									
Lead-Lag Optimize?									
Recall Mode	C-Max	C-Max	C-Max	C-Max	C-Max	None	None	None	None
Act Effct Green (s)		40.5	40.5		40.5		19.4		19.4
Actuated g/C Ratio		0.63	0.63		0.63		0.30		0.30
v/c Ratio		0.47	0.04		0.36		0.29		0.01
Control Delay		11.5	2.5		10.3		8.5		12.2
Queue Delay		0.0	0.0		0.0		0.0		0.0
Total Delay		11.5	2.5		10.3		8.5		12.2
LOS		B	A		B		A		B
Approach Delay		11.0			10.3		8.5		12.3
Approach LOS		B			B		A		B
Queue Length 50th (m)		44.3	0.0		27.2		4.3		0.4
Queue Length 95th (m)		73.1	2.8		47.5		14.6		2.3
Internal Link Dist (m)		37.9			130.2		72.7		29.6
Turn Bay Length (m)									
Base Capacity (vph)		1116	883		989		570		654
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		0.47	0.04		0.36		0.23		0.01

### Intersection Summary

Cycle Length: 64

Actuated Cycle Length: 64

Offset: 21 (33%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green

Natural Cycle: 60

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.47

Intersection Signal Delay: 10.5

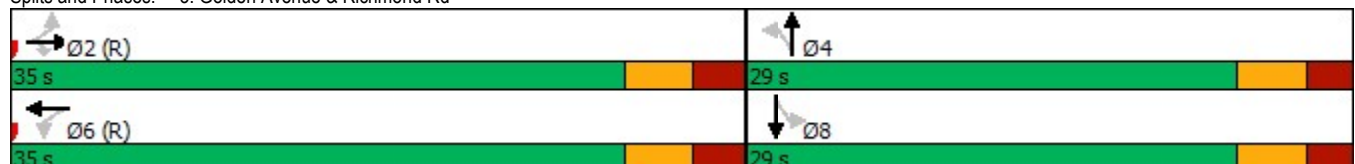
Intersection LOS: B

Intersection Capacity Utilization 74.0%

ICU Level of Service D

Analysis Period (min) 15


















Splits and Phases: 3: Golden Avenue & Richmond Rd



# Conditions

## 3: Golden Avenue & Richmond Rd

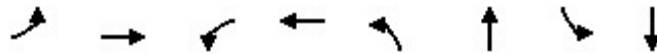
2025 Future Background AM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	2	471	28	46	272	3	49	2	69	1	4	0
Future Volume (vph)	2	471	28	46	272	3	49	2	69	1	4	0
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)		4.0	4.0		4.0			4.0			4.0	
Lane Util. Factor		1.00	1.00		1.00			1.00			1.00	
Frpb, ped/bikes		1.00	0.91		1.00			0.95			1.00	
Flpb, ped/bikes		1.00	1.00		1.00			0.98			0.99	
Frt		1.00	0.85		1.00			0.92			1.00	
Flt Protected		1.00	1.00		0.99			0.98			0.99	
Satd. Flow (prot)		1764	1371		1742			1479			1729	
Flt Permitted		1.00	1.00		0.89			0.89			0.96	
Satd. Flow (perm)		1763	1371		1561			1340			1676	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	2	523	31	51	302	3	54	2	77	1	4	0
RTOR Reduction (vph)	0	0	12	0	0	0	0	56	0	0	0	0
Lane Group Flow (vph)	0	525	19	0	356	0	0	77	0	0	5	0
Confl. Peds. (#/hr)	62		45	45		62	33		49	49		33
Confl. Bikes (#/hr)			8			8			6			20
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2		2	6			4			8		
Actuated Green, G (s)		36.8	36.8		36.8			15.8			15.8	
Effective Green, g (s)		38.6	38.6		38.6			17.4			17.4	
Actuated g/C Ratio		0.60	0.60		0.60			0.27			0.27	
Clearance Time (s)		5.8	5.8		5.8			5.6			5.6	
Vehicle Extension (s)		3.0	3.0		3.0			3.0			3.0	
Lane Grp Cap (vph)		1063	826		941			364			455	
v/s Ratio Prot												
v/s Ratio Perm		c0.30	0.01		0.23			c0.06			0.00	
v/c Ratio		0.49	0.02		0.38			0.21			0.01	
Uniform Delay, d1		7.2	5.1		6.5			18.0			17.0	
Progression Factor		1.00	1.00		1.00			1.00			1.00	
Incremental Delay, d2		1.6	0.1		1.2			0.3			0.0	
Delay (s)		8.8	5.2		7.7			18.3			17.0	
Level of Service		A	A		A			B			B	
Approach Delay (s)		8.6			7.7			18.3			17.0	
Approach LOS		A			A			B			B	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			9.6			HCM 2000 Level of Service				A		
HCM 2000 Volume to Capacity ratio			0.41									
Actuated Cycle Length (s)			64.0			Sum of lost time (s)			8.0			
Intersection Capacity Utilization			74.0%			ICU Level of Service			D			
Analysis Period (min)			15									
c Critical Lane Group												

# Conditions

## 4: Roosevelt Avenue & Richmond Rd

2025 Future Background AM



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	3	636	14	298	26	10	32	12
Future Volume (vph)	3	636	14	298	26	10	32	12
Lane Group Flow (vph)	0	721	0	376	0	76	0	57
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		2		6		4		8
Permitted Phases	2		6		4		8	
Detector Phase	2	2	6	6	4	4	8	8
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	33.4	33.4	33.4	33.4	24.6	24.6	24.6	24.6
Total Split (s)	45.0	45.0	45.0	45.0	25.0	25.0	25.0	25.0
Total Split (%)	64.3%	64.3%	64.3%	64.3%	35.7%	35.7%	35.7%	35.7%
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	2.1	2.1	2.1	2.1	2.3	2.3	2.3	2.3
Lost Time Adjust (s)		-1.4		-1.4		-1.6		-1.6
Total Lost Time (s)		4.0		4.0		4.0		4.0
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	C-Max	C-Max	C-Max	C-Max	None	None	None	None
Act Effct Green (s)		48.9		48.9		17.0		17.0
Actuated g/C Ratio		0.70		0.70		0.24		0.24
v/c Ratio		0.59		0.32		0.22		0.18
Control Delay		10.7		7.1		13.2		18.3
Queue Delay		0.3		0.0		0.0		0.0
Total Delay		11.0		7.1		13.2		18.3
LOS		B		A		B		B
Approach Delay		11.0		7.1		13.2		18.3
Approach LOS		B		A		B		B
Queue Length 50th (m)		61.3		23.6		4.0		4.9
Queue Length 95th (m)		100.2		39.6		13.3		13.1
Internal Link Dist (m)		130.2		276.4		56.5		123.0
Turn Bay Length (m)								
Base Capacity (vph)		1227		1173		425		398
Starvation Cap Reductn		117		0		0		0
Spillback Cap Reductn		0		0		0		0
Storage Cap Reductn		0		0		0		0
Reduced v/c Ratio		0.65		0.32		0.18		0.14

### Intersection Summary

Cycle Length: 70

Actuated Cycle Length: 70

Offset: 27 (39%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green

Natural Cycle: 60

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.59

Intersection Signal Delay: 10.3

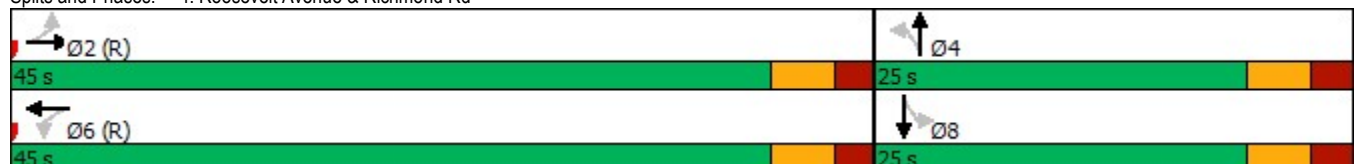
Intersection LOS: B

Intersection Capacity Utilization 58.8%

ICU Level of Service B

Analysis Period (min) 15

















Splits and Phases: 4: Roosevelt Avenue & Richmond Rd



# Conditions

## 4: Roosevelt Avenue & Richmond Rd

2025 Future Background AM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	3	636	10	14	298	26	26	10	32	32	12	7
Future Volume (vph)	3	636	10	14	298	26	26	10	32	32	12	7
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)		4.0			4.0			4.0			4.0	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frpb, ped/bikes		1.00			0.99			0.95			0.98	
Flpb, ped/bikes		1.00			1.00			0.96			0.96	
Frt		1.00			0.99			0.94			0.98	
Flt Protected		1.00			1.00			0.98			0.97	
Satd. Flow (prot)		1757			1724			1480			1578	
Flt Permitted		1.00			0.97			0.88			0.81	
Satd. Flow (perm)		1756			1672			1333			1312	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	3	707	11	16	331	29	29	11	36	36	13	8
RTOR Reduction (vph)	0	1	0	0	3	0	0	28	0	0	6	0
Lane Group Flow (vph)	0	720	0	0	373	0	0	48	0	0	51	0
Confl. Peds. (#/hr)	74		69	69		74	65		40	40		65
Confl. Bikes (#/hr)			7			4			4			4
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2			6			4			8		
Actuated Green, G (s)		45.6			45.6			13.4			13.4	
Effective Green, g (s)		47.0			47.0			15.0			15.0	
Actuated g/C Ratio		0.67			0.67			0.21			0.21	
Clearance Time (s)		5.4			5.4			5.6			5.6	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		1179			1122			285			281	
v/s Ratio Prot												
v/s Ratio Perm		c0.41			0.22			0.04			c0.04	
v/c Ratio		0.61			0.33			0.17			0.18	
Uniform Delay, d1		6.4			4.9			22.4			22.5	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		2.4			0.8			0.3			0.3	
Delay (s)		8.8			5.7			22.7			22.8	
Level of Service		A			A			C			C	
Approach Delay (s)		8.8			5.7			22.7			22.8	
Approach LOS		A			A			C			C	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			9.3			HCM 2000 Level of Service				A		
HCM 2000 Volume to Capacity ratio			0.51									
Actuated Cycle Length (s)			70.0			Sum of lost time (s)			8.0			
Intersection Capacity Utilization			58.8%			ICU Level of Service			B			
Analysis Period (min)			15									

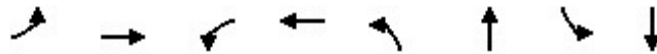
c Critical Lane Group



# Conditions

## 5: Churchill Avenue North & Richmond Rd

2025 Future Background AM



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	Ø9	Ø10
Lane Configurations										
Traffic Volume (vph)	264	390	43	183	24	278	29	331		
Future Volume (vph)	264	390	43	183	24	278	29	331		
Lane Group Flow (vph)	293	465	48	226	0	428	0	559		
Turn Type	Prot	NA	Perm	NA	Perm	NA	Perm	NA		
Protected Phases	5	2		6		4		8	9	10
Permitted Phases			6		4		8	8		
Detector Phase	5	2	6	6	4	4	8	8		
Switch Phase										
Minimum Initial (s)	5.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	1.0	1.0
Minimum Split (s)	11.1	26.1	26.1	26.1	26.1	26.1	26.2	26.2	5.0	5.0
Total Split (s)	14.0	40.0	26.0	26.0	30.0	30.0	30.0	30.0	5.0	5.0
Total Split (%)	17.5%	50.0%	32.5%	32.5%	37.5%	37.5%	37.5%	37.5%	6%	6%
Yellow Time (s)	3.3	3.3	3.3	3.3	3.6	3.6	3.6	3.6	2.0	2.0
All-Red Time (s)	2.8	2.8	2.8	2.8	2.6	2.6	2.6	2.6	0.0	0.0
Lost Time Adjust (s)	-2.1	-2.1	-2.1	-2.1		-2.2		-2.2		
Total Lost Time (s)	4.0	4.0	4.0	4.0		4.0		4.0		
Lead/Lag	Lead		Lag	Lag						
Lead-Lag Optimize?			Yes	Yes						
Recall Mode	None	C-Max	C-Max	C-Max	None	None	None	None	None	None
Act Effct Green (s)	24.4	50.4	22.0	22.0		21.6		21.6		
Actuated g/C Ratio	0.30	0.63	0.28	0.28		0.27		0.27		
v/c Ratio	0.57	0.43	0.22	0.47		0.55		0.70		
Control Delay	31.1	9.8	25.5	27.2		19.2		26.7		
Queue Delay	0.0	0.0	0.0	0.0		0.0		0.0		
Total Delay	31.1	9.8	25.5	27.2		19.2		26.7		
LOS	C	A	C	C		B		C		
Approach Delay		18.0		26.9		19.2		26.7		
Approach LOS		B		C		B		C		
Queue Length 50th (m)	39.2	32.8	5.9	29.0		18.3		36.2		
Queue Length 95th (m)	#81.9	65.3	15.0	50.1		26.9		47.9		
Internal Link Dist (m)		276.4		61.0		100.0		41.6		
Turn Bay Length (m)	40.0		45.0							
Base Capacity (vph)	510	1090	223	480		937		962		
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	0.57	0.43	0.22	0.47		0.46		0.58		

### Intersection Summary

Cycle Length: 80

Actuated Cycle Length: 80

Offset: 43 (54%), Referenced to phase 6:WBTL and 2:EBT, Start of Green

Natural Cycle: 80

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.70

Intersection Signal Delay: 21.9

Intersection LOS: C

Intersection Capacity Utilization 74.3%

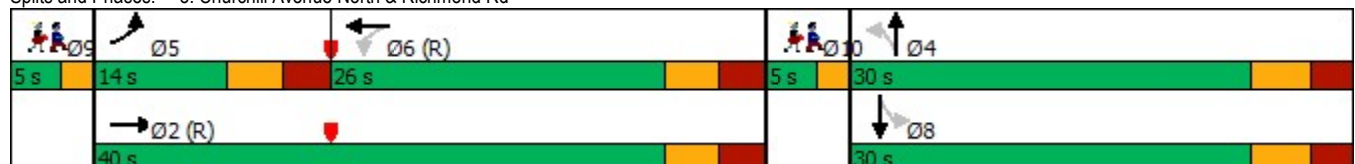
ICU Level of Service D

Analysis Period (min) 15

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

Queue shown is maximum after two cycles.



















### Splits and Phases: 5: Churchill Avenue North & Richmond Rd



# Conditions

## 5: Churchill Avenue North & Richmond Rd

2025 Future Background AM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	264	390	29	43	183	21	24	278	83	29	331	143
Future Volume (vph)	264	390	29	43	183	21	24	278	83	29	331	143
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0			4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			0.95			0.95	
Frpb, ped/bikes	1.00	0.99		1.00	0.99			0.97			0.95	
Flpb, ped/bikes	1.00	1.00		0.93	1.00			1.00			1.00	
Frt	1.00	0.99		1.00	0.98			0.97			0.96	
Flt Protected	0.95	1.00		0.95	1.00			1.00			1.00	
Satd. Flow (prot)	1676	1727		1557	1728			3136			3041	
Flt Permitted	0.95	1.00		0.50	1.00			0.88			0.91	
Satd. Flow (perm)	1676	1727		813	1728			2753			2764	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	293	433	32	48	203	23	27	309	92	32	368	159
RTOR Reduction (vph)	0	2	0	0	5	0	0	34	0	0	58	0
Lane Group Flow (vph)	293	463	0	48	221	0	0	394	0	0	501	0
Confl. Peds. (#/hr)	34		68	68		34	45		36	36		45
Confl. Bikes (#/hr)			11			1						8
Turn Type	Prot	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases	5	2			6			4			8	
Permitted Phases				6			4			8	8	
Actuated Green, G (s)	22.3	48.3		19.9	19.9			19.4			19.4	
Effective Green, g (s)	24.4	50.4		22.0	22.0			21.6			21.6	
Actuated g/C Ratio	0.30	0.63		0.28	0.28			0.27			0.27	
Clearance Time (s)	6.1	6.1		6.1	6.1			6.2			6.2	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	511	1088		223	475			743			746	
v/s Ratio Prot	c0.17	c0.27			0.13							
v/s Ratio Perm				0.06				0.14			c0.18	
v/c Ratio	0.57	0.43		0.22	0.47			0.53			0.67	
Uniform Delay, d1	23.4	7.5		22.3	24.1			24.9			26.0	
Progression Factor	1.00	1.00		1.00	1.00			0.77			1.00	
Incremental Delay, d2	1.6	1.2		2.2	3.3			0.7			2.4	
Delay (s)	25.0	8.7		24.5	27.4			19.9			28.4	
Level of Service	C	A		C	C			B			C	
Approach Delay (s)		15.0			26.9			19.9			28.4	
Approach LOS		B			C			B			C	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			21.4		HCM 2000 Level of Service				C			
HCM 2000 Volume to Capacity ratio			0.61									
Actuated Cycle Length (s)			80.0		Sum of lost time (s)			16.0				
Intersection Capacity Utilization			74.3%		ICU Level of Service			D				
Analysis Period (min)			15									

c Critical Lane Group

# Conditions

## 6: Ped Crossing & Richmond Rd

2025 Future Background AM



Lane Group	EBT	WBT	Ø4	Ø8
Lane Configurations	↑↑↑	↑		
Traffic Volume (vph)	793	387		
Future Volume (vph)	793	387		
Lane Group Flow (vph)	881	430		
Turn Type	NA	NA		
Protected Phases	2	6	4	8
Permitted Phases				
Detector Phase	2	6		
Switch Phase				
Minimum Initial (s)	10.0	10.0	10.0	10.0
Minimum Split (s)	15.1	15.1	25.0	25.0
Total Split (s)	40.0	40.0	25.0	25.0
Total Split (%)	61.5%	61.5%	38%	38%
Yellow Time (s)	3.0	3.0	3.0	3.0
All-Red Time (s)	2.1	2.1	1.0	1.0
Lost Time Adjust (s)	-1.1	-1.1		
Total Lost Time (s)	4.0	4.0		
Lead/Lag				
Lead-Lag Optimize?				
Recall Mode	C-Max	C-Max	Ped	Ped
Act Effct Green (s)	36.0	36.0		
Actuated g/C Ratio	0.55	0.55		
v/c Ratio	0.47	0.44		
Control Delay	9.8	10.4		
Queue Delay	0.0	0.0		
Total Delay	9.8	10.4		
LOS	A	B		
Approach Delay	9.8	10.4		
Approach LOS	A	B		
Queue Length 50th (m)	32.2	29.1		
Queue Length 95th (m)	45.2	48.4		
Internal Link Dist (m)	41.2	106.6		
Turn Bay Length (m)				
Base Capacity (vph)	1857	977		
Starvation Cap Reductn	0	0		
Spillback Cap Reductn	0	0		
Storage Cap Reductn	0	0		
Reduced v/c Ratio	0.47	0.44		

### Intersection Summary
















Cycle Length: 65	
Actuated Cycle Length: 65	
Offset: 11 (17%), Referenced to phase 2:EBT and 6:WBT, Start of Green	
Natural Cycle: 45	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.47	
Intersection Signal Delay: 10.0	Intersection LOS: B
Intersection Capacity Utilization 26.5%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 6: Ped Crossing & Richmond Rd


# Conditions

## 6: Ped Crossing & Richmond Rd

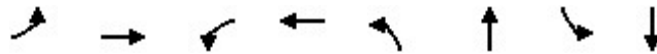
2025 Future Background AM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 										
Traffic Volume (vph)	0	793	0	0	387	0	0	0	0	0	0	0
Future Volume (vph)	0	793	0	0	387	0	0	0	0	0	0	0
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)		4.0			4.0							
Lane Util. Factor		0.95			1.00							
Frpb, ped/bikes		1.00			1.00							
Flpb, ped/bikes		1.00			1.00							
Frt		1.00			1.00							
Flt Protected		1.00			1.00							
Satd. Flow (prot)		3353			1765							
Flt Permitted		1.00			1.00							
Satd. Flow (perm)		3353			1765							
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	0	881	0	0	430	0	0	0	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	881	0	0	430	0	0	0	0	0	0	0
Confl. Peds. (#/hr)							14		14	14		14
Confl. Bikes (#/hr)									1			9
Turn Type		NA			NA							
Protected Phases		2			6							
Permitted Phases												
Actuated Green, G (s)		34.9			34.9							
Effective Green, g (s)		36.0			36.0							
Actuated g/C Ratio		0.55			0.55							
Clearance Time (s)		5.1			5.1							
Vehicle Extension (s)		3.0			3.0							
Lane Grp Cap (vph)		1857			977							
v/s Ratio Prot		0.26			0.24							
v/s Ratio Perm												
v/c Ratio		0.47			0.44							
Uniform Delay, d1		8.8			8.6							
Progression Factor		1.00			1.00							
Incremental Delay, d2		0.9			1.4							
Delay (s)		9.6			10.0							
Level of Service		A			A							
Approach Delay (s)		9.6			10.0			0.0			0.0	
Approach LOS		A			A			A			A	
<b>Intersection Summary</b>												
HCM 2000 Control Delay		9.8			HCM 2000 Level of Service			A				
HCM 2000 Volume to Capacity ratio		0.30										
Actuated Cycle Length (s)		65.0			Sum of lost time (s)			8.0				
Intersection Capacity Utilization		26.5%			ICU Level of Service			A				
Analysis Period (min)		15										
c Critical Lane Group												

# Conditions

## 1: Churchill Avenue North & Byron Avenue

2025 Future Background PM



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	19	134	110	307	31	309	23	344
Future Volume (vph)	19	134	110	307	31	309	23	344
Lane Group Flow (vph)	0	224	0	516	34	419	26	441
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		4		8		2		6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	2	2	6	6
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	30.6	30.6	30.6	30.6	26.4	26.4	26.4	26.4
Total Split (s)	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0
Total Split (%)	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	2.3	2.3	2.3	2.3	2.1	2.1	2.1	2.1
Lost Time Adjust (s)		-1.6		-1.6	-1.4	-1.4	-1.4	-1.4
Total Lost Time (s)		4.0		4.0	4.0	4.0	4.0	4.0
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	C-Max	C-Max	C-Max	C-Max
Act Effct Green (s)		36.2		36.2	45.8	45.8	45.8	45.8
Actuated g/C Ratio		0.40		0.40	0.51	0.51	0.51	0.51
v/c Ratio		0.34		0.86	0.10	0.48	0.07	0.51
Control Delay		17.2		39.3	14.6	17.3	11.7	14.8
Queue Delay		0.0		0.0	0.0	0.0	0.0	0.9
Total Delay		17.2		39.3	14.6	17.3	11.7	15.6
LOS		B		D	B	B	B	B
Approach Delay		17.2		39.3		17.1		15.4
Approach LOS		B		D		B		B
Queue Length 50th (m)		23.6		79.9	3.2	47.1	2.3	43.2
Queue Length 95th (m)		38.5		#118.1	9.5	79.0	m4.2	66.8
Internal Link Dist (m)		244.6		113.6		126.7		100.0
Turn Bay Length (m)					30.0		30.0	
Base Capacity (vph)		735		676	341	876	367	873
Starvation Cap Reductn		0		0	0	0	0	201
Spillback Cap Reductn		0		0	0	0	0	0
Storage Cap Reductn		0		0	0	0	0	0
Reduced v/c Ratio		0.30		0.76	0.10	0.48	0.07	0.66

### Intersection Summary

Cycle Length: 90

Actuated Cycle Length: 90

Offset: 40 (44%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green

Natural Cycle: 60

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.86

Intersection Signal Delay: 23.5

Intersection LOS: C

Intersection Capacity Utilization 78.5%

ICU Level of Service D

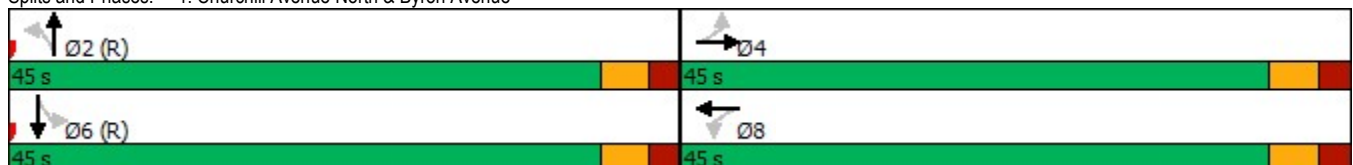
Analysis Period (min) 15

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

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.



















Splits and Phases: 1: Churchill Avenue North & Byron Avenue



# Conditions

## 1: Churchill Avenue North & Byron Avenue

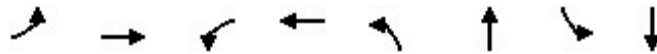
2025 Future Background PM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	19	134	49	110	307	48	31	309	68	23	344	53
Future Volume (vph)	19	134	49	110	307	48	31	309	68	23	344	53
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)		4.0			4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes		0.99			1.00		1.00	0.99		1.00	0.99	
Flpb, ped/bikes		1.00			1.00		0.96	1.00		1.00	1.00	
Frt		0.97			0.99		1.00	0.97		1.00	0.98	
Flt Protected		1.00			0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1683			1712		1618	1707		1669	1705	
Flt Permitted		0.94			0.85		0.39	1.00		0.41	1.00	
Satd. Flow (perm)		1588			1476		668	1707		722	1705	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	21	149	54	122	341	53	34	343	76	26	382	59
RTOR Reduction (vph)	0	14	0	0	5	0	0	8	0	0	5	0
Lane Group Flow (vph)	0	210	0	0	511	0	34	411	0	26	436	0
Confl. Peds. (#/hr)	3		11	11		3	40			5		40
Confl. Bikes (#/hr)			1						1			
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		34.6			34.6		44.4	44.4		44.4	44.4	
Effective Green, g (s)		36.2			36.2		45.8	45.8		45.8	45.8	
Actuated g/C Ratio		0.40			0.40		0.51	0.51		0.51	0.51	
Clearance Time (s)		5.6			5.6		5.4	5.4		5.4	5.4	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		638			593		339	868		367	867	
v/s Ratio Prot								0.24			c0.26	
v/s Ratio Perm		0.13			c0.35		0.05			0.04		
v/c Ratio		0.33			0.86		0.10	0.47		0.07	0.50	
Uniform Delay, d1		18.5			24.6		11.4	14.3		11.3	14.6	
Progression Factor		1.00			1.00		1.00	1.00		0.82	0.82	
Incremental Delay, d2		0.3			12.3		0.6	1.9		0.3	1.7	
Delay (s)		18.8			36.9		12.0	16.2		9.6	13.6	
Level of Service		B			D		B	B		A	B	
Approach Delay (s)		18.8			36.9			15.8			13.4	
Approach LOS		B			D			B			B	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			22.1			HCM 2000 Level of Service				C		
HCM 2000 Volume to Capacity ratio			0.66									
Actuated Cycle Length (s)			90.0			Sum of lost time (s)			8.0			
Intersection Capacity Utilization			78.5%			ICU Level of Service			D			
Analysis Period (min)			15									
c Critical Lane Group												

# Conditions

## 2: Roosevelt Avenue & Byron Avenue

2025 Future Background PM



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	13	150	22	297	6	21	31	21
Future Volume (vph)	13	150	22	297	6	21	31	21
Lane Group Flow (vph)	0	190	0	405	0	47	0	93
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		2		6		4		8
Permitted Phases	2		6		4		8	
Detector Phase	2	2	6	6	4	4	8	8
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	22.5	22.5	22.5	22.5	20.0	20.0	20.0	20.0
Total Split (s)	50.0	50.0	50.0	50.0	20.0	20.0	20.0	20.0
Total Split (%)	71.4%	71.4%	71.4%	71.4%	28.6%	28.6%	28.6%	28.6%
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	2.2	2.2	2.2	2.2	1.7	1.7	1.7	1.7
Lost Time Adjust (s)		-1.5		-1.5		-1.0		-1.0
Total Lost Time (s)		4.0		4.0		4.0		4.0
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	Max	Max	Max	Max	None	None	None	None
Act Effct Green (s)		54.1		54.1		14.1		14.1
Actuated g/C Ratio		0.75		0.75		0.20		0.20
v/c Ratio		0.15		0.32		0.15		0.31
Control Delay		4.2		5.1		17.4		19.0
Queue Delay		0.0		0.0		0.0		0.0
Total Delay		4.2		5.1		17.4		19.0
LOS		A		A		B		B
Approach Delay		4.2		5.1		17.4		19.0
Approach LOS		A		A		B		B
Queue Length 50th (m)		8.3		19.8		3.6		7.0
Queue Length 95th (m)		15.2		33.4		11.2		18.0
Internal Link Dist (m)		50.9		244.6		129.2		56.5
Turn Bay Length (m)								
Base Capacity (vph)		1275		1273		361		338
Starvation Cap Reductn		0		0		0		0
Spillback Cap Reductn		0		0		0		0
Storage Cap Reductn		0		0		0		0
Reduced v/c Ratio		0.15		0.32		0.13		0.28

### Intersection Summary

Cycle Length: 70

Actuated Cycle Length: 72

Natural Cycle: 45

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.32

Intersection Signal Delay: 7.4

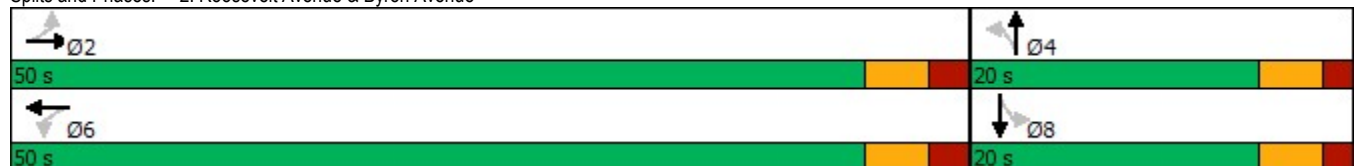
Intersection Capacity Utilization 44.9%

Analysis Period (min) 15

Intersection LOS: A

ICU Level of Service A

Splits and Phases: 2: Roosevelt Avenue & Byron Avenue





















# Conditions

## 2: Roosevelt Avenue & Byron Avenue

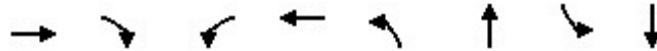
2025 Future Background PM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	13	150	8	22	297	46	6	21	15	31	21	32
Future Volume (vph)	13	150	8	22	297	46	6	21	15	31	21	32
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)		4.0			4.0			4.0			4.0	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frpb, ped/bikes		1.00			0.99			0.98			0.95	
Flpb, ped/bikes		1.00			1.00			0.99			0.99	
Frt		0.99			0.98			0.95			0.95	
Flt Protected		1.00			1.00			0.99			0.98	
Satd. Flow (prot)		1742			1716			1619			1548	
Flt Permitted		0.97			0.98			0.96			0.88	
Satd. Flow (perm)		1694			1687			1558			1384	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	14	167	9	24	330	51	7	23	17	34	23	36
RTOR Reduction (vph)	0	2	0	0	6	0	0	14	0	0	30	0
Lane Group Flow (vph)	0	188	0	0	399	0	0	33	0	0	63	0
Confl. Peds. (#/hr)	17		7	7		17	46		9	9		46
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2			6			4			8		
Actuated Green, G (s)		51.7			51.7			10.9			10.9	
Effective Green, g (s)		53.2			53.2			11.9			11.9	
Actuated g/C Ratio		0.73			0.73			0.16			0.16	
Clearance Time (s)		5.5			5.5			5.0			5.0	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		1232			1227			253			225	
v/s Ratio Prot												
v/s Ratio Perm		0.11			0.24			0.02			0.05	
v/c Ratio		0.15			0.33			0.13			0.28	
Uniform Delay, d1		3.0			3.5			26.2			26.8	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		0.3			0.7			0.2			0.7	
Delay (s)		3.3			4.3			26.4			27.5	
Level of Service		A			A			C			C	
Approach Delay (s)		3.3			4.3			26.4			27.5	
Approach LOS		A			A			C			C	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			8.4			HCM 2000 Level of Service				A		
HCM 2000 Volume to Capacity ratio			0.32									
Actuated Cycle Length (s)			73.1			Sum of lost time (s)			8.0			
Intersection Capacity Utilization			44.9%			ICU Level of Service			A			
Analysis Period (min)			15									
c Critical Lane Group												

# Conditions

## 3: Golden Avenue & Richmond Rd

2025 Future Background PM



Lane Group	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	347	21	44	649	67	1	6	3
Future Volume (vph)	347	21	44	649	67	1	6	3
Lane Group Flow (vph)	386	23	0	774	0	138	0	11
Turn Type	NA	Perm	Perm	NA	Perm	NA	Perm	NA
Protected Phases	2			6		4		8
Permitted Phases		2	6		4		8	
Detector Phase	2	2	6	6	4	4	8	8
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	28.8	28.8	28.8	28.8	28.6	28.6	28.6	28.6
Total Split (s)	50.0	50.0	50.0	50.0	29.0	29.0	29.0	29.0
Total Split (%)	63.3%	63.3%	63.3%	63.3%	36.7%	36.7%	36.7%	36.7%
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	2.5	2.5	2.5	2.5	2.3	2.3	2.3	2.3
Lost Time Adjust (s)	-1.8	-1.8		-1.8		-1.6		-1.6
Total Lost Time (s)	4.0	4.0		4.0		4.0		4.0
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	C-Max	C-Max	C-Max	C-Max	None	None	None	None
Act Effct Green (s)	51.6	51.6		51.6		19.4		19.4
Actuated g/C Ratio	0.65	0.65		0.65		0.25		0.25
v/c Ratio	0.34	0.03		0.71		0.39		0.03
Control Delay	8.3	1.8		15.3		16.8		18.5
Queue Delay	0.0	0.0		1.0		0.0		0.0
Total Delay	8.3	1.8		16.2		16.8		18.5
LOS	A	A		B		B		B
Approach Delay	7.9			16.2		16.8		18.5
Approach LOS	A			B		B		B
Queue Length 50th (m)	29.2	0.0		84.8		9.4		1.1
Queue Length 95th (m)	46.5	1.9		137.6		23.6		4.7
Internal Link Dist (m)	37.9			130.2		72.7		29.6
Turn Bay Length (m)								
Base Capacity (vph)	1152	844		1096		444		450
Starvation Cap Reductn	0	0		126		0		0
Spillback Cap Reductn	0	0		0		0		0
Storage Cap Reductn	0	0		0		0		0
Reduced v/c Ratio	0.34	0.03		0.80		0.31		0.02

### Intersection Summary

Cycle Length: 79

Actuated Cycle Length: 79

Offset: 5 (6%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green

Natural Cycle: 70

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.71

Intersection Signal Delay: 13.8

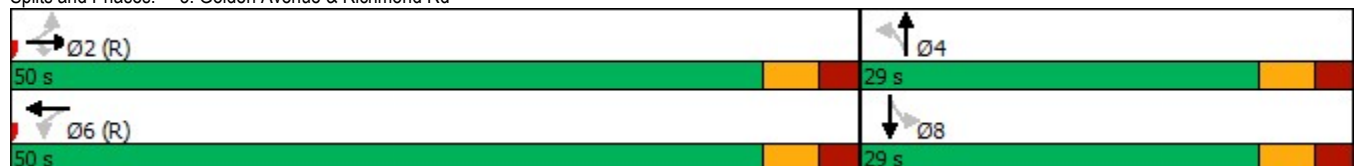
Intersection LOS: B

Intersection Capacity Utilization 86.2%

ICU Level of Service E

Analysis Period (min) 15


















Splits and Phases: 3: Golden Avenue & Richmond Rd



# Conditions

## 3: Golden Avenue & Richmond Rd

2025 Future Background PM

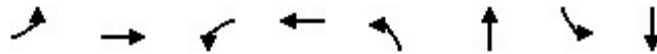
												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	347	21	44	649	4	67	1	57	6	3	1
Future Volume (vph)	0	347	21	44	649	4	67	1	57	6	3	1
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)		4.0	4.0		4.0			4.0			4.0	
Lane Util. Factor		1.00	1.00		1.00			1.00			1.00	
Frpb, ped/bikes		1.00	0.85		1.00			0.94			0.99	
Flpb, ped/bikes		1.00	1.00		1.00			0.98			0.95	
Frt		1.00	0.85		1.00			0.94			0.99	
Flt Protected		1.00	1.00		1.00			0.97			0.97	
Satd. Flow (prot)		1765	1273		1749			1487			1596	
Flt Permitted		1.00	1.00		0.96			0.84			0.86	
Satd. Flow (perm)		1765	1273		1679			1283			1421	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	0	386	23	49	721	4	74	1	63	7	3	1
RTOR Reduction (vph)	0	0	8	0	0	0	0	42	0	0	1	0
Lane Group Flow (vph)	0	386	15	0	774	0	0	96	0	0	10	0
Confl. Peds. (#/hr)	66		77		66		25		60		60	
Confl. Bikes (#/hr)			3			17			2			7
Turn Type		NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2		2	6			4			8		
Actuated Green, G (s)		49.8	49.8		49.8			17.8			17.8	
Effective Green, g (s)		51.6	51.6		51.6			19.4			19.4	
Actuated g/C Ratio		0.65	0.65		0.65			0.25			0.25	
Clearance Time (s)		5.8	5.8		5.8			5.6			5.6	
Vehicle Extension (s)		3.0	3.0		3.0			3.0			3.0	
Lane Grp Cap (vph)		1152	831		1096			315			348	
v/s Ratio Prot		0.22										
v/s Ratio Perm			0.01		c0.46			c0.07			0.01	
v/c Ratio		0.34	0.02		0.71			0.30			0.03	
Uniform Delay, d1		6.1	4.8		8.8			24.3			22.6	
Progression Factor		1.00	1.00		1.00			1.00			1.00	
Incremental Delay, d2		0.8	0.0		3.8			0.5			0.0	
Delay (s)		6.9	4.8		12.6			24.8			22.7	
Level of Service		A	A		B			C			C	
Approach Delay (s)		6.8			12.6			24.8			22.7	
Approach LOS		A			B			C			C	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			12.2		HCM 2000 Level of Service					B		
HCM 2000 Volume to Capacity ratio			0.60									
Actuated Cycle Length (s)			79.0		Sum of lost time (s)				8.0			
Intersection Capacity Utilization			86.2%		ICU Level of Service				E			
Analysis Period (min)			15									

c Critical Lane Group

# Conditions

## 4: Roosevelt Avenue & Richmond Rd

2025 Future Background PM



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	7	408	27	699	34	18	32	11
Future Volume (vph)	7	408	27	699	34	18	32	11
Lane Group Flow (vph)	0	485	0	846	0	111	0	64
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		2		6		4		8
Permitted Phases	2		6		4		8	
Detector Phase	2	2	6	6	4	4	8	8
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	33.4	33.4	33.4	33.4	24.6	24.6	24.6	24.6
Total Split (s)	60.0	60.0	60.0	60.0	25.0	25.0	25.0	25.0
Total Split (%)	70.6%	70.6%	70.6%	70.6%	29.4%	29.4%	29.4%	29.4%
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	2.1	2.1	2.1	2.1	2.3	2.3	2.3	2.3
Lost Time Adjust (s)		-1.4		-1.4		-1.6		-1.6
Total Lost Time (s)		4.0		4.0		4.0		4.0
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	C-Max	C-Max	C-Max	C-Max	None	None	None	None
Act Effct Green (s)		63.9		63.9		17.0		17.0
Actuated g/C Ratio		0.75		0.75		0.20		0.20
v/c Ratio		0.38		0.67		0.40		0.25
Control Delay		6.5		11.3		20.5		24.0
Queue Delay		0.3		0.0		0.0		0.0
Total Delay		6.7		11.3		20.5		24.0
LOS		A		B		C		C
Approach Delay		6.7		11.3		20.5		24.0
Approach LOS		A		B		C		C
Queue Length 50th (m)		33.6		84.9		8.2		6.5
Queue Length 95th (m)		52.2		136.5		22.8		17.2
Internal Link Dist (m)		130.2		276.4		56.5		123.0
Turn Bay Length (m)								
Base Capacity (vph)		1282		1267		332		306
Starvation Cap Reductn		307		0		0		0
Spillback Cap Reductn		0		0		0		0
Storage Cap Reductn		0		0		0		0
Reduced v/c Ratio		0.50		0.67		0.33		0.21

### Intersection Summary

Cycle Length: 85

Actuated Cycle Length: 85

Offset: 78 (92%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green

Natural Cycle: 65

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.67

Intersection Signal Delay: 11.1

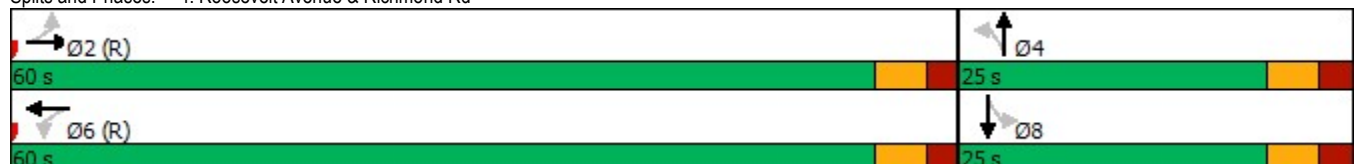
Intersection LOS: B

Intersection Capacity Utilization 79.6%

ICU Level of Service D

Analysis Period (min) 15

















Splits and Phases: 4: Roosevelt Avenue & Richmond Rd



# Conditions

## 4: Roosevelt Avenue & Richmond Rd

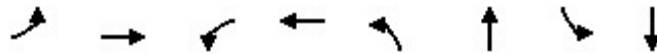
2025 Future Background PM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	7	408	22	27	699	35	34	18	48	32	11	14
Future Volume (vph)	7	408	22	27	699	35	34	18	48	32	11	14
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)		4.0			4.0			4.0			4.0	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frpb, ped/bikes		0.98			0.99			0.89			0.93	
Flpb, ped/bikes		1.00			1.00			0.92			0.91	
Frt		0.99			0.99			0.94			0.97	
Flt Protected		1.00			1.00			0.98			0.97	
Satd. Flow (prot)		1723			1723			1332			1408	
Flt Permitted		0.99			0.98			0.88			0.83	
Satd. Flow (perm)		1703			1683			1191			1196	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	8	453	24	30	777	39	38	20	53	36	12	16
RTOR Reduction (vph)	0	2	0	0	2	0	0	42	0	0	13	0
Lane Group Flow (vph)	0	483	0	0	844	0	0	69	0	0	51	0
Confl. Peds. (#/hr)	135		182	182		135	116		92	92		116
Confl. Bikes (#/hr)			3			9			5			2
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2			6			4			8		
Actuated Green, G (s)		60.6			60.6			13.4			13.4	
Effective Green, g (s)		62.0			62.0			15.0			15.0	
Actuated g/C Ratio		0.73			0.73			0.18			0.18	
Clearance Time (s)		5.4			5.4			5.6			5.6	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		1242			1227			210			211	
v/s Ratio Prot												
v/s Ratio Perm		0.28			0.50			0.06			0.04	
v/c Ratio		0.39			0.69			0.33			0.24	
Uniform Delay, d1		4.3			6.2			30.6			30.1	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		0.9			3.2			0.9			0.6	
Delay (s)		5.3			9.4			31.5			30.7	
Level of Service		A			A			C			C	
Approach Delay (s)		5.3			9.4			31.5			30.7	
Approach LOS		A			A			C			C	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			10.6									
HCM 2000 Volume to Capacity ratio			0.62									
Actuated Cycle Length (s)			85.0						8.0			
Intersection Capacity Utilization			79.6%									
Analysis Period (min)			15									
c Critical Lane Group												

# Conditions

## 5: Churchill Avenue North & Richmond Rd

2025 Future Background PM



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	Ø9	Ø10
Lane Configurations										
Traffic Volume (vph)	163	298	128	453	27	275	22	266		
Future Volume (vph)	163	298	128	453	27	275	22	266		
Lane Group Flow (vph)	181	382	142	544	0	420	0	634		
Turn Type	Prot	NA	Perm	NA	Perm	NA	Perm	NA		
Protected Phases	5	2		6		4		8	9	10
Permitted Phases			6		4		8	8		
Detector Phase	5	2	6	6	4	4	8	8		
Switch Phase										
Minimum Initial (s)	5.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	1.0	1.0
Minimum Split (s)	11.1	26.1	26.1	26.1	26.1	26.1	26.2	26.2	5.0	5.0
Total Split (s)	12.0	52.0	40.0	40.0	28.0	28.0	28.0	28.0	5.0	5.0
Total Split (%)	13.3%	57.8%	44.4%	44.4%	31.1%	31.1%	31.1%	31.1%	6%	6%
Yellow Time (s)	3.3	3.3	3.3	3.3	3.6	3.6	3.6	3.6	2.0	2.0
All-Red Time (s)	2.8	2.8	2.8	2.8	2.6	2.6	2.6	2.6	0.0	0.0
Lost Time Adjust (s)	-2.1	-2.1	-2.1	-2.1		-2.2		-2.2		
Total Lost Time (s)	4.0	4.0	4.0	4.0		4.0		4.0		
Lead/Lag	Lead		Lag	Lag						
Lead-Lag Optimize?			Yes	Yes						
Recall Mode	None	C-Max	C-Max	C-Max	None	None	None	None	None	None
Act Effct Green (s)	18.7	59.5	36.8	36.8		22.5		22.5		
Actuated g/C Ratio	0.21	0.66	0.41	0.41		0.25		0.25		
v/c Ratio	0.52	0.35	0.47	0.77		0.67		0.78		
Control Delay	40.3	8.5	26.3	31.8		23.6		24.7		
Queue Delay	0.0	0.0	0.0	0.0		0.0		0.2		
Total Delay	40.3	8.5	26.3	31.8		23.6		24.9		
LOS	D	A	C	C		C		C		
Approach Delay		18.7		30.7		23.6		24.9		
Approach LOS		B		C		C		C		
Queue Length 50th (m)	29.1	26.0	18.8	83.9		16.8		33.1		
Queue Length 95th (m)	#64.2	51.9	37.7	#131.5		m24.9		49.0		
Internal Link Dist (m)		276.4		61.0		100.0		41.6		
Turn Bay Length (m)	40.0		45.0							
Base Capacity (vph)	348	1089	302	709		703		879		
Starvation Cap Reductn	0	0	0	0		0		0		
Spillback Cap Reductn	0	0	0	0		0		20		
Storage Cap Reductn	0	0	0	0		0		0		
Reduced v/c Ratio	0.52	0.35	0.47	0.77		0.60		0.74		

### Intersection Summary

Cycle Length: 90

Actuated Cycle Length: 90

Offset: 0 (0%), Referenced to phase 6:WBT and 2:EBT, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.78

Intersection Signal Delay: 24.9

Intersection LOS: C

Intersection Capacity Utilization 83.8%

ICU Level of Service E

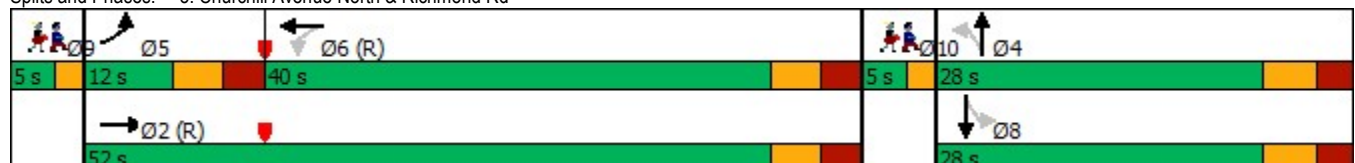
Analysis Period (min) 15

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

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.



















### Splits and Phases: 5: Churchill Avenue North & Richmond Rd



# Conditions

## 5: Churchill Avenue North & Richmond Rd

2025 Future Background PM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	163	298	46	128	453	37	27	275	76	22	266	283
Future Volume (vph)	163	298	46	128	453	37	27	275	76	22	266	283
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0			4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			0.95			0.95	
Frpb, ped/bikes	1.00	0.95		1.00	0.99			0.96			0.85	
Flpb, ped/bikes	1.00	1.00		0.78	1.00			1.00			1.00	
Frt	1.00	0.98		1.00	0.99			0.97			0.93	
Flt Protected	0.95	1.00		0.95	1.00			1.00			1.00	
Satd. Flow (prot)	1676	1642		1315	1728			3092			2620	
Flt Permitted	0.95	1.00		0.54	1.00			0.77			0.92	
Satd. Flow (perm)	1676	1642		741	1728			2403			2426	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	181	331	51	142	503	41	30	306	84	24	296	314
RTOR Reduction (vph)	0	4	0	0	3	0	0	25	0	0	201	0
Lane Group Flow (vph)	181	378	0	142	541	0	0	395	0	0	433	0
Confl. Peds. (#/hr)	86		163	163		86	84		54	54		84
Confl. Bikes (#/hr)			2			4			3			1
Turn Type	Prot	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases	5	2			6			4			8	
Permitted Phases				6			4			8	8	
Actuated Green, G (s)	16.6	57.4		34.7	34.7			20.3			20.3	
Effective Green, g (s)	18.7	59.5		36.8	36.8			22.5			22.5	
Actuated g/C Ratio	0.21	0.66		0.41	0.41			0.25			0.25	
Clearance Time (s)	6.1	6.1		6.1	6.1			6.2			6.2	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	348	1085		302	706			600			606	
v/s Ratio Prot	c0.11	0.23			c0.31							
v/s Ratio Perm				0.19				0.16			c0.18	
v/c Ratio	0.52	0.35		0.47	0.77			0.66			0.71	
Uniform Delay, d1	31.7	6.7		19.5	22.9			30.3			30.8	
Progression Factor	1.00	1.00		1.00	1.00			0.68			1.00	
Incremental Delay, d2	1.4	0.9		5.2	7.8			2.3			4.0	
Delay (s)	33.1	7.6		24.6	30.7			23.0			34.8	
Level of Service	C	A		C	C			C			C	
Approach Delay (s)		15.8			29.4			23.0			34.8	
Approach LOS		B			C			C			C	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			26.4			HCM 2000 Level of Service			C			
HCM 2000 Volume to Capacity ratio			0.73									
Actuated Cycle Length (s)			90.0			Sum of lost time (s)			16.0			
Intersection Capacity Utilization			83.8%			ICU Level of Service			E			
Analysis Period (min)			15									
c Critical Lane Group												

# Conditions

## 6: Ped Crossing & Richmond Rd

2025 Future Background PM



Lane Group	EBT	WBT	Ø4	Ø8
Lane Configurations	↑↑	↑		
Traffic Volume (vph)	575	805		
Future Volume (vph)	575	805		
Lane Group Flow (vph)	639	894		
Turn Type	NA	NA		
Protected Phases	2	6	4	8
Permitted Phases				
Detector Phase	2	6		
Switch Phase				
Minimum Initial (s)	10.0	10.0	10.0	10.0
Minimum Split (s)	23.1	23.1	25.0	25.0
Total Split (s)	40.0	40.0	25.0	25.0
Total Split (%)	61.5%	61.5%	38%	38%
Yellow Time (s)	3.0	3.0	3.0	3.0
All-Red Time (s)	2.1	2.1	1.0	1.0
Lost Time Adjust (s)	-1.1	-1.1		
Total Lost Time (s)	4.0	4.0		
Lead/Lag				
Lead-Lag Optimize?				
Recall Mode	C-Max	C-Max	Ped	Ped
Act Effct Green (s)	36.0	36.0		
Actuated g/C Ratio	0.55	0.55		
v/c Ratio	0.34	0.92		
Control Delay	8.6	29.9		
Queue Delay	0.0	0.0		
Total Delay	8.6	29.9		
LOS	A	C		
Approach Delay	8.6	29.9		
Approach LOS	A	C		
Queue Length 50th (m)	21.2	92.7		
Queue Length 95th (m)	30.7	#175.1		
Internal Link Dist (m)	41.2	106.6		
Turn Bay Length (m)				
Base Capacity (vph)	1857	977		
Starvation Cap Reductn	0	0		
Spillback Cap Reductn	0	0		
Storage Cap Reductn	0	0		
Reduced v/c Ratio	0.34	0.92		

### Intersection Summary

Cycle Length: 65

Actuated Cycle Length: 65

Offset: 40 (62%), Referenced to phase 2:EBT and 6:WBT, Start of Green

Natural Cycle: 70

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.92

Intersection Signal Delay: 21.0

Intersection LOS: C

Intersection Capacity Utilization 48.1%

ICU Level of Service A

Analysis Period (min) 15

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

Queue shown is maximum after two cycles.

Splits and Phases: 6: Ped Crossing & Richmond Rd













→ Ø2 (R)	Ø4
40 s	25 s
← Ø6 (R)	Ø8
40 s	25 s



# Conditions

## 6: Ped Crossing & Richmond Rd

2025 Future Background PM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑			↑							
Traffic Volume (vph)	0	575	0	0	805	0	0	0	0	0	0	0
Future Volume (vph)	0	575	0	0	805	0	0	0	0	0	0	0
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)		4.0			4.0							
Lane Util. Factor		0.95			1.00							
Frpb, ped/bikes		1.00			1.00							
Flpb, ped/bikes		1.00			1.00							
Frt		1.00			1.00							
Flt Protected		1.00			1.00							
Satd. Flow (prot)		3353			1765							
Flt Permitted		1.00			1.00							
Satd. Flow (perm)		3353			1765							
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	0	639	0	0	894	0	0	0	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	639	0	0	894	0	0	0	0	0	0	0
Confl. Peds. (#/hr)							13		12	12		13
Confl. Bikes (#/hr)									2			1
Turn Type		NA			NA							
Protected Phases		2			6							
Permitted Phases												
Actuated Green, G (s)		34.9			34.9							
Effective Green, g (s)		36.0			36.0							
Actuated g/C Ratio		0.55			0.55							
Clearance Time (s)		5.1			5.1							
Vehicle Extension (s)		3.0			3.0							
Lane Grp Cap (vph)		1857			977							
v/s Ratio Prot		0.19			0.51							
v/s Ratio Perm												
v/c Ratio		0.34			0.92							
Uniform Delay, d1		8.0			13.1							
Progression Factor		1.00			1.00							
Incremental Delay, d2		0.5			14.4							
Delay (s)		8.5			27.5							
Level of Service		A			C							
Approach Delay (s)		8.5			27.5			0.0			0.0	
Approach LOS		A			C			A			A	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			19.6			HCM 2000 Level of Service				B		
HCM 2000 Volume to Capacity ratio			0.58									
Actuated Cycle Length (s)			65.0			Sum of lost time (s)				8.0		
Intersection Capacity Utilization			48.1%			ICU Level of Service				A		
Analysis Period (min)			15									

c Critical Lane Group

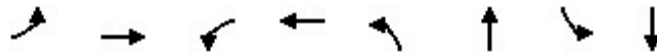
# E

## Appendix E – Total Projected Conditions Output Data

# Conditions

## 1: Churchill Avenue North & Byron Avenue

2025 Total Projected AM



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	57	170	51	122	27	329	36	316
Future Volume (vph)	57	170	51	122	27	329	36	316
Lane Group Flow (vph)	0	315	0	246	30	442	40	383
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		4		8		2		6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	2	2	6	6
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	30.6	30.6	30.6	30.6	26.4	26.4	26.4	26.4
Total Split (s)	38.0	38.0	38.0	38.0	42.0	42.0	42.0	42.0
Total Split (%)	47.5%	47.5%	47.5%	47.5%	52.5%	52.5%	52.5%	52.5%
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	2.3	2.3	2.3	2.3	2.1	2.1	2.1	2.1
Lost Time Adjust (s)		-1.6		-1.6	-1.4	-1.4	-1.4	-1.4
Total Lost Time (s)		4.0		4.0	4.0	4.0	4.0	4.0
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	C-Max	C-Max	C-Max	C-Max
Act Effct Green (s)		22.8		22.8	49.2	49.2	49.2	49.2
Actuated g/C Ratio		0.28		0.28	0.62	0.62	0.62	0.62
v/c Ratio		0.72		0.60	0.06	0.42	0.09	0.36
Control Delay		33.0		27.7	8.7	10.5	3.5	3.6
Queue Delay		0.0		0.0	0.0	0.0	0.0	0.3
Total Delay		33.0		27.7	8.7	10.5	3.5	3.8
LOS		C		C	A	B	A	A
Approach Delay		33.0		27.7		10.4		3.8
Approach LOS		C		C		B		A
Queue Length 50th (m)		42.2		30.7	1.7	31.4	1.1	10.4
Queue Length 95th (m)		60.9		46.6	6.6	66.4	m2.6	19.3
Internal Link Dist (m)		244.6		113.6		126.7		100.0
Turn Bay Length (m)					30.0		30.0	
Base Capacity (vph)		641		601	508	1052	466	1068
Starvation Cap Reductn		0		0	0	0	0	234
Spillback Cap Reductn		0		0	0	0	0	0
Storage Cap Reductn		0		0	0	0	0	0
Reduced v/c Ratio		0.49		0.41	0.06	0.42	0.09	0.46

### Intersection Summary

Cycle Length: 80

Actuated Cycle Length: 80

Offset: 74 (93%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green

Natural Cycle: 60

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.72

Intersection Signal Delay: 16.3

Intersection LOS: B

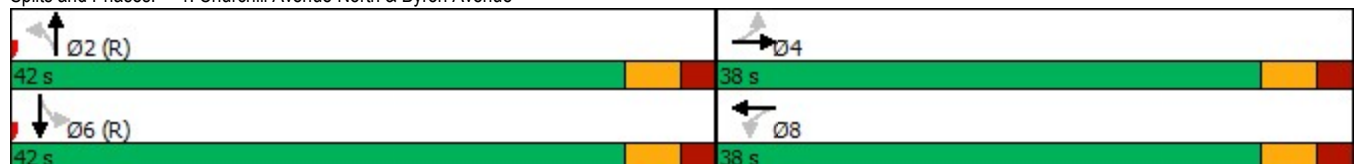
Intersection Capacity Utilization 59.5%

ICU Level of Service B

Analysis Period (min) 15

m Volume for 95th percentile queue is metered by upstream signal.



















Splits and Phases: 1: Churchill Avenue North & Byron Avenue



# Conditions

## 1: Churchill Avenue North & Byron Avenue

2025 Total Projected AM

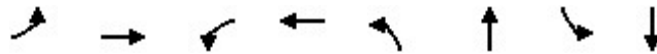
												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	57	170	57	51	122	48	27	329	68	36	316	29
Future Volume (vph)	57	170	57	51	122	48	27	329	68	36	316	29
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)		4.0			4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes		0.99			0.99		1.00	0.99		1.00	1.00	
Flpb, ped/bikes		1.00			1.00		0.96	1.00		0.96	1.00	
Frt		0.97			0.97		1.00	0.97		1.00	0.99	
Flt Protected		0.99			0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1683			1681		1604	1702		1613	1735	
Flt Permitted		0.87			0.82		0.49	1.00		0.44	1.00	
Satd. Flow (perm)		1482			1386		824	1702		755	1735	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	63	189	63	57	136	53	30	366	76	40	351	32
RTOR Reduction (vph)	0	14	0	0	15	0	0	7	0	0	3	0
Lane Group Flow (vph)	0	301	0	0	231	0	30	435	0	40	380	0
Confl. Peds. (#/hr)	13		13	13		13	43		18	43		18
Confl. Bikes (#/hr)			1						7			
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		21.2			21.2		47.8	47.8		47.8	47.8	
Effective Green, g (s)		22.8			22.8		49.2	49.2		49.2	49.2	
Actuated g/C Ratio		0.29			0.29		0.62	0.62		0.62	0.62	
Clearance Time (s)		5.6			5.6		5.4	5.4		5.4	5.4	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		422			395		506	1046		464	1067	
v/s Ratio Prot								c0.26			0.22	
v/s Ratio Perm		c0.20			0.17		0.04			0.05		
v/c Ratio		0.71			0.58		0.06	0.42		0.09	0.36	
Uniform Delay, d1		25.7			24.5		6.2	8.0		6.3	7.6	
Progression Factor		1.00			1.00		1.00	1.00		0.37	0.31	
Incremental Delay, d2		5.6			2.2		0.2	1.2		0.3	0.8	
Delay (s)		31.3			26.7		6.4	9.2		2.6	3.1	
Level of Service		C			C		A	A		A	A	
Approach Delay (s)		31.3			26.7			9.0			3.1	
Approach LOS		C			C			A			A	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			15.1			HCM 2000 Level of Service					B	
HCM 2000 Volume to Capacity ratio			0.51									
Actuated Cycle Length (s)			80.0						8.0			
Intersection Capacity Utilization			59.5%			ICU Level of Service					B	
Analysis Period (min)			15									

c Critical Lane Group

# Conditions

## 2: Roosevelt Avenue & Byron Avenue

2025 Total Projected AM



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	36	231	14	145	4	31	26	20
Future Volume (vph)	36	231	14	145	4	31	26	20
Lane Group Flow (vph)	0	306	0	208	0	57	0	64
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		2		6		4		8
Permitted Phases	2		6		4		8	
Detector Phase	2	2	6	6	4	4	8	8
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	22.5	22.5	22.5	22.5	20.0	20.0	20.0	20.0
Total Split (s)	50.0	50.0	50.0	50.0	20.0	20.0	20.0	20.0
Total Split (%)	71.4%	71.4%	71.4%	71.4%	28.6%	28.6%	28.6%	28.6%
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	2.2	2.2	2.2	2.2	1.7	1.7	1.7	1.7
Lost Time Adjust (s)		-1.5		-1.5		-1.0		-1.0
Total Lost Time (s)		4.0		4.0		4.0		4.0
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	Max	Max	Max	Max	None	None	None	None
Act Effct Green (s)		55.8		55.8		13.0		13.0
Actuated g/C Ratio		0.81		0.81		0.19		0.19
v/c Ratio		0.23		0.15		0.18		0.23
Control Delay		4.0		3.4		18.4		21.7
Queue Delay		0.0		0.0		0.0		0.0
Total Delay		4.0		3.4		18.4		21.7
LOS		A		A		B		C
Approach Delay		4.0		3.4		18.4		21.7
Approach LOS		A		A		B		C
Queue Length 50th (m)		10.7		5.9		4.8		6.6
Queue Length 95th (m)		25.2		15.5		12.8		15.1
Internal Link Dist (m)		50.9		244.6		129.2		56.5
Turn Bay Length (m)								
Base Capacity (vph)		1349		1360		389		346
Starvation Cap Reductn		0		0		0		0
Spillback Cap Reductn		0		0		0		0
Storage Cap Reductn		0		0		0		0
Reduced v/c Ratio		0.23		0.15		0.15		0.18

### Intersection Summary

Cycle Length: 70

Actuated Cycle Length: 68.8

Natural Cycle: 45

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.23

Intersection Signal Delay: 6.8

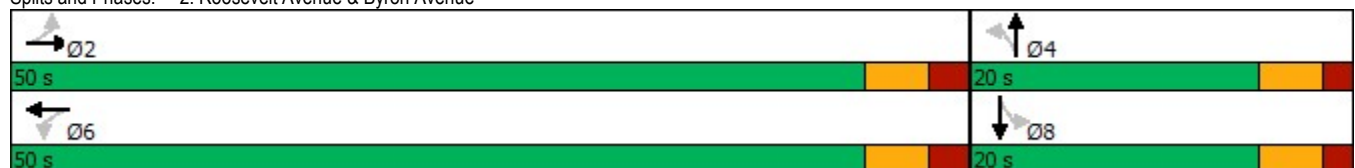
Intersection Capacity Utilization 42.8%

Analysis Period (min) 15

Intersection LOS: A

ICU Level of Service A

















Splits and Phases: 2: Roosevelt Avenue & Byron Avenue



# Conditions

## 2: Roosevelt Avenue & Byron Avenue

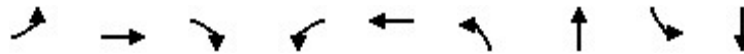
2025 Total Projected AM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	36	231	8	14	145	28	4	31	17	26	20	12
Future Volume (vph)	36	231	8	14	145	28	4	31	17	26	20	12
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)		4.0			4.0			4.0			4.0	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frpb, ped/bikes		1.00			0.99			0.98			0.98	
Flpb, ped/bikes		1.00			1.00			1.00			0.99	
Frt		1.00			0.98			0.95			0.97	
Flt Protected		0.99			1.00			1.00			0.98	
Satd. Flow (prot)		1741			1711			1643			1624	
Flt Permitted		0.95			0.97			0.98			0.87	
Satd. Flow (perm)		1661			1670			1611			1444	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	40	257	9	16	161	31	4	34	19	29	22	13
RTOR Reduction (vph)	0	1	0	0	6	0	0	17	0	0	11	0
Lane Group Flow (vph)	0	305	0	0	202	0	0	40	0	0	53	0
Confl. Peds. (#/hr)	8		13	13		8	33		13	13		33
Confl. Bikes (#/hr)			2			1						1
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2			6			4			8		
Actuated Green, G (s)		52.6			52.6			7.7			7.7	
Effective Green, g (s)		54.1			54.1			8.7			8.7	
Actuated g/C Ratio		0.76			0.76			0.12			0.12	
Clearance Time (s)		5.5			5.5			5.0			5.0	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		1269			1276			197			177	
v/s Ratio Prot												
v/s Ratio Perm		c0.18			0.12			0.03			c0.04	
v/c Ratio		0.24			0.16			0.20			0.30	
Uniform Delay, d1		2.4			2.2			27.9			28.3	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		0.4			0.3			0.5			0.9	
Delay (s)		2.9			2.5			28.5			29.2	
Level of Service		A			A			C			C	
Approach Delay (s)		2.9			2.5			28.5			29.2	
Approach LOS		A			A			C			C	
<b>Intersection Summary</b>												
HCM 2000 Control Delay		7.7			HCM 2000 Level of Service			A				
HCM 2000 Volume to Capacity ratio		0.25										
Actuated Cycle Length (s)		70.8			Sum of lost time (s)			8.0				
Intersection Capacity Utilization		42.8%			ICU Level of Service			A				
Analysis Period (min)		15										
c Critical Lane Group												

# Conditions

## 3: Golden Avenue & Richmond Rd

2025 Total Projected AM



Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations		↑	↗		↖		↖		↗
Traffic Volume (vph)	2	472	28	46	275	49	2	1	4
Future Volume (vph)	2	472	28	46	275	49	2	1	4
Lane Group Flow (vph)	0	526	31	0	360	0	133	0	5
Turn Type	Perm	NA	Perm	Perm	NA	Perm	NA	Perm	NA
Protected Phases		2			6		4		8
Permitted Phases	2		2	6		4		8	
Detector Phase	2	2	2	6	6	4	4	8	8
Switch Phase									
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	28.8	28.8	28.8	28.8	28.8	28.6	28.6	28.6	28.6
Total Split (s)	35.0	35.0	35.0	35.0	35.0	29.0	29.0	29.0	29.0
Total Split (%)	54.7%	54.7%	54.7%	54.7%	54.7%	45.3%	45.3%	45.3%	45.3%
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	2.5	2.5	2.5	2.5	2.5	2.3	2.3	2.3	2.3
Lost Time Adjust (s)		-1.8	-1.8		-1.8		-1.6		-1.6
Total Lost Time (s)		4.0	4.0		4.0		4.0		4.0
Lead/Lag									
Lead-Lag Optimize?									
Recall Mode	C-Max	C-Max	C-Max	C-Max	C-Max	None	None	None	None
Act Effct Green (s)		40.5	40.5		40.5		19.4		19.4
Actuated g/C Ratio		0.63	0.63		0.63		0.30		0.30
v/c Ratio		0.47	0.04		0.36		0.29		0.01
Control Delay		11.5	2.5		10.3		8.5		12.2
Queue Delay		0.0	0.0		0.0		0.0		0.0
Total Delay		11.5	2.5		10.3		8.5		12.2
LOS		B	A		B		A		B
Approach Delay		11.0			10.3		8.5		12.3
Approach LOS		B			B		A		B
Queue Length 50th (m)		44.4	0.0		27.6		4.3		0.4
Queue Length 95th (m)		73.4	2.8		48.0		14.6		2.3
Internal Link Dist (m)		37.9			130.2		72.7		29.6
Turn Bay Length (m)									
Base Capacity (vph)		1116	883		989		570		654
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		0.47	0.04		0.36		0.23		0.01

### Intersection Summary

Cycle Length: 64

Actuated Cycle Length: 64

Offset: 21 (33%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green

Natural Cycle: 60

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.47

Intersection Signal Delay: 10.5

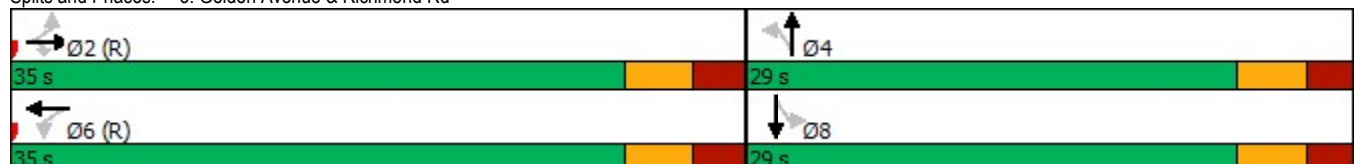
Intersection LOS: B

Intersection Capacity Utilization 74.1%

ICU Level of Service D

Analysis Period (min) 15


















Splits and Phases: 3: Golden Avenue & Richmond Rd



# Conditions

## 3: Golden Avenue & Richmond Rd

2025 Total Projected AM

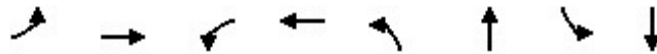
												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	2	472	28	46	275	3	49	2	69	1	4	0
Future Volume (vph)	2	472	28	46	275	3	49	2	69	1	4	0
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)		4.0	4.0		4.0			4.0			4.0	
Lane Util. Factor		1.00	1.00		1.00			1.00			1.00	
Frpb, ped/bikes		1.00	0.91		1.00			0.95			1.00	
Flpb, ped/bikes		1.00	1.00		1.00			0.98			0.99	
Frt		1.00	0.85		1.00			0.92			1.00	
Flt Protected		1.00	1.00		0.99			0.98			0.99	
Satd. Flow (prot)		1764	1371		1742			1479			1729	
Flt Permitted		1.00	1.00		0.89			0.89			0.96	
Satd. Flow (perm)		1763	1371		1562			1340			1676	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	2	524	31	51	306	3	54	2	77	1	4	0
RTOR Reduction (vph)	0	0	12	0	0	0	0	56	0	0	0	0
Lane Group Flow (vph)	0	526	19	0	360	0	0	77	0	0	5	0
Confl. Peds. (#/hr)	62		45	45		62	33		49	49		33
Confl. Bikes (#/hr)			8			8			6			20
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2		2	6			4			8		
Actuated Green, G (s)		36.8	36.8		36.8			15.8			15.8	
Effective Green, g (s)		38.6	38.6		38.6			17.4			17.4	
Actuated g/C Ratio		0.60	0.60		0.60			0.27			0.27	
Clearance Time (s)		5.8	5.8		5.8			5.6			5.6	
Vehicle Extension (s)		3.0	3.0		3.0			3.0			3.0	
Lane Grp Cap (vph)		1063	826		942			364			455	
v/s Ratio Prot												
v/s Ratio Perm		c0.30	0.01		0.23			c0.06			0.00	
v/c Ratio		0.49	0.02		0.38			0.21			0.01	
Uniform Delay, d1		7.2	5.1		6.5			18.0			17.0	
Progression Factor		1.00	1.00		1.00			1.00			1.00	
Incremental Delay, d2		1.6	0.1		1.2			0.3			0.0	
Delay (s)		8.8	5.2		7.7			18.3			17.0	
Level of Service		A	A		A			B			B	
Approach Delay (s)		8.6			7.7			18.3			17.0	
Approach LOS		A			A			B			B	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			9.6									
HCM 2000 Volume to Capacity ratio			0.41									
Actuated Cycle Length (s)			64.0									
Intersection Capacity Utilization			74.1%									
Analysis Period (min)			15									
c Critical Lane Group												



# Conditions

## 4: Roosevelt Avenue & Richmond Rd

2025 Total Projected AM



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	4	636	14	298	26	11	42	13
Future Volume (vph)	4	636	14	298	26	11	42	13
Lane Group Flow (vph)	0	722	0	381	0	77	0	72
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		2		6		4		8
Permitted Phases	2		6		4		8	
Detector Phase	2	2	6	6	4	4	8	8
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	33.4	33.4	33.4	33.4	24.6	24.6	24.6	24.6
Total Split (s)	45.0	45.0	45.0	45.0	25.0	25.0	25.0	25.0
Total Split (%)	64.3%	64.3%	64.3%	64.3%	35.7%	35.7%	35.7%	35.7%
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	2.1	2.1	2.1	2.1	2.3	2.3	2.3	2.3
Lost Time Adjust (s)		-1.4		-1.4		-1.6		-1.6
Total Lost Time (s)		4.0		4.0		4.0		4.0
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	C-Max	C-Max	C-Max	C-Max	None	None	None	None
Act Effct Green (s)		48.9		48.9		17.0		17.0
Actuated g/C Ratio		0.70		0.70		0.24		0.24
v/c Ratio		0.59		0.33		0.22		0.23
Control Delay		10.8		7.1		13.4		18.9
Queue Delay		0.3		0.0		0.0		0.0
Total Delay		11.0		7.1		13.4		18.9
LOS		B		A		B		B
Approach Delay		11.0		7.1		13.4		18.9
Approach LOS		B		A		B		B
Queue Length 50th (m)		61.4		23.8		4.1		6.2
Queue Length 95th (m)		100.6		40.1		13.5		15.7
Internal Link Dist (m)		130.2		276.4		56.5		123.0
Turn Bay Length (m)								
Base Capacity (vph)		1226		1169		425		390
Starvation Cap Reductn		117		0		0		0
Spillback Cap Reductn		0		0		0		0
Storage Cap Reductn		0		0		0		0
Reduced v/c Ratio		0.65		0.33		0.18		0.18

### Intersection Summary

Cycle Length: 70

Actuated Cycle Length: 70

Offset: 27 (39%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green

Natural Cycle: 60

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.59

Intersection Signal Delay: 10.4

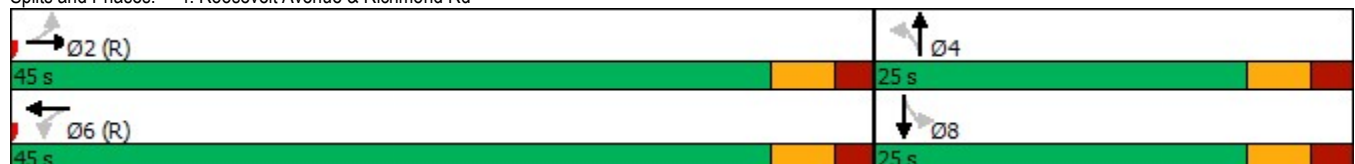
Intersection LOS: B

Intersection Capacity Utilization 59.2%

ICU Level of Service B

Analysis Period (min) 15

















Splits and Phases: 4: Roosevelt Avenue & Richmond Rd



# Conditions

## 4: Roosevelt Avenue & Richmond Rd

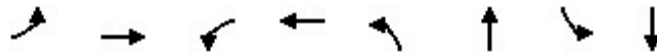
2025 Total Projected AM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	4	636	10	14	298	31	26	11	32	42	13	10
Future Volume (vph)	4	636	10	14	298	31	26	11	32	42	13	10
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)		4.0			4.0			4.0			4.0	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frpb, ped/bikes		1.00			0.99			0.95			0.98	
Flpb, ped/bikes		1.00			1.00			0.96			0.96	
Frt		1.00			0.99			0.94			0.98	
Flt Protected		1.00			1.00			0.98			0.97	
Satd. Flow (prot)		1757			1719			1486			1568	
Flt Permitted		1.00			0.97			0.88			0.79	
Satd. Flow (perm)		1755			1668			1333			1276	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	4	707	11	16	331	34	29	12	36	47	14	11
RTOR Reduction (vph)	0	1	0	0	4	0	0	28	0	0	9	0
Lane Group Flow (vph)	0	721	0	0	377	0	0	49	0	0	63	0
Confl. Peds. (#/hr)	74		69	69		74	65		40	40		65
Confl. Bikes (#/hr)			7			4			4			4
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2			6			4			8		
Actuated Green, G (s)		45.6			45.6			13.4			13.4	
Effective Green, g (s)		47.0			47.0			15.0			15.0	
Actuated g/C Ratio		0.67			0.67			0.21			0.21	
Clearance Time (s)		5.4			5.4			5.6			5.6	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		1178			1119			285			273	
v/s Ratio Prot												
v/s Ratio Perm		c0.41			0.23			0.04			c0.05	
v/c Ratio		0.61			0.34			0.17			0.23	
Uniform Delay, d1		6.4			4.9			22.4			22.7	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		2.4			0.8			0.3			0.4	
Delay (s)		8.8			5.7			22.7			23.2	
Level of Service		A			A			C			C	
Approach Delay (s)		8.8			5.7			22.7			23.2	
Approach LOS		A			A			C			C	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			9.5									
HCM 2000 Volume to Capacity ratio			0.52									
Actuated Cycle Length (s)			70.0						8.0			
Intersection Capacity Utilization			59.2%									
Analysis Period (min)			15									
c Critical Lane Group												

# Conditions

## 5: Churchill Avenue North & Richmond Rd

2025 Total Projected AM



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	Ø9	Ø10
Lane Configurations										
Traffic Volume (vph)	265	397	43	186	25	278	29	331		
Future Volume (vph)	265	397	43	186	25	278	29	331		
Lane Group Flow (vph)	294	475	48	230	0	429	0	560		
Turn Type	Prot	NA	Perm	NA	Perm	NA	Perm	NA		
Protected Phases	5	2		6		4		8	9	10
Permitted Phases			6		4		8	8		
Detector Phase	5	2	6	6	4	4	8	8		
Switch Phase										
Minimum Initial (s)	5.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	1.0	1.0
Minimum Split (s)	11.1	26.1	26.1	26.1	26.1	26.1	26.2	26.2	5.0	5.0
Total Split (s)	14.0	40.0	26.0	26.0	30.0	30.0	30.0	30.0	5.0	5.0
Total Split (%)	17.5%	50.0%	32.5%	32.5%	37.5%	37.5%	37.5%	37.5%	6%	6%
Yellow Time (s)	3.3	3.3	3.3	3.3	3.6	3.6	3.6	3.6	2.0	2.0
All-Red Time (s)	2.8	2.8	2.8	2.8	2.6	2.6	2.6	2.6	0.0	0.0
Lost Time Adjust (s)	-2.1	-2.1	-2.1	-2.1		-2.2		-2.2		
Total Lost Time (s)	4.0	4.0	4.0	4.0		4.0		4.0		
Lead/Lag	Lead		Lag	Lag						
Lead-Lag Optimize?			Yes	Yes						
Recall Mode	None	C-Max	C-Max	C-Max	None	None	None	None	None	None
Act Effct Green (s)	24.3	50.3	22.0	22.0		21.7		21.7		
Actuated g/C Ratio	0.30	0.63	0.28	0.28		0.27		0.27		
v/c Ratio	0.58	0.44	0.22	0.48		0.55		0.69		
Control Delay	31.3	10.0	25.5	27.4		19.2		26.6		
Queue Delay	0.0	0.0	0.0	0.0		0.0		0.0		
Total Delay	31.3	10.0	25.5	27.4		19.2		26.6		
LOS	C	A	C	C		B		C		
Approach Delay		18.1		27.1		19.2		26.6		
Approach LOS		B		C		B		C		
Queue Length 50th (m)	39.4	34.0	5.9	29.6		18.3		36.2		
Queue Length 95th (m)	#82.6	67.4	15.0	50.9		27.0		47.9		
Internal Link Dist (m)		276.4		61.0		100.0		41.6		
Turn Bay Length (m)	40.0		45.0							
Base Capacity (vph)	509	1086	221	480		932		963		
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	0.58	0.44	0.22	0.48		0.46		0.58		

### Intersection Summary

Cycle Length: 80

Actuated Cycle Length: 80

Offset: 43 (54%), Referenced to phase 6:WBTL and 2:EBT, Start of Green

Natural Cycle: 80

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.69

Intersection Signal Delay: 21.9

Intersection LOS: C

Intersection Capacity Utilization 74.9%

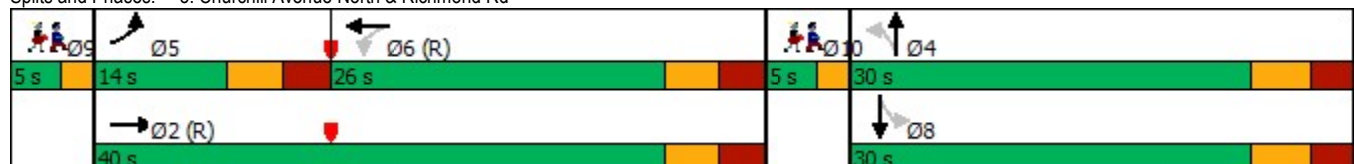
ICU Level of Service D

Analysis Period (min) 15

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

Queue shown is maximum after two cycles.



















### Splits and Phases: 5: Churchill Avenue North & Richmond Rd



# Conditions

## 5: Churchill Avenue North & Richmond Rd

2025 Total Projected AM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	265	397	31	43	186	21	25	278	83	29	331	144
Future Volume (vph)	265	397	31	43	186	21	25	278	83	29	331	144
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0			4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			0.95			0.95	
Frpb, ped/bikes	1.00	0.99		1.00	0.99			0.97			0.95	
Flpb, ped/bikes	1.00	1.00		0.93	1.00			1.00			1.00	
Frt	1.00	0.99		1.00	0.98			0.97			0.96	
Flt Protected	0.95	1.00		0.95	1.00			1.00			1.00	
Satd. Flow (prot)	1676	1726		1559	1729			3136			3040	
Flt Permitted	0.95	1.00		0.49	1.00			0.87			0.91	
Satd. Flow (perm)	1676	1726		806	1729			2738			2763	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	294	441	34	48	207	23	28	309	92	32	368	160
RTOR Reduction (vph)	0	2	0	0	5	0	0	34	0	0	58	0
Lane Group Flow (vph)	294	473	0	48	225	0	0	395	0	0	502	0
Confl. Peds. (#/hr)	34		68	68		34	45		36	36		45
Confl. Bikes (#/hr)			11			1						8
Turn Type	Prot	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases	5	2			6			4			8	
Permitted Phases				6			4			8	8	
Actuated Green, G (s)	22.2	48.2		19.9	19.9			19.5			19.5	
Effective Green, g (s)	24.3	50.3		22.0	22.0			21.7			21.7	
Actuated g/C Ratio	0.30	0.63		0.28	0.28			0.27			0.27	
Clearance Time (s)	6.1	6.1		6.1	6.1			6.2			6.2	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	509	1085		221	475			742			749	
v/s Ratio Prot	c0.18	c0.27			0.13							
v/s Ratio Perm				0.06				0.14			c0.18	
v/c Ratio	0.58	0.44		0.22	0.47			0.53			0.67	
Uniform Delay, d1	23.5	7.6		22.4	24.2			24.8			26.0	
Progression Factor	1.00	1.00		1.00	1.00			0.77			1.00	
Incremental Delay, d2	1.6	1.3		2.2	3.4			0.7			2.4	
Delay (s)	25.1	8.9		24.6	27.5			19.8			28.3	
Level of Service	C	A		C	C			B			C	
Approach Delay (s)		15.1			27.0			19.8			28.3	
Approach LOS		B			C			B			C	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			21.4		HCM 2000 Level of Service					C		
HCM 2000 Volume to Capacity ratio			0.61									
Actuated Cycle Length (s)			80.0						16.0			
Intersection Capacity Utilization			74.9%		ICU Level of Service					D		
Analysis Period (min)			15									

c Critical Lane Group

# Conditions

## 6: Ped Crossing & Richmond Rd

2025 Total Projected AM



Lane Group	EBT	WBT	Ø4	Ø8
Lane Configurations	↑↑↑	↑		
Traffic Volume (vph)	794	390		
Future Volume (vph)	794	390		
Lane Group Flow (vph)	882	433		
Turn Type	NA	NA		
Protected Phases	2	6	4	8
Permitted Phases				
Detector Phase	2	6		
Switch Phase				
Minimum Initial (s)	10.0	10.0	10.0	10.0
Minimum Split (s)	15.1	15.1	25.0	25.0
Total Split (s)	40.0	40.0	25.0	25.0
Total Split (%)	61.5%	61.5%	38%	38%
Yellow Time (s)	3.0	3.0	3.0	3.0
All-Red Time (s)	2.1	2.1	1.0	1.0
Lost Time Adjust (s)	-1.1	-1.1		
Total Lost Time (s)	4.0	4.0		
Lead/Lag				
Lead-Lag Optimize?				
Recall Mode	C-Max	C-Max	Ped	Ped
Act Effct Green (s)	36.0	36.0		
Actuated g/C Ratio	0.55	0.55		
v/c Ratio	0.47	0.44		
Control Delay	9.8	10.4		
Queue Delay	0.0	0.0		
Total Delay	9.8	10.4		
LOS	A	B		
Approach Delay	9.8	10.4		
Approach LOS	A	B		
Queue Length 50th (m)	32.2	29.4		
Queue Length 95th (m)	45.3	48.8		
Internal Link Dist (m)	41.2	106.6		
Turn Bay Length (m)				
Base Capacity (vph)	1857	977		
Starvation Cap Reductn	0	0		
Spillback Cap Reductn	0	0		
Storage Cap Reductn	0	0		
Reduced v/c Ratio	0.47	0.44		

### Intersection Summary
















Cycle Length: 65	
Actuated Cycle Length: 65	
Offset: 11 (17%), Referenced to phase 2:EBT and 6:WBT, Start of Green	
Natural Cycle: 45	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.47	
Intersection Signal Delay: 10.0	Intersection LOS: B
Intersection Capacity Utilization 26.5%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 6: Ped Crossing & Richmond Rd


Conditions

6: Ped Crossing & Richmond Rd

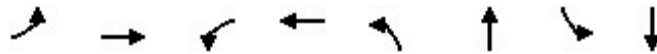
2025 Total Projected AM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 										
Traffic Volume (vph)	0	794	0	0	390	0	0	0	0	0	0	0
Future Volume (vph)	0	794	0	0	390	0	0	0	0	0	0	0
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)		4.0			4.0							
Lane Util. Factor		0.95			1.00							
Frpb, ped/bikes		1.00			1.00							
Flpb, ped/bikes		1.00			1.00							
Frt		1.00			1.00							
Flt Protected		1.00			1.00							
Satd. Flow (prot)		3353			1765							
Flt Permitted		1.00			1.00							
Satd. Flow (perm)		3353			1765							
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	0	882	0	0	433	0	0	0	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	882	0	0	433	0	0	0	0	0	0	0
Confl. Peds. (#/hr)							14		14	14		14
Confl. Bikes (#/hr)									1			9
Turn Type		NA			NA							
Protected Phases		2			6							
Permitted Phases												
Actuated Green, G (s)		34.9			34.9							
Effective Green, g (s)		36.0			36.0							
Actuated g/C Ratio		0.55			0.55							
Clearance Time (s)		5.1			5.1							
Vehicle Extension (s)		3.0			3.0							
Lane Grp Cap (vph)		1857			977							
v/s Ratio Prot		0.26			0.25							
v/s Ratio Perm												
v/c Ratio		0.47			0.44							
Uniform Delay, d1		8.8			8.6							
Progression Factor		1.00			1.00							
Incremental Delay, d2		0.9			1.5							
Delay (s)		9.7			10.0							
Level of Service		A			B							
Approach Delay (s)		9.7			10.0			0.0			0.0	
Approach LOS		A			B			A			A	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			9.8			HCM 2000 Level of Service				A		
HCM 2000 Volume to Capacity ratio			0.30									
Actuated Cycle Length (s)			65.0			Sum of lost time (s)				8.0		
Intersection Capacity Utilization			26.5%			ICU Level of Service				A		
Analysis Period (min)			15									
c Critical Lane Group												

# Conditions

## 1: Churchill Avenue North & Byron Avenue

2025 Total Projected PM



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	19	134	110	307	31	310	23	345
Future Volume (vph)	19	134	110	307	31	310	23	345
Lane Group Flow (vph)	0	224	0	516	34	420	26	442
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		4		8		2		6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	2	2	6	6
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	30.6	30.6	30.6	30.6	26.4	26.4	26.4	26.4
Total Split (s)	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0
Total Split (%)	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	2.3	2.3	2.3	2.3	2.1	2.1	2.1	2.1
Lost Time Adjust (s)		-1.6		-1.6	-1.4	-1.4	-1.4	-1.4
Total Lost Time (s)		4.0		4.0	4.0	4.0	4.0	4.0
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	C-Max	C-Max	C-Max	C-Max
Act Effct Green (s)		36.2		36.2	45.8	45.8	45.8	45.8
Actuated g/C Ratio		0.40		0.40	0.51	0.51	0.51	0.51
v/c Ratio		0.34		0.86	0.10	0.48	0.07	0.51
Control Delay		17.2		39.3	14.6	17.3	11.7	14.8
Queue Delay		0.0		0.0	0.0	0.0	0.0	0.9
Total Delay		17.2		39.3	14.6	17.3	11.7	15.7
LOS		B		D	B	B	B	B
Approach Delay		17.2		39.3		17.1		15.5
Approach LOS		B		D		B		B
Queue Length 50th (m)		23.6		79.9	3.2	47.3	2.3	43.3
Queue Length 95th (m)		38.5		#118.1	9.5	79.1	m4.2	67.2
Internal Link Dist (m)		244.6		113.6		126.7		100.0
Turn Bay Length (m)					30.0		30.0	
Base Capacity (vph)		735		676	340	876	366	873
Starvation Cap Reductn		0		0	0	0	0	202
Spillback Cap Reductn		0		0	0	0	0	0
Storage Cap Reductn		0		0	0	0	0	0
Reduced v/c Ratio		0.30		0.76	0.10	0.48	0.07	0.66

### Intersection Summary

Cycle Length: 90

Actuated Cycle Length: 90

Offset: 40 (44%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green

Natural Cycle: 60

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.86

Intersection Signal Delay: 23.6

Intersection LOS: C

Intersection Capacity Utilization 78.5%

ICU Level of Service D

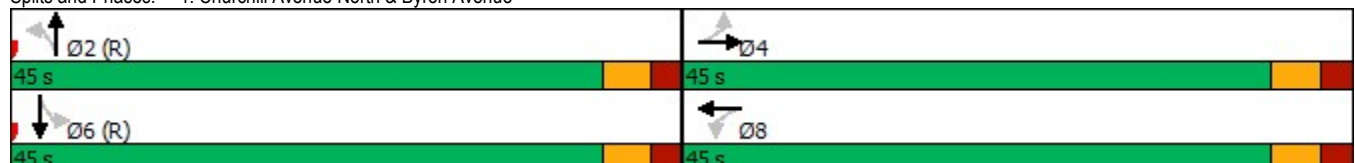
Analysis Period (min) 15

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

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.



















Splits and Phases: 1: Churchill Avenue North & Byron Avenue



# Conditions

## 1: Churchill Avenue North & Byron Avenue

2025 Total Projected PM

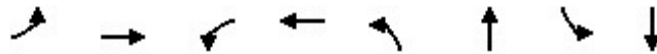
												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	19	134	49	110	307	48	31	310	68	23	345	53
Future Volume (vph)	19	134	49	110	307	48	31	310	68	23	345	53
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)		4.0			4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes		0.99			1.00		1.00	0.99		1.00	0.99	
Flpb, ped/bikes		1.00			1.00		0.97	1.00		1.00	1.00	
Frt		0.97			0.99		1.00	0.97		1.00	0.98	
Flt Protected		1.00			0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1683			1712		1618	1707		1669	1705	
Flt Permitted		0.94			0.85		0.39	1.00		0.41	1.00	
Satd. Flow (perm)		1588			1476		667	1707		721	1705	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	21	149	54	122	341	53	34	344	76	26	383	59
RTOR Reduction (vph)	0	14	0	0	5	0	0	8	0	0	5	0
Lane Group Flow (vph)	0	210	0	0	511	0	34	412	0	26	437	0
Confl. Peds. (#/hr)	3		11	11		3	40			5		40
Confl. Bikes (#/hr)			1						1			
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		34.6			34.6		44.4	44.4		44.4	44.4	
Effective Green, g (s)		36.2			36.2		45.8	45.8		45.8	45.8	
Actuated g/C Ratio		0.40			0.40		0.51	0.51		0.51	0.51	
Clearance Time (s)		5.6			5.6		5.4	5.4		5.4	5.4	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		638			593		339	868		366	867	
v/s Ratio Prot								0.24			c0.26	
v/s Ratio Perm		0.13			c0.35		0.05			0.04		
v/c Ratio		0.33			0.86		0.10	0.47		0.07	0.50	
Uniform Delay, d1		18.5			24.6		11.4	14.3		11.3	14.6	
Progression Factor		1.00			1.00		1.00	1.00		0.83	0.82	
Incremental Delay, d2		0.3			12.3		0.6	1.9		0.3	1.7	
Delay (s)		18.8			36.9		12.0	16.2		9.6	13.6	
Level of Service		B			D		B	B		A	B	
Approach Delay (s)		18.8			36.9			15.9			13.4	
Approach LOS		B			D			B			B	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			22.1			HCM 2000 Level of Service					C	
HCM 2000 Volume to Capacity ratio			0.66									
Actuated Cycle Length (s)			90.0			Sum of lost time (s)				8.0		
Intersection Capacity Utilization			78.5%			ICU Level of Service				D		
Analysis Period (min)			15									
c Critical Lane Group												



# Conditions

## 2: Roosevelt Avenue & Byron Avenue

2025 Total Projected PM



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	13	150	22	297	6	23	31	22
Future Volume (vph)	13	150	22	297	6	23	31	22
Lane Group Flow (vph)	0	190	0	405	0	50	0	94
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		2		6		4		8
Permitted Phases	2		6		4		8	
Detector Phase	2	2	6	6	4	4	8	8
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	22.5	22.5	22.5	22.5	20.0	20.0	20.0	20.0
Total Split (s)	50.0	50.0	50.0	50.0	20.0	20.0	20.0	20.0
Total Split (%)	71.4%	71.4%	71.4%	71.4%	28.6%	28.6%	28.6%	28.6%
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	2.2	2.2	2.2	2.2	1.7	1.7	1.7	1.7
Lost Time Adjust (s)		-1.5		-1.5		-1.0		-1.0
Total Lost Time (s)		4.0		4.0		4.0		4.0
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	Max	Max	Max	Max	None	None	None	None
Act Effct Green (s)		54.0		54.0		14.1		14.1
Actuated g/C Ratio		0.75		0.75		0.20		0.20
v/c Ratio		0.15		0.32		0.16		0.31
Control Delay		4.3		5.1		17.8		19.1
Queue Delay		0.0		0.0		0.0		0.0
Total Delay		4.3		5.1		17.8		19.1
LOS		A		A		B		B
Approach Delay		4.3		5.1		17.8		19.1
Approach LOS		A		A		B		B
Queue Length 50th (m)		8.3		19.8		3.9		7.1
Queue Length 95th (m)		15.2		33.4		11.8		18.1
Internal Link Dist (m)		50.9		244.6		129.2		56.5
Turn Bay Length (m)								
Base Capacity (vph)		1274		1272		364		338
Starvation Cap Reductn		0		0		0		0
Spillback Cap Reductn		0		0		0		0
Storage Cap Reductn		0		0		0		0
Reduced v/c Ratio		0.15		0.32		0.14		0.28

### Intersection Summary

Cycle Length: 70

Actuated Cycle Length: 71.9

Natural Cycle: 45

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.32

Intersection Signal Delay: 7.5

Intersection Capacity Utilization 45.0%

Analysis Period (min) 15

Intersection LOS: A

ICU Level of Service A

















Splits and Phases: 2: Roosevelt Avenue & Byron Avenue



# Conditions

## 2: Roosevelt Avenue & Byron Avenue

2025 Total Projected PM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	13	150	8	22	297	46	6	23	15	31	22	32
Future Volume (vph)	13	150	8	22	297	46	6	23	15	31	22	32
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)		4.0			4.0			4.0			4.0	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frpb, ped/bikes		1.00			0.99			0.99			0.95	
Flpb, ped/bikes		1.00			1.00			0.99			0.99	
Frt		0.99			0.98			0.95			0.95	
Flt Protected		1.00			1.00			0.99			0.98	
Satd. Flow (prot)		1742			1716			1628			1551	
Flt Permitted		0.97			0.98			0.96			0.88	
Satd. Flow (perm)		1694			1687			1570			1386	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	14	167	9	24	330	51	7	26	17	34	24	36
RTOR Reduction (vph)	0	2	0	0	6	0	0	14	0	0	30	0
Lane Group Flow (vph)	0	188	0	0	399	0	0	36	0	0	64	0
Confl. Peds. (#/hr)	17		7	7		17	46		9	9		46
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2			6			4			8		
Actuated Green, G (s)		51.6			51.6			10.9			10.9	
Effective Green, g (s)		53.1			53.1			11.9			11.9	
Actuated g/C Ratio		0.73			0.73			0.16			0.16	
Clearance Time (s)		5.5			5.5			5.0			5.0	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		1232			1227			255			225	
v/s Ratio Prot												
v/s Ratio Perm		0.11			0.24			0.02			0.05	
v/c Ratio		0.15			0.33			0.14			0.28	
Uniform Delay, d1		3.1			3.6			26.2			26.8	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		0.3			0.7			0.3			0.7	
Delay (s)		3.3			4.3			26.4			27.5	
Level of Service		A			A			C			C	
Approach Delay (s)		3.3			4.3			26.4			27.5	
Approach LOS		A			A			C			C	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			8.5			HCM 2000 Level of Service				A		
HCM 2000 Volume to Capacity ratio			0.32									
Actuated Cycle Length (s)			73.0			Sum of lost time (s)			8.0			
Intersection Capacity Utilization			45.0%			ICU Level of Service			A			
Analysis Period (min)			15									
c Critical Lane Group												

# Conditions

## 3: Golden Avenue & Richmond Rd

2025 Total Projected PM

	→	↘	↙	←	↖	↑	↗	↓
Lane Group	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations	↕	↗		↕		↕		↕
Traffic Volume (vph)	350	21	44	651	67	1	6	3
Future Volume (vph)	350	21	44	651	67	1	6	3
Lane Group Flow (vph)	389	23	0	776	0	138	0	11
Turn Type	NA	Perm	Perm	NA	Perm	NA	Perm	NA
Protected Phases	2			6		4		8
Permitted Phases		2	6		4		8	
Detector Phase	2	2	6	6	4	4	8	8
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	28.8	28.8	28.8	28.8	28.6	28.6	28.6	28.6
Total Split (s)	50.0	50.0	50.0	50.0	29.0	29.0	29.0	29.0
Total Split (%)	63.3%	63.3%	63.3%	63.3%	36.7%	36.7%	36.7%	36.7%
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	2.5	2.5	2.5	2.5	2.3	2.3	2.3	2.3
Lost Time Adjust (s)	-1.8	-1.8		-1.8		-1.6		-1.6
Total Lost Time (s)	4.0	4.0		4.0		4.0		4.0
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	C-Max	C-Max	C-Max	C-Max	None	None	None	None
Act Effct Green (s)	51.6	51.6		51.6		19.4		19.4
Actuated g/C Ratio	0.65	0.65		0.65		0.25		0.25
v/c Ratio	0.34	0.03		0.71		0.39		0.03
Control Delay	8.3	1.8		15.3		16.8		18.5
Queue Delay	0.0	0.0		1.0		0.0		0.0
Total Delay	8.3	1.8		16.3		16.8		18.5
LOS	A	A		B		B		B
Approach Delay	7.9			16.3		16.8		18.5
Approach LOS	A			B		B		B
Queue Length 50th (m)	29.5	0.0		85.2		9.4		1.1
Queue Length 95th (m)	46.9	1.9		138.3		23.6		4.7
Internal Link Dist (m)	37.9			130.2		72.7		29.6
Turn Bay Length (m)								
Base Capacity (vph)	1152	844		1096		444		450
Starvation Cap Reductn	0	0		125		0		0
Spillback Cap Reductn	0	0		0		0		0
Storage Cap Reductn	0	0		0		0		0
Reduced v/c Ratio	0.34	0.03		0.80		0.31		0.02

### Intersection Summary

Cycle Length: 79

Actuated Cycle Length: 79

Offset: 5 (6%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green

Natural Cycle: 70

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.71

Intersection Signal Delay: 13.8

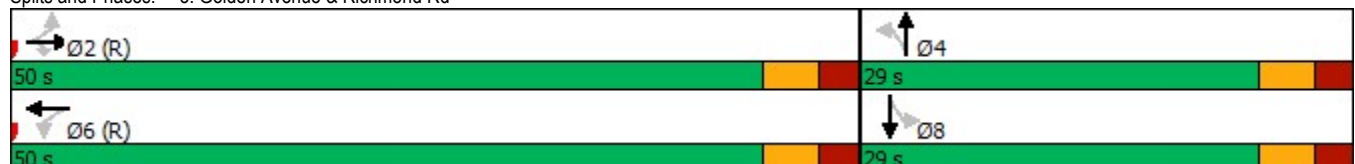
Intersection LOS: B

Intersection Capacity Utilization 86.5%

ICU Level of Service E

Analysis Period (min) 15


















Splits and Phases: 3: Golden Avenue & Richmond Rd



# Conditions

## 3: Golden Avenue & Richmond Rd

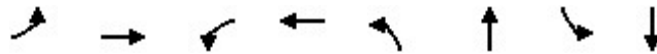
2025 Total Projected PM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	350	21	44	651	4	67	1	57	6	3	1
Future Volume (vph)	0	350	21	44	651	4	67	1	57	6	3	1
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)		4.0	4.0		4.0			4.0			4.0	
Lane Util. Factor		1.00	1.00		1.00			1.00			1.00	
Frpb, ped/bikes		1.00	0.85		1.00			0.94			0.99	
Flpb, ped/bikes		1.00	1.00		1.00			0.98			0.95	
Frt		1.00	0.85		1.00			0.94			0.99	
Flt Protected		1.00	1.00		1.00			0.97			0.97	
Satd. Flow (prot)		1765	1273		1749			1487			1596	
Flt Permitted		1.00	1.00		0.96			0.84			0.86	
Satd. Flow (perm)		1765	1273		1679			1283			1421	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	0	389	23	49	723	4	74	1	63	7	3	1
RTOR Reduction (vph)	0	0	8	0	0	0	0	42	0	0	1	0
Lane Group Flow (vph)	0	389	15	0	776	0	0	96	0	0	10	0
Confl. Peds. (#/hr)	66			77		66	25		60	60		25
Confl. Bikes (#/hr)			3			17			2			7
Turn Type		NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2		2	6			4			8		
Actuated Green, G (s)		49.8	49.8		49.8			17.8			17.8	
Effective Green, g (s)		51.6	51.6		51.6			19.4			19.4	
Actuated g/C Ratio		0.65	0.65		0.65			0.25			0.25	
Clearance Time (s)		5.8	5.8		5.8			5.6			5.6	
Vehicle Extension (s)		3.0	3.0		3.0			3.0			3.0	
Lane Grp Cap (vph)		1152	831		1096			315			348	
v/s Ratio Prot		0.22										
v/s Ratio Perm			0.01		c0.46			c0.07			0.01	
v/c Ratio		0.34	0.02		0.71			0.30			0.03	
Uniform Delay, d1		6.1	4.8		8.8			24.3			22.6	
Progression Factor		1.00	1.00		1.00			1.00			1.00	
Incremental Delay, d2		0.8	0.0		3.9			0.5			0.0	
Delay (s)		6.9	4.8		12.7			24.8			22.7	
Level of Service		A	A		B			C			C	
Approach Delay (s)		6.8			12.7			24.8			22.7	
Approach LOS		A			B			C			C	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			12.2		HCM 2000 Level of Service				B			
HCM 2000 Volume to Capacity ratio			0.60									
Actuated Cycle Length (s)			79.0		Sum of lost time (s)			8.0				
Intersection Capacity Utilization			86.5%		ICU Level of Service			E				
Analysis Period (min)			15									
c Critical Lane Group												

# Conditions

## 4: Roosevelt Avenue & Richmond Rd

2025 Total Projected PM



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	10	408	27	697	34	20	40	12
Future Volume (vph)	10	408	27	697	34	20	40	12
Lane Group Flow (vph)	0	488	0	856	0	113	0	77
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		2		6		4		8
Permitted Phases	2		6		4		8	
Detector Phase	2	2	6	6	4	4	8	8
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	33.4	33.4	33.4	33.4	24.6	24.6	24.6	24.6
Total Split (s)	60.0	60.0	60.0	60.0	25.0	25.0	25.0	25.0
Total Split (%)	70.6%	70.6%	70.6%	70.6%	29.4%	29.4%	29.4%	29.4%
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	2.1	2.1	2.1	2.1	2.3	2.3	2.3	2.3
Lost Time Adjust (s)		-1.4		-1.4		-1.6		-1.6
Total Lost Time (s)		4.0		4.0		4.0		4.0
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	C-Max	C-Max	C-Max	C-Max	None	None	None	None
Act Effct Green (s)		63.9		63.9		17.0		17.0
Actuated g/C Ratio		0.75		0.75		0.20		0.20
v/c Ratio		0.38		0.68		0.40		0.31
Control Delay		6.5		11.7		20.8		24.7
Queue Delay		0.3		0.0		0.0		0.0
Total Delay		6.8		11.7		20.8		24.7
LOS		A		B		C		C
Approach Delay		6.8		11.7		20.8		24.7
Approach LOS		A		B		C		C
Queue Length 50th (m)		34.0		87.1		8.6		7.8
Queue Length 95th (m)		52.7		141.3		23.3		19.8
Internal Link Dist (m)		130.2		276.4		56.5		123.0
Turn Bay Length (m)								
Base Capacity (vph)		1273		1260		337		299
Starvation Cap Reductn		299		0		0		0
Spillback Cap Reductn		0		0		0		0
Storage Cap Reductn		0		0		0		0
Reduced v/c Ratio		0.50		0.68		0.34		0.26

### Intersection Summary

Cycle Length: 85

Actuated Cycle Length: 85

Offset: 78 (92%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green

Natural Cycle: 70

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.68

Intersection Signal Delay: 11.4

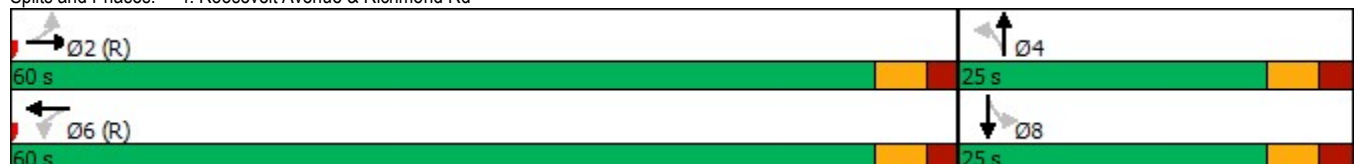
Intersection LOS: B

Intersection Capacity Utilization 78.5%

ICU Level of Service D

Analysis Period (min) 15

















Splits and Phases: 4: Roosevelt Avenue & Richmond Rd



# Conditions

## 4: Roosevelt Avenue & Richmond Rd

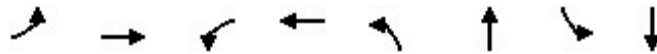
2025 Total Projected PM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	408	22	27	697	47	34	20	48	40	12	18
Future Volume (vph)	10	408	22	27	697	47	34	20	48	40	12	18
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)		4.0			4.0			4.0			4.0	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frpb, ped/bikes		0.98			0.99			0.89			0.93	
Flpb, ped/bikes		1.00			1.00			0.93			0.91	
Frt		0.99			0.99			0.94			0.96	
Flt Protected		1.00			1.00			0.98			0.97	
Satd. Flow (prot)		1722			1713			1344			1400	
Flt Permitted		0.98			0.98			0.89			0.80	
Satd. Flow (perm)		1692			1674			1213			1152	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	11	453	24	30	774	52	38	22	53	44	13	20
RTOR Reduction (vph)	0	2	0	0	2	0	0	41	0	0	16	0
Lane Group Flow (vph)	0	486	0	0	854	0	0	72	0	0	61	0
Confl. Peds. (#/hr)	135		182	182		135	116		92	92		116
Confl. Bikes (#/hr)			3			9			5			2
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2			6			4			8		
Actuated Green, G (s)		60.6			60.6			13.4			13.4	
Effective Green, g (s)		62.0			62.0			15.0			15.0	
Actuated g/C Ratio		0.73			0.73			0.18			0.18	
Clearance Time (s)		5.4			5.4			5.6			5.6	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		1234			1221			214			203	
v/s Ratio Prot												
v/s Ratio Perm		0.29			0.51			0.06			0.05	
v/c Ratio		0.39			0.70			0.34			0.30	
Uniform Delay, d1		4.4			6.4			30.6			30.4	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		0.9			3.3			0.9			0.8	
Delay (s)		5.3			9.7			31.6			31.3	
Level of Service		A			A			C			C	
Approach Delay (s)		5.3			9.7			31.6			31.3	
Approach LOS		A			A			C			C	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			11.0									B
HCM 2000 Volume to Capacity ratio			0.63									
Actuated Cycle Length (s)			85.0						8.0			
Intersection Capacity Utilization			78.5%									D
Analysis Period (min)			15									
c Critical Lane Group												

# Conditions

## 5: Churchill Avenue North & Richmond Rd

2025 Total Projected PM



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	Ø9	Ø10
Lane Configurations										
Traffic Volume (vph)	164	304	128	461	28	275	22	266		
Future Volume (vph)	164	304	128	461	28	275	22	266		
Lane Group Flow (vph)	182	390	142	553	0	421	0	636		
Turn Type	Prot	NA	Perm	NA	Perm	NA	Perm	NA		
Protected Phases	5	2		6		4		8	9	10
Permitted Phases			6		4		8	8		
Detector Phase	5	2	6	6	4	4	8	8		
Switch Phase										
Minimum Initial (s)	5.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	1.0	1.0
Minimum Split (s)	11.1	26.1	26.1	26.1	26.1	26.1	26.2	26.2	5.0	5.0
Total Split (s)	12.0	52.0	40.0	40.0	28.0	28.0	28.0	28.0	5.0	5.0
Total Split (%)	13.3%	57.8%	44.4%	44.4%	31.1%	31.1%	31.1%	31.1%	6%	6%
Yellow Time (s)	3.3	3.3	3.3	3.3	3.6	3.6	3.6	3.6	2.0	2.0
All-Red Time (s)	2.8	2.8	2.8	2.8	2.6	2.6	2.6	2.6	0.0	0.0
Lost Time Adjust (s)	-2.1	-2.1	-2.1	-2.1		-2.2		-2.2		
Total Lost Time (s)	4.0	4.0	4.0	4.0		4.0		4.0		
Lead/Lag	Lead		Lag	Lag						
Lead-Lag Optimize?			Yes	Yes						
Recall Mode	None	C-Max	C-Max	C-Max	None	None	None	None	None	None
Act Effct Green (s)	18.8	59.4	36.6	36.6		22.6		22.6		
Actuated g/C Ratio	0.21	0.66	0.41	0.41		0.25		0.25		
v/c Ratio	0.52	0.36	0.47	0.78		0.67		0.79		
Control Delay	40.3	8.6	26.5	32.8		23.6		24.7		
Queue Delay	0.0	0.0	0.0	0.0		0.0		0.2		
Total Delay	40.3	8.6	26.5	32.8		23.6		24.9		
LOS	D	A	C	C		C		C		
Approach Delay		18.7		31.5		23.6		24.9		
Approach LOS		B		C		C		C		
Queue Length 50th (m)	29.3	26.7	18.8	85.9		16.8		33.2		
Queue Length 95th (m)	#64.6	53.2	37.8	#141.4		m25.0		49.1		
Internal Link Dist (m)		276.4		61.0		100.0		41.6		
Turn Bay Length (m)	40.0		45.0							
Base Capacity (vph)	349	1088	299	706		700		879		
Starvation Cap Reductn	0	0	0	0		0		0		
Spillback Cap Reductn	0	0	0	0		0		21		
Storage Cap Reductn	0	0	0	0		0		0		
Reduced v/c Ratio	0.52	0.36	0.47	0.78		0.60		0.74		

### Intersection Summary

Cycle Length: 90

Actuated Cycle Length: 90

Offset: 0 (0%), Referenced to phase 6:WBL and 2:EBT, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.79

Intersection Signal Delay: 25.1

Intersection LOS: C

Intersection Capacity Utilization 84.4%

ICU Level of Service E

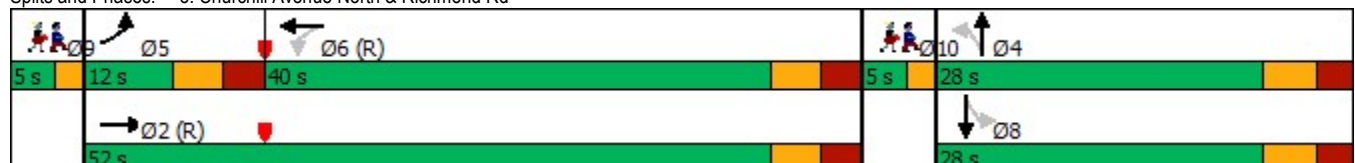
Analysis Period (min) 15

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

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.



















### Splits and Phases: 5: Churchill Avenue North & Richmond Rd



# Conditions

## 5: Churchill Avenue North & Richmond Rd

2025 Total Projected PM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	164	304	47	128	461	37	28	275	76	22	266	284
Future Volume (vph)	164	304	47	128	461	37	28	275	76	22	266	284
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0			4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			0.95			0.95	
Frpb, ped/bikes	1.00	0.95		1.00	0.99			0.96			0.85	
Flpb, ped/bikes	1.00	1.00		0.79	1.00			1.00			1.00	
Frt	1.00	0.98		1.00	0.99			0.97			0.93	
Flt Protected	0.95	1.00		0.95	1.00			1.00			1.00	
Satd. Flow (prot)	1676	1642		1319	1729			3092			2618	
Flt Permitted	0.95	1.00		0.53	1.00			0.77			0.92	
Satd. Flow (perm)	1676	1642		738	1729			2388			2424	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	182	338	52	142	512	41	31	306	84	24	296	316
RTOR Reduction (vph)	0	4	0	0	3	0	0	25	0	0	201	0
Lane Group Flow (vph)	182	386	0	142	550	0	0	396	0	0	435	0
Confl. Peds. (#/hr)	86		163	163		86	84		54	54		84
Confl. Bikes (#/hr)			2			4			3			1
Turn Type	Prot	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases	5	2			6			4			8	
Permitted Phases				6			4			8	8	
Actuated Green, G (s)	16.7	57.3		34.5	34.5			20.4			20.4	
Effective Green, g (s)	18.8	59.4		36.6	36.6			22.6			22.6	
Actuated g/C Ratio	0.21	0.66		0.41	0.41			0.25			0.25	
Clearance Time (s)	6.1	6.1		6.1	6.1			6.2			6.2	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	350	1083		300	703			599			608	
v/s Ratio Prot	c0.11	0.23			c0.32							
v/s Ratio Perm				0.19				0.17			c0.18	
v/c Ratio	0.52	0.36		0.47	0.78			0.66			0.71	
Uniform Delay, d1	31.6	6.8		19.6	23.2			30.3			30.8	
Progression Factor	1.00	1.00		1.00	1.00			0.68			1.00	
Incremental Delay, d2	1.4	0.9		5.3	8.5			2.4			4.0	
Delay (s)	33.0	7.7		24.9	31.7			23.1			34.7	
Level of Service	C	A		C	C			C			C	
Approach Delay (s)		15.8			30.3			23.1			34.7	
Approach LOS		B			C			C			C	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			26.6									
HCM 2000 Volume to Capacity ratio			0.74									
Actuated Cycle Length (s)			90.0									
Intersection Capacity Utilization			84.4%									
Analysis Period (min)			15									
c Critical Lane Group												



# Conditions

## 6: Ped Crossing & Richmond Rd

2025 Total Projected PM



Lane Group	EBT	WBT	Ø4	Ø8
Lane Configurations	↑↑	↑		
Traffic Volume (vph)	578	807		
Future Volume (vph)	578	807		
Lane Group Flow (vph)	642	897		
Turn Type	NA	NA		
Protected Phases	2	6	4	8
Permitted Phases				
Detector Phase	2	6		
Switch Phase				
Minimum Initial (s)	10.0	10.0	10.0	10.0
Minimum Split (s)	23.1	23.1	25.0	25.0
Total Split (s)	40.0	40.0	25.0	25.0
Total Split (%)	61.5%	61.5%	38%	38%
Yellow Time (s)	3.0	3.0	3.0	3.0
All-Red Time (s)	2.1	2.1	1.0	1.0
Lost Time Adjust (s)	-1.1	-1.1		
Total Lost Time (s)	4.0	4.0		
Lead/Lag				
Lead-Lag Optimize?				
Recall Mode	C-Max	C-Max	Ped	Ped
Act Effct Green (s)	36.0	36.0		
Actuated g/C Ratio	0.55	0.55		
v/c Ratio	0.35	0.92		
Control Delay	8.7	30.3		
Queue Delay	0.0	0.0		
Total Delay	8.7	30.3		
LOS	A	C		
Approach Delay	8.7	30.3		
Approach LOS	A	C		
Queue Length 50th (m)	21.3	93.4		
Queue Length 95th (m)	31.0	#176.2		
Internal Link Dist (m)	41.2	106.6		
Turn Bay Length (m)				
Base Capacity (vph)	1857	977		
Starvation Cap Reductn	0	0		
Spillback Cap Reductn	0	0		
Storage Cap Reductn	0	0		
Reduced v/c Ratio	0.35	0.92		

### Intersection Summary

Cycle Length: 65

Actuated Cycle Length: 65

Offset: 40 (62%), Referenced to phase 2:EBT and 6:WBT, Start of Green

Natural Cycle: 70

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.92

Intersection Signal Delay: 21.3

Intersection LOS: C

Intersection Capacity Utilization 48.2%

ICU Level of Service A

Analysis Period (min) 15

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

Queue shown is maximum after two cycles.















Splits and Phases: 6: Ped Crossing & Richmond Rd

Ø2 (R) 40 s	Ø4 25 s
Ø6 (R) 40 s	Ø8 25 s

# Conditions

## 6: Ped Crossing & Richmond Rd

2025 Total Projected PM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	578	0	0	807	0	0	0	0	0	0	0
Future Volume (vph)	0	578	0	0	807	0	0	0	0	0	0	0
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)		4.0			4.0							
Lane Util. Factor		0.95			1.00							
Frpb, ped/bikes		1.00			1.00							
Flpb, ped/bikes		1.00			1.00							
Frt		1.00			1.00							
Flt Protected		1.00			1.00							
Satd. Flow (prot)		3353			1765							
Flt Permitted		1.00			1.00							
Satd. Flow (perm)		3353			1765							
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	0	642	0	0	897	0	0	0	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	642	0	0	897	0	0	0	0	0	0	0
Confl. Peds. (#/hr)							13		12	12		13
Confl. Bikes (#/hr)									2			1
Turn Type		NA			NA							
Protected Phases		2			6							
Permitted Phases												
Actuated Green, G (s)		34.9			34.9							
Effective Green, g (s)		36.0			36.0							
Actuated g/C Ratio		0.55			0.55							
Clearance Time (s)		5.1			5.1							
Vehicle Extension (s)		3.0			3.0							
Lane Grp Cap (vph)		1857			977							
v/s Ratio Prot		0.19			0.51							
v/s Ratio Perm												
v/c Ratio		0.35			0.92							
Uniform Delay, d1		8.0			13.2							
Progression Factor		1.00			1.00							
Incremental Delay, d2		0.5			14.8							
Delay (s)		8.5			27.9							
Level of Service		A			C							
Approach Delay (s)		8.5			27.9			0.0			0.0	
Approach LOS		A			C			A			A	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			19.8			HCM 2000 Level of Service				B		
HCM 2000 Volume to Capacity ratio			0.58									
Actuated Cycle Length (s)			65.0			Sum of lost time (s)				8.0		
Intersection Capacity Utilization			48.2%			ICU Level of Service				A		
Analysis Period (min)			15									

c Critical Lane Group

# F

## Appendix F - Transportation Demand Management (TDM) Strategies

## Introduction

The City of Ottawa's *Transportation Impact Assessment (TIA) Guidelines* (specifically Module 4.1—Development Design) requires proponents of qualifying developments to use the City's **TDM-Supportive Development Design and Infrastructure Checklist** to assess the opportunity to implement design elements that are supportive of sustainable modes. The goal of this assessment is to ensure that the development provides safe and efficient access for all users, while creating an environment that encourages walking, cycling and transit use.

The remaining sections of this document are:

- Using the Checklist
- Glossary
- TDM-Supportive Development Design and Infrastructure Checklist: Non-Residential Developments
- TDM-Supportive Development Design and Infrastructure Checklist: Residential Developments

**Readers are encouraged to contact the City of Ottawa's TDM Officer for any guidance and assistance they require to complete this checklist.**

## Using the Checklist

This **TDM-Supportive Development Design and Infrastructure Checklist** document includes two actual checklists, one for non-residential developments (office, institutional, retail or industrial) and one for residential developments (multi-family or condominium only; subdivisions are exempt). Readers may download the applicable checklist in electronic format and complete it electronically, or print it out and complete it by hand. As an alternative, they may create a freestanding document that lists the design and infrastructure measures being proposed and provides additional detail on them.

Each measure in the checklist is numbered for easy reference. Each measure is also flagged as:

- **REQUIRED** —The Official Plan or Zoning By-law provides related guidance that must be followed.
- **BASIC** —The measure is generally feasible and effective, and in most cases would benefit the development and its users.
- **BETTER** —The measure could maximize support for users of sustainable modes, and optimize development performance.

## **Glossary**

This glossary defines and describes the following measures that are identified in the **TDM-Supportive Development Design and Infrastructure Checklist**:

### ***Walking & cycling: Routes***

- Building location & access points
- Facilities for walking & cycling
- Amenities for walking & cycling

### ***Walking & cycling: End-of-trip facilities***

- Bicycle parking
- Secure bicycle parking
- Shower & change facilities
- Bicycle repair station

### ***Transit***

- Walking routes to transit
- Customer amenities

### ***Ridesharing***

- Pick-up & drop-off facilities
- Carpool parking

### ***Carsharing & bikesharing***

- Carshare parking spaces
- Bikeshare station location

### ***Parking***

- Number of parking spaces
- Separate long-term & short-term parking areas

### ***Other***

- On-site amenities to minimize off-site trips

In addition to specific references made in this glossary, readers should consult the City of Ottawa's design and planning guidelines for a variety of different land uses and contexts, available on the City's website at [www.ottawa.ca](http://www.ottawa.ca). Readers may also find the following resources to be helpful:

- *Promoting Sustainable Transportation through Site Design*, Institute of Transportation Engineers, 2004 ([www.cite7.org/wpdm-package/iterp-promoting-sustainable-transportation](http://www.cite7.org/wpdm-package/iterp-promoting-sustainable-transportation))
- *Bicycle End-of-Trip Facilities: A Guide for Canadian Municipalities and Employers*, Transport Canada, 2010 ([www.fcm.ca/Documents/tools/GMF/Transport\\_Canada/BikeEndofTrip\\_EN.pdf](http://www.fcm.ca/Documents/tools/GMF/Transport_Canada/BikeEndofTrip_EN.pdf))

► ***Walking & cycling: Routes***

**Building location & access points.** Correctly positioning buildings and their entrances can help make walking convenient, comfortable and safe. Minimizing travel distances and maximizing visibility are key.

**Facilities for walking & cycling.** The Official Plan gives clear direction on the provision and design of walking and cycling facilities for both access and circulation. On larger, busier sites (e.g. multi-building campuses) the inclusion of sidewalks, pathways, marked crossings, stop signs and traffic calming features can create a safer and more supportive environment for active transportation.

**Amenities for walking & cycling.** Lighting, landscaping, benches and wayfinding can make walking and cycling safer and more secure, comfortable and accessible.

► ***Walking & cycling: End-of-trip facilities***

**Bicycle parking.** The Official Plan and Zoning By-law both address the need for adequate bicycle parking at developments. Weather protection and theft prevention are major concerns for commuters who spend hundreds or thousands of dollars on a quality bicycle. Bicycle racks should have a design that enables secure locking while preventing damage to wheels. They should be located within sight of busy areas such as main building entrances or staffed parking kiosks.

**Secure bicycle parking.** Ottawa's Zoning By-law requires a secure area for bicycles at office or residential developments having more than 50 bicycle parking spaces. Lockable outdoor bike cages or indoor storage rooms that limit access to registered users are ideal.

**Shower & change facilities.** Longer-distance cyclists, joggers and even pedestrians can need a place to shower and change at work; the lack of such facilities is a major barrier to active commuting. Lockers and drying racks provide a place to store gear away from workspaces, and showers and grooming stations allow commuters to make themselves presentable for the office.

**Bicycle repair station.** Cycling commuters can experience maintenance issues that make the homeward trip difficult or impossible. A small supply of tools (e.g. air pump, Allen keys, wrenches) and supplies (e.g. inner tube patches, chain lubricant) in the workplace can help.

► ***Transit***

**Customer amenities.** Larger developments that feature an on-site transit stop can make transit use more attractive by providing shelters, lighting and benches. Even better, they could integrate the passenger waiting area into a building entrance.

► **Ridesharing**

**Pick-up & drop-off facilities.** Having a safe place to load or unload passengers (for carpools as well as taxis and ride-hailing services) without obstructing pedestrians, cyclists or other vehicles can help make carpooling work.

**Carpool parking.** At destinations with large parking lots (or lots that regularly fill to capacity), signed priority carpool parking spaces can be an effective ridesharing incentive. Priority spaces are frequently abused by non-carpoolers, so a system to provide registered users with vehicle identification tags is recommended.

► **Carsharing & bikesharing**

**Carshare parking spaces.** For developments where carsharing could be an attractive option for employees, visitors or residents, ensuring an attractive location for future carshare parking spaces can avoid challenges associated with future retrofits.

**Bikeshare station location.** For developments where bikesharing could be an attractive option for employees, visitor or residents, ensuring an attractive location for a future bikeshare station can avoid challenges associated with future retrofits.

► **Parking**

**Number of parking spaces.** Parking capacity is an important variable in development design, as it can either support or subvert the mode share targets set during the transportation impact analysis (TIA). While the Zoning By-law establishes any minimum and/or maximum requirements for parking capacity, it also allows a reduction in any minimum to reflect the existence of on-site shower, change and locker rooms provided for cyclists.

**Separate long-term & short-term parking areas.** Because access to unused parking spaces can be a powerful incentive to drive, developments can better manage their parking supply and travel behaviours by separating long-term from short-term parking through the use of landscaping, gated controls or signs. Doing so makes it difficult for long-term parkers (e.g. commuters) to park in short-term areas (e.g. for visitors) as long as enforcement occurs; it also protects long-term parking capacity for its intended users.

► **Other**

**On-site amenities to minimize off-site trips.** Developments that offer facilities to limit employees' need for a car during their commute (e.g. to drop off children at daycare) or during their workday (e.g. to hit the gym) can free employees to make the commuting decision that otherwise works best for them.

## **TDM-Supportive Development Design and Infrastructure Checklist:** *Non-Residential Developments (office, institutional, retail or industrial)*

<b>Legend</b>	
<b>REQUIRED</b>	The Official Plan or Zoning By-law provides related guidance that must be followed
<b>BASIC</b>	The measure is generally feasible and effective, and in most cases would benefit the development and its users
<b>BETTER</b>	The measure could maximize support for users of sustainable modes, and optimize development performance

<b>TDM-supportive design &amp; infrastructure measures:</b> <i>Non-residential developments</i>		<b>Check if completed &amp; add descriptions, explanations or plan/drawing references</b>
<b>1. WALKING &amp; CYCLING: ROUTES</b>		
<b>1.1 Building location &amp; access points</b>		
<b>BASIC</b>	1.1.1 Locate building close to the street, and do not locate parking areas between the street and building entrances	✓
<b>BASIC</b>	1.1.2 Locate building entrances in order to minimize walking distances to sidewalks and transit stops/stations	✓
<b>BASIC</b>	1.1.3 Locate building doors and windows to ensure visibility of pedestrians from the building, for their security and comfort	✓
<b>1.2 Facilities for walking &amp; cycling</b>		
<b>REQUIRED</b>	1.2.1 Provide convenient, direct access to stations or major stops along rapid transit routes within 600 metres; minimize walking distances from buildings to rapid transit; provide pedestrian-friendly, weather-protected (where possible) environment between rapid transit accesses and building entrances; ensure quality linkages from sidewalks through building entrances to integrated stops/stations ( <i>see Official Plan policy 4.3.3</i> )	✓
<b>REQUIRED</b>	1.2.2 Provide safe, direct and attractive pedestrian access from public sidewalks to building entrances through such measures as: reducing distances between public sidewalks and major building entrances; providing walkways from public streets to major building entrances; within a site, providing walkways along the front of adjoining buildings, between adjacent buildings, and connecting areas where people may congregate, such as courtyards and transit stops; and providing weather protection through canopies, colonnades, and other design elements wherever possible ( <i>see Official Plan policy 4.3.12</i> )	✓



TDM-supportive design & infrastructure measures: <i>Non-residential developments</i>		Check if completed & add descriptions, explanations or plan/drawing references
REQUIRED	1.2.3 Provide sidewalks of smooth, well-drained walking surfaces of contrasting materials or treatments to differentiate pedestrian areas from vehicle areas, and provide marked pedestrian crosswalks at intersection sidewalks ( <i>see Official Plan policy 4.3.10</i> )	✓
REQUIRED	1.2.4 Make sidewalks and open space areas easily accessible through features such as gradual grade transition, depressed curbs at street corners and convenient access to extra-wide parking spaces and ramps ( <i>see Official Plan policy 4.3.10</i> )	✓
REQUIRED	1.2.5 Include adequately spaced inter-block/street cycling and pedestrian connections to facilitate travel by active transportation. Provide links to the existing or planned network of public sidewalks, multi-use pathways and on-road cycle routes. Where public sidewalks and multi-use pathways intersect with roads, consider providing traffic control devices to give priority to cyclists and pedestrians ( <i>see Official Plan policy 4.3.11</i> )	✓
BASIC	1.2.6 Provide safe, direct and attractive walking routes from building entrances to nearby transit stops	✓
BASIC	1.2.7 Ensure that walking routes to transit stops are secure, visible, lighted, shaded and wind-protected wherever possible	✓
BASIC	1.2.8 Design roads used for access or circulation by cyclists using a target operating speed of no more than 30 km/h, or provide a separated cycling facility	<input type="checkbox"/>
<b>1.3 Amenities for walking &amp; cycling</b>		
BASIC	1.3.1 Provide lighting, landscaping and benches along walking and cycling routes between building entrances and streets, sidewalks and trails	<input type="checkbox"/>
BASIC	1.3.2 Provide wayfinding signage for site access (where required, e.g. when multiple buildings or entrances exist) and egress (where warranted, such as when directions to reach transit stops/stations, trails or other common destinations are not obvious)	<input type="checkbox"/>

TDM-supportive design & infrastructure measures: <i>Non-residential developments</i>		Check if completed & add descriptions, explanations or plan/drawing references
<b>2. WALKING &amp; CYCLING: END-OF-TRIP FACILITIES</b>		
<b>2.1 Bicycle parking</b>		
REQUIRED	2.1.1 Provide bicycle parking in highly visible and lighted areas, sheltered from the weather wherever possible ( <i>see Official Plan policy 4.3.6</i> )	<input checked="" type="checkbox"/>
REQUIRED	2.1.2 Provide the number of bicycle parking spaces specified for various land uses in different parts of Ottawa; provide convenient access to main entrances or well-used areas ( <i>see Zoning By-law Section 111</i> )	<input checked="" type="checkbox"/>
REQUIRED	2.1.3 Ensure that bicycle parking spaces and access aisles meet minimum dimensions; that no more than 50% of spaces are vertical spaces; and that parking racks are securely anchored ( <i>see Zoning By-law Section 111</i> )	<input checked="" type="checkbox"/>
BASIC	2.1.4 Provide bicycle parking spaces equivalent to the expected number of commuter cyclists (assuming the cycling mode share target is met), plus the expected peak number of customer/visitor cyclists	<input type="checkbox"/>
BETTER	2.1.5 Provide bicycle parking spaces equivalent to the expected number of commuter and customer/visitor cyclists, plus an additional buffer (e.g. 25 percent extra) to encourage other cyclists and ensure adequate capacity in peak cycling season	<input type="checkbox"/>
<b>2.2 Secure bicycle parking</b>		
REQUIRED	2.2.1 Where more than 50 bicycle parking spaces are provided for a single office building, locate at least 25% of spaces within a building/structure, a secure area (e.g. supervised parking lot or enclosure) or bicycle lockers ( <i>see Zoning By-law Section 111</i> )	<input type="checkbox"/>
BETTER	2.2.2 Provide secure bicycle parking spaces equivalent to the expected number of commuter cyclists (assuming the cycling mode share target is met)	<input type="checkbox"/>
<b>2.3 Shower &amp; change facilities</b>		
BASIC	2.3.1 Provide shower and change facilities for the use of active commuters	<input type="checkbox"/>
BETTER	2.3.2 In addition to shower and change facilities, provide dedicated lockers, grooming stations, drying racks and laundry facilities for the use of active commuters	<input type="checkbox"/>
<b>2.4 Bicycle repair station</b>		
BETTER	2.4.1 Provide a permanent bike repair station, with commonly used tools and an air pump, adjacent to the main bicycle parking area (or secure bicycle parking area, if provided)	<input type="checkbox"/>

TDM-supportive design & infrastructure measures: <i>Non-residential developments</i>		Check if completed & add descriptions, explanations or plan/drawing references
<b>3. TRANSIT</b>		
<b>3.1 Customer amenities</b>		
BASIC	3.1.1 Provide shelters, lighting and benches at any on-site transit stops	<input type="checkbox"/>
BASIC	3.1.2 Where the site abuts an off-site transit stop and insufficient space exists for a transit shelter in the public right-of-way, protect land for a shelter and/or install a shelter	<input type="checkbox"/>
BETTER	3.1.3 Provide a secure and comfortable interior waiting area by integrating any on-site transit stops into the building	<input type="checkbox"/>
<b>4. RIDESHARING</b>		
<b>4.1 Pick-up &amp; drop-off facilities</b>		
BASIC	4.1.1 Provide a designated area for carpool drivers (plus taxis and ride-hailing services) to drop off or pick up passengers without using fire lanes or other no-stopping zones	<input type="checkbox"/>
<b>4.2 Carpool parking</b>		
BASIC	4.2.1 Provide signed parking spaces for carpools in a priority location close to a major building entrance, sufficient in number to accommodate the mode share target for carpools	<input type="checkbox"/>
BETTER	4.2.2 At large developments, provide spaces for carpools in a separate, access-controlled parking area to simplify enforcement	<input type="checkbox"/>
<b>5. CARSHARING &amp; BIKESHARING</b>		
<b>5.1 Carshare parking spaces</b>		
BETTER	5.1.1 Provide carshare parking spaces in permitted non-residential zones, occupying either required or provided parking spaces ( <i>see Zoning By-law Section 94</i> )	<input type="checkbox"/>
<b>5.2 Bikeshare station location</b>		
BETTER	5.2.1 Provide a designated bikeshare station area near a major building entrance, preferably lighted and sheltered with a direct walkway connection	<input type="checkbox"/>

TDM-supportive design & infrastructure measures: <i>Non-residential developments</i>		Check if completed & add descriptions, explanations or plan/drawing references
<b>6. PARKING</b>		
<b>6.1 Number of parking spaces</b>		
<b>REQUIRED</b>	6.1.1 Do not provide more parking than permitted by zoning, nor less than required by zoning, unless a variance is being applied for	<input type="checkbox"/>
<b>BASIC</b>	6.1.2 Provide parking for long-term and short-term users that is consistent with mode share targets, considering the potential for visitors to use off-site public parking	<input type="checkbox"/>
<b>BASIC</b>	6.1.3 Where a site features more than one use, provide shared parking and reduce the cumulative number of parking spaces accordingly ( <i>see Zoning By-law Section 104</i> )	<input type="checkbox"/>
<b>BETTER</b>	6.1.4 Reduce the minimum number of parking spaces required by zoning by one space for each 13 square metres of gross floor area provided as shower rooms, change rooms, locker rooms and other facilities for cyclists in conjunction with bicycle parking ( <i>see Zoning By-law Section 111</i> )	<input type="checkbox"/>
<b>6.2 Separate long-term &amp; short-term parking areas</b>		
<b>BETTER</b>	6.2.1 Separate short-term and long-term parking areas using signage or physical barriers, to permit access controls and simplify enforcement (i.e. to discourage employees from parking in visitor spaces, and vice versa)	<input type="checkbox"/>
<b>7. OTHER</b>		
<b>7.1 On-site amenities to minimize off-site trips</b>		
<b>BETTER</b>	7.1.1 Provide on-site amenities to minimize mid-day or mid-commute errands	<input type="checkbox"/>

## **TDM-Supportive Development Design and Infrastructure Checklist:** *Residential Developments (multi-family or condominium)*

<b>Legend</b>	
<b>REQUIRED</b>	The Official Plan or Zoning By-law provides related guidance that must be followed
<b>BASIC</b>	The measure is generally feasible and effective, and in most cases would benefit the development and its users
<b>BETTER</b>	The measure could maximize support for users of sustainable modes, and optimize development performance

<b>TDM-supportive design &amp; infrastructure measures:</b> <i>Residential developments</i>		<b>Check if completed &amp; add descriptions, explanations or plan/drawing references</b>
<b>1. WALKING &amp; CYCLING: ROUTES</b>		
<b>1.1 Building location &amp; access points</b>		
<b>BASIC</b>	1.1.1 Locate building close to the street, and do not locate parking areas between the street and building entrances	✓
<b>BASIC</b>	1.1.2 Locate building entrances in order to minimize walking distances to sidewalks and transit stops/stations	✓
<b>BASIC</b>	1.1.3 Locate building doors and windows to ensure visibility of pedestrians from the building, for their security and comfort	✓
<b>1.2 Facilities for walking &amp; cycling</b>		
<b>REQUIRED</b>	1.2.1 Provide convenient, direct access to stations or major stops along rapid transit routes within 600 metres; minimize walking distances from buildings to rapid transit; provide pedestrian-friendly, weather-protected (where possible) environment between rapid transit accesses and building entrances; ensure quality linkages from sidewalks through building entrances to integrated stops/stations ( <i>see Official Plan policy 4.3.3</i> )	✓
<b>REQUIRED</b>	1.2.2 Provide safe, direct and attractive pedestrian access from public sidewalks to building entrances through such measures as: reducing distances between public sidewalks and major building entrances; providing walkways from public streets to major building entrances; within a site, providing walkways along the front of adjoining buildings, between adjacent buildings, and connecting areas where people may congregate, such as courtyards and transit stops; and providing weather protection through canopies, colonnades, and other design elements wherever possible ( <i>see Official Plan policy 4.3.12</i> )	✓

TDM-supportive design & infrastructure measures: <i>Residential developments</i>		Check if completed & add descriptions, explanations or plan/drawing references
REQUIRED	1.2.3 Provide sidewalks of smooth, well-drained walking surfaces of contrasting materials or treatments to differentiate pedestrian areas from vehicle areas, and provide marked pedestrian crosswalks at intersection sidewalks ( <i>see Official Plan policy 4.3.10</i> )	<input type="checkbox"/>
REQUIRED	1.2.4 Make sidewalks and open space areas easily accessible through features such as gradual grade transition, depressed curbs at street corners and convenient access to extra-wide parking spaces and ramps ( <i>see Official Plan policy 4.3.10</i> )	<input checked="" type="checkbox"/>
REQUIRED	1.2.5 Include adequately spaced inter-block/street cycling and pedestrian connections to facilitate travel by active transportation. Provide links to the existing or planned network of public sidewalks, multi-use pathways and on-road cycle routes. Where public sidewalks and multi-use pathways intersect with roads, consider providing traffic control devices to give priority to cyclists and pedestrians ( <i>see Official Plan policy 4.3.11</i> )	<input type="checkbox"/>
BASIC	1.2.6 Provide safe, direct and attractive walking routes from building entrances to nearby transit stops	<input type="checkbox"/>
BASIC	1.2.7 Ensure that walking routes to transit stops are secure, visible, lighted, shaded and wind-protected wherever possible	<input checked="" type="checkbox"/>
BASIC	1.2.8 Design roads used for access or circulation by cyclists using a target operating speed of no more than 30 km/h, or provide a separated cycling facility	<input type="checkbox"/>
<b>1.3 Amenities for walking &amp; cycling</b>		
BASIC	1.3.1 Provide lighting, landscaping and benches along walking and cycling routes between building entrances and streets, sidewalks and trails	<input checked="" type="checkbox"/>
BASIC	1.3.2 Provide wayfinding signage for site access (where required, e.g. when multiple buildings or entrances exist) and egress (where warranted, such as when directions to reach transit stops/stations, trails or other common destinations are not obvious)	<input type="checkbox"/>

TDM-supportive design & infrastructure measures: <i>Residential developments</i>		Check if completed & add descriptions, explanations or plan/drawing references
<b>2. WALKING &amp; CYCLING: END-OF-TRIP FACILITIES</b>		
<b>2.1 Bicycle parking</b>		
REQUIRED	2.1.1 Provide bicycle parking in highly visible and lighted areas, sheltered from the weather wherever possible ( <i>see Official Plan policy 4.3.6</i> )	<input checked="" type="checkbox"/>
REQUIRED	2.1.2 Provide the number of bicycle parking spaces specified for various land uses in different parts of Ottawa; provide convenient access to main entrances or well-used areas ( <i>see Zoning By-law Section 111</i> )	<input type="checkbox"/>
REQUIRED	2.1.3 Ensure that bicycle parking spaces and access aisles meet minimum dimensions; that no more than 50% of spaces are vertical spaces; and that parking racks are securely anchored ( <i>see Zoning By-law Section 111</i> )	<input type="checkbox"/>
BASIC	2.1.4 Provide bicycle parking spaces equivalent to the expected number of resident-owned bicycles, plus the expected peak number of visitor cyclists	<input type="checkbox"/>
<b>2.2 Secure bicycle parking</b>		
REQUIRED	2.2.1 Where more than 50 bicycle parking spaces are provided for a single residential building, locate at least 25% of spaces within a building/structure, a secure area (e.g. supervised parking lot or enclosure) or bicycle lockers ( <i>see Zoning By-law Section 111</i> )	<input type="checkbox"/>
BETTER	2.2.2 Provide secure bicycle parking spaces equivalent to at least the number of units at condominiums or multi-family residential developments	<input type="checkbox"/>
<b>2.3 Bicycle repair station</b>		
BETTER	2.3.1 Provide a permanent bike repair station, with commonly used tools and an air pump, adjacent to the main bicycle parking area (or secure bicycle parking area, if provided)	<input type="checkbox"/>
<b>3. TRANSIT</b>		
<b>3.1 Customer amenities</b>		
BASIC	3.1.1 Provide shelters, lighting and benches at any on-site transit stops	<input type="checkbox"/>
BASIC	3.1.2 Where the site abuts an off-site transit stop and insufficient space exists for a transit shelter in the public right-of-way, protect land for a shelter and/or install a shelter	<input type="checkbox"/>
BETTER	3.1.3 Provide a secure and comfortable interior waiting area by integrating any on-site transit stops into the building	<input type="checkbox"/>

TDM-supportive design & infrastructure measures: <i>Residential developments</i>		Check if completed & add descriptions, explanations or plan/drawing references
<b>4. RIDESHARING</b>		
<b>4.1 Pick-up &amp; drop-off facilities</b>		
<b>BASIC</b>	4.1.1 Provide a designated area for carpool drivers (plus taxis and ride-hailing services) to drop off or pick up passengers without using fire lanes or other no-stopping zones	<input type="checkbox"/>
<b>5. CARSHARING &amp; BIKESHARING</b>		
<b>5.1 Carshare parking spaces</b>		
<b>BETTER</b>	5.1.1 Provide up to three carshare parking spaces in an R3, R4 or R5 Zone for specified residential uses (see <i>Zoning By-law Section 94</i> )	<input type="checkbox"/>
<b>5.2 Bikeshare station location</b>		
<b>BETTER</b>	5.2.1 Provide a designated bikeshare station area near a major building entrance, preferably lighted and sheltered with a direct walkway connection	<input type="checkbox"/>
<b>6. PARKING</b>		
<b>6.1 Number of parking spaces</b>		
<b>REQUIRED</b>	6.1.1 Do not provide more parking than permitted by zoning, nor less than required by zoning, unless a variance is being applied for	<input type="checkbox"/>
<b>BASIC</b>	6.1.2 Provide parking for long-term and short-term users that is consistent with mode share targets, considering the potential for visitors to use off-site public parking	<input type="checkbox"/>
<b>BASIC</b>	6.1.3 Where a site features more than one use, provide shared parking and reduce the cumulative number of parking spaces accordingly (see <i>Zoning By-law Section 104</i> )	<input type="checkbox"/>
<b>BETTER</b>	6.1.4 Reduce the minimum number of parking spaces required by zoning by one space for each 13 square metres of gross floor area provided as shower rooms, change rooms, locker rooms and other facilities for cyclists in conjunction with bicycle parking (see <i>Zoning By-law Section 111</i> )	<input type="checkbox"/>
<b>6.2 Separate long-term &amp; short-term parking areas</b>		
<b>BETTER</b>	6.2.1 Provide separate areas for short-term and long-term parking (using signage or physical barriers) to permit access controls and simplify enforcement (i.e. to discourage residents from parking in visitor spaces, and vice versa)	<input type="checkbox"/>





## Appendix G - Segment MMLoS

SEGMENTS		LOS	Richmond	Richmond	Roosevelt	Churchill	Byron S	Byron N	Richmond S	Richmond N
			Chur/Roos	Roos/Gold	Rich/Byro	Rich/Byro	Chur/Roos	Chur/Roos	Gold/Ped	Gold/Ped
Pedestrian	Sidewalk Width	C	≥ 2 m	≥ 2 m	≥ 2 m	≥ 2 m	1.5 m	no sidewalk	≥ 2 m	≥ 2 m
	Boulevard Width		< 0.5	< 0.5	< 0.5	< 0.5	0.5 - 2 m	n/a	> 2 m	< 0.5
	Avg Daily Curb Lane Traffic Volume		> 3000	> 3000	≤ 3000	≤ 3000	≤ 3000	≤ 3000	> 3000	> 3000
	Operating Speed		> 30 to 50 km/h	> 30 to 50 km/h	> 30 to 50 km/h	> 30 to 50 km/h	> 30 to 50 km/h	> 30 to 50 km/h	> 30 to 50 km/h	> 30 to 50 km/h
	On-Street Parking		yes	yes	no	yes	no	no	no	yes
	Exposure to Traffic PLoS		B	B	B	B	C	F	B	B
	Effective Sidewalk Width		2.5 m	2.5 m	2.0 m	2.0 m	1.5 m		2.5 m	2.0 m
	Pedestrian Volume		500 ped /hr	500 ped /hr	250 ped/hr	250 ped/hr	250 ped/hr		250 ped/hr	250 ped/hr
Crowding PLoS			B	B	B	B	B	-	B	B
Level of Service			B	B	B	B	C	-	B	B
Bicycle	Type of Cycling Facility	D	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Curbside Bike Lane	Mixed Traffic	Physically Separated	Mixed Traffic
	Number of Travel Lanes		2-3 lanes total	2-3 lanes total	≤ 2 (no centreline)	2-3 lanes total	≤ 1 each direction	≤ 2 (no centreline)		2-3 lanes total
	Operating Speed		>40 to <50 km/h	>40 to <50 km/h	>40 to <50 km/h	>40 to <50 km/h	≤ 50 km/h	>40 to <50 km/h		>40 to <50 km/h
	# of Lanes & Operating Speed LoS		D	D	B	D	A	B	-	D
	Bike Lane (+ Parking Lane) Width						≥1.5 to <1.8 m			
	Bike Lane Width LoS		-	-	-	-	B	-	-	-
	Bike Lane Blockages						Rare			
	Blockage LoS		-	-	-	-	A	-	-	-
	Median Refuge Width (no median = < 1.8 m)		< 1.8 m refuge	< 1.8 m refuge	< 1.8 m refuge	< 1.8 m refuge	< 1.8 m refuge	< 1.8 m refuge		< 1.8 m refuge
	No. of Lanes at Unsignalized Crossing		≤ 3 lanes	≤ 3 lanes	≤ 3 lanes	≤ 3 lanes	≤ 3 lanes	≤ 3 lanes		≤ 3 lanes
	Sidestreet Operating Speed		≤ 40 km/h	≤ 40 km/h	>40 to 50 km/h	>40 to 50 km/h	≤ 40 km/h	>40 to 50 km/h		≤ 40 km/h
	Unsignalized Crossing - Lowest LoS		A	A	B	B	A	B	A	A
Level of Service			D	D	B	D	B	B	A	D
Transit	Facility Type	D	Mixed Traffic	Mixed Traffic		Mixed Traffic			Mixed Traffic	Mixed Traffic
	Friction or Ratio Transit:Posted Speed		Vt/Vp ≥ 0.8	Vt/Vp ≥ 0.8		Vt/Vp ≥ 0.8			Vt/Vp ≥ 0.8	Vt/Vp ≥ 0.8
	Level of Service		D	D	-	D	-	-	D	D
Truck	Truck Lane Width	C	> 3.7 m	> 3.7 m		> 3.7 m	> 3.7 m	> 3.7 m	≤ 3.5 m	≤ 3.5 m
	Travel Lanes per Direction		1	1		1	1	1	1	1
	Level of Service		B	B	-	B	B	B	C	C

# H

## Appendix H - Collision Analysis

Classification of Accident	01 - Approaching	02 - Angle	03 - Rear end	04 - Sideswipe	05 - Turning movement	06 - SMV unattended vehicle	07 - SMV other	99 - Other	Total	
03 - P.D. only	1	23	23	19	12	27	1	11	117	82%
02 - Non-fatal inj	0	4	9	0	4	1	7	0	25	18%
01 - Fatal injury	0	0	0	0	0	0	0	0	0	0%
Total	1	27	32	19	16	28	8	11	142	100%
	#8 or 1%	#3 or 19%	#1 or 23%	#4 or 13%	#5 or 11%	#2 or 20%	#7 or 6%	#6 or 8%		

#### GOLDEN AVE @ RICHMOND RD

Years	Total # Collisions	24 Hr AADT Veh Volume	Days	Collisions/MEV
2014-2018	7	11,593	1825	0.33

Classification of Accident	01 - Approaching	02 - Angle	03 - Rear end	04 - Sideswipe	05 - Turning movement	06 - SMV unattended vehicle	07 - SMV other	99 - Other	Total	
03 - P.D. only	0	1	3	1	0	0	0	0	5	71%
02 - Non-fatal inj	0	0	1	0	0	0	1	0	2	29%
01 - Fatal injury	0	0	0	0	0	0	0	0	0	0%
Total	0	1	4	1	0	0	1	0	7	100%
	0%	14%	57%	14%	0%	0%	14%	0%		

#### CHURCHILL AVE @ RICHMOND RD

Years	Total # Collisions	24 Hr AADT Veh Volume	Days	Collisions/MEV
2014-2018	31	23,424	1825	0.73

Classification of Accident	01 - Approaching	02 - Angle	03 - Rear end	04 - Sideswipe	05 - Turning movement	06 - SMV unattended vehicle	07 - SMV other	99 - Other	Total	
03 - P.D. only	0	7	6	5	4	2	0	0	24	77%
02 - Non-fatal inj	0	0	3	0	0	0	4	0	7	23%
01 - Fatal injury	0	0	0	0	0	0	0	0	0	0%
Total	0	7	9	5	4	2	4	0	31	100%
	0%	23%	29%	16%	13%	6%	13%	0%		

#### RICHMOND RD btwn ROOSEVELT AVE & CHURCHILL AVE N

Years	Total # Collisions	24 Hr AADT Veh Volume	Days	Collisions/MEV
2014-2018	37	14,024	1825	1.45

Classification of Accident	01 - Approaching	02 - Angle	03 - Rear end	04 - Sideswipe	05 - Turning movement	06 - SMV unattended vehicle	07 - SMV other	99 - Other	Total	
03 - P.D. only	1	2	5	6	3	14	1	2	34	92%
02 - Non-fatal inj	0	1	1	0	1	0	0	0	3	8%
01 - Fatal injury	0	0	0	0	0	0	0	0	0	0%
Total	1	3	6	6	4	14	1	2	37	100%
	3%	8%	16%	16%	11%	38%	3%	5%		

#### ROOSEVELT AVE @ RICHMOND RD

Years	Total # Collisions	24 Hr AADT Veh Volume	Days	Collisions/MEV
2014-2018	4	15,991	1825	0.14

Classification of Accident	01 - Approaching	02 - Angle	03 - Rear end	04 - Sideswipe	05 - Turning movement	06 - SMV unattended vehicle	07 - SMV other	99 - Other	Total	
03 - P.D. only	0	0	2	0	0	0	0	0	2	50%
02 - Non-fatal inj	0	0	0	0	1	0	1	0	2	50%
01 - Fatal injury	0	0	0	0	0	0	0	0	0	0%
Total	0	0	2	0	1	0	1	0	4	100%
	0%	0%	50%	0%	25%	0%	25%	0%		

#### RICHMOND RD btwn BROADVIEW AVE & GOLDEN AVE

Years	Total # Collisions	24 Hr AADT Veh Volume	Days	Collisions/MEV
2014-2018	7	12,917	1825	0.30

Classification of Accident	01 - Approaching	02 - Angle	03 - Rear end	04 - Sideswipe	05 - Turning movement	06 - SMV unattended vehicle	07 - SMV other	99 - Other	Total	
03 - P.D. only	0	4	0	0	0	1	0	1	6	86%
02 - Non-fatal inj	0	0	0	0	0	1	0	0	1	14%
01 - Fatal injury	0	0	0	0	0	0	0	0	0	0%
Total	0	4	0	0	0	2	0	1	7	100%
	0%	57%	0%	0%	0%	29%	0%	14%		

**CHURCHILL AVE N btwn RICHMOND RD & BYRON AVE**

Years	Total # Collisions	24 Hr AADT Veh Volume	Days	Collisions/MEV
2014-2018	9	10,494	1825	<b>0.47</b>

Classification of Accident	01 - Approaching	02 - Angle	03 - Rear end	04 - Sideswipe	05 - Turning movement	06 - SMV unattended vehicle	07 - SMV other	99 - Other	Total
03 - P.D. only	0	0	1	3	1	2	0	0	7
02 - Non-fatal inj	0	0	1	0	0	0	1	0	2
01 - Fatal injury	0	0	0	0	0	0	0	0	0
Total	<b>0</b>	<b>0</b>	<b>2</b>	<b>3</b>	<b>1</b>	<b>2</b>	<b>1</b>	<b>0</b>	<b>9</b>
	0%	0%	29%	29%	14%	14%	14%	0%	

78%  
22%  
0%  
100%

**RICHMOND RD btwn GOLDEN AVE & ROOSEVELT AVE**

Years	Total # Collisions	24 Hr AADT Veh Volume	Days	Collisions/MEV
2014-2018	23	10,235	1825	<b>1.23</b>

Classification of Accident	01 - Approaching	02 - Angle	03 - Rear end	04 - Sideswipe	05 - Turning movement	06 - SMV unattended vehicle	07 - SMV other	99 - Other	Total
03 - P.D. only	0	1	3	4	1	7	0	3	19
02 - Non-fatal inj	0	0	3	0	1	0	0	0	4
01 - Fatal injury	0	0	0	0	0	0	0	0	0
Total	<b>0</b>	<b>1</b>	<b>6</b>	<b>4</b>	<b>2</b>	<b>7</b>	<b>0</b>	<b>3</b>	<b>23</b>
	0%	4%	26%	17%	9%	30%	0%	13%	

83%  
17%  
0%  
100%

**BYRON AVE @ CHURCHILL AVE**

Years	Total # Collisions	24 Hr AADT Veh Volume	Days	Collisions/MEV
2014-2018	7	16,307	1825	<b>0.24</b>

Classification of Accident	01 - Approaching	02 - Angle	03 - Rear end	04 - Sideswipe	05 - Turning movement	06 - SMV unattended vehicle	07 - SMV other	99 - Other	Total
03 - P.D. only	0	1	3	0	2	0	0	1	7
02 - Non-fatal inj	0	0	0	0	0	0	0	0	0
01 - Fatal injury	0	0	0	0	0	0	0	0	0
Total	<b>0</b>	<b>1</b>	<b>3</b>	<b>0</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>7</b>
	0%	14%	43%	0%	29%	0%	0%	14%	

100%  
0%  
0%  
100%

**BYRON AVE @ ROOSEVELT AVE**

Years	Total # Collisions	24 Hr AADT Veh Volume	Days	Collisions/MEV
2014-2018	12	6,495	1825	<b>1.01</b>

Classification of Accident	01 - Approaching	02 - Angle	03 - Rear end	04 - Sideswipe	05 - Turning movement	06 - SMV unattended vehicle	07 - SMV other	99 - Other	Total
03 - P.D. only	0	5	0	0	1	0	0	2	8
02 - Non-fatal inj	0	3	0	0	1	0	0	0	4
01 - Fatal injury	0	0	0	0	0	0	0	0	0
Total	<b>0</b>	<b>8</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>12</b>
	0%	67%	0%	0%	17%	0%	0%	17%	

67%  
33%  
0%  
100%

**BYRON AVE btwn ROOSEVELT AVE & CHURCHILL AVE N**

Years	Total # Collisions	24 Hr AADT Veh Volume	Days	Collisions/MEV
2014-2018	1	5,074	1825	<b>0.11</b>

Classification of Accident	01 - Approaching	02 - Angle	03 - Rear end	04 - Sideswipe	05 - Turning movement	06 - SMV unattended vehicle	07 - SMV other	99 - Other	Total
03 - P.D. only	0	0	0	0	0	1	0	0	1
02 - Non-fatal inj	0	0	0	0	0	0	0	0	0
01 - Fatal injury	0	0	0	0	0	0	0	0	0
Total	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>1</b>
	0%	0%	0%	0%	0%	100%	0%	0%	

100%  
0%  
0%  
100%

**ROOSEVELT AVE btwn BYRON AVE & RICHMOND RD**

Years	Total # Collisions	24 Hr AADT Veh Volume	Days	Collisions/MEV
2014-2018	4	1,967	1825	<b>1.11</b>

Classification of Accident	01 - Approaching	02 - Angle	03 - Rear end	04 - Sideswipe	05 - Turning movement	06 - SMV unattended vehicle	07 - SMV other	99 - Other	Total
03 - P.D. only	0	2	0	0	0	0	0	2	4
02 - Non-fatal inj	0	0	0	0	0	0	0	0	0
01 - Fatal injury	0	0	0	0	0	0	0	0	0
Total	<b>0</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>4</b>
	0%	50%	0%	0%	0%	0%	0%	50%	

100%  
0%  
0%  
100%



## Appendix I - Intersection MMLoS



INTERSECTIONS		Richmond/Churchill				Richmond/Roosevelt				Richmond/Golden				Byron/Roosevelt				Byron/Churchill				Richmond/Broadview Ped Crossing				
Crossing Side		NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST	WEST	
Pedestrian	Lanes	3	3	3	3	0 - 2	0 - 2	0 - 2	0 - 2	0 - 2	0 - 2	0 - 2	3	0 - 2	0 - 2	0 - 2	0 - 2	3	3	0 - 2	0 - 2	0 - 2	0 - 2	0 - 2	0 - 2	
	Median	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	
	Conflicting Left Turns	Permissive	Permissive	Protected	Protected	Permissive	Permissive	Permissive	Permissive	Permissive	Permissive	Permissive	Permissive	Permissive	Permissive	Permissive	Permissive	Permissive	Permissive	Permissive	Permissive	Permissive	No left turn / Prohib.	No left turn / Prohib.	No left turn / Prohib.	No left turn / Prohib.
	Conflicting Right Turns	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	No right turn	No right turn	No right turn	No right turn	
	Right Turns on Red (RToR) ?	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR prohibited	RTOR prohibited	RTOR prohibited	RTOR prohibited	
	Ped Signal Leading Interval?	Yes	Yes	Yes	Yes	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
	Right Turn Channel	No Channel	No Channel	No Channel	No Channel	No Channel	No Channel	No Channel	No Channel	No Channel	No Channel	No Channel	No Channel	No Channel	No Channel	No Channel	No Channel	No Channel	No Channel	No Channel	No Channel	No Right Turn	No Right Turn	No Right Turn	No Right Turn	
	Corner Radius	10-15m	10-15m	10-15m	10-15m	10-15m	10-15m	10-15m	10-15m	10-15m	10-15m	10-15m	10-15m	10-15m	10-15m	10-15m	10-15m	10-15m	10-15m	10-15m	10-15m	No Right Turn	No Right Turn	No Right Turn	No Right Turn	
	Crosswalk Type	Zebra stripe hi-vis markings	Zebra stripe hi-vis markings	Zebra stripe hi-vis markings	Zebra stripe hi-vis markings	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings	Zebra stripe hi-vis markings	Zebra stripe hi-vis markings	Zebra stripe hi-vis markings	Zebra stripe hi-vis markings	Std transverse markings	Std transverse markings	No Right Turn	No Right Turn
	PETSI Score	75	75	83	83	85	85	85	85	85	85	85	85	70	85	85	85	85	73	73	88	88	111	111	-	-
Ped. Exposure to Traffic LoS	B	B	B	B	B	B	B	B	B	B	B	B	C	B	B	B	B	C	C	B	B	A	A	-	-	
Cycle Length	30	30	40	40	25	25	45	45	29	29	35	35	20	20	20	50	50	42	42	38	38	25	25	40	40	
Effective Walk Time	7	7	14	14	9	9	18	18	9	9	7	7	7	7	7	7	7	10	10	10	10	7	7	40	40	
Average Pedestrian Delay	9	9	8	8	5	5	8	8	7	7	11	11	4	4	4	18	18	12	12	10	10	6	6	0	0	
Pedestrian Delay LoS	A	A	A	A	A	A	A	A	A	A	B	B	B	A	A	B	B	B	B	B	B	A	A	A	A	
Level of Service	B	B	B	B	B	B	B	B	B	B	B	B	C	B	B	B	B	C	C	B	B	A	A	A	A	
Approach From		B				B				C				B				C				A				
Bicycle	Bicycle Lane Arrangement on Approach	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Pocket Bike Lane	Mixed Traffic	Mixed Traffic	Pocket Bike Lane	Pocket Bike Lane	Mixed Traffic	Mixed Traffic	Pocket Bike Lane	Pocket Bike Lane	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	
	Right Turn Lane Configuration	≤ 50 m	≤ 50 m	≤ 50 m	≤ 50 m	≤ 50 m	≤ 50 m	≤ 50 m	≤ 50 m	≤ 50 m	≤ 50 m	≤ 50 m	≤ 50 m Introduced right turn lane	≤ 50 m	≤ 50 m	≤ 50 m Introduced right turn lane	≤ 50 m Introduced right turn lane	≤ 50 m	≤ 50 m	> 50 m Introduced right turn lane	> 50 m Introduced right turn lane	≤ 50 m	≤ 50 m	≤ 50 m	≤ 50 m	
	Right Turning Speed	≤ 25 km/h	≤ 25 km/h	≤ 25 km/h	≤ 25 km/h	≤ 25 km/h	≤ 25 km/h	≤ 25 km/h	≤ 25 km/h	≤ 25 km/h	≤ 25 km/h	≤ 25 km/h	≤ 25 km/h	≤ 25 km/h	≤ 25 km/h	≤ 25 km/h	≤ 25 km/h	≤ 25 km/h	≤ 25 km/h	≤ 25 km/h	≤ 25 km/h	≤ 25 km/h	≤ 25 km/h	≤ 25 km/h	≤ 25 km/h	
	Cyclist relative to RT motorists	D	D	D	D	D	D	D	D	D	D	D	B	D	D	B	B	D	D	D	D	-	-	D	D	
	Separated or Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Separated	Mixed Traffic	Mixed Traffic	Separated	Separated	Mixed Traffic	Mixed Traffic	Separated	Separated	-	-	Mixed Traffic	Mixed Traffic	
	Left Turn Approach	One lane crossed	One lane crossed	One lane crossed	One lane crossed	No lane crossed	One lane crossed	One lane crossed	One lane crossed	One lane crossed	One lane crossed	One lane crossed	1 lane crossed	One lane crossed	One lane crossed	1 lane crossed	1 lane crossed	One lane crossed	One lane crossed	One lane crossed	≥ 2 lanes crossed	≥ 2 lanes crossed	No lane crossed	No lane crossed	No lane crossed	No lane crossed
	Operating Speed	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h	≤ 40 km/h	≤ 40 km/h	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h	
	Left Turning Cyclist	D	D	D	D	B	D	D	D	D	D	D	C	B	B	C	C	D	D	E	E	-	-	B	B	
Level of Service	D	D	D	D	D	D	D	D	D	D	D	C	D	D	C	C	D	D	E	E	-	-	D	D		
Transit		D				D				D				D				E				D				
Transit	Average Signal Delay	≤ 30 sec	≤ 30 sec	≤ 30 sec	≤ 30 sec	≤ 10 sec				≤ 10 sec				≤ 20 sec				≤ 10 sec				≤ 10 sec				
	Level of Service	D	D	D	D	-	-	B	B	-	-	B	B	-	-	-	-	C	B	-	-	-	-	B	B	
Truck		D				B				B				-				C				B				
Truck	Effective Corner Radius	10 - 15 m	10 - 15 m	10 - 15 m	10 - 15 m	10 - 15 m	10 - 15 m	10 - 15 m	10 - 15 m	10 - 15 m	10 - 15 m	10 - 15 m	10 - 15 m	10 - 15 m	10 - 15 m	10 - 15 m	10 - 15 m	10 - 15 m	10 - 15 m	10 - 15 m	10 - 15 m	10 - 15 m	10 - 15 m	10 - 15 m	10 - 15 m	
	Number of Receiving Lanes on Departure from Intersection	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Auto	Volume to Capacity Ratio	0.71 - 0.80				0.0 - 0.60				0.61 - 0.70				0.0 - 0.60				0.0 - 0.60				0.0 - 0.60				
	Level of Service	C				A				B				A				A				A				



## Appendix J - TDM Checklist



## Introduction

The City of Ottawa's *Transportation Impact Assessment (TIA) Guidelines* (specifically Module 4.3—Transportation Demand Management) requires proponents of qualifying developments to assess the context, need and opportunity for transportation demand management (TDM) measures at their development. The guidelines require that proponents complete the City's **TDM Measures Checklist**, at a minimum, to identify any TDM measures being proposed.

The remaining sections of this document are:

- Using the Checklist
- Glossary
- TDM Measures Checklist: Non-Residential Developments
- TDM Measures Checklist: Residential developments

**Readers are encouraged to contact the City of Ottawa's TDM Officer for any guidance and assistance they require to complete this checklist.**

## Using the Checklist

The City's *TIA Guidelines* are designed so that *Module 3.1—Development-Generated Travel Demand*, *Module 4.1—Development Design*, and *Module 4.2—Parking* are complete before a proponent begins *Module 4.3—Transportation Demand Management*.

Within Module 4.3, *Element 4.3.1—Context for TDM* and *Element 4.3.2—Need and Opportunity* are intended to create an understanding of the need for any TDM measures, and of the results they are expected to achieve or support. Once those two elements are complete, proponents begin *Element 4.3.3—TDM Program* that requires proponents to identify proposed TDM measures using the **TDM Measures Checklist**, at a minimum. The *TIA Guidelines* note that the City may require additional analysis for large or complex development proposals, or those that represent a higher degree of performance risk; as well, proponents proposing TDM measures for a new development must also propose an implementation plan that addresses planning and coordination, funding and human resources, timelines for action, performance targets and monitoring requirements.

This **TDM Measures Checklist** document includes two actual checklists, one for non-residential developments (office, institutional, retail or industrial) and one for residential developments (multi-family, condominium or subdivision). Readers may download the applicable checklist in electronic format and complete it electronically, or print it out and complete it by hand. As an alternative, they may create a freestanding document that lists the TDM measures being proposed and provides additional detail on them, including an implementation plan as required by the City's *TIA Guidelines*.

Each measure in the checklist is numbered for easy reference. Each measure is also flagged as:

- **BASIC** —The measure is generally feasible and effective, and in most cases would benefit the development and its users.
- **BETTER** —The measure could maximize support for users of sustainable modes, and optimize development performance.
- **★** —The measure is one of the most dependably effective tools to encourage the use of sustainable modes.

## **Glossary**

This glossary defines and describes the following measures that are identified in the **TDM Measures Checklist**:

### ***TDM program management***

- Program coordinator
- Travel surveys

### ***Parking***

- Priced parking

### ***Walking & cycling***

- Information on walking/cycling routes & destinations
- Bicycle skills training
- Valet bike parking

### ***Transit***

- Transit information
- Transit fare incentives
- Enhanced public transit service
- Private transit service

### ***Ridesharing***

- Ridematching service
- Carpool parking price incentives
- Vanpool service

### ***Carsharing & bikesharing***

- Bikeshare stations & memberships
- Carshare vehicles & memberships

### ***TDM marketing & communications***

- Multimodal travel information
- Personalized trip planning
- Promotions

### ***Other incentives & amenities***

- Emergency ride home
- Alternative work arrangements
- Local business travel options
- Commuter incentives
- On-site amenities

For further information on selecting and implementing TDM measures (particularly as they apply to non-residential developments, with a focus on workplaces), readers may find it helpful to consult Transport Canada's *Workplace Travel Plans: Guidance for Canadian Employers*, which can be downloaded in English and French from the ACT Canada website at

[www.actcanada.com/resources/act-resources](http://www.actcanada.com/resources/act-resources).

► ***TDM program management***

While some TDM measures can be implemented with a minimum of effort through routine channels (e.g. parking or human resources), more complex measures or a larger development site may warrant assigning responsibility for TDM program coordination to a designated person either inside or outside the implementing organization. Similarly, some TDM measures are more effective if they are targeted or customized for specific audiences, and would benefit from the collection of related information.

**Program coordinator.** This person is charged with day-to-day TDM program development and implementation. Only in very large employers with thousands of workers is this likely to be a full-time, dedicated position. Usually, it is added to an existing role in parking, real estate, human resources or environmental management. In practice, this role may be called TDM coordinator, commute trip reduction coordinator or employee transportation coordinator. The City of Ottawa can identify external resources (e.g. non-profit organizations or consultants) that could provide these services.

**Travel surveys.** Travel surveys are most commonly conducted at workplaces, but can be helpful in other settings. They identify how and why people travel the way they do, and what barriers and opportunities exist for different behaviours. They usually capture the following information:

- *Personal data* including home address or postal code, destination, job type or function, employment status (full-time, part-time and/or teleworker), gender, age and hours of work
- *Commute information* including distance or time for the trip between home and work, usual methods of commuting, and reasons for choosing them
- *Barriers and opportunities* including why other commuting methods are unattractive, willingness to consider other options, and what improvements to other options could make them more attractive

► ***Parking***

**Priced parking.** Charging for parking is typically among the most effective ways of getting drivers to consider other travel options. While drivers may not support parking fees, they can be more accepting if the revenues are used to improve other travel options (e.g. new showers and change rooms, improved bicycle parking or subsidized transit passes). At workplaces or daytime destinations, parking discounts (e.g. early bird specials, daily passes that cost significantly less than the equivalent hourly charge, monthly passes that cost significantly less than the equivalent daily charge) encourage long-term parking and discourage the use of other travel options. For residential uses, unbundling parking costs from dwelling purchase, lease or rental costs provides an incentive for residents to own fewer cars, and can reduce car use and the costs of parking provision.

► ***Walking & cycling***

Active transportation options like cycling and walking are particularly attractive for short trips (typically up to 5 km and 2 km, respectively). Other supportive factors include an active, health-conscious audience, and development proximity to high-quality walking and cycling networks. Common challenges to active transportation include rain, darkness, snowy or icy conditions, personal safety concerns, the potential for bicycle theft, and a lack of shower and change facilities for those making longer trips.

**Information on walking/cycling routes & destinations.** Ottawa, Gatineau and the National Capital Commission all publish maps to help people identify the most convenient and comfortable walking or cycling routes.

**Bicycle skills training.** Potential cyclists can be intimidated by the need to ride on roads shared with motor vehicles. This barrier can be reduced or eliminated by offering cycling skills training to interested cyclists (e.g. CAN-BIKE certification courses).

**Valet bike parking.** For large events, temporary “valet parking” areas can be easily set up to maximize convenience and security for cyclists. Experienced local non-profit groups can help.

► ***Transit***

**Transit information.** Difficulty in finding or understanding basic information on transit fares, routes and schedules can prevent people from trying transit. Employers can help by providing online links to OC Transpo and STO websites. Transit users also appreciate visible maps and schedules of transit routes that serve the site; even better, a screen that shows real-time transit arrival information is particularly useful at sites with many transit users and an adjacent transit stop or station.

**Transit fare incentives.** Free or subsidized transit fares are an attractive incentive for non-transit riders to try transit. Many non-users are unsure of how to pay a fare, and providing tickets or a preloaded PRESTO card (or, for special events, pre-arranging with OC Transpo that transit fares are included with event tickets) overcome that barrier.

**Enhanced public transit service.** OC Transpo may adjust transit routes, stop locations, service hours or frequencies for an agreed fee under contract, or at no cost where warranted by the potential ridership increase. Information provided by a survey of people who travel to a given development can support these decisions.

**Private transit service.** At remote suburban or rural workplaces, a poor transit connection to the nearest rapid transit station can be an obstacle for potential transit users, and an employer in this situation could initiate a private shuttle service to make transit use more feasible or attractive. Other circumstances where a shuttle makes sense include large special events, or a residential development for people with limited independent mobility who still require regular access to shops and services.

► **Ridesharing**

Ridesharing's potential is greatest in situations where transit ridership is low, where parking costs are high, and/or where large numbers of car commuters (e.g. employees or full-time students) live reasonably far from the workplace.

**Ridematching service.** Potential carpoolers in Ottawa are served by [www.OttawaRideMatch.com](http://www.OttawaRideMatch.com), an online service to help people find carpool partners. Employers can arrange for a dedicated portal where their employees can search for potential carpool partners only among their colleagues, if they desire. Some very large employers may establish internal ridematching services, to maximize employee uptake and corporate control. Ridematching service providers typically include a waiver to relieve employers of liability when their employees start carpooling through a ridematching service. Ridesharing with co-workers also tends to eliminate security concerns.

**Carpool parking price incentives.** Discounted parking fees for carpools can be an extra incentive to rideshare.

**Vanpool service.** Vanpools operate in the Toronto and Vancouver metropolitan areas, where vans that carry up to about ten occupants are driven by one of the vanpool members. Vanpools tend to operate on a cost-recovery basis, and are most practical for long-distance commutes where transit is not an option. Current legislation in Ontario does not permit third-party (i.e. private or non-profit) vanpool services, but does permit employers to operate internal vanpools.

► **Carsharing & bikesharing**

**Bikeshare station & memberships.** VeloGO Bike Share and Right Bike both operate bikesharing services in Ottawa. Developments that would benefit from having a bikeshare station installed at or near their development may negotiate directly with either service provider.

**Carshare vehicles & memberships.** VRTUCAR and Zipcar both operate carsharing services in Ottawa, for use by the general public or by businesses as an alternative to corporate fleets. Carsharing services offer 24-hour access, self-serve reservation systems, itemized monthly billings, and outsourcing of all financing, insurance, maintenance and administrative responsibilities.

► **TDM marketing & communications**

**Multimodal travel information.** Aside from mode-specific information discussed elsewhere in this document, multimodal information that identifies and explains the full range of travel options available to people can be very influential—especially when provided at times and locations where individuals are actively choosing among those options. Examples include: employees when their employer is relocating, or when they are joining a new employer; students when they are starting a program at a new institution; visitors or customers travelling to an unfamiliar destination, or when faced with new options (e.g. shuttle services or parking restrictions); and residents when they purchase or occupy a residence that is new to them.

**Personalized trip planning.** As an extension to the simple provision of information, this technique (also known as *individualized marketing*) is effective in helping people make more sustainable travel choices. The approach involves identifying who is most likely to change their travel choices (notably relocating employees, students or residents) giving them customized information, training and incentives to support them in making that change. It may be conducted with assistance from an external service provider with the necessary skills, and delivered in a variety of settings including workplaces and homes.

**Promotions.** Special events and incentives can raise awareness and encourage individuals to examine and try new travel options.

- *Special events* can help attract attention, build participation and celebrate successes. Events that have been held in Ottawa include Earth Day (in April) Bike to Work Month (in May), Environment Week (early June), International Car Free Day (September 22), and Canadian Ridesharing Week (October). At workplaces or educational institutions, similarly effective internal events could include workshops, lunch-and-learns, inter-departmental challenges, pancake breakfasts, and so on.
- *Incentives* can encourage trial of sustainable modes, and might include loyalty rewards for duration or consistency of activity (e.g. 1,000 km commuted by bicycle), participation prizes (e.g. for completing a survey or joining a special event), or personal recognition that highlights individual accomplishments.

#### ► **Other incentives & amenities**

**Emergency ride home.** This measure assures non-driving commuters that they will be able to get home quickly and conveniently in case of family emergency (or in some workplaces, in case of unexpected overtime, severe weather conditions, or the early departure of a carpool driver) by offering a chit or reimbursement for taxi, carshare or rental car usage. Limits on annual usage or cost per employee may be set, although across North America the actual rates of usage are typically very low.

**Alternative work arrangements.** A number of alternatives to the standard 9-to-5, Monday-to-Friday workweek can support sustainable commuting (and work-life balance) at workplaces:

- *Flexible working hours* allow transit commuters to take advantage of the fastest and most convenient transit services, and allow potential carpoolers to include people who work slightly different schedules in their search for carpool partners. They also allow active commuters to travel at least one direction in daylight, either in the morning or the afternoon, during the winter.
- *Compressed workweeks* allow employees to work their required hours over fewer days (e.g. five days in four, or ten days in nine), eliminating the need to commute on certain days. For employees, this can promote work-life balance and gives flexibility for appointments. For employers, this can permit extended service hours as well as reduced parking demands if employees stagger their days off.
- *Telework* is a normal part of many workplaces. It helps reduce commuting activity, and can lead to significant cost savings through workspace sharing. Telework initiatives involve many stakeholders, and may face as much resistance as support within an organization. Consultation, education and training are helpful.

**Local business travel options.** A common obstacle for people who might prefer to not drive to work is that their employer requires them to bring a car to work so they can make business trips during the day. Giving employees convenient alternatives to private cars for local business travel during the workday makes walking, cycling, transit or carpooling in someone else's car more practical.

- *Walking and cycling*—Active transportation can be a convenient and enjoyable way to make short business trips. They can also reduce employer expenses, although they may require extra travel time. Providing a fleet of shared bikes, or reimbursing cyclists for the kilometres they ride, are inexpensive ways to validate their choice.
- *Public transit*—Transit can be convenient and inexpensive compared to driving. OC Transpo's PRESTO cards are transferable among employees and automatically reloadable, making them the perfect tool for enabling transit use during the day.
- *Ridesharing*—When multiple employees attend the same off-site meeting or event, they can be reminded to carpool whenever possible.
- *Taxis or ride-hailing*—Taxis and ride-hailing can eliminate parking costs, save time and eliminate collision liability concerns. Taxi chits eliminate cash transactions and minimize paperwork.
  - *Fleet vehicles or carsharing*—Fleet vehicles can be cost-effective for high travel volumes, while carsharing is a great option for less frequent trips.
  - *Interoffice shuttles*—Employers with multiple worksites in the region could use a shuttle service to move people as well as mail or supplies.
  - *Videoconferencing*—New technologies mean that staying in the office to hold meetings electronically is more viable, affordable and productive than ever.

**Commuter incentives.** Financial incentives can help create a level playing field and support commuting by sustainable modes. A “commuting allowance” given to all employees as a taxable benefit is one such incentive; employees who choose to drive could then be charged for parking, while other employees could use the allowance for transit fares or cycling equipment, or for spending or saving. (Note that in the United States this practice is known as “parking cash-out,” and is popular because commuting allowances are not taxable up to a certain limit). Alternatively, a monthly commuting allowance for non-driving employees would give drivers an incentive to choose a different commuting mode. Another practical incentive for active commuters or transit users is to offer them discounted “rainy day” parking passes for a small number of days each month.

**On-site amenities.** Developments that offer services to limit employees' need for a car during their commute (e.g. to drop off clothing at the dry cleaners) or during their workday (e.g. to buy lunch) can free employees to make the commuting decision that otherwise works best for them.

## TDM Measures Checklist:

*Non-Residential Developments (office, institutional, retail or industrial)*

<b>Legend</b>	
<b>BASIC</b>	The measure is generally feasible and effective, and in most cases would benefit the development and its users
<b>BETTER</b>	The measure could maximize support for users of sustainable modes, and optimize development performance
★	The measure is one of the most dependably effective tools to encourage the use of sustainable modes

TDM measures: <i>Non-residential developments</i>		Check if proposed & add descriptions
<b>1. TDM PROGRAM MANAGEMENT</b>		
<b>1.1 Program coordinator</b>		
<b>BASIC</b> ★	1.1.1 Designate an internal coordinator, or contract with an external coordinator	<input type="checkbox"/>
<b>1.2 Travel surveys</b>		
<b>BETTER</b>	1.2.1 Conduct periodic surveys to identify travel-related behaviours, attitudes, challenges and solutions, and to track progress	<input type="checkbox"/>
<b>2. WALKING AND CYCLING</b>		
<b>2.1 Information on walking/cycling routes &amp; destinations</b>		
<b>BASIC</b>	2.1.1 Display local area maps with walking/cycling access routes and key destinations at major entrances	<input type="checkbox"/>
<b>2.2 Bicycle skills training</b>		
<i>Commuter travel</i>		
<b>BETTER</b> ★	2.2.1 Offer on-site cycling courses for commuters, or subsidize off-site courses	<input type="checkbox"/>
<b>2.3 Valet bike parking</b>		
<i>Visitor travel</i>		
<b>BETTER</b>	2.3.1 Offer secure valet bike parking during public events when demand exceeds fixed supply (e.g. for festivals, concerts, games)	<input type="checkbox"/>



TDM measures: <i>Non-residential developments</i>		Check if proposed & add descriptions
<b>3. TRANSIT</b>		
<b>3.1 Transit information</b>		
BASIC	3.1.1 Display relevant transit schedules and route maps at entrances	<input type="checkbox"/>
BASIC	3.1.2 Provide online links to OC Transpo and STO information	<input type="checkbox"/>
BETTER	3.1.3 Provide real-time arrival information display at entrances	<input type="checkbox"/>
<b>3.2 Transit fare incentives</b>		
<i>Commuter travel</i>		
BETTER	3.2.1 Offer preloaded PRESTO cards to encourage commuters to use transit	<input type="checkbox"/>
BETTER ★	3.2.2 Subsidize or reimburse monthly transit pass purchases by employees	<input type="checkbox"/>
<i>Visitor travel</i>		
BETTER	3.2.3 Arrange inclusion of same-day transit fare in price of tickets (e.g. for festivals, concerts, games)	<input type="checkbox"/>
<b>3.3 Enhanced public transit service</b>		
<i>Commuter travel</i>		
BETTER	3.3.1 Contract with OC Transpo to provide enhanced transit services (e.g. for shift changes, weekends)	<input type="checkbox"/>
<i>Visitor travel</i>		
BETTER	3.3.2 Contract with OC Transpo to provide enhanced transit services (e.g. for festivals, concerts, games)	<input type="checkbox"/>
<b>3.4 Private transit service</b>		
<i>Commuter travel</i>		
BETTER	3.4.1 Provide shuttle service when OC Transpo cannot offer sufficient quality or capacity to serve demand (e.g. for shift changes, weekends)	<input type="checkbox"/>
<i>Visitor travel</i>		
BETTER	3.4.2 Provide shuttle service when OC Transpo cannot offer sufficient quality or capacity to serve demand (e.g. for festivals, concerts, games)	<input type="checkbox"/>

TDM measures: <i>Non-residential developments</i>		Check if proposed & add descriptions
<b>4. RIDESHARING</b>		
<b>4.1 Ridematching service</b>		
<i>Commuter travel</i>		
BASIC	★ 4.1.1 Provide a dedicated ridematching portal at OttawaRideMatch.com	<input type="checkbox"/>
<b>4.2 Carpool parking price incentives</b>		
<i>Commuter travel</i>		
BETTER	4.2.1 Provide discounts on parking costs for registered carpools	<input type="checkbox"/>
<b>4.3 Vanpool service</b>		
<i>Commuter travel</i>		
BETTER	4.3.1 Provide a vanpooling service for long-distance commuters	<input type="checkbox"/>
<b>5. CARSHARING &amp; BIKESHARING</b>		
<b>5.1 Bikeshare stations &amp; memberships</b>		
BETTER	5.1.1 Contract with provider to install on-site bikeshare station for use by commuters and visitors	<input type="checkbox"/>
<i>Commuter travel</i>		
BETTER	5.1.2 Provide employees with bikeshare memberships for local business travel	<input type="checkbox"/>
<b>5.2 Carshare vehicles &amp; memberships</b>		
<i>Commuter travel</i>		
BETTER	5.2.1 Contract with provider to install on-site carshare vehicles and promote their use by tenants	<input type="checkbox"/>
BETTER	5.2.2 Provide employees with carshare memberships for local business travel	<input type="checkbox"/>
<b>6. PARKING</b>		
<b>6.1 Priced parking</b>		
<i>Commuter travel</i>		
BASIC	★ 6.1.1 Charge for long-term parking (daily, weekly, monthly)	<input type="checkbox"/>
BASIC	6.1.2 Unbundle parking cost from lease rates at multi-tenant sites	<input type="checkbox"/>
<i>Visitor travel</i>		
BETTER	6.1.3 Charge for short-term parking (hourly)	<input type="checkbox"/>

TDM measures: <i>Non-residential developments</i>			Check if proposed & add descriptions
<b>7. TDM MARKETING &amp; COMMUNICATIONS</b>			
<b>7.1 Multimodal travel information</b>			
<i>Commuter travel</i>			
BASIC	★	7.1.1 Provide a multimodal travel option information package to new/relocating employees and students	<input type="checkbox"/>
<i>Visitor travel</i>			
BETTER	★	7.1.2 Include multimodal travel option information in invitations or advertising that attract visitors or customers (e.g. for festivals, concerts, games)	<input type="checkbox"/>
<b>7.2 Personalized trip planning</b>			
<i>Commuter travel</i>			
BETTER	★	7.2.1 Offer personalized trip planning to new/relocating employees	<input type="checkbox"/>
<b>7.3 Promotions</b>			
<i>Commuter travel</i>			
BETTER		7.3.1 Deliver promotions and incentives to maintain awareness, build understanding, and encourage trial of sustainable modes	<input type="checkbox"/>
<b>8. OTHER INCENTIVES &amp; AMENITIES</b>			
<b>8.1 Emergency ride home</b>			
<i>Commuter travel</i>			
BETTER	★	8.1.1 Provide emergency ride home service to non-driving commuters	<input type="checkbox"/>
<b>8.2 Alternative work arrangements</b>			
<i>Commuter travel</i>			
BASIC	★	8.2.1 Encourage flexible work hours	<input type="checkbox"/>
BETTER		8.2.2 Encourage compressed workweeks	<input type="checkbox"/>
BETTER	★	8.2.3 Encourage telework	<input type="checkbox"/>
<b>8.3 Local business travel options</b>			
<i>Commuter travel</i>			
BASIC	★	8.3.1 Provide local business travel options that minimize the need for employees to bring a personal car to work	<input type="checkbox"/>
<b>8.4 Commuter incentives</b>			
<i>Commuter travel</i>			
BETTER		8.4.1 Offer employees a taxable, mode-neutral commuting allowance	<input type="checkbox"/>
<b>8.5 On-site amenities</b>			
<i>Commuter travel</i>			
BETTER		8.5.1 Provide on-site amenities/services to minimize mid-day or mid-commute errands	<input type="checkbox"/>

**TDM Measures Checklist:**  
*Residential Developments (multi-family, condominium or subdivision)*

<b>Legend</b>	
<b>BASIC</b>	The measure is generally feasible and effective, and in most cases would benefit the development and its users
<b>BETTER</b>	The measure could maximize support for users of sustainable modes, and optimize development performance
<b>★</b>	The measure is one of the most dependably effective tools to encourage the use of sustainable modes

<b>TDM measures: <i>Residential developments</i></b>		<b>Check if proposed &amp; add descriptions</b>
<b>1. TDM PROGRAM MANAGEMENT</b>		
<b>1.1 Program coordinator</b>		
<b>BASIC</b> ★	1.1.1 Designate an internal coordinator, or contract with an external coordinator	<input type="checkbox"/>
<b>1.2 Travel surveys</b>		
<b>BETTER</b>	1.2.1 Conduct periodic surveys to identify travel-related behaviours, attitudes, challenges and solutions, and to track progress	<input type="checkbox"/>
<b>2. WALKING AND CYCLING</b>		
<b>2.1 Information on walking/cycling routes &amp; destinations</b>		
<b>BASIC</b>	2.1.1 Display local area maps with walking/cycling access routes and key destinations at major entrances ( <i>multi-family, condominium</i> )	<input type="checkbox"/>
<b>2.2 Bicycle skills training</b>		
<b>BETTER</b>	2.2.1 Offer on-site cycling courses for residents, or subsidize off-site courses	<input type="checkbox"/>

TDM measures: <i>Residential developments</i>		Check if proposed & add descriptions
<b>3. TRANSIT</b>		
<b>3.1 Transit information</b>		
BASIC	3.1.1 Display relevant transit schedules and route maps at entrances ( <i>multi-family, condominium</i> )	<input type="checkbox"/>
BETTER	3.1.2 Provide real-time arrival information display at entrances ( <i>multi-family, condominium</i> )	<input type="checkbox"/>
<b>3.2 Transit fare incentives</b>		
BASIC ★	3.2.1 Offer PRESTO cards preloaded with one monthly transit pass on residence purchase/move-in, to encourage residents to use transit	<input type="checkbox"/>
BETTER	3.2.2 Offer at least one year of free monthly transit passes on residence purchase/move-in	<input type="checkbox"/>
<b>3.3 Enhanced public transit service</b>		
BETTER ★	3.3.1 Contract with OC Transpo to provide early transit services until regular services are warranted by occupancy levels ( <i>subdivision</i> )	<input type="checkbox"/>
<b>3.4 Private transit service</b>		
BETTER	3.4.1 Provide shuttle service for seniors homes or lifestyle communities (e.g. scheduled mall or supermarket runs)	<input type="checkbox"/>
<b>4. CARSHARING &amp; BIKESHARING</b>		
<b>4.1 Bikeshare stations &amp; memberships</b>		
BETTER	4.1.1 Contract with provider to install on-site bikeshare station ( <i>multi-family</i> )	<input type="checkbox"/>
BETTER	4.1.2 Provide residents with bikeshare memberships, either free or subsidized ( <i>multi-family</i> )	<input type="checkbox"/>
<b>4.2 Carshare vehicles &amp; memberships</b>		
BETTER	4.2.1 Contract with provider to install on-site carshare vehicles and promote their use by residents	<input type="checkbox"/>
BETTER	4.2.2 Provide residents with carshare memberships, either free or subsidized	<input type="checkbox"/>
<b>5. PARKING</b>		
<b>5.1 Priced parking</b>		
BASIC ★	5.1.1 Unbundle parking cost from purchase price ( <i>condominium</i> )	<input type="checkbox"/>
BASIC ★	5.1.2 Unbundle parking cost from monthly rent ( <i>multi-family</i> )	<input type="checkbox"/>

TDM measures: <i>Residential developments</i>		Check if proposed & add descriptions
<b>6. TDM MARKETING &amp; COMMUNICATIONS</b>		
<b>6.1 Multimodal travel information</b>		
<b>BASIC</b> ★	6.1.1 Provide a multimodal travel option information package to new residents	<input type="checkbox"/>
<b>6.2 Personalized trip planning</b>		
<b>BETTER</b> ★	6.2.1 Offer personalized trip planning to new residents	<input type="checkbox"/>



## Appendix K - Transit Map





# 11

## Fréquent

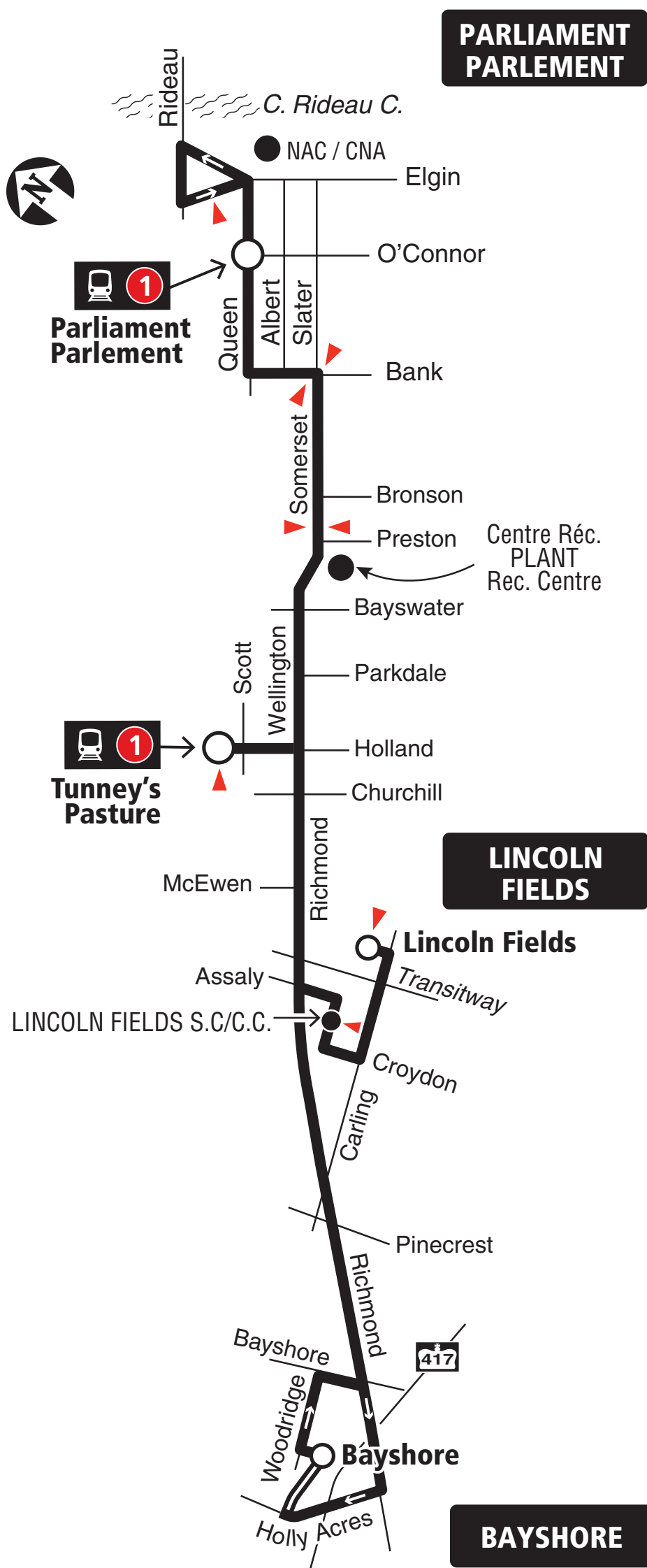
### LINCOLN FIELDS BAYSHORE

### PARLIAMENT PARLEMENT

7 days a week / 7 jours par semaine

All day service

Service toute la journée



Transitway & Station



Timepoint / Heures de passage

2019.07



# 1



**Future route after O-Train Line 1 is open**  
**Trajet du circuit après l'ouverture de la Ligne 1 de l'O-Train**

Lost and Found / Objets perdus..... **613-563-4011**

Security / Sécurité ..... **613-741-2478**

**OC Transpo**

**INFO 613-741-4390**  
**octranspo.com**





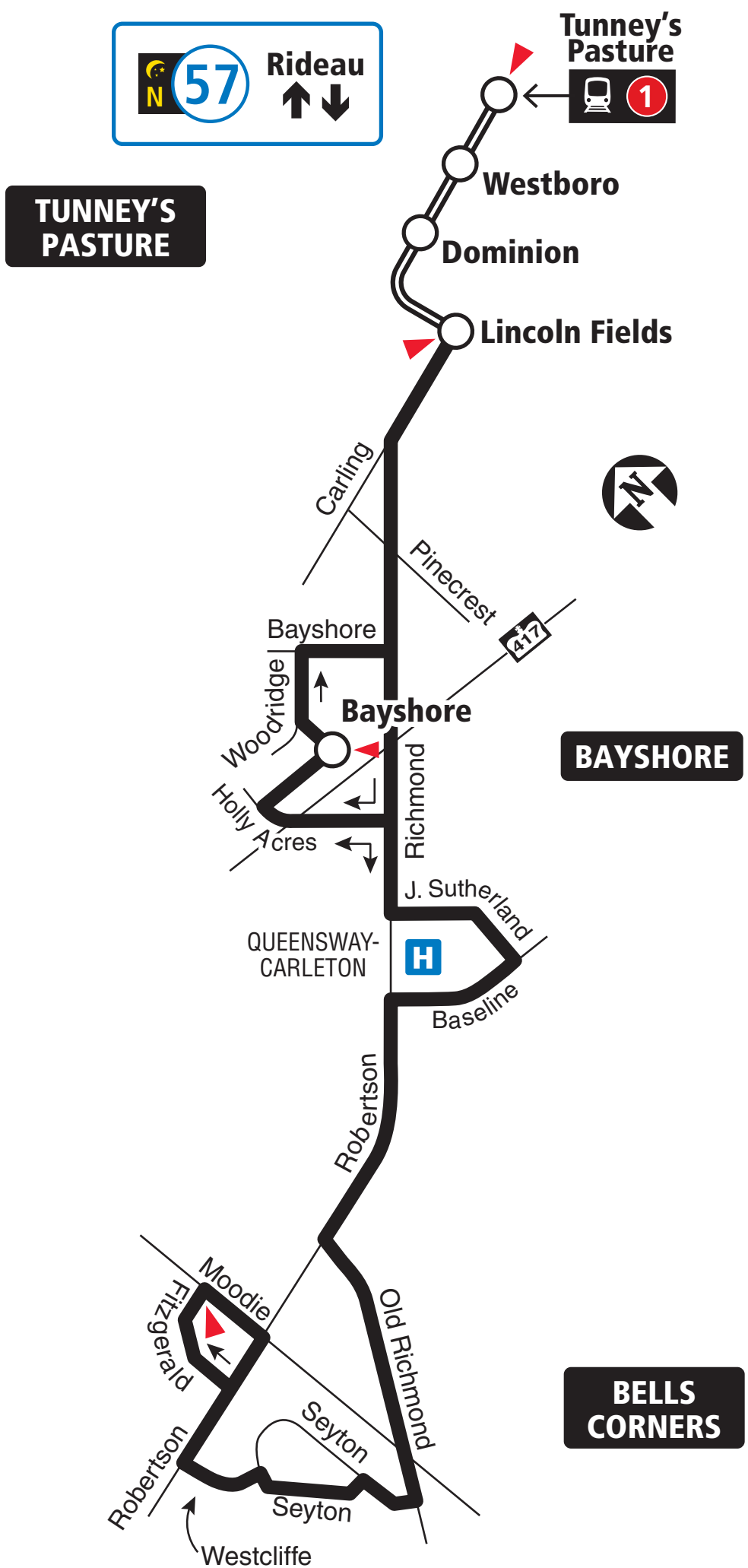
**Rapid<sup>e</sup>**

# BAYSHORE BELLS CORNERS TUNNEY'S PASTURE

**7 days a week / 7 jours par semaine**

All day and limited overnight service

Service toute la journée et limité la nuit



When O-Train Line 1 is not running overnight, Route 57 will be extended downtown to Rideau Station. / Lorsque la ligne 1 de l'O-Train ne circule pas la nuit, le circuit 57 sera prolongée au centre-ville jusqu'à la station Rideau.

2019.07



**Future route after O-Train Line 1 is open**  
**Trajet du circuit après l'ouverture de la Ligne 1 de l'O-Train**

Lost and Found / Objets perdus..... **613-563-4011**

Security / Sécurité ..... **613-741-2478**

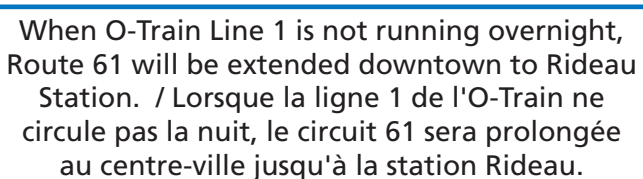
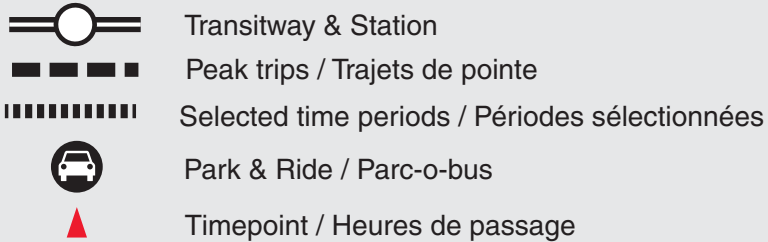
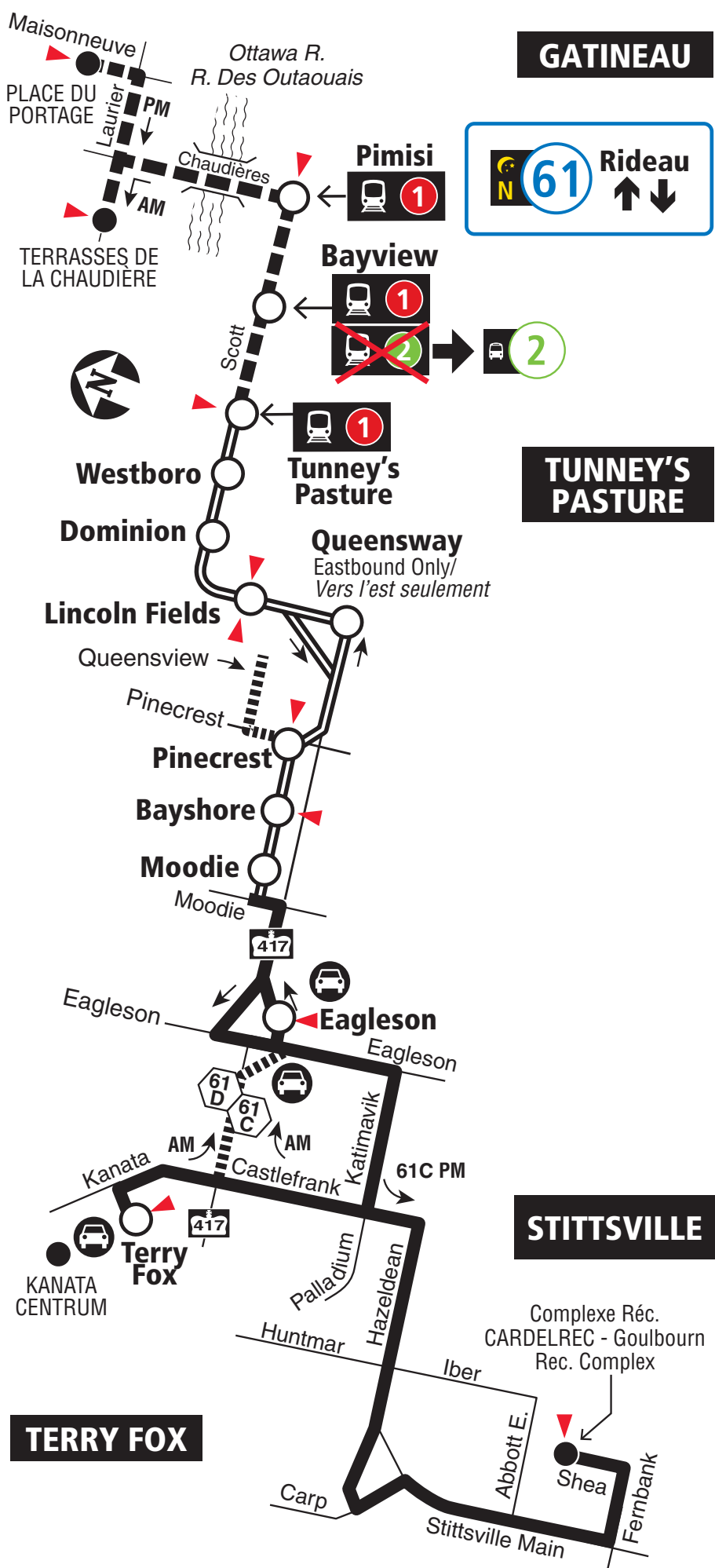


**INFO 613-741-4390**  
**octranspo.com**



# TUNNEY'S PASTURE GATINEAU

## Service toute la journée et limité la nuit



2020.05



*plus your four digit bus stop number / plus votre numéro d'arrêt à quatre chiffres*

Security / Sécurité ..... **613-741-2478**

**En vigueur 3 mai 2020**

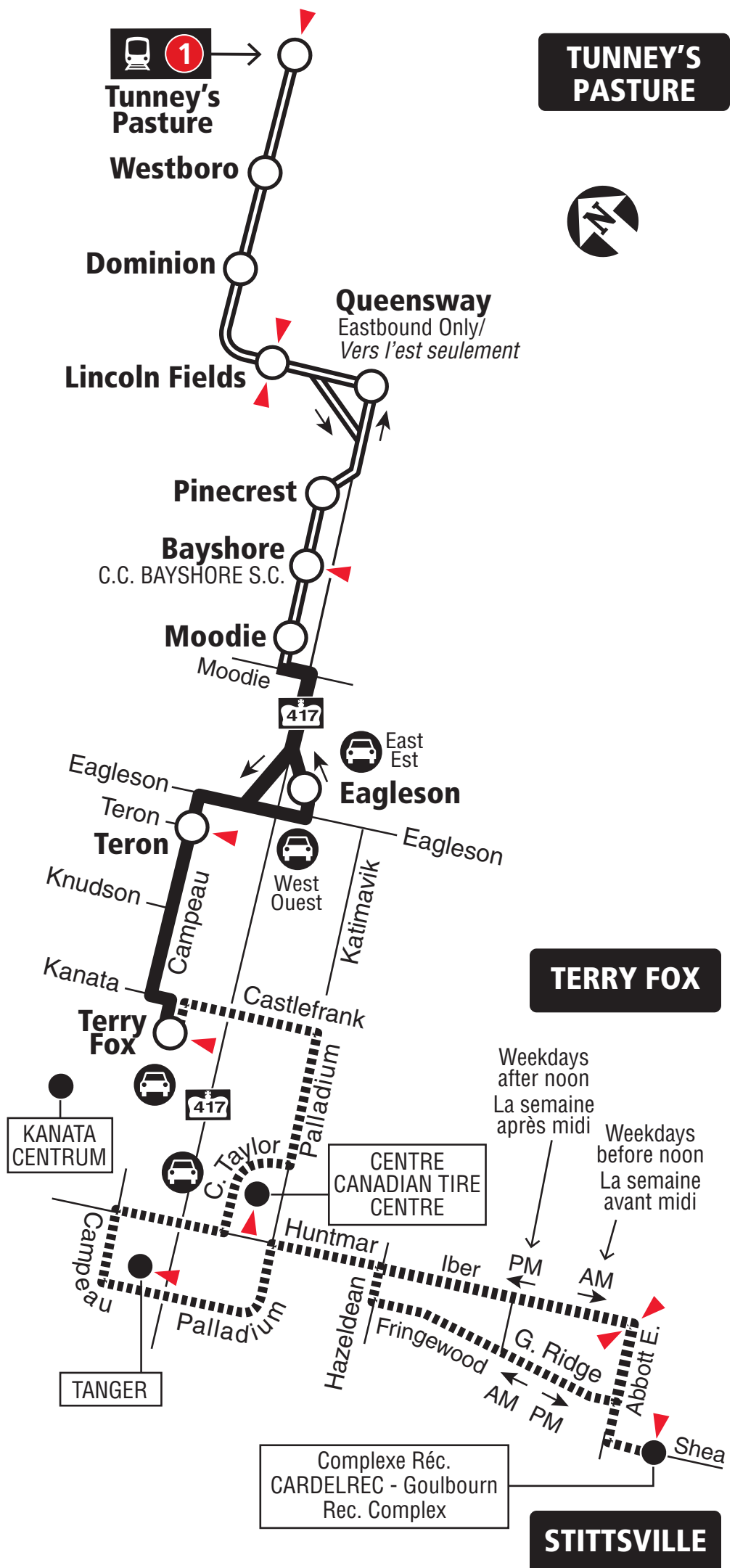


**INFO 613-741-4390**  
**octranspo.com**



# TERRY FOX STITTSVILLE TUNNEY'S PASTURE

**7 days a week / 7 jours par semaine**  
All day service  
Service toute la journée



- Transitway & Station
- Monday to Friday only (limited evening service)  
Lundi au vendredi seulement (service de soirée limité)
- Park & Ride / Parc-o-bus
- Timepoint / Heures de passage

2019.07



**Starting July 14, 2019**  
**À partir du 14 juillet 2019**

Lost and Found / Objets perdus..... **613-563-4011**  
Security / Sécurité ..... **613-741-2478**

**Transpo**

**INFO 613-741-4390**  
**octranspo.com**



# INNOVATION BRIARBROOK TUNNEY'S PASTURE GATINEAU

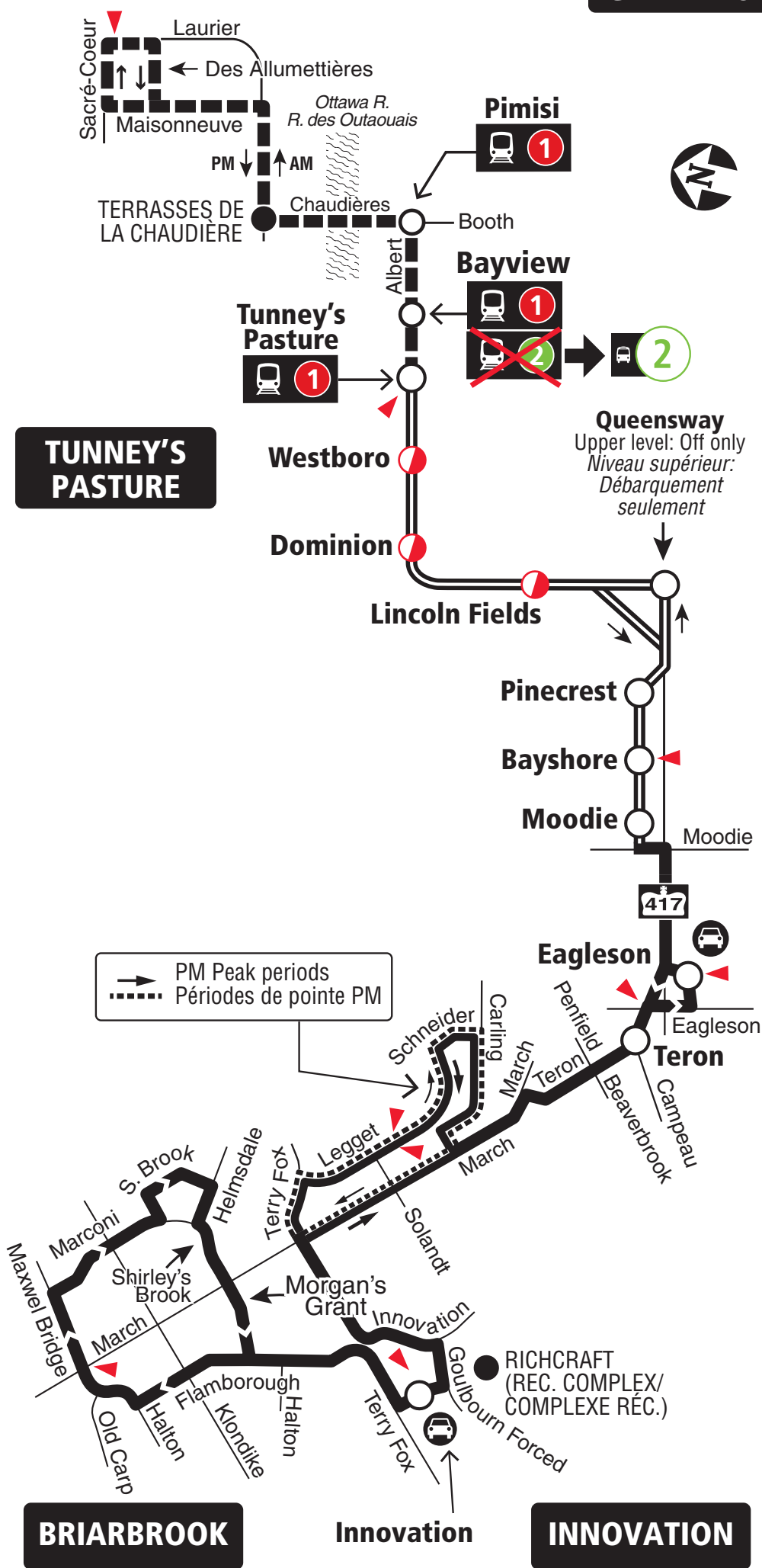
**Rapid®**

**7 days a week / 7 jours par semaine**

All day service

Service toute la journée

**GATINEAU**



- Transitway & Station
- Peak Periods Only / Périodes de pointe seulement
- Eastbound: AM Off only - Westbound: Full Service  
Vers l'est AM: Débarquement seulement  
Vers l'ouest: Service complet
- Park & Ride / Parc-o-bus
- Timepoint / Heures de passage

2020.04



**Schedule / Horaire.....613-560-1000**

**Text / Texto .....560560**

plus your four digit bus stop number / plus votre numéro d'arrêt à quatre chiffres

Customer Service

Service à la clientèle ..... **613-741-4390**

Lost and Found / Objets perdus..... **613-563-4011**

Security / Sécurité ..... **613-741-2478**

**Effective May 3, 2020**

**En vigueur 3 mai 2020**

**Transpo**

**INFO 613-741-4390**  
**octranspo.com**



**Rapid<sup>e</sup>**

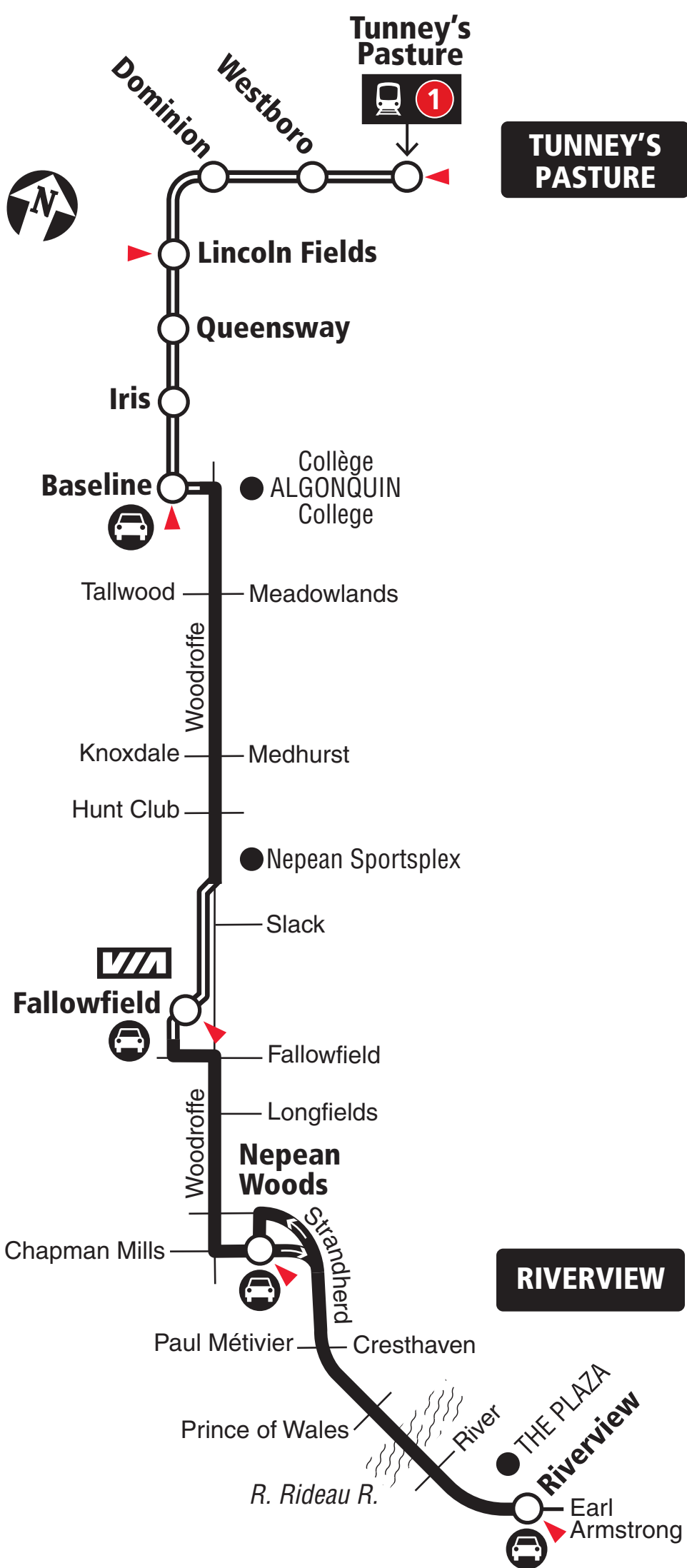
**RIVERVIEW**

**TUNNEY'S PASTURE**

**7 days a week / 7 jours par semaine**

All day service

Service toute la journée



Transitway & Station



Park & Ride / Parc-o-bus



Timepoint / Heures de passage

2019.07



**Future route after O-Train Line 1 is open**  
**Trajet du circuit après l'ouverture**  
**de la Ligne 1 de l'O-Train**

Lost and Found / Objets perdus..... **613-563-4011**

Security / Sécurité ..... **613-741-2478**



**INFO 613-741-4390**  
**octranspo.com**



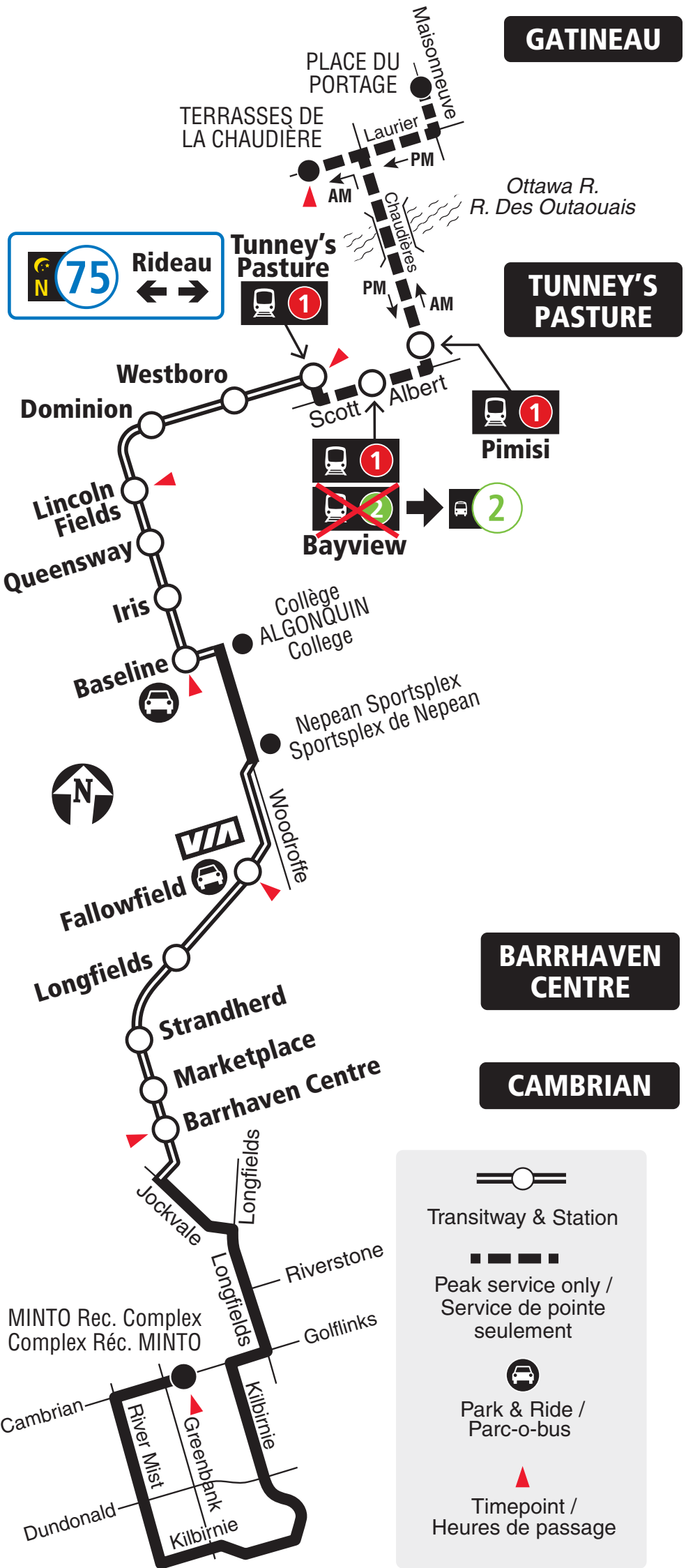


# CAMBRIAN BARRHAVEN C. TUNNEY'S PASTURE GATINEAU

**7 days a week / 7 jours par semaine**

All day service and limited overnight

Service toute la journée et limité la nuit



**75** When O-Train Line 1 is not running overnight, Route 75 will be extended downtown to Rideau Station. / Lorsque la ligne 1 de l'O-Train ne circule pas la nuit, le circuit 75 sera prolongée au centre-ville jusqu'à la station Rideau.

2020.04



**Schedule / Horaire.....613-560-1000**

**Text / Texto .....560560**

plus your four digit bus stop number / plus votre numéro d'arrêt à quatre chiffres

Customer Service

Service à la clientèle ..... **613-741-4390**

Lost and Found / Objets perdus..... **613-563-4011**

Security / Sécurité ..... **613-741-2478**

**Effective May 3, 2020**

**En vigueur 3 mai 2020**



**INFO 613-741-4390**  
**octranspo.com**

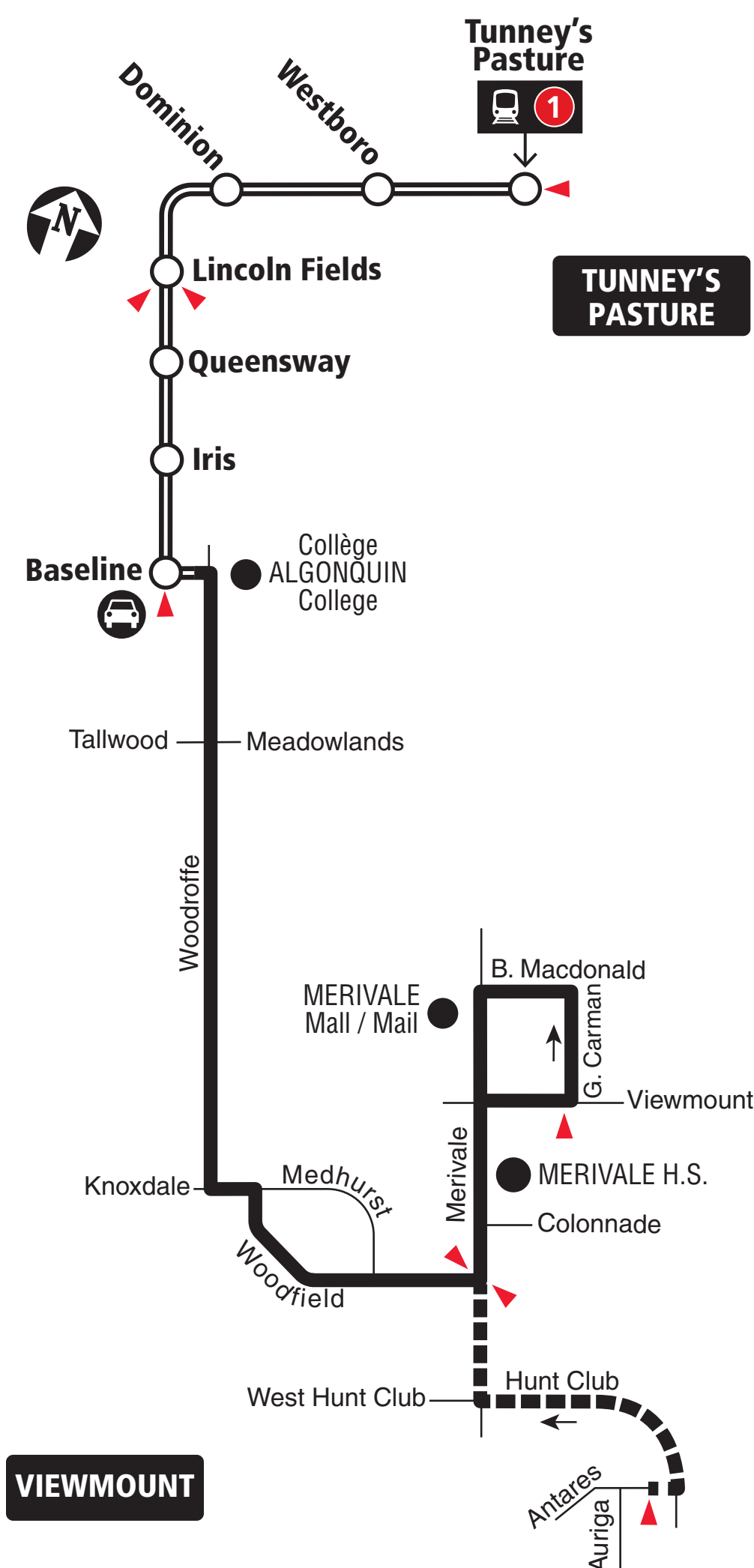
# 83

## VIEWMOUNT TUNNEY'S PASTURE

*Local*

**7 days a week / 7 jours par semaine**

All day service  
Service toute la journée



Transitway & Station



Some trips Sundays only /  
Quelques trajet le dimanche seulement



Park & Ride / Parc-o-bus



Timepoint / Heures de passage

2019.07



**Future route after O-Train Line 1 is open**  
**Trajet du circuit après l'ouverture**  
**de la Ligne 1 de l'O-Train**

Lost and Found / Objets perdus..... **613-563-4011**

Security / Sécurité ..... **613-741-2478**



**INFO 613-741-4390**  
**octranspo.com**



# 87

## BASELINE TUNNEY'S PASTURE

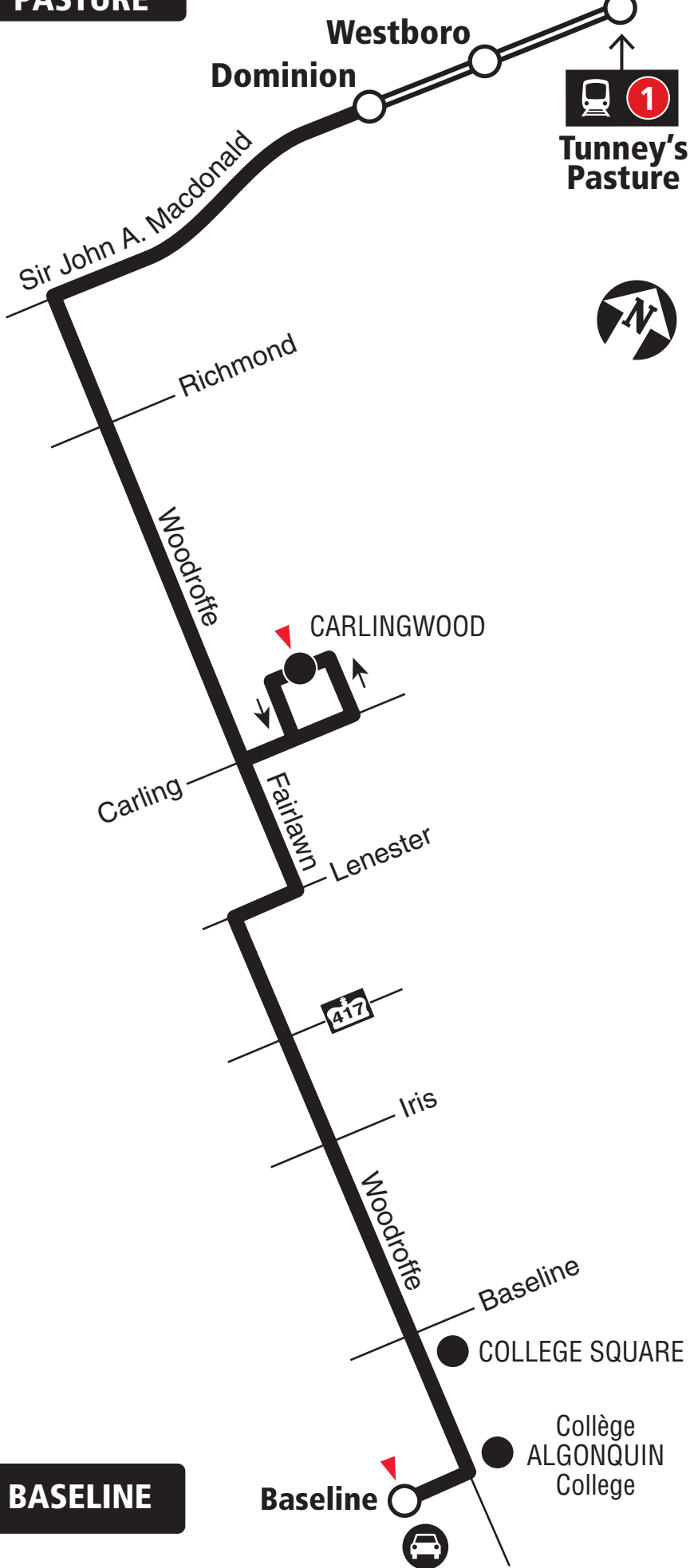
### Fréquent

7 days a week / 7 jours par semaine

All day service

Service toute la journée

**TUNNEY'S  
PASTURE**



Transitway & Station



Park & Ride / Parc-o-bus



Timepoint / Heures de passage

2019.07



**Future route after O-Train Line 1 is open**  
**Trajet du circuit après l'ouverture**  
**de la Ligne 1 de l'O-Train**

Lost and Found / Objets perdus..... **613-563-4011**

Security / Sécurité ..... **613-741-2478**



**INFO 613-741-4390**  
**octranspo.com**





# 153

## LINCOLN FIELDS TUNNEY'S PASTURE CARLINGWOOD

*Local*

**7 days a week / 7 jours par semaine**

Selected time periods only  
Périodes sélectionnées seulement



Station



Some trips / Quelques trajets



Timepoint / Heures de passage

2019.10



**Schedule / Horaire.....613-560-1000**

**Text / Texto .....560560**

*plus your four digit bus stop number / plus votre numéro d'arrêt à quatre chiffres*

Customer Relations

Service à la clientèle ..... **613-842-3600**

Lost and Found / Objets perdus..... **613-563-4011**

Security / Sécurité ..... **613-741-2478**

**Effective October 6, 2019**

**En vigueur 6 octobre 2019**



**INFO 613-741-4390**  
**octranspo.com**



## Appendix L - Transit Ridership Data

**Winter 2020 (5 Jan 2020 - 7 Mar 2020)**

Stop No.	Location	Route	Direction	AM			PM			24-HR		
				Boardings	Alightings	Avg Load at Departure	Boardings	Alightings	Avg Load at Departure	Boardings	Alightings	Avg Load at Departure
4987	CHURCHILL / RICHMOND	50	WB	0	4	11	1	3	11	8	16	9
		153	WB	-	-	-	0	0	5	2	0	3
3013	CHURCHILL / RICHMOND	50	EB	3	1	20	2	3	7	5	8	10
		153	EB	-	-	-	0	1	4	0	1	3
4876	RICHMOND / CHURCHILL	11	EB	7	6	14	17	2	11	66	28	11
5616	RICHMOND / CHURCHILL	11	WB	1	9	6	9	23	18	24	83	11
		153	WB	-	-	-	0	0	7	0	0	4
2436	RICHMOND / ROOSEVELT	11	WB	2	13	5	11	29	17	28	85	10
		153	WB	-	-	-	2	0	7	4	0	5
4870	RICHMOND / ROOSEVELT	11	EB	12	17	14	25	10	10	90	65	10
		153	EB	-	-	-	2	1	6	2	1	3
4941	RICHMOND / GOLDEN	11	WB	6	9	5	13	23	16	29	71	10
		153	WB	-	-	-	2	1	6	4	3	4
7406	RICHMOND / GOLDEN	11	EB	8	4	14	7	11	9	52	29	10
		153	EB	-	-	-	0	0	5	0	7	3
3013	DOMINION 1A	57	WB	0	7	4	9	32	29	20	63	15
		58	EB	2	0	7	9	0	15	11	0	11
		61	WB	6	4	8	20	88	31	32	124	21
		62	WB	0	0	10	4	17	22	12	25	16
		63	IB	3	7	8	4	33	29	12	55	15
		64	IB	6	6	11	29	17	18	36	41	13
		66	WB	6	11	30	-	-	-	6	13	18
		73	SB	0	0	5	-	-	-	0	0	3
		74	SB	2	2	3	3	2	10	76	20	10
		75	SB	0	0	10	40	33	17	69	58	14
		82	WB	0	0	9	16	2	16	16	2	9
		83	NB	2	0	6	1	1	10	3	1	7
		84	WB	4	0	15	2	2	6	6	4	9
		87	NB	3	0	3	2	1	17	14	2	9
		164	SB	0	0	2	-	-	-	0	0	2
		258	OB	-	-	-	0	0	6	0	0	6
		282	OB	-	-	-	0	1	24	0	1	18
		284	SB	-	-	-	2	0	7	2	0	6
3013	DOMINION 2A	57	EB	12	5	30	3	1	10	20	12	16
		58	WB	9	0	27	0	1	10	10	2	15
		61	EB	23	7	26	2	7	20	39	22	19
		62	EB	0	0	4	0	4	21	5	7	12
		63	OB	4	0	34	2	4	17	11	10	19
		64	OB	9	1	25	1	15	9	13	17	14
		66	EB	-	-	-	6	8	27	8	9	19
		73	NB	-	-	-	9	9	10	9	9	10
		74	NB	16	5	20	6	15	15	49	33	19
		75	NB	32	9	33	9	8	33	64	47	28
		82	EB	9	3	24	0	5	11	9	9	14
		83	SB	9	4	17	1	0	8	18	17	13
		84	EB	5	0	27	9	0	13	17	3	17
		87	SB	10	0	14	8	2	9	30	9	9
		164	NB	-	-	-	-	-	0	0	0	0
		251	IB	-	0	9	-	-	-	-	0	8
		252	IB	-	4	16	-	-	-	-	4	16
		256	IB	-	0	31	-	-	-	-	0	40
		257	IB	-	7	30	-	-	-	-	7	30
		258	IB	8	2	13	-	-	-	8	2	18
		261	IB	-	0	28	-	-	-	-	0	28
		262	IB	-	0	19	-	-	-	-	0	19
		263	IB	-	0	25	-	-	-	-	0	25
		264	IB	-	0	22	-	-	-	-	0	22
		265	IB	-	0	25	-	-	-	-	0	25
		266	IB	-	0	16	-	-	-	-	0	16
		267	IB	-	0	37	-	-	-	-	1	35
		268	IB	-	3	36	-	-	-	-	3	37
		282	IB	7	1	28	-	-	-	7	1	14
		283	IB	-	0	2	-	-	-	-	0	2
		284	NB	12	3	14	-	-	-	12	3	8
3013	DOMINION STN OFF ONLY	270	IB	-	0	38	-	-	-	-	0	40
		271	IB	-	1	54	-	-	-	-	1	54
		272	IB	-	2	49	-	-	-	-	2	42
		273	IB	-	2	48	-	-	-	-	2	38
		275	IB	-	3	58	-	-	-	-	3	56
		277	IB	-	5	57	-	-	-	-	5	61
		278	IB	-	1	33	-	-	-	-	1	28