403 Richmond Road

Transportation Impact Assessment



April 7, 2022

CIMA+ file number: A001046

403 Richmond Road

Transportation Impact Assessment

Prepared for: Starwood Group Inc.
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CIMA+ file number: A001046
Lastest Revision: April 7, 2022

TIA Plan Reports

On 14 June 2017, the Council of the City of Ottawa adopted new Transportation Impact Assessment (TIA) Guidelines. In adopting the guidelines, Council established a requirement for those preparing and delivering transportation impact assessments and reports to sign a letter of certification.

Individuals submitting TIA reports will be responsible for all aspects of development-related transportation assessment and reporting, and undertaking such work, in accordance and compliance with the City of Ottawa's Official Plan, the Transportation Master Plan and the Transportation Impact Assessment (2017) Guidelines.

By submitting the attached TIA report (and any associated documents) and signing this document, the individual acknowledges that s/he meets the four criteria listed below.

CERTIFICATION

1. I have reviewed and have a sound understanding of the objectives, needs and requirements of the City of Ottawa's Official Plan, Transportation Master Plan and the Transportation Impact Assessment (2017) Guidelines;
2. I have a sound knowledge of industry standard practice with respect to the preparation of transportation impact assessment reports, including multi modal level of service review;
3. I have substantial experience (more than 5 years) in undertaking and delivering transportation impact studies (analysis, reporting and geometric design) with strong background knowledge in transportation planning, engineering or traffic operations; and
4. I am either a licensed[1] or registered[2] professional in good standing, whose field of expertise [check √ appropriate field(s)] is either transportation engineering ☑ or transportation planning ☐.

[1,2] **License of registration body that oversees the profession is required to have a code of conduct and ethics guidelines that will ensure appropriate conduct and representation for transportation planning and/or transportation engineering works.**

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Dated at Burlington (City) this 7th day of April, 2022.

Name: Stephen Keen
(Please Print)

Professional Title: Senior Director, CIMA Canada Inc.

Signature of Individual certifier that s/he meets the above four criteria

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Table of Contents

List of Tables

List of Figures

List of Appendices

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 141 residential units, a 10th floor amenity space and 5,283 ft^2 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**.

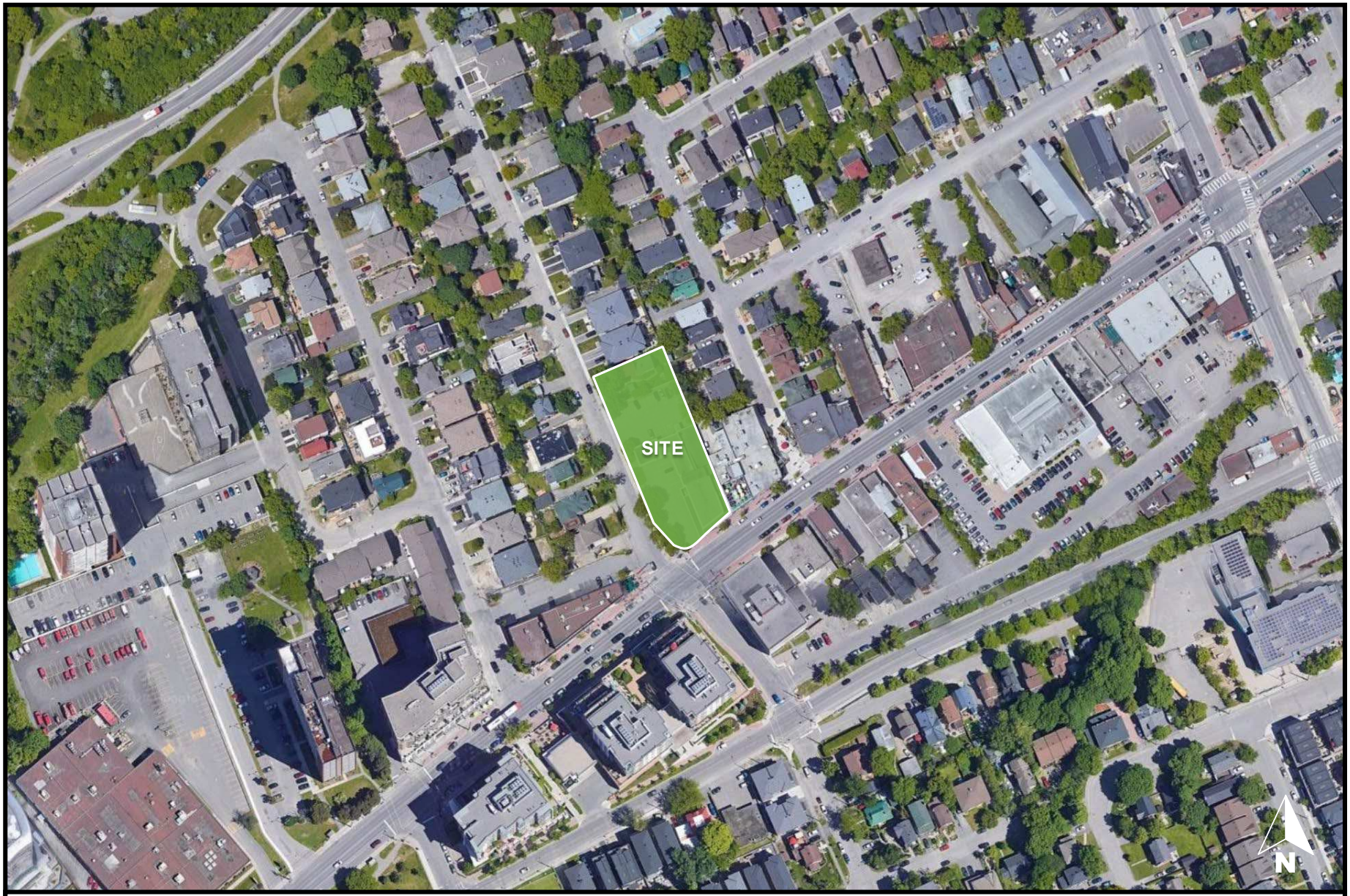

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Figure 1: Local Context

rla / architecture

3D VIEW LOOKING FROM ROOSEVELET AVE.

SCALE

26/07/2021

403 Richmond Road and 389 Roosevelt Ave.

The Hazelton Westboro

STARWOOD GROUP INC.

SHEET #

D401

PAPER SIZE: Tabloid PLOT DATE: 2022-03-25 3:19:35 PM PLOT SCALE: 1:1

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Figure 2: Proposed Development Concept Plan

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, on the west side of the road north of Richmond Road, and in addition, that on-street parking is not permitted on either side of the roadway adjacent to the site (i.e. from Richmond Road to approximately 80 m north of Richmond Road).

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 shared through and left turn lane and an exclusive right-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 northbound 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 two through lanes, and the westbound approach 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**.

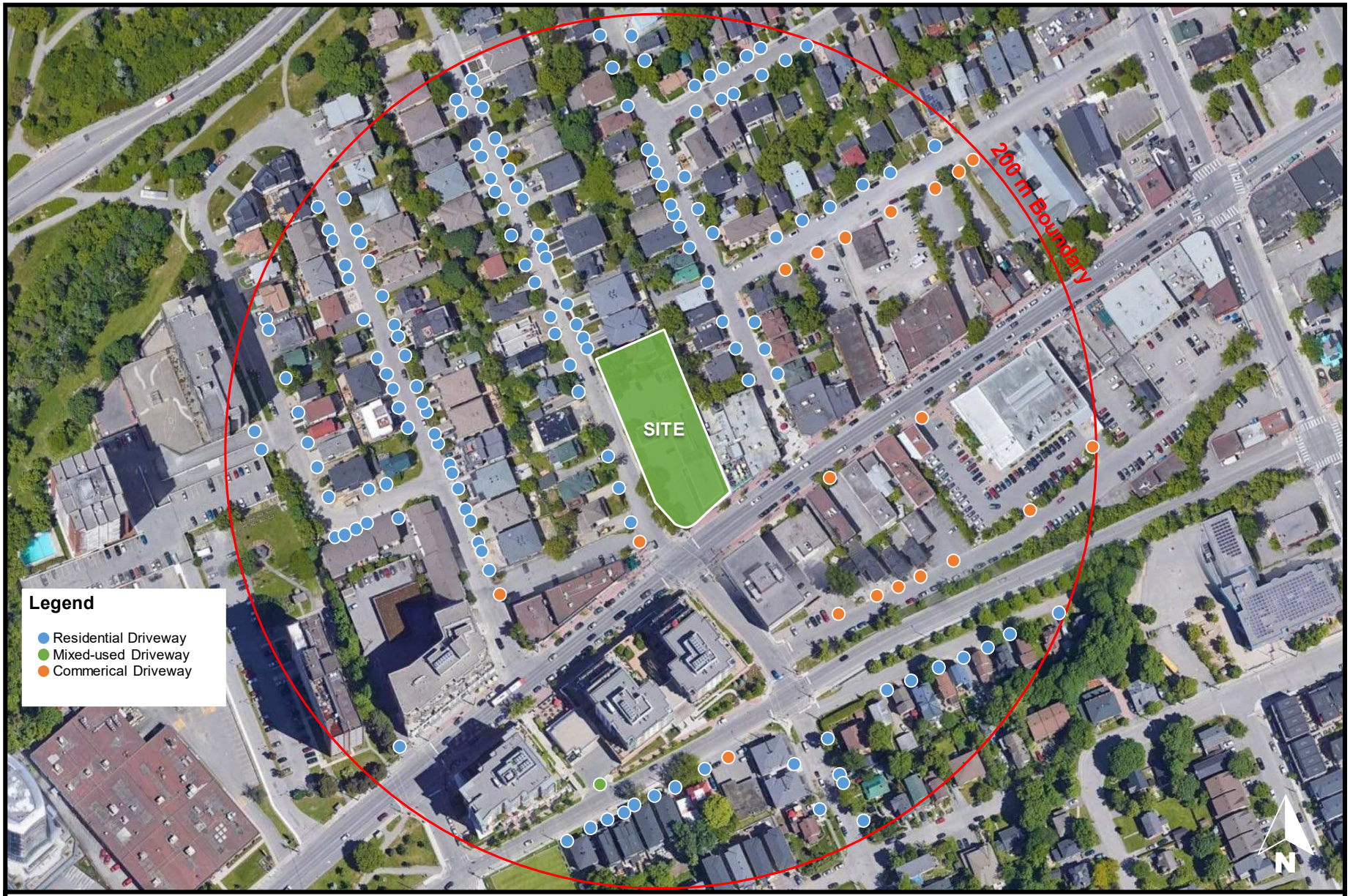

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Figure 3: Adjacent Driveways

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).

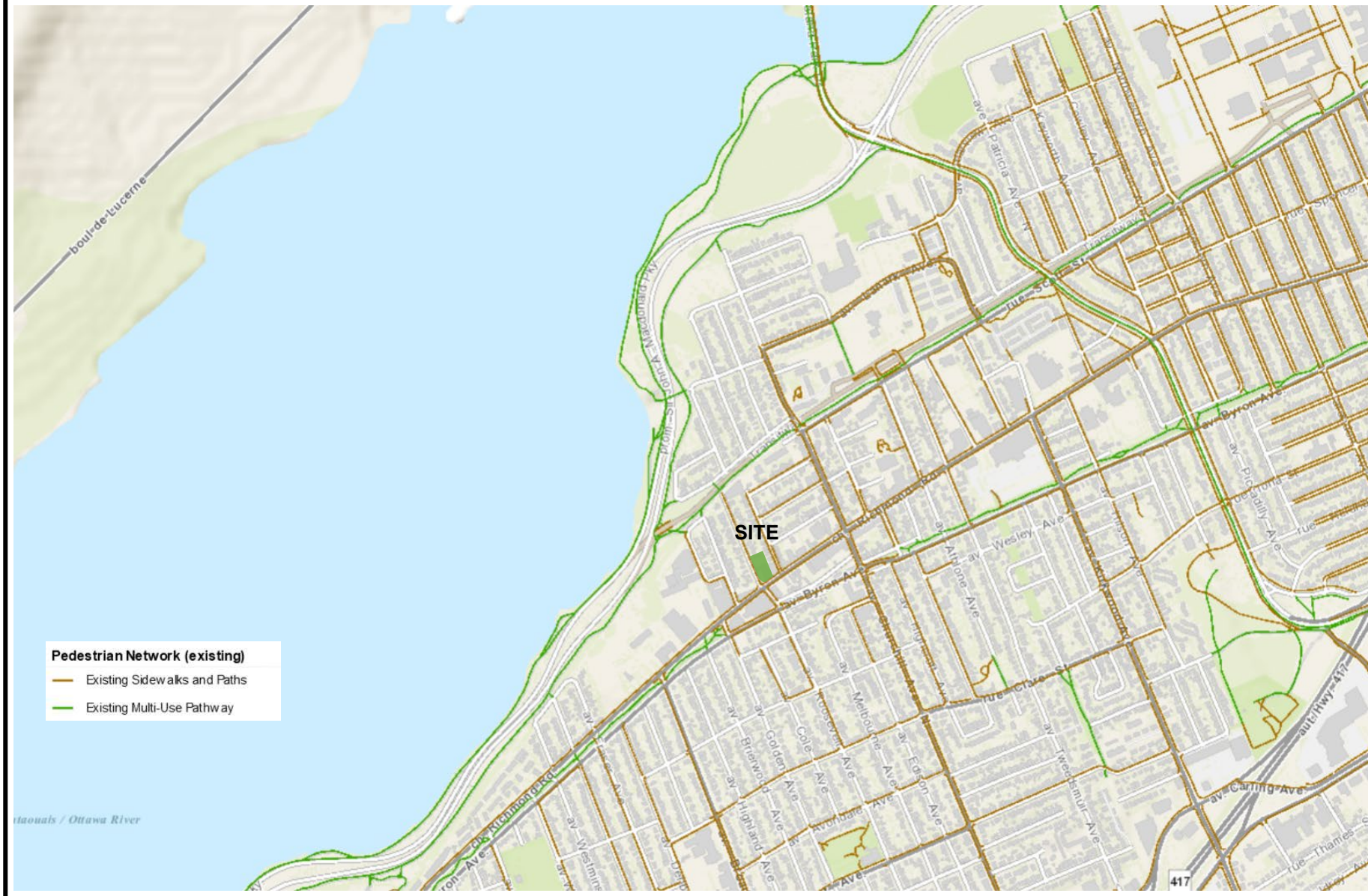


Figure 4: Existing Pedestrian Network

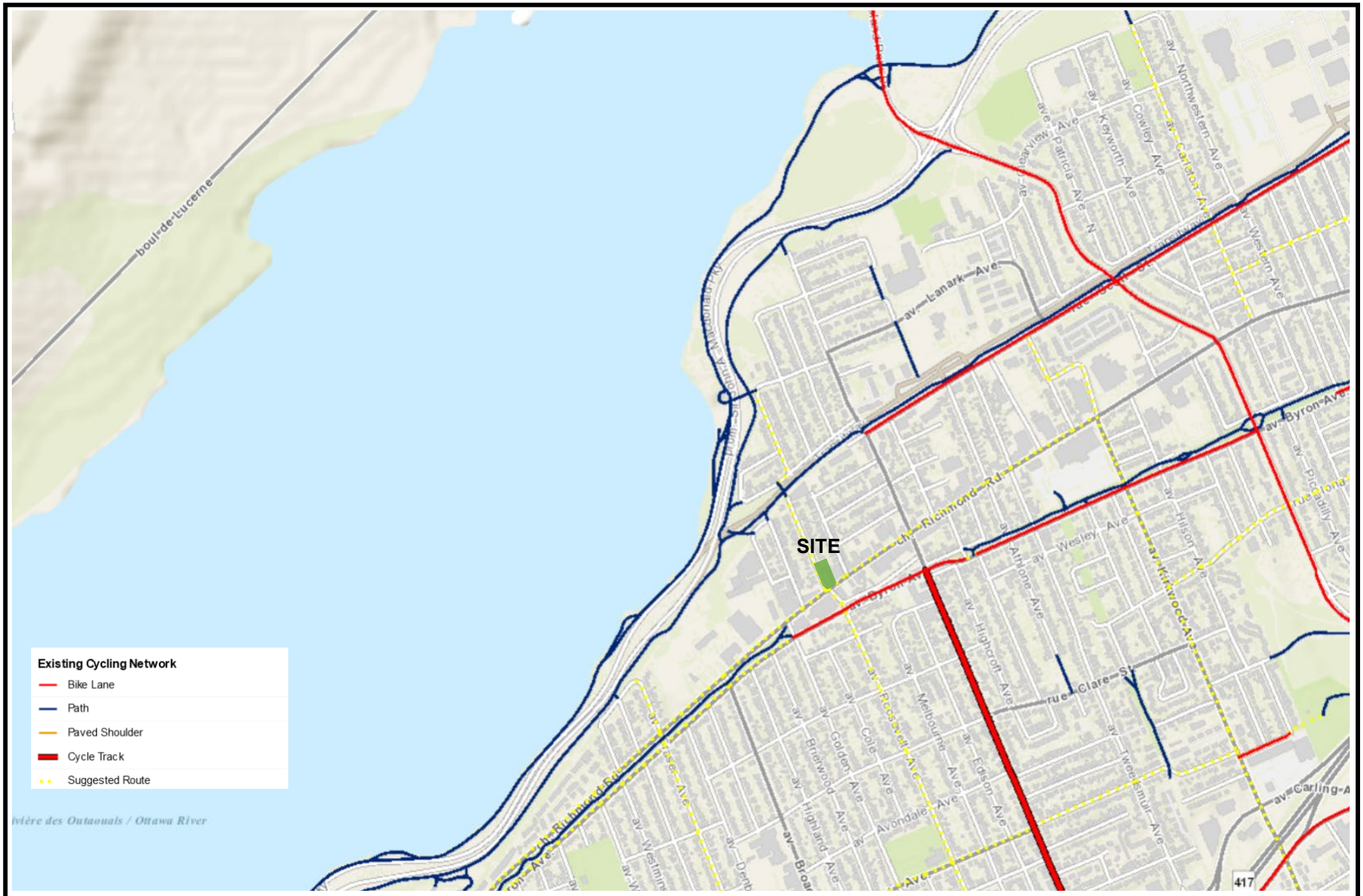


Figure 5: Existing Cycling Network

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
Note:	*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.

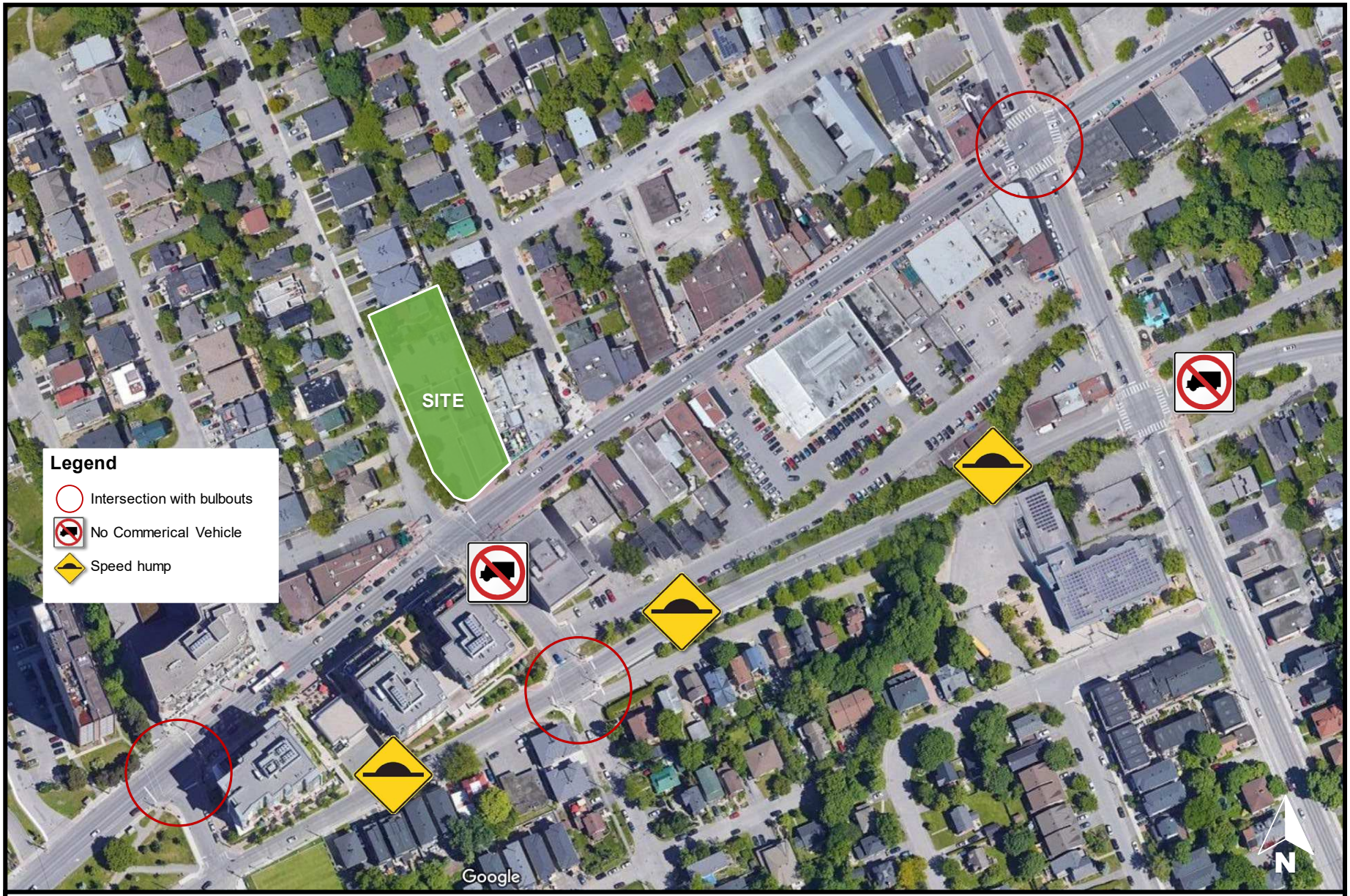


Figure 8: Area Traffic Management

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**. It should be noted that, no volume balancing was applied to the network as the volume imbalances falls within/around 10% between adjacent intersections. One outlier is the eastbound volume from Richmond/Golden to Richmond/Roosevelt during AM peak hour, where the imbalance is 17%. However, since both upstream and downsteam intersection volumes remain within 10%, and there is a unsignalized intersection in between (Richmond/Berkley), volume imbalances can be explained by people tuning southbound left out of Berkley Avenue during the AM peak. As such, no volume balancing was applied in order to preserve the count observations.

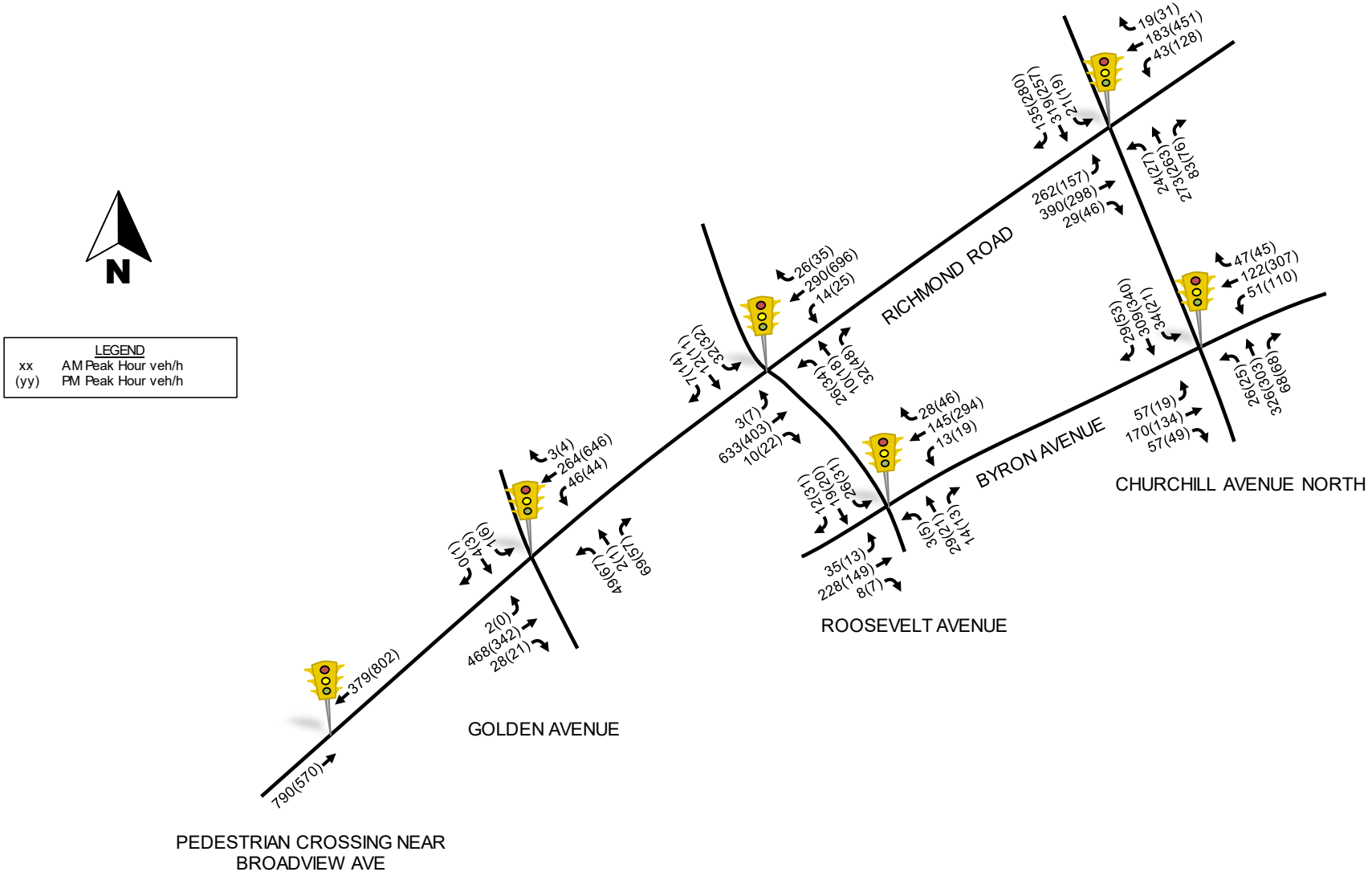


Figure 9: Existing Vehicular Volumes AM(PM)

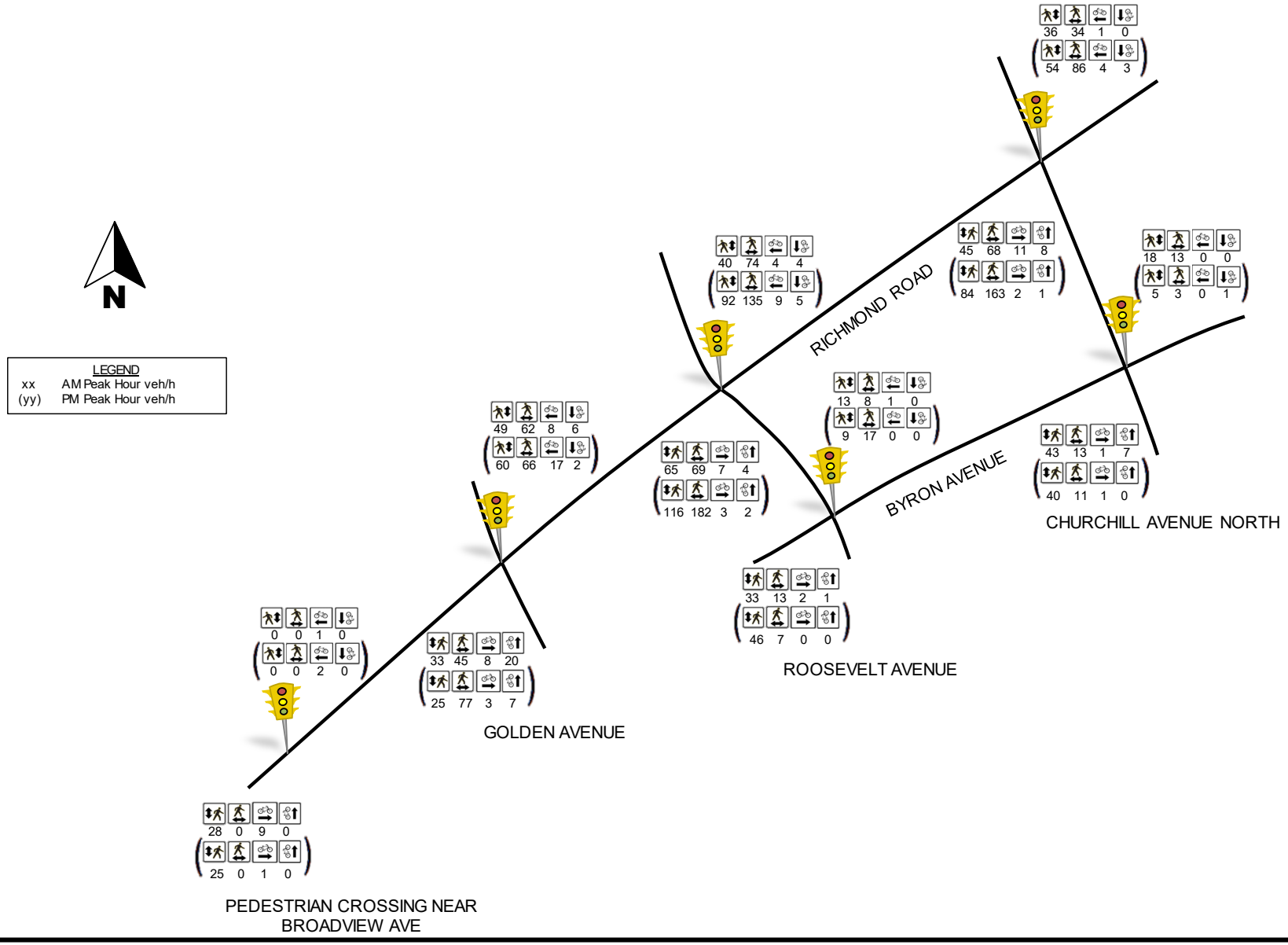


Figure 10: Existing Volumes AM(PM) – Non-motorists

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.

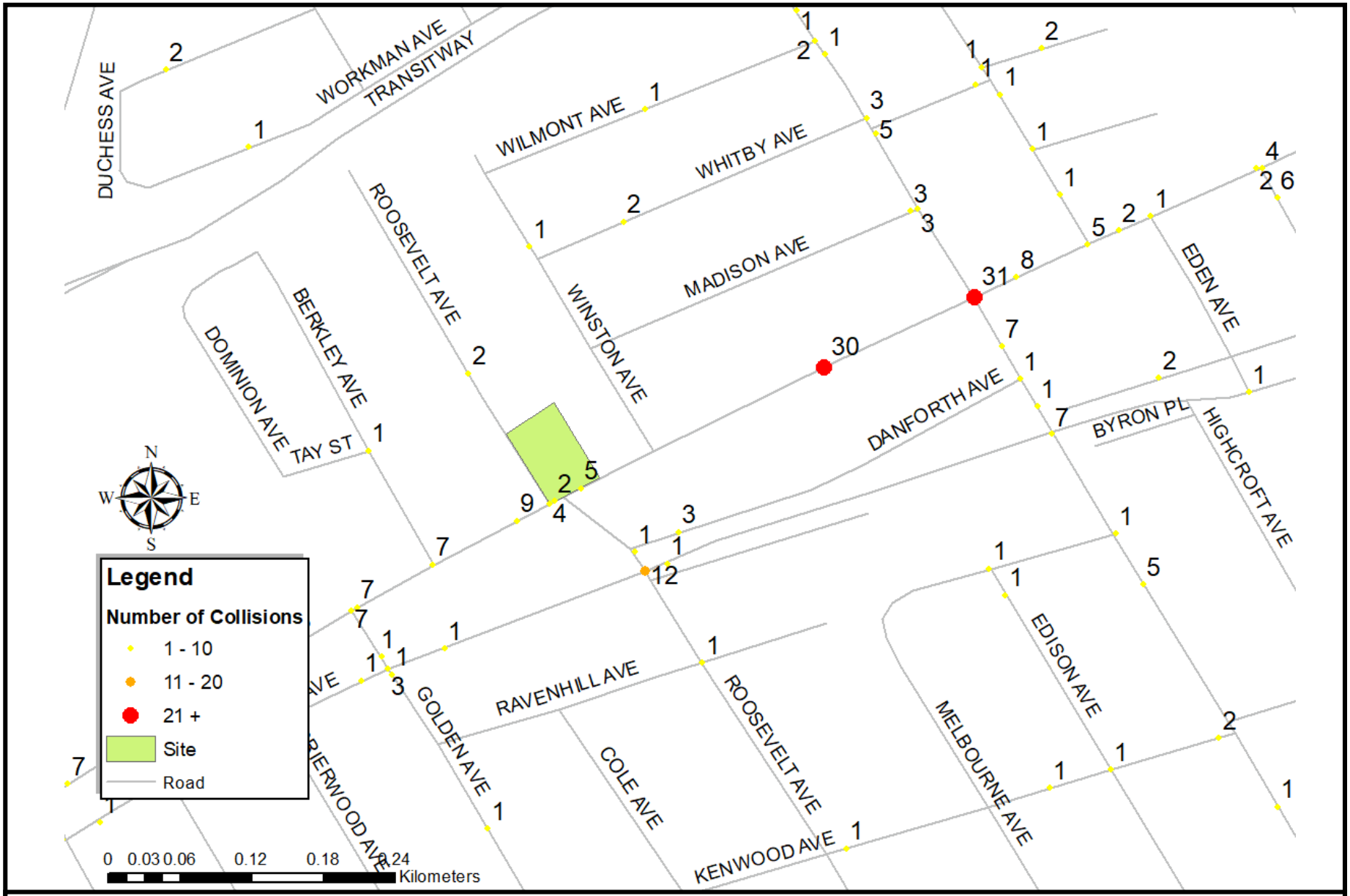


Figure 11: Collision Frequency

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[1].

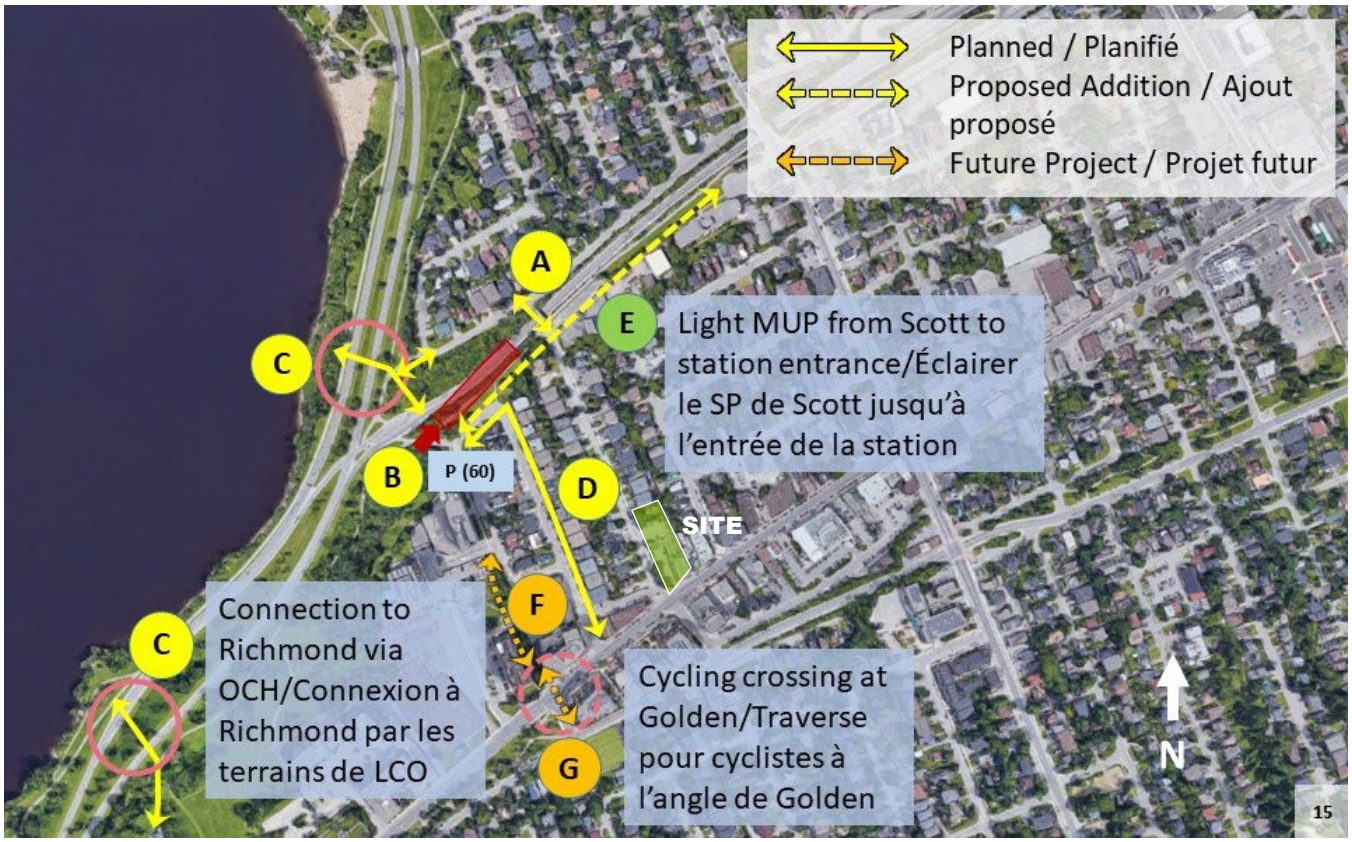


Figure 12: Connectivity Projects Near Dominion Station

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.

[1] 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 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^2 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^2 retail	Mixed-Used Development
335 Roosevelt Avenue	2026	336 units	Apartments

349 Danforth Avenue	2021	13 residential units 2 commercial units	Mixed-Used Development
2070 Scott Street	2022	241 condo units 5,500 ft^2 retail	Mixed-Used Development
Byron Place Apartments 433-435 Churchill Avenue and 468-472 Byron Place	2021	72 apartment units 3660 ft^2 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
Design Review			
4.1 Development Design	4.1.2 Circulation and Access	Required for Site Plans	**Not Exempt**
	4.1.3 New Street Network	Required for Plans of Subdivision	Exempt
4.2 Parking	4.2.1 Parking Supply	Required for Site Plans	**Not Exempt**
	4.2.2 Spillover Parking	Required for Site Plans where parking supply will be 15% below unconstrained demand	Exempt
Network Impact			
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	**Not Exempt**
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	**Not Exempt**
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 143 dwelling units and a 10th floor amenity space, with ground floor retail space of approximately 5,283 ft^2 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 10th 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 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^2)	AM Peak (Person Trips/h)			PM Peak (Person Trips/h)		
		In	Out	Total	In	Out	Total
Apartment	143 units	22	70	92	60	39	99
Ground Floor Commercial	5,283 ft^2	12	10	22	23	23	46
Total 'New' Person Trips		**34**	**80**	**114**	**83**	**62**	**145**

As summarized in **Table 6**, the proposed development is projected to generate an approximate two-way total of 114 and 145 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%	6	13	19	13	10	23
Auto Passenger	5%	2	5	7	5	4	9
Transit	65%	22	51	73	53	40	93
Non-motorized	15%	4	11	15	12	8	20
Total Person Trips	100%	34	80	114	83	62	145
Less Pass-by (34%, PM only)		0	0	0	-1	-1	-2
Total 'New' Auto Trips		6	13	19	12	9	21

As shown in **Table 7**, the proposed development is projected to generate approximate two-way vehicle volumes of 19 veh/h and 21 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 15 trips/h and 20 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 73 trips/h and 93 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 88 trips/h and 113 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 (4 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**.

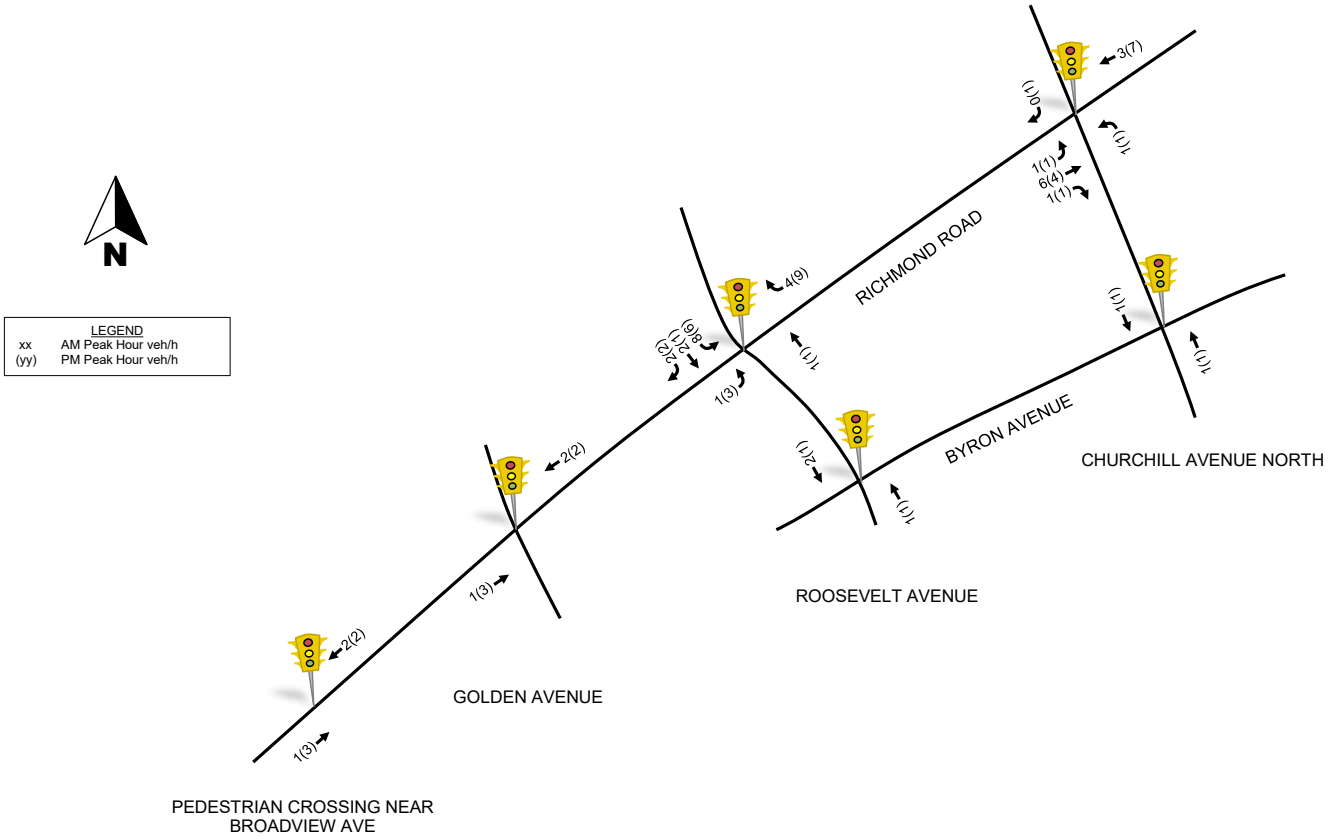


Figure 14: 'New' Projected Site-Generated Traffic

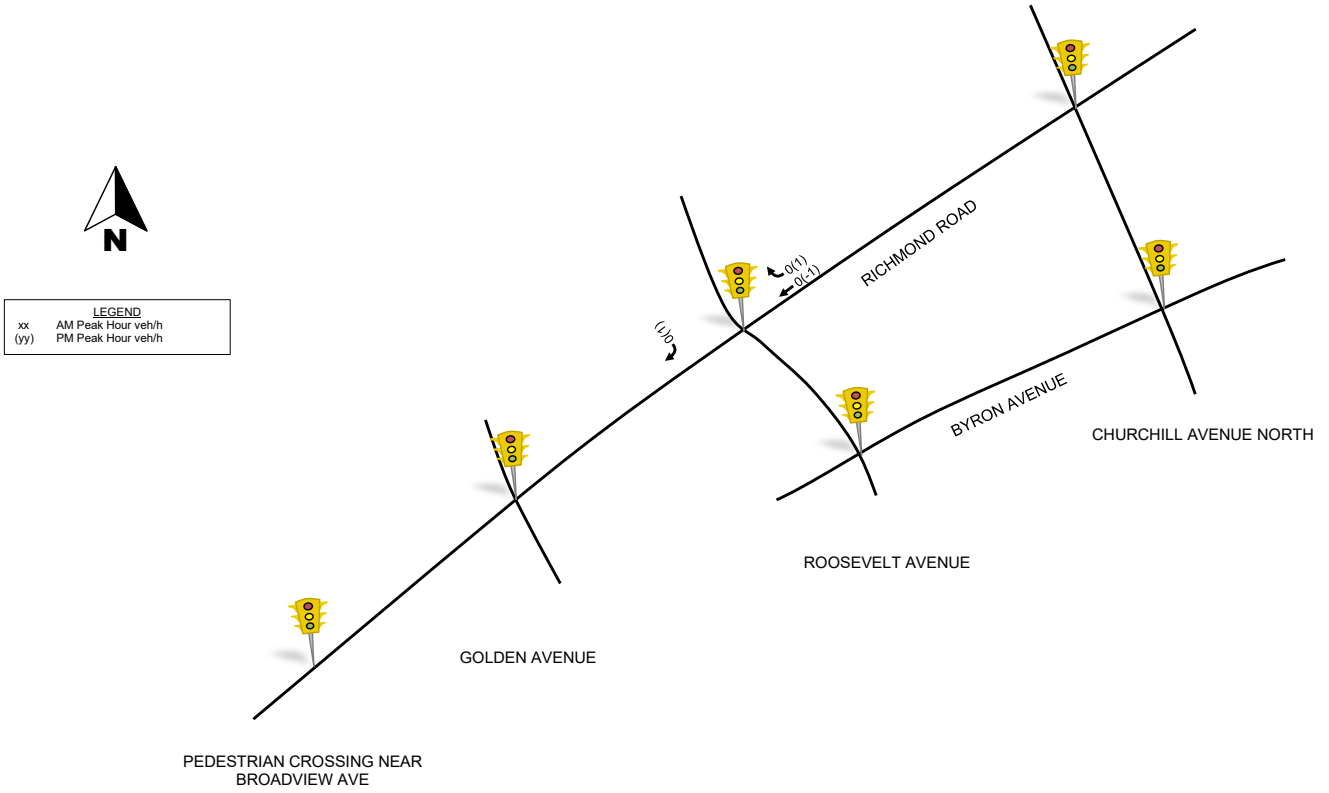


Figure 15: 'Pass-by' Projected Site-Generated Traffic

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 the following location will be included in the subsequent analysis:

- 371 Richmond Road;
- 386 Richmond Road;
- 319 - 327 Richmond Road;
- 335 Roosevelt Avenue;
- 349 Danforth Avenue;
- 2070 Scott Street;
- Byron Place Apartments; and
- Byron-Ravenhill Complex.

For the purpose of this assessment, all developments have been assumed to be fully built-out by the horizon year 2025. Excerpts from the development's TIA reports, depicting projected site-generated traffic, are included as **Appendix C**. The combined new trips generated by the identified development sites are depicted as **Figure 16**.

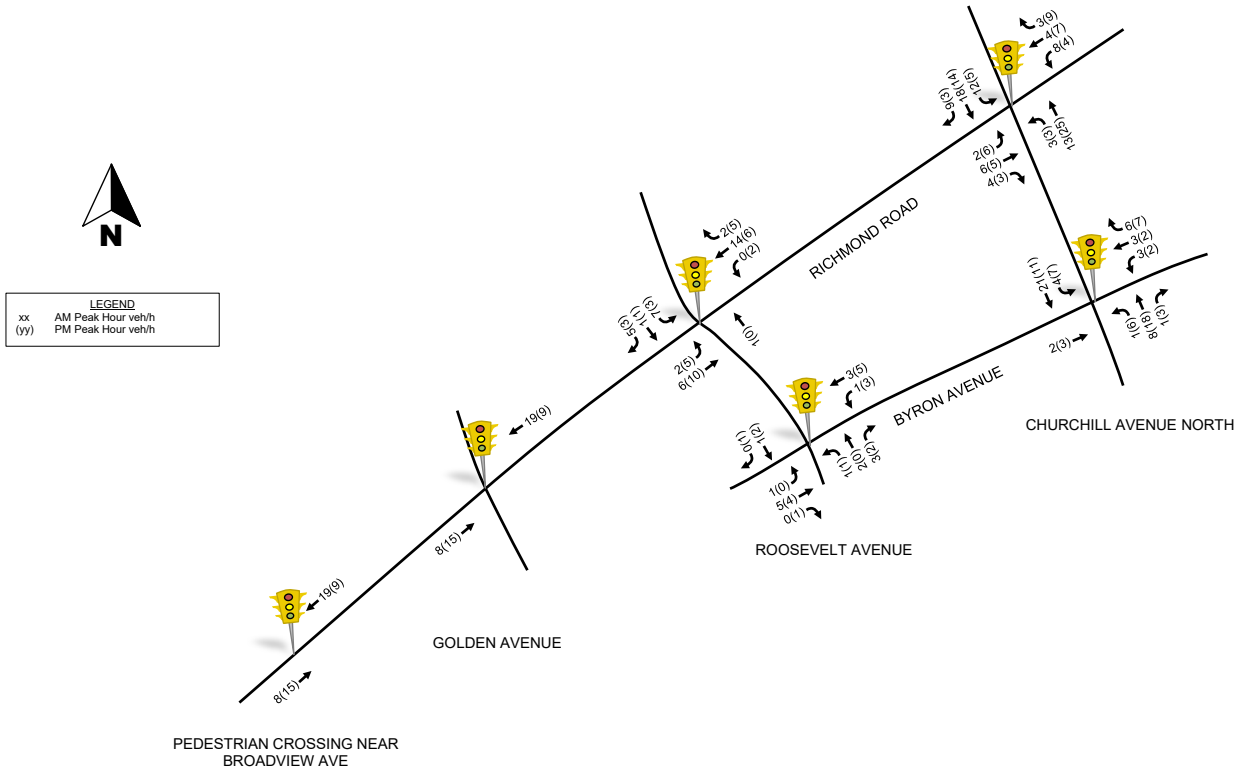


Figure 16: Combined Volumes from Adjacent TIA Studies

It should be noted that, aside from the above-mentioned developments, there are also proposed developments at 342 Roosevelt Avenue, 300 Elmgrove Avenue, and 349 Danforth Avenue. However, 342 Roosevelt Avenue and 300 Elmgrove Avenue does not have TIAs available at the time of this report. As such, developments at 342 Roosevelt Avenue, and 300 Elmgrove Avenue would not be included in this report.

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%.

Given a 0% growth rate for general background traffic and given all area development is assumed to be fully built-out by the horizon year 2025, projected background traffic volumes for the horizon years 2030 will be the same as the background traffic volumes for the 2025 horizon year. Therefore and in the absence of the site development, the following **Figure 17** depicts total projected 'background' traffic volumes for the 2025 horizon year and beyond, which is the combination of existing volumes depicted as **Figure 9** and the projected area development traffic previously depicted in **Figure 16**.

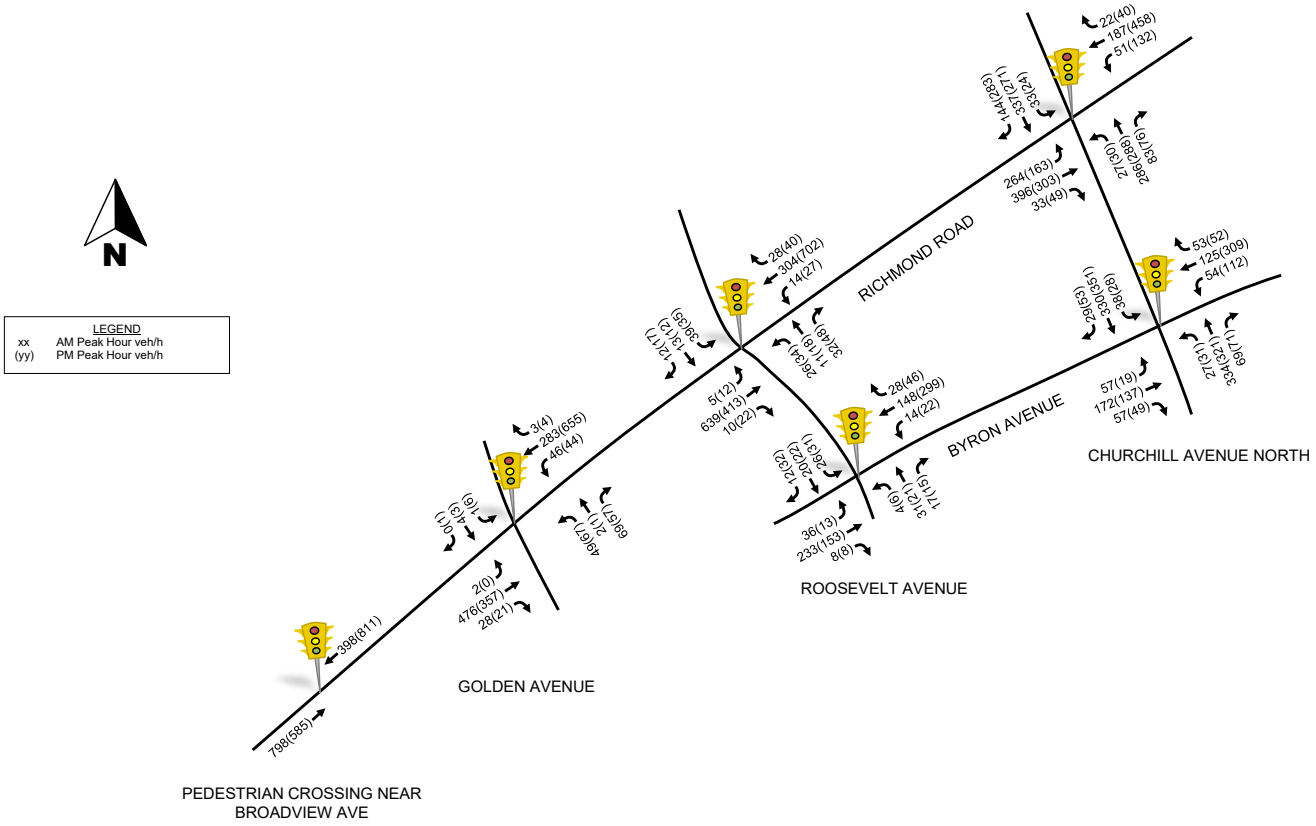


Figure 17: Background Traffic Volumes (2025, 2030)

3.3 Demand Rationalization

The following section summarizes the vehicular intersection capacity analysis of existing, future background and future total volume scenarios.

Using the intersection capacity analysis software Synchro (v10), study area intersections were assessed in terms of vehicle delay (seconds), 95th 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 analysis results were recorded using the percentile method, results from HCM 2000 were also provided in the appendix for reference.

Existing and Background Conditions

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	95th %ile Queue (m)	v/c	Delay (s)	LOS	95th %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
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

Movement	Lanes	Storage Length / Distance to upstream intersection (m)	AM Peak Hour				PM Peak Hour			
			v/c	Delay (s)	LOS	95th %ile Queue (m)	v/c	Delay (s)	LOS	95th %ile Queue (m)
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 95th percentile queue is approaching the upstream intersection during the PM peak hour. At the Golden/Richmond intersection, the westbound 95th 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.

It should be noted that the current issue with the network is concerns queuing at certain intersection (i.e.: projected 95 percentile queues exceeding the storage area or the length of the road segment). However, all intersections have low delays and excellent overall v/c ratio (<D), meaning that the intersections along Richmond are busy but working efficiently. There is no real solution to the storage problem besides road widening, diverting vehicle trips to other modes or changing the modeling standard. Removing existing traffic may not be reasonable since the v/c and delay remain low, and removing new generated vehicle trips and assigning to the already high transit/active mode share (80% combined) isn't deemed reasonable from the same perspective.

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	95th %ile Queue (m)	v/c	Delay (s)	LOS	95th %ile Queue (m)
Churchill Avenue North/Byron Avenue - Actuated-Coordinated Signal										
EBL/T/R	1 L/T/R	250	0.73	33.4	C	62	0.34	17.0	A	39
WBL/T/R	1 L/T/R	620	0.63	28.6	B	49	0.87	39.9	D	126
NBL	1 L	30	0.06	8.8	A	7	0.10	14.8	A	10
NBT/R	1 T/R	440	0.43	10.6	A	68	0.50	17.9	A	83
SBL	1 L	30	0.09	3.7	A	3	0.09	11.8	A	5
SBT/R	1 T/R	90	0.37	3.8	A	22	0.52	15.0	A	69
Overall			**0.48**	**16.6**	**A**	-	**0.60**	**23.9**	**B**	-
Roosevelt Avenue/Byron Avenue - Semi Act-Uncoord Signal										
EBL/T/R	1 L/T/R	250	0.23	4.0	A	26	0.15	4.3	A	15
WBL/T/R	1 L/T/R	150	0.16	3.4	A	16	0.32	5.1	A	34
NBL/T/R	1 L/T/R	60	0.18	18.4	A	13	0.15	17.4	A	11
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**	**7.4**	**A**	-
Golden Avenue/Richmond Rd - Actuated-Coordinated Signal										
EBL/T	1 T	175	0.48	11.6	A	75	0.34	8.4	A	48
EBR	1 R	175	0.04	2.5	A	3	0.03	1.8	A	2
WBL/T/R	1 L/T/R	130	0.37	10.4	A	49	0.71	15.5	C	140
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**	**10.6**	**A**	-	**0.56**	**13.9**	**A**	-
Roosevelt Avenue/Richmond Rd - Actuated-Coordinated Signal										
EBL/T/R	1 L/T/R	130	0.59	10.9	A	102	0.39	6.6	A	54
WBL/T/R	1 L/T/R	270	0.33	7.1	A	41	0.68	11.5	B	140
NBL/T/R	1 L/T/R	60	0.22	13.4	A	14	0.40	20.5	A	23
SBL/T/R	1 L/T/R	300	0.22	18.2	A	15	0.28	24.0	A	18
Overall			**0.45**	**10.4**	**A**	-	**0.53**	**11.3**	**A**	-
Churchill Avenue North/Richmond Rd - Actuated-Coordinated Signal										
EBL	1 L	50	0.59	32.0	A	84	0.53	40.7	A	64
EBT/R	1 T/R	270	0.44	10.3	A	69	0.36	8.8	A	53
WBL	1 L	45	0.26	26.5	A	17	0.49	27.1	A	39
WBT/R	1 T/R	245	0.48	27.6	A	51	0.79	33.1	C	141
NBT	1 T/L & 1 T/R	90	0.56	19.3	A	28	0.69	24.2	B	27
SBT	1 T/L & 1 T/R	300	0.70	26.8	B	49	0.79	25.0	C	51
Overall			**0.56**	**22.2**	**A**	-	**0.70**	**25.5**	**B**	-
Ped Crossing/Richmond Rd - Actuated-Coordinated Signal										
EBT	2 T	280	0.48	9.9	A	46	0.35	8.7	A	31
WBT	1 T	175	0.45	10.5	A	50	0.92	30.9	E	177
Overall			**0.47**	**10.1**	**A**	-	**0.68**	**21.6**	**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, including the eastbound left-turn movement at the Churchill/Richmond intersection exceeding the available storage

lane capacity during both AM and PM peak hours; Richmond Road signalized pedestrian crossing westbound movement operates with a LOS 'E' and a V/C ratio of 0.92, and the 95th percentile queue is exceeding the upstream intersection during the PM peak hour; Golden/Richmond intersection westbound 95th percentile queue is estimated to spillback to the upstream Roosevelt/Richmond intersection during the PM peak hours. All of them 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**).

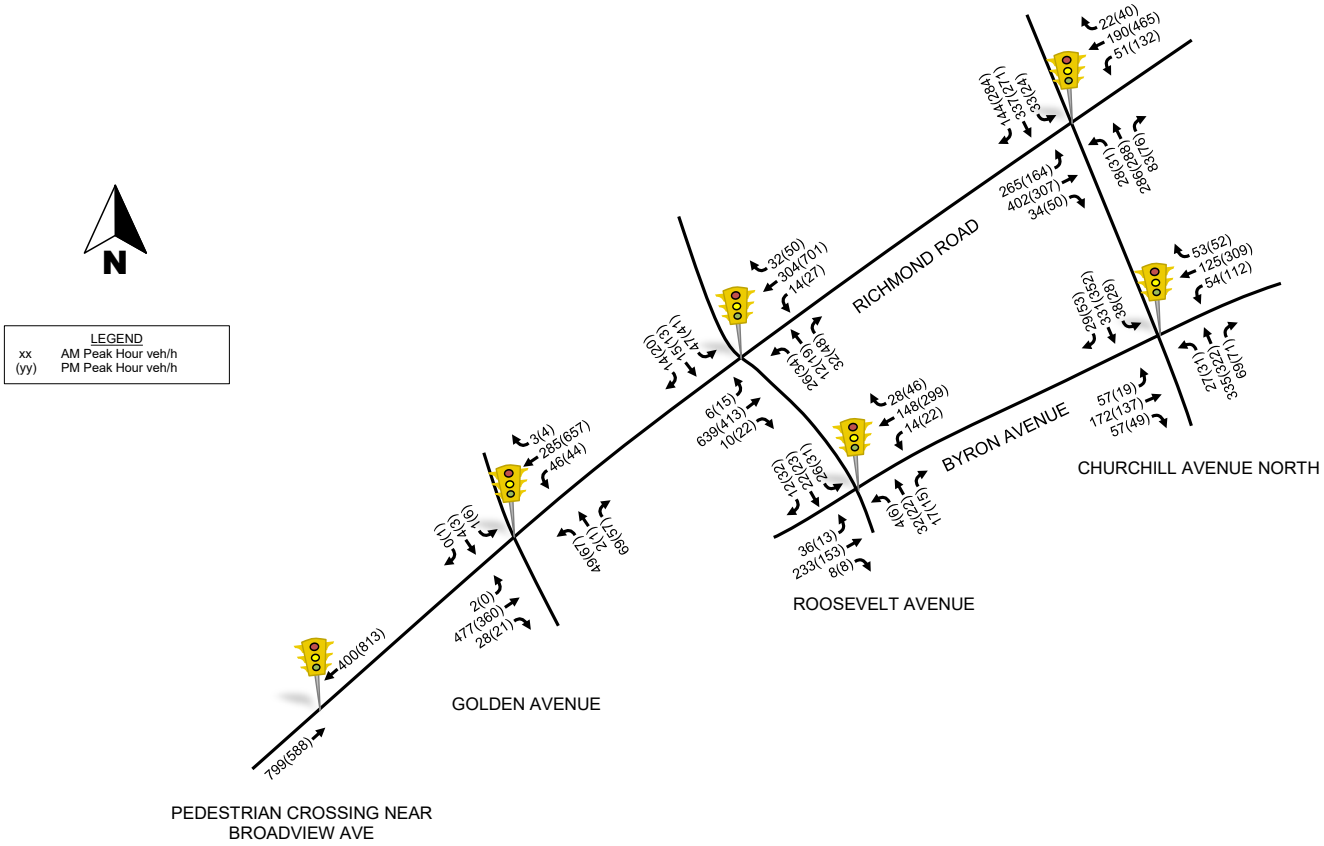


Figure 18: Total Projected Traffic Volumes (2025,2030)

Similar to existing and future background conditions, total projected conditions were assessed using the intersection capacity analysis software Synchro (v10). Metrics such as Auto-LOS, V/C Ratio, 95th 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 / Distance to upstream intersection (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	0.73	33.3	C	61	0.34	17.0	A	39
WBL/T/R	1 L/T/R	620	0.63	28.5	B	49	0.87	39.9	D	126
NBL	1 L	30	0.06	8.9	A	7	0.10	14.8	A	10
NBT/R	1 T/R	440	0.43	10.7	A	68	0.50	17.9	A	83
SBL	1 L	30	0.09	3.7	A	3	0.09	11.9	A	5
SBT/R	1 T/R	90	0.38	3.9	A	22	0.52	15.1	A	71
Overall			**0.48**	**16.6**	**A**	-	**0.60**	**23.9**	**B**	-
Roosevelt Avenue/Byron Avenue - Semi Act-Uncoord Signal										
EBL/T/R	1 L/T/R	250	0.23	4.0	A	26	0.15	4.3	A	15

Movement	Lanes	Storage Length / Distance to upstream intersection (m)	AM Peak Hour				PM Peak Hour			
			v/c	Delay (s)	LOS	Queue (m)	v/c	Delay (s)	LOS	Queue (m)
WBL/T/R	1 L/T/R	150	0.16	3.4	A	16	0.32	5.1	A	34
NBL/T/R	1 L/T/R	60	0.18	18.6	A	13	0.15	17.6	A	11
SBL/T/R	1 L/T/R	240	0.23	21.7	A	16	0.32	19.2	A	19
Overall			**0.18**	**6.9**	**A**	-	**0.26**	**7.5**	**A**	-
Golden Avenue/Richmond Rd - Actuated-Coordinated Signal										
EBT	1 T	175	0.48	11.6	A	75	0.35	8.4	A	49
EBR	1 R	175	0.04	2.5	A	3	0.03	1.8	A	2
WBT	1 L/T/R	130	0.37	10.5	A	50	0.71	15.6	C	141
NBT	1 L/T/R	30	0.29	8.5	A	15	0.39	16.8	A	24
SBT	1 L/T/R	50	0.01	12.2	A	2	0.03	18.5	A	5
Overall			**0.39**	**10.6**	**A**	-	**0.56**	**14.0**	**A**	-
Roosevelt Avenue/Richmond Rd - Actuated-Coordinated Signal										
EBT	1 L/T/R	130	0.59	10.9	A	102	0.40	6.7	A	55
WBT	1 L/T/R	270	0.33	7.1	A	41	0.69	11.9	B	145
NBT	1 L/T/R	60	0.22	13.5	A	14	0.40	20.4	A	23
SBT	1 L/T/R	300	0.26	18.8	A	18	0.33	25.1	A	21
Overall			**0.44**	**10.6**	**A**	-	**0.53**	**11.6**	**A**	-
Churchill Avenue North/Richmond Rd - Actuated-Coordinated Signal										
EBL	1 L	50	0.59	32.1	A	84	0.53	40.7	A	65
EBT	1 T/R	270	0.45	10.4	A	70	0.37	8.9	A	54
WBL	1 L	45	0.26	26.5	A	17	0.50	27.3	A	39
WBT	1 T/R	245	0.49	27.7	A	52	0.80	34.1	C	145
NBT	1 T/L & 1 T/R	90	0.57	19.4	A	28	0.70	24.3	B	27
SBT	1 T/L & 1 T/R	300	0.70	26.8	B	49	0.79	24.9	C	51
Overall			**0.56**	**22.3**	**A**	-	**0.70**	**25.7**	**B**	-
Ped Crossing/Richmond Rd - Actuated-Coordinated Signal										
EBT	2 T	280	0.48	9.9	A	46	0.35	8.7	A	32
WBT	1 T	175	0.45	10.5	A	50	0.92	31.2	E	178
Overall			**0.47**	**10.1**	**A**	-	**0.68**	**21.7**	**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 'B' 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 0.92, and the 95th percentile queue is projected to spillback to the upstream signalized intersection during the PM peak hour. At the Golden/Richmond intersection, the westbound 95th percentile queue is projected to spillback to the upstream Roosevelt/Richmond intersection during the PM peak hour.

Similar to the assessment of background conditions, the individual movements approaching/exceeding available capacity mentioned above 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 600 m 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
Note:	*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 400 m to/from the subject development site.

A Transportation Demand Management (TDM) Supportive Development Design and Infrastructure Checklist, which includes strategies to promote transit use, was provided as **Appendix F**. Both the retail and residential were considered in the checklist. Walking & Cycling routes satisfy all required and most basic categories. Parking satisfy all required categories. Bike parking for the apartment remains undetermined. Other items, including transit, ridesharing, carsharing and bikesharing are subject to change and agreement with the future tenant, therefore not considered in this checklist.

Circulation and Access

The width of proposed site driveway access to underground parking is proposed to be 6 m, 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.

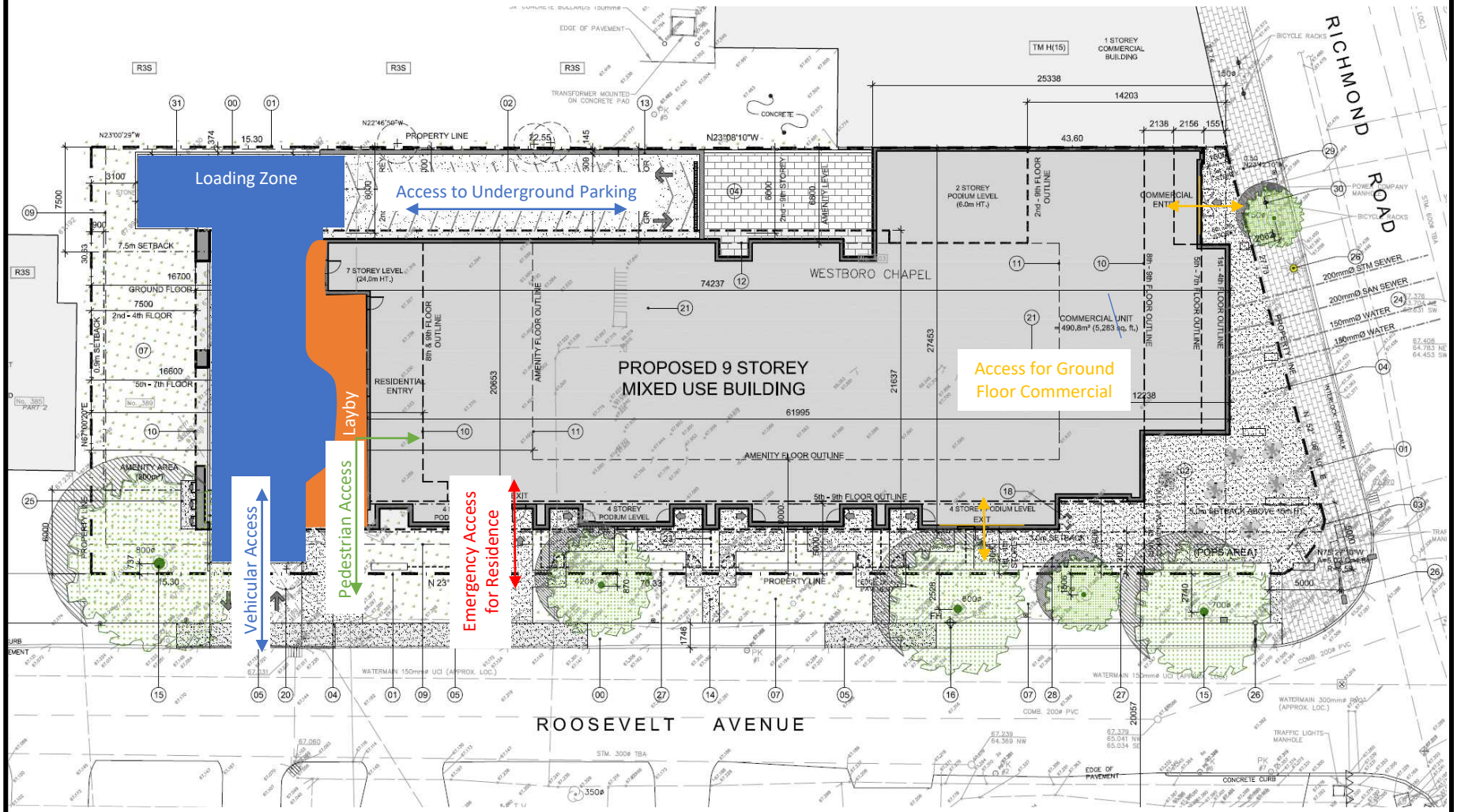


Figure 19: Circulation and Access

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, and 102.

Table 12: Vehicular Parking Supply

Type	Zoning Requirement	GFA	Minimum parking Requirement
Residence Parking[2]	0.5 per dwelling unit for mid-rise apartment	141 units of Apartment	65
Visitor Parking[3]	0.1 per dwelling unit for mid-rise apartment	141 units of Apartment	13
		Total Required	**78**
		Provided (As shown in the site plan)	150

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^2 GFA for Retail	141 units of Apartment 490.8 m^2 GFA of Retail	71 for Apartment 2 for Ground Floor Commercial
		Total Required	**73**
		Provided (As shown in the site plan)	148

[2] Section 101 of Zoning (By-law No. 2008-250), subsection (4) (a): *"where a residential use is located within a building of four or fewer storeys, no off-street motor vehicle parking is required to be provided under this section for the residential use"*
[3] Section 101 of Zoning (By-law No. 2008-250), subsection (2): *"Despite (1), within Areas B, X, Y and Z, no visitor parking spaces are required for the first twelve dwelling units on a lot. (By-law 2016-249)"*

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 14**. 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 14** 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**(A)	**D**(A)	D(D)	B(D)
2	Richmond Rd	Roosevelt & Golden	**B**(A)	**D**(A)	D(D)	B(D)
3	Roosevelt Ave	Richmond & Byron	B(B)	B(C)	- (D)	- (-)
4	Churchill Ave N	Churchill & Roosevelt	B(C)	**D**(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)	**D**(A)	D(D)	C(D)
Note: *'-' denotes No Target/ No facility/ No service*						

Based on the results summarized in **Table 14**, 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 14**.

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 1st, 2014 to December 31st, 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 northbound approach) will not be captured since those projects were completed more recently. It is also worth noting that the Richmond/Churchill intersection was reconstructed between late 2018 and early 2019 to install bulb outs on all approaches, and relocate the traffic signal heads; the Byron/Roosevelt intersection was modified between late 2014 and early 2015 to convert it from an Intersection Pedestrian Signal (IPS) to a full, four-way traffic signal. Therefore, some contributing factors to collisions may no longer be present at those intersections..

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
Total		**81**	**-**	**71**	**10**	**0**

Notes: '' Denotes data was not available*
C/MVK = Collisions per Million Vehicle Kilometers

As shown in **Table 15**, based on the available data, segments on Richmond Road between Churchill and Richmond have a considerably higher collision rate compare to other road segments within the study area. Regarding the collision types, mostly rear end and single motor vehicle collisions were cited.

Based on the same most recent five (5) years of historical collision data (collected from January 1st, 2014 to December 31st, 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. As previously mentioned, Richmond/Churchill may not be representative of current conditions, since bulb outs was installed at all approach, and the traffic signal heads were relocated between late 2018 and early 2019.

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** (0.53)	8	4	0
Byron/Churchill	7	0.24	7	0	0
Total	**61**	**-**	**46**	**15**	**0**

Notes: C/MEK = Collisions per Million Entering Vehicles
The numbers in brackets indicate the collision rate after intersection reconstruction in 2014/2015.

Based on the available data, Byron/Roosevelt has a notable collision rate compared to the rest of the intersections in the study area. It also has a high proportion of angle collisions (8 out of 12, or 67%), however this high proportion occurred predominantly under the previous intersection control (IPS). Seven (7) collisions were reported in 2014 alone, all of which were angle collisions. Due to the high frequency of angle collisions, city staff installed a full, four-way traffic signal in 2015 and trimmed vegetation on the southwest corner (northbound approach). Since the traffic signal installation, collisions were reduced from 7 in 2014 to 1.25 per year (5 collisions between 2015 and 2018). The frequency of angle collisions was also reduced from 100% (7 out of 7) to 20% (1 out of 5).

Within the five (5) years of recorded collision data, there were seven (7) collisions involving pedestrians. The following **Table 17** summarizes the time and location of the collisions. All of the reported collisions involving pedestrians were non-fatal; however, personal injuries were reported.

Table 17: Summary of Pedestrian Collisions

Intersection /Segments	Total Collisions (5 Year Total)	Number of Involved Pedestrians	Date of Collision
Richmond @ Churchill Intersection	4	1	2014-05-01, 12:54 AM
		1	2016-06-02, 7:22 PM
		1	2016-12-31, 5:01 PM
		2	2018-10-27, 9:39 PM
Richmond @ Golden Intersection	1	1	2018-02-27, 6:59 PM
Richmond @ Roosevelt Intersection	1	1	2014-06-29, 3:07 PM
Churchill btwn Richmond & Byron	1	1	2016-12-16, 8:45 PM
Total	**7**	**8**	**-**

Collisions involving pedestrians within the study area predominantly (5 out of 7) happened at night; enhancing the street lighting may help prevent these collisions in the future. No other collision patterns could be identified relating to environment or road surface conditions, and additional collision details, such as vehicle maneuver or driver action, were not provided in the dataset.

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 18**.

Intersection MMLOS Summary

Similar to the MMLOS analysis conducted for the Boundary Street Design, the following **Table 18** 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 18: Intersection MMLOS – Existing LOS(Target LOS)

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

Based on the results summarized in **Table 18**, the following should be noted/considered:

Pedestrian LOS

- Richmond/Churchill, 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 18**, 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[4].

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 street 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.

[4] https://www.octranspo.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 polices, 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

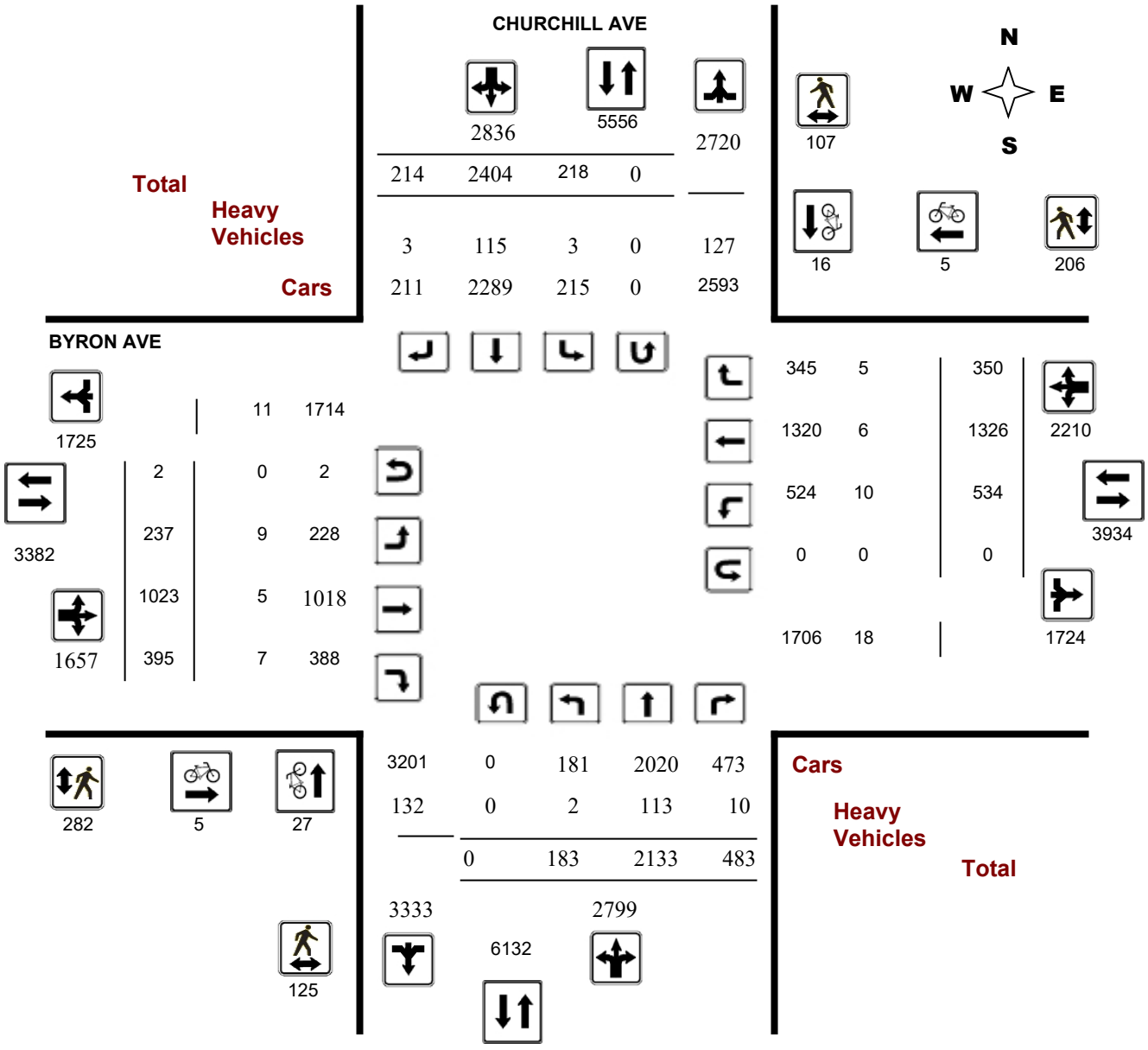
Transportation Services - Traffic Services

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 Diagram



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

Transportation Services - Traffic Services

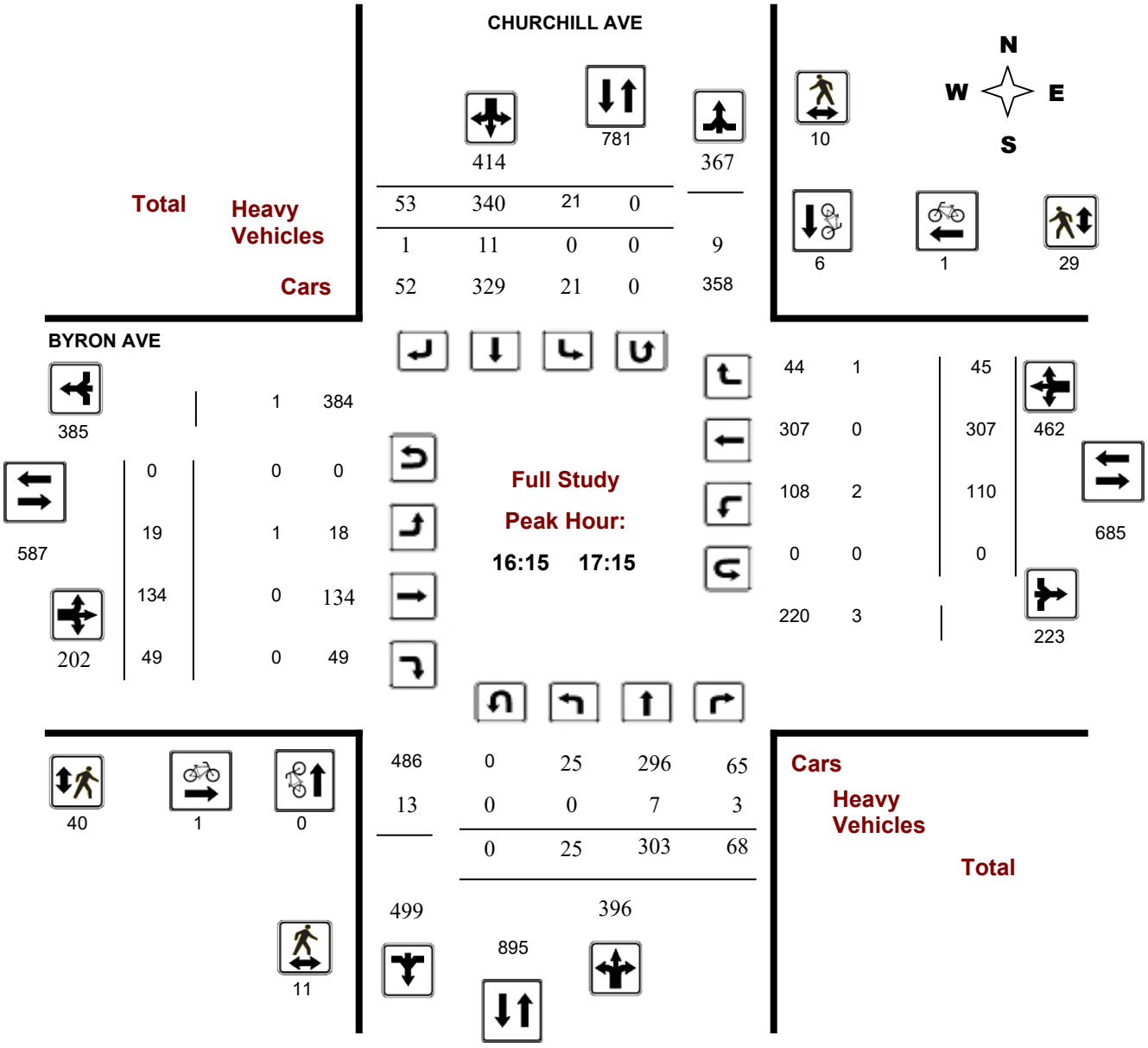
Turning Movement Count - Study Results

BYRON AVE @ CHURCHILL AVE

Survey Date: Thursday, January 23, 2020 **WO No:** 39387

Start Time: 07:00 **Device:** Miovision

Full Study Peak Hour Diagram



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

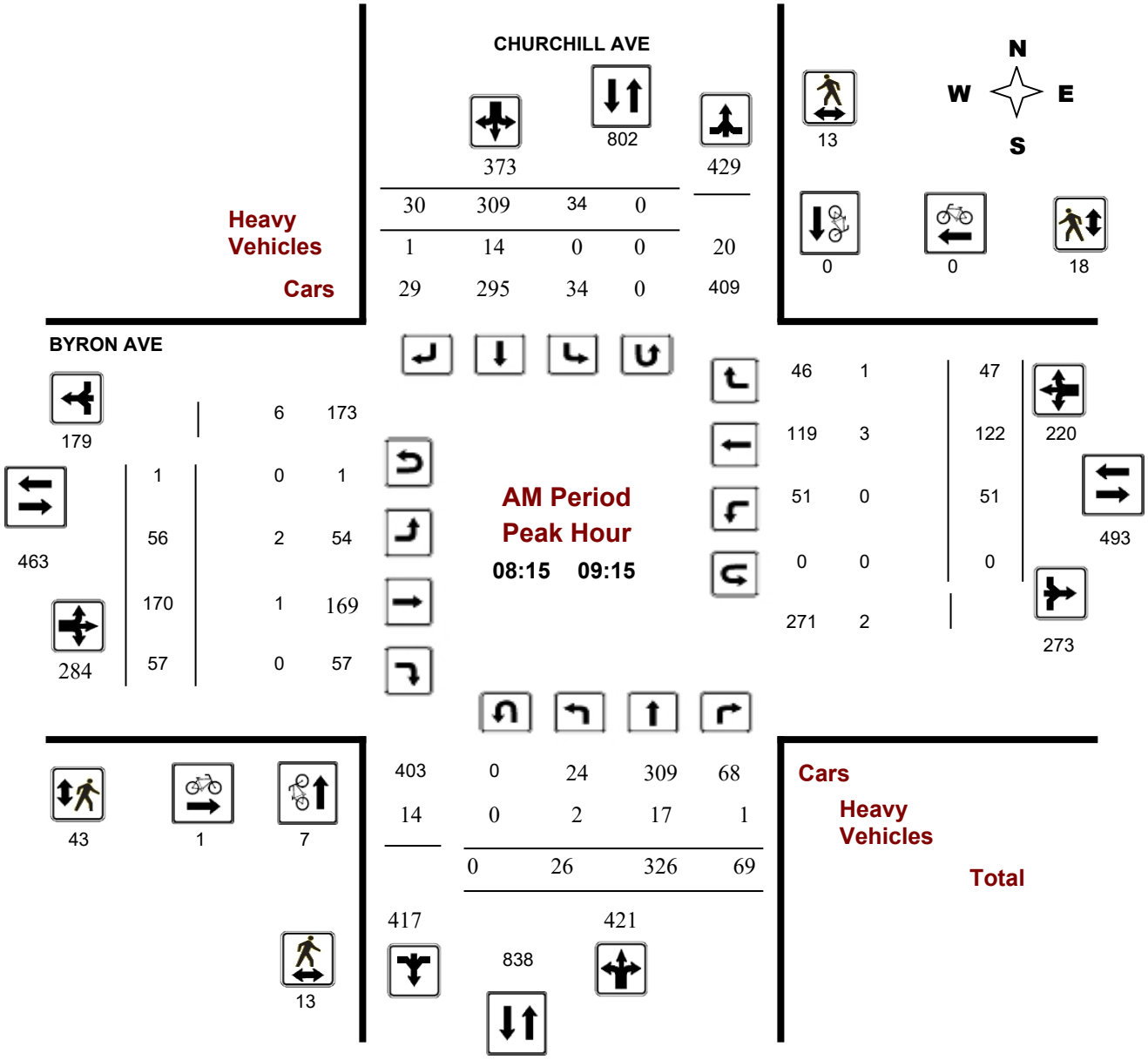
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

BYRON AVE @ CHURCHILL AVE

Survey Date: Thursday, January 23, 2020 **WO No:** 39387

Start Time: 07:00 **Device:** Miovision



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

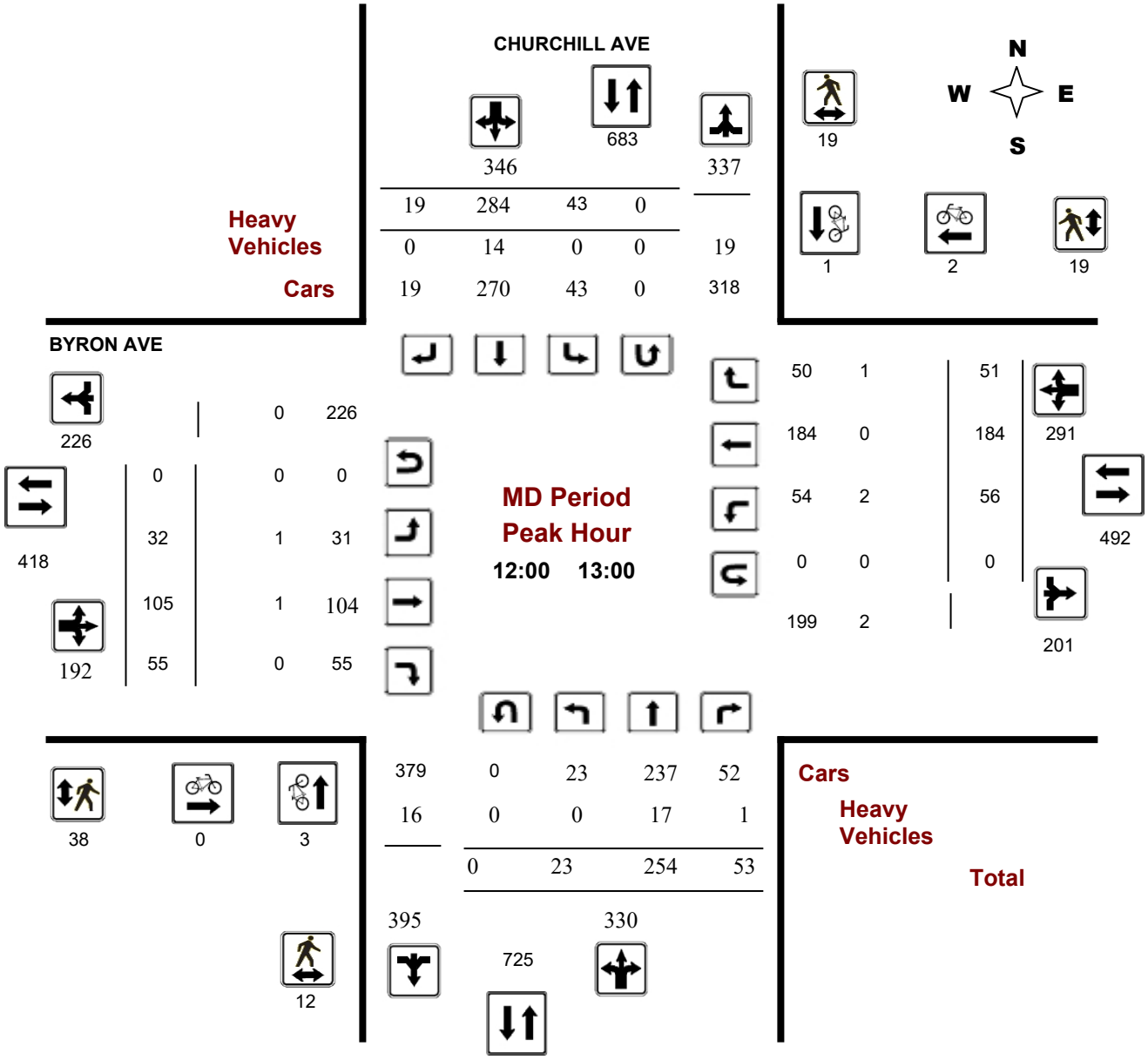
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

BYRON AVE @ CHURCHILL AVE

Survey Date: Thursday, January 23, 2020 **WO No:** 39387

Start Time: 07:00 **Device:** Miovision



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

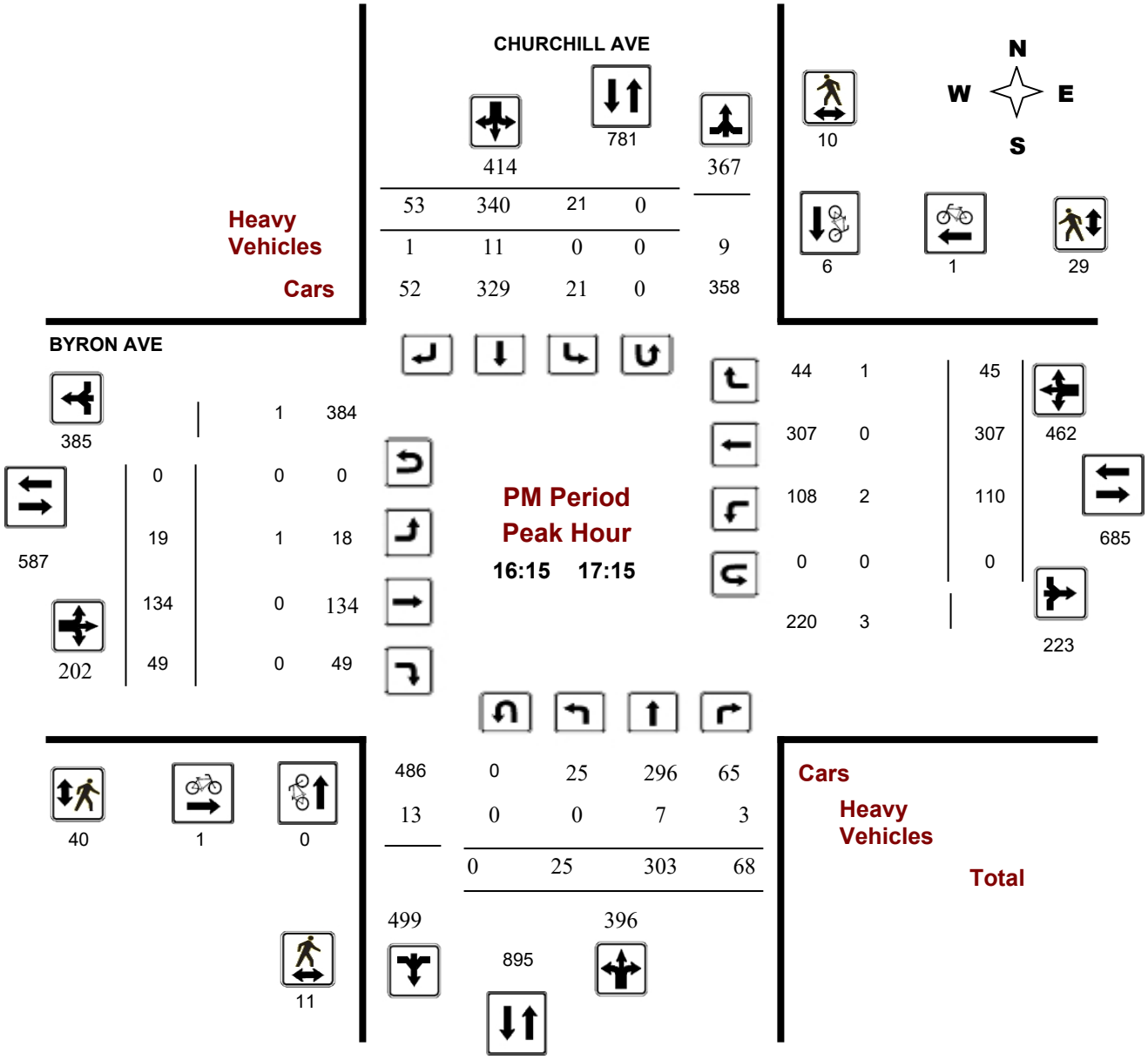
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

BYRON AVE @ CHURCHILL AVE

Survey Date: Thursday, January 23, 2020 **WO No:** 39387

Start Time: 07:00 **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									
	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	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**
Sub Total	183	2133	483	**2799**	218	2404	214	**2836**	**5635**	237	1023	395	**1655**	534	1326	350	**2210**	**3865**	**9500**
U Turns				**0**				**0**	**0**				**2**				**0**	**2**	**2**
Total	183	2133	483	**2799**	218	2404	214	**2836**	**5635**	237	1023	395	**1657**	534	1326	350	**2210**	**3867**	**9502**
EQ 12Hr	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.														**1.39**					
AVG 12Hr	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.														**1**					
AVG 24Hr	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

Time Period		CHURCHILL AVE			BYRON AVE			
		Northbound	Southbound	Street Total	Eastbound	Westbound	Street Total	Grand 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**
Total	125	107	**232**	282	206	**488**	**720**

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		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	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

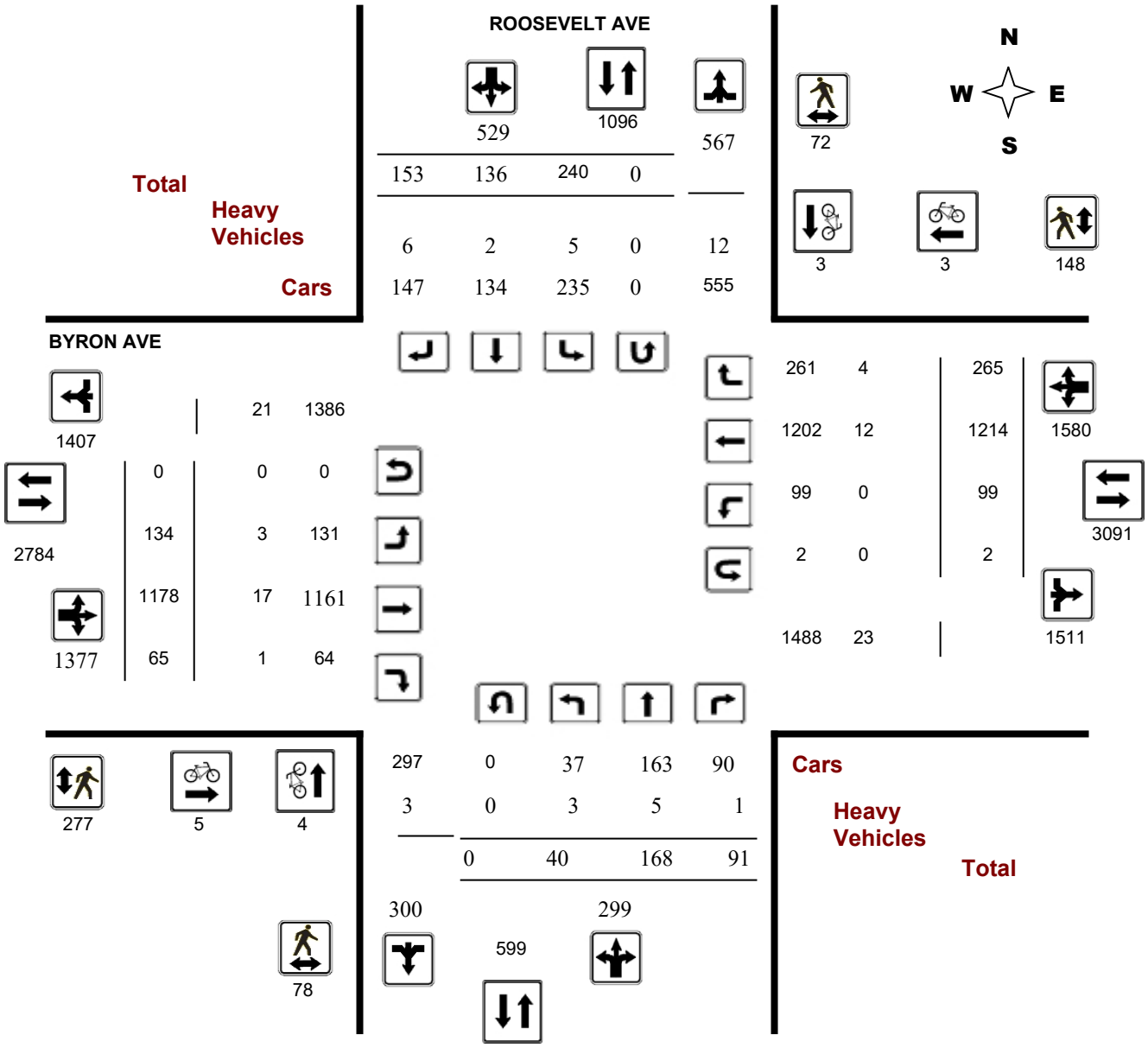
Transportation Services - Traffic Services

Turning Movement Count - Study Results

BYRON AVE @ ROOSEVELT AVE

Survey Date: Wednesday, February 27, 2019
Start Time: 07:00
WO No: 38395
Device: Miovision

Full Study Diagram



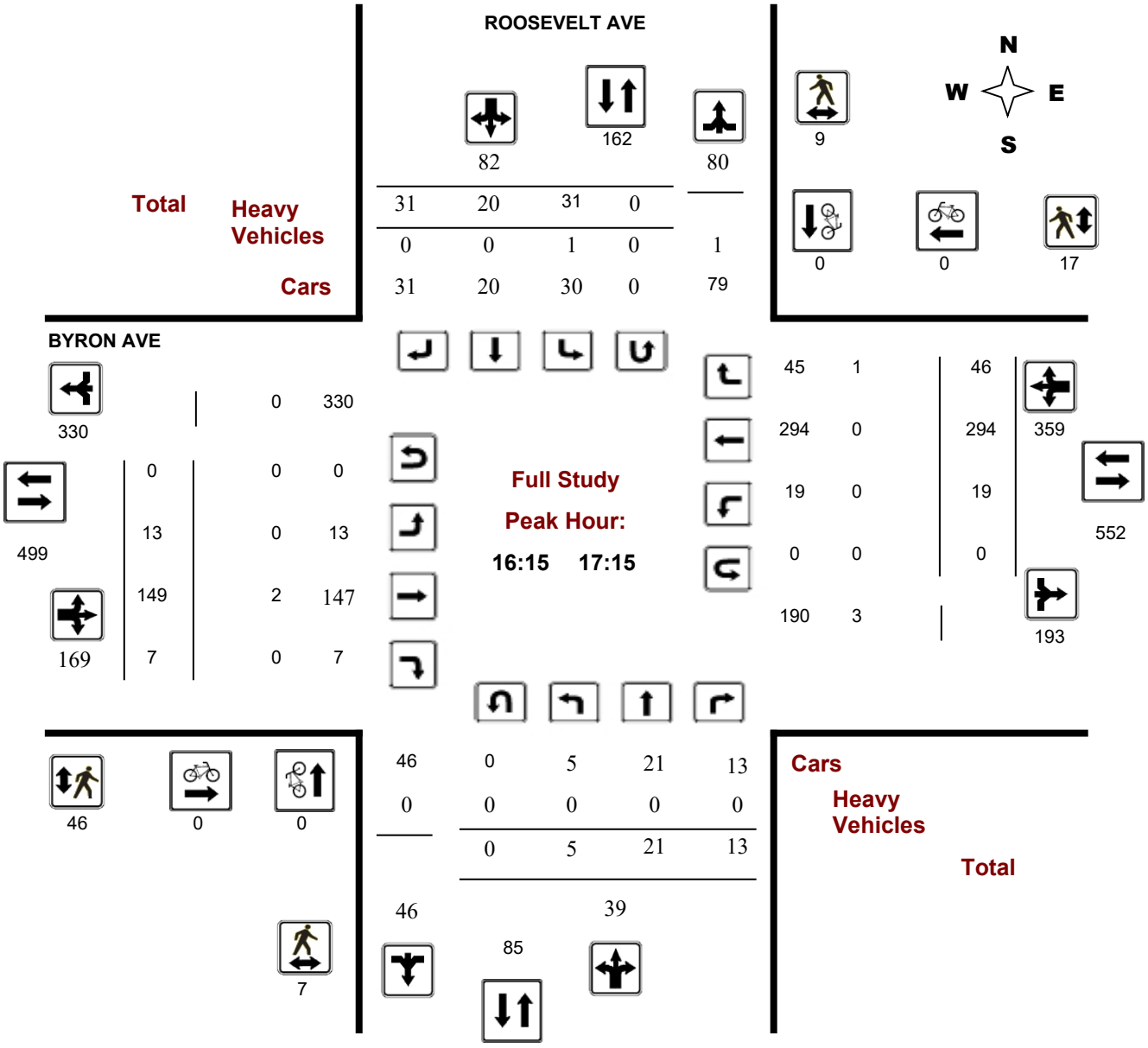
Transportation Services - Traffic Services

Turning Movement Count - Study Results

BYRON AVE @ ROOSEVELT AVE

Survey Date: Wednesday, February 27, 2019
Start Time: 07:00
WO No: 38395
Device: Miovision

Full Study Peak Hour Diagram



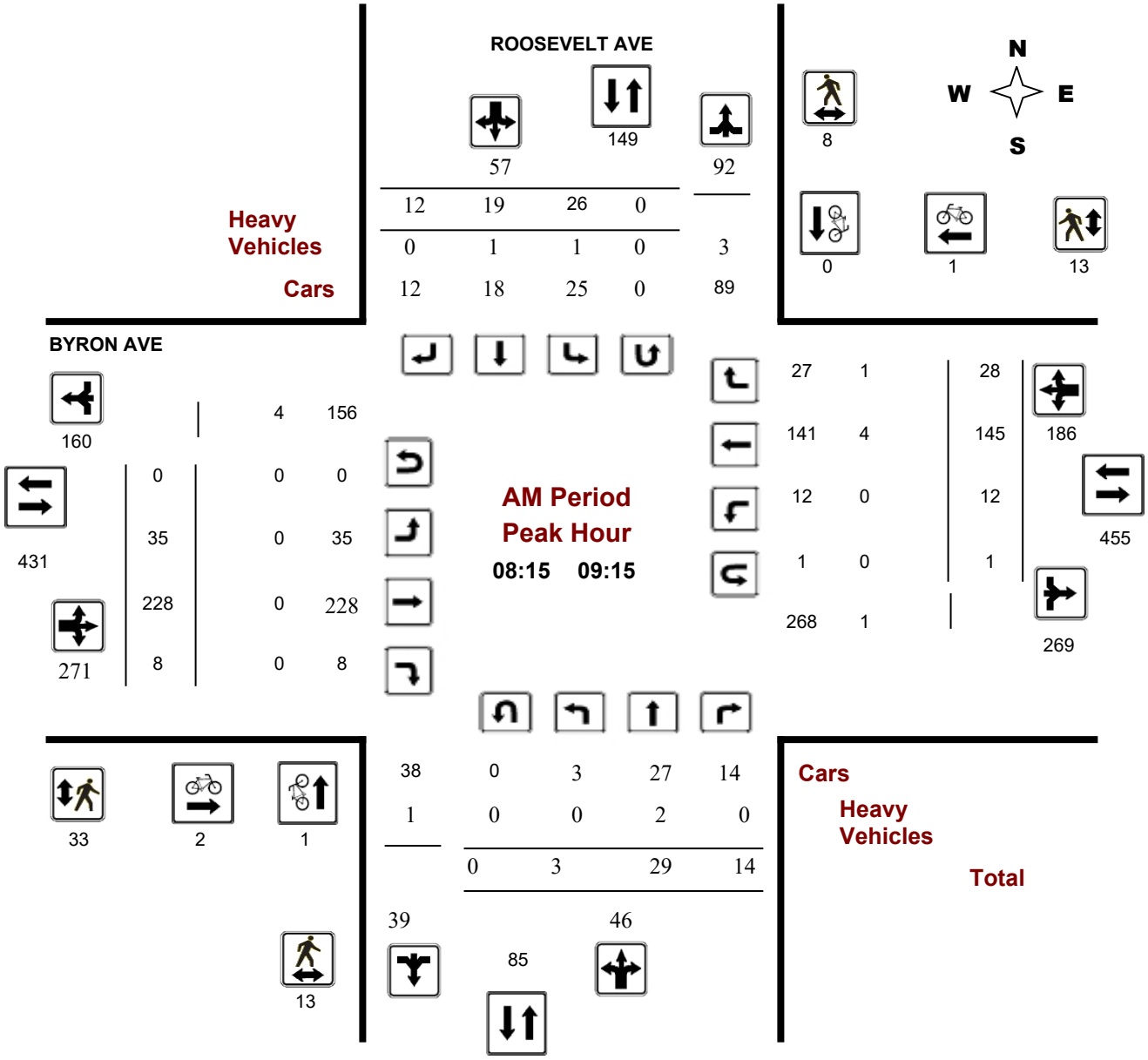
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

BYRON AVE @ ROOSEVELT AVE

Survey Date: Wednesday, February 27, 2019 **WO No:** 38395

Start Time: 07:00 **Device:** Miovision



Comments

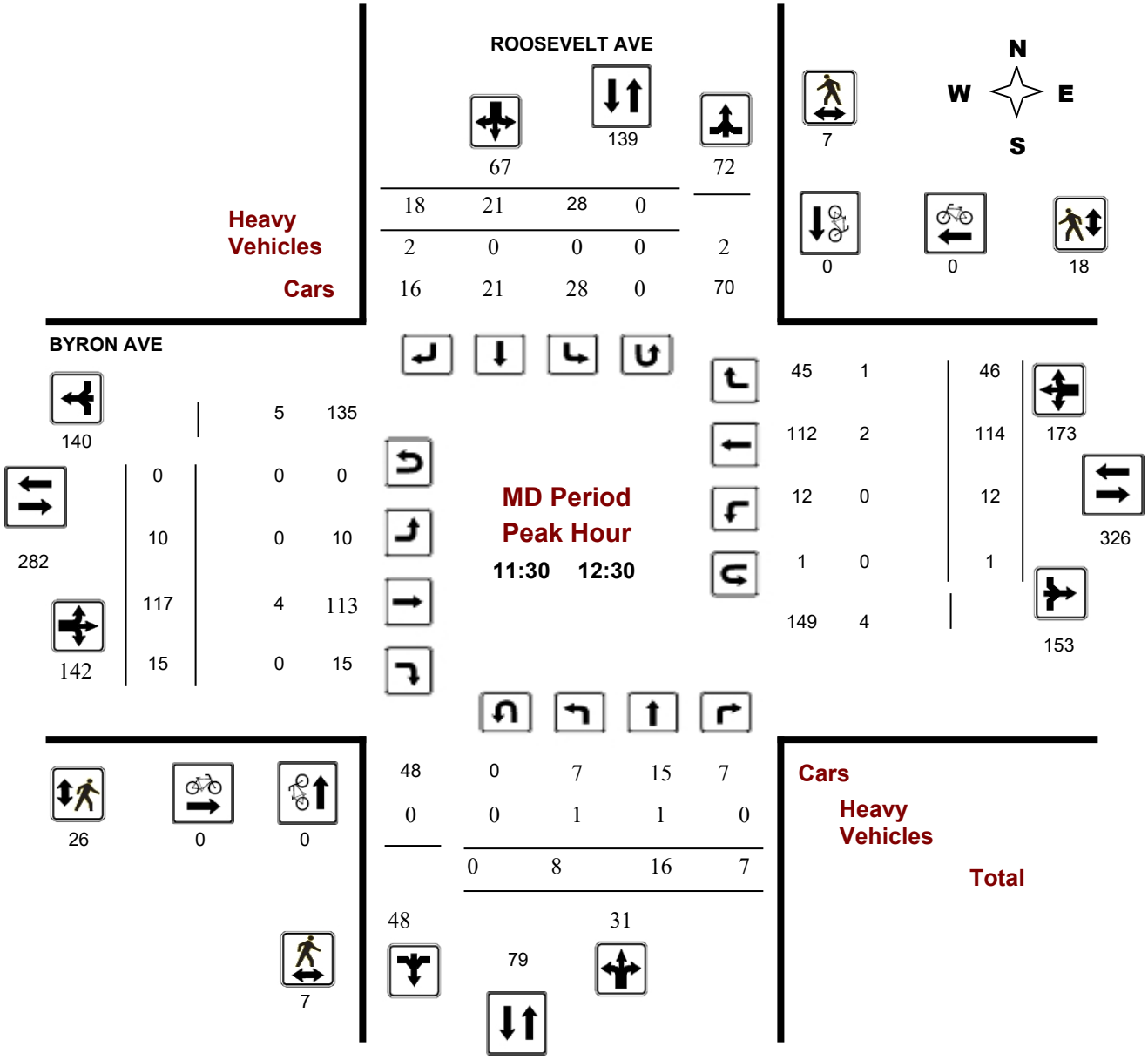
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

BYRON AVE @ ROOSEVELT AVE

Survey Date: Wednesday, February 27, 2019 **WO No:** 38395

Start Time: 07:00 **Device:** Miovision



Comments

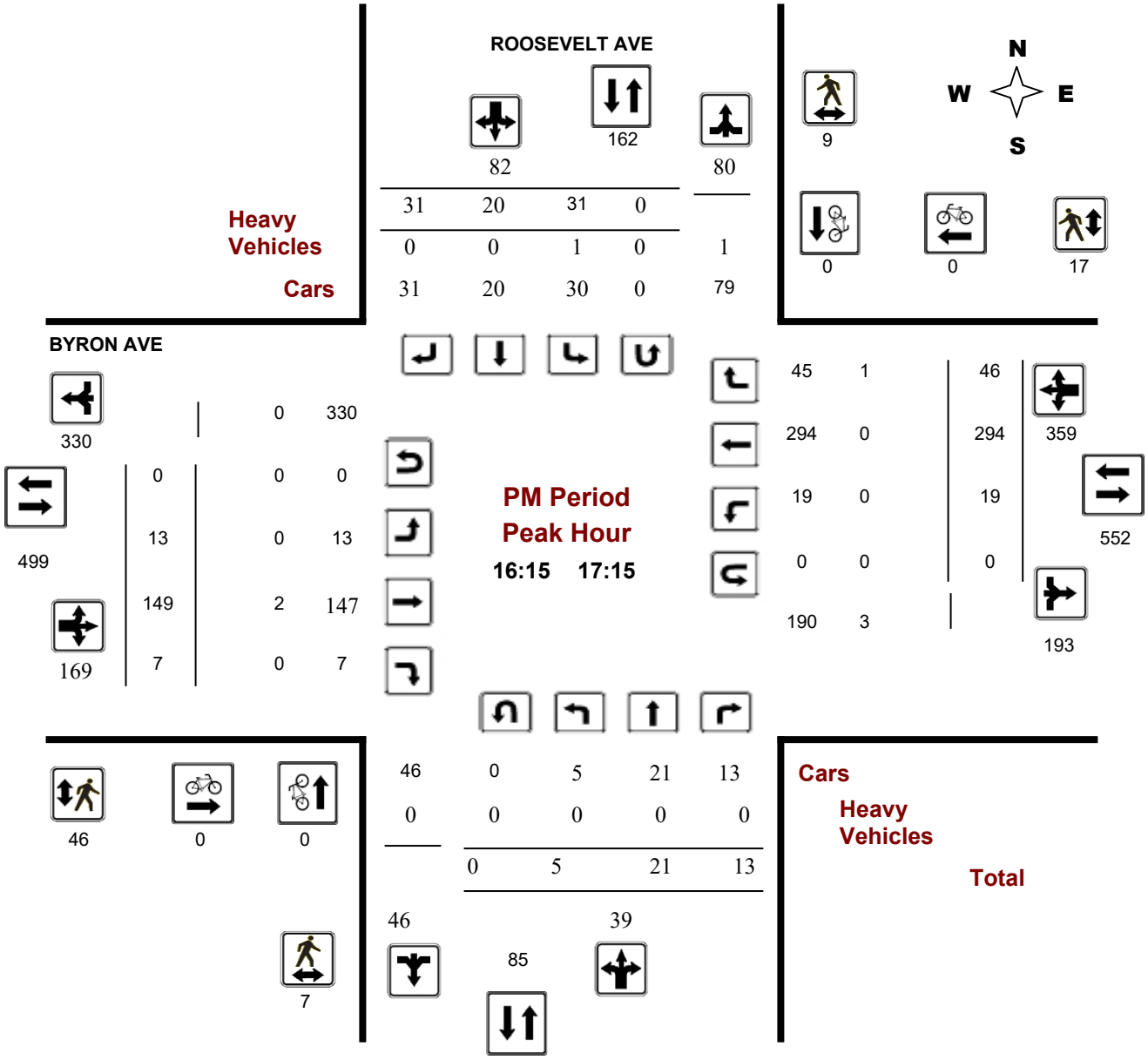
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

BYRON AVE @ ROOSEVELT AVE

Survey Date: Wednesday, February 27, 2019 **WO No:** 38395

Start Time: 07:00 **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

Time Period		ROOSEVELT AVE			BYRON AVE			
		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**
Total	78	72	**150**	277	148	**425**	**575**

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

Time Period		ROOSEVELT AVE Northbound U-Turn Total	ROOSEVELT AVE Southbound U-Turn Total	BYRON AVE Eastbound U-Turn Total	BYRON AVE 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

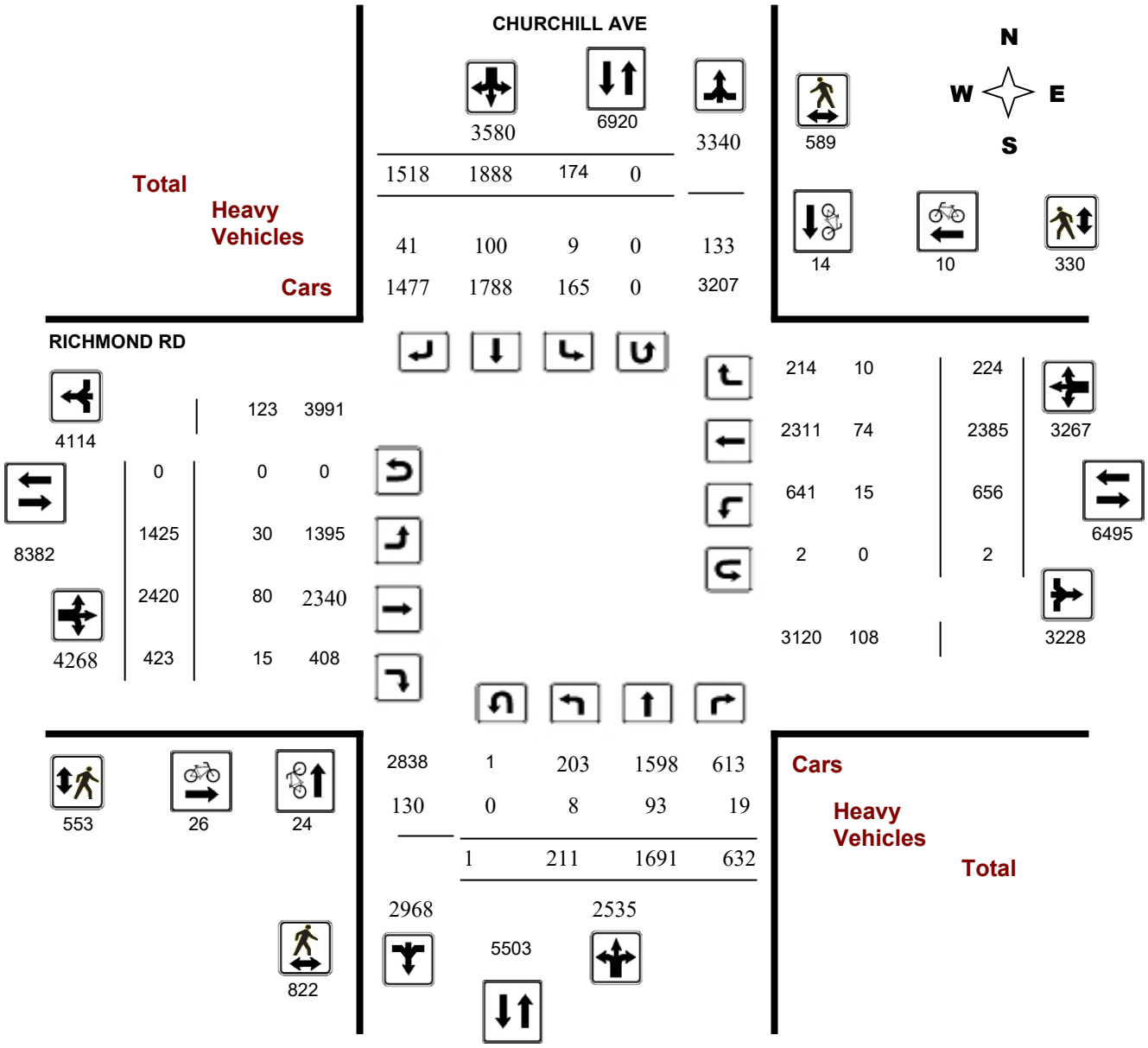
Transportation Services - Traffic Services

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



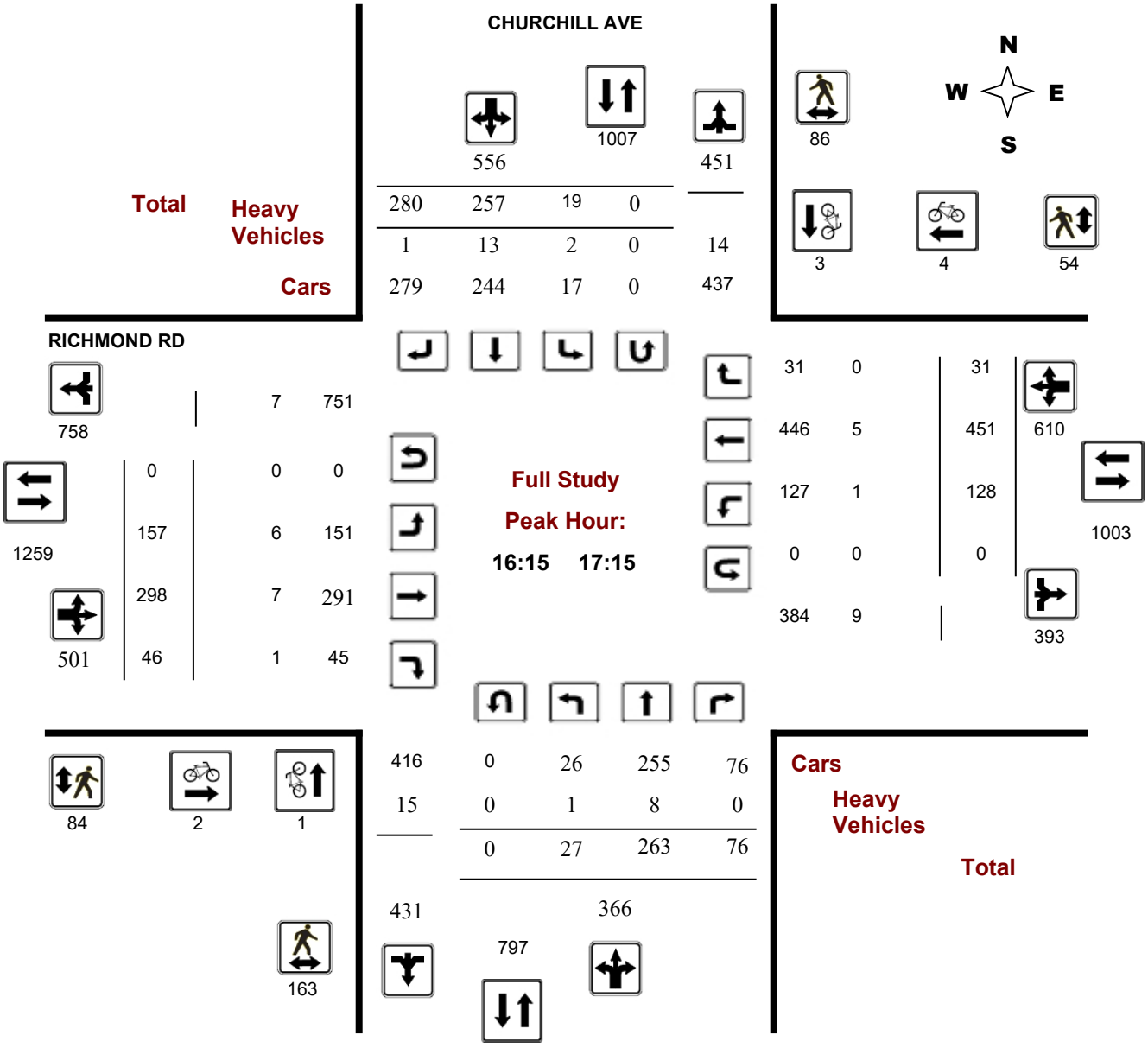
Transportation Services - Traffic Services

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

Northbound: 1 Southbound: 0

Eastbound: 0 Westbound: 2

AADT Factor

1.00

	CHURCHILL AVE								RICHMOND RD									
	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	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**
Sub Total	211	1691	632	**2534**	174	1888	1518	**3580**	**6114**	1425	2420	423	**4268**	656	2385	224	**3265**	**7533**	**13647**
U Turns				**1**				**0**	**1**				**0**				**2**	**2**	**3**
Total	211	1691	632	**2535**	174	1888	1518	**3580**	**6115**	1425	2420	423	**4268**	656	2385	224	**3267**	**7535**	**13650**
EQ 12Hr	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**					
AVG 12Hr	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**					
AVG 24Hr	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.

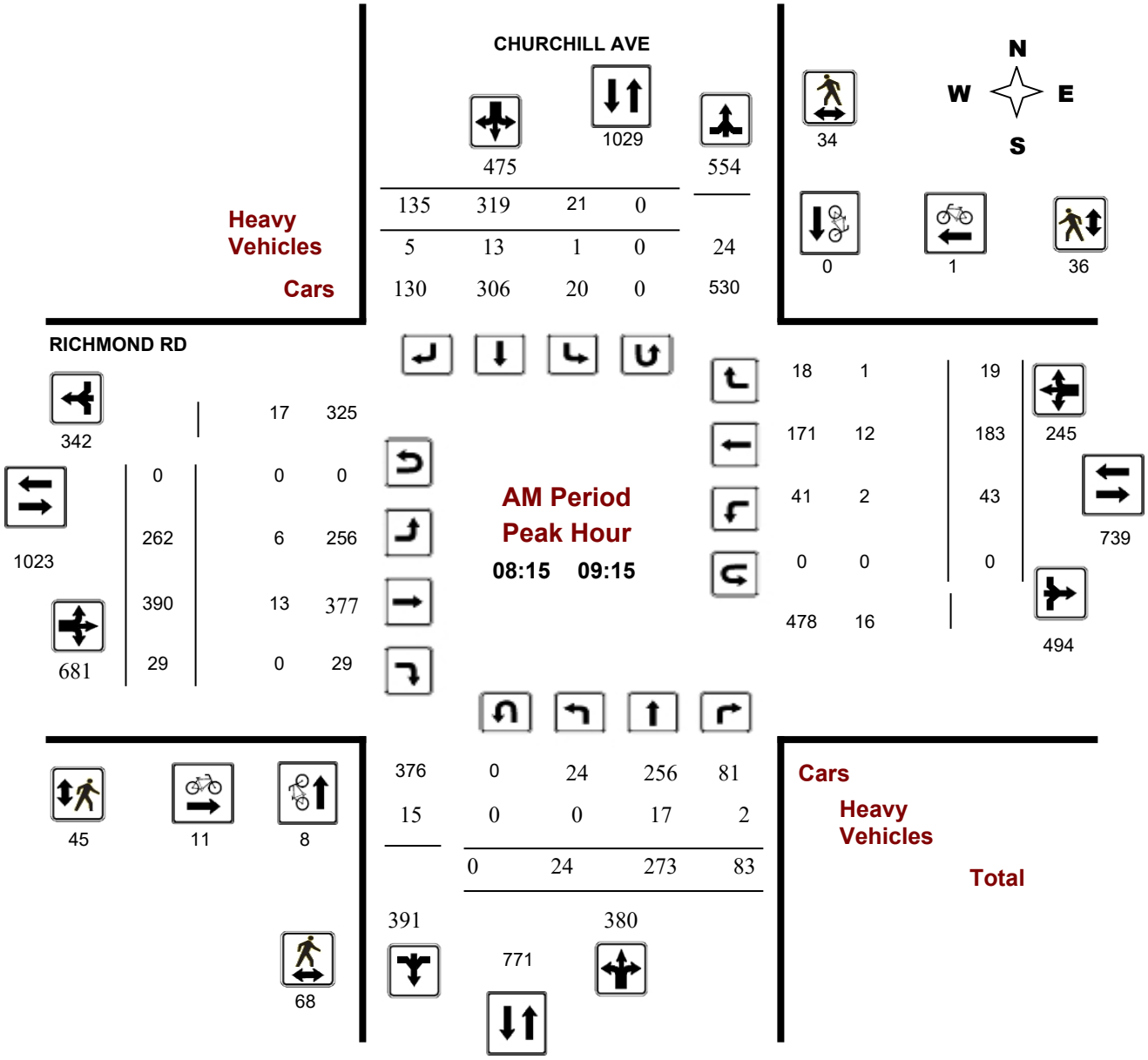
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

CHURCHILL AVE @ RICHMOND RD

Survey Date: Thursday, January 23, 2020 **WO No:** 39644

Start Time: 07:00 **Device:** Miovision



Comments

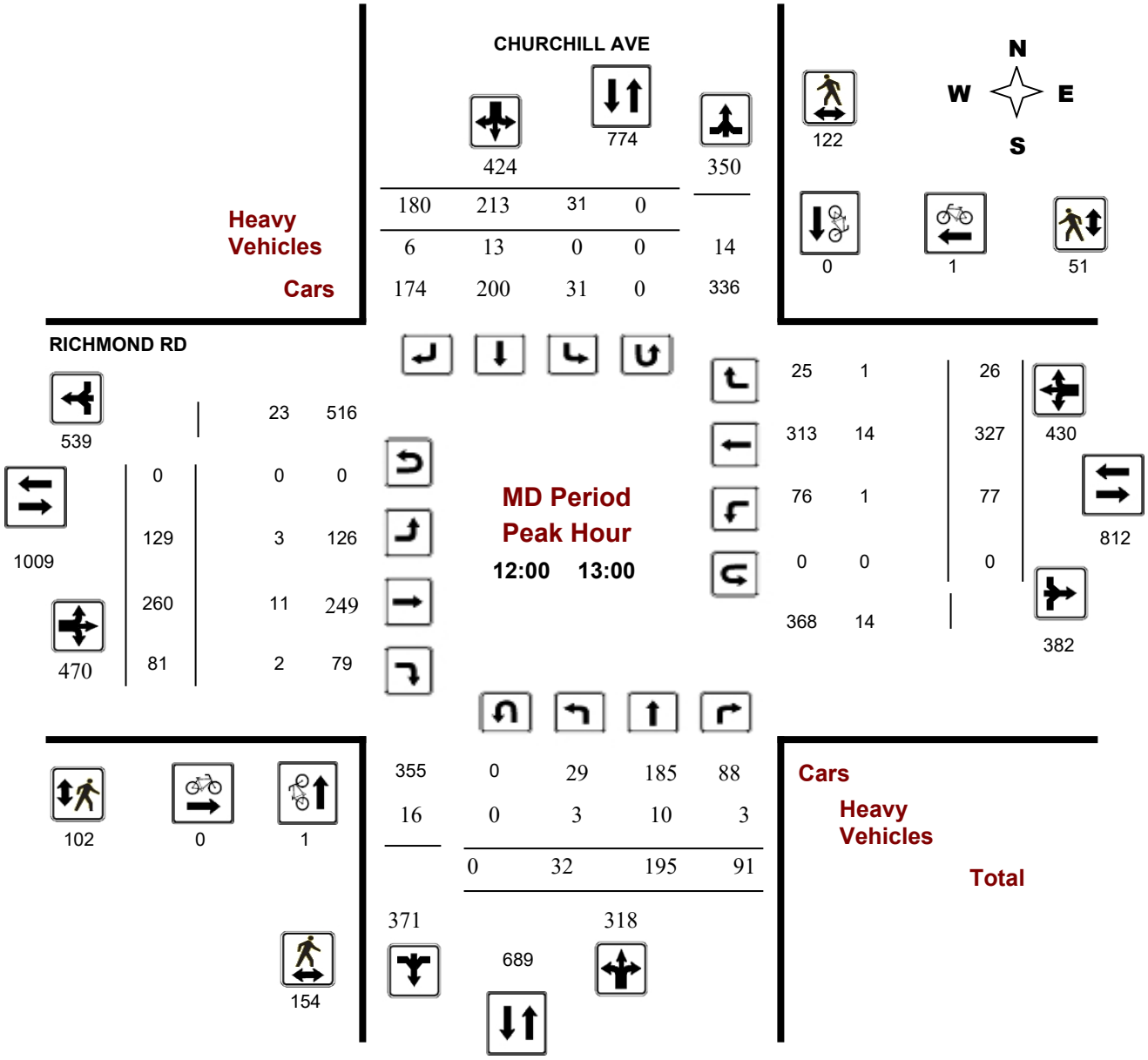
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

CHURCHILL AVE @ RICHMOND RD

Survey Date: Thursday, January 23, 2020 **WO No:** 39644

Start Time: 07:00 **Device:** Miovision



Comments

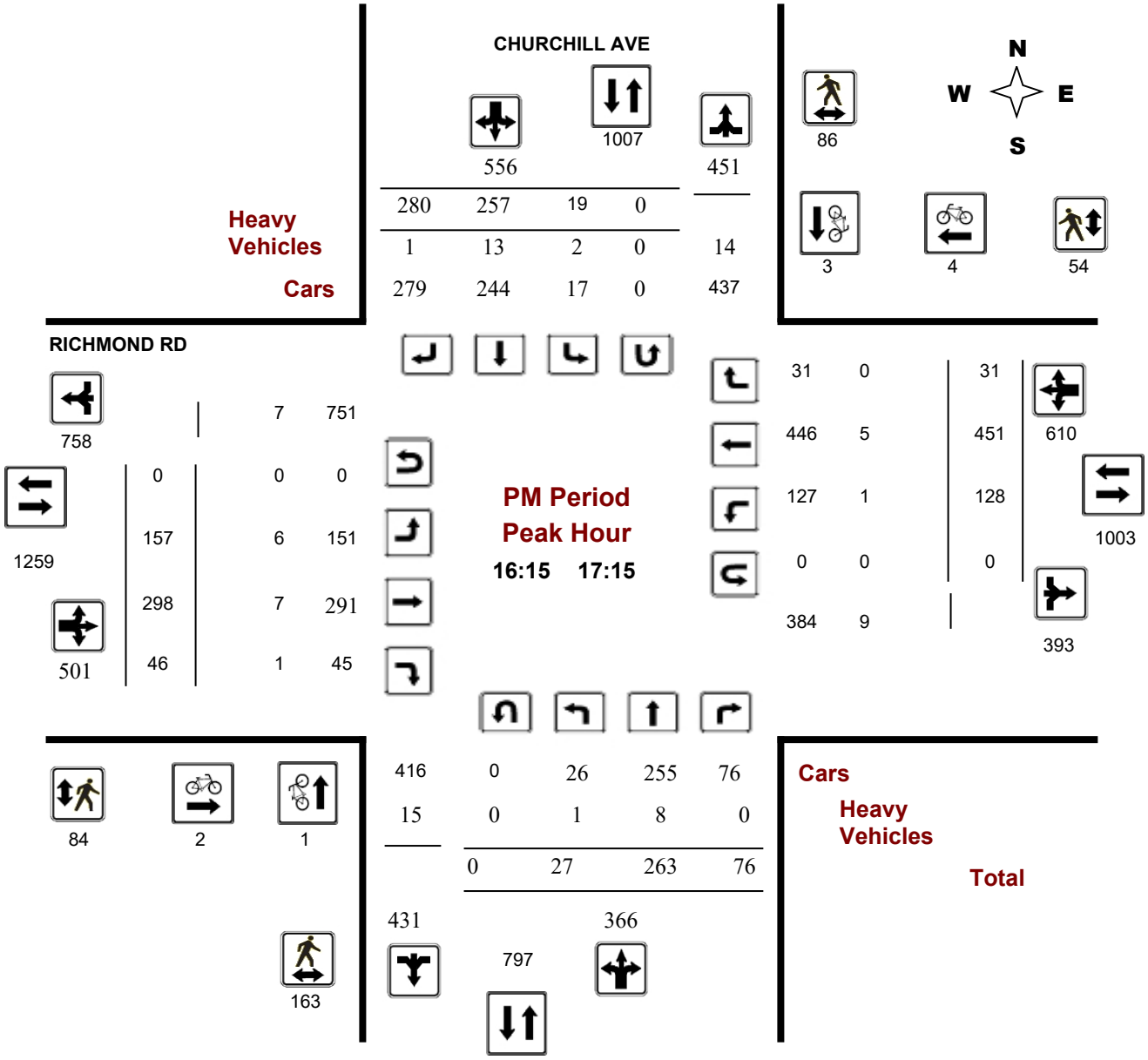
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

CHURCHILL AVE @ RICHMOND RD

Survey Date: Thursday, January 23, 2020 **WO No:** 39644

Start Time: 07:00 **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

Time Period		CHURCHILL AVE			RICHMOND RD			
		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	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**
Total	822	589	**1411**	553	330	**883**	**2294**

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		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	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:	None	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

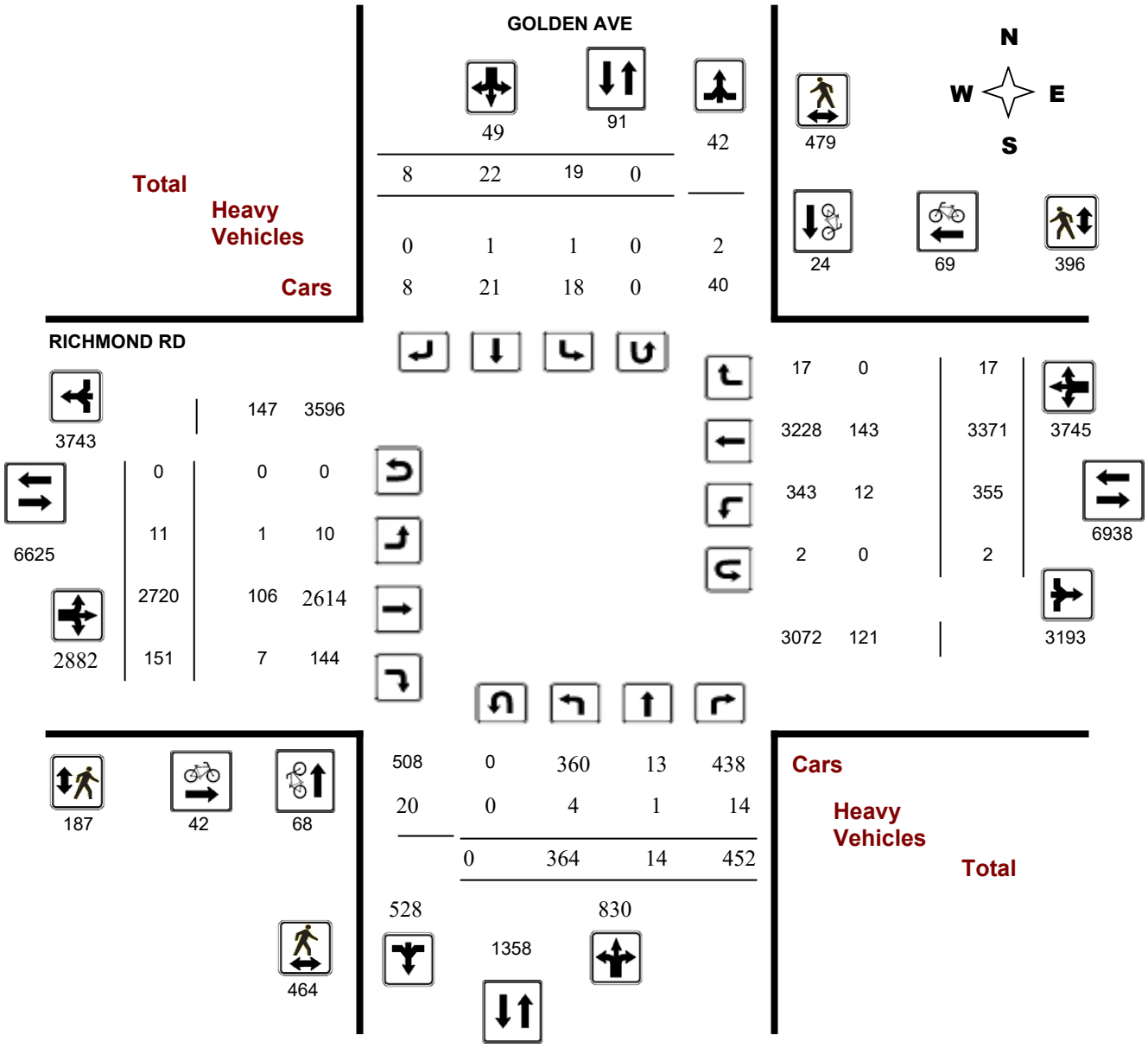
Transportation Services - Traffic Services

Turning Movement Count - Study Results

GOLDEN AVE @ RICHMOND RD

Survey Date: Thursday, October 24, 2019
Start Time: 07:00
WO No: 38905
Device: Miovision

Full Study Diagram



Transportation Services - Traffic Services

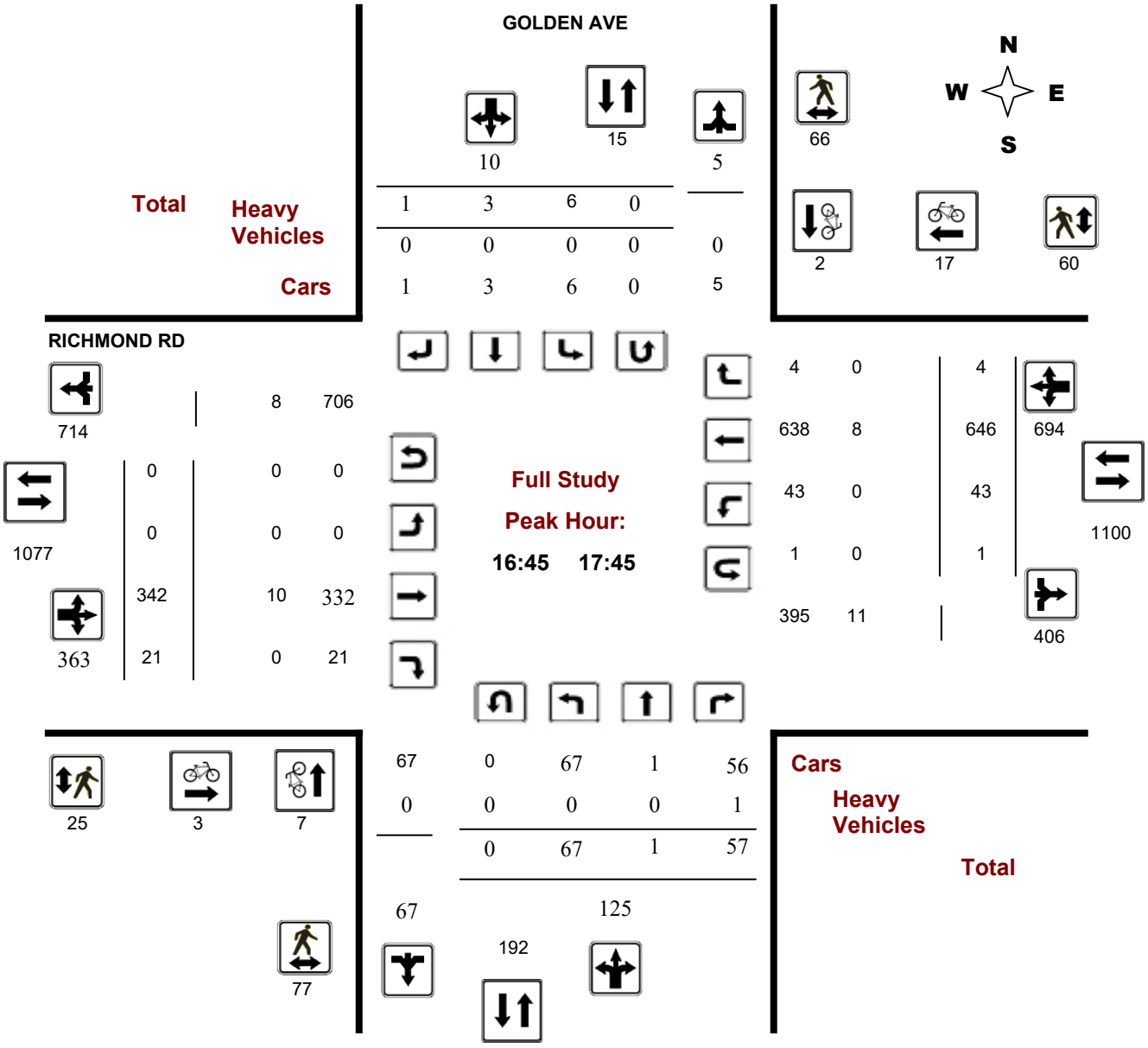
Turning Movement Count - Study Results

GOLDEN AVE @ RICHMOND RD

Survey Date: Thursday, October 24, 2019 **WO No:** 38905

Start Time: 07:00 **Device:** Miovision

Full Study Peak Hour Diagram



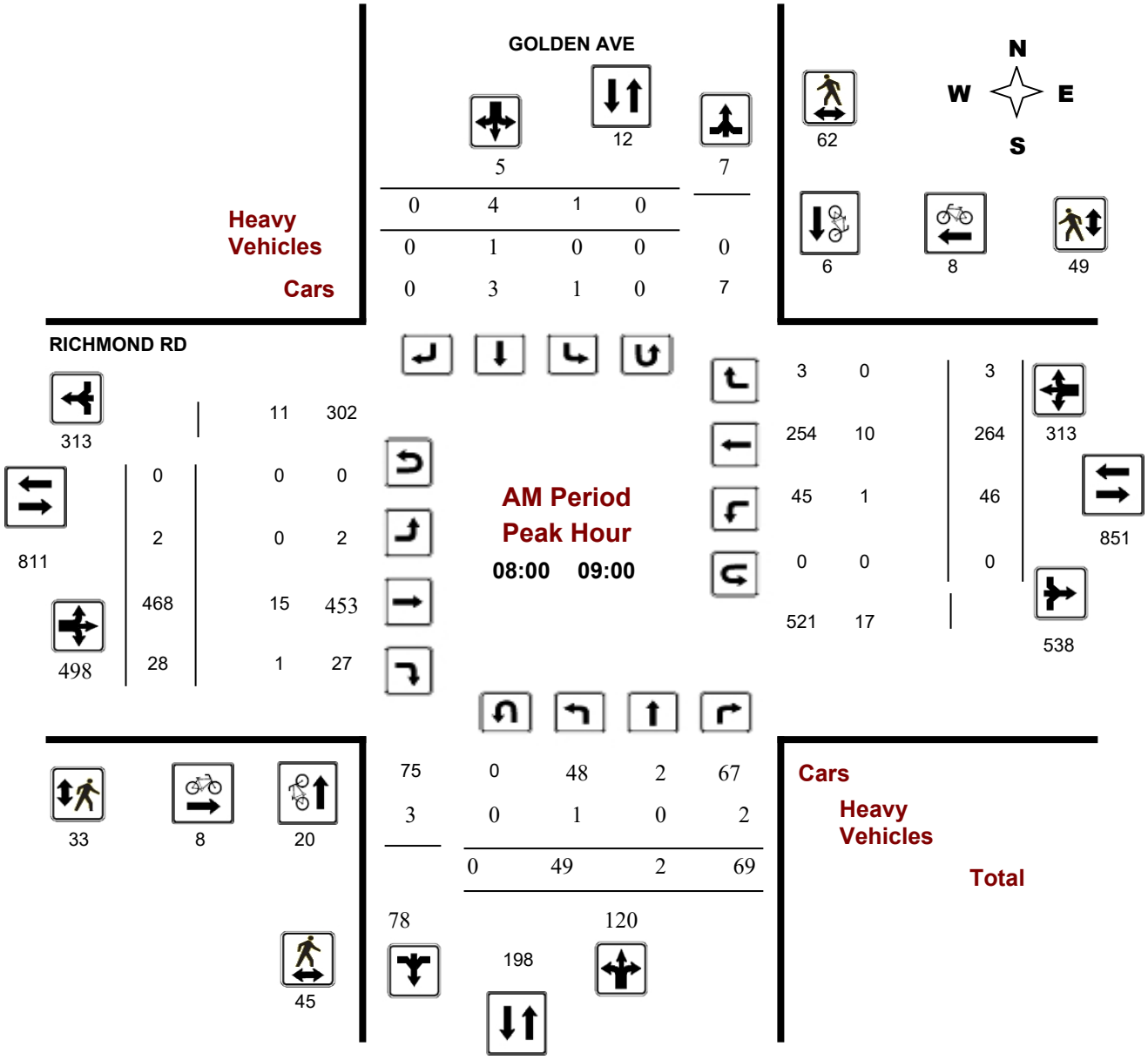
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

GOLDEN AVE @ RICHMOND RD

Survey Date: Thursday, October 24, 2019 **WO No:** 38905

Start Time: 07:00 **Device:** Miovision



Comments

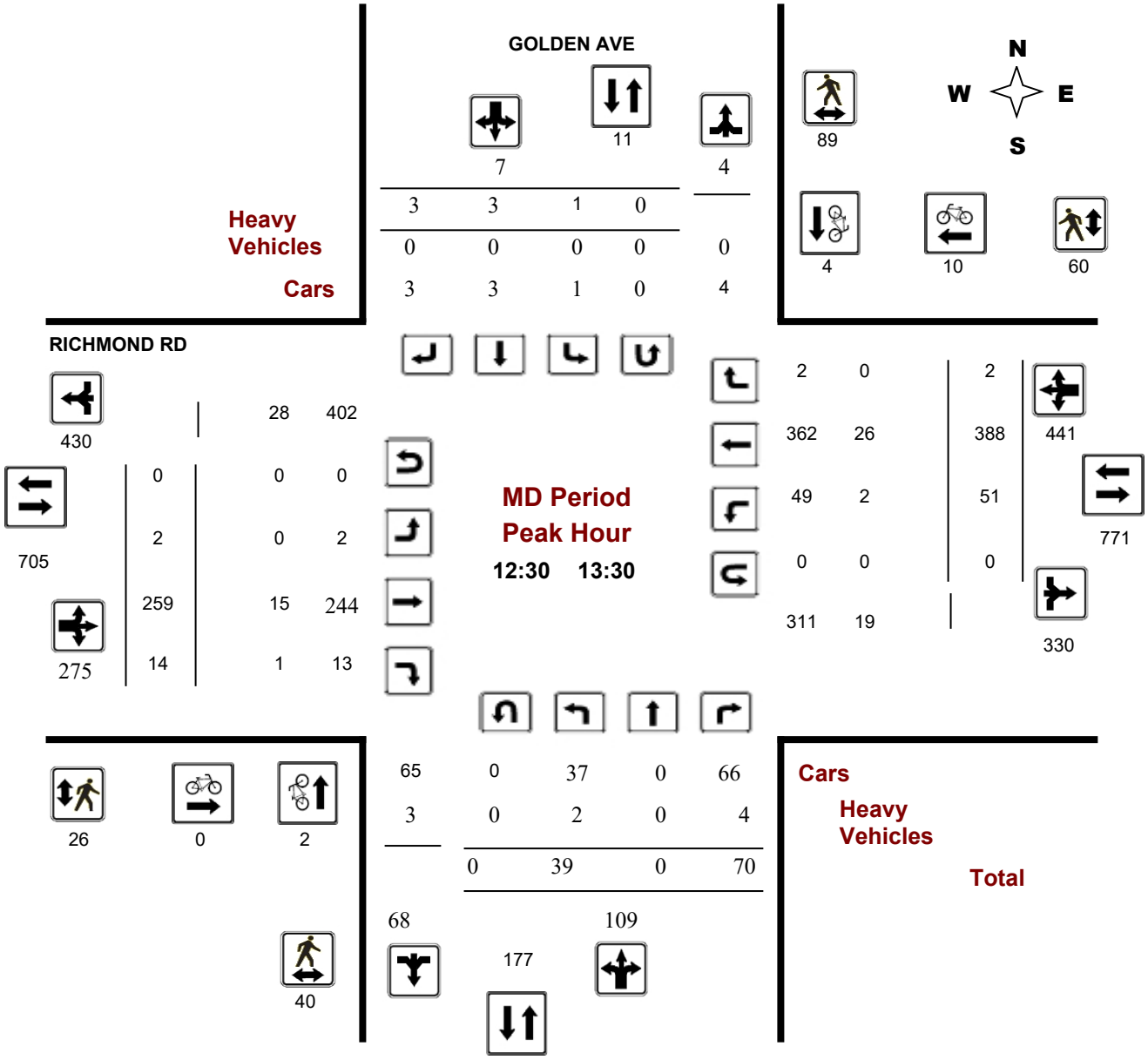
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

GOLDEN AVE @ RICHMOND RD

Survey Date: Thursday, October 24, 2019 **WO No:** 38905

Start Time: 07:00 **Device:** Miovision



Comments

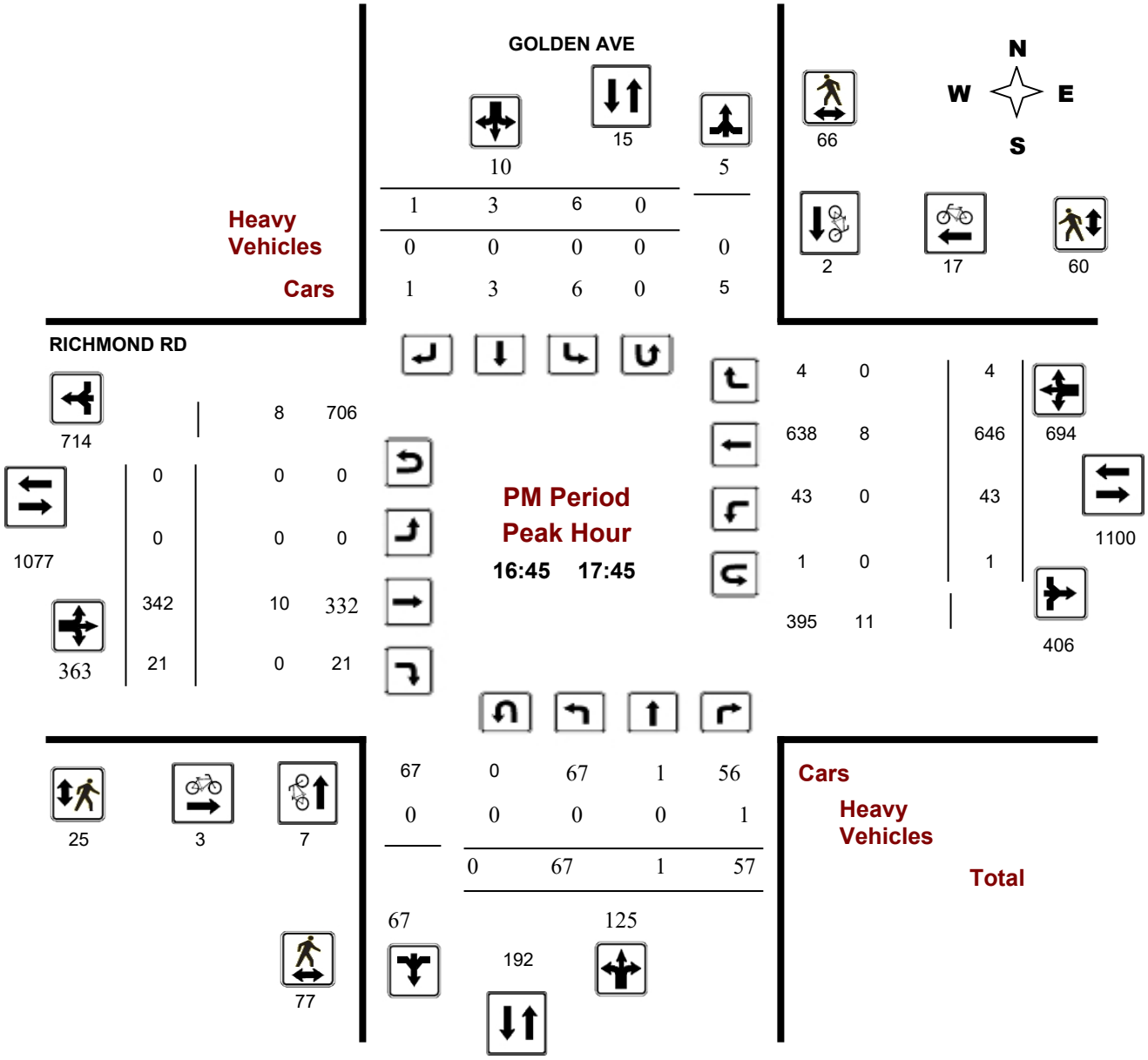
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

GOLDEN AVE @ RICHMOND RD

Survey Date: Thursday, October 24, 2019 **WO No:** 38905

Start Time: 07:00 **Device:** Miovision



Comments

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

Northbound: 0 Southbound: 0

Eastbound: 0 Westbound: 2

AADT Factor

.90

	GOLDEN AVE								RICHMOND RD									
	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	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**
Sub Total	364	14	452	**830**	19	22	8	**49**	**879**	11	2720	151	**2882**	355	3371	17	**3743**	**6625**	**7504**
U Turns				**0**				**0**	**0**				**0**				**2**	**2**	**2**
Total	364	14	452	**830**	19	22	8	**49**	**879**	11	2720	151	**2882**	355	3371	17	**3745**	**6627**	**7506**
EQ 12Hr	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.														**1.39**					
AVG 12Hr	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.														**0.9**					
AVG 24Hr	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

Time Period		GOLDEN AVE			RICHMOND RD			
		Northbound	Southbound	Street Total	Eastbound	Westbound	Street Total	Grand 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**
Total	.....	464	479	**943**	187	396	**583**	**1526**

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

Time Period		GOLDEN AVE Northbound U-Turn Total	GOLDEN AVE Southbound U-Turn Total	RICHMOND RD Eastbound U-Turn Total	RICHMOND RD 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

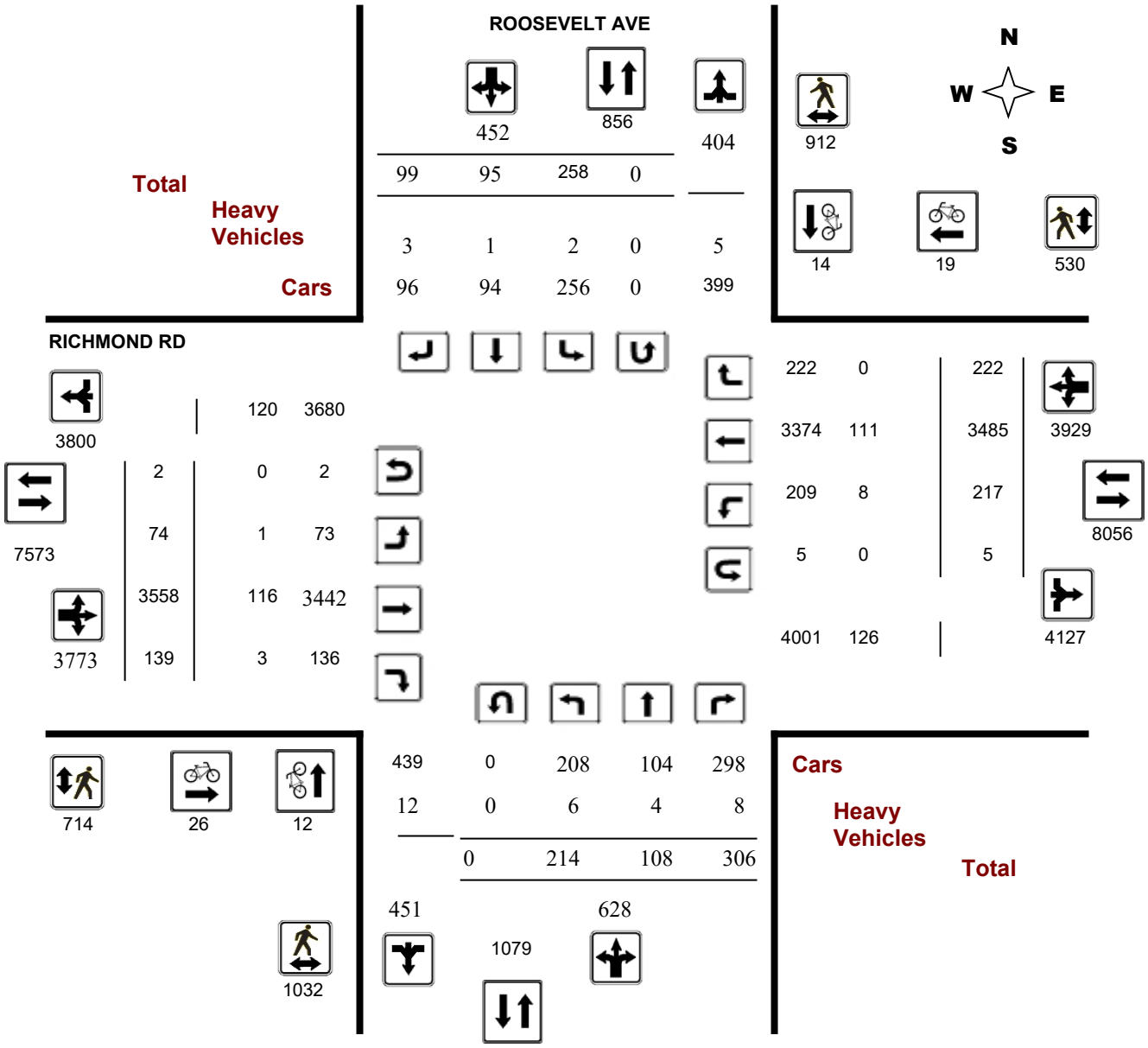
Transportation Services - Traffic Services

Turning Movement Count - Study Results

ROOSEVELT AVE @ RICHMOND RD

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

Transportation Services - Traffic Services

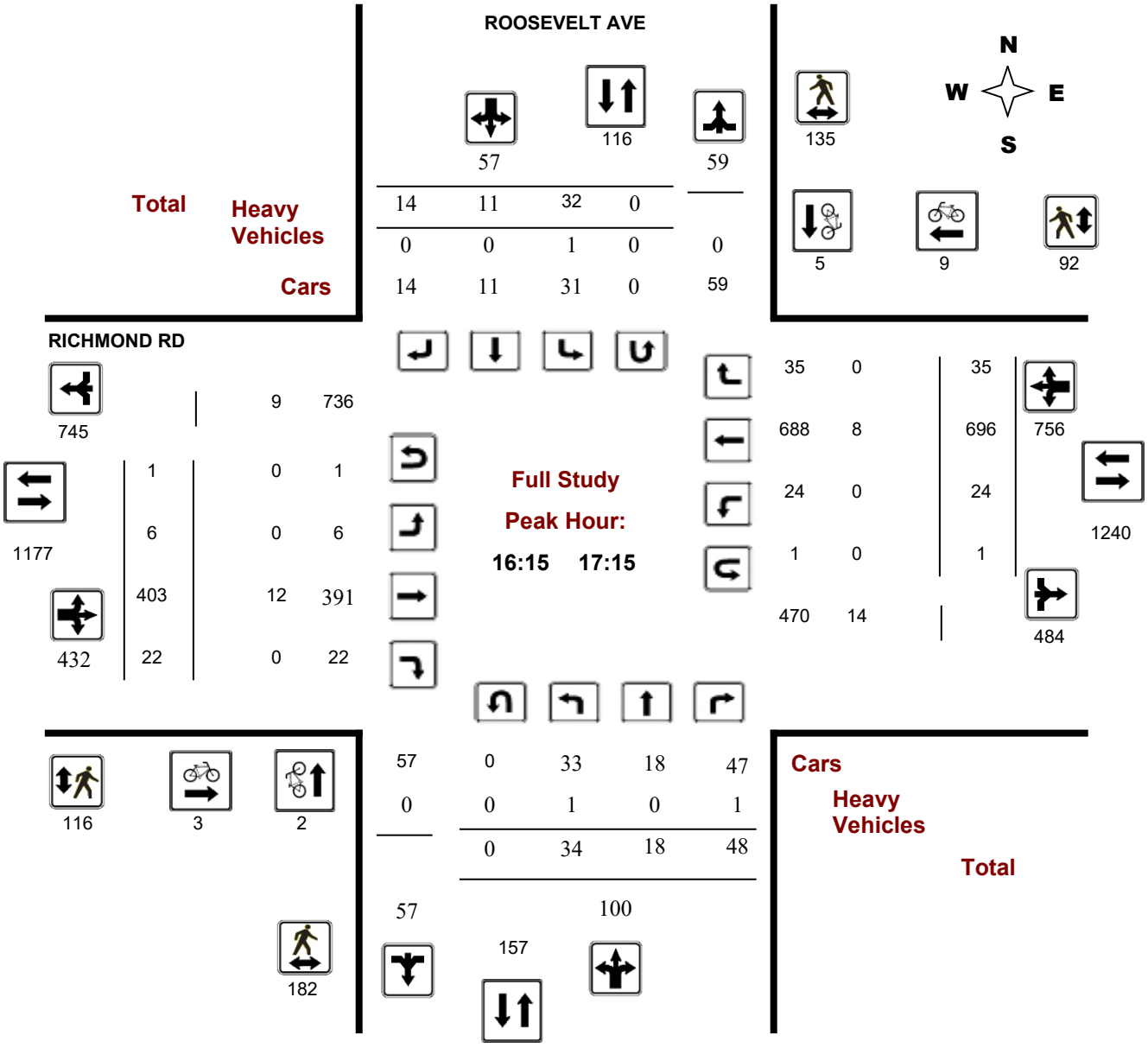
Turning Movement Count - Study Results

ROOSEVELT AVE @ RICHMOND RD

Survey Date: Thursday, January 23, 2020 **WO No:** 39385

Start Time: 07:00 **Device:** Miovision

Full Study Peak Hour Diagram



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

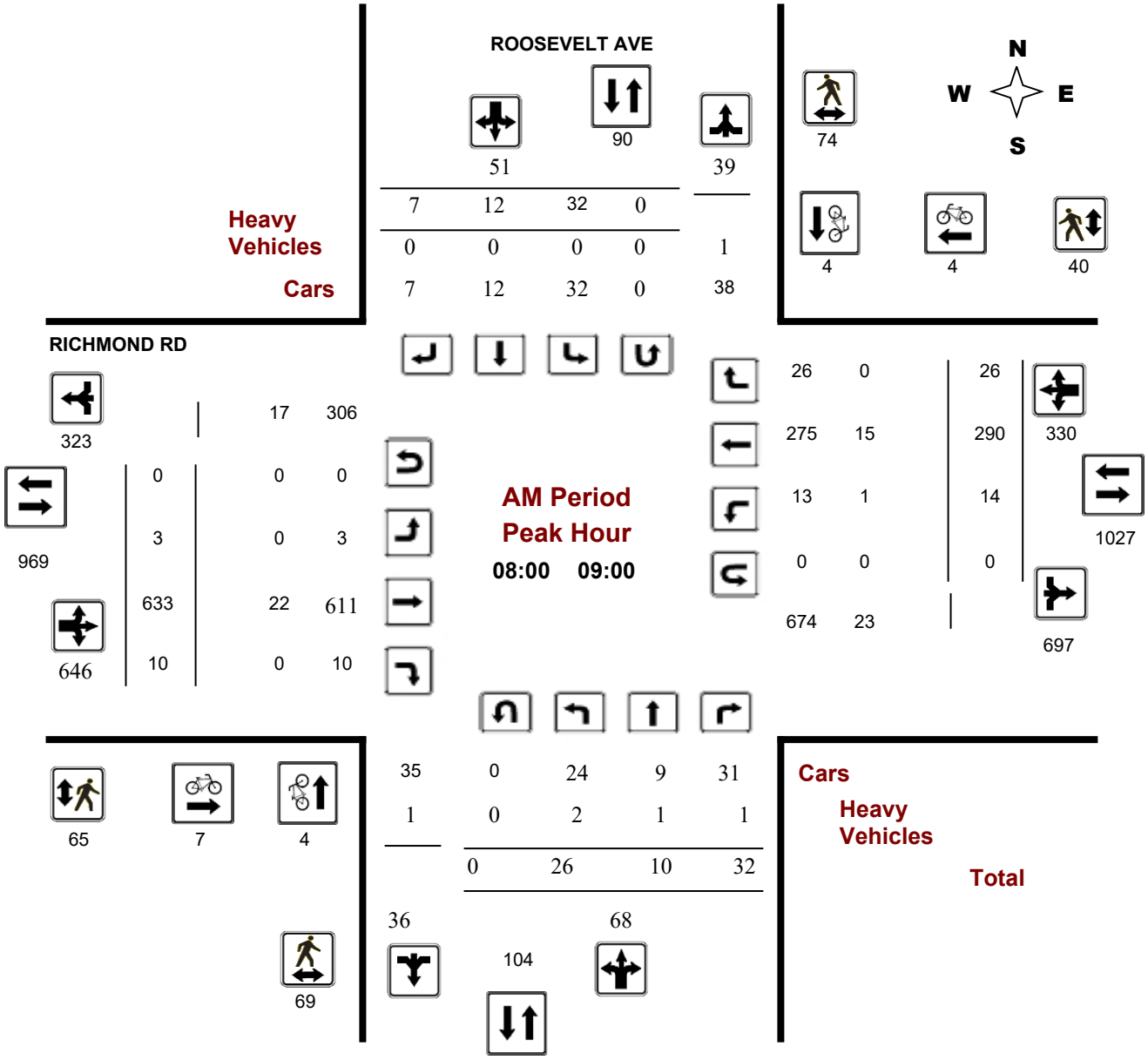
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

ROOSEVELT AVE @ RICHMOND RD

Survey Date: Thursday, January 23, 2020 **WO No:** 39385

Start Time: 07:00 **Device:** Miovision



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

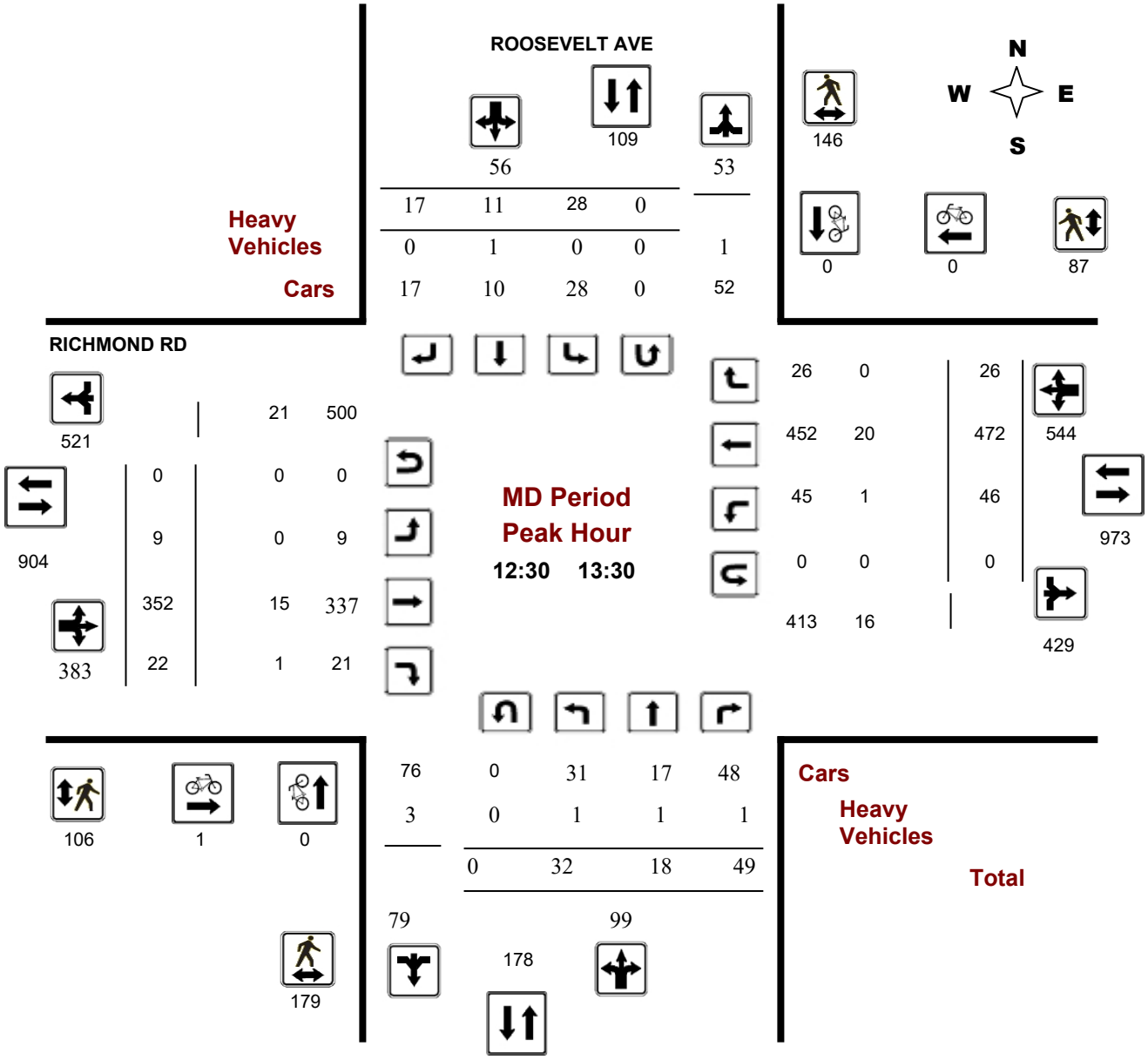
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

ROOSEVELT AVE @ RICHMOND RD

Survey Date: Thursday, January 23, 2020 **WO No:** 39385

Start Time: 07:00 **Device:** Miovision



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

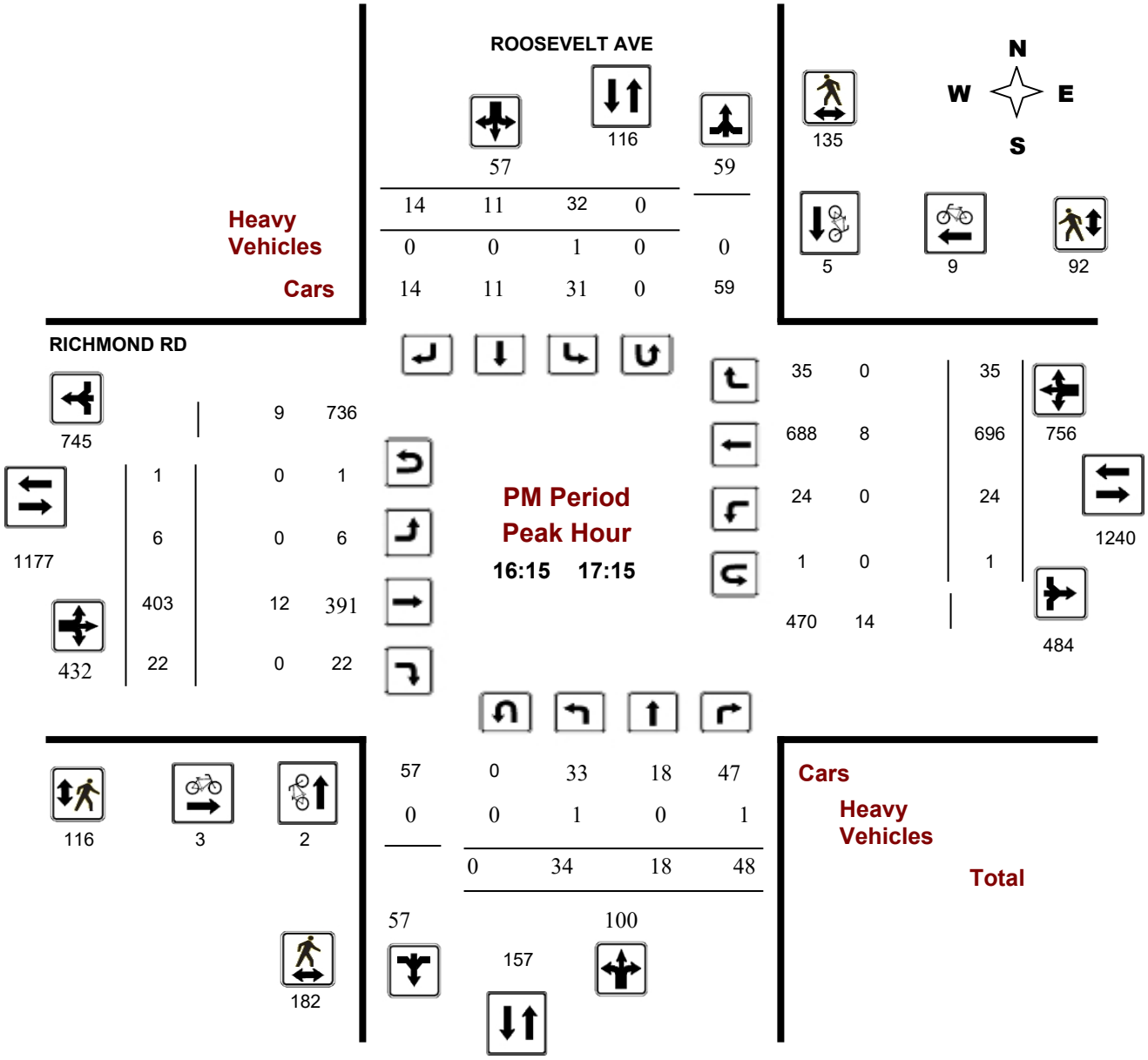
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

ROOSEVELT AVE @ RICHMOND RD

Survey Date: Thursday, January 23, 2020 **WO No:** 39385

Start Time: 07:00 **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									
	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	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**
Sub Total	214	108	306	**628**	258	95	99	**452**	**1080**	74	3558	139	**3771**	217	3485	222	**3924**	**7695**	**8775**
U Turns				**0**				**0**	**0**				**2**				**5**	**7**	**7**
Total	214	108	306	**628**	258	95	99	**452**	**1080**	74	3558	139	**3773**	217	3485	222	**3929**	**7702**	**8782**
EQ 12Hr	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**

AVG 12Hr	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**

AVG 24Hr	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

Time Period		ROOSEVELT AVE			RICHMOND RD			
		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**
Total	1032	912	**1944**	714	530	**1244**	**3188**

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**

Time Period		Northbound				Southbound					Eastbound				Westbound					
		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	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

Transportation Services - Traffic Services

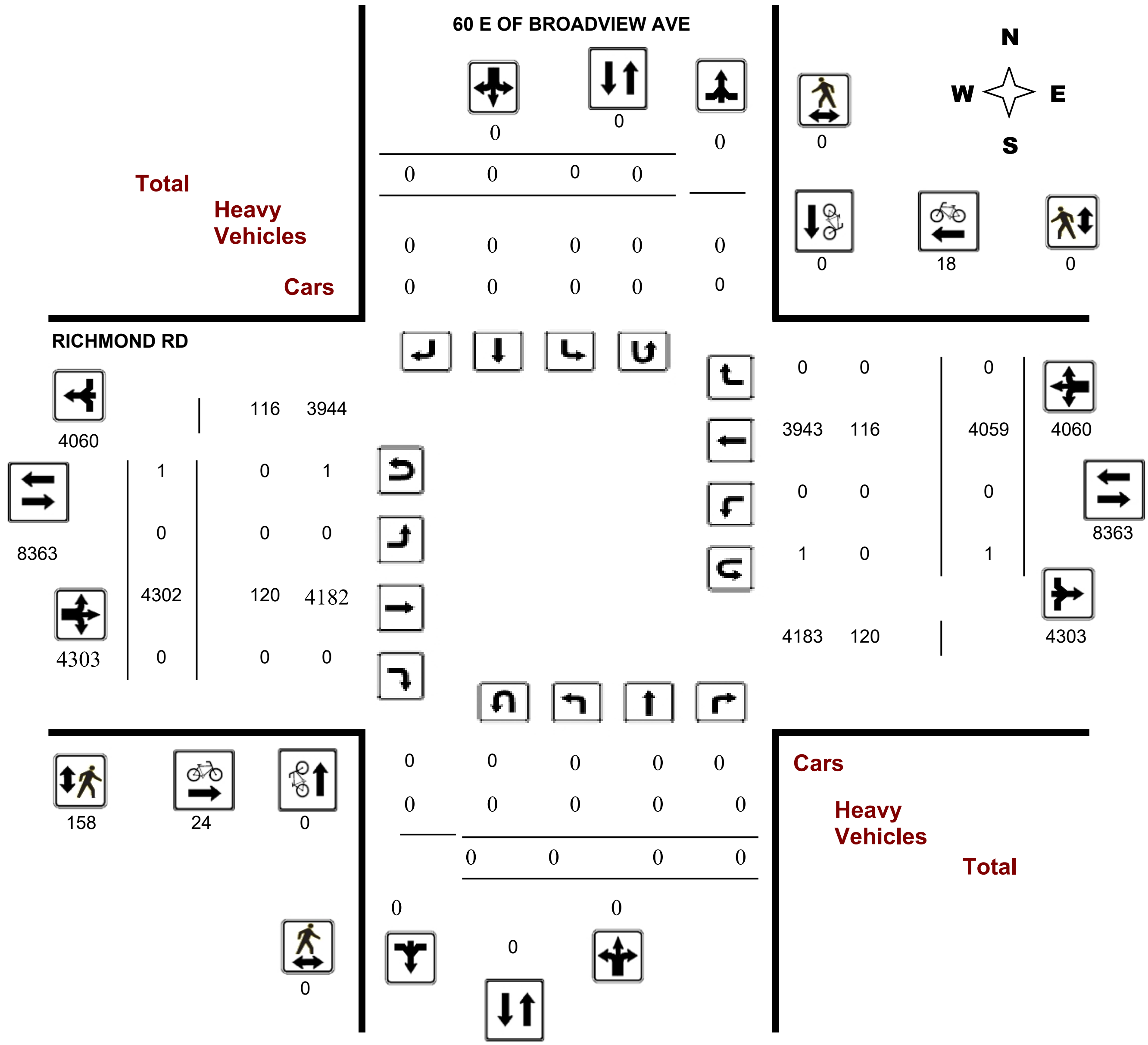
Turning Movement Count - Study Results

60 E OF BROADVIEW AVE @ RICHMOND RD

Survey Date: Wednesday, November 22, 2017 **WO No:** 37469

Start Time: 07:00 **Device:** Miovision

Full Study Diagram



Transportation Services - Traffic Services

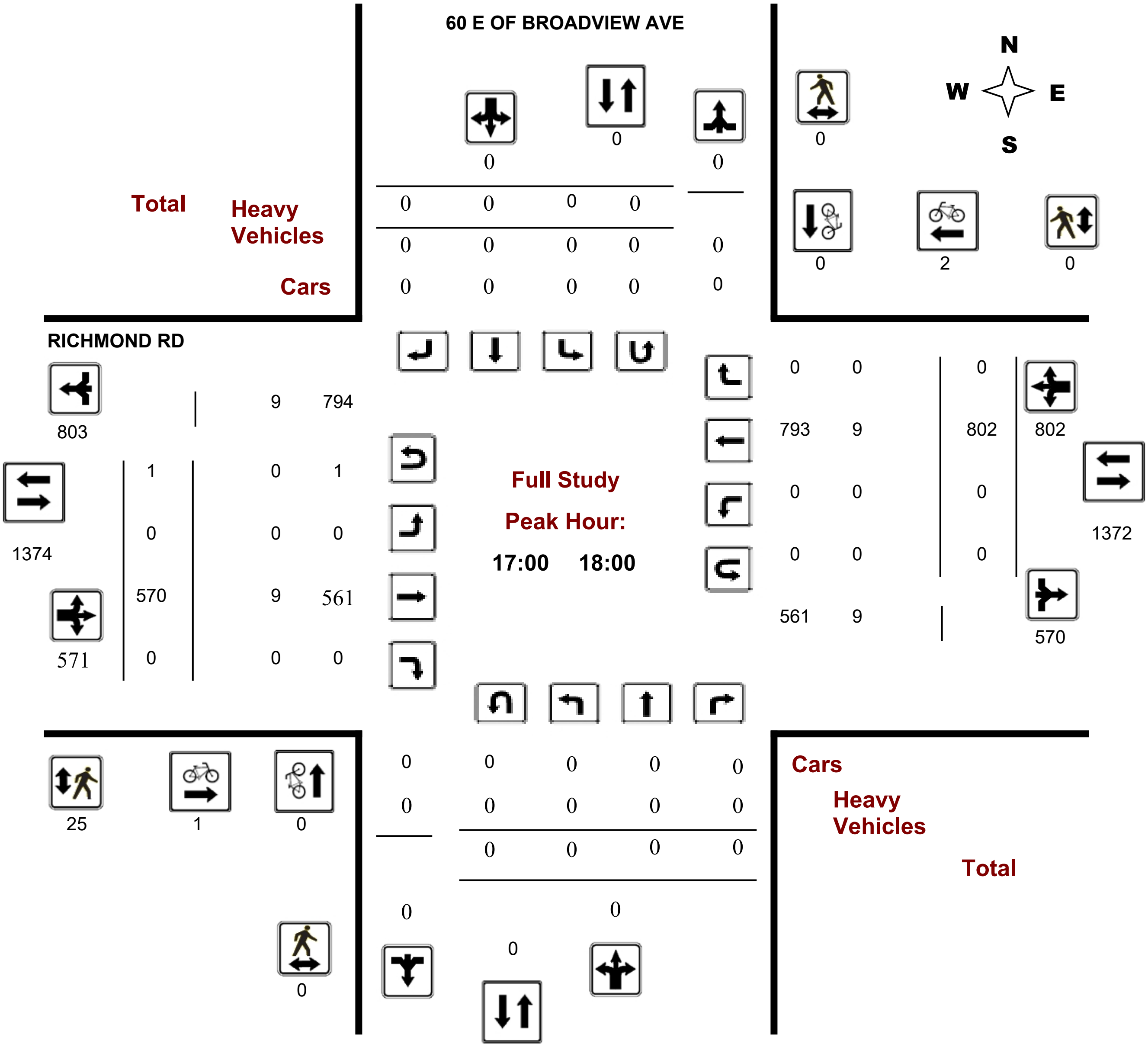
Turning Movement Count - Study Results

60 E OF BROADVIEW AVE @ RICHMOND RD

Survey Date: Wednesday, November 22, 2017 **WO No:** 37469

Start Time: 07:00 **Device:** Miovision

Full Study Peak Hour Diagram



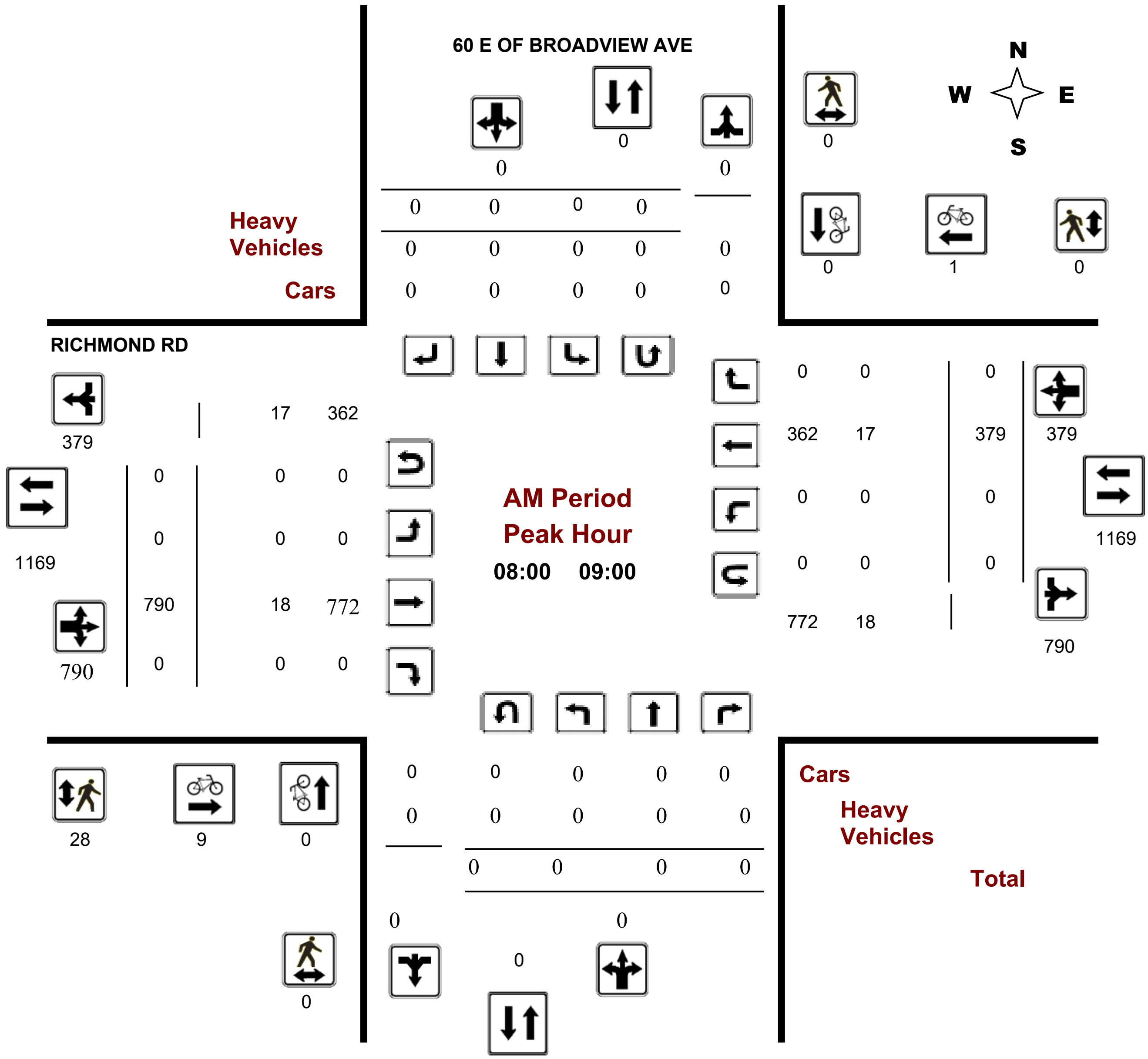
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

60 E OF BROADVIEW AVE @ RICHMOND RD

Survey Date: Wednesday, November 22, 2017 **WO No:** 37469

Start Time: 07:00 **Device:** Miovision



Comments

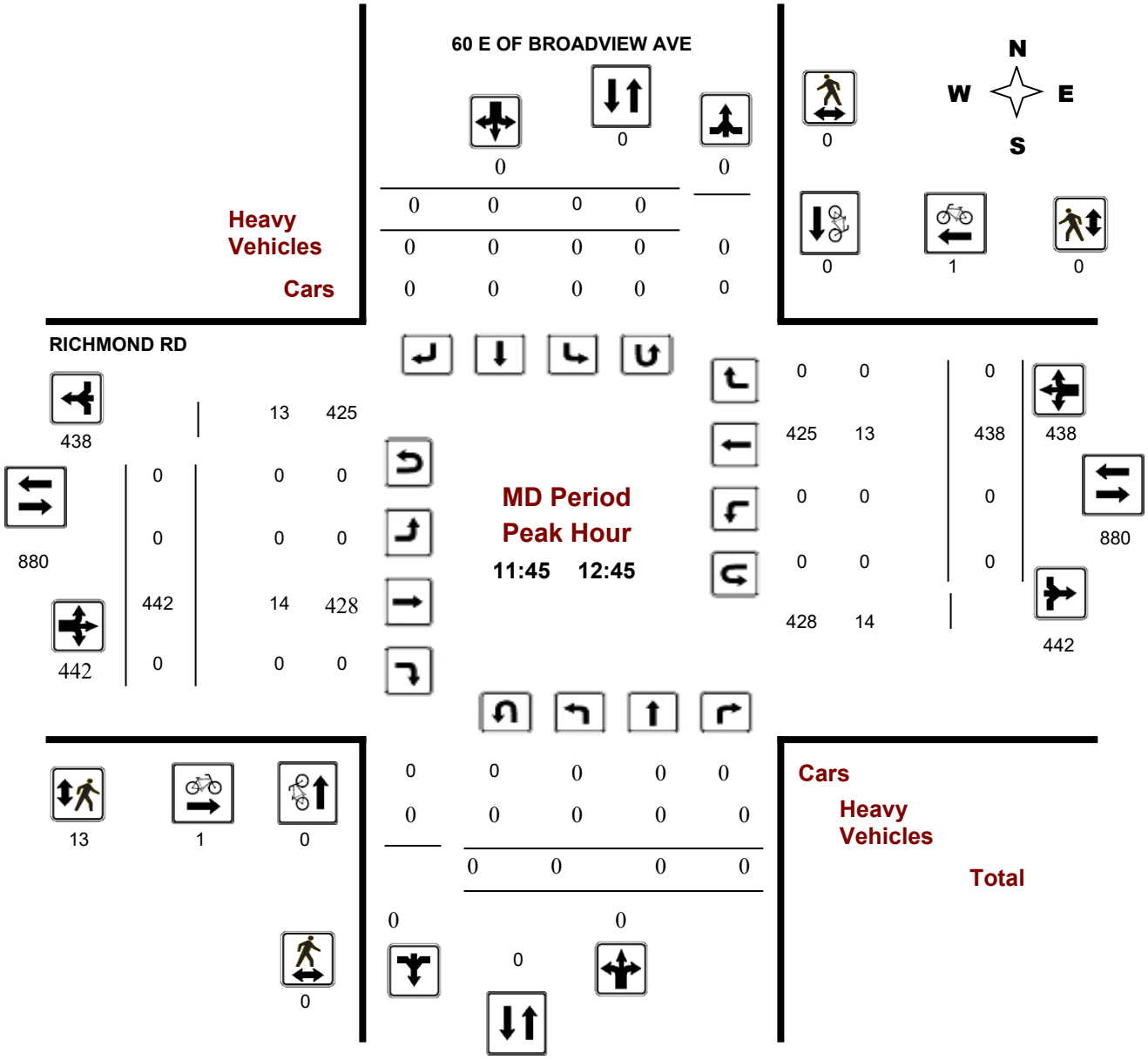
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

60 E OF BROADVIEW AVE @ RICHMOND RD

Survey Date: Wednesday, November 22, 2017 **WO No:** 37469

Start Time: 07:00 **Device:** Miovision



Comments

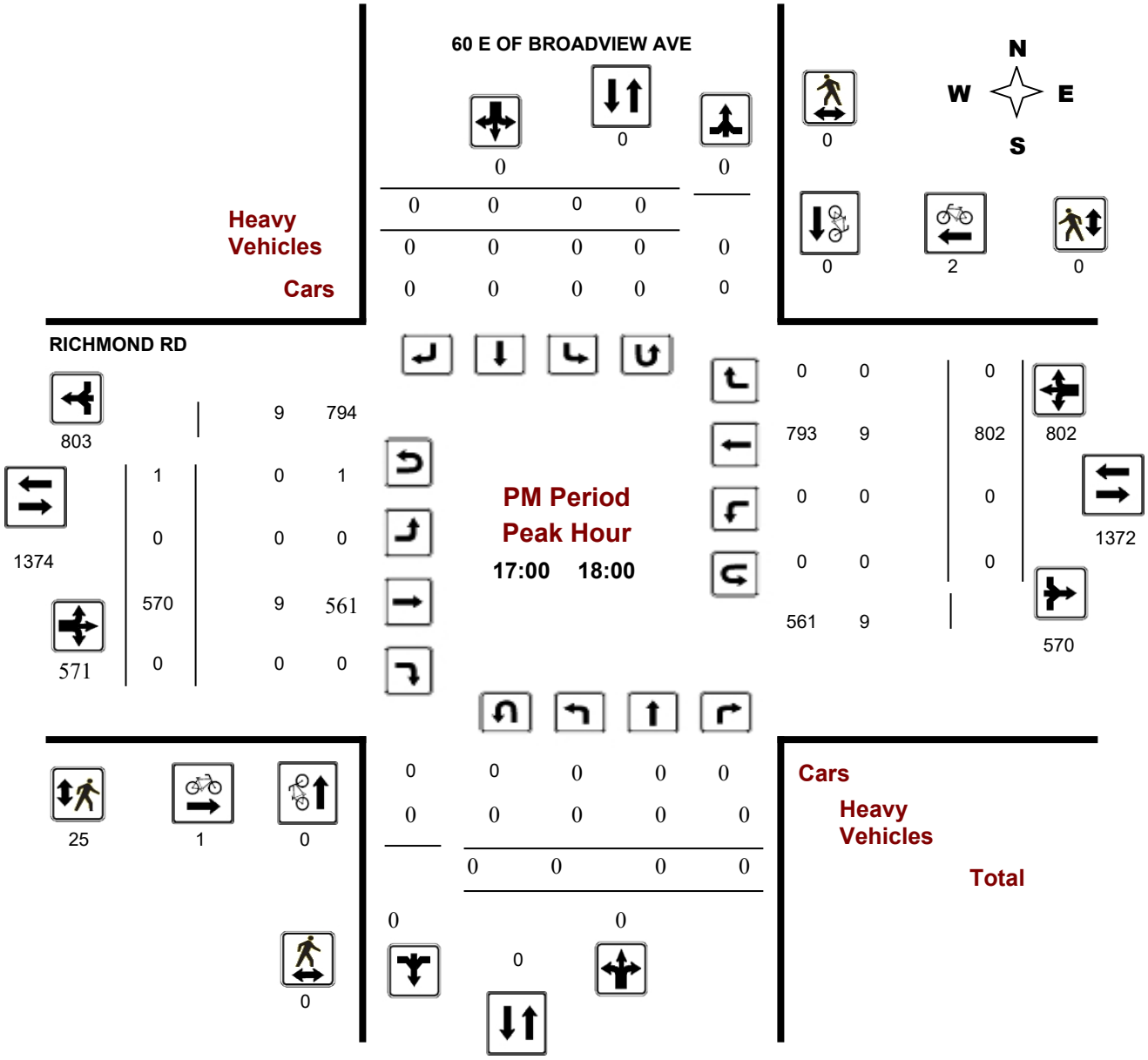
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

60 E OF BROADVIEW AVE @ RICHMOND RD

Survey Date: Wednesday, November 22, 2017 **WO No:** 37469

Start Time: 07:00 **Device:** Miovision



Comments

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

Northbound: 0 Southbound: 0

Eastbound: 1 Westbound: 1

AADT Factor

.90

	60 E OF BROADVIEW AVE								RICHMOND RD									
	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	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**
Sub Total	0	0	0	**0**	0	0	0	**0**	**0**	0	4302	0	**4302**	0	4059	0	**4059**	**8361**	**8361**
U Turns				**0**				**0**	**0**				**1**				**1**	**2**	**2**
Total	0	0	0	**0**	0	0	0	**0**	**0**	0	4302	0	**4303**	0	4059	0	**4060**	**8363**	**8363**
EQ 12Hr	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	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	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

Time Period		60 E OF BROADVIEW AVE			RICHMOND RD			
		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**
Total	0	0	**0**	158	0	**158**	**158**

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**

Time Period		Northbound				Southbound					Eastbound				Westbound					
		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	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

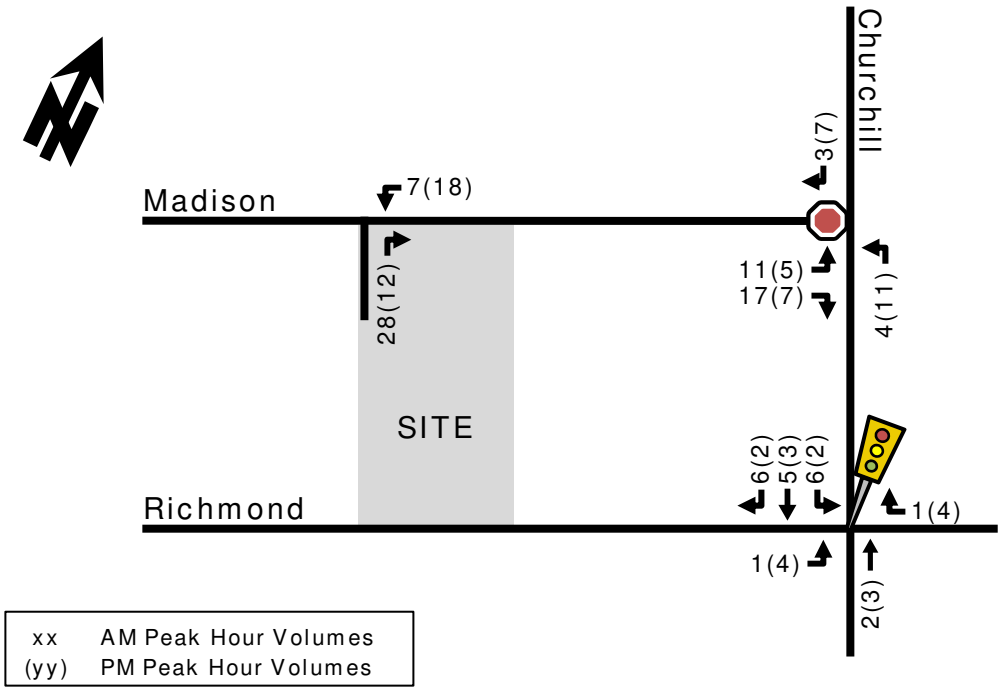
FID	Location	Year	Date	Time	Classficat	Impact_Typ	Environmen	Light	Road_Surfa	Traffic_Co	Traffic__1	No_of_Peds	
1316	GOLDEN AVE @ RICHMOND RD	2018	5/11/2018 0:00	10:00:00 AM	03 - P.D. only	04 - Sideswipe	01 - Clear	01 - Daylight	01 - Dry	01 - Traffic signal	01 - Functioning		0
1539	CHURCHILL AVE @ RICHMOND 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 AM	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

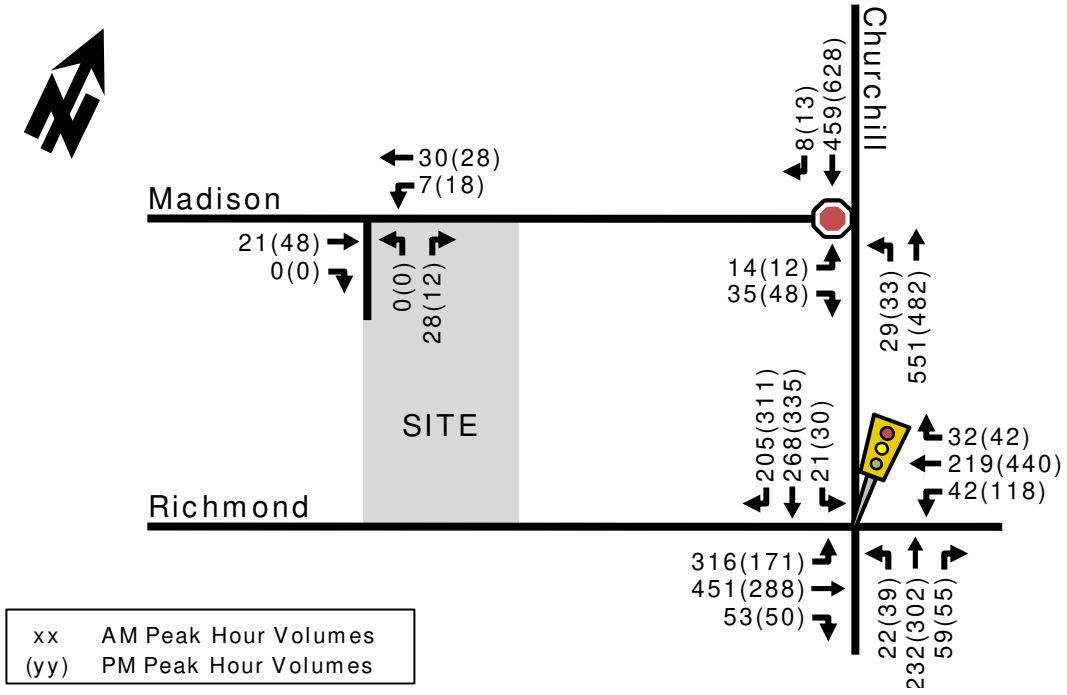
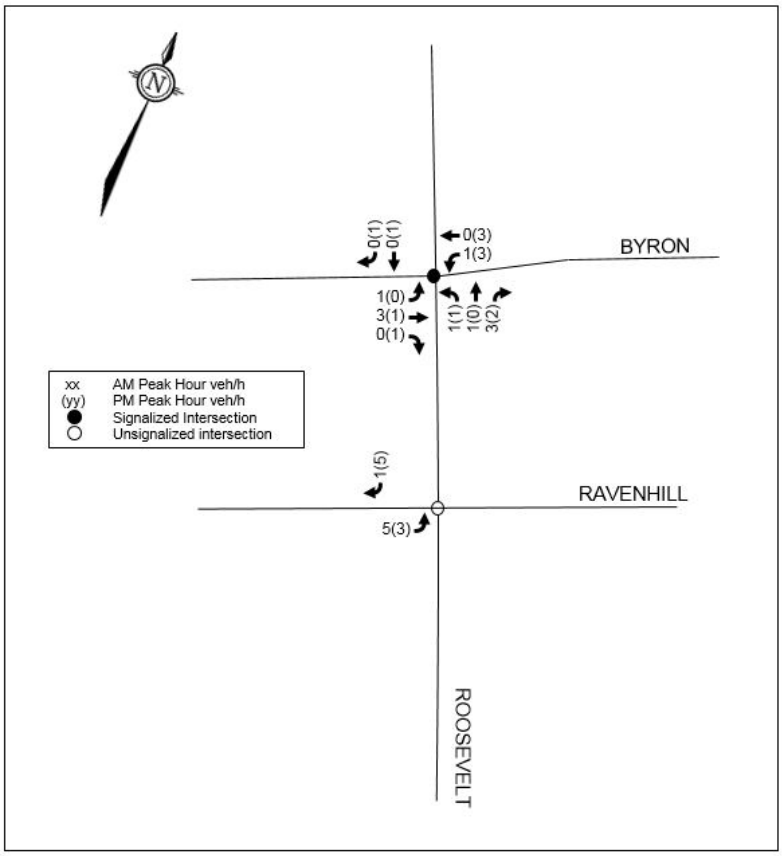


Figure 6: Proposed Site Generated Traffic Volumes



4.2 Background Traffic

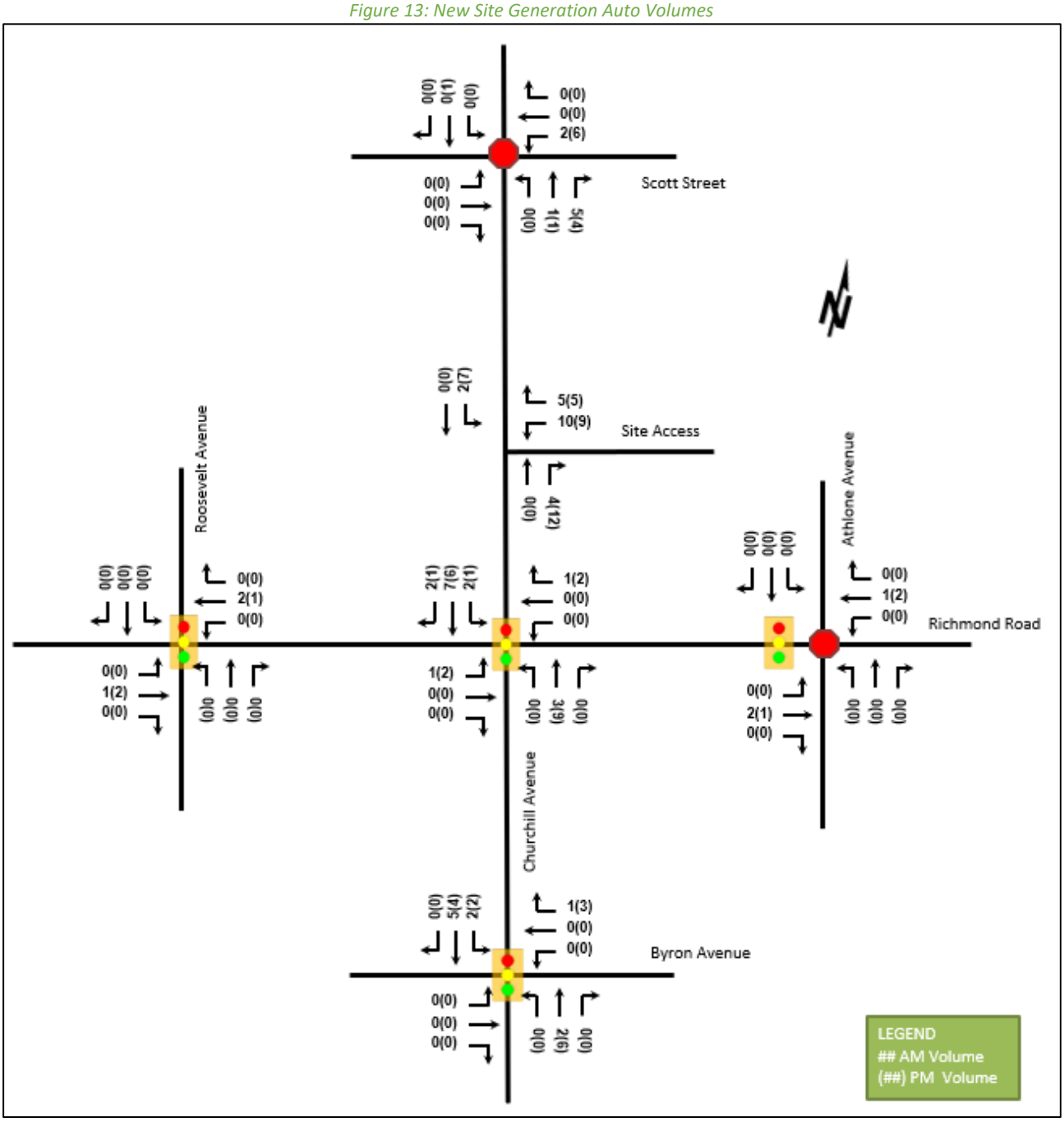
Background growth rates were not reviewed due to the low volume of site generated traffic.

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.

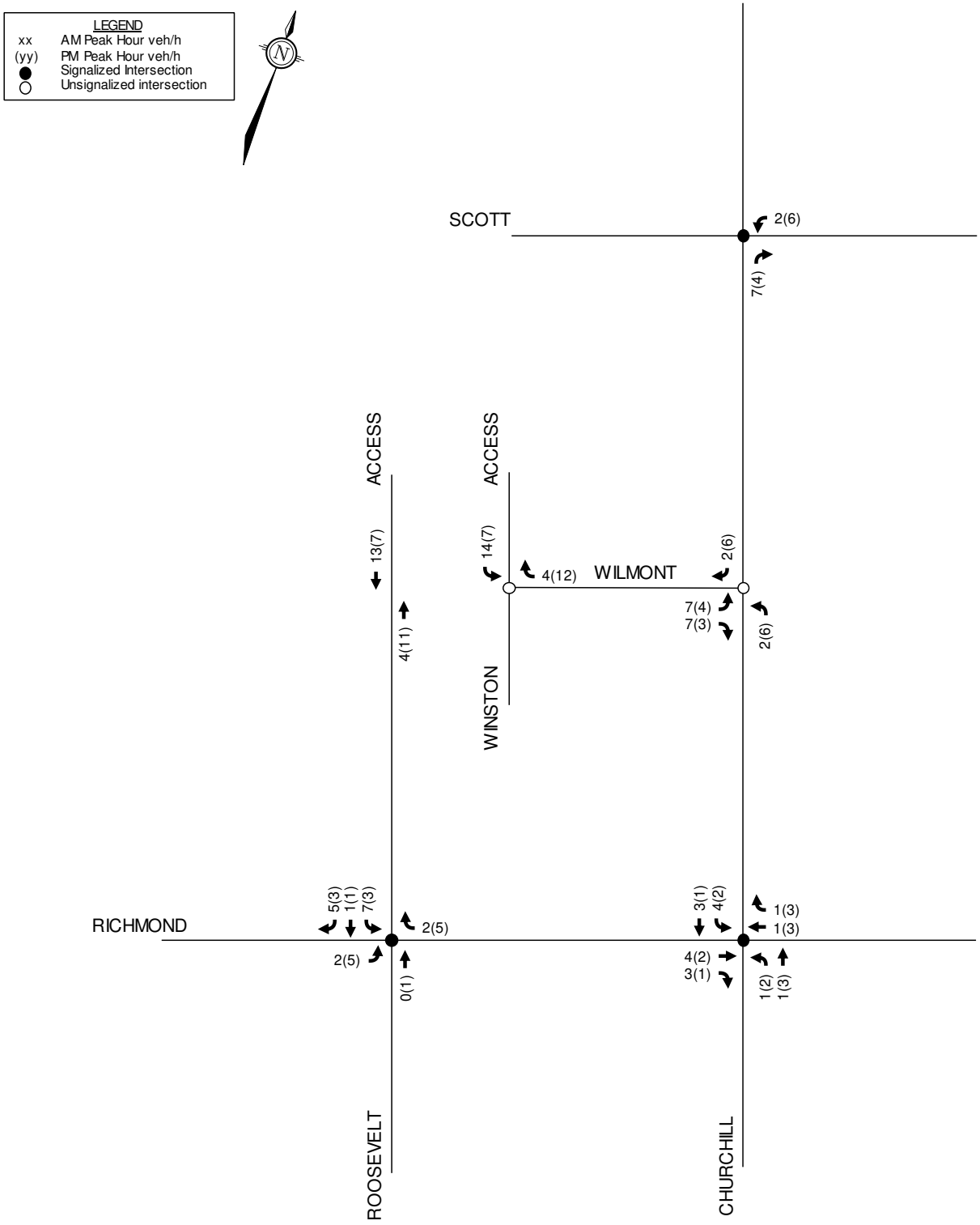
5.1.2. PEDESTRIAN ROUTES AND FACILITIES

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. LOACTION 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.

Figure 10: Site Generated Traffic



City of Ottawa 2017 TIA Guidelines Screening Form

1. Description of Proposed Development

Municipal Address	349 DANFORTH AVE.
Description of Location	LOT 3, RP 204
Land Use Classification	MIXED USE
Development Size (units)	13 RES UNITS + 2 COMM UNITS
Development Size (m^2)	1020 m^2
Number of Accesses and Locations	0
Phase of Development	1
Buildout Year	2021

If available, please attach a sketch of the development or site plan to this form.

2. Trip Generation Trigger

Considering the Development's Land Use type and Size (as filled out in the previous section), please refer to the Trip Generation Trigger checks below.

Land Use Type	Minimum Development Size
Single-family homes	40 units
Townhomes or apartments	90 units
Office	3,500 m^2
Industrial	5,000 m^2
Fast-food restaurant or coffee shop	100 m^2
Destination retail	1,000 m^2
Gas station or convenience market	75 m^2

** If the development has a land use type other than what is presented in the table above, estimates of person-trip generation may be made based on average trip generation characteristics represented in the current edition of the Institute of Transportation Engineers (ITE) Trip Generation Manual.*

If the proposed development size is greater than the sizes identified above, the Trip Generation Trigger is satisfied.

3. Location Triggers

	Yes	No
Does the development propose a new driveway to a boundary street that is designated as part of the City's Transit Priority, Rapid Transit or Spine Bicycle Networks?		✓
Is the development in a Design Priority Area (DPA) or Transit-oriented Development (TOD) zone?*		✓

**DPA and TOD are identified in the City of Ottawa Official Plan (DPA in Section 2.5.1 and Schedules A and B; TOD in Annex 6). See Chapter 4 for a list of City of Ottawa Planning and Engineering documents that support the completion of TIA).*

If any of the above questions were answered with 'Yes,' the Location Trigger is satisfied.

4. Safety Triggers

	Yes	No
Are posted speed limits on a boundary street are 80 km/hr or greater?		✓
Are there any horizontal/vertical curvatures on a boundary street limits sight lines at a proposed driveway?		✓
Is the proposed driveway within the area of influence of an adjacent traffic signal or roundabout (i.e. within 300 m of intersection in rural conditions, or within 150 m of intersection in urban/ suburban conditions)?		✓
Is the proposed driveway within auxiliary lanes of an intersection?		✓
Does the proposed driveway make use of an existing median break that serves an existing site?		✓
Is there is a documented history of traffic operations or safety concerns on the boundary streets within 500 m of the development?		✓
Does the development include a drive-thru facility?		✓

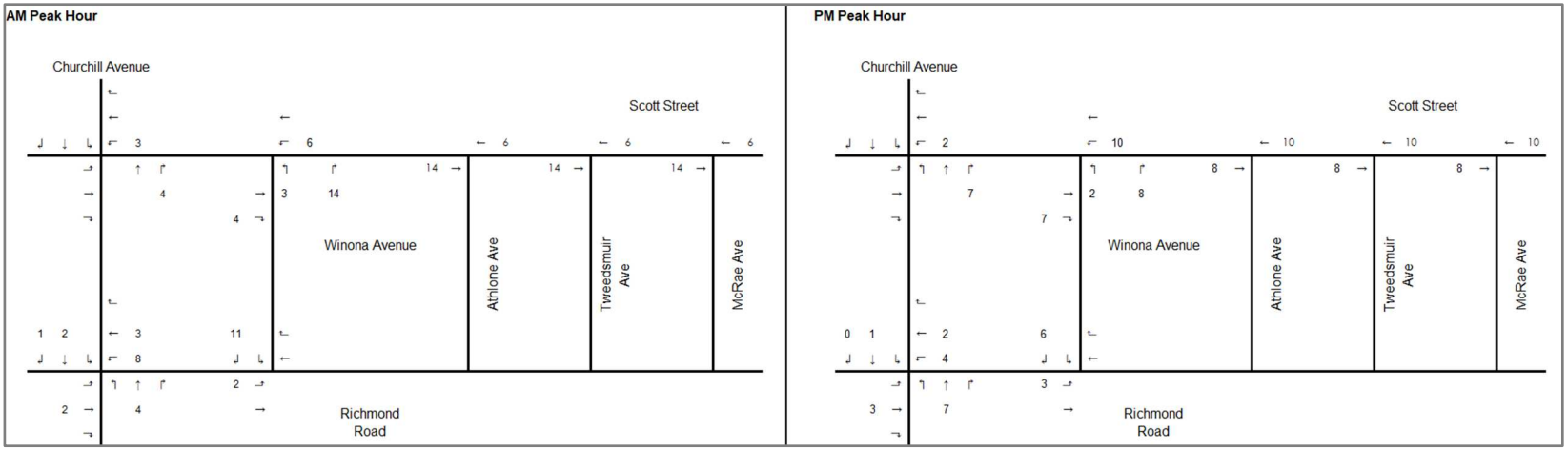
If any of the above questions were answered with 'Yes,' the Safety Trigger is satisfied.

5. Summary

	Yes	No
Does the development satisfy the Trip Generation Trigger?		✓
Does the development satisfy the Location Trigger?		✓
Does the development satisfy the Safety Trigger?		✓

If none of the triggers are satisfied, the TIA Study is complete. If one or more of the triggers is satisfied, the TIA Study must continue into the next stage (Screening and Scoping).

Figure 12 - Site Trips



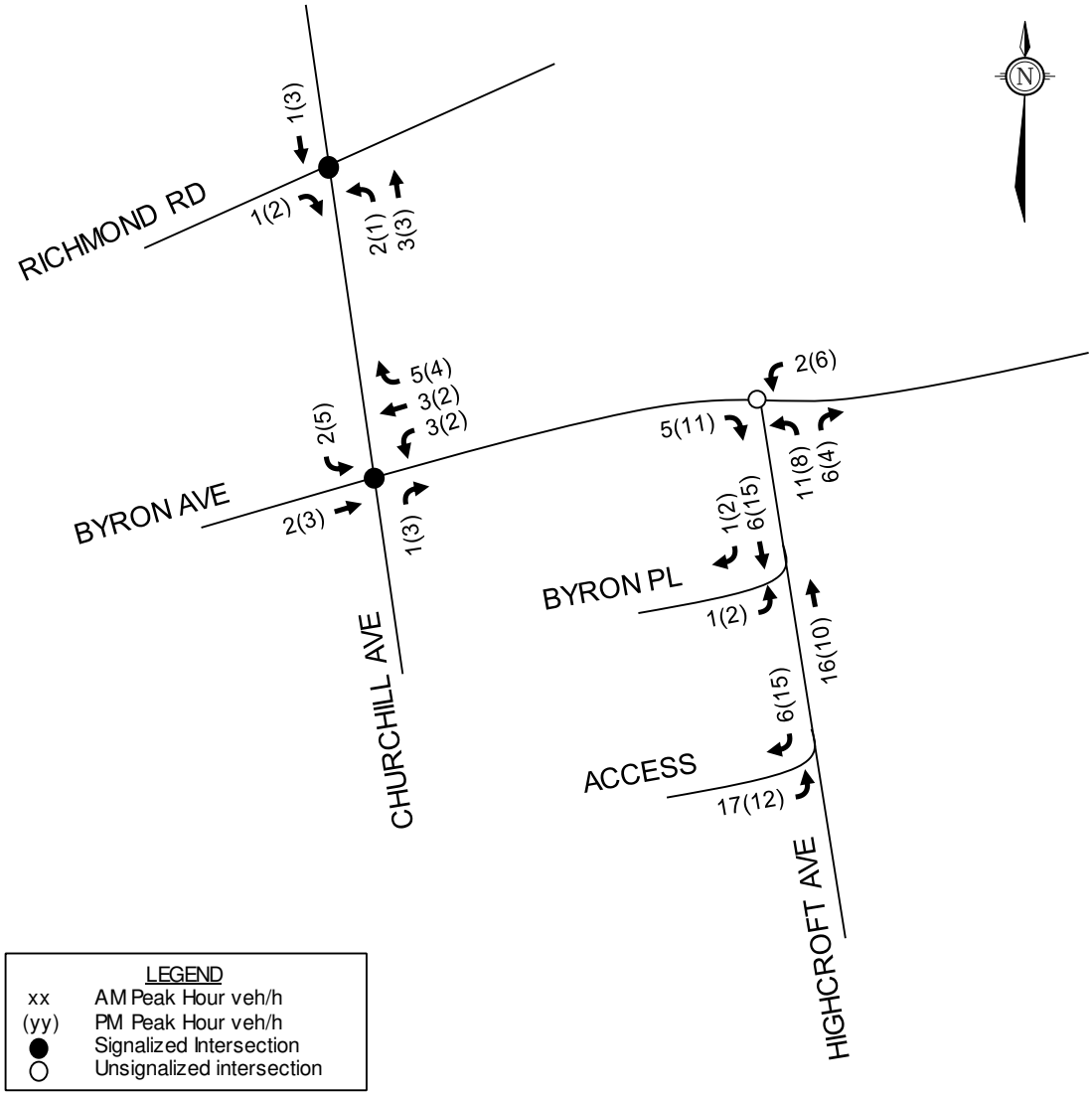
4.1.2 Trip Distribution

The assumed distribution of trips generated by the proposed development has been derived from existing traffic patterns on the roadways within the study area. As the proposed development is predominantly residential, the majority of peak hour trips are anticipated to be to/from work. It is appropriate for the assumed trip distribution to be based on the distribution of existing traffic volumes exiting the study area during the AM peak hour and arriving to the study area during the PM peak hour. The projected distribution of trips is summarized as follows:

- 35% to/from the east via either Byron Avenue or Richmond Road
- 30% to/from the west via either Byron Avenue or Richmond Road
- 20% to/from the north via Churchill Avenue
- 15% to/from the south via Churchill Avenue

Site generated traffic volumes are shown in **Figure 4**.

Figure 4: Site Generated Traffic



D

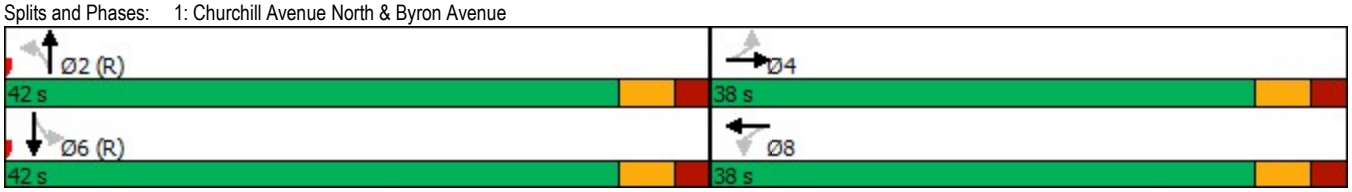
Appendix D – Existing and Background Conditions Output Data

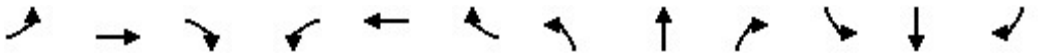
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	57	170	51	122	26	326	34	309
Future Volume (vph)	57	170	51	122	26	326	34	309
Lane Group Flow (vph)	0	315	0	245	29	438	38	375
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		4		8		2		6
Permitted Phases	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





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	

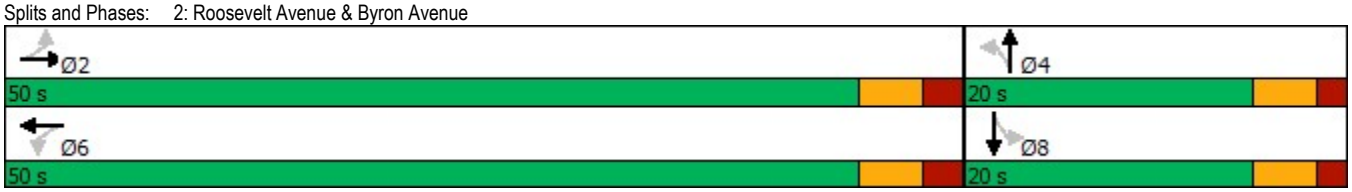
Intersection Summary			
HCM 2000 Control Delay	15.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	57.8%	ICU Level of Service	B
Analysis Period (min)	15		

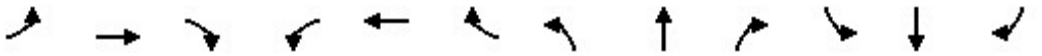
c Critical Lane Group

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 LOS: A
Intersection Capacity Utilization 42.8%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 2: Roosevelt Avenue & Byron Avenue





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	

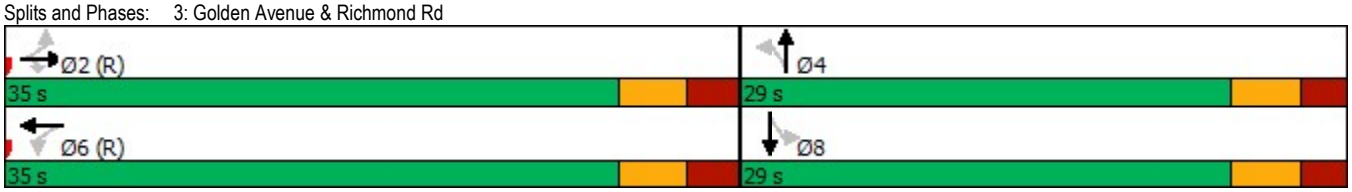
Intersection Summary			
HCM 2000 Control Delay	7.5	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.24		
Actuated Cycle Length (s)	71.2	Sum of lost time (s)	8.0
Intersection Capacity Utilization	42.8%	ICU Level of Service	A
Analysis Period (min)	15		

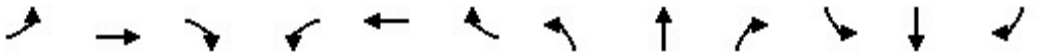
c Critical Lane Group

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





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	

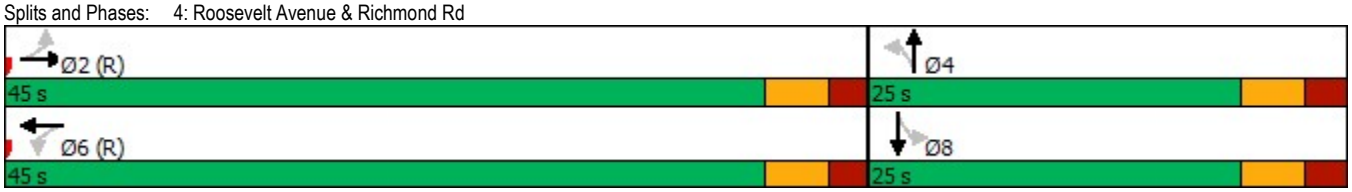
Intersection Summary			
HCM 2000 Control Delay	9.5	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.40		
Actuated Cycle Length (s)	64.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	73.9%	ICU Level of Service	D
Analysis Period (min)	15		

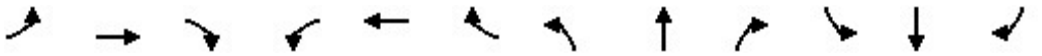
c Critical Lane Group

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





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	

Intersection Summary			
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		

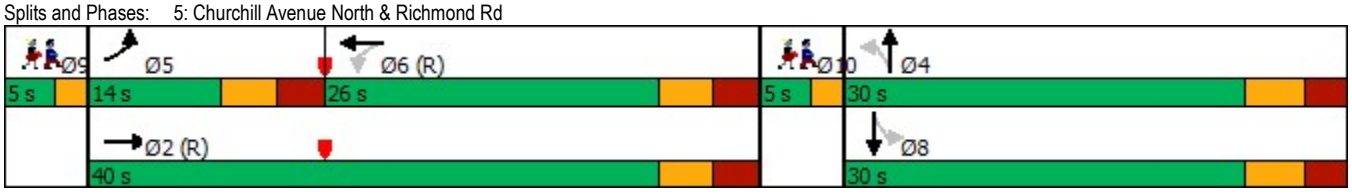
c Critical Lane Group

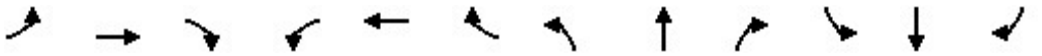
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	Ø9	Ø10
Lane Configurations										
Traffic Volume (vph)	262	390	43	183	24	273	21	319		
Future Volume (vph)	262	390	43	183	24	273	21	319		
Lane Group Flow (vph)	291	465	48	224	0	422	0	527		
Turn Type	Prot	NA	Perm	NA	Perm	NA	Perm	NA		
Protected Phases	5	2		6		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





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	

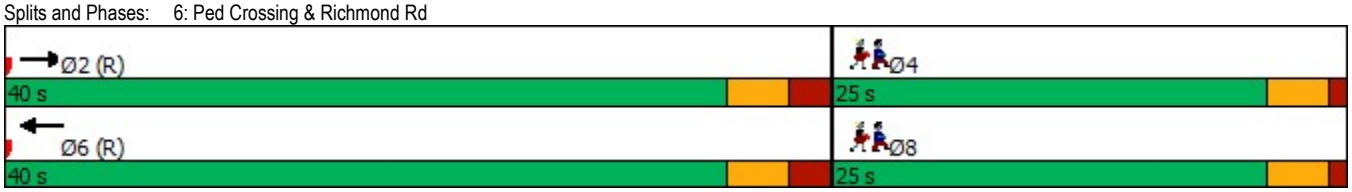
Intersection Summary			
HCM 2000 Control Delay	21.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	73.3%	ICU Level of Service	D
Analysis Period (min)	15		

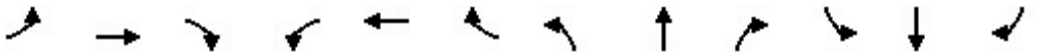
c Critical Lane Group

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





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		c0.26			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	

Intersection Summary			
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		

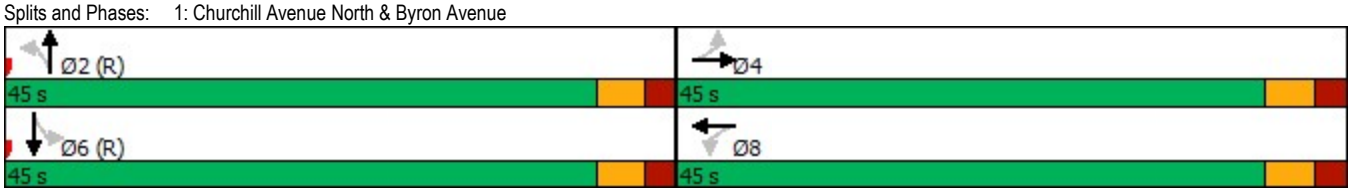
c Critical Lane Group

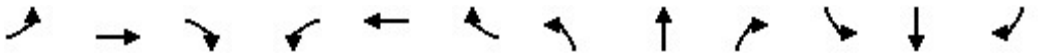
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	19	134	110	307	25	303	21	340
Future Volume (vph)	19	134	110	307	25	303	21	340
Lane Group Flow (vph)	0	224	0	513	28	413	23	437
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		4		8		2		6
Permitted Phases	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





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	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	

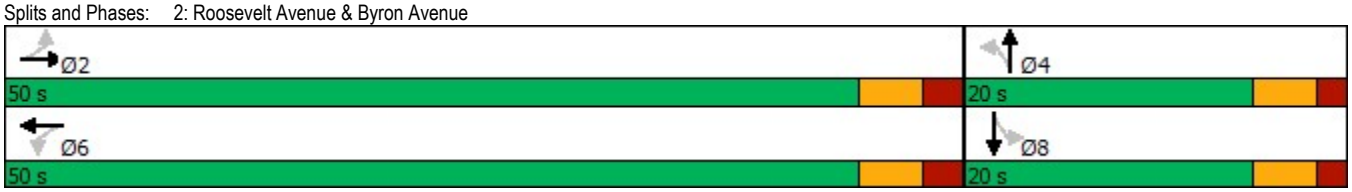
Intersection Summary			
HCM 2000 Control Delay	22.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	73.8%	ICU Level of Service	D
Analysis Period (min)	15		

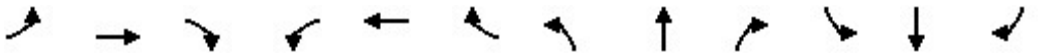
c Critical Lane Group

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 LOS: A
Intersection Capacity Utilization 44.0%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 2: Roosevelt Avenue & Byron Avenue





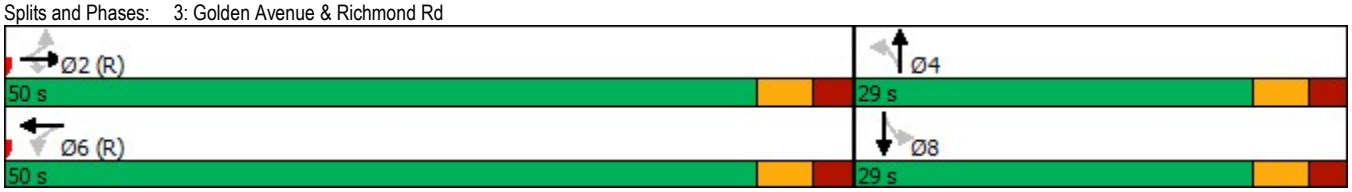
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	13	149	7	19	294	46	5	21	13	31	20	31
Future Volume (vph)	13	149	7	19	294	46	5	21	13	31	20	31
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)		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	

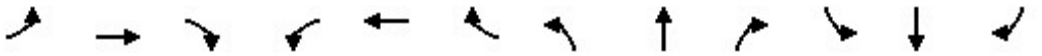
Intersection Summary			
HCM 2000 Control Delay	8.2	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.31		
Actuated Cycle Length (s)	73.2	Sum of lost time (s)	8.0
Intersection Capacity Utilization	44.0%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

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





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	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		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	

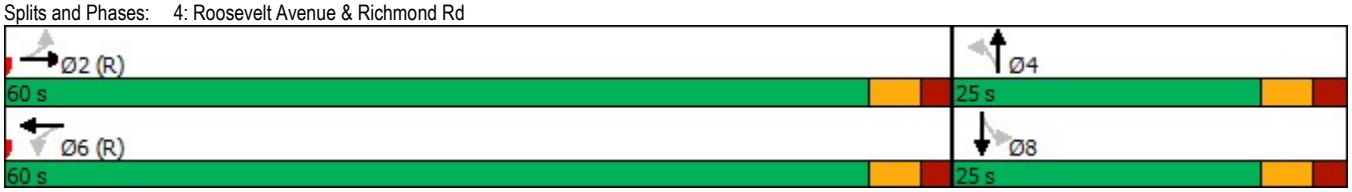
Intersection Summary			
HCM 2000 Control Delay	12.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	79.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	86.0%	ICU Level of Service	E
Analysis Period (min)	15		

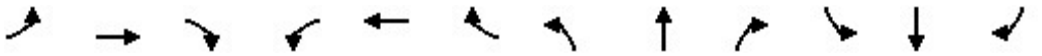
c Critical Lane Group

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





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			c0.50			c0.06			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	

Intersection Summary			
HCM 2000 Control Delay	10.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	78.2%	ICU Level of Service	D
Analysis Period (min)	15		

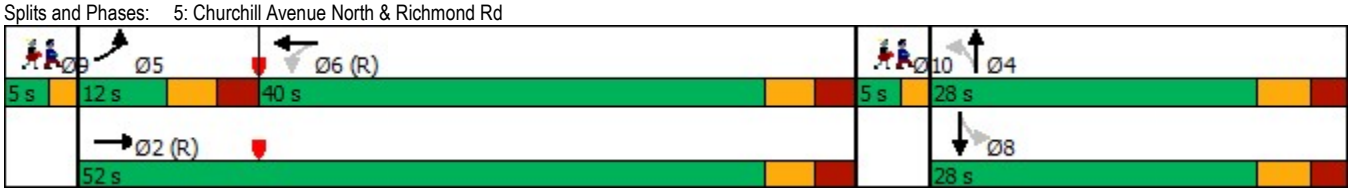
c Critical Lane Group

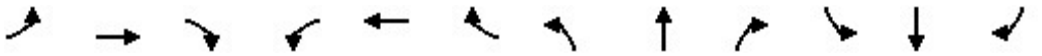
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	Ø9	Ø10
Lane Configurations										
Traffic Volume (vph)	157	298	128	451	27	263	19	257		
Future Volume (vph)	157	298	128	451	27	263	19	257		
Lane Group Flow (vph)	174	382	142	535	0	406	0	618		
Turn Type	Prot	NA	Perm	NA	Perm	NA	Perm	NA		
Protected Phases	5	2		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





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	

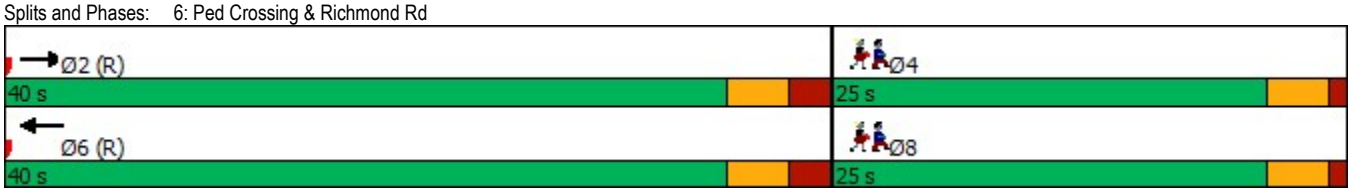
Intersection Summary			
HCM 2000 Control Delay	25.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	82.1%	ICU Level of Service	E
Analysis Period (min)	15		

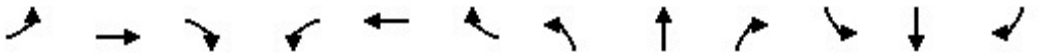
c Critical Lane Group

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





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	

Intersection Summary			
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		

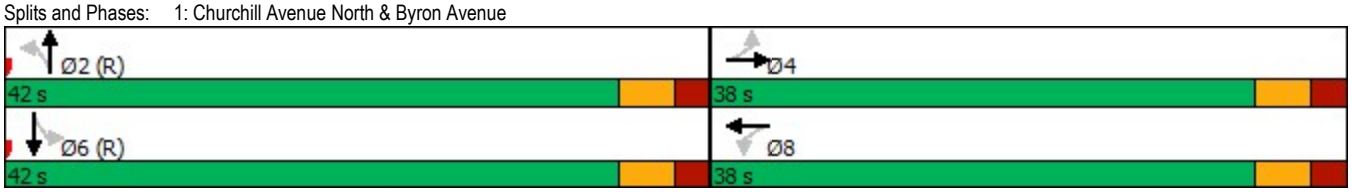
c Critical Lane Group

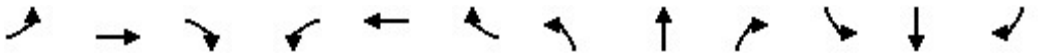
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	57	172	54	125	27	334	38	330
Future Volume (vph)	57	172	54	125	27	334	38	330
Lane Group Flow (vph)	0	317	0	258	30	448	42	399
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		4		8		2		6
Permitted Phases	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)		22.9		22.9	49.1	49.1	49.1	49.1
Actuated g/C Ratio		0.29		0.29	0.61	0.61	0.61	0.61
v/c Ratio		0.73		0.63	0.06	0.43	0.09	0.37
Control Delay		33.4		28.6	8.8	10.6	3.7	3.8
Queue Delay		0.0		0.0	0.0	0.0	0.0	0.3
Total Delay		33.4		28.6	8.8	10.6	3.7	4.1
LOS		C		C	A	B	A	A
Approach Delay		33.4		28.6		10.5		4.1
Approach LOS		C		C		B		A
Queue Length 50th (m)		42.7		32.4	1.8	32.3	1.2	12.1
Queue Length 95th (m)		61.5		49.0	6.6	68.0	m2.9	21.7
Internal Link Dist (m)		244.6		113.6		126.7		100.0
Turn Bay Length (m)					30.0		30.0	
Base Capacity (vph)		636		596	493	1050	460	1067
Starvation Cap Reductn		0		0	0	0	0	228
Spillback Cap Reductn		0		0	0	0	0	0
Storage Cap Reductn		0		0	0	0	0	0
Reduced v/c Ratio		0.50		0.43	0.06	0.43	0.09	0.48

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: 0.73	
Intersection Signal Delay: 16.6	Intersection LOS: B
Intersection Capacity Utilization 61.3%	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





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	57	172	57	54	125	53	27	334	69	38	330	29
Future Volume (vph)	57	172	57	54	125	53	27	334	69	38	330	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)		1684			1677		1607	1702		1614	1736	
Flt Permitted		0.87			0.81		0.48	1.00		0.44	1.00	
Satd. Flow (perm)		1473			1372		804	1702		747	1736	
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	191	63	60	139	59	30	371	77	42	367	32
RTOR Reduction (vph)	0	14	0	0	16	0	0	7	0	0	3	0
Lane Group Flow (vph)	0	303	0	0	242	0	30	441	0	42	396	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)		21.3			21.3		47.7	47.7		47.7	47.7	
Effective Green, g (s)		22.9			22.9		49.1	49.1		49.1	49.1	
Actuated g/C Ratio		0.29			0.29		0.61	0.61		0.61	0.61	
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)		421			392		493	1044		458	1065	
v/s Ratio Prot								c0.26			0.23	
v/s Ratio Perm		c0.21			0.18		0.04			0.06		
v/c Ratio		0.72			0.62		0.06	0.42		0.09	0.37	
Uniform Delay, d1		25.7			24.7		6.2	8.1		6.3	7.7	
Progression Factor		1.00			1.00		1.00	1.00		0.38	0.33	
Incremental Delay, d2		6.0			2.9		0.2	1.3		0.3	0.8	
Delay (s)		31.7			27.6		6.4	9.3		2.8	3.4	
Level of Service		C			C		A	A		A	A	
Approach Delay (s)		31.7			27.6			9.1			3.3	
Approach LOS		C			C			A			A	

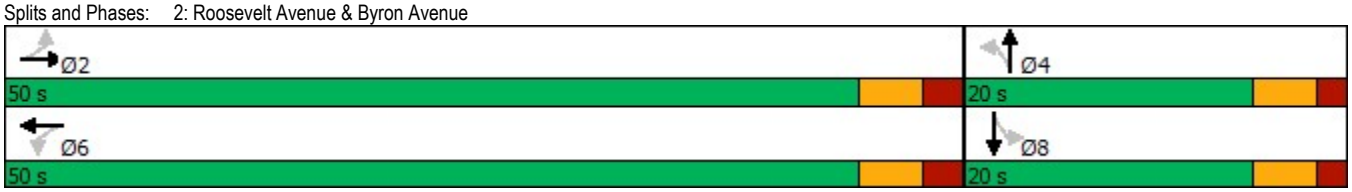
Intersection Summary			
HCM 2000 Control Delay	15.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	61.3%	ICU Level of Service	B
Analysis Period (min)	15		

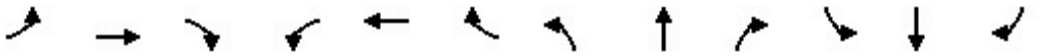
c Critical Lane Group

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	36	233	14	148	4	31	26	20
Future Volume (vph)	36	233	14	148	4	31	26	20
Lane Group Flow (vph)	0	308	0	211	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		0.16		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)		10.8		6.0		4.8		6.6
Queue Length 95th (m)		25.5		15.7		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		0.16		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 LOS: A
Intersection Capacity Utilization 43.0%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 2: Roosevelt Avenue & Byron Avenue





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	36	233	8	14	148	28	4	31	17	26	20	12
Future Volume (vph)	36	233	8	14	148	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			1712			1643			1624	
Flt Permitted		0.95			0.97			0.98			0.87	
Satd. Flow (perm)		1661			1671			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	259	9	16	164	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	307	0	0	205	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		0.5			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	

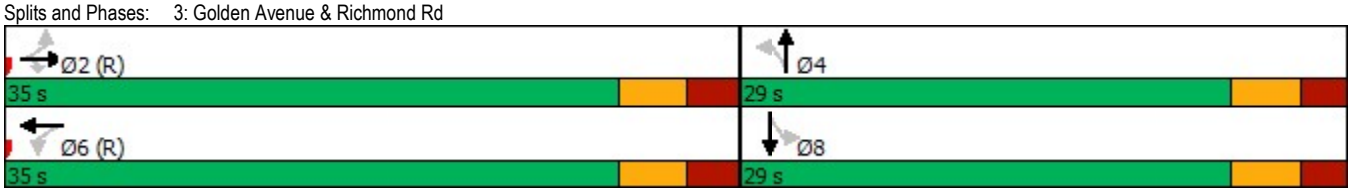
Intersection Summary			
HCM 2000 Control Delay	7.7	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.25		
Actuated Cycle Length (s)	70.8	Sum of lost time (s)	8.0
Intersection Capacity Utilization	43.0%	ICU Level of Service	A
Analysis Period (min)	15		

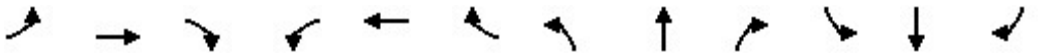
c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	2	476	28	46	283	49	2	1	4
Future Volume (vph)	2	476	28	46	283	49	2	1	4
Lane Group Flow (vph)	0	531	31	0	368	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		0.48	0.04		0.37		0.29		0.01
Control Delay		11.6	2.5		10.4		8.5		12.2
Queue Delay		0.0	0.0		0.0		0.0		0.0
Total Delay		11.6	2.5		10.4		8.5		12.2
LOS		B	A		B		A		B
Approach Delay		11.1			10.4		8.5		12.3
Approach LOS		B			B		A		B
Queue Length 50th (m)		45.0	0.0		28.3		4.3		0.4
Queue Length 95th (m)		74.5	2.8		49.3		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		991		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		0.48	0.04		0.37		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: 0.48	
Intersection Signal Delay: 10.6	Intersection LOS: B
Intersection Capacity Utilization 74.3%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 3: Golden Avenue & Richmond Rd





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	2	476	28	46	283	3	49	2	69	1	4	0
Future Volume (vph)	2	476	28	46	283	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		1743			1479			1729	
Flt Permitted		1.00	1.00		0.89			0.89			0.96	
Satd. Flow (perm)		1763	1371		1565			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	529	31	51	314	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	531	19	0	368	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		943			364			455	
v/s Ratio Prot												
v/s Ratio Perm		c0.30	0.01		0.23			c0.06			0.00	
v/c Ratio		0.50	0.02		0.39			0.21			0.01	
Uniform Delay, d1		7.2	5.1		6.6			18.0			17.0	
Progression Factor		1.00	1.00		1.00			1.00			1.00	
Incremental Delay, d2		1.7	0.1		1.2			0.3			0.0	
Delay (s)		8.9	5.2		7.8			18.3			17.0	
Level of Service		A	A		A			B			B	
Approach Delay (s)		8.7			7.8			18.3			17.0	
Approach LOS		A			A			B			B	

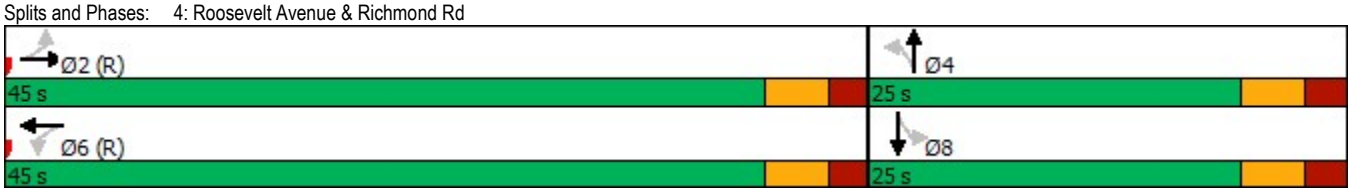
Intersection Summary			
HCM 2000 Control Delay	9.6	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.41		
Actuated Cycle Length (s)	64.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	74.3%	ICU Level of Service	D
Analysis Period (min)	15		

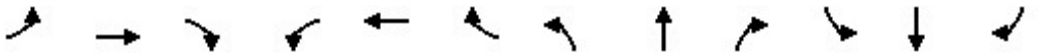
c Critical Lane Group

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	5	639	14	304	26	11	39	13
Future Volume (vph)	5	639	14	304	26	11	39	13
Lane Group Flow (vph)	0	727	0	385	0	77	0	70
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		0.22
Control Delay		10.9		7.1		13.4		18.2
Queue Delay		0.3		0.0		0.0		0.0
Total Delay		11.2		7.1		13.4		18.2
LOS		B		A		B		B
Approach Delay		11.2		7.1		13.4		18.2
Approach LOS		B		A		B		B
Queue Length 50th (m)		62.3		24.2		4.1		5.8
Queue Length 95th (m)		102.2		40.6		13.5		15.0
Internal Link Dist (m)		130.2		276.4		56.5		123.0
Turn Bay Length (m)								
Base Capacity (vph)		1225		1171		425		396
Starvation Cap Reductn		114		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 59.8%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 4: Roosevelt Avenue & Richmond Rd





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	5	639	10	14	304	28	26	11	32	39	13	12
Future Volume (vph)	5	639	10	14	304	28	26	11	32	39	13	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			0.95			0.97	
Flpb, ped/bikes		1.00			1.00			0.96			0.96	
Frt		1.00			0.99			0.94			0.97	
Flt Protected		1.00			1.00			0.98			0.97	
Satd. Flow (prot)		1757			1723			1486			1561	
Flt Permitted		1.00			0.97			0.88			0.80	
Satd. Flow (perm)		1753			1671			1333			1290	
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)	6	710	11	16	338	31	29	12	36	43	14	13
RTOR Reduction (vph)	0	1	0	0	4	0	0	28	0	0	10	0
Lane Group Flow (vph)	0	726	0	0	381	0	0	49	0	0	60	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)		1177			1121			285			276	
v/s Ratio Prot												
v/s Ratio Perm		c0.41			0.23			0.04			c0.05	
v/c Ratio		0.62			0.34			0.17			0.22	
Uniform Delay, d1		6.5			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)		8.9			5.7			22.7			23.1	
Level of Service		A			A			C			C	
Approach Delay (s)		8.9			5.7			22.7			23.1	
Approach LOS		A			A			C			C	

Intersection Summary			
HCM 2000 Control Delay	9.6	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	59.8%	ICU Level of Service	B
Analysis Period (min)	15		

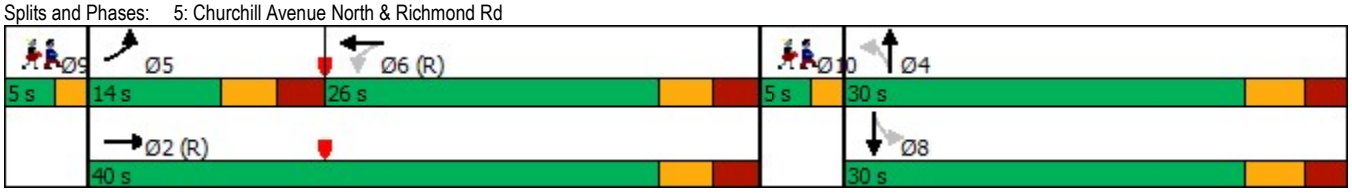
c Critical Lane Group

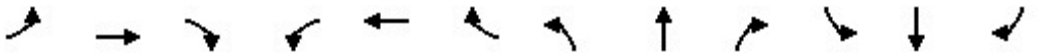
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	Ø9	Ø10
Lane Configurations										
Traffic Volume (vph)	264	396	51	187	27	286	33	337		
Future Volume (vph)	264	396	51	187	27	286	33	337		
Lane Group Flow (vph)	293	477	57	232	0	440	0	571		
Turn Type	Prot	NA	Perm	NA	Perm	NA	Perm	NA		
Protected Phases	5	2		6		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)	23.9	49.9	22.0	22.0		22.1		22.1		
Actuated g/C Ratio	0.30	0.62	0.28	0.28		0.28		0.28		
v/c Ratio	0.59	0.44	0.26	0.48		0.56		0.70		
Control Delay	32.0	10.3	26.5	27.6		19.3		26.8		
Queue Delay	0.0	0.0	0.0	0.0		0.0		0.0		
Total Delay	32.0	10.3	26.5	27.6		19.3		26.8		
LOS	C	B	C	C		B		C		
Approach Delay		18.6		27.3		19.3		26.8		
Approach LOS		B		C		B		C		
Queue Length 50th (m)	39.6	34.7	7.1	30.0		19.0		37.3		
Queue Length 95th (m)	#84.0	68.7	17.3	51.4		27.6		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)	499	1075	221	480		925		956		
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	0.59	0.44	0.26	0.48		0.48		0.60		

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: 22.2	Intersection LOS: C
Intersection Capacity Utilization 75.5%	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.

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





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	264	396	33	51	187	22	27	286	83	33	337	144
Future Volume (vph)	264	396	33	51	187	22	27	286	83	33	337	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	1723		1559	1728			3140			3044	
Flt Permitted	0.95	1.00		0.49	1.00			0.86			0.90	
Satd. Flow (perm)	1676	1723		805	1728			2710			2738	
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	440	37	57	208	24	30	318	92	37	374	160
RTOR Reduction (vph)	0	3	0	0	5	0	0	32	0	0	55	0
Lane Group Flow (vph)	293	474	0	57	227	0	0	408	0	0	516	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)	21.8	47.8		19.9	19.9			19.9			19.9	
Effective Green, g (s)	23.9	49.9		22.0	22.0			22.1			22.1	
Actuated g/C Ratio	0.30	0.62		0.28	0.28			0.28			0.28	
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)	500	1074		221	475			748			756	
v/s Ratio Prot	c0.17	c0.28			0.13							
v/s Ratio Perm				0.07				0.15			c0.19	
v/c Ratio	0.59	0.44		0.26	0.48			0.55			0.68	
Uniform Delay, d1	23.8	7.8		22.6	24.2			24.7			25.8	
Progression Factor	1.00	1.00		1.00	1.00			0.77			1.00	
Incremental Delay, d2	1.8	1.3		2.8	3.4			0.7			2.6	
Delay (s)	25.6	9.1		25.4	27.6			19.8			28.4	
Level of Service	C	A		C	C			B			C	
Approach Delay (s)		15.4			27.2			19.8			28.4	
Approach LOS		B			C			B			C	

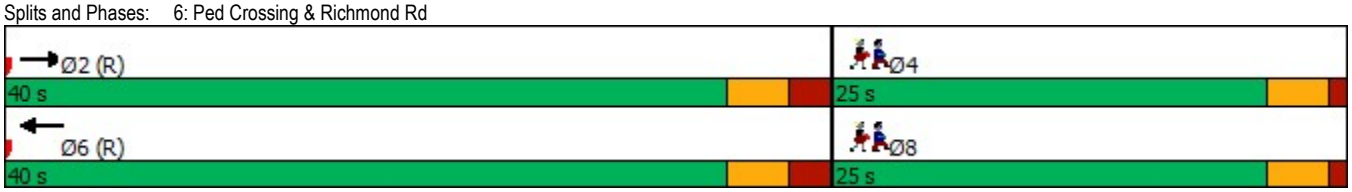
Intersection Summary			
HCM 2000 Control Delay	21.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	75.5%	ICU Level of Service	D
Analysis Period (min)	15		

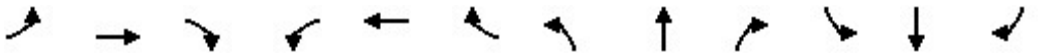
c Critical Lane Group

Lane Group	EBT	WBT	Ø4	Ø8
Lane Configurations				
Traffic Volume (vph)	798	398		
Future Volume (vph)	798	398		
Lane Group Flow (vph)	887	442		
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	0.48	0.45		
Control Delay	9.9	10.5		
Queue Delay	0.0	0.0		
Total Delay	9.9	10.5		
LOS	A	B		
Approach Delay	9.9	10.5		
Approach LOS	A	B		
Queue Length 50th (m)	32.5	30.1		
Queue Length 95th (m)	45.6	50.0		
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	0.48	0.45		

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: 50	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.48	
Intersection Signal Delay: 10.1	Intersection LOS: B
Intersection Capacity Utilization 26.6%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 6: Ped Crossing & Richmond Rd





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	798	0	0	398	0	0	0	0	0	0	0
Future Volume (vph)	0	798	0	0	398	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	887	0	0	442	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	887	0	0	442	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		c0.26			0.25							
v/s Ratio Perm												
v/c Ratio		0.48			0.45							
Uniform Delay, d1		8.8			8.6							
Progression Factor		1.00			1.00							
Incremental Delay, d2		0.9			1.5							
Delay (s)		9.7			10.1							
Level of Service		A			B							
Approach Delay (s)		9.7			10.1			0.0			0.0	
Approach LOS		A			B			A			A	

Intersection Summary			
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	26.6%	ICU Level of Service	A
Analysis Period (min)	15		

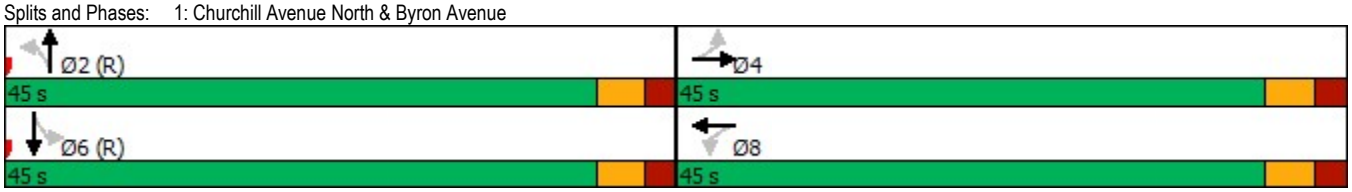
c Critical Lane Group

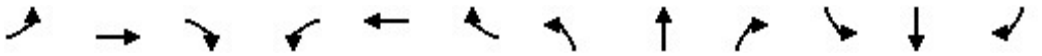
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	19	137	112	309	31	321	28	351
Future Volume (vph)	19	137	112	309	31	321	28	351
Lane Group Flow (vph)	0	227	0	525	34	436	31	449
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		4		8		2		6
Permitted Phases	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)		36.6		36.6	45.4	45.4	45.4	45.4
Actuated g/C Ratio		0.41		0.41	0.50	0.50	0.50	0.50
v/c Ratio		0.34		0.87	0.10	0.50	0.09	0.52
Control Delay		17.0		39.9	14.8	17.9	11.8	15.0
Queue Delay		0.0		0.0	0.0	0.0	0.0	0.9
Total Delay		17.0		39.9	14.8	17.9	11.8	16.0
LOS		B		D	B	B	B	B
Approach Delay		17.0		39.9		17.7		15.7
Approach LOS		B		D		B		B
Queue Length 50th (m)		23.6		80.8	3.2	50.6	2.7	44.9
Queue Length 95th (m)		39.1		#125.9	9.5	83.1	m4.9	69.3
Internal Link Dist (m)		244.6		113.6		126.7		100.0
Turn Bay Length (m)					30.0		30.0	
Base Capacity (vph)		736		675	329	869	349	866
Starvation Cap Reductn		0		0	0	0	0	195
Spillback Cap Reductn		0		0	0	0	0	0
Storage Cap Reductn		0		0	0	0	0	0
Reduced v/c Ratio		0.31		0.78	0.10	0.50	0.09	0.67

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: 0.87	
Intersection Signal Delay: 23.9	Intersection LOS: C
Intersection Capacity Utilization 79.1%	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

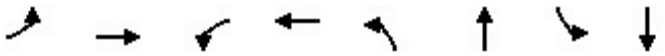




Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	19	137	49	112	309	52	31	321	71	28	351	53
Future Volume (vph)	19	137	49	112	309	52	31	321	71	28	351	53
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost 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)		1684			1710		1619	1707		1669	1706	
Flt Permitted		0.94			0.85		0.38	1.00		0.39	1.00	
Satd. Flow (perm)		1588			1472		653	1707		693	1706	
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	152	54	124	343	58	34	357	79	31	390	59
RTOR Reduction (vph)	0	14	0	0	5	0	0	8	0	0	5	0
Lane Group Flow (vph)	0	213	0	0	520	0	34	428	0	31	444	0
Confl. Peds. (#/hr)	3		11	11		3	40		5	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)		35.0			35.0		44.0	44.0		44.0	44.0	
Effective Green, g (s)		36.6			36.6		45.4	45.4		45.4	45.4	
Actuated g/C Ratio		0.41			0.41		0.50	0.50		0.50	0.50	
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)		645			598		329	861		349	860	
v/s Ratio Prot								0.25			c0.26	
v/s Ratio Perm		0.13			c0.35		0.05			0.04		
v/c Ratio		0.33			0.87		0.10	0.50		0.09	0.52	
Uniform Delay, d1		18.3			24.5		11.7	14.8		11.6	14.9	
Progression Factor		1.00			1.00		1.00	1.00		0.81	0.82	
Incremental Delay, d2		0.3			12.7		0.6	2.0		0.4	1.7	
Delay (s)		18.6			37.2		12.3	16.8		9.8	13.9	
Level of Service		B			D		B	B		A	B	
Approach Delay (s)		18.6			37.2			16.5			13.7	
Approach LOS		B			D			B			B	

Intersection Summary			
HCM 2000 Control Delay	22.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	79.1%	ICU Level of Service	D
Analysis Period (min)	15		

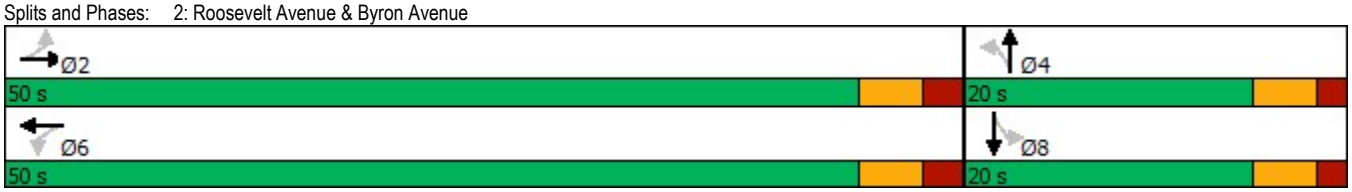
c Critical Lane Group

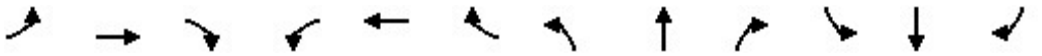


Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	13	153	22	299	6	21	31	22
Future Volume (vph)	13	153	22	299	6	21	31	22
Lane Group Flow (vph)	0	193	0	407	0	47	0	94
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		2		6		4		8
Permitted Phases	2		6		4		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)		54.1		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		4.3		5.1		17.4		19.1
Queue Delay		0.0		0.0		0.0		0.0
Total Delay		4.3		5.1		17.4		19.1
LOS		A		A		B		B
Approach Delay		4.3		5.1		17.4		19.1
Approach LOS		A		A		B		B
Queue Length 50th (m)		8.4		20.0		3.6		7.1
Queue Length 95th (m)		15.4		33.8		11.2		18.1
Internal Link Dist (m)		50.9		244.6		129.2		56.5
Turn Bay Length (m)								
Base Capacity (vph)		1275		1272		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 LOS: A
Intersection Capacity Utilization 45.1%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 2: Roosevelt Avenue & Byron Avenue





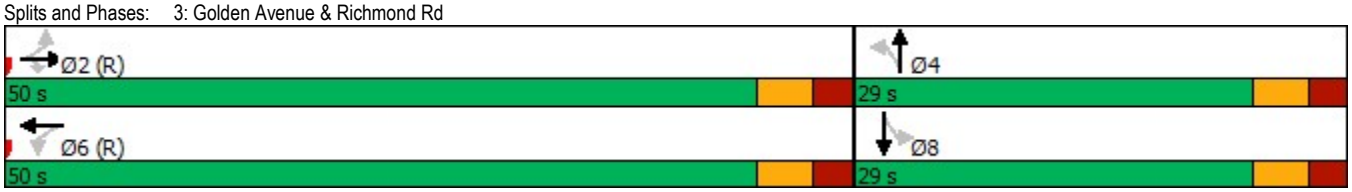
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	13	153	8	22	299	46	6	21	15	31	22	32
Future Volume (vph)	13	153	8	22	299	46	6	21	15	31	22	32
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)		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			0.98			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			1550	
Flt Permitted		0.97			0.98			0.96			0.88	
Satd. Flow (perm)		1695			1687			1558			1387	
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	170	9	24	332	51	7	23	17	34	24	36
RTOR Reduction (vph)	0	2	0	0	6	0	0	14	0	0	30	0
Lane Group Flow (vph)	0	191	0	0	401	0	0	33	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)		51.7			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)		1233			1227			253			225	
v/s Ratio Prot												
v/s Ratio Perm		0.11			c0.24			0.02			c0.05	
v/c Ratio		0.15			0.33			0.13			0.28	
Uniform Delay, d1		3.1			3.6			26.2			26.9	
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			27.6	
Level of Service		A			A			C			C	
Approach Delay (s)		3.3			4.3			26.4			27.6	
Approach LOS		A			A			C			C	

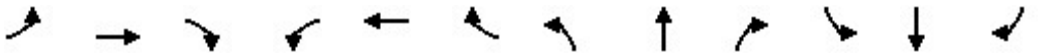
Intersection Summary			
HCM 2000 Control Delay	8.4	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.32		
Actuated Cycle Length (s)	73.1	Sum of lost time (s)	8.0
Intersection Capacity Utilization	45.1%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	357	21	44	655	67	1	6	3
Future Volume (vph)	357	21	44	655	67	1	6	3
Lane Group Flow (vph)	397	23	0	781	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	8.4	1.8		15.5		16.8		18.5
Queue Delay	0.0	0.0		1.0		0.0		0.0
Total Delay	8.4	1.8		16.5		16.8		18.5
LOS	A	A		B		B		B
Approach Delay	8.0			16.5		16.8		18.5
Approach LOS	A			B		B		B
Queue Length 50th (m)	30.3	0.0		86.3		9.4		1.1
Queue Length 95th (m)	48.0	1.9		139.9		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		124		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: 13.9	Intersection LOS: B
Intersection Capacity Utilization 87.1%	ICU Level of Service E
Analysis Period (min) 15	

Splits and Phases: 3: Golden Avenue & Richmond Rd





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	357	21	44	655	4	67	1	57	6	3	1
Future Volume (vph)	0	357	21	44	655	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	397	23	49	728	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	397	15	0	781	0	0	96	0	0	10	0
Confl. Peds. (#/hr)	66		77	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		c0.47			c0.07			0.01	
v/c Ratio		0.34	0.02		0.71			0.30			0.03	
Uniform Delay, d1		6.1	4.8		8.9			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)		7.0	4.8		12.8			24.8			22.7	
Level of Service		A	A		B			C			C	
Approach Delay (s)		6.8			12.8			24.8			22.7	
Approach LOS		A			B			C			C	

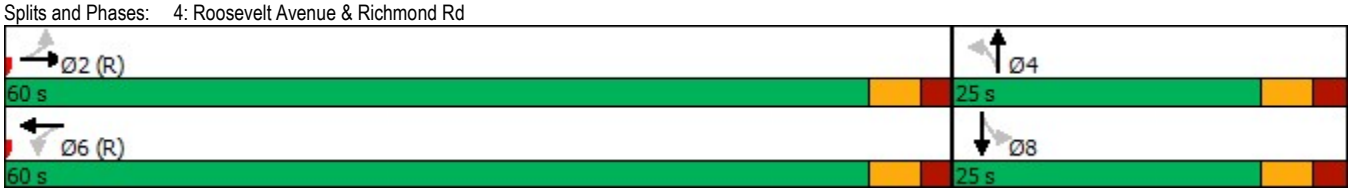
Intersection Summary			
HCM 2000 Control Delay	12.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	79.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	87.1%	ICU Level of Service	E
Analysis Period (min)	15		

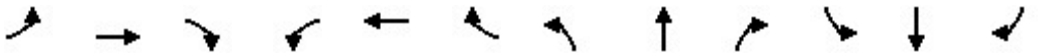
c Critical Lane Group

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	12	413	27	702	34	18	35	12
Future Volume (vph)	12	413	27	702	34	18	35	12
Lane Group Flow (vph)	0	496	0	854	0	111	0	71
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		0.39		0.68		0.40		0.28
Control Delay		6.6		11.5		20.5		24.0
Queue Delay		0.3		0.0		0.0		0.0
Total Delay		6.9		11.5		20.5		24.0
LOS		A		B		C		C
Approach Delay		6.9		11.5		20.5		24.0
Approach LOS		A		B		C		C
Queue Length 50th (m)		34.7		86.6		8.2		7.1
Queue Length 95th (m)		54.2		139.7		22.8		18.4
Internal Link Dist (m)		130.2		276.4		56.5		123.0
Turn Bay Length (m)								
Base Capacity (vph)		1268		1265		332		306
Starvation Cap Reductn		293		0		0		0
Spillback Cap Reductn		0		0		0		0
Storage Cap Reductn		0		0		0		0
Reduced v/c Ratio		0.51		0.68		0.33		0.23

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: 11.3	Intersection LOS: B
Intersection Capacity Utilization 77.3%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 4: Roosevelt Avenue & Richmond Rd





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	12	413	22	27	702	40	34	18	48	35	12	17
Future Volume (vph)	12	413	22	27	702	40	34	18	48	35	12	17
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			0.96	
Flt Protected		1.00			1.00			0.98			0.97	
Satd. Flow (prot)		1722			1719			1335			1401	
Flt Permitted		0.98			0.98			0.88			0.82	
Satd. Flow (perm)		1684			1679			1190			1183	
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)	13	459	24	30	780	44	38	20	53	39	13	19
RTOR Reduction (vph)	0	2	0	0	2	0	0	42	0	0	16	0
Lane Group Flow (vph)	0	494	0	0	852	0	0	69	0	0	55	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)		1228			1224			210			208	
v/s Ratio Prot												
v/s Ratio Perm		0.29			c0.51			c0.06			0.05	
v/c Ratio		0.40			0.70			0.33			0.27	
Uniform Delay, d1		4.4			6.3			30.6			30.2	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		1.0			3.3			0.9			0.7	
Delay (s)		5.4			9.6			31.5			30.9	
Level of Service		A			A			C			C	
Approach Delay (s)		5.4			9.6			31.5			30.9	
Approach LOS		A			A			C			C	

Intersection Summary			
HCM 2000 Control Delay	10.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	77.3%	ICU Level of Service	D
Analysis Period (min)	15		

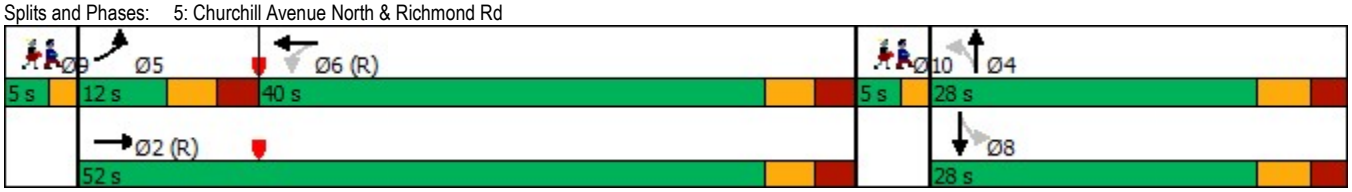
c Critical Lane Group

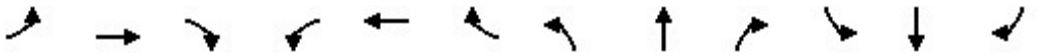
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	Ø9	Ø10
Lane Configurations										
Traffic Volume (vph)	163	303	132	458	30	288	24	271		
Future Volume (vph)	163	303	132	458	30	288	24	271		
Lane Group Flow (vph)	181	391	147	553	0	437	0	642		
Turn Type	Prot	NA	Perm	NA	Perm	NA	Perm	NA		
Protected Phases	5	2		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	58.9	36.5	36.5		23.1		23.1		
Actuated g/C Ratio	0.21	0.65	0.41	0.41		0.26		0.26		
v/c Ratio	0.53	0.36	0.49	0.79		0.69		0.79		
Control Delay	40.7	8.8	27.1	33.1		24.2		25.0		
Queue Delay	0.0	0.0	0.0	0.0		0.0		0.2		
Total Delay	40.7	8.8	27.1	33.1		24.2		25.3		
LOS	D	A	C	C		C		C		
Approach Delay		18.9		31.8		24.2		25.3		
Approach LOS		B		C		C		C		
Queue Length 50th (m)	29.4	27.4	19.6	85.8		17.5		34.2		
Queue Length 95th (m)	#64.2	53.3	39.4	#141.4		m27.1		50.7		
Internal Link Dist (m)		276.4		61.0		100.0		41.6		
Turn Bay Length (m)	40.0		45.0							
Base Capacity (vph)	344	1076	298	703		699		876		
Starvation Cap Reductn	0	0	0	0		0		0		
Spillback Cap Reductn	0	0	0	0		0		24		
Storage Cap Reductn	0	0	0	0		0		0		
Reduced v/c Ratio	0.53	0.36	0.49	0.79		0.63		0.75		

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: 90	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.79	
Intersection Signal Delay: 25.5	Intersection LOS: C
Intersection Capacity Utilization 84.9%	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





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	163	303	49	132	458	40	30	288	76	24	271	283
Future Volume (vph)	163	303	49	132	458	40	30	288	76	24	271	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		0.79	1.00			0.99			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	1637		1319	1726			3099			2628	
Flt Permitted	0.95	1.00		0.53	1.00			0.77			0.92	
Satd. Flow (perm)	1676	1637		737	1726			2382			2419	
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	337	54	147	509	44	33	320	84	27	301	314
RTOR Reduction (vph)	0	5	0	0	4	0	0	23	0	0	195	0
Lane Group Flow (vph)	181	386	0	147	549	0	0	414	0	0	447	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	56.8		34.3	34.3			20.9			20.9	
Effective Green, g (s)	18.5	58.9		36.4	36.4			23.1			23.1	
Actuated g/C Ratio	0.21	0.65		0.40	0.40			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)	344	1071		298	698			611			620	
v/s Ratio Prot	c0.11	0.24			c0.32							
v/s Ratio Perm				0.20				0.17			c0.18	
v/c Ratio	0.53	0.36		0.49	0.79			0.68			0.72	
Uniform Delay, d1	31.8	7.0		19.9	23.4			30.1			30.5	
Progression Factor	1.00	1.00		1.00	1.00			0.69			1.00	
Incremental Delay, d2	1.5	0.9		5.7	8.7			2.6			4.1	
Delay (s)	33.3	8.0		25.7	32.2			23.4			34.6	
Level of Service	C	A		C	C			C			C	
Approach Delay (s)		16.0			30.8			23.4			34.6	
Approach LOS		B			C			C			C	

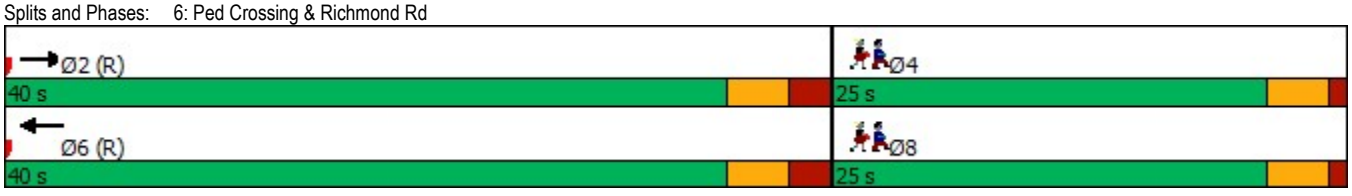
Intersection Summary			
HCM 2000 Control Delay	26.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	84.9%	ICU Level of Service	E
Analysis Period (min)	15		

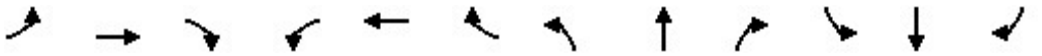
c Critical Lane Group

Lane Group	EBT	WBT	Ø4	Ø8
Lane Configurations				
Traffic Volume (vph)	585	811		
Future Volume (vph)	585	811		
Lane Group Flow (vph)	650	901		
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	30.9		
Queue Delay	0.0	0.0		
Total Delay	8.7	30.9		
LOS	A	C		
Approach Delay	8.7	30.9		
Approach LOS	A	C		
Queue Length 50th (m)	21.7	94.2		
Queue Length 95th (m)	31.4	#177.0		
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	0.35	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: 21.6	Intersection LOS: C
Intersection Capacity Utilization 48.4%	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





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	585	0	0	811	0	0	0	0	0	0	0
Future Volume (vph)	0	585	0	0	811	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	650	0	0	901	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	650	0	0	901	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			c0.51							
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			15.2							
Delay (s)		8.5			28.4							
Level of Service		A			C							
Approach Delay (s)		8.5			28.4			0.0			0.0	
Approach LOS		A			C			A			A	

Intersection Summary			
HCM 2000 Control Delay	20.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	65.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	48.4%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

E

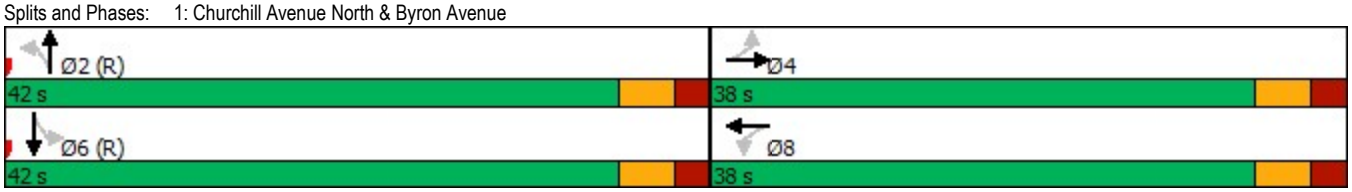
Appendix E – Total Projected Conditions Output Data

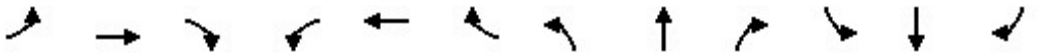
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	57	172	54	125	27	335	38	331
Future Volume (vph)	57	172	54	125	27	335	38	331
Lane Group Flow (vph)	0	317	0	258	30	449	42	400
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		4		8		2		6
Permitted Phases	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)		23.0		23.0	49.0	49.0	49.0	49.0
Actuated g/C Ratio		0.29		0.29	0.61	0.61	0.61	0.61
v/c Ratio		0.73		0.63	0.06	0.43	0.09	0.38
Control Delay		33.3		28.5	8.9	10.7	3.7	3.9
Queue Delay		0.0		0.0	0.0	0.0	0.0	0.3
Total Delay		33.3		28.5	8.9	10.7	3.7	4.2
LOS		C		C	A	B	A	A
Approach Delay		33.3		28.5		10.6		4.1
Approach LOS		C		C		B		A
Queue Length 50th (m)		42.7		32.3	1.8	32.4	1.2	12.2
Queue Length 95th (m)		61.3		48.9	6.6	68.4	m2.9	22.0
Internal Link Dist (m)		244.6		113.6		126.7		100.0
Turn Bay Length (m)					30.0		30.0	
Base Capacity (vph)		637		597	493	1049	458	1066
Starvation Cap Reductn		0		0	0	0	0	228
Spillback Cap Reductn		0		0	0	0	0	0
Storage Cap Reductn		0		0	0	0	0	0
Reduced v/c Ratio		0.50		0.43	0.06	0.43	0.09	0.48

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: 0.73	
Intersection Signal Delay: 16.6	Intersection LOS: B
Intersection Capacity Utilization 61.3%	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

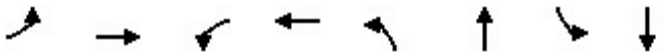




Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	57	172	57	54	125	53	27	335	69	38	331	29
Future Volume (vph)	57	172	57	54	125	53	27	335	69	38	331	29
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (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)		1684			1677		1607	1702		1614	1736	
Flt Permitted		0.87			0.81		0.47	1.00		0.44	1.00	
Satd. Flow (perm)		1475			1374		802	1702		745	1736	
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	191	63	60	139	59	30	372	77	42	368	32
RTOR Reduction (vph)	0	14	0	0	16	0	0	7	0	0	3	0
Lane Group Flow (vph)	0	303	0	0	242	0	30	442	0	42	397	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)		21.4			21.4		47.6	47.6		47.6	47.6	
Effective Green, g (s)		23.0			23.0		49.0	49.0		49.0	49.0	
Actuated g/C Ratio		0.29			0.29		0.61	0.61		0.61	0.61	
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)		424			395		491	1042		456	1063	
v/s Ratio Prot								c0.26			0.23	
v/s Ratio Perm		c0.21			0.18		0.04			0.06		
v/c Ratio		0.72			0.61		0.06	0.42		0.09	0.37	
Uniform Delay, d1		25.6			24.6		6.2	8.1		6.4	7.8	
Progression Factor		1.00			1.00		1.00	1.00		0.39	0.33	
Incremental Delay, d2		5.7			2.8		0.2	1.3		0.3	0.9	
Delay (s)		31.2			27.4		6.5	9.4		2.8	3.4	
Level of Service		C			C		A	A		A	A	
Approach Delay (s)		31.2			27.4			9.2			3.4	
Approach LOS		C			C			A			A	

Intersection Summary			
HCM 2000 Control Delay	15.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	61.3%	ICU Level of Service	B
Analysis Period (min)	15		

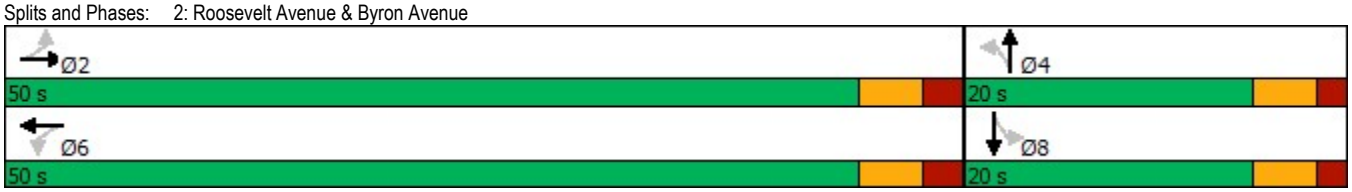
c Critical Lane Group

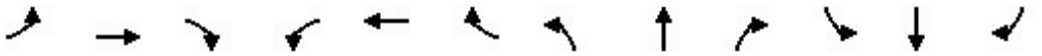


Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	36	233	14	148	4	32	26	22
Future Volume (vph)	36	233	14	148	4	32	26	22
Lane Group Flow (vph)	0	308	0	211	0	59	0	66
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		2		6		4		8
Permitted Phases	2		6		4		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)		55.6		55.6		13.0		13.0
Actuated g/C Ratio		0.81		0.81		0.19		0.19
v/c Ratio		0.23		0.16		0.18		0.23
Control Delay		4.0		3.4		18.6		21.7
Queue Delay		0.0		0.0		0.0		0.0
Total Delay		4.0		3.4		18.6		21.7
LOS		A		A		B		C
Approach Delay		4.0		3.4		18.6		21.7
Approach LOS		A		A		B		C
Queue Length 50th (m)		10.8		6.0		5.0		6.8
Queue Length 95th (m)		25.5		15.7		13.4		15.6
Internal Link Dist (m)		50.9		244.6		129.2		56.5
Turn Bay Length (m)								
Base Capacity (vph)		1347		1359		392		350
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		0.16		0.15		0.19

Intersection Summary	
Cycle Length: 70	
Actuated Cycle Length: 68.6	
Natural Cycle: 45	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.23	
Intersection Signal Delay: 6.9	Intersection LOS: A
Intersection Capacity Utilization 43.0%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 2: Roosevelt Avenue & Byron Avenue





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	36	233	8	14	148	28	4	32	17	26	22	12
Future Volume (vph)	36	233	8	14	148	28	4	32	17	26	22	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			1712			1648			1628	
Flt Permitted		0.95			0.97			0.98			0.88	
Satd. Flow (perm)		1661			1671			1616			1458	
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	259	9	16	164	31	4	36	19	29	24	13
RTOR Reduction (vph)	0	1	0	0	6	0	0	17	0	0	11	0
Lane Group Flow (vph)	0	307	0	0	205	0	0	42	0	0	55	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)		52.4			52.4			7.7			7.7	
Effective Green, g (s)		53.9			53.9			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)		1268			1275			199			179	
v/s Ratio Prot												
v/s Ratio Perm		c0.18			0.12			0.03			c0.04	
v/c Ratio		0.24			0.16			0.21			0.31	
Uniform Delay, d1		2.4			2.3			27.9			28.2	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		0.5			0.3			0.5			1.0	
Delay (s)		2.9			2.5			28.4			29.2	
Level of Service		A			A			C			C	
Approach Delay (s)		2.9			2.5			28.4			29.2	
Approach LOS		A			A			C			C	

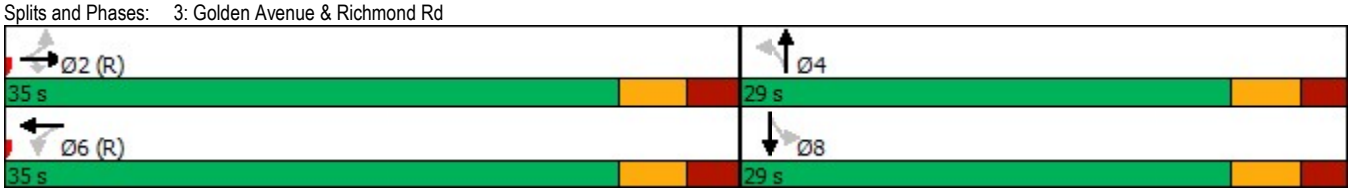
Intersection Summary			
HCM 2000 Control Delay	7.8	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.25		
Actuated Cycle Length (s)	70.6	Sum of lost time (s)	8.0
Intersection Capacity Utilization	43.0%	ICU Level of Service	A
Analysis Period (min)	15		

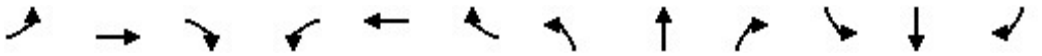
c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	2	477	28	46	285	49	2	1	4
Future Volume (vph)	2	477	28	46	285	49	2	1	4
Lane Group Flow (vph)	0	532	31	0	371	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		0.48	0.04		0.37		0.29		0.01
Control Delay		11.6	2.5		10.5		8.5		12.2
Queue Delay		0.0	0.0		0.0		0.0		0.0
Total Delay		11.6	2.5		10.5		8.5		12.2
LOS		B	A		B		A		B
Approach Delay		11.1			10.5		8.5		12.3
Approach LOS		B			B		A		B
Queue Length 50th (m)		45.1	0.0		28.7		4.3		0.4
Queue Length 95th (m)		74.6	2.8		49.8		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		991		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		0.48	0.04		0.37		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: 0.48	
Intersection Signal Delay: 10.6	Intersection LOS: B
Intersection Capacity Utilization 74.4%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 3: Golden Avenue & Richmond Rd





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	2	477	28	46	285	3	49	2	69	1	4	0
Future Volume (vph)	2	477	28	46	285	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		1743			1479			1729	
Flt Permitted		1.00	1.00		0.89			0.89			0.96	
Satd. Flow (perm)		1763	1371		1566			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	530	31	51	317	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	532	19	0	371	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		944			364			455	
v/s Ratio Prot												
v/s Ratio Perm		c0.30	0.01		0.24			c0.06			0.00	
v/c Ratio		0.50	0.02		0.39			0.21			0.01	
Uniform Delay, d1		7.2	5.1		6.6			18.0			17.0	
Progression Factor		1.00	1.00		1.00			1.00			1.00	
Incremental Delay, d2		1.7	0.1		1.2			0.3			0.0	
Delay (s)		8.9	5.2		7.8			18.3			17.0	
Level of Service		A	A		A			B			B	
Approach Delay (s)		8.7			7.8			18.3			17.0	
Approach LOS		A			A			B			B	

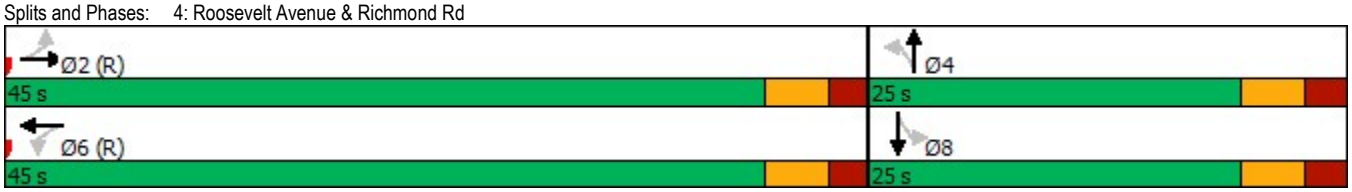
Intersection Summary			
HCM 2000 Control Delay	9.6	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.41		
Actuated Cycle Length (s)	64.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	74.4%	ICU Level of Service	D
Analysis Period (min)	15		

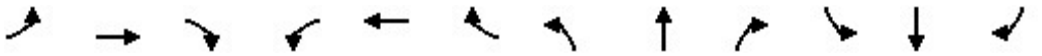
c Critical Lane Group

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	6	639	14	304	26	12	47	15
Future Volume (vph)	6	639	14	304	26	12	47	15
Lane Group Flow (vph)	0	728	0	390	0	78	0	85
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		0.26
Control Delay		10.9		7.1		13.5		18.8
Queue Delay		0.3		0.0		0.0		0.0
Total Delay		11.2		7.1		13.5		18.8
LOS		B		A		B		B
Approach Delay		11.2		7.1		13.5		18.8
Approach LOS		B		A		B		B
Queue Length 50th (m)		62.4		24.5		4.2		7.0
Queue Length 95th (m)		102.2		41.2		13.7		17.6
Internal Link Dist (m)		130.2		276.4		56.5		123.0
Turn Bay Length (m)								
Base Capacity (vph)		1225		1169		425		393
Starvation Cap Reductn		114		0		0		0
Spillback Cap Reductn		0		0		0		0
Storage Cap Reductn		0		0		0		0
Reduced v/c Ratio		0.66		0.33		0.18		0.22

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: 10.6	Intersection LOS: B
Intersection Capacity Utilization 60.2%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 4: Roosevelt Avenue & Richmond Rd





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	6	639	10	14	304	32	26	12	32	47	15	14
Future Volume (vph)	6	639	10	14	304	32	26	12	32	47	15	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		1.00			0.99			0.95			0.97	
Flpb, ped/bikes		1.00			1.00			0.96			0.96	
Frt		1.00			0.99			0.94			0.97	
Flt Protected		1.00			1.00			0.98			0.97	
Satd. Flow (prot)		1756			1718			1492			1560	
Flt Permitted		1.00			0.97			0.88			0.79	
Satd. Flow (perm)		1751			1667			1333			1275	
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)	7	710	11	16	338	36	29	13	36	52	17	16
RTOR Reduction (vph)	0	1	0	0	4	0	0	28	0	0	13	0
Lane Group Flow (vph)	0	727	0	0	386	0	0	50	0	0	72	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)		1175			1119			285			273	
v/s Ratio Prot												
v/s Ratio Perm		c0.42			0.23			0.04			c0.06	
v/c Ratio		0.62			0.34			0.17			0.27	
Uniform Delay, d1		6.5			4.9			22.4			22.9	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		2.5			0.8			0.3			0.5	
Delay (s)		8.9			5.8			22.7			23.4	
Level of Service		A			A			C			C	
Approach Delay (s)		8.9			5.8			22.7			23.4	
Approach LOS		A			A			C			C	

Intersection Summary			
HCM 2000 Control Delay	9.8	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	60.2%	ICU Level of Service	B
Analysis Period (min)	15		

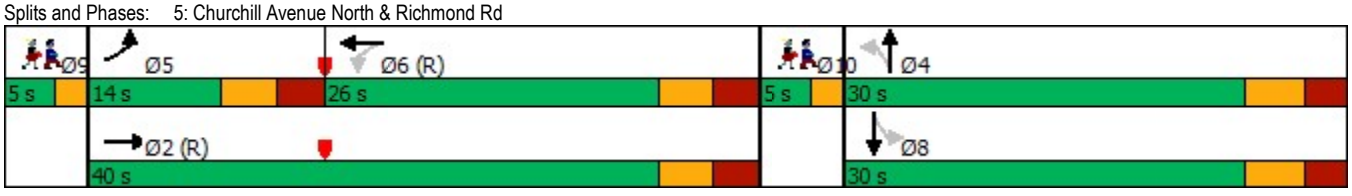
c Critical Lane Group

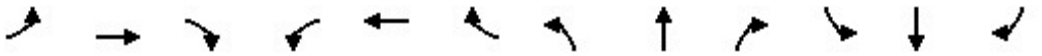
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	Ø9	Ø10
Lane Configurations										
Traffic Volume (vph)	265	402	51	190	28	286	33	337		
Future Volume (vph)	265	402	51	190	28	286	33	337		
Lane Group Flow (vph)	294	485	57	235	0	441	0	571		
Turn Type	Prot	NA	Perm	NA	Perm	NA	Perm	NA		
Protected Phases	5	2		6		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)	23.9	49.9	22.0	22.0		22.1		22.1		
Actuated g/C Ratio	0.30	0.62	0.28	0.28		0.28		0.28		
v/c Ratio	0.59	0.45	0.26	0.49		0.57		0.70		
Control Delay	32.1	10.4	26.5	27.7		19.4		26.8		
Queue Delay	0.0	0.0	0.0	0.0		0.0		0.0		
Total Delay	32.1	10.4	26.5	27.7		19.4		26.8		
LOS	C	B	C	C		B		C		
Approach Delay		18.6		27.5		19.4		26.8		
Approach LOS		B		C		B		C		
Queue Length 50th (m)	39.7	35.6	7.1	30.4		19.0		37.3		
Queue Length 95th (m)	#84.4	70.2	17.3	52.1		27.9		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)	499	1075	220	480		920		956		
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	0.59	0.45	0.26	0.49		0.48		0.60		

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: 22.3	Intersection LOS: C
Intersection Capacity Utilization 75.9%	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





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	265	402	34	51	190	22	28	286	83	33	337	144
Future Volume (vph)	265	402	34	51	190	22	28	286	83	33	337	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	1722		1560	1728			3140			3044	
Flt Permitted	0.95	1.00		0.49	1.00			0.85			0.90	
Satd. Flow (perm)	1676	1722		800	1728			2693			2738	
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	447	38	57	211	24	31	318	92	37	374	160
RTOR Reduction (vph)	0	3	0	0	5	0	0	32	0	0	55	0
Lane Group Flow (vph)	294	482	0	57	230	0	0	409	0	0	516	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)	21.8	47.8		19.9	19.9			19.9			19.9	
Effective Green, g (s)	23.9	49.9		22.0	22.0			22.1			22.1	
Actuated g/C Ratio	0.30	0.62		0.28	0.28			0.28			0.28	
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)	500	1074		220	475			743			756	
v/s Ratio Prot	c0.18	c0.28			0.13							
v/s Ratio Perm				0.07				0.15			c0.19	
v/c Ratio	0.59	0.45		0.26	0.48			0.55			0.68	
Uniform Delay, d1	23.9	7.9		22.6	24.3			24.7			25.8	
Progression Factor	1.00	1.00		1.00	1.00			0.77			1.00	
Incremental Delay, d2	1.8	1.4		2.8	3.5			0.8			2.6	
Delay (s)	25.6	9.2		25.5	27.8			19.9			28.4	
Level of Service	C	A		C	C			B			C	
Approach Delay (s)		15.4			27.3			19.9			28.4	
Approach LOS		B			C			B			C	

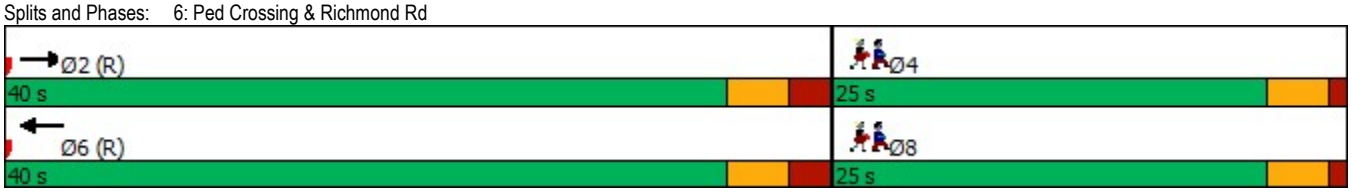
Intersection Summary			
HCM 2000 Control Delay	21.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	75.9%	ICU Level of Service	D
Analysis Period (min)	15		

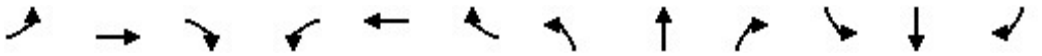
c Critical Lane Group

Lane Group	EBT	WBT	Ø4	Ø8
Lane Configurations				
Traffic Volume (vph)	799	400		
Future Volume (vph)	799	400		
Lane Group Flow (vph)	888	444		
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	0.48	0.45		
Control Delay	9.9	10.5		
Queue Delay	0.0	0.0		
Total Delay	9.9	10.5		
LOS	A	B		
Approach Delay	9.9	10.5		
Approach LOS	A	B		
Queue Length 50th (m)	32.5	30.4		
Queue Length 95th (m)	45.8	50.4		
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	0.48	0.45		

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: 50	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.48	
Intersection Signal Delay: 10.1	Intersection LOS: B
Intersection Capacity Utilization 26.6%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 6: Ped Crossing & Richmond Rd

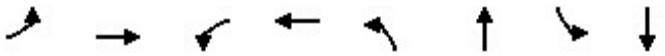




Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	799	0	0	400	0	0	0	0	0	0	0
Future Volume (vph)	0	799	0	0	400	0	0	0	0	0	0	0
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)		4.0			4.0							
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	888	0	0	444	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	888	0	0	444	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		c0.26			0.25							
v/s Ratio Perm												
v/c Ratio		0.48			0.45							
Uniform Delay, d1		8.8			8.6							
Progression Factor		1.00			1.00							
Incremental Delay, d2		0.9			1.5							
Delay (s)		9.7			10.2							
Level of Service		A			B							
Approach Delay (s)		9.7			10.2			0.0			0.0	
Approach LOS		A			B			A			A	

Intersection Summary			
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	26.6%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

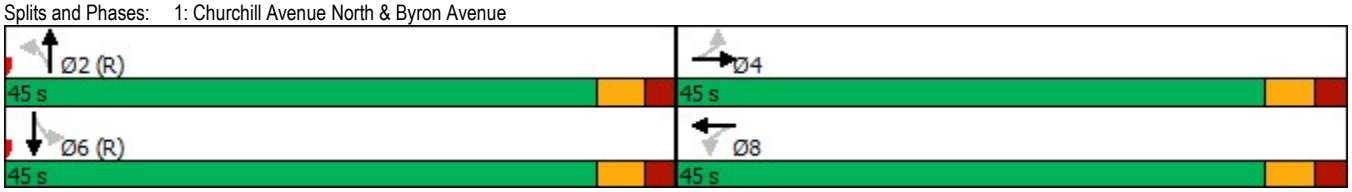


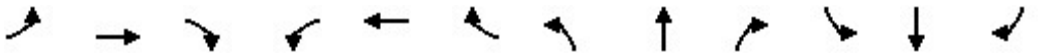
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	19	137	112	309	31	322	28	352
Future Volume (vph)	19	137	112	309	31	322	28	352
Lane Group Flow (vph)	0	227	0	525	34	437	31	450
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		4		8		2		6
Permitted Phases	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)		36.6		36.6	45.4	45.4	45.4	45.4
Actuated g/C Ratio		0.41		0.41	0.50	0.50	0.50	0.50
v/c Ratio		0.34		0.87	0.10	0.50	0.09	0.52
Control Delay		17.0		39.9	14.8	17.9	11.9	15.1
Queue Delay		0.0		0.0	0.0	0.0	0.0	0.9
Total Delay		17.0		39.9	14.8	17.9	11.9	16.0
LOS		B		D	B	B	B	B
Approach Delay		17.0		39.9		17.7		15.8
Approach LOS		B		D		B		B
Queue Length 50th (m)		23.6		80.8	3.2	50.8	2.7	45.1
Queue Length 95th (m)		39.1		#125.9	9.5	83.4	m4.9	70.5
Internal Link Dist (m)		244.6		113.6		126.7		100.0
Turn Bay Length (m)					30.0		30.0	
Base Capacity (vph)		736		675	329	869	348	866
Starvation Cap Reductn		0		0	0	0	0	195
Spillback Cap Reductn		0		0	0	0	0	0
Storage Cap Reductn		0		0	0	0	0	0
Reduced v/c Ratio		0.31		0.78	0.10	0.50	0.09	0.67

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: 0.87	
Intersection Signal Delay: 23.9	Intersection LOS: C
Intersection Capacity Utilization 79.1%	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





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	19	137	49	112	309	52	31	322	71	28	352	53
Future Volume (vph)	19	137	49	112	309	52	31	322	71	28	352	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)		1684			1710		1619	1707		1669	1706	
Flt Permitted		0.94			0.85		0.38	1.00		0.39	1.00	
Satd. Flow (perm)		1588			1472		652	1707		691	1706	
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	152	54	124	343	58	34	358	79	31	391	59
RTOR Reduction (vph)	0	14	0	0	5	0	0	8	0	0	5	0
Lane Group Flow (vph)	0	213	0	0	520	0	34	429	0	31	445	0
Confl. Peds. (#/hr)	3		11	11		3	40		5	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)		35.0			35.0		44.0	44.0		44.0	44.0	
Effective Green, g (s)		36.6			36.6		45.4	45.4		45.4	45.4	
Actuated g/C Ratio		0.41			0.41		0.50	0.50		0.50	0.50	
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)		645			598		328	861		348	860	
v/s Ratio Prot								0.25			c0.26	
v/s Ratio Perm		0.13			c0.35		0.05			0.04		
v/c Ratio		0.33			0.87		0.10	0.50		0.09	0.52	
Uniform Delay, d1		18.3			24.5		11.7	14.8		11.6	14.9	
Progression Factor		1.00			1.00		1.00	1.00		0.82	0.82	
Incremental Delay, d2		0.3			12.7		0.6	2.1		0.4	1.7	
Delay (s)		18.6			37.2		12.3	16.8		9.9	14.0	
Level of Service		B			D		B	B		A	B	
Approach Delay (s)		18.6			37.2			16.5			13.7	
Approach LOS		B			D			B			B	

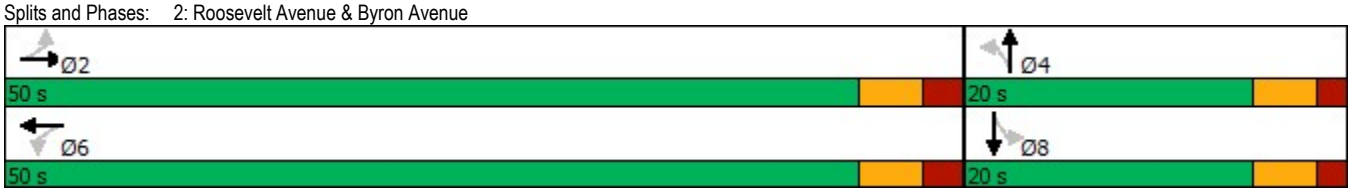
Intersection Summary			
HCM 2000 Control Delay	22.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	79.1%	ICU Level of Service	D
Analysis Period (min)	15		

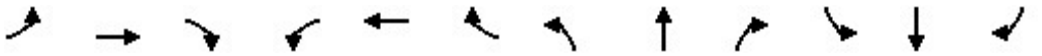
c Critical Lane Group

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	13	153	22	299	6	22	31	23
Future Volume (vph)	13	153	22	299	6	22	31	23
Lane Group Flow (vph)	0	193	0	407	0	48	0	96
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		0.15		0.32
Control Delay		4.3		5.1		17.6		19.2
Queue Delay		0.0		0.0		0.0		0.0
Total Delay		4.3		5.1		17.6		19.2
LOS		A		A		B		B
Approach Delay		4.3		5.1		17.6		19.2
Approach LOS		A		A		B		B
Queue Length 50th (m)		8.4		20.0		3.7		7.3
Queue Length 95th (m)		15.4		33.8		11.4		18.6
Internal Link Dist (m)		50.9		244.6		129.2		56.5
Turn Bay Length (m)								
Base Capacity (vph)		1274		1272		362		340
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: 71.9	
Natural Cycle: 45	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.32	
Intersection Signal Delay: 7.5	Intersection LOS: A
Intersection Capacity Utilization 45.1%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 2: Roosevelt Avenue & Byron Avenue





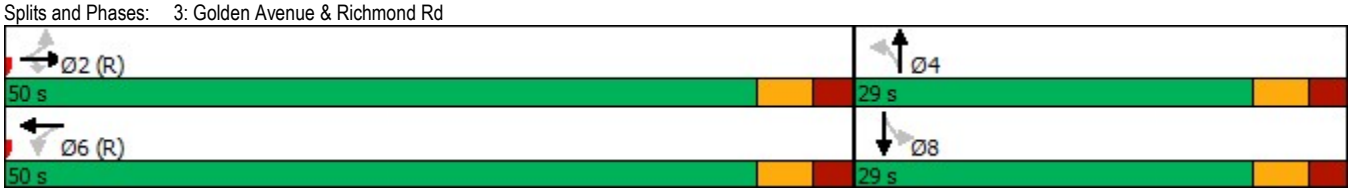
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	13	153	8	22	299	46	6	22	15	31	23	32
Future Volume (vph)	13	153	8	22	299	46	6	22	15	31	23	32
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)		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			1717			1622			1555	
Flt Permitted		0.97			0.98			0.96			0.88	
Satd. Flow (perm)		1695			1687			1562			1393	
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	170	9	24	332	51	7	24	17	34	26	36
RTOR Reduction (vph)	0	2	0	0	6	0	0	14	0	0	30	0
Lane Group Flow (vph)	0	191	0	0	401	0	0	34	0	0	66	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			254			227	
v/s Ratio Prot												
v/s Ratio Perm		0.11			c0.24			0.02			c0.05	
v/c Ratio		0.16			0.33			0.13			0.29	
Uniform Delay, d1		3.1			3.6			26.1			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			27.6	
Level of Service		A			A			C			C	
Approach Delay (s)		3.3			4.3			26.4			27.6	
Approach LOS		A			A			C			C	

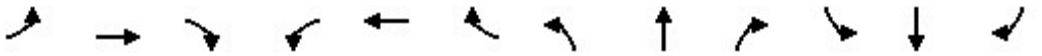
Intersection Summary			
HCM 2000 Control Delay	8.5	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.32		
Actuated Cycle Length (s)	73.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	45.1%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	360	21	44	657	67	1	6	3
Future Volume (vph)	360	21	44	657	67	1	6	3
Lane Group Flow (vph)	400	23	0	783	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	0.35	0.03		0.71		0.39		0.03
Control Delay	8.4	1.8		15.6		16.8		18.5
Queue Delay	0.0	0.0		1.0		0.0		0.0
Total Delay	8.4	1.8		16.6		16.8		18.5
LOS	A	A		B		B		B
Approach Delay	8.0			16.6		16.8		18.5
Approach LOS	A			B		B		B
Queue Length 50th (m)	30.6	0.0		86.7		9.4		1.1
Queue Length 95th (m)	48.6	1.9		140.8		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		124		0		0
Spillback Cap Reductn	0	0		0		0		0
Storage Cap Reductn	0	0		0		0		0
Reduced v/c Ratio	0.35	0.03		0.81		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: 14.0	Intersection LOS: B
Intersection Capacity Utilization 87.4%	ICU Level of Service E
Analysis Period (min) 15	

Splits and Phases: 3: Golden Avenue & Richmond Rd





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	360	21	44	657	4	67	1	57	6	3	1
Future Volume (vph)	0	360	21	44	657	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		1678			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	400	23	49	730	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	400	15	0	783	0	0	96	0	0	10	0
Confl. Peds. (#/hr)	66		77	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		0.23										
v/s Ratio Perm			0.01		c0.47			c0.07			0.01	
v/c Ratio		0.35	0.02		0.71			0.30			0.03	
Uniform Delay, d1		6.1	4.8		8.9			24.3			22.6	
Progression Factor		1.00	1.00		1.00			1.00			1.00	
Incremental Delay, d2		0.8	0.0		4.0			0.5			0.0	
Delay (s)		7.0	4.8		12.9			24.8			22.7	
Level of Service		A	A		B			C			C	
Approach Delay (s)		6.9			12.9			24.8			22.7	
Approach LOS		A			B			C			C	

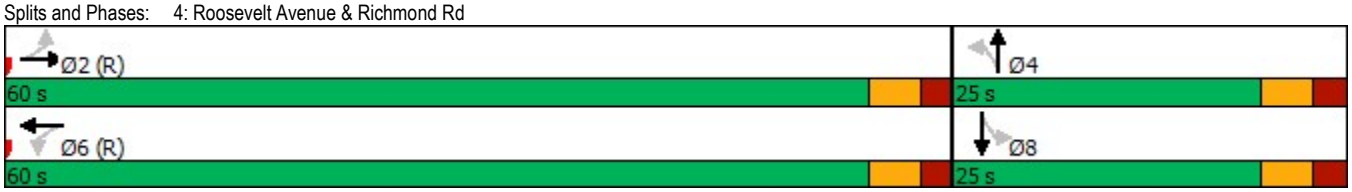
Intersection Summary			
HCM 2000 Control Delay	12.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	79.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	87.4%	ICU Level of Service	E
Analysis Period (min)	15		

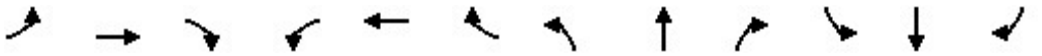
c Critical Lane Group

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	15	413	27	701	34	19	41	13
Future Volume (vph)	15	413	27	701	34	19	41	13
Lane Group Flow (vph)	0	500	0	865	0	112	0	82
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		0.40		0.69		0.40		0.33
Control Delay		6.7		11.9		20.4		25.1
Queue Delay		0.3		0.0		0.0		0.0
Total Delay		7.0		11.9		20.4		25.1
LOS		A		B		C		C
Approach Delay		7.0		11.9		20.4		25.1
Approach LOS		A		B		C		C
Queue Length 50th (m)		35.4		89.1		8.3		8.4
Queue Length 95th (m)		55.0		145.2		22.9		20.8
Internal Link Dist (m)		130.2		276.4		56.5		123.0
Turn Bay Length (m)								
Base Capacity (vph)		1255		1258		338		298
Starvation Cap Reductn		284		0		0		0
Spillback Cap Reductn		0		0		0		0
Storage Cap Reductn		0		0		0		0
Reduced v/c Ratio		0.51		0.69		0.33		0.28

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: 0.69	
Intersection Signal Delay: 11.6	Intersection LOS: B
Intersection Capacity Utilization 76.8%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 4: Roosevelt Avenue & Richmond Rd





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	413	22	27	701	50	34	19	48	41	13	20
Future Volume (vph)	15	413	22	27	701	50	34	19	48	41	13	20
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			0.98			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)		1721			1711			1342			1398	
Flt Permitted		0.97			0.98			0.89			0.80	
Satd. Flow (perm)		1666			1671			1216			1149	
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)	17	459	24	30	779	56	38	21	53	46	14	22
RTOR Reduction (vph)	0	2	0	0	2	0	0	42	0	0	17	0
Lane Group Flow (vph)	0	498	0	0	863	0	0	70	0	0	65	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)		1215			1218			214			202	
v/s Ratio Prot												
v/s Ratio Perm		0.30			c0.52			c0.06			0.06	
v/c Ratio		0.41			0.71			0.33			0.32	
Uniform Delay, d1		4.4			6.4			30.6			30.6	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		1.0			3.5			0.9			0.9	
Delay (s)		5.5			9.9			31.5			31.5	
Level of Service		A			A			C			C	
Approach Delay (s)		5.5			9.9			31.5			31.5	
Approach LOS		A			A			C			C	

Intersection Summary			
HCM 2000 Control Delay	11.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	76.8%	ICU Level of Service	D
Analysis Period (min)	15		

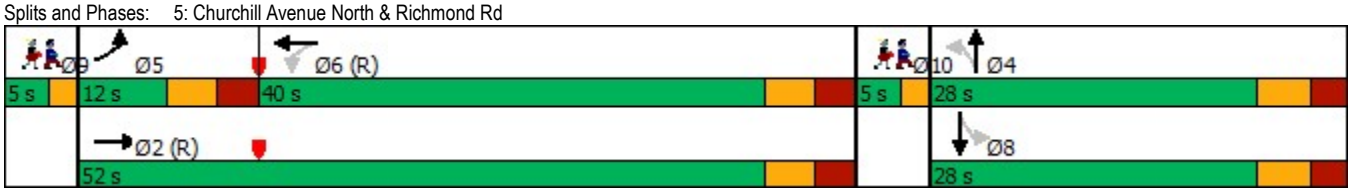
c Critical Lane Group

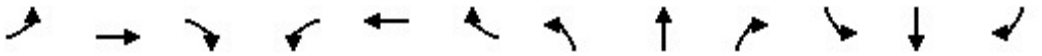
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	Ø9	Ø10
Lane Configurations										
Traffic Volume (vph)	164	307	132	465	31	288	24	271		
Future Volume (vph)	164	307	132	465	31	288	24	271		
Lane Group Flow (vph)	182	397	147	561	0	438	0	644		
Turn Type	Prot	NA	Perm	NA	Perm	NA	Perm	NA		
Protected Phases	5	2		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	58.9	36.3	36.3		23.1		23.1		
Actuated g/C Ratio	0.21	0.65	0.40	0.40		0.26		0.26		
v/c Ratio	0.53	0.37	0.50	0.80		0.70		0.79		
Control Delay	40.7	8.9	27.3	34.1		24.3		24.9		
Queue Delay	0.0	0.0	0.0	0.0		0.0		0.2		
Total Delay	40.7	8.9	27.3	34.1		24.3		25.2		
LOS	D	A	C	C		C		C		
Approach Delay		18.9		32.7		24.3		25.2		
Approach LOS		B		C		C		C		
Queue Length 50th (m)	29.6	28.1	19.6	87.6		17.5		34.2		
Queue Length 95th (m)	#64.6	54.4	39.4	#144.5		m27.3		50.8		
Internal Link Dist (m)		276.4		61.0		100.0		41.6		
Turn Bay Length (m)	40.0		45.0							
Base Capacity (vph)	345	1074	296	700		693		876		
Starvation Cap Reductn	0	0	0	0		0		0		
Spillback Cap Reductn	0	0	0	0		0		24		
Storage Cap Reductn	0	0	0	0		0		0		
Reduced v/c Ratio	0.53	0.37	0.50	0.80		0.63		0.76		

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: 90	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.80	
Intersection Signal Delay: 25.7	Intersection LOS: C
Intersection Capacity Utilization 85.4%	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





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	164	307	50	132	465	40	31	288	76	24	271	284
Future Volume (vph)	164	307	50	132	465	40	31	288	76	24	271	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			0.99			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	1635		1322	1726			3099			2626	
Flt Permitted	0.95	1.00		0.53	1.00			0.76			0.92	
Satd. Flow (perm)	1676	1635		735	1726			2363			2417	
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	341	56	147	517	44	34	320	84	27	301	316
RTOR Reduction (vph)	0	5	0	0	4	0	0	23	0	0	197	0
Lane Group Flow (vph)	182	392	0	147	557	0	0	415	0	0	447	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	56.8		34.3	34.3			20.9			20.9	
Effective Green, g (s)	18.5	58.9		36.4	36.4			23.1			23.1	
Actuated g/C Ratio	0.21	0.65		0.40	0.40			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)	344	1070		297	698			606			620	
v/s Ratio Prot	c0.11	0.24			c0.32							
v/s Ratio Perm				0.20				0.18			c0.18	
v/c Ratio	0.53	0.37		0.49	0.80			0.68			0.72	
Uniform Delay, d1	31.9	7.1		20.0	23.6			30.2			30.5	
Progression Factor	1.00	1.00		1.00	1.00			0.69			1.00	
Incremental Delay, d2	1.5	1.0		5.8	9.3			2.8			4.1	
Delay (s)	33.3	8.0		25.7	32.9			23.6			34.6	
Level of Service	C	A		C	C			C			C	
Approach Delay (s)		16.0			31.4			23.6			34.6	
Approach LOS		B			C			C			C	

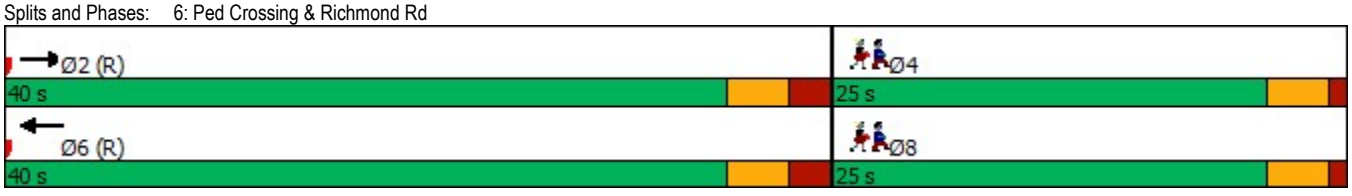
Intersection Summary			
HCM 2000 Control Delay	27.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	85.4%	ICU Level of Service	E
Analysis Period (min)	15		

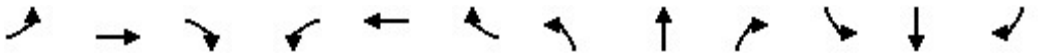
c Critical Lane Group

Lane Group	EBT	WBT	Ø4	Ø8
Lane Configurations				
Traffic Volume (vph)	588	813		
Future Volume (vph)	588	813		
Lane Group Flow (vph)	653	903		
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	31.2		
Queue Delay	0.0	0.0		
Total Delay	8.7	31.2		
LOS	A	C		
Approach Delay	8.7	31.2		
Approach LOS	A	C		
Queue Length 50th (m)	21.8	94.6		
Queue Length 95th (m)	31.5	#177.8		
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	0.35	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: 21.7	Intersection LOS: C
Intersection Capacity Utilization 48.5%	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





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	588	0	0	813	0	0	0	0	0	0	0
Future Volume (vph)	0	588	0	0	813	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	653	0	0	903	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	653	0	0	903	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			c0.51							
v/s Ratio Perm												
v/c Ratio		0.35			0.92							
Uniform Delay, d1		8.0			13.3							
Progression Factor		1.00			1.00							
Incremental Delay, d2		0.5			15.5							
Delay (s)		8.6			28.7							
Level of Service		A			C							
Approach Delay (s)		8.6			28.7			0.0			0.0	
Approach LOS		A			C			A			A	

Intersection Summary			
HCM 2000 Control Delay	20.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	65.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	48.5%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

F

Appendix F - Transportation Demand Management (TDM) Supportive Development Design and Infrastructure Checklist

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. 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)
- *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)

▶ *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)

Legend

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

		TDM-supportive design & infrastructure measures: *Non-residential developments*	Check if completed & add descriptions, explanations or plan/drawing references
	1.	**WALKING & CYCLING: ROUTES**	
	1.1	**Building location & access points**	
BASIC	1.1.1	Locate building close to the street, and do not locate parking areas between the street and building entrances	✓
BASIC	1.1.2	Locate building entrances in order to minimize walking distances to sidewalks and transit stops/stations	✓
BASIC	1.1.3	Locate building doors and windows to ensure visibility of pedestrians from the building, for their security and comfort	✓
	1.2	**Facilities for walking & cycling**	
REQUIRED	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 *(see Official Plan policy 4.3.3)*	✓
REQUIRED	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 *(see Official Plan policy 4.3.12)*	✓

		TDM-supportive design & infrastructure measures: *Non-residential developments*	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 *(see Official Plan policy 4.3.10)*	✓
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 *(see Official Plan policy 4.3.10)*	✓
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 *(see Official Plan policy 4.3.11)*	✓
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	☐
	1.3	**Amenities for walking & cycling**	
BASIC	1.3.1	Provide lighting, landscaping and benches along walking and cycling routes between building entrances and streets, sidewalks and trails	☐
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)	☐

		TDM-supportive design & infrastructure measures: *Non-residential developments*	Check if completed & add descriptions, explanations or plan/drawing references
	2.	**WALKING & CYCLING: END-OF-TRIP FACILITIES**	
	2.1	**Bicycle parking**	
REQUIRED	2.1.1	Provide bicycle parking in highly visible and lighted areas, sheltered from the weather wherever possible *(see Official Plan policy 4.3.6)*	✓
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 *(see Zoning By-law Section 111)*	✓
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 *(see Zoning By-law Section 111)*	✓
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	☐
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	☐
	2.2	**Secure bicycle parking**	
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 *(see Zoning By-law Section 111)*	☐
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)	☐
	2.3	**Shower & change facilities**	
BASIC	2.3.1	Provide shower and change facilities for the use of active commuters	☐
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	☐
	2.4	**Bicycle repair station**	
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)	☐

	TDM-supportive design & infrastructure measures: *Non-residential developments*		Check if completed & add descriptions, explanations or plan/drawing references
	3.	**TRANSIT**	
	3.1	**Customer amenities**	
BASIC	3.1.1	Provide shelters, lighting and benches at any on-site transit stops	☐
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	☐
BETTER	3.1.3	Provide a secure and comfortable interior waiting area by integrating any on-site transit stops into the building	☐
	4.	**RIDESHARING**	
	4.1	**Pick-up & drop-off facilities**	
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	☐
	4.2	**Carpool parking**	
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	☐
BETTER	4.2.2	At large developments, provide spaces for carpools in a separate, access-controlled parking area to simplify enforcement	☐
	5.	**CARSHARING & BIKESHARING**	
	5.1	**Carshare parking spaces**	
BETTER	5.1.1	Provide carshare parking spaces in permitted non-residential zones, occupying either required or provided parking spaces *(see Zoning By-law Section 94)*	☐
	5.2	**Bikeshare station location**	
BETTER	5.2.1	Provide a designated bikeshare station area near a major building entrance, preferably lighted and sheltered with a direct walkway connection	☐

		TDM-supportive design & infrastructure measures: *Non-residential developments*	Check if completed & add descriptions, explanations or plan/drawing references
	6.	**PARKING**	
	6.1	**Number of parking spaces**	
REQUIRED	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	✓
BASIC	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	☐
BASIC	6.1.3	Where a site features more than one use, provide shared parking and reduce the cumulative number of parking spaces accordingly *(see Zoning By-law Section 104)*	☐
BETTER	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 Zoning By-law Section 111)*	☐
	6.2	**Separate long-term & short-term parking areas**	
BETTER	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)	☐
	7.	**OTHER**	
	7.1	**On-site amenities to minimize off-site trips**	
BETTER	7.1.1	Provide on-site amenities to minimize mid-day or mid-commute errands	☐

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

Legend

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

		TDM-supportive design & infrastructure measures: *Residential developments*	Check if completed & add descriptions, explanations or plan/drawing references
	1.	**WALKING & CYCLING: ROUTES**	
	1.1	**Building location & access points**	
BASIC	1.1.1	Locate building close to the street, and do not locate parking areas between the street and building entrances	✓
BASIC	1.1.2	Locate building entrances in order to minimize walking distances to sidewalks and transit stops/stations	✓
BASIC	1.1.3	Locate building doors and windows to ensure visibility of pedestrians from the building, for their security and comfort	✓
	1.2	**Facilities for walking & cycling**	
REQUIRED	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 *(see Official Plan policy 4.3.3)*	✓
REQUIRED	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 *(see Official Plan policy 4.3.12)*	✓

		TDM-supportive design & infrastructure measures: *Residential developments*	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 *(see Official Plan policy 4.3.10)*	✓
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 *(see Official Plan policy 4.3.10)*	✓
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 *(see Official Plan policy 4.3.11)*	✓
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	☐
	1.3	**Amenities for walking & cycling**	
BASIC	1.3.1	Provide lighting, landscaping and benches along walking and cycling routes between building entrances and streets, sidewalks and trails	✓
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)	☐

		TDM-supportive design & infrastructure measures: *Residential developments*	Check if completed & add descriptions, explanations or plan/drawing references
	2.	**WALKING & CYCLING: END-OF-TRIP FACILITIES**	
	2.1	**Bicycle parking**	
REQUIRED	2.1.1	Provide bicycle parking in highly visible and lighted areas, sheltered from the weather wherever possible *(see Official Plan policy 4.3.6)*	✓
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 *(see Zoning By-law Section 111)*	☐
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 *(see Zoning By-law Section 111)*	☐
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	☐
	2.2	**Secure bicycle parking**	
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 *(see Zoning By-law Section 111)*	☐
BETTER	2.2.2	Provide secure bicycle parking spaces equivalent to at least the number of units at condominiums or multi-family residential developments	☐
	2.3	**Bicycle repair station**	
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)	☐
	3.	**TRANSIT**	
	3.1	**Customer amenities**	
BASIC	3.1.1	Provide shelters, lighting and benches at any on-site transit stops	☐
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	☐
BETTER	3.1.3	Provide a secure and comfortable interior waiting area by integrating any on-site transit stops into the building	☐

	TDM-supportive design & infrastructure measures: *Residential developments*		Check if completed & add descriptions, explanations or plan/drawing references
	4.	**RIDESHARING**	
	4.1	**Pick-up & drop-off facilities**	
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	☐
	5.	**CARSHARING & BIKESHARING**	
	5.1	**Carshare parking spaces**	
BETTER	5.1.1	Provide up to three carshare parking spaces in an R3, R4 or R5 Zone for specified residential uses *(see Zoning By-law Section 94)*	☐
	5.2	**Bikeshare station location**	
BETTER	5.2.1	Provide a designated bikeshare station area near a major building entrance, preferably lighted and sheltered with a direct walkway connection	☐
	6.	**PARKING**	
	6.1	**Number of parking spaces**	
REQUIRED	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	✓
BASIC	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	☐
BASIC	6.1.3	Where a site features more than one use, provide shared parking and reduce the cumulative number of parking spaces accordingly *(see Zoning By-law Section 104)*	☐
BETTER	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 Zoning By-law Section 111)*	☐
	6.2	**Separate long-term & short-term parking areas**	
BETTER	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)	☐

G

Appendix G - Segment MMLOS

SEGMENTS		LOS	Richmond Chur/Roos	Richmond Roos/Gold	Roosevelt Rich/Byro	Churchill Rich/Byro	Byron S Chur/Roos	Byron N Chur/Roos	Richmond S Gold/Ped	Richmond N Gold/Ped
Pedestrian	Sidewalk Width Boulevard Width	C	≥ 2 m < 0.5	≥ 2 m < 0.5	≥ 2 m < 0.5	≥ 2 m < 0.5	1.5 m 0.5 - 2 m	no sidewalk n/a	≥ 2 m > 2 m	≥ 2 m < 0.5
	Avg Daily Curb Lane Traffic Volume		> 3000	> 3000	≤ 3000	≤ 3000	≤ 3000	≤ 3000	> 3000	> 3000
	Operating Speed On-Street Parking		> 30 to 50 km/h yes	> 30 to 50 km/h yes	> 30 to 50 km/h no	> 30 to 50 km/h yes	> 30 to 50 km/h no	> 30 to 50 km/h no	> 30 to 50 km/h no	> 30 to 50 km/h 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**
Auto	**Level of Service**	**Not Applicable**								

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	**0.47**

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	78%
02 - Non-fatal inj	0	0	1	0	0	0	1	0	2	22%
01 - Fatal injury	0	0	0	0	0	0	0	0	0	0%
Total	**0**	**0**	**2**	**3**	**1**	**2**	**1**	**0**	**9**	100%
	0%	0%	29%	29%	14%	14%	14%	0%		

RICHMOND RD btwn GOLDEN AVE & ROOSEVELT AVE

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

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	83%
02 - Non-fatal inj	0	0	3	0	1	0	0	0	4	17%
01 - Fatal injury	0	0	0	0	0	0	0	0	0	0%
Total	**0**	**1**	**6**	**4**	**2**	**7**	**0**	**3**	**23**	100%
	0%	4%	26%	17%	9%	30%	0%	13%		

BYRON AVE @ CHURCHILL AVE

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

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	100%
02 - Non-fatal inj	0	0	0	0	0	0	0	0	0	0%
01 - Fatal injury	0	0	0	0	0	0	0	0	0	0%
Total	**0**	**1**	**3**	**0**	**2**	**0**	**0**	**1**	**7**	100%
	0%	14%	43%	0%	29%	0%	0%	14%		

BYRON AVE @ ROOSEVELT AVE

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

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	67%
02 - Non-fatal inj	0	3	0	0	1	0	0	0	4	33%
01 - Fatal injury	0	0	0	0	0	0	0	0	0	0%
Total	**0**	**8**	**0**	**0**	**2**	**0**	**0**	**2**	**12**	100%
	0%	67%	0%	0%	17%	0%	0%	17%		

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	**0.11**

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	100%
02 - Non-fatal inj	0	0	0	0	0	0	0	0	0	0%
01 - Fatal injury	0	0	0	0	0	0	0	0	0	0%
Total	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**1**	100%
	0%	0%	0%	0%	0%	100%	0%	0%		

ROOSEVELT AVE btwn BYRON AVE & RICHMOND RD

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

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	100%
02 - Non-fatal inj	0	0	0	0	0	0	0	0	0	0%
01 - Fatal injury	0	0	0	0	0	0	0	0	0	0%
Total	**0**	**2**	**0**	**0**	**0**	**0**	**0**	**2**	**4**	100%
	0%	50%	0%	0%	0%	0%	0%	50%		

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	4	4	4	4	0 - 2	0 - 2	4	4	0 - 2	3	4	4	3	3	0 - 2	0 - 2	3	3	0 - 2	0 - 2	4	4	0	0
	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	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
	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	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		
	PETSI Score	**58**	**58**	**66**	**66**	**85**	**85**	**53**	**53**	**85**	**70**	**53**	**53**	**70**	**70**	**85**	**85**	**73**	**73**	**88**	**88**	**79**	**79**		
	Ped. Exposure to Traffic LoS	**D**	**D**	**C**	**C**	**B**	**B**	**D**	**D**	**B**	**C**	**D**	**D**	**C**	**C**	**B**	**B**	**C**	**C**	**B**	**B**	**B**	**B**	**-**	**-**
	Cycle Length	30	30	40	40	25	25	45	45	29	29	35	35	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	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**	**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**	**A**	**A**	**B**	**B**	**B**	**B**	**B**	**B**	**A**	**A**	**A**	**A**
	Level of Service	**D**	**D**	**C**	**C**	**B**	**B**	**D**	**D**	**B**	**C**	**D**	**D**	**C**	**C**	**B**	**B**	**C**	**C**	**B**	**B**	**B**	**B**	**A**	**A**
		D				**D**				**D**				**C**				**C**				**B**			
Approach From		**NORTH**	**SOUTH**	**EAST**	**WEST**	**NORTH**	**SOUTH**	**EAST**	**WEST**	**NORTH**	**SOUTH**	**EAST**	**WEST**	**NORTH**	**SOUTH**	**EAST**	**WEST**	**NORTH**	**SOUTH**	**EAST**	**WEST**	**NORTH**	**SOUTH**	**EAST**	**WEST**
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
	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
	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
	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	≥ 2 lanes crossed	≥ 2 lanes 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
	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**
		D				**D**				**D**				**D**				**E**				**D**			
Transit	Average Signal Delay	≤ 30 sec	≤ 30 sec	≤ 30 sec	≤ 30 sec			≤ 10 sec	≤ 10 sec			≤ 10 sec	≤ 10 sec					≤ 20 sec	≤ 10 sec					≤ 10 sec	≤ 10 sec
	Level of Service	**D**	**D**	**D**	**D**	**-**	**-**	**B**	**B**	**-**	**-**	**B**	**B**	**-**	**-**	**-**	**-**	**C**	**B**	**-**	**-**	**-**	**-**	**B**	**B**
		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				
	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				
	Level of Service	**E**	**E**	**E**	**E**	**E**	**E**	**E**	**E**	**E**	**E**	**E**	**E**	**-**	**-**	**E**	**E**	**E**	**E**	**-**	**E**	**-**	**-**	**-**	**-**
		E				**E**				**E**				**E**				**E**				**-**			
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**			

J

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.

▶ *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, 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.
- *Ridesharin*g—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)

Legend

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

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

			TDM measures: *Non-residential developments*	Check if proposed & add descriptions
		3.	**TRANSIT**	
		3.1	**Transit information**	
BASIC		3.1.1	Display relevant transit schedules and route maps at entrances	☐
BASIC		3.1.2	Provide online links to OC Transpo and STO information	☐
BETTER		3.1.3	Provide real-time arrival information display at entrances	☐
		3.2	**Transit fare incentives**	
			Commuter travel	
BETTER		3.2.1	Offer preloaded PRESTO cards to encourage commuters to use transit	☐
BETTER	★	3.2.2	Subsidize or reimburse monthly transit pass purchases by employees	☐
			Visitor travel	
BETTER		3.2.3	Arrange inclusion of same-day transit fare in price of tickets (e.g. for festivals, concerts, games)	☐
		3.3	**Enhanced public transit service**	
			Commuter travel	
BETTER		3.3.1	Contract with OC Transpo to provide enhanced transit services (e.g. for shift changes, weekends)	☐
			Visitor travel	
BETTER		3.3.2	Contract with OC Transpo to provide enhanced transit services (e.g. for festivals, concerts, games)	☐
		3.4	**Private transit service**	
			Commuter travel	
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)	☐
			Visitor travel	
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)	☐

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

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

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

Legend

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

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

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

			TDM measures: *Residential developments*	Check if proposed & add descriptions
		6.	**TDM MARKETING & COMMUNICATIONS**	
		6.1	**Multimodal travel information**	
BASIC	★	6.1.1	Provide a multimodal travel option information package to new residents	☐
		6.2	**Personalized trip planning**	
BETTER	★	6.2.1	Offer personalized trip planning to new residents	☐

K

Appendix K - Transit Map

11

Fréquent

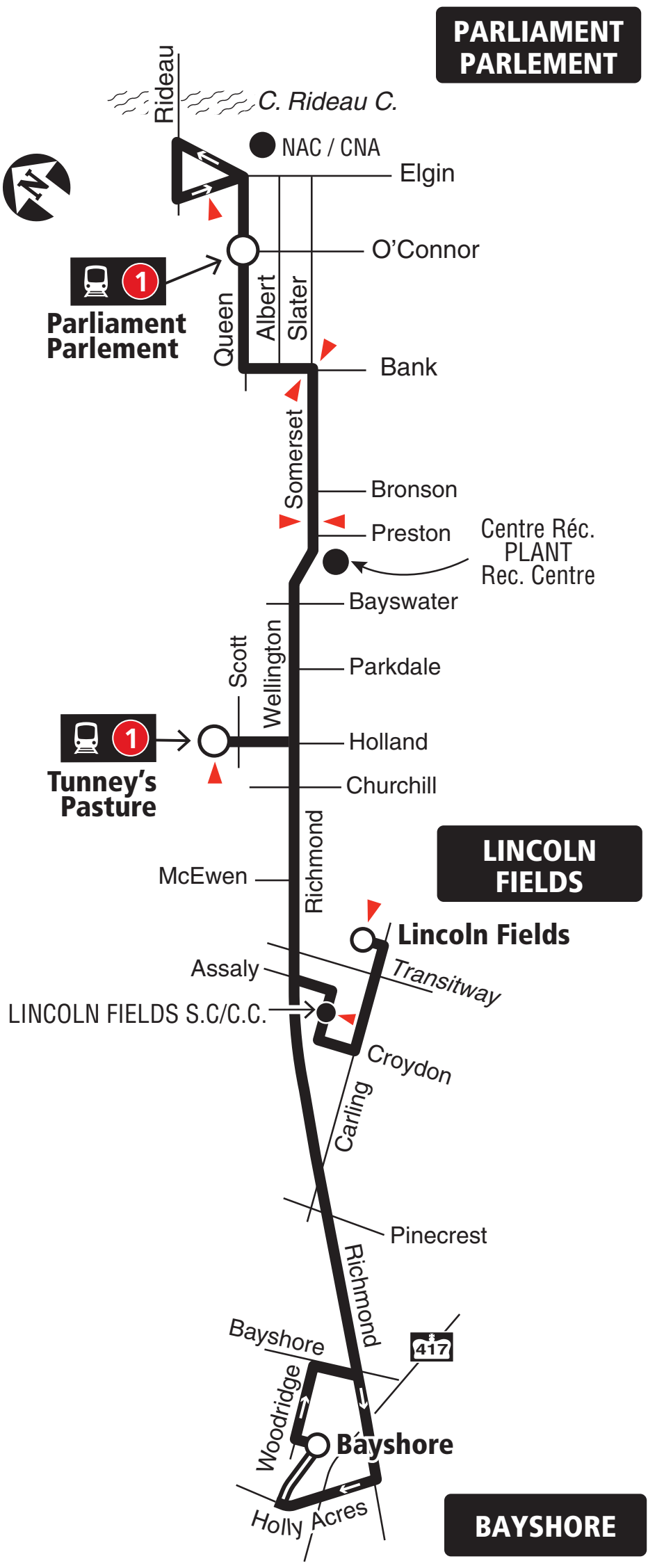
LINCOLN FIELDS BAYSHORE

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

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

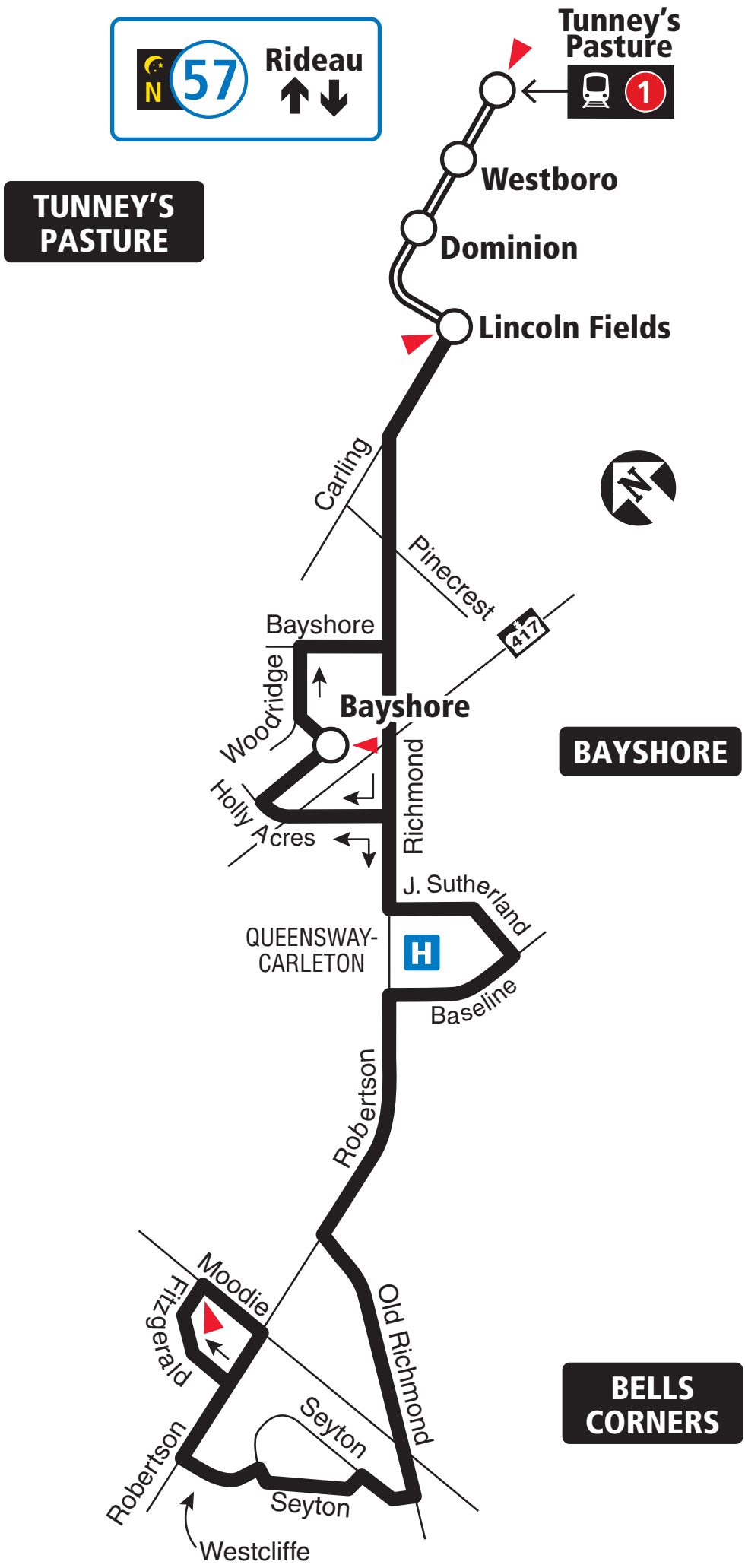
INFO 613-741-4390
octranspo.com

57 Rapide

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



Transitway & Station

Timepoint | Heures de passage

N 57 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

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**

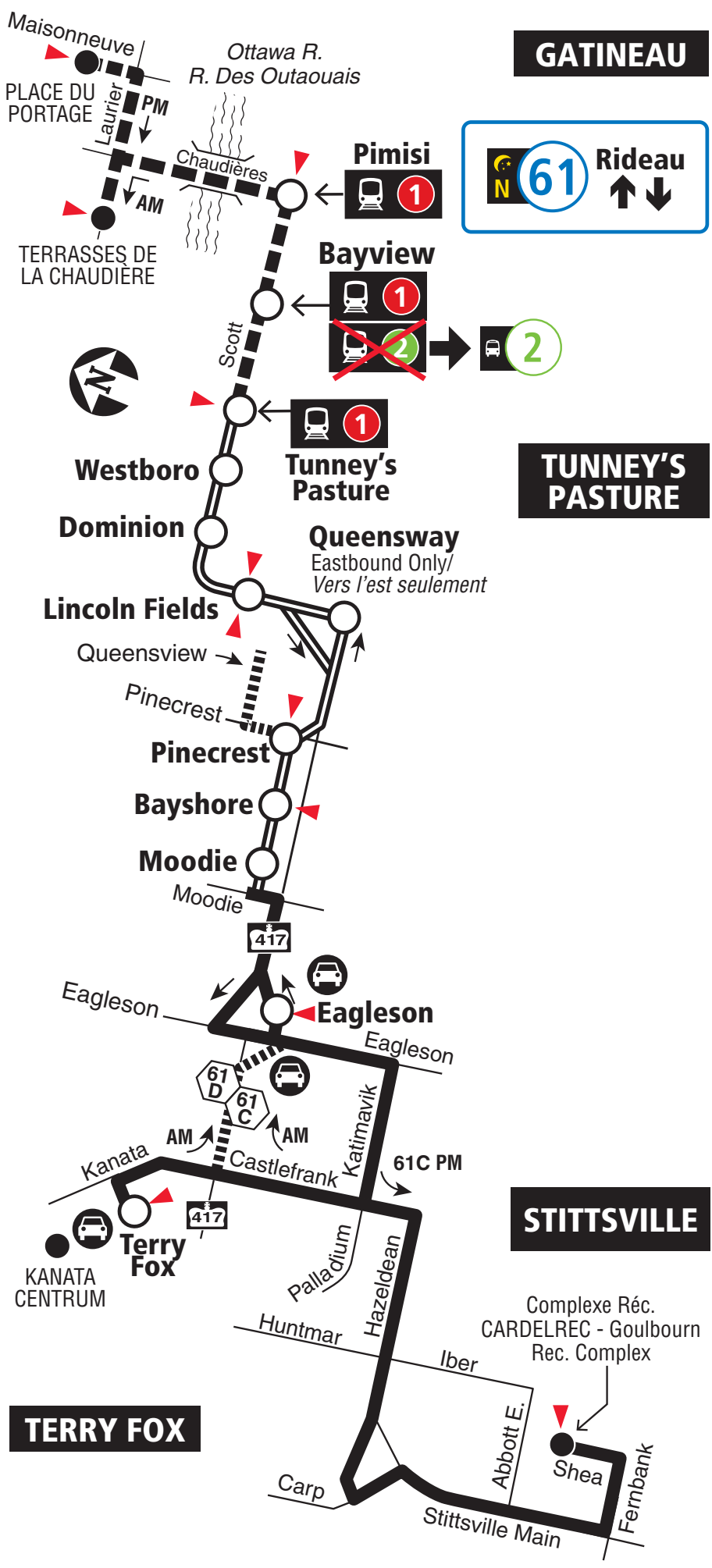
OC Transpo
INFO 613-741-4390
octranspo.com

61 Rapide

TERRY FOX STITTSVILLE
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



Transitway & Station
Peak trips / Trajets de pointe
Selected time periods / Périodes sélectionnées
Park & Ride / Parc-o-bus
Timepoint / Heures de passage

When O-Train Line 1 is not running overnight, Route 61 will be extended downtown to Rideau Station. / Lorsque la ligne 1 de l'O-Train ne circule pas la nuit, le circuit 61 sera prolongée au centre-ville jusqu'à la station Rideau.

2020.05

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

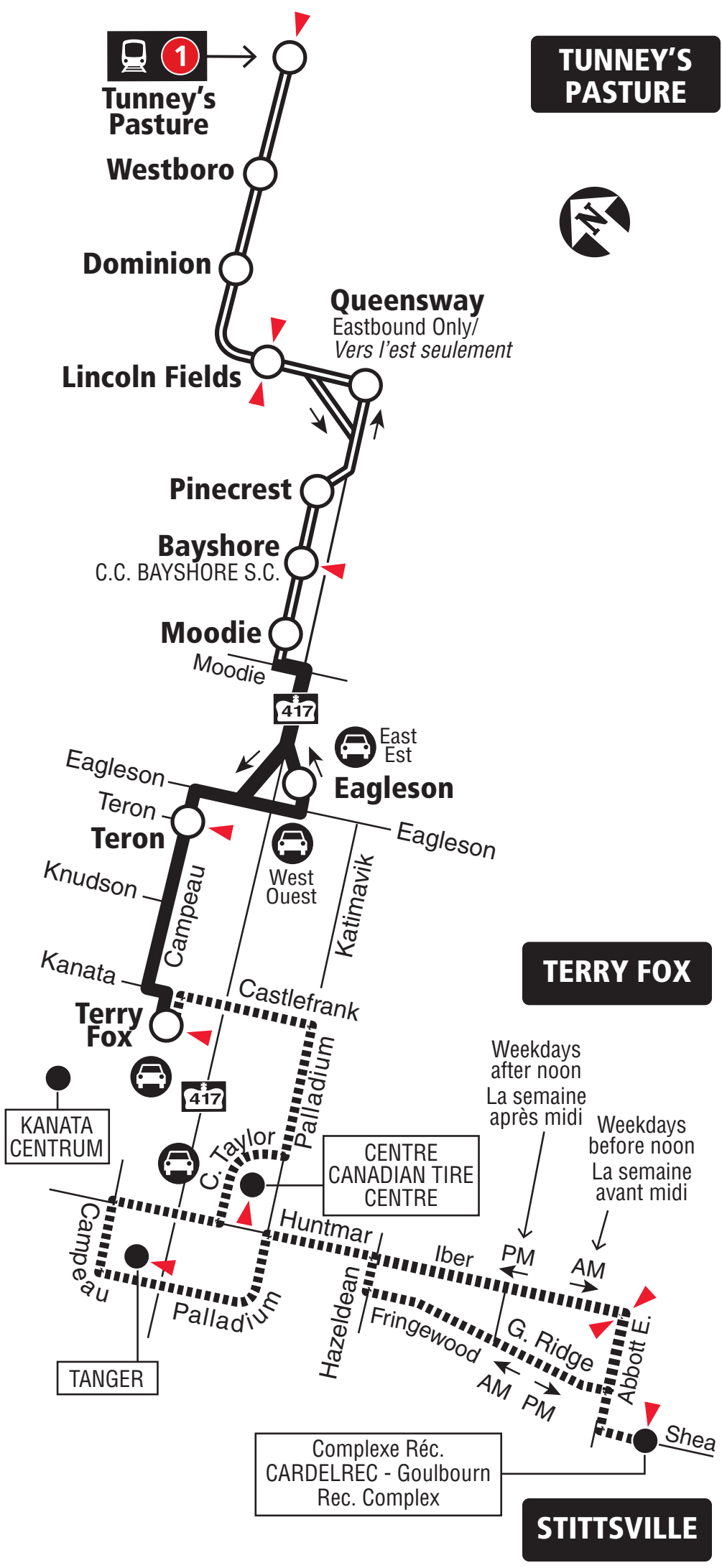
OC Transpo
INFO 613-741-4390
octranspo.com

62 Rapide

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

1

Starting July 14, 2019
À partir du 14 juillet 2019

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

OC Transpo

INFO 613-741-4390
octranspo.com

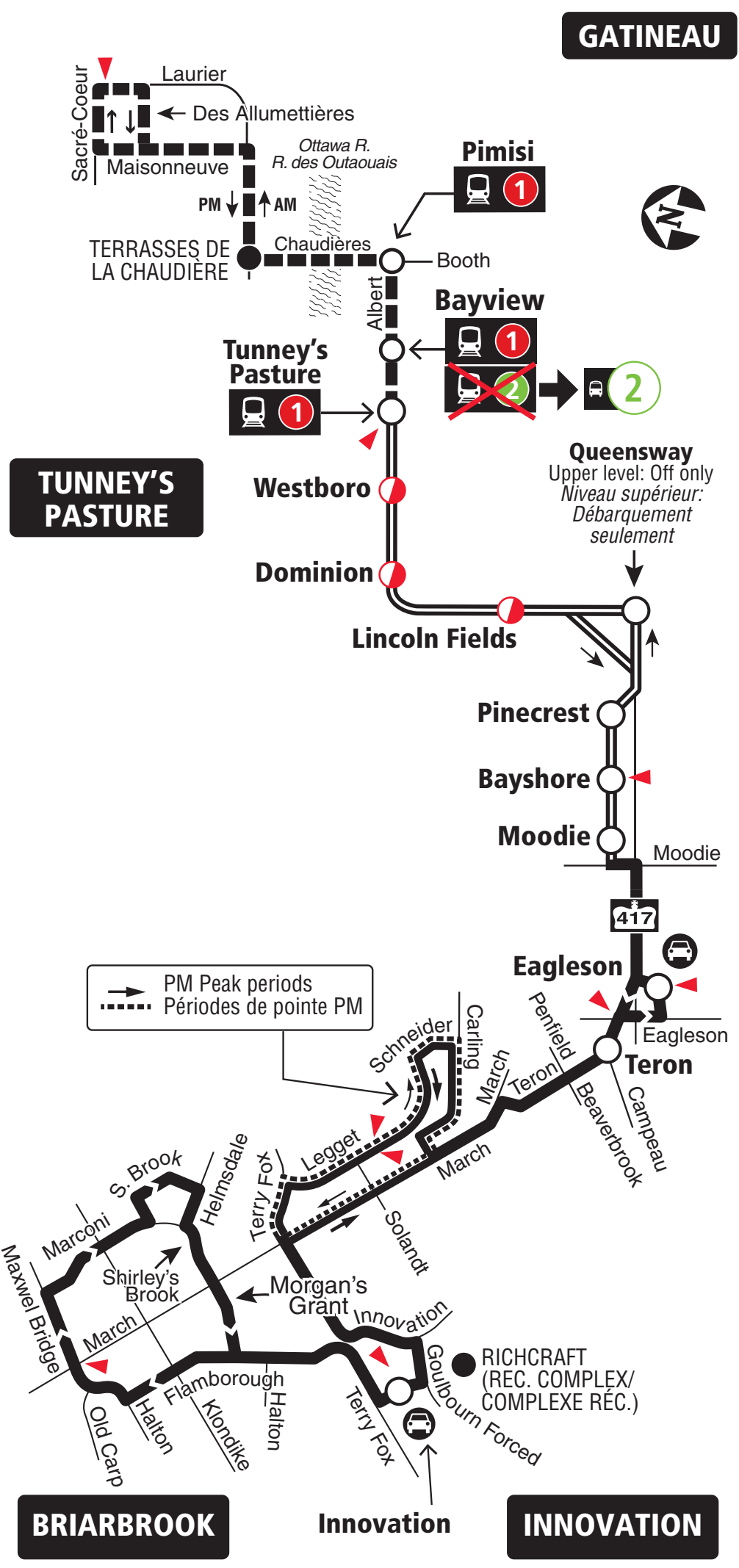
63 Rapide

INNOVATION BRIARBROOK
TUNNEY'S PASTURE GATINEAU

7 days a week / 7 jours par semaine

All day service

Service toute la journée



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

OC Transpo

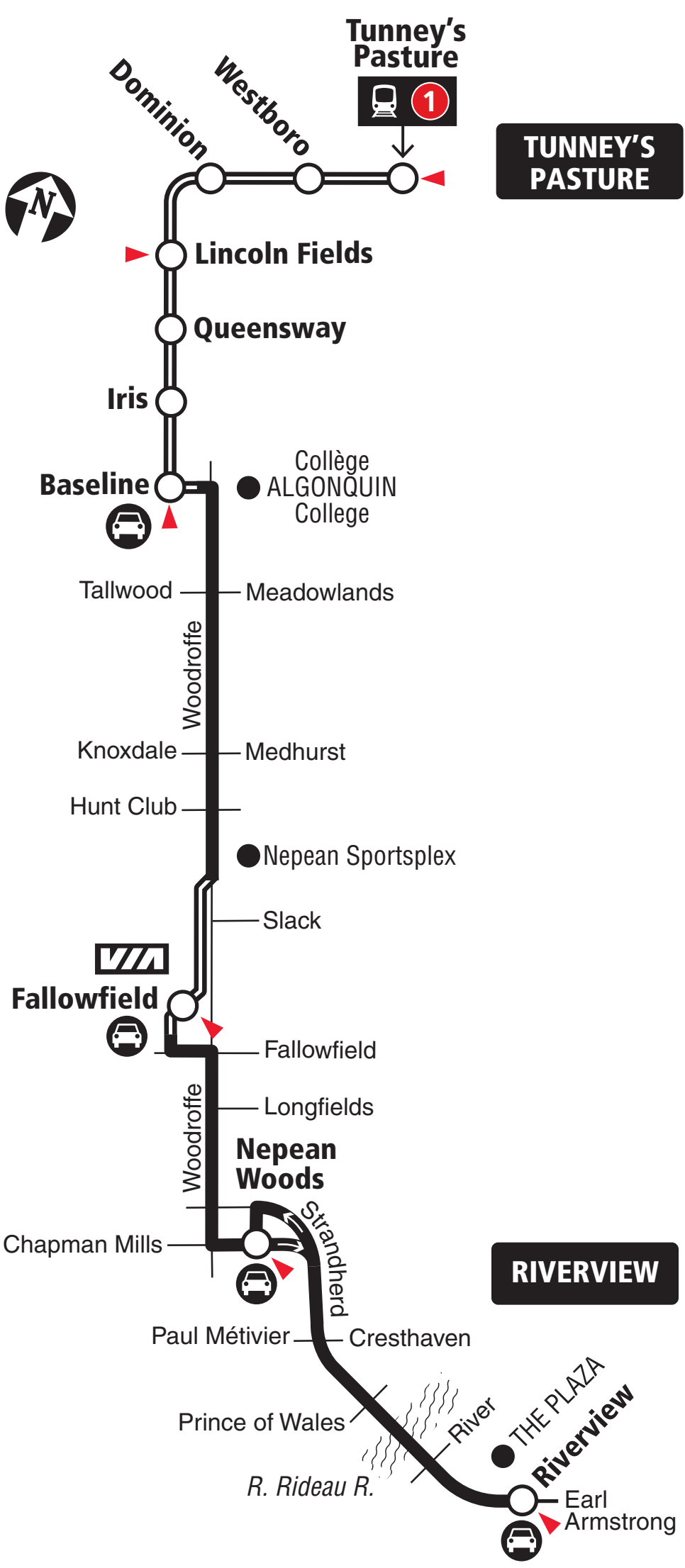
INFO 613-741-4390
octranspo.com

74 Rapide

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

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

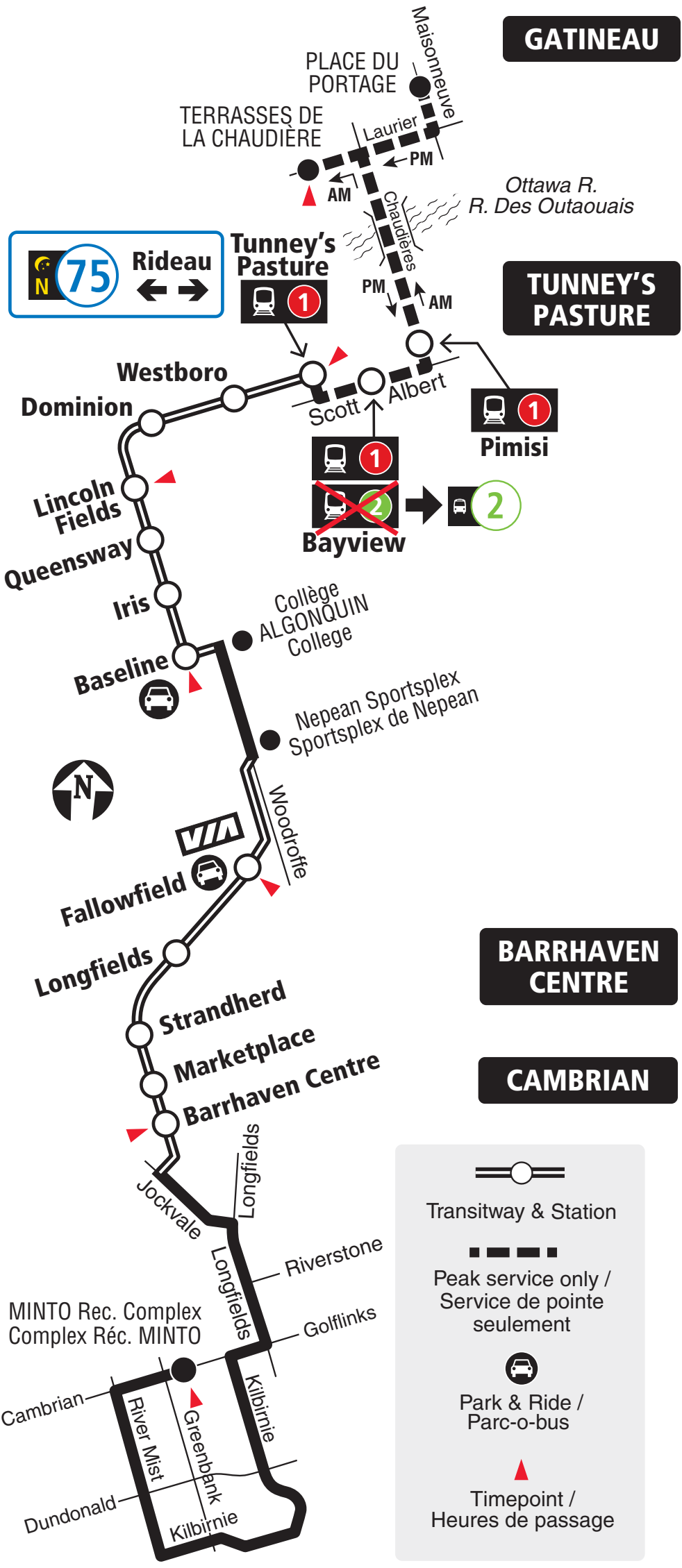
75 Rapide

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



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

OC Transpo

INFO 613-741-4390
octranspo.com

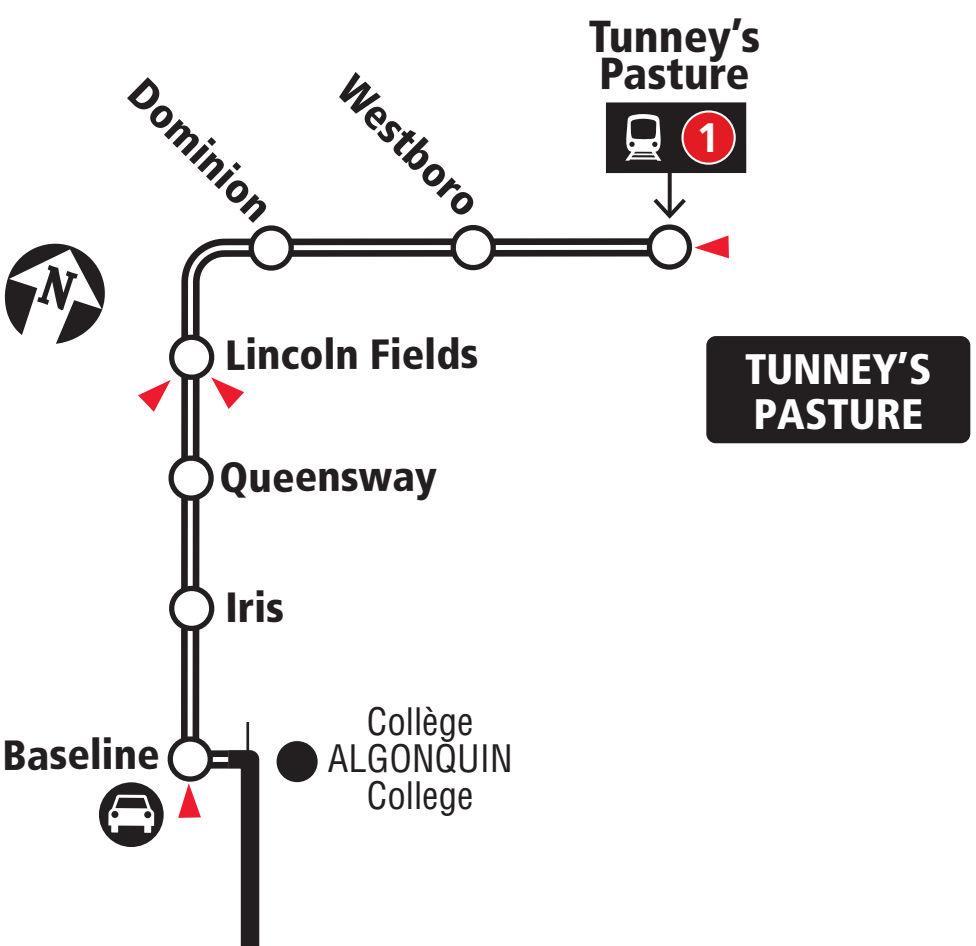
83

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**

OC Transpo
INFO 613-741-4390
octranspo.com

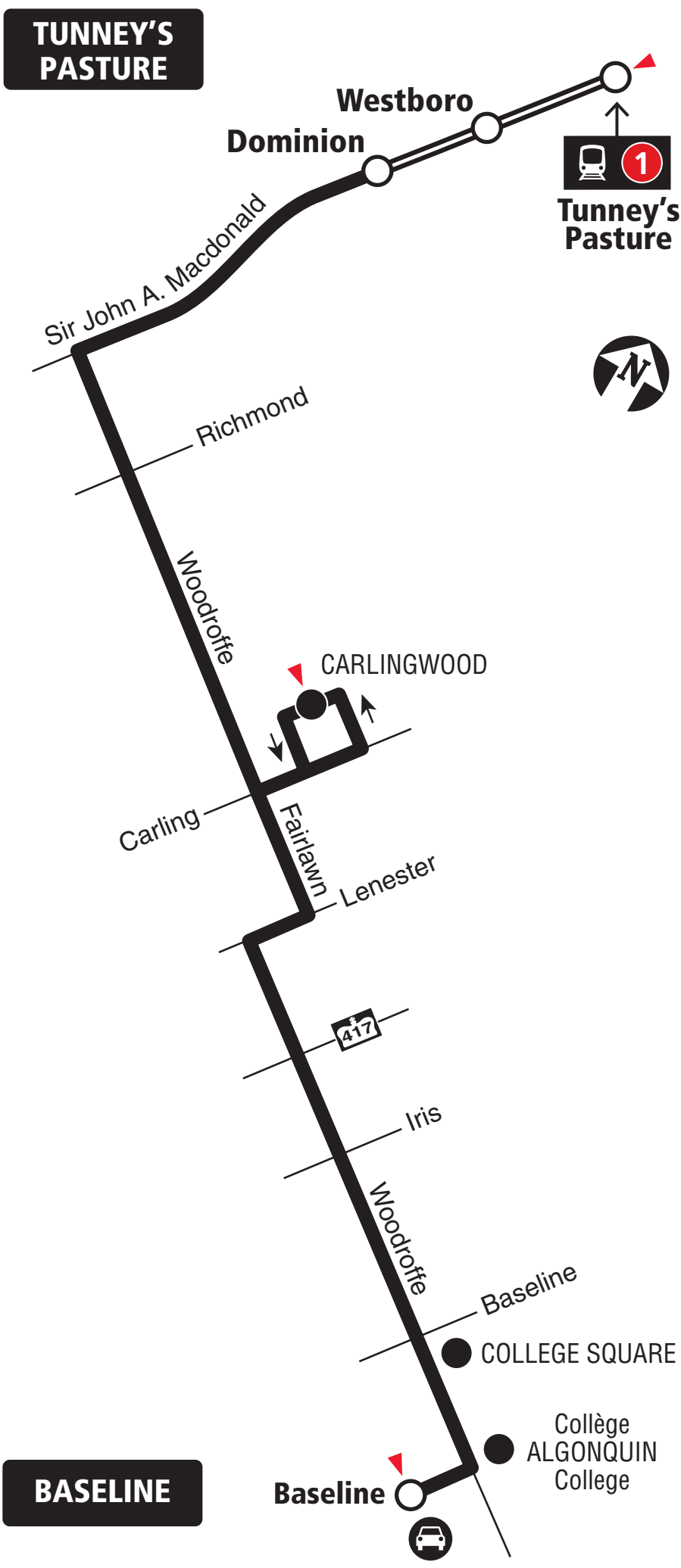
87

BASELINE
TUNNEY'S PASTURE

Fréquent

7 days a week / 7 jours par semaine

All day service
Service toute la journée



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**

OC Transpo

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

OC Transpo

INFO 613-741-4390
octranspo.com

L

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